

MINK

Claw Vacuum Pumps

MM 1324 AV, MM 1202 AV

MM 1252 AV, MM 1322 AV

Instruction Manual



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1 Safety

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

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

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

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

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

The machine has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain, as described in the following chapters and in accordance with the chapter *Intended Use* [→ 5]. This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, NOTICE and NOTE as follows:



DANGER

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



WARNING

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



CAUTION

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



NOTICE

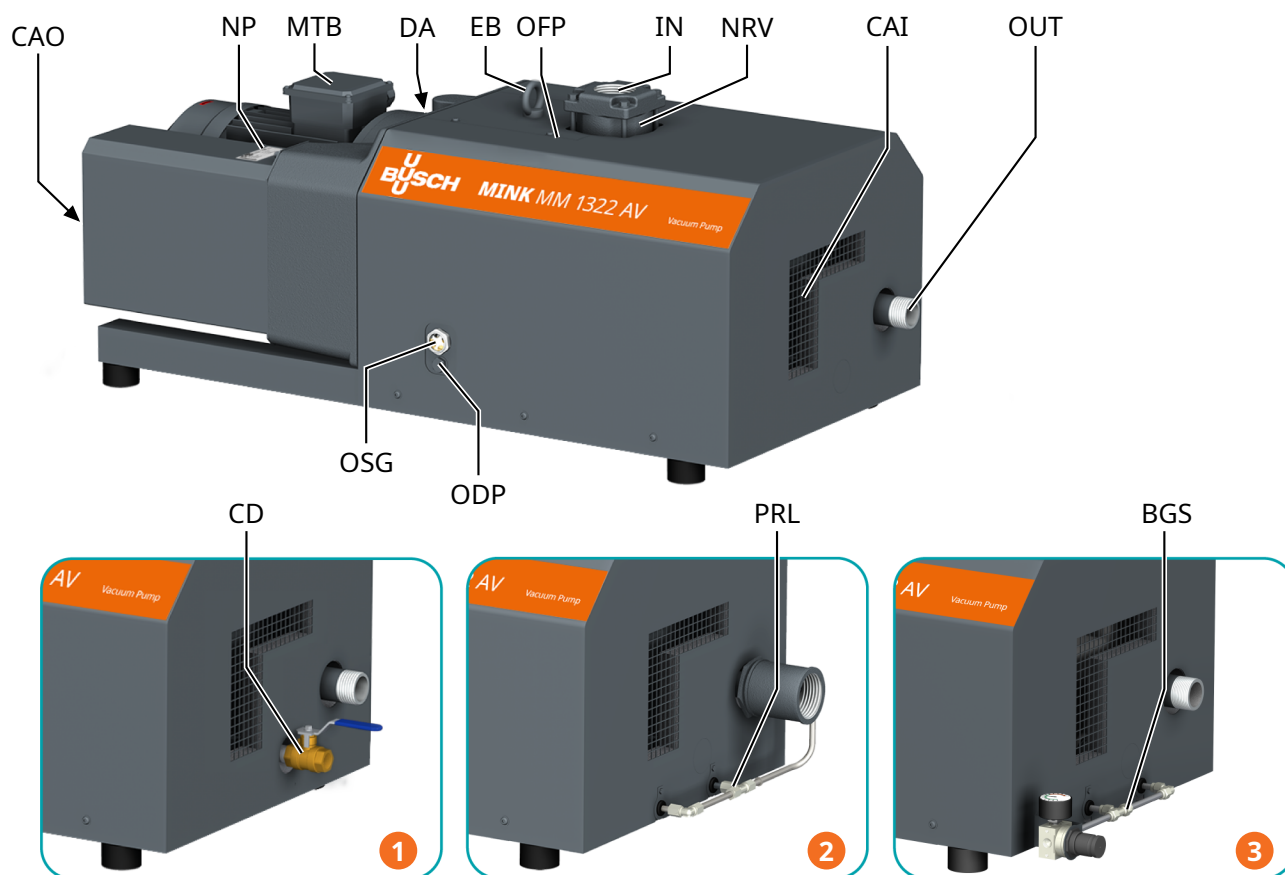
... indicates a potentially dangerous situation that could result in damage to property.



NOTE

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

2 Product Description



Description

| | | | |
|-----|---------------------------------|-----|---------------------------------|
| IN | Suction connection | OUT | Discharge connection |
| OFF | Oil fill plug (below the cover) | ODP | Oil drain plug |
| CAI | Cooling air inlet | CAO | Cooling air outlet |
| OSG | Oil sight glass | NRV | Non-return-valve (integrated) |
| EB | Eye bolt | DA | Directional arrow |
| MTB | Motor terminal box | NP | Nameplate |
| 1 | Aqua version | CD | Condensate drain (optional) |
| 2 | Gas tight version | PRL | Pressure relief line (optional) |
| 3 | Light chemical version | BGS | Barrier gas system (optional) |



NOTE

Technical term.

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



NOTE

Illustrations

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

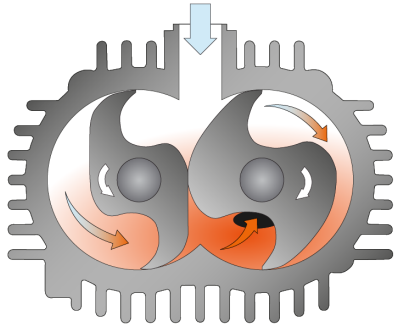


NOTE

Product origin

The serial number on the nameplate (NP) determines the manufacturing plant.

2.1 Operating Principle



The machine works on the claw principle.

The MINK is fully air-cooled thanks to an integrated fan in the drive unit.

In order to avoid solids from entering, the machine is equipped with an inlet screen (IS).

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

2.2 Intended Use



WARNING

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

Risk of injuries!

Risk of damages to the machine!

Risk of damages to the environment!

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

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

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

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

The machine is designed for indoor installation, in case of outdoor installation, ask your Busch representative in order to take specific precautions.

The machine is not capable of maintaining ultimate pressure.

- The minimum allowed ultimate pressure is to be read from the nameplate of the machine.
- By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed ultimate pressure will not be underrun.

The machine is suitable for continuous operation up to a certain suction pressure indicated below:

| Machine type | Suction pressure limitation for continuous operation |
|--------------|--|
| MM 1202 AV | 200 hPa (mbar) abs. |
| MM 1252 AV | |
| MM 1322 AV | |
| MM 1324 AV | 60 hPa (mbar) abs. = ultimate pressure |

The operating time of the following machine is limited to 20 minutes at ultimate pressure:

| Machine type | Suction pressure |
|--------------|---|
| MM 1202 AV | 100 hPa (mbar) abs. = ultimate pressure |
| MM 1252 AV | |
| MM 1322 AV | 150 hPa (mbar) abs. = ultimate pressure |

Cooling time: After operation at ultimate pressure, the machine must cool down by operating between range of 200 to 1013 hPa (mbar) for atleast same amount of time as at ultimate pressure.
For example : 20 min operation at ultimate pressure = 20 minutes of cool down time.

Note: The non-return valve (NRV) shouldn't be used as a non-return or shut off valve for the System. The non-return valve is only to protect the pump.

If the machine needs to be maintained after shutdown:

- Provide an additional manual or automatic operated non-return valve in the suction line.

Permitted environmental conditions, see *Technical Data* [→ 33].

2.3 Design Options

The design options described in the following chapters might be combined.

Please refer to the nameplate (NP) to identify the corresponding design option of your machine.

| Design option | Codification | Example |
|-----------------------------|--------------|--------------|
| Standard (no design option) | 0 | MM 1322 A V0 |
| Aqua version | A | MM 1322 A VA |
| ATEX version * | E | MM 1322 A VE |
| Gas tight version | G | MM 1322 A VG |
| Light chemical version ** | F | MM 1322 A VF |

* ATEX-version machines have a separate dedicated 'ATEX Instruction Manual' document.

** The light chemical version is only available for the machine size **MM 1322 A VF**.

2.3.1 Aqua Version

The Aqua version is a design option for conveying condensable vapors (water).

This machine is specifically equipped with:

- corrosion protection coating.
- optional condensate drain (CD) in the internal silencer.

2.3.2 Gas Tight Version



WARNING



Media potentially dangerous.

Risk of poisoning!

Risk of infection!

- Wear appropriate personal protective equipment in case of high concentration of the medium in the ambient atmosphere of the machine.

The gas tight version is a design option for applications where the process gas remains in the machine and does not escape to the environment.

It is a very important feature for applications where gases potentially dangerous to human health are not allowed and the concentration of the process gas must not exceed the admissible values of the ambient atmosphere of the machine.

This machine is specifically equipped with:

- pressure relief lines
- collecting lines
- shaft seal rings

Requirements for a proper functioning:

Description

| | |
|---------------------|---|
| Ambient pressure | The gas tight machine requires an ambient pressure at the gas discharge during the whole operation range of +/- 200 hPa (mbar), unless otherwise specified on the nameplate. |
| Leakage rate | The machine is not absolutely gas tight. The leakage rate of the machine described in this manual is of 0.1 hPa l/s (mbar l/s) at a suction pressure of 250 mbar. It can considerably increase up to prohibited pressure values at the gas inlet/outlet due to used shaft seal rings or clogged pressure relief lines. |
| Ambient environment | Closed air cooling systems are not suitable and therefore prohibited. <ul style="list-style-type: none"> • Make sure that the machine is sufficiently vented (see <i>Installation Conditions</i> [→ 12]). |

2.3.3 Light Chemical Version



WARNING



Media potentially dangerous.

Risk of poisoning!

Risk of infection!

- Wear appropriate personal protective equipment in case of high concentration of the medium in the ambient atmosphere of the machine.

The light chemical version is a design option to handle mild non-corrosive & non-toxic process vapors from chemical and pharmaceutical industries. The process gas remains in the machine and doesn't escape to the environment, similar to gas tight version. As the machine is a dry claw vacuum pump and is not made to handle liquids, condensation inside the machine should be avoided. The light chemical version is also available in combination with aqua version for conveying condensable vapors.

If you're not sure if this light chemical version is suitable for your application, please contact a Busch representative.

It is a very important feature for applications where gases potentially dangerous to human health are not allowed and the concentration of the process gas must not exceed the admissible values of the ambient atmosphere of the machine.

This machine is specifically equipped with:

- barrier gas lines
- collecting lines
- shaft seal rings
- o-ring
- gasket

Requirements for a proper functioning:

| Description | |
|---------------------|--|
| Ambient pressure | The light chemical machine requires an ambient pressure at the gas discharge during the whole operation range of +/- 200 hPa (mbar), unless otherwise specified on the nameplate. |
| Leakage rate | The machine is not absolutely gas tight. The leakage rate of the machine described in this manual is of 0.1 hPa l/s (mbar l/s) at a suction pressure of 250 mbar. It can considerably increase up to prohibited pressure values at the gas inlet/outlet due to used shaft seal rings or clogged barrier gas lines. |
| Ambient environment | Closed air cooling systems are not suitable and therefore prohibited. <ul style="list-style-type: none"> • Make sure that the machine is sufficiently vented (see <i>Installation Conditions</i> [→ 12]). |

2.4 Start Controls

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

The machine can be equipped with a soft-starter.

2.5 Standard Features

2.5.1 Vacuum Relief Valve

The ultimate pressure is limited by a vacuum relief valve (VRE). The vacuum relief valve is adjusted ex-works to the minimum permitted ultimate pressure shown on the nameplate (NP).

2.6 Optional Accessories

2.6.1 Inlet Filter

The inlet filter protects the machine against dust and other solids in the process gas. The inlet filter is available with a paper or polyester cartridge.

2.6.2 Condensate Drain

The condensate drain (CD) uses to drain the accumulated fluids.

3 Transport



WARNING

Suspended load.

Risk of severe injury!

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

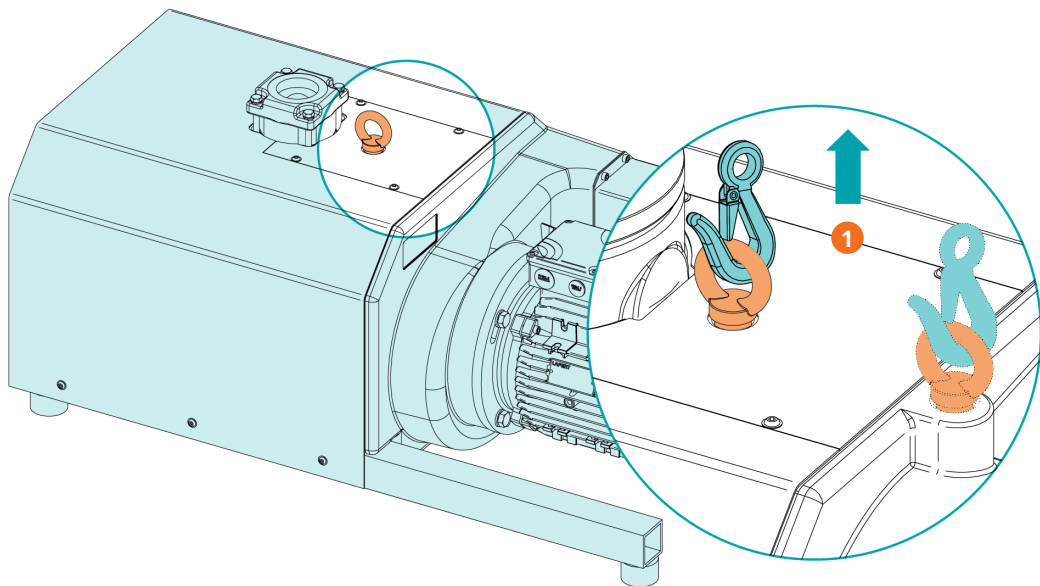


WARNING

Lifting the machine using the motor eye bolt.

Risk of severe injury!

- Do not lift the machine using the eye bolt fitted to the motor. Only lift the machine as shown.
- To find out the weight of the machine, refer to the chapter *Technical Data* [→ 33] or the name-plate (NP).
- Make sure that the eye bolt(s) (EB) is/are in faultless condition, fully screwed in and tightened by hand.



Description

| | | | |
|---|---|--|--|
| 1 | Use both eye bolts, in case a second eye bolt is mounted! | | |
|---|---|--|--|

- Check the machine for transport damage.

If the machine is secured to a base plate:

- Remove the machine from the base plate.

4 Storage

- Seal all apertures with adhesive tape or reuse provided caps.

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

- Wrap the machine in a corrosion inhibiting film.
- Store the machine indoors, dry, dust free and if possible in original packaging preferably at temperatures between 0 ... 40 °C.

5 Installation

5.1 Installation Conditions



WARNING

Gas tight version:

The machine is not absolutely gas tight, possible leakages of dangerous media.

Risk of poisoning!

Risk of infection!

- Make sure that the ambient atmosphere of the machine is sufficiently ventilated. Closed air cooling systems are not suitable and therefore prohibited.



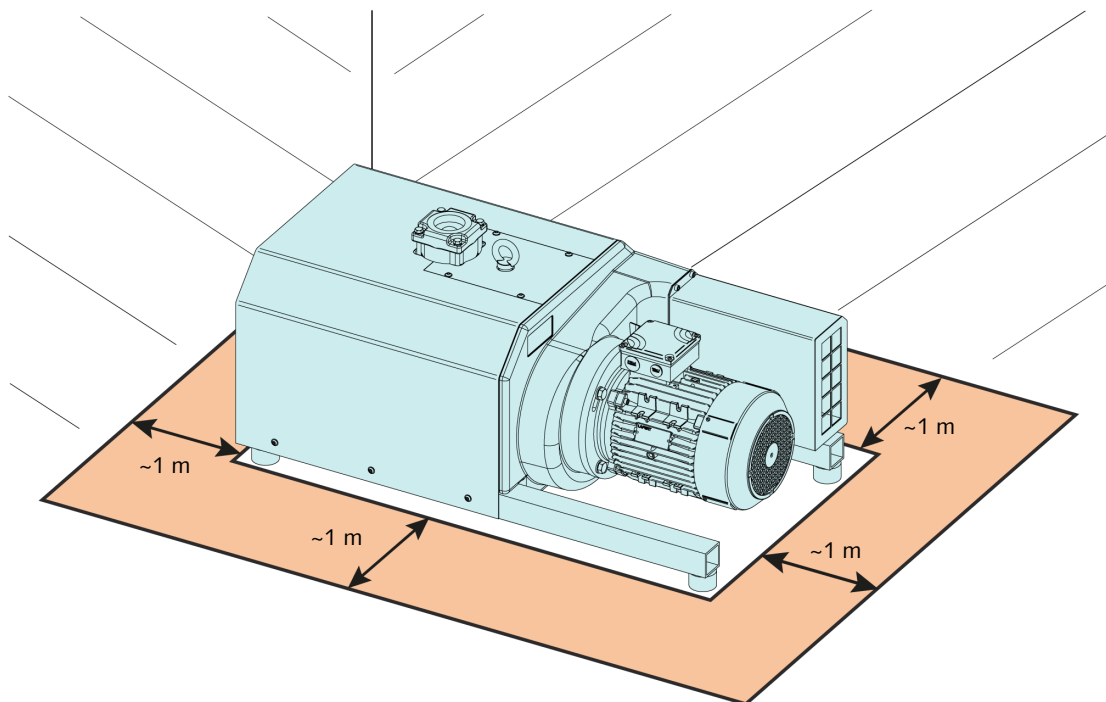
NOTICE

Use of the machine outside of the permitted installation conditions.

Risk of premature failure!

Loss of efficiency!

- Take care that the installation conditions are fully complied with.



- Make sure that the environment of the machine is not potentially explosive.
- Make sure that the ambient conditions comply with the *Technical Data* [→ 33].
- Make sure that the environmental conditions comply with the protection class of the motor and the electrical elements.
- Make sure that the installation space or location is protected from weather and lightning.
- Make sure that the installation space or location is vented such that sufficient cooling of the machine is provided.

- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Make sure that the oil sight glass (OSG) remains easily visible.
- Make sure that enough space remains for maintenance work.
- Make sure that the machine is placed or mounted horizontally, a maximum deviation of 1° in any direction is acceptable.
- Check the oil level, see *Oil Level Inspection* [→ 21].
- Make sure that all provided covers, guards, hoods, etc. are mounted.

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

- Contact your Busch representative, the motor should be derated or the ambient temperature limited.

5.2 Connecting Lines / Pipes



WARNING

Rotating Parts.

Risk of severe injury!

- Do not operate the machine without suction / discharge connection installed.

- Remove all protective covers before installation.
- Make sure that the connection lines cause no stress on the connection of the machine; if necessary use flexible joints.
- Make sure that the line size of the connection lines over the entire length is at least as large as the connections of the machine.

In case of long connection lines, it is advisable to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your Busch representative.

5.2.1 Suction Connection



NOTICE

Ingress of foreign objects or liquids.

Risk of damage to the machine!

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

- Install a suitable filter (5 micron or less) upstream from the machine.

Connection size(s):

- G2" - without inlet filter (IF)
- G2" ½ - with inlet filter (IF)

Depending on the specific configuration ordered, other connection dimensions may apply.

5.2.2 Discharge Connection

NOTICE

Discharge gas flow obstructed.

Risk of damage to the machine!

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

Connection size(s):

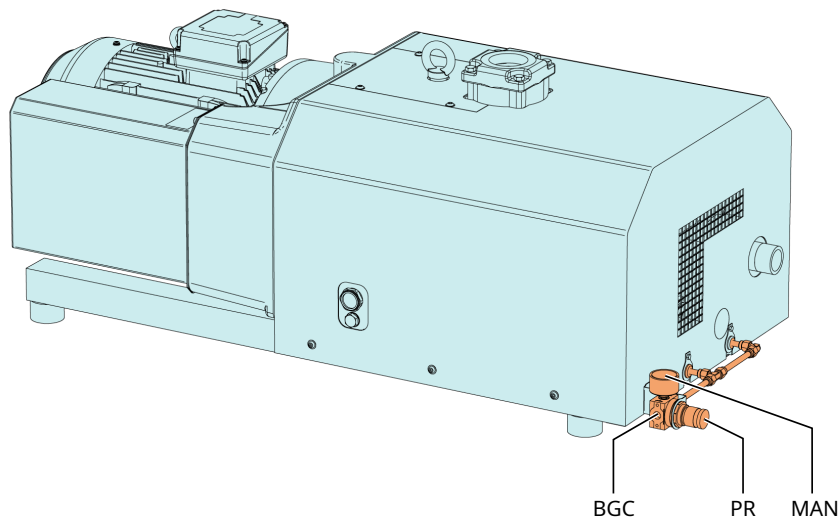
- R1 for MM 1324 AV, MM 1202 AV, MM 1252 AV
- R1 1/4 for MM 1322 AV

Depending on the specific configuration ordered, other connection dimensions may apply.

Unless the aspirated air is discharged to the environment right at the machine:

- Make sure that the discharge line either slopes away from the machine or provide a liquid separator or a siphon with a drain cock, so that no liquids can flow back into the machine.

5.2.3 Barrier Gas System Connection



| Description | | | |
|-------------|------------------------|----|------------------|
| BGC | Barrier gas connection | PR | Pressure reducer |
| MAN | Manometer | | |

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

Connection size:

- G1/4, ISO 228-1

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

| | | |
|--|---------------------|-----------|
| Gas type | Dry nitrogen or air | |
| Gas temperature | °C | 0 ... 50 |
| Maximum gas pressure before barrier gas connection (BGC) | bar (g) | 1 bar (g) |
| Recommended pressure setting after the pressure reducer (PR) | mbar (g) | max. 200 |

5.3 Filling Oil

NOTICE

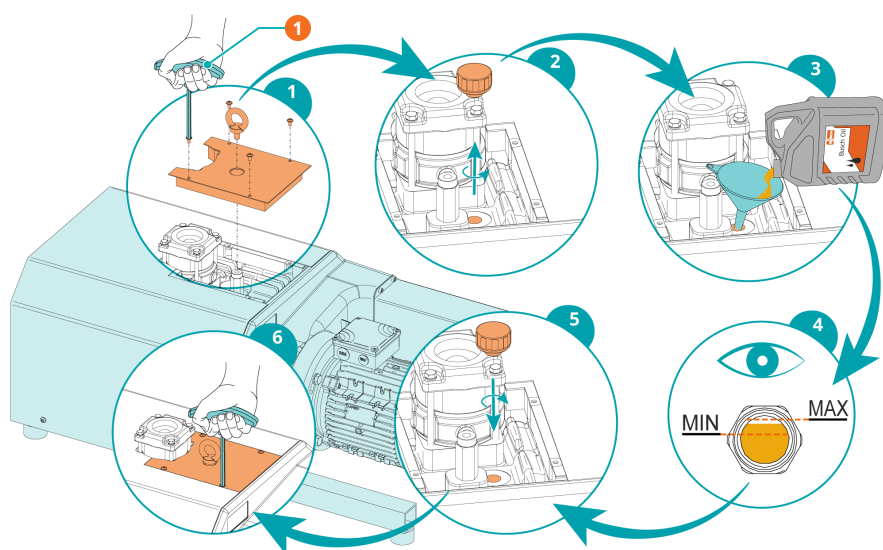
Use of an inappropriate oil.

Risk of premature failure!

Loss of efficiency!

- Only use an oil type which has previously been approved and recommended by Busch.

For oil type and oil capacity see *Technical Data* [→ 33] and *Oil* [→ 35].



Description

| | | | |
|---|--------------|--|--|
| 1 | 4 mm hex key | | |
|---|--------------|--|--|

The oil level should stay constant over the lifetime of the oil. If the level does fall, this indicates a leak and the machine requires repair.

6 Electrical Connection



DANGER

Live wires.

Risk of electrical shock.

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

CURRENT PROTECTION OF THE CUSTOMER INSTALLATION:



DANGER

Missing current protection.

Risk of electrical shock.

- Current protection according to EN 60204-1 must be provided by the customer on his installation.
 - The electrical installation must comply with the applicable national and international standards.
-



NOTICE

Electromagnetic compatibility.

- Make sure that the motor of the machine will not be affected by electric or electromagnetic disturbance from the mains, if necessary seek advice from Busch.
 - Make sure that the EMC of the machine is compliant with the requirements of your supply network system, if necessary provide further interference suppression (EMC of the machine, see *EU Declaration of Conformity* [→ 36] or *UK Declaration of Conformity* [→ 37]).
-

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



DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.
-
- Make sure that the power supply for the motor is compatible with the data on the nameplate of the motor.
 - If the machine is equipped with a power connector, install a residual current protective device to protect persons in case of a defective insulation.
 - Busch recommends installing a type B residual protective device suitable for the electrical installation.
 - Provide a lockable disconnect switch or an emergency stop switch on the power line so that the machine is completely secured in case of an emergency situation.
 - Provide a lockable disconnect switch on the power line so that the machine is completely secured during maintenance tasks.
 - Provide an overload protection according to EN 60204-1 for the motor.
 - Busch recommends installing a D-curve circuit breaker.
 - Connect the protective earth conductor.
 - Electrically connect the motor.



NOTICE

Incorrect connection.

Risk of damage to the motor!

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

6.2 Wiring Diagram Three-Phase Motor

NOTICE

Incorrect direction of rotation.

Risk of damage to the machine!

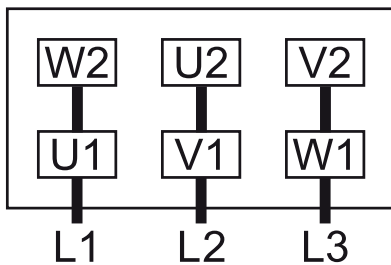
- Operation in the wrong direction of rotation can destroy the machine in a short time! Prior to start-up, ensure that the machine is operated in the right direction.

- Determine the intended direction of rotation with the arrow (stuck on or cast).
- Jog the motor briefly.

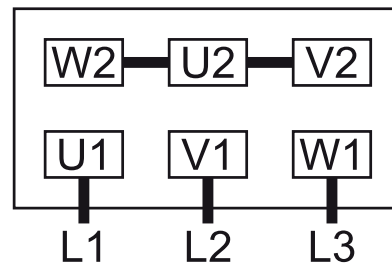
If the rotation of the motor must be changed:

- Switch any two of the motor phase wires.

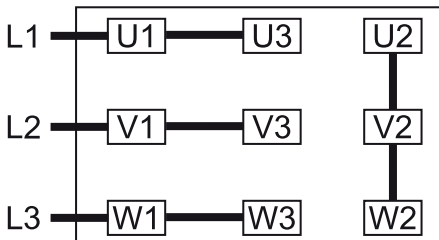
Delta connection (low voltage):



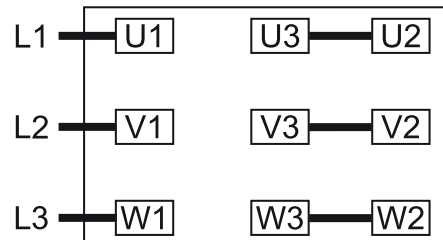
Star connection (high voltage):



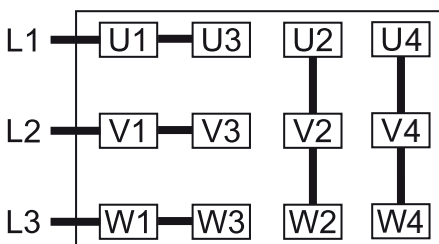
Double star connection, multi-voltage motor with 9 pins (low voltage):



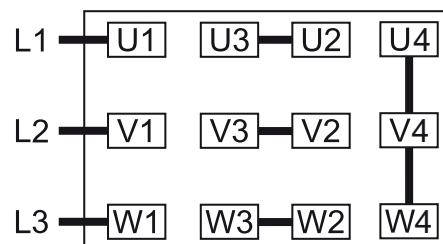
Star connection, multi-voltage motor with 9 pins (high voltage):



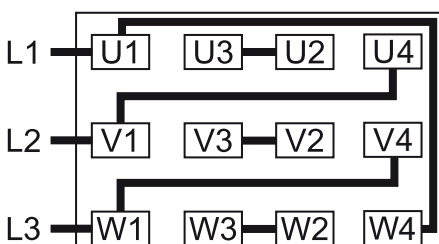
Double star connection, multi-voltage motor with 12 pins (low voltage):



Star connection, multi-voltage motor with 12 pins (high voltage):



Delta connection, multi-voltage motor with 12 pins (middle voltage):



7 Commissioning

NOTICE

Lubricating a dry running machine (compression chamber).

Risk of damage to the machine!

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



CAUTION

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

Risk of burns!

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

CAUTION



Noise of running machine.

Risk of damage to hearing!

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

- Make sure to wear hearing protection.
- Make sure that the *Installation Conditions* [→ 12] are met.
- Start the machine.
- Make sure that the maximum permissible number of starts does not exceed 12 starts per hour. Those starts should be spread within the hour.
- Make sure that the operating conditions comply with the *Technical Data* [→ 33].

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

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

7.1 Conveying Condensable Vapors

The Aqua version is a design option for conveying condensable vapors (water).

Water vapor within the gas flow is tolerated within certain limits. The conveyance of other vapors shall be agreed upon with Busch.

If condensable vapors are to be conveyed:

Before process:

- Warm up the machine for approximately half an hour.

After process:

- Operate the machine for approximately another half an hour.
- Regularly drain condensate from the silencer with the drain cock.

8 Maintenance



DANGER

Live wires.

Risk of electrical shock.

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



WARNING



Machines contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.



CAUTION

Hot surface.

Risk of burns!

- Prior to any action requiring touching the machine, let the machine cool down first.



CAUTION

Failing to properly maintain the machine.

Risk of injuries!

Risk of premature failure and loss of efficiency!

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



NOTICE

Using inappropriate cleaners.

Risk of removing safety stickers and protective paint!

- Do not use incompatible solvents to clean the machine.

- Shut down the machine and lock against inadvertent start up.
- Vent the connected lines to atmospheric pressure.

If necessary:

- Disconnect all connections.

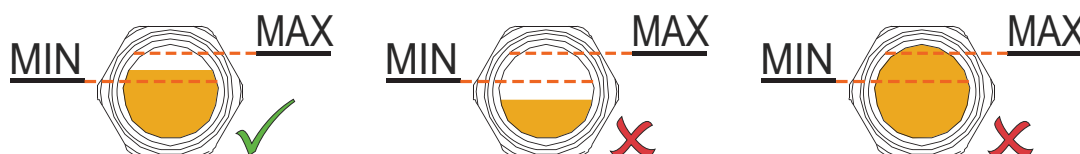
8.1 Maintenance Schedule

The maintenance intervals depend very much on the individual operating conditions. The intervals given below are considered as starting values which should be shortened or extended as appropriate. Particularly harsh applications or heavy duty operation, such as high dust loads in the environment or in the process gas, other contamination or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

| Interval | Maintenance work |
|---|---|
| Monthly | <ul style="list-style-type: none"> Check the inlet screen, clean if necessary. In case of an inlet filter (IF) being installed: <ul style="list-style-type: none"> Check the inlet filter cartridge, replace if necessary. |
| Every 3 months | <ul style="list-style-type: none"> Check the oil level, see <i>Oil Level Inspection</i> [→ 21]. |
| Every 6 months | <ul style="list-style-type: none"> Clean the machine from dust and dirt. In case of a coupling (CPL) being installed: <ul style="list-style-type: none"> Check the coupling (CPL) for backlash and wear. |
| Gas tight version and light chemical version only Every 5000 hours or after 2 years | Depending on the requirements in terms of gas tightness: <ul style="list-style-type: none"> Replace sealing rings (contact Busch). |
| Gas tight version only Every 10000 hours or after 2 years | <ul style="list-style-type: none"> Check that pressure relief lines (PRL) are not clogged, see <i>Pressure Relief Lines Maintenance</i> [→ 24]. |
| Light chemical version only Every 10000 hours or after 2 years | <ul style="list-style-type: none"> Check that the lines of the barrier gas system (BGS) are not clogged, see <i>Barrier Gas System Maintenance</i> [→ 26]. |
| Every 20000 hours | <ul style="list-style-type: none"> Change the oil. The change interval of 20000 operating hours is valid for Busch approved oils only. The change interval depends very much on the operating conditions. Borderline operation may reduce the change interval down to approximately 5000 operating hours. Other oils may reduce the change interval. |
| Every 6 years | <ul style="list-style-type: none"> Have a major overhaul on the machine (contact Busch). |

8.2 Oil Level Inspection

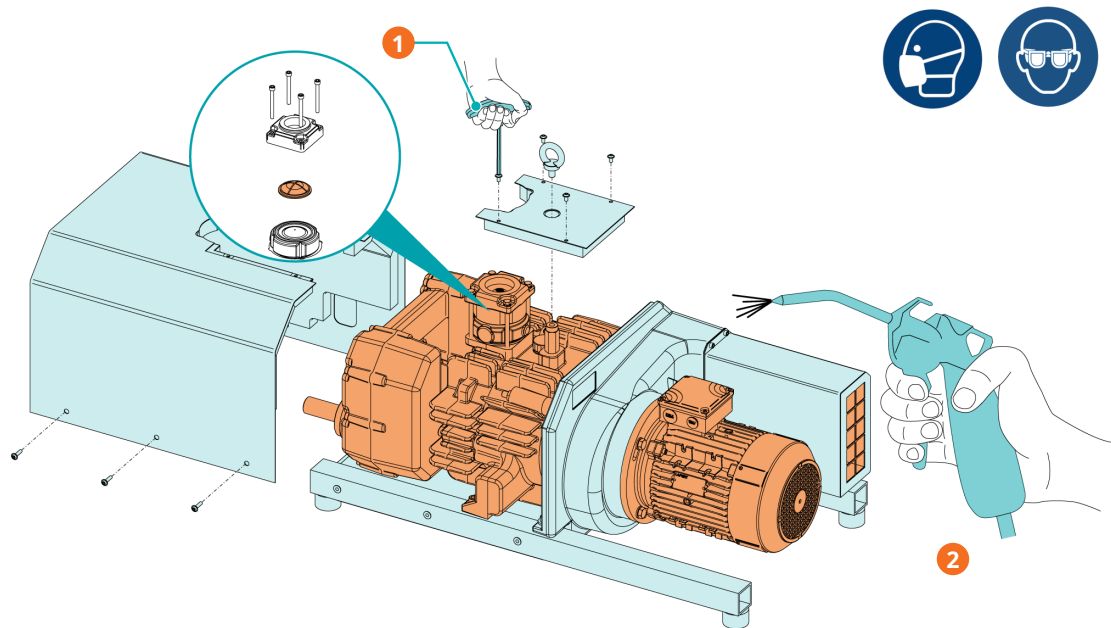
- Shut down the machine.
- When the machine is stopped, wait 1 minute before checking the oil level.



The oil level should stay constant over the lifetime of the oil. If the level does fall, this indicates a leak and the machine requires repair.

- Fill up if necessary, see *Oil Filling* [→ 15].

8.3 Cleaning from Dust and Dirt



Description

| | | | |
|---|--------------|---|---|
| 1 | 4 mm hex key | 2 | Clean the ventilation grid, fans, inlet screen and cooling fins |
|---|--------------|---|---|

8.4 Oil Change

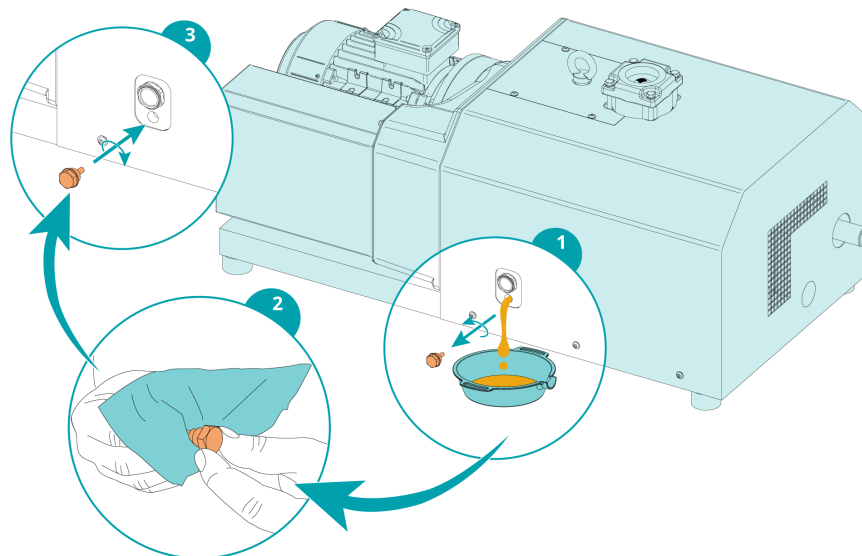
! NOTICE

Use of an inappropriate oil.

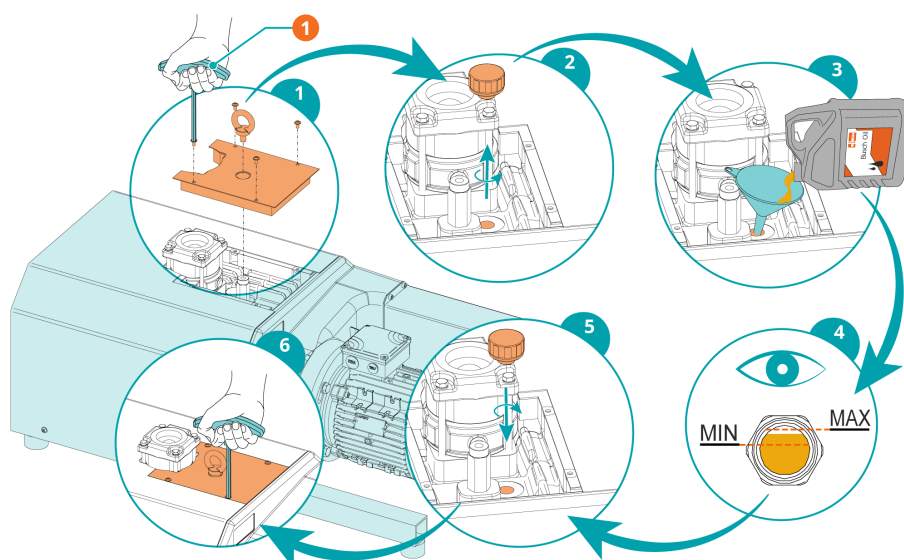
Risk of premature failure!

Loss of efficiency!

- Only use an oil type which has previously been approved and recommended by Busch.



For oil type and oil capacity see *Technical Data* [→ 33] and *Oil* [→ 35].



Description

| | | | |
|---|--------------|--|--|
| 1 | 4 mm hex key | | |
|---|--------------|--|--|

The oil level should stay constant over the lifetime of the oil. If the level does fall, this indicates a leak and the machine requires repair.

8.5 Pressure Relief Lines Maintenance

(Gas Tight Version Only)



WARNING



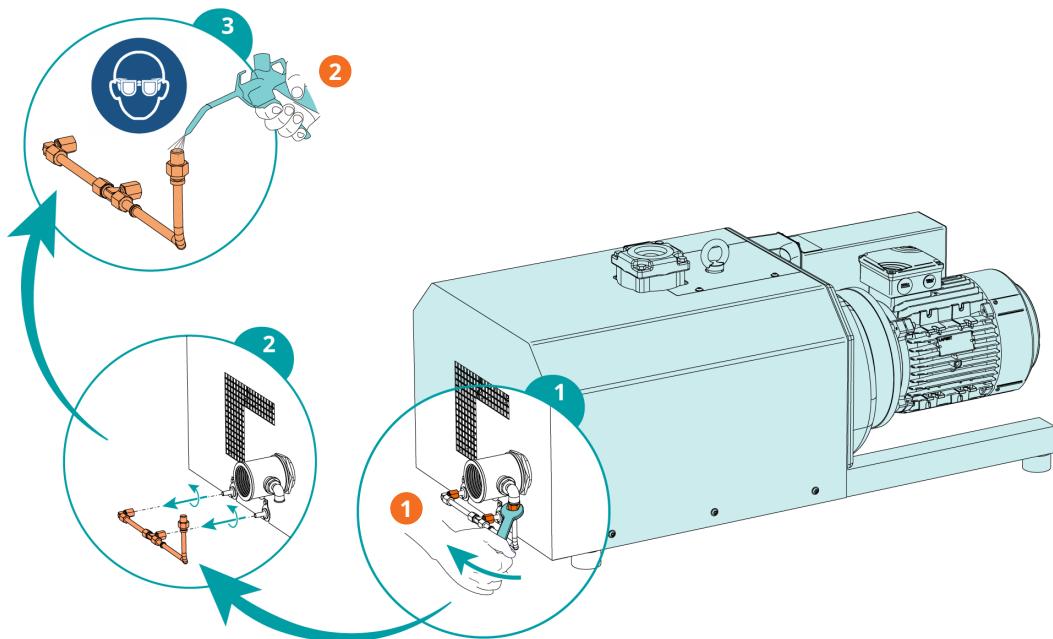
Media potentially dangerous.

Risk of poisoning!

Risk of infection!

- Wear appropriate personal protective equipment in case of high concentration of the medium in the ambient atmosphere of the machine.

- Check that pressure relief lines (PRL) are not clogged as described in the following illustrations.



| Description | |
|-------------|--------------------|
| 1 | Unscrew nuts |
| 2 | Blow into the pipe |

NOTICE

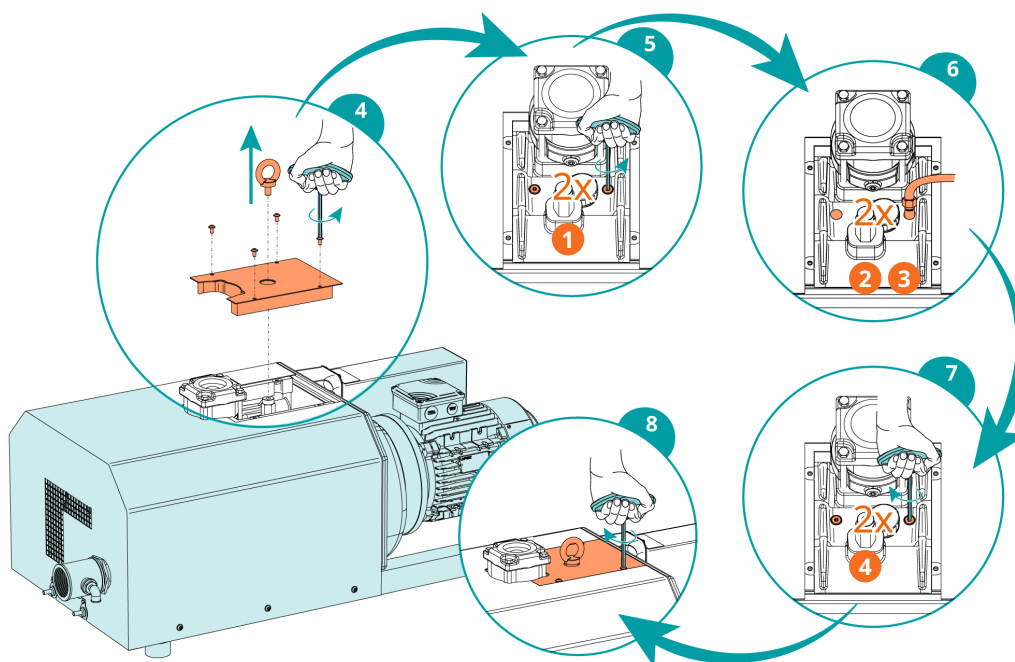
Pressurized air systems supply too high pressure.

Risk of damage to the machine!

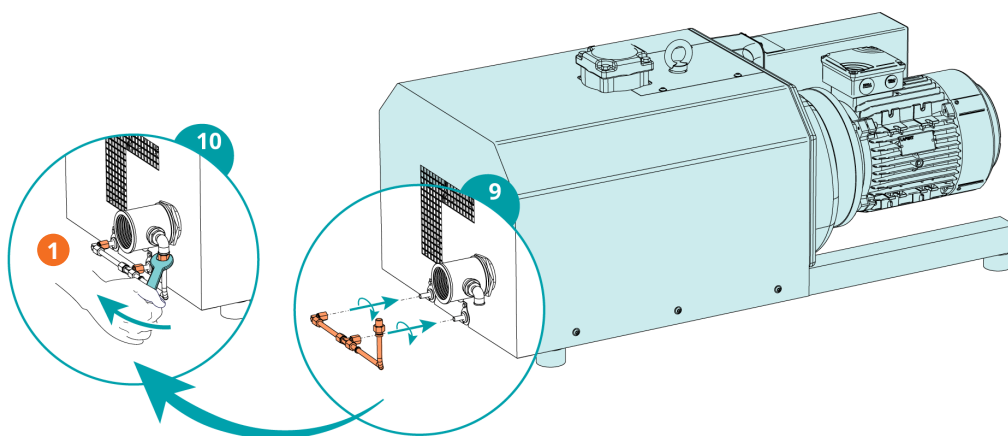
- Adjust the pressurized air to 0.2 bar(g) by means of a pressure regulator.

In case of clogged pressure relief lines (PRL):

- Remove the clogging or have the machine repaired (contact Busch).



| Description | | | |
|-------------|-------------------------------|---|--|
| 1 | Unscrew plugs | 2 | Connect pressurized air to the pressure relief lines |
| 3 | Air pressure max. 0.2 bar (g) | 4 | Tighten plugs |



| Description | | | |
|-------------|--------------|--|--|
| 1 | Tighten nuts | | |

8.6 Barrier Gas System Maintenance

(Light Chemical Version Only)



WARNING



Media potentially dangerous.

Risk of poisoning!

Risk of infection!

- Wear appropriate personal protective equipment in case of high concentration of the medium in the ambient atmosphere of the machine.



NOTICE

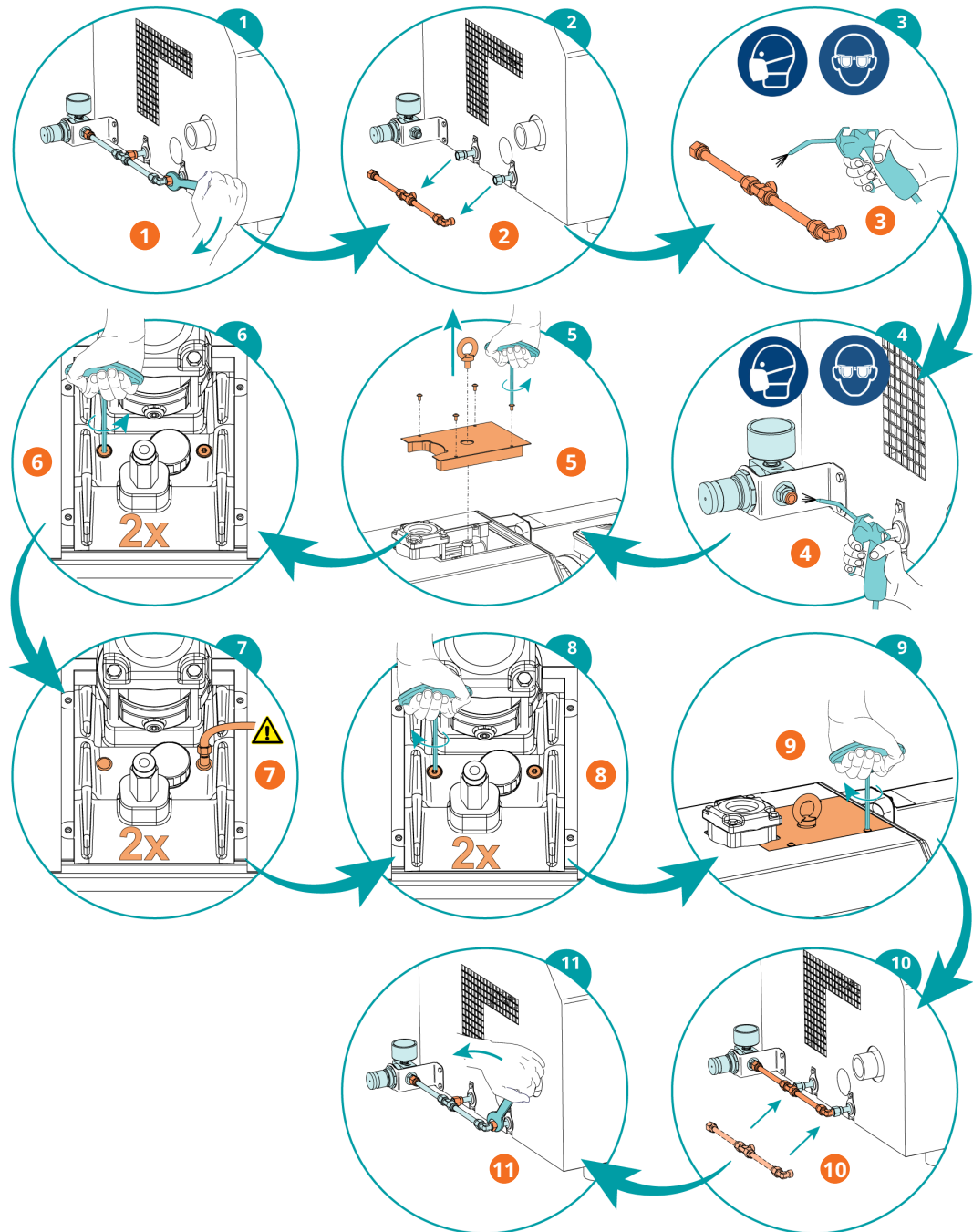
Pressurized air systems supply too high pressure.

Risk of damage to the machine!

- Adjust the pressurized air to 0.2 bar(g) by means of a pressure regulator.

In case of clogged barrier gas system (BGS):

- Remove the clogging or have the machine repaired (contact Busch).



| Description | |
|-------------|--|
| 1 | Unscrew the nuts |
| 2 | Remove the line |
| 3 | Blow into the line |
| 4 | Blow into the pressure reducer (PR) |
| 5 | Remove the cover |
| 6 | Unscrew the plugs |
| 7 | Connect the pressurized air to the relief lines. Maximum air pressure 0.2 bar (g) |
| 8 | Tighten the plugs |
| 9 | Reinstall the cover |
| 10 | Reinstall the line |
| 11 | Tighten the nuts |

9 Overhaul



WARNING



Machines contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.



NOTICE

Improper assembly.

Risk of premature failure!

Loss of efficiency!

- Any dismantling of the machine that goes beyond anything that is described in this manual should be done by Busch authorized technicians.

In case of the machine having conveyed gas that was contaminated with foreign materials which are dangerous to health:

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

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

10 Decommissioning



DANGER

Live wires.

Risk of electrical shock.

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



CAUTION

Hot surface.

Risk of burns!

- Prior to any action requiring touching the machine, let the machine cool down first.

- Shut down the machine and lock against inadvertent start up.
- Disconnect the power supply.
- Vent the connected lines to atmospheric pressure.
- Disconnect all connections.

If the machine is going to be stored:

- See *Storage* [→ 11].

10.1 Dismantling and Disposal

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

11 Spare Parts



NOTICE

Use of non-Busch genuine spare parts.

Risk of premature failure!

Loss of efficiency!

- The exclusive use of Busch genuine spare parts and consumables is recommended for the correct functioning of the machine and to validate the warranty.

| Spare part | Description | Part no. |
|--------------------------------|---------------------------------|--------------|
| Oil fill plug (=Venting valve) | Includes appropriate seal ring | 0543 107 407 |
| Oil sight glass (OSG) | | 0583 000 001 |
| Seal ring | For oil sight glass | 0480 202 576 |
| Oil drain plug (ODP) | Includes appropriate seal ring | 0415 134 870 |
| Seal ring | For oil drain plug | 0482 137 352 |
| Inlet flange lower part | Includes non-return valve | 0916 000 670 |
| Inlet flange lower part | For light chemical version only | 0916 532 372 |
| Inlet screen (IS) | | 0534 000 041 |

If other parts are required:

- Contact your Busch representative.

12 Troubleshooting



DANGER

Live wires.

Risk of electrical shock.

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

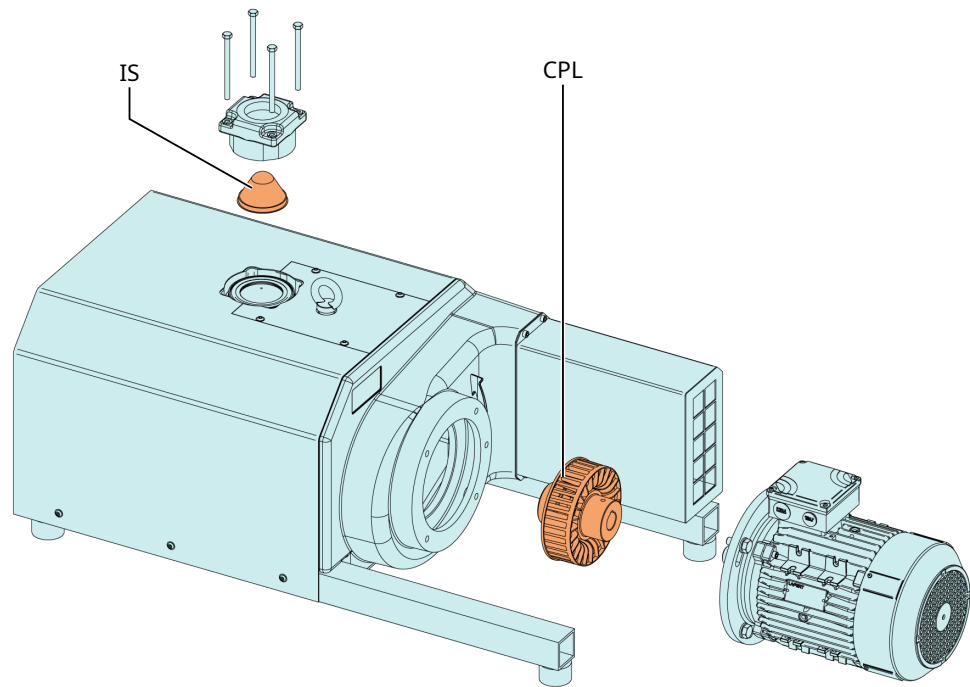


CAUTION

Hot surface.

Risk of burns!

- Prior to any action requiring touching the machine, let the machine cool down first.



Description

| | | | |
|----|--------------|-----|----------|
| IS | Inlet screen | CPL | Coupling |
|----|--------------|-----|----------|

| Problem | Possible Cause | Remedy |
|-----------------------------|---|-------------------------------|
| The machine does not start. | The motor is not supplied with the correct voltage. | • Check the power supply. |
| | The motor is defective. | • Replace the motor. |
| | The coupling (CPL) is defective. | • Replace the coupling (CPL). |

| Problem | Possible Cause | Remedy |
|--|---|--|
| The machine does not reach the usual pressure on the suction connection. | The inlet screen (IS) is partially clogged. | <ul style="list-style-type: none"> • Clean the inlet screen (IS). |
| | The inlet filter cartridge (optional) is partially clogged. | <ul style="list-style-type: none"> • Replace the inlet filter cartridge. |
| | Internal parts are worn or damaged. | <ul style="list-style-type: none"> • Repair the machine (contact Busch). |
| The machine runs very noisily. | Worn coupling (CPL). | <ul style="list-style-type: none"> • Replace the coupling (CPL). |
| | Oil level too low. | <ul style="list-style-type: none"> • Top up oil. |
| | Defective bearings. | <ul style="list-style-type: none"> • Repair the machine (contact Busch). |
| The machine runs too hot. | Insufficient cooling. | <ul style="list-style-type: none"> • Remove dust and dirt from the machine . |
| | The cooling fan's rotation direction is incorrect. | <ul style="list-style-type: none"> • Check the rotation direction of the cooling fan, if needed switch any one of the two power supply wires. |
| | Ambient temperature too high. | <ul style="list-style-type: none"> • Observe the permitted ambient temperature, see <i>Technical Data</i> [→ 33]. |
| | Temperature of the process gases at the inlet too high. | <ul style="list-style-type: none"> • Observe the permitted gas inlet temperature, see <i>Technical Data</i> [→ 33]. |
| | Oil level too low. | <ul style="list-style-type: none"> • Top up oil. |

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

13 Technical Data

| | | MM 1202 AV | MM 1252 AV |
|---|--------------------|--|--------------|
| Nominal pumping speed (50Hz / 60Hz) | m ³ /h | 200 / 240 | 245 / 290 |
| | ACFM | 118 / 141 | 144 / 171 |
| Ultimate pressure [continuous operation] | hPa (mbar) abs. | 100 [200] | |
| | Torr abs. | 75 [150] | |
| Nominal motor rating (50Hz / 60Hz) | kW | 4.3 / 5.2 | 5.1 / 6.8 |
| | HP | 5.8 / 7.1 | 6.3 / 9.1 |
| Nominal motor speed (50Hz / 60Hz) | min ⁻¹ | 3000 / 3600 | |
| | rpm | 3000 / 3600 | |
| Permitted motor speed range | min ⁻¹ | 600 ... 3600 ▶ ≥100*** hPa (mbar) abs. | |
| | rpm | 600 ... 3600 ▶ ≥75*** torr abs. | |
| Noise level (EN ISO 2151) at 400 hPa (mbar) abs. suction pressure (50Hz / 60Hz) | dB(A) | 75 / 79 | |
| Ambient temperature range | °C | 0 ... 40* | |
| | °F | 32 ... 104* | |
| Gas inlet temperature range | °C | 0 ... 40* | |
| | °F | 32 ... 104* | |
| Ambient pressure | | Atmospheric pressure | |
| Oil capacity | l | 1.0 | |
| | Qts | 1.0 | |
| Weight approx. | kg | ~240 / 245** | ~240 / 290** |
| | lbs | ~530 / 545** | ~530 / 640** |

* In case of higher or lower temperatures, please consult your Busch representative.

** The weight can vary depending on the order.

*** Operating time limit at ultimate pressure, see Intended Use

| | | MM 1322 AV | MM 1324 AV |
|---|--------------------|---|---------------------------------------|
| Nominal pumping speed (50Hz / 60Hz) | m ³ /h | 300 / 360 | 160 / 190 |
| | ACFM | 177 / 212 | 94 / 112 |
| Ultimate pressure [continuous operation] | hPa (mbar) abs. | 150 [200] | 60 |
| | Torr abs. | 112.5 [150] | 45 |
| Nominal motor rating (50Hz / 60Hz) | kW | 6.0 / 8.0 | 4.0 / 4.2 |
| | HP | 8.0 / 10.9 | 5.4 / 5.6 |
| Nominal motor speed (50Hz / 60Hz) | min ⁻¹ | 3000 / 3600 | 1500 / 1800 |
| | rpm | 3000 / 3600 | 1500 / 1800 |
| Permitted motor speed range | min ⁻¹ | 1200 ... 3600 ► ≥150*** hPa (mbar) abs. | 600 ... 1800 ► ≥60 hPa (mbar) abs. |
| | rpm | 1200 ... 3600 ► ≥112.5*** torr abs. | 600 ... 1800 ► ≥45 torr abs. |
| Noise level (EN ISO 2151) at 400 hPa (mbar) abs. suction pressure (50Hz / 60Hz) | dB(A) | 77 / 82 | 70 / 74 |
| Ambient temperature range | °C | 0 ... 40* | |
| | °F | 32 ... 104* | |
| Gas inlet temperature range | °C | 0 ... 40* | |
| | °F | 32 ... 104* | |
| Ambient pressure | | Atmospheric pressure | |
| Oil capacity | l | 1.0 | |
| | Qts | 1.0 | |
| Weight approx. | kg | ~260 / 300** | ~240 / 270** |
| | lbs | ~575 / 665** | ~530 / 600** |

* In case of higher or lower temperatures, please consult your Busch representative.

** The weight can vary depending on the order.

*** Operating time limit at ultimate pressure, see Intended Use

14 Oil

| | VS 150 | VSB 100 |
|---------------------------|--------------|--------------|
| ISO-VG | 150 | 100 |
| Part number 1 L packaging | 0831 164 883 | 0831 168 351 |
| Part number 5 L packaging | 0831 164 884 | 0831 168 352 |
| Remark | 3 | 4 |

1 = Single-phase motor; 2 = Three-phase motor; 3 = Standard oil for non-demanding applications; 4 = Food applications (H1); 5 = Anti-corrosion; 6 = Suitable for continuous operation; 7 = Not suitable for continuous operation; 8 = Improved air separation properties; 9 = Light cycle operation; 10 = Heavy duty cycle operation; 11 = Standard application up to 90°C; 12 = Suitable for Harsh application; 13 = Standard application up to 80°C

To know which oil has been filled in the machine, please refer to the nameplate (NP).

15 EU Declaration of Conformity

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

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

The manufacturer is determined by the serial number:

Serial number starts with **DEM1...**

Busch Produktions GmbH
Schauinslandstr. 1
79689 Maulburg
Germany

Serial number starts with **USM1...**

Busch Manufacturing LLC
516 Viking Drive
Virginia Beach, VA 23452
USA

declares that the machine: MINK MM 1324 AV; MINK MM 1202 AV; MINK MM 1252 AV; MINK MM 1322 AV

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

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

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

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

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

Busch Dienste GmbH
 Schauinslandstr. 1
 DE-79689 Maulburg

Maulburg, 11.07.2022

Virginia Beach, 11.07.2022

Dr. Martin Gutmann
General Manager
Busch Produktions GmbH

David Gulick
General Manager
Busch Manufacturing LLC

16 UK Declaration of Conformity

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

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

The manufacturer is determined by the serial number:

Serial number starts with **DEM1...**

Busch Produktions GmbH
Schauinslandstr. 1
79689 Maulburg
Germany

Serial number starts with **USM1...**

Busch Manufacturing LLC
516 Viking Drive
Virginia Beach, VA 23452
USA

declares that the machine: MINK MM 1324 AV; MINK MM 1202 AV; MINK MM 1252 AV; MINK MM 1322 AV

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

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2021

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

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

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

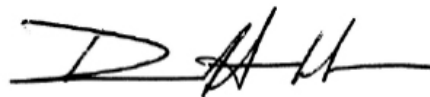
Busch (UK) Ltd
 30 Hortonwood
 Telford - UK

Maulburg, 11.07.2022



Dr. Martin Gutmann
General Manager
Busch Produktions GmbH

Virginia Beach, 11.07.2022



David Gulick
General Manager
Busch Manufacturing LLC

Notes

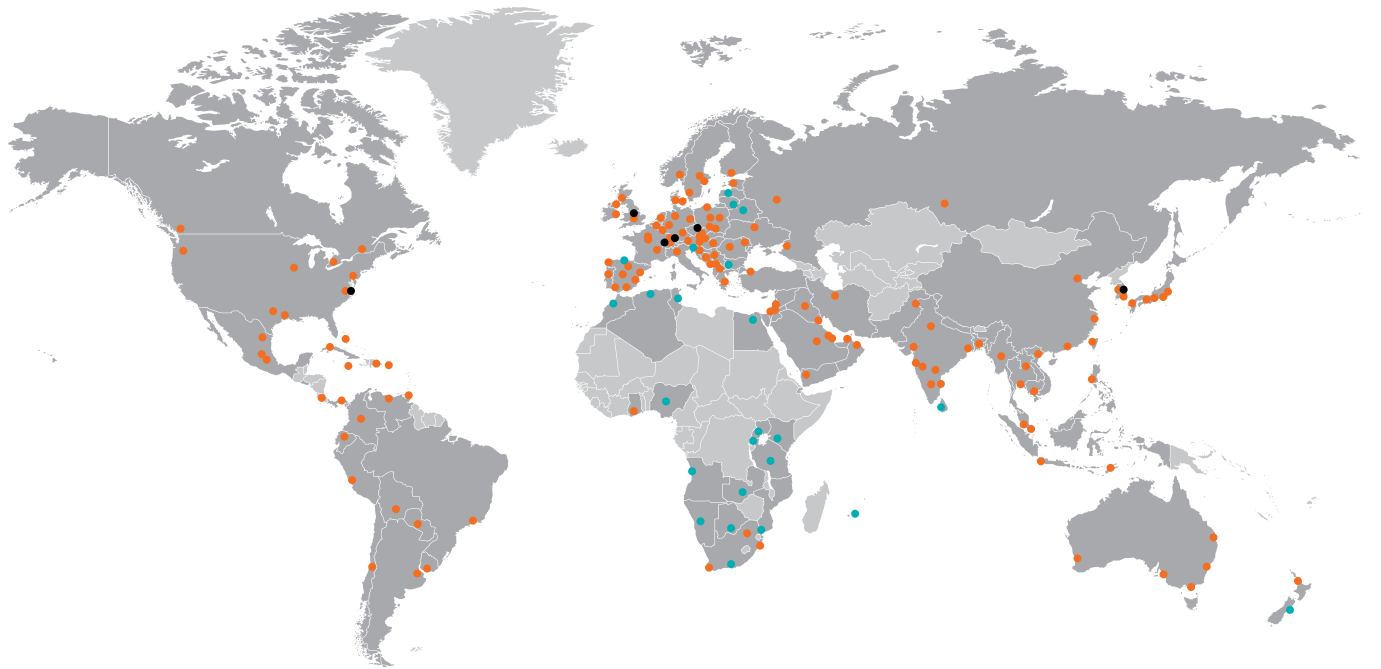
A large grid of small dots, intended for taking notes. The grid consists of approximately 30 columns and 40 rows of dots, providing a structured space for handwritten text.

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Busch

Vacuum Solutions

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

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