

# Instruction Manual

## COBRA

Screw Vacuum Pumps  
DS 0080-2000 G



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## Preface

Congratulations on your purchase of the Busch vacuum pump. With watchful observation of the field's requirements, innovation and steady development Busch delivers modern vacuum and pressure solutions worldwide.

These operating instructions contain information for

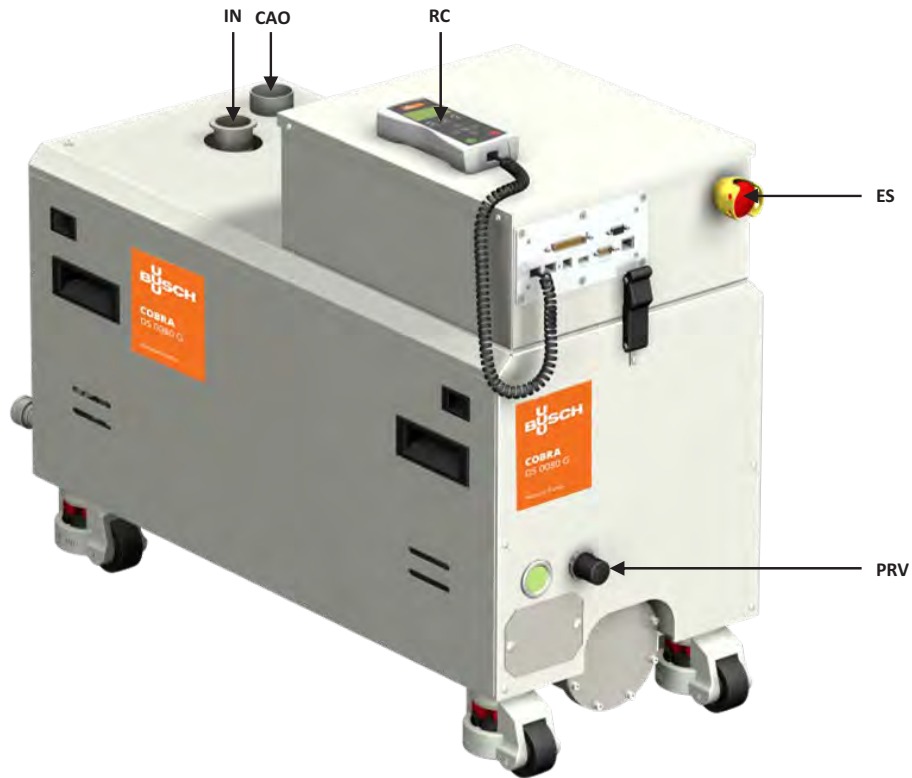
- product description,
- safety,
- transport,
- storage,
- installation and commissioning
- maintenance,
- overhaul and
- troubleshooting

of the vacuum pump.

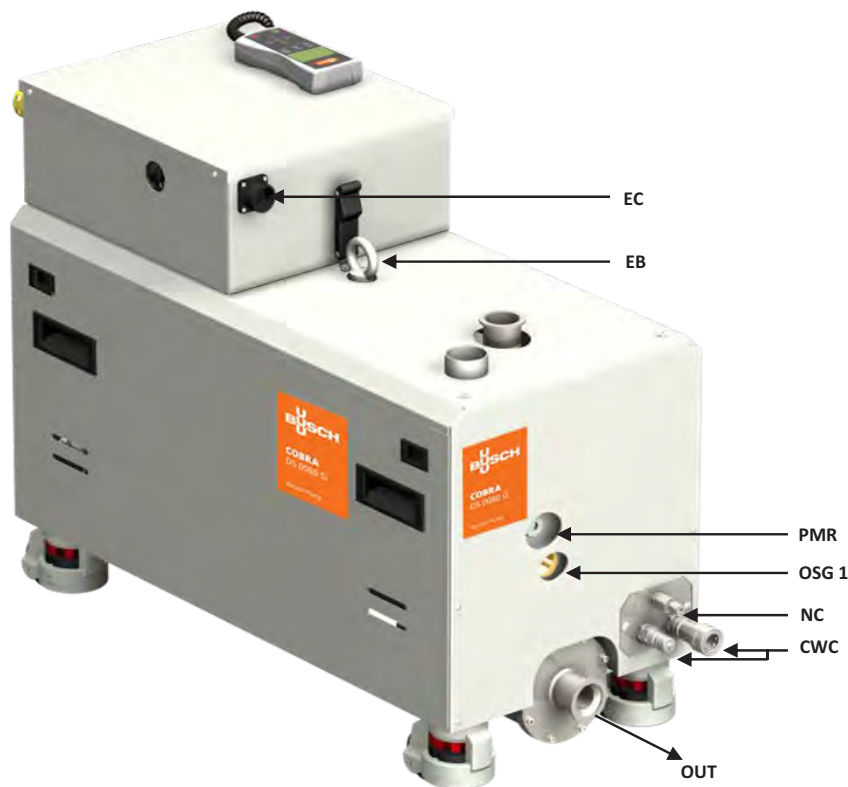
For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

**Prior to handling the vacuum pump these operating instructions shall be read and understood. If anything remains to be clarified please contact your Busch representative.**

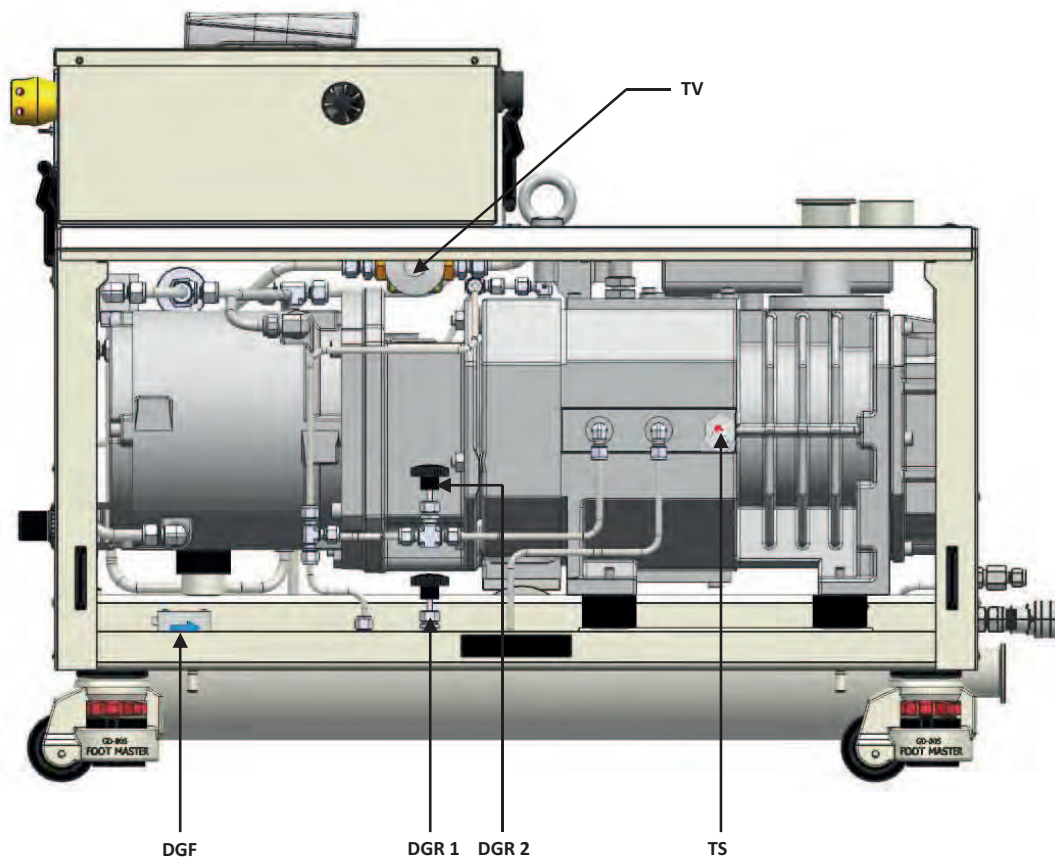
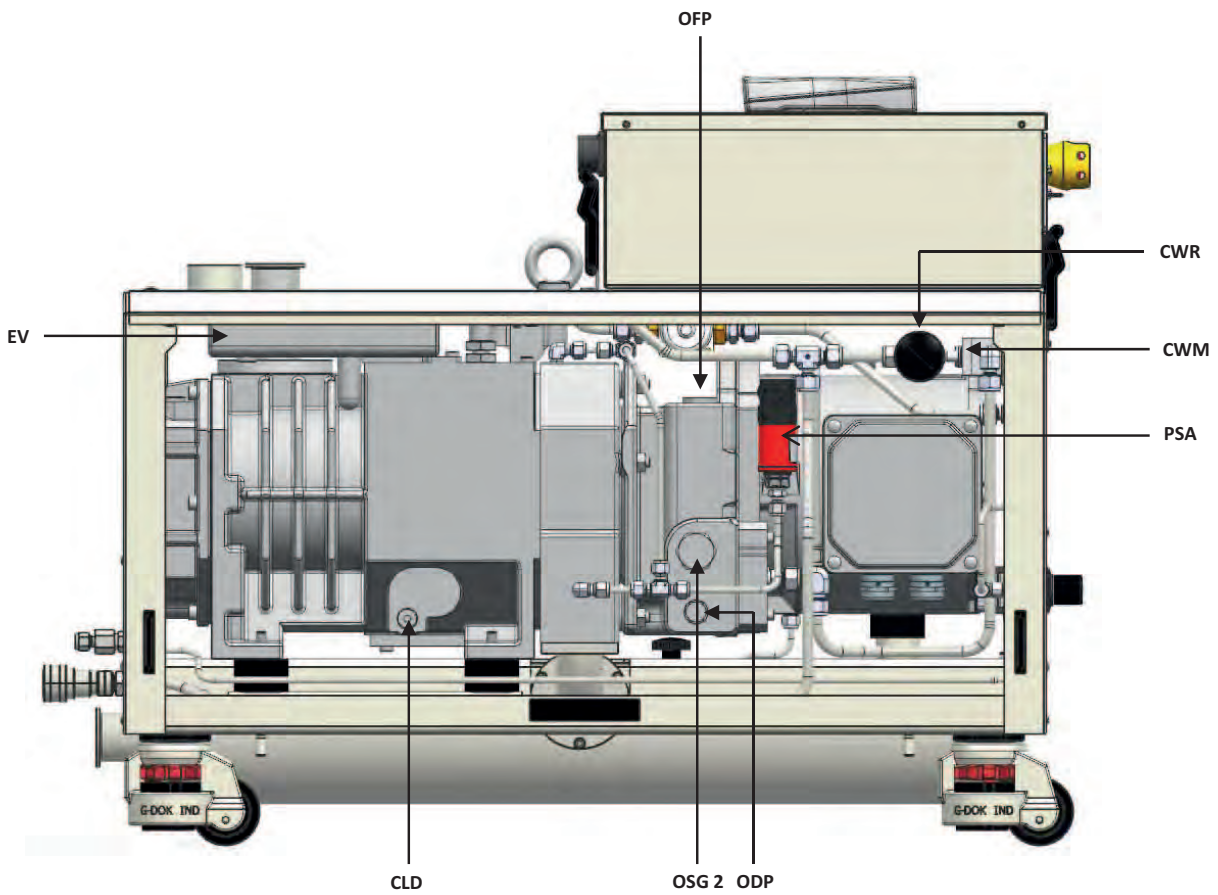
**Keep these operating instructions and, if applicable, other pertinent operating instructions available on site.**



COBRA DS 0080/ 0160 G



- IN Inlet
- OUT Discharge
- CAO Extracting ventilator
- RC LCD
- ES Emergency stop button (EMO)
- PRV Nitrogen pressure reducer
- EC Electrical connections
- EB Eye bolts
- PMR Unblocking for screw
- OSG1 Oil sight glass
- OFF Oil filler plug
- ODP Oil drain plug
- NC Nitrogen connections
- CWC Cooling water connections
- EV Expansion vessel
- CWR Cooling water regulating valve
- CWM Cooling water flow meter
- PSA Pressure sensor
- CLD Cooling liquid drain plug
- TV Thermostatic valve
- TS Temperature sensor
- DGR 1 Regulating valve, dilution gas (middle of cylinder)
- DGR 2 Regulating valve, dilution gas (end of cylinder)
- DGF Nitrogen flow meter

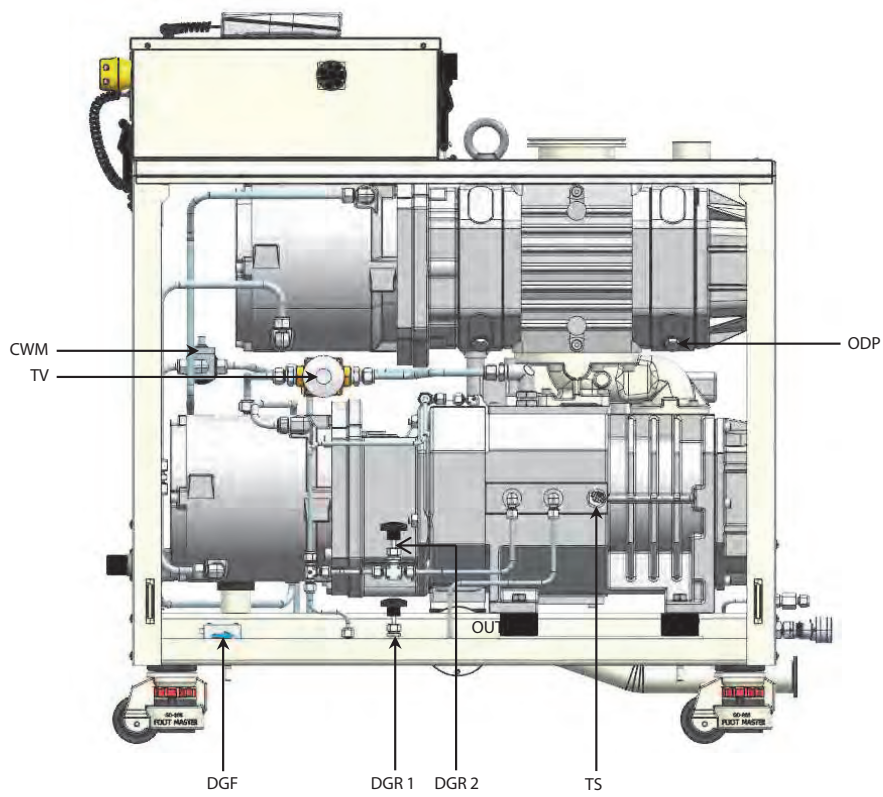
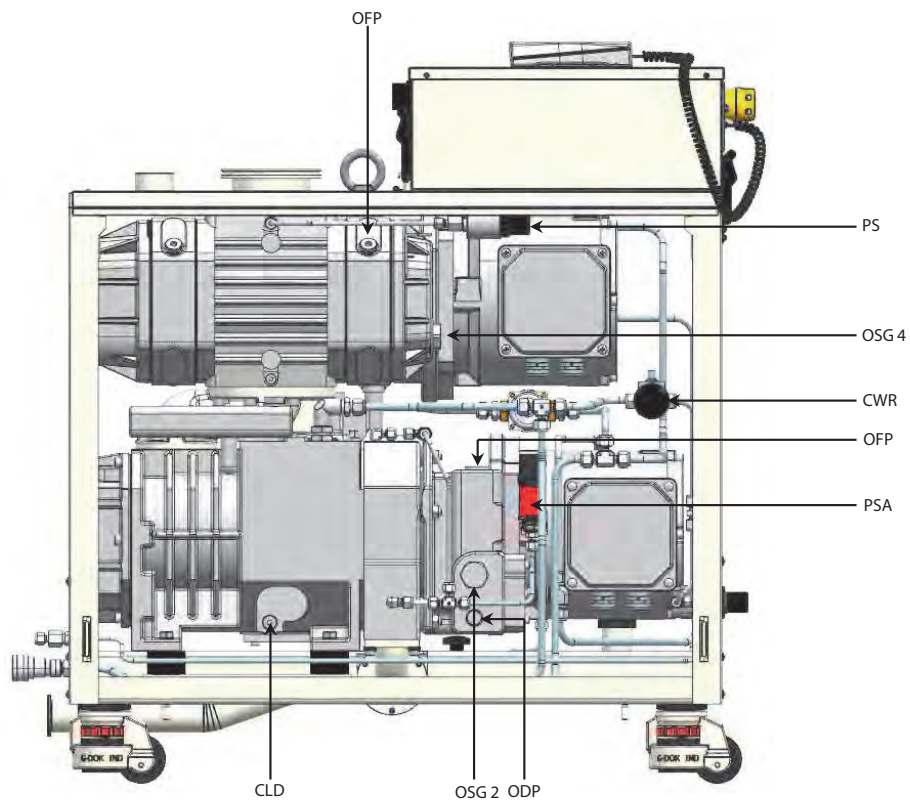




## COBRA DS 0700 G



- IN Inlet
- OUT Discharge
- CAO Extracting ventilator
- RC LCD
- ES Emergency stop button (EMO)
- PRV Nitrogen pressure reducer
- EC Electrical connections
- EB Eye bolts
- PMR Unblocking for screw
- OSG1 Oil sight glass (DP)
- OSG2 Oil sight glass (MB)
- OFF Oil filler plug
- ODP Oil drain plug
- NC Nitrogen connections
- CWC Cooling water connections
- CWR Cooling water regulating valve
- CWM Cooling water flow meter
- PS Pressure switch at MB inlet
- PSA Pressure sensor
- CLD Cooling liquid drain plug
- TV Thermostatic valve
- TS Temperature sensor
- DGR 1 Regulating valve, dilution gas (middle of cylinder)
- DGR 2 Regulating valve, dilution gas (end of cylinder)
- DGF Nitrogen flow meter

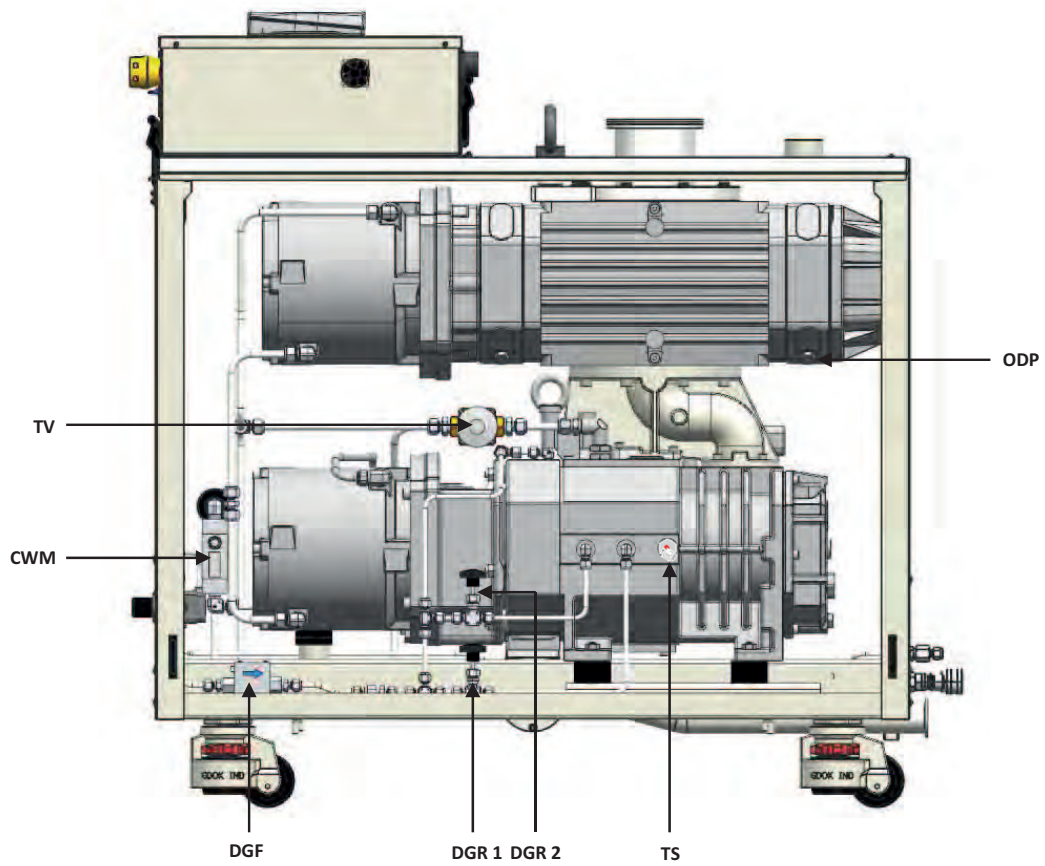
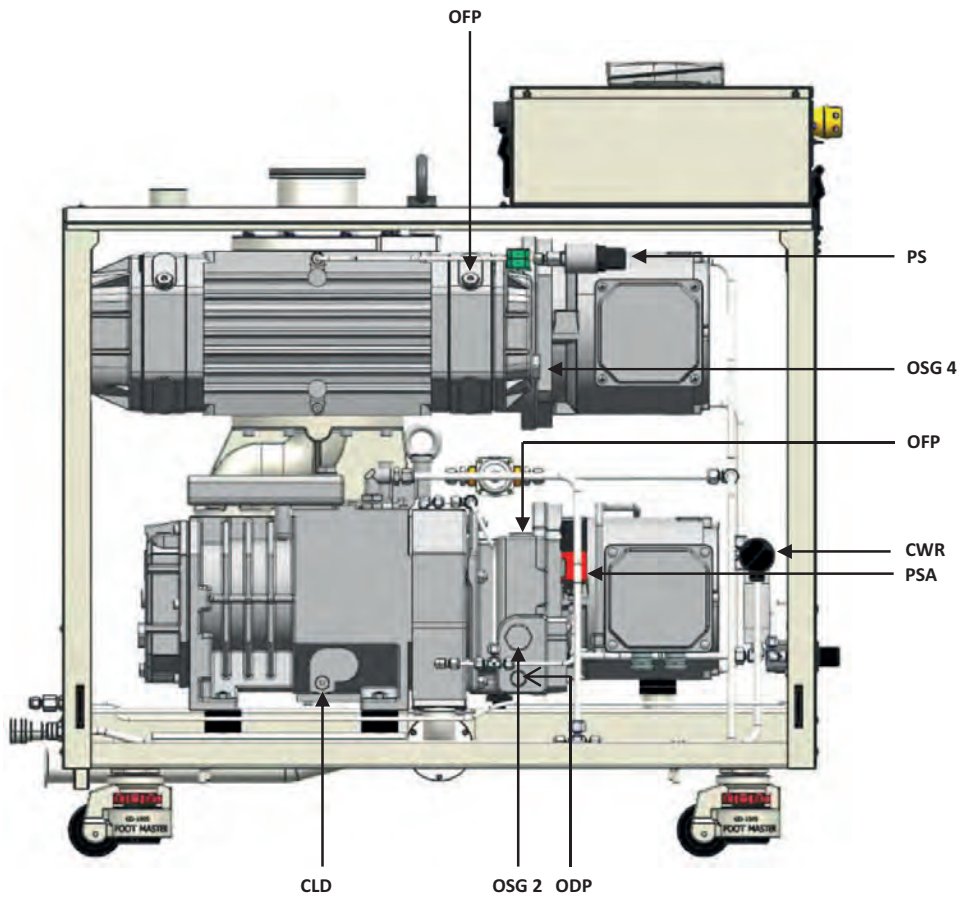




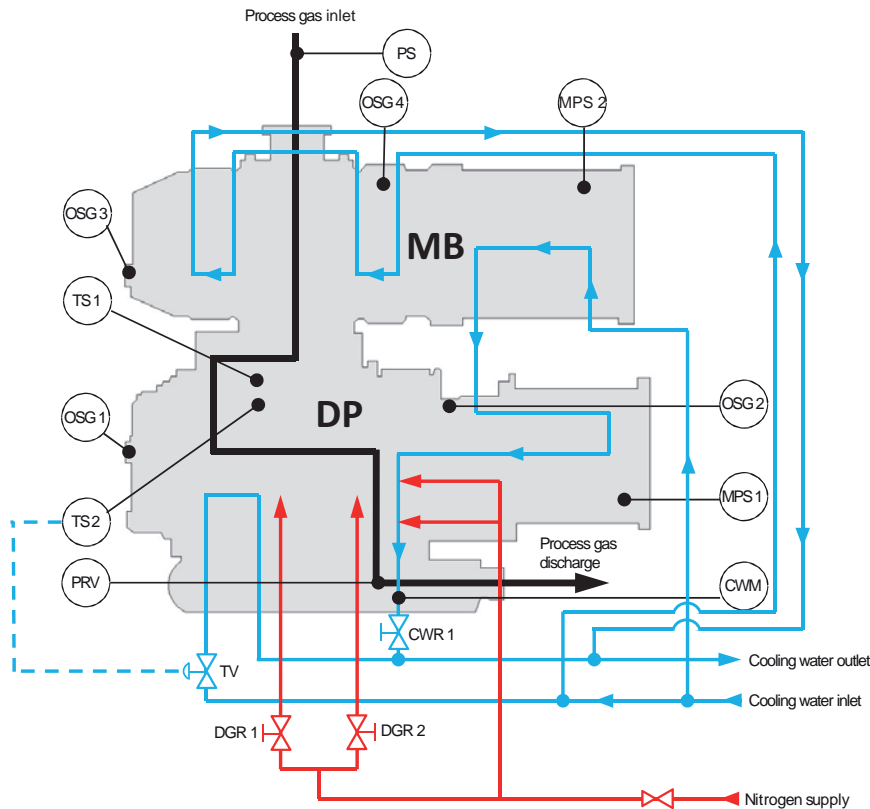
COBRA DS 1000/ 2000 G



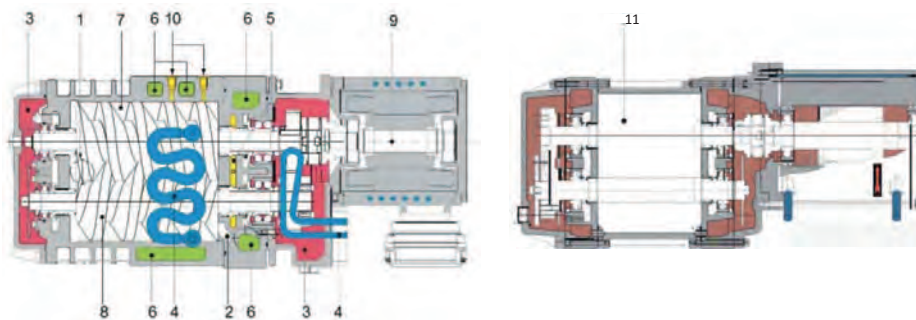
- IN Inlet
- OUT Discharge
- CAO Extracting ventilator
- RC LCD
- ES Emergency stop button (EMO)
- PRV Nitrogen pressure reducer
- EC Electrical connections
- EB Eye bolts
- PMR Unblocking for screw
- OSG1 Oil sight glass (DP)
- OSG2 Oil sight glass (MB)
- OFP Oil filler plug
- ODP Oil drain plug
- NC Nitrogen connections
- CWC Cooling water connections
- CWR Cooling water regulating valve
- CWM Cooling water flow meter
- PS Pressure switch at MB inlet
- PSA Pressure sensor
- CLD Cooling liquid drain plug
- TV Thermostatic valve
- TS Temperature sensor
- DGR 1 Regulating valve, dilution gas (middle of cylinder)
- DGR 2 Regulating valve, dilution gas (end of cylinder)
- DGF Nitrogen flow meter







- TS 1 Temperature sensor
- DGF Nitrogen flow meter, dilution gas
- PGR Nitrogen pressure reducer
- PS Inlet pressure switch
- PRV Outlet pressure regulator
- OSG 1 Oil level indicator (DP)
- OSG 2 Oil level indicator (DP)
- OSG 3 Oil level indicator (MB)
- OSG 4 Oil level indicator (MB)
- MPS 1 Power sensor (DP)
- MPS 2 Power sensor (MB)
- TV Thermostatic valve
- CWR 1 Cooling water valve for rear bearing (option)
- CWR 2 Cooling water valve for motors/ drive
- DGR 1 Regulating valve, dilution gas
- DGR 2 Regulating valve, dilution gas
- CWM Cooling water flow meter
- TS 2 Temperature sensor for thermostatic valve



- 1 Inlet
- 2 Discharge
- 3 Oil
- 4 Cooling water
- 5 Barrier gas
- 6 Cooling liquid
- 7 Pumped gas
- 8 Screw rotors
- 9 Motor klixon
- 10 Dilution gas
- 11 Roots rotors

## Product description

### Use

The COBRA DS vacuum pumps are designed for use in the field of microelectronics and similar industries.

They can be used to suck gases and gas mixtures.



#### WARNING

**When using toxic, inflammable and/ or explosive gases, make sure that the system corresponds in design to applicable local and national safety regulations and that all applicable safety measures are followed.**

**All product-specific safety regulations must be observed.**

Solid particles must not get into the vacuum pump. Procedural errors can result in the pump sucking in a certain quantity of liquid. If the pump has sucked in liquid, a short drying time is necessary at the end of the procedure.

The allowed maximum inlet gas temperature depends on the inlet pressure and the type of gas: the lower the inlet pressure (Pa), the higher the drawn gas temperature (TGas) can be.

The following indicative values for air can be considered:

- Pa > 50 mbar, TGas < 80°C
- Pa < 50 mbar, TGas < 200°C

The vacuum pump is intended for use in a potentially non-explosive environment.

The vacuum pump is thermally suitable for continuous operation at any pressure between atmospheric pressure and ultimate pressure.

Max. permissible number of startings per hour: 6.

### Operating principle

The COBRA DS 0080-2000 G vacuum pumps are COBRA NS screw vacuum pumps with cooling water and nitrogen circuits.

The COBRA NS screw vacuum pumps are driven by water-cooled motors.

### COMBI

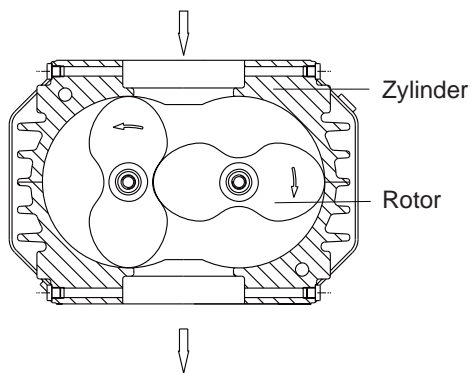
The COBRA DS 080 - 0160 G pumps are streamlined DP screw vacuum pumps. The COBRA DS 0700/ 1000/ 2000 G pumps are a combination of a screw vacuum pump (DP) and a Roots vacuum pump (MB). The Combi pumps are streamlined.

### Principle of DP vacuum pumps

The COBRA NS screw vacuum pumps work by the principle of spiral pumps. Two parallel screws (8) rotate in opposite directions in the pump body. Entering gases are trapped between the flights of the screws and the pump body. The gases are conveyed by the rotation of the screws to the exhaust, where they are discharged.

### Principle of MB vacuum pumps

The WY Roots vacuum pumps operate according to the approved principle of the Roots type machine. Operation is both simple and effective. Two lobe rotors (1) with identical profiles rotate in opposition directions within a casing. As they rotate, gas is drawn into the space between each lobe rotor and the casing (2) where it is trapped and by the rotation pushed out into the discharge. This action is repeated twice for each revolution of each lobe rotor and therefore four times for each revolution of the drive shaft. There is no mechanical contact between rotors and cylinder. So no oil lubrication is required. The drive motor of roots pump is a water cooled canned motor.



## Gas flow checks

A pressure switch PS at the inlet flange (except for DS 0080, 0160, 1000, 2000 G) monitors the inlet pressure. The MB vacuum pump will start when the pressure reaches 15 mbar (for DS 0700) and 10 mbar (for DS 1000, 2000 G). If the pressure does not go down, the DP vacuum pump stops.

A pressure sensor PRV at the discharge monitors the discharge pressure. If the pressure reaches more than the limit value (preset at the factory: 0.2 bar), the purge cycle starts.

## Oil circuit

Since the complete operating principle works without contact, no oil circuit is needed in the work area.

## Cooling

The vacuum pump is cooled by

- the filling of cooling water inside the water chambers (6) of cylinder and end plate of cylinder B-side. An indirect circuit is made with a water pump mounted at the motor endplate. The flow of the cooling water is controlled by a thermostatic valve V1 with a temperature sensor TS 2. The adjustment of the valve varies the operating temperature between approximately 50°C (minimum) and 90°C (maximum) and must be set to suit your operating conditions. We recommend to use a high valve setting to prevent resublimation in the vacuum pump.
- a direct cooling water circuit in the motors and the DP transmission casing. The flow regulating valve CWR 2 of cooling water is preset on 2 l/min at the factory. The water cools in the DP and MB pumps motors and the drive/ pump transmission DP system.
- a direct cooling water circuit in the rear bearing (for exceptionally cool running in option).



### CAUTION

The COBRA DS 0080-2000 G vacuum pumps are generally dispatched without oil and cooling liquid, without cooling water. Before vacuum pump first startup, control the oil level and the cooling liquid level. Operation without these coolants can result in damage to the vacuum pump.

## Nitrogen system

The nitrogen system can be used for diverse functions:

- nitrogen is used as dilution gas. It is injected inside the cylinder on two different places. Nitrogen flow DGF injected in the middle hole is preset at 2 l/min and can be adjusted with valve DGR 1, depending on the application. Nitrogen flow injected in the hole on cylinder endplate side is preset at 10 l/min and can be adjusted with valve DGR 2, depending on the application. When flow is too low a warning then an alarm signal is generated by flowmeter DGF to the PLC. Status of the pump depends on the alarm function set by user (factory setting: None, pump continues running with an alarm). Dilution improves the screws functioning, especially when sucking corrosive gases.
- the nitrogen is used as sealing gas. The nitrogen is injected between the transmission and the process gas to achieve good closeness.
- the nitrogen is used as purge gas. The purge eliminates traces of gases remaining in the vacuum pump. The vacuum pump purge cycle is programmed in the control and starts, either after a STOP operation or after an alarm function. For a correct purge execution, the shut-off valve at the inlet flange must be closed. The purge cycle lasts about 30 min. (Programmable time in the basic parameters).

## Optional functions/ Use of available accessories

The relief valve (SV) prevents excessively high pressure in the expansion tank (EV), relief pressure: 6 bar.

A pressure switch with normally closed contact mounted in the expansion tank monitors the pressure of the cooling liquid. It must be connected in such a way that actuation causes the vacuum pump to be switched off when the pressure exceeds a value of 3 bar.

A temperature sensor PT100 (10) mounted on the cylinder, measures the temperature inside the cylinder.

A silencer or sound absorber (accessory) at the exhaust reduces the noise of the pump and collects any condensate.

A leak-protection non-return valve (optional) at the exhaust traps the condensate in the pump when the pump is switched off.

The LCD controller shows the data of the sensors as follows:

- PRV: overpressure sensor
- OSG1 and OSG2: DP oil level (option)
- TS 1: temperature in the cylinder DP
- MPS1 : DP current, rotation speed and MPS2: MB current, rotation speed
- DGF: nitrogen flow
- CWM: cooling water flow rate in motors/ transmission

See "Installation and Maintenance Instructions, Busch PLC and Busch LCD (No. 0870758077)".

## On/ Off switch

The vacuum pump is delivered with on/ off switch. The LCD controls directly the pump for start and stop.

# Safety

## Intended use

**DEFINITION:** To rule out any misunderstanding, the term “handling” of the vacuum pump covers transport, storage, installation and operation of the pump as well as effects on operating states and troubleshooting on the vacuum pump.

The vacuum pump is intended for industrial use. It may only be operated by qualified personnel.

The different application possibilities and limit values for operation described in “Product description” and “Installation requirements” must be observed by the manufacturer of the system into which the vacuum pump is to be integrated and by users.

The need for personal safety regulations depends in principle on the type of use. The operator must provide the users with the necessary means and must inform his personnel about the dangers emanating from the processed product.

The operator of the vacuum pump must observe the safety regulations and must train and instruct his personnel accordingly.

Local regulations regarding the motors and electric control elements must be observed when installing the pump in potentially explosive environments.

The maintenance instructions must be followed and observed.

These installation and maintenance instructions must be read and understood before the vacuum pump is used. If you have any doubts, contact your Busch representative.

## Safety information

The vacuum pump is designed and manufactured in compliance with the latest technical standards and safety regulations. Nevertheless an element of residual risk remains.

Various safety instructions are to be found in this handbook and on the pump. These instructions must be followed. You can recognise these instructions by the signal words DANGER, WARNING and CAUTION, which are defined as follows:



**DANGER**

Disregard of this safety instruction will always result in death, serious injuries or severe damage.



**WARNING**

Disregard of this safety instruction may result in death, serious injuries or severe damage.



**CAUTION**

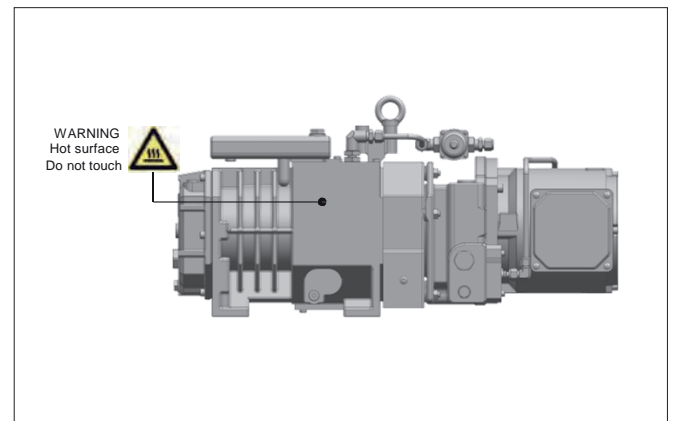
Disregard of this safety instruction may result in minor or moderate injuries or damage.



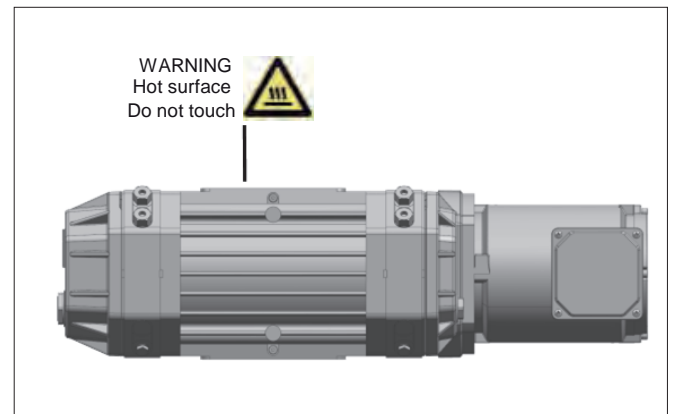
**CAUTION**

The COBRA DS system includes provision for the secondary containment of liquids leaks such as water and oil.

## Safety information on the NS 0070 C pump



## Safety information on the WY 2000 C pump



## Noise emission

Refer to the table “Technical data” for the permissible noise level in free field conditions according to EN ISO 2151.



**CAUTION**

The intensity of the noise of the vacuum pump is higher within a certain area of the pump.

Risk of hearing deterioration.

Users must wear ear protection when spending a longer period of time in the vicinity of a non-insulated vacuum pump.

## Maintenance clearance

Before any maintenance action, ensure a maintenance clearance around the pump of min. 610 [mm].

## Transport

The COBRA DS vacuum pumps are tested and checked in our factory before careful packing. Check the packaging for transport damage when the goods arrive. The pump can withstand temperatures between -25°C and +55°C during transport.



## Transport in packed state



Packed on a pallet, the vacuum pump can be moved with a hand forklift truck.

## Transport in unpacked state

The vacuum pump is fastened to the pallet with fixing pins:

- ◆ Unscrew the fastening nuts underneath the pallet.

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


 CAUTION  
Please check out the weight of the vacuum pump before lifting it up (see "Technical Data").  
Use adequate lifting gear for this.

**NOTE:** The suspension eyes are located at about the center-of-gravity of the vacuum pump. If the vacuum pump is equipped with accessories that could influence the center-of-gravity, this must be taken into account when lifting and a belt must additionally be attached to a specific point.

- Fasten the hoist to the suspension eye(s) on the cylinder
- Use a hoist that is equipped with a hook and safety lock
- Lift the vacuum pump

If the pump is fastened to a pallet with fixing pins:

Unscrew the fixing pins in the base frame

 CAUTION  
In case of a vacuum pump filled with oil, make sure that by lifting the inclination angle of the vacuum pump do not exceed 5° from the horizontal. In case of too high inclination (>5°), risk of oil leak within the work area

Make sure before every transport using the appropriate lifting mean that the inclination of the vacuum pump is less than 5°.

The packaging material must be disposed of in accordance with local and national regulations.

## Storage

### Temporary storage

- Make sure that the intake and exhaust flanges are closed (put on the protective caps included in the delivery package of the vacuum pump)
- Store the vacuum pump
  - if possible, the vacuum pump should be stored in its original packaging,
  - indoors,
  - dry,
  - in a dust-free and vibration-free room

### Removal of the pump

Before starting a vacuum pump that has been stored outside the building for a while, the vacuum pump must be moved to a room with ambient temperature, where it should rest for a day.

### Preservation

If the vacuum pump will be exposed to unfavourable ambient conditions (for example, aggressive environment, frequent temperature changes), begin immediately with preservation work on the vacuum pump.

In the case of favourable ambient conditions, perform preservation work on the vacuum pump if a storage period of more than three months is planned.

- Make sure that all openings are hermetically sealed; use adhesive tape to fasten loose parts (seal rings, flat seals, etc.).

**NOTE:** VCI is the abbreviation for "volatile corrosion inhibitor". The VCI molecule is an organic corrosion inhibitor in the vapour phase. Integrated in various carriers such as film, cardboard, paper, foam, liquid and powder, it protects the parts against corrosion as a result of its action in the vapour phase. However, VCI packaging can attack synthetic surfaces and surfaces of other elastomers. If in doubt, please contact your nearest distributor. VCI packaging provides several years of protection against corrosion, even under the harshest of conditions: overseas shipment, extended storage before use.


- Wrap the vacuum pump in a VCI film
- Store the vacuum pump
  - if possible, the vacuum pump should be stored in its original packaging,
  - indoors,
  - dry,
  - in a dust-free and vibration-free room

### Start-up of the vacuum pump after storage:



- Make sure that all protective elements, stoppers or adhesive tapes attached before preservation have been removed
- Switch on the vacuum pump in the sequence described in the chapter "Installation and start-up"

## Installation and start-up

### Necessary installation instructions

 CAUTION  
If the necessary installation instructions are not followed and particularly in the case of inadequate cooling:  
  
Risk of damage to and total destruction of the vacuum pump and its components!  
  
Risk of personal injury!  
  
The necessary installation instructions must be followed.

- Make sure that the integration of the vacuum pump in its new environment complies with the safety regulations according to the Machinery Directive 2006/ 42/ EC (regarding the responsibility of the manufacturer of the system in which the vacuum pump is to be integrated, see information in the Declaration of Conformity).


 WARNING  
Local regulations regarding the motors and electric control elements must be observed when installing the pump in potentially explosive environments. Make sure before start-up that all safety measures have been followed.

### Installation site and installation

- Make sure that the environment of the vacuum pump is not potentially explosive
- Make sure that the following ambient conditions are fulfilled:
  - Ambient temperature: 0 ... 40 °C (32 ... 104 °F)
  - Ambient pressure: atmosphere
  - Humidity range: 20 to 95%
  - Altitude: up to 1000 m
- Make sure that the cooling water fulfills the following requirements:
  - Temperature: 10 - 25 °C
  - Water pressure: 2 - 5 bar (relative)
  - Water hardness: < 5° dGH

**NOTE:** 1° (german degree = 1° dGH) = 1,78° (french degree) = 1,25 e (english degree) = 17,9 mg/kg CaCO<sub>3</sub> (american hardness)

- Approximate flow rate: 7 - 8 l/ min for the standard version
- Make sure that the cooling water is neutral and clean
- Make sure that the cooling water outlet is unpressurised
- Make sure that the nitrogen fulfills the following requirements:
  - Overpressure: 1,5 bar
  - Approximate flow rate: 0 - 75 l/ min
- Make sure that the ambient conditions correspond to the protection class of the motor (according to nameplate)
- Make sure that the vacuum pump is placed on or fastened to a horizontal surface
- Make sure that the vacuum pump is level
- Make sure that the vacuum pump is at least 1 m away from any wall to ensure good cooling
- Make sure that the vacuum pump is easily accessible and that the selected installation site fulfills the requirements for assembly/ dismantling
- Make sure that no temperature-sensitive parts (for example, of plastic, wood, cardboard, paper, electronic parts) come into contact with the hot surfaces of the vacuum pump
- Make sure that the installation site or assembly area is ventilated in such a way that adequate cooling of the vacuum pump is ensured



**CAUTION**


The surface temperature of the vacuum pump can exceed 50°C when the vacuum pump is in operation.

Danger of burns!

- Make sure that no-one can touch the vacuum pump accidentally. If necessary, attach safeguard
  - Make sure that the oil sight glasses (OSG) are easily accessible
- If oil changes are to be made on site:
- ◆ Make sure that the oil drain and oil filler are easily accessible

### Inlet connection


- Make sure that the protection that was attached to prevent penetration of particles during transport has been removed before the vacuum pump is connected to the vacuum line



**CAUTION**

Do not put hands into the inlet aperture.

Risk of body damage!



**CAUTION**

The intake of liquids or solid particles can lead to the destruction of the vacuum pump

If the sucked gas contains dusts or solid foreign bodies:

- ◆ Make sure that a filter or protective grating is installed at the extraction point
- Make sure that the nominal diameter of the intake line is at least equal to the diameter of the intake flange of the vacuum pump to prevent a drop in the performance of the vacuum pump in the case of a smaller cross-section
- Make sure that the vacuum pump is connected with leakproof lines



**CAUTION**

When the intake lines have been connected, make sure that the system does not leak. Leakages of dangerous substances must be prevented!

- Make sure that the intake lines are equipped with a shut-off device upstream of the intake flange so that the flow of sucked gas can be stopped
- Make sure that the intake lines do not exercise any force on the intake flange. Mount bellows if necessary.
- The inlet flange has the following dimension:

DS 0080 G	DN 40 ISO KF
DS 0160 G	DN 50 ISO KF
DS 0700 G	DN 63 ISO K
DS 1000 G	DN 100 ISO K
DS 2000 G	DN 160 ISO K

In the case of long intake lines, the line cross-section should be larger than the intake flange to prevent a drop in the performance of the vacuum pump. If you have any doubts, contact your Busch representative.

### Discharge connection

The following instructions for connection to the discharge only apply if the sucked gas is discharged by the vacuum pump into a suitable environment.

- Make sure that the protection that was attached to prevent penetration of particles during transport has been removed before the vacuum pump is connected to the vacuum line
- Make sure that the nominal diameter of the exhaust line is at least equal to the diameter of the exhaust flange of the vacuum pump to prevent a drop in the performance of the vacuum pump in the case of a smaller cross-section
- Make sure that the vacuum pump is connected with leakproof lines



**CAUTION**

Do not put hands into the outlet aperture.

Risk of body damage!



**CAUTION**

When the discharge lines have been connected, make sure that the system does not leak. Leakages of dangerous substances must be prevented!

- Make sure that the discharge line is mounted in such a way that condensate cannot penetrate into the pump (siphon trap, gradient)
- Make sure that no shut-off devices are mounted in the discharge line
- Make sure that the discharge lines do not exercise any force on the discharge flange. Mount bellows if necessary
- The discharge flange has the following dimension:
  - DN 40 ISO KF

In the case of long discharge lines the line cross-section should be larger than the discharge flange to prevent a drop in the performance of the vacuum pump. If you have any doubts, contact your Busch representative.

## Cooling water connection

The cooling water is generally connected with a hose.

The cooling water outlet must be unpressurised.

Connection diameter: 3/8 NPT

## Nitrogen connection

The nitrogen is connected with a pipe (leakproof against oxygen).

Connection diameter: 1/4 NPT

## Electrical connection/ Checks

- Make sure that the regulations of the Electromagnetic Compatibility Directive 2014/30/EU as well as standard EN norms, safety directives and especially local and national regulations are observed (this is the responsibility of the manufacturer of the system into which the vacuum pump is integrated according to the Declaration of Conformity)
- Make sure that the mains power supply corresponds to the data on the nameplate of the motor
- Make sure that an overload cut-out according to EN 60204-1 is provided for the motor
- Make sure that the drive of the vacuum pump is not disturbed by any electric or electromagnetic interferences. If you have any doubts, contact your Busch representative

## Installation

### Mounting

- Make sure that the "Necessary installation instructions" are followed
- Fasten or install the pump at its final installation site

## Electrical connection



**WARNING**

Risk of electrocution, risk of damage.

Electrical installation must be performed by a suitably qualified electrician who knows and follows the following regulations:

- IEC 364 or CENELEC HD 384 or DIN VDE 0100,
- IEC Report 664 or DIN VDE 0110,
- VBG 4 or corresponding national regulations on accident prevention



**CAUTION**

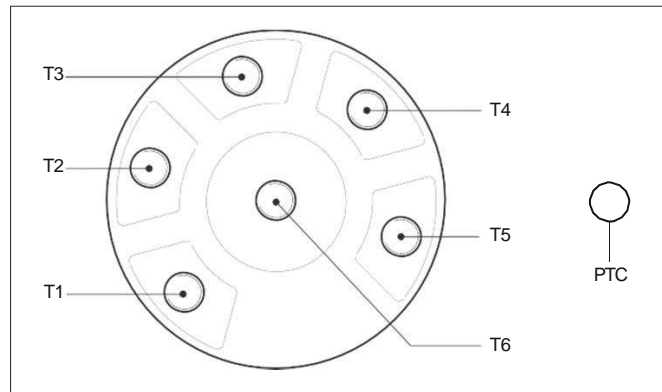
The circuit diagrams described below conform to the standard. Other circuit diagrams might be used. This depends on the particular order and the market.

Risk of damage to the motor!

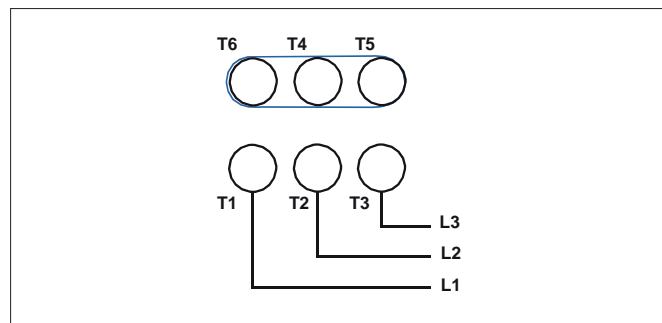
Check the connection of the motor inside the terminal box according to the circuit diagram.

Motor of screw pump DS 0080-2000 G is connected at factory.

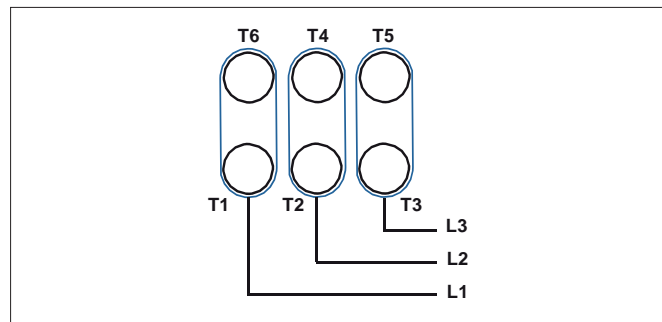
Three phase motor connection:



Star connection (High voltage)



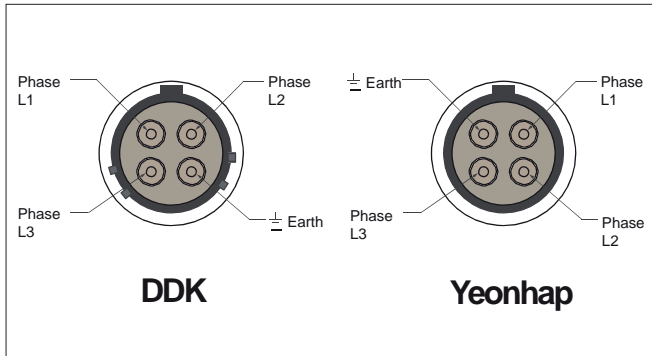
Delta connection (Low voltage)



## Power wiring connection

Power wiring 4 poles	
1	Phase L1
2	Phase L2
3	Phase L3
4	Ground

## Power connector on vacuum pump front side



### CAUTION

If the vacuum pump is operated with a motor that turns in the wrong direction, it can be destroyed, even if this is the case for only a short moment.

Make sure that the vacuum pump is connected correctly before switching it on.

- Determine rotation sense of the motor by using a measure tool or by placing a rubber plate on the inlet.
- Press the on/ off switch briefly
- Make sure that the vacuum pump sucks
- If not, push the Emergency stop button

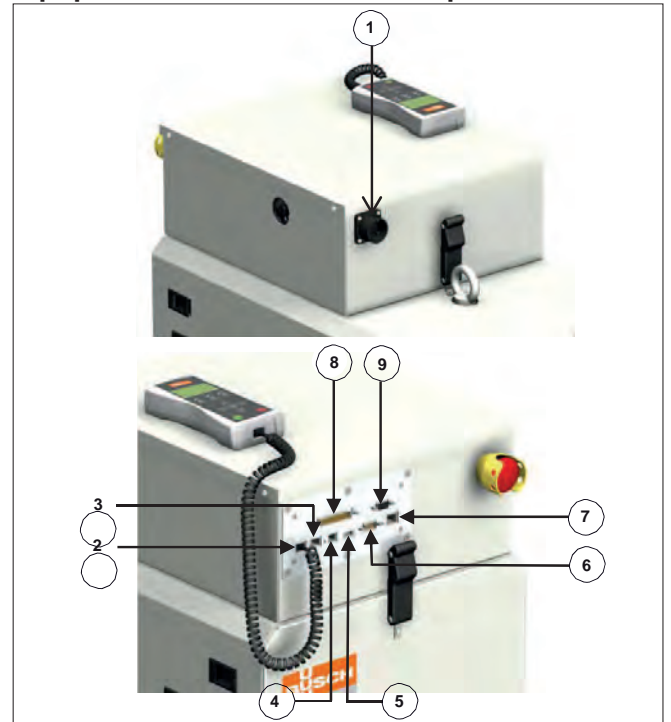
If the direction of rotation has to be changed:

- ◆ Exchange two of the three feeder leads

## Electrical data

Model	Frequency	I Rate		IMAX		Icu	
		200 - 240 V	380 - 460 V	200 - 240 V	380 - 460 V	200 - 240 V	380 - 460 V
DS 0080 G	50 Hz	17.2 A	11.7 A	25 A	16 A	20 kA	10 kA
	60 Hz	20 A	9.9 A	25 A	16 A	20 kA	10 kA
DS 0160 G	50 Hz	22 A	16 A	32 A	20 A	20 kA	10 kA
	60 Hz	25 A	17 A	32 A	20 A	20 kA	10 kA
DS 0700 G	50 Hz	40 A	23.4 A	50 A	32 A	20 kA	10 kA
	60 Hz	34.4 A	19.8 A	50 A	32 A	20 kA	10 kA
DS 1000 G	50 Hz	40 A	23.4 A	50 A	32 A	20 kA	10 kA
	60 Hz	34.4 A	19.8 A	50 A	32 A	20 kA	10 kA
DS 2000 G	50 Hz	50 A	28.6 A	63 A	40 A	20 kA	10 kA
	60 Hz	54 A	30.8 A	63 A	40 A	20 kA	10 kA

## Equipment connections (with options)



- 1 General supply
- 2 LCD serial wiring (RJ45), LCD1
- 3 LCD serial wiring (RJ45), LCD2
- 4 PC serial wiring (9 poles) (option)
- 5 USB connection
- 6 Customer Network, Communication modbus RTU RS 232
- 7 Ethernet network connection (Busch Monitoring System) (option)
- 8 Interface connection (50 poles) (option)
- 9 PID Interface (9 poles) (option)

The information concerning the use of the Busch PLC and the Busch LCD can be found in the Operation and Maintenance manual (Art. No. 0870758077).

## Connection of the lines/ pipes

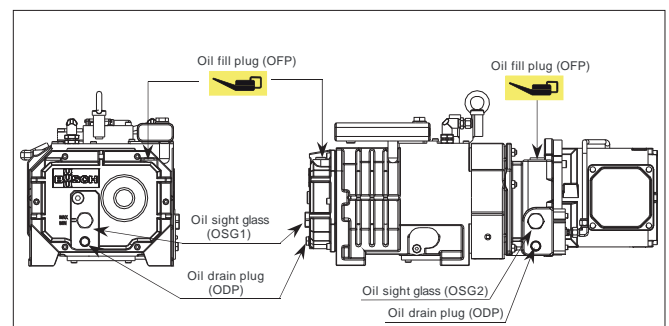
- Connect the intake lines
- Connect the discharge lines
- Make sure that all caps, safeguards and similar covers are mounted
- Make sure that the inlet and outlet for the cooling air are not covered or closed and that the flow of cooling air is not impaired in any way

## Oil filling

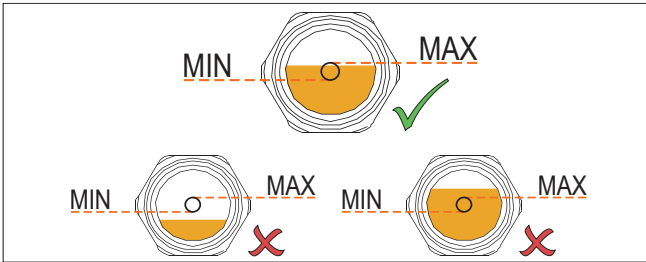
The COBRA DS 0080-2000 G vacuum pumps are generally dispatched with oil already in the vacuum pump. Before vacuum pump first startup, control the oil level. In the event of absence of one or the other of these lubricants, please carry out the filling (see the chapter "Oil types" for information on the recommended oils).

- Prepare the quantity of oil specified in the table "Oil quantity"

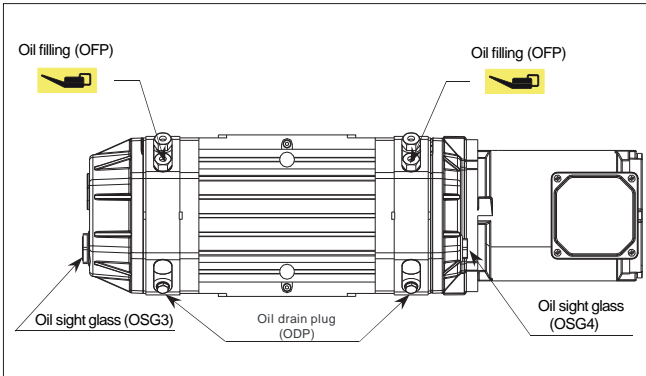
## Oil filling on vacuum pump NS 0070 C



- Unscrew the oil filler plugs (OFP)
- Fill up to the upper level of the target circle of the oil sight glasses (OSG 1, 2). Make sure that the filling level is in the target circle of the oil sight glasses (OSG 1, 2).
- Make sure that the seal ring in the oil filler plugs is not damaged, replace plugs if necessary. Fit the oil filler plugs and tighten up.



### Oil filling on vacuum pump WY 2000 C



**NOTE:** The quantity of oil specified in the installation handbook is of informative nature only. Check the oil level with the help of the various oil sight glasses (OSG) on the vacuum pump.



#### CAUTION

Before you change the type of oil, make sure that the new type is compatible with the old type. If necessary, flush the vacuum pump.

- Unscrew the oil filler cap (OFP)
- Fill in oil
- Make sure that the oil level lies between the MIN and MAX-markings on the oil sight glasses
- Make sure that the seals of the oil filler cap are not damaged. Replace them if necessary
- Screw on the oil filler cap hermetically tight

**NOTE:** It is easier to switch on the vacuum pump with cold oil when the intake line is not closed or when the intake flange is not covered by a rubber plate.

- Start the vacuum pump

If the intake line is equipped with a shut-off device:

- ◆ Close the shut-off device

If the intake line is equipped with a shut-off device:

- ◆ Place a rubber plate on the intake flange

- Let the vacuum pump run for a few minutes
- Stop the vacuum pump and wait a few minutes
- Make sure that the oil level still lies in the target circle or between the MIN and MAX markings (Booster) on the oil sight glasses.

If the oil level is below the target circle or the MIN marking (Booster):

- ◆ Fill in more oil

If the intake line is equipped with a shut-off device:

- ◆ Open the shut-off device

If the intake line is not equipped with a shut-off device:

- ◆ Remove the rubber plate from the intake flange and connect the intake line to the intake flange



#### CAUTION

In case of a vacuum pump filled with oil, make sure that by lifting the inclination angle of the vacuum pump do not exceed 5° from the horizontal. In case of too high inclination (>5°), risk of oil leak within the work area.

- Make sure before every transport using the appropriate lifting mean that the inclination of the vacuum pump is less than 5°.



#### CAUTION

The vacuum pump must remain in a horizontal position when it has been filled with oil.

### Filling in cooling liquid

The COBRA DS 0080-2000 G vacuum pumps are generally dispatched with cooling liquid already in the vacuum pump. Before vacuum pump first startup, control the cooling liquid level. In the event of absence of one or the other of these lubricants, please carry out the filling (see the chapter "Cooling liquid types" for information on the recommended cooling liquids).

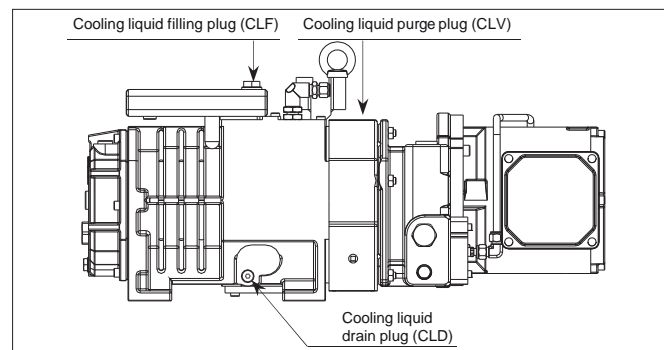
- Prepare the quantity of cooling liquid specified in the table "Cooling liquid quantity"

Cooling liquid filling	NS 0070/ 0160 C	Cooling liquid type
Cooling liquid quantity [Liter]	4	Glycol (Ethylene), Art. No. 0831 238 761, Zitrec M-25

**NOTE:** The quantity of cooling liquid specified in the installation handbook is of informative nature only. Respect the procedure of filling the cooling liquid. Check the level of the cooling liquid at the liquid level indicator located at the filler or with a measuring scale. The level of the cooling liquid in the expansion tank may never exceed 5 mm seen from the bottom of the vessel.

- Unscrew filler cap (CLF) of cooling liquid on the expansion vessel
- Open the purge valve (CLV)

### Cooling liquid filling on vacuum pump NS 0070 C



- Fill in the cooling liquid through the filler opening until the liquid starts running out the purge valve (CLV)
- Stop filling in cooling liquid
- Close the purge valve (CLV)
- Fill in more cooling liquid through the filler opening until the level of the liquid is 5 mm above the bottom of the expansion vessel
- Check the level of the cooling liquid with the measuring scale located under the filler. The level of the liquid must not lie above the bottom marking.



**NOTE:** You can also check the level of the liquid with the help of a ruler

- Screw on the filler cap (CLF) for the cooling liquid again.
- If cooling liquid has run on the outside surfaces of the vacuum pump, wipe it off.

## Checking the direct cooling

The flow of the cooling water is checked by the flowmeter CWM. The flowmeter must be connected in such a way that switching-on leads to a warning at 2 l/min, when the flow drops below 1,5 l/min, the vacuum pump must be stopped.

## Checking the nitrogen supply

The flow of the nitrogen is checked by the flowmeter DGF. The flowmeter must be connected in such a way that switching-on leads to an alarm. The alarm limit can be adjusted depending the type of process.

## Saving the operating parameters

As soon as the vacuum pump is working under normal conditions after being switched on:

- Measure the working current of the motor and save it as reference value for all future maintenance and repair work

## Recommendations on operation

### Application



#### WARNING

The vacuum pump is designed for use under the conditions specified here.

**If these conditions are not met, there is a risk of damage to or total destruction of the vacuum pump and its components!**

**The vacuum pump may only be switched on under the specified conditions.**

The COBRA DS vacuum pumps are designed for use in the field of microelectronics and similar industries.

They can be used to suck gases and gas mixtures.



#### WARNING

**When using toxic, inflammable and/ or explosive gases, make sure that the system corresponds in design to applicable local and national safety regulations and that all applicable safety measures are followed.**

**All product-specific safety regulations must be observed.**

Solid particles must not get into the vacuum pump. Procedural errors can result in the pump sucking in a certain quantity of liquid. If the pump has sucked in liquid, a short drying time is necessary at the end of the procedure.

The allowed maximum inlet gas temperature depends on the inlet pressure and the type of gas: the lower the inlet pressure (Pa), the higher the drawn gas temperature (TGas) can be.

The following indicative values for air can be considered:

- Pa > 50 mbar, TGas < 80°C
- Pa < 50 mbar, TGas < 200°C

The vacuum pump is intended for use in a potentially non-explosive environment.

Max. permissible number of startings per hour: 6.

As far as temperature is concerned, the pump is suitable for continuous duty at any pressure between atmosphere and ultimate pressure.



#### CAUTION

The surface temperature of the vacuum pump can exceed 50 °C when the vacuum pump is in operation.

Danger of burns!

The vacuum pump may not be touched when it is in operation. If touching the pump is unavoidable, wait until the surface temperature has cooled down or wear protective gloves.



#### CAUTION

The intensity of the noise of the vacuum pump is higher within a certain area of the pump.

Risk of hearing deterioration.

Users must wear ear protection when spending a longer period of time in the vicinity of a non-insulated vacuum pump.



#### CAUTION

The COBRA DS 0080-2000 G vacuum pumps could be delivered without oil, without cooling water and without cooling liquid. Operation without oil will result in damage to the vacuum pump!

The vacuum pump must remain in a horizontal position when it has been filled with oil.



#### CAUTION

The COBRA DS 0080-2000 G vacuum pumps are always delivered without oil, without cooling water and without cooling liquid.

Operation without coolants will result in damage to the vacuum pump!



#### CAUTION

The cooling water flow, which is checked by the flowmeter CWM, must be at least 3 l/min.

- Make sure that all caps, safeguards and similar covers are mounted
- Make sure that the safeguards are switched on
- Make sure that the inlet and outlet for the cooling air are not covered or closed and that the flow of cooling air is not impaired in any way
- Make sure that the system does not leak. Leakages of dangerous substances must be prevented
- Make sure that the "Necessary installation instructions" are followed and especially that adequate cooling is ensured

The following must be noted when the pump is shut down for a longer period of time:



#### CAUTION

If there is a risk of frost, all the cooling water must be drained out of the vacuum pump if the pump is shut down for a longer period of time!

- Drain the cooling liquid
  - ◆ Unscrew the drain cap (CLD) for the cooling liquid
  - ◆ Drain the cooling liquid completely
  - ◆ Screw on the drain cap (CLD) for the cooling liquid again
  - ◆ Collect the cooling liquid and recycle it or dispose of it according to local or national regulations

- Drain the cooling water
  - ◆ Pull off the connections for the inlet and outlet of the cooling water
  - ◆ Drain the cooling water completely
  - ◆ If necessary, drain the cooling water with the help of compressed air to prevent any risk of frost or corrosion

**NOTE:** When the pump has not been in operation for a few days or when a sticky substance has been sucked, it is possible that the two scroll rotors of the NS vacuum pump will stick to each other. Screw open the access cover to the scroll rotors. Loosen the rotors from each other with the help of an Allan key by turning them in clockwise direction by hand.

## Switching the vacuum pump on/ off

### First start-up of the system

- Make sure that the “Necessary installation instructions” are followed

If the system is equipped with a solenoid gate valve at the intake:

- Open the solenoid gate valve
- Make sure that the cooling water flow is set correctly with valves TV and CWR 1
- The thermostatic valve TV is preset on position 4.5 at works. The position 1 of the valve corresponds to around 50°C minimum and the position 5 is approximately 90°C maximum. We recommend to use a high valve setting to prevent resublimation in the pump
- Do not exceed the position 5 of the thermostatic valve. If you change the position of the thermostatic valve, adjust the regulating valve CWR 1.
- The cooling water flow is factory set on 2 l/min and can be adjusted at the regulating valve CWR 1. This water circuit is used to cool the motor of the NS pump. It cools also the cylinder and cylinder endplate B-side when temperature of cooling liquid is above 50°C.
- Make sure that the nitrogen flow is set correctly
- Nitrogen flow injected in the middle hole (8) is preset at 2 l/min and can be adjusted with valve DGR 1. Nitrogen flow injected in the hole on cylinder endplate side (9) is preset at 10 l/min and can be adjusted with valve DGR 2.
- Make sure that the system does not leak

If the system is equipped with a solenoid gate valve at the intake:

- ◆ Open the solenoid gate valve

### Switching the system off

If the system is equipped with a solenoid gate valve at the intake:

- ◆ Close the solenoid gate valve
- Switch off the vacuum pump
- Shut off the nitrogen supply
- Shut off the cooling water supply

If the system is equipped with a solenoid gate valve in the cooling water circuit:

- ◆ Close the solenoid gate valve
- Make sure that the system is currentless

## Maintenance



In case the vacuum pump has conveyed gases that have been contaminated with foreign materials that are dangerous to health, the oil and condensates will also be contaminated.

These foreign materials can infiltrate the pores, recesses and other internal spaces of the vacuum pump.

Danger to health when the vacuum pump is dismantled.

Danger to the environment.

Always wear protective clothing when carrying out maintenance work.

Before any maintenance work, the inlet and outlet piping as well as the vacuum pump itself must be flushed with nitrogen.



Only authorised personnel may carry out dismantling work on the vacuum pump. Before work begins, the operator of the vacuum pump must fill in a form or a “Declaration Regarding Contamination of Equipment and Components” that provides information on possible dangers and appropriate measures. If this form has not been filled in completely and signed, the vacuum pump may not be dismantled.



Before maintenance work is started, a safety area of at least 610 [mm] around the machine must be set up.



The surface temperature of the vacuum pump can exceed 50°C when the vacuum pump is in operation.

Danger of burns!

Before starting maintenance work, make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally. Follow the shutdown procedure in the section “Lock Out/ Tag Out procedure”:

- stop the pump with the remote control (press on STOP button during 10s)
- press on emergency stop button
- switch off the main disconnect switch
- switch off the customer’s power supply
- switch off the water and nitrogen quick connections (inlet first, then outlet)
- put the label or warning board “Maintenance processing” on or next to the pump



The oil temperature can reach a value of 100°C!

The cooling liquid temperature can reach the value of 100°C!

Danger of burns!

- Make sure that the oil circuit and the coolant circuit have been emptied before moving the vacuum pump
- Make sure that there are no cleaning tools in the pump anymore according to local and national regulations

Before pulling off the different connections, make sure that the intake and exhaust lines of the vacuum pump correspond to atmospheric pressure

When the maintenance work has been finished, follow the procedure "Safety Lockout procedure":

- take off the label or warning board "Maintenance processing"
- check the cooling liquid and oil levels according to the chapters "Checking the oil level" and "Checking the cooling liquid level"
- open the power box cover and check that the FDP1 thermal relay is on manual reset position
- close the cover
- switch on the main disconnect switch
- release the emergency stop button
- switch on the water and nitrogen quick connections (outlet first, then inlet)
- make sure that the "Necessary installation instructions" are followed
- start the pump with the remote control (press on START button)

## Maintenance program

**NOTE:** The maintenance intervals depend on the operating conditions. The following intervals are basic values, which can be shortened or lengthened depending on operating conditions. In especially difficult operating conditions such as, for example, a very dusty environment the maintenance intervals must be shortened considerably.

### Weekly:

- Check the oil level and the colour of the oil (see "Checking the oil")
- Check the level of the cooling liquid (see "Checking the cooling liquid")
- Check the cooling water flow (see "Checking the cooling water")
- Check the nitrogen flow (see "Checking the nitrogen")
- Inspect the vacuum pump for oil leaks - if there are leaks, repair the vacuum pump (Busch)
- Inspect the vacuum pump for leaks of cooling liquid - if there are leaks, repair the vacuum pump (Busch)
- Inspect the vacuum pump for leaks of cooling water - if there are leaks, repair the vacuum pump (Busch)

### Monthly:

In the case of operation in a dusty environment:

- ◆ Make sure that the operating room is clean and free of dust; clean if necessary
- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Check the electrical connections
- Carry out a visual inspection of the vacuum pump

### Yearly:

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally

If the intake is equipped with a sieve:

- ◆ Check the sieve at the intake and clean if necessary
- Check the measuring and safety equipment for working order

If the discharge is equipped with a sound absorber:

- ◆ Clean the sound absorber

If the discharge is equipped with a leak-protection non-return valve:

- ◆ Clean the leak-protection non-return valve
- Drain the cooling liquid (see "Draining the cooling liquid")
- Check the ventilator filter, clean if necessary

If the cooling water line is equipped with a filter:

- ◆ Check the filter and clean or replace if necessary
- Check the seals and replace if necessary
- Check the intake and discharge lines and clean or replace if necessary

## Every 16 000 hours of operation, at the latest after 4 years:

- Drain the oil (see "Draining the oil")
- A main inspection of the vacuum pump (Busch)

## Lock Out/ Tag Out procedure

- Stop the pump with the remote control (press on STOP button during 10s)
- Press on emergency stop button
- Switch off the main disconnect switch
- Switch off the customer's power supply
- Switch off the water and nitrogen quick connections (inlet first, then outlet)
- Put the label or warning board "Maintenance processing" on or next to the pump

## Safety Lockout procedure

- Take off the label or warning board "Maintenance processing"
- Check the cooling liquid and oil levels according to the chapters "Checking the oil level" and "Checking the cooling liquid level"
- Open the power box cover and check that the FDP1 thermal relay is on manual reset position
- Close the cover
- Switch on the main disconnect switch
- Release the emergency stop button
- Switch on the water and nitrogen quick connections (outlet first, then inlet)
- Make sure that the "Necessary installation instructions" are followed
- Start the pump with the remote control (press on START button)

## Checking the oil

### Checking the oil level

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Indication of the oil level on the various oil sight glasses

If the oil level is below the target circle or the MIN marking (Booster):

- ◆ Top up with oil (see "Refilling oil")

If the oil level exceeds the target circle or the MAX marking (Booster):

- ◆ Check the condensate drain
- Drain the oil (see "Draining the oil")

### Refilling oil

**NOTE:** Oil does not normally have to be refilled outside the recommended oil change intervals. A drop in the oil level indicates a fault (see "Troubleshooting" Busch PLC and Busch LCD).



CAUTION

Only fill in oil through the oil filler opening.



### CAUTION

Danger of burns when the oil filler cap is open.

Danger of injuries when the oil filler cap is not screwed on properly.

Only unscrew the oil filler cap when the vacuum pump has been switched off.

The vacuum pump may only be switched on when the oil filler cap is properly closed and tight.

We recommend submitting the vacuum pump to a leakage rate test in order to ensure the vacuum pump is leak tight.

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Unscrew the oil filler cap (OFF)
- Fill in oil up to the target circle or the middle (Booster) of the oil sight glass (OSG)
- Make sure that the oil level still lies in the target circle or between the MIN and MAX markings (Booster) on the oil sight glasses.
- Make sure that the seals of the filler cap are not damaged and that they sit properly. Replace them if necessary
- Screw on the filler cap again

### Checking the colour of the oil

**NOTE:** The oil must be clear and transparent. A permanent milky colour is an indication for contamination by foreign bodies. A dark colour is an indication for oil that has been chemically altered or contaminated by foreign bodies.



### WARNING

Dark colored oil may indicate a hazardous pump condition which could cause personal injury.



If dark oil similar to the example shown is observed, you have to contact the Busch Customer Service without delay.

### Oil change



### DANGER

If the vacuum pump has pumped gases that were contaminated with foreign bodies that are hazardous to health, the oil is also contaminated with these foreign bodies.

There is a health hazard when changing contaminated oil.

There is also a danger to the environment.

Wear protective clothing when replacing contaminated oil.

Contaminated oil must be treated specially and must be disposed of according to applicable regulations.

### Draining used oil

**NOTE:** After switching off the vacuum pump at normal operating temperature wait no more than 20 minutes before the oil is drained.

- Make sure that the vacuum pump is switched off and cannot accidentally be switched on again
- Make sure that the vacuum pump is vented to atmospheric pressure
- Put a drain tray underneath the oil drain plugs (ODP)
- Remove the oil drain plugs (ODP)
- Carefully remove the drain plugs
- Drain the oil
- Because of wear and tear on the seals replace the current drain plugs with new ones

When the oil flow has stopped:

- ◆ Close the oil drain plugs (ODP)
- Switch on the vacuum pump for a few seconds
- Make sure that the vacuum pump is switched off and cannot accidentally be switched on again
- Remove the oil drain plugs again and drain any remaining oil
- Check that no metal swarf sticks to the magnet of the drain plug, clean if necessary
- Refit the oil drain plugs and tighten up
- Dispose of the used oil in compliance with applicable regulations



### CAUTION

Because the ends of the drain plugs are magnetic, metal swarf can stick to them. Always clean away this swarf when removing the drain plugs.

Because of wear and tear of the seals, it is recommended to replace the drain plugs whenever the oil is changed.

### Filling in new oil

- Prepare the quantity of oil needed (see "Oil type/ quantity")



### WARNING

The use of chemically contaminated or polluted oil can lead to hazardous pump conditions which could cause personal injury.

**NOTE:** The quantity of oil specified in the installation handbook is of informative nature only. Check the oil level with the help of the various oil sight glasses on the vacuum pump.

- Make sure that the drain plugs have been fitted properly and that they do not leak

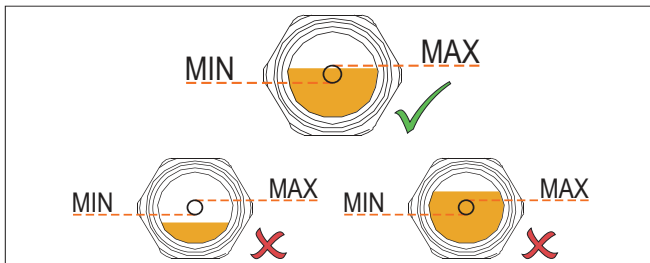


### CAUTION

Only fill in oil through the oil filler opening.

### COBRA NS 0070 C

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Unscrew the oil filler cap (OFF)
- Fill in oil up to the target circle of the oil sight glass (OSG)
- Make sure that the oil level still lies in the target circle on the oil sight glasses (OSG).
- Make sure that the seals of the filler cap are not damaged and that they sit properly. Replace them if necessary.
- Screw on the filler cap again



### Booster

- Unscrew the oil filler cap (OFF)
- Fill in oil
- Make sure that the oil level lies between the MIN and MAX markings on the oil sight glasses
- Make sure that the seals of the oil filler cap are not damaged. Replace them if necessary
- Screw on the oil filler cap hermetically tight

## Checking the cooling liquid

### Checking the level of the cooling liquid

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Check the level of the cooling liquid.
  - ◆ Unscrew purge valve on cylinder upper plate.

Cooling liquid level should be just under the plate.

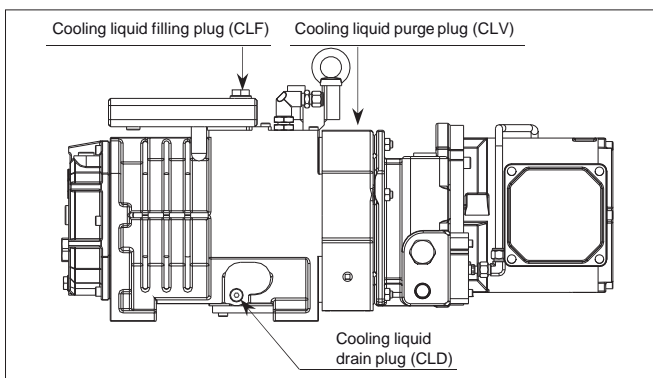
If the level is below:

- ◆ Top up with cooling liquid (see "Refilling cooling liquid")

### Refilling cooling liquid

**NOTE:** Cooling liquid does not normally have to be refilled outside the recommended change intervals. A drop in the level of the liquid indicates a fault (see "Troubleshooting").

Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally



- Unscrew the filler cap (CLF) for the cooling liquid
- Open purge valve (CLV)
- Fill in by filler hole (CLF) until cooling liquid flows by drain plug of cylinder upper plate
- Stop fill in
- Fill in again by filler hole until cooling liquid flows by purge valve of cylinder upper plate
- Close the purge valve (CLV)
- Screw on the cooling liquid filler cap again
- If liquid has run on to the outside surfaces of the vacuum pump, wipe it off

## Draining the cooling liquid

- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Make sure that the vacuum pump has adjusted to atmospheric pressure
- Place a container under the drain plug (CLD) for the cooling liquid
- Unscrew purge valve (CLV) on cylinder upper plate
- Unscrew drain plug (CLD) of cooling liquid
- Drain the cooling liquid

When cooling liquid stops running out:

- Close the drain plug (CLD) for the cooling liquid
- Screw purge valve (CLV) and drain plug (CLD)
- Switch on the vacuum pump and let it run for a few seconds
- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Unscrew again purge valve (CLV) on cylinder upper plate
- Unscrew the drain plug (CLD) for the cooling liquid again and drain the remaining liquid
- Make sure that the seal of the drain plug is not damaged and that it sits properly. Replace it if necessary
- Screw on the drain plug (CLD) again
- Screw purge valve (CLV) and drain plug (CLD)
- Dispose of the used cooling liquid according to applicable environmental protection regulations

## Filling in new cooling liquid

- Prepare the quantity of cooling liquid needed (see "Cooling liquid type/ quantity")

**NOTE:** The quantity of cooling liquid specified is of informative nature only. Respect the procedure of filling the cooling liquid.

- Unscrew filler cap (CLF) of cooling liquid on the expansion vessel
- Open the purge valve (CLV)
  - Fill in the cooling liquid through the filler opening until the liquid starts running out the purge valve (CLV)
- Stop filling in cooling liquid
- Close the purge valve (CLV)
- Fill in more cooling liquid through the filler opening until the level of the liquid is 5 mm above the bottom of the expansion vessel
- Check the level of the cooling liquid with the measuring scale located under the filler. The level of the liquid must not lie above the bottom marking.

**NOTE:** You can also check the level of the liquid with the help of a ruler

- Screw on the filler cap for the cooling liquid again.
- If cooling liquid has run on the outside surfaces of the vacuum pump, wipe it off.

## Checking the cooling water

### Checking the cooling water flow

- Check the cooling water flow regularly

If the flow drops, check for leaks

- ◆ Make sure that the specifications of the cooling water are followed

## Checking the nitrogen

### Checking the nitrogen flow

- Check the nitrogen flow regularly

If the flow drops, check for leaks

- ◆ Make sure that the specifications of the nitrogen are followed

## Checking the current consumption

- Check the current intensity of the motor

An increased intensity is an indication for a fault (see "Troubleshooting")

## Checking the sound absorber (accessory)

- Make sure that the condensate does not collect at the exhaust of the vacuum pump
- Drain the condensate at the drain opening and collect it in a container
- Dispose of the condensate according to applicable environmental protection regulations
- Check the sound absorber regularly and clean it if necessary

## Checking the leak-protection non-return valve (accessory)

- Check the leak-protection non-return valve regularly and clean it if necessary



CAUTION

Wear protective clothing when carrying out maintenance work on the sound absorber and leak-protection non-return valve.

There could still be residues of contamination.

## Overhaul



CAUTION

Inappropriate maintenance work on the vacuum pump can damage the pump.

Danger of explosion!

If requirements are not met, the vacuum pump may not be switched on!

Should work exceed the dismantling work described in this handbook, it may only be carried out by authorised persons.



DANGER

If the vacuum pump has pumped gases that were contaminated with foreign bodies that are hazardous to health, the oil and condensate are also contaminated with these foreign bodies.

These foreign bodies can penetrate into pores, openings and other internal parts of the vacuum pump.

There is a health hazard when dismantling the vacuum pump.

There is also a danger to the environment.

Prior to shipping, the vacuum pump must imperatively be decontaminated and the degree of contamination must be documented in a declaration of decontamination ("Declaration of Decontamination"), which can be downloaded from [www.buschvacuum.com](http://www.buschvacuum.com).

Busch service will only accept vacuum pumps that come with a completely filled in and legally binding signed form.

## Removal from service

### Temporary removal from service

Before disconnecting the intake and exhaust lines and switching off the cooling water and nitrogen lines, make sure that the lines have been adjusted to atmospheric pressure.

## Recommissioning



CAUTION

If the vacuum pump was switched off for a longer period of time, the rotors of the COBRA NS vacuum pump can be jammed.

Turn the scroll rotors by hand.

- Make sure that the various protective elements, stoppers or adhesive tapes have been removed
- Switch on the vacuum pump by following the procedure described in the chapter "Installation and start-up"

## Dismantling and disposal



DANGER

If the vacuum pump has pumped gases that were contaminated with foreign bodies that are hazardous to health, the oil and condensate are also contaminated with these foreign bodies.

These foreign bodies can penetrate into pores, openings and other internal parts of the vacuum pump.

There is a health hazard when dismantling the vacuum pump.

There is also a danger to the environment.

Protective clothing must be worn when dismantling the vacuum pump.

Prior to shipping, the vacuum pump must imperatively be decontaminated and the degree of contamination must be documented in a declaration of decontamination ("Declaration of Decontamination"), which can be downloaded from [www.buschvacuum.com](http://www.buschvacuum.com).

Dispose of the used oil and condensate according to applicable environmental protection regulations.

When the product has reached the end of its lifetime:

- decontaminate the vacuum pump



CAUTION

Dismantling work must be carried out by authorised personnel. Before work begins, the operator of the vacuum pump must fill in a form or a "Declaration of Decontamination" that provides information on possible dangers and appropriate measures.

If this form has not been filled in completely and signed, the vacuum pump may not be dismantled.

- drain the oil
  - ◆ dispose of the oil according to local environmental protection regulations
- drain the cooling liquid
  - ◆ dispose of the cooling liquid according to local environmental protection regulations
- begin dismantling the vacuum pump



CAUTION

Wear protective clothing when carrying out dismantling work.

- ◆ dispose of the vacuum pump as scrap metal
  - dispose of the individual parts of the machine according to local regulations
- A lithium battery is present inside the PLC:
- eliminate the lithium battery according to local and national regulations in place, relating to environment

# Oil type/ quantity

## Oil type

- Make sure that the oil type corresponds to specification:
  - Busch YLC 250 B, Art. No. 0831 131 400 (0,5 l  $\cong$  1 kg)



**WARNING**

The use of chemically contaminated or polluted oil can lead to hazardous pump conditions which could cause personal injury.

## Oil quantity

The quantity of oil specified in the following table is of informative nature only. Check the oil level with the help of the various oil sight glasses on the vacuum pump.

Pump type	MB pump motor side (A - liters)	MB pump gear side (B- liters)	DP pump motor side (A - liters)	DP pump gear side (B - liters)
DS 0080 G	-	-	1.2	0.5
DS 0160 G	-	-	1.2	0.5
DS 0700 G	0.6	0.8	1.2	0.5
DS 1000 G	0.6	0.8	1.2	0.5
DS 2000 G	1.2	1.5	1.2	0.5

# Cooling liquid type/ quantity

## Cooling liquid type

- Make sure that the cooling liquid type corresponds to specifications:

Specifications	Zitrec M-25 (ready-to-use)	
	20 litres can	5 litres can
	part no. 0831 238 761	part no. 0831 563 469

## Cooling liquid quantity

The quantity of cooling liquid specified in this instructions manual is of informative nature only. Respect the procedure of filling the cooling liquid.

Quantity	Zitrec M-25 (already mixed ready-to-use)
DS 0080-2000 G	4 litres



### CAUTION

The proportion of pure glycol and water for the cooling liquid corresponds to a percentage of 40% pure glycol and 60% water. It is therefore not necessary to prepare the mix before use. But when using pure glycol, it is imperative to prepare the mix prior to filling the pump and to respect this proportion.



# Technical data

Technical data				DS 0080 G	DS 0160 G	DS 0700 G
Nominal suction capacity		50 Hz 60 Hz	m <sup>3</sup> /h (cfm) m <sup>3</sup> /h (cfm)	70 (40) 85 (50)	140 (82) 160 (93)	500 (290) 610 (354)
Ultimate pressure			Torr mbar	2.25 x 10 <sup>-2</sup> 3 x 10 <sup>-2</sup>	2.25 x 10 <sup>-2</sup> 3 x 10 <sup>-2</sup>	2.25 x 10 <sup>-3</sup> 3 x 10 <sup>-3</sup>
Nominal motor rating	DP	50 Hz 60 Hz	kW kW	4.0 4.4	5.5 6.6	4.0 4.4
Nominal motor rating	MB	50 Hz 60 Hz	kW kW	-	-	4.0 4.4
Power at ultimate pressure		50 Hz 60 Hz	kW kW	2.6 3.2	4.3 5.2	3.0 3.6
Nominal motor speed	DP	50 Hz 60 Hz	min <sup>-1</sup> min <sup>-1</sup>	3000 3600	3000 3600	3000 3600
Nominal motor speed	MB	50 Hz 60 Hz	min <sup>-1</sup> min <sup>-1</sup>	-	-	3000 3600
Noise level (EN ISO 2151)*		50 Hz 60 Hz	dB(A) dB(A)	62	68	62
Ambient temperature			°C °F	0 - 40 32 - 104	0 - 40 32 - 104	0 - 40 32 - 104
Maximal counter pressure	Discharge		bar	0.2	0.2	0.2
Cooling water requirement			l/ min	7-8	7-8	7-8
Cooling water pressure			bar	2-5	2-5	2-5
Nitrogen requirement	approx.		l/ min	0-75	0-75	0-75
Nitrogen overpressure			bar	1.5	1.5	1.5
Weight	approx.		kg	276	338	445

\* with silencer at exhaust

Technical data				DS 1000 G	DS 2000 G
Nominal suction capacity		50 Hz 60 Hz	m <sup>3</sup> /h (cfm) m <sup>3</sup> /h (cfm)	775 (447) 960 (565)	1365 (790) 1640 (950)
Ultimate pressure			Torr mbar	2.25 x 10 <sup>-3</sup> 3 x 10 <sup>-3</sup>	2.25 x 10 <sup>-3</sup> 3 x 10 <sup>-3</sup>
Nominal motor rating	DP	50 Hz 60 Hz	kW kW	4.0 4.4	5.5 6.6
Nominal motor rating	MB	50 Hz 60 Hz	kW kW	4.0 4.4	5.5 6.6
Power at ultimate pressure		50 Hz 60 Hz	kW kW	3.3 4.0	5.6 6.8
Nominal motor speed	DP	50 Hz 60 Hz	min <sup>-1</sup> min <sup>-1</sup>	3000 3600	3000 3600
Nominal motor speed	MB	50 Hz 60 Hz	min <sup>-1</sup> min <sup>-1</sup>	3000 3600	3000 3600
Noise level (EN ISO 2151)*		50 Hz 60 Hz	dB(A) dB(A)	62	68
Ambient temperature			°C °F	0 - 40 32 - 104	0 - 40 32 - 104
Maximale counter pressure	Discharge		bar	0.2	0.2
Cooling water requirement			l/ min	7-8	7-8
Cooling water pressure			bar	2-5	2-5
Nitrogen requirement	approx.		l/ min	0-75	0-75
Nitrogen overpressure			bar	1.5	1.5
Weight	approx.		kg	576	668

\* with silencer at exhaust

# EU Declaration of Conformity

This Declaration of Conformity and the CE-mark 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-mark.

The manufacturer

Busch Manufacturing Korea, Ltd.  
189-51, Soicheon-ro, Majang-myun  
Icheon-si, Gyunggi-do, 467-813  
Republic of Korea

declares that the machine(s): **DS 0080 G; DS 0160 G; DS 0700 G; DS 1000 G; DS 2000 G**

fulfil(s) all the relevant provisions from European directives:

- 'Machinery' 2006/42/EC
- 'Electromagnetic Compatibility' 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 designated standards that have been used to fulfil those provisions:

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

Icheon-si, 25.01.2022



Seung-hwa Yoo, General Director

# UK Declaration of Conformity

This Declaration of Conformity and the UKCA-mark 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-mark.

The manufacturer

**Busch Manufacturing Korea, Ltd.**  
189-51, Soicheon-ro, Majang-myun  
Icheon-si, Gyunggi-do, 467-813  
Republic of Korea

declares that the machine(s): **DS 0080 G; DS 0160 G; DS 0700 G; DS 1000 G; DS 2000 G**

fulfil(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

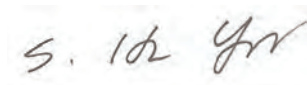
and comply(-ies) with the following designated standards that have been used to fulfil those provisions:

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

Icheon-si, 25.01.2022

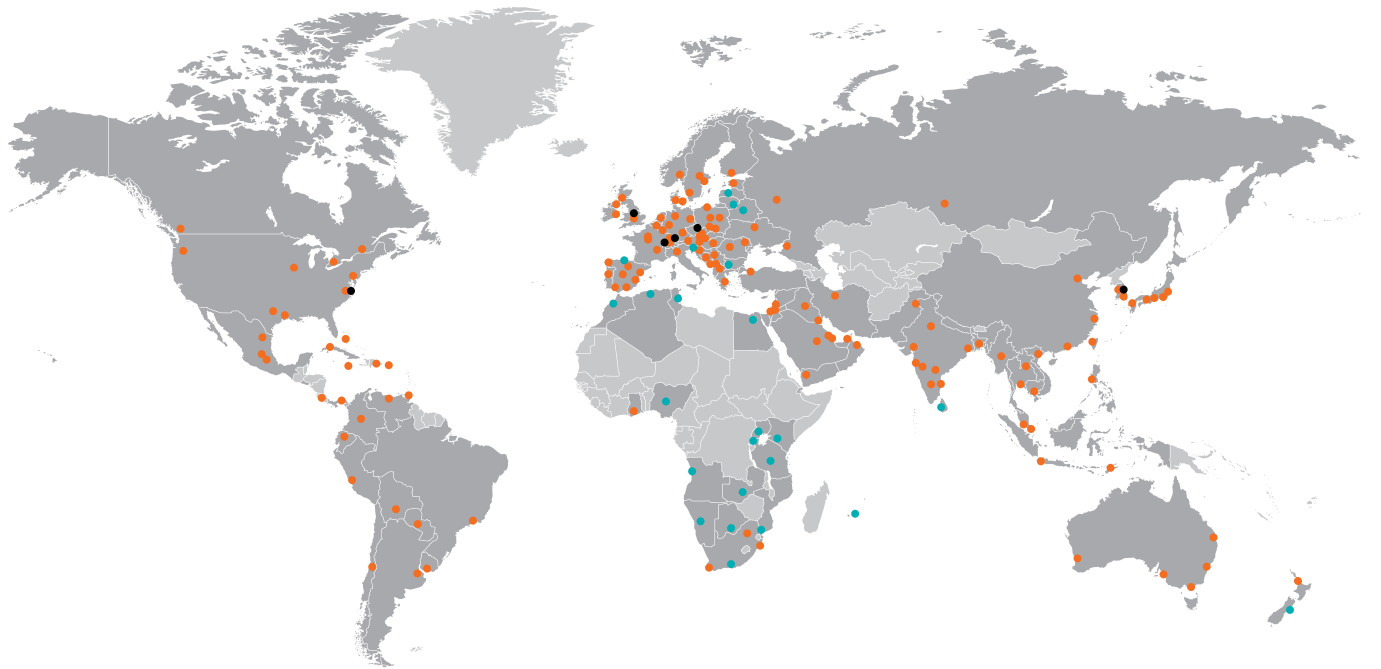


**Seung-hwa Yoo, General Director**

# Busch

## Vacuum Solutions

With a network of over 60 companies in more than 40 countries and agencies worldwide, Busch has a global presence. In every country, highly competent local personnel delivers custom-tailored support backed by a global network of expertise. Wherever you are. Whatever your business. We are there for you.



● Busch companies and Busch employees   ● Local representatives and distributors   ● Busch production site

[www.buschvacuum.com](http://www.buschvacuum.com)