



## 3-CMOS prism-based R-G-B area scan cameras for machine vision and life sciences applications



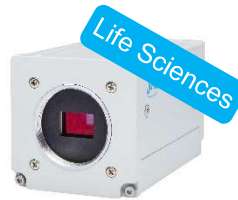
**AP-3200T**

3.2 megapixels



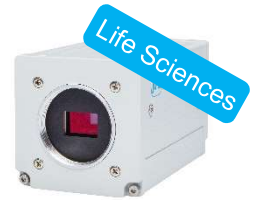
**AP-1600T**

1.6 megapixels



**AP-3200T-USB-LS**

3.2 megapixels



**AP-1600T-USB-LS**

1.6 megapixels

***When color matters...the Apex Series  
is the clear choice!***

Exceptionally  
accurate color  
image data

High resolution  
combined with  
high frame rates

Flexible  
color space  
conversion

Highest levels of  
dust/FOD  
suppression



*See the possibilities*

## 3-CMOS prism-based industrial area scan cameras for machine vision and life sciences applications.

**APEX**

AP-1600T  
AP-3200T

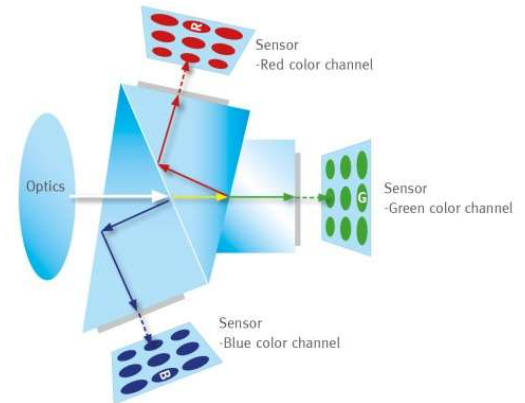


### When color matters....

*In nature, no one handles color better than the chameleon.... And for color vision systems, no industrial cameras handle color better than the Apex Series. With their new 3-CMOS, prism-based technology, Apex cameras provide significantly higher color accuracy and spatial precision than typical Bayer-filter cameras.*

### Exceptionally accurate color image data

JAI's prism-based RGB cameras separate the incoming light into red, green and blue wavelengths, which are directed to three precisely-aligned CMOS sensors. The JAI RGB color imaging technique provides better color accuracy and spatial precision than traditional color cameras using the Bayer mosaic technique.



### High resolution combined with high frame rates

The AP-3200T is built around the Sony Pregius™ IMX265 sensor and the AP-1600T around Sony Pregius™ IMX273. Combined with Power over Mini Camera Link interface the AP-3200T-PMCL and AP-1600T-PMCL can output as much as 3 x 3.2 megapixels at 55 frames/second and 126 frames/second respectively. The table below gives an overview of available resolutions and interfaces.

	Resolution	Width x Height	FPS	Imager	Optical Format
<b>Models with 1.6 megapixel:</b>					
AP-1600T-PGE	3 x 1.6 MP	1456 x 1088	24	IMX273	1/2.9"
AP-1600T-USB <sup>1)</sup>	3 x 1.6 MP	1456 x 1088	79	IMX273	1/2.9"
AP-1600T-USB-LS (Life sciences) <sup>1)</sup>	3 x 1.6 MP	1456 x 1088	79	IMX273	1/2.9"
AP-1600T-USB-LSX (Life sciences) <sup>1) 2)</sup>	3 x 1.6 MP	1456 x 1088	79	IMX273	1/2.9"
AP-1600T-PMCL	3 x 1.6 MP	1456 x 1088	126	IMX273	1/2.9"
<b>Models with 3.2 megapixel:</b>					
AP-3200T-PGE	3 x 3.2 MP	2064 x 1544	12	IMX265	1/1.8"
AP-3200T-USB <sup>1)</sup>	3 x 3.2 MP	2064 x 1544	38	IMX265	1/1.8"
AP-3200T-USB-LS (Life sciences) <sup>1)</sup>	3 x 3.2 MP	2064 x 1544	38	IMX265	1/1.8"
AP-3200T-USB-LSX (Life sciences) <sup>1) 2)</sup>	3 x 3.2 MP	2064 x 1544	38	IMX265	1/1.8"
AP-3200T-PMCL	3 x 3.2 MP	2064 x 1544	55	IMX265	1/1.8"



**USB**  
VISION  
-USB



**GiGE**  
VISION  
-PGE



**CoCL**  
-PMCL



**USB**  
VISION  
-USB

Life Sciences (LS and LSX) models.

1) The models can be delivered with or without IR-cut filter. Models without IR-cut filter provide higher red channel sensitivity and higher NIR sensitivity.

2) Pre-screened "LSX" models offers minimal levels of image artifacts from dust/FODs.

### Highest levels of dust/FOD suppression

All Apex LS models provide exceptional image quality for most medical and life sciences applications, but some applications call for an even higher grade of image clarity, and here the LSX models are recommended. The Apex LSX models are all pre-screened to offer minimal levels of image artifacts from dust/FODs, providing maximum image quality for the most demanding life sciences and microscopy applications.

### Flexible color space conversion

The Apex Series cameras provide great flexibility in on-board color space conversion: including RGB to HSI color space conversion and RGB to CIE XYZ color space conversion. (sRGB and Adobe RGB color spaces are also available).



The Image-Pro image analysis software platform from Media Cybernetics enables users and system designers to more easily capture, process, measure, analyze and share microscopy-based images. Custom drivers allow the Apex Series cameras to seamlessly pass images to the Image-Pro software while allowing certain camera functions to be controlled from within the Image-Pro environment.

Also, device adapters for the open source µManager (Micro-Manager) software are available. These adapters have been developed to allow the Apex Series cameras to fully interact with the µManager software which works with microscopes from all four major manufacturers (Leica, Nikon, Olympus and Zeiss) plus many others.



- **Single and multi-region-of-Interest (ROI) for faster frame rates and faster image processing**

The ROI can be set up in rectangular fields as both single and multi-ROIs to increase the frame rate or to increase the image processing speed. Image processing is only done on the ROI to increase processing speed further and to avoid influence from image details outside the ROI.

- **Analog gain and exposure setting for each individual R-G-B channel**

The analog gain and the exposure time can be set independently for the red, green and blue sensor channels allowing for better signal/noise conditions. This maximizes the dynamic range for each color channel resulting in improved image quality.

- **Automatic Level Control**

The ALC function combines automatic gain control and automatic shutter control to efficiently handle various changes in brightness.

- **Shading correction on ROI**

When the ROI function is used, shading correction is performed only on the region of interest. This enables the use of lenses with smaller optical formats without negatively impacting the correction process.

- **Color Enhancer**

With the color enhancer tool it is possible to strengthen certain colors (double emphasis) in the image for additive hues (red, green and blue) and subtractive hues (cyan, magenta and yellow). This feature is useful in certain applications such as microscopy and medical imaging.

- **Edge Enhancer**

The edge enhancer function can improve the edge contrast in an image. The image processing filter identifies the boundaries between contrasting colors and increases the contrast in those areas, thereby improving edge sharpness and definition.

- **Pixel Binning**

Binning can be used to increase the light sensitivity of the pixels but also to achieve a higher signal-to-noise ratio if this is more important than getting images with maximum resolution. Various horizontal and vertical binning combinations are available: two horizontal pixels (2x1), two vertical pixels (1x2) and two horizontal and vertical pixels (2x2).

- **Chunk data for each image** (This feature is not supported in Image-Pro and µManager)

Chunk data provides user data and control data for each image such as offset X and Y, width, height, exposure time, binning, LUT Enable, Frame Trigger Counter, exposure start plus many more parameters.

- **Color Temperature Preset** (This feature is not supported in Image-Pro and µManager)

The color temperature preset function allows the user to choose between five different color temperatures (3200K, 5000K, 6500K, 7000K and 9000K). This enables the camera to adjust to different light sources with a single click.

- **Robust and compact design**

The camera is built with a high degree of robustness (Shock **50G** and Vibration **3G**) and is designed to perform reliably even in harsh and hot industrial environments. (Ambient temperature: -5°to +45°C).



See the possibilities



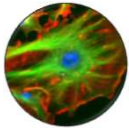


## Apex Series application examples:



### Ophthalmology

Eye examination looking at interior features such as the retina, optic nerve head and microcirculation in blood vessels.



### Digital pathology/cell imaging

Imaging of human tissue slices, cells and body fluid samples under a microscope.



### Endoscopy/surgical imaging

Imaging inside the human body and organs. Surgical imaging via microscopes or ceiling mounted cameras.



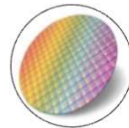
### Medical quality control

Color quality control of ampoules, capsules, multi-layer tablets and other medical products.



### Food/bottle inspection

Fruit, vegetable, egg, meat and bottle inspection.



### PCB inspection and wafer

Visual inspection of printed circuit boards, chips, electronic parts and wafers.



### Flat panel inspection

Calibration of chrominance and luminance values to specified color spaces, as well as detection of pixel defects.



### Print inspection

High-end print inspection of currency, pharmaceutical packages and other printed material.



### Automotive inspection

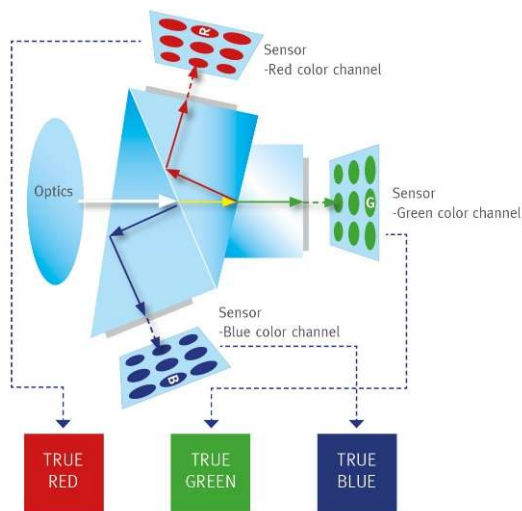
Paint inspection and verification of color LEDs in dashboard instruments.



### Mineralogy

Inspection of clarity and colors of diamonds and inspection of minerals.

## Prism-based imaging



### DELIVERING TRUE COLORS

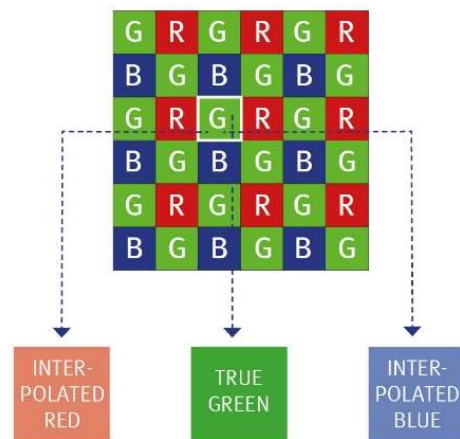


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AP-1600T  
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vs

## Bayer Mosaic imaging



### DELIVERING "ONLY" INTERPOLATED COLORS



*In Bayer cameras, each pixel is filtered to record only one of three colors. Therefore the data from each pixel cannot fully specify each of the red, green, and blue values on its own. To obtain a full-color image, various algorithms are used to interpolate a set of complete red, green, and blue values for each pixel. These algorithms make use of the surrounding pixels of the corresponding colors to estimate the values for a particular pixel. The result is less color accuracy than can be obtained with JAI prism-based cameras.*

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See the possibilities