

CSI 2010 Specification for: FLIR DM-Series Dual-Spectrum PTZ Camera

Notes to Specifier:

- 1. This CSI 2010-compliant specification is designed to allow the specifier to specify FLIR or similar products for any type of project. Specifier can easily customize this specification to his/her needs.**
- 2. The specification is not proprietary to Teledyne FLIR. Any suitable brand can be specified using this specification.**
- 3. Teledyne FLIR has placed Text Boxes such as this in bold to alert the specifier of important information. Delete all Text Boxes after editing.**
- 4. Teledyne FLIR has also placed edit prompts “[]” throughout the specification to prompt the specifier to add or modify information relative to the paragraph at hand. Delete all Edit Prompts “[]” after editing.**
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GENERAL

1.1. Summary

- A. This Specification is for a pan/tilt dual-spectrum security camera (DM-Series) for installation into a fully operational Digital Video System. This Specification is part of a larger project which may be covered in one or more of the Specification Sections listed below.

1.2. Section Contents and Related Specification References

- A. This Specification may be part of a larger Security System project. ***[If so, utilize the appropriate specification sections below.]*** Refer to the appropriate CSI 2010 Specification Sections as referenced below: ***[Delete any sections not for coordination to this work.]***

1. 000000 – Procurement and Contracting Requirements (Division 0)
2. 010000 – General Requirements (Division 1)
3. 020000 – Existing Conditions (Division 2)
4. 080000 – Openings (Doors, Door Hardware and other Openings) (Division 8)
5. 101400 – Signage (Division 10)
6. 111200 – Parking Control Equipment (Division 11)
7. 142000 – Elevators (Division 14)
8. 250000 – Integrated Automation Systems (Division 25)
9. 260000 – Electrical (Division 26)
10. 270000 – Communications (Division 27)
 - a. 271000 – Data Communications Network Equipment (including Firewalls, Routers, Codecs, Switches and Access Points)
 - b. 272200 – Data Communications Hardware (including Servers, Storage, Workstations, Printers, etc.)
 - c. 273000 – Voice Communications
11. 280000 – General Security System Specification (Division 28)
 - a. Section 280800 – Commissioning of Electronic Safety and Security
 - b. Section 281000 – Electronic Access Control and Intrusion Detection
 - c. Section 281600 – Intrusion Detection
 - d. Section 281619 – Intrusion Detection Remote Devices and Sensors
 - e. Section 282000 – Electronic Surveillance
 - f. Section 282300 – Video Surveillance
 - g. Section 282313 – Video Surveillance Control and Management Systems

- h. Section 282316 – Video Surveillance Monitoring and Supervisory Interfaces
- i. Section 282323 – Video Surveillance Systems Infrastructure
- j. Section 282329 – Video Surveillance Remote Devices and Sensors

1.3. Drawings and Specifications:

A. Drawings:

- 1. ***[Include this paragraph if Drawings were included.]*** Drawings delivered with these Specifications show device locations, and may show conduits, details, device schedules and single-line or detailed schematics.
- 2. ***[Include this paragraph if Drawings were not included.]*** Drawings are not included. See the descriptive narratives in Articles 1.5 and 1.7 below.

B. Specifications: The Specifications describe the Scope of Work including:

- 1. Section 1 – System Descriptions, all items to be delivered and installed and all services to be performed.
- 2. Section 2 – Products, describes acceptable products.
- 3. Section 3 – Execution, describes the standards and practices to be used by the installer for this work.

1.4. Project Background and Site Conditions:

A. ***[Fill in Project Background and Site Conditions for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***

B. See Section 282313 – Video Surveillance Control and Management Systems

1.5. Product Description:

- A. Provide a quantity of pan/tilt dual-spectrum security cameras (DM-Series) as shown on the associated Purchase Order or Bill of Quantities.

1.6. Submittals:

A. ***[Fill in Submittal Requirements for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***

B. See Section 013300 – Submittal Procedures

C. *DM-Series Camera Quick Install Guide*

D. *DM-Series Camera Installation and User Guide*

1.7. Delivery, Storage and Handling

A. ***[Fill in Submittal Requirements for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***

B. See Section 016000 – Product Requirements

1.8. Quality Assurance:

- A. ***[Fill in Submittal Requirements for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***
- B. Manufacturer:
 - 1. Minimum 10 years' experience in manufacture and design of IP Thermal Analytic Video Surveillance Systems.
 - 2. ISO 9001:2008 certification
- C. Installer:
 - 1. Minimum 5 years' experience in installing IP Thermal Analytic Surveillance Systems.
 - 2. All camera installation, configuration and commissioning shall be performed by technicians fully authorized by manufacturer.

1.9. Applicable Codes and Standards:

- A. ***[Fill in Applicable Codes and Standards for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***
- B. Electromagnetic Compatibility: CE; FCC Part 15, Subpart B, Class A
- C. Environmental: IP66
- D. Material: RoHS; WEEE
- E. ONVIF Profile S

1.10. Warranty:

- A. ***[Fill in specific services for this work here or delete this paragraph and include the paragraph below if this is part of a complete system.]***
- B. Manufacturer's warranty will cover two years for replacement or repair of defective equipment and a ten-year warranty for the thermal core.

PART 1 - PRODUCTS

1.1. Acceptable Manufacturer and Model:

- A. Acceptable Manufacturers: ***[Teledyne FLIR and/or name acceptable alternative manufacturers here, or indicate to submit all for review.]***
- B. Models: ***[FLIR dual-spectrum model DM-Series and/or name acceptable alternative models here, or indicate to submit all for review.]***

1.2. General Product Description:

- A. A dual-spectrum video surveillance system consisting of a PTZ dual-spectrum security camera (DM-Series).

1.3. Detailed Product Description:

A. Basic Description:

1. The integrated system shall operate either as a stand-alone PTZ dual-spectrum security camera or as part of an integrated network or DVR configuration.
2. The camera shall consist of (1) a thermal sensor with multiple lens options of various fixed fields of view and (2) a 4K visible light sensor.
3. Field software upgrades shall be distributable across the network.
4. The camera shall provide digital IP video output using an Ethernet connection.
5. The camera shall include dry contact input and output.
6. Video from the thermal sensor shall allow the user to view images, thermal patterns, and contrast despite smoke, low light, light fog, and haze.
7. The camera shall be passive and not produce any energy or emit light in any bandwidth.
8. The thermal sensor shall include athermalized optics that automatically adjust to ambient temperature changes, and therefore do not require re-adjustment and/or thermal refocusing.
9. The thermal sensor shall not be susceptible to "image blooming" that results from brightly lit objects that appear as intense glows that might hide nearby detail and might blind the camera by flooding the scene with light.
10. The thermal sensor shall utilize automatic flat-field correction (FFC) to compensate for temperature variations and eliminate the need for focal plane array (FPA) temperature stabilization.
11. The video from the thermal sensor shall feature the following colorization modes: WhiteHot, BlackHot, RedHot, RedHotInverse, Fusion, FusionInverse, FireIce, and FireIceInverse. For example, in the default WhiteHot mode, warmer objects and areas will be displayed in white or lighter shades of gray than cooler objects and areas, and in the BlackHot mode, warmer objects and areas will be displayed as black or dark gray compared to cooler objects and areas.

12. The camera shall include a web interface for remote control/configuration without requiring the use of a VMS.
 13. The camera shall be compatible with 3rd party Network Video Management Software (NVMS), digital video displays or recording devices.
 14. The camera shall digitally encode images into a compressed IP video stream over IP to a VMS.
 15. The camera shall support overlaying on-screen display information onto the encoded video.
 16. The camera's web interface shall include georeference and geotracking settings, including the capability to
 - configure its geographical location and mounting information;
 - upload and calibrate a map image;
 - overlay onto the map image the camera's thermal and visible sensors' field of views;
 - be paired with compatible FLIR Security edge devices that provide geotracking information;
 - manually and automatically engaging objects detected by those devices; and
 - overlay onto the map image objects detected by the paired device.
 17. The camera's web interface shall include alarm settings. The alarm rules shall support:
 - local triggers—local and external I/O;
 - remote triggers—video analytics; radiometry; geotracking; and
 - actions—local and external I/O; email notifications; move to a preset.
 18. Setup and Configuration:
 - Single-handedly install and set up one or more cameras without requiring another person's assistance.
 - It shall be possible to configure the camera via its web interface.
- B. The camera shall enable the following additional functionality:
1. Via the unit's web interface, set up and configure the unit
 2. Utilize the unit's relay outputs to control external devices
 3. Support for ONVIF Profile S
 4. Support for IEEE 802.1X authentication (EAP-TLS)
 5. Firewall with options to allow RTSP, UPnP, and ICMP
 6. Support for TLS control and HTTPS redirect

1.4. The camera shall include the following specifications:

A. Basic Camera Specifications:

1. The following models are available:

Model	Sensor	Thermal FOV (H x W)	Thermal Focal Length	Visible FOV (H x W)	Visible Focal Length
DM-392	320x256	92° x 69°	2.3 mm	110° x 59°	2.8 mm
DM-350	320x256	50° x 38°	4.3 mm	110° x 59°	2.8 mm
DM-324	320x256	24° x 18°	9.1 mm	54° x 30°	6 mm
DM-312	320x256	12° x 9°	18 mm	36° x 20°	12 mm
DM-695	640x512	95° x 72°	4.9 mm	110° x 59°	2.8 mm
DM-650	640x512	50° x 38°	8.7 mm	110° x 59°	2.8 mm
DM-624	640x512	24° x 18°	18 mm	54° x 30°	6 mm
DM-612	640x512	12° x 9°	36 mm	36° x 20°	12 mm

B. Thermal Imager/Processor Specifications:

- a. Long-Life, Uncooled Vanadium Oxide Microbolometer Sensor (imager)
- b. Array Format (NTSC):
 - DM-3xx: 320x256 pixel array
 - DM-6xx: 640x512 pixel array
- c. Spectral range: 7.5 – 13.5 μm (LWIR)
- d. Pixel pitch: 12 μm
- e. The camera is available in three thermal sensor frame rate options: 8.3 fps and 25 fps for PAL, and 30 fps for NTSC. The 8.3 fps models are easier to export. An export license is not required.
- f. The following optimal human detection, recognition, and identification distances are supported (Johnson's Criteria):

Model	Detection		Recognition		Identification	
	[m]	[ft]	[m]	[ft]	[m]	[ft]
DM-392	100	328.1	25	82.0	12	39.4
DM-350	183	600.4	46	150.9	23	75.5
DM-324	382	1253.3	95	311.7	48	157.5
DM-312	764	2506.6	191	626.6	95	311.7
DM-695	193	633.2	48	157.5	24	78.7
DM-650	367	1204.1	92	301.8	46	150.9
DM-624	764	2506.6	191	626.6	95	311.7
DM-612	1528	5013.1	382	1253.3	191	626.6

The following optimal vehicle detection, recognition, and identification distances are supported (Johnson's Criteria):

Model	Detection		Recognition		Identification	
	[m]	[ft]	[m]	[ft]	[m]	[ft]
DM-392	306	1003.9	76	249.3	38	124.7
DM-350	562	1843.8	141	462.6	70	229.7
DM-324	1171	3841.9	293	961.3	146	479.0
DM-312	2343	7687.0	586	1922.6	293	961.3
DM-695	592	1942.3	148	485.6	74	242.8
DM-650	1125	3690.9	281	921.9	141	462.6
DM-624	2343	7687.0	586	1922.6	293	961.3
DM-612	4686	15374.0	1171	3841.9	586	1922.6

The range predictions above are configured with the indicated lenses, assuming the following:

- a. Optimal performance
 - b. Clear weather and thermal contrast
 - c. Human critical dimension is 0.75m (29.5")
 - d. Vehicle critical dimension is 2.3m (7.5')
 - e. Pixels for detection under optimal conditions: 1.5
 - f. Pixels for recognition under optimal conditions: 6
 - g. Pixels for identification under optimal conditions: 12
 - h. Other assumptions apply
2. Digital Detail Enhancement (DDE)
 3. Automatic Gain Control (AGC)
 4. Image Polarity:
 - a. WhiteHot/BlackHot
 - b. RedHot/RedHotInverse
 - c. Fusion/FusionInverse
 - d. FireIce/FireIceInverse
- C. Visible Light Sensor Specifications:
1. Sensor Type: 1/2.3-type Exmor R CMOS
 2. Sensor Resolution: Full HD 4K

3. Sensitivity:

a. DM-x12 models:

Color: 0.40 Lux (@ f2.0 AGC On, 30FPS)
B/W: 0.16 Lux (@ f2.0 AGC On, 30FPS)

b. All other models:

Color: 0.25 Lux (@ f1.6 AGC On, 30FPS)
B/W: 0.10 Lux (@ f1.6 AGC On, 30FPS)

4. Lens Type:

a. DM-x12 models: Fixed-focus, fixed FOV F2.0 lens

b. All other models: Fixed-focus, fixed FOV F1.6 lens

5. White Balance: Auto/ATW/One Push/Manual

6. Noise Reduction:

a. ColorNR/3DNR On/Off (3 levels)

b. 2DNR On/Off

7. Night Mode:

a. Color (day)

b. B/W (night)

c. Auto, with separate night-to-day and day-to-night thresholds.

8. Wide Dynamic Range Settings

a. Digital Wide Dynamic Range (dWDR): On/Off (3 levels)

b. True (Shutter) Wide Dynamic Range: On/Off

9. Digital Zoom: up to 8x

10. Autoexposure Modes: Full Auto/Manual (NTSC: 1/30-1/32000 seconds; PAL: 1/25-1/32000 seconds)

11. Highlight Compensation (HLC)

12. Servo motor for precise positioning and preset location

D. Video:

1. The camera shall provide three concurrent digital streams plus bi-directional audio on one Ethernet connection.

2. Video Compression:

a. Thermal: One channel of H.264 and MJPEG

- b. Visible: Two independent channels of H.264 and MJPEG
- 3. Streaming Resolution:
 - a. Thermal: VGA
 - b. Visible: VGA to 4K
- 4. User-Definable Frame Rate: 5-30/25 fps @ MJPEG; 5-30/25 fps @ H.264 (NTSC/PAL)
- 5. Bit Rate for H.264: Restricted VBR and CBR (100kbps-12Mbps)
- E. Audio:
 - 1. Bidirectional Audio:
 - a. Line-In for using line-level audio inputs
 - b. Line-Out to feed any single-ended line-level audio input, such as an amplified bullhorn, amplified speakers, or public address system
 - 2. Compression: G.711
- F. Input/output:
 - 1. Input: Four sets / 5V 10k Ω pull up
 - 2. Output: Two sets / relay output, 120mA max at 24VDC / 24VAC
- G. Network:
 - 1. Ethernet: RJ45 10/100/1000 Mbps
 - 2. Services and protocols: IPV4, HTTP, HTTPS, UPnP, DNS, NTP, TCP, UDP, ICMP, IGMP, DHCP, ARP, SNMP
 - 3. Digital Streams: The camera shall provide two digital streams plus bi-directional audio on one Ethernet connection
 - 4. Cybersecurity:
 - a. User credentials with policy enforcement
 - b. Protection from brute force attack
 - c. Digest authentication
 - d. IEEE 802.1X Authentication (EAP-TLS)
 - e. TLS/HTTPS
 - f. Access control via firewall
 - g. IP address filtering

H. Management:

1. Configuration: Remote (via web interface or supported video management system)
2. Firmware Updates: Flash memory for upgrade of camera firmware over the network

I. Electrical:

1. Power Input:
 - a. 24 VAC
 - b. Universal Power over Ethernet (PoE) 60W (4 pair forced mode, no support for CDP/LLDP)
2. Power Consumption:
 - a. 24 VAC: 2.36A, 57VA
 - b. PoE: 55 VDC, 0.62A, 34W

J. Connections:

1. Network: RJ45
2. Power:
 - a. 24 VAC (Through terminal block connector)
 - b. PoE: Through the RJ45 connector
3. Audio In/Out:
 - a. Line In/Line Out: Through terminal block connector
 - b. Alarm In/Alarm Out: Through terminal block connector

K. Physical and Mechanical:

1. Physical:
 - a. Dimensions: 300 x 207 mm (11.8 x 8.15 in.) (H x D)
 - b. Unit Weight: 3.8 Kg (8.38 lbs.)
2. Mechanical:
 - a. Pan Travel: 360° continuous
 - b. Tilt Travel: -10° to 190°

L. Software:

1. Integrated web server
2. Discovery Network Assistant (DNA) tool to discover and configure the camera's IP addressing and DNS server settings; set device properties and user credentials; set the TV system

(PAL/NTSC); upgrade the camera's firmware; reset defaults; reboot the analytics firmware; and display camera properties.

M. Environmental:

1. IP Rating (Dust & Water Ingress): IP66
2. Operating temperature: -40°C to 55°C (-40°F to 131°F) cold start
3. Storage temperature: -40°C to 85°C (-40°F to 185°F)
4. Relative Humidity: 10-90%
5. Shock tolerance: IEC 60068-2-27
6. Vibration tolerance: IEC 60068-2-64

B. Certifications:

1. USA: FCC Part 15 (subpart B, class A)
2. International: CE Marked, RoHS, WEEE, IEC 62368

C. Optional Accessories:

1. CX-GSNK-G32: Gooseneck mount kit (1.5" PF inner threaded), including base and gooseneck pipe
2. CX-GSNK-G32-B: Gooseneck mounting bracket
3. CX-DRP-G32-B: Ceiling mount kit (1.5" PF inner threaded), including base and 20cm drop-down pipe
4. CX-PIPE-G325: 50cm long extender pipe (1.5" PF outer & inner threaded)
5. CX-ARMX-G3: Wall mount bracket (1.5" threaded)
6. CX-ELBX-G3: Wall mount bracket (1.5" inch threaded) with IP68 electrical box enclosure
7. CX-GSNK-G3: Gooseneck mount (1.5" inch threaded) with IP68 electrical box enclosure
8. CX-CRNR-G3: 90-degree angle exterior corner adapter for CX-xxxx-G3 mounts
9. CX-POLE-G3: Pole adapter for CX-xxxx-G3 mounts, including 2.5"-8.5" straps
10. CP-POE-4P-60W-US: Inline 60W 4 pair PoE injector with USA-type power plug
11. CX-PRWR-241: NEMA 4X 24 VAC Power Supply in Weather Resistant Enclosure for 1 PTZ

D. Required System Elements to Complete a Workable System

1. Digital Video Software or Video System See Section 282313 – Video Surveillance Control and Management Systems

EXECUTION

- 1.1. Examination:
 - A. See Section 282313 – Video Surveillance Control and Management Systems
- 1.2. Installation:
 - A. See Section 282313 – Video Surveillance Control and Management Systems
- 1.3. Preparation:
 - A. See Section 282313 – Video Surveillance Control and Management Systems
- 1.4. Quality Control:
 - A. See Section 282313 – Video Surveillance Control and Management Systems
- 1.5. Testing and Commissioning:
 - A. See Section 282313 – Video Surveillance Control and Management Systems
- 1.6. Handing Over:
 - A. See Section 282313 – Video Surveillance Control and Management Systems

--- End of Specifications ---