



[edwardsvacuum.com](http://edwardsvacuum.com)

# Industrial Dry Vacuum Pumps

## EDS 200 AND EDS 300

### INSTRUCTION MANUAL

## Copyright notice

©Edwards Limited 2019. All rights reserved.

## Trademark credit

Edwards and the Edwards logo are trademarks of Edwards Limited, Innovation Drive, Burgess Hill, West Sussex RH15 9TW.

# Contents

<b>1. Safety and compliance.</b>	<b>6</b>
1.1 Definition of Warnings and Cautions.	6
1.1.1 Safety symbols.	6
<b>2. Important safety information.</b>	<b>8</b>
2.1 Mechanical hazards.	8
2.2 Electrical hazards.	9
2.3 Thermal hazards.	10
2.4 Danger through materials and substances.	10
2.5 Explosion hazard.	10
2.6 Noise hazard.	11
<b>3. ATEX certification.</b>	<b>12</b>
3.1 Classification and marking of the pump.	12
3.2 Conditions of safe use.	13
<b>4. Description.</b>	<b>13</b>
4.1 Design.	14
4.2 Supplied equipment.	15
4.3 Ordering information.	15
4.3.1 Pumps.	15
4.3.2 Accessories.	16
<b>5. Technical data.</b>	<b>17</b>
<b>6. Transport and storage.</b>	<b>20</b>
6.1 Storage.	20
<b>7. Installation.</b>	<b>22</b>
7.1 Placement.	24
7.2 Normal operation.	24
7.2.1 Abnormal operation.	24
7.3 Connecting the inlet and exhaust lines.	25
7.3.1 Inlet lines.	25
7.3.2 Exhaust lines.	26
7.4 Connecting cooling-water.	27
7.4.1 Water quality.	28
7.5 Connecting purge gas.	29
7.6 Electrical connections.	31
7.6.1 Wiring the motor.	32
7.6.2 Motor thermistors.	34

7.6.3 Pump body thermal snap switch. . . . .	34
7.6.4 Grounding. . . . .	34
7.6.5 Check the direction of rotation of the motor. . . . .	35
7.6.6 Connecting the heat exchanger fan. . . . .	35
7.7 Leak check after installation. . . . .	35
<b>8. Operation. . . . .</b>	<b>36</b>
8.1 Media compatibility. . . . .	37
8.2 Start-up. . . . .	37
8.3 Manual shut-down. . . . .	37
8.4 Unplanned shut-down and alarms. . . . .	37
<b>9. Maintenance. . . . .</b>	<b>38</b>
9.1 Return the equipment or components for service . . . . .	38
9.2 Maintenance intervals. . . . .	39
9.3 Checking the oil. . . . .	39
9.4 Inspect the closed cooling-water circuit. . . . .	40
9.5 Inspect pipelines and connectors. . . . .	41
<b>10. Spares. . . . .</b>	<b>42</b>
<b>11. Diagnose a fault. . . . .</b>	<b>43</b>
11.1 Pump does not start up. . . . .	43
11.2 Pump gets too hot. . . . .	43
11.3 Pump is extremely loud. . . . .	44
11.4 Motor power consumption is too high. . . . .	44
11.5 Pump is too loud. . . . .	44
11.6 Pump is losing lubricant. . . . .	45
11.7 Oil gets too dark. . . . .	45
11.8 Lubricant in the pump chamber. . . . .	45
11.9 Pump does not attain its pumping speed. . . . .	46
<b>12. Dimension drawings. . . . .</b>	<b>47</b>
<b>13. Wearing parts. . . . .</b>	<b>49</b>
<b>14. Waste disposal. . . . .</b>	<b>50</b>

# List of Figures

Figure 1: EDS pump models. . . . .	13
Figure 2: Pumping speed curves EDS 200 and EDS 300. . . . .	19
Figure 3: Lifting the EDS pump. . . . .	20
Figure 4: Connections and controls. . . . .	23
Figure 5: Oil level at pump standstill. . . . .	24
Figure 6: Inlet flange dimensions (in mm). . . . .	26
Figure 7: Maximum permissible flange loads. . . . .	27
Figure 8: Connections and direction of motor rotation. . . . .	28
Figure 9: Cooling water level. . . . .	28
Figure 10: Schematic for purge gas and switches - EDS pump with air cooling. . . . .	30
Figure 11: Schematic for purge gas and switches - EDS pump with water cooling. . . . .	31
Figure 12: Wiring schematic-1. . . . .	32
Figure 13: Wiring schematic-2. . . . .	33
Figure 14: Pump body thermal snap switch connection. . . . .	34
Figure 15: Grounding. . . . .	34
Figure 16: Heat exchanger fan connection. . . . .	35
Figure 17: Oil level check. . . . .	40
Figure 18: Oil level at pump standstill. . . . .	40
Figure 19: Cooling water level. . . . .	41
Figure 20: EDS 200/300 with air cooling (dimensions in mm). . . . .	47
Figure 21: EDS 200/300 with water cooling (dimensions in mm). . . . .	48

# 1. Safety and compliance

## 1.1 Definition of Warnings and Cautions

### NOTICE:

#### Obligation to Provide Information

Read and follow these instructions carefully before installing and commissioning to ensure optimum and safe operation right from the start.



Safe and proper operation is guaranteed when used correctly and in accordance with the instructions contained in these operating instructions. Please read all safety instructions in this section and the rest of this manual carefully and make sure that these instructions are followed. The device may be operated and maintained only by trained personnel in the proper condition and as described in the operating instructions. Also observe local and state requirements and regulations. If you have any questions regarding safety, operation or maintenance of the device, please contact our nearest subsidiary.



### DANGER:

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



### WARNING:

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



### CAUTION:

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



### NOTICE:

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








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

Keep the instructions for future use.

### 1.1.1 Safety symbols

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

The safety symbols that follow can be used on the product or throughout the product documentation.

	General warning sign
	Warning of counter-rotating rollers
	Warning of automatic start-up
	Warning of danger of slipping
	Warning of electrical voltage
	Warning of hot surface
	Warning of explosion

## 2. Important safety information

### 2.1 Mechanical hazards



#### CAUTION: LOSS OF STABILITY DURING TRANSPORT

Uncontrolled movement due to incorrect attachment / lifting / carrying / rolling or movement of the vacuum pump. Only use the attachment points and conveying means described in this manual for vertical and horizontal conveying.



#### WARNING: EJECTION OF PARTS

Ejection of parts through bursting of vacuum system due to excessive pressure caused by incorrect direction of rotation. Pressure build-up in the vacuum system or in vacuum chambers. Check the direction of rotation of the vacuum pumps before each start-up, after each motor change and after each electrical connection change.

Ejection of parts through bursting of vacuum system as a result of excessive pressure caused by clogged or constricted exhaust. Pressure build-up in the vacuum system or exhaust pipes. Do not start up or operate the vacuum system with the outlet closed or throttled.

Ejection of parts through bursting of vacuum system due to excessive pressure, caused by faulty function at the gas inlet into the vacuum system. Pressure build-up in the vacuum system or inlet lines. Check correct connection of inlet and outlet flanges before commissioning. The inlet pressure at the suction port of the vacuum system must not exceed atmospheric pressure. If seal gas or gas-ballast from pressure vessels is used, secure the supply in such a way that no overpressure can occur in the vacuum system in the event of a fault or power interruption.

Ejection of parts through bursting of vacuum system as a result of excessive pressure caused by the pump running backwards after it has been switched off under vacuum. Danger of overpressure in the inlet lines and recipients as well as uncontrolled backward running of rotors. In the event of a fault or during service, separate the vacuum pumps from the vacuum vessel and connecting lines before the inlet by means of suitable valves.



#### WARNING: RISK OF CUTTING AND CRUSHING

Risk of cutting and cutting off by contact with moving parts such as couplings, shafts and rotors.

Risk of cutting and crushing when reaching into open flanges or covers.

Do not operate the vacuum pump with open flanges or covers. When installing, first mechanically connect the inlets and outlets, close the covers of rotating parts and then make the electrical connections. Disconnect the vacuum pump from the power supply before servicing. Only use trained service personnel.



### **WARNING: UNEXPECTED RESTART**



Failure or malfunction of the central control system (unexpected start-up) or danger of a pump restarting automatically after switching off due to a fault.

Risk of crushing, cutting or cutting off by touching moving parts due to recurring start command or power supply.

Before carrying out maintenance or service work, disconnect the pump from the power supply, secure it against being switched on again, determine that it is de-energised, ground and short-circuited and cover / isolate adjacent live parts.

### **CAUTION: RISK OF INJURY**



Pulling in of body parts and objects into the vacuum through open flanges. Do not operate the vacuum pump with open flanges. When installing the vacuum pump, first mechanically connect the inlets and outlets and then make the electrical connections.

### **CAUTION: HIGH PRESSURE GAS**



Danger due to incorrect connection of the pump to the system to be pumped out. Pressure build-up in the vacuum system.

Check correct connection of inlet and outlet flanges before commissioning. When using the pump with seal gas, protect the seal gas supply so that no overpressure can occur in the pump system in the event of a malfunction or power interruption.

### **CAUTION: TRIP HAZARD**



Slipping, tripping or falling as a result of oil leaking from the pump. Oil can escape from the vacuum pump during pumping or depending on the work process. Risk of falling on oil spills. Check the vacuum pump regularly for oil leaks. Take the appropriate safety measures

## 2.2 Electrical hazards

### **DANGER: ELECTRICAL SHOCK**



Risk of electrical shock caused by direct or indirect contact with live parts. Electrical shock due to faulty electrical connection and possible residual voltage up to 5 minutes after disconnection from the mains. The electrical connection may only be carried out by a trained person. Observe the national regulations in the user country, e.g. for Europe EN 50110 - 1. Prior to servicing, disconnect the vacuum pump from the power supply.

Risk of electrical shock due to interruption of the protective conductor system. In the event of a fault, life-threatening voltages may be present on electrically conductive components. Before commissioning, check the resistance of the earthing cable and the suitability of the assigned overcurrent protection device.



### **DANGER: LIGHTNING STRIKE**

Risk of fire and injury from lightning strike. The operator is responsible for assessing the hazard potential when used outside of buildings.

## 2.3 Thermal hazards

### **CAUTION: HOT SURFACES**

Burning of fingers, hands or arms on hot surfaces. Handle the pump only when ventilated and cooled down. Wear suitable protective equipment.



Scalding by contact with hot equipment or lubricants. Danger of scalding when opening the hot pump with hot operating fluid or cooling-water. Only open the outlet or inlet port for operating media if the operating medium has adapted to the room temperature. Wear suitable protective equipment.

A barrier must be placed around the pump to prevent accidental contact with hot surfaces. The barrier must not only consist of barricade tapes or warning signs. The barrier must be reliable and require tools (such as screwdriver or allen key) for removal.

## 2.4 Danger through materials and substances



### **DANGER: HAZARDOUS GASES**

Danger due to a rapid increase in pressure due to the decomposition of pumped gases. Uncontrolled emission of process gases by reaction products within the pump. The pumping of reactive gases, vapours or gas mixtures is generally prohibited. The operator is responsible for assessing the hazard potential of the process media or mixtures.

Danger of escaping or emitting pumped hazardous gases, vapours or substances. Pumped process gases may escape from the exhaust and leaks in the vacuum system. The pumping of pyrophoric / radioactive / oxidizing gases or gas mixtures, as well as the pumping of oxygen of more than atmospheric concentration (21 %) is generally prohibited. The operator is responsible for assessing the hazard potential of the process media or mixtures.

## 2.5 Explosion hazard



### **DANGER: INTERNAL EXPLOSION**

The pump is suitable for use with internal and external flammable atmospheres as defined by the pump marking. There is a risk of internal explosions within the pump, or ignition sources externally, if the pump is operated outside of the limits of operation.

## 2.6 Noise hazard



### **CAUTION: HIGH NOISE LEVELS**

**The operating conditions can cause higher noise levels than specified in the technical data. Take suitable hearing protection measures.**

Pressure values in bar or mbar are absolute pressures, unless expressly stated otherwise (e.g. bar(g)).

### 3. ATEX certification

#### **DANGER: INTERNAL EXPLOSION**



The EDS dry pump is designed to pump gas and/or vapours. Ensure that the pump temperatures are sufficient to prevent condensation forming which may otherwise lead to corrosion and loss of explosion protection. The use of seal purges and correct warm-up and shut-down procedures are necessary to prevent the formation of condensation. If in any doubt, please consult Edwards.

Shaft-seal purge must be maintained in order to ensure long term reliability of shaft-seals and the zoning/protection concept.

If blockages of the exhaust are possible, exhaust pressure should be monitored, otherwise excessive back-pressure can occur, leading to high temperatures and risk of explosion.


The EDS ATEX Category 3 dry pump uses the protection strategy of constructional safety for internal atmospheres, and satisfies the requirements for ATEX Category 3.

Constructional safety relies on there being no ignition sources inside the pump. EDS dry pumps are manufactured and tested to show that running clearances are maintained in the pump during extremes of normal operation and at trip points of pump safety instruments. For Category 3 inside pumps, ignition hazards are prevented from occurring in normal operation. When using constructional safety as the protection concept ensure that no process deposits are formed inside the pump which could potentially create an ignition source. This can be achieved either by process control or by the use of solvent flush. In such systems the solvent flush operation is safety critical and suitable safeguards must be put in place to ensure that solvent flow is maintained to the prescribed regime. The gearbox of the EDS pump is classified one zone lower than the pumping chamber; the high-integrity seal in combination with seal purge ensures zone separation.

The EDS is capable of pumping a potentially explosive atmosphere that is likely to occur occasionally in normal operation and therefore satisfies the essential requirements identified in Annex II of the ATEX Directive 2014/34/EU for Category 3 equipment.


#### 3.1 Classification and marking of the pump

The pump is marked as follows:

	II 3/-G Ex h IIC T3 Gc 5 °C < Ta < 40 °C (internal atmospheres only)
---	--

Modifying the supplied pump, voids the CE and ATEX Declaration of Conformity.

**Table 1** Key to the Symbols

	ATEX logo
h	The code letter "h" is valid for all non-electrical devices.
IIC	Explosion group

T3	Temperature class. Pumps belonging to temperature class T3 must only be operated with gases or vapors which exhibit an ignition temperature of over 200 °C.
----	---

## 3.2 Conditions of safe use

The EDS pump must be operated in accordance with the definitions of normal use and operational limits as specified within this manual.

Accessories and additional parts fitted to the EDS pump must fulfil the requirements of the ATEX Directive 2014/34/EU regarding the equipment group and category and they must be applicable for use in explosive atmospheres of the respective gas group and temperature class. Accessories and additional parts should be approved by Edwards otherwise they may have a detrimental effect on the pump performance and safety.

The mandatory safety instruments specified in this manual must be used and must not be replaced with alternatives from other manufacturers without consultation with Edwards.

Only processes which fulfill the conditions of the normal operation as specified in this manual must be used.

EDS pumps must only be used on processes if their materials resist the mechanical and/or chemical influences and corrosion, under the respective operating conditions, so that the explosion protection is always maintained.

Means for preventing back-flow of the pumped media must be used if back-flow can result in process hazards.

Opening the EDS pump is only permitted with the pump switched off, isolated from the electrical supply and in the absence of explosive atmosphere.

### Process limits

Inlet pressure: The range of allowable inlet pressures is 0 – 1013 mbar.

Exhaust pressure: The maximum allowable exhaust pressure is 1200 mbar for T3 pumps and 1100 mbar for T4 pumps.

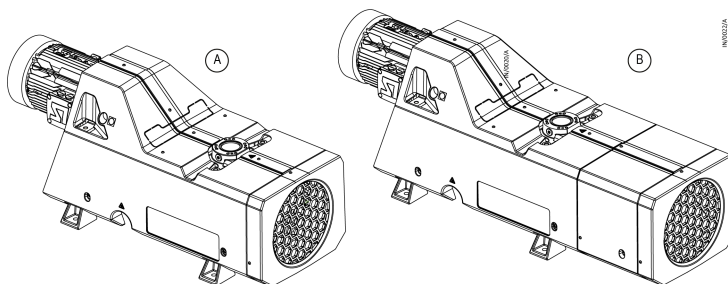
Inlet gas temperature: The maximum allowable inlet gas temperature is 110 °C for inlet pressures < 150 mbar, and 80 °C for inlet pressures > 150 mbar.

### Safety instruments

Refer to [Pump body thermal snap switch](#) (on page 34) and install and connect all mandatory safety switches.

## 4. Description

Figure 1 EDS pump models



*EDS 200 and EDS 300 look the same, they differ only in their performance.*

A. EDS 200/300 water-cooled

B. EDS 200/300 air-cooled (with heat exchanger)

## 4.1 Design

The EDS dry pump range has been developed to meet the demanding requirements for pumping solutions in industrial and chemical applications. The EDS pumps in general are designed for general vacuum use only and operation in rough and fine vacuum to evacuate vessels and to pump gas mixtures.

The pump is a dry, positive displacement screw vacuum pump in which pairs of intermeshing, non-contacting screw rotors are turning contrawise in phase by timing-gears. The screw rotors are driven by an asynchronous electrical motor. Blow-off valves within the mechanism minimize pumping power at high pressures and allow the pump to be started direct-on-line. The rotational speed of screw rotors is increased by transmission gears. Gears and bearings are oil lubricated.

The EDS pumps are supplied with different motors concerning main voltage and supply frequencies.

### Cooling system

The motor is air-cooled by an integrated cooling-fan. The EDS pump itself is water or air cooled.

Water cooled: cooling-water circulates around the pump-body and then passes out of the pump. The cooling system is open-loop and unregulated such that the cooling water flow rate and temperature will directly the temperature of the pump.

Air cooled: glycol/water mixture circulates around the pump-body and through the water to air cooled heat exchanger via an integrated water pump. The cooling system is closed-loop.

The pumps have a thermal snap-switch on the pump-body as temperature monitoring.

The output of the thermal snap-switch has two connections: one will open circuit when the temperature of pump-body is higher than 90 °C. Use this output to provide a warning of high temperature. The second output will open circuit when the temperature of pump-body is higher than 110 °C. Use this output to shut-down the pump when it is too hot.

### Gas system

The EDS pumps have a shaft-seal purge system and a gas-ballast system.

The shaft-seal purge delivers the supplied gas, e.g. dry compressed air or nitrogen, to the internal shaft seal system to protect it and ensure lifetime and functionality. Shaft-seal purge ensures that the shaft-seals are maintained at a positive pressure gradient to pumping chamber during pump operation; therefore it prevents the entry of corrosive or toxic process vapours into the pump gearbox; prevents contamination of the process gases by pump oil; prevents damage to shaft-seals by debris.

As supplied, the gas-ballast system can deliver ambient air to the pump gas-ballast inlet. Gas-ballast use depends on your application and can e.g. reduce temperature load or increase water vapour capability. The air-flow is filtered and is controlled by a valve. A check-valve in the system prevents the escape of process gases out of the gas ballast. If required for your application, it is possible to connect dry nitrogen supplies to the pump, to deliver nitrogen gas ballast and nitrogen shaft-seal purge instead of air.

## Covers

The pump is equipped with covers. These must always be mounted during operation of the pump, because they protect the operators from touching hot surfaces and they are required for the cooling air flow.

## 4.2 Supplied equipment

1. Pump as described in Design and Pumps
2. The pumps are filled with lubricant: Ultragrade® Endurance Extend 110
3. The pump flanges have been blanked off with a sealing cap
4. 4x crane eyes M16
5. Inlet diffuser
6. NW 40 clamping ring & O-ring for exhaust, O-ring for inlet
7. Pump body thermal snap switch

## 4.3 Ordering information

### 4.3.1 Pumps

**Table 2** Pumps ordering information

EDS	ATEX	Electrical Supply	Part No.
EDS 200 water cooled	II 3/-G Ex h IIC T3 Gc 5 °C < Ta < 40 °C (internal atmospheres only)	200/400 V 50 Hz	A41820945
		230/460 V 60 Hz	A41820946
		200 V 50 Hz	A41820934
		200/380 V 60 Hz	A41820936
		575 V 60 Hz	A41820957
EDS 200 air cooled		200/400 V 50 Hz	A41821945
		230/460 V 60 Hz	A41821946
		200 V 50 Hz	A41821934
		200/380 V 60 Hz	A41821936
		575 V 60 Hz	A41821957
EDS 300 water cooled		200/400 V 50 Hz	A41830945
		230/460 V 60 Hz	A41830946
		200/380 V 50 Hz	A41830934
		200/380 V 60 Hz	A41830936
		575 V 60 Hz	A41830957
EDS 300 air cooled	200/400 V 50 Hz	A41831945	
	230/460 V 60 Hz	A41831946	
	200/380 V 50 Hz	A41831934	
	200/380 V 60 Hz	A41831936	
	575 V 60 Hz	A41831957	

### 4.3.2 Accessories

**Table 3** Accessories

<b>Accessories</b>	<b>Part number</b>
Exhaust pressure transmitter (PS1)	A41894000
Exhaust gas temperature transmitter (TS3)	A41895001
Stator temperature transmitter (Pt 100)	A41895000
Roots adapter	A41893000
Ultragrade® Endurance Extend 110, 1 l	H11032010
Ultragrade® Endurance Extend 110, 4 l	H11032012
Roots adapter for EH 500	A41893001
TCV direct cooled	A41890000
Silencer kit NW40	A41896009
Solenoid valve for purge system	A41891001



## 5. Technical data

**Table 4** Technical data

EDS	200	300
Pumping speed without gas-ballast	> 210 m <sup>3</sup> /h	> 280 m <sup>3</sup> /h
Ultimate partial pressure	< 0.05 mbar	< 0.01 mbar
Maximum permissible inlet pressure	1013 mbar	
Max. permanent discharge pressure (absolute pressure)	1200 mbar	
Swept volume maximum pressure rating	11 bar	
Integral leak rate	< 10 <sup>-4</sup> mbar l/s	
Water vapour capacity without condensation between 10 – 50 mbar	1.5 - 7 kg/h	2 - 10 kg/h
Permissible ambient temperature	5 to 40 °C	
Storage temperature	-30 to +50°C	
Typical continuous A-weighted sound pressure level at ultimate pressure (without silencer but with long exhaust line)	≤ 72 dB(A)	
Relative atmospheric humidity	max. 90%	
Installation location	up to 2000 m (m ASL)	
Cooling	Water and water/ glycol mixture	
Mains voltage	200 - 230 V or 380 - 460 V AC ± 10% or 575 V	
Frequency	50/60 Hz	
Phases	3-ph	
Motor rating	5.5 kW (7.5 HP)	7.5 kW (10 HP)
Current rating (200 – 230 V systems) @ full load	23 A	29 A
Current rating (380 – 460 V systems) @ full load	11.5 A	14.5 A
Recommended branch circuit fuse:		
UL (200 – 230 V systems)	32 A	
IEC (200 – 230 V systems)	32 A	
UL (380 – 460 V systems)	16 A	
IEC (380 – 460 V systems)	16 A	
UL (575 V systems)	16 A	
IEC (575 V systems)	16 A	
Min cable size for:		
200 – 230 V systems	6 mm <sup>2</sup>	
380 – 460 V systems	4 mm <sup>2</sup>	
575 V systems	4 mm <sup>2</sup>	
Power consumption at ultimate pressure	4.1 kW (5.5 HP)	4.5 kW (6 HP)
Installation category	II (IEC 60664-1)	
Input supply voltage unbalance	Should not exceed 2% when assessed over any one minute period	

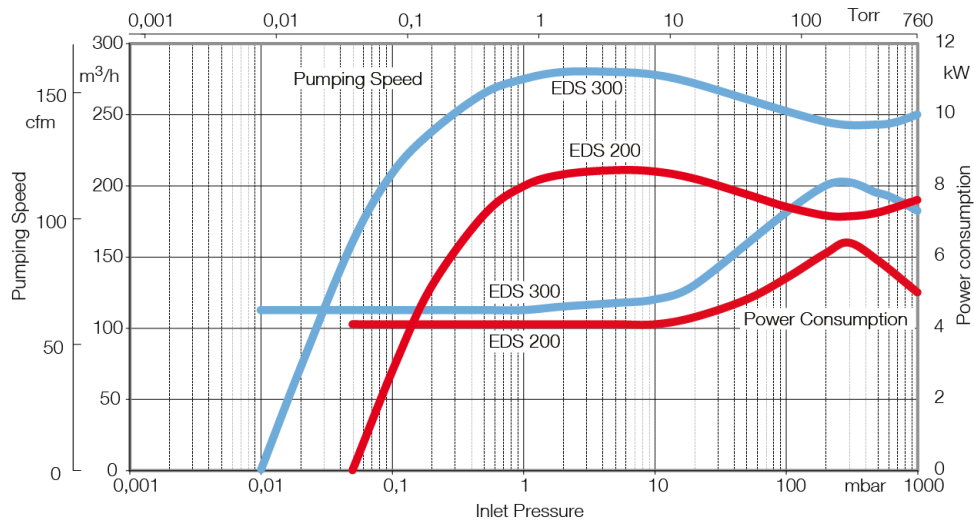
EDS	200	300
Short circuit current rating according IEC/EN 60947 suitable for motors with efficiency class IE3.	225 A	
Second protective earth (ground) conductor	Must be fitted with cross-sectional area at least equal to phase conductor size	
Cooling fan for heat exchanger		
Supply voltage 1-phase	24 V DC	
Nominal current consumption	5 A	
Pump body thermal snap switch		
Supply voltage 1-phase	6 - 230 V AC	
Rotor speed	6600 rpm	7500 rpm
Min. permissible motor speed <sup>1)</sup>	1200 rpm	
Protection class		
Water cooled	IP 54	
Air cooled	IP 20	
Approx warm-up time to a temperature of 40 °C (stator), with a cooling-water flow of 4 l·min <sup>-1</sup> @20°C	60 min	
Oil filling	Ultragrade® Endurance Extend 110	
Oil quantity		
Drive (gearbox)	1250 ml	
Inlet side	250 ml	
Inlet flange	ISO 63	
Exhaust flange	NW 40	
Materials		
Rotors, Stators, Shafts, Gearbox	Cast SG Iron	
Seals	PTFE and fluoroelastome	
Coupling cover	Cast grey iron, steel, aluminium, brass, rubber	
Timing gears	Steel	
Closed water circuit filling	Drystar water mixture 50:50	
Oil filling	Synthetic	
Weight (approximate)	420 kg	
Water		
Water connection	G½" female threads	
Water supply temperature	5 °C - 35 °C	
Required water pressure differential (to achieve minimum 8 l/min)	0.2 bar	
Maximum supply pressure	7 bar(g)**	
Primary cooling circuit volume (Drystar water mixture volume in case of variant with indirect cooling)	6 l	
Purge		
Connection	G¼" female thread	
Purge gas supply pressure range	4 to 10 bar (g)	
Purge gas regulated pressure	> 2.2 bar (g)	

EDS	200	300
Purge gas supply quality	< 5 μm	
Seal purge flow rate	12 slm total	
Gas-ballast flow rate	0 to 50 slm (adjustable)	

1) The minimum permissible speed is relevant for the oil lubrication of bearings and gears. Running the pump at less than the minimum speed for more than 1 hour can cause damage to the pump due to a lack of lubrication.

\*\*bar(g): bar (gauge) is the overpressure, i.e. atmospheric pressure = 0 bar(g)

Figure 2 Pumping speed curves EDS 200 and EDS 300



IN/0023/A

## 6. Transport and storage



### CAUTION: LOSS OF STABILITY DURING TRANSPORT

Uncontrolled movement due to faulty attaching/lifting/carrying/rolling or moving the vacuum pump. For vertical and horizontal transport, use only the attachment points and transport means described in this manual.



### NOTICE:

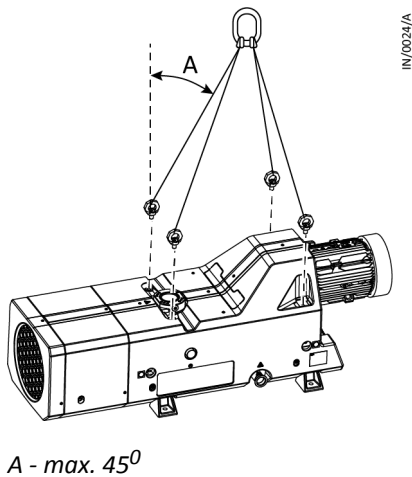
The pumps are supplied filled with synthetic oil. For this reason they should, while being transported or shipped, not be subjected to much tilting (10° max.). Store the pumps only horizontally standing on their feet.

Use a suitable fork-lift truck or pallet truck to move the pump on its pallet, close to where you will install it.

Remove all packing materials.

Lift the pump at the crane eyes. Use all crane eyes. Ensure that it cannot tip over.

Figure 3 Lifting the EDS pump



### 6.1 Storage

Store the pumps only horizontally standing on their feet.

Open the pumps only immediately before installing them.



### NOTICE:

If there is the danger of frost, the cooling-water must be drained.

You may use a water glycol mixture of up to 50 %

Temperature (only for storage without cooling-water)	-30 °C to +50 °C
Storage site	dry
Maximum atmospheric humidity	90 %, non-condensing

The pump must be stored at the most for one year only. Longer storing without turning the rotors will damage the bearings. Connect the pump to operate it briefly and then decommission it as described in the following sections. (The intake flange can stay sealed during this brief operation, the exhaust flange must be opened.).

## 7. Installation



### **WARNING: RISK OF CUTTING AND CRUSHING**

Risk of cutting and cutting off by contact with moving parts such as couplings, shafts and rotors. Risk of cutting and crushing when reaching into open flanges or covers. Do not operate the vacuum pump with open flanges or covers. When installing, first mechanically connect the inlets and outlets, close the covers of rotating parts and then make the electrical connections. Disconnect the vacuum pump from the power supply before servicing. Only use trained service personnel.



### **WARNING: EJECTION OF PARTS**

Ejection of parts through bursting of vacuum system due to excessive pressure caused by incorrect direction of rotation. Pressure build-up in the vacuum system or in vacuum chambers. Check the direction of rotation of the vacuum pumps before each start-up, after each motor change and after each electrical connection change.

Ejection of parts through bursting of vacuum system due to excessive pressure, caused by faulty function at the gas inlet into the vacuum system. Pressure build-up in the vacuum system or inlet lines. Check correct connection of inlet and outlet flanges before commissioning. The inlet pressure at the suction port of the vacuum system must not exceed atmospheric pressure. If seal gas or gas-ballast from pressure vessels is used, secure the supply in such a way that no overpressure can occur in the vacuum system in the event of a fault or power interruption.



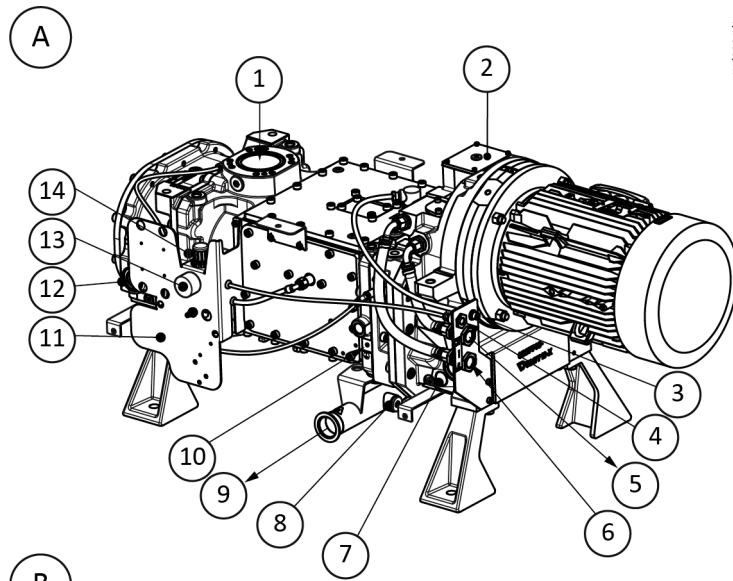
### **WARNING: RISK OF GAS LEAKAGE**

The atmospheric shaft seal between the gearbox and atmosphere is a PTFE dynamic seal, which may, under wear-out conditions, lead to small leakage of gas. Ensure that purge gas is supplied continuously to the main pump shaft seals to prevent process gas entering the gearbox which could otherwise leak from the atmospheric shaft seal. Leakage of purge gas to atmosphere should also be considered; ensure the pump is in a well ventilated area.

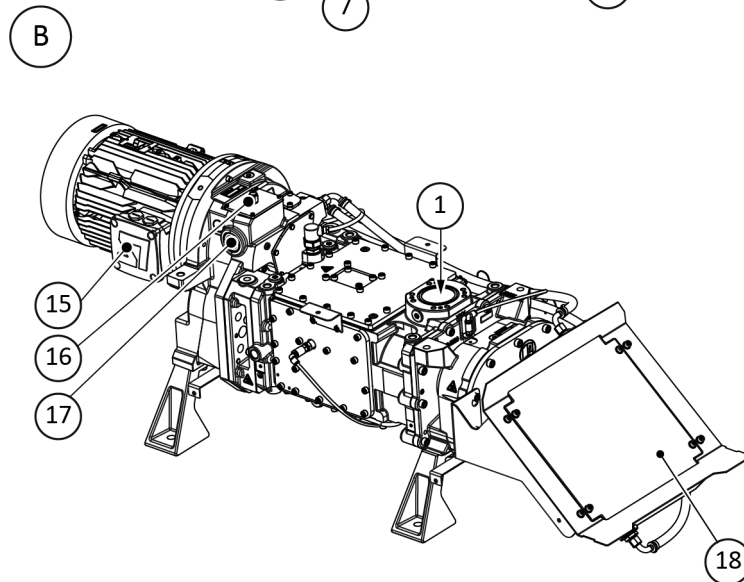
Only competent persons may install this EDS pump.

- Ensure that you comply with all local and national safety requirements when you install the pump.
- Do not operate the pump system unless the inlet and outlet are connected to your piping system.
- Disconnect the other components in the pumping system from the electrical supply so that they cannot be operated accidentally.
- Electrical, purge gas and water supplies are all potentially hazardous energy sources. Before carrying out any maintenance the supply of these sources should be locked and tagged out.
- Ensure that the cooling-air flow through the pump-motor cooling-fan cannot be obstructed.
- Ensure that all electrical cables, purge gas pipelines and cooling-water pipelines are safely positioned, secured and routed, so that they do not present a trip hazard.

**Figure 4** Connections and controls



IN/2021/A

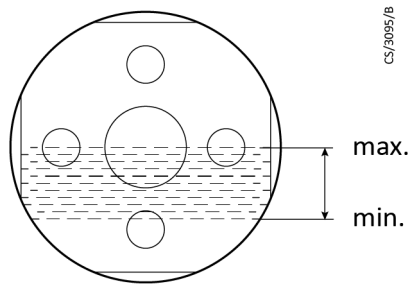


**A.** Water cooled version

**B.** Air cooled version

- |  |                                      |
|--|--------------------------------------|
| 1. Inlet                                   | 2. Pump body thermal snap switch     |
| 3. Pump body temperature control connector | 4. Purge gas IN                      |
| 5. Cooling-water OUT                       | 6. Cooling-water IN                  |
| 7. Gearbox oil level glass                 | 8. Exhaust pressure transmitter port |
| 9. Exhaust                                 | 10. Grounding connection M6          |
| 11. Gas panel                              | 12. HV end oil level glass           |
| 13. Gas system pressure gauge              | 14. Gas system pressure regulator    |
| 15. Pump motor terminal box                | 16. Relief valve                     |
| 17. Cooling water level glass              | 18. Heat exchanger                   |

Figure 5 Oil level at pump standstill



## 7.1 Placement

Place the pump system on a flat and level surface.

The pump is designed for operation in building. We recommend leaving the crane eyes screwed in.

Remove the covers and blank flanges on the pump just before fitting the pump so that the assembly work can be performed under the cleanest conditions.

Check whether there is any desiccant present in the intake area and remove it.

The pumps are supplied filled with synthetic oil. Nothing will have to be refilled. Check the oil levels through both oil level glasses.

If one of the oil levels is found to be incorrect, contact Edwards.

Fit suitable bolts through the fixing holes in the mounting feet, to secure the pump in position.

## 7.2 Normal operation

The EDS pumps are suitable for a wide range of industrial and chemical applications. Edwards has a dedicated team of applications engineers who can help you determine the best EDS system for your application.

If you use the system on an application for which it is not suitable, you may invalidate your warranties. If in doubt, contact Edwards.

### 7.2.1 Abnormal operation



#### **WARNING: UNPREDICTABLE FAILURES**

**Use of equipment in abnormal operations can lead to failures that result in injury or death. Misuse of the pump as described below is strictly prohibited.**

- Use of the EDS as a positive displacement compressor
- Operation outside the limits of operation further defined in this manual
- Operation outside the limits of the ATEX marking
- Reverse rotation of the EDS
- Pumping gases and vapours for which the materials (see *Technical data (on page 17)*) of the pump are not suitable
- Pumping of substances and mixtures (gases, liquids and solids) where the explosion hazard results exclusively from the presence of explosive substances
- Pumping gases that tend to self-decompose, or that are chemically unstable



- Use of the EDS dry pump with materials which have auto-ignition temperatures below the defined temperature rating
- Operation such that dusts and process deposits can build up inside the pump mechanism, blow-off-valve and exhaust. This could lead to a loss of constructional safety and an ignition hazard
- Operation such that the EDS dry pump inlet temperature falls below the dew point of a vapour being pumped. This could lead to condensate that can collect and lead to the risk of corrosion or an ignition hazard
- Pumping of, or use of the EDS dry pump in the presence of, explosive dust atmospheres
- Use of the EDS dry pump in a system or flammable process that causes the ingress of metallic particles into the pump
- Pumping of liquids and solid particles
- Pumping pyrophoric gases
- Use with oxygen enriched atmospheres
- Operation with insufficient attachment of the pump
- Conversion, manipulation, and maintenance by people not authorized by Edwards
- Use of accessories that are not suitable for the internal or external ATEX rating, or which are not permitted or approved by Edwards

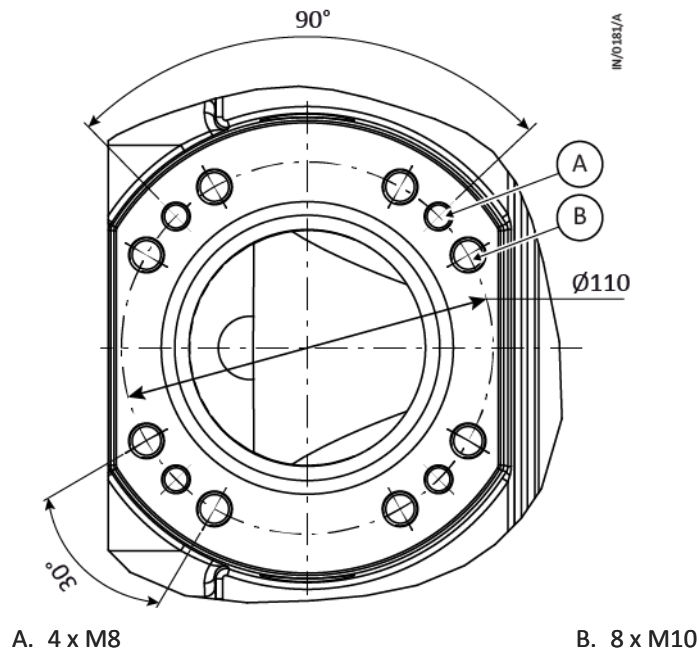
## 7.3 Connecting the inlet and exhaust lines

### 7.3.1 Inlet lines

When you connect the EDS pump to the process system:

- Support process pipelines to stop the transmission of stress to pipeline joints.
  - Use flexible connection in the pipeline from the process system to the pump to reduce vibration and stress in the system pipelines.
  - Ensure the loads on the pump-inlet flange do not exceed the limits specified in Exhaust Lines.
  - Consider to isolate the pump from the atmosphere and from your process systems if you have pumped or produced dangerous chemicals.
  - On very dusty applications, incorporate an inlet filter in the inlet pipeline, to minimise the ingress of dust into the pump.
1. Undo and remove the bolts which secure the blanking-plate to the pump-inlet and remove the blanking plate. Retain the bolts.
  2. Use the trapped O-ring (fitted to the pump) to connect the pump-inlet to your vacuum system. Secure the bolts retained in Step 1.

Figure 6 Inlet flange dimensions (in mm)



### 7.3.2 Exhaust lines



#### **WARNING: DANGEROUS GASES**

Pipe the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases or vapours to the surrounding atmosphere.



#### **WARNING: INTERNAL EXPLOSION**

Incorporate safety devices to prevent operation of the pump when the exhaust pipeline is restricted or blocked. If you do not, the exhaust pipeline may become over-pressurised and may burst.

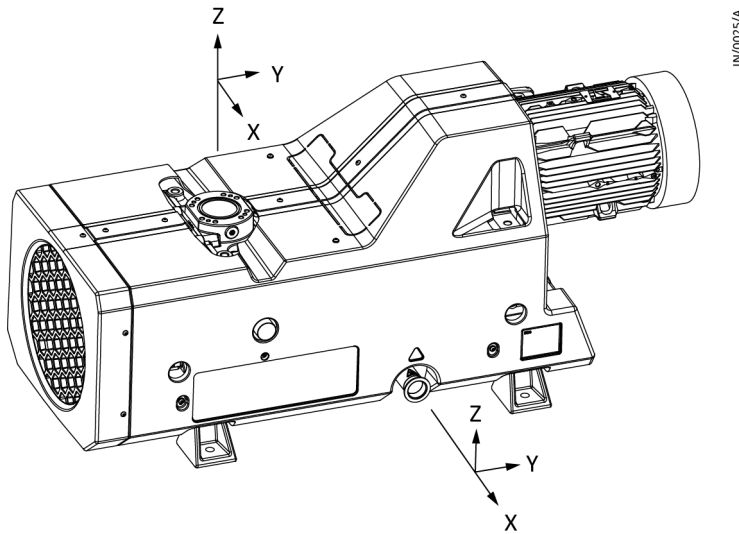
**Do not operate the EDS dry pump with the exhaust pipeline blocked. If the exhaust pipeline is blocked, the pump can generate exhaust pipeline pressures of up to 12 bar.**

Your exhaust pipeline system must be designed so that the pressure in the pipeline during operation is less than 1.2 bar absolute.

Incorporate flexible bellows in the exhaust pipeline to reduce the transmission of vibration and to prevent loading of coupling-joints, which can withstand pressure and maximum temperature of about 170 °C.

Remove the blanking-cap from the pump-outlet.

Use the NW 40 clamping ring and trapped O-ring supplied in the fittings kit to connect the pump-outlet to your exhaust pipeline.

**Figure 7** Maximum permissible flange loads**Table 5** Maximum permissible flange load

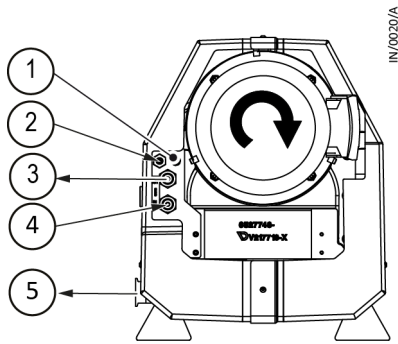
Maximum force	Pump inlet	Pump outlet
$F_X$	$\pm 892$ N	$\pm 446$ N
$F_Y$	$\pm 1070$ N	$\pm 356$ N
$F_Z$	$\pm 1338$ N	$\pm 290$ N
$F_R$	$\pm 1931$ N	$\pm 640$ N
Maximum moment	Pump inlet	Pump outlet
$M_X$	$\pm 476$ Nm	$\pm 115$ Nm
$M_Y$	$\pm 952$ Nm	$\pm 231$ Nm
$M_Z$	$\pm 721$ Nm	$\pm 177$ Nm
$M_R$	$\pm 1285$ Nm	$\pm 313$ Nm

## 7.4 Connecting cooling-water

(Only for water cooled version)

1. Use G1/2 male pipe fittings to fit the cooling-water supply and return hoses.
2. Remove the blanking plugs from the cooling-water inlet and outlet.
3. Connect your water return hose to the cooling-water-outlet and connect your water supply hose to the water-cooling inlet.
4. Turn on the cooling-water supply.
5. Inspect the water hoses, pipelines and connections and check that there are no leaks.

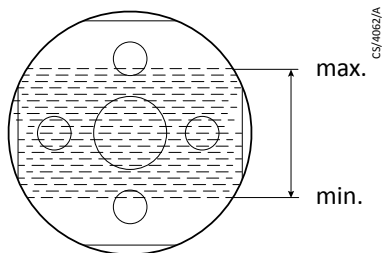
**Figure 8** Connections and direction of motor rotation



- 1. Pump body temperature control connector
- 2. Purge gas inlet
- 3. Cooling-water outlet
- 4. Cooling-water inlet
- 5. Exhaust

Type	Cooling-water demand at feed temperature (assuming a constant discharge temperature of 50 °C)		
	30°C...35°C	25°C...30°C	5°C...25°C
	l/min	l/min	l/min
EDS 200/300	8.0	6.0	4.0
Depending on your application and use of thermostatic valve temperatures and flows may differ			

**Figure 9** Cooling water level



### 7.4.1 Water quality

In order to ensure long trouble-free operation the cooling-water must not contain any oils, greases and suspended solids. Moreover, we recommend compliance with the following limit values:

Appearance	Clear, free of oils and greases
Suspended matter	< 250 mg/l
Particle size	< 150 µm
Electrical conductivity	< 700 µS/cm
pH value	7.0 to 9.0
Total hardness (total alkaline earths)	< 8 °dH
Aggressive carbon dioxide	None, not detectable
Chloride	< 100 mg/l
Sulfate	< 150 mg/l
Nitrate	≤ 50 mg/l
Iron	< 0.2 mg/l
Manganese	< 0.1 mg/l
Ammonium	< 1.0 mg/l

Free chlorine	< 0.2 mg/l
8 °dH (degrees German hardness) = 1.4mmol/l = 10 °e (degrees English hardness) = 14 °f (degrees French hardness)	
If there is the danger of frost, you may use a water Drystar mixture of up to 50%.	
DS water can be used for cooling the pump, if the pH value corresponds to the range indicated above.	

## 7.5 Connecting purge gas

The pump must be operated with purge gas. The purge gas is distributed in the pump via flow restrictors as follows:

- to the shaft-seal on the low vacuum side
- into the pumping chamber (balance line)
- to the shaft-seal on the high vacuum side.

The flow restrictors ensure that the gas flow to the shaft-seal on the high vacuum side becomes very low at ultimate pressure.

The purge gas on the shaft-seals provides an air cushion under the shaft-seals and thus prevents premature wear.

Use of the correct shaft-seal purge and gas-ballast requirements depend on your application. If in doubt about your application setting, contact Edwards.

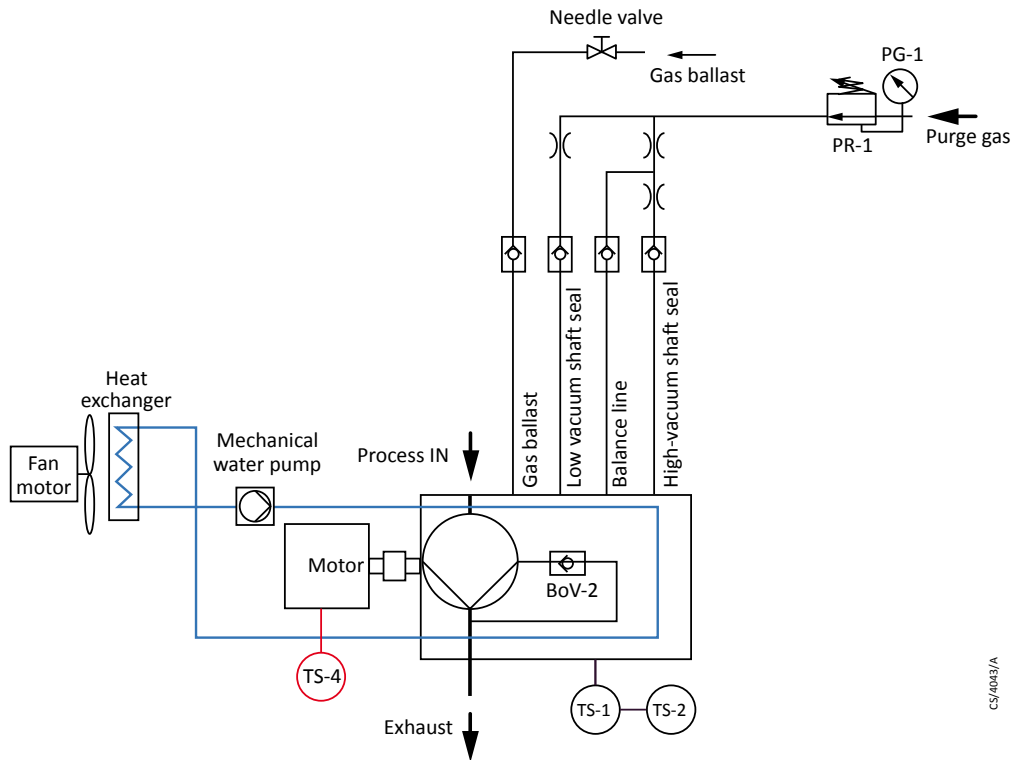
- Connect an inert gas supply to the gas system. An upstream supply pressure of 4 to 10 bar(g) is required. Ensure that your gas system can maintain pressure whilst flowing up to 62 SLM of purge gas.
- Adjust the regulator on the gas panel to 2.2 bar(g).
- The purge supply should be maintained whenever the pump is operational, to ensure the process seals operate correctly and that the oil boxes are adequately protected from process media.
- Be aware that the purge supplies are not automatically controlled, therefore it could be possible to pressurise the pump or system if purge is left on with a closed system.
- Atmospheric gas-ballast can be adjusted or shut off completely, depending on your application, using the manual needle valve.

### **WARNING: LEAKAGE OF GAS**





The atmospheric shaft-seal between the gearbox and atmosphere is a PTFE dynamic seal, which may, under wear-out conditions, lead to small leakage of gearbox gas. Ensure that purge gas is supplied continuously to the main pump shaft-seals to prevent process gas entering the gearbox which could otherwise leak from the atmospheric shaft-seal. Leakage of purge gas to atmosphere should also be considered; ensure the pump is in a well ventilated area.

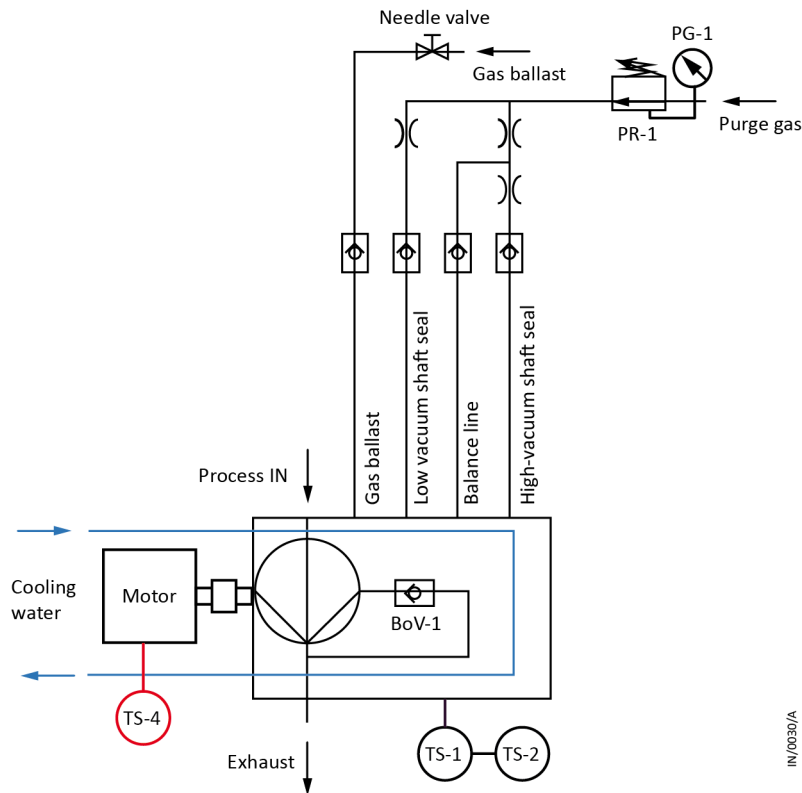
**Figure 10** Schematic for purge gas and switches - EDS pump with air cooling





CS/403/A

PG-1	Pressure gauge purge gas
PR-1	Pressure regulator purge gas
BoV-1	Blow off valve
TS-1	Pump body thermal snap switch, warning
TS-2	Pump body thermal snap switch, trip
TS-4	Motor thermistor
	Flow restrictor
	Non-return valve

**Figure 11** Schematic for purge gas and switches - EDS pump with water cooling



PG-1	Pressure gauge purge gas
PR-1	Pressure regulator purge gas
BoV-1	Blow off valve
TS-1	Pump body thermal snap switch, warning
TS-2	Pump body thermal snap switch, trip
TS-4	Motor thermistor
	Flow restrictor
	Non-return valve

## 7.6 Electrical connections

### **DANGER: ELECTRIC SHOCK**



Electrical shock caused by direct or indirect contact with live parts. Electrical shock due to faulty electrical connection and possible residual voltage up to 5 minutes after disconnection from the mains. The electrical connection may only be carried out by a trained person. Observe the national regulations in the user country, e.g. for Europe EN 50110 - 1. Prior to servicing, disconnect the vacuum pump from the power supply.

Electrical shock due to interruption of the protective conductor system. In the event of a fault, life-threatening voltages may be present on electrically conductive components. Before commissioning, check the resistance of the earthing cable and the suitability of the assigned overcurrent protection device.



**WARNING: LIGHTNING STRIKE**

Risk of fire and injury from lightning strike. The operator is responsible for assessing the hazard potential when used outside of buildings.

**7.6.1 Wiring the motor**

All variants of EDS pump are supplied with a three-phase 5.5 or 7.5 kW pump motor.

Wire the motor in accordance with the instructions supplied with the motors.

Ensure that the electrical installation of the EDS pump conforms to your local and national safety requirements. It must be connected to a suitably rated fused and protected electrical supply and a suitable earth (ground) point.

Provide suitable strain relief on the electrical supply cables. If you do not, the cables (or wires in the cables) may become disconnected and there may be a risk of injury or death by electric shock.

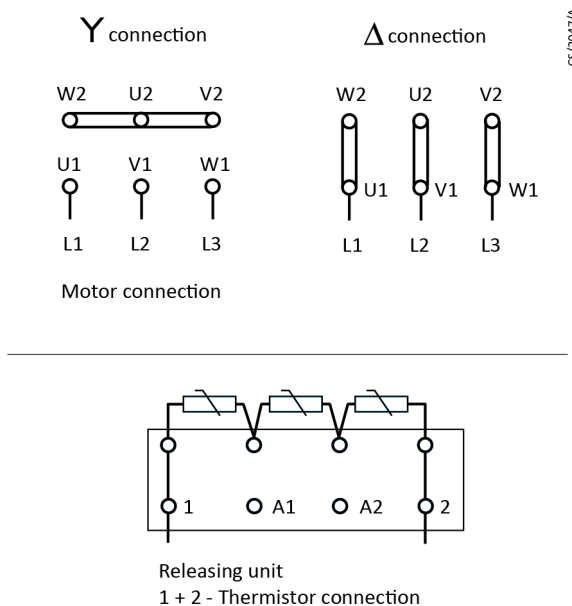
We recommend that you connect the electrical supply to the pump motor through a suitable current monitor, and that you configure the high current setting on the current monitor to switch off the pump motor at a suitable overload current.

Connect the electrical supply to the pump motor through a contactor which has a manual reset control. The contactor must be installed such that manual reset is required after a power failure. The contactor must incorporate a motor circuit-breaker which meets the full load current ratings of the pump motor.

You must be able to isolate and lock out the electrical supply to the EDS pump motor.

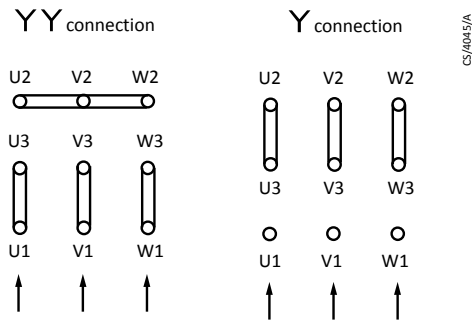
The EDS pump can be operated direct-on-line or via a frequency converter. Selection and installation of a frequency inverter is the responsibility of the user. Ensure that the motor operation and certification is not adversely affected by the use of a frequency converter. The min and max motor speeds given in the technical data must be followed.

**Figure 12** Wiring schematic-1





**Figure 13** Wiring schematic-2



EDS	Electrical Supply	Part No.	Motor terminal connection	Wiring Schematic
EDS 200 water cooled	200/400 V 50 Hz	A41820945	Y/YY	Wiring schematic-2
	230/460 V 60 Hz	A41820946	Y/YY	
	200 V 50 Hz	A41820934	Y/Δ	Wiring schematic-1
	200/380 V 60 Hz	A41820936	Y/Δ	
	575 V 60 Hz	A41820957	Y	
EDS 200 air cooled	200/400 V 50 Hz	A41821945	Y/YY	Wiring schematic-2
	230/460 V 60 Hz	A41821946	Y/YY	
	200 V 50 Hz	A41821934	Y/Δ	Wiring schematic-1
	200/380 V 60 Hz	A41821936	Y/Δ	
	575 V 60 Hz	A41821957	Y	
EDS 300 water cooled	200/400 V 50 Hz	A41830945	Y/YY	Wiring schematic-2
	230/460 V 60 Hz	A41830946	Y/YY	
	200/380 V 50 Hz	A41830934	Y/Δ	Wiring schematic-1
	200/380 V 60 Hz	A41830936	Y/Δ	
	575 V 60 Hz	A41830957	Y	
EDS 300 air cooled	200/400 V 50 Hz	A41831945	Y/YY	Wiring schematic-2
	230/460 V 60 Hz	A41831946	Y/YY	
	200/380 V 50 Hz	A41831934	Y/Δ	Wiring schematic-1
	200/380 V 60 Hz	A41831936	Y/Δ	
	575 V 60 Hz	A41831957	Y	

**Motor thermistor**

Connect the motor thermistors (PTC 150 °C) to your pump-motor control circuit. These must be configured so that manual reset is required, otherwise the pump may restart automatically once it has cooled down.

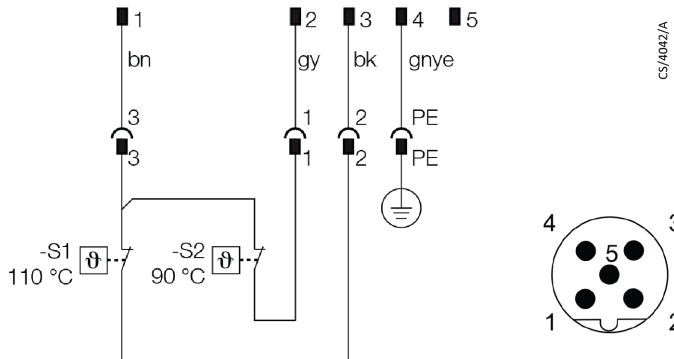
The pump motor has 3 PTCs in series. They comply with the standard DIN VDE V098-1-401. In the terminal box are two wires of the PTCs, they have no polarity. Connect them to a control unit. Do not connect the wires directly to the power.

The temperature sensor has a basic insulation to the motor winding. The operator has to provide appropriate measure for the protection against indirect contact. For example, a monitoring body with galvanic isolation from the temperature sensor to the pump control can be provided for this.

### 7.6.2 Motor thermistors

### 7.6.3 Pump body thermal snap switch

Figure 14 Pump body thermal snap switch connection



Wire the snap switch into the pump-motor control circuit so that it stops the pump motor. This must be configured so that manual re-set is required.

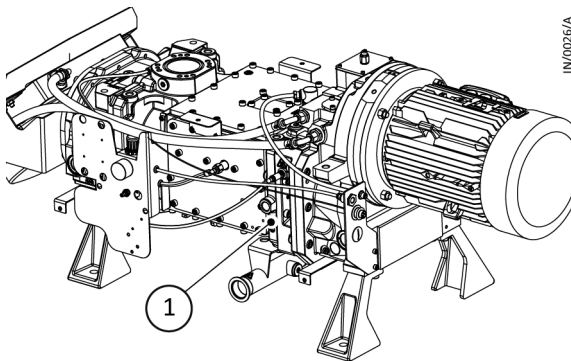
Switching point(s)	Connection
Normally closed	Plug: GSP3-U1
90 °C ± 5 K warning	90 °C: terminal 1 and 3
110 °C ± 5 K trip	110 °C: terminal 2 and 3
Switching capacity: 230 V a.c., 2.5 A	see <a href="#">Figure: Wiring schematic-1</a> on page 32

The output of the thermal snap-switch has two connections: one will open circuit when the temperature of pump-body is higher than 90 °C. Use this output to provide a warning of high temperature. The second output will open circuit when the temperature of pump-body is higher than 110 °C. Use this output to shut-down the pump when it is too hot.

### 7.6.4 Grounding

Connect the pump to a suitable factory or plant earth (ground) via a M6 earth thread.

Figure 15 Grounding



1. M6 thread

## 7.6.5 Check the direction of rotation of the motor

Blank the inlet or connect the EDS pump to the vacuum system before you check the direction of pump rotation. If you do not, there is danger of objects being trapped in the rotating pump rotors.

Direction of rotation is clockwise as viewed from the motor end of the pump. View the motor fan direction.

Let the pump run up briefly (for approximately 1 second) and then immediately switch it off again.

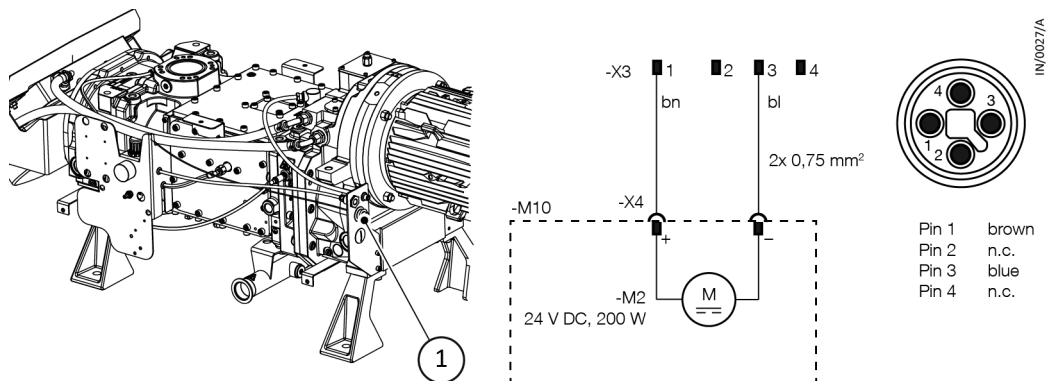
If the rotation direction is incorrect, isolate and lock-out the power supply, then change the phases on the pump-motor and recheck direction.

## 7.6.6 Connecting the heat exchanger fan

**(only for air cooled versions)**

Connect the heat exchanger fan as shown.

**Figure 16** Heat exchanger fan connection



### 1. Heat exchanger fan connection

The direction of rotation is indicated. Check the direction of rotation by viewing the fan. If the direction of rotation is incorrect, the live and neutral phases are incorrectly wired.

Power supply must be intrinsically safe according to EN 61010 and the fan supply must be fused with maximum 4 A.

## 7.7 Leak check after installation

EDS pumps are not hermetical sealed and leak tight by principle. Leak-check all relevant connections after having installed the pump.

## 8. Operation

### **DANGER: EMISSION OF HAZARDOUS GAS**



Danger as a result of rapid increase in pressure due to decomposition of pumped gases. Uncontrolled emission of process gases by reaction products within the pump. The pumping of reactive gases, vapours or gas mixtures is generally prohibited. The operator is responsible for the assessment of the hazard potential of the process media or mixtures.

Dangers through escaping or emitting transported hazardous gases, vapours or substances. Process gases may escape from the exhaust and from leaks in the vacuum system. The pumping of pyrophoric / radioactive / oxidizing gases or gas mixtures, as well as the pumping of oxygen of more than atmospheric concentration (21 %) is generally prohibited. The operator is responsible for the assessment of the hazard potential of the process media or mixtures.

### **WARNING: EJECTION OF PARTS**



Ejection of parts by bursting of the vacuum system due to excessive pressure caused by clogged or constricted exhaust. Pressure build-up in the vacuum system or exhaust pipes. Do not operate the vacuum system with the outlet closed or throttled.

Ejection of parts by bursting of the vacuum system due to excessive pressure caused by the pump running backwards after it has been switched off under vacuum. Danger of overpressure in the inlet lines and recipients as well as uncontrolled backward running of rotors. In the event of a fault or during service, separate the vacuum pumps from the vacuum container and connecting lines before the inlet by means of suitable valves.

### **CAUTION: EXTREME SUCTION**



Pulling body parts and objects into the vacuum through open flanges. Do not put the vacuum pump into operation with open flanges. During installation of the vacuum pump first mechanically connect the inlets and outlets, and only then make the electrical connections.

### **CAUTION: TRIP HAZARD**



Hazard of slipping, tripping or falling due to oil leakage from the pump. During transport or depending on the work process, oil may escape from the vacuum pump. Risk of falling on oil spills. Check vacuum pump regularly for oil leaks. Take appropriate safety measures.

### **CAUTION: HOT SURFACES**



Burns due to contact with hot surfaces. Burning of fingers, hands or arms on hot surfaces. Handle the pump only when ventilated and cooled down. Wear suitable protective equipment.



### CAUTION: HIGH NOISE LEVELS

Hearing loss due to high noise level. Depending on the operating conditions, higher noise levels can be achieved than specified in the technical data. Take suitable hearing protection measures.

## 8.1 Media compatibility

See *Normal operation* (on page 24). For a list of materials in contact with the process gas, see *Technical data* (on page 17).

If you use the system on an application for which it is not suitable, you may invalidate your warranties. If in doubt, contact Edwards.

## 8.2 Start-up

1. Ensure that any isolation valves in the process pipework are in the correct positions (exhaust must be open).
2. Switch on the cooling water for water cooled pumps. For air cooled pumps ensure the heat exchanger fan is powered and running.
3. Switch on or open the purge gas supply line and ensure right setting. Refer to *Connecting purge gas* (on page 29).
4. Start the EDS pump by switching on the electrical supply.

The pump is ready for process when the stator temperature, measured next to the stator thermal switch, reaches 40°C. (note this process-ready temperature may be different, depending on your application)

## 8.3 Manual shut-down

1. Close the pump-inlet isolation-valve (if fitted).
2. Leave the EDS pump operating for sufficient time such that the pump is thoroughly purged of any process gases. If condensable fluids have been pumped, operate the EDS pump for at least 40 minutes with all purges on.
3. Switch off the EDS pump.
4. Close or switch off the purge gas supply line.
5. For water cooled pumps only keep the water cooling on for 10 minutes, then switch off the cooling water.



### NOTICE:

If you switch off water-cooling by closing both cooling-water inlet and outlet, temperature may rise and result in unacceptable high water pressure and the water circuit may leak.

## 8.4 Unplanned shut-down and alarms

Refer to *Pump body thermal snap switch* (on page 34) for instrument trip points.

If the pump stops unexpectedly whilst processing corrosive or condensable vapours internally, it must be fully purged for sufficient time to ensure it is free of corrosives or liquids. Otherwise the pump may corrode and be damaged.

## 9. Maintenance

### **WARNING: UNEXPECTED RESTART**



Failure or malfunction of the central control system (unexpected start-up) or danger of a pump restarting automatically after switching off due to a fault. Crushing, cutting or cutting off by touching moving parts due to recurring start command or power supply. Before carrying out maintenance or service work, disconnect the pump from the power supply, secure it against being switched on again, determine that it is de-energised, ground and short-circuit it and cover/isolate adjacent live parts.

### **CAUTION: HOT EQUIPMENT**



Scalding by touching hot equipment or lubricants. Danger of scalding when opening the hot pump with hot operating fluid or cooling-water. Open outlet or inlet port for operating fluids only if the operating fluid has adapted to the room temperature. Wear suitable protective equipment.

### **CAUTION: HIGH PRESSURE GAS**



Danger due to incorrect connection of the pump to the system to be pumped out. Pressure build-up in the vacuum system. Check correct connection of inlet and outlet flanges before operation. When using the pump with seal gas, protect the seal gas supply so that no overpressure can occur in the pump system in the event of a malfunction or power interruption.

### 9.1 Return the equipment or components 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/](http://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.

**NOTICE:**

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

## 9.2 Maintenance intervals

Standard maintenance activities are listed below. These activities are given for standard operating conditions and may differ depending on the harshness of your application. Therefore the maintenance plan might need to be adapted to your process conditions. If in doubt, please contact Edwards for any further advice.

**Table 6** Maintenance intervals

Service work	Interval
Check the oil level and top-up if required	1 week
Check the cooling-water level and top-up if required	1 week (only air cooled versions)
Check the purge gas supply pressure and hoses	6 months
Check the water hoses	6 months
Drain and replace oil	1 year
Drain and replace coolant	1 year (only air cooled versions)
Remove and clean water pump	1 year (only air cooled versions)
Replace blow-off valve	1 year
Clean the heat exchanger	1 year (only air cooled versions)
Complete overhaul in Edwards service centre	4 years or 32,000 operating hours
Leak check the entire pump system	after all maintenance and assembly work and upon request

## 9.3 Checking the oil

**WARNING: RISK OF BURNS**

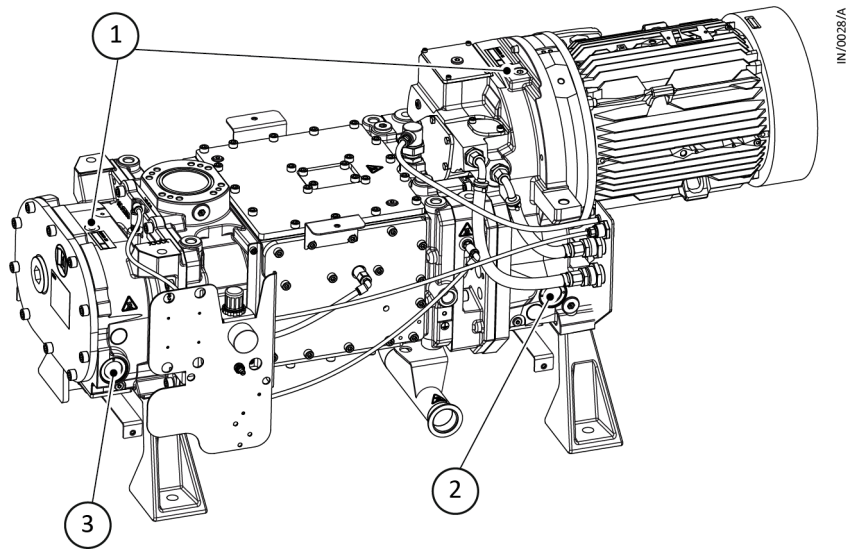
**Before removing the oil-drain or oil-fill plug always switch off the pump first and vent to atmospheric pressure. When the pump has become warm during operation the casing and the oil temperature may exceed 80 °C. Leave the pump to cool down. Always wear protective gloves also to protect yourself against aggressive residues in the oil**

The oil-level should be between the bottom and top of the glass for a non-operating pump. When the pump is operating the oil-level is slightly lower than in a static condition.

If the oil shows any significant change in normal colour consider an oil change and contact Edwards.

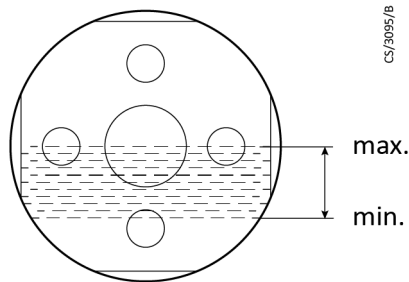
Make sure to use the right kind of oil, see [Accessories](#) (on page 16). Only use Edwards oil.

Figure 17 Oil level check



- 1. Oil fill plugs
- 2. Oil level glass-motor side
- 3. Oil level glass-intake side

Figure 18 Oil level at pump standstill



**NOTICE:**



If the oil level is too low, the bearings and gearwheels are not lubricated adequately; if it is too high, oil may enter the pumping chamber.

The oil filling openings must be airtight. Under vacuum, the inflow of outside air can cause oily gas to enter the pump chamber via the piston rings.

Clean the oil-fill port and reinstall the plug using a gasket which is in perfect condition. Wipe off any oil residues from the casing.

## 9.4 Inspect the closed cooling-water circuit

(only for air cooled pump variants)



**CAUTION:**

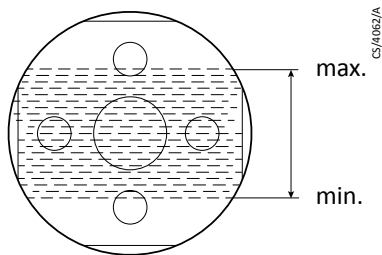
The cooling system may be pressurized. Ensure that the EDS pump is cooled before attempting to open the cooling-water header tank. Slowly open the filler cap to release pressure.

Only for air cooled EDS pump the water or Drystar mixture filling of the closed-loop circuit needs to be checked.



Cooling-water should be visible in the cooling-water level sight glass above the gearbox. If no water or Drystar mixture is visible, the system will require additional coolant. Fill up the system with adequate coolant, so that the sight glass is completely filled up.

**Figure 19** Cooling water level



## 9.5 Inspect pipelines and connectors

Inspect all of the cooling system and purge gas pipelines and connections. Check that they are not corroded or damaged. Replace any of the pipelines and connections that are corroded or damaged. Check that all connections are secure. Tighten any loose connections.

Inspect all of the electrical cables. Check that they are not damaged and have not overheated. Replace any cables that are damaged or have overheated. Check that all of the electrical connections are secure. Tighten any loose connections.

Inspect all of the process inlet and exhaust pipelines and connections. Check that they are not corroded or damaged. Replace any of the pipelines and connections that are corroded or damaged. Check that all connections are secure. Tighten any loose connections.

## 10. Spares

Table 7 Spare

Part number	Description
H11033015	Ultragrade® Kinetic 150 1L
H11033010	Ultragrade® Kinetic 150 4L
H12810003	Drystar coolant 0.9/2L
A41889706	EDS200/300 Direct cooled service kit
A41889708	EDS200/300 Indirect cooled service kit
A41889705	EDS 200/300 BOV kit
A41889702	EDS 200/300 Chemical atmospheric seal kit
EK32000113	Sight glass 40, 3 X 4 kit ATEX
A41889710	200/300 Chemical exhaust kit

## 11. Diagnose a fault

A list of fault conditions and their possible causes is provided here to assist in basic troubleshooting. If you are unable to rectify a fault using this guide, call your supplier or your nearest Edwards Service Centre for advice.

<b>Fault</b>	<b>Pump does not start up</b>
<b>Cause</b>	<b>Motor incorrectly connected.</b>
Remedy	Connect motor correctly.
<b>Cause</b>	<b>Overtemperature switch or motor stator defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Pressure switch is defective.</b>
Remedy	Replace the pressure switch.
<b>Cause</b>	<b>Lubricant is too thick.</b>
Remedy	Exchange the lubricant or warm up lubricant and pump.
<b>Cause</b>	<b>Motor rotor defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Pump has seized: defective rotors, bearings or toothed gears.</b>
Remedy	Contact Edwards Service.
<b>Fault</b>	<b>Pump gets too hot</b>
<b>Cause</b>	<b>Cooling-water supply is not sufficient.</b>
Remedy	Ensure sufficient cooling-water supply.
<b>Cause</b>	<b>Cooling-water lines are clogged.</b>
Remedy	Decalcify cooling-water lines.
<b>Cause</b>	<b>Ambient temperature is too high or cooling air flow is obstructed.</b>
Remedy	Install the pump at a suitable place or ensure a sufficient flow of cooling air.
<b>Cause</b>	<b>Pump is operating in the wrong pressure range.</b>
Remedy	Check the pressure levels within the system.
<b>Cause</b>	<b>Gas temperature is too high.</b>
Remedy	Check system.
<b>Cause</b>	<b>Clearance between housing and rotors are too small due to contamination.</b>
Remedy	Clean pumping chamber.
<b>Cause</b>	<b>Clearance between housing and rotors are too small due to distortion of the pump.</b>
Remedy	Affix and connect the pump free of tension.

<b>Cause</b>	<b>Friction resistance is too high due to contaminated bearings and/or contaminated lubricant.</b>
Remedy	Clean pump, respectively perform maintenance.
<b>Cause</b>	<b>Lubricant level is too high.</b>
Remedy	Drain lubricant down to the correct level.
<b>Cause</b>	<b>Lubricant level is too low.</b>
Remedy	Top up lubricant to the correct level.
<b>Cause</b>	<b>Wrong lubricant filled in.</b>
Remedy	Contact Edwards service.
<b>Cause</b>	<b>Bearing is defective.</b>
Remedy	Contact Edwards service.
<b>Fault</b>	<b>Pump is extremely loud</b>
<b>Cause</b>	<b>Bearing damage.</b>
Remedy	Repair pump.
<b>Cause</b>	<b>Thick particle deposits.</b>
Remedy	Clean pump, respectively perform maintenance.
<b>Fault</b>	<b>Motor power consumption is too high</b>
<b>Cause</b>	<b>Like "Pump gets too hot".</b>
Remedy	See <a href="#">Pump gets too hot</a> (on page 43).
<b>Cause</b>	<b>Incorrect mains voltage for the motor.</b>
Remedy	Connect the motor to the correct mains voltage.
<b>Fault</b>	<b>Pump is too loud</b>
<b>Cause</b>	<b>Motor stator defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Motor rotor defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Distances between housing and rotors is too small due to contamination.</b>
Remedy	Clean pumping chamber.
<b>Cause</b>	<b>Distances between housing and rotors is too small due to distortion of the pump.</b>
Remedy	Affix and connect the pump free of tensions.
<b>Cause</b>	<b>Rotors make contact with the housing.</b>
Remedy	Contact Edwards Service. Shutdown pump immediately.
<b>Cause</b>	<b>Rotor is running untrue.</b>
Remedy	Contact Edwards Service. Shutdown pump immediately.

<b>Cause</b>	<b>Oil slinger disc makes contact with the gear housing.</b>
Remedy	Contact Edwards Service.
<b>Fault</b>	<b>Pump is losing lubricant</b>
<b>Cause</b>	<b>Oil drain plug is leaky.</b>
Remedy	Drain lubricant, firmly screw in a new oil drain plug with the gasket, fill in correct lubricant quantity.
<b>Cause</b>	<b>Oil level glasses leaky.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Gear cover is leaky.</b>
Remedy	Replace the O-ring of the gear cover.
<b>Cause</b>	<b>Puddle under the motor, leak in the seal.</b>
Remedy	Contact Edwards Service. shutdown pump immediately.
<b>Cause</b>	<b>No lubricant leak is apparent.</b>
Remedy	See <i>Lubricant in the pump chamber</i> (on page 45)
<b>Fault</b>	<b>Oil gets too dark</b>
<b>Cause</b>	<b>Oil has been used up.</b>
Remedy	Exchange the oil.
<b>Cause</b>	<b>Pump gets too hot.</b>
Remedy	See <i>Pump gets too hot</i> (on page 43); after remedy of the fault, exchange the oil.
<b>Fault</b>	<b>Lubricant in the pump chamber</b>
<b>Cause</b>	<b>Lubricant level is too high.</b>
Remedy	Drain the lubricant down to the correct level.
<b>Cause</b>	<b>Lubricant is ejected from the system.</b>
Remedy	Check system.
<b>Cause</b>	<b>Pump is not standing horizontally.</b>
Remedy	Place the pump correctly.
<b>Cause</b>	<b>Pump has a gas leak towards the outside.</b>
Remedy	Run a leak search and pinpoint leaks. If the leak is not at the oil-fill or oil-drain plugs, return the pump to the Edwards Service.
<b>Cause</b>	<b>Pump has an internal leak.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Shaft-seals are defective.</b>
Remedy	Contact Edwards Service.

<b>Fault</b>	<b>Pump does not attain its pumping speed</b>
<b>Cause</b>	<b>Intake screen is clogged.</b>
Remedy	Clean intake screen.
<b>Cause</b>	<b>Motor incorrectly connected.</b>
Remedy	Connect motor correctly.
<b>Cause</b>	<b>Motor stator defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Motor rotor defective.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Vacuum pump system has a gas leak.</b>
Remedy	Detect leak and seal it.
<b>Cause</b>	<b>Rotor gap is too great.</b>
Remedy	Contact Edwards Service.
<b>Cause</b>	<b>Bearing defective.</b>
Remedy	Contact Edwards Service.

## 12. Dimension drawings

Figure 20 EDS 200/300 with air cooling (dimensions in mm)

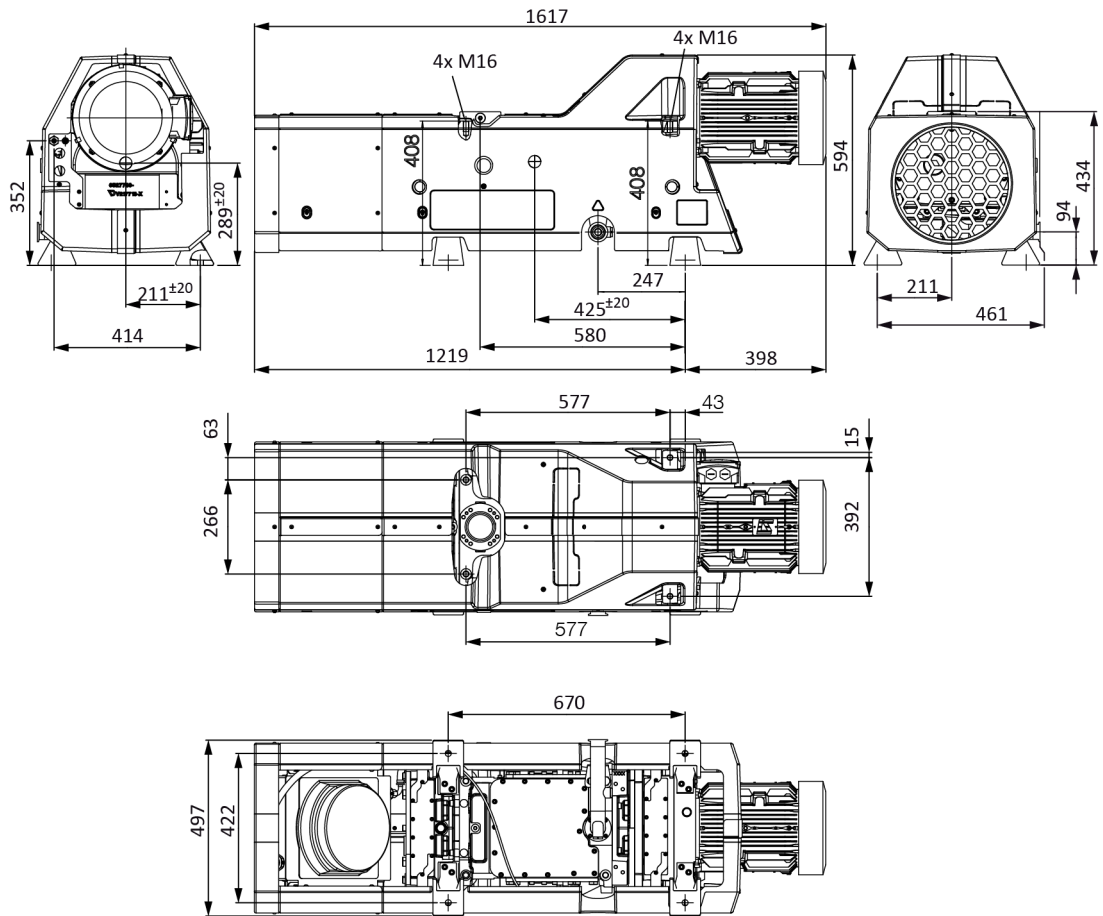
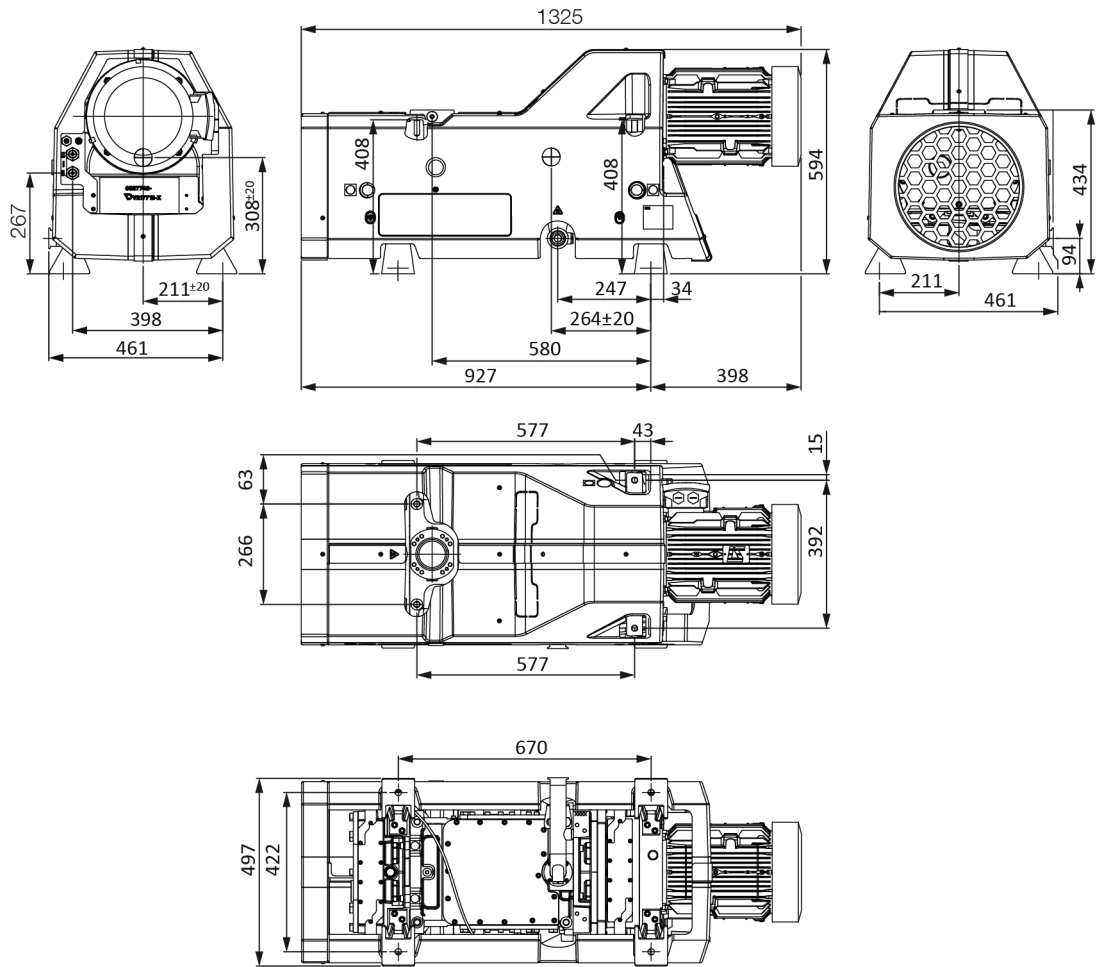


Figure 21 EDS 200/300 with water cooling (dimensions in mm)





## 13. Wearing parts

Gasket for plug screw G 3/8 (oil fill plug)	ES23955165
---	------------

## 14. Waste disposal

The equipment may have been contaminated by the process or by environmental influences. In this case the equipment must be decontaminated in accordance with the relevant regulations. We offer this service at fixed prices. Further details are available on request.

Separate clean components according to their materials, and dispose of these accordingly.

When sending us any equipment, observe the regulations given in section [Return the equipment or components for service](#) on page 38.

### Disposal of waste oil

Owners of waste oil are responsible for proper disposal of this waste.



Waste oil from vacuum pumps must not be mixed with other substances or materials.

Waste oil from vacuum pumps (Edwards oils are based on mineral oils) which are contaminated due to the influence of oxygen in the air, high temperatures or mechanical wear must be disposed of through a local waste oil disposal system.

Waste oil from vacuum pumps which is contaminated with other substances must be marked and stored in such a way that the type of contamination is apparent. This waste must be disposed of as special waste.

European, national and regional regulations concerning waste disposal need to be observed. Waste must only be transported and disposed of by an approved waste disposal vendor.

### Symbols on the vacuum device

	<p>Do not dispose of the vacuum device as residual waste. Dispose of it in accordance with the applicable local regulations.</p>
	<p>China RoHS: Products marked with this symbol contain residual quantities of substances that are subject to quantitative regulation in accordance with Chinese Directive GB/T 26552. These parts can safely be used for the environmental protection use period (20 years) as indicated and should enter into the recycling system after their environmental protection use period.</p>

## CE Declaration of Conformity

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

The following product

### EDS 200 and EDS 300

#### Part number

**A418**vwxz

v = 2, 3 (pumping speed)

w = 0, 1 (cooling system)

x = 934, 936, 945, 946, 957 (motor variants)

z = blank or V01 to V99

#### ATEX Marking:

⊕ II 3/-G Ex h IIC T3 Gc

5°C ≤ Ta ≤ 40°C

(internal atmospheres only)

Is in conformity with the relevant requirements of European CE legislation:

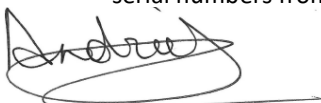
2006/42/EC	Machinery directive
2014/34/EU	ATEX directive on use in potentially explosive atmospheres
2014/30/EU	Electromagnetic compatibility (EMC) directive
2011/65/EU	Restriction of certain hazardous substances (RoHS) directive as amended by Delegated Directive (EU) 2015/863

Based on the relevant requirements of harmonised standards:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 60204-1:2006+A1:2009	Safety of machinery - Electrical equipment of machines Part1: General requirements
EN ISO 80079-36:2016	Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres. Basic method and requirements
EN ISO 80079-37:2016	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres -- Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007 +A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Documentation Officer: Jelena Havelkova, Spielberk Office Centre, Holandska 10, Brno, 63900 Czech Republic,  
☎: +42(0) 734 418 896, ✉: documentation@edwardsvacuum.com

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: 20<sup>th</sup> January 2020.



Andries De Bock – Vice President Engineering  
Industrial Vacuum Division  
Qingdao



Axel Guddas – General Manager  
Cologne

# Additional Legislation and Compliance Information

## EU EMC Directive: Class A/B Industrial equipment

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

## EU RoHS Directive: Material Exemption Information

This product is compliant with the following Annex III Exemptions:

- 6(a) **Lead** as an alloying element in steel for machining purposes and in galvanised steel containing up to 0.35 % lead by weight
- 6(b) **Lead** as an alloying element in aluminium containing up to 0.4% by weight
- 6(c) Copper alloy containing up to 4% **lead** by weight

## EU REACH Regulation Compliance

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


This product does contain 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) added to the Candidate List June 2018

As indicated by the applied RoHS exemption(s) above this substance is present in certain aluminium/brass/steel components.

#### 材料成分声明

#### China Material Content Declaration

部件名称 Part name 	有害物质 Hazardous Substances					
	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)
铸铝及铝合金制品 Aluminium alloys	X	O	O	O	O	O
钢合金制品 Steel alloys	X	O	O	O	O	O
铜接头 Brass connectors	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.

This page has been intentionally left blank.

This page has been intentionally left blank.

This page has been intentionally left blank.

