WINGMAN

THE COBOT TOOL CHANGER SYSTEM

QUICK GUIDE

Version 1.0

1   Unboxing your kit

1.1   Manuel kit

The **manual kit** enables you to complete quick and easy **manual** exchange between two cobot tools and is provided with all the necessary parts for installation on a cobot that is featured with the ISO 9409-1-50-4-M6 tool flange like cobots from Universal Robots.

The manual kit is featured with pneumatic *pass-through connections* build into the housing. If additional *pass-through connectivity* is needed, pass-thought modules are available for purchase. See available pass-through modules in chapter **Product Data** in the end of the user guide.

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1.2 Automatic kits

The **automatic kits** enables you to complete quick and easy **manual and automatic** exchange between two cobot tools and is provided with all the necessary parts for installation on a cobot that is featured with the ISO 9409-1-50-4-M6 tool flange like on cobots from Universal Robots.

The kits are featured with pneumatic *pass-through connections* build into the housing and can be included with additional modules for electricity and for pneumatic/vacuum pass-through. See available **automatic kits** and pass-through modules in chapter **Product data** in the end of the user guide.

(Example pictures of one of our standard kits(

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2   Safety

DANGER!

WARNING! This *quick guide* only partly includes the safety information and other information necessary for correct and safe install, setup and operation of the WINGMAN Tool Changer System. The full safety information is found in the *user guide* which must always be read, understood, and followed in full. The product may not be used in any way based only on the instructions found in this *quick guide.*

The *user guide's* safety information is listed throughout the user guide where appropriate and in the dedicated chapters: **1. Important safety notes** and **9. Safety**.

Before use, you must read, understand and comply with the safety instructions provided in the *user guide*. Among other make sure that your cobot is certified for collaborative operation, that you have setup the cobot's collaborative safety settings correctly and that a full risk assessment of the whole robot application has been completed to local legislation/standards*.*

Always ensure to use the product within its intended use. *(User guide chapter: 6.1-6.4)*

3   Installing

Step 1.   Bolt the tool changer *robot part* onto to the cobot arm and the *tool parts* onto the *end-effectors*.
(User guide chapter: 6.1-6.4)
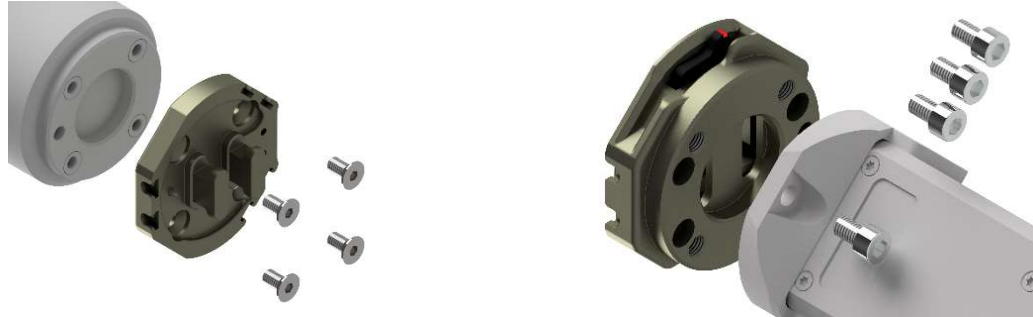
Step 2.   Install pneumatic and electrical connections for the *end-effectors* to test the *end-effectors* functionality with connectivity through the tool changer parts. Make sure that the *end-effectors* work as expected and that cables and hoses can be installed after good practice for such.
(User guide chapter: 6.4-6.5)

Step 3.   Install the *tool part holders* and place the *tool part* and *end-effector* assemblies in the *tool part holders* to make sure that there is space as appropriate. The *tool part holders* must be installed as instructed in the *user guide*. *(User guide chapter: 6.6)*

4   Manual use

WARNING! Before engage/disengage the tool changer's *robot part* and *tool part*, make sure that all energy and control to the *end-effector* has been turned off. Failing in doing so can cause serious injury and even death.

Step 1.   **Unlocked:** Move both *levers* on the *tool part* (one on each side) with your fingers to the unlocked position where the **red** markers on the *levers* are visible, and the green markers are not visible.

(Only one *lever* is shown in above illustration)

Step 2.   **Pre-locked:** Engage the *tool part* with the *robot part* and **PRESS** on both *levers* with your fingers so that they move to the *pre-lock position* where the **red** marker and the **green** marker are both visible on both *levers*.

PRESS   *Pre-locked position*

WARNING! It is not allowed to deploy the tool changer when in **pre-locked** position as the tool changer will not have full strength.

Step 3.   **Locked: PRESS** again on both *levers* with your fingers to the *locked position* where only the **green** markers are visible, and you feel a "click" as the *levers* move into place.

PRESS again   *Locked position*

Step 4.   Unlocking is in the reversed order.

ATTENTION! Do not use hand tools of any kind such as screw drivers etc. to move the levers as this will permanently damage the levers.

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5   Automatic use

WARNING! Before engage/disengage the tool changer's *robot part* and *tool part*, make sure that all energy and control to the *end-effector* has been turned off. Failing in doing so can cause serious injury and even death.

WARNING! Before you start programming and testing automatic tool changes, you must ensure to do it in a safe way. Failing in doing so can cause hardware damage, injury and even death. Among other you must:
- adjust the cobot's *robot limits* (collaborative safety limits) to a setting that correspond to your risk assessment,
- adjust the cobot's speed to a low setting that allow you time to move free from moving parts,
- prevent unintended/unexpected movement of the cobot and of the *end-effector(s)*,
- prevent incorrect energy levels to reach the *end-effector* (e.g. 24 volts to an *end-effector* designed for 12 volts) and
- ensure that the *end-effectors* you plan to deploy are suitable for automatic tool change.

In general, the user guides chapter "**8.4 Good practice for setting up tool changes**" must be followed.

Step 1.   Uninstall all the cables, hoses and pass-through modules so you can proceed to setting up automatic tool change without the risk of damage to cables, hoses and pass-through modules. Then program/teach the cobot with the three waypoints (W1, **W2** and W4) for each individual *end-effector* to achieve automatic tool change (see next page). You might also consider programming/teaching waypoint W0, W3 and W5 depending on your application. See scheme in the next page.
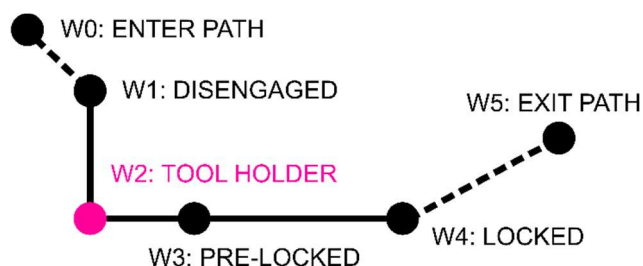
Waypoint **W2** is the reference point for the other waypoints, so program/teach waypoint **W2** first and from there move the cobot linear in the axial direction to program/teach W1 and from **W2** in the radial direction to teach/program W4 (and W3). Waypoint W4 can be programmed/teached with a slight incline to lift the *tool part* free of the *tool part holder*.

Test the automatic tool change for each *end-effector*. Test at low cobot speed and in general be aware that high speed will decrease life span and increase safety risks. Among other, the cobot's speed must be considered in the Integrators/users risk assessment.
(User guide chapter: 8.1 and 8.2)

Universal Robots users can deploy the optional URcap software provided by TripleA robots, which provide **1-minute automatic tool change setup** as only waypoint **W2** must be teached for each *end-effector*. Follow the instructions provided in the URcap and in the *user guide.*
(User guide chapter: 8.5)

	WAYPOINTS		
W0	**ENTER PATH** (optional) Use a waypoint to ensure free passage of the cobot arm into and away from the *tool space.*		
W1	**DISENGAGED** *(mandatory):* *Robot part* and *tool part* aligned on the same axis ready to engage.		
W2	**TOOL HOLDER** *(mandatory):* *Robot part, tool part* and *tool part holder* are **FULLY** engaged. **W2** is the reference waypoint for all other waypoints. Fully engagement is important to ensure smooth tool change. **WARNING!** Energy and control (electricity, vacuum, air pressure) for the *end-effector* must be turned off before moving from W1 to **W2** and before moving from **W2** to W1. **DANGER!**		
W3	**PRE-LOCKED** *(mandatory):* The tool changer is in *pre-lock position*. In this position the payload and COG are toggled to fit the *end-effector.* Default distance between W2 and W3 is 12 mm.		
W4	**Locked position** *(mandatory):* The tool changer is in *locked position.* In this position other *end-effector* parameters are toggles such as power supply, TCP, Tool Voltage, Tool I/O's etc.		
W5	**EXIT PATH** *(optional):* Use a waypoint to ensure free passage of the cobot arm into and away from the *tool space.*		

Step 2.   After testing that tool changes executes correctly, re-install the pass-through modules, cables and hoses to provide connectivity to the *end-effectors*. Then setup the cobot to toggle parameters like voltage, pneumatic and vacuum OFF before tool change takes place and ON after tool change has taken place. You should toggle these parameters in waypoint W4 or W5.

WARNING! Before tool change takes place all electrical, pneumatic and vacuum must be turned OFF and with no residual electricity, air pressure, vacuum etc. in the system. This is important to prevent hardware damage and *end-effectors* unexpected movement which pose a risk of injury or even death.

The optional URcap software provide functionality to toggle power supply, TCP, Tool Voltage, Tool I/O's etc. *(User guide chapter: 8.5.4)*

Step 3.   Now test the tool change and if necessary, adjust until you are satisfied with the tool change execution. Then implement the remaining robot program to complete your application. Deploy the checklists provided in the user guide before deploying your application into production. *(User guide chapter: 9.8)*

If you encounter issues, please consult the troubleshooting in the end of the user guide.

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