PFRemote Documentation

Photonfocus AG

Revision: 1.5

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Chapter 1. Preface

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1. About Photonfocus

The Swiss company Photonfocus is one of the leading specialists in the development of CMOS image sensors and corresponding industrial cameras for machine vision, security & surveillance and automotive markets.

Photonfocus is dedicated to making the latest generation of CMOS technology commercially available. Active Pixel Sensor (APS) and global shutter technologies enable high speed and high dynamic range (120 dB) applications, while avoiding disadvantages, like image lag, blooming and smear.

Photonfocus has proven that the image quality of modern CMOS sensors is now appropriate for demanding applications. Photonfocus' product range is complemented by custom design solutions in the area of camera electronics and CMOS image sensors.

Photonfocus is ISO 9001 certified. All products are produced with the latest techniques in order to ensure the highest degree of quality.

2. Contact

Photonfocus AG, Bahnhofplatz 10, CH-8853 Lachen SZ, Switzerland

Table 1.1. Photonfocus Contact

Sales	Phone: +41 55 451 00 00	Email: sales@photonfocus.com
Support	Phone: +41 55 451 01 37	Email: support@photonfocus.com

3. Sales Offices

Photonfocus products are available through an extensive international distribution network and through our key account managers. Details of the distributor nearest you and contacts to our key account managers can be found at www.photonfocus.com.

4. Further information

For further information on the products, documentation and software updates please see our web site www.photonfocus.com or contact our distributors.

Note

Photonfocus reserves the right to make changes to its products and documentation without notice. Photonfocus products are neither intended nor certified for use in life support systems or in other critical systems. The use of Photonfocus products in such applications is prohibited.

Note

Note

Note

Photonfocus can not be held responsible for any technical or typographical errors.

5. Legend

In this documentation the reader's attention is drawn to the following icons:

> **Note**
>
> Important note.

> **Important**
>
> Alerts and additional information.

> **Caution**
>
> Attention, critical warning.

Tip

Notification, user guide.

Chapter 2. The PFRemote Control Tool

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1. Overview

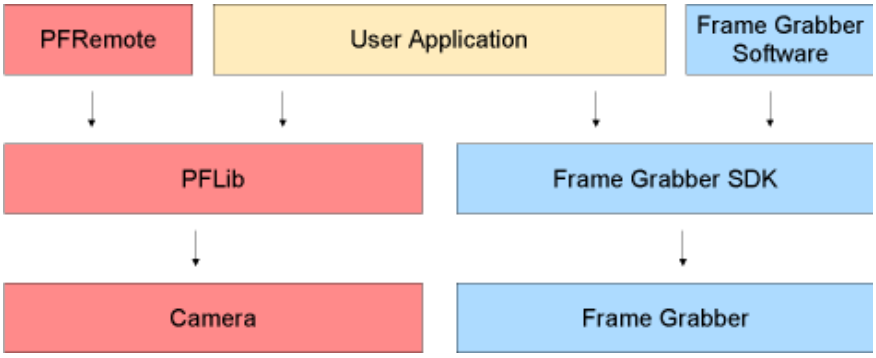
PFRemote is a graphical configuration tool for Photonfocus cameras. The latest release can be downloaded from the support area of *www.photonfocus.com*.

All Photonfocus cameras can be either configured by PFRemote, or they can be programmed with custom software using the PFLib SDK ([PFLIB]).

1.1. CameraLink Model

As shown in Figure 2.1, “PFRemote and PFLib in context with the CameraLink frame grabber software”, the camera parameters can be controlled by PFRemote and PFLib respectively. To grab an image use the software or the SDK that was delivered with your frame grabber.

Figure 2.1. PFRemote and PFLib in context with the CameraLink frame grabber software

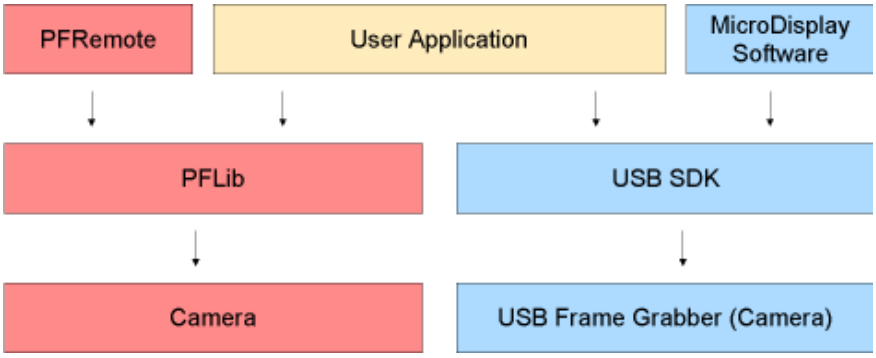


1.2. USB 2.0 Model

For the USB camera model, there is no external frame grabber necessary, as the camera connects directly to the USB 2.0 port. Instead, the frame grabber functionality was transferred into the camera.

As shown in Figure 2.2, “PFRemote and PFLib in context with the USB 2.0 frame grabber software”, the camera parameters can be controlled by PFRemote and PFLib respectively. To grab an image use the MicroDisplayUSB software or the USB SDK.

Figure 2.2. PFRemote and PFLib in context with the USB 2.0 frame grabber software



> **Important**
>
> The USB isochronous interface mode (fast mode 48 MBytes/sec) works only with Windows XP and ServicePack 2 and an Intel Chipset!

2. Operating System

The PFRemote GUI is available for Windows OS only. For Linux or QNX operating systems, we provide the necessary libraries to control the camera on request, but there is no graphical user interface available.

> **Important**
>
> If you require support for Linux or QNX operating systems, you may contact us for details of support conditions.

3. Installation Notes

For CameraLink Cameras:

Before installing the required software with the PFInstaller, make sure that your frame grabber software is installed correctly.

For USB Cameras:

Before installing the required software to control a Photonfocus camera with USB 2.0 interface, make sure that no USB

camera is connected to the computer.
- During PFinstaller installation, choose "Install PFRemote with USB environment".
- After the installation, power on the camera and connect it to the USB interface.
- Windows should display the "New Hardware found" wizard automatically. If this wizard is not displayed, please continue as described in the following section.
- Let the hardware wizard install the drivers. It is not necessary to allow the search for current and updated software on the Internet. Proceed by choosing the option "Install the software automatically (Recommended)". Another hardware installation message will appear, which can be ignored ("Continue Anyway").

> **Note**
>
> The procedure described above applies to Windows XP and Service pack 2.

3.1. Manual Driver Installation (only USB 2.0 Model)

If Windows did not automatically install the driver for your USB camera, please proceed as follows:

- Open the Device Manager in the Windows Control Panel.
- There will be an unknown device called "Silicon Software GmbH microUSB2".
- Right click on the unknown device and choose "Update driver".
- The hardware update wizard will appear. It is not necessary to allow the search for current and updated software on the internet. Click on "No, not this time" and "Next".
- Then choose "Install the software automatically (Recommended)" and proceed with "Next".
- When you get asked about the driver location, specify `\Photonfocus\microDisplayUSB\driver`.

> **Note**
>
> This procedure applies to Windows XP and Service pack 2.

3.2. DLL Dependencies

Several DLLs are necessary in order to be able to communicate with the cameras:

- `PFCAM.DLL`: The main DLL file that handles camera detection, switching to specific camera DLL and provides the interface for the SDK.
- `'CAMERANAME'.DLL`: Specific camera DLL, e.g. mv_d750e_20.dll.
- `COMDLL.DLL`: Communication DLL. This COMDLL is not necessarily CameraLink specific, but may depend on a CameraLink API compatible DLL, which should also be provided by your frame grabber manufacturer.
- `CLALLSERIAL.DLL`: Interface to CameraLink frame grabber which supports the clallserial.dll.
- `CLSER_USB.DLL`: Interface to USB port.

More information about these DLLs is available in the SDK documentation [SW002].

4. Graphical User Interface (GUI)

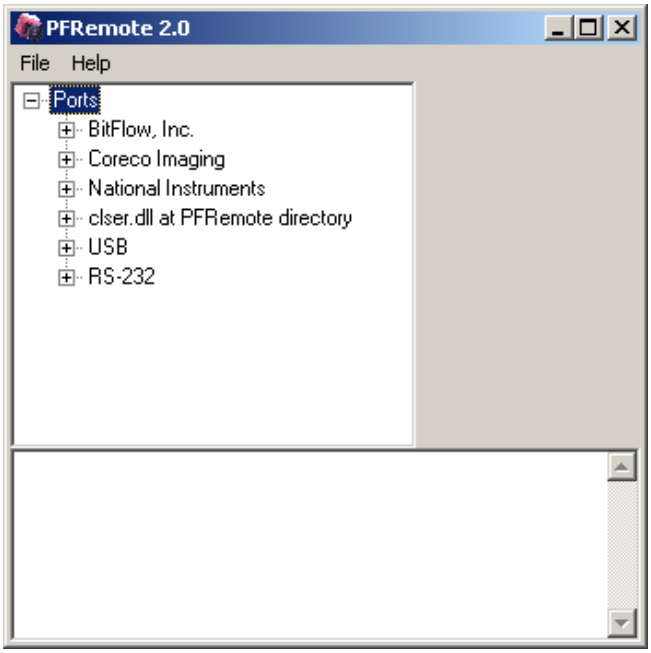
PFRemote consists of a main window (Figure 2.3, “PFRemote main window with PortBrowser and log messages”) and a configuration dialog. In the main window, the camera port can be opened or closed, and log messages are displayed at the bottom. The configuration dialog appears as a sub window as soon as a camera port was opened successfully. In the sub window of PFRemote the user can configure the camera properties.

The following sections describe the general structure of PFRemote.

4.1. Port Browser

On start, PFRemote displays a list of available communication ports in the main window.

Figure 2.3. PFRemote main window with PortBrowser and log messages



To open a camera on a specific port double click on the port name (e.g. USB). Alternatively right click on the port name and choose Open & Configure.... The port is then queried for a compatible Photonfocus camera.

In the PFRemote main window, there are two menus with the following entries available:

4.1.1. File Menu

Clear Log:

Clears the log file buffer

Quit:

Exit the program

4.1.2. Help Menu

About:

Copyright notice and version information

Help F1:

Invoke the online help (PFRemote documentation)

4.2. Ports, Device initialization

After starting PFRemote, the main window as shown in Figure 2.3, “PFRemote main window with PortBrowser and log messages” will appear. In the PortBrowser in the upper left corner you will see a list of supported ports.

> **Note**
>
> Depending on the configuration, your port names may differ, and not every port may be functional.

> **Important**
>
> If your frame grabber supports clallserial.dll version 1.1 (CameraLink compliant standard Oct 2001), the name

of the manufacturer is shown in the PortBrowser.

Important

If your frame grabber supports clallserial.dll version 1.0 (CameraLink compliant standard Oct 2000), the PortBrowser shows either the name of the dll or the manufacturer name or displays "Unknown".

Important

If your frame grabber doesn't support clallserial.dll, copy the clserXXXX.dll of your frame grabber in the PFRemote directory and rename it to clser.dll. The PortBrowser will then indicate this DLL as "clser.dll at PFRemote directory".

After connecting the camera, the device can be opened with a double click on the port name or by right-clicking on the port name and choosing *Open & Configure*. If the initialisation of the camera was successful, the configuration dialog will open. The device is closed when PFRemote is closed. Alternatively, e.g. when connecting another camera or evaluation kit, the device can also be closed explicitely by right clicking on the port name and choosing *Close*. Make sure that the configuration dialog is closed prior to closing the port.

Tip

Errors, warnings or other important activities are logged in a log window at the bottom of the main window.

If the device does not open, check the following:

- Is the power LED of the camera active? Do you get an image in the display software of your frame grabber?
- Verify all cable connections and the power supply.
- Check the communication LED of the camera: do you see some activity when you try to access the camera?

4.3. Main Buttons

The buttons on the right side of the configuration dialog store and reset the camera configuration.

Figure 2.4. Main buttons

Reset:

Reset the camera and load the default configuration.

Store as defaults:

Store the current configuration in the camera flash memory as the default configuration. After a reset, the camera will load this configuration by default.

Settings file - File Load:

Load a stored configuration from a file.

Settings file - File Save:

Save current configuration to a file.

Factory Reset:

Reset camera and reset the configuration to the factory defaults.

5. Device properties

Cameras or sensor devices are generally addressed as 'device' in this software. These devices have properties that are accessed by a property name. These property names are translated into register accesses on the driver DLL. The property names are reflected in the GUI as far as practicable. A property name normally has a special mark up throughout this document, for example: **ExposureTime**. Some properties are grouped into a structure whose member is accessed via dot notation, e.g. **Window.X** (for the start X value of a region of interest). When changing a property, the property name can always be seen in the log window of the main program window.

Chapter 3. Camera Configuration

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1. EMPHIS300-Evaluation Kit

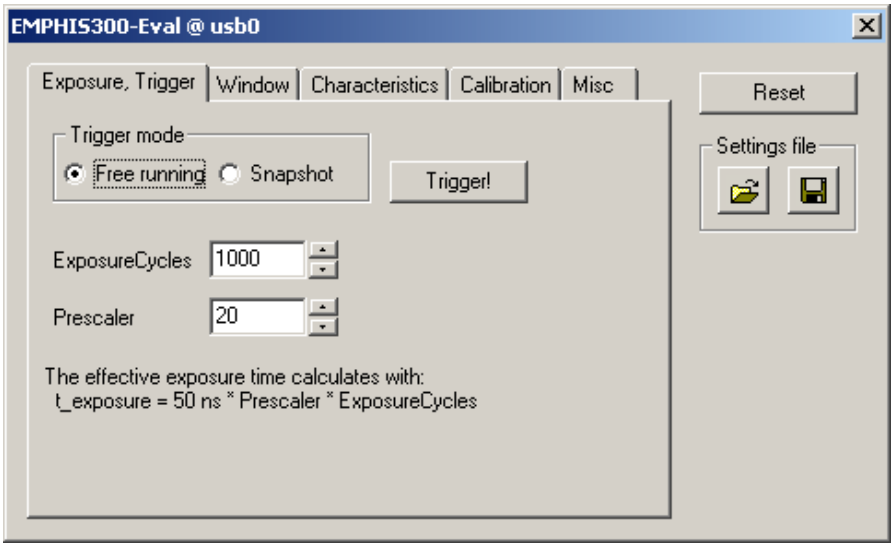
The following sections decribe the available features of the EMPHIS300-Eval. The sections are grouped according to the panel tabs in the configuration dialog.

1.1. Exposure and Trigger

The exposure of the global shutter is controlled by the number of clock cycles. To provide longer exposures, a clock divider ('**Prescaler**') is implemented. The effective exposure time is calculated as shown in Figure 3.1, “Sensor exposure and triggering panel”. Note that the **ExposureCycles** are related to **LinLog.Time1** (see Characteristics).

It is recommended to leave **ExposureCycles** untouched and change the **Prescaler** only to get a quick result.

Figure 3.1. Sensor exposure and triggering panel



The trigger modes work as follows:

Free running:

The sensor delivers frames consecutively, the rate is determined by the exposure time plus readout (See Manual).

External Trigger:

The sensor expects a trigger signal (active high) on the trigger input. Note that if the trigger level is kept high before switching to this mode, the sensor will still stay in free running mode.

Trigger!:

Generate a software trigger. The trigger input must be low.

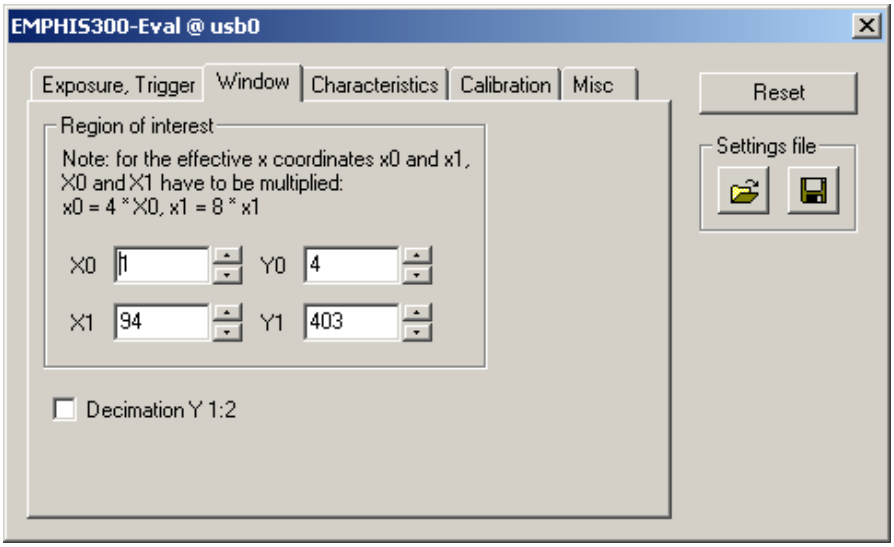
ExposureTime:

The effective exposure time calculates with: "ExposureTime = 50ns * Prescaler * ExposureCycles".

1.2. Window

The region of interest (ROI) is defined via a coordinate tuple (x0, y0), (x1, y1), denoting the upper left and bottom right corner of a rectangular window, where the (0,0) coordinate lies in the top left corner of the full image. The end point is considered inclusive. For example, a window of width 320 and height 256 starting at (0, 0) has the bottom right corner at (319, 255).

Figure 3.2. Sensor window panel



Important: The effective X coordinates differ from the displayed values by a certain factor, as displayed in the dialog. Since **X0** has to be a multiple of 4 and **X1** a multiple of 8, the real coordinates calculate as follows:

```
x0 = 4 * X0;  x1 = 8 * X1
```

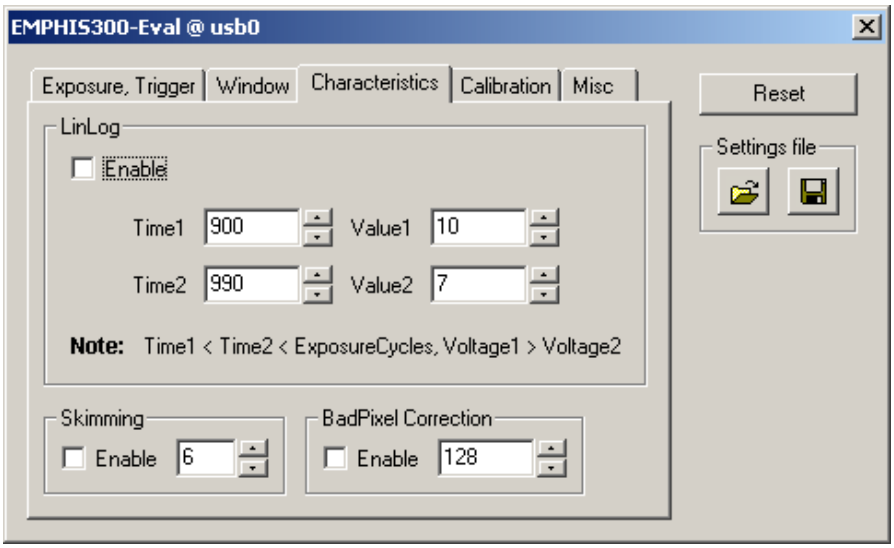
Decimation Y 1:2:

The **DecimationY** property, if enabled, causes the sensor readout to skip every second line, which reduces the readout time and thus increases the frame rate.

1.3. Characteristics, LinLog

Figure 3.3, “Sensor characteristics panel” shows the properties that control the characteristic curve of the sensor. It also provides a feature to minimize bad pixels.

Figure 3.3. Sensor characteristics panel



LinLog:

Time values must be less than **ExposureCycles**, Values range from 0 to 15, for proper settings of the values and detailed help see Section 1, “LinLog”.

Skimming:

Enable Skimming mode. See Section 2, “Skimming”

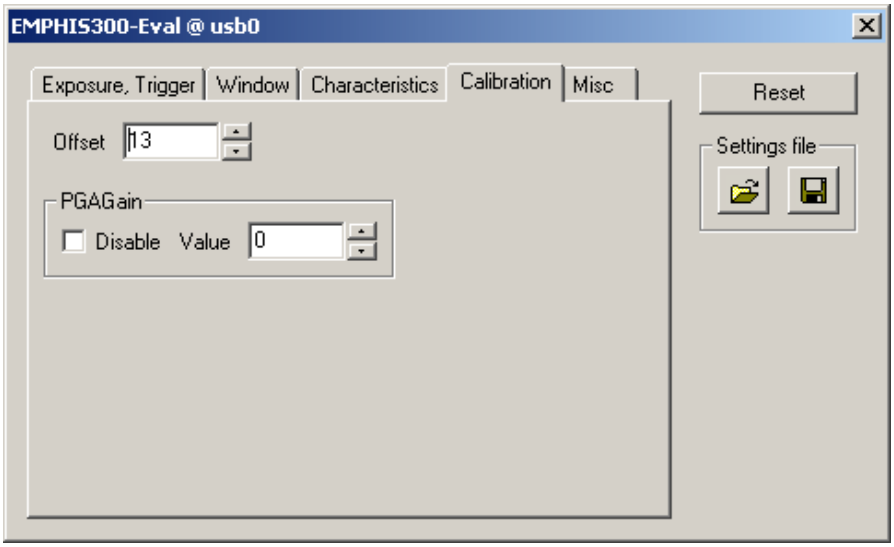
BadPixelCorrection:

This value denotes a threshold when faulty pixels should be corrected by an on chip filter. Lower values cause a stronger correction. Too low values can cause a blurred image, (the default value of the factory settings, does not need to be changed).

1.4. Calibration

These properties control offset and gain characteristics of the sensor. Normally they can be left as default.

Figure 3.4. Sensor calibration panel



Offset:

Black level offset value. Use this to adjust the black illumination.

PGA.Disable:

Selecting this checkbox disables the PGA gain (amplification)

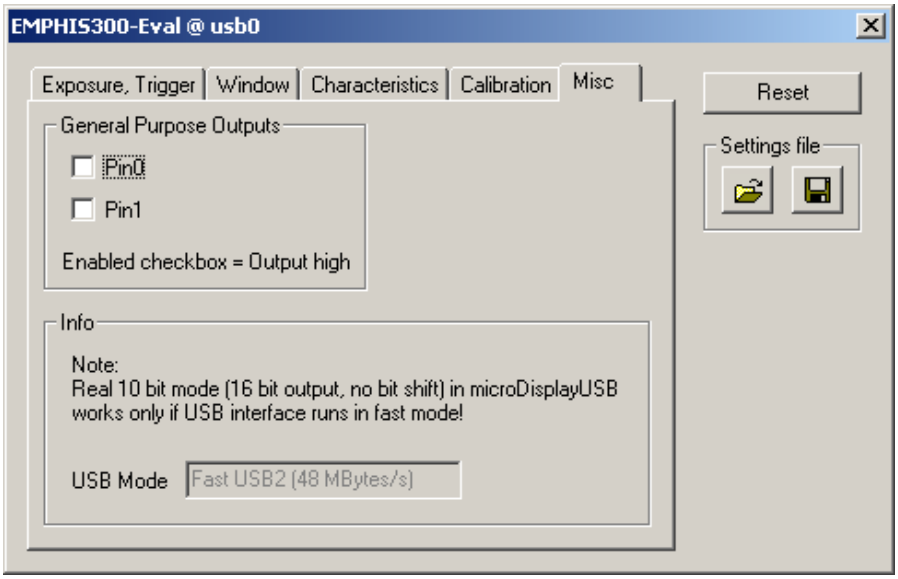
PGA.Value:

This is the gain value for on chip amplification.

1.5. Miscellaneous

This section is reserved for miscellaneous options. Currently, this covers only General purpose Output controls.

Figure 3.5. Sensor miscellaneous panel



2. MV-D750E-20

This section describes the parameters of the following cameras.

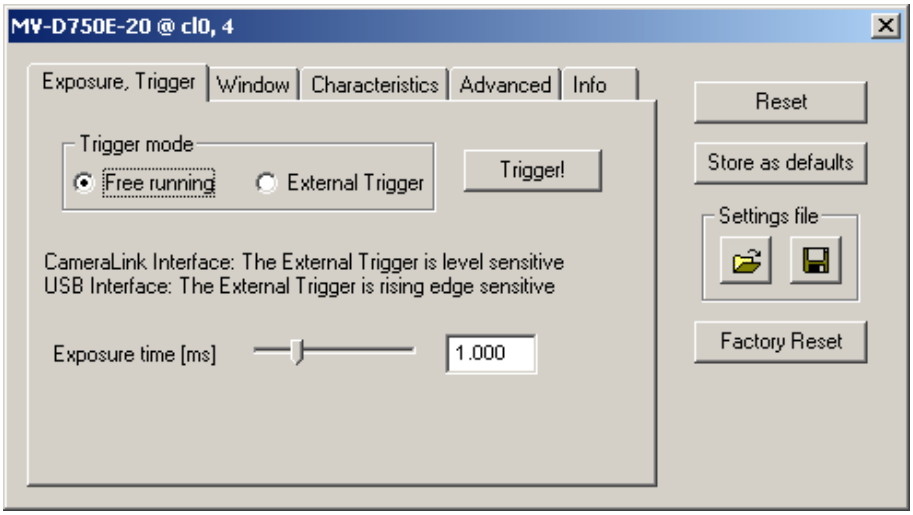
- MV-D750E-20-CL, CameraLink interface
- MV-D750E-20-U2, USB interface

The following sections are grouped according to the tabs in the configuration dialog.

2.1. Exposure, Trigger

This tab contains exposure and trigger settings.

Figure 3.6. MV-D750E-20 exposure, trigger panel



Free running:

By default, the camera delivers images continuously with a certain frame rate, which is defined by the exposure time and the readout time.

External Trigger:

A trigger pulse starts the acquisition of an image. The exposure time of the triggered image is configured with the property **ExposureTime**.

For CameraLink Interface: The External Trigger is level sensitive.

For USB Interface: The External Trigger is rising edge sensitive.

Trigger!:

Generate a software trigger. The trigger input level must be low.

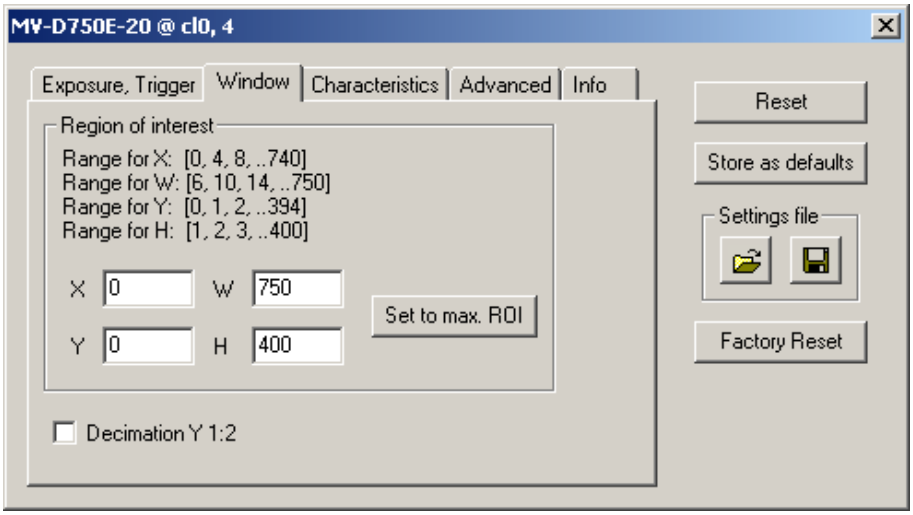
Exposure time [ms]:

Configure the exposure time in milliseconds.

2.2. Window

This tab contains ROI settings.

Figure 3.7. MV-D750E-20 window panel



2.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

Set ROI to max. (X=0; Y=0; W=750; H=400).

The parameters for the ROI must follow the rules according to Table 3.1, “MV-D750E-20 ROI Parameters”.

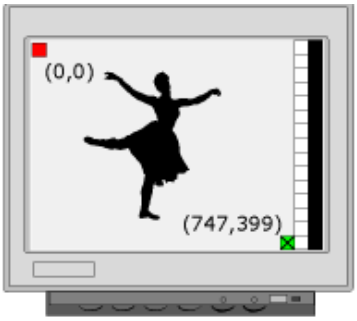
Table 3.1. MV-D750E-20 ROI Parameters

Parameter	Range	Step Size
X	0, 4, 8, 12, ... 740	modulo 4
Y	6, 10, 14, 16, ... 750	4
W	0, 1, 2, 3, ... 394	1
H	0, 1, 2, 3, ... 400	1

Note

Every acquired image consists of the active pixel array information and a white and black test column, which is transmitted as an end-of-line (see Figure 3.8, “White and black column as an end of line pattern”). This EOL pattern cannot be switched off.

Figure 3.8. White and black column as an end of line pattern



> **Note**
>
> Not all frame grabbers can handle ROI changes while they are running. If your frame grabber application crashes in this case, stop grabbing before adjusting the window size and make sure you have set the same window size in your frame grabber software.

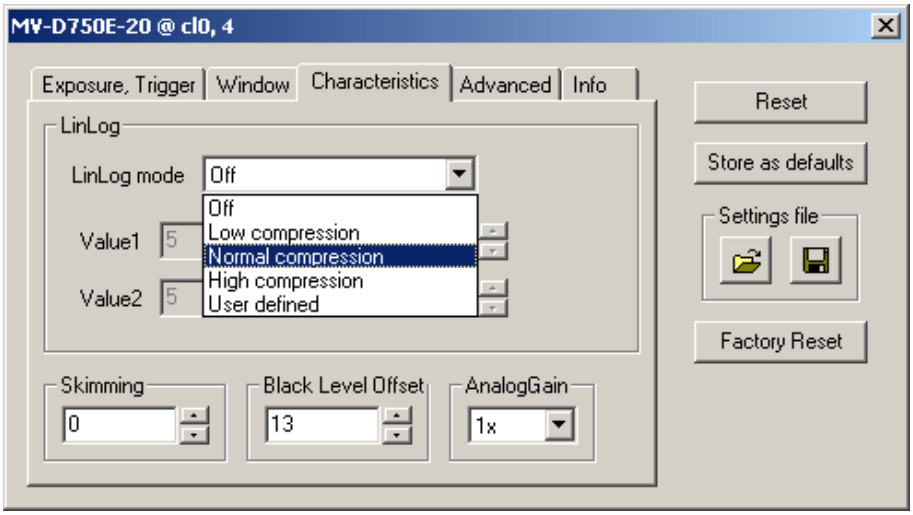
2.2.2. Decimation

The **DecimationY** property, if enabled, causes the sensor readout to skip every second line, yielding a readout time decrease.

2.3. Characteristics, LinLog

This tab contains settings of LinLog, Skimming, BlackLevelOffset and AnalogGain.

Figure 3.9. MV-D750E-20 characteristics panel



The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Mode:

Off: LinLog is disabled

Low/Normal/High compression: Three LinLog presettings.

User defined: Value1, Time1, Value2 and Time2.

Skimming:

Skimming value. If 0, Skimming is disabled. See Section 2, “Skimming”.

Black Level Offset:

Black level offset value. Use this to adjust the black illumination.

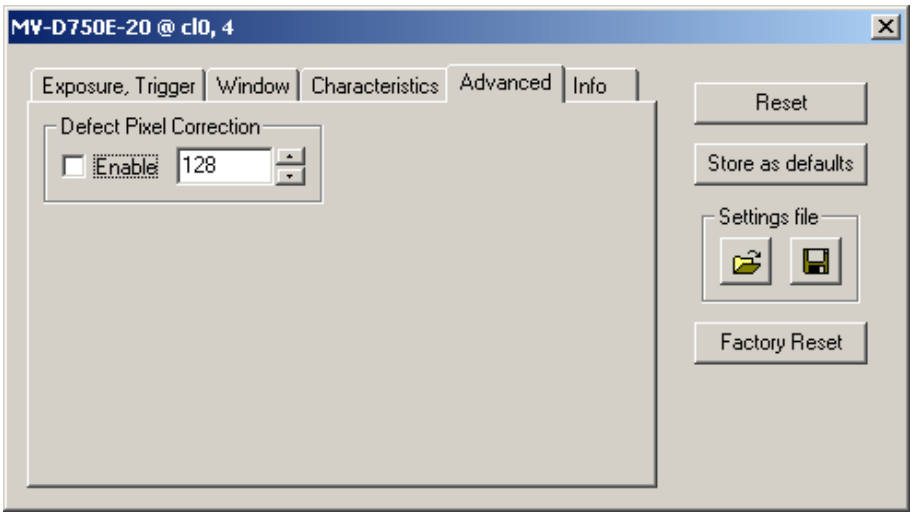
AnalogGain:

Change the analog gain of the sensor.

2.4. Advanced

This tab contains settings of Defect Pixel Correction.

Figure 3.10. MV-D750E-20 Advanced panel



Defect Pixel Correction:

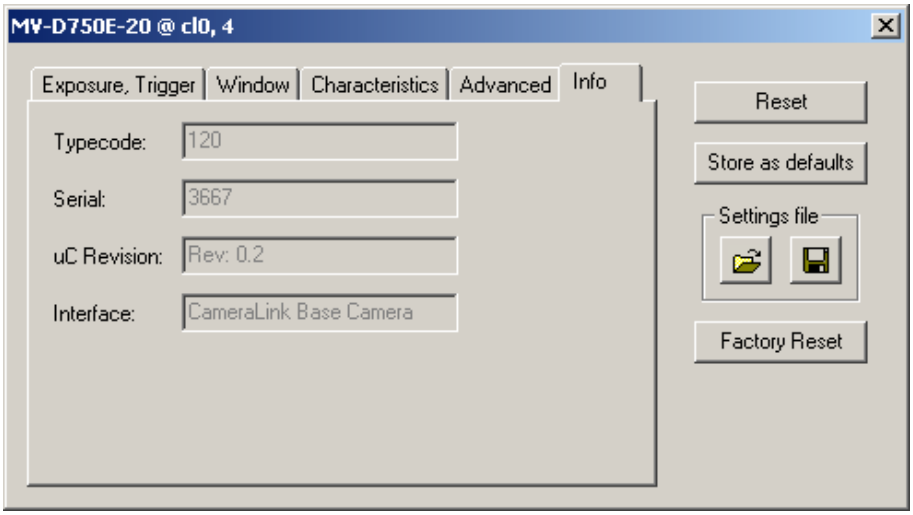
This Camera has a hot pixel removal function. It is implemented as a sliding window containing five pixels, which examines the current pixel and two pixels either side of it. If the current pixel exceeds the average of its neighbours by more than a certain user-defined threshold, the pixel's value will be rejected and replaced by this average value.

> **Note**
>
> Low threshold values (< 50) will smooth the image because the correction acts as a low pass filter.

2.5. Info

This tab shows camera specific information such as type code, serial number, firmware revision and interface info.

Figure 3.11. MV-D750E-20 info panel



Typecode:

The type code of the connected camera.

Serial:

Serial number of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Description about the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

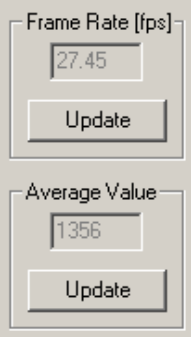
3. MV-D1024E-40

This section describes the parameters of the following cameras.

- MV-D1024E-40-CL, CameraLink interface
- MV-D1024E-40-U2, USB interface

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.12. MV-D1024E-40 frame rate and average value



Frame Rate [fps]:

Shows the actual frame rate of the camera in frames per second.

Update:

To update the value of the frame rate, click on this button.

Average Value:

Grayscale average of the actual image. This value is in 12bit (0...4095).

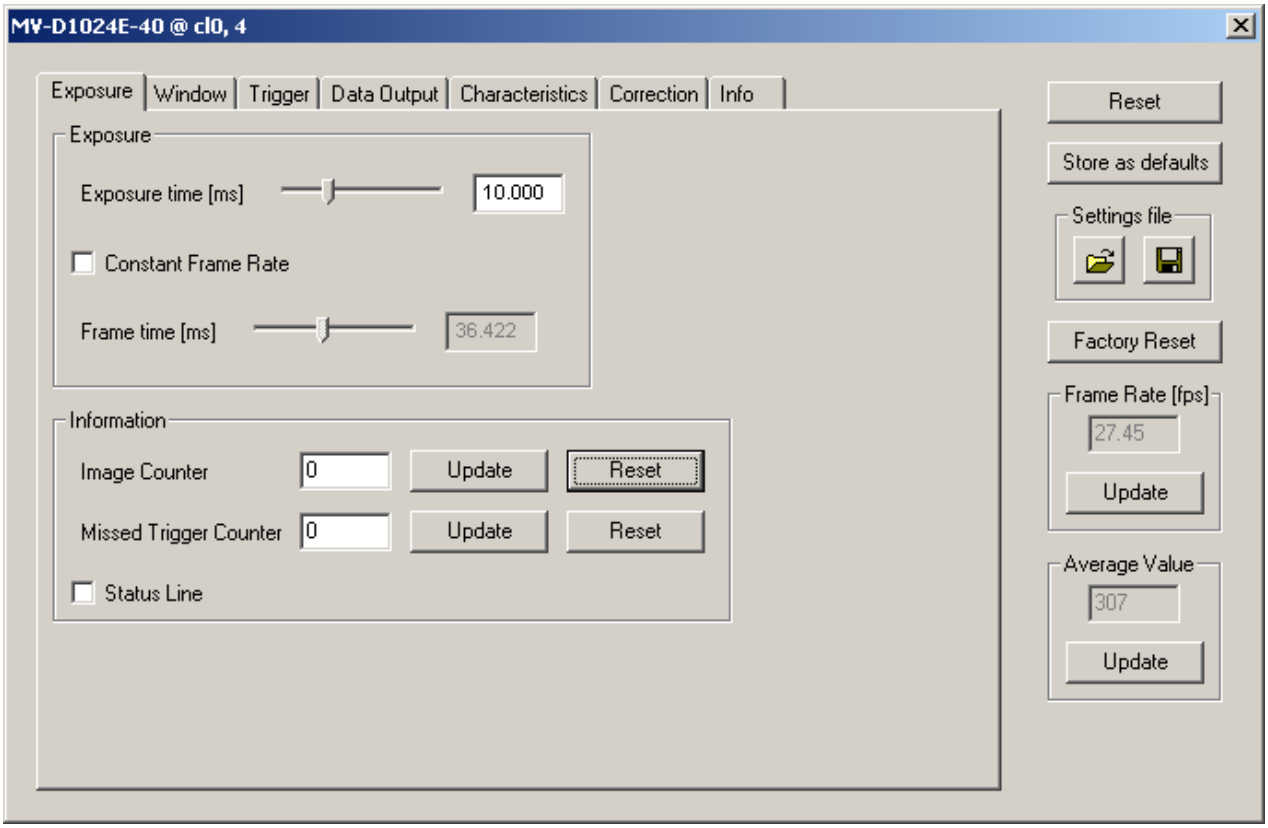
Update:

To update the value of the average, click on this button.

3.1. Exposure

This tab contains exposure settings.

Figure 3.13. MV-D1024E-40 exposure panel



3.1.1. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate (CFR) is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

Frame time [ms]:

Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The minimum frame time depends on the exposure time and readout time.

3.1.2. Information

The Information properties provide information about the acquired images.

Image Counter:

The image counter is a 24 bit real-time counter and is incremented by 1 for every new image.

Missed Trigger Counter:

This is a counter for trigger pulses that were blocked because the trigger pulse was received during image exposure or readout. In free-running mode it counts all pulses received from interface trigger or from I/O trigger interface.

Status Line:

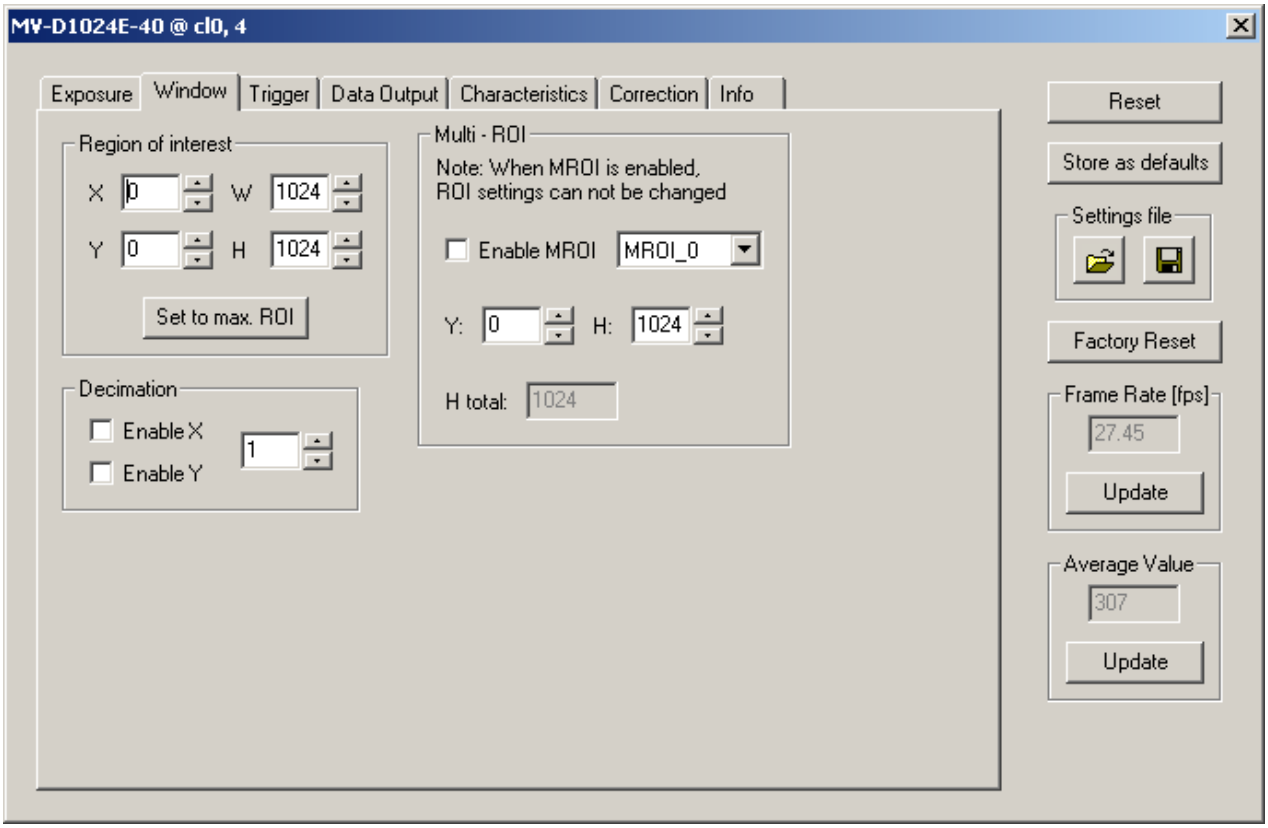
The status line replaces the last line of an image with image information.

To update the value of the information properties, click on the Update-Button; to reset the properties, click on the Reset-Button.

3.2. Window

This tab contains ROI, multi-ROI and decimation settings.

Figure 3.14. MV-D1024E-40 window panel



3.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=1024; H=1024).

> **Note**
>
> For the MV-D1024E-40-U2 (USB camera): W x H > 1024.

3.2.2. Decimation

Decimation reduces the number of pixels in x- or y-direction or both. Decimation can also be used together with a ROI or MROI. Decimation in y-direction transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively. Decimation in x-direction transfers every pixel of a row, but uses the CameraLink **DVAL** (data valid) signal to indicate which pixels to mask.

> **Note**
>
> Please consult the documentation of your frame grabber on how to configure the frame grabber such that it interpretes the DVAL signal.

Enable X:

Enable decimation in x-direction.

Enable Y:

Enable decimation in y-direction.

Value:

Decimation factor. Example: Value = 4 reads every fourth row and fourth column respectively only.

3.2.3. Multi - ROI

The MV-D1024E-40 cameras can handle up to 16 different regions of interest. The multiple ROIs are joined together and form a single image, which is transferred to the frame grabber. An ROI is defined by its starting value in y-direction and its height. The width and the horizontal offset are specified by X and W settings. The maximum frame rate in MROI mode depends on the number of rows and columns being read out. Overlapping ROIs are allowed, and the total height may exceed 1024 rows.

Enable MROI:

Enable MROI. If MROI is enabled, the ROI and MROI settings cannot be changed.

MROI_X:

Select one of the MROI settings.

Y:

Y - coordinate of the selected MROI. If Y is set to 1023, this and all further MROI settings will be ignored.

H:

Height of the selected MROI.

H tot:

Shows the sum of all MROIs as the total image height.

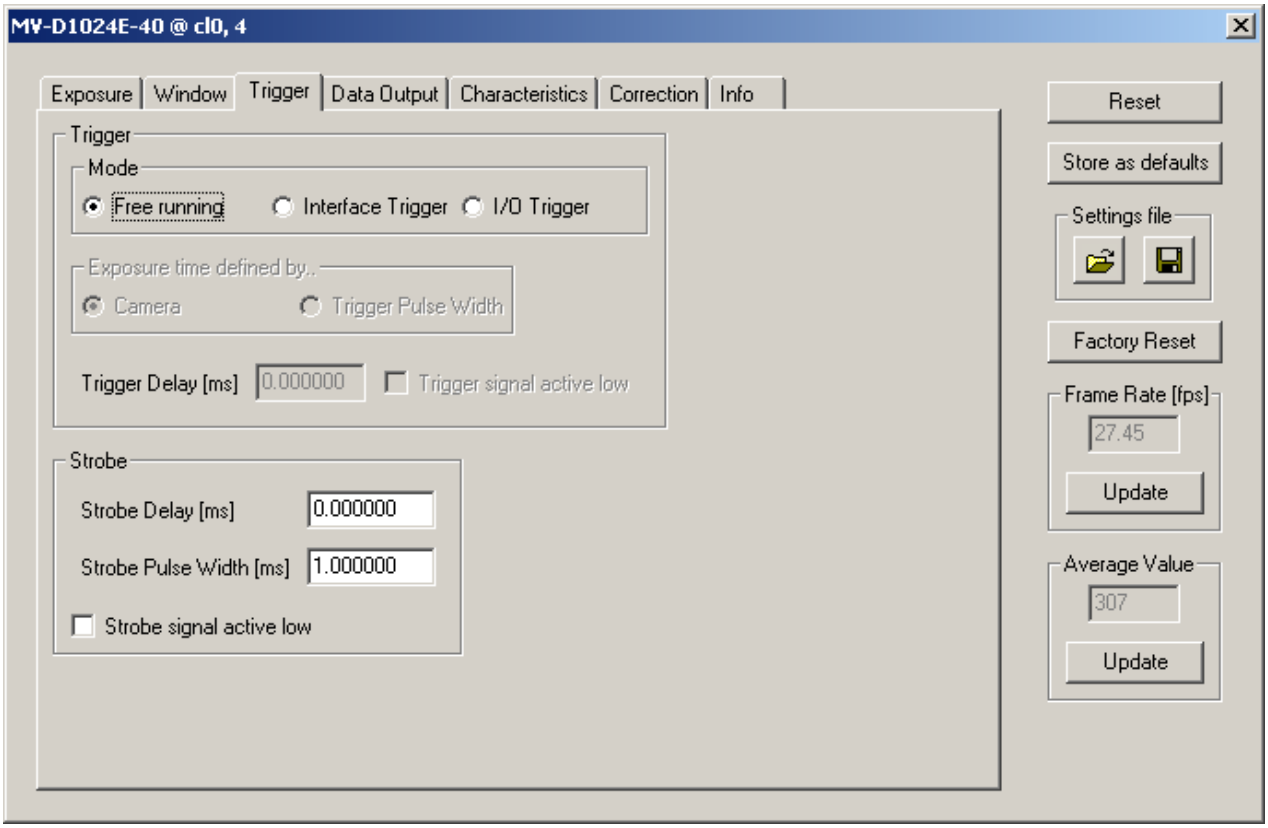
> **Note**
>
> After changing a property, always press Enter in order to make the change active.

> **Note**
>
> For the MV-D1024E-40-U2 (USB camera): W x Htot > 1024.

3.3. Trigger

This tab contains trigger and strobe settings.

Figure 3.15. MV-D1024E-40 trigger panel



3.3.1. Trigger

Trigger Source:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera on the power supply connector.

Exposure time defined by:

Camera:

The exposure time is defined by the property **ExposureTime**.

Trigger Pulse Width:

The exposure time is defined by the pulse width of the trigger signal (level-controlled exposure).

> **Note**
>
> This property disables LinLog.

Further trigger settings:

Trigger Delay:

Programmable delay in milliseconds between the incoming trigger edge and the start of the exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

3.3.2. Strobe

The camera generates a strobe output signal that can be used to trigger a strobe. The delay, pulse width and polarity can be defined by software. To turn off strobe output, set StrobePulseWidth to 0.

Strobe Delay [ms]:

Delay in milliseconds from the input trigger edge to the rising edge of the strobe output signal.

Strobe Pulse Width [ms]:

The pulse width of the strobe trigger in milliseconds.

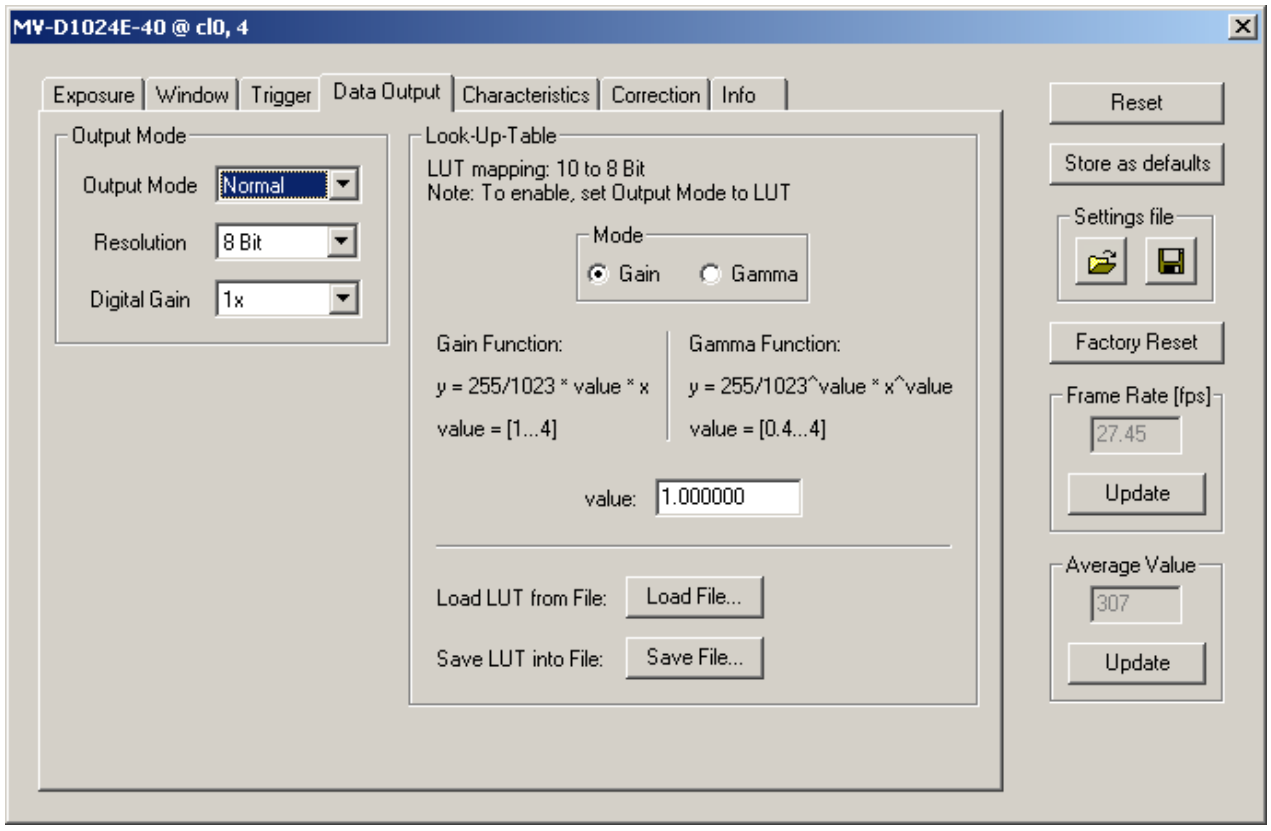
Strobe signal active low:

Define the strobe output to be active high (default) or active low.

3.4. Data Output

This tab contains image data settings.

Figure 3.16. MV-D1024E-40 data output panel



3.4.1. Output Mode

Output Mode:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

Resolution:

8 Bit:

Gray level resolution of 8 bit.

10 Bit:

Gray level resolution of 10 bit.

12 Bit:

Gray level resolution of 12 bit.

Digital Gain:

1x:

No digital gain, normal mode.

2x:

Digital gain 2.

4x:

Digital gain 4.

3.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D1024E-40 camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

The default LUT is a gain function with value = 1.

Lut Mode:

Gain:

Linear function. Y = 255 / 1023 * value * X; Valid range for **value** [1...4].

Gamma:

Gamma function. Y = 255 / 1023^value * X ^ value; Valid range for **value** [0.4...4].

value:

Enter a value. The LUT will be calculated and downloaded to the camera.

Load File...:

Load a user defined LUT - file into the camera (*.txt tab delimited). There is an example in the PFRemote directory (mv_d1024e_40_lut.txt).

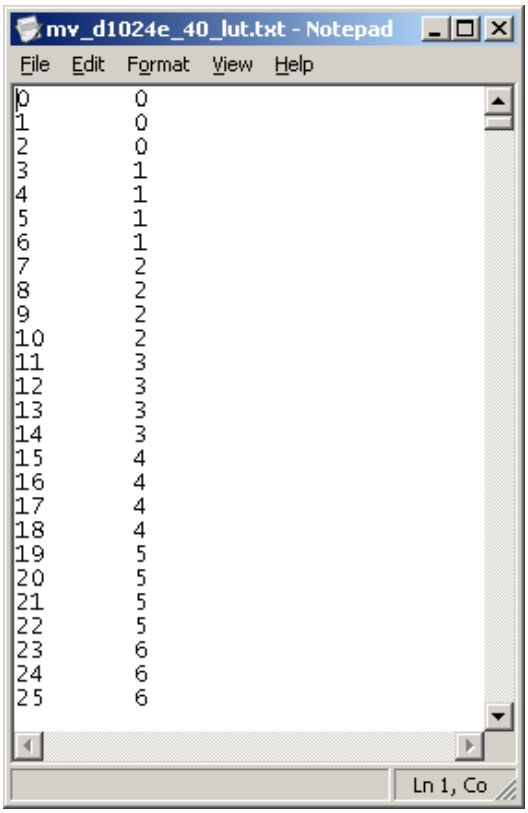
Save File...:

Save LUT from camera into a file.

It is also possible to load a user LUT-file with missing input values (LUT-addresses). Then only pixel values corresponding to listed LUT entries will be overwritten.

Example of a user defined LUT file:

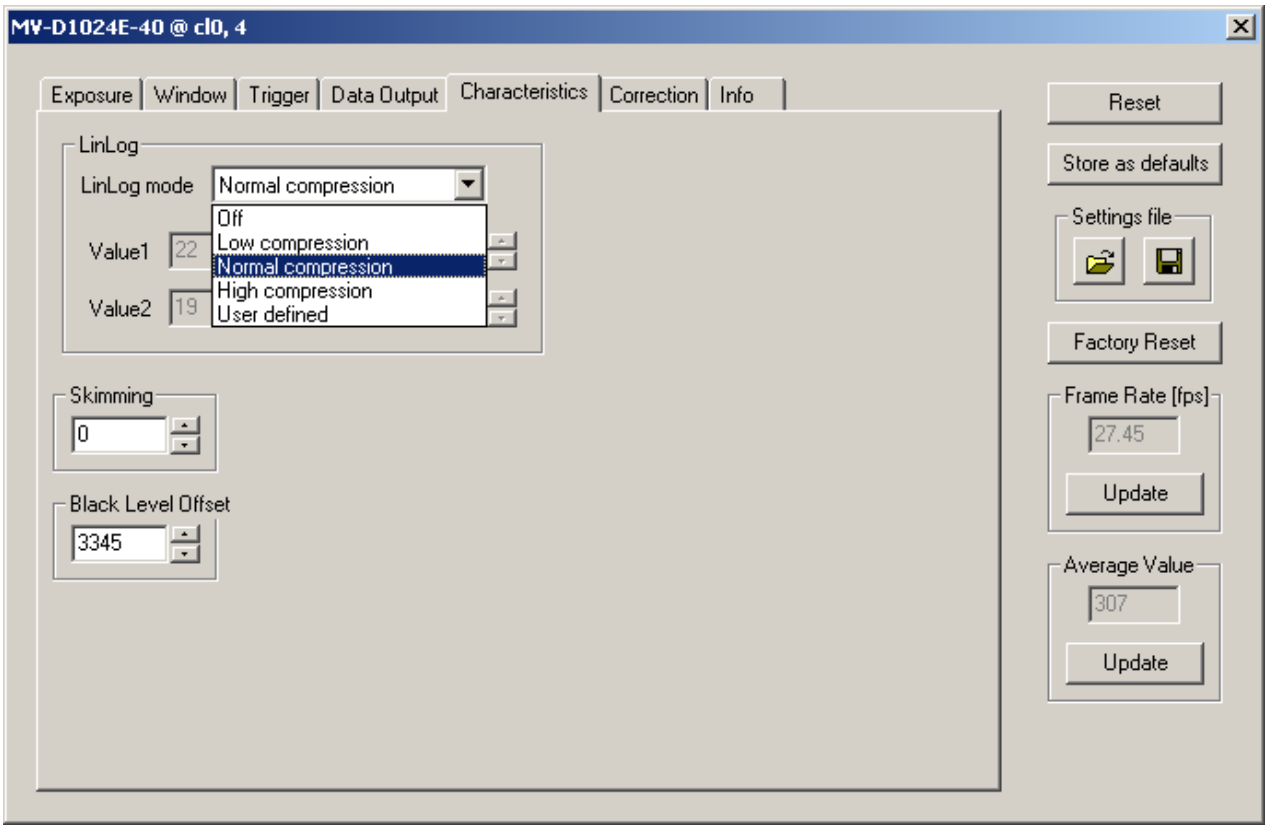
Figure 3.17. Example of a user defined LUT file



3.5. Characteristics

This tab contains LinLog and Skimming settings.

Figure 3.18. MV-D1024E-40 characteristics panel



3.5.1. LinLog

The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Mode:

Off: LinLog is disabled.

Low/Normal/High compression: Three LinLog presettings.

User defined: **Value1**, **Time1**, **Value2** and **Time2** (please read the User Manual for a more detailled explanation).

The Linlog times are per thousand of the exposure time. Time 800 means 80% of the exposure time.

3.5.2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image.

Skimming:

Skimming value. If 0, Skimming is disabled. See Section 2, “Skimming”.

3.5.3. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

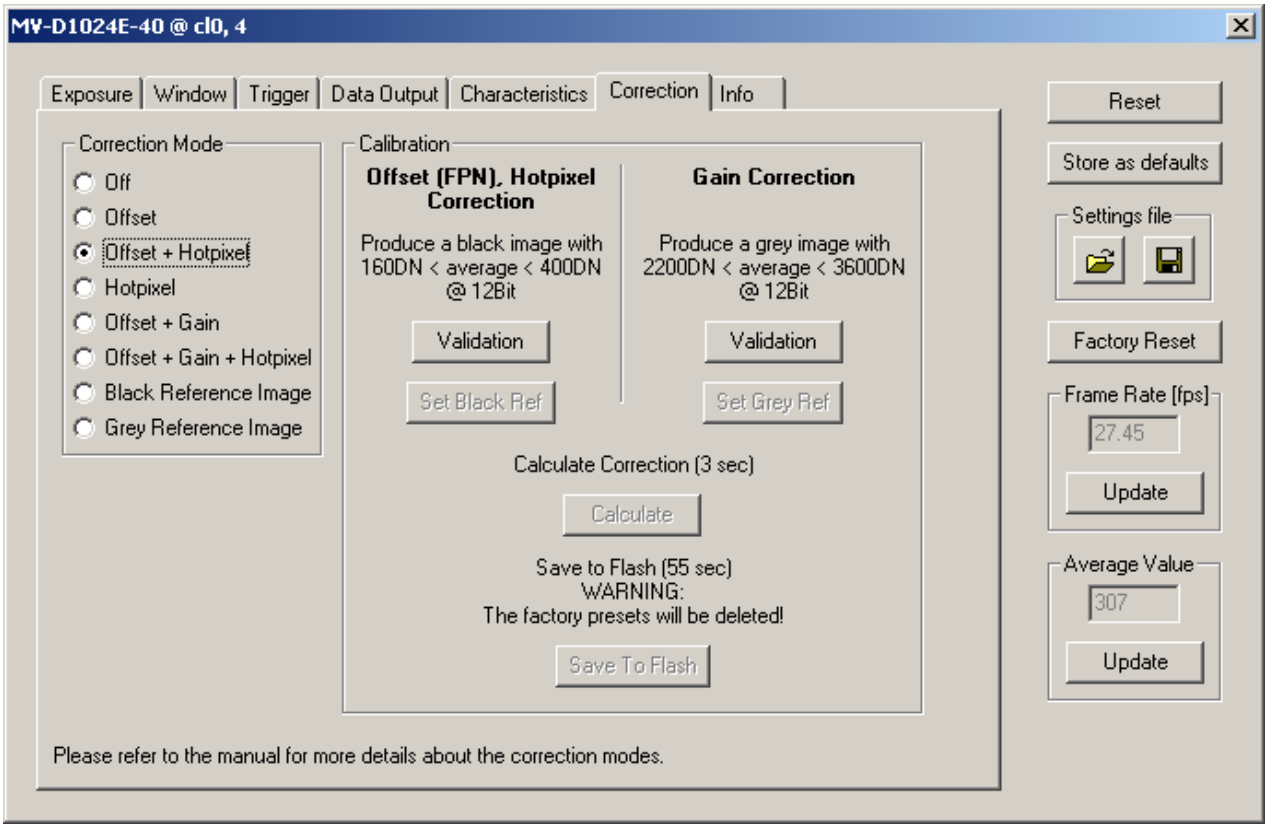
Black Level Offset:

Black level offset value. Use this to adjust the black level.

3.6. Correction

This tab contains correction settings.

Figure 3.19. MV-D1024E-40 correction panel



3.6.1. Correction Mode

This camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction

Offset + Hotpixel:

Activate offset and hot pixel correction.

Hotpixel:

Activate hot pixel correction.

Offset + Gain:

Activate offset and gain correction.

Offset + Gain + Hotpixel:

Activate offset, gain and hot pixel correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

3.6.2. Calibration

Offset (FPN), Hotpixel Correction:

The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live

images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change to panel Charateristics and change the Property **BlackLevelOffset** until the average of the image is between 160 and 400DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction is needed it is not necessary to calibrate a gray image. (see Calculate)

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average between 2200 and 3600DN. Click on the Validation button to check the average. If the average is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

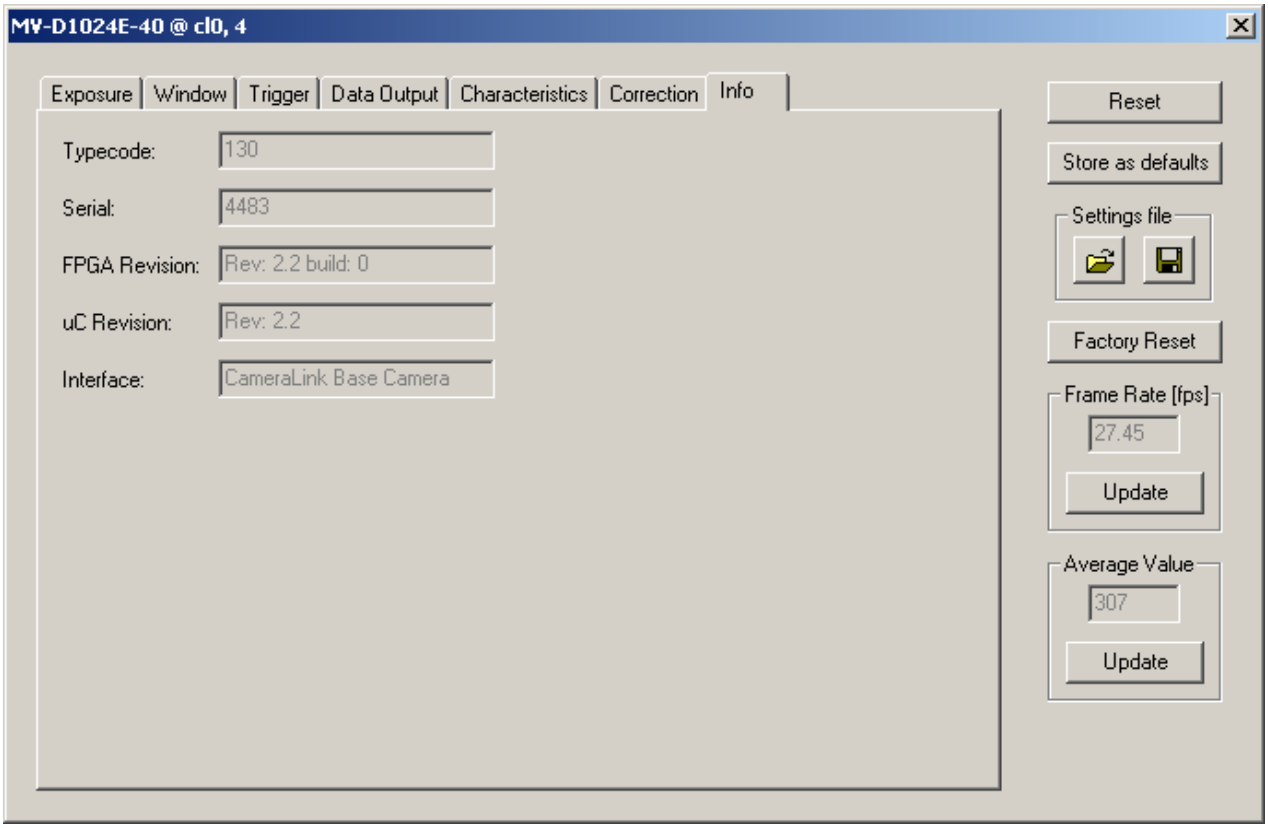
Save the current correction values to the internal flash memory.

> **Warning**
>
> This will overwrite the factory presets.

3.7. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and microcontroller and the description of the camera interface.

Figure 3.20. MV-D1024E-40 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Revision:

Firmware revision of built-in FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

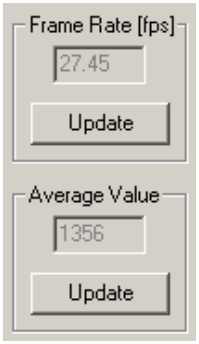
4. MV-D1024E-80 and MV-D1024E-160

This section describes the parameters of the following cameras.

- MV-D1024E-80-CL, CameraLink interface
- MV-D1024E-160-CL, CameraLink interface

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.21. MV-D1024E-160 frame rate and average value



Frame Rate [fps]:

Shows the actual frame rate of the camera in frames per second.

Update:

To update the value of the frame rate, click on this button.

Average Value:

Grayscale average of the actual image. This value is in 12bit (0...4095).

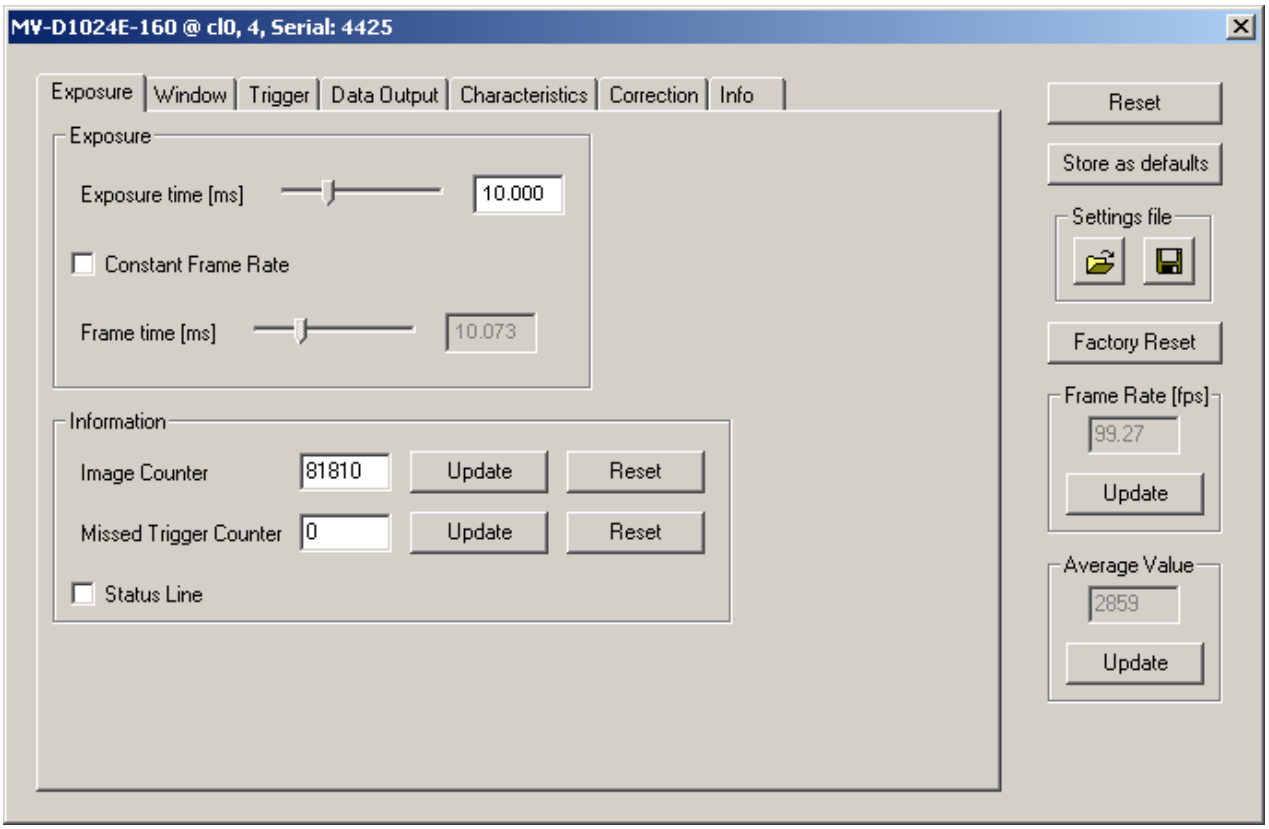
Update:

To update the value of the average, click on this button.

4.1. Exposure

This tab contains exposure settings.

Figure 3.22. MV-D1024E-160 exposure panel



4.1.1. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate (CFR) is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

Frame time [ms]:

Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The minimum frame time depends on the exposure time and readout time.

4.1.2. Information

The Information properties provide information about the acquired images.

Image Counter:

The image counter is a 24 bit real-time counter and is incremented by 1 for every new image.

Missed Trigger Counter:

This is a counter for trigger pulses that were blocked because the trigger pulse was received during image exposure or readout. In free-running mode it counts all pulses received from interface trigger or from I/O trigger interface.

Status Line:

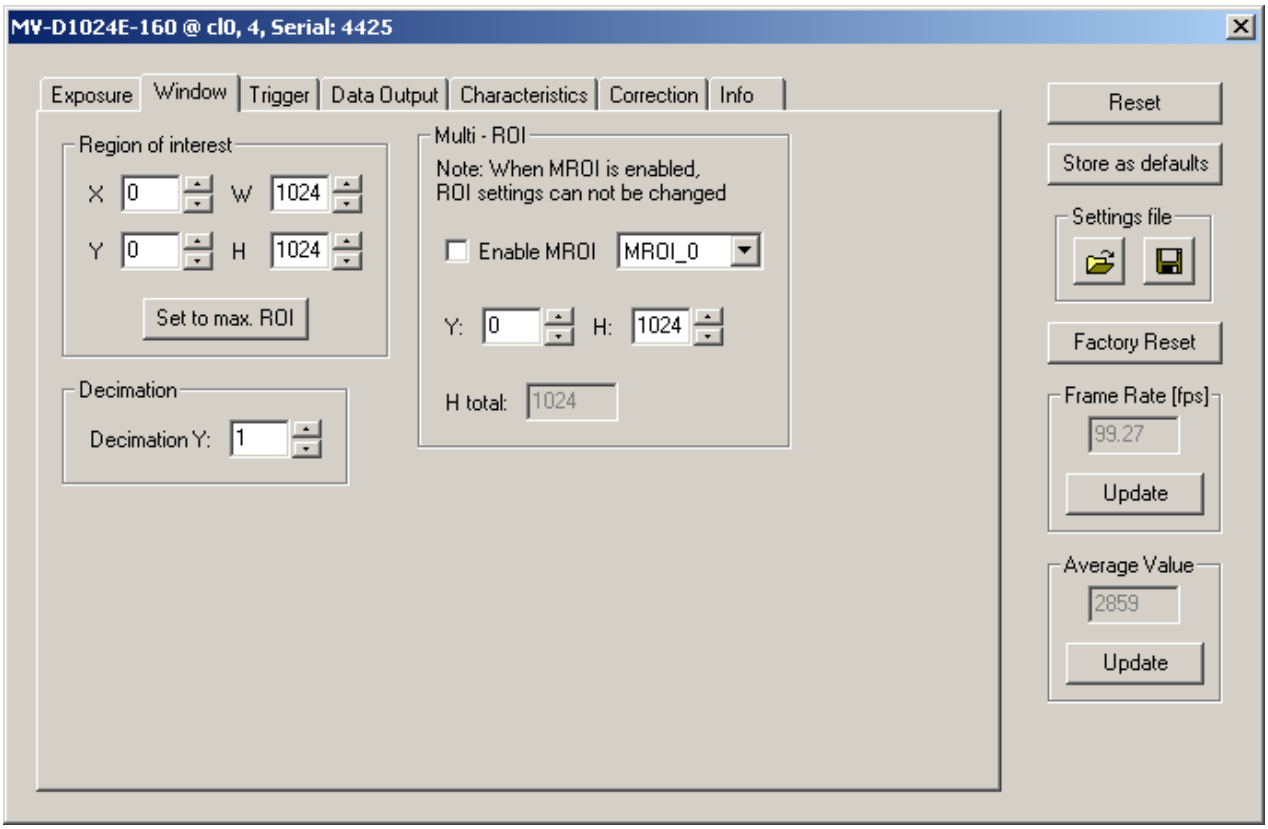
The status line replaces the last line of an image with image information.

To update the value of the information properties, click on the Update-Button; to reset the properties, click on the Reset-Button.

4.2. Window

This tab contains ROI, multi-ROI and decimation settings.

Figure 3.23. MV-D1024E-160 window panel



4.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width (in steps of 4 pixel).

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=1024; H=1024).

> **Note**
>
> Window width is only available in steps of 4 pixel.

4.2.2. Decimation

Decimation reduces the number of pixels in y-direction. Decimation can also be used together with a ROI or MROI. Decimation in y-direction transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively.

Decimation Y:

Decimation value for y-direction. Example: Value = 4 reads every fourth row only.

4.2.3. Multi - ROI

The MV-D1024E-80 and MV-D1024E-160 cameras can handle up to 16 different regions of interest. The multiple ROIs are joined together and form a single image, which is transferred to the frame grabber. An ROI is defined by its starting value in y-direction and its height. The width and the horizontal offset are specified by X and W settings. The maximum frame rate in MROI mode depends on the number of rows and columns being read out. Overlapping ROIs are allowed, and the total height may exceed 1024 rows.

Enable MROI:

Enable MROI. If MROI is enabled, the ROI and MROI settings cannot be changed.

MROI_X:

Select one of the MROI settings.

Y:

Y - coordinate of the selected MROI. If Y is set to 1023, this and all further MROI settings will be ignored.

H:

Height of the selected MROI.

H tot:

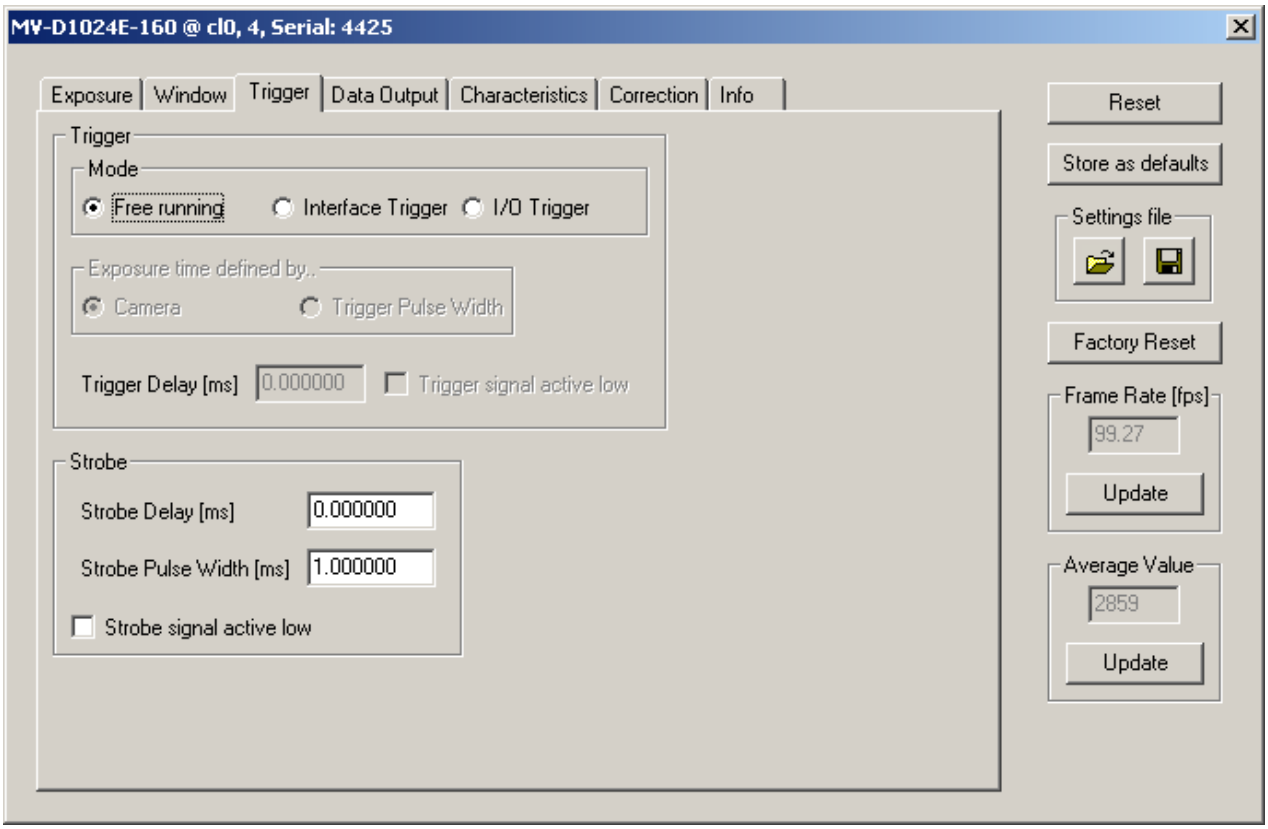
Shows the sum of all MROIs as the total image height.

> **Note**
>
> After changing a property, always press Enter in order to make the change active.

4.3. Trigger

This tab contains trigger and strobe settings.

Figure 3.24. MV-D1024E-160 trigger panel



4.3.1. Trigger

Trigger Source:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera on the power supply connector.

Exposure time defined by:

Camera:

The exposure time is defined by the property **ExposureTime**.

Trigger Pulse Width:

The exposure time is defined by the pulse width of the trigger signal (level-controlled exposure).

> **Note**
>
> This property disables LinLog and simultaneous readout mode.

Further trigger settings:

Trigger Delay:

Programmable delay in milliseconds between the incoming trigger edge and the start of the exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

4.3.2. Strobe

The camera generates a strobe output signal that can be used to trigger a strobe. The delay, pulse width and polarity can be defined by software. To turn off strobe output, set StrobePulseWidth to 0.

Strobe Delay [ms]:

Delay in milliseconds from the input trigger edge to the rising edge of the strobe output signal.

Strobe Pulse Width [ms]:

The pulse width of the strobe trigger in milliseconds.

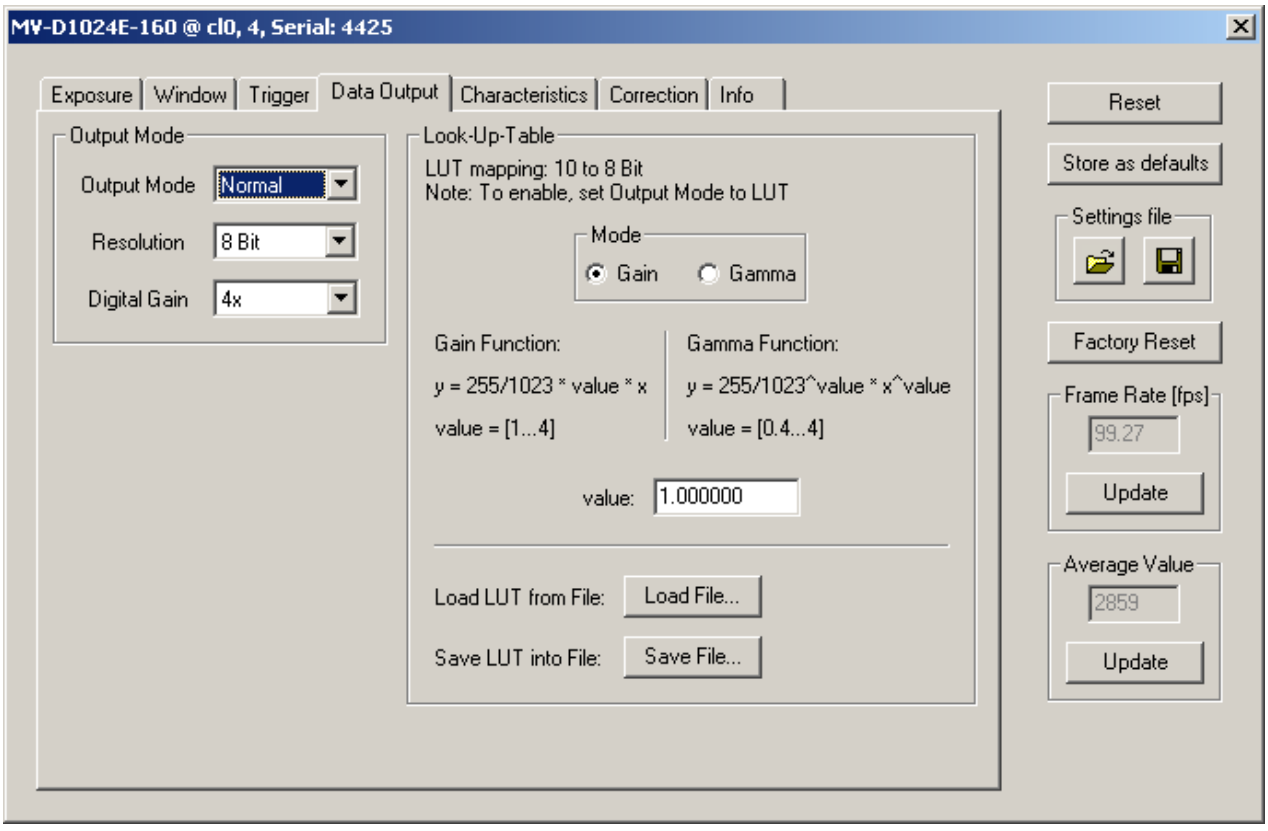
Strobe signal active low:

Define the strobe output to be active high (default) or active low.

4.4. Data Output

This tab contains image data settings.

Figure 3.25. MV-D1024E-160 data output panel



4.4.1. Output Mode

Output Mode:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

Resolution:

8 Bit:

Gray level resolution of 8 bit.

10 Bit:

Gray level resolution of 10 bit.

12 Bit:

Gray level resolution of 12 bit.

Digital Gain:

1x:

No digital gain, normal mode.

2x:

Digital gain 2.

4x:

Digital gain 4.

4.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D1024E-80 and the MV-D1024E-160 camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

The default LUT is a gain function with value = 1.

Lut Mode:

Gain:

Linear function. Y = 255 / 1023 * value * X; Valid range for **value** [1...4].

Gamma:

Gamma function. Y = 255 / 1023^value * X ^ value; Valid range for **value** [0.4...4].

value:

Enter a value. The LUT will be calculated and downloaded to the camera.

Load File...:

Load a user defined LUT - file into the camera (*.txt tab delimited). There is an example in the PFRemote directory (mv_d1024e_80_lut.txt or mv_d1024e_160_lut.txt).

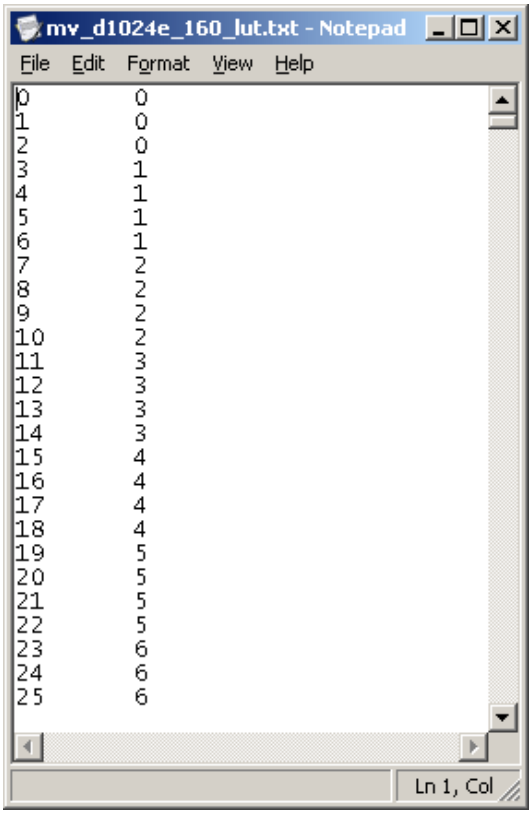
Save File...:

Save LUT from camera into a file.

It is also possible to load a user LUT-file with missing input values (LUT-addresses). Then only pixel values corresponding to listed LUT entries will be overwritten.

Example of a user defined LUT file:

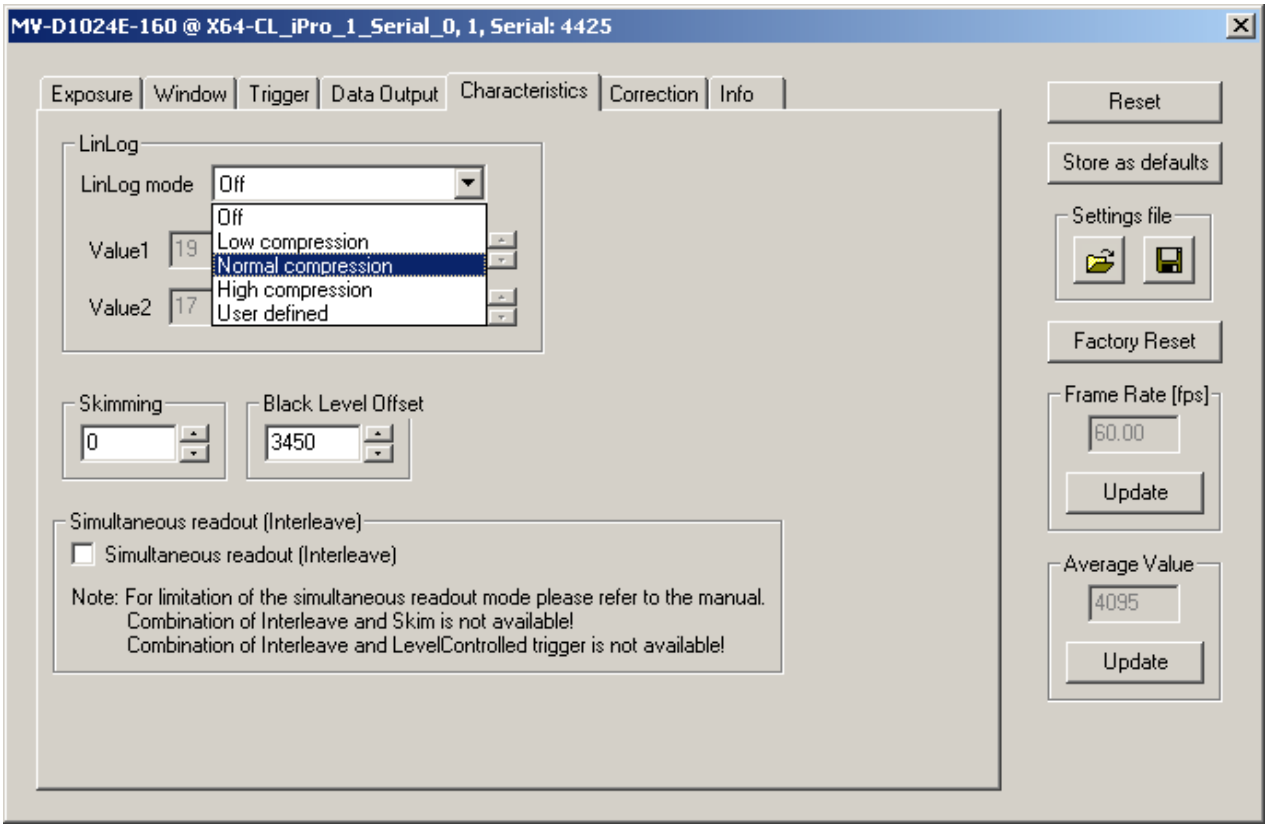
Figure 3.26. Example of a user defined LUT file



4.5. Characteristics

This tab contains LinLog and Skimming settings.

Figure 3.27. MV-D1024E-160 characteristics panel



4.5.1. LinLog

The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Mode:

Off: LinLog is disabled.

Low/Normal/High compression: Three LinLog presettings.

User defined: **Value1**, **Time1**, **Value2** and **Time2**.

The Linlog times are per thousand of the exposure time. Time 800 means 80% of the exposure time.

4.5.2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image.

Skimming:

Skimming value. If 0, Skimming is disabled. See Section 2, “Skimming”.

4.5.3. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

Black Level Offset:

Black level offset value. Use this to adjust the black level.

4.5.4. Simultaneous readout (Interleave)

The simultaneous readout mode allows higher frame rate.

Simultaneous readout (Interleave):

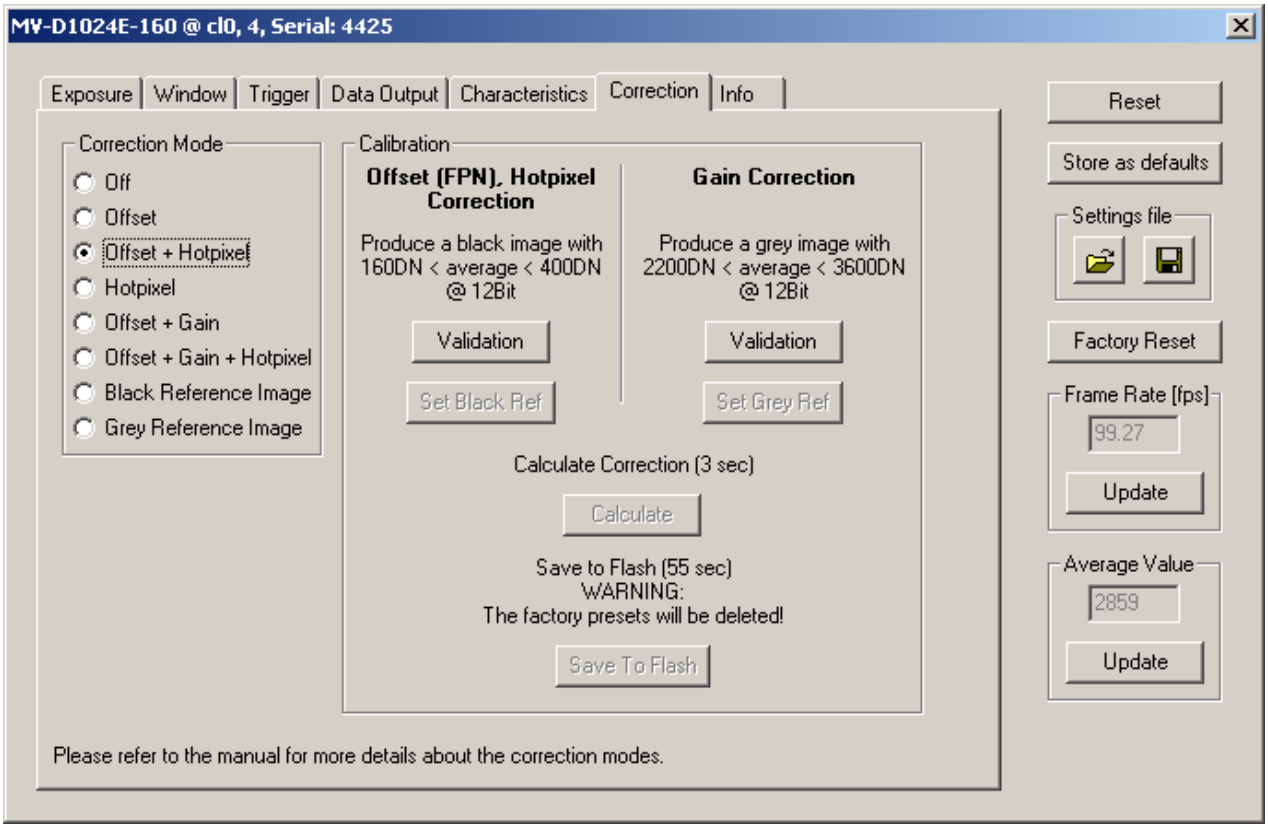
Enable the simultaneous readout mode.

> **Note**
>
> Combination of property **Trigger.Interleave** and property **Skim** is not available!
>
> Combination of property **Trigger.Interleave** and property **Trigger.LevelControlled** is not available!

4.6. Correction

This tab contains correction settings.

Figure 3.28. MV-D1024E-160 correction panel



4.6.1. Correction Mode

This camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction

Offset + Hotpixel:

Activate offset and hot pixel correction.

Hotpixel:

Activate hot pixel correction.

Offset + Gain:

Activate offset and gain correction.

Offset + Gain + Hotpixel:

Activate offset, gain and hot pixel correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

4.6.2. Calibration

Offset (FPN), Hotpixel Correction:

The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change to panel Charateristics and change the Property **BlackLevelOffset** until the average of the image is between 160 and 400DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction is needed it is not necessary to calibrate a gray image. (see Calculate)

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average between 2200 and 3600DN. Click on the Validation button to check the average. If the average is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

Save the current correction values to the internal flash memory.

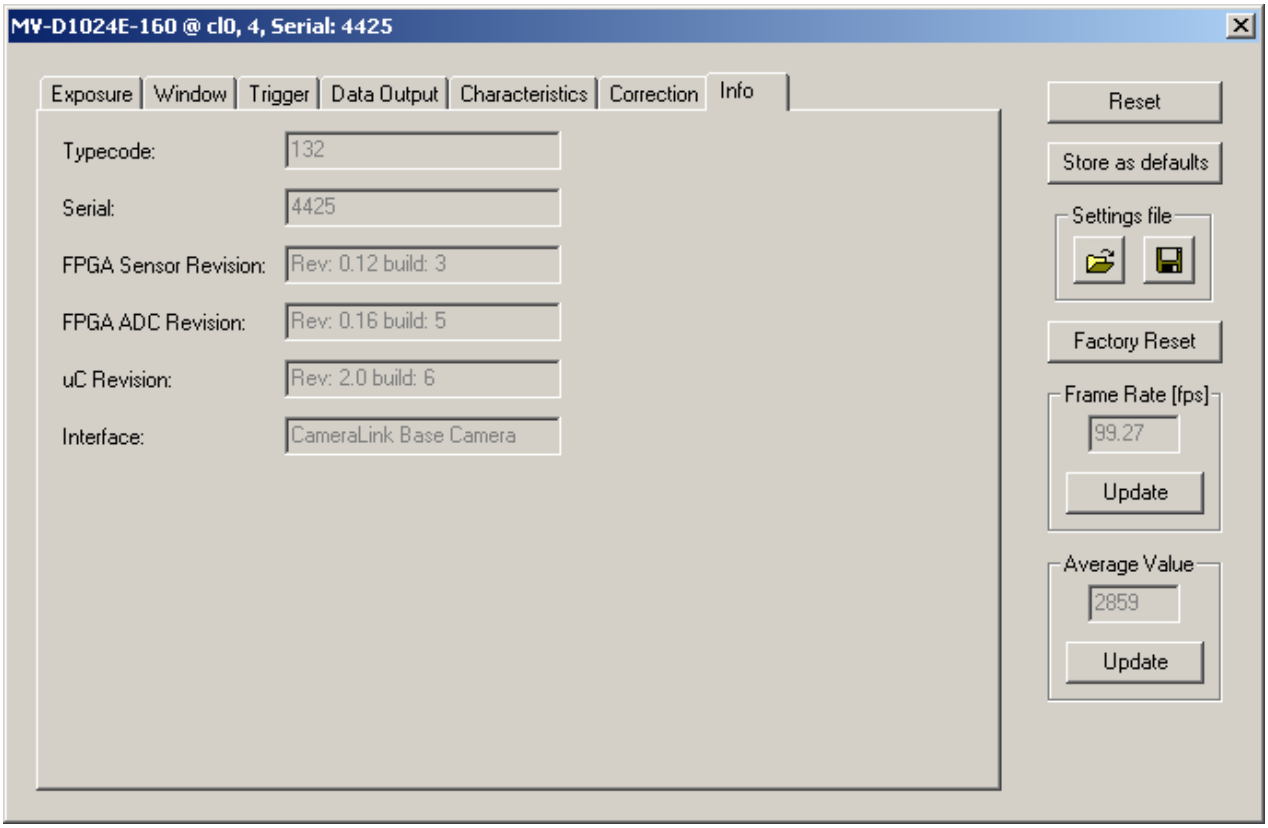
> **Warning**
>
> This will overwrite the factory presets.

4.7. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and

microcontroller and the description of the camera interface.

Figure 3.29. MV-D1024E-160 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Sensor Revision:

Firmware revision of built-in Sensor FPGA of the connected camera.

FPGA ADC Revision:

Firmware revision of built-in ADC FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

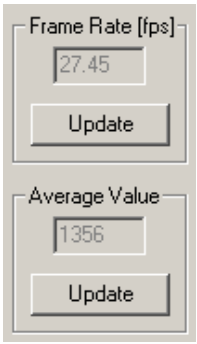
5. MV-D752E-40

This section describes the parameters of the following cameras.

- MV-D752E-40-CL, CameraLink interface
- MV-D752E-40-U2, USB interface

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.30. MV-D752E-40 frame rate and average value



Frame Rate [fps]:

Show the actual frame rate of the camera in frames per second.

Update:

To update the value of the frame rate, click on this button.

Average Value:

Grayscale average of the actual image. This value is in 12bit (0...4095).

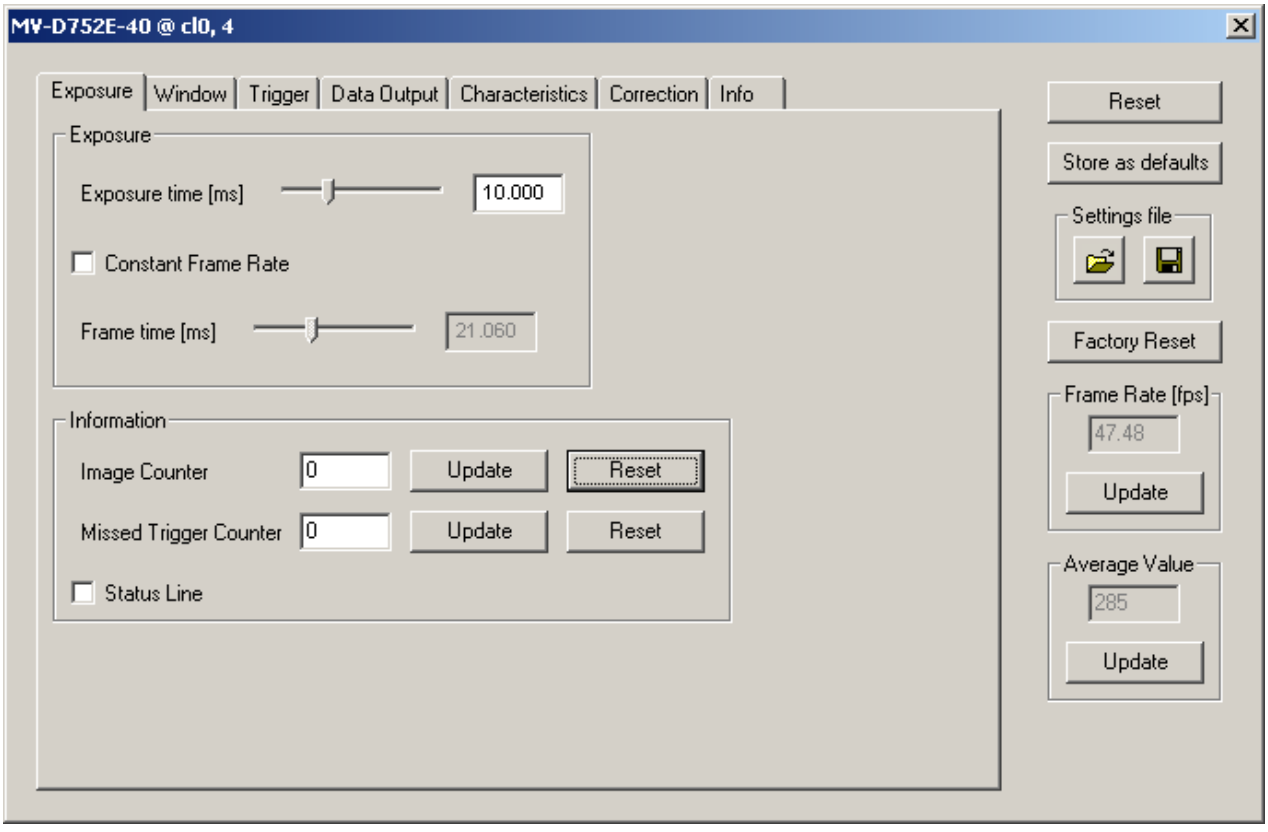
Update:

To update the value of the average, click on this button.

5.1. Exposure

This tab contains exposure settings.

Figure 3.31. MV-D752E-40 exposure panel



5.1.1. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

Frame time [ms]:

Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The minimum frame time depends on the exposure time and readout time.

5.1.2. Information

The Information properties provide information about the acquired images.

Image Counter:

24 bit real-time counter. Incremented by 1 for every new image.

Missed Trigger Counter:

Counter for trigger pulses that were blocked because the trigger pulse was received during image exposure or readout. In free-running mode it counts all pulses received from interface trigger or from I/O trigger interface.

Status Line:

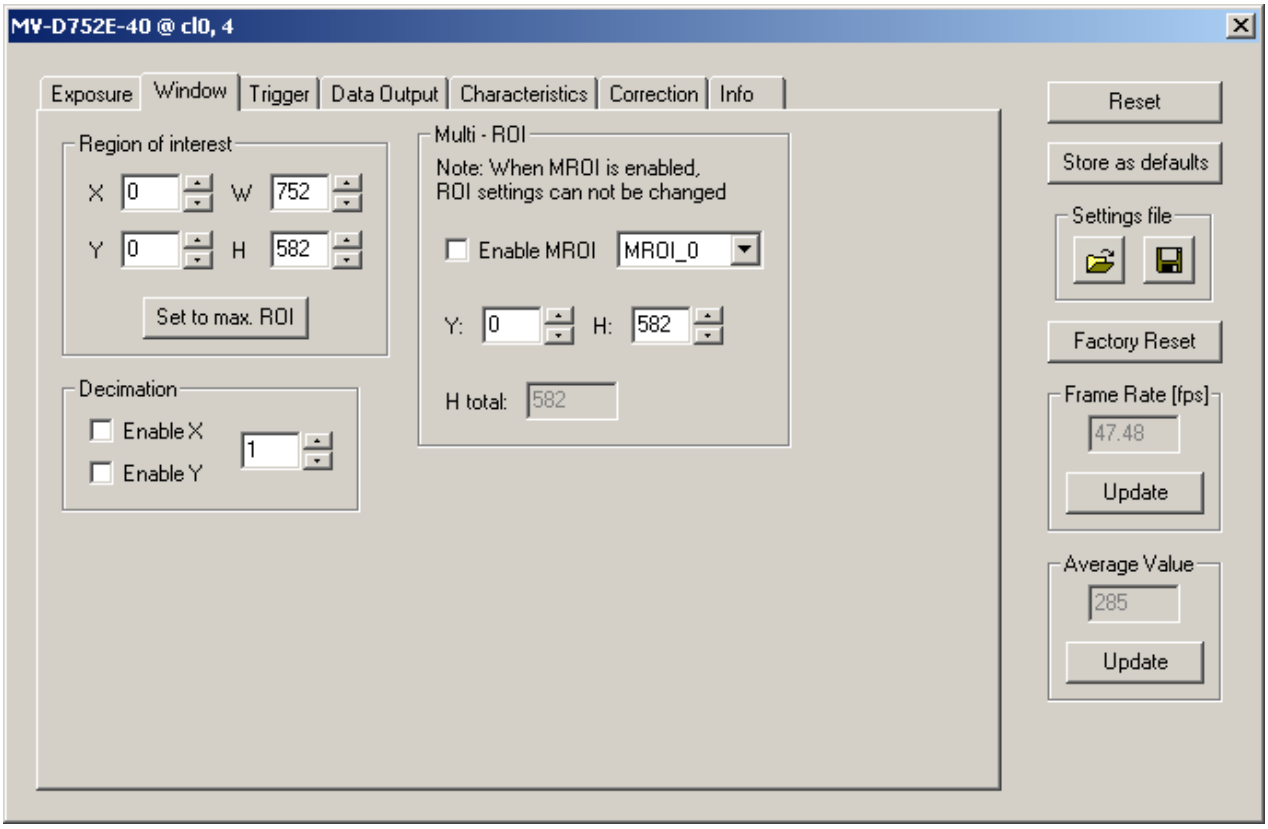
The status line replaces the last line of an image with image information.

To update the value of the information properties, click on the Update-Button; to reset the properties, click on the Reset-Button.

5.2. Window

This tab contains ROI, multi-ROI and decimation settings.

Figure 3.32. MV-D752E-40 window panel



5.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=752; H=582).

> **Note**
>
> For the MV-D752E-40-U2 (USB camera): W x H > 1024.

5.2.2. Decimation

Decimation reduces the number of pixels in x- or y-direction or both. Decimation can also be used together with a ROI or MROI. Decimation in y-direction transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively. Decimation in x-direction transfers every pixel of a row, but uses the CameraLink **DVAL** (data valid) signal to indicate which pixels to mask.

> **Note**
>
> Please consult the documentation of your frame grabber on how to configure the frame grabber such that it interpretes the DVAL signal.

Enable X:

Enable decimation in x-direction.

Enable Y:

Enable decimation in y-direction.

Value:

Decimation factor. Example: Value = 4 reads every fourth row and fourth column respectively only.

5.2.3. Multi - ROI

The MV-D752E-40 cameras can handle up to 16 different regions of interest. The multiple ROIs are joined together and form a single image, which is transferred to the frame grabber. An ROI is defined by its starting value in y-direction and its height. The width and the horizontal offset are specified by X and W settings. The maximum frame rate in MROI mode depends on the number of rows and columns being read out. Overlapping ROIs are allowed, and the total height may exceed 1024 rows.

Enable MROI:

Enable MROI. If MROI is enabled, the ROI and MROI settings cannot be changed.

MROI_X:

Select one of the MROI settings.

Y:

Y - coordinate of the selected MROI. If Y is set to 751, this and all further MROI settings will be ignored.

H:

Height of the selected MROI.

H tot:

Shows the sum of all MROIs as the total image height.

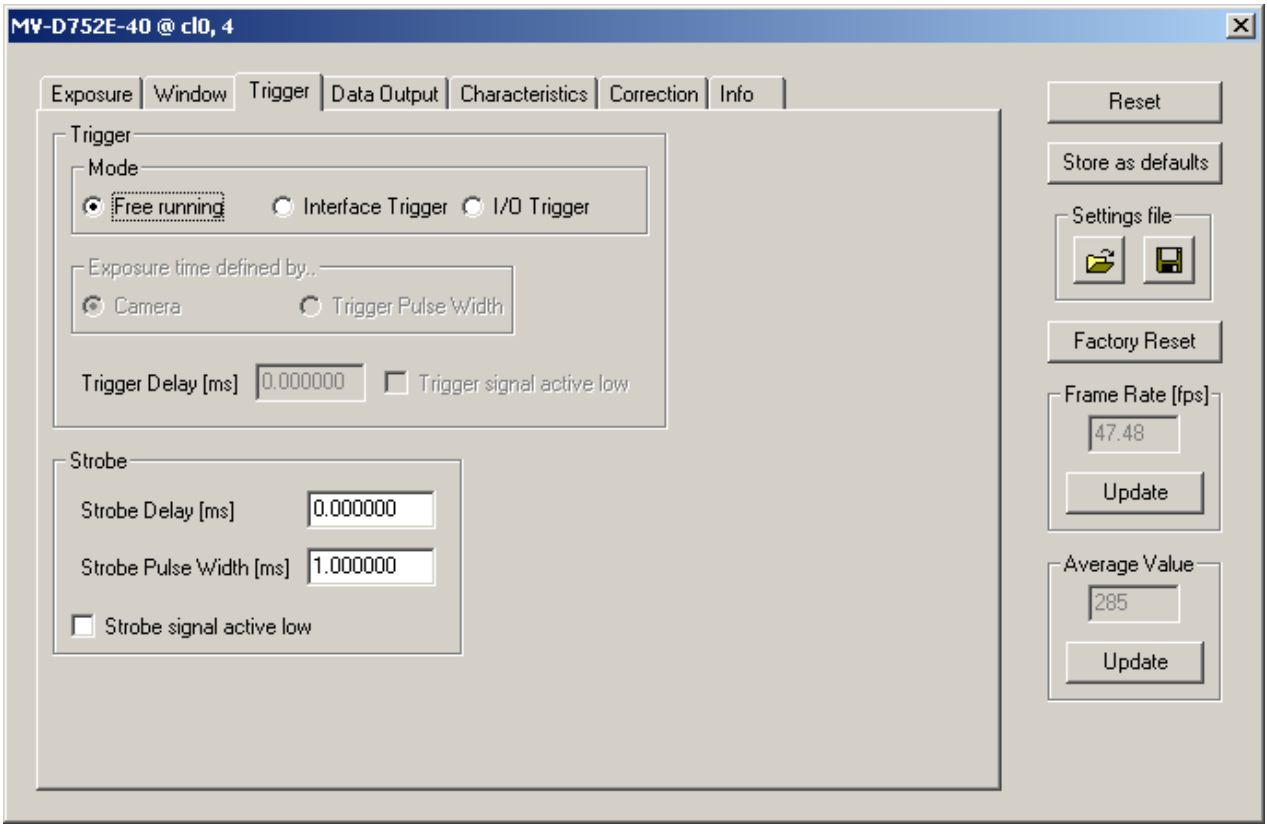
> **Note**
>
> After changing a property, always press Enter in order to make the change active.

> **Note**
>
> For the MV-D752E-40-U2 (USB camera): W x Htot > 1024.

5.3. Trigger

This tab contains trigger and strobe settings.

Figure 3.33. MV-D752E-40 trigger panel



5.3.1. Trigger

Trigger Source:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera on the power supply connector.

Exposure time defined by:

Camera:

The exposure time is defined by the property **ExposureTime**.

Trigger Pulse Width:

The exposure time is defined by the pulse width of the trigger signal (level-controlled exposure).

> **Note**
>
> This property disables LinLog.

Further trigger settings:

Trigger Delay:

Programmable delay in milliseconds between the incoming trigger edge and the start of the exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

5.3.2. Strobe

The camera generates a strobe output signal that can be used to trigger a strobe. The delay, pulse width and polarity can be defined by software. To turn off strobe output, set StrobePulseWidth to 0.

Strobe Delay [ms]:

Delay in milliseconds from the input trigger edge to the rising edge of the strobe output signal.

Strobe Pulse Width [ms]:

The pulse width of the strobe trigger in milliseconds.

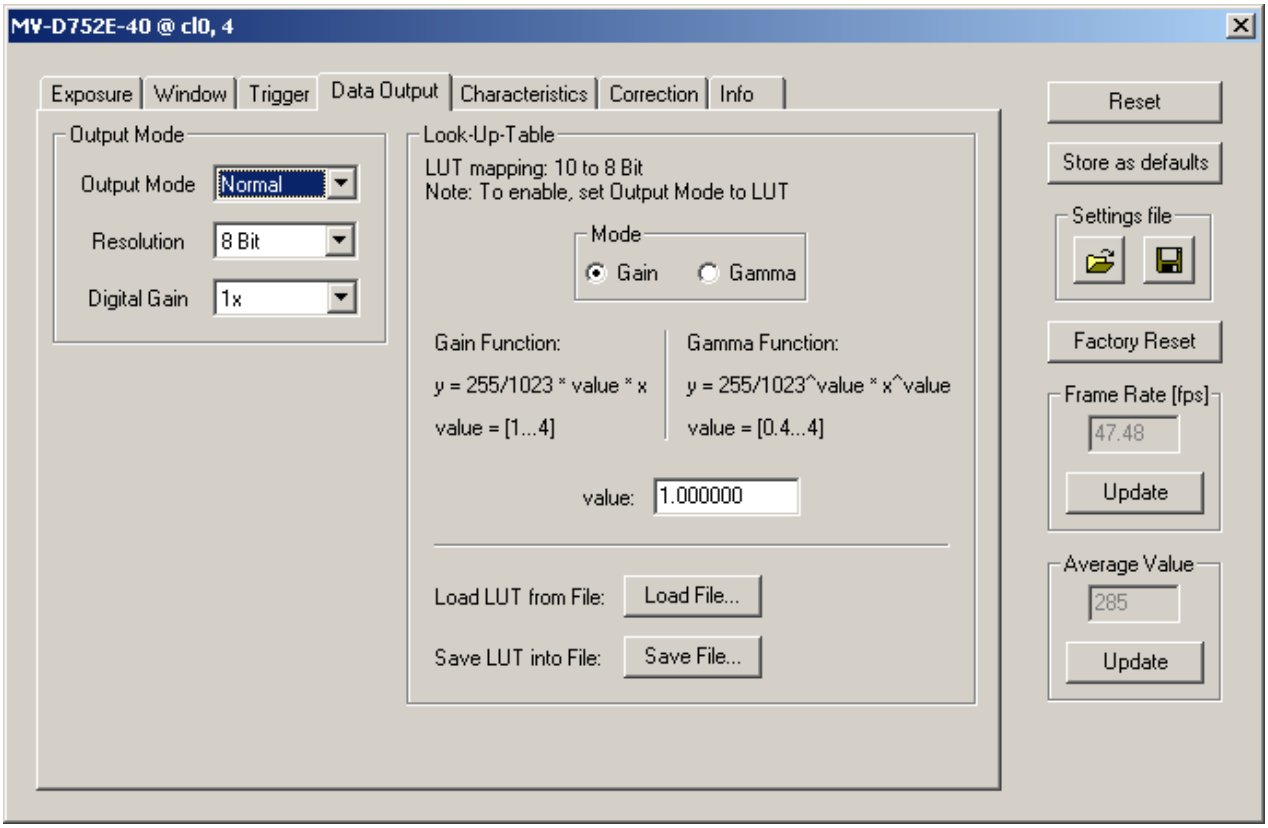
Strobe signal active low:

Define the strobe output to be active high (default) or active low.

5.4. Data Output

This tab contains image data settings.

Figure 3.34. MV-D752E-40 data output panel



5.4.1. Output Mode

Output Mode:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

Resolution:

8 Bit:

Gray level resolution of 8 bit.

10 Bit:

Gray level resolution of 10 bit.

12 Bit:

Gray level resolution of 12 bit.

Digital Gain:

1x:

No digital gain, normal mode.

2x:

Digital gain 2.

4x:

Digital gain 4.

5.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D752E-40 camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

The default LUT is a gain function with value = 1.

Lut Mode:

Gain:

Linear function. Y = 255 / 1023 * value * X; Valid range for **value** [1...4].

Gamma:

Gamma function. Y = 255 / 1023^value * X ^ value; Valid range for **value** [0.4...4].

value:

Enter a value. The LUT will be calculated and downloaded to the camera.

Load File...:

Load a user defined LUT - file into the camera (*.txt tab delimited). There is an example in the PFRemote directory (mv_d752e_40_lut.txt).

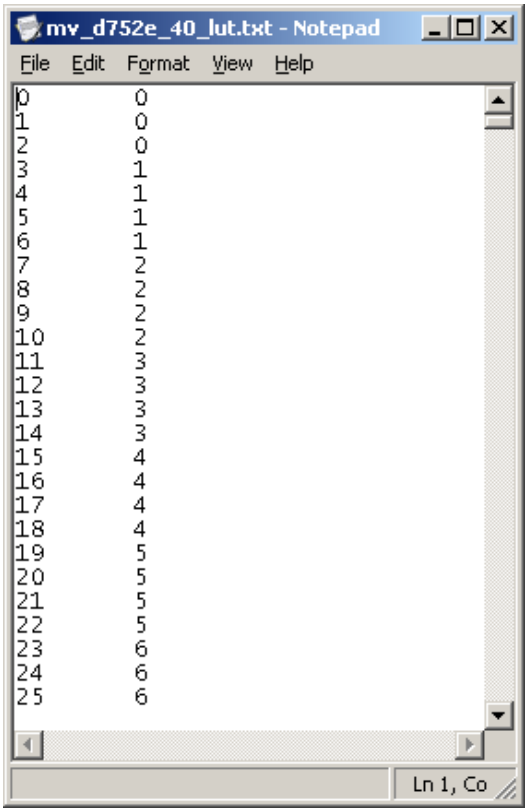
Save File...:

Save LUT from camera into a file.

It is also possible to load a user LUT-file with missing input values (LUT-addresses). Then only pixel values corresponding to listed LUT entries will be overwritten.

Example of a user defined LUT file:

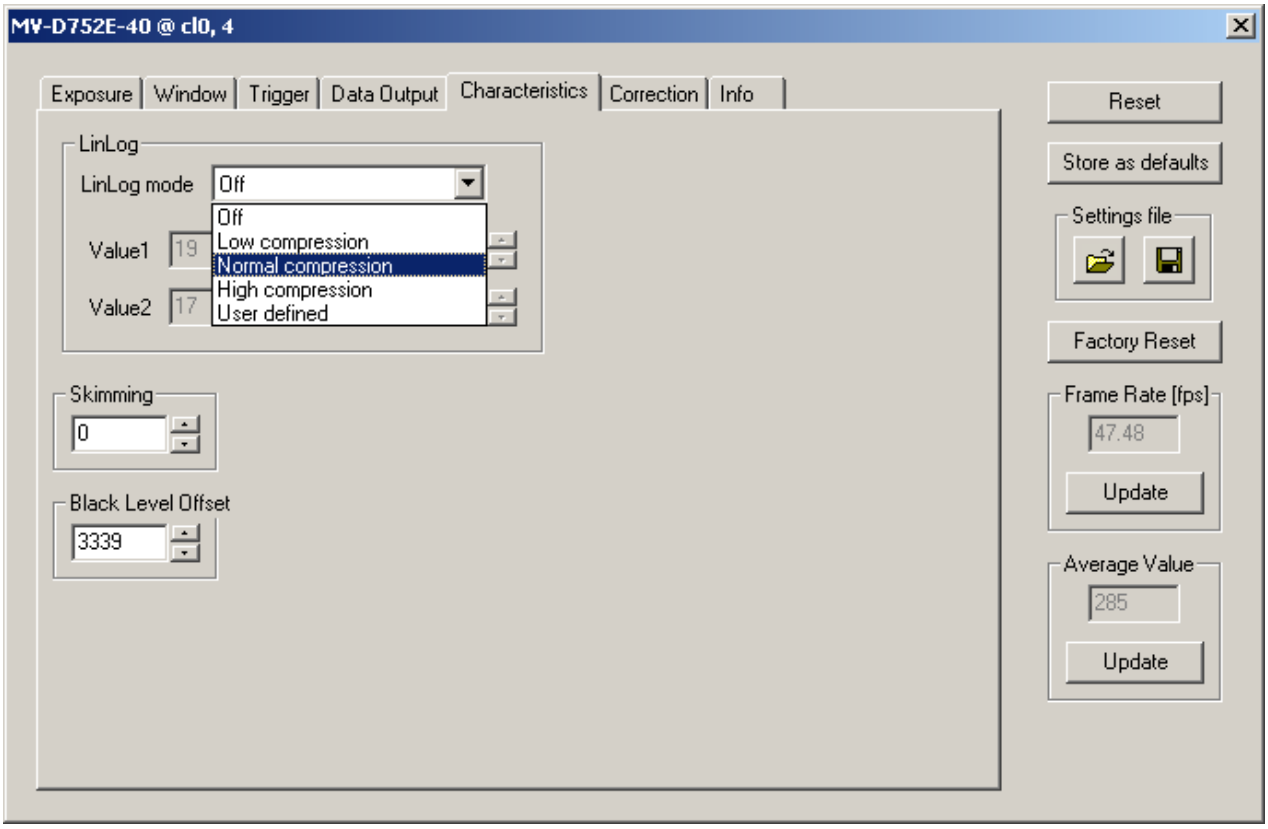
Figure 3.35. Example of a user defined LUT file



5.5. Characteristics

This tab contains LinLog and Skimming settings.

Figure 3.36. MV-D752E-40 characteristics panel



5.5.1. LinLog

The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition

between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Mode:

Off: LinLog is disabled.

Low/Normal/High compression: Three LinLog presettings.

User defined: **Value1**, **Time1**, **Value2** and **Time2**.

The LinLog times are per thousand of the exposure time. Time 800 means 80% of the exposure time.

5.5.2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image.

Skimming:

Skimming value. If 0, Skimming is disabled. See Section 2, “Skimming”.

5.5.3. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

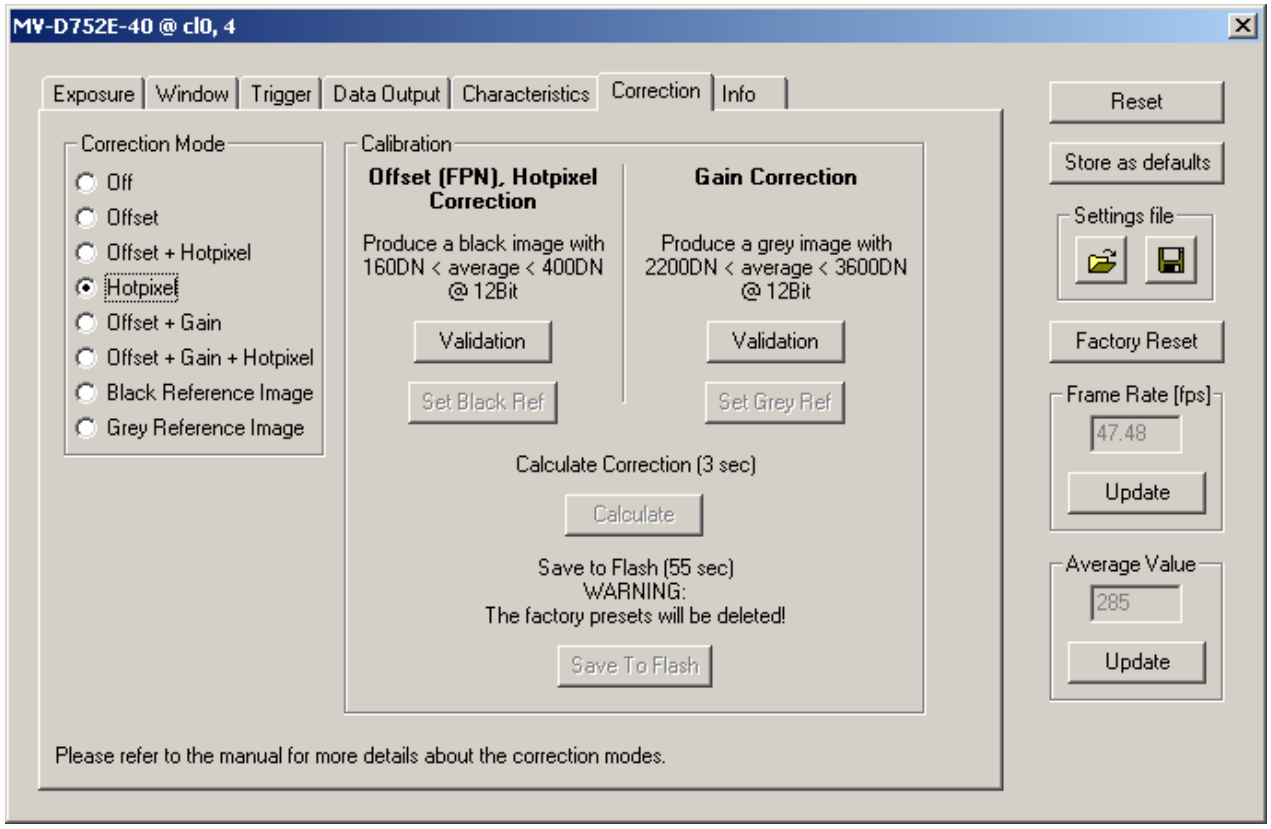
Black Level Offset:

Black level offset value. Use this to adjust the black level.

5.6. Correction

This tab contains correction settings.

Figure 3.37. MV-D752E-40 correction panel



5.6.1. Correction Mode

This camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction.

Offset + Hotpixel:

Activate offset and hot pixel correction.

Hotpixel:

Activate hot pixel correction.

Offset + Gain:

Activate offset and gain correction.

Offset + Gain + Hotpixel:

Activate offset, gain and hot pixel correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

5.6.2. Calibration

Offset (FPN), Hotpixel Correction:

The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change to panel Charateristics and change the Property **BlackLevelOffset** until the average of the image is between 160 and 400DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction is needed it is not necessary to calibrate a gray image. (see Calculate)

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average between 2200 and 3600DN. Click on the Validation button to check the average. If the average is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

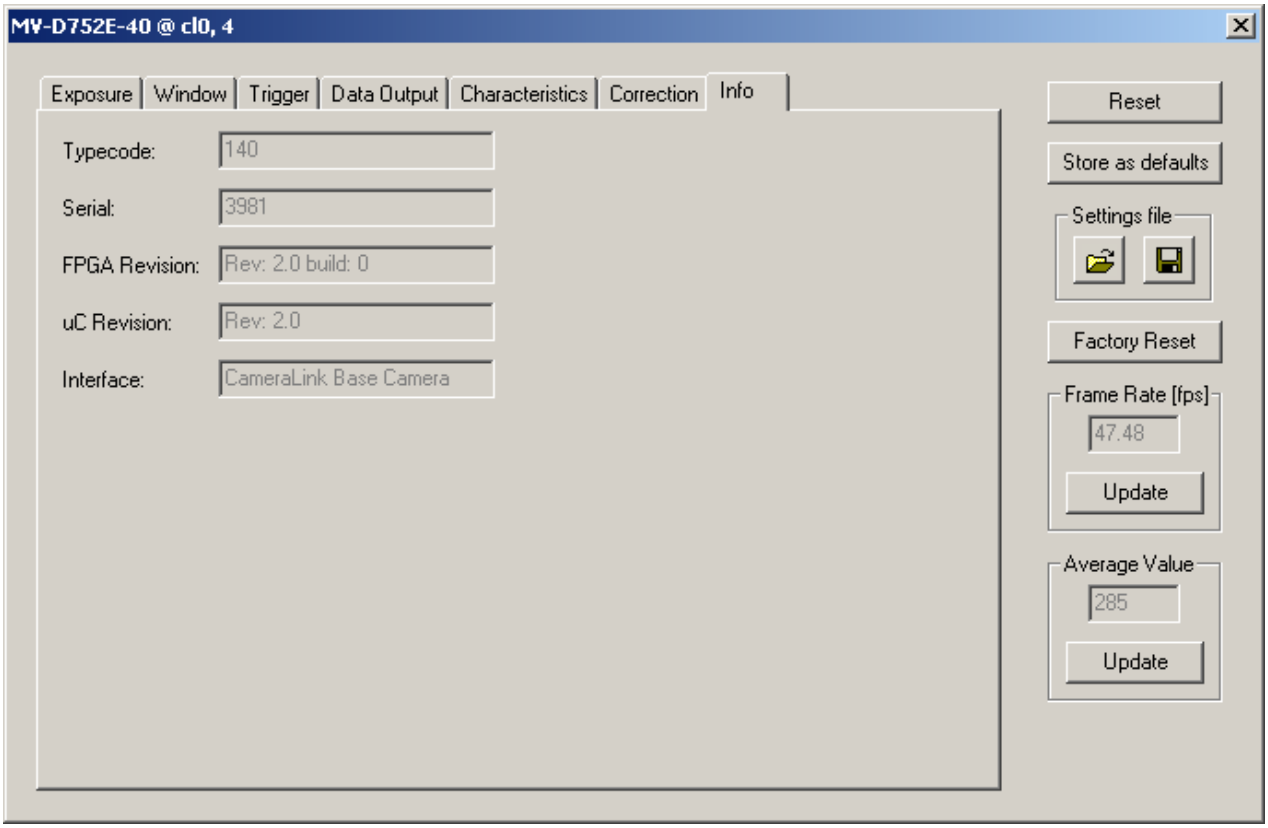
Save the current correction values to the internal flash memory.

> **Warning**
>
> This will overwrite the factory presets.

5.7. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and microcontroller.

Figure 3.38. MV-D752E-40 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Revision:

Firmware revision of built-in FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Information about the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

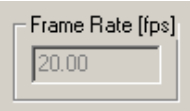
6. MV-D1024 - SERIES (-28, -80, -160)

This section describes the parameters of the following cameras.

- MV-D1024-28-CL
- MV-D1024-80-CL, MV-D1024-Track
- MV-D1024-160-CL

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.39. MV-D1024-SERIES frame rate and average value



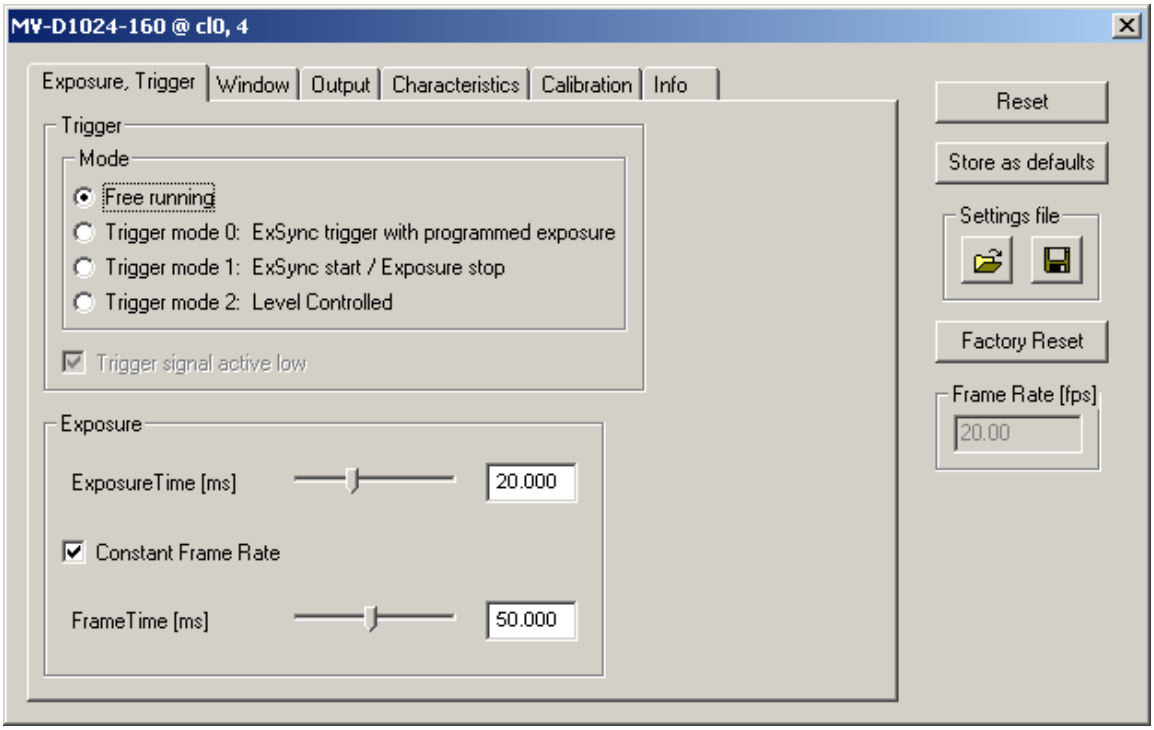
Frame Rate [fps]:

Show the actual frame rate of the camera in frames per second.

6.1. Exposure

This tab contains exposure and trigger settings.

Figure 3.40. MV-D1024-SERIES exposure panel



6.1.1. Trigger

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Trigger mode 0: ExSync trigger with programmed exposure:

External trigger with programmed exposure time.

Trigger mode 1: ExSync start / Exposure stop:

External trigger start exposure time, Exposuretrigger stop exposure time (this feature of the trigger mode is not supported by the MV-D1024-Track).

Trigger mode 2: Level Controlled:

Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

6.1.2. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

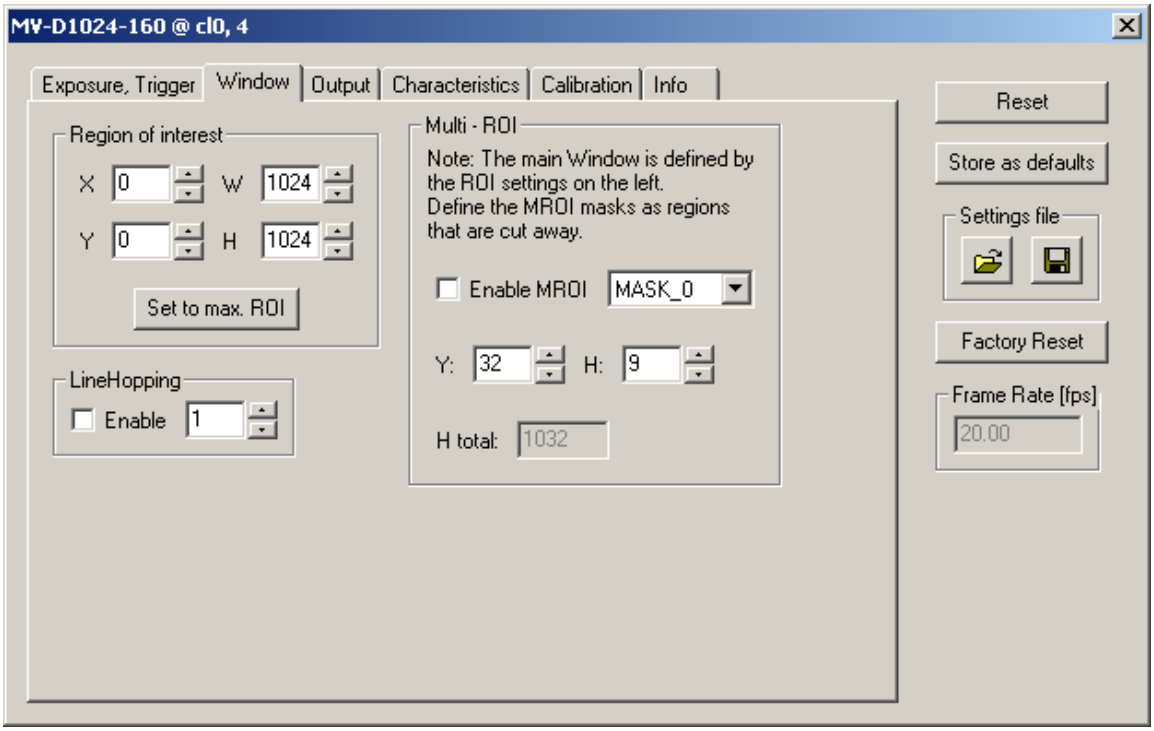
Frame time [ms]:

Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The exposure time sets the minimum frame time.

6.2. Window

This tab contains ROI, multi-ROI and decimation settings.

Figure 3.41. MV-D1024-SERIES window panel



6.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=1024; H=1024).

6.2.2. LineHopping

LineHopping reduces the number of pixels in y-direction. LineHopping can also be used together with a ROI or MROI. LineHopping transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively.

Enable:

Enable decimation in x-direction.

Value:

LineHopping factor. Example: Value = 4 reads every fourth line only.

6.2.3. Multi - ROI

The MV-D1024 camera series can handle up to 17 different regions of interest. Overlapping windows are not allowed. The maximum frame rate in MROI mode depends on the number of rows and columns being read out.

Enable MROI:

Enable MROI. If MROI is enabled, the ROI and MROI settings cannot be changed.

MASK_X:

Select one of the MROI window.

Y:

Y - coordinate of the selected MROI. If Y is set to 1023, this and all further MROI settings will be ignored.

H:

Height of the selected MROI.

H tot:

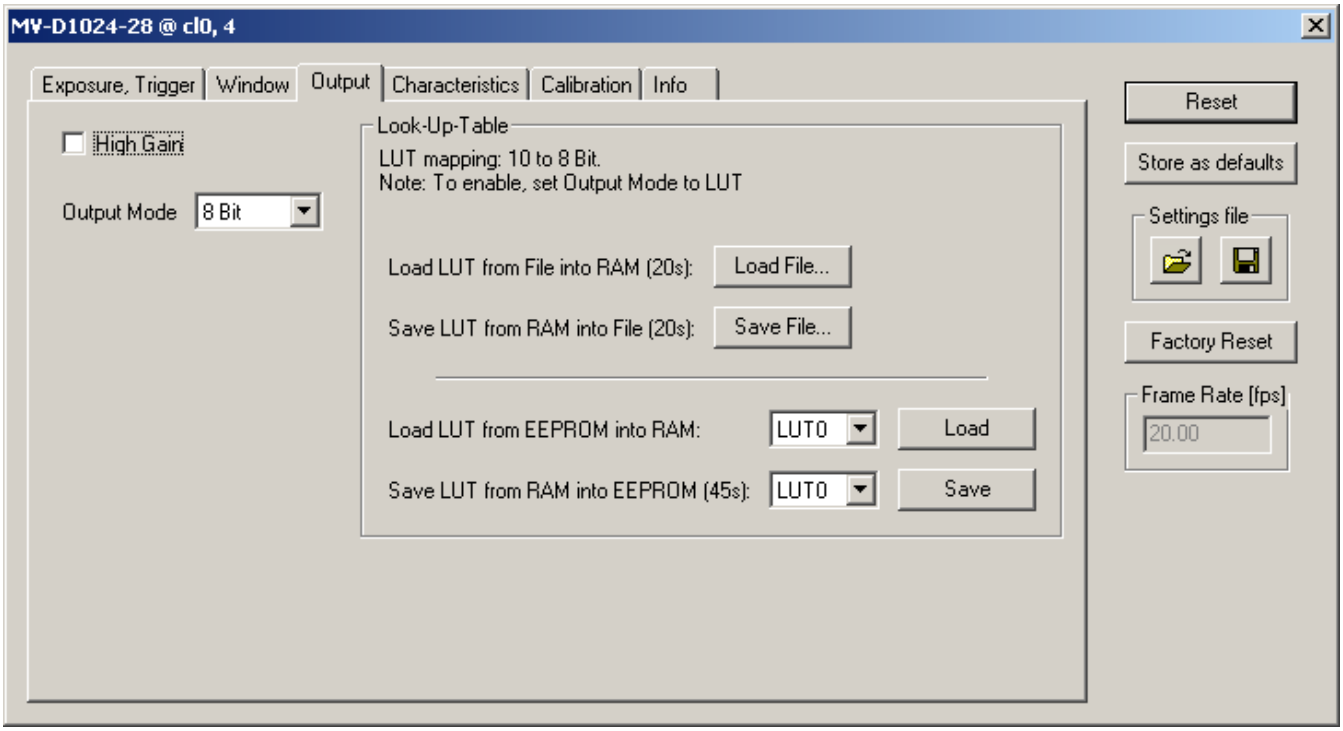
Shows the sum of all MROIs as the total image height.

> **Note**
>
> After changing a property, always press Enter in order to make the change active.

6.3. Output for MV-D1024-28-CL

This tab contains image data settings of the MV-D1024-28-CL.

Figure 3.42. MV-D1024-28-CL output panel



6.3.1. Output Mode

High Gain:

Increases the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

10 Bit:

Gray level resolution of 10 bit.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

6.3.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D1024-28-CL camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

This camera can save 2 different LUT's in the EEPROM. The LUT in the RAM is the active one.

Buttons:

Load File...:

Load a user defined LUT - file (*.txt tab delimited) into the RAM of the camera. There is an example in the PFRemote directory (mv_d1024_28_lut.txt).

Save File...:

Save the current LUT from RAM into a file (*.txt tab delimited).

Load:

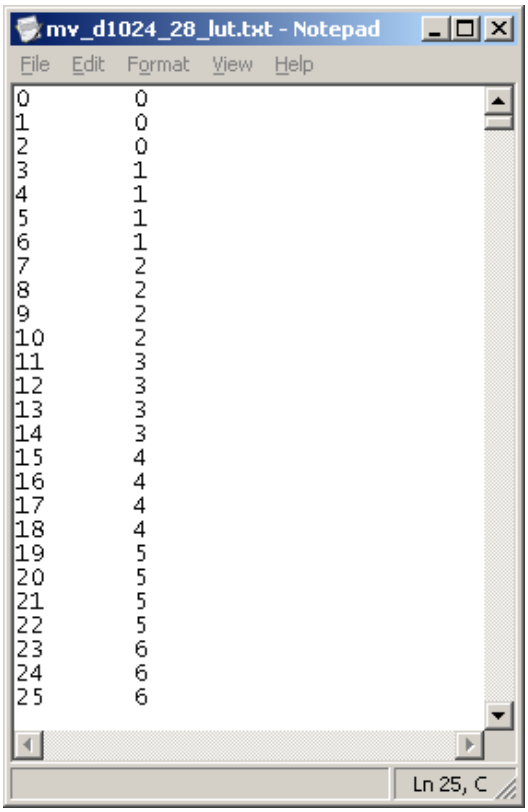
Load selected LUT from EEPROM into RAM.

Save:

Save selected LUT into EEPROM.

Example of a user defined LUT file:

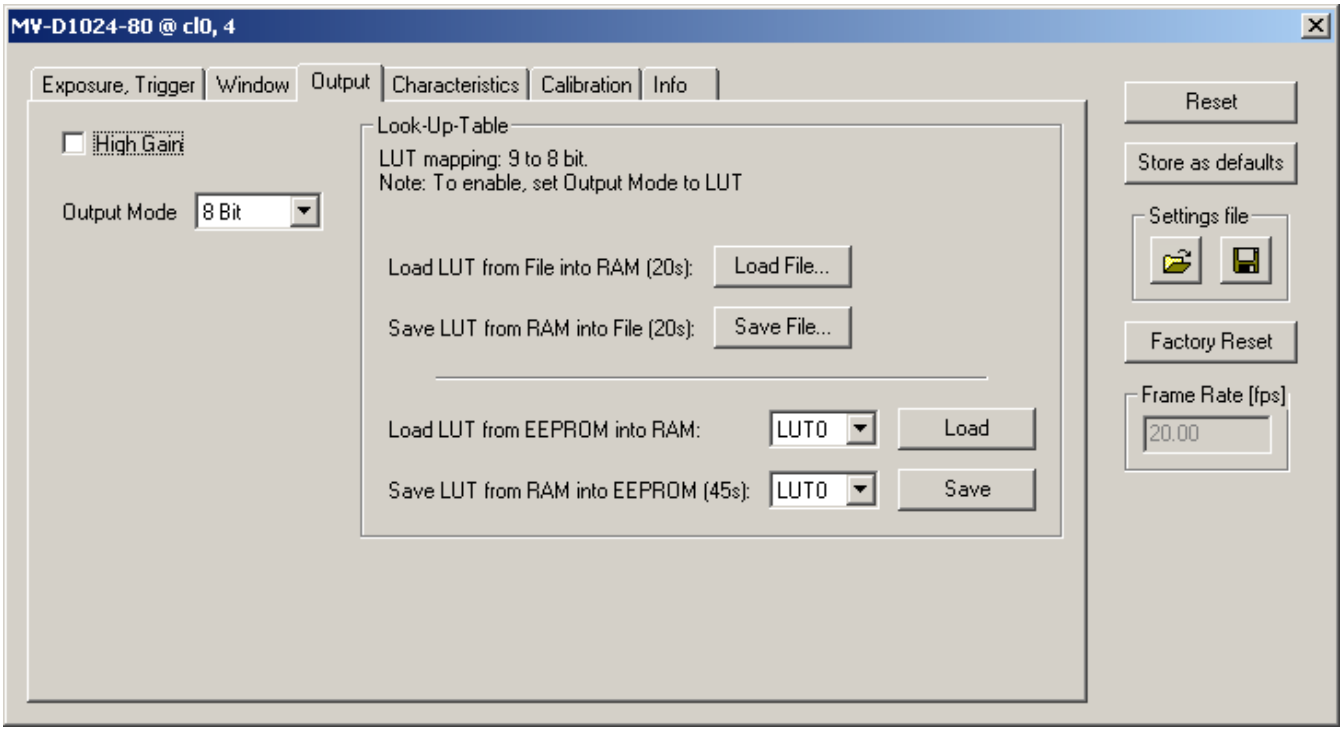
Figure 3.43. Example of a user defined LUT file for MV-D1024-28-CL



6.4. Output for MV-D1024-80-CL

This tab contains image data settings of the MV-D1024-80-CL.

Figure 3.44. MV-D1024-80-CL output panel



6.4.1. Output Mode

High Gain:

Increases the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

Gain 2X:

Digital gain 2.

LUT:

Look-Up-Table, a 9-to-8-bit mapping of gray levels.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

6.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D1024-80-CL camera performs a 9-to-8-bit mapping, so that 512 input gray levels can be mapped to 256 output gray levels (0 to 511 and 0 to 255).

This camera can save 4 different LUT's in the EEPROM. The LUT in the RAM is the active one.

Buttons:

Load File...:

Load a user defined LUT - file (*.txt tab delimited) into the RAM of the camera. There is an example in the PFRemote directory (mv_d1024_80_lut.txt).

Save File...:

Save the current LUT from RAM into a file (*.txt tab delimited).

Load:

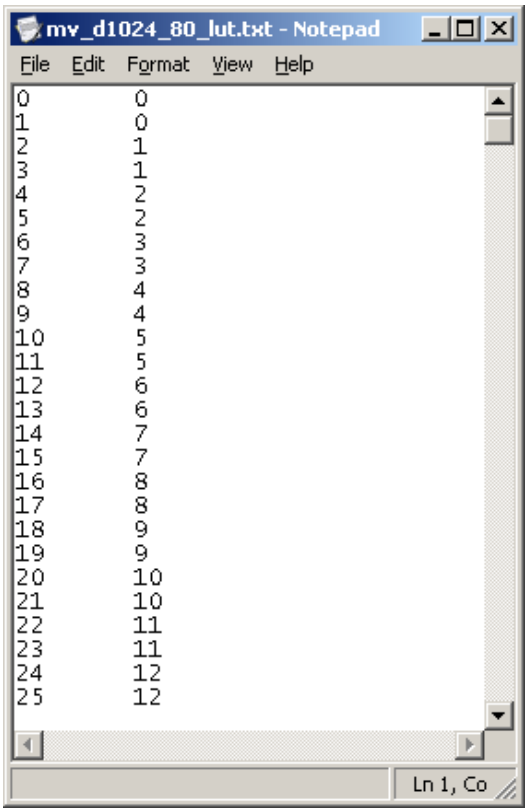
Load selected LUT from EEPROM into RAM.

Save:

Save selected LUT into EEPROM.

Example of a user defined LUT file:

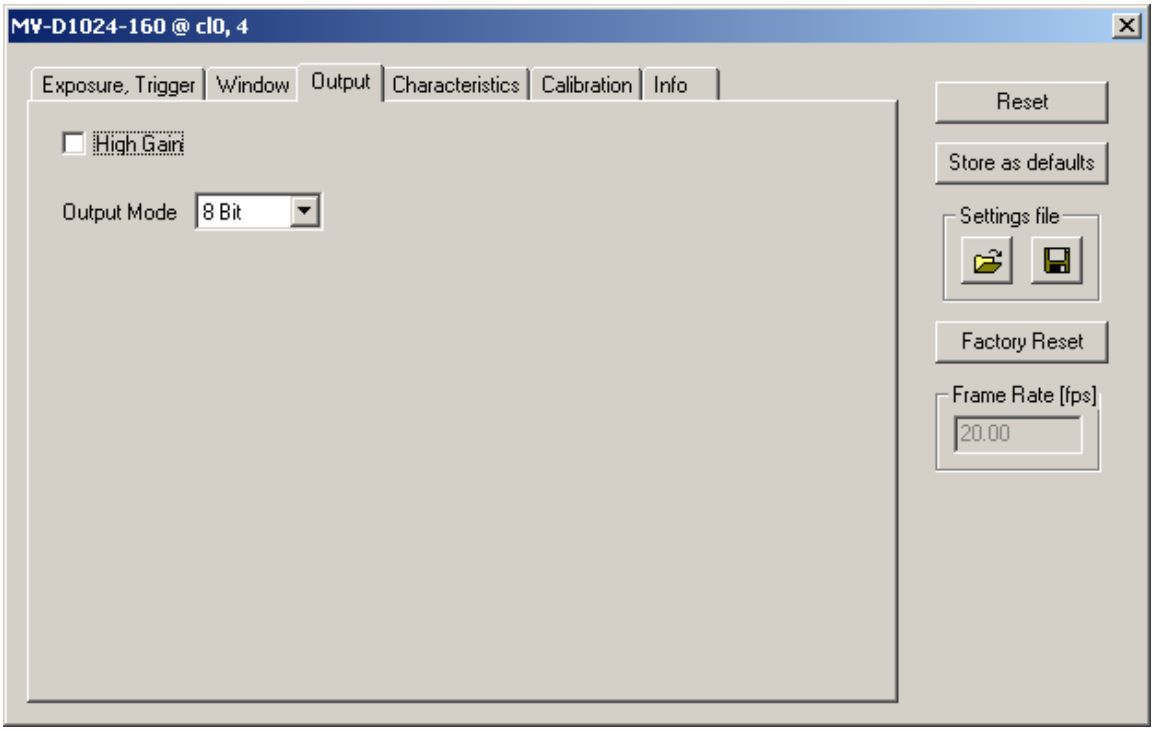
Figure 3.45. Example of a user defined LUT file for MV-D1024-80-CL



6.5. Output for MV-D1024-160-CL

This tab contains image data settings of the MV-D1024-160-CL.

Figure 3.46. MV-D1024-160-CL output panel



6.5.1. Output Mode

High Gain:

Increases the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

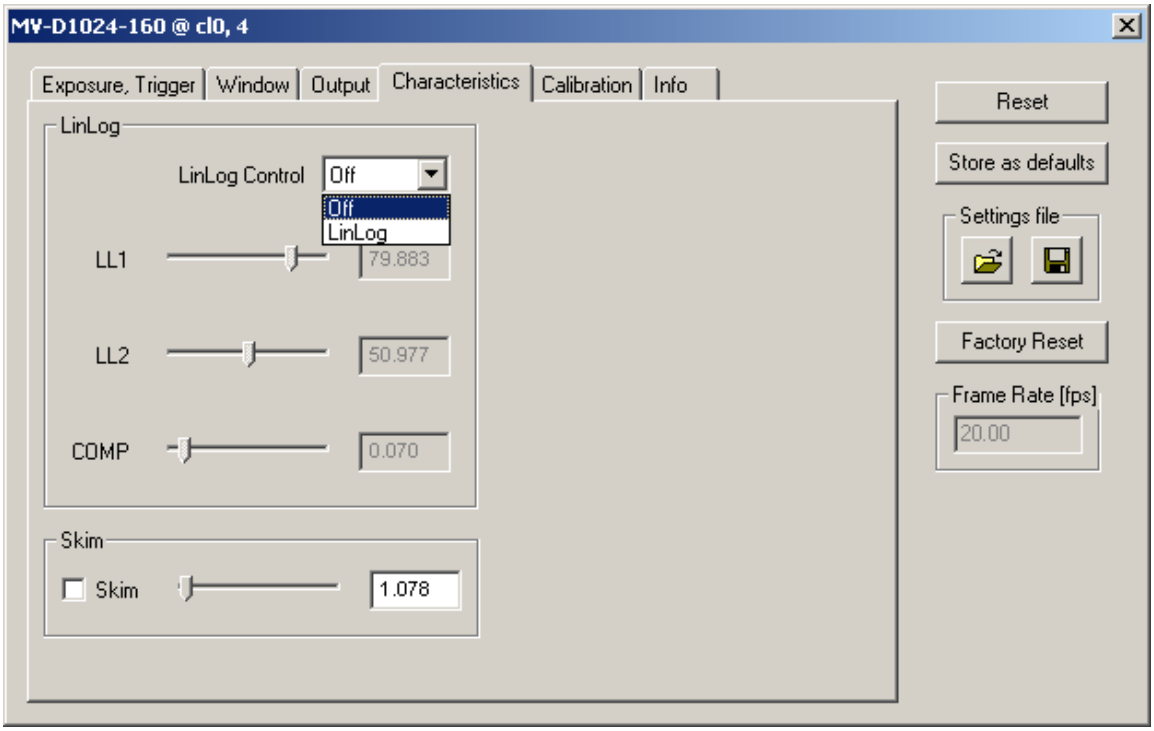
LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

6.6. Characteristics

This tab contains LinLog and Skimming settings.

Figure 3.47. MV-D1024-SERIES characteristics panel



6.6.1. LinLog

The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Control:

Off: LinLog is disabled.

LinLog: LinLog feature is enabled.

LL1:

LinLog Value 1. The higher this value, the stronger the compression.

LL2:

LinLog Value 2. The higher this value, the stronger the compression.

COMP:

COMP is a value that defines the ratio between strong and week compression.

6.6.2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image.

Skim:

Enable or disable skim. See Section 2, “Skimming”.

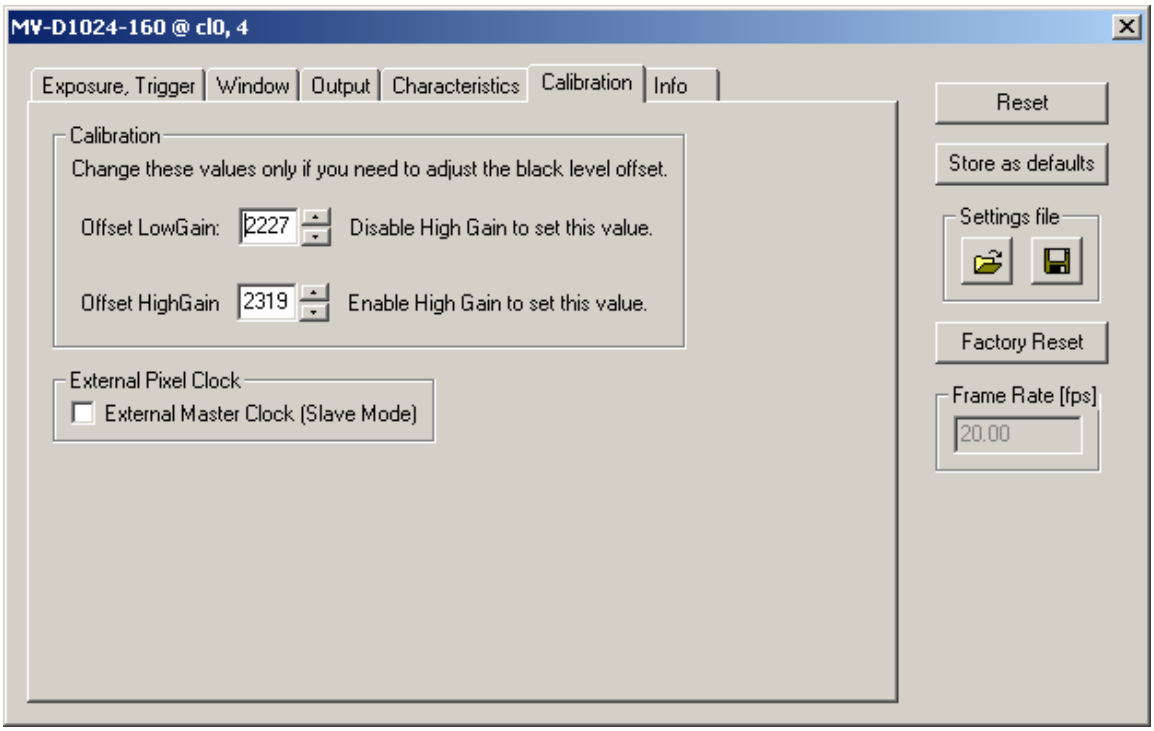
Value:

Skimming value. See Section 2, “Skimming”.

6.7. Calibration

This tab contains black level offset settings.

Figure 3.48. MV-D1024-SERIES calibration panel



6.7.1. Calibration

Offset LowGain:

Set the Offset of the camera for the mode with disabled HighGain.

Offset HighGain:

Set the Offset of the camera for the mode with enabled HighGain.

6.7.2. External Pixel Clock

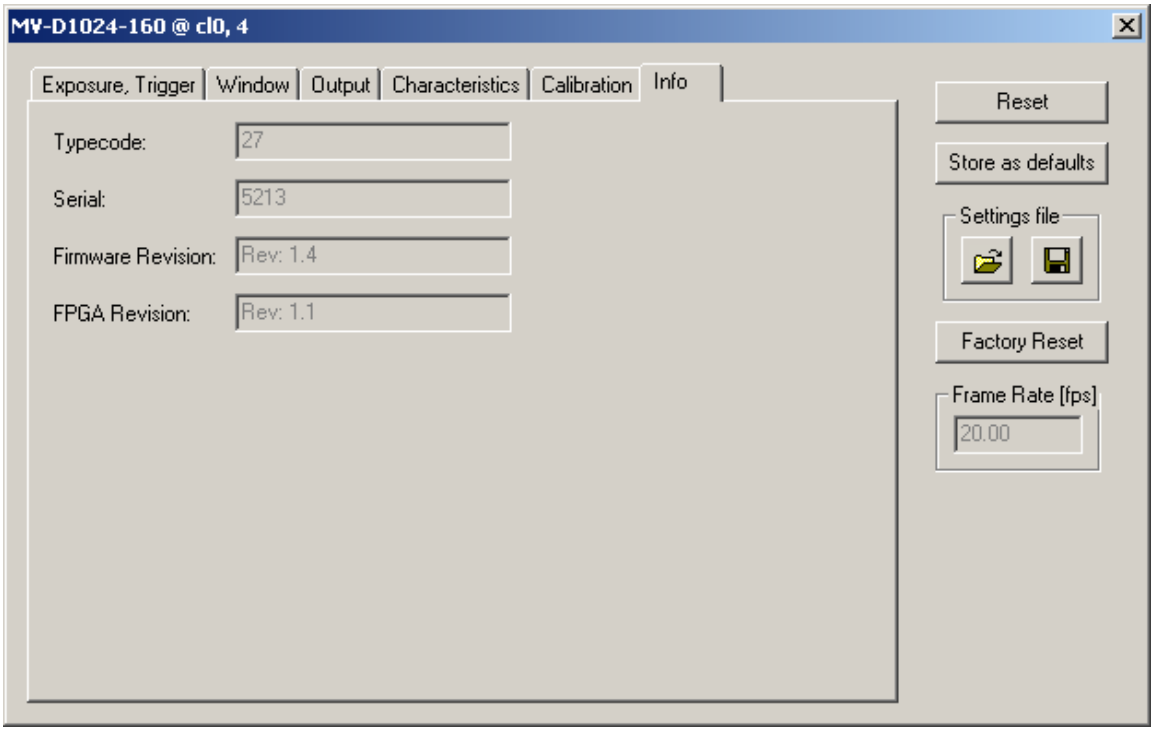
External master Clock (Slave Mode):

External pixel clock.

6.8. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA.

Figure 3.49. MV-D1024-SERIES info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

Firmware Revision:

Camera firmware revision of the connected camera.

FPGA Revision:

Firmware revision of built-in FPGA of the connected camera.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

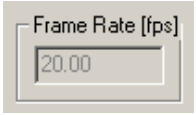
7. MV-D752 - SERIES (-28, -80, -160)

This section describe the parameters of the following cameras.

- MV-D752-28-CL
- MV-D752-80-CL
- MV-D752-160-CL

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.50. MV-D752-SERIES frame rate and average value



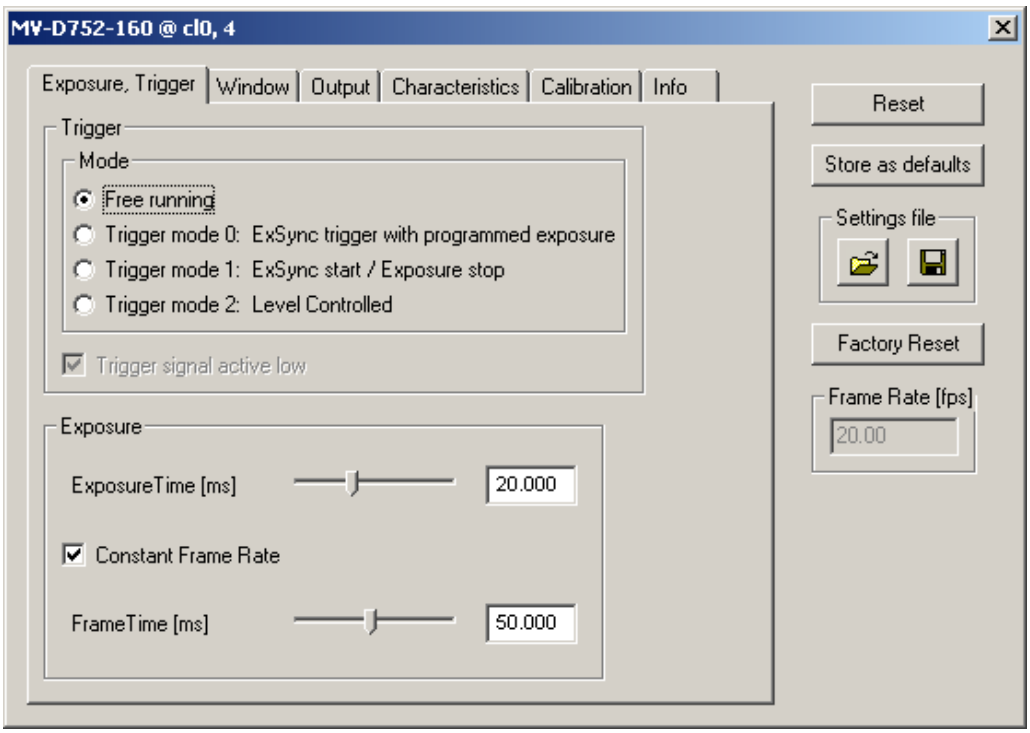
Frame Rate [fps]:

Show the actual frame rate of the camera in frames per second.

7.1. Exposure

This tab contains exposure and trigger settings.

Figure 3.51. MV-D752-SERIES exposure panel



7.1.1. Trigger

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Trigger mode 0: ExSync trigger with programmed exposure:

External trigger with programmed exposure time.

Trigger mode 1: ExSync start / Exposure stop:

External trigger start exposure time, Exposuretrigger stop exposure time.

Trigger mode 2: Level Controlled:

Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

7.1.2. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

Frame time [ms]:

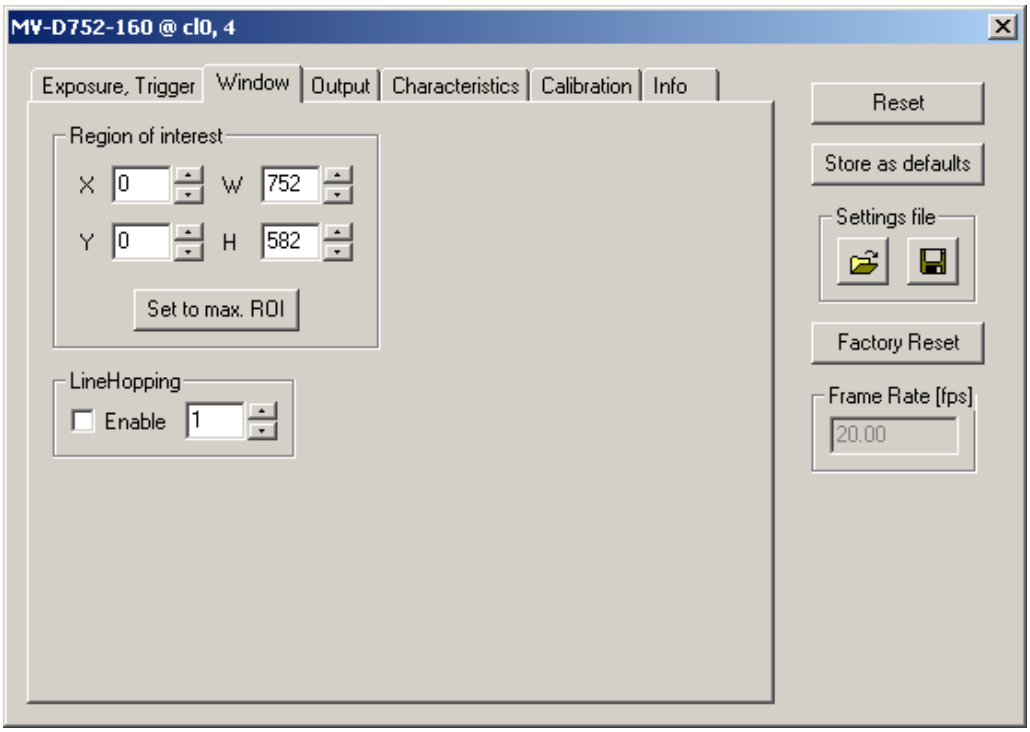
Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The exposure time sets the

minimum frame time.

7.2. Window

This tab contains ROI settings.

Figure 3.52. MV-D752-SERIES window panel



7.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=752; H=582).

7.2.2. LineHopping

LineHopping reduces the number of pixels in y-direction. LineHopping can also be used together with a ROI or MROI. LineHopping transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively.

Enable:

Enable decimation in x-direction.

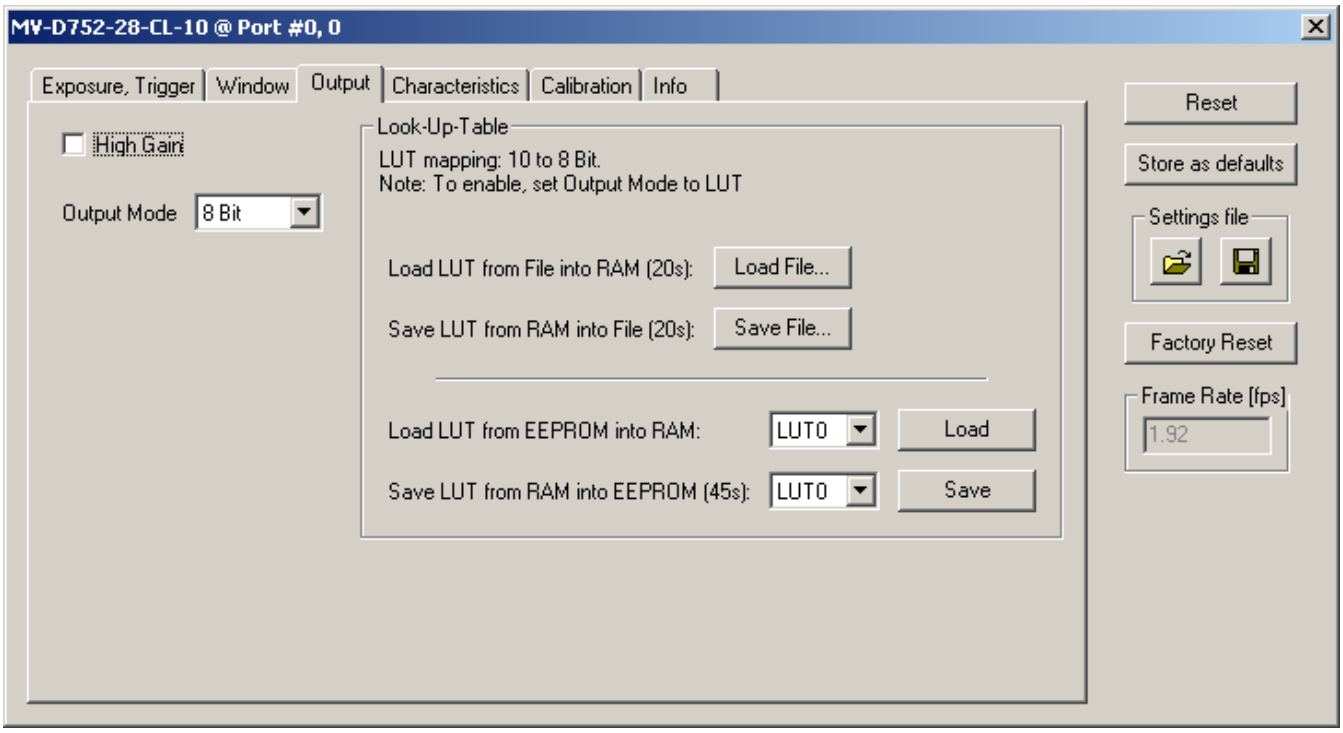
Value:

LineHopping factor. Example: Value = 4 reads every fourth line only.

7.3. Output for MV-D752-28-CL

This tab contains image data settings of the MV-D752-28-CL.

Figure 3.53. MV-D752-28-CL output panel



7.3.1. Output Mode

High Gain:

Increases the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

10 Bit:

Gray level resolution of 10 bit.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

7.3.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D752-28-CL camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

This camera can save 2 different LUT's in the EEPROM. The LUT in the RAM is the active one.

Buttons:

Load File...:

Load a user defined LUT - file (*.txt tab delimited) into the RAM of the camera. There is an example in the PFRemote directory (mv_d752_28_lut.txt).

Save File...:

Save the current LUT from RAM into a file (*.txt tab delimited).

Load:

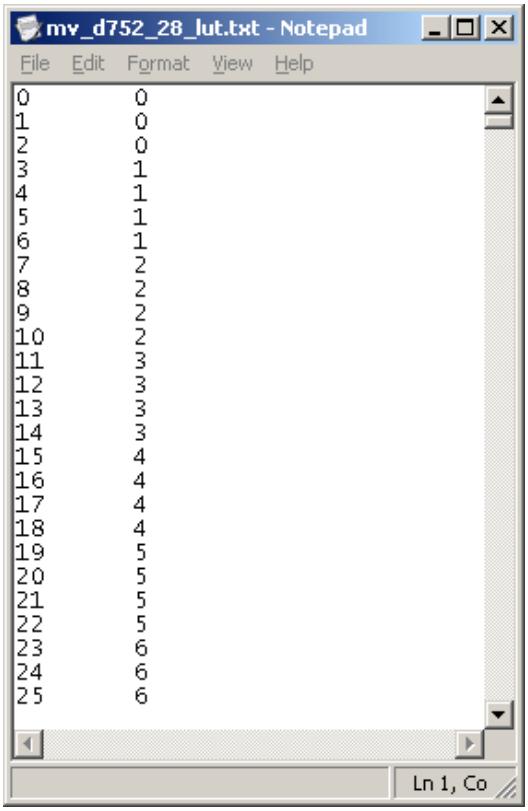
Load selected LUT from EEPROM into RAM.

Save:

Save selected LUT into EEPROM.

Example of a user defined LUT file:

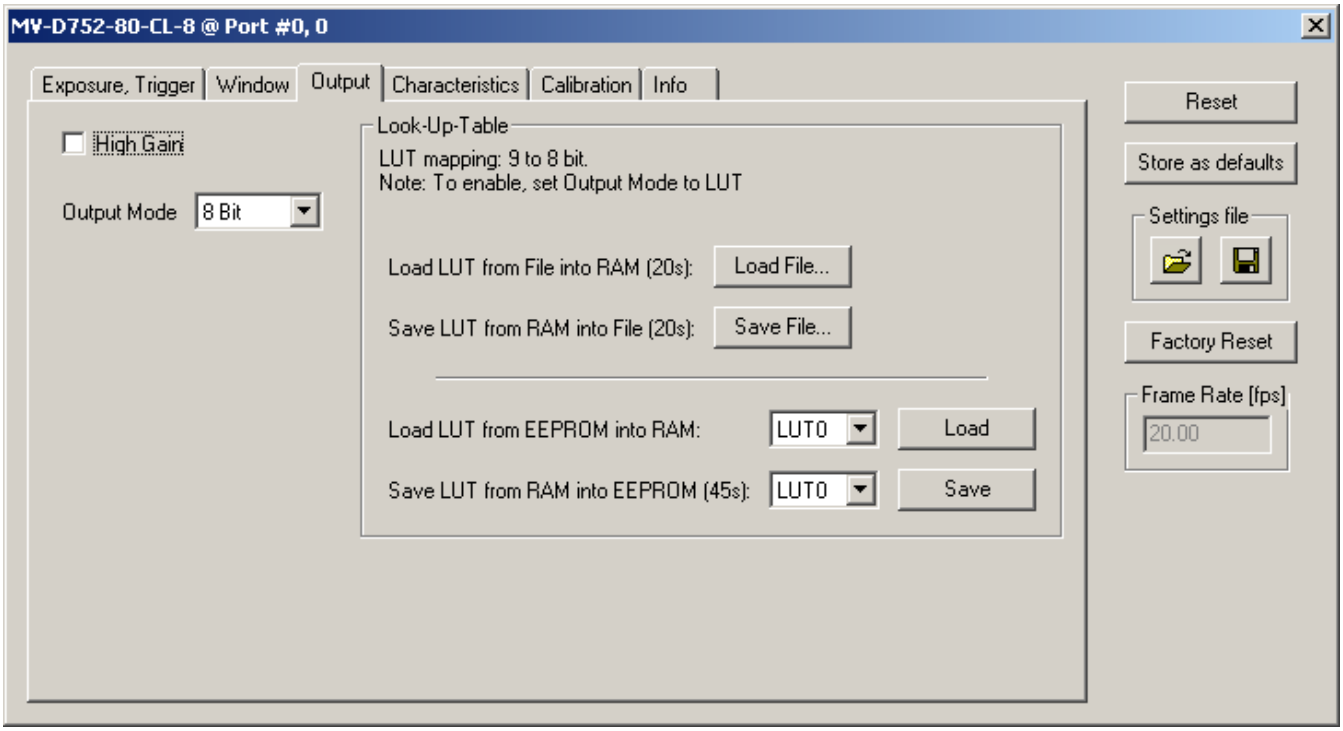
Figure 3.54. Example of a user defined LUT file for MV-D752-28-CL



7.4. Output for MV-D752-80-C

This tab contains image data settings of the MV-D752-80-CL.

Figure 3.55. MV-D752-80-CL output panel



7.4.1. Output Mode

High Gain:

Increases the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

Gain 2X:

Digital gain 2.

LUT:

Look-Up-Table, a 9-to-8-bit mapping of gray levels.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

7.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV-D752-80-CL camera performs a 9-to-8-bit mapping, so that 512 input gray levels can be mapped to 256 output gray levels (0 to 511 and 0 to 255).

This camera can save 4 different LUT's in the EEPROM. The LUT in the RAM is the active one.

Buttons:

Load File...:

Load a user defined LUT - file (*.txt tab delimited) into the RAM of the camera. There is an example in the PFRemote directory (mv_d752_80_lut.txt).

Save File...:

Save the current LUT from RAM into a file (*.txt tab delimited).

Load:

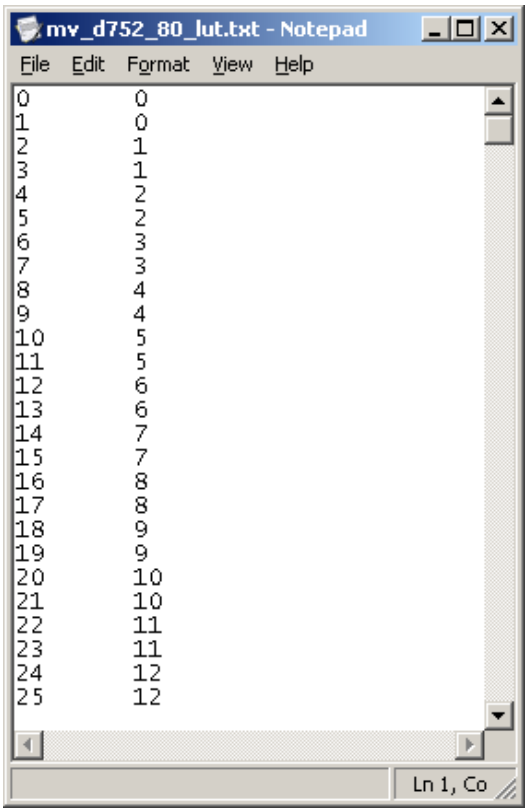
Load selected LUT from EEPROM into RAM.

Save:

Save selected LUT into EEPROM.

Example of a user defined LUT file:

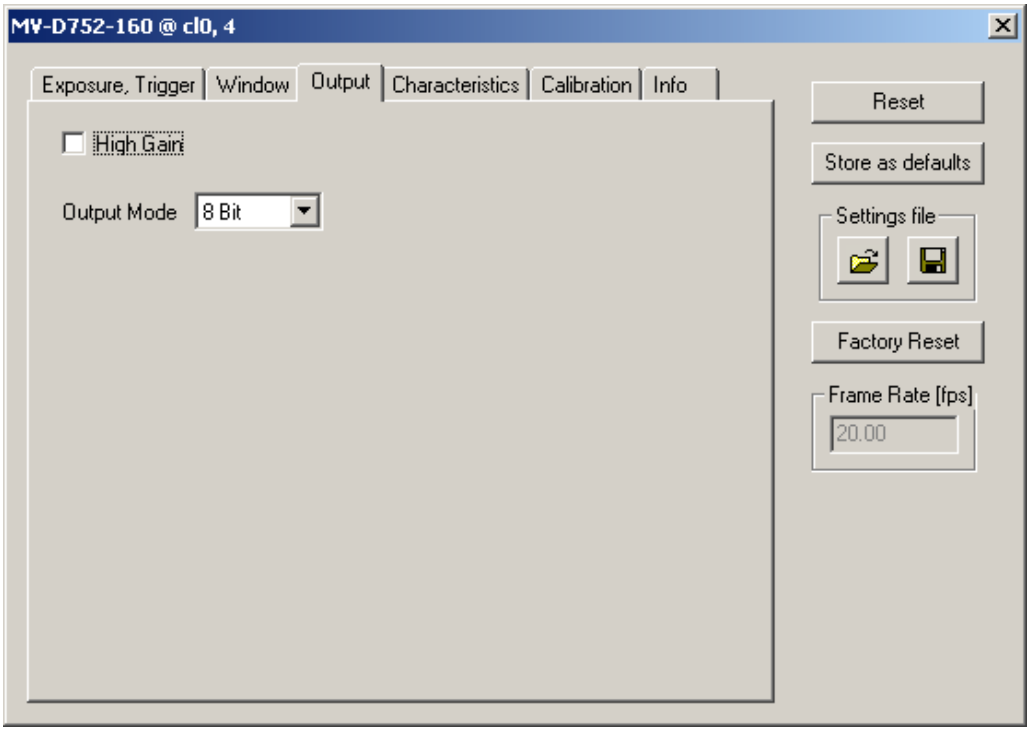
Figure 3.56. Example of a user defined LUT file for MV-D752-80-CL



7.5. Output for MV-D752-160-CL

This tab contains image data settings of the MV-D752-160-CL.

Figure 3.57. MV-D752-160-CL output panel



7.5.1. Output Mode

High Gain:

Increase the gain in the analog path by a factor 4 and thus makes the camera more sensitive.

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

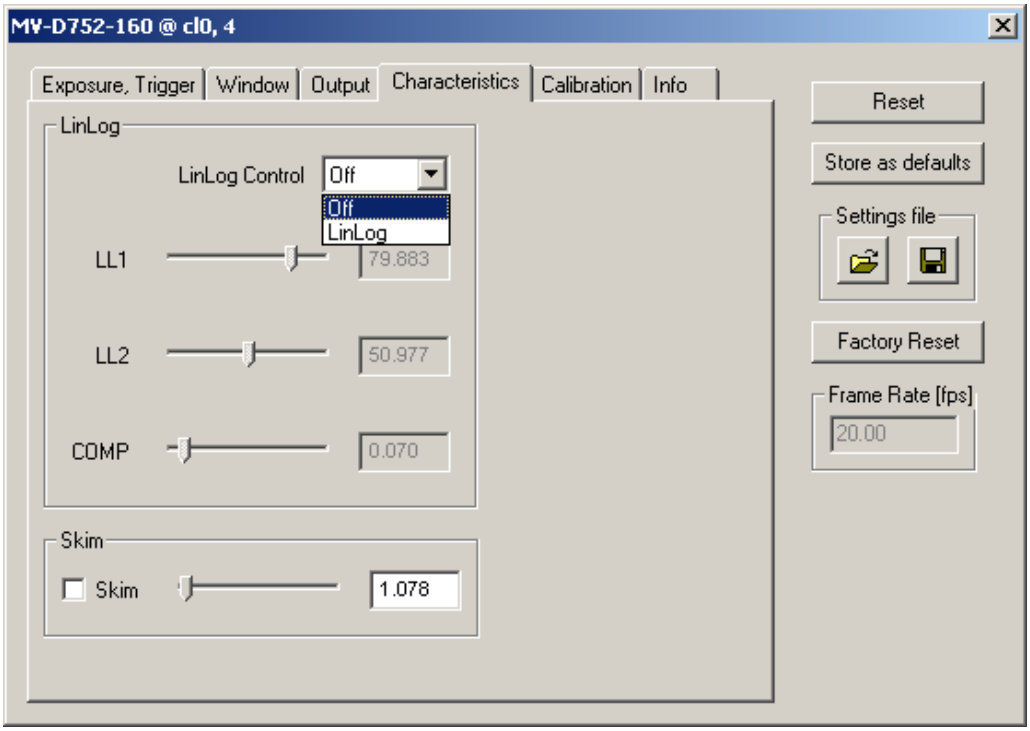
LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

7.6. Characteristics

This tab contains LinLog and Skimming settings.

Figure 3.58. MV-D752-SERIES characteristics panel



7.6.1. LinLog

The LinLog technology from Photonfocus allows a logarithmic compression of high light intensities. In contrast to the classical non-integrating logarithmic pixel, the LinLog pixel is an integrating pixel with global shutter and the possibility to control the transition between linear and logarithmic mode (Section 1, “LinLog”). There are 3 predefined LinLog settings available. Alternatively, custom settings can be defined in the **User defined** Mode.

LinLog Control:

Off: LinLog is disabled.

LinLog: LinLog feature is enabled.

LL1:

LinLog Value 1. The higher this value, the stronger the compression.

LL2:

LinLog Value 2. The higher this value, the stronger the compression.

COMP:

COMP is a value that defines the ratio between strong and week compression.

7.6.2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image.

Skim:

Enable or disable skim. See Section 2, “Skimming”.

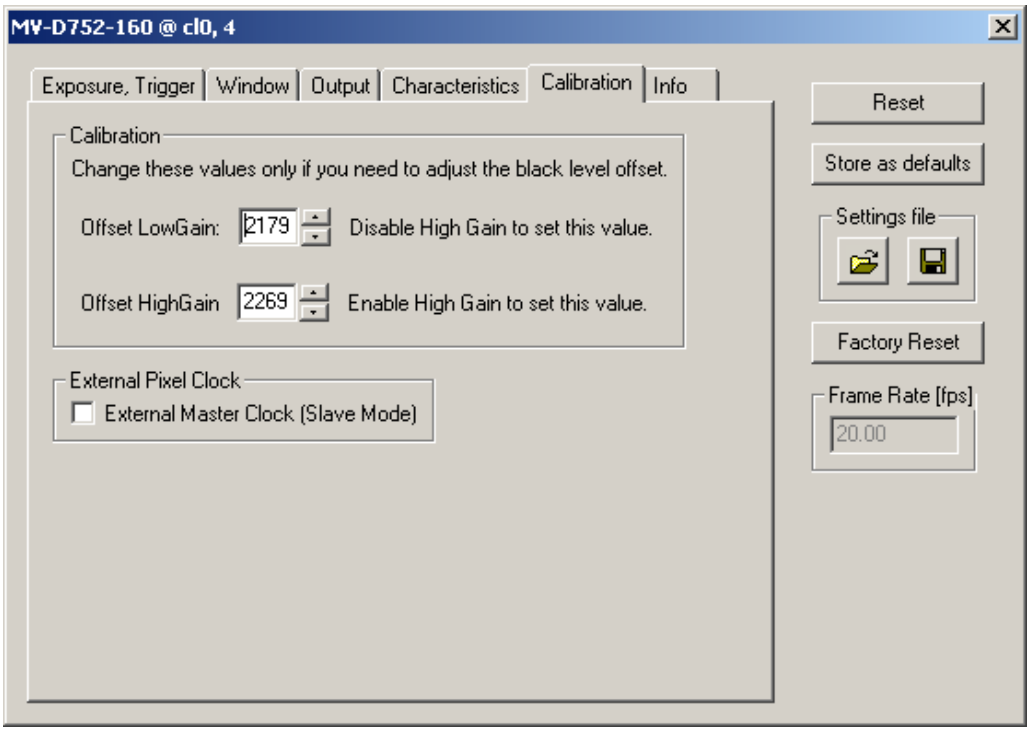
Value:

Skimming value. See Section 2, “Skimming”.

7.7. Calibration

This tab contains black level offset settings

Figure 3.59. MV-D752-SERIES calibration panel



7.7.1. Calibration

Offset LowGain:

Set the Offset of the camera for the mode with disabled HighGain.

Offset HighGain:

Set the Offset of the camera for the mode with enabled HighGain.

7.7.2. External Pixel Clock

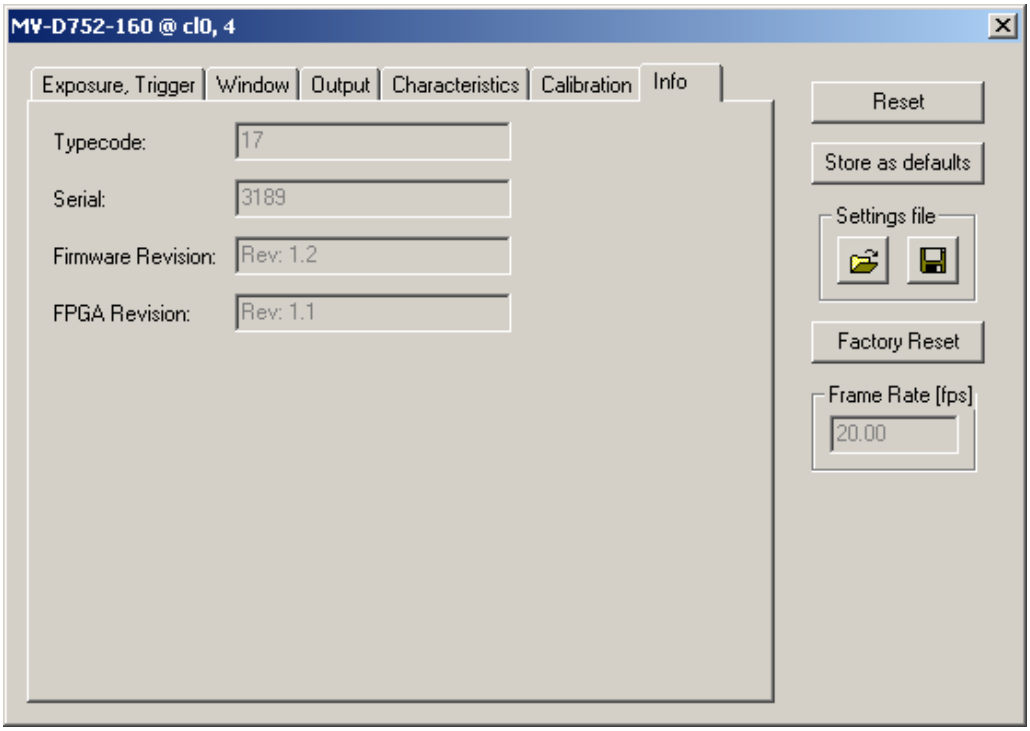
External master Clock (Slave Mode):

External pixel clock.

7.8. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA.

Figure 3.60. MV-D752-SERIES info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

Firmware Revision:

Camera firmware revision of the connected camera.

FPGA Revision:

Firmware revision of built-in FPGA of the connected camera.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

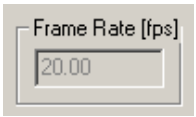
8. MV-D640(C) - SERIES

This section describes the parameters of the following cameras.

- MV-D640-33-CL, CameraLink interface
- MV-D640C-33-CL, CameraLink interface, color
- MV-D640-66-CL, CameraLink interface
- MV-D640C-66-CL, CameraLink interface, color
- MV-D640-48-U2, USB interface
- MV-D640C-48-U2, USB interface, color

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.61. MV-D640(C)-SERIES frame rate and average value



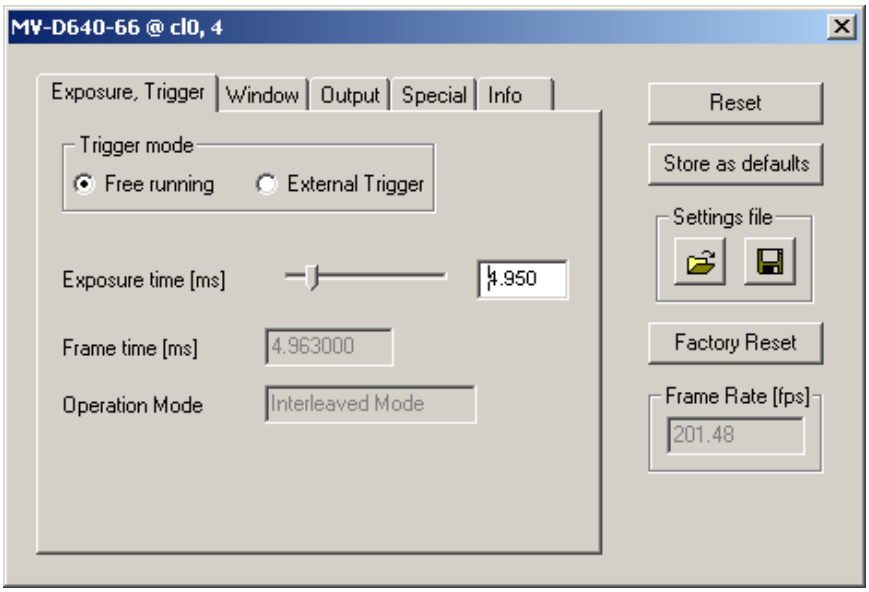
Frame Rate [fps]:

Show the actual frame rate of the camera in frames per second if the trigger mode is in free running. In external trigger mode it shows the maximum possible frame rate.

8.1. Exposure

This tab contains exposure and trigger settings.

Figure 3.62. MV-D640(C)-SERIES exposure and trigger panel



8.1.1. Trigger mode

Free running:

The camera continuously delivers images with a certain configurable frame rate.

External Trigger:

External trigger with programmed exposure time.

8.1.2. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

Frame time [ms]:

Shows the frame time of the camera in milliseconds.

Operation Mode:

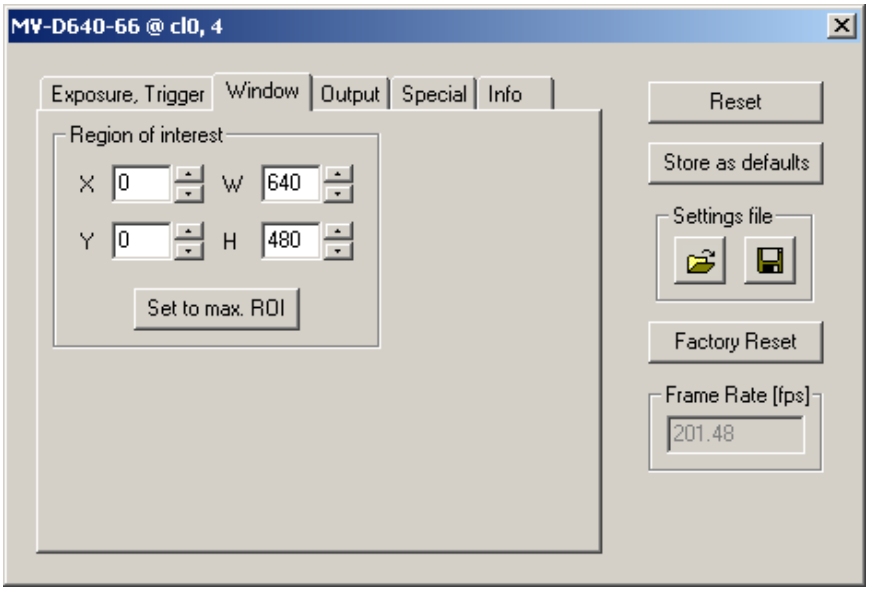
Shows whether the camera works in "Interleaved Mode" or in "Non-Interleaved Mode".

If the trigger is in external trigger mode, the camera works only in "Non-Interleaved-Mode".

8.2. Window

This tab contains ROI settings.

Figure 3.63. MV-D640(C)-SERIES window panel



8.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width.

H:

Window height.

Set to max ROI:

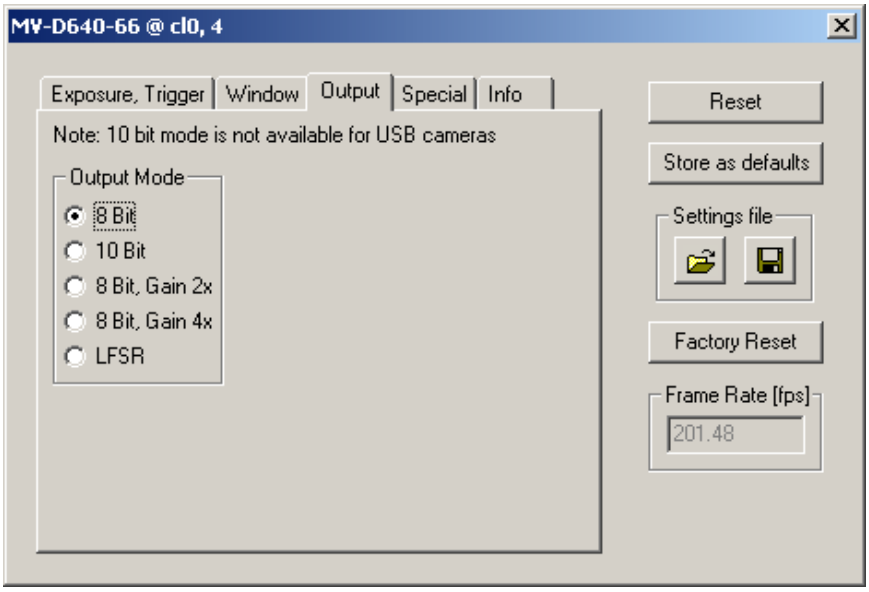
Set Window to maximal ROI (X=0; Y=0; W=640; H=480).

> **Note**
>
> For USB Cameras: W * H > 1024.

8.3. Output

This tab contains image data settings.

Figure 3.64. MV-D640(C)-SERIES output panel



8.3.1. Output Mode

Output Mode:

8 Bit:

Normal mode, gray level resolution of 8 bit.

10 Bit:

Gray level resolution of 10 bit (not available for USB cameras).

8 Bit, Gain 2x:

Gray level resolution of 8 bit and gain 2.

8 Bit Gain 4x:

Gray level resolution of 8 bit and gain 4.

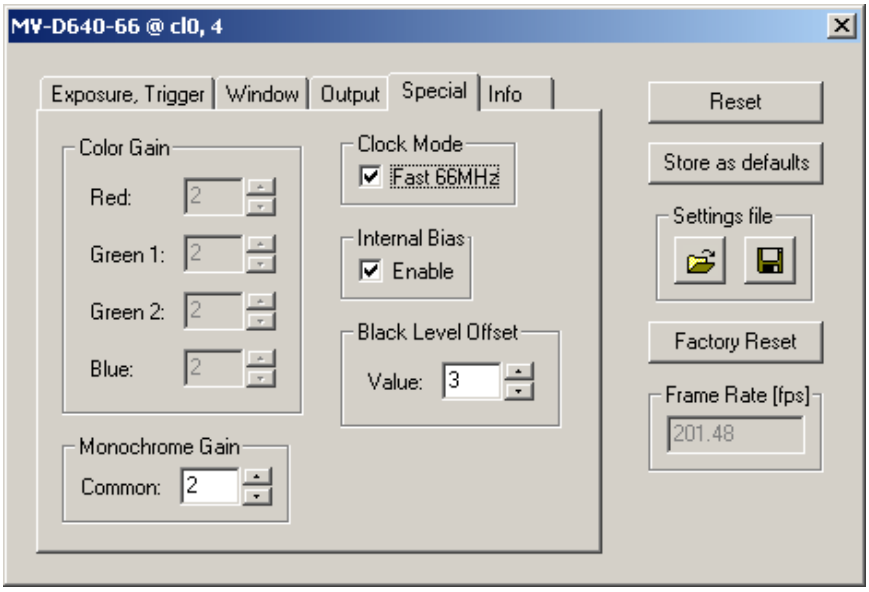
LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

8.4. Special

This tab contains gain and clock settings.

Figure 3.65. MV-D640(C)-SERIES special panel



8.4.1. Color Gain (only for color cameras)

Red: Color gain control for red.

Green1: Color gain control for green1.

Green2: Color gain control for green2.

Blue: Color gain control for blue.

8.4.2. Monochrome Gain (only for monochrome cameras)

Common gain control.

8.4.3. Clock Mode (only available for MV-D640(C)-66-CL)

Change pixel clock of camera.

Disabled: Camera clock: 33MHz.

Enabled: Camera clock: 66MHz.

8.4.4. Internal Bias

Enabled: Default mode.

Disabled: When experiencing randomly moving white pixel, disable the internal bias. Depending on the gain settings, the column noise may be increased.

8.4.5. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

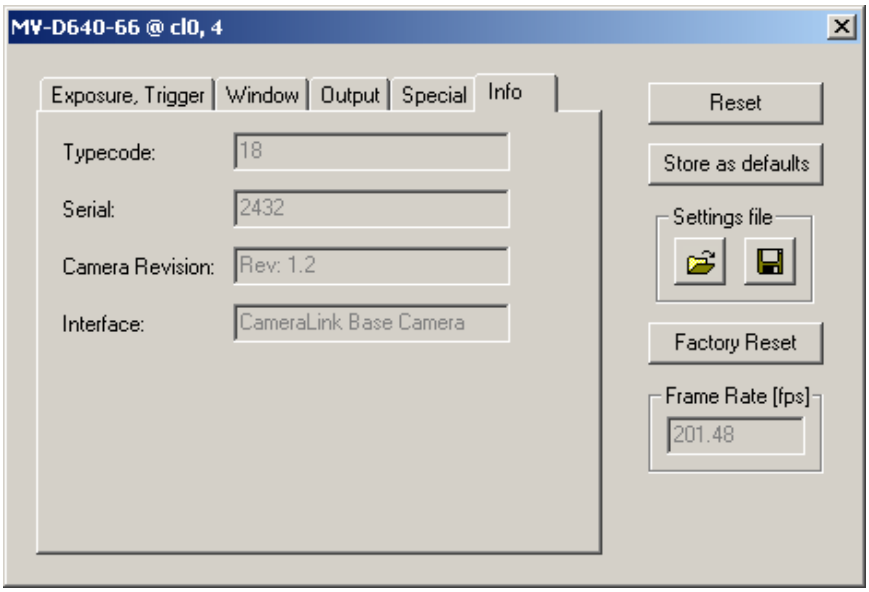
Black Level Offset:

Black level offset value. Use this to adjust the black level.

8.5. Info

This panel shows camera specific information such as type code, serial number, camera revision and camera interface.

Figure 3.66. MV-D640(C)-SERIES info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

Camera Revision:

Revision of the connected camera.

Interface:

Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

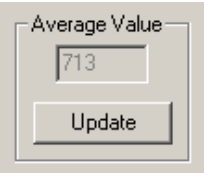
9. DS1-D1024-40

This section describes the parameters of the following cameras:

- DS1-D1024-40-CL, CameraLink interface
- DS1-D1024-40-U2, USB 2.0 interface

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.67. DS1-D1024-40 average value



Average Value:

Gray scale average of the actual image. This value is in 10 bit (0...1023).

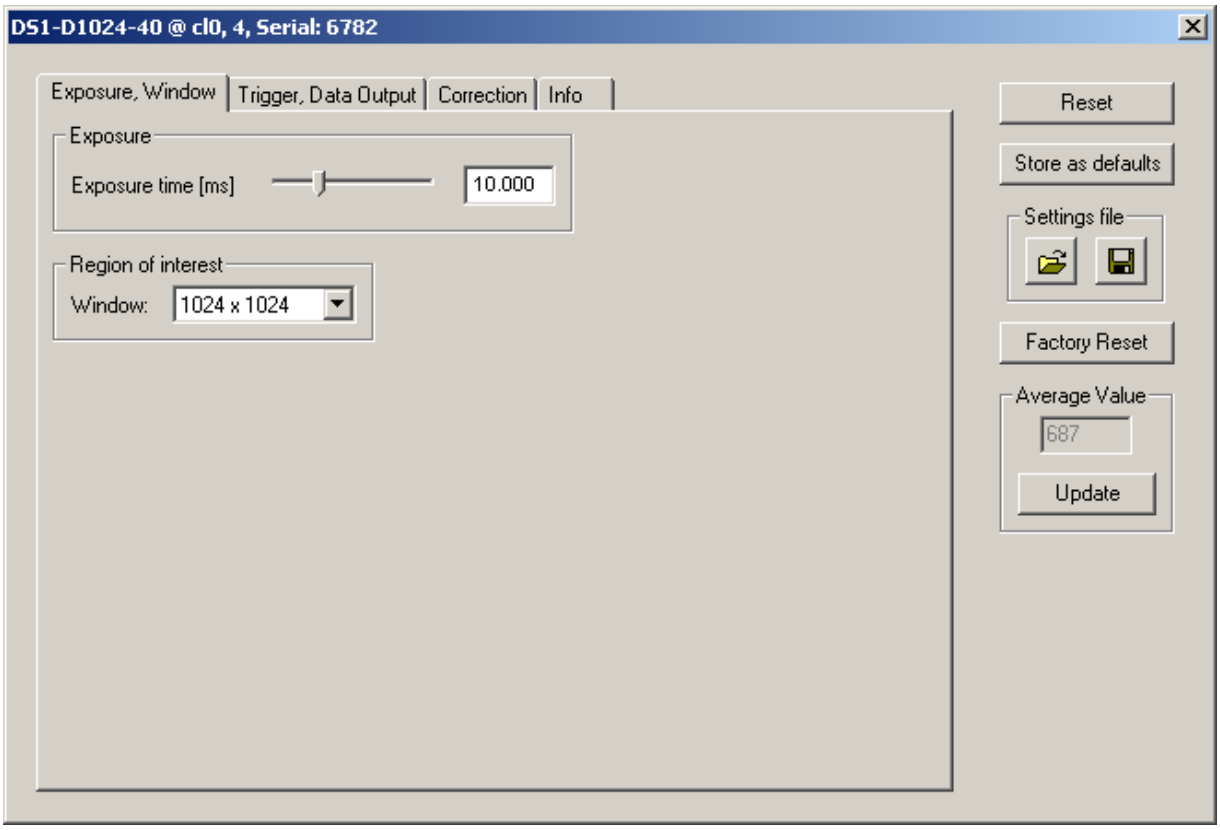
Update:

To update the value of the average, click on this button.

9.1. Exposure, Window

This tab contains exposure time and ROI settings.

Figure 3.68. DS1-D1024-40 exposure and window panel



9.1.1. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

9.1.2. Region of Interest

There are four predefined regions of interest available:

1024 x 1204:

A region of interest with the size of 1024 x 1024 pixel.

1024 x 512:

A region of interest with the size of 1024 x 512 pixel.

1024 x 256:

A region of interest with the size of 1024 x 256 pixel.

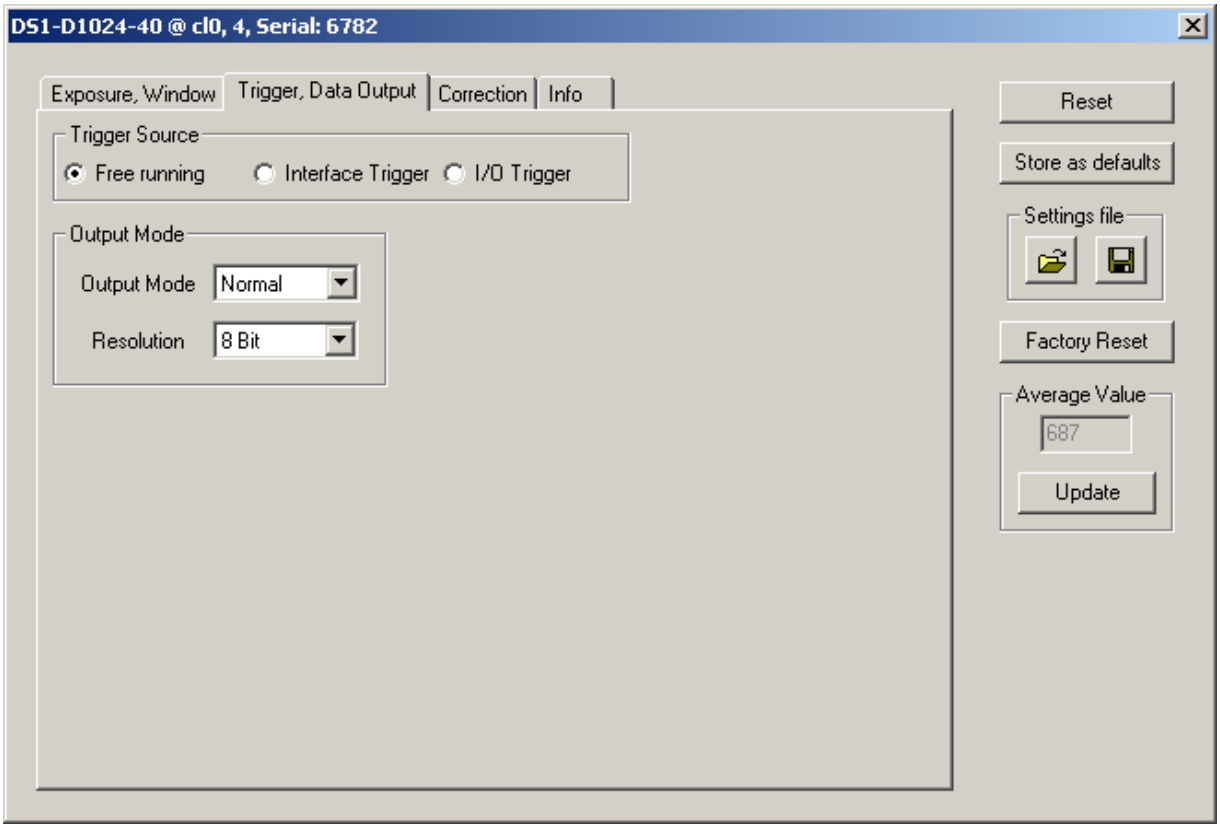
512 x 512:

A region of interest with the size of 512 x 512 pixel.

9.2. Trigger

This tab contains trigger and data output settings.

Figure 3.69. DS1-D1024-40 trigger and data output panel



9.2.1. Trigger

Trigger Source options are:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera via the power supply connector.

9.2.2. Output Mode

Output Mode options are:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

Resolution options are:

8 Bit:

Gray level resolution of 8 bit.

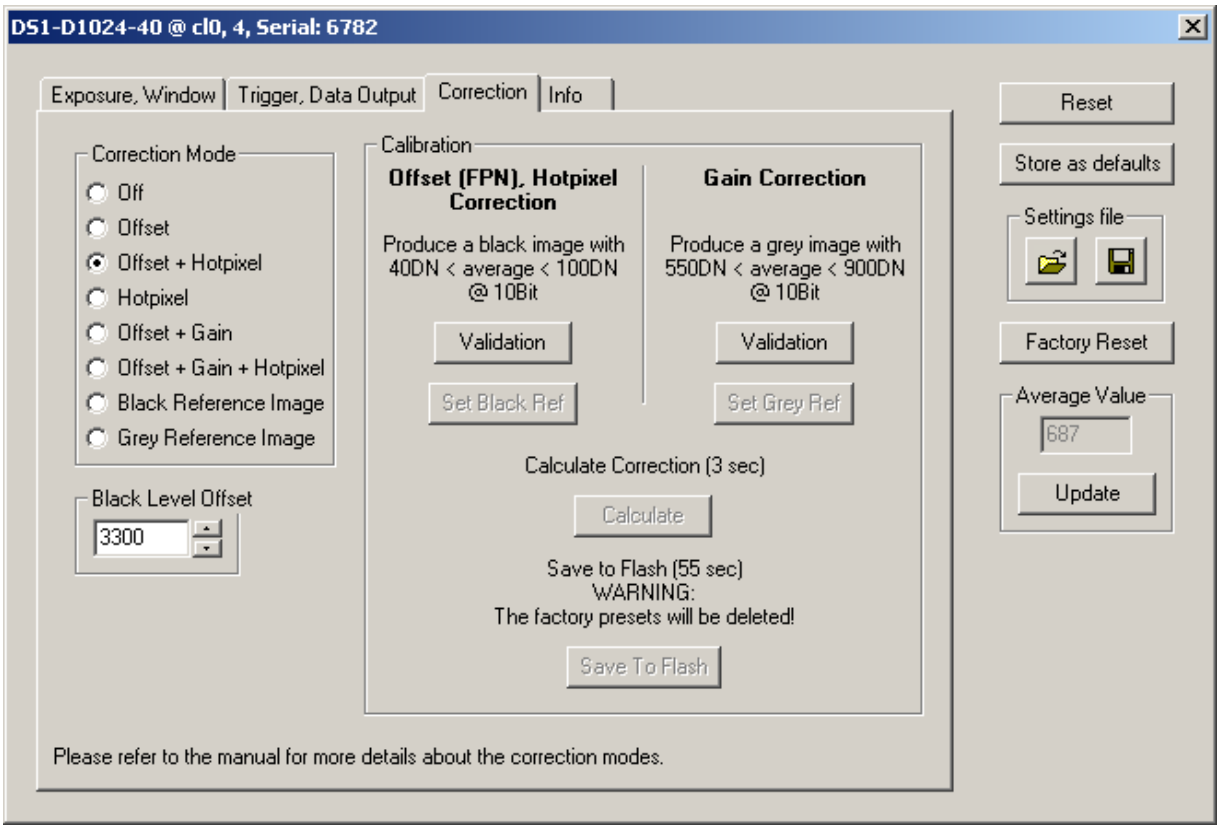
10 Bit:

Gray level resolution of 10 bit.

9.3. Correction

This tab contains correction settings.

Figure 3.70. DS1-D1024-40 correction panel



9.3.1. Correction Mode

The camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction.

Offset + Hotpixel:

Activate offset and hot pixel correction.

Hotpixel:

Activate hot pixel correction.

Offset + Gain:

Activate offset and gain correction.

Offset + Gain + Hotpixel:

Activate offset, gain and hot pixel correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

9.3.2. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

Black Level Offset:

Black level offset value. Use this to adjust the black level.

9.3.3. Calibration

Offset (FPN), Hotpixel Correction:

The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change the Property **Voltage.BlackLevelOffset** until the average value of the image is between 40 and 100 DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction are needed it is not necessary to calibrate a gray image.

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average value between 550 and 900 DN. Click on the Validation button to check the average value. If the average value is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

Save the current correction values to the internal flash memory.

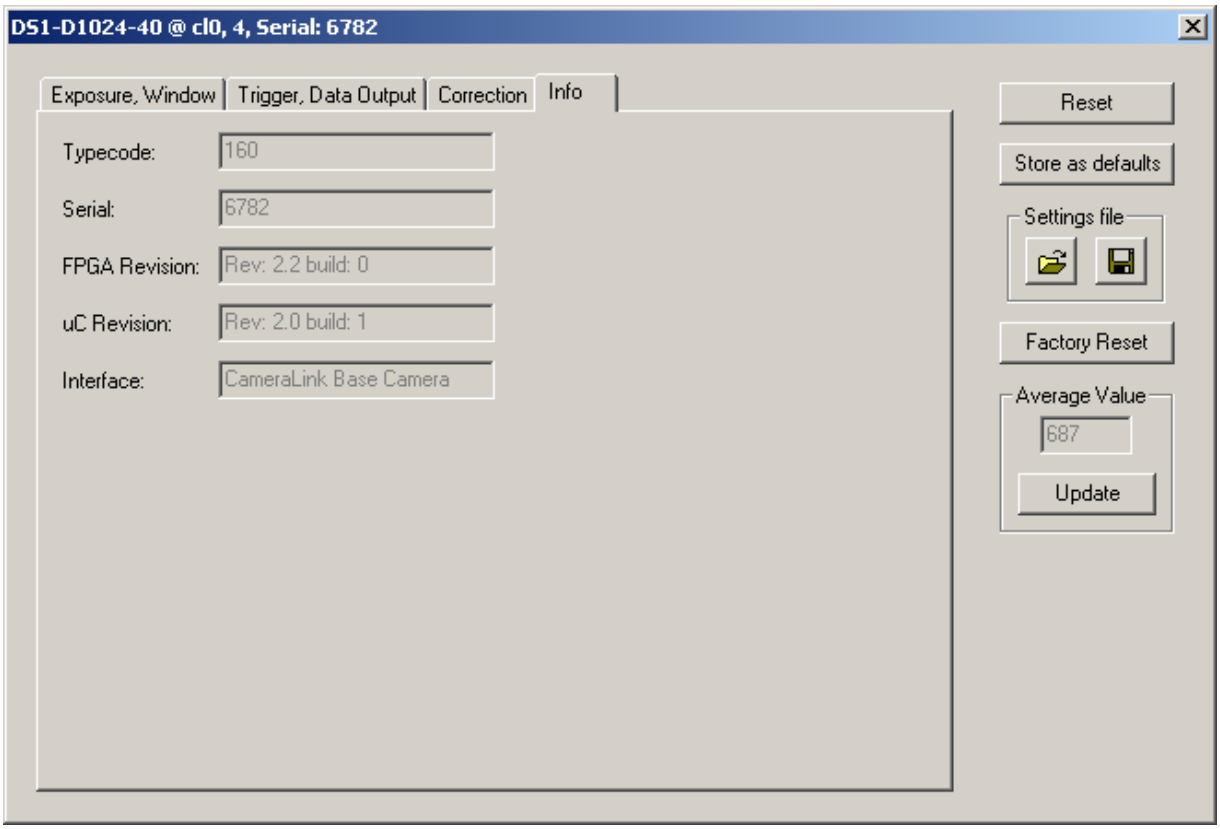
> **Warning**
>
> This will overwrite the factory presets.

9.4. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and

microcontroller and the description of the camera interface.

Figure 3.71. DS1-D1024-40 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Revision:

Firmware revision of built-in FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

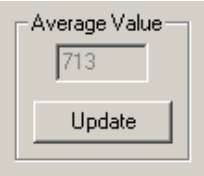
10. DS1-D1024-80 and DS1-D1024-160

This section describes the parameters of the following cameras:

- DS1-D1024-80-CL, CameraLink interface
- DS1-D1024-160-CL, CameraLink interface

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.72. DS1-D1024-160 average value



Average Value:

Gray scale average of the actual image. This value is in 10 bit (0...1023).

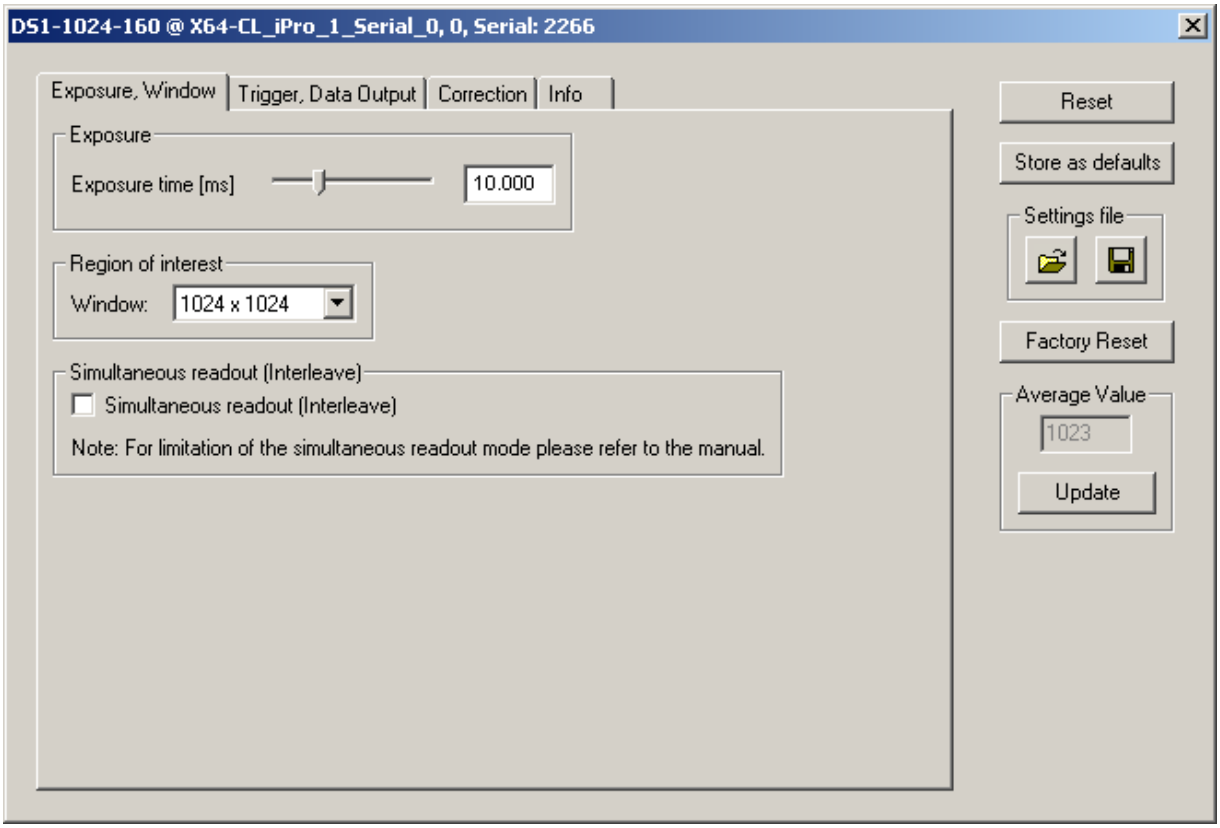
Update:

To update the value of the average, click on this button.

10.1. Exposure, Window

This tab contains exposure time and ROI settings.

Figure 3.73. DS1-D1024-160 exposure and window panel



10.1.1. Exposure

Exposure time [ms]:

Configure the exposure time in milliseconds.

10.1.2. Region of Interest

There are four predefined regions of interest available:

1024 x 1204:

A region of interest with the size of 1024 x 1024 pixel.

1024 x 512:

A region of interest with the size of 1024 x 512 pixel.

1024 x 256:

A region of interest with the size of 1024 x 256 pixel.

512 x 512:

A region of interest with the size of 512 x 512 pixel.

10.1.3. Simultaneous readout (Interleave)

The simultaneous readout mode allows higher frame rate.

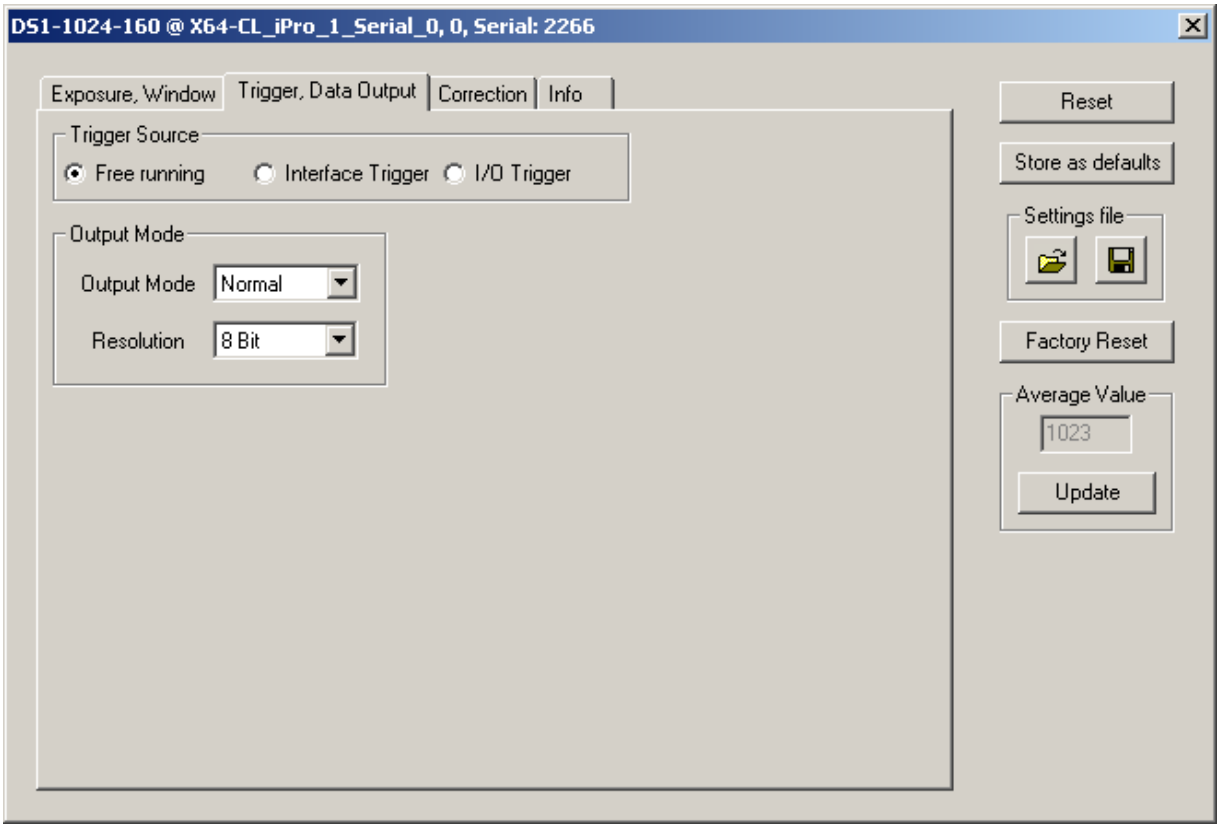
Simultaneous readout (Interleave):

Enable the simultaneous readout mode.

10.2. Trigger

This tab contains trigger and data output settings.

Figure 3.74. DS1-D1024-160 trigger and data output panel



10.2.1. Trigger

Trigger Source options are:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera on the power supply connector.

10.2.2. Output Mode

Output Mode options are:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

Resolution options are:

8 Bit:

Gray level resolution of 8 bit.

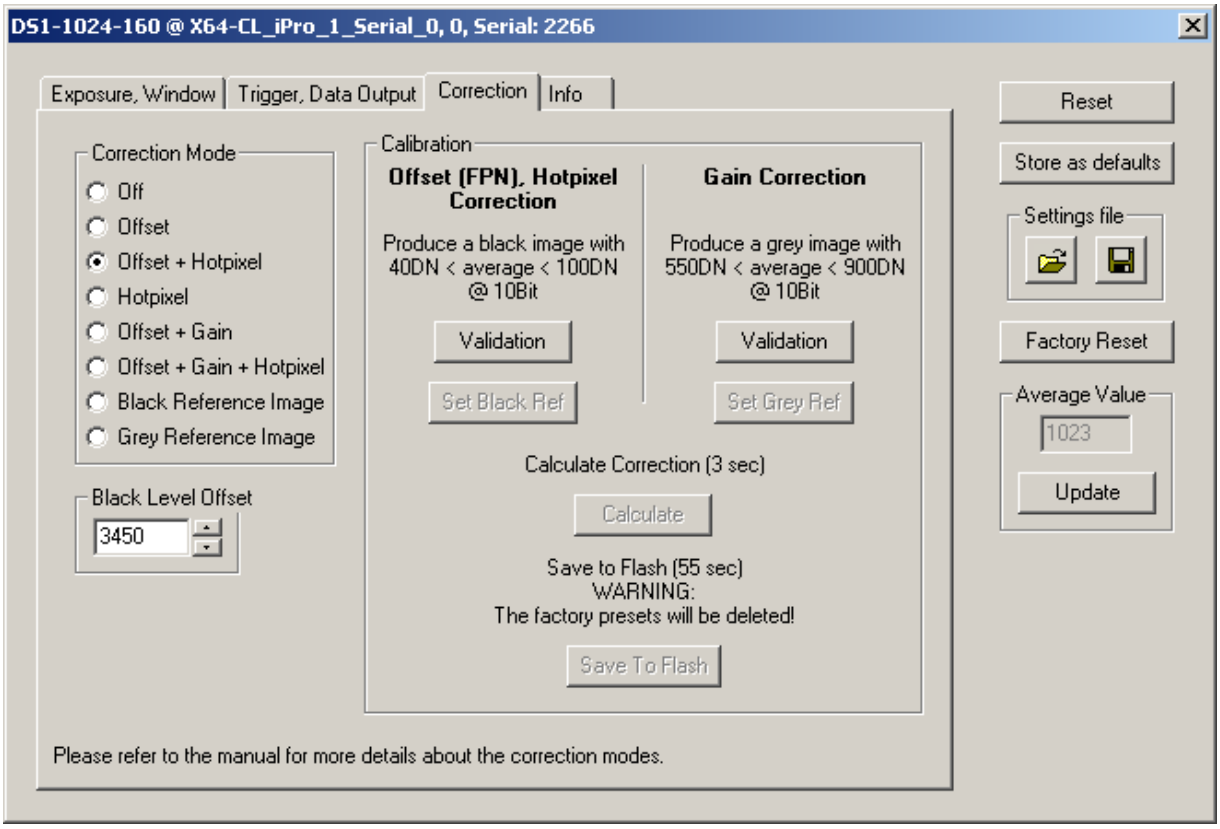
10 Bit:

Gray level resolution of 10 bit.

10.3. Correction

This tab contains correction settings.

Figure 3.75. DS1-D1024-160 correction panel



10.3.1. Correction Mode

The camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction.

Offset + Hotpixel:

Activate offset and hot pixel correction.

Hotpixel:

Activate hot pixel correction.

Offset + Gain:

Activate offset and gain correction.

Offset + Gain + Hotpixel:

Activate offset, gain and hot pixel correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

10.3.2. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

Black Level Offset:

Black level offset value. Use this to adjust the black level.

10.3.3. Calibration

Offset (FPN), Hotpixel Correction:

The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change the Property **Voltage.BlackLevelOffset** until the average value of the image is between 40 and 100 DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction are needed it is not necessary to calibrate a gray image.

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average value between 550 and 900 DN. Click on the Validation button to check the average value. If

the average value is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

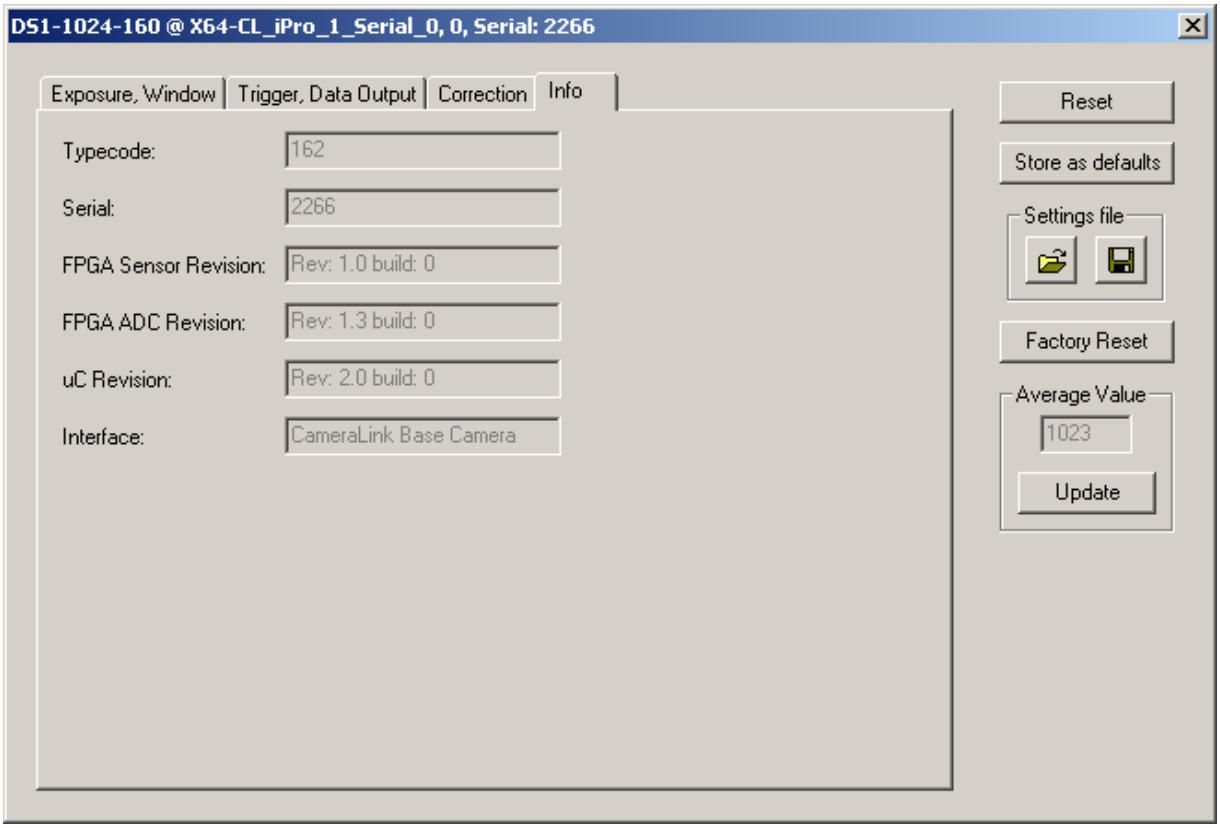
Save the current correction values to the internal flash memory.

> **Warning**
>
> This will overwrite the factory presets.

10.4. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and microcontroller and the description of the camera interface.

Figure 3.76. DS1-D1024-160 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Sensor Revision:

Firmware revision of built-in Sensor FPGA of the connected camera.

FPGA ADC Revision:

Firmware revision of built-in ADC FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

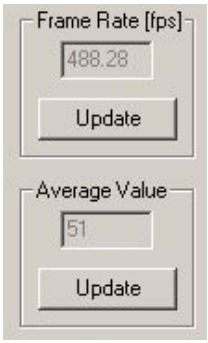
Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

11. MV2-D1280-640-CL

The following sections are grouped according to the tabs in the configuration dialog.

Figure 3.77. Frame rate and average value



Frame Rate [fps]

Shows the actual frame rate of the camera in frames per second.

Update:

To update the value of the frame rate, click on this button.

Average Value:

Grayscale average of the actual image. This value is in 8 bit (0...255 DN) format.

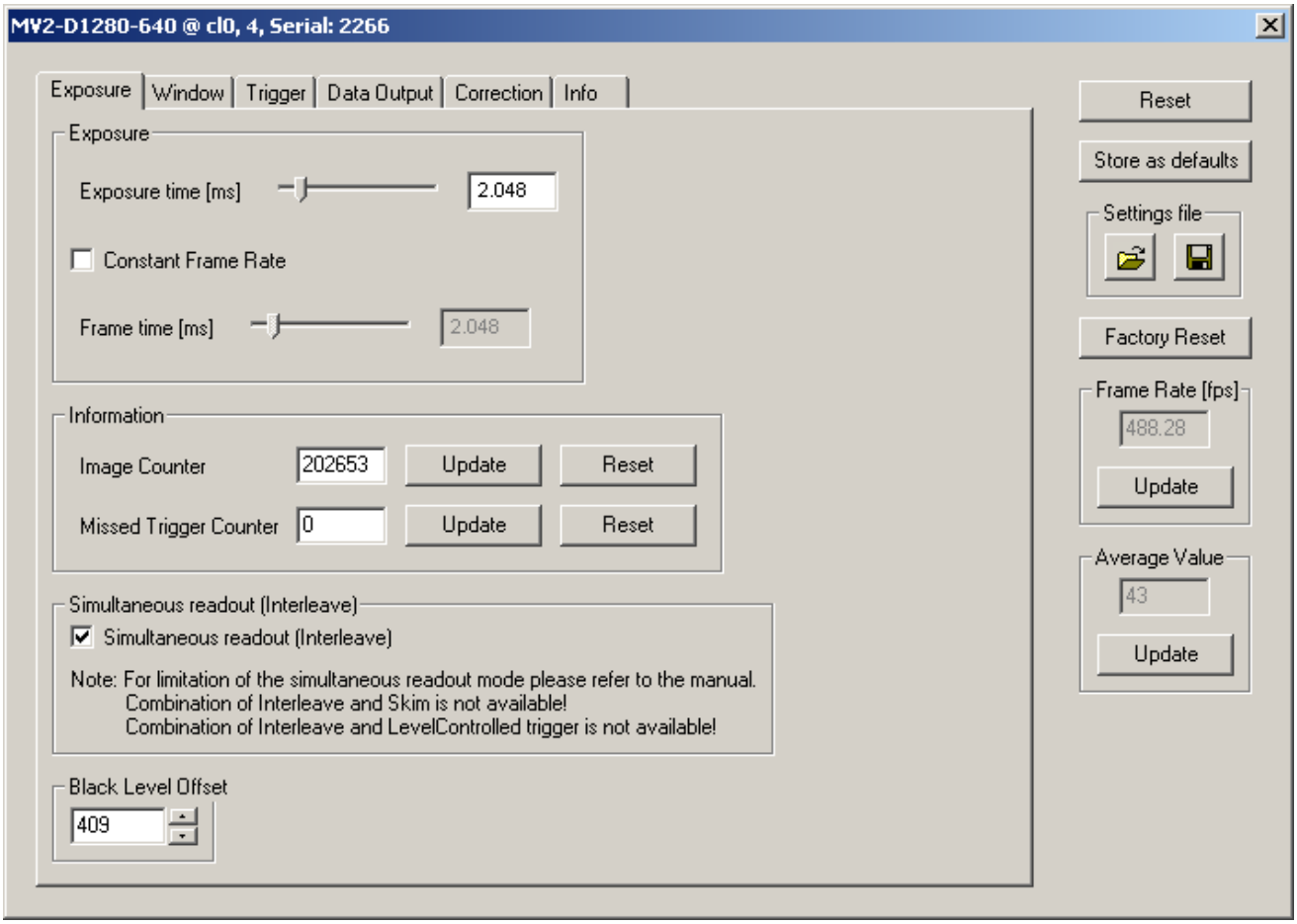
Update:

To update the value of the average, click on this button.

11.1. Exposure

This tab contains exposure settings.

Figure 3.78. MV2-D1280-640 Exposure panel



11.1.1. Exposure

Exposure time [ms]

Configure the exposure time in milliseconds.

Constant Frame Rate:

When the Constant Frame Rate (CFR) is switched on, the frame rate (number of frames per second) can be varied from almost 0 up to the maximum frame rate. Thus, fewer images can be acquired than would otherwise be possible. When Constant Frame Rate is switched off, the camera delivers images as fast as possible, depending on the exposure time and the read-out time.

Frame time [ms]

Configure the frame time in milliseconds. Only available if Constant Frame Rate is enabled. The minimum frame time depends on the exposure time and readout time.

11.1.2. Information

The Information properties provide information about the acquired images.

Image Counter:

The image counter is a 24 bit real-time counter and is incremented by 1 for every new image.

Missed Trigger Counter:

This is a counter for trigger pulses that were blocked because the trigger pulse was received during image exposure or readout. In free-running mode it counts all pulses received from interface trigger or from I/O trigger interface.

To update the value of the information properties, click on the Update-Button; to reset the properties, click on the Reset-Button.

11.1.3. Readout Mode

Simultaneous readout (interleave):

Enable simultaneous readout to increase framerate

11.1.4. Black Level Offset

It may be necessary to adjust the black level offset of the camera.

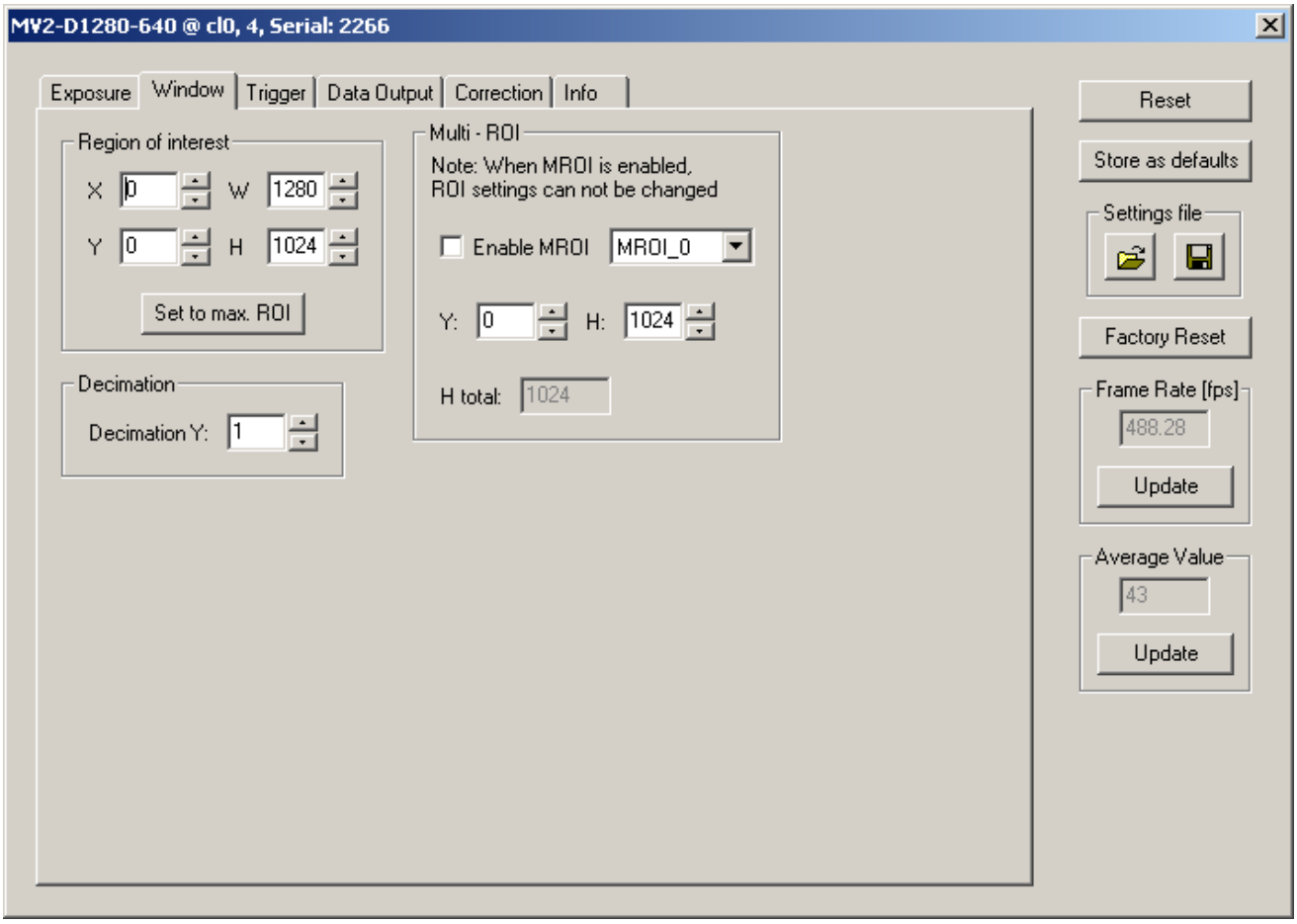
Black Level Offset:

Black level offset value. Use this to adjust the black level.

11.2. Window

This tab contains ROI and decimation settings.

Figure 3.79. MV2-D1280-640 window panel



11.2.1. Region of Interest

The region of interest (ROI) is defined as a rectangle (X, Y), (W, H) where

X:

X - coordinate, starting from 0 in the upper left corner.

Y:

Y - coordinate, starting from 0 in the upper left corner.

W:

Window width (in steps of 10 pixels).

H:

Window height.

Set to max ROI:

Set Window to maximal ROI (X=0; Y=0; W=1280; H=1024).

> **Note**
>
> Window width is only available in steps of 10 pixels.

11.2.2. Decimation

Decimation reduces the number of pixels in y-direction. Decimation can also be used together with a ROI or MROI. Decimation in y-direction transfers every n-th row only and directly results in reduced read-out time and higher frame rate respectively.

Decimation Y:

Decimation value for y-direction. Example: Value = 4 reads every fourth row only.

11.2.3. Multi - ROI

The MV-D1280-640 camera can handle up to 16 different regions of interest. The multiple ROIs are joined together and form a single image, which is transferred to the frame grabber. An ROI is defined by its starting value in y-direction and its height. The width and the horizontal offset are specified by X and W settings. The maximum frame rate in MROI mode depends on the number of rows and columns being read out. Overlapping ROIs are not allowed.

Enable MROI:

Enable MROI. If MROI is enabled, the ROI and MROI settings cannot be changed.

MROI_X:

Select one of the MROI settings.

Y:

Y - coordinate of the selected MROI. If Y is set to 1023, this and all further MROI settings will be ignored.

H:

Height of the selected MROI.

H tot:

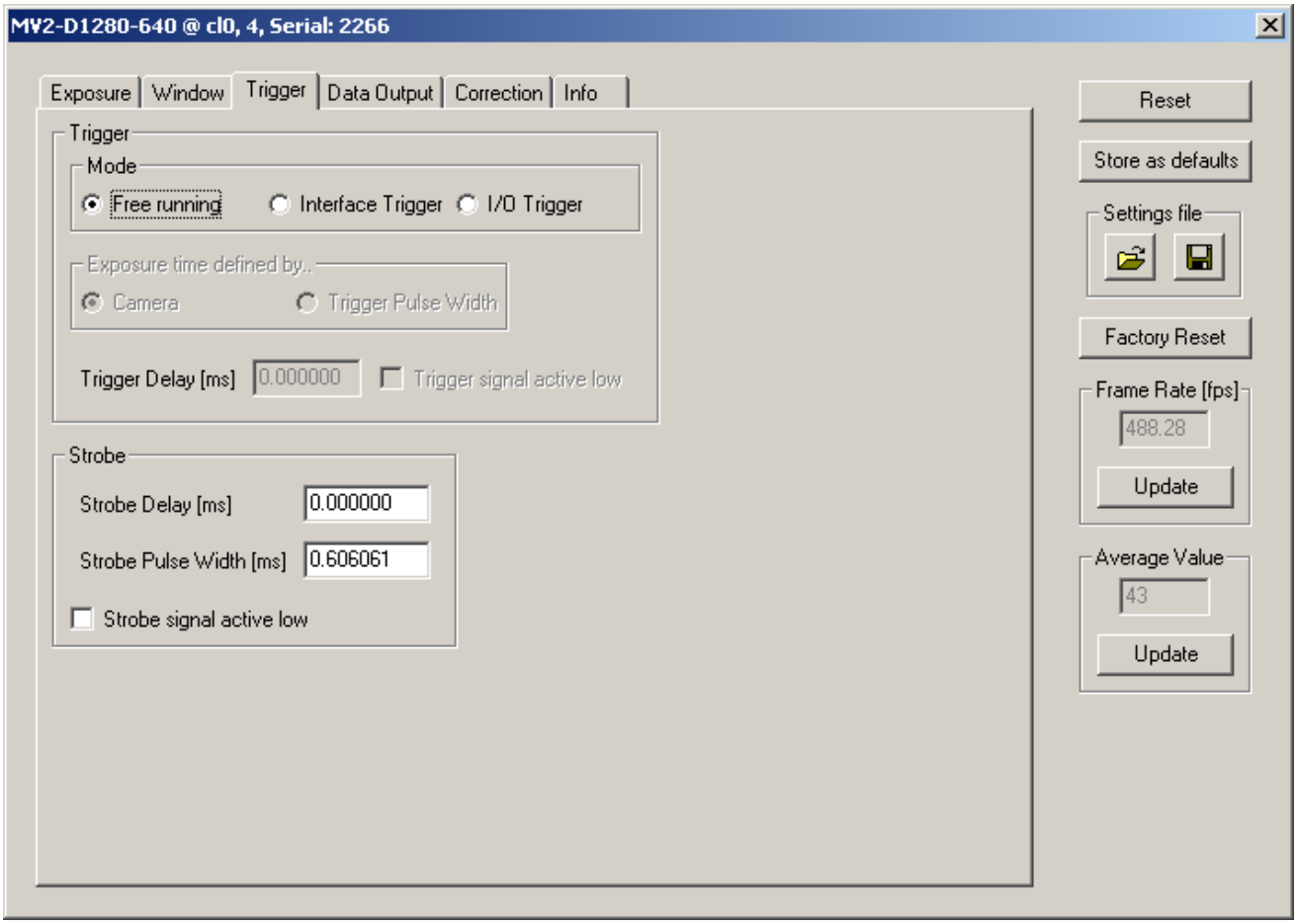
Shows the sum of all MROIs as the total image height.

> **Note**
>
> After changing a property, always press Enter in order to make the change active.

11.3. Trigger

This tab contains trigger and strobe settings.

Figure 3.80. MV2-D1280-640 trigger panel



11.3.1. Trigger

Trigger Source:

Free running:

The camera continuously delivers images with a certain configurable frame rate.

Interface Trigger:

The Trigger signal is applied to the camera by the CameraLink frame grabber or the USB interface respectively.

I/O Trigger:

The trigger signal is applied directly to the camera on the power supply connector.

Exposure time defined by:

Camera:

The exposure time is defined by the property **ExposureTime**.

Trigger Pulse Width:

The exposure time is defined by the pulse width of the trigger signal (level-controlled exposure).

> **Note**
>
> This property disables simultaneous readout mode.

Further trigger settings:

Trigger Delay:

Programmable delay in milliseconds between the incoming trigger edge and the start of the exposure.

Trigger signal active low:

Define the trigger signal to be active high (default) or active low.

11.3.2. Strobe

The camera generates a strobe output signal that can be used to trigger a strobe. The delay, pulse width and polarity can be defined by software. To turn off strobe output, set StrobePulseWidth to 0.

Strobe Delay [ms]

Delay in milliseconds from the input trigger edge to the rising edge of the strobe output signal.

Strobe Pulse Width [ms]

The pulse width of the strobe trigger in milliseconds.

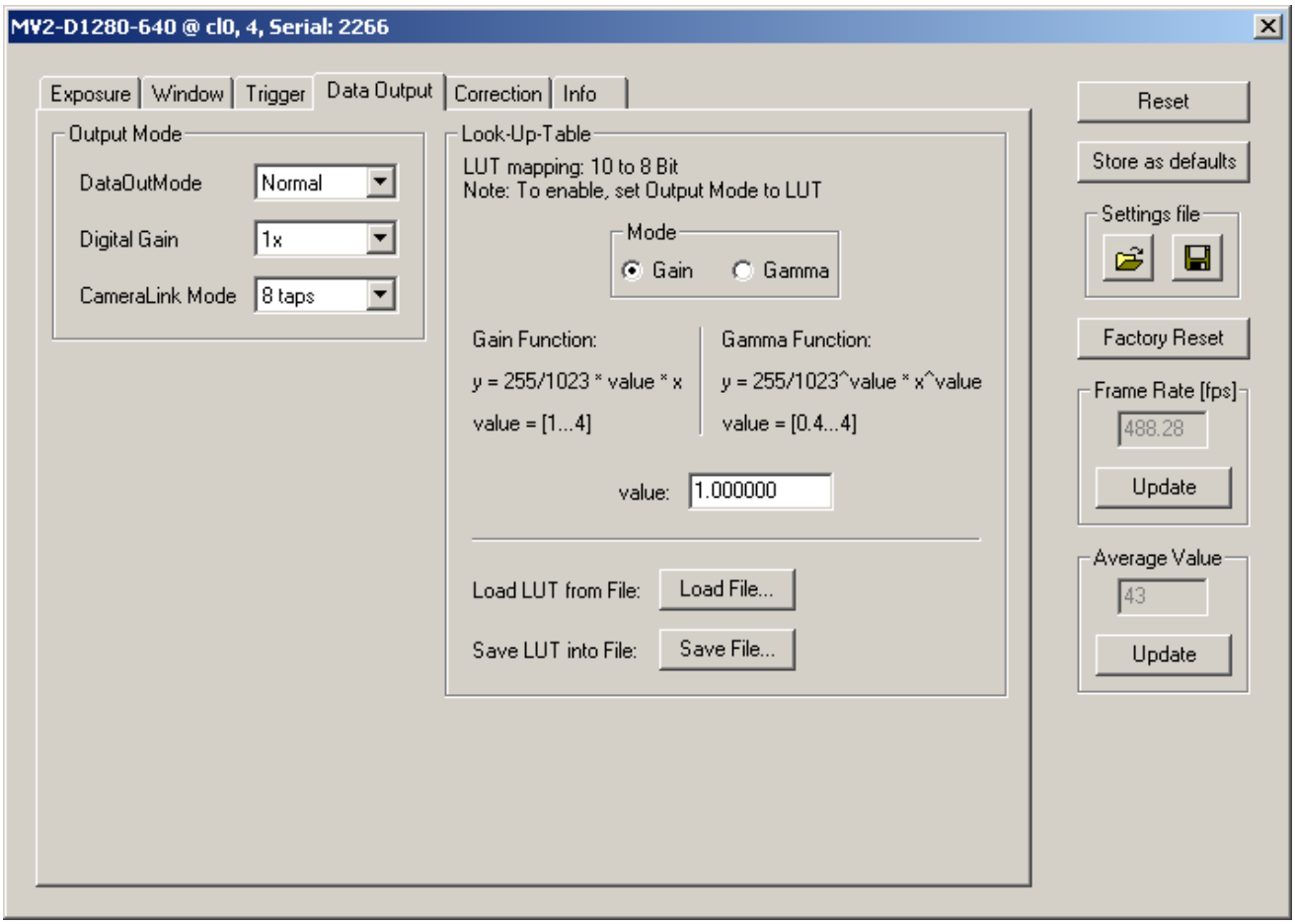
Strobe signal active low:

Define the strobe output to be active high (default) or active low.

11.4. Data Output

This tab contains image data settings.

Figure 3.81. MV2-D1280-640 data output panel



11.4.1. Output Mode

Output Mode:

Normal:

Normal mode.

LFSR:

Test image. Linear feedback shift register (pseudo-random image). The pattern depends on the gray level resolution.

Ramp:

Test image. Values of pixel are incremented by 1, starting at each row. The pattern depends on the gray level resolution.

LUT:

Look-Up-Table, a 10-to-8-bit mapping of gray levels.

Digital Gain:

1x:

No digital gain, normal mode.

2x:

Digital gain 2.

4x:

Digital gain 4.

CameraLink Mode:

8 taps:

CameraLink Full 8 Taps 8 Bits output

10 taps:

CameraLink Full 10 Taps 8 Bits output

11.4.2. Look-Up-Table

Gray level transformation is remapping of the gray level values of an input image to new values which transform the image in some way. The look-up-table (LUT) is used to convert the grayscale value of each pixel in an image into another gray value. It is typically used to implement a transfer curve for contrast expansion.

The MV2-D1280-640 camera performs a 10-to-8-bit mapping, so that 1024 input gray levels can be mapped to 256 output gray levels (0 to 1023 and 0 to 255).

The default LUT is a gain function with value = 1.

Lut Mode:

Gain:

Linear function. Y = 255 / 1023 * value * X; Valid range for **value** [1...4].

Gamma:

Gamma function. Y = 255 / 1023^value * X ^ value; Valid range for **value** [0.4...4].

value:

Enter a value. The LUT will be calculated and downloaded to the camera.

Load File...:

Load a user defined LUT - file into the camera (*.txt tab delimited). There is an example in the PFRemote directory (mv_d1280_640_lut.txt).

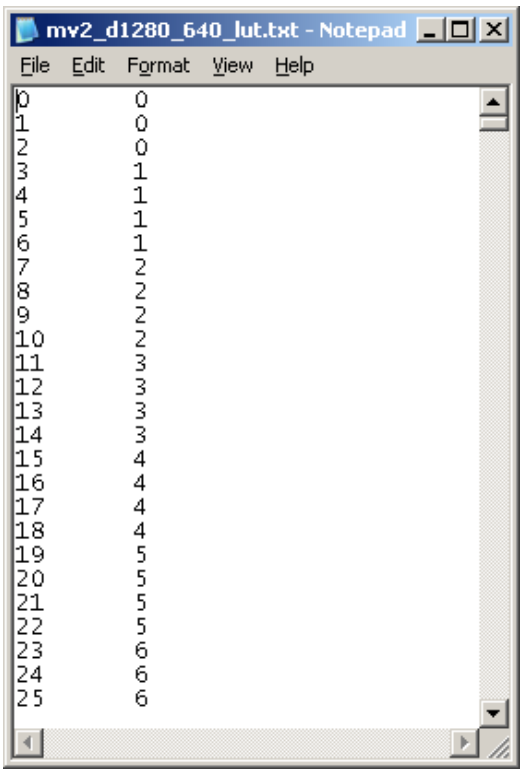
Save File...:

Save LUT from camera into a file.

It is also possible to load a user LUT-file with missing input values (LUT-addresses). Then only pixel values corresponding to listed LUT entries will be overwritten.

Example of a user defined LUT file:

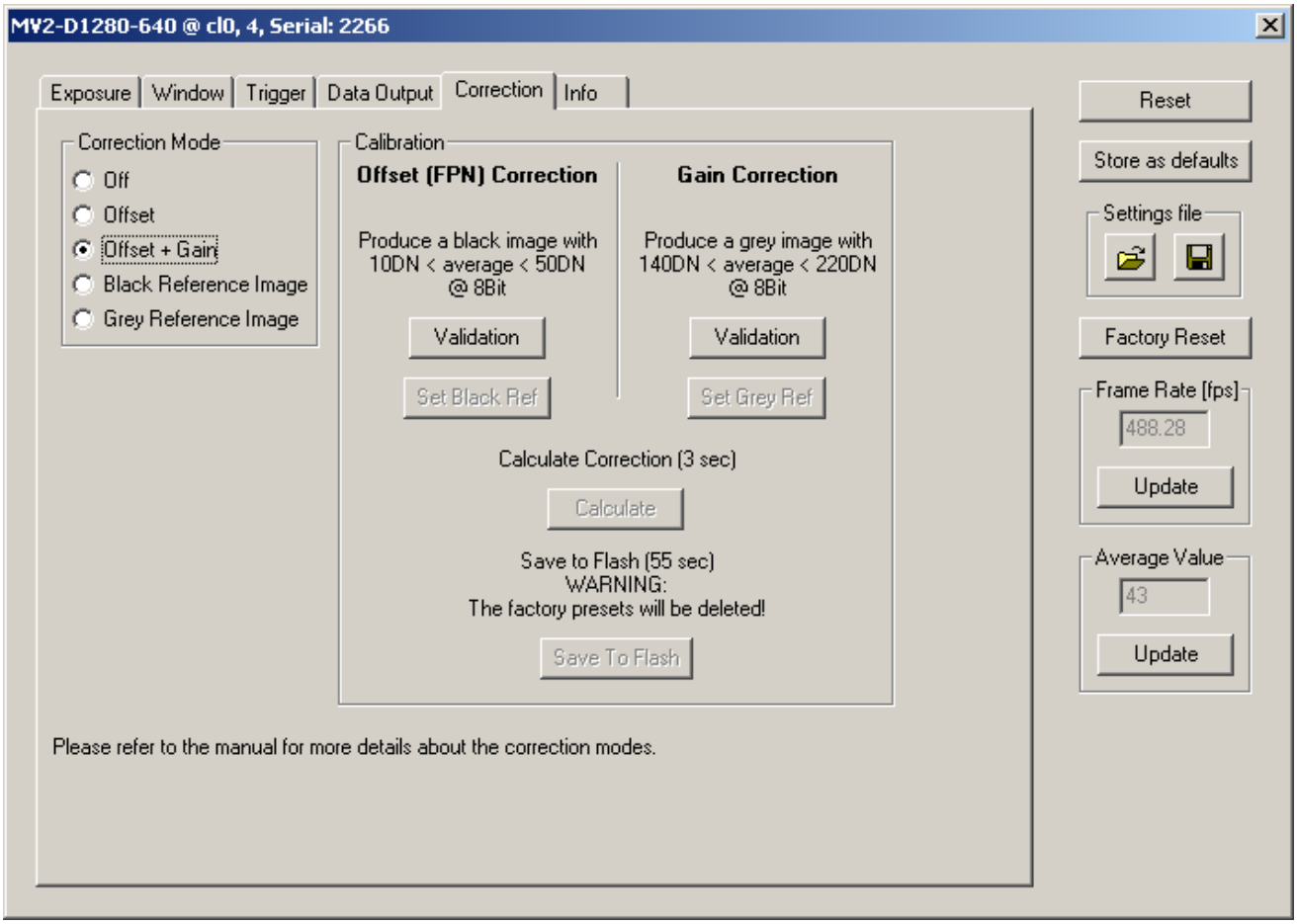
Figure 3.82. Example of a user defined LUT file



11.5. Correction

This tab contains correction settings.

Figure 3.83. MV2-D1280-640 correction panel



11.5.1. Correction Mode

This camera has image pre-processing features, that compensate for non-uniformities caused by the sensor, the lens or the illumination.

Off:

No correction.

Offset:

Activate offset correction

Offset + Gain:

Activate offset and gain correction.

Black Reference Image:

Output the black reference image that is currently stored in the camera RAM (for debugging reasons).

Grey Reference Image:

Output the grey reference image that is currently stored in the camera RAM (for debugging reasons).

11.5.2. Calibration

Offset (FPN) Correction:

The offset (Fixed Pattern Noise FPN) correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise.

Close the lens of the camera. Click on the Validation button. If the Set Black Ref - button is still inactive, the average of the image is out of range. Change to panel Charateristics and change the Property **BlackLevelOffset** until the average of the image is between 160 and 400DN. Click again on the Validation button and then on the Set Black Ref Button.

> **Note**
>
> If only offset and hot pixel correction is needed it is not necessary to calibrate a gray image. (see Calculate)

Gain Correction:

The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level.

> **Important**
>
> Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction.

Produce a gray image with an average between 2200 and 3600DN. Click on the Validation button to check the average. If the average is in range, the Set Grey Ref button is active.

Calculate:

Calculate the correction values into the camera RAM. To make the correction values permanent, use the 'Save to Flash' button.

Save to Flash:

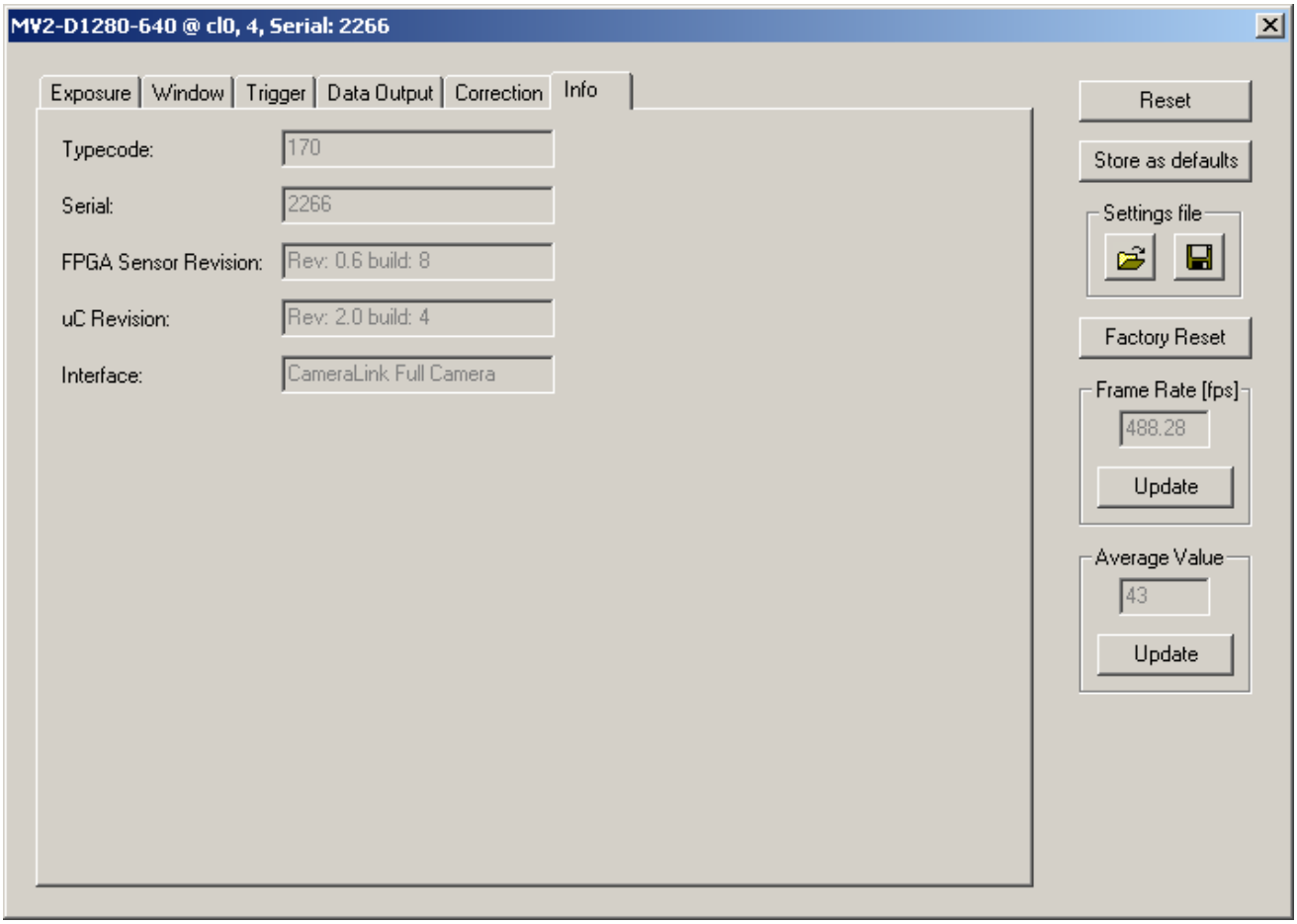
Save the current correction values to the internal flash memory.

> **Warning**
>
> This will overwrite the factory presets.

11.6. Info

This panel shows camera specific information such as type code, serial number and firmware revision of the FPGA and microcontroller and the description of the camera interface.

Figure 3.84. MV2-D1280-640 info panel



Typecode:

Type code of the connected camera.

Serial:

Serial number of the connected camera.

FPGA Sensor Revision:

Firmware revision of built-in Sensor FPGA of the connected camera.

uC Revision:

Firmware revision of built-in microcontroller of the connected camera.

Interface:

Description of the camera interface.

> **Note**
>
> For any support requests, please enclose the information provided on this tab.

Chapter 4. LinLog and Skimming

Table of Contents

1. LinLog

1.1. Overview

LinLog is a patented Photonfocus technology to increase the dynamic range of CMOS cameras. It provides a logarithmic compression of the brightness level in the brighter parts of the image. The amount and turn-on point of the compression can be freely adjusted. Typically LinLog gives contrast in bright parts of the image that would otherwise be saturated white.

> **Important**
>
> In order to understand LinLog and its configuration parameters, it is imperative that you read the explanations given in the user manual and the application notes on our website.

1.2. LinLog Example

This section presents a LinLog example with its configuration values. Figure 4.1, “PCB inspection at linear characteristics (with white saturation)” shows a PCB with a quartz crystal that reflects the light such that the engraved marking cannot be read. When using LinLog, the saturated areas are resolved into lower gray values so that the marking can be read (Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)” and Figure 4.5, “Adjusted LinLog scenario (Low compression)”). However, the brightness of the darker parts in the image does not change, so that the overall dynamic range of the image is increased.

The histograms of the two images below confirm that there are more details visible in the LinLog image. In Figure 4.2, “Histogram of white saturated image”, there is a peak at the right side of the histogram (barely visible), which represents the overexposed (white) pixels in the image.

When you compare the histogram of the two images (Figure 4.2, “Histogram of white saturated image” and Figure 4.4, “Histogram of normal compression”), you can notice that the histogram looks the same at lower gray levels. This is because LinLog leaves the darker gray levels untouched (this corresponds to the 'Lin' part in LinLog), whereas it differs for medium and bright gray levels ('Log' in LinLog).

Figure 4.1. PCB inspection at linear characteristics (with white saturation)

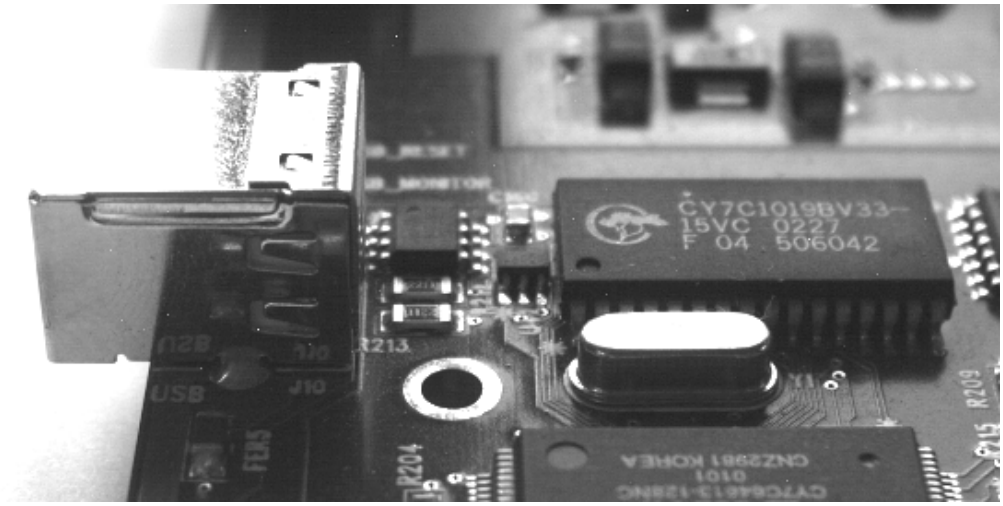


Figure 4.2. Histogram of white saturated image

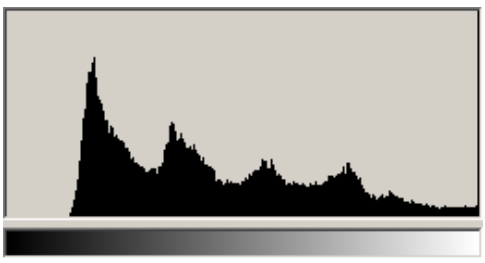


Figure 4.3. PCB inspection with default LinLog characteristics (Normal compression)

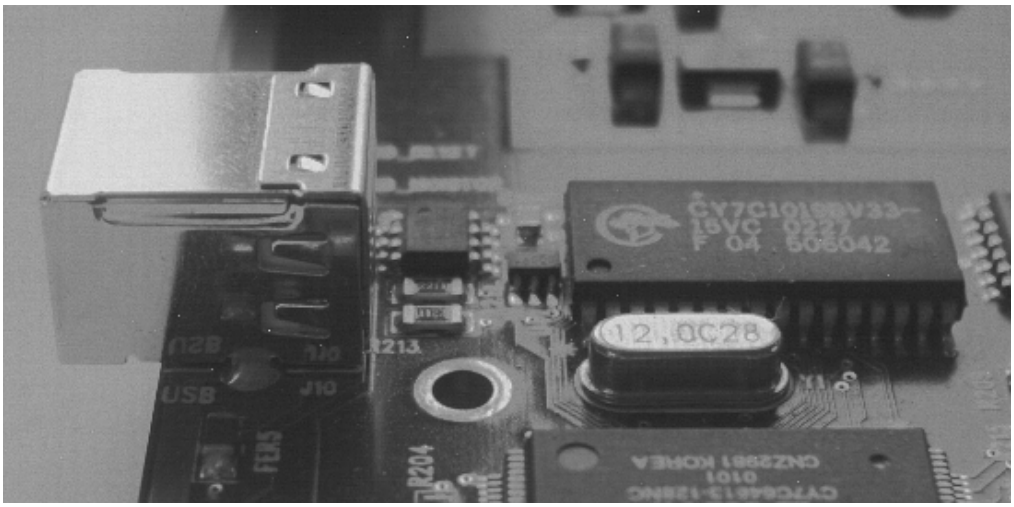
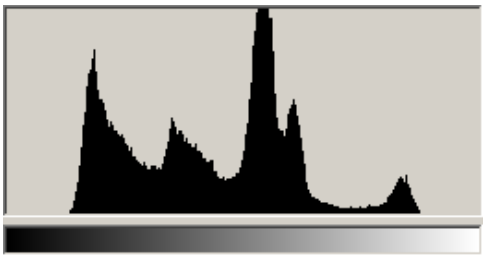


Figure 4.4. Histogram of normal compression



1.3. LinLog Fine Adjustment

LinLog highly depends on the user application, so it has to be adjusted by the user. The three available LinLog presets are a good start to experiment with the LinLog parameters. For example, the image in Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)” that uses one of the LinLog presets may be further improved by fine tuning the LinLog values in order to result in an image like Figure 4.5, “Adjusted LinLog scenario (Low compression)”.

In order to use user defined LinLog values, please read the explanations in the User Manual.

Figure 4.5. Adjusted LinLog scenario (Low compression)

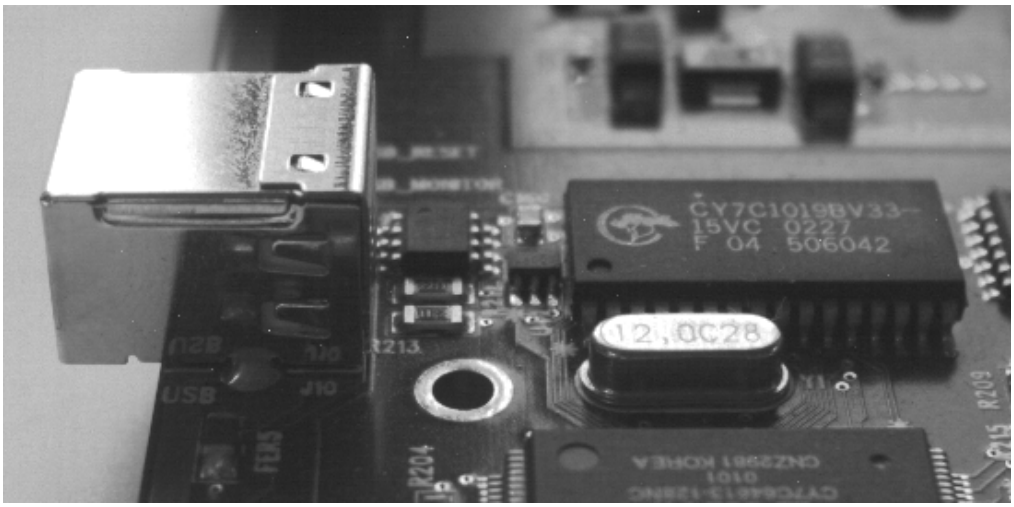
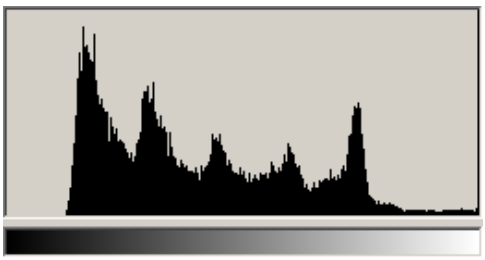


Figure 4.6. Histogram of fine adjusted LinLog scenario



> **Note**
>
> It may help to activate a real time histogram function (of your display software) to achieve better control over saturation.

Here are a few hints that may help improving the result:

- Too little contrast in bright intensity ranges: Decrease **Time1** or **Voltage1**.
- Too much saturation: Increase **Voltage1**, then increase **Voltage2**
- Too little resolution in very bright local areas (such as laser spots, light bulbs, etc.): Increase **Time2** and/or **Voltage2** (example: see Figure 4.7, “Halogen bulb shot (High compression)”), increase **Voltage1** and adjust **Time1**.
- Generally: Start with the default values, adjust the Voltage values such that high intensities are compressed to a bright gray value (no saturation).
- Fine tune by changing the Time values.

In all examples below, **ExposureCycles** is set to 1000. The **Prescaler** can be varied freely.

Note: **ExposureCycles** and **Prescaler** are only available in the EMPHIS Series.

Table 4.1. LinLog example scenarios and values of EMPHIS-300

Scenario	Time1	Value1	Time2	Value2
Low compression Figure 4.5, “Adjusted LinLog scenario (Low compression)”	800	9	900	1
Normal compression Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)”	900	10	990	7
High compression Figure 4.7, “Halogen bulb shot (High compression)”	970	15	1000	9

EMPHIS300-Eval: For these examples, **ExposureCycles** is set to 1000, the **Prescaler** can be varied freely.

Table 4.2. LinLog example scenarios and values of MV-D750E-20

Scenario	Time1	Value1	Time2	Value2
Low compression Figure 4.5, “Adjusted LinLog scenario (Low compression)”	800	9	900	1
Normal compression Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)”	900	10	990	7
High compression Figure 4.7, “Halogen bulb shot (High compression)”	970	15	1000	9

MV-D750E-20: LinLog time 1023 means 100% of the exposure time

Table 4.3. Linlog example scenarios and values of MV-D1024E-40

Scenario	Time1	Value1	Time2	Value2
Low compression Figure 4.5, “Adjusted LinLog scenario (Low compression)”	800	19	900	18
Normal compression Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)”	850	22	950	19
High compression Figure 4.7, “Halogen bulb shot (High compression)”	980	23	990	22

MV-D1024E-40: The LinLog time is per thousand of the exposure time. 800 means 80% of the exposure time

Table 4.4. Linlog example scenarios and values of MV-D1024E-80 and MV-D1024E-160

Scenario	Time1	Value1	Time2	Value2
Low compression Figure 4.5, “Adjusted LinLog scenario (Low compression)”	800	19	900	18
Normal compression Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)”	850	22	950	19
High compression Figure 4.7, “Halogen bulb shot (High compression)”	980	23	990	22

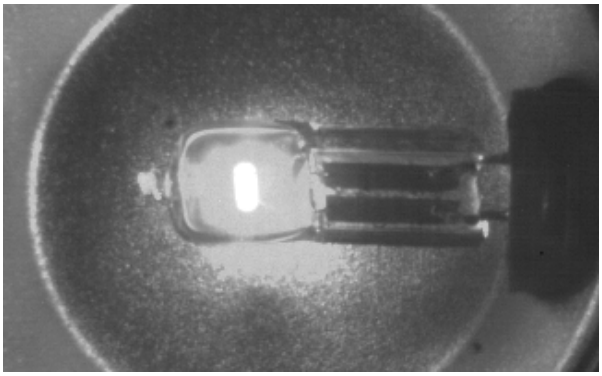
MV-D1024E-80 and MV-D1024E-160: The LinLog time is per thousand of the exposure time. 800 means 80% of the exposure time

Table 4.5. Linlog example scenarios and values of MV-D752E-40

Scenario	Time1	Value1	Time2	Value2
Low compression Figure 4.5, “Adjusted LinLog scenario (Low compression)”	800	19	900	18
Normal compression Figure 4.3, “PCB inspection with default LinLog characteristics (Normal compression)”	850	22	950	19
High compression Figure 4.7, “Halogen bulb shot (High compression)”	980	23	990	22

MV-D752E-40: The LinLog time is per thousand of the exposure time. 800 means 80% of the exposure time

Figure 4.7. Halogen bulb shot (High compression)



2. Skimming

Skimming is a Photonfocus proprietary technology to enhance detail in dark areas of an image. Skimming provides an adjustable level of in-pixel gain for low signal levels. It can be used together with LinLog to give a smooth monotonic transfer function from high gain at low levels, through normal linear operation, to logarithmic compression for high signal levels. The resulting response is similar to a gamma correction. Skimming can be used together or without LinLog.

Chapter 5. Camera Properties

Table of Contents

1. EMPHIS300-Eval

1.1. Properties by category

Table 5.1. Triggering & Exposure

Property	Type	Access	Description
ExposureCycles	INT	RW	This is the integrating time (exposure time) in seconds Valid range: [0.0, 1023.0]
Prescaler	INT	RW	Prescaler Valid range: [0.0, 1023.0]
TriggerDelayCoarse	REGISTER	RW	LSB of delay register Valid range: [0.0, 1023.0]
TriggerDelayFine	REGISTER	RW	MSB of delay register Valid range: [0.0, 1023.0]
TriggerMode	MODE	RW	Two trigger modes available, free running and slave mode Possible values: **0 : Free Running** Free running mode (internal autotrigger), camera delivers consecutive frames **1 : External Trigger** Camera triggers an exposure on an external trigger impulse (high, level triggered) or on a software trigger command (FrameTrigger property)

Table 5.2. Window

Property	Type	Access	Description
ROI.X0	INT	RW	The x coordinate of the start point of the region of interest (left upper corner) Valid range: [0.0, 188.0]
ROI.Y0	INT	RW	The y coordinate of the start point of the region of interest (left upper corner) Valid range: [0.0, 398.0]
ROI.X1	INT	RW	The x coordinate of the inclusive end point of the region of interest (right bottom corner) Valid range: [1.0, 94.0]
ROI.Y1	INT	RW	The y coordinate of the inclusive end point of the region of interest (right bottom corner) Valid range: [1.0, 403.0]

Table 5.3. Characteristics

Property	Type	Access	Description

Offset	INT	RW	Black offset value Valid range: [0.0, 15.0]
LinLog.Enable	BOOL	RW	1: enables LinLog mode, 0: disables
LinLog.Time1	INT	RW	LinLog switching time 1, see Application notes or online help of PFEval or PFRemote Valid range: [0.0, 1023.0]
LinLog.Time2	INT	RW	LinLog switching time 2, see Application notes or online help of PFEval or PFRemote Valid range: [0.0, 1023.0]
LinLog.Value1	INT	RW	LinLog Voltage corresponding to Time1. The higher the Voltage, the stronger the compression. Please see online help. Valid range: [0.0, 15.0]
LinLog.Value2	INT	RW	LinLog Voltage corresponding to Time2. The higher the Voltage, the stronger the compression. Please see online help. Valid range: [0.0, 15.0]
PGAGain.Disable	BOOL	RW	Setting this property DISABLES the PGA gain feature
PGAGain.Value	INT	RW	Programmable Gain voltage, higher values yield higher signal gain 0: Gain 1X, 1: Gain 1.4X, 2: Gain 1.8X, 3: Gain 2.5X, 4: Gain 3.3X, 5: Gain 4.5X, 6: Gain 5.7X, 7: Gain 8.2X, Valid range: [0.0, 7.0]
Skim.Enable	BOOL	RW	1: Enable Skimming mode, 0: disable
Skim.Value	INT	RW	The skimming voltage value. Note that this value corresponds to the LinLog voltage. See online help for specific setup. Valid range: [0.0, 15.0]

Table 5.4. Miscellaneous

Property	Type	Access	Description
DecimationY	BOOL	RW	1: Enable line decimation by 2: 0, disable.
DefectPixelCorrection.Enable	BOOL	RW	1: enable Hot pixel correction, 0: disable
DefectPixelCorrection.Threshold	INT	RW	The lower this voltage, the stronger the hot pixel correction. Too low values can cause a blurred image. Valid range: [0.0, 1023.0]
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera 1: USB - port in fast mode (48 MBytes/s, isochronous mode)

Table 5.5. Commands

Property	Type	Access	Description
FrameTrigger	COMMAND	RW	Sending this command issues a software trigger impulse (snapshot)
Reset	COMMAND	WO	This command resets the camera to its boot up state.

2. MV-D750E-20

2.1. Properties by category

Table 5.6. Triggering & Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	This is the integrating time (exposure time) in milliseconds Valid range: [0.01, 51.15]
Trigger.Source	MODE	RW	Two trigger modes available, free running and external trigger mode (also called slave mode in some applications) Possible values: **0 : FreeRunning** Free running mode (internal autotrigger), camera delivers consecutive frames **1 : ExternalTrigger** Camera triggers an exposure on an external trigger impulse (high, level triggered) or on a software trigger command (FrameTrigger property)
Trigger.DelayCoarse	INT	RW	LSB of delay register Valid range: [0.0, 1023.0]
Trigger.DelayFine	INT	RW	MSB of delay register Valid range: [0.0, 1023.0]
Trigger.Counter	INT	RW	This counter counts the trigger impulses received since camera reset. It can also be reset manually by writing a value of 0.
Trigger.Frame	COMMAND	WO	Sending this command issues a software trigger impulse (snapshot)

Table 5.7. Window

Property	Type	Access	Description
Window.X	INT	RW	X coordinate of upper left corner of the read out window Valid range: [0.0, 740.0]
Window.Y	INT	RW	Y coordinate of upper left corner of the read out window Valid range: [0.0, 394.0]
Window.W	INT	RW	Window width Valid range: [6.0, 750.0]
Window.H	INT	RW	Window height Valid range: [1.0, 400.0]
Window.Max	COMMAND	RW	Set to max. region of interest

Table 5.8. Characteristics

Property	Type	Access	Description
BlackLevelOffset	INT	RW	Black offset value Valid range: [0.0, 15.0]

Skim	INT	RW	Skimming property. Values: 0: off, n: maximum, where n is depending on LinLog. Value1 Valid range: [0.0, 12.0]
AnalogGain.Value	MODE	RW	Programmable Gain voltage, higher values yield higher signal gain Possible values: **0 : 1x** Gain: 1X **1 : 1_5x** Gain: 1.5X **2 : 1_8x** Gain: 1.8X **3 : 2_5x** Gain: 2.5X **4 : 3x** Gain: 3X **5 : 4_5x** Gain: 4.5X **6 : 6x** Gain: 6X **7 : 8x** Gain: 8X
LinLog.Mode	MODE	RW	The LinLog mode presets. Setting this mode value alters all the values in the LinLog struct and may also have an influence on the maximum Skim value. Possible values: **0 : Off** LinLog off **1 : Low_compression** Low LinLog compression for semi-bright scenarios with good high intensity resolution **2 : Normal_compression** Normal LinLog compression for bright scenarios **3 : High_compression** High LinLog compression for extremely bright scenarios **127 : User_defined** No value preset, user defined values from LinLog struct property
LinLog.Time1	INT	RW	LinLog switching time 1, see also Application notes Valid range: [0.0, 1022.0]

LinLog.Time2	INT	RW	LinLog switching time 2, see also Application notes Valid range: [0.0, 1023.0]
LinLog.Value1	INT	RW	LinLog Voltage corresponding to Time1. The higher the Voltage, the stronger the compression. Valid range: [3.0, 15.0]
LinLog.Value2	INT	RW	LinLog Voltage corresponding to Time2. The higher the Voltage, the stronger the compression. Valid range: [0.0, 15.0]

Table 5.9. Miscellaneous

Property	Type	Access	Description
DecimationY	BOOL	RW	1: Enable line decimation by 2: 0, disable.
DefectPixelCorrection.Enable	BOOL	RW	1: enable Hot pixel correction, 0: disable
DefectPixelCorrection.Threshold	INT	RW	The lower this voltage, the stronger the hot pixel correction. Too low values can cause a blurred image. Valid range: [0.0, 1023.0]
USB.IsUSB	BOOL	RO	0: CameraLink Base Camera 1: USB Camera
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera. 1: USB - port in fast mode (48 MBytes/s, isochronous mode).

Table 5.10. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	This command resets the camera and all default values. Set camera to delivery status.
Reset	COMMAND	WO	This command resets the camera and loads the default values.
StoreDefaults	COMMAND	RW	This command stores the actual values in the camera Flash-Memory as new default. After a reset, the camera loads these values as default.

Table 5.11. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

3. MV-D1024E-40

3.1. Properties by category

Table 5.12. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Maximum value is 419ms. Valid range: [0.01,]

FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Only available in CFR Mode. Maximum value is 419ms. Valid range: [0.01,]

Table 5.13. Trigger

Property	Type	Access	Description
Counter.Image	INT	RW	For every image: ImageCounter++; Every write access sets this property to 0. Max. value is 16'777'215 (24Bit)
Counter.MissedTrigger	INT	RW	Counts trigger pulses that could not be served. Missed triggers can only occur with the trigger sources 'Interface Trigger' and 'I/O Trigger' and with the 'Trigger.Async' property set to false. A missed trigger is a trigger pulse that was received during image exposure or image readout; Every write access, sets this property to 0. The max. value is 255 (8Bit).
Counter.Time	INT	RW	Counts the real time in units of 1 microsecond (40 clock cycles); Every write access, sets this property to 0. The maximal value is 4'294'967'295 (32 Bit) = 4'294.96sec
Strobe.Delay	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The delay from the active input trigger edge to the rising edge of the trigger output signal is set by this property. The values are specified in ms. Maximum value is 419ms. Valid range: [0.0,]
Strobe.PulseWidth	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The width of the pulse is set with this property. The values are specified in ms. Maximum value is 419ms. Valid range: [0.0,]
Strobe.Invert	BOOL	RW	Invert polarity of strobe output
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode. **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Invert	BOOL	RW	Invert Trigger signal
Trigger.Async	BOOL	RW	1: Enables abortion of images (applies to Interface Trigger and I/O Trigger only). When set, a trigger starts a new image regardless of the completion of the current image. When not set, a trigger only starts a new image if the current image has been completely read out.

Trigger.LevelControlled	MODE	RW	1: Enables control of exposure time by length of trigger pulse (applies to Interface Trigger and I/O Trigger only). When set, the active trigger edge starts exposure and the inactive edge stops exposure. When not set, exposure is started by active trigger edge and is stopped after the time specified by the ExposureTime property. Possible values: **0 : Software** Exposure time is set by Camera **1 : Trigger_Pulse_Width** Exposure time is set by the duration of the trigger pulse width.
Trigger.Delay	FLOAT	RW	Gives additional delay from active edge of external trigger to exposure start (applies to Interface Trigger and I/O Trigger only). The unit is ms. Maximum value is 419ms. Valid range: [0.0,]
Trigger.CFR	BOOL	RW	1: Enable Constant Frame Rate

Table 5.14. Window

Property	Type	Access	Description
Decimation.EnableX	BOOL	RW	1: Enable X - Decimation
Decimation.EnableY	BOOL	RW	1: Enable Y - Decimation
Decimation.Value	INT	RW	Value for decimation Valid range: [1.0, 64.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI.MROIx_Y and MROI.MROIx_H have no effect if this property is enabled
MROI.Htot	INT	RO	Calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MROI0_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI0_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI1_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI1_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI2_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI2_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI3_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI3_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI4_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI4_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI5_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI5_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI6_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI6_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI7_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI7_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI8_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI8_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI9_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI9_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI10_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI10_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI11_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI11_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI12_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI12_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI13_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI13_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI14_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI14_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI15_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI15_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1015.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [9.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest.

Table 5.15. Characteristics

Property	Type	Access	Description
Skim	INT	RW	0: Skimming disabled: n: Skimming enabled with value n Valid range: [0.0,]
LinLog.Mode	MODE	RW	The LinLog mode presets. Setting of this property have an influence on the maximum Skim value. Possible values: **0 : Off** LinLog off. **1 : Low_compression** Low LinLog compression for semi-bright scenarios. **2 : Normal_compression** Normal LinLog compression for bright scenarios. **3 : High_compression**

			High LinLog compression for extremely bright scenarios. **4 : User_defined** No value preset, user defined values from LinLog struct property.
LinLog.Value1	INT	RW	LinLog Voltage corresponding to Time1. The higher the Voltage, the stronger the compression. See also camera manual. Valid range: [0.0,]
LinLog.Value2	INT	RW	LinLog Voltage corresponding to Time2. The higher the Voltage, the stronger the compression. See also camera manual. Valid range: [0.0,]
LinLog.Time1	INT	RW	LinLog switching time 1. See also camera manual. Valid range: [0.0, 1000.0]
LinLog.Time2	INT	RW	LinLog switching time 2. See also camera manual. Valid range: [0.0, 1000.0]

Table 5.16. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Possible values: **0 : Normal** Normal Mode. **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system. **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row. **3 : Lut** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT.
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res12Bit** 12 Bit Resolution **1 : Res10Bit** 10 Bit Resolution **2 : Res8Bit** 8 Bit Resolution

DigitalGain	MODE	RW	Digital Gain of the image Possible values: **0 : Gain1** Gain 1X, normal **1 : Gain2** Gain 2X **2 : Gain4** Gain 4X
LUT.Mode	MODE	RW	This property sets only the active LUT mode. To recalculate the LUT, set the property LUT.Value. Possible values: **0 : Gain** Linear function. Y = 255 / 1023 * value * X; Valid range for value [1.0,4.0] **1 : Gamma** Gamma function: Y = 255 / 1023^value * X^value; Valid range for value [0.4,4.0]
LUT.Address	INT	WO	Address property to write or read LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT). Valid range: [0.0, 1023.0]
LUT.Data	INT	RW	Data property to read or write LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT). Valid range: [0.0, 255.0]
LUT.Value	FLOAT	RW	Value for Gain- or Gamma-function. Set first LUT.Mode, then LUT.Value Valid range: [0.4, 4.0]
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file). The parameter is the name of the file, eg. Lut.FileRead1 filename.txt.
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file, eg. Lut.FileSave1 filename.txt.

Table 5.17. Correction

Property	Type	Access	Description

Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the

Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.18. Miscellaneous

Property	Type	Access	Description
EnStatusLine	BOOL	RW	1: Enable status line. Status line is the last line of the current ROI
Average.Enable	BOOL	RW	1: Enable average
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit
USB.IsUSB	BOOL	RO	0: CameraLink Base Camera 1: USB Camera
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera 1: USB - port in fast mode (48 MBytes/s, isochronous mode)

Table 5.19. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.20. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	Valid range: [0.0, 4095.0]

Table 5.21. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

4. MV-D1024E-80

4.1. Properties by category

Table 5.22. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in millisecond. Maximum value is 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RW	Frame time of the camera in millisecond. Only available in CFR Mode. Maximum value is 419ms. Valid range: [0.01,]

Table 5.23. Trigger

Property	Type	Access	Description
Counter.Image	INT	RW	For every images: ImageCounter++; Every write access, set this property to 0. Max. value is 16'777'215 (24Bit) Valid range: [0.0, 1.6777215E7]
Counter.MissedTrigger	INT	RW	Counts trigger pulses that could not be served. Missed triggers can only occur with the trigger sources 'Interface Trigger' and 'I/O Trigger' and with the 'Trigger.Async' property set to false. A missed trigger is a trigger pulse that was received during image exposure or image readout; Every write access, set this property to 0. The max. value is 255 (8Bit). Valid range: [0.0, 255.0]
Counter.Time	INT	RW	Counts the real time in units of 1 microsecond (40 clock cycles); Every write access, set this property to 0. The maximal value is 4'294'967'295 (32 Bit) = 4'294.96sec
Strobe.Delay	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The delay from the active input trigger edge to the rising edge of the trigger output signal is set ths property. The values are specified in ms Valid range: [0.0,]
Strobe.PulseWidth	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The width of the pulse is set with this property The values are specified in ms Valid range: [0.0,]
Strobe.Invert	BOOL	RW	Invert polarity of strobe output
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Invert	BOOL	RW	Invert Trigger signal

Trigger.LevelControlled	MODE	RW	1: Enables control of exposure time by length of trigger pulse (applies to Interface Trigger and I/O Trigger only). When set, the active trigger edge starts exposure and the inactive edge stops exposure. When not set, exposure is started by active trigger edge and is stopped after the time specified by the ExposureTime property. Possible values: **0 : Software** Exposure time is set by Camera **1 : Trigger_Pulse_Width** Exposure time is set by the duration of the trigger pulse width
Trigger.Delay	FLOAT	RW	Gives additional delay from active edge of external trigger to exposure start (applies to Interface Trigger and I/O Trigger only). The unit is ms. Maximum value is 419ms. Valid range: [0.0,]
Trigger.CFR	BOOL	RW	1: Enable Constant Frame Rate
Trigger.Interleave	BOOL	RW	1: Enable simultaneous readout. Combination of Interleave and Skim is not available! Combination of Interleave and LevelControlled trigger is not available! For limitation of this property, please refer the manual

Table 5.24. Window

Property	Type	Access	Description
Decimation.Y	INT	RW	Value for Y - decimation Valid range: [1.0, 15.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI. MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	Calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MROI0_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI0_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI1_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI1_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI2_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI2_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI3_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI3_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI4_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI4_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI5_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI5_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI6_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI6_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI7_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI7_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI8_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI8_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI9_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI9_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI10_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI10_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI11_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI11_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI12_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI12_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI13_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI13_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI14_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI14_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI15_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI15_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1012.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [12.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest

Table 5.25. Characteristics

Property	Type	Access	Description
Skim	INT	RW	0: Skimming disabled: n: Skimming enabled with value n Valid range: [0.0, 8.0]
LinLog.Mode	MODE	RW	The LinLog mode presets. Setting of this property have an influence on the maximum Skim value. Possible values: **0 : Off** LinLog off **1 : Low_compression** Low LinLog compression for semi-bright scenarios with good high intensity resolution **2 : Normal_compression** Normal LinLog compression for bright scenarios

			3 : High_compression High LinLog compression for extremely bright scenarios **4 : User_defined** No value preset, user defined values from LinLog struct property
LinLog.Value1	INT	RW	LinLog Value corresponding to Time1. The higher the Voltage, the stronger the compression. See also camera manual Valid range: [0.0, 30.0]
LinLog.Value2	INT	RW	LinLog Value corresponding to Time2. The higher the Voltage, the stronger the compression. See also camera manual Valid range: [0.0, 30.0]
LinLog.Time1	INT	RW	LinLog switching time 1, see also camera manual Valid range: [0.0, 1000.0]
LinLog.Time2	INT	RW	LinLog switching time 2, see also camera manual Valid range: [0.0, 1000.0]

Table 5.26. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Data Output Mode: Possible values: **0 : Normal** Normal Mode **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row **3 : Lut** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res12Bit** 12 Bit Resolution **1 : Res10Bit** 10 Bit Resolution **2 : Res8Bit** 8 Bit Resolution

DigitalGain	MODE	RW	Digital Gain of the image Possible values: **0 : Gain1** Gain 1X, normal **1 : Gain2** Gain 2X **2 : Gain4** Gain 4X
LUT.Mode	MODE	RW	This property set only the active lut mode. To calculate the LUT new, set the property LUT.Value. Possible values: **0 : Gain** Linear function. Y = 255 / 1023 * value * X; Valid range for value [1.0,4.0] **1 : Gamma** Gamma function: Y = 255 / 1023^value * X^value; Valid range for value [0.4,4.0]
LUT.Address	INT	RW	Address property to write or read LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 1023.0]
LUT.Data	INT	RW	Data property to read or write LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 255.0]
LUT.Value	FLOAT	RW	Value for Gain- or Gamma-function. Set first LUT.Mode, then LUT.Value Valid range: [0.4, 4.0]
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file) The parameter is the name of the file. eg: Lut.FileRead1 filename.txt
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file. eg: Lut.FileSave1 filename.txt

Table 5.27. Correction

Property	Type	Access	Description

Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the

Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.28. Miscellaneous

Property	Type	Access	Description
EnStatusLine	BOOL	RW	Enable status line. Status line is the last line of the current ROI
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit Valid range: [0.0, 4095.0]

Table 5.29. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.30. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	The BlackLevelOffset is the average image value at no intensity. Thus, the overall image gets brighter or darker. Valid range: [0.0, 4095.0]

Table 5.31. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

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5.1. Properties by category

Table 5.32. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in millisecond. Maximum value is 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RW	Frame time of the camera in millisecond. Only available in CFR Mode. Maximum value is 419ms. Valid range: [0.01,]

Table 5.33. Trigger

Property	Type	Access	Description
Counter.Image	INT	RW	For every images: ImageCounter++; Every write access, set this property to 0. Max. value is 16'777'215 (24Bit) Valid range: [0.0, 1.6777215E7]
Counter.MissedTrigger	INT	RW	Counts trigger pulses that could not be served. Missed triggers can only occur with the trigger sources 'Interface Trigger' and 'I/O Trigger' and with the 'Trigger.Async' property set to false. A missed trigger is a trigger pulse that was received during image exposure or image readout; Every write access, set this property to 0. The max. value is 255 (8Bit). Valid range: [0.0, 255.0]
Counter.Time	INT	RW	Counts the real time in units of 1 microsecond (40 clock cycles); Every write access, set this property to 0. The maximal value is 4'294'967'295 (32 Bit) = 4'294.96sec
Strobe.Delay	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The delay from the active input trigger edge to the rising edge of the trigger output signal is set ths property. The values are specified in ms Valid range: [0.0,]
Strobe.PulseWidth	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The width of the pulse is set with this property The values are specified in ms Valid range: [0.0,]
Strobe.Invert	BOOL	RW	Invert polarity of strobe output
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Invert	BOOL	RW	Invert Trigger signal

Trigger.LevelControlled	MODE	RW	1: Enables control of exposure time by length of trigger pulse (applies to Interface Trigger and I/O Trigger only). When set, the active trigger edge starts exposure and the inactive edge stops exposure. When not set, exposure is started by active trigger edge and is stopped after the time specified by the ExposureTime property. Possible values: **0 : Software** Exposure time is set by Camera **1 : Trigger_Pulse_Width** Exposure time is set by the duration of the trigger pulse width
Trigger.Delay	FLOAT	RW	Gives additional delay from active edge of external trigger to exposure start (applies to Interface Trigger and I/O Trigger only). The unit is ms. Maximum value is 419ms. Valid range: [0.0,]
Trigger.CFR	BOOL	RW	1: Enable Constant Frame Rate
Trigger.Interleave	BOOL	RW	1: Enable simultaneous readout. Combination of Interleave and Skim is not available! Combination of Interleave and LevelControlled trigger is not available! For limitation of this property, please refer the manual

Table 5.34. Window

Property	Type	Access	Description
Decimation.Y	INT	RW	Value for Y - decimation Valid range: [1.0, 15.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI. MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	Calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MROI0_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI0_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI1_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI1_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI2_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI2_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI3_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI3_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI4_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI4_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI5_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI5_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI6_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI6_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI7_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI7_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI8_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI8_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI9_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI9_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI10_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI10_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI11_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI11_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI12_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI12_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI13_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI13_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI14_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI14_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI15_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI15_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1012.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [12.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest

Table 5.35. Characteristics

Property	Type	Access	Description
Skim	INT	RW	0: Skimming disabled: n: Skimming enabled with value n Valid range: [0.0, 8.0]
LinLog.Mode	MODE	RW	The LinLog mode presets. Setting of this property have an influence on the maximum Skim value. Possible values: **0 : Off** LinLog off **1 : Low_compression** Low LinLog compression for semi-bright scenarios with good high intensity resolution **2 : Normal_compression** Normal LinLog compression for bright scenarios

			3 : High_compression High LinLog compression for extremely bright scenarios **4 : User_defined** No value preset, user defined values from LinLog struct property
LinLog.Value1	INT	RW	LinLog Value corresponding to Time1. The higher the Voltage, the stronger the compression. See also camera manual Valid range: [0.0, 30.0]
LinLog.Value2	INT	RW	LinLog Value corresponding to Time2. The higher the Voltage, the stronger the compression. See also camera manual Valid range: [0.0, 30.0]
LinLog.Time1	INT	RW	LinLog switching time 1, see also camera manual Valid range: [0.0, 1000.0]
LinLog.Time2	INT	RW	LinLog switching time 2, see also camera manual Valid range: [0.0, 1000.0]

Table 5.36. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Data Output Mode: Possible values: **0 : Normal** Normal Mode **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row **3 : Lut** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res12Bit** 12 Bit Resolution **1 : Res10Bit** 10 Bit Resolution **2 : Res8Bit** 8 Bit Resolution

DigitalGain	MODE	RW	Digital Gain of the image Possible values: **0 : Gain1** Gain 1X, normal **1 : Gain2** Gain 2X **2 : Gain4** Gain 4X
LUT.Mode	MODE	RW	This property set only the active lut mode. To calculate the LUT new, set the property LUT.Value. Possible values: **0 : Gain** Linear function. Y = 255 / 1023 * value * X; Valid range for value [1.0,4.0] **1 : Gamma** Gamma function: Y = 255 / 1023^value * X^value; Valid range for value [0.4,4.0]
LUT.Address	INT	RW	Address property to write or read LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 1023.0]
LUT.Data	INT	RW	Data property to read or write LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 255.0]
LUT.Value	FLOAT	RW	Value for Gain- or Gamma-function. Set first LUT.Mode, then LUT.Value Valid range: [0.4, 4.0]
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file) The parameter is the name of the file. eg: Lut.FileRead1 filename.txt
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file. eg: Lut.FileSave1 filename.txt

Table 5.37. Correction

Property	Type	Access	Description

Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the

Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.38. Miscellaneous

Property	Type	Access	Description
EnStatusLine	BOOL	RW	Enable status line. Status line is the last line of the current ROI
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit Valid range: [0.0, 4095.0]

Table 5.39. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.40. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	The BlackLevelOffset is the average image value at no intensity. Thus, the overall image gets brighter or darker. Valid range: [0.0, 4095.0]

Table 5.41. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

6. MV-D752E-40

6.1. Properties by category

Table 5.42. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Maximum value is 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Only available in CFR Mode. Maximum value is 419ms. Valid range: [0.01,]

Table 5.43. Trigger

Property	Type	Access	Description
Counter.Image	INT	RW	For every image: ImageCounter++; Every write access sets this property to 0. Max. value is 16'777'215 (24Bit)
Counter.MissedTrigger	INT	RW	Counts trigger pulses that could not be served. Missed triggers can only occur with the trigger sources 'Interface Trigger' and 'I/O Trigger' and with the 'Trigger.Async' property set to false. A missed trigger is a trigger pulse that was received during image exposure or image readout; Every write access, sets this property to 0. The max. value is 255 (8Bit).
Counter.Time	INT	RW	Counts the real time in units of 1 microsecond (40 clock cycles); Every write access, sets this property to 0. The maximal value is 4'294'967'295 (32 Bit) = 4'294.96sec
Strobe.Delay	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The delay from the active input trigger edge to the rising edge of the trigger output signal is set by this property. The values are specified in ms. Maximum value is 419ms. Valid range: [0.0,]
Strobe.PulseWidth	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The width of the pulse is set with this property. The values are specified in ms. Maximum value is 419ms. Valid range: [0.0,]
Strobe.Invert	BOOL	RW	Invert polarity of strobe output
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode. **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Invert	BOOL	RW	Invert Trigger signal
Trigger.Async	BOOL	RW	1: Enables abortion of images (applies to Interface Trigger and I/O Trigger only). When set, a trigger starts a new image regardless of the completion of the current image. When not set, a trigger only starts a new image if the current image has been completely read out.

Trigger.LevelControlled	MODE	RW	1: Enables control of exposure time by length of trigger pulse (applies to Interface Trigger and I/O Trigger only). When set, the active trigger edge starts exposure and the inactive edge stops exposure. When not set, exposure is started by active trigger edge and is stopped after the time specified by the ExposureTime property. Possible values: **0 : Software** Exposure time is set by Camera **1 : Trigger_Pulse_Width** Exposure time is set by the duration of the trigger pulse width.
Trigger.Delay	FLOAT	RW	Gives additional delay from active edge of external trigger to exposure start (applies to Interface Trigger and I/O Trigger only). The unit is ms. Maximum value is 419ms. Valid range: [0.0,]
Trigger.CFR	BOOL	RW	1: Enable Constant Frame Rate

Table 5.44. Window

Property	Type	Access	Description
Decimation.EnableX	BOOL	RW	1: Enable X - Decimation
Decimation.EnableY	BOOL	RW	1: Enable Y - Decimation
Decimation.Value	INT	RW	Value for decimation Valid range: [1.0, 64.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI.MROIx_Y and MROI.MROIx_H have no effect if this property is enabled.
MROI.Htot	INT	RO	Calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MROI0_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI0_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI1_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI1_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI2_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI2_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI3_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]

MROI.MROI3_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI4_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI4_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI5_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI5_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI6_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI6_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI7_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI7_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI8_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI8_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI9_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI9_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI10_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI10_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI11_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI11_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI12_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]

MROI.MROI12_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI13_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI13_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI14_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI14_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
MROI.MROI15_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 581.0]
MROI.MROI15_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 582.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 743.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 581.0]
Window.W	INT	RW	Width of region of interest Valid range: [9.0, 752.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 582.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest.

Table 5.45. Characteristics

Property	Type	Access	Description
Skim	INT	RW	0: Skimming disabled: n: Skimming enabled with value n Valid range: [0.0,]
LinLog.Mode	MODE	RW	The LinLog mode presets. Setting of this property have an influence on the maximum Skim value. Possible values: **0 : Off** LinLog off. **1 : Low_compression** Low LinLog compression for semi-bright scenarios. **2 : Normal_compression** Normal LinLog compression for bright scenarios. **3 : High_compression**

			High LinLog compression for extremely bright scenarios. **4 : User_defined** No value preset, user defined values from LinLog struct property.
LinLog.Value1	INT	RW	LinLog Voltage corresponding to Time1. The higher the Voltage, the stronger the compression. See also camera manual. Valid range: [0.0,]
LinLog.Value2	INT	RW	LinLog Voltage corresponding to Time2. The higher the Voltage, the stronger the compression. See also camera manual. Valid range: [0.0,]
LinLog.Time1	INT	RW	LinLog switching time 1. See also camera manual. Valid range: [0.0, 1000.0]
LinLog.Time2	INT	RW	LinLog switching time 2. See also camera manual. Valid range: [0.0, 1000.0]

Table 5.46. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Possible values: **0 : Normal** Normal Mode. **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system. **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row. **3 : Lut** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT.
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res12Bit** 12 Bit Resolution **1 : Res10Bit** 10 Bit Resolution **2 : Res8Bit** 8 Bit Resolution

DigitalGain	MODE	RW	Digital Gain of the image Possible values: **0 : Gain1** Gain 1X, normal **1 : Gain2** Gain 2X **2 : Gain4** Gain 4X
LUT.Mode	MODE	RW	This property sets only the active LUT mode. To recalculate the LUT, set the property LUT.Value. Possible values: **0 : Gain** Linear function. Y = 255 / 1023 * value * X; Valid range for value [1.0,4.0] **1 : Gamma** Gamma function: Y = 255 / 1023^value * X^value; Valid range for value [0.4,4.0]
LUT.Address	INT	WO	Address property to write or read LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT). Valid range: [0.0, 1023.0]
LUT.Data	INT	RW	Data property to read or write LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT). Valid range: [0.0, 255.0]
LUT.Value	FLOAT	RW	Value for Gain- or Gamma-function. Set first LUT.Mode, then LUT.Value Valid range: [0.4, 4.0]
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file). The parameter is the name of the file, eg. Lut.FileRead1 filename.txt.
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file, eg. Lut.FileSave1 filename.txt.

Table 5.47. Correction

Property	Type	Access	Description

Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the

Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.48. Miscellaneous

Property	Type	Access	Description
EnStatusLine	BOOL	RW	1: Enable status line. Status line is the last line of the current ROI
Average.Enable	BOOL	RW	1: Enable average
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit
USB.IsUSB	BOOL	RO	0: CameraLink Base Camera 1: USB Camera
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera 1: USB - port in fast mode (48 MBytes/s, isochronous mode)

Table 5.49. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.50. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	Valid range: [0.0, 4095.0]

Table 5.51. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

7. MV-D1024-28

7.1. Properties by category

Table 5.52. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms, for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, the camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock
Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.53. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI.MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MASK0_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK0_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK1_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK1_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]

MROI.MASK2_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK2_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK3_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK3_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK4_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK4_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK5_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK5_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK6_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK6_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK7_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK7_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK8_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK8_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK9_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK9_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK10_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK10_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]

MROI.MASK11_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK11_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK12_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK12_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK13_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK13_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK14_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK14_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK15_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK15_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.54. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive

OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **1 : LUT** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT **2 : 10 Bit** 10 Bit resolution **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file). The parameter is the name of the file, eg. Lut.FileRead1 filename.txt.
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file, eg. Lut.FileSave1 filename.txt.
LUT.LoadSlot	MODE	RW	Select slot for property LoadEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1**
LUT.SaveSlot	MODE	RW	Select slot for property SaveEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1**
LUT.LoadEeprom	COMMAND	WO	Load LUT from Eeprom to RAM. The Eeprom slot is given by property LoadSlot
LUT.SaveEeprom	COMMAND	WO	Save LUT from RAM to Eeprom. The Eeprom slot is given by property SaveSlot
LUT.Address	INT	WO	Address property to write or read LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).

LUT.Data	INT	RW	Data property to read or write LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).
Voltages.OffsetLowGain	INT	RW	set offset voltage for low gain mode (HighGain is disabled) Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	set offset voltage for high gain mode (HighGain is enabled) Valid range: [80.0, 2420.0]

Table 5.55. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.
LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim
Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.56. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.57. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera

Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

8. MV-D1024-80

8.1. Properties by category

Table 5.58. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms, for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, the camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock
Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.59. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI.MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MASK0_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]

MROI.MASK0_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK1_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK1_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK2_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK2_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK3_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK3_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK4_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK4_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK5_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK5_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK6_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK6_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK7_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK7_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK8_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK8_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK9_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]

MROI.MASK9_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK10_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK10_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK11_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK11_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK12_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK12_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK13_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK13_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK14_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK14_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK15_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK15_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.60. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive
OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **1 : Gain2X** digital gain 2X **2 : LUT** LUT: (Look-Up-Table) The camera has one 9-to-8 bit LUT **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file). The parameter is the name of the file, eg. Lut.FileRead1 filename.txt.
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file, eg. Lut.FileSave1 filename.txt.
LUT.LoadSlot	MODE	RW	Select slot for property LoadEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1** **2 : LUT2** **3 : LUT3**
LUT.SaveSlot	MODE	RW	Select slot for property SaveEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1** **2 : LUT2** **3 : LUT3**
LUT.LoadEeprom	COMMAND	WO	Load LUT from Eeprom to RAM. The Eeprom slot is given by property LoadSlot
LUT.SaveEeprom	COMMAND	WO	Save LUT from RAM to Eeprom. The Eeprom slot is given by property SaveSlot

LUT.Address	INT	WO	Address property to write or read LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).
LUT.Data	INT	RW	Data property to read or write LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).
Voltages.OffsetLowGain	INT	RW	set offset voltage for low gain mode (HighGain is disabled) Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	set offset voltage for high gain mode (HighGain is enabled) Valid range: [80.0, 2420.0]

Table 5.61. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.
LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim
Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.62. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.

StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.63. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

9. MV-D1024-160

9.1. Properties by category

Table 5.64. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms, for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, the camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock
Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.65. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]

MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI.MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MASK0_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK0_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK1_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK1_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK2_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK2_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK3_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK3_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK4_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK4_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK5_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK5_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK6_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK6_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK7_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK7_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]

MROI.MASK8_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK8_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK9_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK9_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK10_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK10_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK11_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK11_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK12_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK12_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK13_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK13_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK14_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK14_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
MROI.MASK15_Y	INT	RW	Start Y of the current MROI.-MASK Valid range: [0.0, 1023.0]
MROI.MASK15_H	INT	RW	Height H of the current MROI.-MASK Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]

Window.W	INT	RW	Width of region of interest Valid range: [8.0, 1024.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.66. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive
OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
Voltages.OffsetLowGain	INT	RW	set offset voltage for low gain mode (HighGain is disabled) Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	set offset voltage for high gain mode (HighGain is enabled) Valid range: [80.0, 2420.0]

Table 5.67. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.
LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim

Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.68. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.69. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

10. MV-D752-28

10.1. Properties by category

Table 5.70. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time. **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time. **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock

Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.71. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 751.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 581.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 752.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 582.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.72. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive.
OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **1 : LUT** LUT: (Look-Up-Table) The camera has one 10-to-8 bit LUT **2 : 10 Bit** 10 Bit resolution **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file). The parameter is the name of the file, eg. Lut.FileRead1 filename.txt.
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file, eg. Lut.FileSave1 filename.txt.

LUT.LoadSlot	MODE	RW	Select slot for property LoadEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1**
LUT.SaveSlot	MODE	RW	Select slot for property SaveEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1**
LUT.LoadEeprom	COMMAND	WO	Load LUT from Eeprom to RAM. The Eeprom slot is given by property LoadSlot.
LUT.SaveEeprom	COMMAND	WO	Save LUT from RAM to Eeprom. The Eeprom slot is given by property SaveSlot.
LUT.Address	INT	WO	Address property to write or read LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).
LUT.Data	INT	RW	Data property to read or write LUT to the camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit (10 to 8 bit LUT).
Voltages.OffsetLowGain	INT	RW	Set offset voltage for low gain mode (HighGain is disabled). Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	Set offset voltage for high gain mode (HighGain is enabled). Valid range: [80.0, 2420.0]

Table 5.73. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.

LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim
Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.74. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.75. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

11. MV-D752-80

11.1. Properties by category

Table 5.76. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]

Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time. **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time. **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock
Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.77. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 751.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 581.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 752.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 582.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.78. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive.

OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **1 : Gain2X** digital gain 2X **2 : LUT** LUT: (Look-Up-Table) The camera has one 9-to-8 bit LUT **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file) The parameter is the name of the file. eg: Lut.FileRead1 filename.txt
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file. eg: Lut.FileSave1 filename.txt
LUT.LoadSlot	MODE	RW	select slot for property LoadEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1** **2 : LUT2** **3 : LUT3**
LUT.SaveSlot	MODE	RW	select slot for property SaveEeprom. This camera has 4 Eeprom slots for LUT tables Possible values: **0 : LUT0** **1 : LUT1** **2 : LUT2** **3 : LUT3**
LUT.LoadEeprom	COMMAND	WO	Load LUT from Eeprom to RAM. The Eeprom slot is given by property LoadSlot
LUT.SaveEeprom	COMMAND	WO	Save LUT from RAM to Eeprom. The Eeprom slot is given by property SaveSlot

LUT.Address	INT	WO	Address property to write or read LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT)
LUT.Data	INT	RW	Data property to read or write LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT)
Voltages.OffsetLowGain	INT	RW	Set offset voltage for low gain mode (HighGain is disabled). Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	Set offset voltage for high gain mode (HighGain is enabled). Valid range: [80.0, 2420.0]

Table 5.79. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.
LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim
Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.80. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.81. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

12. MV-D752-160

12.1. Properties by category

Table 5.82. Exposure/Trigger

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
FrameRate	STRING	RO	Framerate of the camera in fps (frames per second)
FrameTime	FLOAT	RW	Frame time of the camera in milliseconds. Max Value for -28: 591ms; for -80: 419ms; for -160: 419ms. Valid range: [0.01,]
Trigger.Source	MODE	RW	Possible values: **0 : Free running** Trigger is in free running mode, camera delivers images continuously. **1 : Extern Sync** External trigger with programmed exposure time. **2 : Extern Sync FT** External trigger start exposure time, Exposuretrigger stop exposure time. **3 : LevelControlled** Exposure time by length of trigger pulse. When set, the active trigger edge starts exposure and the inactive edge stops exposure.
Trigger.Invert	BOOL	RW	1: Invert trigger signal
Trigger.Slave	BOOL	RW	1: Enable external pixel clock
Trigger.CFR	BOOL	RW	1: Enable constant frame rate

Table 5.83. Window

Property	Type	Access	Description
LineHopping.Enable	BOOL	RW	Enable LineHopping
LineHopping.Value	INT	RW	If enabled, transmit every n'th line only Valid range: [1.0, 255.0]

Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 751.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 581.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 752.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 582.0]
Window.Max	COMMAND	WO	Set Window to max. region of interest.

Table 5.84. OutputMode

Property	Type	Access	Description
HighGain	BOOL	RW	1: Increases the gain in the analog path by a factor of 4 and thus makes the camera more sensitive.
OutputMode	MODE	RW	Possible values: **0 : 8 Bit** Normal mode, 8 Bit resolution **3 : LSFR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.
Voltages.OffsetLowGain	INT	RW	Set offset voltage for low gain mode (HighGain is disabled). Valid range: [80.0, 2420.0]
Voltages.OffsetHighGain	INT	RW	Set offset voltage for high gain mode (HighGain is enabled). Valid range: [80.0, 2420.0]

Table 5.85. Characteristics

Property	Type	Access	Description
LinLog.Mode	MODE	RW	Possible values: **0 : Off** Disable LinLog. **1 : LinLog** Enable LinLog.
LinLog.LL1	FLOAT	RW	LinLog Value 1. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]

LinLog.LL2	FLOAT	RW	LinLog Value 2. The higher this value, the stronger the compression. See also camera manual. Valid range: [0.0, 100.0]
LinLog.COMP	FLOAT	RW	See camera manual. Valid range: [0.0, 100.0]
Skim.Enable	BOOL	RW	1: Enable Skim
Skim.Value	FLOAT	RW	Value of skim. See camera manual. Valid range: [0.0, 100.0]

Table 5.86. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.87. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

13. MV-D640(C) - SERIES

13.1. Properties by category

Table 5.88. Trigger/Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera, in milliseconds Valid range: [0.05, 1300.0]
FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RO	Frame time of the camera in milliseconds
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is in Free Running mode **1 : External_Trigger** External Trigger mode

Table 5.89. Window

Property	Type	Access	Description

Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 639.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 479.0]
Window.W	INT	RW	Width of region of interest Valid range: [1.0, 640.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 480.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest.

Table 5.90. Output

Property	Type	Access	Description
OutputMode	MODE	RW	Possible values: **0 : 8 Bit** 8 Bit. Normal mode. **1 : 10 Bit** 10 Bit. Not available for USB cameras. **2 : Gain 2x** 8 Bit and Gain 2x. **3 : Gain 4x** 8 Bit and Gain 4x. **4 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system.

Table 5.91. Special

Property	Type	Access	Description
Clock	BOOL	RW	Only available for MV-D640-66-CL. 0: 33MHz clock 1: 66 MHz clock
EnIntBias	BOOL	RW	Enable or disable internal bias. 1: default mode 0: when experiencing randomly moving white pixels, disable the internal bias. Depending on the gain settings, the column noise may be increased.
ColorGain.Blue	INT	RW	Only available for color cameras. Amplification of color blue Valid range: [1.0, 18.0]
ColorGain.Green1	INT	RW	Only available for color cameras. Amplification of color green1 Valid range: [1.0, 18.0]
ColorGain.Red	INT	RW	Only available for color cameras. Amplification of color red Valid range: [1.0, 18.0]

ColorGain.Green2	INT	RW	Only available for color cameras. Amplification of color green2 Valid range: [1.0, 18.0]
ColorGain.Common	INT	RW	Only available for monochrome cameras. Amplification of image Valid range: [1.0, 18.0]
Voltages.BlackLevelOffset	INT	RW	Close the lens aperture completely to adjust the black level offset of the camera. See camera manual. Valid range: [0.0, 15.0]

Table 5.92. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.93. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Interleaved	INT	RO	0: camera in non-interleaved mode. 1: camera in interleaved mode
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RW	The maximal sensor resolution (X)
Header.ResolutionY	INT	RW	The maximal sensor resolution (Y)
USB.IsUSB	BOOL	RO	0: CameraLink Base Camera. 1: USB Camera.
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera. 1: USB - port in fast mode (48 MBytes/s, isochronous mode).

14. DS1-D1024-40

14.1. Properties by category

Table 5.94. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in milliseconds. Maximum value is 419ms. Valid range: [0.01,]

Table 5.95. Trigger

Property	Type	Access	Description

Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode. **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.

Table 5.96. Window

Property	Type	Access	Description
Window.Mode	MODE	RW	3 window presettings are available Possible values: **0 : Window_1024x1024** A region of interest with the size 1024 x 1024 pixel **1 : Window_1024x512** A region of interest with the size 1024 x 512 pixel **2 : Window_1024x256** A region of interest with the size 1024 x 256 pixel **3 : Window_512x512** A region of interest with the size 512 x 512 pixel

Table 5.97. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Possible values: **0 : Normal** Normal Mode. **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system. **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row.

DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res10Bit** 10 Bit Resolution **1 : Res8Bit** 8 Bit Resolution

Table 5.98. Correction

Property	Type	Access	Description
Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 40 and 100DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.

Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 550 and 900. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the
Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 40 and 100DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 550 and 900DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.99. Miscellaneous

Property	Type	Access	Description
Average.Value	INT	RO	Average of the actual images. Value is ever in 10bit
USB.IsUSB	BOOL	RO	0: CameraLink Base Camera 1: USB Camera
USB.FastMode	BOOL	RO	0: USB - port in slow mode (24 MBytes/s) or no USB camera 1: USB - port in fast mode (48 MBytes/s, isochronous mode)

Table 5.100. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.101. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	Valid range: [0.0, 4095.0]

Table 5.102. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera

Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

15. DS1-D1024-80

15.1. Properties by category

Table 5.103. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in millisecond. Maximum value is 419ms. Valid range: [0.01,]

Table 5.104. Trigger

Property	Type	Access	Description
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Interleave	BOOL	RW	1: Enable simultaneous readout. Combination of Interleave and Skim is not available! Combination of Interleave and LevelControlled trigger is not available! For limitation of this property, please refer the manual

Table 5.105. Window

Property	Type	Access	Description
Window.Mode	MODE	RW	3 window presettings are available Possible values: **0 : Window_1024x1024** A region of interest with the size 1024 x 1024 pixel **1 : Window_1024x512** A region of interest with the size 1024 x 512 pixel **2 : Window_1024x256** A region of interest with the size 1024 x 256 pixel **3 : Window_512x512** A region of interest with the size 512 x 512 pixel

Table 5.106. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Data Output Mode: Possible values: **0 : Normal** Normal Mode **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res10Bit** 10 Bit Resolution **1 : Res8Bit** 8 Bit Resolution

Table 5.107. Correction

Property	Type	Access	Description
Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut**

			Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the
Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.108. Miscellaneous

Property	Type	Access	Description
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit Valid range: [0.0, 1023.0]

Table 5.109. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.110. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	The BlackLevelOffset is the average image value at no intensity. Thus, the overall image gets brighter or darker. Valid range: [0.0, 4095.0]

Table 5.111. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

16. DS1-1024-160

16.1. Properties by category

Table 5.112. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in millisecond. Maximum value is 419ms. Valid range: [0.01,]

Table 5.113. Trigger

Property	Type	Access	Description
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Interleave	BOOL	RW	1: Enable simultaneous readout. Combination of Interleave and Skim is not available! Combination of Interleave and LevelControlled trigger is not available! For limitation of this property, please refer the manual

Table 5.114. Window

Property	Type	Access	Description

Window.Mode	MODE	RW	3 window presettings are available Possible values: **0 : Window_1024x1024** A region of interest with the size 1024 x 1024 pixel **1 : Window_1024x512** A region of interest with the size 1024 x 512 pixel **2 : Window_1024x256** A region of interest with the size 1024 x 256 pixel **3 : Window_512x512** A region of interest with the size 512 x 512 pixel

Table 5.115. DataOutput

Property	Type	Access	Description
DataOutMode	MODE	RW	Data Output Mode: Possible values: **0 : Normal** Normal Mode **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row
DataResolution	MODE	RW	Resolution of the image Possible values: **0 : Res10Bit** 10 Bit Resolution **1 : Res8Bit** 8 Bit Resolution

Table 5.116. Correction

Property	Type	Access	Description

Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetHotpixel** Remove hotpixel and offset. **3 : Hotpixel** Remove hotpixel. **4 : OffsetGain** Remove offset, apply gain correction. **5 : OffsetGainHotpixel** Remove offset and hotpixel, apply gain correction. **6 : BlackRefOut** Output of black reference image. **7 : GreyRefOut** Output of grey reference image.
Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the

Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.117. Miscellaneous

Property	Type	Access	Description
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit Valid range: [0.0, 1023.0]

Table 5.118. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.119. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	The BlackLevelOffset is the average image value at no intensity. Thus, the overall image gets brighter or darker. Valid range: [0.0, 4095.0]

Table 5.120. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

17. MV2-D1280-640

17.1. Properties by category

Table 5.121. Exposure

Property	Type	Access	Description
ExposureTime	FLOAT	RW	Exposure time of the camera in millisecond Valid range: [0.002125, 1012.0]
FrameRate	STRING	RO	Frame rate of the camera in 1/second.
FrameTime	FLOAT	RW	Frame time of the camera in millisecond. Only available in CFR Mode Valid range: [0.01,]

Table 5.122. Trigger

Property	Type	Access	Description
Counter.Image	INT	RW	For every images: ImageCounter++; Every write access, set this property to 0. Max. value is 16'777'215 (24Bit)
Counter.MissedTrigger	INT	RW	Counts trigger pulses that could not be served. Missed triggers can only occur with the trigger sources 'Interface Trigger' and 'I/O Trigger' and with the 'Trigger.Async' property set to false. A missed trigger is a trigger pulse that was received during image exposure or image readout; Every write access, set this property to 0. The max. value is 255 (8Bit).
Counter.Time	INT	RW	Counts the real time in units of 1 microsecond (40 clock cycles); Every write access, set this property to 0. The maximal value is 4'294'967'295 (32 Bit) = 4'294.96sec
Strobe.Delay	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The delay from the active input trigger edge to the rising edge of the trigger output signal is set ths property. The values are specified in ms Valid range: [0.0, 419000.0]
Strobe.PulseWidth	FLOAT	RW	The camera generates a trigger output signal that can be used to control a flash light. The output is a pulse whose delay and pulse width can be set as follows. The width of the pulse is set with this property The values are specified in ms Valid range: [0.0, 419000.0]
Strobe.Invert	BOOL	RW	Invert polarity of strobe output
Trigger.Source	MODE	RW	Possible values: **0 : Free_Running** Trigger is on Free Running Mode **1 : Interface_Trigger** Interface Trigger is the trigger source. **2 : IO_Trigger** I/O Trigger is the trigger source.
Trigger.Invert	BOOL	RW	Invert Trigger signal

Trigger.LevelControlled	MODE	RW	1: Enables control of exposure time by length of trigger pulse (applies to Interface Trigger and I/O Trigger only). When set, the active trigger edge starts exposure and the inactive edge stops exposure. When not set, exposure is started by active trigger edge and is stopped after the time specified by the ExposureTime property. Possible values: **0 : Software** Exposure time is set by Camera **1 : Trigger_Pulse_Width** Exposure time is set by the duration of the trigger pulse width
Trigger.Delay	FLOAT	RW	Gives additional delay from active edge of external trigger to exposure start (applies to Interface Trigger and I/O Trigger only). The unit is ms Valid range: [0.0, 419.0]
Trigger.CFR	BOOL	RW	1: Enable Constant Frame Rate
Trigger.Interleave	BOOL	RW	1: enable interleaved mode

Table 5.123. Window

Property	Type	Access	Description
Decimation.Y	INT	RW	Value for Y - decimation Valid range: [1.0, 15.0]
MROI.Enable	BOOL	RW	1: Enable MROI. All settings for properties Window.Y, Window.H, MROI. MROIx_Y and MROI.MROIx_H have no effect during this property is enabled
MROI.Htot	INT	RO	Calculate all H in MROI Mode (H = Hmroi0 + Hmroi1 + ...)
MROI.MROI0_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI0_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI1_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI1_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI2_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI2_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI3_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI3_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI4_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI4_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI5_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI5_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI6_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI6_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI7_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI7_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI8_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI8_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI9_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI9_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI10_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI10_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI11_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI11_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI12_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]

MROI.MROI12_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI13_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI13_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI14_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI14_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
MROI.MROI15_Y	INT	RW	Start Y of the current MROI. Valid range: [0.0, 1023.0]
MROI.MROI15_H	INT	RW	Height H of the current MROI. Valid range: [1.0, 1024.0]
Window.X	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1272.0]
Window.Y	INT	RW	Start of region of interest (Top left corner) Valid range: [0.0, 1023.0]
Window.W	INT	RW	Width of region of interest Valid range: [8.0, 1280.0]
Window.H	INT	RW	Height of region of interest Valid range: [1.0, 1024.0]
Window.Max	COMMAND	RW	Set Window to max. region of interest

Table 5.124. DataOutput

Property	Type	Access	Description
CameraLinkMode	MODE	RW	Possible values: **0 : 8 taps** 8 taps mode **1 : 10 taps** 10 taps mode

DataOutMode	MODE	RW	Possible values: **0 : Normal** Normal Mode **1 : LFSR** Test image. Linear feedback shift registers: generates a pseudo-random image, so that errors can be identified in the complete image processing system **2 : Ramp** Test image. Values of pixels are incremented by 1, starting at each row **3 : LUT** Enables LUT
DigitalGain	MODE	RW	Digital Gain of the image Possible values: **0 : Gain1** Gain 1X, normal **1 : Gain2** Gain 2X **2 : Gain4** Gain 4X
LUT.Mode	MODE	RW	This property set only the active lut mode. To calculate the LUT new, set the property LUT.Value. Possible values: **0 : Gain** Linear function. Y = 255 / 1023 * value * X; Valid range for value [1.0,4.0] **1 : Gamma** Gamma function: Y = 255 / 1023^value * X^value; Valid range for value [0.4,4.0]
LUT.Address	INT	RW	Address property to write or read LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT. Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 1023.0]

LUT.Data	INT	RW	Data property to read or write LUT to Camera. To write or read the table to the camera property LUT.Address and LUT.Data are needed. LUT.Address is equivalent to the original brightness of the pixel. LUT.Data is equivalent to the new brightness value of the pixel. Set property LUT.Address with X and LUT.Data with Y means, that all pixel with the brightness X were changed to brightness Y. Size of LUT.Address is 10 bit. Size of LUT.Data is 8 bit. (10 to 8 bit LUT) Valid range: [0.0, 255.0]
LUT.Value	FLOAT	RW	Value for Gain- or Gamma-function. Set first LUT.Mode, then LUT.Value Valid range: [0.4, 4.0]
LUT.FileRead1	STRING	RW	Open a file and copy values to LUT. (Use LUT.FileSave1 first to see, how is the format of the file) The parameter is the name of the file. eg: Lut.FileRead1 filename.txt
LUT.FileSave1	STRING	RW	Open a file and copy values from LUT to file. The parameter is the name of the file. eg: Lut.FileSave1 filename.txt

Table 5.125. Miscellaneous

Property	Type	Access	Description
Average.Value	INT	RW	Average of the actual images. Value is ever in 12bit Valid range: [0.0, 255.0]

Table 5.126. Correction

Property	Type	Access	Description
Correction.Mode	MODE	RW	for more infomation, see camera manual Possible values: **0 : Off** No Correction. **1 : Offset** Remove offset. **2 : OffsetGain** Remove hotpixel and offset. **3 : BlackRefOut** Output of black reference image. **4 : GreyRefOut** Output of grey reference image.

Correction.SetBlackRef	COMMAND	RW	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.SetGreyRef	COMMAND	RW	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.
Correction.Calculate	COMMAND	RW	Calculate correction values (needs 2sec). This property is inactive until a black or grey image is recorded
Correction.SaveToFlash	COMMAND	RW	Save correction values to Flash (needs 55sec). This property in inactive until the
Correction.ValidationBlack	COMMAND	WO	The offset correction is based on a black reference image, which is taken at no illumination (e.g. lens aperture completely closed). The black reference image contains the fixed-pattern noise of the sensor, which can be subtracted from the live images in order to minimize the static noise. Close the lens of the camera. Set property Correction.ValidationBlack. If the property Correction. Set BlackRef is still inactive, the average of the image is out of range. Change the property Voltages.BlackLevelOffset until the average of the image is between 160 and 400DN. Set property Correction.ValidationBlack again and then property Correction.Set BlackRef.
Correction.ValidationGrey	COMMAND	WO	The gain correction is based on a gray reference image, which is taken at uniform illumination to give an image with a mid gray level. Gain correction is not a trivial feature. The quality of the gray reference image is crucial for proper gain correction. Produce a gray image with an average between 2200 and 3600DN. Set property Correction.ValidationGrey to check the average. If the average is in range, the property Correction.SetGreyRef is active.

Table 5.127. Commands

Property	Type	Access	Description
FactoryReset	COMMAND	WO	Restores the settings from the factory preset area to the default boot up set.
Reset	COMMAND	WO	This command resets the camera to its boot up state.
StoreDefaults	COMMAND	WO	Stores the current settings as default boot up values.

Table 5.128. Calibration

Property	Type	Access	Description
Voltages.BlackLevelOffset	INT	RW	The BlackLevelOffset is the average image value at no intensity. Thus, the overall image gets brighter or darker. Valid range: [0.0, 4095.0]

Table 5.129. Info

Property	Type	Access	Description
CameraName	STRING	RO	The name of the connected camera
Header.PixelClock	INT	RO	The pixel clock in Hz
Header.ResolutionX	INT	RO	The maximal sensor resolution (X)
Header.ResolutionY	INT	RO	The maximal sensor resolution (Y)

Appendix A. References

All referenced documents can be downloaded from our website at www.photonfocus.com.

CL

CameraLink Specification

AN001

Application Note "LinLog"

AN007

Application Note "Camera Acquisition Modes"

AN010

Application Note "Camera Clock Concepts"

AN015

Application Note "Glossary"

AN021

Application Note "CameraLink"

AN022

Application Note "Image and Lens Formats"

AN023

Application Note "The right Interface for every Speed"

AN024

Application Note "LinLog - Principle and Practical Example"

AN026

Application Note "LFSR Test Images"

AN027

Application Note "Framerate Calculator"

Appendix B. Revision History

Revision	Date	Changes
1.0	May 2005	First release
1.01	May 2005	EMPHIS300-Eval added
1.1	August 2005	MV-D750E-20 added
1.2	October 2005	MV-D1024E-40 and MV-D752E-40 added
1.3	November 2005	MV-D640(C) - SERIES added
1.4	September 2006	MV-D1024-28-CL, MV-D1024-80-CL, MV-D1024-160-CL, MV-D752-28-CL, MV-D752-80-CL, MV-D752-160-CL and MV-D1024-Track added
1.5	October 2006	PFRemote 2.0

1.6	February 2007	MV-D1024E-80-CL and MV-D1024E-160-CL added