



SCROLLVAC plus

SCROLL VACUUM PUMP

Operating instructions 300668736_002_C7



Part Numbers

1410xxVxx

1411xxAxx

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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.

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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

Safety and compliance

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 - Moving parts present Risk of injury. Identifies moving parts that may cause injury or damage to equipment.
	Warning - Noise hazard Risk of injury. Identifies a possible source of noise above the recommended safe level.
	Warning - Overpressure Risk of increased pressure beyond permissible limit.
	Warning - Risk of explosion Risk of injury or damage to equipment. Identifies a situation that could result in an explosion.
	Warning - Toxic material Risk of injury or damage to the environment. Identifies a source of toxic gases, liquid or material.
	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.

Safety and compliance

	Warning - Use protective equipment Risk of injury. Use appropriate Personal Protective Equipment (PPE) when performing the task.
	Symbol - Protective earth Identifies an electrical equipment earth (ground) terminal.

Important safety information

2 Important safety information

2.1 Mechanical hazards



WARNING: VACUUM HAZARD

Risk of physical injury. Do not expose any part of the human body to vacuum as it can cause injury.



WARNING: HEAVY OBJECT

Risk of physical injury. Use suitable lifting equipment.



CAUTION: ROTATING PARTS

Risk of physical injury. Care must be taken not to touch any rotating parts.



CAUTION: AUTO-RUN MODE

Risk of physical injury. The system has an Auto-run mode which is designed to automatically start the pump system once power is applied.

- Do not operate the pump if the exhaust pipeline is restricted or blocked as the pump will not operate correctly and may be damaged.
- If operating in Auto-run mode, make sure that no unsafe situation can be created and inform the users of this mode. Make sure that mains is disconnected before opening any part of the vacuum chamber.
- Make sure that any cabling and/or pipe work attached to the pump are routed carefully to avoid causing a slip/trip hazard and to prevent any damage to the cable.
- Install the pump in the vacuum system before you connect the power supply. This will make sure that the pump can not operate and injure people during installation.
- Local legislation concerning the impact of the pump on the environment must be followed when installing and removing the pump.
- Do not operate the pump with an open inlet as this may cause damage to the pump and/or injury to people.

2.2 Electrical hazards



WARNING: HAZARDOUS VOLTAGE

Risk of electric shock. Do not operate the pump with any parts of the enclosures removed or damaged as there may be a risk of an electric shock.

The electrical installation must be performed by a qualified person. Always make the electrical connections after the pump has been installed on the vacuum system.

Important safety information



WARNING: HAZARDOUS VOLTAGE

Risk of injury or damage to equipment and risk of electric shock. Operator must wait for a minute for capacitor discharge after disconnecting the power supply before working on the pump.

- Make sure that the electrical installation of the pumping system conforms with your local and national safety requirements. It must be connected to a suitably fused and protected electrical supply and a suitable earth (ground) point.
- This equipment is suitable for Installation Category II as defined in IEC 60664-1. The dry pumping system must be connected to an isolator that disconnects all current carrying conductors and can be locked in the off position (LOTO). The isolator must be in close proximity to the equipment, within easy reach of the operator and identified as the disconnect device for the equipment.
- Isolate the electrical supply before disconnecting the electrical supply cable from the dry pumping system.
- Make sure that the system and your electrical supply cable are suitably protected against earth (ground) faults and that the earth (ground) conductor of the electrical supply cable is longer than the phase conductors in the connector.
- The power wiring to the system must be properly protected and routed away from any potential hazards.

2.3 Thermal hazards



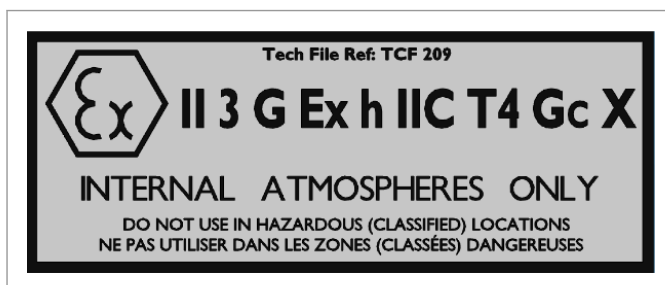
WARNING: HOT SURFACE

Risk of burns. Do not touch the pump inlet or exhaust ports while the pump is running since the temperature of these parts could be high enough to cause harm.

Elevated temperature could remain after the pump has stopped.

- Care shall be taken during final installation to make sure that access to hot surfaces are prevented by additional guarding.
- Do not exceed the maximum continuous operating pressures (COP) specified in [Table: General Technical data](#).

2.4 ATEX directive implications



Pumps which carry the ATEX mark are designed to meet the requirements of Group II Category 3G in respects to ignition sources internal to the pump. This classification is in accordance with Directive 2014/34/EU.

There is no potential source of ignition within the pump during normal operation but there may be potential sources of ignition under conditions of rare or unexpected malfunction as defined in the directive. As a result of this, it is necessary to consider the potential consequences of ignition

Important safety information

sources occurring under rare or expected malfunction. (Reference ATEX137 1992/92/EC).

The notations used in these ratings are as follows:

	Equipment to be used in a potentially explosive atmosphere
II	Equipment group II - non mining equipment as defined in directive 2014/34/EU
3	Equipment category - suitable for hazardous area zone 2 as defined in directive 2014/34/EU
G	Explosive atmosphere caused by gases, vapours or mists
Ex h	Non-electrical equipment for explosive atmospheres, regardless of which type of protection is used; see EN ISO 80079-37. Non-electrical equipment for explosive atmospheres
IIC	Suitable for flammable gas group IIC - (also Hydrogen, Acetylene, Carbon disulphide)
T4	Temperature class - <135 °C
GC	Equipment protection level (EPL) as defined in EN ISO 80079-36
X	Specific conditions of use of the equipment. The special conditions and notes provided in the Operating Instructions will be applicable.

When flammable materials are present within the equipment you must:

- Not allow air to enter the equipment.
- Make sure the system is leak tight.
- Use an inert gas purge (for example, a nitrogen purge) to dilute any flammable gases or vapours entering the pump inlet, and/or use an inert gas purge to reduce the concentration of flammable gases or vapours in the pump and in the exhaust pipeline to less than one quarter of the gases' published lower explosive limits (LEL).
- If higher concentration of flammable gases or vapours is requested, contact us for support.

Do not pump pyrophoric materials, process debris could produce an ignition source on the scroll surface.

Do not locate the pump in an ATEX zoned area, the ATEX specification is not applicable for external atmospheres.

When planning to pump hazardous substances with this pump, read the related chapters in the Safety Booklet and in these Operating Instructions first. You can download the Safety Booklet from the Leybold homepage.

2.5 Hazards caused by materials and substances



WARNING: EXPLOSION HAZARD

Risk of explosion. The product in its standard version is not suited for operation in explosion hazard areas.

Important safety information



WARNING: TOXIC MATERIAL

Risk of inhalation injury. If within the system toxic substances or gases are being used, then the operator must obey the necessary safety precautions.

- Please see ATEX section for more information of internal ATEX classification.
- The product in its standard version is not normally suited for pumping of:
 - combustible and explosive gases and vapours
 - radioactive and toxic gases and vapours
 - pyrophoric substances
 - extremely aggressive or corrosive media
 - dusty media
 - liquids
 - solids
- Please consult us first when considering operation under such conditions.
- If the pump has previously pumped hazardous gases take the appropriate safety measures before opening the intake or exhaust ports. Use gloves, a breathing mask or protective clothing to avoid skin contact with toxic or highly corrosive substances. Work under a fume hood.
- Contaminated parts can be detrimental to health and environment. Before beginning with any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

2.6 Noise hazard



WARNING: NOISE HAZARD

Risk of high noise levels in this area. Hearing protection must be worn when this equipment is in operation.

The noise level of the pump during ultimate pressure operation corresponds to the values stated in the technical data. In other operating modes and depending on the connected vacuum system, higher values can be expected. Make sure that suitable protection measures are taken to protect your hearing.

2.7 Danger of pump damage



CAUTION: PUMP DAMAGE

Risk of damage to the equipment. Do not allow the ingestion of any objects (screws, welding beads, nuts, washers, pieces of wire, etc.) through the intake port of the pump.

- The exhaust line should be laid so that it slopes down and away from the pump to prevent condensate from back streaming into the pump.
- During installation work on the intake and discharge pipe do not subject flanges to excessive loads.

Important safety information

- Improper decommissioning of the pump may damage it. Follow the instructions given in [Transportation](#) on page 25 and [Storage](#) on page 67 of these operating instructions.

3 Description

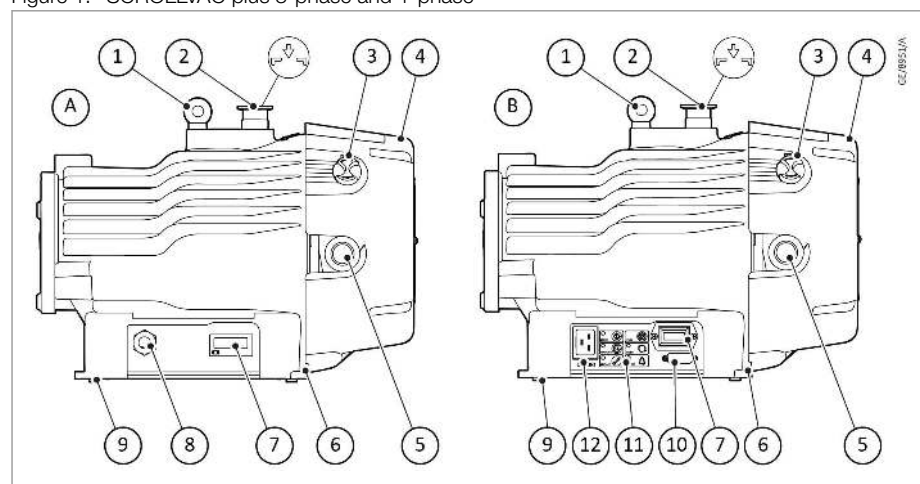
3.1 Design and function

The SCROLLVAC plus 3-phase and 1-phase pumps are shown in [Figure: SCROLLVAC plus 3-phase and 1-phase](#).

The pump is a dry vacuum pump as all the bearings, with their hydrocarbon lubricant, are isolated from the vacuum space. The pump is suitable for use on vapour handling processes and may be used for some pumping applications involving corrosive substances. For information on pumping flammable gases, contact us.

The body of the pump includes a fixed scroll and an orbiting scroll. The orbiting scroll is controlled by an electric motor through an eccentric cam on the motor drive shaft. The movement of the orbiting scroll, meshed with the fixed scroll, forms successive crescent shaped volumes in the pump. Gas that enters the pump through the inlet is compressed by the movement of the orbiting scroll and swept towards the centre of the fixed scroll. The compressed gas enters the exhaust port near the centre of the fixed scroll and is exhausted from the pump through the outlet.

Figure 1. SCROLLVAC plus 3-phase and 1-phase



A. 3-phase pump

1. Lifting eye
3. Gas ballast control
5. DN 25 ISO-KF exhaust
7. Hours counter
9. Rubber foot
11. User interface panel

B. 1-phase pump

2. DN 25 ISO-KF Inlet
4. Cooling fan
6. Earth (ground) terminal
8. Mains power cable inlet (3-phase only)
10. Digital I/O connector
12. Mains power connector (1-phase only)

3.2 1-phase pump

Pump controller

The 1-phase integral pump controller manages the supply of current to an embedded 3-phase electric motor in accordance with operating conditions. The 1-phase pump controller nominally supplies the motor with a 60 Hz excitation frequency. The controller monitors power and temperature, and

Description

will protect the pump in the event of operation under sustained high load or under fault conditions.

The controller provides the user interface. The pump may be operated in these modes:

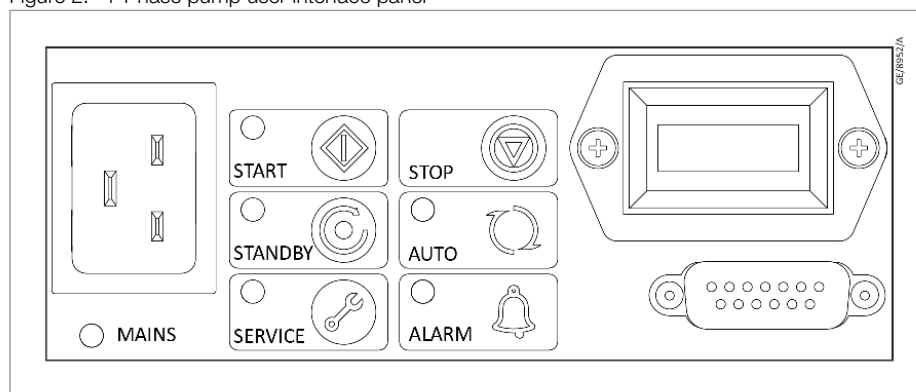
- Manually, using the buttons on the interface panel. Refer to ([Figure: 1-Phase pump user interface panel](#) and [Figure: User interface panel](#))
- Remotely via the 15-pin D-Sub digital I/O connector.

Logic interface

The pump controller can be operated via the 15-pin D-sub digital I/O connector. The signals on the logic interface are of the following types:

- Control inputs: there are switch-type signals that are used to control the pump
- Status outputs: these outputs identify the status of the system.

Figure 2. 1-Phase pump user interface panel

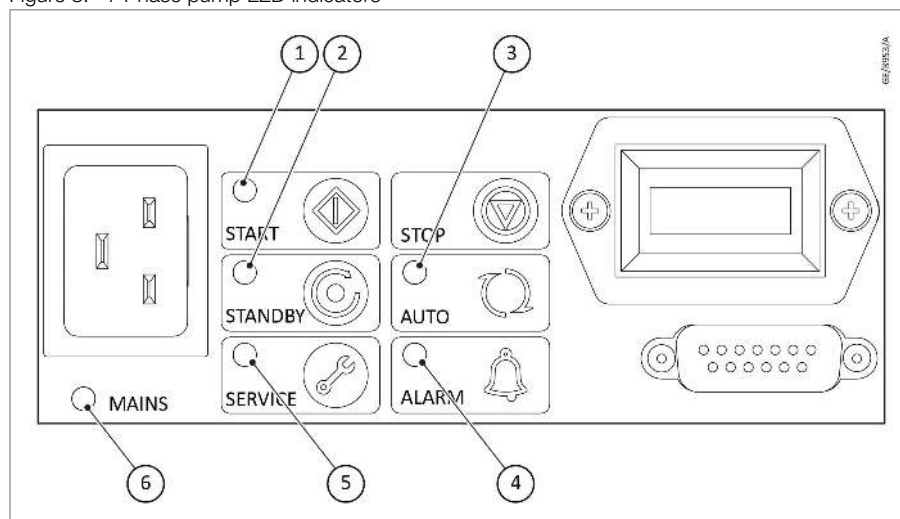


Operation	Select	Status
Apply power	MAINS POWER	The pump will remain stopped (factory default). The POWER INDICATOR will illuminate.
Start the pump	START BUTTON	The pump will accelerate up to full running speed. The RUN INDICATOR will flash while accelerating. The RUN INDICATOR will remain ON when the pump reaches full speed.
Stop the pump	STOP BUTTON	The pump will decelerate and stop running. The RUN INDICATOR will flash while decelerating. The RUN INDICATOR will go OFF when the pump has stopped.
Select and dese- lect the standby speed	STANDBY MODE SELECT BUTTON	When engaged, the STANDBY INDICATOR will illuminate and the pump will run at the standby speed setting of 75% of full speed.

Description

Select and deselect the Auto-run function	START or STOP BUTTON (>8 seconds)	When engaged, the AUTO-RUN INDICATOR will illuminate. The pump will restart automatically after the power has been re-stored.
To reset the service indicator	SERVICE RESET BUTTON	To reset the service indicator, press and hold the service reset button for more than 5 seconds.

Figure 3. 1-Phase pump LED indicators



1	Run indicator	Indicates that the pump is operating
2	Standby mode indicator	Indicates that the standby mode has been selected
3	Auto-run indicator	Indicates that the auto run mode has been selected
4	Alarm indicator	Indicates an alarm has been triggered
5	Service indicator	Indicates that a service interval has been reached
6	Power indicator	Indicates that electrical mains supply to the pump is ON

3.3 3-phase pump

The 3-phase direct-on-line pump includes a customer interface, electric terminal box and an embedded 3-phase electric motor. The electric terminal box provides a method for connecting and configuring the 3-phase supply to the embedded 3-phase motor. The electric terminal box also provides the user interface, comprising of:

- 3-Phase power input field wiring terminals and cable gland
- Hours counter (This contains a compact lithium cell battery which contains 1,2 DimethoxyEthane, included in the REACH candidate list of substances of very high concern, in the electrolyte.)

3.4 Gas ballast control

To pump high vapour loads, gas ballast can be delivered into the pump to prevent condensation of the vapour carried by the pumped gases.

Air can be introduced to the low vacuum stages through the gas ballast control refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#). Alternatively, an inert gas such as nitrogen can be supplied through a

Description

suitable external valve and by using the appropriate adapter, available as an accessory.

3.5 Materials

All surfaces of the pump which are exposed to the pumped gases are free from copper, zinc and cadmium. Exposed components include: anodized aluminium scrolls, aluminium housing, nickel-plated inlet and exhaust ports, PTFE composite tip-seals, various stainless steel parts and fluorocarbon elastomer seals.

Other materials of construction not exposed to vacuum include steel, copper, hydrocarbon lubricant and chemically resistant polymers.

3.6 Supplied equipment

The 1-phase pump is delivered ready for use, except for a mains power cable. Refer [Table: Accessories](#) for recommended mains power cables. The inlet and exhaust flanges are closed.

The 3-phase pump is delivered already configured for high voltage use only. High voltage is defined as 380-415 V 50 Hz and 460 V 60 Hz. The inlet and exhaust flanges are closed.



Note:

The 3-phase pump is not delivered with a power cable.

4 Technical data

Table 1 Technical data

SCROLLVAC		7 plus	10 plus	15 plus	18 plus
Peak pumping speed (m ³ h ⁻¹) 1-Phase (50/60 Hz) and 3-Phase (60 Hz)		6.1	10.6	14.5	20.0
Peak pumping speed (m ³ h ⁻¹) 3-Phase (50 Hz) only		5.1	8.8	12.1	16.7
Maximum permitted continuous operating pressure (COP) (mbar)*		200	200	200	50
Maximum permitted outlet pressure bar(g) [†]		0.5			
Maximum permitted gas ballast inlet pressure bar(g)		0.5			
Maximum inlet peak pressure bar(g)		4			
Maximum recommended chamber volume to pump down from atmospheric pressure (litres) [‡]		25	50	75	75
Maximum pressure rise when stopped, with no inlet or gas ballast flow (mbar)		7			
Leak tightness (mbar ls ⁻¹)		1 x 10 ⁻⁶	1 x 10 ⁻⁶	1 x 10 ⁻⁶	1 x 10 ⁻⁶
Pump ultimate pressure (mbar), Gas ballast position 0		2 x 10 ⁻²	9 x 10 ⁻³	9 x 10 ⁻³	3 x 10 ⁻²
Pump ultimate pressure (mbar), Gas ballast position 1		5 x 10 ⁻²	4 x 10 ⁻²	4 x 10 ⁻²	6 x 10 ⁻²
Gas ballast flow (l min ⁻¹), Gas ballast position 1 (60 Hz)		12	16	31	24
Maximum water vapour pumping rate (with gas ballast) (g h ⁻¹)		100	140	280	220
Overall dimensions (L x W x H)		430 x 282 x 325 mm			
Maximum tilt angle		10 degrees			
Rotational speed at full load (1-phase 50/60 Hz)		1800 rpm			
Rotational speed at full load (3-phase 50 Hz)		1500 rpm			
Rotational speed at full load (3-phase 60 Hz)		1800 rpm			
Mass (kg)		26	25	26	25
Inlet connection		DN 25 ISO-KF			
Outlet connection		DN 25 ISO-KF			
Parameter	1-Phase		3-Phase		
Declared dual-number noise emission values in accordance with ISO 4871. Values determined in accordance with ISO 3744:2010					
Measured A-weighted emission sound pressure level, L _{pA} at ultimate vacuum 1 m from the pump in free space dBA	55		55		
Uncertainty, K _{pA} dBA	2.5		2.5		

Technical data

SCROLLVAC		7 plus	10 plus	15 plus	18 plus
Vibration: measured at the inlet port (ISO 10816)	Class 1C...< 4.5 mm s ⁻¹ (rms radial)				
Supply voltage, Frequency, Input current	100 - 127 V a.c. rms ±10%, 50/60 Hz, 10 A rms 200 - 240 V a.c. rms ±10%, 50/60 Hz, 6 A rms		200 V a.c. rms ±10%, 50 Hz, 2.4 A rms 380 - 415 V a.c. rms +6%/-10%, 50 Hz, 1.5 A rms 200 - 230 V a.c. rms ±10%, 60 Hz, 2.4 A rms 460 V a.c. rms ±10%, 60 Hz, 1.5 A rms		
Fuse rating (Time-lag fuses must be used, as current transients can exceed the rated values.)	UK/Europe: T10AH250 for 250 V a.c rms US/Europe: T10AH250 for 250V a.c. rms		For 3-phase fuse types, refer to Electrical installation 3-phase on page 30		

* These pumps are designed to pump down from atmospheric pressure, but prolonged operation at inlet pressures higher than specified may reduce bearing life.

† These pumps are intended to exhaust to atmospheric pressure. High exhaust pressure may reduce tip-seal life.

‡ Larger volumes may be pumped, but prolonged operation at inlet pressures higher than specified may reduce bearing life. The pumping is optimised for constant throughput and is not recommended for cyclic duty.

Note:

The pump system is designed to operate continuously at specified, maximum, continuous operating pressures (COP), refer to [Table: General Technical data](#) for specific details. Operation beyond these pressure limits could result in long term reduced pumping performance, e.g. increased tip seal wear and reduced bearing life.

In the event of operating outside the specified, maximum, continuous operating pressure (COP) limits; the controller, within the 1-phase pump system, regulates the output power delivered to the motor. If the COP motor power is exceeded for a defined period of time, the controller will reduce the motor speed hence regulating the overall system power. This protection method, aims to preserve the life expectancy of the serviceable items, e.g. tip seals and bearings, but at the expense of pumping performance.

The 3-phase pump system has the same COP limits as the 1-phase pump but does not have the same power regulation functionality. The 3-phase pump system can run continuously beyond the recommended COP limits; however prolonged operation beyond the COP limits will result in: increased housing temperatures; increased tip seal wear and reduced bearing life.

4.1 Ordering information

Some parts numbers may be available on request only.

Table 2. SCROLLVAC plus 1-Phase

1-phase (FU)	Standard	H-Version	C-Version
SCROLLVAC 7 plus	141007V10	141007V11	141007V12
SCROLLVAC 10 plus	141010V10	141010V11	141010V12

Technical data

1-phase (FU)	Standard	H-Version	C-Version
SCROLLVAC 15 plus	141015V10	141015V11	141015V12
SCROLLVAC 18 plus	141018V10	141018V11	141018V12

Table 3. SCROLLVAC plus 3-Phase

3-phase	Standard	H-Version	C-Version
SCROLLVAC 7 plus	141007V30	141007V31	141007V32
SCROLLVAC 10 plus	141010V30	141010V31	141010V32
SCROLLVAC 15 plus	141015V30	141015V31	141015V32
SCROLLVAC 18 plus	141018V30	141018V31	141018V32

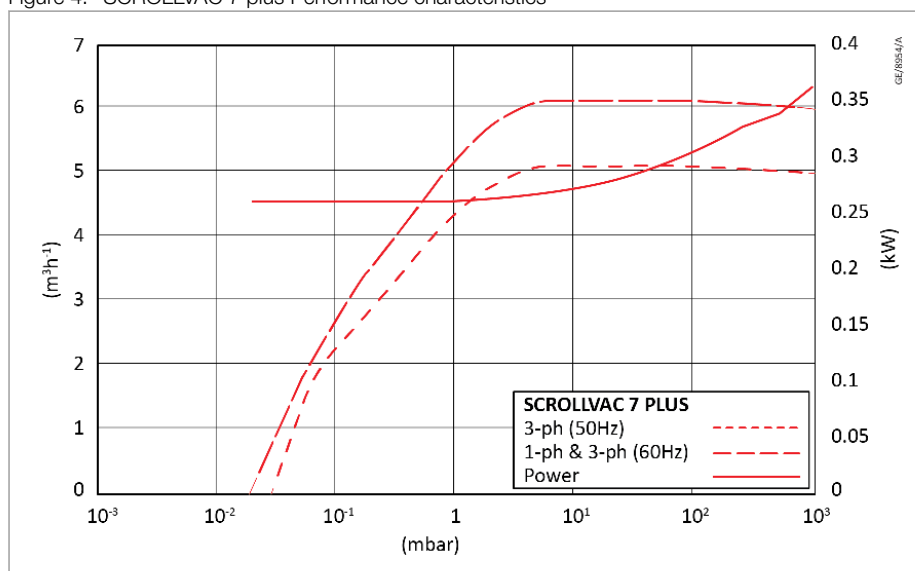
- In the H-version pump the gas ballast control is replaced with a blank adapter so that the gas ballast cannot be accidentally opened. This feature is useful for applications such as rare gas recirculation or gas recovery. Another advantage is improved leak tightness at this location.
- The C-version pump may be necessary if the pump is used on applications involving corrosive substances. For more information, contact us.
- The standard pumps can be retrofitted to H or C version pumps.

4.2 Pump performance characteristics

The table below indicates the axis titles for all following performance characteristics of the pump

X - axis	Pressure
Y - axis	Pumping speed
Z - axis	Input power

Figure 4. SCROLLVAC 7 plus Performance characteristics



Technical data

Figure 5. SCROLLVAC 10 plus Performance characteristics

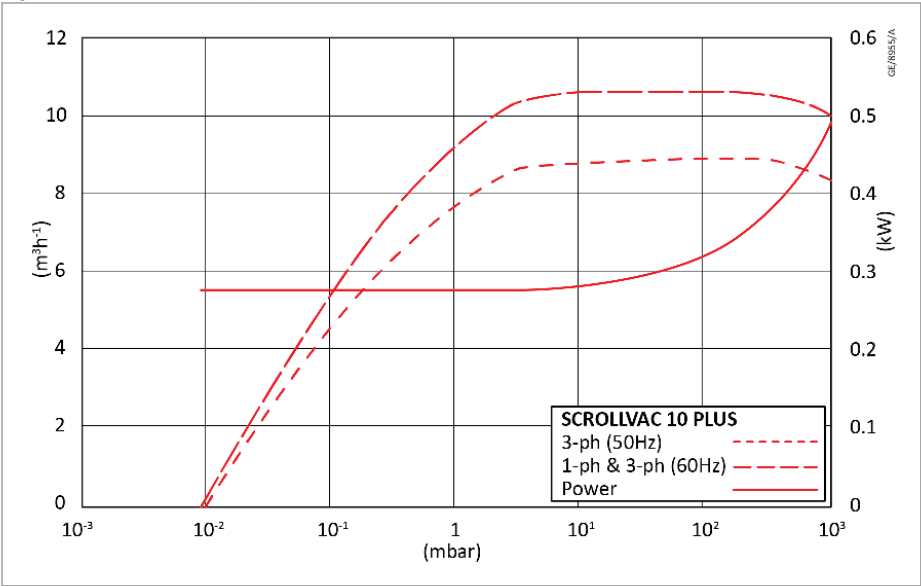
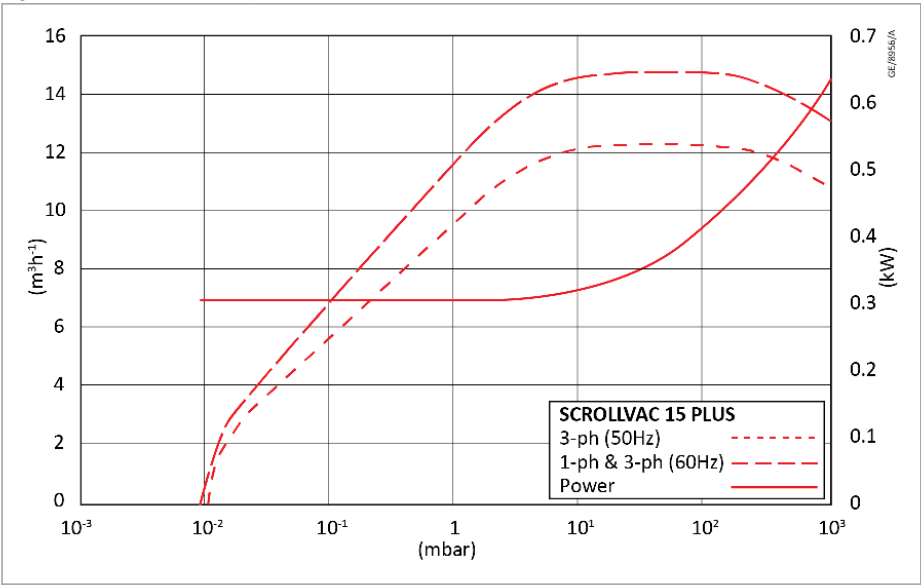


Figure 6. SCROLLVAC 15 plus Performance characteristics



Technical data

Figure 7. SCROLLVAC 18 plus Performance characteristics

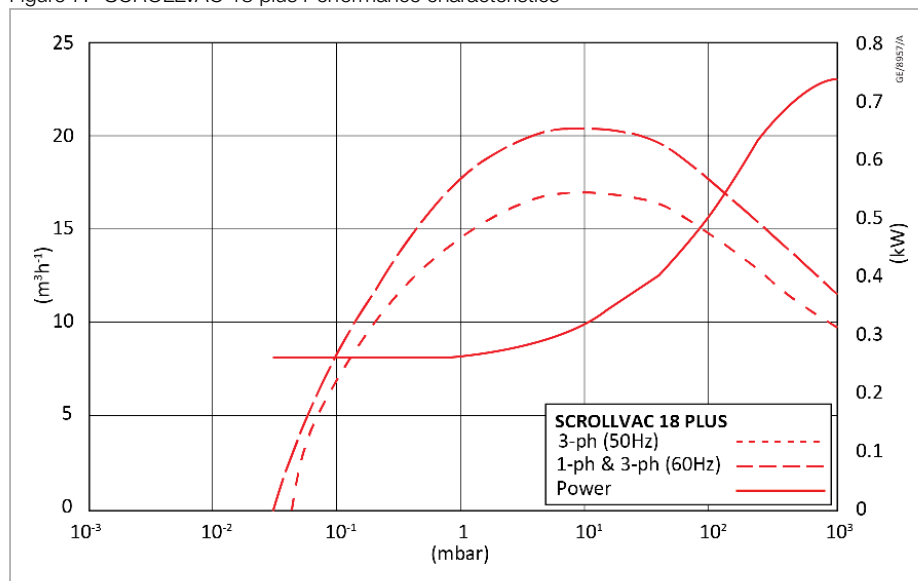
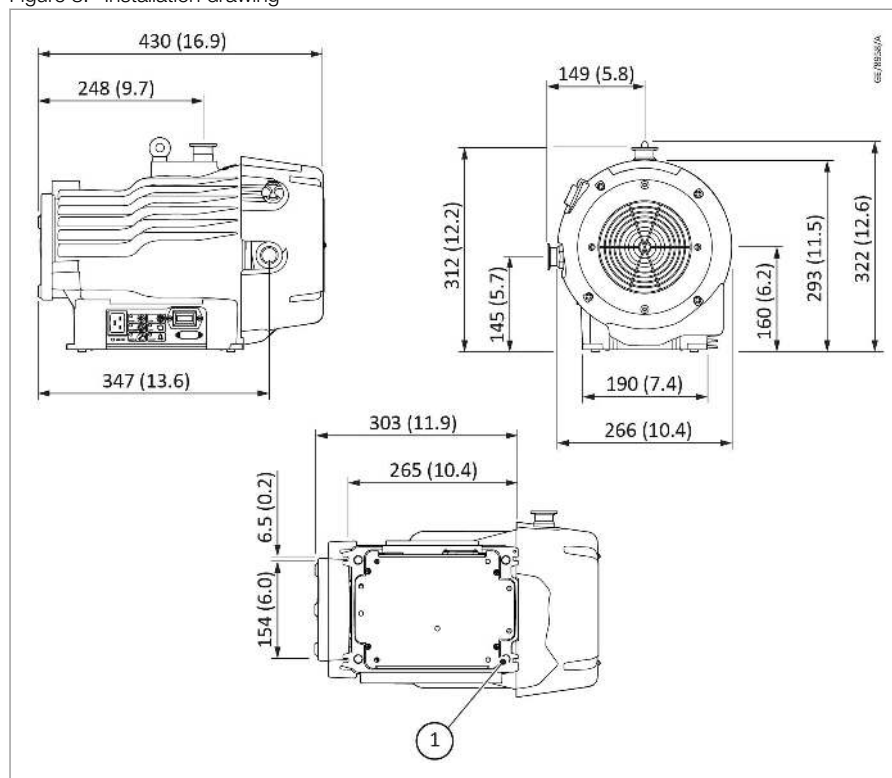


Figure 8. Installation drawing



1. Rubber feet x 4

All dimensions given are in mm (inch). External dimensions are the same for all variants.

Only the 1-phase pump is shown.

Technical data

Table 4. Operating and storage conditions

Parameter	Value
Ambient temperature range (storage)	-30 °C to +70 °C
Ambient temperature range (operation)	+5 °C to +40 °C
Maximum humidity (storage in original packaging)	≤ 95% RH
Relative humidity (operation)	10–90%

- If the storage time was shorter than 2 years start the pump by instruction described in [Pump storage less than 2 years](#) on page 67.
- If the storage time was longer than 2 years continue by instruction described in [Pump storage more than 2 years](#) on page 67.
- Non-condensing conditions shall be assured to avoid condensation from quick temperature changes during storage and transport.

Table 5. Environmental conditions

Parameter	Value
Pollution	Pollution degree 2
Installation	Installation category II
Altitude restriction	Maximum 2000 m*
Area of use	Indoor

* The product can be used up to an altitude of 3000 m. However, the product is only certified for use up to 2000 m.

5 Transportation



CAUTION: HEAVY OBJECT

Risk of physical injury. Take care when moving the pump into position. Its mass may make it difficult to slide.

Use suitable lifting equipment to move the pump. The maximum pump mass is 26 kg.

Mechanical lifting equipment should be attached to the lifting eye; Loose slings should not be used.

6 Installation



CAUTION: INSTALLATION SAFETY

Risk of injury to the pump. Follow all safety instructions and take note of all appropriate precautions. If the equipment is used in a manner not specified by this manual, the protection provided by the equipment may be impaired.

Make sure that the pump is suitable for the application. If in doubt, refer to the our Safety Booklet in which the hazards and general safety concepts for design, operation and maintenance of vacuum systems are explained or contact us for advice.

A suitably trained and supervised technician must perform the installation of the pump. Obey the safety instructions listed below, especially when connecting the pump into an existing system. Details of the specific safety precautions are given at the appropriate point in the instructions.

- Wear the appropriate safety clothing if contact with contaminated components is anticipated. Dismantle and clean contaminated components inside a fume cupboard.
- Vent and purge the vacuum system before installation work is started.
- Make sure that the installation technician is familiar with the safety procedures that relate to the products handled by the pumping system.
- Disconnect the other components in the pumping system from the electrical supply to prevent accidental operation.

6.1 Safety design considerations

Consider the following points when designing the pumping system:

- Use a suitable valve to isolate the pump from the vacuum system if the pump needs to warm up before pumping condensable vapours or if vacuum needs to be maintained when the pump is switched off.
- Avoid high levels of heat input into the pump from the process gases, otherwise the pump may overheat and cause the thermal protection system to operate.
- Make sure that the exhaust pipeline cannot become blocked. If an outlet-isolation valve is fitted, make sure the pump cannot be operated with the valve closed.
- Provide for a purge of inert gas when the pumping system is shut down, to dilute dangerous gases to safe concentrations.

6.2 Conforming use

The pump is designed to pump the following gases:

- Air
- Carbon dioxide
- Helium
- Carbon monoxide
- Nitrogen
- Argon
- Oxygen (O₂)

The pump can be used to pump water vapour. Caution must be taken to make sure that vapour does not condense inside the pump. Refer [To pump](#)

[condensable vapours](#) on page 42 on how to prevent condensation of water vapour in the pump.

If pumping a vapour or gas not in the list above or if its temperature is higher than 40 °C, contact us for advice.

6.3 Non-conforming use



WARNING: EXPLOSION HAZARD

Risk of explosion. The standard version of the pump must not be used to pump pyrophoric materials or dust. Furthermore, it is not intended to pump explosive gases continuously.



WARNING: HOT SURFACE

Risk of burns. If the pump is operated outside the specific limits, the pump housing may become hot.

Consult us first when considering operation under such conditions. Refer to [ATEX directive implications](#) on page 11 for more information of internal ATEX classification.

The C-version of the pump has improved corrosion resistance of critical components, allowing additional gases to be pumped, please contact us to discuss your application before use.

6.4 Placement

Unpack and inspect



WARNING: OPERATION SAFETY

Risk of injury or damage to equipment. Do not use the pump if it is damaged. Failure to do so can result in injury or damage to equipment.

Take care when unpacking the pump to avoid excessive shocks which could damage the bearings and reduce the life of the pump.

If the pump is damaged, notify the supplier and carrier immediately stating the part number and serial number of the pump together with the order number and the supplier's invoice number. Retain all packaging materials for inspection.

Open the box, remove any excess packaging as required. It is advised to retain all packaging materials for use should the pump be needed to return for service.

If the pump is not to be used immediately, store in suitable conditions as described in [Storage](#) on page 67.

The pump is supplied with the inlets and outlet sealed to prevent entry of dust and vapour. Do not remove these seals until ready to install the pump on the vacuum system.

Installation

Position the pump

Use suitable lifting equipment attached to the lifting eyebolt to move the pump to its final operating position. Refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#)

When positioning the pump make sure that access to the pump electrical supply cable or any other controls are not obstructed.

Make sure that there is a minimum air gap of 40 mm on all sides of the pump to allow effective air circulation.

The pump must be located on a firm, level surface capable of supporting the mass of the pump.

The system should be installed away from combustible materials.

The pump can be secured to the floor by using the four holes located on each corner of the pump base. We recommend using M6 (Class 12.9) bolts of suitable length (not supplied).

The pump must be in level to a maximum of 3° in any direction, measured at the pump inlet.

It is your responsibility to carry out a risk assessment of their location and take appropriate measures to make sure that the dry pumping system is manoeuvred safely and in accordance with local and national manual handling guidelines.

6.5 Connect to the vacuum system



WARNING: HAZARDOUS SUBSTANCES

Risk of injury. If pumping dangerous gases or vapours, connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere.



CAUTION: OVERPRESSURE

Risk of damage to the equipment. If the pump is operated with the exhaust line blocked, high pressure may be generated in the exhaust line pipework.

Before connecting the pump to the vacuum system, remove the plastic cap from the inlet and exhaust, and make sure that the inlet strainer is fitted to the pump inlet port. Use appropriate DN 25 ISO-KF vacuum fittings for connection to the system.

Take note of the following information when connecting the pump to the vacuum system.

- To minimise noise and exhaust emissions, it is recommended that the pump is connected to an exhaust line or a silencer.
- For optimum pumping speeds, make sure that the pipeline connected to the pump inlet is as short as possible and has a suitable internal diameter.
- Support the vacuum pipeline to prevent loading of the coupling joints.
- A pressure of 3 bar(g) may be generated in the exhaust pipework if the pump is operated with the exhaust line blocked. Connect the pump using appropriate pipework and fittings.

- If necessary, incorporate flexible bellows in the system pipelines to reduce the transmission of vibration and to prevent loading of the coupling joints. If using flexible bellows, make sure that bellows have a maximum pressure rating which is greater than the highest pressure that can be generated in the system. Manufacturer's bellows are recommended.
- Incorporate an inlet isolation valve in the pipeline between the vacuum system and pump. This will isolate the vacuum system from the pump when it is switched off and prevent the suck-back of process gases and debris into the vacuum system.
- Make sure that the sealing surfaces are clean and scratch-free.

We recommend using an exhaust extraction system suitable for use with all process gases that will be pumped. Make sure that the exhaust extraction system cannot become blocked or obstructed when the pump is operating.

A small amount of tip seal wear product may collect in the exhaust duct of the pump. The dust may be blown out with the initial burst of air after the pump has been vented. This is quite common and the amount of dust seen will reduce over time.

Leak test the system and seal any leaks found after pump installation.

6.6 Electrical installation 1-phase

Fuses and circuit breakers



CAUTION: PROTECTIVE EARTH CONNECTION

Risk of injury. Make sure that the electrical installation of the pump conforms to your local and national safety requirements. It must be connected to a suitably fused and protected electrical supply with a suitable earth point.

For recommended fuse ratings refer to [Table: Technical data](#) and for recommended main cord sets refer to [Table: Accessories](#)

Make sure that the access of the power cable to the pump is not obstructed when you locate the pump.

Route and secure cables, hoses and pipework during installation to avoid possible risk of trips.

If an overload circuit breaker is used, make sure that is a time lag type.

If using an earth leakage current device, for example a Residual Current Device (RCD), use a 30 mA (minimum) rated unit to avoid nuisance tripping during start up.

The live conductor is fused inside the pump controller while the neutral conductor is not. An external RCD should be installed to guard against damage in the event of a short circuit between neutral and earth.

Electrical supply connection

Use an IEC 60320 connector (C19) and cable that meets local electrical standards when connecting to the pump. The pump must be earthed via the earth conductor of the IEC 60320 connector.

An additional earth connection point is provided if a separate earth is required. We recommend fitting a separate earth to the pump using a non-insulated braid or a separate insulated green/yellow conductor. The conductor must be a minimum of 14 AWG. Use the M5x10 screw and

Installation

shake proof washer located on the front of the pump housing to secure the earth conductor to the pump. Refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#).

Disconnect the pump from the electrical supply.

Isolate the Mains supply before removing the physical electrical supply connection to the pump, via the IEC 60320 cable (C19).

The 1-phase pump comes supplied with a V-lock IEC connector. This is a latching type connector and does not require a tool to disconnect the mains to the pump. In accordance with IEC 61010-1, the mains input cable must be kept to a maximum length of 3 m, there must be a suitable means to unplug the mains plug at the customer's supply source.

6.6.1 Connection for remote control and monitoring

To operate the pump using parallel control, use the 15-pin D-Sub connector on the user interface panel.

6.6.2 Connect the logic interface to the control equipment

The pump can be controlled using a hardware parallel control interface.

To control the pump using the hardware parallel interface, refer to [Interface 1-phase pump](#) on page 38 for more information.

6.7 Electrical installation 3-phase



WARNING: HAZARDOUS VOLTAGE

Risk of electric shock. Make sure that the electrical installation of the 3-phase pump system conforms to local and national safety requirements. The electrical Installation needs to be carried out by a trained electrician.



CAUTION: PUMP DAMAGE

Risk of damage to pump. The 3-phase pump must be installed with motor thermal overload protection, failure to install could result in permanent damage to pump

Fuses and circuit breakers

The 3-phase pump system is suitable for Installation Category II as defined in IEC 60664-1. The pump system must be connected to an isolator that disconnects all current carrying conductors and can be locked out in the off position (LOTO). The isolator must be in close proximity to the equipment, within easy reach of the operator and identified as the disconnect device for the equipment.

Prior to operating the 3-phase pump system; make sure that the pump is supplied with the correct external branch circuit protection. The 3-phase pump system is defined as “multiphase, permanently connected equipment”, and it does not include internal fuse protection for the overall pump system. There is internal fusing for the low power branch circuits within the pump system, however the overall pump system must be fused externally as part of the installation procedure.

[Table: Fuses and circuit breakers](#) specifies the required fusing to protect the 3-phase pump system in the event of a fault. In addition to this fusing,

the 3-phase pump system must be installed with motor thermal overload protection. Failure to install the 3-phase pump system without the specified motor thermal overload protection could result in permanent damage to the pump if subjected to sustained overload or fault conditions, e.g. a block exhaust.

Furthermore, the pump housing surface temperature could reach levels greater than 105 °C without this protection.

Table 6 Fuses and circuit breakers

Input supply	Rated system input current	Recommended external fuse rating	Recommended fuse type
200 V, 50 Hz	2.4 A rms	2.5 A, 250 V a.c	RK1 and RK5
200-230 V, 60 Hz	2.4 A rms	2.5 A, 250 V a.c	
380-415 V, 50 Hz	1.5 A rms	1.6 A, 600 V a.c	RK1, RK5 and J
460 V, 60 Hz	1.5 A rms	1.6 A, 600 V a.c	

Table 7 Recommended motor thermal overload protection

Parameter	3-phase SCROLLVAC 15, 18, 7 and 10 plus			
Supply voltage and frequency	200 V, 50 Hz	200 - 230 V, 60 Hz	380 - 415 V, 50 Hz	460 V, 60 Hz
Maximum COP current (A rms)	1.85	1.75	1.45	1.30
Maximum Atmospheric current (A rms)	2.15	2.75	1.55	1.50
Motor thermal overload setting (A rms)	2.40		1.50	
Recommended motor thermal overload device	ABB: T16 - 3.1		ABB: T16 - 1.7	
Trip class	10			

6.7.1 Electrical supply connection

CAUTION: PUMP DAMAGE



The 3-phase pump system is delivered configured for high voltage use. High voltage is defined as: 380 - 415 V/50 Hz and 460 V/60 Hz. Make sure that the pump is correctly configured for the electrical supply voltage and frequency. If not, the embedded 3-phase motor within the pump can be damaged.

The 3-phase pump system is not designed to be powered directly from a variable speed drive (VSD) using inverter technology. The direct use of inverter technology will lead to increased heating within the pump system, resulting in long term damage to the pump.

3-phase power must be connected to the 3-phase pump system. The overall 3-phase cable must include 3 live wires and a protective earth (PE) ground wire.

In addition to the primary 3-phase power supply connection to the pump, the pump must also be earthed via the secondary earth connection on the front of the pump housing using a M5x10 screw with a shake proof washer, refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#) for more details. The specification of this secondary earth wire must also meet the above mentioned requirements.

Installation

If inverter technology is required; suitable in-line filtering between the inverter and the pump system must be applied. The filtering must reduce the total harmonic distortion of the supply voltage to less than 5%. Please consult the inverter manufacturer for more details on the type of filter required.

In addition to the in-line filtering, the correct fuse protection is still required. Refer to tables in [Electrical installation 3-phase](#) on page 30.

Make sure the access to the pump electrical supply cable is not obstructed when locating the pump.

If using an earth leakage current device, for example a Residual Current Device (RCD), use a 30 mA (minimum) rated unit to avoid nuisance tripping during start up.

 Note:

The pump will restart automatically when the electrical supply is restored after an interruption. If automatic restart is not desired, use electrical control equipment which must be reset manually.

Table 8 Input supply

Voltage (a.c. rms)	Frequency (Hz)	Rated system input current (A rms)	Minimum wire gauge (4 wire: 3-phase+PE)	Recommended wire temperature	Recommended UL style number
200	50	2.5	16 AWG/1.5 mm ²	105 °C	UL1015
200-208	60	2.5			
380-415	50	1.25			
460	60	1.25			

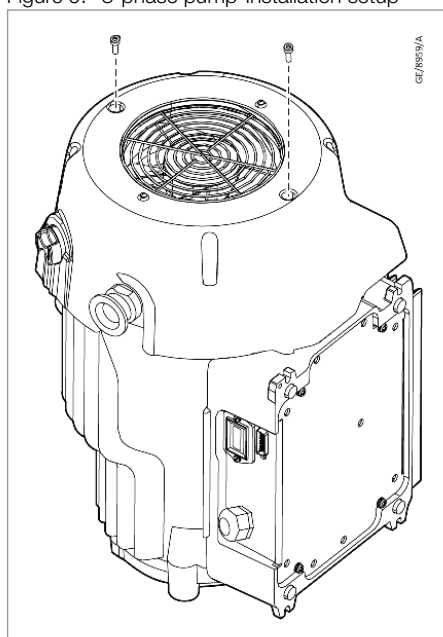
The recommended overall cable gauge, including 3 live wires and a PE wire with the individual wire specification defined in the table, is approximately 9.6 mm outer diameter. The M20 cable gland on the front panel of the pump is suitable for a cable diameter range: 5-12 mm.

Use the following procedure to connect a mains cable to the 3-phase pump:

Installation

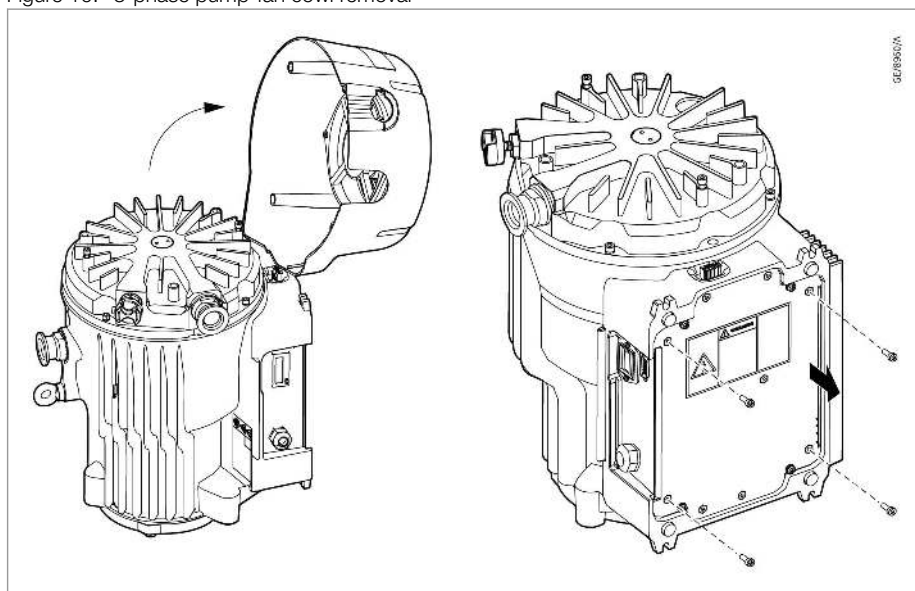
1. Place the pump on a flat and stable surface with the fan cowl facing upwards

Figure 9. 3-phase pump-Installation setup



2. Remove the fan cowl via the two screws on the top and bottom of the cowl. When the cowl is mechanically removed, disconnect the fan from the electric terminal box via the three-way connector.

Figure 10. 3-phase pump-fan cowl removal



3. Remove the electric terminal box via the four M5 fixing screws on the under-side of the controller.



Note:

The cable leading from the motor will still be attached to the terminal box.

Installation

4. Pass the electrical cable through the cable gland and connect to the appropriate terminals. Tighten the earth (ground) terminal connection to a torque of 2.13 to 2.87 Nm. Refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#). Refer to [Table: Wiring convention](#) for correct wiring convention.
5. Tighten the dome shaped nut on the cable gland until the outer sheath of the cable is firmly gripped. Using a tool, tighten to a torque of 2.5 Nm. Do not overtightened.
6. Refit the terminal box to the pump housing using the 4 off M5 screws torqued to 3 Nm.
7. Refit the fan cowl to the pump by first inserting the fan connector into the mating half in the terminal box and securing the cowl using the 2 off M5 screws torqued to 3 Nm.

The correct wiring convention for a positive electrical phase rotation (clockwise phase sequence) is as follows:

Table 9. Wiring convention

Customer's supply	3-phase Electric terminal box
L1	L1
L2	L2
L3	L3

Disconnect from electrical supply

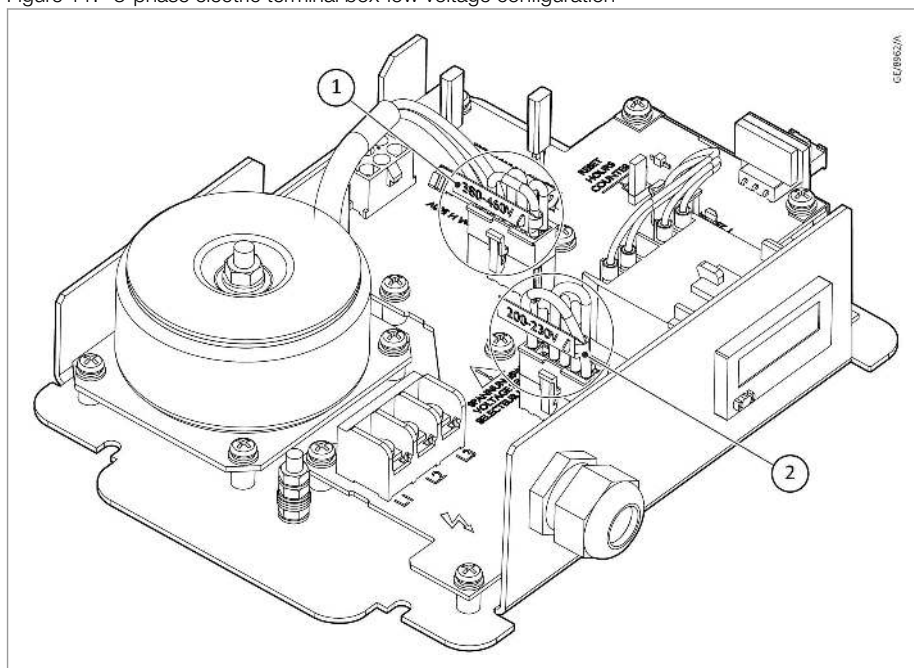
Before removing the physical electrical supply connection to the pump, isolate the mains input supply.

Voltage configuration 3-phase pump

- For low voltage operation, defined as 200 V, 50 Hz and 200-230 V, 60 Hz, the wiring must be configured as shown in [Figure: Low-voltage configuration](#).
- 3-phase pump will be delivered configured for high voltage operation, defined as 380-415 V, 50 Hz and 460 V, 60 Hz, and wired as shown in [Figure: High-voltage configuration](#).

Installation

Figure 11. 3-phase electric terminal box-low voltage configuration

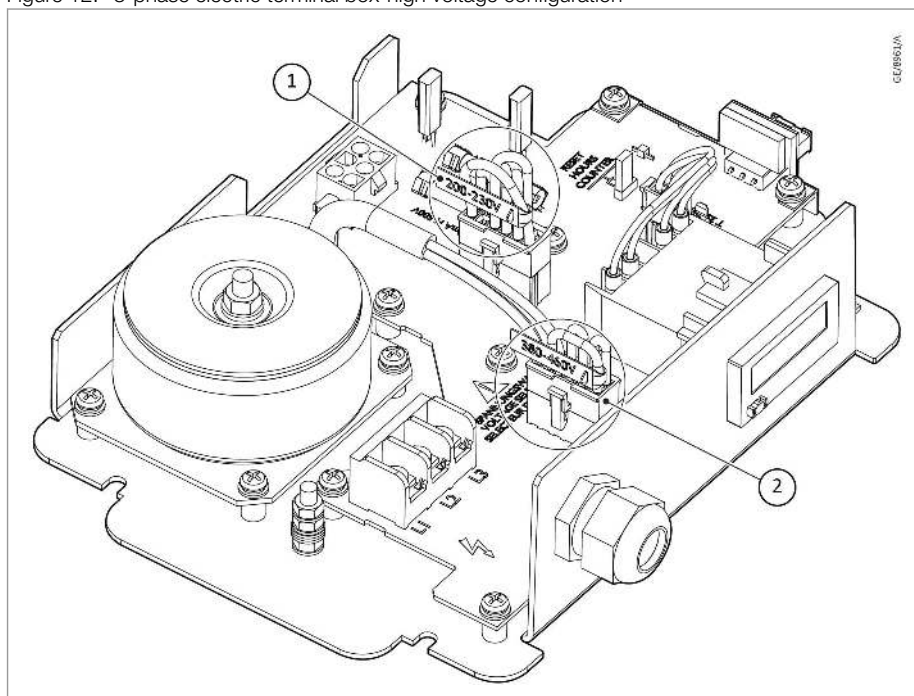


1. High-voltage switcher

2. Low-voltage switcher

Care must betaken to insure the voltage selector is in correct position to achieve low-voltage configuration.

Figure 12. 3-phase electric terminal box-high voltage configuration



1. Low-voltage switcher

2. High-voltage switcher

Care must betaken to insure the voltage selector is in correct position to achieve high-voltage configuration.

Installation

6.7.2 Check the direction of rotation



CAUTION: DAMAGE TO PUMP

Risk of pump damage. When checking rotation, avoid dropping foreign matter into the inlet. Dropping foreign matter into the pump can cause failure.

Make sure that the motor rotates in the correct direction. If it does not, the pump and the vacuum system can become pressurised when operating the pump.



CAUTION: ROTATING PARTS

Risk of physical injury. Care must be taken not to touch any rotating parts.



CAUTION: VACUUM

Risk of physical injury. Avoid exposing any part of the human body to the vacuum.

The direction of rotation can be checked by operating the pump with the inlet and exhaust ports open and checking that air comes out of the exhaust outlet.

Alternatively, the direction of rotation can be determined by removing the sealing grommet on the rear of the pump and observing the shaft rotation using the following procedure:

1. Remove the sealing grommet on the rear of the pump using a suitable tool.
2. With the electrical supply isolated, connect the pump electrical cable to the electrical supply.
3. With the pump inlet unconnected, switch on the electrical supply for a few seconds, then switch off the electrical supply again.
4. Check the direction of rotation of the shaft when viewed from the rear of the pump. The correct direction is clockwise. This is also indicated by an arrow on the rear of the pump. If the direction of rotation is incorrect:
 - Switch off the electrical supply immediately.
 - Isolate the pump from the electrical supply.
 - Remove the terminal box from the pump as described above and swap wires L1 and L3.
 - Refit the terminal box to the pump as described above.
5. Replace the grommet after the rotation has been determined.

7 Operation



WARNING: OPERATION SAFETY

Risk of pump damage. Do not operate the pump if the exhaust pipeline is restricted or blocked as the pump will not operate correctly and may be damaged.



CAUTION: OPERATION SAFETY

A fine dust may be emitted from the exhaust of the scroll pump during start up, particularly when the pump is new or if new tip seals are fitted.

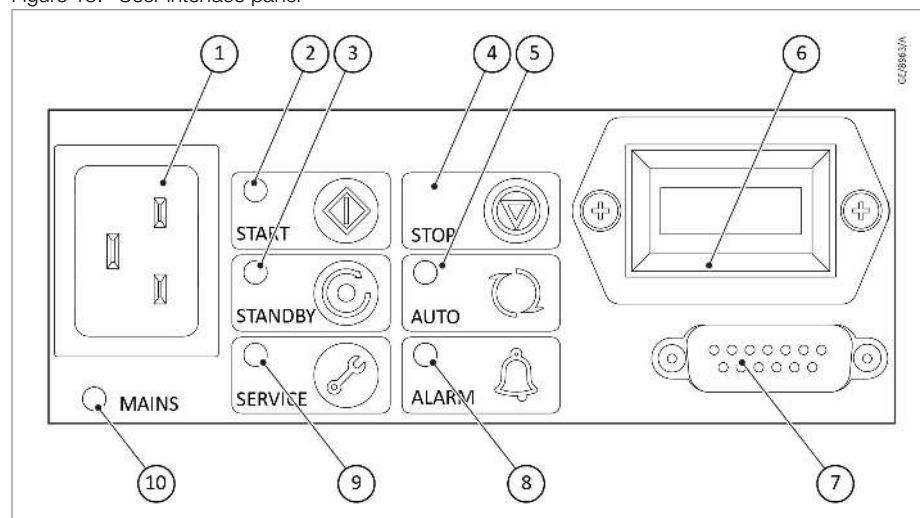
7.1 Operational modes 1-phase pump

The pump implements two control modes:

1. Manual Control Mode - using buttons on user interface panel.
2. Digital I/O Mode - via 15-pin D-SUB connector on user interface panel

The Control Mode is determined by the way the pump is started. Once started, the pump can only be stopped by the mode in which it was started, unless the power is cycled by isolation from the electrical supply.

Figure 13. User interface panel



- | | |
|--|--------------------------------|
| 1. Mains power connector | 2. Start button with indicator |
| 3. Standby button with indicator | 4. Stop button |
| 5. Auto-run enabled indicator | 6. Hours counter |
| 7. 15-pin D-Sub connector | 8. Alarm indicator |
| 9. Service reset button with indicator | 10. Power connected indicator |

7.2 Manual operation 1-phase pump

The pump control functions of the user interface panel are detailed in [Figure: User interface panel](#).

Operation

Start and stop

Use the buttons to start and stop the pump. Refer to [Figure: User interface panel](#).



Note:

The stop command does not isolate the pump from the electrical supply.

Standby

Operation at reduced speed will further improve tip seal and bearing service life. Vacuum performance will be reduced when operating at standby speed.

Push the standby button to select the standby mode. The pump will initially run at factory default standby speed (75% of full speed).

The Standby button must be pressed to return to normal run speed.

Auto run 1-phase pump

The auto-run setting configures the pump to start at power-up without any customer intervention. This parameter is customer configurable using the START/STOP buttons. Holding down either the START or STOP button, for more than eight seconds, will enable or disable the auto-run setting. The status of the auto-run setting is visible via the auto-run LED.

The pump can be stopped using either manual or parallel control modes while in auto-run.

7.3 Interface 1-phase pump

7.3.1 Digital I/O

The pumps have a 15-pin D-Sub connector located on the user interface panel. A suitable connector mating half must be used (not supplied) to connect the pump to the customer control system.

Table 10. Logic interface description

Connector (pump side)*	15-pin D-Sub (male)
Start and remote enable:	0 to 0.8 V d.c. ($I_{out} = 0.55$ mA nominal)
Enable control voltage: low (closed)	4 - 26.4 V d.c.
Disable control voltage: high (open)	(internal pull up to 6.4 V nominal)
Standby control input:	0 to 0.8 V d.c. ($I_{OUT} = 0.3$ mA nominal)
Enable control voltage: low (closed)	4 - 26.4 V d.c.
Disable control voltage: high (open)	(internal pull up to 3.2 V nominal)

* Mating half of connector not supplied

Table 11. NORMAL status output:

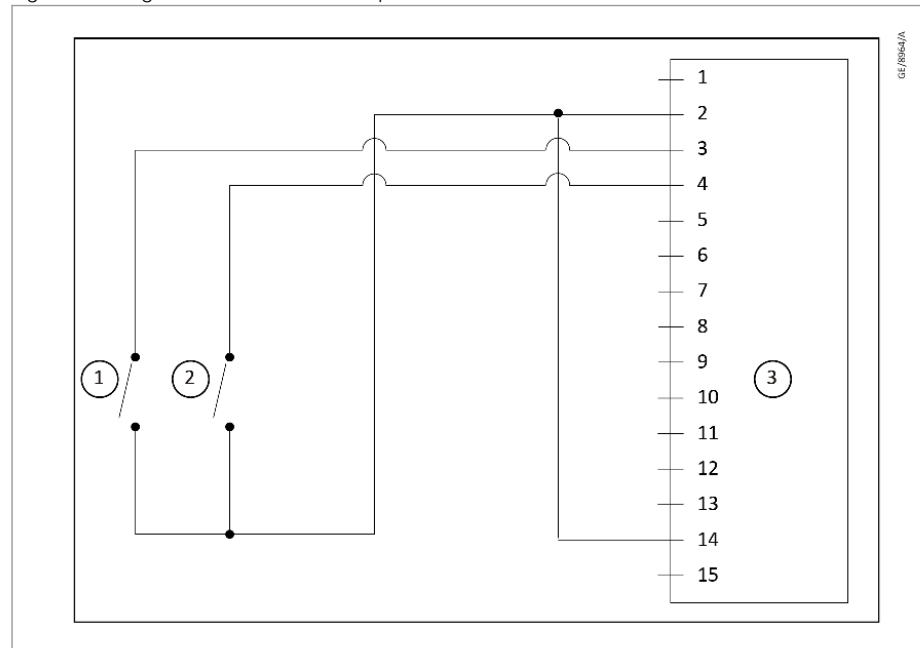
Type	Open collector transistor plus pull up resistor.
< Normal speed (default 80%)	OFF (4.7 k pull up + diode to 12 V d.c.)
$\geq$ Normal speed	ON (< 0.8 V d.c. sinking 10 mA)
Maximum current rating	10 mA
Maximum voltage rating	28.8 V d.c.

Table 12. FAIL status output

Type	Open collector transistor plus pull up resistor.
Fail	OFF (4.7 k pull up + diode to 12 V d.c.)
OK	ON (< 0.8 V d.c. sinking 10 mA)
Maximum current rating	10 mA
Maximum voltage rating	28.8 V d.c

7.3.2 Digital I/O interface connector pins

Figure 14. Logic interfae connections-parallel control



1. Start switch
2. Standby switch (optional)
3. SCROLLVAC plus pump logic interface

Table 13 Digital I/O interface connector pins

Pin number	Signal	Use
1	Not connected	Unused control pin
2	0 V Control reference	(0 V) reference for ALL control and status signals listed within this table.
3	START/STOP control input	Connect to pin 2 (0 V) to START the pump system.
4	STANDBY-Control Input	Connect to pin 4 (0 V) to enable STANDBY
5	Not connected	Unused control pin
6	Not connected	Unused control pin
7	FAIL-Status Output	Logic HIGH when a fail/fault condition exists
8	(0 V) Control reference	(0 V) reference for ALL control and status signals listed within this table.
9	Not connected	Unused control pin

Operation

Pin number	Signal	Use
10	Chassis/Screen	Screen
11	Not connected	Unused control pin
12	Chassis/Screen	Screen
13	Not connected	Unused control pin
14	REMOTE-Control Input	Connect to pin 2 (0 V) to enable remote control via Parallel control mode
15	NORMAL-Status Output	Logic LOW when the pump rotational speed is at normal speed or above.

7.3.3 Remote control and monitoring

Note:

If using the normal and fail lines to drive the coils of d.c. relays, include a back EMF suppression diode in parallel with each relay coil to protect the pump.

Connect the control equipment to the control input pins of the logic interface mating half. The control inputs are as follows:

- Start
- Standby speed

To activate any of these control inputs, connect the relevant control input (pin 14) to the (0 V) control reference.

To monitor the normal status output, connect the control equipment to the Normal status output (pin 15) and to (pin 2) of the logic interface mating half. The output can be used to control other devices in the pumping system. The output can drive a low power relay of up to 24 V coil rating (up to 10 mA).

To monitor the fail status output, connect the control equipment to the fail output (pin 7) and to (pin 2) of the logic interface mating half. The output can be used to control other devices in the pumping system. The output can drive a low power relay of up to 24 V coil rating (up to 10 mA).

7.4 Manual operation 3-phase pump



CAUTION: PUMP DAMAGE

Do not run the pump at frequencies above 65 Hz as this could cause damage to the pump.

The 3-phase pump is a direct-on-line pump application with no speed control. The pump running speed is determined by the electrical frequency of the customer's supply, i.e. 50 Hz or 60 Hz. Refer to [Table: Technical data](#).

The pump will start as soon as power is applied.

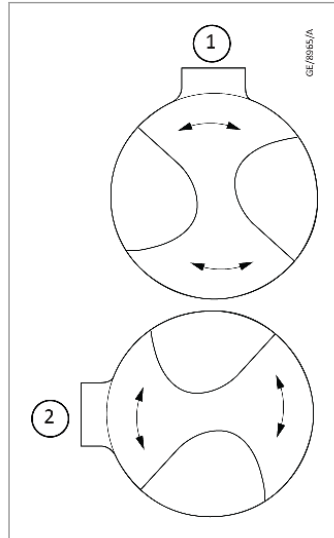
7.5 Use of a gas ballast control 1 and 3-phase pump

The gas ballast control can be used to optimise the performance of the pump for the application. The position of the gas ballast control can be changed when the pump is either off or operating.

Operation

Use the gas ballast control to introduce air into the final stage of the pump. Use of gas ballast will reduce the condensation of vapours in the pump. The condensates would contaminate the pump.

There are only two positions, 1 and 2. The gas ballast control knob will rotate 360° in either direction at 90° intervals.



1. Position 1 - Gas ballast OFF

2. Position 2 - Gas ballast ON

Position 1 = Gas ballast OFF. Use this setting to:

- Achieve ultimate vacuum
- Pump dry gases.

Position 2 = Gas ballast ON. Use this setting to:

- Pump condensible vapours within the concentrations described in the [Table: Technical data](#).
- Decontaminate the pump

Note:

If the pump is used at recirculation systems, at system with very low flow or with high humidity to clean the pump from vapours and tip seal dust, we recommend to use Gas ballast more frequently (~0.5 hour every day). If the flammable gases are pumped use inert gas for purge.

For "H" versions, contact us.

7.6 Start-up procedure

Use the following procedure to start the 1-phase pump:

1. Make sure that the vacuum system isolation valve is closed (if installed).
2. With the mains supply to the pump isolated, make the electrical connection to the pump mains connector port with an IEC60320 connector (C19). Refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#).
3. Check that the exhaust-extraction system is not restricted, and that any valves in the exhaust-extraction system are open.
4. Apply power.

Operation

5. Start the pump system using the appropriate control source, that is, using the Start button in manual control mode refer to [Figure: 1-Phase pump user interface panel](#); the Start/Stop control input in parallel control mode or a Start command in serial control mode.
6. Open the vacuum system isolation valve (if installed).

Use the following procedure to start the 3-phase pump:

1. Make sure that the vacuum system isolation valve is closed (if installed).
2. With the mains electrical supply isolated, make the electrical connection from the mains electrical supply outlet to the pump.
3. Check that the exhaust-extraction system is not restricted, and that any valves in the exhaust-extraction system are open.
4. Apply power.
5. As the pump is direct-on-line, the pump will start as soon as power is applied.
6. Open the vacuum system isolation valve (if installed).

7.7 To achieve ultimate vacuum

In order to achieve the best possible vacuum, the pump should be operated with the gas ballast control turned off. However, if the pump, or elements of the vacuum system it is attached to, are new or have been newly fitted, some atmospheric moisture may be present. If atmospheric moisture is present, run the pump with gas ballast on for 20 minutes before turning gas ballast off. If moisture is allowed to remain, the performance of the pump will be impaired.

7.8 To pump condensable vapours

Select gas ballast ON when there is a high proportion of condensable vapours in the process gases. This will assist the vapours to pass through the pump without condensing and keep the pump performance from degrading.

7.9 Shut down



CAUTION: PUMP DAMAGE

Risk of damage to the pump. If the gas-ballast control is open and the motor is switched off for any reason, the pump drive shaft may rotate in the reverse direction, causing a system pressure rise. To prevent this, use a gas-ballast control valve.



CAUTION: ELECTRIC SHOCK

Risk of electric shock. Do not disconnect the pump from the electrical supply until the pump has stopped completely.



Note:

The hours counter within the 3-phase pump system includes an embedded battery. When power is removed from the 3-phase pump, the hours counter will continue to display the previous "run hours" of the pump.

Use the procedure below to shut down the pump:

1. If shutting the pump down prior to a period of storage, remove any process gases by running on a gas ballast for at least one hour.
2. Close any vacuum system isolation valves to prevent suck-back into the vacuum system (where installed).
3. For the 1-phase pump; stop the pump system using the appropriate control source, that is, using the Stop button in manual control mode refer to [Figure: User interface panel](#); the Start/Stop control input in parallel control mode or a Stop command in serial control mode.
For the 3-phase pump system; remove power by isolating the incoming 3-phase electrical supply.
4. Vent the pump system using the gas ballast control or the valve on the inlet.
5. Isolate the Mains supply.

7.10 Emergency Stop (EMS) (3-phase pump only)**CAUTION: PUMP DAMAGE**

Risk of damage to the pump. The 3-phase pump is not fitted with an emergency stop. If an emergency stop function is required, then this product can be connected into the user's own Emergency Stop Control Circuit.

Accessories

8 Accessories

Spare parts and accessories

Our products, spares and accessories are available from our companies, a world-wide network of distributors and in our online shop <https://www.leyboldproducts.com>. Refer to the last page of this manual.

When ordering, state for each part required:

- Model and item number of your equipment
- Serial number
- Item number and description of part

Table 14 Spare parts

Spare part	Part No.	Comment
Minor service kit 7-15 plus	EK117141000	Used to maintain or restore the performance of the pump. (Tip-seal replacement) Refer to Replace the tip-seals on page 58
Minor service kit 18 plus	EK117141001	
Minor service kit 7-15 plus C-version	EK117141002	
Minor service kit 18 plus C-version	EK117141003	
Silencer spares kit	EK117141005	Replacement spares for the pump silencer 141102A02

Table 15 Accessories

Accessory	Part Number	Comment
Gas ballast adapter blank	141100A01	The gas ballast control is replaced with a blank adapter so that the gas ballast cannot be accidentally opened. This feature is useful for applications such as rare gas recirculation or gas recovery. Another advantage is improved leak tightness at this location.
Gas ballast adapter (no restriction)	141100A02	A gas ballast adapter may be fitted in place of the gas ballast control on the pump. The adapter allows a controlled supply of inert gas to be connected to the pump.
Gas ballast adapter (fine restriction)	141100A03	A gas ballast adapter may be fitted in place of the gas ballast control on the pump. The adapter allows a controlled supply of inert gas to be connected to the pump. (0.5 l min ⁻¹)
Chemical resistance conversion kit SCROLLVAC (7-15 plus) (18 plus)	141101A01 141101A02	This adapter kit allows a standard pump to be converted into an C - version pump. This conversion may be necessary if the pump is used on applications involving corrosive substances. For more information, contact us.
Vibrator isolators	141102A01	Fit vibration isolators to the pump to reduce the transmitted vibration from the pump to a structure, such as a frame or a system.
Silencer	141102A02	Refer to Connect to the vacuum system on page 28 for guidance on its use.

Accessories

Accessory	Part Number	Comment
Mains cables 1-Phase pump	-	Used to connect the pump to the electrical supply
Mains cable EU	161810EU	H05VV-F, 3x 1.5 mm ² , 300 V, 70 °C, length 2 m Europlug CEE7/VII (Schuko) 16 A/250 V rated IEC 60320 style C19 V-Lock
Mains cable UK	161810UK	H05VV-F, 3x 1.5 mm ² , 300 V, 70 °C, length 2 m 13 A fused BS1363 UK plug IEC 60320 style C19 V-Lock
Mains cable (USA/ CANADA) 200-230 V	161810US	SJT 3x14 AWG, 300 V, 70 °C, length 2.5 m NEMA 6/15P plug IEC 60320 style C19 V-Lock
Mains cable (USA/ CANADA) 110-120 V	141103US	SJT 3x14 AWG, 300 V, 70 °C, length 2.0 m NEMA 5/15P plug IEC 60320 style C19 V-Lock

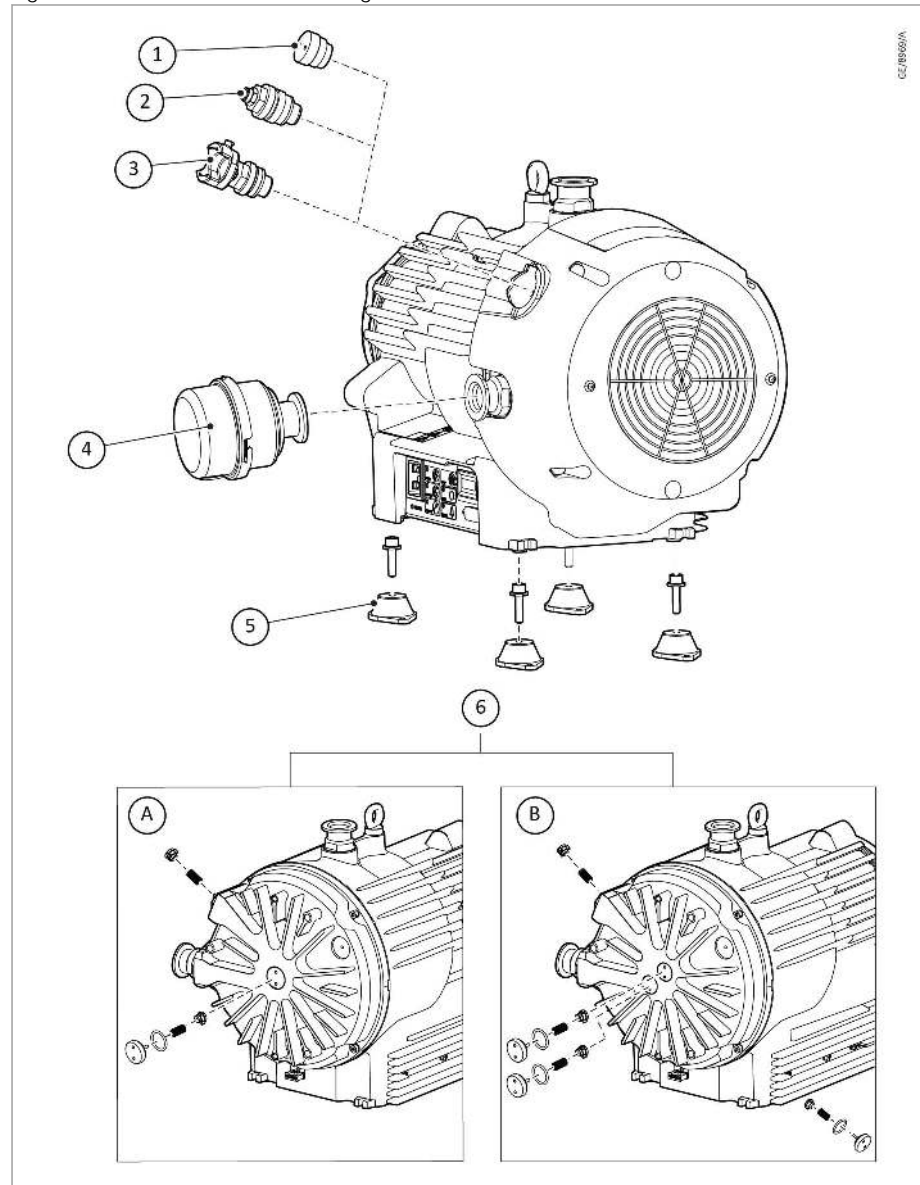


Note

If returning the pump to us for repair or service having been converted from a standard version to an C - version pump, Service must be informed, otherwise the pump will be returned back as a standard version.

Accessories

Figure 15. SCROLLVAC accessories-general view



A. SCROLLVAC 7,10 and 15 plus

B. SCROLLVAC 18 plus

1. Gas ballast adapter blank
3. Gas ballast control
5. Mountable vibration isolator

2. Gas ballast adapter
4. Silencer
6. Chemical resistance conversion kit

8.1 Mounting accessories



WARNING: HAZARDOUS VOLTAGE

Risk of injury or damage to equipment and risk of electric shock. Operator must wait for a minute for capacitor discharge after disconnecting the power supply before working on the pump.

This Section provides installation, operation and maintenance instructions of the accessories for the pump.

Accessories

The accessories are shown in [Figure: SCROLLVAC accessories-general view](#) (O-ring seals not shown). The Item Numbers for the accessories are listed in the [Table: Accessories](#). The accessories must be used as specified in this manual. Read this manual before installing accessories onto the pump.

Before installing the accessory:

- Switch off the and wait until the pump has stopped rotating.
- Isolate the pump from the electrical supply
- When ordering accessories, please state for each part required:
- Model and Item Number of the equipment
- Serial number (if any)
- Item Number and description of part.

8.1.1 Gas ballast adapter blank

This adapter kit allows the conversion of a pump into an H - version pump. The gas ballast control is replaced with a blank adapter so that the gas ballast cannot be accidentally opened.

Supplied equipment: Gas ballast adapter blank, O-ring 19.6ID x 2.4

Installation

The method for installing the gas ballast adapter blank follows some of the stages used to install the gas ballast adapter. To install the gas ballast adapter blank, refer to stages 1, 2, 3 and 5 of the gas ballast adapter fitting instructions in [Gas ballast adapter](#) on page 48.

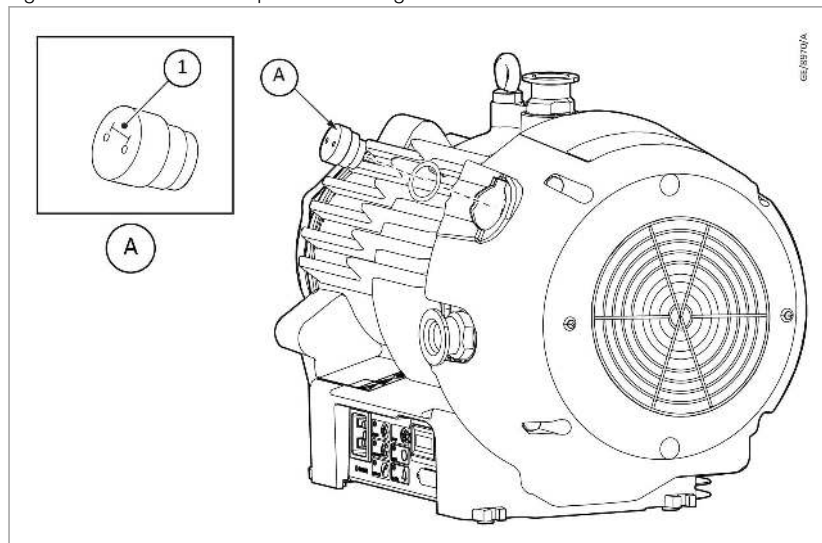
Using a pin spanner (not provided), fit the adapter blank and tighten to 6 Nm.



Note:

As a precaution, we recommend that a complete vacuum leak check be performed following this installation.

Figure 16. Gas ballast adaptor blank fitting



A. Gas ballast adapter blank

1. 14 mm pin spanner

Accessories

8.1.2 Gas ballast adapter

The gas ballast adapter fits in place of the gas ballast control. The gas ballast adapter allows connection of a controlled supply of inert gas such as nitrogen into the low vacuum stage of the pump.

The gas purge can be used to dilute flammable gases down to a safe level (We recommend 1/4 of the Lower Explosive Limit). An inert purge can also be used to reduce the likelihood of gas vapours such as iodine from condensing at the outlet stage of the pump.

Accessory	Part number	Maximum supply pressure	Gas ballast flow
Gas ballast adapter (no restriction)	141100A02	1 bar (absolute)	Standard*
Gas ballast adapter (fine restriction)	141100A03	1.5 bar (absolute)	0.5 l min ⁻¹

* Refer to [Table: Technical data](#) for standard gas ballast flows

Supplied equipment: Gas ballast adapter, O-ring 19.6ID x 2.4

Installation

Make sure the pump is switched OFF before fitting. Refer to [Figure: Installing the gas ballast adapter](#).

1. Undo the 2 off retaining bolts and partially remove the fan cowl.



Note:

Cooling fan supply lead attached.

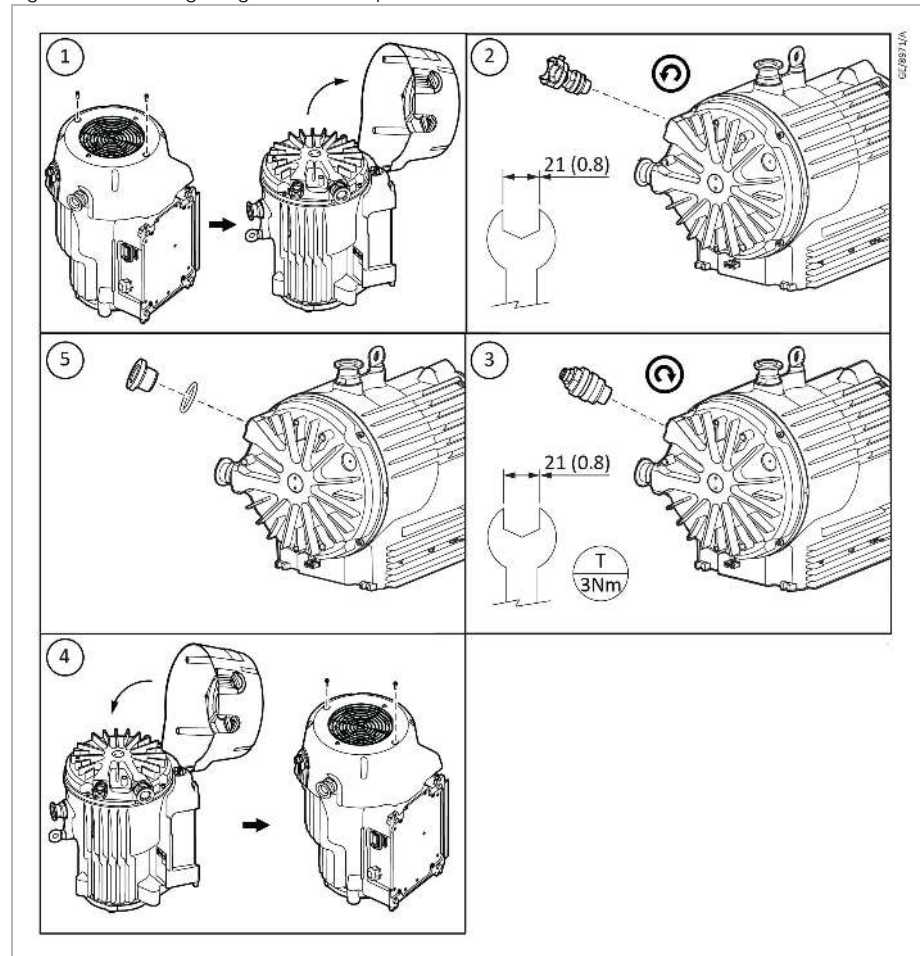
2. Carefully disconnect the cooling fan electrical supply lead and remove the fan cowl.
3. Using a 21 mm AF spanner, remove the gas ballast control assembly.
4. Carefully remove the gas ballast control seat and O-ring.
5. Assemble the gas ballast adapter and new O-ring, make sure the O-ring and seal surface are clean and free of dust or dirt.
6. Reconnect and assemble the cooling fan supply lead and fan cowl in reverse order. Torque the retaining bolts to 3 Nm.

As a precaution, we recommend that a complete vacuum leak check be performed following this installation.

Make sure the cooling fan operates correctly following the installation of the gas ballast adapter.

Retain the gas ballast control assembly and seat for future use if required.

Figure 17. Installing the gas ballast adaptor



8.1.3 Silencer

The pump silencer has two main functions.

- To reduce exhaust noise during pump down and gas ballast operation.
- To collect and retain tip seal dust as the pump is operated.

Exhaust gases exit the exhaust port when the pump is being used to evacuate a process chamber, when the gas ballast control is being used, or both. The noise level when pumping down rises as the throughput increases and the silencer is used to reduce this noise level.

The outer can is made of pressed steel and is split to allow access to the filter elements.

The filter element housing is made from Santoprene® thermoplastic elastomer. The element itself is polyester. The foam block is manufactured from filter foam.



Note:

These elements can only be used in dry applications and must not be allowed to moisten.

The pump silencer has been manufactured with an NW25 fitting to enable fitting to the pump exhaust. An NW25 clamp and centering ring are included.

Accessories

A sectional view of the silencer is shown in [Figure: Silencer](#)

Table 16. Technical data

Maximum back pressure	0.2 bar gauge
Mass	265 g
Port size	NW25

Installation



CAUTION:

The silencer is not recommended for use with pumping hazardous substances.
A pressure relief valve is not fitted to the silencer.

Make sure the pump is switched off before fitting the silencer.

1. Clean the face of the pump exhaust.
2. Place the centering O-ring in the end of the NW25 backing port and seat the silencer in the pump exhaust.
3. Fit the clamp and tighten to secure the silencer.

Silencer maintenance



WARNING: DANGEROUS VOLTAGE

Risk of electric shock. Do not attempt to dismantle the silencer while the pump is running.

Make sure the pump is isolated from its electrical supply before removing the silencer.



WARNING: WEAR PROTECTIVE EQUIPMENT

Do not inhale the tip seal dust. Do not blow the tip seal dust from the silencer with compressed air.

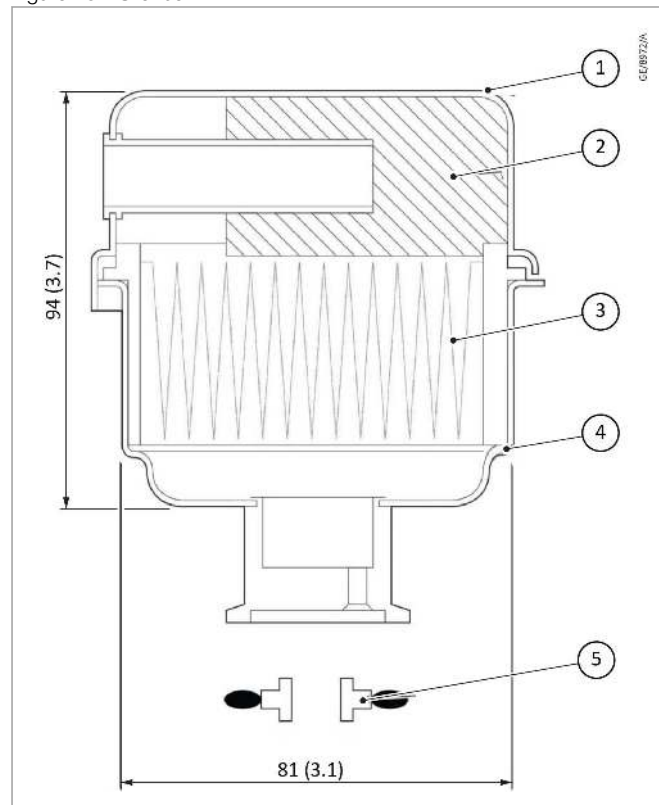
Take all necessary precautions if toxic or dangerous substances have been pumped. Wear PPE when handling contaminated filters and filter elements.

The foam block and polyester element need to be inspected periodically. We recommend both are replaced every 9000 hours of pump use. The silencer has been designed to handle 10 cc of tip-seal dust without affecting the performance of the pump. The silencer spares kit contains both items. For part number refer to [Table: Spare parts](#).

Make sure the pump is switched off before removing the silencer.

Remove the NW25 clamp and silencer from the pump exhaust. Hold the top half of the silencer with one hand, and the bottom half with the other hand. Keeping one hand steady, twist clockwise with the other, and the two halves will separate. The polyester element will be retained in the top half. With the element uppermost, lift the element out by lightly gripping the protruding surface of the element. Put the element to one side ready to inspect it. The foam block is pushed onto the outlet pipe and is trapped into position by the polyester element.

Figure 18. Silencer



- | | |
|----------------------|------------------|
| 1. Top casing | 2. Foam block |
| 3. Polyester element | 4. Bottom casing |
| 5. Centering ring | |

8.1.4 Inspection of elements



CAUTION: TOXIC MATERIAL

Risk of hazardous gases. The tip seal wear product will begin to decompose if the temperature exceeds 250 °C, giving rise to gaseous fumes that can produce unpleasant symptoms.

The silencer will be contaminated with the process chemicals that have been pumped during operation. Make sure that the pump is decontaminated before maintenance and that adequate precautions are taken to protect people from the effects of dangerous substances if contamination has occurred.

Renewal of the elements is recommended regardless of their level of contamination. Neither element should be heavily contaminated with tip seal dust, but if either is, they **MUST** be replaced or cleaned in order to avoid a build up of dust that may adversely affect performance. Rinse the elements through with soap and water to clean them. Observe local guidelines to advise the safe disposal of PTFE dust.

Replacement of elements

Fitting the new elements is the reverse of removal, fit the foam block first and then the polyester element. Fit both halves of the silencer together and twist

Accessories

anticlockwise to secure. Make sure fastening is complete by looking at the bayonet fitting and checking it is home.

8.1.5 Mountable vibration isolators

The mountable vibration isolators can be used to reduce the transmitted vibration from the pump to a mounting surface such as a system frame.

The mountable vibration isolators have fixing holes to allow the pump to be bolted to the floor or system frame.

Supplied equipment:

- 1. 4-vibration isolators
- 2. 4-pump fixing screws
- 3. 4-plain washers
- 4. 4-shake proof washers.

Maximum load per isolator	18 kg
Nominal deflection	4 mm

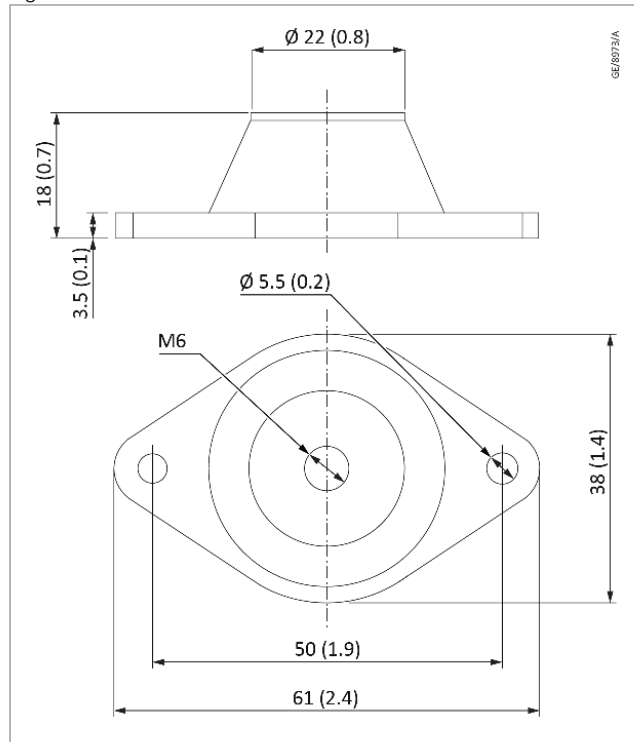
Installation

Make sure the pump is switched off before fitting.

- 1. Unscrew and remove the standard rubber feet if fitted.
- 2. Fit the vibration isolators to the pump using the screws and washers provided.
- 3. Using 5 mm bolts (not supplied), fix the vibration isolators bolted to the fixing surface or system frame.

We recommend the fitting of flexible tubing or bellows connections between the pump-inlet and the pump- outlet and the rest of the system, to prevent the transmission of stress to the vacuum pipelines and/or equipment.

Figure 19. Vibration isolator dimension



All dimensions given are in mm (inch)

8.1.6 Chemical resistance conversion kit

The adapter kit allows the conversion of a standard pump into an C - version pump. This conversion may be necessary if anticipating the use of the pump on applications involving corrosive substances.

Table 17. Supplied equipment:

Part	Quantity for SCROLLVAC 7/10/15 plus	Quantity for SCROLLVAC 18 plus
Valve pad (Chemraz)	2	4
Valve spring	2	4
19.6 ID O-ring	2	2
NW25 stainless steel port	2	2
NW25 port O-ring	2	2

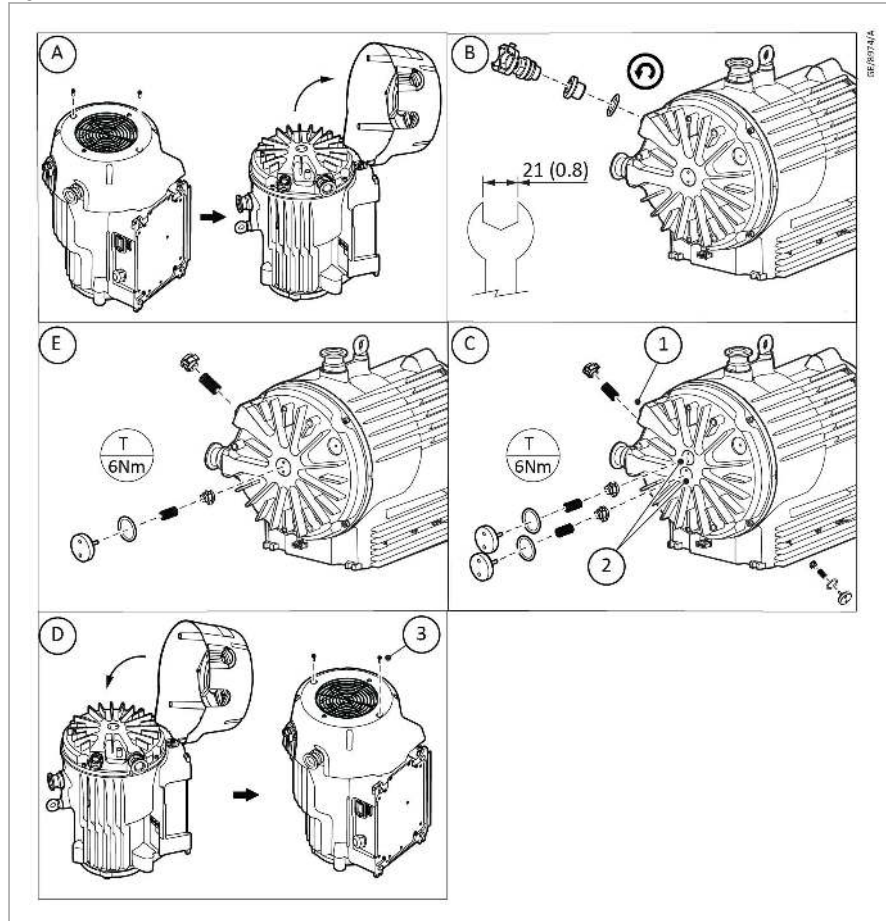
Installation

Make sure the pump is switched off before fitting. Discard all used 19.6 ID O-rings.

Refer to [Figure: Installing the chemical resistance conversion kit](#)

Accessories

Figure 20. Install the chemical resistance conversion kit



8.1.7 Valve pad conversion

1. Undo the 2 off retaining bolts and partially remove the fan cowl.

Note:

Cooling fan supply lead attached. Carefully disconnect the cooling fan electrical supply lead and remove the fan cowl.

2. Using a 21 mm AF spanner (not supplied), remove the gas ballast control assembly, seat and O-ring.
3.
 - a. (SCROLLVAC 7/10/15 plus) Remove the remaining items (spring and pad) from the gas ballast port. Using a pin spanner, remove the exhaust valve end cap, O-ring, spring and valve pad.
 - b. (SCROLLVAC 18 plus) The SCROLLVAC 18 plus uses two addition exhaust valves. Remove these using the same procedure as in (3-a).
4. Assemble the new valve parts in reverse order. Reconnect and assemble the cooling fan supply lead and fan cowl in reverse order. Torque the retaining bolts to 3 Nm.

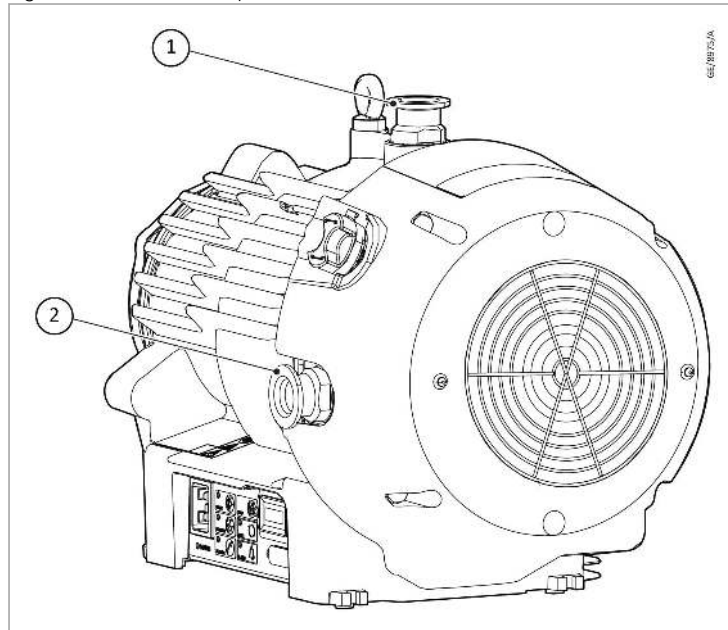
8.1.8 Inlet/exhaust port conversion

Using a 30 mm AF spanner (not supplied), remove both the inlet and exhaust ports. Locate the stainless steel ports provided in the kit and assemble using new O-rings in reverse order.

Accessories

As a precaution, we recommend a complete vacuum leak check after this installation

Figure 21. Inlet/exhaust port conversion



1. Inlet port

2. Exhaust port

Maintenance

9 Maintenance

9.1 Safety information



WARNING: MAINTENANCE SAFETY

Risk of damage to the equipment. Obey the safety instructions in this section and take note of appropriate precautions. Failure to observe these instructions may result in injury to people and damage to equipment.



WARNING:

In order to maintain the ATEX certification, all maintenance work has to be carried out in accordance with this SCROLLVAC plus instruction manual and the SCROLLVAC plus Replacement Tip Seal manual, using only genuine Leybold spare parts



WARNING: HAZARDOUS VOLTAGE

Risk of electric shock. Disconnect the pump and other components from the electrical supply to prevent accidental operation.



WARNING: USE PROTECTIVE EQUIPMENT

Risk of physical injury. The pump may be contaminated with the process chemicals that have been pumped during operation. If so, make sure that the pump is decontaminated before maintenance and that adequate precautions are taken to protect people from the effects of dangerous substances if contamination has occurred.



CAUTION: HOT SURFACE

Allow the pump to cool for at least 3 hours before starting maintenance work.



CAUTION: TOXIC MATERIAL

Do not touch or inhale the thermal breakdown products of fluorinated materials which may be present in the pump if the pump has been heated to 260 °C and above. Fluorinated materials are safe in normal use but can decompose into very dangerous substances (which may include hydrofluoric acid) if heated to 260 °C and above. The pump may have overheated if it was misused or if it was in a fire. Safety Data Sheets for fluorinated materials used in the pump are available on request; contact us or the supplier.



CAUTION:

External surfaces of the pump should be cleaned using a damp cloth. Care must be taken with solvent-based cleaning fluids as they may remove important information from the product labels.

Maintenance

The pump is designed to require little user maintenance. Observe the following guidelines when carrying out maintenance on the pump:

- Make sure the maintenance is done by a suitably trained and supervised technician. Obey local and national safety requirements.
- Make sure the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
- Check that all the required parts are available and are of the correct type before starting work.

9.2 Maintenance plan

More frequent maintenance may be required if the pump is used to pump aggressive gases or vapours, such as solvents, organic substances and acids, or if the pump is operated continuously at the higher end of its operating temperature.

Table 18 Maintenance plan

Operation	Frequency (months)	Service indicator 1-phase	Hours indicators 1-phase 3-phase	Section reference
Inspect and clean the inlet strainer	12	No	8760	Inspect and clean the inlet strainer on page 57
Inspect and clean the external fan cover if required	12	No	8760	Clean the external fan cover on page 58
Check the pump performance	30	Yes	21900	Check the pump performance on page 58
Replace the tip-seal	30 or when needed	Yes	21900	Replace the tip-seals on page 58
Replace the pump bearings	60	Yes	43800	Replace the pump bearings on page 58
Replace the pump controller	120	Yes	87600	Replace the pump controller (1-phase pump indicator only) on page 59
Electrical safety check	60	No	43800	Electrical safety check on page 60

For service indicator codes (1-phase), refer to [Service indicator codes \(1-phase service indicator only\)](#) on page 60.

9.3 Inspect and clean the inlet strainer

Whenever the pump is disconnected from the vacuum system, or on an annual basis, we recommend:

- Removing the inlet strainer from the pump inlet and remove any debris that may have accumulated. Refer to [Figure: SCROLLVAC plus 3-phase and 1-phase](#).
- Inspecting the inlet strainer and if necessary, clean it with a cleaning solution suitable for the substances pumped. Refit the inlet strainer before reconnecting the pump to the vacuum system. Refer to [Connect to the vacuum system](#) on page 28.

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9.4 Clean the external fan cover

If the fan cover is not kept clean, the air flow over the pump can be restricted and the pump may overheat.

1. Switch off the pump and disconnect it from the electrical supply.
2. Use a dry cloth and a soft brush to remove dirt and deposits from the fan cover.

9.5 Check the pump performance

If the service indicator for 1-phase pumps is flashing ON 1s / Off 1s or the hours counter on the 3-phase pump has reached the recommended running hours as detailed in [Maintenance plan](#) on page 57, then it is recommended that the performance of the pump is checked.

If after checking, the pump is no longer achieving the required performance as detailed in [Table: General Technical data](#), We recommend carrying out a tip-seal replacement, refer to [Replace the tip-seals](#) on page 58.

If the pump performance is within acceptable limits, or is performing satisfactorily, the tip-seal replacement can be delayed.

If operating a preventative maintenance plan, depending upon the particular regime, a tip-seal change can be carried out at this time irrespective of the pump performance.

To reset the 1-phase service indicator, refer to [Service indicator codes \(1-phase service indicator only\)](#) on page 60.

9.6 Replace the tip-seals

This information is applicable to the pump replacement tip seal kit that must be fitted.

A tip-seal replacement should be carried out to maintain or restore the pumps performance. The frequency for replacing the pump tip-seals is determine by the following factors:

- The pump has reached a service interval. Refer to ([Maintenance plan](#) on page 57 and [Check the pump performance](#) on page 58).
- The pump is no longer achieving the required performance.

If the pump is no longer achieving the required performance prior to a service interval being reached We recommend first following the Fault finding, ([The pump has failed to achieve the required performance](#) on page 64).

Note:

There may be a running-in period after fitting your new tip-seals. The performance should improve over a period of 24 to 48 hours. If the pump performance does not improve sufficiently after the running-in period, please contact us for advice.

9.7 Replace the pump bearings

If the service indicator for 1-phase pumps is flashing ON 3 s/Off 1 s or the hours counter on the 3-phase pump has reached the recommended running hours as detailed in [Maintenance plan](#) on page 57, then this is an indication that a bearing replacement service interval has been reached.

Bearing wear cannot necessarily be detected under normal operating conditions. This service interval is a recommendation that a bearing

replacement is required, this is especially useful if operating a preventative maintenance plan.

It is possible for an experienced technician, who is suitably trained, to perform maintenance and repair on pumps up to and including bearing replacement.



Note:

Failure to replace the pump bearings at this time may subsequently lead to damage of the pumping mechanism.



Note:

A tip-seal change and exhaust and ballast valve change should be carried out at the same time when performing a bearing replacement.

To reset the 1-phase service indicator, refer to [Service indicator codes \(1-phase service indicator only\)](#) on page 60.

9.8 Replace the pump controller (1-phase pump indicator only)

The service indicator, (flashing ON 3 s/OFF 3 s) is triggered to indicate that the pump controller should be replaced. Contact us for further details.

The pump controller service indicator cannot be reset.

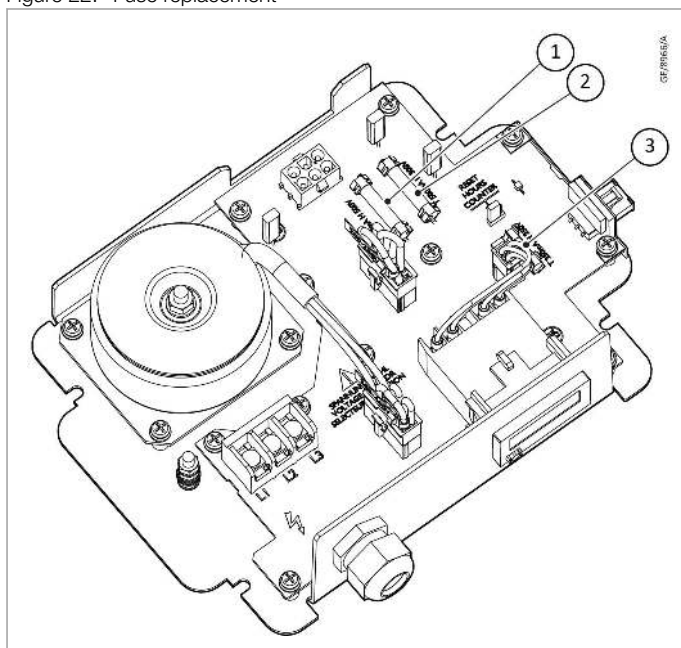
9.9 Replace 3-phase electric terminal box fusing

The 3-phase electric terminal box includes fuse protection for the hours counter and the electric fan. In the event of either sub-component failing the internal fusing can be changed using the following procedure:

1. Remove power to the 3-phase pump
2. Isolate the electrical supply
3. Remove the 3-phase electric terminal box. Refer to [Electrical installation 3-phase](#) on page 30 for details.
4. Transformer fusing: FS1 and FS2-T 500 mA 500 V Refer to [Figure: Fuse replacement](#).
5. Fan and Hours counter fusing: FS3-T 250 mA 250 V Refer to [Figure: Fuse replacement](#).

Maintenance

Figure 22. Fuse replacement



- | | |
|------------------------|------------------------|
| 1. FS1-T 500 mAh 500 V | 2. FS2-T 500 mAh 500 V |
| 3. FS3-T 250 mAh 250 V | |

9.10 Electrical safety check

Test the earth continuity and the insulation resistance of the pump system in accordance with local regulations for the periodic testing of electrical equipment.

The earth continuity should be less than 0.1 Ω and the DC insulation resistance greater than 10 M Ω . If the pump fails any of these tests, the supplier or we must be contacted.

9.11 Service indicator codes (1-phase service indicator only)

The pump controller incorporates a service indicator. The service indicator will flash a specific code whenever a service interval has been reached.

Service flash code	Comments	See section
ON 1 s/OFF 1 s	Pump performance check	Check the pump performance on page 58
ON 3 s/OFF 1 s	Pump bearing service	Replace the tip-seals on page 58
ON 3 s/OFF 3 s	Pump controller service	Replace the pump bearings on page 58

The pump controller service indicator cannot be reset.



Note:

Resetting the pump bearing service indicator will also reset the performance check timer, that is, both counters will be set to zero.



Note:

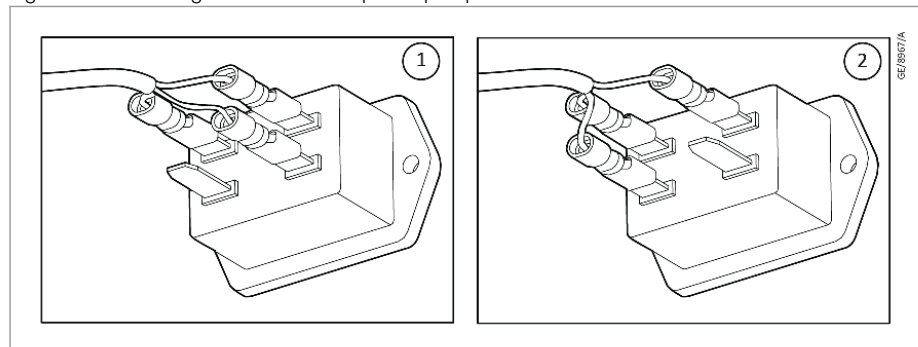
Resetting the performance check service indicator will reset the service timer back to zero.

9.12 Reset the hours counter 1-phase pump

We recommend not to reset the hours counter but leave it running in order to keep track of the pump history. If a hours counter reset is required the following steps need to be carried out:

1. Remove power to 1-phase pump and wait two minutes for the residual voltage to discharge; then take the hours counter off the front panel.
2. Unplug the wire from the enabling signal tab and plug it onto the reset tab, as shown in [Figure: Hours counter reset 1-phase pump](#) (view 2).
3. Fit the hours counter back onto the front panel.
4. Apply power to the 1-phase pump and press the Start button; the hours counter will immediately reset to zero.
5. Remove power to the 1-phase pump and wait two minutes for the residual voltage to discharge; then take the hours counter off the front panel.
6. Unplug the wire from the reset tab and replace it onto the enabling signal tab, as shown in [Figure: Hours counter reset 1-phase pump](#) (view 1).
7. Fit the hours counter back onto the front panel.
8. Apply power to the unit and press the Start button; check if the hourglass flickers, which means it is ready to start to counting.

Figure 23. Resetting hours counter 1-phase pump



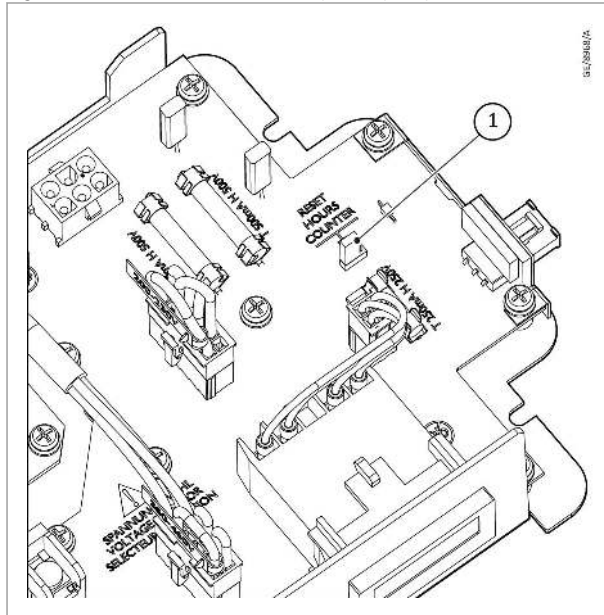
9.13 Reset the hours counter 3-phase pump

1. Remove power to the 3-phase pump and isolate the incoming electrical supply.
2. Remove the electric terminal box using the procedure documented in [Electrical installation 3-phase](#) on page 30
3. With power removed to the 3-phase pump; the hours counter should remain powered as it has an embedded battery – check the display to make sure the counter is still working.
4. On the printed circuit board of the electric terminal box there is a three pin reset connector/jumper - “RESET HOURS COUNTER”, refer to [Figure: Hours counter reset 3-phase pump](#). Move the jumper to the reset pins following the symbol on the board.
5. Wait approximately 5 seconds for the counter to reset.
6. After resetting, move the jumper back to its default position.

Reassemble the electric terminal box and fan cowl as per [Electrical installation 3-phase](#) on page 30.

Maintenance

Figure 24. Hours counter reset 3-phase pump



1. *RESET HOURS COUNTER* - three pin connector/jumper.

9.14 Battery replacement 3-phase hours counter

We do not consider the replacement of the battery within the hours counter as a customer function. In the event of failure, please contact us for further guidance on battery replacement.

10 Fault finding

Table 19. Fault finding

Conditions
<i>The pump has failed to start or has stopped</i> on page 63
<i>The pump cycles between a running and stopped state, but with power applied (3-Phase pump only)</i> on page 63
<i>The pump has failed to achieve the required performance</i> on page 64
<i>Poor ultimate vacuum</i> on page 65
<i>The pump is noisy</i> on page 65
<i>The pump surface temperature is high</i> on page 66

Fault	The pump has failed to start or has stopped
Cause	The electrical supply fuse has blown.
Remedy	Change the blown fuse
Cause	The motor is incorrectly wired (3-Phase pump only)
Remedy	Check the connection wiring
Cause	The operating voltage does not match that of the motor (3-Phase pump only)
Remedy	Check the power supply
Cause	The ambient temperature is too high.
Remedy	Cool down ambient temperature
Cause	The cooling air supply is insufficient or is too hot.
Remedy	Check the distance from the object which could affect air flow
Cause	The process gas is too hot or the maximum continuous operating pressure has been exceeded.
Remedy	Check the ambient of pumping medium and maximum inlet pressure
Cause	The fan is not working or is not connected.
Remedy	Check the fan connection or contact us
Cause	The motor is faulty.
Remedy	Contact us
Fault	The pump cycles between a running and stopped state, but with power applied (3-Phase pump only)
Cause	The motor is incorrectly wired
Remedy	Check the connection wiring
Cause	The operating voltage does not match that of the motor.
Remedy	Check your power supply

Fault finding

Cause	The ambient temperature is too high.
Remedy	Cool down ambient temperature
Cause	The cooling air supply is insufficient or is too hot.
Remedy	Check the distance from the object which could affect air flow
Cause	The process gas is too hot or the maximum continuous operating pressure has been exceeded.
Remedy	Check the ambient of pumping medium and maximum inlet pressure
Cause	The fan is not working or is not connected.
Remedy	Check the fan connection or contact us

Fault	The pump has failed to achieve the required performance
Cause	Gas ballast may be selected.
Remedy	To close gas ballast, turn the control a quarter turn so that the valve snaps shut. Use this setting to achieve the best possible vacuum. If the pump has been used to pump condensable vapours or is to pump a large chamber that has been exposed to atmospheric air (water vapour), it may be necessary to run for at least an hour on gas ballast.
Cause	If the electrical supply voltage is more than 10% below the lowest voltage specified on the user inter- face panel, the pump may operate but deliver a degraded vacuum performance.
Remedy	Use correct power supply
Cause	There is a leak in the system.
Remedy	Check full system for vacuum leakage
Cause	Tip seals may need further run-in, typically 24 hours, with some requiring up to a maximum of 100 hours.
Remedy	Keep the pump running for additional time, for speed up tip seal run-in, you can open GB valve
Cause	The pressure measurement technique or gauge head is unsuitable or gives an incorrect indication of pressure.
Remedy	Check or calibrate measure equipment
Cause	The vacuum fittings are dirty or damaged.
Remedy	Replace the fitting
Cause	The inlet strainer is blocked.
Remedy	Clean or replace the strainer
Cause	The connecting pipelines are too long or too small in diameter, conductance.
Remedy	Use hoses with the bigger diameter or contact us for calculation your system
Cause	There is high pressure or a blockage in the exhaust line.
Remedy	Check exhaust pipeline

Fault finding

Cause The pump contains traces of process vapours. The pump is outside the specified range of operating

Remedy Run 12 hours with gas ballast

Cause The pump is outside the specified range of operating conditions.

Remedy Reduce inlet pressure or the process cycling is too aggressive

Cause The tip seals need replacing.

Remedy Replace the tip seal

Cause The pump is in standby mode.

Remedy Check the pump setup and switch off standby mode

Cause The motor shaft rotates in the wrong direction (3-Phase pump only)

Remedy Reconnect and change two wires between at unit connector

Fault Poor ultimate vacuum

Cause The pump is not running correctly.

Remedy Connect it correctly

Cause There is a pulse at the exhaust with the gas ballast set to zero: Pump is leaking.

Remedy Find the leak and rectify.

Cause There is no pulse at the exhaust with the gas ballast set to zero: Pump is not leaking.

Remedy Change the tip seal

Fault The pump is noisy

Cause The inlet is open

Remedy Seal off inlet

Cause The gas ballast is open.

Remedy Set Gas ballast to (0) zero, if possible.

Cause Scroll clash.

Remedy Remove fixed scroll, inspect scroll and clean.

Cause Bearing needs servicing.

Remedy Return the pump to Leybold.

Cause Contamination

Remedy Remove fixed scroll, clean scroll and plenum chamber.

Cause Motor needs servicing.

Remedy Return the pump to us.

Fault finding

Fault	The pump surface temperature is high
Cause	The ambient temperature is too high.
Remedy	Cool down ambient temperature
Cause	The cooling fan is not running.
Remedy	Check the fan connection or contact us
Cause	The process gas is too hot or the maximum continuous operating pressure has been exceeded.
Remedy	Check the ambient of pumping medium and maximum inlet pressure

10.1 Alarm indicator codes 1-phase pump

Whenever a fail condition becomes active the red alarm indicator shows a flashing sequence. If the error light is on continuously this indicates a problem has been found with the embedded software. In this case, try cycling the power. If cycling the power does not clear the indication, a software download may be required. In this situation, contact us or the supplier. If the alarm indicator is flashing, identify the error flash code and consult

There is a sufficient off period between each subsequent cycle repetition to clearly mark the start of a new flash sequence. The duration of a long flash (L) is equal to 3 times the duration of a short flash (0.5 seconds).

Table 20 Alarm indicator codes 1-phase pump

Error flash positions	Error flash sequence	Comment	Actions
0	ssssss	Overload timeout	Check whether the pump is not running under constant high pressure or the inlet or outlet is not blocked.
1	Lsssss	Controller software error	Cycle the power to the pump and see whether the error code appears again. If it does, contact us or the supplier.
2	sLssss	Controller failed internal configuration and calibration operation	Cycle the power to the pump and see whether the error code appears again. If it does, contact us or the supplier.
3	ssLsss	Acceleration timeout	Check whether the pump is not running under constant high pressure or the inlet or outlet is not blocked.
4	sssLss	Over-current trip activated, or other hardware fault.	Cycle the power to the pump and see whether the error code appears again. If it does, contact us or the supplier.
5	ssssLs	Self test fault	Cycle the power to the pump and see whether the error code appears again. If it does, contact us or the supplier.
6	ssssL	Serial Control Mode Interlock	Re-activate serial enable and send a serial command to clear the error code.

11 Storage

Use the following procedure to store the pump:

1. Shut down the pump as described in [Shut down](#) on page 42.
 2. Disconnect the pump from the electrical supply.
 3. Place and secure protective covers over the inlet and outlet ports.
 4. Non-condensing conditions shall be assured to avoid condensation from quick temperature changes during storage and transport.
 5. Store the pump in cool, dry conditions until required for use. When required, prepare and install the pump as described in [Installation](#) on page 26.
- If the storage period is less than 1 year, pump can be used in a standard way
 - If the storage period is between 1 and 2 years, we recommend to do the following steps every half of the year:
 - Remove the black plastic plug from the motor stator, manually rotate the plug few times by 4 mm Allen key in the direction shown to ensure it is rotating free and allow the bearing to be lubricated.
 - Remove Allen key and place the plug back.
 - Switch on the pump and run the pump at ultimate pressure for 10 hours, then open GB to level 1 and run the pump for another 14 hours to clean and dry the pump.
 - We recommend to use exhaust filter (silencer).

If the storage period is longer than 2 years, we recommend you send the pump to our service for cleaning and check pump condition with full testing.

12 Disposal



WARNING: CONTAMINATION HAZARD

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

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. We offer this service. Further details are available on request.

13 Service

13.1 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 leybold.com/en/downloads/download-documents/declaration-of-contamination/, 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.

EU Declaration of Conformity



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

Leybold GmbH
Bonner Strasse 498
D-50968 Köln
Germany

Documentation Officer
T: +49(0) 221 347 0
documentation@leybold.com

The product specified and listed below

Type designation:	Part numbers:		
	Standard	H-Version	C-Version
SCROLLVAC 7 plus	141007Vx0	141007Vx1	141007Vx2
SCROLLVAC 10 plus	141010Vx0	141010Vx1	141010Vx2
SCROLLVAC 15 plus	141015Vx0	141015Vx1	141015Vx2
SCROLLVAC 18 plus	141018Vx0	141018Vx1	141018Vx2

Where 1-ph x=1, 3-ph x=3

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>
2014/34/EU	ATEX directive on use in potentially explosive atmospheres Ⓔ II 3 G Ex h IIC T4 Gc X Only the internal pumping mechanism is classified as ATEX category 3, external parts and motor are not in scope
2014/30/EU	Electromagnetic compatibility (EMC) directive Class A Emissions, Industrial Immunity
2006/66/EC	Batteries directive - <i>Applicable to 3-ph variants only</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
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 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. 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: 2022-12-07

You must retain the signed legal declaration for future reference

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



*Petr Šmerek – Engineering Manager
Scientific Vacuum Division
Lutín*



*Jan Večeřa – General Manager
Lutín, CZ*

Declaration of Conformity

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

Leybold GmbH
Bonner Strasse 498
D-50968 Köln
Germany

Documentation Officer
Innovation Drive
Burgess Hill
West Sussex
RH15 9TW
documentation@leybold.com

The product specified and listed below

Type designation:

	Standard
SCROLLVAC 7 plus	141007Vx0
SCROLLVAC 10 plus	141010Vx0
SCROLLVAC 15 plus	141015Vx0
SCROLLVAC 18 plus	141018Vx0

Part numbers:

H-Version	C-Version
141007Vx1	141007Vx2
141010Vx1	141010Vx2
141015Vx1	141015Vx2
141018Vx1	141018Vx2

Where 1-ph x=1, 3-ph x=3

The object of the declaration described above is in conformity with relevant statutory requirements:

Supply of Machinery (Safety) Regulations 2008

The objectives of the Electrical Equipment (Safety) Regulations 2016 are governed by Annex 1 1.5.1 of this regulation.

Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016

 II 3 G Ex h IIC T4 Gc X

Only the internal pumping mechanism is classified as ATEX category 3, external parts and motor are not in scope

Electromagnetic Compatibility Regulations 2016

Class A Emissions, Industrial Immunity

Batteries and Accumulators (Placing on the Market) Regulations 2008 - *Applicable to 3-ph variants only*

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Relevant designated standards or technical specifications are as follows:

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
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 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements

This declaration, based on the requirements of the listed Statutory Instruments and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: 2022-12-07

You must retain the signed legal declaration for future reference

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

Signed for and on behalf of Leybold GmbH



*Petr Šmerek – Engineering Manager
Scientific Vacuum Division
Lutín*



*Jan Večeřa – General Manager
Lutín, CZ*

ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

EMC (EU, UK): Class A 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.

RoHS (EU, UK): Material Exemption Information

This product is compliant with no Exemptions

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.

- 3-ph variants only: 1,2-dimethoxyethane (EDGME)
This substance is sealed within the case of the compact lithium coin cell battery and is essential to the long life and reliable performance of the battery.

Additional Applicable Requirements

The product is in scope for and complies with the requirements of the following:

2012/19/EU	Directive on waste electrical and electronic equipment (WEEE)
Product is certified to CSA-C22.2 No.61010-1-12	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements CU_72180252 01
Product is certified to UL61010-1 3 rd Edition	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements CU_72180252 01
CCR Title 22 Division 4.5 Chapter 33: Perchlorates Batteries	This equipment may contain a lithium battery which requires notification for the presence of Perchlorate Material: special handling may apply, refer to www.dtsc.ca.gov/hazardouswaste/perchlorate/ - Applicable to 3-ph variants only

材料成分声明

China Material Content Declaration



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。

Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.



Pioneering products. Passionately applied.

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