WEISS ROBOTICS

GRIPLINK-PLUGIN FOR FANUC

Version 2.1.1

Content

1 Introduction

With GRIPLINK technology, IO-Link compatible automation components can be connected to robot systems from leading manufacturers via a network connection. The GRIPLINK plug-in for FANUC is the control-side link and enables the simple integration of GRIPLINK technology from WEISS ROBOTICS into robot systems from the manufacturer FANUC.

These instructions describe the functions of the GRIPLINK plug-in. For information on mounting, commissioning, and operation of the GRIPLINK controller, refer to the operating instructions of the respective module. These can be found online at **www.griplink.de**

1.1 Notation and symbols

For a better overview, the following symbols are used in these instructions:

Function or safety-relevant note. Non-observance may endanger the safety of personnel and plant, damage the device or impair the function of the device.

Additional information for a better understanding of the described facts.

Reference to further information.

1.2 Intended use

The „GRIPLINK Plug-in“ software is intended for communication between the GRIPLINK Controller from WEISS ROBOTICS and a robot controller. The requirements of the applicable directives and the installation and operating instructions in these instructions must be observed and complied with. Any other use or use beyond the scope of this manual is considered improper use. The manufacturer is not liable for any damage resulting from this.

1.3 System requirements

This plug-in is compatible with GRIPLINK from firmware version 2.0.0.
One of the following FANUC robot controllers is required for operation:

- R-30iB with software version 8.30 (or higher)
- R-30iB plus with software version 9.10 (or higher)

The following FANUC robot controller is required for operation with a robot of the CRX series:

- R-30iB plus with software version 9.40P/06 (or higher)

The following robot options are required to run the software:

- R632 KAREL
- R648 User Socket Msg

Contact your FANUC distributor to obtain robot options.

The IP address of the GRIPLINK controller must be in 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

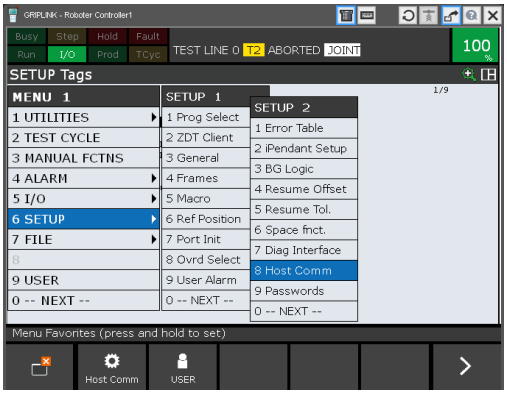
The GRIPLINK plug-in is protected by copyright. The respective valid license terms are included in the software package. With the installation you accept these license terms.

2 Installation

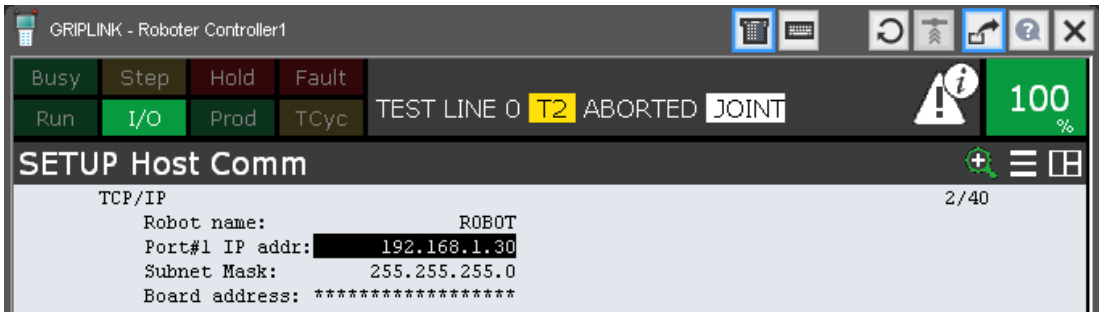
2.1 Preparation of the robot

Switch on the robot and set up the IP address (e.g. 192.168.1.30). Make sure that the robot and the GRIPLINK controller are in the same network.
To do this, perform the following steps:

1. Select MENU → 6 (SETUP) → 0 (--NEXT--) →0 (--NEXT--) → 7 (Host Comm).
2. Select „TCP/IP“ and press ENTER.



3. Enter the IP address and the subnet mask of the robot (in the example 192.168.1.30, subnet 255.255.255.0).

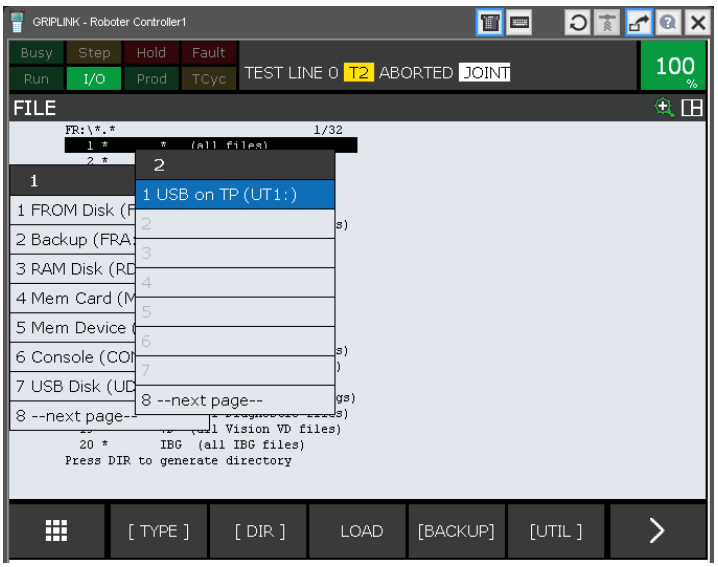


2.2 Software installation for controllers without tablet teach pendant

Make sure that you are using the latest version of the GRIPLINK plug-in. The current version can be downloaded from **www.griplink.de/software**.

1. Download the plugin ZIP archive “griplink_fanuc_<version>.zip”
2. Unpack the previously downloaded ZIP archive with the GRIPLINK plug-in into the root directory of a USB stick and insert it into the USB slot of the teach pendant.
3. Press the Menu → 7 (FILE) → 1 (File) button

4. Press the UTIL → 1 (Set Device) softkey.
5. Select 8 (-- next page --) → 1 (USB on TP (UT1:))



6. Select „All Files“. You should now see, among other things, the installation file SETUP.CM.
7. Execute the installation file. For controllers of the R-30iB series, you must perform a cold start afterwards to apply the parameters.

2.2.1 Checking the installation

After you have finished the installation process, press the SELECT on the teach pendant. You should now see the program „GRIPLINK.PC“ and the sample program „GRIPLINK_DEMO.TP“.

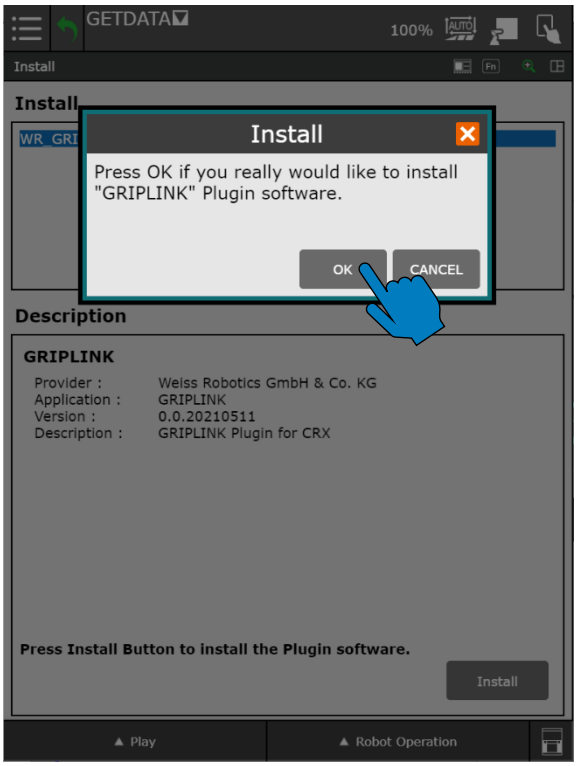
2.3 Install the FANUC CRX GUI plugin for controllers with tablet teach pendant

For robots of the FANUC CRX series you can install an additional plugin that provides graphical instruction blocks. These can be added by dragging and dropping them into a robot program.

Make sure that you are using the latest version of the GRIPLINK plug-in. The current version can be downloaded from **www.griplink.de/software**.

1. Download the plugin ZIP archive “griplink_fanuc_crx_<version>.zip”
2. Unpack the previously downloaded ZIP archive with the GRIPLINK plug-in into the root directory of a USB stick and insert it into the USB slot of the teach pendant (UD1).

For the installation, first start the robot and switch on the Tablet Teach Pendant. Wait until the Tablet TP app is open and the Teach Pendant has established a connection to the controller. Then perform the following steps:



After the prompt to restart the robot controller, switch it off at the main switch and switch it on again after about ten seconds. The teach pendant does not have to be restarted. Wait until the teach pendant has reconnected with the robot controller.

2.4 Uninstall the software

To remove the GRIPLINK plug-in from your robot again, run the uninstall script. This is also part of the software distribution. To do this, follow the steps in chapter 2.2 and select the uninstall script „UNINSTALL.CM“ instead of the installation script „SETUP.CM“.
For uninstalling the CRX plugin, navigate to the menu “Plugin List”, select the plugin from the list and press the button “Uninstall”. For additional information refer to the instructions in the robot controller’s manual.

2.5 Configuration of the socket messaging interface

The socket messaging interface is required for communication between the robot and the GRIPLINK controller. This must be configured as follows:

1. Press the „MENU“ key and navigate to 6 (SETUP) → 0 (NEXT) → 8 (HOST COMM). The „SETUP Protocols“ menu appears. In it, select 3 (SM Socket Messaging Device) and press the SHOW softkey. Select 2 (Clients).
2. Socket Messaging offers you eight TAGs for free use. Select the TAG you want to use for communication with the GRIPLINK controller (TAG 1 in the example).
3. Enter the following data in the input mask:

Comment: GRIPLINK
Protocol: SM
Startup State: START
Server IP/Hostname: (IP address of the GRIPLINK controller, factory setting 192.168.1.40)
Port: 10001
Inactivity Timeout: 15 min

The Remote Path/Share, Username and Password fields are not required and can be left blank.

4. Go back to the overview (SETUP Clients) and select the value 1 (DEFINE) for the tag just set via the ACTION softkey.
5. Then select the value 3 (START) via the ACTION softkey.

2.6 Behavior in case of error

If an error occurs within the GRIPLINK plug-in or during communication with the GRIPLINK controller, the running robot program is basically stopped by means of an error. This usually leads to the fact that running movements of the robot are aborted. The same also applies if the addressed device is in FAULT state or changes to this state due to a command.

Errors are also stored in the log file of the robot and can be retrieved via the teach pendant, key MENU → 4 (ALARM) → 4 (Appl Log).

The most common cases are listed in section 0 with possible solutions.

3 Command Reference

The GRIPLINK plug-in provides the user with a collection of gripping module-specific functions. Both single and multiple commands are available. The commands are implemented via an interface program (GRIPLINK.PC), which receives the command together with the necessary parameters as transfer values. To execute a command, the interface program GRIPLINK.PC must be inserted into the robot program via a CALL. The command to be executed is selected via a parameter.

Argument Wizard

On controllers with software version 9.10 (R-30iB plus series), command and parameters can be selected directly via the Argument Wizard.
On controllers with software version 8.30 (R-30iB series), the command can be selected via the Argument Wizard. The parameter values required for the command must be entered via the generic parameters A to K. Parameters that are not required can be set to 0.

Return values

The return values of the commands are stored in a register. The index of this register or the start index of the register area can be specified via the RRI parameter (Return Register Index).

Multiple commands

With the multiple commands (prefix M), several gripping modules can be addressed simultaneously in parallel. These commands are particularly suitable for handling large or bendable workpieces with several gripping modules.

The basic program flow with the GRIPLINK plug-in is always as follows:

1. Establish connection with CONNECT
2. Activate gripping module and connection monitoring with ENABLE
3. For servo gripping modules without absolute encoder: Reference gripping module with HOME
4. Grasp/release with GRIP/MGRIP or RELEASE/MRELEASE

The available commands of the GRIPLINK plug-in are described below.

3.1 Establish connection – CONNECT

This command establishes the connection between the GRIPLINK controller and the robot controller. As transfer parameter the TAG of the socket messaging module configured before according to chapter 2.5transferred. The command waits until the connection is established. If the GRIPLINK controller cannot be reached at the specified address, an error is triggered and the program execution is stopped.

If GRIPLINK commands are executed before a CONNECT, this will trigger an error.

Syntax

R-30iB plus:	CALL GRIPLINK(CONNECT, < COM_TAG >)
R-30iB:	CALL GRIPLINK(CONNECT, A=< COM_TAG > , B=0, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< COM_TAG >	Index of the socket messaging TAG (1 to 8)

Return values

none

Example

Establish connection between robot and the GRIPLINK via socket messaging TAG 1:

```
CALL GRIPLINK(CONNECT,COM_TAG=1)
```

3.2 Device assertion – ASSERT DEVICE

This command asserts, that the expected device is connected to the selected port. If the connected device does not have the expected vendor and product ID, the robot program halts immediately.

Syntax

R-30iB plus:	CALL GRIPLINK(ASSERT DEVICE, < PORT >, < VID >, < PID >)
R-30iB:	CALL GRIPLINK(ASSERT DEVICE, A=< PORT >, B=< VID >, C=< PID >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< VID >	Vendor ID of the expected device
< PID >	Product ID of the expected device

Return values

none

Example

Assert, that an IEG 55-020 by Weiss Robotics (VID 815, PID 20) is connected to port 3:

CALL GRIPLINK(ASSERT DEVICE,PORT=3,VID=815,PID=20)

Vendor and product ID can be found of the device description and IODD of the device that are provided by the vendor.

3.3 Switch on device – ENABLE

This command activates the connected device and the connection monitoring. If the connection to the device is disconnected (e.g. due to a cable break), this triggers an error and the robot program is stopped.

Gripping part monitoring

The gripping part monitoring can be switched on or off via a parameter. If the gripping part monitoring is active and the gripping module loses a previously picked-up workpiece, this triggers an error and the robot program is stopped.

ENABLE must be executed after CONNECT for all gripping modules.
If GRIPLINK commands are executed before an ENABLE, this will trigger an error.

Syntax

R-30iB plus:	CALL GRIPLINK(ENABLE, < PORT >, < PARTMON >, < RRI >)
R-30iB:	CALL GRIPLINK(ENABLE, A=< PORT >, B=< PARTMON >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< PARTMON >	Gripping part monitoring: 1 (PM_EN) = on, 0 (PM_DIS) = off
< RRI > Index of	the return value register (1 to 1000)

Return values

R[RRI]	current device state

Example

Activate drive and gripping part monitoring of the gripping module at port 0:

```
CALL GRIPLINK(ENABLE,PORT=0,PM_EN,RRI=1)
```

3.4 Query device state – GET STATE

This command returns the device state of the selected gripping module.

Syntax

R-30iB plus:	CALL GRIPLINK(GET_STATE, < PORT >, < RRI >)
R-30iB:	CALL GRIPLINK(GET_STATE, A=< PORT >, B=< RRI >, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	current device state

Example

Wait until the device state of the gripping module at port 2 is „HOLDING“ (4):

```
LBL[1]
CALL GRIPLINK(GET_STATE,PORT=2,RRI=1)
IF R[1]=4,JMP LBL[2]
WAIT 0.01(sec)
JMP LBL[1]
LBL[2]
! Gripper 2 is now in HOLDING state
```

3.5 Query device state of several gripping modules – GET MSTATE

This command returns the device state of all gripping modules.

Syntax

R-30iB plus:	CALL GRIPLINK(GET_MSTATE, < RRI >)
R-30iB:	CALL GRIPLINK(GET_MSTATE, A=< RRI >, B=0, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< RRI > Index of	the first return value register (1 to 997)

Return values

R[RRI + 0]	current device state of gripping module at port 0
R[RRI + 1]	current device state of gripping module at port 1
R[RRI + 2]	current device state of gripping module at port 2
R[RRI + 3]	current device state of gripping module at port 3

Example

Wait until all gripping modules are in the „RELEASED“ state (3):

```
LBL[1]
CALL GRIPLINK(GET_MSTATE,RRI=1)
IF (R[1]=3 AND R[2]=3 AND R[3]=3 AND R[4]=3),JMP LBL[2]
WAIT 0.01(sec)
JMP LBL[1]
LBL[2]
! All grippers are now in RELEASED state
```

3.6 Disable device – DISABLE

Deactivates the device connected to the selected device port. This command can be used, for example, to change tools. The device can be reactivated via GRIPLINK_ENABLE.

Syntax

R-30iB plus:	CALL GRIPLINK(DISABLE, < PORT >, < RRI >)
R-30iB:	CALL GRIPLINK(DISABLE, A=< PORT >, B=< RRI >, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	current device state

Example

Change the gripping module at port 0:

```
! Connect to GRIPLINK controller using ComTAG 1
CALL GRIPLINK(CONNECT,COMTAG=1)
! Activate Drive and Part Monitoring of gripper 0
CALL GRIPLINK(ENABLE,PORT=0,PM_EN,RRI=1)
! DO something
! ...
! Prepare tool change:
! Disable gripper 0:
CALL GRIPLINK(DISABLE,PORT=0,RRI=1)
! Now, the gripper can be changed
!
! - OPERATE THE TOOL CHANGER HERE -
!
!Activate the new gripper:
CALL GRIPLINK(ENABLE,PORT=0,RRI=1)
```

3.7 Reference gripping module – HOME

References the selected servo gripper. The command executes a reference run of the gripping module and waits until this is completed. After the HOME command has been executed, the fingers of the gripping module are powerless and must be moved to a defined position with a GRIP/MGRIP or RELEASE/MRELEASE.

The reference run can be configured via the web interface of the GRIPLINK controller.

Syntax

R-30iB plus:	CALL GRIPLINK(HOME, < PORT >, < RRI >)
R-30iB:	CALL GRIPLINK(HOME, A=< PORT >, B=< RRI >, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	current device state

Example

Reference the gripping module to port 2:

```
CALL GRIPLINK(HOME,PORT=2,RRI=1)
```

3.8 Grip a workpiece – GRIP

Grips a workpiece with the selected gripping module and the selected grip recipe. The command waits until the device state changes to either „HOLDING“ or „NO PART“.

The gripping parameters (so called „recipe”) can be configured via the web interface of the GRIPLINK controller.

Syntax

R-30iB plus:	CALL GRIPLINK(GRIP, < PORT >, < PRESET >, < RRI >)
R-30iB:	CALL GRIPLINK(GRIP, A=< PORT >, B=< PRESET >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< PRESET >	Selected handle (0 to 3 or 0 to 7 for CRG gripping modules).
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	current device state

Examples

Gripping module at port 0 is to grip with grip recipe 2. If no workpiece was found, the gripper should open again and try again:

```
LBL[1]
CALL GRIPLINK(GRIP,PORT=0,PRESET=2,RRI=1)
IF R[1]=4,JMP LBL[2]
CALL GRIPLINK(RELEASE,PORT=0,PRESET=2,RRI=1)
JMP LBL[1]
LBL[2]
! Part gripped!
```

3.9 Simultaneous gripping of workpieces – MGRIP

This command executes a grip with the selected gripping modules. The command waits until all gripping modules have each reached one of the states „HOLDING“ or „NO PART“.

The gripping parameters can be configured via the web interface of the GRIPLINK controller.

Syntax

R-30iB plus:	CALL GRIPLINK(MGRIP, < MASK >, < PRESET > , < RRI >)
R-30iB:	CALL GRIPLINK(MGRIP, A=< MASK >, B=< PRESET >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< MASK >	Selected gripping modules as bit vector: Bit 0: 1 = gripping module selected at port 0, 0 = not selected Bit 1: 1 = gripping module selected at port 1, 0 = not selected Bit 2: 1 = gripping module selected at port 2, 0 = not selected Bit 3: 1 = gripping module selected at port 3, 0 = not selected Bit 31...4: reserved (set to 0)
< PRESET >	Selected handle (0 to 3 or 0 to 7 for CRG gripping modules).
< RRI >	Index of the first return value register (1 to 997)

Return values

R[RRI + 0]	current device state of gripping module at port 0
R[RRI + 1]	current device state of gripping module at port 1
R[RRI + 2]	current device state of gripping module at port 2
R[RRI + 3]	current device state of gripping module at port 3

Examples

Gripper modules at port 1 and 2 grip workpiece with grip recipe 2:

```
CALL GRIPLINK(MGRIP,MASK=6,PRESET=2,RRI=1)
```

3.10 Release a workpiece – RELEASE

Releases the workpiece gripped with the selected gripping module. The command waits until the workpiece has been released.

The gripping parameters can be configured via the web interface of the GRIPLINK controller.

Syntax

R-30iB plus:	CALL GRIPLINK(RELEASE, < PORT >, < PRESET > , < RRI >)
R-30iB:	CALL GRIPLINK(RELEASE, A=< PORT >, B=< PRESET >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< PRESET >	Selected grip recipe (range depends on selected gripper model).
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	current device state

Examples

Release the workpiece gripped with the gripping module at port 0 and grip recipe 2:

```
CALL GRIPLINK(RELEASE,PORT=0,PRESET=2,RRI=1)
```

3.11 Simultaneous release of workpieces – MRELEASE

Simultaneously releases the workpiece gripped with the selected gripping modules. The command waits until all gripping modules have each reached the „RELEASED“ state.

Syntax

R-30iB plus:	CALL GRIPLINK(MRELEASE, < MASK >, < PRESET >, < RRI >)
R-30iB:	CALL GRIPLINK(MRELEASE,A=< MASK >, B=< PRESET >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< MASK > Selected	gripping modules as bit vector: Bit 0: 1 = gripping module selected at port 0, 0 = not selected Bit 1: 1 = gripping module selected at port 1, 0 = not selected Bit 2: 1 = gripping module selected at port 2, 0 = not selected Bit 3: 1 = gripping module selected at port 3, 0 = not selected Bit 31...4: reserved (set to 0)
< PRESET >	Selected handle (range depends on selected gripper model).
< RRI >	Index of the first return value register (1 to 997)

Return values

R[RRI + 0]	current device state of gripping module at port 0
R[RRI + 1]	current device state of gripping module at port 1
R[RRI + 2]	current device state of gripping module at port 2
R[RRI + 3]	current device state of gripping module at port 3

Examples

Gripping module at port 1,2 and 3 release workpiece with grip recipe 3:

```
CALL GRIPLINK(MRELEASE,MASK=14,PRESET=3,RRI=1)
```

3.12 Read current finger position – GET POSITION

This command returns the current finger position of the selected gripping module.

The return value is stored in the NUMERIC REGISTER with the passed register index.

Syntax

R-30iB plus:	CALL GRIPLINK(GET_POSITION, < PORT >, < RRI >)
R-30iB:	CALL GRIPLINK(GET_POSITION,A=< PORT >, B=< RRI >, C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< RRI >	Index of the return value register (1 to 1000)

Return values

R[RRI]	Finger position in 0.01 mm steps

Example

Execute the subroutine „PROG“ if the finger position of the gripping module at port 2 is greater than 10.5 mm:

```
CALL GRIPLINK(GET_POSITION,PORT=2,RRI=42)
IF R[42]> 1050, CALL PROG
! If program execution reach here, position is lower than 10.5 mm
```

3.13 Control gripping force holding – HOLD

The innovative gripping force safety device developed by WEISS ROBOTICS maintains the gripping force on the workpiece even if the power supply to the gripping module is unexpectedly interrupted. Thanks to the integrated absolute sensor technology, production can continue immediately when the power supply is restored, even without referencing. Furthermore, HOLD enables permanent gripping without the gripping module becoming hot.
This command activates or deactivates the gripping force safety device for the selected gripping module.

HOLD is not available with all gripping modules.

Syntax

R-30iB plus:	CALL GRIPLINK(HOLD, < PORT >, < ENABLE >)
R-30iB:	CALL GRIPLINK(HOLD, A=< PORT >, B=< ENABLE > , C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< ENABLE >	Gripping force retention: 1 (EN) = on, 0 (DIS) = off

Return values

none

Example

Activates mechanical gripping force retention for gripping module at port 2 if the device state is „HOLDING“:

```
CALL GRIPLINK(GRIP,PORT=2,RRI=1)
IF R[1]=5, CALL GRIPLINK(HOLD,PORT=2,EN)
```

3.14 Control of the LED display – LED

This command changes the color and pattern of the light ring of a selected CRG gripping module. This function is only available for gripping modules of the CRG series.

Light patterns can be configured via the web interface of the GRIPLINK controller.

A controllable LED display is not available for all gripping modules.

Syntax

R-30iB plus:	CALL GRIPLINK(LED, < PORT >, < PATTERN >)
R-30iB:	CALL GRIPLINK(LED, A=< PORT >, B=< PATTERN > , C=0, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< PATTERN >	Index of the predefined light pattern (0 to 7)

Return values

none

Example

Grasp with the gripping module at port 3 and other the color of the illuminated ring on the illuminated pattern 0, if the finger position is greater than or equal to 8.1 mm afterwards and on illuminated pattern 1, if smaller:

```
CALL GRIPLINK(GRIP,PORT=3,PRESET=0,RRI=1)
CALL GRIPLINK(GET_POSITION,PORT=3,RRI=2)
IF(R[2]> =810) THEN
    CALL GRIPLINK(LED,PORT=3,PATTERN=0)
ELSE
    CALL GRIPLINK(LED,PORT=3,PATTERN=1)
ENDIF
```

3.15 Parametrization of a grip preset – SET GRIPCFG

This command changes the parameters of a grip preset. All eight configurable parameters are sent, even when the connected device supports less than eight parameters.
Depending on the device, each parameter has an individual meaning, that can be found in the device's GRIPLINK driver manual.

Syntax

R-30iB plus:	CALL GRIPLINK(SET GRIPCFG, < PORT >, < PRESET >,< PRM0 >, < PRM1 >, < PRM2 >,< PRM3 >,< PRM4 >,< PRM5 >,< PRM6 >,< PRM7 >)
R-30iB:	CALL GRIPLINK(SET GRIPCFG, A=< PORT >, B=< PRESET >, C=< PRM0 >, D=< PRM1 >, E=< PRM2 >, F=< PRM3>, G=< PRM4 >, H=< PRM5 >, I=< PRM6 >, J=< PRM7>, K=0)

Parameters in general

< PORT >	Index of the gripping module (0 to 3)
< PRESET >	Index of the preset (0 to 7)
< PRM0..7 >	Device specific parameters 0 to 7

Parameters in general

< PORT >	Index of the gripping module (0 to 3)
< PRESET >	Index of the grip preset (0 to 7)
< PRM0 >	No Part Limit (Value range depends on the gripper type, in 1/1000 mm)
< PRM1 >	Release Limit (Value range depends on the gripper type, in 1/1000 mm)
< PRM2 >	Force Factor (Value range depends on the gripper type, in 1/1000 %)
< PRM3..7 >	Not used

Return values

none

Example

Set the parameters of grip preset 1 for the gripper at port 3 to:

No Part Limit = 31 mm	→in 1/1000 mm:	31000
Release Limit = 41 mm	→in 1/1000 mm:	41000
Force Factor = 59 %:	→in 1/1000 %:	59000

```
CALL GRIPLINK(SET GRIPCFG,PORT=3,INDEX=1,PRM0=31000,PRM1=41000,
FRC=59000)
```

3.16 Get a device value – VALUE

This command reads an indexed device value.

The return value is stored in the NUMERIC REGISTER with the passed register index.

The valid value index range can be found in the device's GRIPLINK driver description.

Syntax

R-30iB plus:	CALL GRIPLINK(VALUE, < PORT >, < INDEX >, < RRI >)
R-30iB:	CALL GRIPLINK(VALUE, A=< PORT >, B=< INDEX >, C=< RRI >, D=0, E=0, F=0, G=0, H=0, I=0, J=0, K=0)

Parameter

< PORT >	Index of the gripping module (0 to 3)
< INDEX >	Index of the value that is to be read (0 to 10)
< RRI >	Index of the return value register (1 to 1000)

Return values

Value

Example

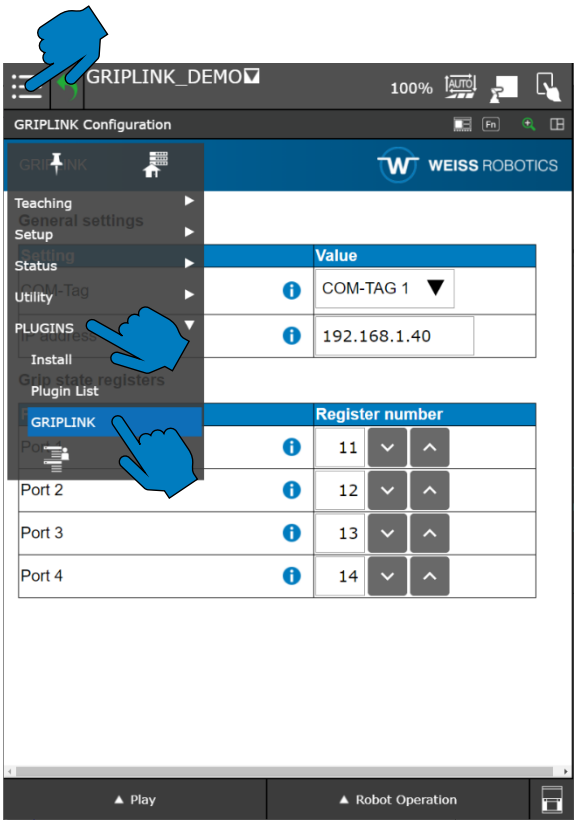
Read the primary value (value index 0) of the device connected to port 3 and store it to the Numeric Register 31:

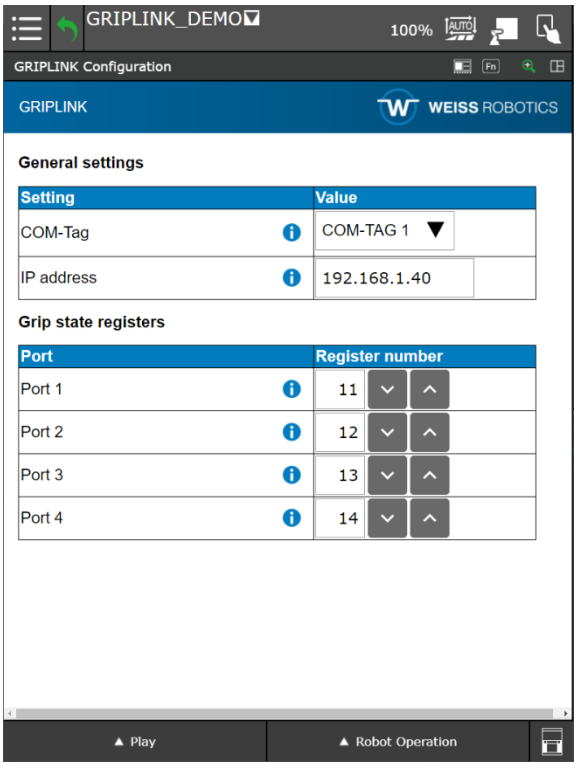
CALL GRIPLINK(VALUE,PORT=3,INDEX=0,RRI=31)

4 Usage of the FANUC CRX plugin

4.1 Preparation via the configuration page

Open the configuration page by selecting the „Plugins“-tab in the menu and clicking on the „GRIPLINK“ entry.





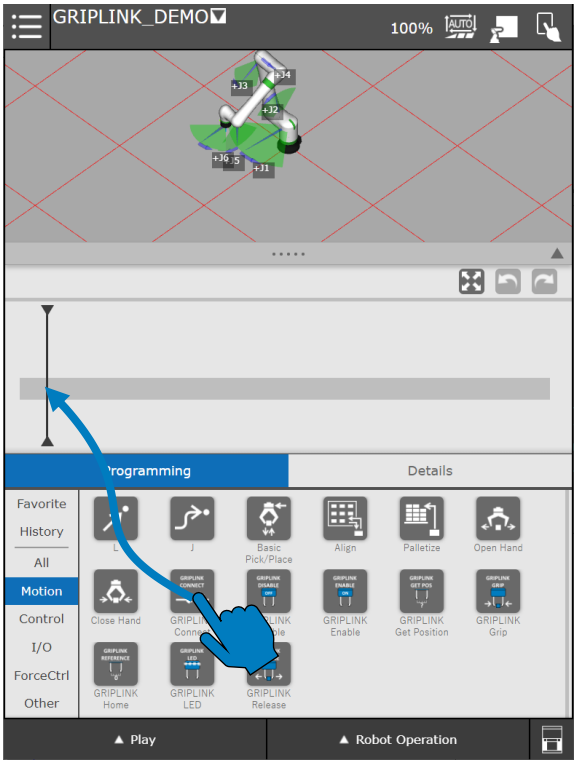
Use the „COM Tag“ drop-down field to set the previously parameterized communication tag. Set the IP address of the connected GRIPLINK here as well.
The background service requires return registers of the type NUMERIC REGISTER in which it stores the gripping state of the respective gripping module. Enter the desired indices in the corresponding fields.

For further information on the numeric registers, refer to the robot operating manual.

Further information on the possible gripping states can be found in the GRIPLINK operating manual.

4.2 Create robot applications

To easily address the gripping module in the robot program, the GRIPLINK plugin provides various graphical commands. The commands can be dragged and dropped into the program via the program editor of the robot controller and are located in the „Motion“ section.

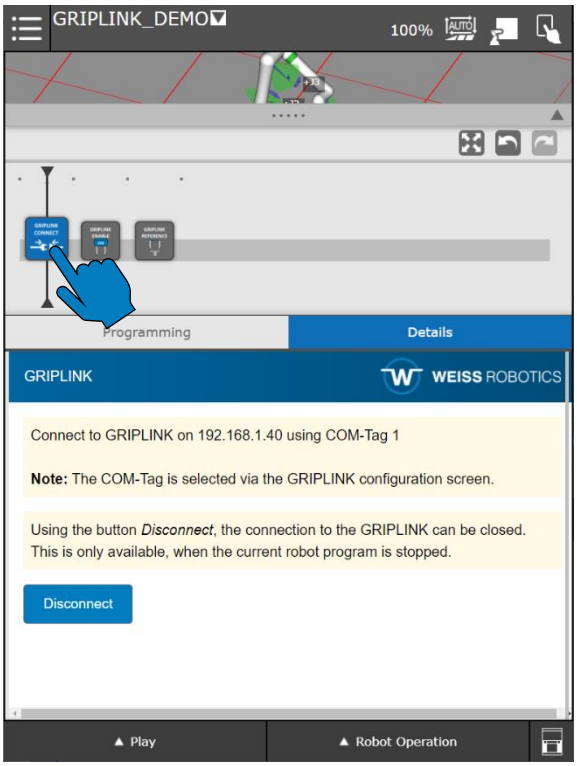


When you select an instruction, the „Details“ tab takes you to a detailed view of the instruction, where you can make specific settings depending on the instruction.

4.2.1 Establish a Connection

At the beginning of each program with GRIPLINK functions, a connection must first be established. To do this, drag the „GRIPLINK Connect“ instruction into the robot program. The Communication Tag set on the configuration page is displayed in the detail view.

Every program shall start by connecting to the GRIPLINK using the „Connect“ instruction!



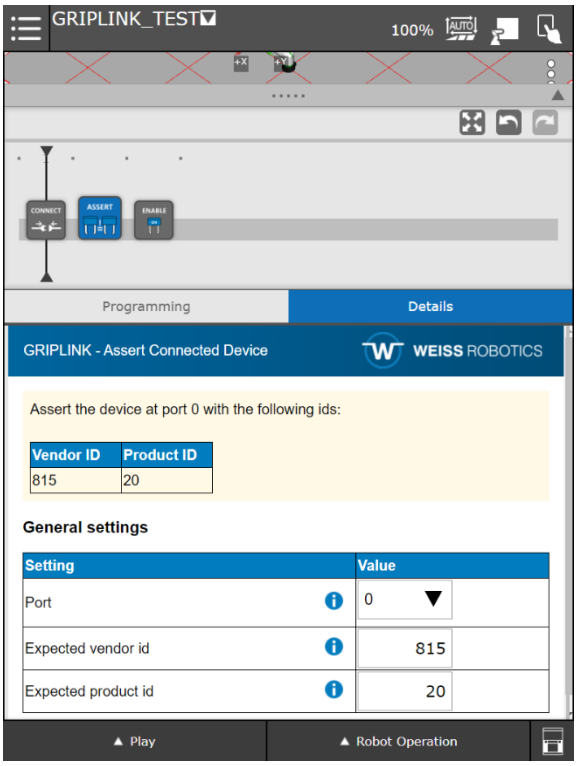
When the robot program is stopped, the connection between the GRIPLINK and the robot can be closed by clicking on the “Disconnect”-button.

4.2.2 Asserting a specific device

Before activating a device, it is good practice to check if the expected device is connected. The “Device Assert” instruction takes the port and additionally the expected vendor and product id of the expected device and halts the robot program if there is a mismatch.

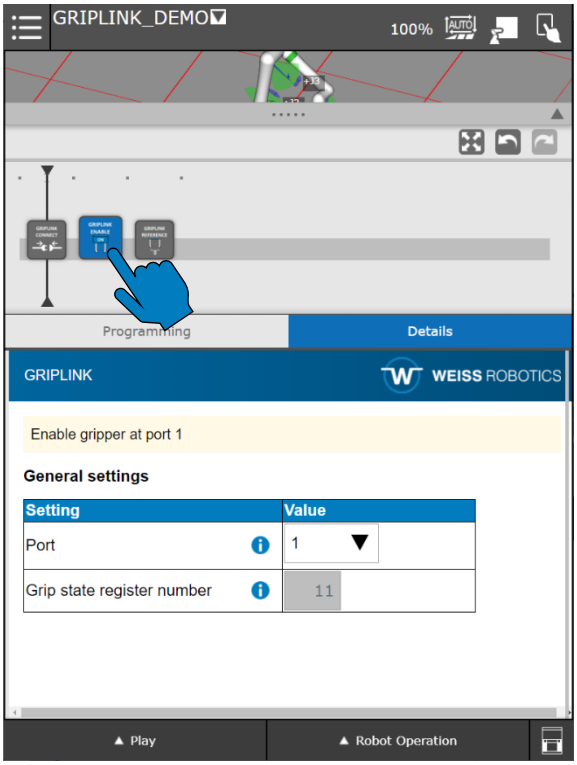
Further information on the vendor and device id can be found in the operating manual of the respective device.

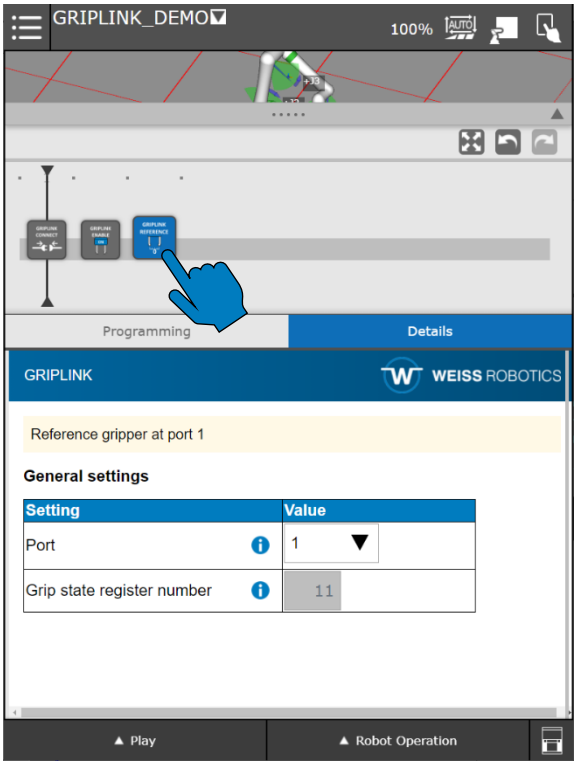
On the detail page of the instruction „GRIPLINK Assert Device“ port of the desired device and the vendor/product id can be selected. In this example, an IEG 55-020 by Weiss Robotics (VID 815, PID 20) is expected to be connected to port 0.



4.2.3 Activate and Referencing

Each gripping module must be activated and referenced at the beginning. To do this, drag the instructions „GRIPLINK Enable“ and „GRIPLINK Home“ into the robot program and select the port of the respective gripping module.



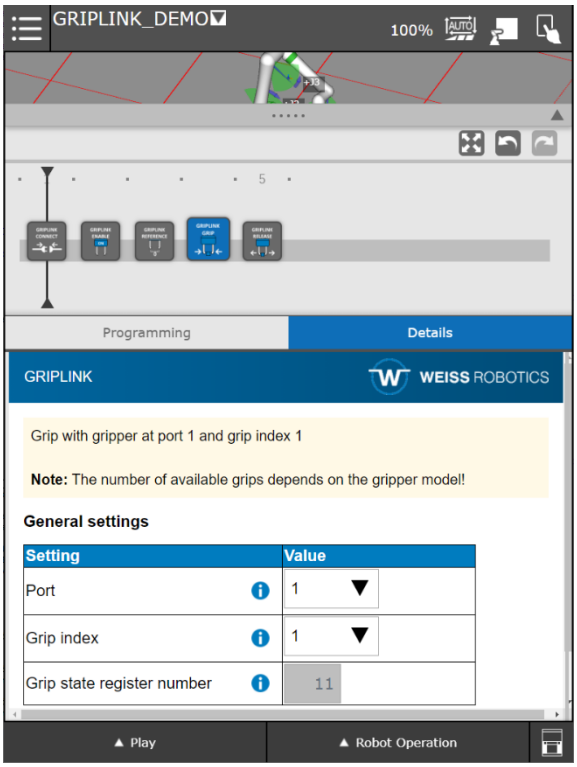


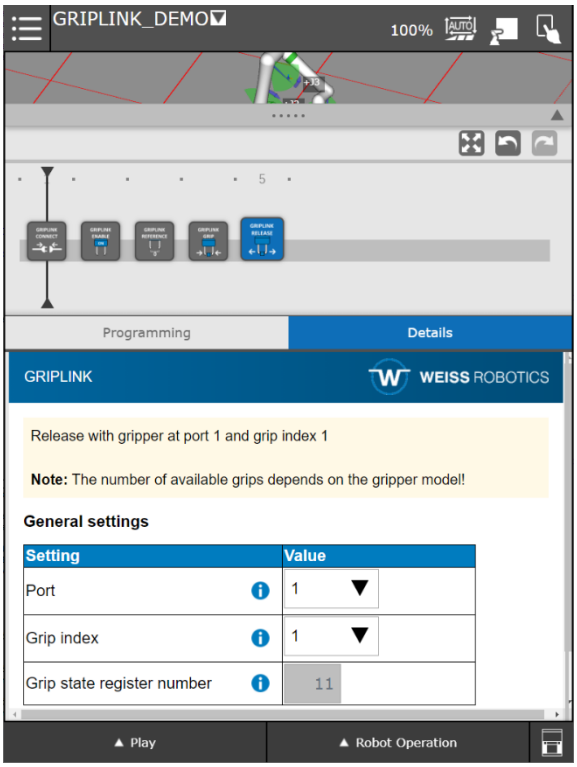
4.2.4 Gripping and Releasing

Each gripping module knows the basic commands gripping („Grip“) and releasing („Release“). Depending on the gripping module, up to eight freely configurable grips can be executed.

Further information on the handles and their parameterization can be found in the operating manual of the respective gripping module.

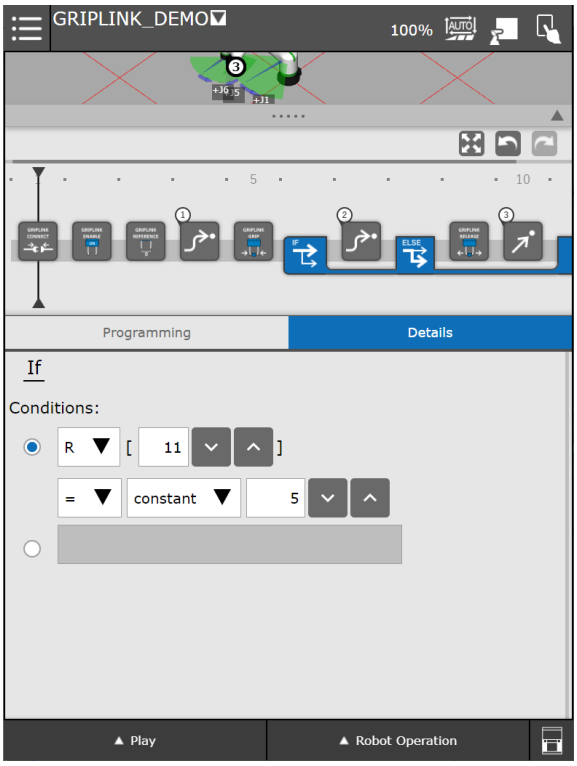
On the detail page of the instructions „GRIPLINK Grip“ and „GRIPLINK Release“ port of the desired gripper and the index of the grip can be selected.





4.2.4.1 Processing of the Grip State

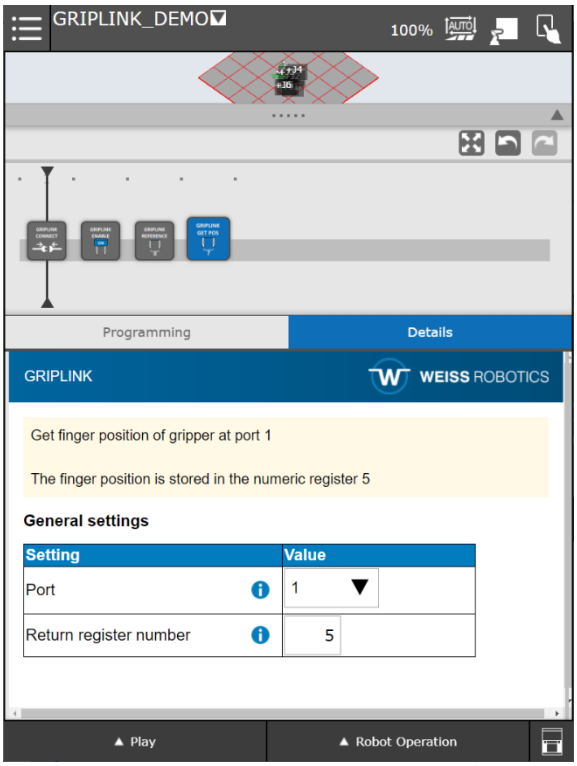
After gripping a component, the grip state register can be used to detect whether a component has been gripped or not. The following program excerpt shows an example. Here, the gripper is gripped at port 1 and its grip state is stored in register 11. If the gripping state is 5 (corresponds to „HOLDING“), the gripped component is moved to position 2. Otherwise, a release command is executed and the gripped component is moved to position 3.



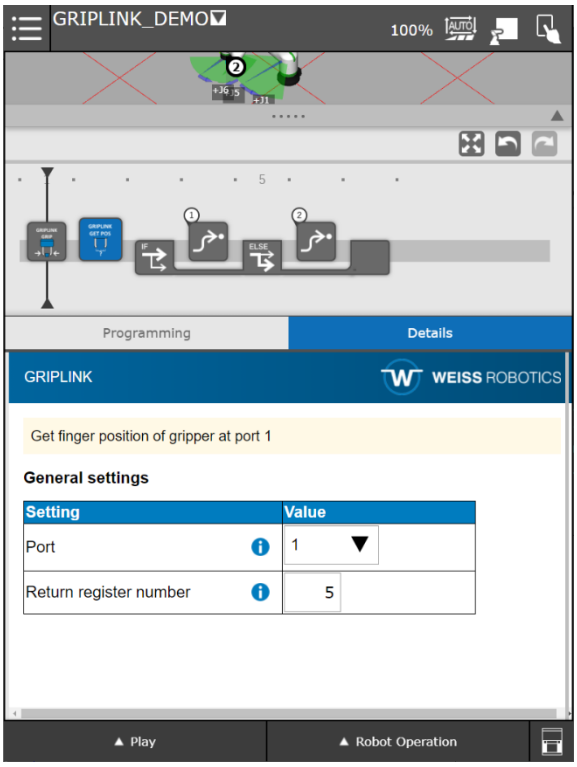
4.2.4.2 Processing of the Finger Position

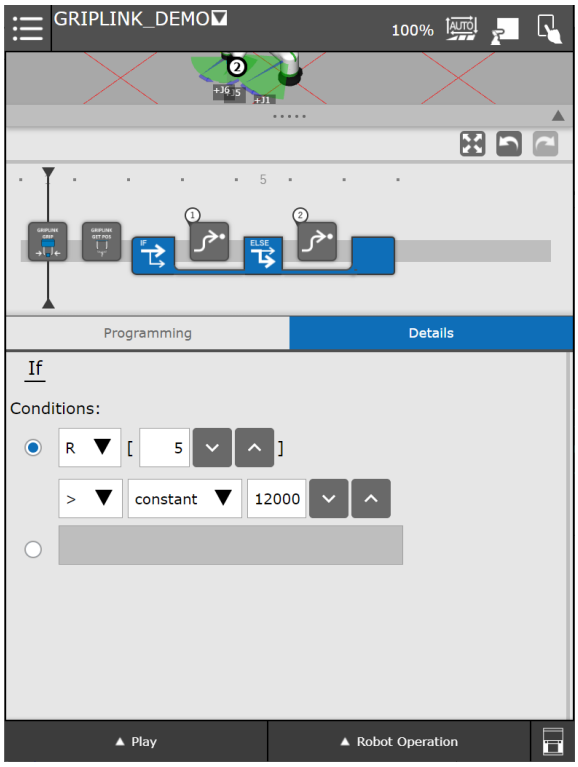
To read out the position of the finger jaws, for example to perform a check of the gripped component based on its size, the “GRIPLINK Get Position“ instruction can be used. This writes the current position of the finger jaws in thousandths of a millimeter of the selected gripping module into a numeric register.

When selecting the register, make sure that it is only used for evaluating the grip width of the gripping module!



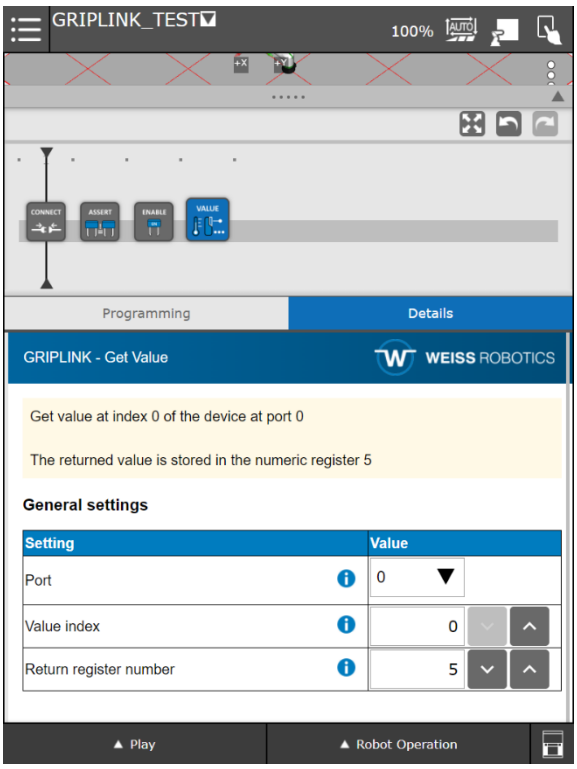
In the following section of a robot program, a part is gripped with the command „GRIPLINK Grip“ and then the grip width is read out via „GRIPLINK Get Position“. The value is stored in the numeric register with index 5. The value of the register is checked in the IF query. If the grip width is greater than 12 mm (e.g. the register value is greater than 12000), position 1 is approached. Otherwise, position 2 is approached.





4.2.5 Reading a device value

Devices such as sensors might provide data as indexed values. These can be read using the Value instruction. In this example, the primary value (index 0) of the device connected to port 0 is read and written into the numeric register 5.



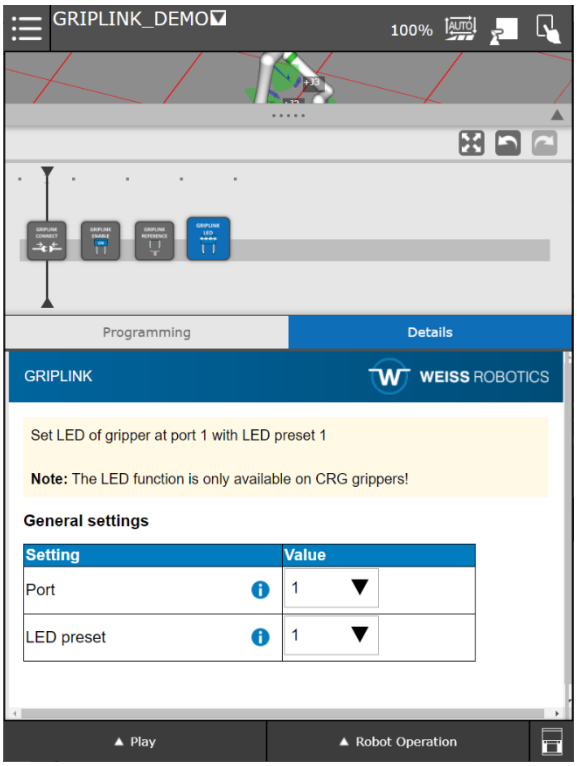
The value 2147483647 is used by the robot controller as internal flag to determine uninitialized variables. On the other hand, GRIPLINK uses this value to code (sensor) values that are out of range.
Keep this in mind when creating a robot program e.g. via explicit value check.

4.2.6 Control of the LED ring

The gripping modules of Weiss Robotics' CRG series have an LED ring for visualization of various operating states. The ring can be controlled by a dedicated instruction. Each CRG gripping module comes with eight configurable visualization presets that can be started via the instruction.

Further information on how to configure the visualization presets can be found in the operating manual of the CRG gripping modules.

On the detail page of the instruction „GRIPLINK LED", the port of the desired gripper and the index of the preset can be selected.



The LED visualization is only available on CRG gripper modules!

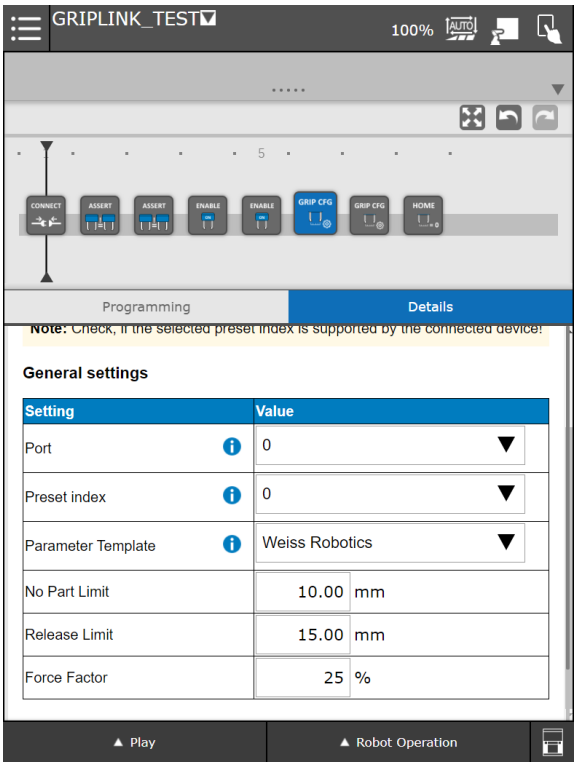
4.2.7 Configuring a grip preset

Depending on the gripping module, up to eight freely configurable grips can be executed. Using the command “Grip Cfg“, a grip preset’s parameters can be modified in runtime. This allows for example to initialize a gripper at the beginning of a program.

Further information regarding the grip parameters, especially their limitations, can be found in the manual oft he respective gripper module.

On the details page of the instruction “GRIPLINK Grip Cfg”, the port of the desired gripper and the index of the desired grip preset can be chosen.
The parameter template controls the visualization of the parameters on the details page. Parameters that are not available for the devices that are described by the template, are hidden automatically.
For gripper modules from Weiss Robotics, No Part Limit, Release Limit and Force Factor can be adjusted.

For gripper modules from Weiss Robotics, select the template “Weiss Robotics”, to display and check the entered values correctly.



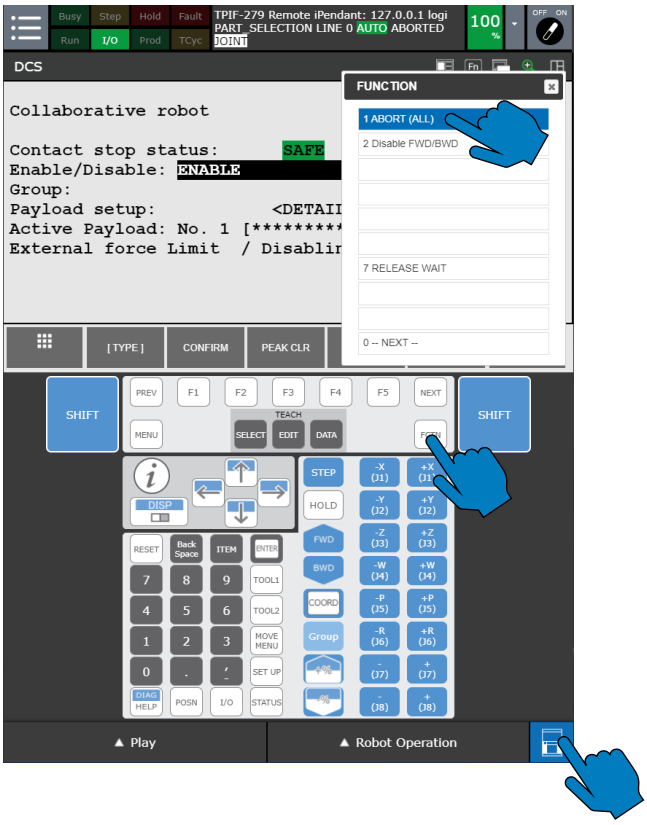
Please note, that depending on the gripper module, eight grip presets are not always available!

4.3 Troubleshooting

The plugin displays messages when errors occur. The following section describes important messages and solving procedures.

4.3.1 Message „TPIF-013 Other program is running“

Possible cause	Remedy
Another program (e.g. the background service) is running and must be terminated first	• Terminate all programs using the command „ABORT (ALL)“: Button FCTN → 1 ABORT (ALL) • Restart the current program • Click the button “Disconnect” on the CONNECT-Node detail page • If necessary, disconnect the GRIPLINK’s power supply



4.3.2 Message „GRIPLINK could not connect via SM slot Cx:“

Possible cause	Remedy
GRIPLINK is not active	• Check the GRIPLINK's power supply
The socket connection between robot controller and GRIPLINK could not be established	• Enter the settings of the selected client tag (Cx) via the setup menu „Host Comm” (refer to chapter 2.5) • Select the action „UNDEFINE” via the [ACTION] button • Select the action „DEFINE” via the [ACTION] button • Select the action „START” • Terminate all programs using the command „ABORT (ALL)“: Button FCTN → 1 ABORT (ALL) • Restart the current program • If necessary, disconnect the GRIPLINK's power supply

4.3.3 Message „Device x not connected“

Possible cause	Remedy
The selected GRIPLINK port is not connected to a gripping module	• Check the ports and the connected gripping modules • Check the connection wires between the gripping modules and the GRIPLINK

4.3.4 Message „GRIPLINK is offline“

Possible cause	Remedy
The GRIPLINK is still connected after a program was stopped	• Open the web app and navigate to the main menu and “Robot” sub-menu. Then click “DISCONNECT” if a robot is connected • Open another TP program (e.g. TRANSPORT) and start it • Stop program and terminate all programs using the command „ABORT (ALL)“: Button FCTN → 1 ABORT (ALL) • Restart SM Slot (see section 0)

4.3.5 Message „GLU_RUN_CMD Line 144“

Possible cause	Remedy
The communication Tag is not in the correct state	• Enter the settings of the selected client tag (Cx) via the setup menu „Host Comm” (refer to chapter 2.5) • Select the action „UNDEFINE” via the [ACTION] button • Select the action „DEFINE” via the [ACTION] button • Select the action „START” • Stop program and terminate all programs using the command „ABORT (ALL)“: Button FCTN → 1 ABORT (ALL)
The GRIPLINK is not powered	• Check the power supply and ensure that it fulfils the requirements

4.3.6 Message „GRIPLINK: Failed to listen on socket“

Possible cause	Remedy
The socket connection between robot controller and GRIPLINK has been interrupted the button „Disconnect“ on the details page of the „Connect“ node, has been pressed	• Check the network connection (network cable) between Roboter-Steuerung und GRIPLINK and check the power supply and ensure that it fulfils the requirements • Restart the desired robot program. It has to start with a “Connect” node. • This message also appears, when a user deliberately closes the connection.

Appendix A. Device state

Device state	Code	Description
NOT CONNECTED	0	Gripper module not connected
NOT INITIALIZED	1	Gripper module not initialized
IDLE	2	Ready for operation, not active
RELEASED	3	Workpiece released
NO PART	4	No workpiece found
HOLDING	5	Workpiece is held
OPERATING	6	Sensor ready for operation
FAULT	7	Error condition