

PYLON CAMERA SOFTWARE SUITE

AS EASY AS CONNECTING THE DOTS.
SAVE TIME. SAVE MONEY.

**New CoaxPress 2.0, Compression
Beyond, Sharpness Indicator, GigE Ac-
tion Commands, Vignetting Correction**



USB[®]
VISION

GIGE[®]
VISION

CXP-12

BCON
for LVDS

BCON
for MIPI

CAMERA
Link[®]
GENICAM PRODUCT

- Easy-to-use tools for camera configuration, and for capturing and recording images
- Access to all camera features thanks to GenICam technology
- User-optimized SDK for desktop and embedded applications
- Windows, macOS, Linux x86 and Linux ARM support

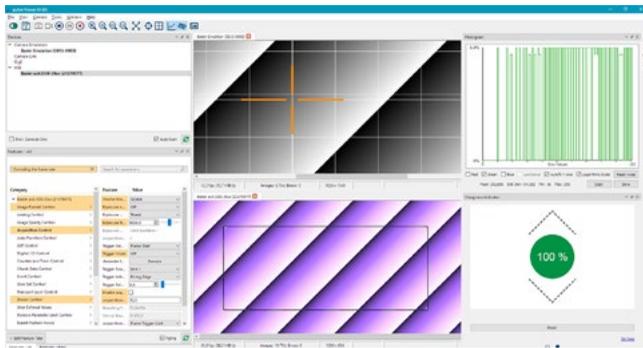
BASLER
the power of sight

OVERVIEW

Basler pylon 6 Camera Software Suite

The pylon Camera Software Suite is a collection of drivers and tools for operating any Basler camera with a Windows, macOS or Linux PC or embedded processing board. As it is based on GenICam technology, it offers barrier-free access to the newest camera models and the latest features. Making changes to an existing camera device in your application essentially becomes a plug and play process.

The **pylon Viewer** is a versatile application for testing and evaluating Basler cameras.

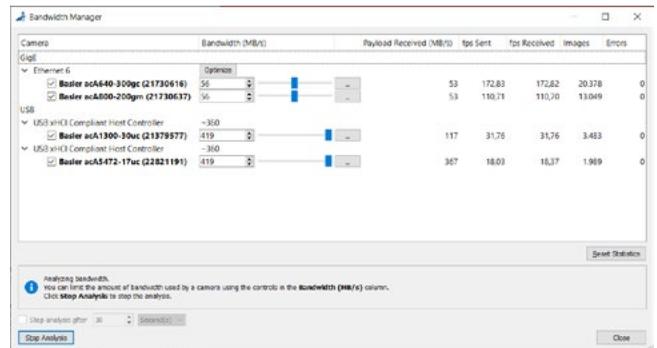


The tree structure of the viewer's graphical user interface lets you easily find the best camera parameter setup, adjust image quality, and control advanced camera features. Use predefined use cases to easily find any related parameters for your application use case, e.g. check whether the application is losing image data. Use the **search function** to quickly find all camera features with names containing the search term you entered. You can also create your own **Feature Tabs** that contain your favorite or most used features. This helps you save valuable time during the camera evaluation and setup design.

An easy-to-use set of **configuration tools** allows you to configure the camera's interface. For example, you can easily configure the IP settings of a GigE Vision camera, fix driver or bandwidth problems for USB cameras, or configure baud rates for Camera Link cameras.

With the viewer's **Bandwidth Manager** you can quickly check whether your GigE or USB 3.0 camera(s) can reliably deliver all images to your application (e. g. the pylon Viewer) with the given bandwidth settings.

You can adjust the camera's bandwidth load until all cameras connected to your PC will transmit their images without any losses.



The pylon Viewer and APIs allow for camera images to be recorded to video files (**MP4** or **AVI**) or into a sequence of single images. Furthermore, the recording speed can be varied to create time-lapse videos.

With the new pylon 6 release, Basler provides support for the new CoaXPRESS 2.0 standard for a first time. It takes just a few clicks to install all necessary drivers and libraries and get your Basler CXP-12 interface card and Basler boost camera set up and running.

The pylon **USB3 Vision Driver** fully supports the USB3 Vision standard. It allows Basler USB 3.0 cameras to use the full speed and bandwidth of USB 3.0 for image transmission, while reducing resource load and using off-the-shelf hardware components.

The pylon **GigE Vision Performance Driver** quickly separates incoming packets carrying image data from other traffic on the network, and makes the data available for use by your vision application while requiring low CPU resources. This driver can only be used with network cards that include specific Intel chipsets. The pylon **GigE Vision Filter and Socket Drivers** support all kinds of hardware, common GigE network cards, and GigE ports on your motherboard as well.

The pylon Camera Software Suite is also available for the Basler dart with **BCON for MIPI** and **BCON for LVDS**, Basler's interface for sophisticated embedded technology requirements.

The pylon **Camera Link Configuration Driver** offers easy access to all camera parameters of Basler's latest Camera Link families: ace, aviator, beat, and racer.

Software Development Kit

The pylon Camera Software Suite also contains a **powerful SDK** and helps to develop any kind of camera application for Windows, Linux or macOS on desktop as well as on embedded systems.

With the **well-designed** and **user-friendly** API you will need just **a few lines of code** to configure the camera and to grab and display images. The Instant Camera Class takes care of device lifetime and buffer management, as well as setting up a grab loop and handling camera events.

Documentation and Samples

Comprehensive documentation, plus a collection of programming samples for C++, C, .NET languages (C#, VB.NET, etc.), illustrate various use cases for different grab strategies, multi-camera applications, recording video files, and many more.

The GenICam Concept

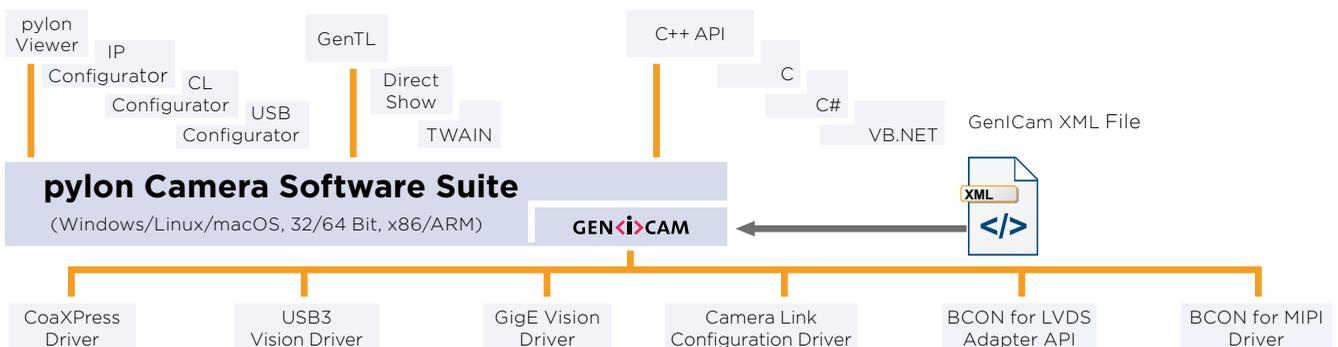
The pylon SDK is based on the concept of GenICam. This means that the camera itself describes its features and parameters (name, data type, value range etc.) through an XML file which is part of the camera firmware.

When pylon opens the camera, it loads and processes the camera XML file and creates a generic API which provides access to all camera parameters and functions. The new GenICam version 3.1 performs these actions **significantly faster** than previous versions, while consuming a lot less user memory.

This approach allows the creation of **generic** camera applications compatible with all kinds of Basler cameras, no matter what interface they use.

You can easily provide generic GUI feature controls which are generated dynamically when processing the camera XML, and which provide access to all camera features without having any prior knowledge about the existence of these features - the pylon Viewer's feature tree is a good example of these kinds of controls.

The pylon Camera Software Suite operates with all Basler line scan and area scan cameras - no matter what interface they use. It offers stable, reliable and flexible data exchange between Basler cameras and PCs, for Windows, macOS and Linux on x86 and ARM based systems - at a very low CPU load.



PYLON SDK - NEW FEATURES



CoaXPress 2.0



With the new pylon 6 release, Basler provides support for the new CoaXPress 2.0 standard for a first time. It takes just a few clicks to install all necessary drivers and libraries and get your Basler CXP-12 interface card and Basler boost camera set up and running.

Thanks to the easy-to-use and generic pylon SDK you can easily adapt your existing pylon application to support the new CoaXPress cameras, too.

With the integrated GenTL support in pylon, Basler CoaXPress cameras can also be used in any GenICam GenTL compatible 3rd party libraries, e.g. MVTec HALCON or Matrox MIL.

Compression Beyond

With the new pylon 6.1 release, Basler provides support for the new Compression Beyond feature of Basler's ace 2 Pro GigE and USB 3.0 cameras. Choose between lossless or lossy data compression to reach up to three times higher frame rates and throughput.

The pylon Viewer allows for intuitive and easy evaluation of the Compression Beyond feature while the pylon APIs enable its seamless integration into your own applications.

Thanks to the integrated decompression in pylon's GenTL producers, Basler ace 2 Pro cameras can also be used in any GenICam GenTL compatible 3rd party libraries.

Sharpness Indicator

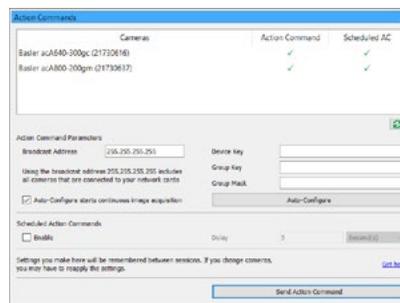


With the new Sharpness Indicator in the pylon Viewer, focusing your lens becomes a piece of cake! Simply define the area of interest you

want to focus your lens on. Cycle through the entire focus range of your lens by turning the focus ring to its

minimum and maximum positions. And eventually find the perfect focus for your lens based on the sharpness measurement of the pylon Sharpness Indicator.

GigE Action Commands evaluation tool



With the Action Command and Scheduled Action Command (PTP, IEEE1588) camera features and the pylon Camera Software Suite this task can be completed with ease. The new

Action Command pane in the pylon Viewer is designed to help beginners as well as experienced developers to easily evaluate Action Commands and Scheduled Action Commands and implement them in their own application.

Vignetting Correction

With the new Vignetting Correction camera feature and the pylon Camera Software Suite you can make use of smaller size and low-cost lenses and still avoid vignetting artefacts. Simply let the pylon Viewer calculate the correction values and save them in the camera. The camera will then apply the correction values to every image while maintaining its real-time functionality and still providing maximum performance to your application. In this way, you can make use of cost-effective lenses and thus decrease your total project costs.



**pylon Open Source Projects:
Be Part of It!**

“pypylon” and “pylon camera driver for ROS” are two new products from which you can benefit, particularly while programming in the **Python** programming language and when creating robot applications. Basler is making both available as open source projects for the first time. baslerweb.com/pylon-open-source-projects

pylon Camera Software Suite for Windows

The pylon Camera Software Suite for Windows contains the following main modules. Each one can be individually selected/unselected during the installation process, preventing the installation of unneeded modules on your system:

- CoaxPress 2.0 Driver
- USB3 Vision Driver
- GigE Vision Filter, Socket and Performance Driver
- Camera Link Serial Communication Driver
- pylon Viewer
- Configuration tools for GigE Vision, USB3 Vision and Camera Link

Standard Interface Adapter for 3rd Party Software

pylon for Windows provides a number of adapters to interface with other 3rd party software:

- pylon GenICam **GenTL producers** for CoaxPress, GigE and USB 3.0 cameras with third-party software libraries Matrox MIL, MVTec HALCON or STEMMER IMAGING Common Vision Blox
- pylon DirectShow adapter – interfaces with any Direct Show-compliant software (e.g. other Machine Vision software, video editing software).
- pylon TWAIN adapter – interfaces with any TWAIN-compliant software (most commonly scanner or microscopy software).
- pylon AIK Driver – interfaces Basler USB 3.0 cameras with Cognex Vision Pro.
- pylon Neurocheck Driver – interfaces Basler cameras with Neurocheck 6.1 or higher.

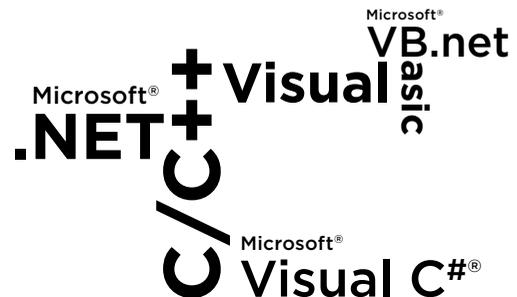
Easy Software Deployment

pylon offers two methods to redistribute pylon based applications to the end user:

- A dedicated “pylon **redistributable**” includes the pylon runtime environment and drivers for USB 3.0, GigE, CoaxPress – It simply needs to be installed along with the actual end user application
- With the **Copy Deployment** option it is possible to simply copy the needed pylon files to the target system – this helps to keep the end user application as lean as possible.

Support for Various Programming Languages

The pylon SDK for Windows supports all Basler cameras with the major programming languages: C, C++, and the .NET languages (C#, VB.NET).



pylon for Windows System Requirements

- Windows 7, Windows 8.1, Windows 10, 32 or 64 bit

The pylon Camera Software Suite for Windows can be downloaded for free at:

baslerweb.com/pylon-windows.

For more information on the installation process, refer to the pylon Installation Guide. The helpful pylon Release Notes contain all improvements and bug fixes since the first pylon version.

pylon Camera Software Suite for Linux

The pylon 6 Camera Software Suite is also available for Linux on x86 and ARM architectures. pylon for Linux offers:

- Design for standard PC applications as well as for embedded systems
- User friendly, well-designed C and C++ APIs
- pylon Viewer, IP Configuration and Bandwidth Manager tools
- BCON for LVDS and BCON for MIPI I²C Driver Adapter
- Full support of Basler CoaxPress 2.0 (Linux 64-bit x86 architectures), GigE and USB 3.0 cameras
- pylon GenICam **GenTL producers** for GigE, CoaXPress, and USB 3.0 cameras with third-party software libraries Matrox MIL, MVTec HALCON (only option for Linux ARM), STEMMER IMAGING Common Vision Blox
- Support for 32 and 64-bit x86 architectures
- Support for ARM 32-bit and 64-bit hard-float options: pylon 6 for Linux was successfully tested on several systems including the following ARM systems: **NVIDIA Jetson TK1, TX1, TX2, Nano and AGX Xavier, Odroid XU4, Raspberry Pi 4, Pi 3 and Pi2 and others.** An application note about "pylon on ARM systems" is available on our **website**.

Easier Software Development for Embedded Systems

Because of their significant cost advantages (compared to standard Desktop PCs) embedded systems – quite often based on low cost ARM processors – are getting more and more attractive for computer vision applications. However in contrast to classic PCs software development for embedded systems is typically much more complex and hence costly.

pylon eases software development for embedded platforms and can help to reduce the development costs:

- Because pylon offers the same API for different operating systems, application development can be started on a standard PC (Windows, Mac, Linux) and later **easily migrated** to an embedded target e.g. Linux (ARM). Already existing code can simply be ported from a desktop to an embedded target.
- Since pylon can easily be ported from one camera interface technology to another (e.g. from USB 3.0 to BCON) without any significant code changes, an application can be prototyped with an easy-to-integrate, plug and play camera interface (like USB 3.0) before switching to a more complex camera interface technology.
- pylon's modular concept and the **Copy Deployment** option allow users to redistribute applications with the necessary pylon runtime files only. This keeps the application lean and reduces memory consumption.

pylon for Linux System Requirements

pylon for Linux is built with the Ubuntu 16.04 toolchain and supports all relevant Linux distributions.

The pylon Camera Software Suite can be downloaded for free at www.baslerweb.com/pylon-Linux-x86 or www.baslerweb.com/pylon-Linux-ARM.

For more information on the installation process, refer to the pylon README and INSTALL file.



pylon has been successfully tested on several embedded boards

pylon for BCON

The **proven** and **user-friendly** pylon Camera Software Suite is also available for the dart with BCON for LVDS and BCON for MIPI interface and supports Linux on x86 or ARM-based systems. The programming interface for creating user-specific applications is identical to other interfaces, such as USB 3.0. This fact makes migrations (e.g. dart USB 3.0 to dart BCON) much easier.

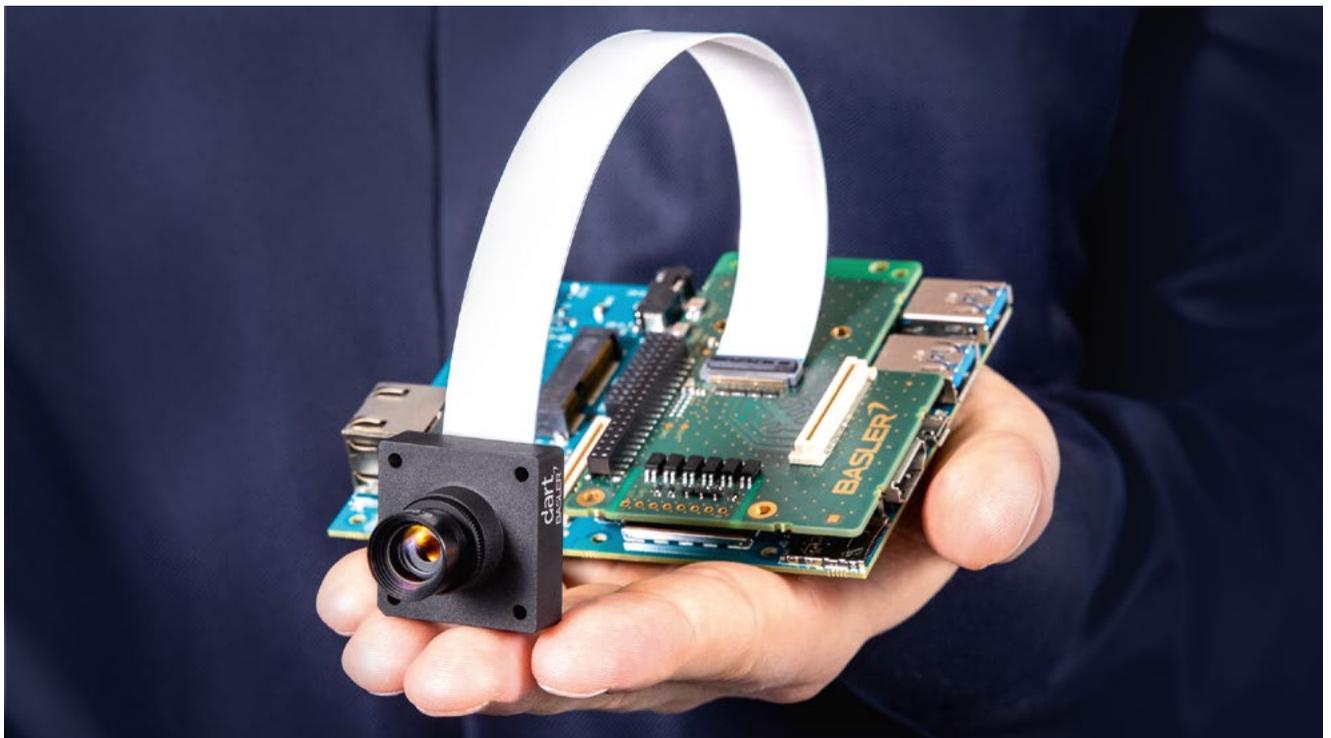
pylon for BCON for LVDS

Based on GenICam technology, the camera configuration is performed via the I²C bus of the Linux system. For this purpose, pylon introduces the BCON for LVDS Adapter API which needs to be implemented in order to let pylon communicate with the system's I²C bus. A ready-to-use sample implementation is provided as binary as well as in source code - it can be used "as-is" without any modification or as a blueprint for a custom adapter implementation.

The BCON for LVDS Adapter API can also be used to implement the image acquisition for the actual image-grabbing hardware. After doing so, pylon can be used without limitation - even for image data transfer.

pylon for BCON for MIPI

pylon also supports the BCON for MIPI interface on Linux/ARM based platforms with Qualcomm Snapdragon SoCs. Along with Basler's Driver Package all image preprocessing is offloaded to the SoC's internal Image Signal Processor (ISP), the CPU itself is not affected. This allows **ultra-lean** and **cost-efficient** designs with no additional hardware required, the full CPU and GPU power of the Snapdragon SoC is still available for the actual image-processing task. With this setup the integration of the camera module becomes actually a plug and play procedure. Due to the GenICam compliance pylon offers full access to all camera parameters and **eases** the image acquisition as for any other Basler camera interface.



Tailor-made for embedded vision applications: pylon for BCON

PYLON FOR MACOS

pylon Camera Software Suite for macOS

The pylon Camera Software Suite is also available for macOS. It offers:

- User friendly, well-designed C++ API
- GenICam 3.1-based technology
- pylon Viewer, IP Configuration and Bandwidth Manager tools
- Full support of Basler GigE and USB 3.0 cameras
- Support for 64-bit x86 architectures

About Basler

Basler is a leading manufacturer of high-quality cameras and camera accessories for industry, medicine, traffic and a variety of other markets. The company's product portfolio encompasses area scan and line scan cameras in compact housing dimensions, camera modules in board level variants for embedded solutions, and 3D cameras. The catalog is rounded off by our user-friendly pylon SDK plus a broad spectrum of accessories, including several developed specially for Basler and optimally harmonized for our cameras.

Basler has three decades of experience in computer vision. The company is home to approximately 600 employees, at its headquarters in Ahrensburg, Germany, and at its subsidiaries and sales offices in Europe, Asia, and North America.

Easy Software Deployment

With the Copy Deployment option it is possible to simply copy the needed pylon files to the target system - this helps to keep the end user application as lean as possible.

pylon for macOS System Requirements

- pylon for macOS requires macOS Version 10.12 (Sierra), 10.13 (High Sierra) or 10.14 (Mojave)

The pylon Camera Software Suite can be downloaded for free at www.baslerweb.com/pylon-macos.

For more information on the installation process, refer to the pylon README and INSTALL file. The helpful pylon Release Notes contain all improvements and bug fixes since the first pylon version.



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ID 2000030030

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