Instruction Manual

Mink
Claw Vacuum Pumps
MM 1324 AV, MM 1202 AV, MM 1252 AV, MM 1322 AV
US Version
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1 Safety

Before installing and operating the vacuum pump, this instruction manual should be read and understood. If anything needs to be clarified please contact your Busch representative.

Read 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 vacuum pump 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 vacuum pump has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain. 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.

ℹ️ **NOTE**

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

The vacuum pump works on the claw principle.
2.2 Application

The vacuum pump 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 vacuum pump and is permissible only after a consultation with Busch.
The vacuum pump is intended for the placement in a non-hazardous environment.
The vacuum pump is not capable of maintaining ultimate pressure. The minimum allowed ultimate pressure is to be read from the nameplate of the vacuum pump. 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 vacuum pump is thermally suitable for continuous operation:
• The continuous operation of MM1202 AV; MM 1252 AV; MM 1322 AV is limited to a suction pressure of 150 Torr.
In case of a lower suction pressure:
• The operating time in continuous operation is limited at 20 minutes, when operating up to ultimate pressure (see Technical Data [19]).
  – Ultimate suction pressure for MM 1202 AV; MM 1252 AV: 75 Torr
  – Ultimate suction pressure for MM 1322 AV: 112.5 Torr
• Afterwards the vacuum pump must cool down for at least the same amount of time, at a suction pressure range of 150 ... 750 Torr.
For permitted environmental conditions see Technical Data [19].

2.3 Optional Accessories

2.3.1 Inlet Filter

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

2.3.2 Vacuum Relief Valve

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

3 Transport

**WARNING**

Suspended load.
**Risk of severe injury!**
• Do not walk, stand or work under suspended loads.
4 Storage

**WARNING**

Motor eye bolt.

*Risk of severe injury!*

- Do not lift the vacuum pump using the eye bolt fitted to the motor. Only lift the vacuum pump as previously shown.

- Check the vacuum pump for transport damage.

If the vacuum pump is secured to a shipping base:

- Remove the vacuum pump from the shipping base.

**NOTICE**

Do not remove covers from pump suction or discharge until connections are ready to be made.

*Risk of damage to the vacuum pump!*

- The covers prevent dirt and other foreign material from entering the pump.

If storage for more than 3 months is scheduled:

- Wrap the vacuum pump in a corrosion inhibiting film.

- Store the vacuum pump indoors, dry, dust free and if possible in original packaging preferably at temperatures between 32 ... 104 °F.
5 Installation

5.1 Installation Conditions

• Make sure that the environment of the vacuum pump is not potentially explosive.
• Make sure that the ambient conditions comply with the Technical Data [► 19].
• Make sure that the environmental conditions comply with the protection class of the motor.
• Make sure that the installation space or location is vented such that sufficient cooling of the vacuum pump 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 vacuum pump is level within 1° in any direction.
• Check the oil level, see Oil Level Inspection [► 12].
• Make sure that all provided covers, guards, hoods, etc. are mounted.

5.2 Connecting Lines / Pipes

• Remove all protective caps before installation.
• Make sure that the connection lines cause no stress on the vacuum pump’s connection; 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 vacuum pump.

In case of very 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

**Foreign objects or liquids.**

**Risk of damage to the vacuum pump!**

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

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

**Connection size:**

- 2" NPT

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

5.2.2 Discharge Connection

**Connection size:**

- 1" NPT for MM 1324 AV, MM 1202 AV, MM 1252 AV
- 1 ¼" NPT for MM 1322 AV

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

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

Unless the pumped gas is discharged to the environment right at the vacuum pump:

- Make sure that the discharge line either slopes away from the vacuum pump or provide a liquid separator or a drip leg with a drain valve, so that no liquids can flow back into the vacuum pump.

5.3 Filling Oil

### NOTICE

**Do not use 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 [► 19] and Oil [► 19].

4 mm hex key

Check 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 vacuum pump requires repair.

5.4 Electrical Connection

⚠️ DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.
- Make sure that the motor is connected according to local electrical codes.
- Make sure that the power supply for the motor is compatible with the data on the nameplate of the motor.
- The power supply must be routed through a fused switch to protect the motor against electrical or mechanical overloads.
- The motor starter has to be set consistent with the motor current listed on the motor nameplate.
- Make sure that the motor of the vacuum pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary seek advice from Busch.
- Ensure the electrical connection is properly grounded.
- Electrically connect the motor.
5.4.1 Wiring Diagram Three-Phase Motor
The wiring diagram for the electrical connection is located in the terminal box or on the nameplate of the motor.

If the pump is supplied with a motor starter, it is preset at the factory in accordance with the supplied motor. For other voltage requirements, contact the factory for motor and/or starter information.

NOTE
See the motor manufacturer’s manual for start-up maintenance of the motor.

NOTICE
Incorrect connection.
Risk of damage to the motor!
• Check the inside of the terminal box for motor connection instructions/diagrams.

NOTICE
Incorrect direction of rotation.
Risk of damage to the vacuum pump!
• Operation in the wrong direction of rotation can damage the vacuum pump in a short time! Prior to starting-up make sure that the vacuum pump is operated in the right direction.
  • Determine the intended direction of rotation from the arrow on the motor.
  • Jog the motor briefly.
If the rotation of the motor must be changed:
  • Switch any two of the motor phase wires.

6 Commissioning

NOTICE
Lubricating a dry running vacuum pump (process chamber).
Risk of damage to the vacuum pump!
• Do not lubricate the process chamber of the vacuum pump with oil or grease.

CAUTION
During operation the surface of the vacuum pump may reach temperatures of more than 158°F.
Risk of burns!
• Avoid contact with the vacuum pump during and directly after operation.
6.1 Conveying Condensable Vapours

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

In order to use the vacuum pump to pump condensable vapors, the vacuum pump must be equipped with a corrosion protection coating (Aqua version) and a drain cock in the silencer.

If condensable vapours are to be conveyed:

Before process:
- Operate the vacuum pump for approximately half an hour.

After process:
- Operate the vacuum pump for approximately half an hour.
- Regularly drain condensate from the silencer with the drain cock.

7 Maintenance

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum pumps contaminated with hazardous material.</td>
</tr>
</tbody>
</table>

Risk of poisoning!

Risk of infection!

If the vacuum pump is contaminated with hazardous material:
- Wear appropriate personal protective equipment.
7 | Maintenance

![CAUTION](image)

Hot surface.

**Risk of burns!**

- Prior to touching the vacuum pump, let the vacuum pump cool down.
- Shut down the vacuum pump and lock against inadvertent start up.
- Vent the connected lines to atmospheric pressure.

If necessary:
- Disconnect all connections.

7.1 Maintenance Schedule

The maintenance intervals depend very much on the individual operating conditions. The intervals given below are intended to be 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.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Maintenance work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>If an inlet filter is installed:</td>
</tr>
<tr>
<td></td>
<td>• Check the inlet filter cartridge, replace if neces-</td>
</tr>
<tr>
<td></td>
<td>sary.</td>
</tr>
<tr>
<td>Every 3 months</td>
<td>• Check the oil level, see Oil Level Inspection [▸ 12].</td>
</tr>
<tr>
<td>Every 6 months</td>
<td>• Clean dust and dirt off of the vacuum pump.</td>
</tr>
<tr>
<td>Every 20000 hours</td>
<td>• Change the oil.</td>
</tr>
<tr>
<td></td>
<td>The change interval of 20000 operating hours is valid</td>
</tr>
<tr>
<td></td>
<td>for Busch approved oils only. The change interval de-</td>
</tr>
<tr>
<td></td>
<td>pends very much on the operating conditions. Border-</td>
</tr>
<tr>
<td></td>
<td>line operation may reduce the change interval down to</td>
</tr>
<tr>
<td></td>
<td>approximately 5000 operating hours. Other oils may re-</td>
</tr>
<tr>
<td></td>
<td>duc e the change interval.</td>
</tr>
<tr>
<td>Every 6 years</td>
<td>• Have a major overhaul on the vacuum pump (contact</td>
</tr>
<tr>
<td></td>
<td>Busch).</td>
</tr>
</tbody>
</table>

7.2 Oil Level Inspection

- Shut down the vacuum pump.
- When the vacuum pump 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 vacuum pump requires repair.

- Fill up if necessary, see Oil Filling [▸ 8].
7.3 Cleaning from Dust and Dirt

4 mm hex key

Clean the ventilation grilles and cooling fins

7.4 Oil Change

⚠️ NOTICE

Do not use 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 [► 19] and Oil [► 19].

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

**NOTICE**

Improper assembly.

Risk of premature failure!
Loss of efficiency!

- It is highly recommended that any dismantling of the vacuum pump beyond what is described in this manual should be done through Busch.

**WARNING**

Vacuum pumps contaminated with hazardous material.

Risk of poisoning!
Risk of infection!

If the vacuum pump is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

If the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health:

- Decontaminate the vacuum pump as well as possible and state the contamination status in a ‘Declaration of Contamination’.

Busch will only accept vacuum pumps that come with a complete filled in and legally binding signed ‘Declaration of Contamination’.

9 Decommissioning

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

If the vacuum pump is going to be stored:

- See Storage [6].

9.1 Dismantling and Disposal

- Drain the oil.
- Separate special waste from the vacuum pump.
- Dispose of special waste in compliance with applicable regulations.
- Dispose of the vacuum pump as scrap metal.
10 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 proper function of the vacuum pump and for granting of warranty.

<table>
<thead>
<tr>
<th>Spare part</th>
<th>Description</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil fill plug (=Venting valve)</td>
<td>Includes appropriate seal ring</td>
<td>0543 107 407</td>
</tr>
<tr>
<td>Oil sight glass</td>
<td></td>
<td>0583 000 001</td>
</tr>
<tr>
<td>Seal ring</td>
<td>For oil sight glass</td>
<td>0480 000 271</td>
</tr>
<tr>
<td>Oil drain plug</td>
<td>Includes appropriate seal ring</td>
<td>0415 134 870</td>
</tr>
<tr>
<td>Seal ring</td>
<td>For oil drain plug</td>
<td>0482 137 352</td>
</tr>
<tr>
<td>Inlet flange lower part</td>
<td>Includes non-return valve</td>
<td>0915 000 670</td>
</tr>
<tr>
<td>Inlet screen</td>
<td></td>
<td>0534 000 041</td>
</tr>
</tbody>
</table>

If other parts are required:

- Contact your Busch representative for the detailed spare parts list.
11 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 touching the vacuum pump, let the vacuum pump cool down.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vacuum pump does not start.</td>
<td>The motor is not supplied with the correct voltage.</td>
<td>• Check the power supply.</td>
</tr>
<tr>
<td></td>
<td>The motor starter overload settings are too low or trip level is too low.</td>
<td>• Check overload settings in motor starter for size and set according to motor nameplate data.</td>
</tr>
<tr>
<td></td>
<td>A fuse is blown.</td>
<td>• Check the fuses, replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Connection wiring is too small or runs are too long causing too great a voltage drop.</td>
<td>• Use proper wire size.</td>
</tr>
<tr>
<td></td>
<td>Pump or motor is blocked.</td>
<td>• Remove fan cover and try to turn the pump and motor by hand. If frozen, remove motor from pump and check motor and pump separately. If pump is frozen, disassemble completely and remove foreign objects in the pump (contact Busch service).</td>
</tr>
<tr>
<td></td>
<td>The motor is defective.</td>
<td>• Replace the motor.</td>
</tr>
<tr>
<td></td>
<td>The coupling (CPL) is defective.</td>
<td>• Replace the coupling (CPL).</td>
</tr>
<tr>
<td>The vacuum pump does not reach the usual pressure on the suction connection.</td>
<td>The inlet screen (IS) is partially clogged.</td>
<td>• Clean the inlet screen (IS).</td>
</tr>
<tr>
<td></td>
<td>The inlet filter cartridge (optional) is partially clogged.</td>
<td>• Replace the inlet filter cartridge.</td>
</tr>
<tr>
<td></td>
<td>Internal parts are worn or damaged.</td>
<td>• Repair the vacuum pump (contact Busch).</td>
</tr>
<tr>
<td>The vacuum pump runs very noisily.</td>
<td>Worn coupling (CPL).</td>
<td>• Replace the coupling (CPL).</td>
</tr>
<tr>
<td></td>
<td>Oil level too low.</td>
<td>• Top up oil.</td>
</tr>
<tr>
<td></td>
<td>Defective bearings.</td>
<td>• Repair the vacuum pump (contact Busch).</td>
</tr>
<tr>
<td>The vacuum pump runs too hot.</td>
<td>Insufficient cooling.</td>
<td>• Remove dust and dirt from the vacuum pump.</td>
</tr>
<tr>
<td></td>
<td>Ambient temperature too high.</td>
<td>• Observe the permitted ambient temperature, see Technical Data [19].</td>
</tr>
<tr>
<td></td>
<td>Temperature of the process gases at the inlet too high.</td>
<td>• Observe the permitted gas inlet temperature, see Technical Data [19].</td>
</tr>
<tr>
<td></td>
<td>Oil level too low.</td>
<td>• Top up oil.</td>
</tr>
</tbody>
</table>

For the solution of problems not mentioned in the troubleshooting chart contact your Busch representative.
## 12 Technical Data

<table>
<thead>
<tr>
<th></th>
<th>MM 1324 AV</th>
<th>MM 1202 AV</th>
<th>MM 1252 AV</th>
<th>MM 1322 AV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pumping speed</td>
<td>ACFM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>112</td>
<td>141</td>
<td>170</td>
<td>212</td>
</tr>
<tr>
<td>Ultimate pressure</td>
<td>Torr abs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>75</td>
<td>75</td>
<td>112.5</td>
</tr>
<tr>
<td>Nominal motor rating</td>
<td>hp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>6.4</td>
<td>7.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Motor speed range</td>
<td>RPM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 - 1800</td>
<td></td>
<td></td>
<td>600 - 3600</td>
</tr>
<tr>
<td>Noise level (EN ISO 2151)</td>
<td>dB(A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>74</td>
<td>79</td>
<td></td>
<td>82</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32 ... 104</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient pressure</td>
<td></td>
<td>Atmospheric pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil capacity</td>
<td>Qts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight approx.</td>
<td>lb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>~659</td>
<td>~610</td>
<td>~616</td>
<td>~651</td>
</tr>
</tbody>
</table>

## 13 Oil

<table>
<thead>
<tr>
<th></th>
<th>Busch R 550</th>
<th>VS 150</th>
<th>VSB 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO-VG</td>
<td>220</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Part number 1 qt packaging</td>
<td>0831 916 798</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Part number 1 L (0.95 qt) packaging</td>
<td>N/A</td>
<td>0831 164 883</td>
<td>0831 168 351</td>
</tr>
<tr>
<td>Part number 5 L (4.75 qt) packaging</td>
<td>N/A</td>
<td>0831 164 884</td>
<td>0831 168 352</td>
</tr>
<tr>
<td>Remark</td>
<td>Standard oil for non-demanding applications</td>
<td>Standard oil for non-demanding applications</td>
<td>Food applications (H1)</td>
</tr>
</tbody>
</table>
EU Declaration of Conformity

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

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

The manufacturer

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

declare that the vacuum pump(s): Mink MM 1324 AV; MM 1202 AV; MM 1252 AV; MM 1322 AV has (have) been manufactured in accordance with the 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

and following the standards.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title of the Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN ISO 12100:2010</td>
<td>Safety of machinery - Basic concepts, general principles of design</td>
</tr>
<tr>
<td>EN ISO 13857:2008</td>
<td>Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs</td>
</tr>
<tr>
<td>EN 1012-1:2010 + A1:2009</td>
<td>Compressors and vacuum pumps - Safety requirements - Part 1 and Part 2</td>
</tr>
<tr>
<td>EN ISO 2151:2008</td>
<td>Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)</td>
</tr>
<tr>
<td>EN 60204-1:2006</td>
<td>Safety of machinery - Electrical equipment of machines - Part 1: General requirements</td>
</tr>
<tr>
<td>EN 61000-6-2:2005</td>
<td>Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments</td>
</tr>
<tr>
<td>EN ISO 13849-1:2015</td>
<td>Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design</td>
</tr>
</tbody>
</table>

Person authorised to compile the technical file:

Gerd Rohweder
Busch Dienste GmbH
Schauinslandstr. 1
DE-79689 Maulburg

Virginia Beach, 07.02.2018

David Gulick, General Manager

(1) In case control systems are integrated.
Busch Vacuum Pumps and Systems
All over the World in Industry

Argentina
www.busch-vacuum.com.ar

Australia
www.busch.com.au

Austria
www.busch.at

Belgium
www.busch.be

Brazil
www.buschdobrasil.com.br

Canada
www.busch.ca

Chile
www.busch.cl

China
www.busch-china.com

Colombia
www.buschvacuum.co

Czech Republic
www.buschvacuum.cz

Denmark
www.busch.dk

Finland
www.busch.fi

France
www.busch.fr

Germany
www.busch.de

Hungary
www.buschvacuum.hu

India
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