

Illustra, the IP camera product line for Security Products, a division of Building Technologies & Solutions for Johnson Controls, is a leading manufacturer and designer of video surveillance products. Security and other industries require a full line-up of cyber secure, high-definition video devices that provide superior low-light, wide dynamic range, low network latency, multiple codecs and streams. The Pro, Flex and Essential family of Illustra IP cameras include PTZ and Fisheye devices, as well as a variety of different form-factor cameras such as Mini-Dome, Bullet, Box and Micro.

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## 2MP IR PTZ OUTDOOR NETWORK IP CAMERA (ISIN-P02Z321-N)

**MasterFormat 2016:**

**28 21 13 IP Cameras**

**Notes to Specifier:**

1. Explanatory notes and comments are presented in **colored** text.



## Notice

Please read this A&E document thoroughly and save it for future use before attempting to specify this unit. The information in this document was current when published. The manufacturer reserves the right to revise and improve its products. All specifications are therefore subject to change without notice.

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**Important Note to Security Systems Specifiers**

CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written using MasterFormat 2016. The following is a guide to the MasterFormat numbers relevant to the product referenced in this specification.

**Primary Specification Area:**

MasterFormat 2016:

- 28 20 00 Video Surveillance
- 28 21 00 Surveillance Cameras
- 28 21 13 IP Cameras

**Related Requirements:**

MasterFormat 2016:

Division 27 Communications

- 27 20 00 Data Communications
- 27 21 00 Data Communications Network Equipment
- 27 21 29 Data Communications Switches and Hubs

Division 28 Electronic Safety and Security

- 28 05 00 Common Work Results
- 28 05 07.13 Power Sources for Video Surveillance
- 28 05 07.21 PoE Power Sources for Electronic Safety and Security
- 28 05 11 Cyber Security Requirements for Electronic Safety and Security
- 28 05 19.13 Hybrid Digital Video Recorders
- 28 05 19.15 Network Video Recorders
- 28 05 33 Safety and Security Network Communications Equipment
- 28 06 20 Schedules for Video Surveillance
- 28 21 19 Camera Mounts
- 28 23 00 Video Management System

## 2MP IR PTZ OUTDOOR NETWORK IP CAMERA

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section includes a True Day/Night Smart/Adaptive IR 2MP imager network IP Outdoor vandal PTZ camera with single RJ-45 port for HD quality images, 22x optical zoom power, True WDR for superior low-light performance, and high-sensitivity low-noise CMOS progressive sensor.
- B. Product: A NVT complaint ONVIF Profile S, G, T, standard high-speed Pan/Tilt/Zoom camera powered by PoE 802.3at PoE+ Type 2 (30w) or 24VAC.
- C. Related Requirements

Refer to MasterFormat notes at the beginning of this document to select requirements specific to the MasterFormat version being used in the specification.

#### 1.02 REFERENCES

- A. Abbreviations
  - 1. 2D/3D DNR 2-Dimensional / 3-Dimensional Digital Noise Reduction
  - 2. 2MP Two MegaPixel (2,000,000 pixels)
  - 3. AEC Automatic Exposure Control
  - 4. ARP Address Resolution Protocol
  - 5. B/W Black and White
  - 6. BNC Bayonet Neill Concelman connector
  - 7. CAT5 Category 5 twisted pair Ethernet cable
  - 8. CAT5E Category 5 Enhanced twisted pair Ethernet cable
  - 9. CAT6 Category 6 twisted pair Ethernet cable
  - 10. CBR Constant Bit Rate
  - 11. CMOS Complementary Metal-Oxide Semiconductor image sensor
  - 12. CVBR Constrained Variable Bit Rate
  - 13. CCTV Closed-Circuit Television (aka Video Surveillance)
  - 14. DHCP Dynamic Host Configuration Protocol
  - 15. DNS Domain Name System
  - 16. DDNS Dynamic Domain Name System
  - 17. DOF Depth of Field
  - 18. EAP-TLS Extensible Authentication Protocol Transport Layer Security
  - 19. EAPoL Extensible Authentication Protocol over LAN
  - 20. FE Fisheye

21. FOV	Field of View
22. FPS	Frames per Second (same as Images per Second)
23. FTP	File Transfer Protocol
24. GB	Giga Bytes
25. GbE	Gigabit Ethernet
26. H.264	MPEG-4 Part 10, Advanced video compression format standard
27. H.265	MPEG-H Part 2, HEVC video compression format standard
28. HD	High Definition
29. HEVC	High Efficient Video Coding
30. HTTP	Hypertext Transfer Protocol
31. HTTPS	Hypertext Transfer Protocol Secure
32. iAPI3	Illustra Application Programming Interface (version 3.x)
33. ICMP	Internet Control Message Protocol
34. ICR	Infrared Cut-filter Removal
35. IETF NTP	Internet Engineering Task Force for Network Time Protocol working group
36. IGMP	Internet Group Management Protocol
37. IK07	Impact Protection (07 = Impact Proof from 40 cm height and 2 joules)
38. IK10	Impact Protection (10 = Impact Proof from 40 cm height and 20 joules)
39. IntelliZip	Illustra enhanced image and bandwidth compression for H.264 & H.265
40. IP	Internet Protocol
41. IP66	Ingress Protection (66 = Dust-Tight and Low Water Pressure)
42. IP67	Ingress Protection (67 = Dust-Tight and Immersion up to 3 feet / 1 meter)
43. IPS	Images per Second (same as Frames per Second)
44. IPv4	Internet Protocol Version 4 (32-bit addresses)
45. IPv6	Internet Protocol Version 6 (128-bit addresses)
46. IR	Infrared
47. LAN	Local Area Network
48. LLDP	Link Layer Discovery Protocol
49. Mbps	Megabits per second (10 or 100 or 1,000)
50. MB	Mega Bytes
51. MD	Mini-Dome form-factor
52. mDNS	Multicast DNS
53. Micro SDXC	Onboard Storage Media Type
54. MJPEG	Motion JPEG video compression format standard
55. mm	Millimeter
56. nm	Nanometer

57. n/a	Not Applicable
58. NR	Noise Reduction
59. NTP	Network Time Protocol
60. NVT	Network Video Transmitter
61. ONVIF	Open Network Video Interface Forum
62. PEAP	Protected Extensible Authentication Protocol
63. PoE	Power over Ethernet standard
64. PoE+	Power over Ethernet Plus standard
65. PPPoE	Point-to-Point Protocol over Ethernet
66. PoE Ultra	Power over Ethernet Ultra
67. PTZ	Pan-Tilt-Zoom optical functionality
68. QoS	Quality of Service
69. ROI	Region of Interest
70. RTCP	RTP Control Protocol
71. RTP	Real-Time Transport Protocol
72. RTSP	Real Time Streaming Protocol
73. SDN	Soft Day/Night
74. SFTP	Secure File Transfer Protocol
75. SMTP	Simple Mail Transfer Protocol
76. SNMP	Simple Network Management Protocol
77. SOAP	Simple Object Access Protocol
78. SSH	Secure Shell protocol
79. SSL	Secure Socket Layer encryption cryptographic protocol
80. TCP/IP	Transmission Control Protocol / Internet Protocol
81. TDN	True Day/Night
82. TLS	Transport Layer Security cryptographic protocol
83. UDP	User Datagram Protocol
84. UPnP	Universal Plus and Play
85. VBR	Variable Bit Rate
86. WAN	Wide Area Network
87. WDR	Wide Dynamic Range
88. WS	Web Services Dynamic Discovery
89. Zeroconf	Zero-configuration networking

## B. Reference Standards

### 1. Safety Standards:

- a. EN 60950-1 – Information Technology Equipment

- b. CSA 22.2 No. 60950 – Information Technology Equipment
- c. IEC 60950-1 – Information Technology Equipment
- 2. Emissions Standards:
  - a. FCC Part 15 Class A – Commercial or Industrial Use
  - b. EN55032 Class A – Information Technology Equipment
- 3. IEEE Standards:
  - a. 802.1x Port-based Network Access Control provides authentication mechanism
  - b. 802.3: Ethernet standard that specifies physical media and working characteristics of Ethernet.
  - c. 802.3af: PoE (Power over Ethernet) standard that provides 12.95 watts (maximum 15.40 watts and 250 mA current) of electrical current over a compliant Ethernet cable (CAT5e or CAT6) as an alternative power source to 24VAC power input for operating the device.
  - d. 802.3at: PoE+ (Power over Ethernet Plus) standard that provides 25.50 watts (maximum 30.00 watts and 600 mA current) of electrical current over a compliant Ethernet cable (CAT5e or CAT6) as an alternative power source to 24VAC power input for operating the device.
  - e. 802.3bt: PoE Ultra (Power over Ethernet Ultra) standard that provides 60.00 watts of electrical current over a compliant Ethernet cable (CAT5e or CAT6) as an alternative power source to 24VAC power input for operating the device.
- 4. Immunity Standards:
  - a. EN61000-6-1
  - b. EN50130-4
- 5. Safety:
  - a. IEC 60950-1/62368/60950-22;
  - b. CSA 22.2 No. 60950/62368;
  - c. CE: EN60950-1 / EN62368 / EN60950-22;
  - d. UL 50 (Type 4X);
  - e. EN60529 (IP66/67)
  - f. IS 9000 (Part 7/Sec 7): 2020 (IK10)
- 6. NDAA: Yes

## A. Definitions

Pan-Tilt-Zoom (PTZ) – A camera with an elongated dome form-factor enclosure that provides the capability for remote directional and optical control. It can mechanically pan (left and right 360-degrees continuously), tilt (upwards and downwards) and zoom (view closer in and farther away up to 22X optically and 12x digitally) its lens to maintain visual contact of objects within its field-of-view.

## 1.03 SUBMITTALS

### A. Product Data

- 1. Manufacturer's printed or electronic data sheets

2. Manufacturer's installation and operation manuals
3. Manufacturer's release notes, application notes, and/or technical bulletins

## **1.04 QUALIFICATIONS**

- A. Manufacturer shall be ISO 9001:2008 certified and a reputable Fortune 100 company with a minimum of 20 years' experience in manufacturing for in the security industry.
- B. Contractor shall provide a competent trainer who has extensive experience with the installed systems and in delivering training to provide the instruction. As an alternative, the Contractor may propose the use of factory training personnel for onsite Professional Services.

## **1.05 WARRANTY**

- A. Manufacturer shall provide a limited 3-year warranty for the device to be free of defects in material and workmanship.

END OF SECTION



## PART 2 PRODUCTS

### 2.01 EQUIPMENT

A. Manufacturer:

TYCO SAFETY PRODUCTS INDIA PRIVATE LIMITED  
 ANTARIKSH LOGIDROME, BLDG. NO.B-4, PADGHA-KALYANROAD,  
 NEAR VASHERE PETROL PUMP, MUMBAI - NASHIKHIGHWAY,  
 AT POST -AMANE, BHIWANDI, DIST. THANE - 421302,MAHARASHTRA, INDIA.  
 Phone: +91-020-66067100  
 Email: [bts-india-tspmarketing@jci.com](mailto:bts-india-tspmarketing@jci.com)  
 Web: [www.tycosecurityproducts.in](http://www.tycosecurityproducts.in)

B. Model: ISIN-P02Z321-N

C. Alternatives:

### 2.02 DESCRIPTION

A. The network IP camera shall:

1. Built-in web server
2. Support multiple streams, up to 1920x1080 resolution
3. Progressive scan imager
4. High speed Pan/Tilt/Zoom
5. Onboard storage for local recording
6. IP67 rated
7. Complies with ONVIF Profile S, G, T
8. Capable of integration with network recording systems which support ONVIF Profiles S
9. Capable of operation as a standalone device on the network

B. Functions

Motion detection	1 Full screen zone
Face detection	Full image ROI with Highlight Faces Option
Tamper AI Detection:	Blackout, Whiteout, scene change (FoV tamper)
Events	Basic Event: Motion detection, video tampering, alarm input and output Smart Event: Line Crossing detection, intrusion detection, region entrance detection, region exiting detection, unattended baggage detection, object removal detection, audio exception detection
Smart Defog	Digital Defog
WDR	True WDR (120dB)
Local storage	Micro SD Card
Enhanced Security	Enhanced Security Feature Provides: One-Click Security Hardening, User Access Log, Validates Complex Credentials, Disables Unused Protocols; Encrypted SD card, Video Over HTTPS
Exposure Profiles	Auto, Outdoor, Indoor, Gaming, Shutter Priority, Iris Priority, Manual, LPR High/Medium/Low
Intelligent Guard Tour	Person tracking and vehicle tracking

1. Video Compression

- a. H.265
- b. H.264 (default)
- c. MJPEG
2. Standards: ONVIF Profile S G T
3. Web Browser access:
  - a. Microsoft Edge
  - b. Google Chrome
  - c. Mozilla Firefox
  - d. Apple Safari
4. Streaming methods for audio, video and metadata:
  - a. Unicast
  - b. Multicast
5. Streaming Mode:
  - a. Standard – legacy Stream capability
6. 8MP resolution camera shall support up to 4 streams with the following resolution options with maximum fps dependent on resolution:
  - a. Stream 1
    - H.265, H.265+, H.264, H.264+
    - a) Maximum of 60 ips @ 1920x1080 without True WDR
    - b) Maximum of 30 ips @ 1920x1080 with True WDR
  - b. Stream 2
    - H.265, H.265+, H.264, H.264+, MJPEG
    - a) Maximum of 30 ips @ D1 with/without True WDR
    - b) Maximum of 15 ips @ 1920x108 (DualFullHDmode) 1280x720 (Standard) with True WDR3x
    - MJPEG
    - a) Maximum of 30 ips @ 1920x108 (DualFullHDmode) 1280x720 (Standard) with/without True WDR
    - b) Maximum of 15 ips @ 1920x108 (DualFullHDmode) 1280x720 (Standard) with TWDR3x
  - c. Stream 3
    - H.265, H.265+, H.264, H.264+
    - a) Maximum of 30 ips @ 1920x1080 with/without True WDR
    - MJPEG
    - a) Maximum of 30 ips @ 1920x1080 with/without True WDR

*Note to specifier: See attached tables for full list of resolutions.*

C. Cyber Security and Authentication:

1. Enhanced Security:
    - a. HTTPS encryption
    - b. Disabling Unused Protocols
    - c. User Access Log for Cyber Audit Trail
    - d. Validate Complex Credentials
    - e. Encrypted SD card
  2. IEEE 802.1x:
    - a. EAP-TLS – RFC 5216
    - b. EAP-LEAP
    - c. EAP-MD5
  3. HTTPS Encryption (HTTP over TLS) – RFC2818
  4. IP Address Filtering
  5. Multi-Level Password Protection
  6. TLS – RFC5246 v1.2, v1.3
  7. WS-Security
- D. Camera Characteristics:
1. Onboard Storage: (Not Included)
    - a. Type: Micro SDXC Card
    - b. Speed: Class 10 or higher
    - c. Capacity: Maximum of 256 GB
    - d. Encryption
  2. Memory:
    - a. ROM/Flash: 1 GB
    - b. RAM: 2 GB
  3. Video Codec Settings:
    - a. H.265 and H.265+
      - 1) High & Main & Basic Profile
      - 2) GOP Range: 1 to 400 (default 25)
      - 3) Bit Rate Methods: CBR, VBR (default VBR)
      - 4) VBR Quality: Lowest, Lower, Low, Medium, Higher, Highest (default Medium)
      - 5) Video Bit Rates: 32 to 16,384 (default 4,096)
    - b. H.264 and H.264 IntelliZip
      - 1) High & Main & Basic Profile
      - 2) GOP Range: 1 to 400 (default 25)
      - 3) Bit Rate Methods: CBR, VBR (default VBR)
      - 4) VBR Quality: Lowest, Lower, Low, Medium, Higher, Highest (default Medium)

- 5) Video Bit Rates: 32 to 16,384 (default 4,096)
- c. MJPEG
  - 1) Quality: Lowest, Lower, Low, Medium, Higher, Highest (default Medium)
- 4. Audio Settings:
  - a. Standard: G.711 mu-law
  - b. Sampling Rate: 8 KHz
  - c. Sampling Rate: 16 bit
  - d. Frequency Response Range: 100 to 3,600 Hz
  - e. Inputs:
    - 1) Choice of Line in & Built in Microphone
    - 2) Connector Type: Terminal Block
    - 3) Impedance: 20K ohms/attenuation = 0 dB
    - 4) Maximum level: 2Vp-p
  - f. Outputs:
    - 1) Connector Type: Terminal Block
    - 2) Impedance: High
    - 3) Maximum level: 2Vp-p
- 5. Imager: 1/ 2.8" CMOS progressive
- 6. Lens:
  - a) Format: 1/2.8"
  - b) Design: 1 Aspheric glass lens
  - c) Focal Length range: 4.8 -153.0mm
  - d) Aperture Range: F/1.6 (Wide) ~ F/22 (Telephoto)
  - e) 32X optical and 16X digital
  - f) Focus Type:
    - 1) Continuous Auto Focus
    - 2) Manual focus adjustments
  - g) Iris Type: DC-Iris
  - h) Day/Night: True D/N with ICR
  - i) View Angles:
    - 1) Horizontal: 50.8° (Wide) and 2.6° (Telephoto)
    - 2) Vertical: 29.4° (Wide) and 1.5° (Telephoto)
    - 3) Diagonal: 57.4° (Wide) and 3° (Telephoto)
- 7. PTZ
  - a) Rotation:
    - 1) Pan Range: 360° continuous, no end stop

- 2) Tilt Range:  $-15^{\circ} \sim +90^{\circ}$  (auto flip)
  - b) Manual Continuous Speed  $< 0.1^{\circ}$  to  $160^{\circ}/s$  scaled in proportion to zoom position
  - c) Presets
    - a. Total:300
    - b. Preset Accuracy  $< 0.1$  degree
    - c. Preset Speed  $240^{\circ}/sec.$
  - d) Sequences: 96
  - e) Pattern: 4
  - f) Home Function Yes
  - g) Auto Flip
  - h) Image Stabilization: EIS
8. Video Imaging
- a. AE Weighting Methods:
    - 1) Auto
    - 2) Manual
    - 3) Iris Priority
    - 4) Shutter Priority
  - b. Shutter Speed
    - 1)  $1/30,000$  to  $1/1$  sec

*Note to specifier: See attached tables for full list of shutter speed.*
  - c. Exposure:
    - 1) Profile: Auto, Manual, Shutter Priority, Iris Priority
    - 2) Compensation Offset Range:  $-7$  to  $+7$  F-Stops (default 3)
    - 3) Minimum Exposure:  $1/30,000$  sec (default)
    - 4) Maximum Exposure:  $1/25$  sec ( $1/25$  default)
    - 5) Frequency: 50Hz or 60Hz (default 50 Hz)
  - d. White Balance:
    - 1) Auto Normal
    - 2) MWB
    - 3) Locked WB
    - 4) Outdoor
    - 5) Indoor
    - 6) Fluorescent Lamp
    - 7) Sodium Lamp
    - 8) ATW
  - e. Wide Dynamic Range Methods:
    - 1) True WDR
  - f. Noise Reduction:

- 1) Mode: Normal, OFF, Expert
- 2) 2D DNR Low Pass Filter
- 3) 3D DNR Adjacent Frame Filter
- g. Minimum Illumination:
  - A. Clear Bubble
    - 1) Color: 0.005 Lux
    - 2) B/W: 0.001 Lux
9. Privacy Zones: 24 programmable polygon privacy masks, mask color or mosaic configurable
10. ROI: 8 fixed regions for each stream
11. Event Alarms:
  - a. Triggers:
    - 1) Alarm Input: Max 6V (High) and 0.6V (Low)
    - 2) Analytics Detection
    - 3) Network Loss
    - 4) IP Address Conflicted
    - 5) HDD Full/Error
    - 6) Periodic events
  - b. Actions:
    - 1) Send Email
    - 2) Auxiliary Output: Relay 30V (Peak AC) / 1A
    - 3) Smart Tracking
    - 4) Upload to FTP/Memory Card/NAS
    - 5) Flashing Alarm
    - 6) Audible Warning
12. I/O Interfaces:
  - a. Alarm Input/Output: 2/1
  - b. Audio Input/Output: 1/1
  - c. Reset/Reboot: 1 Recessed Push Button
  - d. Built-in Speaker
13. Menu Languages:
  - a. English (US) (Default)

*Note to specifier: See attached tables for full list of menu languages.*
14. User Accounts:
  - a. Administrator
  - b. Operator
  - c. User

15. Text Overlay:
  - a. Camera Name
  - b. Date Time
  - c. User Defined Text
  - d. 4 Display Modes
  - e. Text size (Auto, 16x16, 32x32, 48x48, 64x64)
- E. Electrical Characteristics:
  1. Input Voltage options:
    - a. PoE Ultra IEEE 802.3bt Type 4 (90W)
    - b. 24VAC
- F. Network Characteristics:
  1. Ethernet interface: 10/100 Mbps Ethernet
  2. Ethernet port: Single Copper RJ-45
  3. Management
    - a. Remote configuration and management via web browser of the following:
      - 1) System Status
      - 2) IP Address Settings
      - 3) TLS Encryption
      - 4) Password Protected User Levels
      - 5) System Log
      - 6) Device Name
      - 7) Firmware Upgrade
    - b. Remote configuration and management via Illustra Connect of the following:
      - 1) Device Information (Device Name, Hostname, IP Address, Model Name, Product Code, Manufacturer, Firmware Version, Status, MAC Address)
      - 2) Discovery
      - 3) (IPv4, IPv6 or both; ONVIF, CGI IP Address or all 3)
      - 4) Snapshot
      - 5) Configure Network/Users/Date-Time (Single or Bulk)
      - 6) IP Address Settings
      - 7) Firmware Upgrade (Single or Bulk)
      - 8) Access Web Server
      - 9) Device Management (Reset or Reboot)
  4. Base Protocol: TCP/IP – RFC4614
  5. Communication Protocol: IGMP
  6. Discovery Methods:

- a. mDNS Discovery Zeroconf
- b. UPnP
- c. WS-Discovery
- 7. Email:
  - a. SMTP – RFC5321
  - b. Authenticated SMTP – RFC4954
- 8. External Interface Protocol:
  - a. ONVIF Profile S G T
  - b. SOAP
  - c. WS-Addressing
  - d. WS-Eventing
- 9. File Transfer:
  - a. FTP
- 10. Network Address Configurations:
  - a. DHCP – RFC2131
  - b. IPv4 – RFC791
  - c. IPv6 – RFC2460
  - d. Static IP
  - e. Zeroconf – RFC3927
- 11. Network Layer: ICMP
- 12. Network Management: SNMP v2c / v3
- 13. Network Name Resolution:
  - a. DNS – RFC5395
  - b. DDNS – RFC2136
- 14. Streaming Methods:
  - a. RTP – RFC3550
  - b. RTCP – RFC3550
  - c. RTSP – RFC2326
  - d. Unicast
  - e. Multicast – RFC1112 Level 1
- 15. Time Synchronization:
  - a. NTP – RFC1305
  - b. Poll Rate: 1 per minute
- 16. Transport Layers:
  - a. TCP – RFC973
  - b. UDP – RFC768



G. Physical:

1. Dimensions (WxD): Ø 220mm (8.66 in), 363.3 mm body height (13.91 in),
2. Weight: Approximately 5kg (11.03 lbs.)
3. Vandal Rating: IK10 (housing)
4. Installation Type: Outdoor
5. Materials:
  - a. Housing: Aluminum Alloy
  - b. Bubble Trim ring: Aluminum Alloy
  - c. Other housing material: PC

H. Environmental:

1. Operating Temperature: -30°C to 65°C (-22°F to 149°F)
2. Storage Temperature: -40°C to 65°C (-40°F to 149°F)
3. Relative Humidity: Up to 90% non-condensing

END OF SECTION

## **PART 3 EXECUTION**

### **3.01 INSTALLERS**

- A. Contractor shall comply with all applicable state and local licensing requirements.
- B. Contractor shall demonstrate network and CCTV knowledge to the satisfaction of the Owner's representative.

### **3.02 EXAMINATION**

- A. Submission of a proposal confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
- B. The site shall be visited on a regular basis to appraise ongoing progress of other trades and contractors, make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.
- C. Inspect systems before installation for cosmetic defects or damage.

### **3.03 PREPARATION**

- A. Prior to installation, the camera device and network shall be configured and tested to meet the specified requirements in accordance with the manufacturer's instructions.

### **3.04 INSTALLATION**

- A. Contractor shall follow all Manufacturer's published installation guidelines for installing, programming and testing of the camera.
- B. In order to ensure a complete, functional camera, for bidding purposes, where information is not available from the Owner upon request, the worst-case condition shall be assumed.
- C. Camera placement, pointing position, and configurations shall be coordinated with the Owner's representative, where appropriate.
- D. All necessary back boxes, racks, connectors, supports, conduit, cable, and wire must be furnished and installed to provide a complete and reliable camera installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the Owner for approval in advance of any installation.
- E. All conduit, cable, and wire shall be installed parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered and tied up to create an orderly installation.
- F. The vandal-resistant network IP camera shall be installed within an indoor or outdoor environment and ceiling or wall mounted methods using provided or optional mounting accessory.
- G. Contractor ensures that the installed product contains the latest revision of Manufacturer's firmware.
- H. When the camera is part of a larger security system, the camera vendor must also be able to offer Professional Services that would deploy trained personnel to assist with the installation and programming of the camera.

## 3.05 TESTING AND CERTIFICATION

- A. Contractor shall demonstrate the functionality of the camera upon completion of installation, documenting the result of all tests and providing these results to the Owner.
- B. Contractor shall provide the necessary blank forms with instructions to fill in all the required data information that shall make up the information for the installed camera devices (location, installation position, make, model, IP address, username, password, image settings).
- C. Upon satisfactory on line operation of the camera devices, the entire installation including all subsystems shall be inspected. Contractor shall perform all tests, furnish all test equipment and consumable supplies necessary and perform any work as required to establish performance levels for the system in accordance with the specifications. Each device shall be tested as a working component of the completed system. All system controls shall be inspected for proper operation and response.
- D. Tests shall demonstrate the response time and display format of each different type of input sensor and output control device. Response time shall be measured with the system functioning at full capacity. Computer operation shall be tested with the complete data file.
- E. Contractor shall maintain a complete log of all inspections and tests. Upon final completion of system tests, a copy of the log records shall be submitted as part of the as-built documentation along with a letter of certification to indicate that the tests have been performed, and all devices are operational.
- F. The system test shall be witnessed by the Authority Having Jurisdiction. Any deficiencies noted during the testing must be corrected.
- G. A letter of certification shall be provided to indicate that the tests have been performed, and all devices are operational.
- H. The Owner's representative shall accept the system.

## 3.06 MAINTENANCE

- A. Preventative Maintenance Agreement during Warranty: As a separate price item, the Contractor shall provide preventative maintenance during the warranty period. Maintenance shall include, but not be limited to:
  - 1. Labor and materials, at no additional cost, to troubleshoot the camera devices.
  - 2. Labor and materials, at no additional cost, to provide test and adjustments to the camera devices.
  - 3. Regular inspections
- B. Preventative Maintenance Agreement: As a separate price item, the Contractor shall provide a complete Maintenance Agreement for a period of 12 months after the conclusion of the warranty period. The Maintenance Agreement shall include, but not be limited to:
  - 1. Labor and materials, at no additional cost, to troubleshoot the camera devices.
  - 2. Camera devices.
  - 3. Labor and materials, at no additional cost, to provide test and adjustments to the camera devices.
  - 4. Regular inspections.

### 3.07 STORAGE

A. The product shall be stored in an environment consistent within the Manufacturer’s published environmental ratings.

### 3.08 ATTACHED TABLES

4. Table 1: Resolutions when Stream 1, Stream 2 and Stream 3

		Resolution	Description	Max FPS	
				TWDR Off	TWDR
Stream 1	h.264, h.265, h264+, h265+,	1920 x 1080	(1080p) 16:9	60	30
		1280 x 960	4:3	60	30
		1280 x 720	(720p) 16:9	60	30
Stream 2	h.264, h.265, h264+, h265+, MJPEG	704 x 480(60Hz) 704 x 576(50Hz)		30	30
		640 x 480	4:3	30	30
		352 x 240(60Hz) 352 x 288(50Hz)		30	30
Stream 3	h.264, h.265, h264+, h265+, MJPEG	1920 x 1080	16:9	30	30
		1280 x 960	16:9	30	30
		1280 x 720	16:9	30	30
		704 x 480(60Hz) 704 x 576(50Hz)		30	30
		640 x 480	4:3	30	30
		352 x 240(60Hz) 352 x 288(50Hz)		30	30

**Notes**

A maximum of 3 concurrent streams are supported by each camera.

A. Table 2: Shutter Speeds

Shutter Speeds				
1/30,000 sec	1/1,750 sec	1/300 sec	1/150 sec	1/25 sec
1/10,000 sec	1/1,250 sec	1/250 sec	1/120 sec	
1/6,000 sec	1/1,000 sec	1/225 sec	1/100 sec	
1/3,500 sec	1/600 sec	1/200 sec	1/75 sec	
1/2,500 sec	1/425 sec	1/175 sec	1/50 sec	

B. Table 3: Menu Languages

Menu Languages			
Arabic	Dutch	Japanese	Spanish
Czech	English (US)	Korean	Turkish
Chinese (Simplified)	French	Polish	Vietnamese
Chinese (Traditional)	German	Portuguese	
Danish	Italian	Russian	

*Table 4 – Menu Languages (Default = English US)*

END OF SECTION