



E2S 5/12

ROTARY VANE VACUUM PUMP

edwardsvacuum.com



Part Numbers
A67301912 / A67501912
A67322935 / A67522935
and their variants.

301337894_A

Original instructions

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Product warranty and limit of liability are dealt with in our standard terms and conditions of sale or negotiated contract under which this document is supplied.

You must use this product as described in this manual. Read the manual before you install, operate, or maintain the product. For manual enquiries, email manuals@edwardsvacuum.com.

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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:

	Warning/Caution Risk of injury and/or damage to equipment. An appropriate safety instruction must be followed or a potential hazard exists.
	Warning - Automatic start up Risk of injury. The equipment can be started remotely and without warning.
	Warning - Dangerous voltage Risk of injury. Identifies possible sources of hazardous electrical shock.
	Warning - Heavy object Risk of injury or damage to equipment. Identifies a possible hazard from a heavy object.
	Warning - Hot surfaces Risk of injury. Identifies a surface capable of inflicting burns through contact.
	Warning - Trip hazard Risk of injury. Identifies spilled liquids, trailing cords, pipes and other low-lying objects that may result in slipping, tripping or falling.
	Warning - Wear hearing protection Risk of injury. Wear appropriate hearing protection when performing the task.
	Symbol - Protective earth Identifies an electrical equipment earth (ground) terminal.
	Warning - Risk of explosion Risk of injury or damage to equipment. Identifies a situation that could result in an explosion.

2. Important safety information

2.1 Mechanical hazards

WARNING: BLOCKED EXHAUST

Risk of injury or damage to the equipment. If exhaust gases are collected or contained, the exhaust line may get pressurised. Make sure that the gas flow from the exhaust port is not blocked or restricted in any way.



The pressure in the oil box must not exceed 0.5 bar(g). An exhaust line too small in diameter or which is blocked can result in overpressure within the pump. The pump may get damaged or burst if the pump is opened. So the exhaust line must be checked from time to time to make sure that there are no obstructions.

Design the exhaust line so that the pressure does not reach above 1.2 bar absolute (0.2 bar relative). The pressure regulation device must be installed by the end-user. We recommend to treat the gases from the pump exhaust in function of their nature.

- Do not expose any part of the human body to the vacuum as this can cause injury.
- Do not step on the pump.
- Do not operate the pump without connecting the intake line or without fitting a protection cover.
- Do not open vacuum connections, oil filling plug and oil draining valve during operation of the pump as there is a risk of serious injury.
- The location at which the pump (including its accessories) is being operated must not have an angle more than 10 degrees from the vertical. Check that the inclination of the pump is less than 10 degrees from the vertical. Select the operating place so that all controls are easily accessible.
- Move the pump filled with oil only in its upright position. Spilt oil involves the risk of falling.
- Take adequate safety precautions before you open the intake or exhaust port.
- Do not connect the intake line of the pump to a device with over atmospheric pressure.
- Operating the pump without oil or operating with incorrect direction of rotation can damage the pump.
- Do not use discarded seals. Always assemble using new seals.
- Follow the instructions concerning environmental protection to discard used oil.
- Touch the inner sections of the pumps only while wearing clean gloves and use clean tools, do the necessary work in clean and dry rooms.
- Do not allow the ingestion of any objects for example-screws, welding beads, nuts, washers, pieces of wire, fittings etc. through the intake port of the pump. Objects falling into the pump can cause severe damage.
- To move the pump always use suitable transport means.

2.2 Electrical hazards



WARNING: HAZARDOUS VOLTAGES

Risk of electric shock. Do not touch parts at high electric voltages, there is the risk of suffering severe injuries by an electric shock. Covers marked with this symbol must only be opened by trained electricians after having reliably de-energised (Lockout/Tagout) the equipment. Observe the national regulations for example - EN 50110-1 for Europe.



WARNING: AUTOMATIC RESTART

Risk of injury or damage to the equipment. After a mains power failure, the pump will operate automatically again. This also applies in the case of an emergency shut-down. To prevent the pump from operating automatically, the pump must be integrated with a control arrangement such that it can only be switched on manually after the mains power has returned.

- Always operate the pump with a properly connected protective earth conductor and make sure that the motor terminal box is closed.
- Lay electric feed lines so that there is no risk of tripping.
- Lay the connecting lines so that the connecting lines do not get damaged. Protect the lines against humidity and contact with fluids. Avoid thermally stressing the lines by unfavourable laying. Provide strain relief for the connecting lines so that the plugs and the line connectors are not subjected to excessively high mechanical stresses.
- Take appropriate precautions to make sure that the pump does not start while laying electric feed lines.

2.3 Thermal hazards



WARNING: HOT SURFACE

Risk of burn. During normal operation, the pump surface temperature can reach above 70 °C (158 °F). There is a risk of getting burns. Note the symbols on the pump indicating the hazards. If the pump is hot, wear the required protective clothing. All the work must be done using protection gloves if the pump is still warm.

- Handle the pump only after venting and after it cools down.
- Do not remove the oil-fill or oil-drain plugs while the pump is operating. There is a risk of suffering burns. Always wear protective gloves and protective goggles for protection against the oil.
- Note the warning information on the housing surface. If these warning notices have been removed, covered or obstructed, include corresponding additional warning information.

2.4 Hazards caused by materials and substances



WARNING: HAZARDOUS SUBSTANCES

Risk of injury. When pumping toxic, chemical, radioactive and corrosive gases as well as pyrophoric substances, you must comply with the national and international safety regulations and guidelines. If such gases or substances are to be pumped, consult us first for the suitability of the pumps for special applications.



WARNING: CONTAMINATION HAZARD

Risk of toxic exposure. Contaminated parts can be detrimental to health and the environment. Before beginning with any work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

- Liquid and solid particles or dust must not enter the pump. Install the adequate filters, separators and/or condensers. In case of doubt consult us.
- The pump must be packaged in such a way that it will not be damaged during shipping so that no harmful substances can escape from the package.
- The vacuum and exhaust lines must be leak tight. Hazardous process gases may escape or the pumped gases can react with air or atmospheric humidity. After installation of the pump and after servicing work on the vacuum system, leak detection is necessary.
When pumping hazardous gases we recommend to do leak detection regularly. Leaks in the pump cannot be ruled out under all circumstances. When pumping hazardous gases, the operator must make sure that leaks at the pump and in the vacuum system will not be a hazard.
- Since all application related hazards for vacuum systems cannot be described in detail in these operating instructions, we have a separate document (safety booklet) available in which the hazards and general safety concepts for design, operation and maintenance of vacuum systems are explained.
When planning to pump hazardous substances with this pump, read the related chapters in the safety booklet and these operating instructions first. You can download the safety booklet from our homepage.
- The pump is not suitable for oxygen pumping operation.
- Before commissioning the pump, make sure that the media which are to be pumped are compatible with each other to avoid hazardous situations. All relevant safety standards and regulations must be observed.
- If the pump has previously handled hazardous gases, implement the proper precautionary measures before opening the intake or exhaust connection. Before opening the pump, purge it for a longer period with an inert gas. If necessary, use gloves, a respirator and/or protective clothing and work under an exhaust hood. Firmly seal off the pump. When shipping the contaminated pump for servicing, also state the type of hazard. Refer to [Service](#) on page 51 for more details.
- When cleaning a system in which a pump has been integrated, all parts in contact with the medium need to be compatible with the cleaning agent to prevent a chemical reaction. Residues of the cleaning agent within the pump must be avoided.
- The pump is not suitable for operation in the explosion hazard areas.

2.5 Danger of ignition



WARNING: IGNITION HAZARD

Risk of injury or damage to the equipment. The pumps including the accessories are not suitable for pumping combustible and explosive gases or vapours.

2.6 Hazards caused by noise



CAUTION: NOISE HAZARD

Risk of injury. The noise level produced by the pump is less than or equal to 60 dB(A). Suitable hearing protection measures must be used while working.

2.7 Risk of damage to the pump

- Before starting up for the first time, the motor circuit must be equipped with a suitable protective motor switch. Take note of the information in these operating instructions and on the electric motor (wiring diagram).
- Do not allow the ingestion of small objects (screws, nuts, washers, pieces of wire, etc.) through the inlet port. So always use the inlet screen which is supplied as standard.
- Do not use the pump for applications that produce abrasive or adhesive powders or condensable vapours that can leave adhesive or high viscosity deposits. When planning to pump vapours other than water vapour, contact our sales or service department for advice.
- This pump is suitable for pumping water vapour within the specified water vapour tolerance limits.
- Avoid vapours that can condense into liquids when being compressed inside the pump, if these substances exceed the vapour tolerance of the pump.
- Before pumping vapours the pump must attain its operating temperature. It takes approximately 30 minutes for the pump to attain its operating temperature after the pump is started. During this warming up phase, the pump must be separated from the process, for example, by a blocking valve in the intake line.
- In the case of wet processes, we recommend the installation of liquid separators upstream and downstream of the pump as well as the use of the gas ballast.
- The exhaust line must be laid so that it slopes down and away from the pump to prevent condensate from backstreaming into the pump.
- The entry of particles and fluids must be avoided under all circumstances.
- Reactive or aggressive substances in the pump chamber may impair the operating oil or modify it. In addition, such substances may be incompatible with the materials of the pump (viton, grey cast iron, aluminium, steel, resins, glass etc.).
- Corrosion, deposits and cracking of oil within the pump are not allowed.
- Normal amounts of humidity within the range of the pump's water vapour tolerance will not significantly affect pump performance when the gas ballast is active.

- When operating the pump at gas throughput, it is recommended to connect an exhaust filter or use a suitable exhaust line. The exhaust line must slope down and away from the pump.
- In the case of custom pumps, note the information provided in the supplementary sheets.

3. Description



WARNING: EXPLOSION HAZARD

Risk of injury and damage to the equipment. The pump must not be installed and operated within explosion hazard areas.

The E2S pumps are two-stage, oil sealed, sliding-vane vacuum pumps.

The pump is designed for pumping inert gases in the range of medium vacuum, between atmospheric pressure and the ultimate pressure of the pump. When removing condensable vapours, a gas ballast knob must be opened.

E2S pumps are capable of pumping gases, vapours and evacuating vessels or vacuum systems down into the medium vacuum range. The standard version of the pump is not suitable for pumping oxygen exceeding 25% and for pumping hazardous substances or aggressive or corrosive gases.

Through an intermediate flange, a four-pole three-phase motor is mounted to the coupling housing. The pump and motor shafts are directly connected by a flexible coupling. The oil-level glass, drain valve and nameplate are arranged on the same side. All vacuum connections are default on the top of the pump.

3.1 Principle of operation

The pump is an oil-sealed rotary vane pump. The anti-suck back valve, gas ballast knob and oil return circuit are integrated functional elements. The pump is driven by a directly flanged motor.

The rotor, mounted eccentrically in the pump housing, has two radially sliding vanes which divide the pump chamber into several compartments. The volume of each compartment changes periodically with the rotation of the rotor.

As a result, gas is sucked in at the intake port. The gas passes through a dirt trap sieve and open the anti-suck back valve, then enters the pump chamber. In the pump chamber, the gas is passed on and compressed after the inlet aperture is closed by the vane.

The oil injected into the pump chamber is used for sealing and lubricating. The slap noise of the oil in the pump which usually occurs when attaining the ultimate pressure is prevented by admitting a very small amount of air into the pump chamber.

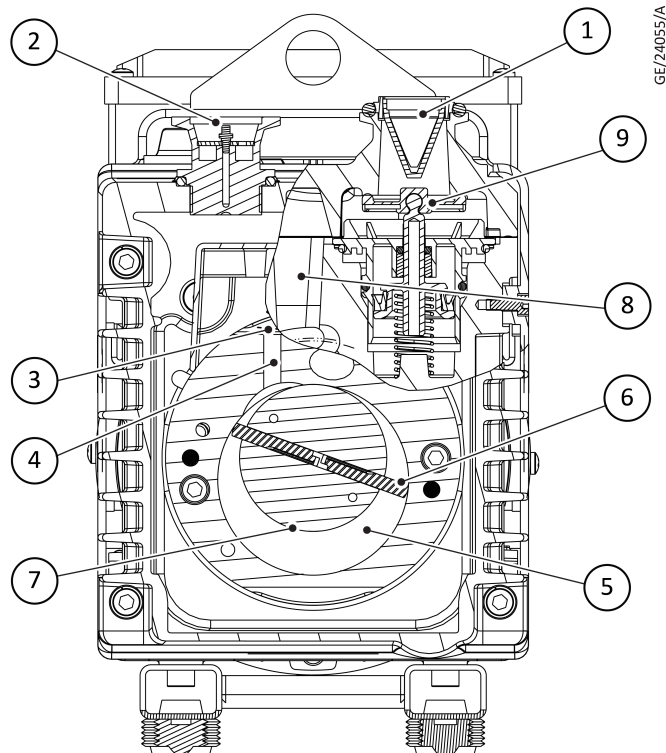
The compressed gas in the pump chamber is ejected through the exhaust valve. The oil entrained in the gas is coarsely separated by the exhaust cover. There the oil is also freed of mechanical impurities. The gas leaves the pump through the exhaust port.

During compression, a controlled amount of air – the so-called gas ballast – can be allowed to enter the pump chamber by opening the gas ballast knob. The gas ballast stops the condensation of vapours in the pump chamber up to the limit of the water vapour tolerance as specified in the technical data for the pump.

The gas ballast knob is opened (position I and position II) and closed (position 0) by turning the gas ballast knob on the front.

A solenoid-operated gas ballast 24 V d.c. is available as an option to give automatic or remote control of gas ballast (refer to [Accessories](#) on page 58).

Figure 1 Section drawing of E2S



- | | |
|-------------------------|--------------------|
| 1. Intake port | 2. Exhaust port |
| 3. Exhaust valve | 4. Exhaust channel |
| 5. Pump chamber | 6. Vanes |
| 7. Rotor | 8. Intake channel |
| 9. Anti suck back valve | |

3.2 Lubricants and oils

The pumps are ready for operation and filled with mineral oil.

Recommended oil: Ultragrade Performance 19.

For specific applications and pumping gas mixture, consult your local representative to select the right lubricant.

3.3 Supplied equipment

The equipment supplied with the pump includes:

- Pump with motor
- 1 liter bottle of Ultragrade Performance 19
- 1 centering ring DN 25 KF with dirt trap
- 2 protective covers
- Operating instructions or QR sheet to download it.

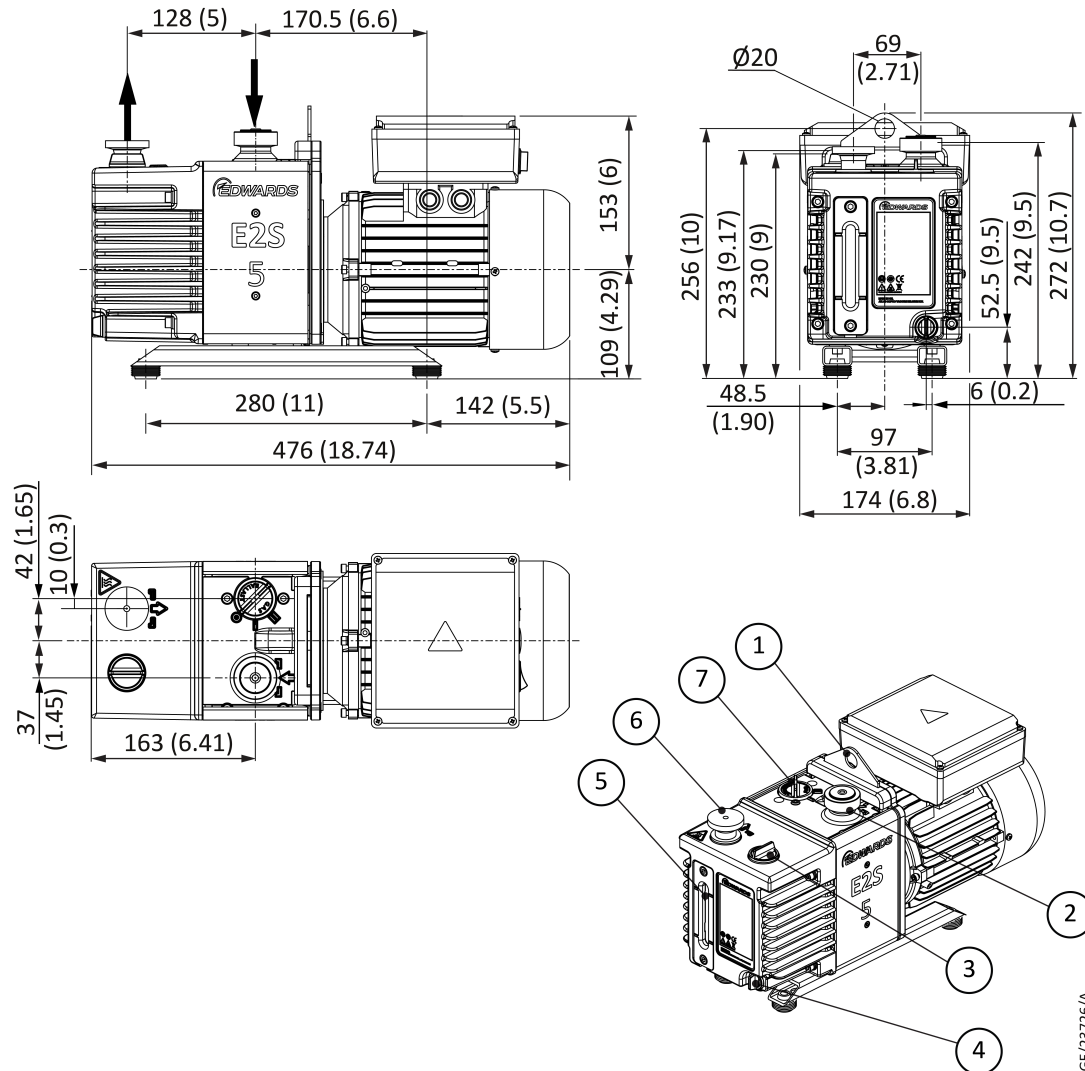
301337894_A - Description

For protection during shipment, the connection ports are each blanked off by the protection cover. The pump delivered from the factory with an individual bottled oil in package.

4. Technical data

4.1 Dimension drawing

Figure 2 Dimensional drawing - E2S 12 (1 phase)

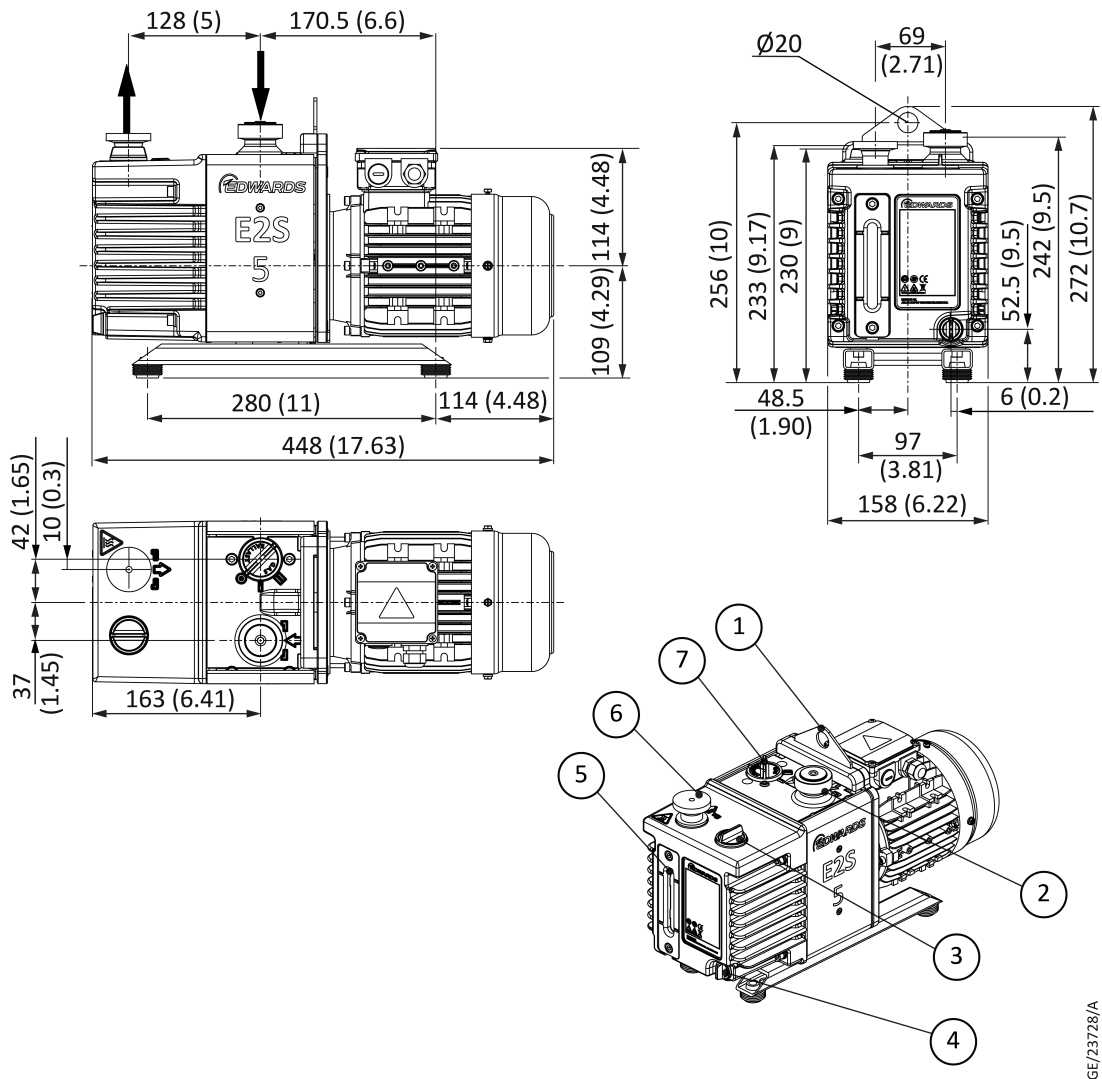


1. Lifting plate
3. Oil filling
5. Oil sight glass
7. Gas ballast

2. Inlet port
4. Oil drain
6. Exhaust port

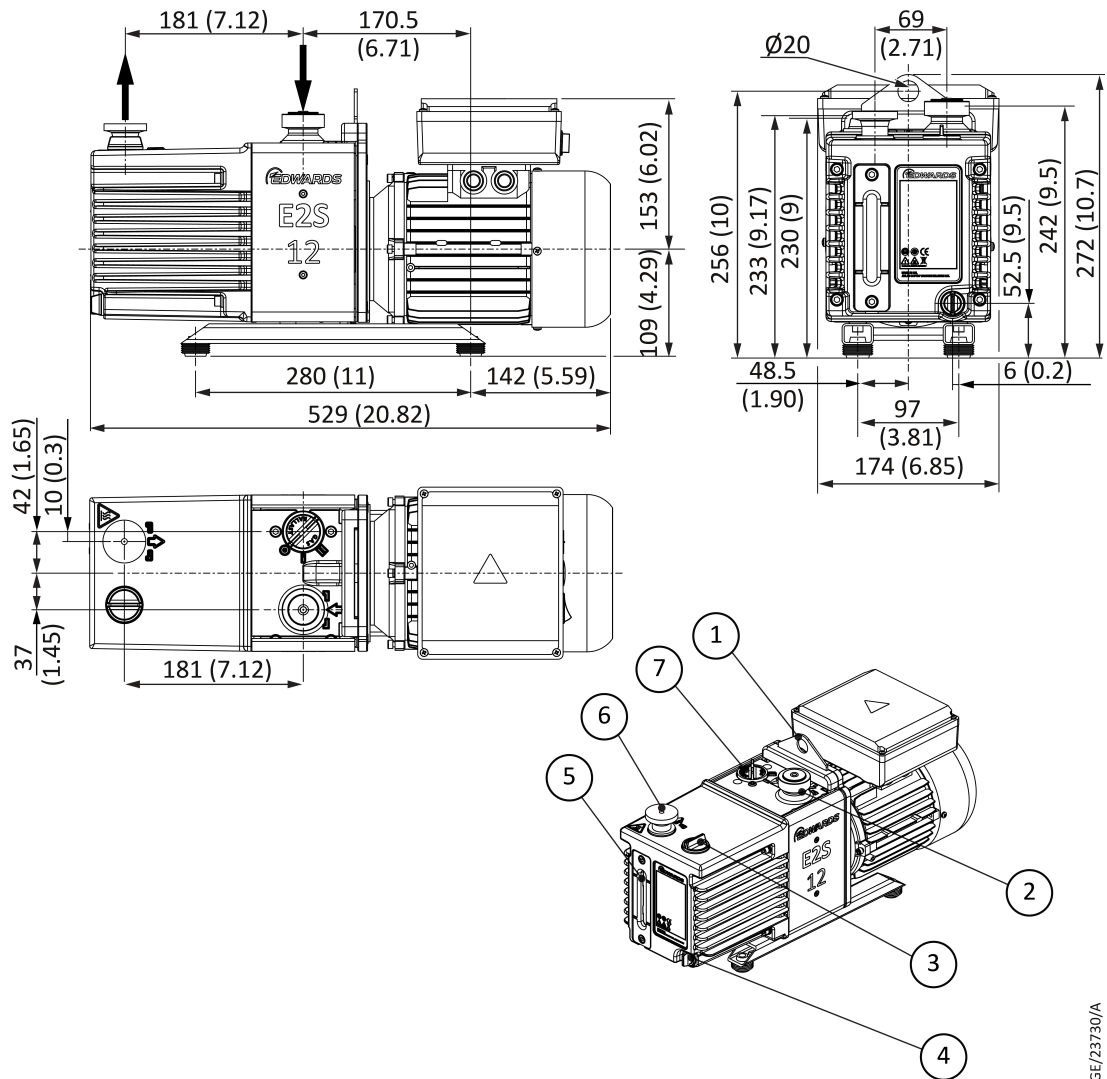
GE/23726/A

Figure 3 Dimensional drawing - E2S 12 (3 phase)



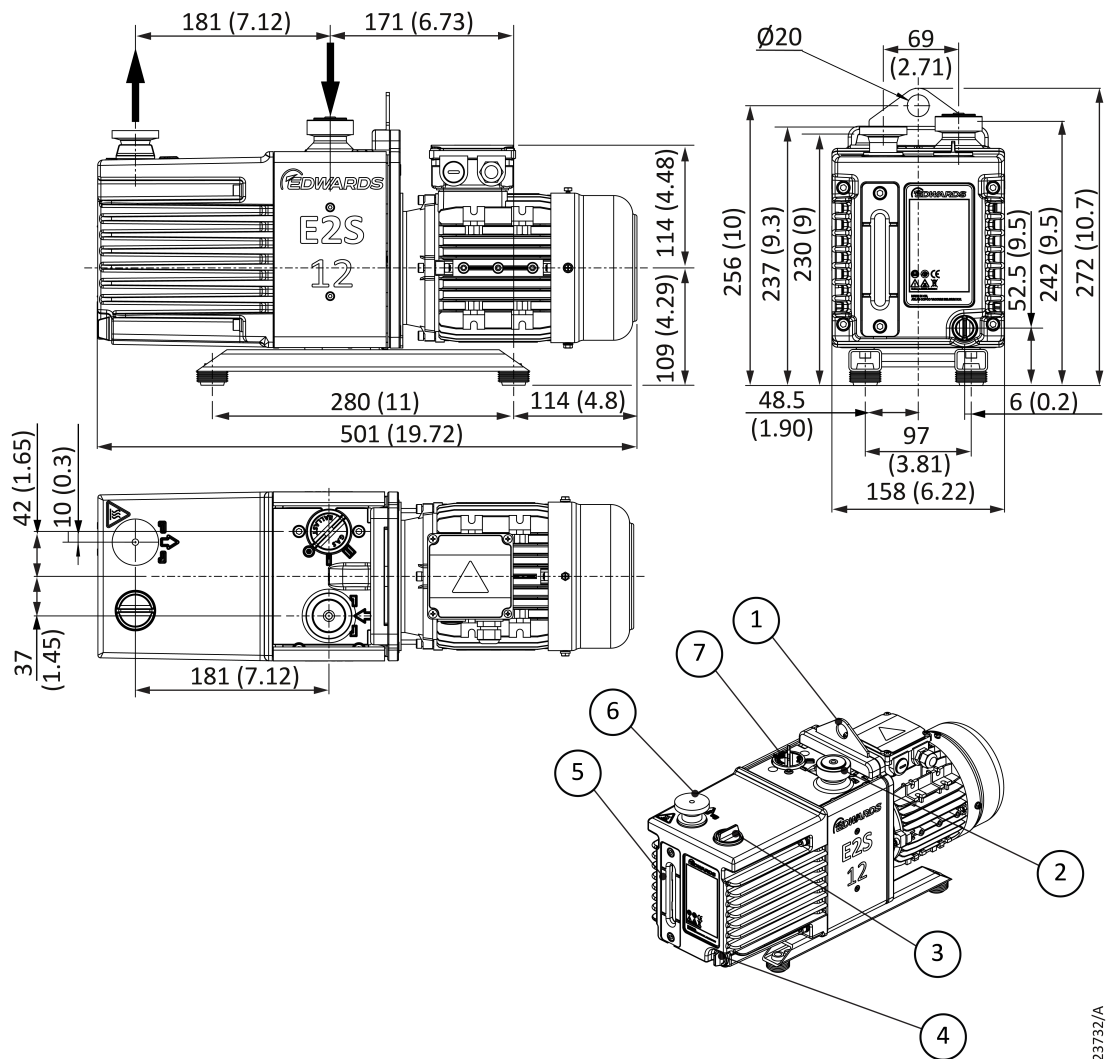
GE/23728/A

Figure 4 Dimensional drawing - E2S 5 (1 phase)



- | | |
|--------------------|-----------------|
| 1. Lifting plate | 2. Inlet port |
| 3. Oil filling | 4. Oil drain |
| 5. Oil sight glass | 6. Exhaust port |
| 7. Gas ballast | |

GE/23730/A

Figure 5 Dimensional drawing - E2S 5 (3 phase)

- | | |
|--------------------|-----------------|
| 1. Lifting plate | 2. Inlet port |
| 3. Oil filling | 4. Oil drain |
| 5. Oil sight glass | 6. Exhaust port |
| 7. Gas ballast | |

Table 1 Technical data

Parameter	Unit	E2S 5	E2S 12
Effective pumping speed	m ³ /h	5.1	12
Nominal pumping speed	m ³ /h	5.8	14.2
Ultimate total pressure w/o GB	mbar	2 x 10 ⁻³	
Ultimate w/GB1 and GB2	mbar	3 x 10 ⁻² / 1 x 10 ⁻¹	3 x 10 ⁻² / 6 x 10 ⁻²
Water vapour tolerance/ rate inlet pressure GB1	mbar	11	5
Water vapour tolerance/ rate inlet pressure GB2	mbar	32	28

GE/23732/A

Parameter	Unit	E2S 5	E2S 12
Water vapour pumping rate GB1	kg/h	0.04	0.04
Water vapour pumping rate GB2	kg/h	0.12	0.25
Maximum noise level without GB*	dB (A)	50	
Maximum permitted inlet pressure	bar.G	0.05	
Maximum permitted outlet pressure	bar.G	0.2	
1 PHASE motor 50 Hz	kW	0.37	
3 PHASE motor 50 Hz	kW	0.37	
Weight w/o	kg	1 PH: 21	1 PH: 24.5
		3 PH: 21.5	3 PH: 25
Length x width x height	mm	1 PH: 476 x 174 x 272	1 PH: 529 x 174 x 272
		3 PH: 448 x 158 x 272	3 PH: 501 x 158 x 272
Oil volume	L	0.45 ~ 0.7	0.75 ~ 1
Feet dimension (length x width)	mm	280 x 97	
Inlet flange		KF 25	
Outlet flange		KF 25	
Air inlet and air outlet position - leybold		Air inlet on coupling housing and air outlet on oil casing	
Internal filter for particle inside the pump oil		-	
Oil drain valve		-	

* Measured at ultimate vacuum 1 meter from the end of the pump to ISO 11201, 50 Hz operation.

Table 2 Unit conversion

Conversion factors	Different pressure units			Different pumping speed units			
	mbar (millibar)	torr	inches Hg vacuum		m ³ .h ⁻¹ (m ³ /h)	ls ⁻¹ (l/s)	cfm (cubic feet per minute)
	1013	760	0	m ³ .h ⁻¹ = m ³ /h	1	0.278	0.589
1 lb = 0.453 kg	400	300	18.12	ls ⁻¹ = l/s	3.60	1	2.12
1 qt = 0.946 l	133	100	25.98	cfm = cubic feet per minute	1.699	0.472	1
1 hp = 0.735 kW	4	3	29.80				
1 rpm = 1 min ⁻¹	1	0.75	29.89				
1 inch = 25.4 mm	0.1	0.075	29.92				
	1 atm (atmosphere) = 1013 bar			Example: 1 m ³ h ⁻¹ = 0.589 cfm Note: The nominal pumping speed of a pump at 60 Hz is 20% higher than at 50 Hz.			
	1 Pa (pascal) = =0.01 mbar = 10 ⁻² mbar						
	1 bar = 1000 mbar						
	1 torr = 1.33 mbar						

Table 3 Electrical data

Pump	Phase	Nominal supply (V)	Frequency (Hz)	Power (kW)	Product number
E2S 5/12, UG19	1	220/230	50	0.37	A67301912 A67501912
	3	220/380	50	0.37	A67322935
	3	230/400	50	0.37	A67522935

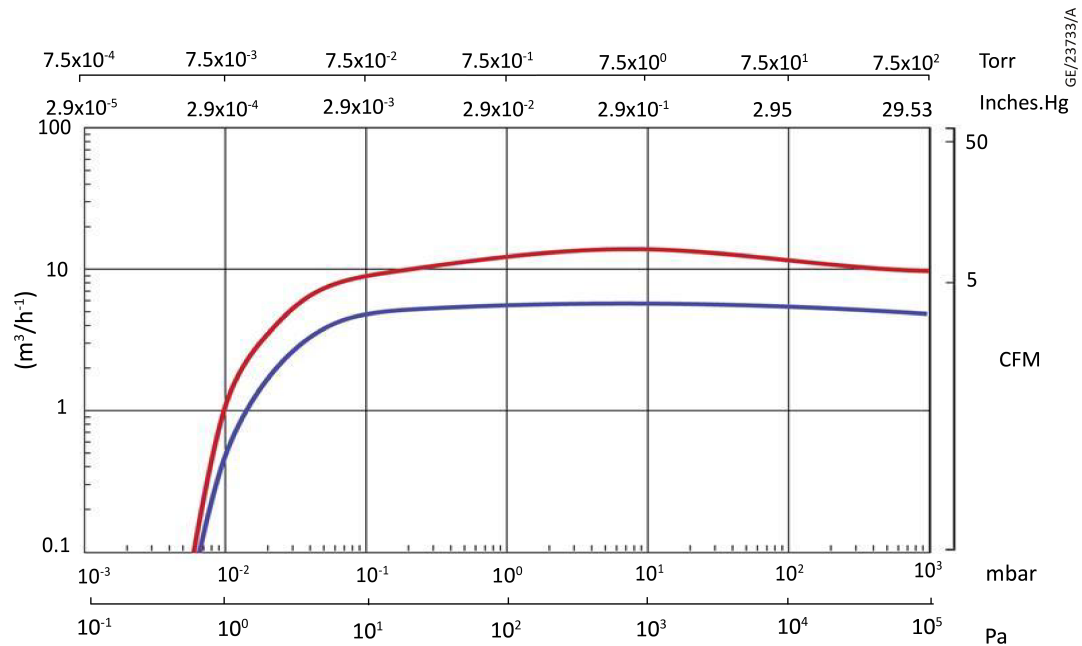
Table 4 Motor requirement

Pump	Motor mounting #	Number of poles	Power	Frequency	Shaft length	Shaft diameter
			Kw	Hz	mm	mm
E2S 5/12	B14	4	0.37	50	15	Ø14

As per standard IEC-72

For additional information about motor requirement please contact us.

4.2 Performance curves

Figure 6 Pumping speed curve of E2S 5/12

4.3 Material of construction

Table 5 Material of construction

Component	Material
Cylinder/End plate	Iron bar
Rotor	Cast iron
Coupling housing	Aluminium silicon copper alloy casting
Mounting plate	Steel
Exhaust cover	Nylon
Oil casing	Aluminium silicon copper alloy casting
Gasket	Polyester
O-ring, piston O-ring	Fluoroelastomer (FKM)
Vane	Resistant epoxy resin and glass fabric
Lip seals	Fluoroelastomer (FKM)
Oil tubes	Stainless steel
Gas ballast knob	Plastic

4.4 Ordering information

Table 6 Ordering information

Product	Part number
E2S5 220-230V 1PH 50Hz	A67301912
E2S5 220-230/380-400V 3PH 50 Hz	A67322935
E2S12 220-230V 1PH 50Hz	A67501912
E2S12 220-230/380-400V 3PH 50Hz	A67522935

5. Transportation

5.1 Transport and packaging

The pump passes a rigorous operating test in our factory and is packaged to avoid transport damages.

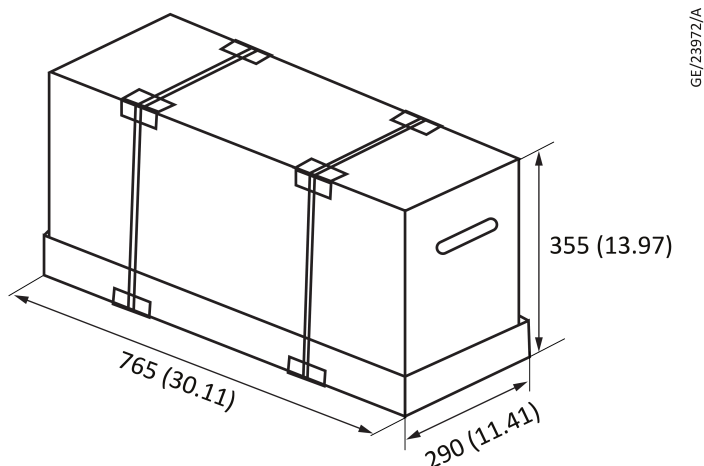
Check the packaging on delivery for transport damages. The outer packaging is made of a wooden pallet and cardboard or wood top.

If the pump is damaged, notify the supplier and the carrier in writing within three days; state the item number of the pump together with the order number and the supplier's invoice number. Retain all packing materials for inspection. Do not use the pump if it is damaged.

Use a forklift to transport the pallet.

If possible transport the pump in its original packaging, if not available exercise due care.

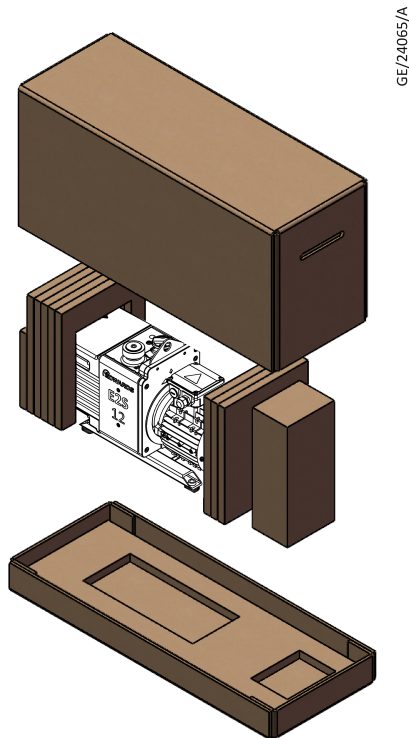
For E2S 5 and E2S 12



5.1.1 Unpack

Wear gloves and protection glasses before you unpack the pump.

1. Cut the 2 plastic straps carefully.
2. Remove the cardboard top.

Figure 7 Unpack for E2S 5 and E2S 12

5.1.2 Remove the pump

The pump is sitting freely on the baseboard and please remove all inner reinforced cardboard and take out the separate box where there is one bottle of oil.

The pump is then ready to be moved and/or placed on the equipment.

Recycle or dispose of the packing materials according to environmental laws.

5.1.3 Lift the pump

WARNING: SUSPENDED LOAD



Risk of physical injury. Due to the pump weight, use only a suitable lifting device to lift the pump at the lifting plate (CE regulations). Lifting facilities are the only recommended way of handling the pump. Do not lift at the motor, cables connection boxes, flanges etc. Do not drag the pump from these points.

5.2 Mounting orientation

WARNING: TRIP HAZARD



Risk of injury. Hazard of slipping, tripping or falling due to oil leakage from the pump. Check the pump for the presence of any oil leaks. There is a risk of falling due to oil spills. Take appropriate safety measures.

- Make sure that all safety regulations are observed.
- Use suitable lifting equipment according to the pump weight.

- Check the nameplate. Do not use pump elements other than the lifting lugs as handles.
- Only use the lifting lugs which are provided on the pump to lift the pump with the specified lifting devices.
- Refer to the [Installation drawing](#) on page 32 for the space required to install the pump.
- A pump that has been filled with oil must only be moved in the upright position (horizontally). Otherwise, the oil may escape.
- The angle of the slope must not be more than 15 degrees.
- Avoid any other orientations while you move the pump.

6. Installation



WARNING: HAZARDOUS VOLTAGE

Risk of shock. Before you install the pump make sure that the pump is reliably disconnected from the electrical power supply and prevent the pump from operating inadvertently.



CAUTION: PUMP DAMAGE

Risk of damage to the equipment. Do not stand on the pump and place objects on the pump as these can cause deformation of the pump.

 Note:

Before conducting any kind of assembly work the personnel must be informed about potential hazards. Observe the safety information given in [Important safety information](#) on page 10.

Observe the following instructions step by step for the safe start-up.

6.1 Conforming utilisation

The pumps can pump gases and vapours and evacuate vessels or vacuum systems in the fine vacuum range.

The pumps are suitable for pumping water vapour within the specified water vapour tolerance limits. Avoid vapours that can condense into liquids when being compressed inside the pump, if these substances exceed the vapour tolerance of the pump. In the case of wet processes, we recommend the installation of liquid separators upstream and downstream of the pump.

6.2 Non-conforming utilisation



WARNING: HAZARDOUS SUBSTANCES

Risk of injury or damage to the equipment. The pump is not suited for pumping of:

- radioactive and toxic substances
- pyrophoric substances
- corrosive gases
- oxygen (or other highly reactive gases) at concentrations exceeding that of the atmosphere (> 21% for oxygen).

CAUTION: MAINTENANCE SAFETY

Risk of damage to the pump. The standard pump is not suited for pumping hazardous gases or vapours. When cleaning a system in which the pump has been integrated, all parts in contact with the medium must be compatible with the cleaning agent so as to prevent a chemical reaction. Residues of the cleaning agent within the pump must be avoided.

 Note:

The pumps are not suited for pumping liquids or media which carry large quantities of dust. Corresponding protection devices need to be provided.

6.3 Placement

CAUTION: TOPPLING HAZARD

Risk of toppling. The maximum tilt allowed for the pump is 10 degrees from the vertical. To firmly install the pump in place, insert bolts through bore holes (Ø 8 mm) in the rubber feet.

 Note:

The rubber feet act as vibration absorbers. They must therefore not be compressed by screws.

Set the pump on a flat, horizontal surface. Rubber feet under the coupling housing ensure that the pump cannot slip.

The installation site chosen must have ready accessibility to connections and controls of the pump.

Make sure that there is adequate cooling of the pump, leave sufficient space at the air intake and the exhaust points for cooling and give access for maintenance. Make sure to keep the air intake clear for the motor.

Make sure to keep the fans, hoods and air intake of the motor clean. The pump must be kept clean (no dust deposit). Install the pump such that the oil level sight-glass can be easily read and will not be broken.

The site chosen must allow adequate air circulation to cool the pump (keep front and rear unobstructed).

Note the ambient conditions during operation. The ambient temperature must not exceed +40 °C (104 °F) and not drop below +10 °C (50 °F) (refer to [Table: Technical data](#) on page 21).

For installation sites 1000 m above mean sea level or relative atmospheric humidity of over 90%, you must discuss this with technical sales.

The maximum amount of heat given off approximately corresponds to the rated motor power.

Install the pump such that only minimal quantities of dust can deposit on the surfaces. In those cases where dust deposits form, measures need to be introduced which make sure that these are removed regularly.

The maximum gas inlet temperature must not exceed 80 °C.

The maximum pressure at the inlet must not exceed atmospheric pressure (approximately 1013 mbar). Do not apply overpressure to the pump's inlet. The maximum exhaust pressure must not exceed 0.2 bar(g).

6.4 Connection to the system

WARNING: EXHAUST EMISSION HAZARD



Risk of injury. Safely lead the exhaust gases away. Exhaust gases, depending on the type of application, may present a health hazard and/or may be detrimental to the environment.

The exhaust gases from the vacuum pump must be safely led away and subjected to post-treatment as required. To reduce the emission of oil vapours we recommend the installation of an additional exhaust filter (refer to [Accessories](#) on page 58). Depending on the type of application or the kind of pumped media, the corresponding regulations and information sheets must be observed.

CAUTION: EXHAUST PIPELINE BLOCKAGE



Risk of damage to the equipment. Note the specified cross sections for the connection lines.

If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurised. The pressure in the oil box must not exceed 0.5 bar(g). An exhaust line that is too small in diameter or which is blocked can result in the formation of overpressure within the pump. Possible consequences can be a damaged or even burst open pump. Thus the exhaust line must be checked from time to time to ensure that there are no obstructions.

Do not operate the pump with a sealed exhaust line. There is the danger of injury.

Note:

To avoid back flowing condensate, install the exhaust line with a downward slope (lower than the pump) to prevent condensate from flowing back into the pump. If this is not possible, insert a condensate trap.

When oil mist is to be removed from the exhaust flow we recommend the use of the exhaust filter with lubricant return which is available in [Accessories](#) on page 58.

Before connecting the pump, remove the protective covers from the connection flanges.

Retain the protective covers in case you need to store the pump in the future.

The pump is shipped with intake and exhaust flanges mounted for vertical connection. You can easily convert the exhaust flange for horizontal connection. Connect the intake and exhaust lines with a centering ring and a clamping ring each. Use the centering ring with a dirt trap for the intake port.

Connect the intake and exhaust line using anti-vibration bellows, without placing any strain on the pump.

The maximum intake pressure must not exceed atmospheric pressure (1013 mbar).

The intake line must be clean. Deposits in the intake line may outgas and adversely affect the vacuum. The connecting flanges must be clean and undamaged.

The maximum throughput of the pump is equivalent to the pumping speed of the pump (refer to [Technical data](#) on page 18).

The cross-section of the intake line must be at least the same as that for the intake port. If the intake line is too narrow, it reduces the pumping speed. If the process gas contains dust, it is essential to install a dust filter in addition to the dirt trap supplied.

The dust filter is recommended to be installed horizontally. This makes sure that when you remove the filter, no particles fall into the intake port.

The pump may be operated with an integrated gas ballast via a connection that is provided for this purpose. The gas ballast knob can be replaced by EM gas ballast knob. Matching connectors are available (refer to [Accessories](#) on page 58).

Gas ballast inlet pressure must not be more than 1013 mbar (absolute), and gas flow must be sufficient.

6.5 Installation drawing

Figure 8 Installation drawing - E2S 5 (1 phase)

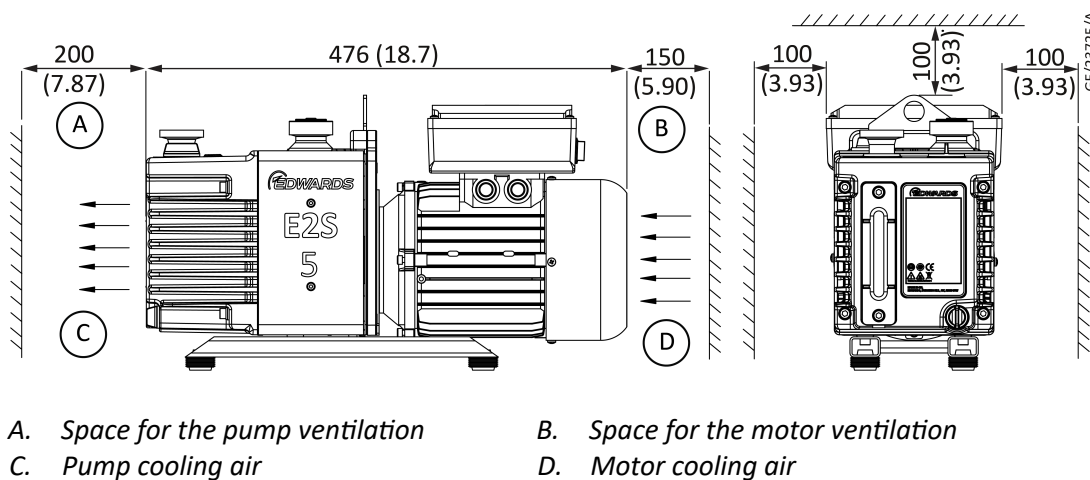


Figure 9 Installation drawing - E2S 5 (3 phase)

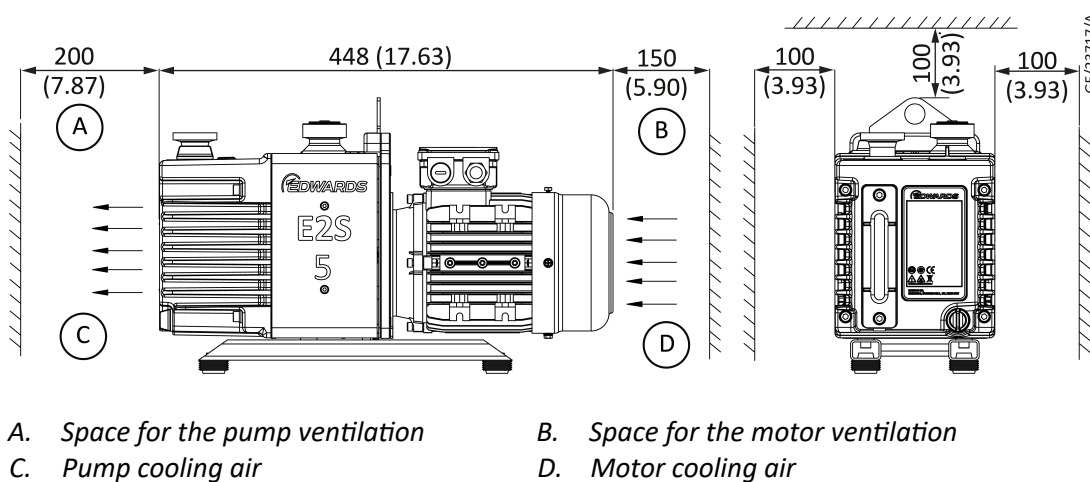
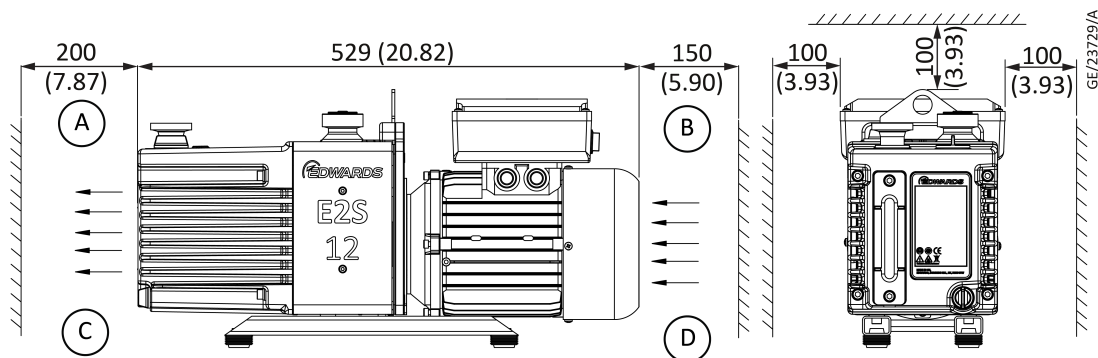
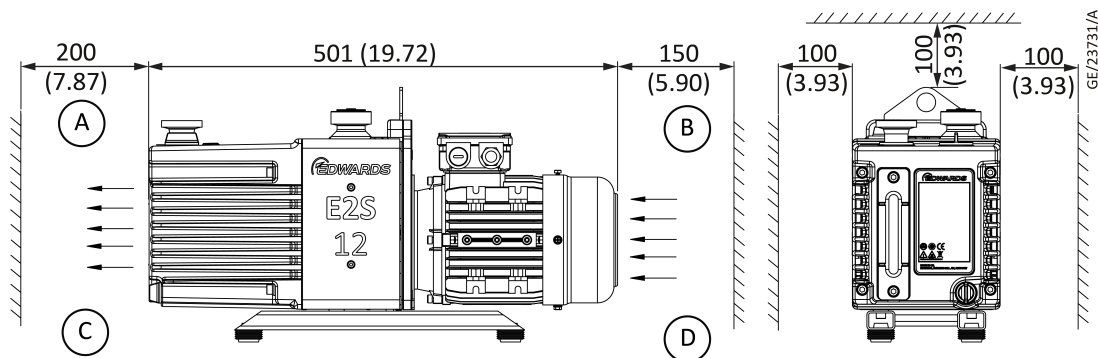


Figure 10 Installation drawing - E2S 12 (1 phase)

- A. Space for the pump ventilation B. Space for the motor ventilation
C. Pump cooling air D. Motor cooling air

Figure 11 Installation drawing - E2S 12 (3 phase)

- A. Space for the pump ventilation B. Space for the motor ventilation
C. Pump cooling air D. Motor cooling air

6.6 Electrical connections



WARNING: PROTECTIVE EARTH CONNECTION

Risk of injury or damage to the equipment. The pump must be adequately earthed to prevent the accumulation of static electricity. The electrical junction box must only be opened and electrical connections made when no explosive atmosphere is present.

WARNING: DANGEROUS VOLTAGE

Risk of shock. The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1. Note the national regulations of the country in which the equipment is being operated.

During all connection work, the mains power supply lines must be de-energised (Lockout/Tagout). To prevent the pump from operating unexpectedly after a mains power failure, the pump must be integrated with the control system in such a way that the pump can only be switched on again manually. This applies equally to the emergency cut-out arrangements. Observe safety information given in *Electrical hazards* on page 11.

CAUTION: DAMAGE TO THE PUMP

Risk of damage to the equipment. Observe the direction arrow on the motor fan cover. It is recommended to check the direction of rotation with a phase sequence indicator.

Prolonged operating of the motor in the wrong direction of rotation will damage the pump.

In the case of custom pumps note the information provided on a separate sheet.

For connecting the motor, follow the schematics provided on the motor nameplate or in its junction box, given your local mains voltage and frequency. Electrical connection work must only be carried out by a qualified electrician in accordance with the applicable safety rules, see IEC 60204-1 and 61010-1.

The pump is supplied with a three-phase motor but without accessories for electrical connection. They must be connected with the appropriate cable and a suitable motor protection switch.

Set the switch in accordance with the rating on the motor nameplate. Observe the diagram at the motor.

After connecting the motor and after every time you alter the wiring, check the direction of rotation. To do so, briefly switch on the motor and check whether a suitable cover (for example- a protection cover) is sucked in at the intake port. If not, interchange two phases of the connection.

For motor wiring information, refer to the motor nameplate or the cover of the motor terminal box. You can configure the dual voltage motors to operate with either the high range or the low range electrical supply.

To reverse operating invert L1 and L2.

7. Operation

WARNING: OPERATION SAFETY



Risk of damage to the equipment. Do not start the pump more than six times within one hour to prevent the overloading of the motor. If frequent starts are needed, the pump must operate continuously and be linked to the vacuum vessel using a valve. In that case, regulation will be made by the valve and not by the start/stop of the pump. With the valve closed, the pump consumes less energy.

WARNING: HOT SURFACE



Risk of burns. The pump in operation is hot and some surfaces could reach a temperature higher than 80°C (176°F). There is a risk of burn by touching. Take note of warning labels on the pump. Let the pump cool down before you start any work.



WARNING: HAZARDOUS WORKING CONDITIONS

Risk of injury. Wear ear protection in case of operation at high inlet pressure.

7.1 Media compatibility

Pumps can pump condensable gases and vapours, provided that the gas ballast knob is open and the pump has attained its operating temperature.

7.2 Start-up

WARNING: AUTOMATIC RESTART



Risk of injury or damage to the equipment. To prevent the pump from operating unexpectedly after a mains power failure, the pump must be integrated with the control system in such a way that the pump can only be switched on again manually. This applies equally to emergency cut-out arrangements.

WARNING: OPERATION SAFETY



Risk of injury or damage to the pump. Before starting the pump make sure that the pump and the fitted accessories meet the requirements of your application and that safe operation can be guaranteed.

WARNING: VACUUM HAZARD



Risk of exposure to the vacuum. Do not operate the pump with an open intake port. Vacuum connections, oil feed and discharge openings must not be opened while the pump is operating. Avoid exposing any part of the human body to the vacuum. There is the risk of suffering injury. Observe safety information given in Mechanical hazards.

Note:

The pump is delivered without oil filled. Before you switch on the pump, make sure that the pump contains enough oil. The normal oil level in a standstill pump is in the upper half of the sight glass. Each time before you start up check the oil level. Do not operate the pump with an oil level below the minimum. To add the oil, unscrew the oil-fill plug, add oil and screw the plug firmly back in.

Open all valves blocking the exhaust lines. Do not operate the pump with a blocked or constricted exhaust line.

Check the direction of rotation before starting the pump for the first time and after each change in the electrical connection (refer to [Electrical connections](#) on page 33).

On initial start-up, after prolonged idle periods or after an oil change, the specified ultimate pressure cannot be attained until the oil is degassed.

This can be done by operating the pump for approximately 30 minutes with the intake line closed and the gas ballast knob.

7.3 Operation

Note:

The pump can pump condensable gases and vapours, provided that the gas ballast knob is open and the pump has attained its operating temperature.

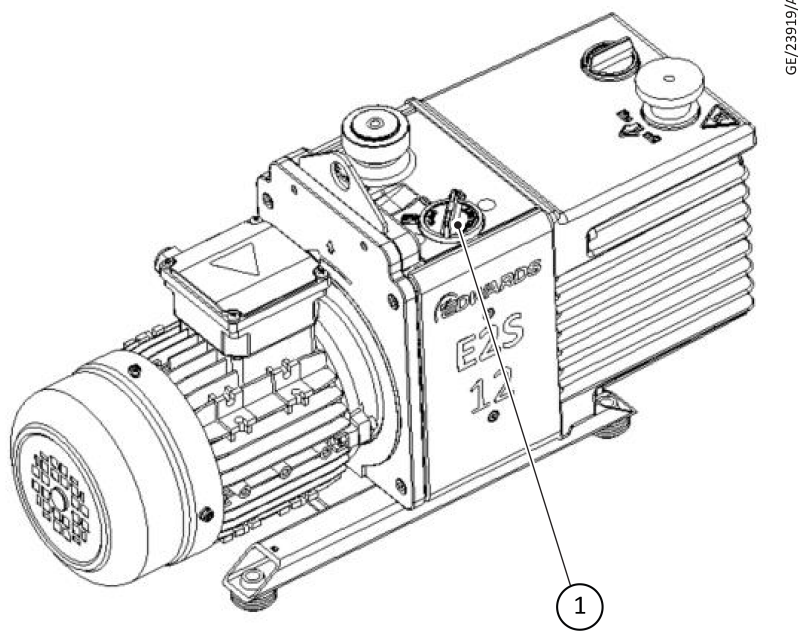
If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurised. The pressure in the oil box must not exceed 0.5 bar(g). An exhaust line that is too small in diameter or which is blocked can result in the formation of overpressure within the pump. The pump may get damaged or burst if the pump is opened. Thus the exhaust line must be checked from time to time to make sure that there are no obstructions.

7.3.1 Pumping of non-condensable gases

If the process contains mainly dry gases, the pump may be operated without gas ballast (position 0), provided that the saturation vapour pressure at operating temperature is not exceeded during compression.

If the composition of the mixture to be pumped is not known and if condensation in the pump cannot be ruled out, operate the pump with dry air or dry inert gas ballast (position I or II) in accordance with Pumping of condensable gases and vapours.

7.3.2 Pumping of condensable gases and vapours



1. Gas ballast knob

The pump is equipped with a three-position manual gas ballast knob which operates with air.

The gas ballast is operated manually by turning the plastic knob on the gas ballast head. There are 3 positions:

- 0 - closed (to achieve best ultimate pressure)
- I - standard flow for standard vapour load
- II - high flow for high vapour load (hydro mode)

The gas ballast flow is valid for a pump operating at ultimate pressure (inlet closed) and for a gas ballast gas supply of 1 bar (absolute). Above 1 bar (absolute) the pump may get damaged.

For remote control, fit an EM gas ballast knob kit (available as an accessory, refer to [Accessories](#) on page 58).

The pump is slightly louder if the gas ballast knob is open. With the gas ballast knob open (position I or II) and when the temperature is stabilised, the pump can pump pure water vapour up to the water vapour tolerance specified in the technical data. If the vapour pressure increases above the permissible level, the water vapour will condense in the oil of the pump.

When pumping vapours make sure that the gas ballast knob is open and that the pump has been warmed up for approximately 30 minutes with the intake line closed.

Note:

Vapour phases may only be pumped up to the permissible limit after the pump has attained its operating temperature.

During pumping, vapours may dissolve in the oil. This changes the oil properties and thus there is a risk of corrosion in the pump. Therefore, do not switch off the pump immediately after the completion of the process. Instead, allow the pump to continue operating with the gas ballast knob open and the intake line closed until the oil is free of condensed vapours. We recommend operating the pump in this mode for about 30 minutes after completion of the process.

For processes with a high proportion of condensable vapours, the intake line must be opened slowly only after the pump has reached the operating temperature.

One sign of condensation of vapours in the pump is a rise of the oil level during the operation of the pump.

In cyclic operation, the pump must not be switched off during the intervals between the individual working phases (power consumption is minimal when the pump is operating at ultimate pressure) but must continue to run with the gas ballast knob open and intake port closed (if possible via a valve).

Once all vapours have been pumped off from a process (for example, during drying), the gas ballast knob can be closed to improve the attainable ultimate pressure.

7.3.3 Operating temperature



WARNING: HOT SURFACES

Risk of injury. There is the danger of receiving burns. Observe safety information given in [Thermal hazards](#) on page 11.

Proper operation of the pump is ensured in the ambient temperature range between 10 °C to 40 °C (50 °F to 104 °F).

At operating temperature, the surface temperature of the pump can be higher than 70 °C (156 °F).

If due to the ambient conditions this temperature range is to be exceeded at either end of the range, contact us.

The motor may accelerate with a delay when simultaneously an under voltage is present at the motor and the pump is at the minimum permissible and ambient temperature.

Under such operating conditions the motor protection switch may respond. In this case, the motor may be started again.

7.3.4 Shut down



CAUTION: OPERATION SAFETY

Risk of damage to the equipment. When pumping condensable media let the pump continue to operate with the gas ballast knob open and the intake line closed before switching off (refer to [Pumping of condensable gases and vapours](#) on page 37).

Under normal circumstances, switch off the pump. The intake port of the pump contains an anti-suck back valve which closes the intake port when the pump is shut down to prevent the pump oil from being sucked back into the vacuum chamber. The function

of the valve is not impaired by gas ballasting. The anti-suck back valve is not a safety vacuum valve.

If the pump was exposed to aggressive and corrosive media, we recommend that you let the pump continue to operate even during long non-working intervals (for example, overnight) with the intake line closed and the gas ballast knob open. This avoids corrosion during idle periods and difficulties when re-starting the pump under conditions where the lubricant has been chemically modified.

If the pump operating with mineral oil is to be shut down for an extended period after pumping aggressive or corrosive media or if the pump has to be stored, proceed as follows:

- Pump and operating agents may be contaminated.
- If hazardous substances have been pumped, then these substances can escape from the pump and the oil. Introduce adequate safety precautions. Use gloves, face protection or a respirator, for example.
- Observe safety Information [Hazards caused by materials and substances](#) on page 12.
- Drain the oil (refer to [Change the oil](#) on page 46).
- Add clean oil until the oil level is at the “min” mark and let the pump operate for some time.
- Then drain the oil and add clean oil until the oil level is at the “max” mark.
- Seal the connection ports. Special conservation or anti-corrosion oils are not necessary.
- Also, take note of the information given in [Transportation](#) on page 26 and Storage.

7.4 Ultimate pump pressure

If the system cannot produce the pressures specified in the technical data, measure the ultimate pressure directly at the intake port of the pump after you disconnect the pump from the system. The ultimate partial pressure of non-condensable gases can only be measured with a compression vacuum gauge or a partial pressure gauge. Precise measurements can only be obtained with calibrated instruments.

Upon initial start-up, after prolonged idle periods or after an oil change, it takes some time until the pump reaches the specified ultimate pressure. Wait until a stable pump temperature is reached and be sure the pump oil is degassed. It takes approximately 30 minutes. We recommend operating the pump initially with the gas ballast knob open.

The ultimate pressure depends on the pump temperature and the pump oil used. The best ultimate pressures can be obtained at a low pump temperature by using the recommended oil types.

7.5 Taking out of use

Contact us for all the queries about the disposal of spares, consumables or the entire pump.

8. Maintenance

8.1 Safety information



WARNING: DANGEROUS VOLTAGES

Risk of electric shock. The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1. Note the national regulations of the country in which the equipment is being operated.

Disconnect the electrical connections before disassembling the pump. Make sure that the pump cannot be accidentally started.

Observe the safety information given in [Electrical hazards](#) on page 11.



WARNING: HAZARDOUS SUBSTANCES

Risk of injury or damage to the equipment. Make sure that there is no potentially explosive atmosphere before conducting any maintenance work.

If the pump has pumped harmful substances, contrary to what has been stated in [Principle of operation](#) on page 15, ascertain the nature of hazard and take adequate safety measures. Observe the safety information given [Hazards caused by materials and substances](#) on page 12.

When disposing of used oil, you must observe the applicable environmental regulations.

All work must be carried out by suitably trained personnel. Maintenance or repairs carried out incorrectly will affect the lifetime and performance of the pump and will void any warranty claims.

Note:

Due to the design concept, the pumps require very little maintenance when operated under normal conditions. The maintenance required is described in the sections below. In addition to this, a maintenance plan is provided in [Maintenance intervals](#) on page 41.

We offer practical courses on the maintenance, repair and testing of pumps. Further details are available on request.

If the pump is used in ambient air which is contaminated, make sure that the air circulation and the gas ballast knob are not adversely affected.

When the pump has been pumping corrosive media we recommend that possibly planned maintenance work be carried out immediately to prevent corrosion of the pump while it is at standstill.

In case of special designs and variants always indicate the serial number when contacting us.

8.2 Maintenance intervals

 Note:

The intervals stated in the maintenance schedule are approximate values for normal pump operation. Unfavourable ambient conditions and/or aggressive media may significantly reduce maintenance intervals.

We recommend that you service the pump every three years covering the following:

- Cleaning
- Checking the individual components
- Exchange of all seals
- Functional check.

Ensure your pump can reach the best performance, the service must be performed by our Service.

Table 7 Maintenance interval

E2S 5, E2S 12	Measurement / Test quantity Operation / Auxiliary materials	Interval	Remarks
Operate the pump for at least 1 hour with gas ballast.	Manually	As required	Condensed water is thus removed from the oil
Check the oil level, change the oil if required.	Oil: Ultragrade Performance 19 or special and alternative oils refer to Lubricants and oils on page 16.	Daily, before switching on the system	Refill: Only after the pump has been switched off. Refer Check the oil level on page 45.
Check the quality of the oil, change the oil if required.	Visually (all oils)	Weekly	Normally the oil is light and transparent, oil change is required when discolourations increase. Refer to Check the oil condition on page 45.
	Chemically	6 months	According to DIN 51558, when the neutralisation number exceeds 2; then an oil change will be required. Refer to Check the oil condition on page 45.
	Mechanically	6 months	When the viscosity is 20% above the fresh oil; then an oil change will be required. Refer to Check the oil condition on page 45.
Change the oil	Oil: Ultragrade Performance 19 or special and alternative oils refer to Lubricants and oils on page 16.	6 months	Oil change: First oil change after 100 to 500 operating hours. When the pump is switched off and cold to avoid releasing absorbed gases. Refer to Change the oil on page 46. Quantity of oil: Refer to Table: Technical data on page 21.

E2S 5, E2S 12	Measurement / Test quantity Operation / Auxiliary materials	Interval	Remarks
Clean the oil level glass.	Suitable cleaning agent and compressed air.	Annually*	Clean the oil level glass with a cleaning agent and blow it out with compressed air under a suction hood. Use cleaning agents only corresponding to the national/international specifications. Observe the safety regulations when using cleaning agents. Refer to <i>Clean or replace the oil sight glass</i> on page 47.
Clean the intake dirt trap and inlet valve in the intake port. Change them as required.	Suitable cleaning agent and compressed air.	6 month	Clean intake dirt trap with a cleaning agent and blow it out with compressed air under a suction hood. Replace the defective intake dirt trap. Clean the inlet valve with a cleaning agent and dry it. Use a cleaning agent which complies with the national/inter national specifications. Observe the safety regulations when using cleaning agents. Refer to <i>Clean the inlet port dirt-trap and inlet valve</i> on page 48.

E2S 5, E2S 12	Measurement / Test quantity Operation / Auxiliary materials	Interval	Remarks
Check the teeth edges of the the coupling element for any damages, change the coupling element as required.	Visual Inspection	Annually*	Refer to Check coupling element and exchange motor on page 50.
Check the fan of the motor as well as the cooling fins on the motor for deposits, and clean as required.	Brush and industrial vacuum cleaner.	Annually*	Clean before the maintenance interval has elapsed when the pump or the motor gets too warm. Caution: Switch off the pump and make sure that it does not run inadvertently (disconnect from the mains). Refer to Clean the motor cooling fan on page 51.

** For normal applications, the maintenance interval is 1 year or 6000 hours.*

The recommendation above is only for pumps running in normal applications. In case of running in medium and harsh applications, the maintenance interval needs to be shortened according to application requirements.

If other type of oil is used for the pump, the maintenance interval needs to be adjusted accordingly.

8.3 Maintenance work

Depending on the process involved, dangerous substances may escape from the pump and oil. Take the appropriate precautions. Observe safety regulations.

Do not install used seals. Always use new seals. Use only genuine parts provided by us.

8.3.1 Check the oil level



CAUTION: MAINTENANCE SAFETY

Risk of damage to the equipment. Check and top up oil only after having shut down the pump first. Note the safety information given in [Thermal hazards](#) on page 11 and [Hazards caused by materials and substances](#) on page 12.

During the operation of the pump, the oil level must always remain between marks on the oil-level glass. Refer to [Table: Maintenance interval](#) on page 42. The amount of oil must be checked and topped up as required.

The oil level must be checked at least once a day. Stop the pump and fill oil when needed.

Pumps that are not directly delivered from us, for example - in systems, may have been filled with oils different from recommended oil. Refer to [Lubricants and oils](#) on page 16. In this case, a refilling with recommended oil may cause problems. Therefore check the oil label before refilling in or change the oil with suitable oil.

Overfilling leads to oil losses at high intake pressures. High oil consumption often indicates that exhaust filters are clogged.

8.3.2 Check the oil condition

The ageing process for the standard operating fluid (refer to [Lubricants and oils](#) on page 16) will depend very much on the area of application for the pump.

There are following ways of checking the oil condition:

1. Visual check: Normally the oil is clear and transparent. If the oil darkness, it must be changed.
2. Chemical check: The neutralisation number of oil is determined according to DIN 51558. If it exceeds 2, the oil must be changed.
3. Viscosity check: If the viscosity of Ultragrade Performance 19 at 25 °C exceeds a level of 240 mPas (20% higher than the viscosity of fresh oil) an oil change is recommended.

If gases or liquids dissolved in the oil result in a deterioration of the ultimate pressure, the oil can be degassed by allowing the pump to operate for approximately 30 minutes with the intake port closed and the gas ballast knob open.

When checking the oil, switch off the pump first and drain out the required amount of oil through the oil drain valve from the warm pump into a beaker or similar container.

Note the maintenance safety information given in [Safety information](#) on page 40.

8.3.3 Change the oil

WARNING: HAZARDOUS SUBSTANCES



Risk of injury or damage to the pump. Hazardous substances may escape from the pump and the oil. If there is a danger that the operating agent may present a hazard in any way due to decomposition of the oil or because of the media which have been pumped, you must determine the kind of hazard and make sure that all necessary safety precautions are taken. Use gloves, face protection or a respirator, for example:

Observe safety information given in [Thermal hazards](#) on page 11 and [Hazards caused by materials and substances](#) on page 12.

Change the oil while the pump is cold to avoid releasing adsorbed gases. If releasing adsorbed gases has no problem, change the oil after the pump has been switched off and while the pump is still warm.

WARNING: HOT SURFACE



Risk of burning. With the pump warm from the operation, both pump and oil can get so hot that there is the risk of suffering burns. If necessary, wear gloves.

Note:

Check and top up oil only after the pump has been shut down.

When disposing of waste oil, observe the applicable environmental protection regulations.

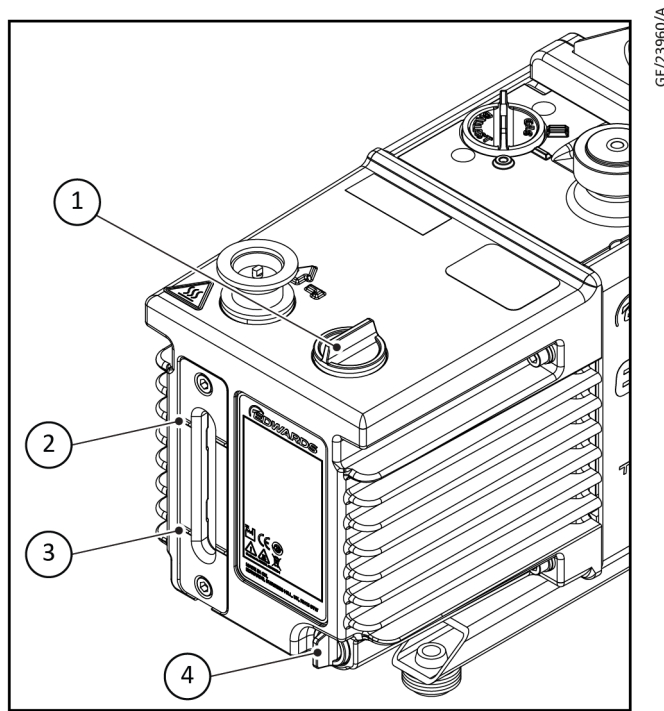
When changing the oil use the same type of oil which was previously in the pump. If you want to change the type of oil entirely consult us first.

The first oil change must be carried out at the first 100-500 operating hours and regular exchange at least every 2000-3000 operating hours or after 6 months. At high intake pressures and/or high intake temperatures when pumping contaminated gases, the oil will have to be changed more frequently.

Further oil changes must be made before and after the long-term storage of the pump.

If the oil becomes contaminated too quickly, install a dust filter (refer to [Accessories](#) on page 58).

Contact us for more information on this matter.



- | | |
|-----------------------------|-----------------------------|
| 1. Oil filling plug | 2. Oil level mark - maximum |
| 3. Oil level mark - minimum | 4. Oil drain plug |

To change the oil do the procedure as follows:

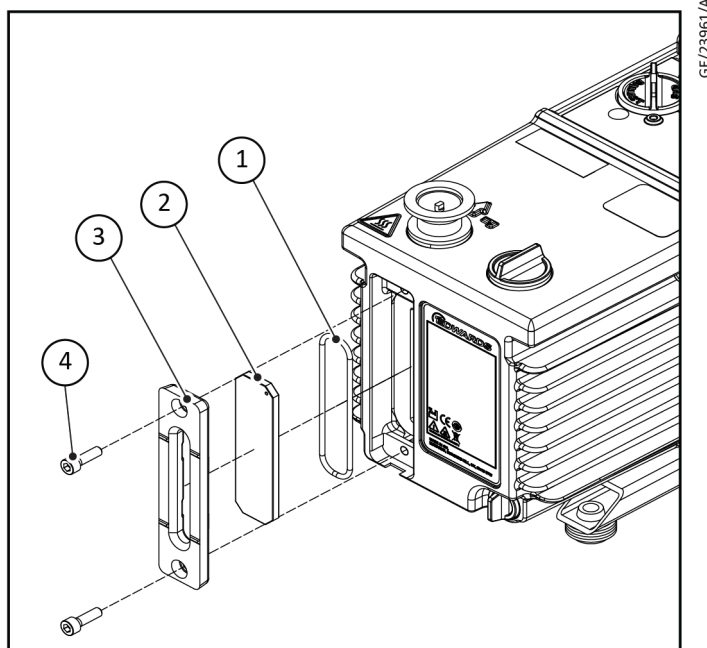
- Remove the oil filling plug.
- Remove the oil drain plug and drain the used oil into a suitable container.
- When the oil flow slows down, close the oil drain plug, switch on the pump (for maximum 10 seconds) and switch it off. Drain the remaining oil.
- Assemble the oil drain plug back.
- Filling in oil until the oil level reach to maximum level mark and assemble the oil filling plug.
- In case of severe pollution, the pump should be flushed with fresh oil, filling in oil to the minimum level mark of the oil-level glass, operate the pump for a short time and then change the oil again.
- When disposing of used oil, always observe the relevant environmental regulations.
- If seal exchange is needed, please refer to [Spare parts](#) on page 52 for more information.

 Note:

We can only guarantee that the pump operates as specified in the technical data if the lubricants recommended by us are used.

8.3.4 Clean or replace the oil sight glass

The oil sight glass is assembled in the oil casing, which will indicate the oil level. If the oil sight glass is dirty, the user will not see the oil level directly and miss refilling the oil to meet the requirement. Clean or replace the oil sight glass if needed.

Figure 12 Clean or replace the oil sight glass

- | | |
|------------------|-----------|
| 1. O-ring | 2. Glass |
| 3. Glass bracket | 4. Screws |

Required tools: Allen key 5 mm

To clean or replace the oil sight glass do the procedure as follows:

1. Use the Allen key to remove 2 screws.
2. Remove the oil sight glass bracket, glass and O-ring.
3. Clean the oil sight glass with suitable solvents.
4. Replace the used parts if necessary.
5. Assemble the oil sight glass in reverse sequence.

Refer to [Table: Oil sight glass kit](#) on page 53 for more information.

8.3.5 Clean the inlet port dirt-trap and inlet valve

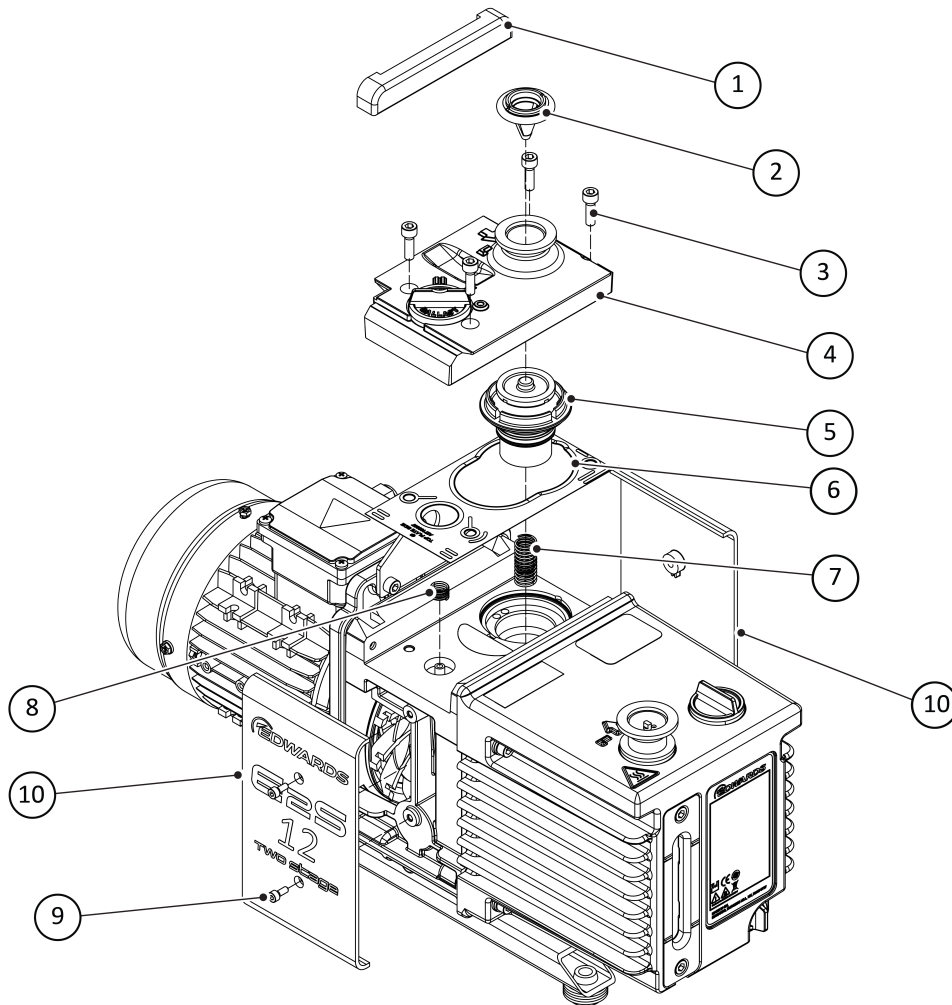
A dirt-trap is located in the inlet port of the pump to stop large foreign objects into the pump. It must be kept clean to avoid a reduction of the pumping speed.

An inlet valve is located inside the inlet port to stop the oil from returning to the inlet pipeline. It must be kept clean to prevent function failure leading the oil back into the inlet pipeline.

For this purpose, remove the dirt trap and inlet valve from the inlet port and rinse them with suitable solvent. Then thoroughly dry them with compressed air.

 Note:

The cleaning intervals depend on the application. If the pump is exposed to large amounts of abrasive materials, a dust filter must be fitted into the inlet line.



- | | |
|-------------------------------|-------------------------|
| 1. <i>Lifting plate cover</i> | 2. <i>Dirt trap</i> |
| 3. <i>Screws</i> | 4. <i>Inlet flange</i> |
| 5. <i>Inlet valve</i> | 6. <i>Flange gasket</i> |
| 7. <i>Inlet valve spring</i> | 8. <i>GB spring</i> |
| 9. <i>Screws</i> | 10. <i>Slide plate</i> |

To clean the inlet dirt-trap and inlet valve do the procedure as follows:

- Tools - Allen key 3mm, 5mm.
- Remove the inlet port connections.
- Take out the dirt-trap and clean it using suitable solvent. Dry it with compressed air.
- Pull the lifting plate cover off manually.
- Remove the side plates screws with allen key 3mm.
- Remove the side plates.
- Remove the inlet flange screws with allen key 5mm.
- Remove the inlet flange from coupling housing.
- Remove the inlet flange gasket, always replace it with new one.
- Take out the inlet valve and clean it using suitable solvent. Dry it with compress air.
- Do not lose the inlet valve spring and GB spring.
- Assemble the parts back in reverse sequence.

Refer to [Table: Inlet valve kit](#) on page 53 for more information.

8.3.6 Check coupling element and exchange motor

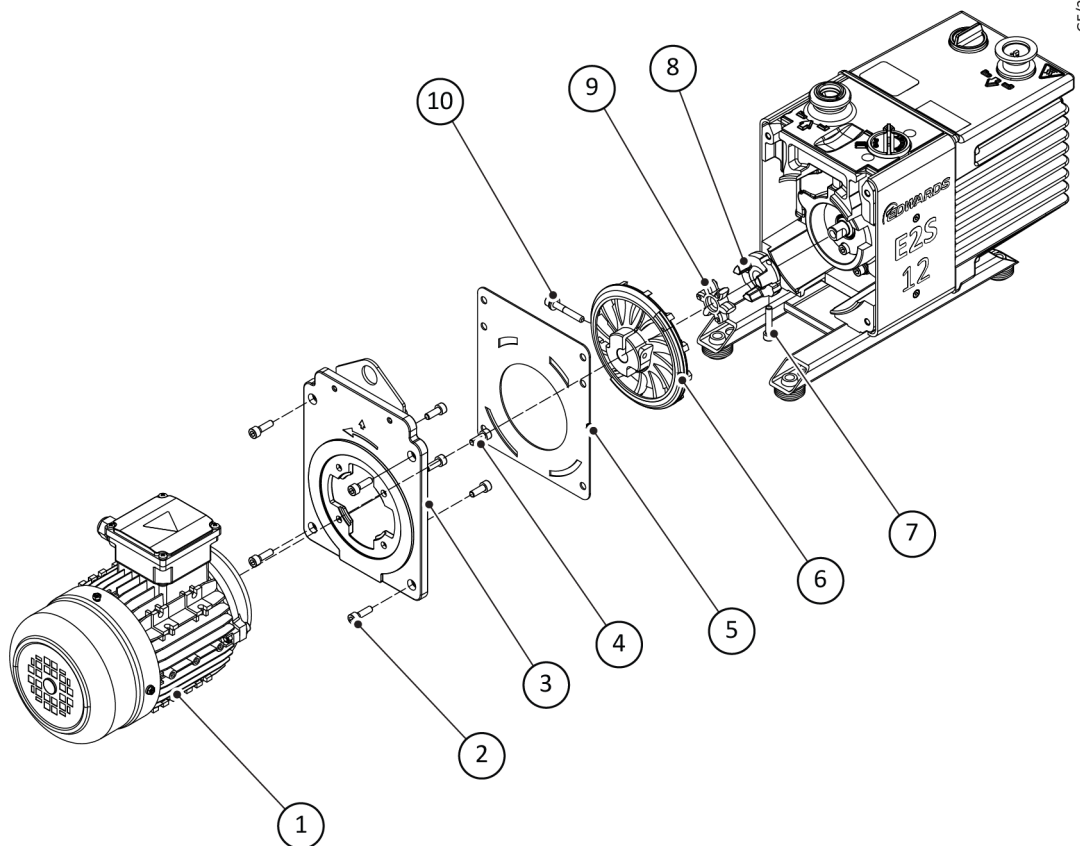


WARNING: DANGEROUS VOLTAGE

Risk of electric shock and mechanical injury. Before starting work, must disconnect the motor from the power supply. Observe safety information given in [Electrical hazards](#) on page 11.

The motor can only be changed with an identical one from the same manufacturer and marking.

In case other motors are used, the pump loses its CE certification.



- | | |
|---------------------|-------------------------------|
| 1. Motor | 2. Screws of coupling housing |
| 3. Motor flange | 4. Screws of motor flange |
| 5. Gasket | 6. Coupling fan |
| 7. Screw | 8. Coupling (pump side) |
| 9. Coupling element | 10. Lock screw |

Required tools:

- Allen key 5 mm
- Possibly a puller for the coupling

To replace the motor do the procedure as follows:

- Disconnect the motor power supply.
- Disconnect the motor main connections.
- Unscrew the coupling housing screws with Allen key 5mm.

- Remove the motor unit from the coupling housing.
- Check the coupling element status and replace it if necessary.
- Unscrew the coupling fan with Allen key 5mm, use a puller to pull the coupling fan out if necessary.
- Remove the motor gasket.
- Unscrew the motor flange screws and remove the motor flange from motor.
- Reassemble the new motor in the reverse sequence.

8.3.7 Clean the motor cooling fan



WARNING: MAINTENANCE SAFETY

Risk of injury or damage to the equipment. Do not disassemble the motor cooling fan cover while the pump is in operation, shut down the pump first.

Tools required:

- Cross screwdriver
- Brush
- Industrial vacuum cleaner

To clean the motor cooling fan, follow below procedure:

- Shut down the pump.
- Unscrew the motor fan cover.
- Clean the motor cooling fan as required.
- Reassemble the motor fan cover in the reverse sequence.

8.4 Service

8.4.1 Return the equipment or components for service

Before you send your equipment to us for service or for any other reason, you must complete a Declaration of Contamination Form. The 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.

If you are returning equipment note the following:

- If the equipment is configured to suit the application, make a record of the configuration before returning it. All replacement equipment will be supplied with default factory settings.
- Do not return equipment 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 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.

**NOTICE:**

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

8.4.2 Transport and hazardous materials

This product may contain components classified as dangerous goods under international transport regulations. These might include:

- **Hazardous substances:** e.g. lithium-ion batteries (for memory backup), helium (for cooling), or other pressurised gases.
- **Purpose:** Each substance serves a specific function such as energy storage or thermal regulation.

Refer to the declarations document for specific details.

These transport and handling regulations may apply to any substances that you have used in your operations.

8.5 Spare parts

 Note:

For best performance, use only our genuine spare parts and lubricants. Non-genuine parts or lubricants reduce efficiency, risk premature failure, and can void your warranty.

When ordering spare parts and accessories, always state the pump type and serial number. You can find part numbers in the spare parts table.

The pump loses its CE certification if non-genuine parts are used.

Consumables and main spare parts kits for the pumps are usually available in stock at our service centres. The list of these parts are given hereafter and in the spare parts table where the contents of each kit are given in detail.

- Oils (Special oils refer to the specific notice of the pump or contact us)
- Shaft seal maintenance kit
- Major maintenance kit

We recommend using these kits which have been defined to allow optimal maintenance or repair. Individual spare parts may need a longer delivery time.

 Note:

OSRV means Oil sealed rotor vane in the spare part description.

Table 8 Major maintenance kit

Part number	Part description	Remark
ZK9100093	Major maintenance kit for E2S 5	Includes vanes, exhaust valves, springs, shaft seals, shaft sleeve, O-rings, gaskets and other sealing parts
ZK9100094	Major maintenance kit for F2S 12	

Table 9 Gas ballast kit

Part number	Part description	Remark
GK9100088	Gas ballast maintenance kit OSRV5/12	Includes gas ballast, spring, O-ring and shoulder washer

Table 10 Oil sight glass kit

Part number	Part description	Remark
GK9100084	Sight glass kit	Includes sight glass and O-ring

Table 11 Coupling unit kit

Part number	Part description	Remark
GK9100085	Fan Coupling kit OSRV5	Including motor side fan coupling and pump side coupling, coupling element, screws
GK9100086	Fan Coupling kit OSRV12	
GM21071077	Coupling element pump OSRV5, PK10	Quantity 10 in the package
GM21071161	Coupling element pump OSRV12, PK10	

Table 12 Inlet valve kit

Part number	Part description	Remark
GK9100087	Inlet valve kit, OSRV5/12	Includes the whole inlet valve and spring
GM27160007	Inlet flange gasket, PK4	Quantity 4 in the package

Table 13 Oil filler and exhaust plug O-ring

Part number	Part description	Remark
GM02126026	Oil filler and exhaust plug O-ring, PK4	Quantity 4 in the package

Table 14 Oil drain plug O-ring

Part number	Part description	Remark
GM02120037	Oil drain plug O-ring, PK10	Quantity 10 in the package

Table 15 Outer shaft seal kit

Part number	Part description	Remark
GK9100089	Outer shaft-seal kit OSRV5/12	Outer shaft seal and gasket

Table 16 Rubber foot

Part number	Part description	Remark
ES6520309	Rubber Foot	Quantity 4 in the package

9. Fault finding

Table 17 Fault finding

Condition
Pump does not start on page 54
Pump does not reach the ultimate pressure on page 54
Pumping speed is too low on page 55
After switching off the pump under vacuum, pressure in the system rises too fast on page 55
Pump gets too hot on page 55
Oil in the intake line or the vacuum vessel on page 56
Oil is turbid on page 56
Pump is excessively noisy on page 56
External oil leakage on page 57

Fault	Pump does not start
Cause	Wiring malfunction.
Remedy	Check and repair wiring.
Cause	Motor protection switches incorrectly set (three-phase motors only).
Remedy	Set motor protection switch properly.
Cause	Motor is malfunctioning.
Remedy	Replace the motor.
Cause	The operating voltage does not match the motor requirement.
Remedy	Check whether the correct product number was booked. Adjust the voltage or replace the motor.
Cause	Oil temperature is below 10 °C (50 °F)
Remedy	Check the temperature with the team. Heat the pump and pump oil or use a different oil.
Cause	Oil is too viscous.
Remedy	Change the oil. Refer to Change the oil on page 46.
Cause	Pump is seized.
Remedy	Repair the pump. Contact Service.
Fault	Pump does not reach the ultimate pressure
Cause	Measuring technique or gauge is unsuitable.
Remedy	Use correct measuring technique and gauge. Measure the pressure directly at the intake port of the pump.

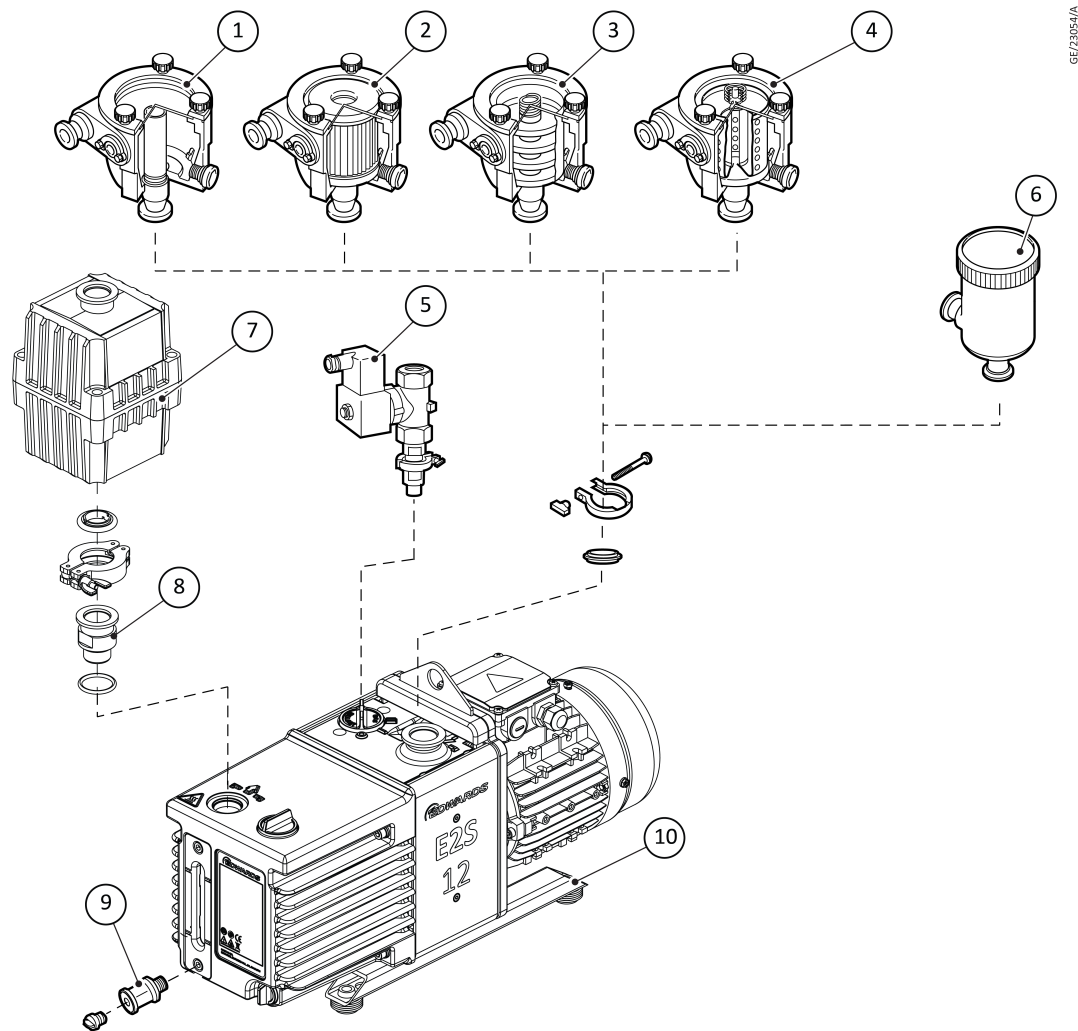
Cause	External leak
Remedy	Repair the pump. Contact Service.
Cause	The inlet valve is malfunctioning.
Remedy	Repair the valve. Refer to Clean the inlet port dirt-trap and inlet valve on page 48.
Cause	Exhaust valve is malfunctioning.
Remedy	Repair the valve. Contact Service.
Cause	Oil is unsuitable.
Remedy	Change the oil (degas it, if necessary). Refer to Change the oil on page 46.
Cause	Vacuum lines are dirty.
Remedy	Clean the vacuum lines.
Cause	Pump is too small.
Remedy	Check the process data requirement, replace the pump if necessary.
Fault	Pumping speed is too low
Cause	The inlet screen in the intake port is clogged.
Remedy	Clean the dirt-trap. Install a dust filter in an inlet line to prevent clogging. Refer to Clean the inlet port dirt-trap and inlet valve on page 48.
Cause	Connecting lines are too narrow or too long.
Remedy	Use adequately wide and short connecting lines.
Fault	After switching off the pump under vacuum, pressure in the system rises too fast
Cause	System has a leak.
Remedy	Check the system inlet line.
Cause	Inlet valve is malfunctioning.
Remedy	Repair the inlet valve. Refer to Clean the inlet port dirt-trap and inlet valve on page 48.
Fault	Pump gets too hot
Cause	Cooling air supply is obstructed.
Remedy	Correct the venting channel. Check if motor cooling fan is dirty and clean if necessary.
Cause	Ambient temperature is too high.
Remedy	Set pump up correctly. Refer to Operating temperature.
Cause	Process gas is too hot.
Remedy	Add cooling method to the pump inlet line.
Cause	Oil level is too low.
Remedy	Add oil to reach the correct oil level. Refer to Check the oil level on page 45.

Cause	Oil is unsuitable.
Remedy	Change the oil. Refer to Check the oil condition on page 45.
Cause	Oil cycle is obstructed.
Remedy	Clean or repair the oil lines and channels. Contact service.
Fault	Oil in the intake line or the vacuum vessel
Cause	Oil comes from the vacuum system.
Remedy	Check the vacuum system.
Cause	Inlet valve is obstruction.
Remedy	Clean or repair the valve. Refer to Clean the inlet port dirt-trap and inlet valve on page 48.
Cause	Sealing surfaces of inlet valve is damaged or dirty.
Remedy	Clean or repair the inlet port and the inlet valve. Refer to Clean the inlet port dirt-trap and inlet valve on page 48.
Cause	Oil level is too high.
Remedy	Drain the excess oil. Refer to Check the oil level on page 45.
Fault	Oil is turbid
Cause	Condensation
Remedy	-Degas the oil or change the oil. Refer to Change the oil on page 46. -To prevent condensation, please open the gas ballast knob or insert a condensate trap.
Fault	Pump is excessively noisy
Cause	Oil level is very low (Oil is no longer visible).
Remedy	Add oil. Refer to Check the oil level on page 45.
Cause	Silencing nozzle is clogged.
Remedy	Clean or replace the silencing nozzle. Contact service.
Cause	Intake pressure is too high.
Remedy	Lower the inlet pressure.
Cause	Coupling element is worn.
Remedy	Install new coupling element. Refer to Check coupling element and exchange motor on page 50.
Cause	Vanes, bearings or other pump parts are damaged.
Remedy	Repair the pump. Contact service.

Fault	External oil leakage
Cause	Oil drain plug broken or O-ring failed.
Remedy	Replace the oil drain plug or O-ring.
Cause	Oil sight glass broken or sealing O-ring and gasket failed
Remedy	Replace the oil sight glass kit.
Cause	Oil casing sealing gasket failed or casing broken
Remedy	Replace the oil casing sealing gaskets or replace the oil casing.
Cause	Oil leakage at the shaft seals
Remedy	Replace the shaft seals.
Cause	Exhaust port blocked.
Remedy	Clear the exhaust line.
Cause	Exhaust port seal failed.
Remedy	Replace the seal.

10. Accessories

Figure 13 Accessories



- | | |
|-------------------------|-------------------------|
| 1. Inlet catchpot | 2. Inlet dust filter |
| 3. Inlet desiccant trap | 4. Inlet chemical trap |
| 5. Gas ballast valve | 6. Foreline trap |
| 7. Outlet mist filter | 8. NW25 adaptor |
| 9. Oil drain extension | 10. Vibration isolators |

Table 18 Accessories

Part description	Part number
ITO20K inlet catchpot	A44110000
Small pump inlet catchpot	A44105000
ITD20K inlet disiccant trap	A44510000
ITC20K inlet chemical trap	A44410000
FL20K foreline trap	A13305000

Part description	Part number
ITF20K inlet dust filter	A44215000
EMF10 outlet mist filter	A46226000
EMF20 oil mist filter NW25	A46229000
RV + EM/EMF oil return kit	A50419000
RV/EMF gas ballast oil return kit	A50523000
EBV20 solenoid operated gas-ballast valve 220-240 V	A50006930
EBV20 solenoid operated gas-ballast valve 100-120 V	A50006984
Gas-ballast adaptor	A50502000
PWR CABLE 2M, UK BS1363-C13, 10A	A50505000
PWR CABLE 2M, EU SCHUKO-C13, 10A	A50506000
PWR CABLE 2M, USA NEMA 5-15P-C13, 10A	A50507000
PWR cable 2M, C13, open wires, 10A	A50508000
RV pumps extended drain plug	A50503000
Vibration isolators (pack of four)	A24801404
3/4" BSP exhaust nozzle kit	A50509000
Exhaust flange assy RV	A65201007
Flange nw25 outlet adapter (3/4" BSP Al)	C10501414
Adaptor NW25X3/4Bsp St.Stl PK1	C10501416

Inlet catchpot

The inlet catchpot traps any liquid droplets and prevents their entry into the pump.

Inlet dust filter

The inlet dust filter protects the pump against abrasive dust.

Inlet desiccant trap

Use a desiccant trap when pumping limited quantities of water vapour at high pumping speeds to a low vapour pressure.

Inlet chemical trap

The inlet chemical trap protects the pump against chemically active gases.

Outlet mist filter

The outlet mist filter separates and traps oil droplets in the pump outlet to prevent oil mist discharge. The mist filter is supplied with an adaptor to connect it to the pump outlet.

Solenoid operated pipeline valve

Fit the pipeline valve between the vacuum system and the pump inlet to provide additional system protection when the pump is switched off.

Foreline trap

Use a foreline trap on a clean pumping system to prevent back-migration of rotary pump oil vapour into the vacuum system.

Vibration isolators

The vibration isolators reduce transmission vibration and noise when the pump is floor or frame mounted and help to reduce strain when the mounting area is uneven.

Oil drain extension

Fit the oil drain extension between the oil drain port on the pump and the oil drain-plug to make the drainage of oil from the pump easier.

Pump inlet adaptor

This is a NW25 to 28 mm bore tube adaptor, supplied with connection hardware. Attach this adaptor to the NW25 pump-inlet to connect 28 mm bore plastic or rubber tube.

Flexible bellows

Use flexible bellows to connect the pump-inlet to the vacuum system. We recommend the use of bellows when using vibration isolators.

Pump outlet adaptor

This is a 3/4 inch BSP to NW25 adaptor. Use this adaptor when removing the hose adaptor supplied fitted to the pump outlet to adapt the 3/4 inch BSP thread to NW25 pump inlet.

Gas ballast banjo/elbow assembly

Use this 3/4 inch BSP assembly when a remote ballast supply or gas ballast valve is fitted.

Gas ballast valve

Use this to control the gas-ballast remotely. The gas ballast banjo/elbow assembly will also be required when fitting this accessory.

 Note:

For more information, refer manual A24801880.

10.1 Oil mist filter

Part description	Part number
EMF20 oil mist filter NW25	A46229000

10.1.1 EMF20 oil mist filter

The EMF20 oil mist filters (shown in [Figure: Component parts of the oil mist filter](#) on page 62) are used to separate and trap oil mist and odours discharged with the exhaust from oil sealed rotary vacuum pumps.

The oil mist filters have two-part injection moulded plastic bodies which contain a fibre composite oil mist filter and an activated carbon odour filter.

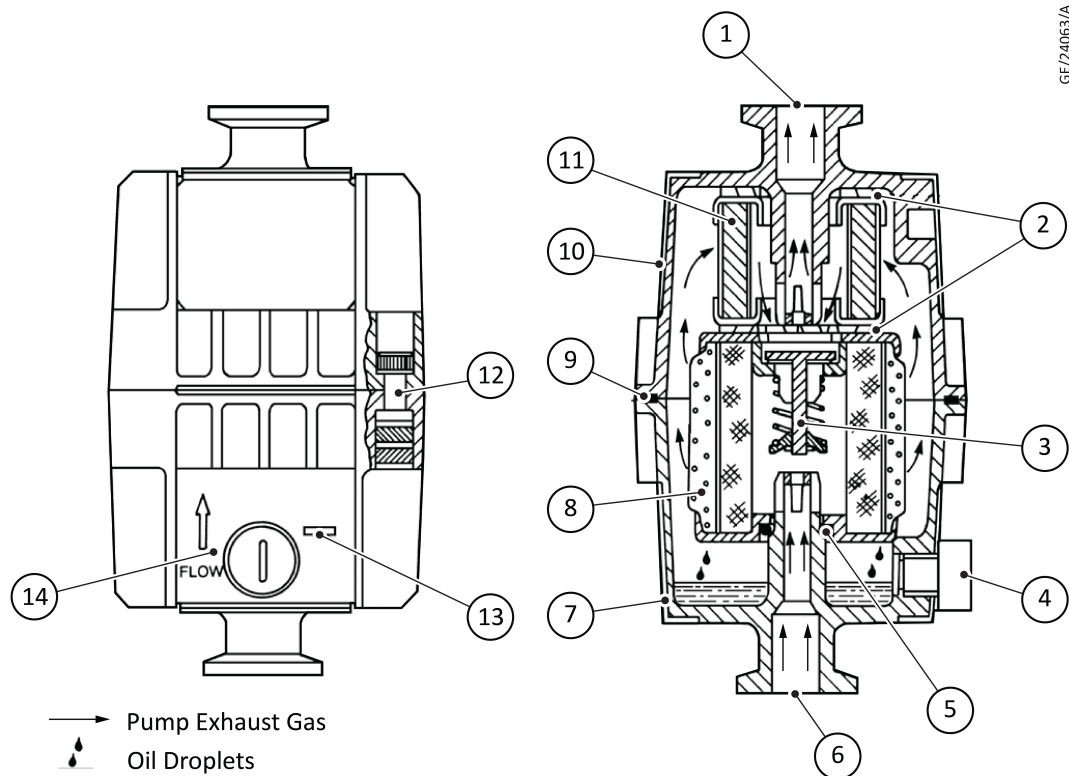
Exhaust gases from the pump travel upwards to the centre of the oil mist filter and through the filter element to the outside. Oil droplets that are trapped by the fibre composite element travel down the filter and collect in a reservoir in the base of the oil mist filter.

The oil-free exhaust fumes then pass through the activated carbon filter element to remove any residual odours.

The filter element has a pressure relief valve. If the element becomes blocked, the pressure relief valve allows exhaust gas to bypass the element and prevents pressure build-up in the pump. The pressure relief valve does not allow gas to escape from the exhaust system. A high exhaust pressure, caused by a blockage elsewhere in the exhaust system, will not be relieved by the pressure relief valve.

The amount of oil that has accumulated in the filter is visible through the sight panel on the lower part of the filter body. When the oil level reaches the maximum oil level (refer [Figure: Component parts of the oil mist filter](#) on page 62), you should remove the drain plug to drain the oil from the filter.

Accessories are available for the EMF20 filters for the drainage and return of trapped oil to the pump: refer to [Spares](#) on page 67.

Figure 14 Component parts of the oil mist filter

- | | |
|-----------------------------------|--|
| 1. Outlet | 2. Odour element seal |
| 3. Pressure relief valve assembly | 4. Drain plug |
| 5. Mist filter element o-ring | 6. Inlet |
| 7. Lower body (white) | 8. Mist filter element |
| 9. D-seal | 10. Upper body (grey) |
| 11. Odour element | 12. Body half securing screws (4 mm hex key, 1.2 Nm) |
| 13. Maximum oil level | 14. Sight panel |

10.1.2 Technical data

Parameter	Value
Dimension (mm)	191 x 118.4
Mass (kg)	0.7
Maximum back pressure	12 psig (1.8 bar absolute, 1.8×10^5 Pa)
Relief pressure	20 psig (2.37 bar absolute, 2.37×10^5 Pa)
Ambient temperature range (operation)	0 to 45 °C
Ambient temperature range (storage)	-10 to 90 °C
Rated flow	20 m ³ /h
Flange size (inlet and outlet)	NW25
Odour filter element	Activated carbon
Mist filter element	Epoxy impregnated borosilicate glass fiber
Filter body material	Crystalline nylon

10.1.3 Installation

Unpack and inspect

Remove all packing materials and check your oil mist filter. If your filter is damaged, notify your supplier and the carrier in writing within three days; state the item number of the filter together with your order number and your suppliers invoice number. Retain all packing materials for inspection. Do not use the filter if it is damaged.

Check that your package contains the items shown in [Table: Delivery scope](#) on page 63. If any of these items is missing, notify your supplier in writing within three days.

Table 19 Delivery scope

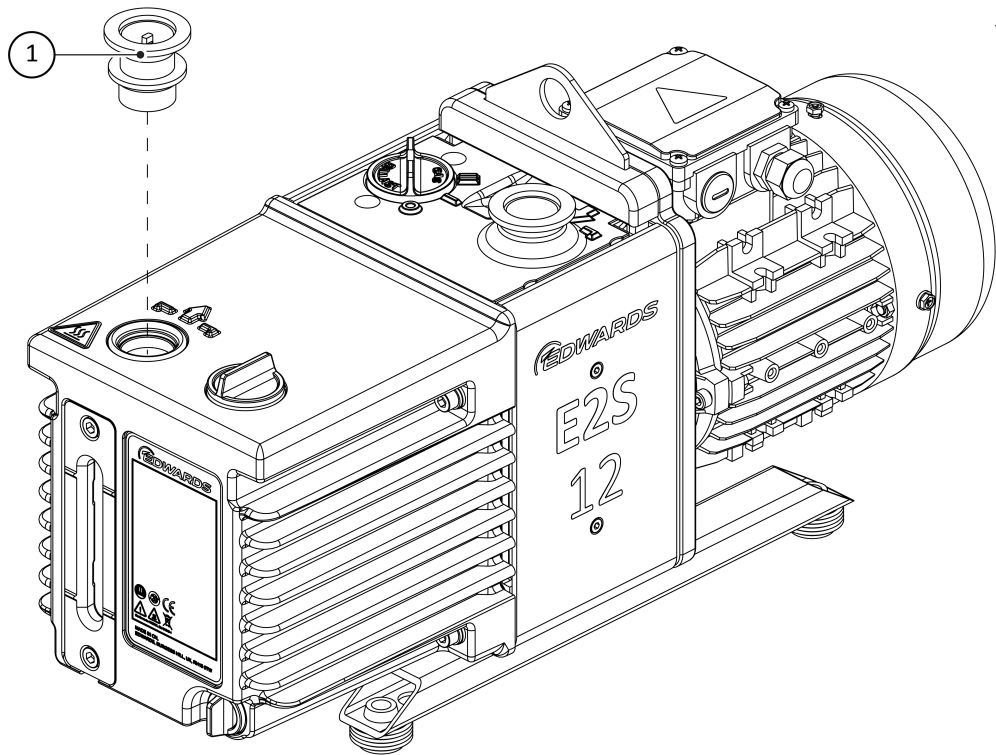
Material name	Quantity
EMF20 oil mist filter	1
Adaptor	1
Centering ring and o-ring	1
Clamping ring	1
O-ring seal	1

Install the oil mist filter

You must install the EMF20 filter vertically with the direction of exhaust flow as indicated by the arrow on the lower part of the body. Use the following procedure and refer to [Figure: Fit the filter to the pump](#) on page 65:

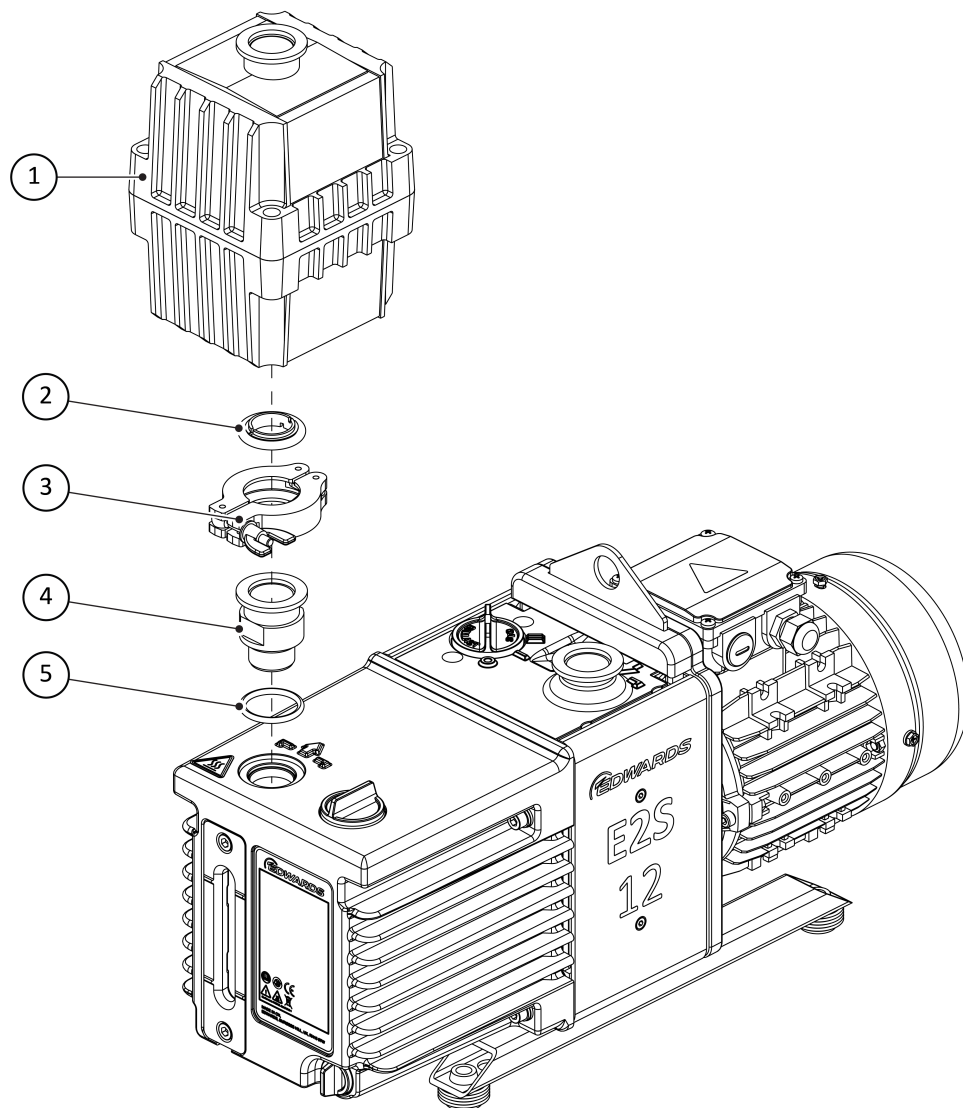
1. Clean the area around the pump outlet connection.

2. Remove the exhaust flange. Please keep it for the future connection without oil mist filter or exhaust pipeline.



1. Pump exhaust flange

3. Install the adaptor on the pump outlet and tighten the adaptor. Do not overtighten. Overtightening can damage the o-ring seal. Recommended tightening torque is 6 Nm.
4. Fit the centering ring with o-ring to the adaptor, then position the filter assembly flange on the o-ring. If necessary, rotate the filter. Make sure the oil-level sight panel is visible, so that you can access the drain plug to drain the filter.
5. Install the swing clamp and tighten it (hand tight only).
6. If required, use a further centring-ring, o-ring and clamp (not supplied) to fit an exhaust pipeline to the outlet of the filter.
7. After clamping do not rotate the EMF20 for further alignment. There is a risk of untightening outlet port of the pump, which can result in oil accumulating on the top of oil box. If further repositioning or alignment of EMF20 is needed, unclamp the EMF20 first and rotate it in loose condition. If you accidentally loosen the outlet port, retighten the outlet port to 6 Nm.

Figure 15 Fit the filter to the pump

GE/24052/A

- | | |
|--------------------|------------------------------|
| 1. Oil mist filter | 2. Centring-ring with o-ring |
| 3. Clamping ring | 4. Adaptor NW25*3/4" BSP |
| 5. O-ring | |

Operation

- Check the oil level in the filter regularly. Remove the drain plug to drain the oil from the filter when the level reaches the maximum mark on the oil-level sight panel. The rate of oil collection depends on your rotary pump and your process application.
- If you need to drain the filter very frequently, or if you want to reduce the amount of oil you use, fit an oil return kit accessory: refer to [Oil return kit](#) on page 67.

10.1.4 Maintenance of oil mist filter

The life of the mist filter depends on the process application. For most applications, you should change the mist filter element every six months. For applications which

contaminate the rotary pump oil, this period will be reduced and must be determined from experience. If the filter element becomes blocked, the pressure relief valve will operate and allow unfiltered exhaust gases to pass through the filter.

Change the odour element monthly or whenever the pump emits an oily odour.

Table 20 Recommended maintenance period

Parameter	Time
Mist filter	6 months
Odour element	1 month

Refer to [Figure: Component parts of the oil mist filter](#) on page 62.

 Note:

When replacing the mist filter element, it is recommended to replace the D-seal to avoid oil leak between the upper and lower body halves.

Change the filter elements



WARNING: WEAR PROTECTIVE EQUIPMENT

Risk of injury. Take all necessary precautions if toxic or dangerous substances have been pumped. Wear protective clothing when handling contaminated filters and filter elements.



WARNING: WEAR PROTECTIVE EQUIPMENT

Risk of injury. Ensure that the mist filter element O-ring is in place when you fit new filter elements. If you do not, the pump exhaust gases will not be treated and oil mist will pass out of the mist filter into the local environment and could cause injury to people.

1. Switch off the electrical supply to the pump.
2. Wipe clean the outside of the filter.
3. Refer to [Figure: Component parts of the oil mist filter](#) on page 62. Remove the drain plug to drain the oil from the filter. When the filter is fully drained, replace the drain plug.
4. If you have connected an exhaust pipeline to the filter outlet, disconnect it.
5. Undo and remove the four screws which secure the upper body to the lower body using 4 mm hex key, then remove the upper body.
6. Lift out the filter elements to be changed. Dispose of the used elements safely.
7. Wipe clean the inside of the upper body and lower body and the mating surfaces. Do not remove the D-seal.
8. Ensure that the mist filter element o-ring is in place in the lower body, then fit the new filter elements; ensure that the foam sealing rings on the top and bottom of the elements are correctly seated.
9. Refit the upper body to the lower body and secure with the screws removed in step 5. Use torque wrench 1.2 Nm.
10. If fitted, reconnect your exhaust system pipeline to the filter outlet.

10.1.5 Spares

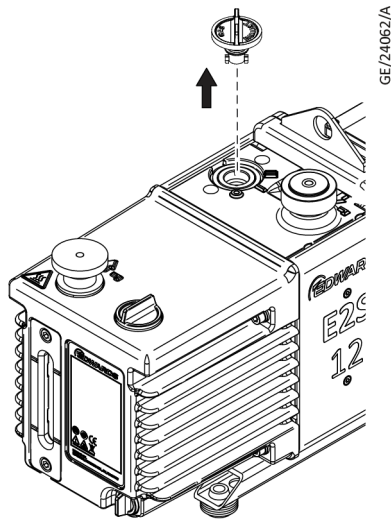
Part description	Part number
Oil mist filter element EMF20	A22304199
D-seal	A27159534
Oil mist filter odour element EMF20	A22304077

10.2 Oil return kit

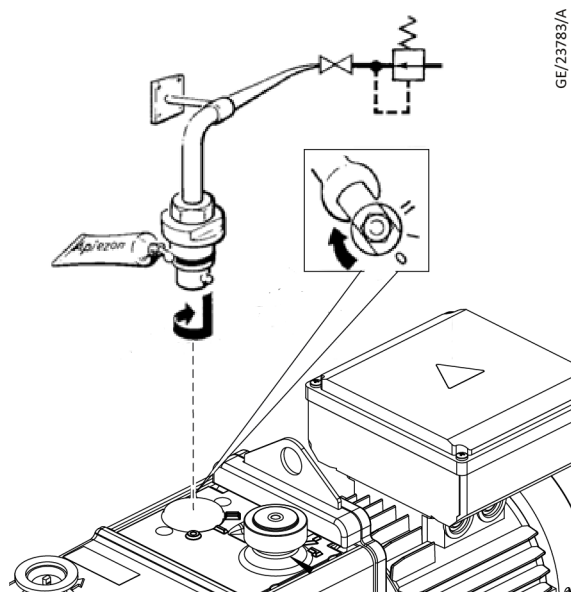
Part description	Part number
RV + EM/EMF oil return kit	A50419000

10.2.1 Installation of oil return kit

1. Unscrew the original GB knob from the GB port of the top plate on the pump.



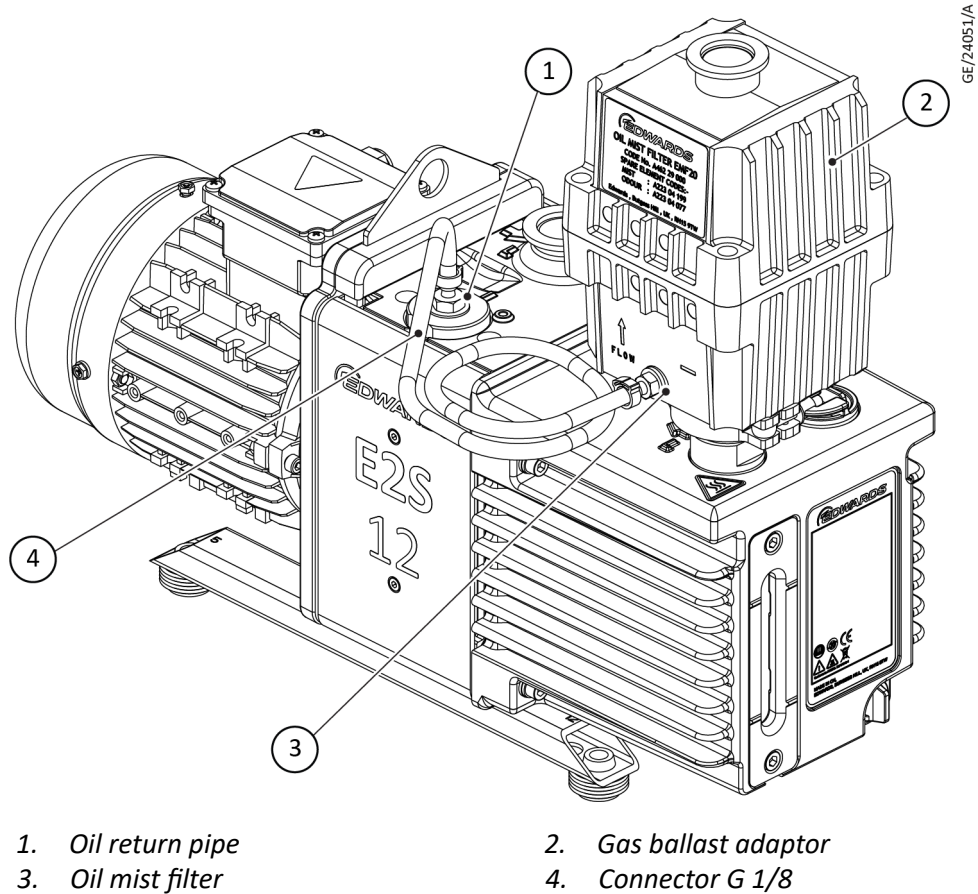
2. Attach the o-ring applied with vacuum grease to adapter fitting (marked as ¼" BSP/ISO) and tighten the pump's oil return port using a wrench. Ensure the adapter is tightened securely to prevent leaks.



10.3 Connect the oil mist filter and oil return kit

Remove the plug from oil mist filter and screw the nozzle 1/8 BSP to the oil mist filter.

Figure 16 Oil mist filter with oil return kit on the pump



11. Storage

- Before the pump is shelved it must be properly disconnected from the vacuum system, purged with dry nitrogen and the oil must be changed.
- The inlet and exhaust ports of the pump must be protected at least with covers which are provided upon delivery.
- The gas ballast switch must be set to the “0” position.
- If the pump is to be shelved for a longer period it must be sealed in a plastic bag containing desiccant (silica gel).
- When a pump is put into operation after it has been shelved for over one year, standard maintenance of the pump must be done and the oil must also be changed (refer to [Change the oil](#) on page 46). We recommend that you contact us.
- Store the pump in a dry place at room temperature until the pump is put back into service again.
 - Storage temperature: -15 °C ~ 70°C
 - Storage humidity: less than 80% RH

12. Disposal

Dispose of the pump, the oil and any components removed from the pump safely in accordance with all local and national safety and environmental requirements.

Particular care must be taken with components and waste oil that have been contaminated with dangerous process substances.



EU Declaration of Conformity CE

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Edwards Ltd
Innovation Drive
Burgess Hill
West Sussex
RH15 9TW
UK

Documentation Officer
Jana Sigmunda 300
Lutín , 78349
Czech Republic
T: +42(0) 580 582 728
documentation@edwardsvacuum.com

The product specified and listed below:

Product	E2S - two stage oil sealed rotary vane pumps with motor (single phase and three phase)
Range	E2S 5, E2S 12
Identifier	• E2S 5: A673xyyy • E2S 12: A675xyyy Where xx: specific product variant (x can be any value from 0 to 9) yyy: motor type (y can be any value from 0 to 9) defining their variant

Is in conformity with the relevant Union harmonisation legislation:

2006/42/EC	Machinery directive <i>Note: The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Annex 1 No. 1.5.1 of this directive.</i>
2011/65/EU	Restriction of certain hazardous substances (RoHS) directive as amended by Delegated Directive (EU) 2015/863

Based on the relevant requirements of harmonised standards:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 61010-1:2010 +A1:2019	Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements

This declaration, based on the requirements of the listed Directives and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: 2025-12-16

You must retain the signed legal declaration for future reference.

This declaration becomes invalid if modifications are made to the product without prior agreement.

Ian Keech
VP Engineering - Scientific Vacuum Division
Scientific Vacuum Division

Andries De Bock
General Manager PC Tianjin
Industrial Vacuum Division

ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION (EU/UK)

RoHS (EU, UK): Material Exemption Information

This product is compliant with the following Exemptions (UKCA equivalent given in brackets).

Annex III:

- 6(b) **Lead** as an alloying element in aluminium containing up to 0.4% by weight (Table 1-15)
- 6(c) Copper alloy containing up to 4% **lead** by weight (Table 1-18)

REACH (EU, UK)

This product is a complex article which is not designed for intentional substance release. To the best of our knowledge the materials used comply with the requirements of REACH. The product manual provides information and instruction to ensure the safe storage, use, maintenance and disposal of the product including any substance based requirements.

Article 33.1 Declaration (EU, UK)

This product contains Candidate List Substances of Very High Concern above 0.1%ww by article as clarified under the 2015 European Court of Justice ruling in case C-106/14.

- Lead (Pb)
This substance is present in certain aluminium/brass components.

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (EU, UK)

This product must be disposed of in accordance with the requirements of the WEEE Directive.

材料成分声明

China Material Content Declaration

	有害物质 Hazardous Substances					
部件名称 Part name 	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
铜接头 Brass connectors	X	O	O	O	O	O
电机（泵和机械增压泵） Motors (pump and mechanical booster)	X	O	O	O	O	O
O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。 O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.						
X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。 X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.						

