Instruction Manual

Mink
Claw Compressor
MM 1202 AP, MM 1252 AP, MM 1322 AP

Busch Produktions GmbH
Schauinslandstraße 1, 79689 Maulburg
Germany

0870135611/A0001_en / Original instructions / Modifications reserved
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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. 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 Product Description

NOTE

Technical term.

In this instruction manual, we consider that the term ‘machine’ refers to the ‘compressor’.

| IN  | Suction inlet                  | ODP  | Oil drain plug  |
| OUT | Discharge connection           | CAI  | Cooling air inlet |
| OSG | Oil sight glass                | CAO  | Cooling air outlet |
| NP  | Nameplate                      | CD   | Condensate drain |
| IF  | Inlet filter                   | SI   | External silencer |
| MTB | Motor terminal box             | SV   | Safety valve     |
| EB  | Eye bolt                       |      |                  |

Aqua version

IN

OUT

CAO

IF

MTB

NP

ODP

OSG

SV

CAI

CD

EB

SI
2.1 Operating Principle

The machine works on the claw principle.
The Mink MM is fully air-cooled thanks to an integrated fan in the drive unit.

2.2 Application

The machine is intended for the compression 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 maximum allowed pressure on the discharge connection (OUT) must not exceed the value indicated on the nameplate (NP).
The machine is suitable for continuous operation.
Permitted environmental conditions, see Technical Data [► 19].
In order to use the machine for the conveyance of condensable vapours, the machine must be equipped with a corrosion protection coating (Aqua version) and a condensate drain (CD) in the internal silencer.

2.3 Start Controls

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

2.4 Standard Features

2.4.1 Safety Valve

The safety valve (SV) protects the machine against overload only. It is not designed for frequent use and must therefore not be used as a system pressure regulating valve.

2.4.2 Inlet Filter with Silencer

The inlet filter (IF) protects the machine against dust and other solids in the process gas. The inlet filter is available with a paper or polyester cartridge. The external silencer (SI) reduces the inlet gas noise at the machine suction inlet (IN).
3 Transport

**WARNING**

Suspended load.

*Risk of severe injury!*

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

- Make sure that the eyebolt (EB) is in faultless condition, fully screwed in and tightened by hand.

Machine weight:
see the technical data or the nameplate

The machine appearance may differ from the illustration.

**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 previously shown.

- 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

**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 [► 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 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 of 1° in any direction.
- Check the oil level, see Oil Level Inspection [► 12].
- 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

- Remove all protective caps before installation.
- Make sure that the connection lines cause no stress on the machine'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 machine.

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**

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:
- Without connection. The inlet gas is sucked from the ambient air of the machine.

Depending on the specific order, other connection dimensions may apply.
- Make sure that the gas is drawn without obstruction.

5.2.2 Discharge Connection

Connection size:
- G2

Depending on the specific order, other connection dimensions may apply.

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 [► 19] and Oil [► 19].

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.

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 power supply for the motor is compatible with the data on the nameplate of the motor.
- Provide overload protection according to EN 60204-1 for the motor.
- 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.
- 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.
5.4.1 Wiring Diagram Three-Phase Motor

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):

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.

6 Commissioning

NOTICE
Lubricating a dry running machine (process chamber).
Risk of damage to the machine!
- Do not lubricate the process 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 persons are present in the vicinity of a non noise insulated machine over extended periods:

- Make sure that ear protection is being used.
- Make sure that the installation conditions (see Installation Conditions [7]) are complied with.
- Switch on the machine.
- Make sure that the maximum permissible number of starts does not exceed 12 starts per hour.
- Make sure that the operating conditions are complied with, see Technical Data [19].

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.

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 machine for the conveyance of condensable vapours, the machine must be equipped with a corrosion protection coating (Aqua version) and a condensate drain (CD) in the internal silencer.

If condensable vapours 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.

7 Maintenance

**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.
### 7.1 Maintenance Schedule

The maintenance intervals depend very much on the individual operating conditions. The intervals given below are desired 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>In case of an inlet filter being 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 the machine from dust and dirt.</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</td>
</tr>
<tr>
<td></td>
<td>depends very much on the operating conditions.</td>
</tr>
<tr>
<td></td>
<td>Borderline operation may reduce the change interval</td>
</tr>
<tr>
<td></td>
<td>down to approximately 5000 operating hours.</td>
</tr>
<tr>
<td></td>
<td>Other oils may reduce the change interval.</td>
</tr>
<tr>
<td>Every 6 years</td>
<td>• Have a major overhaul on the machine (contact</td>
</tr>
<tr>
<td></td>
<td>Busch).</td>
</tr>
</tbody>
</table>

### 7.2 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 [☞ 8].

### 7.3 Cleaning from Dust and Dirt

4 mm hex key

* Aqua version only

Clean the ventilation grilles and cooling fins
7.4 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.

Cleaning cloth
Drain pan
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 machine requires repair.

8 Overhaul

**NOTICE**
Improper assembly.
Risk of premature failure!
Loss of efficiency!

- It is highly recommended that any dismantling of the machine that goes beyond anything that is described in this manual should be done through Busch.

**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.

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

9 Decommissioning

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

If the machine is going to be stored:

- See Storage [► 6].

9.1 Dismantling and Disposal

- Drain the oil.
- Separate special waste from the machine.
- Dispose of special waste in compliance with applicable regulations.
- Dispose of the machine 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 machine 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>
<tr>
<td>Safety valve</td>
<td>Quote in your order also the ultimate working pressure of the machine</td>
<td>On request</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 any action requiring touching the machine, let the machine cool down first.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The machine 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 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>
</tbody>
</table>
The machine does not reach the usual pressure on the discharge connection. | The inlet screen (IS) is partially clogged. | Clean the inlet screen (IS).
---|---|---
| The inlet filter cartridge (optional) is partially clogged. | Replace the inlet filter cartridge.
| The pressure system or pressure line is not leak-tight. | Check the hose or pipe connection for leakage.
| The pressure relief valve/regulating system (SV) is misadjusted or defective. | Adjust, repair or replace, respectively.
| Internal parts are worn or damaged. | Repair the machine (contact Busch).
| Partial clogging in the discharge or pressure line. | Remove the clogging.

The machine runs very noisily. | Worn coupling (CPL). | Replace the coupling (CPL).
---|---|---
| Oil level too low. | Top up oil.
| Defective bearings. | Repair the machine (contact Busch).

The machine runs too hot. | Insufficient cooling. | Remove dust and dirt from the machine.
---|---|---
| Ambient temperature too high. | Observe the permitted ambient temperature, see Technical Data [► 19].
| Temperature of the process gases at the inlet too high. | Observe the permitted gas inlet temperature, see Technical Data [► 19].
| Oil level too low. | Top up oil.

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 1202 AP</th>
<th>MM 1252 AP</th>
<th>MM 1322 AP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pumping speed (50Hz / 60Hz)</td>
<td>m³/h</td>
<td>m³/h</td>
<td>m³/h</td>
</tr>
<tr>
<td>Overpressure (50Hz) bar(g)</td>
<td>0.8 1.2 2.0</td>
<td>0.9 1.6 2.0</td>
<td>1.0 1.7 2.0</td>
</tr>
<tr>
<td>Overpressure (60Hz) bar(g)</td>
<td>see nameplate (NP)</td>
<td>0.8 1.1 1.8 2.0</td>
<td>0.7 1.4 2.0</td>
</tr>
<tr>
<td>Overpressure (60Hz) bar(g)</td>
<td>see nameplate (NP)</td>
<td>0.8 1.1 1.8 2.0</td>
<td>0.7 1.4 2.0</td>
</tr>
<tr>
<td>Nominal motor rating (50Hz) kW</td>
<td>≥6.0 ≥7.5 ≥11.0</td>
<td>≥7.5 ≥10.6 ≥12.5</td>
<td>≥10.5 ≥14.9 ≥16.5</td>
</tr>
<tr>
<td>Nominal motor rating (60Hz) kW</td>
<td>≥8.0 ≥9.5 ≥12.5 ≥13.5</td>
<td>≥9.0 ≥12.6 ≥15.6</td>
<td>≥12.5 ≥17.2 ≥21.0</td>
</tr>
<tr>
<td>Nominal motor speed (50Hz / 60Hz)</td>
<td>m³/h</td>
<td>m³/h</td>
<td>m³/h</td>
</tr>
<tr>
<td>Permitted motor speed range min⁻¹</td>
<td>3000 / 3600</td>
<td>3000 / 3600</td>
<td>3000 / 3600</td>
</tr>
<tr>
<td>Noise level (EN ISO 2151) dB(A)</td>
<td>80 / 83</td>
<td>81 / 84</td>
<td>82 / 85</td>
</tr>
<tr>
<td>Ambient temperature range °C</td>
<td>0 … 40</td>
<td>0 … 40</td>
<td>0 … 40</td>
</tr>
<tr>
<td>Ambient pressure</td>
<td>Atmospheric pressure</td>
<td>Atmospheric pressure</td>
<td>Atmospheric pressure</td>
</tr>
<tr>
<td>Oil capacity l</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Weight approx. (50Hz / 60Hz) kg</td>
<td>250 … 310</td>
<td>265 … 315</td>
<td>305 … 355</td>
</tr>
</tbody>
</table>

## 13 Oil

<table>
<thead>
<tr>
<th></th>
<th>VS 150</th>
<th>VS 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO-VG</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Part number 1 L packaging</td>
<td>0831 164 883</td>
<td>0831 168 351</td>
</tr>
<tr>
<td>Part number 5 L packaging</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>Food applications (H1)</td>
</tr>
</tbody>
</table>
14 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 Produktions GmbH
Schauinslandstr. 1
DE-79689 Maulburg

declare that the machine(s): Mink MM 1202 AP; MM 1252 AP; MM 1322 AP
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</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 (1)</td>
<td>Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design</td>
</tr>
</tbody>
</table>

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Maulburg, 11.01.2018

Martin Gutmann, General director

(1) In case control systems are integrated.
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