

NeuroCheck Digital Camera

Digital Camera Driver



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Table of Contents

NeuroCheck Digital Camera Help - NcDc.NeuroCheck.BO.UI.dll	3
General Information	3
Introduction	3
Supported Cameras	4
System Requirements	7
Installation	8
IP Address Configuration	10
Events	11
Link Aggregation	12
Troubleshooting	14
Camera Properties	16
Camera Properties: Dialog	16
Description	17
Image Format	18
Brightness Control	19
Trigger	20
Digital Output	21
GigE Communication	22
Misc	23
Compatibility Options	24
Optic Control	25
Control Device	26
Support Contact	28
Info Dialog	28
Support Services	30

Introduction

Support for NeuroCheck Gigabit Ethernet cameras



In close collaboration with the camera manufacturer Baumer optronic, both hardware and software have been optimized in order to allow the best possible integration into the NeuroCheck software. The result is the exclusively supported NeuroCheck GigE cameras. Gray value and color cameras are available in different resolutions; see also list of [supported cameras](#).

In theory, an unlimited number of different color and monochrome cameras can be operated simultaneously. In the NeuroCheck Device Manager, the identified cameras are listed in a tree view. For each device, the user can easily set the corresponding parameters in the Properties dialog. All settings can be included in an export XML file and stored in an archive for documentation purposes, to easily transfer settings to another system or to load different settings at runtime.

Supported Cameras

The driver supports all cameras of the NeuroCheck NCG, NCCG, NCHG, NCLG and NCLT camera series. The table below lists the currently supported cameras. Please do not hesitate to contact your NeuroCheck partner for details or new developments on the camera series.

NeuroCheck NCG Series (phase-out model)			
Designation	Sensor	Color Specification	Resolution
NCG203	1/3" CCD	Monochrome	656 x 494
NCG203c	1/3" CCD	Color	656 x 494
NCG206	1/2" CCD	Monochrome	776 x 582
NCG206c	1/2" CCD	Color	776 x 582
NCG208	1/3" CCD	Monochrome	1032 x 776
NCG208c	1/3" CCD	Color	1032 x 776
NCG212	1/3" CCD	Monochrome	1296 x 966
NCG212c	1/3" CCD	Color	1296 x 966
NCG213	1/2" CCD	Monochrome	1392 x 1040
NCG213c	1/2" CCD	Color	1392 x 1040
NCG214	2/3" CCD	Monochrome	1392 x 1040
NCG214c	2/3" CCD	Color	1392 x 1040
NCG220	1/1.8" CCD	Monochrome	1624 x 1236
NCG220c	1/1.8" CCD	Color	1624 x 1236
NCG250	2/3" CCD	Monochrome	2448 x 2050
NCG250c	2/3" CCD	Color	2448 x 2050
NCG-312C	1/3" CCD	Color	1288 x 960
NCG-312M	1/3" CCD	Monochrome	1288 x 960
NCG-320C	1/1.8" CCD	Color	1624 x 1228
NCG-320M	1/1.8" CCD	Monochrome	1624 x 1228
NCG-340C	1" CMOS	Color	2040 x 2044
NCG-340M	1" CMOS	Monochrome	2040 x 2044
NeuroCheck NCCG Series			
Designation	Sensor	Color Specification	Resolution

NeuroCheck NCCG Series

Designation	Sensor	Color Specification	Resolution
NCCG-13M	1/2 progressive scan CMOS	Monochrome	1280 x 1024
NCCG-13C	1/2 progressive scan CMOS	Color	1280 x 1024
NCCG-23M	1/1.2 progressive scan CMOS	Monochrome	1920 x 1200
NCCG-23C	1/1.2 progressive scan CMOS	Color	1920 x 1200
NCCG-32M	1/1.8 progressive scan CMOS	Monochrome	2048 x 1536
NCCG-32C	1/1.8 progressive scan CMOS	Color	2048 x 1536
NCCG-51M	2/3 progressive scan CMOS	Monochrome	2448 x 2048
NCCG-51C	2/3 progressive scan CMOS	Color	2448 x 2048
NCCG-53M	1 progressive scan CMOS	Monochrome	2592 x 2048
NCCG-53M	1 progressive scan CMOS	Color	2592 x 2048
NCCG-124M	1.1 progressive scan CMOS	Monochrome	4096 x 3000
NCCG-124C	1.1 progressive scan CMOS	Color	4096 x 3000

NeuroCheck NCHG Series

Designation	Sensor	Color Specification	Resolution
NCHG220	2/3" CMOS	Monochrome	2048 x 1088
NCHG220c	2/3" CMOS	Color	2048 x 1088
NCHG240	1" CMOS	Monochrome	2048 x 2048
NCHG240c	1" CMOS	Color	2048 x 2048

NeuroCheck NCLG Series

Designation	Sensor	Color Specification	Resolution
NCLG-120M	APS-C CMOS	Monochrome	4096 x 3072
NCLG-120C	APS-C CMOS	Monochrome	4096 x 3072
NCLG-200M	35mm CMOS	Monochrome	5120 x 3840
NCLG-200C	35mm CMOS	Monochrome	5120 x 3840
NCLG-250M	APS-H CMOS	Monochrome	5120 x 5120

NeuroCheck NCHG Series

Designation	Sensor	Color Specification	Resolution
NCHG220	2/3" CMOS	Monochrome	2048 x 1088
NCHG220c	2/3" CMOS	Color	2048 x 1088
NCHG240	1" CMOS	Monochrome	2048 x 2048
NCHG240c	1" CMOS	Color	2048 x 2048

NeuroCheck NCLT Series

Designation	Sensor	Color Specification	Resolution
NCLT-50M.I	2/3" progressive scan CMOS	Monochrome	2448 x 2048
NCLT-50C.I	2/3" progressive scan CMOS	Color	2448 x 2048
NCLT-240M.I	4/3" progressive scan CMOS	Monochrome	5312 x 4592
NCLT-240C.I	4/3" progressive scan CMOS	Color	5312 x 4592
NCLT-650M.I	2.3" progressive scan CMOS	Monochrome	9344 x 7000
NCLT-650C.I	2.3" progressive scan CMOS	Color	9344 x 7000

IVS Series

Designation	Sensor	Color Specification	Resolution
IVS-NCGi-2048-39M	1/1.8 progressive scan CMOS	Monochrome	2048 x 1536



Important Note:

A machine vision system consists of a variety of hardware and software components which must be well coordinated (PC system, BIOS, operating system and version, hardware drivers, camera, PCI boards, etc.). In general, [NeuroCheck GmbH](#) as producer of only one of these components cannot take responsibility for the complete system, i.e. we cannot guarantee that each possible combination of the above mentioned devices and components works properly. However, your NeuroCheck partner will be glad to help you selecting the right components for your machine vision application.

System Requirements

The minimum system requirements are:

Element	Description
Operating system	Microsoft® Windows® 7 (64 bit and 32 bit) Microsoft® Windows® 8 (64 bit and 32 bit) Microsoft® Windows® 8.1 (64 bit and 32 bit) Microsoft® Windows® 10 (64 bit and 32 bit) Microsoft® Windows® 11 (64 bit)
Processor	2.5 GHz Intel® Core i5-2520 comparable processor for single camera systems 3.4 GHz Intel® Core i7-3770 comparable processor for multi-camera systems
RAM	4 to 8 GB (64 bit) 2 to 3 GB (32 bit)
Hard disk	1 GB
Interface for GigE cameras	Gigabit Ethernet compliant network adapter for the communication with the cameras (Intel® chip set recommended, Jumbo Frame support strongly recommended). In the case of an existing company or production Ethernet network, we strongly recommend to use different network adapters.

Installation

Please carefully read the [system requirements](#).

The installation of the camera is described in the following paragraph, followed by the final step of the installation, the so called Integration to NeuroCheck.

Installation of a Gigabit ethernet camera

1. Install Gigabit Ethernet compliant network adapter for the communication with the cameras.
All further instructions refer to this network adapter (not to possibly existing company or production line network adapters).
2. For NeuroCheck NCHG and NCLG cameras configure Link_Aggregation.
3. Copy all files in the `Binaries\[CPU architecture]\` directory from the zip archive to the NeuroCheck installation directory (e.g. `C:\Program Files\NeuroCheck 6.2\`). Depending on the CPU architecture of your system you have to select the appropriate subdirectory (e.g. for 64-bit systems choose `Binaries\64-Bit_x64\`).
4. Install low lever driver by executing `bdrivermanager.exe` inside the `Prerequisites\[CPU architecture]` directory.
Depending on the CPU architecture of your system you have to select the appropriate subdirectory (e.g. for 64-bit systems choose `Prerequisites\64-Bit_x64\`).

Accept that information with "Continue" and go on in the procedure of installation. Select the installed network adapter from the list. After the installation a reboot is required.

- Baumer Packet Filter Driver version 3.2.1.0 must be listed and activated in properties of Network Adapter in Windows Control Panel.

For an update of an older installation please perform the following steps:

- a. Start `bdrivermanager.exe` and uninstall the (old) driver.
 - b. Install the (new) driver.
 - c. Reboot the computer.
5. Open the Windows network connection dialog. Select the LAN connection list entry that represents your network adapter. Open the network connection properties dialog. Press the "Configure ..." button.
 1. On Page "Advanced":
 1. Search for the setting "**Jumbo Frame**" and set it to "Enable" or to maximum size supported by the network adapter and connected switch (if present).
The availability of this property depends on the network adapter.
 2. Search for the setting "**Receive Buffers**" and set it to maximum.
For most Intel cards the settings is found under Advanced | Receive Buffers.
 3. Search for the setting "**Interrupt Moderation Rate**" (if available) and set it to 'Adaptive'.
 4. Search for the setting "**Energy Efficient Ethernet**" (if available) and set it to 'Off'.
 2. On Page "Power Management"
 1. Disable all, e.g. "Allow the computer to turn off this device to save power".
 3. Close the network connection properties dialog afterwards.
 6. For two-way communication with the GigE cameras, your computer needs certain TCP/IP settings, according to the IP configuration of the cameras (persistent IP addresses strongly recommended). Please refer to section IP address configuration for details.
Reopen the network connection properties dialog. Select the property "Internet Protocol (TCP/IP)" and open the dialog "Properties". Select "Use the following IP address". Configure a suitable IP address and subnet mask. Leave the fields "Default gateway", "Preferred DNS server" and "Alternate DNS server" empty.
Close the network connection properties dialog afterwards.
 7. Connect the camera with the computer and the power supply unit now. In the case that the camera has no persistent IP address it takes some time until the connection between the computer and the camera is established. In the worst case this takes several minutes.
 8. Assign persistent IP addresses to the GigE cameras using the NCG IP-Configuration tool.
 9. Proceed with the [Integration of a NeuroCheck edition camera in NeuroCheck](#).

Integration of a NeuroCheck edition camera to NeuroCheck

1. Install NeuroCheck, if you have not done before, and make sure that you also have installed the correct NeuroCheck driver for the cameras. You can make sure the correct files are present for your driver by checking the driver info window:
Device Manager -> New... -> Digital camera -> (Driver type: NeuroCheck GigE Camera) -> About... -> Low Level Driver
2. Configure the camera as new device in NeuroCheck:
 - a. When Windows asks you during this process which network types the executable is allowed to use, simply check all of them.
 - b. In NeuroCheck, open the Device Manager (menu command System | Device Manager)
 - c. Click "New..." to start the NeuroCheck Hardware Wizard.
 - d. Select option "Digital camera" on the first page and continue.
 - e. On the second page, select "NeuroCheck GigE Camera" and continue.
 - f. On the last page, select the camera(s) that you want to use and click "Finish" to close the NeuroCheck Hardware Wizard.
 - g. Select the new device node.
 - h. Choose "Properties" to open the dialog for the camera settings. Configure the camera settings for your application (see [Camera Properties](#)).
 - i. Close the properties dialog with "OK".
3. Check the configuration and the camera connection in the Live Image of NeuroCheck.

IP Address Configuration (Ethernet cameras only)

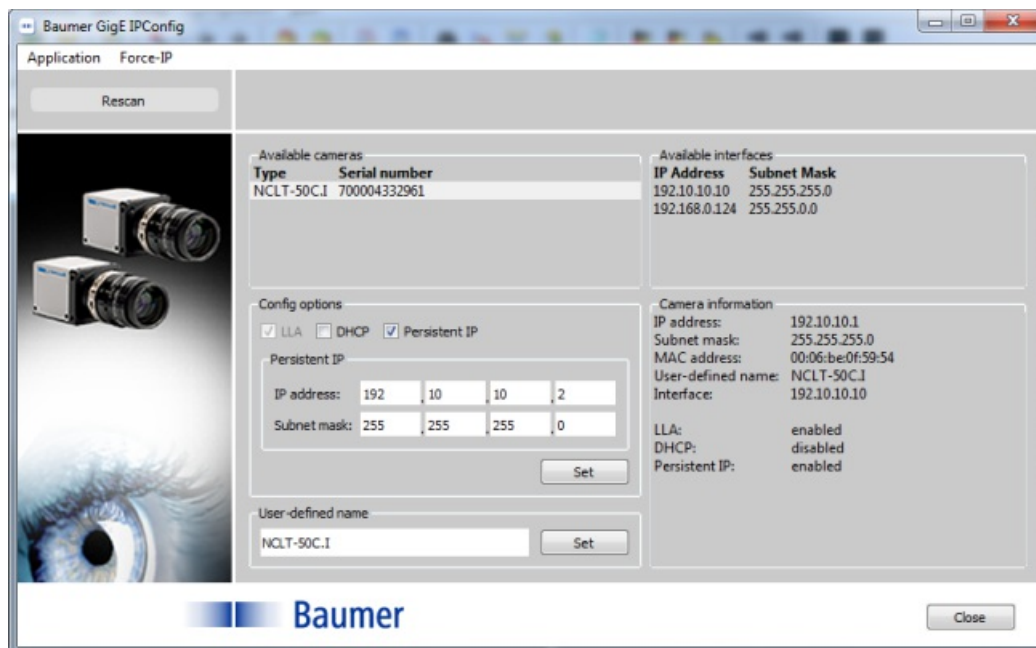
To identify an ethernet camera and to integrate it in NeuroCheck a unique and persistent IP address is required.

The factory settings of the NeuroCheck Gigabit ethernet cameras define no persistent IP address. Therefore a persistent IP address must be assigned to each ethernet camera once.

NeuroCheck Camera IP Configurator

The NeuroCheck Camera IP Configurator is a windows application with a graphical user interface that can be used to assign or change the IP configuration of NeuroCheck ethernet cameras. Please find the tool including comprehensive PDF documentation in the NeuroCheck program directory in the subfolder Tools\CameraiPConfigurator.

The PDF documentation of the tool also contains information about IP configuration in general.



Events

An event is a message that the computer receives from the camera to signal a specific occurrence. It consists of the camera that sent the event, event name and time it occurred at (the time is not supported by every camera).

In order to troubleshoot your application, you can check the events that are written in the log file (if it is activated) or in the Info Dialog of the driver in the Diagnostics page.

The following events are available:

Element	Description
Line0RisingEdge	Rising edge of the trigger signal.
Line0FallingEdge	Falling edge of the trigger signal.
ExposureStart	Start of image exposure.
ExposureEnd	End of image exposure.
TriggerSkipped	Signals if the trigger was skipped because the camera was not ready to start the image acquisition (because it was possibly already acquiring an image)
TriggerOverlapped	Signals if the previous trigger signal arrived outside of the readout time of the sensor and the current signal is inside the readout time. The output line will stay active as long as the signals are during the readout time. It will return to the inactive state only if a signal is outside of the readout time.
TriggerReady	The camera is ready for the trigger signal. This is signaled as soon as the exposure is finished and thus is at the beginning of the readout time.
Gev_Event_Link_Speed_Change	Signals if the speed of the connection between the camera and the computer has changed.
GigEVisionHeartbeatTimeOut	Signals if a timeout of the connection between the camera and computer occurred.

Link Aggregation Group Configuration

For NeuroCheck dual link NCHG and NCLG cameras (and only for these) the configuration of a link aggregation is required.

Link Aggregation (LAG) allows grouping two ethernet connections of the camera to form a "virtual" link, enabling NeuroCheck and the camera to treat the LAG as if it was a single link. This is done in a transparent way from the application perspective.

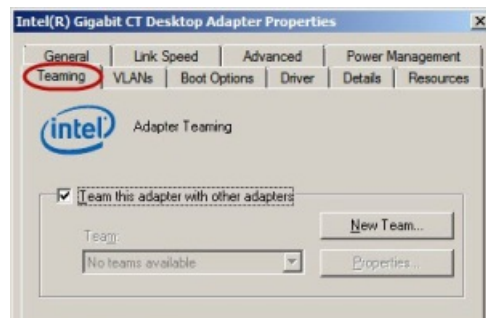
To connect the camera to host using LAG requires two host Ethernet adapter ports. We recommend to use an Intel Dual Port Card. Follow the steps below to setup LAG under Microsoft Windows 7.

Install ANS Teaming Software

A special Intel Advanced Network Services (ANS) Teaming Software is required.

To check if ANS Teaming Software is already installed follow the steps below:

1. Open the Properties Dialog of one network adapter
 - Press Microsoft Windows Start, then choose Control Panel.
 - Click on Hardware and Sound, and select Device Manager.
 - Click on the Network Adapter.
 - Make a right click on Adapter device name.
 - Select Properties
2. Check if a "Teaming" tab page exists.
If yes the ANS Teaming Software is already installed.



To install the ANS Teaming Software execute `PRO_Advanced_Network_Services_WinXX.exe` which is located in the directory `Extra\Drivers\Baumer\GigE\Intel` on the NeuroCheck DVD or the directory `GigE\Intel` if you got the zip file.

The Setup Options give you the choice to install ANS. Because ANS is checked by default, no special action is required during installation. The installation can really take some minutes, please have some patience.

Configure ANS Teaming Software

1. Open the Properties Dialog of one Network Adapter
 - Press Microsoft Windows Start, then choose Control Panel.
 - Click on Hardware and Sound, and select Device Manager.
 - Click on the Network Adapter.
 - Make a right click on Adapter device name.
 - Select Properties
2. Choose the "Teaming" tab page
3. Select "Team this adapter with other adapter".
4. Click on "New Team...".
5. The New Team Wizard window will open. Choose a team name. Click Next.
6. Select the desired adapters corresponding to the ports to be used by the camera and click Next.
7. Choose the team type: "Static Link Aggregation". Click Next. That step can really take some minutes, please have some patience.
8. The configured adapter will now be available in the Network Connection window.
9. Set the Teaming Group IP Address.



Troubleshooting

Which cameras can I use with this driver?

- Any available camera of the NeuroCheck NCG, NCCG, NCHG and NCLG series. Please refer to the list of [supported cameras](#).

Which operating systems are supported?

- Read the [System Requirements](#).

How many cameras can I use?

- In theory, there is no restriction for the maximum number of NeuroCheck cameras that can be used in NeuroCheck.
- Please note that the cameras use a considerable rate of the bandwidth of the network and bus respectively. If multiple cameras are used in the network these cameras have to share the network and bus respectively bandwidth.

Possible causes for problems configuring a camera in the Device Manager of NeuroCheck.

- Have you connected the camera to the correct network adapter, switch and to the power supply?
- The LED next to the Ethernet connector on the camera indicates that it is operational ready. Is this LED switched on (green for ready, yellow for data transfer)?
- Have you installed the low level drivers correctly? Please check the presence and versions of the driver files according to the [installation](#) instructions.
- Does the camera have a valid IP address? The camera must use a unique, persistent IP address within the address space of the network adapter.
- Are cameras connected to multiple network cards in the same computer that share the same subnet? If yes, reconfigure the network cards so each one is on a different subnet and change the IP addresses of the cameras to reflect the changes.
- Did you stop further blocking of NeuroCheck in the Windows Firewall?
- Please check that the used network components are Gigabit Ethernet compliant.

Possible causes for problems with image acquisition and corrupt images at cameras.

- Please note the [system requirements](#).
- Have you installed and activated the Baumer filter driver for the correct network adapter (see chapter [installation](#))? Please check this in the properties of the network connection.
- Please check that the data transfer package size is suitable to your network components (see chapter [Misc](#)).
- Please check that the data transfer package gap is adjusted correctly (see chapter [Misc](#)).

What happens if I disconnect a camera?

- After disconnecting a camera, the next access to the camera lasts up to 30 sec. During this time span NeuroCheck is blocked.
- After disconnecting a camera, Windows generates a Plug-and-Play message which informs NeuroCheck about the removal of the hardware. This event will be logged in the event log and the NeuroCheck logging.
- In the NeuroCheck Device Manager, if you remove an already installed camera, a message box informs you about the removal, and the camera will be deleted from the list of devices.
- In the standard NeuroCheck environment (manual or automatic mode), if you remove an installed camera, a message box will inform you about the removal and the device will be deactivated. Subsequent executions of image acquisition functions will deliver a failure. Reconnecting the camera, in most cases NeuroCheck can automatically re-initialize the device, depending on the time-out and trigger settings.
- Please note that the Windows Plug-and-Play message does not appear immediately after the physical event of removing or connecting the camera device, it may take a few seconds.

Why was no camera discovered by the driver?

- Please check your firewall settings. The Neurocheck executable needs full access and should not be limited to a specific network type, like private or domain. It needs access to the public type as well. When Windows asks you, which network types the executable is allowed to use, simply check all of them.

Why does detecting the overtriggered status not work?

- See the answer to the question "Why was no camera discovered by the driver?". The reason is most likely the firewall that prevents NeuroCheck from getting the information from the camera.

What can I do if one of my network connections causes problems?

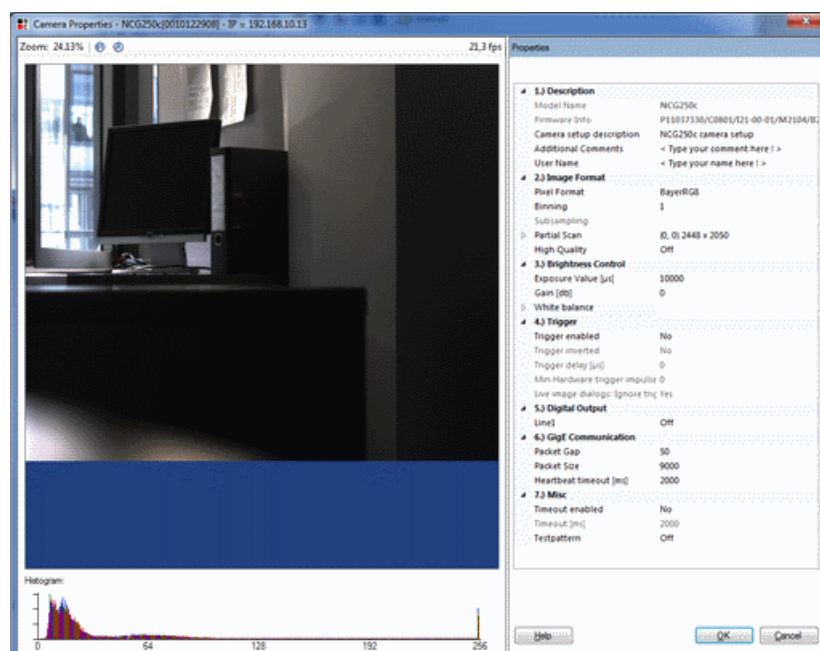
- After you added a camera in the device manager and closed NeuroCheck, you can edit the file NC61CFG.DRV.CFGX in the Project\Configuration directory.
- Inside, you can find a line like this: `<driver assembly="NcDc.NeuroCheck.BO.dll">`
- Find the corresponding closing tag `</driver>` and in front of it, add an xml tag `<blacklist></blacklist>`.
- Inside the blacklist tag, add the tag `<entry>Connection name</entry>` which contains the name of the network connection that causes the problem, e.g. Local Area Connection 01. If you want, you can add multiple entry-tags. One for each network connection you want the driver to ignore.

The following picture shows an example of this blacklist. It blocks two connections:

```
<body name="Konfigurationsdaten">
  <driver name="Treiber" assembly="NcDc.NeuroCheck.BO.dll" .
    <logging name="Logging enabled" display="Ja">1</loggin
    <trace name="Low-level driver trace enabled" display="
    <blacklist name="Blacklist">
      <entry>Local Area Connection 01</entry>
      <entry>Local Area Connection 02</entry>
    </blacklist>
  </driver>
```

Camera Properties Dialog

Dialog to configure the properties of a camera



The Camera Properties Dialog contains a live image preview on the left of the dialog. In the top right corner are the captured frames from the camera per second shown.

Beneath the preview the histogram of the image is displayed. It visualizes the amount of pixels for each color channel and can be used to adjust the exposure value so the image is not over- or underexposed.

The right side of the dialog contains a table of properties. The names of the properties are displayed in the left column of the table whereas the right column contains the current values of the properties. The properties are structured into categories [Brightness Control](#), [Description](#), [Digital Output](#), [GigE Communication](#), [Image Format](#), [Misc](#) and [Trigger](#).

In this document the properties of each category are presented on a separate page.

Live image options

Element	Description
Zoom	Displays the factor the image is currently scaled with.
	Press this button to see the preview image in its original size.
	Press this button to see the whole image fitted to the size of the window.

Editing properties

Depending on the selected property the value can be edited by:

- Directly typing the value in the cell in the right column.
- Some property values can be selected in a list of possible values. This list drops down after clicking the expand button in the right column.
- Some properties are composed of several sub-properties. These sub-properties are shown after clicking on the on the left of the property. To hide the sub-properties click on the that replaced the . The sub-properties can be edited in the same way as other properties.

Description

In this category you can specify the description of the selected camera. These properties are for the purpose of documentation only and do not effect the behaviour of the camera in any way.

Element	Description
Model Name	Name of the camera model.
Firmware Info	Firmware version of the camera.
Camera setup description	Enter a description for the camera here.
Comment	Enter additional information about the camera here.
User Name	Enter your name here.

Image Format

In this category you can specify the format of the image the selected camera captures.

Element	Description
Pixel Format	Select here the pixel format to be used for the digital camera. The pixel format defines how the image is encoded, i.e. the color format and the bit resolution. In case of more than 8 bit per pixel the pixels are transmitted as 16 bit per pixel data to NeuroCheck. Otherwise the pixel data is transmitted with 8 bit per pixel.
Binning	Select here if multiple cells on the camera sensor should be combined to either increase the intensity or reduce noise of the pixel values. This reduces the resolution of the image. This setting is not always available. • 1: 1 sensor cell = 1 image pixel • 2: 2x2 sensor pixels = 1 image pixel
Binning Region0	Replaces Binning on some sensors. Provides the same functionality, calculated on the camera processor. Works together multiplicatively with "Binning Sensor".
Binning Sensor	Replaces Binning on some sensors. Provides the same functionality directly on the sensor. Works together multiplicatively with "Binning Region0".
Binning Mode	Sets the mode to use when combining responses from multiple cells: • Average: the response from the combined cells is averaged. • Sum: the response from the combined cells is cumulated resulting in the increased intensity.
Subsampling	Select here if the image should be subsampled. This halves the horizontal and vertical resolution of the image.
Partial Scan	The configuration of the area of interest (AOI) for the camera image to be transferred (so-called partial scan).
X	Specify here the X-coordinate of the upper left corner of the area of interest.
Y	Specify here the Y-coordinate of the upper left corner of the area of interest.
Height	Specify here the height of the area of interest.
Width	Specify here the width of the area of interest.
High Quality	Specify here if you want to enable the high quality mode to get the lowest readout noise.

Brightness Control

In this category you can specify the settings for controlling the brightness of the image the selected camera captures.

Element	Description
Exposure value [μ s]	Specify here the duration of the exposure time.
Gain	Specify here the gain factor for the digital camera.
White Balance	The configuration of the white balance for a digital color camera. Please note that white balance is only available for color cameras.
Automatic calculation	Click the button of this property to calculate the white balance automatically.
Gain [db] Red channel	The gain factor of the red color channel.
Gain [db] Green channel	The gain factor of the green color channel.
Gain [db] Blue channel	The gain factor of the blue color channel.

Trigger

In this category you can specify the configuration of the trigger for the selected camera.

Element	Description
Trigger enabled	If this option is activated the camera waits for a hardware trigger to capture an image. Otherwise the camera is triggered by software.
Trigger inverted	If this option is activated the image capturing is started when the trigger signal has a falling flank.
Trigger delay [μ s]	Specify here the duration of the gap between the arising of the trigger pulse and the start of the image capture.
Min. Hardware trigger impulse length	Specify here the minimum length of the hardware trigger pulse to be acceptable to the camera.
Live image dialogs: Ignore trigger	If this option is activated the hardware trigger signal is ignored in Live Image Dialog, Adjust Camera Positions Dialog and the Camera Properties dialog. This way, you can adjust focus or iris in Live Image Dialog without manually disabling the trigger.

Digital Output

In this category you can specify the settings for controlling the digital output lines of various cameras.

Element	Description
Line	Some cameras have digital output lines which can be used to signal specific information. The following options are available: • Exposure active: On during image exposure. • Frame active: On during frame capture (that includes image exposure and readout). • Line x: The input signal at Line x is passed through this output line. • Off: The output line is deactivated. • Trigger overlapped: Signals if the previous trigger signal arrived outside of the readout time of the sensor and the current signal is inside the readout time. The output line will stay active as long as the signals are during the readout time. It will return to the inactive state only if a signal is outside of the readout time. • Trigger ready: The camera is ready for the trigger signal. This is signaled as soon as the exposure is finished and thus is at the beginning of the readout time. • Trigger skipped: Signals if the trigger was skipped because the camera was not ready to start the image capturing (possibly because it was already acquiring an image). • UserOutput x: The input signal from the selected user output register bit is passed through this output line.
UserOutput	Permanently sets or resets the selected bit of the user output register.

GigECommunication

In this category you can specify the settings for controlling the Gigabit Ethernet configuration for Ethernet cameras.

Element	Description
Packet Gap	Specify here the gap between two succeeding Ethernet packets in ticks. Use this option in multi camera systems that use parallel image acquisition to optimize the data transfer to the computer. The optimum depends on the used switch and the connected cameras. The formula to compute the optimal Packet Gap depends on the camera model. For NCCG, NCLT, NCG3, NCHG and NCLG cameras, use this formula: $\text{Gap} = ((\text{Packet size in byte} \times (\text{Count of cameras} - 1)) * 8) + 10 \times \text{Count of cameras}$ For NCG2 models, use the following formula: $\text{Gap} = ((\text{Packet size in byte} \times (\text{Count of cameras} - 1)) / 4) + 10 \times \text{Count of cameras}$ If your network speed to the camera is less than 1Gbit/s, you need to adapt the Packet Gap. To do this, divide 1000 by the speed of your connection in MBit/s. For example if you have a speed of 100 MBit/s, you get the value 10 by dividing 1000/100. You multiply this value with your packet gap to get the final value.
Packet Size	Specify here the size of the Ethernet packets in Bytes. Use this option to optimize the data transfer to the computer. The cameras support package sizes from 576 Byte to 65535 Byte. The possible size is further limited by all used network components (network adapter, switches, cameras). Modern network components often support at least 1500 Bytes. We recommend to use components that support the use of 'Jumbo-Frames'. The optimum size also depends on all used network components (network adapter, switches, cameras). It is generally recommended to use larger packages, due to smaller package overhead and less CPU load. If you set the package size higher than the used components allow, this will result in an error during image transfer. Be advised that the maximum usable packet size that can be set is 9000.
Heartbeat Timeout [ms]	The configuration of the heartbeat timeout of a digital camera. If the camera does not receive a signal from the PC it is connected to during this time, it assumes that the connection has been lost.

Example

Assumed package size [Bytes]	Number of cameras	Recommended gap NCCG / NCLT / NCG3 / NCHG / NCLG [ticks]	Recommended gap NCG2 [ticks]
576	1	10	10
576	2	4628	164
576	4	13864	472
9000	1	10	10
9000	2	72020	2270
9000	4	216040	6790

Misc

In this category you can specify the configuration of the timeout for synchronous image capture and the test pattern for the selected camera.

Element	Description
Timeout enabled	Select whether the check function Capture Image should stop waiting for an image when the specified period of time is expired or should wait indefinitely long for an image. If Timeout is activated and no image (resp. trigger event) was received within the maximum time span, the driver will report an error. Activate the Timeout for all non-triggered applications, or for triggered applications where you expect a trigger event within the specified period of time. Deactivating the Timeout might be necessary for triggered applications where you cannot guarantee a trigger to occur within a specified period or time. Please note that the application will be stopped and you can only proceed after a trigger event occurred. Attention: this might be interpreted as "hang-up" by the user!
Timeout [ms]	Specify here the maximum time span in milliseconds the check function Capture Image waits for an image.
Testpattern	Specify here which test pattern should be transmitted.

Compatibility Options

This category contains features that are useful to retrofit a newer camera model with different image dimensions to a older vision system.

Element	Description
Scaling X	Scales the Image horizontally by the given factor before transferring it to NeuroCheck.
Scaling Y	Scales the Image vertically by the given factor before transferring it to NeuroCheck.
Scaled Width	Displays the resulting width after applying scaling.
Scaled Height	Displays the resulting height after applying scaling.
Enable Continuous Partial Scan	Usually the partial scan values can only be set in certain camera dependant increments. Activating this option will allow for continuous (integer) partial scan values. The driver will crop the image to the desired continuous values before transferring it to NeuroCheck.

Optic Control

This category contains features related to a connected electronically focus controllable objective. The category may only be visible on supported devices, such as the **NCLT**.

Element	Description
Optic Controller Model Name	Displays the model name of the connected focus controllable lens (not available on some models).
Optic Controller Firmware Version	Displays the firmware version of the connected focus controllable lens.
Optic Controller Vendor Name	Displays vendor information of the connected focus controllable lens.
Optic Controller Status	Displays the status of the connected focus controllable lens.
Optic Controller Temperature	Displays the temperature of the connected focus controllable lens (not available on some models).
Optic Controller Thermal Compensation	Select whether the focus controllable lens should use the internal thermal compensation (not available on some models).
Focus Stepper	Stepwise focal value of the connected focus controllable lens.
Aperture	Aperture of the connected focus controllable lens. Only available on models with controllable aperture.
Aperture Stepper	Stepwise aperture value of the connected focus controllable lens. Only available on models with controllable aperture.
Optic Controller Initialize	Initialize a connected focus controllable lens. Only necessary if the device was not connected during startup of the camera.
Optic Controller Focus Initialize	Initializes the focus and makes it ready for use.

Focus Stepper Delay Time

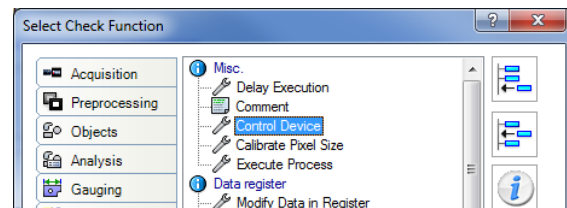
Setting the Focus Stepper value via "Control Device" will automatically delay the execution for about 110 ms. This delay ensures that a immediately following "Capture Image" always acquires focused image data. The lens needs some time to establish the target focal value and settle internal vibrations. The delay value was experimentally determined as a worst case from jumping from the lower end of the scale to the high end. Since the precise delay necessary depends on the lens type and the focal value that was set before, the automatic delay can be disabled, if short execution times are important. You will likely have to insert a "Delay Execution" and manually determine the exact delay necessary to ensure the image is properly focused. To disable the automatic delay, edit the configuration `NC62CFG.DRV.CFGX` in the `Project\Configuration` directory. Search for the node that belongs to this driver. It will look something like this: `<driver assembly="NcDc.NeuroCheck.BO.dll">`. Add the following child node:

`<opticcontrol_no_delay>0</opticcontrol_no_delay>`. The result should look similar to this:

```
<driver name="Treiber" assembly="NcDc.NeuroCheck.BO.dll">
  <logging>0</logging>
  <trace>0</trace>
  <opticcontrol_no_delay>1</opticcontrol_no_delay>
  <blacklist/>
</driver>
```

Control Device

The NeuroCheck driver for GigE cameras provides some properties and methods that can be manipulated or called by the check function Control Device during the execution of a check routine. Please refer to the documentation of NeuroCheck for the usage of the check function Control Device.



Properties

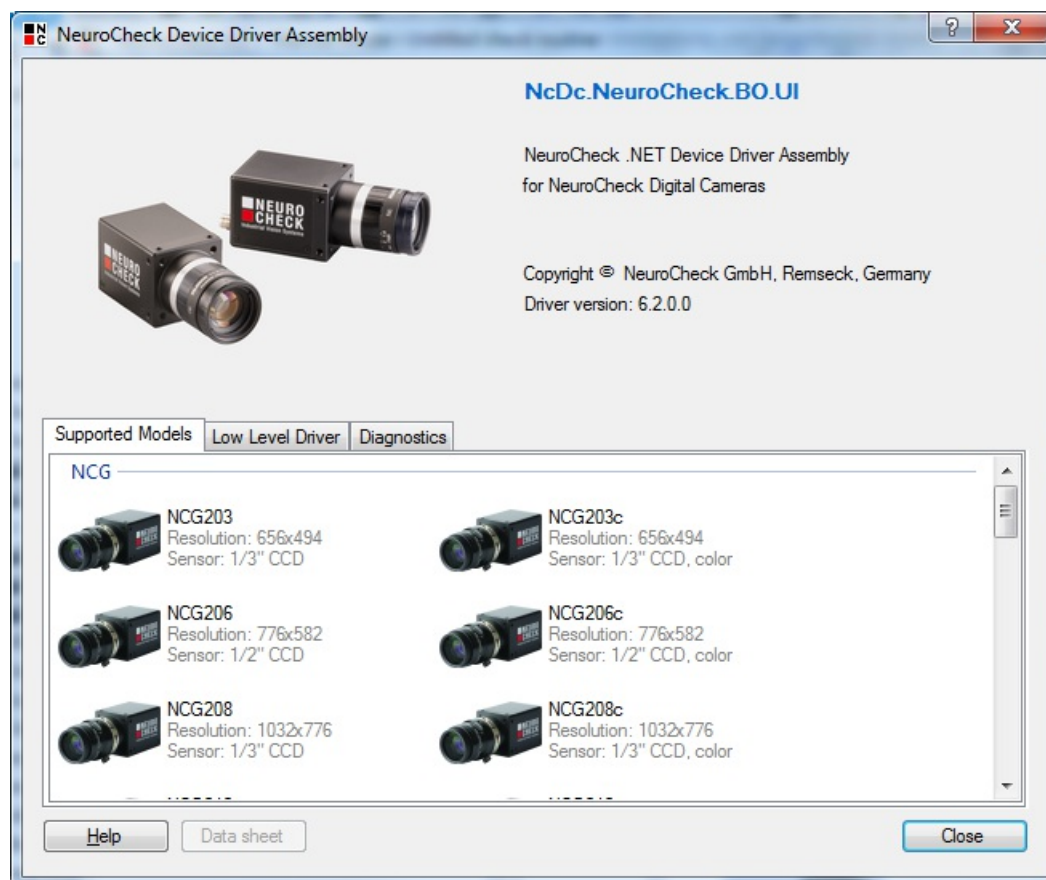
Element	Description
Gain	Specify here the linear gain factor for the digital camera.
Exposure	Specify here the duration of the exposure time.
Size of Image Stack	Specify here the number of images that are acquired as image stack. Please refer to the white paper C:\Program Files\NeuroCheck 6.2\Documentation\Whitepapers\English\Image Stack Acquisition.pdf or contact the NeuroCheck support for further information about the acquisition of an image stack. Note that the image stack needs a lot of RAM, so you should be careful when you set this value.
Active Index in Image Stack	Specify here the index of the image in the image stack that should be used next by check function <i>Transfer Image</i> . Please refer to the white paper C:\Program Files\NeuroCheck 6.2\Documentation\Whitepapers\English\Image Stack Acquisition.pdf or contact the NeuroCheck support for further information about the acquisition of an image stack.
Get image from image stack	Specify here if check function <i>Transfer Image</i> should use the captured image from the image stack or an (a)synchronously acquired image.
Timeout for setting active Index in Image Stack	Specify here the time out for setting the active index in the image stack. Please refer to the white paper C:\Program Files\NeuroCheck 6.2\Documentation\Whitepapers\English\Image Stack Acquisition.pdf or contact the NeuroCheck support for further information about the acquisition of an image stack.
Line	Specify here which information the specific output line should signal.
UserOutput	Specify the state of the selected user output register bit.
Delay in μ s for free run acquisition in Image Stack	Specify the delay between each image acquisition in the image stack if you don't use a hardware trigger. If you get problems during the image acquisition, try increasing the value.
Optic Feature Value	Specify the focal value of the connected electronically focus controllable lens. Only available on supported devices, such as the NCLT.

Methods

Element	Description
Acquire Image Stack	Call this function to start the acquisition of an image stack. Please contact the NeuroCheck support or refer to the white paper SE-AS-075 for further information about the acquisition of an image stack.

Element	Description
Abort Image Stack Acquisition	Call this function to abort the acquisition of an image stack. Please contact the NeuroCheck support or refer to the white paper SE-AS-075 for further information about the acquisition of an image stack.
Check Image is not overtriggered	Call this function to check whether during the last call of this method or the start of the image acquisition the trigger signal was skipped. See the page "Digital Output" for further details. The check function result is OK if no trigger was skipped during the time. The check function result is not OK if the trigger was skipped during the image acquisition.

Info Dialog



This dialog displays information about the NeuroCheck driver DLL. You can select between three pages with specific information the dialog provides. On each page the context menu provides a further function.

Element	Description
Help	Click here to open this help file you are currently reading.
Data sheet	Click here to open the data sheet of the selected digital camera model. (Only available on page Supported Models.)
Enable logging	Check the box to activate logging. Please note that the creation log messages can slow down the system. (On page Diagnostics only)

Page Supported Models

This page provides information about the camera models that are supported by this NeuroCheck driver DLL. Besides the name of the digital camera the resolution and the chip size are shown.

Element	Description
Data sheet	Click here to open the data sheet of the selected camera model.

Page Low Level Driver

This page provides a list of all driver files from Baumer optronics. Please note that the list contains driver files that are required by some of

the supported models only. Therefore it might happen that your installation is proper even if some driver files in the list are not present on your computer.

Additionally to the drivers name the list provides information about the version, the location on your computer, the date and time of the last change and the size of the driver file.

Element	Description
Copy to clipboard	Click here to copy the entire list of driver files to the clipboard. From the clipboard you can paste the list to a word processor, text editor or E-mail client.

Page Diagnostics

This page provides a list of all the last events that occurred within the driver. The list is empty if the logging is disabled. If logging is enabled and the logging of NeuroCheck is enabled as well, all events are written to the NeuroCheck log file (`NcLog.XML`). Every entry in the list contains the priority, the date and time when it occurred and a description of the event.

Element	Description
Copy to clipboard	Click here to copy the entire list of events to the clipboard. From the clipboard you can paste the list to a word processor, text editor or E-mail client.

Support Services

For technical support, please contact your local NeuroCheck partner or NeuroCheck GmbH:

Phone: +49 (0) 7146 - 89 56-40

E-Mail: support@neurocheck.com

Web: www.neurocheck.com

Before contacting us, please provide some important information about your system:

- **Information about your NeuroCheck installation and your PC setup:**

Use the NeuroCheck Diagnostics tool to check your installation and computer configuration.

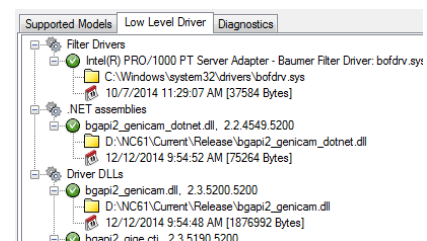
The NeuroCheck Diagnostics is installed in the "Tools" folder within your NeuroCheck installation.

- **Information about the connected cameras:**

the number and the model names of the connected cameras can be seen in the Device Manager of NeuroCheck. If possible, please also provide a CSUX export of your current camera input settings by clicking the Export button for each camera. Please attach the generated CSUX files to your email.

- **Information about your low level driver installation:**

this can be found in the [Info Dialog](#) of the NeuroCheck driver DLL which can be opened by clicking the info button when the camera is selected in the Device Manager of NeuroCheck. On page Low Level Driver you see the list of installed low-level drivers. Copy this list to your E-mail by right clicking.



- **Log file information:**

Logging for the driver can be activated in the [Info Dialog](#) of the NeuroCheck driver DLL. It can be opened by clicking the info button when the camera is selected in the Device Manager of NeuroCheck. On page Diagnostics of the Info Dialog check the box Enable logging.

Please note that logging will be written to the NeuroCheck log file which must be activated, too. Logging for NeuroCheck is activated in the General Software Settings on page Diagnostics.

