

# BrightWay Vision

## GUI manual

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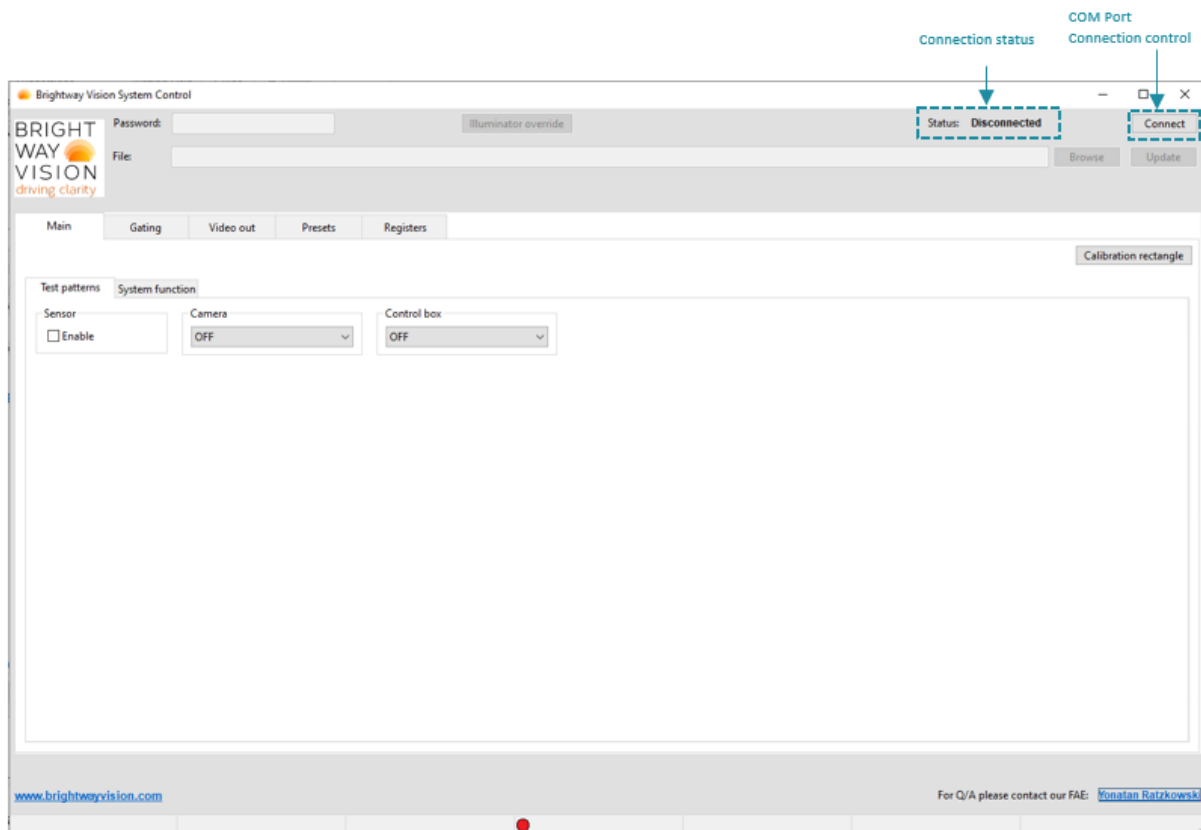
## 1. Preface

This document describes the GUI supplied together with the BWV system.

## 2. GUI General

### 2.1. GUI disconnected

The following image shows the GUI main window as it appears when it is opened with the system either **powered OFF** or **disconnected** from the PC (or both):



*Figure 1: GUI appearance with the system powered OFF/disconnected*

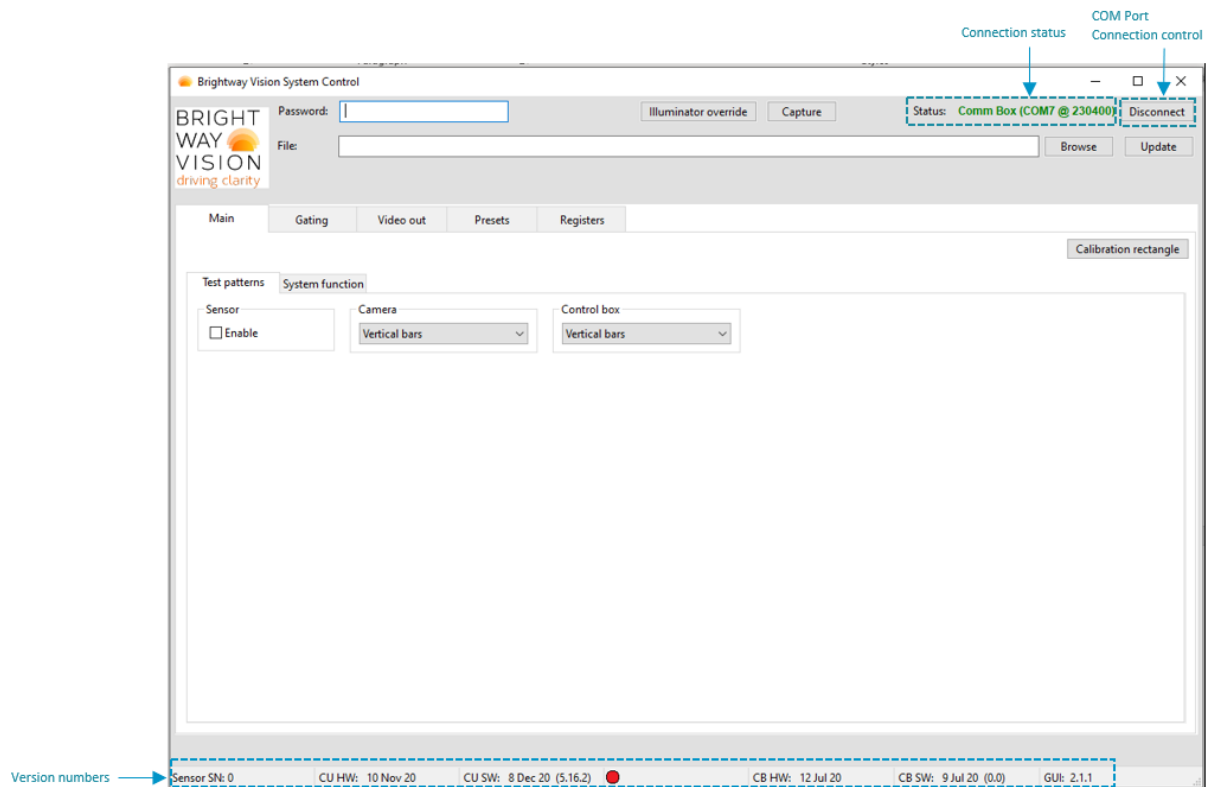
Most of the GUI is inactive in this state and the GUI options are grayed out.

The 'Connection' status will show "Disconnected".

The only active button is the 'Connect' button in the top-right corner. Pressing it after connecting the system and powering it ON will connect the system and will activate the GUI (as shown in the figure below). In some scenarios, the system will auto-recognize the Comport and the connection will be made automatically. If GUI is active and combox is on but still no connection, please power off and on the combox switch.

## 2.2. GUI connected

The following image shows the GUI main window as it appears when opening it with the system powered ON and connected to the PC:



*Figure 2: GUI appearance with the system powered ON and connected*

All the GUI options are active in this state.

The connection status will show "Connected to COM#" in green, where # is the number of the connected COM port.

Pressing the 'Disconnect' button in the top-right corner will disconnect the COM port and will deactivate the GUI (as shown in the figure 1 above).

At the bottom of the GUI, one can read the time and date of the SW/HW versions for the camera unit, the Combox, and the GUI. The user can also place the mouse cursor on the bottom line of the GUI and the "Version numbers" will appear in details.

## 2.3. Contact and support

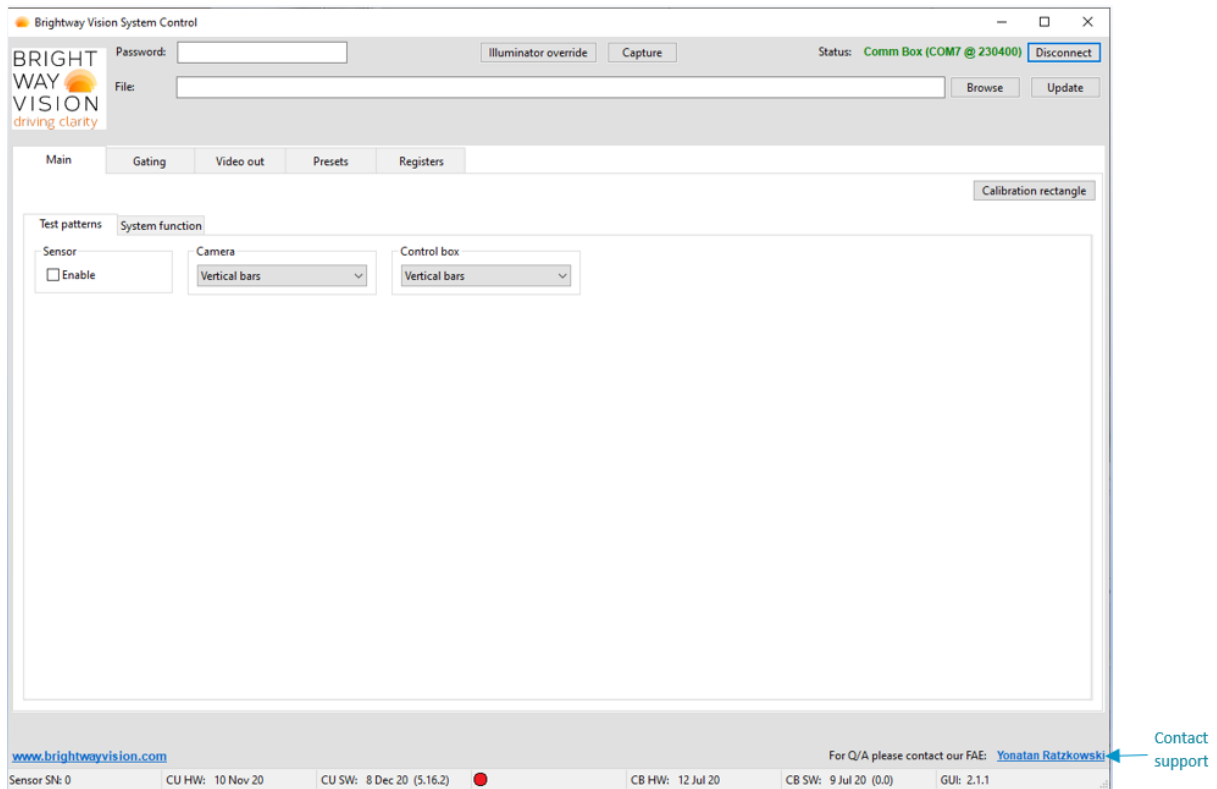


Figure 3: contact Brightway vision's support

If any question appears, or support is needed, the user can easily contact the Brightway Vision support team. By clicking the 'Yonatan Ratzkowski' link, the GUI will refer your email to Brightway Vision's field application engineer and head of the support department.

## 2.4. Firmware update

This option is used to burn firmware versions into the camera unit and the Combox if needed. And will be provided by BrightWay vision only.

It is possible to upgrade the firmware versions of the camera and Combox with new MCS or IMG files when required. The user should click on "Browse" in the main window to select the desired MCS or IMG files and press "Update". The system will detect automatically whether the file is intended for the camera or the Combox.

The progress of the update can be seen in the following bars:

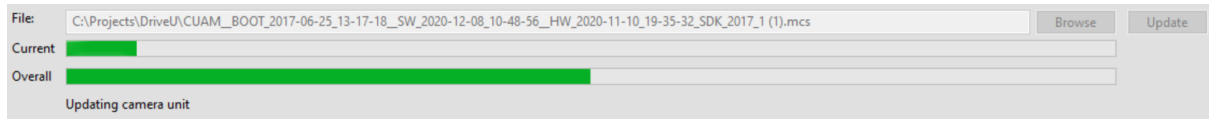


Figure 4: Firmware update bars

When the update is completed, a confirmation popup window will appear:

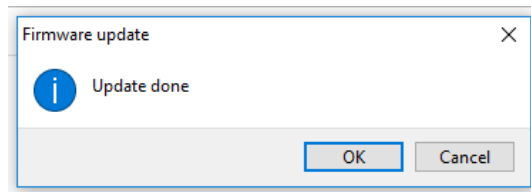


Figure 5: Firmware upgrade complete confirmation pop up

In order to switch to the new FW version, a power cycle should be completed (turn the system OFF and back ON again).

## 2.5. Capture

The capture tool is a preview window. It applies the customer view option and enables recording the actual Bright Way Vision's camera output.

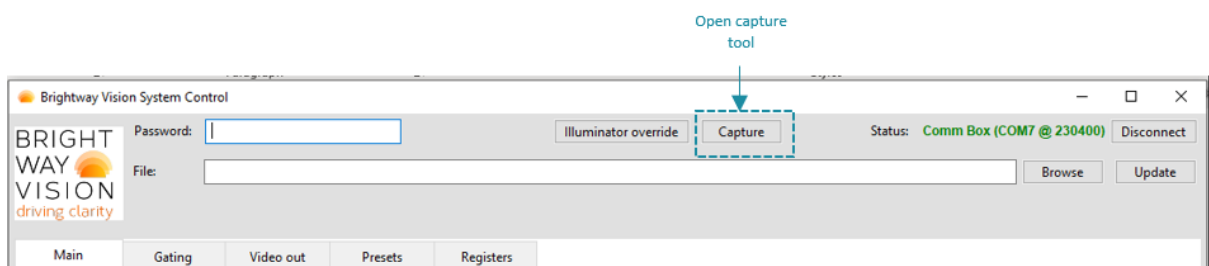


Figure 6: Capture tool

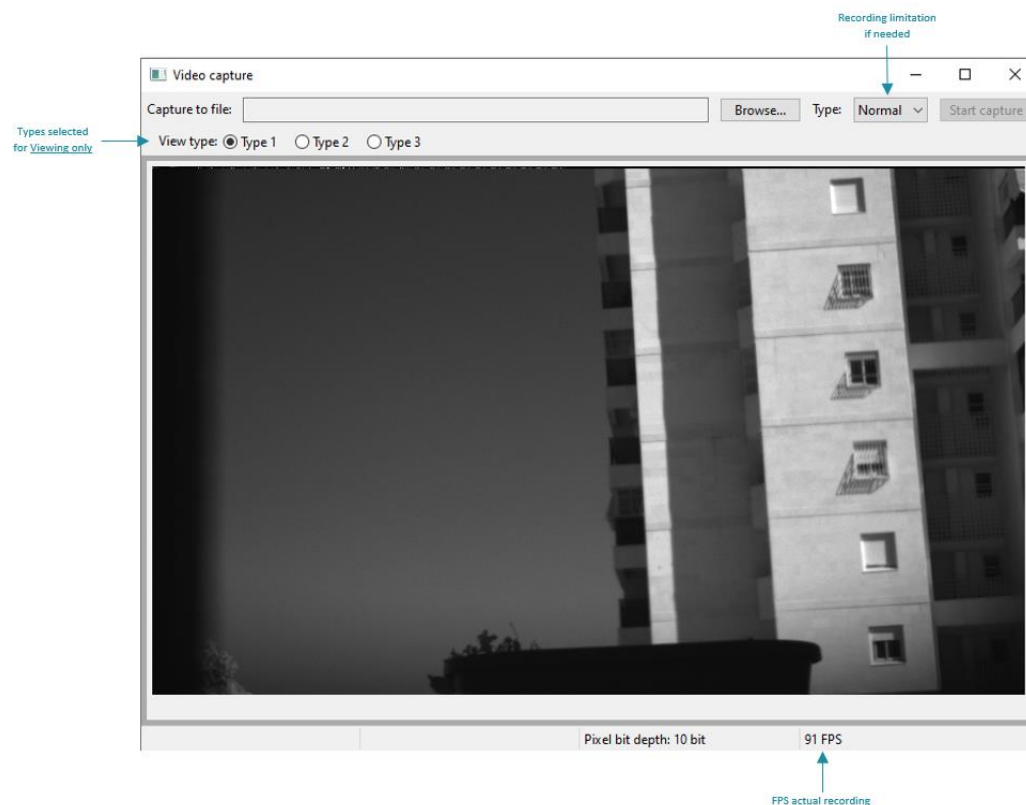


Figure 7: Video capture window

## 2.5.1 Live recorder

On the bottom right side of the window, the user can see the number of frames that are currently being used. But when viewing the capture tool, only one type (30fps) is viewed.

On the top left of the capturing window, the user can choose which type is selected to view.

The viewing option type depends on which types were selected to be used through the USB section in the [Video-Out tab](#).

Note that the user can choose 6 different types to record\capture in the [Video-Out tab](#) whereas it's possible to view only one single type at a time with the 'Capture tool'.

The 'Capture tool' function is very useful for recording, aiming, focusing, and calibrating the Bright Way Vision camera system.

On the top right of the capturing window, the user can start recording after choose file location and file name. If necessary, it is possible to add a specific limitation to the video capturing tool according to the number of frames/actual time/file size.

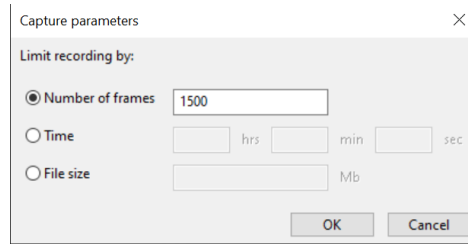


Figure 8: Capture limitation parameters

## 2.6 Illuminator override

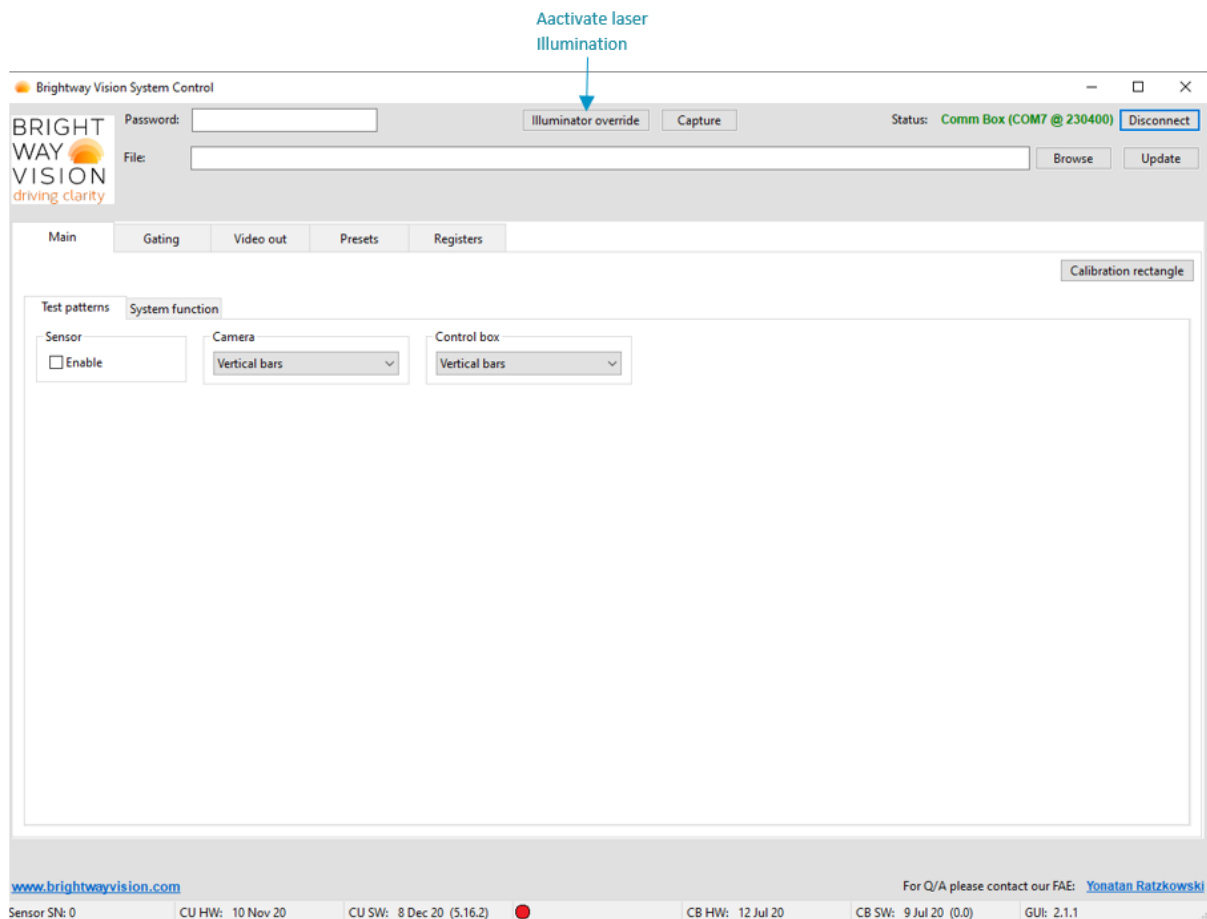


Figure 9: Illuminator override

The 'Illuminator override' button can be used to activate the laser on demand. Once the Illumination is activated, the "Interlock override" message will appear in the GUI to warn the user that the illuminators have been forced on (see figure 9). Clicking 'Cancel override' will turn the Illuminators off.



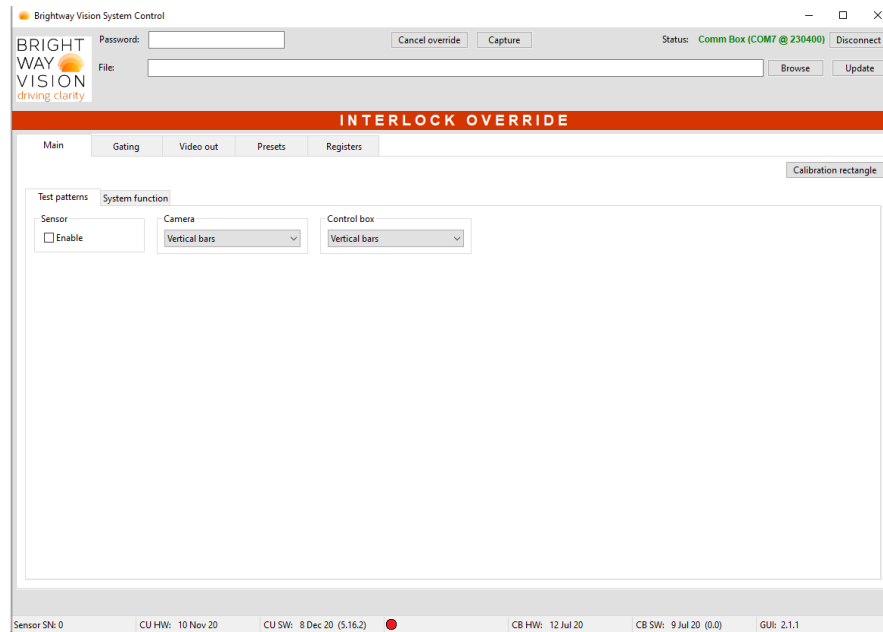


Figure 10: "Interlock override" message

Remark:

The illumination is activated automatically when the vehicle's speed is above a certain threshold if the OBD is connected. When the vehicle is standing or whenever the speed detection is not available (in the lab for example), the illuminators can only be activated on demand.

**The BrightEye™ system emits laser radiation. Like any laser source, some precautions have to be considered during operation and storage. The User's technical personal that will operate the system will need to follow the supplier's instructions regarding the eye safety requirements.**

### 3. The GUI tabs

There are five tabs in the GUI (see figure 5):

1. 'Main'
2. 'Gating'
3. 'Video out'
4. 'Presets'
5. Registers

The following sections describe these tabs.

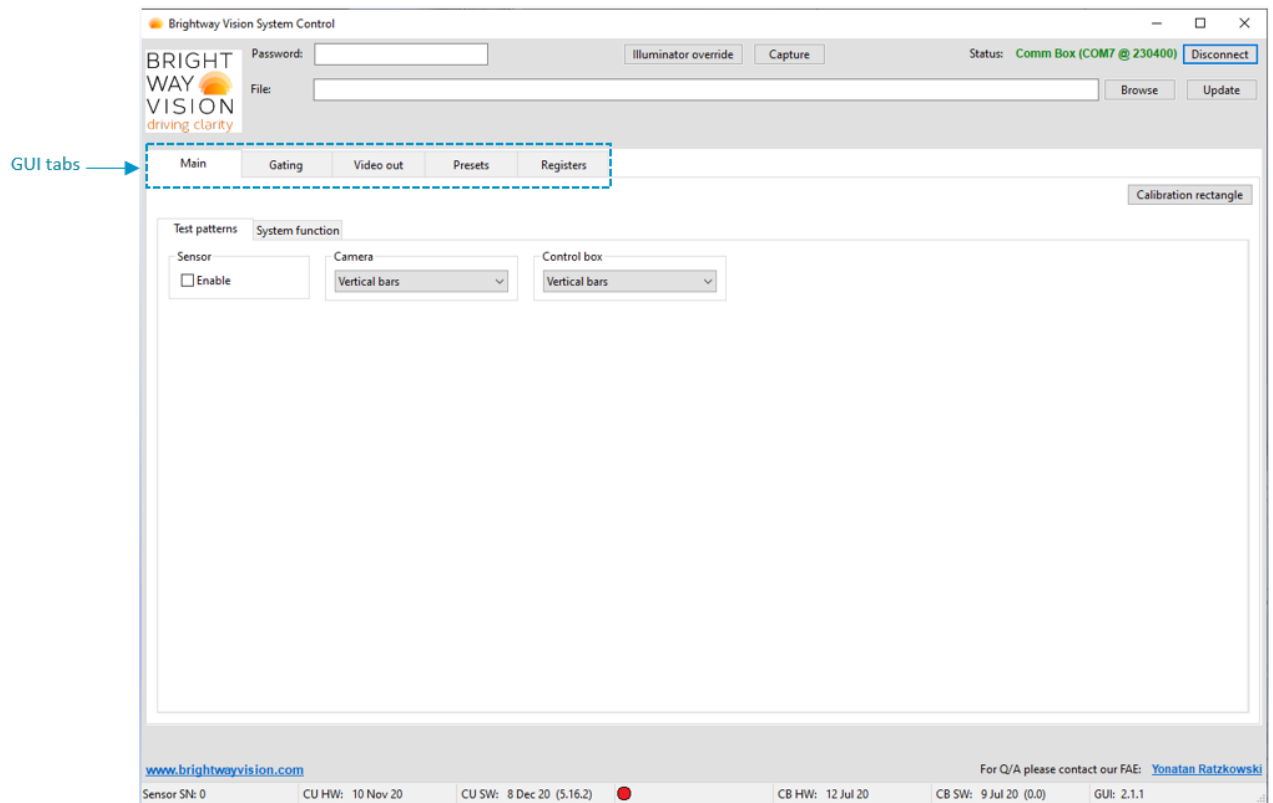


Figure 11: GUI tabs

## 3.1. The 'Main' tab

### 3.1.1. 'Main' sub tabs

The GUI Main tab is divided into two sub tabs (see figure below):

1. 'Test Pattern'
2. 'System function'

These sub tabs are described in the following sections.

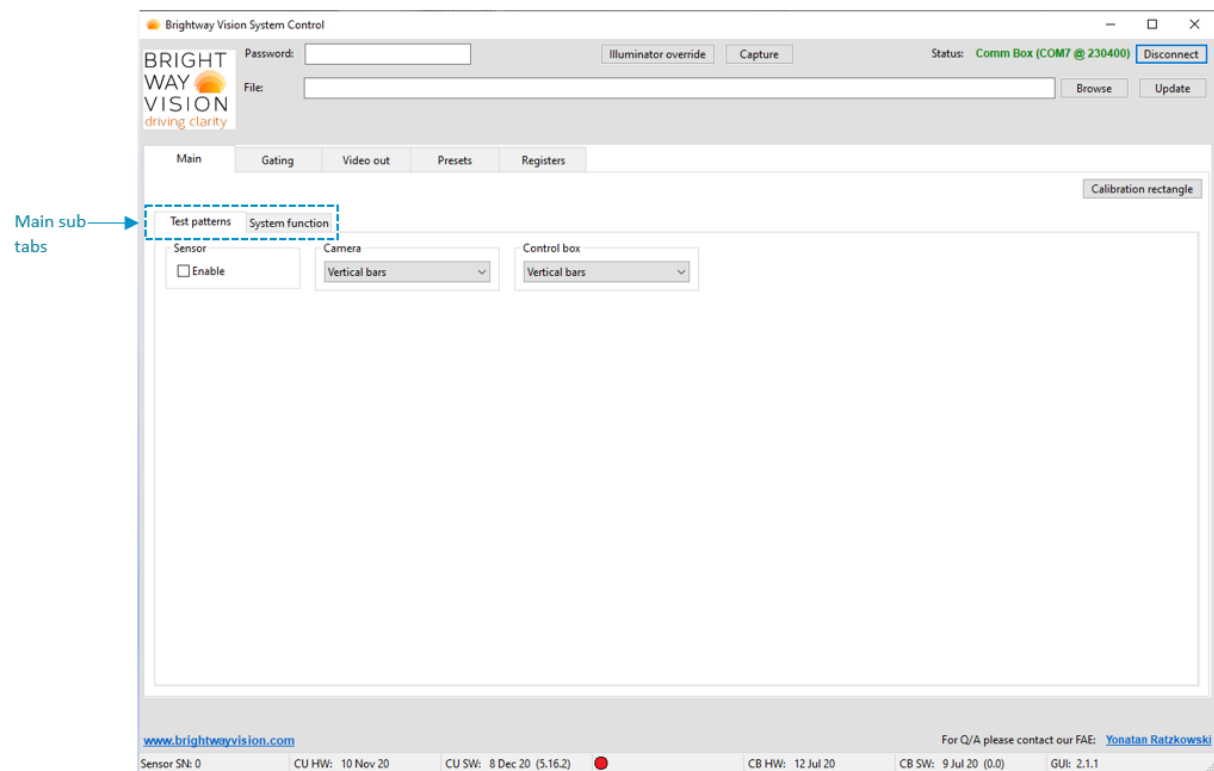


Figure 12: Main sub tabs

#### 3.1.1.1. Calibration rectangle

When clicking on the 'Calibration rectangle' button a cyan rectangle will appear in the middle of the HDMI screen. The user should click again on the same button to make the rectangle disappear.

This function is useful when calibrating the illuminator.

### 3.1.1.2. The 'Test pattern' sub-tab

The user can select various test patterns to be applied instead of the real image. This is necessary for debugging purposes.

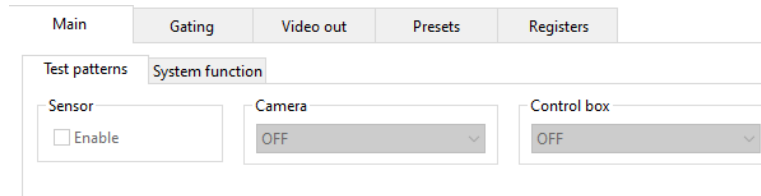


Figure 13: Test pattern sub tab

The test pattern can come from 3 different components in the BWV system:

1. Sensor - A generated pattern that looks like a series of vertical bars from left to right, while the bars become darker to the left and brighter to the right.
2. Camera board – the user can choose between a few options of test patterns as given in the menu.
3. Control box board– the user can choose between few options of test patterns given in the menu.

### 3.1.1.3. The 'System function' sub-tab

There are 4 optional operation modes for the system:

1. Normal operation
2. Auto range slicing
3. Manual range slicing
4. Retro emphasis

Note: Both 'Auto range slicing' and 'Retro emphasis' operations require the laser to be ON. In normal operation it is possible, at least during the daytime, to see an image even without the laser being ON. Therefore, when testing the 'Auto range slicing' / 'Retro emphasis' in a static car, use the "Illuminator override" button to activate the laser. Otherwise, you are likely to see a darkened image instead of the expected image.

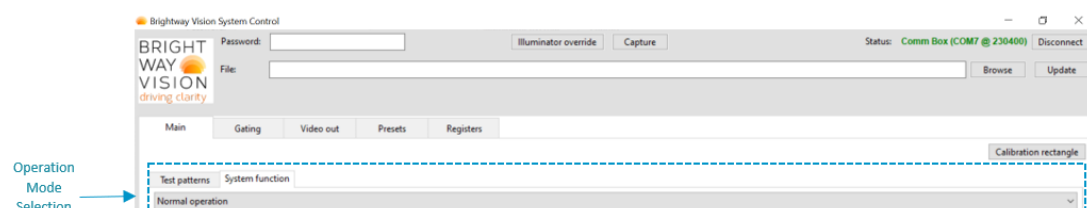


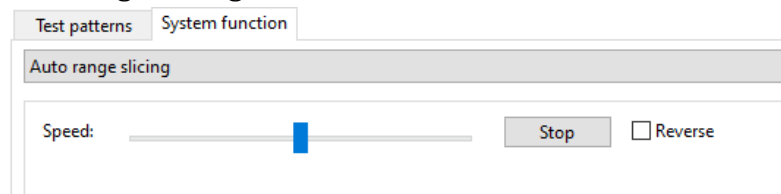
Figure 14: system function

The above operation modes will be explained in the following sections.

#### 3.1.1.3.1. Normal operation

In Normal operation, the system provides a regular image automatically, based on the ACS (Automatic Control System) algorithm. This is the default system status.

#### 3.1.1.3.2. Auto Range slicing



*Figure 15: Auto range slice window*

In this mode, there is a hardcoded table in the camera that will run a range slicing automatically. By default, the slice moves from close range towards the far range. When it reaches the furthest range, it jumps back to the closest range and starts over.

There are three controllable options in auto range slicing:

1. Reverse

Selecting 'Reverse' will switch to reverse mode.

In this mode, the slice moves from far range to close range. When it reaches the furthest range, it starts going back in the opposite direction until it returns to the closest range. Once it reaches the closest range it starts moving forward again and the cycle is repeated.

2. Speed

The speed is controlled by a sliding bar.

This option is used to set the speed of the slicing movement. In other words, how long each range slice is active before it is replaced by the next slice.

Moving the bar to the right or left, increases, or decreases the speed, respectively.

3. Stop\Start

The user can stop and start the automatic range slicing.

#### 3.1.1.3.3. Manual Range slicing

The user can select the 'Manual range slicing' mode and the table below will be accessible:

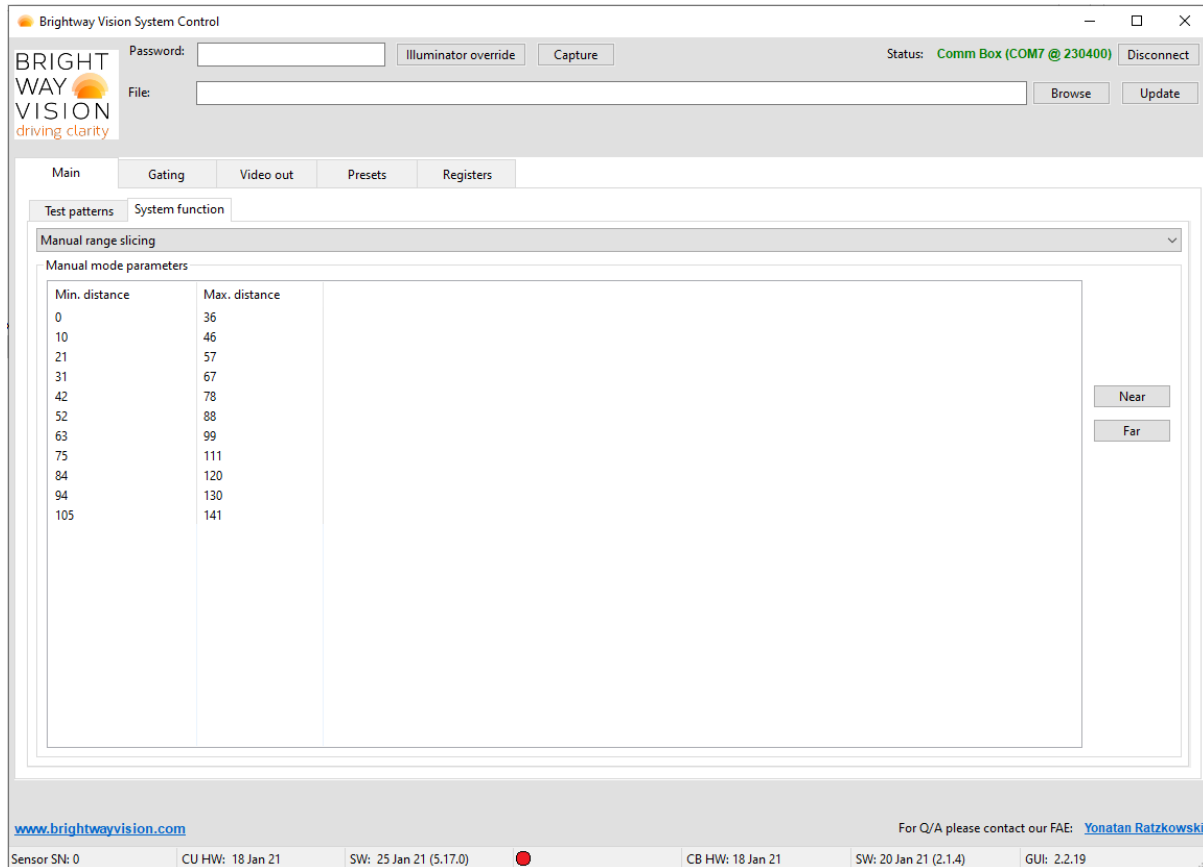


Figure 16: Manual range slice window

When the user selects a given row at the table, it is immediately applied and the image at the display will behave accordingly.

In order to move to a different slice, a user should either click on its row at the table or use the "Near" or "Far" buttons to move one slice up or down respectively.

#### 3.1.1.3.4. Retro Emphasis mode

The following window will be displayed when the 'Retro emphasis' mode is selected:

System function:

Retro emphasis

Threshold:

*Figure 17: retro emphasis window*

In this mode, the pixels with a value above a certain threshold will be replaced with white ones and the rest will be replaced with black ones.

The user can modify the threshold by entering a new value and pressing "Write" to update it.

The main purpose of this mode is to detect highly reflective objects, such as traffic signs, by setting a threshold that is high enough to "filter" out all the rest of the image.

In order to exit the 'Retro emphasis' mode, switch the current mode option back to 'Normal operation'.

## 3.2. The 'Gating' tab

The following window will be displayed when clicking on the 'Gating' tab:

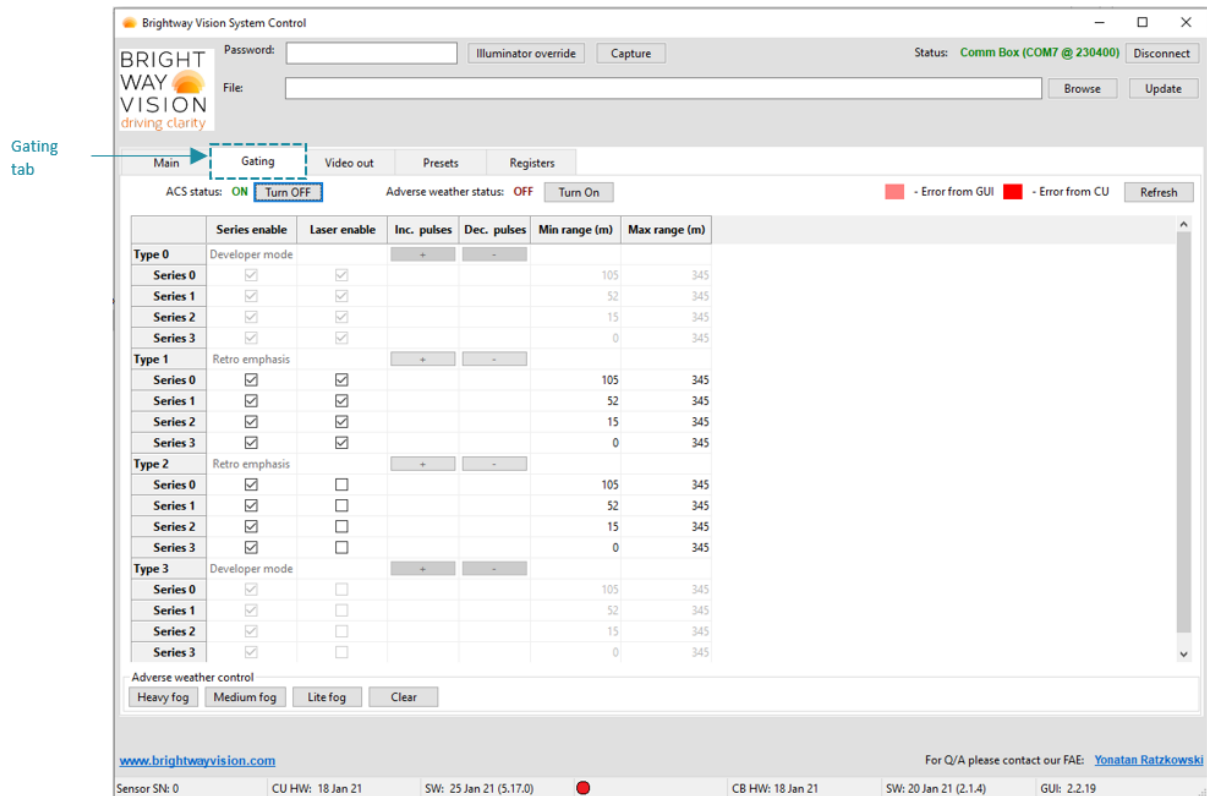


Figure 18: Gating tab with types tabs

The Bright Way Vision system has 4 different frame types: 'Type 0', 'Type 1', 'Type 2', and 'Type 3'. Each type has its own gating scheme. Each type can be activated or deactivated through the 'Video Out' tab as explained below in the '[Video Out](#)' tab section. The activated types will show the Minimum range and Maximum range numbers in each type in black. While the numbers of deactivated types will appear grey.



### 3.2.1. Gating functions

The user can see the current gating function written on the top of rows as shown in the figure below:

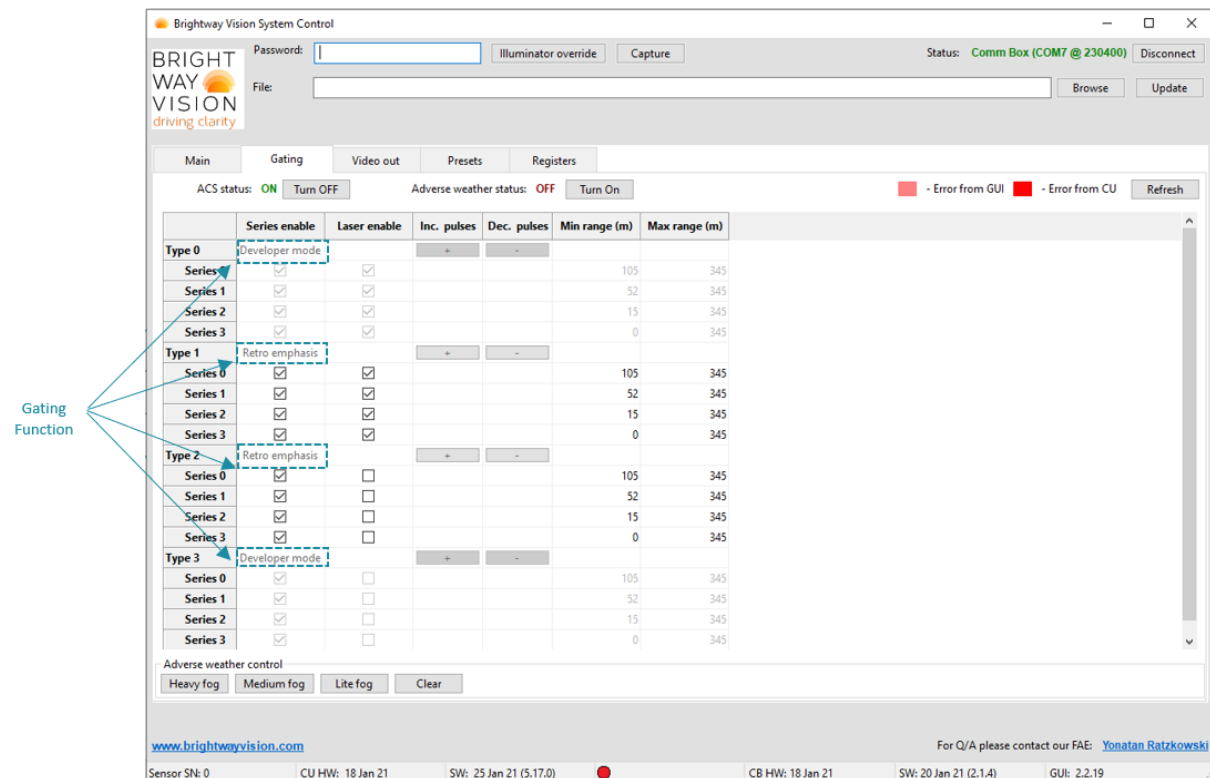


Figure 19: Gating Function description

The default when using 'Normal operation' is "ACS" (Automatic Control System) on 'Type 1'. If the user reaches this window while the system is in range slicing or retro emphasis, the appropriate function("range slicing" or "retro emphasis") will be displayed instead of displaying "ACS".

### 3.2.2. ACS status & Adverse weather status

When ACS is ON, it means that the amount of Gate and Illumination pulses are being changed automatically.

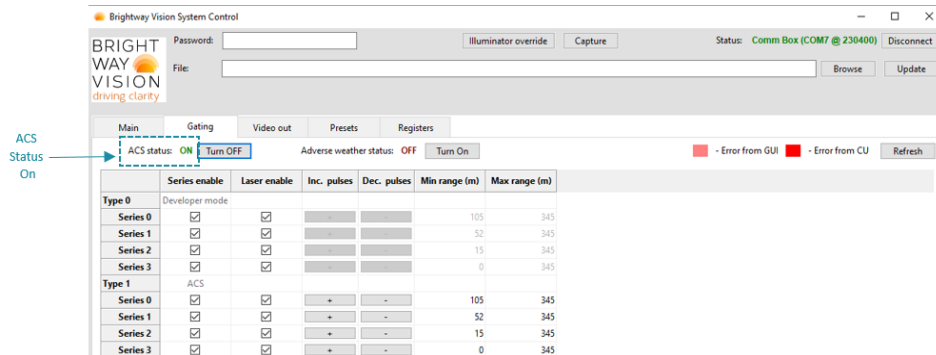


Figure 20: ACS status is ON

When changing any of the amount of pulses, the gating function will be changed to 'Developer mode' and the ACS will be automatically turned OFF, so all the parameters will be frozen. The user can turn back ON the ACS by clicking 'Turn On'. See figure below:

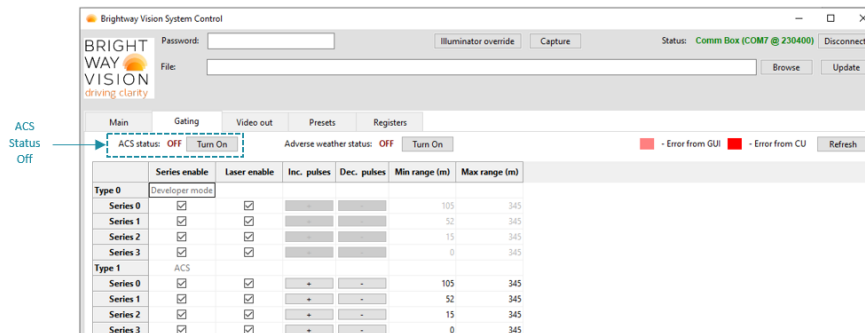


Figure 21: ACS status is OFF

### 3.2.3 Adverse weather control

Clicking the 'Adverse weather status' and turning it on, will stop the 'automatic operation' of the system and set the system setup (Gating of Type 1), to the setup appropriate to the specified fog level, displayed on the buttons\*.

Adverse weather automatic mode requires the 'Adverse weather' button to be on.

In order to resume the automatic operation of the system, the user must first press the **clear** button.

\*This function is still under development, and the buttons: “heavy fog”, “medium fog”, “light fog” are not precise classifications. “visibility limitation” is usually defined when the visibility decreases below 1km.

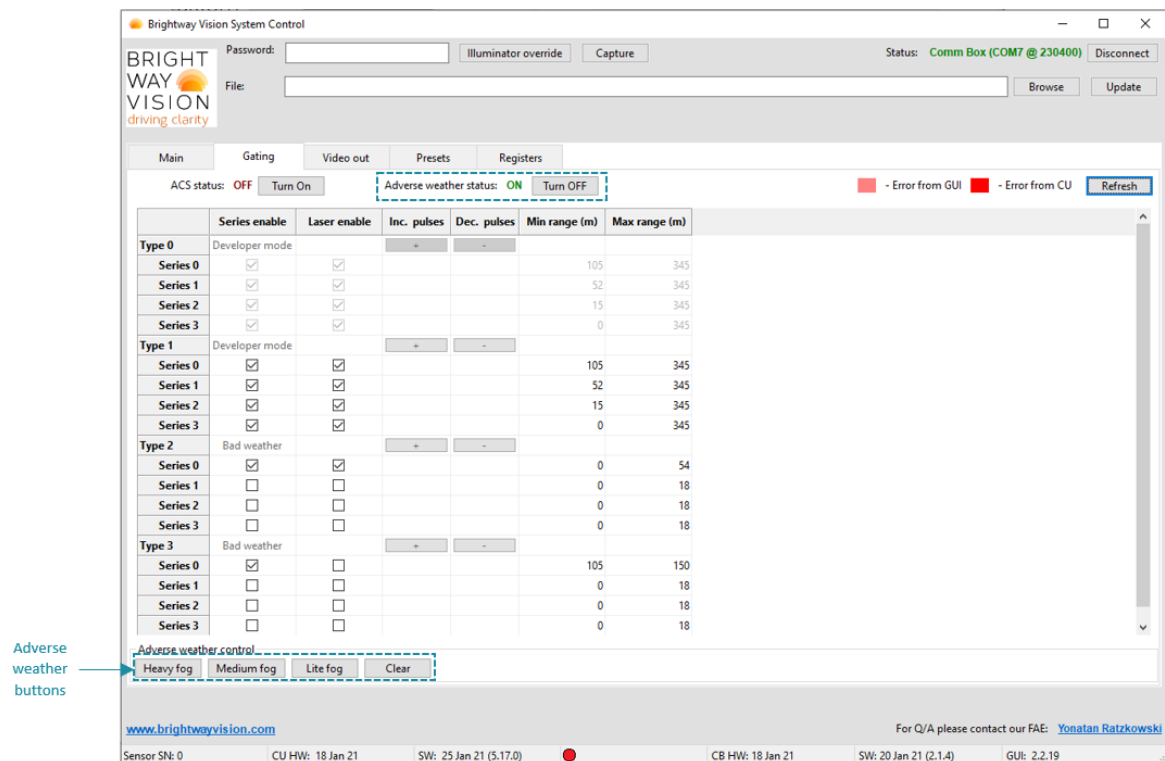


Figure 22: Adverse weather

### 3.2.4 Series & Laser enable

For each series, the user can turn 'Off' and back 'On' the laser or the whole series with their enable checkboxes. Each series has an indication of the minimum and maximum range covered by it and can be changed by the user.

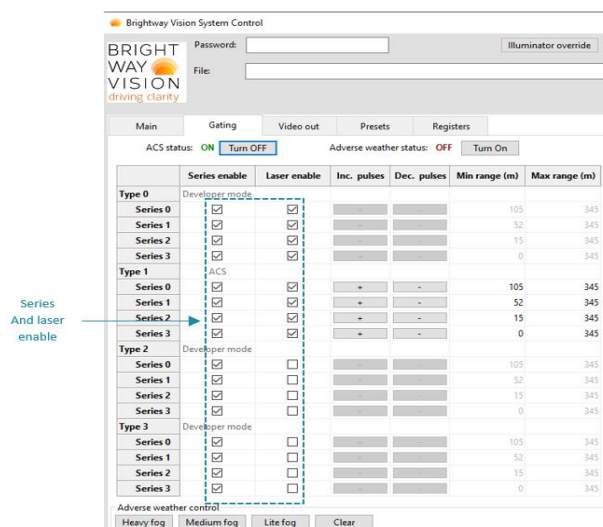


Figure 23: Series & laser enable/disable

## 4.1. The 'Video out' tab

This tab controls what is driven to the HDMI and USB outputs of the system.

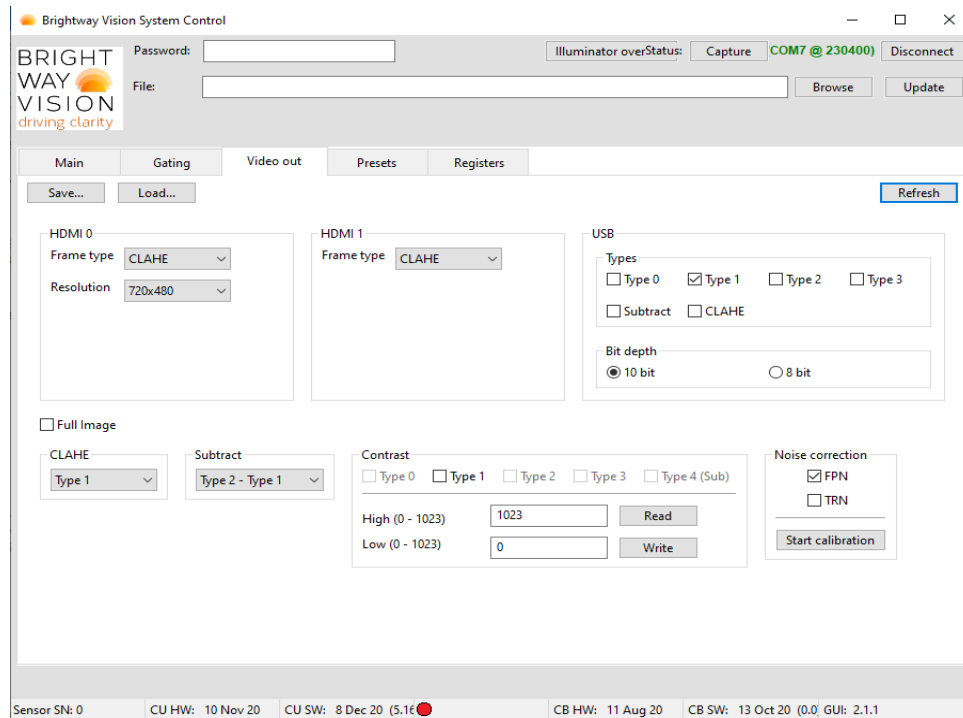


Figure 24: GUI video out tab

There are three video output channels: HDMI 0, HDMI 1, USB 3.0

For the HDMI channels, the user can output one frame type at a time for each channel, whereas in the USB 3.0 the user can output from 0 up to 6 channels together.

The frame type's options are: 'Type 0', 'Type 1', 'Type 2', 'Type 3', 'Subtract', 'CLAHE'.

The 'Subtract' direction can be defined as 'Type 2 minus Type 1' or 'Type 1 minus Type 2'.

The frame type's option for the 'CLAHE' can also be defined as: 'Type 0', 'Type 1', 'Type 2', 'Type 3', 'Subtract'.

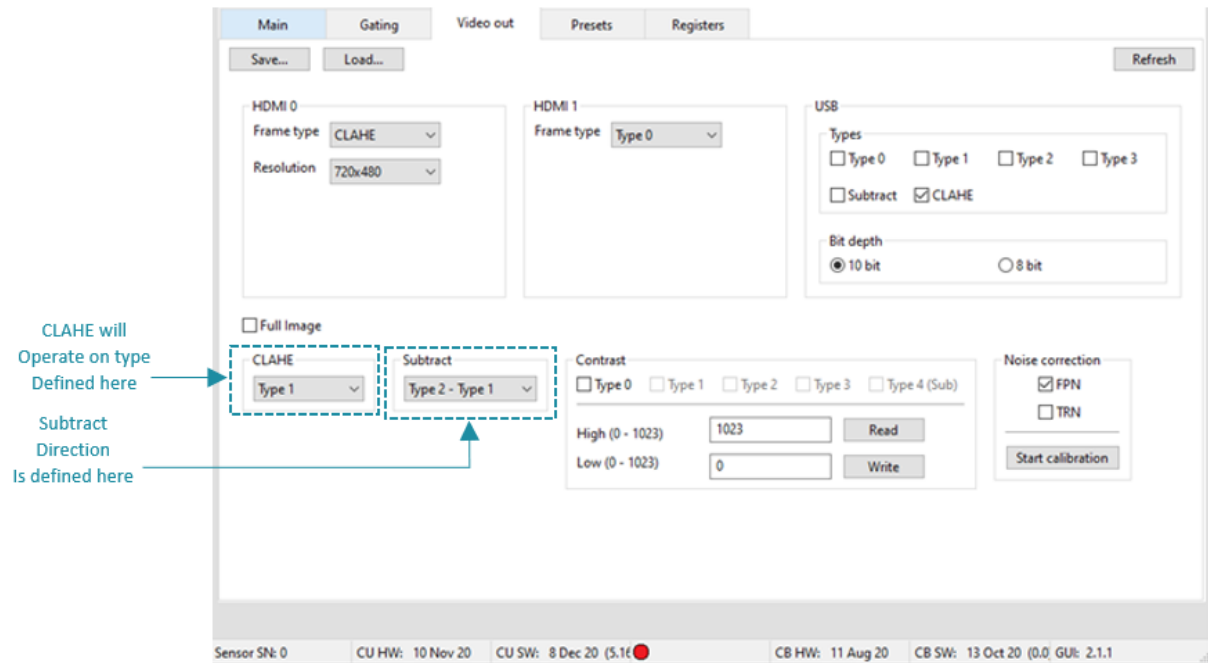


Figure 25: CLAHE, Subtract options

There are 4 HDMI resolution options, 1280x720, 720x480, 800x600 and 848x480.

The user can choose any of the optional types above for linear contrast but cannot choose the same type for CLAHE and linear Contrast at the same time, as the GUI will not allow it.

The user can adjust its low and high limits. The default values are 0 and 1023 which result in practically no stretching. So, they need to be modified in order to produce an actual stretching.

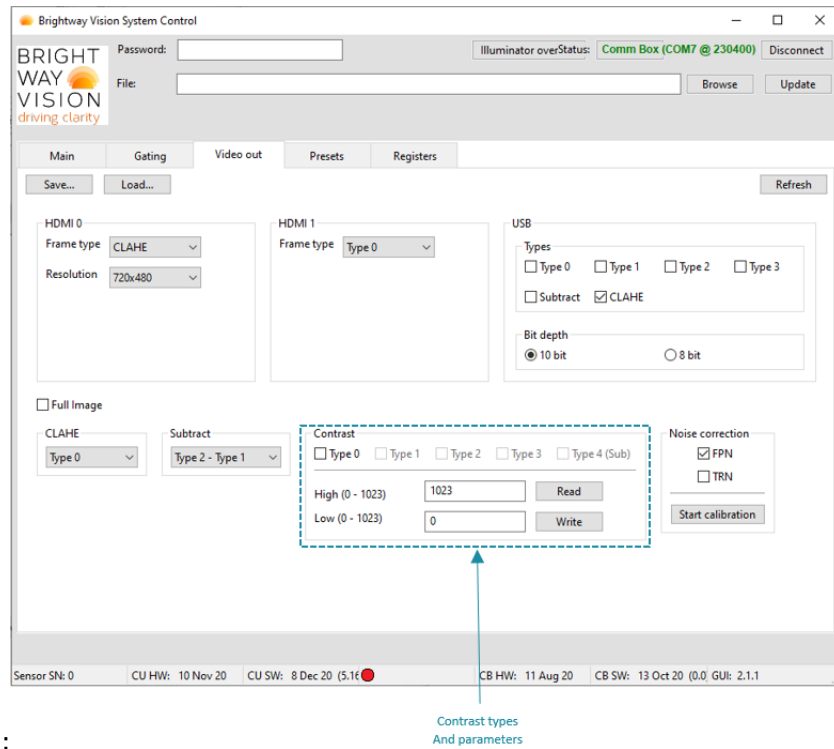


Figure 26: linear contrast

The user can select whether the FPN (Fixed Pattern Noise) corrections should be applied to the images.

The TRN (Temporal Row Noise) corrections are not available and not supported. The user should not use it.

The user can recalibrate the camera's FPN by clicking the start calibration button and following the GUI instructions:

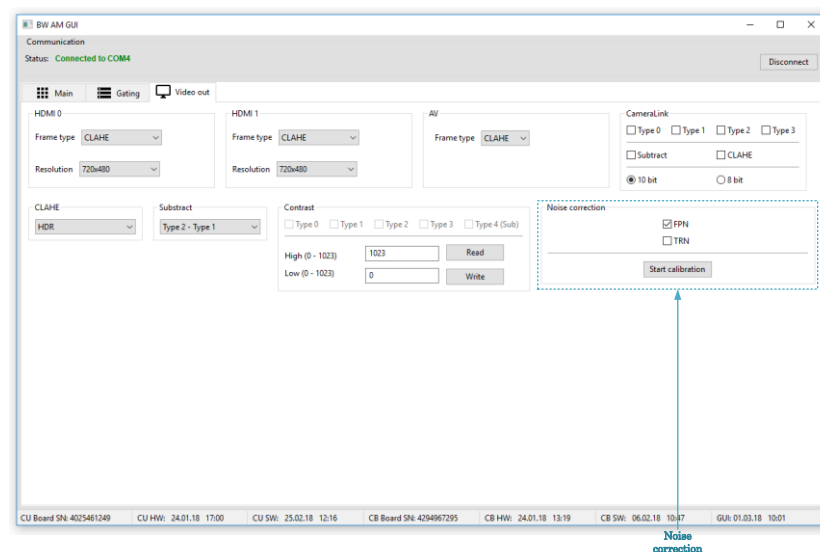


Figure 27: Noise correction

### 4.1.2 The 'Presets' tab

Presets will be provided by Brightway vision FAE if needed. The user can flash the preset direct to the camera.

For a complete explanation regarding the Presets tab, the user should refer to the presets manual.

### 4.1.3 Initial setting

In order to go back to the initial settings, the user should turn the camera OFF and then turn it back ON again.

The initial settings are defined by the Boot preset (In the Upper-Left corner of the Presets tab).

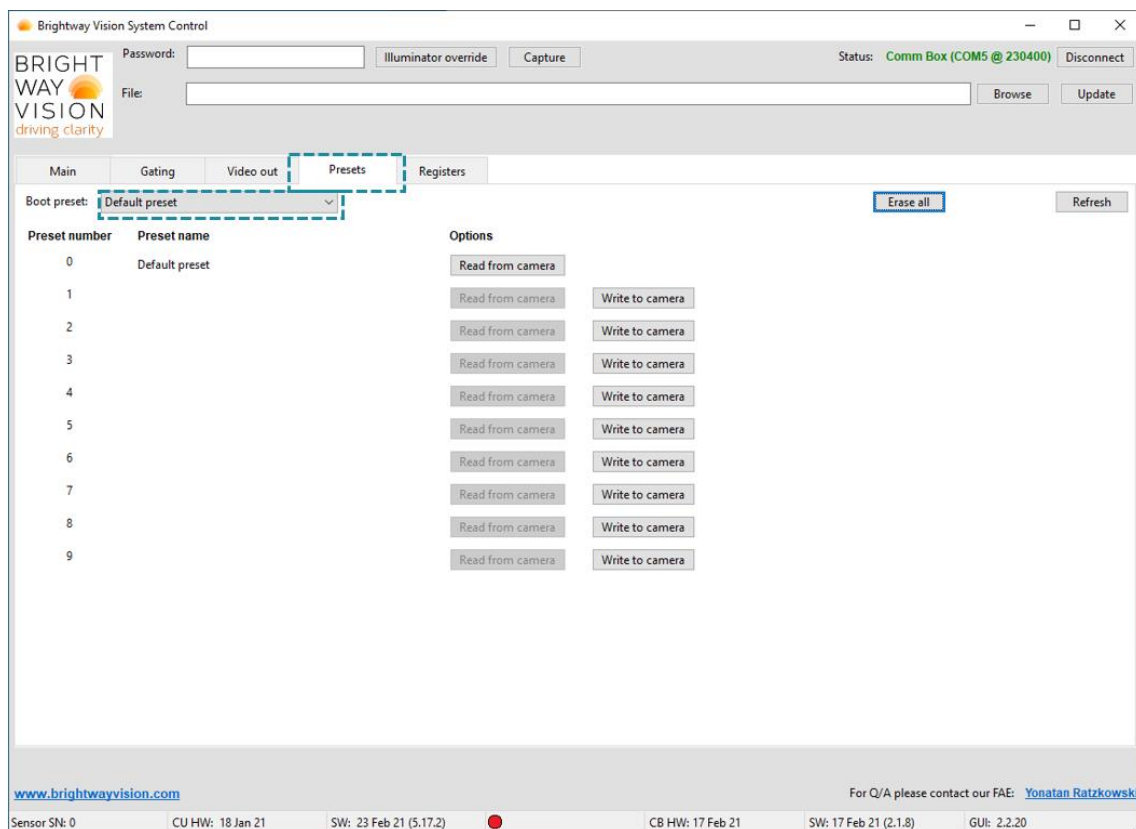


Figure 28: Noise correction

## 5. The 'Registers' tab

The 'Registers' tab is made for debugging needs. It should be in use only for support actions with the Bright Way Vision's support department.