# SKAARHOJ B4 Links

The SKAARHOJ B4 Links are used for remote control iris on B4 lenses connected to BMD cameras. There are two models available the Eth-B4 Link which communicates via UDP connection from a networked Skaarhoj controller (TCP when using with Blue Pill devices) and the SDI-B4 Link which receives iris command from a 3G SDI feed from either a Blackmagic Atem or another SKAARHOJ controller.

# Introduction

The SKAARHOJ B4 Links are used for remote control iris on B4 lenses connected to BMD cameras. There are two models available the Eth-B4 Link which communicates via UDP connection from a networked Skaarhoj controller and the SDI-B4 Link which receives iris command from a 3G SDI feed from either a Blackmagic Atem or another SKAARHOJ controller.

The SDI-B4 Link extracts iris information from 3G-SDI input signal according to Blackmagic Designs Camera Control Protocol. Outputs analog B4 lens iris control (Hirose-12), tally LED and relay. Supports camera 1-10 by multi-position switch. SDI input passed through on SDI out.
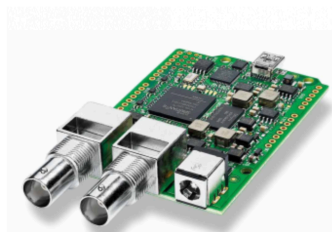
The Eth-B4 Link is similar to the SDI-B4 Link but the data input is via network instead of SDI. The protocol is also Blackmagic Camera Control, but over UDP ("UDP Camera Control") and typically served by a SKAARHOJ controller. Has an incredibly light and compact form factor. The ETH-B4 Link has a camera selector switch that sets it's camera ID filter as well as its IP address and the iris data it receives is output on the Hirose-12 connector. It also features a tally lamp (red/green) and a relay output (PGM tally out).

## Eth-B4 Link Port Information

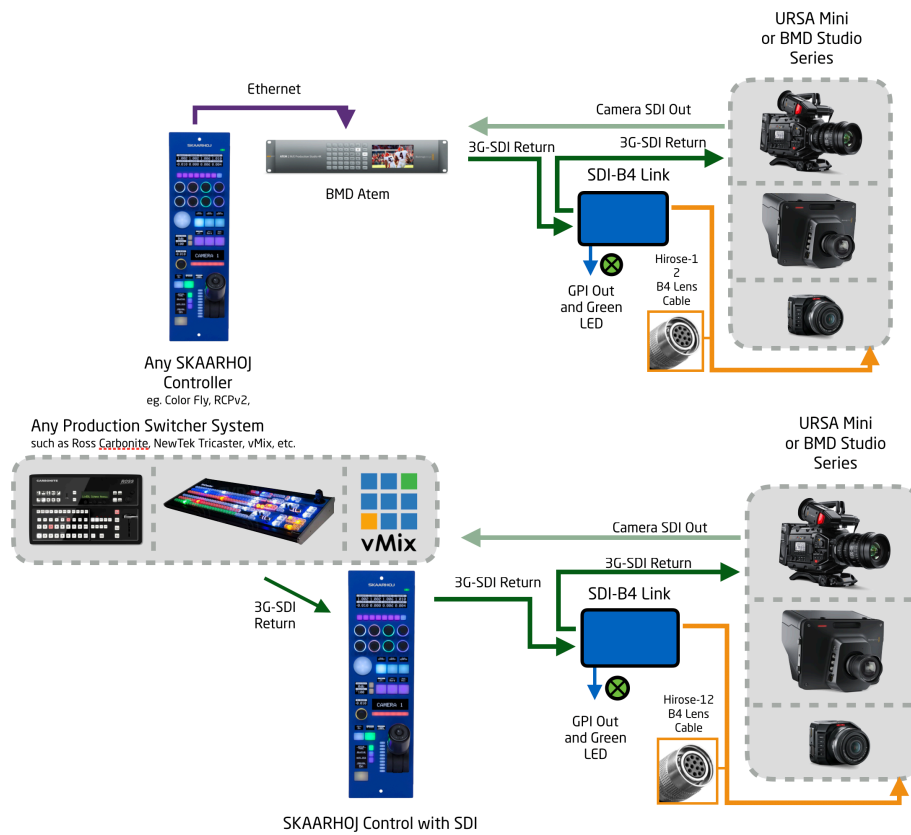| Protocol | Communication Port |
|----------|--------------------|
| UDP      | 5463               |
| TCP      | 5463               |

## SDI-B4 Link 3G SDI Shield Information

The SDI-B4 Link uses the Blackmagic Design 3G-SDI Shield. The Blackmagic 3G-SDI Arduino Shield supports the following formats using SDI Level B: 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50 (output only), 1080p59.94 (output only) and 1080p60 (output only), but the camera does not have to be running the same video format as the program input, so you can use cameras in Ultra HD while the camera protocol is sent over HD signal to the camera.
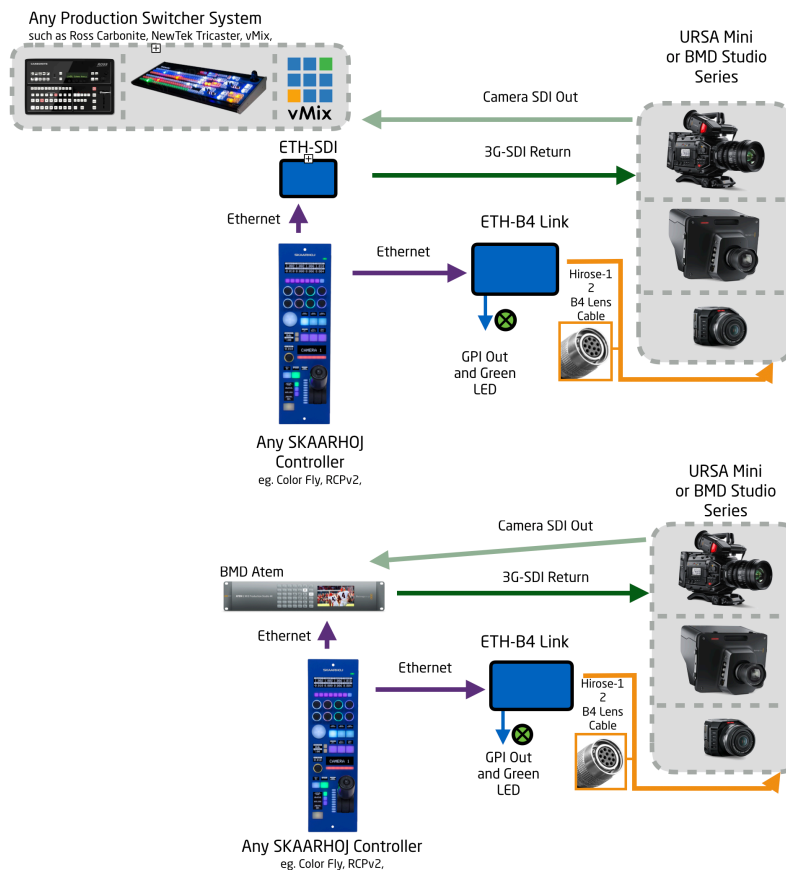
# Set Up

## SDI-B4 Link

URSA Mini
or BMD Studio
Series

Ethernet

Camera SDI Out

3G-SDI Return

3G-SDI Return

SDI-B4 Link

BMD Atem

Hirose-12
B4 Lens
Cable

GPI Out
and Green
LED

Any SKAARHOJ
Controller
eg. Color Fly, RCPv2,

**Any Production Switcher System**
such as Ross Carbonite, NewTek Tricaster, vMix, etc.

vMix

URSA Mini
or BMD Studio
Series

Camera SDI Out

3G-SDI Return

3G-SDI Return

SDI-B4 Link

3G-SDI
Return

Hirose-12
B4 Lens
Cable

GPI Out
and Green
LED

SKAARHOJ Control with SDI

## Eth-B4 Link

**Any Production Switcher System**
such as Ross Carbonite, NewTek Tricaster, vMix,

vMix

URSA Mini
or BMD Studio
Series

Camera SDI Out

3G-SDI Return

ETH-SDI

ETH-B4 Link

Ethernet

Ethernet

Hirose-12
B4 Lens
Cable

GPI Out
and Green
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Any SKAARHOJ
Controller
eg. Color Fly, RCPv2,

URSA Mini
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Camera SDI Out

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3G-SDI Return

Ethernet

ETH-B4 Link

Ethernet

Hirose-12
B4 Lens
Cable

GPI Out
and Green
LED

Any SKAARHOJ Controller
eg. Color Fly, RCPv2,

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## Eth-B4 Link Configuration
### IP Config
**Method 1**

Set the IP address on the web interface of the Eth-B4 Link. In order to access the web interface press and hold the "config" button on the device, about 10 seconds. The status LED will turn solid green.

Open a browser  and enter the web interface by using the base IP address 192.168.10.99. This is the the



default and config IP address of the ETH-B4 Link, even if the IP address was changed for operation mode.

Set the first 3 decimals are set in Device IP settings with the 4th set in the Camera Port section. The Port number being the final decimal of the IPv4 address. Press "Submit" to save the settings.

**Method 2**

Boot the Eth-B4 Link with the camera selector set to 0. This will enable the web server with the web interface available on the base IP address of the Eth-B4 Link instead of 192.168.10.99.



**Method 3**

Starting with firmware version 1.0.2, the base IP can be set via the serial monitor with the serial command: **ip=X.X.X.X**  Example: ip=192.168.10.90
Please note, this sets the base IP address. The IP address of the device with be the base IP address + the number of the camera selector dial.



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# Updating Firmware

## SDI-B4 Link
## Access to USB micro plug

On the SDI-B4 Link units, a micro usb plug for upgrading purposes is located inside the enclosure. In order to gain access to it, one side panel must be removed:
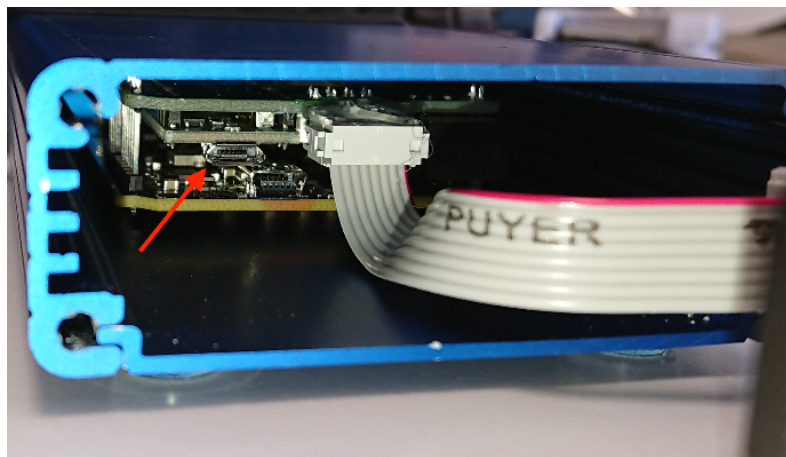
**Step 1:**

Remove the four screws on the panel with the lens connector



**Step 2:**

Carefully slide the end panel off, and move it to the side.

Connect a micro usb cable to the plug indicated by the arrow on the picture, and to a computer. A small blue LED will light up.

## Firmware Update

- Download and install our Deprecated Firmware Updater Application for Mac or PC: https://www.skaarhoj.com/support/deprecated-firmware-app **(Version 2.4.1 or higher is required)**

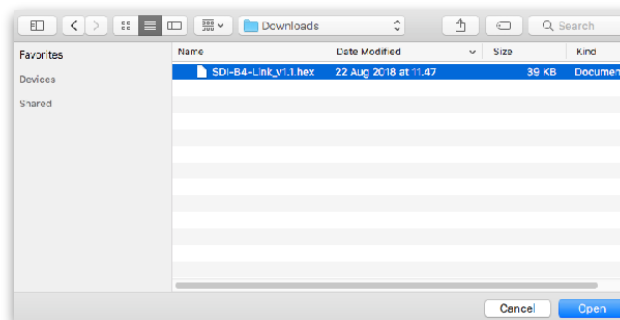- Download the .hex firmware (SDI-B4 Link V1.1) file on https://www.skaarhoj.com/support/standalone-firmwares, "SDI-B4 Link"

**Step 1**

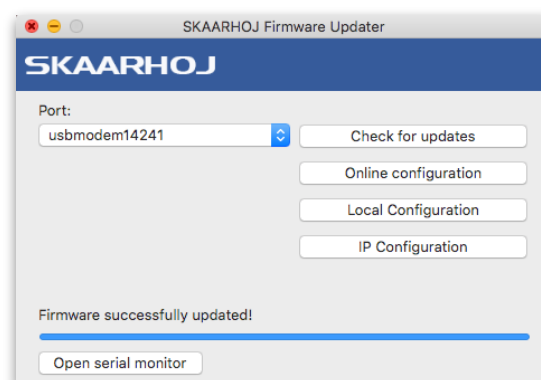Select "Load firmware from file"
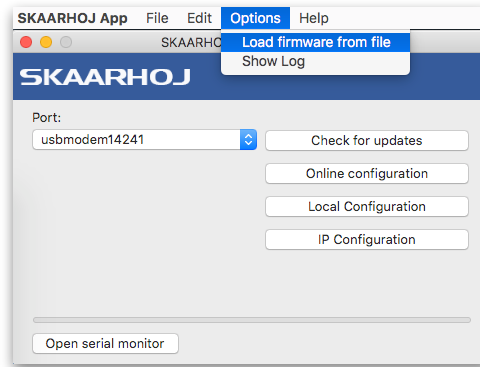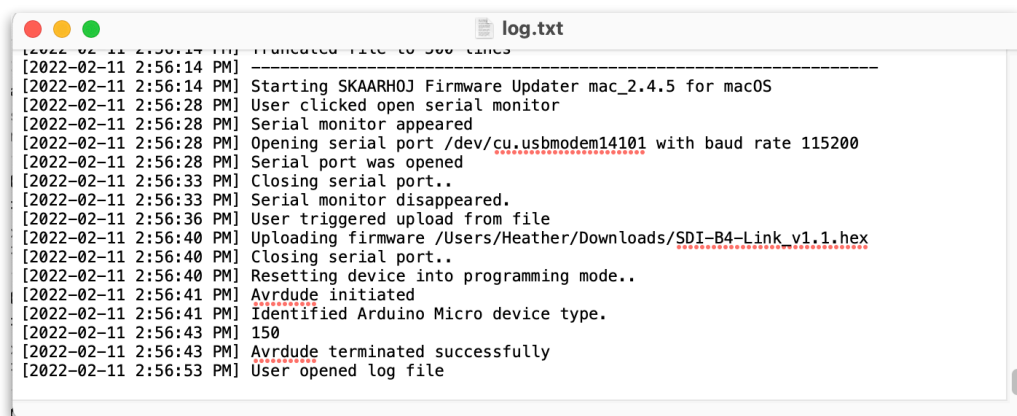


**Step 2**

Select the .hex firmware file



**Step 3**

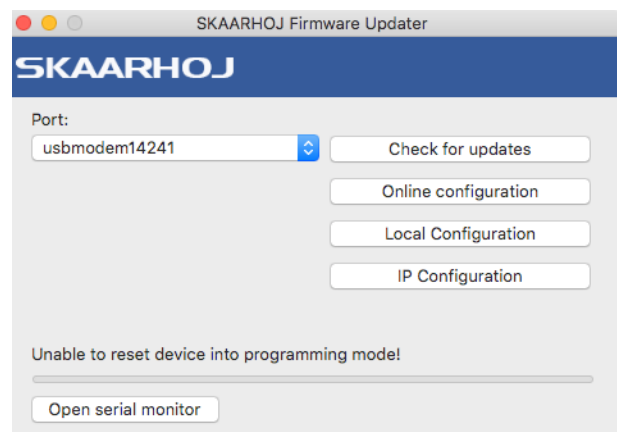Wait for "Firmware successfully updated!" message

## Troubleshooting

A successful firmware update will look like this in the log file.



If you experience the following two messages then make sure you are running the Firmware Updater v. 2.4.5: https://www.skaarhoj.com/support/deprecated-firmware-app



## Additional Drivers

The Depreciated Firmware Updater may need additional drivers downloaded.

For Windows the Arduino IDE may be needed: https://www.arduino.cc/en/software

For all operating systems a Virtual COM Port (VCP) driver may be needed: https://ftdichip.com/drivers/vcp-drivers/

# Eth-B4 Link
## Finding the Latest Firmware

The firmwares for the Eth-B4 Link can be found in the section "Stand Alone Firmwares" from https://www.skaarhoj.com/support/standalone-firmwares

## Load Firmware from File

The function "Load Firmware from File" is in the Options tab in the Firmware Application. The function is used to for the Eth-B4 Link.

Please note that though the SKAARHOJ Firmware Updater is needed to do firmware updates, DO NOT use "Update Firmware" in the Firmware Application as this will render the firmware on the device useless. If "Update Firmware" have been pressed, please re-upload the proper firmware .hex file found in the section "Stand Alone Firmwares" from https://www.skaarhoj.com/support/firmware-updater/

## Confirm Firmware Version
### SDI-B4 Link
The current firmware version loaded onto the SDI-B4 Link can be seen in the serial monitor when the device boots up.
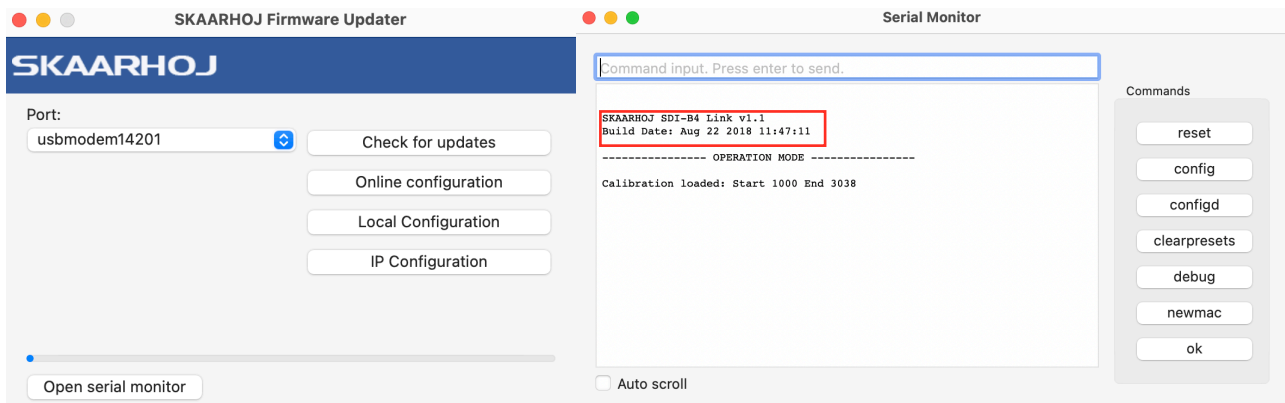


### Eth-B4 Link
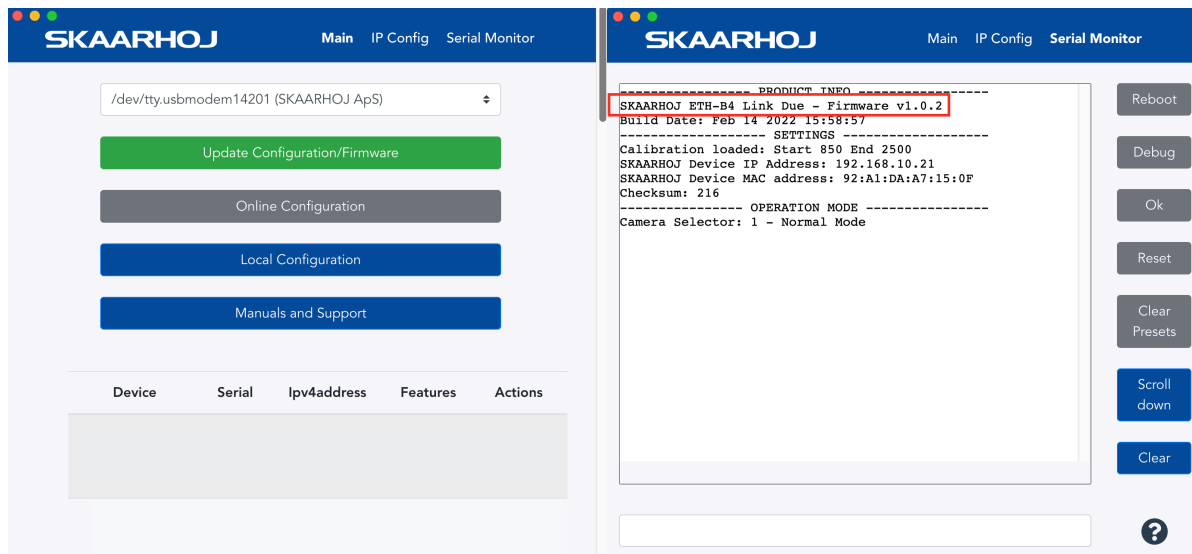The current firmware version loaded onto the Eth-B4 Link can be seen in the serial monitor when the device boots up.



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# Change Log

### SDI-B4 Link Firmware Change Log

v1.1

- Added Iris-F support. The mapping used is 1.50-9.0 in the equation used in camera documentation

v1.0

- Initial release

### Eth-B4 Link Firmware Change Log

v1.0.2

- Added BMD TCP mode for working with Blue Pill
- Added serial commands type "help" in the serial monitor for more information
- Fixed bug related to Camera ID and IP. The unit now reboots after setting the ID. This makes sure the IP is set correctly

v1.0.1

- Fixed a bug where it would not load a valid calibration on first boot after a firmware flash

v1.0.0

- Initial release

# B4 Link Hardware Interface



## Hirose 12 Point Connector

The Hirose 12pin connector supports most B4 lenses, but it's your *own* responsibility to **check** that your particular lens has the features described below. Two example pin outs are given to the left from manuals for cameras and lenses, so you should be able to look up and check similar information for your lens.

Please be aware you might expect vignetting depending on your lens, the sensor size and the type of mount adaptor used. SKAARHOJ takes no responsibility in this regard. Check with your camera/lens supplier.

Example 1:
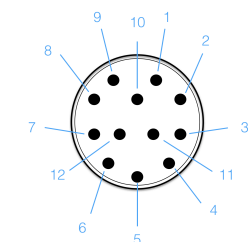


12-pin Hirose male connector

| Pin | Description | Pin | Desciption |
|-----|-------------|-----|------------|
| 1 | External Video on/off | 7 | Iris follow |
| 2 | VTR trigger switch | 8 | Lens servo |
| 3 | +12V DC Return | 9 | Range Extender |
| 4 | Momentary Iris | 10 | Zoom follow |
| 5 | Iris Control | 11 | RxD / Focus follow[2] |
| 6 | +12V DC (max 1.1 A)[1] | 12 | TxD |

1 If more than maximum power is drawn from the lens connector, the camera automatically shuts off power to the lens. A message (Lens Power Error) is shown in the viewfinder.

2 Focus Follow is not a default function of all lens types

NOTE: Only connect broadcast ENG/EFP lenses to the lens interface connector.

Example 2:

| 3 | 2 | GND | LENS ground | GND | |
|---|---|-----|-------------|-----|--|
| 4 | 9 | AUTO +5V (DC) IRIS SERVO ON | Iris fixed servo On/OFF SERVO On : +6V SERVO OFF : OPEN | OUT | |
| 5 | 6 | IRIS CONT | Lens iris control output B4 type: F2.8 : +6.2V, F16: +3,4V, Close: +2.5 V | OUT | |
| 6 | 1 | +12V Lens | +12V output for lens | OUT | 200 mA MAX |
| 7 | - - - | IRIS FOLLOW | Iris position signal +3.4V (F16) to +6.2V (F2.8) | IN | |

## The SKAARHOJ SDI-B4 Link will:

- Pass on the DC 12V input to the lens with GND going to pin 3 and 12V going to pin 6

- Adjust the lens iris with an analog value between 2.5 and 7.5V going out on pin 5 (output to lens)

- Read back the iris position as an analog value from pin 7 (input from lens)

- Enable iris adjustment from the B4 Link box by pulling pin 6 to 5V through a 10 K resistor. To turn of iris adjustment, it will short pin 6 to ground

- Notice: The lens may have a "Manual / Auto" button which must typically be in Manual for this to work. In auto you may find that the lens always adjusts the iris to whatever value it receives from the B4 link box

## Tally

Tally information is pulled from the CCU data. The tally light is also used in during calibration.

## Relay

Program tally from 3-pin phoenix connector: Ground, IO/OUT, 12V (VIN)

## Camera Select Dial

| Dial Position | Function | Serial Monitor Feedback |
|---|---|---|
| 0 | SDI-B4: Deactivate<br>Eth-B4: Web Server | SDI-B4: Camera Selector: 0 - Turned OFF<br>Eth-B4: Camera Selector: 0 - Web server Enabled<br>       Find your SKAARHOJ device at: X.X.X.X |
| 1-C | Camera Select 1-12 | Camera Selector: 1-12 Normal Mode |
| D | Test Mode | Camera Selector: 13 - Test Mode<br>Test Mode: 2247-1372 - 0…….<br>(*Tally indicator flashes red/green/yellow*)<br>**Only set in Test Mode with Lens attached** |
| E | Calibration Factory Reset | Camera Selector: 14 - Clear Calibration<br>Resetting Calibration - Please wait<br>Calibration loaded: Start X End X<br>Calibration has been reset<br>It's now safe to select a new operation mode<br>(*Tally indicator flashes yellow, then solid green*)<br>***Only reset calibration with Lens attached*** |
| F | Calibration Mode | Camera Selector: 15 Calibrate Device<br>Starting Calibration - Please wait for the green tally LED to come ON<br>Calibration results:<br>Start Offset: X<br>End Offset: X<br>Calibration loaded: Start X End X<br>Calibration has Completed<br>It's now safe to select a new operation mode<br>(*Tally indicator flashes red, then solid red, then solid green*)<br>***Only calibrate with Lens attached*** |

# UniSketch Configuration

## Control with SDI-B4 Link

**BMD Cam Control via ATEM**

#42    **Joystick**

**WHITE/BLACK**    CP -
BMD ATEM: Iris ⇕
Mem A ⇕ | Limiter A ⇕ | Scaler A ⇕ | +

**BMD Cam Control via SDI**

#42    **Iris Joystick**

**WHITE/BLACK**    CP -
BMD CamCtrl: Iris ⇕
Mem A ⇕ | Limiter A ⇕ | Scaler A ⇕ | +

**BMD CamCtrl**
☑ 0 . 0 . 0 . 0

**BMD CamCtrl**
☑ 192. . 168 . 10 . 123

**ATEM**

With the default configuration "BMD Cam Control via ATEM" you will find that all HWCs are calling camera control actions through the ATEM switcher.

**SDI or ETH-SDI Link**

If you change to the default configuration "BMD Cam Control via SDI" you will see all the same actions, but via the device core called "BMD CamCtrl" which uses the 3G-SDI output of the controller. However, this is easily changed to the use of the "ETH-SDI Link" because all you need to send out the packages over ethernet is setting the IP address! In other words: If the IP address is 0.0.0.0, control packages will get sent over the SDI output, if the IP address is filled in, the packages will be sent to that IP address (and we assume there sits a SKAARHOJ ETH-SDI Link or ETH-B4 Link box ready to receive the information).

## Control with ETH-B4 Link

**BMD CamCtrl**
☑ 0 . 0 . 0 . 0

**BMD CamCtrl #2**
☑ 192 . 168 . 10 . 123

#24    **Iris**

**LIFT**    CP -
BMD ATEM: Iris ⇕ | Mem AA ⇕
Limiter A ⇕ |
and ⇕ | BMD CamCtrl #2: Iris ⇕
Mem AA ⇕ | | | +

**ETH-B4 Link**

You add another device core for "BMD CamCtrl", but instead of just enabling it, you also add an IP address - the IP address of your ETH-B4 Link. Notice how this device core is suffixed with "#2"

In the behavior for the Iris encoder you add an action to set iris on "BMD CamCtrl #2" with all the same settings.

In case you don't need the iris value to go out on SDI or via the ATEM you can simply change the "BMD ATEM: Iris" action to the "BMD CamCtrl #2: Iris" action.

Also, if you have many ETH-B4 Links you need to make a configuration setting that will change the mode from "direct" to "base" which means the IP address will now be the base address for a whole array of ETH-B4 Link boxes for each camera. This is documented in the manual for the "BMDCamCtrl" device core.

# Troubleshooting

## Error on Check: Your controller is not yet registered

After pressing Update Firmware a message from the Firmware Updater stating that the connected controller is not fully registered yet may pop up. The B4 Links use Stand Alone firmware and are not updated through the "Update Firmware" button on the firmware updater.
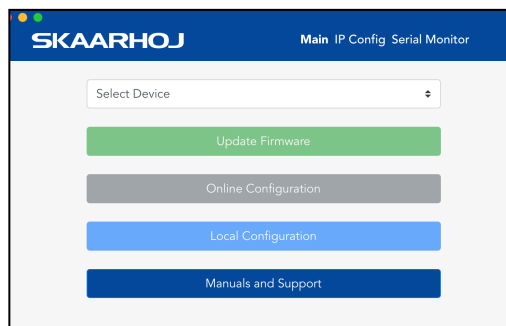
To upload the latest firmware please see the "Updating Firmware" section of this manual.

If trying to change the IP address for the Eth-B4 Link please see the "IP Config" section of this manual.
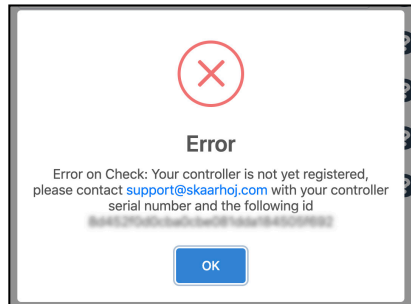


## Controller does not show up under Port in Firmware Application

If the controller doesn't show up under ports, try these things first:



- Make sure you have attached your controller with a micro USB cable to your computer. Check the micro USB is fully inserted into the USB plug on the controller

- Is the controller turned on?

- Reboot you computer

- Change the USB cable for another one

- Avoid using USB adapters to eliminate point of failures

- Try to use a different USB port on your computer

- Boot the controller in config mode: Disconnect the controllers power, then hold the config button under the power plug down with a pen tip, power on the controller and hold the button until it lights blue, then release.

If none of the above brings up the USB port, you may try this procedure **but only after clearing it with the SKAARHOJ support team!**:

• Locate the small hole just below the config button

• Power on the controller and press this tiny button for a second and release. You may repeat this. (Pressing this button while the controller is on should reset it completely).

• Turn off the controller, then turn it on again. Now you should see the USB port in the firmware application.



## Controller Not Confirming Connection

Try power cycling the B4 Link. It can connect better when powered after the other Skaarhoj controller.

## Check the IP Settings

Make sure the IP for the Device Core in the connected SKAARHOJ controller is set to the same IP address as the Eth-B4 Link.

# Network Recommendations

## Facts

• SKAARHOJ controllers have a 100 mbps network interface

• Network switch must have Auto-MDI/MDIX

• Network switch must support 100 mbps

• PoE: IEEE 802.3af

• SKAARHOJ controllers only support Half Duplex mode without Auto-Negotiate

When connected to a network switch, the yellow LED (lower left) at the ethernet jack will be on. If the device in the other end supports TX/RX auto detection you may be able to connect the SKAARHOJ controller directly to your device, otherwise use a crossed cable or a network switch (the supported setup). Remember a SKAARHOJ controller and client must be on the same subnet (192.168.10.* or one you set up in the controller). If you have multiple SKAARHOJ units connected to the same network they need to have different IP addresses!

## Power over Ethernet (PoE) Specifications

We use the PoE industry standard 48V IEEE 802.3af. If you want to power our controllers using PoE it is important your switch supports this standard. Please notice some manufactures such as Ubiquity have their own non-standard 24V type of PoE which is incompatible with our controllers. Especially pay attention to the standard if you use a PoE injector.

## Troubleshooting

If you experience no network activity at all try one or more of the following suggestions:

• Use a managed network switch

• Force network switch port to 100 mbps

• Try a different network switch

1GB or 10 GB switches can have issues with our 100 mbps interface if not properly managed. The iMac Pro with 10 GB have issues if connected directly to our controller. Try with a USB to ethernet adapter in this case.

# WEEE Information

**For private households: Information on Disposal for Users of WEEE**



Figure 1

This symbol (figure 1) on the product(s) and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points where it will be accepted free of charge.
Alternatively, in some countries, you may be able to return your products to your local retailer upon purchase of an equivalent new product.
Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.
Please contact your local authority for further details of your nearest designated collection point.
Penalties may be applicable for incorrect disposal of this waste, in accordance with you national legislation.

**For professional users in the European Union**
If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.

**For disposal in countries outside of the European Union**
This symbol is only valid in the European Union (EU). If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.