



# Quick-change pallet system

## VERO-S NSP 140, NSP-S 140

### Assembly and Operating Manual

Translation of Original Operating  
Manual

## Imprint

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### 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

<b>1 General</b> .....	<b>5</b>
1.1 About this manual.....	5
1.1.1 Illustration of safety notes .....	5
1.1.2 Applicable documents .....	6
1.1.3 Design .....	6
1.2 Warranty .....	6
1.3 Scope of delivery.....	6
1.3.1 Accessories .....	6
<b>2 Basic safety notes</b> .....	<b>7</b>
2.1 Appropriate use .....	7
2.2 Inappropriate use .....	7
2.3 Structural changes.....	7
2.4 Spare parts .....	8
2.5 Ambient conditions and operating conditions .....	8
2.6 Material limitations .....	8
2.7 Personnel qualification .....	8
2.8 Personal protective equipment .....	9
2.9 Transport.....	9
2.10 Protection during handling and assembly .....	9
2.11 Protection during commissioning and operation .....	10
2.12 Notes on safe operation.....	10
2.13 Disposal .....	10
2.14 Fundamental dangers .....	11
2.15 Protection against dangerous movements .....	11
2.16 Notes on particular risks .....	11
<b>3 Technical data</b> .....	<b>13</b>
3.1 Suitability for welding applications .....	14
<b>4 Function</b> .....	<b>15</b>
4.1 Clamping function .....	15
4.2 Lifting and centering function.....	16
4.3 Dynamic pressure monitoring and blow-out function for cleaning the flat surface .....	16
4.4 Dynamic pressure monitoring at the clamping slides.....	17
4.5 Electrical cylinder piston stroke monitoring.....	18
<b>5 Assembly</b> .....	<b>20</b>
5.1 Pre-assembly .....	20

5.2	Installing and connecting .....	20
5.3	General assembly notes .....	21
5.4	Fastening and connection .....	22
5.5	Clamping rings SRA, SRB, SRC.....	25
5.6	Pneumatic and hydraulic circuit diagram .....	27
<b>6</b>	<b>Operation .....</b>	<b>29</b>
<b>7</b>	<b>Maintenance and care .....</b>	<b>30</b>
<b>8</b>	<b>Storage.....</b>	<b>32</b>
<b>9</b>	<b>Trouble shooting.....</b>	<b>33</b>
<b>10</b>	<b>Parts lists .....</b>	<b>34</b>
<b>11</b>	<b>Assembly drawing .....</b>	<b>36</b>
11.1	NSP 140 .....	36
11.2	NSP-S 140 .....	37
<b>12</b>	<b>Manufacturer certificate.....</b>	<b>38</b>

# 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.

#### **CAUTION**

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**.

### 1.1.3 Design

This guide applies to the following sizes in all variants

#### Quick-Change Pallet System

- Size NSP 140
- Size NSP-S 140

## 1.2 Warranty

The warranty for standard products is 24 months from the date of delivery from the factory, or 500,000 cycles\* 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

- Quick-change pallet system in the version ordered
- Accessory kit
- Assembly and Operating Manual

### 1.3.1 Accessories

on separate order, see catalog or data sheets

- Clamping rings Types SRA, SRB, SRC

## 2 Basic safety notes

Improper handling, assembly and maintenance of this product may result in risk to persons and equipment if this operating manual is not observed.

### 2.1 Appropriate use

- This product is intended for positioning and clamping workpieces or clamping pallets on machine tools.
- The product may only be used within the scope of its technical data.
- The product is intended for industrial and commercial use.
- Appropriate use of the product includes compliance with all instructions in this manual.
- Clamping of pallets and workpieces with temperatures between 0°C and 100°C.

### 2.2 Inappropriate use

The product is not being used appropriately if:

- the product is used as a pressing tool, a toolholder, a load-handling device or as lifting equipment.
- the technical data specified are exceeded during usage.
- the clamping ring is not mounted properly.
- the product is used for turning applications over 100 RPM without consulting SCHUNK.
- the product is not fully covered by the pallet, the fixture or the workpiece.
- the product is brought into contact with aggressive media, especially acids.
- the product is used in abrasive blasting processes, especially sandblasting.

### 2.3 Structural 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.

- Only use original spare parts and spares authorized by SCHUNK.

## 2.5 Ambient conditions 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 in the service life of the product.

- Ensure that the product is only used within its technical data.
- Ensure that the product is of a sufficient size for the application.
- Ensure that the contact surfaces of the interface and recesses towards the locating surfaces above the mounting points are kept clean at all times. Prevent chips from entering the interface.
- Only use cooling emulsions with anti-corrosive additives when machining.

## 2.6 Material limitations

The product is made of steel alloys, elastomers and aluminum alloys. In addition, Branotect anti-rust oil and Renolit HLT2 are incorporated into the product as auxiliary and operating materials.

## 2.7 Personnel qualification

### Inadequate qualification of personnel

Any work on the product by inadequately qualified personnel can lead to serious injuries and considerable material damage.

- All work must be performed by appropriately qualified personnel.
- Personnel must have read and understood the complete manual before beginning any work on the product.
- Observe country-specific accident prevention regulations and the general safety notes.

The following personnel qualifications are required for the various activities on the product:

<b>Qualified electrician</b>	Qualified electricians have the professional training, knowledge, and experience to work on electrical systems, to recognize and avoid potential dangers, and know the relevant standards and regulations.
<b>Specialist personnel</b>	Specialist personnel have the specialized training, knowledge, and experience to perform the tasks entrusted to them, to recognize and avoid potential dangers, and know the relevant standards and regulations.
<b>Instructed person</b>	Instructed persons have been instructed by the operator regarding the tasks entrusted to them and the potential dangers of inappropriate behavior.
<b>Manufacturer's service personnel</b>	The manufacturer's service personnel have the specialized training, knowledge, and experience to perform the work entrusted to them and to recognize and avoid potential dangers.

## 2.8 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.

## 2.9 Transport

### Handling during transport

Incorrect handling during transport can make the product unsafe and risks the danger of serious injuries and considerable material damage.

- During transport and handling, secure the product to prevent it from falling.

## 2.10 Protection during handling and assembly

### Incorrect handling and assembly

Incorrect handling and assembly can make the product unsafe and can risk the danger of serious injuries and considerable material damage.

- All work must only be performed by appropriately qualified personnel.
- Secure the system against accidental operation during all work.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

## 2.11 Protection during commissioning and operation

### Falling or violently ejected components

Falling and ejected components can lead to serious injury or death.

- Take suitable protective measures to secure the danger zone.

### Manual loading

- If the clamping device is closed, the clamping pallet rests on the clamping slides after loading. When the clamping device is opened, the clamping pallet falls down. This poses a risk of crushing.

## 2.12 Notes on safe operation

### Incorrect manner of working by personnel

An incorrect manner of working can make the product unsafe and risks serious injuries and considerable material damage.

- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. Products for special ambient conditions are excluded here.
- Do not expose the product to any media that lead to swelling or corroding of seals.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention, and environmental protection regulations for the application field of the product.
- The machine spindle must not be started until the clamping pressure in the clamping device has built up.
- Unclamping may only occur once the machine spindle has come to a standstill.

## 2.13 Disposal

### Handling of disposal

Incorrect handling of disposal can make the product unsafe and lead to risks of environmental harm.

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

## 2.14 Fundamental dangers

### General

- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- Do not reach into the open mechanism or movement area of the product during operation.

## 2.15 Protection against dangerous movements

### Safe condition

Quick-change pallet system clamped and without energy.

### Unexpected movements

If the system still retains residual energy, serious injuries can be caused while working on the product.

- Establish a safe state, switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.

## 2.16 Notes on particular risks



### **⚠ WARNING**

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

- During operation, unintentional loosening of the clamping ring must be prevented by suitable countermeasures (implementation of the safety functions according to the risk assessment of the integrator).
- Wear personal protective equipment.



### **⚠ WARNING**

**Risk of injury during commissioning due to a falling unlocked device, pallet or workpiece.**

- During loading, check that the coupling elements, devices, pallets or workpieces are positioned so they are aligned to each other.
- Clamping pallets with torque pin must be fed to the module in the correct orientation before locking.



### **⚠ WARNING**

**Risk of injury when the clamping ring axis is in a horizontal position or during overhead applications due to the device or pallet falling down.**

- Use a crane or a transport truck when transporting workpieces or clamping pallets.
- During horizontal or overhead applications, the device or clamping pallet must be secured before loosening to prevent it from falling.



### **⚠ WARNING**

**The quick-change pallet 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 or failure of the power supply.**

- Wait for the system to come to a complete standstill in safe state.



### **⚠ CAUTION**

**Risk of injury due to contamination (e.g. coolant or splashing water) in the blow-out and air purge connections of the clamping module or in the change interface.**

- Clean the quick-change pallet system before loading.
- Wear personal protective equipment (safety goggles).

### 3 Technical data

Pull down force without turbo [kN]	7
Pull down force with turbo [kN]	45
Lifting weight [kg]	630
Minimum weight of the pallet [kg]	25
Lifting height [mm]	5.5
Max. actuating pressure [bar]	25
Repeat accuracy [bar]	< 0.005
Burst pressure [bar]	> 150
Unlocking pressure [bar]	> 12
Max. operating pressure [bar]	35
Module installation position	any
Clamping ring installation position	The installation position of the clamping ring must be matched to the module. The countersunk screws of the clamping ring must not lie on the module's supporting projections.
Operating temperature [°C]	+5 to +60
Noise emission [dB(A)]	≤ 70
Hydraulic operation	Hydraulic oil, filtered (10 µm), viscosity 46 mm/s at 40°C to 60°C, volumetric flow max. 9 l/min, ø5 mm (hose-free direct connection)
Compressed air	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]
Pneumatic dynamic pressure monitoring (only NSP)	<ul style="list-style-type: none"> <li>the clamping slide position CLAMPED (1x) 4 - 5 mm (hose-free direct connection)</li> <li>the clamping slide position RELEASED (1x) 4 - 5 mm (hose-free direct connection)</li> <li>the locating surface (3x) 4 - 5 mm (hose-free direct connection)</li> <li>the clamping ring monitoring WITHOUT clamping ring (1x) 4 - 5 mm (hose-free direct connection)</li> <li>with clamping ring (1x) 4 - 5 mm (hose-free direct connection)</li> </ul>
Central air purge	Cleaning (1x) 4 - 5 mm (hose-free direct connection)
IP rating	IP 67

Designation Variant	Lifting	Centering	Sensory (piston stroke measurement)	Dynamic pressure monitoring (clamping slide)	Dynamic pressure monitoring (clamping ring)
NSP 140				X	X
NSP 140-A	X			X	X
NSP 140-AZ	X	X		X	X
NSP-S 140			X		X
NSP-S 140-A	X		X		X
NSP-S 140-AZ	X	X	X		X

The actuating pressure for the turbo function must not exceed 25 bar.

### 3.1 Suitability for welding applications

The clamping device can be used for welding applications with a **welding current of up to 525 A**. The welding current is allowed to flow through the clamping device.

#### CAUTION

In welding applications, special care must be taken to ensure that the operating temperature of the clamping device is not exceeded due to heat conduction in the workpiece.

#### CAUTION

The contact surfaces of the workpiece and the clamping bolt must always be kept clean to ensure the best possible contact with the clamping device.

If the quick-change pallet system is to be used outside the specified welding currents, please contact your SCHUNK contact person.

## 4 Function

### NOTE

In order to achieve the maximum lifting force, the clamping system should be operated with an actuating pressure of 25 bar. If the actuating pressure falls below this value, the clamping system cannot be decoupled properly.

### 4.1 Clamping function

#### Unlocking

1. To unlock the clamping system, hydraulic pressure has to be supplied (actuating pressure 25 bar).
2. The positively driven cylinder piston is moved upwards by hydraulic pressure.
3. The return pins (item 5) connected by screws move into the clamping slides (item 2), which move inwards and release the clamping ring. Afterwards, the optional lifting pins (item 6) move upwards and lift the pallet.  
The clamping pins can be delivered as separate accessories in three versions (see ▶ 5.5 [📄 25]). The clamping rings are mounted on customized pallets or devices.
4. The pallet can be removed.

#### Locking

1. Before inserting a pallet, the clamping system has to be supplied with hydraulic pressure (actuating pressure 25 bar) so that the clamping slides retract and the system is in unlocked status.
2. The pallet can be inserted.
3. To lock the system, depressurize it.
4. The cylinder piston is guided downwards by spring force; first the locking process takes place in a fast stroke, then the power stroke is initiated. This leads to a very high pull down force.  
When the turbo connection is used, the spring-actuated locking procedure is actively supported with hydraulic pressure. If the turbo connection is not used, it must be possible to ventilate the relevant side of the piston.
5. The lifting pins lower and bring the pallet to the contact surface.
6. An air flow is generated on the bearing surface via blow-out bores. This way the clamping ring support is cleaned so that a clean flat surface is ensured.
7. The clamping slides move outwards and lock the clamping ring on the pallet in a self-locking form fit.  
The clamping rings are centered on the taper surface of the clamping module.

## 4.2 Lifting and centering function

The quick-change pallet modules NSP 140-A and -AZ have an optional lifting function (A) for lifting the pallets after opening or they have a centering and lifting function (AZ). With the lifting function, the clamping ring is automatically centered during locking and slowly lowered to the bearing surface. The lifting function is also provided to regulate the air control (see ▶ 4.3 [16]).

With the centering and lifting function, the fed pallet is pre-centered by a centering mandrel before the pallet is slowly brought to the bearing surface.

The base body (item 1) contains an axially movable lifting pin (item 6). The lifting pin is sealed with an O-ring (item 33) against the ingress of coolant, dust and chips. The lifting function is initiated and transmitted by the shoulder screw (item 10) which is connected to the cylinder piston (item 3). The lifting pin is located inside the clamping ring, so that the pallet is lifted directly at the lower base side of the pallet.

The maximum permissible lifting force per clamping module is limited (see Link Technische Daten). The permissible total weight of the device assembly to be lifted on a clamping module must not be exceeded. A higher weight can lead to tension when removing the pallet. A malfunction could result and damage the clamping system. The stroke range of the lifting pin is max. 5.5 mm.

In locked status, the lifting pin is lowered by 0.1 mm. The lifting pin is lowered without the need for force to be applied, therefore no minimum contact weight of the clamping pallet is required.

## 4.3 Dynamic pressure monitoring and blow-out function for cleaning the flat surface

The quick-change pallet module NSP features dynamic pressure monitoring. Channel holes are located on each of the four raised clamping ring locating surfaces of the clamping system in order to monitor the dynamic pressure. It is therefore possible, for example, to monitor the volumetric flow on the bearing surface of the quick-change pallet module using an electronic flow meter. When unlocking or locking the clamping module, differential volumetric flows prevail on the bearing surface, achieved by the integrated lifting function. In addition, the air control air bores provide a blow-out function to clean the flat surface (see ▶ 4.1 [15]). A further blow-out function is used to clean the taper of the clamping ring.

When using this control and cleaning function, it must be ensured that the clamping ring is in the right position orientation. The cylinder head countersinks of the clamping ring must not be positioned on the air outlet holes of the clamping module, since otherwise the blast air will escape and it will not be possible to achieve a measurable difference in volumetric flow.

**Variant 1**

**The measurable differential pressure must reach a minimum of 1 bar for assessment via the air gap sensor to be reliable. The maximum pressure is 2 bar and 15 l/min volumetric flow. Monitoring requires a pressure gauge, an adjustable throttle and an air gap sensor.**

**Variant 2**

**The measurable volumetric flow must not exceed 0.6 l/min in order to allow an enabling signal to be sent to the control system. At this volumetric flow, the maximum distance between the NSP and clamping ring is <0.03 mm.**

The measurable differential pressure must reach a minimum of 1 bar for assessment via the air gap sensor to be reliable. The maximum pressure is 2 bar and 15 l/min volumetric flow.

Monitoring requires a pressure gauge, an adjustable throttle and an air gap sensor.

The clamping modules of a clamping station can be connected in parallel and monitored via a pressure switch.

The air connection is made the standard way via the coupling bore on the lower face side of the quick-change pallet module. For information on sealing the air connection, please refer to ▶ 5.4 [□ 22]. Use of the air control function is not mandatory for the basic operation of the clamping module.

**4.4 Dynamic pressure monitoring at the clamping slides**

The quick-change pallet module NSP 140 features dynamic pressure monitoring on the clamping slides.

It is therefore possible, for example, to monitor the dynamic pressure on the clamping slides of the quick-change pallet module using an electronic pressure switch. This means the slide position can be monitored electronically in order to ensure that the clamping slides are in an unlocked position. This way, the clamping system can be protected from any possible damage.

**The measurable differential pressure must reach a minimum of 1 bar for assessment via the air gap sensor to be reliable. The maximum pressure is 2 bar and 15 l/min volumetric flow.**

Monitoring requires a pressure gauge, an adjustable throttle and an air gap sensor.

The air connection is made the standard way via the coupling bore on the lower face side of the quick-change pallet module. For information on sealing the air connection, please refer to chapter "Fastening and connection" ▶ 5.4 [□ 22]. Use of the dynamic pressure monitoring function is not mandatory for the basic operation of the clamping module.

For slide monitoring for "Module opened", the clamping modules of a clamping station (connected in parallel) can be monitored via a pressure switch. For slide monitoring for "Module clamped", the clamping slides must be monitored individually via their own pressure switch.

## 4.5 Electrical cylinder piston stroke monitoring

The quick-change pallet system NSP-S 140 features electrical cylinder piston stroke monitoring.

Here, the cylinder piston stroke is monitored via a magneto-inductive sensor.

A magnet is fixed in the cylinder piston. The movement of the magnet causes a change of the magnetic flux in the sensor element, which is detected by the sensor coil.

The sensor provides a physical output voltage of 2 – 10 V. The supply voltage is 11.5 – 30 VDC.

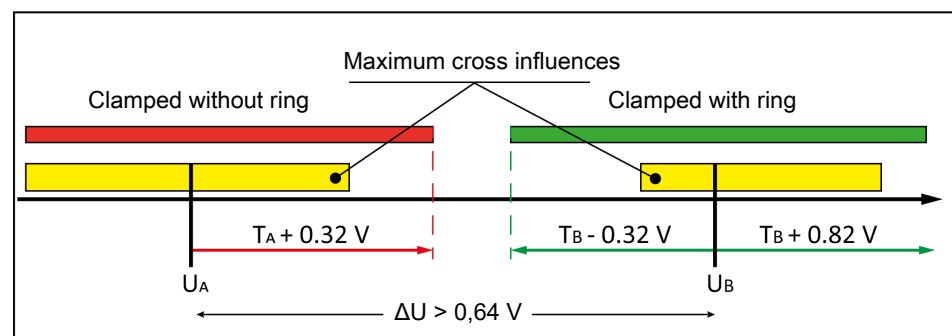
The signals are transmitted via spring contact pins in the module and via rigid contacts in the counterpart (machine table), ▶ 5.4 [22].

The sensor signal is influenced by several cross influences. Therefore it is necessary to include a tolerance range to the voltage values per module.

For the voltage value  $U_A$  "clamped without clamping ring" clamping position closed, a tolerance range of  $T_A + 0.32$  V must be taken into account.

For the voltage value  $U_B$  "clamped with clamping ring and turbo" a tolerance range of  $T_B - 0.32$  V and  $T_B + 0.82$  V must be taken into account.

The voltage value "clamped with clamping ring without turbo" cannot be monitored in addition to the voltage value  $U_B$  "clamped with clamping ring and turbo". There may be voltage overlaps between the two clamping positions. If this voltage value "clamped with clamping ring without turbo" is to be used as the release value, the tolerance  $T_B$  must be subtracted as the exact limit value.



### CAUTION

After installation, the voltage values  $U_A$  and  $U_B$  must be measured for each module and for each pallet. This also applies after each exchange or modification of the clamping modules or the pallet.

### Calibration of the NSP-S 140 by the customer

Connect the measuring instrument to the electrical interface and read the voltage value from the various clamping positions.

Clamping positions:

- Open module --> Apply opening pressure 12 -25 bar and read the voltage value on the measuring device.
- Clamped module without clamping ring and without turbo  $U_A$  --> depressurized, clamped via spring. Read the voltage value.
- Clamped module with clamping ring (pallet) and without turbo --> spring-loaded clamping ring inserted. Read the voltage value.
- Clamped module with clamping ring and with 25 bar turbo  $U_B$  --> clamping ring inserted and actuated with 25 bar hydraulic pressure (turbo). Read the voltage value.

The voltage values are used to determine the clamping position of the module. The tolerance values must be added or subtracted to these voltage values.

Example:

$U_A$  --> clamped without clamping ring:  $2.096 \text{ V} + T_A (0.32 \text{ V}) = 2.416 \text{ V}$

$U_B$  --> clamped with clamping ring and 25 bar turbo  $2.898 \text{ V} - T_B (0.32 \text{ V}) = 2.578 \text{ V}$

The exact limit value can be assumed to be 2.58 V.

The voltage value for the clamping position "Open module" is between 9 ..... 10 V.

## 5 Assembly

### 5.1 Pre-assembly

Request our installation drawings if doing the installation yourself.

### 5.2 Installing and connecting

Lift the quick-change pallet system carefully (e.g. using suitable lifting equipment) out of the packaging.

Check that the delivery is complete and that there is no transport damage.

Assembly, dismantling and modification work on the quick-change pallet system may only be carried out by specialist personnel.



#### **⚠ 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 dropping the quick-change pallet system during transport**

- Transport with care.  
Use a crane and/or a trolley for transporting the system.



#### **⚠ CAUTION**

##### **Danger of injury due to sharp edges and rough or slippery surfaces**

- Wear personal protective equipment, particularly protective gloves.



#### **⚠ CAUTION**

##### **Risk of injury due to crushing.**

- Install the quick-change pallet system carefully.
- Do not place any limbs into the gaps or between the clamping station and the machine.
- Wear protective gloves.

1. Check the flatness of the mounting surface, ▶ 5.4 [22].

2. Screw the module with the O-rings inserted onto the clamping station.

⇒ Observe permissible tightening torques for the mounting screws and the strength class, ▶ 5.5 [26].

3. Connect module, ▶ 5.4 [ 22].
  - ⇒ via the hose-free direct connection in the base of the quick-change pallet system.
4. If necessary, connect the monitoring functions.

### 5.3 General assembly notes

If several linked clamping units are mounted, make sure that the flatness and height deviation of the locating surfaces from module to module (based on a gauge of 200 mm) lie within 0.01 mm. The interface position deviation must not exceed  $\pm 0.015$  mm.

Due to redundancy, the clamping rings with positioning accuracy in one direction (SRB) should be used for clamping systems that are more than 160 mm apart or that do not show a positioning tolerance of  $\pm 0.015$  mm. For the clamping areas that are not intended for alignment of the device or pallet, clamping rings with centering clearance (SRC) can be used ▶ 5.5 [ 25].

#### NOTE

When connecting the quick-change pallet systems, ensure that it is only possible to completely bleed the piston chambers via the air bleed screws (item 24) during the locking process and opening process. The relevant valves or shut-off cocks should therefore be equipped with load relief. This also applies to the turbo connection. If the turbo connection is not used, it must be possible to ventilate the relevant side of the piston.

When disconnecting, the relevant openings must be secured with center plugs to prevent ingress of dirt or coolant. If several units are activated via shared lines, feed lines with the following minimum cross-sections must be used.

Number of modules	min. nominal hose width
1	5 mm
2, 3	8 mm
4	10 mm

For bleeding the piston chamber "Clamping with turbo", the four air bleed screws (item 24) located on the upper side must be loosened by two turns. The piston chamber must be pressurized until hydraulic fluid emerges at the four air bleed screws. Close the four air bleed screws again under pressure.

In order to bleed the piston chamber "Open", the air bleed screw (item 24) on the side of the module must be loosened by two turns. Then pressurize the piston chamber until hydraulic fluid emerges at the air bleed screw. Close the air bleed screw again under pressure.

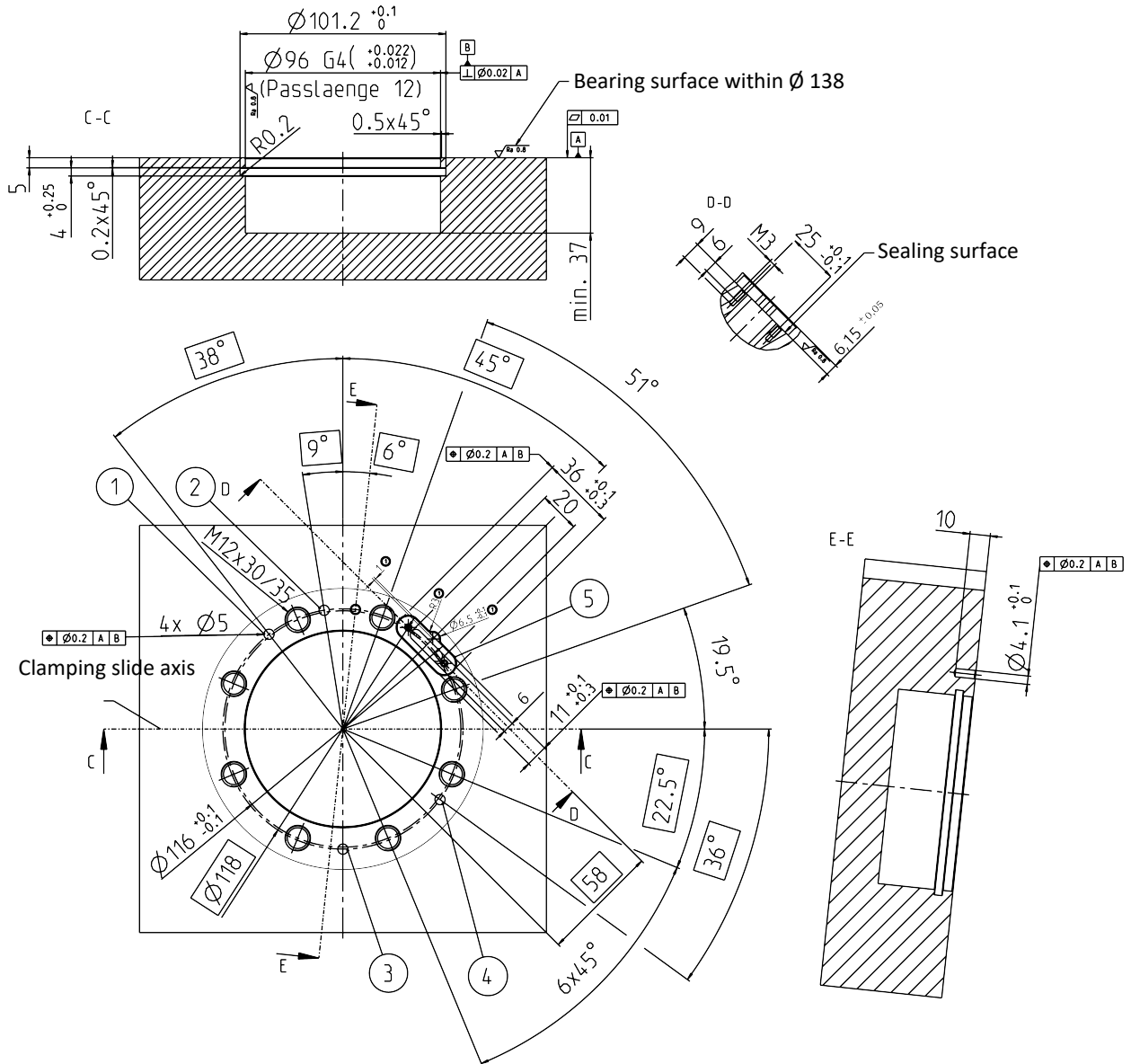
The hydraulic pressure for bleeding is to be selected significantly lower than the max. clamping pressure.

**Disassembling and assembling the quick-change pallet system**

The quick-change pallet system must be disassembled and assembled by specially trained personnel using special tools as well as special instructions. For more information, see ▶ 7 [ 30].

**5.4 Fastening and connection**

**Request our installation drawings when installing the modules yourself.**



Detail D-D does not apply for variant NSP 140.

- 1 Hose-free direct connection for OPEN module

---

- 2 Hose-free direct connection for turbo function

---

- 3 Hose-free direct connection for air control of the clamping rings blast air

---

- 4 Hose-free direct connection for blast air

---

- 5 Electrical transfer for piston position

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The NSP 140 is fastened in the installation space with 8 screws M12 (item 20) of strength class 12.9. The clamping module is sealed via an O-ring (item 45 in the accessory kit) in the bore hole of the module mount.

The built-in clamping module is positioned via the centering diameter of the installation space:  $\varnothing$  96H6. With the NSP-S 140, a pin (item 25) is additionally used. This secures rotation of the module in relation to the plate or table. The pin also serves as positional orientation for the electrical transfer on the NSP-S 140.

All base-side air connection openings for "Open module" and the turbo function are sealed with set-screws (item 26) on delivery.

As standard, the hydraulic and air connections are established via the coupling bore on the lower face side of the quick-change pallet module. For axial sealing, the O-rings (item 30) must be inserted in the base-side O-ring seats of the clamping module.

The accessory kit of the NSP 140 contains the O-rings (item 30) for sealing the hose-free direct connections on the base side.

When the turbo connection is used, the spring-actuated locking procedure is actively supported with hydraulic pressure. If the turbo connection is not used, it must be connected to ensure that the oil is returned.

Request our installation drawings if performing the installation yourself.

The NSP 140 features dynamic pressure monitoring of the clamping ring and contact monitoring via dynamic pressure monitoring of the clamping slides. Via two separate air connections, the clamping slide position can be monitored in "OPENED" and/or "CLOSED" status alternately.

The monitoring functions can be monitored via an electronic pressure switch. A pressure switch signals to the operator or the machine which position the clamping slides are in or if the clamping pallet is completely flush and locked.

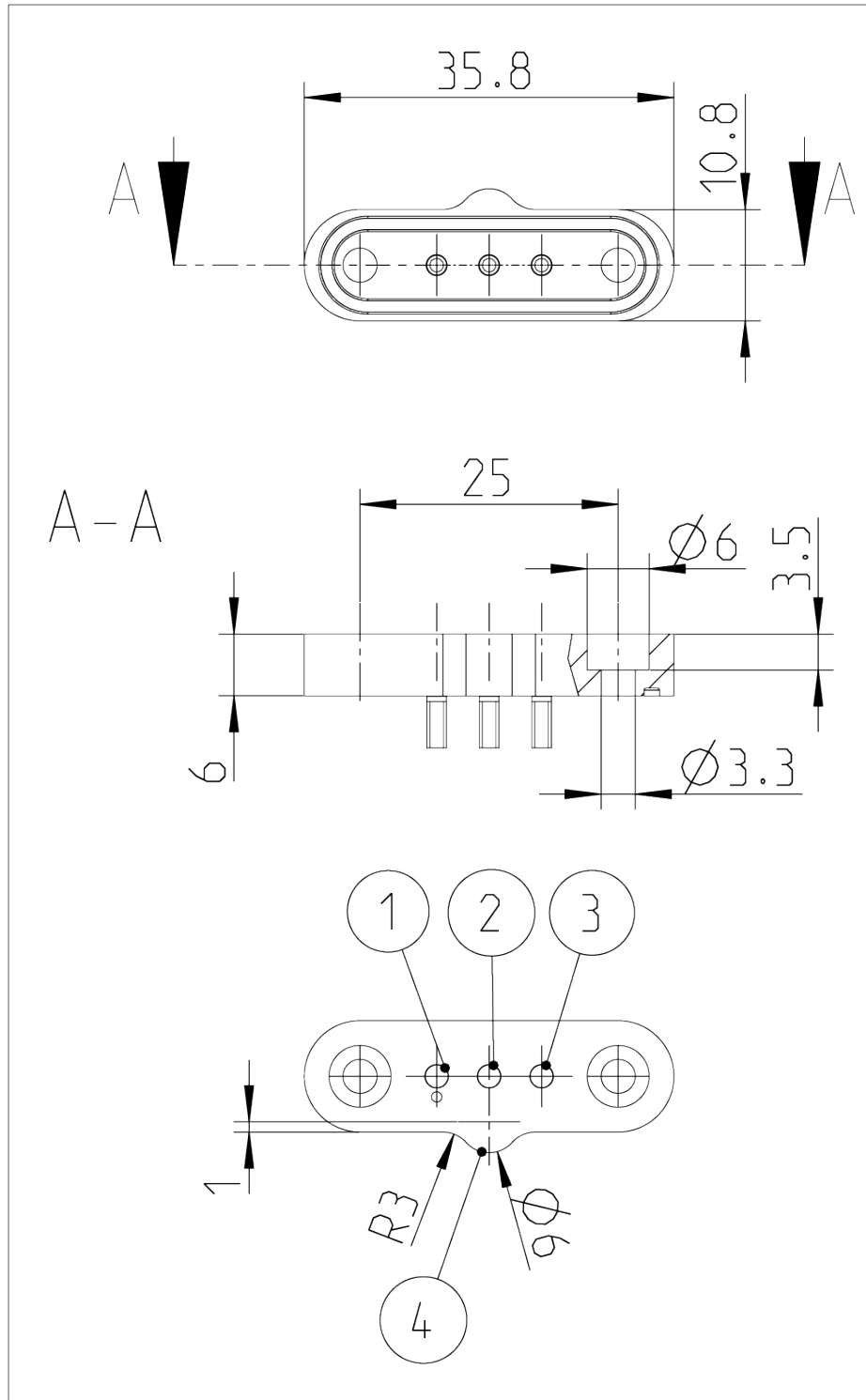
The air connection for the monitoring functions is done the standard way via the coupling hose on the lower face side of the quick-change pallet module.

Remove the set-screw (item 26) to make this connection. For axial sealing, the O-rings (item 30) must be inserted in the base-side O-ring seats of the clamping module.

The accessory kit contains the O-rings (item 30) for sealing the air connection. The O-rings must be fitted even when contact monitoring is not used.

### **Mounting the electrical transfer for the NSP-S 140**

The electrical transfer (item 55) for the NSP-S 140 must be screwed into the plate or table with two screws (item 43). A seal (item 46) must be inserted to seal the groove below the transfer (item 55).



Wiring diagram for the NSP 140 electrical transfer

Pin	Color	Description
1	brown	Supply voltage 11.5 V ... 30 V
2	white	Ground GND
3	green	Output signal 2 V ... 10 V
4		Increase points away from the module

The maximum cable length is 3 m.

In order to minimize electrical interference, it is recommended the shield winding be connected to the machine housing.

## 5.5 Clamping rings SRA, SRB, SRC

### Clamping rings

The clamping rings SRA, SRB and SRC of the NSP are fastened in the installation space with 12 screws M10 of strength class 12.9. Two M12 forcing threads are provided on the clamping ring to facilitate removal.

If the turbo connection is not used, it must be connected to ensure that the oil is returned.

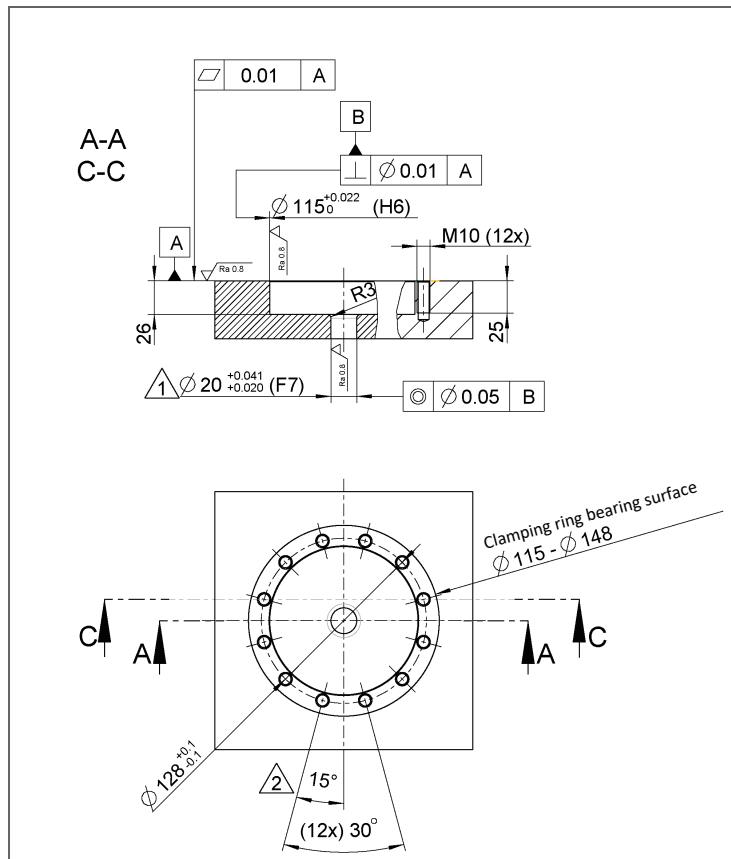
If several linked clamping units are mounted on a pallet, make sure that the flatness and height deviation of the locating surfaces of all of the locating holes lie within the permissible tolerance range of  $\pm 0.01$  mm. Otherwise, the optimum clamping and repeat accuracy of the quick-change pallet system cannot be guaranteed.

When aligning the clamping rings to the clamping module, it must be ensured that the flat surface between the cylinder head countersinks is resting on the locating points of the clamping module.

When using the air control function [▶ 4.3 \[16\]](#), it must be ensured that the clamping rings are in the right position orientation. The air outlet openings on the raised locating surfaces of the clamping module must be completely covered by the flat surface of the clamping ring. The cylinder head countersinks of the clamping ring must therefore not be orientated towards the air outlet holes.

Request our installation drawings of the clamping rings if doing the installation yourself.

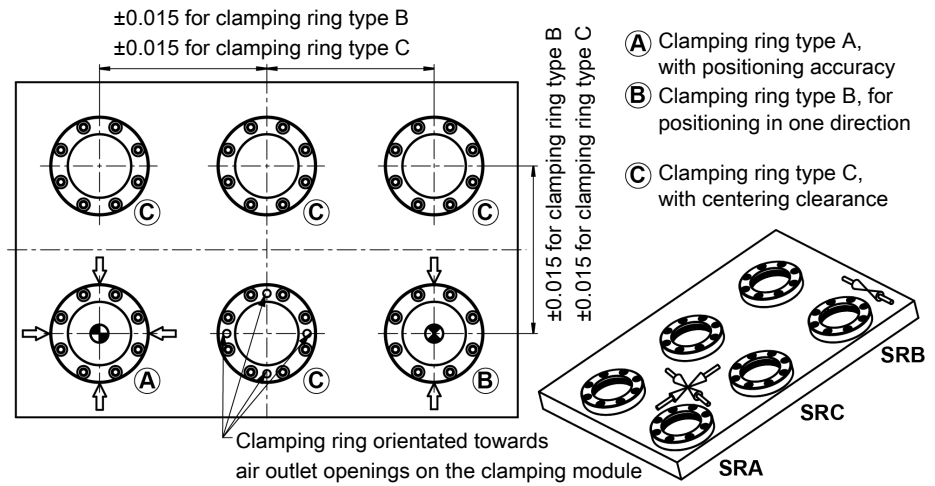
### Installation recommendation for the clamping rings



**Tightening torques for fastening all screws of the clamping rings and modules (Screw quality 12.9)**

Screw size	M3	M5	M6	M8	M10	M12	M14	M16
Tightening torques (Nm)	2.4	9	15	32	62	108	170	262

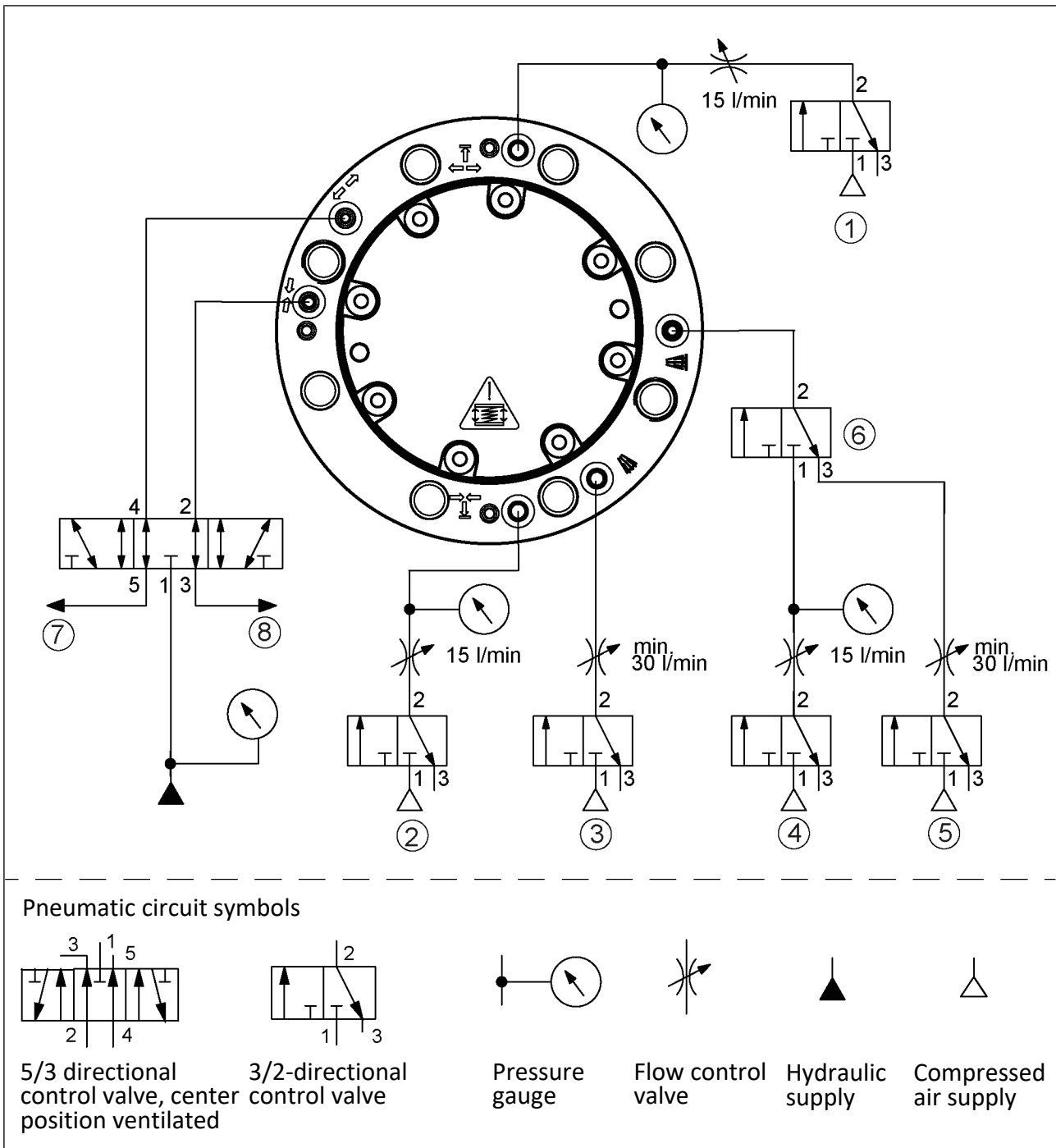
**Use / arrangement of the different types of clamping rings (Workpiece: pallet with 6 clamping areas)**



**Tightening torques for fastening the screw item 22 ▶ 11 [ 36] (Screw quality 10.9)**

Screw size	M5	M6
Tightening torques (Nm)	7	12

### 5.6 Pneumatic and hydraulic circuit diagram



Circuit diagram, pneumatic and hydraulic

Item	Description
1	For control function, 2 bar, clamping slide - opened -
2	For control function, 2 bar, clamping slide - clamping -
3	Cleaning air, min. 2 bar, - taper -
4	Dynamic pressure monitoring, 2 bar, - clamping ring -
5	Cleaning air, min. 2 bar, - clamping ring support -
6	Switching position (4) dynamic pressure monitoring or (5) cleaning air - clamping ring support -
7	Return flow tank open, hydraulic
8	Return flow tank close, hydraulic

**When actuating the quick-change pallet systems NSP 140, the following must be observed:**

**Turbo function:**

- The actuating pressure for the turbo function must not exceed 25 bar.

**Slide monitoring:**

- The max. pressure of the slide monitoring is 2 bar.
- Limit volumetric flow to 15 l/min.
- Pressure difference upon failure of a module min. 1 bar.
- If the slide monitoring (control function) of several standard NSP 140 modules is connected in series, only the evaluation of the OPENED position works (dynamic pressure = all modules opened).
- The NSP-S 140 has no control function.

In order to guarantee reliable evaluation, the pressure and air volume must be held constant. Pressure fluctuations can affect the settings of the pressure switch and lead to incorrect measurement results. The length and cross-section of lines can affect the switching time of the control components. It may be necessary to readjust the control components. Check the control components of the monitoring functions at regular intervals. If errors occur in the monitoring control system, you must detect the cause of these.

## 6 Operation



### ⚠ WARNING

**Risk of injury due to losing pallets or workpieces in the case of incorrect actuation caused by incorrect operation**

- Disconnect the energy supply after locking.
- Use check valves or safety switches.
- The danger zone must be surrounded by a protective enclosure during operation.



### ⚠ WARNING

**Risk of injury due to falling parts during transport of the quick-change pallet system, when the axis of the clamping ring is in a horizontal position, or in the case of overhead application**

- Use a crane for transportation.
- In the case of overhead application, or if the system is in a horizontal position, secure the pallets or workpieces so that they do not fall when releasing the clamping modules.



### ⚠ WARNING

**Risk of injury due to losing pallets or workpieces if the hydraulic supply drops or fails, and due to the clamping rings immediately closing**

- Do not reach into the clamping modules.
- Use pressure maintenance valves.
- Use loading devices.



### ⚠ CAUTION

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

- Do not reach into the clamping ring receptacle.
- Work with the smallest possible clamping and opening strokes.
- Use loading devices.
- Wear protective gloves.

## 7 Maintenance and care

The quick-change pallet system is designed for low-maintenance operation so that opening and disassembling the clamping modules is only necessary in exceptional cases.

The service life of the clamping system depends on the number of clamping cycles and the operating conditions.

The pull down force must be measured after every 3000 operating hours. If the pull down force is less than 36 kN, the actuating piston must be greased as described below. If the pull down force remains below 36 kN after greasing, the module is due for a complete service.

A maintenance interval must be carried out after every 50,000 clamping cycles. This involves greasing the actuating piston (item 11). To lubricate, the module must be in the open clamping position (clamping slide inside). Remove the ventilation set-screw (item 48 step 1) and fill the special grease LINOMAX plus with the grease gun via the lubrication nipple (item 47 step 2) until the grease oozes out of the ventilation hole. Thereafter actuate (close and open) the module several times (3-5 times); this will push the excess grease out of the ventilation hole. Remove the excess grease.

Then close the ventilation hole with the ventilation set-screw (item 48 step 3).

After every disassembly operation, each quick-change pallet system must be ventilated.

The clamping rings must be inspected for wear in the area of the clamping slides (item 2). In case of heavy wear or after 100,000 clamping cycles, the clamping ring must be replaced or turned 30°. To do this, the fastening screws must be loosened and the clamping ring turned 30°. Tighten the fastening screws to the specified torque after turning the clamping ring.

After every 250,000 clamping cycles, all visible wear parts must be inspected visually and the system must be checked for leakage.

To replace wearing parts, the quick-change pallet system must be removed from the machine and disassembled, the wearing parts exchanged and the machine reassembled by appropriately trained personnel using special tools (calibration rings, calibration mandrels, etc.).

After every disassembly operation, each quick-change pallet system must be ventilated.

Only genuine SCHUNK spare parts may be used.



## ⚠ CAUTION

**Risk of injury to persons and risk of damage to the clamping module when opening the cover.**

**If the clamping module has to be disassembled, ship the module to SCHUNK for repair.**

**The covers of the clamping modules are spring pre-loaded and must only be removed by trained specialist personnel.**

**To ensure the quick-change pallet system operates perfectly, the following instructions are to be observed:**

Pressure medium: hydraulic oil, filtered (10 µm), viscosity 46 mm<sup>2</sup>/s at 40°C to 60°C, volumetric flow max. 9 l/min and Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4].

- Make sure that the contact surfaces of the interface are always clean.
- Always ensure that no chips of any kind enter the interface.
- When machining, only use high-quality coolant emulsions with anti-rust additives, as they are prescribed for use on machining centers anyway.
- Check the units at regular intervals (at least every two weeks or after 1000 clampings). The system is functioning correctly if the clamping slides and the lifting pins move smoothly at minimum system pressure (12 bar).
- Carry out regular visual/functional checks. In case of visible damage or signs of malfunction, shut down the quick-change pallet system immediately. The system may only be commissioned again once the faults have been removed. For example, by replacing the damaged unit.
- If a used module is exchanged for a new module, additional clamping rings in mint condition must be used.

## 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 Trouble shooting

### The clamping area does not unlock

Possible cause	Solution(s)
Defective hydraulic connections	Check the hydraulic connections
Pressure below minimum	Check the actuating pressure (at least 12 bar)
A component is broken (e.g. due to overloading)	Replace the module or send it to SCHUNK for repair
Excess tensile load on clamping ring	Reduce the tensile force/contact weight.

### The clamping area does not unlock perfectly

Possible cause	Solution(s)
Pressure below minimum	Check the actuating pressure (at least 12 bar)
Pipe diameter below minimum	for required pipe diameters, see chapter "General assembly notes"
The turbo connection is still pressurized	Ventilate the connection

### The quick-change pallet system no longer opens quietly

Possible cause	Solution(s)
The clamping faces on the clamping slides and on the clamping ring are dirty	Remove the clamping ring and clean the clamping faces on the clamping slides and on the clamping ring. In case of heavy wear, turn the clamping ring.

## 10 Parts lists

**NSP 140** (ID number 1357113)

**NSP 140-A** (ID number 1388296)

**NSP 140-AZ** (ID number 1388297)

**NSP-S 140** (ID number 1357114)

**NSP-S 140-A** (ID number 1388298)

**NSP-S 140-AZ** (ID number 1388299)

Item	Designation	Quantity	Note
1	Body	1	
2	Clamping slide	1	
3	Cylinder piston	1	
4	Cover	1	
5	Return pin	2	
6	Lifting pin	1	A
7	Lifting pin with centering	1	Z
8	Cover plate with lifting function	1	A / Z
9	Cover plate without lifting function	1	
10	Shoulder screw	1	V
11	Actuating piston	1	V
12	Guide bushing	1	S
13	Protective cover	1	S
14	Clamping slide	1	
20	Screw	8	X
21	Screw	2	
22	Screw	8	
23	Screw	2	
24	Screw	5	
25	Pin	2	
26	Set-screw	6	
27	Expander	9	
28	Expander	7	
29	Overpressure valve	1	
30	O-ring	6	S / V / X
	O-ring	8	V / X
31	O-ring	5	V
32	O-ring	1	V

Item	Designation	Quantity	Note
33	O-ring	1	A / V / Z
34	O-ring	2	V
35	O-ring	2	V
36	O-ring	2	V
37	Screw	2	S / V
38	Copper sealing ring	5	V
39	TURCON-GLYD-ring	1	V
40	TURCON stepseal	1	V
41	Set-screw	1	
42	Screw plug	6	
	Screw	2	S / X
43	Cover cap	8	X
44	O-ring	1	S / V / X
45	O-ring	1	V / X
46	O-ring	1	S / V / X
47	Lubrication nipple	1	
48	Set-screw	1	V
49	Set-screw	4	S
50	Spring	4	
51	Ring	1	S
52	Magnet	1	S
53	Sensor	1	S
54	Transfer module	1	S
55	Transfer Table	1	S / X
66	Screw plug	4	S / X

#### Parts list key

A	with lifting	V	Wear part
S	for NSP-S	X	Included in the accessory kit
Z	with centering		

**Clamping ring SRA** (ID number 1357126)

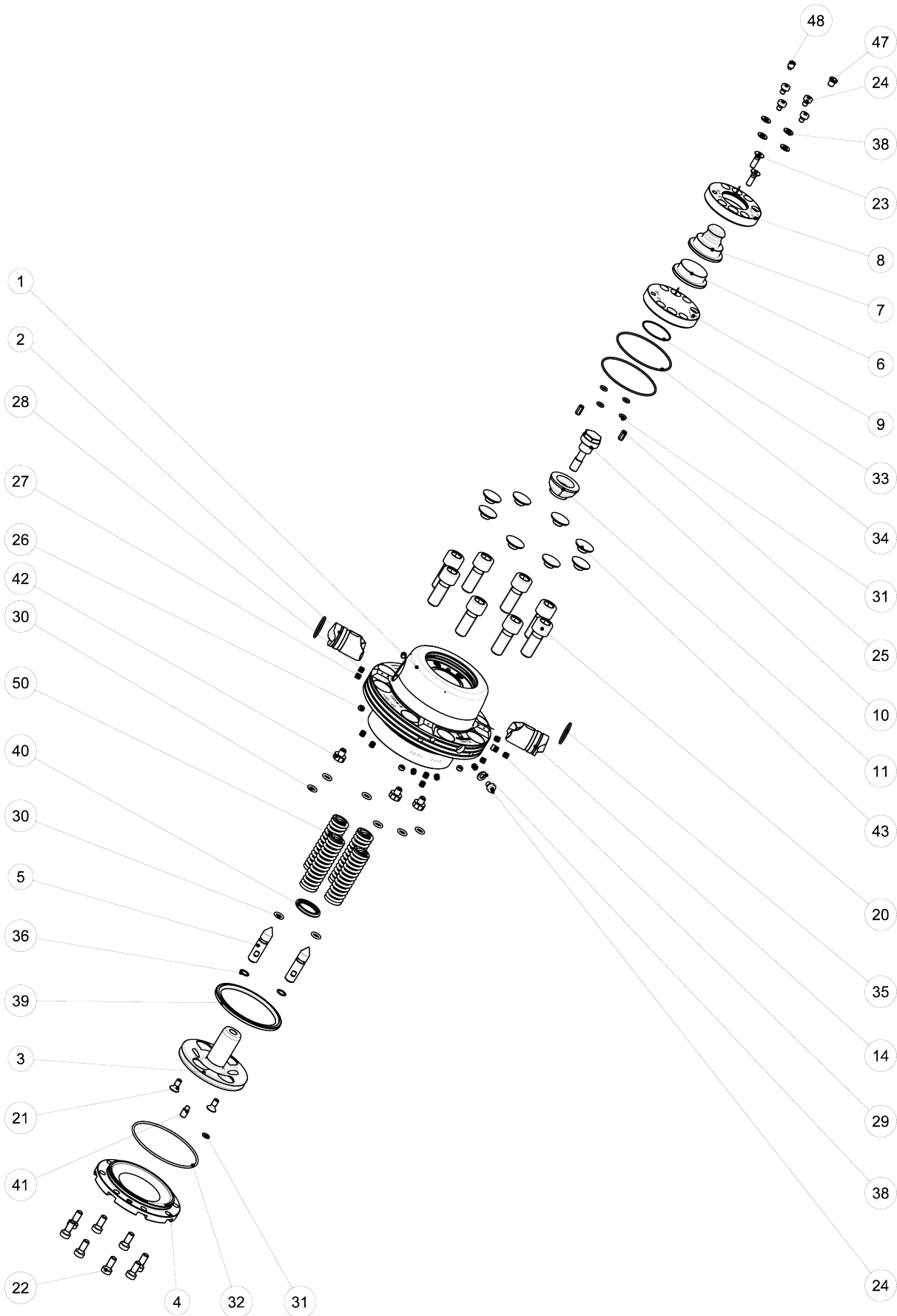
**Clamping ring SRB** (ID number 1357127)

**Clamping ring SRC** (ID number 1357128)

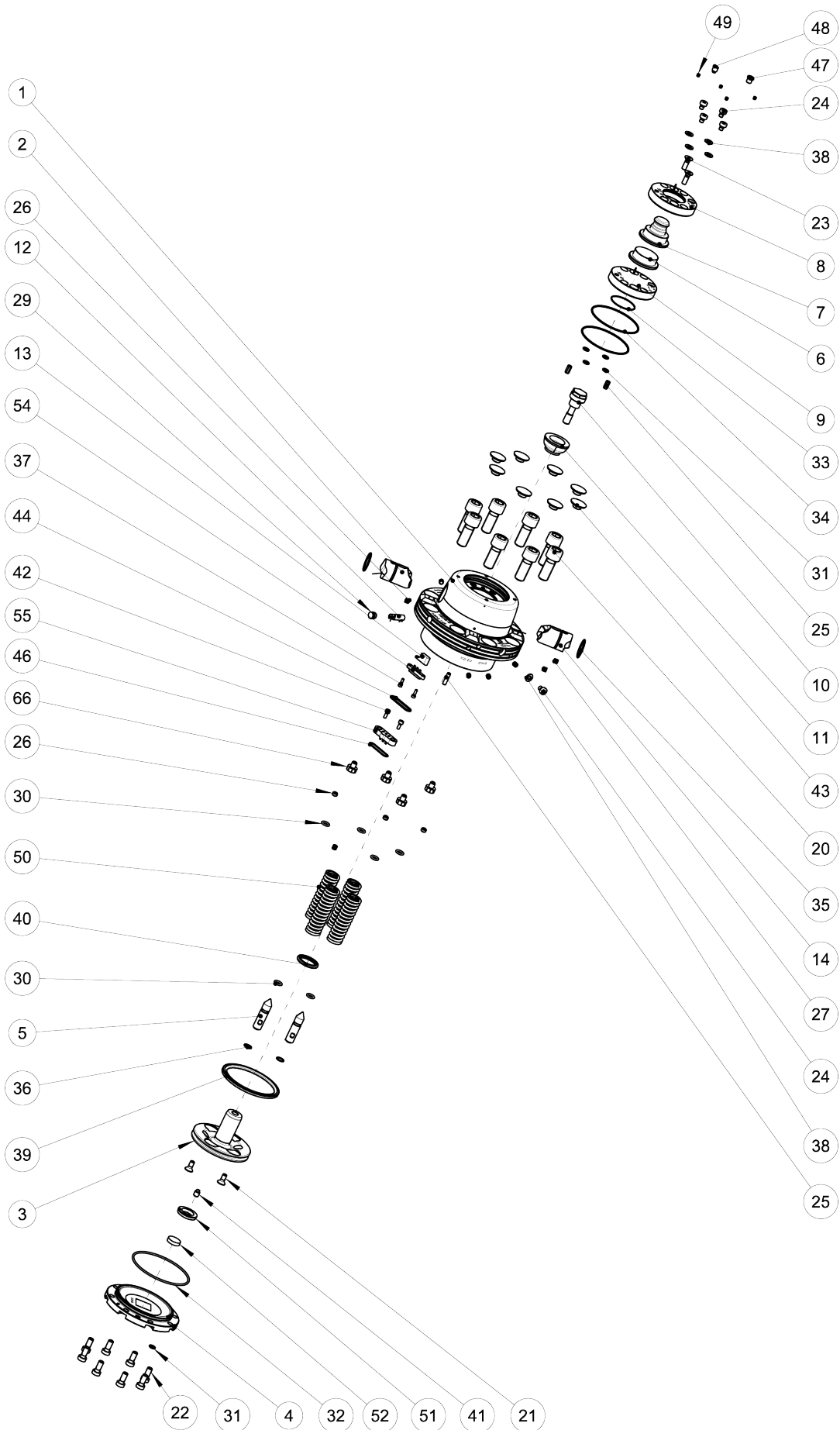
Item	Designation	Quantity
1	Clamping ring	1
2	Screw	12

# 11 Assembly drawing

## 11.1 NSP 140



### 11.2 NSP-S 140



## 12 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:	NSP, AM, NSE3-H

**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*

*Signature: see original declaration*

p.p. Philipp Schröder  
Head of Development standard products

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





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