SCHUNK

Quick-change pallet system VERO-S NSL turn Clamping stations

Assembly and Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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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

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

Table of Contents

1 General

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 [🗋 6]

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 of business *
- Catalog data sheets of standard products used *
- Assembly and Operating Manual for VERO-S NSE plus quick-change pallet system *
- Assembly and Operating Manual for manual lathe chuck used *

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

1.1.3 Sizes

This operating manual applies to the following sizes:

Clamping station

- NSL turn 450-3
- NSL turn 450-3-Z
- NSL turn 570-5
- NSL turn 570-5-Z

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 [🗋 6]
- 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 Scope of delivery

The scope of delivery includes

- Clamping station in the version ordered, Link Stückliste
- Assembly and Operating Manual

1.4 Accessories

(ordered separately, see catalog or data sheets)

- Clamping pallets with a centering ring adapted for this clamping station
- Clamping pins types SPA, SPB, SPC
- Protective cover type SDE
- Flexible centering cone
- Centering ring to match flexible centering cone
- Matching screw connecting elements
- Matching alignment pins
- Hand-operated chuck
- Clamping jaws for hand-operated chuck

2 Basic safety notes

2.1 Intended use

This product is suitable for the clamping of clamping pallets, manual chucks on clamping pallets, clamping devices or workpieces.

The product is designed for operation in dynamic working conditions for turning and milling machining on combined milling/turning centers. It has been balanced and designed for the speeds specified.

- The use and commissioning of a manual chuck on the clamping station requires the approval of SCHUNK.
- When using lathe chucks on the clamping station, the maximum permissible sizes for the chucks must be observed.
  - Clamping stations with at least three clamping points are designed for use with manual chucks up to size Ø 315.
  - Clamping stations with at least five clamping points are designed for use with manual chucks up to size Ø 630.
- The product may only be used within the scope of its technical data, ▸ 3 [🗋 16].
- 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

The product is not being used as intended if, for example:

- It is used as a pressing tool, a toolholder, a load-handling device or as lifting equipment.
- It is used in working environments that are not permissible.
- People work on machines or technical equipment that do not comply with the EC Machinery Directive 2006/42/EC, disregarding the applicable safety regulations.
- The technical data specified by the manufacturer are exceeded during usage.

2.3 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.

2.4 Spare parts

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 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.

- Make sure that the product is used only in the context of its defined application parameters, ▶ 3 [🗋 16].
- Make sure that the contact surfaces of the interface are always clean.
- Always ensure that no chips of any kind enter the interface.

2.6 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.

2.7 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.

2.8 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.

2.9 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.

2.10 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.

2.11 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.

2.12 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.

2.12.1 Holding force and screw strength

The holding force of the System is essentially limited by the strength of the screwed connections with which the clamping pin is connected to the pallet or device. On this basis fastening screws of the property class 12.9 are to be used only.

Only original SCHUNK Clamping-Pins are to be used.

When the clamping pin is used in the customer's own assembly device, the customer is to provide for a sufficiently dimensioned tap and satisfactory strength of the fastening material.

2.12.2 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.

2.12.3 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.

2.12.4 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.

2.12.5 Notes on particular risks

⚠ WARNING

Risk of injury due to falling parts when setting up, dismantling, and transporting the product.

- Secure the clamping device against falling during transport and when installing or detaching it.
- Use suitable lifting equipment and means of transport.
- Stay clear of the suspended load.
- Wear personal protective equipment.

⚠ WARNING

Risk of injury to the operating personnel when transporting the product, when the clamping pin axis is in a horizontal position or during overhead application, as a result of the device or pallet falling down.

- Use suitable lifting equipment and means of transport.
- During horizontal or overhead applications, the device or pallet must be secured before loosening to prevent it from falling.

⚠ WARNING

Risk of injury due to falling device, pallet or workpiece if the clamping pin is loosened erroneously or as a result of negligence.

- During operation, erroneous or negligent loosening of the clamping pin must be prevented using suitable countermeasures (disconnecting the power supply after locking, use of check valves or safety switches).
- The machines and equipment must fulfill the minimum requirements of the EC Machinery Directive 2006/42/EC; specifically, they must have effective technical measures to protect against potential mechanical hazards.
- Wear personal protective equipment.

⚠ WARNING

Risk of injury due to a falling device, pallet or workpiece while coupling the air supply at the "Open" input.

When coupling the air supply at the "Open" input, the coupled clamping pallet may come loose from the clamping station, or the workpiece may fall out of the clamping device.

- Before coupling the air supply at the "Open" input, secure the device, pallet or workpiece to prevent it from falling down.

⚠ WARNING

The system clamps using spring force. Risk of injury due to parts automatically moving to their end positions following actuation of an "emergency stop" or after switching off the power supply.

- Wait for the system to shut down completely.
- Do not reach into the clamping module.
- Use pressure maintenance valves.

⚠ WARNING

Risk of injury due to rotation movements of the product.

When the product is commissioned, resulting rotation and swivel movements may catch or pull in adjoining components or limbs.

- The danger zone must be surrounded by a protective enclosure during operation.
- Follow the safety and accident-prevention regulations when operating the product, especially when working with machine tools and other technical equipment.

⚠ WARNING

Risk of injury due to product rotating with high imbalance.

When commissioning the product, imbalance, centrifugal forces and vibrations may arise on the clamping structure

- The danger zone must be surrounded by a protective enclosure during operation.
- The clamping device and the clamped workpiece must be balanced to a sufficient degree of accuracy during operation.

⚠ CAUTION

Risk of injury due to impurities (e.g. metal chips) in the exhaust and air purge connections of the clamping station.

- The danger zone must be surrounded by a protective enclosure during operation.
- Wear personal protective equipment (safety goggles).

⚠ CAUTION

Risk of injury due to compressed air hoses coming loose when connected improperly.

- Use check valves or safety switches.
- The danger zone must be surrounded by a protective enclosure during operation.

⚠ CAUTION

Risk of injury due to crushing.

- Install the product carefully.
- Do not place any limbs into the gaps or between the product and the machine.
- Wear protective gloves.

⚠ CAUTION

Risk of slipping or falling if the quick-change pallet system's operational environment is not clean (e.g. contaminated with cooling lubricants or oil).

- Ensure that the working environment is clean before starting assembly and installation work.
- Wear suitable safety boots.
- Follow the safety and accident-prevention regulations when operating the quick-change pallet system, especially when working with machine tools and other technical equipment.

⚠ CAUTION

Risk of burns due to workpieces with high temperatures

There is a risk of burns due to workpieces with high temperatures.

- Wear protective gloves when removing the workpieces.
- Automatic loading is preferred.

⚠ CAUTION

Danger due to pneumatic exhaust noises.

Noise pollution from the exhaust system and whistling pneumatic equipment during the working process.

- Wear hearing protection.

3 Technical data

Type	NSL turn 450-3	NSL turn 450-3-Z*	NSL turn 570-5	NSL turn 570-5-Z*
ID	0471450	0471451	0471455	0471456
Holding force (M10 / M12 / M16) [kN]**	105 / 150 / 225	105 / 150 / 225	175 / 250 / 375	175 / 250 / 375
Pull-down force with Turbo [kN]	75	75	125	125
Run-out accuracy in relation to the turning center [mm]	< 0.02	< 0.01	< 0.02	< 0.01
Max. speed [rpm]	2000	2000	1400	1400
weight [kg]	50	51	90	91

* With flexible centering taper

** Holding force of the clamping pin when mounting with cylindrical screw (DIN EN ISO 4762/12.9)

Unlocking pressure [bar]	6
Minimum pressure [bar]	5
Actuation pressure [bar]	6
Maximum pressure [bar]	10
Operating temperature [°C]	+15 to +60
Required level of cleanliness	IP 30 in accordance with DIN EN 60529: 2014-09
Noise emission [dB(A)]	≤ 70
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]

A separate maintenance unit with oiler must be used for the air supply.

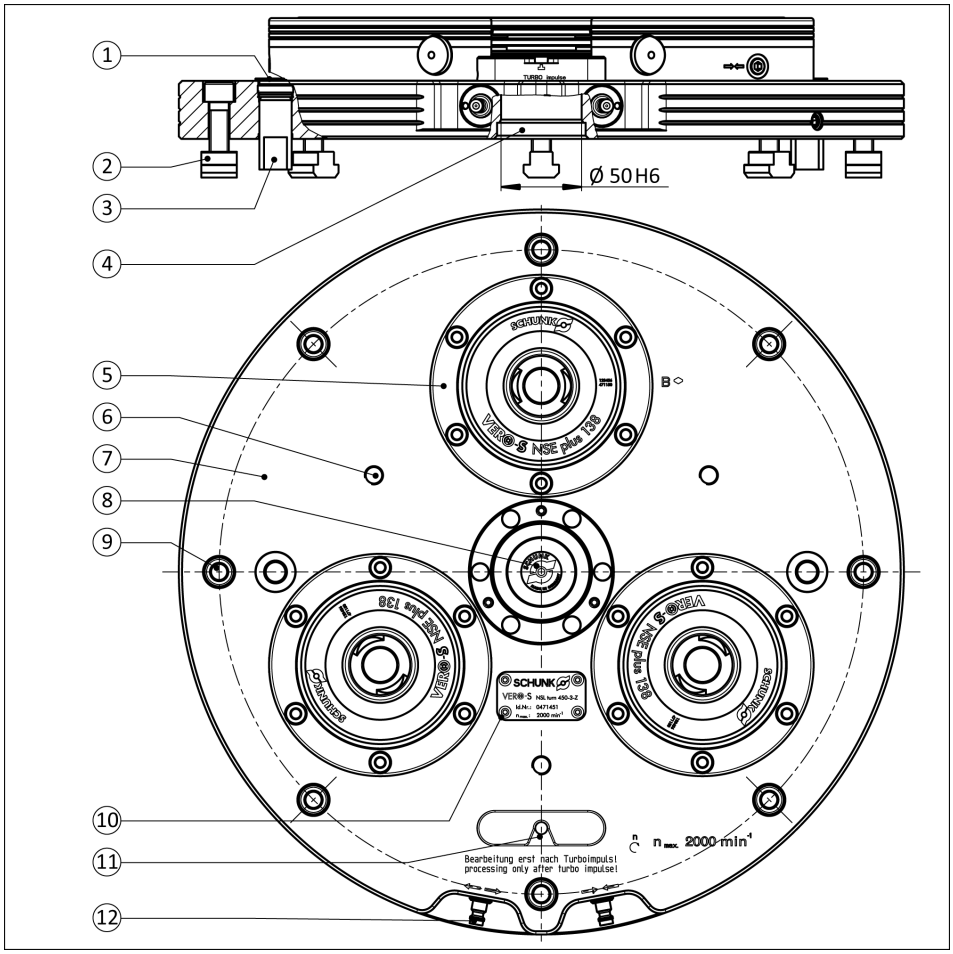
Further technical details for the products used can be found in the assembly and operating manual enclosed, ▸ 1.1.2 [🗋 6].

4 Function

The clamping function of the clamping station ensures fast and accurate changing of clamping pallets.

The clamping pallet is locked in the VERO-S quick change clamping modules and positioned by means of the respective alignment elements, such as clamping pins or centering cones. Two air connections accessible from outside supply the functions of the clamping system with the required system pressure.

4.1 Components of a clamping station

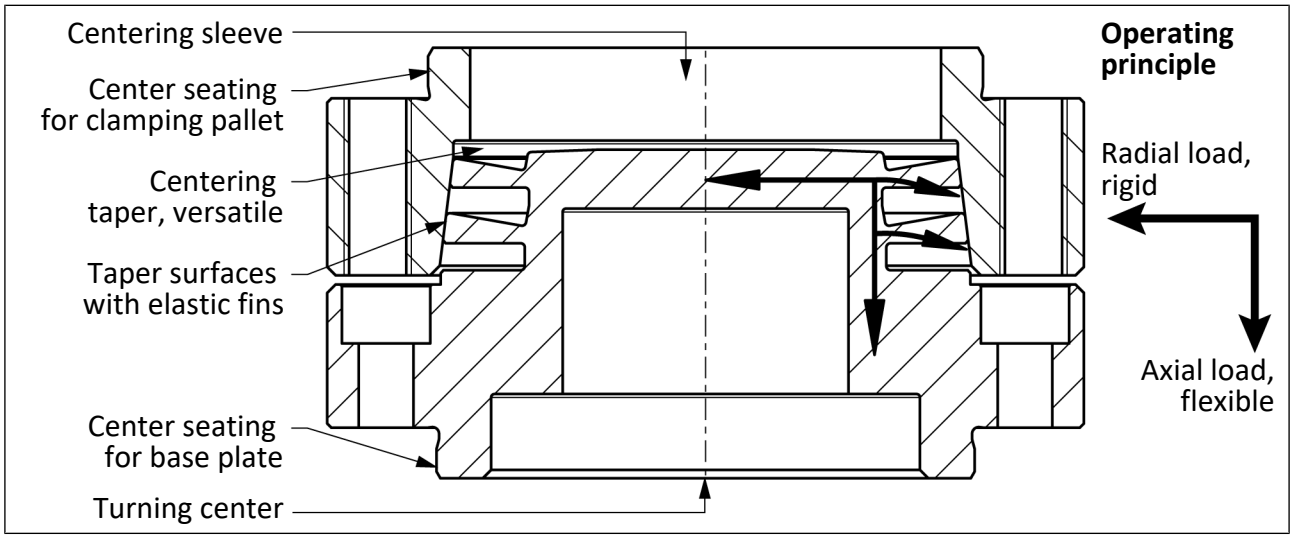


1	Locking screw	7	Base plate
2	Nut for T-slot	8	Versatile centering taper centering element (for Z version)
3	Guide pin for table groove	9	Mounting screws for star groove tables in pitch circle (8 x 45°)
4	Fitting bore for centering pin	10	Name plate
5	Quick-change pallet modules	11	Pressure indicator for turbo monitoring
6	Fastening holes for transport lugs	12	Air connections

4.2 Functioning principle of the flexible centering cone

By means of the centering taper built in the turning center, the highest repeat accuracy is achieved based on the run-out accuracy of the clamping design.

The patented centering taper is a mechanical alignment element and has a radially slotted taper clamping face with several ribs.



Centering taper with coupled centering sleeve

The centering diameter of the centering taper is somewhat in excess compared with the tapered inner diameter of the coordinated centering sleeve. (The centering sleeve is an accessory – for the required parts, see the table in chapter "Accessories for clamping pallets" ▸ 9 [🗋 37]). The flexible ribs can compensate for the existing excess in the axial direction.

Radially, the taper connection provides the highest rigidity with maximum centering accuracy. A transition fit ensures that the seat of the taper is installed free from play in the turning center of the base plate (item 1).

With a centering taper, the alignment function of a clamping pin type SPA 40 is replaced. A more versatile centering taper can be optionally retrofitted on an NSL turn and thus upgrade it to an NSL turn-Z. (For the required parts, see table presented in the chapter "Upgrading to NSL turn-Z" ▸ 9 [🗋 37]).

When commissioning the clamping station in dynamic operation, the connection for the turbo function should be pressurized once with compressed air so that the pull down force of the clamping pins to the clamping areas is increased.

5 Assembly

⚠ WARNING

Risk of injury due to dropping the clamping system during transport

When transporting the module for stationary use/ application, use the supplied eye bolts in the provided bore holes in the baseplate.
When transporting use a crane and/or a trolley.
Wear protective clothing (gloves, safety shoes).

Disconnect the energy supply lines and ensure that there is no residual energy in the system when performing assembly, modification, maintenance, or adjustment work.

Mounting means are provided on the circumference of the base plate and on the top side between the clamping modules.

The eye bolts must be removed before commissioning the clamping station.

5.1 General assembly notes

When connecting the clamping station, ensure that it is possible to completely bleed the piston chamber during the locking procedure. The air connections on the clamping station are provided with a bleed function.

When connecting to the air connection for unlocking, the system is bled through the air connection for the turbo function. When the air supply is attached to the turbo function, the system is bled via the unlocking connection.

The connections for opening and turbo are actuated via a locking coupling, which is included in the scope of delivery (accessory pack). The actuating air must be attached to one connection only.

When attaching the hose line to the air supply, the air coupling and the air connection for the clamping station must be free of dirt.

5.2 Mounting and alignment of the clamping station

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▶ 10 [🗋 40].

Cylindrical screws (item 33) and nuts for T-slots (item 34) are used for mounting. The clamping station must be screwed to the mounting points provided using at least 8 screws.

When mounting the clamping station on a machine table, cylindrical screws of strength class 10.9 in accordance with DIN ISO 4762 must be used. They should be accessible from above.

The nuts used for the T-slots must match the grooves in the machine table. The mounting procedure can be adjusted to the respective machine table by altering the size of the nuts; the cylindrical screws are always used, however.

Tighten the mounting screws evenly with a torque wrench. The required tightening torques can be found in the table at the end of the chapter.

The central alignment on the machine table is carried out using the centering bolt in the turning center of the clamping station. The clamping station is aligned at an angle using two overhead guide pins (item 16).

The aligning elements have internal threads and can thus be removed, if required.

If greater accuracy is required, do not use the centering bolt to align the connection of the clamping station to the machine table; use a **measuring probe** to center the machine instead.

The clamping station can be aligned using the ground peripheral surface of the base plate, the central bore hole or, if available, the taper surface of the centering taper as a reference point.

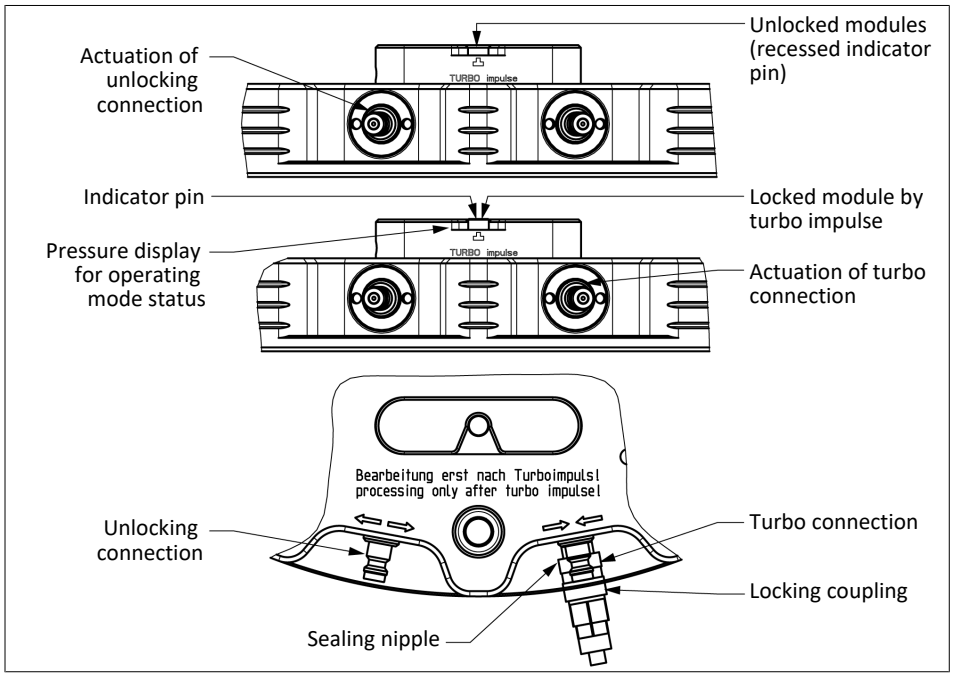
Once the clamping station has been mounted, seal the screw connection bore holes that are not in use and the centering bore holes of the guide pins using the locking screws (item 17).

The height of the modules will only be even once the clamping station has been properly mounted on the machine table.

Tightening torques for the mounting screws
(strength class 10.9)

Screw size	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Tightening torque M_A [Nm]	13	28	50	88	120	160	200	290	400	500

5.3 Connections of the clamping station



Connections on the clamping station

The clamping station has two pneumatically actuated functions. They can be actuated separately using an air connection with a sealing nipple and locking coupling.

There is an air connection on both the unlocking connection and the turbo connection. An additional coupling ring ensures that these air connections do not fall out.

The locking coupling is connected to the external air supply. The required size is in the clamping station's accessory pack.

⚠ CAUTION

The use of other (customer-owned) air connections can lead to increased imbalance.

Increased imbalance could cause parts (workpieces) to come loose and be expelled.

- The clamping station may only be operated with the installed sealing nipples.

5.3.1 Unlocking connection

⇦⇨ If the unlocking connection of the clamping station is actuated, all the modules will be unlocked at the same time. Clamping pallets, devices or workpieces can be removed from the clamping station, or be inserted now.

5.3.2 Turbo connection

⇨⇦ The clamping station has a turbo connection. When compressed air is applied, this actively provides air pressure to support the spring-actuated locking procedure. This increases the pull down force in all the modules.

After a short pressure pulse from the compressed air supply, it can be disconnected from the turbo connection again.

Technical data for the turbo connection can be found in the chapter "Technical Data" in the Assembly and Operating Manual for VERO-S quick-change pallet system NSE plus.

For optimum machining results, the clamping station must be operated in dynamic operation with a turbo pulse activated at the turbo connection so as to achieve the highest pull down forces. Failure to observe this fact may result in relative movement between the clamping station and the clamping pallet/workpiece.

The clamping station may only be put into dynamic operation when the turbo pulse at the turbo connection is activated.

5.3.3 Visual pressure indicator for turbo monitoring

The clamping station is equipped with a pressure indicator for visually monitoring the operating modes. An **indicator pin** on the built-in pressure display indicates the operating condition of the VERO-S quick-change pallet modules (see Fig. "Connections of the clamping station", ▸ 5.3 [🗋 21]). When the clamping system is pressurized with compressed air via the unlocking connection, all of the clamping modules are unlocked. The **indicator pin** on the pressure display drops to the »unlock« operating condition.

Clamping pallets, devices or workpieces can now be inserted in or removed from the unlocked modules of the clamping station.

After uncoupling the air supply from the unlocking connection, the **indicator pin** remains down and the clamping modules close via the spring-actuated locking procedure. If the air supply is attached to the turbo connection, the pull down force of the clamping modules increases. The »turbo function« operating status is indicated by the extended **indicator pin**. The indicator pin on the pressure display always remains in the most recently selected operating mode. A switch symbol on the pressure display is used to monitor the current operating mode.

5.4 Variants of the NSL turn clamping stations

5.4.1 NSL turn

The basic version of the clamping station is the NSL turn.

NSL turn has several VERO-S clamping areas, but does not have a versatile centering taper in the clamping tower.

Two of the installed quick-change pallet modules cover the alignment function here. The three different clamping pin types **SPA, SPB, SPC** are needed (see Fig. "NSL turn 450-3" and "NSL turn 570-5" as well as the chapter "Clamping pins SPA 40, SPB 40, SPC 40" ▶ 5.5 [🗋 26]).

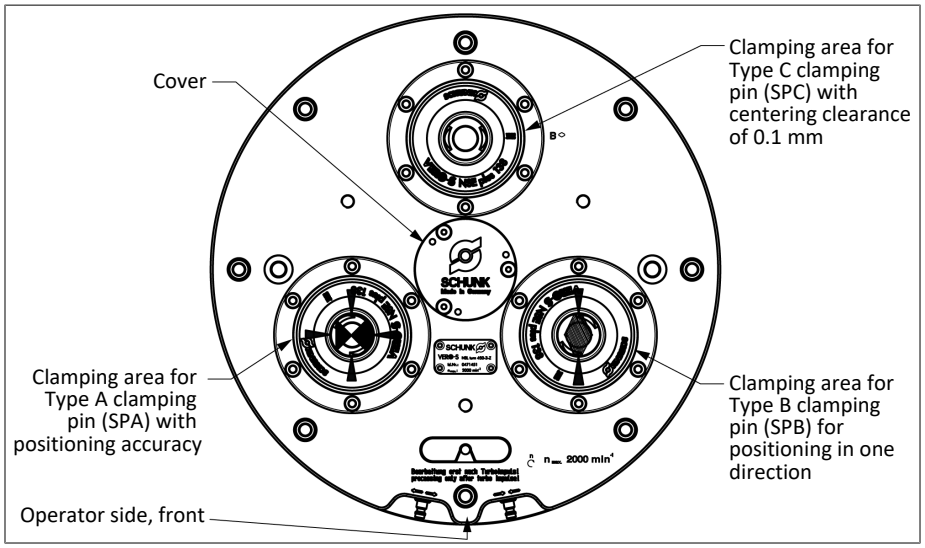
Clamping pin types **SPA 40** and **SPB 40** are installed in a straight line at a distance between the two farthest apart quick-change pallet modules. The greatest possible distance between the two clamping pins achieves the maximum centering accuracy and supporting effect. When the clamping pin is fitted with positioning accuracy in a direction **SPB 40**, pay attention to the angle-oriented positioning of the sword-shaped alignment surfaces. The supporting alignment surfaces on the **SPB 40** must be oriented perpendicular to an imaginary line joining it to the **SPA 40**. All the other clamping areas are fitted with clamping pins with centering clearance **SPC 40** to prevent over-determination of the interface position deviation.

Close the unused mounting hole for the centering taper with the cover (item 3).

The versatile centering taper can be optionally retrofitted. The NSL turn clamping station can be upgraded to a NSL turn-Z. For the required components, see table presented in the chapter "Upgrading to NSL turn-Z". ▶ 9 [🗋 37]

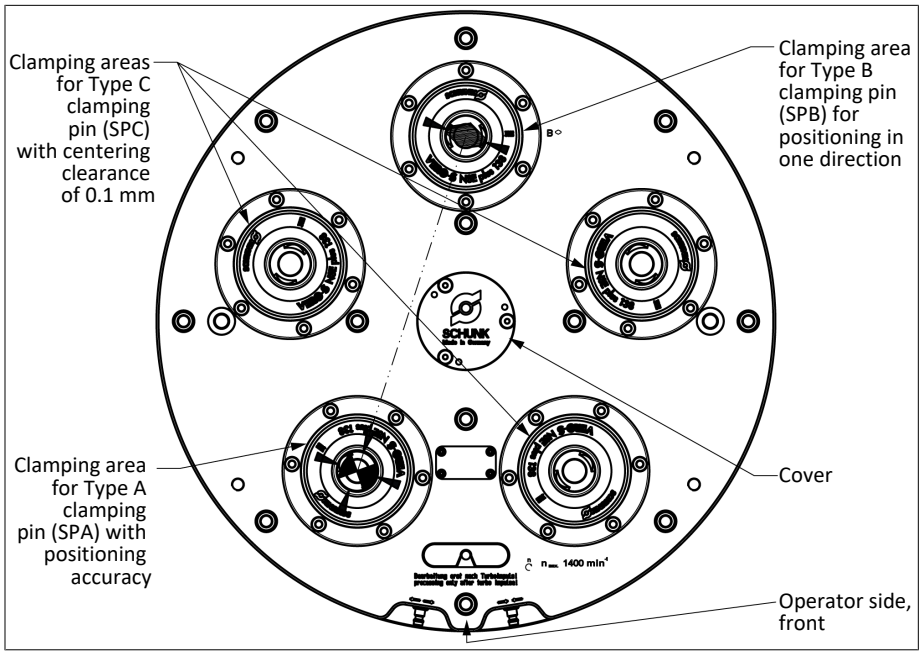
Particularly heavy devices or lathe chucks should be preferably used on a NSL turn-Z clamping station.

NSL turn with three VERO-S quick-change pallet modules



NSL turn 450-3

NSL turn with five VERO-S quick-change pallet modules



NSL turn 570-5

5.4.2 NSL turn-Z

The clamping station NSL turn-Z is equipped with a centering taper as an alignment element in the turning center.

The centering taper achieves the highest centering and run-out accuracy and replaces the SPA clamping pin.

Here, the alignment function is divided between the centering taper and one of the built-in VERO-S quick-change pallet modules. The two different clamping pin types **SPB, SPC** are needed (see Fig. "NSL turn 450-3-Z" and "NSL turn 570-5-Z" as well as the chapter "Clamping pins SPA 40, SPB 40, SPC 40" ▶ 5.5 [🗋 26]).

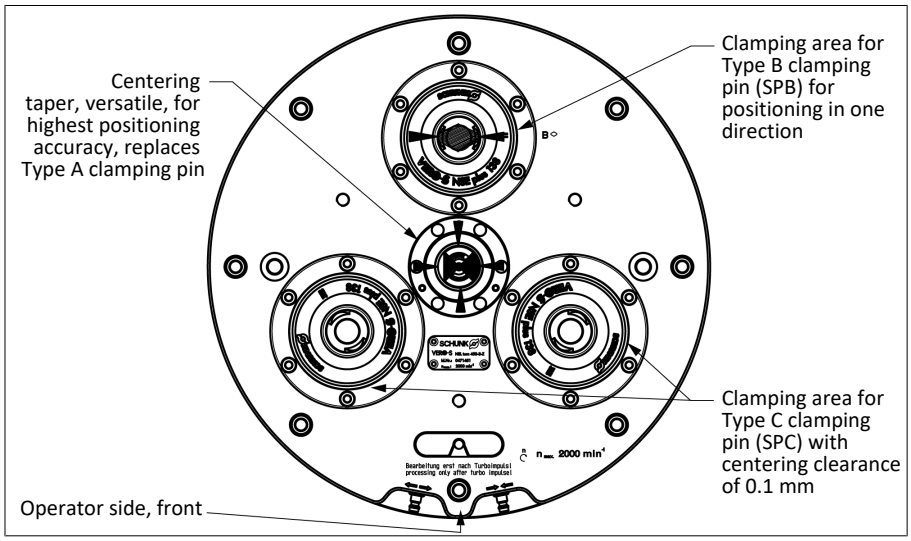
The central positioning of the clamping pallet is achieved with the centering taper. In a VERO-S quick-change pallet module, the clamping pin is fitted with positioning accuracy in a direction **SPB**

40, which ensures the angular alignment of the clamping pallet. Attention must be paid to the angle-oriented positioning of the sword-shaped alignment surfaces. The supporting alignment surfaces on the **SPB 40** must be oriented parallel to the **centering taper** so that a length offset can be balanced. All the other clamping areas are fitted with clamping pins with centering clearance **SPC 40** to prevent over-determination of the interface position deviation.

For the application and installation of the centering sleeve, which is available as an accessory, see chapter "Centering sleeve for clamping pallets" ▸ 5.6 [🗋 30]

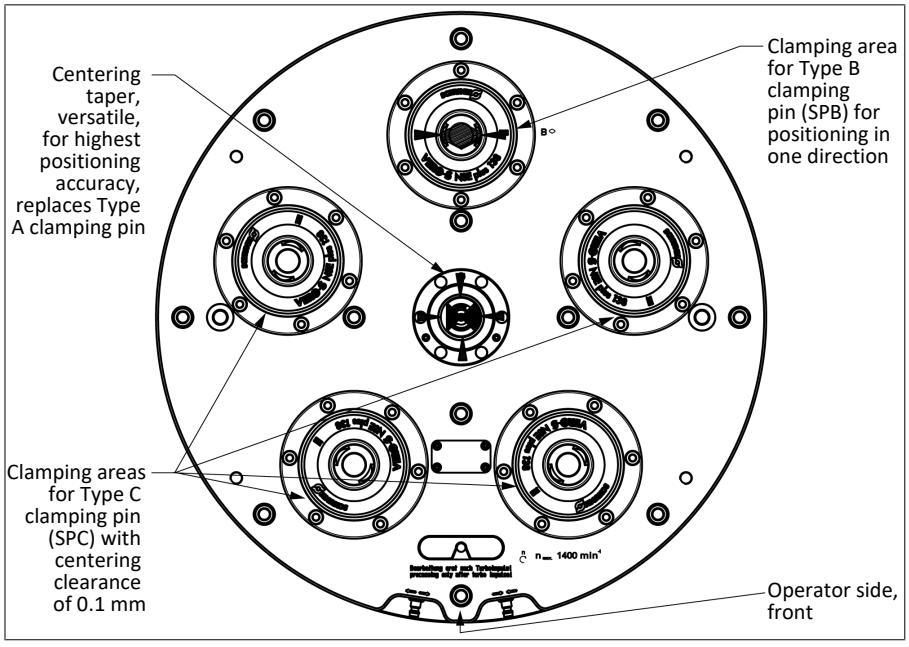
For the required parts, see table in the chapter "Accessories for clamping pallets". ▸ 9 [🗋 37]

NSL turn-Z with three VERO-S quick-change pallet modules and versatile centering taper in the turning center



NSL turn 450-3-Z

NSL turn-Z with five VERO-S quick-change pallet modules and versatile centering taper in the turning center



NSL turn 570-5-Z

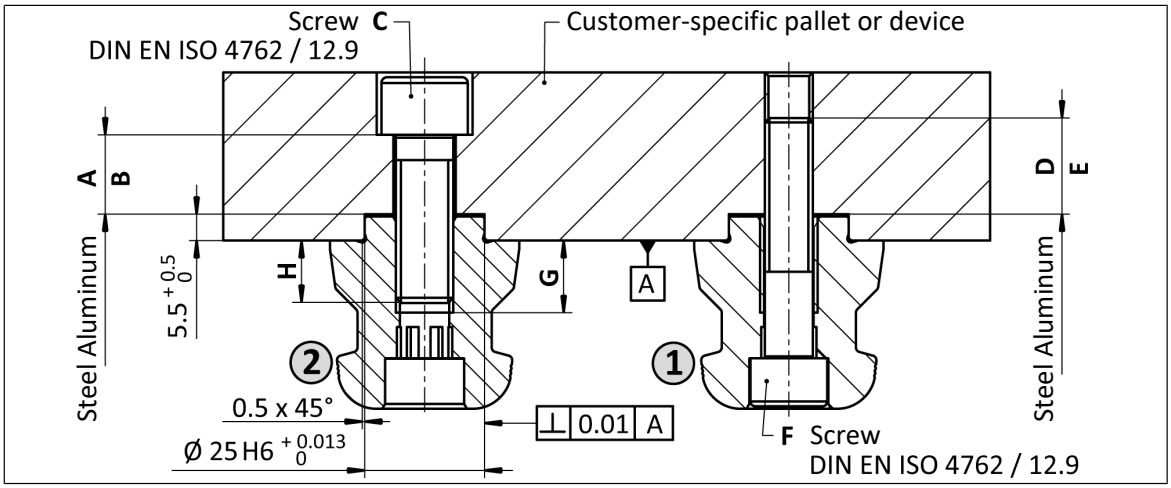
5.5 Clamping pins SPA 40, SPB 40, SPC 40

NOTICE

Notes on clamping pins and mounting screws

The holding force of the quick-change pallet system is limited essentially by the tightness of the screw connection which connects the clamping pin to the pallet or the device. This is why only screws of strength class 12.9 may be used.
Only original SCHUNK clamping pins may be used. If the clamping pins are to be used in customer-owned devices, the customer must provide sufficiently dimensioned threaded holes or a sufficiently thick mounting material.

If clamping pins are used outside of SCHUNK pallets, for example in customer-specific devices or workpieces, the outer diameter of the part to be clamped must be large enough to completely cover the O-ring on the top of the quick-change pallet system.



Tolerances and installation conditions for SPA 40 / SPA 40-16 clamping pins

Tolerances and installation conditions

Type	ID no.	A	B	C	D	E	F	G*	H
SPA 40	0471151	> 12	> 17	M12	> 15	> 20	M10	15	> 12
SPB 40	0471152	> 12	> 17	M12	> 15	> 20	M10	15	> 12
SPC 40	0471153	> 12	> 17	M12	> 15	> 20	M10	15	> 12
SPG 40	0471154	> 12	> 17	M12	> 15	> 20	M10	25	> 22
SPA 40-16	0471064	> 13	> 18	M16	> 18	> 24	M12	20	> 16
SPB 40-16	0471065	> 13	> 18	M16	> 18	> 24	M12	20	> 16
SPC 40-16	0471066	> 13	> 18	M16	> 18	> 24	M12	20	> 16

* The length of the screwed thread must not exceed the dimension "G" under any circumstances!

Tightening torques for mounting clamping pins
(screw quality 12.9)

Screw size	M6	M8	M10	M12	M14	M16
Tightening torque M_A (Nm)	15	32	62	108	170	262

For heavy devices or clamping pallets, the clamping pins with mounting screws must be screwed with at least M12 thread.

5.5.1 Information to clamping pin SPG 40

The SPG 40 can be used with a clamping position instead of the SPA 40.

With several clamping positions, all three types of clamping pins can be replaced with the SPG 40.

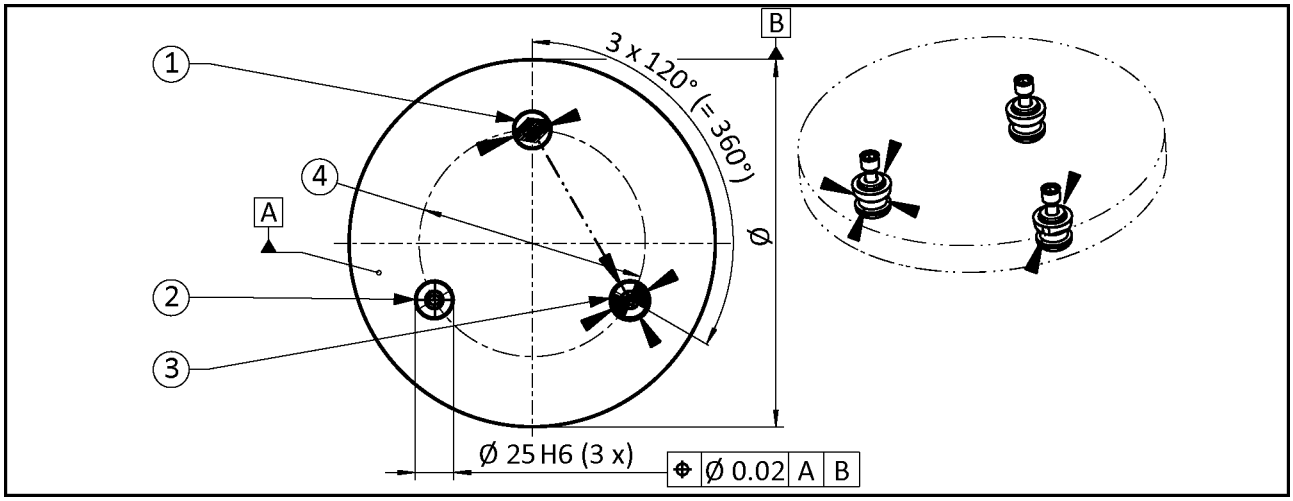
The repeat accuracy increases to < 0.002 mm when using the SPG 40.

When connecting the screws from above, an M12 screw 10 mm longer of strength class 12.9 must be used after order of preference 2.

5.5.2 Use and arrangement of the different clamping pin types

Depending on the clamping station used, different clamping pallets are provided. In order to achieve the maximum centering accuracy for the pallets, it is essential that the clamping pins be arranged as specified in the illustrations.

Clamping pallet with three clamping points for clamping station NSL turn



Clamping pallet for NSL turn 450-3

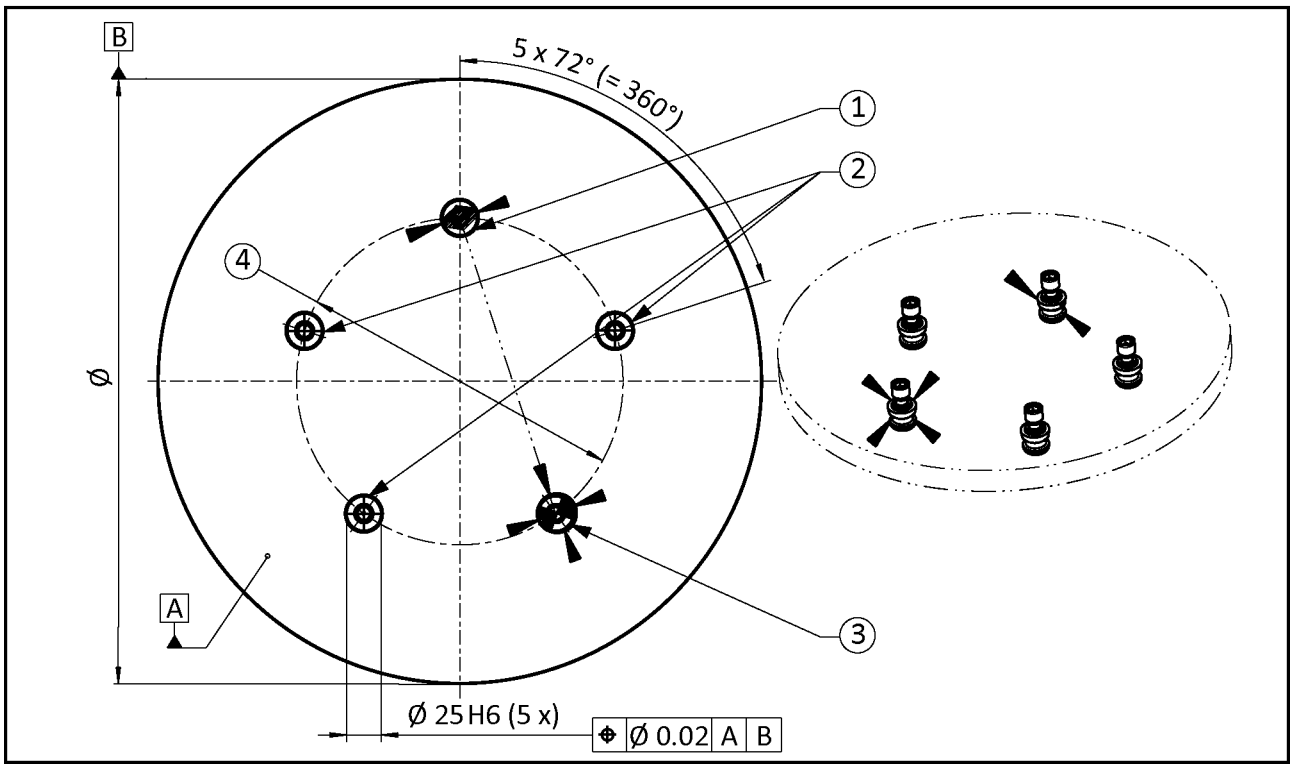
1 Type B clamping pin (SPB) for positioning in one direction

2 Type C clamping pin (SPC) with centering clearance of 0.1 mm

3 Type A clamping pin (SPA) with positioning accuracy

4 Ø Pitch circle

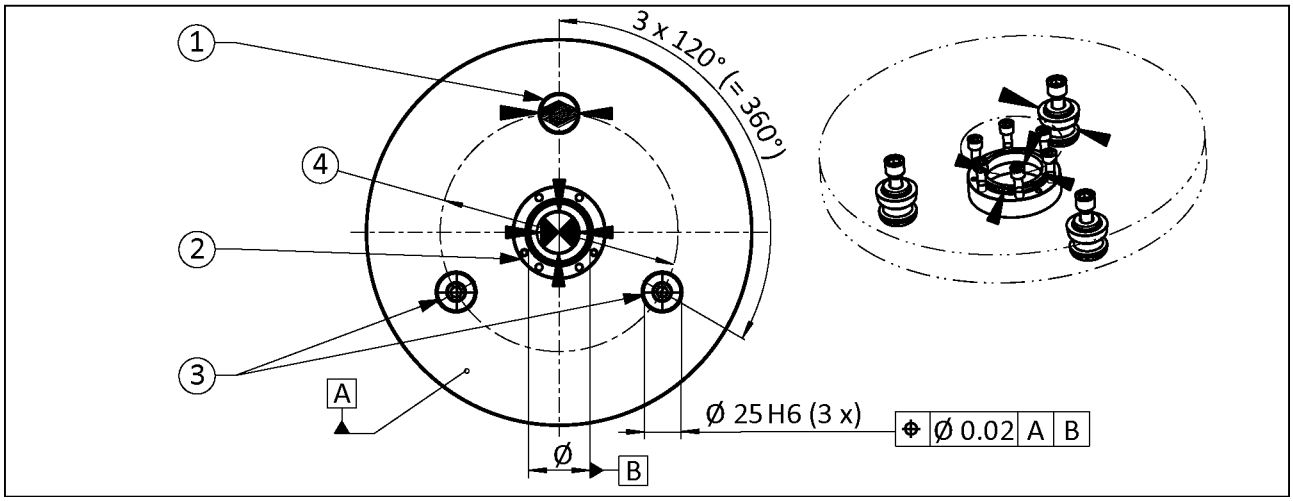
Clamping pallet with five clamping points for clamping station NSL turn



Clamping pallet for NSL turn 570-5

1 Type B clamping pin (SPB) for positioning in one direction
2 Type C clamping pin (SPC) with centering clearance of 0.1 mm
3 Type A clamping pin (SPA) with positioning accuracy
4 Ø Pitch circle

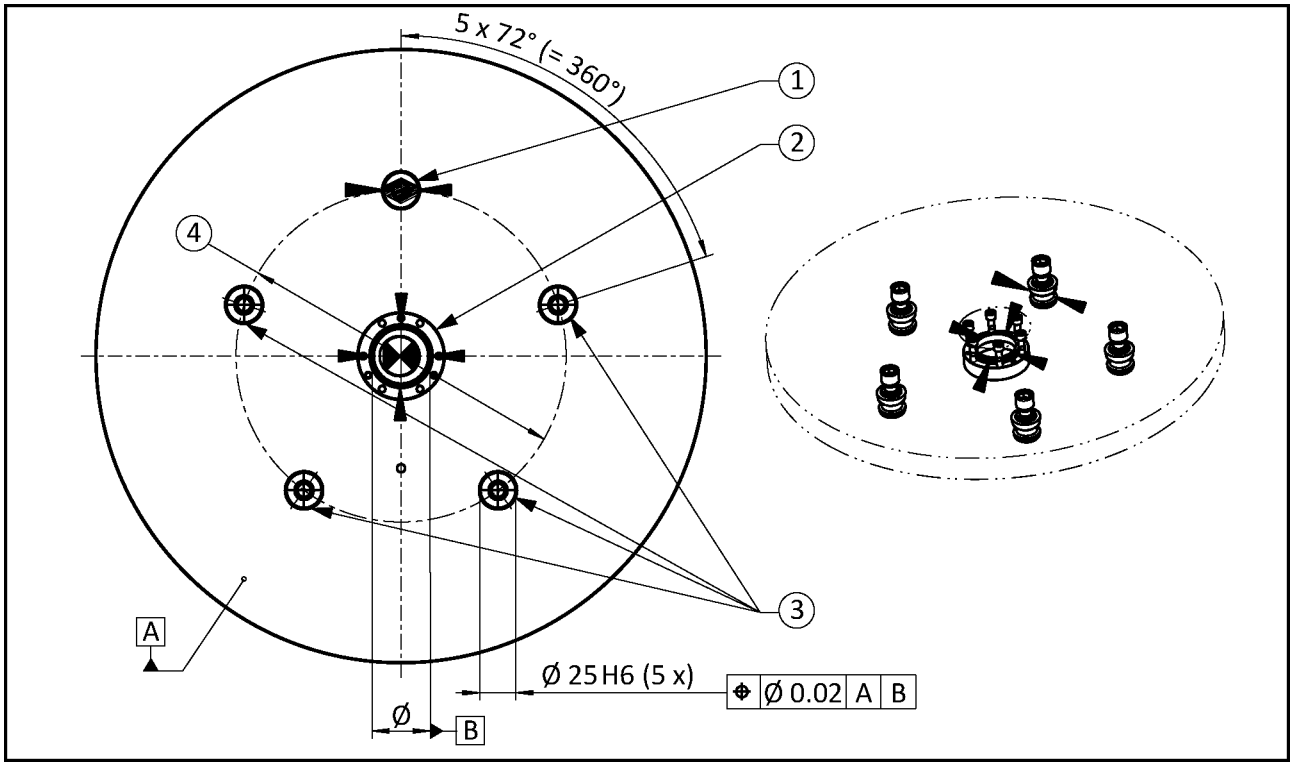
Clamping pallet with three clamping points for clamping station NSL turn-Z



Clamping pallet for NSL turn 450-3-Z

1 Type B clamping pin (SPB) for positioning in one direction
2 Versatile centering taper for highest positioning accuracy, replaces Type A clamping pin
3 Type C clamping pin (SPC) with centering clearance of 0.1 mm
4 Ø Pitch circle

Clamping pallet with five clamping points for clamping station NSL turn-Z



Clamping pallet for NSL turn 570-5-Z

1 Type B clamping pin (SPB) for positioning in one direction

2 Versatile centering taper for highest positioning accuracy, replaces Type A clamping pin

3 Type C clamping pin (SPC) with centering clearance of 0.1 mm

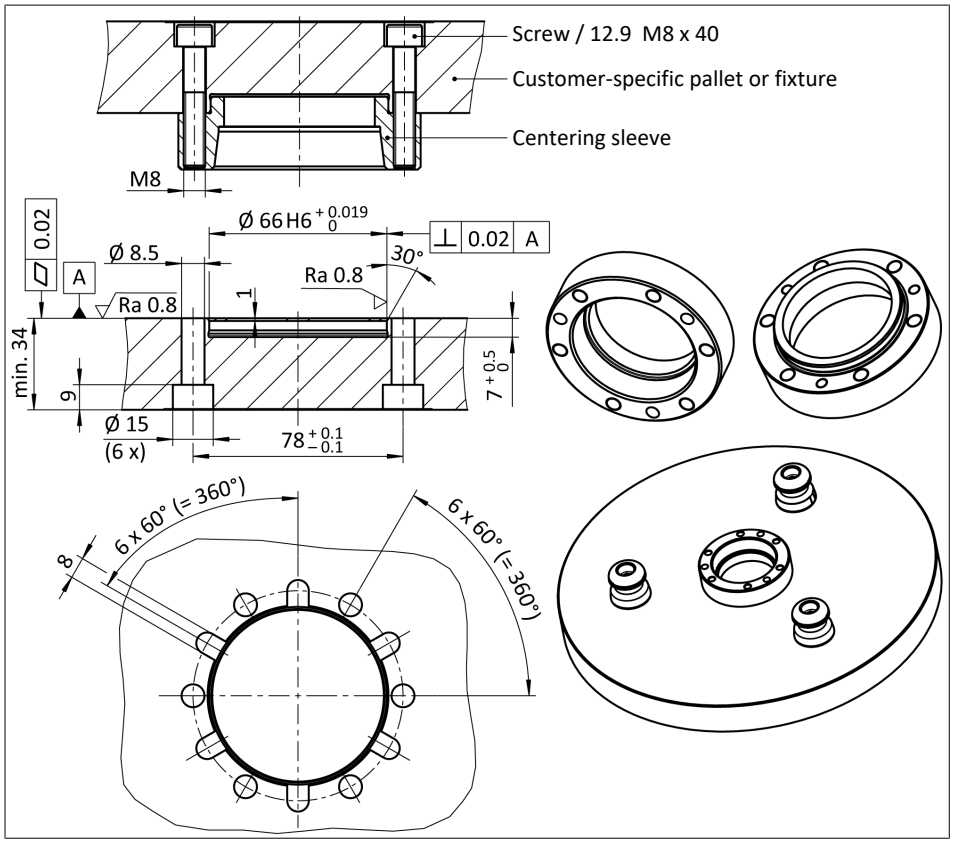
4 Ø Pitch circle

5.6 Centering ring for clamping pallets

An increased run-out accuracy can be attained using the centering taper connection of an NSL turn-Z. The centering sleeve, which has been specifically designed for the centering taper, is available as an accessory (see chapter "Accessories for Clamping Pallets" ▸ 9 [🗋 37]).

Based on Fig. "Installation example for centering sleeve in clamping pallet", the installation of the centering sleeve can be made in-house.

Installation example for centering sleeve for clamping pallet for 3x NSL turn-Z clamping station



When mounting the centering sleeve on the clamping pallet, cylindrical screws according to DIN ISO 4762 with the strength class 10.9 must be used. Tighten the screws according to the tightening torques in the table "Tightening torques of the mounting screws" ▸ 5.2 [🗋 20]. Tighten the mounting screws crosswise with a torque wrench.

NOTICE

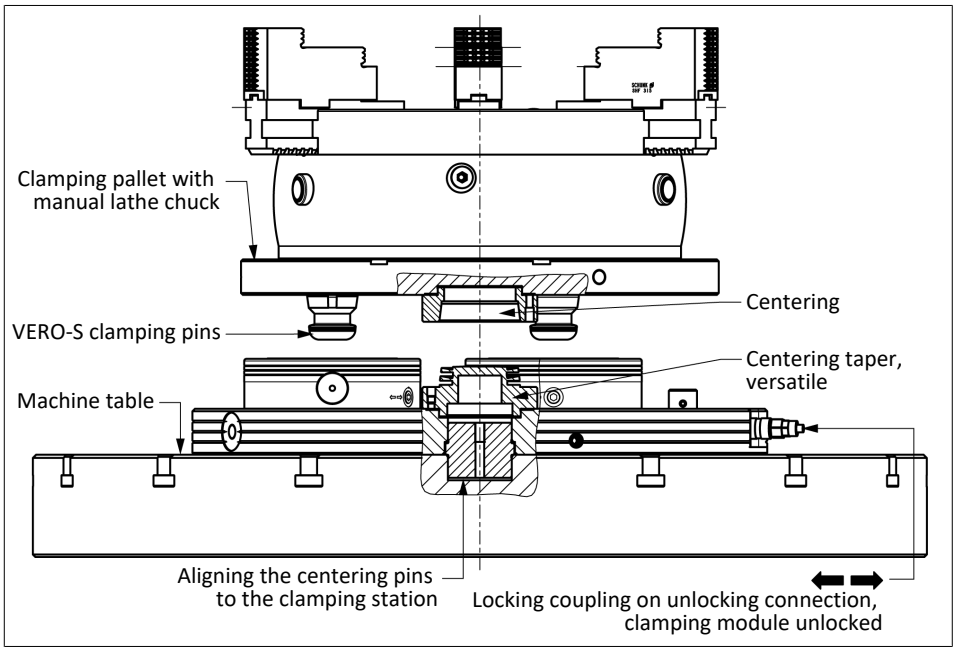
Clamping pallets with centering sleeve to suit all NSL turn-Z may not have a through-hole center bore. Protect the taper connection against penetrating dirt.

NOTICE

To protect the quick-change pallet modules, the clamping pallet must cover them completely.

5.7 Clamping pallet setup

NSL turn-Z in loading position



NSL turn-Z in loading position

Attach the air connection to the unlocking connection of the clamping station.

Apply pressure to the air connection so that the VERO-S quick-change pallet modules can be unlocked. The unlocking connection must be supplied with constant pressure during tooling.

Install the clamping pallet with the clamping pins flush onto the clamping areas of the clamping station.

Attach the compressed air line to the turbo connection and apply a short turbo impulse. Once this is done, disconnect the air connection from the clamping station. The clamping pallet is locked and aligned with the VERO-S clamping modules

Once the tooling procedure is complete, the clamping station is ready for use.

NOTICE

Before swapping a clamping pallet, ensure that the connecting elements such as the centering taper and centering sleeve are clean and undamaged.

NOTICE

After swapping a pallet or before commissioning the clamping station, actuate the "turbo" connection.

NOTICE

It is important that a workpiece is clamped when commissioning a manual chuck on the clamping station.

6 Maintenance and care

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▶ 10 [🗋 40].

The clamping station is designed for low-maintenance operation. As such opening and disassembly of the clamping modules is only necessary in exceptional cases.

The "Maintenance and care" chapter in the corresponding assembly and operating manual applies to the quick-change pallet modules NSE plus and manual lathe chuck used.

At regular intervals, check that all the screw connections and moving components of the clamping station are seated securely.

6.1 Disassembly and assembly

Replacing wearing parts (e.g. seals)

- When removing the seals, ensure that the sealing surfaces are not damaged.

1. The ring on the base side (item 2) is used to distribute the air to the clamping modules. To disassemble, first unscrew the screws (item 9) and then the set-screws (item 18).
2. Alternately screw lifting screws into the threads of the set-screws (item 18) and evenly push out the ring (item 2).
3. The set-screws (item 11 and 12) screwed into the base plate should only be removed if required. When using again, screw in until air-tight using a thread sealant.
4. The sealing nipples (item 14) and sealing rings (item 13) can only be unscrewed once the threaded sleeves (item 15) have been removed. Safety ring pliers are recommended for removing the threaded sleeves.
5. To remove the pressure indicator, unscrew the screws (item 22) and (item 23) accessible from the base side and remove the seal (item 24). The pressure indicator assembly group can be disassembled further in order to change the seals.

Clean all the parts thoroughly and check for damage and wear. Damaged, worn and lost parts must be replaced. These parts can be reordered from SCHUNK in accordance with the spare parts list.

Only use SCHUNK original spare parts.

To assemble the clamping station, complete the above procedure in reverse.

- Lubricate the new seals with Renolit HLT-2 or an equivalent grease and carefully assemble. They must not be damaged during installation.
- Once assembly is complete, perform a final inspection and check that all the components are present and have been installed properly.
- Carry out a functionalcheck ▸ 6.3 [🗋 34] and leak test ▸ 6.4 [🗋 34], prior to commissioning.

6.2 Removal and installation of the centering cone

The versatile centering taper fits with the built-in clamping modules.

Threaded extraction holes are provided for disassembling the taper. The lifting screws press on deep recesses, thus this keeping the flat surface of the base plate (item 1) undamaged.

Before disassembling the centering taper, mark the installation position. In order to achieve the highest possible accuracy, it must be mounted in the same installation position again. When disassembling, make sure that the taper surface does not become damaged.

If the clamping station is used without a centering taper, the mounting seat in the base plate must be closed with the supplied cover.

When mounting the centering taper on the base plate of the clamping station, cylindrical screws according to DIN ISO 4762 with the strength class 10.9 must be used (For required tightening torques see ▸ 5.2 [🗋 20]).

After the installation of the centering taper, the mounting screws (item 52) must be closed with the associated cover caps (item 53) so that no chips get caught on the cylinder center bores.

If the versatile centering taper is retrofitted as an accessory or spare part, the total height together with a centering sleeve (▸ 9.3 [🗋 39]) should be checked. Depending on the design of the clamping pallet, the centering sleeve may have been pre-mounted.

The tapering surface of the taper must be free of any damage. Only an undamaged component guarantees the maximum repeat clamping accuracy and the associated manufacturing accuracy of the workpiece.

When replacing always use SCHUNK original spare parts.

- Make sure that the contact surfaces of the mounting surfaces are always clean.
- Conduct regular visual and functional checks of the centering taper and centering sleeve. If there is visible damage, it may be necessary to replace the component to ensure the required centering accuracy.

6.3 Function Test

The functional test should confirm the proper functioning of the quick-change pallet systems and the pressure display.

Proper functioning is deemed, if

- the clamping slide moves smoothly at minimum system pressure (5 bar).
- the clamping system shows no signs of leaking.
- the (safety) indicator pin of the pressure display visualizes the corresponding operating mode and remains in the respective position.

6.4 Leak test

As part of a leak test, the air and plug-in connections and the pressure display for turbo monitoring should be tested for leaks.

The following components are required for the leak test: pressure gauge, supply line with coupling nipple.

Performing the leak test:

1. Connect the components to the air connection in the following order:
   – pressure gauge, supply line with coupling nipple.
2. Pressurize the clamping system with compressed air.
3. Check the clamping system for tightness in both switch positions for module control.
4. Check the tightness of the integrated pressure display. The indicator pin should change to the corresponding operating mode.

To determine the tightness of the clamping system, no clamping pallet should be fitted.

If the clamping system has leaks, check the entire pneumatic system (e.g. using Metaflux leak detector spray).

If any leaks are identified, check the seals and replace them if necessary.

Leaks at the pressure display or in the plug-in connections of the air supply, for example, must be sealed and any defective components replaced.

7 Trouble shooting

The clamping area fails to unlock properly, or at all

Possible cause	Remedial measures
Operating pressure below 5 bar	Increase operating pressure
The clamping station was not operated with oiled compressed air	Air must be supplied via a separate maintenance unit with an oiler
Defective air connections	Check air supply
Excessive tensile load on clamping slides	Reduce load
The turbo connection is still pressurized	Ventilate turbo connection
Leaky air supply or air connection	Check connections and seals

Pressure indicator for monitoring turbo not working correctly

Possible cause	Remedial measures
Leaky pressure indicator or air supply	Check connections and seals

Deterioration in centering accuracy

Possible cause	Remedial measures
The taper surfaces on the versatile centering taper or the centering sleeve are damaged or worn	Replace damaged parts with SCHUNK original spare parts
The clamping pins are not arranged correctly on the clamping pallet	Check arrangement
The clamping setup does not correspond to the required balancing grade G 6.3	Balance according to the required balancing grade

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 Seal kit and part lists

9.1 Sealing kit lists

Size / Sealing kit*	ID
NSL turn 450-3 (-Z)	0471454
NSL turn 570-5 (-Z)	0471459

* For included items see note **X** in Parts Lists chapter below. Seals are wearing parts and recommended to be replaced during maintenance. The sealing kit can only be ordered as a complete kit.

9.2 Part lists

NSL turn 450-3 (ID number 0471450)

NSL turn 450-3-Z (ID number 0471451)

NSL turn 570-5 (ID number 0471455)

NSL turn 570-5-Z (ID number 0471456)

Item	Designation	Quantity	Note
1	Base plate	1	
2	Ring	1	
3	Cover	1	
4	Pressure display	1	
5	O-ring	1	**X**
6	O-ring	1	**X**
7	O-ring	1	**X**
8	O-ring	1	**X**
9	Screw 10.9	9	
	Screw 10.9	10	Z
10	Pan head screw 10.9	3	
11	Set-screw	1	570
12	Set-screw	3	
13	Sealing ring	2	**X**
14	Sealing nipple	2	
15	Threaded sleeves	2	
16	Guide pin for groove	2	
17	Locking screw	2	450
	Locking screw	6	570
18	Set-screw	3	
20	O-ring	3	**X**
	O-ring	5	**X**

Item	Designation	Quantity	Note
21	VERO-S NSE plus 138	3	
	VERO-S NSE plus 138	5	
22	Screw 10.9	1	
23	Screw 10.9	2	
24	Seal	1	**X**
29	Centering pin	1	
31	Pan-head screw 10.9	4	
32	Centering taper	1	Z
33	Screw 10.9	8	
	Screw 10.9	12	
34	Nut for T-slot	8	
	Nut for T-slot	12	
40	Locking coupling	1	
41	Eye bolt	3	450
	Eye bolt	4	570
42	Eye bolt	1	570
44	O-ring	1	**X**
45	O-ring	1	**X**
46	O-ring	1	**X**
47	O-ring	1	**X**
52	Screw 10.9	6	Z
53	Cover cap	6	Z
54	Set-screw	3	Z
A	Cover cap	18	450
	Cover cap	30	570
B	O-ring	12	450
	O-ring	20	570
C	Screw 10.9	18	450
	Screw 10.9	30	570

Parts list key	
X	included in the sealing kit
Z	for variants with centering taper (-Z)
450	only for size NSL turn 450
570	only for size NSL turn 570

9.3 Retrofit and expansion components for NSL turn clamping stations to NSL turn-Z

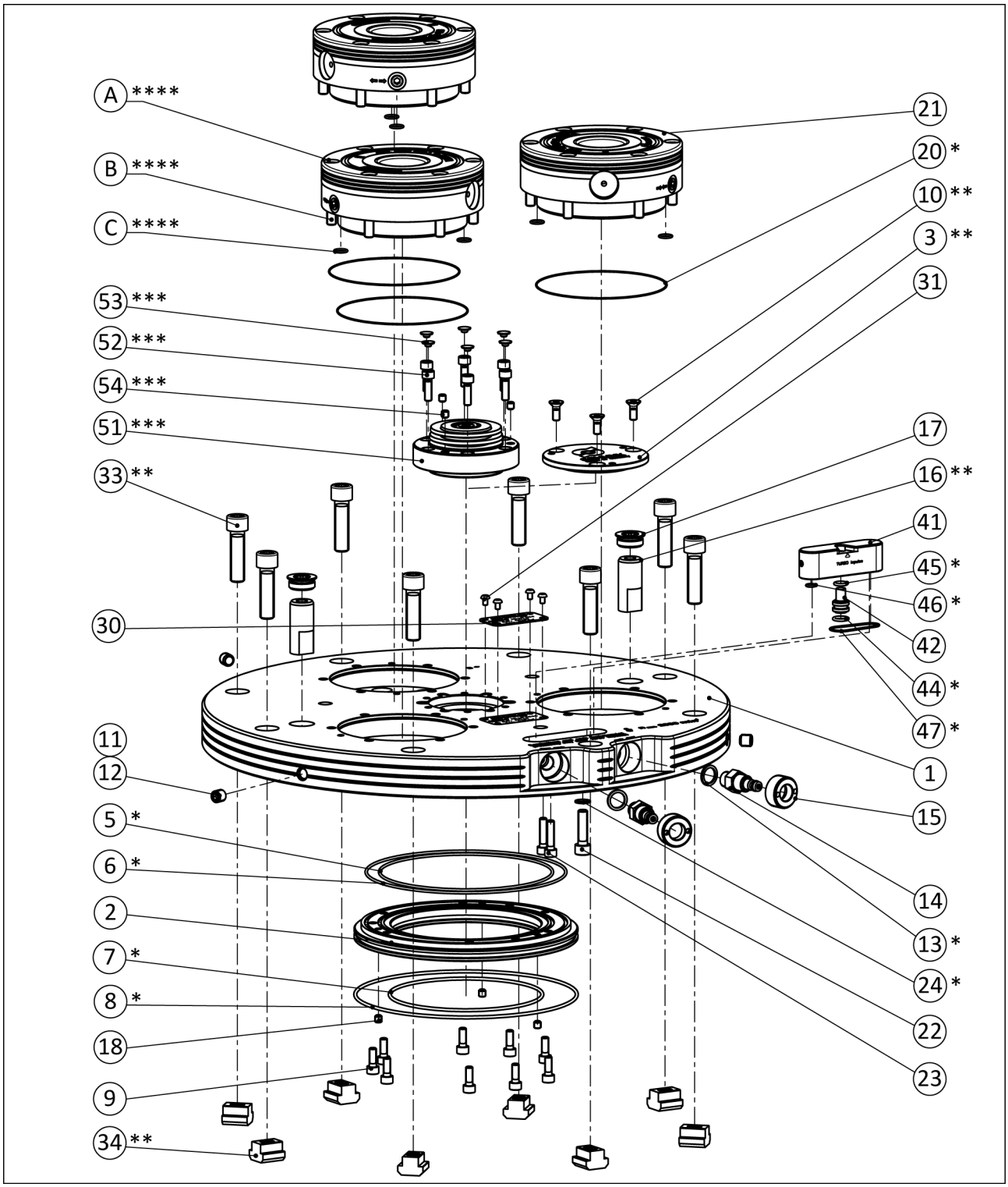
Centering taper (ID number 0471452)

Item	Designation	Quantity	Note
1	Centering taper, flexible A4	1	
2	Screw 10.9	6	
3	Cover cap	6	
4	Set-screw	3	

Centering ring (ID number 0471460)

Item	Designation	Quantity	Note
1	Centering ring ZRI A4	1	
2	Screw 10.9	6	

10 Assembly drawing



A	Cover plug	B	Screw
C	O-ring		
*	Sealing kit	**	Accessory kit
***	Also with NSL3 turn 450-3-Z	****	Included in scope of delivery

11 Manufacturer certificate

Manufacturer / Distributor:	H.-D. SCHUNK GmbH & Co. Spanntechnik KG Lothringer Str. 23 D-88512 Mengen
Product:	Quick-change pallet system
Designation:	VERO-S
Type designation:	NSL, NSD, NST, GSL, SSN, SSN turn

Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG certifies that the above-mentioned products, when used as intended and in compliance with the operating manual and the warnings on the product, are safe according to the national regulations and:

- a **risk assessment** has been carried out in accordance with ISO 12100:2010.
- an **operating manual** for the assembly instructions has been created in accordance with the contents of the Machinery Directive 2006/42/EC Annex I No. 1.7.4.2. and the contents of the provisions of Annex VI of the Machinery Directive 2006/42/EC.
- **Markings** have been made in accordance with EN 1550:1997+A1:2008 Section 6.3.1, VDMA 34192:2019 Section 6.3 or ISO 16156:2004 Section 6.3. The requirements of Annex I No. 1.7.3. of the Machinery Directive 2006/42/EC have been complied with.
- the relevant basic and proven safety principles of the Annexes of **ISO 13849-2:2012**, taking into account the requirements of the documentation have been observed for the component. The parameters, limitations, ambient conditions, characteristic values, etc. for proper operation are defined in the operating manual.
- an $MTTF_D$ value of 150 years can be estimated for mechanical components using the informative procedure in Table C.1 of ISO 13849-1:2015.
- **fault exclusion** against the fault "Unexpected release without pending release signal".
- the **fault exclusion** against the fault "Breakage during operation" in compliance with the parameters, limitations, ambient conditions, characteristic values and maintenance intervals, etc., specified in the operating manual.
- that internal bore diameters in the **pipe or control lines** are at least 2 mm for pneumatic clamping systems and at least 3 mm for hydraulic clamping systems

Harmonized Standards applied:

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

Other related technical Standards and specifications:

- **VDMA 34192:2019** Safety requirements for clamping devices for use on machines

Mengen, 19th of July 2023

Signature: see original declaration

p.p. Philipp Schräder
Head of Development standard products

Signature: see original declaration

p.p. Alexander Koch
Head of Engineering Design special products

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