

## Flexible. Modular. Strong.

### SWS-L Quick-change System

Pneumatic tool changing system with patented locking system for heavy loads.

#### Field of Application

Can be used wherever short changeover times between a handling device and a tool (gripper, pallets, welding gun) are required

#### Advantages – Your benefit

**Patented fail-safe locking mechanism** for safe connection between quick-change master and quick-change adapter

**Manual emergency unlocking possible** no counter-forces from springs

**All functional components made from hardened steel** for a greater change system load bearing capacity

**The same option modules for all sizes** that permits the use of standard parts in the production line

**Possibility of transmission of electric devices** SWS 041 storage module

**As standard, many option modules can be attached** for highest flexibility of your application

**Adapter coding** via electric module possible

**Suitable storage racks for all sizes** to ensure the optimal adaption to each application

**ISO flange pattern** for easy assembly to most types of robots without needing additional adapter plates



Sizes  
Quantity: 4



Handling weight  
300 .. 1350 kg



Moment load  $M_x$   
7600 .. 13500 Nm



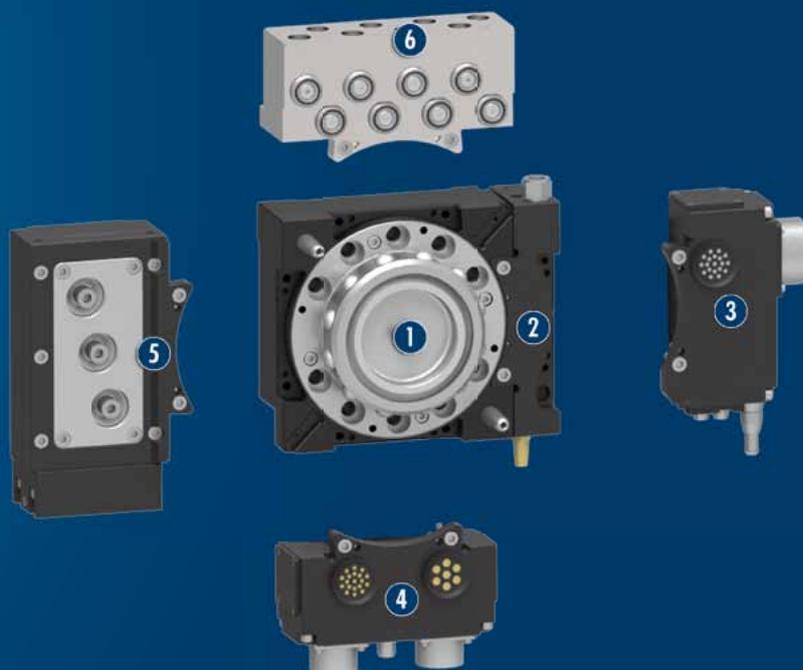
Moment load  $M_z$   
4060 .. 16200 Nm

## Functional Description

Due to the automatic change of the robot tool (e.g. gripper, vacuum gripping system, pneumatically or electrically driven tools, welding guns ...) flexibility of your robot is increased.

The SWS quick-change system consists of a SWK quick-change master and a SWA quick-change adapter. The SWK,

mounted onto the robot, couples up 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 **SWS quick-change master**  
with patented locking

② **Valve adapter**  
with integrated valve for control of the unit

③ **Control module**  
for control of the valve adapter and additional signal transmission to the tool

④ **E-module**  
for separate transmission of power and sensor signals for servo drives, for example

⑤ **Welding current module**  
for high current loads

⑥ **Fluid module, self-sealing**  
for drip-free transfer of liquid media

CAD data, operating manuals and other current product documents are available at [www.schunk.com](http://www.schunk.com)

## General Notes to the Series

**Actuation:** pneumatic, with filtered compressed air as per DIN ISO 8573-1: 7 4 4

**Operating principle:** Locking balls actuated by pistons

**Pass through:** Variable via attachment modules, depending on the type

**Housing:** The housing is made of high-tensile, hard-coated aluminum alloy. The functional parts are made of hardened steel.

**Scope of delivery:** Operating and maintenance instructions, manufacturer's declaration

**Warranty:** 24 months (details, general terms and conditions and operation manuals can be downloaded at [www.schunk.com](http://www.schunk.com))

**Harsh environmental conditions:** Please note that use in harsh environmental conditions (e.g. in the coolant area, cast and grinding dust) can considerably reduce the service lifetime of the units, and could void warranty. However, in many cases we can find a solution. Please contact us.

**Handling weight:** The weight of the total load attached to the flange. The design must take into account the permissible forces and moments. Please note that the life span will be reduced if the maximum handling weight is exceeded.

## Application example

Heavy-load gripper unit with robot quick-change system for changing the handling devices such as grippers and electrode holders.

- 1 SWS-L Quick-change System
- 2 PZN-plus 3-Finger Universal Gripper



## SCHUNK offers more ...

The following components make the SWS-L even more productive – the perfect complement for highest functionality, flexibility, and process reliability.



SWM-L Storage Rack



Cable Connector



Optional Electrical Module



Pneumatic Optional Modules



Extension Cable



Adapter Plates



Inductive Proximity Switches

① Further information regarding the products can be found on the following products pages or at [www.schunk.com](http://www.schunk.com). Please contact us for further information: 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 contact.

**Patented fail-safe locking mechanism:** Large piston diameter and outward ball travel increase moment load. All locking parts are made of Rc 58 stainless steel.

## Selection of a SWS Quick-change System

### 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 that is 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:

The forces and moments are a critical factor in choosing a suitable quick-change system. Proceed as follows to estimate the most unfavorable moment:

- Calculate for 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 tool plate.
- Calculate the mass (m) of the heaviest end effector.
- Multiply m, D and gravity (9,81 m/s<sup>2</sup>) to determine the approximate static moment (M) (or a moment based on 1 g acceleration).
- Choose a quick-change system with a high moment load that is equal to or greater than M.

Due to their potentially high acceleration, robots can generate moments that are two to three times higher than M. The quick-change systems are designed for absorbing dynamic moments that are three times higher than their static moments.

### 2. Pneumatic and electrical System

Determine the number of required pneumatic connections and electrical contacts. 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 pneumatic supply to the tool plate. O-rings seal the pneumatic locking mechanism. These O-rings are resistant to most chemical influences and also withstand temperatures in the range from -25 to 65 °C. Please contact your SCHUNK representative if you need information on temperatures or chemical influences in particular environments.

### 4. Precision Applications

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

## SWS Sizes

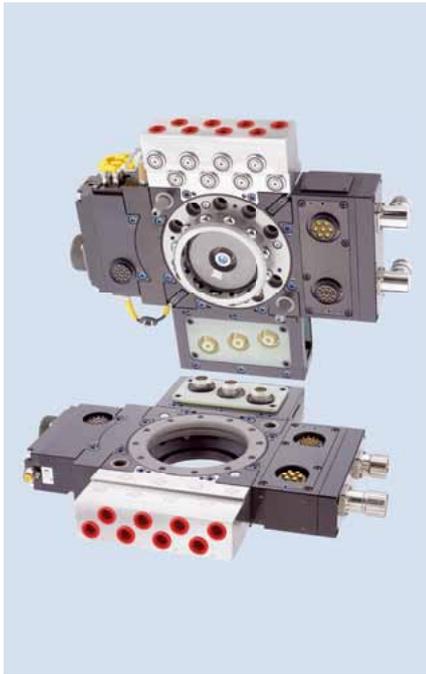
| Designation | Recommended handling weight [kg] | Dynamic moment [Nm]               |                | Static moment [Nm]                |                | Pneumatic feed-throughs | Air connections locked and unlocked |
|-------------|----------------------------------|-----------------------------------|----------------|-----------------------------------|----------------|-------------------------|-------------------------------------|
|             |                                  | M <sub>x</sub> and M <sub>y</sub> | M <sub>z</sub> | M <sub>x</sub> and M <sub>y</sub> | M <sub>z</sub> |                         |                                     |
| SWS-001     | 1.4                              | 2.8                               | 3.45           | 0.983                             | 1.15           | 4 x M5                  | M5                                  |
| SWS-005     | 8                                | 37.2                              | 50.7           | 12.4                              | 16.9           | 6 x M5                  | M5                                  |
| SWS-011     | 16                               | 74.7                              | 101.7          | 24.9                              | 33.9           | 6 x M5                  | M5                                  |
| SWS-020     | 25                               | 169.5                             | 234            | 56.5                              | 78             | 12 x M5                 | M5                                  |
| SWS-021     | 25                               | 169.5                             | 234            | 56.5                              | 78             | 8 x G1/8"               | M5                                  |
| SWS-027     | 38                               | 254.1                             | 298.2          | 84.7                              | 99.4           | 8 x G1/8"               | G1/8"                               |
| SWS-040Q    | 50                               | 678                               | 678            | 226                               | 226            | 8 x G1/8"               | G1/8"                               |
| SWS-041     | 50                               | 471                               | 648            | 157                               | 216            | 6 x G3/8"; 4 x G1/8"    | G1/8"                               |
| SWS-060     | 75                               | 591                               | 882            | 197                               | 294            | 8 x G1/8"               | G1/8"                               |
| SWS-071     | 79                               | 1185                              | 1185           | 395                               | 395            | 8 x G1/4"               | G1/8"                               |
| SWS-076     | 100                              | 1626                              | 2103           | 542                               | 701            | 5 x G3/8"               | G1/8"                               |
| SWS-110     | 150                              | 2352                              | 2352           | 784                               | 784            | 8 x G3/8"               | G1/8"                               |
| SWS-160     | 300                              | 7170                              | 3800           | 2390                              | 1267           | 5 x G3/8"; 4 x G1/2"    | G1/8"                               |
| SWS-210     | 270                              | 8130                              | 6780           | 2710                              | 2260           |                         |                                     |
| SWS-300     | 450                              | 9870                              | 8460           | 3290                              | 2820           | 10 x G3/8"              | G1/4"                               |
| SWS-310     | 510                              | 9870                              | 9480           | 3290                              | 3160           |                         |                                     |
| SWS-510     | 700                              | 14580                             | 10500          | 4860                              | 3500           |                         |                                     |
| SWS-1210    | 1350                             | 16260                             | 16260          | 5420                              | 5420           |                         |                                     |

## SWS-L sample order

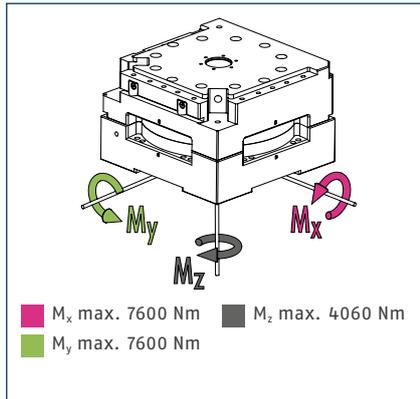


|  | SW | K - 210 | BM/BT - JF2 | DA2 - FC2 - PA2 - EF5 - SM |
|--|----|---------|-------------|----------------------------|
| <b>Designation</b>   |    |         |             |                            |
| SW   |    |         |             |                            |
| <b>Side</b>  |    |         |             |                            |
| K = Master (robot side)  |    |         |             |                            |
| A = Adapter (tool side)  |    |         |             |                            |
| <b>Size</b>  |    |         |             |                            |
| 210 = SWS-210  |    |         |             |                            |
| 310 = SWS-310  |    |         |             |                            |
| 510 = SWS-510  |    |         |             |                            |
| <b>Collar or step on the mounting surface</b>  |    |         |             |                            |
| A = No collar (head side), no step (tool side)   |    |         |             |                            |
| B = 80 mm step / collar (only for 210)   |    |         |             |                            |
| C = 100 mm step / collar (only for 210, 310)   |    |         |             |                            |
| D = 125 mm step / collar (only for 310, 510)   |    |         |             |                            |
| E = 160 mm collar (only for 510)   |    |         |             |                            |
| <b>Jxx: Locking and unlocking adapter or a valve adapter (only on surface 'A')</b>   |    |         |             |                            |
| <b>Note:</b> A Jxx module, locking and unlocking adapter or a valve adapter must be mounted on surface A. Signal modules are mounted on the Jxx module. When combining two modules (i.e. JC2 and DD4) on surface A, the description 'A' is a combination of Jxx- and the SWK-210BM-JC2DD4-AA2-0-0-SM |    |         |             |                            |
| <b>Option modules</b>  |    |         |             |                            |
| Axx = Pneumatic module (anodized aluminum housing, not suitable for fluids)  |    |         |             |                            |
| Dxx = DeviceNet modules  |    |         |             |                            |
| Exx = Servo modules  |    |         |             |                            |
| Fxx = Fluid modules (stainless steel, self-sealing)  |    |         |             |                            |
| Pxx = Power module for welding current   |    |         |             |                            |
| Sxx = Signal modules   |    |         |             |                            |
| Uxx = Stud welding modules   |    |         |             |                            |
| Vxx = Signal modules with valve actuation  |    |         |             |                            |
| '0' = Option not used  |    |         |             |                            |
| A selection of available modules can be found in the chapter "SWS-L" Options. Additional variants on request.  |    |         |             |                            |
| <b>Proximity switch monitoring</b>   |    |         |             |                            |
| SM = Inductive proximity switch PNP  |    |         |             |                            |
| 0 = No proximity switch  |    |         |             |                            |
| Additional variants on request   |    |         |             |                            |





### Forces and moments



ⓘ This is the max. sum of all forces and moments (from acceleration or deceleration, process forces or moments, emergency stop situations, etc.) which are permitted to act on the tool change system while still ensuring proper functioning.

### Technical data

| Description                     |       | SWK-210BM-0-0-0-0-SM | SWA-210CT-0-0-0-0    |
|---------------------------------|-------|----------------------|----------------------|
|                                 |       | Quick-change master  | Quick-change adapter |
| Recommended handling weight     | [kg]  | 300                  | 300                  |
| Piston stroke monitoring        |       | integrated           |                      |
| Presence monitoring             |       | integrated           |                      |
| Locking force                   | [N]   | 31000                | 31000                |
| Repeat accuracy                 | [mm]  | 0.015                | 0.015                |
| Mass                            | [kg]  | 5.2                  | 2.6                  |
| min. / max. locking distance    | [mm]  | 2.5                  | 2.5                  |
| max. permissible XY offset      | [mm]  | ±2                   | ±2                   |
| max. permissible angular offset | [°]   | ±1                   | ±1                   |
| min. / max. ambient temperature | [°C]  | 5/60                 | 5/60                 |
| min. / max. operating pressure  | [bar] | 5/6.9                | 5/6.9                |
| Robot side connection           |       | ISO 9409-1-125-6-M10 | ISO 9409-1-125-6-M10 |

