Product Information
Quick change system SWS 007
Modular. Robust. Flexible.
Quick-change system SWS

Pneumatic tool changing system with patented locking system

Field of application
Can be used wherever short changeover times between a handling device and a tool (pallet, gripper)

Advantages – Your benefits
Complete series of 14 sizes for optimal size selection and a broad application range
Patented fail-safe locking mechanism for secure connection between the quick-change master and adapter
Manual emergency unlocking possible no counter-forces from springs
All functional components made from hardened steel for high mechanical resilience of the changing system
Wide range of electric, pneumatic, and fluid modules for universal energy transmission possibilities
Integrated pneumatic feed-through for a safe power supply of the handling modules and tools
Possibility of transmission of fluid systems with self-sealing couplings possible
Adapter side coding via plug connector possible
Suitable storage racks for all sizes to ensure the optimum adaption to each application
ISO mounting pattern for easy assembly to most types of robots without needing additional adapter plates

Sizes
Quantity: 14

Handling weight
1.4 .. 300 kg

Moment load Mx
2.8 .. 7170 Nm

Moment load Mz
3.45 .. 3800 Nm
Functional description

Automatic exchange of the end effector (e.g. gripper, pallets, vacuum gripping systems, pneumatically or electrically driven tools, welding guns, etc.) increases the flexibility of your robot.

The quick-change system (SWS) consists of a quick-change master (SWK) and a quick-change adapter (SWA). The SWK is mounted onto the robot, and couples the SWA mounted onto your tool. A pneumatically driven locking piston, with its patented design, ensures that the connection is secure. After coupling, pneumatic and electric feed-throughs automatically supply your robot tool.

- **Sensor monitoring of the locking device**
  optional, for process-reliable monitoring of the locking condition

- **Housing**
  is weight-optimized due to the use of high-strength aluminum alloy

- **Drive**
  pneumatic, efficient, and easy to handle

- **Locking mechanism**
  load-free locking and unlocking, fail-safe in locked condition

- **Air feed-through**
  without interfering contours due to the integration into the housing. Also suitable for vacuum.
Detailed functional description

Sectional diagram SWS-001

1. Drive pneumatic, efficient, and easy to handle
2. Locking mechanism load-free locking and unlocking, fail-safe in locked condition
3. Housing is weight-optimized due to the use of high-strength aluminum alloy
4. Centering and mounting possibilities by using a standardized ISO 9409 interface for robots
5. Electric feed-through no interfering contour, as integrated in the housing
6. Air feed-through without interfering contours due to the integration into the housing. Also suitable for vacuum.

Quick-change system in unlocked position

1. Adapter plate
2. Quick-change master SWK
3. Electrical module, robot-side
4. Locking mechanism
5. Locking ring
6. Quick-change adapter SWA
7. Electrical module, tool-side

Section view in ready-to-lock position

1. Piston
2. Quick-change master SWK
3. Locking piston
4. No-Touch-Locking™
5. Locking ring
6. Quick-change adapter SWA

Detail view of the locking ball position in ready-to-lock position

1. Hardened locking ball is on the 1st taper of the cam. The 1st taper allow head and tool to be separate while locking.
Section view of the quick-change system in locked position

1. When the piston is actuated, the locking balls are pushed under the hardened steel ring and the adapter is pulled onto the head.

Detail view of the locking ball in locked position

1. Hardened steel balls on the 2nd taper of the cam create extremely high locking forces.
2. Fail-safe reverse taper
3. 1st taper of the cam

Section view of the quick-change system in fail-safe position

1. The master and the adapter can only be separated from one another in the self-locking status if the piston is pneumatically actuated with the unlock air pressure.

Detail view of locking ball while in fail-safe position

1. In the case of pressure loss, the locking piston is held in place by the cylindrical part of the locking piston. The friction from the piston seal prevents the piston from moving from its own weight or vibrations. The head and adapter can only be separated by pneumatic actuation of the piston.
2. Fail-safe reverse taper
3. 1st taper of the cam
General notes about the series

**Actuation:** pneumatic, with filtered compressed air as per ISO 8573-1:2010 [7:4:4].

**Operating principle:** locking balls actuated by pistons for locking

**Energy transmission:** variable via attachment feed-through modules, depending on the unit size

**Housing:** The housing consists of high-strength, hard-coated aluminum alloy. The functional components are made of hardened steel.

**Scope of delivery:** Operating and maintenance instruction, manufacturer’s declaration

**Warranty:** 24 months

**Harsh environmental conditions:** Please note that use under harsh environmental conditions (e.g. in the coolant area, cast and grinding dust) can considerably reduce the service life of the units, and we will not take over any warranty. However, in many cases we can find a solution. Please contact us for assistance.

**Handling weight:** is the weight of the total load attached to the flange. When designing, the permissible forces and moments have to be paid attention to. Please note that exceeding the recommended handling weight will shorten the lifespan.

Application example

Insertion tool for assembly of small to medium-sized workpieces. The tool can be used in both clean and dirty environments. Due to its quick-change system, other tools can alternately be fixed to the robot flange.

1. Quick-change system SWS
2. Electric feed-through
3. Tolerance compensation unit TCU-Z
4. 3-finger centric gripper PZN-plus
SCHUNK offers more ...

The following components make the product even more productive – the suitable addition for the highest functionality, flexibility, reliability, and controlled production.

For more information on these products can be found on the following product pages or at schunk.com.

Options and special information

No-Touch-Locking™: Locking without touching. Ensures that the SWS is securely locked even when the SWK and SWA do not touch.

Patented fail-safe locking mechanism: A large piston diameter and an outside clamping locking increase the permissible moment capacity. Steel parts made of low corrosion Rc 58.
Selection of a Quick-change System SWS

1. Determining the Size

Quick Method:
When low or medium forces and moments act upon the SCHUNK quick-change system, you should choose a quick-change system with a payload comparable to that of your robot.

If high moments and forces act upon the SCHUNK quick-change system, please use the following method, which is more precise.

More precise Method:
Forces and moments are critical factors in choosing a suitable quick-change system. Proceed as follows to estimate the most unfavorable moment:

- Calculate the approximate center of gravity (COG) of the heaviest end effector that will be used. Calculate the distance (D) from the COG to the bottom of the quick-change adapter.
- Calculate the weight (W) of the heaviest end effector.
- Multiply W and D to find an approximate static moment (M) (or a moment based on 1 g of acceleration).
- Choose a quick-change system with a high moment load equal to or greater than M.

Due to their potentially high accelerations, robots can generate moments that are two or three times higher than M.

2. Pneumatic and electrical Systems

Determine the number of pneumatic connections and electrical contacts required. Larger quick-change systems feature a higher number of pneumatic connections and electrical contacts.

3. Temperature and Chemicals

SCHUNK quick-change systems use nitrile seals for the feed-through of pneumatics. O-rings seal the pneumatic locking mechanism. These O-rings are resistant to most chemical influences and also withstand temperatures ranging from -25 to +65 °C. Please contact us if you should need information on temperatures or chemical influences in particular environments.

4. Precision Applications

Always comply with the specifications if you work with applications that require high repeat accuracy.

Please note: A quick-change system has an influence on force and moment, payload, size, and repeat accuracy of the robot.

Sizes SWS

<table>
<thead>
<tr>
<th>Designation</th>
<th>Recommended handling weight [kg]</th>
<th>Max. moment [Nm]</th>
<th>Pneumatic feed-throughs</th>
<th>Air connections locked and unlocked</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Mx, My, Mz</td>
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<tr>
<td>SWS 001</td>
<td>1.4</td>
<td>2.8, 3.45</td>
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<td>SWS 005</td>
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<td>75, 102, 220</td>
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<td>169.5, 230</td>
<td>8x G1/8&quot;, 6x G1/8&quot;</td>
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<td>G1/8&quot;</td>
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<td>SWS 110</td>
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<td>2352, 2352</td>
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<td>G1/8&quot;</td>
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<td>SWS-160</td>
<td>300</td>
<td>7170, 3800</td>
<td>5x G3/8&quot;; 4x G1/2&quot;, 4x G1/8&quot;</td>
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<td>7600, 4060</td>
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<td>SWS-l 310</td>
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<td>SWS-l 510</td>
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<td>SWS-l 1210</td>
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<td>13500, 16200</td>
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### Bestellbeispiel SWS

#### Description

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<tr>
<th>SW</th>
<th>K</th>
<th>110</th>
<th>R19</th>
<th>G19</th>
<th>SM</th>
</tr>
</thead>
</table>

#### Page

- **K** = head (robot side)
- **A** = Adapter (tool side)

#### Size

##### Optional module

- **Rxx, Sxx, Gxx, Kxx** = electric module
- **Pxx** = pneumatic module (anodized aluminum housing, not suitable for liquids)
- **Vxx** = Vacuum module
- **Fxx** = Fluid module (stainless steel, self-sealing)
- **000** = Unused option

##### Proximity switch monitoring

- **SG** = Inductive proximity switch (SWK-040Q/076)
- **SM** = Inductive proximity switch (SWK-007/110/160)
- **SQ** = Inductive proximity switch (SWK-011H/020H/021H)
- **SIP-IN** = monitoring prepared, inductive proximity switch included (SWK-011/020/021/027/041/046/060/071)

More versions on request
SWS 007
Quick change system

Dimensions and maximum loads

This is the max. sum of all forces and moments which are permitted to act on the change system for ensuring proper functioning.

Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>SWK-007-000-000-IN03</th>
<th>SWK-007-000-000</th>
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<td>ID</td>
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<tr>
<td>Recommended handling weight [kg]</td>
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<td>Piston stroke monitoring</td>
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<td>Locking force [N]</td>
<td>1100</td>
<td>1100</td>
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<td>Repeat accuracy [mm]</td>
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<tr>
<td>Weight [kg]</td>
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<td>0.08</td>
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<td>Max. distance when locking [mm]</td>
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<td>Air connection thread pneumatic feed-through</td>
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<td>5x M5</td>
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<td>Lock/unlock main connection</td>
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<td>Max. permissible XY-axis offset [mm]</td>
<td>±1</td>
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<td>Max. permissible angular offset [*°]</td>
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<td>Robot-side connection</td>
<td>ISO 9409-1-31.5-4-M5</td>
<td>ISO 9409-1-31.5-4-M5</td>
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<td>Min./max. ambient temperature [°C]</td>
<td>5/60</td>
<td>5/60</td>
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<tr>
<td>Min./max. operating pressure [bar]</td>
<td>4.5/6.9</td>
<td>4.5/6.9</td>
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<tr>
<td>Dimensions X x Y x Z* [mm]</td>
<td>56.5 x 45.5 x 28.4</td>
<td>54.5 x 48.3 x 17.1</td>
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<tr>
<td>Screw connection diagram</td>
<td>S7</td>
<td>S7</td>
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</table>

* Please note that the heights of the change master (ZK) and change adapter (ZA) differ. The sum represents the total height of a coupled change system.
The drawing shows the basic design of the quick-change system without dimensional consideration of the options described below.

A, a Air connection locked
B, b Air connection unlocked
1 Robot-side connection
2 Tool-side connection
19 Mounting surface for options
24 Bolt circle
25 Pneumatic feed-throughs
27 Through holes for screw connections
90 Sensor IN ...
91 Axial air connection (supplied with locking screw)
92 Bore hole for sealing ring (back)
95 Fit for centering pins
96 Fit for centering
### Adapter plate ISO-A40-R

<table>
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### Adapter plate ISO-A50-R

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Electric feed-through module

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<td>Feed-through module for signal on the robot side</td>
<td>SWS-A15-K</td>
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<td>SWS-E10-011-K</td>
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<td></td>
<td>SWS-E20-011-K</td>
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<td>SWS-EM8-011-K</td>
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<td></td>
<td>SWS-ML12R-K</td>
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<td></td>
<td>SWS-ML8A-K</td>
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<td></td>
<td>SWS-P4E19-K</td>
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Feed-through module for signal on the tool side

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<tr>
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<td>SWS-EM8-011-A</td>
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<td>SWS-ML12R-A</td>
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<td>SWS-P4E19-A</td>
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</table>

For more detailed information and further modules and matching cable connectors, see catalog chapter “SWO” or visit our website.

Tooling plate, horizontal

Center SWS 007 (reference point for load diagram)

View center of gravity offset in x or y direction

The storage stand serves as a storage rack for the quick-change adapter with tools which are mounted by the customer himself.

<table>
<thead>
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<th>ID</th>
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</thead>
<tbody>
<tr>
<td>Tooling plate, horizontal</td>
<td>SWM-TSS-MMS-11345</td>
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</table>

When using the storage rack, the load diagram must be observed.
If the center of gravity of the tool is offset by more than 10 mm in the x or y direction (see storage tray drawing), the SWA will tilt after being set down in the storage module. The use of this storage tray in applications with SCARA robots or Cartesian robots is not recommended in this case.

### Design of an adapter plate for using the axial air feed-through

The adapter plate serves as an interface between the quick-change adapter and the tool of the customer. To ensure correct use of the axial air feed-throughs, the counterbores shown in the drawing must be taken into account when designing the adapter plate. The appropriate seals are included in the accessory kit.