

# preliminary datasheet **pco.pixelfly 10 bi CLHS**

industrial sCMOS camera

**bi** back  
illuminated

resolution  
**10.4 MPixel**

pixel size  
**4.6  $\mu\text{m}$  x 4.6  $\mu\text{m}$**

interface  
**CLHS FOL**



back illuminated  
sCMOS with high MTF

fiber-optic data  
interface

high resolution  
4416 x 2368 pixels

compact housing

low readout noise  
1.2 e<sup>-</sup> @ 57 fps

monochrome and  
color versions

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## technical data

### image sensor

|                                                        |                                                         |
|--------------------------------------------------------|---------------------------------------------------------|
| <b>sensor technology</b>                               | back illuminated scientific CMOS (bi sCMOS)             |
| <b>color type</b>                                      | monochrome<br>color (bayer pattern)                     |
| <b>resolution (horizontal x vertical)</b>              | 4416 px x 2368 px                                       |
| <b>pixel size (horizontal x vertical)</b>              | 4.6 µm x 4.6 µm                                         |
| <b>sensor size (horizontal x vertical)</b>             | 20.3 mm x 10.8 mm                                       |
| <b>sensor diagonal</b>                                 | 23.0 mm                                                 |
| <b>shutter mode</b>                                    | rolling shutter (RS)                                    |
| <b>modulation transfer function (theoretical max.)</b> | 108.6 lp/mm                                             |
| <b>peak quantum efficiency</b>                         | 82 % @ 500 nm (monochrome)                              |
| <b>spectral range</b>                                  | 400 nm - 1100 nm (monochrome)                           |
| <b>dark current (typ.)</b>                             | 6.2 e <sup>-</sup> /pixel/s @ +35 °C sensor temperature |
| <b>fullwell capacity</b>                               | 14 000 e <sup>-</sup>                                   |
| <b>readout noise (typ.)<sup>1</sup></b>                | 1.2 e <sup>-</sup> rms<br>1.2 e <sup>-</sup> med        |
| <b>dynamic range (intra-scene)<sup>2</sup></b>         | 14 000 : 1 (83 dB)                                      |

<sup>1</sup> The readout noise values are given as median (med) and root mean square (rms) values, due to the different noise models which can be used for evaluation. All values are raw data without any filtering.

<sup>2</sup> The dynamic range value is calculated with the median value of the readout noise and rounded.

### frame rate table

#### vertical resolution reduction

|                    |          |
|--------------------|----------|
| <b>4416 x 2368</b> | 57 fps   |
| <b>4416 x 2048</b> | 67 fps   |
| <b>4416 x 1024</b> | 133 fps  |
| <b>4416 x 512</b>  | 264 fps  |
| <b>4416 x 256</b>  | 521 fps  |
| <b>4416 x 128</b>  | 1013 fps |
| <b>4416 x 64</b>   | 1913 fps |
| <b>4416 x 32</b>   | 3444 fps |
| <b>4416 x 16</b>   | 5741 fps |
| <b>4416 x 8</b>    | 8611 fps |

#### typical resolutions

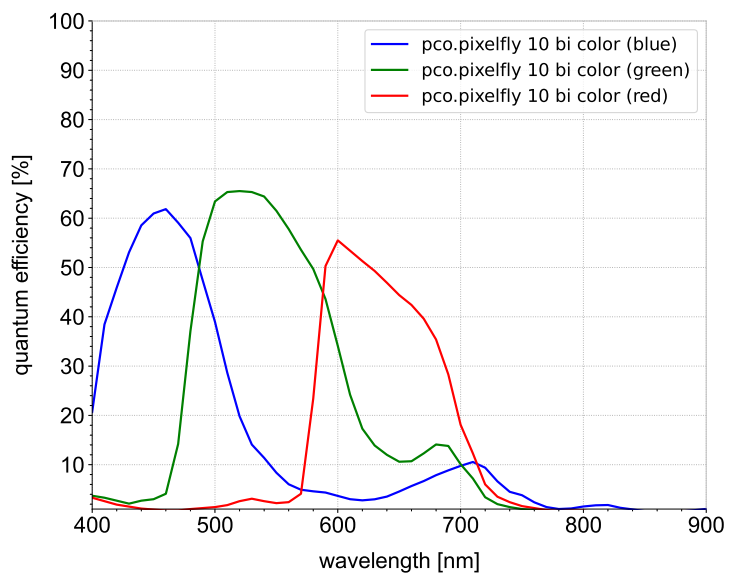
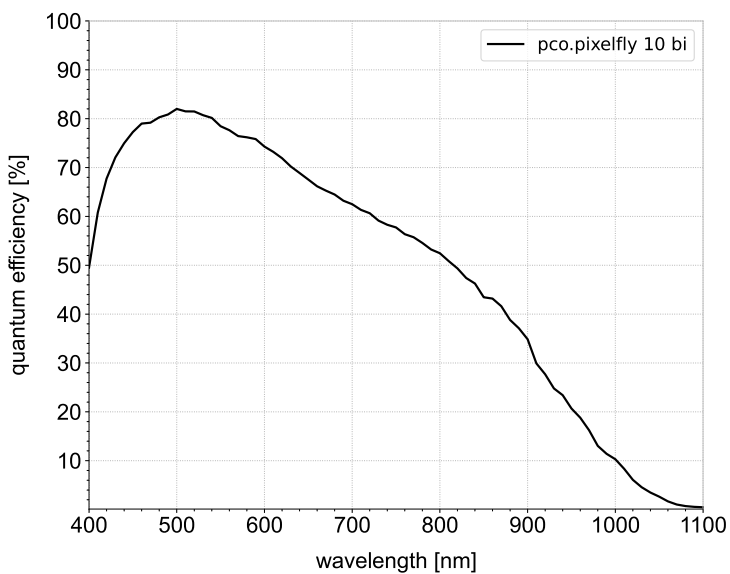
|                    |         |
|--------------------|---------|
| <b>2304 x 2304</b> | 59 fps  |
| <b>2048 x 2048</b> | 67 fps  |
| <b>1920 x 1080</b> | 126 fps |
| <b>1280 x 1024</b> | 133 fps |
| <b>640 x 512</b>   | 264 fps |
| <b>320 x 256</b>   | 521 fps |

**camera**

|                                             |                                                                      |
|---------------------------------------------|----------------------------------------------------------------------|
| <b>max. frame rate @ full resolution</b>    | 57 fps                                                               |
| <b>exposure time range</b>                  | 13.8 $\mu$ s - 100 ms                                                |
| <b>dynamic range A/D<sup>1</sup></b>        | 16 bit                                                               |
| <b>conversion factor<sup>2</sup></b>        | 0.214 e-/DN                                                          |
| <b>pixel rate</b>                           | 596 MPixel/s                                                         |
| <b>region of interest (ROI)</b>             | horizontal: steps of 32 columns<br>vertical: steps of 4 rows         |
| <b>binning</b>                              | horizontal: x2, x4 (average, sum)<br>vertical: x2, x4 (average, sum) |
| <b>non-linearity</b>                        | < 0.2 %                                                              |
| <b>dark signal non-uniformity (DSNU)</b>    | < 0.23 e- rms                                                        |
| <b>photo response non-uniformity (PRNU)</b> | < 0.25 %                                                             |
| <b>cooling method</b>                       | forced air                                                           |
| <b>trigger input signals</b>                | external exposure start, external exposure control, acquire enable   |
| <b>status output signals</b>                | exposure, busy, line                                                 |
| <b>input / output signal connectors</b>     | SMA                                                                  |
| <b>time stamp</b>                           | in image (1 $\mu$ s resolution)                                      |
| <b>data interface</b>                       | Camera Link HS FOL                                                   |

<sup>1</sup> The high dynamic signal is simultaneously converted at high and low gain by two 11 bit A/D converters and the two 11 bit values are sophistically merged into one 16 bit value.

<sup>2</sup> According to EMVA1288, the conversion factor equals the inverse of the system gain and can be operational mode dependent.

**quantum efficiency**

## general

|                                                    |                                   |
|----------------------------------------------------|-----------------------------------|
| power supply                                       | 24 VDC ( $\pm 10\%$ )             |
| power consumption                                  | tbd                               |
| weight                                             | 0.9 kg                            |
| dimensions (height x width x length <sup>1</sup> ) | 80 mm x 80 mm x 100 mm            |
| operating temperature range                        | +10 °C to +40 °C                  |
| storage temperature range                          | -10 °C to +60 °C                  |
| humidity range (non-condensing)                    | 10 % to 80 % (recommended < 65 %) |
| certifications                                     | CE, FCC, UKCA                     |

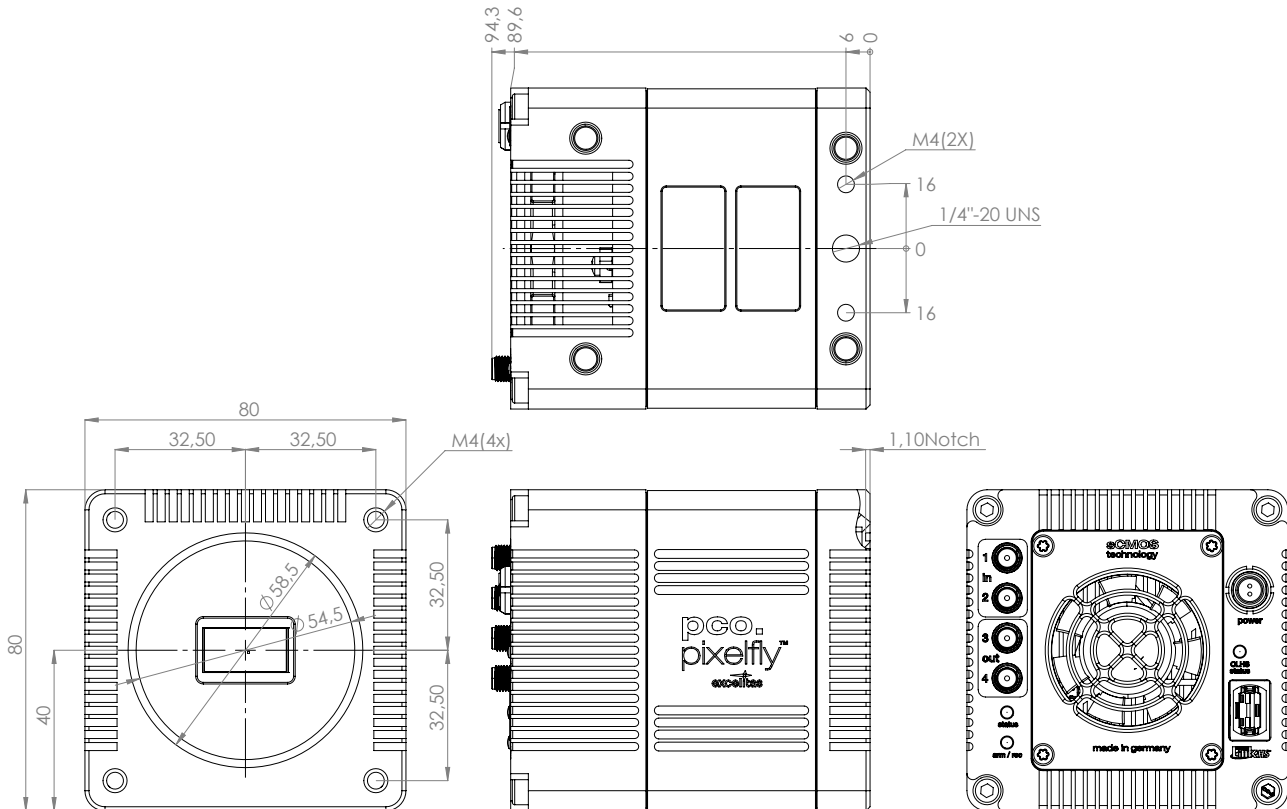
<sup>1</sup> This value refers to the length including the camera flange.

## optical interface

|                                             |                       |
|---------------------------------------------|-----------------------|
| direct mounting distance (no camera flange) | 3.4 mm ( $\pm 10\%$ ) |
| lens mounting                               | C-mount, F-mount      |
| optional lens mounting                      | TFL-mount             |

Configure your optical setup with our **MachVis Lens Selector** online tool.

## dimensions



outlines of pco.pixelfly 10 bi CLHS without camera flange (all dimensions given in mm)

## software

### Your first choice is pco.camware:

Our main camera control software enables control of most camera settings and facilitates image acquisition and storage.

You can customize it exactly to your needs using different layouts, styles and features.

### You prefer to use a different software:

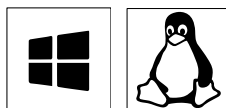
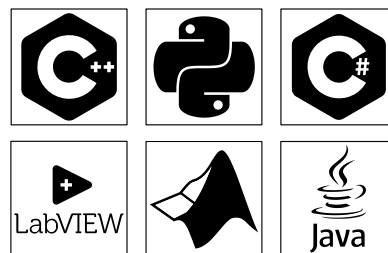
Our cameras integrate with a range of third-party software applications.

In microscopy we offer dedicated support for µManager, while ensuring compatibility with other software maintained by their providers.

### You want to create your own application:

We feature a wide range of software development kits (SDK) for various programming languages, such as C++, Python, C#, LabVIEW, Matlab, and Java.

If you are looking for more general SDKs, we present pco.sdk and pco.recorder, our low-level SDKs with C interface.



Our software is available for Windows and Linux platforms.

Visit our **website** for detailed information, installation guidance, and Github projects.

## areas of application

3D surface and dimensional metrology | biochip and microarray reading | biometrics and forensic imaging | brightfield and phase contrast microscopy | digital pathology and whole-slide imaging | high-speed brightfield and ratio imaging | high-throughput screening and automated analysis | industrial quality inspection and defect detection | material testing and surface characterization | structured illumination microscopy (SIM, brightfield-based) | wafer and semiconductor inspection

### ordering information

|                                  |             |                                                                                                              |
|----------------------------------|-------------|--------------------------------------------------------------------------------------------------------------|
| <b>pco.pixelfly 10 bi CLHS</b>   | 85108076022 | camera system, 4432 x 2368 pixel, monochrome, back illuminated, rolling shutter, CLHS interface, air cooling |
| <b>pco.pixelfly 10 bi C CLHS</b> | 85108076023 | camera system, 4432 x 2368 pixel, color, back illuminated, rolling shutter, CLHS interface, air cooling      |

|          |                                                                  |
|----------|------------------------------------------------------------------|
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