New 0.5kg ~1kg Payload
Compact Robotic Hand Changer

Model SWR0010

The Best Tool Changer for 0.5kg-Payload Robots
0.5kg~1kg Payload
Compact Robotic Hand Changer

Model SWR0010

The Best Tool Changer for 0.5kg-Payload Robots
Repeatability: 5 μm

High accuracy Robotic Hand Changer enables multiple functions of robots and setup time reduction. It enhances the productivity of automated production line.
The World’s Only
Zero-Backlash Robotic Hand Changer

Kosmek Robotic Hand Changer

General Robotic Hand Changer

When torque acts in twisting direction,

No Initial Displacement

Initial Displacement

No Clearance (Zero Backlash)

Clearance (Backlash)

Application Examples

One robot performs multiple operations.

SCARA Robot
For Nut Runner Tool Change

Parallel Link Robot
For Screw Tightening

Dual-Arm Robot
For Assembly
Features

Light • Compact
Kosmek Tool Changer is light and compact, yet highly rigid when connected. Its weight of the body part is only 63g, suitable for compact robots.
(Master side: 40g, Tool side: 23g)

Long Life and High Rigidity
Zero backlash when connecting and the durability is 1 million cycles. Even after 1 million cycles, locating repeatability 5 μm is maintained.

Zero backlash prevents core deflection and chattering.
No clearance or backlash with dual contact by the taper sleeve. It prevents core deflection and chattering due to the work load, and enhances productivity.

Prevents moment stops caused by electrode error.
“Zero” backlash of robotic hand changer minimizes the vibration of electrode and prevents noise and friction. Highly reliable electrode prevents moment stops caused by communication error.

Self-Locking prevents tools from falling.
Even when pressure is at zero, self-locking function prevents tools from falling.
※ Usually it should be connected with spring force and air pressure.

High Accuracy Repeatability 0.005mm
Repeatability is 5 μm.
Dual contact with movable taper sleeve enables high accuracy locating. Only slight fluctuation at the end of tool allowing for precise operation.

Lift up (Detaching) function protects locating part.
When connecting, lift up function prevents damage of the locating function part (seat surface and taper surface). When disconnecting, the piston rod detaches tool adaptor preventing moment stop caused by adhesion and galling.
Cross Section

High Accuracy / High Rigidity / Long Operational Life

High Accuracy
Marginal error is absorbed by the taper sleeve. The clearance between the master cylinder, taper sleeve and tool adapter is eliminated. This enables the repeated locating accuracy and stabilized clamping force.

High Rigidity
Clearance is eliminated when the master cylinder and tool adapter are connected. This enables high rigidity.

Long Operational Life
Wear is absorbed by the movable taper sleeve.

Action Description

Before Connected (Released State)
Supply air to the release side. The piston rod is pushed down with thrust force caused by release air. At this time the steel balls are free to move (set inside).

Just Before Connection (Setting State)
Lifted State (Detached State)
When the master cylinder is lowered and stopped at the amount of lift \(\pm 0.5\) mm, it is in setting state. At this time there is a moderate gap at taper reference surface and seating surface. It prevents locating mechanism part from damage. When detached, the piston pushes out A part to prevent moment stop caused by fixation or galling.

Connected State (Locked State)
Stop the release air pressure and supply air to the lock port. The piston rod will be pulled up with piston thrust and an internal spring, and the tool adapter will be pulled to the seating surface by the steel balls. When the tool adapter is pulled, the taper reference surface and phasing taper sleeve are centered in a reference axis (body), and locating is completed.

*1. Refer to the caution "Optimum Clearance between Master Cylinder and Tool Adapter at Lifted State" on P.13.
0.5kg ~ 1kg Payload Compact Robotic Hand Changer

Model No. Indication

Master Cylinder (Robot Side)

SWR 001 0 - M - J

1 Payload ※Payload at Supply Air Pressure 0.5MPa

001 : 0.5~1 kg

2 Design No.

0 : Revision Number

3 External Option Symbol (Electrode)

Blank : Standard: No External Option

J ※1 : Resin Connector (DC24V 10 Poles)

Tool Adapter (Tool Side)

SWR 001 0 - T - B

1 Payload ※Payload at Supply Air Pressure 0.5MPa

001 : 0.5~1 kg

2 Design No.

0 : Revision Number

3 External Option Symbol (Electrode)

Blank : Standard: No External Option

B ※1 : Solder Terminal (DC24V 10 Poles)

Note:

※1. External electrodes are used as the combination of Resin Connector on the master cylinder and Solder Terminal on the tool adapter.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWR0010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload ※2 at 0.5MPa kg</td>
<td>0.5 ~ 1</td>
</tr>
<tr>
<td>Repeatability mm</td>
<td>0.005</td>
</tr>
<tr>
<td>Lift Stroke (Detaching Stroke) mm</td>
<td>0.5</td>
</tr>
<tr>
<td>Cylinder Capacity</td>
<td></td>
</tr>
<tr>
<td>Lock cm³</td>
<td>0.45</td>
</tr>
<tr>
<td>Release cm³</td>
<td>0.51</td>
</tr>
<tr>
<td>Operating Air Pressure</td>
<td></td>
</tr>
<tr>
<td>Max. Pressure MPa</td>
<td>0.7</td>
</tr>
<tr>
<td>Min. Pressure MPa</td>
<td>0.35</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>1.0</td>
</tr>
<tr>
<td>Holding Force</td>
<td>Refer to the graph.</td>
</tr>
<tr>
<td>Lifting Force (Detaching Force)</td>
<td>Refer to the graph.</td>
</tr>
<tr>
<td>Allowable ※2 Bending (at 0.5MPa) N·m</td>
<td>3.0</td>
</tr>
<tr>
<td>Static Moment Twisting N·m</td>
<td>6.0</td>
</tr>
<tr>
<td>Max. Load ※3 Bending (at 0.5MPa) N·m</td>
<td>6.0</td>
</tr>
<tr>
<td>Moment Twisting N·m</td>
<td>12.0</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>Dry Air</td>
</tr>
<tr>
<td>Weight ※4 Master Cylinder g</td>
<td>40</td>
</tr>
<tr>
<td>Tool Adapter g</td>
<td>23</td>
</tr>
<tr>
<td>No. of Air Ports ※5 Thread Size × No. of Ports</td>
<td>M3 × 0.5 × 2 Ports</td>
</tr>
<tr>
<td>Air Port Minimum Passage Area mm²</td>
<td>1.1 (Equal to φ1.2)</td>
</tr>
<tr>
<td>Electrode Option</td>
<td>Refer to P.7</td>
</tr>
<tr>
<td>Allowable Offset while Teaching</td>
<td>Refer to P.12</td>
</tr>
</tbody>
</table>

Holding Force • Lifting Force (Detaching Force)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWR0010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding Force at 0MPa ※6 kN</td>
<td>0.05</td>
</tr>
<tr>
<td>at 0.35MPa kN</td>
<td>0.27</td>
</tr>
<tr>
<td>at 0.4MPa kN</td>
<td>0.30</td>
</tr>
<tr>
<td>at 0.5MPa kN</td>
<td>0.37</td>
</tr>
<tr>
<td>at 0.7MPa kN</td>
<td>0.49</td>
</tr>
<tr>
<td>Lifting Force (Detaching Force) at 0.35MPa kN</td>
<td>0.07</td>
</tr>
<tr>
<td>at 0.5MPa kN</td>
<td>0.11</td>
</tr>
<tr>
<td>at 0.7MPa kN</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Notes:

※2. Please consider both the payload and allowable static moment when selecting a product.

※3. This product must be used within Allowable Static Moment (※1). Using with Max. Load Moment will not fill the specifications.

※4. Weight of the body without external options.

※5. Refer to P.10 for air port use.

※6. It indicates holding force when air pressure is at 0MPa after connecting and may not fill the specification.

1. Tables and graphs shown are the relationship between supply air pressure (MPa) and holding force or lifting force (kN).
External Dimensions

※ This drawing shows the released state of SWR0010.

Master Cylinder SWR0010-M

Tool Adapter SWR0010-T
External Option: Electrode

External Option Symbol: J
Master Cylinder
model SWR0010-M-J

External Option Symbol: B
Tool Adapter
model SWR0010-T-B

Specifications

<table>
<thead>
<tr>
<th>Rated Value (per contact)</th>
<th>DC 24V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A: Pin 1, 3, 5, 7, 9</td>
<td></td>
</tr>
<tr>
<td>1A: Pin 2, 4, 6, 8, 10</td>
<td></td>
</tr>
</tbody>
</table>

Resin Connector (Master Cylinder Side) DF11-10DP-2DS(24) (HIROSE ELECTRIC)
Contact Resistance (initial value) 30mΩ or less
Total Current Capacity 7.5A
Number of Poles (per electrode) 10

Weight
- Master Cylinder Side Electrode 10g
- Tool Adapter Side Electrode 3g
- Cable with Applicable Connector (Sold Separately) SEZ0J0-CL (Refer to P.9)

*1. Weight per electrode.

Connecting Cable

Master Cylinder Side

Connector: DF11-10DP-2DS (24) (HIROSE ELECTRIC)

Prepared by Customer
Cable Side Connector and Contact

The cable side (connector, contact, cable) is not included.

Please prepare the cable with applicable connector (SEZ0J0-CL) on P.9, or design them yourself referring to the following list.

<table>
<thead>
<tr>
<th>Cable Side Connector Model No.</th>
<th>Cable Side Contact Model No.</th>
<th>Recommended Wire Size</th>
<th>Protective Tool</th>
<th>Tooling Equipment</th>
<th>Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF11-10DS-2C</td>
<td>DF11-22SC</td>
<td>AWG22</td>
<td>DF11-TA22HC</td>
<td>DF-C-PQ(B)</td>
<td>HIROSE ELECTRIC</td>
</tr>
<tr>
<td></td>
<td>DF11-2428SC</td>
<td>AWG24 ~ 2B</td>
<td>DF11-TA2428HC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. Refer to HIROSE ELECTRIC catalogs for the detailed specifications and the rated current based on wire size.

Pin Number

Master Cylinder Side

View A

Tool Adapter Side

Rated Value 1A: 9, 7, 5, 3, 1

Rated Value 2A: 8, 10, 6, 2, 4

Note:
1. Please note that the pin number layouts of master cylinder and tool adapter are different.
### External Dimensions

#### Master Cylinder Side

<table>
<thead>
<tr>
<th>Model No.</th>
<th>No.</th>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWRZ5J0-M</td>
<td>①</td>
<td>Electrode (Master Side)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>②</td>
<td>Circular Washer ISO Small for M2.5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>③</td>
<td>Parallel Pin φ 1.5 × 4 B Type (SUS)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>④</td>
<td>Hexagon Socket Bolt M2.5 × 0.45 × 16 (SUS)</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Tool Adapter Side

<table>
<thead>
<tr>
<th>Model No.</th>
<th>No.</th>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWRZ5B0-T</td>
<td>⑤</td>
<td>Electrode (Tool Side)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>⑥</td>
<td>Circular Washer ISO Small for M2.5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>⑦</td>
<td>Parallel Pin φ 1.5 × 4 B Type (SUS)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>⑧</td>
<td>Hexagon Socket Bolt M2.5 × 0.45 × 10 (SUS)</td>
<td>2</td>
</tr>
</tbody>
</table>

Note:
1. Inform us with the model number shown above if you require an electrode only. (SWRZ5J0-M, SWRZ5B0-T: one set is one electrode.)

### Option Mounting Dimensions

Electrodes and fixtures provided by other than Kosmek, can be mounted with option mounting bolts. This drawing shows the connected state of the master side and tool side.
External Option: Cable with Connector for Resin Connector

This cable is an optional cable applicable to the Resin Connector Electrode (SWR External Option Symbol: J).

Model No. Indication

SEZ0J0-C

L1

L2

Cable Length
L1: 1m
L2: 2m

Design No.
(Revision Number)

Rated Current

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>2A</th>
<th>1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blue</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>3</td>
<td>White</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>7</td>
<td>Red</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>9</td>
<td>Gray</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>5</td>
<td>Green</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>6</td>
<td>Black</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>2</td>
<td>Yellow</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>8</td>
<td>Violet</td>
<td>Twisted Pair</td>
</tr>
<tr>
<td>10</td>
<td>Orange</td>
<td>Twisted Pair</td>
</tr>
</tbody>
</table>

Connector: DF11-10DS-2C
HIROSE ELECTRIC

Cable (with Shield): ORP—SL0.2SQX5P(SB) (2464)
Oki Electric Cable
Conductor Cross-Sectional Area: 0.2mm² (AWG25)
Number of Cores: 10

[Notes on Wire/Cable Procedure and Wiring]

- Make sure to fix the wire and cable so that they are not pulled while a robot is moving or turning around.
  External force should not be applied on the connector part since it leads to breaking of wire, detaching of connector and contact failure.

- Install a cable clamp, etc. to protect from external force.

Unable to be fixed at the rotation part.
Air Port Option (Joint Option)

When the master cylinder and tool adapter are connected, the air port is in the connected state. At this time, it is able to supply air from the robot side to the tool side. Air port can be used for the operation of the actuator (positive pressure) and the suction pad (negative pressure).
The number of air ports: 2 (M3 × 0.5 Thread)

Electrode Option

When the master cylinder and tool adapter are connected, the electrode (option) is in the connected state. At this time, it is able to transmit electrical signal and supply electricity between the robot and tool.
C Cautions

● Notes for Design
1) Check Specifications
   ● Please use each product according to the specifications.
   ● Maximum Air Pressure: 0.7MPa, Minimum Air Pressure: 0.35MPa

2) Air Pressure Circuit Reference
   ● SWR maintains clamping tools with mechanical lock (spring for maintain). However, for safety, when using 2-position solenoid valve, select the solenoid valve for SWR actuation that supplies air to the lock port when it is not energized. If air is supplied to the release port when the switch of solenoid valve is turned off, it is very dangerous since SWR may drop the tool (hand).

3) Operating Environment (External Option (Electrode))
   ● Do not use the product in the environment with water • vapor • liquid • scattering of chemicals • explosion • gas with causticity. Also, using in the environment with cutting chips • cutting fluid • dust • spatter scattering may lead to continuity error of electrode.

4) Electrification of Electrodes while Connecting/Disconnecting (External Option (Electrode))
   ● If connecting/disconnecting robotic hand changer while energized (hot swapping), there will be a discharge phenomenon (spark phenomenon) between the electrodes opposing each other. The tips of contact probes and electrode bars will be severely worn down due to the phenomenon, and the basis metal might be melted due to oxidation or abrasion of gold-plating leading to conduction failure. Electricity should be shut off while connecting/disconnecting the robotic hand changer.
   In case of continuous electrification with more than 40~60% of rated current, it is recommended to use multiple electrodes in a line. (In order to improve durability of contact probes.)

5) Note for Single Use of SWR Robotic Hand Changer
   ● Applying withstanding pressure without mounting on a robot or a plate leads to damage on the product. Make sure to supply air after setting SWR on a robot or a plate.

6) Hand Changing (Attaching/Detaching) in a Horizontal Position
   ● When connecting/disconnecting the Robotic Hand Changer in a horizontal position, make sure not to apply excessive moment on master cylinder. Please select an appropriate size of model considering robot payload with allowance fully taken into consideration. When connecting, make sure the tool side has no lifting or tilting that is larger than the allowable position offset range. Also, do not fix it completely on the tool stand, and make a margin (clearance) within the allowable position offset range. Otherwise, this will affect locating repeatability.

● Installation Notes
1) Please supply filtered clean dry air.
   ● Make sure to supply filtered clean dry air.
   ● Oil supply with a lubricator etc. is unnecessary.

2) Procedure before Piping
   ● The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly. The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
   ● There is no filter provided with this product for prevention of contaminants in the air circuit.

3) Notes on Wire/Cable Procedure and Wiring (External Options (Electrode))
   ● Make sure to fix the wire and cable so that they are not pulled while a robot is moving or turning around.
   External force should not be applied on the connector part since it leads to breaking of wire, detaching of connector and contact failure.

● When allocating each electric signal, imperceptible signal and power signal should be apart. Otherwise noise will be propagated from power signal to imperceptible signal. Also it is the same for wire and cable of external options (electrode). Make sure to keep imperceptible signal from power signal.
4) Installation/Removal of Master Cylinder/Tool Adapter
   ● Please follow the tightening torque below.
   When mounting, use the attached pins and tighten them with
   bolts evenly not to incline the master cylinder and tool adapter.
   Recommended Low Head Cap Screw (SUS) :
   Strength Class A2-50 or greater (Prepared by customer)

   [ Master Cylinder / Tool Adapter ]

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Thread Size</th>
<th>No. of bolts</th>
<th>Tightening Torque [N-m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWR0010</td>
<td>M3 x 0.5</td>
<td>3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Do not lose attached pins for installation/removal of the master
cylinder/tool adapter.
If not using attached pins, moment quality may not be secured.

5) Installation of Optional Electrode
   For electrode installation, apply screw lock glue (equivalent to 1401
   made by ThreeBond) on the tip of the mounting bolt and tighten it
   with the tightening torque shown below.
   ● M2.5 Hexagon Socket Bolt : 0.5N \cdot m

6) Test Run Method
   ● If supplying a large amount of air just after installation,
   action time will be extremely fast leading to severe damage on
   robotic hand changer. Set the speed controller (Meter-in) and
   gradually supply air pressure.

7) Allowable Offset while Teaching
   ● Allowable offset of the master cylinder and tool adapter while
   teaching should be within the range shown below.
   Tool adapter and tool placing stand should have space within
   the range of allowable offset.

   ① Allowable Position Offset in Horizontal Direction

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Allowable Offset [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWR0010</td>
<td>±0.8 mm</td>
</tr>
</tbody>
</table>

   ② Allowable Position Offset in Tilt Direction

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Allowable Offset [θ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWR0010</td>
<td>±1.5 deg</td>
</tr>
</tbody>
</table>

   ③ Allowable Position Offset in Rotation Direction

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Allowable Offset [θ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWR0010</td>
<td>±3 deg</td>
</tr>
</tbody>
</table>

Continuing “Installation Notes” on the Next Page
C Cautions

8) Most Suitable Gap between Master Cylinder and Tool Adapter
   Just Before Connection (When Setting)
   When connecting, the gap between master cylinder
   and tool adapter should be within the range of
   [Lift Stroke]−(Lift Stroke+0.5mm) shown on P.S.
   It may not be able to connect with more than the lift stroke + 0.5mm.

9) Most Suitable Gap between Tool Adapter and Tool Placing Stand
   Just Before Disconnection
   When detaching, the gap between the tool adapter and tool
   stand should be more than [Lift Stroke] shown on P.S.
   Tool adapter is forcibly detached with detaching (lifting)
   function of the master cylinder.
   It is recommended to install cushioning mechanism between
   the tool adapter and tool stand.

10) Connection Method for -B : Solder Terminal (External Option (Electrode))
   Soldering condition should be : 280℃, within 3 seconds.
   [Recommended Wire Diameter]
   Use wires with AWG26 size or smaller diameter. If you need
   electric current more than allowable flowing current of AWG26,
   use wires within the rated value of electrode. At this time, soldering
   hole and attached continuity prevention cover cannot be used.
   If required, insulate them with a thermal contraction tube etc.

11) Connection Method for -J : Connector (External Option (Electrode))
   A Connector must be fully inserted into the electrode.
● Maintenance • Inspection

1) Removal of the Machine and Shut-off of Pressure Source
- Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
- Make sure there is no abnormality in the bolts and respective parts before restarting.

2) Cleaning of Master Cylinder • Tool Adapter
- If using the product when the taper reference surface or seat check surface of master cylinder/tool adapter are contaminated with dirt, it may lead to locating accuracy failure, malfunction or air leaks. (Do not apply grease on the taper reference surface.)

3) Regularly examine and retighten piping, mounting bolts and wires to ensure proper use.

4) Make an inspection before use and regularly.
- If there is dirt or dust on the electric contact part, electric signal is hard to conduct. Wipe it out with a cloth soaked in an organic solvent such as IPA.
- If there is a contact failure while in use, make an inspection mainly of the electricity connection part and clean it out.

5) Make sure to supply filtered clean dry air.

6) Make sure there is smooth action and no air leaks.
- Especially when it is restarted after left unused for a long period, make sure it can be operated properly.
  - If there is air leak while connecting, please contact us for overhaul and repair.

7) The products should be stored in the cool and dark place without direct sunshine or moisture.

8) Please contact us for overhaul and repair.

● Warranty

1) Warranty Period
- The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope
- If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.
  ① If the stipulated maintenance and inspection are not carried out.
  ② If the product is used while it is not suitable for use based on the operator’s judgment, resulting in defect.
  ③ If it is used or handled in inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
  ④ If the defect is caused by reasons other than our responsibility.
  ⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
  ⑥ Other caused by natural disasters or calamities not attributable to our company.
  ⑦ Parts or replacement expenses due to parts consumption and deterioration. (Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.
Kosmek Products for Automation and Setup Improvement in Every Process

[FA•Industrial Robot Related Products Complete Catalog]

Products: Robotic Hand Changers, Pneumatic Robotic Hands, Clamps, High Accuracy Locating/Setup Products, Auto Couplers and Supports