FLIR®

PROCESS AND QUALITY ASSURANCE SOLUTIONS

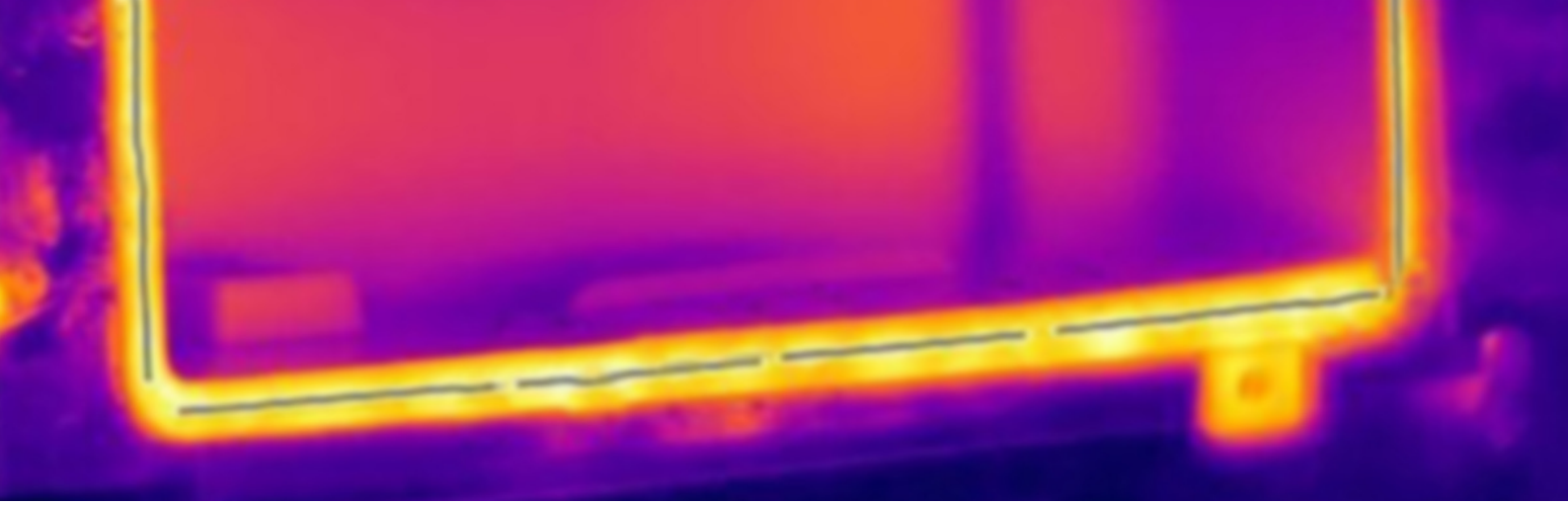
for the Food and Beverage Industry

About Teledyne FLIR

Teledyne FLIR designs, develops, manufactures, markets, and distributes technologies that enhance perception and awareness. We bring innovative sensing solutions into daily life through our thermal imaging, visible-light imaging, video analytics, measurement and diagnostic, and advanced threat detection systems.

Teledyne FLIR offers a diversified portfolio that serves a number of applications in government & defense, industrial, and commercial markets. Our products help first responders and military personnel protect and save lives, promote efficiency within the trades, and innovate consumer-facing technologies. Teledyne FLIR strives to strengthen public safety and well-being, increase energy and time efficiency, and contribute to healthy and intelligent communities.

Teledyne FLIR building in Täby, Sweden



Thermal Imaging Cameras in the Food Industry

In the food industry, it's essential to carefully control the temperature of perishable goods throughout production, transportation, storage, and sales. Repeated warnings about illnesses due to tainted and improperly cooked foods highlight the need for tighter process control. Because this almost always involves a human factor, food processors need tools that automate crucial operations in a way that helps minimize human error while holding down costs.

Using FLIR thermal imaging cameras, you can automate non-contact temperature measurements in many food processing applications. FLIR smart sensor fixed thermal cameras are ideal for users who want built-in, on-camera analytics and alarm capabilities. The smart sensor configuration simplifies integration efforts with camera that can communicate with standard industrial protocols and video management systems including HMI, SCADA, and optional ONVIF S compatibility. Thermal image streaming cameras offer the industry standard GigE Vision protocol for communication with machine vision applications. These cameras, when combined with machine vision software, can accurately detect and identify thermal issues across manufacturing and industrial processes.

How It Works

The main requirements for non-contact temperature measurements in the food processing industry are a thermal imaging camera and associated software. They act as "smart" non-contact sensors to measure the temperature of equipment, refrigerated products, and cooked foods as they exit the cooking process.

Thermal imaging cameras are easy to use, small, and can be positioned almost anywhere as needed. They can also be used to inspect package sealing and improve efficiency in other food processing operations.

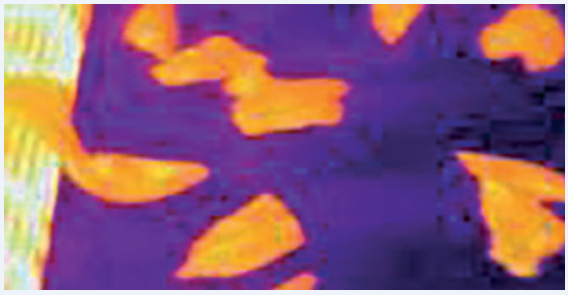
FLIR thermal imaging cameras have firmware and communication interfaces that enable their use in automated process control. Third-party software makes it easy to incorporate these tools into automated machine vision systems without the need for extensive custom-written control code.

The growing number of thermal imaging applications for the food industry include:

- Monitoring the temperature of oven-baked goods
- Verifying the temperature of microwave-cooked meats
- Monitoring the use of microwaves when drying of parboiled rice and other grains
- Inspecting ovens for proper temperature
- Verifying the proper filling of frozen meal package compartments
- Checking integrity of cellophane seals over microwave meals
- Inspecting box flap glue of overwrap cartons
- Monitoring refrigerator and freezer compartments

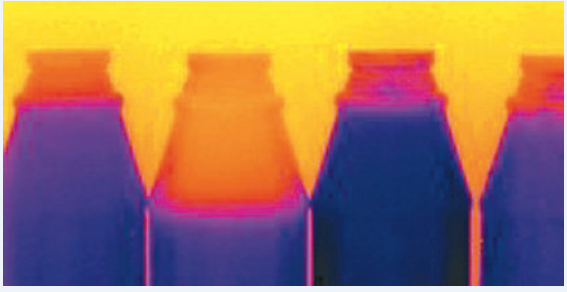
Thermography for Quality Assistance And Product Safety

Thermal imaging is first and foremost a quality assurance (QA) tool. Controlling the quality and safety of cooked meat products is an excellent use of this technology. For example, a fixed-mount thermal imaging camera trained above a continuous conveyor oven can record the temperature of chicken tenders as they exit the oven.

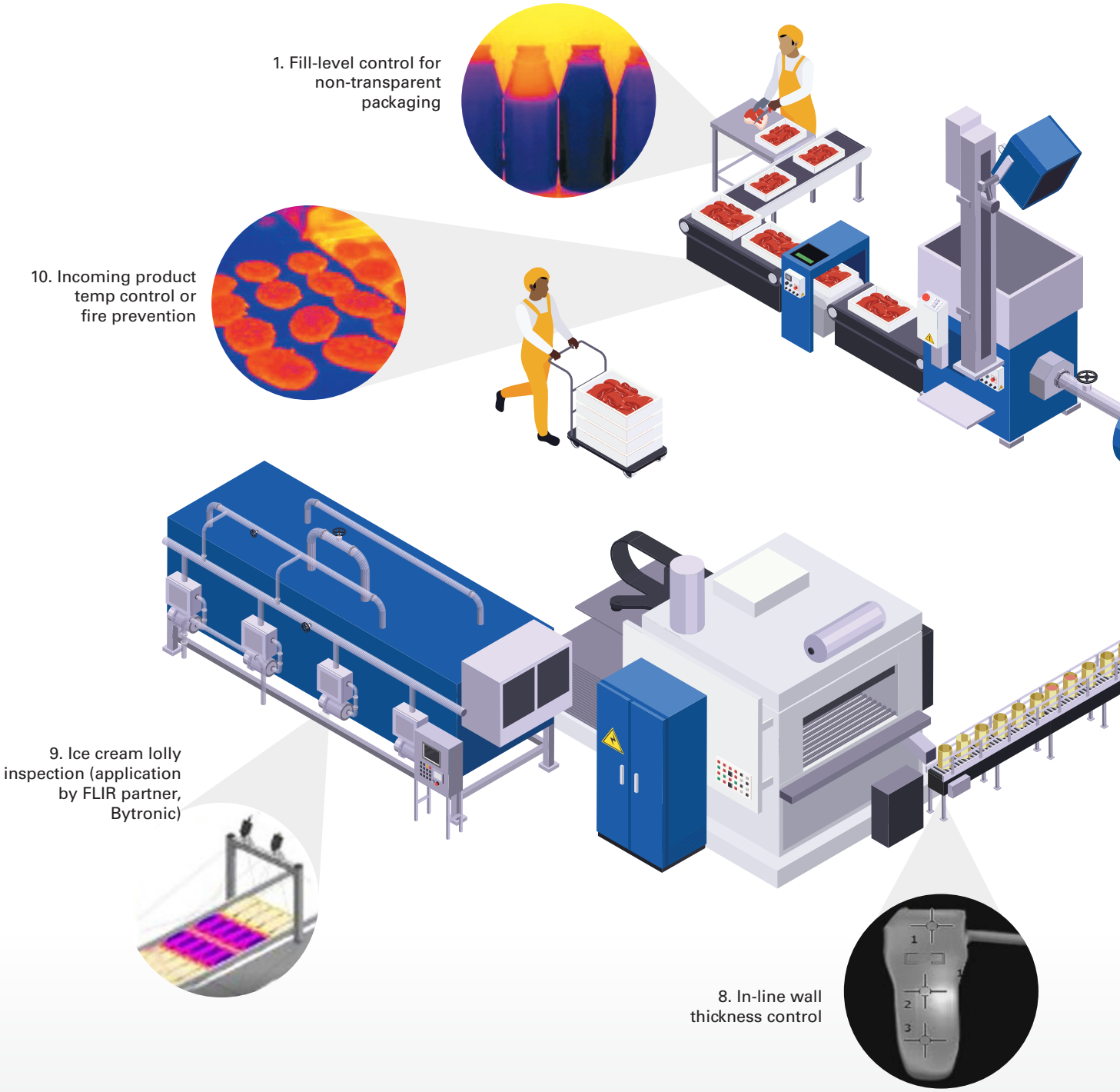


The objective is to make sure they reached a safe temperature without becoming over-cooked and dried out. Food producers can also use thermal imaging cameras to inspect microwave precooking lines. Besides improving product quality and safety, overall throughput can be increased. An additional benefit is reduced energy costs.

This thermal image shows bottles being filled automatically so bottles that are over-or under-filled can be removed. Thermal imaging is especially effective when inspecting dark-colored glass or opaque plastic bottles, as the internal temperature creates an image that visible light cameras can't see.



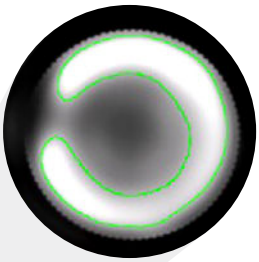
Solutions for the Food and Beverage Industry



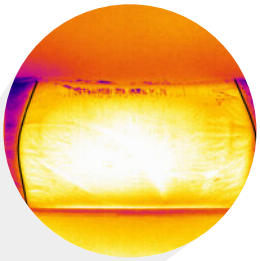
1. Fill-level of hot or cold beverage inside an opaque bottle can be checked. Shortwave and midwave IR cameras can also see through certain plastics.
2. A high-speed infrared camera can easily detect regions where the elastic glue gaps are needed to prevent quality defects in dippers, as shown in the picture with 600 ppm line speed.
3. Induction seal bottle cap can be observed under an infrared camera to detect the quality of seal. A midwave infrared camera can even see the heat radiation though plastic caps.
4. The heat generated in the sealing of pouches can be detected by an infrared camera while machine vision software can analyze the quality of seal based on the shape.
5. Liquid contaminates that are not visible by vision camera can easily be detected with an infrared camera.
6. Infrared camera can see though plastic to count or analyze packages.

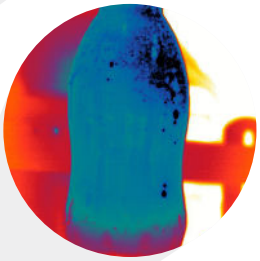
2. In-line dipper quality control

3. In-line cap seal integrity inspection

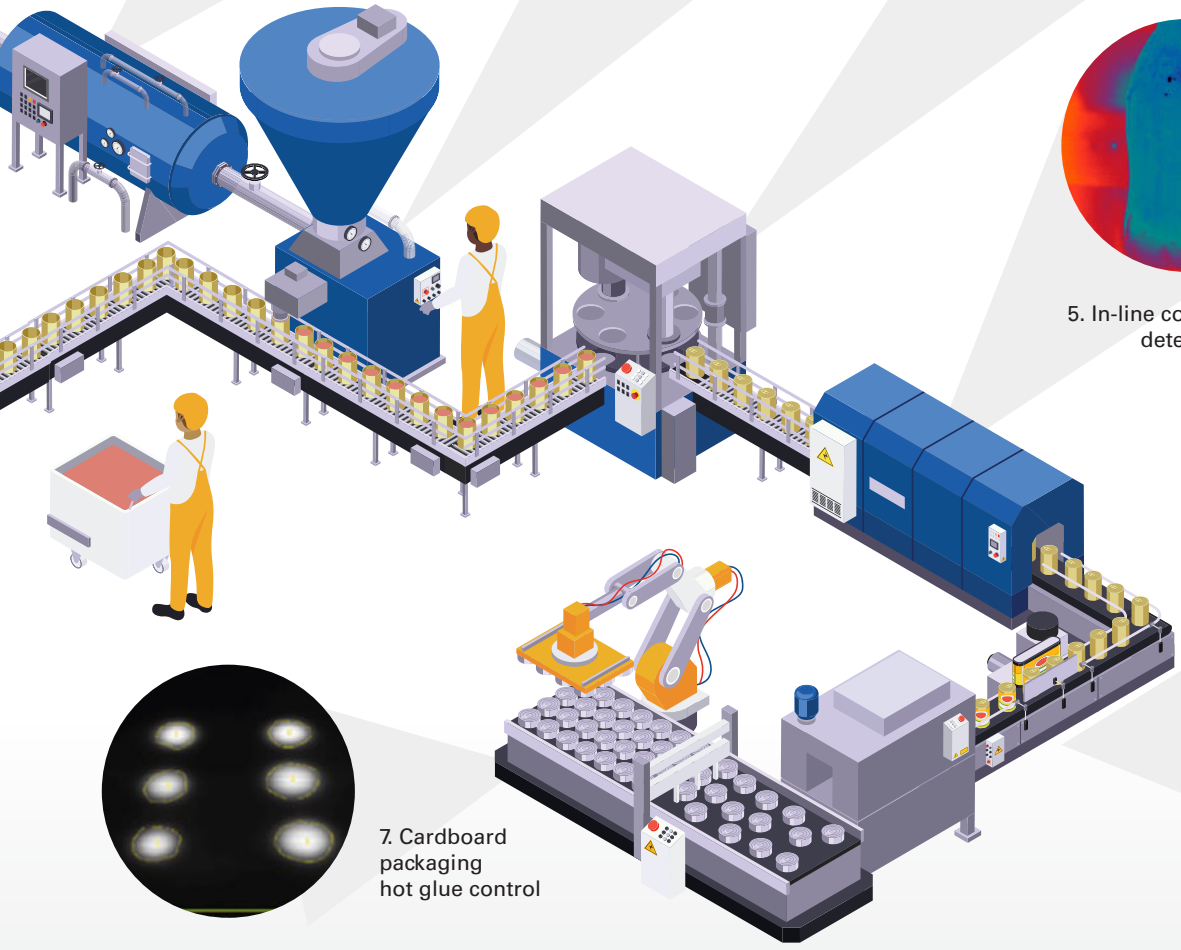


4. Seal check pouches on conveyor

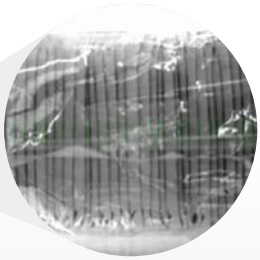




5. In-line contamination detection



7. Cardboard packaging hot glue control



6. Product counting quality control through packaging

7 Hot glue on cardboard or plastic boxes after the box is closed can be analyzed with infrared camera to detect missing glue points.

8 Preforms can be checked before going into the mold for temperature uniformity to ensure proper wall thickness of the plastic bottles.

9 Ice cream lolly can be checked over the wrapper to detect if there are more than one stick or no stick in the package. Application developed by Bytronic.

10 Temperature of hot or cold incoming products can be checked to determine whether they've reached but not exceeded the correct temperature. This can help avoid burning.

Learn more about thermal imaging solutions on www.flir.com

FLIR Fixed Thermal Imaging Cameras

	A50 & A70 Image Streaming (GigE)	A50 & A70 Smart Sensor	A500 & A700 Image Streaming (GigE)
IR resolution	464 × 348 (A50, A500); 640 × 480 (A70, A700)		
Thermal sensitivity/NETD	35 mK		<30 mK, 42° @ +30°C;
Visual resolution	1280 × 960 pixels (optional)		
Focus	Fixed, adjustable with included focus tool		Auto-focus, One-shot
FOV option	29°, 51°, 95°		
Spectral range	7.5–14.0 µm		
Frame rate	30 Hz		
Measurement			
Object temperature range	A50: -20°C to 175°C, 175°C to 1000°C | A70: -20°C to 175°C, -20°C to 250°C, 175°C to 1000°C		A500: -20°C to 120°C, 0°C to 650°C, 300°C to 1500°C
Accuracy	±2°C or ±2% of reading, for ambient temperature 15°C to 35°C and object temperature above 0°C		±2°C or ±2% of reading, for ambient temp-
Measurement analysis (smart functions)			
Smart functions (advanced configuration)	-	10 Spotmeters, 10 Boxes or Polygons, 3 Deltas (difference any value/reference/external lock), 2 Isotherm (above/below/ interval), 2 Iso-coverage, 2 Lines, 1 Polyline, 1 Reference temperature	-
Measurement frequency	-	Up to 10 Hz	-
Measurement result Read-out (advanced configuration)	-	Ethernet/IP (poll), Modbus TCP server/client (poll/push), MQTT (push), REST API (read/write), Measurements and Still image, Web interface	-
Alarm			
Alarm output (advanced configuration)	-	Digital out, e-mail (SMTP) (push), Ethernet/IP (pull), file transfer (FTP) (push), Modbus TCP server/ client (poll/push), MQTT (push), RESTful API (pull), and store image or video	-
Video streaming			
Dual video streams	ONVIF/RTSP (Adv. config), Not in GigE stream but switching between visual and IR possible	ONVIF/RTSP (Adv. config)	ONVIF/RTSP (Adv. config), Not in GigE stream but switching between visual and IR possible
Camera configuration			
Web interface	Yes (only stream and camera settings)	Yes with smart features	Yes (only stream and camera settings)
Ethernet			
Ethernet communication	GigE Vision, GenICam (SFNC 2.4)	TCP/IP socket-based FLIR proprietary	GigE Vision, GenICam (SFNC 2.4)
Ethernet interface	Wired, Wi-Fi (optional)		
Ethernet power	Power over Ethernet, PoE IEEE 802.3af class 3		
Ethernet protocols	IEEE 1588, SNMP, TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, sftp (server), FTP (client), SMTP, DHCP, MDNS (Bonjour), uPnP	EtherNet/IP, IEEE 1588, Modbus TCP Client, Modbus TCP Server, MQTT, ONVIF-S, SNMP, TCP, UDP, SNTP, RTSP, RTP, HTTP, HTTPS, ICMP, IGMP, sftp (server), FTP (client), SMTP, DHCP, MDNS (Bonjour), uPnP	IEEE 1588, SNMP, TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, sftp (server), FTP (client), SMTP, DHCP, MDNS (Bonjour), uPnP
Ethernet type			
Digital input/output			
Digital input	2× opto-isolated, Vin (low) = 0 to 1.5 V, Vin (high) = 3 to 25 V		
Digital output	3× opto-isolated, 0 to 48 V DC, max. 350 mA (derated to 200 mA at 60°C). Solid-state opto relay,		
Power			
Power consumption (typical)	7.5 W at 24 V DC, 7.8 W at 48 V DC, 8.1 W at 48 V PoE		7.5 W at 24 V DC, 7.8 W at
External power operation	24/48 V DC 8 W max		
External voltage	Allowed range 18 V to 56 V DC		
Environmental data			
Operating temperature range	With cooling plates on at least three sides: -20 to 50°C; No cooling plates: -20 to 35°C		-20 to 50°C, Cooling plate is needed in temp-
Encapsulation	IEC 60529, IP66		IEC 60529, IP 54,
Shock	IEC 60068-2-27, 25 g		
Vibration	IEC 60068-2-6, 0.15 mm at 10–58 Hz and 2 g at 58–500 Hz, sinusoidal; IEC 61373 Cat 1 (Railway)		
Physical data			
Weight (including lens)	0.52 kg		0.82 kg
Size (L × W × H)	107 × 67 × 57 mm		123 × 77 × 77 mm
Export regulation	-		

	A500 & A700 Smart Sensor	A38 & A68 (GigE)	A6751 (GigE)
		320 × 240 (A38), 640 × 480 (A68)	640 × 512
	<40 mK, 24° @ +30°C; <50 mK, 14° @ +30°C	<50 mK @ 25°C ambient	≤20 mK
		-	-
	contrast, Motorized, Manual	Fixed, adjustable	Manual
	14°, 24°, 42°	24°, 42°	17 mm, 25 mm, 50 mm, 100 mm, 200 mm
			3.0–5.0 µm
		60 Hz(A38), 30 Hz (A68)	Programmable; 0.0015 Hz to 125 Hz
	A700: -20°C to 120°C, 0°C to 650°C, 300°C to 2000°C	Non-radiometric	Standard: -20°C to 350°C; with optic: 45°C to 600°C (ND1) 250°C to 2000°C (ND2) 500°C to 3000°C (ND3)
	erature 15°C to 35°C and object temperature above 0°C	Non-radiometric	≤100°C ±2°C (±1°C typical), >100°C ±2% of reading (±1% typical)
	10 Spotmeters, 10 Boxes or Polygons, 3 Deltas (difference any value/reference/external lock), 2 Isotherm (above/below/interval), 2 Iso-coverage, 2 Lines, 1 Polyline, 1 Reference temperature	-	-
	Up to 10 Hz	-	-
	Ethernet/IP (poll), Modbus TCP server/client (poll/push), MQTT (push), REST API (read/write), Measurements and Still image, Web interface	-	-
	Digital out, e-mail (SMTP) (push), Ethernet/IP (pull), file transfer (FTP) (push), Modbus TCP server/client (poll/push), MQTT (push), RESTful API (pull), and store image or video	-	-
	ONVIF/RTSP (Adv. config)	-	-
	Yes with smart features	-	-
	TCP/IP socket-based FLIR proprietary	GigE Vision, GenICam	GigE Vision, GenICam
		Wired	Wired
		PoE	-
	EtherNet/IP, IEEE 1588, Modbus TCP Client, Modbus TCP Server, MQTT, ONVIF-S, SNMP, TCP, UDP, SNTP, RTSP, RTP, HTTP, HTTPS, ICMP, IGMP, sftp (server), FTP (client), SMTP, DHCP, MDNS (Bonjour), uPnP	GigE Vision	GigE Vision
	1000 Mbps		
		1x General purpose input	Sync-in, Trigger-in
	1x dedicated as fault output (NC)	1x General purpose output	Sync-out
	48 V DC, 8.1 W at 48 V PoE	2.8 W at 12V DC, 2.8 W at 24V DC, 3.5 W at 48 V DC PoE	<24 W steady state
		12/24V DC	24 VDC
		min 9V, max 57V DC	24 VDC
	eratures above 40°C, Maximum camera case temperature: 65°C	-35°C to 60°C	-20°C to 50°C
	IP66 with accessory	-	-
		See user manual	-
		See user manual	-
	0.82 kg	0.07 Kg	2.3 kg
	123 × 77 × 77 mm	29 × 36 × 59 mm	226 × 102 × 109 mm
			EAR 15 C.F.R. Sections 730-774

iNspect - Simple Infrared Machine Vision Solution

For Food and Beverage producers who use Teledyne FLIR fixed thermal cameras, the GEVA 400 iNspect package offered by Teledyne DALSA is a simple and affordable solution. It is pre-loaded with iNspect software (now with 16-bit camera support) that connects to GigE-based FLIR thermal camera platforms including the FLIR A70, FLIR A400/A700, and FLIR A38/A68. This package is customizable for various thermal imaging-based machine vision applications and can be used for a wide range of manufacturing tasks including:

- Hot glue inspection
- Heat sealing & packaging inspection
- Thermal flow control and fill control
- Object counting and shape verification
- Critical asset monitoring

WILSONVILLE
27700 SW Parkway Ave.
Wilsonville, OR 97070
USA
PH: +1 866.477.3687

HUDSON
110 Lowell Rd
Hudson, NH 03051
USA
PH: +1 603.324.7600

CANADA
3430 S. Service Rd, Suite 103
Burlington, Ontario L7L 3J5
Canada
PH: +1 800.613.0507

LATAM
Av. Antonio Bardella
320 Sorocaba, SP 18085-852
Brasil
PH: +55 15 3238 7080

CHINA
Rm 1613-16, Tower II
Grand Central Plaza
138 Shatin Rural Committee Rd.
Shatin, New Territories
Hong Kong
PH: +852 2792 8955

EUROPE
Luxemburgstraat 2
2321 Meer
Belgium
PH: +32 (0) 2 896 29 05

FLIR Systems Sweden
Tel.: +46 (0)8 753 25 00
Fax: +46 (0)8 753 23 64

FLIR Systems UK
Tel.: +44 (0)1732 220 011
Fax: +44 (0)1732 843 707

FLIR Systems Germany
Tel.: +49 (0)69 95 00 900
Fax: +49 (0)69 95 00 9040

FLIR Systems France
Tel.: +33 (0)1 60 37 01 00
Fax: +33 (0)1 64 11 37 55,

FLIR Systems Italy
Tel.: +39 (0)2 99 45 10 01
Fax: +39 (0)2 99 69 24 08

FLIR Systems Spain
Tel.: +34 91 573 48 27
Fax.: +34 91 662 97 48

For more information contact us

www.flir.com
NASDAQ: FLIR