Allied Vision

USER GUIDE

Vimba X Defective Pixel Manager

V2.2.0
July 2025

Introduction

Prerequisites

To use Vimba X Defective Pixel Manager 2.2.0, you need:

- Vimba X, we recommend using Version 2025-2 or higher
- An Alvium camera with defect pixel correction feature or a Goldeye Pro camera

You can install Vimba X Defective Pixel Manager in a directory of your choice on your PC (choose a directory where you have writing privileges).

About pixel defects

Pixel defects occur especially in cameras with high resolution. Manufacturing such sensors for a reasonable price without any defects is impossible. Moreover, only some pixel defects can be identified and corrected during the sensor or camera manufacturing process. Other pixel defects occur and vary in intensity depending on factors such as the camera's operating temperature, camera settings such as the exposure time, and the aging process of the sensor. In these cases, only camera users can see and decide which defects occur and should be corrected for their particular imaging application.

Pixel defects can usually be divided into three main groups:

- Stuck high pixels are those which produce output values much higher than expected from its surrounding neighbors, even until the point of saturation of the value.
- Stuck low pixels are pixels whose values are much lower than expected from neighboring pixels and the value may even be completely low.
- Noisy pixels are pixels whose values are different by a certain degree than its surrounding neighborhood, usually by a small factor.

The dark current, which is a major contributor to defective pixels, is highly sensitive to temperature. Therefore, defects and associated detection threshold levels are usually defined for a specific operating temperature.

About Vimba X Defective Pixel Manager

Vimba X Defective Pixel Manager enables you to use the on-board pixel correction features of your Alvium and Goldeye Pro camera. Depending on the available features and memory size of your camera, you can create and change lists of defective pixels, upload them to the camera, or store them as an .xml file. The factory defect pixel list is set during calibration (production) and cannot be modified by the user. You can make changes to the user set.

Vimba X Defective Pixel Manager is not a tool for pixel correction on the host computer.

Using Vimba X Defective Pixel Manager

Preparation:

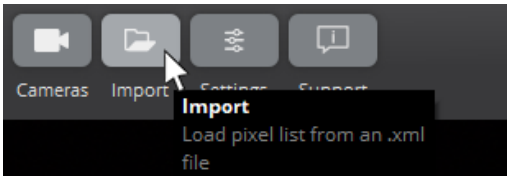
- Make sure the camera uses full resolution. Switch off:
- Binning and decimation
- ROI and Multi-ROI
- Make sure triggering is switched off.
- Goldeye Pro:
    - Optimize performance according to the instructions in the User Guide.
    - For most use cases, NUC (Non-Uniformity Correction) should be performed before DPC (Defective Pixel Correction).
    - Check if NUC should be performed continuously during DPC or not.
    - Make sure the sensor temperature is stable. Use external cooling if necessary.

To do this, you can use Vimba X Viewer.

Getting started

When you use Vimba X Defective Pixel Manager for the first time, an onboarding dialog opens and shows how to get started. To access the onboarding dialog at any time, click the Support button:

Moreover, each button is equipped with a tooltip:



Best practice

Each use case is different and each camera model is different – however, we can recommend some best practices to identify defective pixels:

- Let the camera warm up until it has reached the typical operating temperature of your use case. In general, a cooler operating temperature results in a less noisy image and less pixels that deviate from the ideal values.
- Set your color camera to a RAW image format: Select a Bayer pixel format and switch off debayering. With a monochrome camera, use a mono RGB pixel format.
- Cover the lens of your camera to identify too bright pixels on a dark background.
- Only set Gain to a value higher than 0 if your application requires it. Increasing Gain increases noise in the image.

Automatic detection

Vimba X Defective Pixel Manager can automatically detect pixels that are too bright on a dark background.

Starting automatic detection causes the following:

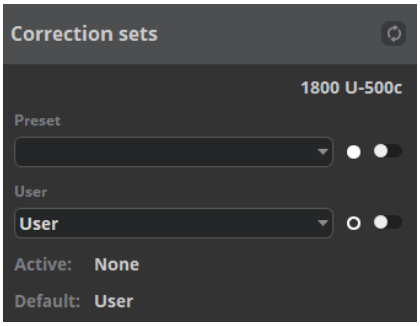
- Defective Pixel Manager checks if auto exposure or auto gain are switched on. If yes, they are switched off.
- If a color camera is detected, Defective Pixel Manager changes the pixel format to Bayer and switches debayering off as soon as the automatic detection is started.
- The pixel format is switched to an 8-bit format.
- The camera acquires four frames. Frame number 4 is used to calculate the brightness values.
- The values are compared with the threshold value. By default, the threshold value is 40 for all cameras. Pixels brighter than the threshold value are considered as defective.

For the automatic detection, we recommend the following approach additionally to the Best practice listed above:

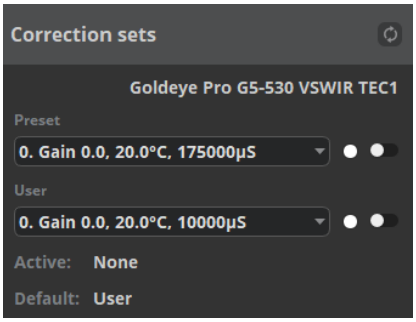
- Switch off the default correction set if your camera cannot use it together with the user correction set (see image below).
- Switch off the user correction set (or Defective Pixel Manager will do it before starting automatic correction).
- All pixel defects can be detected only if all correction sets are switched off or don't contain any defects.
- Make sure no light reaches the camera sensor.
- Start automatic detection. Note that the automatic detection is limited to 8-bit pixel formats.
- If the preset detected too few defective pixels, reduce the threshold value.
- If the preset detected too many defective pixels, increase the threshold value.
- Increasing gain and exposure time results in more pixels that are shown to be defective.

In the Correction sets, switch on User set (as default, if the camera allows it). If a Preset (factory) is available, switch it off.

Goldeye Pro: See section Goldeye Pro user sets

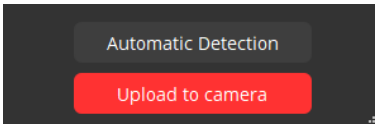


Correction sets Alvium U

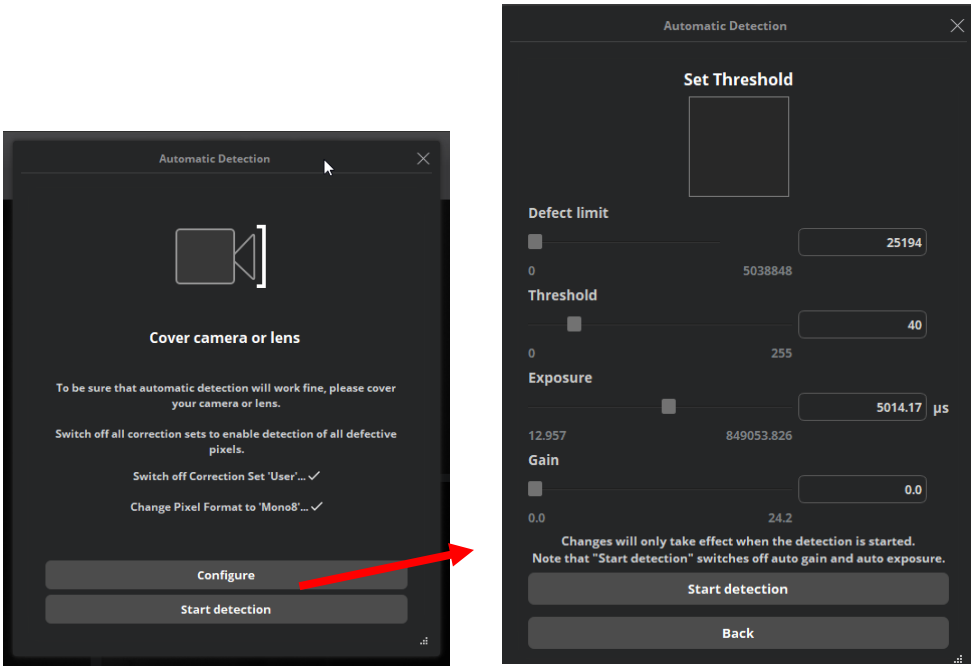


Correction sets Goldeye Pro

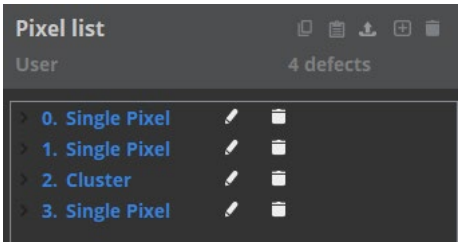
Click **Automatic Detection**:



In the Automatic Detection dialog, select **Start detection** or select **Configure** to adjust the maximal number of defects, threshold, exposure, and gain:



As soon as the automatic detection is done, the detected pixels are listed:



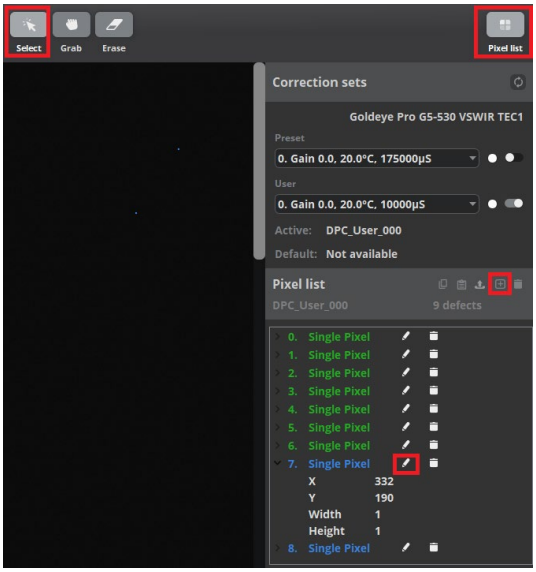
Optionally, edit the pixel list before you upload it to the camera, or edit it after you have uploaded it.

Selecting, adding, and deleting pixels

You can select and add defective pixels with the Select tool or by clicking the plus icon of the Pixel list.

To remove pixels from the pixel list, use the eraser or the trash icon.

Pixel defects stored in the camera are displayed in green. Pixels that are not yet stored in the cameras are displayed in blue. To edit pixel coordinates, click the pencil. The user-changeable correction set (in contrast to the factory set, if the camera has one) must be switched on.

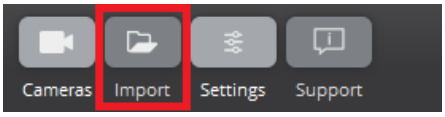


Note that an **updated defective pixel list only becomes active after upload to camera and camera reset**. This is Alvium and Goldeye Pro camera firmware behavior. New or edited pixels are shown at the bottom of the list.

Exporting and importing pixel lists

You can export the pixel list including pixels that are not yet stored in the camera:

To import a pixel list, use the Import button.



Copying pixel lists

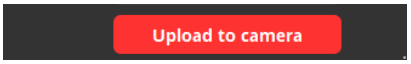
You can copy a pixel list and paste it into another pixel list (user set only):

Restoring the default set

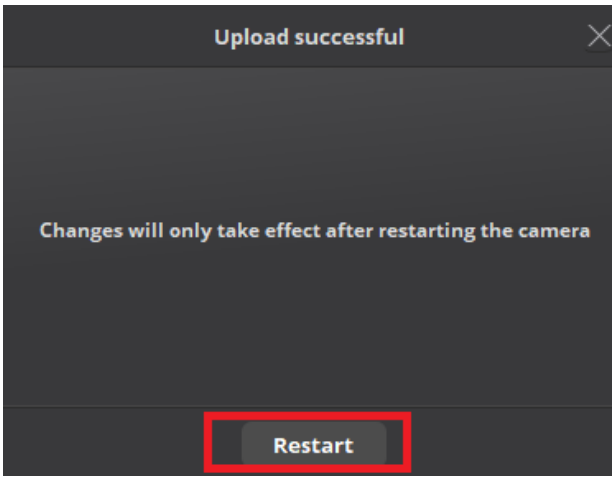
Tipp: If the camera firmware allows it, you can restore the default set.

Uploading and activating a pixel list

To apply a new or updated pixel list in the camera, upload it to the camera and restart the camera.



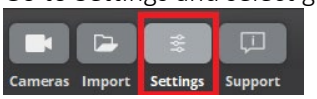
After a successful upload, a dialog opens and you can restart the camera:



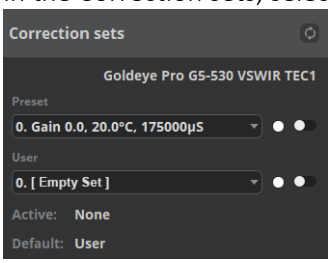
Goldeye Pro user sets

To create a new Goldeye Pro user set:

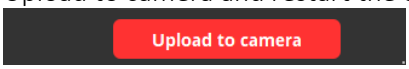
1. Go to Settings and select gain, temperature and exposure values.



2. In the Correction sets, select an empty user set:



3. Perform automatic detection or add pixels manually.
4. Upload to camera and restart the camera as described above.



After restarting the camera, the selected user set is available in the camera.

Tip: Make sure you choose a unique value set of gain, temperature, and exposure before creating a new user set. Otherwise, an existing set with identical values will be overwritten.