Overview

Camera Hitachi KP-F100BCL

Running modes

- Freerunning [X]
- Fixed shutter [X]
- ONE trigger [X]
- TWO trigger [X]

Resolution

- Horizontal 1392 pixel
- Vertical 1040 pixel
- Bits per Pixel 10 bpp
- Binning []
- Partial Scan []

Timings

- Pixel clock 23 MHz
- Horizontal 16 kHz
- Vertical 15 fps

MATRIX VISION GmbH Frame Grabber

<table>
<thead>
<tr>
<th>Typ</th>
<th>mvTITAN-CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Enable by</td>
<td>camera [X] Frame Grabber [ ] external [ ]</td>
</tr>
<tr>
<td>Frame Enable by</td>
<td>camera [X] Frame Grabber [ ] external [ ]</td>
</tr>
<tr>
<td>Trigger by</td>
<td>external [X] Frame Grabber [X]</td>
</tr>
<tr>
<td>Flash by</td>
<td>camera [ ] Frame Grabber [ ] external [ ]</td>
</tr>
</tbody>
</table>

Software

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

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.
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Email: info@matrix-vision.de.

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Freerunning Mode

The camera runs with its own timing and sends the data and all needed signals for synchronization to the mvTITAN-CL.

Signal map

Camera settings set by hardware

Dip-Switch MODE settings:

<table>
<thead>
<tr>
<th>Position</th>
<th>1 or 2</th>
</tr>
</thead>
</table>

Dip-Switch FD settings:

<table>
<thead>
<tr>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
</tr>
</tbody>
</table>

Dip-Switch SHUTTER settings:

| A0 | A1 | A2 | RM |<| X  | X  | X  | X |

‘ON’: switched on, ‘OFF’: switched off, ‘X’: switch setting not relevant
Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available. So the settings must done on the backside of the camera. For this the remote switch (RM) must be set to off.

Pin connection (Camera Link™ base standard)

<table>
<thead>
<tr>
<th>MDR 26 pin</th>
<th>MDR 26 pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>inner Shield</td>
</tr>
<tr>
<td>Pin 2</td>
<td>Tx Data 0-</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Tx Data 1-</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Tx Data 2-</td>
</tr>
<tr>
<td>Pin 5</td>
<td>XCLK-</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Tx Data 3-</td>
</tr>
<tr>
<td>Pin 7</td>
<td>SerTC+</td>
</tr>
<tr>
<td>Pin 8</td>
<td>SerTFG-</td>
</tr>
<tr>
<td>Pin 9</td>
<td>CC1-</td>
</tr>
</tbody>
</table>
Pin 10  CC2+  Pin 17
Pin 11  CC3-  Pin 16
Pin 12  CC4+  Pin 15
Pin 13  inner Shield  Pin 14
Pin 14  inner Shield  Pin 13
Pin 15  Tx Data 0+  Pin 12
Pin 16  Tx Data 1+  Pin 11
Pin 17  Tx Data 2+  Pin 10
Pin 18  XCLK+  Pin 9
Pin 19  Tx Data 3+  Pin 8
Pin 20  SerTC-  Pin 7
Pin 21  SerTFG+  Pin 6
Pin 22  CC1+  Pin 5
Pin 23  CC2-  Pin 4
Pin 24  CC3+  Pin 3
Pin 25  CC4-  Pin 2
Pin 26  inner Shield  Pin 1

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
/* -------------------------- KP-F100bcl ------------------------------------*/
DefCamType "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit "KP-F100bcl" PIXEL
DefVerticalUnit "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire "KP-F100bcl" 9L 1040L 1
DefCamClamp "KP-F100bcl" 0L 0L
DefCamZero "KP-F100bcl" 0L 0L
DefCamFieldGate "KP-F100bcl" 0L 0L

Settings in MVacquireControl

In MVacquireControl you have to do at least the following settings:
- Choose the camera definition KP-F100bcl in tab Camera
- Activate Greyscale acquire in tab Acquire
- Set Greyscale acquire to 10bit

Settings in mvIMPACT Go!

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the Options dialog by the menu Tools / Options. Choose for Default bitshift for 16bit images the entry 2 (use for 10 bit images).
Now you are able to grab and show 10bpp greyscale images.
Fixed shutter mode (Restart/Reset)

The mvTITAN-CL sends a trigger signal to the camera. With this signal the camera is reset and integrates an images with a shutter time predefined in the camera.

### Signal map

![Signal map diagram](image)

#### Camera settings set by hardware

- **Dip-Switch ***MODE* settings:

<table>
<thead>
<tr>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

- **Dip-Switch ***FD* settings:

<table>
<thead>
<tr>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
</tr>
</tbody>
</table>

- **Dip-Switch ***SHUTTER* settings:

<table>
<thead>
<tr>
<th>A0</th>
<th>A1</th>
<th>A2</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>OFF</td>
</tr>
</tbody>
</table>

‘ON’: switched on, ‘OFF’: switched off, ‘X’: switch setting not relevant

The Switches A0 to A2 define the shutter time the camera uses each time the camera is reset by the trigger signal Trigger A.

Remark: The camera must be switched off and on to be sure it runs in the correct mode.

#### Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available. So the settings must done on the backside of the camera. For this the remote switch (RM) must be set to off.

#### Pin connection (Camera Link™ base standard)

<table>
<thead>
<tr>
<th>MDR 26 pin</th>
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<tbody>
<tr>
<td>Pin 1</td>
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<td>Tx Data 0-</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Tx Data 1-</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Tx Data 2-</td>
</tr>
<tr>
<td>Pin 5</td>
<td>XCLK-</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Tx Data 3-</td>
</tr>
<tr>
<td>Pin 7</td>
<td>SerTC+</td>
</tr>
</tbody>
</table>
Pin 8  SerTFG-  Pin 19
Pin 9  CC1-  Pin 18
Pin 10  CC2+  Pin 17
Pin 11  CC3-  Pin 16
Pin 12  CC4+  Pin 15
Pin 13  inner Shield  Pin 14
Pin 14  inner Shield  Pin 13
Pin 15  Tx Data 0+  Pin 12
Pin 16  Tx Data 1+  Pin 11
Pin 17  Tx Data 2+  Pin 10
Pin 18  XCLK+  Pin 9
Pin 19  Tx Data 3+  Pin 8
Pin 20  SerTC-  Pin 7
Pin 21  SerTFG+  Pin 6
Pin 22  CC1+  Pin 5
Pin 23  CC2-  Pin 4
Pin 24  CC3+  Pin 3
Pin 25  CC4-  Pin 2
Pin 26  inner Shield  Pin 1

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

/* -------------------------- KP-F100bcl ------------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L

Settings in MVacquireControl

Basic settings
In MVacquireControl you have to do at least the following settings:

- Choose the camera definition KP-F100bcl in tab Camera
- Activate Greyscale acquire in tab Acquire
- Set Greyscale acquire to 10bit
Trigger settings
To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register Shutter
- Enable checkbox Enable Shutter Control
- Disable High active
- Disable Start pulse seq. Vsync. Synchronous
- Choose One Trigger Mode

The shutter time can be set to at least 1. The shutter time doesn’t influence the image acquisition in this mode.

In register trigger you will see that the autotrigger is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.

In autotrigger mode no external trigger signal must be connected to the mvTITAN-CL. The Autotrigger period defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In external trigger mode the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL’s manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

Settings in mvIMPACT Go!
Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.

For that open the Options dialog by the menu Tools / Options. Choose for Default bitshift for 16bit images the entry 2 (use for 10 bit images).

Now you are able to grab and show 10bpp greyscale images.
One trigger mode (pulse width control)

The mvTITAN-CL sends a trigger signal to the camera. With this signal the camera is reset and integrates images with a shutter time defined by the length of the trigger signal.

Signal map

Camera settings set by hardware

Dip-Switch *MODE* settings:

| Position | 3 |

Dip-Switch *FD* settings:

| FD | ON |

Dip-Switch *SHUTTER* settings:

| A0 | A1 | A2 | RM | X | X | X | OFF |

'ON': switched on, 'OFF': switched off, 'X': switch setting not relevant

Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available. So the settings must done on the backside of the camera. For this the remote switch (*RM*) must be set to off.

Pin connection (Camera Link™ base standard)

<table>
<thead>
<tr>
<th>MDR 26 pin</th>
<th>MDR 26 pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>inner Shield</td>
</tr>
<tr>
<td>Pin 2</td>
<td>Tx Data 0-</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Tx Data 1-</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Tx Data 2-</td>
</tr>
<tr>
<td>Pin 5</td>
<td>XCLK-</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Tx Data 3-</td>
</tr>
<tr>
<td>Pin 7</td>
<td>SerTC+</td>
</tr>
<tr>
<td>Pin 8</td>
<td>SerTFG-</td>
</tr>
<tr>
<td>Pin 9</td>
<td>CC1-</td>
</tr>
</tbody>
</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
/* -------------------------- KP-F100bcl ------------------------------------
DefCamType              "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup      "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam       "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit       "KP-F100bcl" PIXEL
DefVerticalUnit         "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire   "KP-F100bcl" 9L 1040L 1
DefCamClamp             "KP-F100bcl" 0L 0L
DefCamZero              "KP-F100bcl" 0L 0L
DefCamFieldGate         "KP-F100bcl" 0L 0L
```

**Settings in MVacquireControl**

**Basic settings**

In MVacquireControl you have to do at least the following settings:

- Choose the camera definition *KP-F100bcl* in tab Camera
- Activate Greyscale acquire in tab Acquire
- Set Greyscale acquire to 10bit
Trigger settings
To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register Shutter
- Enable checkbox Enable Shutter Control
- Enable High active
- Disable Start pulse seq. Vsync. Synchronous
- Choose One Trigger Mode

The value for shuttertime defines the pulse length of the trigger signal (Trigger A) sent to the camera. In this mode the shuttertime defines the integration time used with each image acquisition in the camera.

In register trigger you will see that the autotrigger is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.

In autotrigger mode no external trigger signal must be connected to the mvTITAN-CL. The Autotrigger period defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In external trigger mode the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL’s manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

Settings in mvIMPACT Go!
Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.
For that open the Options dialog by the menu Tools / Options. Choose for Default bitshift for 16bit images the entry 2 (use for 10 bit images).
Now you are able to grab and show 10bpp greyscale images.
TWO trigger mode

The mvTITAN-CL sends two trigger signals to the camera. With this signals the camera is reset and integrates images with a shutter time defined by the time between these two triggers.

Signal map

Camera settings set by hardware

Dip-Switch MODE settings:

<table>
<thead>
<tr>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

Dip-Switch FD settings:

<table>
<thead>
<tr>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
</tr>
</tbody>
</table>

Dip-Switch SHUTTER settings:

<table>
<thead>
<tr>
<th>A0</th>
<th>A1</th>
<th>A2</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>OFF</td>
</tr>
</tbody>
</table>

‘ON’: switched on, ‘OFF’: switched off, ‘X’: switch setting not relevant

Remark: The camera must be switched off and on to be sure it runs in the correct mode.

Camera modes set by software

At the time of implementation no camera control software via Camera Link™ was available. So the settings must done on the backside of the camera. For this the remote switch (RM) must be set to off.

Pin connection (Camera Link™ base standard)

<table>
<thead>
<tr>
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</tr>
<tr>
<td>Pin 2</td>
<td>Tx Data 0-</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Tx Data 1-</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Tx Data 2-</td>
</tr>
<tr>
<td>Pin 5</td>
<td>XCLK-</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Tx Data 3-</td>
</tr>
<tr>
<td>Pin 7</td>
<td>SerTC+</td>
</tr>
<tr>
<td>Pin 8</td>
<td>SerTFG-</td>
</tr>
<tr>
<td>Pin 9</td>
<td>CC1-</td>
</tr>
</tbody>
</table>
Pin 10  |  CC2+  |  Pin 17  
Pin 11  |  CC3-  |  Pin 16  
Pin 12  |  CC4+  |  Pin 15  
Pin 13  | inner Shield |  Pin 14  
Pin 14  | inner Shield |  Pin 13  
Pin 15  |  Tx Data 0+ |  Pin 12  
Pin 16  |  Tx Data 1+ |  Pin 11  
Pin 17  |  Tx Data 2+ |  Pin 10  
Pin 18  | XCLK+   |  Pin 9   
Pin 19  |  Tx Data 3+ |  Pin 8   
Pin 20  | SerTC-  |  Pin 7   
Pin 21  | SerTFG+ |  Pin 6   
Pin 22  |  CC1+   |  Pin 5   
Pin 23  |  CC2-   |  Pin 4   
Pin 24  |  CC3+   |  Pin 3   
Pin 25  |  CC4-   |  Pin 2   
Pin 26  | inner Shield |  Pin 1   

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
/* ------------------------------ KP-F100bcl ------------------------------
DefCamType     "KP-F100bcl" VM_DIG10 NONINTERLACED 15 16000 28620 PCLK_EXTERN
DefCamAcquireSetup "KP-F100bcl" VSCAN NOT_INV NEXT_FIELD
DefCamAnalogParam   "KP-F100bcl" AC 1 0 0 1200
DefHorizontalUnit   "KP-F100bcl" PIXEL
DefVerticalUnit     "KP-F100bcl" LINES
DefCamHorizontalAcquire "KP-F100bcl" 250L 1392L 1
DefCamVerticalAcquire "KP-F100bcl" 9L 1040L 1
DefCamClamp        "KP-F100bcl" 0L 0L
DefCamZero         "KP-F100bcl" 0L 0L
DefCamFieldGate    "KP-F100bcl" 0L 0L

Settings in MVacquireControl

Basic settings
In MVacquireControl you have to do at least the following settings:

- Choose the camera definition KP-F100bcl in tab Camera
- Activate Greyscale acquire in tab Acquire
- Set Greyscale acquire to 10bit
**Trigger settings**

To activate the trigger output in MVacquireControl you have to do at least the following settings:

- Switch to register **Shutter**
- Enable checkbox **Enable Shutter Control**
- Disable **High active**
- Disable **Start pulse seq. Vsync. Synchronous**
- Choose **Two Trigger Mode**

The value for **shuttertime** defines the time between the pulse 1 (Trigger A) and pulse 2 (Trigger B). In this mode the shuttertime defines the integration time used with each image acquisition in the camera.

In register **trigger** you will see that the **autotrigger** is automatically enabled. The output of the shutter control signal needs this trigger signal. You can either choose the autotrigger or the external trigger mode.

In **autotrigger mode** no external trigger signal must be connected to the mvTITAN-CL. The **Autotrigger period** defines the frequency of the internal generated trigger signal and so the frame rate you will get.

In **external trigger mode** the optional trigger signal must be connected to the mvTITAN-CL. You will find the description of this connector in the appendix of the mvTITAN-CL’s manual. Each time an external trigger signal comes into the mvTITAN-CL the trigger signal is sent to the camera an image is acquired and is sent to the mvTITAN-CL.

**Settings in mvIMPACT Go!**

Additionally to the settings in MVacquireControl you have to tell mvIMPACT Go! to interpret the 10 bit image data correctly.

For that open the **Options** dialog by the menu **Tools / Options**. Choose for Default bitshift for 16bit images the entry 2 (use for 10 bit images).

Now you are able to grab and show 10bpp greyscale images.
Remarks

More about the frame grabber you will find in the mvTITAN-CL’s manual which comes with the supplied mvIMPACT CD-ROM. If you want to know more about the settings and behavior of MVacquireControl and mvIMPACT Go! please take a look at the manuals which are automatically copied to your system with the program’s installation.
## 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>