Quick-change pallet system VERO-S NSL3 Clamping stations

Assembly and Operating Manual

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

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

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Dear Customer,

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

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

Best regards,

Your SCHUNK team

Customer Management

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

Table of Contents

1 General

1.1 About this manual

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

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

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

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

Besides this manual, other documents which apply are those listed under ▸ 1.1.2 [🗋 5]

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 Sizes

This operating manual applies to the following sizes:

Clamping station

- NSL3 150-V1-T
- NSL3 200
- NSL3 200-V1-T
- NSL3 300-200
- NSL3 400
- NSL3 600
- NSL3 800

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 [🗋 5]
- Observance of the ambient conditions and operating conditions
- Observe the care and maintenance instructions

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

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

1.3 Scope of delivery

The scope of delivery includes

- Clamping station in the version ordered
- Assembly and Operating Manual

1.4 Accessories

(see catalog or data sheets when ordering separately)

- Clamping pallets PAL-S, PAL-A
- Clamping pins SPA, SPB, SPC, SPG
- Protection cover SDE
- Cylindrical clamp blanks BRR 50
- Indexing pin IXB V1 NSE plus
- Connecting strip ASL1-G1/8", ASL2-G1/8"
- Cone seal NSE3
- Monitoring system AFS3 138 MMS
- Monitoring system AFS3 138 PMI
- Media feed-through VERO-S MDN 3-2
- Locking coupling for the air supply
- Pneumatic screws M7
- Hose and cable shielding
- Torque wrench

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.
- 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, with clamping devices for higher temperatures (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.
- 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.

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 chuck jaws 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.

⚠ 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 Technical data

Designation Type	ID	Holding force* (M10 / M12) [kN]	F_{max} ** [kN]	F_{maxT} *** [kN]	Weight [kg]
NSL3 150-V1-T	1323568	35 / 50	8	28	7.0
NSL3 200	1323569	70 / 100	16	–	16.9
NSL3 200-V1-T	1323570	70 / 100	16	56	16.7
NSL3 300-200	1323571	105 / 150	24	–	27.8
NSL3 400	1323572	140 / 200	32	–	35.7
NSL3 600	1323574	210 / 300	48	–	54.4
NSL3 800	1323575	280 / 400	64	–	73.2

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

** Total pull-down force without TURBO (total sum of pull-down forces of all the clamping modules mounted in the clamping station)

*** Total pull-down force with TURBO function (total sum of pull-down forces with TURBO of all the clamping modules mounted in the clamping station)

Minimum pressure [bar]	5
Unlocking pressure [bar]	5 to 6
Maximum pressure turbo function [bar]	6
Repeatability [mm]	< 0.005
Installation position	any
Operating temperature [°C]	+5 to +60
Required level of cleanliness	IP 30 in accordance with DIN EN 60529
Noise emission [dB(A)]	≤ 70
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]
IP rating	IP 67

The actuating pressure for the unlocking function must be set to at least 5 bar up to a maximum of 6 bar.

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

4 Assembly

4.1 General Installation Notes

Pre-assembly measures

Lift the quick-change pallet system carefully out of the packaging (e.g. using suitable lifting equipment). For clamping stations NSL3 400 or higher, eye bolts are supplied for transporting the clamping station. The eye bolts are to be mounted into the transport threads on the base plate and then removed after assembly. Before assembly, the interfaces (bottom of the clamping station and support area of the machine table) must be clean and free of any contamination or damage.

⚠ 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.

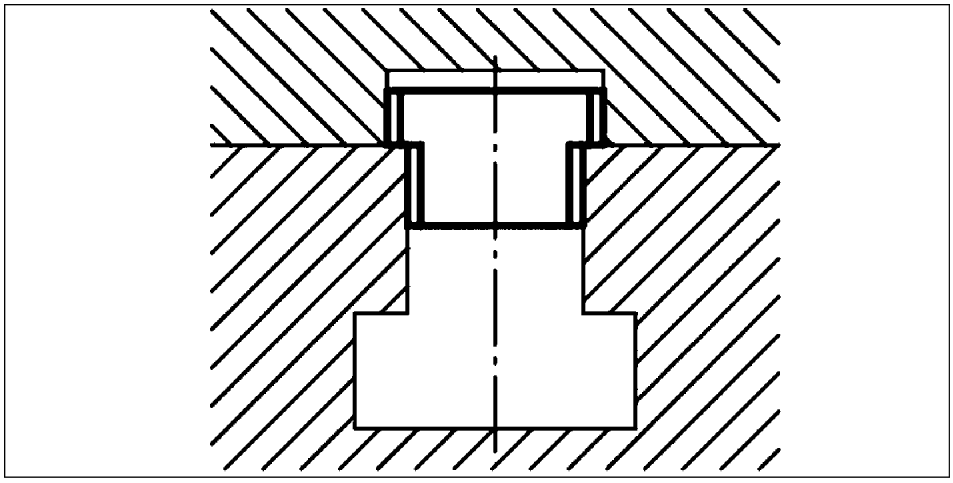
⚠ CAUTION

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

- Wear personal protective equipment, particularly protective gloves.

4.2 Aligning the clamping station

The clamping station can be aligned with loose T-nuts along an aligning groove on the machine table. At least two T-nuts offset lengthwise are provided and their size is matched to the aligning groove on the machine table. The T-nuts are not included in the scope of delivery of the clamping station.



Alignment using T-nuts

4.3 Mounting and connecting the clamping station

Flatness and distances

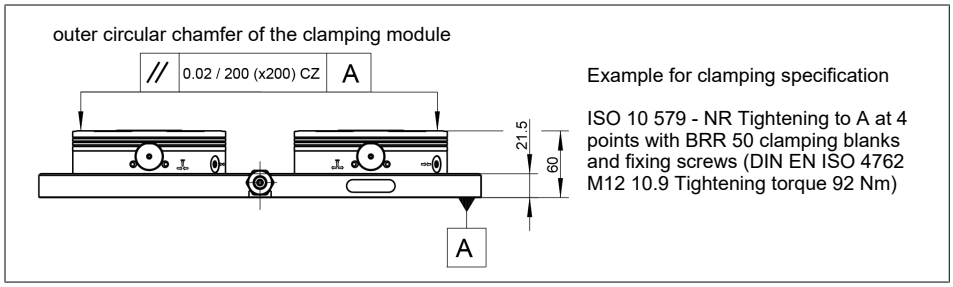
In order to assemble the clamping station, the clamping surface must have a flatness of ≤ 0.03 mm (based on the entire support areas of the clamping station). The clamping zone must have sufficient rigidity in order to ensure the relative flatness of the clamping modules. If several clamping stations are interlinked, make sure that the flatness and height deviation of the locating surfaces between modules (based on a 200 mm gauge for bore holes) is ≤ 0.03 mm. The gauge deviation between the separate clamping stations must not exceed ± 0.015 mm from module to module.

Redundancy

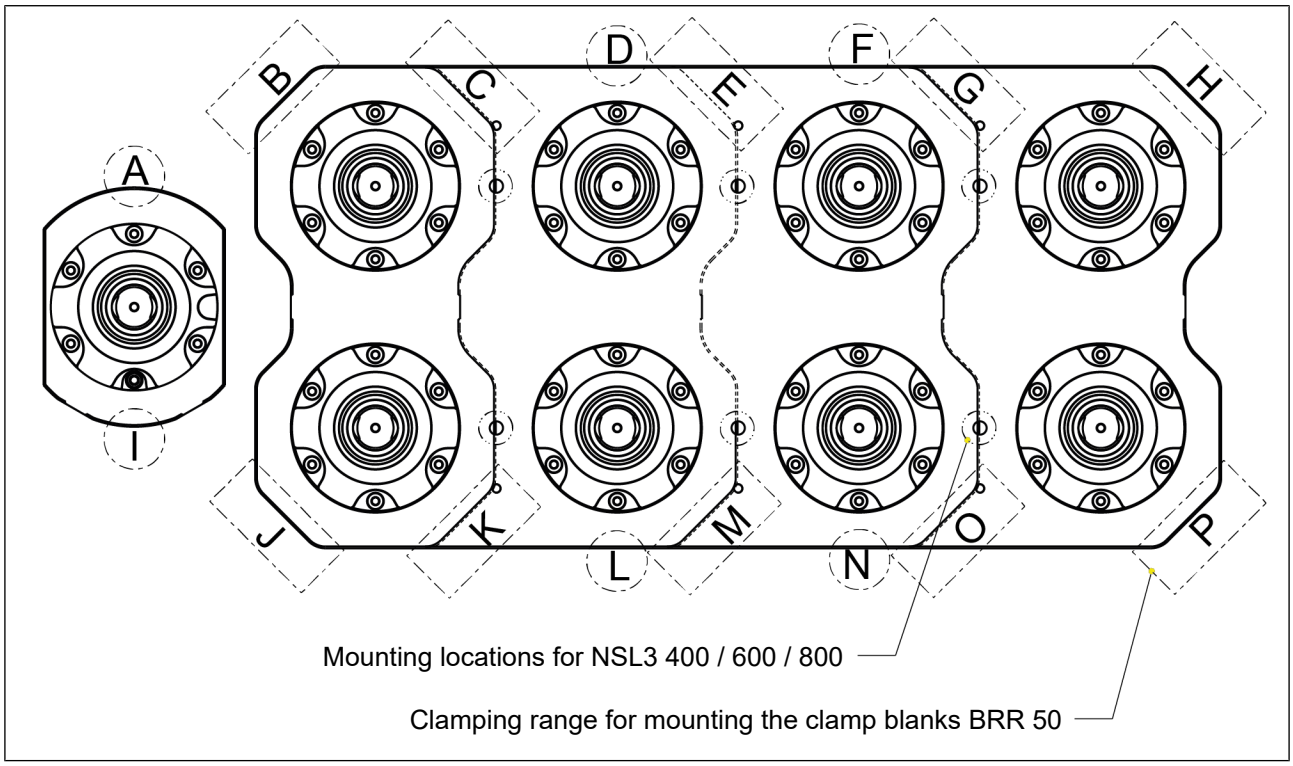
For the sake of conformity, clamping pins with positioning accuracy in one direction (SPB 40) should be used for clamping modules inside a clamping station or multiple linked clamping stations that are more than 160 mm apart or that do not show a positioning tolerance of ± 0.01 mm. For the clamping areas that are not intended for aligning the device or pallet, clamping pins with centering clearance (SPC 40) can be used (also refer to chapter "Clamping pins" ▸ 4.4 [🗋 25]).

Even height of the clamping modules

Even height of the clamping modules inside a clamping station is only ensured when in a clamped state. Set-up is performed by means of individually inserted holes or optionally available clamp blanks. The clamping station or the clamp blanks must be fastened using adequately dimensioned mounting screws in accordance with DIN EN ISO 4762 starting with thread size M10. The prescribed arrangement for the BRR 50 clamp blanks can be found in the following clamping diagram. Permitted ranges for mounting holes can be found in the attached bore hole drawings. Clamping stations from size NSL3 400 already have holes for at least two M10 mounting screws. The mounting points are offset centrally between the clamping modules at a distance of 200 mm. Due to the additional fitting, increased rigidity on the machine table is achieved for the clamping station when fastening with clamp blanks.



NSL3 200 Set-up 1



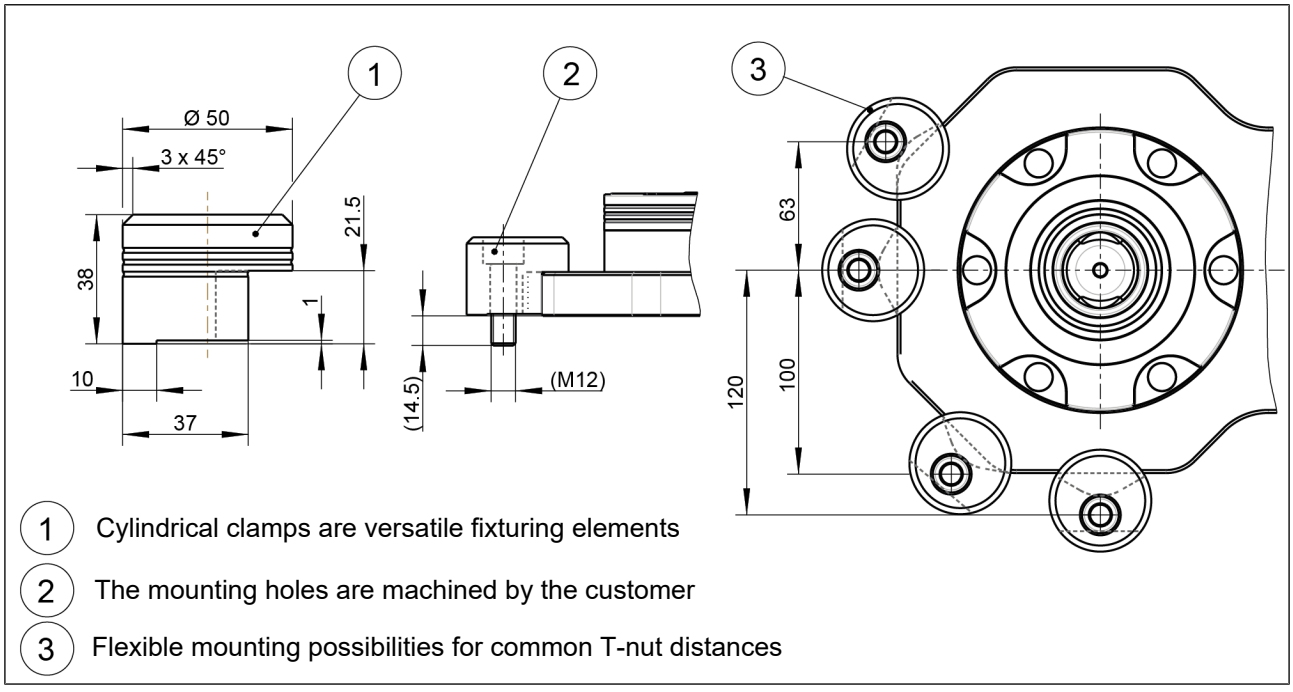
Clamping diagram

Clamping range

NSL3 150-V1-T	NSL3 200 / NSL3 200-V1-T	NSL3 400	NSL3 600	NSL3 800
A, I	B, C, J, K	B, E, J, M	B, D, G, J, L, O	B, D, F, H, J, L, N, P

Note

The clamping range of the NSL3 300-200 is based on the clamping scheme of the NSL3 400. Here, optionally available BRR50 clamp blanks are to be attached to four clamping points distributed evenly on the round outer diameter.



Mounting clamp blanks

Alternating ventilation for the clamping modules when connecting and disconnecting the air supply at the clamping station

When connecting the clamping station, it must be taken into consideration that complete ventilation of the piston chambers in all clamping modules during the locking process is only possible via the air connection. For safe pressure ventilation, use the appropriate valves, shut-off valves with discharge or sealing nipples with air bleed screw.

NSL3 clamping stations without turbo function

For NSL3 clamping stations without turbo function, ventilation of the clamping modules occurs as a result of pressure applied to the unlocking connection via its own ventilation hole along the bottom of the base plate of the clamping station used. When setting up a clamping station without turbo function on the machine table, make sure that the vented compressed air is able to escape unobstructed along the bottom of the base plate. Make sure that the clamping station with the base plate is not located in the water bath. For this reason, make sure the coolant in the machine compartment has completely drained when actuating the air connections.

NSL3-V1 clamping stations with turbo function

For clamping stations with turbo function type NSL3-V1, piston chamber ventilation takes place alternately at one of the two free air connections. The air connections or connected supply lines must have a ventilation option for this reason. When a clamping station NSL3-V1 with turbo connection is used, the spring-actuated locking procedure at the quick-change pallet modules is actively supported with air pressure. This results in a higher pull down force. The increase in the pull down force on the clamping modules is achieved with a pressure pulse at the air connection. After actuation of the turbo function, the compressed air supply can be disconnected again.

Connecting hose lines

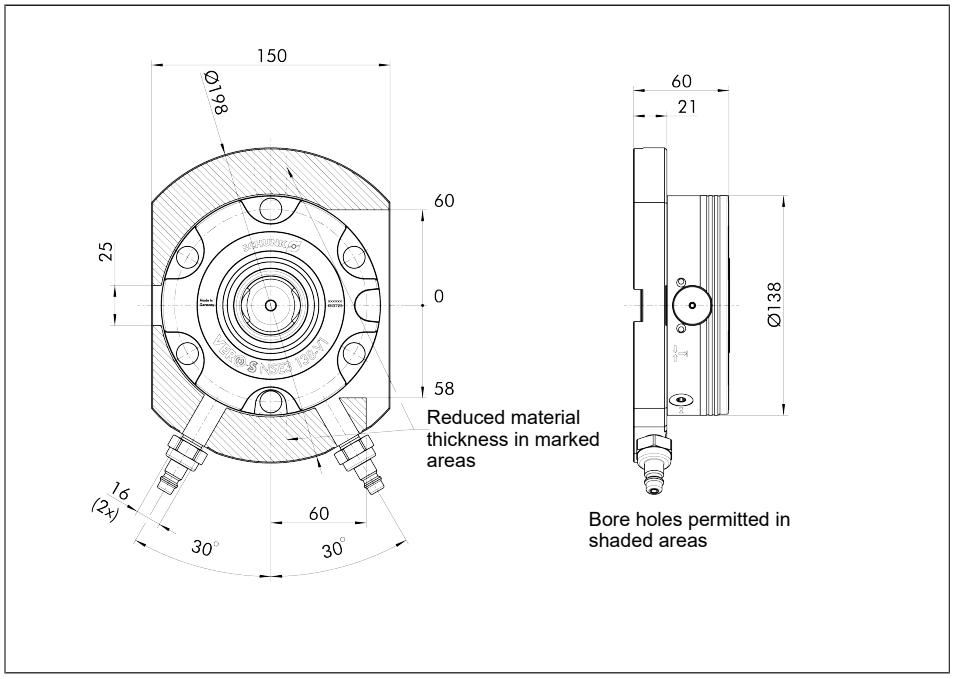
Choosing the minimum cross section for the hose line depends on the number of quick-change pallet modules installed inside one clamping station or in several clamping stations actuated with shared hose lines. Then, supply lines with the following minimum cross sections must be used.

Number of clamping modules installed	min. nominal hose width (hose inner diameter)
1	4 mm
2, 3, 4	6 mm
5	8 mm

When decoupling hose lines, the pneumatic plug-in connection or the sealing nipple must be protected against the ingress of dirt or coolant. The sealing nipple comes with a plastic cover plug. If, however, the supplied pneumatic plug-in connection is installed, a suitable seal must be provided via an accessory on the plug connection or the hose line.

4.3.1 NSL3 150-V1-T

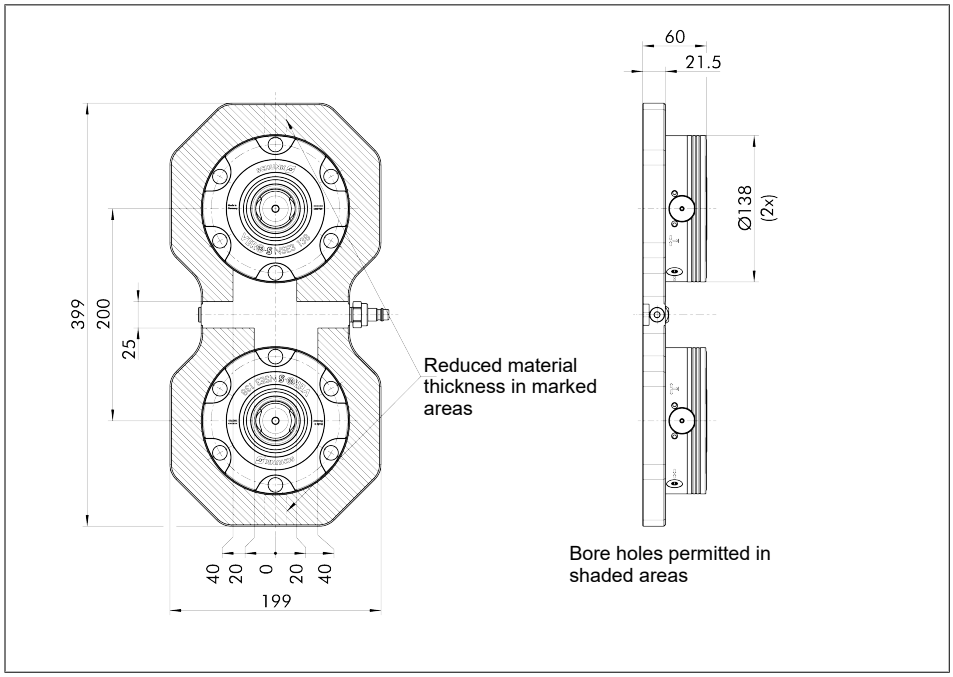
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are four alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping station. These allow for precise alignment along an alignment groove. The clamping station is equipped with a quick-change pallet module with two fitting grooves for the positional orientation of the clamping pallet or for the use of a clamping membrane type SPM plus 138. The NSL3 150-V1-T has two G 1/8" connectors for separate functions. One air connection for unlocking and one air connection for the turbo function. Supply occurs either via the pneumatic plug connections G1/8" 6/4 or the sealing nipple for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted to the supply points at both air connections with separately available connection strips (accessories).



NSL3 150-V1-T

4.3.2 NSL3 200

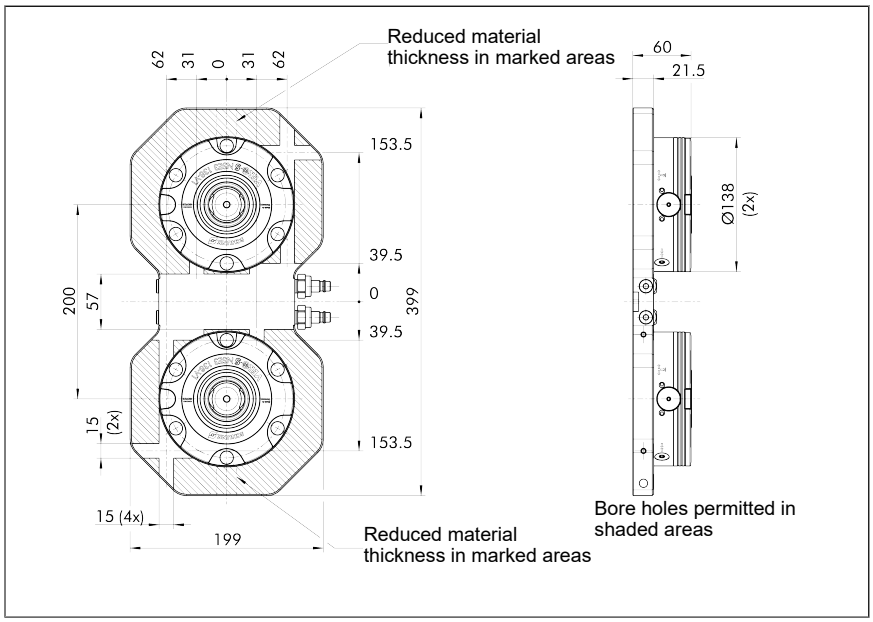
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are four alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping station. These allow for precise alignment along an alignment groove. The NSL3 200 is equipped with two interconnected G 1/8" air connections for simultaneously unlocking both clamping points. The air supply can be connected to either the front or the back of the clamping station. The opposing connection point is closed with a locking screw. Supply occurs either via two pneumatic plug connections G1/8" 6/4 or two sealing nipples for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted at the connection points using a separately available connecting strip (accessory).



NSL3 200

4.3.3 NSL3 200-V1-T

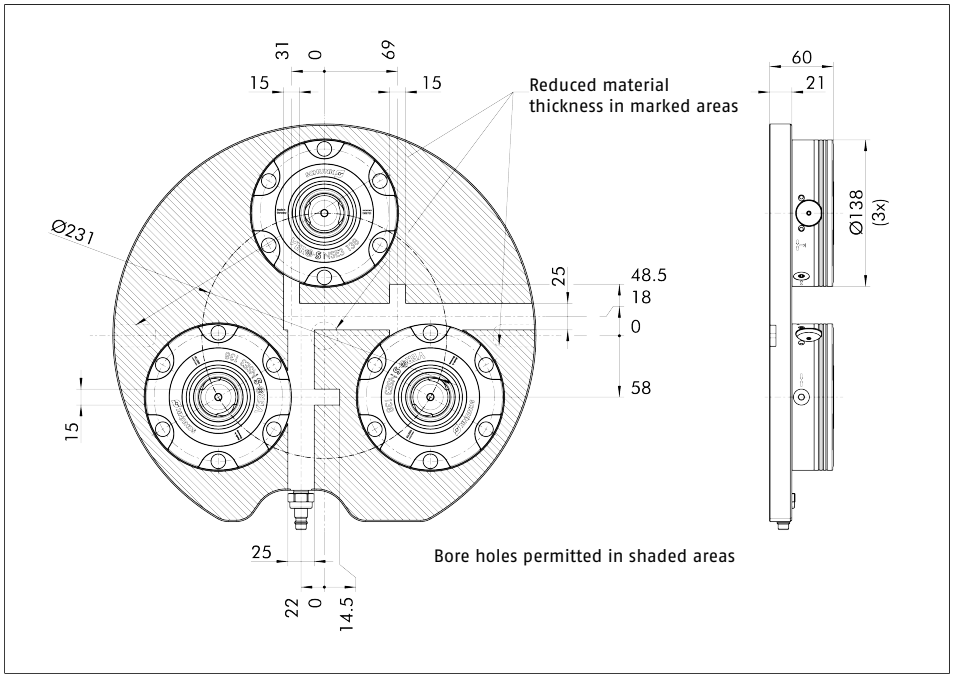
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are four alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping station. These allow for precise alignment along an alignment groove. The NSL3 200-V1-T is equipped with two interconnected G 1/8" air connections for simultaneously unlocking both clamping points. Two additional interconnected G 1/8" air connections to the supply of the turbo function at both clamping points. The air supply can be connected to either the front or the back of the clamping station. The opposing connection points are closed with locking screws. Supply occurs either via two pneumatic plug connections G1/8" 6/4 or two sealing nipples for locking couplings type NW 7.4 (accessory). The clamping station is equipped with quick-change pallet modules with two fitting grooves each. These are intended for positional orientation when using single clamping pallets types PAL-S, PAL-A or clamping membranes for workpiece clamping type SPM plus 138. The clamping station can be retrofitted at the connection points using a 2x connection strip (accessory).



NSL3 200-V1-T

4.3.4 NSL3 300-200

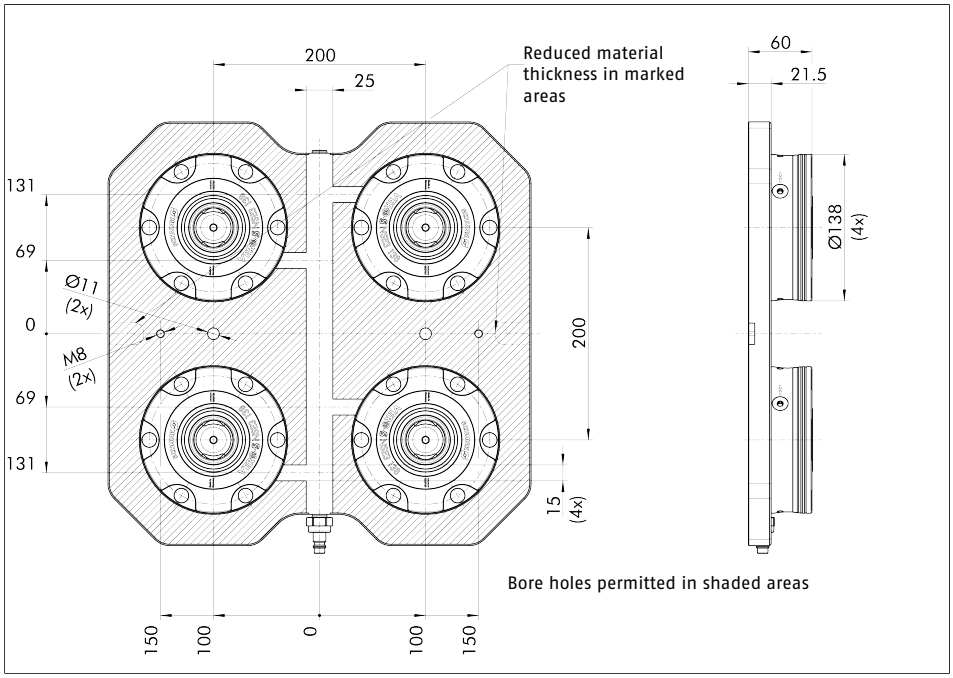
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are four alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping station. These allow for precise alignment along an alignment groove. The NSL3 300-200 is equipped with a G 1/8" air connection for simultaneously unlocking all three clamping points. Supply occurs either via a pneumatic plug connection G1/8" 6/4 or a sealing nipple for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted at the connection points using a separately available connection strip (accessory).



NSL3 300-200

4.3.5 NSL3 400

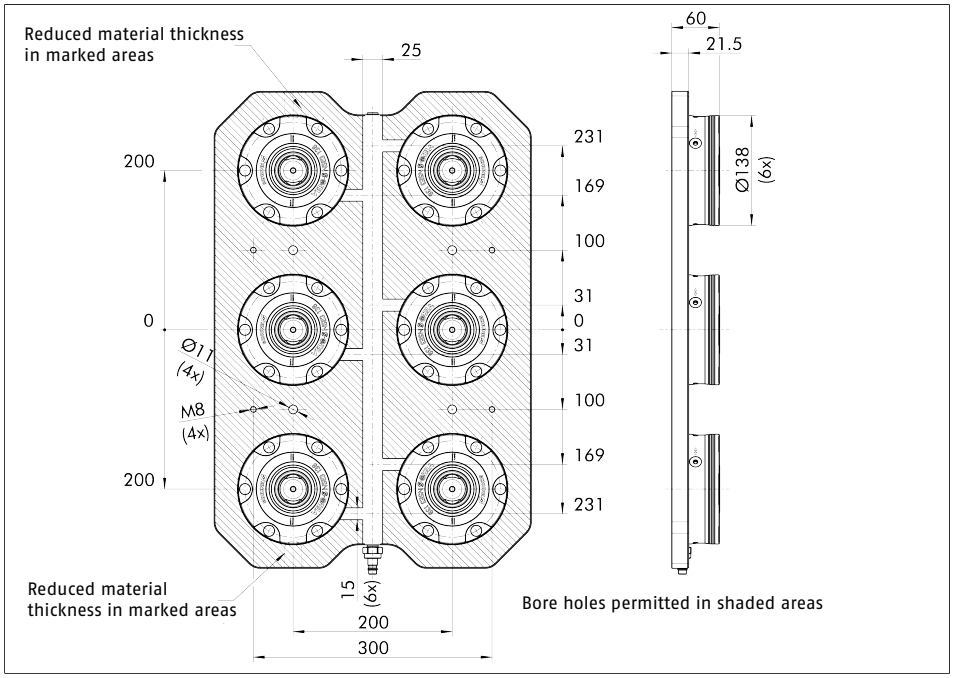
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are already 2 mounting holes at a distance of 200. These mounting points are fixed between the clamping modules, transverse to the operator side. Size M10 screws can be used at the additional mounting points to achieve a more rigid set-up when using clamps. There are two alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping stations. These allow for precise alignment along an alignment groove. The NSL3 400 is equipped with two interconnected G 1/8" air connections for simultaneously unlocking all four clamping points. The air supply can be connected to either the front or the back of the clamping station. The opposing connection point is closed with a locking screw. Supply occurs either via a pneumatic plug connection G1/8" 8/6 or a sealing nipple for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted at the connection points using a separately available connecting strip (accessory).



NSL3 400

4.3.6 NSL3 600

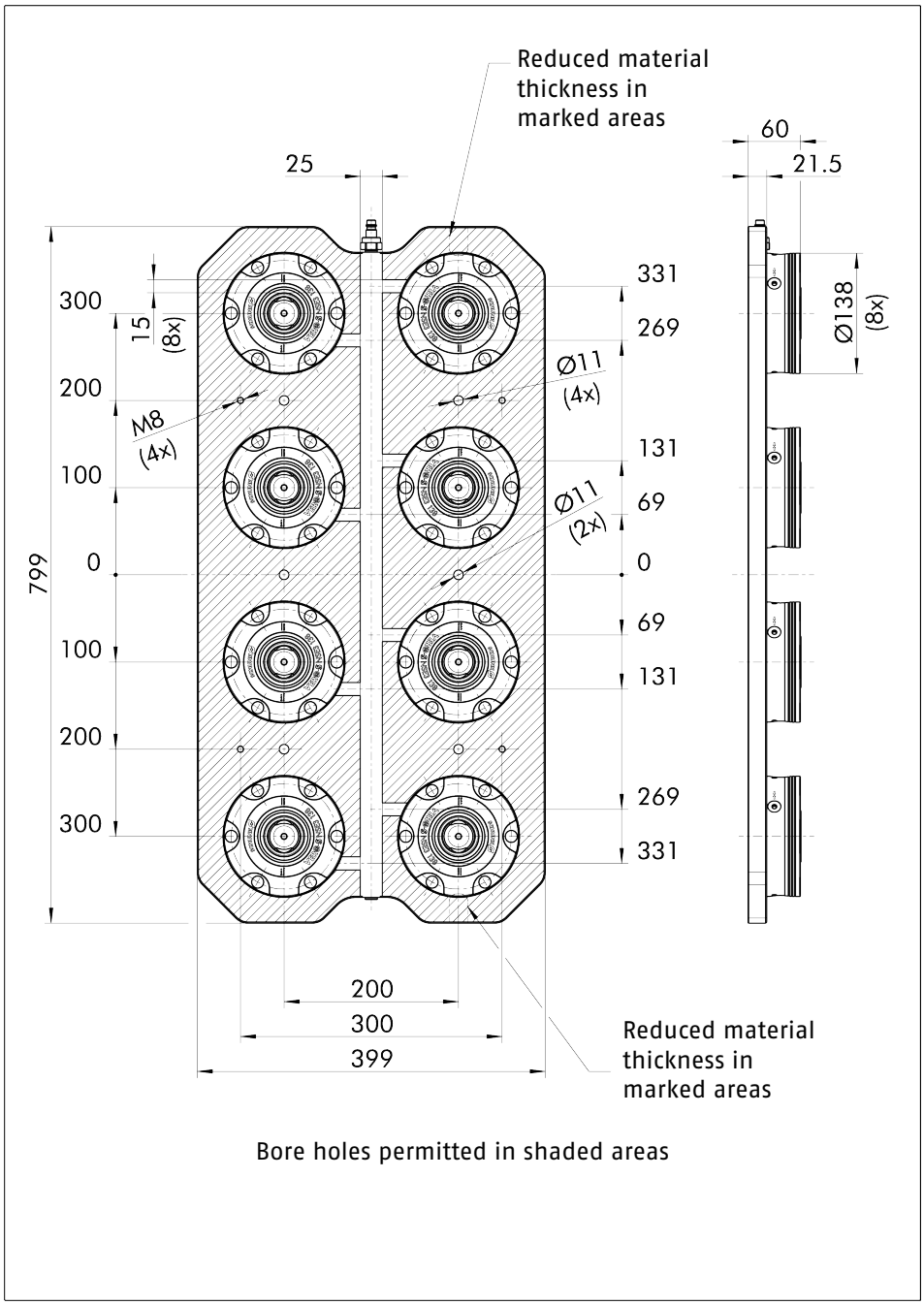
The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are already 4 mounting holes at a distance of 200 x 200. The mounting points are located in the middle between the clamping modules. Size M10 screws can be used at the additional mounting points to achieve a more rigid set-up when using clamps. There are two alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping stations on the machine table. These allow for precise alignment along an alignment groove. The NSL3 600 is equipped with two interconnected G 1/8" air connections for simultaneously unlocking all six clamping points. The air supply can be connected to either the front or the back of the clamping station. The opposing connection point is closed with a locking screw. Supply occurs either via a pneumatic plug connection G1/8" 8/6 or a sealing nipple (accessory) for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted at the connection points using a separately available connecting strip (accessory).



NSL3 600

4.3.7 NSL3 800

The clamping station can be clamped directly onto the machine table via screws. Permitted areas for appropriate bore holes can be found in the attached bore hole drawings. Optionally, BRR 50 clamp banks can be purchased. There are already 6 mounting holes at a distance of 200 x 200. The mounting points are located in the middle between the clamping modules. Size M10 screws can be used at the additional mounting points to achieve more rigid set-up on the machine table when using clamps. There are two alignment grooves on the bottom of the clamping station to mount T-nuts used for aligning the clamping stations on the machine table. These allow for precise alignment along an alignment groove. The NSL3 800 is equipped with two interconnected G 1/8" air connections for simultaneously unlocking all eight clamping points. The air supply can be connected to either the front or the back of the clamping station. The opposing connection point is closed with a locking screw. Supply occurs either via a pneumatic plug connection G1/8" 8/6 or a sealing nipple for locking couplings type NW 7.4 (accessory). The clamping station can be retrofitted at the connection points using a separately available connecting strip (accessory).



NSL3 800

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

CAUTION

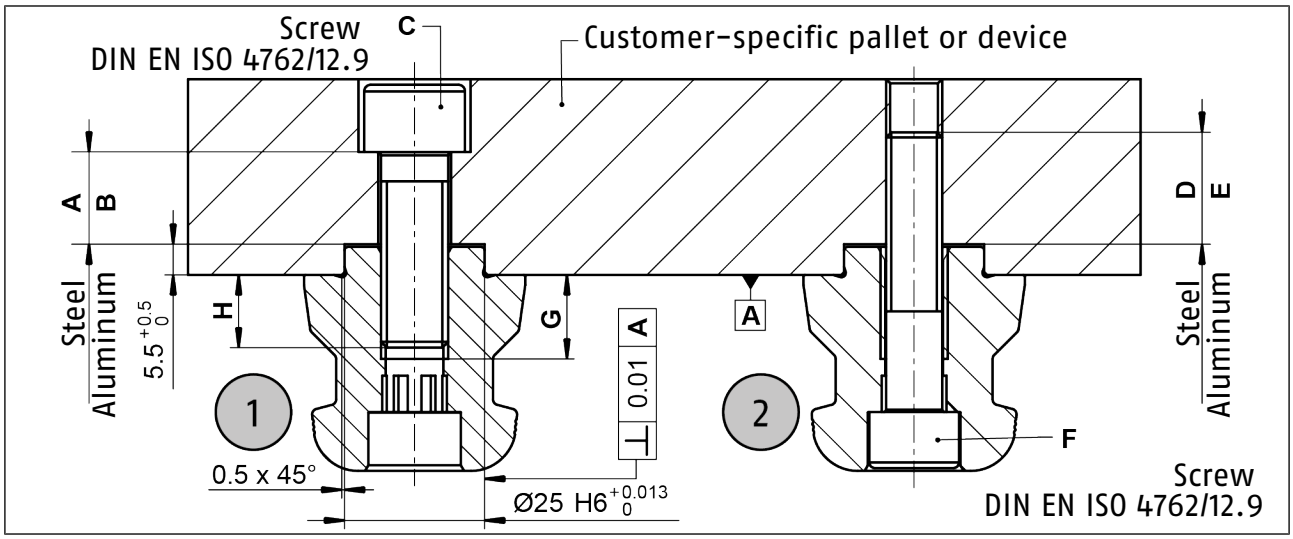
Notes on clamping pins and mounting screws

The holding force of the quick-change pallet system is limited essentially by the tightness of the screw connection which connects the clamping pin to the pallet or the device. This is why only screws of strength class 12.9 may be used for connections to the palette or device.
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 in two different ways to the workpiece or pallet; the mounting variants are numbered in order of preference.

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 plan sealing ring on the top of all quick-change pallet systems involved in the clamping function.

Type designation	ID no.	Min. outer diameter on the support of the part
NSE3 138 (-K)	1313721, 1313722	68 mm
NSE3 138-V1 (-K)	1313723, 1313724	68 mm

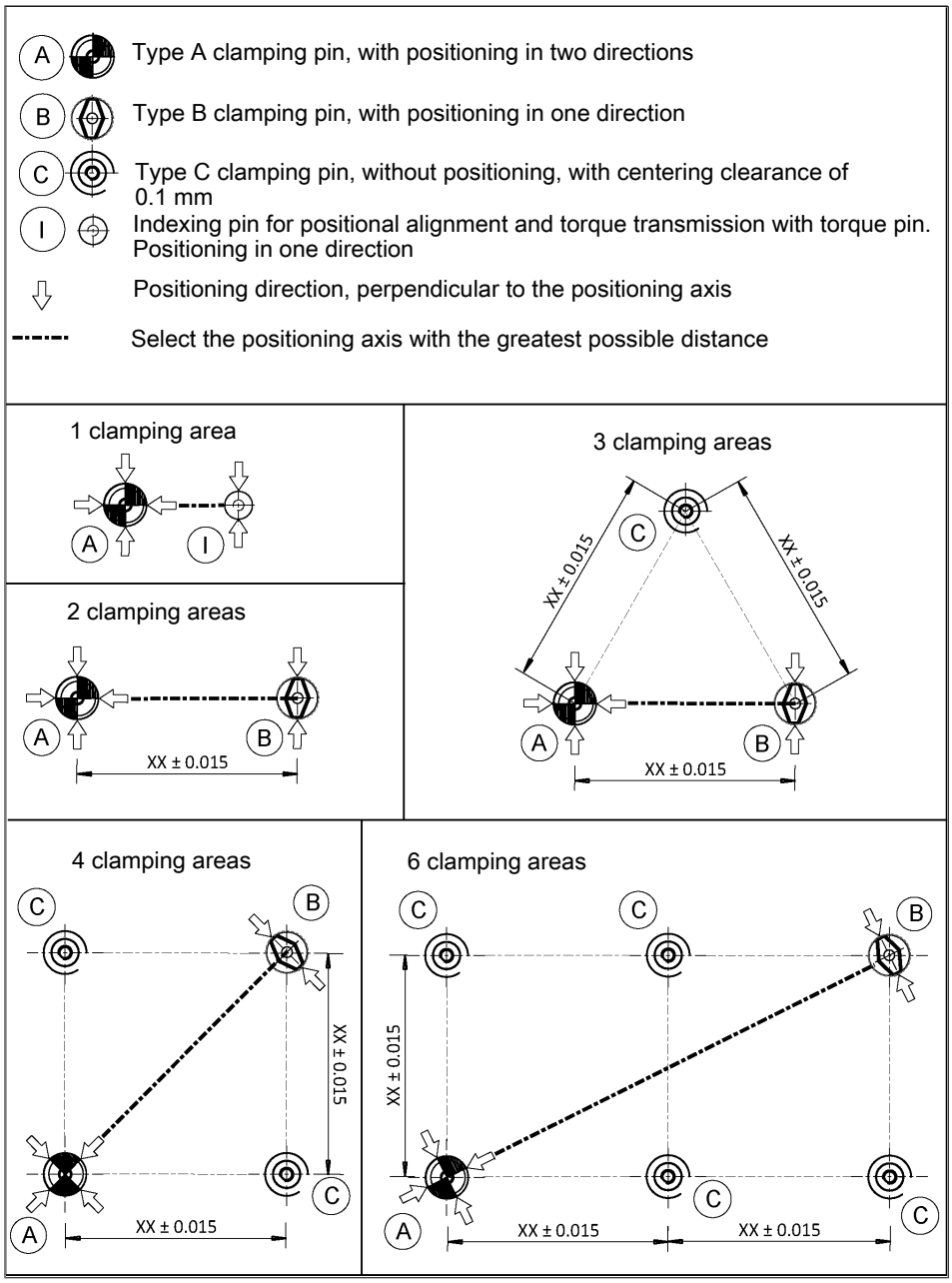


Tolerances and installation conditions

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

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

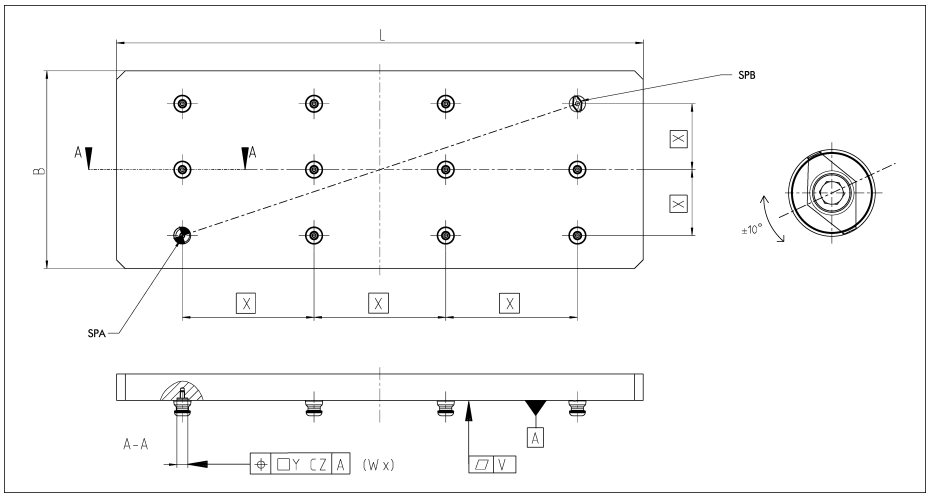
Usage/arrangement of the different types of clamping pins



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°.



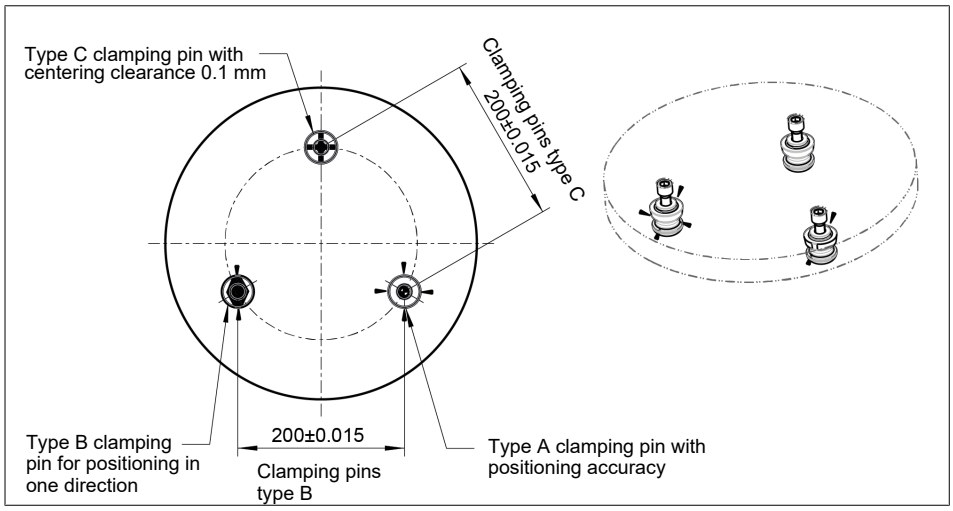
X = gauge of the clamping pins is variable

W = number of clamping pin interface

Plate size	Position when using clamping pin type A, B and C	Recommended flatness for optimal results	Prescribed flatness to ensure the function
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

Use / arrangement of the different types of clamping pins with a clamping pallet for clamping station NSL3 300-200

(Application: clamping pallet with 3 clamping positions)



Clamping pallet with 3 clamping areas

4.4.1 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.

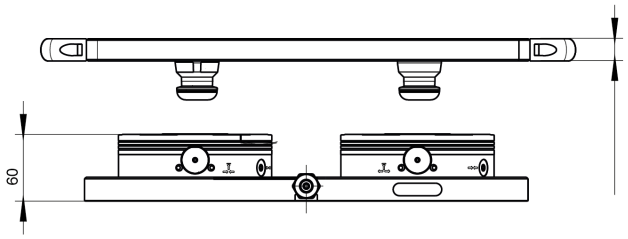
The repeat accuracy increases to < 0.002 mm when using the SPG 40.

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.

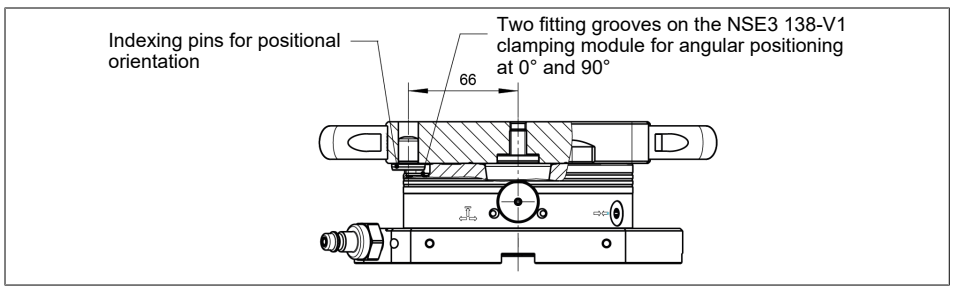
4.5 Clamping pallets PAL-S, PAL-A (optional)

There are suitable VERO-S clamping pallets to be used as accessories for NSL3 clamping stations. There are different sized clamping pallets that correspond to the clamping stations. These are available in steel as well as aluminum. The clamping pallets achieve highly accurate repeat accuracy in combination with the VERO-S NSL3 clamping station.

When using single clamping pallets, these can be placed in a position-oriented and non-rotating fashion on a single NSE3 138-V1 clamping module in combination with the NSL3-V1 clamping station. The positional orientation is achieved using an indexing pin type IXB V1 NSE plus, which inserts into one of two 90° angled fitting grooves on the clamping module. Request our installation drawings if doing the installation yourself.



VERO-S clamping pallets



NSL3 150-V1-T with single clamping pallet

4.6 Screw tightening torques

Tightening torques for mounting clamping pins to the workpiece or to the clamping pallet.

(Screw quality 12.9)

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

Tightening torques for fastening the clamping station with BRR50 clamp blanks.

The clamp blanks that have been adjusted by the customer to correspond to the machine table must be fastened to the machine table with fastening screws of strength class 10.9. These fixing screws and any nuts required for the T-slots are not included in the scope of delivery.

Note:

The clamping stations should preferably be fastened with M12 screws in connection with the clamp blanks.

(Screw quality 10.9)

Screw size	M10	M12	M14
Tightening torques (Nm)	50	88	120

5 Function

The VERO-S NSL3 clamping station guarantees rapid changing of VERO-S clamping pallets, devices or workpieces in the machine room with a high level of repeat accuracy. In the VERO-S quick-change pallet modules, the clamping pallet is positioned and locked via the related VERO-S clamping pin.

5.1 Connections on the clamping station

The VERO-S clamping station is actuated using an air connection with sealing nipple and sealing coupling. The sealing nipple is included in the accessory pack for the clamping station. The locking couplings are not included in the scope of delivery of the clamping station. The required locking coupling required is the industry standard-size NW 7.4. The scope of delivery also includes a pneumatic plug-in connection with a nominal hose diameter of 4 mm or 6 mm as an alternative connection option.

CAUTION

The pressure chambers of the quick-change pallet modules must be able to vent during actuation.

- When using customer-specific air connection plug-in systems. Use sealing nipples without shut-off function (with an open through-hole) to vent the clamping module piston chambers.
- The corresponding valves, sound absorbers or shut-off valves should be fitted with a ventilation function.

CAUTION

When disconnecting hose lines, the relevant air connections (sealing nipples) must be closed with seal plugs to prevent the ingress of dirt or cooling lubricant. The attachable seal plugs are made of plastic and are included in the scope of delivery.

5.2 Unlocking connection

If the unlocking connection on the clamping station is pressurized with compressed air, all modules are unlocked simultaneously. Clamping pallets, devices and workpieces can be exchanged or removed from the clamping station.

Since VERO-S NSE3 clamping modules are spring-operated clamping systems, the connection must remain pressurized with compressed air (at least 5 bar) during the set-up / changing process.

After decoupling the air supply at the unlocking connection, all clamping modules are locked simultaneously. The exchanged clamping pallet is firmly fastened and aligned with high precision. If no clamping pallet is used in the clamping station, the clamping slides of the quick-change pallet module moves into the closed position. Exchanging the clamping pallet is not possible with clamping modules that are not locked.

⚠ WARNING

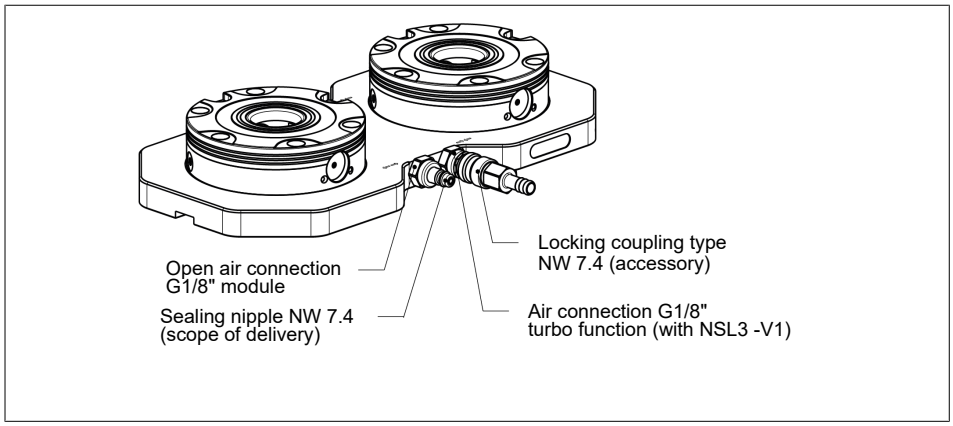
Risk of injury due to clamping pallet falling from the clamping station if the unlocking connection is not scheduled pressurized according to schedule.

- The unlocking connection may only be operated if the clamping pallet has been prevented from falling.

5.3 TURBO connection (with NSL 3-V1)

NSL3 -V1 clamping stations are equipped with an additional turbo connection. When compressed air is applied at the connection for the turbo function, this function actively provides air pressure to support the spring-actuated locking procedure of the quick-change pallet module. This increases the pull-in force in all the modules.

One pressure pulse is sufficient to increase the pull-in force until the maximum permissible value is reached. Afterwards, the clamping station can be switched back to depressurized. The pull-in force is retained due to the self-locking function of the spring-loaded system.



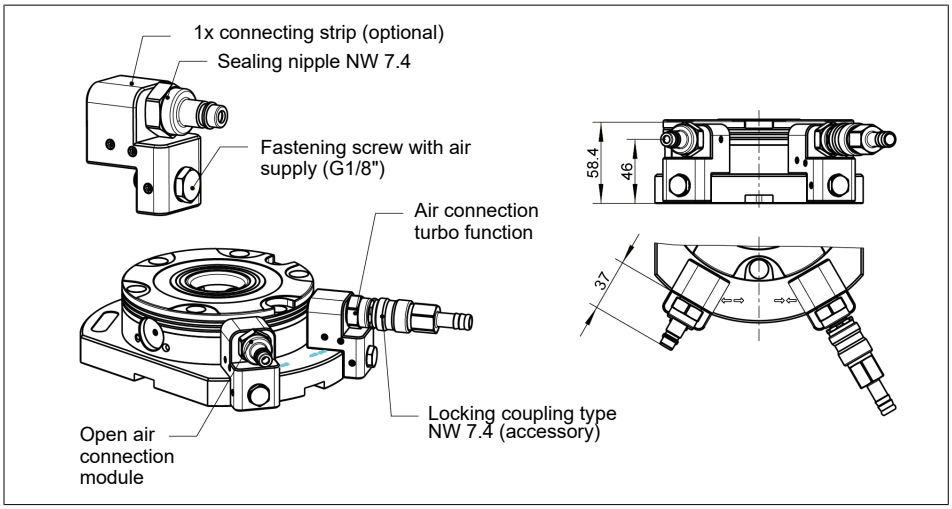
Connections on the clamping station

5.4 VERO-S connecting strip ASL1-G1/8", ASL2-G1/8" (optional)

Upon customer request, a VERO-S terminal block can be mounted to the clamping station in order to facilitate access to the air supply point. The connecting strip is equipped with an elevated connection point with a size NW 7.4 sealing nipple. A quick air relief valve is integrated into the connecting strip. The quick air relief reduces the opening and closing times of the clamping station as the air can escape rapidly through a sound absorber. The valve strip is available in two different versions, a single connecting strip type ASL1-G1/8" and a coupled 2x connecting strip type ASL2-G1/8". To mount the connecting strip, the front air connection (sealing nipple) is removed from the clamping station and in its place, the connecting strip is directly adjusted via the hollow screw. The rear air connection of the clamping station remains locked with the locking screw. The NSL3 200-V1-T is fitted with the 2x connecting strip, which supplies both air connections separately. The circuit symbols for the "unlocking function" and the "turbo function" are engraved on the clamping stations type NSL3 -V1.

1x connecting strip ASL1-G1/8" ID no.: 1327465 suitable for clamping station					
NSL3 150-V1-T (installed 2x)	NSL3 200	NSL3 300-200	NSL3 400	NSL3 600	NSL3 800

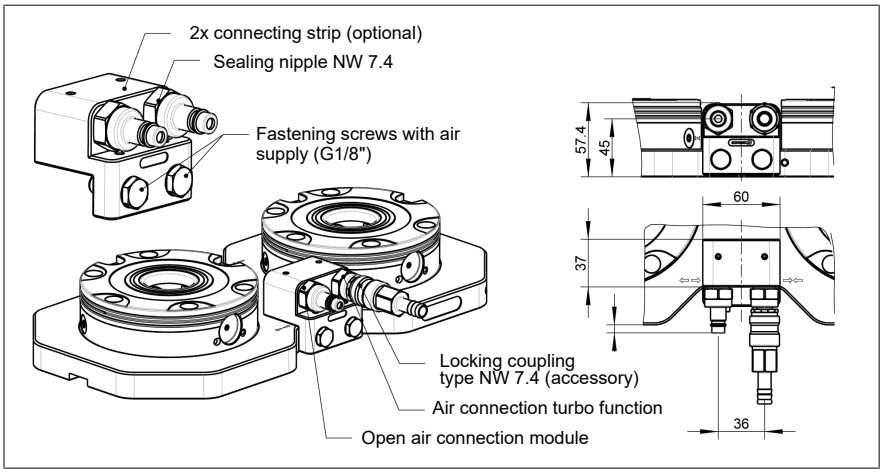
Labeling 1x connecting strip



1x connecting strip ASL1-G1/8"

2x connecting strip ASL2-G1/8" ID no.: 1315007 suitable for clamping station					
NSL3 200-V1-T					

Labeling 2x connecting strip



2x connecting strip ASL2-G1/8"

5.5 Cone seal KVS3 (optional)

Upon customer request, VERO-S NSE3 and NSE3-V1 can be retrofitted with a KVS3 cone seal without removing the unit from the installation space. Via the cone seal, the quick-change pallet system can be protected against the penetration of coolant and chips into the change interface.

Note

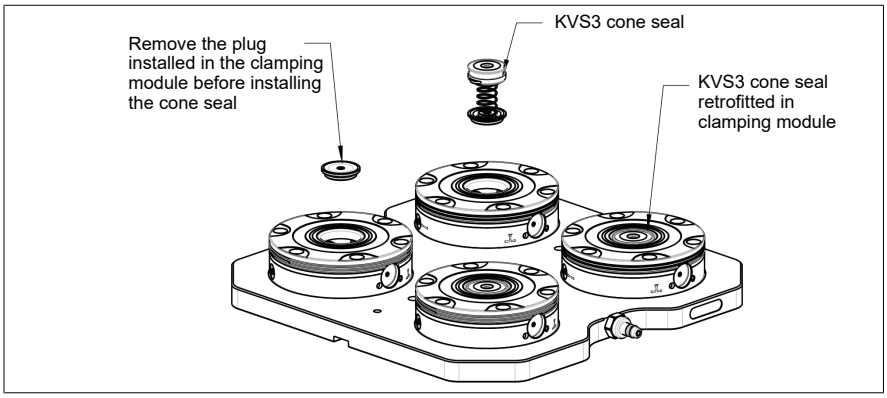
The clamping stations VERO-S NSL3 are not fitted as standard to a connection position for the exhaust function of the clamping modules.

Note

To install the cone seal in a VERO-S NSE3, the plug fitted must first be removed from the change interface. Use a hexagon socket screwdriver for this purpose.

Note

The technical data and the exact installation instructions for the cone seal can be found in the operating manual for the VERO-S NSE3, NSE-T3 Document no.: 1152197.



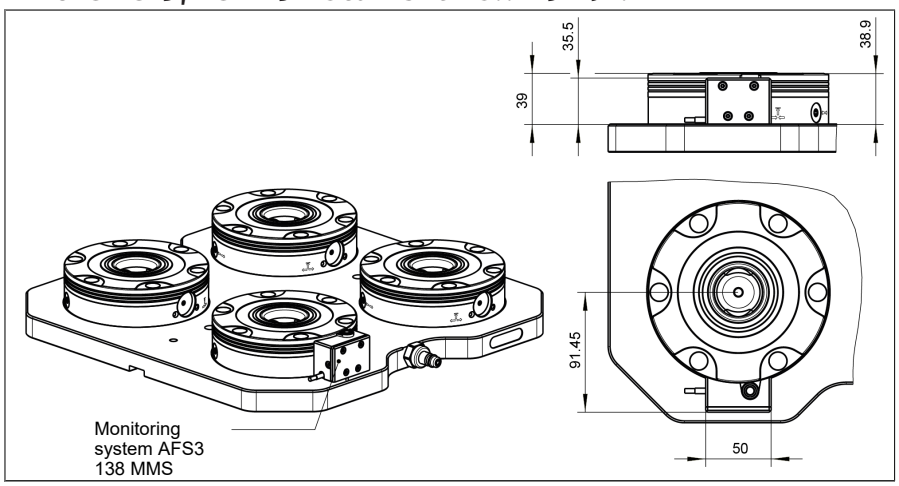
NSL3 clamping station retrofitted with cone seal

5.6 Monitoring system AFS3 138 MMS (optional)

The AFS3 138 MMS monitoring system can be mounted to the NSL3 clamping station upon customer request. The monitoring system can evaluate whether the operating states is "TENSIONED" or "UNLOCKED" and transmit this data to the machine control system. Workpiece contact monitoring is possible.

Note

The technical data and the exact installation instructions for the AFS3 138 MMS can be found in the operating manual for the VERO-S NSE3, NSE-T3 Document no.: 1152197.



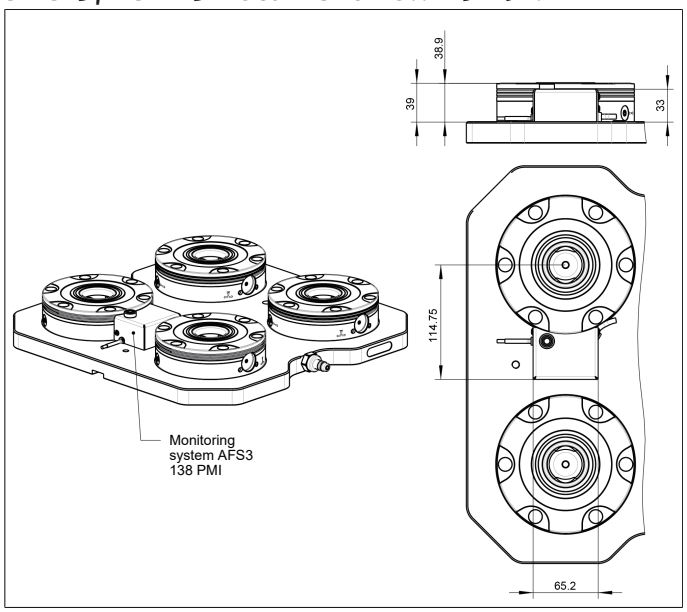
Clamping station NSL3 400 retrofitted with the AFS3 138 MMS monitoring system

5.7 Monitoring system AFS3 138 PMI (optional)

The AFS3 138 PMI monitoring system can be mounted to the NSL3 clamping station upon customer request. The monitoring system can evaluate whether the operating states is "TENSIONED" or "UNLOCKED" and transmit this data to the machine control system. Workpiece contact monitoring is possible.

Note

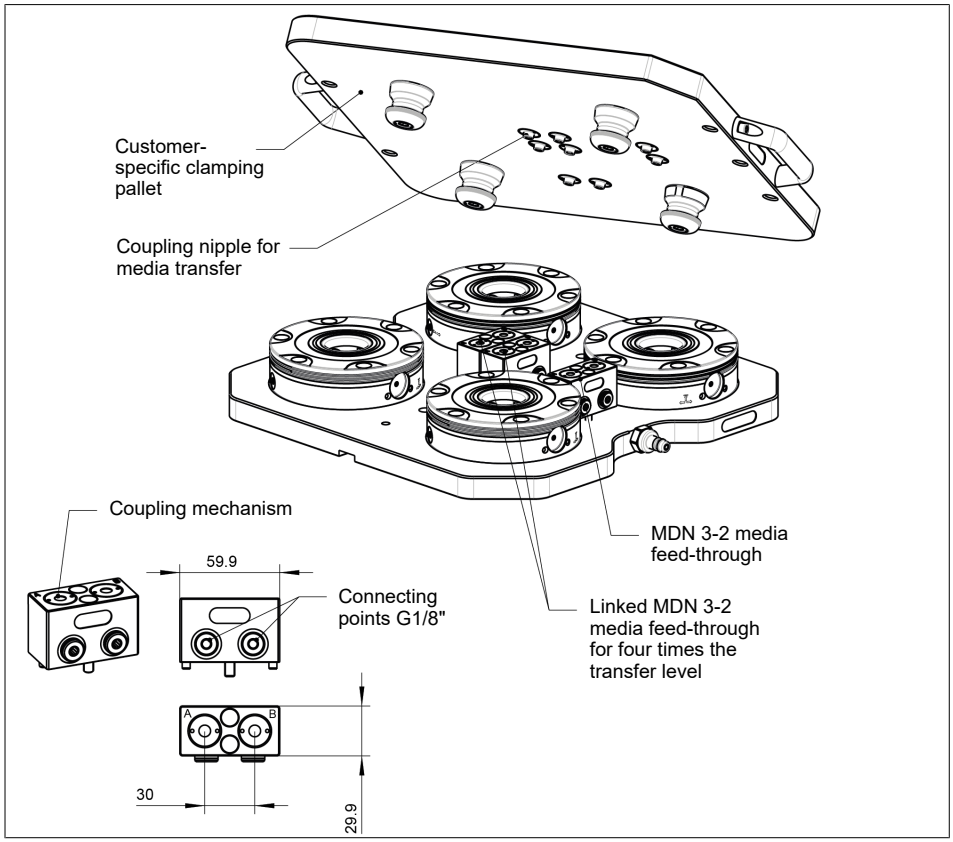
The technical data and the exact installation instructions for the AFS3 138 PMI can be found in the operating manual for the VERO-S NSE3, NSE-T3 Document no.: 1152197.



NSL3 400 clamping station retrofitted with the AFS3 138 PMI monitoring system

5.8 Media feed-through VERO-S MDN 3-2 (optional)

As an option, the NSL3 clamping station can be enhanced with the VERO-S MDN 3-2 media feed-through. The media feed-through is intended for transmitting liquid and gaseous media from the NSL3 clamping station to the clamping pallet. The compact design of the media feed-through allows for variable positioning on the base plate of the clamping station. Attaching the media feed-through requires additional screw threads on the clamping station. Further details on the MDN 3-2 media feed-through and the corresponding coupling elements are available on request.



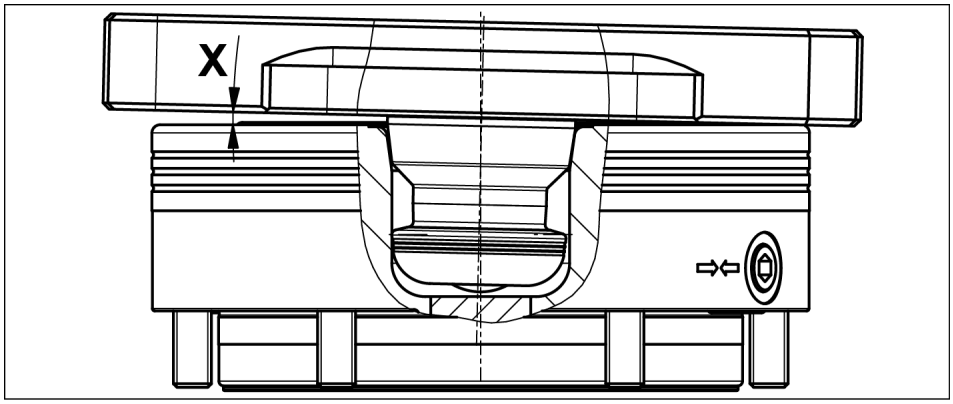
NSL3 400 clamping station retrofitted with VERO-S MDN 3-2 media feed-through

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.

7 Maintenance and care

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

⚠ 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 covers of the clamping modules are spring preloaded and may only be removed by trained specialist personnel. The covers can only be disassembled and assembled using a special assembly tool and by observing the corresponding disassembly and assembly instructions.

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

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.

- Check the clamping station at regular intervals (at least every two weeks or after 1000 clampings). The system is functioning correctly if the clamping slides on all simultaneously actuated clamping modules move smoothly at the minimum system pressure of 5 bar and open completely.
- 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 corrected. For example, by replacing the damaged unit.

- During maintenance work on the quick-change pallet modules or the bottom air supply of the clamping station, new seals must be fitted and lubricated with Renolit HLT 2 or a similar grease before assembly.
- Check the supply hose line to the pressure supply of the clamping station for damage at regular intervals. The supply hose line must be of the appropriate nominal hose width and be completely inserted into the air connections and securely clamped. Protect the supply hose line from kinking and avoid tensile loads. After replacing the hose line, perform a leak test.

CAUTION

Only polyurethane hydrolysis-resistant air hoses with appropriate diameters are to be used.

Detaching thread on the clamping modules

The clamping modules installed in the clamping stations have two detaching threads located opposite each other. This allows, for example, the clamping modules to be more easily removed from the clamping station for performing maintenance work.

7.1 Leak test

As part of a leak test, the air and plug-in connections and the coupling mechanism should be tested for leaks.

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

Performing the leak test

1. Connect the components to the air connection in the following order: pressure gauge, supply line with coupling nipple.
2. Pressurize the clamping system with compressed air.
3. Test the clamping station for leaks in both module positions.

To identify any leaks in the clamping station, no clamping pallet should be fitted.

If the clamping system has leaks, check the entire pneumatic system (e.g. using leak detector spray). If any leaks are identified, check the seals and replace them if necessary. Leaks at the plug-in connections or in the pneumatic lines, for example, must be sealed and any defective components replaced.

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 areas do not unlock

Possible cause	Remedial measures
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 support weight

9.2 The clamping areas do not unlock perfectly

Possible cause	Remedial measures
Pressure below minimum	Check operating pressure (min. 5 bar)
The modules were not operated with oiled compressed air	Install maintenance unit with oiler
Hose diameter below minimum	for required hose diameters, see chapter "Securing and connecting" ▶ 4.3 [🗋 15]
The turbo connection is still pressurized, this applies to clamping stations with turbo function	Ventilate the connection

9.3 The quick-change pallet systems no longer open quietly

Possible cause	Remedial measures
The clamping faces on the clamping slides and on the clamping pin are dirty	Remove the clamping pallet and clean the clamping faces on the clamping slides and on the clamping pins. Clean all clamping modules installed on the clamping slides

10 Parts lists

10.1 Part lists

NSL3 150-V1-T (ID no. 1323568)

Item	Designation	Quantity
1	Base plate	1
2	NSE3 138-V1	1
4	Set-screw	1
11	Locking screw	2
12	Sealing ring G1/8"	2
13	Sealing nipple G1/8"	2
14	Pneumatic screw-in union G1/8" 6/4	2
21	Cylindrical clamp blanks BRR 50	Optional

NSL3 200 (ID no. 1323569)

Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	2
3	NSE3 138	2
5	O-ring	2
6	O-ring	4
7	Countersunk screw	4
8	Locking screw	1
12	Sealing ring G1/8"	1
13	Sealing nipple G1/8"	1
14	Pneumatic screw-in union G1/8" 6/4	1
21	Cylindrical clamp blanks BRR 50	Optional

NSL3 200-V1-T (ID no. 1323570)

Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	2
3	NSE3 138-V1	2
5	O-ring	2
6	O-ring	6
7	Countersunk screw	6
9	Set-screw	2
10	Locking screw	2
12	Sealing ring G1/8"	2
13	Sealing nipple G1/8"	2
14	Pneumatic screw-in union G1/8" 6/4	2
21	Cylindrical clamp blanks BRR 50	Optional

NSL3 300-200 (ID no. 1323571)

Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	3
3	NSE3 138	3
5	O-ring	3
6	O-ring	6
7	Countersunk screw	6
10	Locking screw	1
12	Sealing ring G1/8"	1
13	Sealing nipple G1/8"	1
14	Pneumatic screw-in union G1/8" 6/4	1
21	Cylindrical clamp blanks BRR 50	Optional

NSL3 400 (ID no. 1323572)

Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	4
3	NSE3 138	4
5	O-ring	4
6	O-ring	8
7	Countersunk screw	8
8	Locking screw	1
12	Sealing ring G1/8"	1
13	Sealing nipple G1/8"	1
14	Pneumatic screw-in union G1/8" 8/6	1
21	Cylindrical clamp blanks BRR 50	Optional
22	Eye bolt, M8	2

NSL3 600 (ID no. 1323574)

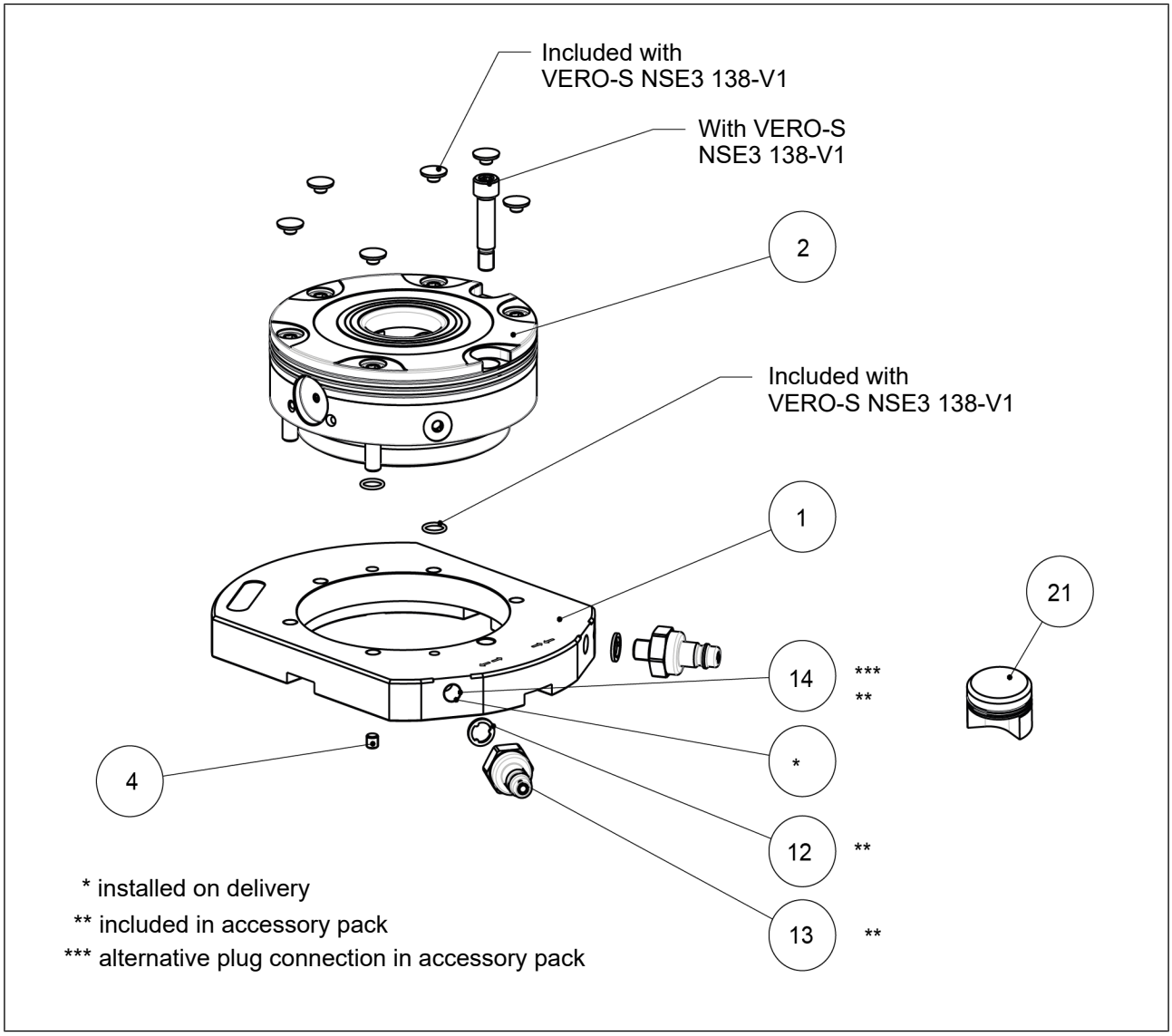
Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	6
3	NSE3 138	6
5	O-ring	6
6	O-ring	12
7	Countersunk screw	12
8	Locking screw	1
12	Sealing ring G1/8"	1
13	Sealing nipple G1/8"	1
14	Pneumatic screw-in union G1/8" 8/6	1
21	Cylindrical clamp blanks BRR 50	Optional
22	Eye bolt, M8	2

NSL3 800 (ID no. 1323575)

Item	Designation	Quantity
1	Base plate	1
2	Air duct strip	8
3	NSE3 138	8
5	O-ring	8
6	O-ring	16
7	Countersunk screw	16
8	Locking screw	1
12	Sealing ring G1/8"	1
13	Sealing nipple G1/8"	1
14	Pneumatic screw-in union G1/8" 8/6	1
21	Cylindrical clamp blanks BRR 50	Optional
22	Eye bolt, M8	2

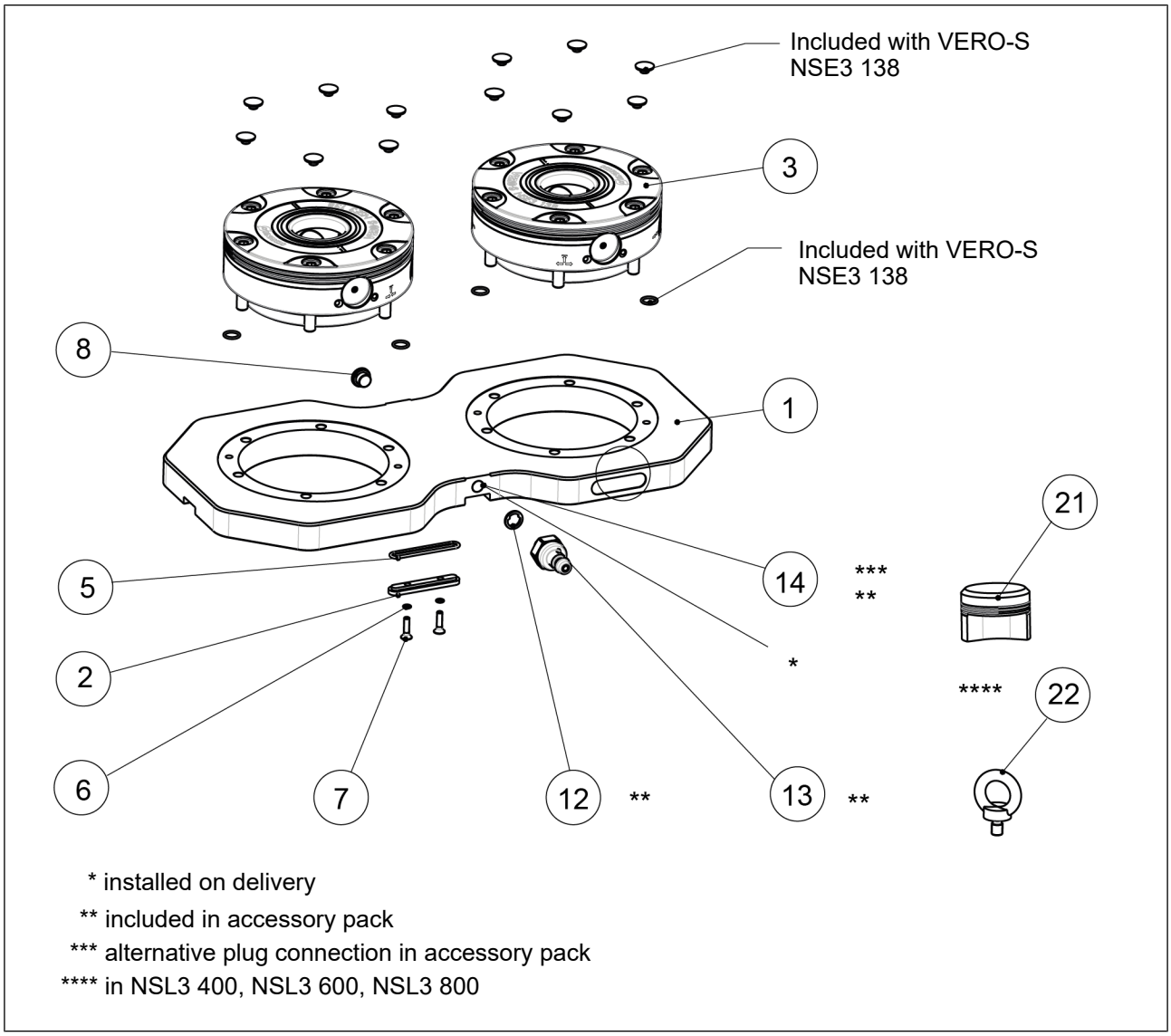
11 Assembly Drawings

11.1 NSL3 with NSE3 138-V1 quick-change pallet module



NSL3 with NSE3 138-V1 quick-change pallet module

11.2 NSL3



NSL3

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:	NSL, NSD, NST, GSL, SSN, SSN turn

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

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

Harmonized Standards applied:

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

Other related technical Standards and specifications:

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

Mengen, 19th of July 2023

Signature: see original declaration

p.p. Philipp Schräder
Head of Development standard products

Signature: see original declaration

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

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