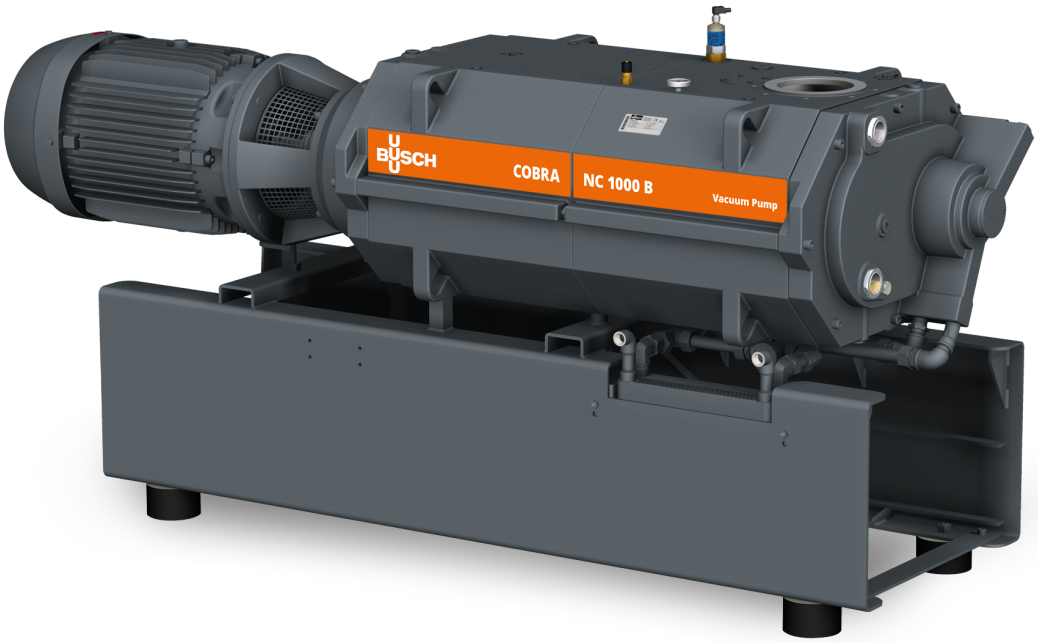
VACUUM SOLUTIONS

Part of the BUSCH GROUP

COBRA

Dry Screw Vacuum Pumps
NC 1000 B Water-Cooled Version (WCV)

Instruction Manual



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VACUUM APP

CE UK CA

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2025/05/15

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1 Safety

Prior to handling the machine, this instruction manual should be read and understood. If anything needs to be clarified, please contact your manufacturer representative.

Read this manual carefully before use and keep for future reference.

This instruction manual remains valid as long as the customer does not change anything on the product.

The machine is intended for industrial use. It must be handled only by technically trained personnel.

Always wear appropriate personal protective equipment in accordance with the local regulations.

The machine has been designed and manufactured in accordance with the state-of-the-art methods. Nevertheless, residual risks may remain, as described in the following chapters and in accordance with the chapter *Intended Use* [➔ 6].

This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, NOTICE and NOTE as follows:

DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.

WARNING

... indicates a potentially dangerous situation that could result in death or serious injuries.

CAUTION

... indicates a potentially dangerous situation that could result in minor injuries.

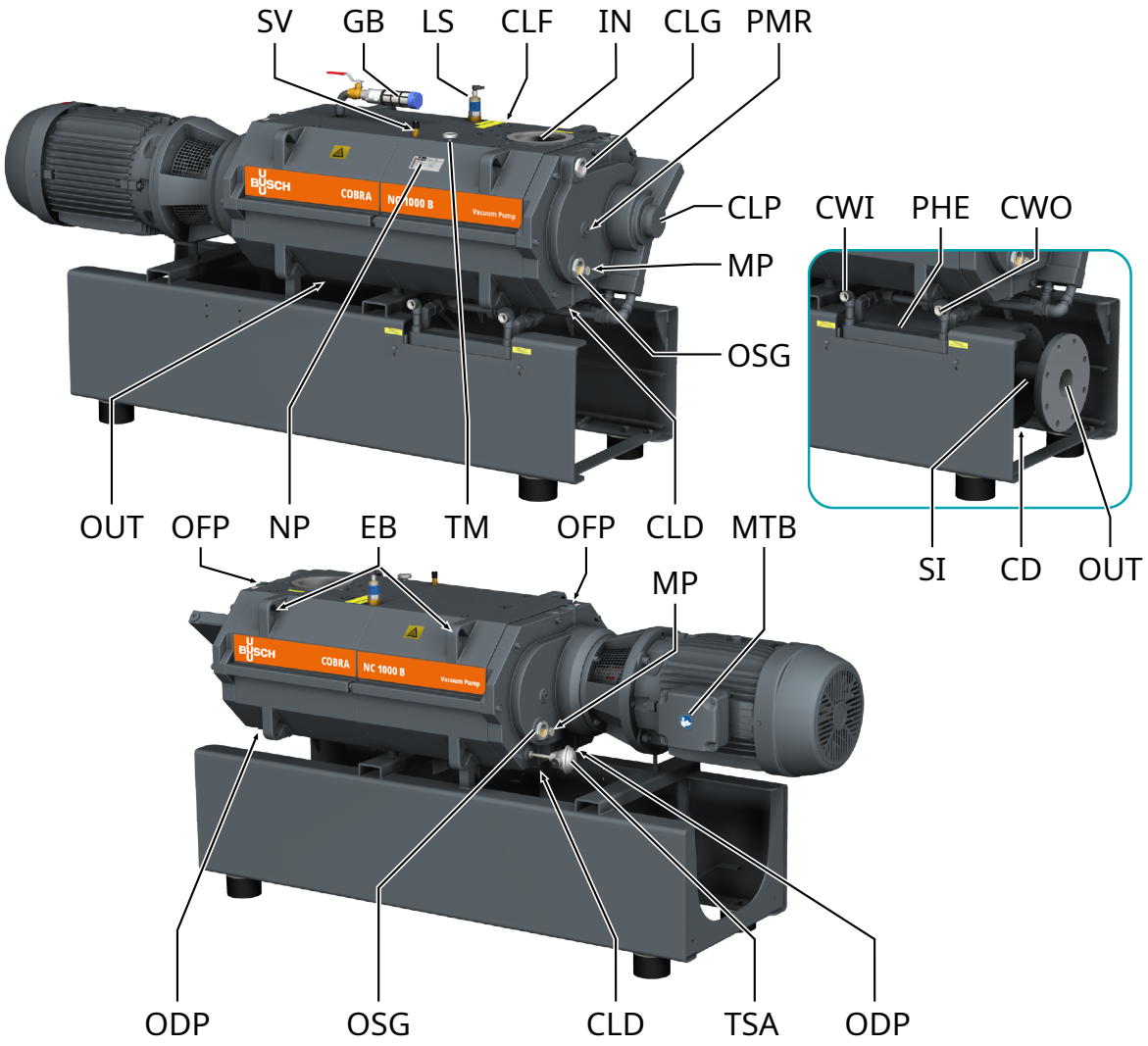
NOTICE

... indicates a potentially dangerous situation that could result in damage to property.

NOTE

... indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

2 Product Description



Description			
IN	Inlet connection	OUT	Exhaust connection (Outlet)
CD	Condensate drain	CLD	Cooling liquid drain plug
CLF	Cooling liquid fill plug	CLG	Cooling liquid sight glass
CLP	Cooling liquid pump	CWI	Cooling water inlet
CWO	Cooling water outlet	EB	Eye bolt
GB	Gas ballast valve	LS	Level switch
MP	Magnetic plug	MTB	Motor terminal box
NP	Nameplate	ODP	Oil drain plug
OFP	Oil fill plug	OSG	Oil sight glass
PHE	Plate heat exchanger	PMR	Plug for manual rotation of rotors
SI	Silencer	SV	Safety valve
TM	Thermometer	TSA	Resistance thermometer

NOTE

Technical term.

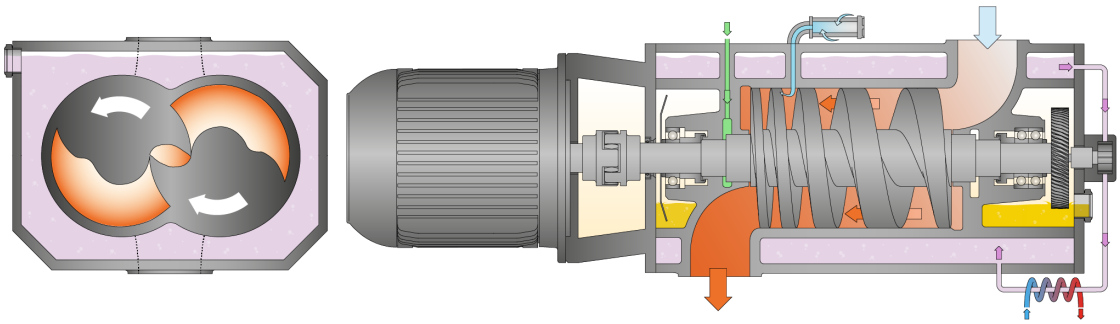
In this instruction manual, we consider that the term ‘machine’ refers to the ‘vacuum pump’.

NOTE

Illustrations.

In this instruction manual, the illustrations may differ from the appearance of the machine.

2.1 Operating Principle



The machine works on the one-stage, twin-screw pump principle.

Two screw rotors rotate inside the cylinder. The pumped medium is trapped between the cylinder and screw chambers, compressed, and transported to the gas outlet. During the compression process, the two screw rotors do not come into contact with each other or with the cylinder. There is no need for a lubrication or an operating fluid in the compression chamber.

2.2 Intended Use

WARNING

In case of foreseeable misuse outside the intended use of the machine.

Risk of injuries!

Risk of damage to the machine!

Risk of damage to the environment!

- Make sure to follow all instructions described in this manual.

The machine is intended for the suction of air and other dry, non-aggressive, non-toxic, non-ignitable and non-explosive gases.

Conveying of other media leads to an increased thermal and/or mechanical load on the machine and is permissible only after a consultation with the manufacturer.

The machine is intended for placement in a non-potentially explosive environment.

The machine is capable of maintaining ultimate pressure, see Technical Data.

The machine is suitable for continuous operation.

Permitted environmental conditions, see Technical Data.

2.3 Start Controls

The machine comes without start controls. The control of the machine is to be provided in the course of installation.

The machine can be equipped with a soft-starter or a variable speed drive (not included in the scope of supply).

2.4 Standard Features

2.4.1 Water Cooling

The machine is cooled by a cooling liquid circuit in the cylinder cover and cylinder.

The cooling liquid pump (CLP) allows a recirculating flow in the cooling liquid chamber.

The cooling liquid is cooled by a plate heat exchanger (PHE) which must be connected to the water main.

2.4.2 Resistance Thermometer

The resistance thermometer monitors the cooling liquid temperature of the machine.

A trip signal must be set. The machine must be stopped when the cooling liquid temperature reaches 70 °C.

2.4.3 Level Switch

The level switch monitors the cooling liquid level in the cylinder.

The machine must be stopped when the cooling liquid level is too low.

2.4.4 Thermometer

The thermometer allows a visual display of the cooling liquid temperature.

2.4.5 Sealing Systems

The machine is equipped with labyrinth seals on the motor side and inlet side.

Other sealing systems are optionally available, see *Mechanical Seals* [➔ 8].

Sealing systems prevent the process gas going to the bearings chambers.

Depending on the application, the sealing systems efficiency can be improved with a barrier gas system, see *Barrier Gas System* [➔ 7].

2.5 Optional Accessories

2.5.1 Gas Ballast Valve

The gas ballast valve mixes the process gas with a limited quantity of ambient air to counteract the condensation of vapor inside the machine.

The gas ballast valve has an influence on the ultimate pressure of the machine, see Technical Data.

A ball valve enables to open or close the gas ballast flow.

2.5.2 Silencer

A silencer at the exhaust connection (OUT) can be installed to reduce the exhaust gas noise.

2.5.3 Barrier Gas System

The barrier gas system allows the supply of compressed air or nitrogen into the motor side shaft seals to improve the sealing efficiency.

2.5.4 Mechanical Seals

The sealing systems can be equipped with mechanical seals. The following variants are possible:

- Oil lubricated single mechanical seals on the motor side and labyrinth seals on the inlet side.
- Oil lubricated single mechanical seals on the motor side and inlet side.

3 Transport

WARNING

Suspended load.

Risk of severe injury!

- Do not walk, stand, or work under suspended loads.

WARNING

Lifting the machine using the motor eye bolt.

Risk of severe injury!

- Do not lift the machine using the eye bolt fitted to the motor. Only lift the machine as shown.

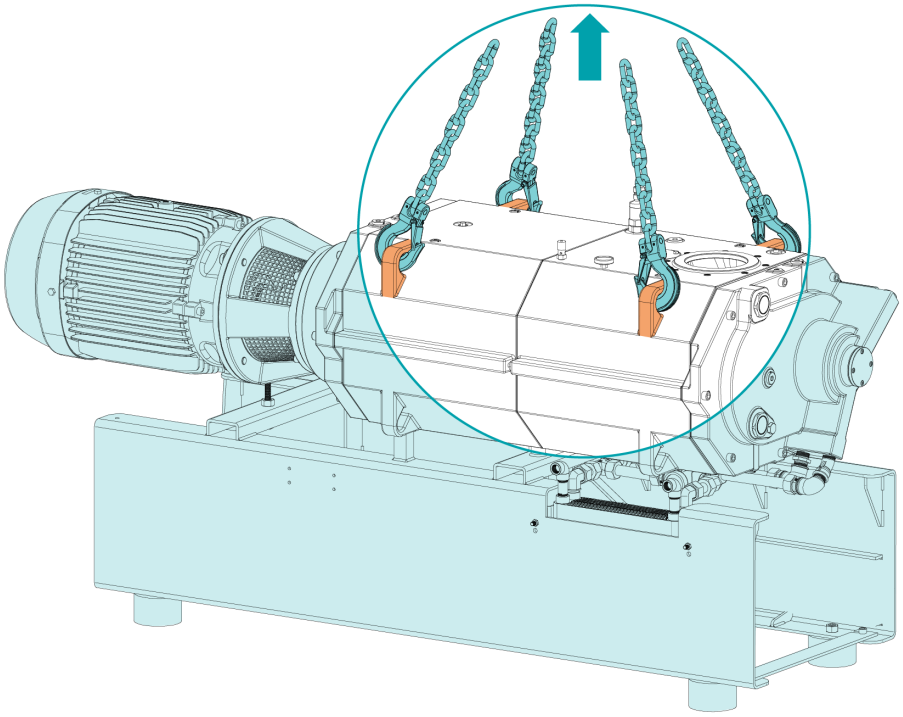
NOTICE

In case the machine is already filled with oil.

Tilting a machine that is already filled with oil can cause large quantities of oil to ingress into the cylinder.

- Drain the oil prior to every transport or always horizontally transport the machine.

- To find out the weight of the machine, refer to the chapter Technical Data or the nameplate (NP).



- Check that the machine has not been damaged during transport.

If the machine is secured to a base plate:

- Remove the machine from the base plate.

4 Storage

- Seal hermetically all apertures with the caps provided with the machine, or with adhesive tape if the caps are no longer available.
- Store the machine indoors, in a dry place, away from dust and vibrations and if possible, in original packaging, preferably at temperatures between 5 ... 55 °C.

If the machine is to be stored for more than 3 months:

- Seal hermetically all apertures with the caps provided with the machine, or with adhesive tape if the caps are no longer available.
- Wrap the machine in a corrosion inhibitor film.
- Store the machine indoors, in a dry place, away from dust and vibrations and if possible, in original packaging, preferably at temperatures between 5 ... 55 °C.

NOTICE

Long storage time.

Risk of damage to the machine!

- If the machine is equipped with oil lubricated mechanical seals, we recommend to completely fill the oil chamber before a long storage, see “Oil filling” in chapter *Oil Change* [➔ 27]. This protects the mechanical seals during a long storage. Use the standard pump oil, see chapter *Oil* [➔ 38].
- Before restarting the machine, drain the oil to the normal oil level, see “Oil draining” in chapter *Oil Change* [➔ 27].

5 Installation

5.1 Installation Conditions

WARNING

If the machine is installed in a potentially explosive environment or if the machine is used to draw toxic, inflammable or non-inert gases:

Risk of injuries!

Risk of death!

- Ensure that the machine complies with all local, national rules and safety regulations.

NOTICE

Use of the machine outside of the permitted installation conditions.

Risk of premature failure!

Loss of efficiency!

- Make sure that the installation conditions are fully respected.

- Make sure that the environment of the machine is not potentially explosive.
- Make sure that the ambient conditions comply with the Technical Data.
- Make sure that the environmental conditions comply with the protection class of the motor and the electrical elements.
- Make sure that the installation space or location is vented such that sufficient cooling of the machine is provided.
- Make sure that cooling air inlets and outlets of the motor fan are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Make sure that the oil sight glass (OSG) remains easily visible.
- Make sure that enough space remains for maintenance work.
- Make sure that the machine is placed or mounted horizontally, a maximum deviation of 1° in any direction is acceptable.
- Check the oil level, see *Oil Level Inspection* [➔ 26].
- Check the cooling liquid level, see *Cooling Liquid Level Inspection* [➔ 26].
- Make sure that the cooling water complies with the requirements, see *Cooling Water Connection* [➔ 13].

If the machine is installed at an altitude greater than 1000 meters above sea level:

- Contact your manufacturer representative, the motor must be derated or the ambient temperature limited.

5.2 Connecting Lines / Pipes

- Remove all protective covers before installation.
- Make sure that the connection lines cause no stress on the connections of the machine. Therefore, we recommend installing flexible lines at the inlet and exhaust connections.
- Make sure that the diameter of the connection lines over the entire length is at least as large as the connections of the machine.

In case of long connection lines:

- Use larger diameters to avoid a loss of efficiency.
- Contact your manufacturer representative for more information.

5.2.1 Inlet Connection

WARNING

Unprotected inlet connection.

Risk of severe injury!

- Do not put hand or fingers in the inlet connection.

NOTICE

Ingress of foreign objects or liquids.

Risk of damage to the machine!

If the inlet gas contains dust or other foreign solid particles:

- Install a suitable filter (5 micron or less) at the inlet of the machine.

Connection size(s):

- DN125 PN16, EN 1092-1

If the machine is used as part of a vacuum system:

- Busch recommends the installation and use of an isolation valve to prevent the machine from running backwards.
- Busch also recommends not opening the isolation valve until at least the minimum machine speed has been reached.

- Make sure that the connection lines cause no stress on the connections of the machine. Therefore, we recommend installing flexible lines at the inlet and exhaust connections.

5.2.2 Exhaust Connection

NOTICE

Exhaust gas flow obstructed.

Risk of damage to the machine !

- Make sure that the exhaust gas will flow without obstruction. Do not shut off or throttle the exhaust line or use it as a pressurized air source.

Connection size(s):

At the machine exhaust connection:

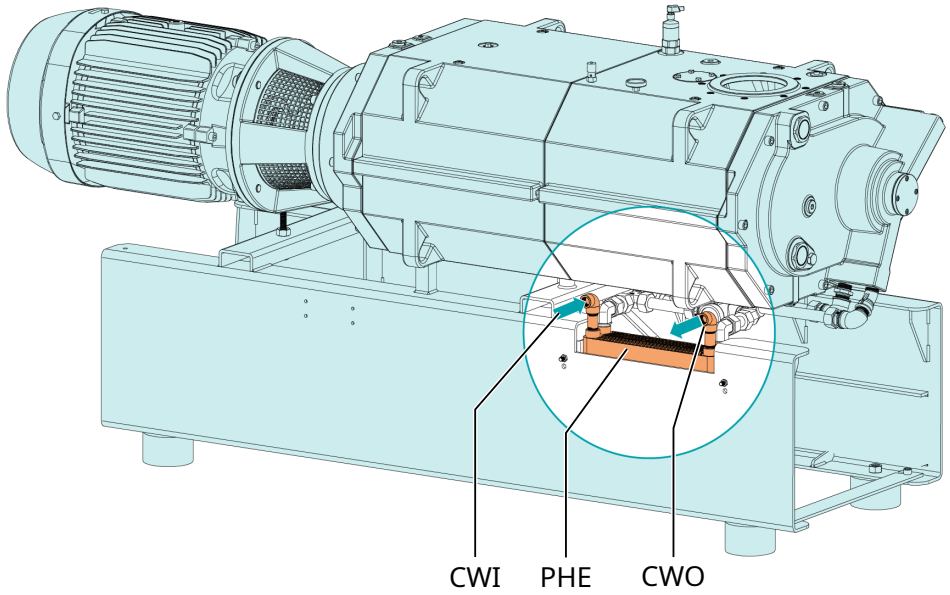
- DN125 PN16, EN 1092-1

At the silencer (SI) exhaust connection (two optional versions available):

- DN125 PN16, EN 1092-1
- DN100 ISO-K, DIN 28404

- Make sure that the connection lines cause no stress on the connections of the machine. Therefore, we recommend installing flexible lines at the inlet and exhaust connections.
- Make sure that the counter pressure (also called “back pressure”) at the exhaust connection (OUT) does not exceed the maximum allowable exhaust pressure, see Technical Data.

5.2.3 Cooling Water Connection



Description			
CWI	Cooling water inlet	CWO	Cooling water outlet
PHE	Plate heat exchanger		

- Connect the cooling water connections (CWI / CWO) to the water supply.

Connection size:

– G ½”, ISO 228-1 (CWI / CWO)

- Make sure that the cooling water complies with the following requirements:

Supply capacity	l/min	15
Water pressure	bar (g)	1 ... 6
Supply temperature	°C	+5 ... +30
Required pressure differential across supply and return	bar (g)	≥ 1

- To reduce the maintenance effort and ensure a long product lifetime, we recommend the following cooling water quality:

Hardness	mg/l (ppm)	< 90
Properties	Clean & clear	
PH value	7 ... 8	
Particle size	µm	< 200
Chloride	mg/l	< 100
Electrical conductivity	µS/cm	≤ 100
Free chloride	mg/l	< 0.3
Materials in contact with the cooling water	Stainless steel	

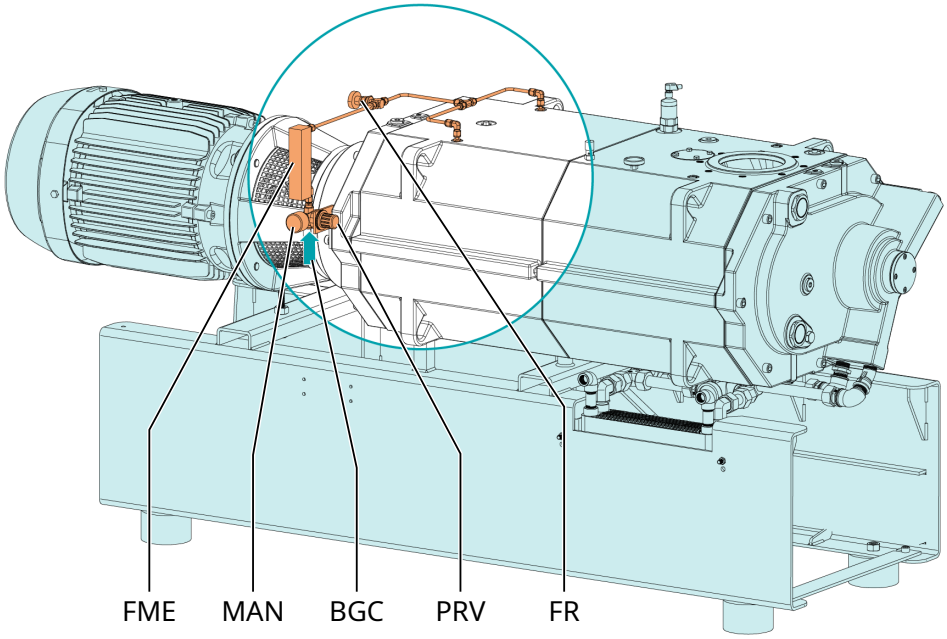
NOTE

Water hardness unit conversion.

1 mg/l (ppm) = 0.056 °dh (german degree) = 0.07 °e (english degree) = 0.1 °fH (french degree)

5.2.4 Barrier Gas System Connection (Optional)

Without nitrogen panel



Description			
BGC	Barrier gas connection	FME	Flow meter
FR	Flow regulator	MAN	Manometer
PRV	Pressure regulating valve		

- Connect the barrier gas connection (BGC) to the gas supply.

Connection size:

– G1/4", ISO 228-1

- Make sure that the gas complies with the following requirements:

Gas type	Dry nitrogen or air	
Gas temperature	°C	0 ... 60
Maximum gas pressure	bar (g)	13
Recommended pressure setting at the pressure regulating valve (PRV)	bar (g)	3
Filtration	µm	5
Recommended flow rate	SLM (standard liter per minute)	30
Air quality (only for air)	Acc. to ISO 8573-1	Class 5.4.4.

5.3 Filling Oil

NOTICE

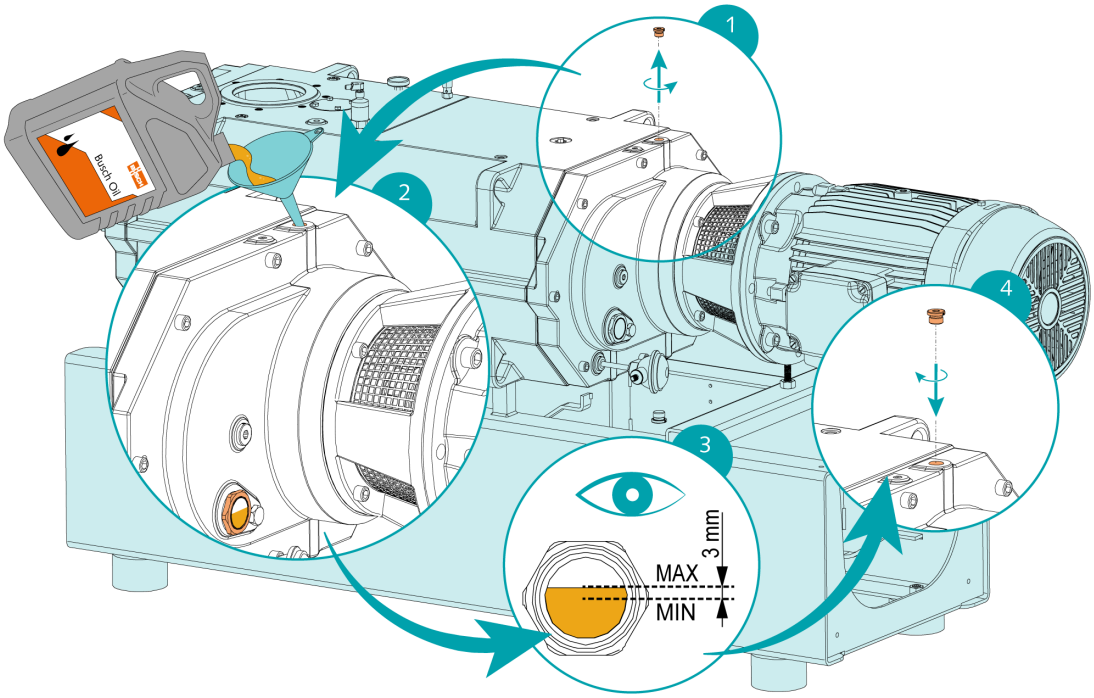
Use of inappropriate oil.

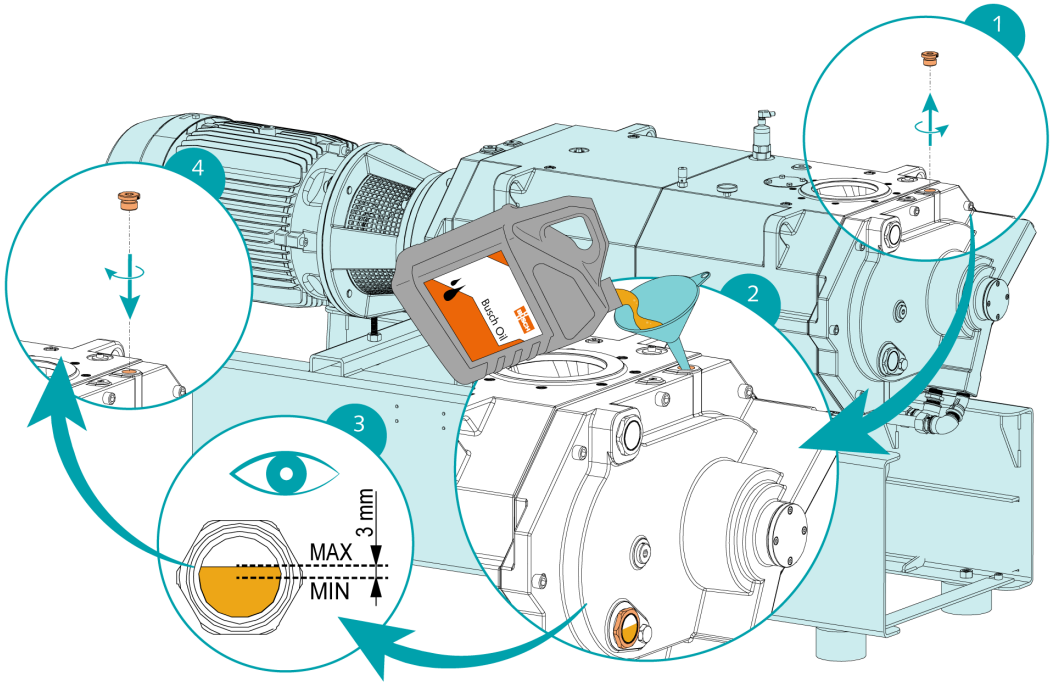
Risk of premature failure!

Loss of efficiency!

- Use only a type of oil previously approved and recommended by the manufacturer.

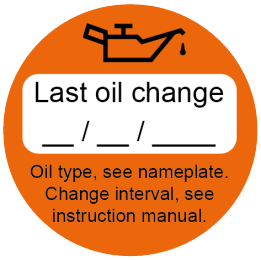
For oil type and oil capacity see Technical Data and *Oil* [➔ 38] chapters.





When oil filling is complete:

- Note the date of the oil change on the sticker.

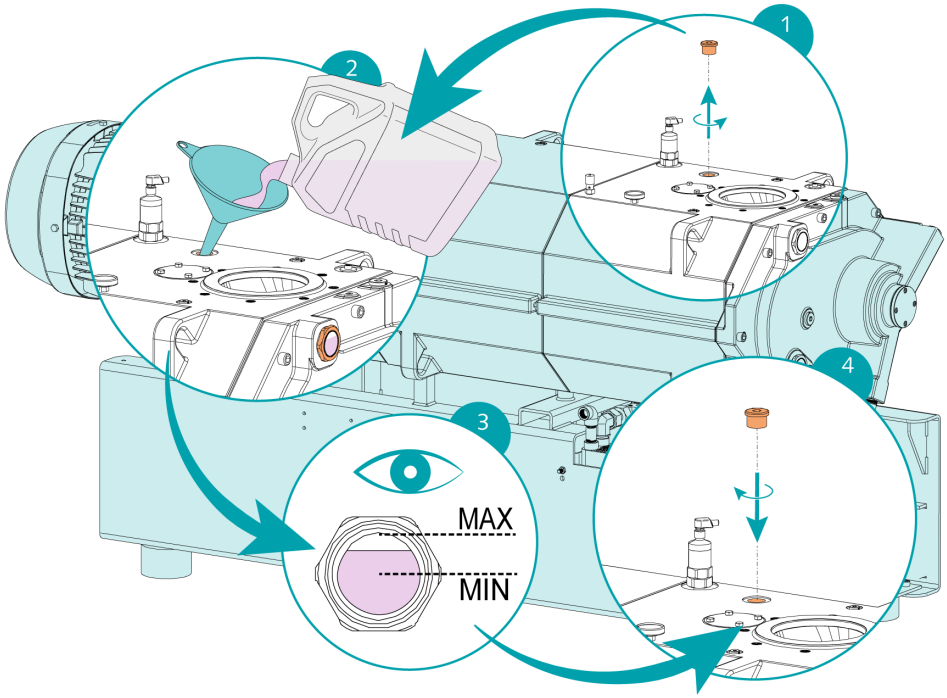


If there is no sticker on the machine:

- Order it from your Busch representative (article number 0565 568 959).

5.4 Filling Cooling Liquid

For cooling liquid type and cooling liquid capacity see Technical Data and *Cooling Liquid* [➔ 37].

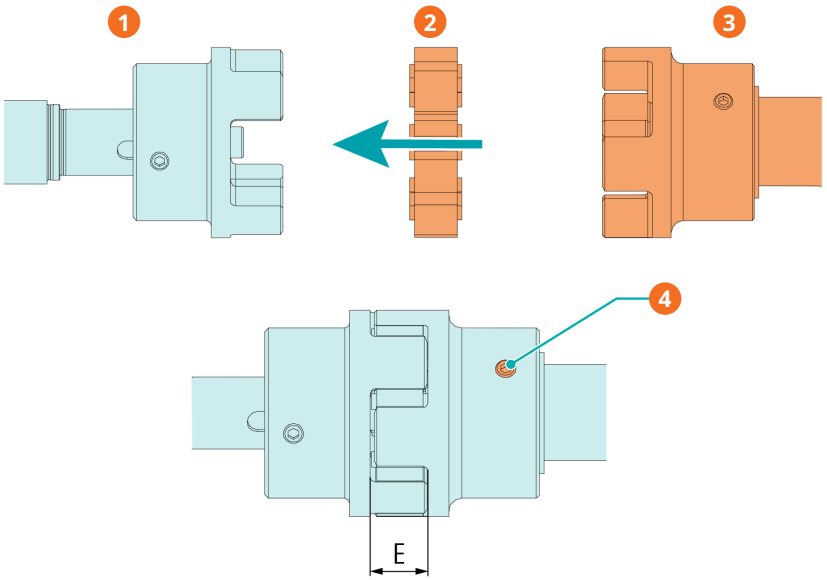


5.5 Fitting the Coupling

NOTE

Radial screw.

For trouble-free operation, use thread locking glue to secure the radial screw.



Description			
1	Coupling hub (machine side)	2	Coupling spider
3	Coupling hub (motor side)	4	Radial screw / Tightening torque: 10Nm

Machine type	Coupling size	Value “E” (mm)
NC 1000 B	ROTEX® 48	28

In case of a machine delivery without motor:

- Fit the second coupling hub on the motor shaft (separately delivered).
- Axially adjust the hub in such a way until value "E" is reached.
- When the coupling adjustment is done, lock the coupling hub by tightening the radial screw.
- Mount the motor on the machine by including the coupling spider.

For further coupling information, go to *www.ktr.com* and download the instruction manual of the ROTEX® coupling.

English	German	French
Instruction Manual - English	*Instruction Manual - German*	*Instruction Manual - French*

6 Electrical Connection

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

INSTALLATION(S) CURRENT PROTECTION:

DANGER

Missing current protection.

Risk of electrical shock!

- Provide current protection in accordance with EN 60204-1 on your installation(s).
- The electrical installation must comply with the applicable national and international standards.

NOTICE

Electromagnetic compatibility.

- Make sure that the motor of the machine will not be affected by electric or electromagnetic disturbance from the mains. If necessary, contact your Busch representative for more information.
- Make sure that the EMC of the machine is compliant with the requirements of your supply network system, if necessary, provide further interference suppression (EMC of the machine, see *EU Declaration of Conformity* [➔ 39] or *UK Declaration of Conformity* [➔ 40]).

6.1 Machine delivered without Control Box or Variable Speed Drive (VSD)

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

- Make sure that the power supply for the motor is compatible with the data on the nameplate of the motor.
- If the machine is equipped with a power connector, install a residual current protective device to protect persons in case of a defective insulation.
  - Busch recommends installing a type B residual protective device suitable for the electrical installation.
- Provide a lockable disconnect switch or an emergency stop switch on the power line so that the machine is completely secured in case of an emergency situation.
- Provide a lockable disconnect switch on the power line so that the machine is completely secured during maintenance tasks.

- Provide an overload protection according to EN 60204-1 for the motor.
- Connect the protective earth conductor.
- Electrically connect the motor.

NOTICE

The motor frequency is below 30 Hz.

Risk of damage to the machine!

- The motor nominal speed must always be higher than 1800 min^{-1} (30 Hz).

NOTICE

The admissible motor nominal speed exceeds the recommendation.

Risk of damage to the machine!

- Check the admissible motor nominal speed (n_{max}) on the nameplate of the machine (NP).
- Make sure to comply with it.
- For more information, consult the chapter Technical Data.

NOTICE

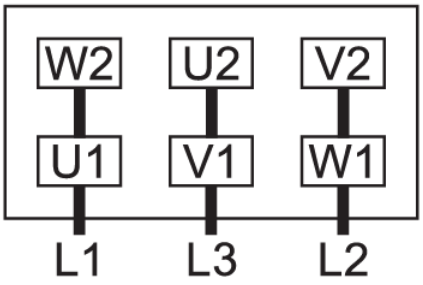
Incorrect connection.

Risk of damage to the motor!

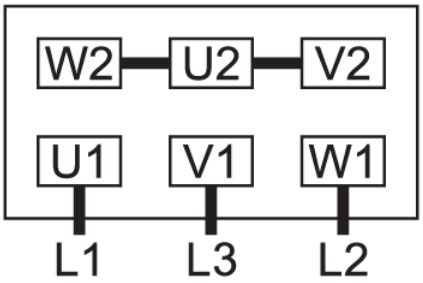
- The wiring diagrams given below are typical. Check the inside of the terminal box for motor connection instructions/diagrams.

6.2 Wiring Diagram Three-Phase Motor (Pump Drive)

Delta connection (low voltage):



Star connection (high voltage):



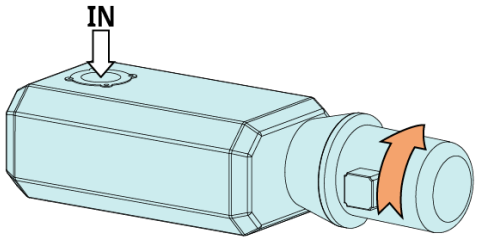
NOTICE

Incorrect direction of rotation.

Risk of damage to the machine!

- Operation in the wrong direction of rotation can destroy the machine in a short time! Prior to start-up, ensure that the machine is operated in the right direction.

The intended rotation direction of the motor is defined by the illustration below:



- Jog the motor briefly.
- Watch the fan wheel of the motor and determine the direction of rotation just before the fan wheel stops.

If the rotation of the motor must be changed:

- Switch any two of the motor phase wires.

6.3 Electrical Connection of the Monitoring Devices

NOTE

To prevent potential nuisance alarms, Busch recommends that the control system is configured with a time delay of at least 20 seconds.

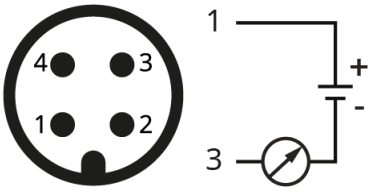
6.3.1 Wiring Diagram Resistance Thermometer

Article number: 0651 552 252

Connector: M12x1, 4-pin

Electrical Data: U = 7.5 ... 30 VDC; 4 ... 20 mA► -50 ... 150 °C

Trip signal: T_{trip}: 70 °C



1 = Brown; 3 = Blue

6.3.2 Wiring Diagram Level Switch

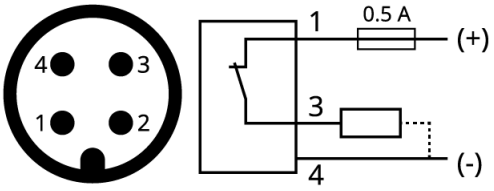
Article number: 0652 569 236

Connector: M12x1, 4-pin

Electrical Data: U = 10 ... 30 VDC (DC-PNP); I_{max} = 200 mA

Contact: Normally closed

Switch point: L_{trip} ► pin 1 + 4 ► low level “stop the machine”



1 = Brown; 3 = Blue; 4 = Black

7 Commissioning

CAUTION

In operation, the surface of the machine may reach temperatures over 70°C.

Risk of burns!

- Avoid contact with the machine during and directly after operation.

CAUTION

Noise of running machine.

Risk of damage to hearing!

If people are present in the vicinity of a machine that is not insulated from noise for extended periods of time:

- Make sure to wear hearing protection.

NOTICE

The machine is normally shipped without oil.

Operation without oil will ruin the machine in short time!

- Prior to commissioning, the machine must be filled with oil, see *Filling Oil* [➔ 15].

NOTICE

The machine can be shipped without cooling liquid.

Operation without cooling liquid will ruin the machine in short time!

- Prior to commissioning, the machine must be filled with cooling liquid, see *Filling Cooling Liquid* [➔ 16].

NOTICE

Lubricating a dry running machine (compression chamber).

Risk of damage to the machine!

- Do not lubricate the compression chamber of the machine with oil or grease.

- Make sure that the *Installation Conditions* [➔ 11] are met.
- Open the water supply.

If the machine is equipped with a barrier gas system:

  - Open the barrier gas supply.
  - Adjust the barrier gas pressure and volume flow.

- Start the machine.
- Make sure that the maximum permissible number of starts does not exceed 6 starts per hour. Those starts should be spread within the hour.

- Make sure that the operating conditions comply with the Technical Data.
- After a few minutes of operation, perform an *Oil Level Inspection* [➔ 26].
- After a few minutes of operation, perform a *Cooling Liquid Level Inspection* [➔ 26].

As soon as the machine is used under normal operating conditions:

- Measure the motor current and record it as reference for future maintenance and trouble-shooting work.

7.1 Conveying Condensable Vapors

CAUTION

Venting the machine.

The discharged gases and/or liquids may reach temperatures above 70°C!

Risk of burns!

- Avoid direct contact with the flow of gases and/or liquids.

The machine, equipped either with a gas ballast valve or a dilution gas system, is suitable for conveying condensable vapors in the gas stream.

If condensable vapors are to be conveyed:

START

- Open the gas ballast valve* or the dilution gas system* (Solenoid valve).
- Warm up the machine for 30 minutes.
- Open the inlet valve.
- Perform the process.
- Close the inlet valve.
- Wait 30 minutes.
- Close the gas ballast valve* or the dilution gas system* (Solenoid valve).

END

* Optional accessories

- Continuously drain condensate from the condensate drain plug (CD) of the silencer (SI) (Optional).

8 Maintenance

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

DANGER

Live wires. Carry out any work on the variable speed drive and motor.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

WARNING

The machine is contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

CAUTION

Hot surface.

Risk of burns!

- Before doing anything that requires touching the machine, let it cool down first.

CAUTION

Hot liquids.

Risk of burns!

- Before draining liquids, let the machine cool down first.

CAUTION

Failing to properly maintain the machine.

Risk of injuries!

Risk of premature failure and loss of efficiency!

- Maintenance work must only be executed by qualified personnel.
- Respect the maintenance intervals or ask your Busch representative for service.

NOTICE

Using inappropriate cleaners.

Risk of removing safety stickers and protective paint!

- Do not use incompatible solvents to clean the machine.

- Stop the machine and lock it to prevent accidental start-up.
- Close the water supply.

If the machine is equipped with a barrier gas system:

- Close the barrier gas supply.

- Vent the connected lines to atmospheric pressure.

If necessary:

- Disconnect all connections.

8.1 Maintenance Schedule

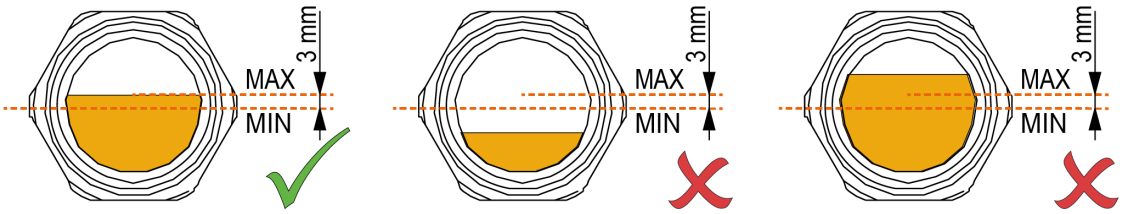
The maintenance intervals depend very much on the individual operating conditions. The intervals given below are considered as starting values which should be individually shortened or extended as appropriate.

Particularly harsh applications or heavy duty operation, such as high dust loads in the environment or in the process gas, other contamination or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

Interval	Maintenance work
Monthly	• Check the oil level, see *Oil Level Inspection* [➔ 26]. • Check the cooling liquid level, see *Cooling Liquid Level Inspection* [➔ 26]. • Check the machine for oil leaks. In case of leaks, have the machine repaired (Contact Busch).
Yearly	• Carry out a visual inspection and clean the machine from dust and dirt. • Check the electrical connections and the monitoring devices.
Yearly If one or more of these accessories are installed.	• Check the filter of the gas ballast valve (GB) and change it if necessary, see *Replacing the Gas Ballast Filter (Optional)* [➔ 26]. • Check the silencer (SI) and clean it if necessary.
Every 5000 hours or after 1 year	• Change the oil of the gear and bearing housings (both sides), see *Oil Change* [➔ 27]. • Change the cooling liquid, see *Cooling Liquid Change* [➔ 30]. • Clean the magnetic plugs (MP).
Every 16000 hours or after 4 years	• Carry out a major overhaul on the machine (Contact Busch).
Refer to motor nameplate for interval and grease type	• Regrease motor bearings.

8.2 Oil Level Inspection

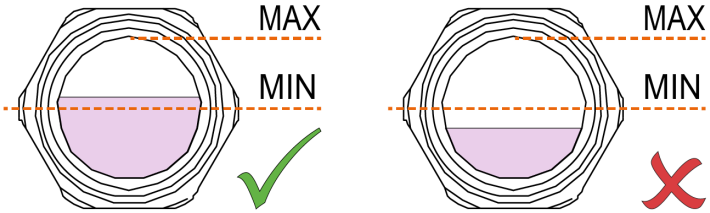
- Stop the machine.
- Wait 1 minute.
- Check the oil level.



- Make sure that the oil level is between the middle of the oil sight glass and 3mm above it.
- Fill up if necessary, see *Filling Oil* [➔ 15].

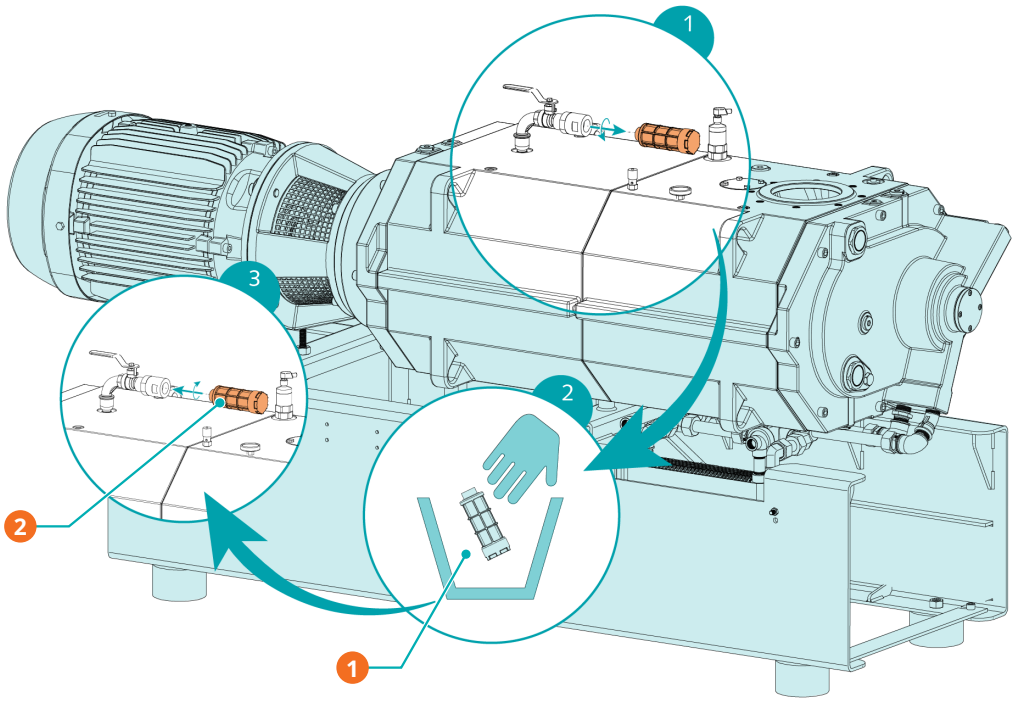
8.3 Cooling Liquid Level Inspection

- Stop the machine.



- Fill up if necessary, see *Filling Cooling Liquid* [➔ 16].

8.4 Replacing the Gas Ballast Filter (Optional)



Description			
1	Discard the used part	2	Gas ballast filter - Art.No. 0562 550 434 (Busch genuine spare part)

8.5 Oil Change

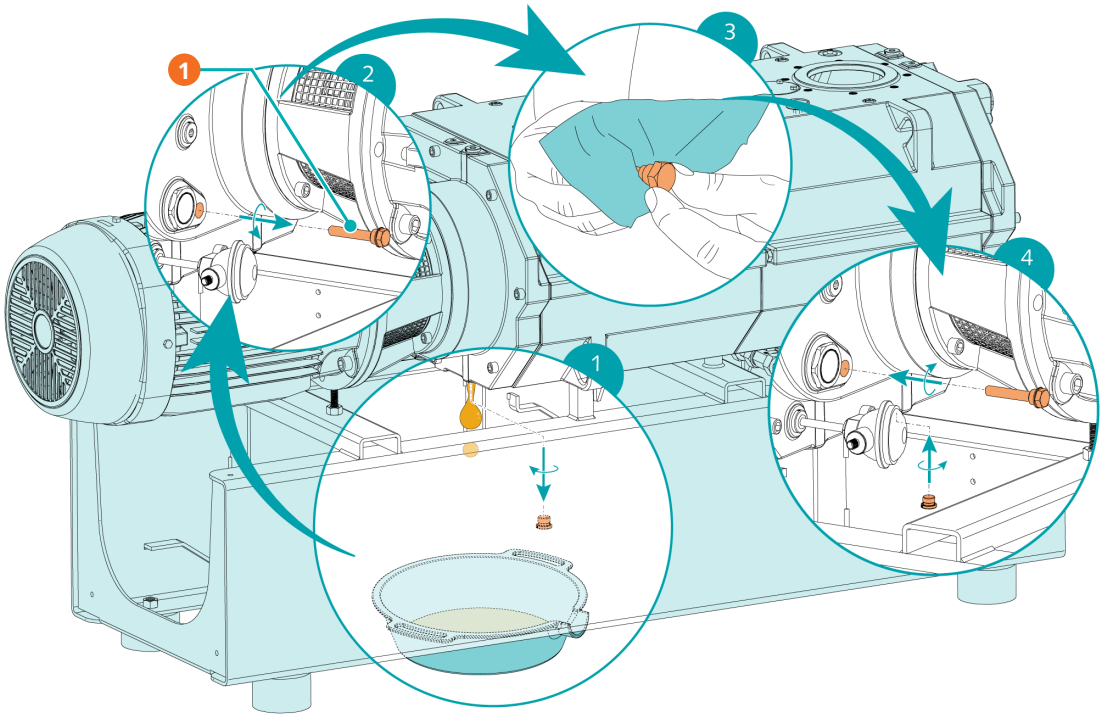
NOTICE

Use of inappropriate oil.

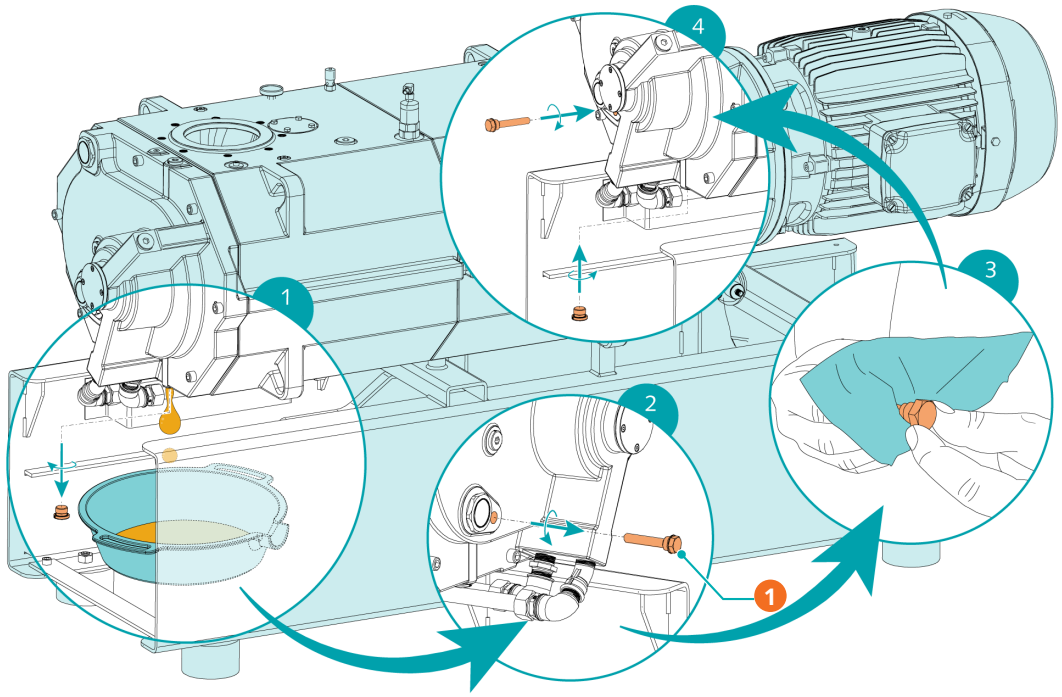
Risk of premature failure!

Loss of efficiency!

- Use only a type of oil previously approved and recommended by the manufacturer.

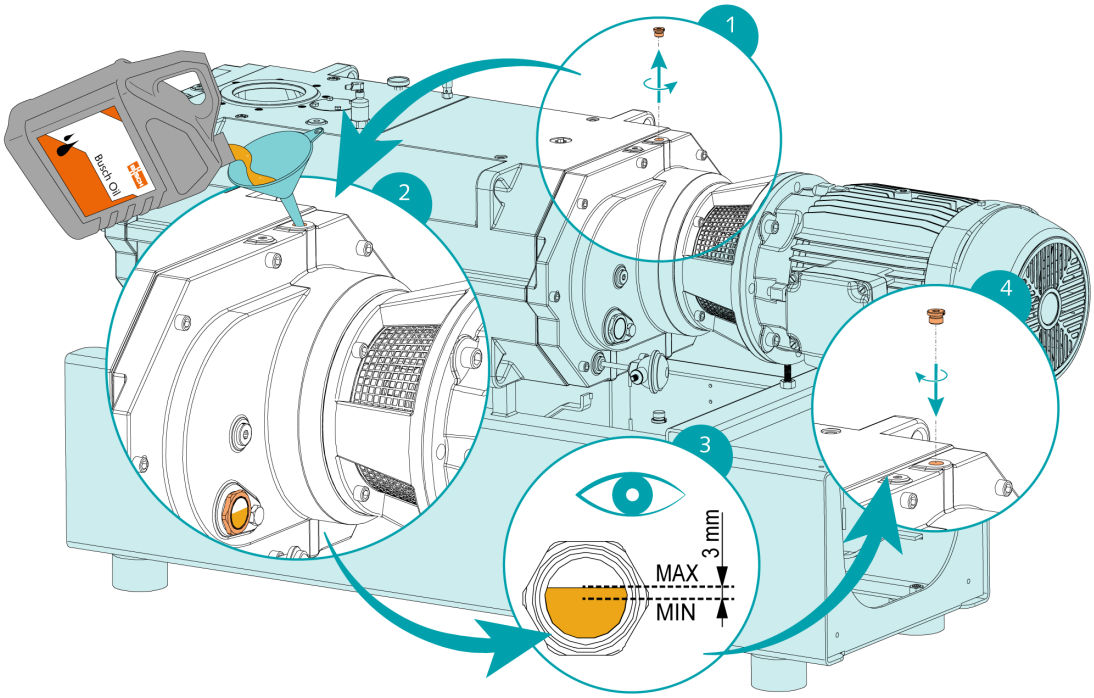


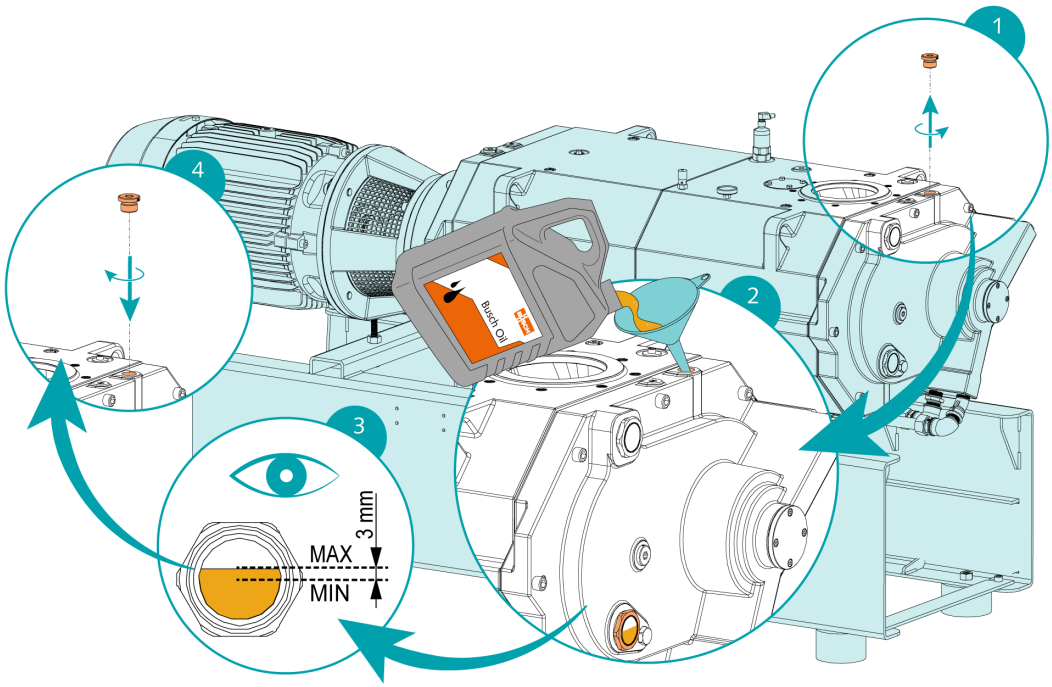
Description			
1	Magnetic plug		



Description			
1	Magnetic plug		

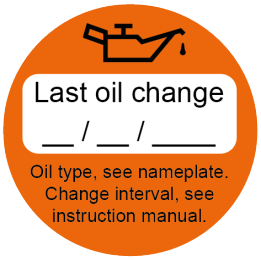
For oil type and oil capacity see Technical Data and *Oil* [➔ 38] chapters.





When oil filling is complete:

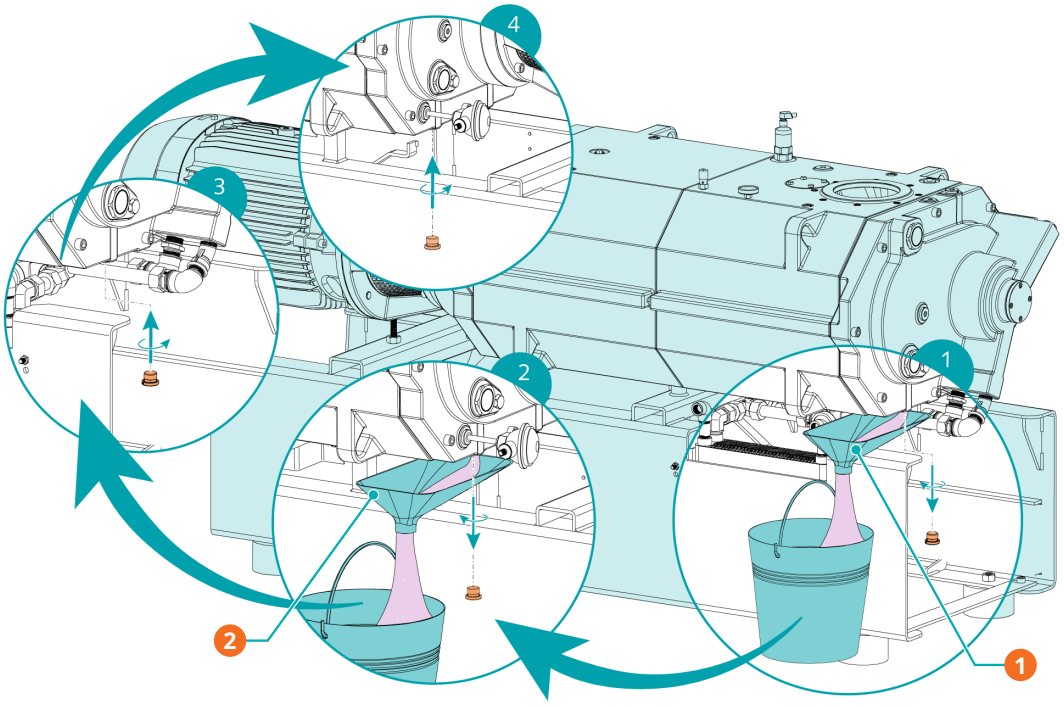
- Note the date of the oil change on the sticker.



If there is no sticker on the machine:

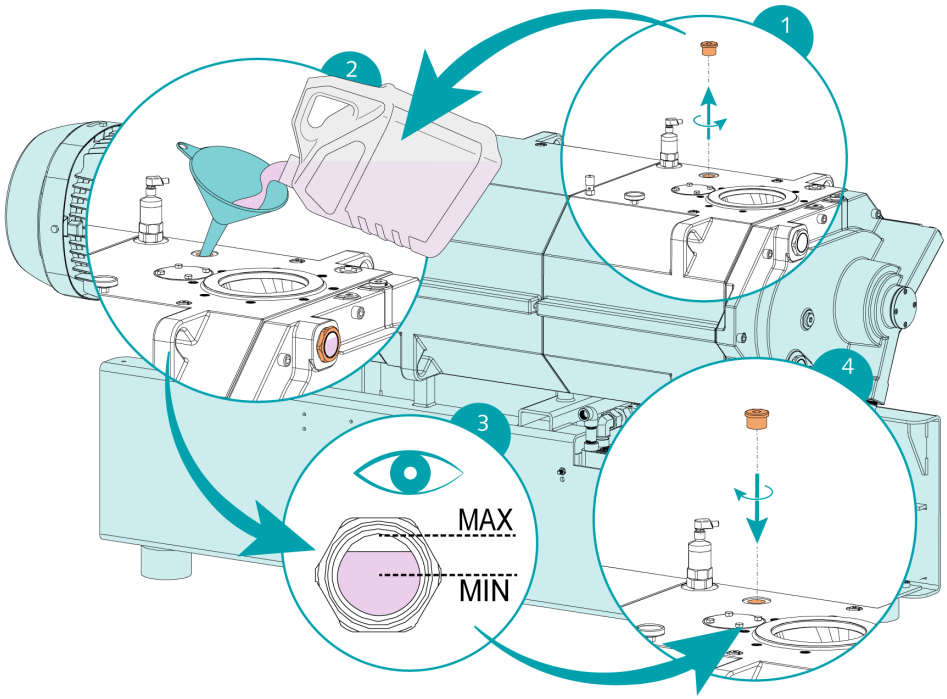
- Order it from your Busch representative (article number 0565 568 959).

8.6 Cooling Liquid Change



Description			
1	Funnel or liquid deflector	2	Funnel or liquid deflector

For cooling liquid type and cooling liquid capacity see Technical Data and *Cooling Liquid* [➔ 37].



9 Overhaul

WARNING

The machine is contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

NOTICE

Incorrect assembly.

Risk of premature failure!

Loss of efficiency!

- Any disassembly of the machine beyond that described in this manual must be carried out by technicians approved by Busch.

If the machine has conveyed gas contaminated with foreign materials which are hazardous to health:

- Decontaminate the machine as much as possible and state the contamination status in a ‘Declaration of Contamination’.

The manufacturer will only accept machine accompanied by a signed, fully completed and legally binding "declaration of contamination", downloadable from the following link: *buschvacuum.com/declaration-of-contamination*.

10 Decommissioning

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

CAUTION

Hot surface.

Risk of burns!

- Before doing anything that requires touching the machine, let it cool down first.

CAUTION

Hot liquids.

Risk of burns!

- Before draining liquids, let the machine cool down first.

- Stop the machine and lock it to prevent accidental start-up.
- Disconnect the power supply.
- Close the water supply.

If the machine is equipped with a barrier gas system:

- Close the barrier gas supply.

- Vent the connected lines to atmospheric pressure.
- Disconnect all connections.

If the machine is to be stored:

- See *Storage* [➔ 10].

10.1 Dismantling and Disposal

- Drain and collect the oil.
- Make sure that no oil drips onto the floor.
- Drain and collect the cooling liquid.
- Make sure that no cooling liquid drips onto the floor.
- Separate special waste from the machine.
- Dispose of special waste in compliance with applicable regulations.
- Dispose of the machine as scrap metal.

11 Spare Parts

NOTICE

Use of non-Busch genuine spare parts.

Risk of premature failure!

Loss of efficiency!

- Use only Busch genuine spare parts, consumables and supplies to ensure correct operation of the machine and to validate the warranty.

There are no standard spare parts kits available for this product.

For Busch genuine spare parts:

- Contact your Busch representative.

12 Troubleshooting

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

CAUTION

Hot surface.

Risk of burns!

- Before doing anything that requires touching the machine, let it cool down first.

CAUTION

Hot liquids.

Risk of burns!

- Before draining liquids, let the machine cool down first.

Problem	Possible Cause	Remedy
The machine does not start.	The motor is not supplied with the correct voltage.	• Check the power supply.
	The rotors are jammed or seized.	• Turn the screw rotors manually from the rotor access plug (PMR). • Repair the machine (contact Busch).
	Solid foreign matter has entered the machine.	• Remove the solid foreign matter or repair the machine (contact Busch). • Install an inlet filter if necessary.
	The resistance thermometer (TSA) reached the switch point.	• Let the machine cool down. • See problem “The machine runs too hot”.
	Corrosion in the machine from remaining condensate.	• Repair the machine. • Check the process and follow the recommendation in case of Conveying Condensable Vapours.
	The motor is defective.	• Replace the motor.

Problem	Possible Cause	Remedy
The machine does not reach the usual pressure at the inlet connection.	Suction or exhaust lines too long or section diameter too small.	• Use larger diameter or shorter lines. • Seek advice from your local Busch representative.
	Process deposits on the pumping components	• Flush the machine.
	The machine runs in the wrong direction.	• Check the direction of rotation, see *Wiring Diagram Three-Phase Motor (Pump Drive)* [➔ 19].
	Internal parts are worn or damaged.	• Repair the machine (contact Busch).
The machine runs very noisily.	Wrong oil quantity or unsuitable oil type.	• Use one of the recommended oils in the correct quantity, see *Oil* [➔ 38].
	Defective gears, bearings or coupling element.	• Repair machine (contact Busch).
The machine runs too hot.	Insufficient cooling.	• Make sure to comply with the cooling water requirements, see *Cooling Water Connection* [➔ 13].
	Ambient temperature too high.	• Observe the permitted ambient temperature, see Technical Data.
	Temperature of the process gases at the inlet too high.	• Observe the permitted gas inlet temperature, see Technical Data.
	The cooling water pump is defective.	• Repair the machine.
	Oil level too low.	• Top up oil.
The oil is black.	Oil change intervals are too long.	• Drain the oil and fill in new oil, see *Oil Change* [➔ 27].
	The machine runs too hot.	• See problem "The machine runs too hot".

For resolution of problems not listed in the troubleshooting table, contact your Busch representative.

13 Technical Data

		NC 1000 B
Pumping speed (50 / 60 Hz)	m^3/h	840 / 1000
Ultimate pressure without gas ballast (50 / 60 Hz)	hPa (mbar) abs.	≤ 0.05 / ≤ 0.01
Ultimate pressure with gas ballast (50 / 60 Hz)	hPa (mbar) abs.	≤ 0.5 / ≤ 0.5
Nominal motor rating (50 / 60 Hz)	kW	22 / 25
Nominal motor speed (50 / 60 Hz)	min^{-1}	3000 / 3600
Sound pressure level (ISO 2151) KpA = 3 dB (50 / 60 Hz)	dB(A)	≤ 75 / ≤ 81
Ambient temperature range	°C	5 ... 50
Maximum allowable counter pressure at exhaust connection	hPa (mbar) rel.	200
Maximum allowable gas inlet temperature according to the inlet pressure	°C	≤ 50 hPa (mbar) abs. : 200
		> 50 hPa (mbar) abs. : 70
Relative humidity	at 30°C	90 %
Ambient pressure		Atmospheric pressure
Cooling water requirements		See *Cooling Water Connection* [➔ 13]
Oil capacity - Motor side	l	1.3
Oil capacity - Inlet side	l	1.5
Cooling liquid capacity approx.	l	44
Weight approx.	kg	1500

14 Cooling Liquid

	CLA 25 (Ready-to-use)
Article number 5 L packaging	2000 241 757
Article number 20 L packaging	2000 241 738

CLA 25 cooling liquid is ready-to-use and requires no additional water.

For more information, contact your Busch representative.

15 Oil

	VSC 100
ISO-VG	100
Oil type	Synthetic
Article number 1 L packaging	0831 168 356
Article number 5 L packaging	0831 168 357
Article number 10 L packaging	0831 210 162
Article number 20 L packaging	0831 168 359

16 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the nameplate are valid for the machine within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the CE-marking.

The manufacturer

Ateliers Busch S.A.
Zone Industrielle
CH-2906 Chevenez

declares that the machine: COBRA NC 1000 B; COBRA NX 1000 B

fulfill(s) all the relevant provisions from EU directives:

- 'Machinery' 2006/42/EC
- 'Electromagnetic Compatibility' (EMC) 2014/30/EU
- 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

and comply(-ies) with the following harmonized standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN ISO 12100 : 2010	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN 60204-1 : 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN ISO 13857 : 2019	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs
EN ISO 2151 : 2008	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN IEC 61000-6-2 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments
EN IEC 61000-6-4 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):

Busch Dienste GmbH
Schauinslandstr. 1
DE-79689 Maulburg

Chevenez, 2025.03.01

Christian Hoffmann, General Manager

Ateliers Busch S.A.

17 UK Declaration of Conformity

This Declaration of Conformity and the UKCA-markings affixed to the nameplate are valid for the machine within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the UKCA-marking.

The manufacturer

Ateliers Busch S.A.
Zone Industrielle
CH-2906 Chevenez

declares that the machine: COBRA NC 1000 B; COBRA NX 1000 B

fulfill(s) all the relevant provisions from UK legislations:

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2012

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN ISO 12100 : 2010	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN 60204-1 : 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN ISO 13857 : 2019	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs
EN ISO 2151 : 2008	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN IEC 61000-6-2 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments
EN IEC 61000-6-4 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments

Legal person authorized to compile the technical file and importer in the UK (if the manufacturer is not located in the UK):

Busch (UK) Ltd
30 Hortonwood
Telford – UK

Chevenez, 2025.03.01

Christian Hoffmann, General Manager

Ateliers Busch S.A.

Notes

BUSCH GROUP

The Busch Group is one of the world's largest manufacturers of vacuum pumps, vacuum systems, blowers, compressors and gas abatement systems. Under its umbrella, the group houses two well-known brands: Busch Vacuum Solutions and Pfeiffer Vacuum+Fab Solutions. Together, they offer solutions to a wide range of industries. A global network of highly competent local teams in 44 countries ensures that expert, tailor-made support is always available near you. Wherever you are. Whatever your business.

- Busch Group companies
- Busch Group production sites
- Busch Group service centers
- Busch Group local representatives

www.buschvacuum.com

www.pfeiffer-vacuum.com

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