

Release Notes for Rainbow MSI v2.3.3 (7 pages)

New Phase One Rainbow MSI v2.3.3 is a service release addressing several minor performance and stability fixes:

- 1. Removal of exposure calibration of VIL and UVIL for Multiband.** For multiband imaging, the MSI software would fail to make an appropriate exposure calibration for the VIL and UVIL steps, so these have been removed from the calibration, providing a more stable and accurate image stack.
- 2. Fixed a software hang when using narrowband with iXG:** this is a rare problem where MSI software would hang when using an iXG camera with narrowband lights. The issue is fixed in this release.

This update is recommended to all users of Phase One Rainbow MSI Solutions, both multiband and narrowband.

The update package includes the installer, an updated User Guide and the Release Notes and is available from <https://www.phaseone.com/MSI>

Known Issues

1. The Rainbow program will stop without warning if focus is outside the focusing range of the lens in the current camera position. Please relocate the camera assembly and continue.
2. Please ensure the Power Settings in the Windows 10 System Settings are set correctly to avoid the computer going into Sleep Mode during multi spectral imaging. If the computer goes to sleep during long exposure and calibration sequences, the MSI software will not be able to complete the task.
3. With Multiband, when using the Analysis Tool, if you have a stack with a step from the 4th socket in the Cleware switch such as a raking light, and you choose "select all" as the input, the program never finishes loading the images. If you select the files individually and omit the 4th socket step, it works as expected.

Release Notes for Rainbow MSI v2.3.2 (October 19, 2022)

New Phase One Rainbow MSI v2.3.2 is a service release addressing several minor performance and stability fixes as well as adding the following workflow improvements:

1. **Support for Achromatic Cameras.** For narrowband imaging, the iXG 100MP Achromatic and iXH 150MP Achromatic cameras are now supported in the MSI software.
2. **Automatic Exposure Compensation.** For narrowband and multiband imaging, when carrying out an Exposure Calibration at the start of a Project, exposure offsets will be automatically applied to incorrectly exposed images, removing the need to edit the Recipe manually and restart the Calibration.
3. **Single image pixel readout.** A readout tool is added that shows the current values at a selected point in the image. This can be useful for checking exposure values from the PTFE target, etc.
4. **Save and Load Analysis Settings.** Individual analysis settings can now be saved and loaded, making it easy to create a set of analysis settings on one image and re-use the same settings on subsequent images.
5. **Support for 4th Socket for Multiband.** The Multiband workflow has been updated to allow use of the 4th socket in the Cleware USB Switch. This can be used to add a raking light, for example. Support for the 4th socket is side specific, and the additional light can be given a custom name.
6. **IR Flare Mitigation.** Fixes an issue where exposures in the IR range can vary depending on the brightness of the background and subject, particularly relevant for Multiband and CHARISMA.
7. **Thumbnail sorting.** Fixes an issue where image stacks appear in the incorrect order.
8. **Preliminary support for Windows 11.**
9. Several bug fixes and general workflow improvements.

Friday May 5th, 2023

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Release Notes for Rainbow MSI v2.3 (April 7th, 2022)

New Phase One Rainbow MSI v2.3 is a service release addressing several minor performance and stability fixes as well as adding the following workflow improvements:

- 1. Readout Tool.** This new tool displays the intensity values of each waveband at a given point in a reflectance narrowband stack. Readouts can be pinned, moved and deleted, up to a maximum of nine points. The data can be exported as a csv file for further use outside of MSI software.
- 2. Experimental Tab.** The Experimental Tab has been updated:
 - a.** The filtering of images based on a 2D histogram of PCA channels has improved functionality. Masks drawn on the plot can be cleared and erased, enabling another mask to be drawn on a different area; and the created TIFF file can be saved with a name and in a location of your choosing for each mask. This updates the functionality described in the earlier release notes.
 - b.** A new narrowband to RGB conversion is added to the Experimental Tab. This works on narrowband reflectance image stacks using the 16 different channels. Currently this is based on a default calibration, so colors might vary depending on local conditions.
- 3.** Several bug fixes and general workflow improvements.

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Release Notes for Rainbow MSI v2.2.2 (January 10, 2022)

New Phase One Rainbow MSI v2.2.2 is a service release addressing several minor performance and stability fixes as well as adding the following workflow improvements:

1. **Cancel Button.** This allows you to abort a capture sequence which is already in progress.
2. **Load Calibration:** This enables the re-use of a calibration and recipe that have already been performed for an earlier capture sequence, removing the need to calibrate for every new Project.
3. Several bug fixes and general workflow improvements.

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Release Notes for Rainbow MSI v2.2 (November 15, 2021)

The New Phase One Rainbow MSI v2.2 adds an Installer and Metadata to the automated Capturing and Processing Modules and intuitive Analysis Module.

The Phase One Rainbow v2.2 is a high-resolution, camera based, flexible multispectral imaging solution, offering automated operation for the capturing of both Multiband and Narrowband stacks, for visual and for statistical analysis, respectively. By the use of a high-resolution RGB sensor, the Rainbow system can be operated for both multispectral imaging and for “normal” volume digitization projects within the Cultural Heritage markets.

The new Rainbow MSI v2.2 adds a streamlined Installation process and an updated metadata EXIF section to follow the main industry standards.

Rainbow MSI v2.2 offers support for the Phase One iXH 150MP and iXG 100MP camera systems coupled with the Schneider Kreuznach 72mm and 120mm lenses. Please note the Phase One 72mm Mk II lens is not supported for Rainbow MSI.

Two capturing workflows: Multiband and Narrowband

The Multiband workflow delivers captures of multispectral stacks in RGB color and grey scale (UVR & IRR) and adds false-color images for visual analysis, based on the specifications in the Charisma manual and further methods.

The Charisma Manual, including new information about UV-induced IR Luminescence not present in the original 2013 Charisma Manual, can be found here: <https://www.researchgate.net/publication/341827828>

The Narrowband workflow delivers a full stack of normalized greyscale images. With the new Analysis Module the stack can be analyzed to provide a visual display of the stack's content.

For detailed analysis outside Rainbow MSI, the Narrowband stacks can be exported with a naming convention compatible with the ImageJ based Paleo Corebox made by William Christens-Barry of Equipoise Imaging. Reference can be found here:

<https://www.academia.edu/43866728>

New and Improved Functionality with Rainbow v2.2

- Rainbow MSI v2.2 includes major new functionality:
- Support for the Phase One iXH 150MP Wide Spectrum camera
- A new, simple and easy to use installer
- New and improved alignment algorithms, including perspective correction
- Updated EXIF Metadata handling
- Several bug fixes and general workflow improvements

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Included in the Analysis Module is an Experimental tab. This is an area where we place analysis features that are not finalised but can offer an insight into future features and enable you, the customer, to provide your feedback on the feature.

In Rainbow MSI v2.2, we include an experimental function for filtering PCA images based on a 2D histogram. To use the feature, do the following:

- Choose some channels in the analysis tab
- Run PCA
- Go to the experimental tab
- Choose two different channels, for example channel 1 in the right box and channel 2 in the left box
- A density plot (2D histogram) will be shown
- You can now draw a mask on the plot and mark a region. Note that at present you cannot clear or erase the mask. You can only draw more.

A TIFF file is created and saved in the AppData folder (for example C:\Users\home-account\AppData\Local\Phase One\Rainbow MSI\). This may take a while depending on resolution.

Please note that the TIFF images created are over-written when you draw a new mask to highlight a different region of interest. To keep these files, please move them from the AppData folder before creating a new mask.

Rainbow MSI v2.2 also includes a host of under the hood improvements that will help adding features and improving performance further in the future.

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Important operational notes

- If your MSI system includes the iXH 150MP camera, please ensure that the firmware on the camera is 1.04 or later. This firmware, as well as the firmware updater, are available on <https://www.phaseone.com/download-categories/cultural-heritage-firmware/>
- Selection of the Capture Recipe: In the Recipe Editor you set the parameters of the capture: Light, Filter, Aperture, ISO and Shutter Speed. Please note, that the Exposure Compensation is automatically calculated in the calibration process setting the exposure gain and the white balance for best possible exposure. This is done assuming that Aperture and ISO are kept constant as specified in the Recipe.
- Should you want to work at, for example, a higher ISO you will need to start in the Recipe Editor by setting the new ISO and manually adjust Shutter Speeds up or down in 1/3 steps. Then, re-do the calibration process, which will calculate a new Exposure Compensation.

User Guide for Rainbow

The setup and use of Rainbow MSI v2.3.3 are described in the MSI User Guide.

All the best from the Phase One CH Team