# **Software manual MTB Application Kit for Universal Robots** SCHUNK software module for URCap



Superior Clamping and Gripping

## Imprint

#### Copyright:

This manual is protected by copyright. The author is SCHUNK GmbH & Co. KG. All rights reserved.

#### Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

Document number: 1495031

Version: 01.00 | 21/12/2021 | en

Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management Tel. +49-7133-103-2503 Fax +49-7133-103-2189 cmg@de.schunk.com



Please read the operating manual in full and keep it close to the product.

# **Table of Contents**

1	Gene	eral	4
	1.1	About this manual	4
	1.2	Symbol definition	4
	1.3	Presentation of Warning Labels	5
	1.4	Applicable documents	5
2	Func	tional description of "URCap"	6
3	Conn	ecting the product to the robot control system	7
4	Insta	lling the software module 1	0
	4.1	Uninstalling the software module 1	2
5	Confi	iguring and testing the software module1	.3
6	Creat	ting robot program1	8
	6.1	MTB Enable 1	9
	6.2	MTB Gripper 2	20
	6.3	MTB Vise 2	21
	6.4	MTB Blow Off Valve 2	22
7	Mon	itoring of the position status within a program 2	23
8	Setti	ng the Tool Center Point (TCP) and gripper weight 2	25
9	Exam	ple of a robot program 2	27

# 1 General

## 1.1 About this manual

This manual contains information about the SCHUNK software module "URCap" and its use in the robot control interface UR Polyscope.

The software is used to easily integrate and control the following products in Universal Robots applications:

- MTB Application Kit SG-JGP-P
- MTB Applikations-Kit DG-JGP-P
- MTB Application Kit KS-PGS3

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

This manual describes the software environment on an e-Series UR robot. Compatibility with the CB series is not provided.

In addition to these instructions, the documents listed under ▶ 1.4 [□ 5] are applicable.

## 1.2 Symbol definition

The following symbols are used in this manual:

- Prerequisite for an action
- 1. Action 1
- 2. Action 2
  - ✓ Intermediate results
- ✓ Final results
- ▶ 1.2 [□ 4]: chapter number and [page number] in hyperlinks

## 1.3 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.







# 

## Danger for persons!

Non-observance will inevitably cause irreversible injury or death.

# 

## Dangers for persons!

Non-observance can lead to irreversible injury and even death.

# 

# Dangers for persons!

Non-observance can cause minor injuries.

# CAUTION

## Material damage!

Information about avoiding material damage.

## **1.4 Applicable documents**

- Assembly and operating manual for the product:
  - MTB Application Kit SG-JGP-P \*c
  - MTB Application Kit DG-JGP-P \*\*
  - MTB Application Kit KS-PGS3 \*\*
- Assembly and operating manual of the sensor MMS 22-PI2 \*
- Operating manual for the UR robot e-Series

The documents labeled with an asterisk (\*) can be downloaded from **schunk.com**.

The documents labeled with an asterisk (\*\*) can be downloaded from **schunk.com/mtb-downloads**.



# 2 Functional description of "URCap"

The "URCap" software module facilitates operation and application creation for SCHUNK products on a collaborative robot from Universal Robots.

All necessary controls are installed via the software module. After the installation is complete, the programming elements are deployed within the Polyscope graphical user interface (GUI). The GUI supports the entire configuration of SCHUNK products as well as the necessary control and programming options.

The following functions are available in the software module and can be used in a robot program:

- MTB Enable: Activates the gripper or the clamping force block IMPORTANT! Activation leads to dangerous movement of the product!
- MTB Gripper: Opens or closes the gripper
- MTB Vise: Opens or closes the clamping force block
- MTB Blow Off Valve: Activates the blow off nozzle

Further Information on the functions  $\triangleright$  6 [ $\Box$  18].

The "URCap" software module has been tested under the Polyscope version 5.11 of Universal Robots. SCHUNK recommends installing the current Polyscope version on the robot used. To avoid compatibility problems, check the operating software of the UR control unit before using "URCap" and update it if necessary.



# **3** Connecting the product to the robot control system

Before connecting or commissioning the product, read the operating manual of the robot and observe the instructions in this manual!



# **A** WARNING

#### Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.



# 

#### Risk of injury from electric shock due to contact with live parts!

- Follow the operating manual for the robot.
- Before starting any work on the product: Switch off the energy supply and secure against re-connection.

#### NOTE

Safety-relevant signals (e.g. emergency stop) must be wired externally, e.g. via safety relays, thus completely disconnecting the product from the power supply.

- Perform a risk assessment for the entire robotic application based on legal requirements to evaluate all safety-related aspects of the application.
- There is no power or compressed air supply on.
- Product is mounted on the robot. Compressed air hose and cable are connected to the product, see product assembly and operating manual.
- 1. Connect the wire strands of the M12 cable to the terminals of the control unit. For connection assignment, see the following table.
- 2. Connect logic and power supply.
  - ✓ LED "Power" lights up green.



Pin	Wire	Signal	Robot in	terface
	strand		Register	Assignment *
1	Brown	+24 VDC	Power <i>or</i> digital inputs	24V
2	Blue	GND	Power <i>or</i> digital outputs	0V
3	White	Sensor Gripper A, Position 1	Digital inputs	DIO
4	Green	Sensor Gripper A, Position 2	Digital inputs	DI1
5	Pink	Sensor Gripper B, Position 1	Digital inputs	DI2
6	Yellow	Sensor Gripper B, Position 2	Digital inputs	DI3
7	Black	Teach function, Sensor Gripper A	Digital outputs	DO3
8	Grey	Teach function, Sensor Gripper B	Digital outputs	DO5
9	Red	Switching Gripper A <i>or</i> Switching clamping force block	Digital outputs	DO1
10	Violet	Switching Gripper B	Digital outputs	DO4
11	Grey/ Pink	Enable signal	Digital outputs	DO0
12	Red/ Blue	Switching blow-off nozzle	Digital outputs	DO2

Connection assignment MTB to UR e-series

#### \* Recommendation - Use digital inputs and outputs

### NOTE

When wiring with the control unit, the user can basically freely select the assignment of the digital connections. SCHUNK recommends using the digital inputs and outputs – as marked below.

Compared coupled         Compared coupled<			Pala		Bom	ala		10000	_	Carto		. Inc. do		Confe	mahle	Outer de		ollol I	ooudo		Dia	ulo de		1		Anal	
24V       12V       PWR       24V       0       0V	_	_	Jale	y .	rven	018	P	Owe	•	Comig	urabi	inputs	_	Comiş	uable	outputs		giuari	iputs	_	UIG	uipuis	_	۱.	_	Anal	<u> </u>
etc       GND       GND       GND       Cl0       Cl4       COO       CO4       M       Dl0       Dl4       DO0       DO4       M       Pace       A0       A0       A0         24V       ON       24V       ON       24V       OV       C11       C15       C01       CC5       D11       D15       D01       D04       D00       D04       A0			24V		12V		P٧	VR		24V		24V		0V		0V	24V		24V		<b>V</b> 0	0V			_	AG	
24V       ON       24V       24V       24V       24V       0V		y Slo	EI0		GND		GΝ	١D		CIO		CI4		COO		CO4	DI0		DI4		DO0	DO4			puts.	AI0	
BI1       OFF       OV       C11       C15       C01       D15       D11       D05       Z       AI         24V       24V       24V       24V       0V       0V       0V       24V       0V       0V       0V       0V       AG       AG         86       S10       C12       C16       CO2       C06       D1       D16       D02       D06       AG       AG         98       S10       C4V       24V       0V       0V       0V       24V       D24V       D02       D06       AG       AG         98       S11       0       C13       C17       0V       0V       D17       D03       D07       D3       A01       A01		genc	24V		ON		24	v		24V		24V		0V		0V	24V		24V		0V	0V			8	AG	
24V       ■       24V       ■       0V       ■       0V       ■       24V       ■       0V       ■       24V       ■       0V       ■       0V <t< td=""><td></td><td>Eme</td><td>EI1</td><td></td><td>OFF</td><td></td><td>0</td><td>v</td><td></td><td>CI1</td><td></td><td>CI5</td><td></td><td>CO1</td><td></td><td>CO5</td><td>DI1</td><td></td><td>DI5</td><td></td><td>DO1</td><td>DO5</td><td></td><td></td><td>ş</td><td>Al1</td><td></td></t<>		Eme	EI1		OFF		0	v		CI1		CI5		CO1		CO5	DI1		DI5		DO1	DO5			ş	Al1	
g       SI0       Image: Contract of the state			24V				_			24V		24V		0V		0V	24V		24V		0V	0V				AG	
24V         24V         24V         0V         0V         24V         0V         0V <th< td=""><td></td><td>Stop</td><td>SI0</td><td></td><td></td><td></td><td></td><td></td><td></td><td>CI2</td><td></td><td>CI6</td><td></td><td>CO2</td><td></td><td>CO6</td><td>DI2</td><td></td><td>DI6</td><td></td><td>DO2</td><td>DO6</td><td></td><td></td><td>atputs</td><td>AO0</td><td></td></th<>		Stop	SI0							CI2		CI6		CO2		CO6	DI2		DI6		DO2	DO6			atputs	AO0	
Š         SI1         ■         CI3         ■         CI7         ■         CO3         ■         DI7         ■         DO3         ■         DO7         ■         2         A01         ■		guard	24V							24V		24V		0V		0V	24V		24V		0V	0V			ő 8	AG	
		Safe	SI1							CI3		CI7		CO3		<b>CO7</b>	DI3		DI7		DO3	D07			Anal	AO1	

Recommended use of the digital inputs and outputs



If other digital outputs have been selected, these ports can also be set in the settings in the "Installation" menu, ▶ 5 [□ 13].



## 4 Installing the software module

## CAUTION

#### Possible damage to product!

The product or the robot may get damaged if electrical cables are connected or disconnected during operation.

 Connect or disconnect electrical connections only when the device is switched off.

#### NOTE

To install the software, SCHUNK recommends using the enclosed USB stick.

- **Prepare the USB stick** The USB stick must meet the following requirements:
  - Formatted in FAT32 format
  - Designation of the removable drive: "SCHUNK MTB".

Name	Date modified		Туре				Size		
SCHUNK-MTB-1.0.0.urcap	11/15/2021 3:31	PM	URCAP	File					
		🥪 SCH	IUNK_M	FB (D:) Prop	erties			×	
		General	Tools	Hardware	Sharing	ReadyBoost	Customiz	e	
		-		SCHUNK_M	тв				
		Type: File sy	stem:	USB Drive FAT32					
		0	sed space	:	28,770,304	bytes 2	27.4 MB	- 1	
		Fr	ee space	: 15,3	39,683,840	bytes	14.2 GB	- 1	
			apacity:	15,3	0	Dytes	14.3 GB		
					Deixe Dr				

Designation of the USB stick

#### Installing the software module

#### NOTE

To avoid malfunctions, SCHUNK recommends installing the latest version of the software module.

1. Download the latest URCap version at schunk.com/mtbdownloads and copy it to the USB stick.

2. Connect the USB stick to the robot control system. The USB interface is located at the back.



- 3. Switch on the robot control system.
  - ✓ The robot control system is started.

Program	Variables	? Help
		About
<unnamed></unnamed>		🗭 Settings
Load Program		U Shutdown Robet
Chabus	Ne Verieblee	
Stopped	No variables	
<b>7</b> -1-1 4		
RODOT AGE		
9 11 49 39		



- 4. Select the "System" button in the left menu.
  - ✓ A sub-menu opens.
- 5. Select the "URCaps" button.
- 6. Select the "+" button.
- 7. Select URCaps software module.
- 8. Select the "Open" button.
  - The software module is added and displayed in the Explorer window.
- 9. Select the "Restart" button to complete the installation.
  - ✓ The system restarts.

Settings								
> Preferences	Active URCaps	Inactive URCaps						
> Password	SCHUNK Pneumatic Machine Tending Bundle	Remote TCP & Toolpath						
✓ System								
System Backup								
Robot Registration								
URCaps	URCap Information							
Remote Control								
Constrained Freedrive								
Network								
Update								
> Security								
Exit	+ -		Restart					

#### 4.1 Uninstalling the software module

- 1. Switch on the robot control system.
  - ✓ The robot control system is started.
- 2. Open the menu at the top right and choose "Settings".
- 3. Select the "System" button in the left menu.
  - ✓ A sub-menu opens.
- 4. Select the "URCaps" button.
- 5. Select URCaps software module.
- 6. Select the "-" button.
- 7. Select the "Restart" button to complete the deinstallation.
  - ✓ The system restarts.

## 5 Configuring and testing the software module



## A WARNING

#### Risk of injury due to sudden movements!

Components could move unexpectedly and result in serious injuries.

- During commissioning, observe all warnings displayed on the software interface.
- Keep a safe distance and wear suitable protective equipment.
- Robot is switched on.
- 1. Switch on the compressed air supply. WARNING! Activated digital inputs and outputs can lead to immediate movement of the gripper fingers or clamping jaws.
- 2. Select the "Installation" button in the header line.
- 3. Select the "URCaps" button.
- 4. Select the "MTB Plugin Configuration" button.
  - ✓ The explorer window shows the configurable parameters and product images.

> General	SCHUNK MTB Conf	lguration			
> Safety					
> Features		Choose configur	ation Dual Gripper + Vise	• •	schunk
> Fieldbus	Gripper A	Gripper B Vise			
✓ URCaps	Please select the I/C	) for the following signals:			
SCHUNK MTB Config	Enable G	ripper digital_out[0] 🔻			
	Grip	oper A digital_out[1] 🔻			
	Blow Off	fValve digital out[2] 🔻	10		
		_			
	Sensor A			?	
	Teach	Mode digital_out[3] 🔻			and a fer
	Pos	ition 1 digital inf01 💌	Teach Position	1	
	Pos	tion ? diaital b[1]	Teach Position	2	
	103	digital_h[1] +		2	
			Test	7	Enable
		Open Clos	e Blow Off		

The following settings can be made in the menu item "MTB Plugin Configuration":

- Selection of configurable products (single gripper, double gripper, clamping force block)
- Selection of digital inputs and outputs
- Enabling/disabling the products
- Manual control or function test of the products



#### Configuring and testing the gripper and clamping force block

- 1. Select the desired product configuration from the drop-down menu.
  - ✓ Depending on the selection made, the content in the explorer window changes. Different tabs appear, e.g. Gripper A, Gripper B or Clamping force block.
- Select digital inputs and outputs in the drop-down menus. Note: The designations of the digital inputs and outputs refer to the numbering of the ports in the robot control unit, ▶ 3 [<sup>1</sup>] 8].
- 3. CAUTION! Risk of injury due to moving parts! Activate the "Enable" button for the selected product. Select "Open", "Close" or "Blow Off" to test the settings.
- 4. Configure other products, e.g. the second gripper or clamping force block, in the same way. To do this, switch to the corresponding tab.



Configuration of gripper A - with selection of double gripper and clamping force block

#### Change configuration - restart required

After configurations have been changed, it may be necessary to restart the robot control system.

- 1. Save installation file.
  - ✓ Changed settings can be loaded after restart.
- 2. Perform a restart.
- 3. Check whether robot programs already created must be adapted to the new configuration.

🗲 General	SCHUNK MTB Configurat	ion			
🔪 Safety					
> Features		Choose configuration	Dual Gripper	•	SCHUNK
🔪 Fieldbus	Gripper A Gripp	er B			
V URCaps	Please select the I/O for th	e following signals:	Restart R	equired	
SCHUNK MTB Config	Enable Gripper	config_out[0]			
	Gripper A	config_out[1] 🔻			
	Blow Off Valve	config_out[2] 🔻			<b>X C</b>
	Sensor A			?	Enable
	Teach Mode	config_out[3] 🔻			
	Position 1	config_in[0] 🛛 🔻	Teach Position	1	
	Position 2	config_in[1] 🔻	Teach Position	2	
	[	Open Close	Blow Off	]	





Restart required with program changes



#### **Teaching sensors**

The sensor can detect two positions of the gripper.

- Digital channels are configured.
- 1. Press the "Teach Position 1" button.

> General	SCHUNK MTB Cor	nfiguration				
> Safety					_	
> Features		Ch	oose configuratio	Dual Gripper + Vise	•	SCHUNK
> Fieldbus	Gripper A	Gripper B	Vise			
✔ URCaps	Please select the I/	O for the follow	na sianals:			
SCHUNK MTB Config	Enable	Gripper digita	_out[0] 🔻 [			
	Gr	ripper A digita	_out[1] 🔻 [			
	Blow O	Iff Valve digita	_out[2] 🔻 [			Enable
	Sensor A			Ċ	?	
	Teac	h Mode digita	out[3] 🔻			E el e E
	Po	sition 1 digita	in[0] 🔻	Teach Position 1		
	Po	osition 2 digita	_in[1] 🔻	Teach Position 2		A STOR
		Ope	n Close	st Blow Off		Enable

- 2. CAUTION! Risk of injury! Gripper fingers move at max. speed and force. Select the "Open" and "Close" buttons.
  - ✓ Gripper fingers move to the corresponding end position. Note: If another position is to be taught, a workpiece of the corresponding dimension must be gripped. Do not attempt to move the gripper fingers by hand, as there is a risk of injury.



3. Press the "Begin Teaching" button to start the teach-in process.

> Conorol	en Move U0 Log
Safety     Features	Choose gripper configuration: Dual Gripper + Vise  SCHUNK
> Fieldbus	Gripper 1 Gripper 2
VIRCaps SCHUNK MTB Configuration	Please select the digital I/C  Leader grane made for backing audies 1 Leader Gripper 1 Gripper 2 Blow Off Valve Confirm Position Cancel Enable
	Sensor A (?) Teach Mode digital_out[4] ♥ Position 1 digital_in[0] ♥ Position 2 digital_in[1] ♥ Teach Position 2
	Close Blow Off

- ✓ The LEDs built into the sensor signal the teach status. For details, see the Assembly and Operating Manual for the sensor.
- 4. Select the "OK" button.
  - ✓ Status display lights up next to the "Teach Position 1" button.
- 5. Teach sensor analog to second position.
- 6. *Depending on the selection made*: Repeat action steps for gripper B.



Teaching sensor, gripper B - with selection of double gripper and clamping force block

- The positions were taught in.
- ✓ Within the program, the positions taught in this way can be monitored via the digital inputs, ▶ 7 [<sup>1</sup> 23].



## 6 Creating robot program

After installing the software module "SCHUNK Machine Tending Bundle", the following actions can be inserted into a robot program.

Function	Description	Command	Activity
MTB Enable [🗅 19]	Activate gripper or	Enable	Turns on the air supply for the selected product.
	clamping force block	Disable	Turns off the air supply for the selected product.
MTB Gripper	The gripper	Open	The gripper finger opens.
[🗅 20]	opens or closes	Close	The gripper finger closes.
MTB Vise	The clamping	Open	The chuck jaws open.
[🗅 21]	force block opens or closes	Close	The chuck jaws open.
MTB Blow Off Valve [🗅 22]	Switching the blow-off nozzle	On	Compressed air flows through the blow- off nozzle.
	on or off	Off	Stops the air supply to the blow-off nozzle.
		On for a duration	Blow-off nozzle switches on and switches off automatically after the specified time in seconds.

#### Add function to robot program

- 1. Select the "Program" button in the header line.
  - ✓ The robot program and a short description for creating the program are displayed in the Explorer window.
- 2. In the robot program, select the position where the function is to be inserted.
- 3. Press the "URCaps" button.
  - ✓ All available functions are displayed in the menu.
- 4. For further information on the functions, see the following sections.



## 6.1 MTB Enable

- In the robot program, the position where the function is to be inserted is marked.
- 1. Press the button "URCaps" > "Enable".
  - ✓ "Command" tab is displayed in the Explorer window.
- 2. Select the desired product (gripper or clamping force block).
- 3. Select the desired command.
- 4. **CAUTION! Risk of injury! Moving parts.** Select the "Execute" button to test the function.
  - ✓ The selected function has been added to the program code.





## 6.2 MTB Gripper

- In the robot program, the position where the function is to be inserted is marked.
- 1. Press the "URCaps" > "Gripper" button.
  - ✓ "Command" tab is displayed in the Explorer window.
- 2. *If a double gripper has been configured*: Select the desired gripper.
- 3. Select the desired command.
- 4. **CAUTION! Risk of injury! The gripper fingers move.** Select the "Execute" button to test the function.

> Basic		Q	Command	Graphics	Variables	
<ul> <li>&gt; Advanced</li> <li>&gt; Templates</li> </ul>	1 <b>V</b> Robot Program 2 Close Gripper (1)		Gripper			
V URCaps			Select which g	ripper to use for this	s operation:	
Vise				Gripper	r 1 Gripper 2	
Blow Off Valve			() op	n	6	
Enable			U Clo	se		
			• C	aution! Using this	button will	Freedo
			· c	ause immediate m	iotion.	Execute

 $\checkmark\,$  The selected function has been added to the program code.

"Gripper" function - when double gripper is selected



### 6.3 MTB Vise

- In the robot program, the position where the function is to be inserted is marked.
- 1. Press the button "URCaps" > "Vise".
  - ✓ "Command" tab is displayed in the Explorer window.
- 2. Select the desired command.
- 3. CAUTION! Risk of injury! The chuck jaws move. Select the "Execute" button to test the function.
  - ✓ The selected function has been added to the program code.

Basic	C	Command	Graphics Variables	
Advanced	1 V Robot Program	Vise		
	2 Close Vise			
Blow Off Valve		Opens or clos	es vise.	schunk
Enable			I	
Gripper		O Open		
Vise		Close		
	0	•		A AM
		<b>^</b>	Caution! This button may cause immediate motion.	Execute



#### 6.4 MTB Blow Off Valve

- In the robot program, the position where the function is to be inserted is marked.
- 1. Press the button "URCaps" > "Blow Off Valve".
  - ✓ "Command" tab is displayed in the Explorer window.
- 2. Select the desired command.
  - ✓ On: Compressed air flows through the blow-off nozzle.
  - ✓ Off: Stops the air supply.
  - ✓ On for a duration \_\_\_\_ sec: Compressed air flows through the blow-off nozzle for a certain period of time, after which the air supply stops.
- 3. CAUTION! Increased noise level! Compressed air escapes. Select the "Execute" button to test the function.
  - ✓ The selected function has been added to the program code.



## 7 Monitoring of the position status within a program

URCap provides functions to perform sensor interrogation with respect to the taught positions. This is illustrated below using the example of an if query.

- 1. Select the "Program" button in the header line.
- 2. Select the button "Advanced" > "If" > Box "f(x)".
  - ✓ A sub-menu opens.
- 3. Select drop-down menu <Function> at the bottom left.
- Select desired function to be assigned to the If command and assign values "False" or "True".
   For further information on the functions, see the following table.
- 5. Select the "Submit" button.
  - ✓ The command is displayed in the robot program.

> Basic		Q		Comma	nd	Graphic	s	Variables					
✔ Advanced	1 Robot Program			_									
Loop	2 9 <b>b</b> If		ŀ	f									
Suit Press	3 empty>		D	epending	on the s	tate of th	ne given :	sensor input	t or pro	igram var	iable, th	e following	3
<function></function>		^	16	:	- execute	u		<i>4</i> (57)					
pose_add( <pose1;< td=""><td><pre>&gt;,<pose2>)</pose2></pre></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(X)</td><td></td><td></td><td></td><td></td><td></td></pose1;<>	<pre>&gt;,<pose2>)</pose2></pre>							(X)					
pose_sub( <pose_t< td=""><td>&gt;&gt;,<pose_trom>;</pose_trom></td><td></td><td></td><td>L Chec</td><td>:k expres</td><td>sion con</td><td>inubusiy</td><td></td><td></td><td></td><td></td><td></td><td></td></pose_t<>	>>, <pose_trom>;</pose_trom>			L Chec	:k expres	sion con	inubusiy						
pose_trans( <pose_< td=""><td>from&gt;,<pose_to>)</pose_to></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td></pose_<>	from>, <pose_to>)</pose_to>												_
pose_inv( <pose>)</pose>	/												×
Interpolate_poset<	pose_irom>, <pose_to>,<alpha>)</alpha></pose_to>												
pose_dist( <pose_if< td=""><td>om&gt;,<pose_to>)</pose_to></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pose_if<>	om>, <pose_to>)</pose_to>												
get_actual_tcp_pos	e()								8				
get_actual_joint_po	sitions()				False	e (LO)			Esc	-	Backsp	ace	
get_inverse_kin( <p< td=""><td>ose&gt;)</td><td></td><td></td><td></td><td></td><td></td><td></td><td>i ī</td><td></td><td></td><td></td><td></td><td></td></p<>	ose>)							i ī					
get_target_tcp_pos		ľ		×	or	n	ot		7	8	9		
get_target_tcp_spe	ed()		_					1 1					
get_target_joint_po	sicons()		)	<	>	- 1	*		4	5	6		
get_target_joint_sp	eds()					$\vdash$		1 -		$\vdash$			
force()			1	≤	≥		+		1	2	з		
												Submit	£



Function	Value	Description
get_gripper_one_pos_one()	True/ False	<b>True</b> is returned if the taught position 1 for gripper A is detected. Otherwise, <b>False</b> is returned.
get_gripper_one_pos_two()	True/ False	<b>True</b> is returned if the taught position 2 for gripper A is detected. Otherwise, <b>False</b> is returned.
get_gripper_two_pos_one()	True/ False	<b>True</b> is returned if the taught position 1 for gripper B is detected. Otherwise, <b>False</b> is returned.
get_gripper_two_pos_two()	True/ False	<b>True</b> is returned if the taught position 2 for gripper B is detected. Otherwise, <b>False</b> is returned.



# 8 Setting the Tool Center Point (TCP) and gripper weight

For proper use of the gripper on a UR robot, it is recommended to store the Tool Center Point (TCP) and the gripper weight in the robot settings.

- 1. Select the "Installation" button in the header line.
- 2. Select the "General" button in the left menu.
  - ✓ A sub-menu opens.
- 3. Select the "TCP" button.
- 4. Enter the corresponding values in the "Position" and "Orientation" area, see the following table.

✔ General	Tool Center Point		TCP Visualizatio	n	
тср	TCP V	<b>H</b>			
Payload					<u>+</u>
Mounting	Position				
I/O Setup	X 0.0 mm				
Tool I/O	Y 0.0 mm	🎢 Measure			
Variables	2 0.0 mm				
Startup					
Smooth Transition	Units Rotation Vector [rad]	•			
Home	BX 0.0000				
Conveyor Tracking	RY 0.0000	🎢 Measure			
Screwdriving	RZ 0.0000		Tool Flange		
> Safety				<b>f</b> <sup>y</sup>	t <sup>v</sup>
> Features					
> Fieldbus				X	z
> URCaps					

- 5. Select the "Payload" button.
- 6. In the "Payload" area, enter the gripper weight and the center of gravity (CX, CY and CZ), see the following table.

TCP     Image: Payload     Image: Payload       Payload     Image: Payload     Image: Payload       Mounting     Payload     Image: Payload       Moss     Image: Payload     Image: Payload       I/O Setup     Mass     Image: Payload       Tool I/O     Cr     0.00 mm       Variables     CY     0.00 mm	+
Payload     Image: Constraint of the second se	+
Mounting     Payload     Stervice       I/O Setup     Mass     IIIMIN     Kg       Tool I/O     Canter of Gravity     C       Variables     CY     0.00 mm	
I/O Setup     Mass     I/Mass       Tool I/O     Canter of Gravity       Cx     0.00 mm       Variables     CY       Cy     0.00 mm	
Tool I/O     Center of Gravity       Cx     0.00 mm       Variables     CY       Cy     0.00 mm	
Variables CY 0.00 mm	
	T
startup CZ 0.00 mm	
Smooth	
Transition	(İ
Home	
Conveyor Inertia (kg m²)	
Use custom Inertia Matrix	
Screwdriving X Y Z Tool Flange	
> Safety X 0.015516 0.000000 0.000000 ↓Y	
Features         Y         0.000000         0.015516         0.000000	
Eiclidhus Z 0,000000 0,000000 0,015516	
VIRCaps	





Tool Center Point, DG: double gripper, SG: single gripper

Size		Т	CP		Cente	Weight		
	X [mm]	Y [mm]	Z [mm]	RY [deg]	CX [mm]	CY [mm]	CZ [mm]	[kg]
MTB DG-JGP-P 64 *	62.6	0	68.5	±45	-0.5	12.8	44.5	1.62
MTB DG-JGP-P 80 *	69.7	0	75.5	±45	-0.5	15.3	37.6	2.1
MTB SG-JGP-P 80	0	0	65.5	-	-0.5	10	49.3	0.99
MTB SG-JGP-P 100	0	0	71.5	-	-0.5	11.4	40.9	1.38

\* For the double gripper: Note the angle of 45° when calculating the TCP values.

### NOTE

The blow-off nozzle may protrude beyond the TCP, creating an interference contour. For dimensions, see catalog data sheet at **schunk.com/mtb-downloads**.

#### NOTE

If a workpiece with a certain weight is gripped, the total useful load can be dynamically adjusted within the robot program under "Program" > "Basic".

The operating manual of the UR robot contains further information on TCP  $\blacktriangleright$  1.4 [  $\Box$  5].



## 9 Example of a robot program

The following sample program shows a pick-and-place application. Two positions must be taught in: Gripper open (position 1) and workpiece gripped (position 2).



Example program

Item	Description
1	Select line in robot program.
	Activate the "Add Before Start Sequence" checkbox.
	<ul> <li>The following variables or monitoring tasks have already been defined in advance:</li> <li>Grip_Open: The first position (gripper completely open) has been reached</li> </ul>
	<ul> <li>Grip_Success: The second position (corresponding to the dimension of the workpiece to be gripped) was detected by the sensor.</li> </ul>
	Each of the two defined functions returns a true value when the sensor detects the corresponding position. These functions are used in the further course of the program.
2	Use the move commands to move the robot to the waypoints "Pick_Approach" and in a separate step "Pick_Position". New workpieces are fed in this area (in a tray or similar).



Item	Description
3	• Call up the "Gripper A Close" program node to grip the workpiece.
	<ul> <li>Check the variable "Grip_Success" in the If node. If gripper A is in position 2 and has thus gripped the workpiece, the command was successful.</li> </ul>
4	<ul> <li>Use the move commands to move the robot to the waypoints "Place_Approach" and "Place_Position". The workpieces are placed in this area (in a tray or similar).</li> </ul>
	Call up the "Gripper A Open" program node.
	<ul> <li>Check that gripper A is open and in position 1.</li> </ul>
5	If the opening of the gripper in step (4) was not successful, an error message is displayed on the teach pendant. To stop the robot program here, tap the "Stop Program" button in the pop-up window.
6	If gripping the workpiece in step (3) was not successful, an error message is displayed on the teach pendant. Select "Continue" in the pop-up window. The robot program starts again at the "Pick_Approach" waypoint.



																	_
																T	

_																		 	 					
_																			 					
_																	_		 					
 _																								
 _		_																						
 _														 	 	 		 	 	 	 	 		
_																		 	 					
 _																			 					
 _																			 					
_																		 	 					
 _														 		 		 	 			 		
 _														 				 	 					
 _																								
	-																							
	_																							
 	_																							

																	_
																T	

## SCHUNK GmbH & Co. KG Clamping and gripping technology

Bahnhofstr. 106 - 134 D-74348 Lauffen/Neckar Tel. +49-7133-103-0 Fax +49-7133-103-2399 info@de.schunk.com schunk.com

Folgen Sie uns I Follow us

