



# **Dry Claw Vacuum and Overpressure Pumps**

CP65, CP150, CP300

OP65, OP150, OP300

**Operating instructions 6996022987\_C**

Part Number

178065V01/10

178150V01/10

178300V01/10

178065P01/10

178150P01/10

178300P01/10



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

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# Safety and compliance

## 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.

---

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#### **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.

# Safety and compliance

## 1.2 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 An appropriate safety instruction must be followed or caution to a potential hazard exists.
	Warning - Automatic start up The equipment can be remotely started.
	Warning - Heavy object Identifies a possible hazard from a heavy object.
	Warning - Hot surfaces Identifies a potential hazard from a hot surface.
	Warning - Maximum angle of paired slings The maximum angle of the paired slings must not be more than 45°.
	Warning - Moving parts present Identifies parts that move. You must let the parts that turn stop before you remove the electrical power.
	Mandatory - Read the manual
	Warning - Use protective equipment Use appropriate protective equipment for the task.
	WEEE symbol The equipment must be discarded carefully. Obey local and national regulations for disposal of this equipment.

## 1.3 General safety precautions

### CAUTION: SAFETY PRECAUTIONS



Risk of loss of warranty. We will disclaim all responsibility for any damage or injury if you do not follow the safety precautions. You must follow all normal caution and care required for installation, operation, maintenance and repair, even if not stated in this manual.

### WARNING: AUTOMATIC RESTART



Risk of injury and damage to equipment. If the pump has an automatic restart function and it is set to on, the pump will restart automatically when the power is restored after the power interruption.

# Safety and compliance

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## WARNING: RADIO INTERFERENCE

Risk of injury. In a domestic environment, the pump can cause radio interference which requires supplementary mitigation measures.

- The operator must obey the work safety requirements and regulations.
- Make sure that you obey all the local site safety and operating procedures.
- If any of the statements does not agree with the applicable legislation, the stricter of the two is applicable.
- The installation, operation, maintenance and repair work must be done by authorised, trained and specialized personnel.
- The vacuum pump does not provide air of breathing quality. For breathing quality air, the compressed air must be purified as per the applicable legislation and standards.
- Before you do the maintenance, repair work, adjustment or other non-routine checks refer to *Preventive maintenance schedule* on page 47.
- For the pump that have a supply from the frequency converter, wait for 10 minutes before you start the electrical work.
- Do not rely on the indicator lamps or electrical door locks before you do the maintenance work. Always disconnect and check with a measuring device.
- Do not touch the pump intake when the pump is in operation.
- The pump must be kept in a safe operating condition. Replace parts and accessories that are not safe for operation.
- Do not walk or stand on the pump or on its components.
- Do not cause blockage to the outlet of the pump.

### 1.4 Safety precautions during installation

---



## CAUTION: INSTALLATION SAFETY

Risk of damage to equipment. Obey the safety instructions and take note of all applicable precautions. Refer to *Safety precautions during operation* on page 10 and *Safety precautions during maintenance or repair* on page 11.

### Note:

These precautions are applicable to the pump that process or use air or inert gas. When the pump is used with other gases, it is necessary to use more safety precautions. Some precautions are general and might not apply to your pump.

1. When you lift the pump, make sure that:
  - you use the correct lifting equipment and you obey the local safety regulations.
  - you tighten all the loose and movable parts before you lift the pump.
  - no personnel are in the risk zone below the lifted load.
  - the speed of the lifting equipment is in the safety limits.
  - you wear a safety helmet in the areas of overhead or lifting equipment.
2. The pump is designed for indoor use. Contact us and take special precautions if you want to install the pump outside.

# Safety and compliance

3. Install the pump in an area with cool and clean air. Do not cause blockage to the air inlet.
4. The water handling capacity of the pump is very less. For operating in such applications, consult us.
5. Remove the blanking flanges, plugs, caps and desiccant bags before you connect the pipes.
6. The vacuum connection and discharge pipes must be of correct size and applicable for the working pressures and temperatures. Do not use damaged or worn hoses.
7. The inlet air must have no flammable fumes, vapours or particles (for example, paint solvents can cause internal fire or explosions). Refer to the material safety guidelines.
8. Install the air intake such that clothes worn by people do not get sucked in the air intake.
9. Make sure that there is no external force on the inlet and outlet connection. Make sure that there is no strain on the pipe connections. Do not install supports to the external body (canopy) of the pump.
10. If remote control is installed, the machine must bear a clear sign stating: "DANGER: This machine is remotely controlled and can start without warning"  
Before any maintenance or repair, the operator must make sure that:
  - the pump is stopped
  - the isolation switch is open and locked
11. The operator for remote-control device must obey the necessary precautions and make sure that no one is working on the pump. Attach a suitable sign adjacent to the remote start equipment.
12. Air-cooled pump must be installed in such a way that the sufficient flow of the cooling air is available. Make sure that the exhausted air does not circulate again to the pump air inlet or cooling air inlet.
13. The electrical connections must be same as the applicable codes. Make sure that the pump is grounded and protected against short circuits by fuses in all phases. Install a power isolation switch near the pump. You must be able to lock the power isolation switch.
14. The pumps with an automatic start/stop system or an Automatic Restart After Voltage Failure (ARAVF) function must have the following warning sign attached near to the instrument panel.  
"This pump can start without warning"
15. In multiple pump systems, manual valves must be installed to isolate each pump. Do not rely on Non-return valves (check valves) for isolating multiple systems.
16. Do not remove or adjust the safety devices, guards or insulation installed on the pump.
17. There are pipes and the parts with temperature more than 70 °C (158 °F). Install insulation or guards to prevent contact with hot surfaces. All pipes and parts with high temperatures must be clearly marked.
18. If the ground is not flat or it has slope, contact the manufacturer.
19. When the air that has hazardous substances is sucked in (for example, biological or microbiological agents), use the abatement systems (installed upstream of the pump).

# Safety and compliance

20. The pump installed in an application with inlet gas stream temperatures more than the maximum temperature must be approved by us before start-up.

## 1.5 Safety precautions during operation

### CAUTION: OPERATION SAFETY



Risk of injury or damage to equipment. Obey the safety instructions and take note of all applicable precautions. Refer to *Safety precautions during installation* on page 8 and *Safety precautions during maintenance or repair* on page 11.

#### Note:

These precautions are applicable to the pump that process or use air or inert gas. When the pump is used with other gases, it is necessary to use more safety precautions. Some precautions are general and might not apply to your pump.

1. Do not touch the pipes or components of the pump during operation.
2. Use the correct type and size of hose end fittings and connections. Make sure that the hose is depressurised before you disconnect the hose.
3. The operator for remote-control device must obey the necessary precautions and make sure that no one is working on the pump. Attach a suitable sign adjacent to the remote start equipment.
4. Do not operate the pump:
  - near flammable or toxic fumes, particles or vapours as given in the principal data sheet.
  - outside the specified limit ratings.
5. Make sure that the external body (canopy) doors are closed during the operation of the pump. The doors can be opened for short periods (for example, routine service operation). Persons must wear ear protection when the doors are open. For the pump without an external body (canopy), ear protection must be worn near the pump.
6. If the pump is operated in a room where the sound pressure level is more than or equal to 85 dB(A), personnel must wear ear protectors.
7. At regular intervals make sure that:
  - the guards are correctly installed and are in the correct position
  - the hoses and pipes inside the pump are in good condition, secure and not rubbing
  - there are no leaks
  - the fasteners are tight
  - the electrical leads are secure and in good order
  - the inlet valve and the air net components (for example, pipes, couplings, manifolds and valves) are in good condition.
8. If warm cooling air from the pump is used in an air heating systems (for example, to warm-up a workroom) take necessary precautions for the air pollution and possible contamination of the breathing air.
9. Do not remove or adjust:
  - the sound-damping material
  - the safety devices
  - the guards
  - the insulation installed on the pump.

# Safety and compliance

10. Do not change the purpose of the pump. If the pump is configured to be used as a vacuum pump, do not use the pump as an overpressure pump. If the pump has been configured to be used as an overpressure pump, do not use the pump as a vacuum pump
11. We recommend to install an air intake filter for the safety of the pump. Contact us to check if the air intake filter is necessary for the application for the pump.

## 1.6 Safety precautions during maintenance or repair



### WARNING: MAINTENANCE SAFETY

Risk of injury or damage to equipment. Obey the safety instructions and take note of all applicable precautions. Refer to *Safety precautions during installation* on page 8 and *Safety precautions during operation* on page 10.

#### Note:

These precautions are applicable to the pump that process or use air or inert gas. When the pump is used with other gases, it is necessary to use more safety precautions. Some precautions are general and might not apply to your pump.

1. Make sure that you use correct safety equipment (for example, safety glasses, gloves, safety shoes).
2. You must use correct tools for maintenance and repair work. Always use genuine spare parts.
3. Do not start the maintenance until the pump is cool.
4. Attach a warning sign of "Work in progress, do not start" adjacent to the pump before you start the maintenance or repair.
5. The operator for remote-control device must obey the necessary precautions and make sure that no one is working on the pump. Attach a suitable sign adjacent to the remote start equipment.
6. Before components are removed from the pump, make sure that :
  - the pump is isolated from all sources of under and overpressure
  - the pump is at atmospheric pressure.
7. Do not use flammable solvents or carbon tetrachloride to clean the parts. Obey the safety precautions for toxic vapours of cleaning liquids.
8. During the maintenance and repair:
  - clean the pump carefully
  - install the protective covers on the parts and openings of the pump.
9. Do not weld or do the operation involving heat near the oil system.
10. When there is an indication or suspicion that an internal part of a pump is overheated, stop the pump. Do not open the inspection covers until enough cooling time is completed to prevent the risk of spontaneous ignition of the oil vapour.
11. Do not use a light source with a flame to examine the inner side of the pump.
12. Make sure that no tools, parts or other items are left in or on the pump.
13. Be careful when you handle the regulating and safety devices. Make sure that they operate correctly. For safety, do not disconnect the regulating and safety devices.

# Safety and compliance

14. Before you use the pump after maintenance or overhaul, make sure that:
  - the operating pressures, temperatures and time settings are correct
  - the control and shutdown devices are installed and they operate correctly
  - the coupling guard of the vacuum pump drive-shaft is installed.
15. Install protection for the motor, electrical and regulating components to prevent damage from moisture when the pump is cleaned (for example, steam cleaning).
16. Make sure that the sound-damping material and vibration dampers of the pump (for example, the sound-damping material on the external body (canopy)) is in good condition. Replace the damaged material with genuine material from the manufacturer to prevent the sound pressure level from increasing.
17. Do not use caustic solvents which can damage the materials of the air net, (for example, the polycarbonate bowls).
18. Faults or wearing of seals can cause leakage of oil lubricant. Prevent the dispersion in soil and pollution of the other materials.

# General description

## 2 General description

### 2.1 Vacuum and flow rate

A vacuum is a pressure in a system that is less than the ambient atmospheric pressure. It can be shown in absolute terms or in effective gauge terms:

- mbar(a) - the absolute pressure shows how much the pressure is above the absolute zero pressure (perfect vacuum).
- (minus) mbar(e) - the effective or gauge pressure shows how much the pressure is below the local atmospheric pressure.

#### Flow rate definitions

The two ways to show the flow rate in a vacuum are:

1. The displacement or volumetric flow rate ( $\text{Am}^3/\text{hr}$ )
2. Throughput or mass flow rate

#### Displacement/volumetric flow rate

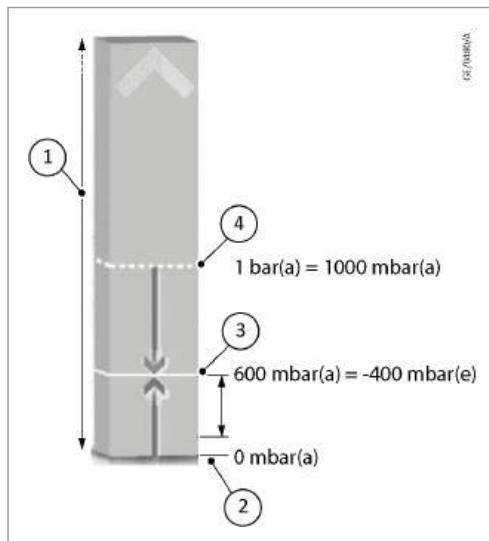
For the relevant pressure range, when the pump operates at quasi constant motor speed (rotations per minute) and since the compression chambers have fixed dimensions, the same volume of air is pumped from inlet to outlet with decrease in pressure level. Over the relevant pressure range, this makes the volumetric flow rate quasi independent of the vacuum level. It is the expression of the flow rate inside the piping at the governing vacuum level ( $\text{Am}^3/\text{hr}$ ) and is always higher than the throughput or mass flow rate.

#### Throughput or mass flow rate

If the volumetric flow does not change with the decrease in pressure level, the number of molecules in the volume of air can change. The deeper the vacuum, the less number of molecules in the same volume of air.

The mass flow rate will decrease with a decrease in (absolute) pressure. A flow rate must be shown at a specified vacuum level when you use throughput or mass flow rate.

# General description



1. Pressure	2. Absolute vacuum
3. Typical pump working range (600 mbar(a)) (450 Torr(a)) - 150 mbar(a) (112.5 Torr(a))	4. Atmospheric pressure (1000 mbar(a)) (750 Torr(a))

Atmospheric pressure at sea level is approximately 1 bar(a) or 1000 mbar(a) (750 Torr). The working range for the pumps is 600 mbar(a) (450 Torr(a)) to 150 mbar(a) (112.5 Torr(a)) (equivalent to -400 mbar(e) (-300 Torr(e)) to 850 mbar(e) (-637.6 Torr(e))).

Always select a correct pressure gauge to measure the vacuum. Note that the distinction does not matter for a pressure difference (delta P, for example, pressure loss), since it is always the result of subtracting two pressures (as absolute or effective pressures).

## 2.2 Introduction

The pump is a single-stage, dry vacuum and overpressure pump driven by an electric motor. The pump is designed to function as a vacuum pump or an overpressure pump depending on its configuration.

The pump is designed to work with clean air, inert gas or small amounts of water vapour. The ambient temperature must be between 0 °C to 40 °C (32 °F to 104 °F).

The pump is air-cooled and is covered with a sound-insulated body. The body helps to reduce the noise, maintain cleanliness and transfer heat.

The pump is designed for complete flexibility and quick access to all parts. The pump mainly includes dry claw element, gearbox, electric motor and drive train. All the components are mounted on a common base frame.

### Element

The pumping chamber consist of duplex set of rotating claws or rotors on cantilevered shafts. The two claws and the cylinder are all non-touching but have accurate clearances to allow a very efficient performance. The chamber is lubrication free and designed with corrosion resistant material.

### Inlet non-return valve

The Inlet non-return valve prevents reverse flow of the inlet air and thus prevents reverse rotation of the pump.

# General description

## Gearbox

The element is driven through an oil lubricated gearbox housing synchromeshing gears which is coupled to a direct drive motor.

## Electric motor

Electric motors are 3 phase multi-voltage multi-frequency type. The main motor options are:

Motor voltage supply range (V)		Approval	
50 Hz	60 Hz	50 Hz	60 Hz
200	200	IEC	UL/cUL
230	230	IEC	UL/cUL
	380		IEC
400		IEC	
	460		UL/cUL
500	575	IEC	IEC - UL/cUL

### Note:

A dual voltage 230/460 V 60 Hz motor with UL/cUL approval is also available.

The motors are suited to operate with Variable Speed Drive to have complete control and to reduce power consumption. This efficiency improvement leads to power reduction and a lower carbon footprint.

The pump is supplied with the following standard features:

- Vacuum relief valve (for vacuum pump)  
The relief valve is designed to open at a predetermined pressure to protect the pump from damage. When the vacuum level is exceeded, the relief valve opens and allows air to enter the pumping chamber. This has the effect of internal cooling.
- Intake filter (for overpressure pump)  
Intake filter prevents foreign material from entering the pump. Abrasive, bulky material will damage the pump's internal parts and can cause catastrophic failure.
- Silencer  
To improve the level of comfort during operation, the pump is equipped with a silencer. For the overpressure pump an extra inlet silencer is installed.
- Pressure safety valve (for overpressure pump)  
A pressure safety valve automatically releases air from a pump, when the pressure exceeds the preset limits.

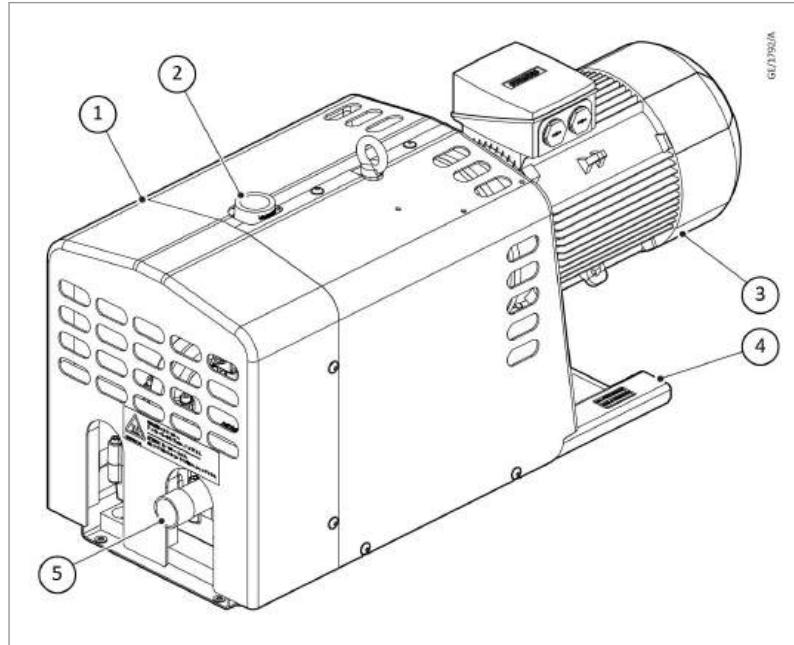
### Note:

The pressure safety valve should only be used as a safety device to prevent too high pressures and not for pressure regulation.

# General description

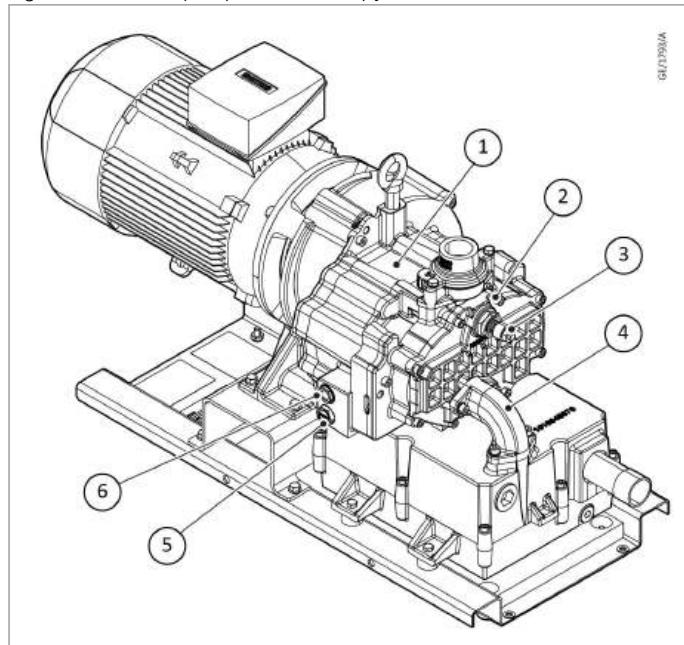
## 2.2.1 General pump view

Figure 1. Vacuum pump with canopy



1. Noise reducing canopy	2. Inlet non-return valve
3. Drive motor (Fixed speed or inverter driven)	4. Base frame
5. Air outlet	

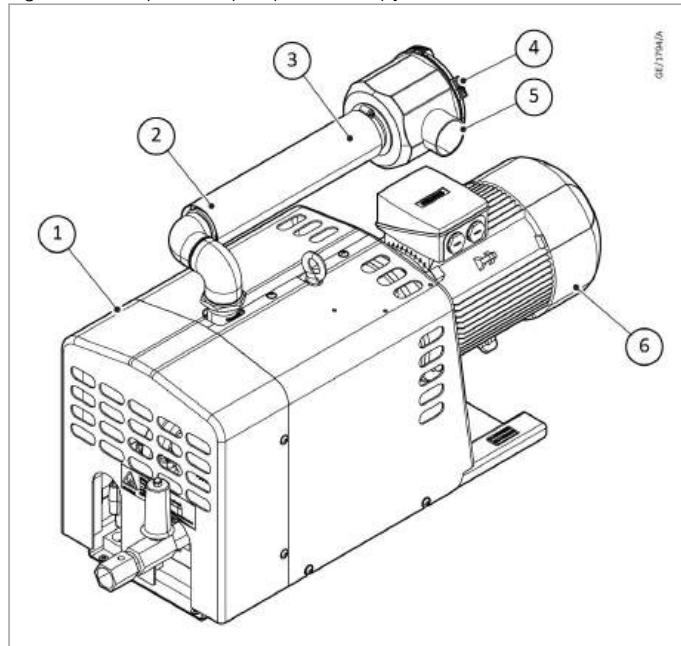
Figure 2. Vacuum pump without canopy



1. Gearbox	2. Element
3. Vacuum relief valve	4. Exhaust silencer
5. Oil drain plug	6. Oil sight glass

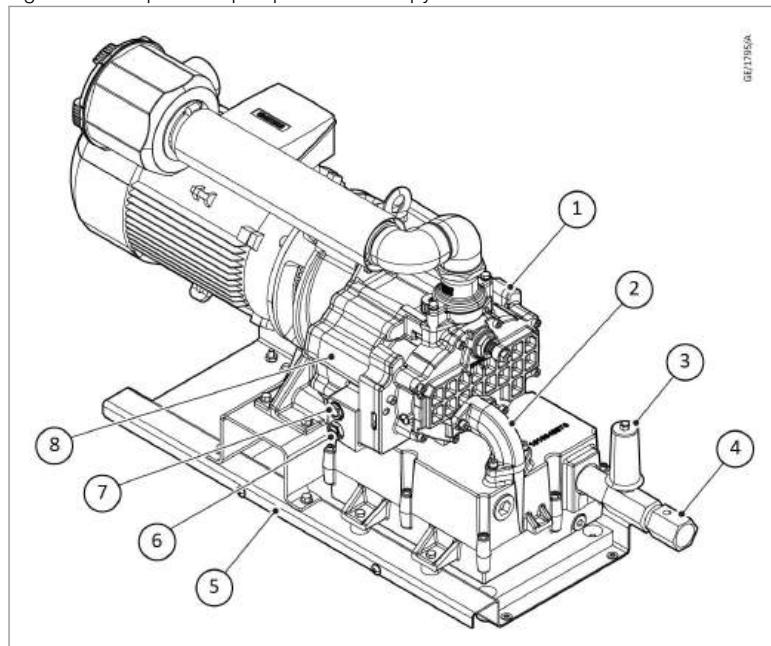
# General description

Figure 3. Overpressure pump with canopy



1. Noise reducing canopy	2. Inlet non return valve
3. Inlet silencer	4. Air intake filter
5. Air inlet	6. Drive motor (Fixed speed or inverter driven)

Figure 4. Overpressure pump without canopy



1. Element	2. Exhaust silencer
3. Pressure safety valve	4. Air outlet
5. Base frame	6. Oil drain plug
7. Oil sight glass	8. Gearbox

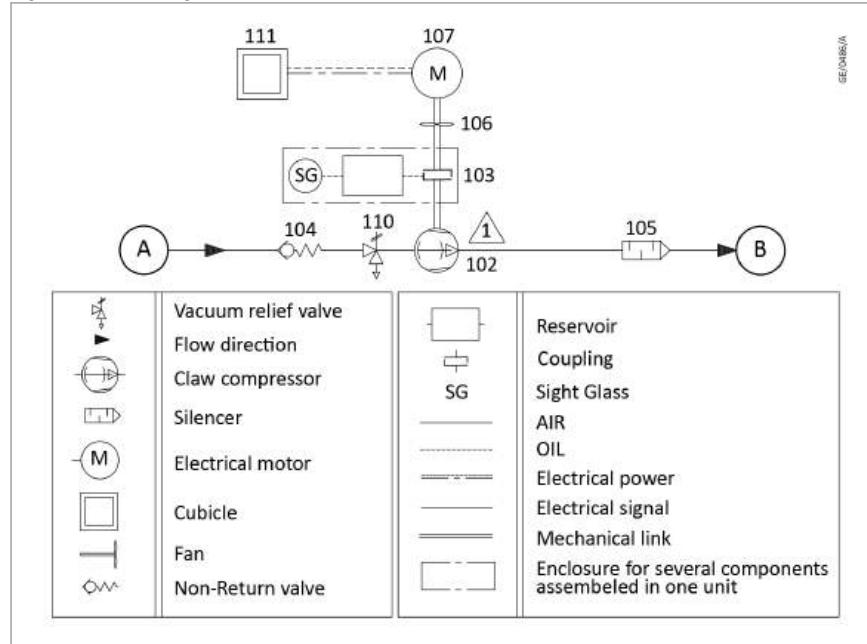
# General description

## 2.3 Flow diagram

### 2.3.1 Vacuum pump

Air comes in through the air intake and non-return valve. The air is displaced by the vacuum pump element. After passing the element, the air enters the discharge silencer before exiting to the atmosphere.

Figure 5. Flow diagram with vacuum relief valve



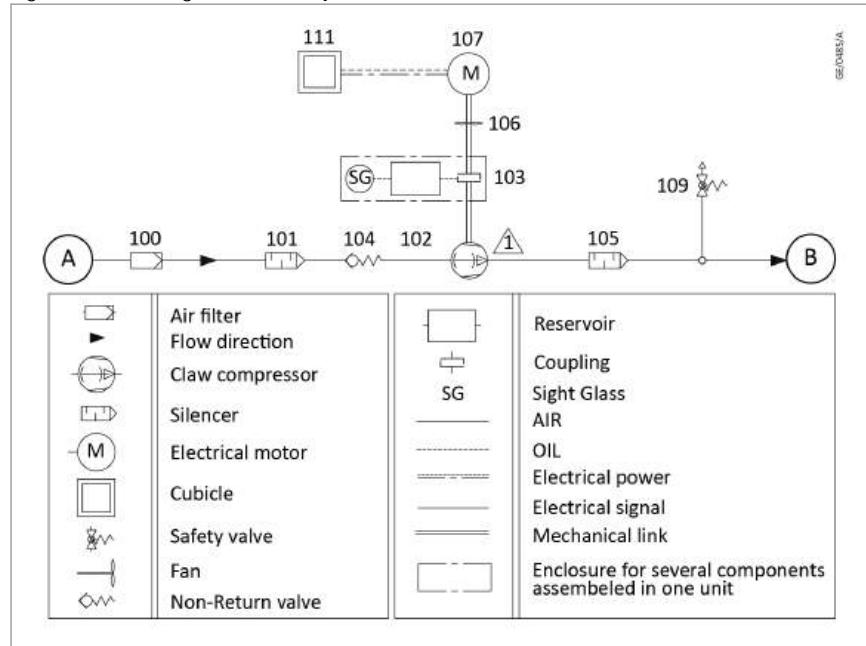
### 2.3.2 Over pressure pump

Air comes in through the air inlet filter and silencer. The air flows through the non-return valve which prevents reverse flow of air to the inlet. The air is compressed in the element and the pressurised air is exhausted through the pressure port.

Make sure that the safety valve at the outlet is correctly installed and adjusted.

# General description

Figure 6. Flow diagram with safety valve

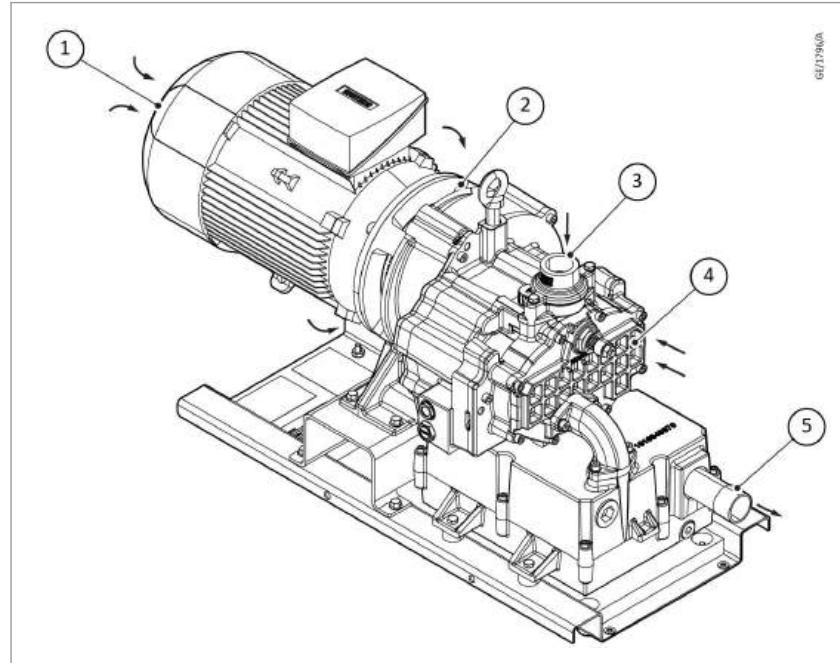


## 2.4 Cooling

The pump is cooled by forward curved fan installed within the coupling housing. This provides air flow around the pump to aid cooling. The cooling fins also radiate the heat away and the motor fan cools the drive motor.

The gearbox oil is cooled down by recirculation and convection from the fan. In many cases the process gas can also cool the element.

Figure 7. Pump cooling



1. Motor cooling air intake	2. Element cooling air intake
3. Process air intake	4. Element air flow
5. Exhaust out	

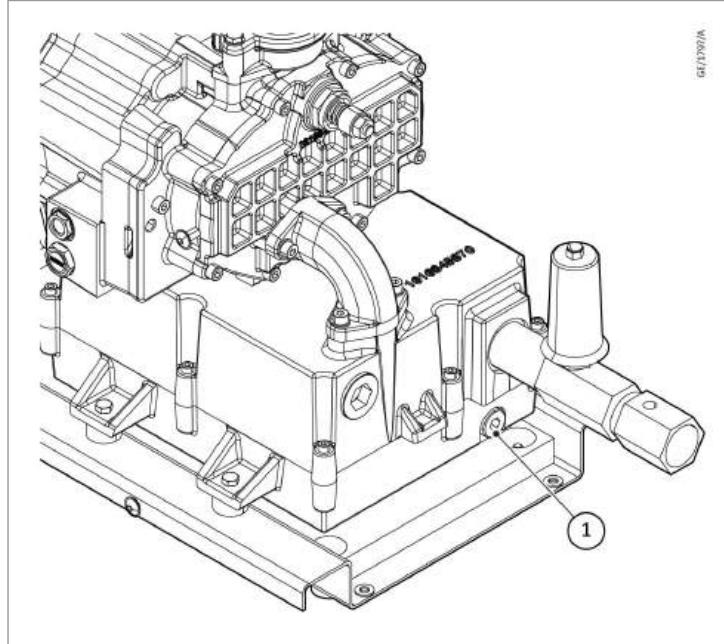
# General description

## 2.5 Condensate system

The condensate flows out through a drain port at the base of the exhaust silencing chamber. For humid applications, a manual drain or a tap can be used to facilitate easy drainage.

When the pump is delivered, the drain port is sealed with a threaded plug. It can be exchanged by a connector with tube to drain the condensate. You must obey your local regulations applicable for water drainage.

Figure 8. Position of drain port



1. Drain port

# Technical data

## 3 Technical data

### 3.1 General technical data

**Table 1. Pump and motor weight**

<b>Pump type</b>	<b>Motor weight</b>		<b>Unit weight</b>	
	<b>Kg</b>	<b>lbs</b>	<b>Kg</b>	<b>lbs</b>
Vacuum pump				
CP65	21	46.3	120	264.6
CP150	34	75	160	352.7
CP300	57	125.7	300	661.4
Overpressure pump				
OP65	34	75	160	352.7
OP150	70	154.3	196	432.1
OP300	105	231.5	252	555.6

Weight tolerances (oil included) = +/- 10 kg (22 lbs).

### 3.2 Reference conditions and limitations

**Table 2. Reference condition**

<b>Parameters</b>	<b>Unit</b>	<b>Value</b>
Relative humidity	%	0
Air inlet temperature	°C	20
	°F	68
Exhaust back pressure	mbar(g)	0
	psi	0
Ambient barometric pressure	mbar(a)	1013
	psi	14.7

**Table 3. Limitations**

<b>Parameters</b>	<b>Unit</b>	<b>Value</b>
Minimum ambient temperature	°C	0
	°F	32
Maximum ambient temperature	°C	40
	°F	104
Minimum allowable inlet temperature*	°C	0
	°F	32
Maximum allowable inlet temperature*	°C	40
	°F	104
Maximum (absolute) inlet pressure	mbar(a)	1050
	psi	15.22
Outlet pressure mbar(a) (vacuum pump)	mbar(a)	1013
	psi	14.7
Maximum outlet pressure mbar(g) (overpressure pump)	bar(g)	2.3
	psi	33.4

# Technical data

\* In case of higher or lower temperatures, please consult us.

## 3.3 Pump data

### Note:

The readings are valid only when the pump operates in the conditions described in [Table: Reference condition](#).

**Table 4. Common pump data**

Parameter	Unit	Value
Number of compressions		1
Maximum exhaust back pressure	mbar(g)	200
	Torr	900
Temperature of the air leaving the discharge (Approx.)	°C	250
	°F	482

The vacuum pump is designed to work constantly on a pressure from ultimate until atmospheric pressure.

The maximum inlet pressure of the pump is 1050 mbar(a). In case of a higher inlet pressure, contact your pump manufacturer.

**Table 5. Vacuum pump data**

Parameter	Unit	CP65	CP150	CP300
Ultimate pressure <sup>#</sup>	mbar(a)	50	50	140
	Torr	37.5	37.5	105
Maximum displacement* 50 Hz	M <sup>3</sup> /h	65	152	295
	Cfm	38	89	173
Maximum displacement* 60 Hz	M <sup>3</sup> /h	79	184	347
	Cfm	46	108	204
Connection inlet	-	G 1 1/4" or NPT	G 1 1/4" or NPT	G 2" or NPT
Connection outlet	-	G 1 1/4" or NPT	G 1 1/4" or NPT	G 1 1/4" or NPT
Oil capacity	L	0.8	0.8	1.6
	US GAL	0.211336	0.211336	0.422672
	Imp. GAL	0.1752	0.1752	0.3504
	cu.ft.	0.02824	0.02824	0.05648

\* for continuous operation

# ultimate pressure is within 10-15% tolerance.

**Table 6. Overpressure pump data**

Parameter	Unit	OP65	OP150	OP300
Maximum outlet pressure	bar(g)	1.8	2.3	2.3
	Torr	1350	1725	1725
Maximum displacement at ultimate pressure <sup>#</sup> 50 Hz	M <sup>3</sup> /h	42	108	238
	Cfm	25	64	140
Maximum displacement at ultimate pressure <sup>#</sup> 60 Hz	M <sup>3</sup> /h	56	143	280
	Cfm	33	84	165

# Technical data

Parameter	Unit	OP65	OP150	OP300
Connection inlet	-	G 1 1/4" or NPT	G 1 1/4" or NPT	G 2" or NPT
Connection outlet	-	G 1 1/4" or NPT	G 1 1/4" or NPT	G 1 1/4" or NPT
	L	0.8	0.8	1.6
Oil capacity	US GAL	0.211336	0.211336	0.422672
	Imp. GAL	0.1752	0.1752	0.3504
	cu.ft.	0.02824	0.02824	0.05648

# ultimate pressure is within 10-15% tolerance.

## 3.4 Motor data

**Table 7 Motor data**

Model	Motor voltage supply range (V)		Nominal current (A)		Nominal speed (RPM)		Nominal power (kW)		Service factor	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
CP65 (Vacuum pump)	200 (Δ)	200 (Δ)	6.9	8.3	2885	3490	1.8	2.2	1.1	1.1
	230 (Δ)	230 (Δ)	6.3	7.6	2910	3520	1.8	2.2	1.1	1.1
		230 (YY)		7.3		3505		2.2		1.1
		380 (Δ)		4.4		3500		2.2		1.1
	400 (Y)		3.5		2910		1.8		1.1	
		460 (Δ)		3.7		3505		2.2		1.1
	500 (Δ)	575 (Δ)	2.8	2.9	2910	3505	1.8	2.2	1.1	1.1
CP150 (Vacuum pump)	200 (Δ)	200 (Δ)	13.2	13.4	2930	3545	3.7	3.7	1.1	1.46
	230 (Δ)	230 (Δ)	11.8	11.9	2950	3560	3.7	3.7	1.1	1.46
		230 (YY)		11.8		3555		3.7		1.46
		380 (Δ)		7.1		3555		3.7		1.46
	400 (Y)		6.8		2950		3.7		1.1	
		460 (Δ)		5.9		3555		3.7		1.46
	500 (Δ)	575 (Δ)	5.5	4.7	2950	3555	3.7	3.7	1.1	1.46
CP300 (Vacuum pump)	200 (Δ)	200 (Δ)	21.5	26	2940	3545	6.2	7.5	1.1	1.09
	230 (Δ)	230 (Δ)	19.1	22.5	2960	3560	6.2	7.5	1.1	1.09
		230 (YY)		22.5		3555		7.5		1.09
		380 (Δ)		13.7		3555		7.5		1.09
	400 (Δ)		11		2955		6.2		1.1	
		460 (Δ)		11.3		3555		7.5		1.09
	500 (Δ)	575 (Δ)	8.8	9.1	2960	3555	6.2	7.5	1.1	1.09

# Technical data

Model	Motor voltage supply range (V)		Nominal current (A)		Nominal speed (RPM)		Nominal power (kW)		Service factor	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
CP65 (Over pressure pump)	200 (Δ)	200 (Δ)	13.2	13.4	2930	3545	3.7	3.7	1.1	1.46
	230 (Δ)	230 (Δ)	11.8	11.9	2950	3560	3.7	3.7	1.1	1.46
		230 (YY)		11.8		3555		3.7		1.46
		380 (Δ)		7.1		3555		3.7		1.46
	400 (Δ)		6.8		2950		3.7		1.1	
		460 (Δ)		5.9		3555		3.7		1.46
CP150 (Over pressure pump)	200 (Δ)	200 (Δ)	38	47	2940	3540	11	15.0	1.1	1.03
	230 (Δ)	230 (Δ)	33.5	47.5	2960	3560	11	15.0	1.1	1.03
		230 (YY)		48		3555		15.0		1.03
		380 (Δ)		28.5		3550		15.0		1.03
	400 (Δ)		19.8		2955		11		1.1	
		460 (Δ)		23.5		3555		15.0		1.03
CP300 (Over pressure pump)	200 (Δ)	200 (Δ)	65	75	2945	3540	19	22	1.1	1.14
	230 (Δ)	230 (Δ)	57	65	2965	3555	19	22	1.1	1.14
		230 (YY)		65		3550		22		1.14
		380 (Δ)		39.5		3550		22		1.14
	400 (Δ)		32.5		2955		19		1.1	
		460 (Δ)		32.5		3550		22		1.14
	500 (Δ)	575 (Δ)	26	26	2955	3555	19	22	1.1	1.14

## 3.5 Electrical cable size and fuses

### CAUTION: ELECTRICAL CABLE SIZE



Risk of injury and damage to equipment. Check and confirm the fuse size for the calculated cable size. If necessary, decrease the fuse size or increase the cable size. The cable length must not be more than the limit given in IEC 60204 Table 10.

### CAUTION: HIGH STARTING CURRENT



Risk of injury and damage to equipment. The starting currents can be 1000% higher than the nominal current of the motor. Make sure that the system is protected against high current flow.

The voltage on the pump terminals must not deviate more than 10% of the nominal voltage. It is recommended to keep the voltage drop over the supply cables at nominal current below 5% of the nominal voltage (IEC 60204-1).

If cables are grouped together with other power cables, it can be necessary to use cables of a larger size than those calculated for the standard operating conditions.

# Technical data

Use the original cable entry. Refer to [Dimension drawings](#) on page 32. To keep the IP protection degree of the electric cubicle and to protect its components from dust, it is mandatory to use a correct cable gland when you connect the supply cable to the pump.

Local regulations remain applicable if they are stricter than the values proposed in [Table: Currents and fuses](#).

## Leakage breaker (optional)

If a leakage breaker is necessary for installation, use an all current sensitive leakage breaker, RCM or RCD Type B (refer to IEC/EN 60755) with a sufficient trip level.

**Table 8 Currents and fuses**

Model	Motor voltage supply range (V)		Imax under voltage		Max. fuse pack IEC class GL/gC	Max. fuse pack UL class K5 CSA HRC from ii	Recommended cable size mm <sup>2</sup> (P/FF)
	50 Hz	60 Hz	50 Hz	60 Hz			
CP65 (Vacuum pump)	200 (Δ)	200 (Δ)	8.3	10.0	12	15	4
	230 (Δ)	230 (Δ)	7.6	9.1	10	10	4
		230 (YY)		8.8	10	10	4
		380 (Δ)		5.3	6	6	4
	400 (Y)		4.2		6	6	4
		460 (Δ)		4.4	6	6	4
	500 (Δ)	575 (Δ)	3.4	3.5	6	6	4
CP150 (Vacuum pump)	200 (Δ)	200 (Δ)	15.8	16.1	20	20	4
	230 (Δ)	230 (Δ)	14.2	14.3	16	20	4
		230 (YY)		14.2	16	20	4
		380 (Δ)		8.5	10	10	4
	400 (Y)		8.2		10	10	4
		460 (Δ)		7.1	8	10	4
	500 (Δ)	575 (Δ)	6.6	5.6	8	10	4
CP300 (Vacuum pump)	200 (Δ)	200 (Δ)	25.8	31.2	32	40	10
	230 (Δ)	230 (Δ)	22.9	27.0	32	40	10
		230 (YY)		27.0	32	40	10
		380 (Δ)		16.4	20	20	4
	400 (Δ)		13.2		16	20	4
		460 (Δ)		13.6	16	20	4
	500 (Δ)	575 (Δ)	10.6	10.9	12	15	4
OP65 (Over pressure pump)	200 (Δ)	200 (Δ)	15.8	16.1	20	20	4
	230 (Δ)	230 (Δ)	14.2	14.3	16	20	4
		230 (YY)		14.2	16	20	4
		380 (Δ)		8.5	10	10	4
	400 (Δ)		8.2		10	10	4
		460 (Δ)		7.1	8	10	4
	500 (Δ)	575 (Δ)	6.6	5.6	8	10	4

# Technical data

Model	Motor voltage supply range (V)		Imax under voltage		Max. fuse pack IEC class gL/gC	Max. fuse pack UL class K5 CSA HRC from ii	Recommended cable size mm <sup>2</sup> (P/FF)
	50 Hz	60 Hz	50 Hz	60 Hz			
OP150 (Over pressure pump)	200 (Δ)	200 (Δ)	45.6	56.4	63	80	25
	230 (Δ)	230 (Δ)	40.2	57.0	63	80	25
		230 (YY)		57.6	63	80	25
		380 (Δ)		34.2	40	40	16
	400 (Δ)		23.8		25	25	6
		460 (Δ)		28.2	32	40	6
	500 (Δ)	575 (Δ)	18.7	22.6	25	25	4
OP300 (Over pressure pump)	200 (Δ)	200 (Δ)	78.0	90.0	100	10	50
	230 (Δ)	230 (Δ)	68.4	78.0	80	80	35
		230 (YY)		78.0	80	80	35
		380 (Δ)		47.4	50	50	16
	400 (Δ)		39.0		40	40	10
		460 (Δ)		39.0	40	40	10
	500 (Δ)	575 (Δ)	31.2	31.2	40	40	10

- Fuse size calculations for IEC

Refer to 60364-4-43 electrical installations of buildings, part 4: protection for safety- section 43: protection against over current.

Fuse sizes are calculated to give the necessary protection to the cable against short circuits.

- Fuse calculations for cUL and UL

The recommended fuse size is the maximum fuse size to protect the motor against short circuit.

For cUL fuse HRC form II, for UL fuse class K5.

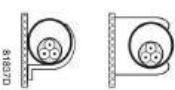
## Earthing

The earthing cable size connected to the pump (PE) must be minimum 10 mm<sup>2</sup> as per the EN 60204-1 section 828.

## Cable sizing according to IEC

The tables below shows the current carrying capacities of cables for three commonly used installation methods, calculated as per the standard 60364-5-52 - electrical installations of buildings part 5 - selection and erection equipment and section 52 - current carrying capacities in wiring systems.

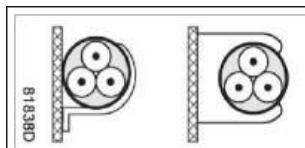
The permitted currents are valid for PVC insulated cables with three loaded copper conductors (maximum conductor temperature 70 °C (158 °F)).

	Installation method B2 as per the table B.52.1.
	Multi-core cable in conduit on a wooden wall.

Maximum permitted current is function of the ambient temperature for installation method B2.

# Technical data

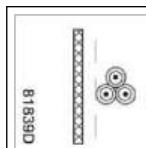
Cable section	Ambient temperature				
	30 °C (86 °F)	40 °C (104 °F)	45 °C (113 °F)	50 °C (122 °F)	55 °C (131 °F)
4 mm <sup>2</sup>	< 27 A	< 23 A	< 21 A	< 19 A	< 16 A
6 mm <sup>2</sup>	< 34 A	< 30 A	< 27 A	< 24 A	< 21 A
10 mm <sup>2</sup>	< 46 A	< 40 A	< 36 A	< 33 A	< 28 A
16 mm <sup>2</sup>	< 62 A	< 54 A	< 49 A	< 44 A	< 38 A
25 mm <sup>2</sup>	< 80 A	< 70 A	< 63 A	< 57 A	< 49 A
35 mm <sup>2</sup>	< 99 A	< 86 A	< 78 A	< 70 A	< 60 A
50 mm <sup>2</sup>	< 118 A	< 103 A	< 93 A	< 84 A	< 72 A
70 mm <sup>2</sup>	< 149 A	< 130 A	< 118 A	< 106 A	< 91 A
95 mm <sup>2</sup>	< 179 A	< 156 A	< 141 A	< 127 A	< 109 A
120 mm <sup>2</sup>	< 206 A	< 179 A	< 163 A	< 146 A	< 126 A



Installation method C as per the table B.52.1.  
Single-core or multi-core cable on a wooden wall.

Maximum permitted current in function of the ambient temperature for installation method C.

Cable section	Ambient temperature				
	30 °C (86 °F)	40 °C (104 °F)	45 °C (113 °F)	50 °C (122 °F)	55 °C (131 °F)
4 mm <sup>2</sup>	< 32 A	< 28 A	< 25 A	< 23 A	< 20 A
6 mm <sup>2</sup>	< 41 A	< 36 A	< 32 A	< 29 A	< 25 A
10 mm <sup>2</sup>	< 57 A	< 50 A	< 45 A	< 40 A	< 35 A
16 mm <sup>2</sup>	< 76 A	< 66 A	< 60 A	< 54 A	< 46 A
25 mm <sup>2</sup>	< 96 A	< 84 A	< 76 A	< 68 A	< 59 A
35 mm <sup>2</sup>	< 119 A	< 104 A	< 94 A	< 84 A	< 73 A
50 mm <sup>2</sup>	< 144 A	< 125 A	< 114 A	< 102 A	< 88 A
70 mm <sup>2</sup>	< 184 A	< 160 A	< 145 A	< 131 A	< 112 A
95 mm <sup>2</sup>	< 123 A	< 194 A	< 176 A	< 158 A	< 136 A
120 mm <sup>2</sup>	< 259 A	< 225 A	< 205 A	< 184 A	< 158 A



Installation method F as per the table B.52.1. Single-core cables, touching in free air clearance to wall not less than one cable diameter.

Maximum permitted current in function of the ambient temperature for installation method F.

# Technical data

Cable section	Ambient temperature				
	30 °C (86 °F)	40 °C (104 °F)	45 °C (113 °F)	50 °C (122 °F)	55 °C (131 °F)
25 mm <sup>2</sup>	< 110 A	< 96 A	< 87 A	< 78 A	< 67 A
35 mm <sup>2</sup>	< 137 A	< 119 A	< 108 A	< 97 A	< 84 A
50 mm <sup>2</sup>	< 167 A	< 145 A	< 132 A	< 119 A	< 102 A
70 mm <sup>2</sup>	< 216 A	< 188 A	< 171 A	< 153 A	< 132 A
95 mm <sup>2</sup>	< 264 A	< 230 A	< 209 A	< 187 A	< 161 A
120 mm <sup>2</sup>	< 308 A	< 268 A	< 243 A	< 219 A	< 188 A

## Calculation method for IEC:

- Single supply cables (3 phases + PE - configuration (1)):
  - Add 10% to the total pump current (ItotPack or ItotFF from the tables)
  - Install the specified fuse on each cable.
- Parallel supply cable (2 x 3 phases + PE - configuration (2)):
  - Add 10% to the total pump current (ItotPack or ItotFF from the tables) and divide by 2
  - Multiply the ampacity of the cables with 0.8 (refer to table A.52.17 (52-E1))
  - Install fuses of half the size of the recommended maximum fuse size on each cable.
- When using 2 x 3 phases + PE as in (3):
  - Add 10% to the total pump current (ItotPack or ItotFF from the tables) and divide by  $\sqrt{3}$
  - Multiply the ampacity of the cables with 0.8 (refer to table A.52.17 (52-E1))
  - Fuse size: the recommended maximum fuse size divided by  $\sqrt{3}$  on each cable.
- Size of the PE cable:
  - For supply cables up to 35 mm<sup>2</sup>: same size as supply cables
  - For supply cables larger than 35 mm<sup>2</sup>: half the size of the supply wires

Always check the voltage drop over the cable (less than 5% of the nominal voltage is recommended).

Example: Itot= 89 A, maximum ambient temperature is 45 °C (113 °F) , recommended fuse = 100 A

- Single supply cables (3 phases + PE - configuration (1)):
  - $I = 89 A + 10\% = 89 \times 1.1 = 97.9 A$
  - The table for B2 and ambient temperature = 45 °C (113 °F) permits a maximum current of 93 A for a 50 mm<sup>2</sup> cable. For a cable of 70 mm<sup>2</sup>, the maximum permitted current is 118 A, which is sufficient. Use a 3 x 70 mm<sup>2</sup> + 35 mm<sup>2</sup> cable.

If method C is used, 50 mm<sup>2</sup> is sufficient. (35 mm<sup>2</sup> for method F) =>cable 3 x 50 mm<sup>2</sup> + 25 mm<sup>2</sup>.

- Parallel supply cable (2 x 3 phases + PE - configuration (2)):
  - $I = (89 A + 10\%)/2 = (89 \times 1.1)/2 = 49 A$

# Technical data

- For a cable of  $25 \text{ mm}^2$ , B2 at  $45^\circ\text{C}$  ( $113^\circ\text{F}$ ), the maximum current is  $63 \text{ A} \times 0.8 = 50.4 \text{ A}$ . So, 2 parallel cables of  $3 \times 25 \text{ mm}^2 + 25 \text{ mm}^2$  are sufficient.
- Install 50 A fuses on each cable instead of 100 A.

## Cable sizing according to UL/cUL

Calculation method according to UL 508A, table 28.1 column 5: permitted ampacities of insulated copper conductors ( $75^\circ\text{C}$  ( $167^\circ\text{F}$ )).

Maximum permitted current in function of the wire size

AWG or kcmil	Maximum current
10	< 30 A
8	< 50 A
6	< 65 A
4	< 85 A
3	< 100 A
2	< 115 A
1	< 130 A
1/0	< 150 A
2/0	< 175 A
3/0	< 200 A

## Calculation method for UL:

- Single supply cables (3 phases + 1 PE - configuration (1)):
  - Add 25% to the total current from the tables (refer to UL 508A 28.3.2: "Capacity shall have 125% of the full load current")
  - Install the specified maximum fuse on each cable.
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
  - Add 25% to the total current from the tables and divide by 2
  - Multiply the capacity of the cables with 0.8 (refer to UL 508A table 28.1 continued)
  - Install fuses of half the size of the recommended maximum fuse size on each cable.
- When using 2 x 3 phase + 2 PE as in (3):
  - Add 25% to the total current from the tables and divide by  $\sqrt{3}$
  - Multiply the capacity of the cables with 0.8 (refer to UL 508A table 28.1 continued)
  - Fuse size: the recommended maximum fuse size divided by  $\sqrt{3}$  on each cable.
- Size PE cable:
  - For supply cables up to AWG8: same size as the supply cables
  - For supply cables larger than AWG8: use maximum permitted capacity.
    - < 100 A: use AWG8
    - < 200 A: use AWG6
    - < 300 A: use AWG4

Always check the voltage drop over the cable (less than 5% of the nominal voltage is recommended).

# Technical data

Example of supply cable calculation:  $I_{tot} = 128$  A, maximum ambient temperature is  $45$  °C ( $113$  °F), recommended fuse =  $150$  A.

- Single supply cables (3 phases + 1 PE - configuration (1)):
  - $I = 128$  A + 25% =  $128 \times 1.25 = 160$  A
  - For AWG2/0, the maximum current is  $175$  A, which is sufficient  
=> use AWG2/0
  - Install the specified maximum fuse (150 A) on each cable.
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
  - $I = (128$  A + 25%)/2 =  $(128 \times 1.25)/2 = 80$  A
  - For an AWG4, the maximum current is  $85$  A x 0.8 =  $68$  A, which is not sufficient. For an AWG3, the maximum current is  $100 \times 0.8 = 80$  A. So, 2 parallel cables of 3 x AWG3 + 2 x AWG8 are sufficient.
  - Install 80 A fuses on each cable.

# **Instructions for use**

## **4 Instructions for use**

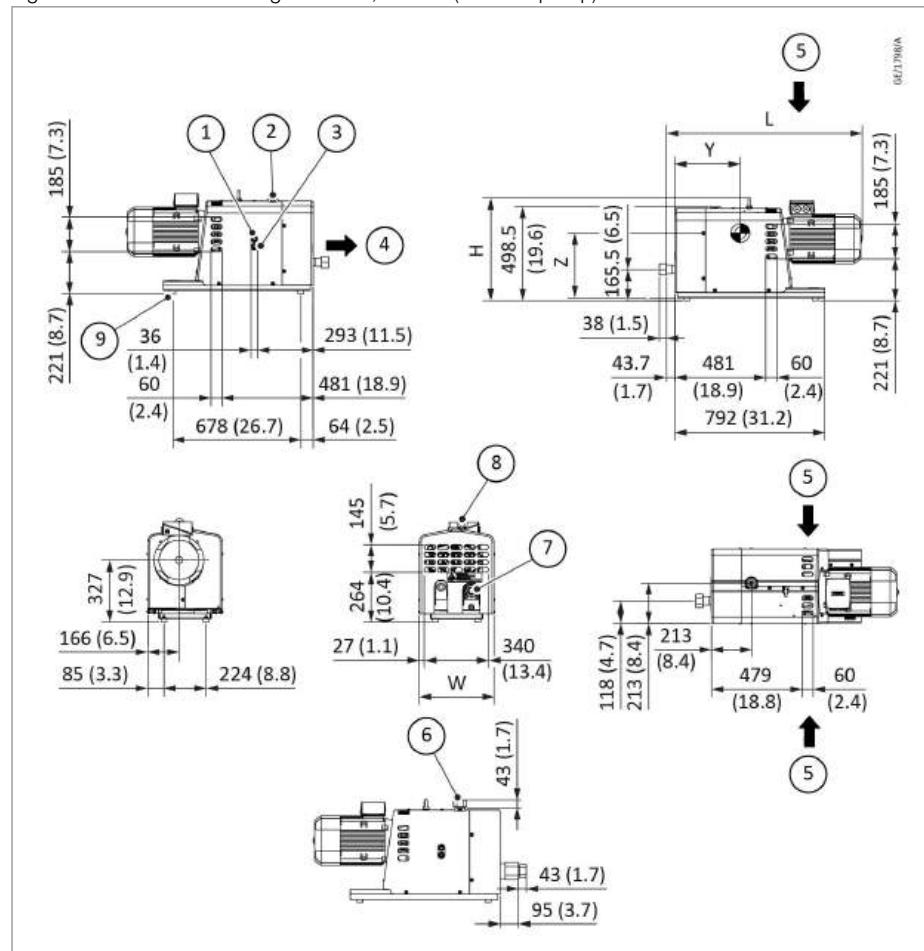
- Operate the pump in the limits given on the data plate.
- Do not make changes to the pump by welding, drilling or by other mechanical methods without the written permission of the manufacturer.
- Only use oil as specified by the manufacturer.
- The pressure and temperature of the pump must be clearly indicated.

# Installation

## 5 Installation

### 5.1 Dimension drawings

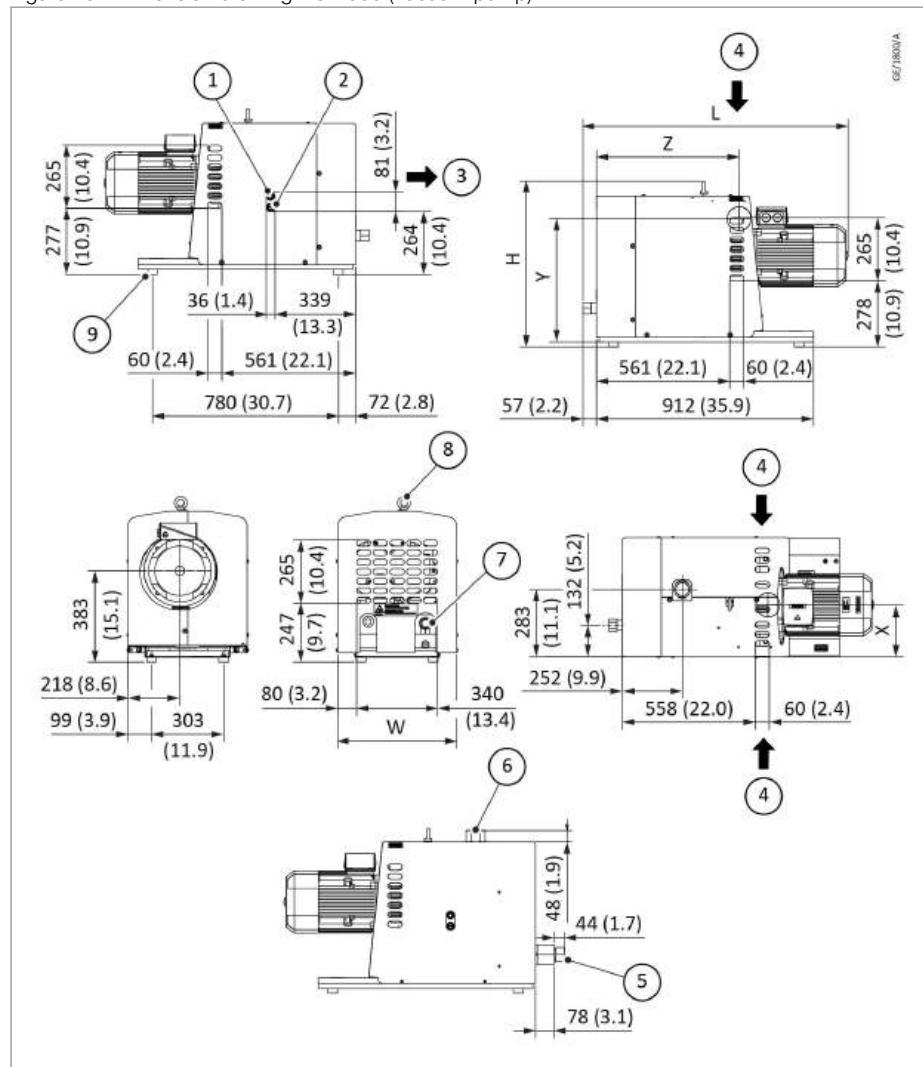
Figure 9. Dimension drawing - CP 065, CP150 (Vacuum pump)



1. Oil level indicator
2. Inlet
3. Oil drain plug
4. Cooling air outlet
5. Cooling air inlet
6. NPT adaptors (60 Hz units)
7. Outlet
8. Lifting eye
9. Anti-vibration feet (x4)

# Installation

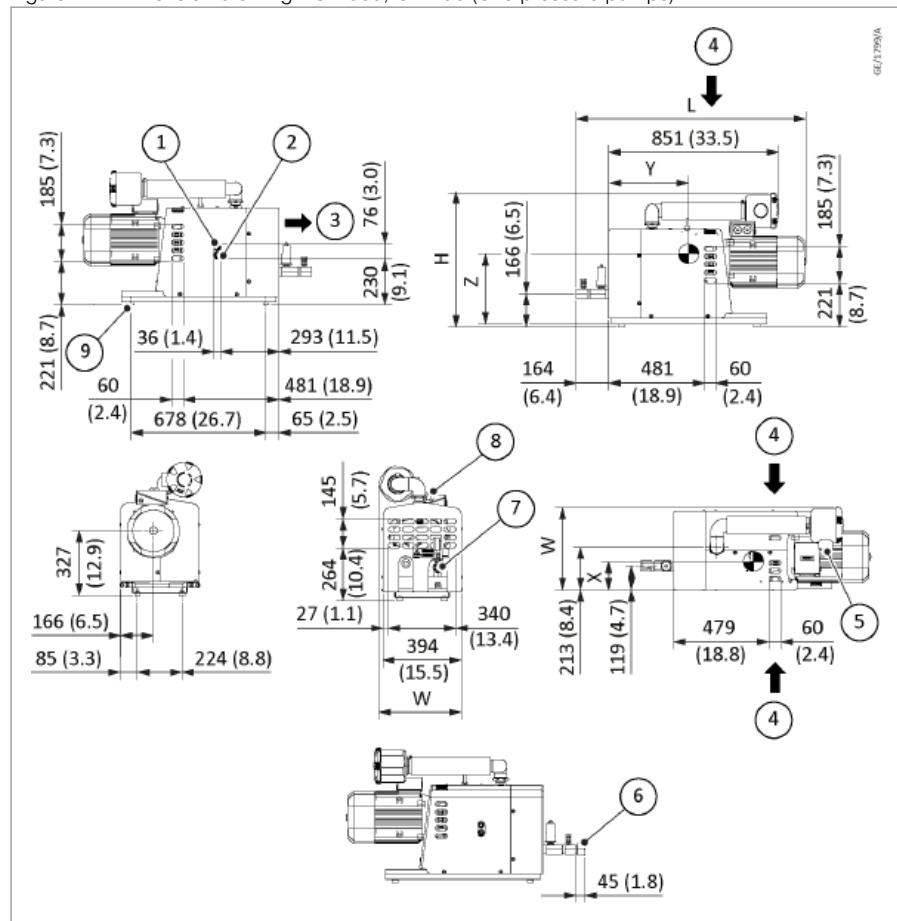
Figure 10. Dimension drawing - CP 300 (Vacuum pump)



1. Oil level indicator	2. Inlet
3. Oil drain plug	4. Cooling air outlet
5. Cooling air inlet	6. NPT adaptors (60 Hz units)
7. Outlet	8. Lifting eye
9. Anti-vibration feet (x4)	

# Installation

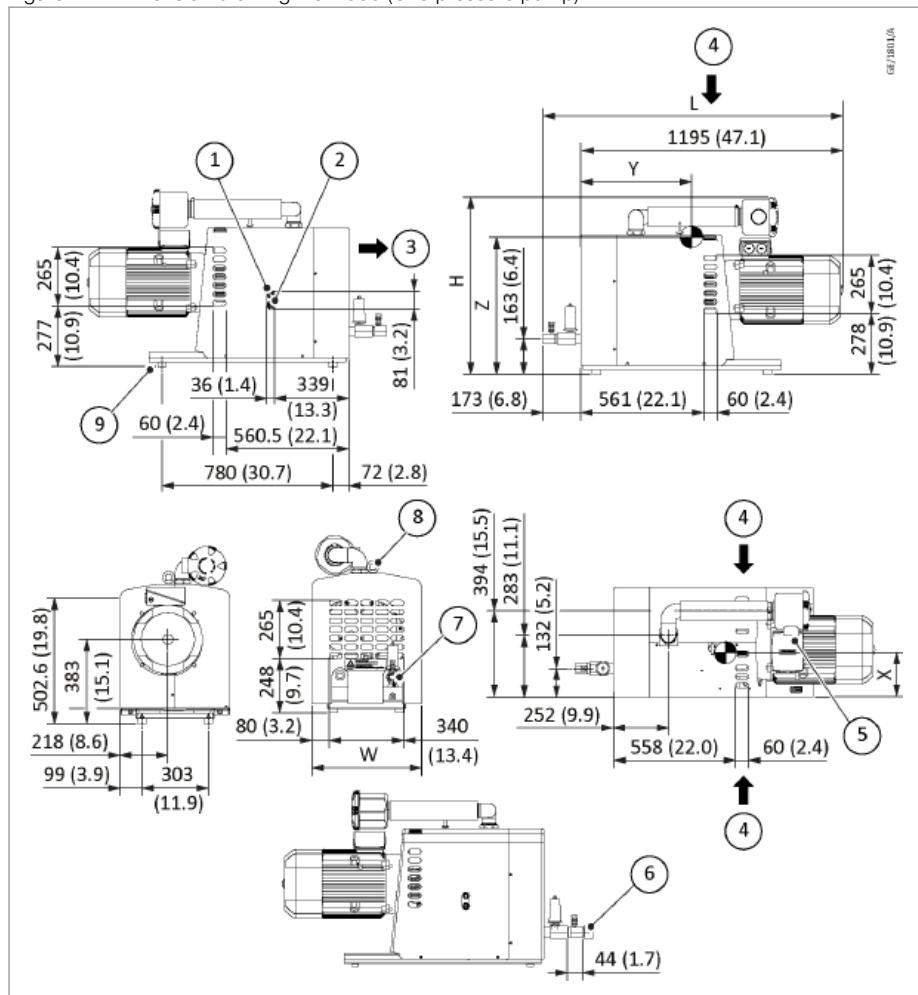
Figure 11. Dimension drawing - OP 065, OP 150 (Overpressure pumps)



1. Oil level indicator	2. Oil drain plug
3. Cooling air outlet	4. Cooling air inlet
5. Inlet	6. NPT adaptors (60 Hz units)
7. Outlet	8. Lifting eye
9. Anti-vibration feet (x4)	

# Installation

Figure 12. Dimension drawing - OP 300 (Overpressure pump)



1. Oil level indicator	2. Oil drain plug
3. Cooling air outlet	4. Cooling air inlet
5. Inlet	6. NPT adaptors (60 Hz units)
7. Outlet	8. Lifting eye
9. Anti-vibration feet (x4)	

**Table 9 Dimensions for vacuum pump**

Type	Variable dimensions						Centre of gravity					
	H		L		W		X		Y		Z	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
CP65*	545	21.4	1022	40.2	394	15.5	131	5.1	361	14.2	332	13
CP150	545	21.4	1036	40.8	394	15.5	151	5.9	361	14.2	342	13.4
CP300	692	27.2	1113	43.8	500	19.6	208	8.2	481	18.9	601	23.6

Dimension tolerances = +/- 10 mm (0.4 inch).

\*Additional silencer is not included in these dimensions.

**Table 10 Dimensions for overpressure pump**

Type	Variable dimensions						Centre of gravity					
	H		L		W		X		Y		Z	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
OP65	673	26.5	1052	41.4	416	16.4	196	7.7	384	15.1	398	15.7

# Installation

OP150	673	26.5	1159	45.6	416	16.4	141	5.5	401	15.7	352	13.8
OP300	804	31.6	1372	53.9	502	19.8	198	7.8	501	19.7	611	24

Dimension tolerances = +/- 10 mm (0.4 inch).

## 5.2 Installation proposal

### CAUTION: INSTALLATION SAFETY



Risk of damage to equipment. The pump is designed to be installed and operated in a safe environment areas where there is no risk of explosion. Environmental conditions must comply with the protection class of the motor as given on its name plate.



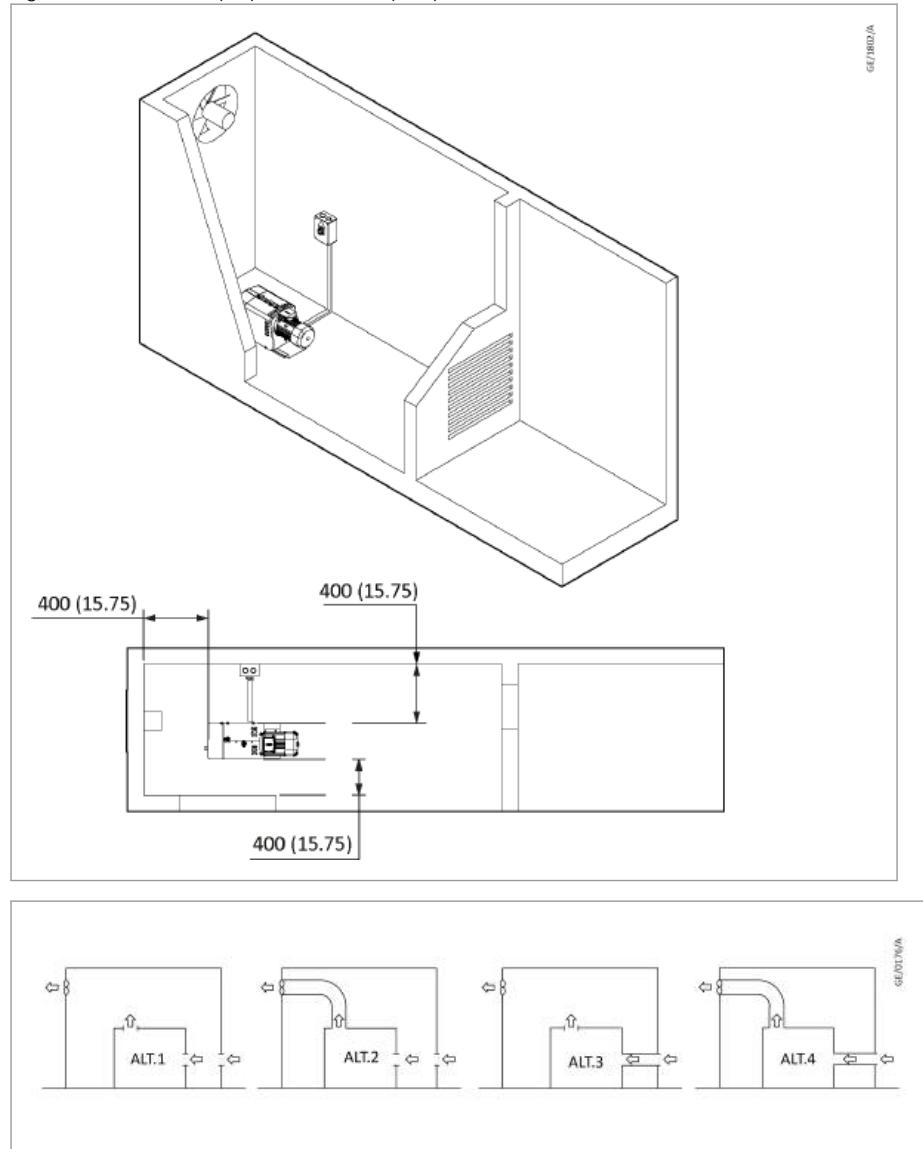
### CAUTION: HOT SURFACE

Risk of burn injury. The pump surface and exhaust gas will be hot. You must consider the safety of personnel when the pump is installed.

- Install the pump horizontally on a level surface. The surface must be:
  - clean
  - vibration free
  - well lit
  - ventilated
  - capable to support the weight of the pump.
- You must provide a support for complete length of the base frame. Add a shim where it is necessary. Do not use wood for support.
- Make sure that the pipes attached to the pump are not under stress.
- Make sure that the ambient temperature is not more than the specified temperature. Refer to [Technical data](#) on page 21.
- The pump is designed for indoor installation. For outdoor installation, you must provide necessary weather protection.
- Make sure that hot exhaust air from other pump or heat generating equipment does not enter in the pump.
- The flow of exhaust air from the pump must not be blocked. Release the hot exhaust air outside to prevent high ambient conditions in the room.
- Refer to [Table: Limitations](#) for operation criteria. If it is necessary to operate the pump outside the criteria, contact us.
- A sufficient space is necessary on all sides and top of the pump for the safe and correct installation, daily inspection and maintenance.
- It is not necessary to fix the pump to the ground. Fix the pump to the ground if it is mounted on a frame or a structure that may result in the movement of the pump. Always consider using anti-vibration mounts.
- The pump is designed for operation in a safe environment where there is no risk of explosion. Environmental conditions must comply with the protection class of the motor as marked on its name plate.
- You must install thermal insulation for protection against the intense heat which can be generated around the exhaust of the pump.

# Installation

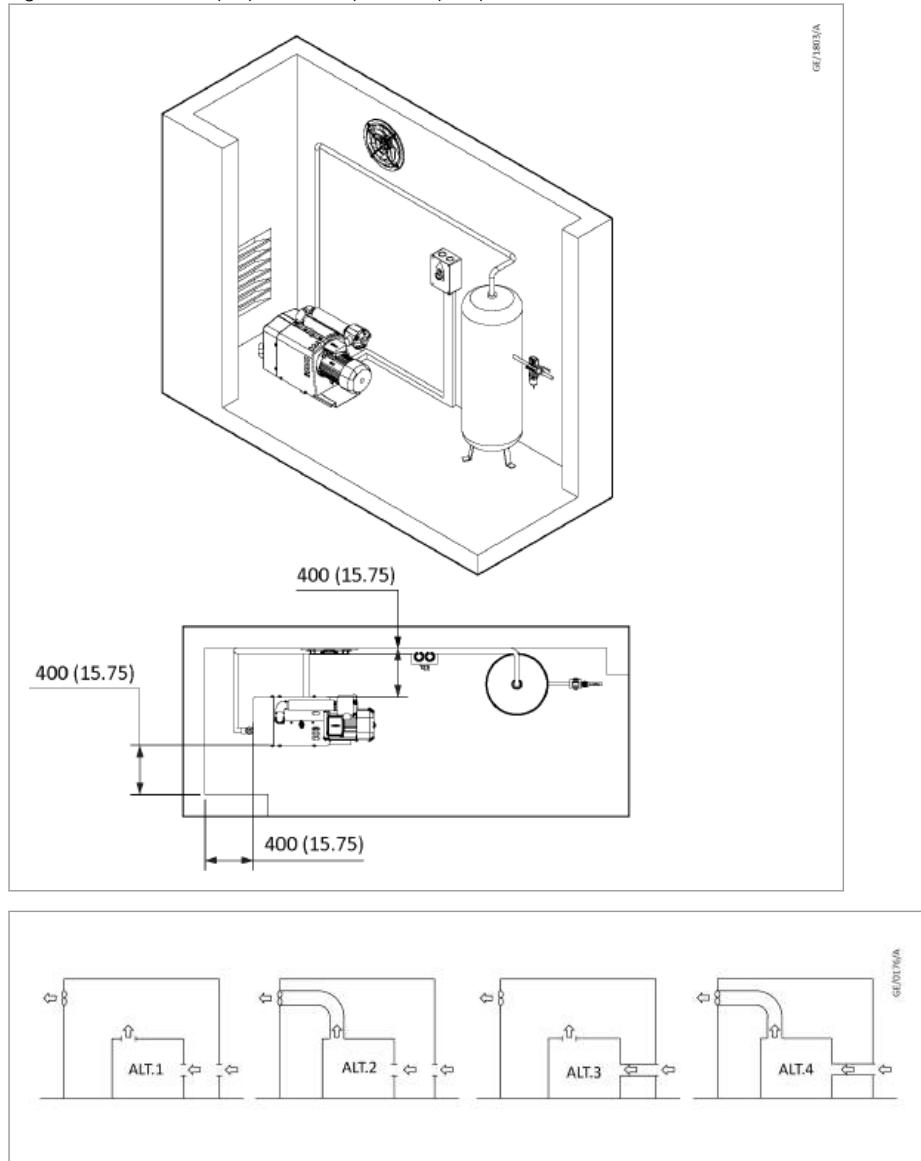
Figure 13. Installation proposal, Vacuum pumps



All dimensions are given in mm (inch).

# Installation

Figure 14. Installation proposal, Overpressure pumps



## 5.2.1 Piping connection

The piping connection for process, exhaust and all related components must be designed in accordance with generally accepted engineering practises and as per the local laws and regulations. For piping connections, we recommend the practises that follow:

- The process pipes must be of correct size to decrease the loss of performance and prevent damage to the pump.
- All pipework, filters and accessories must be fully supported to reduce physical stress on the pump.
- The vibration transmission through the pipework must be minimised.
- The process pipe should be installed sloping away from the pump to prevent the condensate to go back into the pump. Install filtration equipment if particulates can carry-over. The filtration equipment of 5 micron or less is ideal. Make sure that the volume of the pipe is big enough to have a correct regulation of the unit. If this is not possible, install a correctly sized vessel.

# Installation

- The pipes must be straight with no tight bends, fold or twists. The pipes should be sized correctly to decrease the losses. Use the same diameter of pipe for the pump process connection. Correct sizing is necessary for the folded, twisted or the pipes with a length more than 10 meter.
- Use easy to release and flexible connection at the final connection to the pump.
- The process isolation valves are necessary. For the vacuum pump, do not isolate the exhaust to prevent high back-pressure. Install a drip-leg drain or a low position drain point.
- The exhaust silencer has a drain plug or drain tab and consideration must be given to deal with the condensate drain off.
- The pipe material must be compatible with the process medium.
- The discharge air can have temperature up to 250 °C (482 °F). Make sure that the connection pipes are compatible for this temperature range.

 **Note:**

At 2.3 bar (g) pressure, overpressure pump can generate hot air up to 250 °C.

- Make sure that there is no leakage in the pipes and accessories to prevent the decrease in the performance and efficiency of the pump.
- Do the regular inspection and leak test of the system.
- Make sure that the pipe is cleaned internally and there are no blockage before you start the pump.

## 5.2.2 Ventilation

For ventilation at the site of installation, consider the points that follow:

- Do not recirculate the hot air from the pump ventilation ports back to the pump cooling system and relief valve. This will cause less cooling and overheating.
- The air velocity to the grids must not be more than 5 m/s.
- The maximum air temperature at intake is 40 °C (104 °F) and the minimum air temperature is 0 °C (32 °F).

Refer to [Installation proposal](#) on page 36 for ventilation alternatives.

- Alternative 1 and 3

The necessary ventilation to limit the room temperature of the pump is calculated as:

$$Qv = 1.06 N / T$$

Where,

- $Qv$  = Necessary cooling air flow ( $m^3/s$ )
- $N$  = Nominal motor power of the pump (kW)
- $T$  = Temperature increase in the pump room (°C)

- Ventilation alternative 2 and 4: The fan capacity must match the pump - fan capacity at a pressure head equal to the pressure drop caused by the cooling air ducts.

Maximum permitted pressure drop in ducting before or after the pump = 10 Pa

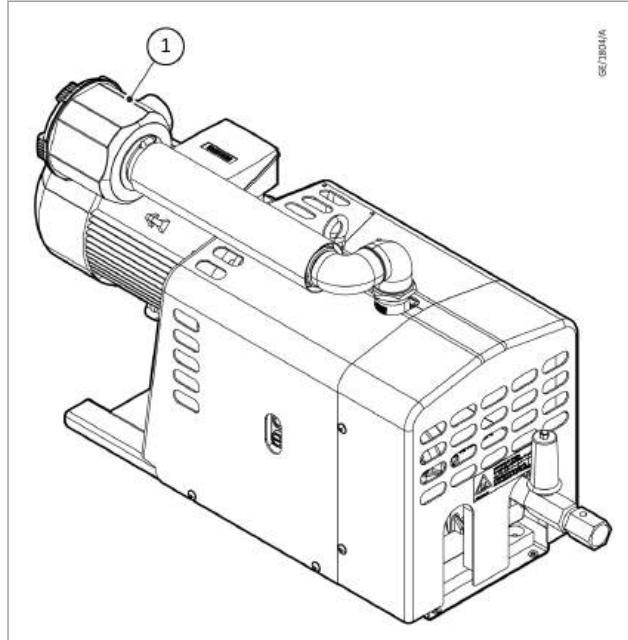
## Air intake filter (In case of overpressure pump)

If the air intake filter is delivered loose, install it in a leak-tight position. When the air intake filter element is replaced, the dust can fall into the pump inlet

# Installation

and damage the pump. The air intake filter must be installed in a horizontal position to prevent filtered dust falling into the pump inlet.

Figure 15. Air filter



1. Air filter

## 5.2.3 Outdoor installation

The pump is not designed for outdoor use.

The pumps can only be used in temperatures more than 0 °C (+ 32 °F). If frost occurs, take applicable protective steps to prevent the damage to the pump and its ancillary equipment. Contact us for details.

If it is necessary to operate the pump at more than 1000 m (3300 ft), contact us.

## 5.2.4 Hygienic enclosure

A range of Stainless-Steel Hygienic Enclosures are available for the Food and Packaging industry. These are designed in line with the basic hygienic principles and are tailor-made for the vacuum pumps.

With these enclosures, the pumps can cope with daily wash-downs, even with aggressive cleaning liquids. The pump can be placed near to the process medium which reduces the pressure losses over the piping.

The Hygienic enclosure guarantee the highest food safety level and best vacuum pump performance. Contact us for more information.

**Table 11 Ordering information for Hygienic enclosure**

Ordering information		Technical data	
Pump	Material number	Maximum ambient temperature (°C)	Dimensions L x W x H (mm)
CP65	178065v01 - 178065v10	15	1400 x 730 x 798
CP150	178150v01 - 178150v10		
CP300	178300v01 - 178300v10		1400 x 730 x 996

Figure 16. Hygienic enclosure



## 5.2.5 Position the pump

### **WARNING: HEAVY OBJECT**



Risk of injury and damage to the equipment. Do not lift the pump if the external body (canopy) parts or lifting supports are not fully installed. When the pump is being lifted, do not stand below the load or do the maintenance work.

### **CAUTION: LIFTING ANGLE**



Risk of injury and damage to the equipment. Always check the centre of gravity before you lift the pump. Some pressure pumps are heavy and will tilt when you lift the pump.

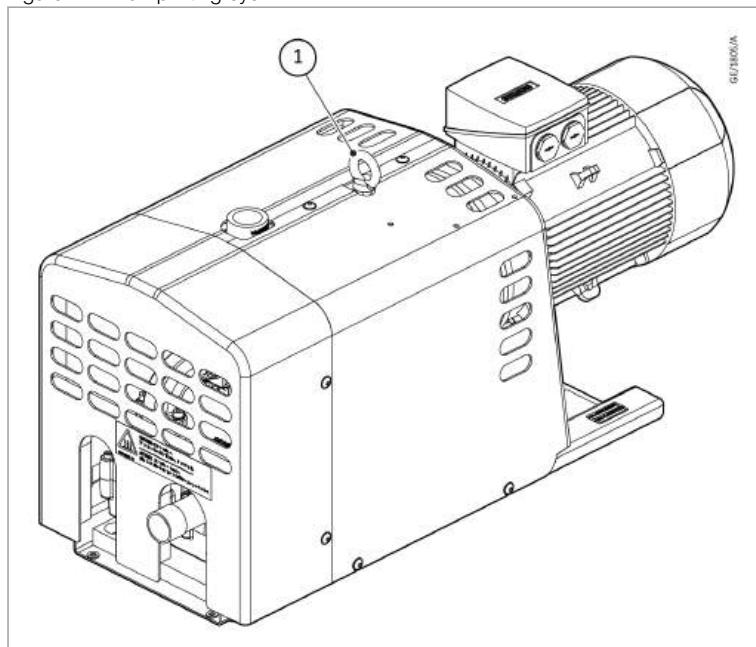
The pump is delivered on a wooden pallet. During transport, the pump is secured to the pallet using bolts to prevent from damages. Remove the transport fixation bolt before you lift the pump.

When you move the pump to its installation position, consider the points that follow:

- Lift the pump carefully with a hoist of appropriate lifting capacity.
- You must use the lifting eye provided at the top of the pump to lift the pump. Refer to [Figure: Pump lifting eye](#).
- The pump can be moved by a hoist using the lifting eye. Take care not to damage the bodywork during lifting or transport.
- Make sure that the eyebolt is fully inserted in the lifting boss. The eye bolt must be in serviceable condition and rated according to the load of the pump.
- The motor is also equipped with an eyebolt but it is designed only for the motor. You must use the eyebolt installed at the pump for lifting the pump assembly. Do not use the motor eyebolt.

# Installation

Figure 17. Pump lifting eye



1. Lifting eye

## 5.2.6 Acclimatization

### CAUTION: MOISTURE FORMATION



Risk of damage to equipment. To prevent moisture that can damage the electrical components, make sure that a minimum of 2 hours of acclimatization is done before you start the pump.

When you move the pump to the installation room, condensation can occur on some components. Make sure that the pump is left idle for minimum 2 hours to adjust in the installation room condition.

## 5.3 Electrical connections

### CAUTION: MOTOR ROTATION



Risk of damage to equipment. Before you start the machine, check the rotation direction of the motor to prevent pump failure. Motor rotation direction must be counter clockwise (when viewed from non-drive side to drive side) for all motors.

If the direction is wrong, switch off the voltage and reverse two incoming electric lines.

Always use a protection system, including an overcurrent protection and an electrical disconnecting device between the pump and the electrical power supply. The protection system must prevent the pump from automatic restart after power failure. If this is not possible, attach a sign near the pump that states "Danger: This machine may start without warning".

Refer to [Motor data](#) on page 23 and the motor data plate for motor current details. The pump is delivered without electrical cable and switch. For the electrical connection, check the diagram inside the terminal box or on the motor data plate.

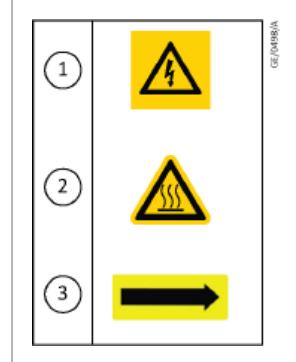
# Installation

For the selection of the correct cables and fuses, refer to [Electrical cable size and fuses](#) on page 24.

Your local legislations may require you to install an emergency stop device to stop the pump in case of any hazardous situation. Consult us for details.

## 5.4 Pictographs

Figure 18. Pictograph



1. Warning: Voltage  
3. Rotation direction of fan

2. Warning: Hot surface

# Operation

## 6 Operation

### 6.1 Initial start-up



#### CAUTION: OPERATIONAL SAFETY

Risk of damage to equipment. The operator must apply all relevant safety precautions. Refer to *Safety precautions during operation* on page 10.



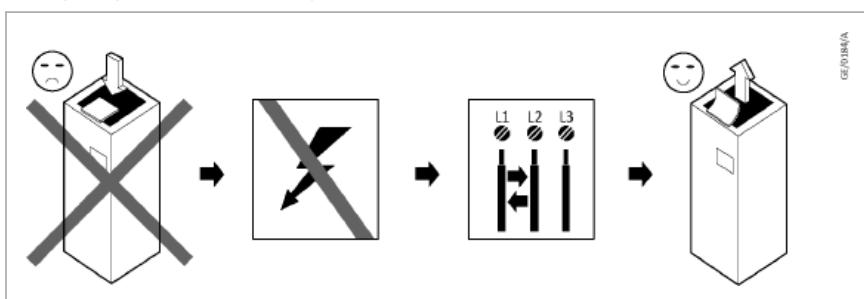
#### CAUTION: HUMID APPLICATION

Risk of damage to equipment. If it is necessary to operate the pump on a humid applications, we recommend to let the pump reach the optimal operating temperature before you use it for the operation. To do this, operate the pump against a closed suction line for 30 minutes.

 **Note:**

The pump is supplied with oil in the gearbox.

1. Remove the external body (canopy) panels to get access to the internal components.
2. Check the process lines for the correct size to prevent high pressure drop and for cleanliness to protect the pump.
3. Make sure that the pump outlet is not blocked.
4. Make sure that the electrical connections correspond to the local codes and that all wires are clamped tight to their terminals.
5. The installation must be earthed and protected against the short circuits by fuses of the inert type in all phases. Install an isolating switch near the pump.
6. Check the oil level. The minimum level should reach the oil sight glass when the pump is stopped. If needed, top up the oil.
7. Take care that no dirt drops into the oil system. Refit and tighten the filler plug.
8. Give labels, warning to the operator that:
  - The pump can automatically restart after the voltage failure (if activated, contact us).
  - The pump is automatically controlled and can be automatically restarted.
  - The pump can be remotely controlled.



# Operation

9. Start and operate the pump for a few minutes. Check the rotation direction of the motor. The correct rotation direction of the drive motor is shown by an arrow shown on the motor fan cowl.

If the rotation direction of motor is incorrect:

- Open the isolating switch.
- Reverse two incoming electric lines.

Incorrect rotation direction of the motor can cause damage to the pump.

10. Start and operate the pump for a few minutes. Check that the pump operates normally.

11. Open the inlet isolation valve.

12. Install the external body (canopy) panels.

## 6.2 Start the pump

### CAUTION: STARTING FREQUENCY



Risk of damage to equipment. To prevent the excessive energy consumption and damage to the pump, the maximum permitted starting frequency is 30 starts per hour.

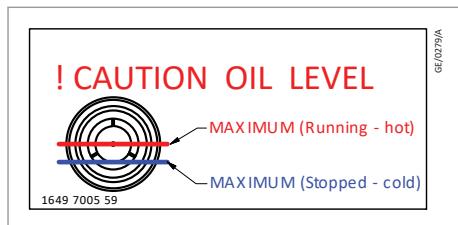
To start the pump:

1. Check the oil level and the oil condition.

 **Note:**

When you start the cold pump, the oil level must not be above the blue line marked on the warning label. Refer to [Figure: Oil level warning label](#).

2. Switch on the voltage.



## 6.3 During operation

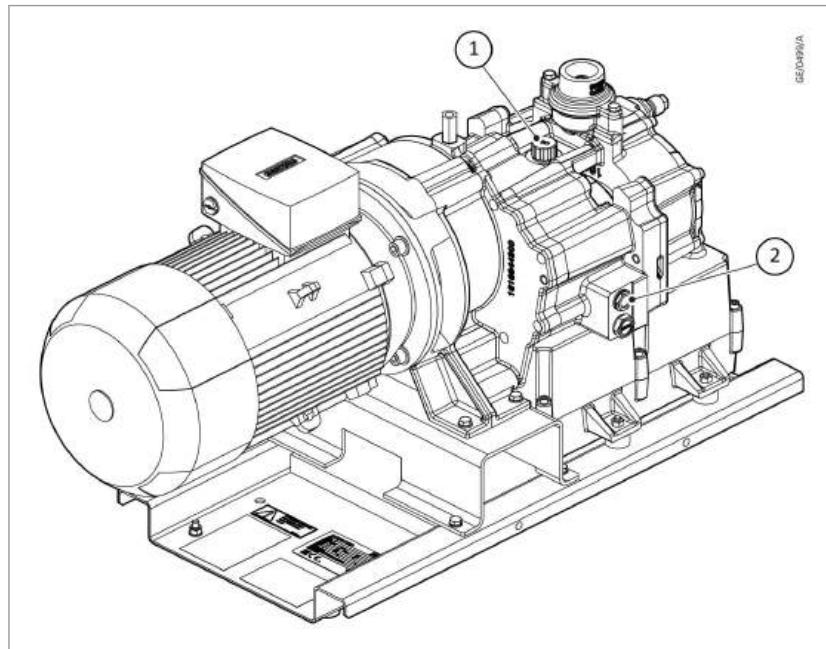
Regularly check the oil level and the oil condition. The oil level must be visible through the oil sight glass. It must not exceed the limits marked on the warning label. For accurate oil level measurement, the pump must be heated (when in operation) or cooled (when stopped) for at least 90 minutes. If the oil level is low, refill the oil with correct type of lubricants.

To fill the oil in gearbox, do the steps that follow:

1. Remove the canopy panel(s) in order to get access to the internal components.
2. Remove the oil filler plug.
3. Pour oil in the gearbox. Make sure that the oil is not above the maximum oil level marked on [Figure: Oil level warning label](#).
4. Close the filler plug.
5. Remove all oil spills on the pump and the floor.

# Operation

6. Reinstall the canopy panel(s).



1. Oil filler plug

2. Oil sight glass

## 6.4 Stop the pump

Before you switch off the pump, operate the pump isolated for 15 minutes, pumping clean dry air at around 50 - 100 mbar(a). If the air stream is very contaminated with water vapour, a longer operation of the pump off-line can increase the lifetime.

## 6.5 Taking out of operation

To take the pump out of operation, set the voltage to off and disconnect the pump from the mains power supply.

## 7 Maintenance



### WARNING: HIGH VOLTAGE

Risk of injury or damage to equipment. Isolate the pump from the customer's network before you do the adjustment on the pump.

Before you do the maintenance, repair or adjustment:

1. Stop the pump.
2. Close the isolation valve and wait for 3 minutes.
3. Push the emergency stop button and set the voltage to off.
4. Release the pressure by venting the process side of the pump (if it is safe to do).
5. Open and lock the isolation switch.
6. Lock the air inlet isolation valve.

### Warranty - Product Liability

Use only authorised parts. Any damage or malfunction caused by the use of unauthorised parts is not covered by Warranty or Product Liability.

### Service kits

For overhauling and for preventive maintenance, service kits are available. Service kits comprise all parts required for servicing the component and offer the benefits of genuine parts while keeping the maintenance budget low.

Refer to the Spare Parts List for part numbers.

### Service contracts

We offer several types of service contracts, relieving you of all preventive maintenance work. Consult us for more details and a customised maintenance plan for your machine.

### General

When servicing, replace all removed O-rings and washers.

### Intervals

The local Customer Centre may overrule the maintenance schedule, especially the service intervals, depending on the environmental and working conditions of the pump.

The longer interval checks must include the shorter interval checks.

### 7.1 Preventive maintenance schedule



### CAUTION: PUMP LEAKAGE

Risk of damage to equipment. You must seal the leaks immediately and replace the damaged hoses or the flexible joints.

# Maintenance



## CAUTION: OIL LEVEL

Risk of damage to equipment. We recommend to monitor the oil condition through the sight glass and to change the oil when it becomes discoloured. Not changing oil in time can result in failure of the pump.

For safe operation and long service life of the pump, you must examine the pump as described in [Table: Preventive maintenance schedule](#). The table describes the maintenance schedule for a normal application with your pump manufacturers oil.

The maintenance schedule can change depending on harshness of the process. The pump condition is defined as "normal" or "harsh" based on the process and machine room specifications. Each operating condition has a dedicated service requirement. Contact your pump manufacturer for more guidance and a tailor-made service plan to guarantee your Warranty or Product Liability coverage in line with the used oil of your pump manufacturer.

[Table: Preventive maintenance schedule](#) is valid for normal and clean operation conditions (see [Table: Reference condition](#)) and normal operation pressures (see [Table: Vacuum pump data](#) ). Your maintenance requirement will change if the vacuum pump is exposed to process or external pollutants such as humidity, dust or high cycle times. Contact your pump manufacturer to align your preventive maintenance needs and guarantee your Warranty/Product Liability coverage.

For an overhaul or rebearing of the Claw pump, contact your vacuum pump supplier.

**Note:**

The bearings of the motor are greased for life.

**Table 12 Preventive maintenance schedule**

Action	Normal
Check oil level and fill the gearbox with the oil, if necessary	Weekly
Remove the optional air filter element and inspect them.	
Replace damaged or heavily contaminated elements	Monthly
Check for possible air and oil leakages	
Check coupling and fan	
Open pump camber cover to inspect and clean claws, drain the silencer	4000 hours <sup>(1)</sup>
Change Synthetic Oil <sup>(2)</sup> and replace element lip seals	20000 hours <sup>(3)</sup>
Replace motor lip seal	
Clean silencer	
Change spring, piston and O-rings of the inlet valve	48000 hours <sup>(4)</sup>
Change motor coupling and spider	
Consult us for the internal cleaning guidelines	When necessary

(1) Or every 6 months, whichever comes first

(2) Only use synthetic oil

(3) Or after 4 years, whichever comes first

(4) Or after 6 years, whichever comes first

\* For overpressure pump, oil change intervals are different.

## 7.2 Oil specification



### WARNING: LUBRICATION OIL

Risk of damage to equipment. Do not mix lubricants of different brands or types as they can possibly not be compatible and the oil mix will have inferior properties.

We recommend to use our genuine vacuum lubricants. They are the result of years of field experience and research. Refer to [Table: Preventive maintenance schedule](#) for the applicable replacement intervals. Refer to spare parts list for the part number information.

#### Leybold LVO 330

Leybold LVO 330 is a specially developed lubricant for use in the gearbox of the pump. Its specific composition keeps the pump in excellent condition.

## 7.3 Adjustments and servicing procedures

### 7.3.1 Air filter

The air filter is supplied only with over pressure pump. To replace the filter element, obey the instructions that follow:

1. Stop the pump.
2. Set the voltage to off.
3. Remove the air filter cover.
4. Remove the filter element.
5. Install the new filter element and fit the filter cover.

#### Note:

When you install the air filter element, make sure that the seal is in good condition.

#### Clean the intake air filter element

Remove the intake air filter element from the housing. Clean the intake air filter element by one methods that follow:

##### Hand washing:

1. Soak and agitate the intake air filter element in a warm water and mild detergent solution.
2. Give sufficient time for the intake air filter element to air dry (minimum 24 hours).
3. Do not install a damp intake air filter element. Damp intake air filter element will cause higher initial pressure loss and rapid dirt loading.

##### Compressed air cleaning:

1. To clean the inner side, use approximately 7 bar(g) ( 100 psi(g)) direct air flow at the inner side of the intake air filter element towards the pleats.
2. When you clean outer side of the intake air filter element, keep the air flow pressure less to prevent dirt from embedding in the media.
3. Clean the inner side of the intake air filter element to remove any dirt.

# Maintenance

## Vacuum cleaning:

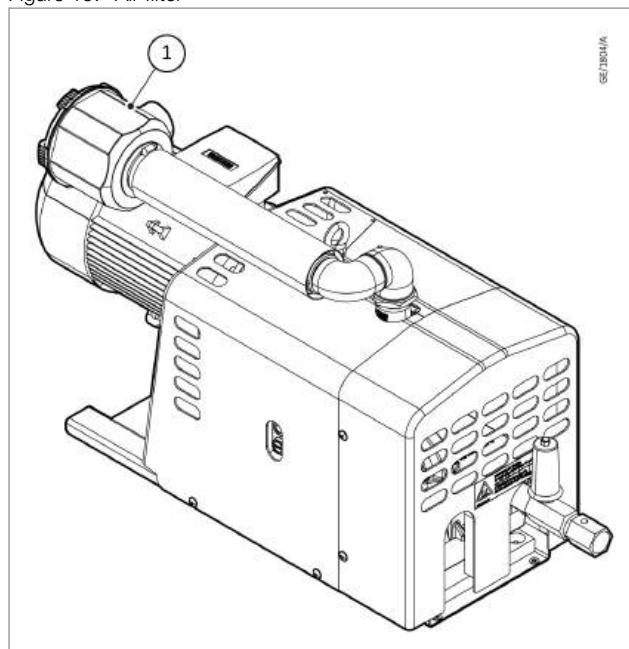
1. Point the vacuum cleaner to the dirty side (outer side of the intake air filter element).
2. Use a vacuum of approximately 100 mbar(a) (75 torr) to clean the intake air filter element. A crevice tool is recommended.

## Hand cleaning:

Hold the intake air filter element down with one hand and move the other hand across the fins in a strumming motion.

You can use the intake air filter element again after cleaning.

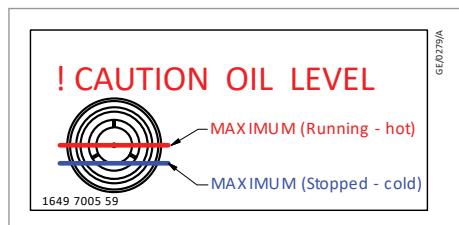
Figure 19. Air filter



1. Air filter

## 7.3.2 Fill the oil

1. Remove the filler plug.
2. Fill the gearbox with oil until it is visible in the oil sight glass but does not exceed the maximum (Stopped – cold) level indicated on the label. Refer to [Figure: Oil level warning label](#). Make sure that no dirt drops into the system.
3. Refit and tighten the filler plug.
4. Run the pump for 90 minutes to stabilise the pump temperature.
5. Check if the oil level is above the maximum (Running - hot) level marked on the label.



When the oil level is low, repeat the steps.

# Maintenance

## 7.3.3 Clean fans and vent holes

Keep the external body (canopy) fans, motor fan, element cooling fan and vent holes clean. Use the compressed air and a dry cloth to clean this parts. Do not use fluids or substances other than given in this manual.

# Fault finding

## 8 Fault finding



### WARNING: HIGH VOLTAGE

Risk of injury or damage to equipment. Isolate the pump from the customer's network before you do the adjustment on the pump.

Before you do the maintenance, repair or adjustment:

1. Stop the pump.
2. Close the isolation valve and wait for 3 minutes.
3. Push the emergency stop button and set the voltage to off.
4. Release the pressure by venting the process side of the pump (if it is safe to do).
5. Open and lock the isolation switch.
6. Lock the air inlet isolation valve.

Fault	Pump does not start when switched on
<b>Cause</b>	<b>No voltage or wrong voltage</b>
Remedy	Check the power supply.
<b>Cause</b>	<b>Overload protection has tripped</b>
Remedy	Compare the electrical data mentioned on the data plate or in the instruction book with setting of overload protection. Adjust setting of overload protection when setpoint is not correct.
<b>Cause</b>	<b>The pump is blocked</b>
Remedy	Clean the claws and check if foreign material has entered the pump. If necessary install an inlet filter to prevent foreign material to enter in the pump.
<b>Cause</b>	<b>The motor is damaged (short-circuit in the windings)</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The bearings are damaged</b>
Remedy	Contact us for support.
Fault	The pump cannot reach stated end pressure
<b>Cause</b>	<b>Air consumption exceeds air delivery of pump</b>
Remedy	Close the shut off valve at inlet to check if it is a pump issue or piping issue. Perform air leak test on the piping.
<b>Cause</b>	<b>The air inlet filter is clogged</b>
Remedy	Replace the air inlet filter.

# Fault finding

<b>Cause</b>	<b>Too high pressure drop between process and pump inlet (Vacuum pump) or pump outlet (Overpressure pump)</b>
Remedy	Check the process lines for correct size and for leakage. Correct if necessary
<b>Cause</b>	<b>The pump element is out of order</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The inlet valve is blocked</b>
Remedy	Overhaul the inlet valve.
<b>Cause</b>	<b>Check vacuum relief valve (Vacuum pump) or safety valve (Overpressure pump)</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>Check the direction of motor rotation</b>
Remedy	Change the direction of motor rotation if it is wrong.

<b>Fault</b>	<b>The pump skid outlet temperature is above normal</b>
<b>Cause</b>	<b>Internal part can be worn or damaged</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The installation proposal is not followed</b>
Remedy	Check for cooling air restriction.
<b>Cause</b>	<b>The fan is damaged</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The pump element is out of order</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The ambient temperature or relative humidity is outside of recommend range</b>
Remedy	Check limitations.
<b>Cause</b>	<b>The inlet pressure is lower than that specified for the pump</b>
Remedy	Check the inlet pressure and relief valve setting for the operating conditions and elevation.
<b>Cause</b>	<b>Insufficient cooling air flow</b>
Remedy	Check the element fan. Consult us for fan replacement.
<b>Cause</b>	<b>The inlet valve is blocked</b>
Remedy	Overhaul the inlet valve.
<b>Cause</b>	<b>Increased back pressure at pump outlet (maximum allowable: 200 mbar(g) or 2.7 Psi(g))</b>
Remedy	Check the outlet piping.

# Fault finding

Fault	Oil leakage found
<b>Cause</b>	<b>Carry over from process contamination</b>
Remedy	Install the liquid separator.
<b>Cause</b>	<b>High oil level in gearbox</b>
Remedy	Lower the oil level.
<b>Cause</b>	<b>Lipseal wear or failure</b>
Remedy	Do the lipseal overhaul on the element side
<b>Cause</b>	<b>Loose magnetic plug or sight glass</b>
Remedy	Tighten the plug and/or the sight glass. Re-fill oil.
<b>Cause</b>	<b>Excessive operating temperature</b>
Remedy	Confirm back pressure, inlet pressure, ambient/inlet temperature and relief valve setting.

Fault	Excessive noise
<b>Cause</b>	<b>Increased back pressure at pump outlet</b>
Remedy	Check the outlet piping
<b>Cause</b>	<b>The inlet pressure is lower than that specified for the pump</b>
Remedy	Check the inlet pressure and relief valve setting for the operating conditions and elevation.
<b>Cause</b>	<b>The motor or coupling are misaligned</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>Touching claws</b>
Remedy	Check the pump chamber for scratches. Contact us for support.
<b>Cause</b>	<b>The vibration damper is loose</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>The exhaust silencer is damaged</b>
Remedy	Contact us for support.
<b>Cause</b>	<b>Connection to the exhaust pipe is stiff</b>
Remedy	Add flexible connection (hose or flexible pipe coupling) in the connection.

## 9 Storage

Store the pump in a clean, dry and isolated area. Cover the pump to protect from mechanical damage.

If the pump is going to be stored without operation from time to time, protective measures must be taken. Contact us for details.

### **Short term storage**

If the pump is put into storage for short term, do the steps that follow:

1. Isolate the pump from the suction inlet and exhaust outlet.
2. Make sure that the pump is clean and dry from the process or condensation in the element.
3. To keep the efficiency of the rubber parts and lip seals, operate the pump with closed intake for minimum 30 minutes after every 6 months.

### **Long term storage**

If the pump is put into storage for long term, make sure to follow all precautions. Contact us when it is necessary to start the pump or when you do decommissioning.

# Disposal

## 10 Disposal

DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL and UK DIRECTIVE 2013 – S.I. 2013/3113 on waste electrical and electronic equipment (WEEE)

This equipment comes under the provisions of the European Directive 2012/19/EU and UK Directive 2013 – S.I. 2013/3113 on waste electrical and electronic appliances (WEEE) and cannot be disposed as unsorted waste.



The equipment is labelled in accordance with the European Directive 2012/19/EU and UK directive 2013 – S.I. 2013/3113 with the crossed-out wheelie bin symbol.

At the end of life-time of the electric and electronic equipment (EEE) it must be taken to separate collection.

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For more information contact your local waste authority, customer centre or the distributor.

## 11 Service

### 11.1 Leybold Service

Whenever you send us equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

The form Declaration of Contamination for Compressors, Vacuum Pumps and Components is available on [www.leybold.com-> Downloads -> Download Documents](http://www.leybold.com-> Downloads -> Download Documents).

Attach the form to each pump. This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We will return to the sender any equipment which is not accompanied by a contamination statement.

## 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](mailto:documentation@leybold.com)

**Product:** Dry Claw Overpressure pump, with motor  
**Models:** OP65, OP150, OP300  
**Pump family numbers:** 178065PXX, 178150PXX, 178300PXX

Is in conformity with the relevant Union harmonisation legislation:

2006/42/EC Machinery directive

*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.*

2014/30/EU Electromagnetic compatibility (EMC) directive  
Class A Emissions, Industrial Immunity

2011/65/EU Restriction of certain hazardous substances (RoHS) directive  
as amended by Delegated Directive (EU) 2015/863

**Note:** Safety Valve purchased certified according to PED 2014/68/EU Class IV Module H1  
Notified body: TUV SUD Industrie Service GmbH Westenstrasses 199-D 80686 Munich 0036

Based on the requirements of relevant harmonised standards and technical documentation:

EN ISO 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction

EN 1012-1:1996+A1:2011 Compressors and vacuum pumps. Safety requirements. Air compressors

EN 60204-1:2018 Safety of machinery. Electrical equipment of machines. General requirements

EN 61000-6-2:2005 Electromagnetic Compatibility (EMC) - Part 6-2: Generic Industrial Immunity Standard

EN 61000-6-4:2007 Electromagnetic Compatibility (EMC) - Part 6-4: Generic Industrial Emission Standard  
A1:2011

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with  
respect to the restriction of hazardous substances

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: 2022-12-02

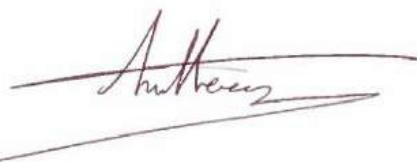
You must retain the signed legal declaration for future reference

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

Signed for and on behalf of Leybold GmbH.



Andries de Bock – VP Engineering  
Industrial Division  
Cologne



Wim Anthierens – Manufacturing Manager  
PC Industrial Air  
Antwerp

## Declaration of Conformity

**Leybold GmbH**  
Bonner Strasse 498  
D-50968 Köln  
Germany

**Documentation Officer**  
Innovation Drive  
Burgess Hill  
West Sussex  
RH15 9TW  
[documentation@leybold.com](mailto:documentation@leybold.com)

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

**Product:** Dry Claw Overpressure pump, with motor  
**Models:** OP65, OP150, OP300  
**Pump family numbers:** 178065PXX, 178150PXX, 178300PXX

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.*

Electromagnetic Compatibility Regulations 2016

Class A Emissions, Industrial Immunity

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

**Note:** Safety Valve purchased certified according to Pressure Equipment (Safety) Regulations 2016 Class IV  
Module H1

**Notified body:** TUV SUD Industrie Service GmbH Westenstrasses 199-D 80686 Munich 0036

Relevant designated standards or technical specifications are as follows:

EN ISO 12100:2010	Safety of machinery. General principles for design. Risk assessment and risk reduction
EN 1012-1:1996+A1:2011	Compressors and vacuum pumps. Safety requirements. Air compressors
EN 60204-1:2018	Safety of machinery. Electrical equipment of machines. General requirements
EN 61000-6-2:2005	Electromagnetic Compatibility (EMC) - Part 6-2: Generic Industrial Immunity Standard
EN 61000-6-4:2007 A1:2011	Electromagnetic Compatibility (EMC) - Part 6-4: Generic Industrial Emission Standard
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

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: 2022-12-02

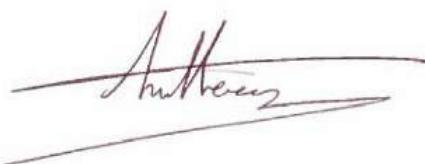
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Andries de Bock – VP Engineering  
Industrial Division  
Cologne



Wim Anthierens – Manufacturing Manager  
PC Industrial Air  
Antwerp

## ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

### EMC (EU, UK): 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 the following Exemptions

#### Annex III:

- 6(b) **Lead** as an alloying element in aluminium containing up to 0.4% by weight
- 6(c) Copper alloy containing up to 4% **lead** by weight
- 7(c) I Electrical and electronic components containing **lead** in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound
- 7(c) II **Lead** in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher

### REACH (EU, UK)

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

### Article 33.1 Declaration (EU, UK)

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

- Lead (Pb)  
This substance is present in certain aluminium / electrical or electronic components.

### Compliance Information – incorporated products and assemblies

#### Motors

Regulation (EU) No 2019/1781 electric motors and variable speed drives

*Based on the requirements of harmonised standard:*

EN 60034-30:2009: Rotating electrical machines -- Part 30: Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)

#### Fans

2009/125/EC Ecodesign directive requirements for energy-related products

Regulation (EU) No 327/2011: Industrial fans driven by motors

### 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)

**材料成分声明**  
**China Material Content Declaration**

部件名称 Part name	有害物质 Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
铸铝及铝合金制品 Aluminum alloys	X	O	O	O	O	O
铜管管件 Brass pipe fitting	X	O	O	O	O	O
铜接头 Brass connectors	X	O	O	O	O	O
电机 (泵和机械增压泵) Motors (pump and mechanical booster)	X	O	O	O	O	O
电子元件和控件 Electronics and Controls	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。  
O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。  
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

## 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](mailto:documentation@leybold.com)

**Product:** Dry Claw Vacuum pump, with motor  
**Models:** CP65, CP150, CP300  
**Pump family numbers:** 178065VXX, 178150VXX, 178300VXX

Is in conformity with the relevant Union harmonisation legislation:

2006/42/EC Machinery directive  
*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.*

2014/30/EU Electromagnetic compatibility (EMC) directive  
Class A Emissions, Industrial Immunity

2011/65/EU Restriction of certain hazardous substances (RoHS) directive  
as amended by Delegated Directive (EU) 2015/863

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EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

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: 2022-12-02

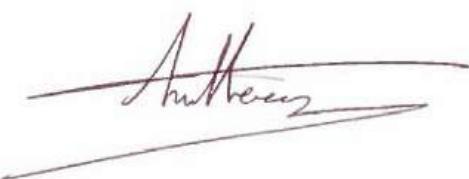
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Andries de Bock – VP Engineering  
Industrial Division  
Cologne



Wim Anthierens – Manufacturing Manager  
PC Industrial Air  
Antwerp

## Declaration of Conformity

**Leybold GmbH**  
Bonner Strasse 498  
D-50968 Köln  
Germany

**Documentation Officer**  
Innovation Drive  
Burgess Hill  
West Sussex  
RH15 9TW  
[documentation@leybold.com](mailto:documentation@leybold.com)

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

**Product:** Dry Claw Vacuum pump, with motor  
**Models:** CP65, CP150, CP300  
**Pump family numbers:** 178065VXX, 178150VXX, 178300VXX

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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.*

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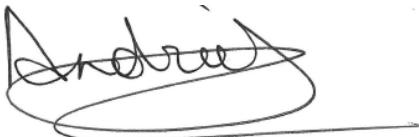
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EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

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: 2022-12-02

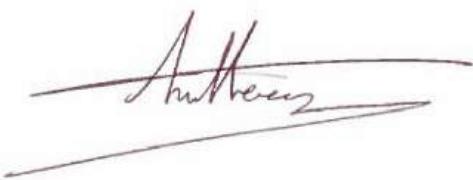
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Cologne



Wim Anthierens – Manufacturing Manager  
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## ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

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### Article 33.1 Declaration (EU, UK)

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

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

### Compliance Information – incorporated products and assemblies

Motors	Regulation (EU) No 2019/1781 electric motors and variable speed drives <i>Based on the requirements of harmonised standard:</i> EN 60034-30:2009: Rotating electrical machines -- Part 30: Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)
Fans	2009/125/EC Ecodesign directive requirements for energy-related products Regulation (EU) No 327/2011: Industrial fans driven by motors

### 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)
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**材料成分声明**  
**China Material Content Declaration**

	有害物质 Hazardous Substances					
	部件名称 Part name	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)
铸铝及铝合金制品 Aluminum alloys	X	O	O	O	O	O
钢合金制品 Steel alloys	X	O	O	O	O	O
铜管管件 Brass pipe fitting	X	O	O	O	O	O
铜衬套轴承 Brass bush bearing	X	O	O	O	O	O
铜接头 Brass connectors	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。  
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Pioneering products. Passionately applied.

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