

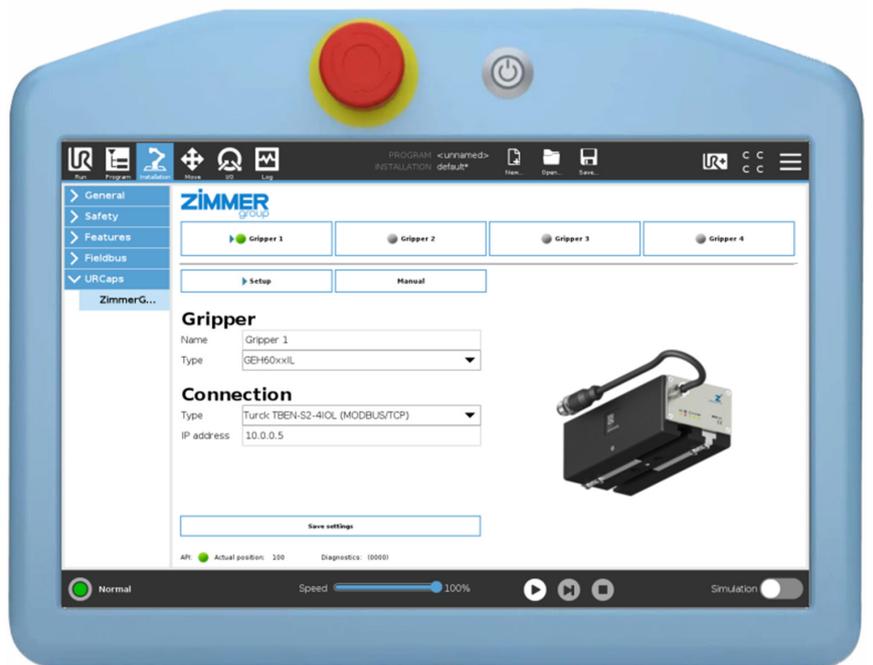


COMMISSIONING INSTRUCTIONS

UR premium app
"Easy to use Package"

DDOC00994

THE KNOW-HOW FACTORY



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1 Supporting documents

NOTICE



Read through the installation and operating instructions before installing or working with the product.

The installation and operating instructions contain important notes for your personal safety. They must be read and understood by all persons who work with or handle the product during any phase of the product lifetime.



The documents listed below are available for download on our website www.zimmer-group.com.

- Installation and operating instructions
 - Catalogs, drawings, CAD data, performance data
 - Information on accessories
 - Technical data sheets
 - General Terms and Conditions, including warranty information.
- ⇒ Only those documents currently available on the website are valid.

In these installation and operating instructions, "product" refers to the product designation on the title page!

1.1 Notices and graphics in the installation and operating instructions

DANGER



This notice warns of an imminent danger to the life and health of people. Ignoring these notices can lead to serious injury or even death.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

WARNING



This notice warns of a situation that is potentially hazardous to personal health. Ignoring these notices can cause serious injury or damage to health.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

CAUTION



This notice warns of a situation that is potentially hazardous to persons. Ignoring these notices can cause minor, reversible injuries.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

NOTICE



This notice warns of possible material and environmental damage. Ignoring these notices can result in damage to the product or the environment.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

INFORMATION



This category contains useful tips for handling the product efficiently. Failure to observe these tips will not result in damage to the product. This information does not include any information relevant to health or workplace safety.

2 Proper use

NOTICE



Material damage and malfunction in case of non-compliance

The product is only to be used in its original state with its original accessories, with no unauthorized changes and within the stipulated parameter limits and operating conditions.

Any other or secondary use is deemed improper.

- ▶ Operate the product only in compliance with the associated installation and operating instructions.
- ▶ Operate the product only when it is in a technical condition that corresponds to the guaranteed parameters and operating conditions.
- ⇒ Zimmer Group GmbH shall accept no liability for any damage caused by improper use. The operator bears sole responsibility.

- The product is designed exclusively for electric operation using a 24 V DC power supply.
- The product is intended for installation and operation of the OEM robot control system on the robot control panel.
- Direct contact with perishable goods/food is not permitted.

3 Personnel qualification

WARNING



Inadequate qualification can cause injury and material damage

If inadequately qualified personnel perform work on the product, this can cause serious injuries and significant material damage.

- ▶ All work on the product must be performed by qualified personnel.
- ▶ Before working with the product, read the document in its entirety and make sure that you have understood everything.
- ▶ Observe country-specific accident prevention regulations and the general safety notices.

The following qualifications are a prerequisite for performing various work on the product.

3.1 Electricians

Electricians are able to perform work on electrical systems, can recognize and avoid possible dangers and know the relevant standards and provisions due to their technical training, knowledge and experience.

3.2 Specialists

Specialists are able to perform the assigned work, can recognize and avoid possible dangers and know the relevant standards and provisions due to their technical training, knowledge and experience.

3.3 Instructed personnel

Instructed personnel have been trained by the operating company on the tasks and possible dangers of improper behavior.

3.4 Service personnel

Service personnel are able to perform the assigned work and can recognize and avoid possible dangers due to their technical training, knowledge and experience.

3.5 Additional qualifications

Persons who work with the product must be familiar with the valid safety regulations and laws as well as the standards, guidelines and laws listed in this document.

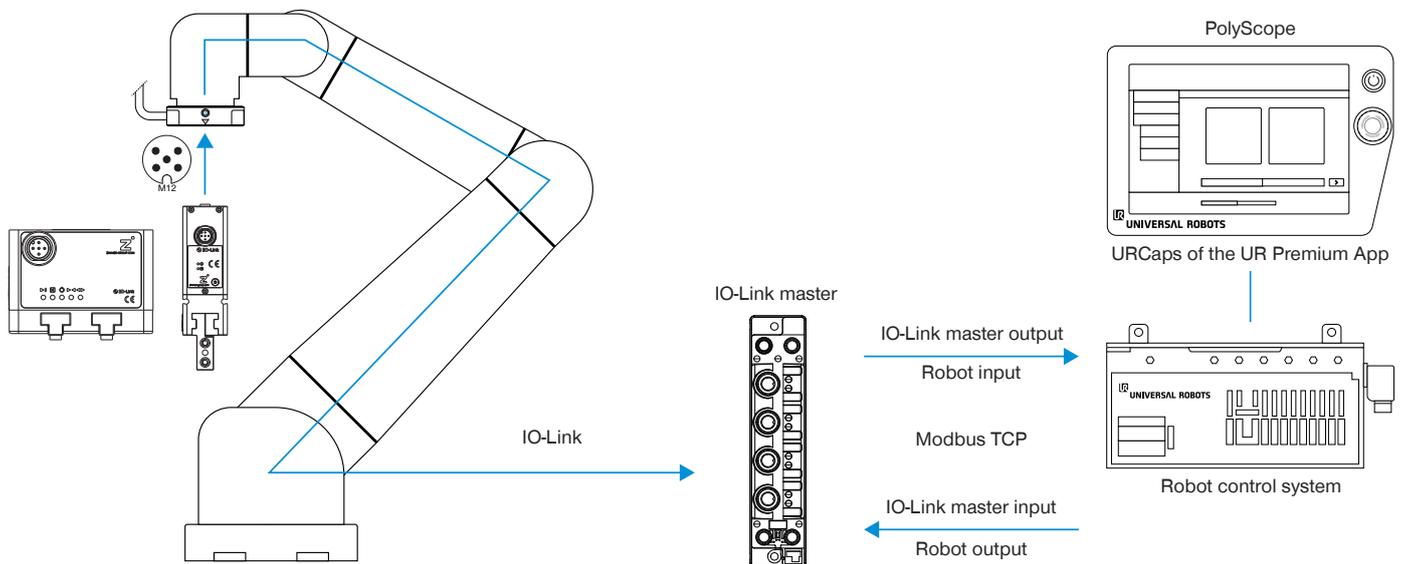
Personnel who work with the product must have facility-issued authorization to commission, program, configure, operate, maintain and also decommission this product.

4 Product description

The IO-Link master is the intelligent gateway between the grippers and the robot control system. The IO-Link master can be configured via URCaps in the UR Premium app. The grippers can be controlled using URCaps the of the UR Premium app on the robot control panel.

The IO-Link master (ZUB068713) enables up to 4 grippers to be connected to the robot.

The image shows a simplified view of the structure of the overall system. All parts for the electrical connection of a gripper with the robot are included or are available from Zimmer Group GmbH as optional accessories.

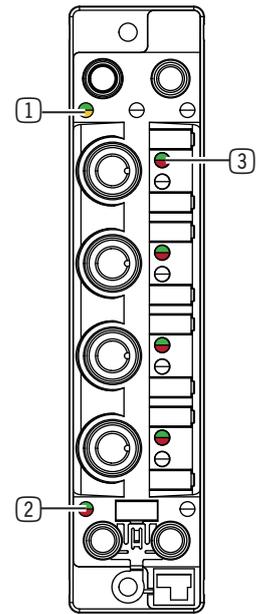


5 Functional description

Using the URCaps of the UR Premium app, Zimmer Group GmbH grippers can be controlled directly from the robot control panel and generated robot jobs can be configured.

The motion tasks for controlling the grippers are defined via the URCap *Z_Gripper*.

5.1 LED status display



- ① IO-Link master supply voltage
- ② Ethernet port
- ③ IO-Link connection

5.1.1 Supply voltage LED display

Status	Meaning
LED lights up continuously green.	<ul style="list-style-type: none"> Supply voltage OK
LED lights up continuously red.	<ul style="list-style-type: none"> No supply voltage or undervoltage
LED does not light up.	<ul style="list-style-type: none"> No supply voltage or undervoltage

5.1.2 Ethernet connection LED display

Status	Meaning
LED lights up continuously green.	<ul style="list-style-type: none"> Connection to the robot control system
LED flashing green.	<ul style="list-style-type: none"> Communication with the robot control system
LED lights up continuously yellow.	<ul style="list-style-type: none"> Slow connection to the robot control system
LED flashes yellow.	<ul style="list-style-type: none"> Slow communication with the robot control system
LED does not light up.	<ul style="list-style-type: none"> No connection to the robot control system

5.1.3 IO-Link connection LED display

Status	Meaning
LED lights up continuously green.	<ul style="list-style-type: none"> Communication with gripper
LED lights up continuously red.	<ul style="list-style-type: none"> No communication with gripper
LED flashes red.	<ul style="list-style-type: none"> Process data invalid

6 Accessories/scope of delivery

INFORMATION



If any accessories not sold or authorized by Zimmer Group GmbH are used, the function of the product cannot be guaranteed. Zimmer Group GmbH accessories are specifically tailored to the individual products.

- ▶ For optional accessories and those included in the scope of delivery, refer to our website.

7 Installation

WARNING



Risk of injury due to uncontrolled movements

Risk of injury in case of unexpected movement of the machine or system into which the product is to be installed.

- ▶ Switch off the energy supply of the machine before any work.
- ▶ Secure the power supply against being switched on unintentionally.
- ▶ Check the machine for any residual energy that may be present.

CAUTION



Risk of injury due to uncontrolled movements

Risk of injury in the event of uncontrolled movement of the product when the power supply is connected.

- ▶ Switch off the power supply to the machine before carrying out any work.
- ▶ Secure the power supply against being switched on unintentionally.
- ▶ Check the machine for any residual energy that may be present.

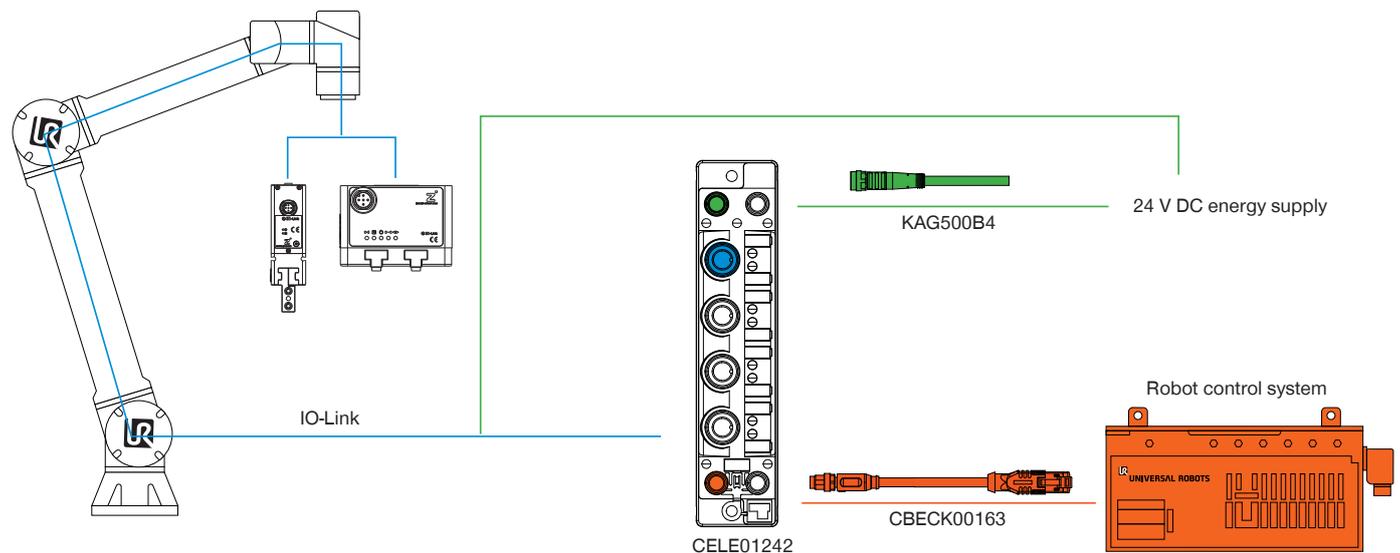
7.1 Installing hardware

NOTICE



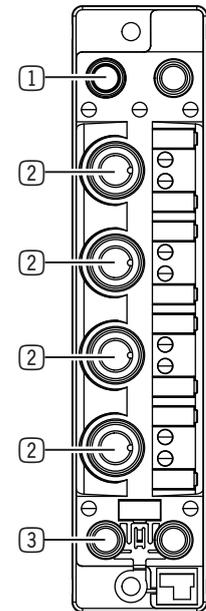
Malfunction in case of non-compliance

The power supply unit supports 10 A (15 A peak). Depending on the gripper and application, 15 A is not enough to move four grippers simultaneously.



7.2 Installing the energy supply

7.2.1 Pin assignment



- ① IO-Link master supply voltage
- ② IO-Link connection
- ③ Ethernet port

7.2.1.1 Supply voltage

Pin	Color	Function	Explanation	Plug, M8
1	Brown	PWR	24 V DC supply voltage	
2	White	PWR	24 V DC supply voltage	
3	Blue	GND 1	0 V DC supply voltage	
4	Black	GND 2	0 V DC supply voltage	

7.2.1.2 Ethernet

Pin	Function	Explanation	Socket, M8 shielded
1	TX +	Send data (positive)	
2	RX +	Receive data (positive)	
3	RX -	Receive data (negative)	
4	TX -	Send data (negative)	

7.2.1.3 IO-Link

Pin	Color	Function	Explanation	Socket, M12
1	Brown	Logic +	Logic voltage 24 V DC	
2	White	-	-	
3	Blue	Logic -	Logic voltage 0 V DC	
4	Black	C/Q	IO-Link communication	
5	Gray	-	-	

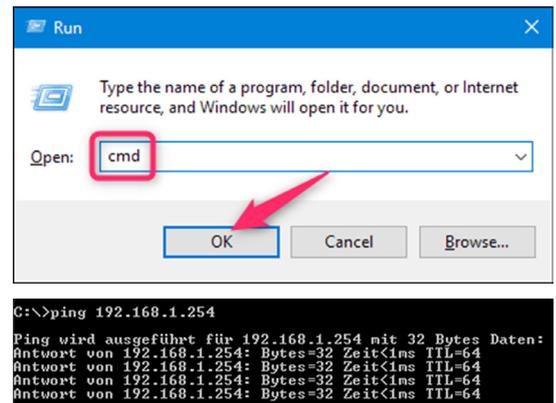
8 Installation

8.1 IO-Link master

- ▶ Carry out a factory reset.
- ▶ Connect the IO-Link master to a PC.
- ▶ Connect the supply voltage of the IO-Link master.
- ▶ Check the connection between the IO-Link master and PC, see section "Testing the connection between the IO-Link master and PC".
- ▶ Configure the IO-Link master, see section "Configuring the IO-Link master".

8.1.1 Testing the connection between the IO-Link master and the PC

- ▶ Start the command prompt (cmd.exe).
- ▶ Press the *Windows* and *R* buttons.
- ▶ In the *Open* field, enter the value *cmd*.
- ▶ Click the *OK* button.



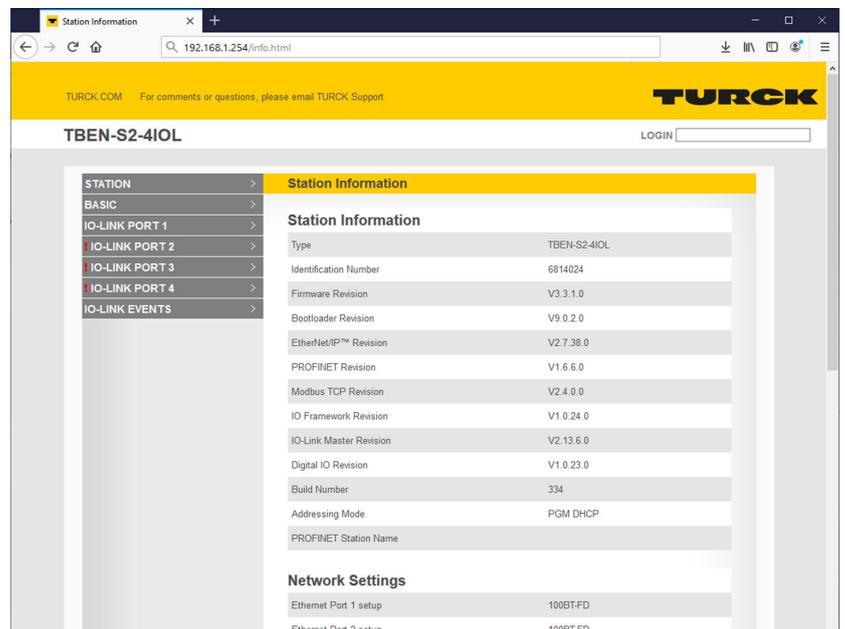
- ▶ Enter *ping 192.168.1.254* in the command prompt.
- ▶ Press the *Enter* button.
- ▶ Check the answers displayed.
 - The IO-Link master has the following IP address by default: 192.168.1.254
 - Line 1: The pinged IP address and the size of the packets sent.
 - Lines 2-5: The responses of each individual packet, including the time (in milliseconds) taken for the response and the time-to-live (TTL) of the packet, i.e. the time that must elapse before the packet is discarded.

If no response is sent, an error report is displayed.

- ▶ In this case, check whether the IO-Link master is switched on and correctly connected to the PC.

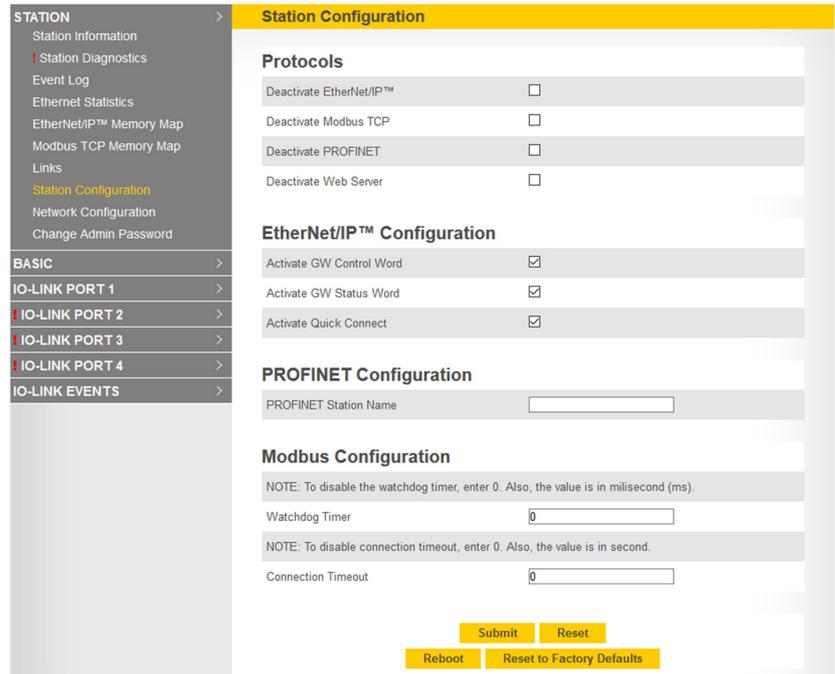
8.1.2 Configuring the IO-Link master

- ▶ Enter the IP address in your Internet browser: <http://192.168.1.254>
- ⇒ The website of the IO-Link master opens.
- ▶ Enter the password in the *LOG/IN* field: password



8.1.2.1 Switching off the watchdog timer

- ▶ In the *STATION* menu, click *Configure station*.
- ▶ Switch off the watchdog timer by entering the value 0 in the *Watchdog Timer* field in the *Modbus Configuration* area.
- ▶ Click the *Submit* button.

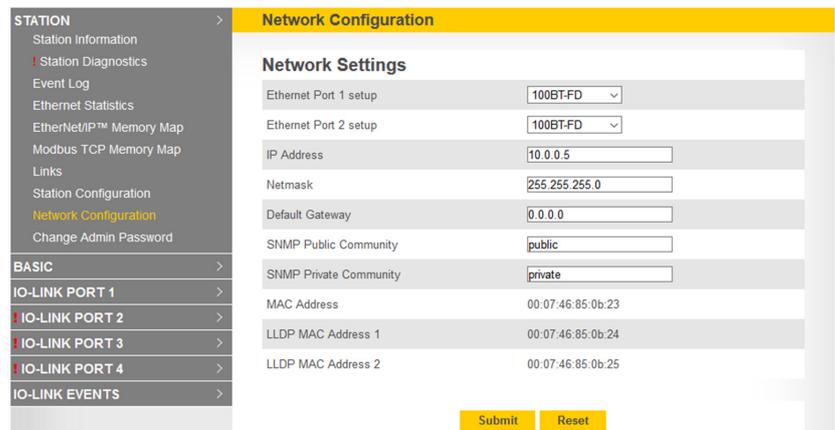


8.1.2.2 Setting the working IP address in the IO-Link master

- ▶ Contact your system administrator before changing the network configuration.
- ▶ Make sure that the robot has an IP address and that the robot and the IO-Link master are in the same network.

Configuration example for a standalone robot:

- ▶ Click *Network Configuration* in the *STATION* menu.
- ▶ Change the IP address of the IO-Link master to the IP address of the robot by entering the IP address of the robot in the *IP Address* field.
 - Recommended default value:
 - IP Address: 10.0.0.5
 - Netmask: 255.255.0.0
- ▶ Click the *Submit* button.
- ▶ Restart the IO-Link master.

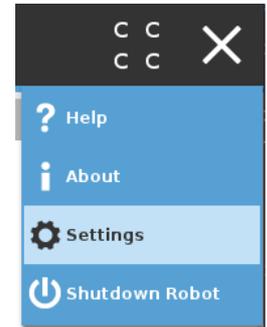


- ▶ Change the IP address of the PC to the IP address of the IO-Link master.
- ▶ Check the connection between the IO-Link master and PC, see section "Testing the connection between the IO-Link master and PC".

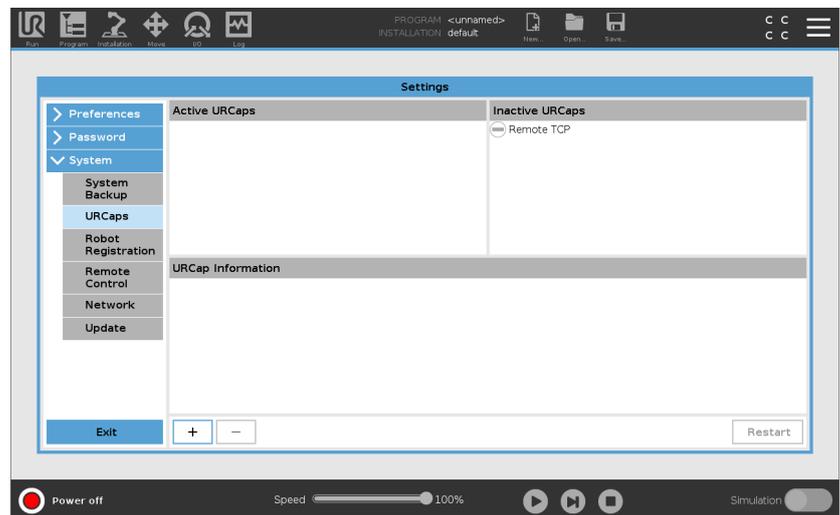
9 Installation URCaps

The URCaps are installed on the robot control panel to enable direct control of the grippers.

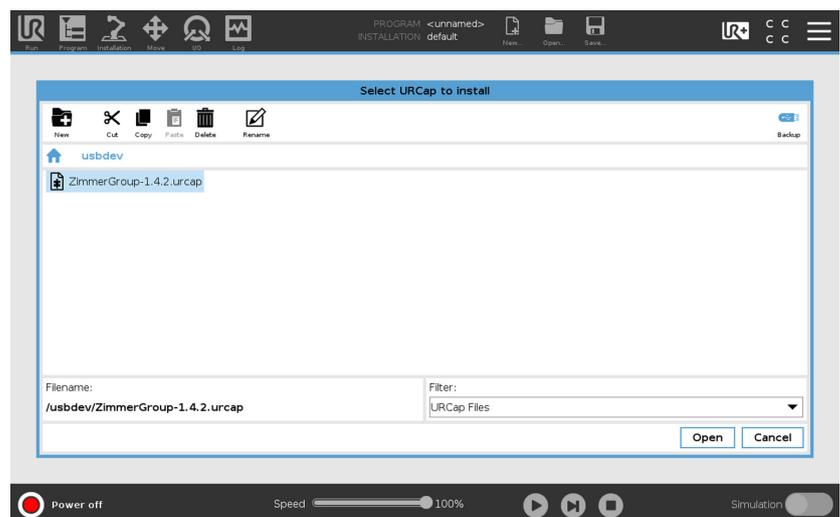
- ▶ Download the Comfort App from our website.
- ▶ Copy the installation file to a USB memory device.
- ▶ Make sure that the robot control panel is already connected to the robot control system.
- ▶ Switch off the voltage supply on the robot tool I/O via the emergency stop button.
- ▶ Plug the USB memory stick with the installation file into the robot control panel.
- ▶ Press the button in the header.
- ▶ Press *Settings*.



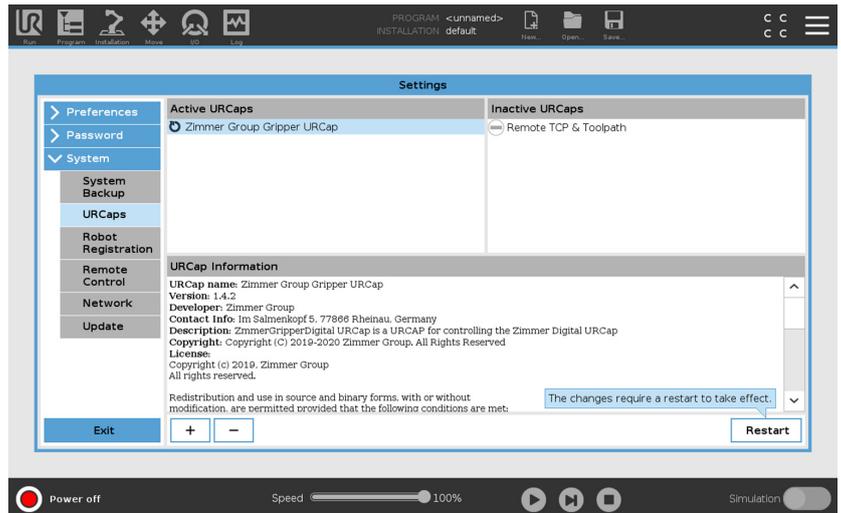
- ▶ In the menu, press *System*.
- ▶ In the *System* menu item, press *URCaps*.
- ▶ Press the + Button.



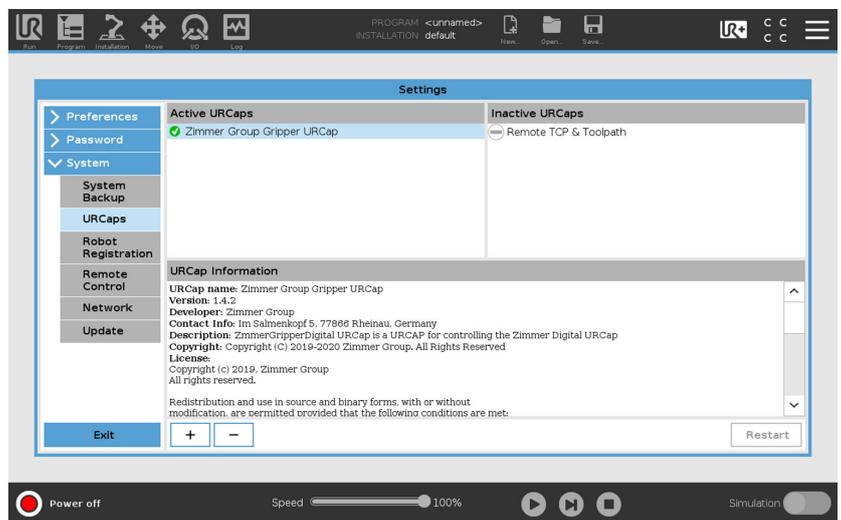
- ▶ Navigate to the installation file.
- ▶ Select the installation file.
- ▶ Press the *Open* button.



- ▶ Press the *Restart* button to activate the firmware.
- ⇒ The robot control panel performs a restart.



- ▶ After the restart, check whether the URCaps have been installed correctly.
- ⇒ The URCaps have been installed correctly if the green checkmark is displayed in the *Active URCaps* area.

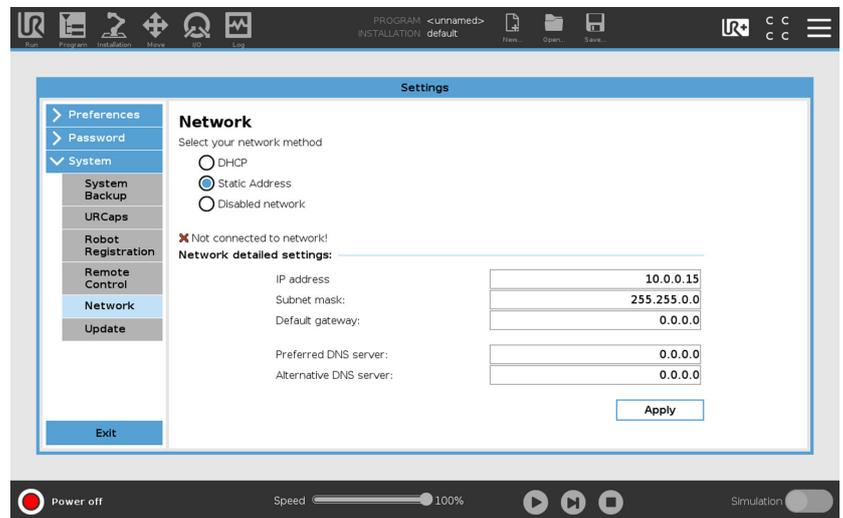


10 Commissioning

10.1 Setting up the network connection on the robot

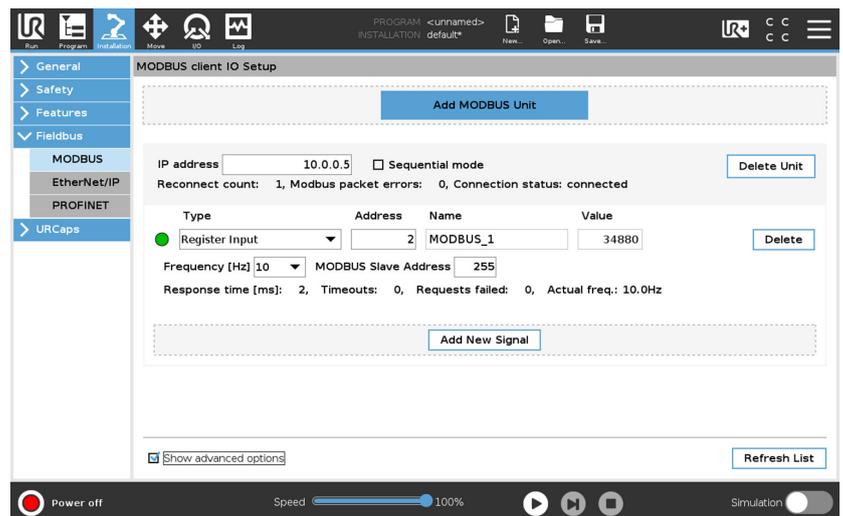
Once the IO-Link master has been successfully configured, you must set up the network connection on the robot.

- ▶ Press the button in the header.
- ▶ Press *Settings*.
- ▶ In the *System* menu item, press *Network*.
- ▶ Enable the *Static Address* radio button.
- ▶ Enter the IP address of the robot in the *IP address* field.
- ▶ Enter the desired subnet mask in the *Subnet Mask* field.
- ▶ Make sure that the robot and the IO-Link master are in the same network.
- ▶ Press the *Apply* button.



10.2 Checking the Modbus connection

- ▶ Press *Installation* in the menu bar.
- ▶ In the *Field Bus* menu, press *MODBUS*.
- ▶ Press the *Add MODBUS Unit* button.
- ⇒ A new MODBUS Unit has been created.
- ▶ Enter the IP address of the IO-Link master in the *IP address* field.
- ▶ Enable the *Show advanced options* checkbox.
- ▶ In the *Type* drop-down menu, select the *Register Input* option.
- ▶ Enter the value 2 in the *Address* field.
- ⇒ The Modbus connection exists if the value for *Reconnect count* is not 0 and *Connection status* is *connected*.
- ▶ Once the Modbus connection has been successfully tested, delete the MODBUS unit by pressing the *Delete* button.
- ▶ Make sure that the IO-Link master and the grippers are connected and switched on.



INFORMATION



- ▶ To reduce the communication traffic and increase the throughput rate on the Modbus, delete all unnecessary Modbus units and signals.

10.3 Setting up the gripper

- ▶ Install the gripper to the robot.
- ▶ Switch the robot on.

INFORMATION



The API LED display provides information on the status of the process.

Diagnostics serves as diagnostic feedback from the gripper.

- ▶ More information can be found in the installation and operating instructions of the gripper.

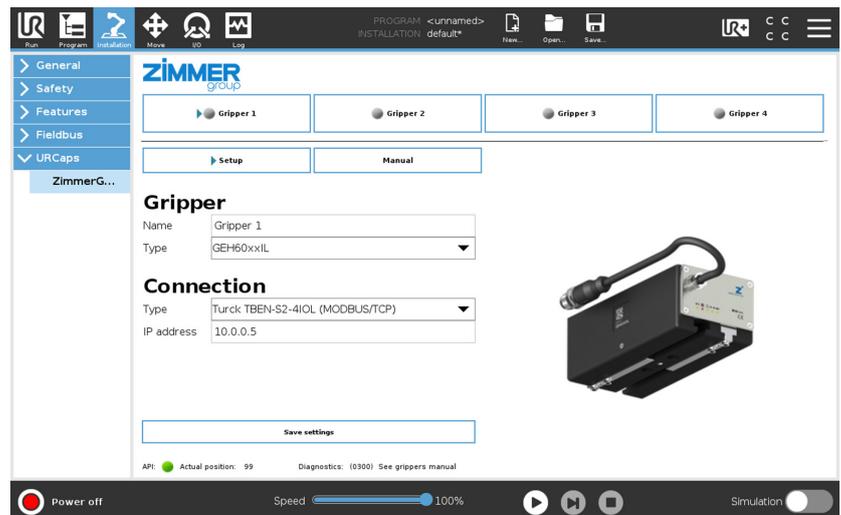
- ▶ Press *Installation* in the menu bar.
- ▶ In the *URCaps* menu, press *Zimmer*.

The order of the gripper buttons corresponds to the order of the IO-Link ports on the IO-Link master.

- ▶ Click the button of the desired gripper.
- ▶ Press the *Setup* button.

The name of the gripper is used for the program node in the robot's program sequence and for the button.

- ▶ In the *Gripper* area, enter the desired name for the gripper in the *Name* field.
- ▶ In the *Gripper* area, select the gripper type that is connected to the selected IO-Link port from the *Type* drop-down menu.
- ▶ In the *Connection* area, select the connection type that matches the IO-Link master from the *Type* drop-down menu.
- ▶ In the *Gripper* area, enter the IP address of the IO-Link master in the *IP address* field.
- ⇒ The LED display on the gripper lights up green when the connection has been established.
- ▶ Press the *Save settings* button.



10.4 Manual control

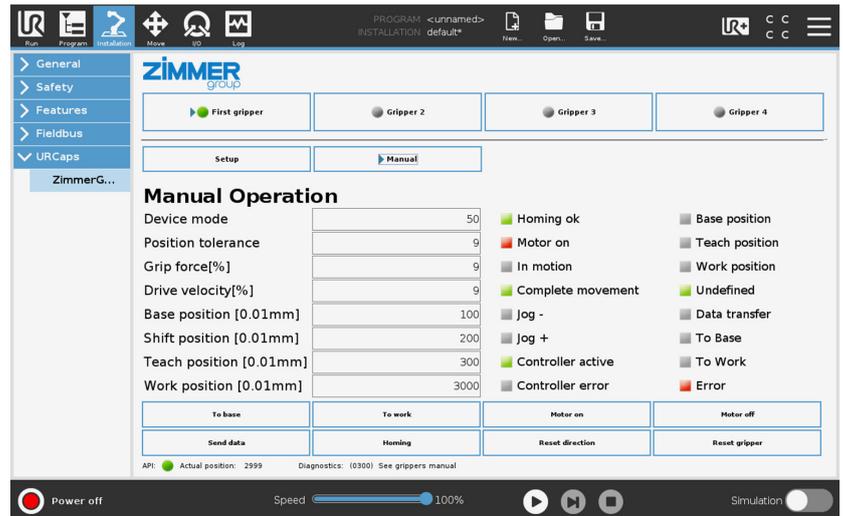
INFORMATION



- Observe the installation and operating instructions of the gripper.

You can test and operate the function of the gripper and view its status in the lower area of the screen.

- Press *Installation* in the menu bar.
- In the *URCaps* menu, press *Zimmer*.
- Click the button of the desired gripper.
- Select the *Manual* button.



The floppy disk symbol indicates parameters that have not been transferred.

- Press the desired commands and make the settings.



INFORMATION



- If you want to move the gripper in the same direction again, change the position parameters, press the *Send data* button and then the *Reset direction* button.

10.5 Commands

Commands are executed until they have been successfully executed or the timeout of approx. 20 seconds has been reached.

The number of available commands depends on the gripper.

► More information can be found in the installation and operating instructions of the gripper.

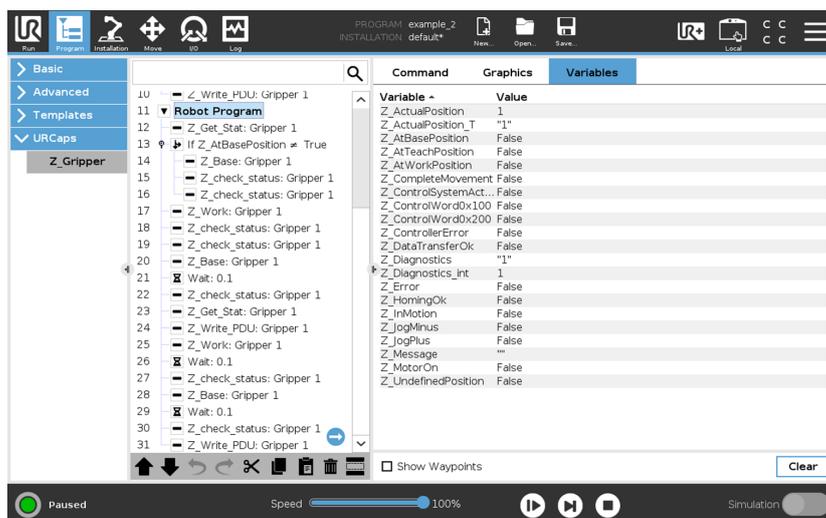
Command	Function
Z_Base	Moves jaws toward the BasePosition.
Z_Work	Moves jaws toward the WorkPosition.
Z_Write_PDU	Sends new process data (PDU) to the gripper and thus enables the parameters in the gripper to be changed.
Z_Motor_On	Switch on motor for <i>Advanced</i> grippers.
Z_Motor_Off	Switch off motor if gripper is present.
Z_Homing	<ul style="list-style-type: none"> A reference run is being performed.
Z_Reset_Direction	Resets the direction flag in the gripper. This allows the jaws to move in the same direction again.
Z_Get_Stat	The command updates the values of all variables once per call.
Z_Reset_Gripper	Reset if gripper is present.
Z_check_status	The command reads the value of the StatusWord in an endless loop. The values of the variables are updated in the process.

10.6 Variables

The variables are listed in the *Variables* tab.

The number of available commands depends on the gripper.

► More information can be found in the installation and operating instructions of the gripper.



INFORMATION



The *Z_Get_Status* and *Z_check_status* commands update the variables for the current gripper. In other words, if you use more than one gripper, the variables apply to the last gripper for which you update the status. The value of *Z_CommandFailFlag* is automatically set after each command listed in the table and reports the status of the last command executed.

-	Data type	Function	StatusWord
Z_ActualPosition	INTEGER	Jaw position in the range 0 - 9999: e.g. 149 = 1.49 mm	-
Z_AtBasePosition	BOOLEAN	= TRUE if the gripper is at BasePosition = FALSE if the gripper is not at BasePosition	Bit 8
Z_AtTeachPosition	BOOLEAN	= TRUE if the gripper is at TeachPosition = FALSE if the gripper is not at TeachPosition	Bit 9
Z_AtWorkPosition	BOOLEAN	= TRUE if the gripper is at WorkPosition = FALSE if the gripper is not at WorkPosition	Bit 10
Z_CommandFailFlag	BOOLEAN	Status of the last command executed = TRUE if the command fails = FALSE if the command was successful	-
Z_CompleteMovement	BOOLEAN	= TRUE if the movement has been completed = FALSE if the movement has not been completed	Bit 3
Z_ControlSystemActive	BOOLEAN	= TRUE if the gripper has started up after the cold start = FALSE if the gripper has not started up after the cold start	Bit 6
Z_ControlWord0x100	BOOLEAN	= TRUE, if the last move command in the direction of the BasePosition has taken place = FALSE, the last move command in the direction of the BasePosition has not taken place	Bit 13
Z_ControlWord0x200	BOOLEAN	= TRUE, if the last move command in the direction of the WorkPosition has taken place = FALSE, the last move command in the direction of the WorkPosition has not taken place	Bit 14
Z_ControllerError	BOOLEAN	= TRUE if there is an error in the control system = FALSE if there is no error in the control system	Bit 7
Z_DataTransferOk	BOOLEAN	= TRUE if data transmission via handshake was successful = FALSE if data transmission via handshake was not successful	Bit 11
Z_Diagnostics	INTEGER	The returned value in the range 0 - 65535 corresponds to the error code.	-
Z_Error	BOOLEAN	= TRUE if there is an error on the gripper = FALSE if there is no error on the gripper	Bit 15
Z_HomingOk	BOOLEAN	= TRUE if the referencing of the gripper is successful = FALSE if the referencing of the gripper is not successful	Bit 15
Z_InMotion	BOOLEAN	= TRUE if the jaws move = FALSE if the jaws do not move	Bit 2
Z_JogMinus	BOOLEAN	= TRUE if the jaws move towards the BasePosition in jog mode = FALSE if the jaws do not move towards the BasePosition in jog mode	Bit 4
Z_JogPlus	BOOLEAN	= TRUE if the jaws move towards the WorkPosition in jog mode = FALSE if the jaws do not move towards the WorkPosition in jog mode	Bit 5
Z_MotorOn	BOOLEAN	= TRUE if the motor for the gripper has been switched on = FALSE if the motor for the gripper has not been switched on	Bit 2
Z_UndefinedPosition	BOOLEAN	= TRUE if the gripper is not at the TeachPosition, WorkPosition and BasePosition = FALSE if the gripper is at the TeachPosition, WorkPosition or BasePosition	Bit 11
Z_Message	STRING	Feedback from the background service	-

10.7 Adding a node

INFORMATION



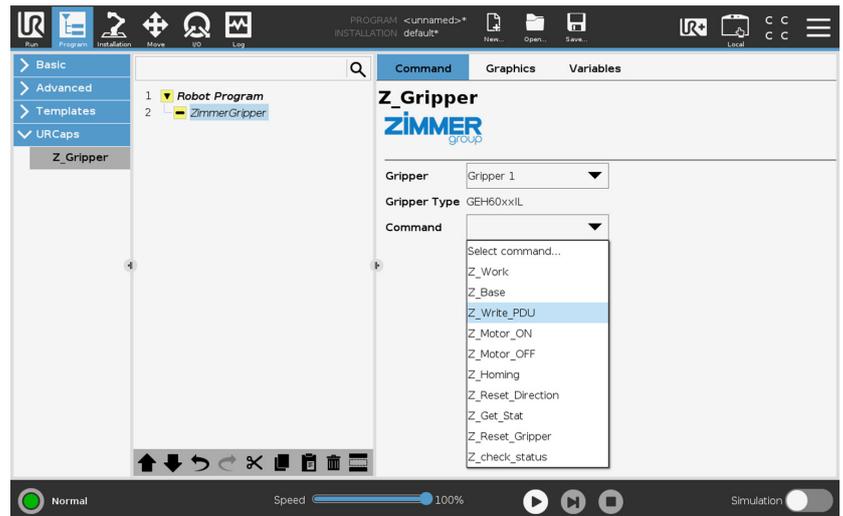
The selection of commands in the *Command* drop-down menu depends on the gripper.

INFORMATION



The yellow symbols in the robot program indicate nodes that still need to be configured.

- ▶ Press *Program* in the menu bar.
- ▶ In the *URCaps* menu, press *Z_Gripper*.
- ⇒ The node is displayed in the robot program.
- ▶ In the *Gripper* drop-down menu, select the desired gripper.
- ▶ In the *Command* drop-down menu, select the desired command.



INFORMATION



- ▶ For more information, refer to section “Commands”.

10.7.1 Z_Write_PDU

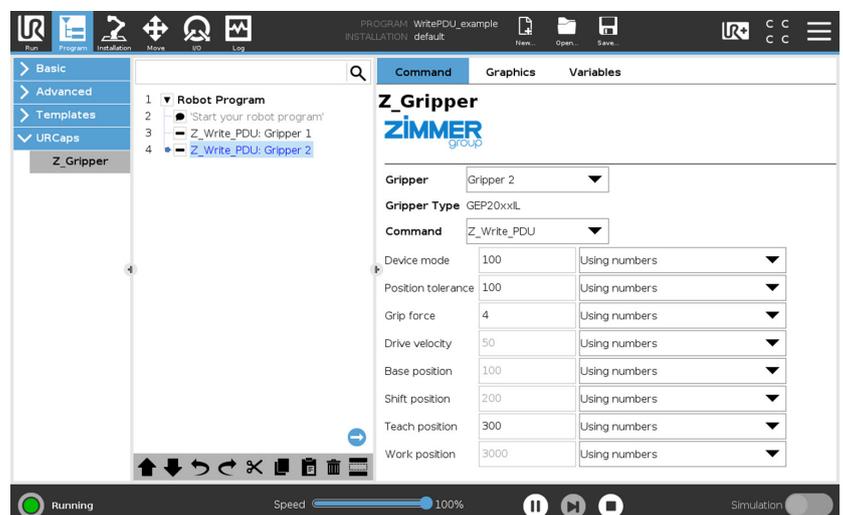
INFORMATION



- ▶ Observe the installation and operating instructions of the gripper.

The *Z_Write_PDU* command can be used to change the process data of the gripper within the robot program.

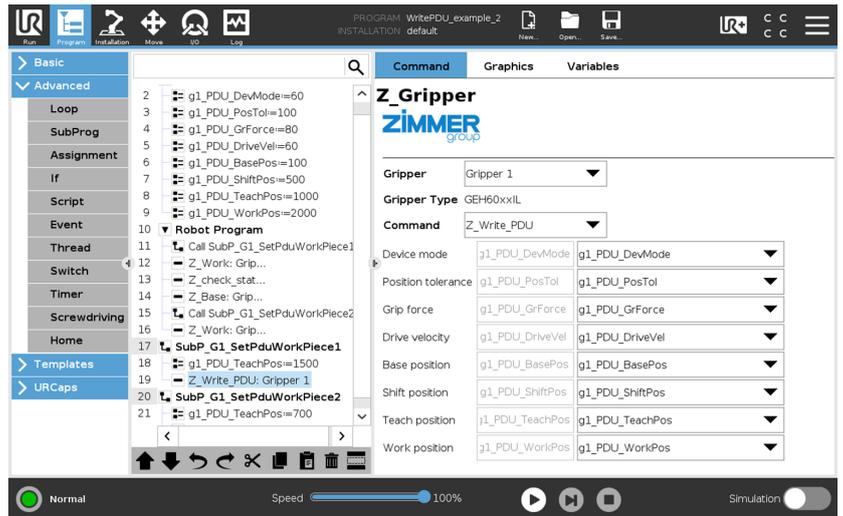
There is one process data set for *basic* grippers and one for *advanced* grippers.



For *Z_Write_PDU*, the variables can also be used and combined instead of numbers.

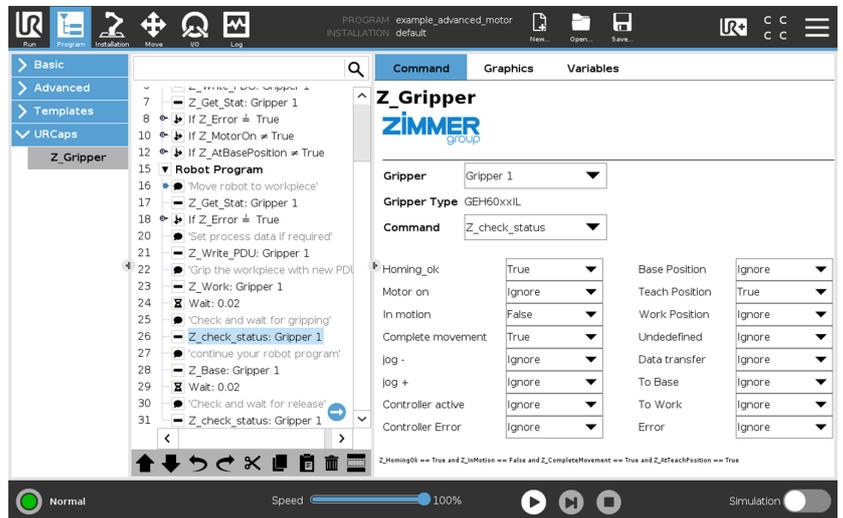
In the illustration, variables for the BeforeStart sequence are defined for the first gripper as an example. These variables are used in the subroutines *SubP_G1_SetPduWorkPiece1* and *SubP_G1_SetPduWorkPiece2*.

The size of the expected workpiece can be changed in the subroutines and sent to the first gripper. In this way, the variables and subroutines for the other grippers can be defined and the parameters changed.



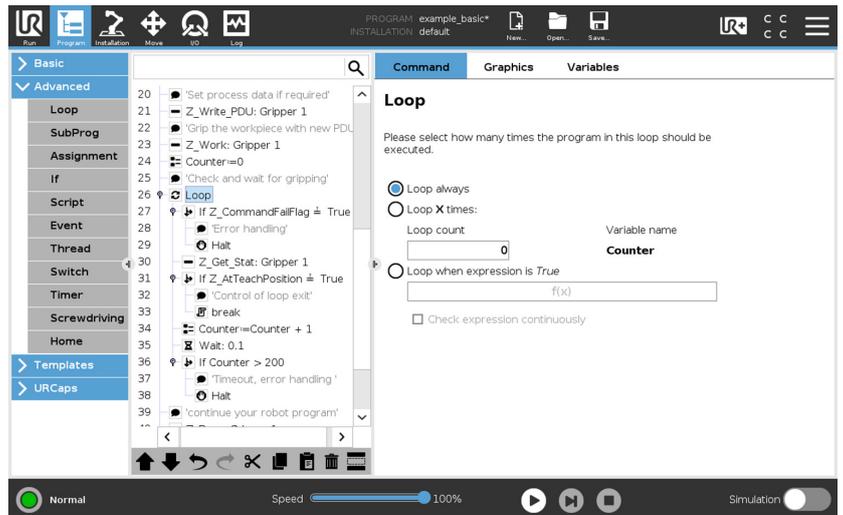
10.7.2 Z_check_status

In the illustration, the loop is active while the HomingPositionOK, TeachPosition and MovementComplete bits are not set and the InMotion bit in the StatusWord is deleted.



10.7.3 Z_Get_Stat

To call up several gripper statuses, the command can be called up in an infinite loop, for example, and check for a position flag in an If condition that controls the termination of the loop and has a defined waiting time.

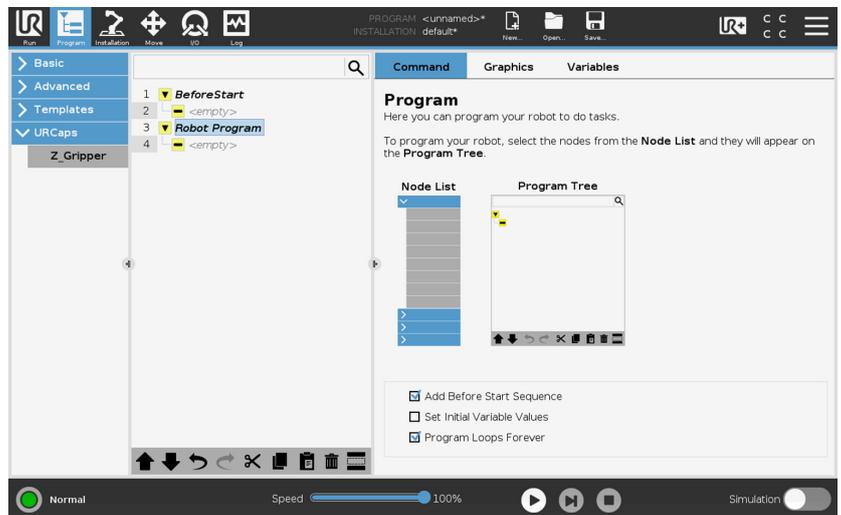


10.8 Start sequence

After switching on, the grippers run through the start sequence once before the main program loop is started.

10.8.1 Adding a BeforeStart sequence

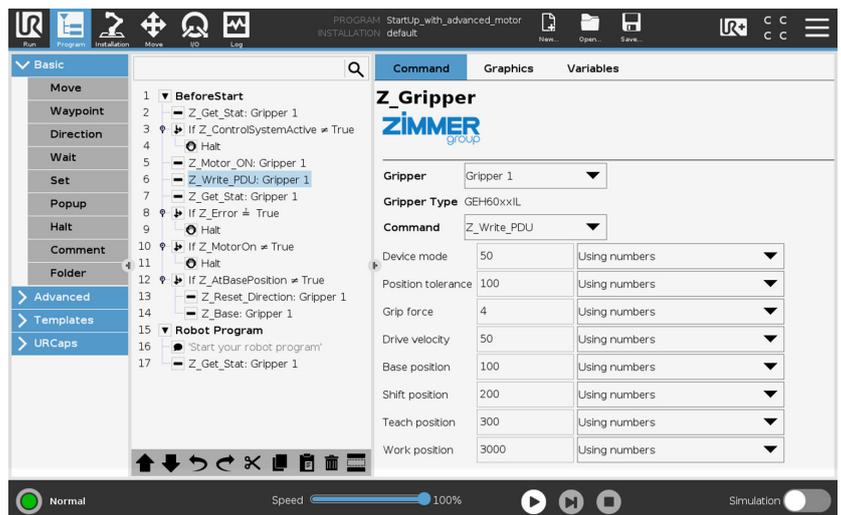
- ▶ Enable the *Add Before Start Sequence*-checkbox.
- ▶ Press *BeforeStart* in the program tree.
- ▶ Add the desired nodes to the *BeforeStart* sequence.



There is one *BeforeStart* sequence for *Basic* grippers and one for *Advanced* grippers.

With *Advanced* grippers, the motor must be started with the *Z_Motor_ON* command.

The figure shows an example of a *BeforeStart* sequence for *Advanced* grippers.



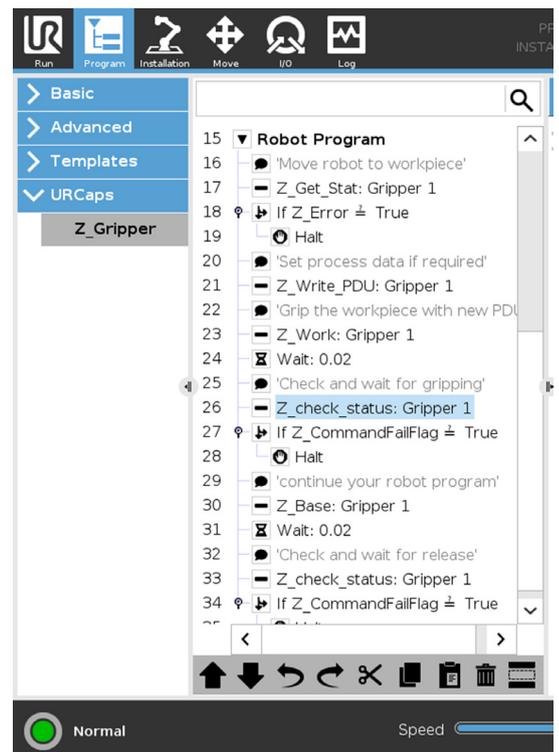
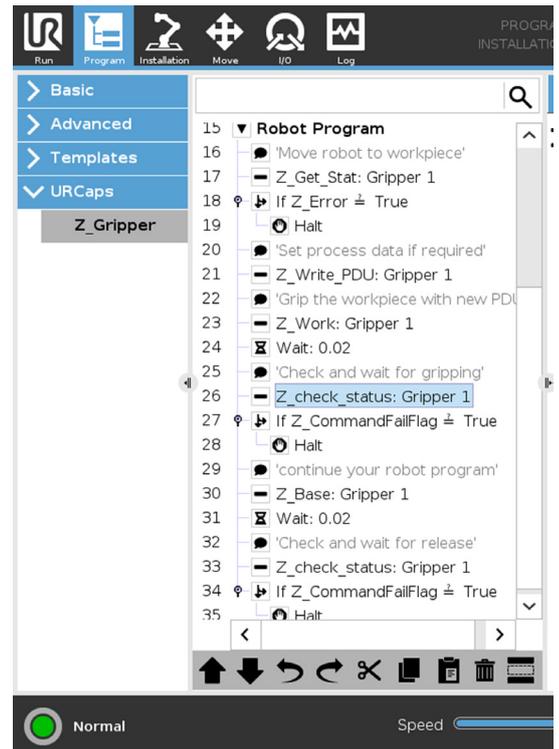
10.9 Example sequence for gripper jaw movement

Example of an *Advanced* gripper where the motor has already been started in the BeforeStart sequence:

- Line 17: Updates values of the variables
- Line 18: Checks for errors
- Line 19: Error handling
- Line 21: Loads new PDU data for the current workpiece
- Line 23: Jaws move towards the WorkPosition
- Line 24: Delay to check that jaw movement has started and the status bits are set
- Line 26: Checks in loop whether the jaws stop in the TeachPosition to ensure that the workpiece is gripped
- Line 27: Checks whether command error flag is set
- Line 28: Error handling
- Line 30: Jaws move towards the BasePosition
- Line 31: Delay to check that jaw movement has started and the status bits are set
- Line 33: Checks in loop whether the jaws stop in the BasePosition to ensure that the workpiece is released
- Line 34: Checks whether command error flag is set
- Line 35: Error handling

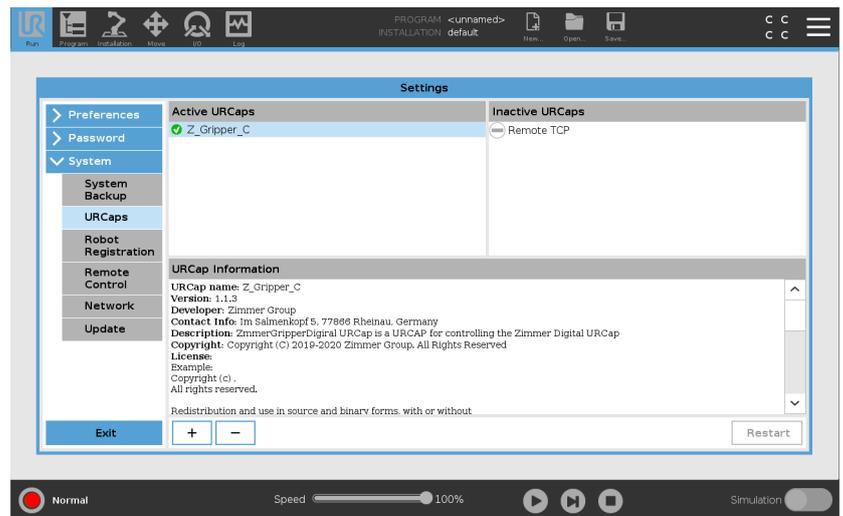
The example can also be used for *Basic* grippers.

The query `Z_check_status` must be adapted, for example, to check only the desired position flag.



11 Uninstall URCaps

- ▶ Press the button in the header.
- ▶ Press *Settings*.
- ▶ In the menu, press *System*.
- ▶ In the *System* menu item, press *URCaps*.
- ▶ In the *Active URCaps* area, press *Z_Gripper_C*.
- ▶ Press the - Button.
- ⇒ Uninstallation is complete.
- ▶ Press the *Restart* button to activate the firmware.
- ⇒ The robot control panel performs a restart.



12 Error diagnosis

INFORMATION



- ▶ More information can be found in the installation and operating instructions of the gripper.
- ▶ Please contact Customer Service if you have any questions.