IRSX Series
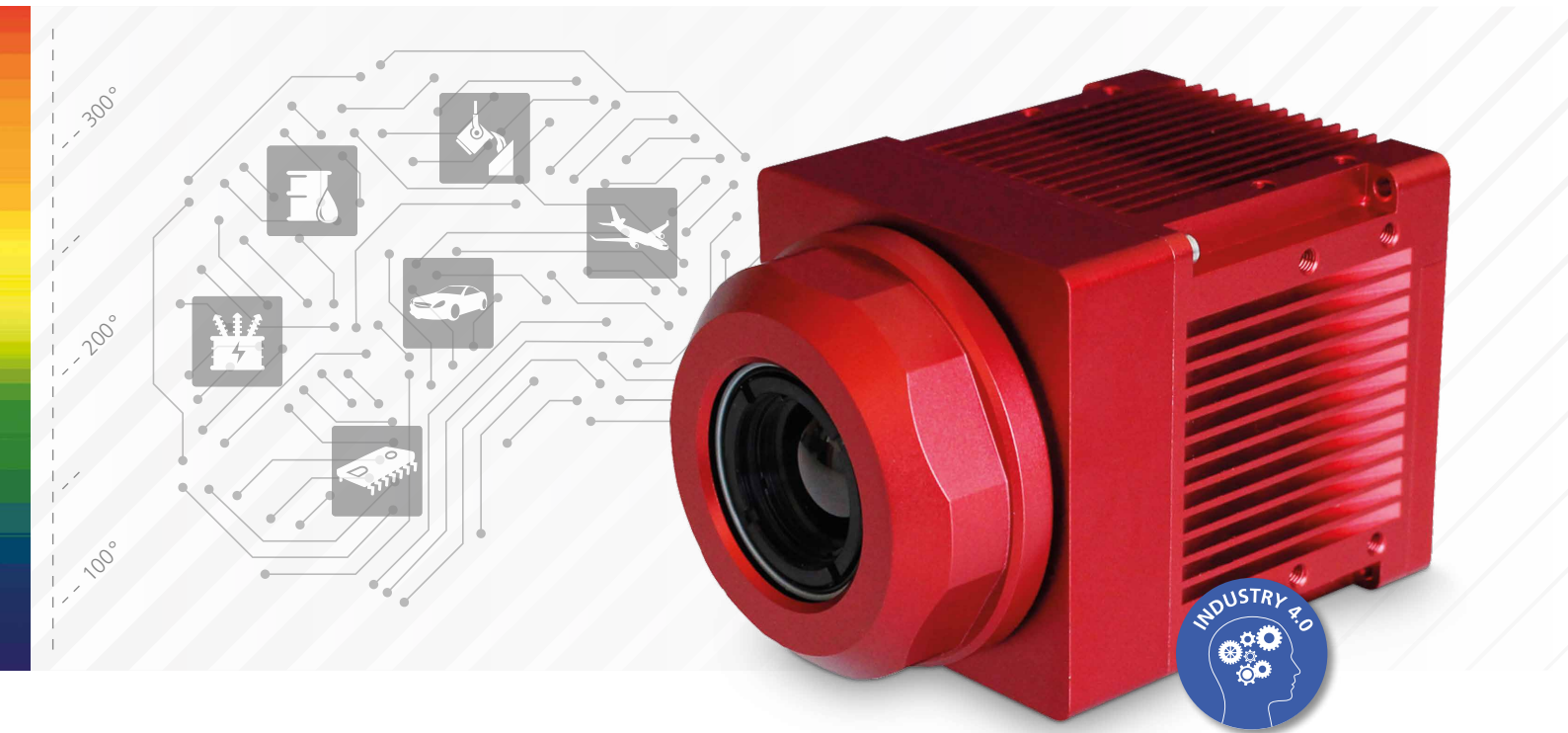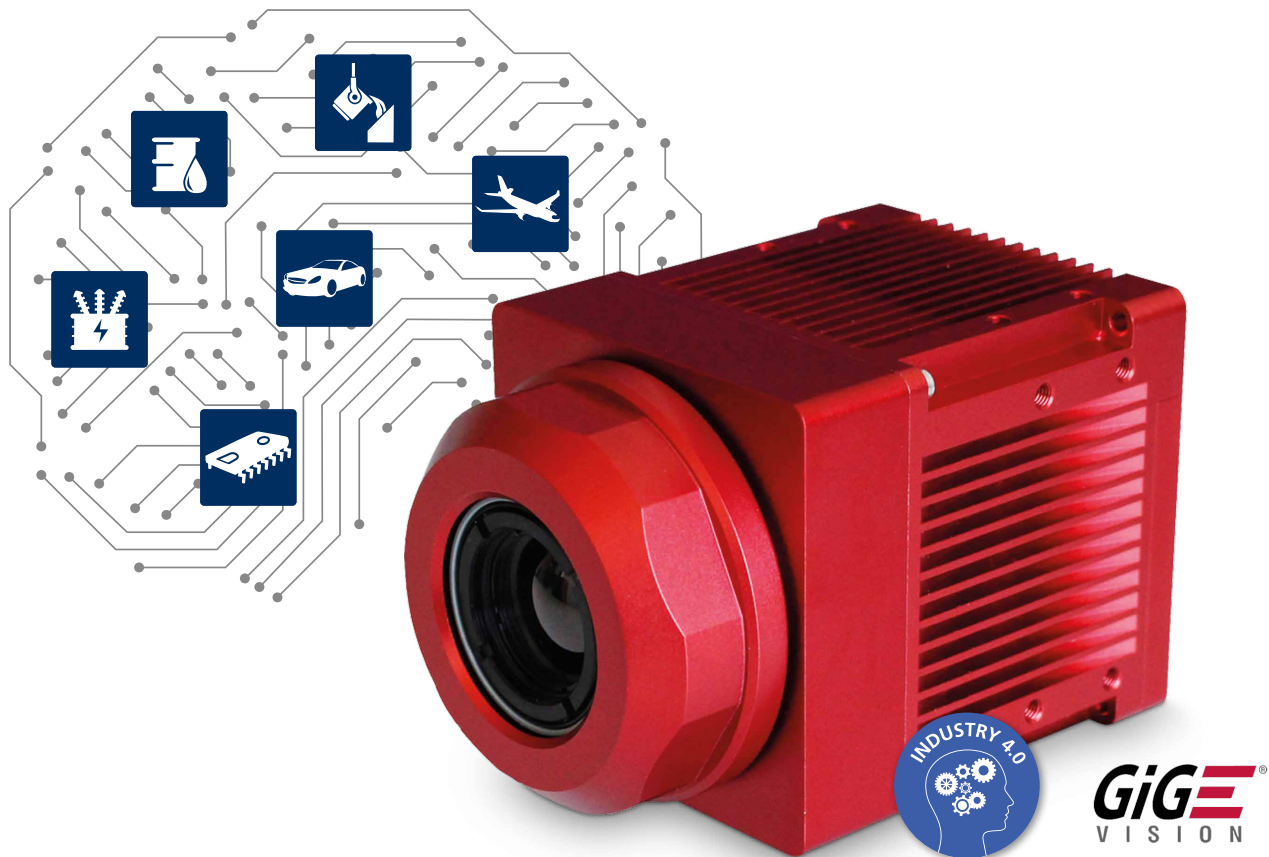
Smart Infrared Cameras for Industry 4.0

✔ Stand-alone solution for thermal machine vision

✔ Consistently designed for industrial use

✔ Easy integration without programming requirements

✔ Web-based configuration and visualization

✔ Exceptional connectivity with standard interfaces

✔ Robust design for maximum reliability (IP67)

✔ Apps for various applications available

The First Truly Smart Infrared Cameras for Industrial Use

With the IRSX series, intelligent, self-contained thermal imaging systems that are consistently designed for industrial use are available for the first time. Designed as an all-in-one solution, the IRSX cameras combine a calibrated thermal imaging sensor with a powerful data processing unit and a variety of industrial interfaces in a rugged IP67 housing small enough to fit in the tightest of spaces. Once installed, they communicate directly with your process control, providing an outstanding functionality for the practical implementation of Industry 4.0.

Less Effort and More Stability
A computer, special thermal imaging software or external interfaces are no longer required, the IRSX cameras give you the complete solution, massively reducing system complexity, installation effort and costs while significantly improving system stability. With their IP67 full-metal housing, they can be installed on the factory floor without any need for an additional protective enclosure.

High Performance and Flexibility
The IRSX series comprises a variety of models with different fields of view, resolutions and frame rates. You will always find a camera configuration that perfectly matches your application requirements. With their embedded data processing unit, the cameras provide a reliable performance even in the most challenging applications.

Perfect Communication and Control
For a smooth direct communication with your automation and control equipment, the IRSX cameras feature a multitude of protocols, including HTTPS, Modbus TCP, Profinet, OPC-UA and MQTT. They also have digital I/Os for control and alarming as well as an encoder interface, e.g. for part tracking on variable speed lines.

Easy Setup for Monitoring Tasks
Thanks to a powerful, user-friendly web interface, configuring the IRSX cameras as a whole as well as the image and result display is child's play. In fact, creating solutions for thermal imaging applications has never been easier and more efficient, and you can very quickly focus on your actual tasks.

The Perfect Toolbox for Your Application

The IRSX cameras are part of the AT Vision World. Based on our high-performance smart camera platform, we have already integrated numerous image sensors to cover multiple spectral ranges (IR, VIS), different resolutions, frame rates and other features. The uniquely versatile AT platform makes the integration of additional image sensors easier than ever, allowing an efficient and quick design of application-tailored smart cameras.

In order to help you get the most out of the IRSX cameras, the AT Vision World provides a comprehensive set of software tools. These include not only sensor communication libraries and standard APIs such as REST, GigE Vision, MQTT and OPC-UA but also a constantly growing number of application-specific apps.

No matter whether you are looking for an out-of-the-box app or want to design a solution for your application yourself: in the AT Vision World, you will always find exactly what you need.
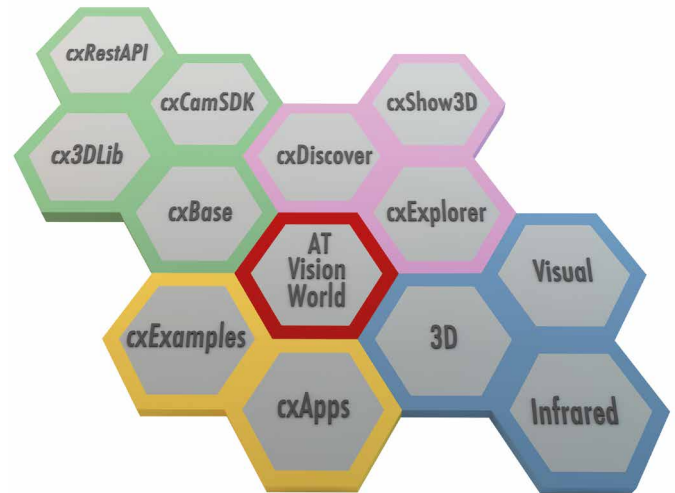
Web-Based Configuration

- ✔ Easily configure camera interfaces and display parameters as well as measurement plans including the processing of measurement results
- ✔ Configurations stored on camera and exportable
- ✔ Script engine for defining special functions
- ✔ Platform independent
- ✔ Multi-client capable
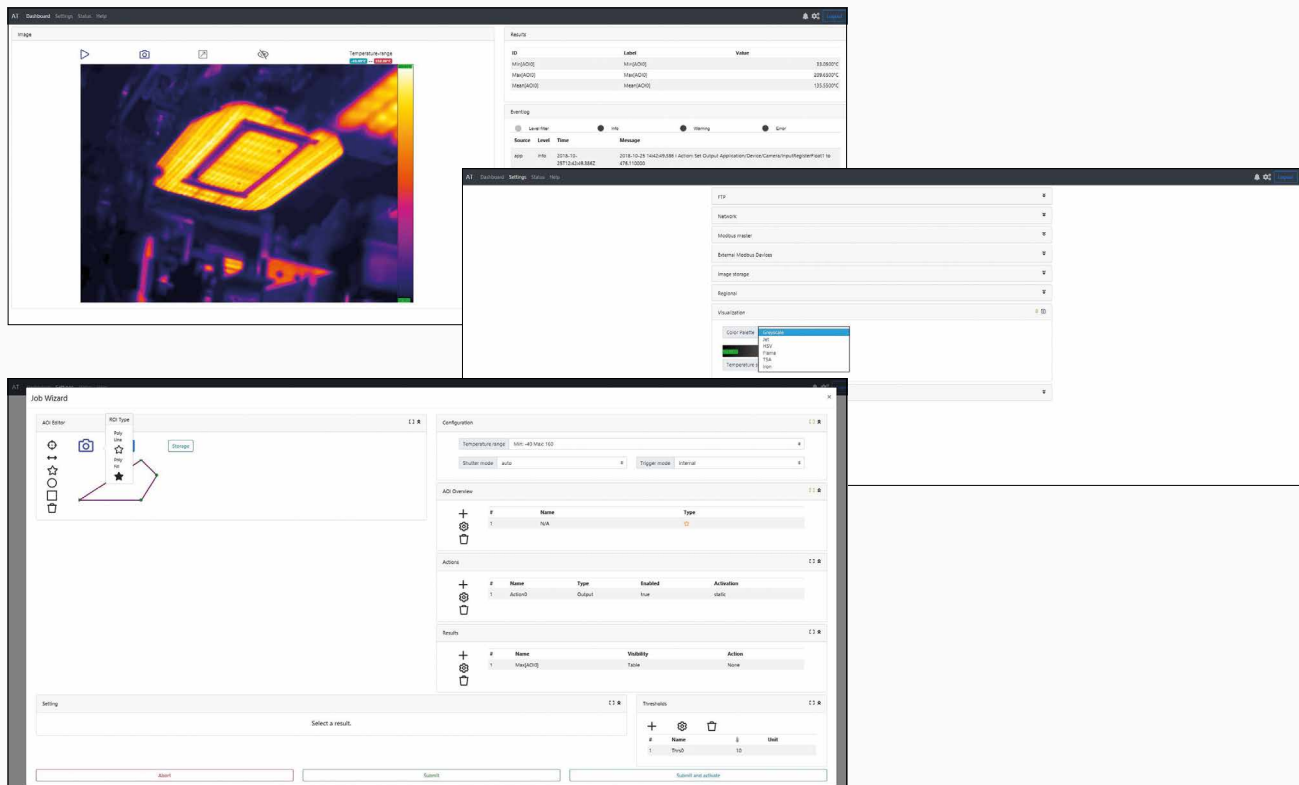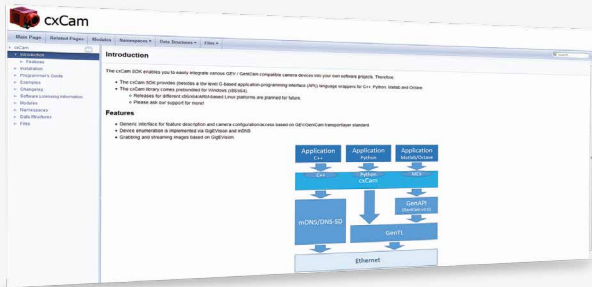
cxCamSDK

cxCamSDK enables an easy integration of the IRSX cameras into software projects. It provides a C-based application-programming interface (API) and language wrappers for C++, Python, MATLAB and Octave and comes with a generic interface for feature description and camera configuration/access based on the GEV/GenICam transport layer standard.
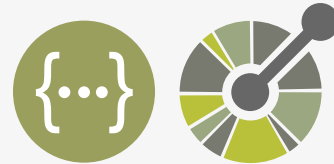
cxRestAPI

The cxRestAPI defines an architecture approach based on WWW standards that describes the possibilities of communication between different systems in networks. This helps the user to easily implement the IRSX cameras based on standardized methods such as HTTP/-S, JSON or XML. The cxRestAPI is compliant to Swagger and OpenAPI 2.0.

OPC-UA

In addition to classic industrial communication protocols such as Profinet or Modbus TCP, the IRSX cameras feature newer protocols that are promising candidates for dominance in the Internet of Things and machine-to-machine communication. One of these is OPC-UA, which follows OPC, but unlike OPC is not based on Microsoft technology. Instead it is manufacturer, operating system and programming language independent and contains sophisticated security mechanisms. OPC-UA is primarily used for transmitting pure machine data (control variables, measured values, parameters) on a TCP/IP basis. It offers standardization, high scalability, is easily adaptable with its open, modular structure and is therefore optimally suited for Industry 4.0.

MQTT

The MQTT communication protocol also plays an important role in the Internet of Things and machine-to-machine communication and is therefore part of the equipment of the IRSX cameras. Unlike OPC-UA, it is used both for transmitting pure machine data and for veritable messaging on a TCP/IP basis. Whereas with OPC-UA sender and receiver communicate directly, with MQTT a mediating instance, a so-called MQTT broker, is involved. MQTT also offers standardization, high scalability and enables even the simplest devices to participate in the Internet of Things. It is efficient and robust even with bad internet connections, has a simple, slim structure and exploits device batteries and transmission resources only to a minor extent.

Practice-Tailored Camera Designs

The cameras of the IRSX series are available in various designs and thus offer a great variability of use. The compact version is designed for WFOV lenses, whereas the universal version can be combined with almost any of our lenses. There is also an open version without housing for customer-specific configurations that can be fitted with the suitable housing by the customer, but for which we also offer a housing integration kit.


Compact Version

✔ Comfortable "plug-and-play" solution
✔ Designed for WFOV lenses, with standard thread
✔ Integrated air barrier for the lens
✔ Compact, robust full-metal housing
✔ Protection class IP67 ex works

Universal Version

✔ Highly versatile solution
✔ Can be combined with almost any of our lenses, with standard thread
✔ Compact, robust full-metal housing
✔ Protection class IP67 with lens protection cap
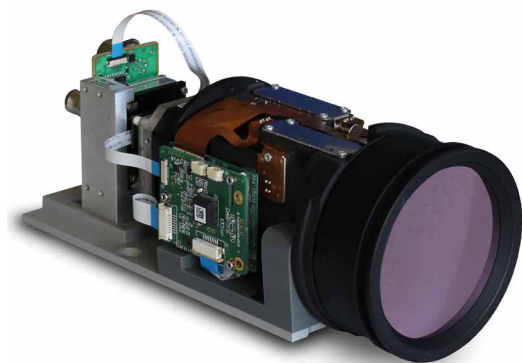
Open Version

✔ Most flexible solution for customer-specific configurations
✔ For integration of specific lenses, with standard thread
✔ To be fitted with suitable housing; housing integration kit available
✔ Protection class IP67 with corresponding housing

Lenses

The Suitable Lens for Every Need

In addition to the various camera designs, we offer a wide range of lenses that covers the entire spectrum of thermographic applications. These are all lenses with a large aperture that guarantees a high radiation yield and exploitation of the sensor sensitivity and thus precise thermal images. Customer-specific focal lengths, e.g. large ones for monitoring distant objects, are available on request.

WFOV Lenses

Focal Length [mm]	Field of View [°]		F/#	Hyperfocal Distance [m]	MOD [mm]	Focus
	IRSX-I336	IRSX-I640				
7.5	45 x 35	90 x 69	1.4	1.2	25	Manual
9	35 x 27	69 x 56	1.25	1.7	32	Manual
13	25 x 19	45 x 37	1.25	4.4	76	Manual
19	17 x 13	32 x 26	1.25	9.5	153	Manual
25	13 x 10	24 x 19	1.4	21	300	Manual
35	9.3 x 7.1	18 x 14	1.5	35	600	Manual

Interchangeable Lenses

Focal Length [mm]	Field of View [°]		F/#	Hyperfocal Distance [m]	MOD [mm]	Focus
	IRSX-I336	IRSX-I640				
6	51 x 40	-	0.8	3	200	Manual
10	31 x 25	66.2 x 47	1	6	500	Manual
12	27 x 21	53 x 40	0.8	11	300	Manual
18	18 x 14	33 x 28	1	19	500	Manual
25	13 x 10	25 x 20	1.1	21	300	Manual
25	13 x 10	24.7 x 19.7	1	36.8	1,000	Manual
35	9.3 x 7.1	18 x 14	1.2	35	600	Manual
60	5.5 x 4.2	10.4 x 8.3	1.25	94	2,300	Manual
100	3.3 x 2.5	6.2 x 5	1.6	160	7,000	Manual

Zoom Lenses

Focal Length [mm]	Field of View [°]		F/#	MOD [mm]	Focus	Zoom
	IRSX-I336	IRSX-I640				
35–105	3.1–9.3 x 2.3–7	6–17.7 x 4.7–14	1.6	7,000	Motorized	Motorized

I/O Panel

For an easy system integration of the IRSX cameras, we offer a compact I/O panel for DIN rail mounting that provides all signal and power connections on plug terminals. The connection for the camera power supply includes a reverse polarity protection and a 2 A micro fuse.

IRSX Cable for Power and I/O

The IRSX cable connects the IRSX camera with the I/O panel. It is tensile- and tear-resistant, available in various lengths and equipped with M12 connectors, supporting protection class IP67. A pigtail version is available if you want to connect camera power and signals without the I/O panel.

IRSX GigE Cable

A reliable Ethernet communication between the IRSX camera and connected hardware is ensured by the tensile- and tear-resistant GigE cable with M12 connectors, supporting protection class IP67. The cable is available in various lengths.

90° Adapter Cable

The integration of an IRSX camera often takes place in a small space where standard straight and M12 connectors can cause cable routing problems. Our 90° adapter cable is a simple and elegant solution for this.

Sun Shield

For outdoor use, we offer a sun shield that protects the IRSX cameras from weather influence. It is made of aluminum, optionally available in a white powder-coated version and attached directly to the camera housing with screw connections for maximum stability.

Applications

Plastic Welding

In infrared and hot-gas welding of plastic parts, the temperature of the joining surfaces is of decisive importance. The continuous monitoring of this process parameter along the entire welding contour is therefore often indispensable for quality assurance. The cameras of the IRSX series, which can be directly integrated into welding systems, provide the perfect solution for this requirement. A tailor-made app for quality assurance in plastic welding ensures maximum process efficiency as well as ease of operation.
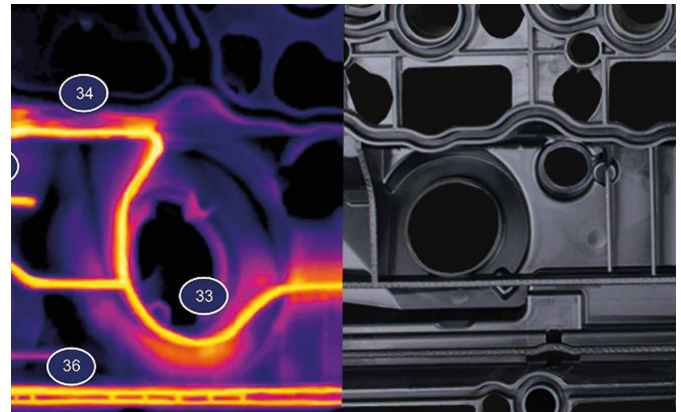
NDT

The so-called active thermography is used in many industries for the non-destructive testing of components. A heat source thermally excites the components, and the flow of thermal energy through the material is reflected in the temperature development at the component surface. Abnormalities in the temperature development indicate defects such as air inclusions, detachment of parts or microcracks. Equipped with application-specific apps, the IRSX cameras not only deliver high-precision thermal images but also intelligent analyses of the component condition for your efficient, seamless quality assurance.

Substation Monitoring

Substations form central nodes in a power grid, which is why a technical failure can have far-reaching consequences for the power supply of entire cities and regions. For the power supplier, in the worst case this means loss of revenue, fines and lasting damage to the company's image. With the cameras of the IRSX series, such problems can be avoided. The cameras continuously capture the temperatures of the installations such as transformers or bus bars and provide accurate information on the condition of your substations. With several IRSX cameras, even large and complex plants can be completely monitored around the clock.

Flare Monitoring

When flaring off excess gases in the oil or chemical industry, a stable pilot flame must be guaranteed because a failure would release untreated gases into the atmosphere. The plant operator would not only have to face a penalty for violating official regulations, but would also suffer a serious image loss. The cameras of the IRSX series save you these worries. They are insensitive to darkness, rain or fog and can therefore monitor flaring systems around the clock and under any weather conditions. As they also allow monitoring from a safe distance, the cost of their installation is lower, and fault management as well as maintenance are hardly ever necessary.
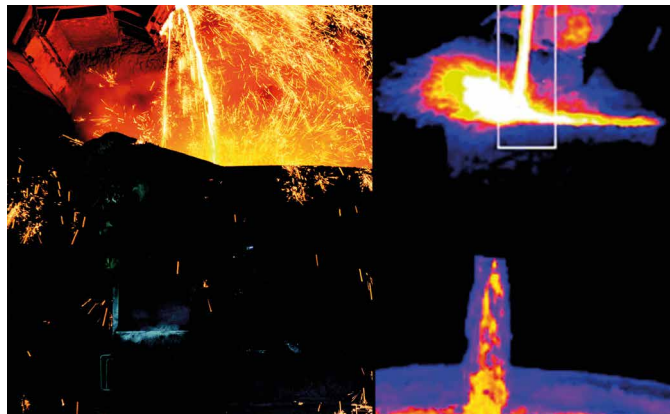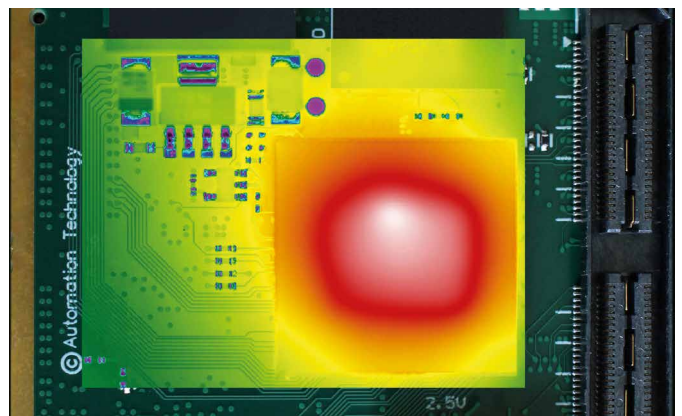
Slag Detection

To meet the demands on the degree of purity of steels, manufacturers must detect and reduce slag content while the liquid steel is transferred from the oxygen steel converter or electric furnace to the ladle. The means of choice for this task is thermographic slag detection, which takes advantage of the fact that the thermal radiation characteristics of steel and slag in the far infrared range are very different at the same temperature. The IRSX cameras are at the heart of our turnkey slag detection solution, designed for continuous operation under the extreme conditions typical of steel mills and delivering reliable results around the clock.

Electronic Component Inspection

For quality assurance purposes, manufacturers of electronic components can supply these with a current pulse and then record a temperature image. This image shows whether a component is faulty and must be sorted out or not. For example, if a conductor path is interrupted, there is no heating, while defects in a conductor or in an electronic component can lead to a local temperature increase, a so-called hotspot. With the cameras of the IRSX series and an application-specific app that outputs a good or bad signal to the process control, efficient, seamless quality assurance is guaranteed in the electronics industry.

Technical Specifications

Camera Model	IRSX-I336		IRSX-I640	
Detector Resolution	336 x 256 px		640 x 512 px	
Detector Type	Focal Plane Array (FPA), uncooled microbolometer			
Spectral Range	7.5–13 µm			
Pixel Size	17 x 17 µm		17 x 17 µm	
Frame Rate	9 Hz	60 Hz*	9 Hz	30 Hz*
Measurement				
Object Temperature Range	Range 1: –25 to 135 °C, range 2: –40 to 550 °C, optional high-temperature range: 200–1,200 °C (w/ ND filter)			
Accuracy	±2 °C (±3.6 °F) or ±2 % of reading (10–100 °C @ 10–35 °C amb)			
NETD	< 30 mK (f/1.0, range 1)			
Lenses				
Fixed Lenses	7.5 mm, 9 mm, 13 mm, 19 mm, 25 mm, 35 mm			
Interchangeable Lenses	6 mm, 10 mm, 12 mm, 18 mm, 25 mm, 60 mm, 100 mm, zoom lens 35–105 mm, microscopy lens 20 µm			
Image Processing				
Configuration	Web interface			
Areas of Interest	Spot, line, polyline, elliptical line, rectangular area, elliptical area, polygon area			
Smart Realignment	Intelligent search and compensation algorithm to guarantee accurate temperature readings independent of e.g. machine or part tolerances			
Temperature Evaluation	Min, max, mean, range, variance, standard deviation			
Comparison Functions	Equal, less, greater, in range, out of range			
Script Interface	Scripting w/ Lua			
Interfaces				
Ethernet Protocols	DHCP, DNS, GigE Vision, HTTP(S), mDNS, NTP, FTP, SSH, Modbus TCP, (MQTT (TLS), OPC-UA, PTP IEEE1588, Profinet (CC-A, RT-1), ONVIF)**			
Ethernet Type	10/100/1,000 MBit/s	Ethernet connector	8-pin A-coded M12 connector	
Image Streaming Protocol	GigE Vision w/ GeniCam, (RTSP)**	Ethernet image streaming	16-Bit, 14-Bit, 8-Bit	
Video out	Available on request			
Input/Output				
Digital Input	2x electrically isolated; 5–24 VDC (max. 27 VDC)	Encoder/resolver input	A+, A–, B+, B–; high-speed, dual RS-422/RS-485 receiver	
Digital Output	2x electrically isolated; 5–24 VDC	Analog output	0–5 VDC	
Digital I/O, Supply Voltage	4.5–30 VDC, max. 100 mA	Analog input	0–5 VDC	
Environmental				
Protection Class	IP67 (IEC 60529)	Bump	200 g (IEC 60068-2-29)	
Operating Temperature Range	–40 to 60 °C (non condensing)	Vibration	4.3 g (IEC 60068-2-6)	
Storage Temperature Range	–50 to 80 °C (IEC 68-2-1 and IEC 68-2-2)	RoHS	Compliant	
Humidity	0–95 % relative humidity (IEC 60068-2-30)			
Mechanical				
Dimensions	I55 x 55 x 77 mm (w/o lens, w/ connectors)	Lens mount	M34x0.5, M34x0.75, M46x0.75	
Weight	270 g (w/o lens)	Base mounting	4x M3 threaded holes (at all 4 sides)	
Accessories				
Adjustable mounting bracket, mounting adaptors, lens protection cap w/ Ge window, air barrier, terminal panel, protective enclosures (IRCamSafe series), focus tool				

*   Subject to dual use export regulations (for frame rates > 9 Hz).
()** Coming soon.
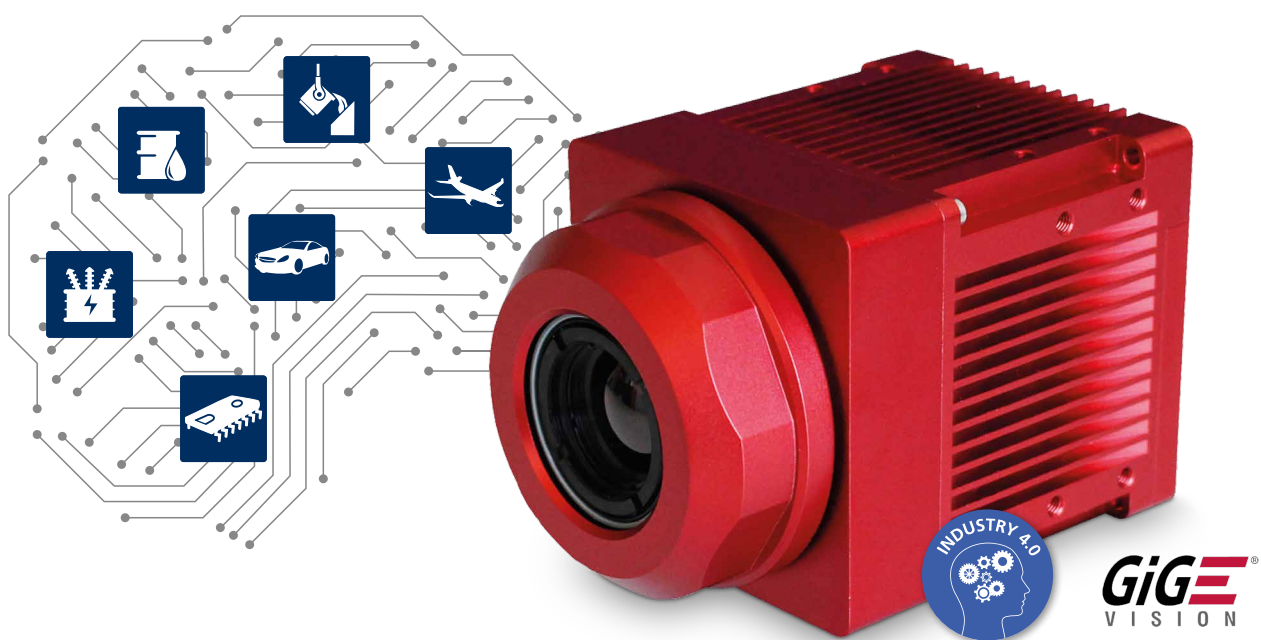
The IRSX Series Benefits in a Nutshell

The IRSX cameras are consistently designed as smart stand-alone devices for thermal machine vision. Once taught for an inspection task, they will do the full job, communicating directly with your process control. The IRSX cameras can automatically switch between a multitude of inspection tasks, giving you the flexibility to keep your production line running even with varying products.

✔ Self-contained thermal imaging devices, designed for industrial environments
✔ Fully web-based configuration and result display
✔ High-performance embedded data processor for cutting-edge performance
✔ Comprehensive range of interfaces for communication and control compliant to current standards
✔ Multiple software tools available, e.g. communication libraries and APIs such as REST, GigE Vision, MQTT, OPC-UA
✔ Constantly growing number of application-specific apps
✔ Wide selection of accessories and lenses to deal with different application requirements

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