



Quick-change pallet system

VERO-S NSE-S3 138 IOL

Assembly and Operating Manual

Translation of Original Operating
Manual

Hand in hand for tomorrow

Imprint

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Technical changes:

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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.

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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 *
- Installation drawing
- Software manual *
- IO-Link Device Description (IODD) *

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 ▶ 3.1 [13]

Quick-Change Pallet System

- Size NSE-S3 138 IOL

Cone seal

- KVS 40

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

- Quick-change pallet system in the version ordered
- Accessory kit

1.4 Accessories

(see catalog or data sheets when ordering separately)

- Clamping pins (in particular SPA 40, SPB 40, SPC 40)
- Plug (conversion)
- Cone seal KVS 40 (retrofitting)
- Air bleed screw for monitoring face contact to KVS 40
- Weaker pressure spring for cone seal
- Monitoring systems
- Protection cover SDE
- Indexing pins IXB V1
- Rigid-contact interface

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 and the compatible add-on components are intended for positioning and clamping workpieces or clamping pallets on machine tools or other suitable technical devices.
- 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 5°C and 60°C, with clamping devices for higher temperatures (pneumatically HT variant) up to 200°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.
- Ambient conditions and parameters are out of the defined range during use.
- the clamping pin or 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.
- if the product is operated with a firmware other than the specified and approved firmware or with a modified firmware.

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 and cooling emulsion from filling the interface.
- Only use cooling emulsions with anti-corrosive additives when machining.
- When using the cone seal, protect it from direct high-pressure spraying with cooling emulsion.

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:

Qualified electrician	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.
Specialist personnel	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.
Instructed person	Instructed persons have been instructed by the operator regarding the tasks entrusted to them and the potential dangers of inappropriate behavior.
Manufacturer's service personnel	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 with or without clamping pin, 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 pin or clamping ring is loosened erroneously or as a result of negligence.

- During operation, unintentional loosening of the clamping pin or 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.
- For modules with media transfer units, ensure the loading weight on the change interface is sufficient to ensure the surface of the interface is level with the module.



⚠ WARNING

Risk of injury when the clamping pin or 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.
- Do not reach into the clamping module.



⚠ WARNING

Risk of injury due to hot surfaces!

Touching hot surfaces can cause burns.

- Before carrying out any work on the product, make sure that all surfaces have cooled down to the ambient temperature.
- Wear suitable protective equipment, especially protective gloves.



⚠ WARNING

Risk of injury in the case of workpiece loss due to component failure on the product as a result of exceeding the technical data.

- The product may only be operated within the scope of its technical data.



⚠ 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).



⚠ CAUTION

Risk of injury from pressurized media transfer unit interfaces. The actuated clamping device on top of these may move unexpectedly as a result.

- Do not control the media transfer units until the device is clamped on the quick-change pallet systems.
- Take suitable protective measures to secure the danger zone.

3 Product description

3.1 Description of design and variant

Clamping module / Variant	Basic Version	Torque pin V1	Cone seal
NSE-S3 138 IOL	X	-	-
NSE-S3 138-V1 IOL	-	X	-
NSE-S3 138-K IOL	-	-	X
NSE-S3 138-V1-K IOL	-	X	X

3.2 Technical data

Actuating pressure [bar]	6
Supply voltage [VDC]	24
Current consumption [mA]	50
Repeat accuracy [mm]	< 0.005
Pull-in stroke [mm]	max. 0.9
Loading weight for versions with cone seal [kg]	min. 3.2
Loading weight for cone seal when using a weaker compression spring (optionally available) [kg]	min. 2
Installation position	any
Operating temperature [°C]	+5 to +60
Storage temperature [°C]	-20 to +80
Required level of cleanliness	dry cleaned interfaces, not permanently exposed to humidity, use with coolant with corrosion protection additive
Noise emission [dB(A)]	≤ 70
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]
Protection class	IP 67

Designation Variant	ID	Holding force* (M10 / M12 / M16) [kN]	Pull down force without turbo [kN]	Pull down force with turbo [kN]
NSE-S3 138 IOL	1514230	35 / 50 / 75	8	28
NSE-S3 138-V1 IOL	1514231	35 / 50 / 75	8	28
NSE-S3 138-K IOL	1545576	35 / 50 / 75	8	28
NSE-S3 138-V1-K IOL	1545577	35 / 50 / 75	8	28

* Holding force when fastening the clamping pin with cylindrical screw – DIN EN ISO 4762/12.9

The actuating pressure for the turbo function must not exceed 6 bar.

A separate maintenance unit must be used for the air supply. The quick-change pallet system is designed for operation with dry compressed air. If oiled compressed air is used for operation, this must be done every time. For an air volume of 1000 liters, the compressed air should be prepared with 1 to 2 drops of oil.

Functions of the quick-change pallet system

Type designation	Function	Type / Connection
All variants with cone seal ▶ 3 [13]	Central exhaust function	Blow-out of change interface, air supply via direct connection with O-ring or screw-in union M7

3.2.1 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 Assembly



⚠ WARNING

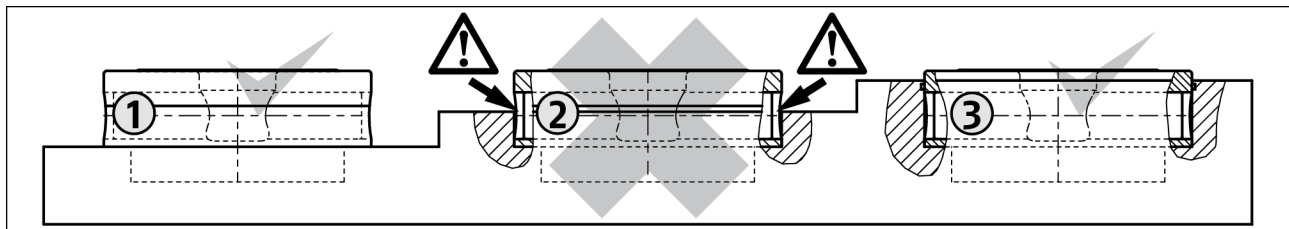
Risk of crushing due to the product approaching the machine table during assembly

- Do not reach between the product and the machine table during assembly

4.1 Pre-assembly

Request our installation drawings if installing the module in the customer's clamping stations yourself.

The installation position must be observed when performing the installation yourself.



1 Partial installation

2 Do not use

3 Full installation

CAUTION

With installation location 2, the clamping slide can be blocked by chips and dirt. For this reason, do not use this installation position. Otherwise make sure to fit deeper clearance in front of the movable clamping slides.

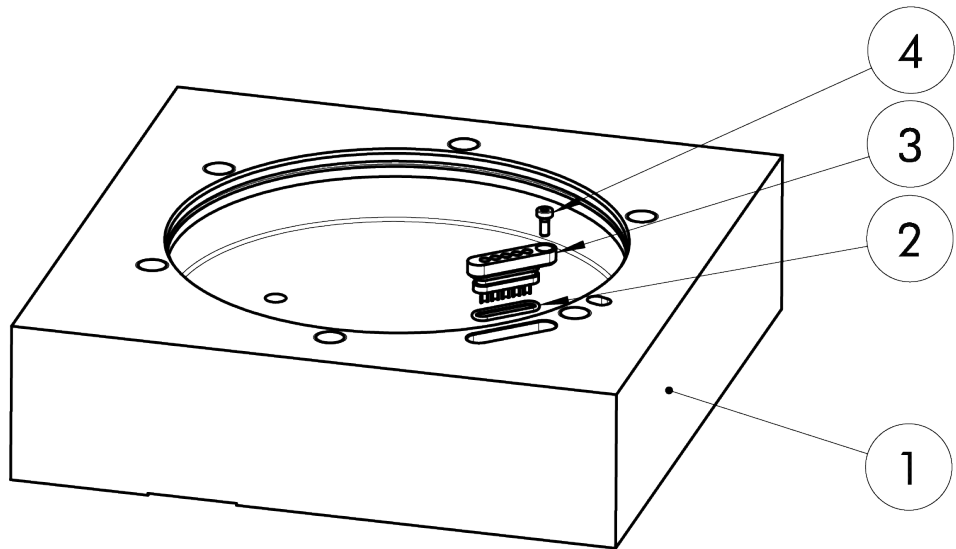
- Damage to the clamping module is possible.

4.2 Electrical rigid contact interface

The electrical rigid contact interface must be installed in the clamping station by the customer, electrically connected and tested. The screw tightening torques ▶ 4.7 [□ 29] and the cable cross-sections must be observed. The rigid-contact interface is not included in the scope of delivery of the module and must be ordered as an accessory in the desired version.

CAUTION

Do not use excessive temperatures when attaching the cables to the rigid contacts. This can damage the rigid contacts.



- 1 Customer-side clamping station
- 2 Sealing
- 3 Rigid-contact interface
- 4 Screw

CAUTION

The rigid contact interface is only protected against the ingress of water when the module is installed. Do not bring it into contact with moisture or water before installing the module!

4.3 Installing and connecting



⚠ 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 unexpected movements when installing and removing the cone seal!

This can cause components to move unexpectedly when working on the cone seal, resulting in injuries.

- Before starting all work on the product, refer to the cone seal chapter, ▶ 4.4.2 [📄 23].
- Make sure that components of the gate unit are fitted in accordance with the installation guidelines and safely locked in place.



⚠ CAUTION

Risk of injury from electric shock if the clamping device is not yet fitted (open interface)

Only connect the interface to the power supply after installation is complete



⚠ CAUTION

Risk of injury due to short circuit if the clamping device has not yet been fitted (open interface)

Only connect the interface to the power supply after installation is complete



⚠ CAUTION

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

- Wear personal protective equipment, particularly protective gloves.
1. Disconnect the electrical interface from the power supply and secure against reconnection.
 2. Check the flatness of the mounting surface ▶ 4.4 [📄 18].
 3. Clean the interface and dry if necessary.

CAUTION

The interface is only splash-proof when the module is installed (IP 67). Only clean open interfaces dry. Do not clean the open interface with compressed air, otherwise dirt or humidity may get into the interior of the interface.

CAUTION

Humidity in the interface leads to corrosion of the contacts during operation and can lead to module failure. Humidity on the interface must be removed before assembling the module.

4. Screw the module with the O-rings inserted onto the clamping station.
Observe the orientation of the electronic interface or orientation pin.
Observe permissible tightening torques for the mounting screws and the strength class, ▶ 4.7 [□ 29].
5. Connect module ▶ 4.4 [□ 18].
 - via the hose-free direct connection in the base of the quick-change pallet system, OR
 - via the supply lines at the side connections (To do this, unscrew the G1/8" locking screws and screw in the air connections)
6. Unscrew locking screws G1/8" and screw in air connections
7. Connecting the power supply and IO-Link communication.
8. If necessary, connect the additional monitoring functions.

4.4 Fastening and connection

Flatness

If several linked clamping modules are mounted, make sure that the flatness and height deviation of the outer ring bearing surfaces from clamping module to clamping module (with respect to a 200 mm gauge) is ≤ 0.02 mm. The gauge deviation from module to module must not be greater than ± 0.015 mm. The position tolerance of all module seats must not exceed a total value of 0.05 mm.

Redundancy

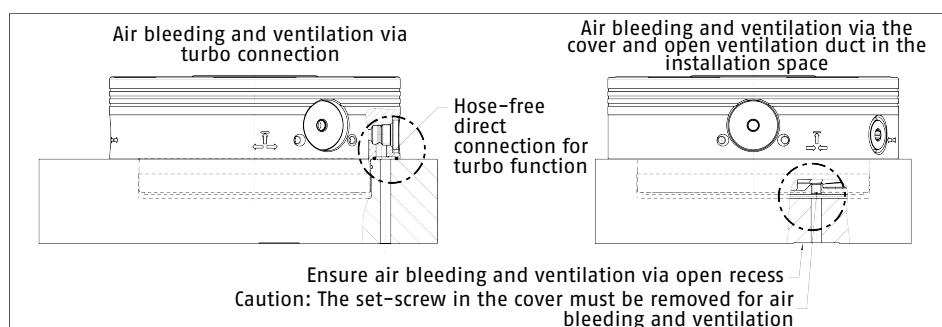
Due to redundancy, a clamping pin with positioning accuracy in one direction (SPB 40, positioned diamond shaped) must be used for clamping systems that are more than 160 mm apart or that do not show a positioning tolerance of ± 0.01 mm. The diamond-shaped alignment surfaces on the SPB 40 clamping pin must be aligned at right angles to the longitudinal axis between clamping pins SPA 40 and SPB 40. This allows for compensation of a distance offset between the clamping areas to be aligned. For the clamping areas that are not intended for aligning the device or pallet, clamping pins with centering clearance (SPC 40) must be used (▶ 4.5 [□ 23]).

Air bleeding for the piston chamber

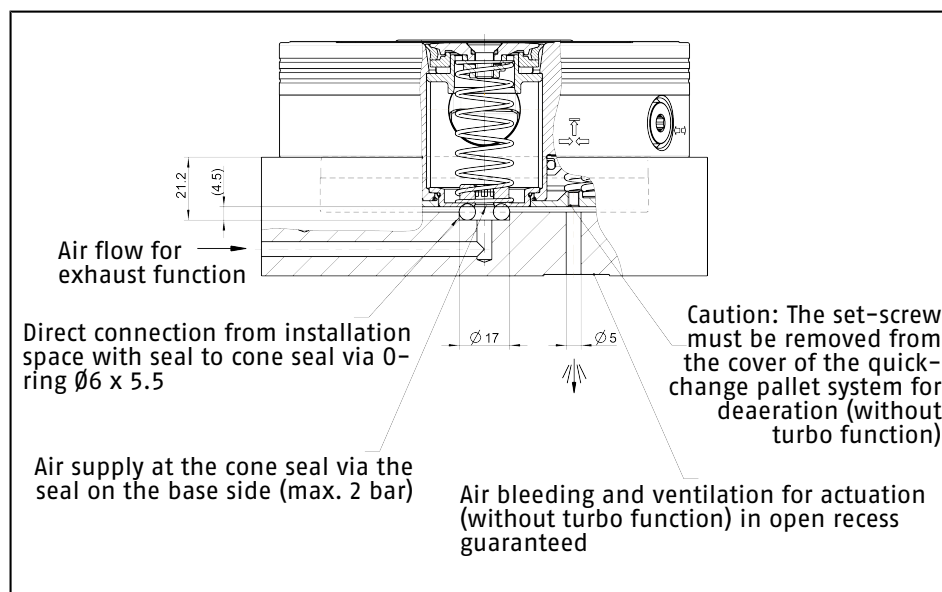
When connecting the quick-change pallet systems, it is important to note that it is only possible to completely bleed the air from the piston chamber via the air connections during the locking process. The relevant valves or shut-off valves should therefore be equipped with load relief.

This also applies to the turbo connection. **If the turbo connection is not used, the relevant side of the piston must have a way of being ventilated.** This is best done via the turbo connection itself. For all versions of NSE-S3 138 IOL, a ventilation option for the cylinder chamber can be created by removing the M5 x 4 set-screw in the cover of the clamping module. The following views illustrate the air bleed options.

Air bleeding via turbo connection, air bleeding via the cover



Air bleeding via the cover in versions with cone seal ▶ 3 [13]



Turbo connection

When using the turbo connection (if supply is connected), the spring-actuated locking procedure is actively supported with air pressure, thereby enhancing the achievable pull down force. One pressure pulse is sufficient to increase the force. The pressure line can be decoupled afterwards without the pull down force being impaired. If the turbo connection is not used, the relevant side of the piston must be able to ventilate.

Connecting hose lines

If several quick-change pallet systems are activated via jointly connected hose lines, feed lines with the following minimum cross-sections must be used.

Number of modules	At least nominal hose width
1	4 mm
2, 3, 4	6 mm
from 5	8 mm

When disconnecting hose lines, the relevant openings of the air supply connections must be protected with seal plugs or cover plates to prevent the entry of dirt or coolant.

Removal from the installation space

Detachable threads facilitate removal of the modules from the installation space of the clamping stations. To pull the clamping module out of the installation space, two levering tools (e.g. long cylindrical screws) are screwed diagonally into two existing internal threads of the mounting holes.

4.4.1 Size NSE-S3 138 IOL

The quick-change pallet module can be positioned using two centering diameters of the installation space:

Ø110 H6 in the lower range. For partial and full installation.

Ø138 H6 in the upper range.

The orientation pin ⑤ must be observed for positional orientation.

Fastening in the installation space with 6 M8 screws

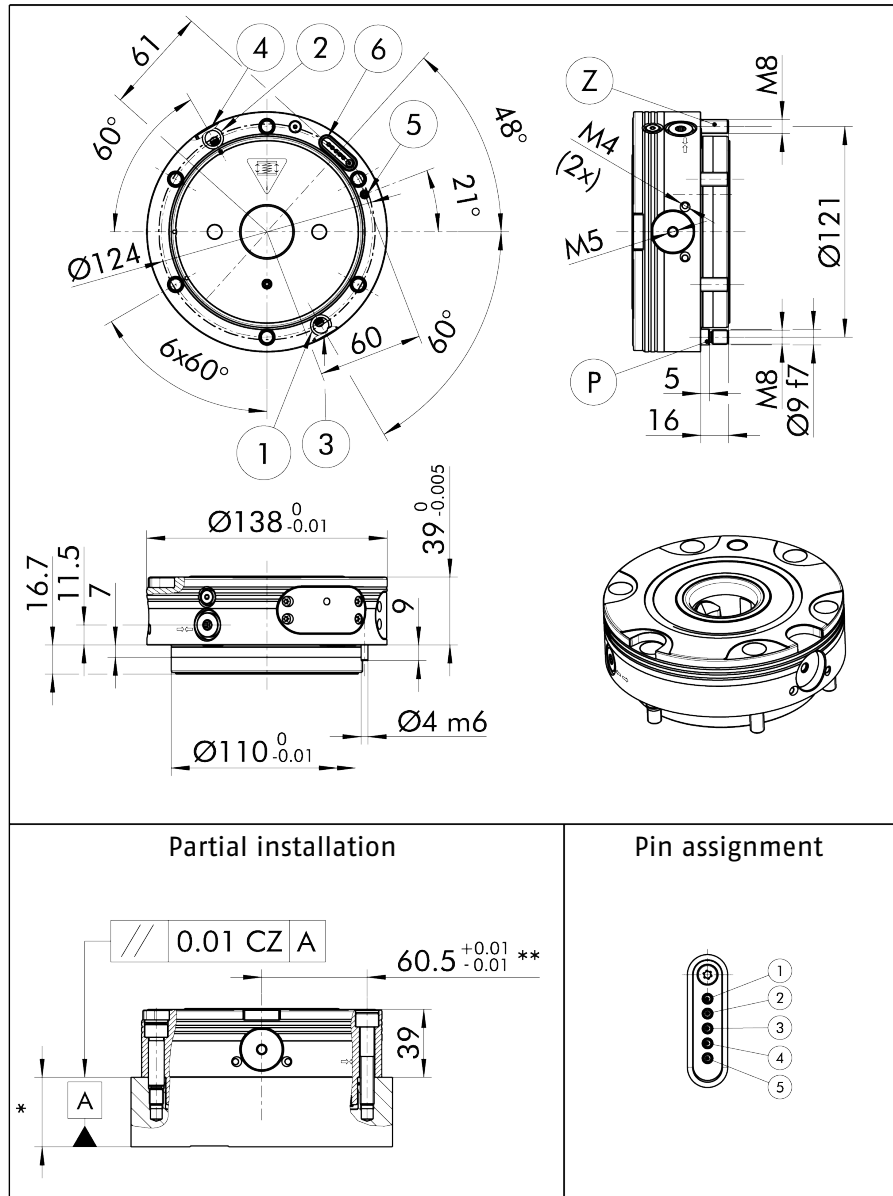
② ▶ 4.7 [29].

For variants with anti-rotation protection ▶ 3.1 [13], one screw is designed as a fitting screw ⑥, which ensures exact position orientation via a fitting bore **Ø9 H7** in the counterpart.

The air connection for opening ① and for turbo function ② is via the bottom-sided connection holes as standard.

Alternative connection option: G1/8 connections on the side for opening ③ and turbo function ④. The openings ③ and ④ on the bottom side must be sealed against the flat bearing surface with O-rings **Ø9 x 1.5**.

The interface for IO-Link communication and the power supply is provided via the spring contact interface on the ground side ⑥. The rigid contact interface Part lists (not included in the scope of delivery) must be implemented and connected by the customer.

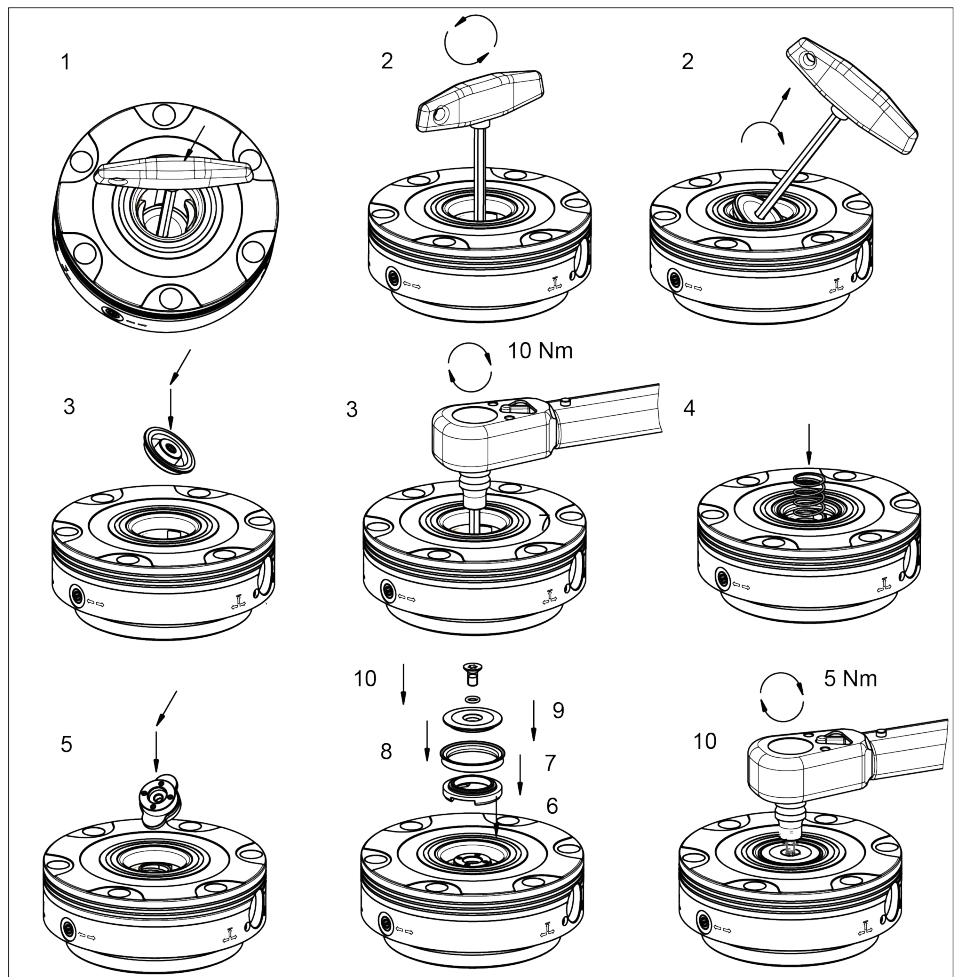


- * All clamping systems of equal height within 0.02 mm
- ** Clearance for fitting screw for variants with anti-rotation protection

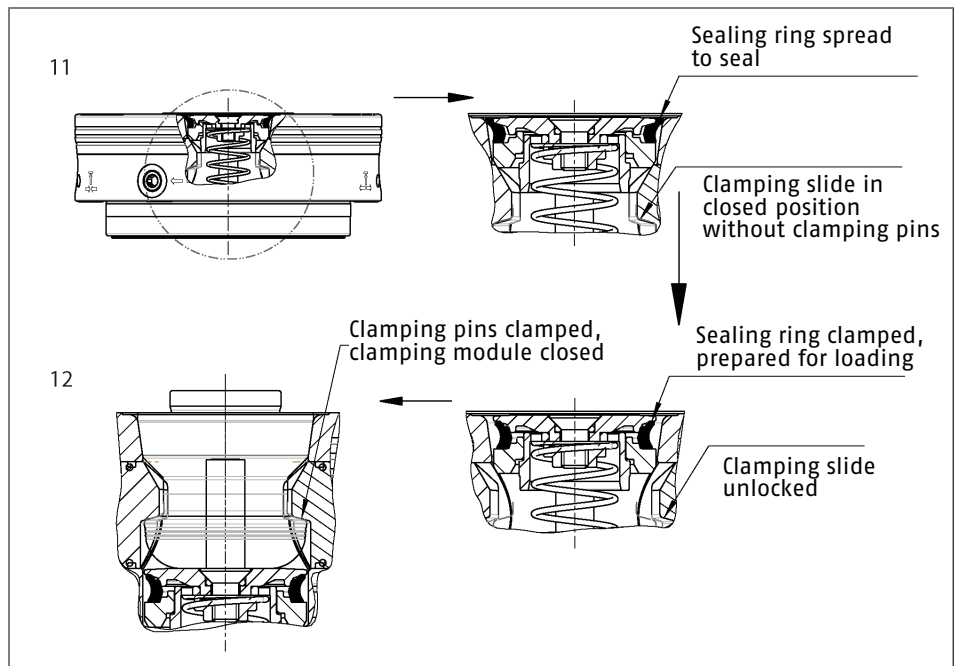
Circuit diagram & pin assignment

Circuit diagram	Pin	Assignment	Function	minimum cross section	IO-Link connection port type Class A
	-	-	-	-	-
	-	-	-	-	-
	3	L+	IO-Link +24 VDC Power	0.25 mm ²	X
	4	L-	IO-Link GND	0.25 mm ²	X
	5	C/Q	IO-Link Communication	0.25 mm ²	X

4.4.2 KVS 40 cone seal

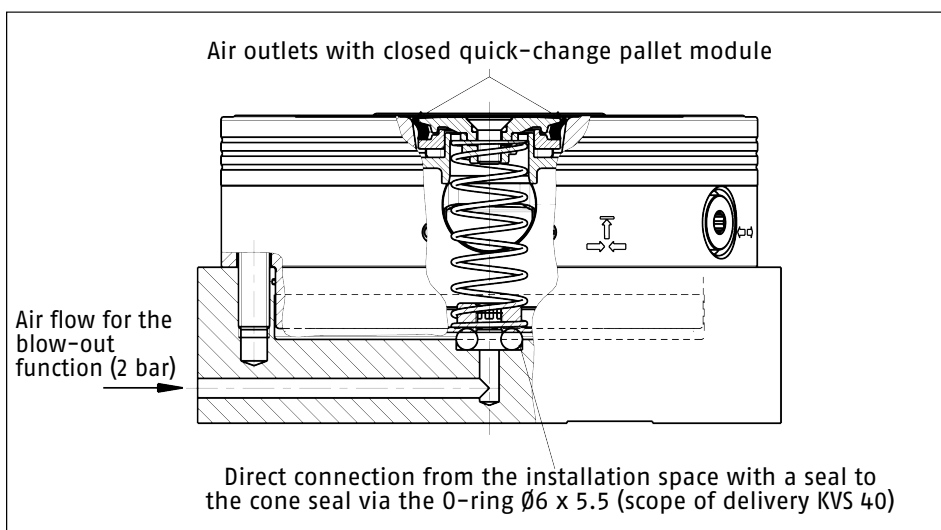
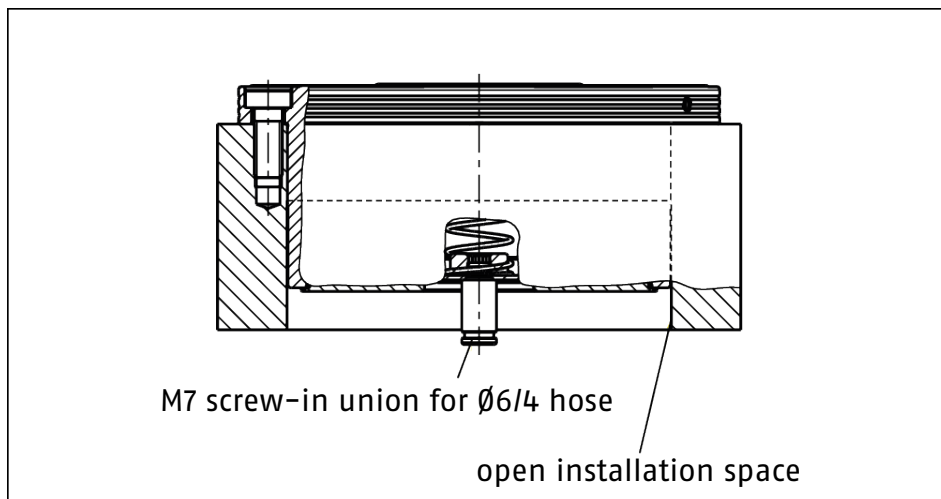


Sequence when inserting the cone seal



Check the cone seal when loading with the clamping pallet.

The air connection for the blow-out air / air purge is achieved via the base M7 connection thread with the installation of a screw-in union. Alternatively, the air supply can be actuated from a drilled channel hole leading out of the installation location of the clamping module. To do this, a drilled channel hole with seal seat must be made in the installation space. To seal this, the enclosed O-ring $\varnothing 6 \times 5.5$ must be inserted in the seal seat.



4.5 Clamping pins SPA 40, SPB 40, SPC 40, SPG 40

CAUTION

Notes on clamping pins and mounting screws

The holding force of the quick-change pallet system is essentially limited by the tightness of the screw connection connecting 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.

The clamping pins can be attached to the workpiece or pallet in two different ways. Preference should be given to the left mounting option in the illustration "Mounting the clamping pins". With this variant, if there is a module failure then the device or pallet can be removed after disassembling the clamping pins. The mounting screw is supplied for the right mounting option as shown in the illustration.

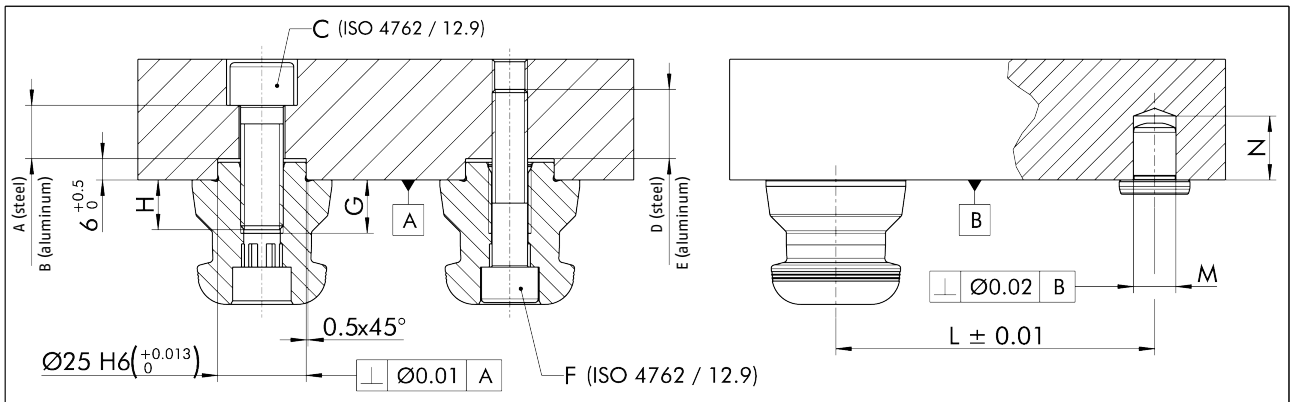
If clamping pins are used outside of SCHUNK pallets, for example in customer-specific devices or workpieces, the outer diameter of the part to be clamped must be large enough to completely cover the inner support area of the quick-change pallet system and the outer support areas of the system must be at least partially covered.

Note

It must be ensured that the customer's device or the workpiece is covered in a width direction that fully covers the outer support area of the quick-change pallet system on both sides.

Size	min. outer diameter on the support of the workpiece
NSE-S3 138 IOL	100 mm

Size	Indexing pin	Indexing pin ID number	L [mm]	M [mm]	N [mm]
NSE-S3 138 IOL	IXB V1	0471980	66	Ø12 H7	>16



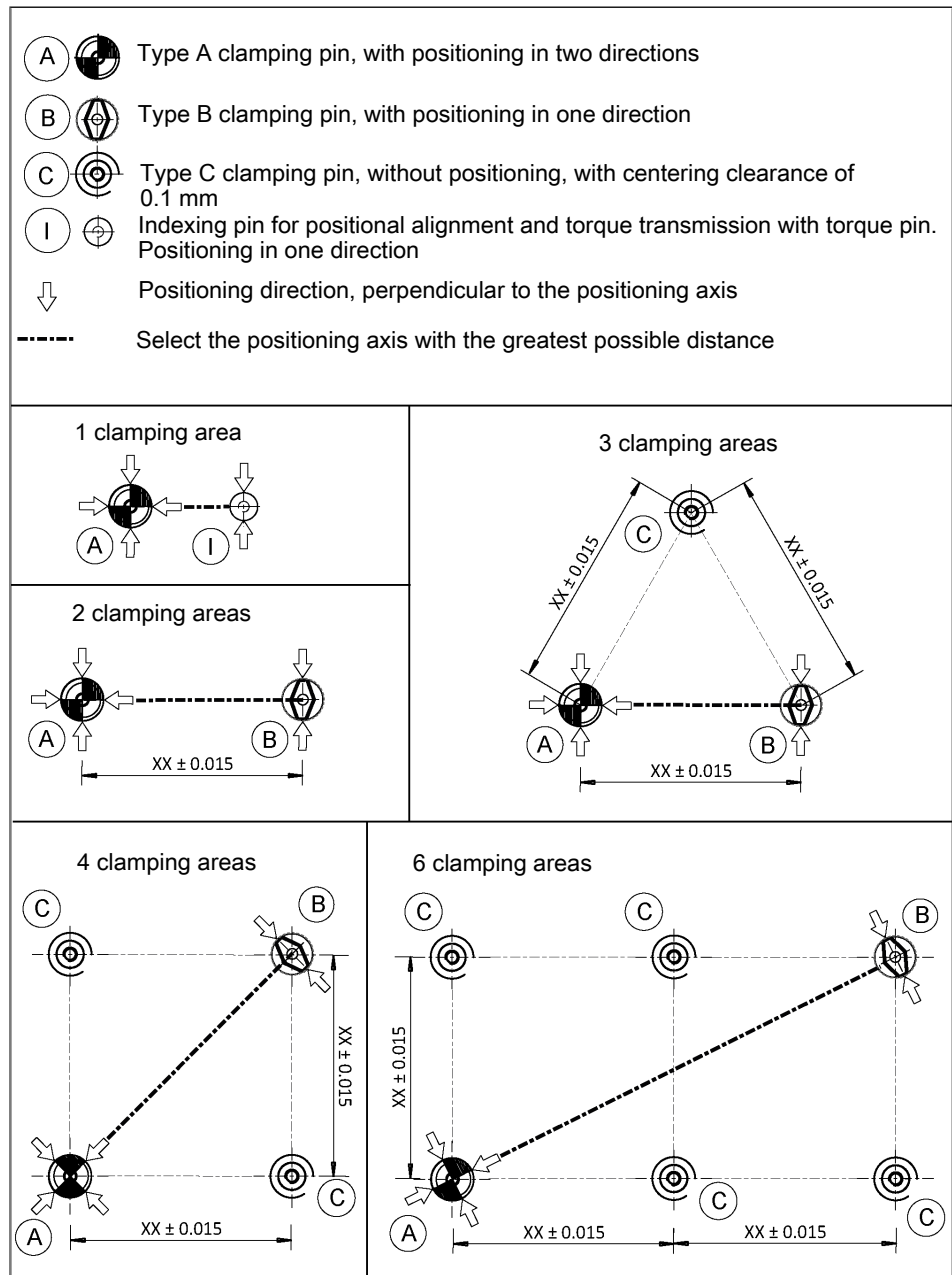
Mounting the clamping and indexing pins

Tolerances and installation conditions

Type	ID	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-in thread must not exceed the dimension "G" under any circumstances!

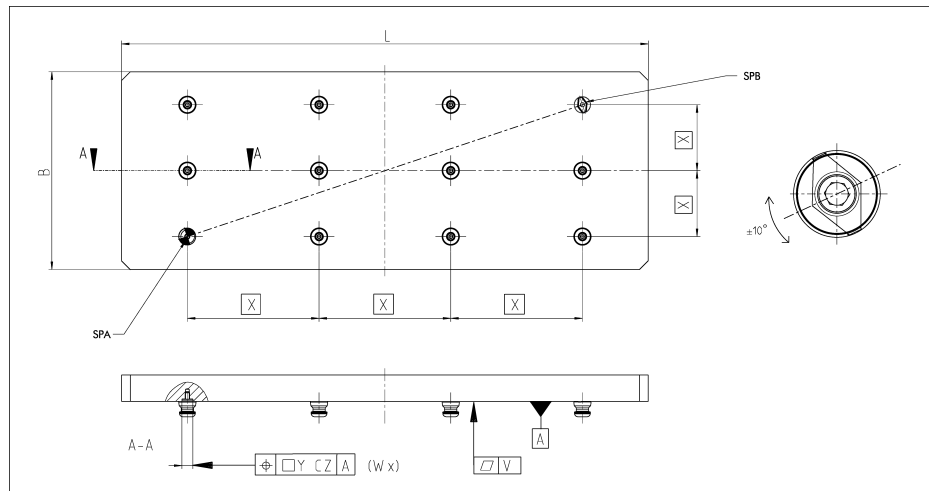
Usage/arrangement of the different types of clamping pins



When positioning the clamping pins, deviating from the previous arrangement examples, the position tolerances given in the following illustration must be observed.

Furthermore, the customer workpiece or the clamping pallet must always have the described flatness.

The clamping pin type B may deviate in its twisting position by max. +/-10°.



X = gauge of the clamping pins is variable

W = number of clamping pin interface

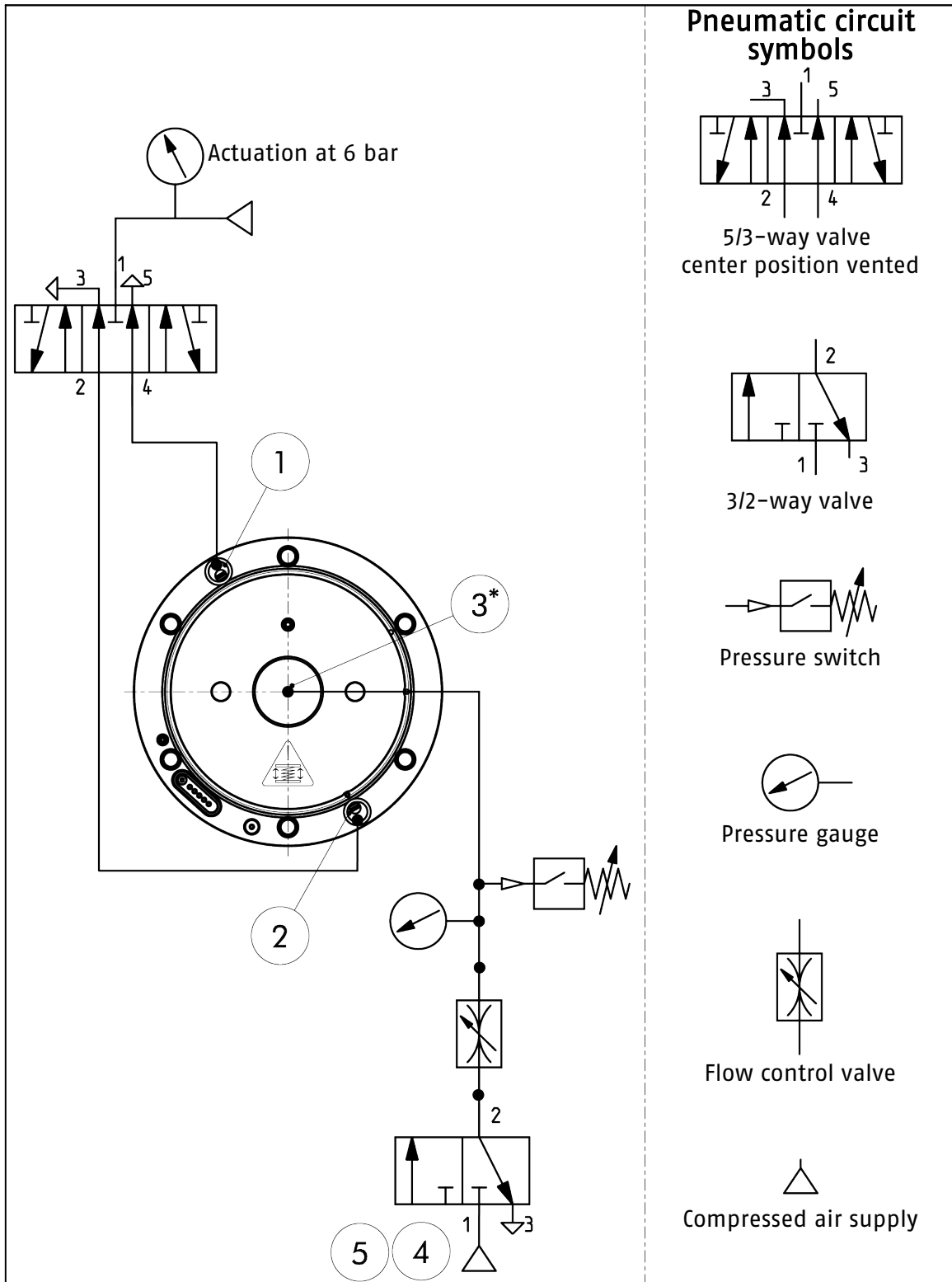
Plate size [mm]	Position when using clamping pin type A, B and C [mm]	Recommended flatness for optimal results [mm]	Prescribed flatness to ensure the function [mm]
L x B	Y	V	V
0 – 600	0.03	0.02	0.05
600 – 1200	0.04	0.04	0.08
1200 – 1800	0.05	0.05	0.10

4.5.1 Information to clamping pin SPG 40

The SPG 40 can be used at a clamping area instead of the SPA 40. If there are several clamping areas and a position tolerance of >0.05 mm, only the clamping area with the SPA 40 clamping pin type may be replaced with the SPG 40. If the position tolerance between the clamping areas is <0.05 mm, all clamping pin types may 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, a 10 mm longer M12 screw of strength class 12.9 must be used according to the mounting option on the left in the illustration.

4.6 Pneumatics circuit diagram



- 1 Unlocking connection
- 2 Turbo connection
- 3 Optional: air purge / contact monitoring / exhaust air
- 4 Air purge / contact monitoring at 2 bar
- 5 Blow-out air cleaning function, 3 to 6 bar
- * Air purge / exhaust air (M7 connection) integrated

Observe the following when controlling the NSE-S3 138 IOL quick-change pallet systems:

Turbo function:

- The actuating pressure for the turbo function must not exceed 6 bar.

Air purge / contact monitoring:

This function is used to monitor the face contact of the clamping pallet that is clamped. A differential pressure switch must be used for monitoring. When using the air purge for contact monitoring, the sealing ring on the support side of the clamping module must be removed carefully. This ensures that the escaping air purge can escape up to the contact of the clamping pallet that is clamped and a differential pressure measurement can be carried out.

Connection by incorporating the connection thread in the center of the plug. For versions with cone seal ▶ 3.1 [13] centrally at the bottom via M7 connection thread:

- Max. pressure 2 bar.
- Limit volumetric flow to 15 l/min.
- When using the air purge for contact monitoring, the sealing ring on the support side of the clamping module must be removed.

To guarantee a reliable evaluation, the pressure and air volume of the air purge for monitoring face contact must be kept constant. Pressure fluctuations can affect the settings of the differential 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 the error.

Blow-out air:

Connection by subsequently incorporating the connection thread in the center of the plug. For versions with cone seal ▶ 3.1 [13] centrally at the bottom via M7 connection thread:

- 3 to max. 6 bar.
- The blow-out air must be switched off before the pallet is placed on top, otherwise a pressure cushion may form or vibrations may occur.

Recommendation:

- Switch off blow-off air → before placing the pallet (approx. 1 mm)
- Switch on blow-off air → only after lifting the pallet (approx. 1 mm)

4.7 Screw tightening torques

Tightening torques for mounting the clamping pins

(Screw quality 12.9)

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

Tightening torques for mounting the clamping modules

(Screw quality 10.9)

Screw size	M4	M5	M6	M8	M10	M12	M14
Tightening torque (Nm)	4.2	7.5	13	28	50	88	120

Tightening torque for the countersunk screw on the cone seal

(Screw quality A2-70)

Screw size	M6
Tightening torque (Nm)	5

Tightening torques for the plug and cover conversion parts in the clamping pin mounting

Component	Plug (basic version)	Bottom cover
Tightening torque (Nm)	10	10

Tightening torques for fastening the rigid contact interface

(Screw quality A2)

Schraubengröße	M2
Tightening torque M_A (Nm)	0.3

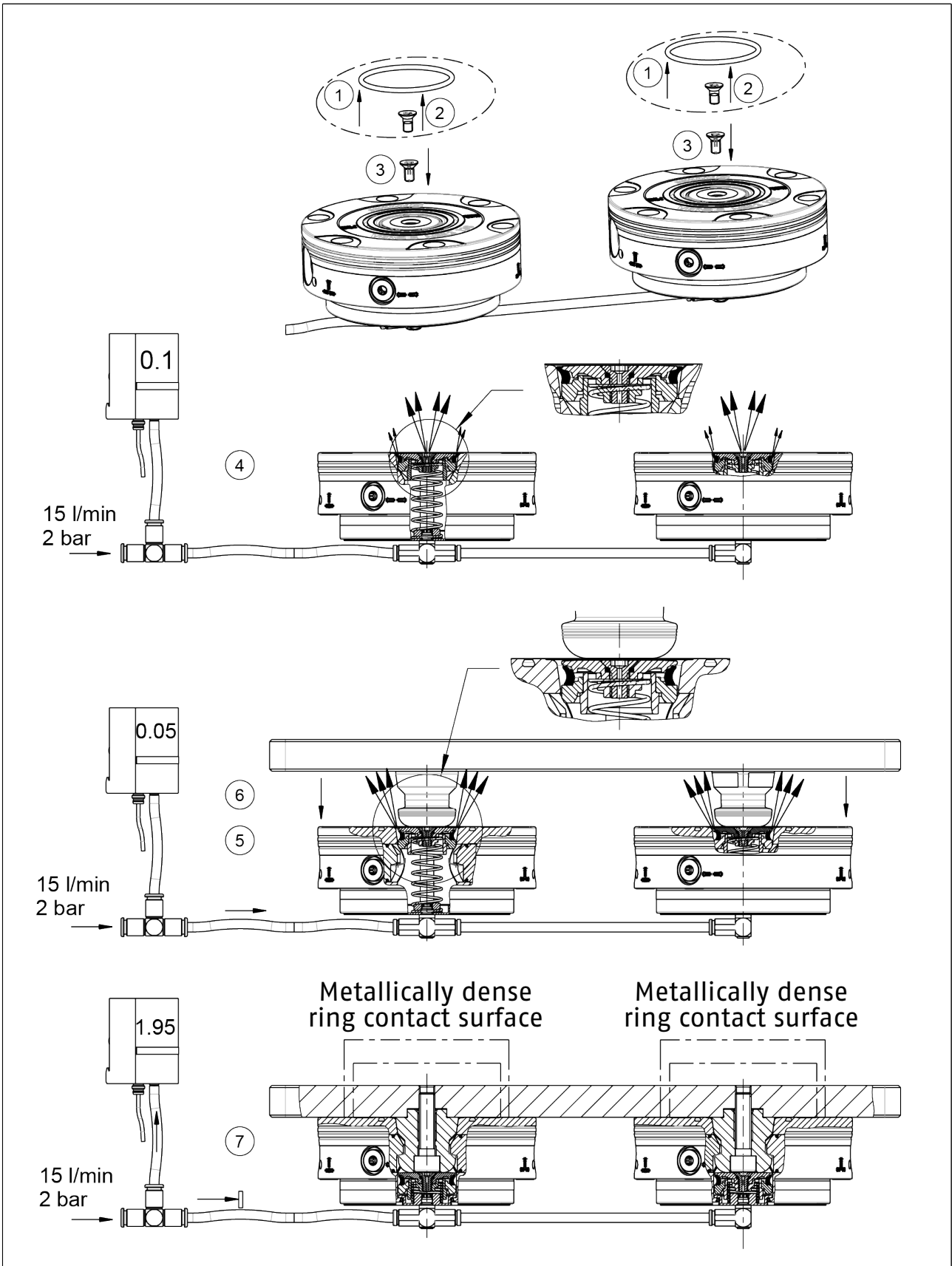
4.8 Dynamic pressure monitoring for workpiece planar contact monitoring for versions with cone seal

For versions with cone seal ▶ 3.1 [13], the cone seal can be used for checking the flat work surface of the workpiece.

Step-by-step sequence of the function with series-connected dynamic pressure monitoring of multiple modules.

Example with 2 modules:

1. Remove the O-ring on the bearing surface of all clamping modules intended for monitoring, use the O-ring assembly tool for this.
2. Remove the countersunk screw on the cone seal, ▶ 4.4.2 [22].
3. Install the countersunk screw with ventilation hole. (Accessories 1403711)
4. For clamped modules without clamping pins, actuate the dynamic pressure monitoring for face contact monitoring air purge → Pressure in the set range 2 bar, volumetric flow 15 l/min → Low measurable differential pressure at the pressure sensor.
5. Actuate clamping modules for loading in "open" status → Differential pressure at the pressure sensor drops further.
6. Insert the clamping pallet into the unlocked clamping areas.
7. Lock clamping areas by removing the pressure control → Differential pressure at the pressure sensor increases, measurable dynamic pressure maximum 2 bar with full-surface support of the clamping pallet at all support areas.



5 Function

The NSE-S3 138 IOL is a pneumatically actuated quick-change pallet system with electronic monitoring.

A pneumatically actuated piston moves the clamping slides in the module, thereby building up the pull-in force on the clamping pin.

The clamping slide position, the pressure in the turbo chamber and the presence of pallets are detected via electronic sensors.

These queries are used to output the module statuses: "Open", "Clamped with clamping pin", "Closed without clamping pin", "Turbo pressure on" and "Pallet detected".

5.1 Communication

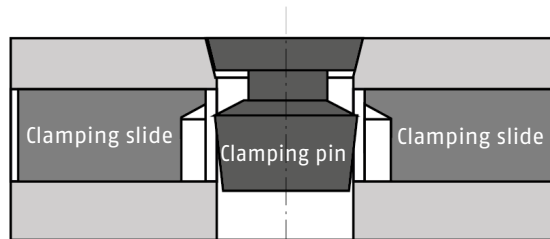
Communication takes place via the IO-Link protocol. Detailed information about the individual parameters can be found in the software manual.

5.2 Module status

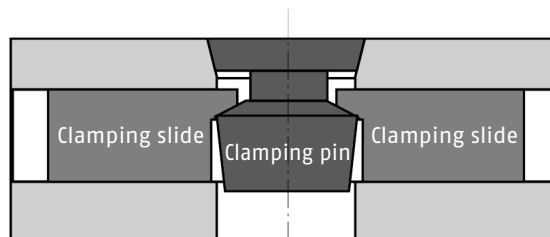
5.2.1 Clamping slide positions

The following clamping slide positions are emitted:

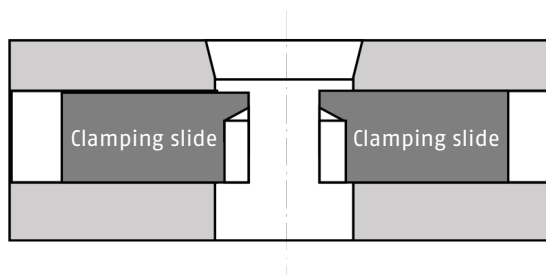
"Open": Clamping slides are fully extended to the open position and a clamping pin can be inserted.



"Clamped with clamping pin": Clamping slides have been moved together and are in contact with the clamping pin.



"Closed without clamping pin": Clamping slides have passed the "Clamped with clamping pin" position and are at their maximum closed position.



5.2.2 Pressure in turbo chamber

The pneumatic pressure in the piston chamber for turbo is monitored. When a threshold value is reached, the module signals "Turbo pressure on".

5.2.3 Pallet presence

The presence of a clamping pallet is detected via a sensor attached to the front of the module. When a sensor threshold value is reached, the module signals "Pallet detected".

5.3 LED indication

The LED is located on the side of the quick-change pallet system and is used to display the status.

LED	Clamping slide	Presence	Pressure in Turbo chamber
green	clamped with clamping pin	detected	not detected
flashing green	clamped with clamping pin	detected	detected
red	clamped with clamping pin	not detected	any
red	closed without clamping pin	any	any
red	undefined	any	any
no signal	opened	any	any
1x red and 1x green flashing	boot procedure		
flashing red	device error / connection setup / no IO-Link connection		

5.4 Teaching-in the sensors

All sensors are taught to a sample pallet ex works.

Due to increased wear or special operating conditions, it is possible that sensors may need to be taught in again. The following queries can be relearned:

- Teaching the clamping slide position to a clamping pin.
- Teaching the presence of a pallet on a clamping pallet.
- Teach-in and tare the pressure sensor for the pressure in the turbo chamber.

The exact sequence of the respective teaching and taring processes is described in the software manual.

If the quick-change pallet module is operated with only one clamping pin, the clamping pin must be rotated by 90° after 250,000 clamping operations to ensure reliable signal separation of the clamping slide positions due to wear, so that it can be operated for a further 250,000 clamping operations. Alternatively, a new clamping bolt can also be used.

5.5 KVS 40 cone seal

The -K versions of the NSE-S3 quick-change pallet systems are equipped with a cone seal to protect the change interface. The sealing unit can be sunk spring-loaded and reset when the module is unlocked.

The change interface is sealed when the clamping module is closed without clamping pins. The seal can be optionally retrofitted without removing the unit from the installation space. A step-by-step installation assembly makes retrofitting the multi-part sealing unit easier, ▶ 4.4.2 [22].

Note

If several clamping modules with a cone seal are fitted in a clamping station, the clamping pallet to be installed or the device must have a corresponding handling system so that no lifting occurs.

5.6 Blow-out and air-purge function

On the bottom, the quick-change pallet system has an air connection to actuate a blow-out or air purge function.

The **air purge function** is designed to use a pneumatic planar system to check the clamping pallet if the electric pallet presence sensor does not detect it due to its material properties.

Note

The **blow-out function** is used to remove contamination such as cooling lubricant and chips from the clamping pin opening and from the face contact surface. Depending on the operating conditions and type of soiling, it may not always be possible to remove all soiling.

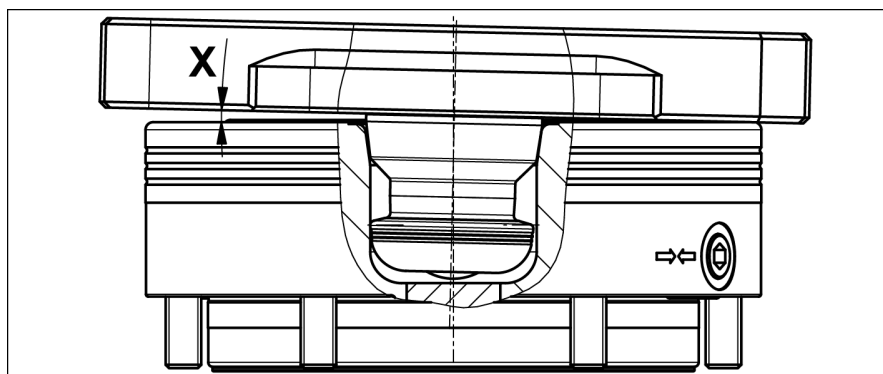
Note

The blow-out function with cone lock must be actuated with the clamping module closed without clamping pins. In this case, the blow-out air is discharged at the sealing position, and in doing so, blows coolant and chips from the bearing surface. When using this function, to load the change interface, the quick-change pallet system must be supplied with blow-out air before unlocking. When using the blow-out function for air-purge face contact monitoring, the sealing ring on the bearing surface of the module must be removed. .

6 Operation

CAUTION

When changing the pallet using lifting equipment or a robot, ensure that the pallet is lifted exactly parallel to the modules. The inclination (X) during lifting may not exceed 1.2°. If the inclination is larger, the clamping pins can jam and the system components could be damaged or destroyed. In this case, the system must be inspected and damaged parts must be replaced immediately.
Only original SCHUNK spare parts may be used!



⚠ WARNING

Risk of injury due to losing pallets or workpieces in the case of incorrect actuation caused by incorrect operation.
Risk of injury due to compressed air hoses coming loose when connected improperly.

- 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 losing pallets or workpieces if the supply of compressed air drops or fails, and due to the clamping pins immediately closing

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



⚠ WARNING

Risk of injury due to sudden movements! If the energy supply to the media transfer units is switched on or if residual energy is still present, this can cause the clamping device to move unexpectedly during loading, which may result in serious injuries.

- Before starting any work on the product: Switch off the energy supply and secure against re-connection.
- Ensure that no residual energy remains in the system.
- Do not actuate media transfer units until loading is completed.

7 Maintenance and care

CAUTION

A separate maintenance unit must be used for the air supply. The quick-change pallet system is designed for operation with dry compressed air. If oiled compressed air is used for operation, this must be done every time. The compressed air should be prepared with 1 to 2 drops of oil for an air volume of 1000 liters.

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

Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]



⚠ CAUTION

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

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

The back cover of the clamping module is spring preloaded and must only be removed by trained specialist personnel. The cover can only be disassembled and assembled using a special assembly tool and by observing the corresponding disassembly and assembly instructions.

- Check the units at regular intervals (at least every two weeks or after 1000 clampings).
The system is functioning correctly if the clamping slides move smoothly at minimum system pressure (5 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.

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 Troubleshooting

9.1 The clamping area does not unlock

Possible cause	Solution(s)
Defective air connections	Check air supply
Pressure below minimum	Check operating pressure (min. 5 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 pins	Reduce tensile load on clamping pin

9.2 The clamping area does not unlock properly

Possible cause	Solution(s)
Pressure below minimum	Check operating pressure (min. 5 bar)
The module was not operated with oiled compressed air	Install maintenance unit with oiler
Hose diameter below minimum	for required hose diameters, see chapter "Mounting and connection" ▶ 4.4 [18]
The turbo connection is still pressurized	Ventilate turbo connection

9.3 The quick-change pallet system no longer opens quietly

Possible cause	Remedial measures
The clamping faces on the clamping slides and on the clamping pin are dirty	Remove the clamping pin and clean the clamping faces on the clamping slides and on the clamping pin

9.4 The clamping area does not lock properly

Possible cause	Solution(s)
Clamping pallet is not flat	Remove chips or foreign objects between clamping pallet and module
The "Clamped with clamping pin" position is not recognized due to increased wear on the clamping pin.	Insert new clamping pin. Teach on clamping pin

9.5 Malfunctions when loading and unloading the change interface with fitted cone seal

Possible cause	Remedial measures
Cone seal jams when being actuated	Remove cone seal from the module and clean it
The pressed down cone seal does not return to its original position	Remove cone seal and clean it. Check components for damage.
Clamping area has been filled with accumulated chips	Remove cone seal and clean it. Clean clamping pin holder, replace sealing ring Actuate exhaust function for supplying compressed air
The cone seal is jammed	Check whether the thrust washer is installed in the correct position on the mounting
A component is broken (e.g. due to overloading)	Replace damaged component of the cone seal. Check change interface of the module for damage
Clamping pallet clamps when unlocking the module from the change interface	Increase loading weight or pressure force.

9.6 The cone seal does not seal

Possible cause	Remedial measures
Sealing ring is damaged or deformed	Remove seal and replace sealing ring
Sealing ring is damaged	Initiate loading and unloading process only when clamping slides are fully retracted
Sealing ring spreads too little when closing the clamping module	Ensure that the components are installed in the correct position

10 Seal kit and part lists

10.1 Sealing Kit List

Size / Sealing kit*	ID
NSE-S3 138 IOL	1596112
Cone seal KVS 40	1153525

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

10.2 Parts lists

10.2.1 Size NSE3 138 and NSE-T3 138

NSE-S3 138 IOL (ID 1514230)

NSE-S3 138-V1 IOL (ID 1514231)

NSE-S3 138-K IOL (ID 1545576)

NSE-S3 138-V1-K IOL (ID 1545577)

Item	Designation	Quantity	Note
1	Plug	1	all, except K-variants
	Cone seal KVS 40	1	K
2	O-ring	2	X
3	O-ring	1	X
4	Fitting screw	1	V
5	Cover cap	6	X
6	Cylindrical screw	6	
	Cylindrical screw	5	V
7	Locking screw	2	
8	O-ring	2	X
9	O-ring	1	X
10	Rigid contact interface *	1	
11	Cylindrical pin	1	
12	Set screw	1	

The module must not be dismantled for maintenance. The cover must not be removed for maintenance. The quick-change pallet module must be sent to SCHUNK for maintenance.

* not included in the scope of delivery. To be ordered as an accessory.

Parts list key

K	-K -Variant
V	all -V1 Variants
X	Included in the sealing kit

10.2.2 Cone seal KVS 40 (ID 1313742)

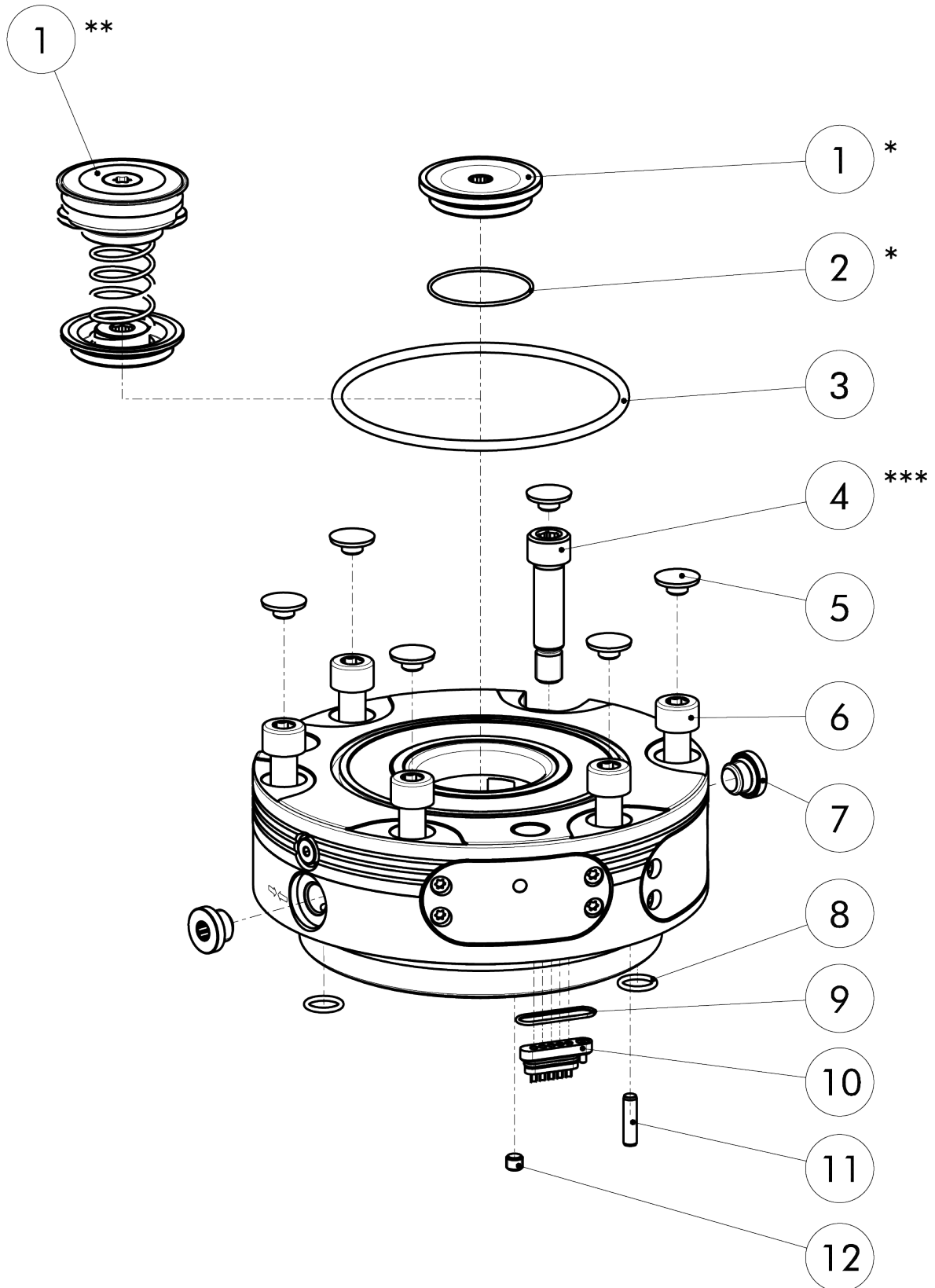
Item	Description	Quantity	Note
1	Mount	1	
2	Thrust washer	1	
3	Cover plate	1	
4	Cover	1	
5	Sealing ring	1	X
6	Compression spring	1	X
7	Countersunk screw	1	X
8	O-ring	1	X
9	O-ring	1	X
10	O-ring	1	Z*

Parts list key

* Component for sealing within the installation space for the supply of blow-out air	X	Included in the sealing kit
	Z	Included in the accessory kit

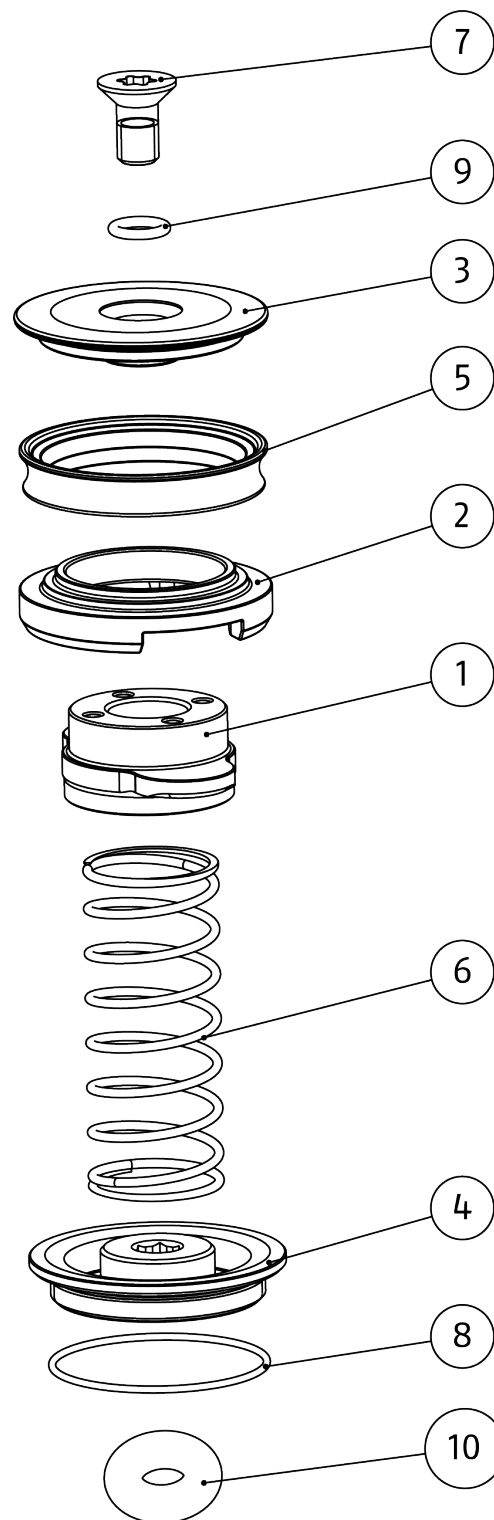
11 Assembly Drawings

11.1 Size NSE-S3 138 IOL



- * NSE-S3 138, NSE-S3 138-V1
- ** NSE-S3 138-K, NSE-S3 138-V1-K
- *** NSE-S3 138-V1, NSE-S3 138-V1-K

11.2 KVS 40 cone seal



12 Manufacturer certificate

Manufacturer / Distributor:	H.-D. SCHUNK GmbH & Co. Spanntechnik KG Lothringer Str. 23 D-88512 Mengen
Product:	Sensorial quick-change pallet system
Designation:	VERO-S
Type designation:	NSE-S3 138 IOL

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 A to C 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.
- the **fault exclusion** against the fault "Breakage during operation" regarding Annex A to C 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

Signature: see original declaration

Mengen, 11th of June 2024

p.p. Philipp Schröder; Head of Engineering Design

13 EU declaration of conformity

in accordance with Directive 2014/30/EU (electromagnetic compatibility), Annex IV of the European Parliament and Council of 26 February 2014.

The manufacturer bears sole responsibility for issuing this EU declaration of conformity.

Manufacturer/
Distributor H.-D. SCHUNK GmbH & Co.
Spanntechnik KG
Lothringer Str. 23
D-88512 Mengen

We hereby declare that the product described below is in conformity with the essential health and safety requirements of Directive 2014/30/EU in its design and construction and in the version placed on the market by us at the time of this declaration. The declaration is rendered invalid if modifications are made to the product.

Product designation: Sensorial quick-change pallet system
Type designation: VERO-S NSE-S3 138 IOL, VERO-S NSE-S3 138-V1 IOL, VERO-S NSE-S3
138-K IOL, VERO-S NSE-S3 138-V1-K IOL
ID number: 1514230, 1514231, 1545576, 1545577

The object of the declaration described above complies with the following harmonization legislation:

2011/65/EU RoHS Directive

European harmonized standards applied:

DIN EN ISO 12100:2011-03 Safety of machinery – General principles for design –
Risk assessment and risk reduction
EN 55011:2016 + A1:2017 Industrial, scientific and medical equipment – Radio-frequency
disturbance characteristics – Limits and methods of measurement
EN 61000-6-2:2019 Electromagnetic compatibility (EMC) – Part 6-2:
Generic standards – Immunity standard for industrial environments
EN 61000-6-4:2019 Electromagnetic compatibility (EMC) – Part 6-4:
Generic standards – Emission standard for industrial environments

Related technical standards and specifications:

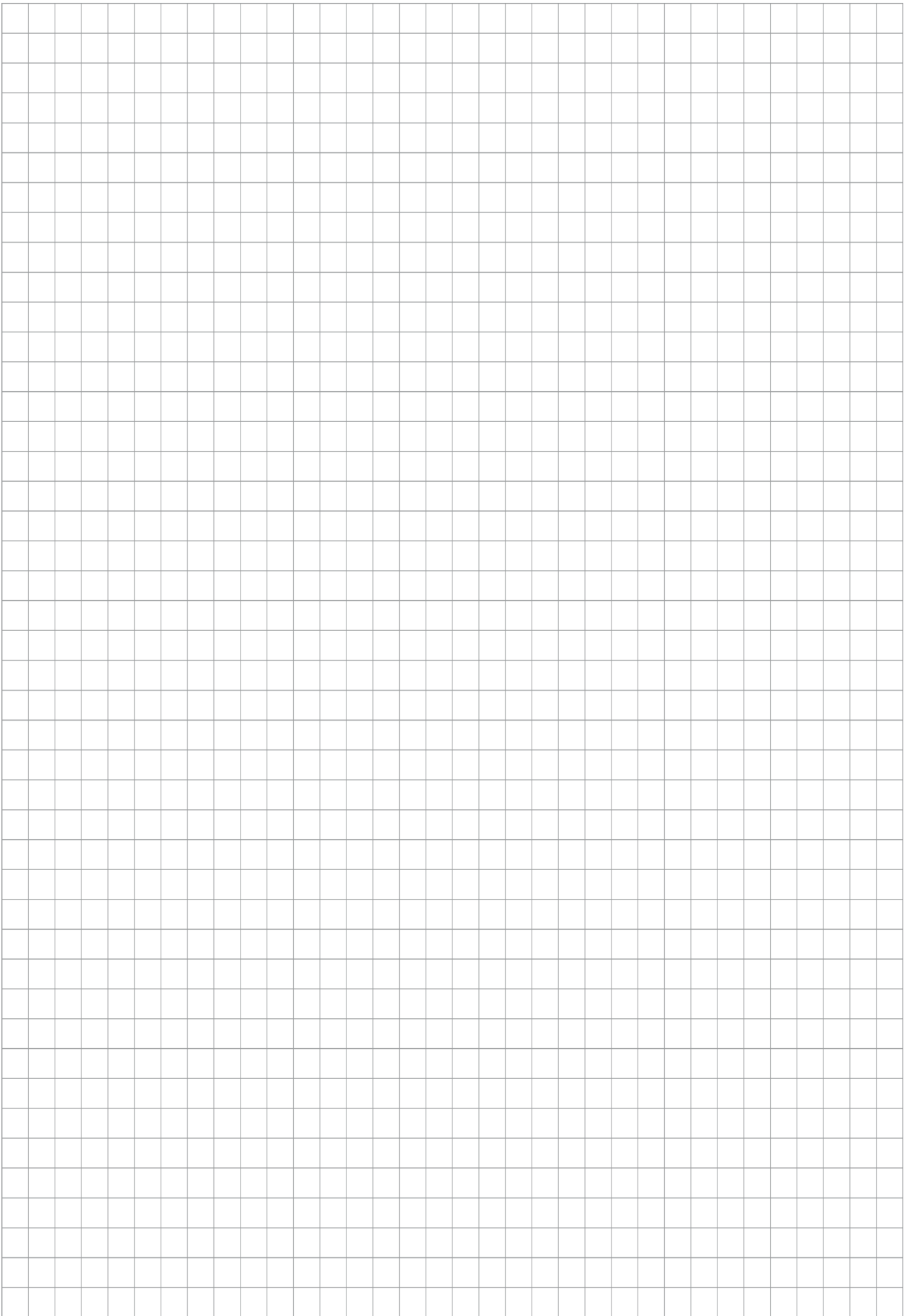
IEC 61131-9:2021

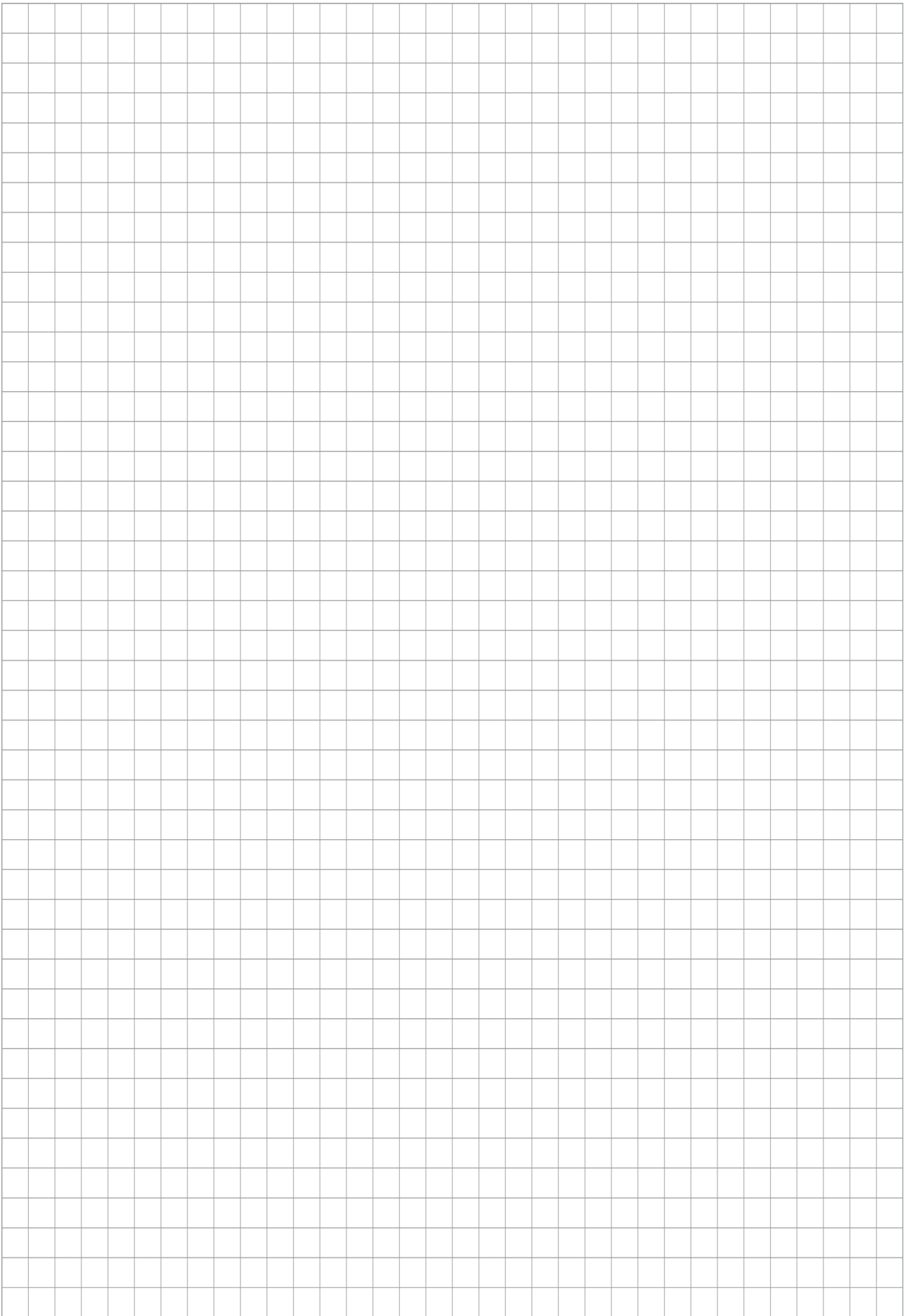
Person authorized to compile the technical documentation:
Philipp Schröder, Address: see manufacturer's address

i. V. Philipp Schröder

Mengen, 11th June 2024

p.p. Philipp Schröder; Head of Engineering Design







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