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 90 lbs (40.8 kg).

• Continuous operation in harsh, all-weather environments, and 100% duty cycle to provide years of service without maintenance
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 painting to geospatial data.

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**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, -30C/+70C 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

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**Product Model Families**

<table>
<thead>
<tr>
<th>Max Payload</th>
<th>Resolution (°)</th>
<th>Speed (Max.)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>D300E</td>
<td>90 lbs (40.8 kg)</td>
<td>0.006°</td>
<td>50°/sec. Stabilization, RF pass-through, slip-ring, IP67</td>
</tr>
<tr>
<td>D100E</td>
<td>25 lbs (11.3 kg)</td>
<td>0.0075°</td>
<td>120°/sec. Stabilization, slip-ring, top-mount/ side-mount, IP67</td>
</tr>
<tr>
<td>D48E</td>
<td>15 lbs (6.8 kg)</td>
<td>0.003°</td>
<td>100°/sec.</td>
</tr>
<tr>
<td>D47</td>
<td>12 lbs (5.4 kg)</td>
<td>0.01°</td>
<td>300°/sec. Top-side mount, &lt;5.5 lbs.</td>
</tr>
<tr>
<td>D46</td>
<td>9 lbs (4.1 kg)</td>
<td>0.01°</td>
<td>300°/sec. Ultra-compact, modular controller</td>
</tr>
</tbody>
</table>

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**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.

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**FLIR pan/tilt with stabilization provides situational awareness in many theaters.**

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Surveillance & Detection

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.

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.

Standoff detection systems provide 24/7 security for checkpoints.

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

FLIR pan/tilts automatically track missile test flight paths.
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 9 pounds (12 lbs 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.

Specifications at a glance

<table>
<thead>
<tr>
<th>PTU-D46/PTU-D47</th>
<th>Payload capacities (D45/D47)</th>
<th>9/12 lbs (4.1/5.4 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan range of motion</td>
<td>+/-180°</td>
<td></td>
</tr>
<tr>
<td>Tilt range of motion</td>
<td>-80° to +31° (111° Range)</td>
<td></td>
</tr>
<tr>
<td>Position resolution (pan/tilt)</td>
<td>0.013° / 0.003°</td>
<td></td>
</tr>
<tr>
<td>Pan speeds (min-max)</td>
<td>&lt; 0.013°/sec - 300°/sec</td>
<td></td>
</tr>
<tr>
<td>Host interfaces</td>
<td>RS-232, RS-485, RS-422</td>
<td></td>
</tr>
<tr>
<td>Payload pass-through wiring</td>
<td>8 conductors (PTU-D47 only)</td>
<td></td>
</tr>
<tr>
<td>Input voltage</td>
<td>12-30VDC</td>
<td></td>
</tr>
<tr>
<td>Weight (D45/D47)</td>
<td>3/5.5 lbs (1.4/2.5 kg)</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20°C to +60°C</td>
<td></td>
</tr>
<tr>
<td>Weatherization</td>
<td>IP65 optional for D46; IP66 for D47</td>
<td></td>
</tr>
</tbody>
</table>

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.
Overview & Applications

The PTU-D48 E-Series is a high-performance real-time positioning system for payloads up to 15 pounds. 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 basic 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. Button 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.

Specifications at a glance

<table>
<thead>
<tr>
<th>PTU-D48 E-Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload capacities (top/side)</td>
</tr>
<tr>
<td>Pan range of motion</td>
</tr>
<tr>
<td>Tilt range of motion</td>
</tr>
<tr>
<td>Position resolution (pan/tilt)</td>
</tr>
<tr>
<td>Pan speeds (min-max)</td>
</tr>
<tr>
<td>Host interfaces</td>
</tr>
<tr>
<td>Payload pass-through wiring</td>
</tr>
<tr>
<td>Input voltage</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Operating temperature</td>
</tr>
<tr>
<td>Weatherization</td>
</tr>
<tr>
<td>Shock/Vibe</td>
</tr>
</tbody>
</table>

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 ±360° continuous)

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

The PTU-D100 E-Series is a high-performance real-time positioning system for payloads up to 25 pounds. 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
- Increased gear ratios for larger top-mounted payloads
- 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.

Specifications at a glance

<table>
<thead>
<tr>
<th>Payload capacities (top/side)</th>
<th>15/25 lbs (25/25 for D100E-EX) (6.8/11.3 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan range of motion</td>
<td>±30° to 360° (with user-programmable limits)</td>
</tr>
<tr>
<td>Tilt range of motion</td>
<td>-90° to +90° (120° range)</td>
</tr>
<tr>
<td>Position resolution (pan/tilt)</td>
<td>0.0075°/0.0075°</td>
</tr>
<tr>
<td>Pan speeds (min-max)</td>
<td>&lt; 0.0075°/sec – 120°/sec (50°/sec D100E-EX)</td>
</tr>
<tr>
<td>Host interfaces</td>
<td>RS-232, RS-485, RS-422, Ethernet</td>
</tr>
<tr>
<td>Payload pass-through wiring</td>
<td>Up to 17 conductors</td>
</tr>
<tr>
<td>Input voltage</td>
<td>12-30VDC (with MIL-STD-1275D protection)</td>
</tr>
<tr>
<td>Weight</td>
<td>~20 lbs (9.1 kg)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30°C to +70°C</td>
</tr>
<tr>
<td>Weatherization</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock/Vibe</td>
<td>MIL-810F</td>
</tr>
</tbody>
</table>

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 ±360° continuous)  |

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

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°
• 360°-continuous pan capability ideal for antenna pointing applications
• 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.

VARIANTS AND OPTIONS

The PTU-D300E is offered standard with built-in slipring. 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.

<table>
<thead>
<tr>
<th>Bracketing</th>
<th>Top or single side (top + 1-2 sides optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload wiring/slick-ring</td>
<td>Optional RF rotary-joint and high-power pass through signals</td>
</tr>
<tr>
<td>Stabilization</td>
<td>Optional</td>
</tr>
<tr>
<td>Range of motion</td>
<td>User-Programmable (up to nx360° continuous)</td>
</tr>
</tbody>
</table>

SPECIFICATIONS AT A GLANCE

<table>
<thead>
<tr>
<th>Payload capacities (top/side)</th>
<th>35/70 lbs (15.9/31.8 kg) [60/90 lbs (27.2/40.8 kg) for D300E-EX]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan range of motion</td>
<td>±360° (with user-programmable limits)</td>
</tr>
<tr>
<td>Tilt range of motion</td>
<td>&lt;30° to ±90° (120° range)</td>
</tr>
<tr>
<td>Position resolution (pan/tilt)</td>
<td>0.006°/0.0064°</td>
</tr>
<tr>
<td>Pan speeds (min/max)</td>
<td>&lt; 0.0064°/sec to 50°/sec for D300E-EX</td>
</tr>
<tr>
<td>Host interfaces</td>
<td>RS-232, RS-485, RS-422, Ethernet</td>
</tr>
<tr>
<td>Payload pass-through wiring</td>
<td>Up to 17 conductors</td>
</tr>
<tr>
<td>Input voltage</td>
<td>12-30VDC (with MIL-STD-1275D protection)</td>
</tr>
<tr>
<td>Weight</td>
<td>~26-30 lbs (11.8–13.6 kg)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30°C to +70°C</td>
</tr>
<tr>
<td>Weatherization</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock/Vibe</td>
<td>MIL-810F</td>
</tr>
</tbody>
</table>

PTU-D300 E/EX Series

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

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. GPM 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.
### General Features

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Payload (lb/kg)</th>
<th>Payload Mounting</th>
<th>Stabilization</th>
<th>Position Resolution (max)</th>
<th>Max Pan Speed (°/sec)</th>
<th>Pan Range</th>
<th>Tilt Range</th>
<th>Input Power</th>
<th>Input Power Protection</th>
<th>Host Control Interfaces</th>
<th>Slip Ring</th>
<th>Payload Pass-Through Wiring</th>
<th>Weight (Lbs.)</th>
<th>Height (in.)</th>
<th>Environmental</th>
<th>Operating Temperature</th>
<th>Shock &amp; Vibe</th>
<th>Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>D300E</td>
<td>70/31</td>
<td>Top, dual-side</td>
<td>Option</td>
<td>0.0084°</td>
<td>50</td>
<td>n/360°</td>
<td>+30°/-90°</td>
<td>12-30VDC</td>
<td>MIL-STD-1275</td>
<td>232/485/422, Ethernet</td>
<td>Standard</td>
<td>up to 17</td>
<td>26</td>
<td>13.01</td>
<td>IP67</td>
<td>-30° - +70°C</td>
<td>MIL-801F</td>
<td>FCC, RoH6, CE</td>
</tr>
<tr>
<td>D300E-EX</td>
<td>90/40</td>
<td>Top, dual-side</td>
<td>Option</td>
<td>0.0084°</td>
<td>22</td>
<td>n/360°</td>
<td>+30°/-90°</td>
<td>12-30VDC</td>
<td>MIL-STD-1275</td>
<td>232/485/422, Ethernet</td>
<td>Standard</td>
<td>up to 17</td>
<td>28</td>
<td>13.01</td>
<td>IP67</td>
<td>-30° - +70°C</td>
<td>MIL-801F</td>
<td>FCC, RoH6, CE</td>
</tr>
<tr>
<td>D100E</td>
<td>25/11</td>
<td>Top, dual-side</td>
<td>Option</td>
<td>0.0075°</td>
<td>100</td>
<td>n/360°</td>
<td>+30°/-90°</td>
<td>12-30VDC</td>
<td>MIL-STD-1275</td>
<td>232/485/422, Ethernet</td>
<td>Standard</td>
<td>up to 17</td>
<td>20</td>
<td>12.56</td>
<td>IP67</td>
<td>-30° - +70°C</td>
<td>MIL-801F</td>
<td>FCC, RoH6, CE</td>
</tr>
<tr>
<td>D100E-EX</td>
<td>15/7</td>
<td>Top, dual-side</td>
<td>Option</td>
<td>0.0075°</td>
<td>100</td>
<td>n/360°</td>
<td>+30°/-90°</td>
<td>12-30VDC</td>
<td>MIL-STD-1275</td>
<td>232/485/422, Ethernet</td>
<td>Standard</td>
<td>up to 17</td>
<td>12</td>
<td>12.56</td>
<td>IP67</td>
<td>-30° - +70°C</td>
<td>MIL-801F</td>
<td>FCC, RoH6, CE</td>
</tr>
<tr>
<td>D48E</td>
<td>12/5</td>
<td>Top, side</td>
<td>No</td>
<td>0.013°</td>
<td>300</td>
<td>+/-180°</td>
<td>+30°/-31°</td>
<td>12-30VDC</td>
<td>N/A</td>
<td>232/485/422</td>
<td>No</td>
<td>up to 8 (option)</td>
<td>5.4</td>
<td>5.11</td>
<td>IP66</td>
<td>-20° - +60°C</td>
<td>N/A</td>
<td>FCC, RoH6, CE</td>
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<td>D47</td>
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<td>up to 8 (option)</td>
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<td>-20° - +60°C</td>
<td>N/A</td>
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</table>

**Certifications:**
- FCC, RoH6, CE
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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.


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.

<table>
<thead>
<tr>
<th>Pan/tit type</th>
<th>remote panning and tilting</th>
<th>computer controlled</th>
<th>industrial/ all-weather</th>
<th>accurate positioning</th>
<th>accurate dynamics</th>
<th>continuous duty</th>
<th>real-time computer controls</th>
<th>gyro-stabilization</th>
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</thead>
<tbody>
<tr>
<td>Analog CCTV pan/tilt</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Digital CCTV pan/tilt</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Precision pan/tilt</td>
<td>x</td>
<td>x</td>
<td></td>
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<td>x</td>
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<tr>
<td>Tracking pan/tilt</td>
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<td>x</td>
<td>x</td>
<td>x</td>
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<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

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?

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.

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
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Precision pan/tilt
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