## Overview

### Camera

**Basler A102kc with mvTITAN-CL**

#### Running modes

- Freerunning [X]
- ExSync mode [X] Level-controlled or programmable

#### Resolution

- Horizontal: 1392 pixel
- Vertical: 1040 pixel
- Bits per Pixel: RGB 3 x 8 bpp
- Binning: []
- Partial Scan: []

#### Timings

- Pixel clock: 28 MHz
- Horizontal: kHz
- Vertical: 14.8 fps

### MATRIX VISION GmbH Frame Grabber

Typ: mvTITAN-CL

- Line Enable by: camera [X]
- Frame Grabber: []
- External: []

- Frame Enable by: camera [X]
- Frame Grabber: []
- External: []

- Trigger by: external []
- Frame Grabber: [X]
- External: []

- Flash by: camera []
- Frame Grabber: []
- External: []

### Software

- mvAquireControl [X]
- mvIMPACT Go! [X]
- Other [ ] [e.g. LabView™, Halcon, etc.]

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**Imprint**

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This document requires the general knowledge of the usage and the technical data of the used frame grabber, camera and application. Information in this document is subject to change without notice and does not represent a commitment on the part of MATRIX VISION GmbH. Email: info@matrix-vision.de.

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Freerunning Mode

Camera generates its own timing and sends images and signals for synchronization continuously to the frame grabber.

Signal map

![Signal Map Diagram]

Camera settings set by software

For setting up the camera the Camera Configuration Tool (CCT+) is needed. You can download the latest version of this tool from the homepage of Basler AG (www.baslerweb.de).

Install this tool and open the mvTITAN-CL before starting CCT+. This is necessary because the serial port of the CameraLink™ connection is only available if the mvTITAN-CL is initialized.

Choose the clserMV Port 0 or 1 concerning to which connector (J1 or J3) the camera is connected to.

Using output withRGB 3 x 8 Bit set Video Data Output Mode to RGB 3x8 Bit. Further you have to set the videomode to VM_DIG24 in your program or better in the used camera definition.

Be sure parameter Exposure Time Control Mode is set to Free-run, programmable.

In section White Balance you can fit the white balance in the camera to your conditions.

All settings concerning exposure and shutter time must be set as application requires.

Pin connection (CameraLink™ base standard)

<table>
<thead>
<tr>
<th>MDR 26 pin</th>
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<tbody>
<tr>
<td>Pin 1</td>
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<tr>
<td>Pin 2</td>
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<td>Pin 4</td>
<td>Tx Data 2-</td>
</tr>
<tr>
<td>Pin 5</td>
<td>XCLK-</td>
</tr>
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</table>
Cameradefinition

```c
/* ----------------------------- Basler A102kc ------------------------------------*/
DefCamType   "A102kc" VM_Dig24 NONINTERLACED 15 15625 28000 PCLK_EXTERN
DefCamAcquireSetup "A102kc" VSCAN NOT_INV NEXT_FIELD
DefHorizontalUnit    "A102kc" PIXEL
DefVerticalUnit      "A102kc" LINES
DefCamHorizontalAcquire "A102kc" 0L 1392L 1
DefCamVerticalAcquire "A102kc" 0L 1039L 1
```

Remarks to programming with standard SDK

Using the Basler A102kc in your own program you have to set the following:

Set videomode to VM_Dig24 with `mvSetVideoMode(dev, VM_Dig24);` and colormode to 24bit RGB with `mvSetColorMode(dev, COL_RGB24);`.

Remarks to `mvAcquireControl`

Choose camera definition `A102kc` in register `camera`. For scaled softlive preview the standard memory organization isn’t useful. You can optimize this with the following settings in the used configuration file like grabber.ini using `mvAcquireControl`:

```c
... [TITAN]
... SetInputBuffer 16 226000
SetOutputBuffer 2 852000
... InitBoard
...```
For single snaps this setting isn’t needed but can be optimize your acquisition especially if you’re realizing fast acquisition based on single snaps like SnapQueue.

Remarks to mvIMPACT Go!
Set up the mvAcquireControl so that you get proper images. Close mvAcquireControl or mvCONFIG and start mvIMPACT Go!. It will automatically use the settings made in the Default configuration.
ExSync mode

Camera is reset by the mvTITAN-CL and sends the video data and all synchronization signals to the mvTITAN-CL after Restart/Reset signal. The camera can be used with a predefined exposure time or an exposure time defined by the Restart/Reset signal.

Signal map

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Camera settings set by software

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Install this tool and open the mvTITAN-CL before starting CCT+. This is necessary because the serial port of the CameraLink™ connection is only available if the mvTITAN-CL is initialized.

Choose the clserMV Port 0 or 1 concerning to which connector (J1 or J3) the camera is connected to.

Using output withRGB 3 x 8 Bit set Video Data Output Mode to RGB 3x8 Bit. Further you have to set the videomode to VM_DIG24 in your program or better in the used camera definition.

Be sure parameter Exposure Time Control Mode is set to ExSync, programmable or ExSync, level-controlled.

In section White Balance you can fit the white balance in the camera to your conditions.

Now the camera must be reset externally (in this case by the mvTITAN-CL with CC1) to acquire and send images. If no Restart/Reset signal is sent to the camera the LED on the backside lights 3 times periodically and no image is sent.

Depending on the chosen ExSync mode the integration time is either preset in the camera (ExSync, programmable) or is defined by the pulse width of the trigger signal (ExSync, level-controlled).
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</tr>
<tr>
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<td>SerTC+</td>
</tr>
<tr>
<td>Pin 8</td>
<td>SerTFG-</td>
</tr>
<tr>
<td>Pin 9</td>
<td>CC1-</td>
</tr>
<tr>
<td>Pin 10</td>
<td>CC2+</td>
</tr>
<tr>
<td>Pin 11</td>
<td>CC3-</td>
</tr>
<tr>
<td>Pin 12</td>
<td>CC4+</td>
</tr>
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<td>inner Shield</td>
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</tr>
<tr>
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<td>CC1+</td>
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<td>CC3+</td>
</tr>
<tr>
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</table>

Recommended cable for this mode from MATRIX VISION GmbH:
KSCL 03.0, length 3 meters
KSCL 05.0, length 5 meters
KSCL 10.0, length 10 meters

Cameradefinition

```c
/* --------------------------- Basler A102kc ---------------------------
DefCamType       "A102kc" VM_DIG24 NONINTERLACED 15 15625 28000 PCLK_EXTERN
DefCamAcquireSetup "A102kc" VSCAN NOT_INV NEXT_FIELD
DefHorizontalUnit "A102kc" PIXEL
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Remarks to programming with standard SDK

Using the Basler A102kc in your own program you have to set the following:

Set videomode to VM_Dig24 with `mvSetVideoMode(dev, VM_DIG24);` and colormode to 24bit RGB with `mvSetColorMode(dev, COL_RGB24);`.

Generating Restart/Reset signal

To generate the needed Restart/Reset signal the following calls are necessary:

1. Define the Restart/Reset signal
   Use command `mvDefPulseSeq(dev, output, startvalue, pulse);` to define the signal.
   - `output`: 0, must be 1st output (CC1)
   - `startvalue`: 1, because camera expects active high signals
   The used array (`pPulse`) should be like that:
element [0]: pulse width in number of lines
element [1]: -1, end of array

2. Define the way the output of the Restart/Reset signal is controlled.
   Decide whether you want to control the output frequently by a predefined period or by an
   external signal.
   If you decide to output the signal frequently set the period time with \texttt{mvSetTriggerPeriod}(dev, time). Where time is given in milliseconds [ms]. If necessary deactivate the external trigger
   input with \texttt{mvSelExtTrig}(dev, 0)
   If you want to output the Restart/Reset signal synchronized to an external trigger signal
   activate the input on the \texttt{mvTITAN-CL} by \texttt{mvSelExtTrig}(dev, 1) and provide the \textit{Trigger In}
   pin of the \texttt{mvTITAN-CL} with the external trigger signal.

You will find more about the shutter control in the \texttt{mvTITAN-CL}’s manual in chapter 3 \textit{Sequence programming}.

\textbf{Remarks to \texttt{mvAcquireControl}}

Choose camera definition ‘A102kc’ in register \textit{camera}.
For scaled softlive preview the standard memory organization isn’t useful. You can optimize this with
the following settings in the used configuration file like grabber.ini using \texttt{mvAcquireControl}:

\begin{verbatim}
… [TITAN]
…
SetInputBuffer 16 226000
SetOutputBuffer 2 852000
…
InitBoard
…
\end{verbatim}

For single snaps this setting isn’t needed but can be optimize your acquisition especially if you’re
realizing fast acquisition based on single snaps like SnapQueue.

\textbf{Setting up Restart/Reset signal}

The Restart/Reset signal is set up with the \textit{shutter control} of the \texttt{mvAcquireControl}. Switch to this
register and activate the shutter control.

Be sure the following is set in the \textit{Shutter} register:

- \textit{Enable Shutter Control}: Enabled
- \textit{High active}: Enabled
- \textit{Start acquisition after pulse seq.}: Enabled
- \textit{Shutter Mode} must be set to \textit{One Trigger Mode}
- \textit{Shutter time} defines the pulse width of the Restart/Reset signal. Depending
  on the camera mode this width defines the integration time or not.
  The width is defined in number of lines.

Switch to register \textit{Trigger} and set the trigger method fitting to your application.
Set *autotrigger* if you want to output the Restart/Reset signal frequently without using an external trigger signal. You define the frequency by setting up the *Autotrigger period*.

If you want to synchronize the output of the Restart/Reset signal with an external trigger signal choose *ext. trigger*. Now you have to supply the external trigger signal to the *Trigger In* input of the mvTITAN-CL.

**Remarks to mvIMPACT Go!**

Set up the mvAcquireControl so that you get proper images. Close mvAcquireControl or mvCONFIG and start mvIMPACT Go!. It will automatically use the settings made in the Default configuration.
## Glossary

<table>
<thead>
<tr>
<th>Expression</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VD</td>
<td>Vertical drive, signal is sent to signalize next field (noninterlaced) or frame (interlaced). Also called Frame Enable, VSync or frame start signal.</td>
</tr>
<tr>
<td>HD</td>
<td>Horizontal drive, signal is sent to signalize next line. Also called Line Enable, HSync or line start signal.</td>
</tr>
</tbody>
</table>