



GRILINK PLUGIN FOR TM ROBOT

Version 4.0.0

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1 Introduction

GRIPLINK technology enables IO-Link-compatible automation components to be connected to robot systems from leading manufacturers via a network connection. The GRIPLINK plugin for TM ROBOT serves as the control-side interface and facilitates the seamless integration of the GRIPLINK technology from WEISS ROBOTICS into robot systems from TM ROBOT.



The term "GRIPLINK Controller" is used in this manual to refer to all products that have integrated GRIPLINK technology. These include both standalone GRIPLINK Controllers (e.g., GRIPLINK-ET4) as well as devices with embedded GRIPLINK functionality, such as WPG or INTRAPAL servo grippers from WEISS ROBOTICS. All of these products implement the same GRIPLINK protocol and can therefore be controlled in the same way via the plugin.



This manual describes the functions of the GRIPLINK plugin. For information on installation, commissioning, and operation of the GRIPLINK Controller, please refer to the Operating Manual for the respective module. These can be found online at www.griplink.de/manuals.

1.1 Notation and symbols

For clarity, the following symbols are used in this manual:



Function- or safety-related note. Failure to observe these instructions may endanger the safety of personnel and the system, damage the device, or impair the device's function.



Additional information to aid in understanding the described topic.



Reference to further information.

1.2 Intended use

The GRIPLINK plugin is intended for communication between the GRIPLINK Controller from WEISS ROBOTICS and a robot controller. It enables the integration and control of GRIPLINK-compatible devices via the standardized GRIPLINK communication interface. The requirements of the applicable guidelines as well as the installation and operating instructions in this manual must be observed and complied with. Any other or additional use is considered improper. The manufacturer is not liable for any resulting damage.

1.3 System requirements

The following TM ROBOT products are required for operation:

- TM ROBOT with TMflow version 2.24 or higher
- A GRIPLINK Controller or GRIPLINK-enabled device with GRIPLINK protocol version 3 or higher



Contact TM ROBOT or your TM ROBOT partner to purchase these products.



The IP address of the GRIPLINK Controller must be on the same subnet as that of the robot controller. The GRIPLINK Controller manual describes the exact procedure for changing the IP address.

1.4 License terms

The GRIPLINK plugin is protected by copyright. The applicable license terms are included with the software package. By installing the software, you accept these license terms.

2 Changes from Previous Versions

Version 4.0.0 changes the parameterisation, the command set and the behaviour in the event of an error. Existing projects are not fully backward compatible and have to be reviewed before they are used with this version.



It is recommended to perform a complete functional test of the application after migration.

2.1 Switch to floating-point parameters

The scaled integer parameters used previously have been replaced by floating-point values. Physical values are now given in their real unit: positions in mm, forces in N, speeds in mm/s and accelerations in mm/s².



Scaling factors such as 1000 must no longer be applied. A position that was passed as 45000 in a previous version is passed as 45 in version 4.0.0.

2.2 New components – FLEXGRIP and FLEXRELEASE

Two components have been added that grip and release with freely selectable motion parameters instead of a configured grip: FLEXGRIP takes position, force, speed and acceleration, FLEXRELEASE takes position, speed and acceleration.

2.3 GRIP and RELEASE – new parameter *var_DoBlock*

The motion components now take the parameter *var_DoBlock*. With 1 the component waits until the motion has finished, with 0 it returns as soon as the controller has accepted the command and takes the branch Started. This makes it possible to start a grip and continue the robot program while the gripping module is still moving.

2.4 CLAMP replaces HOLD

The component that controls the gripping force retention is now called CLAMP, following the name of the GRIPLINK command. Its parameter *var_Enable* is passed as 1 or 0.

2.5 Result branches instead of a status output

Every component ends in an exit gateway and reports its outcome through a named branch: OK and Error for the action components, Holding, NoPart, Released and Started for the motion components,

and Overflow for VALUE. The result is evaluated by connecting the branches in the flow, not by reading a status variable.

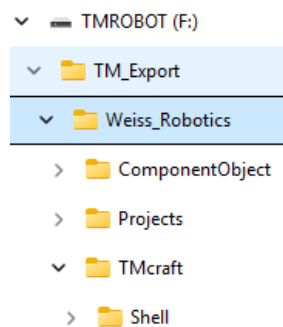


The status codes the GRIPLINK Controller returns on the Error branch are listed in the appendix.

3 Installation

3.1 Preparing the Flash drive

Since the directory structure of the USB Flash drive depends on the individual serial number of the robot, it makes sense to first export an existing project from the robot to the Flash drive. The required directory structure is created automatically. For more information on exporting projects, please refer to the documentation for the robot system. The Flash drive should now have the following directory hierarchy:



The ZIP archive of the GRIPLINK plugin already contains this folder hierarchy, ready for importing the components and the GRIPLINK Shell. Unzip the archive and copy the "Weiss_Robotics" folder into the "TM_Export" directory. Now remove the Flash drive and insert it into a free USB port on the robot system.

3.2 Software installation

To operate the GRIPLINK Controller, the GRIPLINK plugin provided by WEISS ROBOTICS is required on the robot controller. To install the plugin, perform the following steps:

1. Insert the Flash drive into the robot controller and import the plugin components into TMflow via ≡ -> "System" -> "Import/Export" -> "Import" -> "Component" -> Select all components -> "Import" at the bottom left.
2. After importing, enable the imported components in the component list under ≡ -> "Setting" -> "Configuration" -> "Component". The selection is saved automatically.
3. The components for using the GRIPLINK Controller in your project are now available.



For more information about the installation of components, please refer to the TMflow software installation manual.

3.3 Installing the GRIPLINK Shell

In addition to the components, the software package contains the GRIPLINK Shell, a TMcraft Shell that allows a connected gripping module to be operated directly from the robot pendant. Installing it is

optional; the components can be used without it. The plugin package already provides the shell in the ready-to-import folder hierarchy, so preparing the Flash drive as described above is all that is needed.

1. Insert the Flash drive into the robot controller and open $\equiv$ -> "System" -> "Import/Export" -> tab "Import".
2. Select "TMcraft" -> "Shell" in the list on the left.
3. Select the Flash drive under "Import from", for example "\\USB\\TMROBOT".
4. Open the directory "Weiss_Robotics" under "Select files" and select the file "GriplinkShell_<version>.zip". It then appears under "Selected files".
5. Press "Import" at the bottom right.

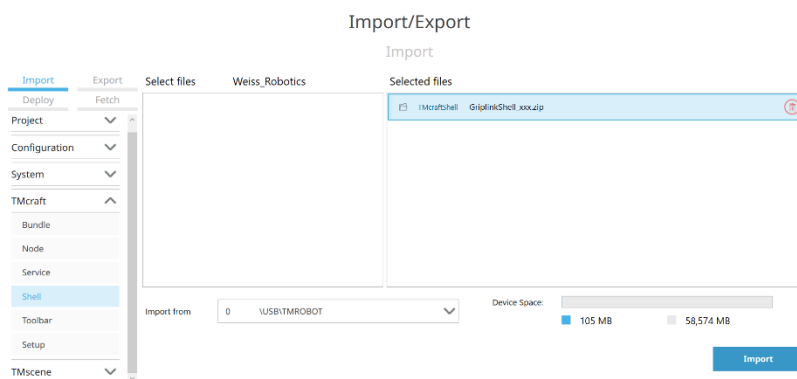


Figure 1: Importing the GRIPLINK Shell in TMflow

1. Activate the shell under $\equiv$ -> "Setting" -> "Configuration" -> "TMcraft Management" -> tab "Shell". Tick the checkbox next to "GriplinkShell" and press "Save".



The activated shell only takes effect after the robot controller has been restarted.



The GRIPLINK Shell communicates with the GRIPLINK Controller directly and independently of the robot program. It is intended for commissioning and diagnostics. While a TMflow project is using the device, the shell switches to monitoring only and sends no commands of its own.

After the shell has been activated it offers three tabs for the selected device. IGRIP executes a configured grip and shows its parameters.

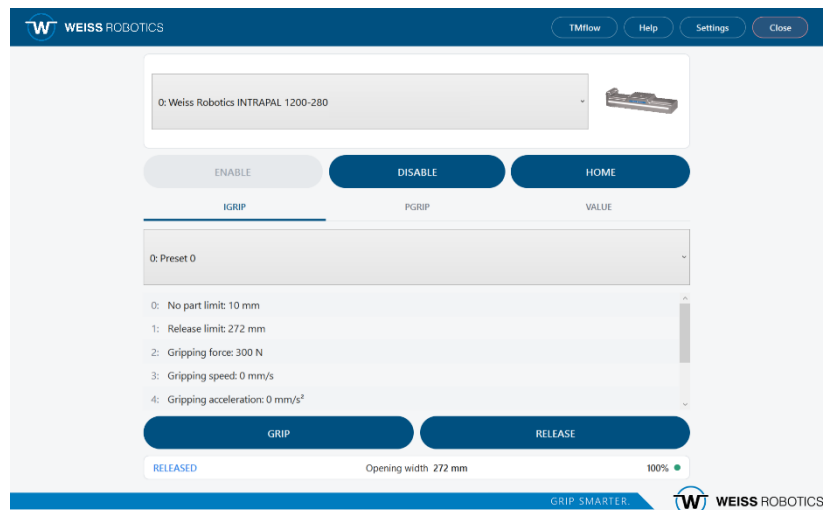


Figure 2: GRIPLINK Shell, IGRIP tab with the parameters of the selected grip

PGRIP grips and releases with freely adjustable position, force and speed.

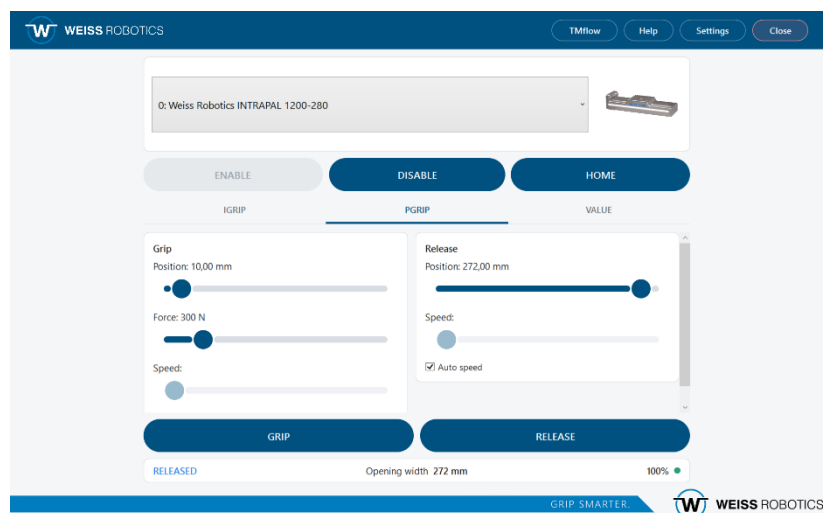


Figure 3: GRIPLINK Shell, PGRIP tab for gripping with free parameters

VALUE shows the measured values the connected device provides.

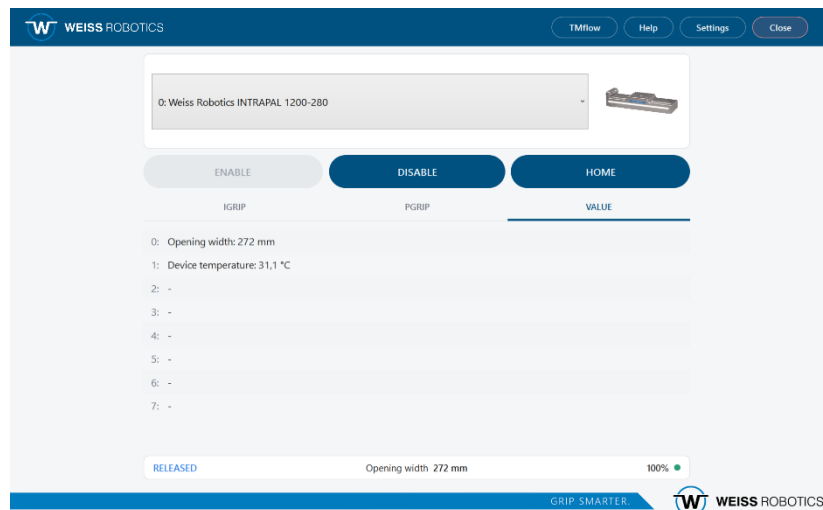


Figure 4: GRIPLINK Shell, VALUE tab with the measured values of the device

3.4 Working with the GRIPLINK Shell

Select the device at the top of the screen. The bar along the bottom shows its state and its main measured values. The address of the GRIPLINK Controller and the number of ports the shell offers are set in the shell itself, under "Settings".

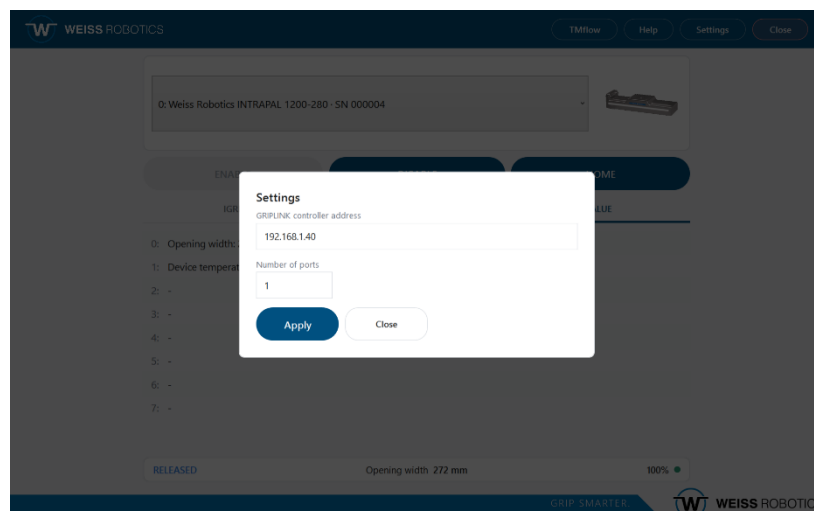


Figure 5: GRIPLINK Shell, "Settings" dialog with the controller address and the number of ports



Two of the states name what is missing rather than describing the connection. NO CONTROLLER means that nothing answers at the configured controller address; check the address under "Settings" and check the network cable. NO DEVICE means that the controller answers but the selected port is empty.

The command buttons are greyed out in four situations

- The robot is stopped or in error. Release the stop and reset the robot, and the screen unlocks by itself. In some cells the reset is a separate button, so releasing the stop alone is not always enough.
- A TMflow project is using the device. The shell still shows the live values but sends no commands. Manual control returns when the project ends; a paused project still holds the device.
- The device is not referenced or not enabled. Press HOME or ENABLE.
- A command is still running. Wait for it to finish.



Press "Help" or F1 on the shell screen for the same information directly at the robot.

Returning to TMflow and closing the shell

Press "TMflow" at the top right to bring TMflow back to the front. The shell keeps running behind it, so Play, Pause and Stop for the robot program are available again.

Press "Close" at the top right and confirm to leave the shell. Nothing on the device changes: it stays enabled and keeps holding whatever it is holding. The shell does not start again until TMflow has been restarted, so use "TMflow" rather than "Close" if you only want to return to the robot program.

3.5 Updating and removing the GRIPLINK Shell

A running shell keeps its program files locked. TMflow can therefore neither delete nor overwrite the shell while it is active; the deletion in "TMcraft Management" then ends with an error message. Always deactivate the shell first:

1. Deactivate the shell under $\equiv \rightarrow$ "Setting" $\rightarrow$ "Configuration" $\rightarrow$ "TMcraft Management" $\rightarrow$ tab "Shell": untick the checkbox next to "GriplinkShell" and press "Save".
2. Restart the robot controller. After the restart the shell is no longer started and its files are released.
3. Delete the shell in "TMcraft Management" $\rightarrow$ tab "Shell" using the trash bin icon next to "GriplinkShell".

To update the shell, remove the installed version as described and then import and activate the new version as described under Installing the GRIPLINK Shell.



Every shell version has its own file name ("GriplinkShell_<version>.zip"). A new version therefore does not overwrite the installed one but appears as an additional entry. Remove the old version to avoid confusion.

3.6 Network configuration

The connection between the GRIPLINK Controller and the robot controller is established via a TCP/IP network connection. The TM ROBOT controller box has three Ethernet connectors on its underside, Ethernet 0 to Ethernet 2, each of which can be configured. For this purpose, an IP address must be

assigned to the robot controller in the system settings. Please note that the IP address of the robot controller must be in the same subnet as the IP address of the GRIPLINK Controller.

The IP address of the GRIPLINK Controller is set to 192.168.1.40 by default and can be adjusted at any time via its web interface. To do this, connect the GRIPLINK Controller to a PC or laptop and open the web interface in the browser of your choice by entering the address <http://192.168.1.40>. You can access the IP settings via the "Config" button.

The command interface of the GRIPLINK accepts incoming connections on port 10001 (TCP).



For more information on the configurations of the GRIPLINK Controller, please refer to the associated user manual.

The IP address of the robot controller is set in TMflow under $\equiv$ -> "System" -> "Network". Select the connection to be used and enter the IP address. As long as "Get IP from DHCP" is selected, the address cannot be edited.



For more information on the robot controller configurations, please refer to the associated TMflow software installation manual.

3.7 Network device of a component

Each GRIPLINK component brings its own network device into the project. You can view and edit it under "Project function" -> "Network Device". The device is listed under the name of the component instance, for example Gripper_WeissRobotics_Griplink_V4_HOME1.ntd_Griplink. Select it and press the pencil icon to edit its settings.

The IP address is preset to the GRIPLINK factory default 192.168.1.40. Change it to the address of your GRIPLINK Controller if you have moved the controller off that default. The port is preset to 10001 and the time out to 60000 ms.

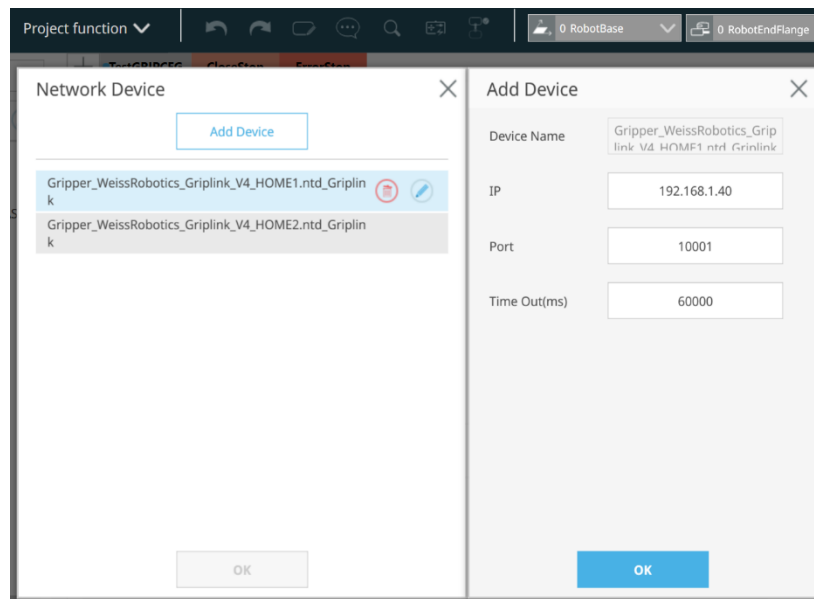


Figure 6: The network device of a component under "Project function" - "Network Device"



Each component sends its command to the address configured on its own network device. Do not change the port unless the GRIPLINK Controller was reconfigured. Increase the Time Out if a component has to wait longer than 60 seconds, for example WAITVAL with a large var_Timeout or a long gripping motion with var_DoBlock = 1.

3.8 Using several GRIPLINK Controllers

Since the network device belongs to the component and not to the project, one robot program can address several GRIPLINK Controllers at the same time, for example two INTRAPAL grippers or one WPG and one INTRAPAL gripper.

Each GRIPLINK Controller requires its own component:

1. Add the component to your project and set its network device to the IP address of the first GRIPLINK Controller.
2. Add the same component type to the project a second time. A new instance of the component is created.
3. Set the network device of the new instance to the IP address of the second GRIPLINK Controller.



Every instance keeps its own IP address and its own return variables, so the devices can be controlled independently of each other.

4 Command Reference

The GRIPLINK plugin provides the user with a collection of GRIPLINK-specific functions, hereinafter also referred to as "components".

The basic program flow with the components of the GRIPLINK plugin is always as follows:

1. For servo gripping modules without absolute encoder: Reference gripping module with HOME
2. Grip/release with GRIP or RELEASE

The available GRIPLINK-specific components are described below.



The components DEVSTATE, WSTR and VALUE return a value to the robot program. It is available as the project variable `var_DevState` or `var_Value` under "Manager" -> "Variables" and can be processed there like any other project variable. All other components report their result through their output branches.

The screenshot shows the 'Variable manager' dialog. On the left, under 'Project Variables', the 'Variable' option is selected. The main area shows a table with one entry:

Used	Type	Name	Value	Action
☒	int	Gripper_WeissRobotics_Griplink_V4_DEVSTATE 1.var_DevState	0	

At the bottom are 'Cancel' and 'OK' buttons.

Figure 7: The return value of DEVSTATE under "Manager" - "Project Variables"

The screenshot shows the 'Variable manager' dialog. On the left, under 'Project Variables', the 'Variable' option is selected. The main area shows a table with one entry:

Used	Type	Name	Value	Action
☒	float	Gripper_WeissRobotics_Griplink_V4_VALUE1.va r_Value	0	

At the bottom are 'Cancel' and 'OK' buttons.

Figure 8: The return value of VALUE under "Manager" - "Project Variables"

Component	Description
ENABLE	Enable Device
DISABLE	Disable Device
DEVSTATE	Query current Device Status
WSTR	Wait for a State Change and Return
DEVICEASSERT	Check Connected Device
HOME	Home Reference
GRIP	Grip Workpiece via Preset
RELEASE	Release Workpiece via Preset
FLEXGRIP	Grip Workpiece via Parameters
FLEXRELEASE	Release Workpiece via Parameters
CLAMP	Control Force Retention
VALUE	Query Device Value
SETVAL	Set Device Value
WAITVAL	Wait for a Device Value
GRIPCFG	Configuring a Grip Preset
LED	Controlling the Status LED

4.1 Enable Device – ENABLE

This command activates the device connected to the selected port. The component reports OK as soon as the GRIPLINK Controller has acknowledged the command.



IO-Link gripping modules move when they are activated: they switch to the RELEASED state and execute the release action of the currently selected grip preset. Make sure the fingers can open safely.



Behavior may vary depending on the connected device. Please refer to the instructions in the respective device driver manual!



Gripping modules from WEISS ROBOTICS are activated automatically when a HOME, GRIP or RELEASE command is executed. An explicit ENABLE is only required after the device was deactivated with DISABLE.

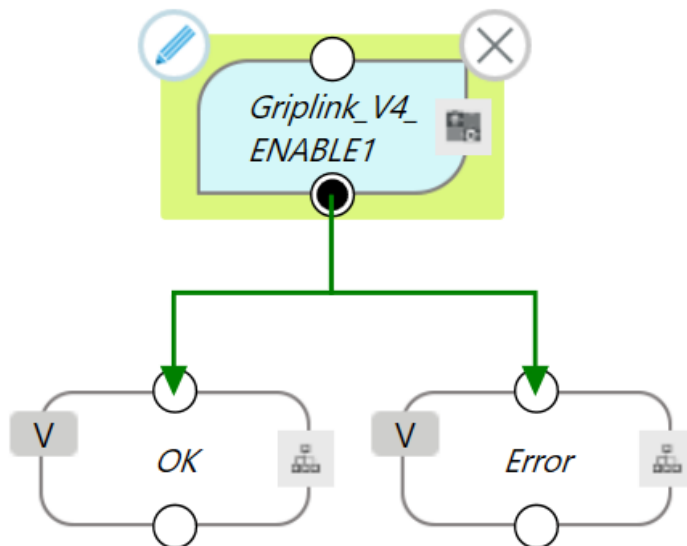


Use the WSTR component if the program has to wait until the device has actually reached its new state.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.2 Disable Device – DISABLE

This command disables the device connected to the selected port. The command can be used, for example, to release the fingers of a gripping module or to temporarily disable the laser beam of a distance sensor. The component reports OK as soon as the GRIPLINK Controller has acknowledged the command.



DISABLE can also be used to acknowledge device errors, for example, if the connected device is in the FAULT state.

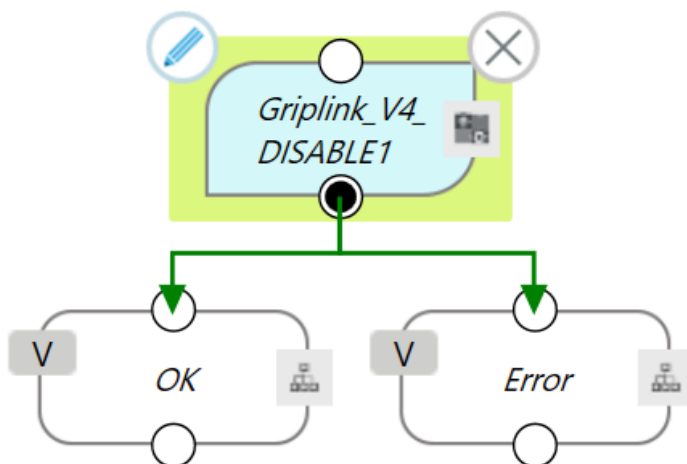


Use the WSTR component if the program has to wait until the device has actually reached the DISABLED state.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.3 Query current Device Status – DEVSTATE

This command returns the device status of the selected device. Every device always has exactly one state, and that state changes whenever an action finishes: a grip, a release, a reference run, an activation or a deactivation. Reading the state is therefore how the program finds out how a non-blocking command ended.

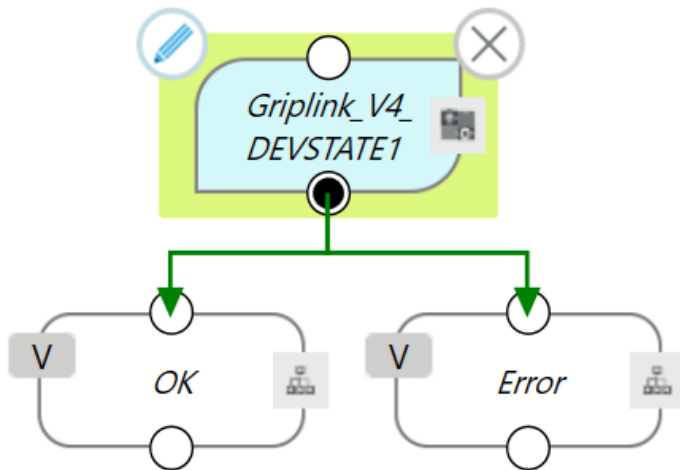


The possible device states are listed in the appendix.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Return values

var_DevState

Gripper_WeissRobotics_Griplink_V4_DEVSTATE_var_DevState Current device state as int (see the appendix Device state)

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.4 Wait for a State Change and Return – WSTR

The WSTR command waits for a change in the device state at the specified port and returns the new state. It can be used, for example, to check whether an asynchronously executed release motion (RELEASE with var_DoBlock = 0) has been completed: the robot program can start a grip or release, carry on with other work and wait here for the motion to finish.



The component waits for a state transition. If the device does not change its state, the GRIPLINK Controller answers with a timeout and the component takes the Error branch. Calling the component twice in a row returns the current device state immediately.

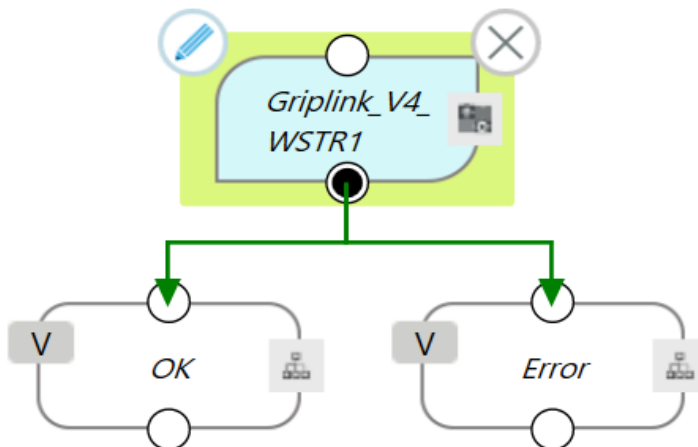


The possible device states are listed in the appendix.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Return values

var_DevState

Gripper_WeissRobotics_Griplink_V4_WSTR_var_DevState Current device state as int (see the appendix Device state)

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.5 Check Connected Device – DEVICEASSERT

This command checks whether the intended device is connected to the selected port, using its vendor and product ID. The component reports an error if a different device or no device is connected. Before a device is used in the program it is advisable to verify it this way.

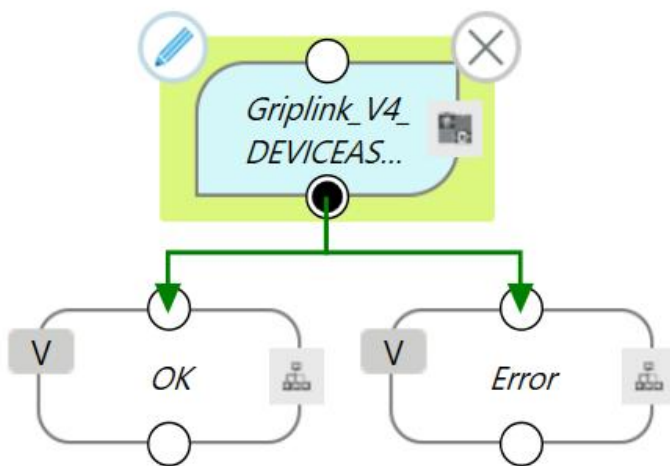


You can find the vendor and product IDs in the device description provided by the manufacturer or in the IODD.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_VendorID

Vendor ID of the expected device, as assigned to the manufacturer by the IO-Link Association

SetParams: var_ProductID

Product ID (device ID) the vendor has assigned to the expected device

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.6 Home Reference – HOME

Performs a homing cycle/reference drive on the selected gripping module. The component executes the device's built-in home-referencing function and waits until it is complete.



Behavior may vary depending on the connected device. Please refer to the instructions in the respective device driver manual!

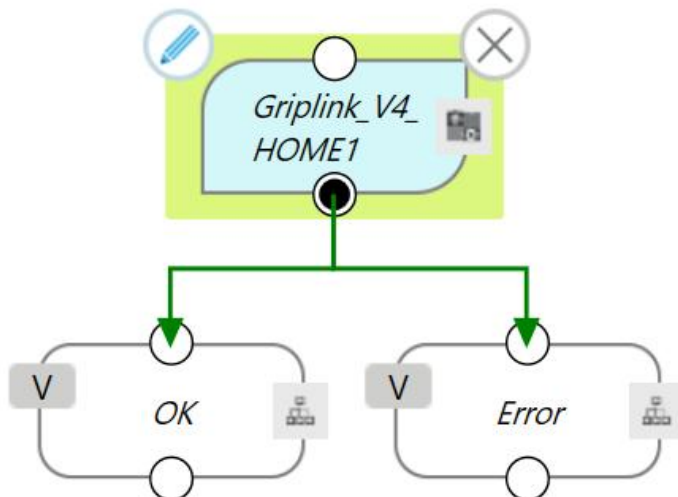


The reference run can be configured via the GRIPLINK Controller's web interface.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.7 Grip Workpiece via Preset – GRIP

The GRIP command performs a grip using the specified grip preset. A grip preset holds the motion and force parameters the module uses when it grips; it is configured in the web interface of the GRIPLINK Controller, or written while the program runs with GRIPCFG.

The parameter *var_DoBlock* decides when the component hands control back. With 1 it waits until the gripping process has finished and takes the Holding or the NoPart branch. With 0 it returns as soon as the controller has accepted the command and takes the Started branch, while the fingers are still moving.



The current state of the gripping module can be queried at any time using the DEVSTATE component. In non-blocking mode (*var_DoBlock* = 0), the WSTR component can also be used to wait for a state change to detect the end of the gripping process.

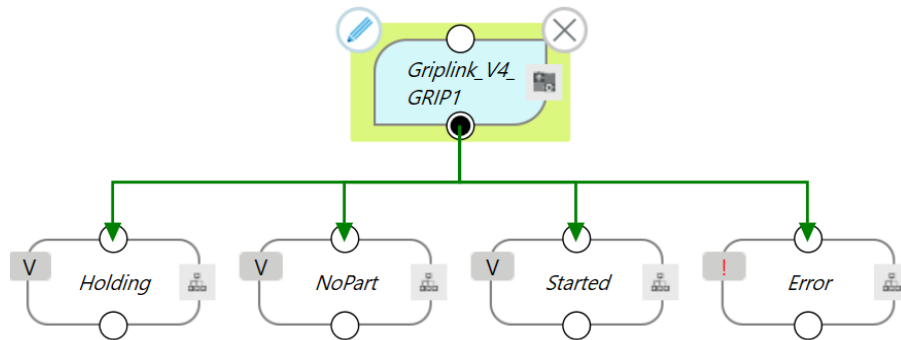


The gripping parameters can be configured via the GRIPLINK Controller's web interface.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_GripIndex

Selected grip preset. The number of available presets depends on the connected device.

SetParams: var_DoBlock

1 = wait until the motion has finished, 0 = return as soon as the command was accepted

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

Holding

The workpiece is held.

NoPart

No workpiece was found.

Started

The command was accepted and is running in the background (non-blocking call).

Error

The controller reported an error, or no valid response was received.

4.8 Release Workpiece via Preset – RELEASE

The RELEASE command releases a previously gripped workpiece using the parameters of the specified grip preset. The fingers open to the release limit stored in that preset.

The parameter *var_DoBlock* decides when the component hands control back. With 1 it waits until the release has finished and takes the Released branch. With 0 it returns as soon as the controller has accepted the command and takes the Started branch, while the fingers are still moving.



The current state of the gripping module can be queried at any time using the DEVSTATE component. In non-blocking mode (*var_DoBlock* = 0), the WSTR component can also be used to wait for a state change to detect the end of the release.

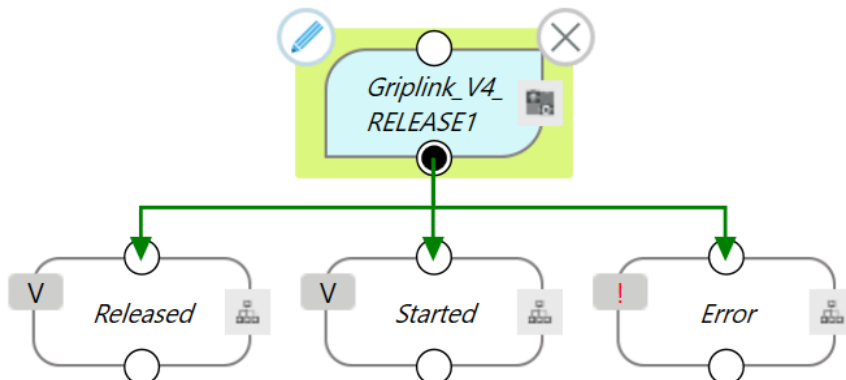


The gripping parameters can be configured via the GRIPLINK Controller's web interface.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_ReleaseIndex

Selected release preset. The number of available presets depends on the connected device.

SetParams: var_DoBlock

1 = wait until the motion has finished, 0 = return as soon as the command was accepted

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

Released

The workpiece has been released.

Started

The command was accepted and is running in the background (non-blocking call).

Error

The controller reported an error, or no valid response was received.

4.9 Grip Workpiece via Parameters – FLEXGRIP

The FLEXGRIP command performs a gripping operation with freely selectable motion parameters. Unlike the GRIP command, no predefined grip configuration (preset) is used here; instead, the motion sequence is determined entirely by the command parameters. This allows the user to specify individual target positions, forces, speeds, and accelerations without having to rely on a saved grip preset.

As with GRIP, *var_DoBlock* decides when the component hands control back: with 1 it waits for the end of the gripping process and takes the Holding or the NoPart branch, with 0 it returns immediately and takes the Started branch.

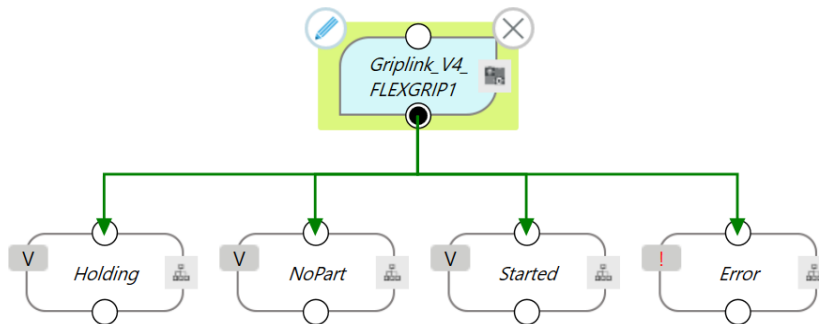


Flexible gripping is not available with all gripping modules.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Position

Target position in mm. For FLEXGRIP this is the no-part limit, for FLEXRELEASE the release limit.

SetParams: var_Force

Gripping force in N

SetParams: var_Speed

Speed in mm/s. Set to 0 to use the device default.

SetParams: var_Accel

Acceleration in mm/s². Set to 0 to use the device default.

SetParams: var_DoBlock

1 = wait until the motion has finished, 0 = return as soon as the command was accepted

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

Holding

The workpiece is held.

NoPart

No workpiece was found.

Started

The command was accepted and is running in the background (non-blocking call).

Error

The controller reported an error, or no valid response was received.

4.10 Release Workpiece via Parameters – FLEXRELEASE

The FLEXRELEASE command releases a previously gripped workpiece using freely selectable motion parameters. It can be used both for simple release and for targeted pre-positioning of a servo gripper. The fingers open to the specified target position, which corresponds to the release limit.

As with RELEASE, *var_DoBlock* decides when the component hands control back: with 1 it waits until the fingers have reached the target position and takes the Released branch, with 0 it returns immediately and takes the Started branch.

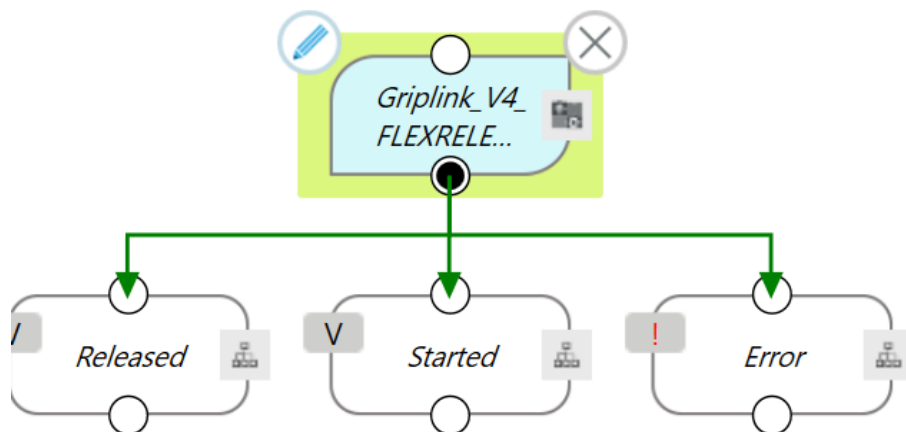


Flexible releasing is not available with all gripping modules.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Position

Target position in mm. For FLEXGRIP this is the no-part limit, for FLEXRELEASE the release limit.

SetParams: var_Speed

Speed in mm/s. Set to 0 to use the device default.

SetParams: var_Accel

Acceleration in mm/s². Set to 0 to use the device default.

SetParams: var_DoBlock

1 = wait until the motion has finished, 0 = return as soon as the command was accepted

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

Released

The workpiece has been released.

Started

The command was accepted and is running in the background (non-blocking call).

Error

The controller reported an error, or no valid response was received.

4.11 Control Force Retention – CLAMP

With the CLAMP command, gripping modules with integrated gripping force retention can de-energize the drive in the HOLDING state to reduce the gripping module's power consumption. The workpiece continues to be held securely, and the module no longer heats up while it holds.

With *var_Enable* set to 1 the drive switches off in the HOLDING state. With 0 the gripping force control remains active in the HOLDING state and the module continuously adjusts the gripping force.



Because the retention is mechanical, the workpiece stays held even if the power supply to the gripping module is interrupted. Thanks to the integrated absolute encoder, production can resume after the supply is restored without referencing again.

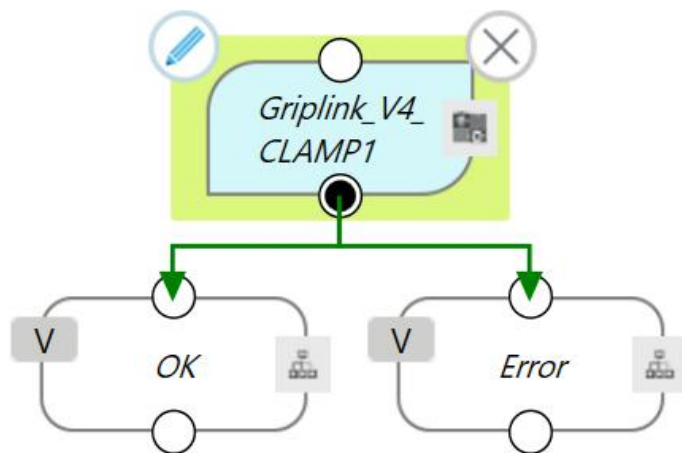


The CLAMP command is not available on all gripping modules. On gripping modules from WEISS ROBOTICS it can only be controlled manually while the device is deactivated; while the device is active, it is controlled automatically by the device.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Enable

Force retention: 1 = on, 0 = off

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.12 Query Device Value – VALUE

The VALUE component reads an indexed device value from the connected device. Depending on the device, one or more measured values are available, which are selected by the value index.



The valid value range for the value index is device-specific and can be found in the driver or device documentation for the respective device.

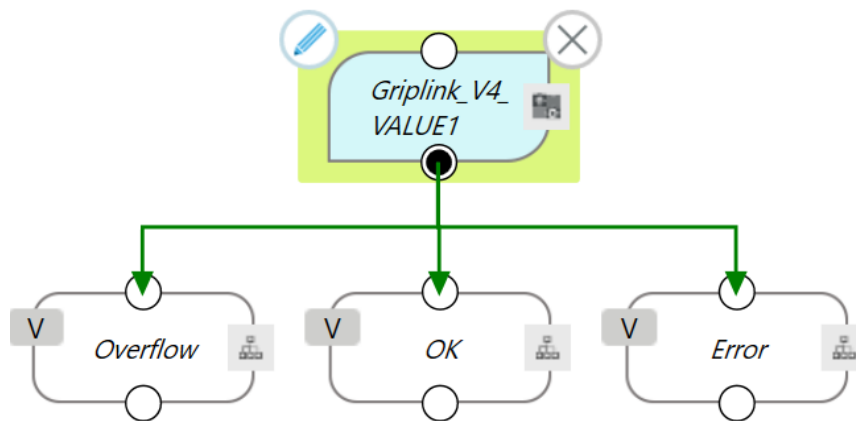


For gripping modules, index 0 corresponds to the finger position in millimetres.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Index

Value index (0 to n-1). The number of available values depends on the connected device.

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Return values

var_Value

Gripper_WeissRobotics_Griplink_V4_VALUE_var_Value Measured value as float

Result*OK*

The command was executed successfully.

Overflow

The sensor value is outside the measuring range and the controller answered INF instead of a number. The return value is not valid on this branch and reads 0.

Error

The controller reported an error, or no valid response was received.

4.13 Set Device Value – SETVAL

This command can be used to set a device-specific value. The value can be selected via an index, which has a valid value range that depends on the device. The value to be written can have different meanings depending on the connected device. The available value indices are the same ones the VALUE component reads, so the current value can be queried with VALUE before it is changed.



Risk of injury: the SETVAL component may cause sudden movement on actuators.

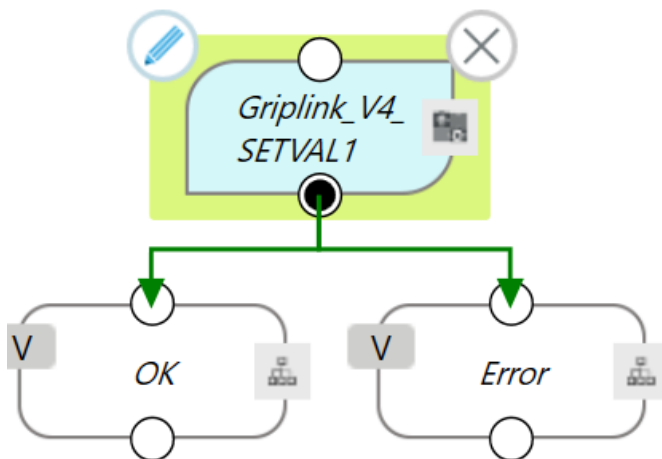


Refer to the driver manual for the respective device for the value ranges of the value index and the value to be written.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_ValueIndex

Value index (0 to n-1). These are the same values the VALUE component reads.

SetParams: var_Value

Value to be set, in the unit of the selected value index

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.14 Wait for a Device Value – WAITVAL

The WAITVAL command waits until a specific device value reaches the previously set target value or falls within a defined tolerance range. It can be used, for example, to check whether a sensor or position value has reached a target range before the program continues, typically after setting a value with SETVAL. The component waits until either the monitored value is within the specified tolerance window, or var_Timeout has elapsed; in that case it reports a timeout and takes the Error branch.

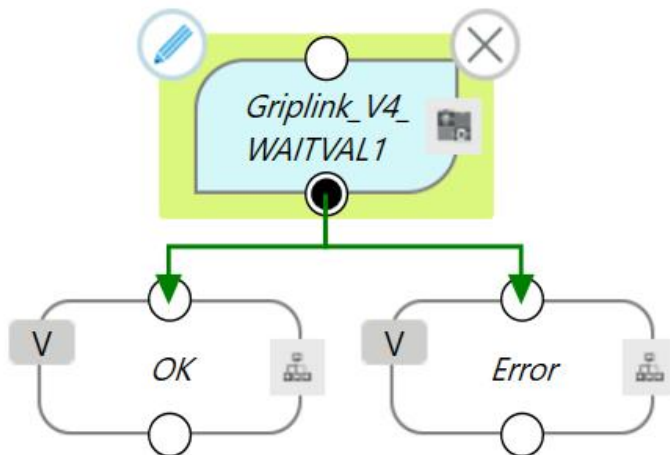


var_Timeout is the time the GRIPLINK Controller waits. The robot controller waits for the answer only as long as the Time Out of the component's network device allows, which is preset to 60000 ms. If you need to wait longer than 60 seconds, increase the Time Out of this component's network device under "Project function" -> "Network Device" to a value above var_Timeout. Otherwise the robot controller stops waiting before the GRIPLINK Controller answers and the component takes the Error branch although the command is still running.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Index

Value index (0 to n-1). The number of available values depends on the connected device.

SetParams: var_Threshold

Target value the device value is compared against

SetParams: var_WindowSize

Size of the window around the threshold to wait for

SetParams: var_Timeout

Timeout in ms

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.15 Configuring a Grip Preset – GRIPCFG

The GRIPCFG command is used to adjust the parameters of a grip preset. A grip preset defines the motion and force parameters that a gripping module uses when executing a GRIP or RELEASE command. A recipe consists of a name and eight parameters whose meaning depends on the connected device, so grip parameters can be adapted while the program is running, for example to handle several workpiece types with one gripping module.

Meaning of the parameters

The following table lists what the eight parameters mean for the WEISS ROBOTICS device families. Parameters marked with a dash are not used by that family and should be passed as 0.

Parameter	IO-Link gripping modules	WPG and INTRAPAL series
var_Param0	No Part Limit (mm)	No Part Limit (mm)
var_Param1	Release Limit (mm)	Release Limit (mm)
var_Param2	Force Factor (%)	Force Factor (%)
var_Param3	-	Grip Velocity (mm/s)
var_Param4	-	Grip Acceleration (mm/s ²)
var_Param5	-	Release Velocity (mm/s)
var_Param6	-	Release Acceleration (mm/s ²)
var_Param7	-	-



For a generic vacuum picker the first three parameters are Part Present Setpoint (kPa), Energy Saving Setpoint (kPa) and Blow-off Duration (ms). For any other device the parameters have no predefined meaning and are passed through to the device unchanged.



The name of the grip recipe must not contain an apostrophe, a quotation mark or a backslash, as these break the syntax of the command.

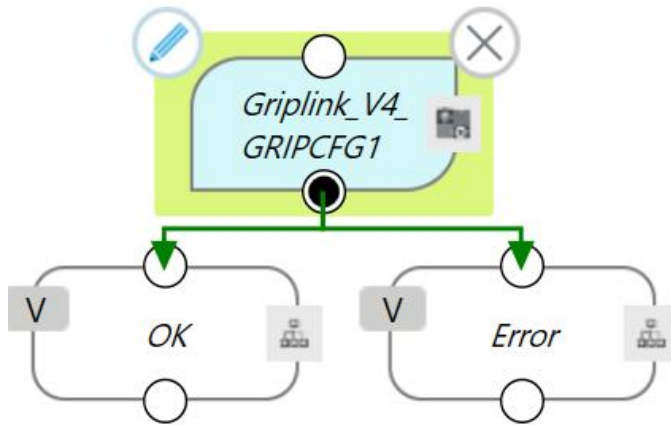


The parameters currently stored in a grip preset can be read on the IGRIP tab of the GRIPLINK Shell and in the web interface of the GRIPLINK Controller. The meaning and permissible value ranges of these parameters are device-specific and must be obtained from the respective device or driver documentation.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_GripIndex

Selected grip preset. The number of available presets depends on the connected device.

SetParams: var_Tag

Name of the grip recipe (max. 32 characters)

SetParams: var_Param0

No Part Limit in mm (WEISS ROBOTICS gripping modules)

SetParams: var_Param1

Release Limit in mm (WEISS ROBOTICS gripping modules)

SetParams: var_Param2

Force Factor in per cent (WEISS ROBOTICS gripping modules)

SetParams: var_Param3

Grip Velocity in mm/s (WPG and INTRAPAL series), otherwise unused

SetParams: var_Param4

Grip Acceleration in mm/s² (WPG and INTRAPAL series), otherwise unused

SetParams: var_Param5

Release Velocity in mm/s (WPG and INTRAPAL series), otherwise unused

SetParams: var_Param6

Release Acceleration in mm/s² (WPG and INTRAPAL series), otherwise unused

SetParams: var_Param7

Not used by the WEISS ROBOTICS device families

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

4.16 Controlling the Status LED – LED

This command activates a predefined LED preset for the status LED of a connected device, and thereby changes the colour and pattern of its status LED. This allows the operating status or progress of a process to be visually indicated directly on the end effector.



The LED command is not supported by all devices. How many LED presets a device provides is device specific.

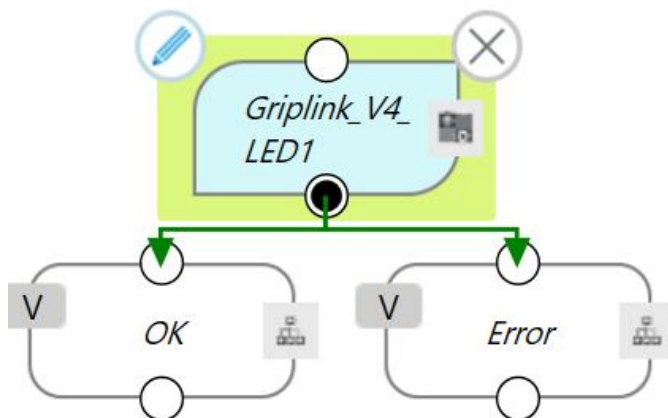


LED presets can be configured via the GRIPLINK Controller's web interface.

Symbol



Component



Parameter

SetParams: var_PortNo

Port number of the device. The number of available ports depends on the hardware: 0 to 3 on the GRIPLINK-ET4, 0 on the WPG series, 0 to 2 on the INTRAPAL series. If the controller is the master of a GRIPLINK network, ports 4 to 31 address the devices on its slave controllers.

SetParams: var_Index

Index of the visualization stored on the device

Network device

GRIPLINK controller at IP address 192.168.1.40, port 10001, time out 60000 ms. Do not change the port and the time out as long as this is not required.

Result

OK

The command was executed successfully.

Error

The controller reported an error, or no valid response was received.

5 Troubleshooting

This chapter lists the problems that occur most often when the GRIPLINK plugin is put into operation, together with their possible causes and how to resolve them.

5.1 The component takes the Error branch

The GRIPLINK Controller rejected the command and answered with an ERR response, or no valid response was received.

Possible causes

- The command is not permitted in the current device state, for example gripping with a gripping module that has not been referenced.
- GRIP or FLEXGRIP was executed on a gripping module that is already in the state HOLDING or NO PART. Both commands report a state conflict (status code 19) in this case.
- A parameter is invalid or outside the permissible range of the connected device.
- The selected device port is not occupied.

Resolution

- Check the device state with DEVSTATE and reference the gripping module with HOME if necessary.
- Release the workpiece with RELEASE or FLEXRELEASE before gripping again.
- Check the parameters against the permissible values of the connected device.
- Check that the device is connected to the configured port and ready for operation.



The status codes returned by the GRIPLINK Controller are listed in the appendix.

5.2 The component stops for 60 seconds and then reports an error

No connection to the GRIPLINK Controller could be established within the timeout of the network device.

Possible causes

- The GRIPLINK Controller is not reachable at the configured IP address.
- The IP address or the port of the network device is configured incorrectly.
- The robot controller and the GRIPLINK Controller are not in the same subnet.
- The GRIPLINK Controller is not supplied with power.

Resolution

- Check the IP address and the port of the network device of the component.
- Check the Ethernet connection and the network settings of the robot controller.
- Open the web interface of the GRIPLINK Controller in a browser to verify that it is reachable.

5.3 The connection is interrupted during operation

A connection to the GRIPLINK Controller had been established, but was lost while the program was running.

Possible causes

- The network cable was disconnected or is damaged.
- A connector is loose or not properly seated.
- The power supply of the GRIPLINK Controller was interrupted or is unstable.

Resolution

- Check the Ethernet cable and the connectors for a secure fit and for damage.
- Make sure the GRIPLINK Controller is supplied with power continuously.
- Restart the robot program after the cause has been removed.

Appendix A Device state

The device state is returned by the DEVSTATE component and is also used by the components that wait for a state change.

Device state	Code	Description
NOT CONNECTED	0	No device connected
NOT INITIALIZED	1	Device is not initialized
DISABLED	2	Idle state
RELEASED	3	Part released
NO PART	4	No part found
HOLDING	5	Holding a part
ENABLED	6	Enabled state
FAULT	7	Fault state

Appendix B Status codes

If an error occurs while a GRIPLINK command is executed, the GRIPLINK Controller answers with an ERR response containing one of the status codes below. The components report this through their Error branch.

Status code	Identifier	Description
0	E_SUCCESS	No error. Command successfully executed.
1	E_OVERRUN	Data overrun
2	E_RANGE_ERROR	Value out of range
3	E_NOT_AVAILABLE	Function or data not available
4	E_NOT_INITIALIZED	Device not initialized
5	E_TIMEOUT	Timeout
6	E_INSUFFICIENT_RESOURCES	Not enough memory available
7	E_CHECKSUM_ERROR	Checksum error
8	E_ACCESS_DENIED	Access denied
9	E_INVALID_HANDLE	Invalid handle
10	E_INVALID_PARAMETER	Invalid parameter
11	E_INDEX_OUT_OF_BOUNDS	Index out of bounds
12	E_IO_ERROR	Generic I/O error
13	E_READ_ERROR	Read error
14	E_WRITE_ERROR	Write error
15	E_NOT_FOUND	Resource not found
16	E_NOT_OPEN	File or device not open
17	E_EXISTS	Resource already exists
18	E_NO_COMM	Connection error
19	E_STATE_CONFLICT	Invalid state
20	E_NOT_SUPPORTED	Command or function not supported
21	E_INCONSISTENT_DATA	Data inconsistent
22	E_CMD_SYNTAX	Syntax error

Status code	Identifier	Description
23	E_CMD_UNKNOWN	Unknown command
24	E_CMD_ABORTED	Command aborted
25	E_CMD_FAILED	Command failed
26	E_AXIS_BLOCKED	Axis is blocked
27	E_PENDING	Action pending / not yet finished

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