SKAARHOJ

ETH-GPI Link

User Manual

October 22, 2025
SKUs: ETH-GPI-LINK-V2
Language: English

I Disclaimer

Before using this product, please read and fully understand all instructions provided. This product is classified as Class A equipment and is intended for use by commercial customers only. It is not suitable for residential use and may cause interference in residential environments.

For the most up-to-date specifications, refer to the latest SKAARHOJ data sheets or publications. Availability of products and types may vary by country —please check with a SKAARHOJ sales representative for details.

The information in this document is subject to change without notice. While SKAARHOJ strives to ensure the quality, reliability, and safety of its products, defects cannot be entirely ruled out. To minimize risks of damage or injury, customers must implement appropriate safety measures and follow the intended use guidelines.

SKAARHOJ and its subsidiaries disclaim any liability, warranty, or responsibility for claims, whether in contract, tort, or any other legal theory. SKAARHOJ shall not be liable for any special, direct, indirect, incidental, or consequential damages, including lost profits, revenues, or economic losses, or for third-party claims, equipment replacement, or any other damages.

SKAARHOJ does not assume liability for patent, copyright, or intellectual property infringement arising from the use of its products. No license or rights are granted under any patents or intellectual property of SKAARHOJ or third parties.

If any of the above clauses are not permitted by applicable law, they will be enforced to the maximum extent allowed.

II Imprint

The source language of this manual is English. Translations into other languages are derived from the English version.

For further assistance:

SKAARHOJ ApS
Rosenkaeret 11C
DK-2860 Soeborg
Denmark
Email: info@skaarhoj.com
Website: www.skaarhoj.com

II.1 Trademarks

III Document Legends

This section explains the meaning of various alert levels and informational notes used throughout this document. Each label serves as a guide to indicate the level of attention required and the type of risk involved. Please review these legends carefully to ensure a clear understanding of the warnings, cautions, and helpful tips provided.

Danger

DANGER indicates an imminent hazard. Failure to avoid it will result in death or serious injury. Always follow the recommended actions to prevent this danger.

Warning

WARNING indicates a potential hazard. Failure to avoid it may result in death or serious injury. Always follow the recommended actions to prevent this risk.

Caution

CAUTION indicates a possible hazard. Failure to avoid it may result in minor or moderate injuries. Always follow the recommended actions to prevent this hazard.

Notice

NOTICE indicates a potential risk of equipment or environmental damage. Always follow the recommended actions to avoid damage.

Hint

HINT provides additional information to clarify or simplify a procedure. It is not related to safety.

Contents

1 About this Document

This operating manual is intended for all users of the SKAARHOJ ETH-GPI Link. It provides essential guidelines for safe and proper operation of the device. All users must read this manual before using the device for the first time to ensure correct usage.

The manual is an important part of the ETH-GPI Link and should be kept easily accessible, close to the device for reference at any time.

For more detailed information about the device's features and functionality, please refer to additional instructions available for download at www.skaarhoj.com or request them via support@skaarhoj.com.

Ensure that the operating manual, user manual, and any other relevant documentation are stored safely for future reference and for any potential future users of the device.

For more resources and helpful information, visit the SKAARHOJ website.

SKAARHOJ offers comprehensive training courses to provide deeper insights into maximizing the potential of SKAARHOJ products.

2 Safety Information

This safety information supplements the specific operating instructions and must be strictly followed. Before operating or installing the device, read and understand all safety and operating instructions. Keep these instructions for future reference. Always follow the guidelines in this and any other documentation provided to avoid injury or damage to the device and surrounding objects.

Assembly and operation should only be performed by trained personnel familiar with the device. Use only the recommended tools, materials, and procedures outlined in this document. For other equipment, refer to the manufacturer's instructions.

Safety instructions, warning symbols, and signal words in this document highlight different levels of risk.

Caution

Using ETH-GPI Link in Humid Environments with Condensation
When moving the device and its accessories from a cool to a warm location, or when used in a damp environment, condensation may form inside the device and on electrical connections. Do not operate the device while condensation is present, as it poses a risk of electric shock and fire due to short circuits.

- Do not use the device or accessories if condensation occurs.
- After moving the device from a cool to a warm environment, allow time for the components to warm up.
- Store the device in a warmer location to reduce the risk of condensation.

Warning

Connected Cables on the Floor
Risk of injury from tripping, falling, or slipping over connected cables.

- Always secure cables connected to the device and accessories properly.
- Install cables in a way that prevents tripping.
- Use a cable duct or secure cables with adhesive tape if necessary.
- Always disconnect cables from the device and accessories before moving them.

3 About ETH-GPI Link

A must-have in any control room and OB van/truck. Designed to seamlessly connect and control a wide range of broadcast devices. Featuring 8 general purpose inputs and 8 general purpose outputs, this versatile converter offers precise control over signal routing, tally control, switching, utility and integration with popular systems like Blackmagic ATEM switchers, AJA KUMO and Grass Valley Routers, RCP controllers, tally lamps and many more. ETH-GPI can be also used as GPIO extension and distribution over standard LAN network.

With ETH-GPI Link you enjoy benefits such as

- 2x8 channels of I/O capabilities, covering all basic needs in most situations.
- Flexible control over a wide range of devices with digital I/O, enhancing production capabilities
- Raw Panel protocol connects it easily to Blue Pill Inside devices, providing unlimited connectivity options.
- Quick and intuitive parameter setup via UniSketch OS, saving time and effort
- Electrical isolation of inputs/outputs ensures reliability and device safety
- Adaptable to various production environments with open collector and relay output compatibility

3.1 Feature Highlights

- Control popular broadcast devices with ease
- 8 GPI and 8 GPO ports, fully isolated
- User-friendly configuration
- Durable build with dual DB25 connectors
- Micro USB port for configuration and updates
- 100M Ethernet w/Power over Ethernet (PoE IEEE802.3af/t)
- Designed and manufactured in Denmark

3.2 Intended Use

Notice

Intended Use of ETH-GPI Link
All versions of ETH-GPI Link, and accessories are intended for professional use only and must be operated by skilled and trained personnel in non-domestic environments. They must not be used by inexperienced individuals without proper training.
Before use, carefully read and understand both the operating and user manuals. Use the product and its accessories solely for the purposes outlined in this document. Always follow the safety instructions and system requirements for all equipment involved.
SKAARHOJ assumes no liability for damages or modifications resulting from improper use. Modifying the product or its accessories is strictly prohibited.

3.3 Product Identification

The ETH-GPI Link is identified by a label located on the bottom of the device. This label contains important information such as certification marks, product code, and the serial number. Ensure this label remains intact for future reference and support.

3.4 Environmental Conditions

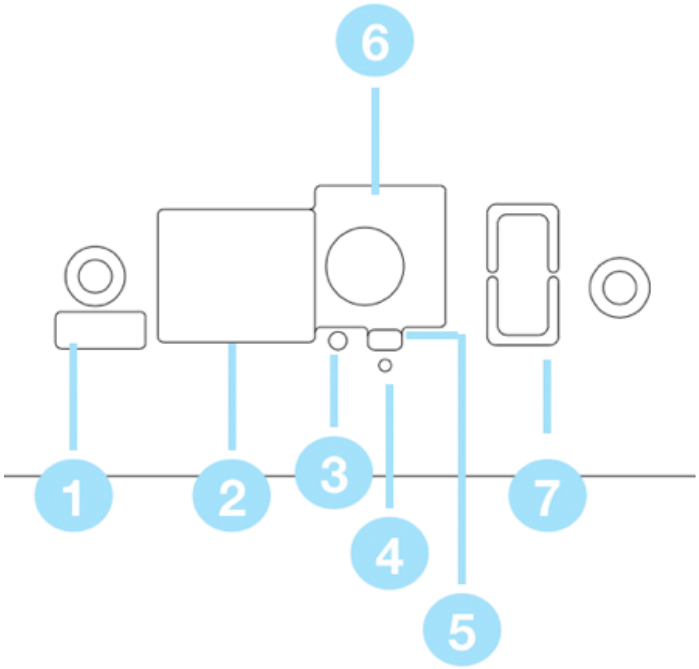
The ETH-GPI Link must be used and stored under specific environmental conditions. Before commissioning and operation, ensure the following conditions are met:

Operating Temperature	0° C to +40° C / +32° F to +104° F
Storage Temperature	-20° C to +45° C / -4° F to +113° F
Humidity	90% RH, non-condensing, from -20° C to +45° C

3.5 Technical Data and Dimensions

3.5.1 Standard Connections

On most SKAARHOJ products, you will find the following cable connections on the backside:



- **1:** Micro USB Port for serial communication with SKAARHOJ Firmware Updater
- **2:** IP Network RJ45 Port for IP control and 5W-30W PoE (+)/PoE Standard: IEEE 802.3af/t
- **3:** Status LED for monitoring and debugging
- **4:** Not used on Blue Pill Inside products.
- **5:** Config Button to enable WiFi Access Point. See WiFi Access Point section
- **6:** 12V DC Power Supply for connection to the supplied DC power adaptor. Center is positive.
- **7:** USB-A Port. Only available on some models for attachment of accessories.

Notice

- Use only shielded Cat6 (STP) cables for Ethernet connections.
- Ensure that your Ethernet switch is properly connected to a protective earth ground.
- All cables, except Ethernet and GPI cables, must be shorter than 3 meters.
- If applicable: The USB-A port's power is not included in the product's maximum power rating. If near maximum load, use a powered USB hub to prevent the USB-A port from impacting the overall power budget.

3.5.2 Protective Earth

Proper grounding of the device in its installation space is highly recommended. In most cases, grounding the unit through a shielded Ethernet cable connected to a properly grounded switch will suffice. However, to fully comply with all immunity standards, more direct grounding may be necessary. If required, attach a protective earth ground wire to the screw located just above the Micro USB port.

3.5.3 Technical Drawing

Figure 1 presents a detailed technical drawing of ETH-GPI Link, highlighting key dimensions and design elements.

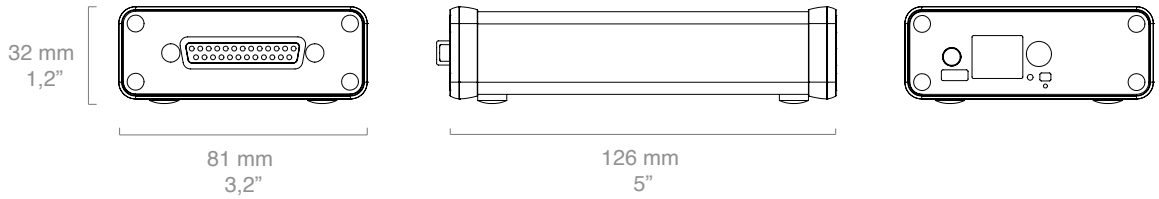


Figure 1: Technical drawing of ETH-GPI Link with key dimensions and layout details.

3.5.4 Technical Data

Technical data for ETH-GPI Link are presented in Table 1.

Hardware Specifications	
Component Highlights	8+8 channels GPIO (8 opto-isolated inputs / 8 relay outputs)
Connectivity	
Networking	100 Mbit Ethernet w/Power over Ethernet (PoE IEEE802.3af)
Power Supply	12V DC Jack 5.5mm x 2.1mm x 10mm Center Positive PoE IEEE802.3af/t
Service Port	Micro USB for updating firmwares and setting manual IP
Software	
Platform	Link IO
Licenses	N/A
Physical and Shipping	
Product Weight	216 g
Shipping Box Weight	528 g
Country of Origin	Denmark

Table 1: Detailed specifications and technical characteristics for ETH-GPI Link

3.6 Scope of Delivery and Warranty

Notice

Important Information:
The packaging materials are recyclable. To contribute to environmental sustainability, please dispose of the packaging at a certified recycling facility. Ensure that all storage, shipping, and disposal comply with local regulations. SKAARHOJ assumes no responsibility for any consequences arising from improper storage, shipping, or disposal of the product.

Upon receiving the delivery, carefully inspect the package and its contents for any signs of damage or missing components. Do not accept the delivery if the package is damaged or incomplete. The package should contain the following items:

- (This Product)
- 12V Power Supply: Manufacturer: PHIHONG, Model Name: PSA15R-120P, Output: 12V/1.25A, Cable Length: 1.5m, Adapter type: EU, GB, US, AU depending on shipping country, DC Output Connector: 5.5mm x 2.1mm x 10mm Center Positive
- Micro USB Cable
- Getting Started Guide

For details regarding the warranty, please contact your local SKAARHOJ Service Partner. SKAARHOJ is not liable for any issues arising from improper shipping, misuse, or the use of unauthorized third-party products.

3.6.1 Recommended Accessories

- Ethernet Cable: Cat 6 S/FTP or better

3.7 Certification and Safety Standards

3.7.1 EU Declaration of Conformity

CE

Brand Name	SKAARHOJ
Product Description	Universal Control Panel ETH-GPI Link

4 Getting Started with Link IO

4.1 Quick Steps

Getting started with ETH-GPI Link - your new Link IO accessory - is straightforward. The first step is to access its web interface. Follow these steps:

- **Connect the Link IO Device:** Plug a Cat6 (STP) or better Ethernet cable into your SKAARHOJ Link IO device and ensure it is connected to your local network.
- **Download SKAARHOJ Discovery:** Download the SKAARHOJ Discovery application from `www.skaarhoj.com`, then launch the application from your Mac or PC on the local network.
- **Connect via USB (if needed):** If the device does not appear automatically in Discovery, connect it directly to your Mac or PC using a USB cable.
- **Set IP Address:** In SKAARHOJ Discovery, switch to the On USB tab. Select your device, click the Change IP Address button, enter a valid IP address, and click Save.
- **Access the Web Interface:** Once your device has a valid IP address, it will appear under the On Network tab with an Open button. Click Open to launch the device's Web UI.

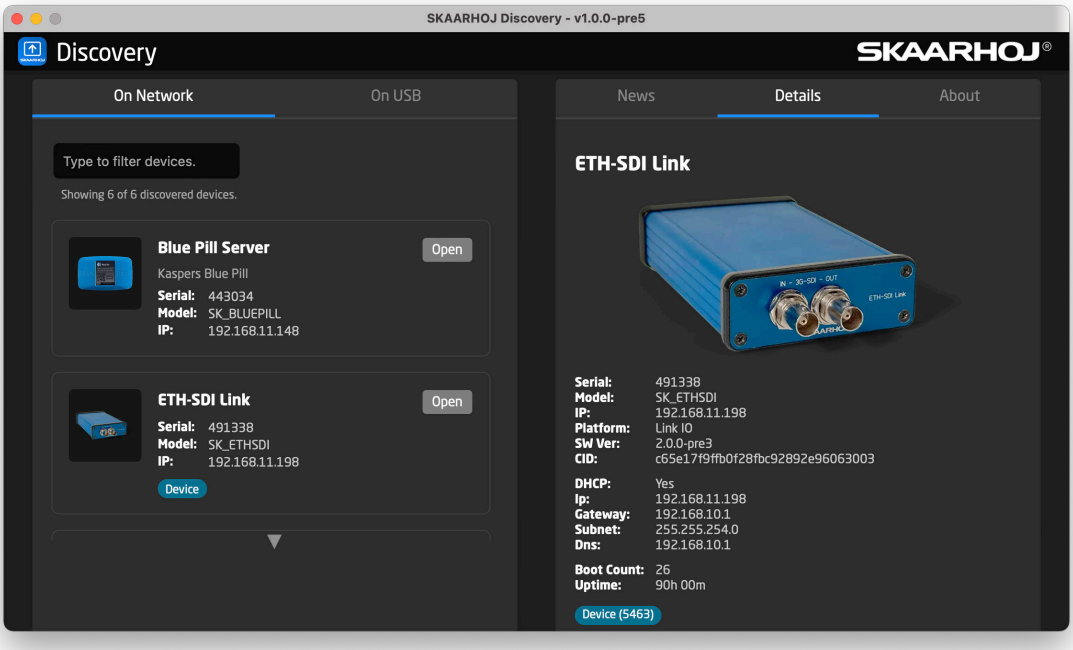
Notice

Screenshots from other Link IO Accessories
In this Getting Started section, some screenshots and illustrations may show other products from the Link IO Accessory series. This is because these devices share the same web interface and follow the same procedure for initial setup as the ETH-GPI Link.
While the appearance of the screenshots may differ slightly depending on the specific accessory, the steps and configuration principles are identical. Additional device-specific tabs (such as Raw Panel, TSL, HTTP, etc.) are covered in subsequent chapters.

4.2 SKAARHOJ Discovery

When you launch the SKAARHOJ Discovery application, it automatically scans your local network for connected SKAARHOJ devices. If DHCP is enabled, the Link IO device will obtain an IP address automatically out of the box, and SKAARHOJ Discovery will display it in the device list. In the example below, the Link IO accessory is an ETH-SDI Link. Clicking on the device will display details on the right side of the screen.

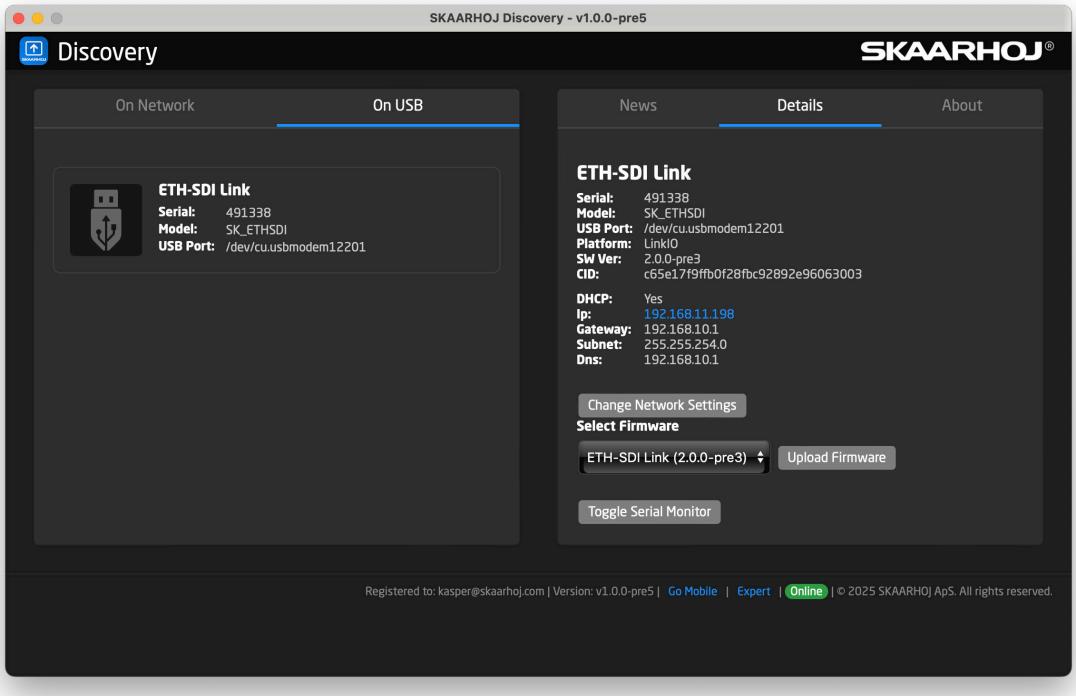
You can also click the Open button for the device to launch its web interface, where you can set IP addresses and configure device-specific settings.



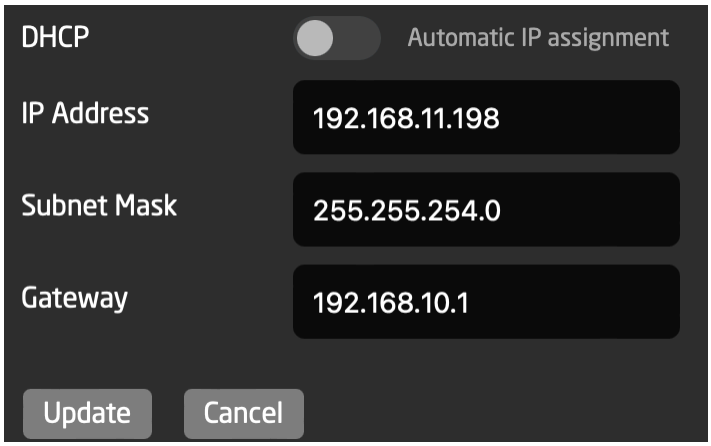
In some cases, your Link IO device may appear in the Network tab but be grayed out, with no Open button available. This can happen if the device has an invalid IP address (e.g., `0.0.0.0`) or an unreachable static IP. In that case, connect the device to your computer via Micro USB and assign a new IP address using the USB connection.

4.3 Configuration via USB

Connect the Link IO device to your computer using a Micro USB cable. Launch the SKAARHOJ Discovery application and switch to the On USB tab. Your device should appear in the list. Select it, then click the Change Network Settings button.



In the fields that appear, enter a static IP address for the device. Make sure to choose an address that is valid for your network and does not conflict with other devices.



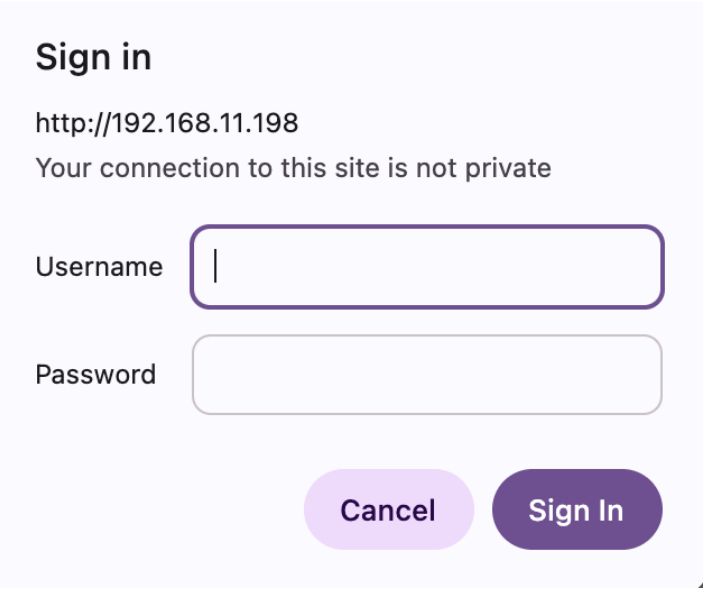
After entering the desired IP address, click the Update button. The new settings will be applied and the device will reboot. Once the update is complete, switch back to the On Network tab to see your device listed with its new IP address.

Caution

Leaving the device connected to USB
Keeping your ETH-GPI Link connected to a computer via USB may cause the device to become frozen or non-functional if the computer enters sleep mode while the USB connection is active. The exact behavior can depend on the operating system and other factors. While there are legitimate cases for maintaining an active USB connection, it is recommended to disconnect the USB cable after configuring the device in standard service use.

4.4 Accessing the Web Interface

Once your Link IO device has a valid IP address, it will appear in the On Network tab of the SKAARHOJ Discovery application. Click the Open button next to the device to launch its web interface in your default web browser.



You will be prompted to enter a username and password. The default credentials are:

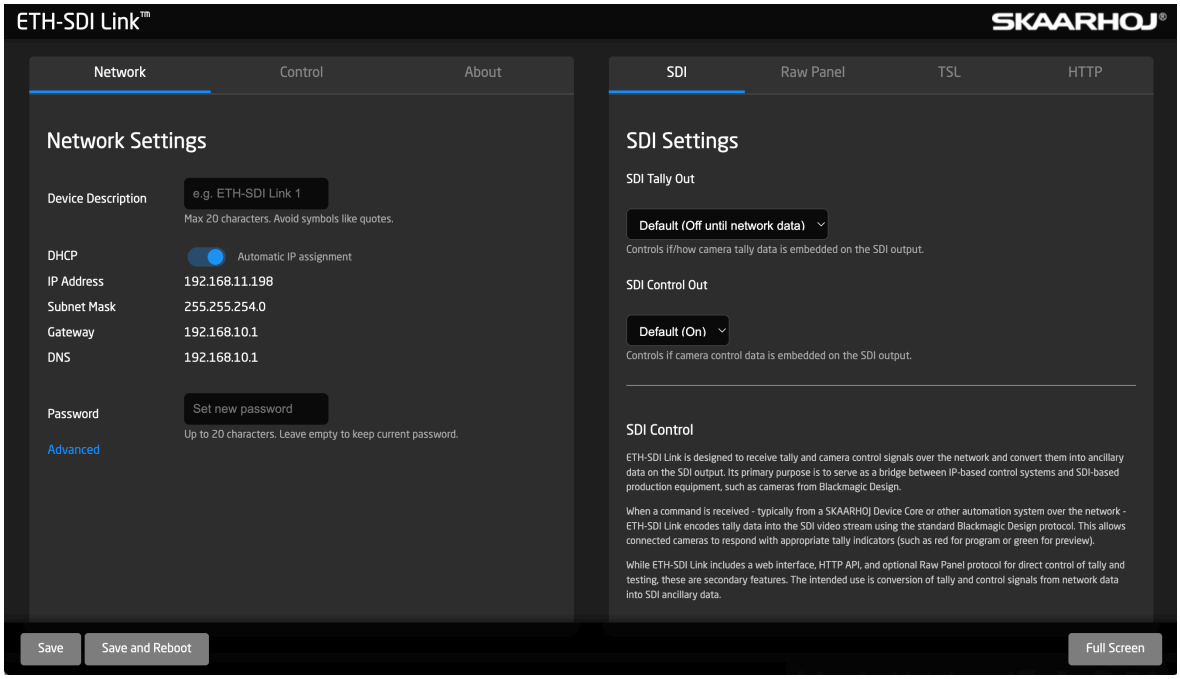
- **Username:** admin
- **Password:** skaarhoj

Caution

Unencrypted Login Credentials
The username and password are transmitted in **unencrypted form** when accessing the Link IO Web UI:

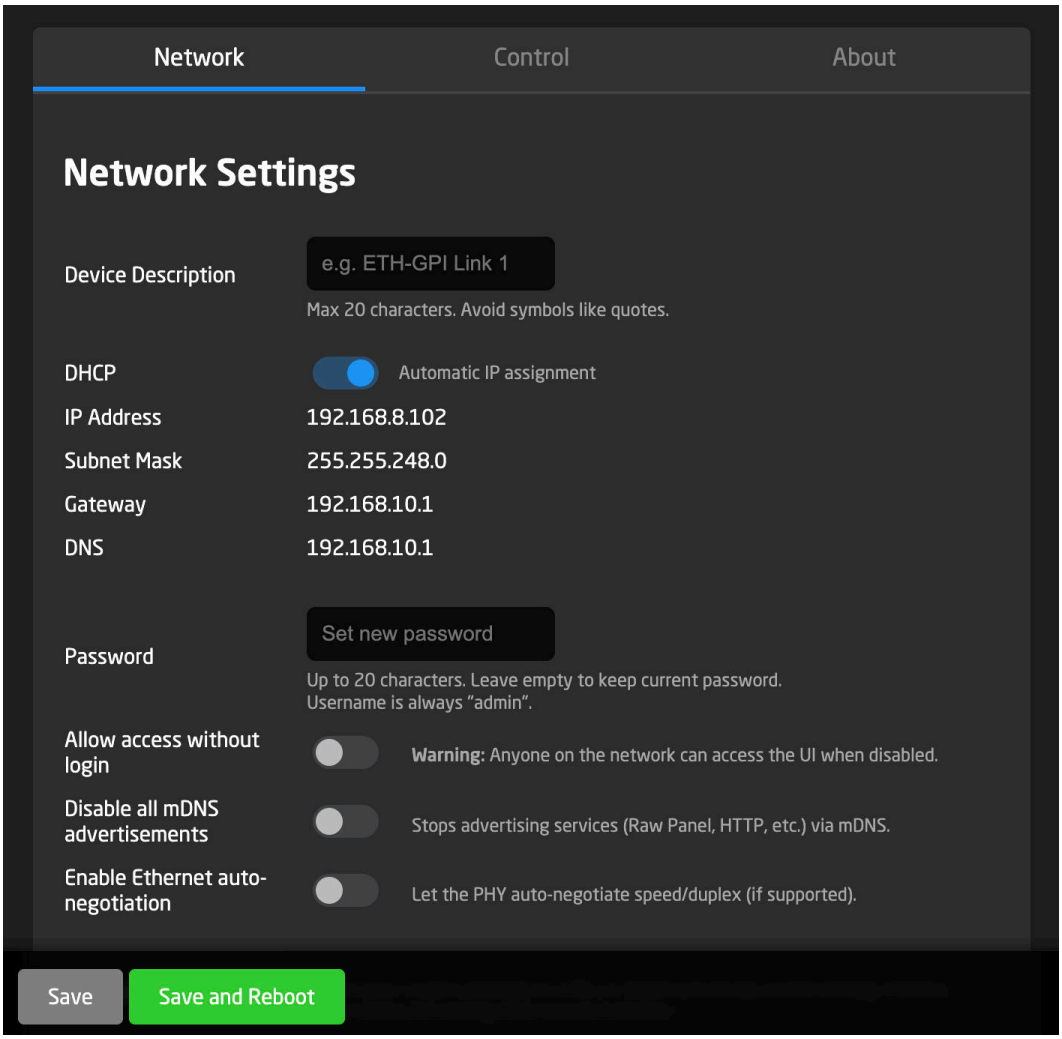
- **Use only on trusted local networks.**
- **Do not expose the device directly to the internet** without proper network safeguards (e.g., VPN or firewall).
- **Be aware of potential security risks** if used on untrusted or public networks.

After logging in, you will see the main dashboard of the Link IO device. From here, you can configure network settings and other device-specific parameters. Below is an example of the dashboard interface from the Link IO device called ETH-SDI Link.



4.4.1 Network Settings

The **Network** tab allows you to configure how your Link IO device connects to your local network. Some of these settings could also be configured via the SKAARHOJ Discovery application over USB. You can assign a static IP address, enable or disable DHCP, and adjust related options for reliable communication.



The following options are available:

- **Device Description:** Enter a custom name (up to 20 characters) for your device. This helps you identify it in SKAARHOJ Discovery or other network tools.
- **DHCP (Automatic IP Assignment):** When enabled, the device requests an IP address from your network's DHCP server (e.g., your router). Disable this option to set a fixed static IP address manually.
- **IP Address:** The unique network address of your device. If DHCP is disabled, enter a valid static IP address that matches your network range.
- **Subnet Mask:** Defines the network segment the device belongs to. For most local networks, this will be `255.255.255.0`.
- **Gateway:** The IP address of your network's default gateway (typically your router). This setting is required if the device needs to communicate outside of the local subnet.

- **Password:** Allows you to change the device's web interface password (up to 20 characters). Leave this field blank to keep the current password. The username is always "admin". See Advanced settings below for an option to disable password protection entirely.

There are also several advanced options available in the Network Settings tab:

- **Allow access without login:** When enabled, anyone on the network can access and configure the device without entering credentials. **Warning:** This is a security risk and should only be used on trusted, isolated networks.
- **Disable all mDNS Advertisements:** Stops the device from broadcasting its presence on the network via mDNS (Bonjour/ZeroConf). Useful in large installations where reducing network traffic is important.
- **Enable Ethernet Auto-Negotiation:** When enabled, the device automatically negotiates the best possible speed and duplex mode with your network switch. Historically, this has not been enabled in SKAARHOJ devices, but it is now available for compatibility with modern network equipment.

Once you have made the necessary changes, click **Save** to apply them, or **Save and Reboot** to restart the device with the new settings.

Notice

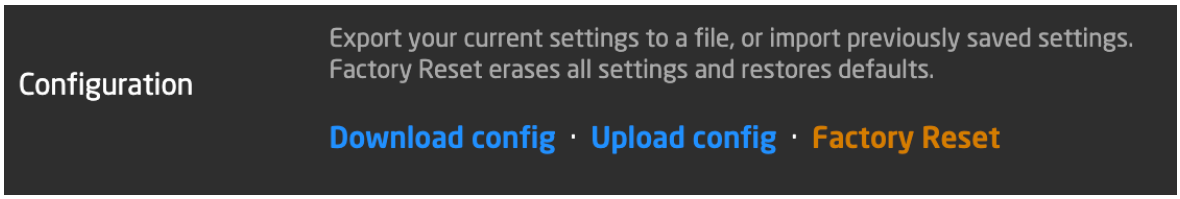
Save or Save and Reboot?
When you change settings in the Web UI, you can choose either **Save** or **Save and Reboot**:

- **Save:** Writes the new settings to the device's persistent memory. Some changes take effect immediately without requiring a reboot. This option is faster and suitable for parameters like labels or minor adjustments.
- **Save and Reboot:** Also writes the settings to persistent memory, but additionally restarts the device. A reboot is required for certain changes such as IP configuration, enabling or disabling network services, or changing communication ports. This option ensures that all changes are fully applied, but takes a little longer.

In general, the safe choice is **Save and Reboot**, but it is not necessary for every change you make in the Web UI. Mostly the UI will highlight the button that is recommended for the specific changes you have made.

4.4.2 Managing Configurations

Under the network settings, you can find options for managing device configurations. This allows you to back up your current settings, restore previous configurations, and reset the device to factory defaults.

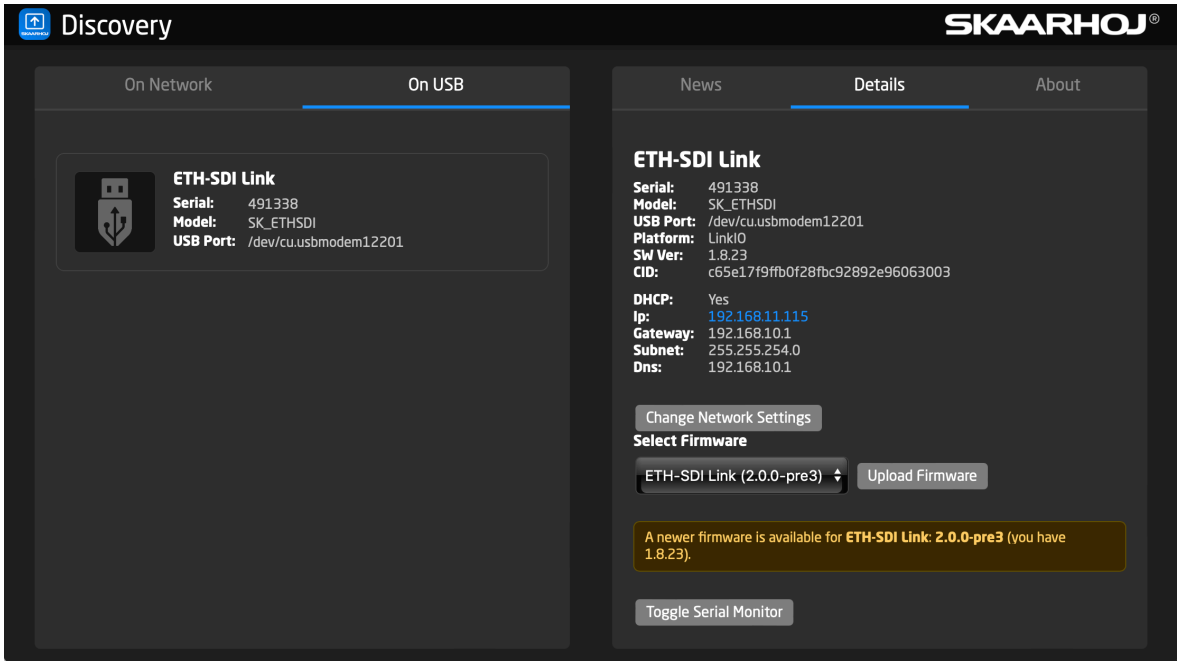


Clicking the link to back up your configuration will download a JSON file containing all current settings. The same file can be uploaded later to restore those settings. Advanced users can also edit the JSON file directly before uploading it back to the device. Restoring to factory defaults erases all custom settings except the network settings and returns the device to its original state.

4.5 Firmware Updates

4.5.1 New Firmware Releases

New firmware releases for the Link IO platform are announced through SKAARHOJ Discovery. When you open SKAARHOJ Discovery, it automatically checks for updates and notifies you if a new firmware version is available for your device. The application will then download the update and prompt you to install it when your device is connected via USB.

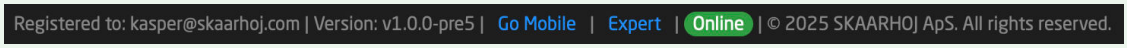


To install the update, simply click the Upload Firmware button. The new firmware will be transferred to your device.

After the update process finishes, the device will reboot automatically. If it does not, you may need to power cycle it by unplugging and reconnecting the device.

Hint

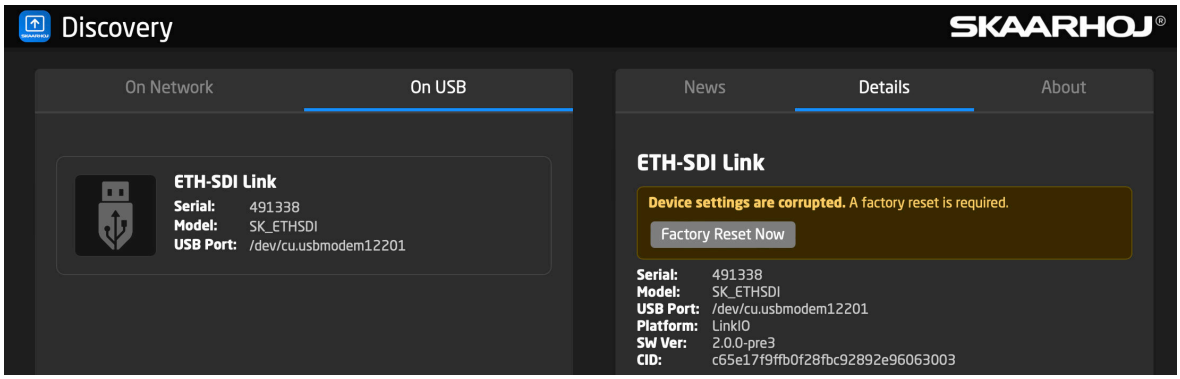
Not Online all the time?
SKAARHOJ Discovery requires an internet connection to download firmware updates. You must therefore be online - at least temporarily - during the update process. For all other interactions with your device, whether over network or USB, an internet connection is not required.
If you see a green badge in the footer of the Web UI, it indicates that your computer running SKAARHOJ Discovery is online and connected to the SKAARHOJ servers.



4.5.2 Factory Reset

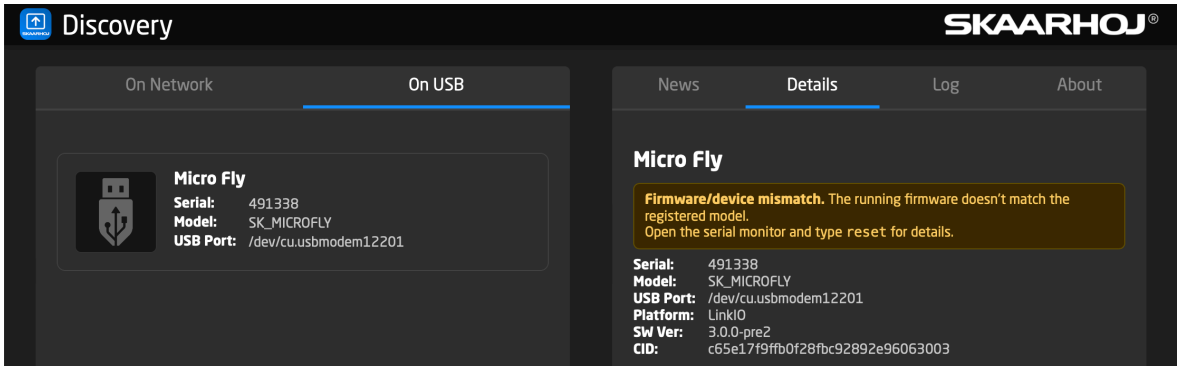
If you encounter issues with your device, a factory reset may be required. This restores the device to its original settings and erases all custom configurations. A factory reset can be performed in several ways:

- **From SKAARHOJ Discovery:** In the Details tab, click the Factory Reset button. It's shown if settings have become corrupted.
- **Using the Reset Button:** Hold down the Reset button on the device for 10 seconds. This resets all settings to defaults, including network configuration and any custom labels or parameters.
- **Via Serial Monitor:** Open the Serial Monitor in the Details tab of SKAARHOJ Discovery and type the command `_resetAll`. Be sure to close the Serial Monitor after performing the reset.
- **Via Web UI:** Open the web interface of ETH-GPI Link and go to the **Network** tab. In the Configuration Management section at the bottom of the page, click **Restore Factory Defaults**. This action resets all configurations except the network settings.

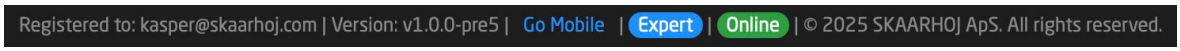


4.5.3 Wrong Firmware

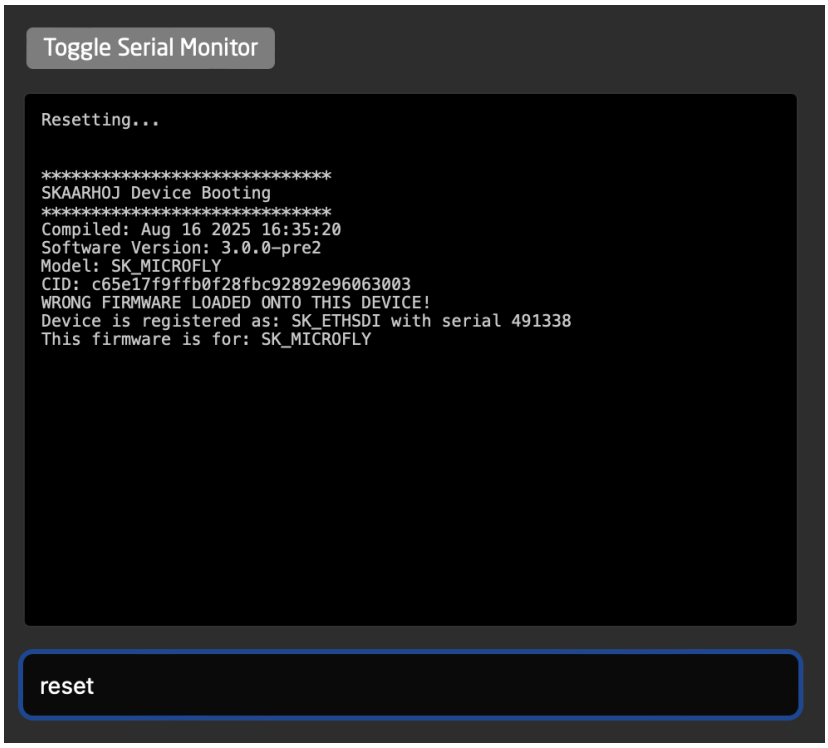
If the wrong firmware has been uploaded to your Link IO device, this will be indicated in SKAARHOJ Discovery.



In this case, first enable Expert Mode by clicking the link in the footer. Otherwise you cannot select other firmware types than the one currently installed.



Next, open the Serial Monitor and type `reset`, then press Enter. The device will reboot and display a message indicating the device type it is really registered as. Read the text carefully, as it will tell you which firmware type to select in the next step.

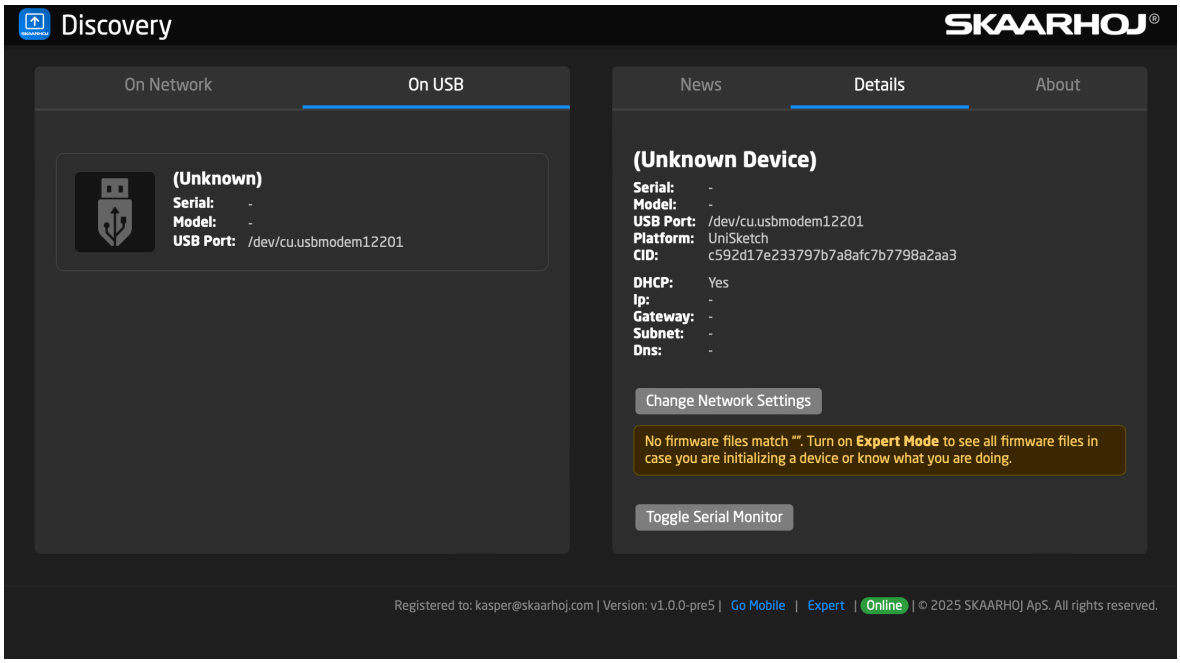


From the list of available firmware in SKAARHOJ Discovery, select the correct firmware for your device and click the Upload Firmware button. The device will reboot and be ready for use with the correct firmware installed.

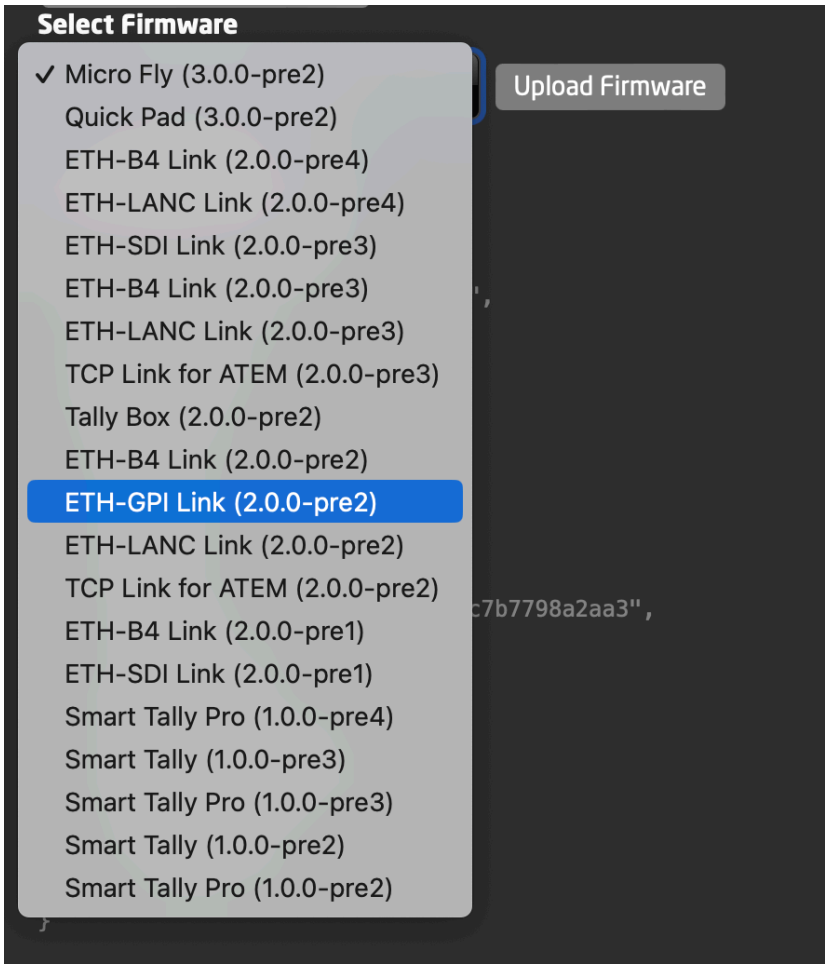
4.5.4 Upgrading to the Link IO Platform

If you wish to upgrade an eligible SKAARHOJ UniSketch or Link IO device to the Link IO platform, follow the steps below. The process requires registering the device on SKAARHOJ's servers, so you must be online during the upgrade. Registration is pending approval by SKAARHOJ and may be free of charge or require a fee, depending on the device and upgrade path.

When you first connect your device, it will appear as Unknown:

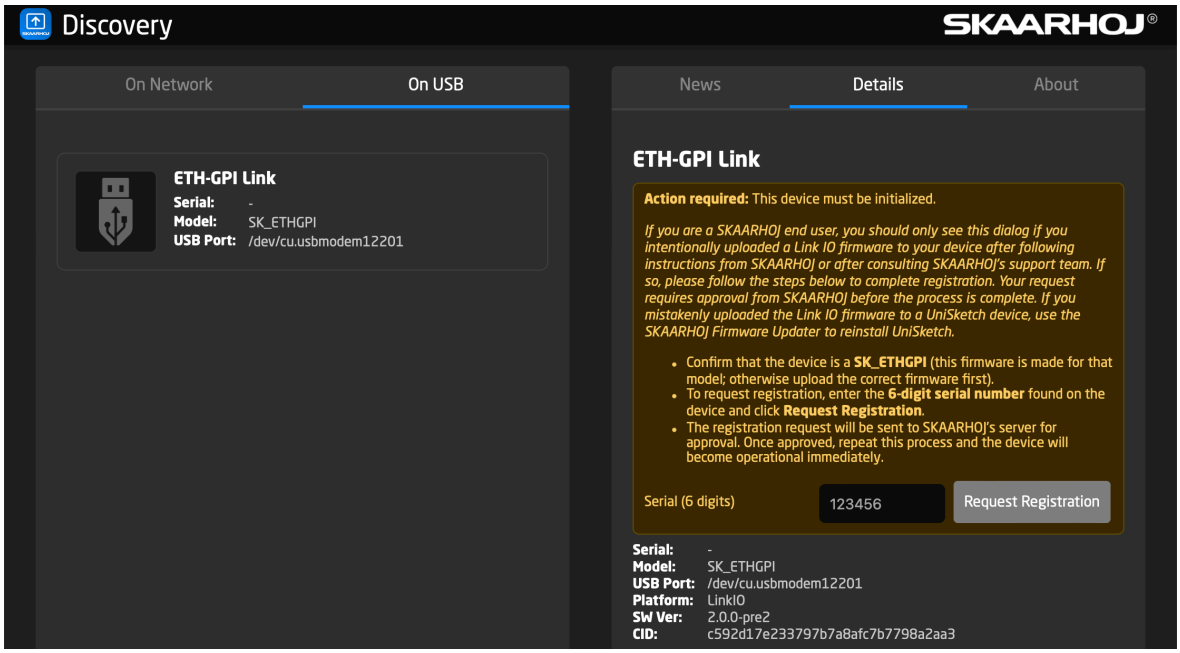


Enable Expert Mode by clicking the link in the footer. This will allow you to select any Link IO firmware type.

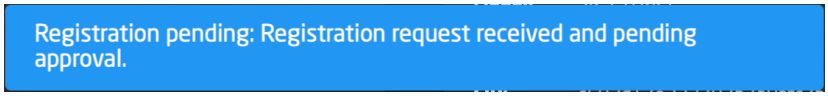


Carefully select the correct firmware type for your device. If you are unsure, contact SKAARHOJ Support for assistance. When you are ready, click the Upload Firmware button.

The device will reboot and display a message indicating that it is pending registration. Read the message carefully, and if you agree with its contents, enter the device's serial number and click the Register button.

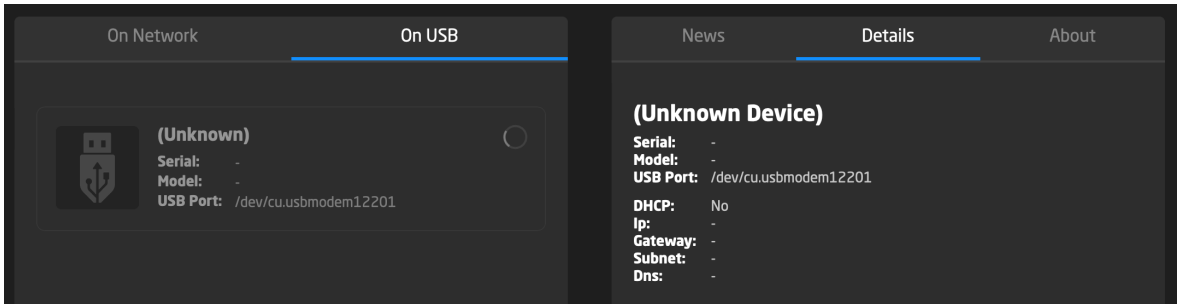


You will then see a confirmation that the device is pending registration. This step must be coordinated with SKAARHOJ Support, so please contact them to complete the approval process.

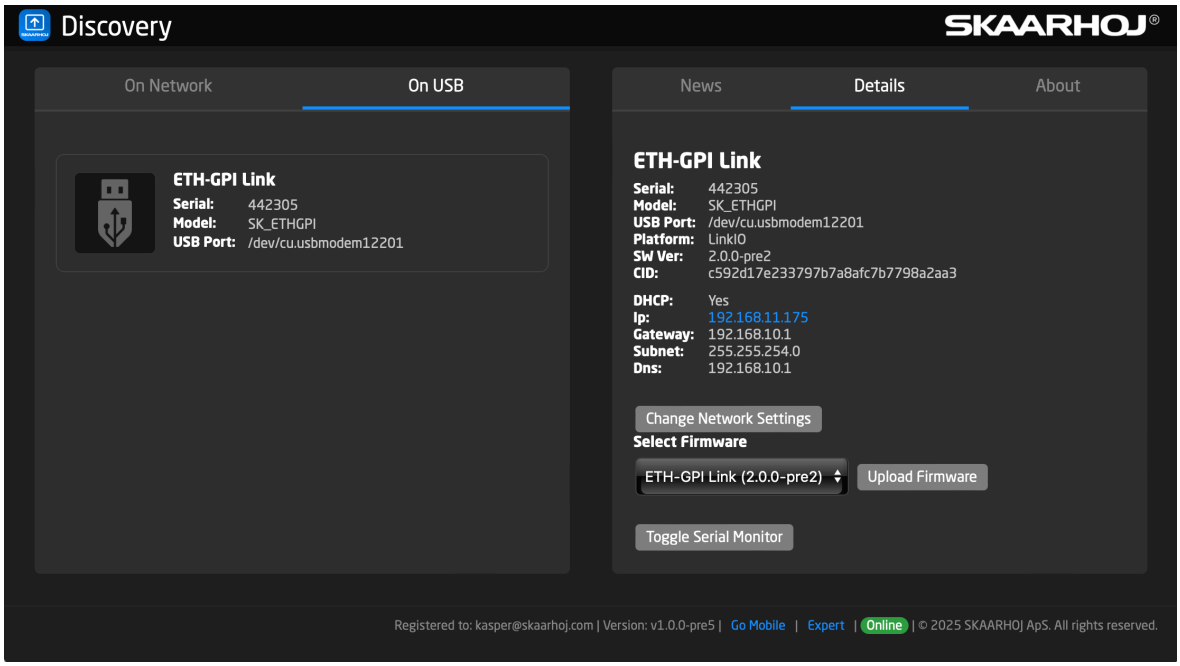


Once the device has been approved, return to the Web UI, enter the serial number again, and click the Register button. The device will then be fully registered and ready for use with the Link IO platform.

The device will reboot and may appear as Unknown for a short time:



It will then update and show up as the correct device type:



Hint

Internet Connection Required
The upgrade and registration process requires an active internet connection:

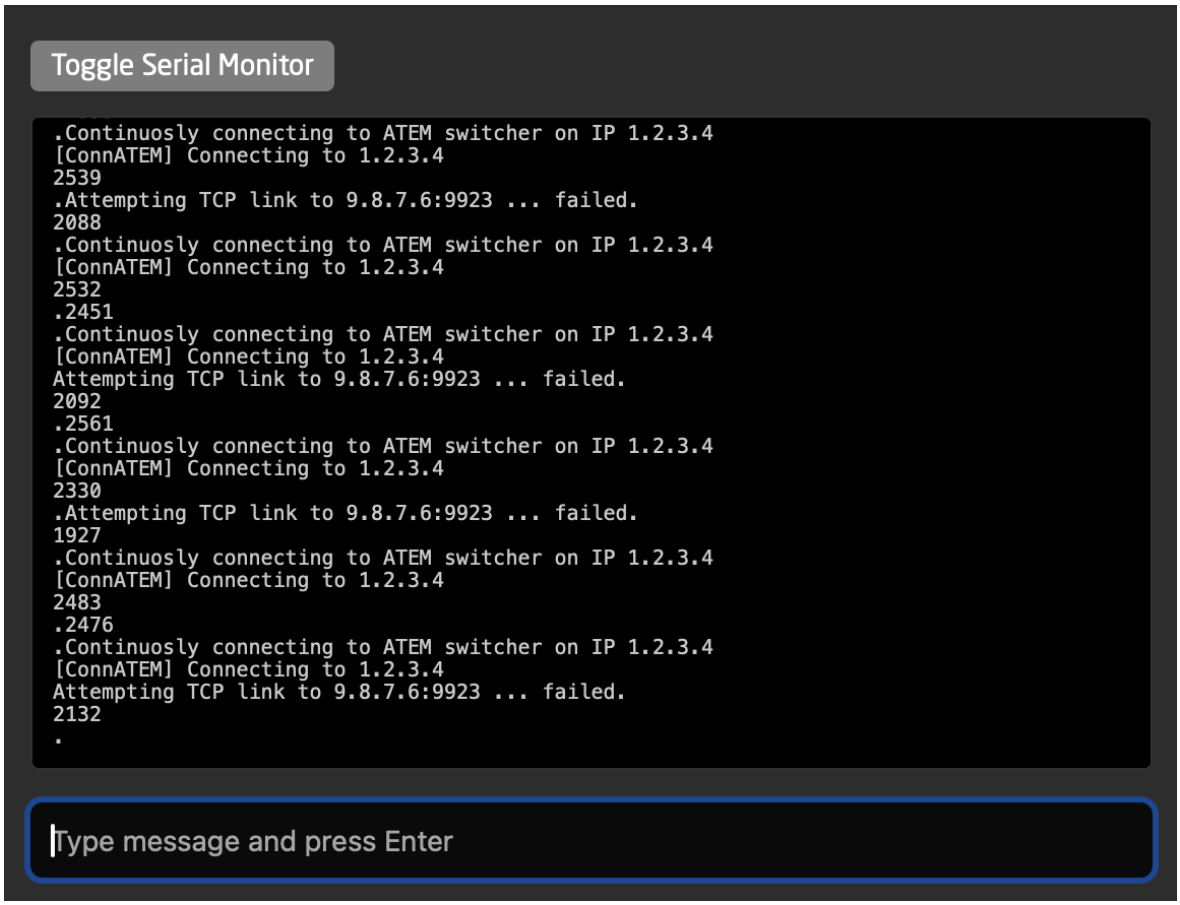
- **Stay online during registration:** Your computer must connect to SKAARHOJ's servers to complete the registration and approval process.
- **Approval is handled remotely:** Registration will remain pending until SKAARHOJ Support approves the request.
- **Offline use afterwards:** Once the upgrade and registration are complete, the device can be used fully offline on your local network.

Make sure you are connected to the internet until the registration process has been successfully completed.

4.6 Serial Monitor

The Serial Monitor in SKAARHOJ Discovery allows you to send and receive plain text commands over the USB serial connection. This is useful for debugging or advanced use cases.

You can open the Serial Monitor by selecting your device in the On USB tab and clicking the Toggle Serial Monitor button. You will see an interface similar to the example below:



To view the list of available commands, type "help" and press Enter in the message field below the monitor output window. The supported commands will be displayed. You can type any supported command in the message field and press Enter to send it to the device. The device's response will appear in the output window.

```
help              Show this help message
ip=a.b.c.d        Set static IP or use ip=0.0.0.0 for DHCP
subnet=a.b.c.d    Set subnet mask
gateway=a.b.c.d   Set gateway address
dns=a.b.c.d       Set DNS server
reset             Reset the device (soft reset)
reboot            Alias for reset
notick            Disable dot and loopcount output every second
ping              Returns ack
debug             Enable debug mode until reboot
sockets           Show current socket status
newmac            Generate and save a new MAC address
_resetAll         Clear user settings and reset
getCID            Get the device CID
getInfo           Display detailed device status in JSON format
```

```
ip=?              Get the current IP address in use
dumpIP            Display IP configuration
```

4.7 Raw Panel over USB Serial

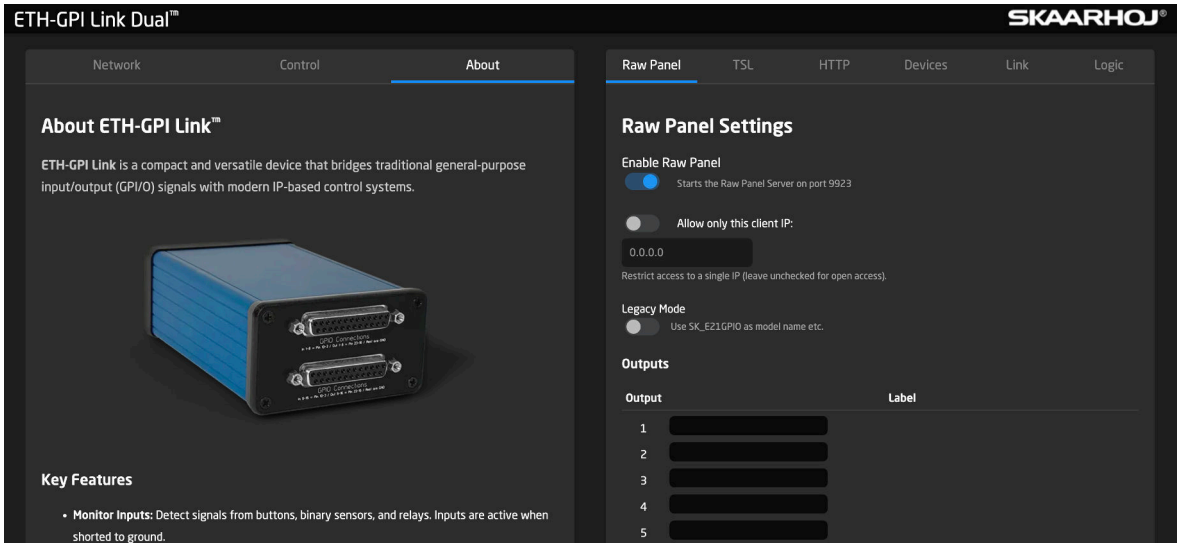
For Link IO devices that support Raw Panel functionality, you can also use the Serial Monitor to send and receive Raw Panel commands over USB. To enable this mode, type the command `serialRawPanel` in the message field and press Enter. The device will switch to Raw Panel mode on the USB connection, allowing you to send and receive Raw Panel commands directly. The only way to exit this mode is to reboot the device by power cycling it. Using USB for Raw Panel commands disables all other serial communication.

Using the Raw Panel protocol over the USB connection of ETH-GPI Link is a highly advanced feature intended for integration by programmers. Typically, developers would write a custom application on the host system that opens the USB port at 115,200 bps, sends the command `serialRawPanel\n`, and then issues Raw Panel commands such as `list\n`.

5 ETH-GPI Link Functionality

The ETH-GPI Link provides a bridge between traditional GPI (General Purpose Interface) signals and IP-based control. It can be used in a variety of broadcast control setups, either as part of a SKAARHOJ Blue Pill based system or through standard protocols such as Raw Panel Protocol, TSL, or HTTP. This makes it possible to integrate physical I/O with different devices and workflows in a consistent way.

The configuration of the ETH-GPI Link is divided into several tabs in the web interface. Each tab corresponds to a specific integration method or function: Raw Panel, TSL, HTTP, Devices, Link, Logic, and Control. The following sections describe each of these tabs in detail, explaining the available settings and how they affect device behavior.

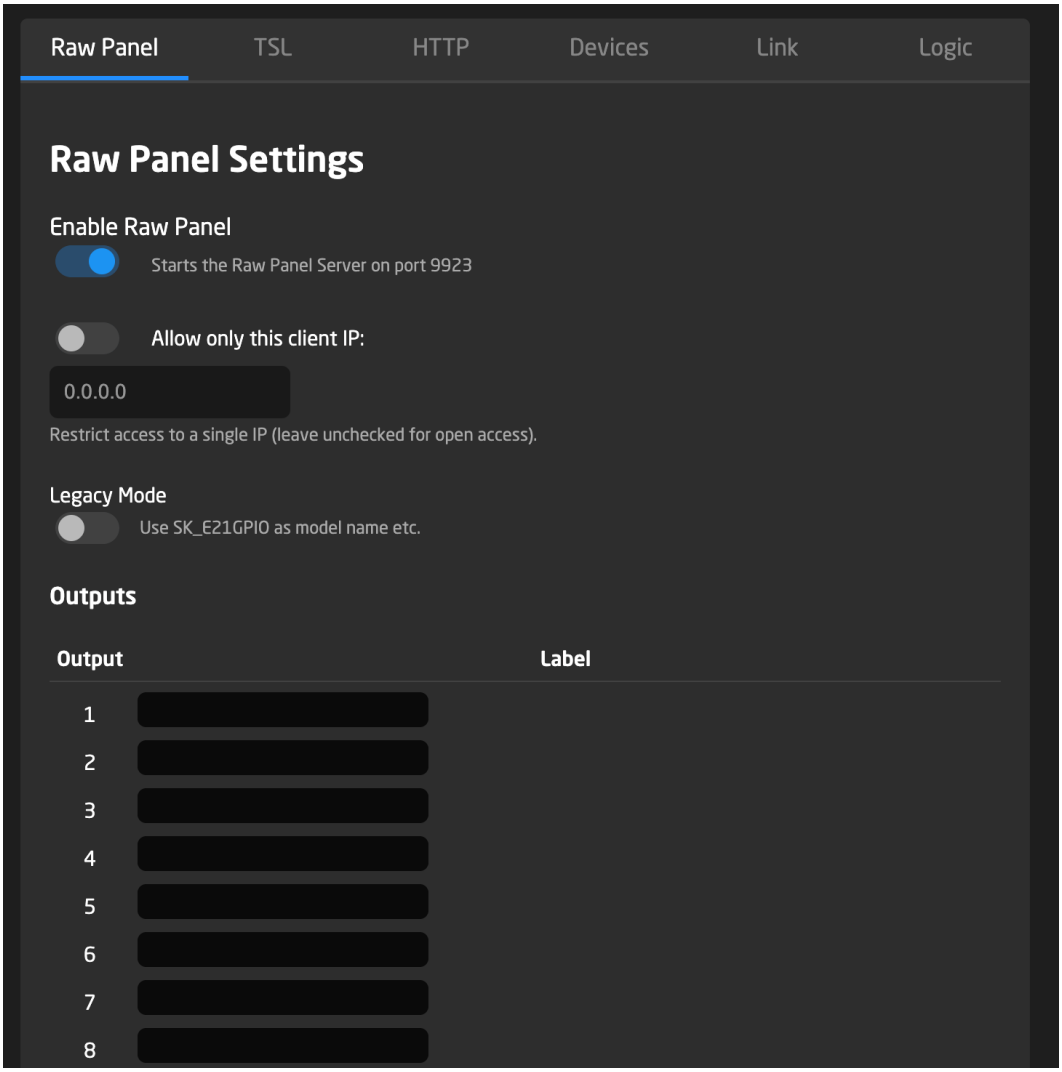


5.1 Raw Panel Tab

The **Raw Panel** tab is where you configure the primary way the ETH-GPI Link integrates with SKAARHOJ's infrastructure, including Reactor on Blue Pill platform products. From Reactor, the ETH-GPI Link can be added as a panel and wired up to various supported devices.

- **Enable Raw Panel:** Starts the Raw Panel Server on TCP port `9923`, allowing the device to communicate with Reactor and other SKAARHOJ tools. Up to 3 clients can connect simultaneously. An mDNS service is advertised for discovery.
- **Allow Only This Client IP:** Restrict Raw Panel access to a single IP. If unchecked, any client may connect.
- **Legacy Mode:** When enabled, the device will identify itself as `SK_E21GPIO`, its legacy model name. Useful for backward compatibility with older systems.
- **Input/Output Labels:** Each of the 8 inputs and 8 outputs can be assigned custom labels for easier identification.

- **Help Section:** At the bottom of the tab, a help area describes how the Raw Panel protocol works and links to the full documentation.



Raw Panel Protocol Integration

Each I/O maps to an HWC ID. Inputs send `Down`/`Up` messages on state changes, and outputs are controlled via commands.

Hardware Component (HWC) Mapping

When integrating with SKAARHOJ Reactor or other Raw Panel controllers, each physical I/O is assigned a unique HWC ID. The mapping depends on your model variant:

Standard Model (8 I/O):

HWC ID	Element	Type
1-8	Output 1-8	Binary Output (relay)
9-16	Input 1-8	Binary Input (button/GPI)
17	Analog Input	Analog Input (0-1000 scale)

Dual Model (16 I/O):

HWC ID	Element	Type
Board 0 (First 8 I/O)		
1-8	Output 1-8	Binary Output (relay)
9-16	Input 1-8	Binary Input (button/GPI)
17	Analog Input	Analog Input (0-1000 scale)
Board 1 (Second 8 I/O)		
18-25	Output 9-16	Binary Output (relay)
26-33	Input 9-16	Binary Input (button/GPI)
34	Analog Input	Analog Input (0-1000 scale)

Analog Input Notes:

- Analog values are scaled from four bits (0-15) to a 0-1000 range
- Only the first 4 physical inputs per board support analog mode
- Raw Panel command: `HWC#17` and `HWC#34` returns current analog value

Connection Details:

- Port: `9923` (TCP)
- Clients: Up to 3 simultaneously
- Discovery: Advertised via mDNS

Command Examples:

Command	Description
`HWC#1=32`	Turn Output 1 ON
`Clear`	Clear all relays
`state`	Request current device state

Behavior:

- Inputs report as `HWC#<id>=Down` or `HWC#<id>=Up`.
- First 4 input pins can also act as analog inputs, reporting values `Abs:NNN` scaled to 0–1000.
- Heartbeat support available via `HeartBeatTimer` command.

Notice

Legacy Mode Use Case
Only enable Legacy Mode if your integration specifically requires the older model name `SK_E21GPIO`. For new deployments, leave it disabled.

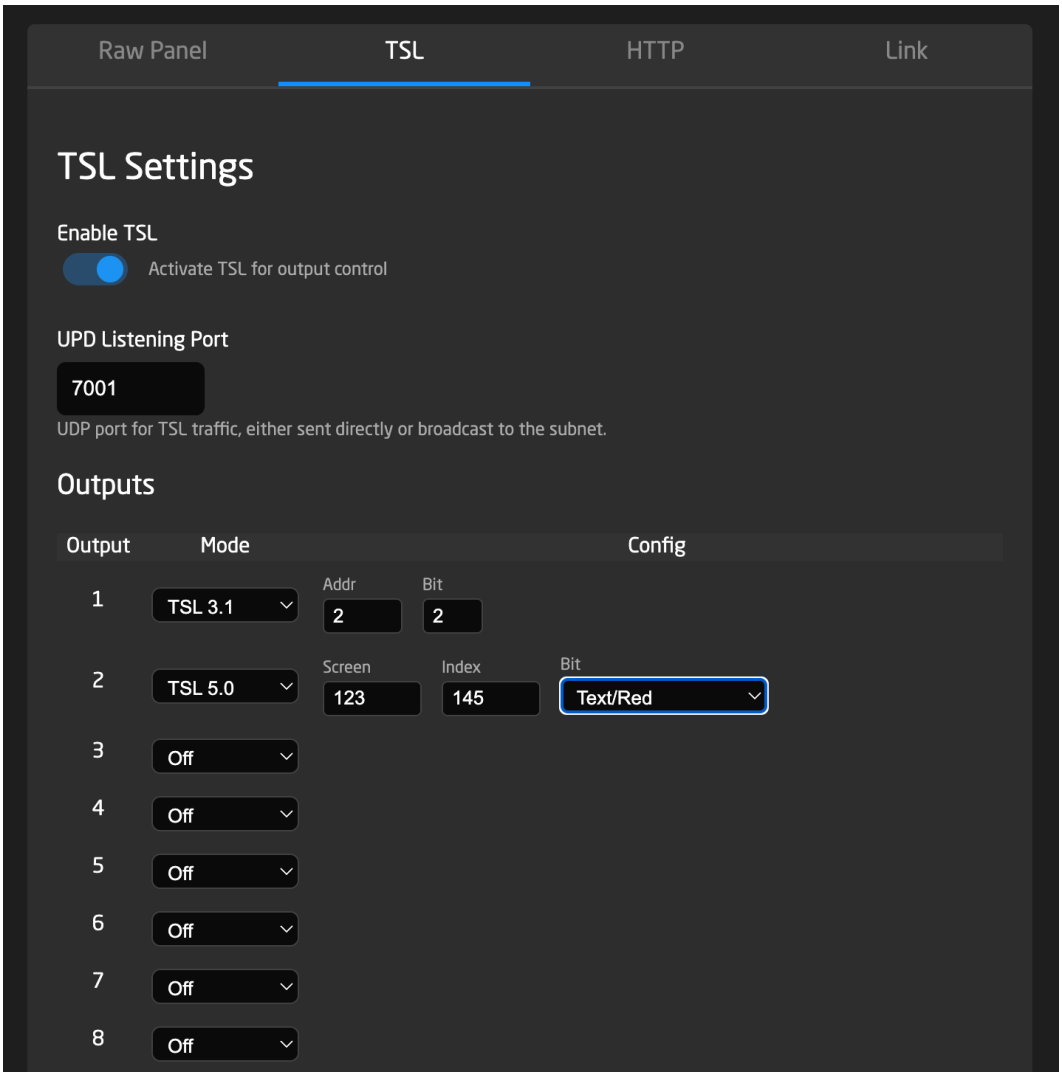
5.2 TSL Tab

The **TSL** tab configures how the ETH-GPI Link interacts with TSL protocols. The device supports **bidirectional** TSL communication, meaning it can both receive tally messages to control outputs and send tally messages when inputs change.

- **Enable TSL:** Toggle to activate TSL for both output control and input message sending.
- **UDP Listening Port:** Configure the port where the ETH-GPI Link listens for TSL traffic (default: 7001).

TSL Outputs (Receiving Tally)

The **Outputs Table** maps incoming TSL messages to physical relay outputs. Each output can be configured to respond to specific TSL addresses or screen/index combinations.



- **Mode:** Select between `TSL 3.1` and `TSL 5.0`.
- **TSL 3.1:** Match by Address (0–126) and Bit (0–3).
- **TSL 5.0:** Match by Screen, Index, and Bit with tally color mapping (Left/Text/Right positions).

Example Scenarios:

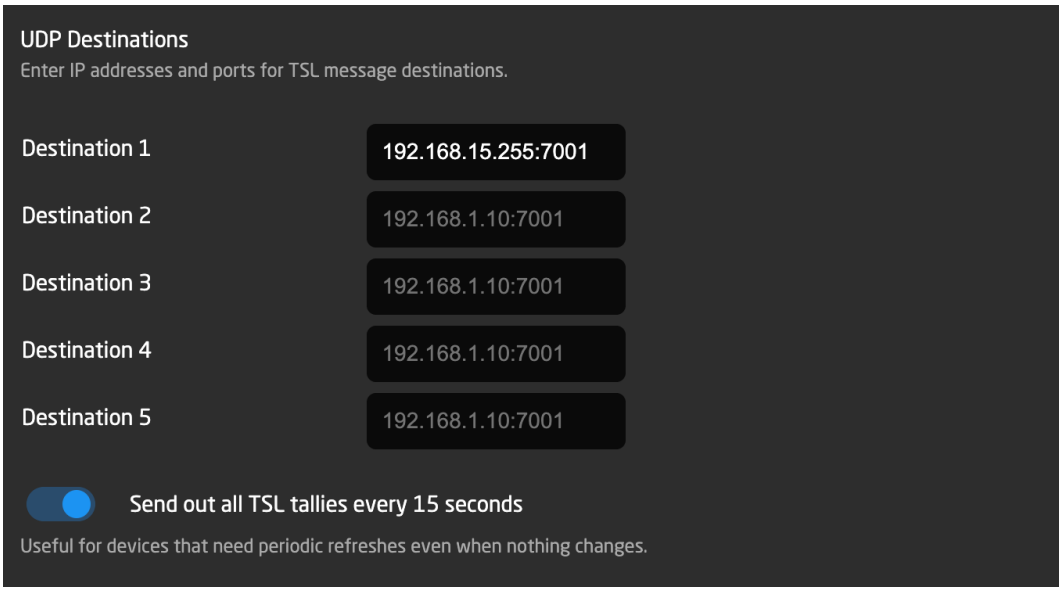
- TSL v3.1: If Address 5 sets Bit 0 to ON, Relay #1 activates.
- TSL v5.0: If Screen 1, Index 100 receives a green right tally, Relay #2 activates.

TSL Inputs (Sending Tally)

The **Inputs Table** configures the device to send TSL messages when GPI inputs change state. This allows the ETH-GPI Link to act as a TSL source, updating remote tally displays based on physical input

triggers.

- **Mode:** Select between `Off`, `TSL 3.1`, or `TSL 5.0` for each input.
- **TSL 3.1 Configuration:**
  - **Address:** Target address (0–126)
  - **Bits:** Bitmask (1–15) specifying which tally bits to set
- **TSL 5.0 Configuration:**
  - **Screen:** Screen number
  - **Index:** Tally index
  - **Position:** Left, Text, Right, or Any
  - **Color Bits:** RGB color bits (1–3)
- **Operation Mode:**
  - **Set & Clear:** Sets tally bit when input goes ON, clears when input goes OFF
  - **Set Only:** Only sets the tally bit on input activation
  - **Clear Only:** Only clears the tally bit on input activation
- **Invert:** Reverses the input logic (OFF triggers ON behavior and vice versa)
- **Destination IPs:** Up to 5 UDP destinations (IP:Port) can be configured to receive TSL messages



Example Scenarios:

- When Input #3 changes to ON, send TSL v3.1 message to address 5, bit 0 SET.
- When Input #3 changes to OFF, send TSL v3.1 message to address 5, bit 0 CLEAR.
- When Input #5 activates, send TSL v5.0 red text tally to Screen 10, Index 50.

Hint

TSL Message Resending
The device automatically resends TSL input messages every 15 seconds to ensure remote displays stay synchronized. This periodic update helps maintain tally state across network interruptions or device restarts.

Supported Versions:

- **TSL 3.1** —Uses address (0-126) and bit index (0-3) for simple tally control
- **TSL 5.0** —Uses screen and index for LED color mapping with multi-color tally support

Hint

Note on UDP Traffic
TSL messages are sent and received over UDP. Ensure your network allows UDP traffic on the configured ports. Multiple destination IP:Port pairs can be configured for sending TSL messages to multiple receivers simultaneously.

5.3 HTTP Tab

The **HTTP** tab enables a simple REST-style API for automation and testing. This is required for the **Control Tab** to work in the Web UI.

- **Enable HTTP API:** Activates the HTTP interface.
- **Base URL Format:**

  `http://<device_ip>/io/<type>/<index>/<action>`

- **Supported Types:** `in` (inputs) and `out` (outputs).
- **Supported Actions:**

Type	Action	Description
out	set	Sets output ON
out	clear	Sets output OFF
out	toggle	Toggles output state
out	(none)	Reads output state
in	set	Simulates input ON (Down)
in	clear	Simulates input OFF (Up)
in	toggle	Toggles simulated input
in	reset	Restores input to hardware state
in	resetAll	Restores all inputs to hardware
in	(none)	Reads input state

Example Requests:

```
Set Output #3 HIGH: http://<ip>/io/out/3/set
Toggle Output #5:   http://<ip>/io/out/5/toggle
Read Input #2:      http://<ip>/io/in/2
Reset All Inputs:   http://<ip>/io/in/resetAll
```

Responses: JSON format:

```
{
  "type": "in",
  "index": 4,
  "state": true
}
```

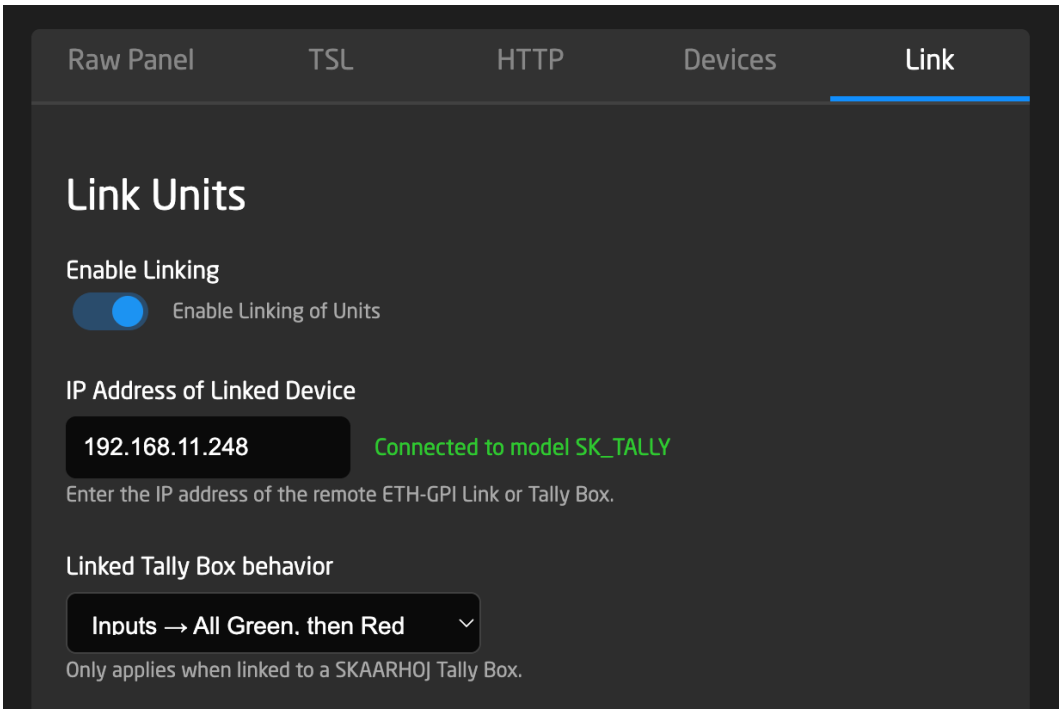
Caution

Automation Security
Credentials can be embedded in URLs as `http://admin:<password>@<ip>/...`. This method is insecure on shared networks - use only in trusted environments.

5.4 Link Tab

The **Link** tab allows multiple units to be connected, expanding I/O capabilities.

- **Enable Linking:** Activates linking mode.
- **IP Address of Linked Device:** Enter the IP of another ETH-GPI Link or a Tally Box to synchronize I/O automatically.



How Linking Works:

- Inputs on this device can trigger outputs on the linked device.
- Outputs on this device can be controlled by the linked unit's inputs.
- Compatible devices: ETH-GPI Link and SKAARHOJ Tally Boxes.

Linked Tally Box Behavior: When linking to a SKAARHOJ Tally Box, a dropdown lets you select how tallies map to ETH-GPI Link inputs:

- **Inputs** to **Alternating Red/Green**
- **Inputs** to **All Red, then Green**
- **Inputs** to **All Green, then Red**

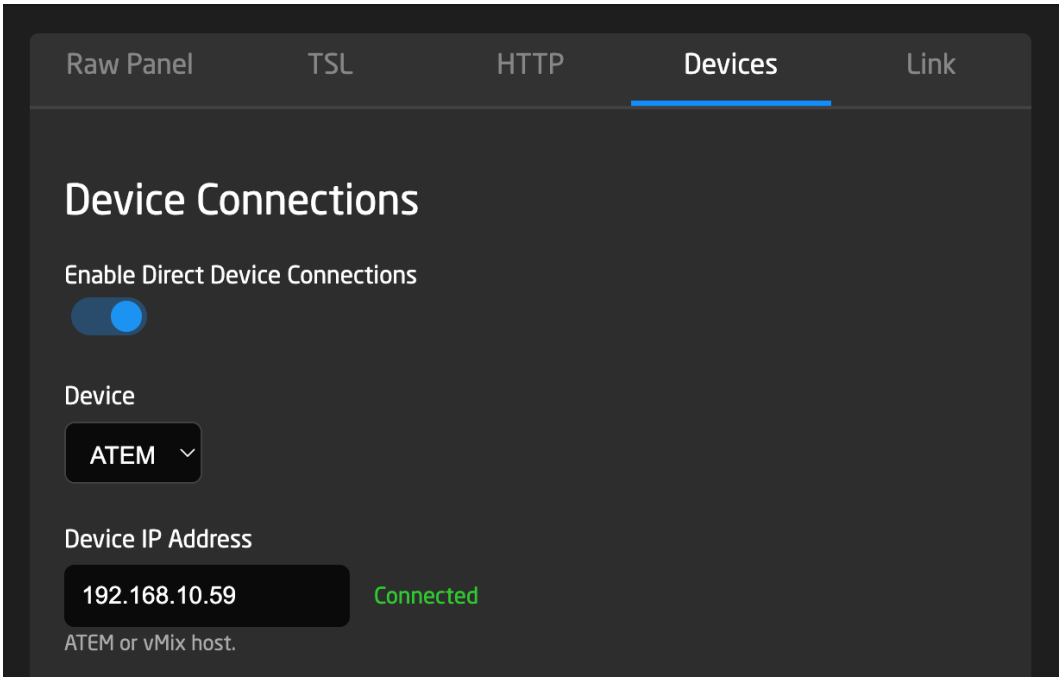
Notice

Important Notes on Linking

- All linked units must be on the same subnet.
- Remote device should be in Raw Panel mode but not have linking enabled.
- Linking is one-to-one; ensure correct IP configuration.

5.5 Devices Tab

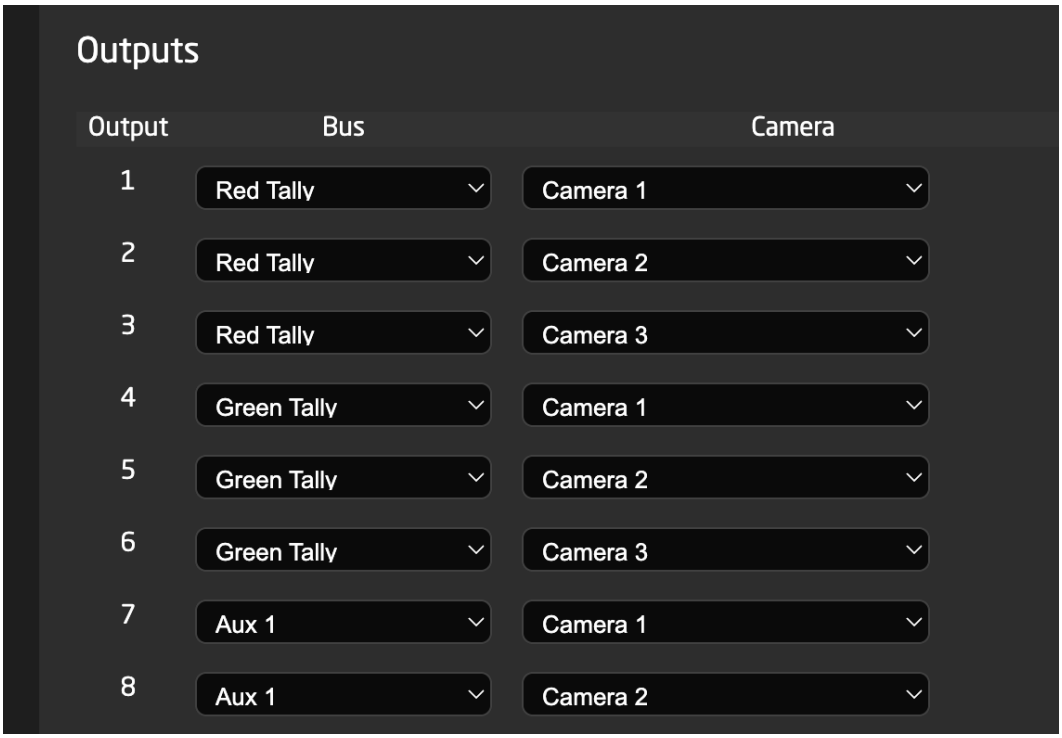
The **Devices** tab configures direct connections to supported switchers such as ATEM and vMix. This allows ETH-GPI inputs to trigger routing actions and outputs to follow program/preview tallies.



Outputs Mapping

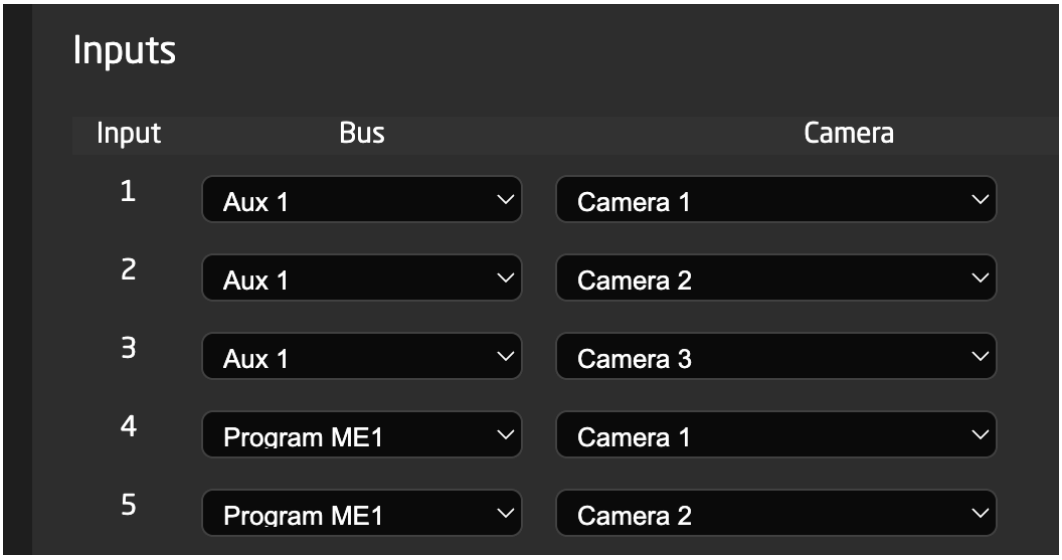
Each row in the outputs table maps a switcher bus + source to a physical relay output. On ATEM, for example:

- **Green Tally** - Relay active if source is on Preview
- **Red Tally** - Relay active if source is on Program
- **Aux N** - Relay active if source is routed to the AUX



Inputs Mapping

Each row in the inputs table assigns a routing action when a GPI input is pressed (shorted to GND). Inputs can be configured to cut program/preview buses or assign sources to AUX outputs.



Hold Groups

When **Hold Group** is enabled, multiple inputs targeting the same destination (bus + camera combination) work together as a temporary override system with automatic baseline restoration.

How It Works:

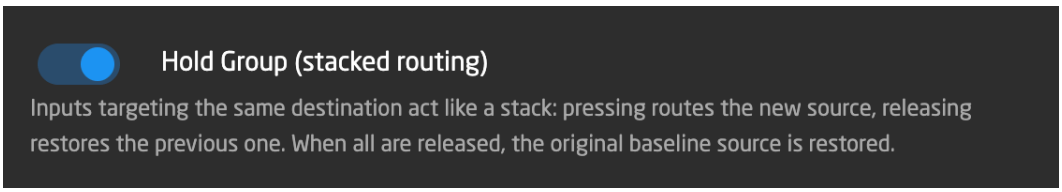
1. **Baseline Capture:** When the first input activates, the system captures the current switcher state as the "baseline" (e.g., Camera 3 was on Program)
2. **Stack Behavior:** Each subsequent input press pushes its assigned source onto a stack:
   - Press Input 1 (Camera 1) -> Camera 1 goes to Program
   - Press Input 2 (Camera 2) -> Camera 2 goes to Program (Camera 1 is "paused" on stack)
   - Press Input 3 (Camera 4) -> Camera 4 goes to Program (Camera 1 and 2 on stack)
3. **Pop on Release:** When an input is released, the stack pops and returns to the previous source:
   - Release Input 3 -> Camera 2 returns to Program
   - Release Input 2 -> Camera 1 returns to Program
   - Release Input 1 -> **Baseline restored** (Camera 3 returns to Program)
4. **Baseline Restoration:** When all inputs are released, the system attempts to restore the original baseline state captured in step 1. If the switcher rejects the command (e.g., source unavailable), it retries with confirmation logic.
5. **Re-basing Window:** After all inputs are released, there is a 1-second "quiet window" where no new baseline is captured. This prevents accidental re-basing during rapid button sequences.

Use Case Example:

A director uses Hold Groups to temporarily preview different cameras while maintaining the current program output:

- **Initial state:** Camera 5 is on Program (baseline)
- **Director holds Input 1:** Camera 1 goes to Program (Camera 5 baseline captured)
- **Director holds Input 2 (while still holding Input 1):** Camera 2 goes to Program
- **Director releases Input 2:** Camera 1 returns to Program
- **Director releases Input 1:** Camera 5 automatically returns to Program (baseline restored)

This allows quick camera switching without manually restoring the original state.



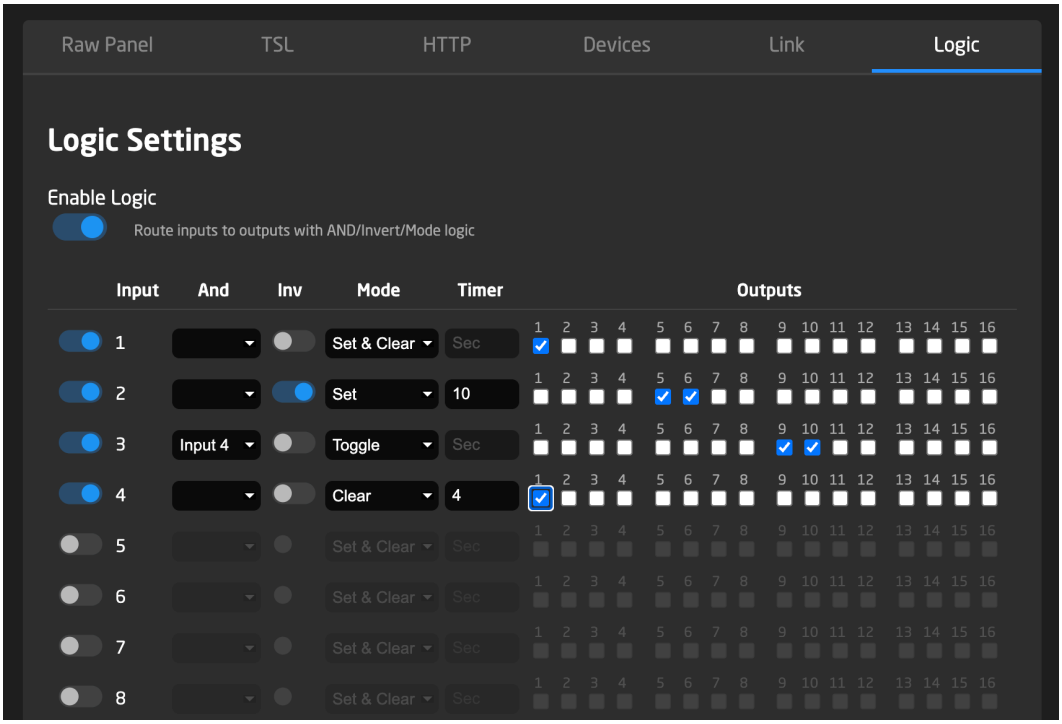
Notice

Hold Groups Behavior
Hold Groups only work when multiple inputs target the same destination (same bus + camera). Inputs targeting different destinations operate independently. The baseline is captured on the first press in a sequence and restored when all inputs are released.

5.6 Logic Tab

The **Logic** tab enables advanced input-to-output routing with logical operations, allowing inputs to control multiple outputs with conditional logic, timers, and various triggering modes.

- **Enable Logic:** Activates the Logic routing engine for all configured input rules.



Configuration Options

Each input can be individually configured with the following parameters:

- **Enable (per input):** Each input must be explicitly enabled to be processed by the Logic engine. Disabled inputs have their configuration hidden.
- **AND Input:** Optional secondary input that must also be active for the logic to evaluate as true (logical AND operation). When the AND input changes state, any primary inputs that use it as their AND condition are automatically re-evaluated, allowing for dynamic logic chains.

- **Invert (Inv):** Inverts the final logical result before applying to outputs. Use this to reverse the trigger condition (e.g., trigger outputs when input goes LOW instead of HIGH).
- **Mode:** Determines how the logic result affects the selected outputs:
  - **Set & Clear:** Sets outputs when logic is true, clears when false (direct following mode)
  - **Set:** Only sets outputs when logic becomes true (rising edge trigger, no automatic clearing)
  - **Clear:** Only clears outputs when logic becomes true (rising edge clears outputs)
  - **Toggle:** Toggles output state each time logic becomes true (rising edge toggle)
- **Timer (0.1s units):** Timeout value from 0 to 6500 seconds (0 = disabled). Only available and shown for **Set** and **Clear** modes.
  - **Range:** 0 to 6500 seconds (0 to 109 minutes)
  - **Resolution:** 100 millisecond (0.1 second) increments for fine-grained timing control
  - The timer starts when the logic triggers the Set or Clear action
  - After the timer expires, outputs automatically revert: Set mode clears outputs, Clear mode sets outputs
  - If the logic triggers again before the timer expires, the timer is cancelled and restarted
  - Use this for momentary pulses, automatic resets, or timed control sequences
- **Outputs:** Bitmask selection of which outputs to control. Multiple outputs can be selected simultaneously, allowing one input to control many relays.

Initialization Behavior

At boot, the Logic engine evaluates all current input states and applies them to outputs (except Toggle mode, which requires state history). If multiple inputs select the same output, they are processed sequentially in order (Input 1 first, then Input 2, etc.), allowing later inputs to override earlier ones.

Example Use Cases

Simple routing:

- Input 1 in **Set & Clear** mode controlling Output 1: Output follows input state directly

AND logic gate:

- Input 1 with AND Input = Input 2: Output only activates when both Input 1 AND Input 2 are active

Momentary pulse:

- Input 3 in **Set** mode with timer value 5 seconds: Output turns ON when Input 3 activates, then automatically turns OFF after 5 seconds

Inverted control:

- Input 4 with **Invert** enabled: Output is ON when input is OFF, and OFF when input is ON

Toggle control:

- Input 5 in **Toggle** mode: Each press of Input 5 toggles the output state

Notice

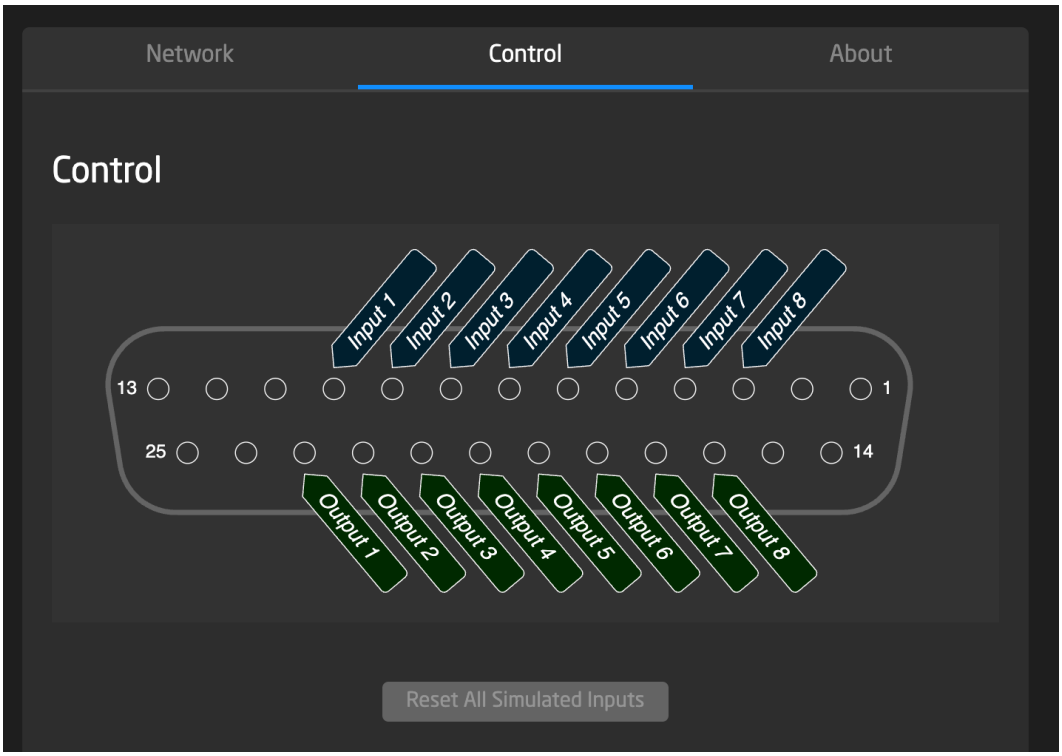
Logic Processing Notes

- Multiple inputs can control the same output - they are processed sequentially
- Toggle mode is not applied during initialization (requires edge detection)
- Logic runs independently from Raw Panel, TSL, HTTP, and other features
- The Logic feature processes both physical hardware inputs and simulated inputs (from HTTP or Control tab) identically

5.7 Control Tab

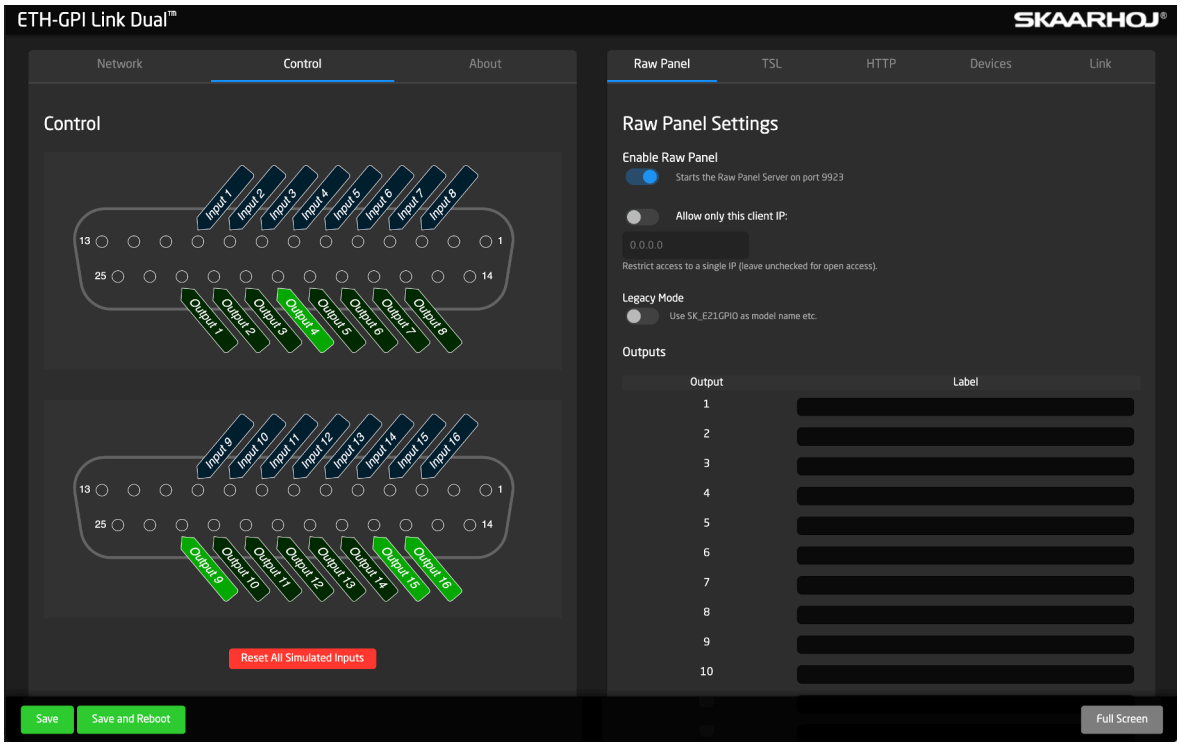
The **Control** tab provides a graphical interface for simulating and testing I/O.

- **Connector Diagram:** Shows the DB25 pinout, mapping Inputs 1–8 and Outputs 1–8.
- **Simulate Inputs:** Click an input to simulate grounding it. A Raw Panel command is sent (`Down`/`Up` state).
- **Simulate Outputs:** Click an output to activate its relay, confirming output control in real time.
- **Full Screen Mode:** Button in lower-right corner expands the view for easier testing.



5.8 Dual Version

The ETH-GPI Link is also available in a **Dual** model with two DB25 connectors, providing 16 inputs and 16 outputs. This version is particularly well-suited for linking to a SKAARHOJ Tally Box with two rows of 8 lamps each, matching perfectly to the dual connector layout.


ETH-GPI Link Dual™
SKAARHOJ
Network
Control
About
Control
Input 1
Input 2
Input 3
Input 4
Input 5
Input 6
Input 7
Input 8
13
1
25
14
Output 1
Output 2
Output 3
Output 4
Output 5
Output 6
Output 7
Output 8
Input 9
Input 10
Input 11
Input 12
Input 13
Input 14
Input 15
Input 16
Output 9
Output 10
Output 11
Output 12
Output 13
Output 14
Output 15
Output 16
Reset All Simulated Inputs
Save
Save and Reboot
Raw Panel
TSL
HTTP
Devices
Link
Raw Panel Settings
Enable Raw Panel
Starts the Raw Panel Server on port 9923
Allow only this client IP:
0.0.0.0
Restrict access to a single IP (leave unchecked for open access).
Legacy Mode
Use SK_E21GPIO as model name etc.
Outputs
Output
Label
1
2
3
4
5
6
7
8
9
10
Full Screen

6 Service

6.1 Troubleshooting

For troubleshooting tips, please refer to our online Wiki:

https://wiki.skaarhoj.com/books/blue-pill-reactor/chapter/troubleshooting

6.2 Cleaning

Proper cleaning and maintenance of your ETH-GPI Link are critical to ensuring its durability and optimal performance. Regular cleaning, when done with care and the right materials, will help maintain the device in excellent working condition. On the other hand, improper cleaning techniques or the use of harsh chemicals can lead to permanent damage to surfaces, connectors, and labels. To prevent wear and tear, it is important to adhere to the cleaning recommendations outlined in this section.

Notice

Proper Cleaning of ETH-GPI Link
To avoid surface damage, follow these guidelines:

- **Disconnect all accessories and cables** before cleaning.
- **Only use the recommended cleaning agents** listed in this section.
- **Avoid harsh chemicals** like Methanol, Acetone, Benzine, or acids. These substances may damage labels, paint, and polished surfaces.
- **Keep connectors dry** —do not moisten connectors or expose them to cleaning liquids.
- **Avoid touching connector pins** directly while cleaning.
- **Air-blow dust from connectors** before wiping them. Use deionized air if static charge is present.
- **Do not use compressed air** on the housing, as it can push dust into the device.

Recommended Cleaning Agents:

- Water
- Glass Cleaner
- Isopropyl Alcohol

To maintain the longevity and optimal performance of your ETH-GPI Link, it is essential to follow proper cleaning guidelines. Different areas of the device require specific cleaning methods to avoid damage

to sensitive components. The following table outlines the recommended cleaning procedures for key areas of the device.

Area	Recommended Cleaning Procedure
Housing	Wipe the housing and external accessories with a soft, lint-free cloth and a mild cleaner like water or glass cleaner. When necessary, use isopropyl alcohol to remove tough residues, such as adhesive or dirt buildup.
Narrow spaces and gaps	Use a manual air blower or a soft brush to gently remove dust from gaps and tight spaces. For delicate areas, cotton swabs may also be used.

Table 2: Proper cleaning methods for ETH-GPI Link

By following these cleaning instructions, you can avoid damaging your device and its components. Routine maintenance will keep your ETH-GPI Link in top condition and reduce the likelihood of damage that could lead to costly repairs or replacements.

6.3 Repair

In addition to proper cleaning, it is also important to be cautious when it comes to repairs. Performing repairs without the necessary expertise can result in personal injury and may further damage the device.

Warning

Repairs by Untrained Personnel
Attempting to repair the device without proper training can lead to injury and product damage:

- **Only perform maintenance tasks** described in this manual.
- **Do not attempt repairs yourself** —all repairs must be carried out by authorized SKAARHOJ service partners.
- **Warranty is void** if unauthorized repairs are attempted.

Repairs and maintenance should always be conducted by professionals trained to handle the ETH-GPI Link. If you encounter any issues requiring repair, we highly recommend contacting SKAARHOJ's authorized service partners. Unauthorized repairs may void the warranty, cause further damage, and pose significant safety risks.

To keep your ETH-GPI Link functioning optimally, always refer to this manual for proper cleaning and repair procedures. For any work beyond the scope of this manual, please contact SKAARHOJ Support team for assistance.

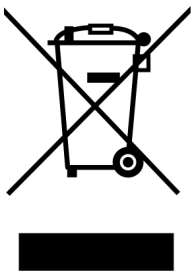
6.4 Disposal

Notice

Disposal of the Product
You can return the product at your own expense to the manufacturer, SKAARHOJ ApS, for disposal. Always follow local guidelines and laws for proper disposal.

Proper disposal of electronic equipment is essential to reduce environmental impact and ensure that hazardous materials are handled safely. Different countries may have specific laws and guidelines regarding electronic waste disposal. It is important to familiarize yourself with these rules to ensure compliance and minimize risks to both health and the environment.

When disposing of third-party accessories, always consult the instructions provided by the relevant manufacturers to ensure safe and compliant disposal practices.



This product falls within the scope of Directive 2012/19 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of June 4, 2012 on waste electrical and electronic equipment (WEEE II).
Accordingly, this product must not be disposed of with household waste. Always adhere to country-specific disposal rules and ensure proper recycling or disposal through authorized facilities.

In addition to the general guidelines provided above, the product must always be disposed of in accordance with local electronic waste regulations. The WEEE Directive sets the framework for the handling of waste electrical and electronic equipment across EU member states. It ensures that electronics are collected and treated separately from household waste to minimize environmental harm.

6.5 Transportation and Storage

Notice

Proper Handling of ETH-GPI Link
To avoid the risk of product damage:

- Follow the recommended environmental conditions at all times.
- Use an appropriate case for transporting the product and its accessories.
- Adhere to the transport and storage guidelines outlined in this section.

Ensuring proper transportation and storage of your ETH-GPI Link is critical to maintaining its performance and longevity. Mishandling the device or its accessories can lead to damage. Please follow these guidelines to protect your equipment during transportation and storage.

Transportation Guidelines:

- Detach all accessories from the product before transport.
- Always transport the product in a protective case designed for its dimensions.
- Avoid exposing the product to strong shocks or impacts during transport.
- Keep the product within the recommended temperature range.

Storage Guidelines:

- Remove all accessories before storing.
- Disconnect all cables and power sources from the product.
- Store the product in a protective case.
- Keep the product within the recommended temperature range.
- Avoid storing the product in environments exposed to extreme temperatures, direct sunlight, high humidity, excessive vibration, dust, or strong magnetic fields.

6.6 SKAARHOJ Service Contacts

For any inquiries, technical support, or service requests regarding your ETH-GPI Link, please reach out to our support team. Our dedicated professionals are ready to assist you with troubleshooting, repairs, and general product information. You can find the contact details for SKAARHOJ below.

SKAARHOJ ApS
Rosenkaeret 11C
DK-2860 Soeborg
Denmark
Email: support@skaarhoj.com
Website: www.skaarhoj.com

SKAARHOJ Inc
2600 W Olive Avenue Suite 500
Burbank, CA 91505
USA
Email: support@skaarhoj.com
Website: www.skaarhoj.com

7 Notes