## Overview

**Camera**

PULNIX PE100

### Running modes

- Freerunning [X]
- Restart/Reset [ ]
- Ext. Synchronized [X]
- Trigger Shutter [X]
- Flash & Reset [ ]

### Resolution

- Horizontal: 644 pixel
- Vertical: 480 pixel

### Binning

[ ]

### Partial Scan

[ ]

### Timings

<table>
<thead>
<tr>
<th></th>
<th>double speed</th>
<th>normal speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pixel clock</td>
<td>24.545 MHz</td>
<td>12.273 MHz</td>
</tr>
<tr>
<td>Horizontal</td>
<td>31.468 kHz</td>
<td>15.734 kHz</td>
</tr>
<tr>
<td>Vertical (interlaced)</td>
<td>119.88 fps</td>
<td>59.94 fps</td>
</tr>
<tr>
<td>Vertical (progressive)</td>
<td>59.94 fps</td>
<td>29.97 fps</td>
</tr>
</tbody>
</table>

**MATRIX VISION GmbH Frame Grabber**

<table>
<thead>
<tr>
<th>Typ</th>
<th>mvTITAN-G1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Enable by</td>
<td>camera [X]</td>
</tr>
<tr>
<td>Frame Enable by</td>
<td>camera [X]</td>
</tr>
<tr>
<td>Trigger by</td>
<td>external [X]</td>
</tr>
<tr>
<td>Flash by</td>
<td>camera [ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Frame Grabber</th>
<th>external</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[X]</td>
<td>[ ]</td>
</tr>
<tr>
<td></td>
<td>[X]</td>
<td>[ ]</td>
</tr>
<tr>
<td></td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

**Software**

- MVacquireControl [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.
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Windows95™, Windows98™, Windows98se™, WindowsNT4.0™, Windows2000™, WindowsXP™ are trademarks of Microsoft, Corp. All other trademarks are the property of their respective holders.
**Freerunning Mode**

The camera runs with its own timing and sends the VD and HD within the video signal.

**Signal map**

![Signal map diagram](image)

**Camera settings set by hardware**

Settings inside the camera:

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

Dip-Switch settings for double speed, 2:1 Interlaced

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

Dip-Switch settings for normal speed, progressive

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

Dip-Switch settings for double speed, progressive

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

‘ON’: switched on, ‘OFF’: switched off, ‘X’: switch setting not relevant
Set camera to **Internal Snc.**:

### Pin connection

<table>
<thead>
<tr>
<th>PE100 12 pin Hirose</th>
<th>Direction</th>
<th>mvTITAN-G1 HD26ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GND</td>
<td>&lt;-&gt;</td>
<td>10 GND</td>
</tr>
<tr>
<td>2 +12 VDC</td>
<td></td>
<td>1 +12 VDC</td>
</tr>
<tr>
<td>3 GND Video</td>
<td>&lt;-&gt;</td>
<td>12 GND</td>
</tr>
<tr>
<td>4 Video out</td>
<td>-&gt;</td>
<td>2 Video 1</td>
</tr>
</tbody>
</table>

Recommended cable for this mode from MATRIX VISION GmbH: KS41 03.0

### Cameradefinition

```c
/* -------------------------- PE100 ------------------------------------ */
/* free running, 2:1 interlaced mode, normal speed */
DefCamType "PE100" VM_RS170 INV_INTERLACED 60 15734 12272 PCLK_INERN
DefCamAcquireSetup "PE100" STANDARD NOT_INV NEXT_FIELD
DefCamAnalogParam "PE100" A C100 1200
DefHorizontalUnit "PE100" PIXEL
DefVerticalUnit "PE100" LINES
DefCamHorizontalAcquire "PE100" 114L 644L 1
DefCamVerticalAcquire "PE100" 14L 240L 1
DefCamClamp "PE100" 74L 5L
DefCamZero "PE100" 84L 5L
DefCamFieldGate "PE100" 260L 330L

/* -------------------------- PE100 ------------------------------------ */
/* free running, progressive mode */
DefCamType "PE100-P" VM_RS170 NON_INTERLACED 60 15734 12272 PCLK_INERN
DefCamAcquireSetup "PE100-P" STANDARD NOT_INV NEXT_FIELD
DefCamAnalogParam "PE100-P" AC 1 0 0 1200
DefHorizontalUnit "PE100-P" PIXEL
DefVerticalUnit "PE100-P" LINES
DefCamHorizontalAcquire "PE100-P" 114L 644L 1
DefCamVerticalAcquire "PE100-P" 28L 480L 1
DefCamClamp "PE100-P" 74L 5L
DefCamZero "PE100-P" 84L 5L
DefCamFieldGate "PE100-P" 260L 330L
```

### Remarks

none
External synchronized mode

[Insert here the description of the mode including timing diagrams from camera's manual if available]

Signal map

Camera settings set by hardware

Settings inside the camera:

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

Dip-Switch settings for double speed, progressive

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

Set camera to External Sync mode:

b. Sync. Mode Switch

Sync. Mode Switch

Internal Sync.  ➔  External Sync.
Pin connection

<table>
<thead>
<tr>
<th>PE100</th>
<th>Direction</th>
<th>mvTITAN-G1 HD26ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 pin Hirose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 GND</td>
<td>↔</td>
<td>10 GND</td>
</tr>
<tr>
<td>2 +12 VDC</td>
<td>↔</td>
<td>1 +12 VDC</td>
</tr>
<tr>
<td>3 GND Video</td>
<td>↔</td>
<td>12 GND</td>
</tr>
<tr>
<td>4 Video out</td>
<td>↔</td>
<td>2 Video 1</td>
</tr>
<tr>
<td>6 HD in</td>
<td>↔</td>
<td>26 HD out</td>
</tr>
<tr>
<td>7 VD in</td>
<td>↔</td>
<td>24 VD out</td>
</tr>
</tbody>
</table>

Recommended cable for this mode from MATRIX VISION GmbH: not yet available

Cameradefinition

```c
/* -------------------------- PE100 ------------------------------------ */
/* free running, progressive mode*/
DefCamType "PE100-P" VM_RS170 NONINTERLACED 60 15734 12272 PCLK_INTERN
DefCamAcquireSetup "PE100-P" STANDARD NOT_INV NEXT_FIELD
DefCamAnalogParam "PE100-P" AC 1 0 0 1200
DefHorizontalUnit "PE100-P" PIXEL
DefVerticalUnit "PE100-P" LINES
DefCamHorizontalAcquire "PE100-P" 114L 644L 1
DefCamVerticalAcquire "PE100-P" 28L 480L 1
DefCamClamp "PE100-P" 74L 5L
DefCamZero "PE100-P" 84L 5L
DefCamFieldGate "PE100-P" 260L 330L
```

Setting up HD out and VD out

For setting up the horizontal and vertical frequency the mvTITAN-G1 sends to the camera on HDout and VDout you have to use the command `mvDefDisplayMode()`.

Sample calling in used INI file (normal speed):  
```
[TITAN]
InitBoard  
DefDisplayMode 0 NULL 0 0 0 758 512 0 0 10 10 0 0 0 15734
```

With this calling a horizontal frequency of 15,734 kHz is sent on HDout. The resultant vertical frequency on VDout is about 30 Hz.

Read more about `mvDefDisplayMode()` in the mvTITAN-G1’s manual.
**Trigger Shutter Mode**

The camera runs with its own timings and the mvTITAN-G1 resets the camera. The length of the trigger pulse does not define the shutter time of the camera! HD is sent within the video signal and VD is sent on WEN out pin.

**Signal map**

![Signal map diagram]

**Camera settings set by hardware**

Settings inside the camera:

![Camera settings diagram]

**Dip-Switch settings for normal speed, progressive**

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

**Dip-Switch settings for double speed, progressive**

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
<th>SW 3</th>
<th>SW 4</th>
<th>SW 5</th>
<th>SW 6</th>
<th>SW 7</th>
<th>SW 8</th>
<th>SW 9</th>
<th>SW 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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

**Set camera to External Sync mode:**

![External Sync diagram]
Pin connection

<table>
<thead>
<tr>
<th>PE100 12 pin Hirose</th>
<th>Direction</th>
<th>mvTITAN-G1 HD26ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>←</td>
<td>10 GND</td>
</tr>
<tr>
<td>+12 VDC</td>
<td>←</td>
<td>1 +12 VDC</td>
</tr>
<tr>
<td>GND Video</td>
<td>←</td>
<td>12 GND</td>
</tr>
<tr>
<td>Video out</td>
<td>←</td>
<td>2 Video 1</td>
</tr>
<tr>
<td>TRIG IN</td>
<td>←</td>
<td>19 GPout 0</td>
</tr>
<tr>
<td>WEN out</td>
<td>←</td>
<td>6 VD in</td>
</tr>
</tbody>
</table>

Recommended cable for this mode from MATRIX VISION GmbH: not yet available

Cameradefinition

```c
/* Random Trigger shutter mode, progressive scan*/
DefCamType  "PE100-RTS" VM_RS170 NONINTERLACED 60 15734 12272 PCLK_INTERN
DefCamAcquireSetup "PE100-RTS" VSCANV NOT_INV NEXT_FIELD
DefCamAnalogParam "PE100-RTS" AC 1 0 0 1200
DefHorizontalUnit "PE100-RTS" PIXEL
DefVerticalUnit    "PE100-RTS" LINRS
DefCamHorizontalAcquire "PE100-RTS" 114L 644L 1
DefCamVerticalAcquire "PE100-RTS" 28L 480L 1
DefCamClamp        "PE100-RTS" 50L 5L
DefCamZero         "PE100-RTS" 50L 5L
DefCamFieldGate    "PE100-RTS" 260L 330L
```

Remarks

In this mode the camera sends the HSync in the video signal and the VSync (WEN) on separate pins. Therefore the frame grabber must be set to a mixed mode: HSync internal and VSync external.

Condition for this is a driver with at least the following versions:
- mvTITAN-DLL: V1.4.26
- Matrixfg.sys: 1.90.0.0
- Titan.bin: 3.1.8.26

Usind MVacquireControl at least the version V3.111 is needed.

Setting up trigger signal

For the camera reset GPout 0 of mvTITAN-G1 is used.

The best way to setup GPout 0 as a trigger signal is to use the shutter control.

In MVacquireControl switch to register Shutter and do the following settings:

- Enable Shutter Control
- Disable High active
- Disable Start puls seq. Vsync synchronous
- Disable Start acquisition after pulse seq.
- Set Shutter mode to One Trigger Mode

The setting in Shuttertime defines the length of the pulse and must be at least 1 line.

Automatically the autotrigger in register Trigger is activated. Define in Autotrigger periode the time between two images to acquire. Use periode times with at least 50ms.
If you are using the optional external trigger signal connect it to the Trigger In pin of the mvTITAN-G1 switch from autotrigger to ext. trigger and the camera reset signal will be output right after each external trigger pulse.

If using the shutter control in software you have to use the functions mvDefPulsSeq() and mvSetTriggerPeriod() to define the shutter control method. You will find more about these functions in the mvTITAN-G1’s manual.
## 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>