



GRILINK CONTROLLER APPLICATION NOTE PROXY

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1 Introduction

The GRIPLINK controller is the link between IO-Link-enabled automation components and robot controllers. It has four IO-Link ports that can be parameterized and controlled independently of each other. In applications where more than four devices are to be used, the proxy functionality can be used to set up a network of several GRIPLINK controllers, one of which acts as the master and forwards incoming TCMD commands from the higher-level controller to up to seven slaves. The master remains the sole point of contact for the robot controller, which greatly simplifies implementation in an existing system.

Advantages:

- + Easy integration into existing systems
- + No additional devices or options required compared to the simple solution with only one GRIPLINK controller
- + Quick configuration via the web interface
- + Simple implementation of complex applications with multiple gripping systems and sensors possible

1.1 Target audience

This manual is intended for system manufacturers and operators, who should keep this and other accompanying documents available to personnel at all times and encourage them to read and observe the safety and warning instructions in particular.

It is also intended for specialist personnel, programmers, and fitters, who should read these instructions and, in particular, observe and follow the safety and warning notices at all times.

1.2 Notation and symbols

For a better overview, the following symbols are used in this manual:



Functional or safety-related information. Failure to observe this information may endanger the safety of personnel and the system, damage the device, or impair its function.



Additional information for a better understanding of the described facts.



Reference to further information.

2 Basic concept of

2.1 Requirements

To integrate multiple GRIPLINK devices into a proxy network, the proxy license (OPT-GL-PROXY) must be installed on the controller that is to be used as the proxy master. No additional hardware components are required.



The proxy functionality is only available if the license (OPT-GL-PROXY) is activated on the master device. Contact our sales department at sales@weiss-robotics.com for further information.

It must be ensured that all GRIPLINK controllers are in the same IP subnet and that each controller has an individual IP address.



In order to assign each controller its own IP address, other controllers may first have to be removed from the network (e.g., by disconnecting the power supply) to avoid address conflicts.



The used GRIPLINK controllers must have at least firmware version 4.0.0. This is independent of the proxy role that the controller is to assume.

2.2 Proxy

2.2.1 Topology

There can be master and slave devices in the proxy network.

Proxy master:

The robot controller always connects to the proxy master. It can manage additional connections to up to seven slaves. The slaves can in turn be configured as slots in the master. The assignment of a proxy slave to a master slot is referred to as adoption.

Proxy slave:

There is no direct connection between the robot controller and the slave. Instead, a slave knows its proxy master and only accepts connection requests and commands from this device.



Connection requests from a controller or proxy master other than the assigned master are rejected.



A proxy slave can be assigned to exactly one proxy master.

A slot in a proxy master can adopt exactly one proxy slave.

Proxy standalone:

A GRIPLINK controller with the standalone role cannot communicate in a proxy network. The standalone role is typically used when a robot controller is only supposed to control exactly one GRIPLINK controller.

Up to four ports can be available at each of the seven slots of a proxy master. This depends on how many IO-Link ports a slave provides. This means that up to 32 devices can be controlled.

Each device has a physical port index and a virtual port index.

The physical port index is the index of the port at which an IO-Link device is connected to the GRIPLINK controller. The virtual port index is calculated from the slot at which a slave was adopted in the master (see Figure 1).

The virtual port indexes are counted up consecutively, starting with the port indexes of the master (0 to 3).

The virtual port index of a device connected to a slave can be determined using the formula(1) :

S Slot index to which the slave is connected
 P_{phys} Physical port index of the slave device
 P_{virt} Virtual port index of the slave device

(1)

$$P_{virt} = (S + 1) \cdot 4 + P_{phys}$$

The virtual port index of a device connected to the master corresponds to the physical port index.

| Slot | Reserved virtual port indexes ¹ |
|--------|--|
| Slot 0 | 4 to 7 |
| Slot 1 | 8 to 11 |
| Slot 2 | 12 to 15 |
| Slot 3 | 16 to 19 |
| Slot 4 | 20 to 23 |
| Slot 5 | 24 to 27 |
| Slot 6 | 28 to 31 |

Table 1: Virtual port indexes for slave slots

Example: An IEG 55-020 is connected to port 1 on the master. A GRIPLINK-ET4 with four IO-Link ports is adopted on proxy slot 0. A CRG 30-050 gripper module is connected to its port 1.

Virtual port of the IEG 55-020: $P_{virt,IEG} = P_{phys,IEG} = 1$

Virtual port of the CRG 30-050: $P_{virt,CRG} = (S + 1) \cdot 4 + P_{phys,CRG} = (0 + 1) \cdot 4 + 1 = 15$

¹ Depending on the GRIPLINK controller used, the number of virtual ports actually available at the corresponding slot may vary.

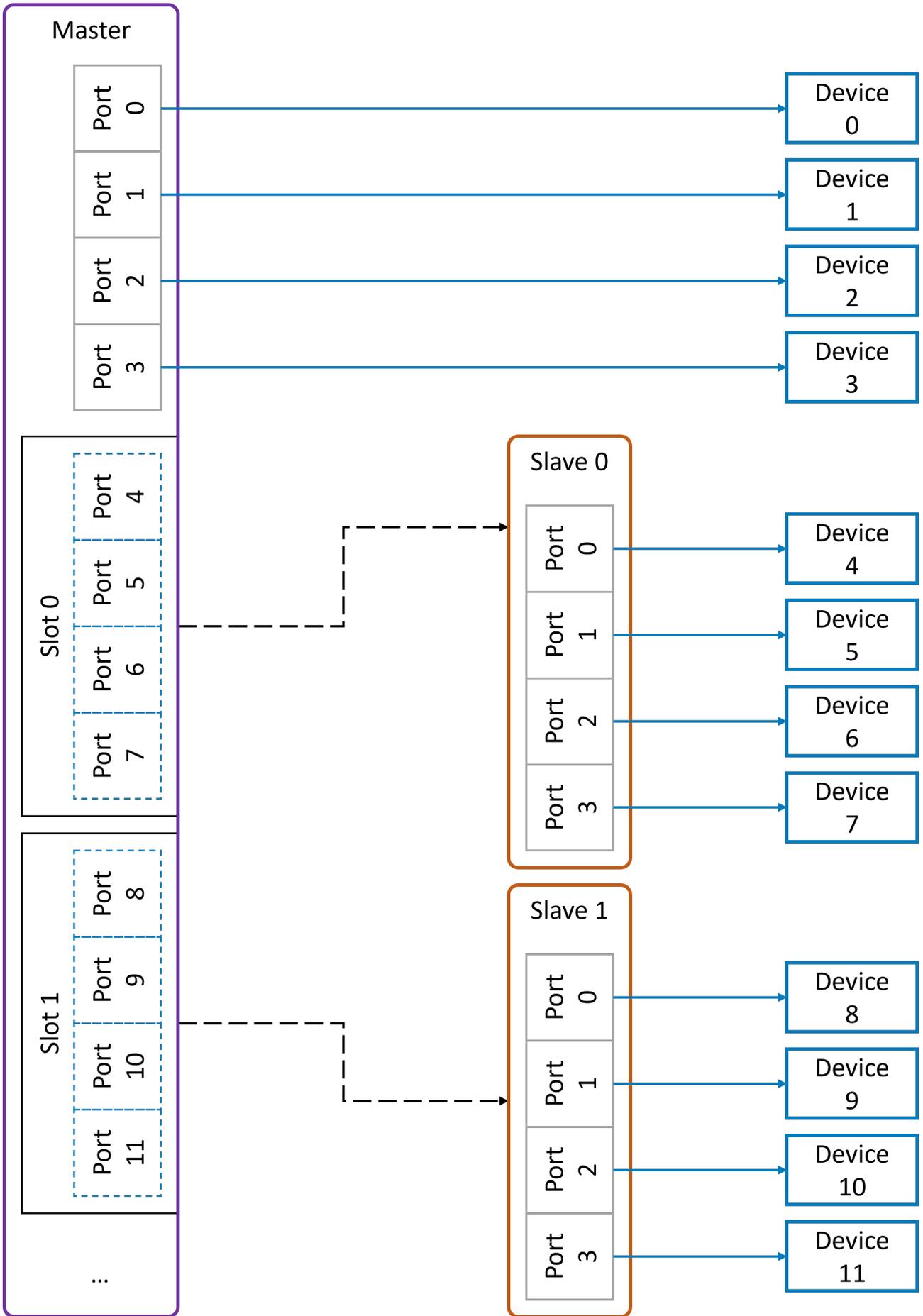


Figure 1: Network topology with proxy master and proxy slaves

2.2.2 Hardware setup

The GRIPLINK controller has a built-in switch that allows daisy chain wiring of multiple GRIPLINK controllers. Furthermore, the power supply can be bridged between multiple controllers. This is shown in Figure 2.

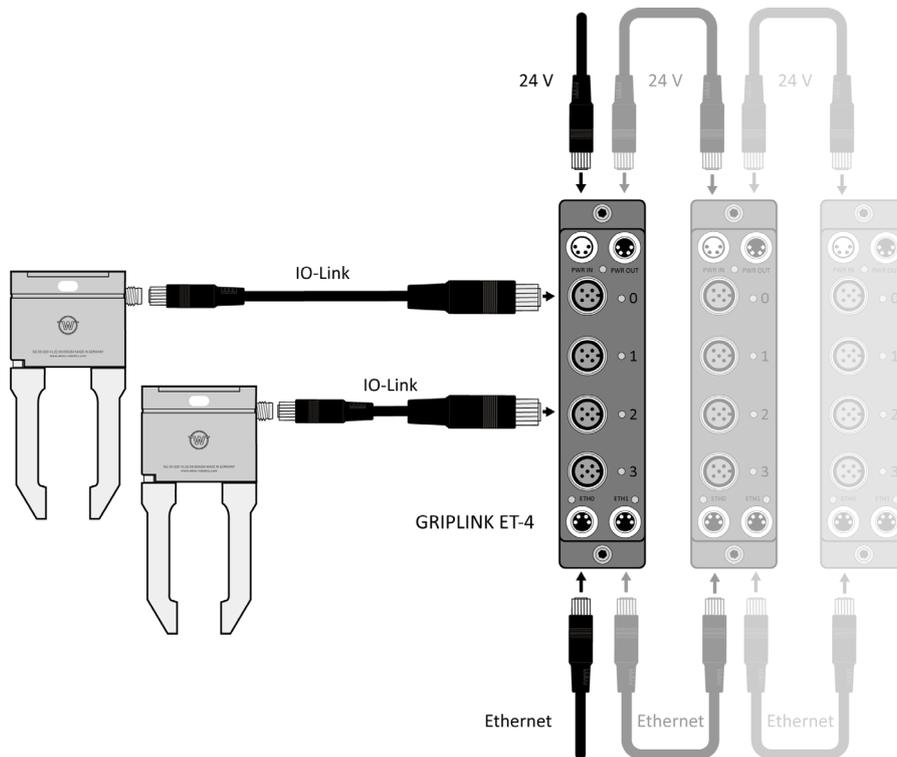


Figure 2: Wiring of multiple GRIPLINK controllers using the built-in switch

Alternatively, an external switch can be used, for example, from which data lines run in a star configuration to the individual GRIPLINK controllers and the robot controller.



Ensure that the housing of the GRIPLINK controller is grounded (mount on a conductive surface or clamp a separate grounding cable with a cable lug under one of the two mounting screws).



Ensure that the power supply can continuously provide the required maximum operating current of all IO-Link devices in total.

In any case, observe the information in the operating manuals for the respective IO-Link devices and the GRIPLINK controller!

2.3 Configuration via the web interface

The currently set proxy configuration is displayed directly in the overview on the web interface. You can switch to the "Proxy" menu via the main menu in the "Overview" tab.

2.3.1 Basic settings

The basic configuration includes setting the proxy role. The role can be selected using the drop-down field and then set using the "Change" button.

If the proxy license is not available on the GRIPLINK controller, only the roles Standalone and Slave can be set.

2.3.2 Role-specific settings of the proxy master

Once a GRIPLINK controller has been configured as a proxy master, other GRIPLINK controllers can be adopted to the seven slots, provided that they have also been configured as proxy slaves. To do this, click on the **+** button in the row of the desired slot (see Figure 3).

The screenshot displays the web interface for configuring a proxy master. On the left, a blue sidebar contains a main menu with 'PROXY' selected, and a sub-menu with 'Overview', 'Settings', 'Proxy', 'Robot', 'Log', and 'About'. Below the menu, device information is shown: Device type (GRIPLINK-ET4), Serial number (63), Device tag, and Robot status (Not connected).

The main content area is titled 'PROXY' and is divided into two sections:

- BASE CONFIGURATION:** This section defines the proxy role. It lists three roles: **STANDALONE** (accepts connections from any device), **MASTER** (receives commands directly from the robot controller), and **SLAVE** (accepts connections only from the assigned proxy master). A dropdown menu is currently set to 'MASTER', and a 'CHANGE' button is located below it.
- SPECIFIC CONFIGURATION:** This section is titled 'CONFIGURATION OF PROXY SLOTS' and contains a table with 6 rows, representing slots 0 through 5. Each row shows the slot number, the device name '(Empty)', and a blue '+' button to the right, indicating that no devices are currently assigned to these slots.

Figure 3: Configuration of the proxy master

In the dialog box that opens, you can now enter the IP address of the slave to be adopted. Clicking on "Adopt" starts the adoption process (see Figure 4).

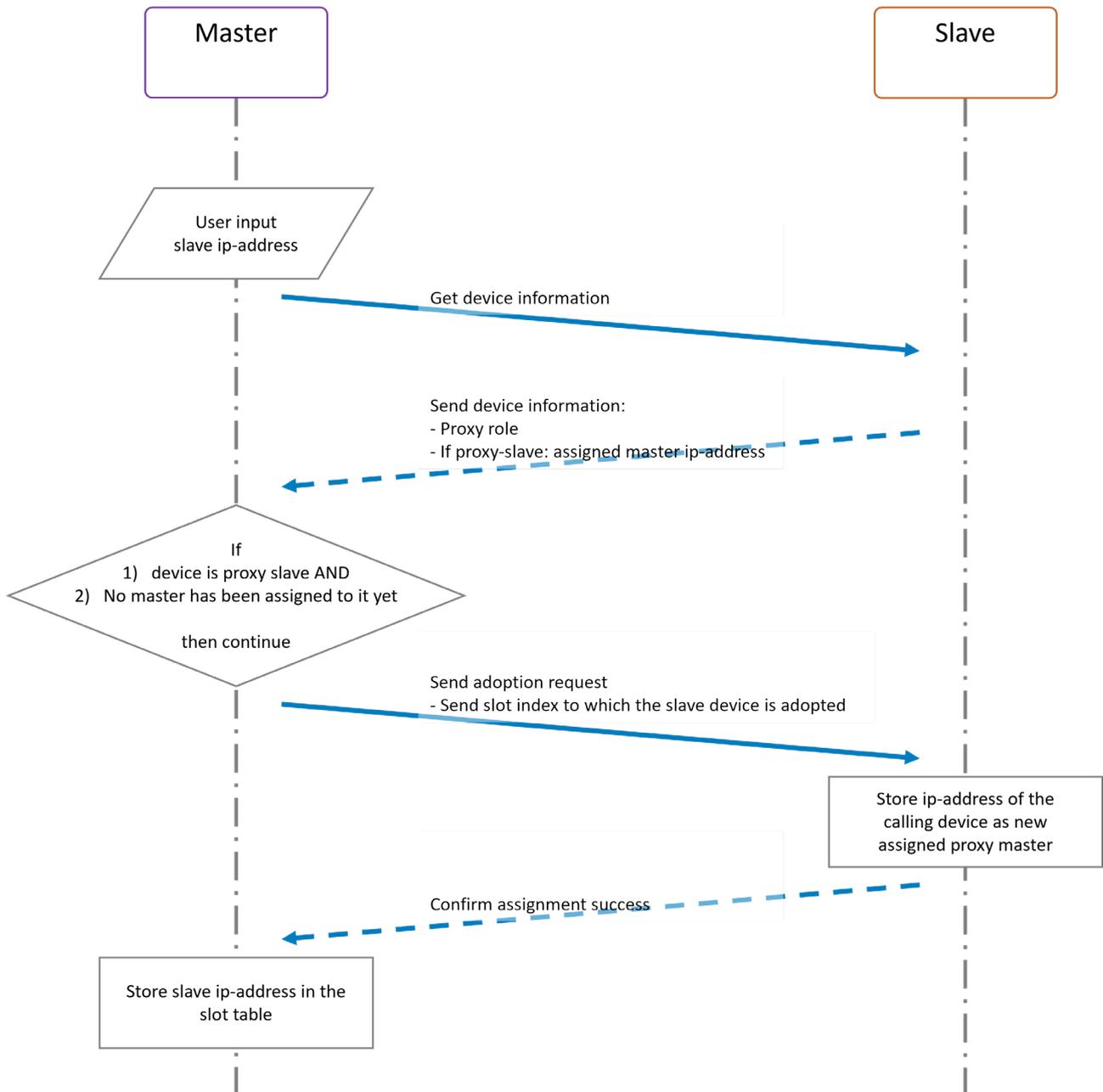


Figure 4: Slot adoption process

Once a slave has been successfully adopted to a slot, a new entry appears in the table (see Figure 3). The slave's web interface can be opened using the  button. The  button queries the slave's device information and displays it in a dialog box (see Figure 5).

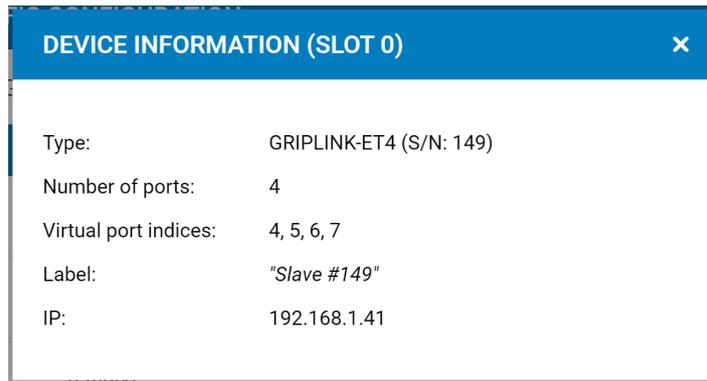


Figure 5: Device information of an adopted slave

If the configuration of the slave changes, for example, if the controller is reconfigured, error messages appear in this dialog box.

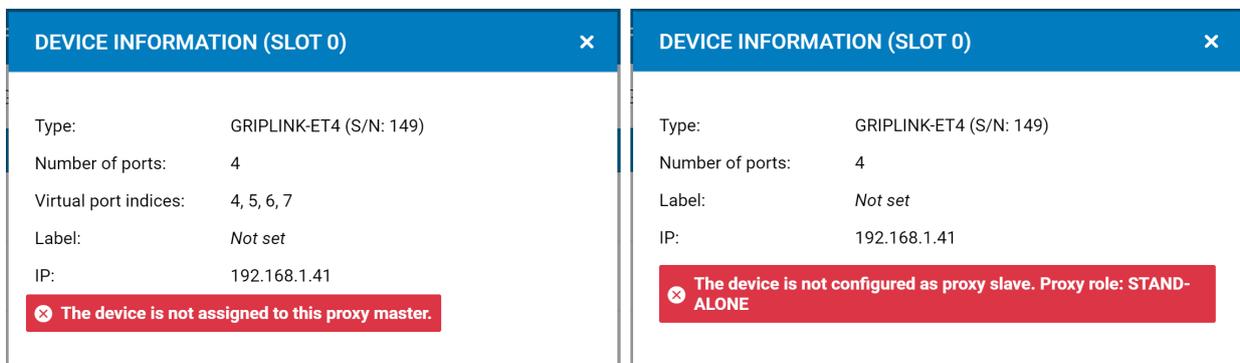


Figure 6: Information about adopted devices with errors

To delete an existing adoption, use the  button. After confirming the dialog box that opens, the system first attempts to reset the assigned proxy master in the slave. Regardless of the success of the previous step, the adoption is then deleted from the slot table of the proxy master.

2.3.3 Role-specific settings of the proxy slave

A GRIPLINK controller configured as a proxy slave initially does not display any input options in the configuration settings (see Figure Figure 7).

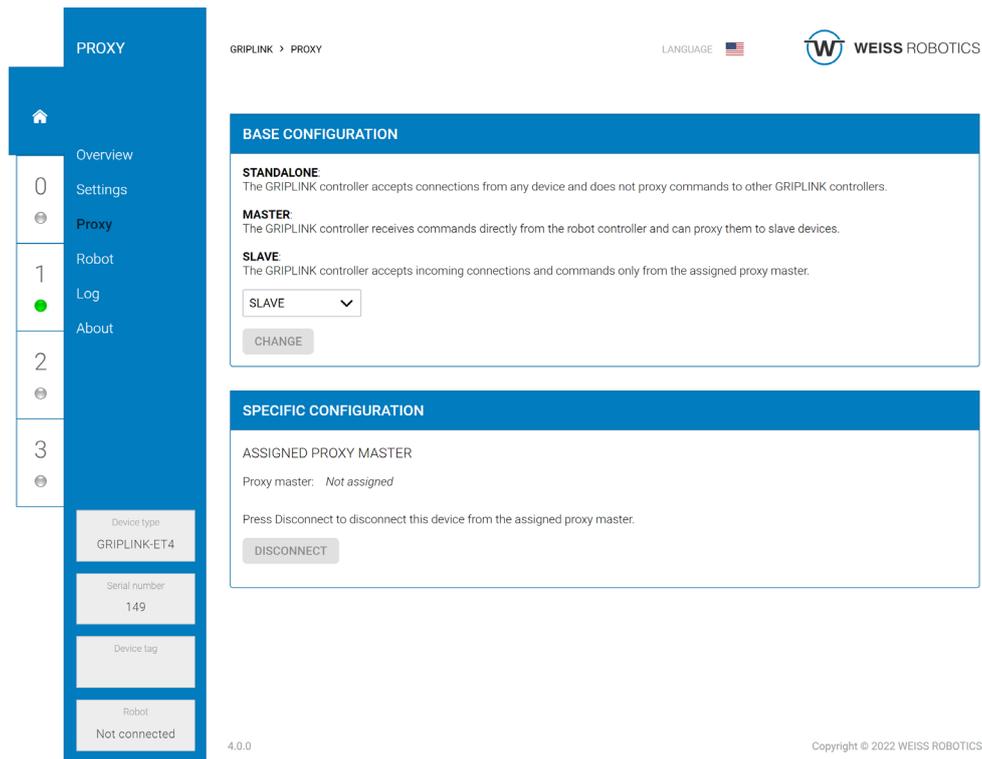


Figure 7: Configuration of the proxy slave

If a master has been assigned through slot adoption, the "Disconnect" button is activated and the IP address of the proxy master is displayed (see Figure 8). The web interface of the master can be opened via the  button. The assignment of the proxy master can be reset with the "Disconnect" button. However, the adoption in the master is not reset; this must be done separately via the master's web interface.

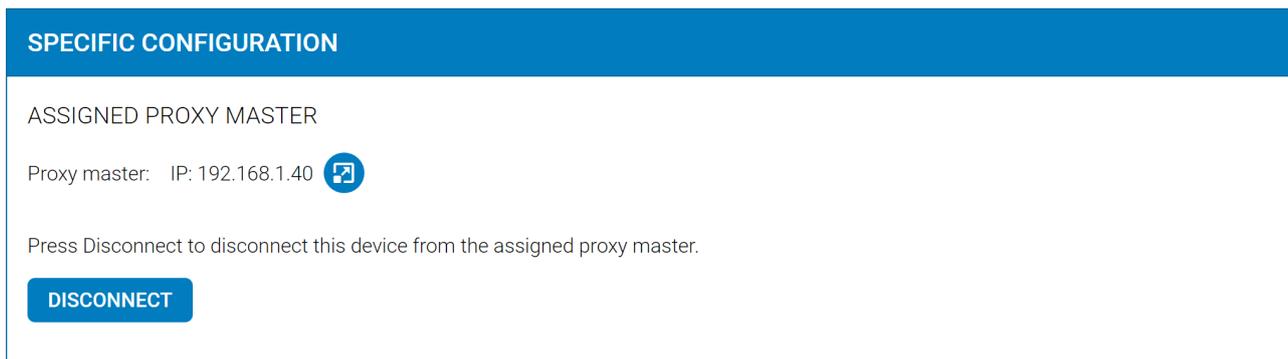


Figure 8: Successfully assigned proxy master

2.4 Example 1: Combination of GRIPLINK-ET4 and WPG 300-120

The proxy functionality allows the GRIPLINK-ET4 interface converter and the WPG 300-120 gripper module to be linked in a common application. This allows, for example, sensors on the GRIPLINK-ET4 and the WPG 300-120 to be operated as an actual gripper module on the robot.

The graphic in Figure 9 shows a GRIPLINK-ET4 as a proxy master with four IO-Link-capable devices on ports 0 to 3. A WPG 300-120 (slave 0) has been adopted at slot 0, which can be regarded as a virtual port. Another GRIPLINK-ET4 (slave 1) has been adopted at slot 1, to which four additional IO-Link-enabled devices can be connected.

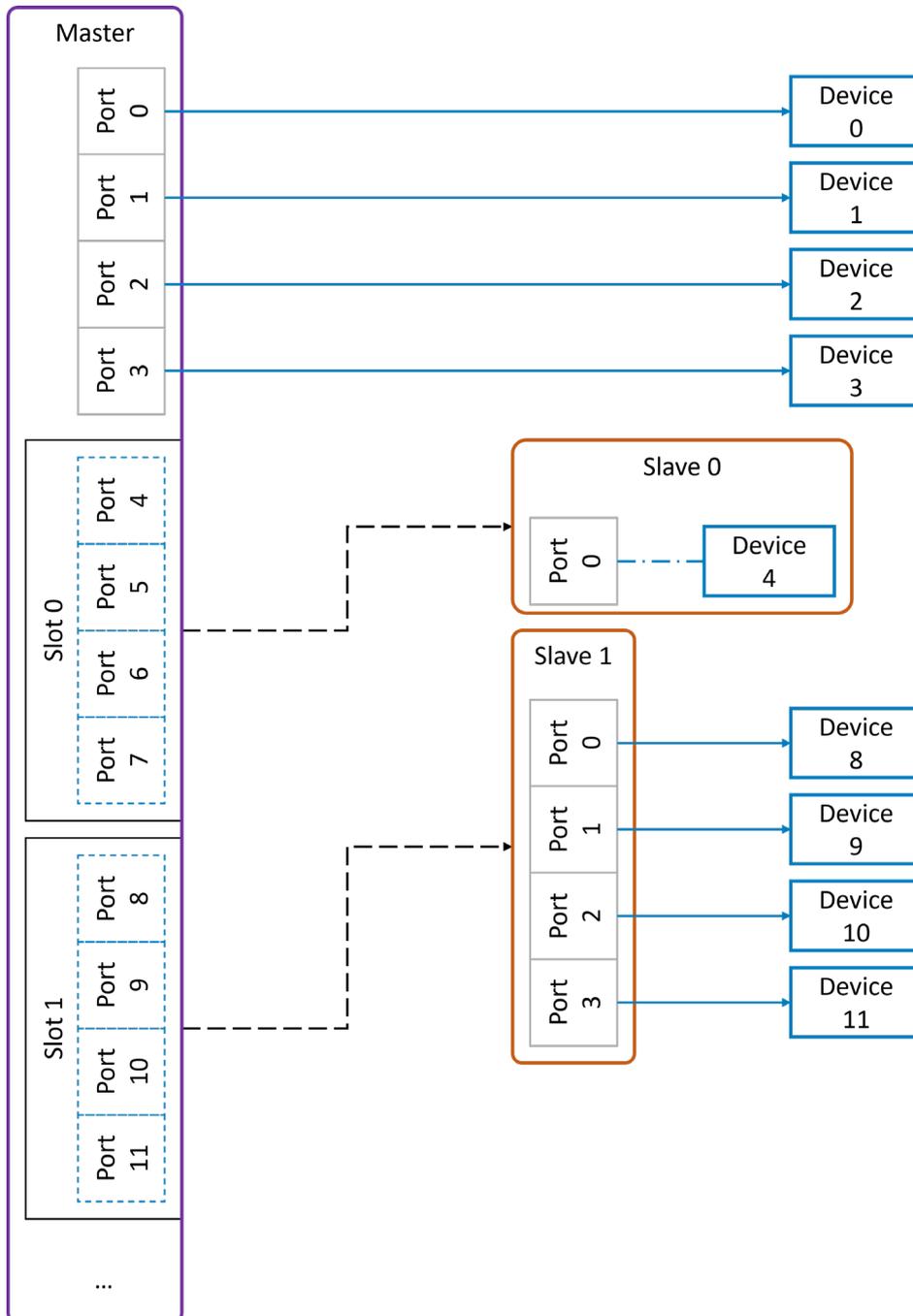


Figure 9: Combination of GRIPLINK-ET4 and WPG 300-120 in a proxy network

3 Licenses

The OPT-GL-PROXY license option is required for operation as a proxy master.

4 Troubleshooting

4.1 No communication with the GRIPLINK controller

| Possible cause | Remedy |
|---|---|
| Power supply interrupted | <ul style="list-style-type: none">• Check power supply |
| No connection, Ethernet LED not lit | <ul style="list-style-type: none">• Check communication cable and connections |
| No connection, but Ethernet LED is lit | <ul style="list-style-type: none">• Check the IP settings of the controller. The GRIPLINK controller must be in the same subnet as the controller/PC. |
| GRIPLINK is in UPDATE mode (LEDs flash alternately red and green) | <ul style="list-style-type: none">• Module is in UPDATE mode. Switch to the web interface and upload the latest firmware.• If UPDATE mode was not actively started: Disconnect the power supply and restart the GRIPLINK controller. |

4.2 No communication with the connected device

| Possible cause | Remedy |
|--|---|
| Operating voltage too low or power supply insufficient | <ul style="list-style-type: none">• Check the power supply• Check the maximum power consumption of the connected device |
| Connection is not fully established (port LED flashes GREEN) | <ul style="list-style-type: none">• Check communication cable and connections• Check compatibility• Check device version |
| Device is not supported (port LED lights up RED) | <ul style="list-style-type: none">• Check compatibility• Check device version• Check the version of the GRIPLINK controller firmware |
| Driver error (port LED flashes RED) | <ul style="list-style-type: none">• Check device version• Check the version of the GRIPLINK controller firmware |
| Overcurrent, overtemperature, or connection error (port LED flashes RED rapidly) | <ul style="list-style-type: none">• Check communication cable and connections• Check the current consumption of the connected device• Remove devices and allow GRIPLINK controller to cool down |

4.3 GRIPINK controller reports a port error

The port LED is lit or flashing red.

| Possible cause | Remedy |
|---|---|
| Connected device is not supported (port LED lights up red) | <ul style="list-style-type: none">• Check compatibility• Check device version Check the version of the GRIPLINK controller firmware |
| Driver error (port LED flashes red) | <ul style="list-style-type: none">• Check device version• Check the version of the GRIPLINK controller firmware |
| Overcurrent or connection error (port LED flashes red rapidly) | <ul style="list-style-type: none">• Check communication cable and connections• Check the current consumption of the connected device |

4.4 GRIPINK controller reports an error

The status LED is lit or flashing red.

| Possible cause | Remedy |
|---|--|
| Error in command format (Status LED lights up RED upon receipt) | An error occurred while evaluating the incoming command. <ul style="list-style-type: none">• Check the version of the GRIPLINK controller firmware• When using an official GRIPLINK plugin: Ensure that the version of the GRIPLINK plugin is compatible with the version of the GRIPLINK firmware.• When using your own software: Check the protocol conversion |
| Malfunction of a component (Status LED flashes RED continuously) | At least one component of the controller that is required for operation could not be initialized. <ul style="list-style-type: none">• Restart the GRIPLINK controller. If the error persists, send in the GRIPLINK controller for repair. |

5 Errata

| Revision | Description | Date |
|----------|------------------|------------------|
| 1.0 | Document created | December 5, 2022 |

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