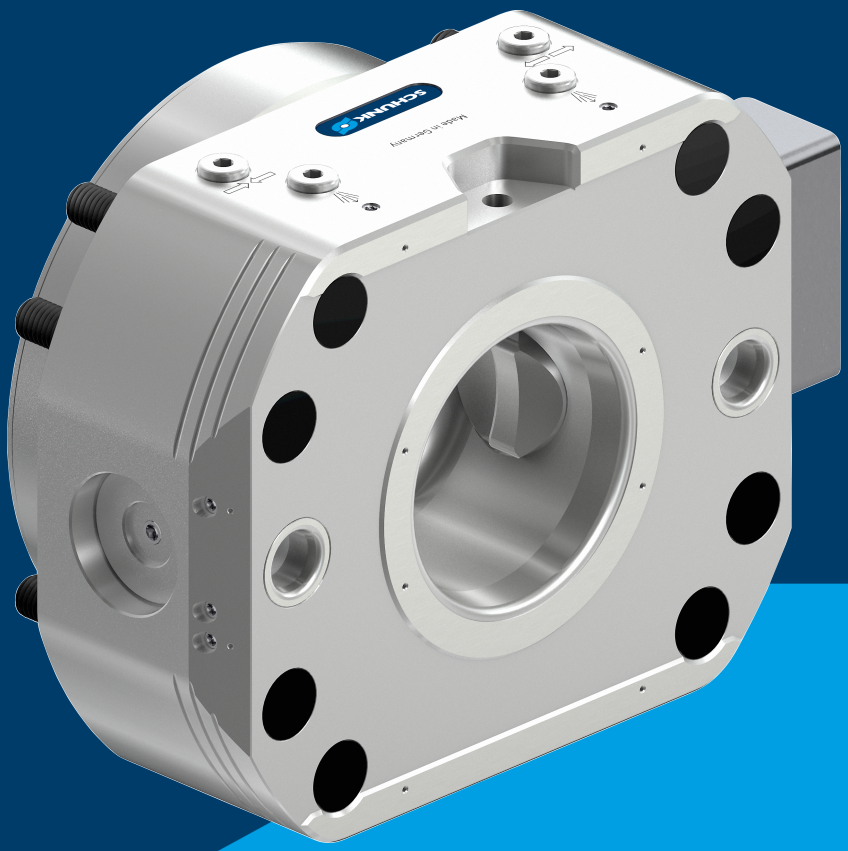

# Robot coupling for pallet handling
# VERO-S NSR maxi 220 / PKL maxi 220
## Assembly and Operating Manual

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.

**Document number:** 0489051

**Version:** 10.00 | 22/01/2025 | en

Dear Customer,

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

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

Best regards,

Your SCHUNK team

Customer Management

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

# Table of Contents

# 1 General

## 1.1 About this manual

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

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

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

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

Besides this manual, other documents which apply are those listed under ▸ 1.1.2 [🗋 6]

### 1.1.1 Illustration of safety notes

To make risks clear, the following signal words and symbols are used for safety notes.

**⚠ DANGER**

Denotes a hazard with a high degree of risk that, if not avoided, will result in death or serious injury.

**⚠ WARNING**

Denotes a hazard with a medium degree of risk that, if not avoided, could result in death or serious injury.

**⚠ CAUTION**

Denotes a hazard with a low degree of risk that, if not avoided, could result in a minor or moderate injury.

***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**.

## 1.2 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

- Robot Coupling for Pallet Handling in the version ordered
- Accessory kit
- Assembly and Operating Manual

### 1.3.1 Accessories

(see catalog or data sheets when ordering separately)

- PKL maxi 220 pallet coupling
- Clamping pin SPA 80-30
- Pneumatic screw connections
- Teaching device (ID 9988354) for inductive position measuring system
- Teaching device + power supply unit (ID 40103327) for inductive position measuring system

# 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.

Report any failures and damage immediately and repair without delay to keep the extent of the damage to a minimum and prevent compromising the safety of the product.

**Only original SCHUNK spare parts may be used.**

## 2.1 Intended use

The VERO-S robot coupling is intended for pallet handling with a robot or similar appropriate technical devices. It is intended for automatic loading of tool machines or other appropriate technical devices.

The product may only be used on the basis of its technical data. The specified maximum technical data must not be exceeded during use.

The product is designed for industrial use.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.

## 2.2 Not intended use

The VERO-S robot coupling for pallet handling is not being used as intended if, for example:

- It is used as load handling or lifting equipment.
- the product is used for turning applications over 100 RPM without consulting SCHUNK.
- It is used in working environments that are not permissible.
- 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.
- People work on machines or technical equipment that do not comply with the EC Machinery Directive 2006/42/EC, disregarding the applicable safety regulations.
- The technical data specified by the manufacturer for using the robot coupling and the pallet coupling is exceeded.

## 2.3 Notes on particular risks

- Disconnect the power supply lines and ensure that there is no residual energy in the system before performing assembly, modification, maintenance, or adjustment work.
- Do not move parts by hand when the energy supply is connected.
- Perform maintenance, modifications, or installations outside of the danger zone.
- For all work, secure the system against accidental operation.
- Do not reach into the open mechanism or the movement area of the system.
- Only specialist personnel may perform assembly, modification and disassembly work.

**⚠ WARNING**

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

- During operation, erroneous or negligent loosening of the clamping pin must be prevented using suitable countermeasures (disconnecting the power supply after locking, use of check valves or safety switches).
- Check the screw fitting of the clamping pin on the pallet coupling at regular intervals to ensure that it is secure.
- In pallet handling setup mode, only one operator may generally work on the robot system.
- Do not step under raised loads in the robot or automation system (clamping pallet connected).

**⚠ WARNING**

**Risk of injury to operating personnel due to movement of robot arm.**

Risk of injury due to uncontrolled movements during robot coupling setup and during operation.

- During robot coupling setup, accidental actuation of the robot arm must be prevented by suitable countermeasures.
- The machines and equipment must fulfill the minimum requirements of the EC Machinery Directive 2006/42/EC; specifically, they must have effective technical measures to protect against potential mechanical hazards.

**⚠ WARNING**

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

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

**⚠ CAUTION**

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

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

**⚠ CAUTION**

**Risk of slipping or falling if the operational environment is not clean (e.g. contaminated with cooling lubricants or oil).**

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

**⚠ CAUTION**

**Risk of burns due to workpieces with high temperatures.**

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

**⚠ CAUTION**

**Danger from noise generation**

Physical and mental stress by noise generation during the working process.

- Wear hearing protection.

## 2.4 Notes on safe operation

The robot coupling may pose a danger to persons (risk of injury) and property if, for example:

- it is not used as intended;
- it is not installed or maintained properly;
- The safety and installation instructions, local applicable safety and accident prevention regulations or the Machine Directive are not observed.

**NOTES**

During automated loading or unloading, particularly with high loading weights, always work with the handling system at reduced speed. The handling system must be positioned and fastened precisely to guarantee that the connection is not offset.

Check the approach position of the handling system at regular intervals. The position of the handling system can change slightly, particularly with high load weights or when the clamping pallet is bearing the loading weight significantly towards the front. In the event of eccentricity on the coupling interfaces, the relevant traveling axes of the handling system must be adjusted. The robot coupling must lie flush with the pallet coupling with no tilt angle and eccentricity when joining.

A rigid handling system must be used with high loading weights.

For the automated coupling process, it is advisable to use the air purge to clean the coupling interface.

The pallet handling should be moved out of the machining area once pallet loading is complete. If the clamping system is left in the working area, it must be protected against dirt entering the interface..

**Maintenance specifications**

Follow the maintenance and care instructions. These instructions are based on a normal working environment. If the robot coupling is to be operated in an environment with abrasive dusts or corrosive or caustic fumes or fluids, prior approval must be obtained from SCHUNK.

**Safety during assembly and servicing**

During assembly, connection, adjustment, commissioning and testing, make sure that no accidental operation of the robot coupling by the fitter or other persons is possible.

Avoid any unsafe manner of working.

### 2.4.1 Holding force and screw strength

**The holding force of the robot coupling is essentially limited by the tightness of the screw connection which connects the clamping pin to the pallet coupling or 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 pin is to be used in customer-specific devices, the customer must provide a sufficiently dimensioned pallet coupling or a sufficiently thick mounting material.

### 2.4.2 Constructional changes

**Implementation of structural changes**

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

### 2.4.3 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 Personnel qualification

The robot coupling must only be installed, removed, started up, operated and serviced by qualified specialist personnel with the relevant safety training.

All persons charged with operating, maintaining and servicing the robot coupling must have access to the operating manual, especially the chapter "Basic safety notes". We recommend that the operator creates in-house safety operating instructions.

Trainees may work on machines and technical equipment in which the robot coupling is installed, provided that they are supervised at all times by qualified specialist personnel.

## 2.6 Using personal protective equipment

When using this product, you must conform with the relevant heath & safety at work rules and you must use the required personal safety equipment.

- Use safety gloves, safety shoes, hearing protection and safety glasses.
- Maintain safe distances.
- Comply with the minimum safety requirements for the use of equipment.

## 2.7 Organizational measures

**Obeying the rules**

The operator must employ suitable organizational measures and instructions in order to ensure that the relevant safety rules are obeyed by the persons asked to operate, maintain and repair the product.

**Monitoring the behavior of personnel**

The operator must at least occasionally check that the personnel are behaving in a safety-conscious manner and are aware of the potential hazards.

**Danger signs**

The operator must ensure that the signs concerning safety and hazards on the machine where the product is mounted are clearly legible and are observed.

**Faults**

If a malfunction occurs in the product and endangers safety, or if a problem is suspected due to production behavior, the machine on which the product is mounted must be stopped immediately and remain shut down until the malfunction has been located and remedied. Only allow specialists to remedy malfunctions.

**Spare parts**

Only use original SCHUNK spare parts.

**Environmental regulations**

The applicable environmental regulations must be observed for all maintenance and repair work.

## 2.8 Environmental and operating conditions

**Required ambient conditions and operating conditions**

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, Link Technische Daten.
- Make sure that the product is a sufficient size for the application.
- Make sure that the contact surfaces of the interface are always clean.
- Make absolutely sure that no chips of any kind can enter the interface and that the interface does not fill with cooling emulsion, which is particularly possible with vertical positioning of the clamping pin axis. The best way to ensure both of these is to use the SDE protection covers. If the interface should fill with cooling emulsion, initiate the unlocking process and dry out the interface in actuated state.
- Only use high-quality cooling emulsions with anti-corrosive additives during processing.

## 2.9 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.

## 2.10 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.

## 2.11 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.

## 2.12 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.

## 2.13 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.

# 3 Technical data

## Robot coupling

| | |
|---|---|
| Designation / type | NSR maxi 220 |
| ID | 0471940 |
| Max. torque Mx * [Nm] | 4000 |
| Max. torque Mz * [Nm] | 4000 |
| Max. transport weight [kg] | 800 |
| Pull down force without turbo [kN] | 12 |
| Pull down force with turbo [kN] | 50 |
| Pull down stroke [mm] | 2.0 |
| Actuation pressure [bar] | 6 |
| Min. Operating pressure [bar] | 5 |
| Weight without pallet coupling [kg] | 21 |
| Repeat accuracy [mm] | < 0.05 |
| 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] |

## Inductive position measuring system

For monitoring the clamping slide position OPENED/CLAMPED – mounted on the perimeter of the robot coupling, OPENED position and CLAMPED position are preset.

| | |
|---|---|
| Range of measurement | 14 mm |
| Voltage | 18 – 30 V DC |
| Output | 2 x PNP closer |
| Protection class | IP 67 |
| Housing | Zinc die-cast, nickel-plated |
| Active surface | PBT |
| Connection type | 0,35 mm cable incl. M12 5-pin connector |

## Pallet coupling

| | |
|---|---|
| Designation / type | PKL maxi 220 |
| ID | 0471950 |
| Weight with clamping pin [kg] | 19.9 |
| Version | Steel |

* max. torque when fastening the clamping pin with cylindrical screw M24 – DIN EN ISO 4762/12.9 and full support on the module flat surface.
The directions of force for the maximum permissible torques are shown in the illustration in the chapter Link Abbildung.

The robot coupling NSR maxi 220 is prepared for monitoring the system state.

- OPENED and CLAMPED monitoring with an inductive position measuring system (included in the scope of delivery of the NSR maxi 220)
- Pallet presence monitoring with a proximity switch NI 32 (included in the scope of delivery)

**A separate maintenance unit must be used for the air supply. The robot coupling is prepared for use with unlubricated compressed air.**

## 3.1 Calculation of Permissible Transport Load

The robot coupling is limited to a maximum permissible torque at the coupling interface. The dynamic load when using the robot system for handling results in acceleration and deceleration forces that have to be taken into consideration for the transport load.

**To operate the robot coupling with dynamic handling, it is essential for the maximum acceleration of the machine to be known.**
**The acceleration has an effect even in the case of an abrupt deceleration, e.g. when the emergency stop switch is actuated.**

**Inclusion of the acceleration values is of crucial importance for the operational safety of the robot coupling and the entire robot and palletizing system. If it is not taken into account, this can result in accidents and damage to the clamping system.**

**Calculation example to determine permissible transport load**

**Missing information or specifications can be requested from the manufacturer.**

Maximum permissible torque for NSR maxi 220:
**M = 4000 Nm**

| Legend | |
|---|---|
| M [Nm] | Torque |
| F [N] | Force |
| l [m] | Effective lever length from the coupling interface between the robot coupling and pallet coupling to the center of gravity of the load. |

| Legend | |
|---|---|
| m [kg] | Mass |
| g [m/s²] | Acceleration due to gravity |
| $m_{tot}$ [kg] | $m_{\text{Pallet coupling}} + m_{\text{Clamping pallet}} + m_{\text{Transport load}}$ |
| a [m/s²] | Maximum acceleration of robot arm |

**Determination of formula values:**

$m_{\text{pallet coupling, type: PKL maxi 220 (steel)}} = 19.9\ \text{kg}$

$m_{\text{clamping pallet, type: PAL S NSR maxi 496 x 496 (steel)}} = 68\ \text{kg}$

$m_{\text{transport load}} = 700\ \text{kg}$ (example value)

$l = 300\ \text{mm} = 0.30\ \text{m}$ (example value)

$$a = 3\frac{m}{s^2}$$

**Calculating the acceleration force:**

$$\mathbf{F = m_{ges.} \cdot g + m_{ges.} \cdot a}$$

$$F = (19.9\ \text{kg} + 68\ \text{kg} + 700\ \text{kg}) \cdot 9.81\frac{m}{s^2} + (19.9\ \text{kg} + 68\ \text{kg} + 700\ \text{kg}) \cdot 3\frac{m}{s^2}$$

$$F = 787.1\ \text{kg} \cdot 9.81\frac{m}{s^2} + 787.1\ \text{kg} \cdot 3\frac{m}{s^2}$$

$$F = 7729\ \text{N} + 2364\ \text{N}$$

$$F = 10093\ \text{N}$$

$$\mathbf{M = F \cdot l}$$

$$M = 10093\ \text{N} \cdot 0.30\ \text{m}$$

$$M = 3028\ \text{Nm}$$

**Maximum permissible torque for NSR maxi 220: M = 4000 Nm**

Result of calculation:
Taking into account the robot acceleration, the loading weight obtained in the calculation example is permissible.

A higher loading weight requires a shortening of the effective lever length from the coupling interface to the center of gravity of the load, or a reduction in the robot acceleration.

**For every change to the technical data, a calculation must be performed.**

# 4 Assembly

**Pre-assembly measures**

Carefully lift the product out of the packaging (e.g. with suitable lifting equipment).

**⚠ CAUTION**

**Risk of injury due to sharp edges and rough or slippery surfaces.**

- Wear personal protective equipment, particularly protective gloves.

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

**Assembly of the robot coupling**

Assembly, dismantling and modification work on the robot coupling may only be carried out by specialist personnel.

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

**The hoses and cables required for the energy supply for the robot coupling must be laid and protected suitably on the pallet handling.**

Wear protective equipment (protective gloves and safety shoes).

**⚠ WARNING**

**Risk of injury due to dropping the robot coupling during transport.**

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

**⚠ WARNING**

**Risk of injury due to crushing.**

- Install the robot coupling carefully.
- Do not place any limbs into the gaps or between the clamping pallet and the machine.

## 4.1 Screw tightening torques

**Screw tightening torques for mounting the robot coupling on the robot flange.**
**Screw tightening torques for mounting the pallet coupling on the clamping pallet** (except the fitting for the clamping pin). (Screw quality 10.9)

| Screw size | M12 | M20 |
|---|---|---|
| Screw tightening torques $M_A$ (Nm) | 88 | 438 |

**Screw tightening torques for mounting the quick-change clamping pin on the pallet coupling.** (Screw quality 12.9)

| Screw size | M24 |
|---|---|
| Screw tightening torques $M_A$ (Nm) | 880 |

## 4.2 General Installation Notes

**Request our installation drawings if doing the installation yourself.**

The NSR maxi 220 robot coupling is designed for heavy-load industrial robots.

The robot coupling is used together with the pallet coupling for work involving the transportation of heavy loading weights. A robot coupling is mainly used as a single change interface.

If several linked clamping units are mounted, make sure that the flatness and height deviation of the locating surfaces from module to module (based on a 200 mm gage for bore holes) lies within 0.02 mm.

**NOTE**

When connecting the robot coupling, ensure that it is only possible to completely ventilate 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. It is vital that the turbo connection be controlled in the NSR maxi 220 robot coupling in order to ensure the required pull-in force at the coupling interface.

When disconnecting hose lines, the relevant openings must be secured with locking plugs to prevent dirt or cooling lubricant from entering.

If several units are activated via shared 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 |

## 4.3 Mounting and Connection

**Request our installation drawings if doing the installation yourself.**

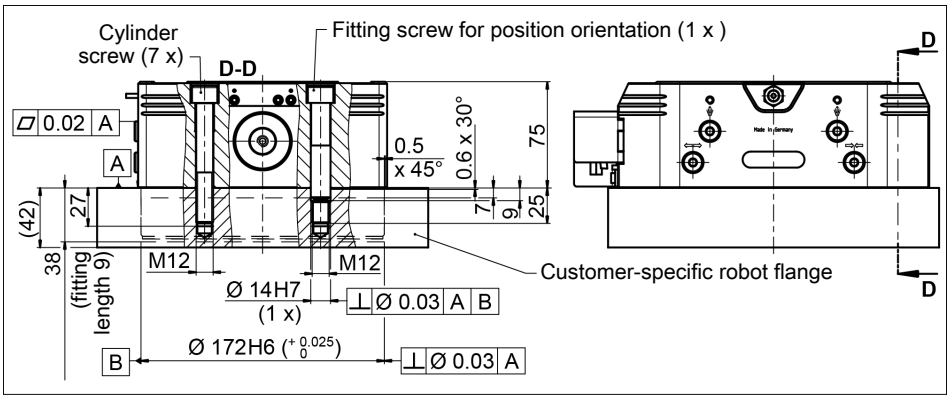
The NSR maxi 220 is fixed in the installation space with 8 x M12 screws (see illustration). The screws must be tightened with the specified torque ▸ 4.1 [🗋 17].

Positioning in the installation space is done using the centering diameter Ø 172. A mounting screw is designed as a fitting screw for precise alignment. Precise alignment and positioning of the robot coupling requires that the fitting bores Ø 14 H7 on the opposite side are precisely positioned in the mounting position.

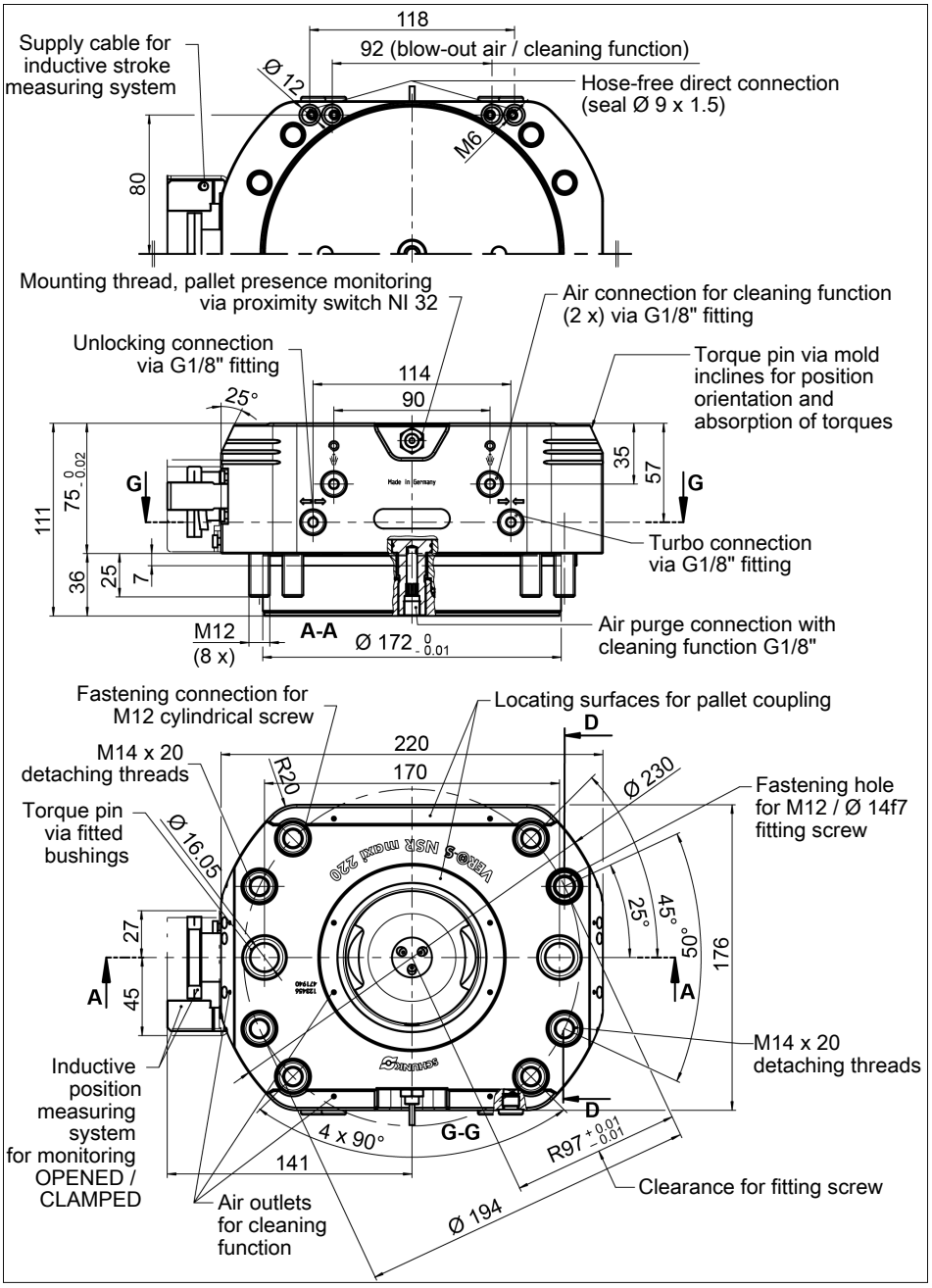
The inductive position measuring system is completely installed on the robot coupling and preset for monitoring the OPENED and CLAMPED positions.

**NOTE:**

Detaching threads facilitate the removal of the modules from the modules for stationary use / application (see illustration "Mounting and connections").




*Mounting*




*Mounting and connections*

The air connection takes place using the G1/8" coupling holes at the side (as standard). The pneumatics screw connections included in the scope of delivery, or any pneumatics screw connections, can be fitted for the air supply.

There is an alternative connection option via two M6 connections on the base side for unlocking and turbo. In this case, the side connections must be sealed off with the G1/8" locking screws from the accessory pack. If this connection version is chosen, the direct connections on the base side, without a hose, must each be sealed with an O-ring. The accessory pack for the NSR maxi 220 contains the Ø 9 x 1.5 O-rings (see ▸ 10 [🗋 37], item 28 ) for sealing the bottom hose-free direct connections.

When the turbo connection is used, the spring-actuated locking procedure is actively supported with air pressure. If the turbo connection is not used, the relevant side of the piston must be able to ventilate.

**To operate the robot coupling, the support of the turbo function is generally recommended.**

### 4.3.1 Unlocking Connection

If compressed air is constantly applied to the unlocking connection of the robot coupling, the clamping system is unlocked. The clamping pallet can be removed or inserted on the module for stationary use/ application via the adapted pallet coupling.

There is the option of controlling the clamping system either via the side G1/8" air connection hole or a hose-free direct connection on the base side. The air connection that is not connected must be sealed air-tight with a G1/8" locking screw or an M6 set-screw (on the base side) (see ▸ 10 [🗋 37]).

### 4.3.2 Turbo Connection

The robot coupling has a turbo connection.

When compressed air is applied, it supports the spring-actuated locking procedure actively with air pressure to increase the pull-in force even further. After a short pressure pulse via the compressed air supply, it can be switched off again - the clamping system remains spring-loaded. In the dynamic work process, switching on the turbo function is recommended.

There is the option of controlling the clamping system either via the side G1/8" air connection hole or a hose-free direct connection on the base side. The air connection that is not connected must be sealed air-tight with a G1/8" locking screw or an M6 set-screw (on the base side) (see ▸ 10 [🗋 37]).

**NOTE**

On a dynamically operated handling system, the robot module can only lift loads if the turbo function has been switched on beforehand.

### 4.3.3 Air Purge Connection with Cleaning Function

The robot coupling has an air purge connection with a G1/8" thread on the lower housing cover for the clamping system. This connection can be used, for example, to blow out the coupling interface or to also monitor the presence of the clamping pallet using a differential pressure switch.

For interface cleaning, the NSR maxi 220 has two air connections at the side for the blow-out or cleaning function using a G1/8" connection thread.

The positively driven air flow is released on the centering and locating surfaces of the clamping system. The NSR maxi 220 therefore has a cleaning function on all contact surfaces of the entire coupling interface.

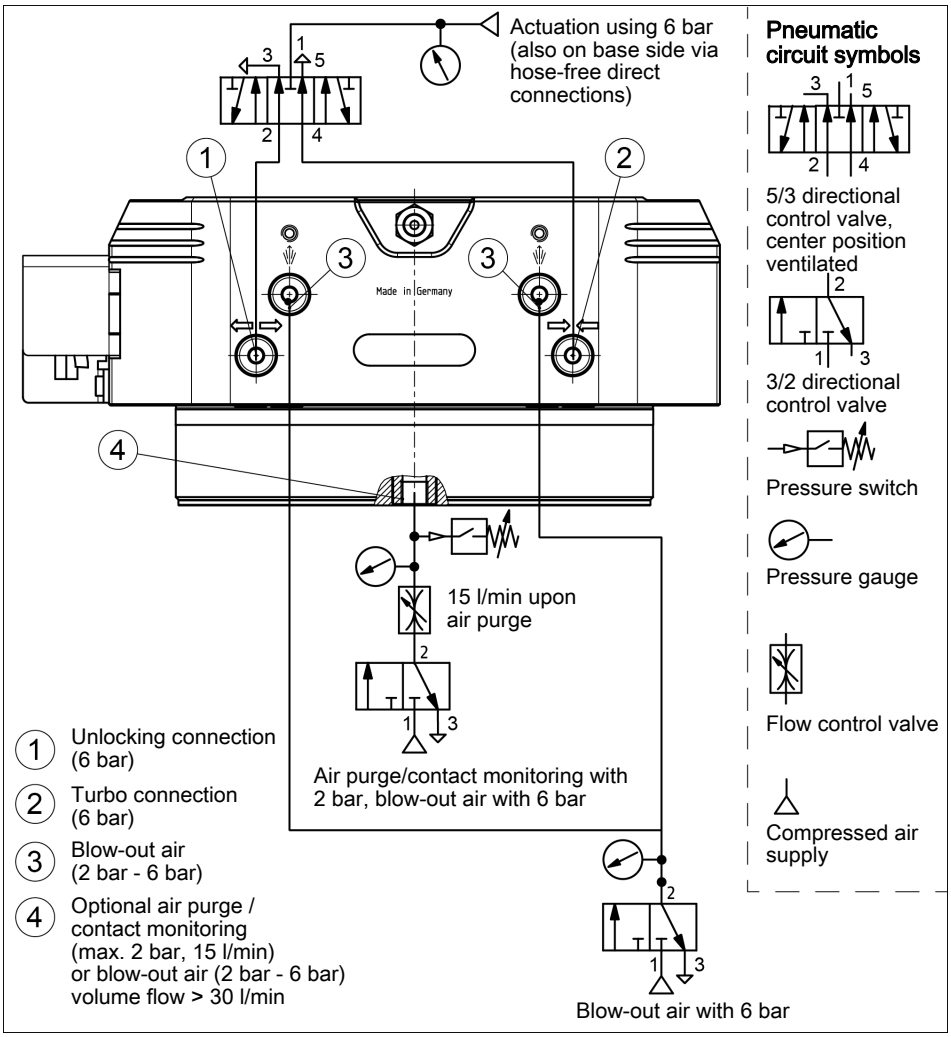
The air for the blow-out function is supplied via two hose lines on a duct system connected to two separate channel systems.

It is advisable to use the air purge function if the clamping module approaches the pallet coupling. The two system components to be coupled are cleaned of dirt and chips.

The following must be taken into account when controlling the NSR maxi 220 robot coupling:

- Max. pressure of the air purge: 6 bar
- **The air purge must be switched off again before the pallet coupling is locked fully in the robot module, as an air cushion can otherwise form.**

### 4.3.4 Pneumatic Circuit Diagram




*Pneumatic circuit diagram*

## 4.4 Coupling Interface

The NSR maxi 220 robot coupling has two different alignment aids for the PKL pallet coupling.

The mounting interface for the clamping pallet is identical for both versions of the pallet couplings.

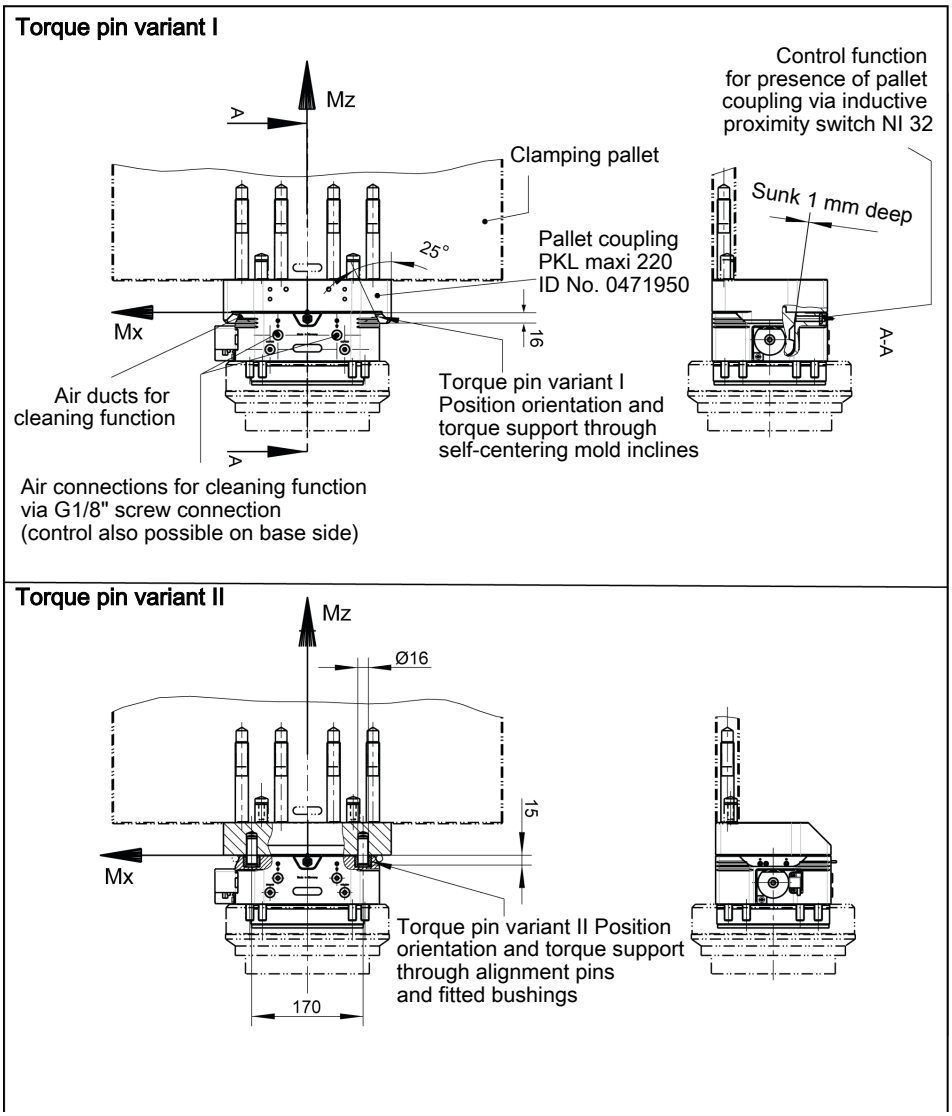
**Torque pin version I**

Here, the pallet coupling is aligned with the robot module using the slanted contact surfaces. The wedge slants on the pallet coupling center precisely with the machining contour of the robot module during assembly.

**Note:** The PKL maxi 220 pallet coupling can only be coupled using torque pin version I.

**Torque pin version II**

The pallet coupling engages in the fitted bushings of the robot module using alignment pins during joining.




*Torque pin version I and version II*

Only an original SCHUNK clamping pin may be mounted on the coupling interface with the designated mounting screw. (The screw must be tightened with the specified torque ▶ 4.1 [🗋 17]). Replacements can be supplied by SCHUNK.

**NOTE**

Check the screw fitting of the clamping pin on the pallet coupling at regular intervals to ensure that it is secure. (The screws must be tightened with the specified torque ▶ 4.1 [🗋 17]).

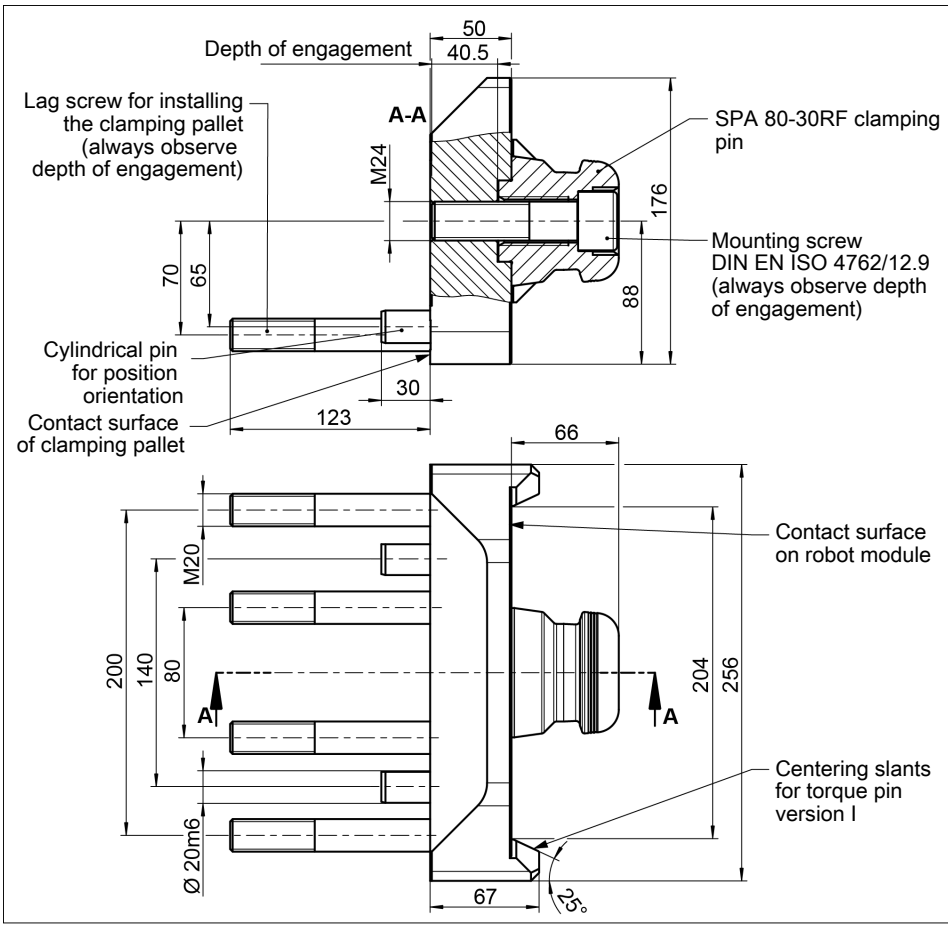
The pallet coupling must always guarantee a completely flat work surface at the robot coupling contact points. Design changes to the pallet coupling by the operator are only permissible with the approval of SCHUNK.

### 4.4.1 PKL maxi 220 Pallet Coupling

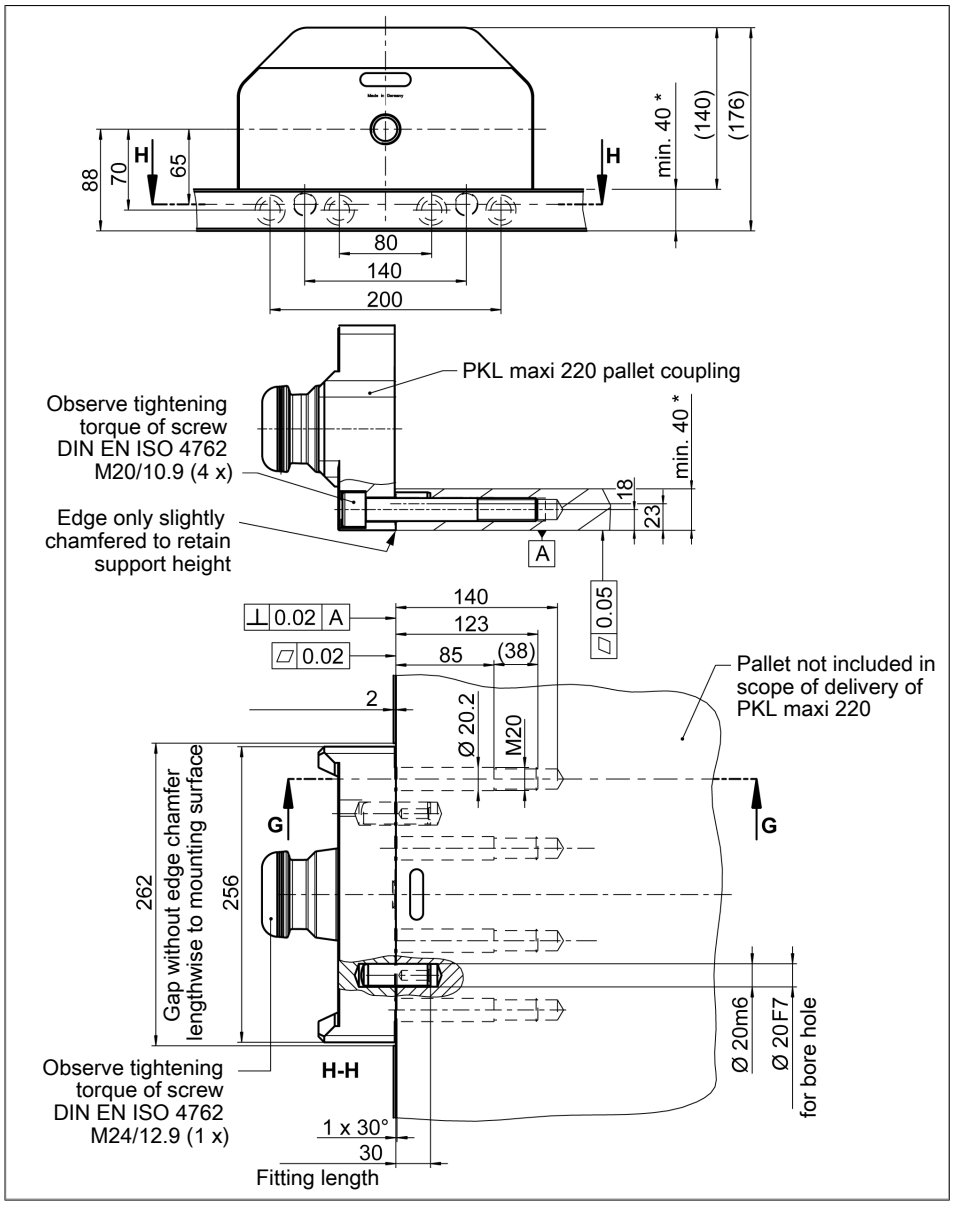
The PKL maxi 220 pallet coupling (ID no. 0471950) was designed as a pallet changing interface for the NSR maxi 220 robot coupling.

play when joining with the robot module. The pallet coupling provides the connection to the clamping pallet. The interface of the pallet coupling has two cylindrical pins for position orientation as well as four mounting screws for adapting the clamping pallet. The clamping pallet to be installed is mounted on the pallet coupling on the front face. The offset mounting screws replaced a lower bracket for supporting purposes.

Four long cylindrical screws act as lag screws and guarantee a high holding force and rigidity with heavy loading weights (see illustra-tion "PKL maxi 220 pallet coupling"). The connection interface between the clamping pallet and pallet coupling is shown in the "Connection interface between the clamping pallet and pallet coupling" illustration.




*PKL maxi 220 pallet coupling*




*Connection interface between the clamping pallet and pallet coupling*

*** The height of the clamping pallet must be at least 40 mm.**

## 4.5 Tolerances and Installation Conditions for SPA 80-30 Clamping Pins in Customer-specific Pallet Coupling

**CAUTION**

**Notes on clamping pins and mounting screws**

The holding force of the robot coupling is essentially limited by the tightness of the screw connection which connects the clamping pin to the pallet coupling. The clamping pin may only be installed with a size M24 screw, strength class 12.9. The specified screw torque must be observed ▶ 4.1 [🗋 17].

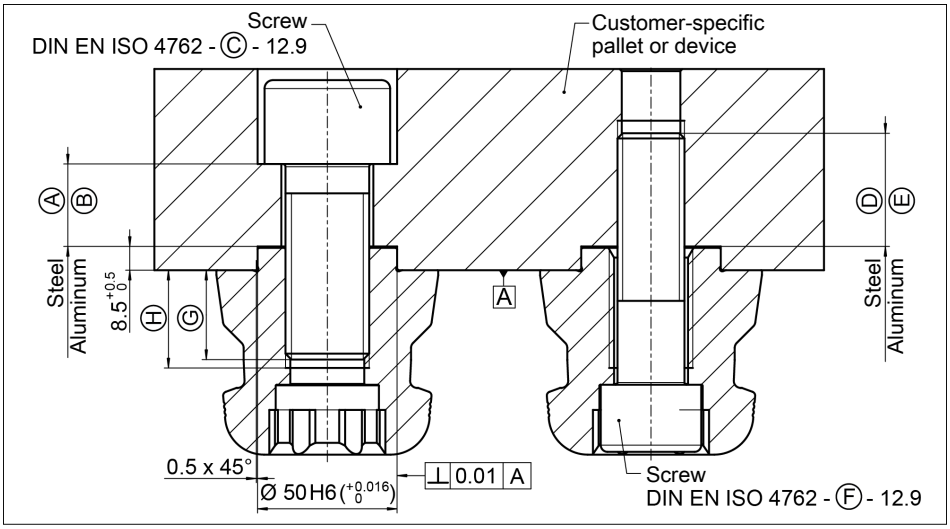
- Only original SCHUNK clamping pins may be used.
- If the clamping pin is to be used in customer-specific pallet couplings, the customer must provide a sufficiently dimensioned depth of engagement in the adapter strip or in the internal clamping pin thread or a sufficiently thick mounting material in the adapter strip for the pallet coupling.
- The installation dimensions (see illustration "Tolerances and Installation Conditions for SPA 80-30 clamping pins") are based on different adapter strip materials for the customer pallet coupling, and must be always be observed.

**Installation of the clamping pin with incorrect components, e.g. excessively short mounting screw, is not permissible for pallet couplings.** Replacements are available for delivery from SCHUNK.

At regular intervals, check the screw connection for the pallet coupling clamping pin for a secure fastening.

**NOTE**

Only the complete pallet coupling can be replaced in the robot coupling change interface. Replacing only the clamping pin would mean that the required complete flat work surface would not be achieved at the change interface.




*Tolerances and installation conditions for SPA 80-30 clamping pins*

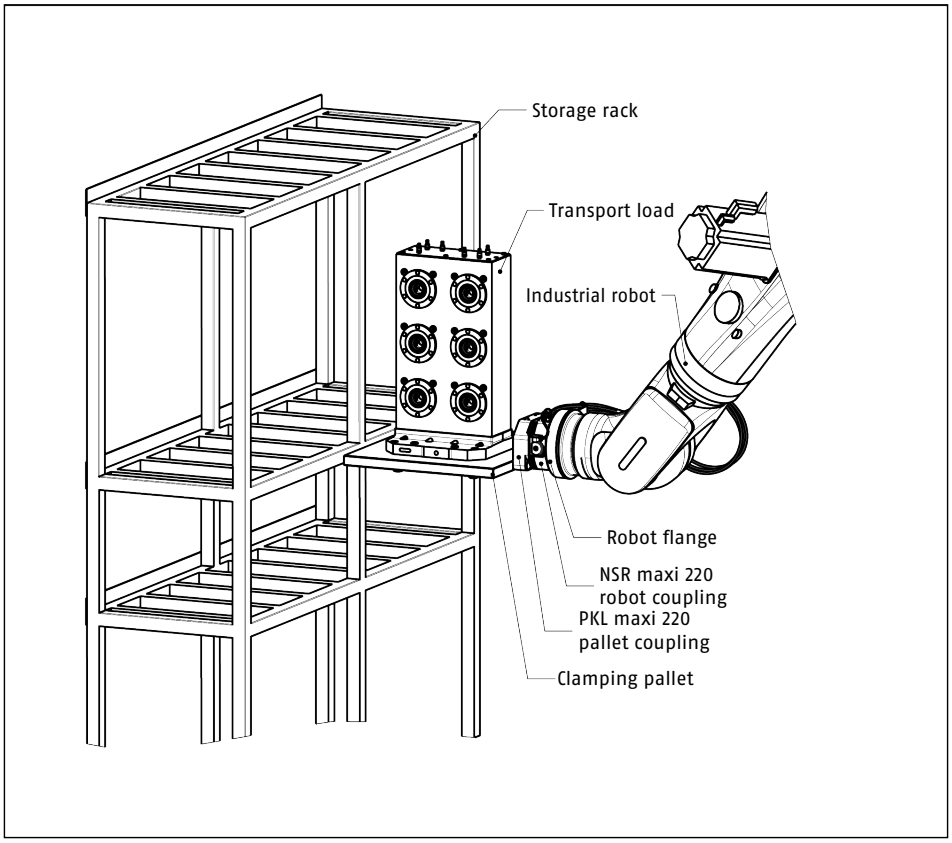
**Tolerances and installation conditions for installation in a customer-specific pallet coupling**

| | ID No. | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|
| SPA 80-30 | 0471181 | > 28 | > 35 | M30 | > 36 | > 48 | M24 | > 30 | 35 |

## 4.6 Application Example for Automated Pallet Loading

The NSR maxi 220 clamping system was designed for automated pallet loading.

The robot coupling, with the handling system, is the interface between the machine work area and pallet rack.

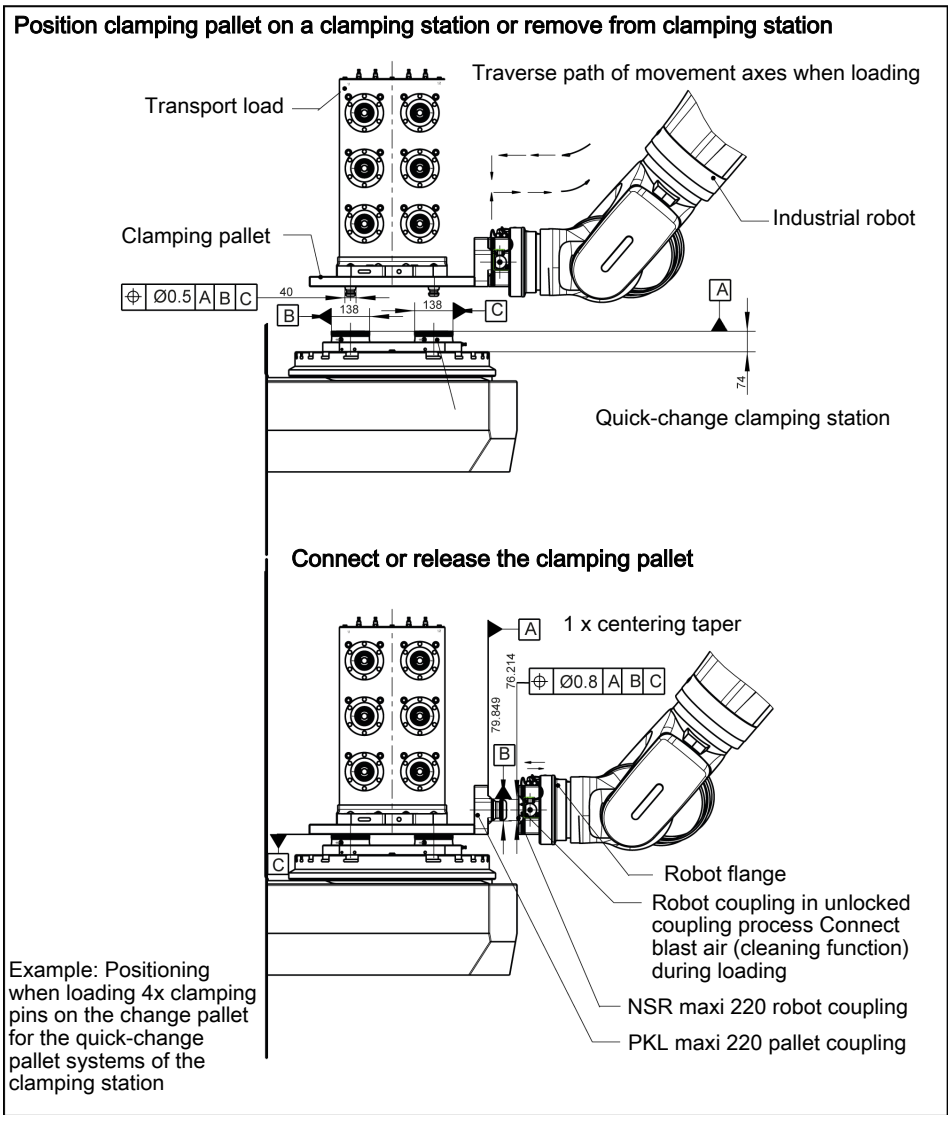



*Application example for automated pallet loading*

### 4.6.1 Connection and Disconnection of Transport Loads

The following must be taken into account during automated connection and disconnection of transport loads:

- Approach the coupling interfaces between the robot module and robot coupling or clamping pallet and module for stationary use / application early without a tilt angle and eccentricity.
- Check that the traverse path is collision-free through the entire machining area.
- Work at a reduced travel speed when loading.
- Ensure a correctly aligned traverse path for connecting and disconnecting the clamping pallet.
- The loading handling should have overload protection.
- The operating states of the module for stationary use / application and the robot coupling must be monitored with suitable sensors to help prevent collisions and incorrect controlling.




*Automated connection and disconnection of transport loads*

# 5 Maintenance and Care

The robot coupling is designed for low-maintenance operation, so that opening and disassembling the 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, ship the module to SCHUNK for repair.**

**The cover of the clamping module is spring preloaded and must only be removed by trained specialist personnel.**

**NOTE:** Detaching threads facilitate the removal of the modules from the modules for stationary use / application Link Befestigung und Anschluss.▸ 4.3 [🗋 18]

**To ensure the robot coupling operates perfectly, the following instructions are to be observed:**

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

**The air supply must be supplied via a separate maintenance unit. The robot coupling is ready for use with non-lubricated compressed air.**

- Make sure that the contact surfaces of the interface are always clean.
- Make absolutely sure that no chips of any kind can enter the interface and that the interface does not fill with cooling emulsion, which is particularly possible with vertical positioning of the clamping pin axis. If the interface should fill with cooling emulsion, initiate the unlocking process and dry out the interface in actuated state.
- Only use high-quality cooling emulsion with anti-corrosive additives during processing.
- Check the units at regular intervals (at least every two weeks or after 1,000 clampings). The system is functioning correctly if the clamping slides move smoothly at minimum system pressure (5 bar).
- Regularly check all electronic components such as the inductive proximity switch and the installed inductive stroke measuring system for damage and functional reliability. Damaged or susceptible electronic components must be replaced as a precaution.

## 5.1 Regular Inspection of Robot and Pallet Coupling

**A visual inspection of the robot coupling and the associated PKL pallet coupling for possible damage to the components must be carried out at regular intervals.** This visual inspection must be carried out every 50,000 clamping cycles.

**A leak test must be carried out on the robot coupling every 50,000 clamping cycles.**

During a leak test, the air and plug-in connections, along with the entire clamping system, are to be tested for leaks and significant compressed air loss.

Test the robot coupling for leaks in both module positions.

To establish the tightness of the entire clamping system, no pallet coupling should be connected.

If there are leaks in the clamping system, test the entire pneumatic system (e.g. with Metaflux leak detection 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 defective components replaced.

Every 100,000 clamping cycles, the screw connections between the robot coupling and the robot flange and the screw connections from the pallet coupling to the clamping pallet must be checked for secure fastening, ▸ 4.1 [🗋 17].

**After a collision (e.g. when connecting or disconnecting the transport load), a visual inspection for possible damage to the components is essential. Any damage such as cracks should be identified.**

**If damage or signs of malfunctions are identifiable on any of the components of the robot and pallet coupling, they may not be restarted.**

They can only be started up again once the faults have been remedied, for example, by replacement of the damaged unit.

# 6 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.

# 7 Troubleshooting

**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 robot coupling or pallet coupling, or send to SCHUNK for repair |
| Excess tensile load on clamping pins | Reduce the transport weight. Adjust the coupling position through fine adjustment of robot system |

**The clamping area does not unlock perfectly**

| 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 | Required hose diameters, ▶ 4.2 [🗋 18] |
| The turbo connection is still pressurized | Ventilate the connection |

**No control of switching valves due to missing signal output**

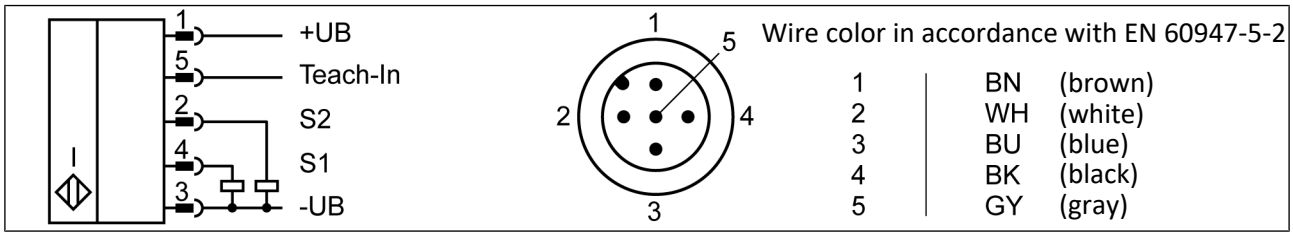
| Possible cause | Solution(s) |
|---|---|
| Proximity switch not switching | Set the position again, adjust switching distance to change interface and fasten |
| Proximity switch not switching | Check the proximity switch on the sensor head and on the connection cable for damage (replace proximity switch if necessary) |
| Cable plug-in connection to the supply cable | Check the plug-in connections, tighten if necessary<br>Replace type IN proximity switch or separately available supply cable |
| Proximity switch moves independently | Tighten the hexagonal nut for clamping<br>Replace type IN proximity switch |
| Stroke measuring system for monitoring system states on the robot coupling is not working correctly | Teach in the stroke measuring system again using a teaching device<br>Check all screw connections in the mounting for a tight fit<br>When the sensor is moved, teach in the stroke measuring system again using a teaching device<br>Check the sensor and supply cable of stroke measuring system for damage<br>(Replace stroke measuring system or connection cable if necessary) |

**The clamping area no longer unlocks quietly**

| Possible cause | Solution(s) |
|---|---|
| The clamping faces on the clamping slides and clamping pin are dirty | Remove the clamping pin and clean the clamping faces on the clamping slides and clamping pin |

# 8 Inductive position measuring system PMI

For technical data see data sheet in chapter Appendix ▶ 12 [🗋 41]




*Connections*

## 8.1 Instructions for PMI Teaching Device

**Teach-in instructions for inductive PMI position measuring system 14V-F166-2E2-1M-V15-Y241843**

**NOTE**

**When the robot coupling is delivered, the inductive stroke measuring system is set and ready for use.**

The teach-in process must only be performed on the quick-change pallet system (thus the robot coupling) when its position measuring system is replaced. A pallet coupling with reference pin (ID 0471950, complete) and a separate "teaching device" must be used for this!

**NOTE**

The teaching device and the pallet coupling are not included in the scope of delivery for the robot coupling NSR maxi 220.

**Please note**

**S1** = position of reference pin CLAMPED with turbo
**S2** = position OPENED

**General information**

- The teach-in process for the two switching windows is done via a separate "teaching device". This device must be connected directly between the sensor and the current supply.
- The taught-in positions are saved even after the supply has been switched off in the sensor.
- The switching windows are positioned symmetrically ±0.25 mm around the set position.

**Teach-in process**

The switching positions on the measuring system are taught in using the teaching device (ID 9988354) or teaching device + power supply unit (ID 40103327). The teaching device is not included in the scope of delivery.

- **Put the sensor into programming mode**
  – Press the key for about 1.5 sec
  – the yellow LED flashes (2 Hz)
- **Teaching in switching window 1 (yellow LED (S1) flashes)**
  – Place the measuring cam in the required position
  – Press the key again
  The position is taught in (switching window ±0.25 mm)
  (the LED goes out for a short while and confirms successful teaching in by briefly lighting up for about 1.5 s)
- **Teaching in switching window 2 (yellow LED (S2) flashes)**
  – Place the measuring cam in the required position
  – Press the key again
  The position is taught in (switching window ±0.25 mm)
  (the LED goes out for a short while and confirms successful teaching in by briefly lighting up for about 1.5 s)
- The sensor then goes back to its normal operating mode. The LEDs of the teaching device now respond according to the switching state of the respective output.
- An unsuccessful teach-in process (e.g. in the case of a teach-in attempt beyond the range of measurement) is indicated by the LED flashing rapidly (16 Hz, for 1.5 s). The previous switching limits are kept.
- By pressing the key for 6.5 sec, the sensor can be reset to the factory settings.
- If the voltage supply is disconnected or the key is not pressed for more than 6 minutes during the programming process, the programming process is stopped without changing the previous limits.
- Programming is generally only possible in the first 6 minutes after switching on the sensor. The programming is then blocked. To re-enable programming, the sensor must be disconnected briefly from the power supply.


# 9 Seal kit and part lists

## 9.1 Sealing Kit List

| Sealing kit * | ID |
|---|---|
| NSR maxi 220 | 0471942 |

* 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.

## 9.2 Bill of material

**NSR maxi 220** (ID 0471940)

| Item | Designation | Quantity | Note |
|---|---|---|---|
| 1 | Base body | 1 | |
| 2 | Cover | 1 | |
| 3 | Clamping slide | 2 | |
| 4 | Piston | 1 | |
| 5 | Cylindrical pin | 2 | X |
| 6 | Plug | 1 | |
| 7 | Fitting screw | 1 | |
| 8 | Extension shaft | 1 | |
| 9 | Cover | 1 | |
| 10 | Fitted bushing | 2 | |
| 11 | Cover plug | 8 | X |
| 12 | Slide washer | 1 | X |
| 19 | O-ring | 1 | X |
| 21 | O-ring | 1 | X |
| 22 | O-ring | 1 | X |
| 23 | O-ring | 4 | X |
| 25 | O-ring | 1 | X |
| 26 | O-ring | 1 | X |
| 27 | O-ring | 1 | X |
| 28 | O-ring | 4 | X |
| 30 | Screw | 7 | |
| 32 | Screw | 4 | |
| 33 | Compression spring | 10 | |
| 35 | Set-screw | 1 | |
| 36 | Set-screw | 1 | |
| 38 | Set-screw | 10 | |
| 41 | G1/8" locking screw | 4 | |

| Item | Designation | Quantity | Note |
|---|---|---|---|
| 42 | Set-screw | 1 | |
| 43 | G1/8" elbow screw-in union | 4 | |
| 50 | Inductive position measuring system | 1 | |
| 51 | Screw | 1 | |
| 52 | Screw | 3 | |
| 53 | Sensor BES 516-324-E0-C-S49-00,3 (NI 32) | 1 | |
| 60 | Connection cable to position measuring system | 1 | |

| Parts list key | |
|---|---|
| **X** | included in the sealing kit |

**PKL maxi 220** (ID No. 0471950)

| Item | Designation | Quantity | Note |
|---|---|---|---|
| 1 | Adapter | 1 | |
| 2 | Clamping pin SPA 80-30 | 1 | |
| 3 | Cover caps | 4 | |
| 4 | Screw | 1 | |
| 5 | Screw | 4 | |
| 6 | Cylindrical pin | 2 | |

## 9.3 Proximity Switches and Supply Cables for Single or Replacement Orders

The inductive proximity switch for the control function for the presence of the pallet coupling consists of the sensor type BES 516-324-E0-C-S49-00,3 (NI 32) with a short connection cable and round plug connection plus an angular plug with a W-M8 supply cable.

If required, the single components for the two-part INW inductive proximity switch can be ordered separately.

The supply cable is available in two connecting lengths.

**Inductive proximity switch IN – M8 plug connection**

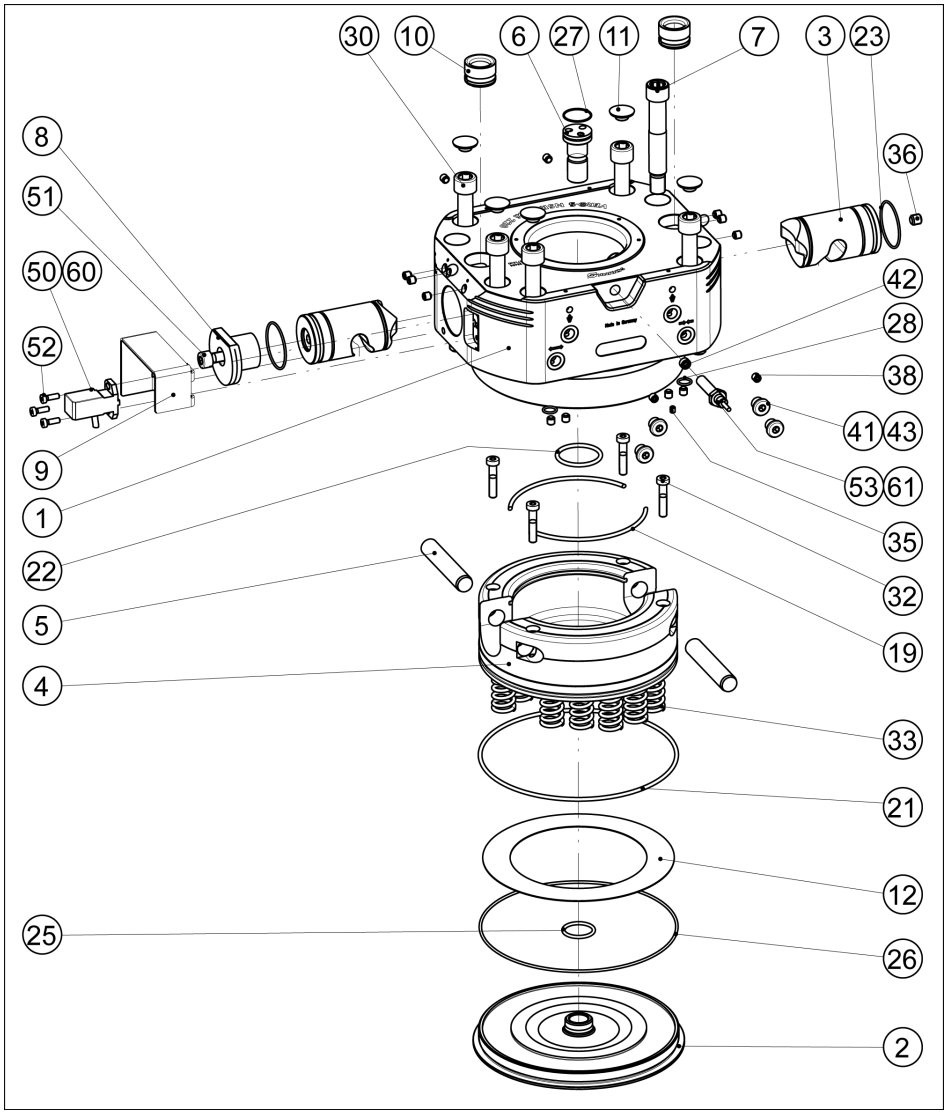
| Designation | ID number |
|---|---|
| BES 516-324-E0-C-S49-00,3 | 0313425 |

**Angular plug with supply cable W – M8 plug connection**

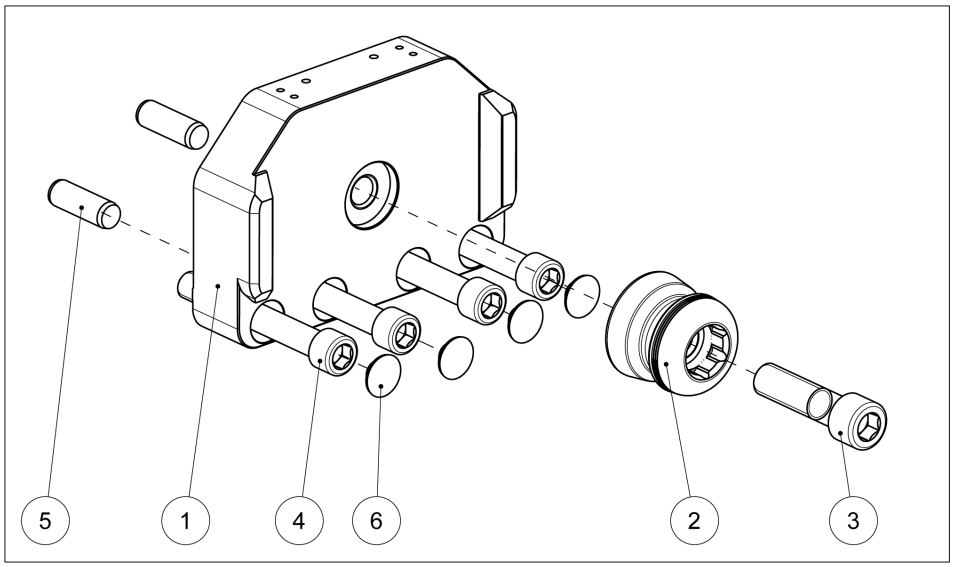
| Designation | ID number |
|---|---|
| W 3-M8 (cable length 3 m) | 301594 |
| W 5-M8 (cable length 5 m) | 301502 |

# 10 Assembly drawings

## NSR maxi 220




## PKL maxi 220



# 11 Sensors

The robot coupling NSR maxi 220 is prepared for using the inductive stroke measuring system and the inductive proximity switch NI 32 (see ▶ 4.4 [🗋 22]).

- Information on handling sensors is available at **schunk.com** or from SCHUNK contact persons.
- Technical data for the sensors can be found in the data sheets (included in the scope of delivery or at **schunk.com**).

The proximity switch used has reverse polarity protection and is short-circuit-proof.

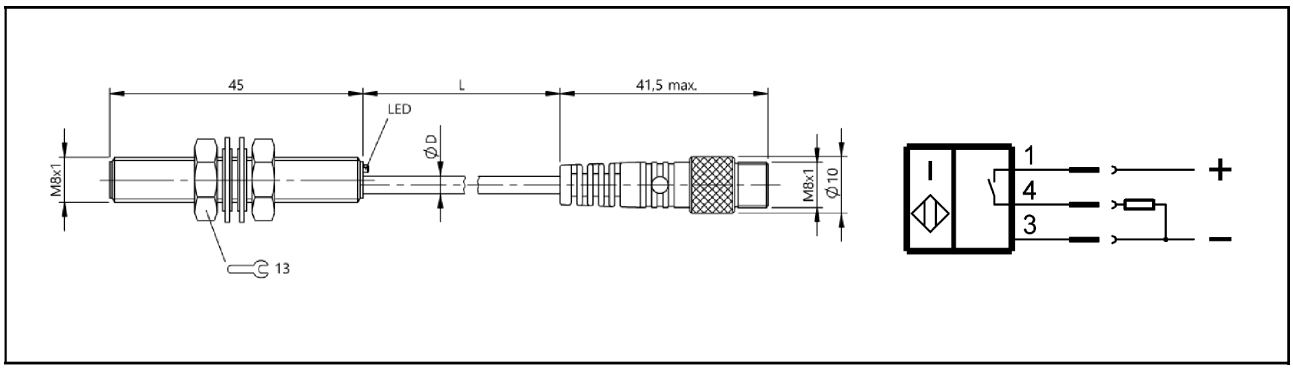
For the proper use of the proximity switches, observe the following:

- Do not pull on the cable of the sensor.
- Do not dangle the sensor from the cable.
- Do not excessively tighten the mounting screw or clips.
- Do not exceed the permissible bending radius of the cable (see catalog specifications).
- Prevent proximity switch from coming into contact with hard objects or with chemicals; in particular, nitric, chromic or sulfuric acid.

Proximity switches are electronic components which can react sensitively to high-frequency interference or electromagnetic fields.

- Check that the cable is correctly connected and installed. There must be sufficient distance between the switches and sources of interference and their supply cables.
- Parallel switching of multiple sensor outputs of the same design (npn, pnp) is permissible, though this does not increase the permissible load current.
- Please note that the leakage current of the individual sensors is accumulative (by about 2 mA).

## Mounting and adjustment BES 516-324-E0-C-S49-00,3 (NI 32) (switching distance 1.5 mm)




Circuit diagram for setting the proximity switches. The proximity switches are equipped with an LED signal display on the sensor head.

**Technical data:**

| | |
|---|---|
| Sensor BES 516-324-E0-C-S49-00,3 (NI 32) (individual): | ID 0313425 |
| Angular plug with supply line WK 3-M8 plug connection 3 meter cable length (individual): | ID 0301594 |
| Angular plug with supply line WK 5-M8 plug connection 5 meter cable length (individual): | ID 0301502 |
| Size: | M8 x 1 x 45 mm |
| Switching function: | PNP closer |
| Switching distance: | 1.5 mm |
| Voltage: | 10 – 30 V DC |
| Ripple: | ≤ 10% |
| Max. current on contact: | 200 mA, short-circuit-proof |
| Switching hysteresis: | ≤ 15% of the nominal switching distance |
| Temperature range: | – 40°C to + 85°C |
| Switching frequency approx.: | 5000 Hz |
| Voltage drop (max. load): | 2.5 V |
| Thread on connecting plug for feed line: | M8x1 |
| Cable diameter of feed line up to sensor head: | 3.0 mm |
| Cable length (L): | 0.3 m |
| Protection class in accordance with DIN EN 60529: | IP 68* |
| Installation type: | flush mounted |
| Tightening torque: | 8 Nm |

* for the round plug connection only when screwed on

The inductive proximity switch NI 32, item 53 (included in the accessory kit of the clamping system) can be used to monitor the presence of a pallet in the robot coupling (see illustration "Automated connection and disconnection of transport loads").

To do this, remove the set-screw (item 42) on the robot coupling and screw in the proximity switch. Adjust the switching point so that the proximity switch switches when the pallet is present.

For precise switching distance adjustment, screw in the proximity switch by hand into the mounting position for the robot coupling. Make sure that the switch head is installed approximately 1 to 2 mm away from the centering taper of the clamping system, meaning that it cannot directly come into contact with the clamping pin for the pallet coupling (see ▸ 4.4 [🗋 22]). The connection cable must not be excessively twisted and certainly not damaged. When making the adjustment, make sure that the signal LED on the sensor is easily visible.

Carry out a function check by alternately inserting and withdrawing the clamping pallet in the change interface. Then fasten the proximity switch using the lock nut for the sensor. If necessary, adjust the switching position.

Then link the plug connection between the proximity switch and connection cable.

**NOTE**

In the operating state, the proximity switch with the sensor head must never touch the clamping pin of the clamping pallet to be replaced.

If the proximity switch for detecting the presence of a pallet is not used, then the mounting position needs to be closed using the set-screw (item 42) so that no chips can penetrate through the open change interface for the clamping system.

# 12 Appendix

## Inductive positioning system — PMI14V-F166-2E2-0,35M-V15-Y

CE

### Model Number

**PMI14V-F166-2E2-0,35M-V15-Y**

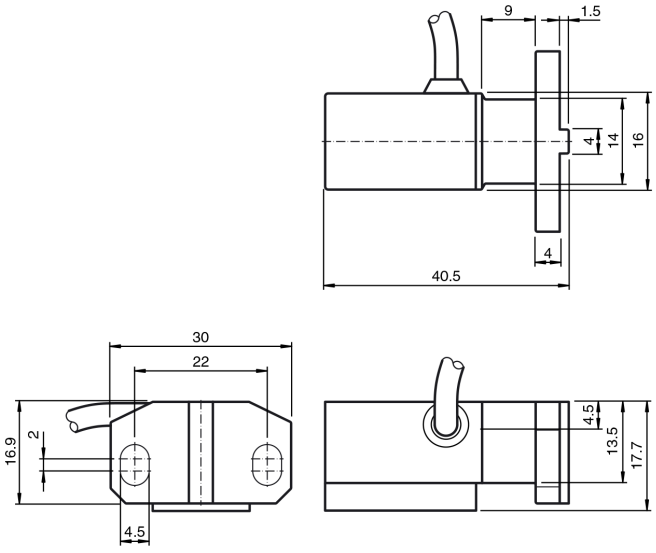
### Features

- **2 switch outputs**
- **2 configurable switching frames**

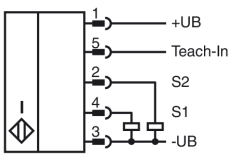
### Technical data

| | |
|---|---|
| **General specifications** | |
| Object distance | 0.5 ... 2 mm |
| Measurement range | 0 ... 14 mm |
| **Nominal ratings** | |
| Operating voltage $U_B$ | 18 ... 30 V |
| Reverse polarity protection | reverse polarity protected |
| Repeat accuracy R | ± 0.05 mm |
| Resolution | 33 µm |
| Temperature drift | ± 0.4 mm |
| No-load supply current $I_0$ | ≤ 20 mA |
| **Switching output** | |
| Output type | 2 PNP , NO contact , reverse polarity protected , short-circuit protected , programmable |
| Operating current $I_L$ | 50 mA ( each output ) |
| Switching window | Width S1: 0,5 mm<br>Width S2: 1,6 mm |
| Voltage drop | ≤ 3 V |
| Short-circuit protection | pulsing |
| **Ambient conditions** | |
| Ambient temperature | -10 ... 50 °C (14 ... 122 °F) |
| **Mechanical specifications** | |
| Connection type | Male cordset, M12 , 5-pin<br>0.35 m PUR cable |
| Degree of protection | IP65 |
| Material | |
| Housing | Zinc die-casting, nickel-plated<br>cover , PBT |
| Target | mild steel, e. g. 1.0037, SR235JR (formerly St37-2) |
| Mass | 53 g |
| **Compliance with standards and directives** | |
| Standard conformity | |
| Standards | EN 60947-5-2:2007<br>IEC 60947-5-2:2007 |

### Dimensions




### Electrical Connection

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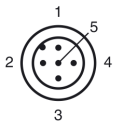
## Inductive positioning system PMI14V-F166-2E2-0,35M-V15-Y

### Pinout

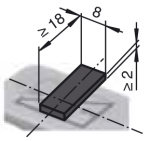



Wire colors in accordance with EN 60947-5-2

| | | |
|---|---|---|
| 1 | BN | (brown) |
| 2 | WH | (white) |
| 3 | BU | (blue) |
| 4 | BK | (black) |
| 5 | GY | (gray) |

### Additional Information

dimensions for the target object:




### Accessories

**BT-F90-W**
Damping element for sensors of type F90, F112, and F166; side hole

**PMI14V-Teach**
Programming unit

### Programming the Switching Windows

The two switching windows can be taught in using the PMI14V-Teach programming unit. The programming unit is connected directly between the sensor and the power supply. The Teach-in process is generally only possible in the first 6 minutes of the sensor being switched on. After that point, programming is blocked and is only possible again once the power supply has been interrupted.

The relevant positions of the switching windows that are taught in are stored in the nonvolatile memory. The switching windows are positioned symmetrically around the configured position in each case. The measured position is based on half of the width (center) of the damping element.

#### Teach-In Process

**Switching the Sensor to Programming Mode**

1. Connect the programming unit between the sensor and the power supply.
2. Press and hold the key on the programming unit for approx. 1.5 seconds.

>> The LED S1 on the programming unit flashes (2 Hz).

**Switching window 1: width 0.5 mm (± 0.25 mm), switching output S1**

Prerequisite: LED S1 is flashing.

1. Position the damping element in the required switching position.
2. Press the button again.

>> The sensor teaches in position 1. LED S1 goes out briefly. If the Teach-in process was successful, LED S1 lights up for approx. 1.5 seconds.

**Switching window 2: width 1.6 mm (± 0.8 mm), switching output S2**

Prerequisite: LED S2 is flashing.

1. Position the damping element in the required switching position.
2. Press the button again.

>> The sensor teaches in position 2. LED S2 goes out briefly. If the Teach-in process was successful, LED S2 lights up for approx. 1.5 seconds. The sensor then returns to its normal operating state. The LEDs now follow the switching status of the respective output.

**Reset to Default Settings**

1. Press and hold the button for approx. 6.5 seconds.

>> The sensor is reset to its default settings. The programming unit confirms this by flashing quickly (8 Hz).

**Faults during Teach-in**

If a Teach-in process fails for any reason, LED S1 flashes quickly (16 Hz) for approx. 1.5 seconds. The cause for this may be that the Teach-in attempt was conducted outside the measuring range.

The Teach-in process is canceled when the power supply is interrupted or if no button is pressed for 6 minutes.

In both cases, the existing switching limits remain saved.

Release date: 2016-10-14 09:38 Date of issue: 2016-10-14 283224_eng.xml

# 13 Manufacturer certificate

| | |
|---|---|
| Manufacturer / Distributor: | H.-D. SCHUNK GmbH & Co. Spanntechnik KG<br>Lothringer Str. 23<br>D-88512 Mengen |
| Product: | Quick-change pallet system |
| Designation: | VERO-S |
| Type designation: | NSR |

**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, 25th of April 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

**H.-D. SCHUNK GmbH & Co.**
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