Product Information
Quick change system SWS 001
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 M, 2.8 .. 7170 Nm

Moment load M, 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.

---

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

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

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

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

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

Quick-change system in unlocked position

1. Adapter plate
2. Quick-change master SWK
3. Electrical module, robot-side
4. Locking mechanism

Section view in ready-to-lock position

1. Piston
2. Quick-change master SWK
3. Locking piston

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

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.
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.

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

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

- Compensation unit
- Anti-collision and overload protection sensor
- Rotary feed-through
- Universal gripper
- Inductive proximity switches
- Electronic module
- Storage rack

For more information on these products can be found on the following product pages or at schunk.com. Please contact us: SCHUNK technical hotline +49-7133-103-2696

**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>
</tr>
</thead>
<tbody>
<tr>
<td>SWS 001</td>
<td>1.4</td>
<td>2.8</td>
<td>4x M5</td>
<td>M5</td>
</tr>
<tr>
<td>SWS 005</td>
<td>8</td>
<td>37.5</td>
<td>6x M5</td>
<td>M5</td>
</tr>
<tr>
<td>SWS 007</td>
<td>16</td>
<td>75</td>
<td>6x M5</td>
<td>M5</td>
</tr>
<tr>
<td>SWS 011</td>
<td>16</td>
<td>75</td>
<td>6x M5</td>
<td>M5</td>
</tr>
<tr>
<td>SWS 020</td>
<td>25</td>
<td>169.5</td>
<td>12x M5</td>
<td>M5</td>
</tr>
<tr>
<td>SWS 021</td>
<td>25</td>
<td>169.5</td>
<td>8x G1/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 040Q</td>
<td>50</td>
<td>471</td>
<td>8x G1/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 041</td>
<td>50</td>
<td>471</td>
<td>8x G1/8&quot;; 4x G1/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 046</td>
<td>50</td>
<td>678</td>
<td>6x G3/8&quot;; 4x G1/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 060</td>
<td>75</td>
<td>591</td>
<td>8x G1/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 071</td>
<td>79</td>
<td>1185</td>
<td>8x G1/4&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 076</td>
<td>100</td>
<td>1626</td>
<td>5x G3/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS 110</td>
<td>150</td>
<td>2352</td>
<td>8x G3/8&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS-160</td>
<td>300</td>
<td>7170</td>
<td>5x G3/8&quot;; 4x G1/2&quot;</td>
<td>G1/8&quot;</td>
</tr>
<tr>
<td>SWS-L 210</td>
<td>300</td>
<td>7600</td>
<td>4060</td>
<td></td>
</tr>
<tr>
<td>SWS-L 310</td>
<td>510</td>
<td>9900</td>
<td>9600</td>
<td></td>
</tr>
<tr>
<td>SWS-L 510</td>
<td>700</td>
<td>10900</td>
<td>10500</td>
<td></td>
</tr>
<tr>
<td>SWS-L 1210</td>
<td>1350</td>
<td>13500</td>
<td>16200</td>
<td></td>
</tr>
</tbody>
</table>
Bestellbeispiel SWS

**Description**

SW

**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 (for SWS 007/011H/020H/021H/040Q/076/110/160)**

MMS = Magnetic switch (SWK-007)
SG = Inductive proximity switch (SWK-040Q/076)
SM = Inductive proximity switch (SWK-110/160)
SQ = Inductive proximity switch (SWK-011H/020H/021H)
SIP = monitoring prepared, inductive proximity switch not included (SWK-001/005/011/020/021/027/041/046/060/071)
0 = Monitoring possible, not included in the scope of delivery

More versions on request
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-001-000-000</th>
<th>SWA-001-000-000</th>
<th>SWK-001-E04-E04</th>
<th>SWA-001-E04-E04</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>0302290</td>
<td>0302291</td>
<td>0302292</td>
<td>0302293</td>
</tr>
<tr>
<td>Recommended handling weight [kg]</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Locking force [N]</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>Repeat accuracy [mm]</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>0.03</td>
<td>0.02</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Max. distance when locking [mm]</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Air connection thread pneumatic feed-through</td>
<td>4x M5</td>
<td>4x M5</td>
<td>4x M5</td>
<td>4x M5</td>
</tr>
<tr>
<td>Lock/unlock main connection</td>
<td>M3</td>
<td>M3</td>
<td>M3</td>
<td>M3</td>
</tr>
<tr>
<td>Number of electrical feed-throughs</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Voltage [V]</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max. permissible XY-axis offset [mm]</td>
<td>±0.3</td>
<td>±0.3</td>
<td>±0.3</td>
<td>±0.3</td>
</tr>
<tr>
<td>Max. permissible angular offset [°]</td>
<td>±0.8</td>
<td>±0.8</td>
<td>±0.8</td>
<td>±0.8</td>
</tr>
<tr>
<td>Min./max. ambient temperature [°C]</td>
<td>5/60</td>
<td>5/60</td>
<td>5/60</td>
<td>5/60</td>
</tr>
<tr>
<td>Min./max. operating pressure [bar]</td>
<td>4.5/6.9</td>
<td>4.5/6.9</td>
<td>4.5/6.9</td>
<td>4.5/6.9</td>
</tr>
<tr>
<td>Dimensions Ø D x Z*</td>
<td>45 x 10.9</td>
<td>45 x 6</td>
<td>45 x 10.9</td>
<td>45 x 6</td>
</tr>
<tr>
<td>Screw connection diagram</td>
<td>S1</td>
<td>S1</td>
<td>S1</td>
<td>S1</td>
</tr>
</tbody>
</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 version of the quick-change system with an electrical optional module.

A, a Air connection locked
B, b Air connection unlocked
1 Robot-side connection
2 Tool-side connection
BT Connection for electric feed-through
BO Pneumatic feed-throughs
CM DIN ISO-9409 bolt circle
IT Groove for tool rack
IO Fit for centering pins
IP Fit for centering
**SWS 001**

**Quick change system**

---

**Electric feed-through module**

<table>
<thead>
<tr>
<th>Description</th>
<th>ID</th>
<th>No. Pins</th>
<th>Elec. Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot side</td>
<td>SWO-E04-K 9960359</td>
<td>4</td>
<td>50 V AC/3 A</td>
</tr>
<tr>
<td>Tool side</td>
<td>SWO-E04-A 9960360</td>
<td>4</td>
<td>50 V AC/3 A</td>
</tr>
</tbody>
</table>

For other modules or technical data, see catalog chapter “Options” or visit our website.

---

**Modular SWM-S-001 quick-change rack**

The modular storage rack is designed for the specific size. The system's modular design allows you to compile your individual storage rack. This provides you with a storage rack that meets your individual requirements, taking into account the number of tools, deposition positions, and tool size. For further information please refer to the chapter “SWM storage rack”

<table>
<thead>
<tr>
<th>Description</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage plate</td>
<td>SWM-TSS-MM-7869 0301276</td>
</tr>
<tr>
<td>Sensor</td>
<td>SWM-SMA-7869 0301277</td>
</tr>
</tbody>
</table>

---

**SWS 001 Storage Plate**

Mounting grooves are not included in the scope of delivery.
Jens Lehmann, German goalkeeper legend, SCHUNK brand ambassador since 2012 for safe, precise gripping and holding.
schunk.com/Lehmann