Blackmagic Camera Control (over SDI)

Used to send Blackmagic Camera Control data over SDI out on a SKAARHOJ controller, alternatively over UDP to a receiving device such as SKAARHOJ ETH-SDI Link or WIFI-B4 Link. In UDP mode a maximum of 8 x clients can be connected from the Device Core.

SDI as the output is used whenever an IP address is 0.0.0.0 (four zeros), otherwise IP mode is used. Notice that for IP mode, two submodes exist, BASE mode and DIRECT mode (default). See note in the bottom of this document.

In SDI mode there are a few facts to mention:

- Tally: By default on power-up, incoming tally data on SDI will be forwarded through on the SDI output. Only if/when a tally state is set by the controller itself will "override" mode be turned on and incoming tally data is blocked out and only controller-generated tally data is outputted. The logic behind this is that sometimes a SKAARHOJ controller should just be transparent to tally input data and at other times it should generate tally data and block any incoming data. Letting this depend on whether a controller actively ever tries to set tally data itself is an easy way to assume the intended function.
- Camera control data: By default no incoming camera control data (CCU data) will be passed through the controller. This makes sense as a default since usually the SKAARHOJ controller is expected to be the source of camera control data and block out any incoming data. However, a special mode exists, "Momentary Override" (see bottom of document) which if set will only enable override mode for as long as it takes to send data out, then disable it again thus letting incoming camera control data pass through. This mode makes sense if you wish to allow devices upstream to send camera control data through the SKAARHOJ controller. This is relevant if there are dedicated controllers for dedicated cameras, for instance if you daisy chain SKAARHOJ controllers together. Notice however, that any incoming data while a controller is in override mode is simply blocked out and lost: In other words; if a controller upstream sends iris information simultaneously with a downstream controller, the upstream controller data is lost because it's blocked out at that time.

Note for SKAARHOJ controllers with Blackmagic 3G-SDI Arduino Shields and Studio Fiber Converter/Camera Fiber Converter

We have tested Blackmagics fiber converter products in general to work with SDI output. This includes the Mini Converter, ATEM Camera Converter, ATEM Studio Converter and ATEM Talkback Converter 4K. The only product we know does not work is the Studio Fiber Converter/Camera Fiber Converter. This product is not compatible with their own 3G-SDI shield which is the component we use inside the RCPs and other products. While the Studio Fiber Converter/Camera Fiber Converter will forward shading data from an ATEM switcher it will not do so for the 3G-SDI shield.

Bottom line is this: We cannot change this situation, only Blackmagic Design can decide to upgrade either the Studio Fiber Converter/Camera Fiber Converter or the 3G-SDI Arduino Shield to make it work. At this point we can suggest that you rather connects a controller to an ATEM switcher which will work as the master for sending out the shading data. You might employ a cheap ATEM switcher for only this purpose.

Controlling PT heads such as Rushworks PTX

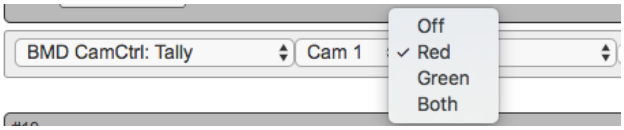
Please have a look at the tutorial "RUSHWORKS PTX Head" at https://www.skaarhoj.com/support/manuals/

An excerpt of the list of BMD CamCtrl related actions.

BMD CamCtrl: Focus
BMD CamCtrl: Focus (Relative)
BMD CamCtrl: Iris
BMD CamCtrl: Iris (f-stop)
BMD CamCtrl: Sensor Gain
BMD CamCtrl: Shutter
BMD CamCtrl: White Balance
BMD CamCtrl: Auto White Balance
BMD CamCtrl: Lift
BMD CamCtrl: Gamma
BMD CamCtrl: Gain
BMD CamCtrl: Hue
BMD CamCtrl: Contrast
BMD CamCtrl: Saturation
BMD CamCtrl: Bars
BMD CamCtrl: Detail
BMD CamCtrl: CCU Settings
BMD CamCtrl: Reset
BMD CamCtrl: Tally
BMD CamCtrl: Zoom
BMD CamCtrl: Coarse Scale
BMD CamCtrl: Video Mode
BMD CamCtrl: Push data
BMD CamCtrl: PT Drive
BMD CamCtrl: PT Preset
BMD CamCtrl: Reference Offset
BMD CamCtrl: Reference Source

Particular details for specific Actions

Tally



Sets or gets tally

Binary triggers: Sets the selected tally type (Red, Green, Both or Off)

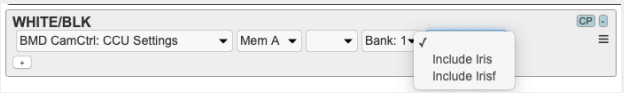
Pulse inputs: Acts like a binary trigger

Binary outputs: On when selected tally matches tally value. The tally value is the incoming tally in case override mode is not enabled, otherwise it will be the memory value of whatever the controller itself set as the latest tally value.

Button colors: Red, for red tally, green for green tally

Displays: Uses background color to denote the tally value and shows the camera number in the display.

CCU Settings



Save, Recall or Save/Recall CCU Settings (color parameters)

Binary inputs: If Save mode, the given CCU settings will be saved to the chosen bank. Iris can be included if wanted. In Recall mode the CCU settings will be recalled. The button will blink for 10 seconds and if you push the button again within this period of time settings will revert back to the settings prior to the recall. If Recall/Save mode (the blank option) the two functions are combined. Press and hold will Save. One press will recall.

Displays: Will show File 1-6

Values:
- Select Camera 1-10. If you choose Mem A-D, the camera value will be taken from the value of this memory register. A total of 6 banks can be selected, not per camera but in *total*. The function originates from the RCP implementation.

PT Preset

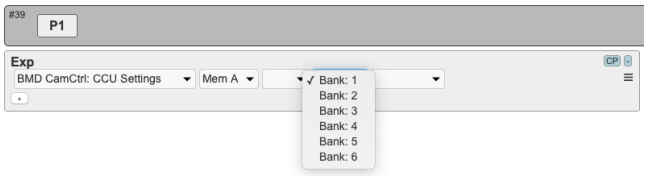
Save, Recall or Save/Recall Pan/Tilt Settings (**zoom and focus not included**)

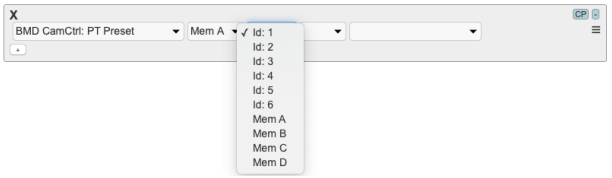
Binary inputs: If Save mode, the given Pan/Tilt settings will be saved to the chosen bank. In Recall mode the Pan/Tilt settings will be recalled. In Recall/Save mode (the blank option) the two functions are combined. Press and hold will Save. One press will recall.

Displays: Will show Cam x: Set/Pre/Rec/Del

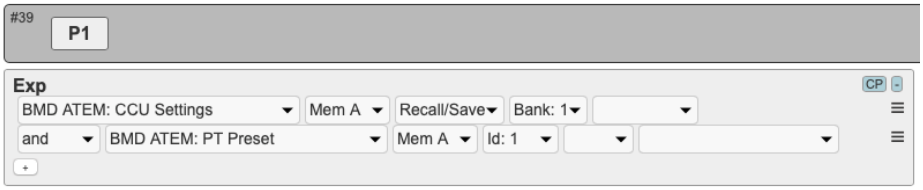
Values:
- Select Camera 1-10. If you choose Mem A-D, the camera value will be taken from the value of this memory register. A total of 6 banks can be selected, not per camera but in *total*. The function originates from the RCP implementation.

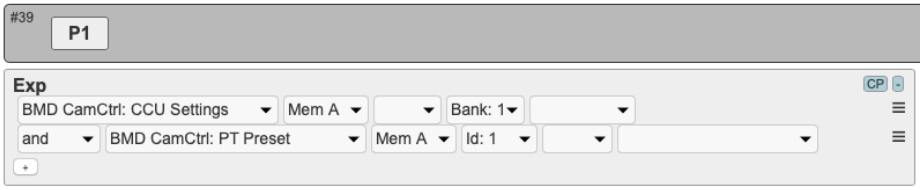
Please notice *only* a total of 6 banks/IDs are available to save CCU settings/PT Presets. Not per camera but **in total**. The reason being is that the actions was originally developed for the RCP which as designed to control just *one* camera at a time.





Please also observe zoom and focus are *not* included in either the CCU Settings or PT Presets





Device Configurations

Device configuration options exist:

- Index 0: **UDP Addressing set to BASE mode**: If "1", then BASE mode is On, otherwise Off (DIRECT mode). DIRECT mode (the default behaviour) means that all commands for any camera is sent to the IP address configured for the device core. This is the "intuitive" behaviour of course and the mode you would use if you want to forward data to a ETH-SDI Link. BASE mode on the other hand forwards data to a number of different IP addresses, basically the "device core IP address + camera number". So for instance, if the device core IP address is 192.168.10.80 and you send iris data to camera 1, it would be forwarded to a ETH-B4 Link (or similar) device on 192.168.10.81 (80+1).
- Index 1: **Momentary Override**: If "1" the controller will only override incoming camera control data at times when it sends out its own data, otherwise it will be transparent to incoming data.
- Index 2: **Sensor Gain / Camera Gain Setting Range**
  - If "0" = default
  - If "1" = Extended -12dB/12dB Range
  - If "2" = Original 0db/18dB Range
- Index 3: **Tally Override**
  - If "0" = Normal behaviour
  - If "1" = Incoming tally will be blocked

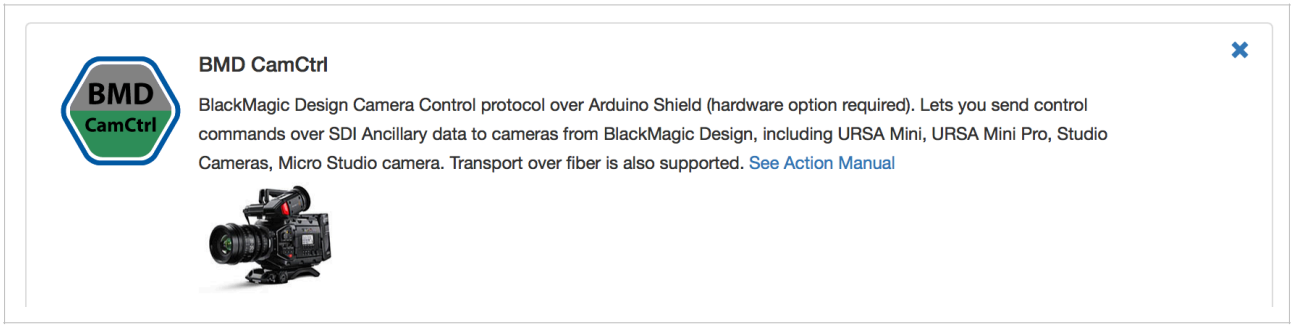
Example - Momentary Override:

Enabling Momentary Override could look like this device configuration code: "D0:1=1" where the general form would be "Dx:y=z" where "x" is the number of the device core as installed on the controller (starting with zero for the first device core), "y" the index number and "z" the value for that index.

To confirm that a device configuration is in fact detected by the controller, please check it out on the serial monitor where it will be mentioned:

```
Compiled: Sep 13 2017 08:52:08
DeviceCore #1: BMDCamCtrl0
BMD Shield Initialized (F/W Ver: 0.10, Protocol Ver: 1.0)
BMDCamCtrl CCU Momentary Override Activated
setup() Done
------------------------------
```

If the BMD CamCtrl Device Core is the first like below:



then Momentary Override would be set by this configuration under "Manage Media" on the configuration page for your controller. Access this by pressing "Online Configuration" in the Firmware Application. Remember to save on the configuration page *and* press "Check for updates" in the Firmware Application.

Device Core Options

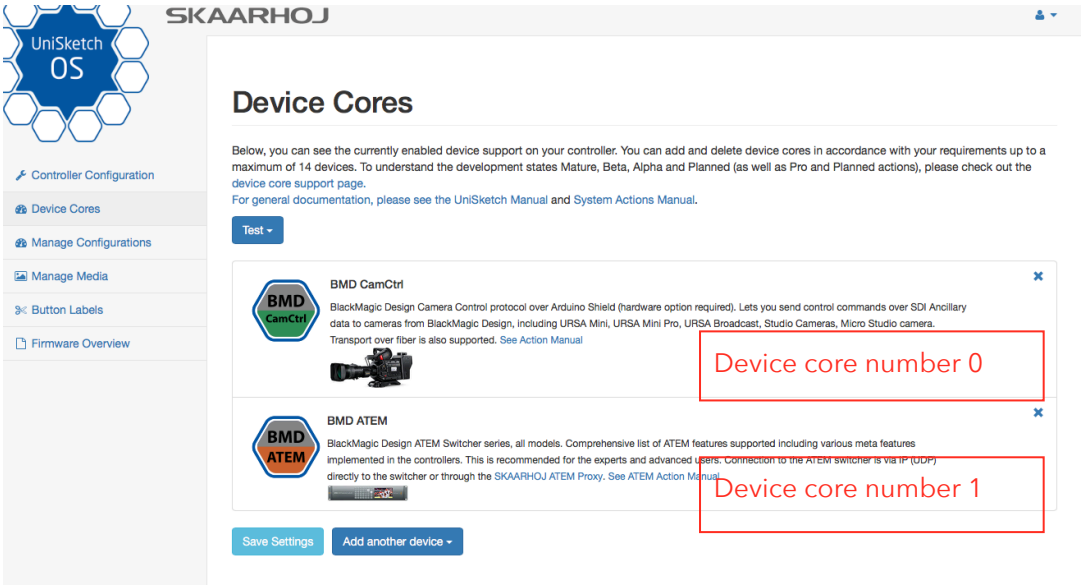
Some device cores support additional options that can be defined through this text field. Please refer to the manual for the particular device core for details.

D0:1=1

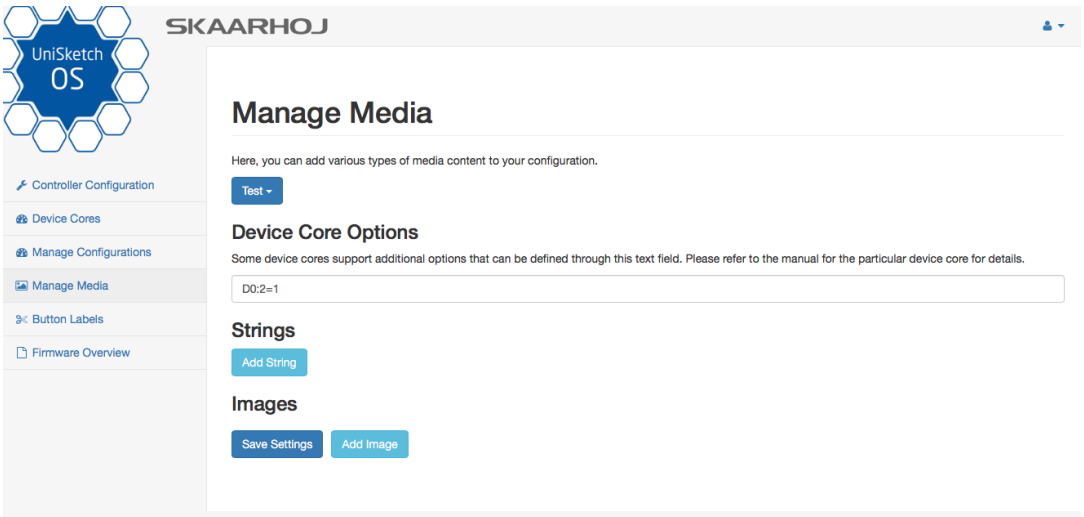
Example - Sensor Gain / Camera Gain Setting Range

Enabling the Sensor to the -12dB/12dB Range could look like this device configuration code: "D0:2=1" where the general form would be "Dx:y=z" where "x" is the number of the device core as installed on the controller (starting with zero for the first device core), "y" the index number and "z" the value for that index.

If the BMD CamCtrl Device core is the first like below:



Sensor Gain range would be set by this configuration under "Manage Media" on the configuration page for your controller. Access this by pressing "Online Configuration" in the Firmware Application. Remember to save on the configuration page *and* press "Check for updates" in the Firmware Application.



To confirm that a device configuration is in fact detected by the controller, please check it out on the serial monitor where it will be mentioned: