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1 Overview

This manual describes the usage of the ProVideo GUI by Dream Chip. The GUI is used to setup supported ProVideo devices which are attached over a serial interface. The GUI is currently available for Linux and Windows operating systems and supports the following devices:

- ATOM one
- ATOM one mini (including AIR and waterproof variants)
- ATOM one 4K Mini
- ATOM one SSM500 (Trigger and SSM Mode)

The goal of this document is to describe the full functionality of the GUI. Not all devices listed above support all features, so the actual appearance of the GUI might vary.

The screenshots in this documentation were created, while the GUI was connected to an ATOM one camera. The application was run on a desktop PC running Ubuntu 18.04, on other operating systems the style of the UI elements may vary.

The GUI mainly consists of two windows: The connection dialog is used to establish a connection to a device, while the main window is used to setup the device. They are described in detail in the following chapters.

The GUI is open source software, you can get the source code from GitLab:

<https://gitlab.com/dreamchip/provideo-gui>

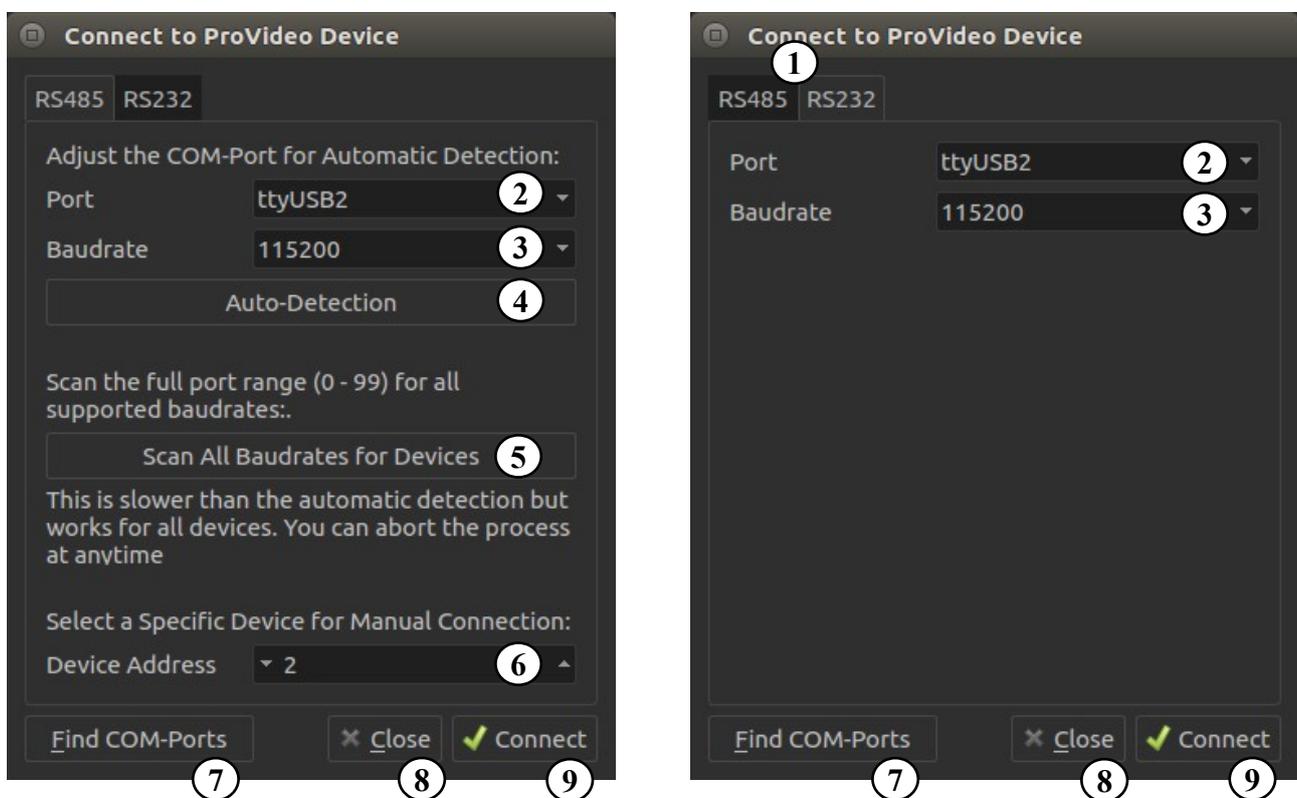
The latest firmware and software updates, manuals and application notes for Dream Chip products, including updates for the ProVideo GUI can be downloaded here:

<https://gitlab.com/dreamchip/provideo-downloads>

2 Connecting with a Device

The GUI supports serial connections using either the RS485 or RS232 protocol. When using RS232 only one device can be connected at a time, with RS485 multiple devices can be connected over one bus. The standard power cable adapter provided with most devices uses RS485.

On application startup the GUI will automatically search for connected devices on the last used COM-Port. If one or more devices are found, the GUI will connect to the first device and directly open the main window. If no device can be found the connect dialog will open. It has two pages, one for setting up RS485 the other for RS232 connections:



| | |
|---|---|
| 1 | Choose between RS485 or RS232 connection. |
| 2 | COM-Port to which the device is connected. This will be "ttyUSBX" on Linux and "ComX" on Windows. |
| 3 | The Baudrate has to match the Baudrate of all connected devices. Using devices with different Baudrates on the same RS485 Bus is not supported. |
| 4 | The Auto-Detection will find all devices which are connected to the selected COM-Port and match the selected Baudrate. |
| 5 | If the Auto-Detection fails, you can try the automated scan which will find all devices which are connected to the selected COM-Port. |
| 6 | When manually connecting to a device, the Device Address has to match the device parameters. |

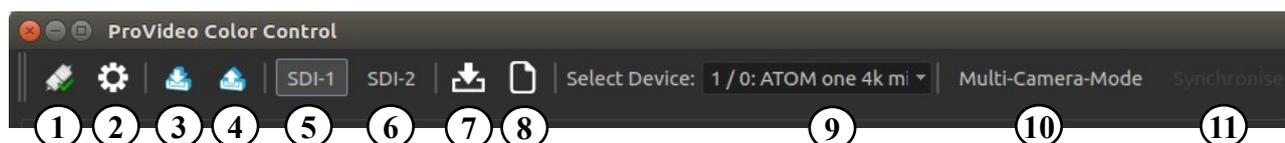


| | |
|---|---|
| 7 | When connecting a new COM-Port device after the GUI was launched, click this button to add it to the Port list. |
| 8 | Close the Connect Dialog. If you have previously tried to establish a connection to a device, but the connection was unsuccessful, this will close the GUI (since it is in disconnected state). |
| 9 | Connect to the device which is specified through the above mentioned settings (see points 2, 3 and 6). |

3 General navigation

After the connection was established, the main window will open. It has toolbar for general options and a sidebar to navigate through the sub pages of the GUI.

3.1 Toolbar



| | |
|----|---|
| 1 | Open the connect dialog (see chapter 2). |
| 2 | Open the system settings dialog (see chapter 3.3) |
| 3 | Load settings from camera to GUI. |
| 4 | Save settings from GUI to camera for startup configuration. |
| 5 | Switch to configuration of SDI 1 LUT. |
| 6 | Switch to configuration of SDI 2 LUT. |
| 7 | Save current system settings to disk. |
| 8 | Load settings from disk into GUI and transfer them to the device. |
| 9 | Switch between connected devices. Only visible if the auto-detection was used to connect with the device over RS485. The first number represents the device address, the second number the device broadcast address. |
| 10 | Toggle broadcast mode. In broadcast mode the currently selected device will be the broadcast master, all other devices in the same broadcast group will be slaves. Settings applied to the master will also be applied on all slaves. |
| 11 | The Synchronise button is only enabled, if broadcast mode is active. Click it to apply the settings of the current device (broadcast master) on all other devices (broadcast slaves). |

Note regarding ATOM one SSM500 cameras in Trigger Mode:

The ATOM one SSM500 in Trigger Mode has two independent chains (Live and Playback). The “SDI-1” and “SDI-2” buttons will thus be shown as “LIVE” and “PLAY” and can be used to switch to setup of either chain.

Additionally a new button “LIVE → PLAY” will be shown if an ATOM one SSM500 in Trigger Mode is detected. This button can be used to copy all settings from the Live chain to the Playback chain. If you want to always apply all settings for both chains, enable the “Link” button which is placed to the right of the “LIVE → PLAY” button.

3.2 Sidebar



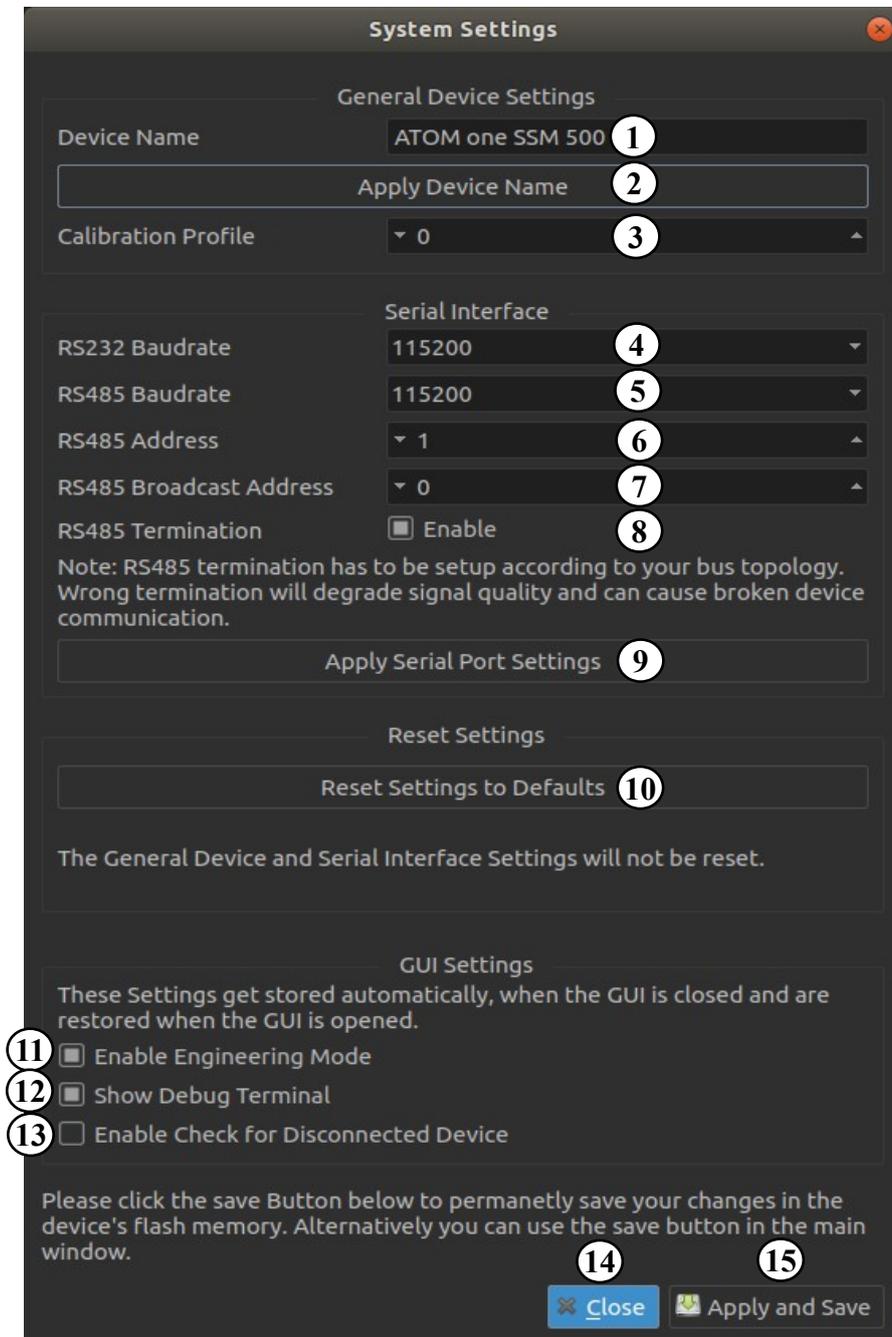
Note: For better presentability the screenshot of the sidebar has been turned left by 90 degrees. A click on a symbol opens the corresponding tab:

| | |
|----|--|
| 1 | In-Out Tab: Configure exposure settings, lens shading correction, video output, genlock and timecode features. |
| 2 | Lens Driver Tab: Configure a connected automated lens (only available for some camera models). |
| 3 | Playback Tab: Control slow-motion recording and playback (only available for ATOM one SSM500 cameras in Trigger Mode). |
| 4 | Black Level Tab: Configure black levels and flare compensation. |
| 5 | White Balance Tab: Configure white balance settings. |
| 6 | Filter Tab: Configure denoise and detail filters. |
| 7 | Multi Color Controller Tab: Configure color correction. |
| 8 | Knee Function Tab: Configure the knee function. |
| 9 | Lookup Table Tab: Configure the gamma correction lookup table. |
| 10 | Defect Pixel Correction Tab: Setup the automatic defect pixel correction and create a defect pixel table. |
| 11 | Output Tab: Configure the RGB to YcbCr matrix and fine tune the SDI output range. |
| 12 | Info Tab: Show device and software information and change system settings. |
| 13 | Update Tab: Perform device updates. |

The tab pages will be described in detail in chapter 4.

3.3 System Settings Dialog

The settings dialog is used to configure general device and GUI settings.



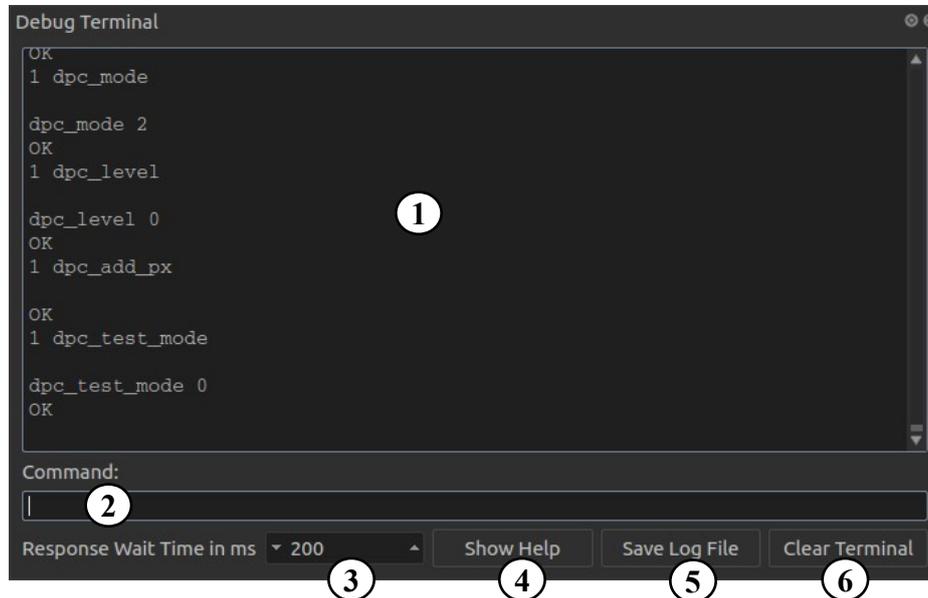
Note: The GUI Settings (points 11, 12 and 13) will be saved when the GUI is closed and are restored when it is opened again.

| | |
|---|---|
| 1 | Use this field to enter a new device name. |
| 2 | Click to apply the device name on the device. |



| | |
|----|---|
| 3 | Change the Calibration Profile. The amount of profiles available depends on the camera model, this setting is not available on all cameras. For details see the description of the “calibration_profile” command in the Reference Manual of your camera. |
| 4 | Change the baudrate of the RS232 port of the device. Usually this should be left at the default setting. |
| 5 | Change the baudrate of the RS485 port of the device. Usually this should be left at the default setting. |
| 6 | Change the RS485 address of the device. Before connecting multiple devices to one RS485 bus, make sure that all devices have different addresses, or you will have address conflicts! |
| 7 | Change the RS485 broadcast address of the device. This is useful if you want to have multiple broadcast groups on one RS485 bus. |
| 8 | Enable or disable the RS485 termination. Note: RS485 termination has to be setup according to your bus topology. Wrong termination will degrade signal quality and can cause broken device communication. |
| 9 | Click this button to apply the new Serial interface settings. Without this step, the settings will be left unchanged. |
| 10 | Use this to reset all settings to factory defaults. Careful: This will delete any calibration you have done, e.g. to the multi color controller. If needed save those settings separately before performing a full reset! |
| 11 | Enable the engineering mode to display additional GUI elements. Careful: Changing engineering settings can drastically decrease the image quality. |
| 12 | Enable the Debug Terminal (see chapter 3.4 for more details). |
| 13 | Enable a periodic connection check. If enabled the GUI will ping the connected device every 2 seconds. If device connection is lost, a dialog will be displayed. |
| 14 | Close the settings dialog. Please note that this will not save any settings. If you have made changes which you want to apply permanently, click the “Apply and Save” button first. |
| 15 | Apply all Settings and Save the settings permanently. This has the same effect as clicking the save settings button in the toolbar. If you do not want to save the settings permanently, use the Buttons 2 and 7 and then close the dialog using the button 11. |

3.4 Debug Terminal



The Debug Terminal shows all commands which are send by the GUI. It can also be used to manually send commands to the device.

By default the Debug Terminal opens as a docked widget of the main window. You can turn it into a stand-alone window by grabbing it and dragging it away from the main window.

The Debug Terminal can be useful to understand how the ProVideo command system of your device works. Simply open the debug terminal, make changes in the GUI and watch the output.

| | |
|---|---|
| 1 | History of send / received commands. This window shows a maximum of 10000 lines, older lines get deleted as soon as this limit is reached. |
| 2 | The command line can be used to enter your own commands (see the reference manual of your device for a full list of the available commands). The command line features a command history which you can access by pressing the Arrow Up and Down keys on your keyboard while the command line is active. The command history can contain up to 100 commands, older commands are deleted as soon as this limit is reached. You can also copy and paste a list of commands, e.g. from a text document to the command line, all commands will then be executed. Please make sure that you have selected an appropriate command response wait time (see point 3). |
| 3 | Since the Debug Terminal does not know how long a manually entered command has to be processed in the device a maximum wait time has to be specified. For most commands the default of 200ms is sufficient. For long commands like storing the DPCC table or enabling Genlock you will have to increase the wait time, otherwise you will not see the answer of the device. If you run a script with multiple commands by pasting it into the command line make sure to select a wait time which is long enough for the most time consuming command in the script. |



| | |
|---|---|
| 4 | Click this button to show the in-application help of the Debug Terminal. |
| 5 | Click this button to save the current content of the Debug Terminal to a text file. If you experience problems with your device like commands which are not correctly executed, it can be helpful for the Dream Chip support team if you send them the command log for investigation. |
| 6 | This button clears the content of the Debug Terminal. The command history is not deleted. |



4 The Tabs

Each tab focuses on a certain feature set of the device. Below is a list of all tabs currently available in the GUI. Depending on your device, some tabs or features might not be available.

4.1 In-Out Tab

The screenshot shows the ProVideo Color Control GUI with the following settings and callouts:

- 1** Bayer-Pattern: GB,RG
- 2** Shutter Time in μ s: 20000
- 3** ISO: 1600
- 4** Enable:
- 5** Use Custom Weights:
- 6** Configure AEC Weights
- 7** Luminance Set Point: 1000
- 8** Maximum ISO: 1600
- 9** Control Speed: 10
- 10** Anti Flicker Period: 50 Hz 60 Hz
- 11** Enable:
- 12** Cos4 Compensation: 0.00
- 13** Offset: 0.00
- 14** Slope: 0.00
- 15** Video Mode: 2160p50
- 16** SDI 1 Downscaler: Disabled
- 17** SDI 2 Mode: SDI-1 (mirror)
- 18** SDI 2 Downscaler: Downscale
- 19** Flip: Off
- 20** Audio Enable / Gain: 1.40
- 21** HDR / LOG Gamma: PQ
- 22** PQ max Brightness: 50 %
- 23** Color Space / Gamut: Rec.709
- 24** Genlock Mode: Disable
- 25** Genlock Crosslock: Disable
- 26** 1080p50
- 27** Genlock Offset Vertical (Lines): 0
- 28** Genlock Offset Horizontal (Pixels): 0
- 29** Genlock Termination:
- 30** Timecode: 00:34:37
- 31** Apply
- 32** Read
- 33** Hold



| | |
|----|---|
| 1 | Setup the bayer pattern of the sensor. This setting is only visible if “Engineering Mode” is enabled on the info tab and usually should not be changed by the user. |
| 2 | Manually set the shutter time in microseconds. Can only be adjusted if auto exposure is disabled. Use the Combo Box and the “+” and “-” buttons to the right of the slider to switch between common exposure time presets. |
| 3 | Manually set the sensor gain (ISO). High values will lead to a brighter image but also more noise. Can only be adjusted if auto exposure is disabled. Use the Combo Box and the “+” and “-” buttons to the right of the slider to switch between common ISO presets. |
| 4 | Enable auto exposure. This will automatically adjust shutter time, ISO and aperture (if available). Turn off to use manual settings (see points 2 and 3). If turned on the elements 5 to 10 will be enabled. |
| 5 | By default the device uses an optimized auto exposure algorithm, which also works with back light conditions. If you want to manually setup the weighting of the auto exposure, check this box and click the “Configure AEC Weights” button (see point 6). |
| 6 | This button is only enabled, if the “Use Custom Weights” check box is checked (see point 5). Click this button to open a dialog to setup the weights of the 5x5 measuring fields of the auto exposure control. By default all fields are weighted equally with ‘1’, setting a higher value for one of the fields prioritizes it, that means the AEC will try to correctly expose that field. The minimum weight is 1, the maximum is 25. |
| 7 | The luminance set point defines how bright the auto exposure will set the output image. |
| 8 | The maximum ISO setting defines how high the auto exposure is allowed to adjust the sensor gain (see point 3). Use a lower value if you want to avoid noise in low light scenarios, choose a higher value if more gain is needed and noise is of secondary importance. |
| 9 | The control speed defines how fast the auto exposure reacts to changes in the light conditions. A lower value means a faster reaction, but setting the value too low might cause the controller to overshoot. |
| 10 | Set the anti flicker period to the power frequency of your country (e.g. 50 Hz in Europe, 60 Hz in North America) to avoid screen flickering when the auto exposure is enabled. |
| 11 | Enable lens shading correction. Please see the notes below this table for detailed instructions on how to setup the lens shading correction module. |
| 12 | The Cosine ⁴ Compensation mainly adjusts the correction in the middle regions of the image. |
| 13 | The Offset determines where the compensation of the outer image regions starts. |
| 14 | The slope defines how strong the compensation in the outer image regions is. |
| 15 | Set the video mode (resolution and timing). |



| | |
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| 16 | Enable 4K to 2K downscaler and optional interlacer for the first SDI output. This option is only available for 4K cameras, see the cameras reference manual for more details. |
| 17 | Set the mode of the second SDI output. In mirror mode the image is identical to the first output, in RAW-10 and RAW-12 modes a custom raw image will be output. Set it to "SDI-2 LUT" to use a custom de-gamma LUT for the second output. To configure the LUT of the second output additionally you have to switch to SDI-2 config in the Toolbar (see chapter 3.1, point 5 and 6 and chapter 4.9 for more details). |
| 18 | Enable 4K to 2K downscaler and optional interlacer for the second SDI output. This option is only available for 4K cameras, see the cameras reference manual for more details. |
| 19 | Set the flip mode to mirror the image vertically, horizontally or both (rotate 180°). |
| 20 | Enable or disable Audio and setup the audio gain. When enabled the audio signal of the device internal microphone is embedded into the SDI output signal. You can change the audio gain via the spin box to the right of the enable button. The default gain is 1.0, to for example double the volume set a value of 2.0, to half it set a value of 0.5. |
| 21 | Enable HDR / LOG mode. In LOG mode the gamma curve of all outputs is fixed to either HLG or PQ. This generates a "flat" output image which preserves more details in the highlights. In HLG LOG mode the gain range is adjusted (minimum ISO is doubled) to match the LOG curve. In PQ LOG mode you can use the "PQ max brightness" setting to adjust the gamma curve to your display (see point 22). Please note that in either LOG mode the Lookup Table Tab (see chapter 4.9) is deactivated. |
| 22 | Setup the maximum PQ brightness from 0% to 100%. At 100% the image contains all highlights, but most display will not be able to display them since they do not achieve the required brightness. At the default value of 50% most displays should be able to display the image without clipping. Only active if LOG mode is set to PQ (see point 21 above). |
| 23 | Switch between Rec.709 and Rec.2020 color space. This will also change the color conversion matrix (see chapter 4.12) |
| 24 | Enable genlock in slave mode (when connecting an external sync source) or master mode (to generate a genlock signal). |
| 25 | Setup the genlock crosslock mode. When disabled the camera will expect a tri-level sync signal which matches the video mode (see point 15). For 4K / UHD video modes this means the matching 2K / FHD video mode (e.g. 1080p30 for 21060p30), since there is no 4K genlock standard. Crosslocking is possible in three different modes: <ul style="list-style-type: none"> • Pal Black & Burst • NTSC Black & Burst |



| | |
|----|--|
| | <ul style="list-style-type: none"> Other HD Mode Pal and NTSC B&B are self-explanatory. In “Other HD Mode” you can select the tri-level sync signal to which the camera shall lock (see point 26). |
| 26 | Setup genlock crosslock video mode. This combo-box is only enabled if crosslocking is set to “Other HD Mode) (see point 25). You can select the tri-level sync signal to which the camera shall lock. |
| 25 | Set the vertical genlock offset in lines. |
| 26 | Set the horizontal genlock offset in pixels. |
| 27 | Enable or disable genlock termination. |
| 28 | Field to enter the timecode. |
| 29 | Apply the currently entered timecode. |
| 30 | Get the current timecode of the device. |
| 31 | Hold the timecode. When enabled the device will stop incrementing the timecode on the SDI output. The internal counter will keep running, so if you resume, the timecode will jump to the current value. This can be used to trigger external flash recorders. |

Note: How to setup the lens shading correction:

1. Point the camera at a homogeneous light source.
2. Connect the camera to a wave monitor and select a line in the middle of the image, depending on the lens you use, you should see a decrease in luminescence towards the edges of the image.
3. Enable lens shading correction, start with the Cosine⁴ Compensation, Offset and Slope set to 0.
4. Now turn up the Cosine⁴ Compensation, this should correct the lens shading in the middle area of the image, the edges will probably still be not ideally illuminated. Make sure to not overcompensate, this will create a wavelike appearance of the luminescence on the monitor.
5. Set the Offset to 0.5 and set to Slope to a high value like 1.5, you should now clearly see where the compensation starts. Now adjust the Slope until you hit the point where the luminescence starts decreasing. Finally decrease the Slope until the result is not overcompensated anymore.
6. Make fine adjustments until you are satisfied with the result.

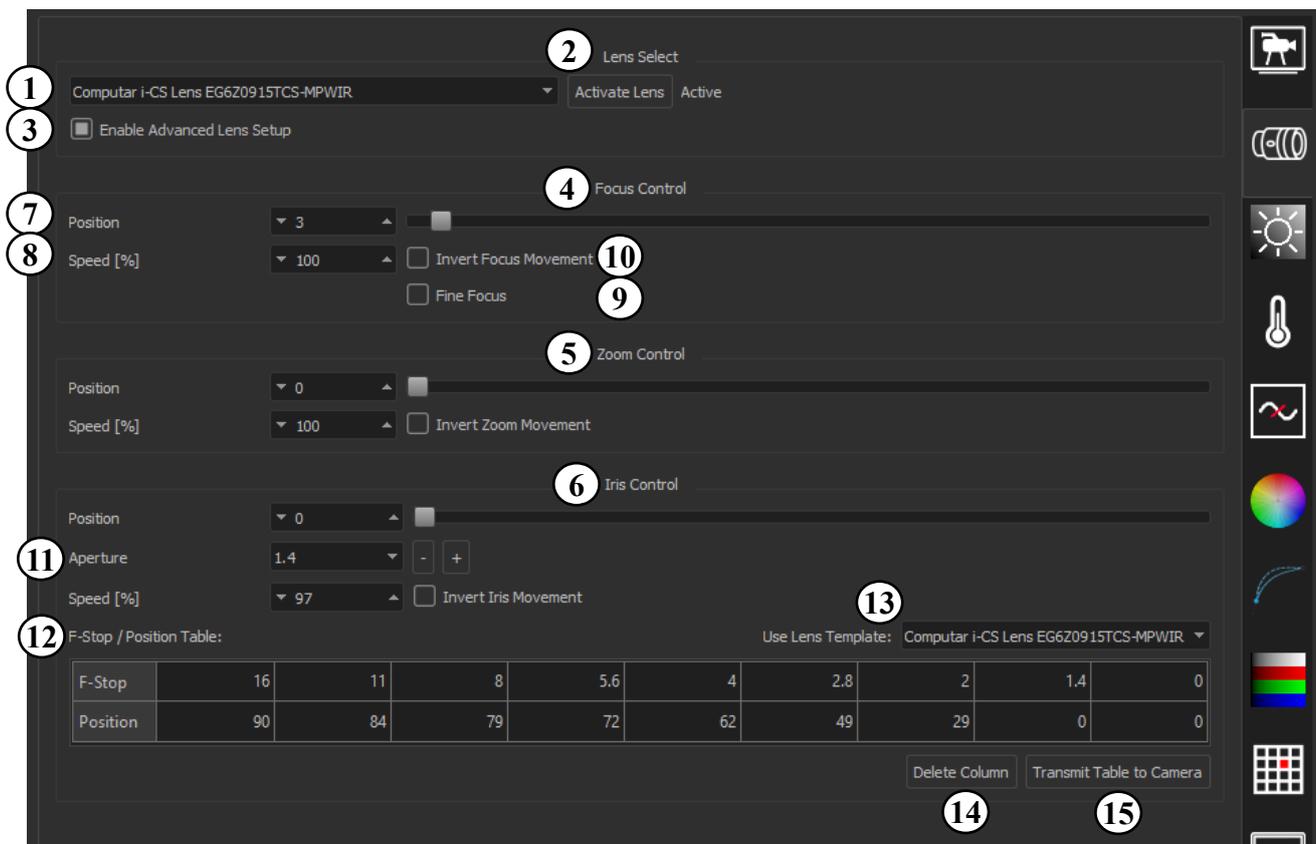
Please note that, depending on the optical lens used, the aperture and focal length have influence on the lens shading, so you should use your default setup for configuring the compensation. Also it might be helpful to turn off the auto exposure during the setup.

Note regarding ATOM one SSM500 cameras:

The ATOM one SSM500 slow-motion cameras share most of the options with the other cameras. Additionally the following functions are available under “Output Configuration:

- **Sensor Framerate:** Setup the framerate at which the sensor runs. The combination of sensor framerate and video mode determines the maximum slow motion factor during playback (Trigger Mode only).
- **Phases:** Select how many of the SDI outputs shall be enabled. This impacts the sensor framerate, e.g. when all 4 phases are enabled and 1080p50 is selected as the video mode the sensor will run at $4 \times 50 = 200$ fps (SSM Mode only).

4.2 Lens Driver Tab



The screenshot shows the Lens Driver Tab interface with the following numbered callouts:

- 1: Lens selection dropdown menu.
- 2: Activate Lens button.
- 3: Enable Advanced Lens Setup checkbox.
- 4: Focus Control section header.
- 5: Zoom Control section header.
- 6: Iris Control section header.
- 7: Position dropdown and slider for Focus Control.
- 8: Speed [%] dropdown for Focus Control.
- 9: Fine Focus checkbox.
- 10: Invert Focus Movement checkbox.
- 11: Aperture dropdown and +/- buttons.
- 12: F-Stop / Position Table.
- 13: Use Lens Template dropdown.
- 14: Delete Column button.
- 15: Transmit Table to Camera button.

| F-Stop | 16 | 11 | 8 | 5.6 | 4 | 2.8 | 2 | 1.4 | 0 |
|----------|----|----|----|-----|----|-----|----|-----|---|
| Position | 90 | 84 | 79 | 72 | 62 | 49 | 29 | 0 | 0 |

| | |
|---|--|
| 1 | Choose the connected lens driver kit |
| 2 | Activate the chosen lens driver kit. The text on the right side next to this button indicates whether the activation was successful or not |
| 3 | Enable Advanced Lens Setup. Enables elements 8 to 15. |
| 4 | Focus control box. Contains all available configuration elements for focus control. |
| 5 | Zoom control box. Contains all available configuration elements for zoom control. |
| 6 | Iris control box. Contains all available configuration elements for iris control. |
| 7 | Position box. The position can be changed by changing the value in the box or by setting the slider. The minimum value is 0, the maximum value is 100. |
| 8 | Speed box. Configuration of the Focus Speed. The minimum value is 0, the |



| | |
|----|--|
| | maximum value is 100. |
| 9 | Fine Focus option. Increases the Focus Position Range from 0...100 to 0...1000. |
| 10 | Invert movement option. If this option is set, the movement of the corresponding axis is inverted. |
| 11 | Iris aperture box. This box can be used to drive the Iris to a specific F-Stop position. The two buttons on the right side of the box can be used to switch between the F-Stops. These options work only correctly, if the table, described in row 12 corresponds to the lens mounted on the camera. |
| 12 | F-Stop/ Position Table. This table contains the F-Stop Positions, that can be determined with the Iris aperture box. This Table should correspond to the lens mounted on the camera. |
| 13 | Iris F-Stop/ Position Table Templates. For some lenses a template can be chosen. |
| 14 | Delete Column. If the button is pressed, selected column of the table is deleted. |
| 15 | Transmit Table to Camera. If this button is pressed, the table is transmitted to the camera, and the Iris aperture box is updated. |

Note: How to setup the lens driver:

1. Select the connected lens in 1.
2. Click the Activate Lens Button. In some cases the connected lens is not recognized by the camera. If this happens, store all settings to the camera and powercycle the camera.
3. If the lens is connected correctly the Software shows all options that are offered by the connected lens. Not supported features are not shown in the ProVideo Gui.
4. For the correct aperture movement, use the corresponding template for the iris F-Stop / Position table. If there is no corresponding template. The table has to be filled in by the user. This can be done in two ways:
 - a. Manually fill in table
 1. Drive the iris to the highest aperture value. Add the Value to the Table.
 2. Insert the corresponding position in the table.
 3. Repeat the two steps until all nine fields of the table are filled, or all values of the lens are filled in the table. Not used columns of the table have to be set to zero.
 - b. Edit the supported lenses file
 1. In the folder where the "ProVideo.exe" is extracted a folder named "tools_and_configs" is placed. Open the folder and the contained file "SupportedLenses.txt".
 2. Add a new entry for your lens.
 3. Increment the number of templates at to top of the document.

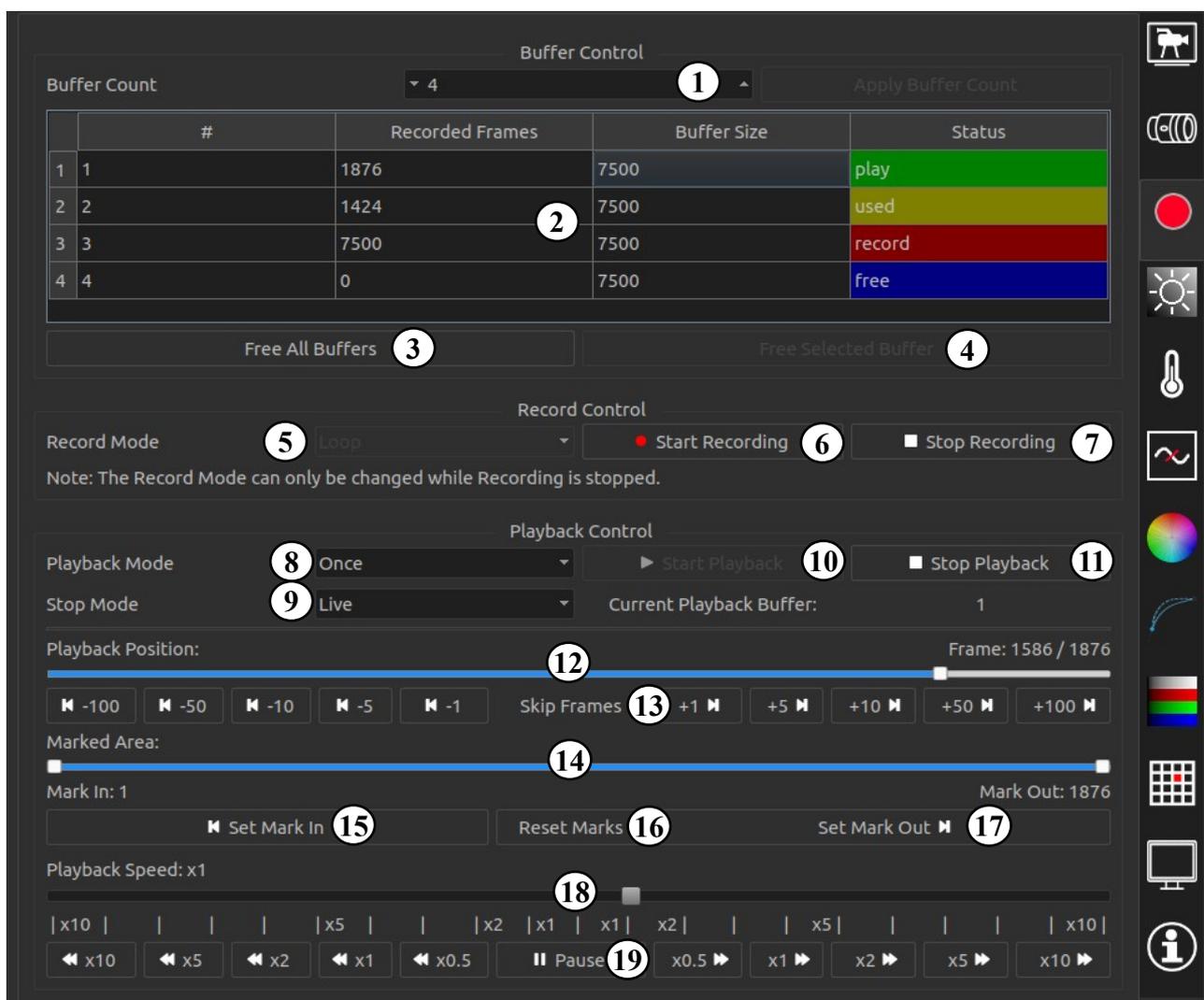
- Restart the GUI for the changes to take effect.

Note:

- The Elements “Step Mode” and “Torque” are not shown in this picture. The use of them is like the speed box.
- If an option is not visible, this option is not supported by the connected lens.
- Changing the advanced options can cause, that the lens driver is not working as expected.

4.3 Playback Tab

This tab is only available for the ATOM one SSM500 in Trigger Mode.



The screenshot shows the Playback Tab interface with the following numbered callouts:

- 1: Buffer Count spin box
- 2: Recorded Frames column in the Buffer Control table
- 3: Free All Buffers button
- 4: Free Selected Buffer button
- 5: Record Mode dropdown
- 6: Start Recording button
- 7: Stop Recording button
- 8: Playback Mode dropdown
- 9: Stop Mode dropdown
- 10: Start Playback button
- 11: Stop Playback button
- 12: Playback Position slider
- 13: Skip Frames button
- 14: Marked Area slider
- 15: Set Mark In button
- 16: Reset Marks button
- 17: Set Mark Out button
- 18: Playback Speed slider
- 19: Pause button

- Change the amount of recording buffers. Since applying a new buffer count deletes all recorded image data you have to confirm this setting by clicking the “Apply Buffer Count” button to the right of the spin box.



| | |
|----|--|
| 2 | The table shows the current state of the recording buffers. It is also used to select a buffer for recording or playback. To do so click on the row of the buffer you want to select and then click on button 6 or 10 to start record or playback. |
| 3 | Free all buffers at once. Caution: This clears all image data! |
| 4 | Free the selected buffer, only enabled if a buffer is selected in the buffer table. |
| 5 | Select the Record Mode which can be either "Loop" to overwrite old data once the buffer is full or "Once" to stop recording when the end of the buffer is reached. |
| 6 | <p>Start Recording into the next buffer. If no buffer is selected the next free buffer (with the smallest index) will be used, otherwise the selected buffer is used. Disabled if no free buffer is available (use the free buffer buttons first to clear an old buffer).</p> <p>A new recording can be started any time (if a free buffer is available), even if a recording is currently running. The switch to the new recording buffer will be done without delay, no frames will be lost.</p> |
| 7 | Stop recording, this switches the current recording buffer into "used" mode so that it can be played back. |
| 8 | Select the Playback Mode which can also be either "Loop" or "Once". Loop will resume playback at the start of the buffer once the end is reached, Once will stop playback when the end is reached. |
| 9 | <p>Select the Stop Mode which defines the behavior of the playback output if no playback is running. Can be either of:</p> <ul style="list-style-type: none"> • Live: Show Live image (just like the live outputs) • Black: Show a black image • Test Pattern: Show a test pattern |
| 10 | Start Playback of the selected buffer. Only enabled if a buffer is selected in the buffer table. Starting playback will enable the playback controls (see point 12 and following). |
| 11 | Stop Playback, this will switch all buffers into "used" state and switch the playback output into the mode that is specified by the Stop Mode (see point 9). |
| 12 | The seek bar shows the current frame position in the frame buffer that is being played back. You can drag the seek bar handle to seek to a new position. |
| 13 | The skip buttons can be used to skip 1 or multiple frames at once (perform a relative seek). They can be used while playback is running or while it is paused. |
| 14 | <p>The mark bar shows the current mark-in and mark-out positions. The playback of the buffer will loop between the mark-in and mark-out position. Drag the left or right mark handle to adjust the positions.</p> <p>To play back a part of the video that is not inside the marked area either re-adjust the mark positions or manually drag the seek handle (see point 12) out of the marked area.</p> <p>Moving the mark-in position behind the mark-out position will reset the mark-out</p> |



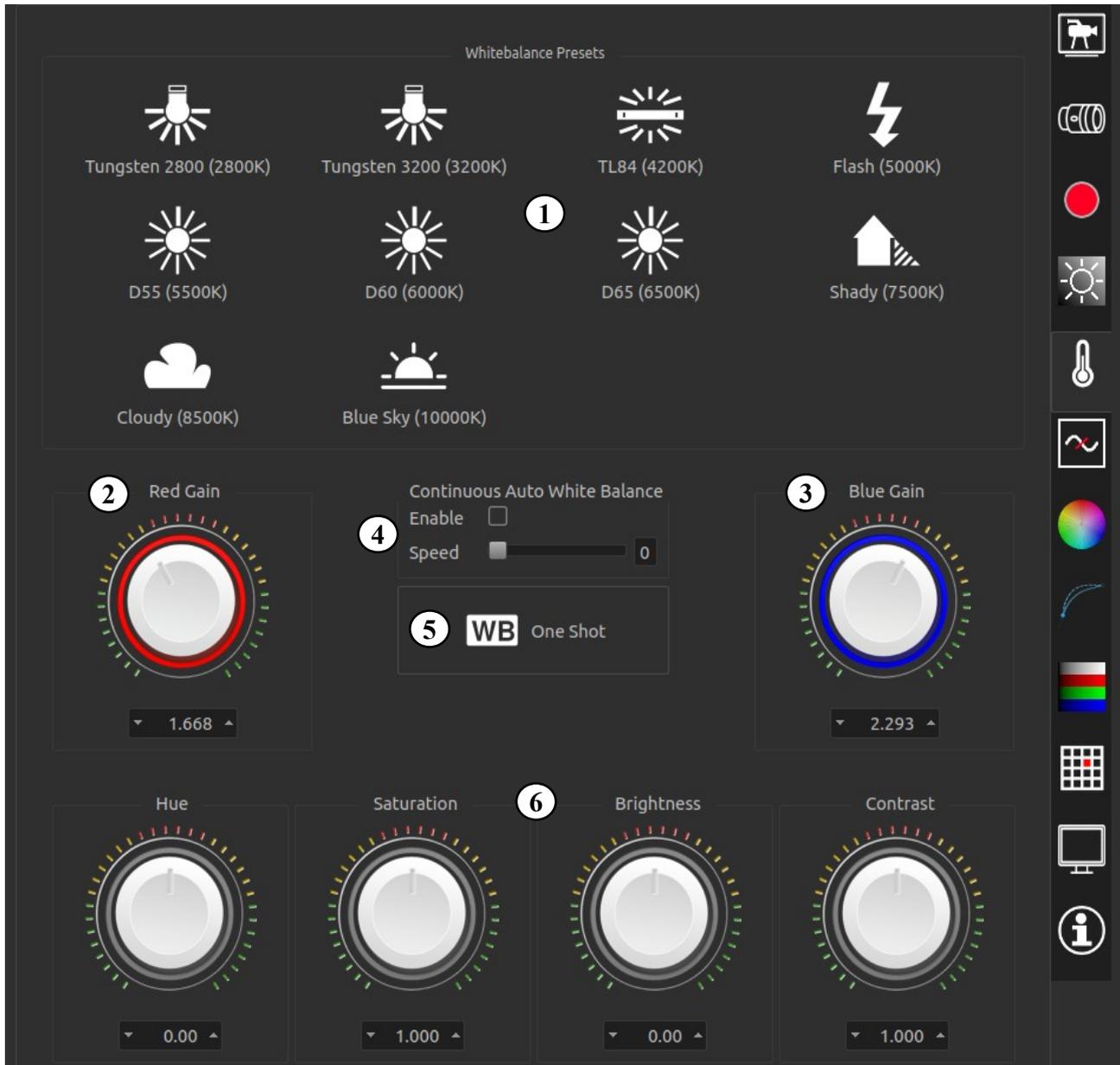
| | |
|----|---|
| | position to maximum and vice-versa. |
| 15 | Alternatively to dragging the left mark handle of the mark bar (see point 13) you can also click the “Set Mark In” button to place the mark-in position. |
| 16 | Reset marks to minimum (frame 1) and maximum (last frame in buffer). |
| 17 | Alternatively to dragging the right mark handle of the mark bar (see point 13) you can also click the “Set Mark Out” button to place the mark-out position. |
| 18 | The playback speed controls allow you to setup the playback speed. You can either use the speed bar to precisely setup the speed or use the x0.5, x1, x2, x5 and x10 hotkeys. |
| 18 | Pause or resume the currently running playback. |

4.4 Black Level Tab



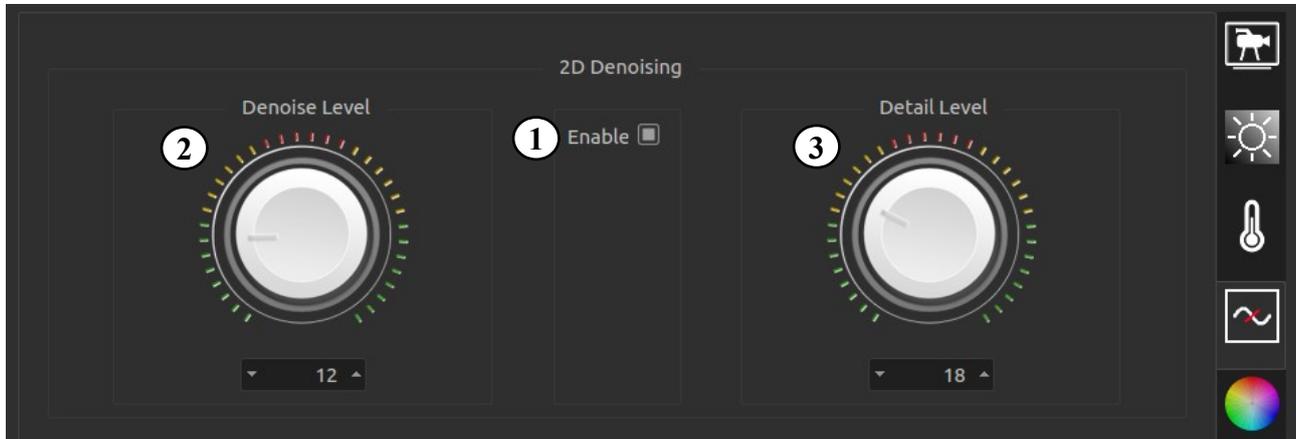
| | |
|---|---|
| 1 | Sensor black for all colors (only visible when “Engineering Mode” is enabled on the Info Tab). |
| 2 | Sensor black for each component separate (only visible when “Engineering Mode” is enabled on the Info Tab). |
| 3 | Flare compensation (defog) for all colors. |
| 4 | Flare compensation (defog) for each component separate. |
| 5 | Master black for all colors. |
| 6 | Master black for each component separate. |

4.5 White Balance Tab



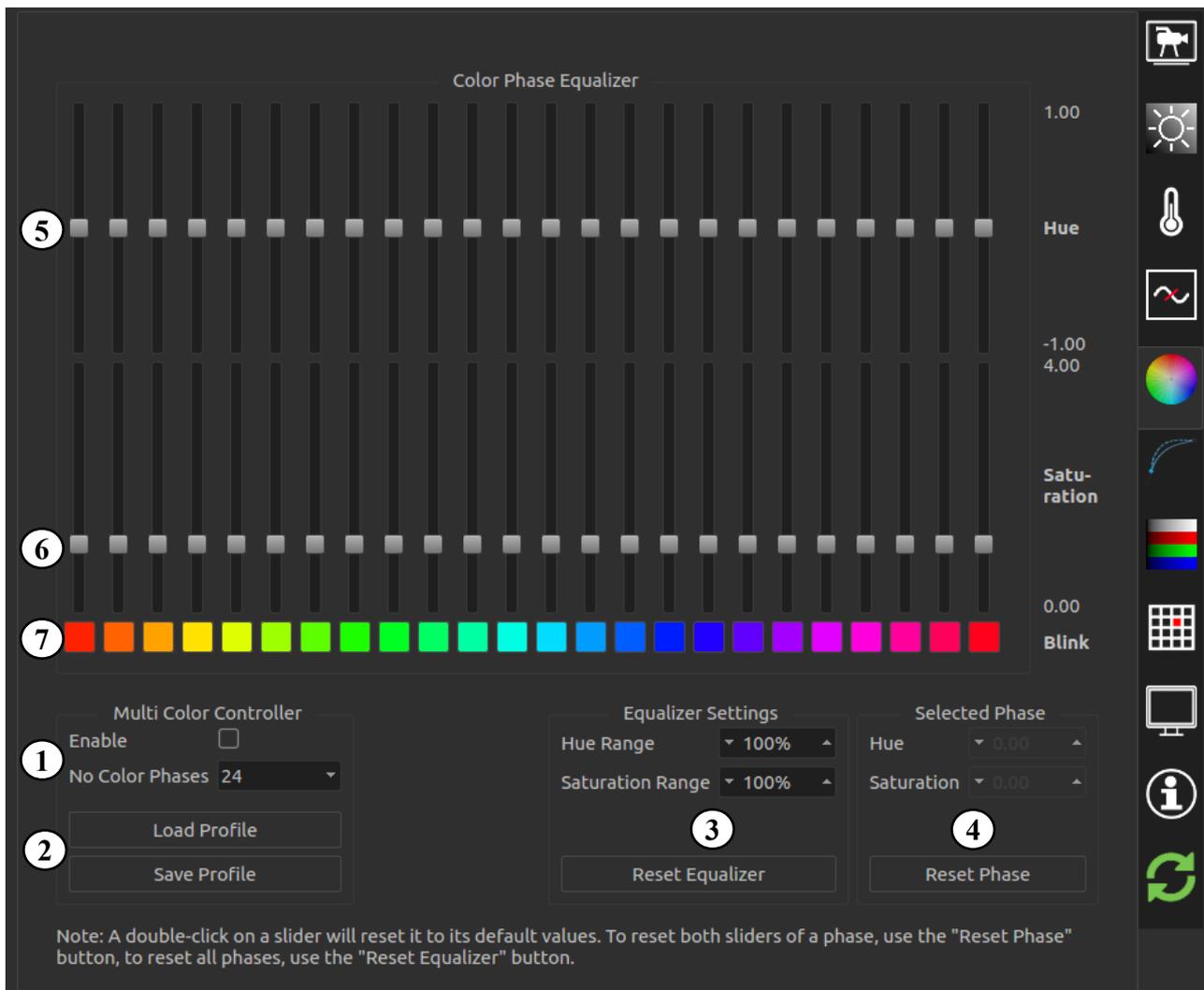
| | |
|---|--|
| 1 | Select a white balance preset depending on the current lighting conditions. The available presets can vary between camera models. |
| 2 | Manual red gain. |
| 3 | Manual blue gain. |
| 4 | Configure continuous automatic white balance (AWB). A higher speed means faster adjustment, but also a less fluid look of the AWB. |
| 5 | Trigger automatic white balance (one shot, not continuous). |
| 6 | Post processing: Hue, Saturation, Brightness, Contrast |

4.6 Filter Tab



| | |
|---|---|
| 1 | Denoise / Detail filter enable. |
| 2 | Set a higher denoise level to for a cleaner image with less noise and detail. |
| 3 | Set a higher detail level to sharpen the image. |

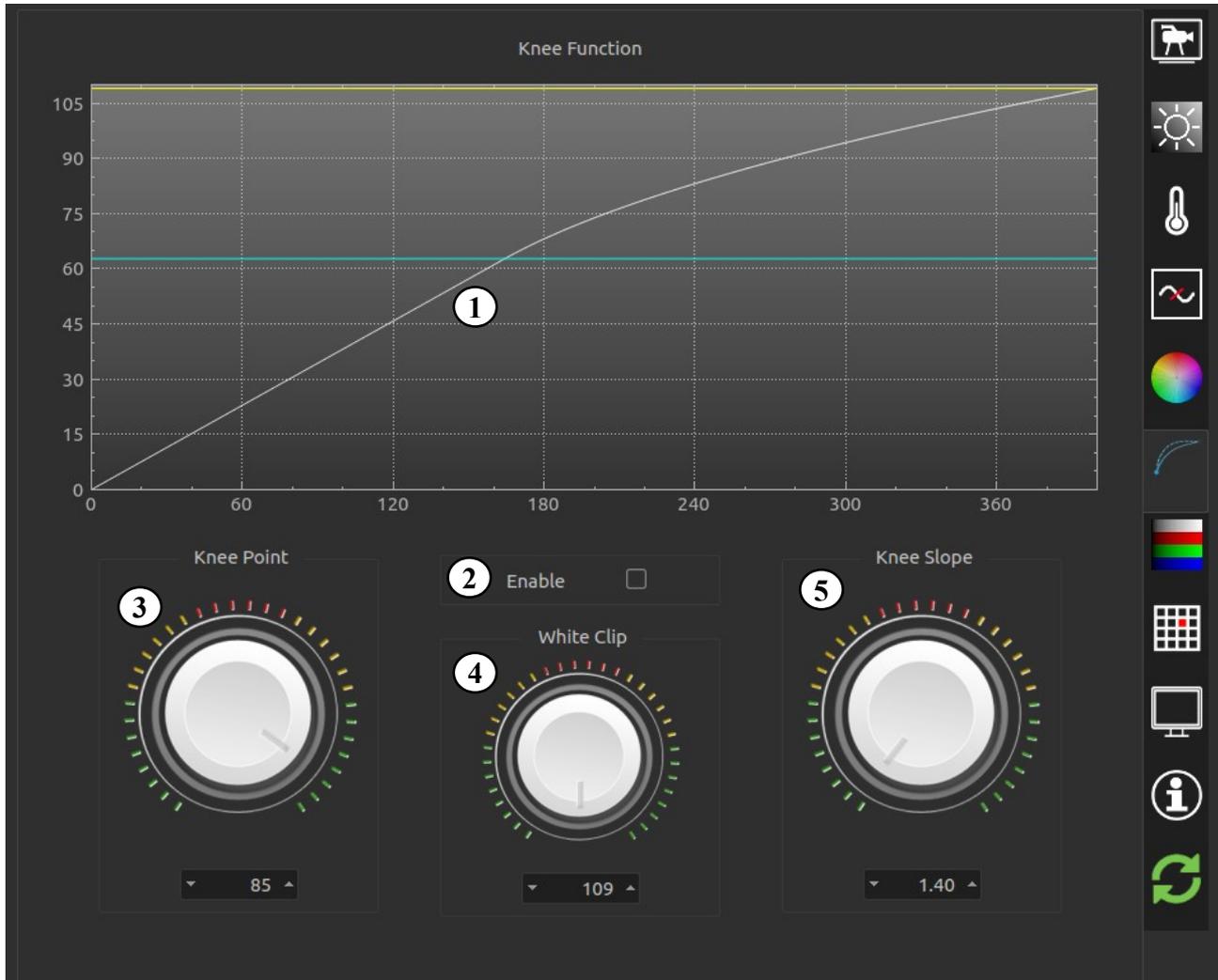
4.7 Multi Color Controller Tab



Note: A double-click on a slider will reset it to its default values. To reset both sliders of a phase, use the "Reset Phase" button, to reset all phases, use the "Reset Equalizer" button.

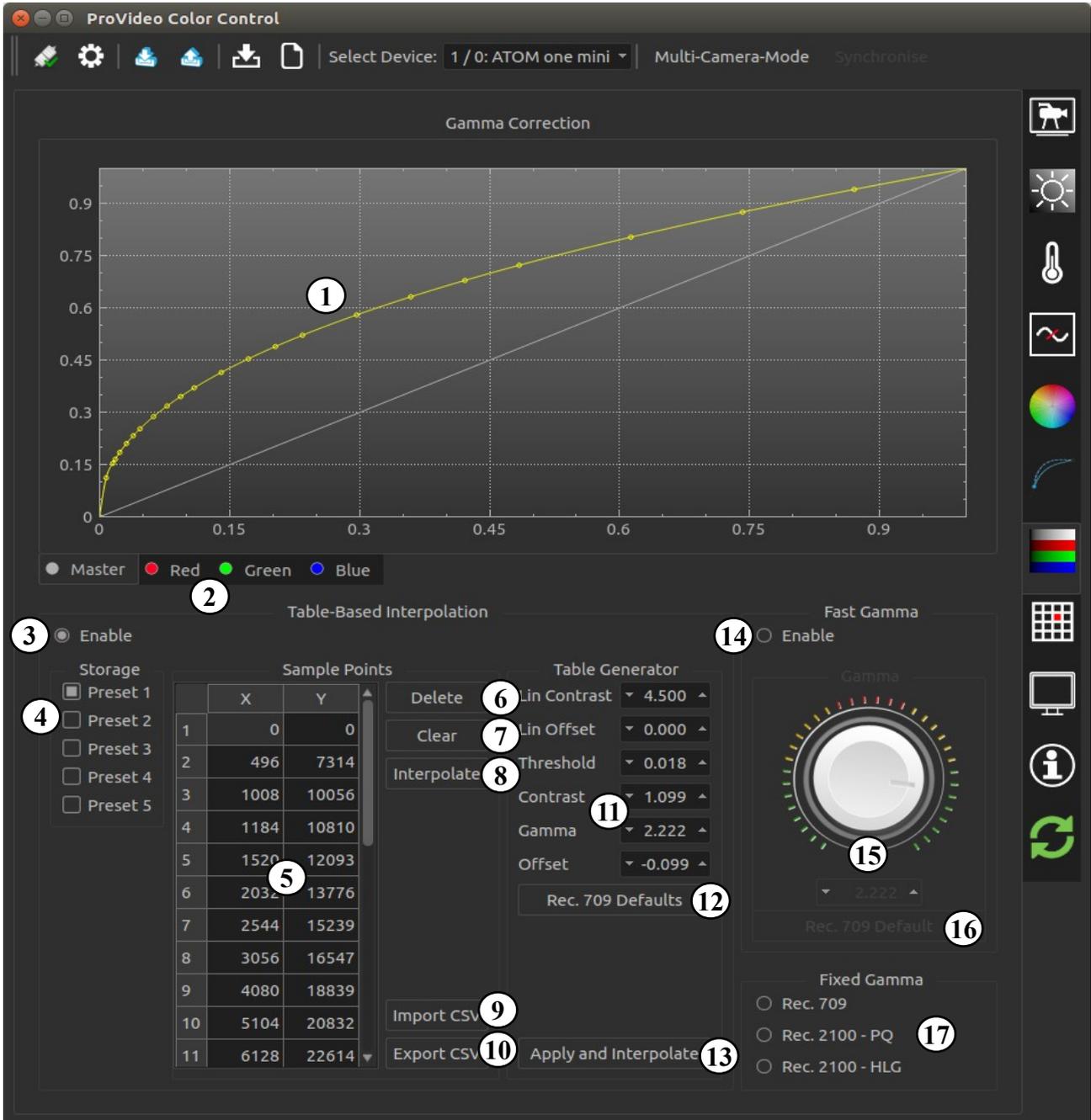
| | |
|---|---|
| 1 | Enable / disable the multi color controller and select the amount of phases (12, 16, 24 or 32). The more phases the finer you can tune the image color. |
| 2 | Load or save the current color profile from / to file. |
| 3 | Change the range of the hue and saturation sliders to make more accurate adjustments to the phases. The current minimum and maximum values are displayed on the right hand side of the equalizer sliders. Resetting the equalizer will set all sliders to their default values. |
| 4 | Set hue and saturation of the currently selected color phase. |
| 5 | The hue sliders will move the color of the selected phase to the neighboring color. |
| 6 | The saturation sliders make the selected phase more or less prominent. |
| 7 | Toggle the blink button of a phase to make it blink in the output image to spot which colors the phase will effect. |

4.8 Knee Function Tab



| | |
|---|--|
| 1 | Graphical view of current knee settings. |
| 2 | Enable knee function. |
| 3 | Set knee point (point where the curve bends, indicated by the blue line in the plot). |
| 4 | Set white clipping point (maximum value of the knee function, indicated by the yellow line in the plot). |
| 5 | Set knee slope (angle of the first part of the knee function till the knee point). |

4.9 Lookup Table Tab



The screenshot shows the 'Gamma Correction' tab in the ProVideo Color Control GUI. The main window title is 'ProVideo Color Control'. The top bar shows 'Select Device: 1 / 0: ATOM one mini' and 'Multi-Camera-Mode Synchronise'. The graph displays a yellow gamma curve on a grid, with a grey diagonal line representing the identity function. Below the graph, there are radio buttons for 'Master', 'Red', 'Green', and 'Blue'. The 'Table-Based Interpolation' section is active, showing a table of sample points and various control parameters. The 'Fast Gamma' section is also visible, featuring a dial and several radio buttons for different gamma modes.

| | X | Y |
|----|------|-------|
| 1 | 0 | 0 |
| 2 | 496 | 7314 |
| 3 | 1008 | 10056 |
| 4 | 1184 | 10810 |
| 5 | 1520 | 12093 |
| 6 | 2032 | 13776 |
| 7 | 2544 | 15239 |
| 8 | 3056 | 16547 |
| 9 | 4080 | 18839 |
| 10 | 5104 | 20832 |
| 11 | 6128 | 22614 |

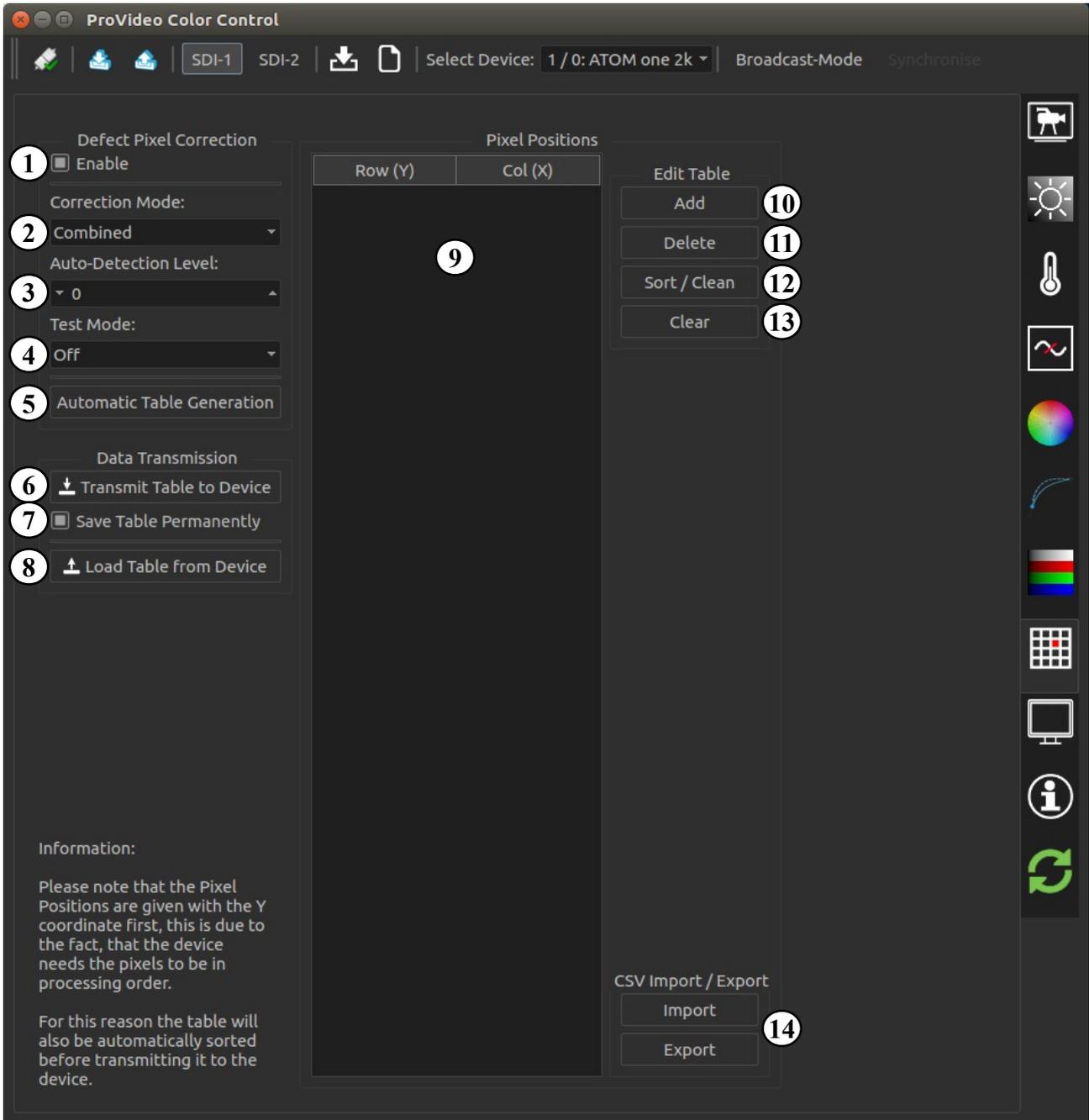
- 1 Graphical representation of current gamma curve. Click anywhere in the plot to add a new sample point. You can add up to 24 sample points. This is only possible in "Table-Based Interpolation" mode, in "Fast Gamma" mode the plot will show an un-editable preview of the gamma curve.
- 2 Select channel for gamma. The RGB curves will be overlain with the master curve to create the resulting RGB curves. The GUI will show the resulting curve with a darker color. In "Fast Gamma" mode, the channels can not be separately and only



| | |
|----|---|
| | "Master" will be shown. |
| 3 | Enable "Table-Based Interpolation" which allows for a fine adjustment of the gamma curve but is not ideal for real-time gamma changes. |
| 4 | The device can store up to five different tables of sample points, use the storage selector to switch between them. |
| 5 | Table of all sample points for the selected curve and preset. Entries can be edited by double clicking a value. |
| 6 | Delete the currently selected entry out of the table. |
| 7 | Clear all sample points from the table. This will create a linear de-gamma function for the currently selected curve and preset. |
| 8 | Calculate LUT tables for given sample points on the device. This must be done to apply any changes. |
| 9 | Load / save gamma curve from / to file. |
| 10 | Save current gamma curve to file. |
| 11 | By default the parameters in this box are set to generate a standard REC.709 de-gamma curve. Fine tune the parameters to generate a custom de-gamma curve. |
| 12 | Reset the REC.709 parameters to their defaults to restore the standard REC.709 de-gamma curve. |
| 13 | Calculate the de-gamma curve based on the given parameters for the currently selected curve and preset. This will also apply the curve on the device. Please note that to generate the default behavior, the Master curve should be set to REC.709 and the RGB curves should be linear. |
| 14 | Enable "Fast Gamma" mode which changes the gamma curve by varying only one parameter. In this mode you can not set the RGB channels separately, but it is faster and thus can be used during production. |
| 15 | Change the gamma value. |
| 16 | Set gamma value to REC.709 default. |
| 17 | Enable "Fixed Gamma" mode where the gamma curve is set to a fixed preset. You can select between REC.709, REC.2100 PQ and REC.2100 HLG. |

Note: Some devices support a feature, where each of the two SDI output has its own lookup-table. To enable this feature the mode of the second SDI output has to be set to "SDI-2 LUT" (see chapter 4.1, point 16). Afterwards you can switch between the configuration of the two outputs by using the "SDI-1" and "SDI-2" buttons in the toolbar (see chapter 3.1).

4.10 Defect Pixel Correction Tab – Full Version (ATOM one, ATOM one 4K mini)



The screenshot shows the ProVideo Color Control GUI. The top bar includes window controls, SDI-1 and SDI-2 buttons, a file icon, a 'Select Device' dropdown set to '1 / 0: ATOM one 2k', and 'Broadcast-Mode' and 'Synchronise' buttons. The main interface is divided into several sections:

- Defect Pixel Correction:** Contains a checked 'Enable' checkbox (1), a 'Correction Mode' dropdown set to 'Combined' (2), an 'Auto-Detection Level' dropdown set to '0' (3), a 'Test Mode' dropdown set to 'Off' (4), and an 'Automatic Table Generation' button (5).
- Data Transmission:** Contains a 'Transmit Table to Device' button (6), a checked 'Save Table Permanently' checkbox (7), and a 'Load Table from Device' button (8).
- Pixel Positions:** A central table with columns 'Row (Y)' and 'Col (X)'. A single pixel position is highlighted with a circled '9' (9).
- Edit Table:** A panel on the right with buttons for 'Add' (10), 'Delete' (11), 'Sort / Clean' (12), and 'Clear' (13).
- Information:** A text block at the bottom left providing details about the pixel position coordinates and sorting.
- CSV Import / Export:** A panel at the bottom right with 'Import' and 'Export' buttons (14).

Information:

Please note that the Pixel Positions are given with the Y coordinate first, this is due to the fact, that the device needs the pixels to be in processing order.

For this reason the table will also be automatically sorted before transmitting it to the device.

| | |
|---|---|
| 1 | Enable the defect pixel correction module. |
| 2 | Set the correction mode. "Combined" will use both, automatic and table based detection. |
| 3 | Increasing the auto-detection level will find more defect pixels, but will also increase the amount of false positives. |



| | |
|----|--|
| 4 | The "Calibration" test mode will configure a black and white output mode, in which defect pixels can be spotted more easily. The "Validation" mode will turn the output image black and highlight currently detected or setup defect pixels. |
| 5 | The automatic table generation will use the currently configured auto-detection level and perform a single shot detection run. The resulting defect pixels will be stored in the defect pixel table. Afterwards the automatic detection can be set to only table based to avoid the detection of false positives. Note: You should use defined lighting conditions and a grey test image to perform the automatic table generation. |
| 6 | Transmit the pixels entered in the table to the device. You have to click this button to apply changes to the table. |
| 7 | If this is box is checked the table will also be stored in the permanent memory and will be restored after a power cycle. If the box is not checked the table is only stored in the non-permanent memory and will be reset after a power cycle. |
| 8 | Load the table from the device. This will always load from the permanent device memory! |
| 9 | Table of defect pixel positions. Double-click a value to edit it. |
| 10 | Add a position to the table. |
| 11 | Delete the selected position from the table. |
| 12 | Sort the table and remove duplicates. |
| 13 | Delete all positions from the table. |
| 14 | Import or export a CSV file with the defect pixel table. |

How-To use the defect pixel correction:

Most ATOM one devices support two different correction modes, they can automatically detect defect pixels and correct them or use a user defined table to do so (you can also combine both methods).

The easiest way is to use the automatic detection. Therefore set the "Correction Mode" to "Auto-Detection" or "Combined". Then increase the "Auto-Detection Level" until the defect pixels are no longer visible. Please note that a higher detection level will increase the amount of pixels found, but it will also increase the amount of false-positives which means it will slightly degrade image quality. So you should keep the detection level as low as possible.

For best image quality you will have to use the table based defect pixel correction. Therefore you need to record the image of the ATOM one and find out the pixel positions (row and column) of the defect pixels. You then have to add them to the defect pixel table.

When manually searching for defect pixels you can use the "Calibration" Test Mode. It will configure a black and white output mode, in which defect pixels can be spotted more easily. The "Validation" Test Mode can be used to verify if the correction is working as intended, it will turn the output image black and highlight currently detected or setup defect pixels.



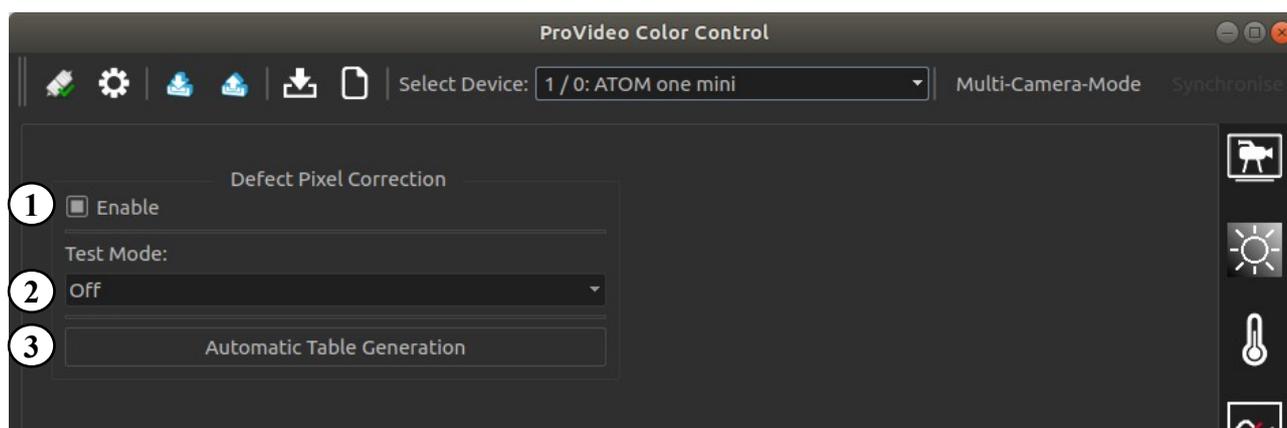
Alternatively you can use the automatic table generation. Therefore you should point the camera at a grey test image which is evenly illuminated, so that you can detect both hot and dead pixels. If you just want to spot hot pixels it is sufficient to place the lens cap on the lens to generate a dark test image for the camera. Then configure the "Correction Mode" to "Combined" and increase the detection level of the automatic detection until all defect pixels are corrected. Then click "Automatic Table Generation" and it will automatically fill the table.

Do not forget to click "Transmit Table to Device", with "Save Table Permanently" checked, to store the table on the camera.

You can then change the "Correction Mode" to "Table Based", or leave it on "Combined" and reduce the auto detection level to reduce the occurrence of false positives.

Please note that if you change the image orientation by using the Flip setting (see chapter 4.1 point 19) you will have to re-calibrate your defect pixel table

4.11 Defect Pixel Correction Tab – Reduced Version (ATOM one mini and ATOM one SSM500)



| | |
|---|--|
| 1 | Enable the defect pixel correction module. |
| 2 | The "Calibration" test mode will configure a black and white output mode, in which defect pixels can be spotted more easily. The "Validation" mode will turn the output image black and highlight currently setup defect pixels. |
| 3 | Automatically generate defect pixel tables for all image rotations (see chapter 4.1 point 19). For more details see the notes below. |

How-To use the defect pixel correction:

The ATOM one mini (including the AIR and waterproof variants) and ATOM one SSM500 models only support a simple defect pixel correction mechanism. It does not support automatic correction during runtime and the user can not edit the defect pixel table. Instead a one-shot calibration is done which has to be repeated from time to time if new defect pixels occur.

To calibrate the defect pixel correction place the lens cap on the lens to generate a dark

test image for the camera. Then make sure the DPC is enabled by checking the “Enable” checkbox, set the “Test Mode” to “Off” and finally click the “Automatic Table Generation”.

You will see that the image is rotated and flipped a few times during the calibration process. The camera will store an individual correction table for each image rotation, this way you can use the “Flip” setting on the In-Out Tab (chapter 4.1 point 19) without having to re-calibrate the DPC.

After the process is finished the table is saved automatically, no further action is required. If you want to test which pixels were detected switch the “Test Mode” to the “Validation” setting.

4.12 Output Tab



The screenshot displays the ProVideo Color Control interface. The main section is titled "Matrix - RGB to YCbCr Conversion" and contains a table of conversion coefficients:

| | Red | Green | Blue | Sum |
|----|---------|---------|---------|--------|
| Y | 0.2126 | 0.7151 | 0.0723 | 1.0000 |
| Cb | -0.1143 | -0.3853 | 0.5000 | 0.0005 |
| Cr | 0.5000 | -0.4539 | -0.0457 | 0.0005 |

Below the table, the "RGB to YCbCr" section includes:

- Two "Colour Difference Coefficient" knobs (3 and 4) with corresponding dropdown menus showing values 0.2126 and 0.0722.
- A "Presets" section with buttons for "Rec.709" (2) and "Rec.2020".
- "Load Matrix" and "Save Matrix" buttons (5).
- An "SDI Output" section with "SDI Black" (7) and "SDI White" (8) knobs, and "SDI Modes" (6) set to "Legal Range".

The interface also features a top toolbar with icons for settings, network, and device selection, and a right-hand sidebar with various control icons.

Note: Settings 1 to 5 are only visible when the Engineering Mode is activated in the GUI Settings.

Instead of manually changing the color conversion matrix it is advised to use the “Color Space” setting in the in-out tab (see chapter 4.1, point 21). When switching the color space the color conversion matrix will automatically be set to its default values for the selected color space.

4.13 Info Tab



The screenshot displays the ProVideo Color Control GUI with the Info Tab selected. The interface includes a top navigation bar with icons for settings, network, and device selection. The main content area is divided into several sections:

- System Information:** A table listing device details such as Device Name (ATOM one 4K mini), Platform (condor4k_mini_16), System ID, Validity (LICENSED), Bitstream ID, Loader ID, Software ID, SW Release Date, SW Build Date, Runtime, and GUI Version.
- System Temperature:** A section with a warning that temperature values are updated every second. It includes fields for Current Temperature (55.0 °C System, 50.4 °C CPU), Fan Speed / Target Temperature (6%, 55 °C), Maximum Logged Temperature (55.0 °C Persistent, 55.0 °C User), Shut-Down Temperature (80.0 °C), and Number of Over-Temperature Events (0). A Reset button is also present.
- Software Licenses:** A section with a disclaimer and two buttons: Show Software License and Show Third Party Licenses.
- Footer:** Copyright information for Dream Chip Technologies GmbH, a warranty disclaimer, and a link to the source code on GitLab.

Numbered callouts (1-7) highlight specific elements in the GUI:

- Validity (LICENSED)
- Current Temperature (55.0 °C System)
- Target Temperature (55 °C)
- Reset button
- Show Software License button
- Show Third Party Licenses button
- GitLab link



1

The system information box gives some general information about the connected device. Check the "Software ID" to find out your current device version.



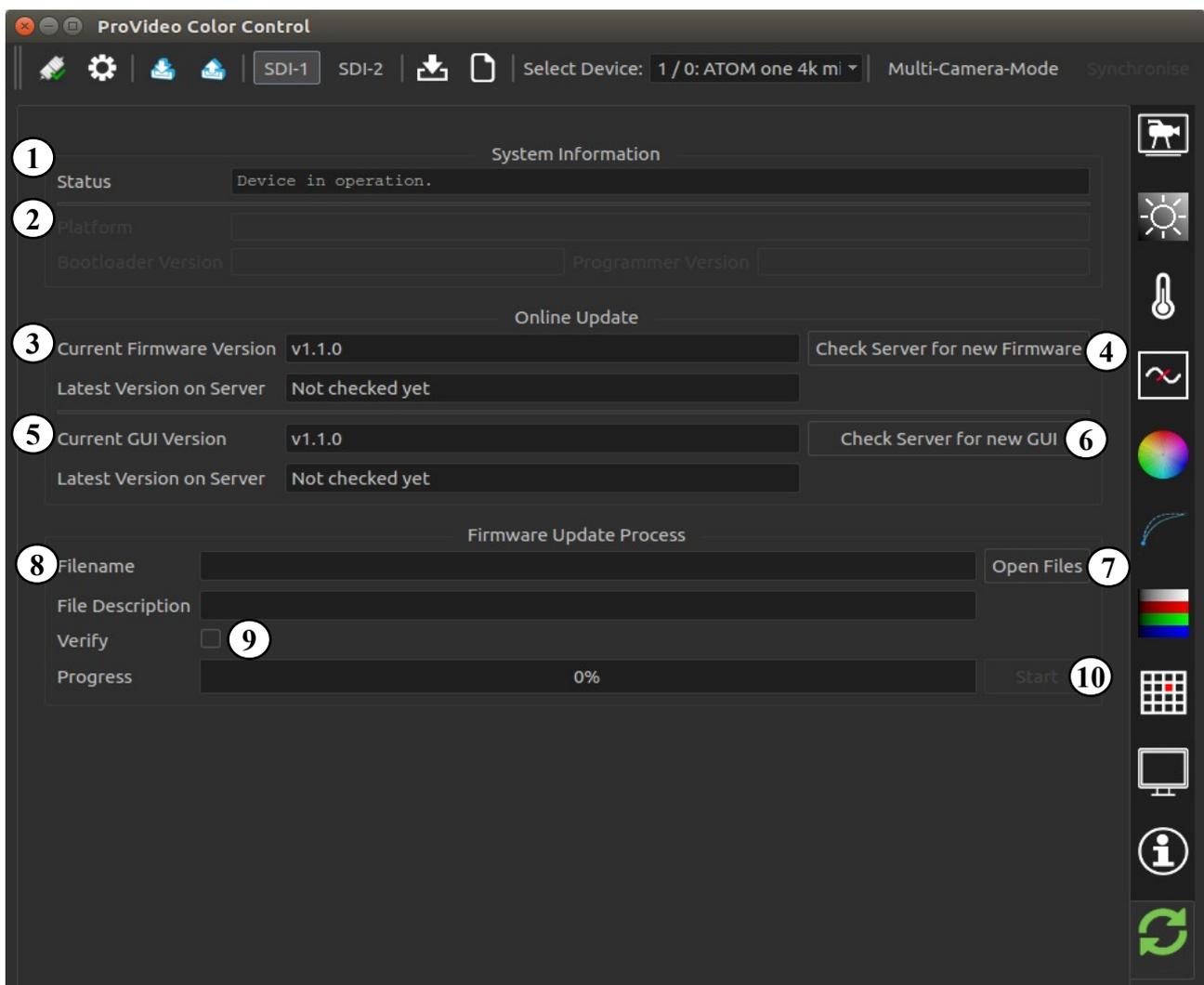
| | |
|---|--|
| 2 | <p>This section shows information about the operating temperature of the device. Depending on the device one or two temperature sensors are available, their current values are listed under “Current Temperature”.</p> <p>Additionally the device is logging the maximum temperature of any sensor, it is displayed under “Maximum Logged Temperature”. There is a persistent maximum temperature value which can not be reset, and a user resettable one (also see point 4).</p> <p>The maximum allowed temperature is displayed under “Shut-Down Temperature”. The “Number of Over-Temperature Events” shows how often the device had reached its critical operating temperature and had to enter the fail-safe mode. The values are updated automatically every second, as long as the info tab is opened.</p> |
| 3 | <p>Set the target system temperature for the fan controller (if device has a cooling fan). The fan controller will try to keep all measured system temperatures below the target value. If the value is set too low, the fan will always run at 100%.</p> |
| 4 | <p>Use the “Reset” button to reset the maximum temperature to the current temperature.</p> |
| 5 | <p>Show the open source software license of the GUI software.</p> |
| 6 | <p>Show the open source software licenses of third party software, which is used in the GUI.</p> |
| 7 | <p>Click the link to open the GitLab page of the ProVideo GUI.</p> |

Note regarding ATOM one SSM500 cameras:

For the ATOM one SSM500 camera models additional “System Operations” are available:

- **Shutdown:** Power down the device, so that the power supply can be safely disconnected. **This should always be done before disconnecting the power supply!** Otherwise the recorded image data and the operating system can get corrupted.
- **Reboot:** Reboots the device. If have unsaved changes, save your settings first.
- **Reboot to Update Mode:** Reboots the camera into the Update Mode, so that a firmware update can be performed via the Web Interface. Please see the ATOM one SSM500 Reference Manual for further instructions on the firmware update procedure.

4.14 Update Tab



The screenshot displays the 'ProVideo Color Control' web interface, specifically the 'Update Tab'. The interface is dark-themed and includes a top navigation bar with icons for various functions and a 'Select Device' dropdown menu set to '1 / 0: ATOM one 4k mi'. The main content area is divided into three sections: 'System Information', 'Online Update', and 'Firmware Update Process'. A vertical toolbar on the right side contains icons for camera, brightness, temperature, and other settings. Numbered callouts (1-10) highlight specific elements: 1. Status field showing 'Device in operation.'; 2. Platform section with 'Bootloader Version' and 'Programmer Version' fields; 3. Current Firmware Version 'v1.1.0'; 4. 'Check Server for new Firmware' button; 5. Current GUI Version 'v1.1.0'; 6. 'Check Server for new GUI' button; 7. 'Open Files' button; 8. Filename input field; 9. 'Verify' checkbox; 10. 'Start' button for the firmware update process. The progress bar shows 0% completion.



| | |
|----|---|
| 1 | Shows the current status of the device. |
| 2 | Shows information about the firmware update components (device and local programmer tool). |
| 3 | Shows the firmware version which is currently installed on the device, and the version which is available on the update server. |
| 4 | Click this button to contact the update server and check for a new firmware version. If a new version is available, you will be asked to download and install it. |
| 5 | Shows the GUI version which is currently installed on the device, and the version which is available on the update server. |
| 6 | Click this button to contact the update server and check for a new GUI version. If a new version is available a browser window will open which redirects you to the download page. |
| 7 | <p>Click the “Open Files” button to open a file open dialog. Navigate to the folder where the update files are placed and click “Open”. You do not have to select the file directly, the GUI will automatically choose the correct update file and display its name in the “Filename” field. An Update can consist of more than one file, in that case the total amount of files is shown to the left of the progress bar.</p> <p>Alternatively you can also drag an update file from your file explorer and drop it anywhere on the Update Tab to load it.</p> |
| 8 | Shows information about the file which is currently being flashed to the device. |
| 9 | If you wish you can run an additional verification check after the update was performed. Usually this is not needed, as the update process is safe. |
| 10 | Click the “Start” button to initiate the update process. The progress bar will inform you about the current status. |

Note: During the update the “Start” button will change into the “Abort” button. Click it to stop the update. Please note that **aborting the update will leave your device in a non-functional state**, you have to re-run the update to make the device operational again. If you do not finish the update you might not be able to access the device with the GUI and have to flash it using an update script.

Note: For ATOM one SSM500 camera models update via the GUI is not possible, please refer to the Reference Manual of these devices, on how to perform a firmware update.