Installation and Maintenance Instructions

Screw Vacuum Pumps

COBRA BA 0100 C

CE

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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

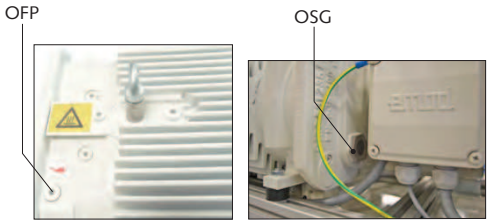
- product description,
- safety,
- transport,
- storage,
- installation and commissioning
- maintenance,
- overhaul and
- troubleshooting

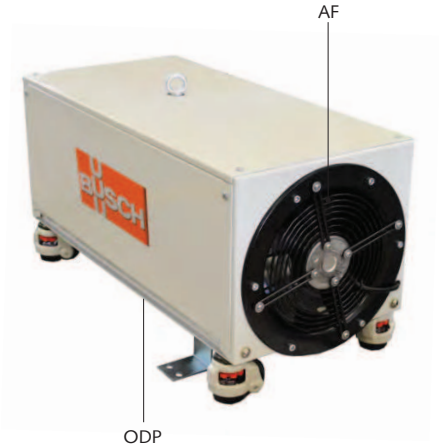
of the vacuum pump.

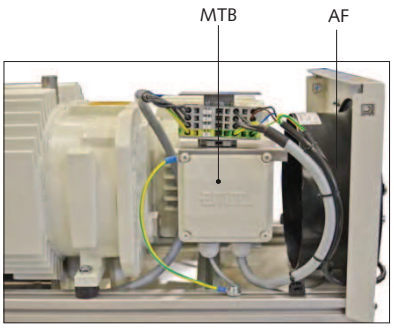
For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

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.



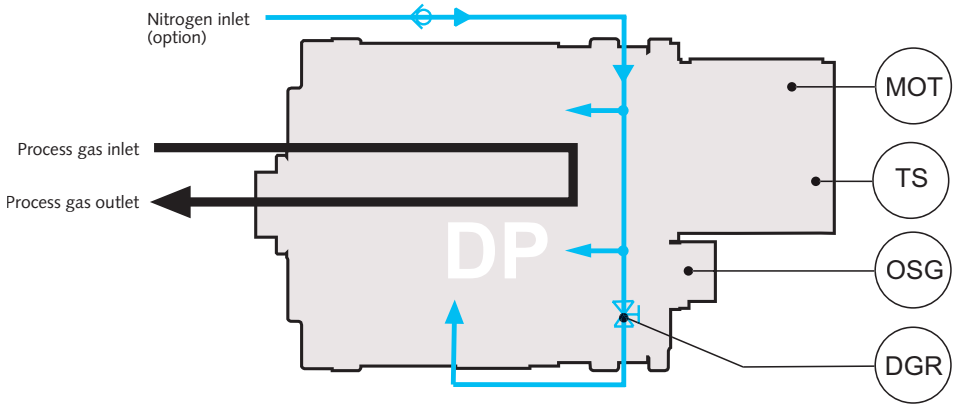




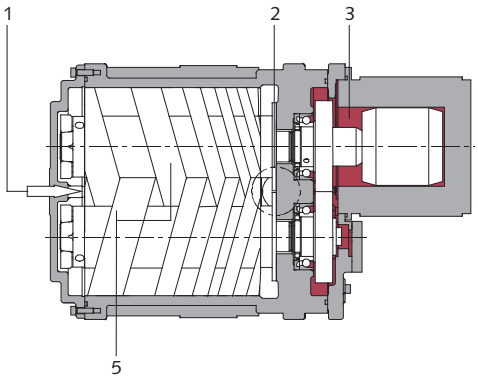
Pump BA 0100 C description

IN Inlet
OUT Discharge
ODP Oil drain plug
OFP Oil filler plug
OSG Oil sight glass
AF Fan
DGC Nitrogen inlet (option)
ECO Electrical connection
ECP Earth connection
MSH On/ Off switch
EB Lifting bracket
DGR Nitrogen regulating valve (option)
MTB Terminal box

Nitrogen circuit



OSG Oil level indicator
MOT Motor
TS Motor klixon
DGR Nitrogen regulating valve, dilution (option)



1 Inlet
2 Discharge
3 Oil
5 Screw rotors

Product description

Use

The COBRA BA 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 vacuum pump sucking in a certain quantity of liquid. If the vacuum 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.

As far as temperature is concerned, the vacuum pump is suitable for evacuation of a 300 liters tank. The vacuum pump is not suitable for continuous duty at a pressure more or equal than 150 mbar. Caution, the operating cycle of 150 mbar must not exceed more than 5 min. For other applications, contact your Busch representative.

The vacuum pump is tight down to ultimate pressure.

Operating principle

The COBRA BA 0100 C vacuum pumps are COBRA NA screw vacuum pumps.

The COBRA NA screw vacuum pumps operate according to the principle of screw pumps. Two parallel screws (5) rotate in opposite directions in the vacuum pump body. Entering gases are trapped between the flights of the screws and the vacuum pump body. The gases are conveyed by the rotation of the screws to the exhaust, where they are discharged.

The COBRA NA screw vacuum pumps are driven by air-cooled motors.

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

- a cooling air circuit. This cooling air circuit is used to cool the motor of the vacuum pump and also the body of the NA pump.

NOTE: The COBRA BA vacuum pumps are always delivered without oil. Operation without this coolant can result in damage to the vacuum pump.

Nitrogen system (option)

The Nitrogen system performs the following functions:

– Nitrogen is used as dilution gas. It is injected inside the cylinder on two ports. Nitrogen flow injected is preset at 4 l/min (Nitrogen overpressure: 1,5 bar) and can be adjusted with valves DGR, depending on the application. Dilution improves the screws functionning, especially when drawing in corrosive gases.
– Nitrogen is used as to improve the sealing, the N2 gas is injected between the transmission and the process gas

The connection of the nitrogen system is generally done using flexible hoses (diameter 1/4'')

Connection diameter:

– G 1/4, ISO 228

Optional functions/ Use of available accessories

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

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

On/ Off switch

Start-up and switch-off of the vacuum pump are carried out with the On/ Off switch.

Safety

Intended use

DEFINITION: To rule out any misunderstanding, the term "handling" of the vacuum pump covers transport, storage, installation and operation of the vacuum 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 vacuum 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.

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 damage.

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 vacuum pump of min. 610 [mm].

Lock Out/ Tag Out procedure

- Switch off the On/ Off switch
- 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 oil level according to the chapters "Checking the oil level"
- Switch on the On/ Off switch

Transport

The COBRA BA vacuum pumps are tested and checked in our factory before careful packing. Check the packaging for transport damage when the goods arrive. The vacuum pump can withstand temperatures betweeen -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 brackets:

◆ Unscrew the fastening nuts of the brackets 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 eyebolt on the cylinder
- Use a hoist that is equipped with a hook and safety lock
- Lift the vacuum pump

CAUTION

The vacuum pump may not be lifted anymore when it has been filled with oil.

- Take off the two brackets

CAUTION

Do not throw away the brackets, they can be re-used later for setting the vacuum pump on the ground.

Moving of the vacuum pump is simple using the four wheels placed under the vacuum pump frame.

The design of the baseframe is such that transport of the vacuum pump can be made with a Europe palett truck.

Make sure before every transport that the oil has been drained out of the vacuum pump.

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

This handbook is contained in the delivery package.

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 vacuum 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 vacuum 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 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

NOTE: The levelling of the vacuum pump is facilitated by the adjustment stroke (~15 mm) of the four machine foots.

- Make sure that the four rollers do not touch the ground

NOTE: In order to ensure the fixation of the vacuum pump to the ground, it is possible to use again the two brackets that were removed at the reception of the machine.

- 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 glass (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:

– DN 50 ISO KF

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

CAUTION

Do not put hands into the outlet aperture.

Risk of body damage!

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

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 vacuum 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.

Electrical connection/ Checks

- Make sure that the regulations of the Electromagnetic Compatibility Directive 2004/ 108/ EC and Low Voltage Directive 2006/ 95/ EC 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 vacuum pump at its final installation site

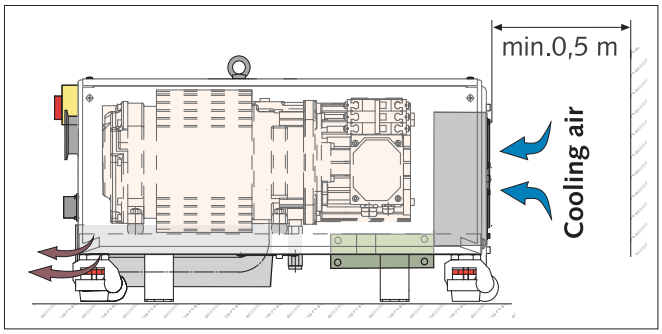
Rotation sense of cooling fan

CAUTION

Check the rotation sense of the cooling fan with the direction arrow placed on the cooling fan and put your hand, palm against the cooling fan grid.

Press the on/ off swtich briefly and check that the cooling fan sucks air inside and through the whole vacuum pump.

If the direction of rotation has to be changed: exchange two of the three feeder leads



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 COBRA BA 0100 C is connected at factory.

CAUTION

The transformer voltage must be in accordance with the supply voltage of the machine.

- Connect supply cable on the female connection (ECO) of the vacuum pump

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 the rotation sense of the motor by using a measure tool or putting a rubber plate on the inlet flange.
- Press the main breaker briefly
- Make sure that the vacuum pump draws in

If the direction of rotation has to be changed:

- ◆ Exchange two of the three feeder leads

Power wiring connection

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

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 BA 0100 C vacuum pumps are always delivered without oil (see the chapter "Oil types" for information on the recommended oils).

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

NOTE: The quantity of oil specified in the installation handbook is of informative nature only. Check the oil level with the help of the oil sight glass (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 glass
- Make sure that the seal of the oil filler cap is not damaged. Replace it 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 not 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 between the MIN and MAX markings on the oil sight glass

If the oil level is below the MIN marking:

- ◆ 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

The vacuum pump may not be lifted anymore when it has been filled with oil.

- Make sure before every transport that the oil has been drained out of the vacuum pump.

CAUTION

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

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 BA 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.
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The vacuum pump is tight down to 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 vacuum 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 damage!

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

CAUTION

The COBRA BA 0100 C vacuum pumps are always delivered without oil.

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.

- 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

Switching the vacuum pump on/ off

First start-up of the system

- Make sure that the “Necessary installation instructions” are followed
- Switch on the vacuum pump
- 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
- Make sure that the system is currentless

Maintenance

DANGER

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.

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

CAUTION

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.

CAUTION

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

CAUTION

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":

– switch off the On/ Off switch
– put the label or warning board "Maintenance processing" on or next to the pump

CAUTION

The oil temperature can reach a value of 90°C!

Danger of burns!

- Make sure that the oil circuit has been emptied before moving the vacuum pump
- Make sure that there are no cleaning tools in the vacuum 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 oil level according to the chapter "Checking the oil level"
– make sure that the "Necessary installation instructions" are followed
– switch on the On/ Off switch

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")
- Inspect the vacuum pump for oil leaks - 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

Every 1000 hours of operation:

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

Every 5000 hours of operation:

- Drain the oil (see "Draining the oil")

Every 10 000 hours of operation:

- 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:

A main inspection of the vacuum pump (Busch)

Lock Out/ Tag Out procedure

- Switch off the On/ Off switch
- 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 oil level according to the chapter "Checking the oil level"
- Make sure that the "Necessary installation instructions" are followed
- Switch on the On/ Off switch

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 oil sight glass

If the oil level does not reach the MIN marking:

◆ Top up with oil (see “Refilling oil”)

If the oil level exceeds the MAX marking:

◆ 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”).

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.

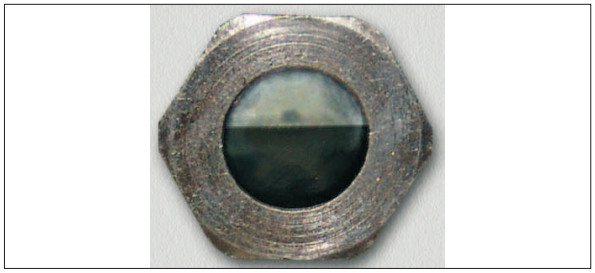
- Make sure that the vacuum pump has been switched off and that it cannot be switched on again accidentally
- Unscrew the oil filler cap (OFP)
- Fill in oil up to the middle of the oil sight glass
- Make sure that the oil level lies between the MIN and MAX markings on the oil sight glass
- Make sure that the seal of the filler cap is not damaged and that they sit properly. Replace it 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.

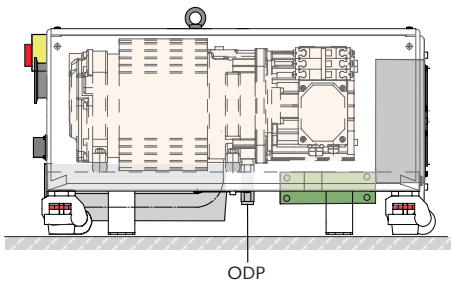
Wear protective clothing when replacing contaminated oil.

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 plug
- Unscrew the oil drain plug (ODP)
- Drain the oil



When the oil flow has stopped:

◆ Refit the oil drain plug

- 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 plug again and drain any remaining oil
- Carefully unscrew and remove the magnetic plug (180)

- Check that no metal swarf sticks to the magnet of the magnetic plug, clean if necessary
- Make sure that the sealing washer on the magnetic plug is not damaged, replace it if necessary
- Refit the magnetic plug and tighten up
- Make sure that the sealing washer on the drain plug is undamaged and correctly positioned, replace it if necessary
- Refit the oil drain plug and tighten up

Dispose of the used oil in compliance with applicable regulations

CAUTION

Because of wear and tear of the seal, it is recommended to replace the drain plug 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 oil sight glass on the vacuum pump.

- Make sure that the drain plug has been fitted properly and that they do not leak

CAUTION

Only fill in oil through the oil filler opening.

- Unscrew the oil filler cap (OFP)
- Fill in oil up to the middle of the oil sight glass
- Make sure that the oil level lies between the MIN and MAX markings on the oil sight glass
- Make sure that the seal of the filler cap is not damaged and that it sit properly. Replace it if necessary
- Screw on the filler cap again

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

Inappropiate 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.

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, make sure that the lines have adjusted to atmospheric pressure

Recommissioning

- 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.

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
– 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

Troubleshooting

N°	Problem	Cause/ Check items	Actions
1	Evacuation difficulties	• Obstruction in the inlet piping • Leakage from inlet piping • Product accumulated in the pump • Leakage from oil filling plug	• Clean the piping • Check the piping • Disassemble the pump • Check tighting of the plug
2	Motor overload	• Back pressure of pump too high • Tightness of the rotors • Failure of the amperage instrument • Mechanical problems in the pump	• Check the discharge piping • Purge the vacuum pump with N2, release if necessary • Replace the instrument • Disassemble the pump
3	Back pressure too high	• Discharge piping obstructed	• Clean the piping
4	Pump temperature too high	• Failure of the fan • Back pressure of pump too high • Pump contaminated with product residues • Ambient temperature too high	• Check the fan • Check the discharge piping • Disassemble the pump • Check the limits of use
5	Oil level too low	• Oil to low • Oil leakage	• Check the oil casing sealings • Refill with oil

Oil type/ quantity

Oil type

- Make sure that the oil type corresponds to specification:

– Busch VF 250, Art. No. 0831 564 840 (0,12 l)

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 oil sight glass on the vacuum pump.

Quantity [Liter]	Quantity [Liter]
BA 0100 C	0,12

Technical data

Technical data				BA 0100 C
Nominal suction capacity		60 (50) Hz	m^3/h	105 (85)
Ultimate pressure		60 (50) Hz	hPa(mbar)/ mTorr	0,01/ 7,5
Nominal motor rating		60 (50) Hz	kW	1,8 (1,5)
Power consumption at ultimate pressure		60 (50) Hz	kW	1,25 (1,1)
Noise level (EN ISO 2151)			dB(A)	<58
Ambient temperature			°C (°F)	0-40 (32-104)
Maximal counter pressure	Discharge		bar	0,2
Nitrogen overpressure			bar	1,5
Weight	approx.		kg	120

EC-Declaration of Conformity

NOTE: This Declaration of Conformity and the CE-mark affixed to the nameplate are valid for the vacuum pump within the Busch-scope of delivery. When this vacuum pump is integrated into a larger machinery the manufacturer of the larger machinery (this can be the operator, too) must conduct the conformity assessment process acc. to the Directive Machinery 2006/42/EC for the larger machine, issue the Declaration of Conformity for it and affix the CE-mark.

We

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declare that the vacuum pumps **BA 0100 C**

in accordance with the European Directives

"Machinery" 2006/42/EC,

"Electromagnatic Compatibility" 2004/108/EC

"Restriction of the use of certain hazardous substances in electrical and electronic equipment" 2011/65/EU

have been designed and manufactured to the following specifications:

Standard	Title of the Standard
Harmonised Standards	
EN ISO 12100-1 EN ISO 12100-2	Safety of machinery - Basic concepts, general principles of design - Part 1 and 2
EN ISO 13857	Safety of machinery - Safety distance to prevent hazard zones being reached by upper and lower limbs
EN 1012-1 EN 1012-2	Compressors and vacuum pumps - Safety requirements - Part 1 and 2
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61000-6-1 EN 61000-6-3	Electromagnetic compatibility (EMC) – Generic standards – Immunity and emission for residential, commercial and light-industrial environments; Part 1 and 3
EN 61000-6-2 EN 61000-6-4	Electromagnetic compatibility (EMC) – Generic standards – Immunity and emission standard for industrial environments; Part 2 and 4
National Standard	
EN ISO 2151	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)

Manufacturer	Representative inside the EU	Person authorised to compile the technical file
Christian Hoffmann General director	**Dr.-Ing. Karl Busch** General director	**Gerd Rohweder** Product manager

Note

Note

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