VILBER LOURMAT

QUANTUM ST4

➔ User manual

03/2009 index f

Please read me first!

Please read carefully the installation instruction before proceeding to the installation.

Please do not connect the QUANTUM ST4 USB camera to the computer before installing the Quantum-Capt software.

After the software is fully installed, connect the Quantum ST4 USB camera to the computer. At that time, Windows Vista or XP will look for the camera driver located in the CD-Rom.

Complete installation procedure are described in this manual. Please refer to the complete details before to proceeding to the installation.

Thank you

Dear Customer,

On behalf of Vilber Lourmat, we would like to thank you for choosing the QUANTUM ST4 imaging systems.

In order to learn the capabilities of your QUANTUM ST4 system, we kindly ask you to read this manual. This manual details how to install and to operate the hardware and the software components.

Vilber Lourmat is dedicated to your satisfaction and we will be pleased to answer any question you may have. We are also very receptive to your suggestions. Many of the new features and enhancements in this system are a direct result of conversations with our customers. Please do not hesitate to contact us to let us know what you would like to see in the next version of this system.

You can contact us at the following addresses:
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Do not hesitate to visit our website at www.vilber.com

Warning and safety

Please read carefully these instructions before installing and operating the QUANTUM ST4 system.

This product is safe to use when operated in accordance with the instruction manual. This instrument should not be modified or altered in any way. Modification or alteration of this instrument will void the manufacturer's warranty, void the regulatory certifications and create a potential safety hazard.

The intended purpose of the QUANTUM ST4 is gel documentation. They are designed for research use in laboratory only. VILBER LOURMAT is not responsible for any injury or damage caused by the use of this instrument for purposes other than those for which it is intended, or for any modifications of the instrument not performed by VILBER LOURMAT or by an authorized agent.

All uses opposed to the notification specified in this technical instruction or all misuses affect the goods and bodies security fastened by this device and can damage the instrument.

It is mandatory to connect the QUANTUM ST4 to an appropriate AC voltage outlet that is properly grounded and protected by a circuit breaker. Connecting to ground constitutes an obligatory protection.

It is mandatory to power down the system and to disconnect the AC main from the unit before performing any disassembly or repair the instrument.

The system must be unplugged from the AC voltage outlet if it is not intended to use it before a long time.

Disconnect the power cord by pulling the plug. Never pull on the cord itself.

Ensure that all the ventilation-opening systems are not obstructed. The obstruction of the air admission grids may affect the performance of the system and cause operational failure.

To prevent fire or shock hazard, do no expose the unit to rain or moisture.

The use of accessories not supplied by VILBER LOURMAT can damage the system or create safety hazard.

Do not use the QUANTUM ST4 in dangerous atmosphere or with dangerous materials for which the QUANTUM ST4 has not been designed for.

The power cable of the camera is expensive and very fragile, because of the thin conducting pin.

Before plugging or unplugging the cable, ensure the unit is off and disconnect the QUANTUM ST4 from the AC voltage outlet.

Never pull the camera cable itself. Disconnect the cable only by grasping the plug.

All the equipment connected to this unit shall be certified according to standard IEC 950, or other IEC/ISO Standards applicable to the equipment.

This instrument must be used only by specialized personnel that know the health risks associated with UV radiation and with the reagents that are normally used with this instrument. Use of the UV protective screen doesn't guarantee protection of the user from UV radiation. The use of protective eyeglasses or mask and gloves is highly recommended.

Do not pour liquids directly on or inside the instrument.

Switch off all the lights immediately after use.

Clean the transilluminator platen after use.

The system should be located away from water, solvents, or a corrosive material, on a bench top that is dry and stable. The system should be placed away from interfering electrical signals and magnetic fields. A dedicated electrical outlet should be used to eliminate electrical interference from other instrumentation in your laboratory.

Introduction

QUANTUM ST4 is an image acquisition system dedicated to the capture of fluorescence gel images.

QUANTUM ST4 offers exquisite precision and resolution, which mean reliable results for both quantification and documentation.

The advanced imaging electronics has been developed by our experts especially for your scientific applications. This association of our exclusive electronic, high-quality optics and advanced software delivers outstanding performance. With QUANTUM ST4, you simply reach the lowest limits of detection on all of your samples.

➔ Key features

- • Last generation of CCD sensor
- • Image Master assistant to easily get the optimum image
- • Megapixels imaging / USB® interface
- • Pure image integrity and access to the raw data
- • Large sample size and ingenious pull-out transilluminator
- • Free software for image acquisition & analysis
- • Optional motorized zoom lens with Autofocus control
- • Exclusive Vilber Lourmat's UV Master™ technology
- • Compatible with the Bio-1D and the Bio-Profile software

Computer configuration

➔ Minimum computer configuration for Windows®

	Minimum requirement
Bus	PCI bus (Intel chipset) supporting bus mastering mode
Processor	Pentium, 3.2 GHz, FSB 800 MHz (bus speed) and upwards
Ram	1 Gb and upwards
Hard disk	10 Gb and upwards At least 1Gb free disk space least in order to allow software installation and image storage
Monitor / Video card	AGP card 1280 x 1024 in 16 millions colour mode (24-bit). Upper resolutions supported Video card with a refresh rate above 70 Hz.
Operating system	Microsoft Windows XP SP2 (and upper) Microsoft Windows Vista SP1 (32-bit only)
USB Port	At least two USB port available

Small form factor (SFF) or slim computers are not compatible with standard PCI board format. Such computers must be avoided.

VILBER LOURMAT cannot guaranty the correct working of the computer and the software when the BIOS energy saving options are active

Windows® is a registered trademark of Microsoft and must be installed before installing the acquisition board and the Quantum-Capt software

Hardware installation

➔ Unpacking the QUANTUM ST4 system

Please, open the QUANTUM ST4 box carefully and verify the contents:

- Darkroom / Camera and camera support 1
- Power cable 1
- Instruction manual 1
- Quantum-Capt software CD-Rom inside the instruction manual 1
- USB cable for Xpress version only (motorised zoom) 1

⇨ Remove carefully each component from the box.
⇨ Remove their protective plastic cover.
⇨ Place the darkroom at its permanent location, the door facing forward. The cabinet has to be placed near the computer used for image acquisition.

It is recommended that the QUANTUM ST4 darkroom be carried by at least two people – one on each side- holding the instrument from the bottom side. Be sure that the door is properly closed when carrying the instrument.

Do not connect the power cable to a power source until all connections are made. The power source has to be grounded and protected by a circuit breaker.

The QUANTUM ST4 system is designed to fit a specific voltage. Please, check the voltage to ensure it corresponds to the QUANTUM ST4 specifications.

Please keep an open area of at least 20 cm at the rear of the cabinet to ensure a proper air circulation for the system. The system should be located in an area free of excessive dust or moisture, strong magnetic fields or ionising radiation. It is also recommended that the ambient temperature be stable and within the range of 15°C to 25°C (20°C recommended) and that the relative humidity not exceed 70%, non-condensing.

Ensure that all of the systems ventilation openings are free of interference. Excessive heat build up in the instrument may effect performance or cause operational failure.

Do not defeat any instrument interlocks; they are designed to prevent user injury

It is compulsory to power down the system and disconnect the AC mains from the unit before performing any disassembly or repair to the system.

WARNING

The use of the QUANTUM ST4 involves ultraviolet (UV) illumination. Proper precautions must be taken to avoid eye and skin exposure to the UV light. This instrument is meant for use only by specialised personnel that know the health risks associated with UV radiation and the chemicals that are normally used with this instrument.

WARNING

The operator should wear appropriate safety glasses or a protective mask and gloves. UV radiation can be dangerous for unprotected eyes and skin; therefore we recommend the user to wear UV protective goggles (LP-70) or face-shield (MP-80 or MP-800).

WARNING

The QUANTUM ST4 system should be located away from water, solvents, or a corrosive material, on a bench top that is dry and stable. The system should be placed away from interfering electrical signals and magnetic fields. A dedicated electrical outlet should be used to eliminate electrical interference from other instrumentation in your laboratory.

Note: The QUANTUM ST4 runs only with Windows® XP SP2 (or upper) or Windows Vista SP1 (32-bit) operating system. You must ensure Windows® is installed on your computer before any other installation.

➔ Installing the hardware

Please read carefully the installation instruction before proceeding to the installation.

Please do not connect the QUANTUM ST4 USB camera to the computer before installing the Quantum-Capt software.

After the software is fully installed, connect the Quantum ST4 USB camera to the computer. At that time, Windows Vista or XP will look for the camera driver located in the CD-Rom.

1- Connect all items

1. Install the darkroom by the computer
2. Fix the set Camera/Zoom/Extra-lens on the camera support with the knurled knob.

Illustration 1: the camera/optics on its support

The camera & optics are already installed on its support. This support need to be fixed on the top of the darkroom by the two fixing knob as described in illustration 3.

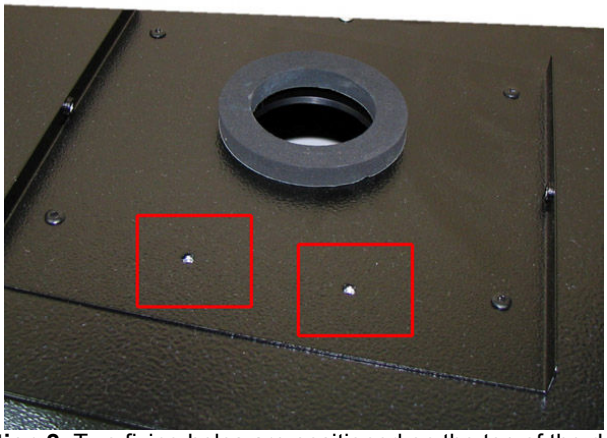


Illustration 2: Two fixing holes are positioned on the top of the darkroom

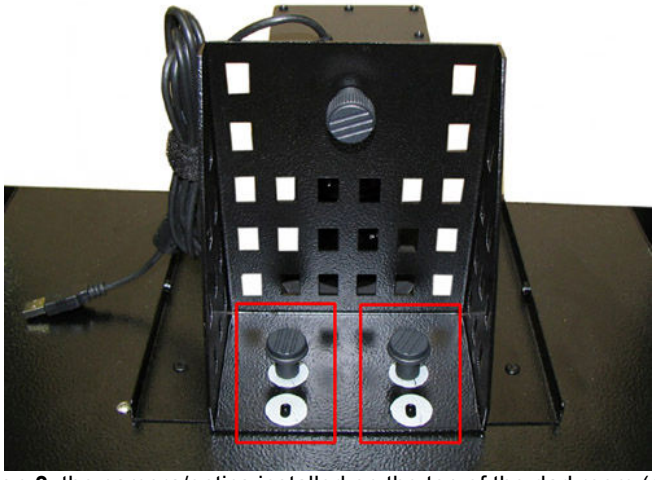


Illustration 3: the camera/optics installed on the top of the darkroom (rear side)

Illustration 4: the camera/optics installed on the top of the darkroom (front side)

Quantum-Capt software installation

Please read carefully the installation instruction before proceeding to the installation.

Please do not connect the QUANTUM ST4 USB camera to the computer before installing the Quantum-Capt software.

After the software is fully installed, connect the Quantum ST4 USB camera to the computer. At that time, Windows Vista or XP will look for the camera driver located in the CD-Rom.

➔ Software installation – Preliminary steps

QUANTUM ST4 runs with Microsoft Windows™ XP SP2 (& upper) or Microsoft Vista™ (32-bit) operating systems. Windows™ or Vista™ must be installed on your computer before any other installation. Windows® is a registered trademark of Microsoft

Note: During the driver installation, the Windows installation CD-ROM might be required. Please, check you have it before starting the Quantum-Capt software installation

➔ Software installation

⇨ If the Autorun option is set on your computer, the Quantum Capt installation will start automatically. If not, double click on the Autorun.exe file to start the installation of the software. The Quantum-Capt Setup window will appear, welcoming you to the Install Wizard for Quantum-Capt Setup.

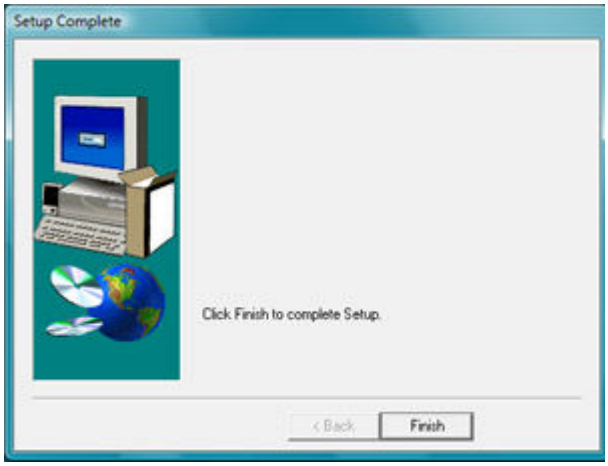
⇨ Please click on the Install Quantum-Capt software icon.

The welcome screen is displayed, click then on NEXT to continue:

⇨ Select the destination directory (“c:\Program files\Vilber Lourmat\Quantum” by default). Then click on NEXT:

Program files are installed in the specified directory and group is created. This can take on few minutes, depending on the computer speed.

When the set-up is completed, click on Finish.



Once the software is installed, connect the camera to the computer and switch it on. Then, Windows detects a new hardware and launches the corresponding wizard.

In the dialog box displayed, select the option:
- for Windows XP: “Install software automatically (recommended)”
- for Windows 2000: “Search for the best driver for your peripheral (recommended)”

⇨ Click on “Next” and follow the wizard instructions.

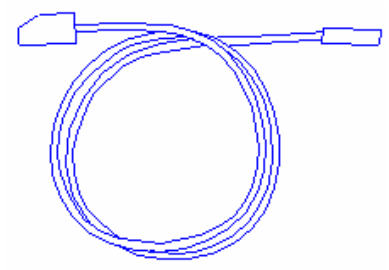
⇨ Once the camera driver installed, click twice on the “QUANTUM ST4CAPT” icon  on the windows main screen to open the QUANTUM-CAPT software.

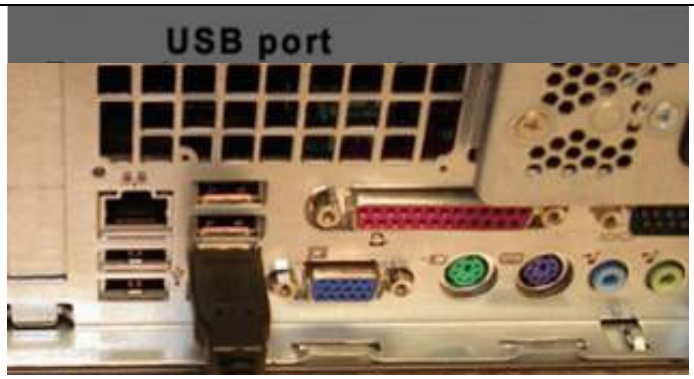
➔ Connecting the camera and its driver

Step 1

⇨ Fig. 1: Connect the “Camera USB cable” from the camera to the **rear side** USB port of the computer.

Fig. 1 USB camera connection





Computer rear side - Connection

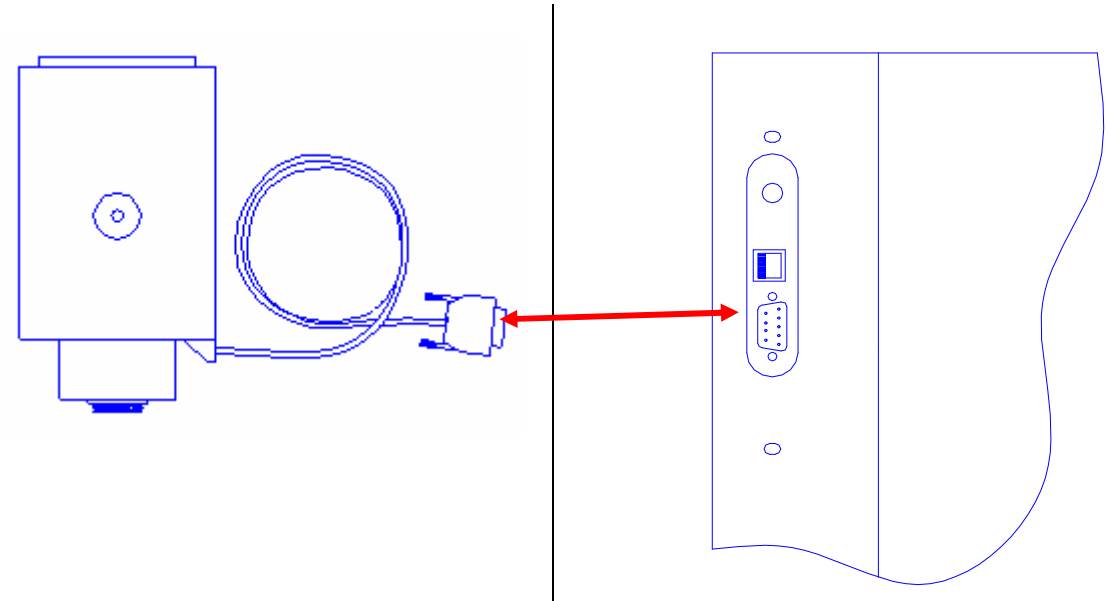
⇨ Connect the cable coming from the USB camera to the computer USB port.

⇨ Fig. 2: Motorised zoom configuration only. Connect the cable coming from the zoom lens to the appropriate port of the rear side of the darkroom.

Then, connect the USB cable from the rear side of the darkroom to the computer USB port.

FIG 2: ZOOM CONNECTION (X-PRESS SERIES ONLY WITH MOTORISED ZOOM LENS)

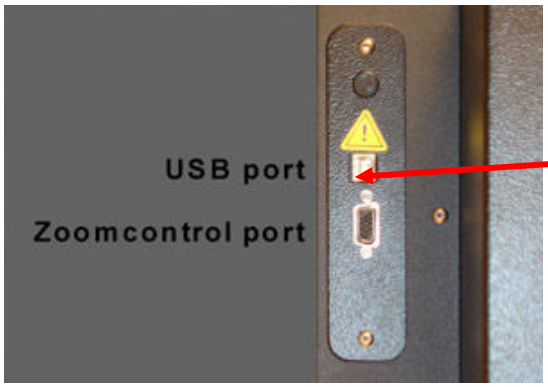
1 – ZOOM TO THE DARKROOM



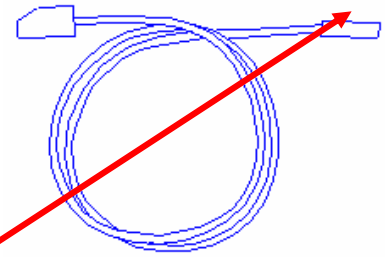
Cable from the zoom lens

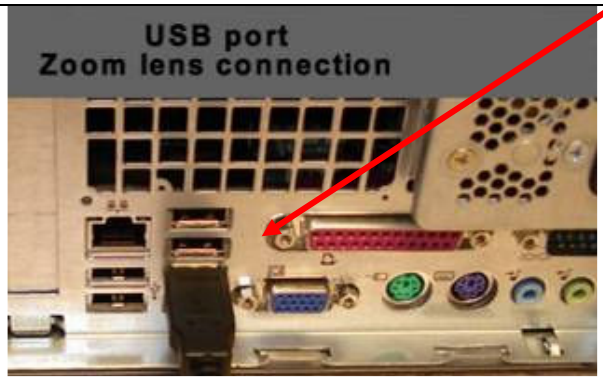
Darkroom rear side

2 – DARKROOM TO THE COMPUTER - USB PORT



Darkroom rear side





Computer rear side - Connection

⇨ Connect the cable coming from the USB port of the rear side of the darkroom control panel to the computer USB port.

3. Connect all items to a main earth connection.

⇨ Connect the “Power supply cable” from the rear side of the darkroom to an earth electrical outlet.

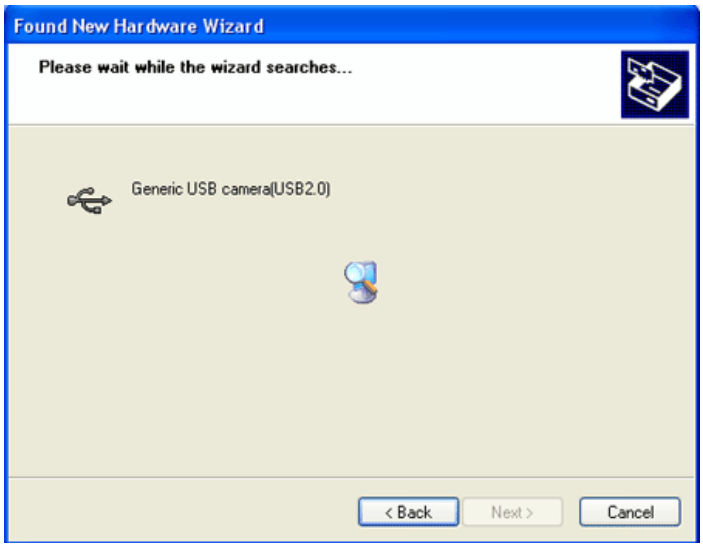
Step 2

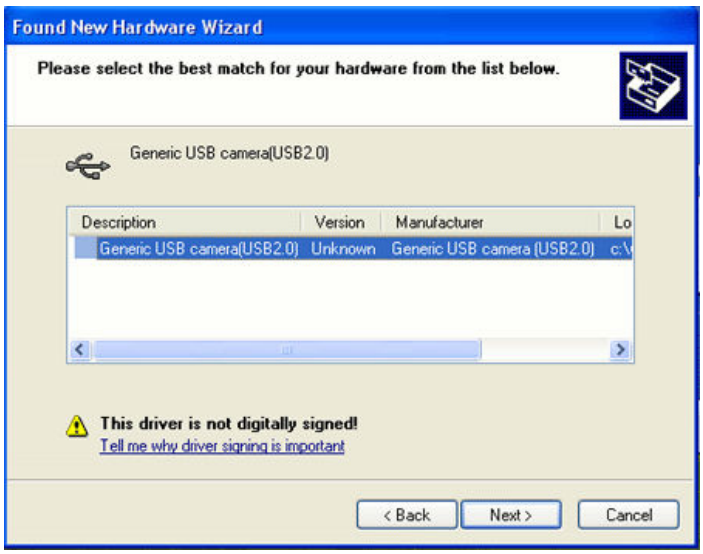
⇨ Ensure all application programs are closed. Windows XP and Windows Vista users should also ensure that they are logged on with administrator privileges.

⇨ Insert the CD-ROM in the CD-ROM drive

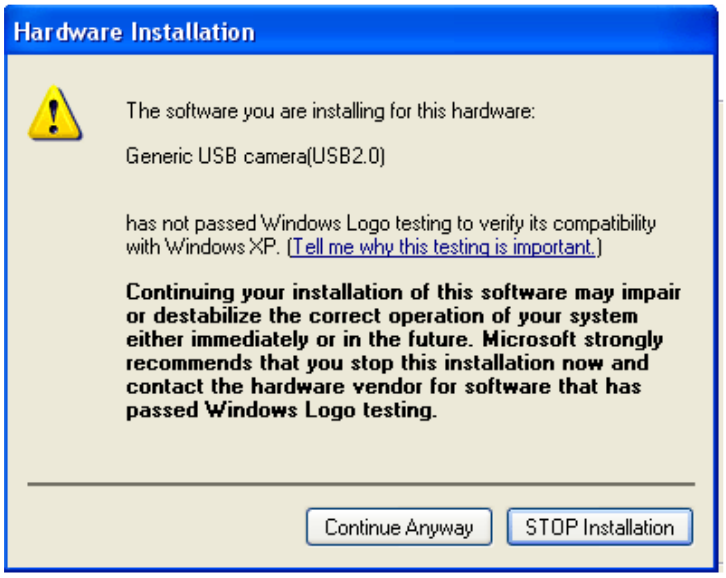
⇨ Ensure the camera is connected to the computer. Windows detects a new hardware and launches the corresponding wizard for driver installation.

Tot the question “Can Windows connect the Windows Update to search for software”, please select “Yes this time only” and click on Next. Windows wizard searches for the driver and find the Generic USB camera (USB2.0).



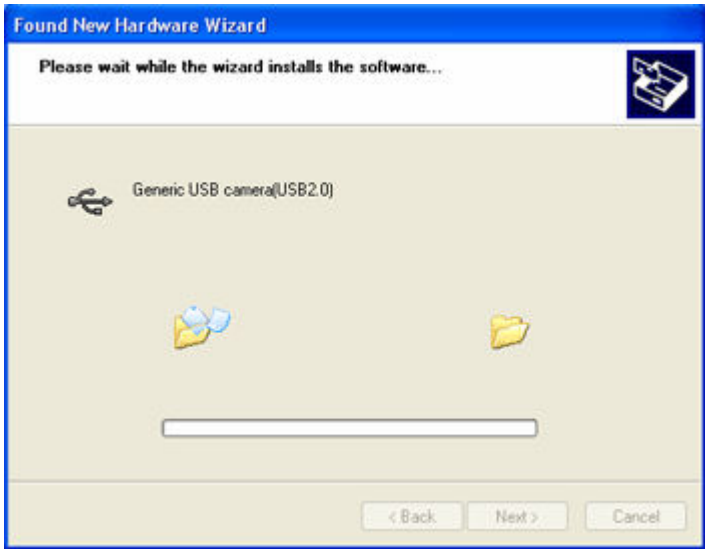


Select the Generic USB camera (USB 2.0) driver and click on “Next”.



Click on “Continue anyway” in the Windows Warning message.

The driver is installed by Windows:



➔ QUANTUM ST4 XPRESS series only: zoom control board driver installation

USB motorised zoom connection

The USB port electrically supplies the motorised zoom. To this extent, only the USB zoom should be connected to the computer USB hub.

In case the electrical supply of the zoom is deficient, we suggest the use of an external USB hub with a separate independent power supply.

USB motorised zoom driver installation

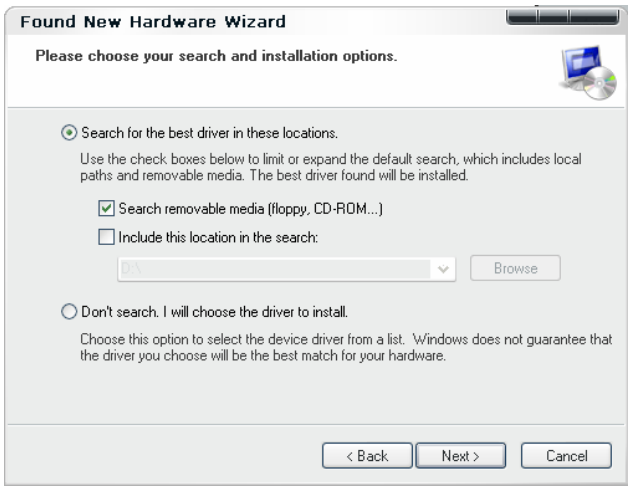
The motorised zoom USB driver is installed at the same time that the Quantum-Capt software. No specific installation is required.

If the Quantum-Capt software does not detect the motorised zoom lens, we recommend checking first if the zoom is properly connected to the USB port. If the problem is not resolved, we recommend to re-install the motorised zoom control board driver.

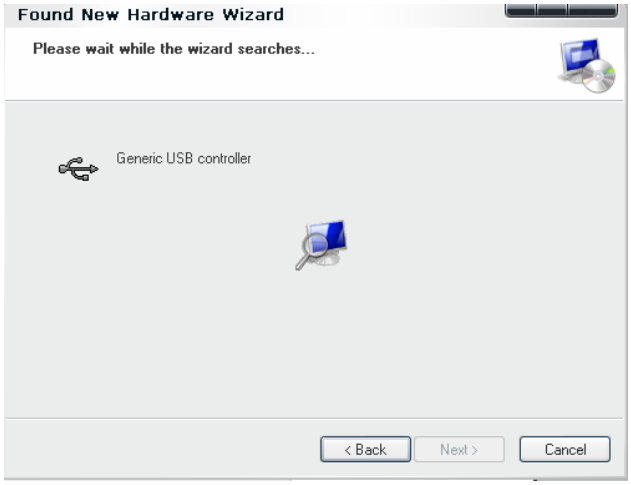
Switching the computer on, Windows® detects a new device and launch the installation wizard:

Select “Not this time” and click on Next:

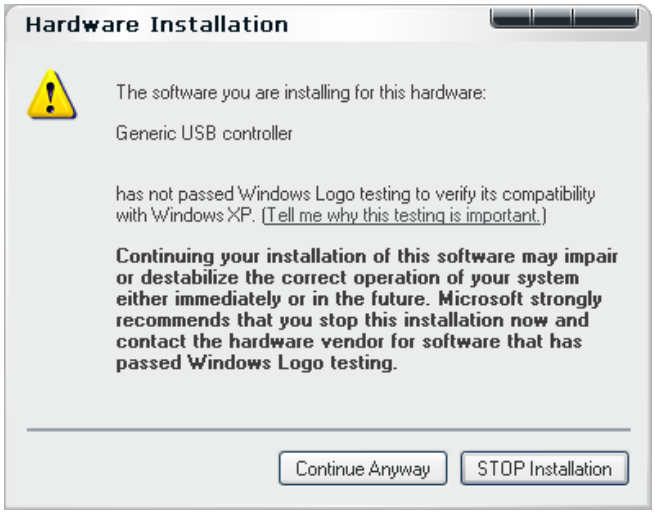
Select install from a “List of specific location” and click on Next:



Select the CD-Rom media drive and click on Next:



A dialog box indicating that this driver has not passed the Windows© Logo testing is displayed. Even though our driver works on Windows XP©, it is not numerically signed, so click on « Continue anyway » button to continue the installation.



Once the driver is installed, click on « Finish » button to validate the driver installation.

➔ Upgrading the software

If you want to upgrade the software to this version, proceed as described in the first Installation chapter.

➔ Quantum-Capt un-install

You may want to un-install the software from your hard disk. The uninstQUANTUM ST4capt program will do it for you.

⇨ Click on “Start” button
⇨ Go to “Programs”, select BIOPROFIL and click on uninstQUANTUM ST4capt
⇨ Answer “Yes” to the question and programs are removed
⇨ Click on “OK” to finish de-installation

➔ Troubleshooting

If the Quantum-Capt software does not detect the camera, we recommend to re-install the Camera USB driver. The driver is located in the Quantum-Capt CD-Rom supplied with the system.

Pre-requirement: Camera Connection

Connect the USB camera to the computer before installing the driver.

Using the darkroom

➔ Warning and security issues

WARNING
The transilluminator is used for the fluorescence applications.

WARNING
The use of the Quantum ST4 involves ultraviolet (UV) illumination. Proper precautions must be taken to avoid eye and skin exposure to the UV light. This instrument is meant for use only by specialised personnel that know the health risks associated with UV radiation and the chemicals that are normally used with this instrument.

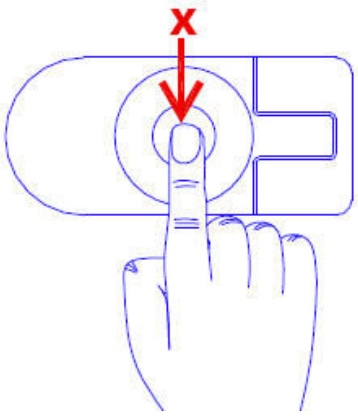
WARNING
The operator should wear appropriate safety glasses or a protective mask and gloves. UV radiation can be dangerous for unprotected eyes and skin; therefore we recommend the user to wear UV protective goggles (LP-70) or face-shield (MP-80 or MP-800).

Caution:
Switch off the transilluminator when gel is not present on the UV filter. If the filter is too hot, it will damage your electrophoresis gel. Over 20 minutes, transilluminator will be in energy saving mode. To activate it again, wait for 20 seconds & press switch on.

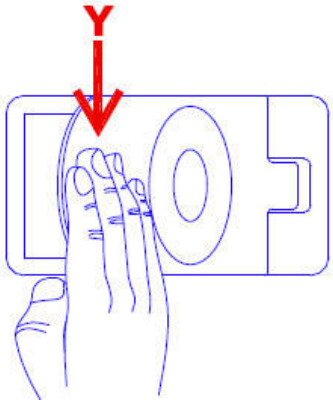
Note:
Wait at least 20 second in the "High" position before reducing the intensity selector to "Low".

Note:
If one or several tubes are off or used, and in order to keep a better homogeneity, we recommend to change the 6 tubes simultaneously.

Opening and closing the door



To open the door: Push the button “X” with the finger and lift the handle.

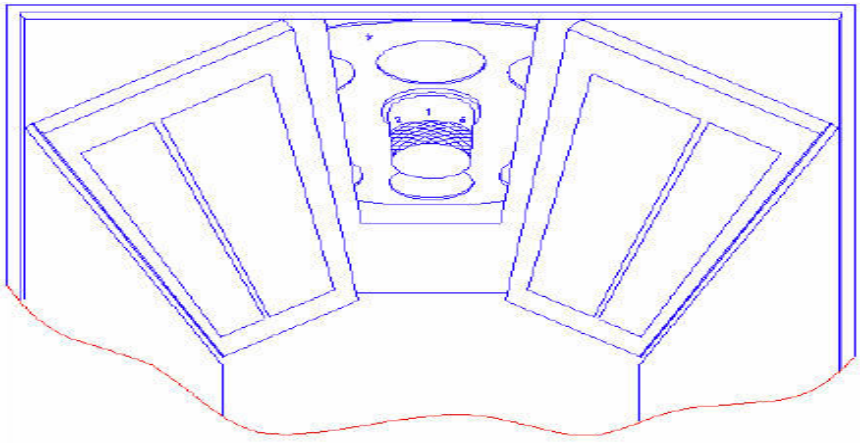


To close the door: Close the door and block it by pushing the part “Y”.

Filter wheel

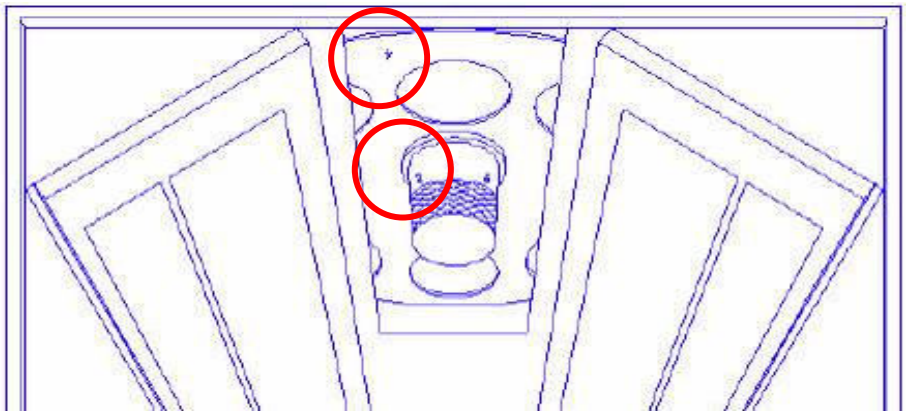
The 6 positions filter wheel is compatible with the F590 M58 interferential filter supplied with the system for ethidium bromide application.

To select the filters, turn the black handle and select the position of your choice. The first position is designed for the F590 filter for ethidium bromide application. Install the filter on the hole in front of you. The filter number corresponds to the number indicated on the filter wheel (for instance, number one to 1 to 5). To select a filter hole, turn the black handle in way to have the filter indication of your choice, in front of you.



The first position is designed for the F590 filter for ethidium bromide application, at UV transilluminator level (if any).

Install the filter on the hole in front of you. The filter number corresponds to the number indicated on the filter wheel (number one to 1 to 5). To select a filter hole, turn the black handle in way to have the filter indication of your choice, in front of you.



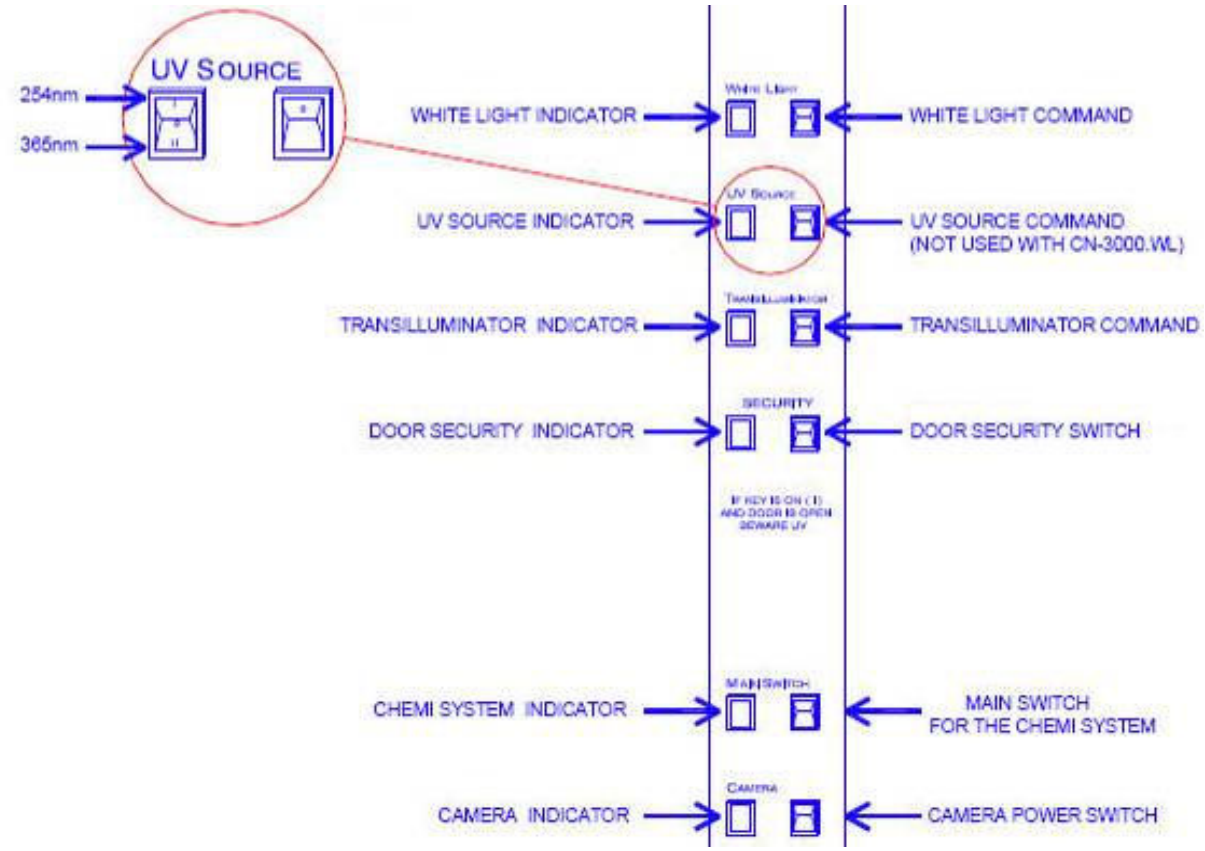
Control panel

WARNING

The use of the Quantum ST4 system may involve ultraviolet (UV) illumination. Proper precautions must be taken to avoid eye and skin exposure to the UV light. This instrument is meant for use only by specialized personnel that know the health risks associated with UV radiation and the chemicals that are normally used with this instrument.

WARNING

The operator should wear appropriate safety glasses or a protective mask and gloves. UV radiation can be dangerous for unprotected eyes and skin; therefore we recommend the user to wear UV protective goggles (LP-70) or face-shield (MP-80 or MP-800).



⇨ **White light lamps**
Switch on the white light lamp by switching the white light command to the position [I], the switch diode will light on. After use, switch off the light by putting the switch to the position [0].

⇨ **UV light lamps** (optional)
With the selector choose the wave length (254nm or 365nm)
Put the UV lamps switch to the position [I], the switch diode will light on
After use, put the switch to the position [0]

⇨ **Transilluminator**
Case 1: security on when the door is open
Switch on the door security switch to the “0” position to activate the UV security when the door is opened. Switch on the transilluminator command.
The door is opened and the UV transilluminator is off as well as the epi-illumination UV light.

Case 2: security off when the door is open
Switch off the door security switch to the “1” position to inactivate the UV security when the door is opened. Switch on the transilluminator command (or the epi UV source).
The door is opened and the UV transilluminator is on (or the epi UV source).

WARNING

You have to protect yours eyes and your skin. You can open the door, the UV table and UV lamp will continue to work. You must wear all possible UV protection, especially for your eyes, when the transilluminator switch is turned ON. Mask and gloves are recommended to block the UV radiation.

WARNING

The system should be located away from water, solvents, or a corrosive material, on a bench top that is dry and stable. The system should be placed away from interfering electrical signals and magnetic fields. A dedicated electrical outlet should be used to eliminate electrical interference from other instrumentation in your laboratory.

➔ Control panel - QUANTUM ST4 1000 & 1500 series

⇨ White light epi-illumination

Switch on the white light lamp by switching the white light command to the position [I], the control panel diode will light on. After use, switch off the light by putting the switch to the position [0]. After use, put the switch to the position [0]

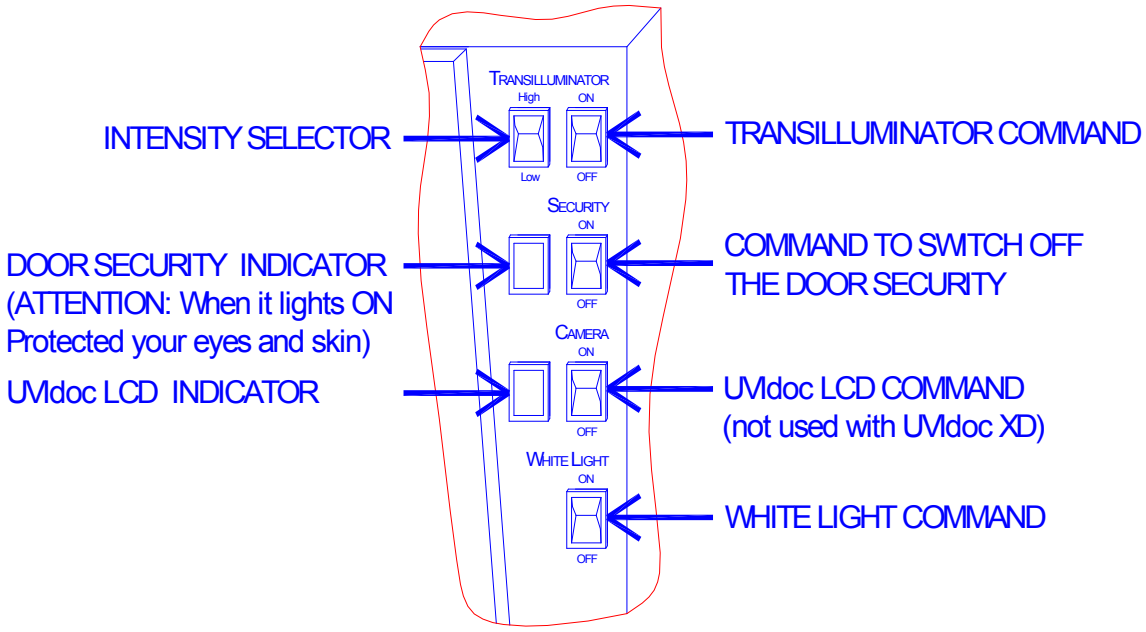
⇨ Transilluminator

Case 1: security on when the door is open

Switch on the door security switch to the “0” position to activate the UV security when the door is opened. Switch on the transilluminator command. The door is opened and the UV transilluminator is off.

Case 2: security off when the door is open

Switch off the door security switch to the “1” position to inactivate the UV security when the door is opened. The security switch’s diode will light on. Switch on the transilluminator command. The door is opened and the UV transilluminator is on.



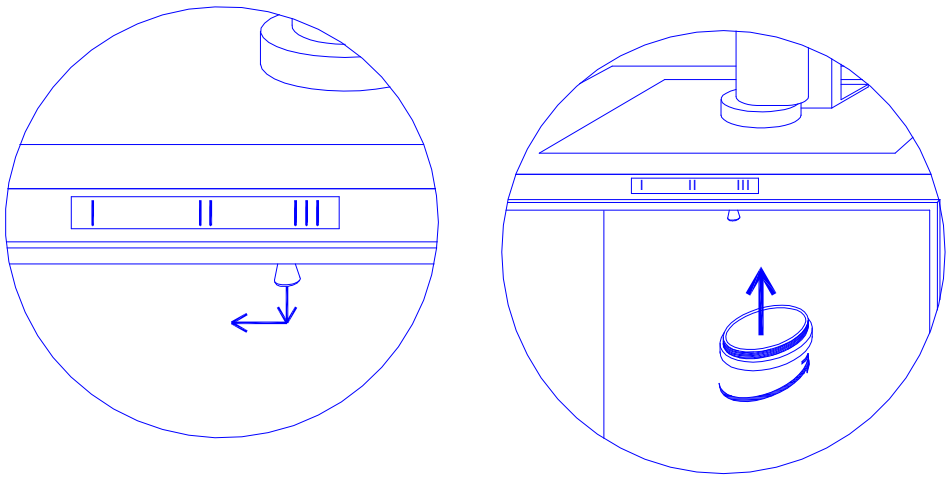
Filter slide

The filter slide is compatible with the interferential filter supplied with the system for most of the fluorescence applications. Three positions are available.

To install the filters, place the slide in the position of your choice (I, II or III).

Place the filter on the hole corresponding to the position (I, II or III) like shown in the diagram.

To install the other filters, slide the support filters by pulling and sliding the knob.



WARNING

You have to protect yours eyes and your skin. You can open the door, the UV table and UV lamp will continue to work. You must wear all possible UV protection, especially for your eyes, when the transilluminator switch is turned ON. Mask and gloves are recommended to block the UV radiation.

WARNING

The system should be located away from water, solvents, or a corrosive material, on a bench top that is dry and stable. The system should be placed away from interfering electrical signals and magnetic fields. A dedicated electrical outlet should be used to eliminate electrical interference from other instrumentation in your laboratory.

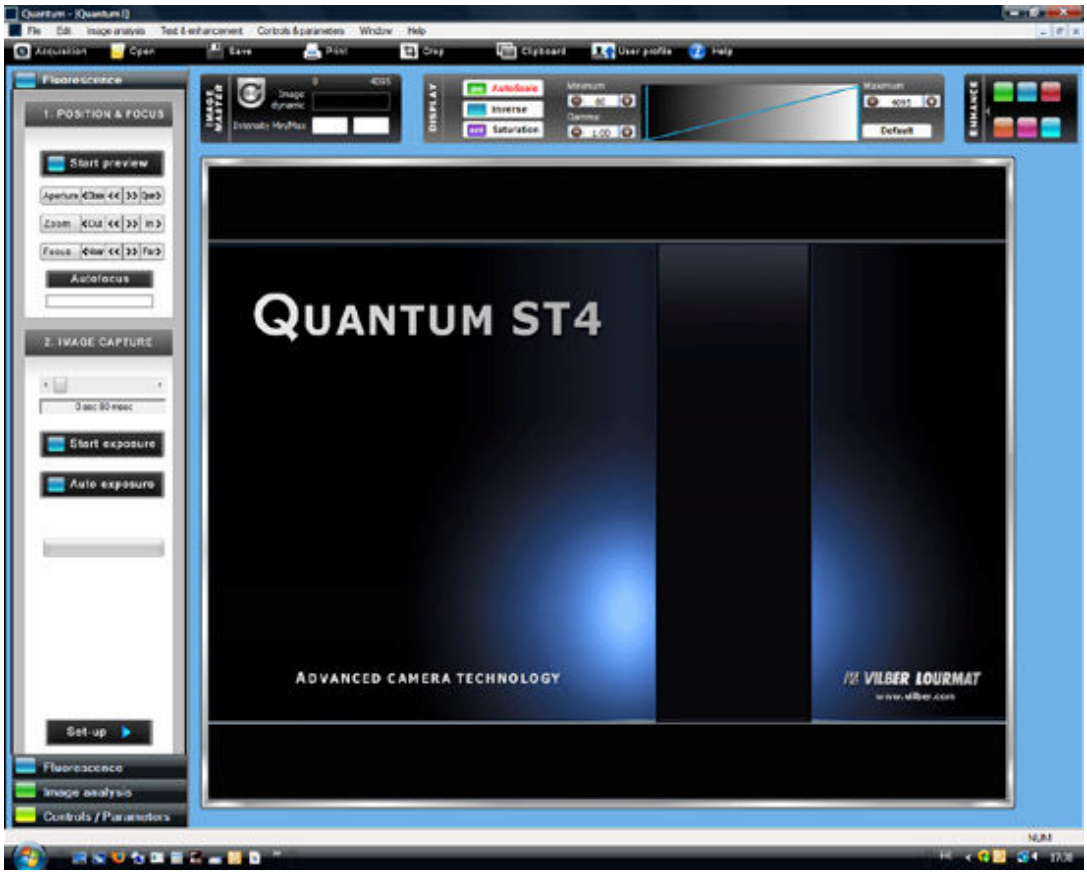
Quick start

➔ Taking your first picture

This Quick start is intended as a quick reference guide for acquisition. For more detailed information on the individual features, please reference the appropriate part of this manual.

Power on the computer. After the computer has booted up completely, turn on the power to the cabinet. Double click on the QUANTUM-CAPT icon : 

⇨ The software opens on the image acquisition window:



Position and focus

⇨ Click on Start preview to position your sample and to adjust the zoom, the aperture and the focus. Open the door to the cabinet and position your sample. Switch on the white light. Zoom so that the area of interest on the sample takes up all of the image size on the screen. Adjust the aperture accordingly and focus on your sample.

Business cards and other pieces of paper with small text are the easiest samples to obtain

optimal focus settings.

For a fluorescence sample

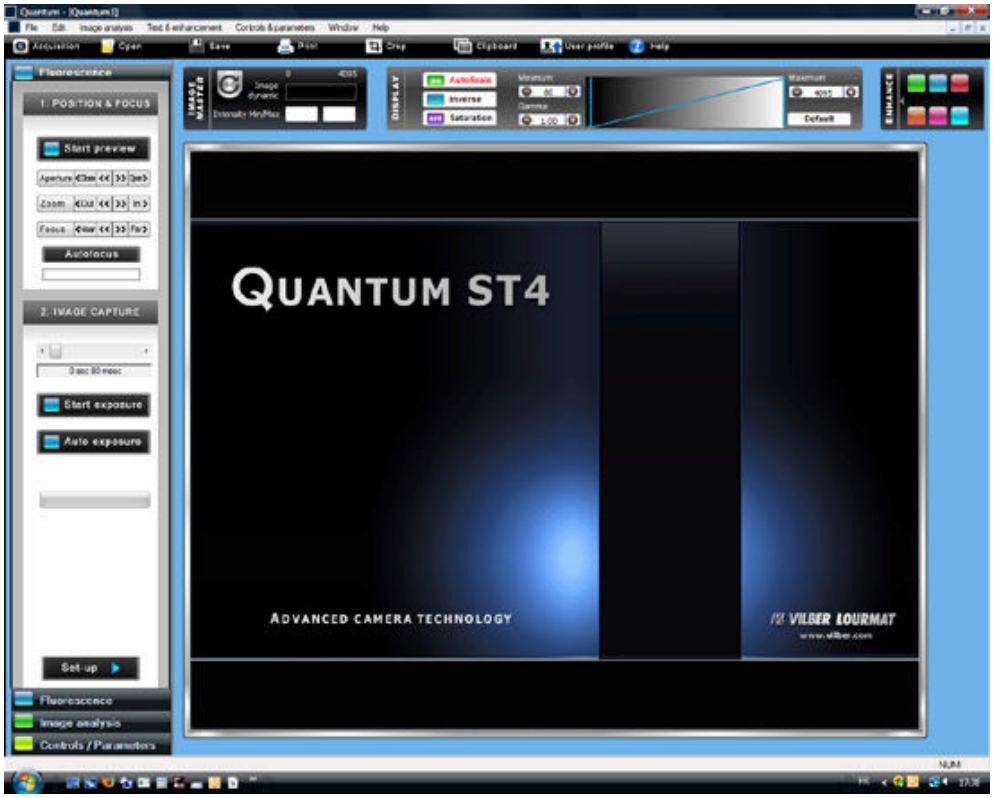
⇨ Choose the appropriate optical filter (from the darkroom)
⇨ Select the appropriate aperture
⇨ Turn on the transilluminator
⇨ Select the Fluorescence folder (from the Quantum-Capt software)
⇨ Click on Saturation on
⇨ Click on Start Exposure
⇨ Adjust the exposure of your image for correct saturation level
⇨ Click on Stop Exposure
⇨ Save the image

Navigating the Quantum-Capt

➔ Quantum-Capt operating environment

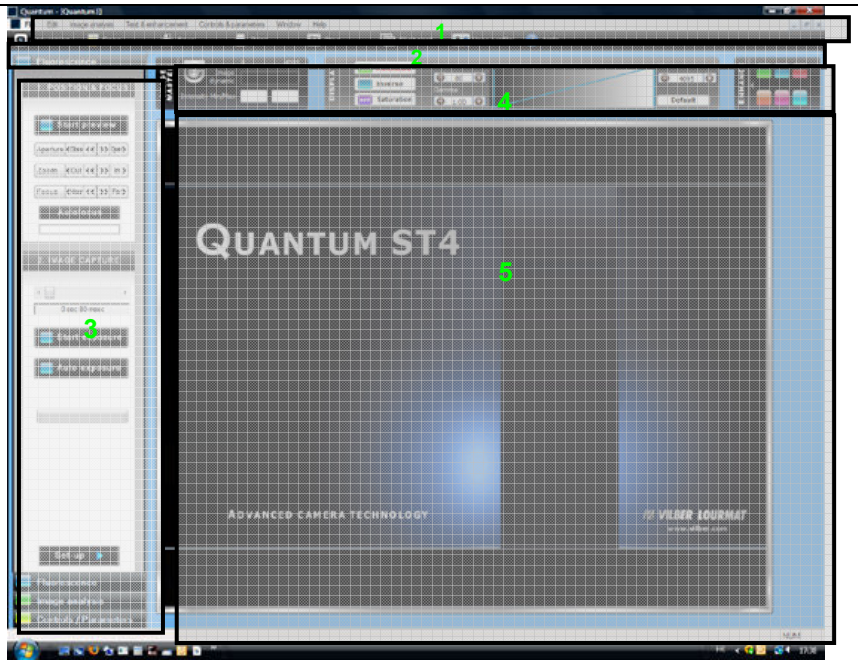
The QUANTUM ST4 3000, 1500 and 1000 are all supported by the Quantum-Capt software.

The Quantum-Capt software opens to the following image window:



The Quantum-Capt operating environment is organised into five areas:

1. The menu bar
2. The toolbar
3. The functions folder
4. The status bar
5. The image window


1
2
3
4
5
QUANTUM ST4
ADVANCED CAMERA TECHNOLOGY
VILBER LOURMAT

➔ Navigating the menu bar

Main menu bar

The main menu bar is organised into six areas:

1. File
2. Edit
3. Image analysis
4. Text and enhancement
5. Controls and parameters
6. Window
7. Help

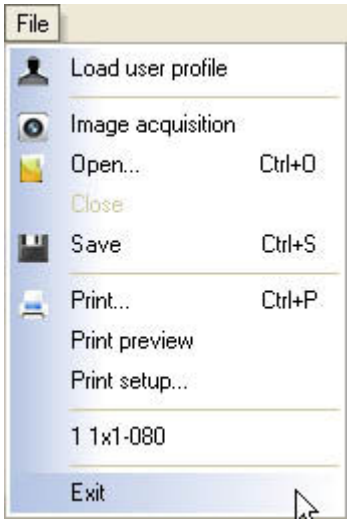
The following image illustrates the main menu bar:

File menu

The File menu contains:

- ⇨ the user profile functions
- ⇨ the file functions
- ⇨ the printing functions

The following image illustrates the File menu:



Edit menu

The Edit menu contains:

- ⇨ the area of interest function
- ⇨ the copy to clipboard function

The following image illustrates the Edit menu:

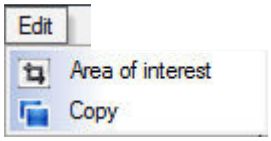
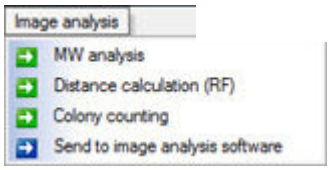
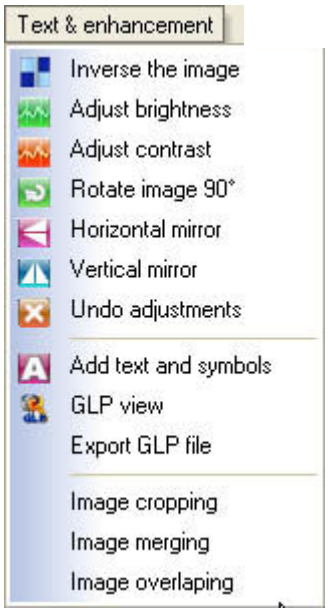
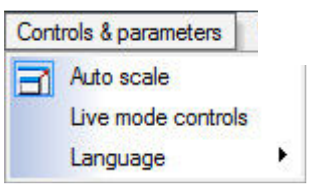
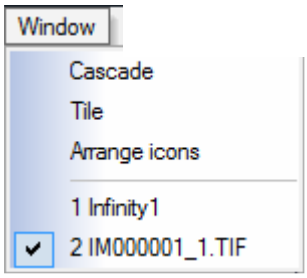
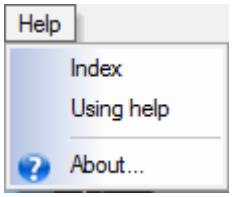


Image analysis	The Image analysis menu contains: ⇨ the image enhancement functions 
Text & enhance-ment	The Text and enhancement menu contains: ⇨ the image enhancement functions ⇨ the annotation functions ⇨ the Good Laboratory Practice (GLP) functions The following image illustrates the Text and enhancement menu: 
Controls and parameters	The Controls and parameters function contains: ⇨ the Autoscale function ⇨ the Live mode parameters ⇨ the language selection The following image illustrates the Controls & Parameters functions menu: 
Window	The Window menu contains:

menu	⇨ the window management function ⇨ the list of the opened images The following image illustrates the Window menu: 
Help menu	The Help menu contains: ⇨ the help index ⇨ the contextual help ⇨ the version details of Quantum-Capt The following image illustrates the Help menu: 

➔ Navigating the function folder

The function folder to frequently used menu items. It appears underneath the Menu bar and contains file management and user profile functions. The following diagram illustrates the main toolbar:

1 2 3 4 5 6 7 8

1- Go to the Image capture menu
2- Open an image
3- Save an image
4- Print on the default printer (if connected)
5- Select the image area to be saved
6- Copy the image to the Windows clipboard
7- Save the user setting
8- Open the Help file on a specific function

➔ Navigating the toolbar

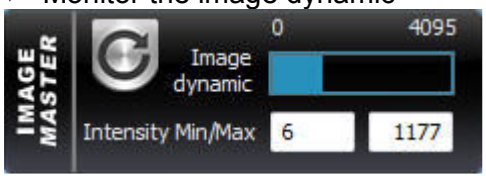
The Quantum-Capt software offers three image acquisition modes:
- ⇨ Fluorescence mode for full control of gel image capture;
- ⇨ Video mode for repetitive image acquisition with or without image accumulation.
- ⇨ Image analysis modes;
- ⇨ Controls and parameters mode.

Each mode is gathered in a specific folder:

You can select the application by clicking on the specific folder.

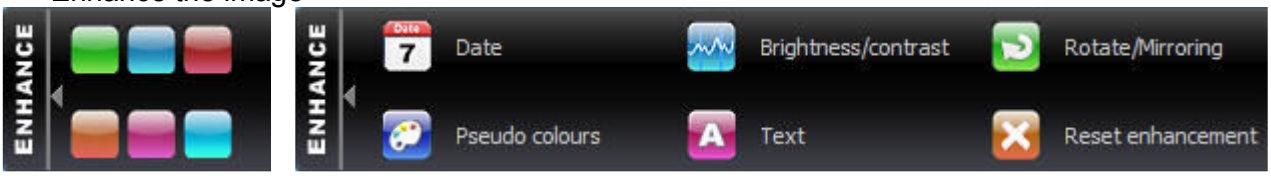
➔ The status bar

The status bar allows you to:
- ⇨ Monitor the image dynamic



- ⇨ Modify the display of the image (autoscale, inverse, saturation, gamma and greyscale selection to enhance the image display)

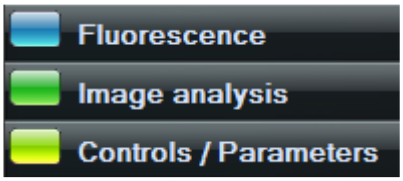
- ⇨ Enhance the image



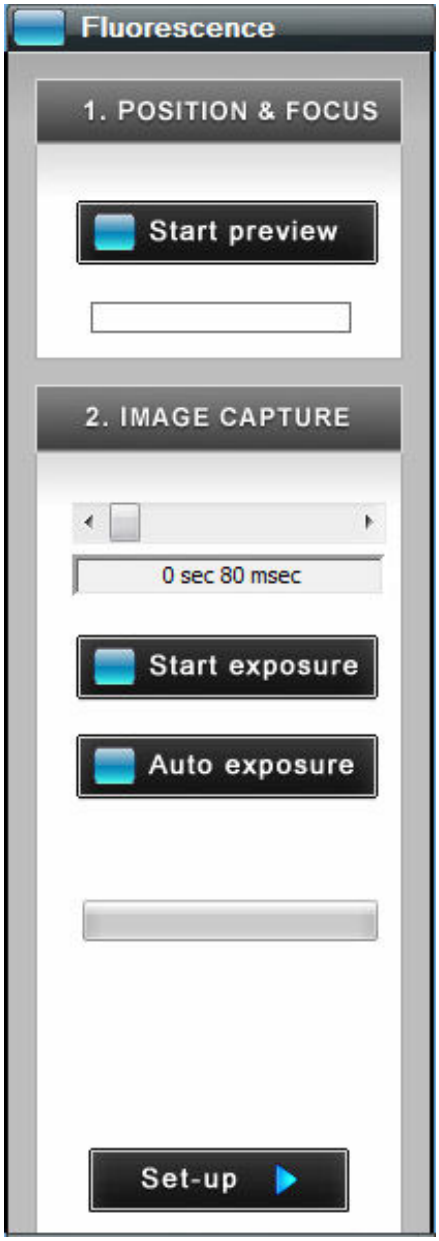
Introduction to image capture

➔ Image capture mode

You can select the image capture mode by clicking on the Fluorescence folder.



➔ Fluorescence mode – Manual zoom lens



1- Position & focus

Start preview: view a real time preview of your image capture.
Stop: end the real time preview.

Focus gauge: the focus gauge is an aid in focusing.

2- Image capture

Exposure time: modify the exposure time to enhance the signal.
Stop exposure: capture the last image view for further saving, analysis or enhancement.

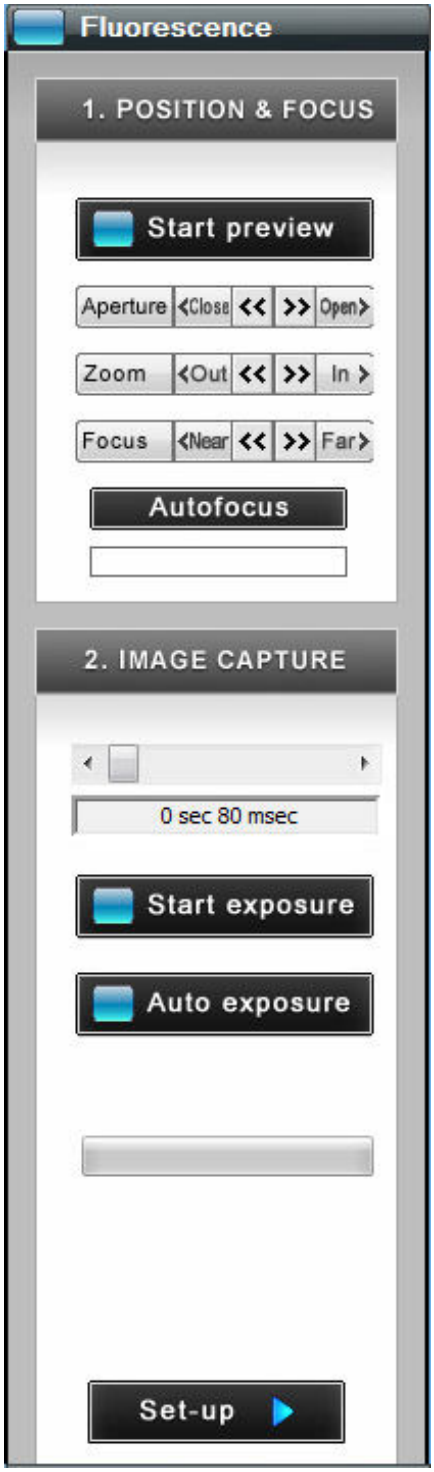
Auto-exposure: The automatic mode allows an automatic calculation of the exposure time.

3- Set-up menu

Sensitivity: select the sensitivity mode from Full resolution, binning 2x2 and binning 4x4

Grid: display a grid for an easiest gel positioning.

➔ Fluorescence mode: Xpress series: motorised zoom lens



1- Position & focus

Start preview: view a real time preview of your image capture.
Stop: end the real time preview.

Aperture: select the appropriate aperture to receive more or less light
Zoom: zoom in or out on your sample
Focus: adjust the focal point
Autofocus: automatically autofocus

Focus gauge: the focus gauge is an aid in focusing.

2- Image capture

Exposure time: modify the exposure time to enhance the signal.
Stop exposure: capture the last image view for further saving, analysis or enhancement.

Auto-exposure: The automatic mode allows an automatic calculation of the exposure time.

3- Set-up menu

Sensitivity: select the sensitivity mode from Full resolution, binning 2x2 and binning 4x4

Grid: display a grid for an easiest gel positioning.

➔ Start preview

Start preview	Live mode allows direct visualisation of the image. This mode enables you to adjust the zoom / focus / aperture and to position your sample.  Note: A live image means the image displayed is refreshed every 1/20th of a second. This short exposure time (or frame) is adequate for a variety of white light samples including protein gels and autoradiography. A live image, however, is not sufficient for most samples, which are visualised and photographed over a relatively dim UV light source. A feature called integration compensates the low light situation by allowing the CCD camera to obtain a timed exposure. Note: After 2 minutes, the software will automatically stop the live preview.
Stop preview	The stop function captures the last image for further saving, analysis or enhancement. To proceed, click on the stop button:

➔ Motorised zoom controls

The zoom control dialog box is displayed each time the acquisition menu is active. It helps you to adjust the 3 settings of the zoom lens:

- Aperture. Aperture allows the CCD sensor to receive more or less light. Closing the aperture decreases the amount of light coming to the sensor, thereby making the image darker. To adjust the aperture, click on the Close or Open. The lens automatically moves to the new value.

- Zoom. Zoom allows you to change the size of your sample, on the image. To proceed, click on the In or Out. The zoom automatically moves to the new value. The zoom control will not affect the focus.

- Focus. Focus is needed to adjust the sharpness of the image. Turning the ring clockwise or counter clockwise changes the focal point of the lens. To proceed, click on the Far or Near button to access the Focus adjustment. Each time you press on one of those buttons the zoom moves of one step the focus settings. It is not necessary to keep the button pressed, press as many times as necessary to get a fine focus adjustment.

Note: "<<" and ">>" are for fast adjustment and "<" and ">" are for step-by-step adjustment.

All cameras require a focus point adjustment. In order to proceed, you have to zoom to the maximum on a straight forward image (a printed paper, a business card ...). Then, focus till you obtain a very sharp image on the screen. This procedure can be done with epi-illumination light and a printed paper. The focus point adjustment varies with the focal distance.

	- Autofocus. Autofocus is a feature that enables focus automatically by a single click on a written sample, instead of requiring the user to adjust focus through the Focus plus and minus controls.  Note: In order to proceed, you have to zoom to the maximum on a straight forward image (a printed paper, a business card ...). The zoom should ensure the sample covers almost the full image window. The aperture should not be wide opened. Note: autofocus feature is centred on the heart of the image. The grey window which appear when autofocus is disregarded by the autofocus function. - Focus gauge. The focus gauge can be used as an aid in focusing. When the Live Image is evaluated as being better focused, the level gauge will approach the red focus line. The red focus line will change location as the selected area and the image focus is changed. 

➔ Start exposure

The exposure time is the acquisition of an image by summing the signal of the camera during the time displayed under integration time button. To activate the exposure time mode, click on the exposure time button:

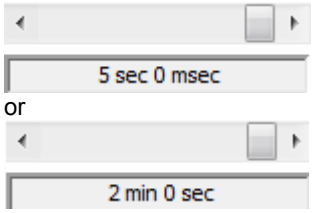
Note: Exposure time is the integration of the image on the CCD sensor over a period of time. The effect is analogous to exposure time for a standard camera.

To adjust the exposure time, adjust the scroll bar position:

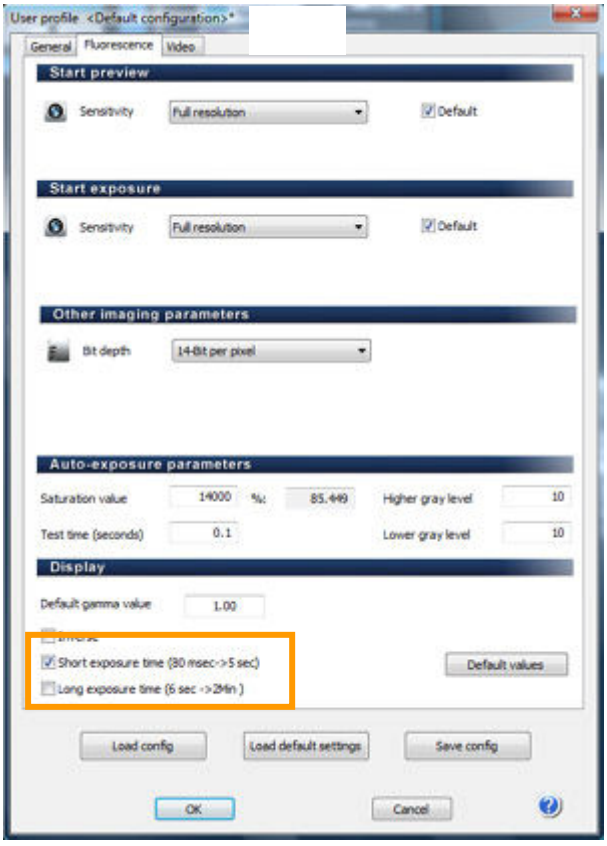
Click on Stop exposure button to stop the image acquisition. The Stop exposure function captures the last image for further saving, analysis or enhancement. To proceed, click on the Stop exposure button:

Note: When the specified exposure time is reached, the last captured image is displayed. The camera continues to integrate the image on the CCD sensor, updating the display whenever the specified Exposure time is reached.
The Stop exposure button stops the exposure process. The last full exposure is displayed.

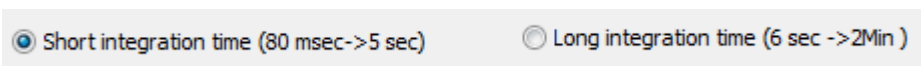
Note: The software has two exposure time scales:
- One for short times: 80 milli-second to 5 seconds
- One for long times: 6 sec to 2 minutes



To switch from one option to another, select "User profile", “Fluorescence folder”, “Display”:



From this window, select the integration time scale you prefer.



Note: With the short integration time scale, the integration time increases or decreases by 40milli seconds.
Note: With long integration time scale, the integration time increases or decreases by 1 second.
Note: With long integration time, a delay could be necessary before an image is displayed on the monitor (up to twice the selected Exposure time).

➔ Auto exposure

The QUANTUM ST4 system can calculate the exposure time (Auto-exposure) taking into account the user defined parameters. When you select the Auto-Exposure option, the system samples the light levels and uses the values to calculate the final exposure time.

Note: The auto-exposure is controlled by a set of parameters described in the Parameters chapters of this manual.

Note: With long integration time, a delay could be necessary before an image is displayed on the monitor. The acquisition will stop automatically at the end of the exposure time.

Click on Stop exposure button to stop the image acquisition.

Note: When the specified exposure time is reached, the last captured image is displayed. The camera continues to integrate the image on the CCD sensor, updating the display whenever the specified Exposure time is reached.
The Stop exposure button stops the exposure process. The last full exposure is displayed.

➔ Set-up

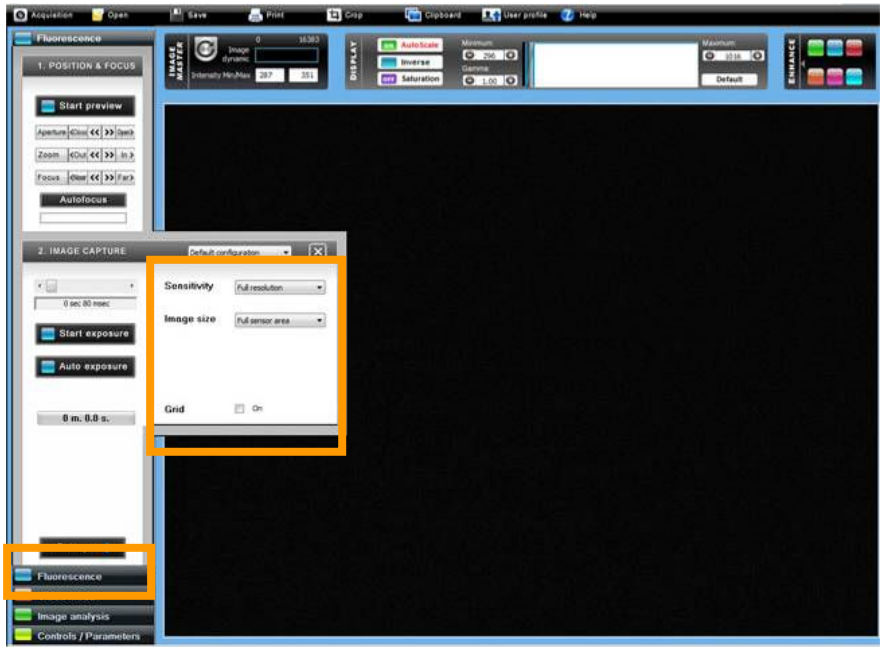
Set-up

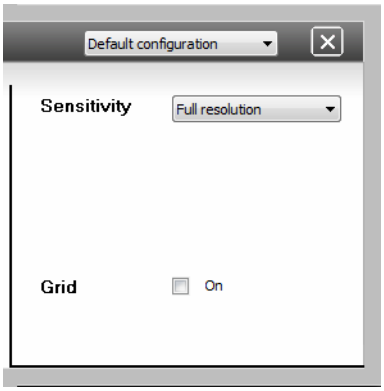
The set-up menu defines the imaging parameters in regards of the sensitivity and the image size. It also allows the display of a grid in the preview mode.

To access the set-up parameters, click on the Set-up button:

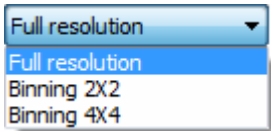
Set-up

A pop-up window displays the defined parameters:

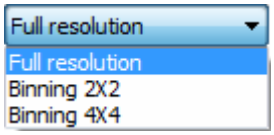




➔ Set-up menu: Sensitivity



The Quantum ST4 system offers exquisite resolution of more than 1.4 million pixels to maximize quantifiable data. The system can be used at either its full resolution or with binning.



The binning technique combines the charge from adjacent pixels so that the total charge can be read-out as a single pixel.

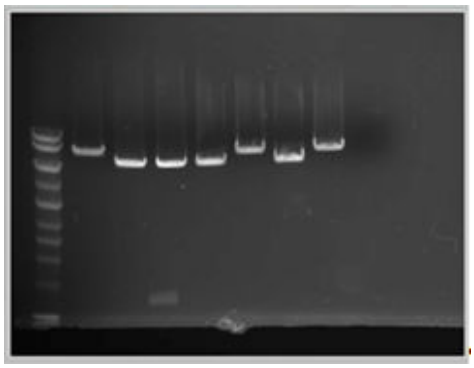
The result is an increased signal and thus an improved sensitivity and a better signal-to-noise ratio. This allows reducing the exposure time. The reduction of the amount of pixels improved the frame rate of the image acquisition. However, the image resolution is decreased by the binning factor (i.e: 4 for a binning of 2 by 2).

A 2x2 binning factor means that pixels in two rows and two columns (a total of 4 pixels) are combined to be represented as one pixel. The sensitivity is heightened but the resolution is then divided by 4:

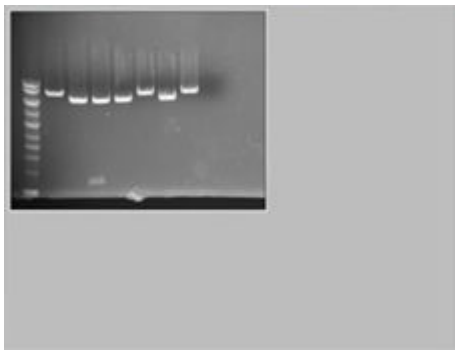
With no binning, the image size is 1360 x 1024
In 2x2 binning mode the image is 680 x 512
In 4x4 binning mode the image is 340 x 256

The camera can either work with or without binning. To proceed, select the binning option you prefer:

Effects of binning on the resolution and sensitivity

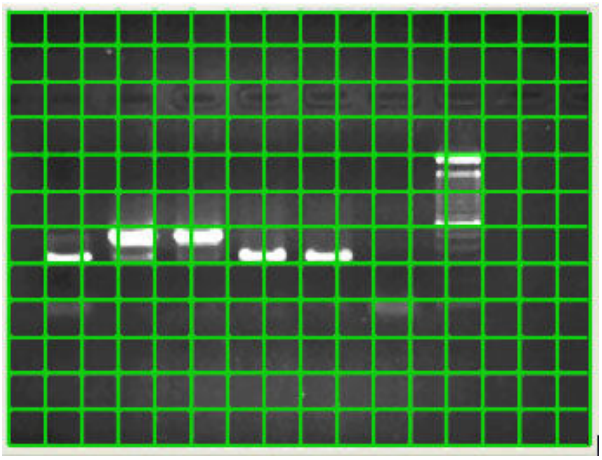


No binning



Binning 2x2

➔ Set-up menu: Grid

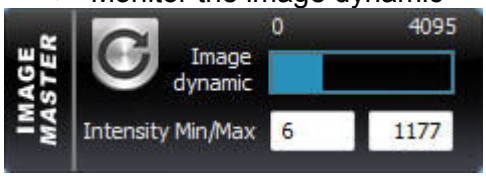
Grid ☑ On	With the grid option, you can display a grid on the screen to adjust your gel according to horizontal and vertical axis. To proceed, select the grid option.  Note: The grid option is only available with the Live mode. Note: You can remove the grid option by deselecting this option.

The status bar

➔ Introduction

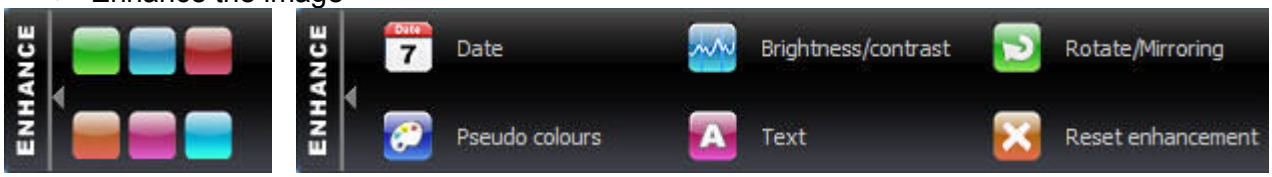
The status bar allows you to:

⇨ Monitor the image dynamic

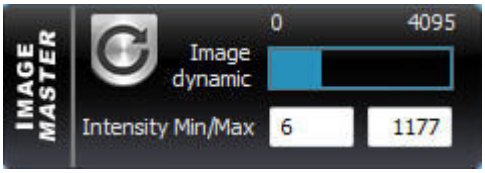


⇨ Modify the display of the image (autoscale, inverse, saturation, gamma and greyscale selection to enhance the image display)

⇨ Enhance the image



➔ The image master

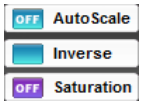


The image dynamic refers to the range of grey levels in between the minimum and the maximum pixel intensities obtained in an image.

Image depth is expressed as gradation level. In an image, the density range between white and black is divided into a number of gradation levels. For instance, a 12-bit image has 4096 gradation levels. The image dynamic refers to the number of grey levels in between the minimum levels obtained and the maximum level obtained on a specific image.

The image dynamic status informs you of the obtained dynamic on your image compared to the potential image depth.

➔ Display - Autoscale



Click on the “Autoscale” to resize the image to fit the size of the monitor.

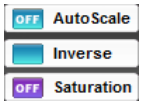
The full resolution of the acquired may be larger than the screen resolution. The navigation requires the Windows scroll bar. The Autoscale allows you to view the whole image, regardless of the window size. Typically, reducing the size of a window also cuts off part of the image. The Fit to Window option solves this problem by resizing the image so that it is always the same size as the window.

The Autoscale feature proportions the display of the image to the screen resolution.

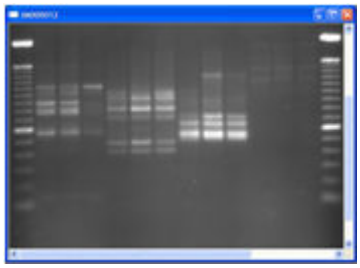
Autoscale (no scroll bar)

No Autoscale (scroll bar)

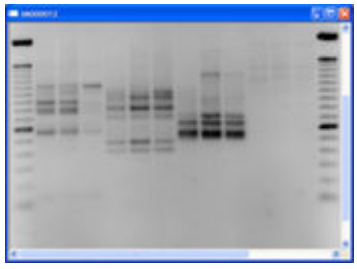
➔ Display - Inverse



Click on the “Inverse the image” to inverse the grey level of the image. This makes a negative image.

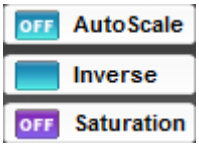


Before



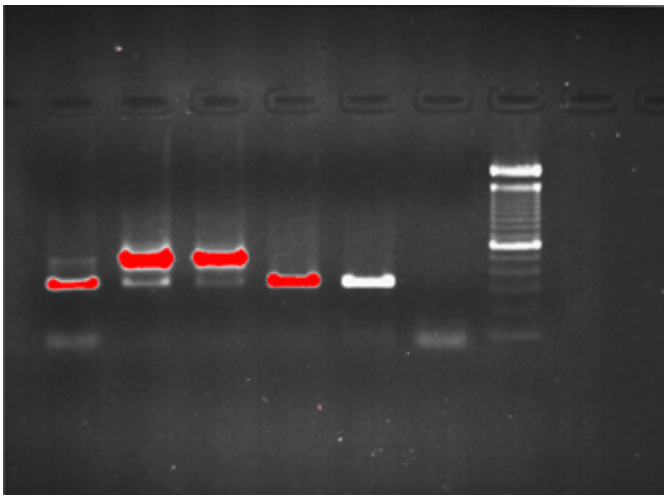
After

➔ Display - Saturation



A saturated image is inappropriate for image quantification with image analysis software. The saturation option allows you to visualise in red, pixels that have the maximum grey level (4095) in order to avoid to flatten the peaks.

To proceed, select the saturation option. The saturated pixels are displayed in red:



Note: If an image is being acquired and the «Saturation» option is checked, the modification is applied to the current acquired image

Note: A saturated image creates quantification error when studied by an image analysis software. Gel-doc systems have to indicate to the user if the image is saturated and if it is then necessary to modify the integration time.

➔ Display – Minimum / Maximum / Default

The Default display windows allows to:

- ⇨ monitor the image dynamic
- ⇨ modify the greyscale selection to enhance the image display

The acquired images are for instance 12-bit ones, ranging from 0 up to 4 095 grey levels. Windows® can only display 8 bit images (256 grey levels).

Due to this limitation, for each acquired image, the Quantum-Capt software handles two images:

⇨ a “memory” image: corresponding to the image acquired (4 096 grey levels)
⇨ a “display image”: corresponding to the image displayed on the screen (256 grey levels)

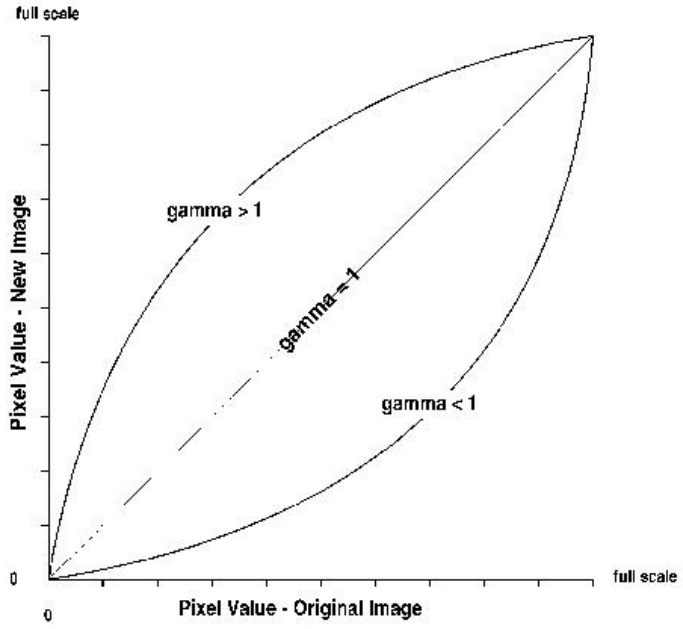
The easiest way to calculate the “display image” would be to translate the full grey scale each time an image is acquired: the 4 096 values of the “memory” image corresponds to 256 values in the displayed image, but in that case, it won’t be possible to visualise faint spots on a dark image.

Quantum-Capt offers you the possibility to select the grey level range to translate for the display image calculation. All the grey levels under the “Min value” defined will be converted to 0 (Black) in the displayed image. All the grey levels upper the “Max Value” defined will be set to 255 (White) in the displayed image. The grey levels between those two limits will be converted in an intermediate grey level value following a linear rule.

For both values, you can:
⇨ Enter it in the corresponding edit field
⇨ Select the value by dragging and dropping the arrow
⇨ Click on the “Default” button: Quantum-Capt calculates then the ideal values to be selected according to the parameters defined

➔ Display – Gamma

Gamma adjustment corrects an image by creating a new version of the original. To create the new image, the Gamma Adjust function reassigns the grey values of each pixel in the image according to the curve in the following graph:

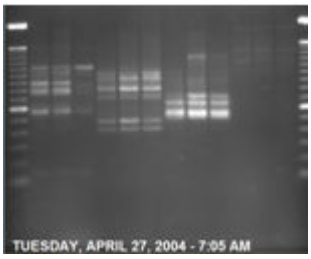


The above graph demonstrates the basic principles of gamma adjustment:
- Black (pixel value = 0) remains black at all gamma values.
- White (pixel value = full scale) remains white at all gamma values.

	- Gamma values greater than one lift the darker areas of the original image into the brighter areas of the new image. A gamma curve is smooth: there are no unexpected jumps or cut-offs. This means that when viewing a gamma adjusted image, you will be able to see the details (intensity differences) in both the black and white areas of the image. When the bright areas of these types of images are correctly exposed, the darker areas can be so dark that they are in effect invisible. Gamma Adjust can remedy this problem. The gamma adjustment results in a better display of detail by lightening the darker areas without burning out bright areas or lightening black areas:

➔ Enhance – Date

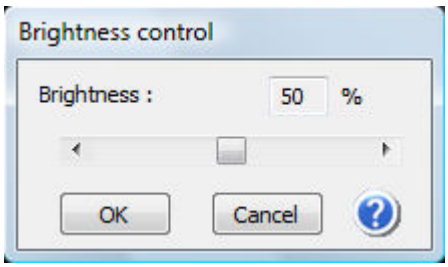
Click on the “Insert date and time” icon to insert the time and the date on the image.

With  , the date and time are incrusted in white.	
With  , the date and time are incrusted in black.	

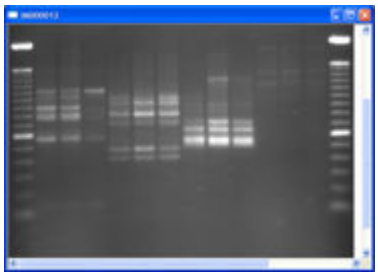
Note: click once again on the activated icon to remove the incrusted text.

➔ Enhance – Brightness / Contrast

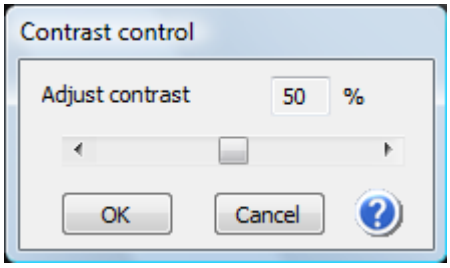
You can adjust the **brightness** to lighten or darken an entire image. To proceed, click on the “Brightness” icon. A pop-up window displays the following menu:



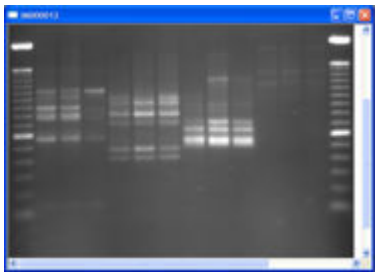
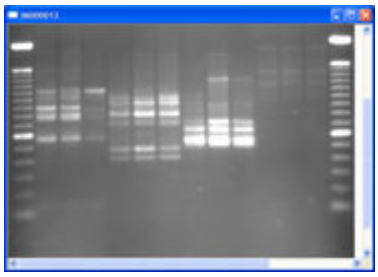
Specify the percentage to add or remove from the image.
- ⇨ Increase the brightness by defining a value above 50%
- ⇨ Decrease the brightness by defining a value inferior to 50%
- ⇨ The image is automatically updated

	
Before	**After (i.e. brightness 40%)**

You can adjust the **contrast** to exaggerate or subdue the difference between the bright and the dark area of an entire image. To proceed, click on the “Contrast” icon. A pop-up window displays the following menu:

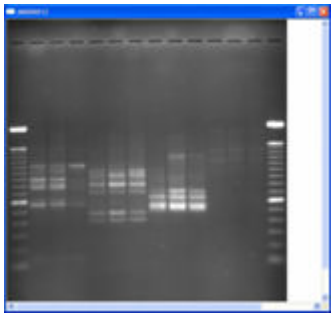
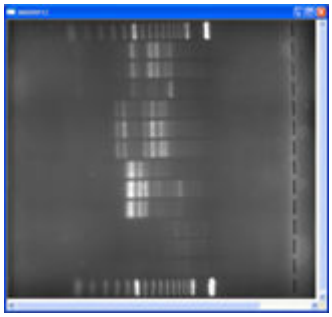


Specify the percentage to add or remove from the image.
- ⇨ Increase the contrast by defining a value above 50%
- ⇨ Decrease the contrast by defining a value inferior to 50%
- ⇨ The image is automatically updated

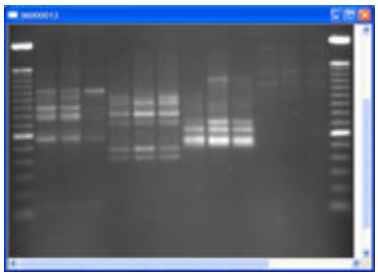
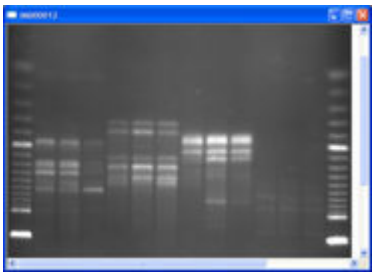
		 **Before**	 **After (i.e. contrast 70%)**	

➔ Enhance – Rotate / Mirroring

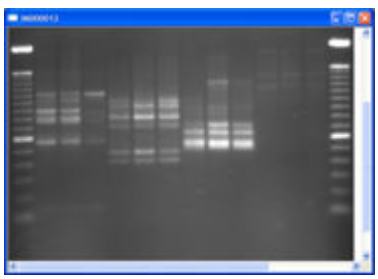
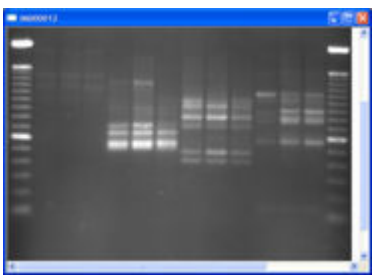
Click on the “**Rotate**” icon to rotate right the image. The image is rotated clockwise in 90° increments.

	
Before	**After**

Click on the “**Horizontal mirroring**” icon to flip the image from top to bottom.

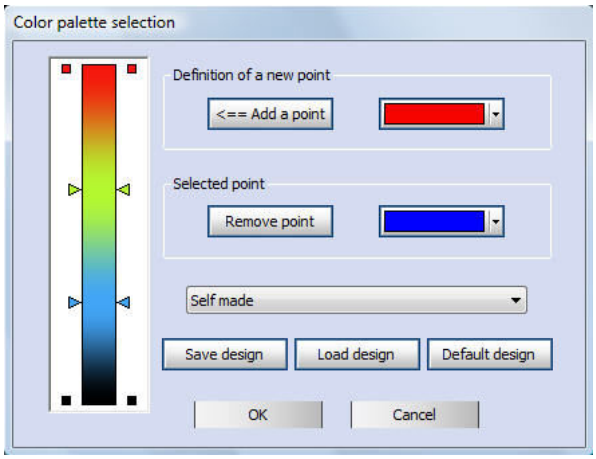
	
Before	**After**

Click on the “**Vertical mirroring**” icon to flip the image from right to left.

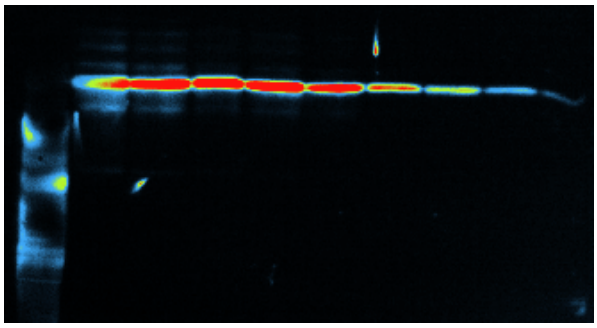
	
Before	**After**

➔ Enhance – Pseudo colours

The pseudo colours can display different types or levels of fluorescence in an image. It replaces the original grey levels of the image by another palette colour. To proceed, click on the Pseudo-colour icon. A pop-up window displays the following menu in which you can adjust the colours of the image:



The image is then displayed with the default pseudo-colours settings. For instance, the image could be as followed:



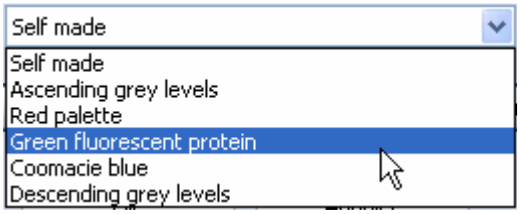
Colours adjustments

For the bicolour selection, click on the arrow to define the value of the colour you want to modify. While keeping the mouse button pressed, move the arrow to its new value. Release the mouse button when value is satisfactory, the image is automatically updated. You can repeat these operations as many times as necessary for all pseudo colours.

Add or remove a colour
Click on Add a point to add a colour on the pseudo colours list. Select the colour from the Add a point palette:

Select the point to remove and click on Remove point to remove a colour from the pseudo colours list.

Default, predefined and user defined palette design
The Quantum-Capt software has several predefined palette designs. Select your palette design from the design list:

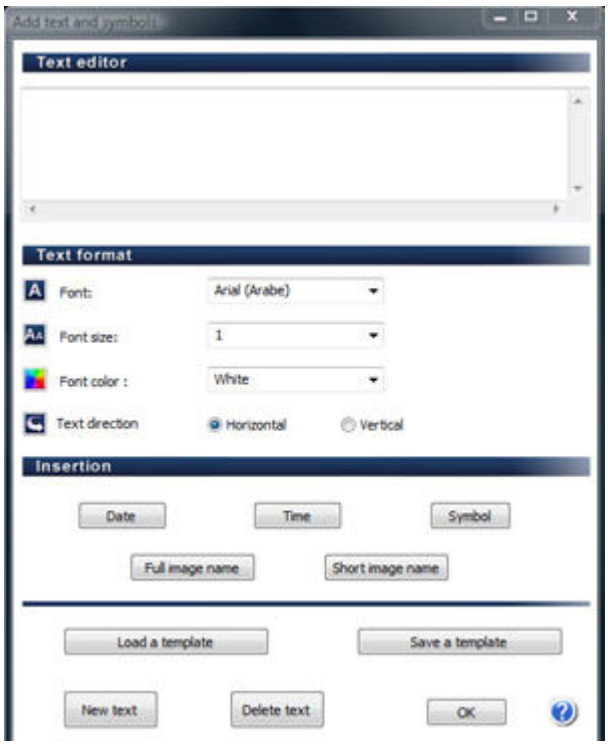


You can also save and load your own palette design. Define the set of colours you want to apply and click on Save to save the palette design. Click on Load to open your palette design.

To come back to the default design, click on the default design button:

➔ Enhance – Text

Click on the “Add text and symbols” icon. A pop-up window displays the following menu:



Enter the text in the text editor window

- ⇨ Select the font
- ⇨ Select the font size
- ⇨ Select the font colour
- ⇨ Click on OK to validate

You can insert symbol by clicking on the Symbol button. You can also add the following items to the image:

- ⇨ Date. Add the current date to the image. This date defaults to the date set on the computer you are using.
- ⇨ Time. Add the current time to the image. This time defaults to the time set on the computer you are using.
- ⇨ Full image name. Add the image title to the image. The title defaults to the file name and location of the opened image.
- ⇨ Short image name. Add the image title to the image. The title defaults to the file name of the opened image.

The text can be saved as a template and re-used for further analysis to facilitate routine text addition.

The template automates a task or set of tasks that you perform repeatedly or on a regular basis. It stores all the text comments. You can save the template created on one image and / or load the template on another image.

	The benefits of the template file are as follows: ⇨ Time saving ⇨ Reproduction of image analysis parameters ⇨ Templates are modifiable, allowing the user to maintain an original template while modifying it for a slightly different result, with minimal effort

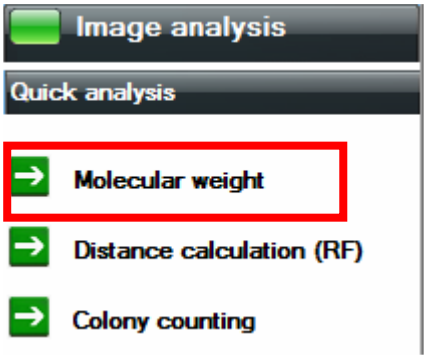
➔ Enhance – Reset enhancement

	Click on the “Cancel image change(s)” icon to undo all previous image treatments. The original image is then displayed without all the further modifications.

Image analysis- Molecular weight

➔ Accessing the quick image analysis menu

Select the Image analysis folder:
From the Image analysis folder, select the Molecular Weight option:

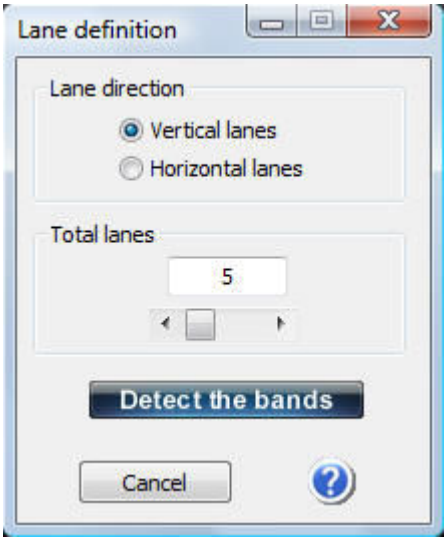


A new icon bar appears:

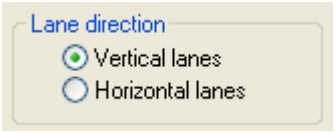
➔ Step 1: Define the number of lanes

Click on the Lane definition

A pop-up window displays the following menu:



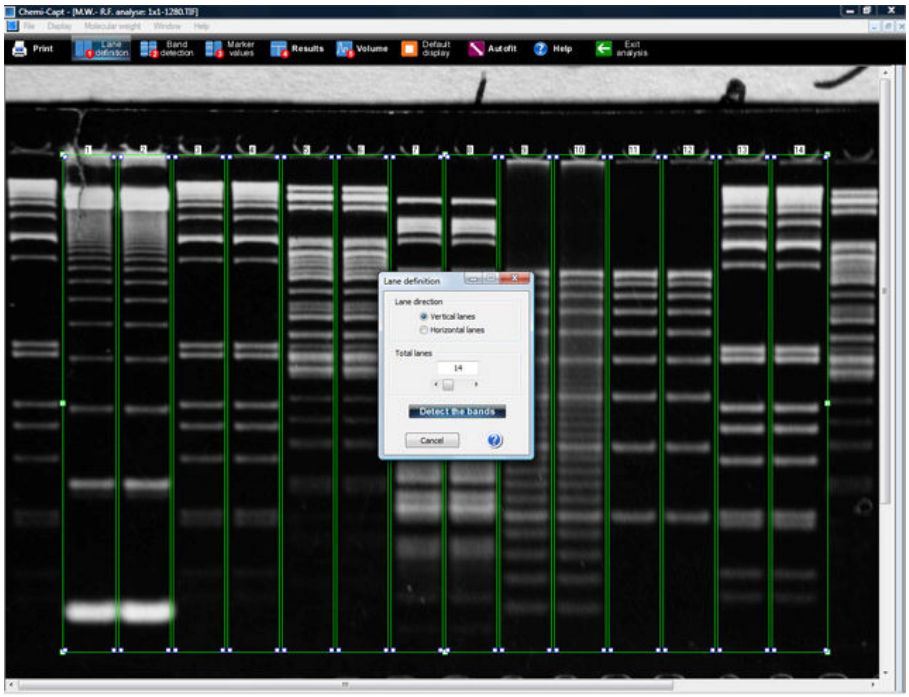
Choose the direction of the lanes from:
⇨ horizontal
⇨ or vertical



Select the number of lanes:

⇨ On the image, click and drag to define the analysis area and to overlap the lanes.
⇨ You can adjust the size of the area by clicking on the tags surrounding the area and drag the selected border to the requested size.

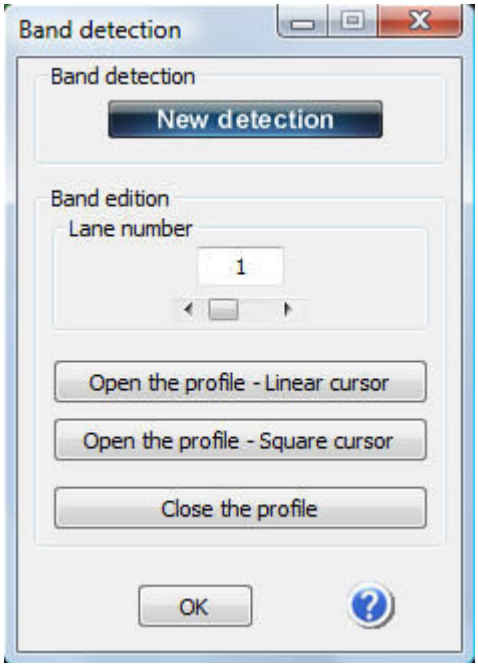
Once the lanes are properly defined, click on Detect to trigger the detection.


Print
Lane definition
Band detection
Marker values
Results
Volume
Default display
Autofit
Help
Exit analysis
Lane definition
Lane direction
Vertical lanes
Horizontal lanes
Total lanes
14
Detect the bands
Cancel

➔ Step 2: Detect the bands

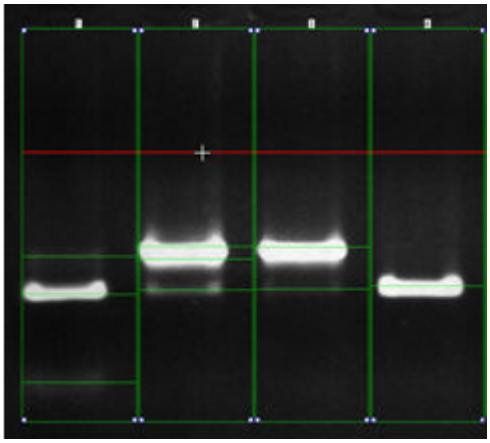
Click on the “Band detection” icon:

A pop-up window displays the following menu:

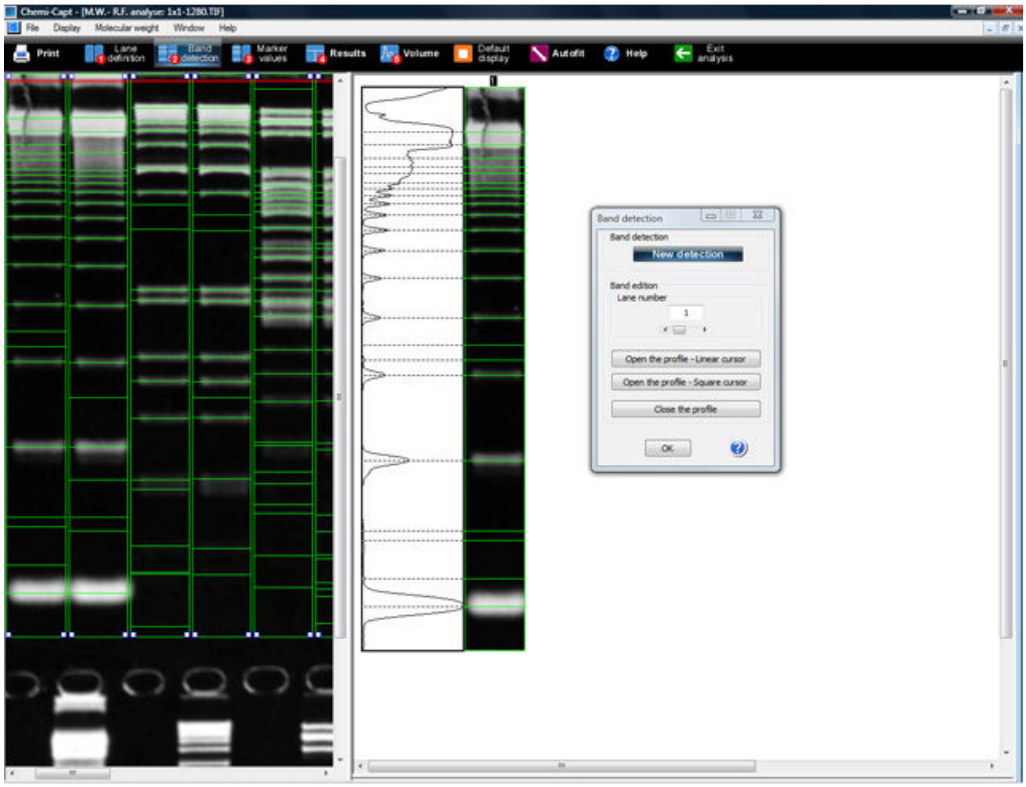


Add or remove bands by clicking on the image.

⇨ Place the cursor at the chosen location and click. The detection line is automatically added or removed



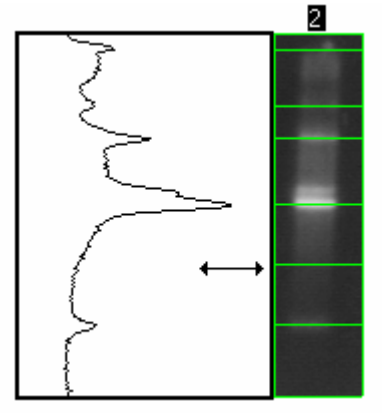
You can edit the profile of one lane. To proceed, click on “Profile – Linear cursor” or “Profile – Rectangular cursor”.



⇨ The linear cursor has the shape of an arrow (⟷)

⇨ The rectangular cursor has the shape of a square (☐)

You can add or remove bands by clicking on the image. To proceed, place the cursor at the chosen location and click. The detection line is automatically added or removed

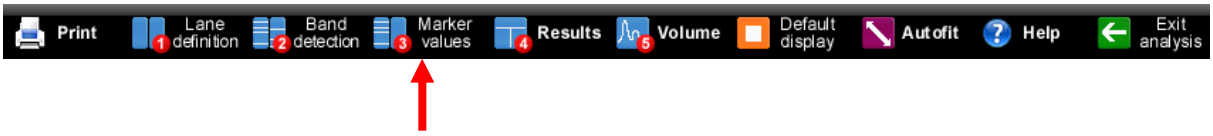


➔ Step 3: Load or define the marker values

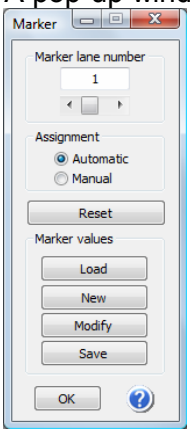
Click on the “Markers values” icon:

Note: The end of “Step 2: Detect the bands” opens automatically the Marker values pop-up windows.

Note: This function allows to assign the molecular weight markers values to the bands of the marker lane.



A pop-up window displays the following menu:

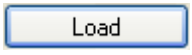


Select the lane corresponding to the molecular weight marker:

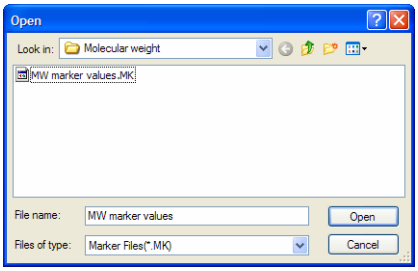
Define the marker’s values by:

⇨ Loading existing values
⇨ Creating new values
⇨ Modifying existing values

1. Load existing values by clicking on the Load button



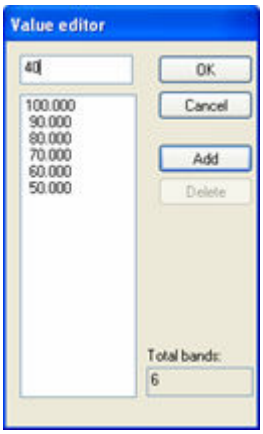
A pop-up window displays the following menu:



Select the molecular weight marker from the list and click on Open.

2. Create new values by clicking on the New button

A pop-up window displays the following menu:



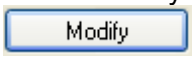
Type your values, lane by lane, in a descending order. The OK button validates your data.

Note: For the size of the fragments and for the molecular weights, the standard must be saved with the values in Kilobases and KiloDaltons only.
Example: 1600 pb = 1,6 Kpb

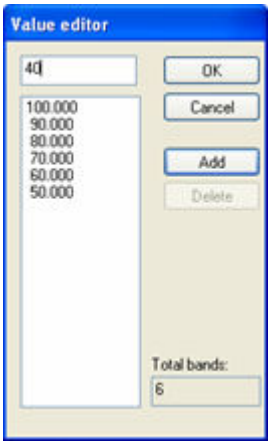
Note: A minimum of four values is necessary to validate the data.

Note: if an automatic calculation with immediate application of the standard values is carried out, it is not necessary to enter all the bands given by the manufacturer's specifications, but only those which are commonly found on the lanes of the gel.

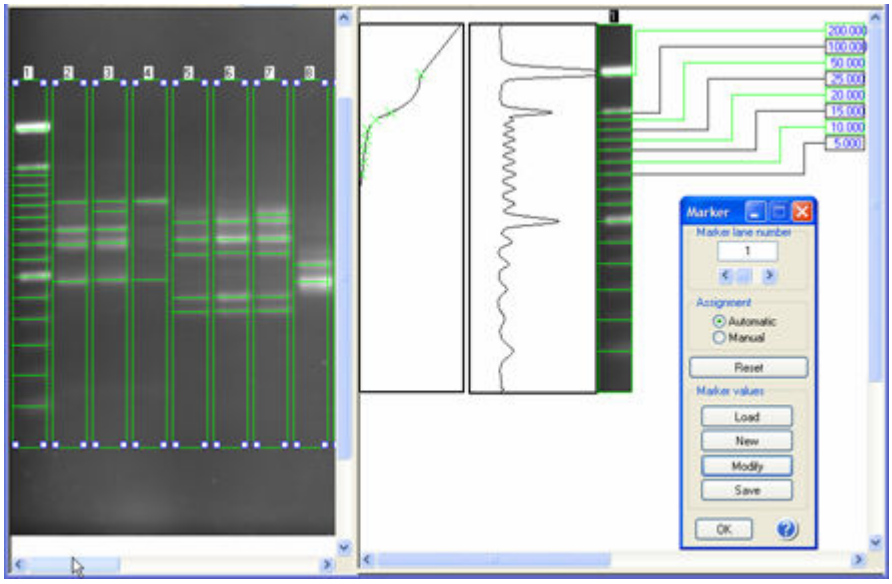
3. Modify existing values by clicking on the Modify button



A pop-up window displays the following menu on which you can modify the marker values:



Migration curve

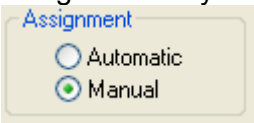


Note: The migration curve allows to check the detection of value application errors, distortion errors, bad separation between the bands, or the quality of the standard itself.

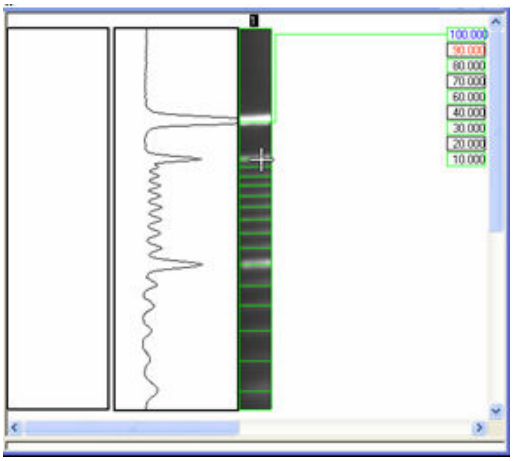
Note: To delete the wrong lane(s) data, you can either place the cursor arrow on the wrong value itself and click on it, or go for the manual assignment.

Note: The displayed migration curve is of the cubic spline type and must then include a minimum of 4 values.

Assign manually the marker values to the lane by selecting the appropriate option:



The markers values and the profile are displayed in the same window:



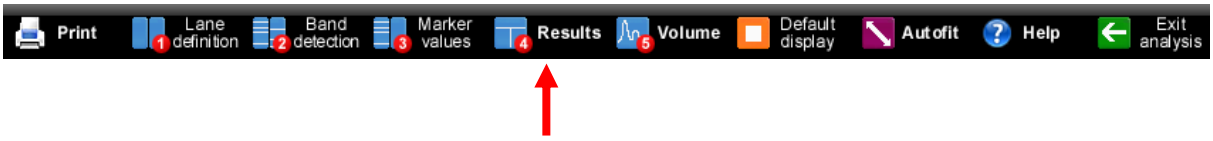
Click successively on the value inside the rectangle, then on the band itself. A link between the value and the lane is displayed.
Place now the arrow on the second value and use the same method up to the last value

Note: A minimum of four values is necessary to validate the data.

Click on OK to exit the marker values function

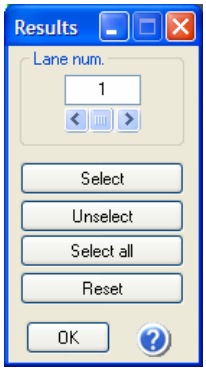
➔ Step 4: Get the results

Click on the “Results” icon:

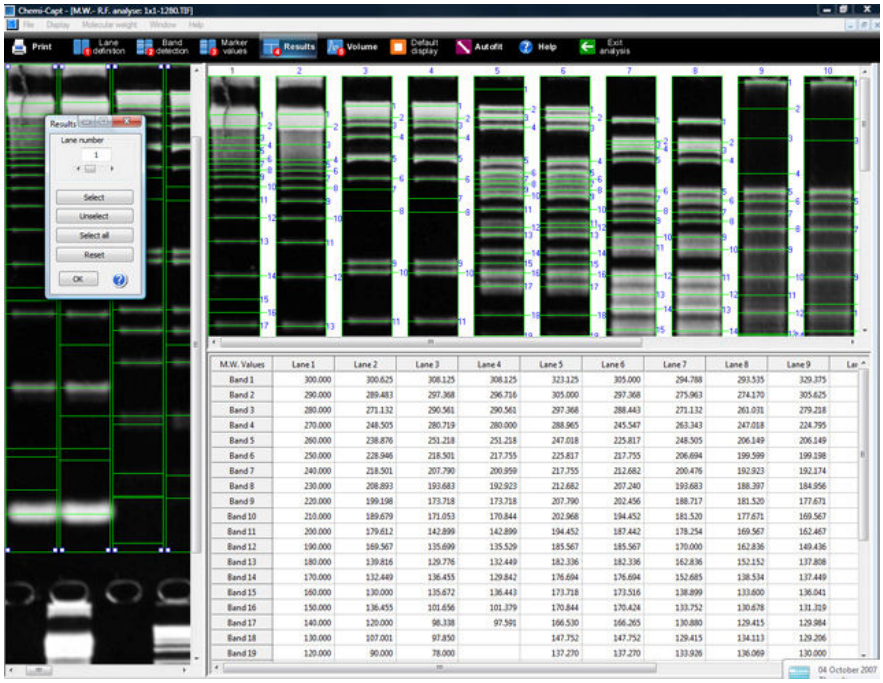


Note: The end of “Step 3: Marker values” opens automatically the Results pop-up windows.

A pop-up window displays the following menu:



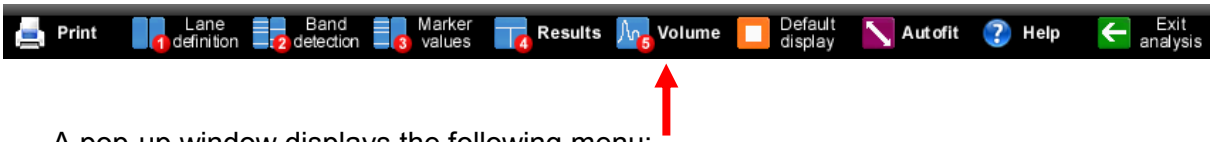
The results are displayed in a table:



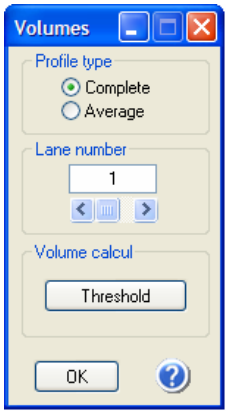
Note: You can display the results of a selection of lanes. To proceed, select the lane you want to display and click on Select. To delete the display of some lanes, select the lane and click on Unselect.

➔ Step 5: Quantify the volumes

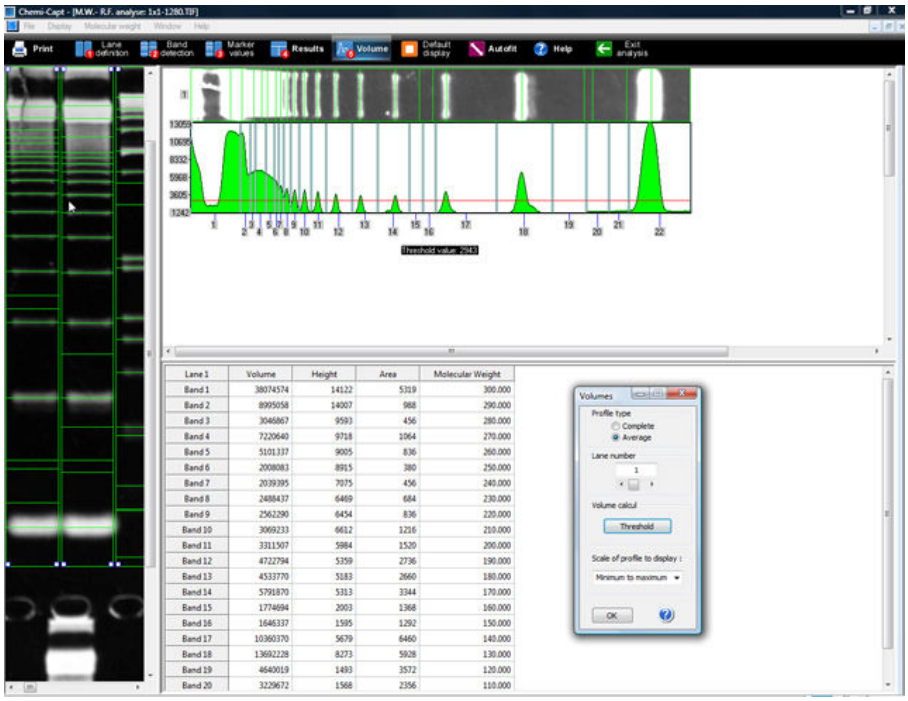
Click on the “Volume” icon:



A pop-up window displays the following menu:



For each lane, the volume, the height and the area are displayed in a table:



⇨ The volume is the sum of all the intensities included in the defined area (window + separation)
⇨ The height is the maximum intensity
⇨ The area is defined for each peak, by the width of the window and the separation lines

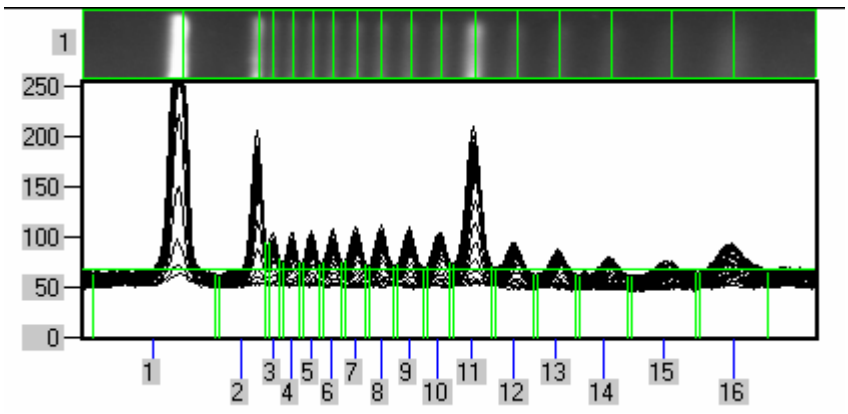
You can define a quantification threshold. To proceed:

⇨ Click on the Threshold button. The threshold allows to distinguish the bands from smears on the lane.

⇨ Move upwards on the screen the horizontal line to display the band contours to quantify.

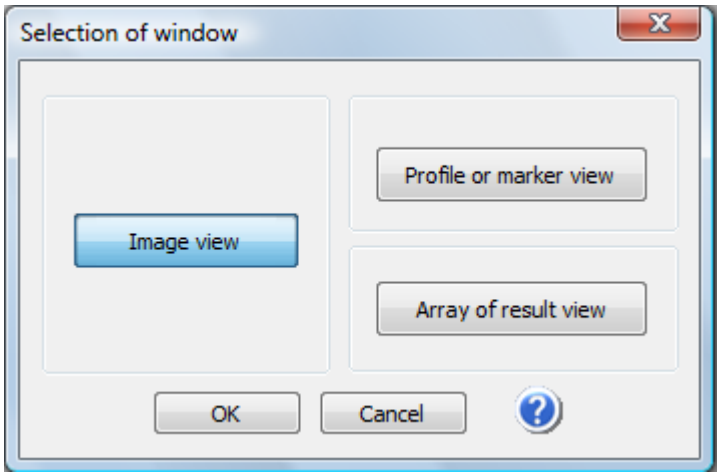
⇨ Click on the left button of the mouse to validate, the values are directly displayed.

⇨ The defined threshold is automatically applied to all lanes. The results are recalculated taking into account the threshold.



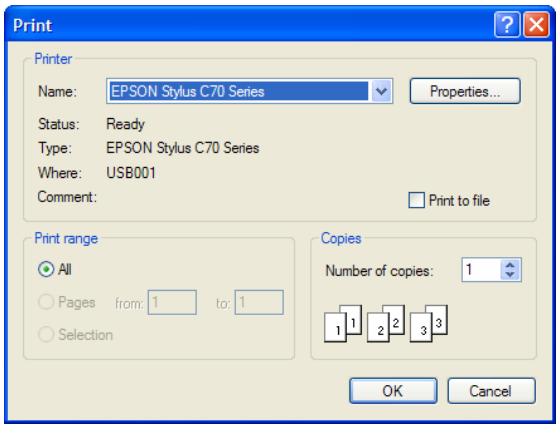
➔ Printing the results

1. Click on the “Print” icon. A pop-up window displays the following menu:



⇨ Select the window to be printed
⇨ Window 1 refers to the analysed image
⇨ Window 2 refers to the lane profile or the molecular weight markers view
⇨ Windows 3 refers to the result table

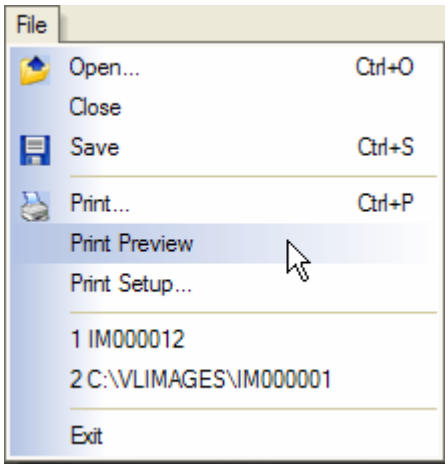
2. Click on OK to validate your choice. A pop-up window displays the following menu:



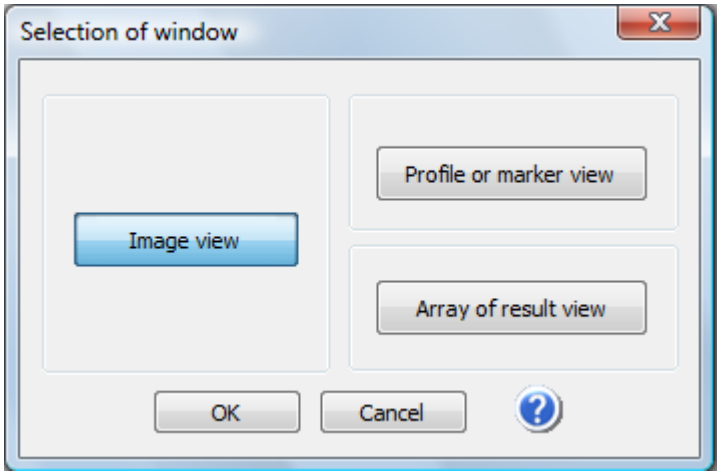
⇨ Select a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the number of copies
⇨ Click on OK to validate your options

Note: You can also access the Print menu from the Menu bar (File\Print).

The Print preview displays a preview of the image, as it will be printed. To proceed, select File\Print Preview from the Menu bar:



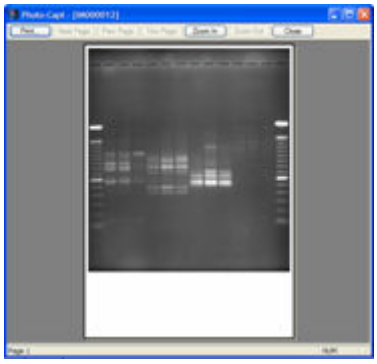
A pop-up window displays the print preview:



⇨ Select the window to be previewed

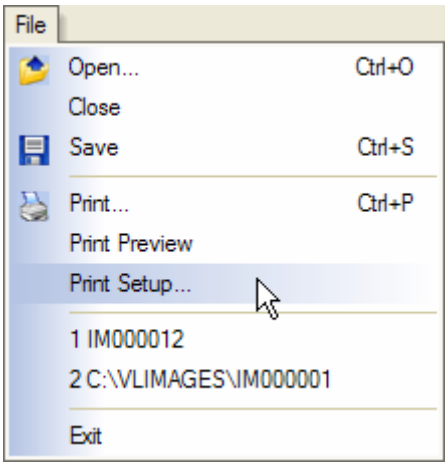
Note: please refer to the “Printing the results” chapter for an explanation of Windows 1,2 and 3.

A pop-up window displays the print preview:

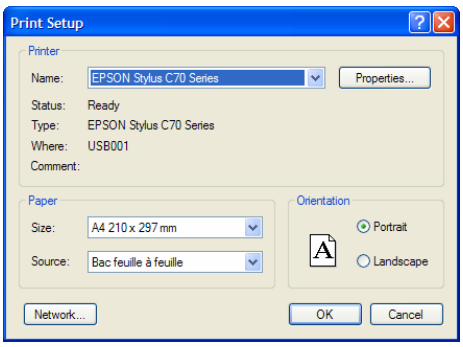


⇨ Click on Print to print as previewed
⇨ Click on Close to close the Print preview and to go back to the main menu

3. The Print Setup allows you to choose a printer and to configure the printing. To proceed, select File\Print Setup from the Menu bar:



A pop-up window displays the print setup menu:



⇨ Select a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the paper size and source; select the orientation
⇨ Click on OK to validate your options
⇨

Note: After you have installed and setup your printer, the procedure for setting up and configuring a printer is the same as in other Windows program.

➔ Autofit

Click on the “Autofit” to resize the image to fit the size of the monitor.

The full resolution of the acquired may be larger than the screen resolution. The navigation requires the Windows scroll bar. The Autofit allows you to view the whole image, regardless of the window size. Typically, reducing the size of a window also cuts off part of the image. The Fit to Window option solves this problem by resizing the image so that it is always the same size as the window.

The Autofit feature proportions the display of the image to the screen resolution.

Autofit (no scroll bar)

No Autofit (scroll bar)

➔ Default display

The Default display windows allows to:
⇨ monitor the image dynamic
⇨ modify the greyscale selection to enhance the image display

The acquired images are for instance 12-bit ones, ranging from 0 up to 4 095 grey levels. Windows® can only display 8 bit images (256 grey levels).

Due to this limitation, for each acquired image, the Quantum-Capt software handles two images:
⇨ a “memory” image: corresponding to the image acquired (4 096 grey levels)
⇨ a “display image”: corresponding to the image displayed on the screen (256 grey levels)

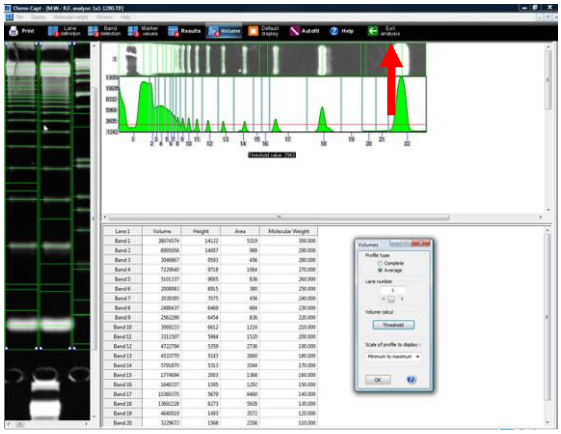
The easiest way to calculate the “display image” would be to translate the full grey scale each time an image is acquired: the 4 096 values of the “memory” image corresponds to 256 values in the displayed image, but in that case, it won’t be possible to visualise faint spots on a dark image.

Quantum-Capt offers you the possibility to select the grey level range to translate for the display image calculation. All the grey levels under the “Min value” defined will be converted to 0 (Black) in the displayed image. All the grey levels upper the “Max Value” defined will be set to 255 (White) in the displayed image. The grey levels between those two limits will be converted in an intermediate grey level value following a linear rule.

For both values, you can:
⇨ Enter it in the corresponding edit field
⇨ Select the value by dragging and dropping the arrow
⇨ Click on the “Default” button: Quantum-Capt calculates then the ideal values to be selected according to the parameters defined

➔ Returning to the main menu

1. To return to the main menu, click on the “Return to the main menu” icon:



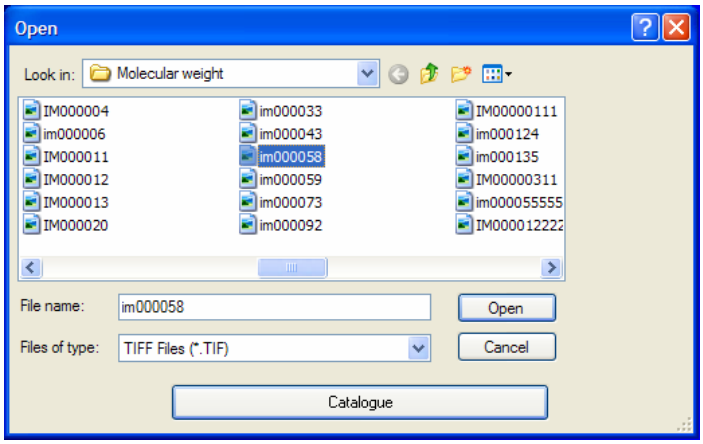
A new menu appears with the main menu task bar functions:

Image analysis – Colony counting

➔ Open an image and select the colony counting menu

Note: the colony counting is designed for 8-bit image (displayed image).

1. Click on the “Open” icon. A pop-up window displays the following menu:

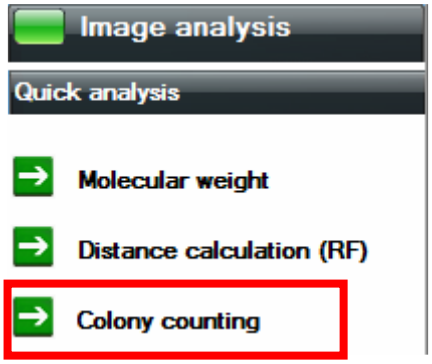


2. Browse to specify the image directory
3. Double click on the image name you want to load

Note: the catalogue function allows a preview of the images to load in the selected directory. To proceed, select one image of the directory on click on “Catalogue”.

4. Select the Image analysis folder

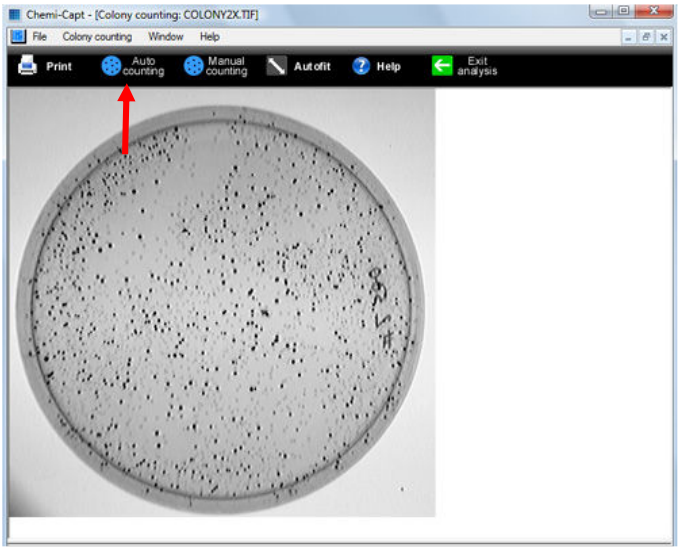
From the Image analysis folder, select the Colony counting option:



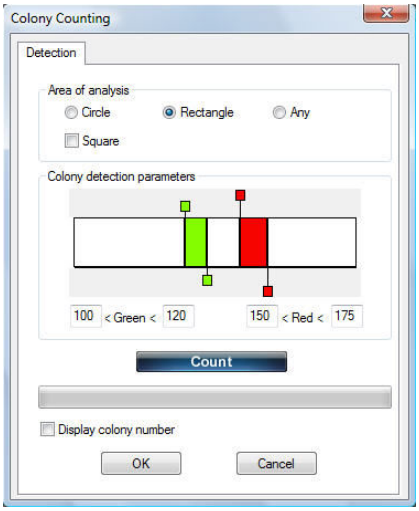
➔ Automatic colony counting

Note: the colony counting is designed for 8-bit image (displayed image).

1. Click on the “Automatic colony counting” icon:



A pop-up window appears with the colony counting functions:



Auto counting

2. Select your area of analysis

There are 3 kinds of area of analysis:

- **Circle and rectangle**

Click on the corresponding option to select it. The area is immediately displayed on the image

Note: You can adjust the size and the position by moving the mouse cursor on the defined area:
⇨ to position the area, click on the area and drag it to its new position
⇨ to resize the area, move the mouse cursor on one of the little square surrounding the area. The mouse cursor is modified, click and drag the edge of the area to its new size.

- **Any area**

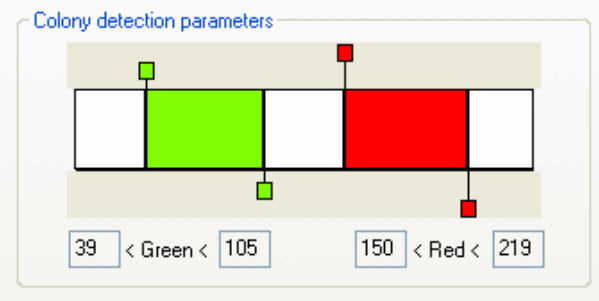
Once this option is selected, the previous area is deleted. Move the mouse cursor on the image and click on the image to define the first point of the area. Move the mouse to another place; a line is drawn, defining one edge of the area. Click when the edge is satisfactory. Repeat those steps until the area is defined. Then, click on right mouse button to finish the definition of the area.

Note: It is not possible to move such an area.

Note: Click on the "SQUARE" check box to obtain a circle instead of an ellipse or a square instead of a rectangle.

Note: If Colony count ("count" button) has been done on the image, the modification of the area will cancel it. It will be necessary to press once again the "count" button to access the results.

3. Define the parameters for the colony detection

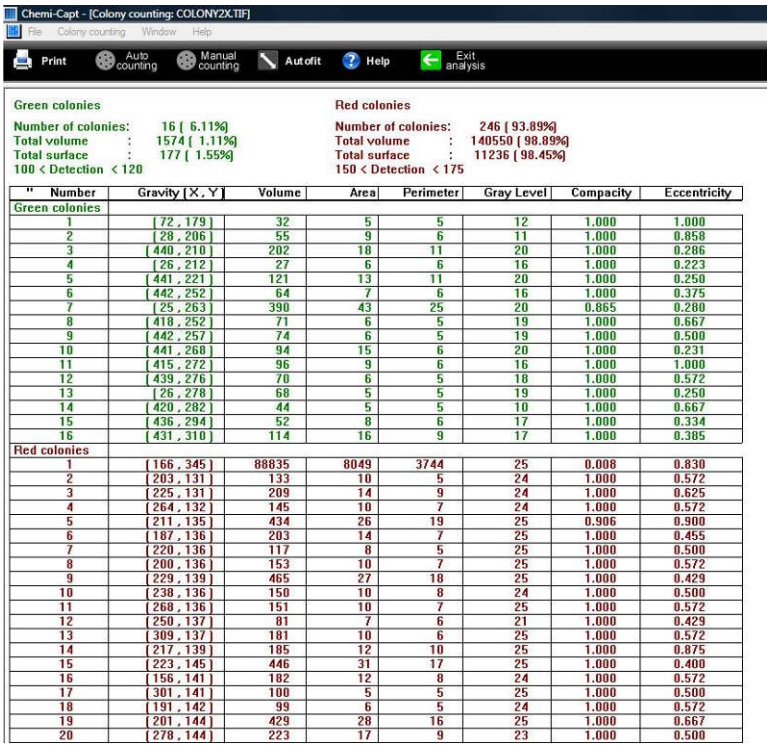


The green and red areas represent the gray level range used to determine both kinds of colonies. Click on the colored square and drag them to a new place to modify the detection range. The new detection parameters are displayed, and a preview of the detection is displayed on the image.

Note: If Colony count ("count" button) has been done on the image, the modification of the area will cancel it. It will be necessary to press once again the "count" button to access the results.

4. Click on the Count button

Once the preview of detection is satisfactory, click on the Count button. The colonies are counted and their parameters are displayed in the bottom part of the screen:



Green colonies
Number of colonies: 16 (6.11%)
Total volume : 1574 (1.11%)
Total surface : 177 (1.55%)
100 < Detection < 120

Red colonies
Number of colonies: 246 (93.89%)
Total volume : 140550 (98.89%)
Total surface : 11236 (98.45%)
150 < Detection < 175

" Number	Gravity [X,Y]	Volume	Area	Perimeter	Gray Level	Compacity	Eccentricity
Green colonies							
1	[72 , 179]	32	5	5	12	1.000	1.000
2	[28 , 206]	55	9	6	11	1.000	0.858
3	[440 , 210]	202	18	11	20	1.000	0.286
4	[26 , 212]	27	6	6	16	1.000	0.223
5	[441 , 221]	121	13	11	20	1.000	0.250
6	[442 , 252]	64	7	6	16	1.000	0.375
7	[25 , 263]	390	43	25	20	0.865	0.280
8	[418 , 252]	71	6	5	19	1.000	0.667
9	[442 , 257]	74	6	5	19	1.000	0.500
10	[441 , 268]	94	15	6	20	1.000	0.231
11	[415 , 272]	96	9	6	16	1.000	1.000
12	[439 , 276]	70	6	5	18	1.000	0.572
13	[26 , 278]	68	5	5	19	1.000	0.250
14	[420 , 282]	44	5	5	10	1.000	0.667
15	[436 , 294]	52	8	6	17	1.000	0.334
16	[431 , 310]	114	16	9	17	1.000	0.385
Red colonies							
1	[166 , 345]	88835	8049	3744	25	0.008	0.830
2	[203 , 131]	133	10	5	24	1.000	0.572
3	[225 , 131]	209	14	9	24	1.000	0.625
4	[264 , 132]	145	10	7	24	1.000	0.572
5	[211 , 135]	434	26	19	25	0.906	0.900
6	[187 , 136]	203	14	7	25	1.000	0.455
7	[220 , 136]	117	8	5	25	1.000	0.500
8	[200 , 136]	153	10	7	25	1.000	0.572
9	[229 , 139]	465	27	18	25	1.000	0.429
10	[238 , 136]	150	10	8	24	1.000	0.500
11	[268 , 136]	151	10	7	25	1.000	0.572
12	[250 , 137]	81	7	6	21	1.000	0.429
13	[309 , 137]	181	10	6	25	1.000	0.572
14	[217 , 139]	185	12	10	25	1.000	0.875
15	[223 , 145]	446	31	17	25	1.000	0.400
16	[156 , 141]	182	12	8	24	1.000	0.572
17	[301 , 141]	100	5	5	25	1.000	0.500
18	[191 , 142]	99	6	5	24	1.000	0.572
19	[201 , 144]	429	28	16	25	1.000	0.667
20	[278 , 144]	223	17	9	23	1.000	0.500

Note: For each colony the parameters are:

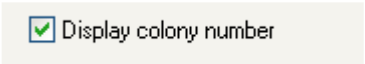
- ⇨ Number: number of order of the colony
- ⇨ Gravity: co-ordinates of the centre of gravity of the detected colony
- ⇨ Volume: sum of the grey level of the pixels constituting the colony
- ⇨ Area: number of pixel constituting the colony
- ⇨ Perimeter: Circumference of the colony
- ⇨ Compacity: Compacity coefficient

$$C = \frac{4\pi S \text{ (area)}}{p2 \text{ (perimeter)}} \qquad 0 < c < 1$$

- ⇨ Eccentricity: Smears and artefacts can be eliminated with this coefficient which calculates how stretched the colony is.

$$E = \frac{W \text{ (mini width)}}{L \text{ (maxi length)}} \qquad 0 < E < 1$$

Note: You can display the colony number on the image, by clicking on the "Display colony number":



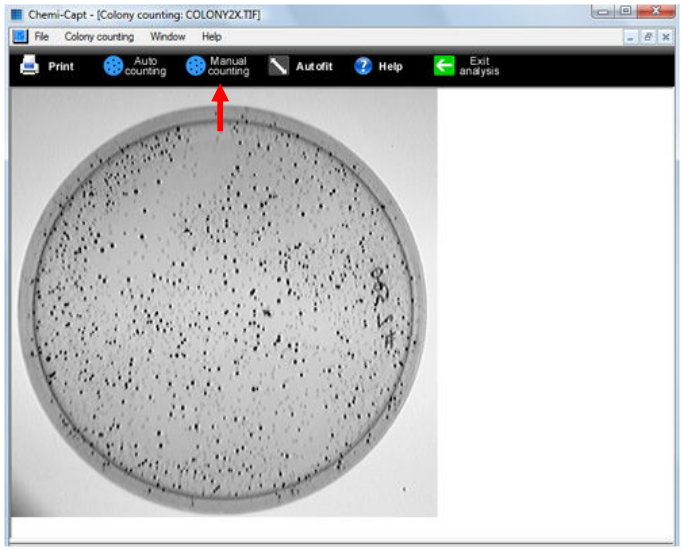
5. You can exit the colony counting function by clicking on the OK or cancel button.

➔ Manual colony counting

Manual counting

Note: the colony counting is designed for 8-bit image (displayed image).

1. Click on the “Manual colony counting” icon from the tool bar:



A pop-up window appears with the manual counting function:

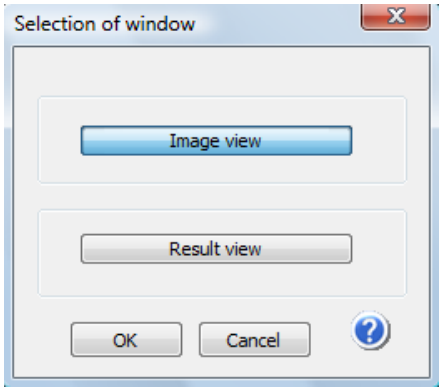
2. To count a colony, click on it with:
⇨ the left mouse button to count it as a green
⇨ the right mouse button to count is as a red colony

Note: To cancel a counted colony, click once again on it with the appropriate mouse button.
Note: To reset the counting, press the Reset button.

3. You can exit the colony counting function by clicking on the Ok or cancel button.

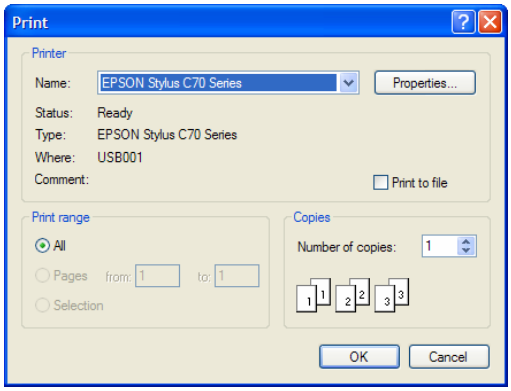
➔ Printing the results

1. Click on the “Print” icon. A pop-up window displays the following menu:



⇨ Select the window to be printed

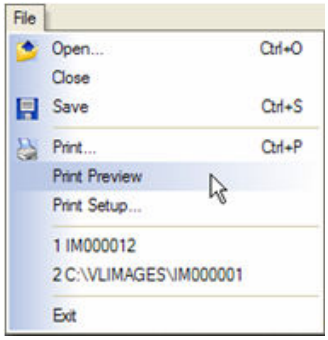
2. Click on OK to validate your choice. A pop-up window displays the following menu:



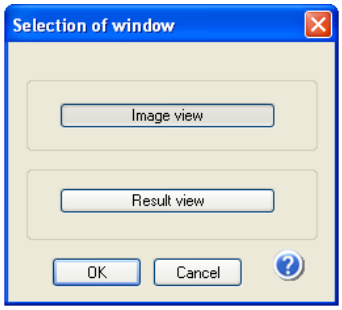
⇨ Select a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the number of copies
⇨ Click on OK to validate your options

Note: You can also access the Print menu from the Menu bar (File\Print).

3. The Print preview displays a preview of the image, as it will be printed. To proceed, select File\Print Preview from the Menu bar:

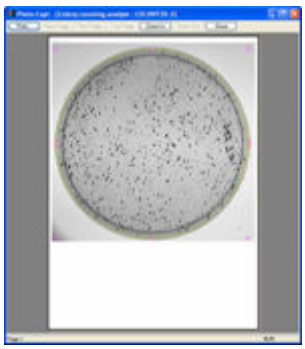


A pop-up window displays the print preview:



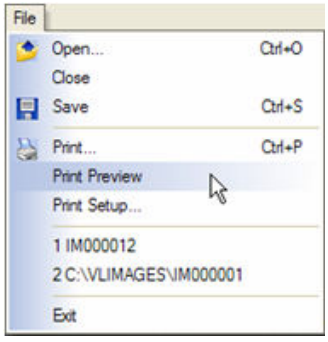
⇨ Select the window to be previewed

A pop-up window displays the print preview:

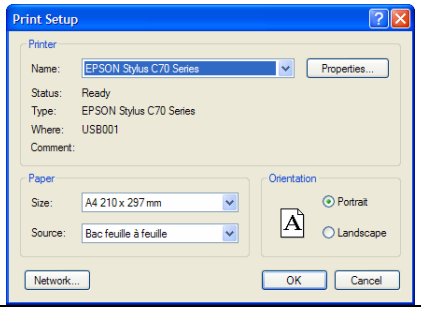


⇨ Click on Print to print as previewed
⇨ Click on Close to close the Print preview and to go back to the main menu

4. The Print Setup allows you to choose a printer and to configure the printing. To proceed, select File\Print Setup from the Menu bar:



A pop-up window displays the print setup menu:



	⇨ Select a printer ⇨ Click on Properties to modify the default setting of the printer, if necessary ⇨ Select the paper size and source; select the orientation ⇨ Click on OK to validate your options Note: After you have installed and setup your printer, the procedure for setting up and configuring a printer is the same as in other Windows program.

➔ Autofit

Click on the “Autofit” to resize the image to fit the size of the monitor.

The full resolution of the acquired may be larger than the screen resolution. The navigation requires the Windows scroll bar. The Autofit allows you to view the whole image, regardless of the window size. Typically, reducing the size of a window also cuts off part of the image. The Fit to Window option solves this problem by resizing the image so that it is always the same size as the window.

The Autofit feature proportions the display of the image to the screen resolution.

Autofit (no scroll bar)

No Autofit (scroll bar)

➔ Default display

The Default display windows allows to:
⇨ monitor the image dynamic
⇨ modify the greyscale selection to enhance the image display

The acquired images are for instance 12-bit ones, ranging from 0 up to 4 095 grey levels. Windows® can only display 8 bit images (256 grey levels).

Due to this limitation, for each acquired image, the Quantum-Capt software handles two images:
⇨ a “memory” image: corresponding to the image acquired (4 096 grey levels)
⇨ a “display image”: corresponding to the image displayed on the screen (256 grey levels)

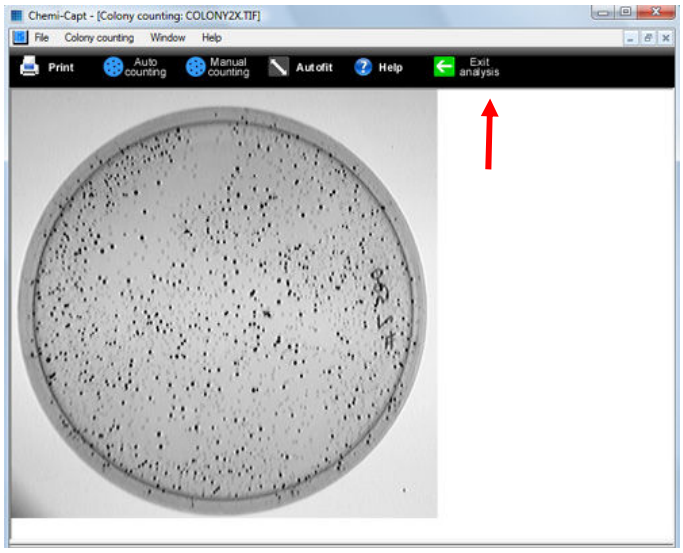
The easiest way to calculate the “display image” would be to translate the full gray scale each time an image is acquired: the 4 096 values of the “memory” image corresponds to 256 values in the displayed image, but in that case, it won’t be possible to visualise faint spots on a dark image.

Quantum-Capt offers you the possibility to select the grey level range to translate for the display image calculation. All the grey levels under the “Min value” defined will be converted to 0 (Black) in the displayed image. All the grey levels upper the “Max Value” defined will be set to 255 (White) in the displayed image. The grey levels between those two limits will be converted in an intermediate grey level value following a linear rule.

For both values, you can:
⇨ Enter it in the corresponding edit field
⇨ Select the value by dragging and dropping the arrow
⇨ Click on the “Default” button: Quantum-Capt calculates then the ideal values to be selected according to the parameters defined

➔ Returning to the image main menu

1. To return to the main menu, click on the image capture icon:

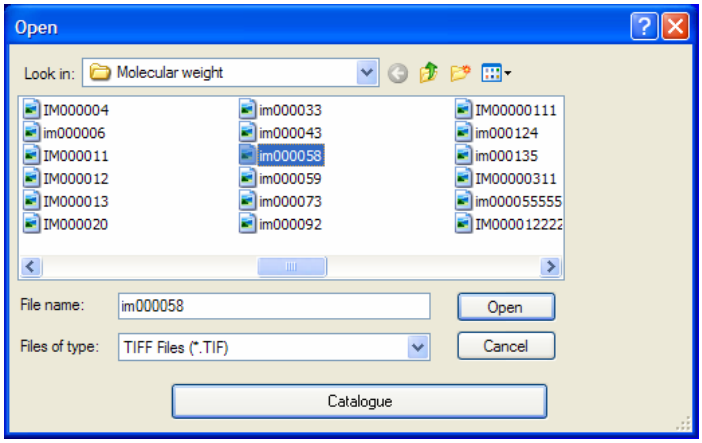


A new menu appears with the main menu task bar functions:

Image analysis – RF

➔ Open an image and select the distance calculation (RF) menu

1. Click on the “Open” icon. A pop-up window displays the following menu:

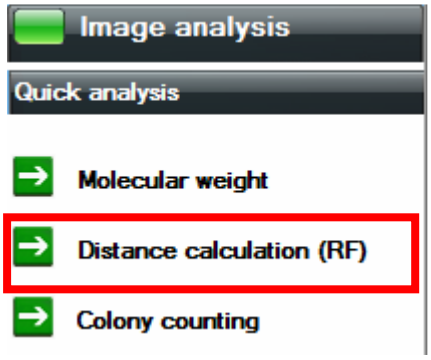


2. Browse to specify the image directory

3. Double click on the image name you want to load

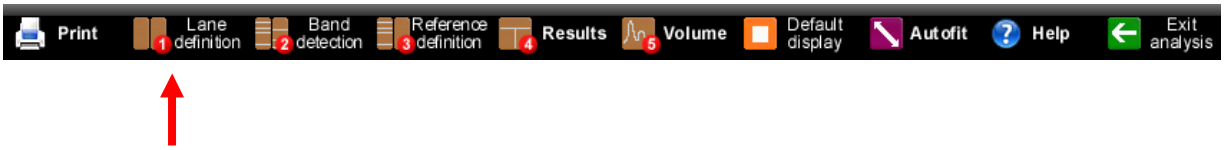
Note: the catalogue function allows a preview of the images loaded in the selected directory. To proceed, select one image of the directory on click on “Catalogue”.

4. Select the Image analysis folder.
From the Image analysis folder, select the Colony counting option:

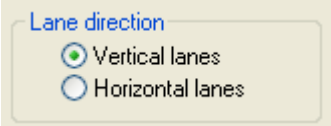


➔ Step 1: Define the number of lanes

1. Click on the Lane definition



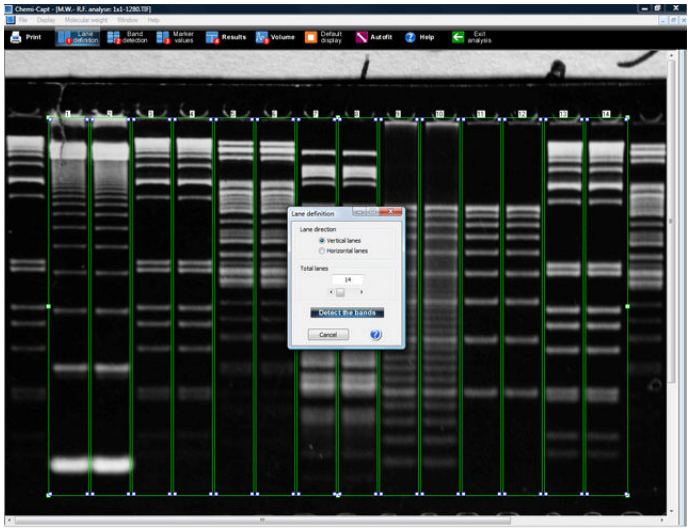
2. Choose the direction of the lanes from:
⇨ horizontal
⇨ or vertical



3. Select the number of lanes:

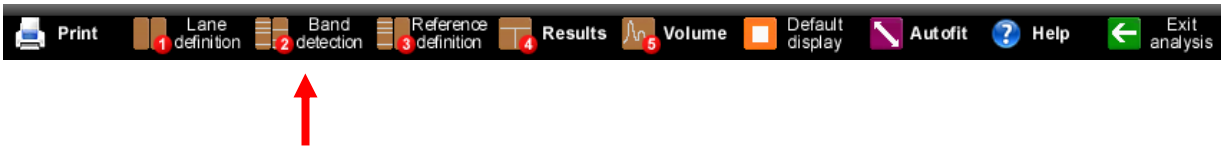
⇨ On the image, click and drag to define the analysis area and to overlap the lanes.
⇨ You can adjust the size of the area by clicking on the tags surrounding the area and drag the selected border to the requested size.

4. Once the lanes are properly defined, click on Detect the bands to trigger the detection.

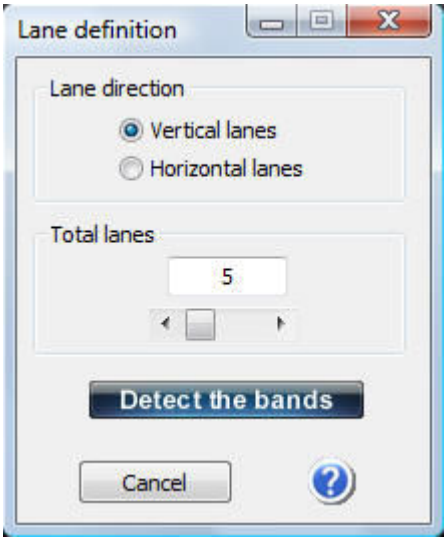


➔ Step 2: Detect the bands

1. Click on the “Band detection” icon:

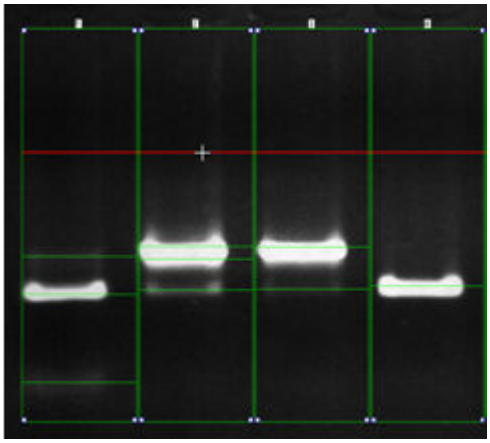


A pop-up window displays the following menu:

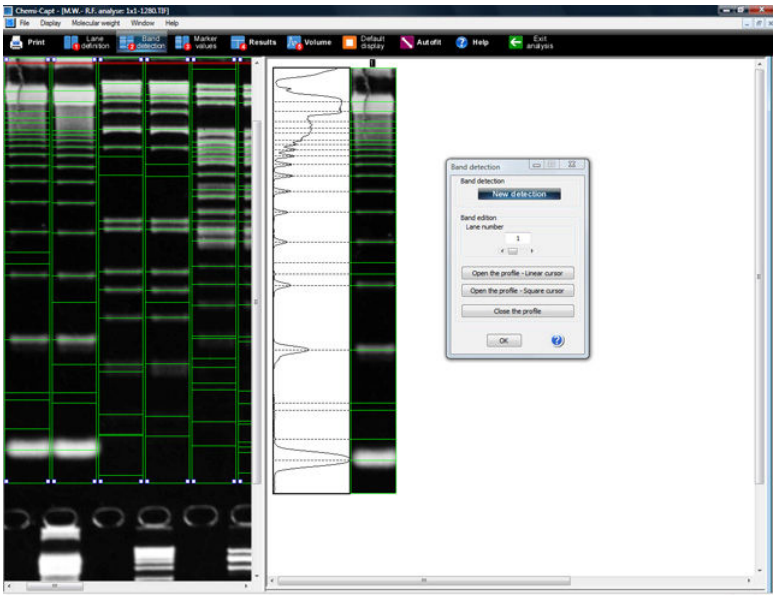


2. You can add or remove bands by clicking on the image.

⇨ Place the cursor at the chosen location and click. The detection line is automatically added or removed.



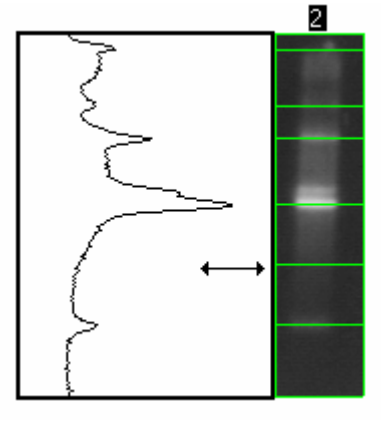
3. You can edit the profile of one lane. To proceed, click on “Profile – Linear cursor” or “Profile – Rectangular cursor”.



⇨ The linear cursor has the shape of an arrow (⟷)

⇨ The rectangular cursor has the shape of a square (□)

4. You can add or remove bands by clicking on the image. To proceed, place the cursor at the chosen location and click. The detection line is automatically added or removed.

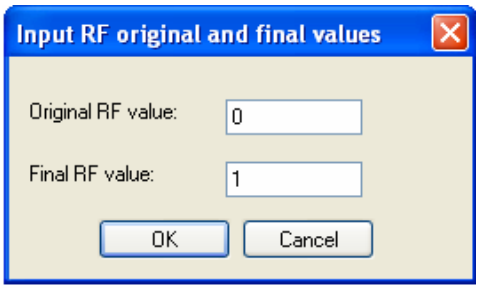


➔ Step 3: Assign the RF values

1. You can assign the RF values to the detected bands. To do this, you must define an origin line (value = 0) and a front line (value = 1). Click on the “Reference definition” icon:

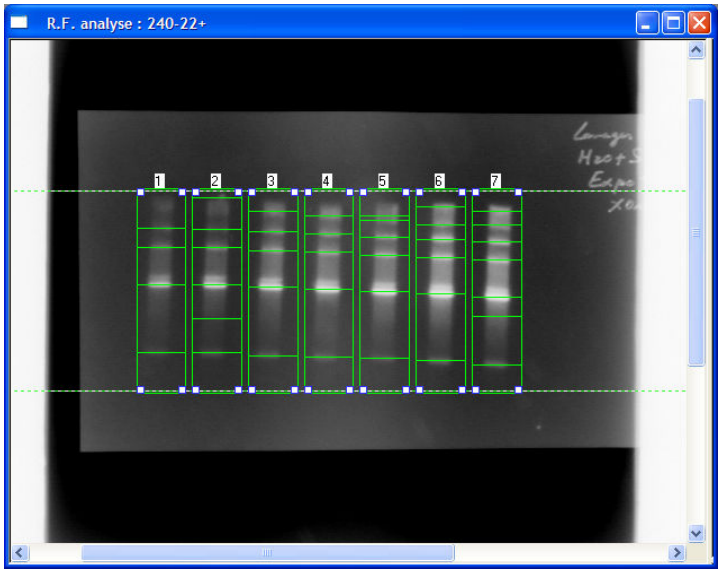
Note: The end of “Step 2: Detect the bands” opens automatically the Marker values pop-up windows.

A pop-up window is displayed:



The select the value for the origin and the value the end. Then, validate by clicking on OK.

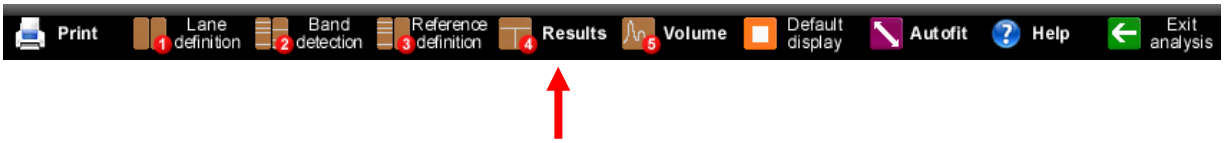
An origin and a front line are displayed on the image:



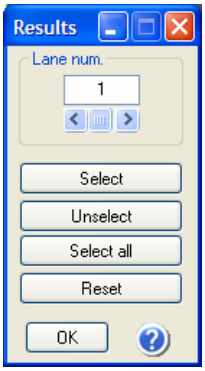
⇨ Click on the first line, kept pressed the left mouse button, and move it to the location for the origin line. Then, release the button.
⇨ Click on the second line and move it to the location for the migration front. Then, release the button. The R.F. values are assigned to the bands.

➔ Step 4: Get the results

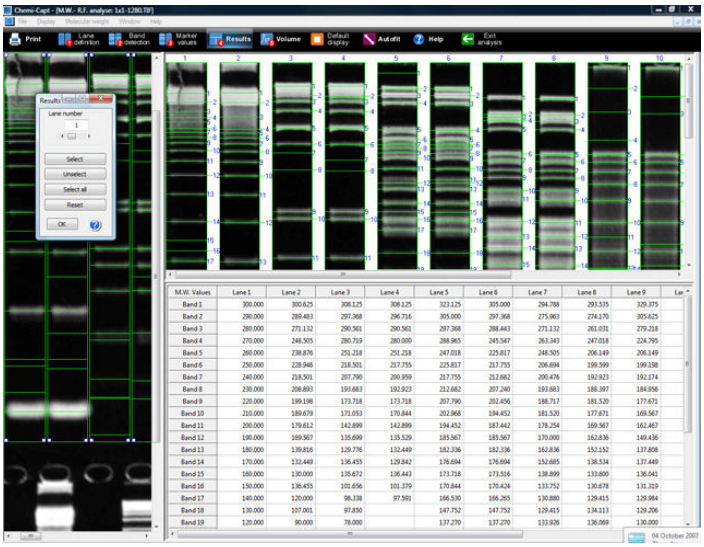
1. Click on the “Results” icon:



A pop-up window displays the following menu:



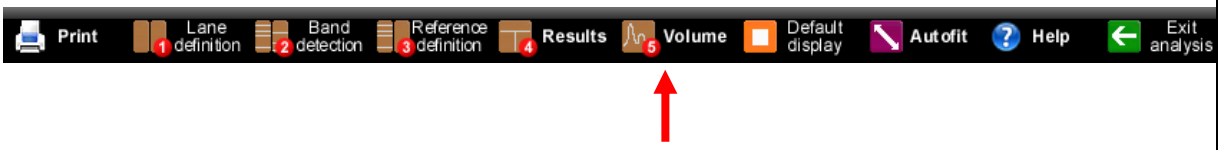
The results are automatically displayed in a table:



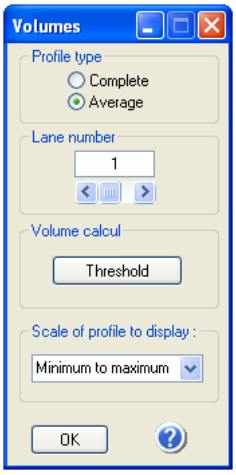
Note: You can display the results of a selection of lanes. To proceed, select the lane you want to display and click on Select. To delete the display of some lanes, select the lane and click on Unselect.

➔ Step 5: Quantify the volumes

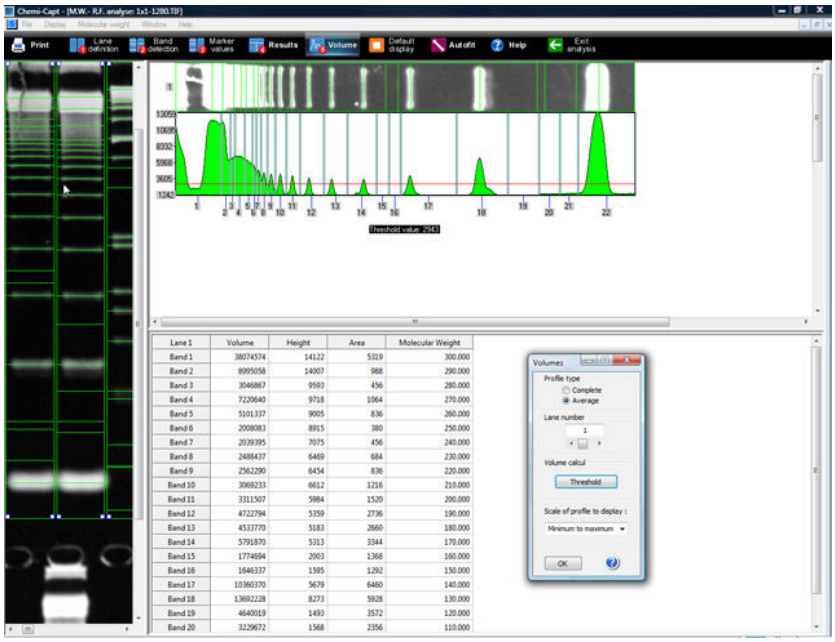
1. Click on the “Volume” icon:



A pop-up window displays the following menu:



2. For each lane, the volume, the height and the area are displayed in a table:



⇨ The volume is the sum of all the intensities included in the defined area (window + separation).
⇨ The height is the maximum intensity.
⇨ The area is defined for each peak, by the width of the window and the separation lines.

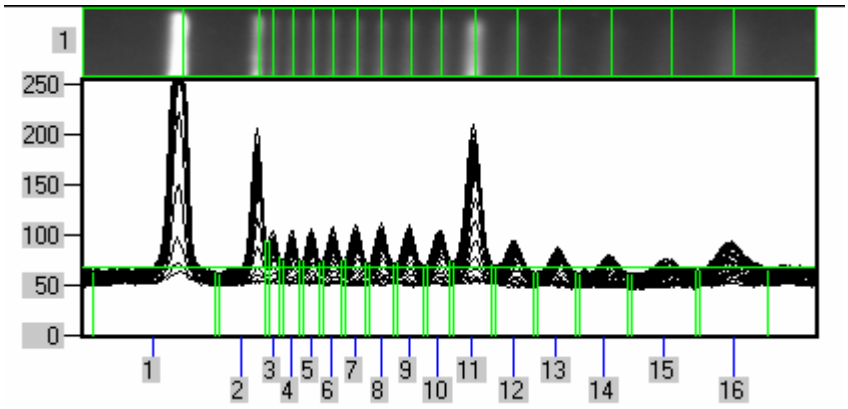
3. You can define a quantification threshold. To proceed:

⇨ Click on the Threshold button. The threshold allows to distinguish the bands from smears on the lane.

⇨ Move upwards on the screen the horizontal line.

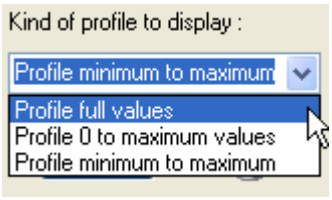
⇨ Click on the left button of the mouse to validate, the values are directly displayed.

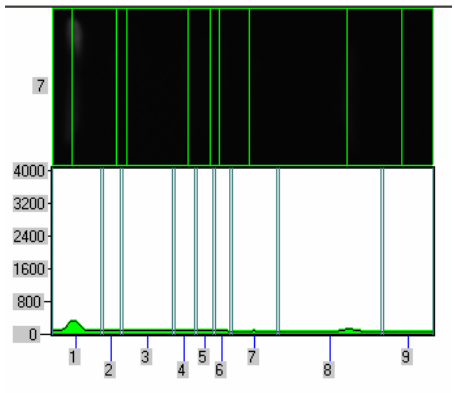
⇨ The defined threshold is automatically applied to all lanes. The results are recalculated taking into account the threshold.



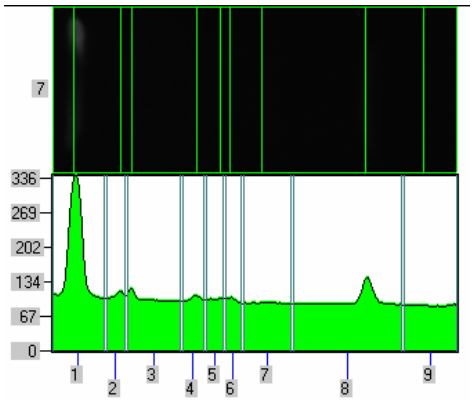
Note: You can select the scale of the lane's display. Three scales are available:
- Profile full values
- Profile 0 to maximum values
- Profile minimum to maximum

To proceed, select the scale from the "Scale profile" menu":

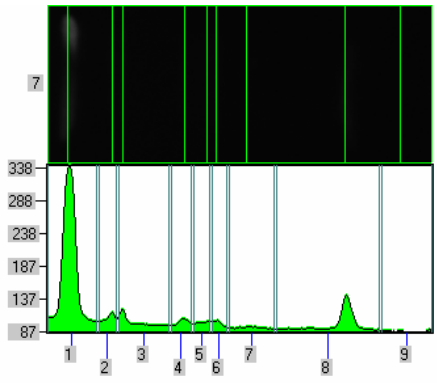




Display of the profile from 0 to the maximum dynamic (i.e.: 255 for a 8-bit image and 16 384 for a 14-bit image).



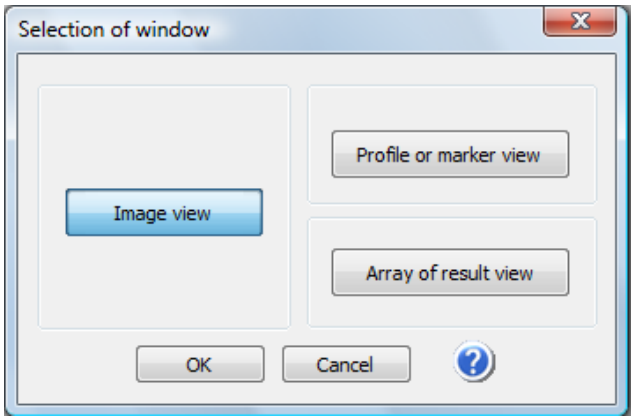
Display of the profile from 0 to the maximum value of the lane



Display of the profile from the minimum value to the maximum value of the lane

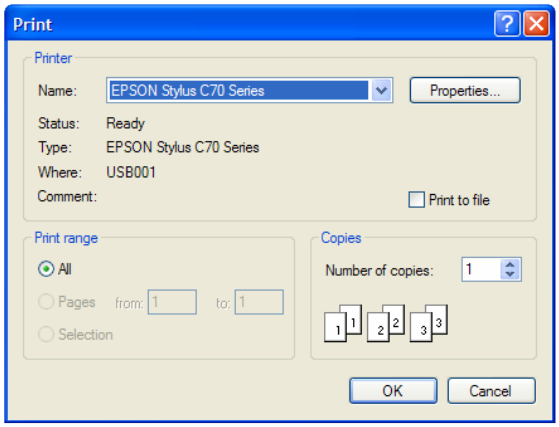
➔ Printing the results

1. Click on the “Print” icon. A pop-up window displays the following menu:



⇨ Select the window to be printed

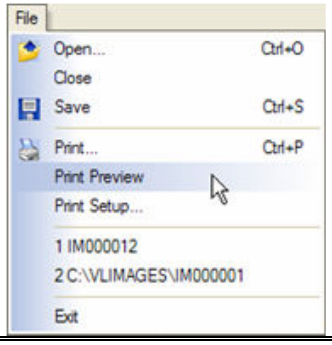
2. Click on OK to validate your choice. A pop-up window displays the following menu:



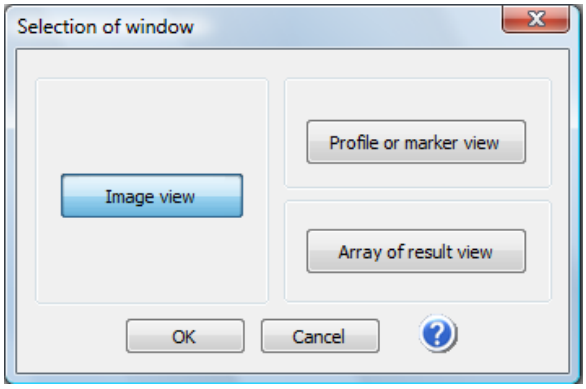
⇨ Select a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the number of copies
⇨ Click on OK to validate your options

Note: You can also access the Print menu from the Menu bar (File\Print).

3. The Print preview displays a preview of the image, as it will be printed. To proceed, select File\Print Preview from the Menu bar:

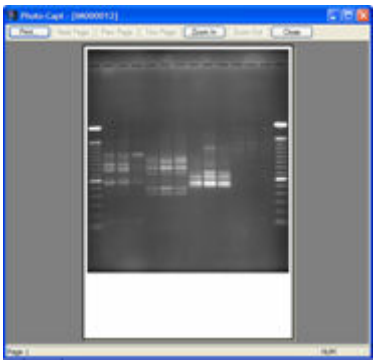


A pop-up window displays the print preview:



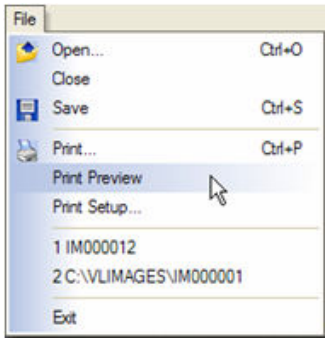
⇨ Select the window to be previewed

A pop-up window displays the print preview:

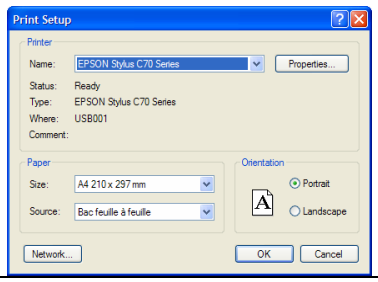


⇨ Click on Print to print as previewed
⇨ Click on Close to close the Print preview and to go back to the main menu

4. The Print Setup allows you to choose a printer and to configure the printing. To proceed, select File\Print Setup from the Menu bar:



A pop-up window displays the print setup menu:



	⇨ Select a printer ⇨ Click on Properties to modify the default setting of the printer, if necessary ⇨ Select the paper size and source; select the orientation ⇨ Click on OK to validate your options Note: After you have installed and setup your printer, the procedure for setting up and configuring a printer is the same as in other Windows program.

➔ Autofit

Click on the “Autofit” to resize the image to fit the size of the monitor.

The full resolution of the acquired may be larger than the screen resolution. The navigation requires the Windows scroll bar. The Autofit allows you to view the whole image, regardless of the window size. Typically, reducing the size of a window also cuts off part of the image. The Fit to Window option solves this problem by resizing the image so that it is always the same size as the window.

The Autofit feature proportions the display of the image to the screen resolution.

Autofit (no scroll bar)

No Autofit (scroll bar)

➔ Default display

The Default display windows allows to:
⇨ monitor the image dynamic
⇨ modify the greyscale selection to enhance the image display

The acquired images are for instance 12-bit ones, ranging from 0 up to 4 095 grey levels. Windows® can only display 8 bit images (256 grey levels).

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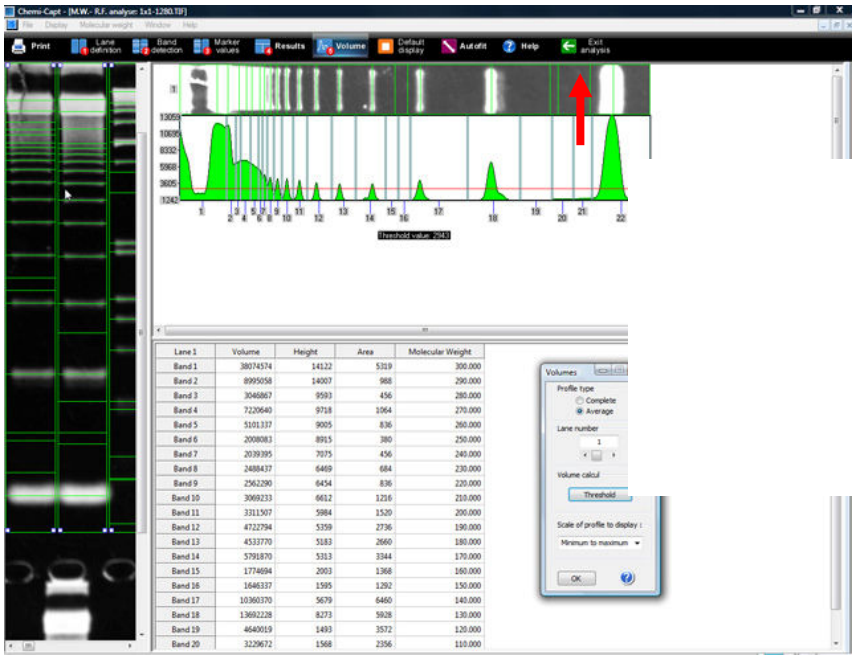
The easiest way to calculate the “display image” would be to translate the full grey scale each time an image is acquired: the 4 096 values of the “memory” image corresponds to 256 values in the displayed image, but in that case, it won’t be possible to visualise faint spots on a dark image.

Quantum-Capt offers you the possibility to select the grey level range to translate for the display image calculation. All the grey levels under the “Min value” defined will be converted to 0 (Black) in the displayed image. All the grey levels upper the “Max Value” defined will be set to 255 (White) in the displayed image. The grey levels between those two limits will be converted in an intermediate grey level value following a linear rule.

For both values, you can:
⇨ Enter it in the corresponding edit field
⇨ Select the value by dragging and dropping the arrow
⇨ Click on the “Default” button: Quantum-Capt calculates then the ideal values to be selected according to the parameters defined

➔ Returning to the image main menu

1. To return to the main menu, click on the image capture icon:



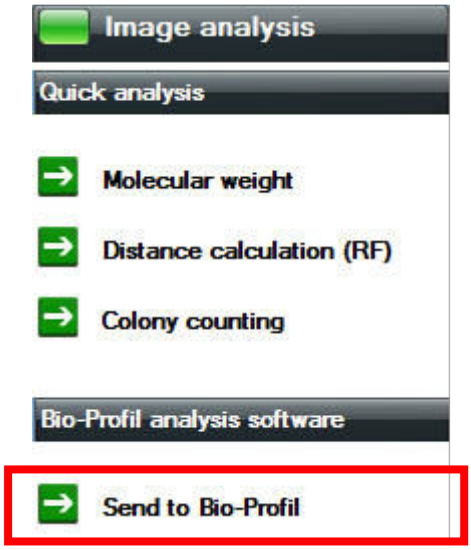
A new menu appears with the main menu task bar functions.

Image analysis – Bio-Profil software

➔ Sending the image to the Bio-Profil analysis software

1. Select the Image analysis folder to access the analysis functions:

2. From the Image analysis folder, click on the “Send to image analysis software

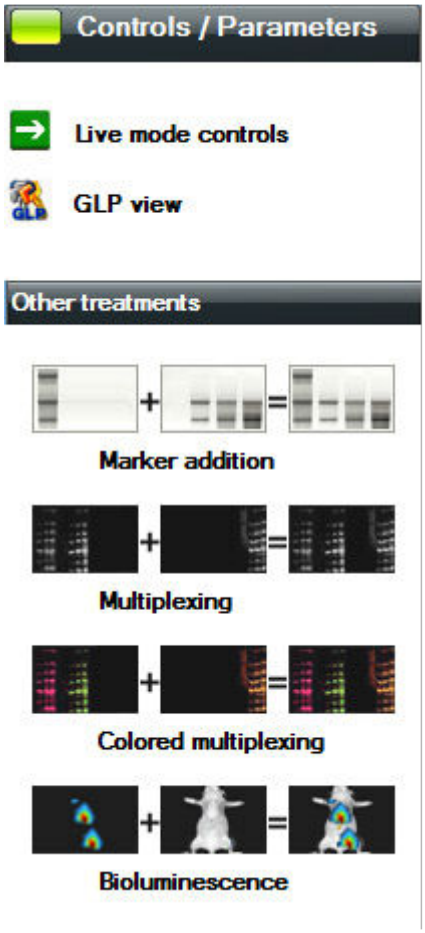


The image is automatically sent to Bio-Profil software such as Bio-1D, Bio-Gene or Bio-1D++.

Controls and parameters

➔ Accessing the Controls & parameters folder

Select the Controls & parameters folder to access these functions:

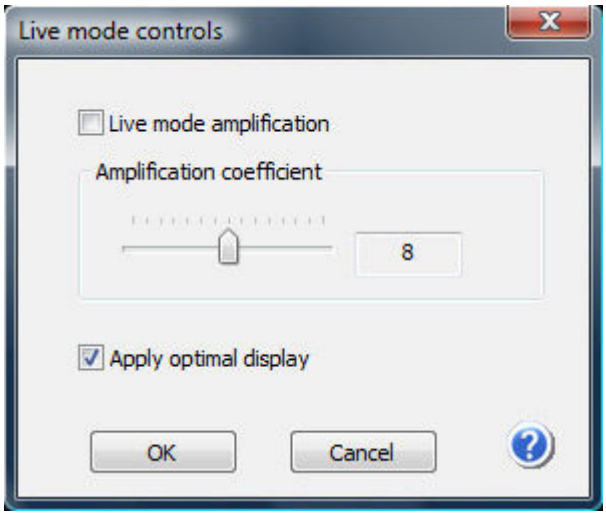


➔ Live mode controls

The Live mode parameters controls:
- the image amplification while using the Live mode (Start preview mode).
- the application of the optimal display as default for the freeze image (Stop preview image).

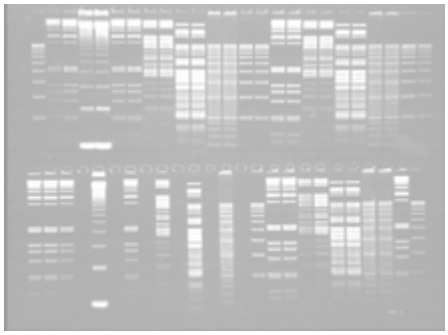
Select the Controls & parameters folder to access these functions:

A pop-up window displays the following window:



1- Live mode amplification

If the amplification option is selected, the brightness of the image is automatically increased so that the sample can be positioned in weak light during the live mode (Start preview mode).

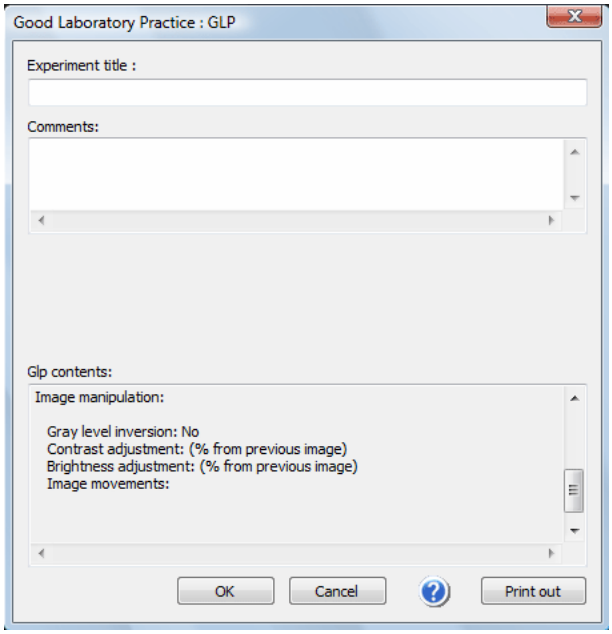


2- Apply optimal display

The optimal display manages the default display of the image. If selected, the software displays the images using the optimum display parameters as described in the user profile chapter of this manual.

➔ Good laboratory practice

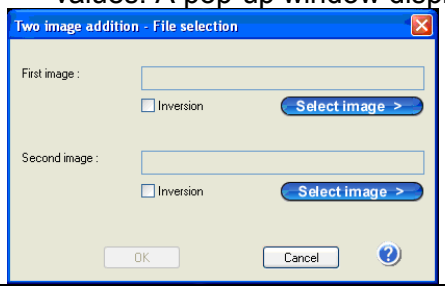
1. The Good Laboratory Practice (GLP) file is made to track all the image treatments performed with the software. Click on the “GLP” icon. A pop-up window displays the following menu:



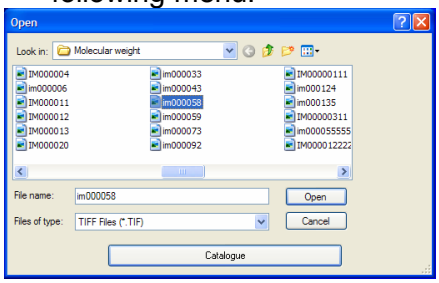
⇨ Enter the experiment title and comments.
⇨ Enter zoom parameters (aperture, zoom, focal distance).
⇨ All other image acquisition parameters (Real time acquisition or integration time, positive or negative image) are recorded.
⇨ Treatments on frozen images (contrast, luminosity, inversion) are also recorded.

➔ Marker addition

1. Click on the “Marker addition” to gather two images by the addition of their pixel values. A pop-up window displays the following menu:

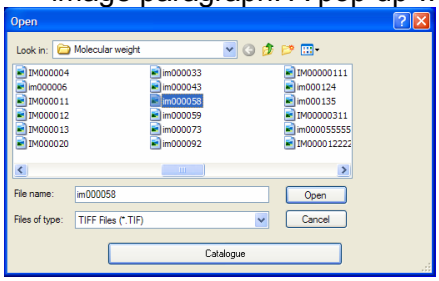


2. Select the first image by clicking on “Select image”. A pop-up window displays the following menu:



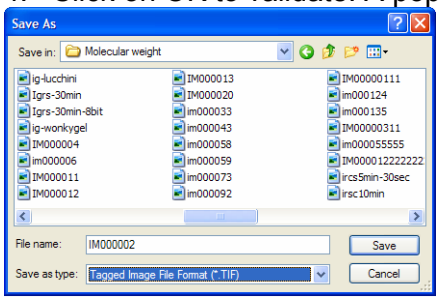
⇨ Browse to specify the image directory
⇨ Double click on the image name you want to load

3. Then, select the second image by clicking on “Select image” from the Second image paragraph. A pop-up window displays the following menu:



⇨ Browse to specify the image directory
⇨ Double click on the image name you want to load

4. Click on OK to validate. A pop-up window displays the following menu:



⇨ Browse to specify the image directory
⇨ Enter the desired file name, select a file extension and validate
⇨ Quantum-Capt displays the new image.

Note: only two positive or two negative images can be added. Thus, it could be necessary to inverse the image one or the image two for having satisfactory results. The following examples shows the different possibility:

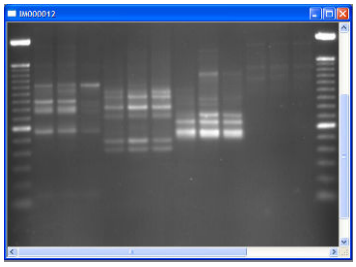


Image 1

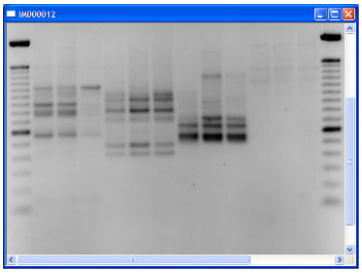


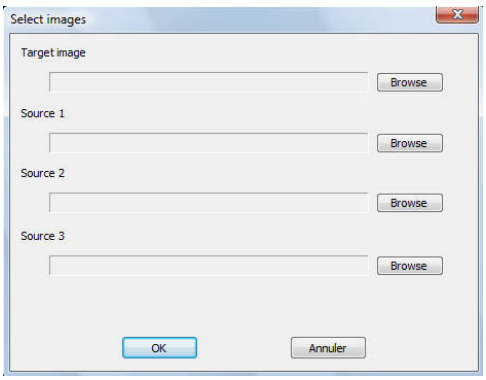
Image 2

NO - except by inversing image 2	
	
Image 1	**Image 2**
YES – no inversion is necessary	

➔ Multiplexing

The Multiplexing images feature allows you to combine two or more images to create a composite image that shows a portion of each image. The multiplexing option is used primarily in fluorescence imaging when specimens have been stained with more than one dye or in chemiluminescence when you want to add a marker lane to your signal sample image.

1. Define the target image and the sources:

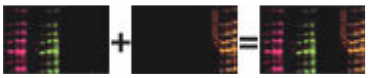


2. Define in the sources image the area you want to be cropped in the target image.

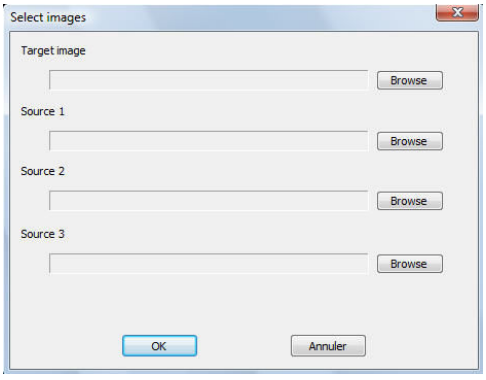
3. Click on crop images to obtain the target image.

➔ Colored multiplexing

The Colored multiplexing images function is used to combine by superposition two or more monochrome images into a single 24-bit colored composite image.



1. Define the target image and the sources:



2. Define in the pseudo colors in the sources image

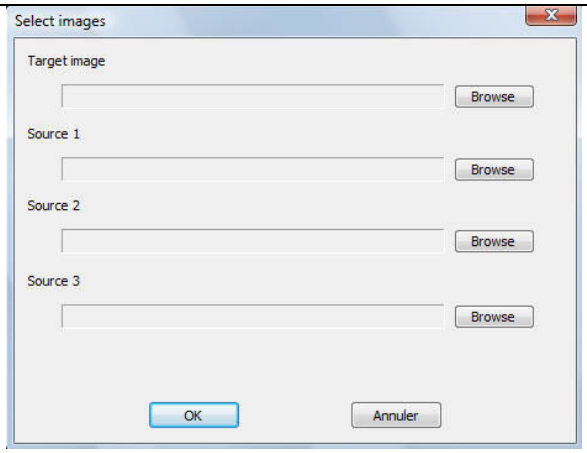
When you are merging monochrome images, the program uses the pseudo colors you have set for that image. If you defined a specific palette for an image, this palette appears in the merged image. If a palette has not been assigned to an image, the program uses the greyscale palette as a default. Palettes cannot be applied to monochrome images through the Colored Multiplexing images function. They must be applied prior to merging the image. For information on defining pseudo colors, refer to the Pseudo colors option of this manual in the Image enhancement chapter.

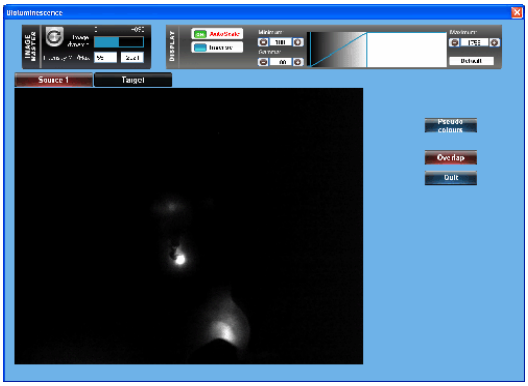
3. Click on merge images to obtain the target image

➔ Bioluminescence

The Bioluminescence function is used to combine by superposition two or more monochrome images into a single 24-bit colored composite image.

1. Define the target image and the sources:

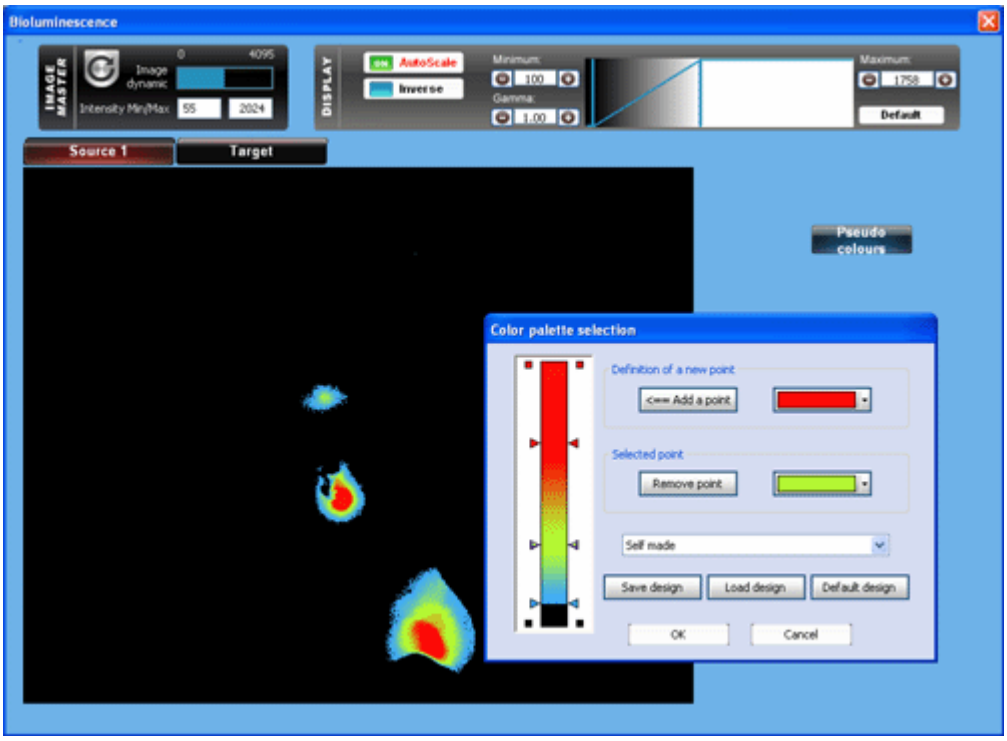




Source image

Target image

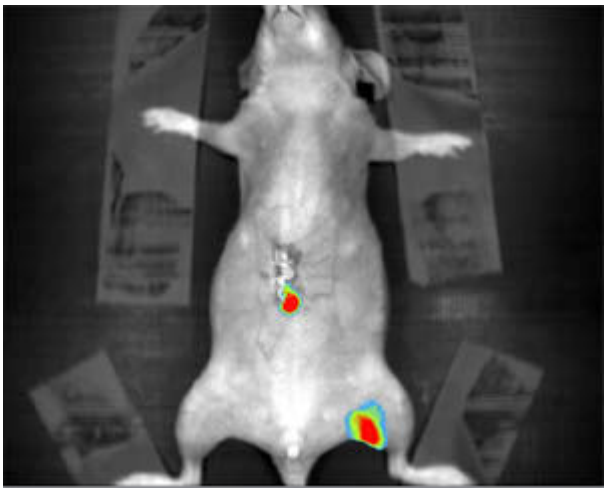
2. Define in the pseudo colours in the source image:



When you are merging monochrome images, the program uses the pseudo colors you have set for that image. If you defined a specific palette for an image, this palette

appears in the merged image. If a palette has not been assigned to an image, the program uses the greyscale palette as a default. Palettes cannot be applied to monochrome images through the Bioluminescence images function. They must be applied prior to merging the image. For information on defining pseudo colors, refer to the Pseudo colors option of this manual in the Image enhancement chapter.

3. Click on Overlap to obtain the target image

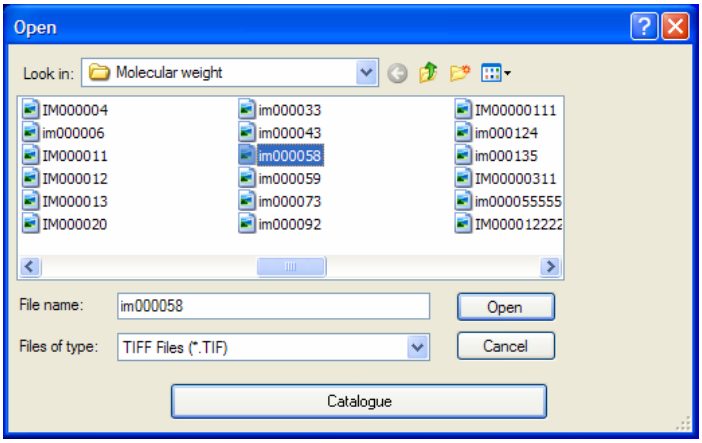


Toolbar in details

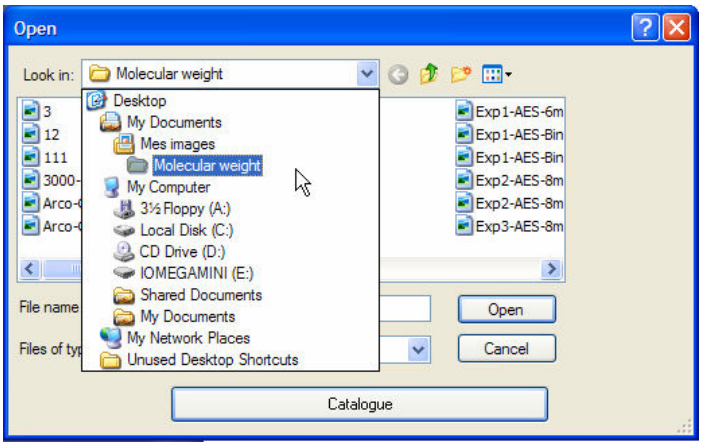
➔ Opening an image

This function opens an image file of a specified format (i.e; TIFF, BMP, GIF, JPEG, …).

1. Click on the “Open” icon. A pop-up window displays the following menu:



2. Browse to specify the image directory



3. Double click on the image name you want to load

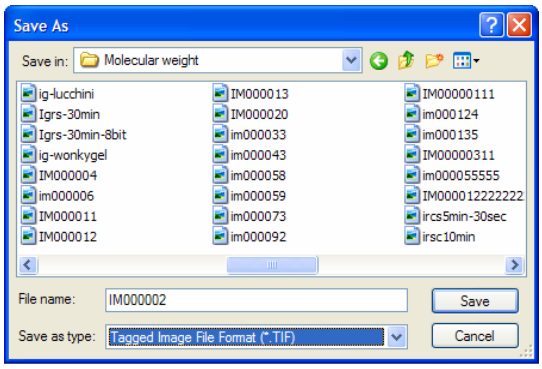
Note: the catalogue function allows a preview of the images located in the selected directory. To proceed, select one image of the directory on click on “Catalogue”.

➔ Saving an image

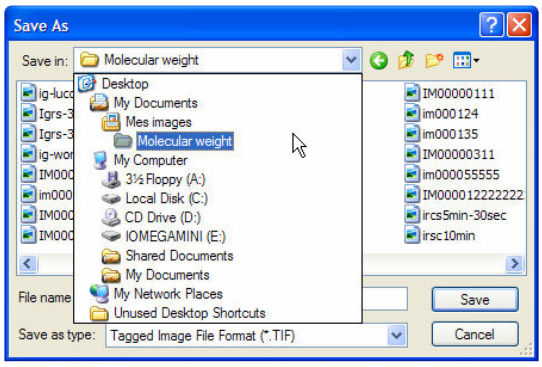
This function saves a previously unsaved image to a new file, or update the changes to an existing image file, or save an image to a new file or file location.

1. Click on the “Save” icon.

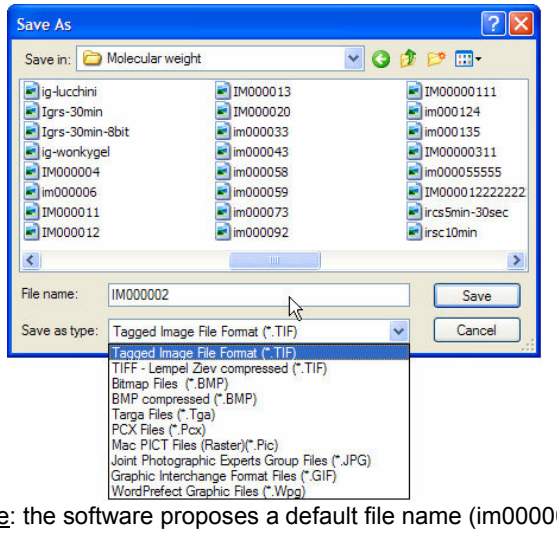
2. A pop-up window displays the following menu:



3. Browse to specify the image directory



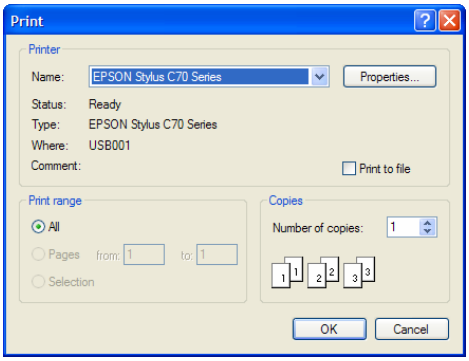
4. Enter the desired file name, select a file extension and validate



Note: the software proposes a default file name (im00000x). If the default file name is selected, it will be incremented by one each time an image is saved.

➔ Printing

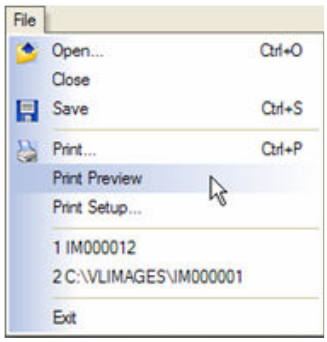
1. Click on the “Print” icon. A pop-up window displays the following menu:



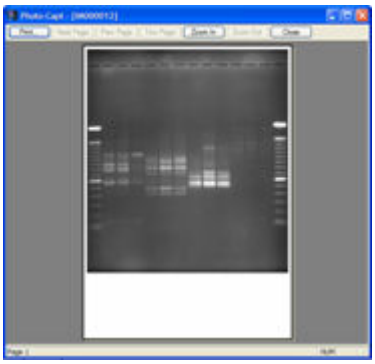
⇨ Choose a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the number of copies
⇨ Click on OK to validate your options

Note: You can also access the Print menu from the Menu bar (File\Print).

2. The Print preview displays a preview of the image, as it will be printed. To proceed, select File\Print Preview from the Menu bar:

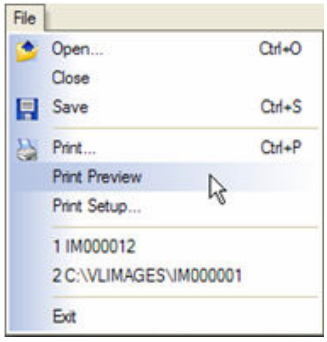


A pop-up window displays the print preview:

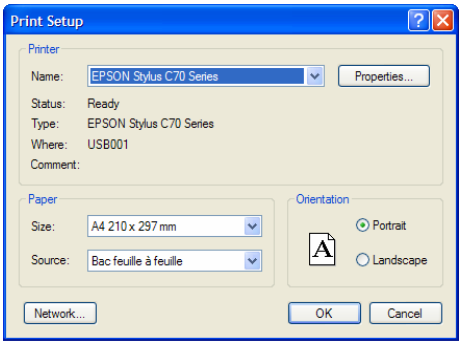


⇨ Click on Print to print as previewed
⇨ Click on Close to close the Print preview and to go back to the main menu

3. The Print Setup allows you to choose a printer and to configure the printing. To proceed, select File\Print Setup from the Menu bar:



A pop-up window displays the print setup menu:

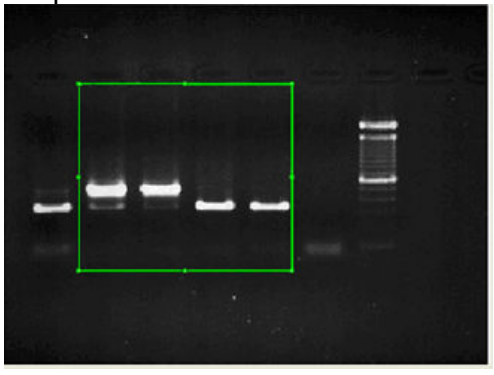


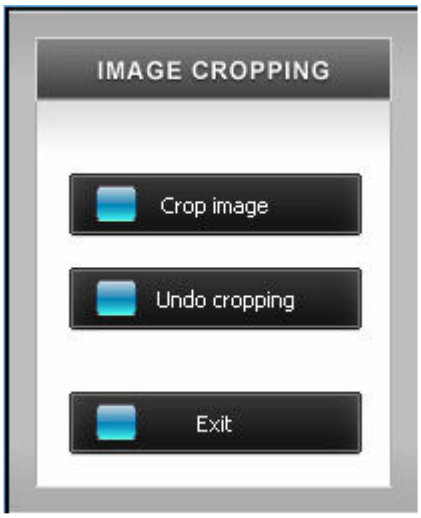
⇨ Select a printer
⇨ Click on Properties to modify the default setting of the printer, if necessary
⇨ Select the paper size and source; select the orientation
⇨ Click on OK to validate your options

Note: After you have installed and setup your printer, the procedure for setting up and configuring a printer is the same as in other Windows program.

➔ Crop - Defining the area to be saved

1. Click on the “Crop” icon. A default area is displayed. Click on the tags surrounding the area to modify its size. Drag and drop the area to modify its position.



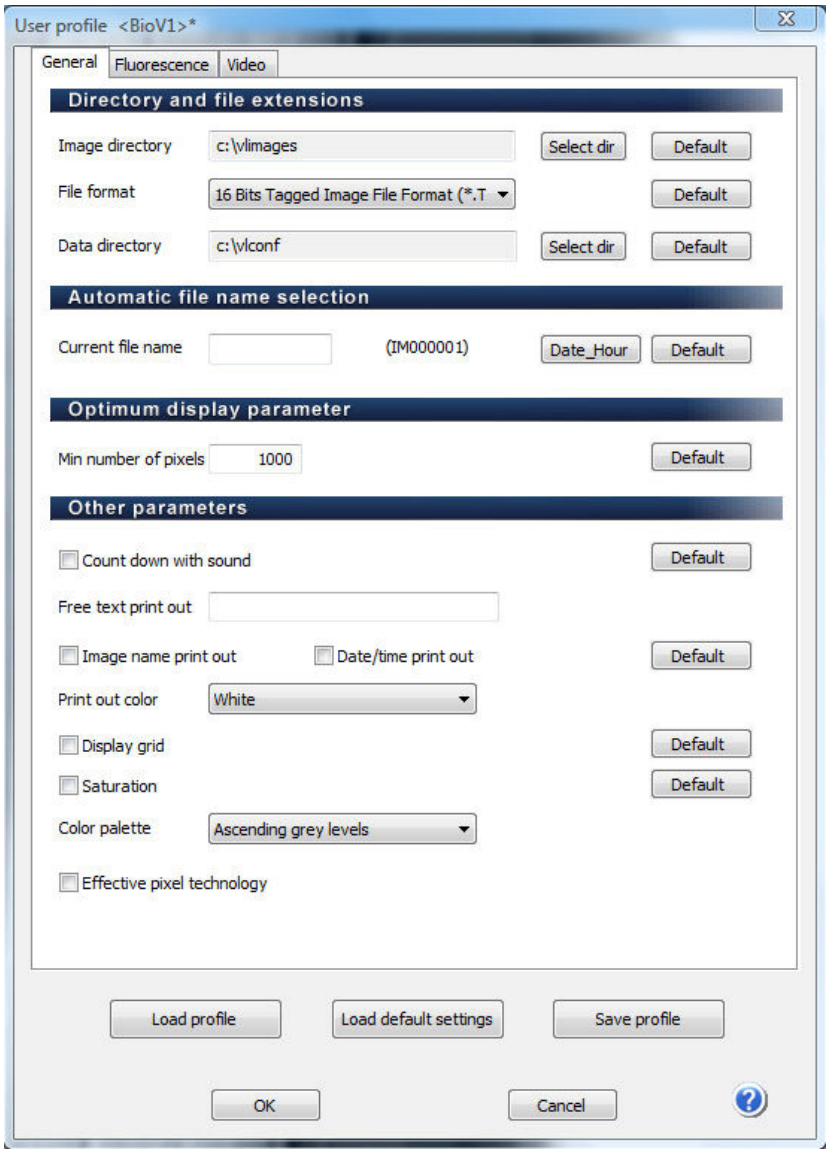
	Note: To erase a previously defined area, click once again on the function. 2- Click on the “Crop image” to crop the image:  Note: You can undo the cropping by clicking on “Undo cropping” Note: Exit the Cropping function by clicking on “Exit”

➔ Clipboard

 	This function copies the active image onto the clipboard for insertion into another program. This option is identical to the Windows® [Ctrl C] command. 1. To proceed, click on the Copy to clipboard icon. The image, the table or the graph is now ready to be pasted into another application. 2. Open the application that you want to paste the image into, and select from the available pasting options ([Ctrl V] command for Windows® software). Note: The image is copied exactly as it is displayed.

➔ User profile parameters introduction

You can save and load your personal software configuration. The acquisition parameters as well as the software configuration can be saved for each user or applications. To proceed, click on the “Save user setting” icon. A pop-up window displays the following menu:



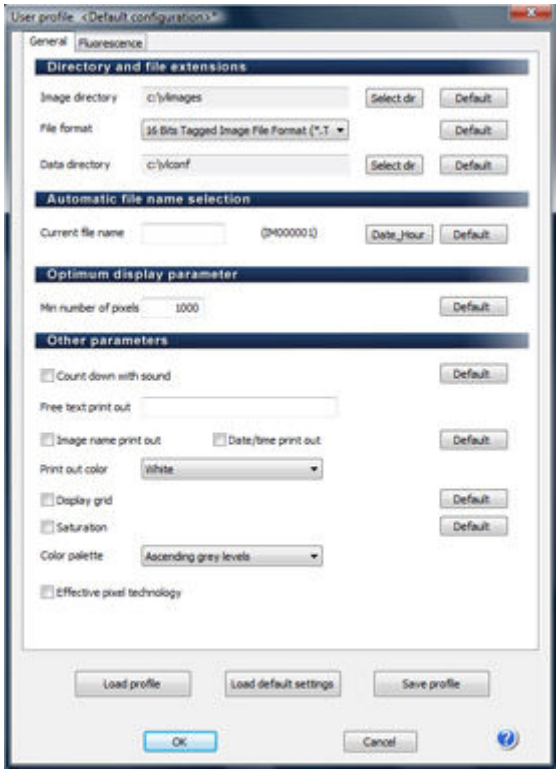
Modify the profile and save it using the Save profile button.

Note: the user setting extension file is CNF.

➔ Profile - General parameters in details

User profile

Within the selected User profile, the General parameters are valid whatever the image acquisition mode you are using.



They are organized into 4 chapters:

- directory and file extensions
- automatic file name selection
- optimum display parameter
- other parameters

Directory and file extensions

➔ **Image directory**: this option defines the directory where the image is saved by default.

➔ **Kind of file**: this option defines the image file format used by default when saving the image.

➔ **Data directory**: this option defines the directory where are saved the configuration files.

Automatic file name selection

You can decide of the default generic file name to simplify the file name generation. By default, the name is IM00000x. The image could also be named according to the time and hour it has been taken.

Optimum display parameter
The default display is controlled by a parameter:

The minimum number of pixel is the minimum number of pixel of the image at a given grey level, used to determine if a grey level is significant to be used as a reference.

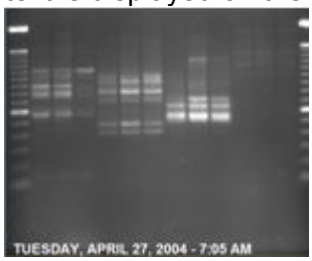
Starting from grey level value 16 383 for a 14-bit image or 65 535 for a 16-bit image, the software searches for the first significant grey level (number of pixel upper than “Minimum number of pixel” variable).

If the number of pixel is higher or equal to the value defined as parameter, the grey level is used as a reference for image display calculation. If not, the software analyses the lower grey level values until something significant is found.

Note: You can always come back to the default values by clicking on the Default values button.

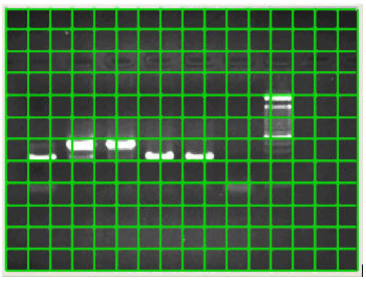
Other parameters

➡ **Free text / Image name / Date & Time print out**: if this option is selected, a text is displayed on the image print out.



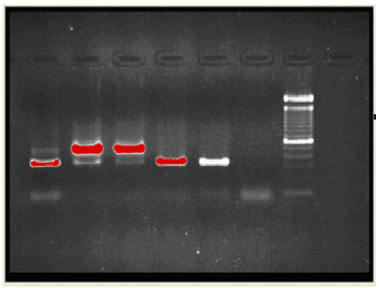
You can select a free text (for instance the name of your institute), the image name (is the image has been previously saved) and date and time.

➡ **Display grid**: if this option is selected, a grid is displayed during the live mode. Thanks to the grid, you can adjust your gel according to horizontal and vertical axis.



Note: The grid option is only available with the Live mode and is not available for 8x8 binning mode.

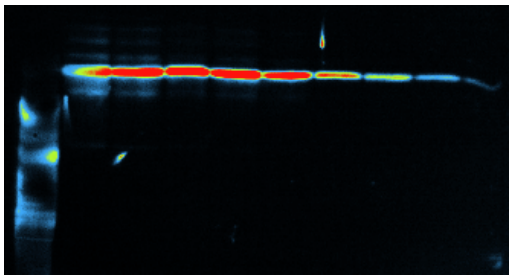
➡ **Saturation.** If this option is selected, the saturated pixels are overlayed in red on the image. A saturated image is inappropriate for image quantification with image analysis software. The saturation option allows you to visualise in red, pixels that have the maximum grey level (16383) in order to avoid flattening the peaks.



Note: If an image is being acquired and the «Saturation» option is checked, the modification is applied to the current acquired image

Note: A saturated image creates quantification error when studied by an image analysis software. Gel-doc systems have to indicate to the user if the image is saturated and if it is then necessary to modify the integration time.

➡ **Colour palette.** If this option is selected, the selected colour palette is applied on the image. The pseudo colour palette can display different types or levels of fluorescence in an image. It replaces the original grey levels of the image by another palette colour.
For instance, the image could be as follows:



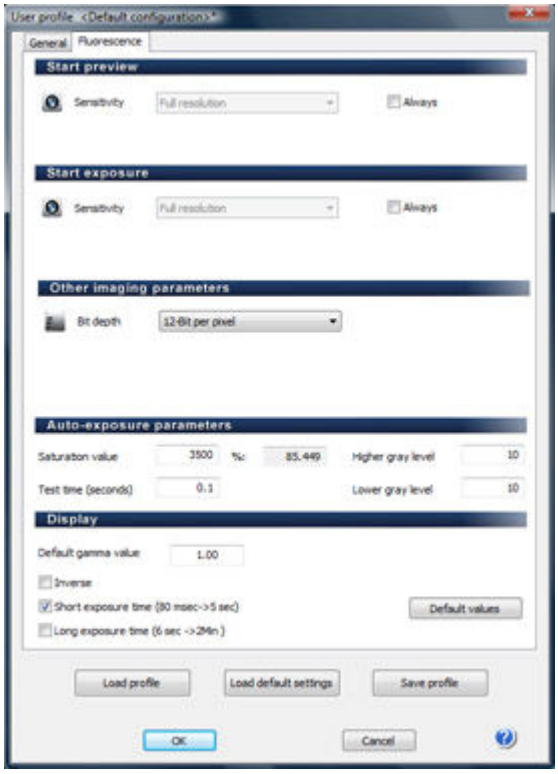
➡ **Effective pixel technology palette.** The effective pixels technology allows the extension of the image resolution by 4. To this extend, the full resolution image is extended to 5.5 megapixels.

Note: This process requires a lot of computer calculation. It require some time for the final image to be displayed.

➔ Profile – Fluorescence parameters in details

User profile

Within the selected User profile, the Fluorescence parameters are valid when using the Fluorescence image acquisition folder.

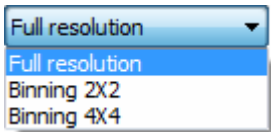


They are organized into 5 chapters:

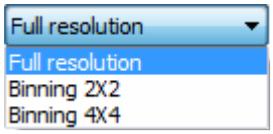
- Start preview
- Exposure & auto-exposure
- Other imaging parameters
- Auto exposure parameter
- Display

Start preview

➔ **Sensitivity**: this option defines the image sensitivity for the Exposure / Auto exposure function of the Fluorescence image acquisition folder.



The Quantum ST4 system offers exquisite resolution of more than 1.4 million pixels to maximize quantifiable data. The system can be used at either its full resolution or with binning.



The binning technique combines the charge from adjacent pixels so that the

total charge can be read-out as a single pixel.

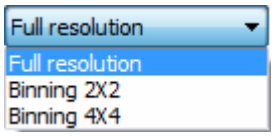
The result is an increased signal and thus an improved sensitivity and a better signal-to-noise ratio. This allows reducing the exposure time. The reduction of the amount of pixels improved the frame rate of the image acquisition. However, the image resolution is decreased by the binning factor (i.e: 4 for a binning of 2 by 2).

A 2x2 binning factor means that pixels in two rows and two columns (a total of 4 pixels) are combined to be represented as one pixel. The sensitivity is heightened but the resolution is then divided by 4:

With no binning, the image size is 1360 x 1024
In 2x2 binning mode the image is 680 x 512
In 4x4 binning mode the image is 340 x 256

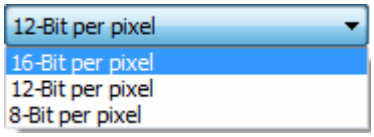
Exposure & auto-exposure

➡ **Sensitivity**: this option defines the image sensitivity for the Exposure / Auto exposure function of the Fluorescence image acquisition folder.
Please refer to the Sensitivity chapter of the Start preview chapter.



Other imaging parameters

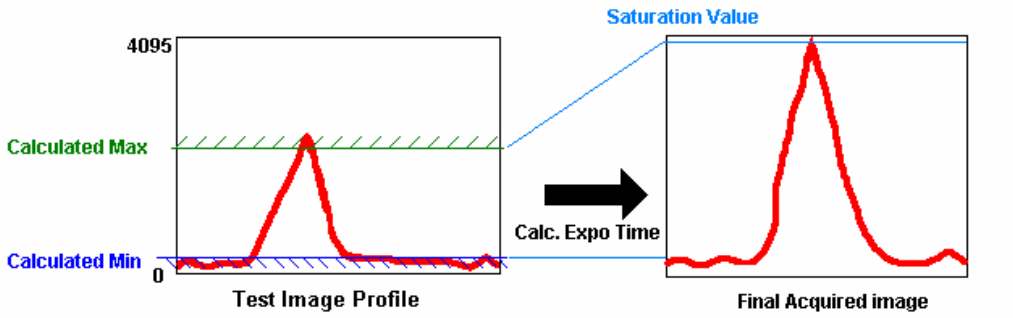
➡ **Bit depth**: this option defines the image bit depth.
The Quantum ST4 system offers the possibility to select the bit-depth for more convenience, from 16-bit, 14-bit and 8-bit.
- 8-bit images has 256 grey levels;
- 12-bit images has 4096 grey levels;
- 16-bit images has 65 536 grey levels.



The default bit depth mode is 12-bit.

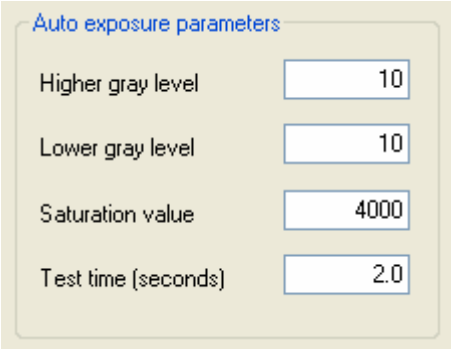
Auto exposure parameter

In order to calculate an ideal exposure time, the software needs to analyse a test image, taken in binning mode with a test exposure time. Then it searches for the minimum and maximum acceptable grey levels and calculate the exposure time so the highest grey levels values of the final image reach a maximum defined (Saturation Value).



Calculated Min ("Lower Gray levels" parameter) : Nr of Lower Gray levels with at least 10 pixels in the image
Calculated Max ("Higher Gray levels" parameter) : Nr of Higher Gray levels with at least 1 pixel in the image

The auto-exposure is controlled by four parameters:



Higher Grey levels: this value is the number pixels with the highest grey levels, which should be present in the test image.

Lower Grey levels: this value is the number pixels with the lowest grey levels, which should be present in the test image.

Saturation value: this value is the maximum grey level, which can be present in the final image. Due to light variation and image capture conditions (Test Exposure time for instance), it is not recommended to set it at 4095 if you do not want to get over-exposed final images.

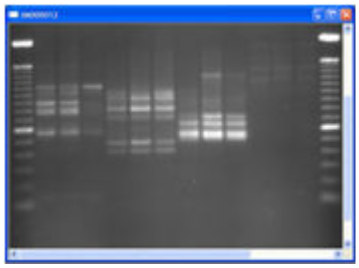
Test time: acquisition time in seconds used to take the test image

Note: You can always come back to the default values by clicking on the Default values button.

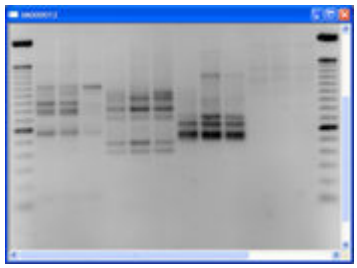
Display

➡ **Default gamma value**: with this option, you can define the default gamma value used for the default display of the images acquired in Fluorescence mode.

➡ **Inverse**: with this option the images grey levels are automatically inversed after the image acquisition, to make a negative image.



Before

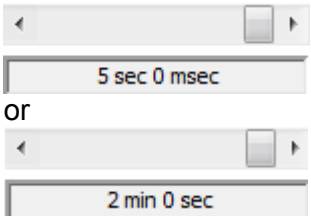


After

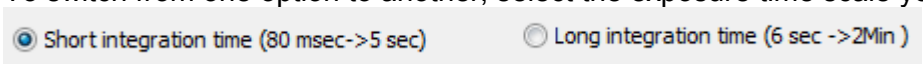
➡ **Exposure time**: this option defines the default imaging exposure time. It could be manually modified in the Fluorescence image acquisition folder.

➡ **Short / long exposure time**

The software has two exposure time scales:
- One for short times: 80 milli-second to 5 seconds
- One for long times: 6 sec to 2 minutes



To switch from one option to another, select the exposure time scale you prefer:



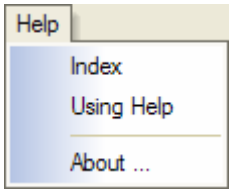
Note: With the short integration time scale, the integration time increase or decrease by 40milli seconds.
Note: With long integration time scale, the integration time increase or decrease by 1 second.
Note: With long integration time, a delay could be necessary before an image is displayed on the monitor (up to twice the selected Exposure time).

➔ Using the contextual help

1. Click on the “Contextual Help” icon. The standard mouse cursor is changed to the following cursor:

2. With the new mouse cursor, click on the function from which you want to access the user manual.

3. You can access the help file index through the File\Help from the Menu bar:



Specifications

➔ Camera and optics

	 **Quantum ST4 1000**	 **Quantum ST4 3000**
Camera	Monochrome scientific grade CCD camera Real time and integration time	
Resolution	1.400.000 pixels – Sony chip (1360x1024)	
Pixel depth	16-bit, 65 536 grey levels.	
Grade	Ultra high sensitivity for fluorescence Scientific grade camera - Chip quality: Grade 0, zero defect Progressive scan – Low dark current HAD (Hole Accumulation Diode) sensor Continuous variable-speed shutter USB2 interface	
Optics	Scientific grade zoom lens Manual (focusing gauge) or motorised configurations (autofocus)	
Software	Quantum ST4 is supplied with the Quantum-Capt software for image enhancement and basic image analysis. The Quantum ST4 images are compatible with Bio-1D and Bio-Gene software for quantification: transform your 1D gel into 3D results.	
	CN-1000 darkroom Roll-out transilluminator UV security switch UV security timer 3 positions filter slide. Overhead white light by fluorescent tubes 312nm transilluminator (6x-8watt) Available filter size : 21x26cm or 20x20cm	CN-3000 darkroom Roll-out transilluminator UV security switch UV security timer 6 positions filter slide. Uniform white light or UV light epi-illumination Upgradable to StarLight module 312nm transilluminator (6x-8watt) Available filter size : 21x26cm or 20x20cm

Technical information

➔ Electrical specifications

Power supply

- Current (A) = 1A/0.5A
- Fuse FST (A) = 2A
- Voltage (V) = 100/230V~ (5%)
- Frequency (Hz) = 50/60Hz
- Power = 150 watts

Fuses

- Type FST.
- Time-lag T.
- Ø 5 x 20
- 2A

➔ Climatic conditions

- Altitude 2000 meters
- Operating humidity: 20% to 70% (no condensation allowed)
- Operating temperature: The maximum ambient temperature should be 25°C.

Spare parts

➔ Spare parts QUANTUM ST4 1000 series

Réf. article	Tubes T-8.WL	Tubes T-8.M	Starter ST-151 FG7-P (100V)	Fuse Ø 5x20		Filter with support	
				Qty	100V ~ 230V ~	Qty	Réf
CN-1000.20M 230Volts~	2	6	2	2	2A	1	FS-TC20.CM
CN-1000.20M 100/115Volts~	2	6	2	2	2A	1	FS-TC20.CM
CN-1000.26M 230Volts~	2	6	2	2	2A	1	FS-TC26.CM
CN-1000.26M 100/115Volts~	2	6	2	2	2A	1	FS-TC26.CM
CN-1000.36MX 230Volts~	2	6	2	2	2A	1	FS-TC26.CM
CN-1000.36MX 100/115Volts~	2	6	2	2	2A	1	FS-TC26.CM

➔ Spare parts QUANTUM ST4 1500 series

Réf. article	Tubes T-8.WL	Tubes T-15.M	Starter ST-151 FG7-P (100V)	Fuse Ø 5x20		Filter with support	
				Qty	100V ~ 230V ~	Qty	Réf
CN-1500.20M 230Volts~	2	6	2	2	2A	1	FS-T20.CM
CN-1500.20M 100/115Volts~	2	6	2	2	2A	1	FS-T20.CM
CN-1500.26M 230Volts~	2	6	2	2	2A	1	FS-T26.CM
CN-1500.26M 100/115Volts~	2	6	2	2	2A	1	FS-T26.CM
CN-1500.26MX 230Volts~	2	6	2	2	2A	1	FS-T26.MX
CN-1500.26MX 100/115Volts~	2	6	2	2	2A	1	FS-T26.MX
CN-1500.36M 230Volts~	2	6	2	2	2A	1	FS-T36.M
CN-1500.36M 100/115Volts~	2	6	2	2	2A	1	FS-T36.M

➔ Spare parts QUANTUM ST4 3000 series

Réf. article	Tube 8W		Starter ST-151	Fuse Ø 5x20		Filter lamp with support		Filter transilluminator
	Qty	Réf		230V ~ 240V ~	100V ~ 115V ~	Qty	Réf	Réf
CN-3000.WL 20M CN-3000.WL 26M CN-3000.WL 26MX	2	T-8.WL	2	3.15A	4A	2	FS-3000.WL	FS-TC20.CM FS-TC26.CM FS-TC26.MX
CN-3000WL/LC 20M	2 2 2	T-8.WL T-8.L T-8.C	6	3.15A	4A	2	FS-3000.WL/CM	FS-TC20.CM
CN-3000WL/LC 26M	2 2 2	T-8.WL T-8.L T-8.C	6	3.15A	4A	2	FS-3000.WL/CM	FS-TC26.CM
CN-3000WL/LC 26MX	2 2 2	T-8.WL T-8.L T-8.C	6	3.15A	4A	2	FS-3000.WL/CM	FS-TC26.MX

GENERAL ADVICE

- To clean the surface of the filter, use a mild solvent or warm water. Dry with a soft cloth
- The filter is porous, so try to keep it dray

All our units are fitted with one or two safety fuses. They are found in the plug at the rear of the unit

TYPE OF FUSE
Type FST
Time-lag T
∅ 5 x 20

Warranty

Our products (except Compact Flash®, light tubes and filters) are warranted against faulty construction or defective material for a period of TWO YEARS from the date of supply. Our products are not warranted for damage due to carelessness, incorrect use or bad maintenance.
The following defects are also specifically excluded:
- Defects caused by improper operation.
- Repair or modification done by anyone other than VILBER LOURMAT or an authorized agent.
- Corrosion caused by improper solvents or samples.
- Use of spare parts supplied by anyone other than VILBER LOURMAT.
- Damage caused by accident or misuse.
- Damage caused by disaster.

This instrument should not be modified or altered in any way. Modification or alteration of this instrument will:
1. Void the manufacturer's warranty.
2. Void the conformity certifications.
3. Create a potential safety hazard.

The Compact Flash®, the tubes and the filters are not cover by our warranty.

The use of consumable products or non-original spare parts not recommended by our service department is at the user's own risk and therefore automatically invalidates the warranty.

Tubes, filters, batteries and consumable products are not included in the warranty.

We reserve the right to decide where the faulty goods will be repaired (in our workshop or elsewhere), and whether or not the faulty part is to be replaced; all other freight charges incurred being at the cost of the purchaser.

Returned goods will not be accepted for repair unless previous written authorisation is obtained from our service department. A request for authorisation must be accompanied by an itemised list of products, model numbers and the corresponding invoice numbers under which they were originally shipped.

All returned goods should have a certificate of decontamination.

The Buyer must bear all costs and risks incurred during the transportation of the goods from their collection at VILBER LOURMAT warehouse.

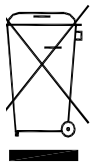
In the case VILBER LOURMAT incorporates some devices or equipment from another supplier in the manufacture of its products, the extent and the duration of the warranty will be those conceded by the suppliers or sellers.

Manufacturer cannot be held responsible for any loss, bodily injury or material accident incurred by any failure of this supply, whatever the origin of this failure may be.

The responsibility of Manufacturer is strictly limited to its staff and to its own supplies.
In the case of dispute, only the commercial court of Meaux (FRANCE) shall be competent, even in third party claims proceedings or when there are several co-defendants.

NOTE: VILBER LOURMAT is not responsible for any injury or damage caused by use of this instrument for purposes other than those for which it is intended, or by modifications of the instrument not performed by VILBER LOURMAT.

France only: Decontamination, collection and elimination of waste



The buyer ensures and finances the decontamination, the collection and the disposal of waste electrical and electronic equipment (WEEE) under the conditions provided in the Articles 21 and 22 of the Decree No. 2005-829 dated of 20 July 2005.
In France, for tubes recycling, contact the Recylum, www.recylum.com
Improper disposal may be harmful to the environment and human health.

Conformity

This system complies with the requirements of the EC Directive 89/336/CEE, 73/23/EEC and EN 61010-1, relating to Electro-magnetic compatibility and low voltage.

The Electro-magnetic susceptibility has been chosen at a level that gains proper operation in residential areas, on business and light industrial premises and on small-scale enterprises, inside as well as outside of the buildings. All places of operation are characterised by their connection to the public low voltage power supply system.