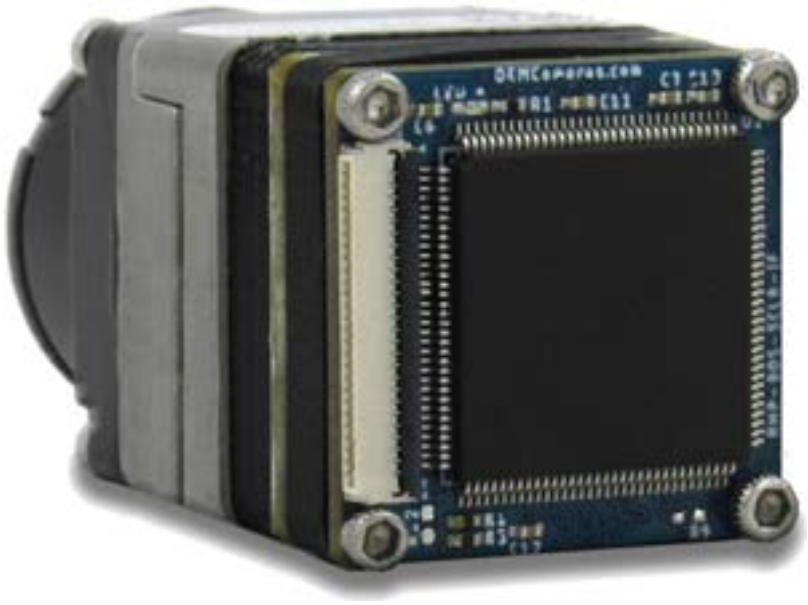
RHP-BOS-RC-HD-IF

Remote Control Interface

User Manual



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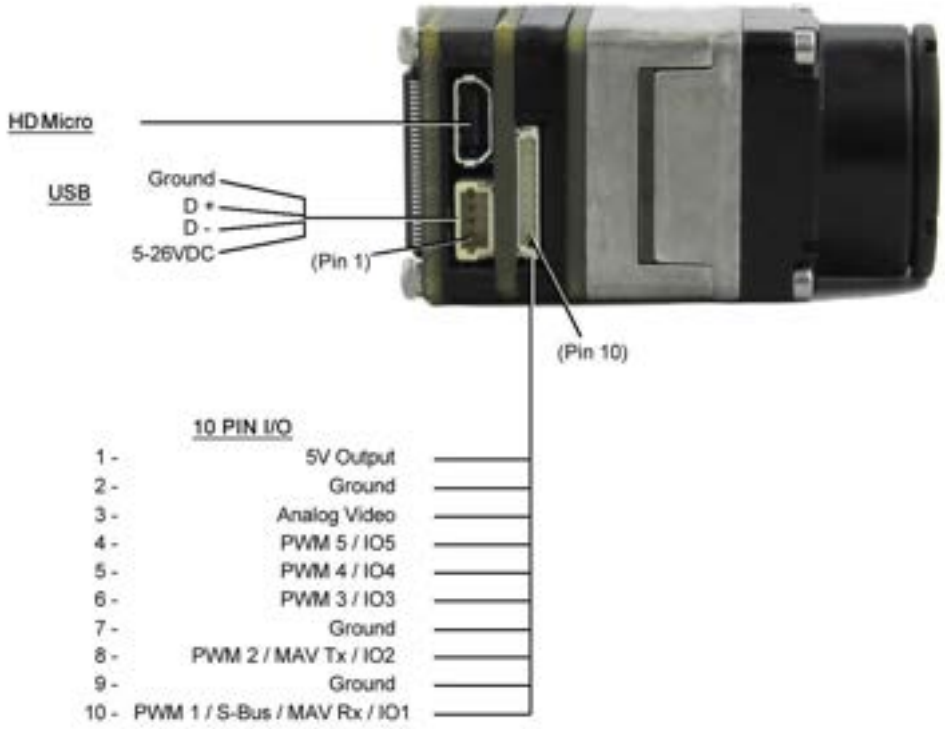
Rev. 1.0.1 JUNE 2023 Release

RHP-BOS-RC-HD-IF PIN-Out

RHP-BOS-RC-HD-IF

RHP International - OEMCameras.com
New York - USA +1-845-343-4077



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Attaching the FLIR Boson Thermal Camera:

BEFORE YOU BEGIN:
This product is static sensitive. Please use proper grounding techniques while installing the RC-IF to the Boson Camera.

Attaching the RHP-BOS-RC-HD-IF to the FLIR BOSON Thermal Camera:

1. Mate the RHP-BOS-RC-HD-IF board to the Boson Camera Hirose 80 pin connector.

2. Using the four screws provided, secure the RHP-BOS-RC-HD-IF Board through the spacers, and attach to the camera.

NOTE: DO NOT OVER TIGHTEN THE SCREWS
Using other screws than the ones provided could damage the camera, RHP-BOS-RC-HD-IF or both.

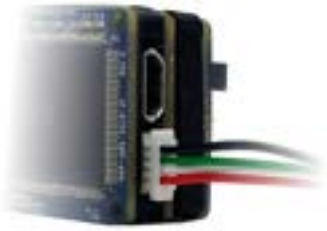
RHP-BOS-RC-HD-IF Connections

Providing power to the RHP-BOS-RC-HD-IF:
There are three ways to provide power to the RHP-BOS-RC-HD-IF: 4-pin to USB, 10-Pin Connector, or 4-pin JST connector to bare wire.

To use the 4-pin to USB:

1. Insert the 4-pin connector on RHP-BOS-RC-HD-IF Board, and then connect the other end to a power source.

2. The power LED will illuminate within 5 seconds, indicating the unit is on.



Use this option when configuring the RHP-BOS-RC-HD-IF with the RHP Controller Software.

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-- **Connecting the Video signal via HD:**

1. Use the provided mini-HD cable and insert it into the HD Port on the BOS-DS-IF.
2. Plug the opposite HD end into your monitor or recording device.

If the power is supplied to the board, the thermal image should appear on the screen.

To use the 4-pin to bare wire:

1. Insert the 4-pin connector on RHP-BOS-RC-HD-IF Board, and then connect the red wire to a positive terminal and the black wire to the negative terminal on the power source.

2. The power LED will illuminate within 5 seconds, indicating the unit is on.

Use this option for powering the RHP-BOS-RC-HD-IF in the field.

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Connecting the 10-pin PWM/SBUS:

The 10-pin connector 'pin out' is as follows:

PWM Mode (5 channels)	**S-Bus Mode (16 Channels)** Assignable using the RHP-BOS-RC-HD-IF software through USB. (PWM 1 – 5 are not used for S-Bus mode)
PIN 1: 5V Output (optional) PIN 2: Ground (optional) PIN 3: Analog Video (optional) PIN 4: PWM 5 / IO5 (optional) PIN 5: PWM 4 / IO4 (optional) PIN 6: PWM 3 / IO3 (optional) PIN 7: Ground (optional) PIN 8: PWM 2 / MAV Tx/ IO2 (optional) PIN 9: Ground (Required) PIN 10: PWM 1 / S-Bus / MAV Rx / IO1 (Required)	PIN 1: 5V Output - optional PIN 2: Ground - not used PIN 3: Analog Video - not used PIN 4: PWM 5 / IO5 - not used PIN 5: PWM 4 / IO4 - not used PIN 6: PWM 3 / IO3 PIN 7: Ground PIN 8: PWM 2 / MAV Tx/ IO2 PIN 9: Ground PIN 10: PWM 1 / S-Bus / MAV Rx / IO1

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RHP-BOS-RC-HD-IF Connecting to a PC

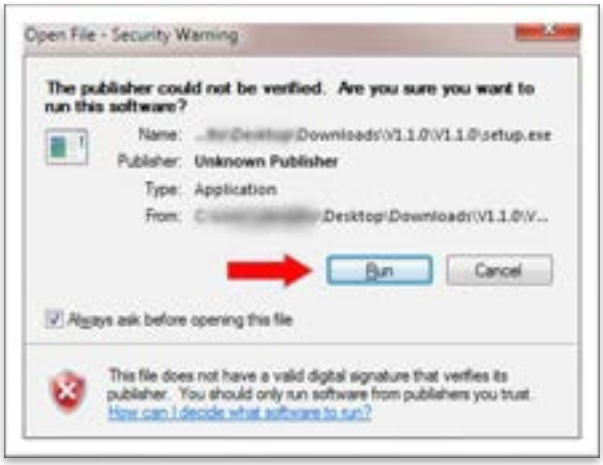
Installing the RHP Controller GUI Software:

NOTE: Be sure the selected computer is connected to the internet before you first connect the RHP-BOS-RC-HD-IF.

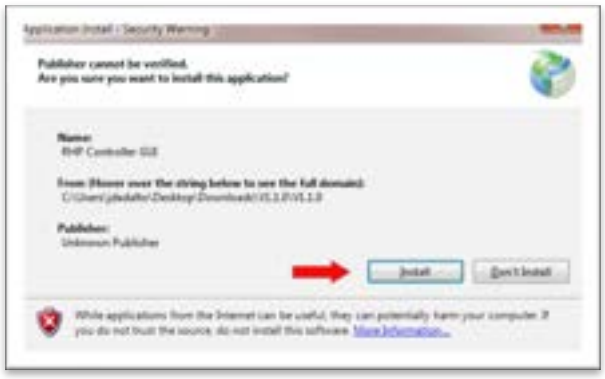
Connect the RHP-BOS-RC-HD-IF via the 4-pin to USB port on a Windows PC.
Windows 10 will automatically find the necessary drivers and download them.

If you have issues connecting, please contact support. (https://www.oemcameras.com/contact)

Installing the RHP Controller Software:
Once the software is downloaded and unzipped, run **'install.exe'**



The application install security warning may appear. Choose **'Install'.**



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Connecting the RHP-BOS-RC-HD-IF to the RHP Controller GUI:

Com Ports

When the driver is completed installing, open the application and select the assigned COM port.

Choose:

File > Connect > COM Ports

Select the COM Number
the RHP-BOS-RC-HD-IF is assigned to.

COM Port Refresh Option:

If the COM Port is not shown or unavailable, choose:

File > Refresh COM

to refresh the COM Ports.

Connecting the Boson

To connect the camera to the RHP-BOS-RC-HD-IF software, choose:
File > Connect

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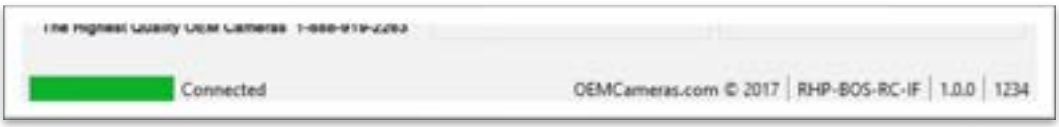
Determining a Successful Connection:

The green bar on the bottom of the screen will indicate that the camera is successfully connected. The program will load the current settings and camera information from the RHP-BOS-RC-HD-IF and the Boson. Once loaded, all available parameters will be enabled for adjustment, based on your configuration.



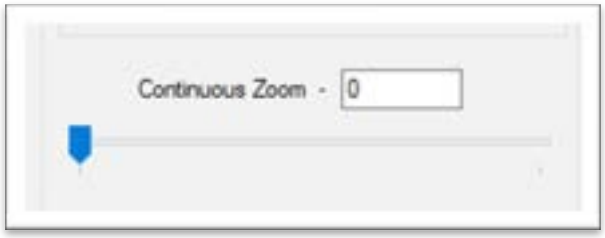
Once connected, the thermal and visual camera settings will be available to modify.

RHP-BOS-RC-HD-IF Thermal Functions Defined

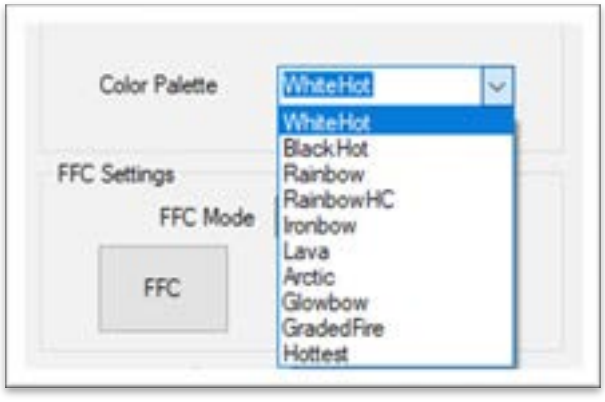
In this section, each setting is defined for the Thermal and RC Control tabs.

Video Settings:
Once connected, the thermal camera settings will be available to modify**.**
HD Video Settings:
This option lets you choose between 720p or 1080p60 fps.
HD Window mode relates to the RHP-BOS-DS-IF only.

Continuous Zoom: The electronic provides an optional interpolation of a subset of the field of view to the 640x512 resolution of the output stream. To adjust the zoom level, simply move the slider from left to right. This will digitally zoom the thermal camera image.



Color Palette Select:
The FLIR Boson provides several factory-installed palettes, changing the parameter Color Palette causes the applied palette to change. The factory-default value is “white hot”.
Select a color palette from the drop down menu as shown. There are 14 options available.



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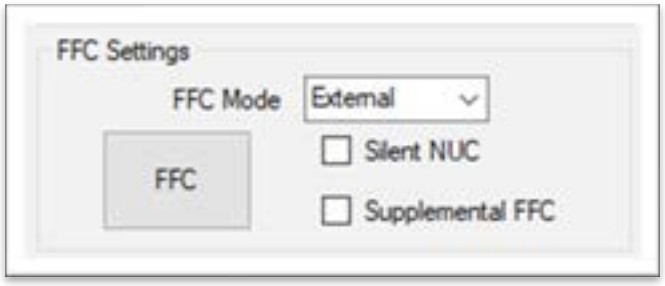
FFC (Flat Field Correction) Settings:



There is a shutter between the camera sensor and the lens. This shutter is used to perform a flat-field correction, or FFC. During FFC, the shutter presents a uniform temperature source to each detector element in the array. While imaging the flat-field source, the camera updates the offset correction coefficients, resulting in a more uniform image after the process is complete.

Automatic FFC: The camera does not load the stored NVFFC map but always performs automatic FFC instead. If the option of a faster start-up is desired, the power-on default FFC mode should be set to manual mode instead.

Manual FFC: If the stored NVFFC map was generated in the same NUC table as the start-up NUC table, then it is loaded and applied. Otherwise, an automatic FFC takes place under the assumption that the stored map is invalid for the current conditions (i.e., will result in suboptimal image quality). If the map is loaded, the value of “Camera temperature at last FFC” will be set to the value stored with the NVFFC map, and the value of “Frame counter at last FFC” will be set to 0. Note that the FFC Desired flag may be set immediately after the NVFFC map is loaded, assuming the difference between current camera temperature and “Camera temperature at last FFC” exceeds the value of FFC Delta Temp.

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External FFC: If the stored NVFFC map was generated in the same gain state as the start-up gain state (see Sections 6.2 and 7.5), then it is loaded and applied. Otherwise, no FFC offset is applied (and the FFC Desired flag will be set) under the assumption that the stored map is invalid for the current conditions. If the map is loaded, the value of "Camera temperature at last FFC" will be set to the value stored with the NVFFC map, and the value of "Frame counter at last FFC" will be set to 0. Note that the FFC Desired flag may be set immediately after the NVFFC map is loaded, assuming the difference between current camera temperature and "Camera temperature at last FFC" exceeds the value of FFC Delta Temp.

NOTE: Generally speaking, it is always preferred to generate a fresh FFC map at start-up rather than relying on a stored, potentially stale NVFFC map. The NVFFC feature is intended primarily for the case in which a camera has only been powered down briefly since the previous FFC. Use of the NVFFC feature does not replace the recommendation to perform FFC at start-up, even for shutterless configurations.

Silent NUC: A filter intended to minimize random spatial noise.

Supplemental FFC: This calibration can compensate for image effects caused by the changing temperature of large lenses or other optical components. It may also help with effects from heat sources in camera housings.

> **This calibration is documented by the Supplemental FFC Application Note, FLIR document number 102-PS242-100-05.**

AGC Settings:

Automatic gain correction (AGC) is the process whereby the 16-bit resolution of the signal pipeline is converted to an 8-bit signal, suitable for a display system.

Boson provides a sophisticated AGC algorithm which is highly customizable via many parameters. It is a variant of classic histogram equalization (HEQ), which uses the cumulative histogram as the transfer function.

Tail Rejection: Determines the percentage of the histogram "tails" which are not ignored when generating the mapping function. The scene outliers which comprise the histogram tails are consequently mapped to either the minimum or maximum grayshade (0 or 255). A large value of Tail Rejection will dedicate more 8-bit grayshades to the central portion of the histogram, resulting in more contrast therein, but as a result, a small cold object or small hot object in the scene may appear completely washed out (no variation in grayshades).

Max Gain: Limits the maximum slope of the mapping function. In a relatively uniform image, a high Max Gain value increases the contrast of the image at the risk of over-exposure and more apparent noise in the image. Lower values of Max Gain result in a less grainy, lower contrast display.

Damping Factor: As new objects enter the scene, or the camera field of view changes, the AGC algorithm will be forced to update accordingly. Damping Factor increases or decreases the update rate of all AGC algorithms. A small value of Damping Factor allows a faster remapping in response to a change in the scene, but in some cases, this can result in the background appearing to "flash" as it is quickly remapped to new 8-bit grayshades. A larger value of Damping Factor minimize flashing in response to a change in scene but at the expense of requiring more time to optimize the mapping function for the new scene content.

ACE/Gamma: ACE provides contrast adjustment dependent on relative scene temperature.

The scale of values ranges from 0.5-4.0. In white-hot polarity, an ACE value less than one darkens the image, increasing contrast in hotter scene content, while an ACE value greater than one will do the opposite.

Plateau Value: Limits the population of any single histogram bin. Increasing values allow the mapping function to allocate more grayshades to dominant scene content, as seen in traditional HEQ. Smaller values of Plateau Value clip the heavily populated bins, reserving more 8-bit grayshades for less heavily populated bins.

Linear Percent: Most histogram based AGC methods do not preserve the relative temperature of objects in the scene.

Increasing values of Linear Percent more accurately preserves the visual representation of an object's temperature by mapping the data in a more linear fashion. For example, in a scene where the two hottest objects in the scene are a human and a heated stovetop, setting Linear Percent to zero will display the stove only slightly brighter than the human because no 8-bit grayshades are dedicated to the empty portion of the histogram between the two. With a high value of Linear Percent, the stove will appear much brighter than the human (as one would expect from a hot stove). However, this enhancement is at the cost of decreased contrast throughout the image because some of the available 8-bit grayshades are allocated to portions of the histogram which are not present in the scene.

Detail Headroom: Defines the amount of 8bit dynamic range is allowed for use by the LP filter data (the histogram equalized data). Increasing values will increase the number of 8bit shades—at the top and bottom of the dynamic range—to be reserved for the HP data.

DDE (Digital Detail Enhancement): Attenuates or gains the HP content of the scene. Reduces the appearance of graininess but blurs the scene when set to values less than 1 and sharpens the details but increases the appearance of noise when set to values greater than 1.

Smoothing Factor: Defines the cut off for the HP filter. Lower values of Smoothing Factor result in less data being included in the HP portion of the image. In other words, a low value of Smoothing Factor decreases the portion of the scene considered to be the more-heavily-weighted details. Smoothing Factor also affects which portion of the scene is attenuated or enhanced via DDE.

Gain Correction: This automatically determines whether the Boson sets the optimum gain state based on current scene conditions.

Column Filter: Spatial column noise reduction (SCNR). This filter is intended to minimize column noise.

Temporal Filter: This feature is intended to minimize temporal noise.

Note: While the spatial filtering algorithms described above are intended to minimize residual non-uniformity, FLIR always recommends using either the Boson internal shutter or an external shutter design to perform periodic FFC for highest image quality.

PROGRAMMING A CONTROLLER

RC CONTROLS DEFINED:

Calibration Mode:

In the event a calibration is necessary, click the **Calibrate RC** button. It will be necessary to move all buttons on the RC Controller from the starting position to the maximum position.

Once the calibration is complete, press the **Stop** button located in the same position where the Calibrate RC was.

Clear:

Clears settings in the setup configuration.

Refresh:

Reloads the last settings for the channel you have selected.

Note: If there is no assignment, it will be reset to the default program setting.
i.e., (Vari "0" Down; Max Function: None; Center/Center Function: None; Min Function: None)

Save:

Saves the settings for the channel you are currently working on. This will save the settings to the controller simultaneously.

Clear All Channels:

Will reset all channels below to the base line.

Refresh All Channels:

The channel will revert to the currently saved channel settings from the controller. This will overwrite any changes currently in the Channel Table.

Save All Channels:

Will send the Channel Table settings to the controller.

Channel: The number of channels is based on the mode you are in. In 'SBUS' mode, Channels 1-16 are available to modify. In the 'PWM' & 'Button' modes, channels 1-5 will be available. Select the channel on the lower list first, then assign a function to that channel.
Examples are in the Controller Assignment section.

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Invert Channel: This is an easy way to reverse the function that has been programmed for a particular channel.

Switch Type: This lets the program know what type of switch will control the channel chosen.

Max Function / Maximum: Tells the program what the channel will do when the knob or switch type is at its maximum.

Center Function / Center: This is used for switches (3 position switch) that have a center position. If a switch has two center positions (4 position switch), then the Center Function 2 can be programmed. A momentary switch will not have a center position and may not be active for editing.

Min Function / Minimum: Tells the program what the channel will do when the knob or switch type is at its minimum.

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Changing Controller Modes:

SBUS to PWM Mode:
When connected, the RHP Controller Software is set to **S-BUS** by default.

To change from S-BUS to PWM mode.

Choose:
Mode > RC Mode
and select PWM.

You will be prompted for confirmation.

Click OK.

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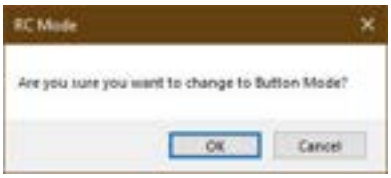
PWM to Button Mode:

The page will refresh and is now in PWM Mode.

The same principal applies when changing to Button mode. Choose:
Mode > RC Mode
and select Button.

You will be prompted for confirmation.

Click OK.



The page will refresh and is now in Button Mode.

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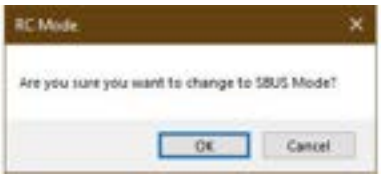
Button to SBUS Mode

To revert to SBUS Mode, select:
Mode > RC Mode
and select SBUS.

You will be prompted for confirmation.
Click OK.



The page will refresh and is now in SBUS Mode.

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Controller Assignment:

Select Channel:

To assign a Function on the RHP-BOS-DS-IF to a switch type on the RC Controller follow these steps:

1. Choose a channel from the *Channel Table* in the lower portion of the screen.

NOTE: When in PWM Mode, only five (5) Channels will show.

2. **Select the switch type**:
   - ***2 position* switches** will only show the Max Function and the Min Function.
   - ***3 position* switches** will show Max Function, Center Function and Min Function.
   - ***Variable +/-*** will only show the Center Function.
   - ***Variable with Center*** will show Max Function, Center Function, Center Function and Min Function

3. **Configure the function**:
   Choose a function and assign a command to that function. i.e., Max Function: Smoothing Factor + adjust the smoothing factor to 100% when activated.

NOTE: Functions are dependent on the switch type selected. Therefore, some functions may not be available for every switch type.

4. **Click save.**
   The channel parameters will reflect the changes in the channel table and save to the RC Controller.

NOTE: Be sure to save your work on each channel. Changing channels before saving will reset the settings for that previous channel.

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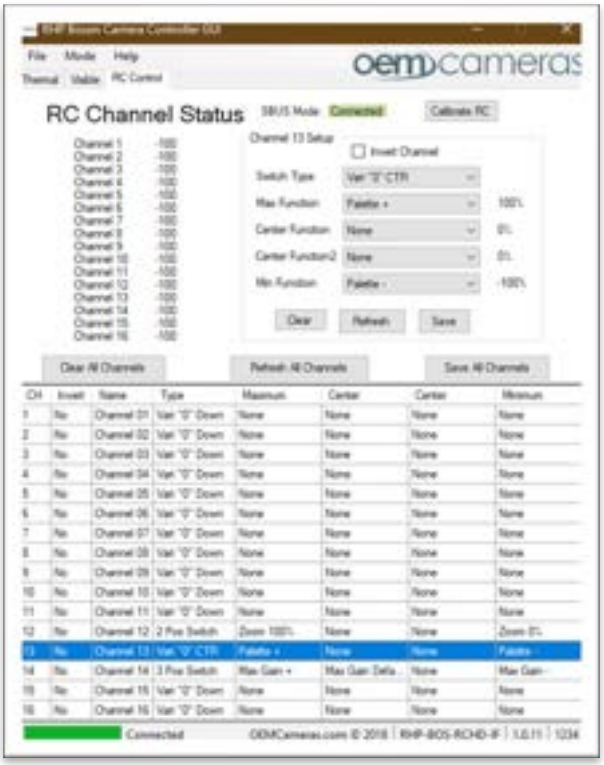
RHP-BOS-RC-HD-IF Controller Sample Configurations

SBUS - Controller Assignment Example:
In our example, we have modified and saved channels 12, 13 and 14.



Channel 12 is a 2-position switch.
At maximum, the switch is assigned to zoom in 48x. The Min Function is set to zoom out to 0x.

Channel 13 is a Variable “0” Center POT which is assigned to Palette (+) when turned to the right and Palette (-) when turned to the left.

Channel 14 (highlighted) is a 3-position switch. At Max will send the Gain Value to the maximum value of 8. At Center, the gain value will return to the default setting. The Minimum value will send the minimum Gain Value to 0.

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5 Button Direction Pad:

This example will walk through setting up a 5 Button Direction Pad. Two of the buttons will zoom in and zoom out. Another two will change palettes. The final button will perform a manual Flat Field Correction (FFC).

This walkthrough is designed to show how a channel is selected, switch type is defined, and function is assigned and saved to the channel. Ensure that you have Button Mode active.

Select Channel 1 from the bottom list.

In our example, each channel will be chosen in succession.

Next, Assign a function. We have assigned the 'Long Click' to Zoom in on Channel 1 of our 5 button Pad.

Next, click Save and the function will be saved to the channel (channel 1) that we selected.

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Select Channel 2 from the bottom list.

We have assigned the ‘Long Click’ to Zoom out on Channel 2.

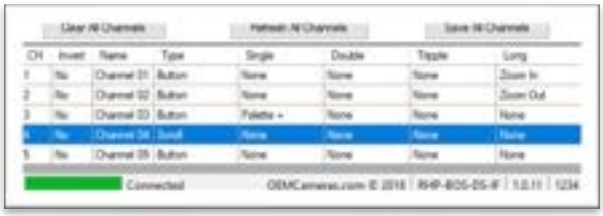
Next, click Save and the function will be saved to the channel (channel 2).

Select Channel 3 from the bottom list.

We have assigned the ‘Palette +’ to cycle forward through the available palettes with a single click on the FLIR Boson on Channel 3.

Next, click Save and the function will be saved to the channel (channel 3).

Select Channel 4 from the bottom list.



We have assigned the ‘Palette - ’ to reverse through the palettes with a single click on the on Channel 4.

Next, click Save and the function will be saved to the channel (channel 4).

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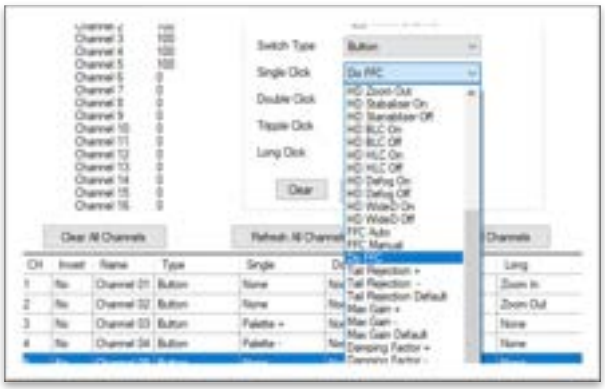
Select Channel 5 from the bottom list.

We have assigned the ‘Do FFC’ command to initiate a Flat Field Correction event on press on Channel 5.



Next, click Save to store on channel (channel 5).

THE FINAL STEP:

Once the channels have been assigned and saved, the last step is done by clicking **Save All Channels** located below the Channel Setup Save button.

This will write the settings to the RHP-BOS-RC-HD-IF.

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