

### Digital industrial cameras

Capture the essential.



# Inspired by nature – our technology as evolution.



The human eye can discern about 100 shades of gray. Our cameras can distinguish more than 4,000.

We can see no more than 16 individual images per second, but our cameras can capture more than 1,000.

Our cameras never get tired.

## Simply focused on the essentials.

Baumer is a global leader in sensor solutions for factory and process automation. More than 2,300 employees in 37 subsidiaries in 19 countries are at your service across the globe.

Industrial image processing is an important business for us. Leading in innovation, we have been providing high-performance digital cameras for PC-based image processing systems and intuitive vision sensors for over 15 years.

Merging cutting-edge technologies with customer-focused consultancy has made us a pramici global provider of high-quality industrial cameras. Our customers benefit from a diverse portfolio of sophisticated products for many different applications across varied industries. We are committed to long-term availability of our cameras to make sure our customers will obtain a high return on their investments in vision systems.

We develop customer-focused products, anticipate trends and shape the market by pointing the way with technology innovations. We put a particular emphasis on high performance, outstanding quality and durability as well as easy system integration.

Where standard products come to their limits, we develop marketoriented, customised components in close cooperation with our customers. The result: Your decisive competitive edge.

Compliments

#### High-performance industrial cameras.

High frame rates, exceptional image quality and ease of integration – that's what our industrial cameras stand for. Their robust, industrial design is the basis for long-term stability and precise image analysis in your application.

The portfolio includes CCD- and CMOS-based matrix cameras in color and monochrome versions with resolutions ranging from VGA to 20 megapixel. Our many years of expertise make us understand your requirements to provide the optimum product for your application.



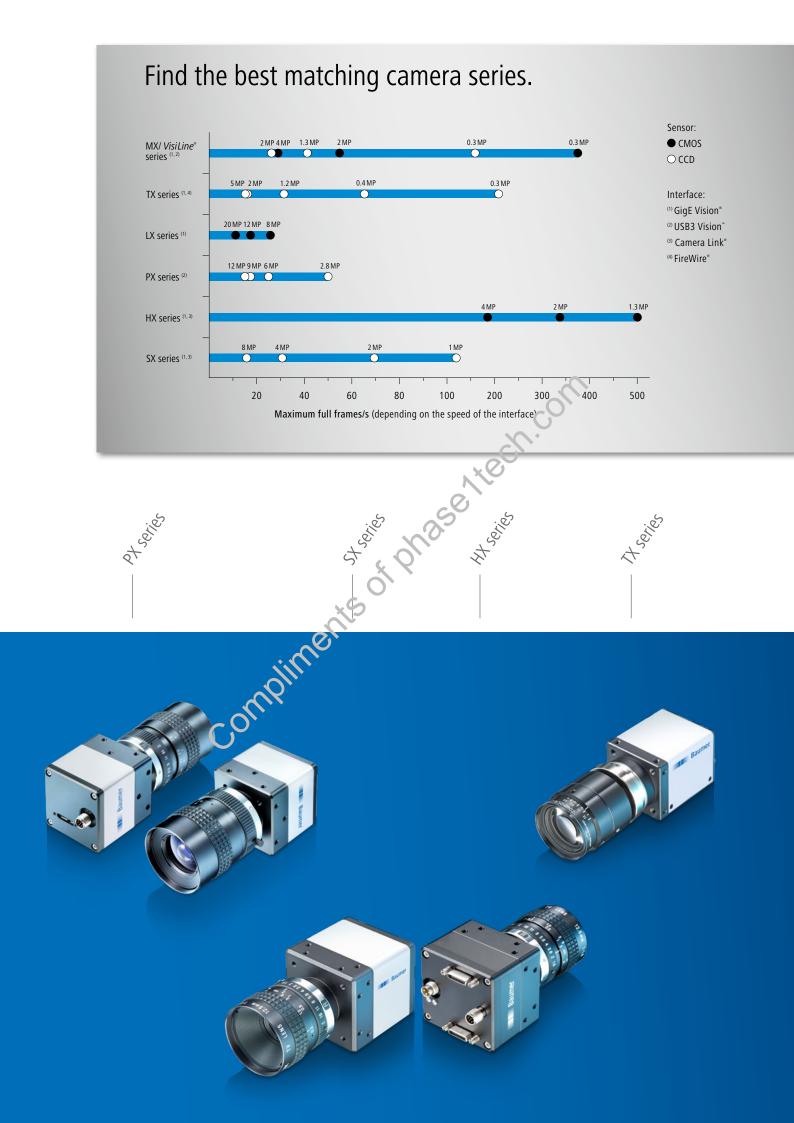














#### Proven products made even better.

With the VisiLine® camera series you are relying on innovative technologies and the proven quality of our successful TX series. Consistent further enhancement has upgraded the cameras in every aspect: higher frame rates with even better image quality and more functionality.

The new camera models incorporate everything that makes it easier to solve your image processing tasks. Color comparison as well as FPN correction and integrated HDR with the CMOS models facilitate efficient image analysis. Multi I/O, moliments PoE and replicable user sets will ease system integration even further.

#### VisiLine® series

- Up to 4 megapixel and 373 fps
- CCD and CMOS sensors
- Industry-capable design with M8 connection
- IP 40 protection



Reliable operation

opto-decoupled inputs and outputs with automation voltage levels





Camera Type	Model V	ariants	Sensor Type Sensor		Resolution [px]	Pixel Size [µm]	Full Frames [fps]	
	Mono	Color	,	,			GigE Vision®	USB3 Vision™
VLG-02 / VLU-02	•	•	1/4" CCD	SONY ICX618	656 × 490	5.6 × 5.6	160	160
VLG-03 / VLU-03 1)	•	•	1/3" CMOS	CMOSIS CMV300	640 × 480	7.4 × 7.4	373	373
VLG-12 / VLU-12	•	•	1/3" CCD	SONY ICX445	1288 × 960	3.75 × 3.75	42	42
VLG-20	•	•	1/1.8" CCD	SONY ICX274	1624 × 1228	4.4 × 4.4	27	_
VLG-22	•	•	2/3" CMOS	CMOSIS CMV2000	2040 × 1084	5.5 × 5.5	55	_
VLG-23 <sup>2)</sup>	•	•	1/1.2" CMOS	SONY IMX174	1920 × 1212	5.86 × 5.86	50	_
VLG-40	•	•	1" CMOS	CMOSIS CMV4000	2040 × 2044	5.5 × 5.5	29	_

<sup>1)</sup> available Q1/2015 <sup>2)</sup> available beginning Q2/2015



#### Flexible board level cameras.

Based on the VisiLine® platform, cameras of the MX series are particularly developed for use in embedded systems. The remote sensor circuit board is connected to the system circuit board via flexprint to make the board level cameras fit in almost any installation space.

USB 3.0 camera models provide you with simple Plug & Play functionality and a single-cable solution. GigE cameras master a transmission distance up to 100 meter cable length and support PoE. moliments

#### Digital, optically decoupled inputs and outputs

reliable protection External power supply against overvoltage 12 or 24 volt





USB3 Vision<sup>™</sup> for reliable system integration

#### MX series

- Up to 4 megapixel and 373 fps
- CCD and CMOS sensors
- Multi I/O for increased flexibility
- CMOS models with FPN correction and HDR





Camera Type	Model Variants		Sensor Type Sensor		Resolution [px]	Pixel Size [µm] Full Frames [fps		[fps]	
	Mono	Color						GigE Vision®	USB3 Vision™
MXG02 / MXU02	•	•	1/4" (	CCD	SONY ICX618	656 × 490	5.6 × 5.6	160	160
MXGC03 1)	•	•	1/3"(	CMOS	CMOSIS CMV300	640 × 480	7.4 × 7.4	373	_
MXG12 / MXU12	•	•	1/3″ (	CCD	SONY ICX445	1288 × 960	3.75 × 3.75	42	42
MXG20 / MXU20	•	•	1/1.8" (	CCD	SONY ICX274	1624 × 1228	4.4 × 4.4	27	27
MXGC20 / MXUC20	•	•	2/3" (	CMOS	CMOSIS CMV2000	2040 × 1084	5.5 × 5.5	55	55
MXGC40 / MXUC40	•	•	1″ (	CMOS	CMOSIS CMV4000	2040 × 2044	5.5 × 5.5	29	29

<sup>1)</sup> available Q1/2015



## Protected in harsh environments.

VisiLine® IP protected cameras are ideal for applications with rough ambient conditions. The IP 65 and IP 67 housings withstand both moisture and particulate contamination. They protect all critical camera components as well as the lens and eliminate the need for additional protective enclosures. The sophisticated mechanical design defies shock and vibration and ensures image acquisition with long-term stable reproducibility.

Thanks to high IP protection, light weight, robust design and single-cable solution capabilities by PoE the *VisiLine*\* IP protected cameras match particularly the application requirements in robotics.

IP-rated nousing protection IP 65/67 and only 220 g in weight

Precise positioning

stable sensor position

centered optical axis and

Flexible integration square housing with M3 mount on all sides and modular IP lens protection



Cost-efficient single-cable solution PoE Ethernet cable for robotics up to 100 m length

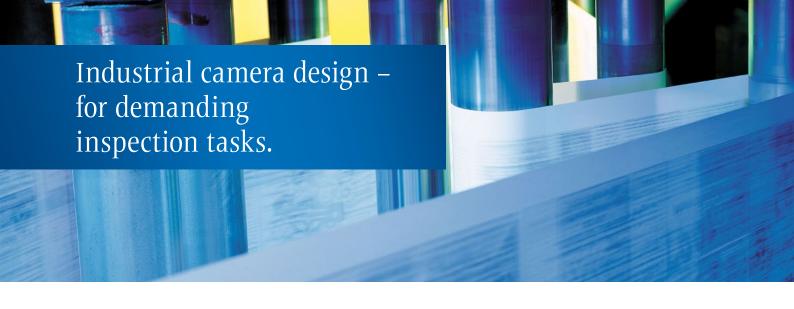
#### *VisiLine*® IP cameras

- Up to 4 megapixel and 160 fps
- Standard M12 connector
- Power supply 12 V, 24 V or PoE
- Vibration 10 g, shock 100 g



Camera Type	Model Variants		Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps]
	Mono	Color					GigE Vision®
VLG-02.I	•	•	1/4" CCD	SONY ICX618	656 × 490	5.60 × 5.6	160
VLG-12.I	•	•	1/3" CCD	SONY ICX445	1288 × 960	$3.75 \times 3.75$	42
VLG-20.I	•	•	1/1.8" CCD	SONY ICX274	1624 × 1228	4.40 × 4.4	27
VLG-22.I	•	•	2/3" CMO:	CMOSIS CMV2000	2040 × 1084	5.50 × 5.5	55
VLG-23.I 1)	•	•	1/1.2" CMO:	SONY IMX174	1920 × 1212	5.86 × 5.86	50
VLG-40.I	•	•	1" CMO:	CMOSIS CMV4000	2040 × 2044	5.50 × 5.5	29

1) available beginning Q2/2015



#### Proven versatility.

TX cameras were among the first compact GigE camera series and they are still a benchmark for market standards today. Tens of thousands have been successfully utilized in most varied applications.

More than 100 camera models with CCD sensors offer what it takes to meet virtually every requirement: PoE models for reduced installation and maintenance, Multi I/O cameras for simplified process synchronization as well as water and dust proof IP 67 models.

#### TX series

- Up to 5 megapixel and 210 fps
- CCD sensors
- Multi-voltage supply ranging from 8 to 30 volt
- Matured electronics design for superior image quality

Sensor Dust Protection System maximum protection for the image sensor

Square housing image center is maintained in each position



opto-decoupled inputs and outputs
with automation voltage levels





Camera Type		ľ	Model	Varian	its		Sensor Type	Sensor	Resolution 1) [px]	Pixel Size [µm]	Full Frames [fps]
	Mono	Color	NIR	IP 67	PoE	Multi I/O					GigE Vision®
TXG02	•	•					1/4" CCD	SONY ICX618	656 × 494	5.6 × 5.6	140
TXG03 2)	•	•		•	•	•	1/3" CCD	SONY ICX424	656 × 494	7.4 × 7.4	90
TXG04	•	•					1/2" CCD	SONY ICX414	656 × 494	9.9 × 9.9	56
TXG04 v2	•	•					1/2" CCD	SONY ICX414	656 × 494	9.9 × 9.9	93
TXG04h	•						1/3" CCD	Truesense KAI-0340	640 × 480	7.4 × 7.4	210
TXG06	•	•					1/2" CCD	SONY ICX415	776 × 582	8.3 × 8.3	64
TXG08 <sup>2)</sup>	•	•		•	•		1/3" CCD	SONY ICX204	1032 × 776	4.65 × 4.65	28
TXG12	•	•					1/3" CCD	SONY ICX445	1296 × 966	$3.75 \times 3.75$	32
TXG13 2)	•	•		•	•	•	1/2" CCD	SONY ICX267	1392 × 1040	$4.65 \times 4.65$	20
TXG14 2)	•	•	•				2/3" CCD	SONY ICX285	1392 × 1040	6.45 × 6.45	20
TXG14f	•	•					2/3" CCD	SONY ICX285	1392 × 1040	6.45 × 6.45	30
TXG20 <sup>2)</sup>	•	•		•	•	•	1/1.8" CCD	SONY ICX274	1624 × 1236	4.4 × 4.4	16
TXG50 2)	•	•		•	•	•	2/3" CCD	SONY ICX625	2448 × 2050	3.45 × 3.45	15

<sup>&</sup>lt;sup>1)</sup> Resolution with color models can have minimal variations. <sup>2)</sup> Model is also available with FireWire interface in monochrome and/or color (full frame rate differs).



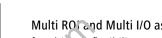
#### **High-resolution** CMOS cameras.

The LX series with high-resolution CMOSIS sensors and Dual GigE interface will master demanding inspection tasks with high requirements on fine-detailed image acquisition at high throughput. The innovative, standard-compliant Dual GigE interface with 240 MB/s bandwidth combines simplified integration with twice the frame rate.

The 8 and 12 megapixel models operate on the successful CMOSIS 5.5 µm pixel design, which allows existing systems an easy upgrade by LX cameras with excellent sensitivity and high frame rates. The 20 megapixel model utilizes a 6.4 µm pixel design. With even higher resolution and dynamic capabilities but yet low-noise this camera ompliment sets new benchmarks.

#### LX series

- Up to 20 megapixel and 29 fps
- CMOS sensors
- Outstanding sensitivity
- Single or Dual GigE with PoE



High Dynamic Range (HDR) further enhanced Dynamic Range

> Multi ROTand Multi I/O as well as PoE for ultimate flexibility

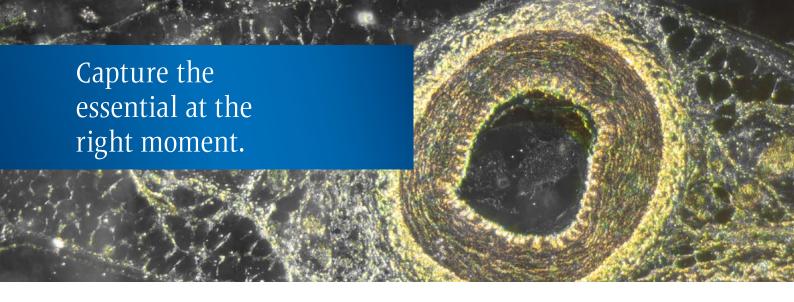


with 240 MB/s high frame rates and easy integration

Modular lens mount M58, M42, F-Mount or C-Mount



Camera Type	<b>Model Variants</b>		Sensor Type S		Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps]	
	Mono	Color						Single GigE	Dual GigE
LXG-80	•	•	4/3"	CMOS	CMOSIS CMV8000	3360 × 2496	5.5 × 5.5	14	29
LXG-120	•	•	APS-C	CMOS	CMOSIS CMV12000	4096 × 3072	5.5 × 5.5	9	19
LXG-200	•	•	35mm	CMOS	CMOSIS CMV20000	5120 × 3840	$6.4 \times 6.4$	6	12



## Brilliant image quality.

Cameras of the PX series with USB 3.0 interface are based on state-of-the-art SONY quad-tap CCD sensors with *EXview* HAD CCD II<sup>®</sup> technology merging brilliant image quality, resolutions up to 12 megapixel and high speed.

Outstanding sensitivity, dynamic properties and linearity in conjunction with USB 3.0 interface open up a wide application potential. The PX cameras master diffuse light conditions and meet the highest demands on image quality, for example in microscopy, measuring technology or traffic systems.

Sequencer and Multi I/O for improved flexibility

SONY CCD sensors with up to 12 MP resolution brilliant image quality, high frame rates and sensitivity



square housing with 3-point mount on all sides

Compact C-mount interface wide selection of high-quality lenses

#### PX series

- Up to 12 megapixel and 50 fps
- Quad-tap CCD sensors
- Very high dynamic range up to 65 dB
- Excellent homogeneity



Camera Type	Model Variants			Model Variants Sensor Type Sensor		Resolution [px]	Pixel Size [µm]	Full Frames [fps]
	Mono	Color 1)	Quad-tap					USB3 Vision <sup>™</sup>
PXU-28 1)	•	•	•	2/3" CCD	SONY ICX674	1936 × 1456	$4.54 \times 4.54$	50
PXU-60	•	•	•	1" CCD	SONY ICX694	2752 × 2200	$4.54 \times 4.54$	25
PXU-90 1)	•	•	•	1" CCD	SONY ICX814	$3384 \times 2704$	$3.69 \times 3.69$	18
PXU-120	•	•	•	1" CCD	SONY ICX834	4248 × 2832	3.1 × 3.1	15

<sup>1)</sup> available Q2/2015



#### Photometric precision.

The SX series stands for CCD cameras with excellent image quality and resolutions from 1 to 8 megapixel. With their Truesense sensors and accordingly aligned processing electronics, the series is characterized by excellent image homogeneity, outstanding linearity and photometric stability. The SX series is thus the ideal choice for demanding measurement tasks.

Thanks to double bandwidth, Dual GigE cameras provide the full frame rate even with a 12 bit resolution. Camera Link® Base models excel by minimum CPU load. Dynamic alignment of the quad tap sensors ensures an exceptional image quality.

#### SX series

- Up to 8 megapixel and 120 fps
- CCD sensors
- Dynamic tap alignment technique
- Robust, industrial design

Truesense CCD sensors up to 8 megapixel high resolution with excellent image quality





Dual GigE or Camera Link® for high frame rates





Camera Type	Modell	l Variants	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frame:	s [fps]
Mono	Mono	Color					Dual GigE	Camera Link®
SXG10 / SXC10	•	•	1/2" CCD	Truesense KAI-01050	1024 × 1024	5.5 × 5.5	120	120
SXG20 / SXC20 / SXC20 v2	•	•	2/3" CCD	Truesense KAI-02050	1600 × 1200	5.5 × 5.5	68	68
SXG21 / SXC21	•	•	2/3" CCD	Truesense KAI-02150	1920 × 1080	5.5 × 5.5	64	64
SXG40 / SXC40	•	•	1" CCD	Truesense KAI-04050	2336 × 1752	5.5 × 5.5	32	32
SXG80 / SXC80 / SXC80 v2	•	•	4/3" CCD	Truesense KAI-08050	3296 × 2472	5.5 × 5.5	16	16



#### High Speed CMOS cameras.

Based on top-of-the-line CMOS sensors, we developed the HX series especially for applications that put high demands on frame rate, resolution and sensitivity. All cameras feature FPN correction, HDR and a global shutter to ensure top image quality.

Dual GigE cameras will tackle any inspection task with all the benefits of GigE Vision® technology — with a frame rate that is even twice as high. For applications with even higher speed requirements you can rely on the Camera Link® Full ompliments models.

Multi ROI (Region of Interest) maximum frame rate with reduced amount of data

(FPN) Correction for homogenous images

**Fixed Pattern Noise** 



**Burst Mode** to capture image sequences with full sensor speed

#### **HX** series

- Up to 4 megapixel and 500 fps
- CMOS sensors
- Excellent sensitivity
- HDR for a higher dynamic range





Camera Type	<b>Modell Variants</b>		<b>Modell Variants</b>		Modell Variants		Sensor	Resolution [px]	Pixel Size [µm]	Full Frame	s [fps]
Mono	Mono	Color	NIR					Dual GigE	Camera Link®		
HXC13				1.4" CMOS	Cypress Lupa-1300-2	1280×1024	14 ×14	_	500		
HXG20 / HXC20	•	•	•	2/3" CMOS	CMOSIS CMV2000	2048×1088	5.5×5.5	105	337		
HXG40 / HXC40	•	•	•	1" CMOS	CMOSIS CMV4000	2048×2048	5.5×5.5	56	180		

## Software integration made easy.

Besides the right camera, the matching software for evaluation and integration is essential in a powerful image processing system. For any of our cameras you can draw upon the Baumer GAPI software development kit (SDK) or on third party software.

Convenient implementation: The Baumer GAPI.

The Baumer GAPI is the generic application programming interface (API) for easy camera integration into user-specific Windows® or Linux software environment. Drivers with low CPU load, particularly optimized to comply with the established interface standards, numerous example programs and documentation support the integration process.

**High-performance SDK** for efficient image capturing

Single-source support in both camera and software

Camera test tool Camera Explorer



Future-oriented integration by standard compliance



Software Download Baumer GAPI SDK www.baumer.com/GAPI-SDK

Just one click to the first image: The Baumer Camera Explorer.

As from software version 2, the new Camera Explorer for quick camera evaluation becomes available. Also acting as an intuitive test tool, it supplies the first image with just one click. All camera parameters are configurable for image display in real-time sequence or as a recording. Extended functionalities furthermore simplify deployment in visualization tasks.

Baumer GAPI		v1.7	v2.x
Interfaces	GigE Vision® (Single / Dual GigE)	•	•
	USB3 Vision <sup>™</sup>	_	•
	Camera Link®	•	_
	FireWire	•	-
Operating systems	Windows* XP   7   8	•   •   -	• 1)   •   •
	Linux (Debian / Ubuntu / Fedora / OpenSuse)	_	<b>●</b> 1)
Programming languages and compatibility	C   C++   C#	• • •	- • •

<sup>1)</sup> GigE Vision® support

#### Flexibility by compatibility.

Every task in image processing is unique and imposes individual requirements on both camera and related machine vision software. We meet them all.

#### Flexibility by standard compliance.

Hassle-free compatibility of GenICam<sup>™</sup>, the Baumer GAPI generic application programming interface, together with standardoptimized drivers for GigE Vision®, USB3 Vision®, Camera Link® and DCAM, simplify camera integration and allow for drop-in replacement across all series.













#### Third Party Software Support.

Full compliance to all relevant standards in camera engineering and development, regular compatibility tests and the close cooperation with our software partners give you the freedom to implement user-specific third party software and ensure troublefree integration of our cameras in any of your application tasks.

Amongst others Baumer supports third party software of the following vendors:

























#### Ideally connected.

Our in-house developed network components are optimally harmonized and particularly conceived for industrial image processing. They complete your image processing system in an ideal way. Based on PoE standard they simplify power supply of the GigE Vision® cameras and reduce cabling effort.

The cameras support data rates up to 1000 Mbit/s. Copper cables allow for a maximum length of 100 m. SFP modules and fiber-optic cable allow for an even more extended range. Supporting jumbo frames cuts down on CPU load and processing effort. Selected models provide 24 V supply and eliminate the need for an additional power unit. DIN rails provide convenient mounting capabilities.

SFP module for fiber-optic transmission of more than 100 meter in length **1000BASE-T with PoE** matching Ethernet interface for single cable solutions



24 V supply

for use in industrial environments

#### Network components

- Simplifies the design of multi-camera systems
- Power supply via PoE
- Supporting jumbo frames
- Robust, industrial design



Components	Connections	Jumbo Frames [kByte]	DC Supply [V]	PoE	Performance per output [W]	Dimensions [mm]
GigE Power Injector	4x 8P8C (RJ-45)	_	48	•	15.4	22.5 × 99 × 113.5
GigE Switch	4x 8P8C (RJ-45)	up to 10	12 24	_	_	22.5 × 99 × 113.5
GigE Power Switch (4 port)	4x 8P8C (RJ-45)	up to 10	48	•	15.4	22.5 × 99 × 113.5
GigE Power Switch Extended (6 port)	5x 8P8C (RJ-45) 1x SFP-Modul	up to 10	48	•	15.4	45 × 99 × 113.5
GigE Power Switch Plus (6 port)	5x 8P8C (RJ-45) 1x SFP-Modul	up to 9	12 36	•	30	41 × 94.9 × 144.3

#### Making it all easy.

We provide you with everything you need to integrate our cameras quickly and easily into your system: From proper accessories on to individual starter kits, you will obtain all that's necessary.

#### Matching accessories for your system.

There is more to an image processing system than just a camera: cables, PCI interface cards, filters, adapters and mountings or lenses. We help you to find the accessories that match your application and provide you with a comprehensive range of crossinterface accessories that are optimally harmonized. Since the system is only as reliable as its individual components, you can be sure our components underwent comprehensive testing and inspection – for long-term longevity and reliability in the image processing application.

#### Starter Kits: Just unpack and go.

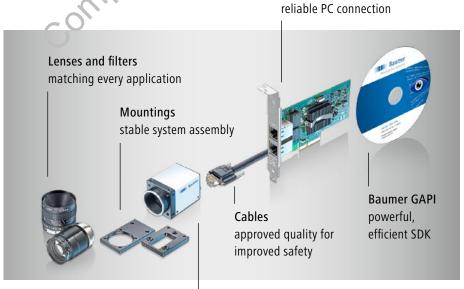
Our starter kits are individually compiled to match the related camera series and will support you in evaluating a camera. You can focus entirely on the solution while we provide you with everything required for set up – from cable to mountings on to software.





Lighting

Your Starter Kit Request today your individual starter kit: www.baumer.com/vision/starterkit:

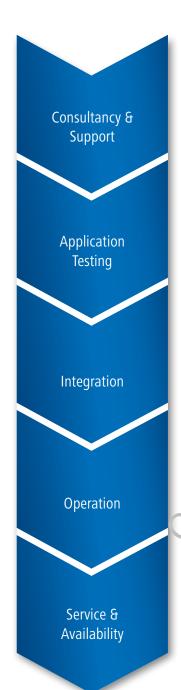


Interface cards

**Third Party** Software

## More than just a camera: From idea to implementation.

When conceiving a new image processing system, our customers focus on the whole. For this reason we attach great importance to continuous improvement of the entire value-added process in order to support you in cutting down on costs and improving efficiency.



Right from the beginning, we are with you every step of the way. Our experienced engineers and technicians provide on-side support when it comes to evaluating the appropriate camera and matching accessories. In close cooperation with you we elaborate on customized components where standard products meet their limits.

Our cameras enable cross-industry deployment in most varied applications. Our individual starter kits and the Camera Explorer in our Baumer GAF software development kit allow you convenient testing of our products already in the exact aims stage. This way, you can be sure to always get the components optimally matching your system.

Easy and time-saving camera integration. Our Technical and Application Support Center will help you in implementing the camera in your application. Comprehensive compatibility tests of several system components and compliance to all relevant standards ensure perfectly reliable system integration, whereas camera integration is aided by our SDK Baumer GAPI or third party software.

The robust design of our industrial cameras is essential in long-term stable image processing. We are EN ISO 9001 certified and by compliance to EMVA 1288 our cameras achieve top results in supplier audits. Every camera is subject to strict controls and compresion electric and optical inspection. Development, production and support all merged in one single location — for best results.

Rely on us and on our cameras throughout the years: 37 locations in 19 countries ensure long-term availability of our products and short reaction channels. Our products are backed by first-class service throughout their entire service life — in general, the experienced experts of our international technical support will answer your questions within 48 hours.

## Machine vision competence at a glance.



#### Worldwide presence.





For more information about our worldwide locations go to:

www.baumer.com/worldwide



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