CropVIEW®

extended user manual

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Table of Content

1. INTRODUCTION TO CropVIEW®

The CropVIEW® system is composed of three parts:

1. The main unit; including:
- Cameras and optics (wide/narrow angle)
- Processor, modem, USB port
- SIM card holder,
- UMTS/GPS antenna,
- Holder with pitch angle selector (0°,11°,22°,33, 44°)
- Eyehole pointer

2. Control Unit, which commands the main unit; including:
- Power supply
- Sensor set

3. The FieldClimate platform; including:
- Pictures hosting
- Image processing
- Diseases modeling, weather forecast
- Coming new value adding services

Picture 1: CropVIEW®

CropVIEW® is to be used in all areas covered at least by UMTS (3G) networks. It is equipped with a solar panel and a battery for all year-round standalone functioning. After installing the unit and setting the recording interval, CropVIEW® is already fully operational.

Important:
CropVIEW® field device needs 3G (UMTS) coverage, and will not be operational under 2G (GPRS) services.

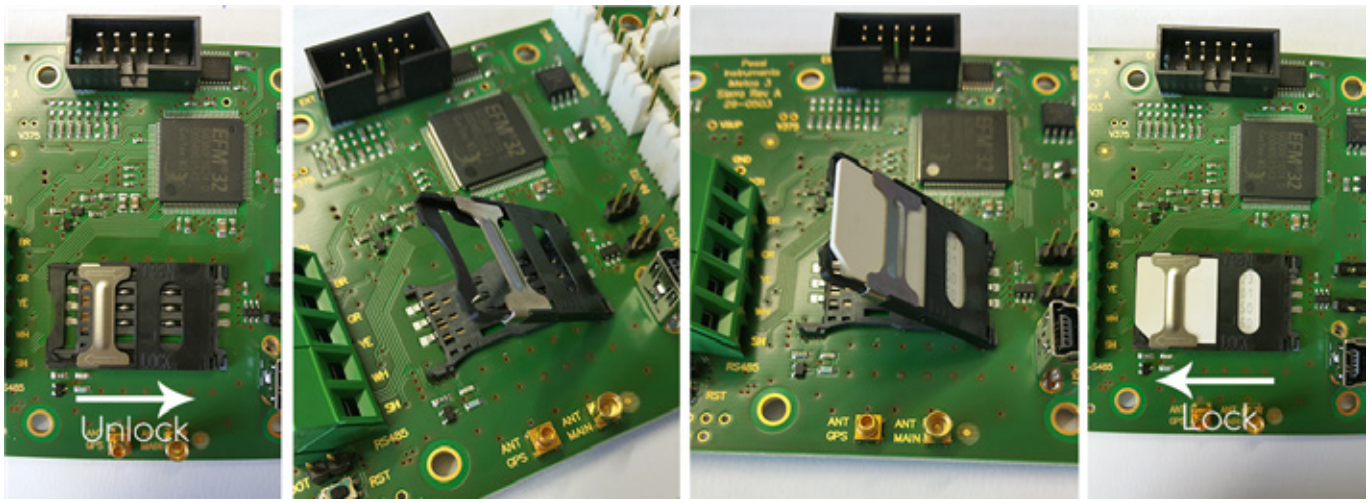
Several versions of CropVIEW® are available with different levels of output offer. Please contact us for further information at support@metos.at.

The CropVIEW® camera uses a set of lenses that should be focused manually. They are delivered already focused for 2.5m to the objective picture. For a different distance, onsite manual focus is essential.

2. SIM CARD

A SIM card from a 3G cellular service provider is needed. To insert or remove a SIM card:

1. Slide the metal part to the right to unlock the holder
2. Open the holder from the left side and insert or remove the SIM card
3. Close the holder
4. Lock the holder by sliding the metal to the left (you should hear a click).



Picture 2: SIM Card holder

2.1 HOW TO DEACTIVATE (DISABLE) PIN REQUEST

This can be done using:

- a GSM handset device or
- directly with the USB <=> PC connection

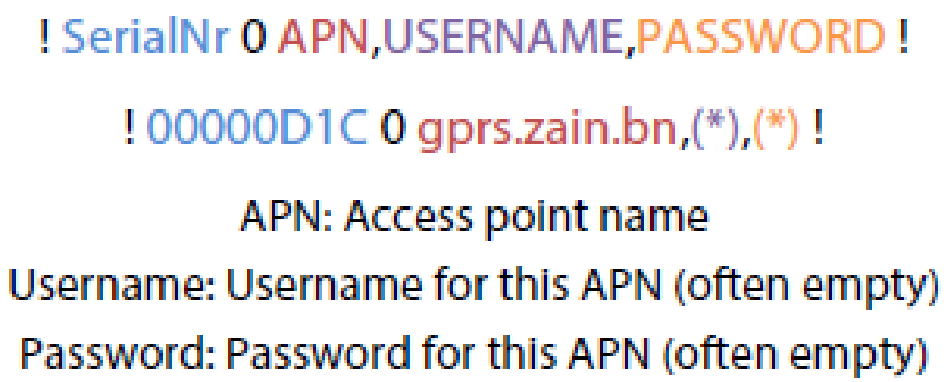
Attention:
Please always check that the PIN request for the SIM is disabled.

2.2 USING UNUSUAL SIM CARDS

We have prepared an extanded table of Internet connection settings for various cellular service providers worldwide, which is present in the device memory (we are adding new providers all the time). You can check if your provider is in the table with sending email to: support@metos.at.

It might happen that your iMETOS is one of the first devices set up with a specific provider. In this case, you will need to set these parameters with your PC via USB port or sending SMS with correct settings to the station.

To set new APN settings send a special SMS to the station, with APN settings, its username and its password. Before sending the SMS insert SIM card into your device. The SMS with APN settings has the following form:



Picture 3: APN

2.3 SIM CARD: PREPAID OR CONTRACT

Prepaid SIM cards may be used temporarily or for service purposes. A contract SIM card will always be more cost effective.

Every picture has 10±2MB depending in the complexity of the image, so the data plan in your SIM should be calculated by the following formula:

Monthy data plan= 12(MB per picture) *number of cameras * shootings per day * 30(days per month)

Example:
CropVIEW® with 2 cameras 2 shootings per day will need minimum monthly data plan:
12MB * 2 cameras* 2 shoots per day *31 days per month = 1.5GB/month

3. FOCUSING THE CAMERAS

The quality of the images captured by the camera depends critically on the precision when focusing the lens. The focus process must be performed in the field.

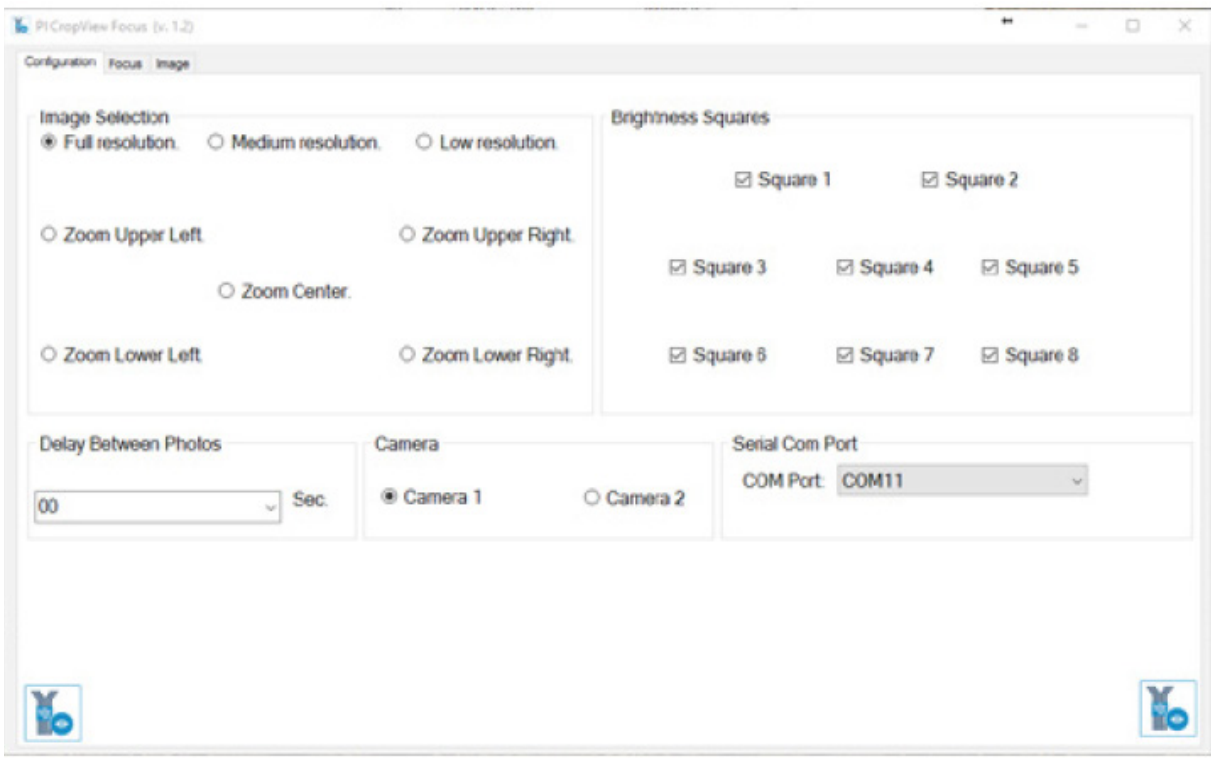
To focus the pictures, use the application PI CropVIEW® Focus and follow the process described in coming pages.

Important note:
Correct onsite focusing of the camera is essential for the quality of the pictures and for the current (and future) added services provided upon them.

3.1 INSTALLING PI CropVIEW® FOCUS APPLICATION

- Download the installer from our website: Firmware and program download
- Extract the files to a folder
- Open the folder containing the extracted files and select CV_PhotoViewer_Installer.msi file and double click on it
- Installation window will open; click on Next and select appropriate Installation Folder or leave default value
- Confirm installation
- Find the application on the Desktop or in Start > Programs > Pessl Instruments > PI CropVIEW® Focus test and run it
- Run the application

The application will open in a window with 3 tabs which will be explained on the following page
- Configuration
- Focus
- Image



Picture 4: Focus APP

3.2 CropVIEW® FOCUS APPLICATION: CONFIGURATION TAB

This tab has 5 sections:

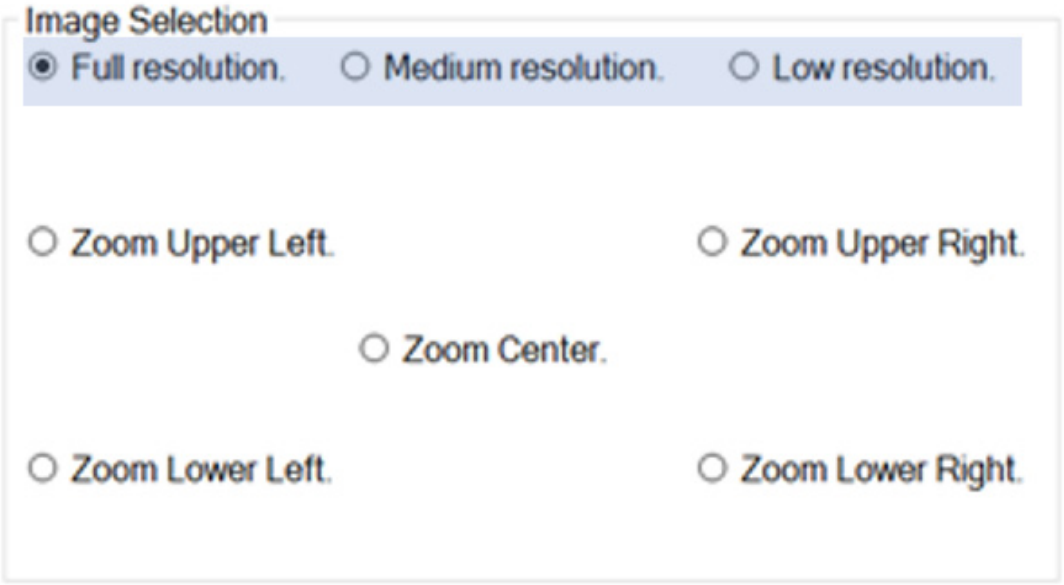
- Image selection
- Brightness squares
- Delay between photos
- Camera selection
- Serial com port

3.2.1 IMAGE SELECTION

To speed up the process of focusing, here you can select the resolution and part of the image to use during the focusing process.

Resolution with 3 options:

- low resolution (3Mpix)
- with medium resolution picture (6Mpix)
- full resolution (12Mpix)



Picture 5: Focus app: images selection

Note:

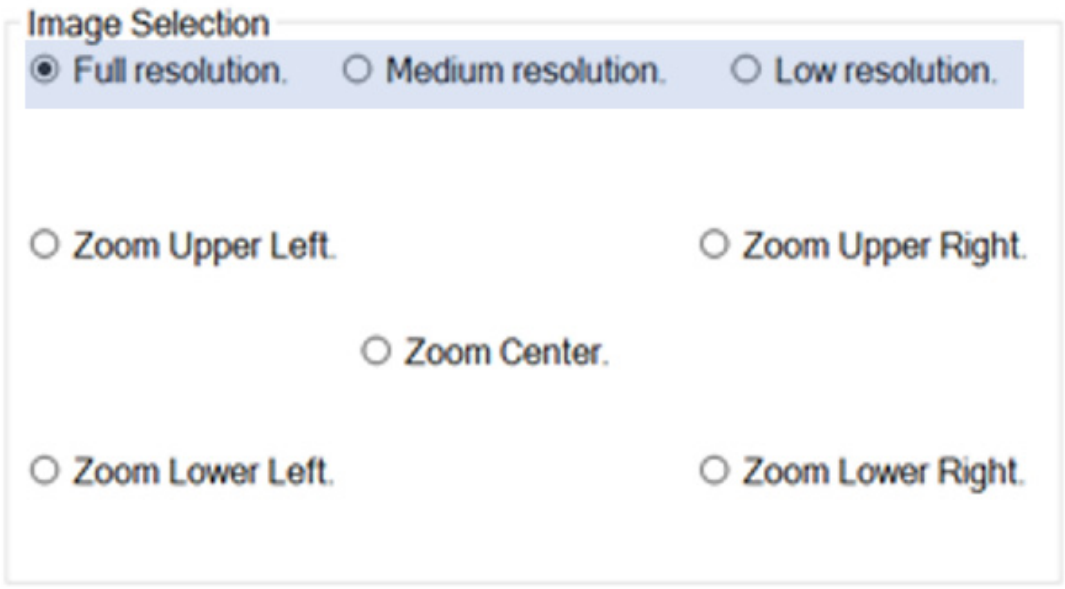
The resolution selected here does not affect the resolution of the final pictures. It is only intended to reduce the data traffic between USB and PC until the final fine focus.
Cameras are delivered focused for an object at 2.5 m, but in most cases the object distance will be much higher, so you will need to start rotating the lens of the camera counter clockwise.

Tip:

Save time in the focusing process by starting with low resolution for the gross focusing, then repeat the process with medium resolution picture to refine it and at last finish with a full resolution to check the result and to do the final adjustments.

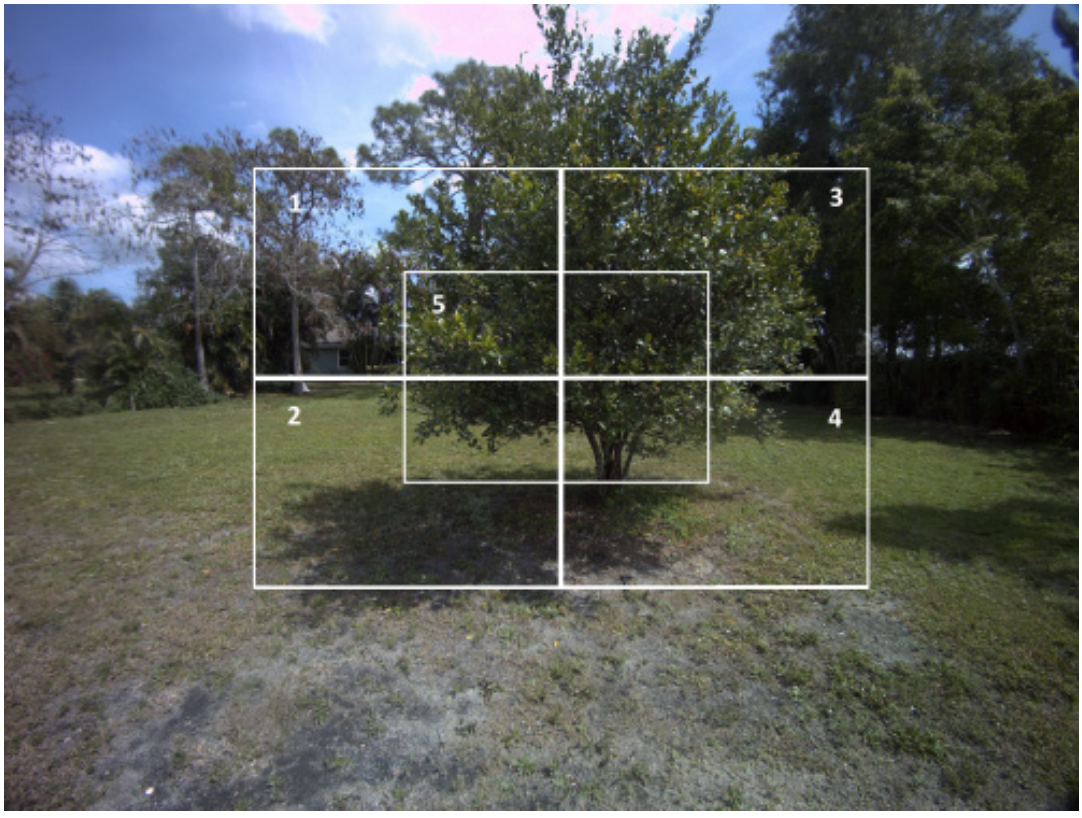
3.2.2 PART OF THE PICTURE

Speed up the process by using the zoom options which allow you to use a partial frame (1/8) with the complete resolution, you can choose between 5 different parts as shown in the image below.



Picture 6: Focus app: Select part of the picture

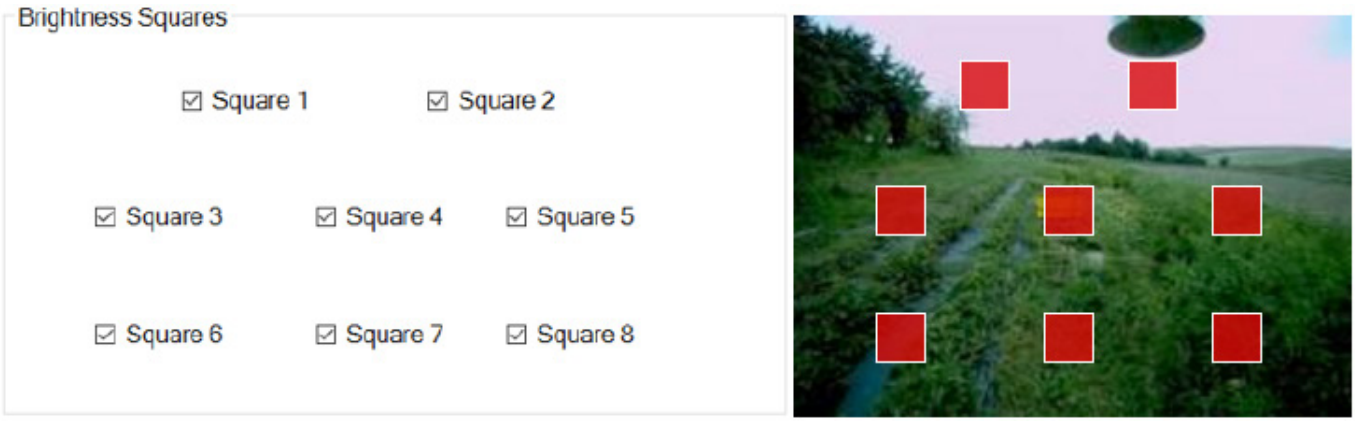
Tip:
It is recommended to start with the "Zoom Center"



Picture 7: Focus app: part of the picture – Zoom center

3.2.3 BRIGHTNESS SQUARES

Use this feature to select the areas to be used by the auto exposure algorithm to get the right brightness of the overall picture. Doing so, you can optimize the contrast for the area of interest in pictures with differences in illumination. Any of the red squares can be enabled or disabled for the final exposure.



Picture 8: Brightness squares

3.2.4 OTHER SETTINGS IN CONFIGURATION TAB

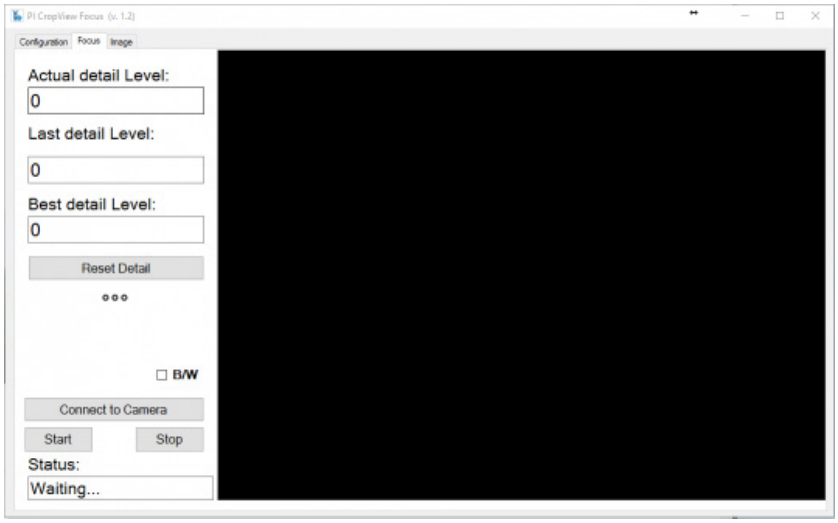
Delay between photos:
Use this to insert a time delay of up to 9 seconds between every image USB transmission to the PC.

Camera:
Select the camera to focus: Wide angle or narrow angle camera.

Serial COM Port:
To select the COM port, to which the CropVIEW® device is connected to the PC via USB.

3.3 CropVIEW® FOCUS APPLICATION: FOCUS TAB

To assist you during the focusing, in this mode PI CropVIEW® Focus filters the edges of the image and converts the total amount of edges into a figure that we call “detail level”.



An image with a higher number of edges is sharper or more focused. Actual detail level is an indicator of the focus accuracy. The higher the value, the more focused the image.

Picture 9: Focus tab

Actual detail level: Displays the detail level of the most recent image.

Last detail level: Displays the detail level of the previously received image, indicates whether you are turning the camera lens in the right direction.

Best detail level: Displays the highest of all detail levels measured in the process

Reset Detail: Resets the detail level fields.

B/W: Option to display the image in Black & White or in colour.

Connect to Camera: Starts the USB communication between PC and the camera.

Start: Starts the image capturing process.

Stop: Stops the image capturing process.

Status: Here you can see the actual action that the system is performing.

3.4 CropVIEW® FOCUS APPLICATION: IMAGE TAB

Check the actual image without processing.

Tip:
In the next page, you will use “detail level” figure, you will rotate the lens between two consecutive pictures and keep rotating in the same direction if the “detail level increases”. If the “detail level” decreases change the direction of rotation (see next page).

3.5 FOCUS PROCESS

3.5.1 CONNECT THE CropVIEW® TO THE PC

1. Unplug control unit from CropVIEW® unit

Picture 10: Connect to PC

2. Connect CropVIEW® unit to your PC with USB cable to mini-USB
Use the mini USB port in the lower left corner of the board.

3. Place the jumper in position J1. If you have access to the internet, USB drivers will be installed automatically.

Attention:
The CropVIEW® device has two mini-USB ports. Use the one labeled as “MAIN-USB” (the other one is only for service purposes).

USB driver

The PC should recognize automatically the CropVIEW® device once you connect it via the USB and it will install the needed driver itself with no further intervention. In case of problems or in the case that your first installation is offline you can previously download and install the driver from the following link: www.st.com

3.5.2 FOCUSING PROCESS USING THE FOCUS APPLICATION

3.5.2.1 CONNECTING TO THE CAMERA

After selecting the correct port for the CropVIEW®, the image size and location required for your installation, you should go to the focus window and click on the button “Connect to Camera”. The status should change from *Waiting* to *CropVIEW® Ready*. At this point the camera is ready to start the image transmission.

3.5.2.2 START THE IMAGE TRANSFER

In the Focus tab click on the Start button and the Status will change to Configuring Camera. During this phase the camera will take a series of images in order to adjust the exposure time with the current light conditions. After setting the camera parameters, the status will change to Getting a new Photo and finally to Next Photo.

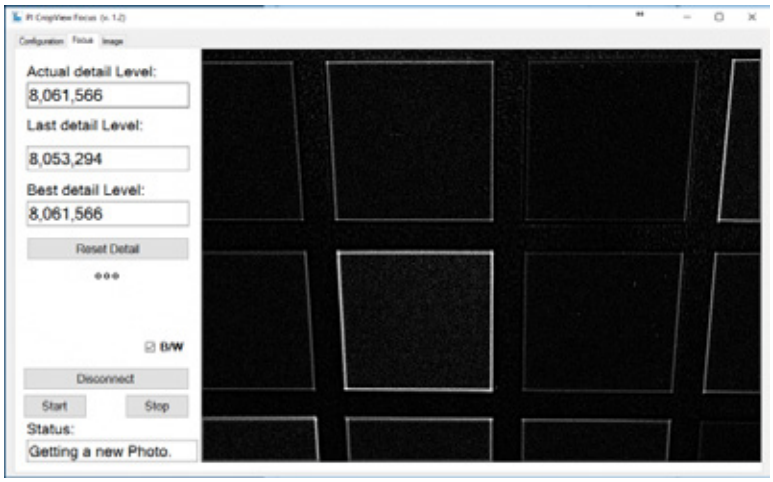
At this point you will see the image on the screen.

Recommendation:
When you are outdoor: check the box labeled B/W (i.e. black and white) to see the image better.

Focusing the camera:

Picture: Focusing the camera

Foucsing the camera- black&white mode:

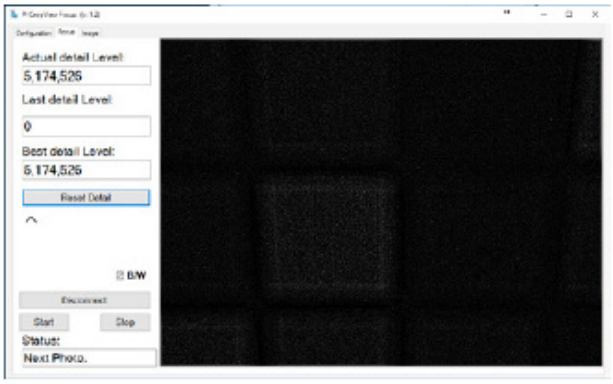


Picture: Focusing the camera in BW mode

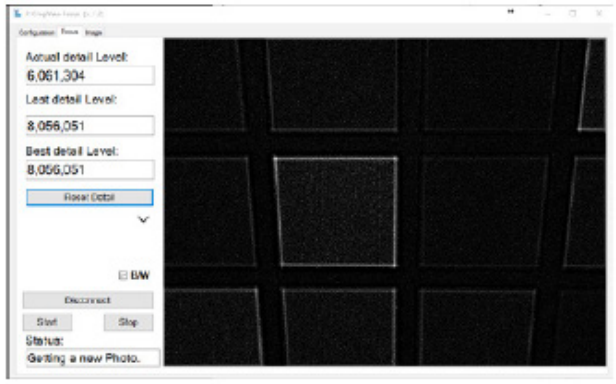
3.5.2.3 FOCUSING

To focus the camera, you should start turning the lenses in one direction, wait one or two images and check the Actual Detail Level to determine if the value of this figure is increasing (the higher the better), continue turning in the same direction until it starts to decrease; at this point, change rotation direction slowly looking for the maximum value of the detail level. Below is a sequence of images of a common focus process:

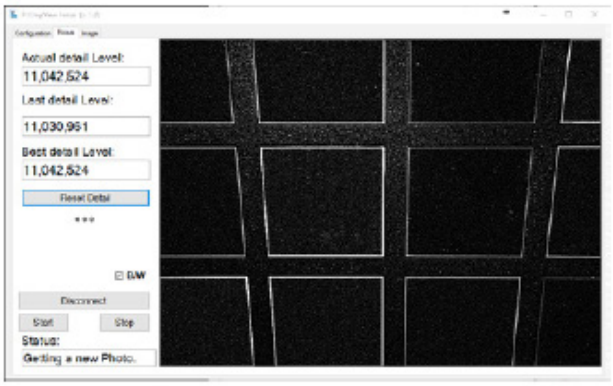
1



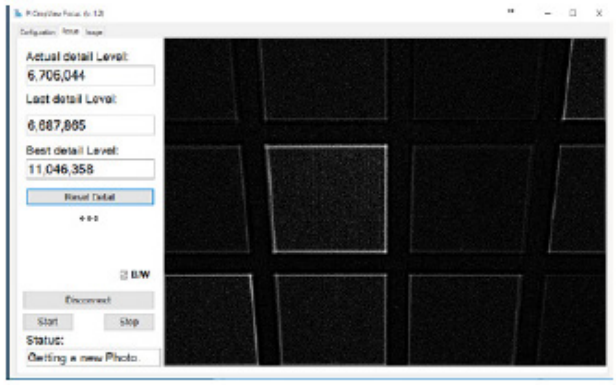
2



3



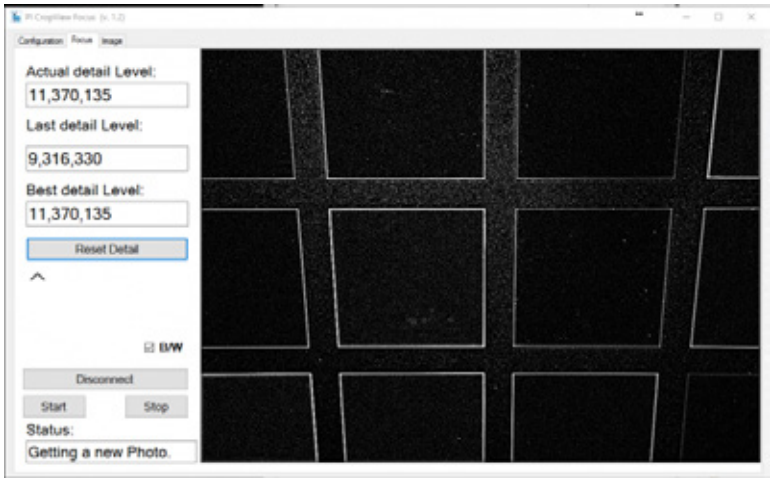
4



Picture: Focus process

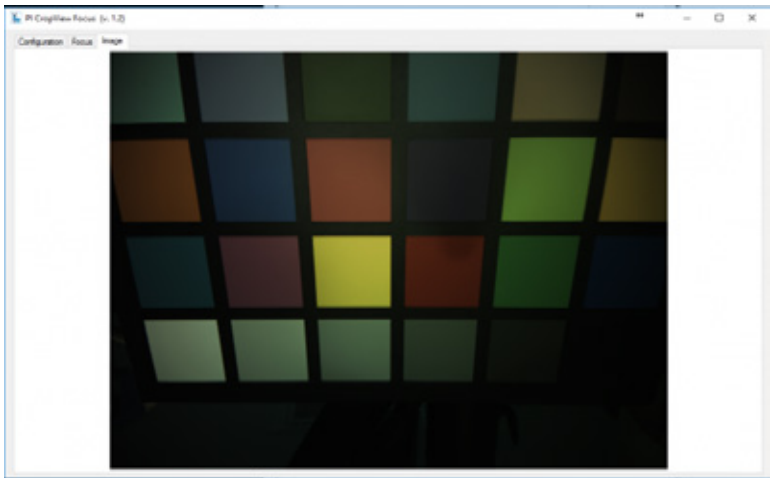
TIP:
Rotate the lens slowly, focus is very sensitive to small rotations. Remember the direction of your last rotation.

Finalized focus:



Picture: Finalized focus

In order to be sure that the camera is well focused you should use the image tab to verify what the image looks like:



Picture 15: Image check

3.5.2.4 CHANGING THE CAMERA TO FOCUS THE SECOND CAMERA

If your CropVIEW® has a second camera, procced to focus it. Procced as follows:

- In the Focus window click on Stop
- Wait until the status change to CropVIEW® Ready
- In the Configuration windowselect the camera you want to focus then repeat the process described in the previous section

3.5.2.5 ENDING THE FOCUS PROCESS

After you are satisfied with the photos, click on the “Stop” button and disconnect the USB cable.

Attention:
Do not forget to remove the jumper from J1!

4. PREPARATION OF YOUR CropVIEW® UNIT BEFORE FIELD INSTALLATION

In order to check the proper operation of the system before going to the field for installation it is highly recommended to perform the procedure following on next pages.

Basic requirements:
- PC with terminal application installed
- Type A USB to Mini USB cable
- Jumper

Note:
You can use the terminal program of your choice. Or you can use our specific terminal program which you can find at: www.metos.at or contact our support team at support@metos.at.

4.1 CHECK THE COMMUNICATION

4.1.1 FINAL TEST BEFORE FIELD INSTALLATION

This is recommended to be done in an indoor environment (e.g. your office).
To correctly connect your CropVIEW® unit to your PC please follow instructions on page Connect the CropVIEW® to the PC.

Open a terminal window on your computer and select the right serial port associated with the camera in your system.

Place the jumper in position J1 and you will see the following text in terminal window:
==========
USER: \ MAIN MENU
==========
(1) SYSTEM
(2) CONTROL UNIT
(3) MODEM
(4) FLASH
(5) CAMERA

Select SYSTEM (press nr. 1 on your keyboard), and in the next menu select QUICK VIEW (again nr. 1). Now you will see station info and its serial number (0700xxxx), where the 07 indicates that it is a CropVIEW® product. Press ESC button on your keyboard several times, to return to the main menu. Then Insert the SIM card in the SIM card holder and fix it (you must hear a click when you lock it).

In terminal window select MODEM (3), then select SEND DATA (3) and finally remove the jumper from position J1 (in order to set up the spy mode). Now you will see in the terminal window the log information of the communication process.

You should not see any error messages. In case of errors please check if the SIM card is unlock ed and make sure that the 3G data service is available (in log of communication process should be indicated that it's connected through UMTS):

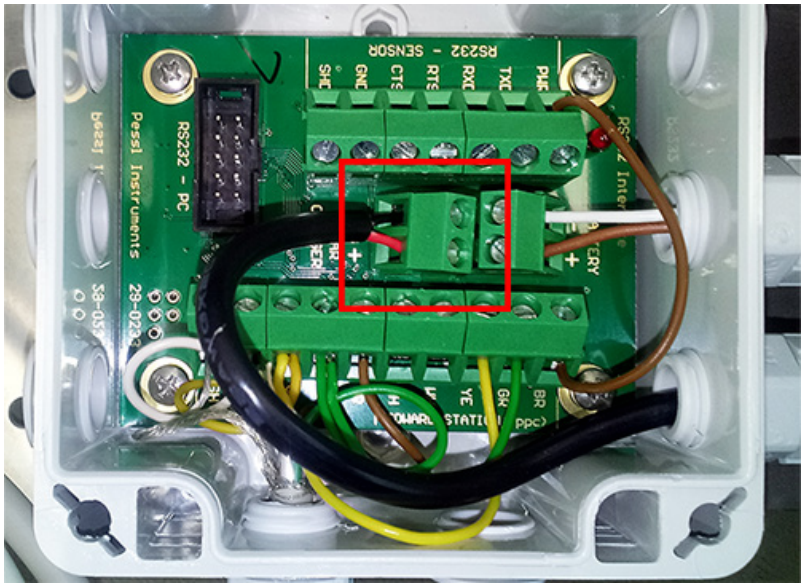
bearer_type='UMTS'
mcc_current='232'
mnc_current='10'
mcc_sim='232'
mnc_sim='10'
sim_id='8943102101104029497'
apn_country='Austria'
apn='drei.at'
user='drei'
passw=''
roaming='0'
/>

4.1.1 FINAL TEST BEFORE FIELD INSTALLATION

To do a final test, do the following:

- Unplug the battery and the solar panel from the control unit
- Unplug the USB cable from CropVIEW® unit
- Connect the cable from control unit to the CropVIEW® unit – make sure it is connected in the right way – as shown on the picture below

Picture: Correct connection



Picture: Unscrew four screws on the control unit box and open it. Once open connect the solar panel cable to the SOLAR CHARGER connector on the control unit board (marked with red square on the picture). Connect the red cable to + and black cable to -. After successfully connecting the solar panel, close the control unit box and screw the four screws.

- Connect the battery to the control unit
- Connect the solar panel to the control unit
- After approximately one or one and a half hour you should see the photos on the web site (it depends on the quality of the internet connection)
- Unplug the battery and solar panel for transport or storage
- Your CropVIEW® device is ready for field installation

5. FIELD INSTALLATION OF YOUR CropVIEW® DEVICE

5.1 CAMERA LOCATION

Look for the scene that you want to take pictures of. Identify the best location for the camera – take into consideration the sun position. We recommend the use of a sun position application for your mobile phone (Sun Surveyor or something similar), in order to be sure that your CropVIEW® unit will not be facing sun light directly at the time that photos should be taken.

Tip:
If you install camera inside the rows (for example in an orchard or vineyard) it is very likely that lenses on camera will get dirty when you spray your plants and the picture quality will decrease. In order to avoid this problem put some kind of a protection over your CropVIEW® device, when spraying.

5.2 FOCUS THE CAMERAS

Unplug the control unit from the camera and connect the USB cable and the Jumper to position J1 and follow instructions on how to focus your camera on page Focusing the camera.

Focus both cameras to get the best results based on the actual scene. You can also focus the cameras in your office, if you know the exact distance on the field – from your CropVIEW® unit to the object of interest.

Tip:
Focusing the cameras in the field: it is recommended to do it in the morning or evening, when the sunlight is low. Otherwise your laptop screen will be hardly visible.

5.3 CHECK THE FULL FRAME IMAGES USING THE FOCUS APPLICATION

To be sure that the camera captures the image that you want, use the Full resolution option in the Configuration Window and check the result in the Image Window (for more information about how to use the Focus application see the page Focusing the camera).

5.3.1 FINAL SETUP OF THE SYSTEM

To avoid any initialization problems, please perform the following steps in the given order:
- Unplug the solar panel from the control unit.
- Unplug the battery from control unit.
- Unplug the USB cable.
- Remove the jumper from position J1.
- Connect the cable from control unit to CropVIEW® unit.
- Connect the battery to control unit.

Now you should see the red LED in the control unit turning off and approximately 2 seconds later, you should see the three LEDs in the CropVIEW® unit turning on and off. At this point we are sure that the system is running. If the LEDs aren't turning on, repeat the process.
- Connect the solar panel to the control unit.
- Final check of all connections, LEDs and cables.
- Close the housing.

Note: When the season is over, remove the device from the field, disconnect the solar panel and the battery to avoid discharge and store it indoors until the next season.

6. ACCESSING THE PICTURES AND SERVICES FROM FieldClimate

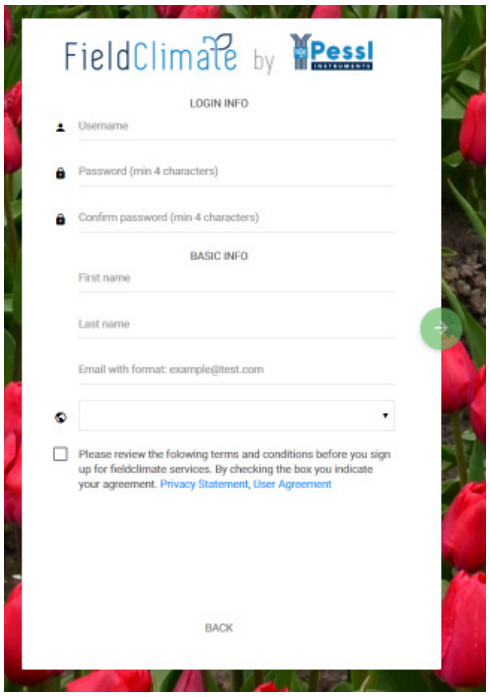
6.1 USE YOUR CropVIEW®

FieldClimate is the web service you are intended to use your CropVIEW® with. It allows you to see photos taken by the two cameras. It provides interfaces for picture downloads and it provides a powerful decision support system for plant protection and irrigation.

6.2 REGISTER YOURSELF AS A USER ON FieldClimate.com

To use the services on FieldClimate.com it is necessary to register as a user first. Click the plus (+) button to add a new user.

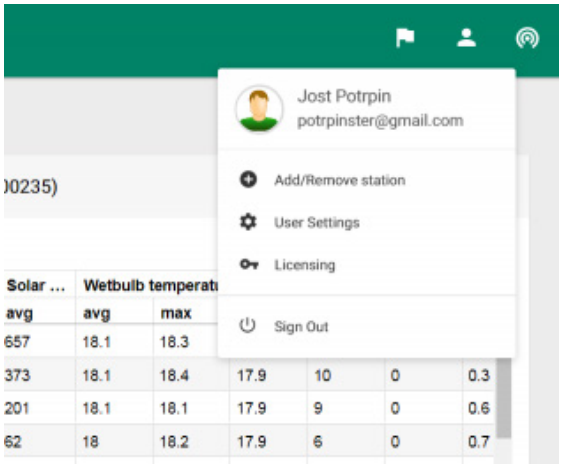
The registration screen which comes up, asks you for a username and a password and it needs your email address as well as your postal address and some information about the company. Please note you will have to enter the real email address. An acknowledge email is send to your inbox and its containing link that has to be used to activate the newly created user account on FieldClimate.com.



Picture: Register yourself

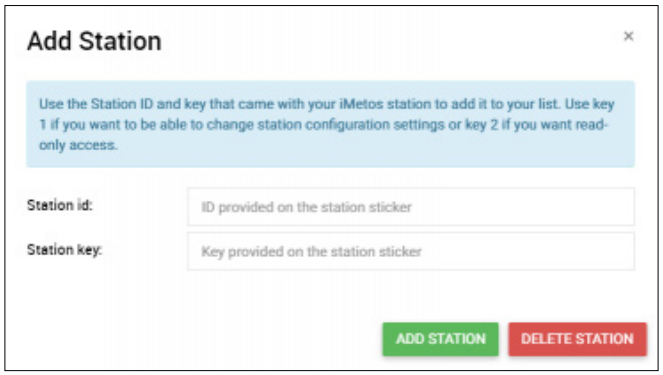
6.3 ADD THE CropVIEW® TO YOUR ACCOUNT

After you have activated your account you can enter thedocs.metos.at/FieldClimate. To add your CropVIEW® device, open user menu and then press the “Add/Remove station” button.



Picture: Add/remove station

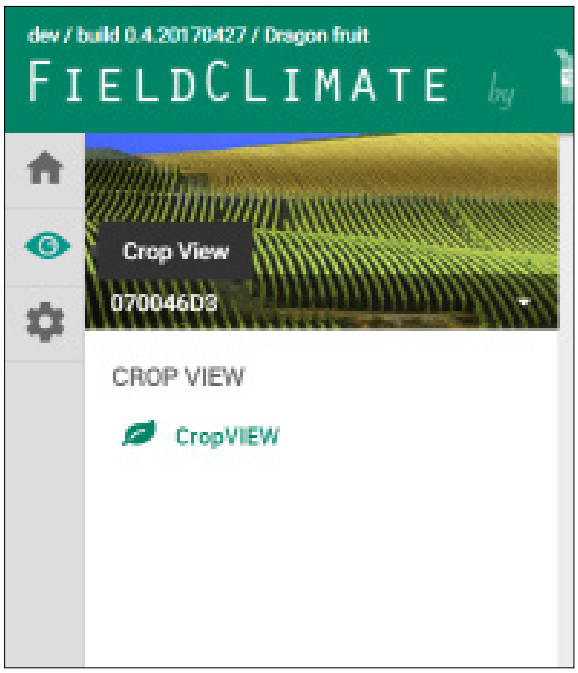
It will ask you for a Station ID number and a station key. Now the little silver colored sticker which came with your CropVIEW® has to be used. This sticker contains two keys. Key 1 gives the power to change all the settings on the CropVIEW® whereas key 2 is only valid to use the data of the system. To be able to set up the CropVIEW® enter the key 1 here. If you entered the correct key, your station list will be enlarged by this CropVIEW® and it can be selected.



Picture: Add station

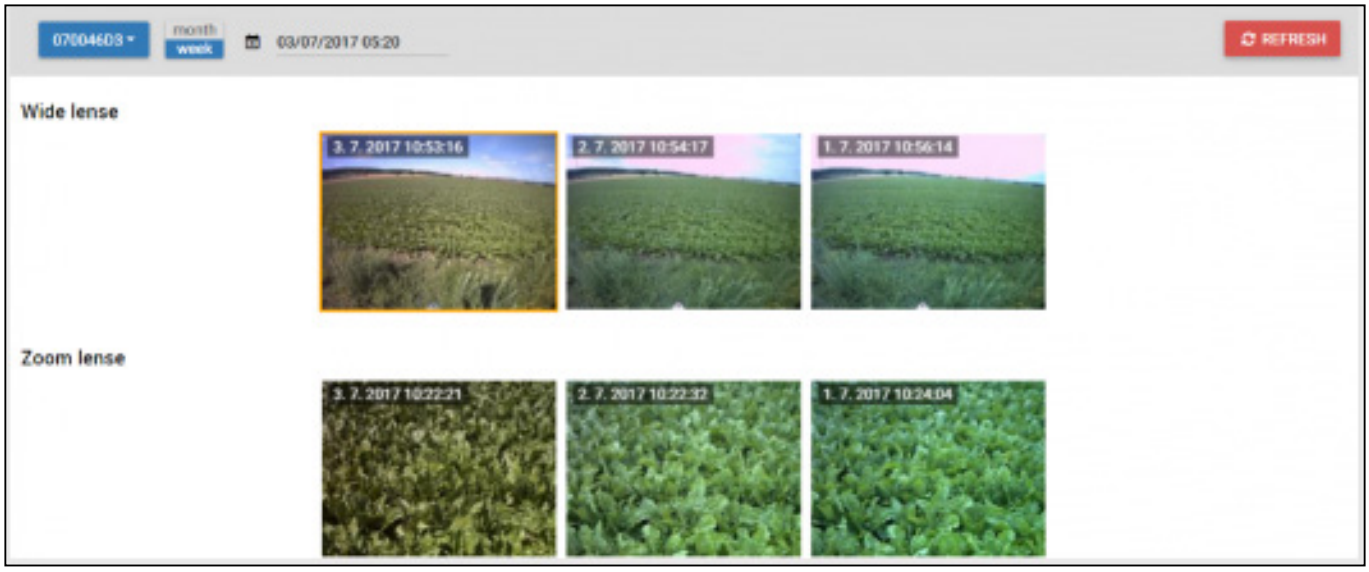
6.4 THE CropVIEW® PAGE

To access the CropVIEW® page, click on the eye icon on the left side of the bar.



Picture: Access CropVIEW®

After clicking on the eye icon a new page with full-scale picture will open. When hovering over this picture with your mouse, you can use the mouse wheel to zoom in and out.
Below the full-scale picture, you can find a date selection option and a selection between the two cameras – wide angle lens and zoom lens. With this you can choose which picture to show in full-scale.



Picture: Camera selection

6.5 SETTINGS FOR YOUR CropVIEW®

Settings menu for your CropVIEW® can be reached from the station settings menu, under configuration.

6.5.1 TIME ZONE AND LOCATION SETTINGS

Be aware that precise location and time-zone settings are essential for proper functioning of weather forecast and other services.

If your device has a built-in GPS, location and time zone will be acquired automatically. You can also define location and time zone manually.

Manually entering the station location:

- You can drag the marker on the map to your location
- You can enter location (by address) into „location search“ box and then click „GO!“ Button
- You can enter coordinates of device location to Longitude, Latitude, Elevation boxes (you can acquire coordinates with help of your mobile phone, if it has built-in gps)

Manually entering the station time zone:

- Select the correct time zone from a drop-down list

When you finish with configuration, do not forget to save new settings that you made (click on „save location“ button)!

6.5.2 TRANSFER SETTINGS

Setup how your CropVIEW® station is sending data.

In Scheduler please select the hours at which you wish your CropVIEW® station to take a picture and send it to the server.

BE AWARE: Taking and sending a picture consumes a lot of energy, so decide wisely about how many times per day you want to do it. During cold periods of year, picture taking and sending is recomended only once per day.

BE AWARE: Sending a picture consumes a lot of transfer data; if station sends three pictures per day, monthly use of data will be 1 GB. In order not to exceed this data amount, there is a limitation of taking pictures only three times per day.

When you finish with configuration, do not forget to save new settings that you made (click on „Save configuration“ button)!

6.5.3 CAMERA SETTINGS

Setup your camera, but be aware that bad settings can result in corrupted images. Change the settings only if you are confident you know what you are doing. Otherwise we recommend to use the default settings.

With „on/off“ button you can turn on and off both cameras.

Exposure mode is recommended to be set to Automatic and Max integration time and brightness reference to default values (you can always click on „Reset to default“ button to get back the default values).

Red and white squares are Brightness squares (red square: measuring point is turned on, white square: measuring point is turned off). With this option you can select the measuring points in which you want to measure the image brightness used by the automatic exposure algorithm. This comes handy, if at a part of picture there is a high amount of light and auto exposure automatically dims the part of picture of your interest (you can deselect measuring point at very bright part to have better brightness on the rest of a picture).

When you finish with configuration, do not forget to save new settings that you made (click on „Save CropVIEW® settings“ button)!