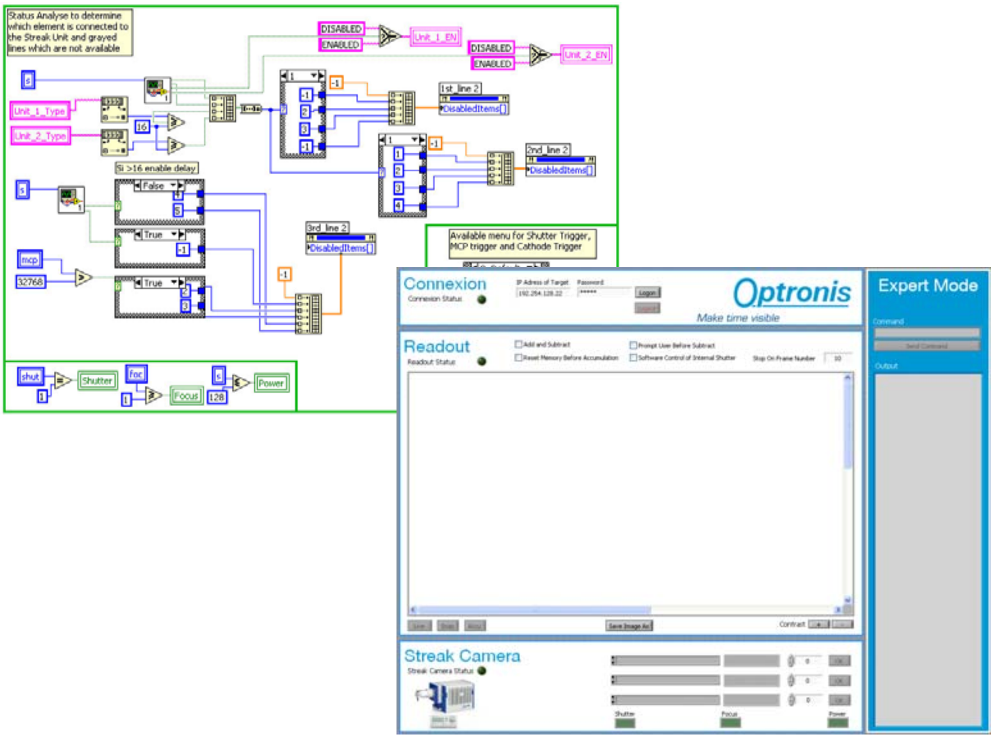
Optronis

Make time visible

OptoAnalyse / CI

Ver. 3.7x

OptoAnalyseNet
LabVIEW Development Kit (LDK)



Status Analyse to determine which element is connected to the Streak Unit and grayed lines which are not available

Available menu for Shutter Trigger, MCP trigger and Cathode Trigger

User Manual

Ref.: 3993-SU-01-C

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General

The option /CI for the OptoAnalyse software consist of two main parts.

- **OptoAnalyseNet**
- **OptoAnalyseVIs**

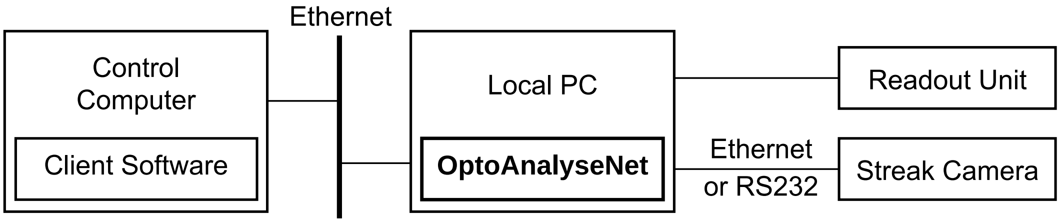
Overview OptoAnalyseNet

The OptoAnalyseNet program is an extended version of the OptoAnalyse program. All functions available with OptoAnalyse are also available with OptoAnalyseNet. This manual only describes the extensions and additional features provided with OptoAnalyseNet. Please refer to the OptoAnalyse manual for all other details.

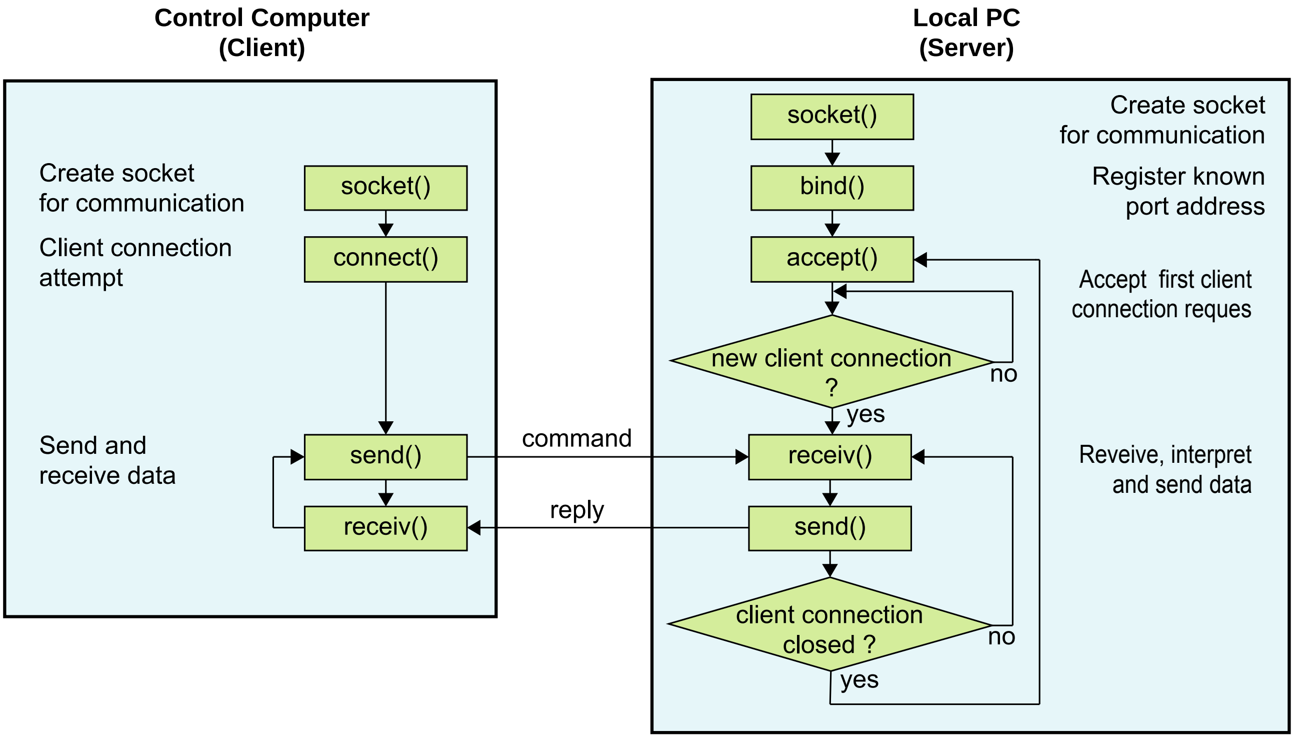
Attention:
The OptoAnalyseNet program and particularly all streak camera related control commands must never be used without basic knowledge of the streak camera operation and the requirements necessary to avoid damages.

The OptoAnalyseNet allows via a standard network to access to all streak camera functions and high level image capture features available with OptoAnalyse. The software runs on a local PC connected to the streak camera main unit by RS232 or Ethernet and to the readout unit by the appropriate physical connection.

The software can be used as the OptoAnalyse program or as server to allow a remote computer to communicate with the streak camera system via Ethernet and TCP/IP protocol. The remote computer can be programmed with a customer control software. For Windows PC type computers a client software is available with its source code. The client program allows to verify principal operation and can be used as example for dedicated control software development.



The server/client communication between the OptoAnalyseNet program and the control software is described below



The C language function names are related to Windows based operating systems. For other operating systems similar functions are available. All commands sent from the client to the server are followed by CR/LF. For all server replies except in the case of a image buffer transfer, the reply information is terminated by CR/LF.

Standard Parameters are	MASK:	255.255.255.0
	PORT:	8686

After a communication is established between server and client, i.e. the two sockets are linked, the server and the client can send and receive login messages. To access to the parameters of OptoAnalyse, the client has to log on by using the LOGON command (see LOGON command in the command list). After logon, the server is locked and no other client can access to the server until the LOGOUT command is done by the logged client or the server is unlocked by a local command.

Installation OptoAnalyseNet

The installation of the OptoAnalyseNet software is identical to the installation of the OptoAnalyse software. Please refer to the corresponding section in the user manual of OptoAnalyse.

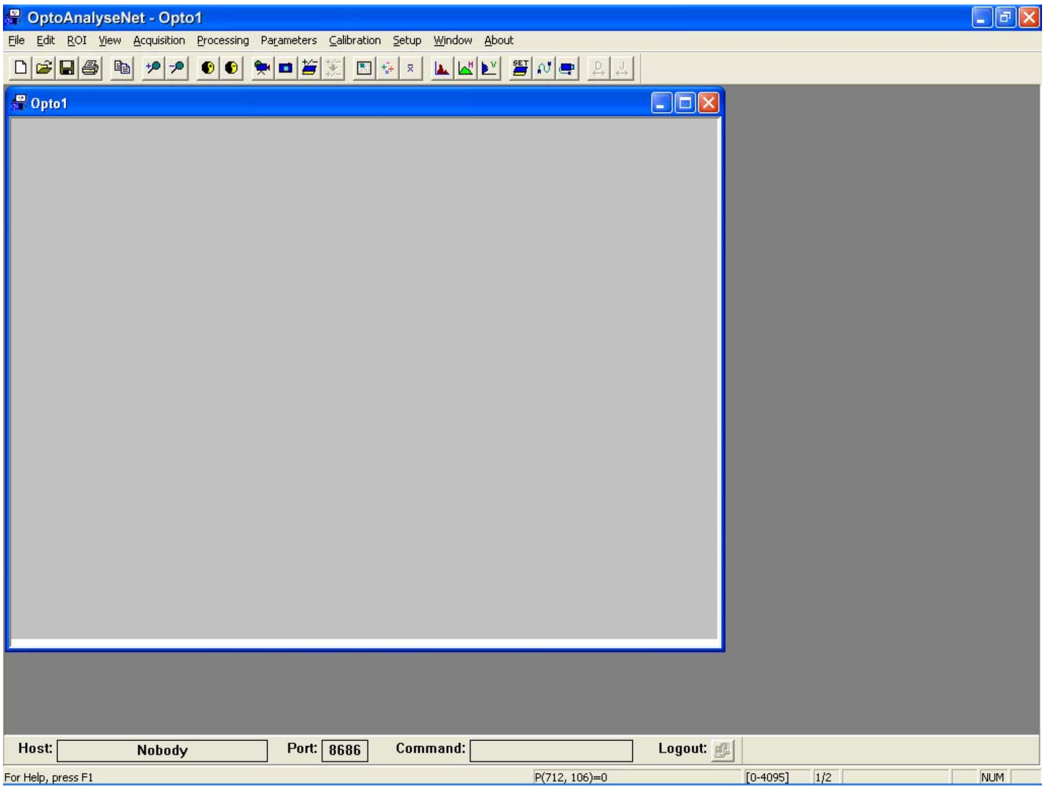
Start of OptoAnalyseNet

OptoAnalyseNet

To start OptoAnalyseNet software click on the icon shown on the left hand side. See trouble shooting section for details if the following display does not appear.

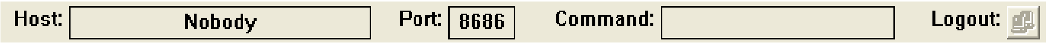
Depending on the type of readout camera, the corresponding application has to be started. For standard installations, the application is found in the OptoAnalyse program group having the corresponding name.

SRU-ED	→ program name: OptoAnalyseNet/ED
SRU-BA, SRU-BX	→ program name: OptoAnalyseNet/Bx
ANIMA-PX	→ program name: OptoAnalyseNet/PX
ANIMA-U10	→ program name: OptoAnalyseNet/U10
SCRU-SE-A	→ program name: OptoAnalyseNet/SE


OptoAnalyseNet - Opto1
File Edit ROI View Acquisition Processing Parameters Calibration Setup Window About
Opto1
Logout:

Host: Nobody
Port: 8686
Command:
For Help, press F1
P(712, 106)=0
[0-4095]
1/2
NUM

At the bottom of the screen, the server toolbar appears.



Host: Nobody
Port: 8686
Command:

Host

The machine name and IP of the connected client is displayed. If no connection is established ‘Nobody’ is displayed.

Port

The port used to communicate with the server (by default, the port is equal to 8686). The port can be changed by clicking on the field and by modifying it. To take the change into account, a restart of the OptoAnalyseNet is needed.

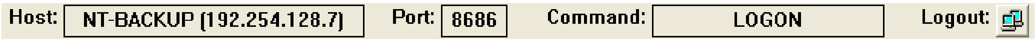
Command

Last command sent by the connected and logged client

Logout

When a client is connected and logged, that button is enabled and unlocks the server in order to use OptoAnalyseNet locally as an usual OptoAnalyse software

After the OptoAnalyseNet is launched, the server is waiting for a client to connect. After a client has connected and logged in, the IP of the client is displayed. After each message sent by the client, the corresponding command is displayed in the toolbar (see figure 5).



Host: NT-BACKUP (192.254.128.7) Port: 8686 Command: LOGON Logout:

When a client is connected and logged in, the server is locked and cannot be used locally. To use it locally, click to the logout button. After that, the client is logged out by the server and the socket connection with the client is closed. To connect and log to the server again, the client has to repeat the initial process again.

Testing the connection with the server

To test the connection between the server and a remote PC, you can use Windows HyperTerminal or any Telnet application.

The Port used in that remote application must be the same as the one defined in OptoAnalyseNet.

After connection with one of these applications, type enter. The message ‘You are not logged on the server, please login with "LOGON" command’ should appear.

Creating a client application

A Visual C++ 6.0 sample project ‘OptoClientDemo.dsp’ is given with the OptoAnalyseNet software and can be found on the CD-ROM at the location ‘/OptoClientDemo /’. This demo program allows to :

- connect/disconnect to/from the server
- display a video live,
- display the result of an accumulation
- display the result of a snapshot
- enter the parameters of the accumulation

All the functions and their prototypes are described in the OptoClientDemo project files. This project uses MFC classes and some standard C functions related to Windows based operating systems. For other operating systems, similar functions are available.

Commands related to the Server

After a communication is established between server and client, i.e. the two sockets are linked, the server and the client can send and receive message. At this point, to access to the parameters of the streak camera, the client has to log on by using the LOGON command. All other commands will receive the reply: ‘You are not logged on the server, please login with "LOGON" command’. After successful logon, if the client sends a command that does not exist, the following message will be returned : 'Invalid command'.

LOGON p

To access to the parameters of streak camera system, the client has to log on by using the LOGON command associated with a password p. After logon, the server is locked and no other client can access to the server until the LOGOUT command is done by the logged client or the server is manually unlocked.

Input parameter: **p** Password (value is ‘optronis’)

Reply: ‘Invalid password’ if the password is not correct

‘Admin logged in and server locked’ if logon has been done successfully

LOGOUT

If the client is logged to the server, this command logs out the client from the server.

Input parameter: none

Reply: ‘OK’

LOG

Send version of remote control interface software

Input parameter: none

Reply: ‘OPTOANALYSENET V**v.v** / OPTRONIS / **d’**

With
v.v Version of remote control software
d Date of remote control software

PASSWD a b

Change current password

Input parameters: **a** New password

b New password

Note : Enter the new password for the two parameters **a** and **b**.

Reply: 'Invalid value' if **a** and **b** are not equal

'OK' if command has been executed successfully

Commands related to Streak Camera

INIT

Initialize the streak camera to default values.

Default values are: If the streak camera is in local mode the shutter is closed (if available), the focus mode is disable, the intensifier gain is set to its minimal value.

Note : This command is not available if the streak camera is in StandBy mode.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'OK' if command has been executed successfully

HELP

Lists all commands

Input parameter: none

Reply: List of all commands

QUERY

Sends the OPTOSCOPE streak camera firmware version and date

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'OPTOSCOPE V**v.vv** / OPTRONIS / **d**' if command has been executed successfully

With
v.vv Version of streak camera firmware
d Date of streak camera firmware

STATUS_STREAK (only available with RS232)

Sends the status information of the streak camera. This indicates the system configuration as well as the current setup.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'S**sss**, L**l**, M**mmmm**, T**t**, O**o**, G**g**, F**f**, E**eee**'
if command has been executed successfully
With

sss
0 → only main unit, no sweep units installed
1 → main unit and sweep unit 1 (first plates) installed
2 → main unit and sweep unit 2 (second plates) installed
3 → main unit and sweep unit 1 and 2 installed
>127 → camera in standby mode

l
0 → local and remote control mode
1 → only remote control mode available

mmmm
Gain of intensifier tube
Example : 0300 → 300V

t
Operation mode of intensifier
0 → intensifier always OFF
1 → intensifier always ON (cont.)
2 → trigger source is sweep unit 1
3 → trigger source is sweep unit 2
4 → external trigger source

o
Operation mode of the electro-mechanical shutter
0 → shutter always closed (manual)
1 → shutter always open (manual)
2 → shutter controlled by external signal

g
Current state of the electro-mechanical shutter
0 → shutter closed
1 → shutter open

f
Current state of the focus mode
0 → focus mode OFF (deflection mode)
1 → focus mode ON

eee
Current hardware error status of the streak camera.
The decimal number has to be converted to a binary number and
the interpretation of the bits has to be done as follows
bit 0-1 → error source is unit 2
bit 2-3 → error source is unit 1

bit 4 → error source is image intensifier power supply
bit 5 → error source is streak tube power supply

If the sweep unit 1 is installed, the following string is added : ‘, S1=**ss**, D1=**ddddd**’ with :

ss Index of the current speed selected for unit 1

ddddd Current delay selected for unit 1. (ddddd is an integer value)

If the sweep unit 2 is installed, the following string is added : ‘, S2=**ss**, D2=**ddddd**’ with :

ss Index of the current speed selected for unit 2

ddddd Current delay selected for unit 2. (ddddd is an integer value)

CFCAMERA_STREAK

Allows to get the configuration of the streak camera main unit.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

‘SN**S**, b**bbbb**, B**BBBB**, S**X**, m**mmmm**, M**MMMM**’
With

S Serial number

bbbb Minimum value of streak tube operation voltage

BBBB Maximum value of streak tube operation voltage

X Presence of shutter

mmmm Minimum value of intensifier gain

MMMM Maximum value of intensifier gain

CF1UNIT

Allows to get the configuration of the sweep unit 1.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid unit' if there no sweep unit 1 is installed

Type of sweep unit, List of sweep speeds, Minimum and maximum values of delay (if available)

CF2UNIT

Allows to get the configuration of the sweep unit 2.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid unit' if there no sweep unit 1 is installed

Type of sweep unit, List of sweep speeds, Minimum and maximum values of delay (if available)

STBY

Sets the camera from run to standby mode

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if streak is already in standby mode

‘OK’ if command has been executed successfully

RUN

Sets the camera from standby to run mode

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if streak is already in run mode

‘OK’ if command has been executed successfully

LOCK (only available with RS232 connection)

Disables the local control via the remote control unit. Only the RS232 commands between the server PC and the streak camera are processed. The remote control unit is locked.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if remote control unit is already locked

‘OK’ if command has been executed successfully

UNLOCK (only available with RS232 connection)

Enables the local control via the remote control unit. The remote control unit is unlocked.

Input parameter: none

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if remote control unit is already unlocked

‘OK’ if command has been executed successfully

ACQ_STREAK a

Controls the acquisition mode of the streak camera.

Input parameter: **a** Index of acquisition mode :

0 → continuous acquisition mode (default)

1 → single shot acquisition mode

Reply : 'No streak camera detected' if there is no communication between server and streak camera

‘Invalid mode’ when an acquisition is in progress

‘OK’ if command has been executed successfully

SHUTTER s

Controls the electro-mechanical shutter in front of the photocathode

Input parameter: **s** Index of shutter mode :

0 → shutter always closed

1 → shutter always open

2 → shutter controlled by external signal

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

‘OK’ if command has been executed successfully

TRIGGER t

Controls the trigger mode of the image intensifier

Input parameter: **t** Image intensifier trigger mode :

0 → intensifier always OFF

1 → intensifier always ON

2 → intensifier trigger source is sweep unit 1

3 → intensifier trigger source is sweep unit 2

4 → intensifier trigger source is external signal input

Reply : 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen sweep unit is not connected

‘OK’ if command has been executed successfully

FOCUS f

Controls the focus mode

Input parameter: **f** Focus mode :

0 → sweep mode

1 → focus mode

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

ENABLE unit ena

Enables/Disables unit

Input parameters: **unit** Sweep unit :

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

ena 1 to enable, 0 to disable

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

DISABLE u

If two sweep units are installed, this command sets the unit **u** in deflection mode

Input parameter : **u** Sweep unit :

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

MCP mmmm

Controls the image intensifier gain

Input parameter: **mmmm** gain in volt, example : 0300 → 300V

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Value out of range' if the MCP gain is out of range

‘OK’ if command has been executed successfully

SPEED u ss

Selects the sweep speed of sweep unit **u**

Input parameter(s) : **u** Sweep unit

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

ss Index of sweep speed

Reply: 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera sweep unit is not connected

‘Value out of range' if the speed index is out of range

‘OK’ if command has been executed successfully

DELAY u ddddd

Selects the delay of the sweep unit **u**

Input parameters: **u** Sweep unit

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

ddddd Delay

Reply : 'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera sweep unit is not connected

'Only available for synchroscan unit' if the chosen streak camera sweep unit is not a synchroscan unit

'Value out of range' if the delay is out of range

'OK' if command has been executed successfully

Commands related to Readout Unit

CFCAMERA_READOUT

Allows to get the configuration of the CCD readout camera.

Input parameter: none

Reply: '**T**, Rx**xxxx**, Ry**yyyy**, Dx**XX.XX**, Dy**YY.YY**, Imin**iiiiii**, Imax**iiiiii**'

With

T	Type of camera (string)
xxxx	Number of total pixel in horizontal direction
yyyy	Number of total pixel in vertical direction
XX.XX	Dimension of one pixel in horizontal direction referred to streak camera screen and given in µm
YY.YY	Dimension of one pixel in vertical direction referred to streak camera screen and given in µm
iiiiii	Integration time in ms for minimal (Imin) and maximal (Imax) that are possible with this camera example : TSCRU-SY, Rx0756, Ry0582, Dx22.50, Dy22,08, Imin000001, Imax999999

STATUS_READOUT

Returns the status information of the readout unit.

Input parameter: none

Reply : ‘**Iiiiiii**, M**m**, Bx**xx**, By**yy**, Px**hhhh-hhhh**, Py**vvvv-vvvv**’

With

iiiiii Integration time in ms example : 000040 → 40ms

m Mode of operation

0 → readout unit operates in continuous mode

1 → readout unit operates in trigger mode

xx Number of pixel for horizontal binning

example : 2 → 2 pixel are added before their readout

yy Number of pixel for vertical binning

example : 1 → no vertial binning is made (default)

hhhh Number of first pixel read and number of total pixel read.

Position 0 is on left side of image.

Example 0000-0752 → Readout area starts with first pixel and reads 752 pixels in horizontal direction

vvvv Line number of first pixel read and number of total lines read.

Position 0 is on top of image.

Example 0000-0580 → Readout area starts with first line and reads 580 lines

STATUS_ACQUISITION

Sends the status of the acquisition.

Input parameter: none

Reply: ‘M**m**, C**c**, A**a**, S**s**’

With

m Mode of operation

0 → no acquisition started

1 → acquisition in progress

2 → acquisition or sequence finished

c Indicates if the system is waiting for a subtraction confirmation

0 → readout unit does not wait for a confirmation

1 → readout unit waits until confirmation to continue with subtraction

a Acquisition counter indicates the actual number of acquisitions made.

0 → acquisition not started jet

1 → acquisition in progress or finished

s Sequence counter indicates the actual number of acquisitions to be made within a sequence.

0 → sequence not started

1 → readout system is prepared to do first acquisition within a sequence

2 → readout system is prepared to do next acquisition within a sequence

SET_INTEGRATION tttttt

Sets the integration time of the readout unit.

Input parameter: **ttttt** Integration time in ms

Reply: **iiiii** New integration time in ms

Example : 000040 → 40ms

SET_BINNING_X xx

Sets the number of pixel for horizontal binning. If no binning option is available, the parameter remains at 1.

Input parameter: **xx** Pixel number for binning

Reply: ‘Bx**xx**’

With

xx Number of binned pixel

Example: 2 → 2 pixel will be added before their readout

SET_BINNING_Y yy

Sets the number of pixel of lines for vertical binning. If no binning option is available, the parameter remains at 1.

Input parameter: **yy** Pixel number for binning

Reply: 'By**yy**'

With

yy Number of binned pixel

Example: 1 → no vertial binning is made (default)

SET_PARTIAL_IMAGE aaaa bbbb cccc dddd

Sets the position and size of the CCD readout region.

Input parameters: **aaaa bbbb** Number of first pixel and number of total pixel of the ROI.

Example 0010-0400 → ROI starts with pixel 11 and is 400 pixel wide in horizontal direction

cccc dddd Number of first line and number of total lines of the ROI.

Example 0099-0200 → ROI starts with line 100 and is 200 lines high.

Reply : 'Invalid value' if the input parameters don't match with the readout characteristics

'Px**hhhh-hhhh**, Py**vvvv-vvvv**'

With

hhhh Number of first pixel read and number of total pixel read.

Position 0 is on left side of image.

Example

0000-0752 –> Readout area starts with first pixel and reads 752

pixel in horizontal direction

vvvv Line number of first pixel read and number of total lines read.

Position 0 is on top of image.

Example

0000-0580 –> Readout area starts with first line and reads 580

lines

Note: Some readout unit do only allow multiples of 32. The values are adapted in this cases.

SET_ACCU a m r s c N

Sets the parameters for accumulation mode of the readout unit.

Input parameters: **a** Add/Subtraction mode

0 → Add mode

1 → Add and Subtract mode

m Index of accumulation mode

0 → analogue accumulation

1 → photon counting mode

r Ignored since OptoAnalyseNet v3.51

s Control of internal shutter

0 → shutter remains unchanged after adding of frames

1 → shutter is closed before subtraction of frames

c Confirmation requested before subtraction

0 → no confirmation requested

1 → subtraction is delayed until confirmation

by SUBTRACTION command

N Number of frames to be added.

If N is <1 (example N= 0.05) then acquisition stops with a defined number of pixels that are saturated. (example 5% of the pixel are saturated)

Reply: ‘OK’

SET_SEQ nnnnn dd hh mm ss mmm s b list h v

Sets the parameters for sequence acquisition of the readout unit.

Input parameter(s): **nnnnn** Number of acquisitions to be made within the sequence

dd hh mm ss mmm

Time interval between acquisitions in days (**dd**), hours (**hh**), minutes (**mm**), seconds (**ss**) and milliseconds (**mmm**). After starting the sequence acquisition, the first acquisition is made immediately.

s Sequence name (if there are spaces in the sequence filename string, use quotes to set the filename). If the sequence name already exists, no warning is returned and the sequence will be overwritten. Example:

If the sequence file name is : *\\my Place\my sequence*, **s** must be equal to "\\my Place\my sequence*".*

b Indicates if every acquired image has to be saved or not.

0 → the images are not saved

1 → the images are saved during sequence acquisition

list Integer describing the parameters to be transferred after each acquisition. The following parameters are available and are given with their index:

1 : Date → date when image is acquired, format dd-hh-mm

2 : Time → time when image is acquired

4 : Name → the image name

8 : Mean → mean value within the image or ROI is transferred

16 : Sigma → calculates and transfers the noise inside the image or ROI

32 : Min → finds and transfers the minimum grey level inside the image or ROI

64 : Max → finds and transfers the maximum grey level inside the image or ROI

128 : cog(x) → calculates the centre of gravity inside the image or ROI along the horizontal (x) axis

256 : cog(y) → calculates the centre of gravity inside the image or ROI along the vertical (y) axis

512 : cog(pulse x) → calculates the centre of gravity of a unique pulse inside the image or ROI along the horizontal (x) axis

1024 : cog(pulse y) → calculates the centre of gravity of a unique pulse inside the image or ROI along the vertical (y) axis

2048 : FWHM(pulse x) → calculates the full width at half maximum (FWHM) of a unique pulse inside the image or ROI along the horizontal (x) axis

4096 : FWHM(pulse y) → calculates the full width at half maximum (FWHM) of a unique pulse inside the image or ROI along the vertical (y) axis

To transfer several parameters, **list** must be equal to the sum of the indexes corresponding to these parameters.

Example : to tranfer the Min and Max values, **list** must be equal to 64+128 = **192**

h Indicates if every horizontal profile has to be saved or not.

0 → the horizontal profiles are not saved

1 → the horizontal profiles are saved during sequence acquisition

v Indicates if every vertical profile has to be saved or not.

0 → the vertical profiles are not saved

1 → the vertical profiles are saved during sequence acquisition

Reply: 'Invalid filename' if the sequence file name path does not exist

'Invalid value' if one of the input parameters is not correct

'OK' if command has been passed successfully

SET_THRES tttt ssss eeee

Sets the threshold value for photon counting acquisition mode.

Input parameters: **tttt** Threshold value. Equal or higher intensities are considered to be a valid event for photon counting.

ssss Areas with pixel intensities above the threshold value are only considered to be a valid event, when their surface (in pixel) is below this max. value.

eeee If the sum of all adjacent pixel above the threshold is larger than eeee, the event is not considered.

Reply: ‘OK’

SET_CALIB_X m P C S U

Sets the parameters for calibration on horizontal (x) axis.

Input parameters: **m** Index of calibration type

0 → no calibration, pixel are only counted starting with 0

1 → linear calibration, see parameters ddff

2 → multi-linear calibration, see parameters ddff

3 → Time based on sweep unit 1

4 → Time based on sweep unit 2

5 → Wavelength based on spectrometer setup

6 → Millimeter (Dimensions referred to the readout camera)

P Pixel co-ordinate at which the calibrated value **C** is set. Together with parameter **S**, this has to be repeated for each point with m=2.

C Calibrated value for pixel position **P.** Together with parameter **P**, this has to be repeated for each point with m=2.

S Slope, increment of calibrated values per pixel. This value has to be omitted with m=2.

U Unit of calibrated value

Example 1:

SET_CALIB_X 1 278 12.4 0.3 ps □ linear calibration with 12.4 ps at pixel position 278 and 0.3ps per pixel in positive direction

Example 2:

SET_CALIB_X 2 127 11.4 250 46.6 800 155 ps □ multi-linear calibration with 11.4 ps at pixel position 127, 46.6ps at pixel position 250 and 155ps at pixel position 800

Reply : 'Invalid unit' if no sweep unit 1 is installed

‘OK’ for m=0, 1 or 2

‘**P**, **C**, **S**, **U**’ for m=3

SET_CALIB_Y m P C S U

Sets the parameters for calibration on vertical (y) axis.

Input parameters: **m** Index of calibration type

0 → no calibration, pixel are only counted starting with 0

1 → linear calibration, see parameters ddff

2 → multi-linear calibration, see parameters ddff

3 → Time based on sweep unit 1

4 → Time based on sweep unit 2

5 → Wavelength based on spectrometer setup

6 → Millimeter (Dimensions referred to the readout camera)

P Pixel co-ordinate at which the calibrated value **C** is set. Together

with parameter **S**, this has to be repeated for each point with

m=2.

C Calibrated value for pixel position **P.** Together with parameter

P, this has to be repeated for each point with m=2.

S Slope, increment of calibrated values per pixel. This value has to

be omitted with m=2.

U Unit of calibrated value

Example 1:

SET_CALIB_Y 1 231 203 -1.1 nm → linear calibration with 231 nm at pixel position 231 and 1.1 ps per pixel in negative (upwards) direction

Example 2:

SET_CALIB_X 2 250 203 420 350.4 560 556.8 nm → multi-linear calibration with 203 nm at pixel position 250, 350.4 nm at pixel position 420 and 556,8 nm at pixel position 560.

Reply: 'Invalid unit' if no sweep unit 1 is installed

‘OK’ for m=0, 1 or 2

‘**P**, **C**, **S**, **U**’ for m=3

SET_CORR_J d a

Sets the parameters for jitter correction.

Input parameters: **d** Direction of jitter correction

1 → horizontal

2 → vertical

3 → both directions

a Activation of jitter correction with next acquisition

0 → jitter correction not activated

1 → jitter correction activated with next acquisition

Reply: ‘OK’

SET_CORR_ROI hhhh-hhhh, vvvv-vvvv

Sets the position and size of the correction ROI.

Input parameters: **hhhh** Number of first pixel and number of total pixel of the ROI. Example =0010-0400 → ROI starts with pixel 11 and is 400 pixel wide in horizontal direction

vvvv Number of first line and number of total lines of the ROI. Example =0099-0200 → ROI starts with line 100 and is 200 lines high.

Reply: ‘OK’ when ROI is valid

‘NO’ if ROI can not be defined with this size

SUBTRACTION

Confirms the start of the subtraction after the readout unit has finished accumulation.

Input parameter: None

Reply : ‘OK’

GET_IMAGE

Transfers the image data of the acquired image

Input parameter: None

Reply : 32 bits buffer.

The size of the buffer depends on the image size. Size is given by calling the function GET_IMA_SIZE.
Example :

GET_IMA_SIZE returns 1376 1024

The calling of GET_IMAGE will then send 1376*1024 dwords of 32 bits through the network.

Each dword is a pixel value. The pixel value is multiplied by 1000.
Example :

The pixel value returned is 88000, the real pixel value is 88000/1000 = 88.

GET_IMA_SIZE

Allows to get the size of the current image

Input parameter: None

Reply : ‘**wwww hhhh**’

With

wwww Width of the image

hhhh Height of the image

ACCU_ACQUISITION

Start an accumulation

Input parameter: None

Reply : ‘OK’

SNAP_ACQUISITION

Start a snapshot

Input parameter: None

Reply : ‘OK’

SEQ_ACQUISITION

Start a sequence acquisition

Input parameter: None

Reply : ‘OK’

STOP_ACQUISITION

Stops the current acquisition (snapshot, accumulation or sequence)

Input parameter: None

Reply : ‘OK’

SET_FAN_SPEED s

Only for ANIMA-U10 readout camera. Sets the speed of the fan.

Input parameter: **s** 0 → low

1 → medium

2 → high

Reply: ‘OK’

‘Invalid parameter’ if **s** is not with in the range listed above

GET_COOLER_STATUS

Only for ANIMA-U10 readout camera. Returns a string in the following format

Input parameter: none

Reply: 'C**c**, H**h**, D**d**, S**s**'

With

c Current CCD temperature in deg. Centigrade

h Current temperature of heat sink in deg. Centigrade

d Drive level of Thermo-Electric cooler in percent (0..100%)

s Status of the temperature controller

0 → cooler is off

1 → cooler is ramping to the Set Point

2 → cooler is at Set Point

3 → cooler controller has generated a temperature revision

SET_COOLER_ON s

Only for ANIMA-U10 readout camera. Sets the cooler on or off.

Input parameters: **s** 0 → Cooler is set to off

1 → Cooler is set to on

Reply: ‘OK’

‘Invalid parameter’ if **s** is not with in the range listed above

SET_CCD_TEMP t

Only for ANIMA-U10 readout camera. Defines the set point of the CCD temperature.

Input parameters: **t** Temperature of the CCD defined in deg. Centigrade. Refer to the user manual to the ANIMA-U10 camera for information about the allowed range.

Reply: ‘OK’

‘Invalid parameter’ if **t** is outside the allowed range

SET_DYNAMIC d

Only for ANIMA-U10 readout camera. Sets dynamic range of the camera by selecting either 12 bit digitizing or 16 bit digitizing mode.

Input parameter: **d** 0 → digitalization is set to 12 bit

1 → digitalization is set to 16 bit

Reply: ‘OK’

‘Invalid parameter’ if **d** is not with in the range listed above

IMG_SAVE_AS p

Allows to save the current frame to the location defined by the path parameter p. The frame used during the latest acquisition has still to be active in order to save the image data from the latest acquisition.

Input parameter: **p** Path of the frame to be saved.

Reply: ‘OK’

‘Invalid Value’ if the path is invalid or if the file has not been created.

Examples: IMG_SAVE_AS C:\OptoImage.imd

This will save the current frame under the name OptoImage.img on the hard drive C of the computer where OptoAnalyseNet is running.

IMG_SAVE_AS \\remote_pc\shared\OptoImage.imd

This will save the current frame under the name OptoImage.img on the specified network path \\remote_pc\shared.

Overview OptoAnalyseVIs

The OptoAnalyseVIs is a LabVIEW development kit (LDK) for Optoscope streak cameras and designed to work with Windows 2000, Windows XP, Windows Vista and Windows Seven. It allows operation of one streak camera. The LDK is delivered on a CD-ROM with the following structure:

- 'doc' folder with the current document
- 'lib' folder with the following files : OptoControlPad.dll and OptoAnalyse.llb (the LabVIEW library), a list of *.vi (files needed by the main VI).
- 'src' folder with the source code of OptoControlPad.dll
- 'sample' folder with two samples projects allowing to access to the main function of the LDK

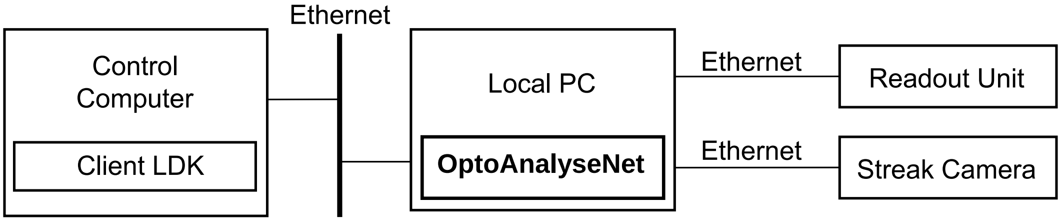
Important:

To use the LDK, 'LabVIEW Full Development System Kit' must be installed.

Communication with OptoAnalyseVIs

The LDK allows via a standard network to access to OptoAnalyseNet which allows to access to all streak camera functions. The LDK runs on a PC connected to a local PC with OptoAnalyseNet which is connected to the streak camera main unit by RS232 or Ethernet and to the readout unit by the appropriate physical connection.

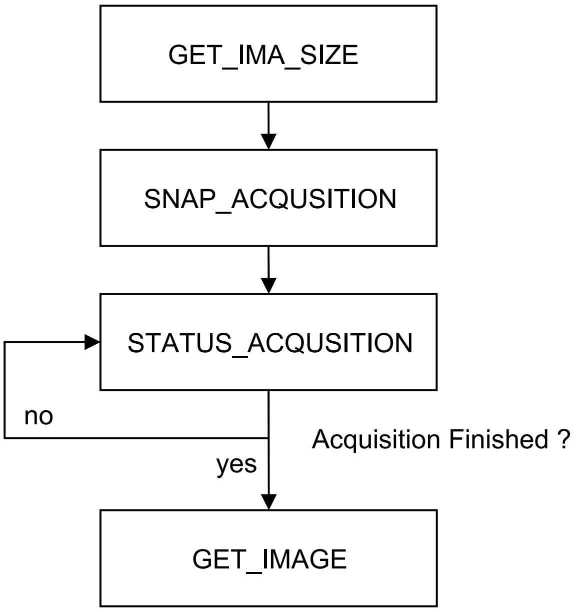
The LDK can be used as the OptoAnalyse program or as server to allow a remote computer to communicate with the streak camera system via Ethernet and TCP/IP protocol. The remote computer can be programmed with a customer control software. For Windows PC type computers a client software is available with its source code. The client program allows to verify principal operation and can be used as example for dedicated control software development.



The server/client communication between the OptoAnalyseNet program and LDK is described below

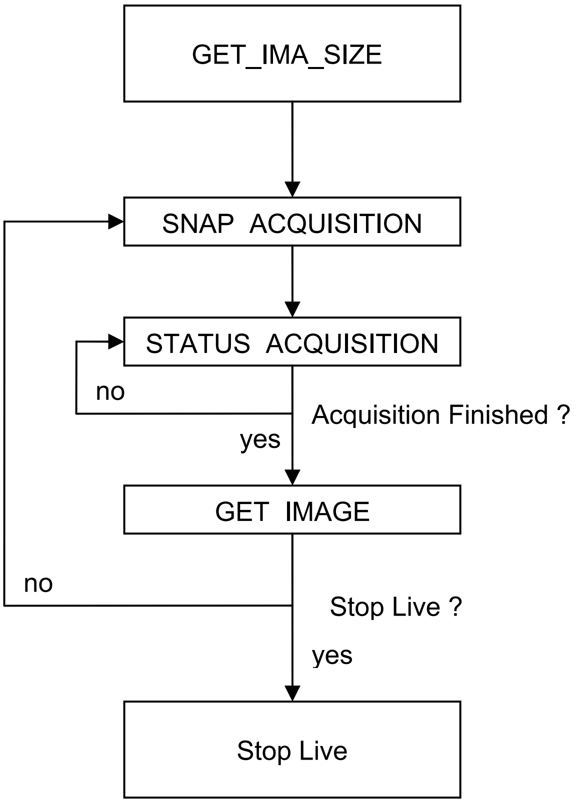
Snapshot

The typical snapshot schema can be given by :



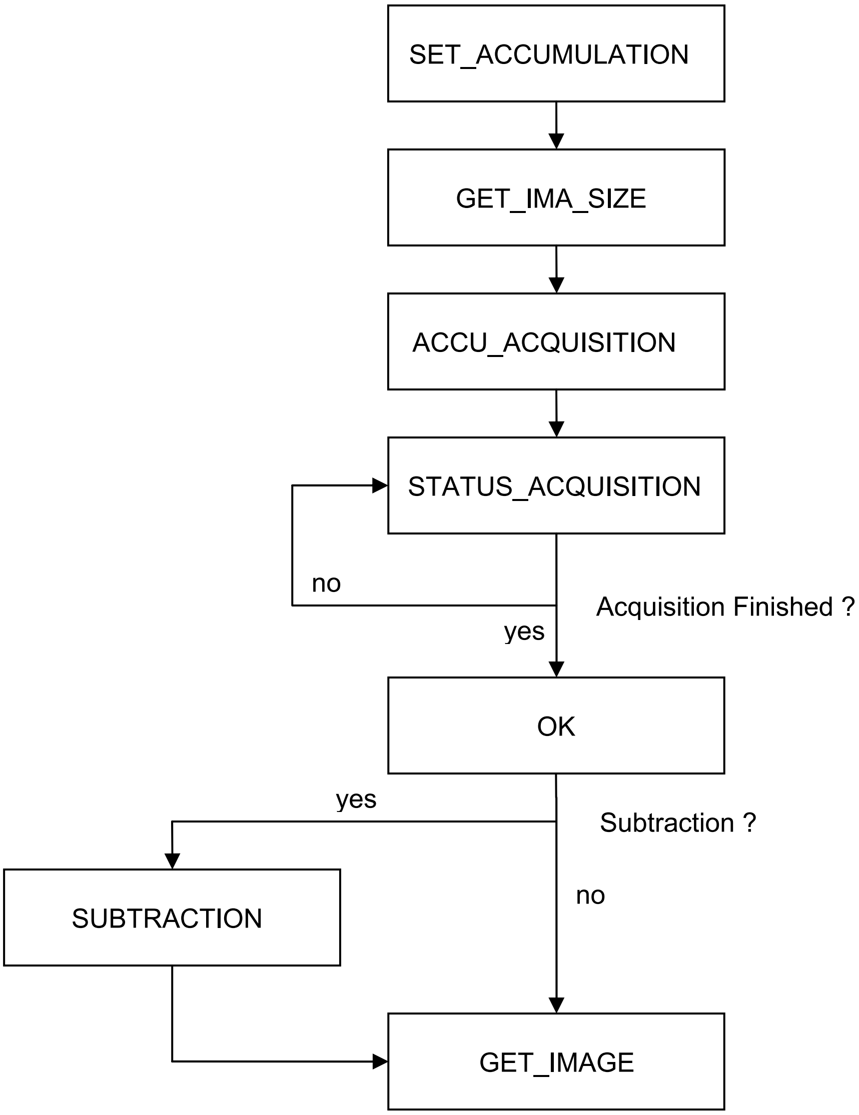
Live

The typical live schema can be given by :



Accumulation

The typical accumulation schema can be given by :

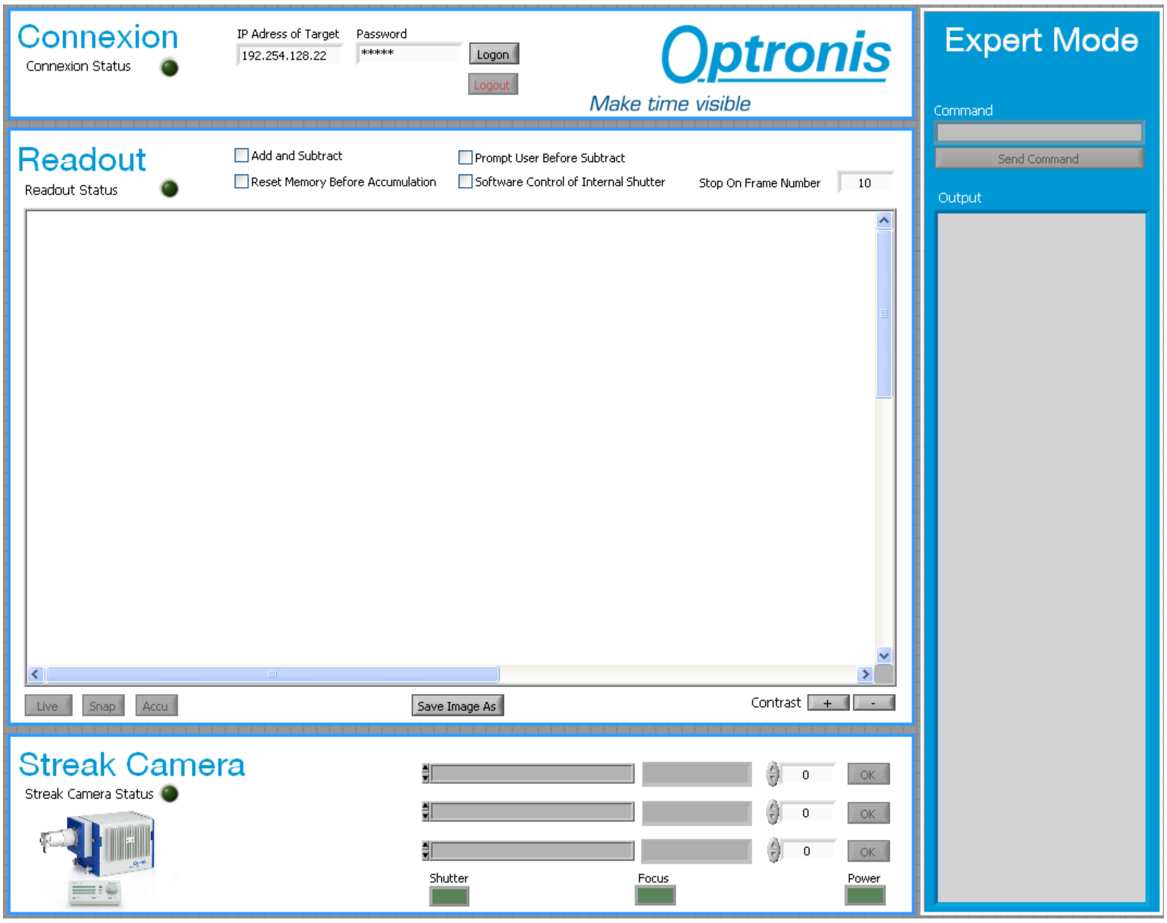


OptoClientDemo Project

The OptoClientDemo project has been written with LabVIEW 8.0 and uses the main VIs of the OptoAnalyse.llb library:

- Camera initialization
- Snapshot Acquisition
- Accumulation Acquisition
- Live Acquisition
- Control of Streak Camera parameters
- …

The project can be found on the LDK CD-ROM on the folder ‘sample’.



IP Adress of Target: 192.254.128.22

Password: *****

□ Add and Subtract

□ Reset Memory Before Accumulation

□ Prompt User Before Subtract

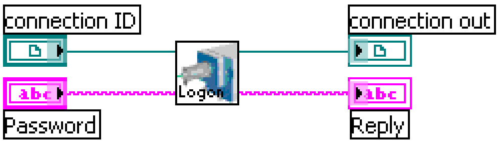
□ Software Control of Internal Shutter

Stop On Frame Number: 10

OptoAnalyseVIs Functions

Functions related to the server

VI_LOGON



Function:

Send the password to connect to OptoAnalyseNet

Note:

To access to the parameters of streak camera system, the client has to log on by using the LOGON function associated with a password. After logon, the server is locked and no other client can access to the server until the LOGOUT function is done by the logged client or the server is manually unlocked.

Input Parameters:

Refnum Connection ID: identifies the TCP connection

String Password (p): password to connect to OptoAnalyseNet

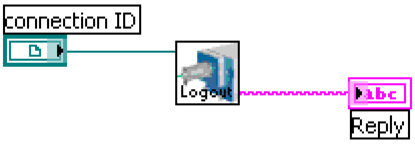
Return Values:

'Invalid Password' if the password is not correct

'Admin logged in and server locked' if logon has been done successfully

Type: refnum

VI_LOGOUT



Function:

Logs out the client from the server

Note:

None

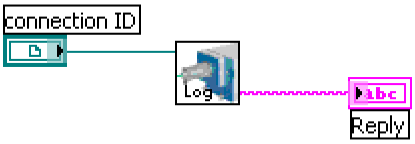
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

'OK'

VI_LOG



Function:

Send version of remote control interface software

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

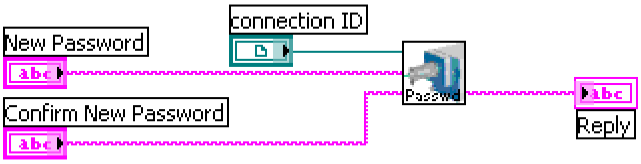
‘OPTOANALYSENET Vv.v / OPTRONIS / d’

With

v.v Version of remote control software

d Date of remote control software

VI_PASSWD



Function:

Send version of remote control interface software

Note:

Enter the password for the two parameters

Input Parameters:

Refnum Connection ID: identifies the TCP connection

String New Password: new password

String Confirm New Password: confirm new password

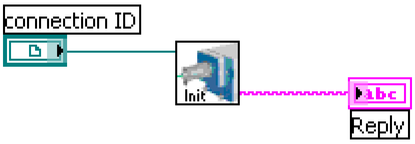
Return Values:

'Invalid value' if a and b are not equal

‘OK’ if command has been executed successfully

Functions related to the Streak Camera

VI_INIT



Function:

Initialize Camera to default Value

Note:

Default values are: If the streak camera is in local mode the shutter is closed (if available), the focus mode is disabled, the intensifier gain is set to its minimal value.

This command is not available if the streak camera is in Standby mode.

Input Parameters:

Refnum Connection ID: identifies the TCP connection

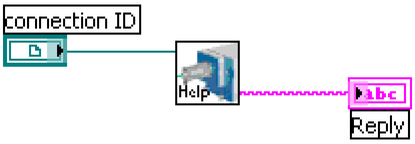
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'OK' if command has been executed successfully

VI_HELP



Function:

List available commands of the Streak camera

Note:

None

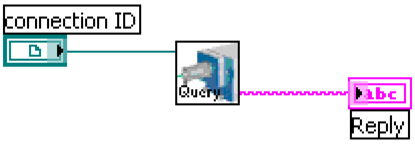
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

List of all commands

VI_QUERY



Function:

Send the OPTOSCOPE streak camera firmware version and date

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

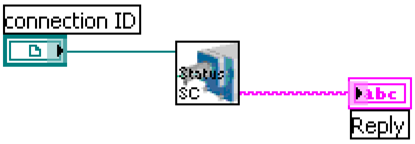
'No streak camera detected' if there is no communication between server and streak camera

'OPTOSCOPE V**v.vv** / OPTRONIS / **d**' if command has been executed successfully

With

v.vv	Version of streak camera firmware
d	Date of streak camera firmware

VI_STATUS_STREAK



Function:

Send the status information of the streak camera. This indicates the system configuration as well as the current setup.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'S**sss**, L**l**, M**mmmm**, T**t**, O**o**, G**g**, F**f**, E**eee**'

If command has been executed successfully

With

sss 0 → only main unit, no sweep units installed

1 → main unit and sweep unit 1 (first plates) installed

2 → main unit and sweep unit 2 (second plates) installed

3 → main unit and sweep unit 1 and 2 installed

>127 → camera in standby mode

l 0 → local and remote control mode

1 → only remote control mode available

mmmm Gain of intensifier tube

Example : 0300 → 300V

t Operation mode of intensifier

0 → intensifier always OFF

1 → intensifier always ON (cont.)

2 → trigger source is sweep unit 1

3 → trigger source is sweep unit 2

4 → external trigger source

o Operation mode of the electro-mechanical shutter

0 → shutter always closed (manual)

1 → shutter always open (manual)

2 → shutter controlled by external signal

g Current state of the electro-mechanical shutter

0 → shutter closed

1 → shutter open

f Current state of the focus mode

0 → focus mode OFF (deflection mode)

1 → focus mode ON

eee Current hardware error status of the streak camera.

The decimal number has to be converted to a binary number and the interpretation of the bits has to be done as follows

bit 0-1 → error source is unit 2

bit 2-3 → error source is unit 1

bit 4 → error source is image intensifier power supply

bit 5 → error source is streak tube power supply

If the sweep unit 1 is installed, the following string is added: ‘, S1=**ss**, D1=**ddddd**’ with:

ss Index of the current speed selected for unit 1

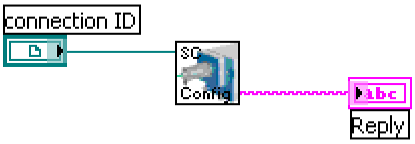
ddddd Current delay selected for unit 1. (ddddd is an integer value)

If the sweep unit 2 is installed, the following string is added: ‘, S2=**ss**, D2=**ddddd**’ with:

ss Index of the current speed selected for unit 2

ddddd Current delay selected for unit 2. (ddddd is an integer value)

VI_CFCAMERA_STREAK



Function:

Allow to get the configuration of the streak camera main unit

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

'No streak camera detected' if there is no communication between server and streak camera

‘SN**S**, b**bbbb**, B**BBBB**, S**X**, m**mmmm**, M**MMMM**’

With

S Serial number

bbbb Minimum value of streak tube operation voltage

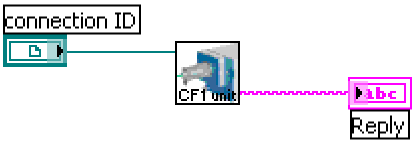
BBBB Maximum value of streak tube operation voltage

X Presence of shutter

mmmm Minimum value of intensifier gain

MMMM Maximum value of intensifier gain

VI_CF1UNIT



Function:

Allow to get the configuration of the sweep unit 1.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

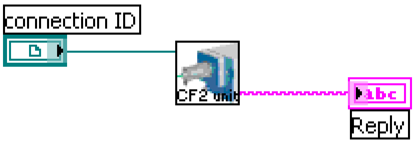
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid unit' if there no sweep unit 1 is installed

Type of sweep unit, List of sweep speeds, Minimum and maximum values of delay (if available)

VI_CF2UNIT



Function:

Allow to get the configuration of the sweep unit 2.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

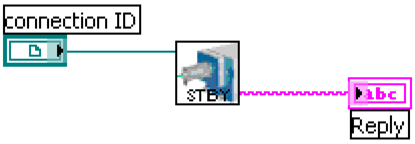
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid unit' if there no sweep unit 2 is installed

Type of sweep unit, List of sweep speeds, Minimum and maximum values of delay (if available)

VI_STBY



Function:

Set the camera from run to standby mode.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

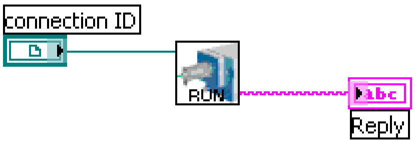
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if streak is already in standby mode

‘OK’ if command has been executed successfully

VI_RUN



Function:

Set the camera from standby to run mode.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

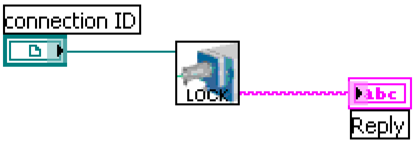
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if streak is already in standby mode

‘OK’ if command has been executed successfully

VI_LOCK (only available with RS232 connection)



Function:

Disable the local control via the remote control unit. Only the RS232 commands between the server PC and the streak camera are processed. The remote control unit is locked.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

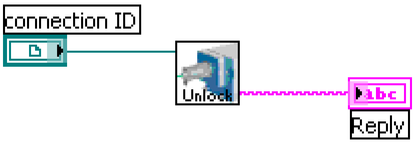
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if remote control unit is already locked

‘OK’ if command has been executed successfully

VI_UNLOCK (only available with RS232 connection)



Function:

Enable the local control via the remote control unit. The remote control unit is unlocked

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

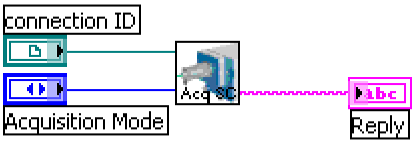
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' if remote control unit is already unlocked

‘OK’ if command has been executed successfully

VI_ACQ_STREAK



Function:

Control the acquisition mode of the streak camera.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Acquisition Mode: Index of acquisition mode

0 → continuous acquisition mode (default)

1 → single shot acquisition mode

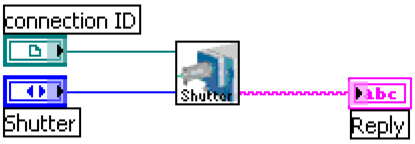
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Invalid mode' when an acquisition is in progress

'OK' if command has been executed successfully

VI_SHUTTER



Function:

Control the electro-mechanical shutter in front of the photocathode

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Shutter: Index of shutter mode

0 → shutter always closed

1 → shutter always open

2 → shutter controlled by external signal

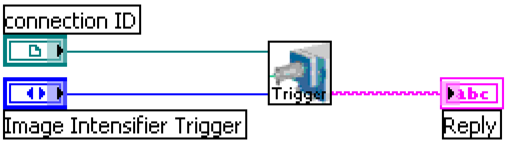
Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'OK' if command has been executed successfully

VI_TRIGGER



Function:

Control the trigger mode of the image intensifier

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Image Intensifier Trigger: Image intensifier trigger mode

0 → intensifier always OFF

1 → intensifier always ON

2 → intensifier trigger source is sweep unit 1

3 → intensifier trigger source is sweep unit 2

4 → intensifier trigger source is external signal

Return Values:

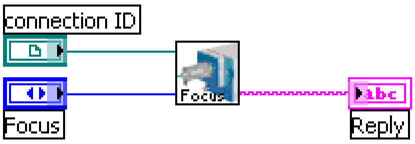
'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen sweep unit is not connected

‘OK’ if command has been executed successfully

VI_FOCUS



Function:

Control the focus mode

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Focus: Index of Focus Mode

0 → sweep mode

1 → focus mode

Return Values:

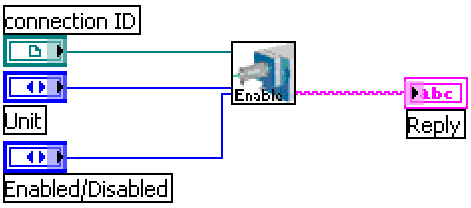
'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

VI_ENABLE



Function:

Control the focus mode

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Unit: Sweep unit:

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

I32 Enabled/Disabled: 1 to enable, 0 to disable

Return Values:

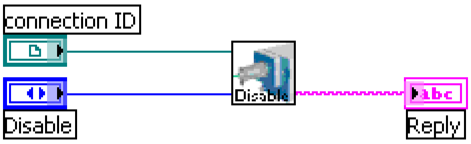
'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

VI_DISABLE



Function:

If two sweep units are installed, this command sets the unit **‘Index of Disable’** in deflection mode

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Disable: Sweep unit:

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

Return Values:

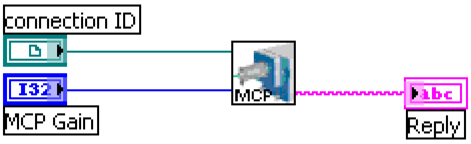
'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera unit is not connected

‘OK’ if command has been executed successfully

VI_MCP



Function:

Controls the image intensifier gain

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 MCP Gain: gain in volt, example: 0300 → 300V

Return Values:

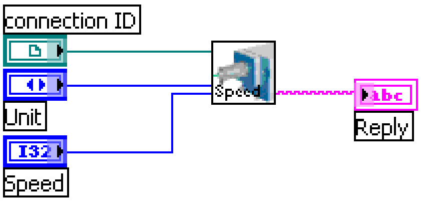
'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Value out of range' if the MCP gain is out of range

‘OK’ if command has been executed successfully

VI_SPEED



Function:

Select the sweep speed of sweep unit **‘Unit’**

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Unit: Sweep unit:

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

I32 Speed: Index of sweep speed

Return Values:

'No streak camera detected' if there is no communication between server and streak camera

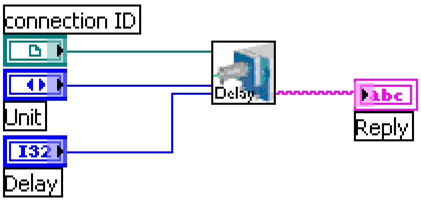
'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera sweep unit is not connected

'Value out of range' if the speed index is out of range

'OK' if command has been executed successfully

VI_DELAY



Function:

Select the delay of sweep unit **'Unit'**

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Unit: Sweep unit:

1 → sweep unit 1 (first plates)

2 → sweep unit 2 (second plates)

I32 Delay: Delay (between 1 and 10000)

Return Values:

'No streak camera detected' if there is no communication between server and streak camera

'Command not available in camera standby mode' if streak camera is in standby mode

'Invalid unit' if the chosen streak camera sweep unit is not connected

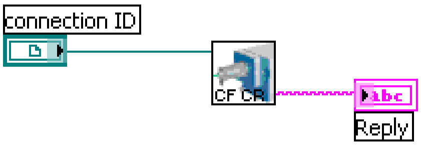
'Only available for synchroscan unit' if the chosen streak camera sweep unit is not a synchroscan unit

'Value out of range' if the delay is out of range

'OK' if command has been executed successfully

Functions related to Readout unit

VI_CFCAMERA_READOUT



Function:

Allow to get the configuration of the CCD readout camera.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘T, Rxxxxx, Ryyyyy, DxXX.XX, DyYY.YY, Iminiiiiii, Imaxiiiiii’

With

T Type of camera (string)

xxxx Number of total pixel in horizontal direction

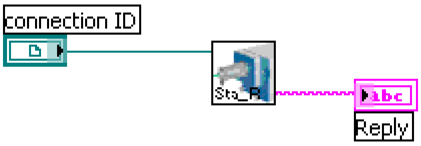
yyyy Number of total pixel in vertical direction

XX.XX Dimension of one pixel in horizontal direction referred to streak camera screen and given in µm

YY.YY Dimension of one pixel in vertical direction referred to streak camera screen and given in µm

iiiiii Integration time in ms for minimal (Imin) and maximal (Imax) that are possible with this camera example : TSCRU-SY, Rx0756, Ry0582, Dx22.50, Dy22,08, Imin000001, Imax999999

VI_STATUS_READOUT



Function:

Return the status information of the readout unit.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘I**iiiiii**, M**m**, B**xxx**, B**yyy**, Px**hhhh-hhhh**, Py**vvvv-vvvv**’

With

iiiiii Integration time in ms example : 000040 → 40ms

m Mode of operation

0 → readout unit operates in continuous mode

1 → readout unit operates in trigger mode

xx Number of pixel for horizontal binning example: 2 → 2 pixel are added before their readout

yy Number of pixel for vertical binning

example: 1 → no vertial binning is made (default)

hhhh Number of first pixel read and number of total pixel read.

Position 0 is on left side of image.

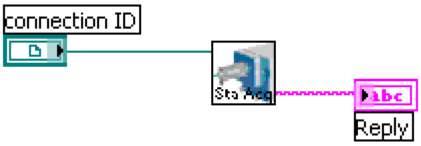
Example 0000-0752 → Readout area starts with first pixel and reads 752 pixels in horizontal direction

vvvv Line number of first pixel read and number of total lines read.

Position 0 is on top of image.

Example 0000-0580 → Readout area starts with first line and reads 580 lines

VI_STATUS_ACQUISITION



Function:

Send the status of the acquisition

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘M**m**, C**c**, A**a**, S**s**’

With

m Mode of operation

0 → no acquisition started

1 → acquisition in progress

2 → acquisition or sequence finished

c Indicates if the system is waiting for a subtraction confirmation

0 →readout unit does not wait for a confirmation

1 →readout unit waits until confirmation to continue with subtraction

a Acquisition counter indicates the actual number of acquisitions made.

0 →acquisition not started jet

1 →acquisition in progress or finished

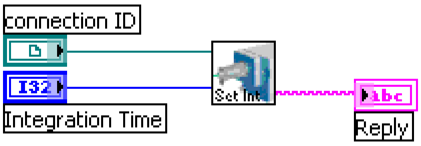
s Sequence counter indicates the actual number of acquisitions to be made within a sequence.

0 →sequence not started

1 →readout system is prepared to do first acquisition within a sequence

2 →readout system is prepared to do next acquisition within a sequence

VI_SET_INTEGRATION



Function:

Set the integration time of the readout unit

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

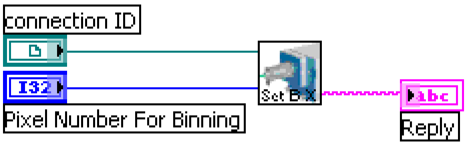
I32 Integration Time: Integration time in ms (ttttt)

Return Values:

iiiii New integration time in ms

Example: 00040 → 40ms

VI_SET_BINNING_X



Function:

Set the number of pixel for horizontal binning. If no binning option is available, the parameter remains at 1.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Integration Time: Pixel number for binning (xx)

Return Values:

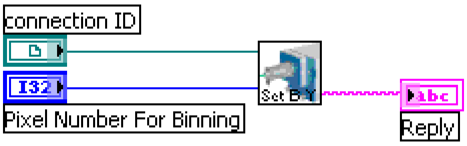
‘Bxxx’

With

xx Number of binned pixel

Example: 2 → 2 pixel will be added before their readout

VI_SET_BINNING_Y



Function:

Set the number of pixel of lines for vertical binning. If no binning option is available, the parameter remains at 1.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Integration Time: Pixel number for binning (yy)

Return Values:

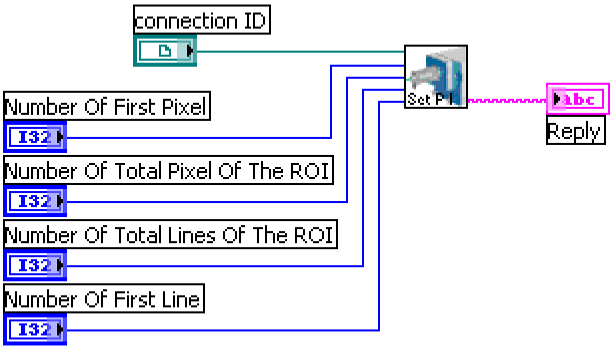
'Bxyy'

With

yy Number of binned pixel

Example: 1 → no vertial binning is made (default)

VI_PARTIAL_IMAGE



Function:

Set the position and size of the CCD readout region.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Number of First Pixel of the Roi (aaaa)

I32 Number of Total Pixel of the Roi (bbbb)

I32 Number of Total Pixel of the Roi (cccc)

I32 Number of First Line (dddd)

Return Values:

'Invalid value' if the input parameters don't match with the readout characteristics

‘Pxhhhh-hhhh, Pyvvvv-vvvv’

With

hhhh Number of first pixel read and number of total pixel read.

Position 0 is on left side of image.

Example: 0000-0752 –> Readout area starts with first pixel and reads 752 pixel in horizontal direction

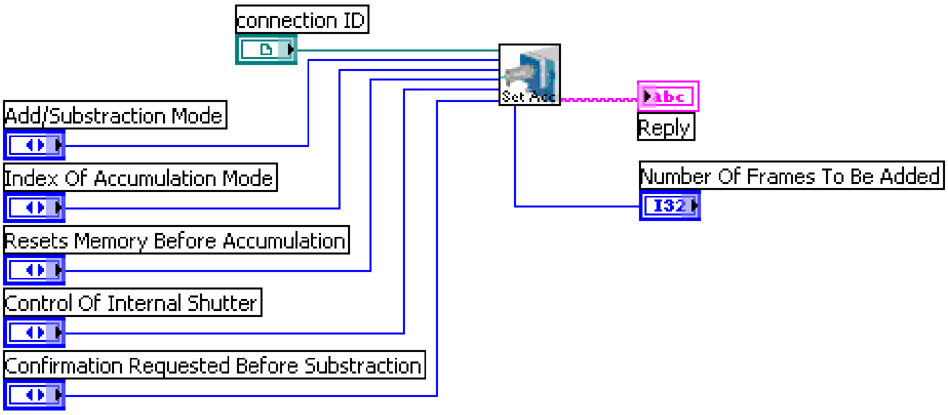
vvvv Line number of first pixel read and number of total lines read.

Position 0 is on top of image.

Example: 0000-0580 –> Readout area starts with first line and reads 580 lines

Note: Some readout units do only allow multiples of 32. The values are adapted in these cases.

VI_SET_ACCU


connection ID
Add/Substraction Mode
Index Of Accumulation Mode
Resets Memory Before Accumulation
Control Of Internal Shutter
Confirmation Requested Before Substraction
Set Acc
abc
Reply
Number Of Frames To Be Added
I32

Function:

Set the parameters for accumulation mode of the readout unit.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Add/Subtraction Mode: 0 → Add mode

1 → Add and Subtract mode

I32 Index of accumulation mode: 0 → analogue accumulation

1 → photon counting mode

I32 Resets memory before accumulation: Ignored since OptoAnalyseNet v3.51

I32 Control of internal shutter: 0 → shutter remains unchanged after adding of frames

1 → shutter is closed before subtraction of frames

I32 Confirmation before subtraction: 0 → no confirmation requested

1 → subtraction is delayed until confirmation

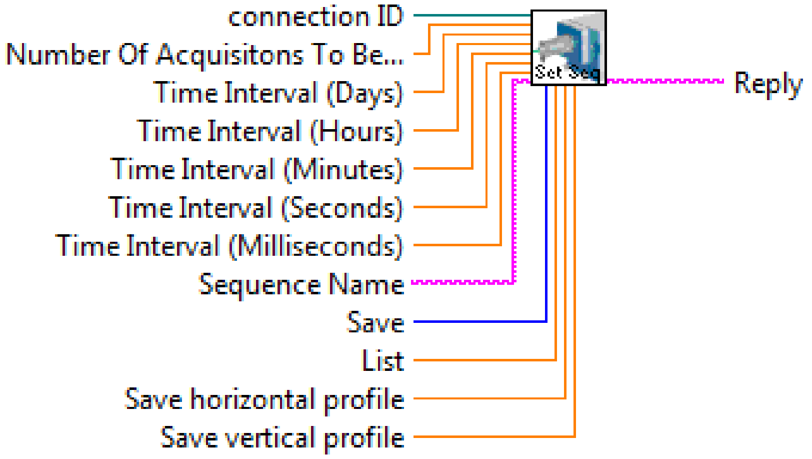
I32 Number of frames to be added

If N is <1 (example N= 0.05) then acquisition stops with a defined number of pixels that are saturated. (example 5% of the pixel are saturated)

Return Values:

'OK'

VI_SET_SEQ



Function:

Set the parameters for sequence acquisition of the readout unit.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Number of acquisitions to be made within the sequence (nnnn)

I32 Time Interval in Days (dd)

I32 Time Interval in Hours (hh)

I32 Time Interval in Minutes (mm)

I32 Time Interval in Seconds (ss)

I32 Time Interval in Milliseconds (mmm)

String Sequence Name: (s)

Sequence name (if there are spaces in the sequence filename string, use quotes to set the filename). If the sequence name already exists, no warning is returned and the sequence will be overwritten.

Example:

If the sequence file name is : \\my Place\my sequence, s must be equal to "\\my Place\my sequence*".*

I32 Save: (b)

Indicates if every acquired image has to be saved or not.

0 → the images are not saved

1 → the images are saved during sequence acquisition

I32 List: (list)

Integer describing the parameters to be transferred after each acquisition. The following parameters are available and are given with their index:

1 : Date → date when image is acquired, format dd-hh-mm

2 : Time → time when image is acquired

4 : Name → the image name

8 : Mean → mean value within the image or ROI is transferred

16 : Sigma → calculates and transfers the noise inside the image or ROI

32 : Min → finds and transfers the minimum grey level inside the image or ROI

64 : Max → finds and transfers the maximum grey level inside the image or ROI

128 : cog(x) → calculates the centre of gravity inside the image or ROI along the horizontal (x) axis

256 : cog(y) → calculates the centre of gravity inside the image or ROI along the vertical (y) axis

512 : cog(pulse x) → calculates the centre of gravity of a unique pulse inside the image or ROI along the horizontal (x) axis

1024 : cog(pulse y) → calculates the centre of gravity of a unique pulse inside the image or ROI along the vertical (y) axis

2048 : FWHM(pulse x) → calculates the full width at half maximum (FWHM) of a unique pulse inside the image or ROI along the horizontal (x) axis

4096 : FWHM(pulse y) → calculates the full width at half maximum (FWHM) of a unique pulse inside the image or ROI along the vertical (y) axis

To transfer several parameters, list must be equal to the sum of the indexes corresponding to these parameters.

Example : to transfer the Min and Max values, list must be equal to 64+128 = 192

I32 Horizontal Profile: (h)

Indicates if every horizontal profile has to be saved or not.

0 → the horizontal profiles are not saved

1 → the horizontal profiles are saved during sequence acquisition

I32 Vertical Profile: (v)

Indicates if every vertical profile has to be saved or not.

0 → the vertical profiles are not saved

1 → the vertical profiles are saved during sequence acquisition

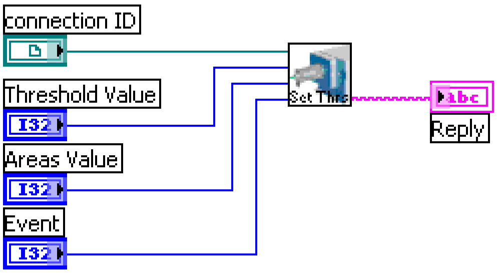
Return Values:

'Invalid filename' if the sequence file name path does not exist

'Invalid value' if one of the input parameters is not correct

‘OK’ if command has been passed successfully

VI_SET_THRES



Function:

Set the threshold value for photon counting acquisition mode.

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Threshold Value (tttt): Equal or higher intensities are considered to be a valid event for photon counting.

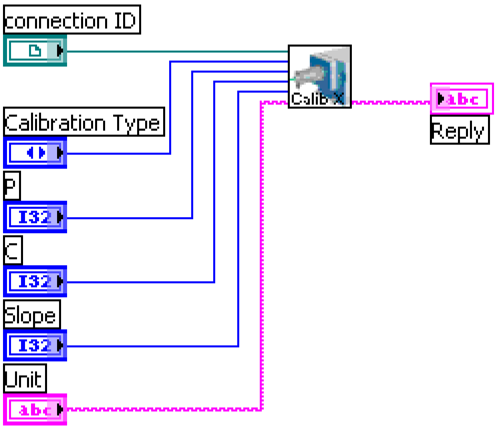
I32 Areas Value (ssss): Areas with pixel intensities above the threshold value are only considered to be a valid event, when their surface (in pixel) is below this maximum value.

I32 Event (eeee): If the sum of all adjacent pixels above the threshold is larger than eeee, the event is not considered.

Return Values:

‘OK’

VI_SET_CALIB_X



Function:

Set the parameters for calibration on horizontal (x) axis.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Index of Calibration Type:

0 → no calibration, pixel are only counted starting with 0

1 → linear calibration, see parameters ddff

2 → multi-linear calibration, see parameters ddff

3 → Time based on sweep unit 1

4 → Time based on sweep unit 2

5 → Wavelength based on spectrometer setup

6 → Millimeter (Dimensions referred to the readout camera)

I32 P: Pixel co-ordinate at which the calibrated value C is set. Together with parameter S, this has to be repeated for each point with m=2.

I32 C: Calibrated value for pixel position P. Together with parameter P, this has to be repeated for each point with m=2.

I32 Slope: (S) Slope, increment of calibrated values per pixel. This value has to be omitted with m=2.

String Unit: (U) Unit of calibrated value.

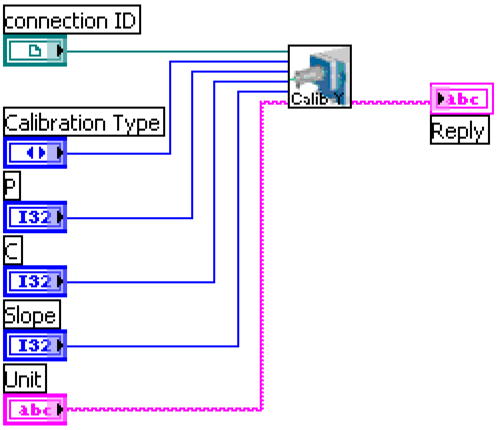
Return Values:

'Invalid unit' if no sweep unit 1 is installed

'OK' for m=0, 1 or 2

'P, C, S, U' for m=3

VI_SET_CALIB_Y



Function:

Set the parameters for calibration on vertical (y) axis.

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Index of Calibration Type:

0 → no calibration, pixel are only counted starting with 0

1 → linear calibration, see parameters ddff

2 → multi-linear calibration, see parameters ddff

3 → Time based on sweep unit 1

4 → Time based on sweep unit 2

5 → Wavelength based on spectrometer setup

6 → Millimeter (Dimensions referred to the readout camera)

I32 P: Pixel co-ordinate at which the calibrated value C is set. Together with parameter S, this has to be repeated for each point with m=2.

I32 C: Calibrated value for pixel position P. Together with parameter P, this has to be repeated for each point with m=2.

I32 Slope: (S) Slope, increment of calibrated values per pixel. This value has to be omitted with m=2.

String Unit: (U) Unit of calibrated value.

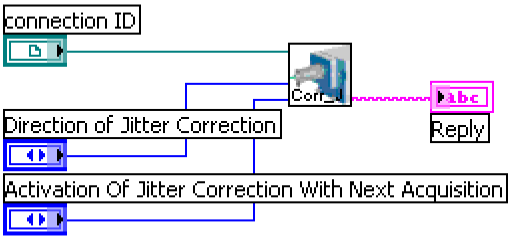
Return Values:

'Invalid unit' if no sweep unit 1 is installed

‘OK’ for m=0, 1 or 2

‘P, C, S, U’ for m=3

VI_SET_CORR_J


connection ID
Corr_J
Reply
Direction of Jitter Correction
Activation Of Jitter Correction With Next Acquisition

Function:

Set the parameters for jitter correction.

Input Parameters:

Refnum Connection ID: identifies the TCP connection

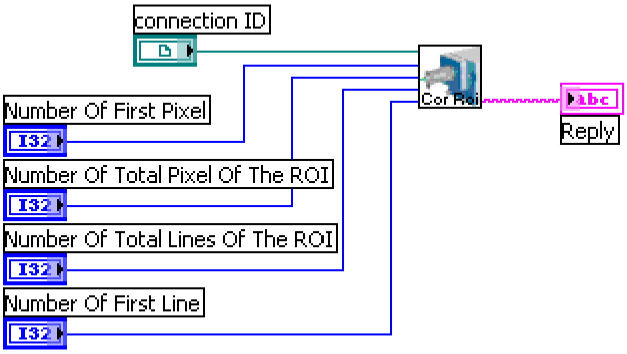
I32 Direction of jitter correction: 1 → horizontal
2 → vertical
3 → both directions

I32 Activation of jitter correction with next acquisition:
0 → jitter correction not activated
1 → jitter correction activated with next acquisition

Return Values:

‘OK’

VI_SET_CORR_ROI



Function:

Set the position and size of the correction ROI.

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Number of First Pixel of the Roi (aaaa)

I32 Number of Total Pixel of the Roi (bbbb)

I32 Number of Total Pixel of the Roi (cccc)

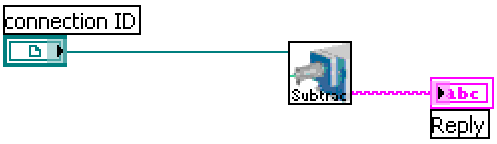
I32 Number of First Line (dddd)

Return Values:

‘OK’ when ROI is valid‘

NO’ if ROI can not be defined with this size

VI_SUBTRACTION



Function:

Confirm the start of the subtraction after the readout unit has finished accumulation.

Note:

None

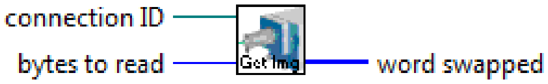
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘OK’

VI_GET_IMAGE



Function:

Transfer the image data of the acquired image

Note:

None

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

32 bits buffer.

The size of the buffer depends on the image size. Size is given by calling the function GET_IMA_SIZE.

Example :

GET_IMA_SIZE returns 1376 1024

The calling of GET_IMAGE will then send 1376*1024 words of 32 bits through the network.

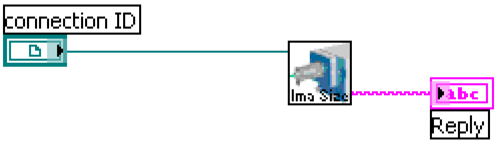
Important:

All the pixel values are multiplied by 1000 in output of this VI.

Example :

If the pixel value returned by GET_IMAGE is 231521, the real value is 231,521

VI_GET_IMA_SIZE



Function:

Allow to get the size of the current image

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

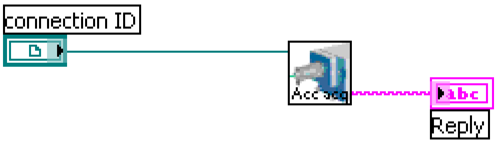
‘wwww hhhh’

With

wwwwWidth of the image

hhhh Height of the image

VI_ACCU_ACQUISITION



Function:

Start an accumulation

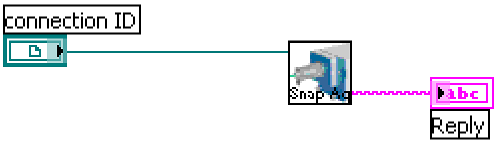
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘OK’

VI_SNAP_ACQUISITION



Function:

Start a snapshot

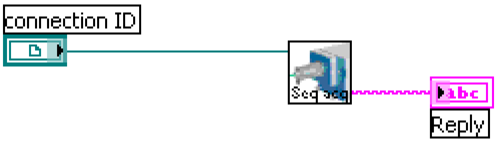
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘OK’

VI_SEQ_ACQUISITION



Function:

Start a sequence acquisition

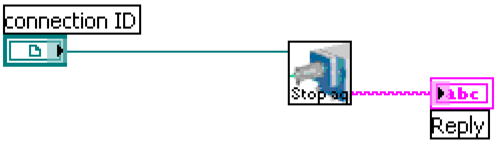
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘OK’

VI_STOP_ACQUISITION



Function:

Start a sequence acquisition

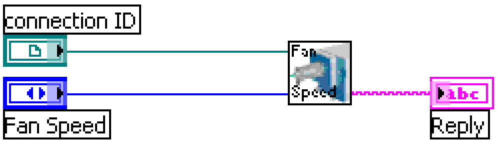
Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

‘OK’

VI_SET_FAN_SPEED



Function:

Set the speed of the fan.

Note:

Only for ANIMA-U10 readout camera

Input Parameters:

Refnum Connection ID: identifies the TCP connection

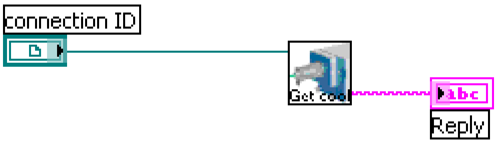
Input parameter: (s) 0 → low 1 → medium 2 → high

Return Values:

'OK'

'Invalid parameter' if **s** is not with in the range listed above

VI_GET_COOLER_STATUS



Function:

Return a string in the following format

Note:

Only for ANIMA-U10 readout camera

Input Parameters:

Refnum Connection ID: identifies the TCP connection

Return Values:

'Cc, Hh, Dd, Ss'

With

c Current CCD temperature in deg. Centigrade

h Current temperature of heat sink in deg. Centigrade

d Drive level of Thermo-Electric cooler in percent (0..100%)

s Status of the temperature controller

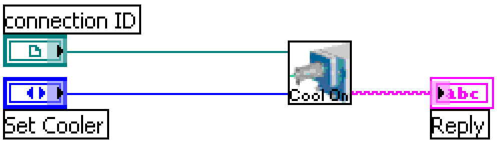
0 → cooler is off

1 → cooler is ramping to the Set Point

2 → cooler is at Set Point

3 → cooler controller has generated a temperature revision

VI_SET_COOLER_ON



Function:

Set the cooler on or off

Note:

Only for ANIMA-U10 readout camera

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Set Cooler: (s) 0 → Cooler is set to off

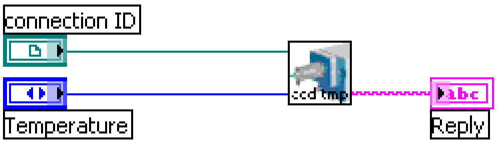
1 → Cooler is set to on

Return Values:

‘OK’

‘Invalid parameter’ if **s** is not with in the range listed above

VI_CCD_TEMP



Function:

Define the set point of the CCD temperature

Note:

Only for ANIMA-U10 readout camera

Input Parameters:

Refnum Connection ID: identifies the TCP connection

I32 Temperature: (t)

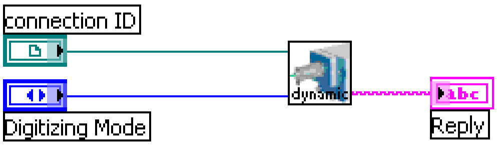
Temperature of the CCD defined in deg. Centigrade. Refer to the user manual to the ANIMA-U10 camera for information about the allowed range

Return Values:

‘OK’

‘Invalid parameter’ if **t** is outside the allowed range

VI_DYNAMIC



Function:

Set dynamic range of the camera by selecting either 12 bit digitizing or 16 bit digitizing mode

Note:

Only for ANIMA-U10 readout camera

Input Parameters:

Refnum Connection ID: identifies the TCP connection

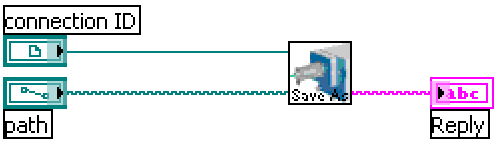
I32 Digitizing Mode (d):	0 → digitalization is set to 12 bit
	1 → digitalization is set to 16 bit

Return Values:

‘OK’

‘Invalid parameter’ if **d** is not with in the range listed above

VI_SAVE_AS



Function:

Allow to save the current frame to the location defined by the path parameter p.

Note:

The frame used during the latest acquisition has still to be active in order to save the image data from the latest acquisition

Input Parameters:

Refnum Connection ID: identifies the TCP connection

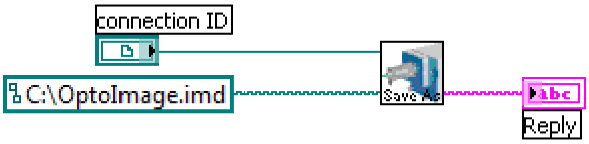
Path (p): Path of the frame to be saved.

Return Values:

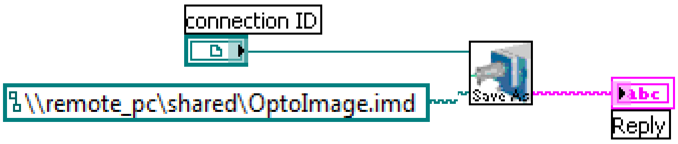
‘OK’

‘Invalid Value’ if the path is invalid or if the file has not been created

Examples:



This will save the current frame under the name OptoImage.imd on the hard drive C of the computer where OptoAnalyseNet is running.



This will save the current frame under the name OptoImage.imd on the specified network path \\remote_pc\shared