Thermal imaging cameras
for security and surveillance applications

HRC-Series

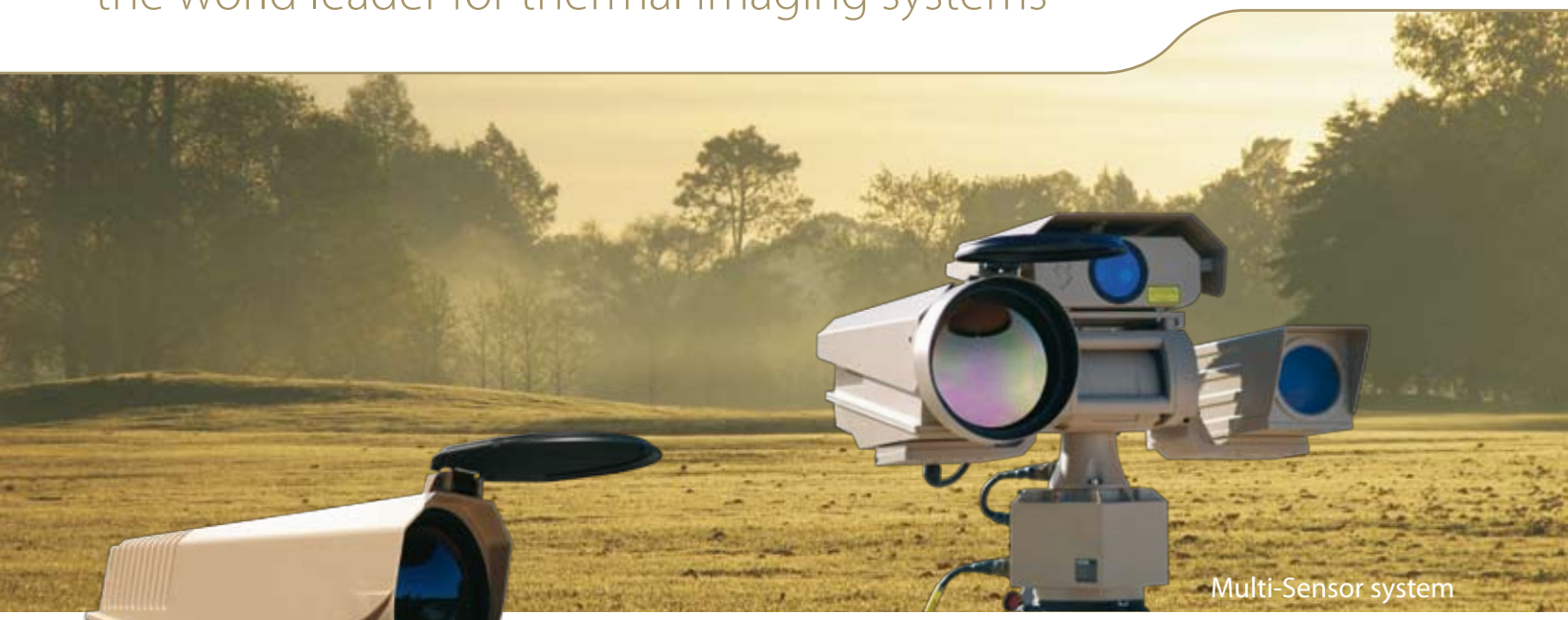
Thermal imaging cameras for ultra long range surveillance applications with cooled InSb detector

Thermal imaging camera only

Multi-Sensor system

HRC-Series
Multi-Sensor systems

HRC-Series from FLIR Systems, the world leader for thermal imaging systems


Multi-Sensor system

Thermal imaging camera only

The HRC-Series are equipped with a highly reliable, mid-wave, cooled Indium Antimonide (InSb) detector which offers extremely long range detection in all weather conditions. The cameras offer a continuous zoom. This offers excellent situational awareness while also giving the possibility to zoom in at suspect activities, and have a closer look, once they are detected. The HRC-series can be integrated into existing networks or used portably.

The HRC-Series offer extreme long range detection and excellent image quality, in the darkest of nights, through smoke and dust. You can detect a man-size target several kilometers away. All thermal imaging cameras are extremely suited for border and coastal surveillance but also for mid-range threat detection.

All versions are also available as a Multi-Sensor systems. In this case they are combined with a daylight camera. Optionally a GPS unit, a Digital Magnetic Compass and laser rangefinder are available.

Cooled InSb detector
The HRC-Series are equipped with a mid-wave, cooled Indium Antimonide (InSb) detector. A thermal imaging camera with a cooled detector gives you the advantage that you can see and detect potential threats much further away than with an uncooled detector. But there is more. Objects which are at a close distance can be seen with much more detail. You can see what people are carrying. There is no need anymore to send someone out in the field to check things out since small details can clearly be seen on the thermal image.

Crisp, high resolution thermal images: 640 x 480 pixels
All thermal imaging cameras are equipped with an InSb detector that produces ultra-sharp thermal images of 640 x 480 pixels. This will satisfy users that want to see the smallest of detail and are demanding the best possible image quality. It allows the user to see more detail and detect more and smaller objects from a further distance. Coupled with high sensitivity, the HRC-Series offer extremely long range performance and excellent image quality.

Four different versions available
- *HRC-E:*
  Equipped with a 22 x 275 mm lens. It zooms between a 25° field of view and a 2° field of view.
- *HRC-S:*
  Equipped with a 39 x 490 mm lens. It zooms between a 14.1° field of view and a 1.1° field of view.
- *HRC-U*
  Equipped with a 59 x 735 mm lens. It zooms between a 9.4° field of view and a 0.75° field of view.
- *HRC-X*
  Equipped with a 88 x 1100 mm lens. It zooms between a 6.3° field of view and a 0.5° field of view.

HRC-X 1100 mm lens
Horizontal Field of View: 0.5°to 6.3°

HRC-U 735 mm lens
Horizontal Field of View: 0.75°to 9.4°

HRC-S 490 mm lens
Horizontal Field of View: 1.1°to 14.01°

HRC-E 275mm lens
Horizontal Field of View: 2°to 25°

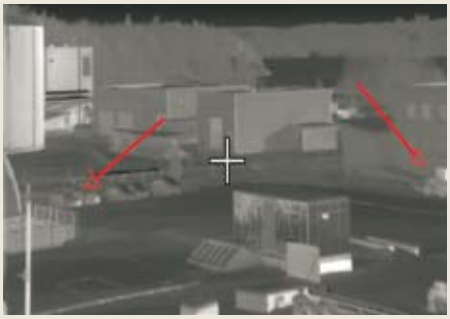
Continuous optical zoom on the thermal image

Optical and digital zoom on the thermal image
The HRC-Series are equipped with powerful optical zoom capability on the thermal image. It offers excellent situational awareness but also the possibility to zoom-in, and see more detail, once a target has been detected. This way operators can see further recognize more detail and react more quickly to security threats.

The advantage of zooming compared to other systems that are using a rotating lens system is that there is no switch or swapping between the different images. You can gradually zoom in while keeping your focus all the time.

All systems are also equipped with an up to 16x continuous digital zoom.

Advanced image processing
FLIR Systems has developed a powerful algorithm that helps to overcome the problem of finding low contrast targets in high dynamic range scenes.Advanced Digital Detail Enhancement (DDE) assures clear, properly contrasted thermal images. DDE delivers a high contrast image even in extremely dynamic thermal scenes. It provides high quality thermal imaging in any night- or daytime environmental conditions.



High contrast scene with standard AGC algorithm applied

DDE applied - all targets can be observed simultaneously

Auto focus
The HRC-Series contain an exclusive auto focus feature which delivers crisp, clear images at the press of a button. Focus is kept while zooming in or out. The system allows you to experience better situational awareness in the wide field of view, while maintaining detailed recognition capabilities in the narrow field of view.

Easy and fast to install
All cameras incorporate easily with common power and video interfaces found in existing and new security systems. They can be easily integrated into any existing infrastructure providing early detection and visibility 24/7 all the year round. The images from the 640 x 480 pixels detector can be displayed on virtually any existing display that accepts standard composite video.

Portability
All systems are configured to be either fixed mounted or field transportable for fast deployment. They can be mounted on a standard tripod. A single operator can set up the system in minutes, making it ideal for mobile operations and quick deployments.

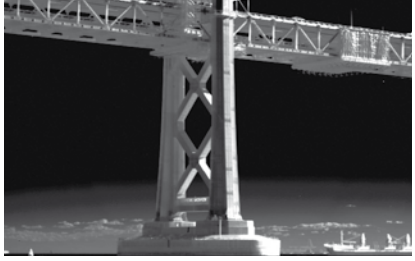
Designed for use in harsh environments
All systems are extremely rugged. Their vital core is well protected against humidity and water. They all operate between -32°C and +55°C.

Easy-to-use, fast, accurate "Pan & Tilt"
The thermal imaging cameras can optionally be mounted on a rugged Pan & Tilt system. Intuitive joystick operation allows the operator to see 360° horizontal and +/- 35° vertically, offering superb situational awareness.

Radar Connection – "Slew to cue"
If installed on a Pan & Tilt mechanism, the thermal imaging cameras can be connected to a radar system. If the radar detects an object, the camera will automatically turn in the right direction and give you a visual image so that you can instantly see what the blip on the radar screen really means. The accurate, fast, Pan & Tilt system, allows for easy tracking and following of fast moving objects.

Multiple installation options
Various options exist to connect the HRC-Series and integrate them in your existing systems. All cameras can be configured for stand alone use, as part of a network or in a hybrid configuration with local and network based control:

- *Analog configuration:* Simply connect the HRC-Series over RS-232 or RS-422 to the remote control panel. A video cable can be connected to any existing display that accepts composite video.
- *TCP/IP configuration:* all cameras can be integrated in any existing TCP/IP network and controlled over a PC. No need to put extra cables. Using this configuration, you can monitor all activity in a protected area over the internet. Even when you are thousands of kilometers away.



HRC-Series Multi-Sensor

The HRC-Series Multi-Sensor systems integrate the long range, short wave thermal imaging camera found in the HRC-Series with a variety of powerful daylight sensors, GPS and optionally a laser range finder. An array of advanced functions and options are available to meet the most demanding needs. The Multi-Sensor systems are installed on a Pan & Tilt system to increase situational awareness.

The Multi-Sensor systems can be ordered in different configurations. This version contains an HRC-U combined with a long range daylight camera (UR-TV), TCP/IP compatible electronics, a laser range finder, a digital magnetic compass and a GPS.

Powerful daylight imaging camera
The Multi-Sensor systems feature a powerful, sensitive daylight camera with excellent zoom and color quality for additional target identification when conditions permit. Displaying both the thermal image and the daylight image at the same time is also possible.

Pan & Tilt
The Multi-Sensor systems are mounted on a rugged Pan & Tilt mechanism. They can be connected to a RADAR in a "slew to cue" configuration.

Programmable search
The Multi-Sensor systems can be programmed to scan an entire area automatically. Different spots that need to be monitored periodically can be preset. The system will scan the predefined areas automatically. This not only ensures that the entire area is being monitored but also reduces operator workload.

Tailored to all needs
Although the Multi-Sensor systems are available with a standard daylight imaging camera, GPS, compass and eventually a laser range finder, the user has the possibility to define his preferred equipment to be included in the system.

Optionally available

Advanced Global Positioning System (GPS)
The Multi-Sensor systems can be equipped with and advanced GPS. This way the systems will know where they are located. This can be extremely important when the Multi-Sensor systems are installed on moving equipment or when they are used as portable systems.

Digital Magnetic compass
A built-in digital magnetic compass allows to determine in which direction the HRC-Series MS are pointing.

Laser range finder
The Multi-Sensor systems can be equipped with an eye safe laser range finder. Combined with the GPS system and the electromagnetic compass, it will allow you to exactly determine where a suspected object is located and how far it is away.




HRC Multi-Sensor systems: Different configurations possible

FLIR Systems offers the Multi-Sensors in different configurations. The user can choose either an HRC-E, HRC-S, HRC-U, or HRC-X. Multiple options exists for the daylight camera as well. Depending on the needs of the user, the HRC Multi-Sensor systems can be equipped with a Short Range (SR-TV) or Long Range (LR-TV or UR-TV) daylight camera. The UR-TV is extremely suited for applications in which the HRC Multi-Sensor systems need to be mounted on a vehicle.

Although FLIR Systems specifies already three different types of daylight cameras, the user has the possibility to define his preferred equipment to be included in the camera. The same goes for the laser range finder, GPS and DMC.

The following are just three possible configurations for the HRC Multi-Sensor systems

Multi-Sensor configuration:
- Thermal camera HRC-U
- Long range daylight camera (LR-TV)
- Robust Pan & Tilt
- TCP/IP electronics
- Digital magnetic compass
- GPS
- Laser range finder

Multi-Sensor configuration:
- Thermal camera HRC-S
- Short range daylight camera (SR-TV)
- Robust Pan & Tilt
- Laser range finder

Multi-Sensor configuration:
- Thermal camera HRC-U
- Long range daylight camera (UR-TV)
- Robust Pan & Tilt
- TCP/IP electronics
- Digital magnetic compass
- GPS
- Laser range finder

HRC-Series
Thermal imaging camera only

Technical specifications

IMAGING PERFORMANCE

Detector type	Indium Antimonide (InSb): 640 x 480 pixels
Spectral range	3.5 to 5.0µm
Field of View: continuous optical zoom	HRC-E:
	2° (H) x 1.5° (V) to 25° (H) x 18.75° (V) with 22 x 275 mm lens
	HRC-S:
	1.1° (H) x 0.84° (V) to 14.01° (H) x 10.50° (V) with 39 x 490 mm lens
	HRC-U:
	0.75° (H) x 0.56° (V) to 9.4° (H) x 7.00° (V) with 59 x 735 mm lens
	HRC-X:
	0.5° (H) x 0.38° (V) to 6.3° (H) x 4.7° (V) with 88 x 1100 mm lens
Preset Fields of View	4
Spatial resolution (IFOV)	HRC-E: 0.67 mrad for 22 mm lens - 0.056 mrad for 275 mm lens
	HRC-S: 0.383 mrad for 39 mm lens - 0.031 mrad for 490 mm lens
	HRC-U: 0.256 mrad for 59 mm lens - 0.020 mrad for 735 mm lens
	HRC-X: 0.17 mrad for 88 mm lens - 0.013 mrad for 1100 mm lens
Thermal sensitivity	20 mK
Image frequency	50 Hz (PAL), 60 Hz (NTSC)
Focus	Automatic or Manual
Continuous e-Zoom	Yes, up to 16x
Electable preset focus distance	Yes
Focus athermalisation	Yes
Image processing	Digital Detail Enhancement (DDE), Histogram Equilazition

SYSTEM FEATURES

Remote Control	By serial link or over TCP/IP
Automatic heater	Yes
Auto front lens cover when parked	HRC-E: no / HRC-S, HRC-U, HRC-X: yes
Palettes	black hot / white hot; colour
Still image cature	JPEG, .fff 14bit
Built-in Test (BIT)	Yes
PelcoD compliance	Yes

IMAGE PRESENTATION

Video	PAL / NTSC selectable

POWER

Requirements	18-35 V DC
Consumption	35 W typical - 110 W with heaters

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	-32°C to +55°C
Storage temperature range	-45°C to +70°c
Automatic Window defrost	Yes
EMC / EMD	CE certified which requires compliance with the following procedures:
	Emission: EN610000-6-4:2001, FCC 47 CFR part 15 class B,
	Immunity: EN61000-6-2:2001
Rain	Mil-Std-810F, 506.4 - procedure I
Humidity	Mil-Std-810F, 507.4
Sand/dust	Mil-Std-810F, 510.4 - procedure II
Ice/ freezing rain	Mil-Std-810F, 521.2 - procedure I
Shock	Mil-Std-810F - procedure I
Vibration	Mil-Std-810C, 514.5 - procedure VIII
Solar radiation	Mil-Std-810F, 505.4 - procedure I, cycle A1

PHYSICAL CHARACTERISTICS

Camera Weight	7.5 kg for HRC-E / 9.5 kg for HRC-S / 12 kg for HRC-U / 12 kg for HRC-X
Camera Size	HRC-E and HRC-S: 475 x 235 x 194 mm *(L x W x H)*
	HRC-U and HRC-X: 564 X 264 X 303 mm *(L x W x H)*

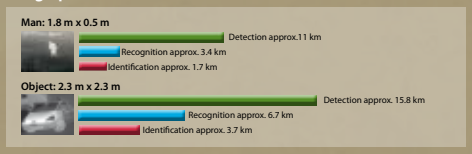
INTERFACES

TCP/IP	Command and control all functions and still images
RS-232	Command and control all functions
RS-485	Command and control all functions

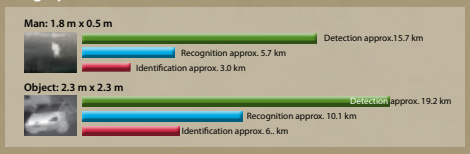
STANDARD PACKAGES

Thermal imaging camera, power supply, hand control, junction box, set of cables (standard camera cable length 7.5 m), operator manual, shipping case.

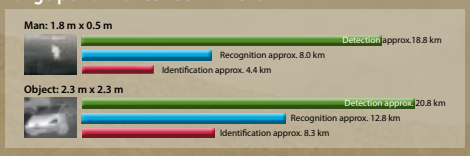
HRC-E:
range performance 275 mm lens



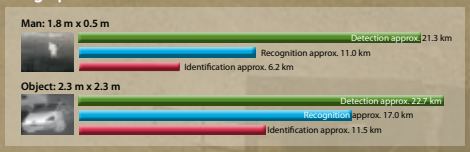
HRC-S:
range performance 490 mm lens



HRC-U:
range performance 735 mm lens



HRC-X:
range performance 1100 mm lens



Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.

Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

HRC-X 1100 mm lens
Horizontal Field of View: 0.5°to 6.3°

HRC-U 735 mm lens
Horizontal Field of View: 0.75°to 9.4°

HRC-S 490 mm lens
Horizontal Field of View: 1.1°to 14.01°

HRC-E 275mm lens
Horizontal Field of View: 2°to 25°




HRC-Series equipped with a continuous optical zoom on the thermal image allowing to have a closer look at objects which are far away.

HRC-Series
Multi-Sensor systems

Technical specifications

IMAGING PERFORMANCE

Thermal:

PLease see page 7 for detailed technical specifications of the HRC-E, HRC-S, HRC-U and HRC-X

Daylight sensors

Daylight CCD:	*SR-TV*	*LR-TV*	*UR-TV*
CCD-Format	1/4"	1/2"	1/2"
Focal Length (Wide to Tele)	3.5mm to 91mm	12.5mm to 750mm 25mm to 1500mm (with 2x Extender)	31.5mm to 750mm
F# (Wide to Tele)	1.6 to 3.8	3.8 to 7.1 7.6 to 14.2 (with 2x Extender)	4.3 to 7
Field Of View (H)	1.6° to 42°	0.48° to 28.7° 0.24° to 14.4° (with 2x Extender)	0.5° to 11.8°
Optical Zoom	26x	60x 120x (with 2x Extender)	23.6x
Digital Zoom	12x	10x	-
Min. Illumination	*2 lux (1/50 sec)* *B&W Mode: 0.7 lux (1/50sec)*	*0.6 lux (1/50sec)** *0.02 lux (32/50sec)**	*0. 08 lux (1/50sec)*
Focus	*One shot AF/Manual*	*Manual*	*One shot AF/Manual*

** Min. Illumination excluding lens*

PAN & TILT:

Az Range; Az velocity	n x 360°; 0.03° - 65° /sec continuous
El Range; El velocity	+/- 35°; 0.03° - 30° / sec
Accuracy	1 mrad
Resolution	0.1 mrad
Parking Position	Yes

SYSTEM FEATURES

Programmable Search	Program multiple preset scene locations
Remote Control	By serial link or over TCP/IP
Automatic heater	Yes
Built-in Test (BIT)	Yes
PelcoD compliance	Yes

IMAGE PRESENTATION

Video output	NTSC or PAL composite video
Connector types	BNC (2) provides thermal and daylight video simultaneously
VOIP	Optional embedded server provides simultaneous IR + TV
MPEG video	MPEG-2 or MPEG-4

POWER

Requirements	18-35 V DC
Consumption	55 W typical - 140 W with heaters - 250 W Max.

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	-32°C to +55°C
Storage temperature range	-45°C to +70°c
Automatic Window defrost	Yes
EMC / EMD	CE certified which requires compliance with the following procedures: Emission: EN610000-6-4:2001, FCC 47 CFR part 15 class B, Immunity: EN61000-6-2:2001
Rain	Mil-Std-810F, 506.4 - procedure I
Humidity	Mil-Std-810F, 507.4
Sand/dust	Mil-Std-810F, 510.4 - procedure II
Ice/ freezing rain	Mil-Std-810F, 521.2 - procedure I
Shock	Mil-Std-810F - procedure I
Vibration	Mil-Std-810C, 514.5 - procedure VIII
Solar radiation	Mil-Std-810F, 505.4 - procedure I, cycle A1

PHYSICAL CHARACTERISTICS

HRC-E MS / HRC-U MS / HRC-S MS / HRC-X MS

Weight	Configuration dependent
Size	Configuration dependent

INTERFACES

TCP/IP	Optional: command and control all functions and MPEG video
RS-232	Command and control all functions
RS-485	Command and control all functions

OPTIONALLY AVAILABLE

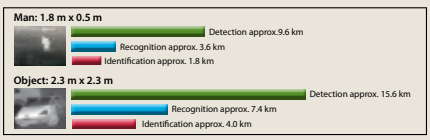
Laser range finder	Erbium glass, eye safe / 80 m - 20 km
Geo Positioning	Internal GPS
Digital magnetic compass	

TYPICAL CONFIGURATION PACKAGE

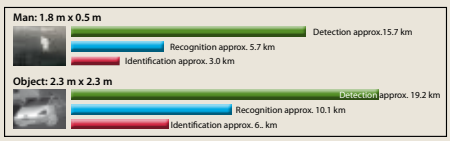
HRC-E MS / HRC-U MS / HRC-S MS / HRC-X MS

Thermal imaging camera, daylight camera, Pan & Tilt, power supply with cables, operator manual, shipping cases (3).

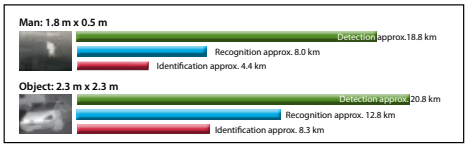
HRC-E: range performance 275 mm lens



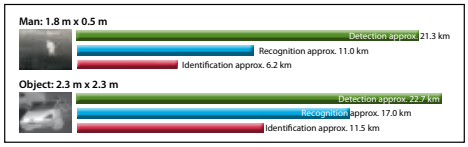
HRC-S: range performance 490 mm lens



HRC-U:
range performance 735 mm lens



HRC-X:
range performance 1100 mm lens



Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.

Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

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