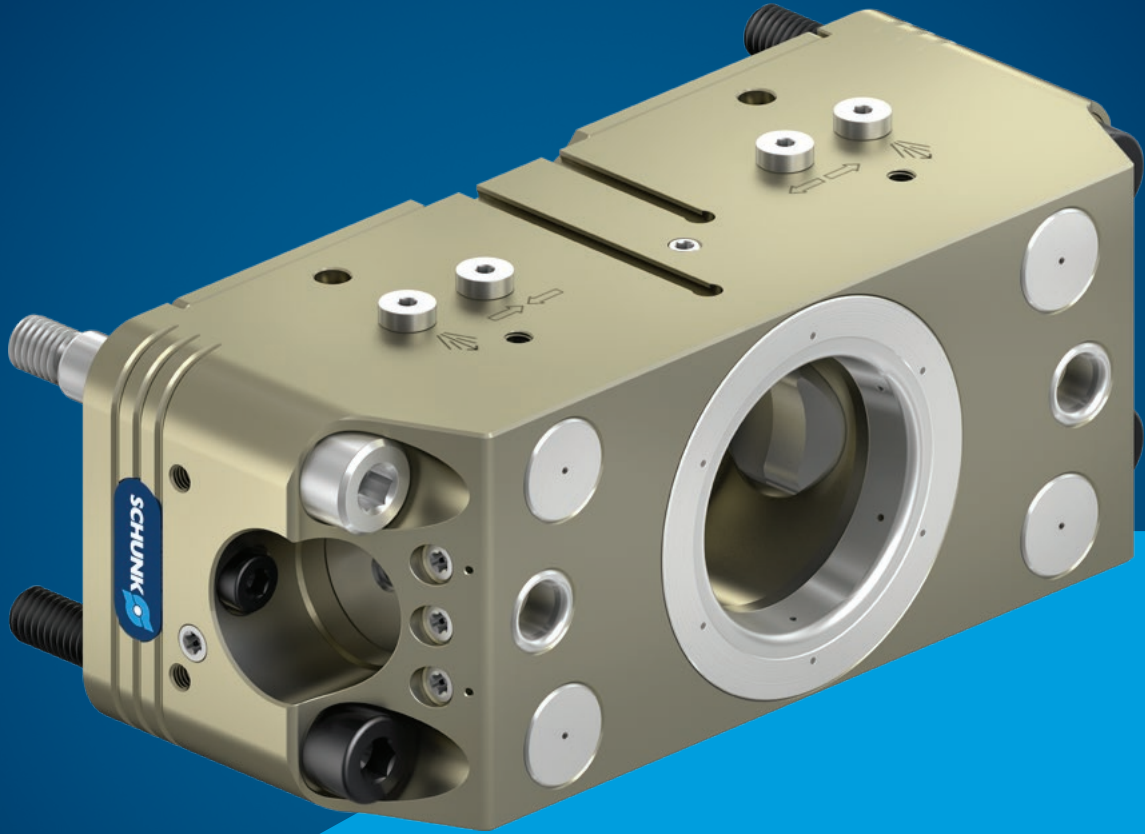




VERO-S NSR

**Robot couplings for high-end
palletizing**

Maintenance-free robot coupling for pallet handling extremely close to the machine table

The robot couplings of the VERO-S NSR series have been setting benchmarks for high-efficiency, robot-assisted pallet change on machine tools for many years. The three robot modules NSR mikro 60, NSR mini 100 and NSR 160 are made of high-strength and hard-anodized aluminum alloy. Due to their low weight and extremely slim design, these modules allow for loading extremely close to the machine table. Heavy pallets, meanwhile, can be easily handled with the robust robot modules NSR3 138 and NSR maxi 220.



Advantages – Your benefits

- + Perfectly suitable for automation**
Loading extremely close to the machine table.
- + All modules can be operated with a system pressure of 6 bar**
Additional pressure intensifiers are not required
- + Positioning via short taper**
Very easy connecting interface with a repeat accuracy of < 0.02 mm
- + Patented dual stroke system for highest pull-down forces**
High force transmission in smallest space
- + Form-fit, self-retained locking**
Full pull-down force is maintained even in the event of a pressure drop
- + Turbo integrated by default**
Pull down forces increased by up to 300%
- + Air purge cleaning integrated in the standard version**
To protect all functional surfaces from dust and chips for maximum process reliability
- + Inductive monitoring of module opened or closed and of pallet presence**
For a maximized process reliability

Technical data

Description	Turbo function	Pull-down force [kN]	Pull-down force with turbo [kN]	Max. moment Mx [Nm]	Max. moment Mz [Nm]
NSR mikro 60	●	0.5	1.5	15	32
NSR mini 100	●	1	4	75	200
NSR3 160	●	4	15	700	1600
NSR3 138	●	8	28	1500	1600
NSR maxi 220	●	12	50	4000	4000

Function NSR3 160

The clamping procedure of the robot module is carried out by an integrated spring assembly. An axial piston and a patented drive kinematics convert the spring force into a maximum pull-down force on the clamping pin. Clamping is carried out by two clamping slides and is self-retained. In addition, the pull-down force can be increased by means of an integrated turbo function. The module is opened pneumatically with a system pressure of 6 bar.



- 1 High-precision short taper centering**
Ensures μ -precise connection
- 2 Patented dual stroke system**
High pull-down forces are ensured between the piston and the clamping slide
- 3 Turbo function**
For amplification of the pull-down force
- 4 Large contact surfaces**
For transmitting the pull-down and holding forces
- 5 Completely sealed system**
Therefore absolutely maintenance-free
- 6 Steel inlays with integrated cleaning function**
For the greatest possible wear resistance
- 7 Monitoring of the clamping slide position module open and module closed**
Possible via inductive proximity switches
- 8 Weight-optimized design**
For greatest payloads
- 9 Anti-rotation protection**
For position orientation of the clamping pallet
- 10 Insertion radii on the clamping pin**
For fast and safe connecting even in the event of tilt angle and eccentricity
- 11 Actuation of the module**
From the side or bottom as desired
- 12 Fitting screw**
For exact positioning of the robot coupling
- 13 Pneumatic system**
Actuation with 6 bar

Centering via short taper

The precise short taper centering combined with the form-fitting and self-retaining locking characterizes SCHUNK robot coupling.



Locking via clamping slides

Large contact surfaces between clamping slides and clamping pin ensure a low surface pressure, resulting in a long service life.



Easy joining

Entry radii on the clamping pin and clamping module enable quick and safe joining, even with a tilt angle and eccentricity. Benefit: The robot's inaccuracies are compensated.



Integrated turbo function

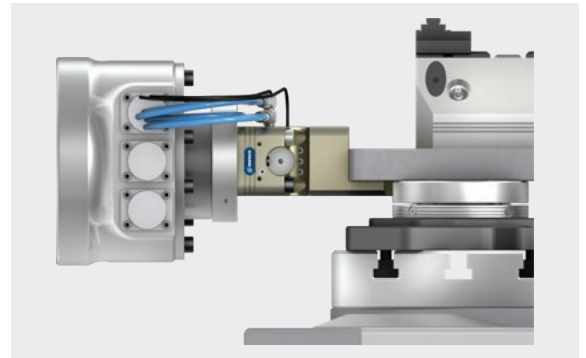
In order to raise the pull-in force, the quick-change pallet module is additionally pressurized with compressed air during clamping. The turbo function increases the pull-down force by up to a factor of 4 (max. 50,000 N) compared to clamping merely based on spring force. With turbo function active, higher loading weights are facilitated.

- ❶ **Spring force**
Stainless, fatigue-resistant pressure springs.
- ❷ **Additional force**
Resulting from the turbo function.
- ❸ **Turbo function connection**



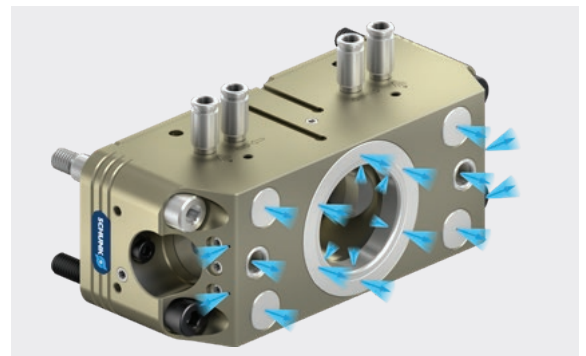
Slim design

The extra slim design of the robot coupling makes it possible to load pallets extremely close to the machine table. Combining with the NSA3 palletizing modules allows for implementation of very low heights – the machine room is still available for the workpieces.



Cleaning based on air purge

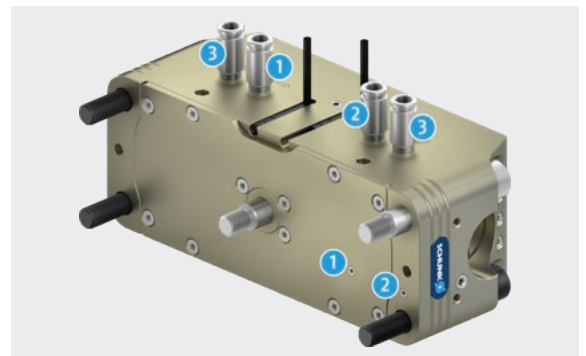
The cleaning function integrated into the standard ensures optimal cleaning of the flat work surface, centering cone, center bore and anti-rotation protection. Bore holes form an air film between the robot coupling and the pallet coupling, which ensures that all reference surfaces are clean.



Control of the robot coupling

Actuation for opening and turbo function can be performed either at the side or on the base side. The connections for the air purge are fixed at the side.

- 1 Open
- 2 Turbo function
- 3 Air purge



Anti-rotation protection for pallets

The pallet is drawn in by the robot coupling via a clamping pin. The anti-rotation protection around the middle longitudinal axis is located either via slanted surfaces on the sides or via two cylindrical pins in the front.

- 1 Possibility 1
Anti-rotation protection via lateral surfaces on the robot coupling
- 2 Possibility 2
Anti-rotation protection via two cylindrical pins in the front of the robot coupling



Economic automation of machine tools without media feed-through

With the VERO-S media coupling, machine tools that have no media routing in the interior of the machine, can now be loaded automatically. Both the VERO-S modules and the pneumatic clamping systems can be actuated via the media coupling at the robot-sided media routing. The media coupling can be retrofitted to all standard VERO-S NSL plus and VERO-S NSL3 clamping stations.

- ❶ **VERO-S NSL3 clamping station**
Used as a basis for fast and repeatable exchange of clamping devices
- ❷ **Media coupling**
Simple retrofitting on all standard clamping stations
- ❸ **Coupling nipple**
Coupling forces depend on the robot, clamping station, and clamping device
- ❹ **Robot coupling**
Required positioning accuracy:
Radial ± 0.3 mm
Axial $+0.5$ mm
- ❺ **Clamping pallet with TANDEM KSP3 clamping force block**
Clamping pallets for actuating pneumatic clamping devices through the pallet cannot be retrofitted



Monitoring options

Monitoring open or clamped (optional)

The position of the clamping slides can be monitored with suitable magnetic switches (accessories) (module open – closed). The magnetic switches are attached and clipped to the outside of the module – retrofitting takes just a few minutes. This monitoring ensures maximum process reliability with daily use of NSR.

- ❶ Robot coupling closed
- ❷ Robot coupling open



Integrated monitoring of pallet presence

An inductive proximity switch (accessories) directly monitors the presence of the clamping pin and hence the presence of a pallet. This monitoring ensures maximum process reliability with daily use of NSR.



Monitoring via monitoring unit with IO-Link interface

With the NSR3 138 robot module, the statuses "module opened," "module closed," "module closed with clamping pin" and "pallet presence" are recorded for the first time via a monitoring unit and transferred to the machine control via an IO-Link interface. This is a fieldbus-independent point-to-point connection that enables events as well as process and service data to be exchanged between machine control and clamping device and can be integrated into almost any fieldbus system.



Lightweight robot modules

Light robot modules made of hard-anodized aluminum alloy

The three robot modules NSR mikro 60, NSR mini 100 und NSR3 160 are made of high-strength and hard-anodized aluminum alloy. The low weight and its extremely slim design make machine loading very close to the machine table possible.



NSR mikro 60

Extremely slim robot coupling made of hard-anodized aluminum alloy for handling small pallets with a torque capacity of up to 15 Nm.



NSR mini 100

Extremely slim robot coupling made of hard-anodized aluminum alloy for handling small pallets with a torque capacity of up to 75 Nm.



NSR3 160

Extremely slim robot coupling made of hard-anodized aluminum alloy for handling pallets with a torque capacity of up to 700 Nm.



Robust robot modules

Robust robot modules for handling heavy pallets

The special design of the robot modules NSR3 138 and NSR maxi 220 ensures high robustness with high torque capacity. This allows even heavy pallets to be easily handled by robots.



NSR3 138

Robust robot coupling for handling heavy pallets with a torque capacity of up to 1,500 Nm.



NSR maxi 220

Robust robot coupling for handling heavy pallets with a torque capacity of up to 4,000 Nm.



VERO-S Media Coupling

With the VERO-S media coupling, machine tools that have no media routing in the interior of the machine, can now be loaded automatically. Both the VERO-S modules and the pneumatic clamping systems can be actuated via the media coupling at the robot-sided media routing. The media coupling can be retrofitted to all standard VERO-S NSL plus and VERO-S NSL3 clamping stations.



1. Clamping station with media coupling

Each NSL3 clamping station can be equipped with a specially designed media coupling.



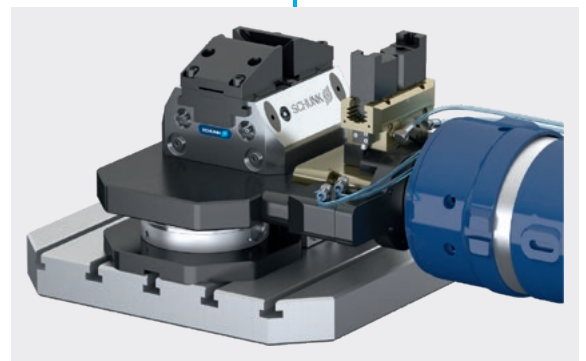
2. Opening the clamping station

The robot opens the clamping station with a media transfer unit that is laterally attached to the machine table. A check valve ensures that the clamping station remains open.



3. Automated loading of the clamping station

The clamping device can then be loaded on the clamping station. During the loading process, the clamping device can be simultaneously opened and, due to the check valve, it remains permanently open even after uncoupling.



4. Locking the clamping station

The modules can be ventilated and closed by docking them to the media transfer unit of the clamping station again. As a result, the clamping device is process-reliably clamped to the clamping station and at a high repeat accuracy.



5. Automated workpiece loading

The workpiece can then be loaded quickly and easily using a SCHUNK gripper.



6. Locking the clamping device

The clamping device is clamped by docking the robot to the clamping pallet again. Machining can then begin.



Alternative clamping version

Alternatively, this clamping principle can also be implemented using mechanically actuated clamping devices. In this example, with a KONTEC KSC3 centric clamping vise.



Pallet coupling

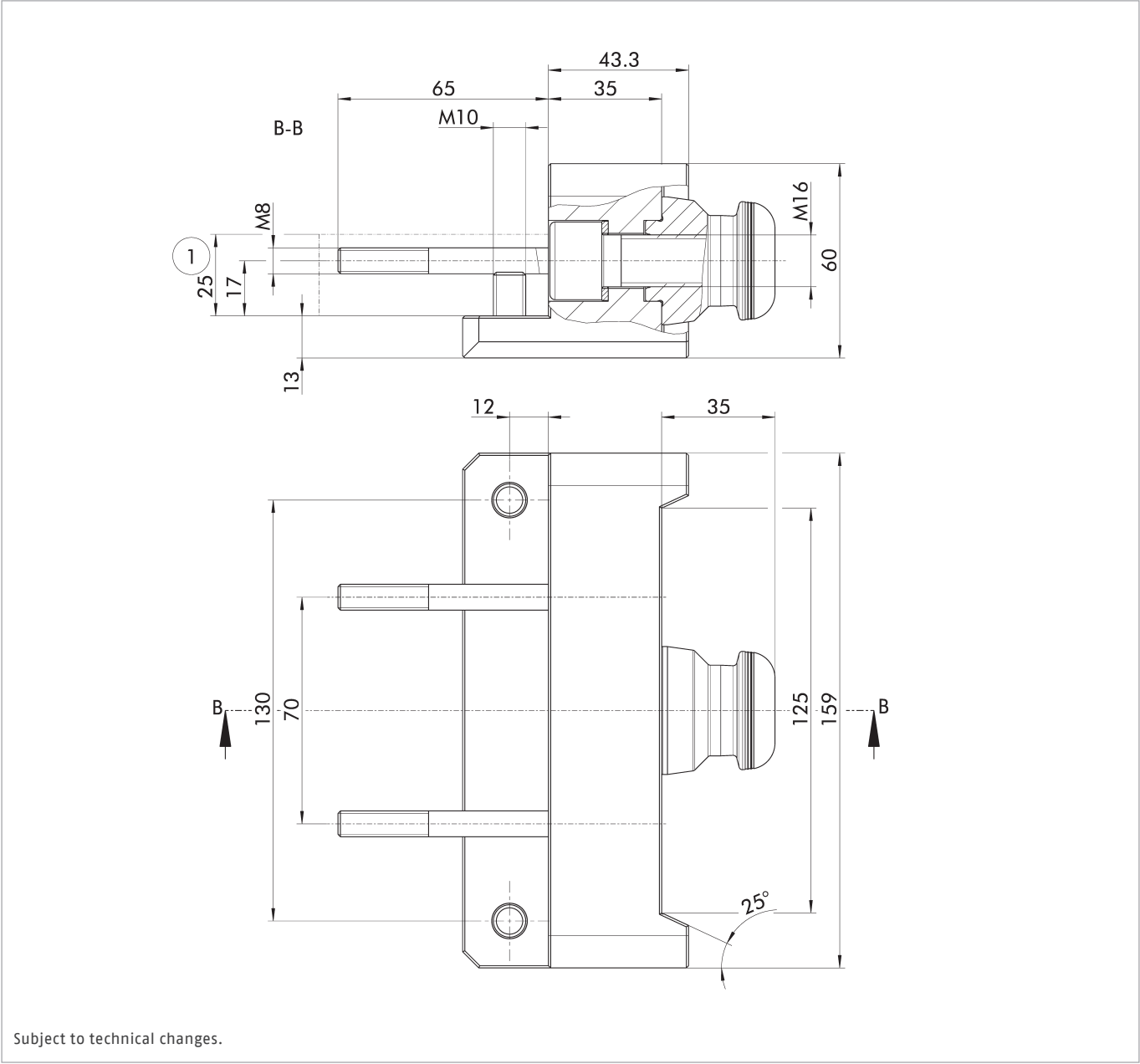
Suitable for robot modules NSR3 160 and NSR 160

Scope of delivery

Pallet coupling, clamping pin, mounting screws, cover caps, operating manual

Technical data

Description	ID	Material	Max. pallet size [mm]	Weight [kg]
PKL-K 160	1642386	Aluminum	500 x 500	1.2



Subject to technical changes.

① Minimum plate thickness

Accessories

Clamping pins SPx

Standard clamping pins with M16 thread for form-fit connection of workpieces or devices with NSE3 clamping modules.



Suitable for	Description	ID
PKL-K 160	SPA 40-16	0471064



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