

Fixture membrane

VERO-S SPM plus 138

Assembly and Operating Manual

Imprint

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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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Please read the operating manual in full and keep it close to the product.

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1 General

The SPM plus 138 fixture membrane is an accessory component designed for the **VERO-S NSE plus 138-V1** and **VERO-S NSE3 138-V1** quick change pallet systems for the direct clamping of workpieces. The SPM plus 138 fixture membrane may only be operated with the **VERO-S NSE plus 138-V1** and **VERO-S NSE3 138-V1** quick change pallet systems. This operating manual is valid only in combination with the operating manual of the attached VERO-S quick-change pallet systems.

1.1 About this manual

This manual contains important information for the safe, correct use of the product.

It is an integral part of the product and must be kept accessible for personnel at all times.

Personnel must have read and understood this manual before beginning any work. The observance of all safety notes in this manual is a prerequisite to ensure safe work processes.

The illustrations are intended to provide a basic understanding and may deviate from the actual version.

Besides this manual, other documents which apply are those listed under ► 1.1.2 [4]

1.1.1 Illustration of safety notes

To make risks clear, the following signal words and symbols are used for safety notes.



⚠ DANGER

Denotes a hazard with a high degree of risk that, if not avoided, will result in death or serious injury.



⚠ WARNING

Denotes a hazard with a medium degree of risk that, if not avoided, could result in death or serious injury.



⚠ CAUTION

Denotes a hazard with a low degree of risk that, if not avoided, could result in a minor or moderate injury.

NOTICE

Information about avoiding material damage.

1.1.2 Applicable documents

- General Terms and Conditions *
- Catalog data sheet for the attached product *
- Technical data sheet for optional attachments *
- Approval drawings

The documents labeled with an asterisk (*) can be downloaded from **schunk.com**.

1.2 Warranty

The warranty for standard products is 24 months from the date of delivery from the factory, or 50,000 cycles* for manually operated clamping devices and 500,000 cycles* for power operated clamping devices. For special clamping devices, it is 12 months from the date of delivery from the factory, assuming appropriate use in accordance with the following conditions:

- Observe the applicable documents, ► 1.1.2 [4]
- Observance of the ambient conditions and operating conditions
- Observe the care and maintenance instructions

Parts touching the workpiece and wearing parts are not covered by the warranty.

* One cycle comprises one complete clamping procedure ("opening" and "closing").

1.3 Sizes

The SPM plus 138 fixture membrane is designed to be used with the following components:

- VERO-S NSE plus 138-V1 quick-change pallet system
- VERO-S NSE3 138-V1 quick-change pallet system
- NSD plus and NSL plus clamping stations
- NSL3 clamping stations

The NSE3 138 is the follow-up model to the NSE plus 138. Unless explicitly mentioned, the information in this manual applies to both models. The VERO-S quick-change pallet systems NSE plus 138-V1 and NSE3 138-V1 will be abbreviated to NSE plus and NSE3 in the further course of the manual to improve readability.

1.4 Scope of Delivery

- **SPM plus 138 fixture membrane** (ID-No. 0471158) complete with SPC 40 clamping pin and IXB V1 indexing pin
- Accessory pack ► 9 [23]
- Assembly and Operating Manual
- **SPM plus 138 fixture membrane** (ID-No. 0471159) complete with IXB V1 indexing pin
- Accessory pack ► 9 [23]
- Assembly and Operating Manual

Note:

The fixture membrane is delivered without incorporated clamping contour. The customer performs the adaptation at the individual workpiece contour (see ► 5.3 [16]).

1.4.1 Accessories

(ordered separately, see catalog or data sheets)

- NSE plus 138-V1 and NSE3 138-V1 quick-change pallet systems
- Clamping pin type SPC 40
- Clamping ring / Cylindrical clamp blanks for quick-change pallet module BRR / BRR 50
- Protection cover for quick-change pallet module type SDE

2 Basic safety notes

The SPM plus fixture membrane and the quick change pallet system that is required for operation could pose risks to personnel and property if they are handled, installed and maintained improperly as a result of non-observance of this manual and the VERO-S quick change pallet system NSE plus / NSE3 assembly and operating manual.

- Read through the instructions carefully prior to assembly and installation.
- Report any failures and damage on the SPM plus fixture membrane and on the quick-change pallet system immediately upon detection and repair it without delay to keep the extent of the damage minimal and prevent compromising the safety of the quick-change pallet system.
Only use original SCHUNK spare parts when replacing damaged parts.
- Keep this manual accessible to all users at all times.
- If transferring the product to a third party, be sure to include this manual.

2.1 Appropriate use

The fixture membrane is an accessory component for the quick change pallet system for the direct clamping of workpieces. The fixture membrane coupled with the quick change pallet system is used for the form-fitting and force-fitting gripping of workpieces.

The product may only be used within the framework of its technical data. When doing this, the maximum technical specifications must not be exceeded.

The clamping system is intended for industrial use for mounting on the machine table or machine pallets.

Intended use also includes the user having completely read and understood this manual and the VERO-S Assembly and Operating Manual NSE plus / NSE3 quick-change pallet system, and particularly the "Basic safety notes" chapter.

2.2 Inappropriate use

Inappropriate use of the fixture membrane and the quick change pallet system includes using the product as lifting equipment, a toolholder, a press or a gripper.

2.3 Notes on particular risks

The fixture membrane and the quick change pallet system required to operate it may pose risks to personnel (danger to life and limb) and property if, for example:

- They are not used as intended.
- They are not installed or maintained properly.
- The safety and installation instructions, local applicable safety and accident prevention regulations or the EC Machinery Directive are not observed.



⚠ WARNING

Risk of injury to operating personnel in the event of horizontal position of the clamping pin axis by falling down of the fixture membrane and/or of the clamped workpiece.

Before releasing the clamping slide lock, the fixture membrane and the clamped workpiece must be secured against falling down.



⚠ WARNING

Danger to life and limb of operating personnel during overhead applications due to falling down of the device or pallet and the clamped workpiece.

Overhead application of a clamped workpiece is only allowed for a spring-mounted clamping system with decoupled compressed air supply and with suitable safety measures to prevent falling down.



⚠ WARNING

Risk of injury to operating personnel by incorrect or negligent releasing of the coupled fixture membrane as well as by the workpiece clamped in it by parts falling down or being flung out.

During operation, incorrect or negligent release of the coupled fixture membrane tension and the workpiece that is clamped in it must be made impossible by suitable countermeasures (disconnecting the power supply after locking, use of check valves or switches).



⚠ CAUTION

There is a risk of limbs being crushed during manual loading and unloading of moving parts and during the clamping process.

Do not reach into the open mechanism of the clamping pin holder of the quick change pallet system.

Grip the workpiece sufficiently high up when inserting it in the fixture membrane.

When decoupling the compressed air, keep hands out of the danger zone.

Use loading devices.

Wear protective gloves.

NOTICE

The maximum permissible clamping depth in the collet and the maximum permissible clamping diameter must not be exceeded.

Damage to the clamping system is possible.

2.4 Notes on safe operation

The fixture membrane and the quick change pallet system can be sources of danger to personnel (risk of injury) and to property if, for example:

- it is used other than as intended;
- it is not installed or maintained properly;
- the safety and installation instructions, the safety and accident prevention regulations valid at the usage site or the EC Machinery Directive are not observed.

Maintenance instructions

The care and maintenance instructions must be observed. The intervals indicated refer to a standard working environment. If the quick change pallet system is to be operated in an environment with abrasive dusts or corrosive or aggressive fumes or fluids, prior approval must be obtained from SCHUNK.

Safety during assembly and maintenance

Only original SCHUNK-Clamping-Pins are to be used.

During assembly, connection, adjustment, commissioning and testing, make sure that no accidental operation of the fixture membrane and the quick change pallet system by the fitter or other persons is possible.

Refrain from all work that could threaten safety.

2.4.1 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

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

2.5 Personnel qualification

Only specialist personnel may install, remove, commission and maintain the fixture membrane and the quick change pallet system. Specialist personnel are persons who by their technical training, experience and knowledge are capable of assessing the work to be performed and recognizing potential dangers, and are thus able to take appropriate countermeasures.

If need be, take advantage of the manufacturer's training courses.

Every person called upon by the operator to work on the fixture membrane and on the quick change pallet system must have read and understood the complete assembly and operating manual (Fixture membrane & quick-change pallet system), especially chapter "Basic safety notes".

The responsibility for operation, maintenance and repair must be clearly specified.

Only allow persons to service or repair parts of the fixture membrane and the quick change pallet system that are relevant to safety who can be considered to be a specialist, as defined in the safety regulations.

Specify the operator's responsibility, also with regard to safe behavior, and authorize the operator to reject instructions from third parties which breach safety regulations.

During training and instruction, personnel must only be permitted to work on the fixture membrane and on the quick change pallet system if continuously supervised by a specialist.

2.6 Organizational measures

Compliance with the Regulations

The business operator must guarantee that suitable measures in organisation and instruction are taken to ensure that the appropriate safety rules and regulations are complied with by the persons entrusted with operation, maintenance and repair of the Quick Change Pallet System.

Supervision of Conduct

The business operator is required, at least from time to time, to check personnel's conduct regarding awareness of safety and hazards.

Hazard Notices

The business operator must ensure that the notes of safety and hazards for the machine to which the Quick Change Pallet System is mounted are observed and that the notice signs are clearly legible.

Troubles

If troubles occur at the system which could affect safety or production characteristics indicate that faults are in existence, the machine (to which the system is mounted) must be stopped immediately and stand still as long as required to locate and eliminate the fault. Only allow specialists to remedy faults.

Spare parts

Only use original SCHUNK spare parts.

Environmental Protection Requirements

The current environmental protection requirements must be observed during all maintenance and repair work.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff in the event of a danger that may interfere with their health or safety at work.

3 Technical data

Designation	SPM plus 138
ID no.	0471158, 0471159
Min. clamping force *	1 kN
Max. clamping force with turbo function *	50 kN
Actuating pressure for turbo function*	6 bar
Smallest clamping diameter	Ø 36 mm
Largest clamping diameter	Ø 125 mm
Min. clamping depth	3 mm
Max. clamping depth	20 mm
Repeat accuracy	< 0.01 mm
Weight	1.5 kg

* Applies to mounted quick-change pallet system

4 Description of clamping system

The SPM plus fixture membrane was developed as a clamping system for direct workpiece clamping in combination with the NSE plus or NSE3 quick change pallet system.

This quick change pallet systems have additional alignment grooves on the flat surface which ensure a repeatable position orientation of the fixture membrane to the machine table.

In the aluminum one-piece collet, workpieces can be surrounded with individual clamping contours on their entire surface. The quick change pallet system causes the targeted warping of the slotted clamping segments by an axial pull-down function. By contraction of the clamping range, the clamping force is thus applied all around the entire workpiece contour.

Since the process takes place in the elastic area of the aluminum, this clamping procedure can be repeated many thousands of times. The resulting force-fit gripping ensures an evenly gentle clamping that is also rigid and secure.

Workpieces can be inserted and machined in seconds once they have been prepared with the individually introduced clamping contour. Due to the clamping contour with a clamping depth of only a few millimeters (at least 3 mm), an almost unlimited accessibility of the workpiece on five sides is ensured.

The fixture membrane is activated using a screwed VERO-S SPC 40 quick change pallet clamping pin which connects it via the clamping slide lock of the pneumatically actuated NSE plus or NSE3 quick change pallet modules. The workpiece clamping is clamped in a self-locking way during the machining via the VERO-S quick change pallet module and is not connected to a compressed air supply.

The fixture membrane needs no additional clamping devices and can be milled multiple times as necessary and given different workpiece contours.

The clamping device is suitable for light machining of the most varied materials and workpiece contours.

5 Assembly and installation

5.1 General installation notes

The SPM plus 138 fixture membrane can only be operated in combination with the pneumatically operated NSE plus and NSE3 quick change pallet systems.

When disconnecting the compressed air from the unlocking connection of the quick change pallet system, the fixture membrane is form-fit locked and simultaneously initiated the warping of the clamping segments.

During machining, the fixture membrane is held solely by the clamping slide lock of the quick change pallet module without further screwing.

If the quick change pallet module is unlocked, the locking of the fixture membrane is also released and it can be lifted. **For this reason, the safety notes absolutely must be observed (see chapter 2).**

The prerequisite for a high holding force for workpiece machining is an exact shape accuracy (rectangularity) of the workpiece as well as the clamping contour in the fixture membrane.

NOTE:

When joining, make sure that the indexing pins of the fixture membrane and the alignment groove of the quick change pallet system are precisely aligned.

NOTE:

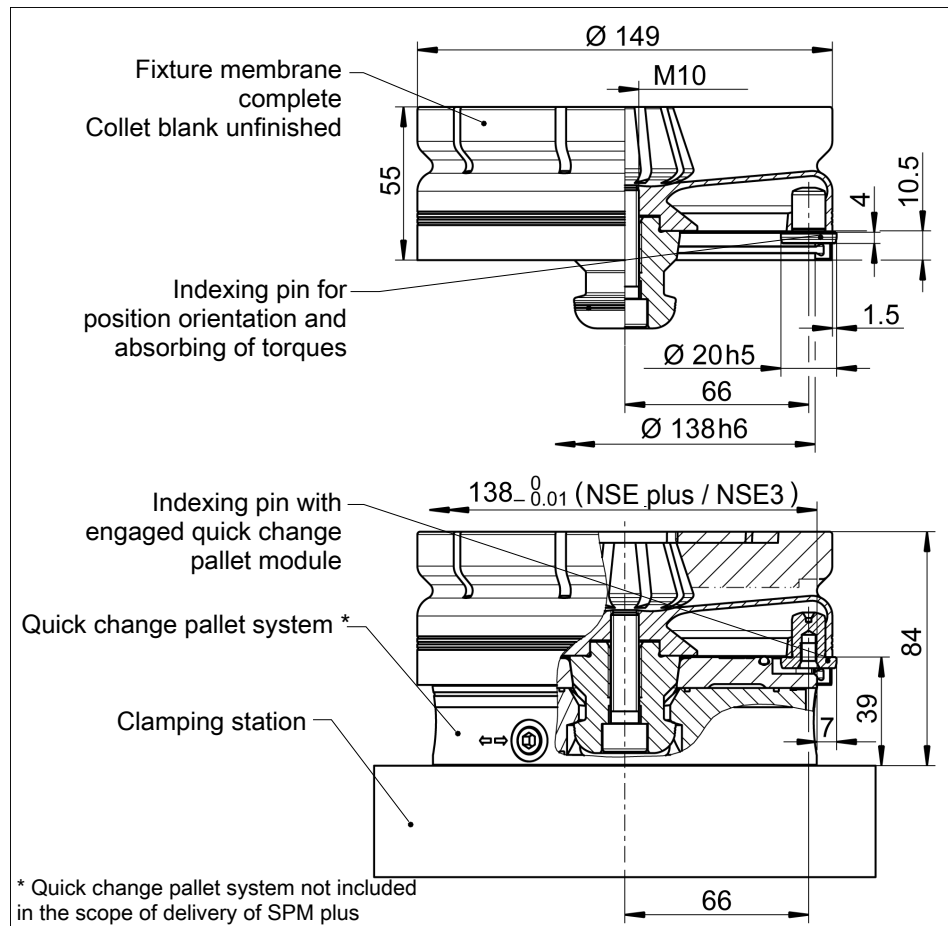
For the horizontal application of the fixture membrane, the O-ring section must be inserted in the collet.

If the O-ring is damaged, it should be replaced (see ► 9 [23]).

If the fixture membrane is not used for a longer time, it should not stay in the clamping module but rather be kept in an unclamped condition.

5.2 Mounting of the fixture membrane on the quick change pallet system

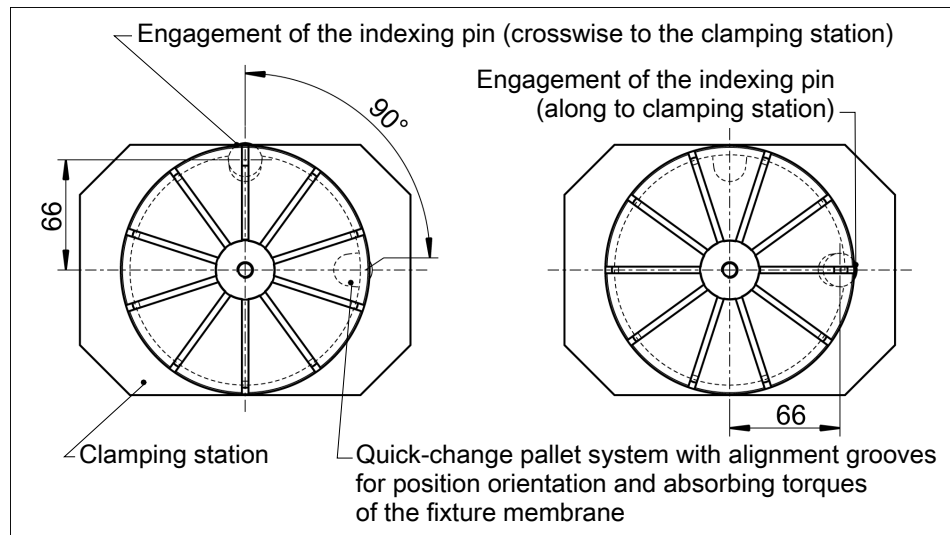
The positioning of the fixture membrane is done using the upper centering diameter of the NSE plus and NSE3 quick change pallet modules: $\varnothing 138_{0 / -0.01}^{\circ}$



Mounting of the fixture membrane on the quick change pallet system

The collet blank has an internally mounted O-ring section. The O-ring is used to ensure that the fixture membrane does not fall out of the quick change pallet system; for example, during horizontal application on a clamping tower/tombstone. Two alignment grooves on the flat surface of the quick change pallet module permit the fixture membrane to be inserted laterally or longitudinally to the machine table.

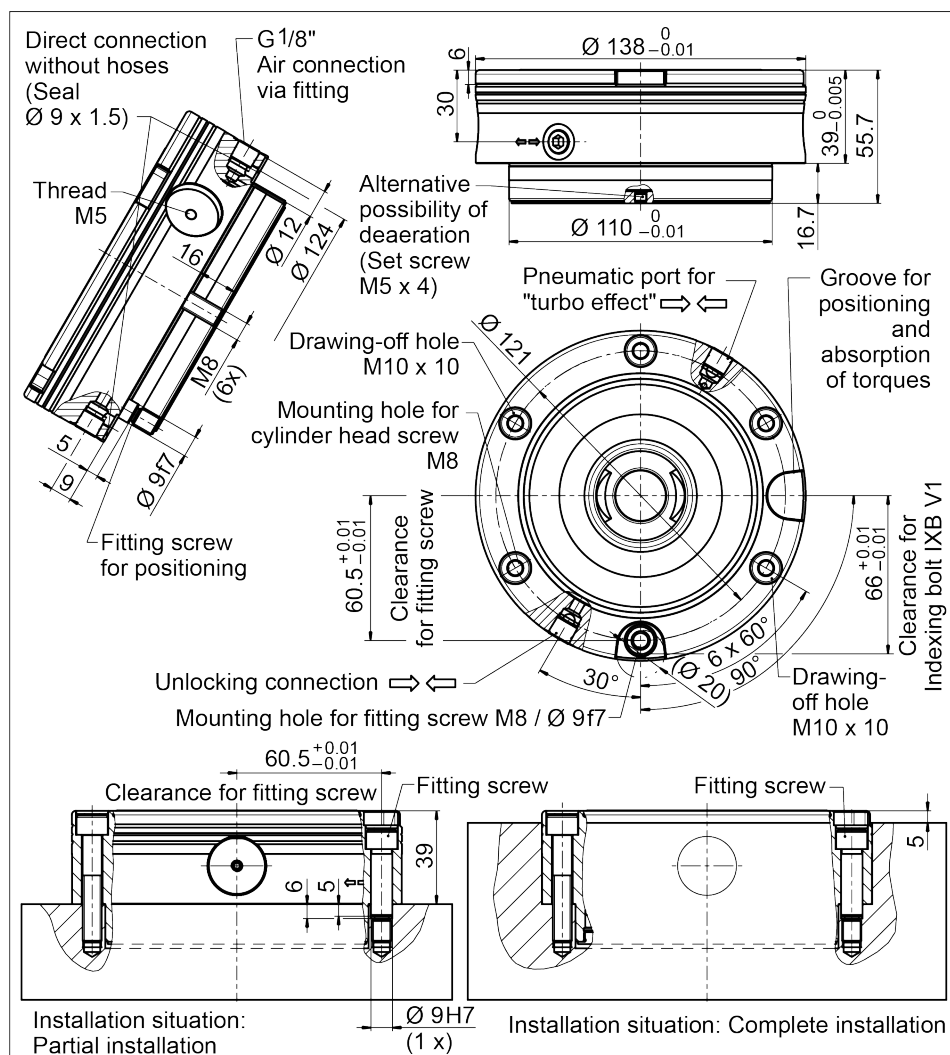
The IXB V1 indexing pin ensures that the position orientation to the fixture membrane is exact and is used to absorb the resulting torque during machining. The fixture membrane is inserted into the quick change pallet module, which is switched to "unlock". The indexing pin must engage in one of the two alignment grooves. The clamping system is already then fixed for direct workpiece clamping with high repeat accuracy and ready for operation.



Angle orientation of the fixture membrane on the quick change pallet system

NOTE:

The technical data and descriptions for operating the mounted quick-change pallet systems can be found in the respective assembly and operating instructions.



Mounting and connecting the NSE plus & NSE3

5.3 Production of the clamping contour

Production of the clamping contour in the collet:

- Check the work piece dimensions with the maximum permissible milling out area of the fixture membrane as well as the effective clamping depth (see chapter technical data).
- Provide the complete fixture membrane with the mounted quick change pallet clamping pin as well as the separately included adjusting ring. The adjusting ring enables the targeted initial tension of the clamping segment.
- **Place the adjusting ring concentrically to the clamping pin axis on the flat surface of the quick change pallet system.** For horizontal application, the adjusting ring is placed on the flat surface of the fixture membrane behind the quick change pallet clamping pin.
- Actuate the quick change pallet system at the unlocking connection with compressed air.
- Insert the fixture membrane into the unlocked quick change pallet system. Observe the positioning of the indexing pin to the alignment groove when doing this (see figure "Preparation for production of the clamping contour").
- Decouple the compressed air supply at the unlocking connection.
- Switch on the air supply at the port for "Turbo function" and then uncouple after a short air pulse. The fixture membrane is now pre-loaded by 0.05 mm.
- Mill in the clamping contour following the exact workpiece dimensions **without joint play** into the collet blank of the fixture membrane (see figure "Production of the clamping contour"). A maximum production tolerance to the workpiece contour (diameter or width dimension) of 0.05 mm is permissible.
- After the opening of the quick change pallet module, the circumference of the fixture membrane widens to 0.5 mm. This results in the ideal insertion gap.

The following points have to be observed when machining the clamping contour:

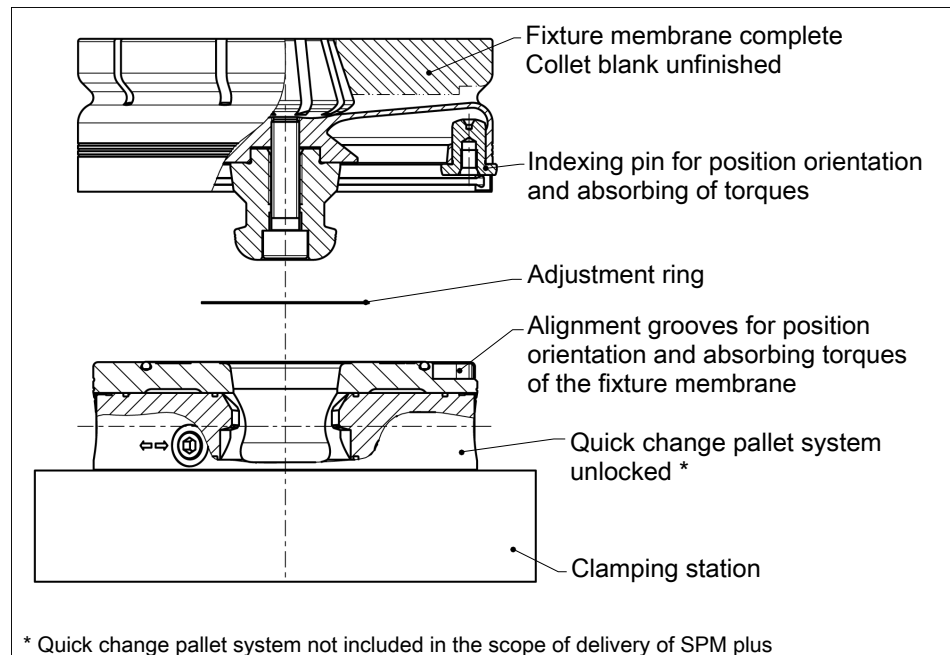
- To ensure a secure workpiece clamping, a clamping depth (clamping edge) of at least 3 mm to 5 mm is needed. A clamping depth of 3 mm is sufficient for a workpiece height of maximum 40 mm.
- The clamping contour should be milled in as close as possible to the center of the fixture membrane.

- The clamping contour must be recessed parallel to the machine table.
- The workpiece should preferably only rest on the edge in the milled out workpiece locating surface to ensure the greatest clamping precision. The internal area should be recessed by 0.1 to 0.2 mm.
- The clamped workpiece must have a rotating chamfer so that a support with a flat surface in the fixture membrane body is ensured.
- The corner radius of the clamping contour must be smaller than the rotating chamfer at the workpiece.
- The fixture membrane can be used more than once by multiple plane milling of the clamping contour.
- The maximum clamping depth in the fixture membrane may not be exceeded (see ► 3 [11]).
A raised clamping edge of 3 mm height is imperative.
The higher the remaining overall stroke of the clamping segment, the greater the achievable radial clamping stroke.

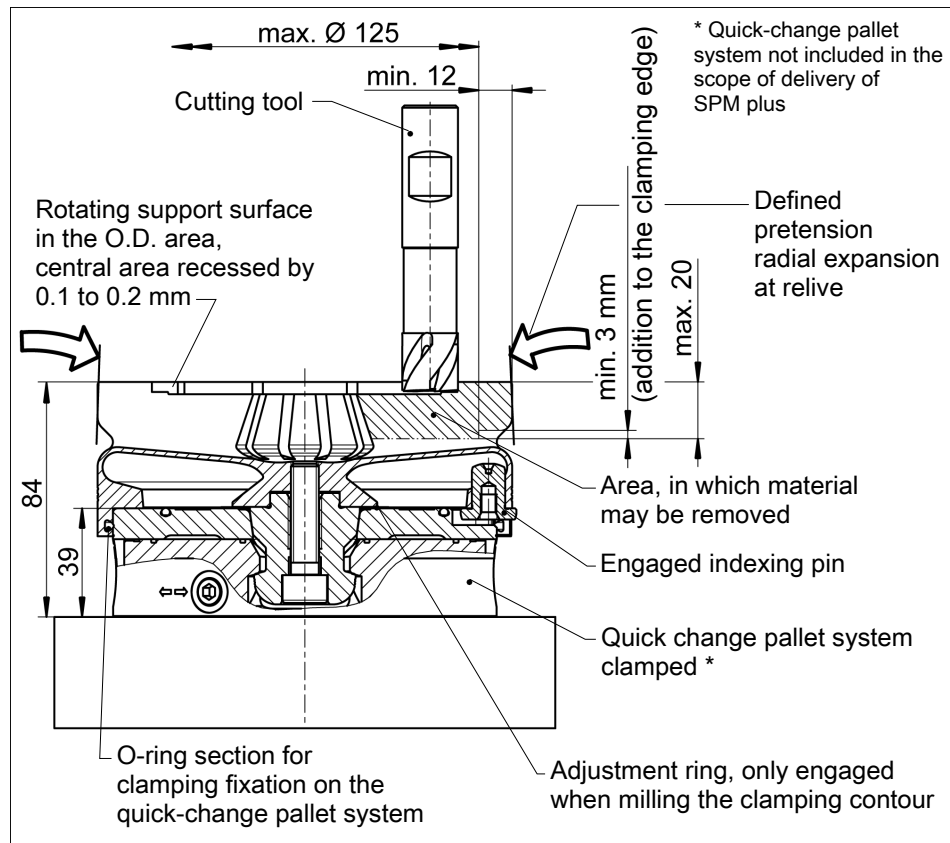
Important:

The adjustment ring is aligned to the exact height of the fixture membrane and cannot be replaced by a user-made component.

If the adjustment ring is lost or damaged, it can be ordered as a spare part from SCHUNK (see ► 9 [23]).



Preparation for production of the clamping contour



Production of the clamping contour

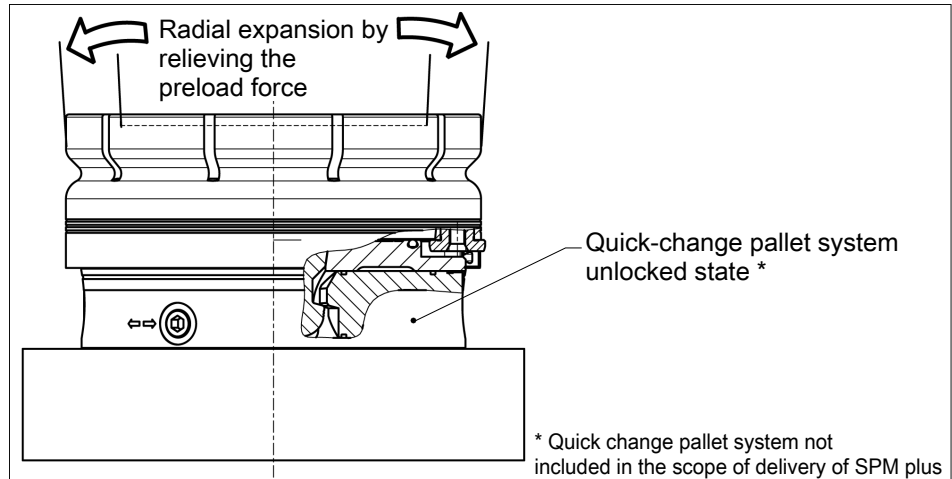
5.4 Clamping the workpiece

- After the production of the clamping contour, open the quick change pallet system with compressed air at the unlocking connection.
 - After the opening of the quick change pallet module, the fixture membrane's circumference widens by 0.5 mm so that the workpiece can be inserted with joint play.
- Lift up the fixture membrane.
- **Be sure to remove and keep the adjusting ring.**
- Re-insert the fixture membrane (without adjusting ring) in the quick change pallet module.
- Insert the workpiece in the prepared clamping contour (see figure "Insertion and machining of the workpiece", left).
- Decouple the compressed air supply at the unlocking connection.
- Switch on the compressed air supply at the port for "Turbo function" with a brief air pulse.
- Decouple the compressed air supply at the port for "Turbo function".
- The workpiece is securely clamped and can be machined (see figure "Insertion and machining of the workpiece", right).

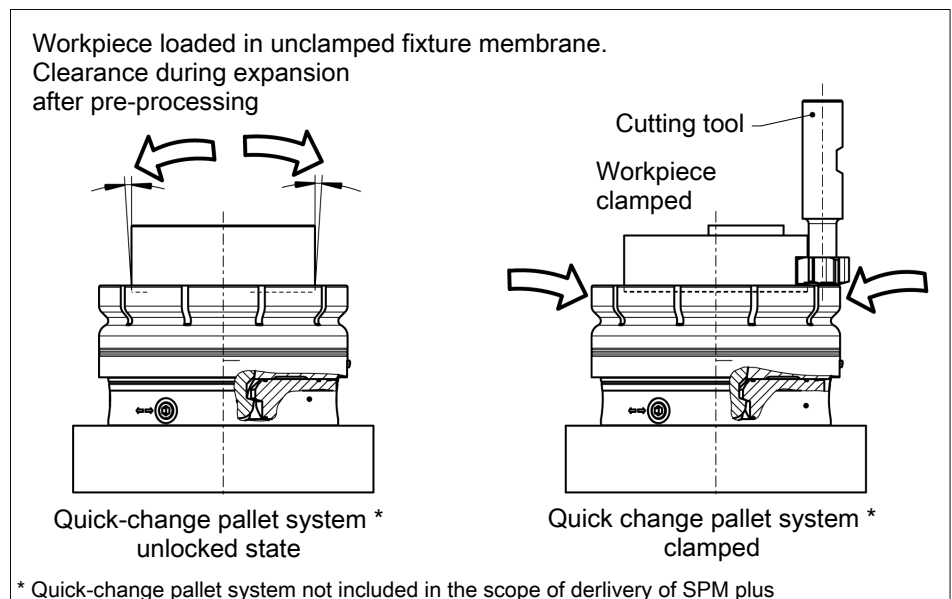
NOTE:

The adjusting ring absolutely must be removed before the workpiece clamping so that the clamping force can act on the workpiece.

The adjusting ring is used to produce the clamping contour.



Expansion of the fixture membrane after the opening of the quick change pallet system



Insertion and machining of the workpiece

6 Maintenance and care

The fixture membrane is designed for low-maintenance operation, so a disassembly of the unit is only necessary in exceptional cases.

- The contact surfaces of the interfaces between the quick change pallet module and the fixture membrane must always be clean.
- No chips of any sort may enter the interface, thereby reducing the clamping stroke.
- Only use high-quality cooling emulsion with anti-corrosive additives during processing.
- The fixture membrane and the quick change pallet system, which is also required for operation, should be checked at regular intervals (at least every two weeks or after 1,000 clampings). The functioning can be seen as excellent if the individual clamping segments of the fixture membrane warp evenly and then reassume concentric initial positions.
- If the quick change pallet system is noticeably loud when the fixture membrane is opened, grease can be applied between the clamping pins and the clamping slide to improve the sliding characteristics of the components.
- Carry out regular visual/functional checks.
If there is visible damage or signs of operative malfunctions, take the fixture membrane and the quick change pallet system, which is also required for operation, out of operation. The system may only be started up again once the faults have been corrected (for example, by replacement of a damaged fixture membrane).

Use original SCHUNK spare parts only when exchanging damaged parts.

7 Problem analysis

The workpiece is not clamped securely enough in the fixture membrane:

- The turbo port at the quick change pallet system was not pressurized.
- The operating pressure at the quick change pallet system is smaller than 6 bar.
- The necessary recommended workpiece clamping depth is not sufficient.
- The workpiece height is too great.
- The tolerance of the clamping contour in the fixture membrane is too great.
- The tolerance variation of the workpieces was exceeded, so the collet can therefore no longer be warped enough in the elastic area.
- The interface between the quick change pallet module and the fixture membrane is dirty.
- The fixture membrane is permanently warped.

The workpiece can not longer be inserted in the recessed clamping contour:

- The quick change pallet module does not unlock without trouble.
- The fixture membrane is permanently warped.
- A clamping segment of the collet is damaged.
- The tolerance variation of the workpieces was exceeded.
- The shape accuracy of the clamping contour and the workpiece contour have not been made to go together.

8 Storage

When storing the product for a longer period of time, observe the following points:

- Clean the product and lubricate it lightly.
- Store the product in a suitable transport container.
- Only store the product in dry rooms.
- Protect the product from major temperature fluctuations.

NOTE: Before recommissioning, clean the product and all attachments, check for damage, functionality and leaks.

9 Part list

SPMplus 138 (ID-No. 0471158)

Item	Designation	Quantity	Note
1	Collet	1	
2	Clamping pin SPC 40	1	
3	IXB V1 indexing pin	1	
4	Socket head screw	1	
5	Adjusting ring	1	X
6	O-ring	1	*

* O-rings are wearing parts and are recommended to be replaced during maintenance.

X Included in the accessory kit.

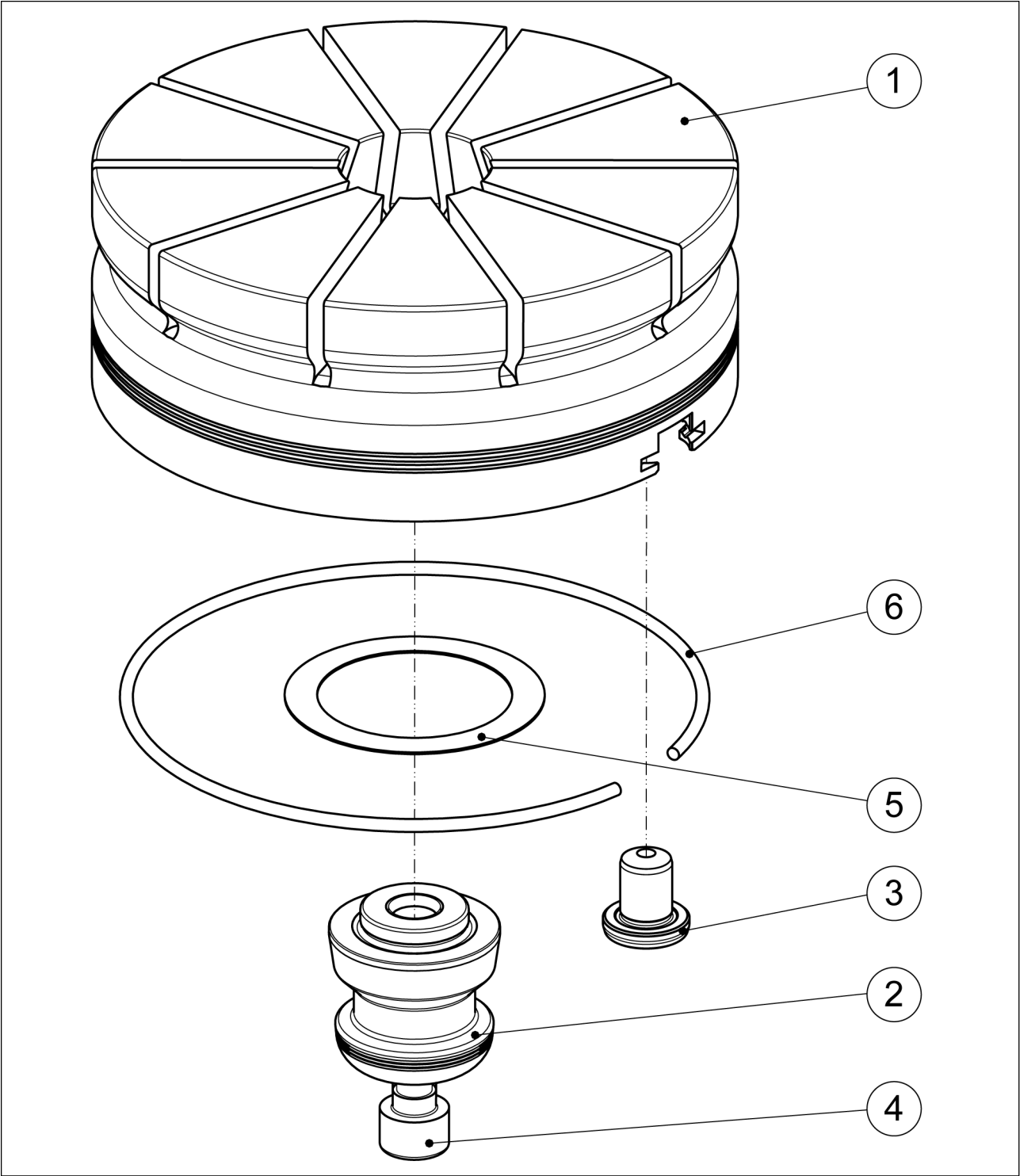
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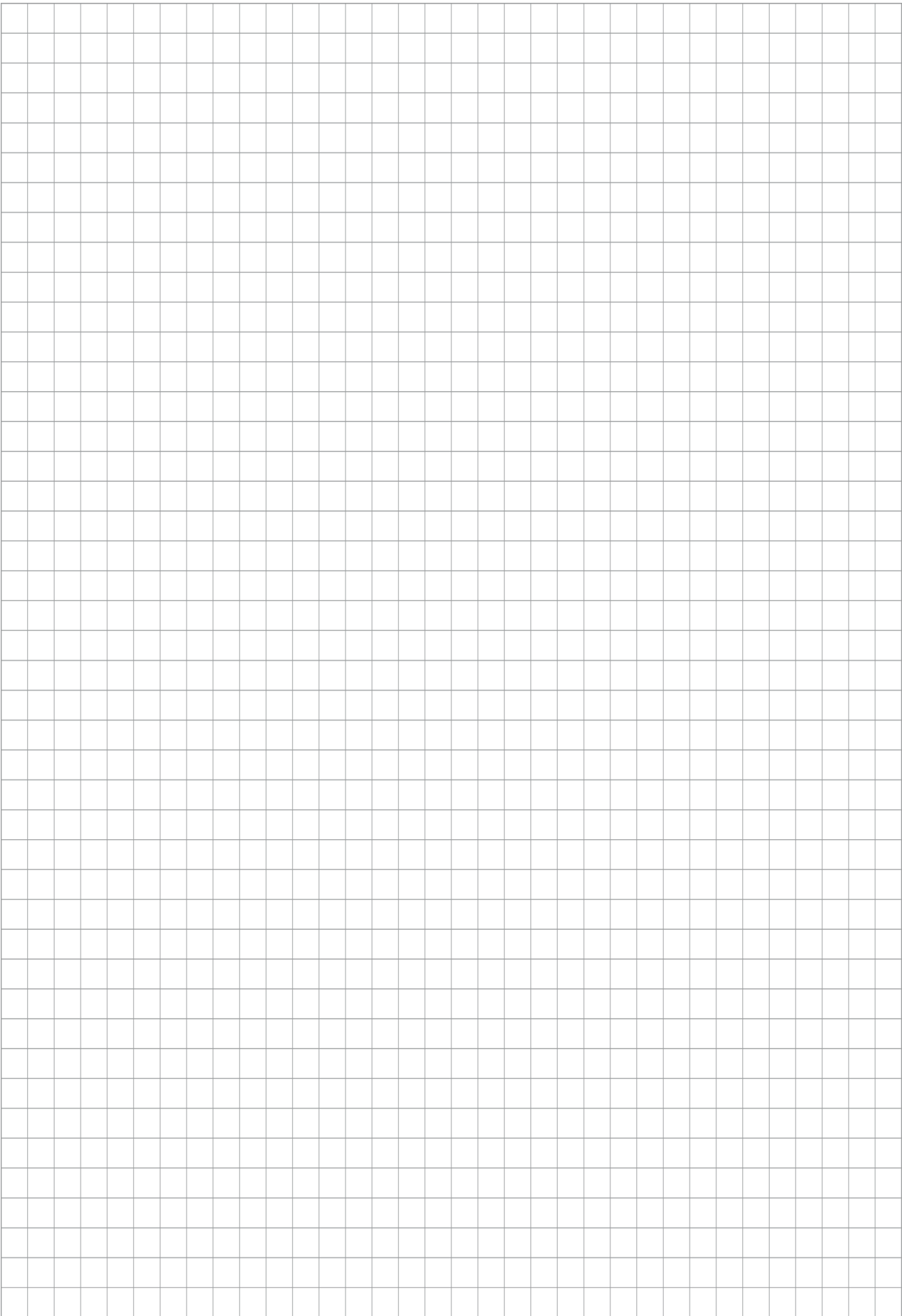
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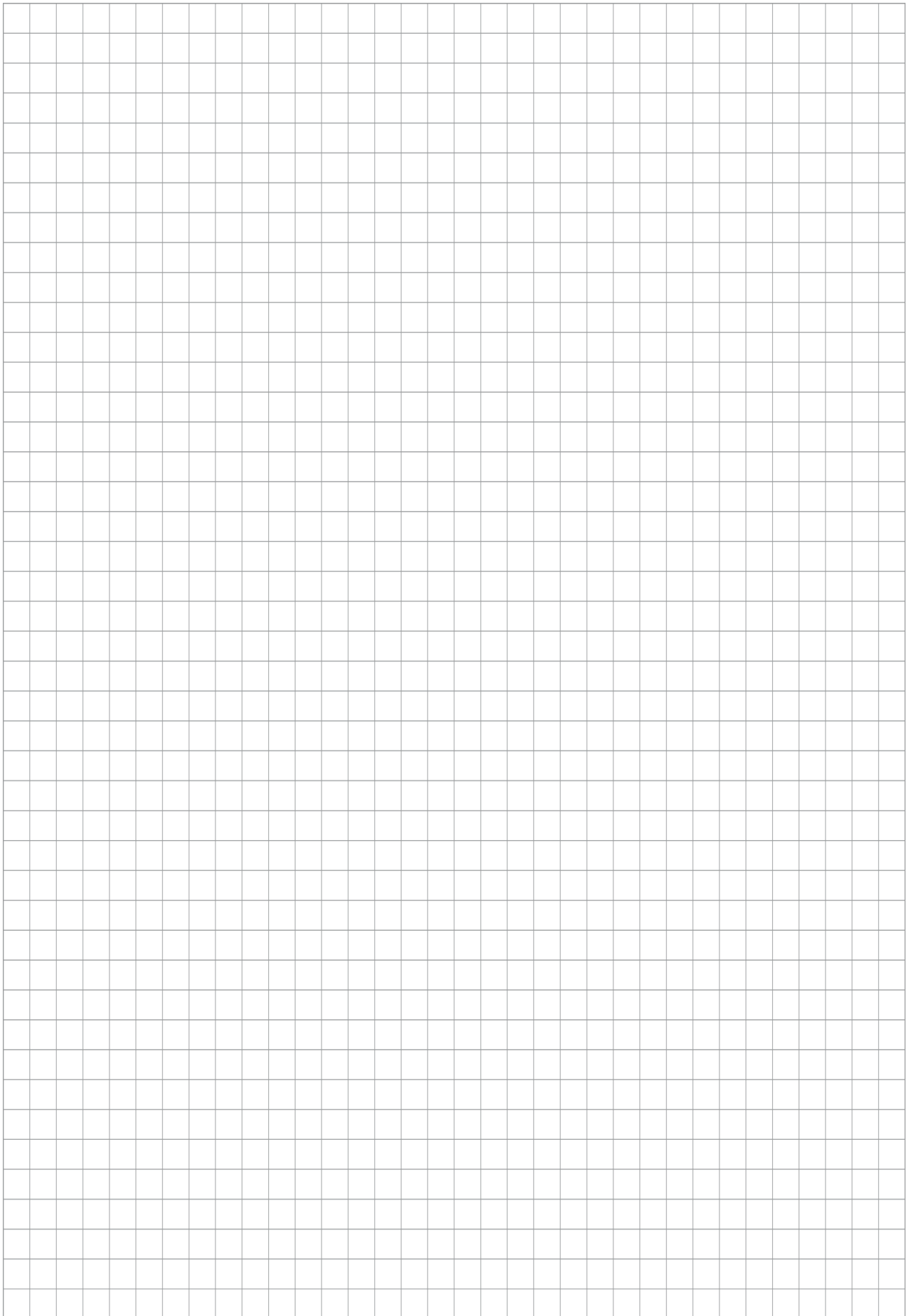
X Included in the accessory kit.

10 Assembly drawing











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