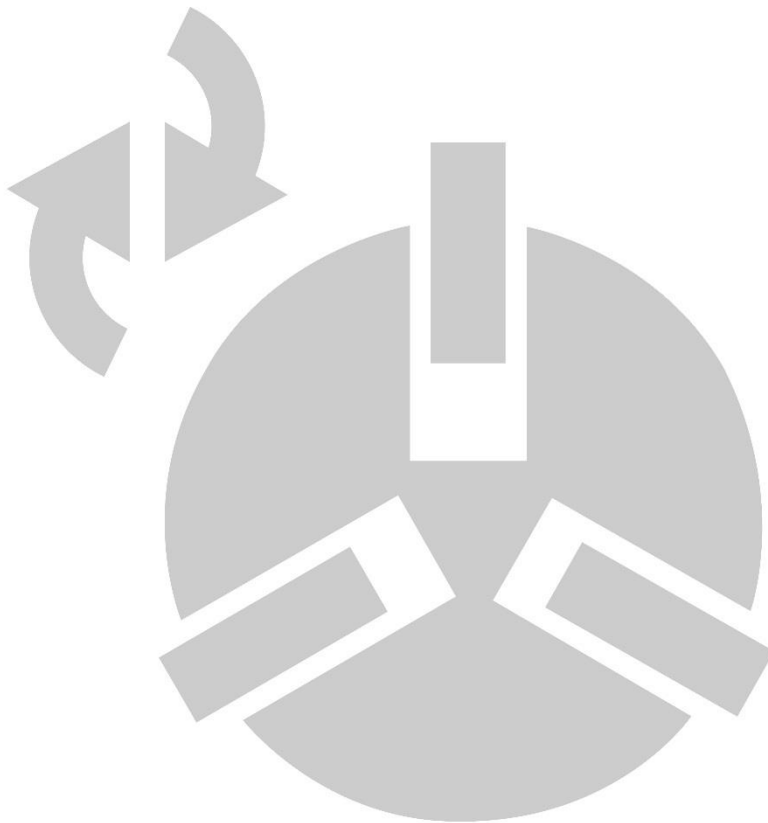




VACUUM SOLUTIONS

Installation and Operating Instructions



Vacuum Pumps

R5 PB/PC 0008 C

Get technical data,
instruction manuals,
service kits



VACUUM APP

CE UK EAC

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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,
- troubleshooting and
- spare parts

of the vacuum pump.

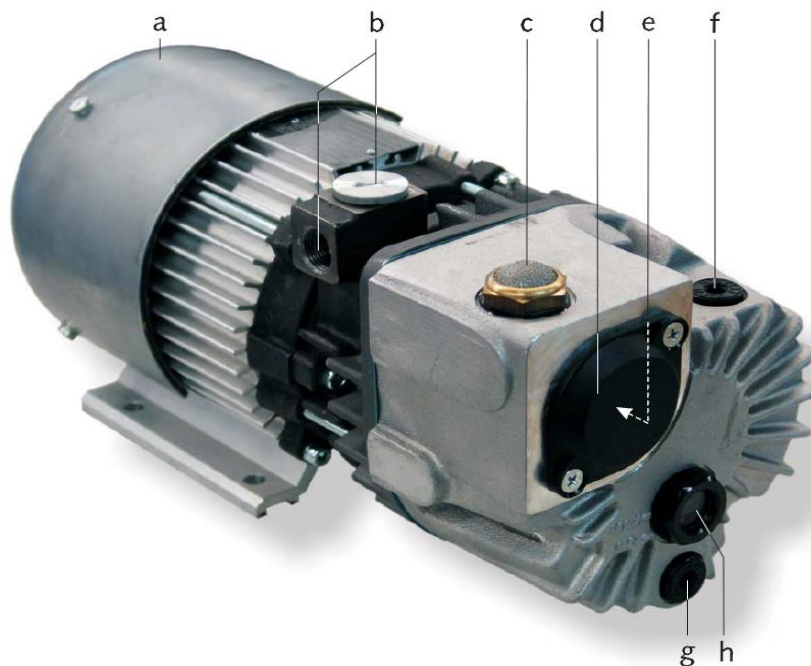
For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

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.

Technical Data

Nominal suction capacity (50Hz/60Hz)	m ³ /h	8 / 9.6
Ultimate pressure	hPa (=mbar) abs.	PB 0008 C: 2 PC 0008 C: 30
Motor nominal rating (50Hz/60Hz)	kW	0.35 / 0.45
Motor nominal speed (50Hz/60Hz)	min ⁻¹	3000 / 3600
Sound pressure level (DIN EN ISO 2151) (50Hz/60Hz)	dB (A)	64 / 68
Ambient temperature range	°C	See "Oil"
Ambient pressure		Atmospheric pressure
Oil quantity	l	0.25
Weight approx. (50Hz/60Hz)	kg	~10.3



- a Directional arrow
- b Suction connections with non-return valve
- c Gas discharge
- d Lid over exhaust filter
- e Exhaust filter
- f Oil fill plug
- g Oil drain plug
- h Oil sight glass

Product Description

Use

The vacuum pump is intended for

- the suction

of

- air and other dry, non-aggressive, non-toxic and non-explosive gases

Conveying media with a lower or higher density than air leads to an increased thermal and/or mechanical load on the vacuum pump and is permissible only after prior consultation with Busch.

Permissible temperature range of the inlet gas: see “Oil”, “Ambient temperature range”

In case the vacuum pump is equipped with a gas ballast (optional) water vapour within the gas flow can be tolerated within certain limits (→ page 9: Conveying Condensable Vapours). The conveyance of other vapours shall be agreed upon with Busch.

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

Version with oil return line to the suction connection (PC 0008 C): The vacuum pump is thermally suitable for continuous operation (100 percent duty).

Version with three-phase motor and oil return valve (PB 0008 C): The vacuum pump is suitable for continuous operation (observe the notes with regard to the oil recirculation: → page 3: Oil Circulation; → page 9: Oil Return).

Version with single-phase motor:

The vacuum and pressure pump is intended for intermittent operation (S3). The drive is equipped with a thermal protection switch.

The vacuum pump is ultimate pressure proof.

Principle of Operation

The vacuum pump works on the rotating vane principle.

A circular rotor is positioned centrally on the shaft of the vacuum pump (i.e. drive motor shaft).

The rotor rotates in an also circular, fixed cylinder, the centreline of which is offset from the centreline of the rotor such that the rotor and the inner wall of the cylinder almost touch along a line. Vanes, sliding in slots in the rotor, separate the space between the rotor and the cylinder into chambers. At any time gas is sucked in and at almost any time ejected. Therefore the vacuum pump works almost pulsation free.

In order to avoid reverse rotation after switching off, the vacuum pump is equipped with a non-return valve (b).

Note: This valve shall not be used as a non-return valve or shut-off valve to the vacuum system and is no reliable means to prevent suction of oil into the vacuum system while the vacuum pump is shut down.

In case the vacuum pump is equipped with a gas ballast (optional):

Through the gas ballast a small amount of ambient air is sucked into the pump chamber and compressed together with the process gas. This counteracts the accumulation of condensates from the process gas inside the vacuum pump (→ page 9: Conveying Condensable Vapours).

The gas ballast line is equipped with a sinter metal filter.

For noise reduction the gas discharge is equipped with a sinter metal plug. The discharge gas is released to the ambient of the vacuum pump.

Oil Circulation

The vacuum pump requires oil to seal the gaps, to lubricate the vanes and to carry away compression heat.

The oil reservoir is located on the pressure side of the vacuum pump (i.e. high pressure) at the bottom of the bottom chamber of the oil separator.

The feed openings are located on the suction side of the vacuum pump (i.e. low pressure).

Forced by the pressure difference between pressure side and suction side oil is being drawn from the oil separator through the oil supply lines and injected on the suction side.

Together with the sucked gas the injected oil gets conveyed through the vacuum pump and ejected into the oil separator as oil mist. Oil that separates before the exhaust filter (e) accumulates at the bottom of the bottom chamber of the oil separator.

Oil that is separated by the exhaust filter (e) accumulates at the bottom of the upper chamber of the oil separator.

The flow resistance of the exhaust filters (e) causes the inside of the exhaust filters (which is connected to the bottom chamber of the oil separator) to be on a higher pressure level than the outside of the exhaust filters (i.e. the upper chamber of the oil separator). Because of the higher pressure in the bottom chamber it is not possible to let oil that drips off the exhaust filters simply flow down to the bottom chamber.

Version with oil return line to the suction connection (PC 0008 C): Therefore the oil that accumulates in the upper chamber is sucked through the oil return line right to the suction connection.

Version with three-phase motor and oil return valve (PB 0008 C): At continuous operation this would cause the entire supply of oil to accumulate at the bottom of the upper chamber, expel oil droplets through the gas discharge/pressure connection and let the vacuum pump run dry. Therefore, the vacuum pump must be shut down at the latest after 0.5 hours of continuous operation, depending on the operating conditions even after a shorter period, for at least approx. 5 minutes (→ page 8: Operation Notes). After turning off the vacuum pump the pressure difference between the inside and the outside of the exhaust filter(s) (e) collapses, hence the two chambers of the oil separator assume an equal pressure level, the oil return valve between the two chambers opens and the accumulated oil in the upper chamber can run down to the bottom chamber.

Cooling

The vacuum pump is cooled by

- radiation of heat from the surface of the vacuum pump incl. oil separator
- the air flow from the fan wheel of the drive motor
- the process gas

Start Controls

The vacuum pump comes with a terminal box or with a cable with MATE-N-LOK-connector. Depending on the specification of the vacuum pump it can come with another cable with switch and/or a connector. In case the vacuum pump comes without a switch the control of the vacuum pump is to be provided in the course of installation.

Note: MATE-N-LOK-connections feature no strain relief.

Safety

Intended Use

Definition: 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.

The vacuum pump is intended for industrial use. It shall be handled only by qualified personnel.

The allowed media and operational limits (→ page 3: Product Description) and the installation prerequisites (→ page 5: Installation Prerequisites) of the vacuum pump shall be observed both by the manufacturer of the machinery into which the vacuum pump is to be incorporated and by the operator.

The maintenance instructions shall be observed.

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

Safety Notes

The vacuum pump has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain. These operating instructions highlight potential hazards where appropriate. Safety notes are tagged with one of the keywords DANGER, WARNING and CAUTION as follows:



DANGER

Disregard of this safety note will always lead to accidents with fatal or serious injuries.



WARNING

Disregard of this safety note may lead to accidents with fatal or serious injuries.



CAUTION

Disregard of this safety note may lead to accidents with minor injuries or property damage.

Emission of Oil Mist



CAUTION

The non-OEM spares market offers exhaust filters that are geometrically compatible with Busch-vacuum pumps, but do not feature the high retention capacity of genuine Busch-exhaust filters.

Increased risk of damage to health.

In order to keep the emission on the lowest possible level only genuine Busch-exhaust filters shall be used.

The oil in the process gas is separated to the greatest possible extent, but not perfectly.



CAUTION

The gas conveyed by the vacuum pump contains remainders of oil.

Aspiration of process gas over extended periods can be harmful.

The room into which the process gas is discharged must be sufficiently vented.

Note: The possibly sensible smell is not caused by droplets of oil, though, but either by gaseous process components or by readily volatile and thus gaseous components of the oil (particularly additives).

Noise Emission

For the sound pressure level in free field according to EN ISO 2151 → page 2: Technical Data.

Transport

Note: Also a vacuum pump, that is not topped up with oil contains residues of oil (from the test run). Always transport and store the vacuum pump in upright position. Do not put the vacuum pump on its side nor put it upside down.

Transport in Packaging

Vacuum pumps individually packed in cardboard boxes can be carried by hand.

Packed on a pallet the vacuum pump is to be transported with a forklift.

Transport without Packaging

In case the vacuum pump is packed in a cardboard box with inflated cushions:

- ◆ Remove the inflated cushions from the box

In case the vacuum pump is packed in a cardboard box cushioned with rolled corrugated cardboard:

- ◆ Remove the corrugated cardboard from the box

In case the vacuum pump is laid in foam:

- ◆ Remove the foam
- Grasp the vacuum pump with both hands



CAUTION

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

Starting the vacuum pump with excessive quantities of oil in the cylinder will immediately break the vanes and ruin the vacuum pump.

Once the vacuum pump is filled with oil it shall not be lifted anymore.

- Prior to every transport make sure that the oil is drained

Storage

Short-term Storage

Version with gas ballast without ball-valve, with sinter metal filter:

- ◆ Close the sinter metal filter of the gas ballast device with adhesive tape
- Make sure that the suction connection and the gas discharge are closed (leave the provided plugs in)
- Store the vacuum pump
 - If possible in original packaging,
 - indoors,
 - dry,
 - dust free and
 - vibration free.

Conservation

In case of adverse ambient conditions (e.g. aggressive atmosphere, frequent temperature changes) conserve the vacuum pump immediately. In case of favourable ambient conditions conserve the vacuum pump if a storage of more than 3 months is scheduled.

During the test run in the factory the inside of the vacuum pump was completely wetted with oil. Under normal conditions a treatment with conservation oil is therefore not required. In case it is advisable to treat the vacuum pump with conservation oil because of very adverse storage conditions, seek advice from your Busch representative!

Version with gas ballast without ball-valve, with sinter metal filter:

- ◆ Close the sinter metal filter of the gas ballast device with adhesive tape
- Make sure that all ports are firmly closed; seal all ports that are not sealed with PTFE-tape, gaskets or o-rings with adhesive tape

Note: VCI stands for “volatile corrosion inhibitor”. VCI-products (film, paper, cardboard, foam) evaporate a substance that condenses in molecular thickness on the packed good and by its electro-chemical properties effectively suppresses corrosion on metallic surfaces. However, VCI-products may attack the surfaces of plastics and elastomers. Seek advice from your local packaging dealer! Busch uses CORTEC VCI 126 R film for the overseas packaging of large equipment.

- Wrap the vacuum pump in VCI film
- Store the vacuum pump
 - If possible in original packaging,
 - indoors,
 - dry,
 - dust free and
 - vibration free.

For commissioning after conservation:

- Make sure that all remains of adhesive tape are removed from the ports
- Commission the vacuum pump as described in the chapter Installation and Commissioning (→ page 5)

Installation and Commissioning

Installation Prerequisites



CAUTION

In case of non-compliance with the installation prerequisites, particularly in case of insufficient cooling:

Risk of damage or destruction of the vacuum pump and adjoining plant components!

Risk of injury!


The installation prerequisites must be complied with.

- Make sure that the integration of the vacuum pump is carried out such that the essential safety requirements of the Machine Directive 2006/42/EC are complied with (in the responsibility of the designer of the machinery into which the vacuum pump is to be incorporated; → page 21: note in the EU-Declaration of Conformity)

Mounting Position and Space

- Make sure that the environment of the vacuum pump is not potentially explosive
 - Make sure that the following ambient conditions will be complied with:
 - ambient temperature: see “Oil”
- If the vacuum pump is installed in a colder environment than allowed with the oil used:

- ◆ Fit the vacuum pump with a temperature switch and control the vacuum pump such that it will start automatically when the oil sump temperature falls below the allowed temperature
- ambient pressure: atmospheric
- Make sure that the environmental conditions comply with the protection class of the drive motor (according to the nameplate)
- Make sure that the MATE-N-LOK-connection will not be put under strain
- Make sure that the vacuum pump will be placed or mounted horizontally
- Make sure that the base for placement / mounting base is even
- Make sure that in order to warrant a sufficient cooling there will be a clearance of minimum 2 cm between the vacuum pump and nearby walls
- Make sure that no heat sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the vacuum pump
- Make sure that the installation space or location is vented such that a sufficient cooling of the vacuum pump is warranted



CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.


Risk of burns!

- Make sure that the vacuum pump will not be touched inadvertently during operation, provide a guard if appropriate
- Make sure that the sight glass (h) will remain easily accessible

If the oil change is meant to be performed on location:

- ◆ Make sure that the drain port (g) and the filling port (f) will remain easily accessible
- Make sure that enough space will remain for the removal and the reinsertion of the exhaust filter (e)

Suction Connection



CAUTION

Intruding foreign objects or liquids can destroy the vacuum pump.

In case the inlet gas can contain dust or other foreign solid particles:

- ◆ Make sure that a suitable filter (5 micron or less) is installed upstream the vacuum pump
- Make sure that the suction line fits to the suction connection (b) of the vacuum pump
- Make sure that the gas will be sucked through a vacuum-tight flexible hose or a pipe

In case of using a pipe:

- ◆ Make sure that the pipe will cause no stress on the vacuum pump's connection, if necessary use an expansion joint
- Make sure that the line size of the suction line over the entire length is at least as large as the suction connection (b) of the vacuum pump

In case of very long suction lines it is prudent to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your Busch representative!

If two or more vacuum pumps work on the same suction line, if the volume of the vacuum system is large enough to suck back oil or if the vacuum shall be maintained after switching off the vacuum pump:


- ◆ Provide a manual or automatic operated valve (= non-return valve) in the suction line

(the standard non-return valve that is installed inside the suction connection is not meant to be used for this purpose!)

If the vacuum pump is planned to be used for the suction of gas that contains limited quantities of condensable vapour:

- ◆ Provide a shut-off valve, a drip-leg and a drain cock in the suction line, so that condensates can be drained from the suction line
- Make sure that the suction line does not contain foreign objects, e.g. welding scales

Gas Discharge



CAUTION

The discharge gas contains small quantities of vacuum oil.

Staying in vacuum oil contaminated air bears a risk of damage to health.

If air is discharged into rooms where persons stay, sufficient ventilation must be provided for.

The discharged gas must flow without obstruction. It is not permitted to shut off or throttle the discharge line or to use it as a pressurised air source.

Electrical Connection / Controls

- Make sure that the stipulations acc. to the EMC-Directive 2014/30/EU and Low-Voltage-Directive 2006/95/EC as well as the EN-standards, electrical and occupational safety directives and the local or national regulations, respectively, are complied with (this is the responsibility of the designer of the machinery into which the vacuum pump is to be incorporated; → page 21: note in the EU-Declaration of Conformity).
- Make sure that the power supply for the drive motor is compatible with the data on the nameplate of the drive motor
- Make sure that an overload protection according to EN 60204-1 is provided for the drive motor
- Make sure that the drive of the vacuum pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary seek advice from the Busch service

Installation

Mounting

- Make sure that the installation prerequisites (→ page 5) are complied with
- Set down or mount the vacuum pump at its location

Connecting Electrically



WARNING

Risk of electrical shock, risk of damage to equipment.

Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations:

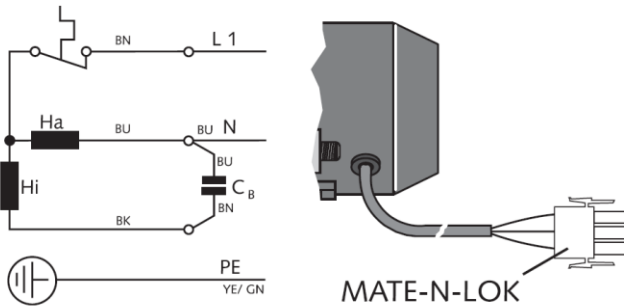
- IEC 364 or CENELEC HD 384 or DIN VDE 0100, respectively,
- IEC-Report 664 or DIN VDE 0110,
- BGV A2 (VBG 4) or corresponding national accident prevention regulation.

- Electrically connect the drive motor
- Connect the protective earth conductor

Connection Scheme Alternating Current Motor

Explanation of colour coding:

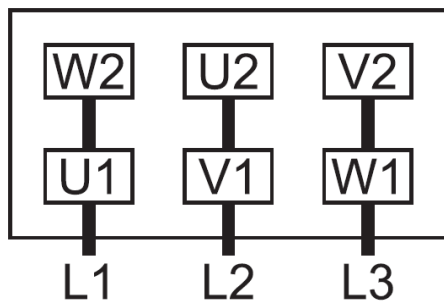
BK = black
 BN = brown
 BU = blue
 GN = green
 WH = white
 YE = yellow



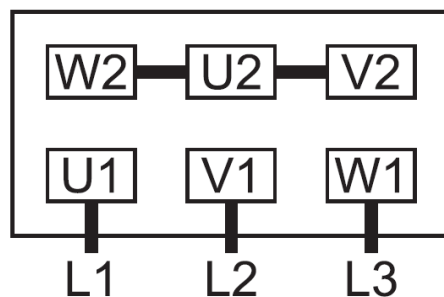
MATE-N-LOK

Connection Scheme Three-Phase Motor

Delta connection (low voltage):



Star connection (high voltage):



CAUTION

Operation in the wrong direction of rotation can destroy the vacuum pump in short time

Prior to starting-up it must be made sure that the vacuum pump is operated in the proper direction (clockwise rotating field).

Version with three-phase motor:

- ♦ Determine the intended direction of rotation with the arrow (stuck on or cast)
- ♦ "Bump" the drive motor
- ♦ Watch the fan wheel of the drive motor and determine the direction of rotation just before the fan wheel stops

If the rotation must be changed:

- ♦ Switch any two of the drive motor wires (three-phase motor)

Connecting Lines/Pipes

In case the suction line is equipped with a shut-off valve:

- ♦ Connect the suction line
- Make sure that the gas discharge (c) is open
- Make sure that all provided covers, guards, hoods etc. are mounted
- Make sure that the cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way

Filling Oil

In case the vacuum pump was treated with conservation oil:

- ♦ Drain the remainders of conservation oil



CAUTION

The vacuum pump is shipped without oil.

Operation without oil will ruin the vacuum pump in short time.

Prior to commissioning it must be made positively sure that oil is filled in.

The vacuum pump is delivered without oil (oil specification → page 20: Oil).

- Keep approx. 0.25 litres oil acc. to the table Oil (→ page 20) ready

Note: The amount given in these operating instructions is a guide. The sight glass (h) indicates the actual amount to be filled in.



CAUTION

Filling oil through the suction connection (b) will result in breakage of the vanes and destruction of the vacuum pump.

Oil may be filled through the filling port (f) only.



CAUTION

During operation the oil separator is filled with hot, pressurised oil mist.

Risk of injury from hot oil mist with open filling port

Risk of injury if a loosely inserted filling plug (f) is ejected.

Remove the filling plug (f) only if the vacuum pump is stopped.

The vacuum pump must only be operated with the filling plug (f) firmly inserted.

- Remove the filling plug (f)
- Fill in approx. 0.25 litres of oil
- Make sure that the level is between the MIN and the MAX-markings of the sight glass (h)
- Make sure that the seal ring is inserted into the filling plug (f) and undamaged, if necessary replace the filling plug (f)
- Firmly reinsert the filling plug (f) together with seal ring

Note: Starting the vacuum pump with cold oil is made easier when at this very moment the suction line is neither closed nor covered with a rubber mat.

- Switch on the vacuum pump

In case the suction line is equipped with a shut-off valve:

- ◆ Close the shut-off valve

In case the suction line is not equipped with a shut-off valve:

- ◆ Cover the suction connection (b) with a piece of rubber mat

- Let the vacuum pump run for a few minutes
- Shut down the vacuum pump and wait a few minutes
- Check that the level is between the MIN and the MAX-markings of the sight glass (h)

In case the level has dropped below the MIN-marking:

- ◆ Top-up oil

In case the suction line is equipped with a shut-off valve:

- ◆ Open the shut-off valve

In case the suction line is not equipped with a shut-off valve:

- ◆ Remove the piece of rubber mat and connect the suction line

Recording of Operational Parameters

As soon as the vacuum pump is operated under normal operating conditions:

- Measure the drive motor current and record it as reference for future maintenance and troubleshooting work

Operating Notes

Use



CAUTION

The vacuum pump is designed for operation under the conditions described below.

In case of disregard risk of damage or destruction of the vacuum pump and adjoining plant components!

Risk of injury!

The vacuum pump must only be operated under the conditions described below.

The vacuum pump is intended for

- the suction

of

- air and other dry, non-aggressive, non-toxic and non-explosive gases

Conveying media with a lower or higher density than air leads to an increased thermal and/or mechanical load on the vacuum pump and is permissible only after prior consultation with Busch.

Permissible temperature range of the inlet gas: see "Oil", "Ambient temperature range"

In case the vacuum pump is equipped with a gas ballast (optional) water vapour within the gas flow can be tolerated within certain limits (→ page 9: Conveying Condensable Vapours). The conveyance of other vapours shall be agreed upon with Busch.

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

Version with oil return line to the suction connection (PC 0008 C): The vacuum pump is thermally suitable for continuous operation (100 percent duty).

Version with three-phase motor and oil return valve (PB 0008 C): The vacuum pump is suitable for continuous operation (observe the notes with regard to the oil recirculation: → page 3: Oil Circulation; → page 9: Oil Return).

Version with single-phase motor:

The vacuum and pressure pump is intended for intermittent operation (S3). The drive is equipped with a thermal protection switch.

The vacuum pump is ultimate pressure proof.



CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

The vacuum pump shall be protected against contact during operation, it shall cool down prior to a required contact or heat protection gloves shall be worn.



CAUTION

The gas conveyed by the vacuum pump contains remainders of oil.

Aspiration of process gas over extended periods can be harmful.

The room into which the process gas is discharged must be sufficiently vented.

- Make sure that all provided covers, guards, hoods etc. remain mounted
- Make sure that protective devices will not be disabled
- Make sure that cooling air inlets and outlets will not be covered or obstructed and that the cooling air flow will not be affected adversely in any other way
- Make sure that the installation prerequisites (→ page 5: Installation Prerequisites) are complied with and will remain complied with, particularly that a sufficient cooling will be ensured

Oil Return

Only for version with three-phase motor and oil return valve (PB 0008 C) :

During operation oil accumulates at the bottom of the upper chamber of the oil separator, which cannot flow down into the bottom chamber, as long as the vacuum pump runs (for detailed description: → page 3: Oil Circulation).

At the latest after 0.5 hours of continuous operation, in case of high pressure difference between suction side and pressure side after a shorter period, the vacuum pump must be shut down for at least 5 minutes, so that the oil can run down from the upper chamber of the oil separator into the bottom chamber. **Note:** This is a good time to check the temperature, the level and the colour of the oil.

Conveying Condensables Vapours



CAUTION

Residual condensates dilute the oil, deteriorate its lubricating properties and can cause a seizure of the rotor.

Apply a suitable operating method to make sure that no condensates remain in the vacuum pump.

In order to use the vacuum pump for the conveyance of condensable vapours, the vacuum pump must be equipped with a shut-off valve in the suction line and with a gas ballast.

- Close the shut-off valve in the suction line
- Operate the vacuum pump with the suction line shut off for approx. half an hour, so that the operating temperature rises to approx. 75 °C

At process start:

- Open the shut-off valve in the suction line

At the process end:

- Close the shut-off valve in the suction line
- Operate the vacuum pump for another approx. half an hour

Maintenance



DANGER

In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in filters.

Danger to health during inspection, cleaning or replacement of filters.

Danger to the environment.

Personal protective equipment must be worn during the handling of contaminated filters.

Contaminated filters are special waste and must be disposed of separately in compliance with applicable regulations.



CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

- Prior to action that requires touching of the vacuum pump, let the vacuum pump cool down, however, if the oil is to be drained, for no more than 20 minutes (the oil shall be warm when being drained)
- Prior to disconnecting connections make sure that the connected pipes/lines are vented to atmospheric pressure

Maintenance Schedule

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

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

Daily:

- Check the level and the colour of the oil (→ page 10: Checking the Oil)

Weekly:

- Check the vacuum pump for leaks - in case of leaks have the vacuum pump repaired (Busch service)

Monthly:

- Check the function of the exhaust filter (e) (→ page 11: Exhaust Filter)
- Make sure that the vacuum pump is shut down and locked against inadvertent start up

In case an inlet air filter is installed:

- ♦ Check the inlet air filter, if necessary replace

In case of operation in a dusty environment:

- ♦ Clean as described under → page 10: Every 6 Months

Every 6 Months:

- Make sure that the housing is free from dust and dirt, clean if necessary
- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Clean the fan cowling, fan wheel, the ventilation grille and cooling fins

Every Year:

- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Replace the exhaust filter (e) (→ page 11: Exhaust Filter)

In case an inlet air filter is installed:

- ◆ Replace the inlet air filter

In case an inlet screen is installed:

- ◆ Check the inlet screen, clean if necessary

Version with gas ballast with sinter metal filter:

- ◆ Clean the sinter metal filter (compressed air)

Every 500 - 2000 Operating Hours:

(→ page 10: Oil Life):

- Change the oil (→ page 11: Oil Change)

Checking the Oil

Checking the Level

- Make sure that the vacuum pump is shut down and the oil has collected at the bottom of the oil separator
- Read the level on the sight glass (h)

In case the level has dropped underneath the MIN-marking:

- ◆ Top up oil (→ page 10: Topping up Oil)

In case the level exceeds the MAX-marking:

- ◆ Excessive dilution with condensates - change the oil and check the process
- ◆ If appropriate retrofit a gas ballast (Busch Service) and observe the chapter Conveying Condensable Vapours (→ page 9)

In case the level exceeds the MAX-marking despite proper use of the gas ballast:

- ◆ Clean the sinter metal filter (compressed air)

Topping up Oil

Note: Under normal conditions there should be no need to top up oil during the recommended oil change intervals. A significant level drop indicates a malfunction (→ page 14: Troubleshooting).

Note: During operation the exhaust filter gets saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filter.



CAUTION

Filling oil through the suction connection (b) will result in breakage of the vanes and destruction of the vacuum pump.

Oil may be filled through the filling port (f) only.



CAUTION

During operation the oil separator is filled with hot, pressurised oil mist.

Risk of injury from hot oil mist with open filling port

Risk of injury if a loosely inserted filling plug (f) is ejected.

Remove the filling plug (f) only if the vacuum pump is stopped.

The vacuum pump must only be operated with the filling plug (f) firmly inserted.

- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Remove the filling plug (f)
- Top up oil until the level reaches the middle of the sight glass (h)
- Make sure that the seal ring is inserted into the filling plug (f) and undamaged, if necessary replace the filling plug (f)
- Firmly reinsert the filling plug (f) together with the seal ring

Checking the Colour of the Oil

Note: The oil should be light, either transparent, a little foamy or a little tarnished. A milky discolouration that does not varnish after sedation of the oil indicates contamination with foreign material. Oil that is either contaminated with foreign material or burnt must be changed (→ page 11: Oil Change).

In case the oil appears to be contaminated with water or other condensates despite proper use of the gas ballast:

- ◆ Clean the sinter metal filter (compressed air)

Oil Life

The oil life depends very much on the operating conditions. A clean and dry air stream and operating temperatures below 100 °C are ideal. Under these conditions the oil shall be changed every 500 to 2000 operating hours or after half a year.

Under very unfavourable operating conditions the oil life can be less than 500 operating hours. Extremely short life times indicates malfunctions (→ page 14: Troubleshooting) or unsuitable operating conditions, though.

Choosing a synthetic oil instead of a mineral oil can extend the oil life. To select the oil best suited oil for your process please contact your Busch representative.

If there is no experience available with regard to the oil life under the prevailing operation conditions, it is recommended to have an oil analysis carried out every 500 operating hours and establish the change interval accordingly.

Oil Change



DANGER

In case the vacuum pump conveyed gas that was contaminated with harmful foreign materials the oil will be contaminated with harmful material.

Danger to health during the changing of contaminated oil.

Danger to the environment.

Personal protective equipment must be worn during the changing of contaminated oil.

Contaminated oil is special waste and must be disposed of separately in compliance with 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 (the oil shall still be warm when being drained).

- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Make sure that the vacuum pump is vented to atmospheric pressure
- Put a drain tray underneath the drain port (g)
- Remove the drain plug (g) and drain the oil

When the oil stream dwindles:

- Reinsert the drain plug (g)
- Switch the vacuum pump on for a few seconds
- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Remove the drain plug (g) again and drain the remaining oil
- Make sure that the seal ring is inserted into the drain plug (g) and undamaged, if necessary replace the drain plug (g)
- Firmly reinsert the drain plug (g) together with the seal ring
- Dispose of the used oil in compliance with applicable regulations

Flushing the Vacuum Pump



WARNING

Degraded oil can choke pipes and coolers.

Risk of damage to the vacuum pump due to insufficient lubrication.

Risk of explosion due to overheating.

If there is a suspicion that deposits have gathered inside the vacuum pump the vacuum pump shall be flushed.

- Make sure that all the used oil is drained
- Create 0.25 litres flushing agent from 50 percent oil and 50 percent paraffin or diesel fuel/fuel oil
- Make sure that the drain plug (g) is firmly inserted
- Remove the filling plug (f)
- Fill in the flushing agent
- Firmly reinsert the filling plug (f)

- Close the suction line
- Run the vacuum pump for at least half an hour
- Drain the flushing agent and dispose of it in compliance with applicable regulations

Note: Due to the use of paraffin and even more in case of using diesel fuel/fuel oil, an unpleasant odour can occur after recommissioning. If this is a problem, diesel fuel/fuel oil should be avoided and the vacuum pump be run at idle in a suitable place until the unpleasant odour vanishes.

Filling in Fresh Oil

- Keep 0.25 litres oil acc. to the table Oil (→ page 20) ready

Note: The amount given in these operating instructions is a guide. The sight glass (h) indicates the actual amount to be filled in.

- Make sure that the drain plug (g) is firmly inserted



CAUTION

Filling oil through the suction connection (b) will result in breakage of the vanes and destruction of the vacuum pump.

Oil may be filled through the filling port (f) only.

- Remove the filling plug (f)
- Fill in approx. 0.25 litres of oil
- Make sure that the level is between the MIN and the MAX-markings of the sight glass (h)
- Make sure that the seal ring is inserted into the filling plug (f) and undamaged, if necessary replace the filling plug (f)
- Firmly reinsert the filling plug (f) together with the seal ring

Exhaust Filter

Check during Operation

- Make sure that the vacuum pump is running
- Check that the drive motor current drawn is in the usual range

Version with oil return valve (PB 0008 C):

Note: The discharged gas will also contain oil if the vacuum pump is operated without interruption for too long a period (→ page 8: Operation Notes).

- Check that the discharged gas is free from oil

Assessment

If the drive motor draws too much current and/or the pump flow rate has dropped, then the exhaust filter (e) is clogged and must be replaced.

Note: Exhaust filters cannot be cleaned successfully. Clogged exhaust filters must be replaced with new ones.

If the drive motor draws less current than usual, then the exhaust filter (e) is broken through and must be replaced.

If the discharge gas contains oil, the exhaust filter (e) can either be clogged or broken through and, if applicable, must be replaced.

Change of the Exhaust Filter



In case the vacuum pump conveyed gas that was contaminated with harmful foreign materials the exhaust filter will be contaminated with harmful material.

Danger to health during the changing of contaminated exhaust filter.

Danger to the environment.

Wear personal protective equipment during the changing of the contaminated exhaust filter.

Used exhaust filters are special waste and must be disposed of separately in compliance with applicable regulations.

Removing the Exhaust Filter

- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Remove the cover (d) from the oil separator
- Undo the exhaust filter (e) from the oil separator

Inserting the Exhaust Filter



The non-OEM spares market offers exhaust filters that are geometrically compatible with Busch-vacuum pumps, but do not feature the high retention capacity of genuine Busch-exhaust filters and deteriorate the service life and the efficiency of the vacuum pump due to their increased back pressure.

Increased risk of damage to health.

Adverse effect on efficiency and service life.

In order to keep the emission on the lowest possible level and to preserve efficiency and service life only genuine Busch-exhaust filters shall be used.

- Make sure that the new exhaust filter (e) is equipped with a new o-ring
- Apply oil on the o-ring on the thread of the exhaust filter (e)
- Screw in the exhaust filter (e)
- Make sure that the seal of the lid (d) is clean and undamaged, if necessary replace with a new seal
- Mount the cover (d) together with the seal on the oil separator

Note: During operation the exhaust filter gets saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filter.

Overhaul



In order to achieve best efficiency and a long life the vacuum pump was assembled and adjusted with precisely defined tolerances.

This adjustment will be lost during dismantling of the vacuum pump.

It is therefore strictly recommended that any dismantling of the vacuum pump that is beyond of what is described in this manual shall be done by Busch service.



In case the vacuum pump conveyed gas that was contaminated with foreign materials the oil and the exhaust filter(s) will be contaminated with harmful material.

Harmful material can reside in pores, gaps and internal spaces of the vacuum pump.

Danger to health during dismantling of the vacuum pump.

Danger to the environment.

Prior to shipping the vacuum pump shall be decontaminated as good as possible and the contamination status shall be stated in a "Declaration of Contamination" (form downloadable from www.buschvacuum.com).

Busch service will only accept vacuum pumps that come with a completely filled in and legally binding signed "Declaration of Contamination" (form downloadable from www.buschvacuum.com).

Removal from Service

Temporary Removal from Service

- Prior disconnecting pipes/lines make sure that all pipes/lines are vented to atmospheric pressure

Recommissioning



Vanes can stick after a long period of standstill.

Risk of vane breakage if the vacuum pump is started with the drive motor.

After longer periods of standstill the vacuum pump shall be turned by hand.

After longer periods of standstill:


- ♦ Make sure that the vacuum pump is locked against inadvertent start up
- ♦ Remove the cover around the fan of the drive motor
- ♦ Slowly rotate the fan wheel by hand several revolutions in the intended direction of rotation (see stuck on or cast arrow)
- ♦ Mount the cover around the fan wheel of the drive motor

If deposits could have gathered in the vacuum pump:

- ♦ Flush the vacuum pump (→ page 9: Maintenance)

- Observe the chapter Installation and Commissioning (→ page 5)

Dismantling and Disposal



DANGER

In case the vacuum pump conveyed gas that was contaminated with harmful foreign material the oil and the exhaust filter(s) will be contaminated with harmful material.

Harmful material can reside in pores, gaps and internal spaces of the vacuum pump.


Danger to health during dismantling of the vacuum pump.

Danger to the environment.

During dismantling of the vacuum pump personal protective equipment must be worn.

The vacuum pump must be decontaminated prior to disposal.

Oil and exhaust filters must be disposed of separately in compliance with applicable regulations.



CAUTION

Used oil and exhaust filters are special waste and must be disposed of in compliance with applicable regulations.

- Remove the exhaust filter (e) (→ page 11: Exhaust Filter)
- Drain the oil
- Make sure that materials and components to be treated as special waste have been separated from the vacuum pump
- Make sure that the vacuum pump is not contaminated with harmful foreign material

According to the best knowledge at the time of printing of this manual the materials used for the manufacture of the vacuum pump involve no risk.

- Dispose of the used oil in compliance with applicable regulations
- Dispose of special waste in compliance with applicable regulations
- Dispose of the vacuum pump as scrap metal

Troubleshooting



WARNING

Risk of electrical shock, risk of damage to equipment.

Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations:

- IEC 364 or CENELEC HD 384 or DIN VDE 0100, respectively,
- IEC-Report 664 or DIN VDE 0110,
- BGV A2 (VBG 4) or corresponding national accident prevention regulation.



CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

Let the vacuum pump cool down prior to a required contact or wear heat protection gloves.

Problem	Possible Cause	Remedy
<p>The vacuum pump does not reach the usual pressure</p> <p>The drive motor draws a too high current (compare with initial value after commissioning)</p> <p>Evacuation of the system takes too long</p>	The vacuum system or suction line is not leak-tight	Check the hose or pipe connections for possible leak
	In case a vacuum relief valve/regulating system is installed: The vacuum relief valve/regulating system is misadjusted or defective	Adjust, repair or replace, respectively
	Contaminated oil (the most common cause)	Change the oil (→ page 9: Maintenance)
	No or not enough oil in the reservoir	Top up oil (→ page 9: Maintenance)
	The exhaust filter (e) is partially clogged	Replace the exhaust filter (e) (→ page 9: Maintenance)
	In case a screen is installed in the suction connection (b): The screen in the suction connection (b) is partially clogged	Clean the screen If cleaning is required too frequently install a filter upstream
	In case a filter is installed on the suction connection (b): The filter on the suction connection (b) is partially clogged	Clean or replace the inlet air filter, respectively
	Partial clogging in the suction, discharge or pressure line	Remove the clogging
	Long suction, discharge or pressure line with too small diameter	Use larger diameter
	The valve disk of the inlet non-return valve is stuck in closed or partially open position	Disassemble the inlet, clean the screen and the valve (b) as required and reassemble
	A shaft seal is leaking	Replace the shaft seal ring (Busch service)
	A vane is blocked in the rotor or otherwise damaged	Free the vanes or replace with new ones (Busch service)
	The radial clearance between the rotor and the cylinder is no longer adequate	Readjust the vacuum pump (Busch service)
Internal parts are worn or damaged	Repair the vacuum pump (Busch service)	

The gas conveyed by the vacuum pump smells displeasing	<p>Process components evaporating under vacuum</p> <p>Readily volatile and thus gaseous components of the oil, e.g. additives, particularly right after an oil change.</p> <p>Note: This is no indication of a malfunction of the oil separator. The oil separator is able to retain droplets of oil, however no gaseous components of it.</p>	<p>Check the process, if applicable</p> <p>Use a different type of oil, if applicable</p>
The vacuum pump stops and restarts after a certain time	<p>Version with AC-motor:</p> <p>The vacuum pump is operated for too long time without interruption, the thermal protection switch activates and stops the vacuum pump until the drive has cooled down</p>	Comply with intermittent operation (S3)
	<p>Version with AC-motor:</p> <p>The thermal protections switch of the drive activates due to insufficient cooling of the vacuum pump</p>	Improve the cooling (increase the distance to adjacent walls, increase fresh air supply)
The vacuum pump does not start	The drive motor is not supplied with the correct voltage or is overloaded	Supply the drive motor with the correct voltage
	The drive motor starter overload protection is too small or trip level is too low	<p>Compare the trip level of the drive motor starter overload protection with the data on the nameplate, correct if necessary</p> <p>In case of high ambient temperature: set the trip level of the drive motor starter overload protection 5 percent above the nominal drive motor current</p>
	One of the fuses has blown	Check the fuses
	<p>Version with alternating current motor:</p> <p>The drive motor capacitor is defective</p>	Repair the drive (Busch service)
	The connection cable is too small or too long causing a voltage drop at the vacuum pump	Use sufficiently dimensioned cable
	The vacuum pump or the drive motor is blocked	<p>Make sure the drive motor is connected from the power supply</p> <p>Remove the fan cover</p> <p>Try to turn the drive motor with the vacuum pump by hand</p> <p>If the vacuum pump is blocked:</p> <p>Repair the vacuum pump (Busch service)</p>
The vacuum pump is blocked	Solid foreign matter has entered the vacuum pump	<p>Repair the vacuum pump (Busch service)</p> <p>Make sure the suction line is equipped with a screen</p> <p>If necessary additionally provide a filter</p>
	Corrosion in the vacuum pump from remaining condensate	<p>Repair the vacuum pump (Busch service)</p> <p>Check the process</p> <p>Observe the chapter Conveying Condensable Vapours (→ page 9)</p>
	<p>Version with three-phase motor:</p> <p>The vacuum pump was run in the wrong direction</p>	<p>Repair the vacuum pump (Busch service)</p> <p>When connecting the vacuum pump make sure the vacuum pump will run in the correct direction (→ page 6 Installation)</p>

	<p>After shutting down the vacuum pump the vacuum system exerted underpressure onto the pump chamber which sucked back excessive oil from the oil separator into the pump chamber</p> <p>When the vacuum pump was restarted too much oil was enclosed between the vanes</p> <p>Oil could not be compressed and thus broke a vane</p>	<p>Repair the vacuum pump (Busch service)</p> <p>Make sure the vacuum system will not exert underpressure onto the shut-down vacuum pump, if necessary provide an additional shut-off valve or non-return valve</p>
	<p>After shutting down the vacuum pump condensate ran into the pump chamber</p> <p>When the vacuum pump was restarted too much condensate was enclosed between the vanes</p> <p>Condensate could not be compressed and thus broke a vane</p>	<p>Repair the vacuum pump (Busch service)</p> <p>Make sure no condensate will enter the vacuum pump, if necessary provide a drip leg and a drain cock</p> <p>Drain condensate regularly</p>
<p>The vacuum pump starts, but labours or runs noisily or rattles</p> <p>The drive motor draws a too high current (compare with initial value after commissioning)</p>	<p>Version with cable outlet:</p> <p>Loose connection(s) at the mains</p> <p>Version with three-phase motor:</p> <p>Loose connection(s) in the drive motor terminal box</p> <p>Not all drive motors coils are properly connected</p> <p>The drive motor operates on two phases only</p>	<p>Check the proper connection of the wires against the connection diagram</p> <p>Tighten or replace loose connections</p>
	<p>Version with three-phase motor:</p> <p>The vacuum pump runs in the wrong direction</p>	<p>Verification and rectification → page 5: Installation and Commissioning</p>
	<p>Standstill over several weeks or months</p>	<p>Let the vacuum pump run warm with inlet closed</p>
	<p>Oil viscosity is too high for the ambient temperature</p>	<p>Use synthetic oil, if necessary use oil of next lower viscosity class (CAUTION: operation with too low viscosity can cause chatter marks inside the cylinder)</p> <p>Warm up the oil with a heater prior to starting up the vacuum pump, or run the vacuum pump in intervals in order not to let it get too cold</p>
	<p>Improper oil quantity, unsuitable oil type</p>	<p>Use the proper quantity of one of the recommended oils</p> <p>(→ page 20: Oil change: → page 9: Maintenance)</p>
	<p>No oil change over extended period of time</p>	<p>Perform oil changed incl. flushing</p> <p>(→ page 9: Maintenance)</p>
	<p>The exhaust filter (e) is clogged and appears black from burnt oil</p>	<p>Flush the vacuum pump</p> <p>Replace the exhaust filter (e)</p> <p>Fill in new oil</p> <p>(→ page 9: Maintenance)</p> <p>In case the oil life is too short: use oil with better heat resistance (→ page 20: Oil) or retrofit cooling</p>
	<p>Foreign objects in the vacuum pump</p> <p>Broken vanes</p> <p>Stuck bearings</p>	<p>Repair the vacuum pump (Busch service)</p>
<p>The vacuum pump runs very noisily</p>	<p>Defective bearings</p>	<p>Repair the vacuum pump (Busch service)</p>

	Stuck vanes	Repair the vacuum pump (Busch service) Use only recommended oils (→ page 20: Oil) and change more frequently
The vacuum pump runs very hot (the oil sump temperature shall not exceed 100 °C)	Insufficient air ventilation	Make sure that the cooling of the vacuum pump is not impeded by dust/dirt Clean the fan cowling, the fan wheel, the ventilation grille and the cooling fins Install the vacuum pump in a narrow space only if sufficient ventilation is ensured On a vacuum pump with oil-cooler: clean the intermediate spaces of the finned tube
	Ambient temperature too high	Observe the permitted ambient temperatures
	Temperature of the inlet gas too high	Observe the permitted temperatures for the inlet gas
	The exhaust filter (e) is partially clogged	Replace the exhaust filter (e)
	Not enough oil in the reservoir	Top up oil
	Oil burnt from overheating	Flush the vacuum pump Replace the exhaust filter (e) Fill in new oil (→ page 9: Maintenance) In case the oil life is too short: use oil with better heat resistance (→ page 20: Oil) or retrofit cooling
	Mains frequency or voltage outside tolerance range	Provide a more stable power supply
	Partial clogging of filters or screens Partial clogging in the suction, discharge or pressure line	Remove the clogging
	Long suction, discharge or pressure line with too small diameter	Use larger diameter
The vacuum pump fumes or expels oil droplets through the gas discharge The oil level drops	The exhaust filter (e) is not properly seated	Check the proper position of the exhaust filter (e), if necessary insert properly (→ page 9: Maintenance)
	The o-ring is missing or damaged	Add or replace resp. the o-ring (→ page 9: Maintenance)
	The exhaust filter (e) shows cracks	Replace the exhaust filter (e) (→ page 9: Maintenance)
	The exhaust filter (e) is clogged with foreign matter Note: The saturation of the exhaust filter with oil is no fault and does not impair the function of the exhaust filter! Oil dropping down from the exhaust filter is returned to the oil circulation.	Replace the exhaust filter (e) (→ page 9: Maintenance)
	Version with three-phase motor and oil return valve (PB 0008 C): In case the vacuum pump runs for more than 0.5 hours without interruption, oil can collect in the upper chamber of the oil separator to an extent that it gets expelled together with the discharged gas	Regularly shut down the vacuum pump for short periods of time. Check that the oil return valve functions properly and lets oil run from the upper into the bottom chamber of the oil separator as soon as the vacuum pump is shut down (→ page 3: Oil Circulation)

	<p>Version with oil return valve (PB 0008 C)</p> <p>The oil return valve does not work properly or is clogged (proper function is when blowing into the valve it should close, when vacuum is applied, the valve should open; CAUTION: do not let your mouth get in direct contact with the oil return valve, do not inhale through the oil return valve!)</p>	Clean or replace the oil return valve
The oil is black	<p>Oil change intervals are too long</p> <p>The oil was overheated</p>	<p>Flush the vacuum pump</p> <p>Replace the exhaust filter (e)</p> <p>Fill in new oil</p> <p>(→ page 9: Maintenance)</p> <p>In case the oil life is too short: use oil with better heat resistance (→ page 20: Oil) or retrofit cooling</p>
The oil is watery and coloured white	<p>The vacuum pump aspirated water or significant amounts of humidity</p> <p>Version with gas ballast:</p> <p>The filter of the gas ballast is clogged</p>	<p>Flush the vacuum pump</p> <p>Replace the exhaust filter (e)</p> <p>Fill in new oil</p> <p>(→ page 9: Maintenance)</p> <p>Modify the operational mode (→ page 9: Operating Notes → Conveying Condensable Vapours)</p> <p>Version with gas ballast with sinter metal filter:</p> <p>Clean the sinter metal filter (compressed air)</p>
The oil is resinous and/or sticky	<p>Improper oil type, perhaps in confusion</p> <p>Topping up of incompatible oil</p>	<p>Flush the vacuum pump</p> <p>Replace the exhaust filter (e)</p> <p>Fill in new oil</p> <p>(→ page 9: Maintenance)</p> <p>Make sure the proper oil is used for changing and topping up</p>
The oil foams	Mixing of incompatible oils	<p>Flush the vacuum pump</p> <p>Replace the exhaust filter (e)</p> <p>Fill in new oil</p> <p>(→ page 9: Maintenance)</p> <p>Make sure the proper oil is used for changing and topping up</p>

Spare Parts

Note: When ordering spare parts or accessories acc. to the table below please always quote the type ("Type") and the serial no. ("No") of the vacuum pump. this will allow Busch service to check if the vacuum pump is compatible with a modified or improved part.

The exclusive use of the genuine spare parts and consumables is a prerequisite for the proper function of the vacuum pump and for the granting of warranty, guarantee or goodwill.

Your point of contact for service and spare parts in the United Kingdom:

Busch (UK) Ltd.
Hortonwood 30-35
Telford
Shropshire
TF1 7YB
Tel: 01952 677 432
Fax: 01952 677 423

Your point of contact for service and spare parts in Ireland:

Busch Ireland Ltd.
A10-11 Howth Junction Business Centre
Kilbarrack, Dublin 5
Tel: +353 (0)1 8321466
Fax: +353 (0)1 8321470

Your point of contact for service and spare parts in the USA:

Busch Inc.
516-B Viking Drive
Virginia Beach, VA 23452
Tel: 1-800-USA-PUMP (872-7867)

Your point of contact for service and spare parts in Canada:

Busch Vacuum Technics Inc.
1740, Boulevard Lionel Bertrand
Boisbriand (Montréal)
Québec J7H 1N7
Tel: 450 435 6899
Fax: 450 430 5132

Your point of contact for service and spare parts in Australia:

Busch Australia Pty. Ltd.
30 Lakeside Drive
Broadmeadows, Vic. 3047
Tel: (03) 93 55 06 00
Fax: (03) 93 55 06 99

Your point of contact for service and spare parts in New Zealand:

Busch New Zealand Ltd.
Unit D, Arrenway Drive
Albany, Auckland 1311
P O Box 302696
North Harbour, Auckland 1330
Tel: 0-9-414 7782
Fax: 0-9-414 7783

Find the list of Busch companies all over the world (by the time of the publication of these installation and operating instructions) on → page 24 (rear cover page).

Find the up-to-date list of Busch companies and agencies all over the world on the internet at www.buschvacuum.com.

Pos.	Part	Qty	Part no.
1	Exhaust filter with o-ring	1	0532 140 152
2	Lid for exhaust filter	1	0710 138 179
3	O-ring for lid for exhaust filter	1	0486 124 845
4	Oil fill plug with seal ring	1	0415 000 071
5	Sight glass with seal ring	1	0583 151 312

6	Oil drain plug with seal ring	1	0415 000 071
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Accessories

Accessories	Description	Part no.
Gas ballast, complete	for the conveying of condensable vapours; only for vacuum pumps prepared for gas ballast (bore in cylinder cover)	0916 140 067

Oil

Denomination	VM 022	VM 032	VSB 032
ISO-VG	22	32	32
Base	Mineral oil	Mineral oil	Synthetic Oil
Density [g/cm ³]	0.868	0.872	0.833
Ambient temperature range [°C]	+5 ... +20	+15 ... +30	+5 ... +40
Kinematic viscosity at 40 °C [mm ² /s]	24	30	30,3
Kinematic viscosity at 100 °C [mm ² /s]	4.5	5	5.9
Flashpoint [°C]	210	225	236
Pourpoint [°C]	-15	-15	-66
Part number 0.1 l packaging	0831 107 954	0946 000 942	-
Part number 1 l packaging	0831 121 577	0831 000 086	0831 168 343
Part number 5 l packaging	-	0831 000 087	0831 168 344
Remark			Food applications (H1, Halal, Kosher); For ultimate pressure critical applications with PB 0008 C
Filling quantity, approx. [l]	0.25		

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 Výroba CZ s.r.o
Svárovská 620
CZ 460 01, Liberec 11

declares that the machine(s) : **R5 PB 0008 C, R5 PC 0008 C**

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 1012-1 : 2010 EN 1012-2 : 1996 + A1 : 2009	Compressors and vacuum pumps - Safety requirements - Part 1 and 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
EN ISO 13849-1 : 2015 ⁽¹⁾	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design

⁽¹⁾ In case control systems are integrated.

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

Liberec, 14.05.2021



Michael Dostálek, 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 Výroba CZ s.r.o
Svárovská 620
CZ 460 01, Liberec 11

declares that the machine(s) : **R5 PB 0008 C, R5 PC 0008 C**

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
BS EN ISO 12100 : 2010	Safety of machinery. Basic concepts, general principles of design. Risk assessment and risk reduction.
BS EN ISO 13857 : 2019	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs.
BS EN 1012-1 : 2010 BS EN 1012-2 : 1996 + A1 : 2009	Compressors and vacuum pumps. Safety requirements. Air compressors and vacuum pumps.
BS EN ISO 2151 : 2008	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
BS EN 60204-1 : 2018	Safety of machinery. Electrical equipment of machines. General requirements.
BS EN IEC 61000-6-2 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Immunity standard for industrial environments.
BS EN IEC 61000-6-4 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments.
BS EN ISO 13849-1 : 2015 ⁽¹⁾	Safety of machinery. Safety-related parts of control systems. General principles for design.

⁽¹⁾ In case control systems are integrated.

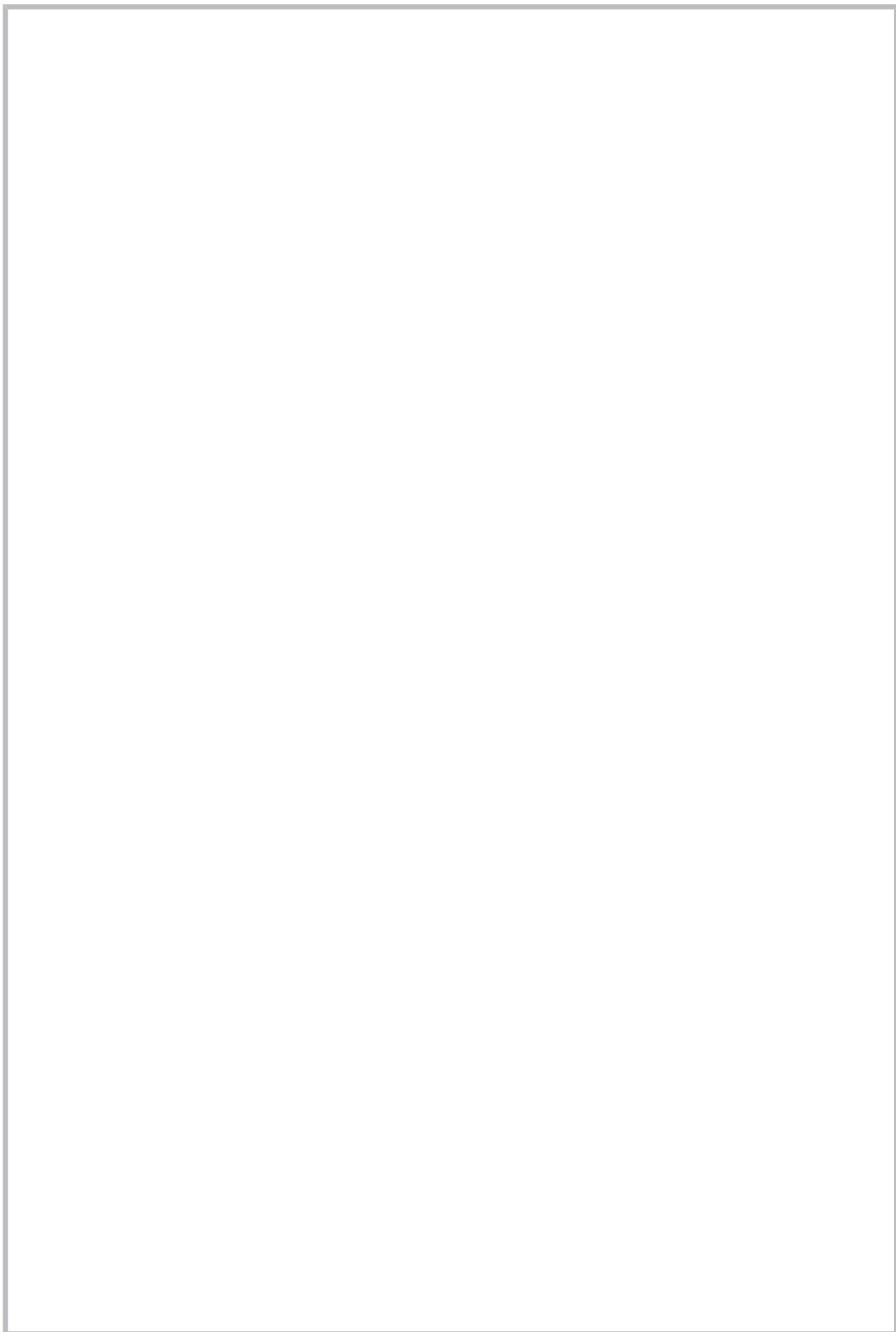
Legal person authorized to compile the technical file
and importer in the UK
(if the manufacturer is not located in the UK):

Busch (UK) Ltd
30 Hortonwood
Telford - UK

Liberec, 14.05.2021



Michael Dostálek, General Director

A large, empty rectangular box with a thin gray border, occupying most of the page. It is intended for writing a note.

Busch

Vacuum Solutions

We shape vacuum for you.

Argentina

info@busch.com.ar

Australia

sales@busch.com.au

Austria

busch@busch.at

Bangladesh

sales@busch.com.bd

Belgium

info@busch.be

Brazil

vendas@buschdobrasil.com.br

Canada

info@busch.ca

Chile

info@busch.cl

China

info@busch-china.com

Colombia

info@buschvacuum.co

Czech Republic

info@buschvacuum.cz

Denmark

info@busch.dk

Finland

info@busch.fi

France

busch@busch.fr

Germany

info@busch.de

Hungary

busch@buschvacuum.hu

India

sales@buschindia.com

Ireland

sales@busch.ie

Israel

service_sales@busch.co.il

Italy

info@busch.it

Japan

info@busch.co.jp

Korea

busch@busch.co.kr

Malaysia

busch@busch.com.my

Mexico

info@busch.com.mx

Netherlands

info@busch.nl

New Zealand

sales@busch.co.nz

Norway

post@busch.no

Peru

info@busch.com.pe

Poland

busch@busch.com.pl

Portugal

busch@busch.pt

Romania

office@buschromania.ro

Russia

info@busch.ru

Singapore

sales@busch.com.sg

South Africa

info@busch.co.za

Spain

contacto@buschiberica.es

Sweden

info@busch.se

Switzerland

info@buschag.ch

Taiwan

service@busch.com.tw

Thailand

info@busch.co.th

Turkey

vakutek@ttmail.com

United Arab Emirates

sales@busch.ae

United Kingdom

sales@busch.co.uk

USA

info@buschusa.com