



Motion Control Systems

High-Performance Pan/Tilts

Key Features:

- Real-time computer control interface for fast reliable response
- Fully programmable high accuracy for payloads of up to 41 kg
- Continuous operation in harsh, all-weather environments, and 100% duty cycle to provide years of service without maintenance






Accurate. Rugged. Reliable.

The complete line of FLIR high-performance pan/tilts offers unparalleled performance in accuracy, speed, ruggedness, and reliability. All units offer a real-time computer control interface for fast, reliable response in applications such as tracking, scanning and slew-to-cue. E-Series models include built-in Ethernet/Web interfaces for simple integration with networks and IP cameras.

FLIR pan/tilt units are:

- Fully programmable to meet any application requirement. Speeds, accelerations, power levels and ranges of motion can all be user programmed for flexible and dynamic operation. E-Series models feature high-resolution digital encoders for fast, reliable absolute positioning.
- Modular with support bracketing options for any type of payload(s), including cameras, lasers, antennas and other instruments.
- Designed for continuous operation in harsh, all-weather environments, and 100% duty cycle to provide years of service without maintenance.
- Loaded with advanced capabilities and options, including low-cost inertial stabilization for applications on-the-move and geo-pointing to easily link pan/tilt pointing with geo-spatial interfaces.

Product Model Families

	Max Payload	Resolution (°)	Speed (Max.)	Features
	41 kg	0.006°	50°/sec.	Stabilization, RF pass-through, slip-ring, ISM, 360°, IP67
	11.5 kg	0.0075°	120°/sec.	Stabilization, slip-ring, top-mount/side-mount, ISM, 360°, IP67
	6.8 kg	0.003°	100°/sec.	Compact, light-weight, ISM, 360°, IP67, inertial stabilization
	5.5 kg	0.01°	300°/sec.	Top+side mount, <2.5 kg.
	4 kg	0.01°	300°/sec.	Ultra-compact, modular controller

About E-Series

FLIR's current E-Series generation products incorporate years of field experience and application success to provide the best overall value and capabilities in a high-performance pan/tilt platform. E-Series models feature:

- Built-in Ethernet and Web (as well as serial) interfaces for flexible integration
- High-resolution optical encoders for accurate and reliable positioning
- Power protection circuitry for robust operation in all installations
- Real-time motion control with high-speed, low-latency commands for smooth tracking
- Strong environmental specifications: IP67, -30°C/+70°C and MIL-810F shock/vibe testing for reliability in mobile and harsh environments
- Flexible mounting for easy integration of any payload
- Multiple slip-ring options for simple control and interfacing of any sensor

Applications

FLIR has nearly two decades of experience helping customers solve difficult and important problems in sensor positioning. FLIR has provided successful pan/tilt solutions across a wide range of applications and markets. This experience is incorporated into our latest product designs and helps ensure that FLIR Motion Control Systems are the best solution for your project or product. FLIR's solid track record in hundreds of mission-critical applications helps ensure success on your project, the first time.



Military Security

FLIR provides a complete line of COTS products that are well-suited to a wide range of military sensing and surveillance applications. FLIR products have proven their robustness and performance in military systems worldwide, including: force protection, perimeter surveillance, border surveillance, driver vision enhancement, IED detection, unattended ground sensors, sniper detection and more.



FLIR pan/tilts with stabilization provide situational awareness in many theaters.

Applications

Surveillance & Detection

FLIR products perform well in a wide range of security and surveillance applications. Real-time control, IP interfaces, radar slew-to-cue, and overall accuracy and robustness make FLIR products a great choice for the security systems integrator and OEM. Some of the applications where FLIR products have proven themselves include: waterway protection, airport warning systems, perimeter surveillance, border protection, intrusion detection and more.



Standoff detection systems provide 24/7 security for checkpoints.

Robotics

FLIR's Motion Control Systems began in the robotics and computer vision markets, providing real-time positioning for applications such as visual tracking and robotic vision. Today FLIR serves growing robotics markets in areas such as manned and unmanned robotic vehicles, computer vision and more.



FLIR is a leader in pan/tilt solutions for mobile robotics that require compact sizes and rugged design.

Communications

Today's growing needs for real-time communications and higher bandwidths place a greater premium on directional antenna systems. FLIR products are well suited for automated antenna pointing systems and communications applications, including ground-to-air UAV communications, rapid setup terrestrial point-to-point communications, robotic submarine communications (ship-to-ship) and many more.



FLIR pan/tilts support mission-critical communications for the U.S. Army.

R&D / Test & Measurement

FLIR's complete line of high-accuracy positioning systems serves a diverse set of applications in R&D and test and measurement. FLIR offers a pointing platform for almost any type of instrument or sensor that requires fast, directional control. Some of the applications where FLIR products have proven successful include: missile launch image capture, laser-based gas detection, remote scientific sensing, real-time atmospheric monitoring, RF spectrum monitoring, 3D-image capture and many more.



FLIR pan/tilts automatically track missile test flight paths.

PTU-46/PTU-D47

“Miniature, real-time, fast and accurate”



Overview & Applications

The PTU-D46 and PTU-D47 family of miniature pan/tilt units provide fast, precise positioning in an extremely small and lightweight package. They are fully computer-controlled and offer programmability of speed, acceleration, power and other parameters. The included controller, with built-in RS-232 and RS-485 interfaces, handles precise kinematic motion control according to user-set parameters. The PTU-D46 and PTU-D47 units accept ASCII and binary command formats and are networkable. Commands can be sent at very high rates for demanding applications such as laser scanning and video tracking. The PTU-D47 models offer all-in-one design with single all-weather connector and weatherization for operation in harsh environments.

Key Features

- Fast - speeds to 300°/second
- Resolutions to 0.003°
- Load capacity over 4 kg (5,5 kg for PTU-D47)
- Precise control of position, speed and acceleration
- On-the-fly position and speed changes
- Small form factor
- Lightweight
- Single DC power input suited for battery operation
- Rigid worm gear design; no belts/pulleys

Benefits

The open platform allows you to precisely control and program the units from any computer over integral serial ports. The PTU-D46 and PTU-D47 models have been proven over decades on hundreds of applications, providing you assurance that they will work the first time for even the most sophisticated applications.

The PTU-D47 models provide an all-in-one design suitable for outdoor applications for single or two-part payloads. The small size and light weight makes the PTU-D46/47 models well suited for pole-top and mobile robot applications.



PTU-46/PTU-47

SPECIFICATIONS AT A GLANCE

Payload capacities (D46/D47)	4.1 / 5.5 kg
Pan range of motion	+/-180 °
Tilt range of motion	-80° to +31° (111° Range)
Position resolution (pan/tilt)	0.013° / 0.003°
Pan speeds (min-max)	< 0.013°/sec - 300°/sec
Host interfaces	RS-232, RS-485, RS-422
Payload pass-through wiring	8 conductors (PTU-D47 option)
Input voltage	12-30VDC
Weight (D46/D47)	1.4 / 2.5 kg
Operating temperature	-20°C to +60°C
Weatherization	IP65 optional for D46; IP66 for D47

VARIANTS AND OPTIONS

The PTU-D46 is offered in three gear ratios, providing different speed and payload capabilities. The PTU-D47 includes an option for payload wiring to simplify system cabling.

Bracketing	Side bracket (optional accessory)
Gear ratio (affects max payload and speeds)	17.5:1, 70:1, and 17.5:1 pan/70:1 tilt
Payload wiring/slip-ring	8 conductor wire through (Option on PTU-D47)
Stabilization	n/a
Weatherization	Option
Range of motion	Option

NOTE: See Configuration Guide for complete details of options and configurations.

PTU-D48 E-Series

“Compact, extremely rugged, precise”



Overview & Applications

The PTU-D48 E-Series is a high-performance real-time positioning system for payloads up to 6.8 kg. The PTU-D48 E-Series pan/tilt offers high precision positioning and speed control. The stepper motor/worm gear design supports micro-stepping and is based on a rigid bearing and mechanical design to ensure solid repeatable motion. The low parts count and highly integrated design provides unsurpassed system reliability.

The PTU-D48 E-Series is an open platform that provides the flexibility needed while minimizing your development and integration effort. It has been proven in a wide range of mission-critical applications for positioning cameras, lasers, antennas and other instruments in fixed and mobile environments.

Key Features

- Precise, real-time control of position, speed and acceleration
- Single connector for power, control and payload signals
- Flexible payload mounting (top or sides)
- Fully sealed for outdoor/marine applications (IP67)
- Wide-range DC power input (12VDC to 30VDC) with battery-friendly power controls
- Precise digital encoders
- Multiple protocol command interface: FLIR, Nexus, Pelco-D
- Stabilization option supports on-the-move applications

Benefits

The PTU-D48 E-Series is an ideal platform for OEMs and integrators to create small to mid-size single or multi-sensor systems. Custom brackets are easily adapted. The built-in wiring/slip-ring option allows wiring all payload signals through the unit to a single base connector. The open interface allows controlling the unit with simple ASCII or efficient binary commands, and Pelco-D support is built in for interfacing to legacy applications. Built-in control interfaces include serial (RS-232/485) as well as Ethernet.

The features and capabilities of the PTU-D48 E-Series platform mean less development time, reduced project risk, and additional features for your camera or antenna system. The solid environmental specifications, along with a strong track record for reliability, mean you can count on the PTU-D48 E-Series day after day and year after year.



PTU-D48 E-Series

SPECIFICATIONS AT A GLANCE

Payload capacities (top/side)	4.5 kg / 6.8 kg
Pan range of motion	Nx360° (with user-programmable limits)
Tilt range of motion	+30° to -90° (120° range)
Position resolution (pan/tilt)	0.003°/0.006°
Pan speeds (min-max)	< 0.003°/sec - 100°/sec
Host interfaces	RS-232, RS-485, RS-422, Ethernet
Payload pass-through wiring	Up to 17 conductors
Input voltage	12-30VDC (with MIL-STD-1275D protection)
Weight	~5,5 kg
Operating temperature	-30°C to +70°C
Weatherization	IP67
Shock/Vibe	MIL-810F

VARIANTS AND OPTIONS

The PTU-D48 E-Series is offered with and without slip-ring/internal wiring. The slip-ring configurations offer multiple wiring options for different payload requirements. It's offered with the inertial stabilization option (ISM) and has the Geo-Pointing Module built in.

Bracketing	Top standard, single/dual side optional
Payload wiring/slip-ring	Optional
Stabilization	Optional
Range of motion	User Programmable (up to nx360° continuous)

NOTE: See Configuration Guide for complete details of options and configurations.

PTU-D100 E-Series

“Mid-size, precise, rugged, programmable”



Overview & Applications

The PTU-D100 E-Series is a high-performance real-time positioning system for payloads up to 11,3 kg. The PTU-D100 E-Series pan/tilt offers very high precision positioning and speed control. The stepper motor/worm gear design supports micro-stepping and is based on a rigid bearing and mechanical design to ensure solid repeatable motion. The low parts count and highly integrated design provide unsurpassed system reliability.

The PTU-D100 E-Series is an open platform that provides the flexibility needed while minimizing your development and integration effort. Designed to withstand high duty cycles in all weather conditions, the PTU-D100 E-Series has been proven in a wide range of mission-critical applications for positioning of cameras, lasers, antennas or other instruments in both fixed and mobile environments.

Key Features

- Precise, real-time control of position, speed and acceleration
- Single connector for power, control and payload signals
- Flexible payload mounting (top or sides)
- Fully sealed for outdoor/marine applications (IP67)
- Wide-range DC power input (12VDC to 30VDC) with battery friendly power controls and MIL-1275 protection
- Precise digital encoders
- Multiple protocol command interface: FLIR, Nexus, Pelco-D

Benefits

Simple to use and feature-rich, the PTU-D100 E-Series forms the core of your multi-sensor product or application. The flexible bracketing and wiring system simplify integration of payloads. Built-in control includes serial and Ethernet for greatest flexibility. In addition to FLIR's high-performance real-time control protocol, Pelco-D is also built in for interfacing to legacy systems.



D100E & D100E-EX

SPECIFICATIONS AT A GLANCE

Payload capacities (top/side)	6.8 / 11.3 kg
Pan range of motion	Nx360° (with user-programmable limits)
Tilt range of motion	+30° to -90° (120° range)
Position resolution (pan/tilt)	0.0075°/0.0075°
Pan speeds (min-max)	< 0.0075°/sec - 120°/sec
Host interfaces	RS-232, RS-485, RS-422, Ethernet
Payload pass-through wiring	Up to 17 conductors
Input voltage	12-30VDC (with MIL-STD-1275D protection)
Weight	~9 kg
Operating temperature	-30°C to +70°C
Weatherization	IP67
Shock/Vibe	MIL-810F

VARIANTS AND OPTIONS

The PTU-D100E is offered standard with built-in slip-ring. Multiple wiring configurations offer options for different payload requirements. The PTU-D100E is also offered with the inertial stabilization option (ISM). All PTU-D100E models include the Geo-Pointing Module built in.

Bracketing	Top and/or single/dual side optional
Payload wiring/slip-ring	Optional
Stabilization	Optional
Range of motion	User Programmable (up to nx360° continuous)

NOTE: See Configuration Guide for complete details of options and configurations.

PTU-D300 E/EX Series

“Large multi-payloads, durable, full-featured”



Overview & Applications

The PTU-D300 E-Series of high-performance pan/tilt units provides robust accurate positioning for very large, heavy multi-sensor systems, antennas and instruments. Nominal payload capacities are up to 40,8 kg.

The PTU-D300 E-Series platform is well-suited for applications such as long-range, multi-sensor surveillance cameras, large antennas and large specialized sensors in both fixed and mobile environments.

The PTU-D300 E-Series models use precision stepper motors and custom worm gear drives in an oil-filled gear system to provide unparalleled performance and durability. Housings are all metal, with oversized bearings, to provide stiffness and rigidity to the overall system. The integrated wiring system provides a large number of slip-ring pass-through channels to meet demanding multi-sensor application requirements.

Key Features

- High accuracy with position resolutions to 0.006°
- High duty cycle up to 100%
- Wide-range DC power input: 12-30VDC
- Multiple control protocols: high-performance FLIR, Pelco-D, Nexus
- High-resolution optical encoder
- Fully programmable ranges of motion, speeds, accelerations and power levels
- Flexible bracketing for side, dual-side and top + dual-side payload mounting
- Environmentally sealed to IP67
- Shock and vibration tolerant

Benefits

Whether you are doing a single project or developing a complex product, the PTU-D300 E-Series platform is designed to make your job simple. Multiple control interfaces and protocols simplify application interfacing. The rich, real-time command set ensures that you can make the unit respond the way you need it to. The years of proven field success of the PTU-D300 E-Series helps reduce your project risk and helps ensure your project works right the first time.



D300E & D300E-EX

SPECIFICATIONS AT A GLANCE

Payload capacities (top/side)	15.8 / 31.7 kg (27 / 41 kg for D300E-EX)
Pan range of motion	Nx360° (with user-programmable limits)
Tilt range of motion	+30° to -90° (120° range)
Position resolution (pan/tilt)	0.0064°/0.0064°
Pan speeds (min-max)	< 0.0064°/sec - 50°/sec (22°/sec for D300E-EX)
Host interfaces	RS-232, RS-485, RS-422, Ethernet
Payload pass-through wiring	Up to 17 conductors
Input voltage	12-30VDC (with MIL-STD-1275D protection)
Weight	~12-13,5 kg
Operating temperature	-30°C to +70°C
Weatherization	IP67
Shock/Vibe	MIL-810F

VARIANTS AND OPTIONS

The PTU-D300E is offered standard with built-in slip-ring. Multiple wiring configurations offer options for different payload requirements. The PTU-D300E models are also offered with the inertial stabilization option (ISM). All PTU-D300E models include the Geo-Pointing Module built in.

Bracketing	Top or single side (top + 1-2 sides optional)
Payload wiring/slip-ring	Optional RF and high-power
Stabilization	Optional
Range of motion	User Programmable (up to nx360° continuous)

Inertial Stabilization Module



PTU-D300 provides real-time communications link to "Dorado," a remote-controlled vessel used for sonar scanning by the Defence R&D Canada-Atlantic (DRDC-Atlantic).



The PTU-300-ISM positioning an Optical Tracker on a Chilean Navy vessel.

FLIR offers unique high-performance, low-cost inertial stabilization (ISM) as an option on most E-Series pan/tilt models. The ISM option consists of a built-in gyro and integrated firmware that allows the pan/tilt to stay pointed at the commanded line-of-site through motion and maneuvers of the vehicle/boat/aircraft in mobile applications.

How ISM Works

The ISM uses a 3-axis MEMS gyro built into the pan/tilt to measure the platform's (e.g., boat, vehicle or aircraft) motion. The second generation built-in firmware commands the pan/tilt in real time to cancel out the platform motion and hold the last commanded line-of-site direction.

Key Features

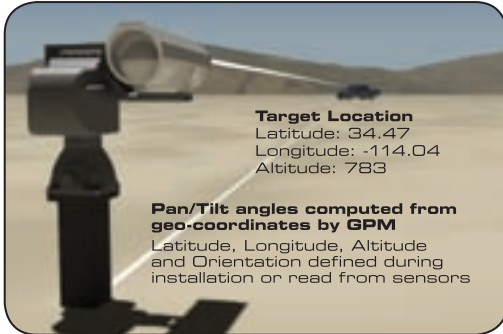
The ISM is fully integrated into the pan/tilt. There are no additional external cables or bulky boxes. The ISM-enabled pan/tilts retain their full weatherization and environmental specifications. Configuration of the ISM is via simple built-in Web pages - only a Web browser is required. The command set for the ISM is completely integrated with the pan/tilt control and can be accessed over serial or Ethernet interfaces.

The pan/tilt can be controlled in real-time while stabilization is turned on. This allows operator control via a joystick, or real-time control for video tracking or radar slew-to-cue to be used with stabilized systems.

Benefits

The ISM improves images and sensing while on-the-move, and can allow ship-to-shore communications with high-gain antennas. The low cost points of the ISM allow stabilization to be incorporated as a feature in a wide range of applications for ground, air and sea that have previously not been economically feasible.

Geo-Pointing Module & Accessories



Geo-Pointing Module

FLIR E-Series pan/tilts include a unique geo-pointing capability (GPM) built into the unit. Geo-pointing allows pan/tilts to be commanded using GPS coordinates (e.g., latitude, longitude and altitude). The GPM provides additional control flexibility for integrating the pan/tilt into application software. Features such as radar slew-to-cue are simplified, as is multi-camera coordination. GIS map-interfaces can be used, allowing the user to aim a pan/tilt by clicking on a map location. The GPM is built into the pan/tilt and once enabled is configured and controlled using the built-in Web and IP interfaces.



Breakout Cables



Brackets



Power Supplies



Software API



Rugged Joystick Controller



Connector Kits for Custom Cables

Accessories

FLIR offers a complete line of accessories to round out your system. Available online, Configuration Guides detail the options and accessories of each pan/tilt model. FLIR accessories are designed to the same high standards as our pan/tilt products and provide the reliability you need day in and day out. Some of the accessories available include:

- Breakout Cables
- Brackets
- Power Supplies
- Software API
- Rugged Joystick Controller
- Connector Kits for Custom Cables

Pan/Tilt



D300E



D300E-EX



D100E

GENERAL FEATURES

Max Payload (Kgs)	31	40	11
Payload Mounting	Top, dual-side	Top, dual-side	Top, dual-side
Stabilization	Option	Option	Option
Position Resolution (max)	0.0064°	0.0064°	0.0075°
Max Pan Speed (°/sec)	50	22	120
Pan Range	nx360°	nx360°	nx360°
Tilt Range	+30°/-90°	+30°/-90°	+30°/-90°
Input Power	12-30VDC	12-30VDC	12-30VDC
Input Power Protection	MIL-STD-1275	MIL-STD-1275	MIL-STD-1275
Host Control Interfaces	232/485/422, Ethernet	232/485/422, Ethernet	232/485/422, Ethernet
Slip Ring	Standard	Standard	Standard
Payload Pass-Through Wiring	up to 17	up to 17	up to 17
Weight (Kgs)	12	13	9
Height (cm)	33	33	32
Environmental	IP67	IP67	IP67
Operating Temperature	-30° - +70°C	-30° - +70°C	-30° - +70°C
Shock & Vibe	MIL-801F	MIL-801F	MIL-801F
Certifications	FCC, RoHS, CE	FCC, RoHS, CE	FCC, RoHS, CE

Units



D100E-EX



D48E



D47



D46

11	7	5	4
Top, dual-side	Top, dual-side	top, side	top
Option	Option	No	No
0.003°	0.006°	0.013°	0.003°
50	100	300	300
nx360°	nx360° (option)	+/-180°	+/-180°
+30°/-90°	+30°/-90°	-80°/+31°	-80°/+31°
12-30VDC	12-30VDC	12-30VDC	12-30VDC
MIL-STD-1275	MIL-STD-1275	N/A	N/A
232/485/422, Ethernet	232/485/422, Ethernet	232/485/422	232/485/422
Standard	Option	No	No
up to 17	up to 17	8 (option)	n/a
9	5,5	2.5	1.5
32	26.6	16.6	13
IP67	IP67	IP66	IP65
-30° - +70°C	-30° - +70°C	-20° - +60°C	-20° - +60°C
MIL-801F	MIL-801F	N/A	N/A
FCC, RoHS, CE	FCC, RoHS, CE	FCC, RoHS, CE	FCC, RoHS, CE

Trusted. Proven. Refined.

Make the Right Pan/Tilt Decision

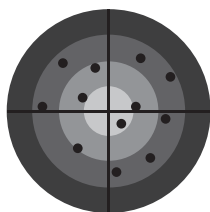
FLIR is a pioneer and market leader in high-performance — or tracking — pan/tilts. Tracking pan/tilts allow computer-controlled pointing of any type of sensor or other payload and are characterized by high accuracy, precise geometry, sophisticated electrical system, full programmability with real-time control, durability and reliability.

PAN/ TILT TYPE	remote panning and tilting	computer controlled	industrial/ all-weather	accurate positioning	accurate dynamics	continuous duty	real-time computer controls	gyro- stabilization
Analog CCTV pan/tilt	x							
Digital CCTV pan/tilt	x	x						
Precision pan/tilt	x	x	x	x				
Tracking pan/tilt	x	x	x	x	x	x	x	x

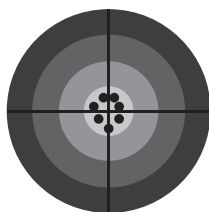
When comparing pan/tilt platforms to design in to your system, there are at least six key factors to consider:

1. Accuracy (see diagram below)
2. Mechanical Design: What level of precision and flexibility do you need in your platform?
3. Electrical System: How robust are the features your system needs powered?
4. Control and Programmability: How do you want to “talk” to your system?
5. Durability and Reliability: What does the environment in which your system will be running demand?
6. The Manufacturer: What level of field experience is being incorporated into your platform's design?

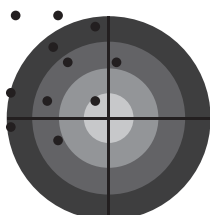
Poor Resolution
Good Accuracy



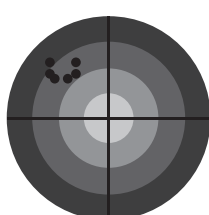
Good Resolution
Good Accuracy



Poor Resolution
Poor Accuracy



Good Resolution
Poor Accuracy



For more details on these six key factors, download “6 Key Factors in Selecting a Pan/Tilt System” at www.FLIR.com/MCS.

FLIR products are the result of solving a wide range of challenging applications in pointing and positioning for more than 18 years, across hundreds of application types for thousands of customers.

This means lower development risk and cost for you and the assurance that your application will work right the first time, and over the long run.



About FLIR Motion Control Systems

FLIR's motion control systems division (formerly Directed Perception) created one of the first miniature computer-controlled pan/tilt tracking mounts in 1992. FLIR continues to lead the field in innovation, applied design and service with patented motion control systems in use in a wide range of industries, including Security & Surveillance, Industrial Automation, Robotics, Communications, Military/Aerospace, Law Enforcement, Education, R&D, Webcams, and Teleconferencing/Distance Learning. FLIR maintains engineering capabilities in mechanical design, electronics, and embedded and network software development. **Find out more at www.FLIR.com/MCS.**

About FLIR Systems, Inc.

As the world's largest commercial infrared company, FLIR Systems has fielded more high quality thermal night vision systems than anyone in the world. Our rugged, stabilized imagers are on thousands of civil and military platforms - surface and airborne - in the US and around the world. That's more than every other manufacturer combined.

With thousands of our thermal cameras on the job in military, scientific, law enforcement, and security applications, FLIR brings an unmatched level of experience and dedication to the creation of cutting-edge thermal night vision systems.

We design and manufacture all of the critical technologies inside our products, including detectors, electronics, special lenses, pan/tilt motion control systems, and we assemble it all right here in the U.S.

For additional technical information, or to see a demonstration of these revolutionary thermal night vision systems, contact a FLIR representative today. You can also visit www.FLIR.com to watch product videos and see how thermal imaging can help you see, night and day.



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