



Hand in hand for tomorrow



Product data sheet

Quick change system SWS 021

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

All functional components made from hardened steel for high mechanical resilience of the changing system

Wide range of signal, pneumatic, fluid and communication 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

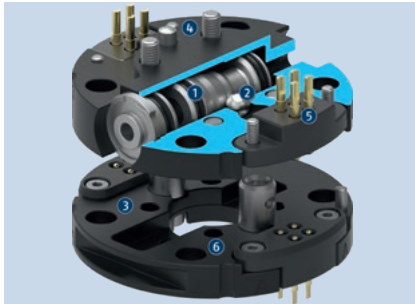
is mounted onto the robot, and couples the SWA mounted onto your tool. A pneumatically driven locking piston, with its patented design, ensures that the connection is secure. After coupling, pneumatic and electric feed-throughs automatically supply your robot tool.



- 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

Sectional diagram SWS-001



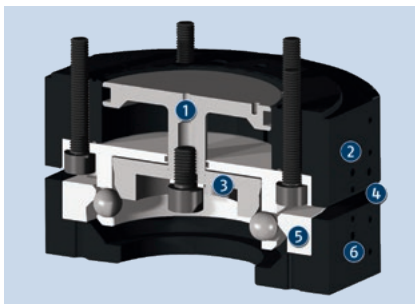
- ① Drive
pneumatic, efficient, and easy to handle
- ② Locking mechanism
load-free locking and unlocking,
fail-safe in locked condition
- ③ Housing
is weight-optimized due to the use
of high-strength aluminum alloy
- ④ Centering and mounting
possibilities
by using a standardized ISO 9409
interface for robots
- ⑤ Electric feed-through
no interfering contour, as integ-
rated 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



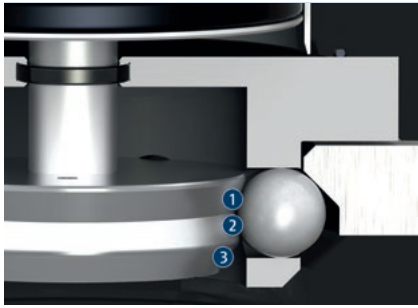
- ① Hardened steel balls on the 2nd taper of the cam create extremely high locking forces.
- ② Fail-safe reverse taper
- ③ 1st taper of the cam

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



- ❶ 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.

- ❷ Fail-safe reverse taper
- ❸ 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

Media 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.

Warranty: 24 months

Service life characteristics: on request

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.

- ❶ Quick-change system SWS
- ❷ Electric feed-through
- ❸ Tolerance compensation unit TCU-Z
- ❹ 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.



Compensation unit



Anti-collision and overload protection sensor



Rotary feed-through



Universal gripper



Inductive proximity switch



Electronic module



Storage rack

① 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 produce moments that are two or three times as high as 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 gaskets 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.

SWS Sizes

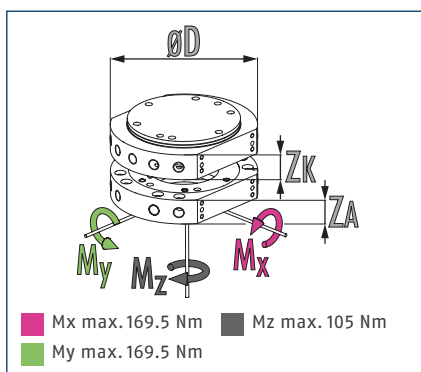
Description	Recommended handling weight [kg]	Max. moment [Nm] M_x and M_y	Max. moment [Nm] M_z	Pneumatic feed-through	Air connections locked and unlocked
SWS 001	1.4	2.8	3.45	4x M5	M3
SWS 007	16	61	38	5x M5	M5
SWS 011	16	61	38	6x M5	M5
SWS 020	25	169.5	105	12x M5	M5
SWS 021	25	169.5	105	8x G1/8"	M5
SWS 029	35	169.5	230	2x G1/8" ; 4x M5	M5
SWS 040Q	50	471	648	8x G1/8"	G1/8"
SWS 041	50	471	648	6x G3/8"; 4x G1/8"	G1/8"
SWS 046	50	678	450	-	G1/8"
SWS 060	75	591	326	8x G1/8"	G1/8"
SWS 071	79	1185	378	8x G1/4"	G1/8"
SWS 076	100	1626	2103	5x G3/8"	G1/8"
SWS 110	150	2352	2352	8x G3/8"	G1/8"
SWS 160	300	7170	3800	5x G3/8"; 4x G1/2"	G1/8"
SWS-L 210	300	7600	4060	-	-
SWS-L 310	510	9900	9600	-	-
SWS-L 510	700	10900	10500	-	-
SWS-L 1210	1350	13500	16200	-	-

Ordering example SWS

	SW	K	-	110	-	R19	-	G19	-	SM
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										
SG = Inductive proximity switch (SWK-040Q/076)										
SM = inductive proximity switch (SWK-007/022/029/110/160)										
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

Dimensions and maximum loads



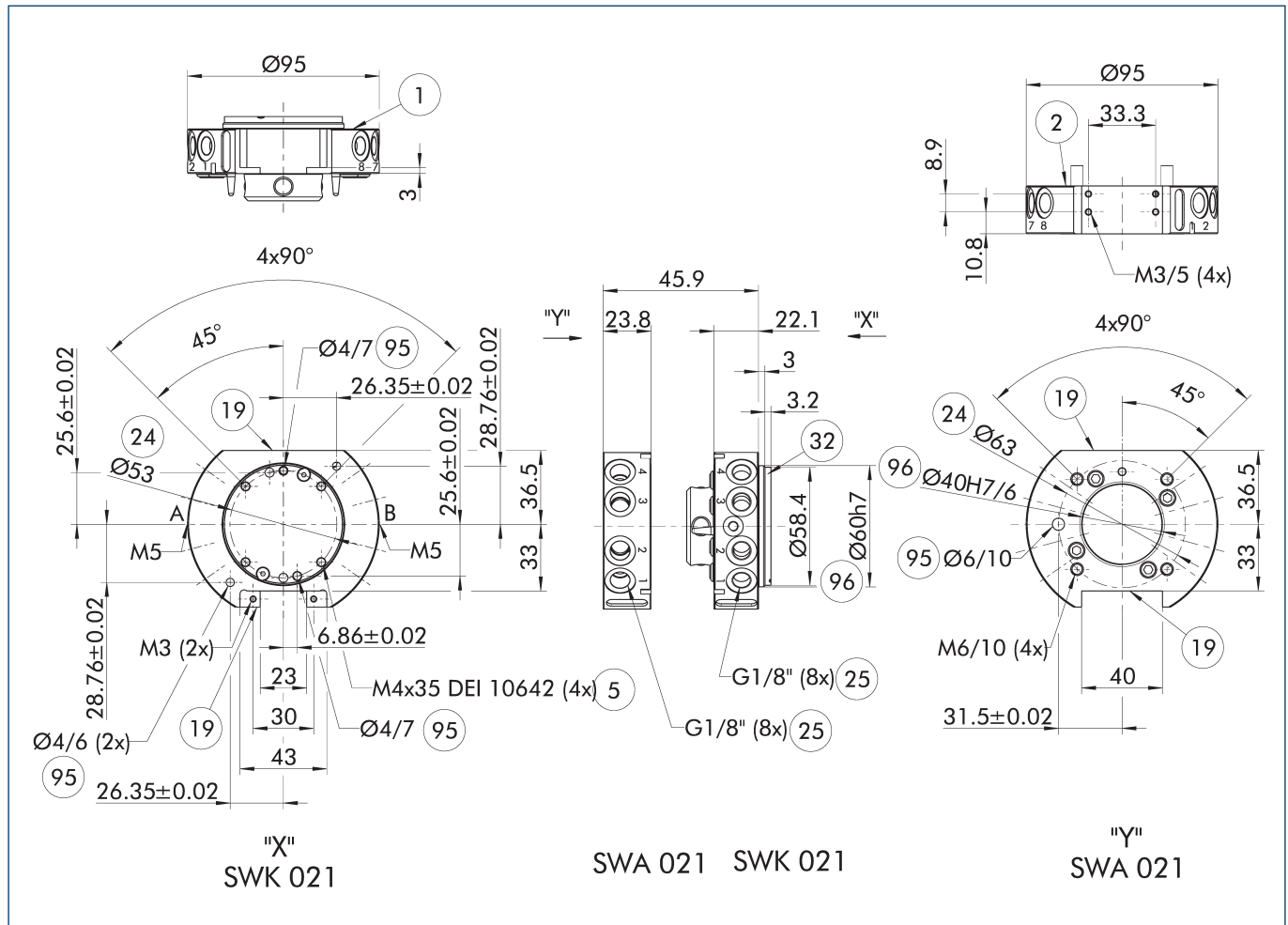
ⓘ This is the max. sum of all forces and moments which are permitted to act on the change system for ensuring proper functioning.

Technical data

Description		SWK-021-000-000	SWK-021HM-000-000-SQ	SWA-021-000-000
		Quick-change master	Quick-Change master for hollow wrist robots	Quick-change adapter
ID		0302326		0302327
Recommended handling weight	[kg]	25	25	25
Piston stroke monitoring		optional	integrated	
Locking force	[N]	2300	2300	2300
Repeat accuracy	[mm]	0.015	0.015	0.015
Weight	[kg]	0.5	0.7	0.3
Max. distance when locking	[mm]	2	2	2
Air connection thread pneumatic feed-through		8x G1/8"	8x G1/8"	8x G1/8"
Lock/unlock main connection		M5	M5	
Max. permissible XY axis offset	[mm]	±1	±1	±1
Max. permissible angular offset	[°]	±1	±1	±1
Min./max. ambient temperature	[°C]	5/60	5/60	5/60
Min./max. operating pressure	[bar]	4.5/6.9	4.5/6.9	4.5/6.9
Dimensions Ø D x Z*	[mm]	95 x 22.1	95 x 58.9	95 x 23.8
Screw connection diagram		K side A/K J via adapter plate side B	K side A/K J via adapter plate side B	K side A/K J via adapter plate side B

* *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.

Main view



The drawing shows the basic design of the quick-change system without dimensional consideration of the options described below.

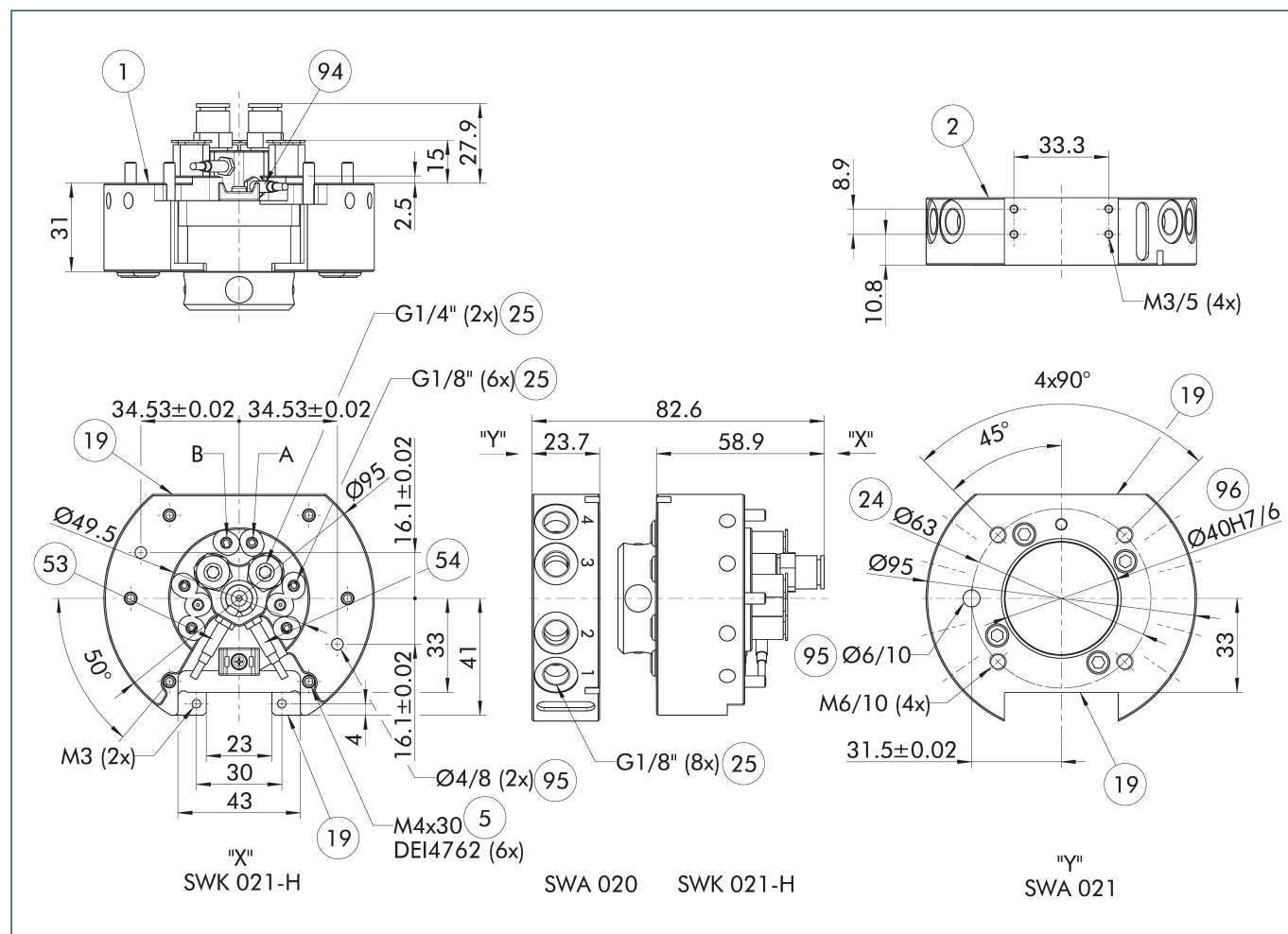
① The robot-side plate mounted on the SWK is a cover for the piston chamber. It is essential that it is supported by the adapter plate. See the further product information for a note on how to design this adapter plate.

A, a Air connection locked
B, b Air connection unlocked

- ① Robot-side connection
- ② Tool-side connection
- ⑤ Through hole for connection with screws

- ①9 Mounting surface for options
- ②4 Bolt circle
- ②5 Pneumatic feed-throughs
- ③2 Cover
- ⑨5 Fit for centering pins
- ⑨6 Fit for centering

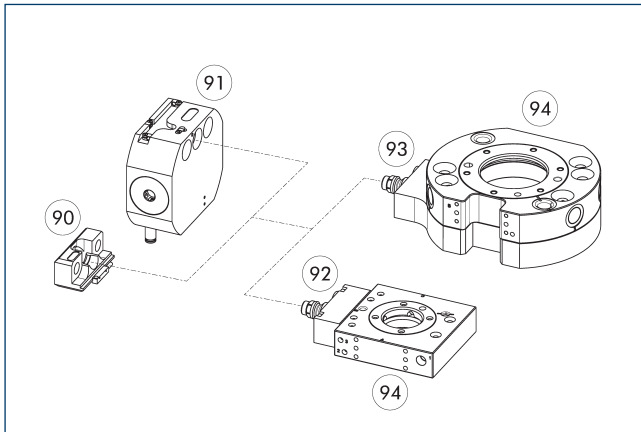
SWK-021-H main view



Via axial air connections it is perfectly suited for robots with through bores.

- | | |
|---|---------------------------------|
| A, a Air connection locked | 24 Bolt circle |
| B, b Air connection unlocked | 25 Pneumatic feed-throughs |
| 1 Robot-side connection | 53 Monitoring Position unlocked |
| 2 Tool-side connection | 54 Monitoring Position locked |
| 5 Through hole for connection with screws | 94 Optional proximity switch |
| 19 Mounting surface for options | 95 Fit for centering pins |
| | 96 Fit for centering |

Storage system SWM-B

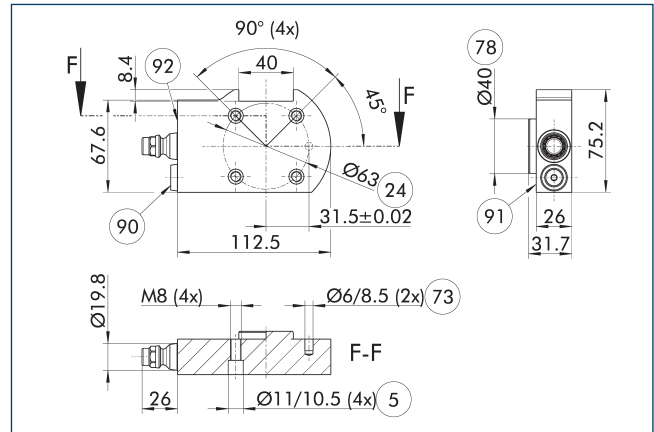


- 90 SWM-B 085
 91 SWM-B 085-V
 92 Side plate
 93 Intermediate plate
 94 Quick-change adapter SWA

Storage system with (-V) and without locking for safe tool storage. Detailed information and further accessories can be found in the catalog chapter "SWM-B" and "SWM."

Description	ID	
Storage system		
SWM-B 085	x1459339	
SWM-B 085-V	1442590	

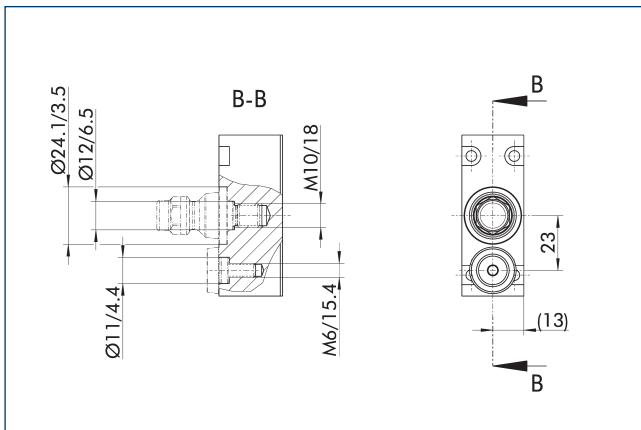
Adapter plate SWA 020/021/022



- 5 Through hole for connection with screws
 24 Bolt circle
 73 Fit for centering pins
 78 Fit for centering
 90 Anti-rotation protection (only for the SWM-B -V adapter plate)
 91 Mounting side SWA
 92 Attachment side SWM-B (-V)

Description	ID	Suitable for
Adapter plates		
A-SWA-020/021/022-SWM-B 085	x1523816	SWA 020/021/022
A-SWA-020/021/022-SWM-B 085-V	x1523845	SWA 020/021/022

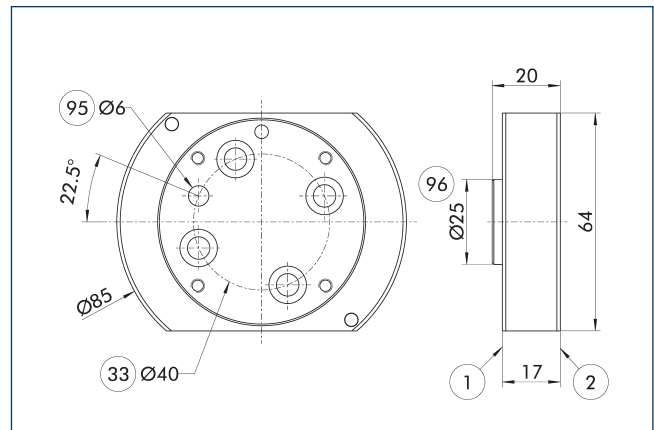
Adapter plate design SWM-B



Instead of using a standard adapter plate, the storage pin and anti-twist protection can also be attached to a customized adapter plate. For error-free function, all dimensions according to the drawing must be taken into account, in particular the distances between the anti-twist protections to the storage pin. The drawing is also valid for all the standard plates listed below.

Description	ID	Suitable for
Adapter plates		
A-SWA-020/021/022-SWM-B 085	x1523816	SWA 020/021/022
A-SWA-020/021/022-SWM-B 085-V	x1523845	SWA 020/021/022

Adapter plate ISO-A40-R



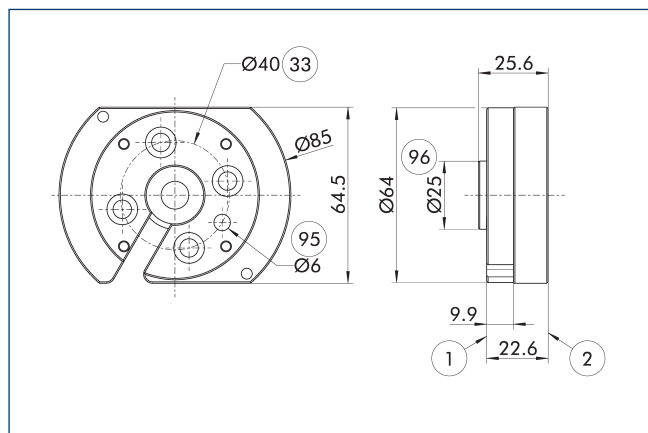
- 1 Robot-side connection
 2 Tool-side connection
 33 DIN ISO-9409 bolt circle
 95 Fit for centering pins
 96 Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A40	0302200	

- ① Adapter plate for quick-change master without piston stroke control, not suitable on quick-change head for hollow wrist robots.

Adapter plate ISO-A40-SIP-R



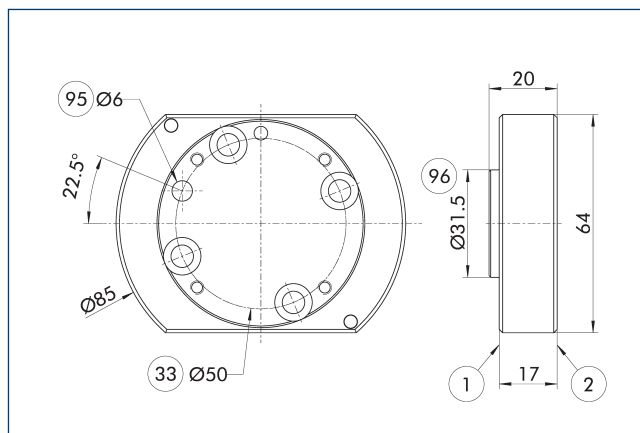
- ① Robot-side connection
- ② Tool-side connection
- ③③ DIN ISO-9409 bolt circle
- ⑨⑤ Fit for centering pins
- ⑨⑥ Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A40-SIP	0302229	

- ① Adapter plate for quick-change master with piston stroke control, not suitable on quick-change head for hollow wrist robots.

Adapter plate ISO-A50-R



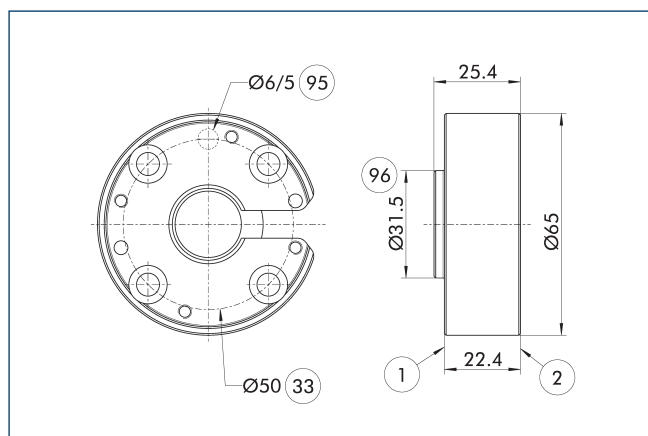
- ① Robot-side connection
- ② Tool-side connection
- ③③ DIN ISO-9409 bolt circle
- ⑨⑤ Fit for centering pins
- ⑨⑥ Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A50	0302201	

- ① Adapter plate for quick-change master without piston stroke control, not suitable on quick-change head for hollow wrist robots.

Adapter plate ISO-A50-SIP-R



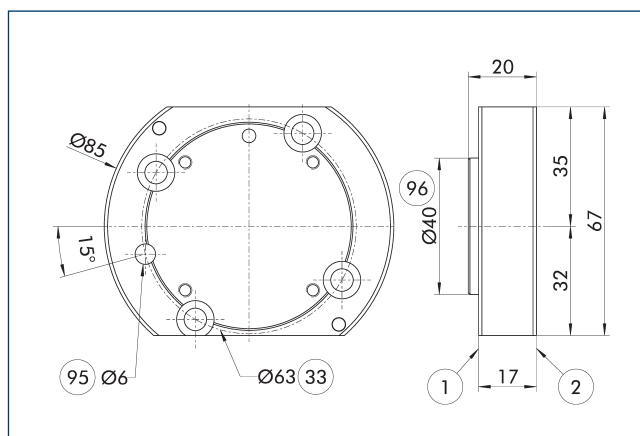
- ① Robot-side connection
- ② Tool-side connection
- ③③ DIN ISO-9409 bolt circle
- ⑨⑤ Fit for centering pins
- ⑨⑥ Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A50-SIP	0302230	

- ① Adapter plate for quick-change master with piston stroke control, not suitable on quick-change head for hollow wrist robots.

Adapter plate ISO-A63-R



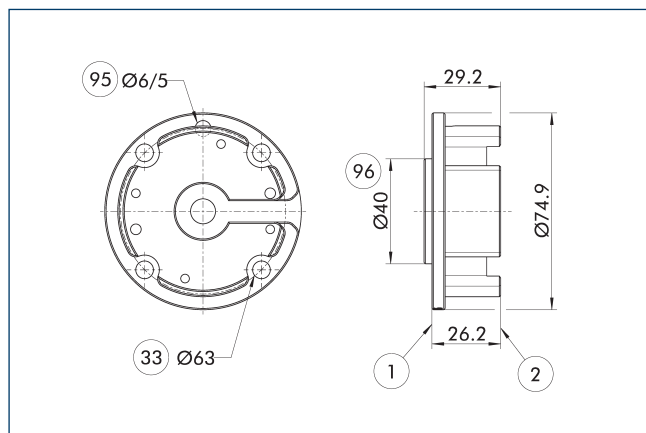
- ① Robot-side connection
- ② Tool-side connection
- ③③ DIN ISO-9409 bolt circle
- ⑨⑤ Fit for centering pins
- ⑨⑥ Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A63	0302202	

- ① Adapter plate for quick-change master without piston stroke control, not suitable on quick-change head for hollow wrist robots.

Adapter plate ISO-A63-SIP-R



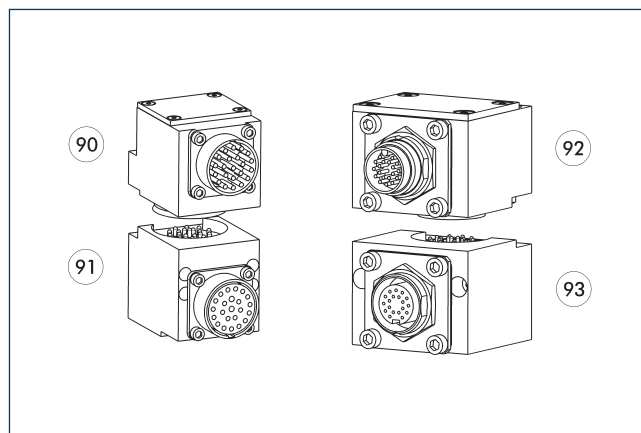
- ① Robot-side connection
- ② Tool-side connection
- ③③ DIN ISO-9409 bolt circle
- ⑨⑤ Fit for centering pins
- ⑨⑥ Fit for centering

Robot side adapter plate

Description	ID	
Robot side		
A-SWK-020/021-ISO-A63-SIP	0302231	

- ① Adapter plate for quick-change master with piston stroke control, not suitable on quick-change head for hollow wrist robots.

Electric feed-through module



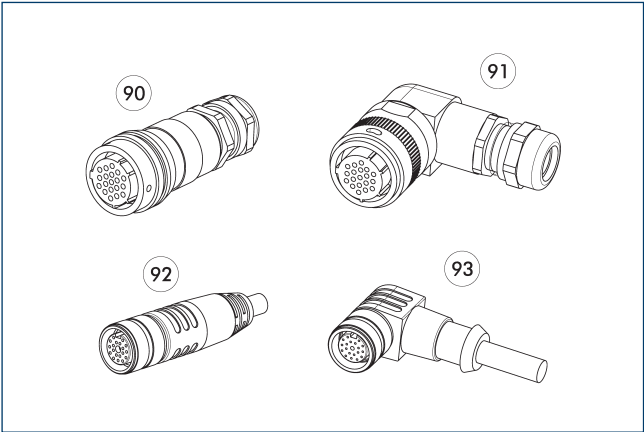
- ⑨⑩ Electric module with bayonet fitting, robot-side
- ⑨① Electric module with bayonet fitting, tool-side
- ⑨② Electric module with metric thread, robot-side
- ⑨③ Electric module with metric thread, tool-side

Modules for transmission of electrical signals.

Description	ID	No. Pins
Feed-through module for communication on the robot side		
SW0-KE7-K	9960993	
Feed-through module for communication on the tool side		
SW0-KE7-A	9960994	
Feed-through module for signal on the robot side		
SW0-K12-K	9948701	12
SW0-K19-K	9937328	19
SW0-K19P-K	9949315	15
SW0-K26-K	9937798	26
SW0-KF19-K	9959886	19
Feed-through module for signal on the tool side		
SW0-K12-A	9948702	12
SW0-K19-A	9937329	19
SW0-K26-A	9937799	26
SW0-KF19-A	9959887	19

- ① For more detailed information and further modules and matching cable connectors, see catalog chapter "SW0" or visit our website.

Cable plug/cable extension



- 90 Plug/socket straight

91 Connector/angled socket
- 92 Connector/straight socket with extension cable

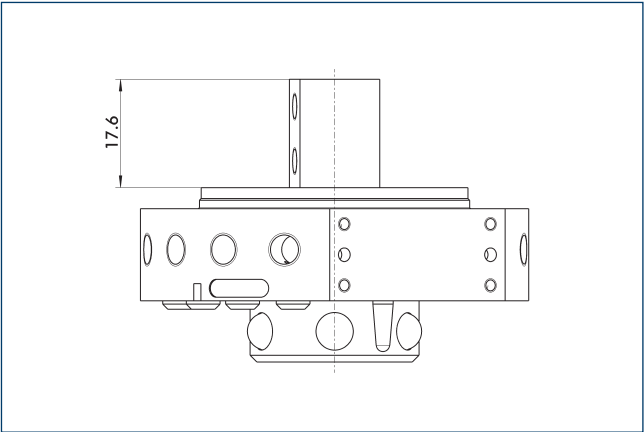
93 Connector/angled socket with extension cable

Other cable lengths on request.

Description	ID	Length
		[m]
Angled cable connector, robot-side		
KAS-19B-K-90-C	0301294	
KAS-19F-K-90	1316879	
KAS-26B-K-90-C	0301296	
Angled cable connector, tool-side		
KAS-19B-A-90-C	0301295	
KAS-19F-A-90	1316873	
KAS-26B-A-90-C	0301297	
Angled cable connector with cable, robot-side		
KV-5-SWK-19B-90	0302190	5
KV-5-SWK-19F-90	0302172	5
Angled cable connector with cable, tool-side		
KV-3-SWA-19B-90	0302191	3
KV-3-SWA-19F-90	0302175	3
Straight cable connector, robot-side		
KAS-19B-K-0-C	0301283	
KAS-19F-K-0	1351134	
KAS-26B-K-0-C	0301290	
Straight cable connector, tool-side		
KAS-19B-A-0-C	0301284	
KAS-19F-A-0	1351135	
KAS-26B-A-0-C	0301291	
Straight cable connector with cable, robot-side		
KV-5-SWK-19B-0	0302177	5
KV-5-SWK-19F-0	0302170	5
Straight cable connector with cable, tool-side		
KV-3-SWA-19B-0	0302178	3
KV-3-SWA-19F-0	0302174	3

① Detailed information and further cable connectors can be found at schunk.com

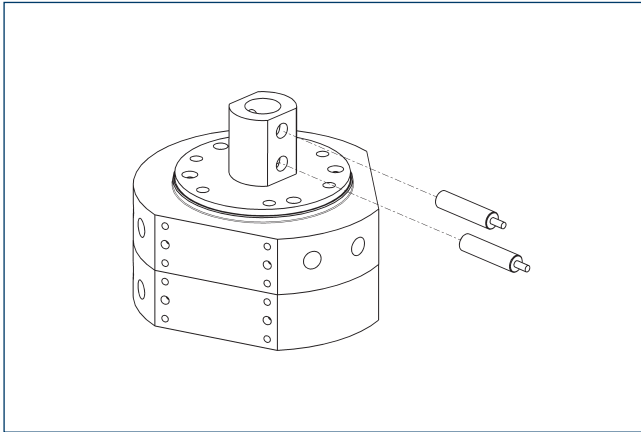
Piston stroke control



The drawing shows the minimal height of the adapter plate for installing a piston stroke control.

Description	ID	
Piston stroke control		
SWK-021-SIP	0302328	

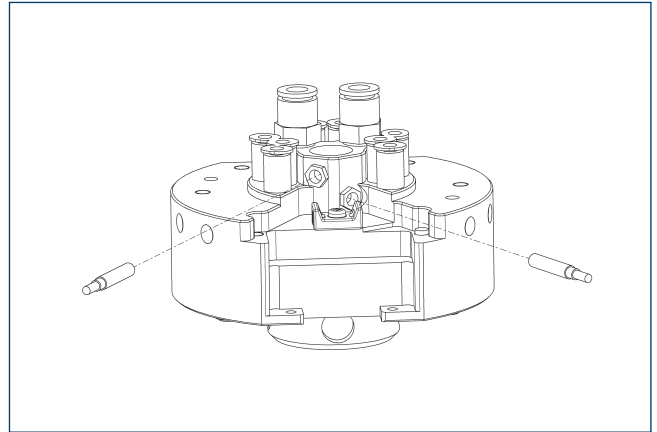
Piston stroke control



Description	ID	Often combined
Inductive proximity switch		
IN 41-S-M8-PNP	1325755	
Connection cables		
KA BG08-L 3P-0300-PNP	0301622	●
KA BG08-L 3P-0500-PNP	0301623	
KA BW08-L 3P-0300-PNP	0301594	
KA BW08-L 3P-0500-PNP	0301502	
Clip for connector/socket		
CLI-M8	0301463	

- ① Per unit two sensors (closer/S) are required for each unit, as well as extension cables on option. Please consider the minimum permissible bending radii for sensor cables. These are generally 35 mm.

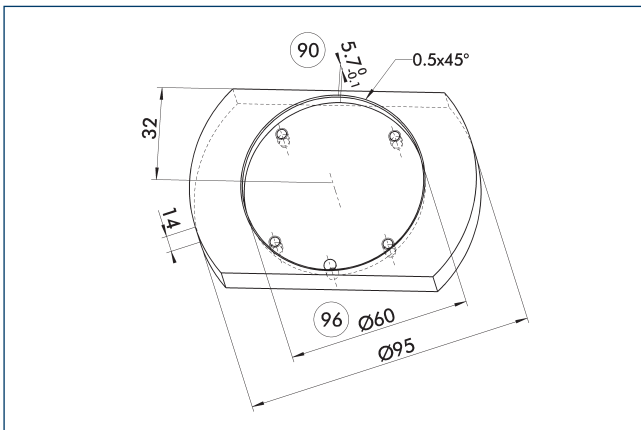
Piston stroke control



Description	ID	Often combined
Inductive proximity switch		
IN 41-S-M8-PNP	1325755	
Connection cables		
KA BG08-L 3P-0300-PNP	0301622	●
KA BG08-L 3P-0500-PNP	0301623	
KA BW08-L 3P-0300-PNP	0301594	
KA BW08-L 3P-0500-PNP	0301502	
Clip for connector/socket		
CLI-M8	0301463	

- ① Two sensors are required per unit for monitoring two positions. On option, extension cables and sensor distributors are available. Additional product variants of the sensor, and further information and technical data can be found in the catalog chapter sensor system.

Adapter plate design



- ⑨⑩ Recommended adapter plate ⑨⑥ Fit for centering depth

Recommendation for the design of the adapter plate.



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