



# User Manual

Quick Changer

Version 1.0.2



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## Technical sheet

### Features

- Quickly change of tools, flange standard ISO 9409-1, type 50-4-M6
- Optimized for collaborative applications
- 10 kg rated payload
- Patented reliable and easy-to-use locking mechanism
- Redundant locking structure and locking springs

	<i>Minimum</i>	<i>Typical</i>	<i>Maximum</i>	<i>Unit</i>
Permissible force	-	-	400*	N
Permissible torque	-	-	50*	Nm
Rated payload	-	-	10	kg
	-	-	22	lbs
Weight (robot-part)	-	0.062	-	kg
	-	0.137	-	lbs
Weight (tool-part)	-	0.140	-	kg
	-	0.308	-	lbs
Combined weight	-	0.202	-	kg
	-	0.445	-	lbs
Combined height	-	24.10	-	mm
	-	0.95	-	in
Angle difference	-	22.5	-	Deg.
	-	0.3927	-	Rad.
Repeatability	-	-	±0.02	mm
Tool change	-	5.000	-	cycles
Robot operation	10	-	-	M cycles

\*Please refer to *Load capacity* on page 13 for details about permissible load.

## What's in the box?

The content in the box depends on the part number, see table below.

<i>Part number.</i>	<i>100063</i>	<i>100010</i>	<i>100048</i>
Quick Changer Robot-part	1	1	-
Quick Changer Tool-part	2	-	1
Torx key, T30	1	1	-
M6x8, T30	4	4	-
Ø6x10 precision pin	1	1	-

The Quick Changer kit 100063 includes everything you need to get started using the Quick Changer to switch between two tools on your robot.

Additional robots can be added with the Quick Changer Robot-part 100010, which also includes bolts, precision pin and a Torx key.

Additional tools can be added with the Quick Changer Tool-part 100048.

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## 1 Getting started



### DANGER

You must read, understand and follow all safety information in this manual, and the robot manual and all associated equipment before initiating the robot motion. Failure to comply with the safety information could result in death or serious injury.

### Mounting the robot-part

- 1) Insert the precision pin into the dedicated hole in the robot-part (*see figure 1.1*)
- 2) Put robot-part onto the robot's flange
- 3) Tighten the four included M6 screws to 6Nm

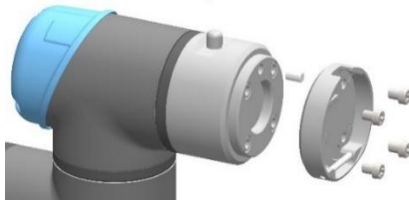


Figure 1.1

### Mounting the tool-part

Refer to user manual of the specific tool for mounting instructions.



## Attaching tool to robot

- 1) Inspect both parts and ensure that they have no defects and they are cleaned from burrs, chips and other debris
- 2) Align the groove on the tool-part with the rod on the robot-part (*figure 1.2*)
- 3) Pivot the tool-part into the robot-part till it makes a 'click' sound (*figure 1.3*)
- 4) Visually confirm that the push button is correctly in place and check that there is no slack between the tool and the robot (*figure 1.4*)

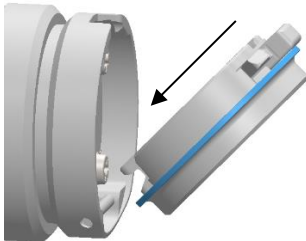


Figure 1.2

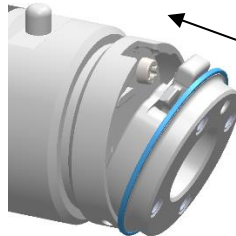


Figure 1.3

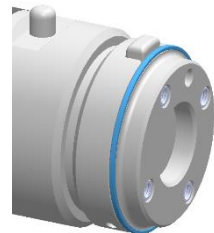


Figure 1.4



### DANGER

The push button must protrude the tool-part by minimum 3 mm (120 mils) in order to lock the Quick Changer correctly. Incorrect locking can cause the tool-part to de-attach unexpectedly.

### Detaching tool from robot

- 1) Push the button all the way down (*figure 1.5*)
- 2) While holding in the button down, pull the tool-part away from the robot-part in a pivoting motion (*figure 1.6*)

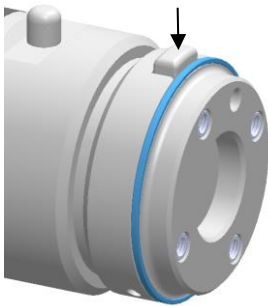


Figure 1.5

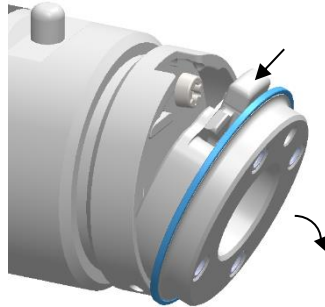


Figure 1.6

## 2 Mechanical design

The Quick Changer system is composed of two parts: a tool-part and a robot-part.

The robot-part features an ISO 9409-1, type 50-4-M6 receiver to be mounted facing the robot tool flange. The other side of the robot-part features a rod and an engagement structure for the locking teethes on the tool-part.

The tool-part features an ISO 9409-1, type 50-4-M6 flange to be mounted to the end-of-arm tooling. The other side of the tool-part features a hinge/centering portion that will engage with the rod of the robot-part and a button with locking teethes that will lock into the engagement structure of the robot-part, securing a firm mechanical connection.

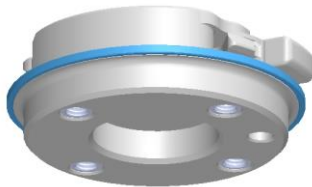


Figure 2.1: Tool-part



Figure 2.2: Robot-part

The two parts can be securely attached to each other and can easily be detached by pressing the button. The attach / detach operations are performed manually. See *Getting Started* on page 8 for details on the operation.

## Dimensions

The outer dimensions of the combined parts can be seen below.

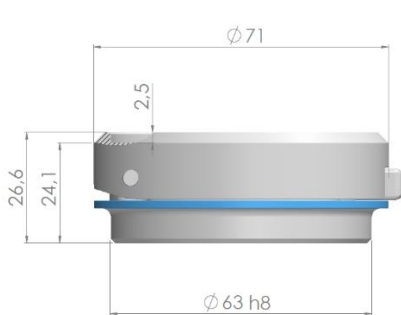


Figure 2.3: Quick Changer Outer dimensions and translation offset.

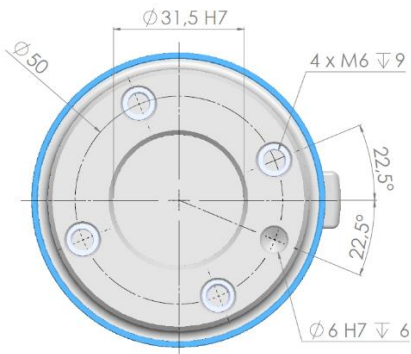


Figure 2.4: Quick Changer Rotation offset.

Use the offset values in the table to convert the robot flange TCP to the flange of the Quick Changer.

	<i>Translation</i>	<i>Rotation</i>
X	0	0
Y	0	0
Z	+24.10 mm +0.95 in	-22.50° -0.3927 rad

## Load capacity

The permissible load depends on the forces between the robot and the end-of-arm tooling. These forces depend on the following three parameters:

- Payload (I.e. weight of end-of-arm tooling)
- Weight distribution (I.e. distance between center of mass of the end-of-arm tooling and center of Quick Changer flange)
- Acceleration (I.e. robot accelerating and gravity,  $1g = 9,81 \text{ m/s}^2$ )

The permissible load as a function of these parameters is shown in figure 2.5.

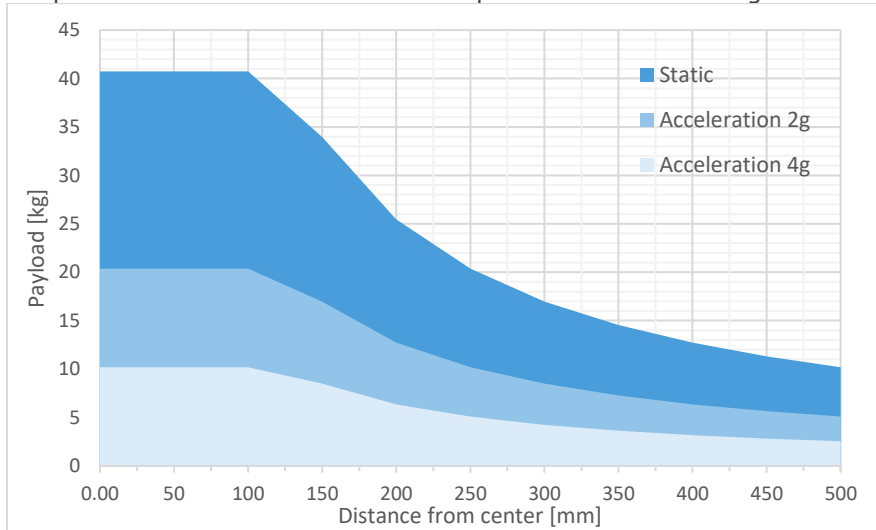


Figure 2.5: Permissible load

### 3 Maintenance and repair

Before each use, the user must check that both the robot-part and tool-part are free from any cracks, bump marks, significant wear and tear and other defects. Both parts must be clean from any chips, dirt, debris, residue and the like.

The Quick Changer must be inspected periodically for presence of slack. Slack can result of repetitive overloads, and the solution is to replace the Quick Changer. See *Technical Sheet* for further information on permissible loads and torques).

The locking surfaces between the robot-part and tool-part are greased with: DIN 51 502: KP2 K-30; ISO6743-09: ISO-L-XCCEB2 when delivered. If the parts are cleaned and the oil film from the grease is totally removed, it can be difficult for the button on the tool-part to slide as intended, e.g. causing the button can be hard to activate. The need for oil decreases the more the Quick Changer is used, and re-greasing the Quick Changer is typically not necessary. Only use the grease specified in this section if re-greasing is wanted.

All maintenance and repairs must be performed in compliance with this manual, including safety instructions. Only authorized distributors or OnRobot A/S shall perform repairs. Only original spare parts may be used.



#### **DANGER**

Failure to comply with the maintenance and repair instructions in this manual can lead to unexpected loss of mechanical connection during operation, resulting in severe hazards.

## 4 Safety

The robot integrators are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that any significant hazards in the complete robot application are eliminated. This includes, but is not limited to:

- Performing a risk assessment for the complete robot system
- Interfacing other machines and additional safety devices if defined by the risk assessment
- Setting up the appropriate safety settings in the robot software
- Ensuring that the user will not modify any safety measures
- Validating that the total robot system is designed and installed correctly
- Specifying instructions for use
- Marking the robot installation with relevant signs and contact information of the integrator
- Collecting all documentation in a technical file; including the risk assessment and this manual

### Intended use

The Quick Changer system is intended to be used in conjunction with industrial robots and end-of-arm tooling up to 10 kg payload. The Quick Changer should only be operated within the conditions stated in the *Technical Sheet* on page 5 of this manual. Any use or application deviation from the intended use is deemed to be impermissible misuse. This includes, but is not limited to:

- Use in medical and life critical applications
- Use before performing a risk assessment

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- Use outside the permissible operation conditions and specifications
- Use close to a human's head, face and eye area
- Use as a climbing aid

### Risk assessment

The robot integrator must perform a risk assessment on the complete robot application. The Quick Changer is only a component in a robot application and the safe use of the Quick Changer relies on the integrators ability to design a safe robot application.

The Quick Changer is designed with unique features, especially suitable for collaborative applications:

- Smooth and round design without any sharp edges on protruding parts. The corners on the button is radius 2 mm or more
- Redundant lock mechanism: Two teeth are holding the robot- and tool-parts together
- Redundant lock springs: Two separate springs are used to ensure full engagement of the locking teethes
- A flat plateau on the locking teethes as a backup protection from disengagement, requiring the button is fully pressed
- Patented self-locking mechanism protects the Quick Changer from disengaging under reasonable overload

In collaborative applications the trajectory of robot can play a significant safety role. The integrator must consider the angle of contact with a human body, e.g. orientate the Quick Changer, tool and workpiece so that the contact surface in the direction of movement is as large as possible, and so that tool connector and



the button on the Quick Changer are pointed in the direction opposite to the movement.

OnRobot A/S have identified the potential hazards listed below as significant hazards that must be considered by the integrator:

- Consequences of a collision between the Quick Changer release button and an obstacle in the work environment
- Injuries due to collisions between humans and work pieces, QC10, tool, robot or other obstacles
- Consequences due to loosen bolts
- Operation with the robot-part (Quick Changer Robot-part) mounted, but without the tool-end (Quick Changer Tool-part) clicked on

It is recommended that the Quick Changer is integrated in compliance with the following guides and standards:

- ISO 10218-2
- ISO 12100
- ISO/TR 20218-1
- ISO/TS 15066

### Environmental safety

OnRobot A/S products must be disposed of in accordance with the applicable national laws, regulations and standards.

The product is produced with restricted use of hazardous substances to protect the environment; as defined by the EU RoHS directive 2011/65/EU. These substances include mercury, cadmium, lead, chromium VI, polybrominated biphenyls and polybrominated diphenyl ethers.



## General safety instructions

Generally, all national regulations, legislations and laws in the country of installation must be taken into consideration. Integration and use of the product must be done in compliance with precautions in this manual. Attention must be paid to the warnings below.



### DANGER

- You must read, understand and follow all safety information in this manual, and the robot manual and all associated equipment before initiating robot motion. Failure to comply with safety information could result in death or serious injury.
- Robot applications must be constructed in such way that a loss of connection, for whatever reason, does not result in any injury to humans or animals.
- Bolts that are insufficiently secured or repetitive overloads can cause the product to separate unexpectedly.
- The Quick Changer must not be used for collaborative applications where the workpiece itself represents a hazard. Necessary measures must be taken to avoid changes in workpieces which has not been addressed by the risk assessment.
- The information in this manual does not cover designing, installing and operating a complete robot application, nor does it cover other peripheral equipment that can influence the safety of the complete system. The complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the robot is installed.
- Any safety information provided in this manual must not be construed as a warranty, by OnRobot A/S, that the robot application will not cause injury or damage, even if robot application complies with all safety instructions.
- OnRobot A/S disclaims any and all liability if the Quick Changer is damaged, changed or modified in any way. OnRobot A/S cannot be held responsible for any damages caused to the Quick Changer, the robot or any other equipment due to programming errors or malfunctioning of the Quick Changer.

## 5 Warranties

### Patents

The Quick Changer robot-part and Quick Changer tool-part, as well as their conjunction and other products of OnRobot A/S are protected by several patents; some still in global publication process (Patents pending). All manufacturers of copies and similar products violating any patent claims will be prosecuted.

### Product warranty

Without prejudice to any claim the user (customer) may have in relation to the dealer or retailer, the customer shall be granted a manufacturer's warranty under the conditions set out below:

In the case of new devices and their components exhibiting defects resulting from manufacturing and/or material faults within 12 months of entry into service (maximum of 15 months from shipment), OnRobot A/S shall provide the necessary spare parts, while the customer (user) shall provide working hours to replace the spare parts, either replace the part with another part reflecting the current state of the art, or repair the said part. This warranty shall be invalid if the device defect is attributable to improper treatment and/or failure to comply with information contained in the user guides. This warranty shall not apply to or extend to services performed by the authorized dealer or the customer themselves (e.g. installation, configuration, software downloads). The purchase receipt, together with the date of purchase, shall be required as evidence for invoking the warranty. Claims under the warranty must be submitted within two months of the warranty default becoming evident. Ownership of devices or

components replaced by and returned to OnRobot A/S shall vest in OnRobot A/S. Any other claims resulting out of or in connection with the device shall be excluded from this warranty. Nothing in this warranty shall attempt to limit or exclude a customer's statutory rights nor the manufacturer's liability for death or personal injury resulting from its negligence. The duration of the warranty shall not be extended by services rendered under the terms of the warranty. Insofar as no warranty default exists, OnRobot A/S reserves the right to charge the customer for replacement or repair. The above provisions do not imply a change in the burden of proof to the detriment of the customer. In case of a device exhibiting defects, OnRobot A/S shall not be liable for any indirect, incidental, special or consequential damages, including but not limited to, lost profits, loss of use, loss of production or damage to other production equipment.

In case of a device exhibiting defects, OnRobot A/S shall not cover any consequential damage or loss, such as loss of production or damage to other production equipment.

## Disclaimer

OnRobot A/S continues to improve reliability and performance of its products, and therefore reserves the right to upgrade the product without prior warning. OnRobot A/S takes every care that the content of this manual is precise and correct but takes no responsibility for any errors or missing information.

## 6 Certifications

Declarations, certificates and applied standards are listed in this chapter.

### Applied standards

Standards applied under development of the product is listed in this section. When an EU Directive number is noted in brackets it indicates that the standard is harmonized under that Directive.

#### **ISO 12100:2010**

#### **EN ISO 12100:2010 (E) [2006/42/EC]**

*Safety of machinery – General principles for design – Risk assessment and risk reduction*

The product is evaluated according to the principles of these standards.

#### **ISO 10218-2:2011**

#### **EN ISO 10218-2:2011(E) [2006/42/EC]**

#### **ANSI/RIA R15.06-2012**

#### **CAN/CSA-Z434-14**

*Robots and robotic devices – Safety requirements for industrial robots  
Part 2: Robot systems and integration*

The product is prepared for compliance with robot system requirements defined in these standards.

#### **ISO/TS 15066:2016**

#### **RIA TR R15.606**

*Robots and robotic devices – Safety requirements for industrial robots –  
Collaborative operation*

This is a Technical Specification (TS), **not** a standard. The product is prepared for easy integration in compliance with provisions in this Technical Specification, see more *in the safety chapter*.

### **ISO/TR 20218-1:2018**

*Robotics – Safety requirements for industrial robots*

*Part 1: Industrial robot system end of arm tooling (end-effector)*

This is a Technical Report (TR), **not** a standard. The product is designed according to principles in this Technical Report.

### **ISO 9409-1:2004 [Type 50-4-M6]**

*Manipulating industrial robots – Mechanical interfaces*

Both parts of the Quick Changer system conforms to type 50-4-M6 of this standard. Robots should also be constructed according to this standard to ensure proper fitting.

### **UL 1740:2018, edition 4**

*Standard for Robots and Robotic Equipment*

The product is designed to meet the requirements in both this and other relevant UL standards. For more information about UL compliance and field certification in US, contact your supplier.

