PCI Grabber-4*plus*

LabView
Driver and Demo Program

1. Edition

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1st Edition June 2005

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1.1   Installation and Software

1.1.1 Requirements

In order to start the driver and the demo program, you will first have to install a version of ***National-Instruments LabView*** on your computer.

The driver *for the Framegrabber card* can be used with LabView version 5.0 or higher. You can obtain image data from the Framegrabber card and process it according to the given task.
For more complex image processing, you will usually require a supplemental „image processing" packet, such as *IMAQ* or *„Vision"* from National Instruments.

For Labview versions 5.0 through 6.x we include an additional demo application. It shows the basic use of the driver and corresponds somewhat to the Windows demo program that is included with the Framegrabber card.
To execute the demo application you will also require a version of the supplemental software ***IMAQ*** (full version) from National Instruments.

Hint:
The demo application is not meant for use with LabView Versions 7.0 or higher, since the library structures for these were modified by National Instruments and are no longer compatible with the previous versions.
However, you will still be able to use the driver with these LabView versions.

The description of the driver is located in *section 1.3*.

- Please note that the LabView driver does not support use of the combi-cable as an S-Video input. If you want to use a camera with an S-Video connector, please connect it to the Mini-DIN socket.

1.1.2 Installation of the Demo Program

Start the setup routine, which will take you through the installation.

1.1.3 Start of the Demo Program

Double click on the file ***LabViewDemo.vi*** to start the demo application or start LabView manually by clicking on ***File Open*** and select the file ***LabViewDemo.vi*** from the directory you chose upon installation.

Caution!
After the initial start, the correct connections to the VIs located on the hard drive will be updated for your system. Save the ***LabViewDemo.vi*** under the same name after you have successfully started up the program, thus adopting the new modifications.

1.2   Description of the Program Functions

1.2.1 Image Control

After starting the program you will be able to input and modify the image parameters described below on the four register sheets.
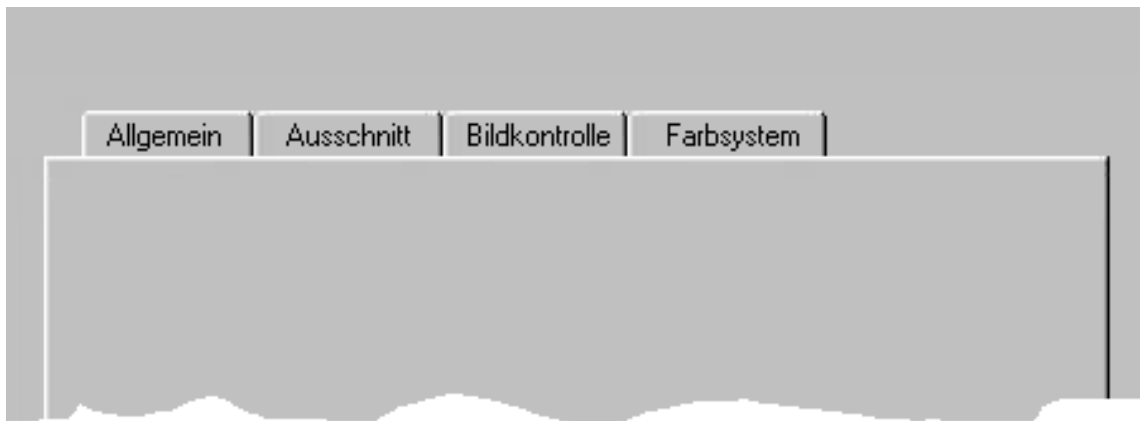
Figure 1:   Window for Image Control

Caution!
Although the program is present as a VI, giving you all configuration possibilities, please do not modify the position of the windows, since the SubVIs appear at specified locations when called up.

The ‚General' - tab

On the register sheet shown below you can select your desired resolution. You can freely set your resolution separately in the horizontal direction (pixel number) and in the vertical direction (column number) if the button *Free* has been selected.

Be aware that the picture will be distorted if the aspect ratio does not correspond to the TV standard. To avoid this select the button *TV-format*. This will automatically calculate the correct image height for the selected image width to give you the correct width/height ratio (4:3).
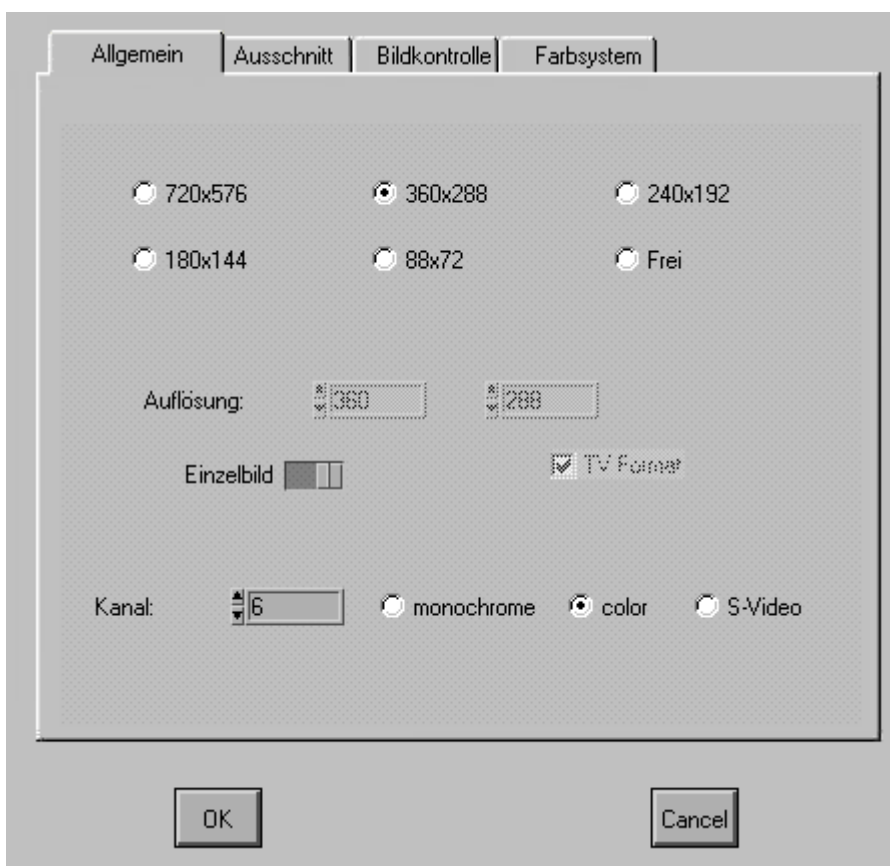
Figure 2:   Register Sheet - General

In the lower part of the window you can select which input channel will be used for the digitalization. Channel 1 through 9 can be selected as the composite input. The radio buttons on the right can be used to select the picture source type. If the picture source is an S-Video source (connected to the Mini-DIN-Socket), channel 9 will be selected automatically, since it carries the S-Video signal.

Clipping - tab

The display window shown on the screen is not necessarily the entire digitalized picture field. With '*Ausschnitt*' (*Clipping)* a segment of the image field can be defined which is smaller than the camera's visual field. If you want to display the entire picture, click on the box '*Ausschnittsgröße = Bildgröße*' (*Clipping Size=Picture Size).* This will automatically adjust the window size to match the image size.

The position of the window within the picture field can be set with '*Fensterposition*' (*Window Position).* The values determine the position of the upper left corner of the segment within the entire picture. If you want the clipping region to be positioned exactly in the middle of your TV screen, activate the box '*zentriert*' (*centered).*
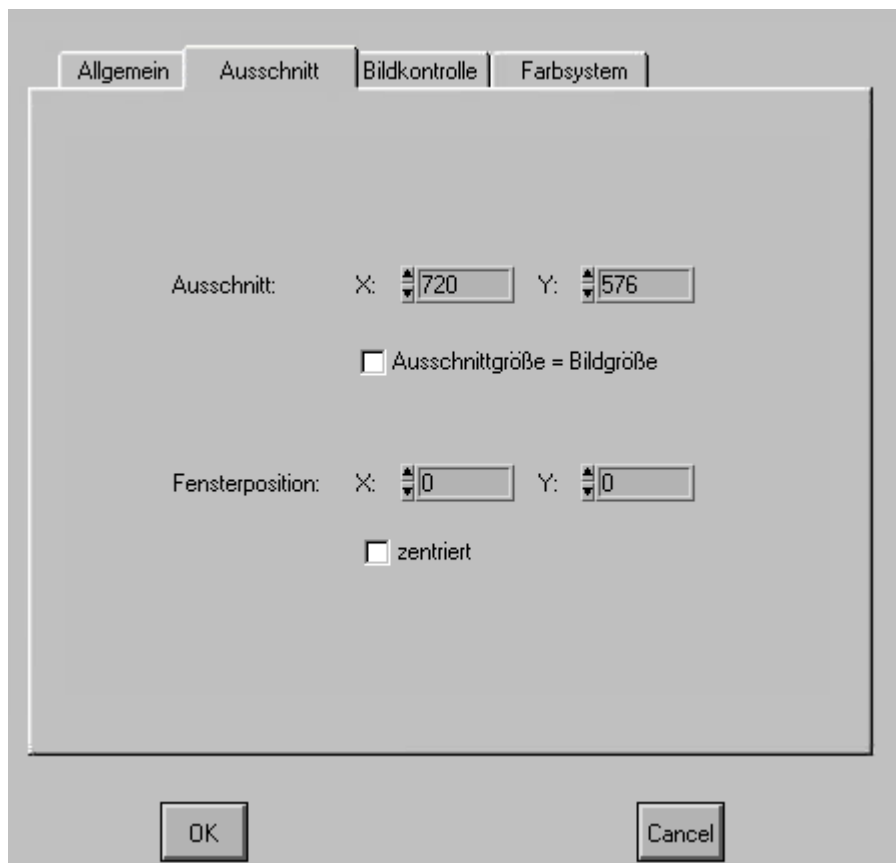
Figure 3:   Register Sheet - Clipping

Image Control - tab

The slide controls can be used to adjust brightness (*Helligkeit*), contrast (*Kontrast*), color saturation and color tone (hue, *Farbton*). There are two sliders available for setting color saturation: *Saturation U* and *Saturation V*. This enables separate manipulation of the saturation in the red and blue ranges.

The slider for color tone, *Hue*, should only be used with an NTSC color system. It is used to correct color falsification due to phase errors along the signal path. This kind of disturbance only occurs with NTSC systems.
The PAL system corrects color tone errors automaticaly, so that changes to the color tone slider have no effect.
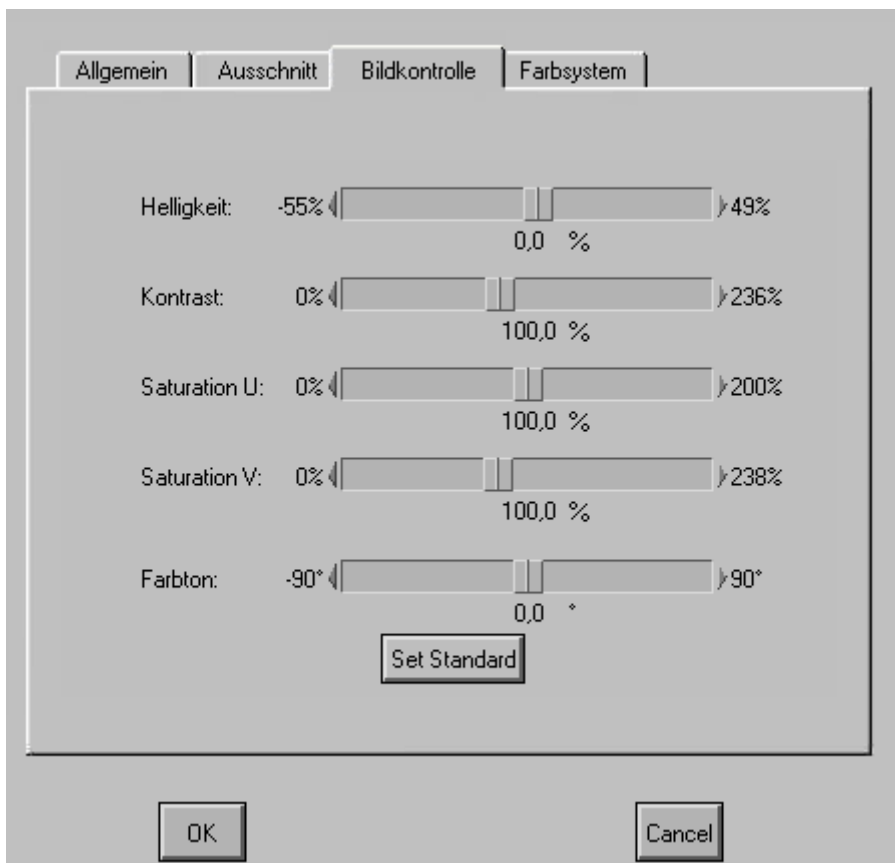
Figure 4:   Register Sheet – Image Control

Color System tab

In the color system menu you can select between PAL or NTSC depending the connected image source.
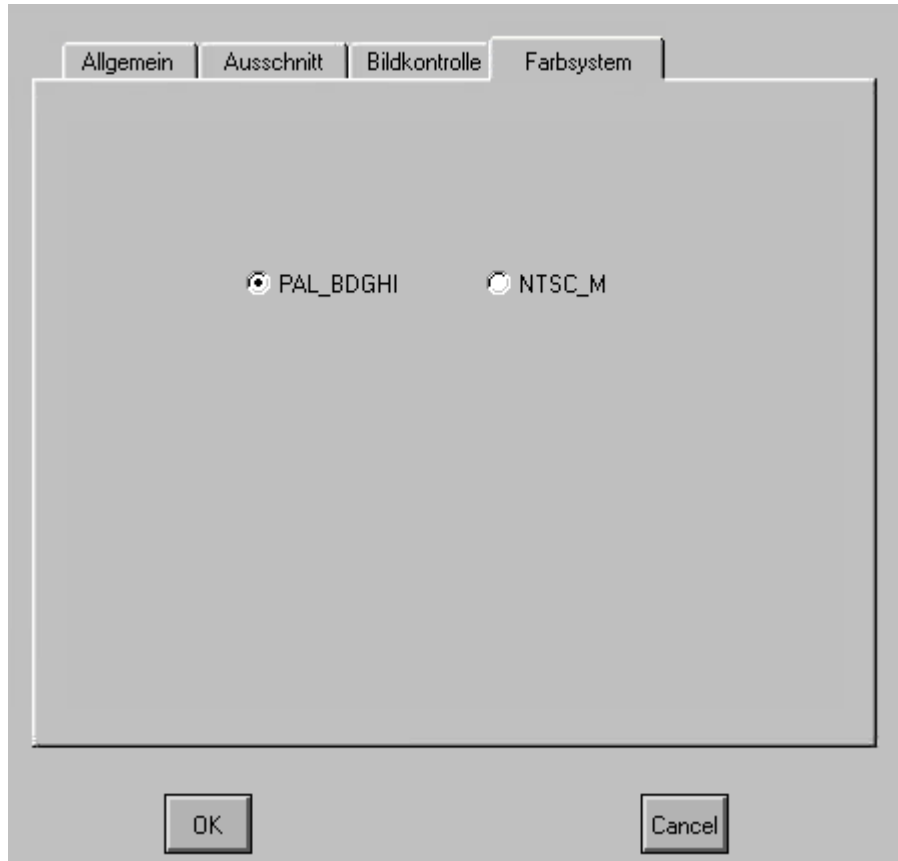
Figure 5:   *Register Sheet – Color System*

1.2.2   Displaying an Image on the Monitor

Click on the *OK button* to start the Grabb procedure and your settigs will be saved on the data carrier, so that these values will be taken as default settings the next time you start.

Caution!
The values that the program stores on your data carrier are written to the same folder as the VI you executed earlier. If this file is damaged or accidentally deleted, confirm the corresponding report after starting LabView with *Continue*. After clicking on the *OK button* the corresponding file will be restored.

Cancel interrupts the program without saving any of the settings you have entered on the data carrier. The last saved values will be kept.

1.2.3   Standard Settings

On the Image Control tab you will find the button *Set Standard*. This will set all of the slide controls on this tab to a value predefined by the program.

1.2.4   Operation Hints

The slide controls used for picture control can be adjusted with short clicks to the arrows to the right and left of the slider bar or you can manually adjust the slider bar to the desired position.

After switching to another tab, please wait until the new sheet is actually displayed.

1.2.5   Creating Your Own Application
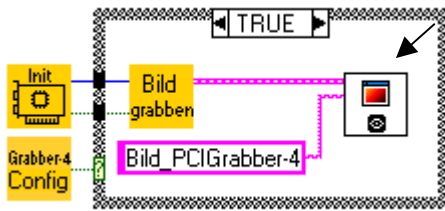
This simple program example can serve as a basis for creating your own application. Simply enter the functions you wish to use in the area indicated by the arrow. Please note that the initialization only has to be executed once, even if you want to capture multiple images. If no modifications to the digitalization parameters are required, use **PCIGrabber_CONFIG.vi** to create the four files with your desired values for channel, resolution etc., and do not call the input menu as indicated above.

1.2.6   Hints

Please refer to the additional information and procedures in the pciGrabber-4/-plus Hardware Manual (L-556e).

The functionality of the program and the individual SubVIs is implemented directly in the program. This can be seen in part directly as text or by clicking on the right mouse button and *Description*...

In addition to the actual LabView Demoprogram and the data for the register sheets, there are also two corresponding VI-libraries required. The VIs contained therein and their functionality are only described briefly in *section 1.2*, since these are frequently called by Windows own *User32.DLL*.
Only a screen resolution of 800x600 pixels or greater will properly display the front panel.

1.3 Description of SubVIs

In this section you will become acquainted with the SubVIs used in the demoprogram. You can use these SubVIs to create your own applications. The VIs that are contained in the library but not listed here are considered technically irrelevant in terms of programming, since these are merely supplemental SubVIs to those listed below and have no function by themselves.

1.3.1 Library SubVIs

PCIGrabber-4_INIT
Must be executed once before an image can be digitalized.

Connections:

Inputs:
None

Outputs:

nDevNo	Device number of the pciGrabber-4 /-plus
Error code:	Returns TRUE or FALSE and is used as interrupt criterium
Signal	Returns a value between 0 and 3, which determines whether a camera is connected to the selected channel and, if so, the signal quality
Video	Returns a value of 0 or 1, which characterizes the video format
Error	Returns a number between 0 and 5, representing possible errors

PCIGrabber-4_SET

Returns the parameters you have set to the Cr4cdll.dll of your Grabber

Connections:

Inputs:

nDevNo	Device number of the pciGrabber-4/-plus
Error:	Coming from INIT; serves as interrupt criterium

Outputs:

IMAGE (von...)	Handle for the picture to be displayed later
Array 32	Array, if „COLOR" is selected
Array 8	Monochromatic array
Adresse	Position of the picture data in the memory
X-Dimension	Size of the picture in the X direction
Y-Dimension	or in the Y direction

PCIGrabber-4_CONFIG

Configures the four files with the values from the register sheets.

Connections:

Inputs:
None

Outputs:

OK	Returns TRUE or FALSE depending on the selected button (OK/CANCEL)

PCIGrabber_CONVERT

Convernts the picture data to IMAQ format, so that the picture can be displayed.

Connections:

Inputs:
See outputs PCIGrabber_SET

Outputs:

IMAGE(zu...)　　　new Handle for transfer to the display-VI of the IMAQ

PCIGrabber_GRABB

Integrates the two functions *PCIGrabber-4_SET* and *PCIGrabber-4_CONVERT* in one single function

Connections:

Inputs:

nDevNo	Device number of the pciGrabber-4/-plus
Error code:	Coming from INIT; used as interrupt criterium

Outputs:

Image(zu...)　　　Digitalized image in IMAQ format

PCIGrabber_STOP

Stops the digitalization procedure and frees the PCI-Bus

Connections:

Inputs:

nDevNo　　　Device number of the pciGrabber-4/-plus

Outputs:

None

PCIGrabber_BILDER_PRO_SEK
Displays the number of digitalized imagess in live mode

Connections:

Inputs:
VON ...1   'from 1…3': connect these three
VON ...2   connections to the shift register
VON ...3   as shown in the demo program
Schleifenzähler (i) Cycle Counter (i): number of the current cycle

Outputs:
TO ...1   connect these three
TO ...2   connections to the shift register
TO ...3   as shown in the demo program

Title Screen
Shows the title screen of the pciGrabber-4 for ...ms

Connections:

Inputs:
Delay Time: This is the time in ms that determines how long
                       the title screen should be displayed

Outputs:
None

General
Calls up a front panel with user elements *(see Figure 2)*

Connections:

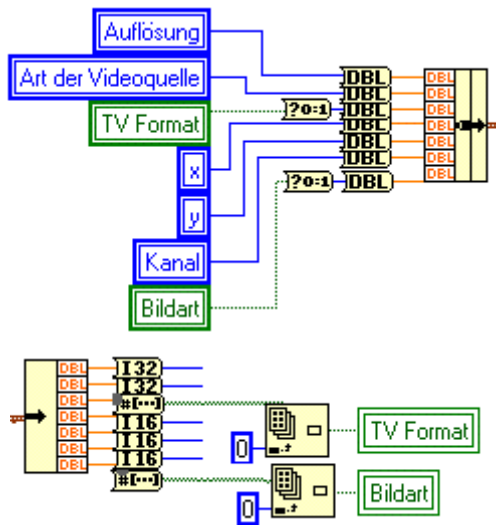**Inputs:**
Input   Cluster of previously established values

Input   Cluster of the register sheet color system
                       (*Farbsystem*)

Outputs:
Output   User modified cluster (updated data set)

Unpacking/Packing of the Cluster

The local variables *Auflösung* (*Resolution)* and *Art der Videoquelle* (*Type of Video Source)* stand for numbers that are used to construct a boolean array and its values (TRUE or FALSE) that will have radio buttons assigned to them based on their position. X and Y are the values if *Frei* (*Free)* has been selected. *Bildart* (*image type*) asks whether it is a *Live* or *Single picture*.

When classifying a culster the values for *TV Format* and Bildart (*image picture type*) can be obtained as shown.

Clipping
Calls up a front panel with user elements (*Figure 3*)

Connections:

Inputs:

Eingang   Input:Cluster of previously established values

Outputs:

Ausgang   Output:User modified cluster

Unpacking/Packing of the Cluster

The input cluster is distributed among the local variables as shown here. *Bildgr (Picturegr)* and *Zentriert (Centered)* can be taken from a boolean array.
The bundling is equivalent to that shown in *General*.

Image Control
Calls a front panel with user elements

Connections:

Input:

Eingang   Input: Cluster of previously established values

Outputs:

Ausgang   Output: User modified cluster

Packing/Unpacking of the Cluster

In the diagram the variables for the individual sliding controls are packed, in corresponding sequence with the accompanying function, into a cluster which is connected as an output, as with all the register SubVIs.

The input cluster can be assigned to local sliding control variables.

 Color Control

Calls a front panel with user elements (*Figure 4*)

Connections:

Inputs:

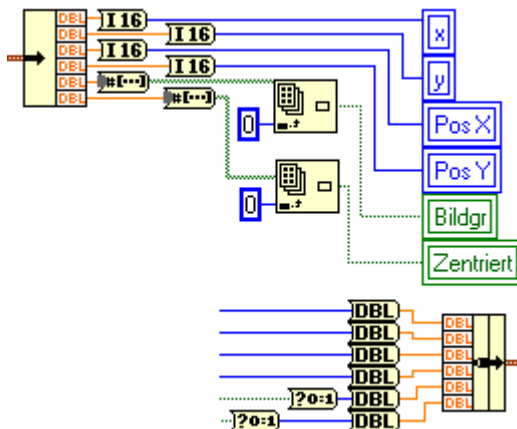Eingang   Input:Cluster of previously established values
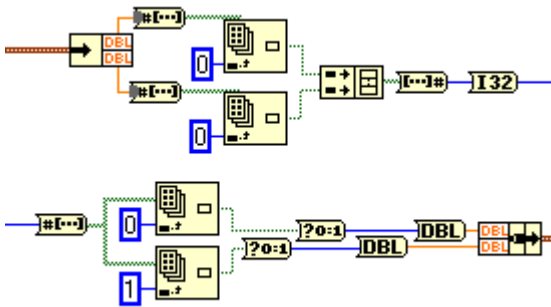
Outputs:

Ausgang   Output:User modified cluster

Packing/Unpacking of the Cluster

The input cluster is split into two numerical values, which are then converted to a boolean array in order to write the first value to a new boolean array and then to convert this array to a numerical value, which establishes which radio button was pressed. To create the cluster the aforementioned numerical value is converted to a boolean array and the first two values (TRUE or FALSE) are transformed into double type numbers. Both of these values can now be packed with the output cluster.

Data Storage

Writes the values in the four clusters in the register sheets to four corresponding files on the hard disk

Connections:

Inputs:

Bildkontrolle	*Image Control*	these are the names for
Allgemein	*General*	the four clusters, that
Ausschnitt	*Clipping region*	contain the values of the
Farbsystem	*Color System*	register sheets

Outputs:
None

Loading Data

This VI loads the value to the four register sheet clusters of the corresponding files.

Connection:

Inputs:
None

Outputs:
See Inputs of Data Storage

1.3.2 Library Window Control

Window Size
Determines the size of a front panel in the X and Y direction

Connections:

Inputs:

Fenstername	Window Name: Descriptor of the VI (string)
Fenstergröße	Window Size: Cluster with X and Y size

Outputs:
None

Window Position

Determines the position of the upper left corner of the front panel in the X and Y direction

Connections:

Inputs:

Fenstername	Window Name: Descriptor of the VI (string)
Fensterposition	Window Position: Cluster with X and Y coordinates of the upper left corner

Outputs:
None

Maximize Window

Increases the front panel to full screen size

Connections:

Inputs:
Window Name: Description of the VI string

Outputs:
None

Window in the Foreground

Sets the front panel in the foreground

Connections:

Inputs:

Fenstername	Window Name: Description of the VI (string)
Ende	End?: Boolean value that determines when this VI can return to the background. This can be a constant as well as a condition defined during the cycle.

Outputs:
None

Mouse over VI?

Determines if the mouse pointer is within the predetermined range

Connections:

Inputs

Fenstergröße	Window Size: Cluster constants with values for X and Y
Fensterposition	Window Position: Cluster constants with values for the upper left corner

Outputs:

Über VI?	Mouse Over VI?: Returns TRUE or FALSE

Minimize Window

Minimizes a VI so that it is reduced to a rectangular symbol on the desktop

Connections:

Inputs:

Fenstername	Window Name: Description of the VI (string)

Outputs:

None

Document:	**LabView-Driver pciGrabber-4/-plus**
Document Number:	**L-515e_1**

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