

**SECTION 28 23 29**  
**THERMAL VIDEO DETECTION AND HD VISIBLE SURVEILLANCE SYSTEM**

**Senstar TC200**

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

**28 20 00 ELECTRONIC SURVEILLANCE**

**28 23 00 Video Surveillance**

**28 23 29 Video Surveillance Remote Devices and Sensors**

*Note: The specifier may wish to incorporate these specifications under sections*

*28 16 00 Intrusion Detection*

*28 16 33 Intrusion Detection Interfaces*

*28 16 33.33 Intrusion Detection Interfaces to Video Surveillance*

**SECTION 28 23 29**  
**THERMAL VIDEO DETECTION AND VISIBLE SURVEILLANCE SYSTEM**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Section includes
  - 1. A hybrid video detection system that uses LWIR thermal to detect objects that violate a site's alarm policies, a Wide Dynamic Range (WDR) HD color imager to provide clear, detailed images, and to provide large-area automated outdoor perimeter and buffer zone protection, operating in all weather conditions and geographical locations and minimizing false and nuisance alarm rates.
- B. Product
  - 1. A hybrid video intruder detection system which receives long wavelength infrared (LWIR) radiated energy for intruder detection and presents HD color video for assessment, integrating a thermal imager, HD color imager, video analytics, image stabilization, advanced image processing, geo-spatial based object tracking, and IR illumination for accurate day/night security.
- C. Related Requirements
  - 1. 26 00 00 – Electrical (Division 26)
    - a. 26 05 00 – Common Work Results for Electrical
    - b. 26 06 00 – Schedules for Electrical
    - c. 26 08 00 – Commissioning of Electrical Systems
    - d. 25 20 00 – Low Voltage Electrical Distribution
    - e. 26 40 00 – Electrical and Cathodic Protection
  - 2. 27 00 00 – Communications (Division 27)
    - a. 27 05 00 – Common Work Results for Communications
    - b. 27 06 00 – Schedules for Communications
    - c. 26 08 00 – Commissioning of Communications
    - d. 27 10 00 – Structured Cabling
    - e. 27 21 00 – Data Communications Network Equipment
    - f. 27 21 00 – Data Communications Hardware
    - g. 27 21 00 – Data Communications Network Equipment
  - 3. 28 00 00 – Electronic Safety and Security (Division 28)
    - a. 28 0500 – Common Work Results for Electronic Safety and Security
    - b. 26 06 00 – Schedules for Electronic Safety and Security
    - c. 26 08 00 – Commissioning of Electronic Safety and Security
    - d. 28 13 33 – Access Control Interfaces
    - e. 28 16 00 – Intrusion Detection
    - f. 28 23 13 – Video Surveillance Control and Management Systems
    - g. 28 23 16 – Video Surveillance Monitoring and Supervisory Interfaces
    - h. 28 23 23 – Video Surveillance Systems Infrastructure
  - 4. 33 80 00 – Communications Utilities (Division 33)

## **1.02 REFERENCES**

- A. Abbreviations and Acronyms
  - 1. FOV – Field of View
  - 2. LWIR – Long Wavelength Infrared
  - 3. MPEG - Moving Pictures Experts Group
  - 4. NETD - Noise Equivalent Temperature Difference
  
- B. Reference Standards
  - 1. Federal Communications Commission (FCC), Code of Federal Regulations, Title 47, Part 15 Class A
  - 2. EN 55024:1998+A1:2001+A2:2003 Information Technology Equipment (ITE) Immunity
  - 3. International Electrotechnical Commission (IEC) - Ingress Protection Rating IP66
  - 4. National Electrical Manufacturers Association (NEMA) - 4X Enclosure Rating
  - 5. Institute of Electronic and Electrical Engineers (IEEE) 802.3 standard
  - 6. ISO/IEC 14496-2:1999 MPEG-4 video compression standard
  - 7. ISO/IEC 14496-10:2012 H.264 video compression standard
  - 8. Open Network Video Interface Forum (ONVIF)

## **1.03 SUBMITTALS**

- A. Product Data
  - 1. Manufacturer’s printed or electronic data sheets
  - 2. Manufacturer’s installation and operation manuals
  - 3. Warranty documentation
  
- B. Maintenance Materials Submittals
  - 1. Spare parts schedule: type and quantity of recommended spare parts
  - 2. Tools: Schedule of special tools or instruments required to install and calibrate system
  
- C. Shop Drawings and Schematics
  - 1. The thermal video detection system shall be depicted in final proposed “as built” configuration, including equipment interconnections.

## **1.04 QUALITY ASSURANCE**

- A. Qualifications
  - 1. Manufacturer shall have a minimum of five years experience of successful manufacture and installation of systems equivalent in function to the system proposed herein.
  - 2. Installation contractor shall be factory authorized to install, service and maintain the system by the system manufacturer.

## **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Delivery, storage, and handling of the thermal video detection system shall be in accordance with the manufacturer’s recommendations.
  
- B. The manufacturer’s ordering instructions and lead-time requirements shall be followed to avoid delivery and installation delays.
  
- C. The thermal video detection system shall be delivered in the manufacturer’s original, unopened, undamaged container with identification labels intact.
  
- D. Storage and Handling Requirements

1. The thermal video detection system shall be stored in a temperature environment of -40° to +80°C (-40° to +176°F) and protected from mechanical and environmental conditions as designated by the manufacturer.

**1.06 WARRANTY**

- A. Manufacturer shall warrant the thermal video detection system to be free from defects in material or workmanship for a period of at least two years.
- B. Maintenance releases for embedded firmware shall be supported for a minimum of two years.

## **PART 2 PRODUCTS**

### **2.01 EQUIPMENT**

- A. Manufacturer: Senstar Corporation  
119 John Cavanaugh Drive  
Ottawa, Ontario, Canada K0A 1L0  
Phone: (613) 839-5572  
senstar.com
- B. Substitutions: Not Permitted
- C. All units shall be supplied from a single manufacturer

### **2.02 DESCRIPTION**

- A. The thermal video detection system consists of an LWIR imager, HD color imager, built-in video analytics processing, embedded software, IR illumination, and IP66 housing. The system detects targets that violate security rules and specifies their GPS position, provides HD color image details, allowing synchronization with other system elements, including automatically steered pan-tilt-zoom (PTZ) surveillance cameras and video management and situational awareness software packages.
- B. The system provides automated outdoor perimeter and buffer zone intrusion detection, operating in all weather conditions and geographical locations. The system integrates thermal detection, HD color video, video analytics, IR illumination, image stabilization, and advanced image processing, and geo-spatial based object tracking to minimize false and nuisance alarm rates for accurate detection 24 hours/day, in all seasons. Direct processing of video at the imager level provides excellent detection reliability increasing the amount of image data available for processing, reducing nuisance alerts.
- C. The system shall receive infrared energy in the wavelength range of 8 – 14 micron emanating from potential objects of interest within the detection zone of the camera via an un-cooled VOx microbolometer detector.
- D. The system shall process the full dynamic range, 14-bit or more, of digital video from the thermal imager. The system shall have processing power to perform multi-region image contrast enhancement at 15 frames per second.
- E. The system shall automatically adapt to varying outdoor thermal conditions to provide accurate detection, both at night and during the day, including conditions of rain, snow, fog, wind, or humidity.
- F. The system shall use a WDR HD visible light imager to provide detailed color video of the area under surveillance, and to assess alarms detected by the thermal imager.
- G. The system shall have user-controlled illumination to “see” i.e. produce images under low light or zero light conditions. The system shall allow the user to clearly identify images in the total absence of light and produce useful security images day or night.
- H. The system shall utilize Vanadium Oxide (VOx) microbolometer detector technology, and shall not be susceptible to permanent damage after viewing the sun. The system shall not utilize blinders to prevent damage from the sun, but rather the system shall provide uninterrupted video which shall be required for security installations.

- I. The system shall not utilize automatic apertures to protect the image sensor because these mechanisms reduce sensitivity for an extended period of time, thus reducing the system performance which shall not be acceptable for security installations.
- J. The system shall provide athermal optics that automatically adapt to ambient temperature changes, and do not require refocusing.
- K. The system shall provide built in electronic motion stabilization to negate the effects of wind and vibration and allow undiminished operation of the video processor.
- L. The system shall electronically factor out the effects of motion in a background environment of land, sky, or water in order to allow detection of foreign objects.
- M. The system shall provide discrimination of small objects in a background of scene clutter by requiring no more than fifty (50) scene pixels for automatic object detection.
- N. Data security: The system shall be capable of providing data security through AES encryption of system metadata and control information; and authentication (basic and digest log-in). SSL protocol shall be used for trusted external communications to other system devices.
- O. GPS Registration: The system shall use a geo-registration technique to capture the GPS location of detected objects and provide for communication of this information to other system elements providing tracking and display capability.
- P. The system shall provide the following analytic capabilities:
  - 1. Modes: motion zone, multi-mode tripwire, directional zone violation, loitering, to and from zone
  - 2. Target information: height, width, speed, direction, aspect-ratio and absolute GPS position.
- Q. Zone configuration and requirements
  - 1. The system's field of view shall be able to be divided into a collection of independent zones or regions, each with the ability to specify different alert criteria. Zones shall be capable of being designated as alarm or mask types.
  - 2. Each alarm type zone shall be able to be associated with a set of rules that specify more precisely the conditions under which alarms are generated. These rules must allow restricting alarms by time, by tripwire, by previous path, or by target attributes such as the target's size, speed, direction, and shape (aspect ratio).
- R. Zone alarm triggers:
  - 1. Object moving within zone (default)
  - 2. Configuration for response to analytic capabilities described in paragraph 2.02G
  - 3. Multiple trigger per zone capability
- S. Video Compression: The system shall support H.264, MPEG-4 (Simple Profile) and MJPEG compression, dual streaming, up to 15 frames per second.
- T. Data Rate
  - 1. The system shall have the ability for the data to stream at Variable Bit-Rate (VBR) with independent bit-rate settings for detection and non-detection conditions.
  - 2. The system shall allow for configurable bandwidth from 64 kbps to 8 Mbps, supporting satellite, cellular, wireless, and full broadband communication
- U. Ethernet Interface: The system will provide a standard 100 Ethernet interface.
- V. Enclosure: The system shall be housed in an IP66 enclosure.
- W. Lenses: The system shall be available with multiple lens combinations providing acceptable trade-offs of field of view versus detection distance.
- X. The system shall provide an IP network video output.

- Y. The system shall provide the ability to upgrade encrypted firmware to the camera over the network.

### **2.03 PERFORMANCE**

- A. **Detection Reliability:** The system shall reliably detect up to 64 human pedestrian targets in under one second, with each target occupying as few as 50 pixels, anywhere in the field of view, while simultaneously enduring a total physical imager movement of less than 100 pixels (shake from wind gusts, etc.) at a frequency of up to one hertz.
- B. **Object Tracking:** The system shall be able to reliably track 64 objects simultaneously.
- C. **Thermal Detection Quality**
  - 1. **Algorithm -** The system shall use multi-region image contrast enhancement technology to negate the thermal effects that conceal targets that are close to the same temperature as the background scene and to display images as clearly defined discernible shapes throughout the image. The number of regions shall be greater than 10 over the entire image
  - 2. **Processing-** The system shall process the full dynamic range, 14-bit or more, of digital video from the thermal imager. The system shall have processing power to perform multi-region image contrast enhancement at 15 frames per second.
- D. **The Noise Equivalent Temperature Difference (NETD)** is the measure of the smallest object temperature that can be detected by the thermal image imager relative to the system noise. The measurement is usually quantified as a mK value. This is the most common Figure of Merit of a thermal imaging system and a true measurement of the thermal camera's sensitivity. The image sensor shall provide a NETD of <60mK f/1.0.
- E. **Operating temperature range:** The system shall operate in an environment with an ambient temperature range of -30° to +50°C (-22° to +122°F).

### **2.04 SPECIFICATIONS**

- A. **Imaging System**

1. Detector: Un-cooled VOx Microbolometer
    - a. Fixed Size: 12 um
  2. Picture Elements: 320 (H) x 240 (V) or 206 (H) x 156
  3. Lens
  4. Focus Adjustment: Fixed focus
  5. Dynamic Range: 14 bit digital sensor interface
  6. Thermal Sensitivity: <60mK f/1.0
- B. Color Video Imaging System
1. Imager: 2 MP Progressive Scan CMOS
  2. Picture Elements: 1920x1080
  3. Focus Adjustment: Fixed
  4. Dynamic Range: WDR >120db Multiple exposure
- C. Illumination System
1. Illuminators: Dual 850nm LEDs
  2. Illumination distance: 45M for HD236, HD355; 70M for HD220, HD332, HD324
- D. Onboard Video Storage System
1. SD Card Slot: Supports High Endurance microSD card  
Stores both thermal and visible video  
Searchable by time and event  
Video viewable in browser or downloaded in .MP4 export
- E. Illumination distance: 45M for HD236, HD355; 70M for HD220, HD332, HD324
- F. Network
1. Ethernet Compliance
    - a. Wired: IEEE 802.3, 802.3i, 802.3u
  2. Interfaces
    - a. Wired: RJ45
  3. Data Rate: 64 kbps to 8 Mbps
  4. Operating Mode: Full-duplex
  5. Network Protocols: Open Network Video Interface Forum (ONVIF), Internet Protocol (IP), User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Dynamic Host Control Protocol (DHCP), Address Resolution Protocol (ARP), Interior Gateway Management Protocol (IGMP) 3.0, Domain Naming System (DNS), Hypertext Transfer Protocol (HTTP and HTTPS), Real-Time Transport Protocol (RTP), Real-Time Streaming Protocol (RTSP), Network Time Protocol (NTP), Secure Shell (SSH), Secure Socket Layer/Transport Layer Security (SSL/TLS), Service Location Protocol (SLP)
- G. Video Output
1. Compression Types
    - a. H.264– ISO/IEC 14496-10:2012
    - b. MJPEG
  2. Bit Rate Profiles: Variable bit rate (VBR)
  3. Aspect Ratio: 16:9 (Full HD 1080p)
  4. Frame Rate (frames/second): 1, 2, 3, 4, 5, 6, 8, 10, 15



- H. Electrical
  - 1. Power Requirements:
    - a. Thermal and visible imager use only: 8W 24 VAC/DC +/- 10% or PoE 802.11af
    - b. NIR Illumination (if enabled): 6W (24VAC required)
    - c. Window Heater (if enabled): 20W (24VAC required)
    - d. Total power (with all functionality): 34W 24VAC (1.5 amps)
  - 2. Connector (power & data):
    - a. Data (Ethernet) RJ45
    - b. Power Screw down terminal block
    - c. Control leads Screw down terminal block
- I. Mechanical
  - 1. Weight: 2.1 kg (4.6lbs.)
  - 2. Dimensions: 30.7 cm L x 14.7 cm W x 14.0 cm H (12.1" x 5.8" x 5.5")
  - 3. Enclosure: IP66 compliant
  - 4. Mounting: 3 x 1/4-20 UNC bolts
- J. Environmental
  - 1. Operating Temperature: -30° to +50°C (-22° to +122°F)
  - 2. Storage Temperature: -40° to +80°C (-40° to +176°F)
  - 3. Relative Humidity: 0 to 100%
  - 4. Emissions: FCC Part 15, Class A Commercial Class

## 2.05 COMPATIBLE SYSTEM ELEMENTS

- A. Tracking System
  - 1. The system shall be capable of communicating with a tracking system, providing target GPS coordinates to allow PTZ camera positioning unit and continual target tracking.
  - 2. Communication shall be via industry standard XML over a HTTP/HTTPS interface and include real time reports of objects tracked, camera name, serial number, firmware version, GPS position, bearing, and vital operating information.
  - 3. Tracked object parameters shall include current time, alarm state, creation time, GPS position, size, heading, speed, aspect ratio, and alarm zone.
- B. Display System:
  - 1. Display system shall display topological position and field of view of all video detection system units, overlaid on a geo-positioned aerial image of the surveillance area. This aerial image can be in standard image formats (e.g. JPEG)
  - 2. Display system shall plot GPS locations of all security violations overlaid on a geo-located aerial image of the surveillance area in real time via red dot markings.

## 2.06 ACCESSORIES

- A. System Software: GPS target mapping, system configuration and target location display software, shall be available for use with geo-positioned aerial images to display real-time target data.
- C. Mounts and Brackets: Manufacturer shall make available a family of adjustable mounting arm.

## 2.07 SOURCE QUALITY CONTROL

- A. Tests and Inspections
  - 1. A test report shall be submitted to indicate that every device was tested successfully in a factory system test to meet manufacturer's published specifications.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLERS**

- A. Installation should be performed by qualified service personnel only in accordance with the National Electrical Code or applicable local codes.
- B. The Contractor's installers and technicians shall be factory trained and certified to install, service and maintain the system.

#### **3.02 PREPARATION**

- A. Geo-referenced images shall be downloaded from a provider such as Google Earth or equivalent to allow calibration of system coordinates. If not available, the GPS coordinates (latitude, longitude, and altitude) for the upper left and lower right corners, as well as width and height measurements (in meters) of the site shall be recorded.
- B. Alternatively, a web-based calibration process shall be used which employs internal sensors to determine the camera's tilt and yaw for analytic accuracy after the user enters the camera's height off the ground.

#### **3.03 INSTALLATION**

- A. Before permanent installation of the system, the system and interconnected components and cables shall be staged on-site to verify that all are in good working order.
- B. The camera system, when installed, shall be pointed low enough to detect maximum height of the most distant target anticipated and no higher.

Once the camera is in place, it shall be adjusted as necessary to capture the area to be monitored. Fixed cameras shall be manually adjusted

END OF SECTION