Assembly- and Operating Manual

MPZ

3 - Finger - Centric - Gripper
Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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1 General

1.1 About this manual
This manual contains important information for a safe and appropriate use of the product. This manual is an integral part of the product and must be kept accessible for the personnel at all times. Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual. Illustrations in this manual are provided for basic understanding and may differ from the actual product design.
In addition to these instructions, the documents listed under Applicable documents [6] are applicable.

1.1.1 Presentation of Warning Labels
To make risks clear, the following signal words and symbols are used for safety notes.

⚠️ DANGER
Danger for persons!
Non-observance will inevitably cause irreversible injury or death.

⚠️ WARNING
Dangers for persons!
Non-observance can lead to irreversible injury and even death.

⚠️ CAUTION
Dangers for persons!
Non-observance can cause minor injuries.

NOTICE
Material damage!
Information about avoiding material damage.
1.1.2 Applicable documents

- General terms of business*
- Catalog data sheet of the purchased product *
- Assembly and operating manuals of the accessories *

The documents marked with an asterisk (*) can be downloaded on our homepage schunk.com

1.1.3 Sizes

This operating manual applies to the following sizes:
- MPZ 16
- MPZ 20
- MPZ 25
- MPZ 30
- MPZ 38
- MPZ 45

1.1.4 Variants

This operating manual applies to the following variations:
- MPZ without gripping force maintenance
- MPZ with gripping force maintenance O.D. gripping
- MPZ with gripping force maintenance I.D. gripping
- MPZ High-temperature version (HT)
- MPZ with flexible position sensor

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:
- Observe the specified maintenance and lubrication intervals
- Observe the ambient conditions and operating conditions

Parts touching the workpiece and wear parts are not included in the warranty.
1.3 Scope of delivery

The scope of delivery includes

- 3 - Finger - Zentrischgreifer MPZ in the version ordered
- Assembly and Operating Manual
- Accessory pack

1.3.1 Accessories pack

NOTE

MPZ 16-25 contains no accessory pack

Content of the accessory pack:

- 2x Cylindrical sleeves for mounting
- 2 x O-ring for hose-free direct connection *
- 2 x Locking screw **

*not for MPZ-FPS 30-45
** not for MPZ-FPS 30

<table>
<thead>
<tr>
<th>Accessory pack for</th>
<th>MPZ</th>
<th>MPZ- High-temperature version (HT)</th>
<th>MPZGKS - High-temperature version (HT)</th>
<th>MPZ- AS / -IS</th>
<th>MPZ- FPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPZ30</td>
<td>5512077</td>
<td>395512077</td>
<td>395512078</td>
<td>5512078</td>
<td>5512079</td>
</tr>
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<td>MPZ38</td>
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<td>395512091</td>
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<td>5512092</td>
<td>5512093</td>
</tr>
<tr>
<td>MPZ45</td>
<td>5512105</td>
<td>395512105</td>
<td>-</td>
<td>5512092</td>
<td>5512093</td>
</tr>
</tbody>
</table>

Content of the accessories pack: Assembly drawing [37].

1.4 Accessories

A wide range of accessories are available for this product

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

1.4.1 Seal kit

<table>
<thead>
<tr>
<th>Seal kit for</th>
<th>MPZ / MPZ-AS / MPZ-IS</th>
<th>MPZ - High-temperature version (HT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPZ 16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MPZ 20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MPZ 25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MPZ 30</td>
<td>0370886</td>
<td>0370490</td>
</tr>
<tr>
<td>MPZ 38</td>
<td>0370887</td>
<td>-</td>
</tr>
<tr>
<td>MPZ 45</td>
<td>0370888</td>
<td>-</td>
</tr>
</tbody>
</table>

Contents of the sealing kit, Assembly drawing [37].
2 Basic safety notes

2.1 Intended use
The product is designed exclusively for gripping and temporarily holding workpieces or objects.

- The product may only be used within the scope of its technical data, \textit{Technical data [16].}
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use
It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

\textbf{Implementation of structural changes}

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

\textbf{Use of unauthorized spare parts}

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.
2.5 **Gripper fingers**

**Requirements for the gripper fingers**

Stored energy within the product creates the risk of serious injuries and significant property damage.

- Arrange the gripper fingers in a way that the product reaches either the position "open" or "closed" in a de-energized state.
- Only exchange the gripper fingers when no residual energy remains in the product.
- Make sure that the product and the top jaws are a sufficient size for the application.

2.6 **Environmental and operating conditions**

**Required ambient conditions and operating conditions**

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

See also [Technical data](#) [16].

2.7 **Personnel qualification**

**Inadequate qualifications of the personnel**

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

**Trained electrician**
Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

**Qualified personnel**
Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

**Instructed person**
Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

**Service personnel of the manufacturer**
Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.
2.8 **Personal protective equipment**

**Use of personal protective equipment**

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.9 **Notes on safe operation**

**Incorrect handling of the personnel**

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.10 **Transport**

**Handling during transport**

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.
2.11 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.12 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product’s safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.13 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.
2.13.1 Protection during handling and assembly

Incorrect handling and assembly
Incorrect handling and assembly may impair the product’s safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads
Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.13.2 Protection during commissioning and operation

Falling or violently ejected components
Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.
2.13.3 Protection against dangerous movements

**Unexpected movements**

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.13.4 Protection against electric shock

**Possible electrostatic energy**

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.
2.14 Notes on particular risks

⚠️ DANGER
Risk of fatal injury from suspended loads!
Falling loads can cause serious injuries and even death.
• Stand clear of suspended loads and do not step within their swiveling range.
• Never move loads without supervision.
• Do not leave suspended loads unattended.
• Wear suitable protective equipment.

⚠️ WARNING
Risk of injury from objects falling and being ejected!
Falling and ejected objects during operation can lead to serious injury or death.
• Take appropriate protective measures to secure the danger zone.

⚠️ WARNING
Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.
• Before starting any work on the product: Switch off the power supply and secure against restarting.
• Make sure, that no residual energy remains in the system.

⚠️ WARNING
Risk of injury from crushing and impacts!
Serious injury could occur during the base jaw procedure and when breaking or loosening the gripper fingers.
• Wear suitable protective equipment.
• Do not reach into the open mechanism or the movement area of the product.

⚠️ WARNING
Risk of injury from sharp edges and corners!
Sharp edges and corners can cause cuts.
• Use suitable protective equipment.
**WARNING**

Risk of injury due to spring forces!

Parts are under spring tension on products which clamp using spring force or which have gripping force maintenance. While disassembling components can move unexpectedly and cause serious injuries.

- Disassemble the product cautiously.
- Make sure that no residual energy remains in the system.

---

**WARNING**

Risk of injury from objects falling during energy supply failure

Products with a mechanical gripping force maintenance can, during energy supply failure, still move independently in the direction specified by the mechanical gripping force maintenance.

- Secure the end positions of the product with SCHUNK SDV-P pressure maintenance valves.
3 Technical data

<table>
<thead>
<tr>
<th>Size</th>
<th>MPZ 16</th>
<th>MPZ 20</th>
<th>MPZ 25</th>
<th>MPZ 30</th>
<th>MPZ 38</th>
<th>MPZ 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure medium</td>
<td>Compressed air, compressed air quality according to ISO 8573-1:2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal working pressure [bar]</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. pressure [bar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- without gripping force maintenance</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- O.D. gripping</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- I.D. gripping</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- with flexible position sensor</td>
<td>-</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. pressure [bar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- without gripping force maintenance</td>
<td>8.0</td>
<td>8.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- O.D. gripping</td>
<td>6.5</td>
<td>6.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- I.D. gripping</td>
<td>6.5</td>
<td>6.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- with flexible position sensor</td>
<td>-</td>
<td>8.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

More technical data is included in the catalog data sheet. Whichever is the latest version.

Ambient conditions and operating conditions

<table>
<thead>
<tr>
<th>Designation</th>
<th>MPZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature [°C]</td>
<td></td>
</tr>
<tr>
<td>min.</td>
<td>+5</td>
</tr>
<tr>
<td>max.</td>
<td>+90</td>
</tr>
<tr>
<td>Protection class IP</td>
<td>40</td>
</tr>
<tr>
<td>Noise emission [dB(A)]</td>
<td>≤ 70</td>
</tr>
</tbody>
</table>

* For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.
4 Design and description

4.1 Configuration

3 - Finger - Zentrischgreifer

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Housing</td>
</tr>
<tr>
<td>2</td>
<td>Main air connections</td>
</tr>
<tr>
<td>3</td>
<td>Base jaws</td>
</tr>
</tbody>
</table>

4.2 Description

3-finger centric gripper with base jaws guided on T-slots
5 Assembly

5.1 Assembly and connection

⚠️ WARNING

Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

NOTICE

Damage to the gripper is possible!
If the maximum permissible finger weight or the permissible mass moment of inertia of the fingers is exceeded, the gripper can be damaged.

- A jaw movement always has to be without jerks and bounce.
- You must therefore implement sufficient reduction and/or damping.
- Observe the diagrams and information in the catalog data sheet.

NOTE

- Observe the requirements for the compressed air supply, Technical data [16].
- In case of compressed air loss (cutting off the energy line), the components lose their dynamic effects and do not remain in a secure position. However, the use of a SDV-P pressure maintenance valve is recommended in this case in order to maintain the dynamic effect for some time. Product variants are also offered with mechanical gripping force via springs, which also ensure a minimum clamping force in the event of a pressure drop.

☐ Check the evenness of the mounting surface, Mechanical connection [20].
☐ Only open the required air connections (main connection or direct connection), Pneumatical connection [21].
☐ Connect the product via the hose-free direct connection.
  ✔ Use O-rings from the accessory pack.
  ✔ Seal main air connections which are not required with locking screws.
➤ OR: Connect compressed air lines to the main air connections "A" and "B".
  ✔ Screw in air connections (plug connections).
  OR: Screw on throttle valve in order to be able to perform sufficient throttling and/or dampening.
➤ Screw the product to the machine/system, Mechanical connection [► 20].
  ✔ If necessary, use appropriate connection elements (adapter plates).
  ✔ Observe the maximal tightening torque, admissible screw-in depth and, if necessary, strength class.
➤ Secure the gripper fingers to the base jaws, Mechanical connection [► 20].
➤ Connect the sensor, see assembly and operating manual of the sensor.
➤ Mount the sensor, Mounting the sensor [► 22].
5.2 Connections

5.2.1 Mechanical connection

Evenness of the mounting surface

The values apply to the whole mounting surface to which the product is mounted.

Requirements for evenness of the mounting surface (Dimensions in mm)

<table>
<thead>
<tr>
<th>Edge length</th>
<th>Permissible unevenness</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Mounting

The module can be mounted from the front and from the rear:

---

Assembly options

Mounting material

<table>
<thead>
<tr>
<th>Item</th>
<th>Mounting</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>38</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front mounting</td>
<td>M1.6</td>
<td>M1.6</td>
<td>M2.5</td>
<td>M3</td>
<td>M4</td>
<td>M4</td>
</tr>
<tr>
<td>2</td>
<td>Rear mounting</td>
<td>M2</td>
<td>M2</td>
<td>M3</td>
<td>M4</td>
<td>M5</td>
<td>M5</td>
</tr>
<tr>
<td></td>
<td>5 deep</td>
<td></td>
<td>8 deep</td>
<td>10 deep</td>
<td></td>
<td>10 deep</td>
<td></td>
</tr>
<tr>
<td>91 *</td>
<td>Centering sleeve</td>
<td>Ø1.5 H7</td>
<td>Ø3.5 H7</td>
<td>Ø5 H7</td>
<td>Ø6 H7</td>
<td>Ø8 H7</td>
<td>Ø8 H7</td>
</tr>
</tbody>
</table>

* Contained in accessory pack.

**NOTE**

- Locate the module with 2 centre sleeves (91).
- Mount the module using the screws (1/2).
5.2.2 Pneumatical connection

**NOTE**

The central air unit must be equipped with a maintenance unit that is located as near as possible to the consumer.

---

**Compressed air connections**

**Thread diameter of the air connections**

<table>
<thead>
<tr>
<th>Item</th>
<th>Connection</th>
<th>16 *</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>38</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hose connection at the side (A = open, B = close)</td>
<td>M2.5 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
</tr>
<tr>
<td>2</td>
<td>Hose-free direct connection from the rear (a = open, b = close)</td>
<td>-</td>
<td>-</td>
<td>M2.5 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
<td>M3 (2x)</td>
</tr>
<tr>
<td>92</td>
<td>O-ring</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Ø3 x 1.00</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* For this size, the hose clips are pre-assembled at the factory and the compressed air hoses prescribed by SCHUNK must be used, see catalog data sheet. Procedure for leaking compressed air connection, see section "Troubleshooting".

** Contained in accessory pack.

Further information on the hose-free direct connection contains the catalog data sheet.
5.3 Mounting the sensor

NOTE
Observe the assembly and operating manual of the sensor for mounting and connecting.

The product is prepared for the use of sensors.

- For the exact type designations of suitable sensors, please see catalog datasheet and Overview of sensors [22].
- For technical data for the suitable sensors, see assembly and operating manual and catalog datasheet.
  - The assembly and operating manual and catalog datasheet are included in the scope of delivery for the sensors and are available at schunk.com.
- Information on handling sensors is available at schunk.com or from SCHUNK contact persons.

5.3.1 Overview of sensors

<table>
<thead>
<tr>
<th>Designation</th>
<th>MPZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Magnetic switch MMS 22</td>
<td>X</td>
</tr>
<tr>
<td>Programmable magnetic switch MMS 22-P11</td>
<td>X</td>
</tr>
<tr>
<td>Programmable magnetic switch MMS 22-P12</td>
<td>X</td>
</tr>
<tr>
<td>Programmable magnetic switch MMS-P 22</td>
<td>X</td>
</tr>
<tr>
<td>Inductive proximity switch IN 30K</td>
<td>X</td>
</tr>
<tr>
<td>Flexible position sensor FPS with FPS-S13</td>
<td>X</td>
</tr>
</tbody>
</table>
5.3.2 Switch-off hysteresis for magnetic switches

**Sensors MMS 22, MMS-P 22, MMS 22-PI1 and MMS 22-PI2**

The smallest detectable difference in stroke is defined in the following table:

*The smallest detectable difference in stroke based on the nominal stroke*

<table>
<thead>
<tr>
<th>For grippers with X mm nominal stroke per jaw</th>
<th>Min. query range per jaw/min. queried stroke difference per jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>X ≤ 5 mm</td>
<td>30% of the nominal stroke per jaw</td>
</tr>
<tr>
<td>X &gt; 5 mm to X ≤ 10 mm</td>
<td>20% of the nominal stroke per jaw</td>
</tr>
<tr>
<td>X &gt; 10 mm</td>
<td>10% of the nominal stroke per jaw</td>
</tr>
</tbody>
</table>

**Example:** Product with 7 mm nominal stroke per jaw
7 mm * 20% = 1.4 mm

5.3.3 Setting dimensions

*Setting dimension l1, from product bottom edge (1) to front sensor (2)*

The setting dimension applies for the following sensors:

- Programmable magnetic switch MMS 22-PI1
- Programmable magnetic switch MMS 22-PI2
- Programmable magnetic switch MMS-P 22

<table>
<thead>
<tr>
<th>Size</th>
<th>l1* [mm]</th>
<th>Size</th>
<th>l1* [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPZ 20-AS</td>
<td>19.3</td>
<td>MPZ 38</td>
<td>17.5</td>
</tr>
<tr>
<td>MPZ 25-AS</td>
<td>18.4</td>
<td>MPZ 38-AS</td>
<td>22.0</td>
</tr>
<tr>
<td>MPZ 30</td>
<td>16.2</td>
<td>MPZ 38-IS</td>
<td>38.5</td>
</tr>
<tr>
<td>MPZ 30-AS</td>
<td>21.2</td>
<td>MPZ 45</td>
<td>19.4</td>
</tr>
<tr>
<td>MPZ 30-IS</td>
<td>29.2</td>
<td>MPZ 45-AS</td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MPZ 45-IS</td>
<td>34.4</td>
</tr>
</tbody>
</table>
5.3.4 Mounting MMS 22 magnetic switch

**NOTICE**

Risk of damage to the sensor during assembly!
- Observe the maximal tightening torque.

---

**Positioning of the magnetic switches**

**Position "Gripper open" or "Part gripped (I.D. gripping)"**
- Bring product in the position to be set.
- If necessary remove T-nut (3).
- Turn the sensor 1 (1) into the groove (2).
  OR: Slide the sensor 1 (1) into the groove (2) until the sensor 1 (1) stops at the end of the groove.
- Pull the sensor 1 (1) back again slowly until it switches.
- Secure the sensor 1 (1) using the set-screw (4).
  Tightening torque: 10 Ncm
- Bring product into the "Gripper open" or "Part gripped" position and test the function.

**Position "Gripper closed" or "Part gripped (O.D. gripping)"**
- Bring product in the position in which it is to be set.
- If necessary remove T-nut (3).
- Turn the sensor 2 (1) into the groove (2).
  OR: Slide sensor 2 (1) into the groove (2) in the direction of the housing middle (3), until the sensor 2 (1) switches.
- Secure the sensor 2 (1) using the set-screw (4).
  Tightening torque: 10 Ncm
- Bring product into the "Gripper closed" or "Part gripped" position and test the function.
5.3.5 Mounting MMS 22-PI1 programmable magnetic switch

**NOTICE**

Risk of damage to the sensor during assembly!
- Observe the maximal tightening torque.

**NOTE**

If there is no T-nut available, slide the sensor according to dimension I1 into the groove (2), Setting dimensions [23].

- Turn the sensor 1 (1) into the groove (2).
  OR: Slide the sensor 1 (1) into the groove (2) until the sensor 1 (1) stops at the T-nut (3).
- Secure the sensor 1 (1) using the set-screw (4).
  Tightening torque: 10 Ncm
- Adjust sensor 1 (1), see sensor assembly and operating manual.
- Repeat steps for sensor 2.
5.3.6 Mounting programmable MMS 22-PI2 magnetic switch

**NOTICE**

Risk of damage to the sensor during assembly!
- Observe the maximal tightening torque.

**NOTE**

If there is no T-nut available, slide the sensor according to dimension I1 into the groove (2), *Setting dimensions* [23].

- Turn the sensor (1) into the groove (2).
  OR: Slide the sensor (1) into the groove (2) until the sensor (1) stops at the T-nut (3).
- Secure the sensor (1) using the set-screw (4).
  Tightening torque: 10 Ncm
- Adjust sensor (1), see sensor assembly and operating manual.
5.3.7 Mounting programmable MMS-P magnetic switch

**NOTICE**

Risk of damage to the sensor during assembly!

- Observe the maximal tightening torque.

---

**NOTE**

If there is no T-nut available, slide the sensor according to dimension I\textsubscript{1} into the groove (2), Setting dimensions \[23].

- Turn the sensor (1) into the groove (2).
  OR: Slide the sensor (1) into the groove (2) until the sensor (1) stops at the T-nut (3).
- Secure the sensor (1) using the set-screw (4).
  Tightening torque: 10 Ncm
- Adjust sensor (1), see sensor assembly and operating manual.
5.3.8 Mounting inductive proximity switch IN 30K

**NOTICE**

Risk of damage to the sensor during assembly!
- Observe the maximal tightening torque.

**NOTE**

The screw heads of screws (23) and (24) are used for proximity switch monitoring. The monitoring positions "Gripper open" and "Gripper closed" were factory-set. These monitoring positions cannot be changed.

- Slide both sensors into the holder (9) and tighten screw (22) slightly.
- Put the product in the position in which it is to be set.
- Slide the sensor carefully towards the screw head.
- Use a feeler gage to set a distance of 0.2 mm.
- Bring the product into position and test the function.
- Tighten screw (22) on the holder (9).
  Tightening torque: 10 Ncm
5.3.9 Mounting flexible position sensor FPS

The flexible position sensor FPS consists of an evaluation unit and one of the following sensors:
- FPS-S 13

**NOTICE**

Risk of damage to the sensor during assembly!
- Observe the maximal tightening torque.

- Insert the sensor (41) with the circular elevation (active sensor surface) in the recess of the housing.
- Secure the sensor (41) on the gripper using screws (46).
  Tightening torque: 1 Ncm
- Connect the evaluation unit and adjust the sensor, see the Assembly and Operating Manual for the sensor.
## 6 Troubleshooting

### 6.1 Product is not moving

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base jaws jam in housing, e.g. mounting surface is not sufficiently even.</td>
<td>Check the evenness of the mounting surface. Mechanical connection [20]</td>
</tr>
<tr>
<td></td>
<td>Loosen the mounting screws of the product and actuate the product again.</td>
</tr>
<tr>
<td>Pressure drops below minimum.</td>
<td>Check air supply. Pneumatical connection [21]</td>
</tr>
<tr>
<td>Compressed air lines switched.</td>
<td>Check compressed air lines. Pneumatical connection [21]</td>
</tr>
<tr>
<td>Proximity switch defective or set incorrect.</td>
<td>Readjust or change sensor.</td>
</tr>
<tr>
<td>Unused air connections open.</td>
<td>Close unused air connections.</td>
</tr>
<tr>
<td>Flow control valve closed.</td>
<td>Open the flow control valve.</td>
</tr>
<tr>
<td>Component part defective.</td>
<td>Replace component or send it to SCHUNK for repair.</td>
</tr>
</tbody>
</table>

### 6.2 Product is not executing the complete stroke

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirt deposits between cover and piston.</td>
<td>Clean and if necessary re-lubricate.</td>
</tr>
<tr>
<td>Dirt deposits between basic jaws and guidance.</td>
<td>Disassemble and clean the product.</td>
</tr>
<tr>
<td>Pressure drops below minimum.</td>
<td>Check air supply. Pneumatical connection [21]</td>
</tr>
<tr>
<td>Mounting surface is not sufficiently flat.</td>
<td>Check the evenness of the mounting surface. Mechanical connection [20]</td>
</tr>
<tr>
<td>Component part defective.</td>
<td>Replace component or send it to SCHUNK for repair.</td>
</tr>
</tbody>
</table>
### 6.3 Product opens or closes abruptly

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too little grease in the mechanical guiding areas.</td>
<td>Clean and lubricate product.</td>
</tr>
<tr>
<td>Compressed air lines blocked.</td>
<td>Check compressed air lines of damage.</td>
</tr>
<tr>
<td>Mounting surface is not sufficiently flat.</td>
<td>Check the evenness of the mounting surface.</td>
</tr>
<tr>
<td>One-way flow control valve is missing or adjustet incorrectly.</td>
<td>Install and adjust one-way flow control valve.</td>
</tr>
<tr>
<td>Loading too large.</td>
<td>Check permissible weight and length of the gripper fingers.</td>
</tr>
</tbody>
</table>

### 6.4 Gripping force is dropping

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed air can escape.</td>
<td>Check seals, if necessary, disassemble the product and replace seals.</td>
</tr>
<tr>
<td>Too much grease in the mechanical movement space.</td>
<td>Clean and lubricate product.</td>
</tr>
<tr>
<td>Pressure drops below minimum.</td>
<td>Check air supply.</td>
</tr>
<tr>
<td>Component part defective.</td>
<td>Replace component or send it to SCHUNK for repair.</td>
</tr>
</tbody>
</table>

[Back to Top](#)
### 6.5 Product does not achieve the opening and closing times

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed air lines are not installed optimally.</td>
<td>If present: Open the flow control couplings on the product to the maximum that the movement of the jaws occurs without bouncing and hitting.</td>
</tr>
<tr>
<td></td>
<td>Check compressed air lines.</td>
</tr>
<tr>
<td></td>
<td>Inner diameters of compressed air lines are of sufficient size in relation to compressed air consumption.</td>
</tr>
<tr>
<td></td>
<td>Flow rate of valve is sufficiently large relative to the compressed air consumption.</td>
</tr>
<tr>
<td></td>
<td>If, despite optimum air connections, the opening and closing times specified in the catalogue are not achieved, SCHUNK recommends the use of quick-air-vent-valves directly at the product.</td>
</tr>
<tr>
<td>Compressed air can escape.</td>
<td>Check seals, if necessary, disassemble the product and replace seals.</td>
</tr>
<tr>
<td>Component part defective.</td>
<td>Replace component or send it to SCHUNK for repair.</td>
</tr>
<tr>
<td>Too much grease in the mechanical movement space.</td>
<td>Clean and lubricate product.</td>
</tr>
<tr>
<td></td>
<td><a href="#">Maintenance</a></td>
</tr>
<tr>
<td>Loading too large.</td>
<td>Check permissible weight and length of the gripper fingers.</td>
</tr>
</tbody>
</table>

### 6.6 Compressed air connection is leaking

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong hose.</td>
<td>Check hose, see catalog data sheet.</td>
</tr>
<tr>
<td>Hose gets wider if it is frequently disassembled/assembled.</td>
<td>Cut off hose, replace if necessary.</td>
</tr>
<tr>
<td>Hose gets wider due to external forces.</td>
<td>Fix hose e.g. using cable tie.</td>
</tr>
</tbody>
</table>
7 Maintenance

7.1 Notes

Original spare parts
Use only original spare parts of SCHUNK when replacing spare and wear parts.

Exchange of housing and base jaws
The base jaws and the guidance in the housing are matched. To exchange these parts, send the product with a repair order to SCHUNK or order the housing with the base jaws as a set.

Maintenance of version with gripping force maintenance I.D. gripping and O.D. gripping
The pistons have to be aligned using an assembly device. Therefore we recommend to have the module serviced and the seals replaced by SCHUNK.

7.2 Maintenance intervals

<table>
<thead>
<tr>
<th>Interval (million cycles) for MPZ</th>
<th>Maintenance work</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 - 25</td>
<td>Treat all grease areas with lubricant, Lubricants/Lubrication points [34]. Oil or grease external steel parts. Clean all parts thoroughly, check for damage and wear</td>
</tr>
<tr>
<td>30 - 45</td>
<td>If necessary, replace seals, Dismantling the product [34]. The seals are in the enclosed sealing kit. Seal kit [7].</td>
</tr>
<tr>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
7.3 Lubricants/Lubrication points
SCHUNK recommends the lubricants listed. During maintenance, treat all greased areas with lubricant. Thinly apply lubricant with a lint-free cloth.

<table>
<thead>
<tr>
<th>Lubricant point</th>
<th>Lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metallic sliding surfaces</td>
<td>microGLEIT GP 360</td>
</tr>
<tr>
<td>All seals</td>
<td>Renolit HLT 2</td>
</tr>
<tr>
<td>Bore hole at the piston</td>
<td>Renolit HLT 2</td>
</tr>
</tbody>
</table>

7.4 Dismantling the product

NOTE
For sizes 16, 20 and 25, there is no need to dismantle the product since seal replacement is not necessary.

7.4.1 Version without gripping force maintenance

Position of the item numbers Assembly drawing [37]

⚠️ WARNING

Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

- Remove the compressed air hoses.
- Unscrew the screws (20) and remove the cover (8).
- Unscrew screw (18) and remove the housing (2).
- Unscrew screw (19) and remove cylinder piston (5).
- Press the piston (4) upward out of the housing (1).
- Pull the base jaws (3) out of the housing (1).
7.4.2  Maintenance of module with gripping force maintenance "O.D. gripping" (O.D.)

Position of the item numbers Assembly drawing [37]

⚠️ WARNING

Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

• Before starting any work on the product: Switch off the power supply and secure against restarting.
• Make sure, that no residual energy remains in the system.

⚠️ WARNING

Risk of injury due to spring forces!
The cylinder piston is under spring tension.

• Carefully disassemble the product.

- Remove the compressed air hoses.
- Unscrew the screws (20) and remove the cover (8).
- Unscrew the screws (38) and remove the housing (32).
- WARNING! Danger of injury due to spring forces! The cover housing is spring tensioned. Carefully disassemble the module. Secure the cylinder piston (35) against accidentally springing out and unscrew the screw (39).
- Release the tension on the spring (31) and remove the cylinder piston (35).
- Press the piston (4) upward out of the housing (1).
- Pull the base jaws (3) out of the housing (1).

7.4.3  Version with gripping force maintenance I.D.

Position of the item numbers Assembly drawing [37]

⚠️ WARNING

Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

• Before starting any work on the product: Switch off the power supply and secure against restarting.
• Make sure, that no residual energy remains in the system.
**WARNING**

Risk of injury due to spring forces!
The cylinder piston is under spring tension.
- Carefully disassemble the product.

- Remove the compressed air hoses.
- Unscrew the screws (20) and remove the cover (8).
- **WARNING! Danger of injury due to spring forces! The cylinder piston (35) is under spring tension** Carefully disassemble the module. Clamp the module between the housing parts (32) and (1) in a vice.
- Unscrew the screws (38).
- Carefully open the vise until the compression spring (31) has no more tension.
- Remove the housing (32) and take out the compression spring (31).
- Unscrew screw (19) and remove cylinder piston (5) from the housing (1).
- Press the piston (4) upward out of the housing (1).
- Pull the base jaws (3) out of the housing (1).

**7.4.4 Variant with flexible position sensor (FPS)**

Position of the item numbers Assembly drawing [37]

**WARNING**

Risk of injury due to unexpected movements!
If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.
- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

- Remove the compressed air hoses.
- Unscrew screws (48) and remove the housing (42).
- Hold the set screw (49) and unscrew the cylinder piston (45).
- Press the piston (4) upward out of the housing (1).
- Pull the base jaws (3) out of the housing (1).
7.5 **Assembling the product**

Assembly takes place in the opposite order to disassembly. Observe the following:

- Unless otherwise specified, secure all screws and nuts with Loctite no. 243 and tighten with the appropriate tightening torque. *Tightening torque for screws [37]*

7.6 **Tightening torque for screws**

Position of the item numbers *Assembly drawing [37]*

<table>
<thead>
<tr>
<th>Values in Nm</th>
<th>Item</th>
<th>MPZ 16</th>
<th>MPZ 20</th>
<th>MPZ 25</th>
<th>MPZ 30</th>
<th>MPZ 38</th>
<th>MPZ 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>2.4</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.2</td>
<td>5.8</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0.3</td>
<td>0.6</td>
<td>1.3</td>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>0.3</td>
<td>0.6</td>
<td>1.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.6</td>
<td>1.1</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.2</td>
<td>5.8</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.8</td>
<td>2.2</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>2.4</td>
<td>2.4</td>
<td></td>
</tr>
</tbody>
</table>

7.7 **Assembly drawing**

The following figures are example images. They serve for illustration and assignment of the spare parts. Variations are possible depending on size and variant.

* Positions are adapted to each other and can not be replaced by the customer.

** Wearing part, replace during maintenance. Included in the seal kit. Seal kit can only be ordered completely.

*** Contained in accessory pack.
7.7.1 Assembly MPZ 16-25

Assembly of the Types O.D. gripping / I.D. gripping / without gripping force maintenance
7.7.2 Assembly MPZ 30-45

Assembly of the Types Außengreifend (AS) / Innengreifend (IS) / ohne Greifkrafterhaltung
7.7.3 Assembly with flexible position sensor FPS

Assembly of the Types with flexible position sensor FPS
8 Translation of original declaration of incorporation


Manufacturer/ Distributor
SCHUNK GmbH & Co. KG Spann- und Greiftechnik
Bahnhofstr. 106 – 134
D-74348 Lauffen/Neckar

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation: 3 - Finger - Zentrischgreifer / MPZ / pneumatic
ID number 0340480 ... 0340533

The partly completed machine may not be put into operation until conformity of the machine into which the partly completed machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery in electronic form to national authorities.

The relevant technical documentation according to Annex VII, Part B, belonging to the partly completed machinery, has been created.

Person authorized to compile the technical documentation:
Robert Leuthner, Address: see manufacturer’s address

Lauffen/Neckar, June 2019

Signature: see original declaration
p.p. Ralf Winkler,
Manager for development of gripping system components
8.1 Annex to Declaration of Incorporation
according 2006/42/EG, Annex II, No. 1 B

1. Description of the essential health and safety requirements pursuant to 2006/42/EC, Annex I that are applicable and that have been fulfilled with:

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To be provided by the System Integrator for the overall machine
Fulfilled for the scope of the partly completed machine
Not relevant

1.1 Essential Requirements

| 1.1.1 Definitions                          | X |
| 1.1.2 Principles of safety integration    | X |
| 1.1.3 Materials and products              | X |
| 1.1.4 Lighting                            | X |
| 1.1.5 Design of machinery to facilitate its handling | X |
| 1.1.6 Ergonomics                          | X |
| 1.1.7 Operating positions                  | X |
| 1.1.8 Seating                             | X |

1.2 Control Systems

| 1.2.1 Safety and reliability of control systems | X |
| 1.2.2 Control devices                          | X |
| 1.2.3 Starting                                 | X |
| 1.2.4 Stopping                                 | X |
| 1.2.4.1 Normal stop                            | X |
| 1.2.4.2 Operational stop                       | X |
| 1.2.4.3 Emergency stop                         | X |
| 1.2.4.4 Assembly of machinery                   | X |
| 1.2.5 Selection of control or operating modes  | X |
| 1.2.6 Failure of the power supply               | X |

1.3 Protection against mechanical hazards

| 1.3.1 Risk of loss of stability               | X |
| 1.3.2 Risk of break-up during operation       | X |
| 1.3.3 Risks due to falling or ejected objects | X |
| 1.3.4 Risks due to surfaces, edges or angles  | X |
| 1.3.5 Risks related to combined machinery     | X |
| 1.3.6 Risks related to variations in operating conditions | X |
## 1.3 Protection against mechanical hazards

| 1.3.7 | Risks related to moving parts | X |
| 1.3.8 | Choice of protection against risks arising from moving parts | X |
| 1.3.8.1 | Moving transmission parts | X |
| 1.3.8.2 | Moving parts involved in the process | X |
| 1.3.9 | Risks of uncontrolled movements | X |

## 1.4 Required characteristics of guards and protective devices

| 1.4.1 | General requirements | X |
| 1.4.2 | Special requirements for guards | X |
| 1.4.2.1 | Fixed guards | X |
| 1.4.2.2 | Interlocking movable guards | X |
| 1.4.2.3 | Adjustable guards restricting access | X |
| 1.4.3 | Special requirements for protective devices | X |

## 1.5 Risks due to other hazards

| 1.5.1 | Electricity supply | X |
| 1.5.2 | Static electricity | X |
| 1.5.3 | Energy supply other than electricity | X |
| 1.5.4 | Errors of fitting | X |
| 1.5.5 | Extreme temperatures | X |
| 1.5.6 | Fire | X |
| 1.5.7 | Explosion | X |
| 1.5.8 | Noise | X |
| 1.5.9 | Vibrations | X |
| 1.5.10 | Radiation | X |
| 1.5.11 | External radiation | X |
| 1.5.12 | Laser radiation | X |
| 1.5.13 | Emissions of hazardous materials and substances | X |
| 1.5.14 | Risk of being trapped in a machine | X |
| 1.5.15 | Risk of slipping, tripping or falling | X |
| 1.5.16 | Lightning | X |

## 1.6 Maintenance

| 1.6.1 | Machinery maintenance | X |
| 1.6.2 | Access to operating positions and servicing points | X |
| 1.6.3 | Isolation of energy sources | X |
| 1.6.4 | Operator intervention | X |
| 1.6.5 | Cleaning of internal parts | X |
Translation of original declaration of incorporation

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The classification from Annex 1 is to be supplemented from here forward.

| 2 | Supplementary essential health and safety requirements for certain categories of machinery |
| 2.1 | Foodstuffs machinery and machinery for cosmetics or pharmaceutical products |
| 2.2 | Portable hand-held and/or guided machinery |
| 2.2.1 | Portable fixing and other impact machinery |
| 2.3 | Machinery for working wood and material with similar physical characteristics |
| 3 | Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery |
| 4 | Supplementary essential health and safety requirements to offset hazards due to lifting operations |
| 5 | Supplementary essential health and safety requirements for machinery intended for underground work |
| 6 | Supplementary essential health and safety requirements for machinery presenting particular hazards due to the lifting of persons |