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**Product Guide Specification**

**SECTION 28 23 29  
VIDEO SURVEILLANCE REMOTE DEVICES AND SENSORS**

**BOSCH MIC IP fusion 9000i**

**PART 1 – GENERAL**

**1.1 SUMMARY**

**1.A. Related Sections**

- 1.A.1. [Section 28 23 13 – Video Surveillance Control and Management Systems.]
- 1.A.2. [Section 28 23 16 – Video Surveillance Monitoring and Supervisory Interfaces.]
- 1.A.3. [Section 28 23 19 – Digital Video Recorders and Analog Recording Devices.]
- 1.A.4. [Section 28 23 23 – Video Surveillance Systems Infrastructure.]

\*\*\*\*\*Specifier's note: Include those standards referenced elsewhere in this SECTION.

## 1.2 REFERENCES

### 2.A. General Product Safety compliance

- 2.A.1. CE Product Safety regulations
- 2.A.2. EN Product Safety standards
- 2.A.3. Underwriters Laboratories standard UL 60950-1 Ed.2.
- 2.A.4. Underwriters Laboratories standard UL 62368-1.
- 2.A.5. IEC 60950-1, Ed.2. -- General safety requirements
- 2.A.6. IEC 62368-1 – Safety
- 2.A.7. IEC 60950-22 – Safety, equipment to be installed outdoors
- 2.A.8. Directive 2014/35/EU -- Low Voltage Directive (LVD)
- 2.A.9. EN 60950-1 -- ITE Product Safety
- 2.A.10. EN 62368-1 – Safety
- 2.A.11. CAN/CSA-C22.2 No.E60950-1B-07

### 2.B. International Electrotechnical Commission (IEC) compliance:

- 2.B.1. IEC 60068-2-1, edition 6.0 – Cold operational and Cold Endurance/Storage
- 2.B.2. IEC 60068-2-2, edition 5.0 – Dry Heat operational and Dry Heat Endurance/Storage
- 2.B.3. IEC 60068-2-30 – Humidity
- 2.B.4. IEC 60529, edition 2.2 – Ingress (IPxx)
- 2.B.5. IEC 62262, edition 1.0 -- Impact rating
- 2.B.6. IEC 60068-2-27, edition 4.0 – Shock
- 2.B.7. IEC 60068-2-6, edition 7.0 -- Sinusoidal Vibration

### 2.C. European Norm compliance

- 2.C.1. Directive 2014/30/EU -- EMC
- 2.C.2. EN 50121-4 -- Railway Applications, Electromagnetic Compatibility: Emission and Immunity of the Signaling and Telecommunications Apparatus (for equipment outside the 3 meter zone).
- 2.C.3. EN 50130-4 – EMC tests
  - 2.C.3.a. EN 61000-4-2 – ESD Susceptibility
  - 2.C.3.b. EN 61000-4-3 – Radiated electromagnetic fields
  - 2.C.3.c. EN 61000-4-4 – Electrical Fast Transient (EFT) Burst
  - 2.C.3.d. EN 61000-4-5 – Surge
  - 2.C.3.e. EN 61000-4-6 – Conducted Immunity
  - 2.C.3.f. EN 61000-4-8 – Power-Frequency Magnetic Fields
  - 2.C.3.g. EN 61000-4-11 – Voltage Dip and Short Interruption
- 2.C.4. EN 50130-5 Alarm systems Part 5: Dust tightness test method
- 2.C.5. EN 55032 – Radiated and Conducted Emissions
- 2.C.6. EN 61000-3-2 – Mains Harmonic Current Emissions
- 2.C.7. EN 61000-3-3 – Mains Voltage fluctuations and flicker
- 2.C.8. EN 62368-1 – Audio/Video safety
- 2.C.9. EN 60950-22 – Outdoor rating
- 2.C.10. EN 50132-7, scope A – DORI  
(detection/observation/recondition/identification)

- 2.C.11. EN 50581 – Restriction of Hazardous Substances (RoHS) directive, 2011/65/EU
- 2.D. USA Federal Communications Commission (FCC) Compliance
  - 2.D.1. Complies with FCC 47 CFR Part 15, Subpart B, Class A.
- 2.E. Canadian Standards Compliance
  - 2.E.1. Complies with Canada ICES-003 regulations.
- 2.F. Australian/New Zealand Standards Compliance
  - 2.F.1. AS/NZS CISPR 32 Radiated & Conducted Emissions (RMC)
- 2.G. China Standards Compliance
  - 2.G.1. China environmental import requirements
- 2.H. USA Mil-Std compliance
  - 2.H.1. Mil-Std-167-1A -- Sinusoidal Vibration
  - 2.H.2. Mil-Std-810-G, 501.5 – High Temperature
  - 2.H.3. Mil-Std-810-G, 502.5 – Low Temperature
  - 2.H.4. Mil-Std-810-G, 503.5 – Temperature Shock
  - 2.H.5. Mil-Std-810-G, 505.5 – Solar Radiation
  - 2.H.6. Mil-Std-810-G, 506.5 – Rain
  - 2.H.7. Mil-Std-810-G, 509.5 – Salt Fog
  - 2.H.8. Mil-Std-810-G, 510.5 – Sand and Dust
- 2.I. Other Environmental compliance ratings
  - 2.I.1. Underwriters Laboratories standard UL50E – Ingress, (UL) Type 6P
  - 2.I.2. Cold Start-up Temperature: -40°C (-40°F); (Requires 60-minute warm-up prior to PTZ operations at reduced max speed; Operate autopan for an additional 10 minutes to achieve full pan speeds.)
  - 2.I.3. Corrosion resistance -- ASTM B117-97, Salt spray, 2000 hrs.
  - 2.I.4. Wind loading rating:
    - 2.I.4.a. 193 kph (120 mph) (sustained)
    - 2.I.4.b. 241 kph (150 mph) (gusts)
  - 2.I.5. ASTM D 3359 -- Paint Adhesion, method B, Cross-hatch
  - 2.I.6. International Safe Transit Association (ISTA) procedure – Drop test per ISTA-2A
- 2.J. HD Standards Compliance
  - 2.J.1. SMPTE 274M-2008 Standard in:
    - 2.J.1.a. Resolution: 1920x1080
    - 2.J.1.b. Scan: Progressive
    - 2.J.1.c. Color representation: complies with ITU-R BT.709
    - 2.J.1.d. Aspect ratio: 16:9
    - 2.J.1.e. Frame rate: 25, 30, 50 and 60 frames/s
  - 2.J.2. 296M-2001 Standard in:
    - 2.J.2.a. Resolution: 1280x720
    - 2.J.2.b. Scan: Progressive

- 2.J.2.c. Color representation: complies with ITU-R BT.709
- 2.J.2.d. Aspect ratio: 16:9
- 2.J.2.e. Frame rate: 25, 30, 50 and 60 frames/s

2.K. International Organization for Standardization (ISO)

- 2.K.1. ISO 9001 & ISO 14001– Quality System.

2.L. Other

- 2.L.1. Highly Accelerated Life Testing (HALT) -- Voltage, Temperature, and Vibration conditions, per Bosch guidelines
- 2.L.2. 24VAC power source – Able to be powered using nominal 24VAC power source
- 2.L.3. High PoE power source – Able to be powered using 95W High Power over Ethernet power source when connected to network cable (CAT5E/6) having <=100m length
- 2.L.4. Redundant power source – Able to be powered using both 24VAC and High PoE providing a redundant power source operating mode
- 2.L.5. Audible Noise – Meets <65dB average noise during pan/tilt operations
- 2.L.6. Video latency – Meet <200ms video latency limit (end-to-end video signal)
- 2.L.7. Control latency – Meet <50ms control latency limit (command received to motor start)
- 2.L.8. NEMA TS2, Sections 2.2.27 – Transients, Temperature, Voltage, and Humidity
- 2.L.9. NEMA TS2, Sections 2.2.28 – Vibration
- 2.L.10. NEMA TS2, Sections 2.2.29 – Shock (Impact)
- 2.L.11. Open Network Video Interface Forum (ONVIF) Profile S, Profile G, and Profile M.
- 2.L.12. NTCIP protocols – Conformant with protocols 1205, 2301, 1101:1996, 2202:2001, 2101:2001, 2102:2003 (Requires optional license; Not available in all regions)
- 2.L.13. Serial protocol compatibility – Accepts Bosch OSRD, Pelco P/D, Forward Vision, Cohu
- 2.L.14. Window defrosting – Able to melt up to 3.1mm (1/8”) ice build-up at -20 °C, under calm winds <3.2kph (<2mph); Applies to both visible and thermal windows
- 2.L.15. Wiper Blade – Meets >200,000 wipe cycles
- 2.L.16. Thermal IC temperature derating guidelines – Per Bosch standard at +65 °C, with and without chamber airflow
- 2.L.17. Window Condensation – Room temperature down to -40 °C at rate of 5 °C per hour
- 2.L.18. MTBF – Calculated per MIL-HDBK-217FN1, GB, GC, 25 °C
- 2.L.19. Motor output torque -- Pan motor = 5.0 N m (3.7 ft lb); Tilt motor = 6.0 N m (4.4 ft lb). (Measured at pan and tilt shafts)
- 2.L.20. Prohibited and declarable substances in products, components, materials and preparations. – Compliant, based on manufacturer’s declarations according to Bosch N 2580-1.

### 1.3 SYSTEM DESCRIPTION

#### 3.A. Section Includes

- 3.A.1. Video Surveillance Remote Device with dual thermal/visible imaging.

#### 3.B. Performance Requirements

- 3.B.1. The dual thermal/visible Pan/tilt/zoom camera shall be a full-featured, highly ruggedized surveillance device designed to provide long range early detection video surveillance in outdoor environments having extreme weather conditions of hot/cold temperatures, high winds, rain, fog, ice, and installations associated with shock and vibration events such as bridges, poles, and towers.
- 3.B.2. The dual thermal/visible PTZ camera shall incorporate a high performance uncooled vanadium oxide microbolometer thermal imager and a 1/2.8-in. progressive scan day/night Exmor R CMOS HD visible imager sitting side-by-side in the same housing.
- 3.B.3. The dual thermal/visible PTZ thermal camera shall offer model mix of thermal imagers having 320 pixel or 640 pixel resolutions, available in either low frame rate (<9Hz) or high frame rate (30/60Hz) options.  
(Note: high frame rate models are export-controlled by the US government.)
- 3.B.4. The thermal imager of the dual thermal/visible PTZ camera models having 320 pixel resolution shall incorporate an Athermal 19mm, F1.1 lens providing field of view of 16 degrees x 12 degrees with digital zoom of 1x-4x.
- 3.B.5. The thermal imager of the dual thermal/visible PTZ camera models having 640 pixel resolution shall incorporate an Athermal 50mm, F1.2 lens providing Field of view of 12.4 degrees x 9.3 degrees with digital zoom of 1x-4x, or an Athermal 9mm, F1.8 lens providing field of view of 70 degrees x 52 degrees.
- 3.B.6. The thermal imager of the dual thermal/visible PTZ camera models shall have a pixel pitch of 17um, a spectral response of 8 to 14um, and thermal sensitivity (NEDT at room temperature; F/1.1) of <62mk for 320 pixel models and <72mk for 640 pixel models.
- 3.B.7. The visible imager of the dual thermal/visible PTZ camera shall incorporate a starlight-quality day/night camera block supporting full HD 1080p images, supporting frame rates up to 60fps, and include an integrated 30x optical motorized zoom lens.
- 3.B.8. The dual thermal/visible PTZ thermal camera shall offer embedded Intelligent Video Analysis that eliminates dedicated PCs and associated software maintenance.
- 3.B.9. The integrated Intelligent Video Analytics shall be available on both the thermal and visible image streams of the dual thermal/visible PTZ thermal camera.
- 3.B.10. The dual thermal/visible PTZ camera shall incorporate a distinct metadata fusion feature where events detected by Intelligent Video Analytics on one image type (either visible or thermal) will be displayed as metadata indicators on the other image type.
- 3.B.11. Using the visible image, the dual thermal/visible PTZ camera shall offer Intelligent Tracking functions that controls the pan, tilt, and zoom movements of the camera to continuously follow an object or individual.

- 3.B.12. The dual thermal/visible PTZ camera shall support video analytics while moving, where an operator can be alerted or the camera's Intelligent Tracking feature can be triggered if an object or person is detected while the camera is panning or tilting.
- 3.B.13. The dual thermal/visible PTZ camera shall comply with IP68 and Type 6P environmental protection ingress ratings. (Requires attachment to properly sealed MIC-DCA Deep Conduit Adapter or MIC Wall Mount mounting accessories.)
- 3.B.14. When not using MIC-HDCA Deep Conduit Adapter or MIC-WMB Wall Mount mounting accessories, the dual thermal/visible PTZ camera shall comply with IP67 standard for a weather resistant package if electrical connectors of pigtail wire harness in base of camera are protected using optional MIC-9K-IP67-5PK weatherproofing kit.
- 3.B.15. The dual thermal/visible PTZ camera (excluding windows) shall comply with IK10 impact rating.
- 3.B.16. The dual thermal/visible PTZ camera shall be engineered to withstand relatively high-impact or continuous low-frequency vibrations.
- 3.B.17. The dual thermal/visible PTZ camera shall conform to the ONVIF standard (Profiles S, G, and M) to provide interoperability with other conformant systems.
- 3.B.18. The dual thermal/visible PTZ camera shall support the following power options:
  - 3.B.18.a. 21 to 30VAC (24 VAC nominal), 50/60Hz, 4.0A, 72W typical
  - 3.B.18.b. High Power over Ethernet, 56VDC nominal, 1.5A, 72W typical (Compatible with Bosch 95W Midspan "NPD-9501-E")
  - 3.B.18.c. 24 VAC and High Power over Ethernet – Camera will operate in dual/redundant backup power mode, where failure of either power source will result in no interruption to operation.
- 3.B.19. The dual thermal/visible PTZ camera shall offer High Dynamic Range (120 dB) for images with simultaneous bright and dark areas.
- 3.B.20. The dual thermal/visible PTZ camera shall provide direct network connection using H.264, H.265, and JPEG compression and bandwidth throttling to efficiently manage bandwidth and storage requirements while delivering outstanding image quality.
- 3.B.21. The dual thermal/visible PTZ camera shall provide multiple individually configurable image streaming capabilities in both HD and SD formats.
- 3.B.22. The dual thermal/visible PTZ camera shall offer intelligent encoding and Content Based Imaging Technology (CBIT) where maximum resolution video is delivered even under challenging light conditions at very low bit rates.
- 3.B.23. The dual thermal/visible PTZ camera shall incorporate on-board Trusted Platform Module (TPM) and Public Key Infrastructure (PKI) support that guarantees superior protection from malicious attacks.
- 3.B.24. The dual thermal/visible PTZ camera shall incorporate internal local storage capability for up to 4 hours of continuous recording, alarm/events recordings, and schedule recordings.
- 3.B.25. The dual thermal/visible PTZ camera shall have variable pan and tilt speeds, and AutoPivot capability for optimal camera control and viewing.
- 3.B.26. The dual thermal/visible PTZ visible camera shall offer a defog image feature that assists the visible camera in registering a usable image when viewing foggy or other low-contrast scenes.

- 3.B.27. The dual thermal/visible PTZ camera shall incorporate an effective window-defrosting function.
- 3.B.28. The dual thermal/visible PTZ camera shall offer simple hardware installation solutions such as compatibility with a deep conduit adapter (MIC-DCA-Hxx) mounting accessory having hinged mounting capability that provides a means to temporarily 'hang' the camera during installation.
- 3.B.29. The packaging of the dual thermal/visible PTZ camera shall support in-the-box configuration programming.
- 3.B.30. The foam packaging of the dual thermal/visible PTZ camera shall provide a means to temporarily stand the MIC camera on a table/bench to support configuration programming.
- 3.B.31. Support on-board diagnostic features and logs to assist field troubleshooting.

#### 1.4 SUBMITTALS

4.A. Submit under provisions of Section [01 33 00.]

4.B. Product Data:

- 4.B.1. Manufacturer's data, user and installation manuals for all equipment and software programs including computer equipment and other equipment required for complete video management system.

4.C. Shop Drawings; include

- 4.C.1. System device locations on architectural floor plans.
- 4.C.2. Full Schematic of system, including wiring information for all devices.

4.D. Closeout Submittals

- 4.D.1. User manual.
- 4.D.2. Parts list.
- 4.D.3. System device locations on architectural floor plans.
- 4.D.4. Wiring and connection diagram.
- 4.D.5. Maintenance requirements.

#### 1.5 QUALITY ASSURANCE

5.A. Manufacturer:

- 5.A.1. Minimum of [10] years experience in manufacture and design Video Surveillance Devices.

5.B. Video Surveillance System:

- 5.B.1. [Listed by UL.]
- 5.B.2. [Certified compliant to CE, UL, EN, CSA, and FCC standards.] Test methods are in accordance with Industry standards. Provide evidence of compliance upon request.

5.C. Installer:

- 5.C.1. Minimum of [5] years experience installing Video Surveillance System.

1.6 DELIVERY, STORAGE AND HANDLING

6.A. Comply with requirements of Section [01 60 00.]

6.B. Deliver materials in manufacture's original, unopened, undamaged containers; and unharmed original identification labels.

6.C. Protect store materials from environmental and temperature conditions following manufacturer's instructions.

6.D. Handle and operate products and systems according to manufacturer's instructions.

6.E. Bosch provides off-the-shelf availability for our top selling products and same-day or 24-hour shipping.

1.7 WARRANTY

7.A. Provide manufacturer's warranty covering [3] years for replacement and repair of defective equipment.

1.8 MAINTENANCE

8.A. Make ordering of new equipment for expansions, replacements, and spare parts available to dealers and end users.

8.B. Provide factory direct technical support from 8:00 a.m. to 8:00 p.m. via phone and e-mail.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

#### 1.A. Acceptable Manufacturer:

[Bosch Security Systems, Inc.  
130 Perinton Parkway  
Fairport, New York, 14450, USA  
Phone: + 1 800 289 0096  
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#### 1.B. Substitutions: [Not permitted.] [Under provisions of Division 1.]

1.B.1. [All proposed substitutions must be approved by the Architect or Engineer professional.]

1.B.2. [Proposed substitutions must provide a line-by-line compliance documentation.]

2.2 BOSCH MIC IP fusion 9000i model numbers:

MIC-9502-Z30BQS	MIC-9502-Z30WQS	MIC-9502-Z30GQS
MIC-9502-Z30BVS	MIC-9502-Z30WVS	MIC-9502-Z30GVS
MIC-9502-Z30BVF	MIC-9502-Z30WVF	MIC-9502-Z30GVF
MIC-9502-Z30BVF9	MIC-9502-Z30WVF9	MIC-9502-Z30GVF9
MIC-9502-Z30BVS9	MIC-9502-Z30WVS9	

2.A. General Characteristics:

- 2.A.1. The dual thermal/visible Pan/tilt/zoom camera shall be a full-featured and highly ruggedized IP based camera designed to provide long range early detection video surveillance in outdoor environments having extreme weather conditions of hot/cold temperatures, high winds, rain, fog, ice, and installations associated with shock and vibration events such as bridges, poles, and towers.
- 2.A.2. The dual thermal/visible PTZ camera shall incorporate a high performance thermal imaging core and a 1080p starlight-quality day/night visible camera integrated into the same housing.
- 2.A.3. The dual thermal/visible PTZ camera shall incorporate H.264, H.265, and M-JPEG compression with bandwidth throttling to efficiently manage bandwidth and storage requirements while delivering outstanding image quality.
- 2.A.4. The dual thermal/visible PTZ camera shall provide integrated Intelligent Video Analytics for both thermal and visible images.
- 2.A.5. The dual thermal/visible PTZ camera shall incorporate a distinct metadata fusion feature where events detected by Intelligent Video Analytics on one image type (either visible or thermal) will be displayed as metadata indicators on the other image type.
- 2.A.6. Using the visible image, the dual thermal/visible PTZ camera shall offer Intelligent Tracking functions that controls the pan, tilt, and zoom movements of the camera to continuously follow an object or individual.
- 2.A.7. The dual thermal/visible PTZ camera shall support video analytics while moving, where an operator can be alerted or the camera's Intelligent Tracking feature can be triggered if an object or person is detected while the camera is panning or tilting.
- 2.A.8. The dual thermal/visible PTZ camera shall incorporate advanced networking and data security features, be conformant to ONVIF Profile S, Profile G, and Profile M, and support integration with various external video security related management and control software.
- 2.A.9. The dual thermal/visible PTZ camera housing shall be completely sealed to an IP68/Type 6P level.
- 2.A.10. The dual thermal/visible PTZ camera shall support redundant power options of 24VAC and/or 95W High Power over Ethernet sources.
- 2.A.11. The dual thermal/visible PTZ camera shall be compatible with a full set of accessories that support upright/inverted mounting configurations on flat surfaces, walls, ceilings, poles, and building corners.

2.B. Thermal imaging

2.B.1. Type: Focal Plane Array (FPA) un-cooled Vanadium Oxide microbolometer core.

2.B.2. Model mixes offering the following characteristics:

Horizontal Resolution	Frame Rate	Lens type/size/f-stop	FoV (H x V)	Thermal Sensitivity (NEDT at room temperature with Noise Reduction ON)
320 pixels	<9Hz/60Hz z	Athermal 19mm, F1.1	16° x 12°	<62mk
640 pixels	<9Hz/30Hz z	Athermal 50mm, F1.2 / Athermal 9mm, F.18	12.4° x 9.3° / 70° x 52°	<72mk

(NOTE: All models are export-controlled by the US government and *may* require an export license).

2.B.3. Thermal Detection, Recognition, and Identification (DRI) distances  
(Approximate performance range in ideal conditions):

	320 pixel models		640 pixel/50mm models	
	Human 1.8m x 0.5m (5.9 ft x 1.6 ft)	Object 2.3m x 2.3m (7.5 ft x 7.5 ft)	Human 1.8m x 0.5m (5.9 ft x 1.6 ft)	Object 2.3m x 2.3m (7.5 ft x 7.5 ft)
Detection	379 m (1243 ft)	1746 m (5728 ft)	982 m (3222 ft)	4517 m (14,820 ft)
Recognition	95 m (312 ft)	436 m (1430 ft)	245 m (804 ft)	1129 m (3704 ft)
Identification	47 m (154 ft)	218 m (715 ft)	123 m (404 ft)	565 m (1854 ft)

	640 pixel/9mm models	
	Human 1.8m x 0.5m (5.9 ft x 1.6 ft)	Object 2.3m x 2.3m (7.5 ft x 7.5 ft)
Detection	174 m (570 ft)	800 m (2625 ft)
Recognition	43 m (142 ft)	200 m (656 ft)
Identification	22 m (71 ft)	100 m (328 ft)

For more information, including detection distances using video analytics, refer to Bosch on-line Video Analytics and Lens Calculator.

2.B.4. Pixel Pitch: 17um.

2.B.5. Spectral response: 8.0 to 14 µm

2.B.6. Thermal color modes: 12 user-selectable thermal color options.

2.B.7. AGC Modes: User-selectable.

2.B.8. Digital image zoom: 1x-4x.

- 2.B.9. Focus: Factory-set at infinity focus.
- 2.B.10. Focus distance:
  - 1.A.1.a. "320" pixel models: 14 m to  $\infty$  (46 ft to  $\infty$ )
  - 1.A.1.b. "640" pixel/50mm models: 84 m to  $\infty$  (276 ft to  $\infty$ )
  - 1.A.1.c. "640" pixel/9mm models: 9 mm to  $\infty$  (29.5 ft to  $\infty$ )
- 2.B.11. Contrast enhancement: 8 user selectable levels
- 2.B.12. Image Polarity: Normal or Inverted

2.C. Visible imaging

- 2.C.1. Imager size: 1/2.8-inch type Exmor R CMOS sensor
- 2.C.2. Resolution: Full HD 1080p 50/60fps.
- 2.C.3. Effective Picture Elements (Pixels): 1945 x 1097 (2.13 MP)
- 2.C.4. Aspect Ratio: HD 16:9
- 2.C.5. Motorized Zoom Lens:
  - 2.C.5.a. 30x optical zoom
  - 2.C.5.b. 4.3 to 129 mm
  - 2.C.5.c. F-stop of f1.6 to f4.7
  - 2.C.5.d. 12x digital zoom
  - 2.C.5.e. Field of View: 2.3° to 63.7°
- 2.C.6. Sensitivity:
  - 2.C.6.a. Color image minimum scene illumination: 0.0077 lux at 30 IRE.
  - 2.C.6.b. Monochrome image minimum scene illumination: 0.0008 lux at 30 IRE.
- 2.C.7. Filter: Automatic IR cut filter
- 2.C.8. DORI (Detect, Observe, Recognize, Identify) performance (per EN 62676-4 standard):

	DORI definition	Distance (WIDE 1x)	Distance (TELE 30x)	Scene Width
Detect	25 pixel/m (8 pixel/ft)	62 m (203 ft)	1913 m (6276ft)	77 m (252 ft)
Observe	63 pixel/m (19 pixel/ft)	25 m (81 ft)	765m (2510 ft)	31 m (100 ft)
Recognize	125 pixel/m (38 pixel/ft)	12 m (41 ft)	383 m (1255 ft)	15 m (50 ft)
Identify	250 pixel/m (76 pixel/ft)	6 m (20 ft)	191 m (628 ft)	8 m (25 ft)

- 2.C.9. Focus: Automatic with manual override
- 2.C.10. Iris: Automatic with manual override
- 2.C.11. Gain Control: Auto/Manual/Max (0 dB to +50dB, 0 to 28 steps)
- 2.C.12. Aperture Correction: Horizontal and vertical
- 2.C.13. Electronic Shutter Speed (AES): 1/1 sec to 1/10,000 sec (22 steps)
- 2.C.14. High Dynamic Range: 120 dB at 25/30 fps
- 2.C.15. Signal-to-Noise Ratio (SNR): >55 dB
- 2.C.16. Backlight Compensation: On/Off

- 2.C.17. White Balance range: 2000 K to 10,000 K
  - 2.C.18. White Balance modes: ATW, AWB Hold, Extended ATW, Manual, Sodium Lamp Auto, Sodium Lamp
  - 2.C.19. Day/Night modes: Monochrome, Color, Auto
  - 2.C.20. Defog Image modes: Auto/On/OFF
  - 2.C.21. Zoom lens speeds:
    - 2.C.21.a. Optical Wide to optical Telephoto: 4.6 seconds
    - 2.C.21.b. Optical wide to digital Telephoto: 6.7 seconds
  - 2.C.22. Pre-programmed user modes: Five (5) pre-programmed user selectable modes are provided with the best settings for the following environments:
    - 2.C.22.a. General (default mode)
    - 2.C.22.b. Motion
    - 2.C.22.c. Low Light
    - 2.C.22.d. Indoor
    - 2.C.22.e. Vibrant
- 2.D. Mechanical / Construction
- 2.D.1. Dimensions (H x W x D): 421 mm x 298 mm x 181 mm (11.74 in. x 16.58 in. x 7.14 in.)
  - 2.D.2. Product Weight: 9 kg (19.7 lb.)
  - 2.D.3. Audible Noise: <65 dB
  - 2.D.4. Viewing Windows:
    - 2.D.4.a.1) Optical: Borosilicate tempered flat glass
    - 2.D.4.a.2) Thermal: Germanium
  - 2.D.5. Construction Material: Cast solid aluminum
  - 2.D.6. Finish: Chromate based surface treatment with powder coat paint, sand finish.
  - 2.D.7. Window Wiper: Integrated window wiper with long-life silicone wiper blade;
  - 2.D.8. Housing Colors: Black (RAL 9005); White (RAL 9010); Grey (RAL 7001 - Specific regions only.)
  - 2.D.9. Heater: Integrated, automatic operation
  - 2.D.10. Blower: Integrated, automatic operation
  - 2.D.11. Window defroster: Integrated defroster feature, with de-icing capability (melt ice buildup of up to 3mm (1/8") thick at ambient temperatures down to -20 °C)
  - 2.D.12. Ruggedness:
    - 2.D.12.a. Engineered to withstand relatively high shock events and/or continuous low-frequency vibration as when mounted on bridges, poles, and towers.
    - 2.D.12.b. Conform to the IK10 rating for external mechanical impact (excluding windows).
    - 2.D.12.c. Meet IEC 60068-2-6, Test Fc: Sinusoidal vibration test, 1.0g.
    - 2.D.12.d. Meet Sinusoidal vibration test IAW MILSTD-167-1A vibration tests.
    - 2.D.12.e. Meet IEC 60068-2-27, 45g, 6ms Half Sine Shock Impulse test.
    - 2.D.12.f. Meet NEMA TS2, Sections 2.2.28 – Vibration
    - 2.D.12.g. Meet NEMA TS2, Sections 2.2.29 – Shock (Impact)
  - 2.D.13. Corrosion resistance:

2.D.13.a. Meet ASTM B117 salt spray standard, 2000 hrs.

## 2.E. Environmental

- 2.E.1. Operating Temperature: -40 °C to +65 °C (-40 °F to +149 °F)
- 2.E.2. Cold Start-up Temperature: -40 °C (-40 °F); (Requires 60-minute warm-up prior to PTZ operations at reduced max speed; Operate autopan for an additional 10 minutes to achieve full pan speeds.)
- 2.E.3. Storage Temperature: -40 °C to +70 °C (-40 °F to +158 °F)
- 2.E.4. Humidity: 0% to 100%
- 2.E.5. Ingress protection:
  - 2.E.5.a. IP68 / (UL) Type 6P complaint for a weather-resistant package (when installed on properly sealed MIC-DCA Deep Conduit Adapter or MIC-WMB Wall Mount mounting accessories).
  - 2.E.5.b. When not using MIC-DCA Deep Conduit Adapter or MIC-WMB Wall Mount mounting accessories, compliant with IP67 standard (moisture and dust) for a weather resistant package if electrical connectors of pigtail wire harness in base of camera are protected using optional MIC-9K-IP67-5PK weatherproofing kit.
  - 2.E.5.c. IP66 compliant (directed spray) for a weather resistant housing.
- 2.E.6. Wind load specifications:
  - 2.E.6.a. Sustained: 193 km/h (120 mph)
  - 2.E.6.b. Gusts: Up to 241 km/h (150 mph)
  - 2.E.6.c. MIC Wall Mount accessory: 130N (29 lbf)
- 2.E.7. Effective Projected Area (EPA), Camera: 0.0910m<sup>2</sup> (0.98 ft<sup>2</sup>)
- 2.E.8. Effective Projected Area (EPA), Camera & sunshield: 0.0929m<sup>2</sup> (1.00 ft<sup>2</sup>)

## 2.F. Electrical

- 2.F.1. Voltage connections:
  - 2.F.1.a. High Power over Ethernet (HPoE); Requires Bosch 95W midspan (NPD-9501-E, sold separately) connected to camera's RJ-45 connector
  - 2.F.1.b. 24VAC (nominal) connected to camera's pigtail connections
  - 2.F.1.c. Both High PoE and 24VAC (For redundant power configuration)
- 2.F.2. Input Voltages:
  - 2.F.2.a. 24VAC connection: 21-30 VAC (24VAC nominal), 50/60 Hz
  - 2.F.2.b. Ethernet connection: 56VDC High Power over Ethernet cable connection
- 2.F.3. Power Consumption: 72 W max (24VAC) typical; 72W max (High PoE) typical
- 2.F.4. Current Consumption: 4.0A (24VAC); 1.5A (High PoE)
- 2.F.5. Surge protection: Built-in surge protection for power, data, and network inputs.
- 2.F.6. Audio:
  - 2.F.6.a. Audio compression: G.711, AAC and L16 (live and recording)
  - 2.F.6.b. Signal-to-Noise Ratio:
    - 2.F.6.b.1) Audio-in: 47 dBA (A-weighting)
    - 2.F.6.b.2) Audio out: 50 dBA (A-weighting)
  - 2.F.6.c. Mode: Two-way, full duplex audio communication
  - 2.F.6.d. Line IN: 15k ohm typical, 1.0Vrms, max

2.F.6.e. Line OUT: 0.8V<sub>rsm</sub> at 12K ohm, typical

## 2.G. Pan/tilt/zoom Functions, Tours, and Display

- 1.A.1. Drive Unit: Brushless, integral pan/tilt motor drive
- 1.A.2. Pan range: 360° continuous rotation
- 1.A.3. Tilt Range: 292° (Calculated moving from extreme down position to straight up, AutoPivot to opposite direction, then moving to extreme down position)
- 1.A.4. Tilt Angles:
  - 1.A.4.a. Upright unit: -56° to +90°
  - 1.A.4.b. Inverted unit: -90° to +56°
- 1.A.5. Variable Pan Speed: 0.2°/second to 120°/second
- 1.A.6. Variable Tilt Speed: 0.2°/second to 90°/second
- 1.A.7. Intelligent Tracking Speed: 4°/second to 120°/second
- 1.A.8. Pre-position Speed: 120°/second (maximum)
- 1.A.9. Worse case time to reach farthest pre-position (pan/tilt): 2.5 seconds
- 1.A.10. Pre-position Accuracy: 0.05° (typical)
- 1.A.11. Proportional Pan/Tilt to Zoom: Yes
- 1.A.12. Sectors: User-selectable 4, 8, 12, or 16 independent sectors with 20-character titles per sector.
- 1.A.13. Sector Blanking: Yes. Any/all 16 sectors can be blanked from view
- 1.A.14. Privacy Masks: Up to 32 masks, configurable on both visible and thermal images, each with 20 characters per title, in black, white, grey, or red color
- 1.A.15. Virtual Masks: 24
- 1.A.16. Pre-position scenes: 256, each with programmable title with up to 20 characters
- 1.A.17. Tour modes:
  - 1.A.17.a. Custom Recorded tours - two (2), maximum total duration 30 minutes
  - 1.A.17.b. Pre-position tour - one (1), consisting of up to 256 scenes consecutively, and (1) customized up to 256 scenes.

## 2.H. Network, Encoding, and Connectivity

- 1.A.1. Interoperability/Conformity: ONVIF Profile S, Profile G, **Profile M**
- 1.A.2. Video Compression: H.264 (ISO/IEC 14496-10), H.265, M-JPEG, JPEG
- 1.A.3. Overall IP Delay (camera only):
  - 1.A.3.a. 30fps: 120ms
  - 1.A.3.b. 60fps: 67ms
- 1.A.4. Streaming: Multiple and independent streams using H.264 or H.265, plus M-JPEG. Configurable frame rate and bandwidth. Regions of Interest (ROI).
- 1.A.5. Supported Streams:
  - 1.A.5.a. SD
  - 1.A.5.b. 720p
  - 1.A.5.c. 1080p
  - 1.A.5.d. D1 4:3 (cropped)
  - 1.A.5.e. 640 x 480
  - 1.A.5.f. 1280 x 1024 (cropped)
- 1.A.6. Resolutions (H x V):

- 1.A.6.a. 1080p HD: 1920 x 1080
- 1.A.6.b. 720p HD: 1280 x 720
- 1.A.6.c. 432p SD: 768 x 432
- 1.A.6.d. 288p SD: 512 x 288
- 1.A.6.e. 144p SD: 256 x 144
- 1.A.7. Protocols: IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP/ RTCP, IGMP V2/V3, ICMP, ICMPv6, RTSP, ARP, DHCP, APIPA (Auto-IP, link local address), NTP (SNTP), 802.1x, DNS, DNSv6, DDNS (Dyn.com, selfHOST.de, noip. com), SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox, CHAP, digest authentication
- 1.A.8. NTCIP protocols – Conformant with protocols 1205, 2301, 1101:1996, 2202:2001, 2101:2001, 2102:2003  
(Requires optional license; Not available in all regions)
- 1.A.9. Ethernet port: 10-Base T/100 Base-TX, auto-sensing, half/full duplex, Auto-MDI-X
- 1.A.10. Ethernet connector: male RJ45 (RJ45 coupler included with camera)
- 1.A.11. Encryption: TLS 1.0, SSL, DES, 3DES, AES
- 1.A.12. GOP Structure: IP, IBP, IBBP
- 1.A.13. Data Rate: 9.6 kbps to 6 Mbps (per stream)
- 1.A.14. Quality of Service (QoS): User selectable options
- 1.A.15. Thermal imaging bit rates (Kbits/second): Less than 800kbits/s (typical)
- 1.A.16. Visible imaging bit rates (Kbits/second):

FPS	1080p		720p	
	H.264	H.265	H.264	H.265
60	4200	1649	2600	1249
30	2600	1413	1300	1096
15	2100	1157	1100	902
12	1800	1075	1000	841
5	1250	746	600	597
2	500	407	270	343

- 1.A.17. Noise Reduction: Bosch Intelligent Dynamic Noise Reduction (iDNR)
  - 1.A.18. Bit Rate Management: Bosch Content Based Imaging Technology (CBIT)
  - 1.A.19. Audio characteristics:
    - 1.A.19.a. G.711.8 kHz sampling rate
    - 1.A.19.b. L16, 16k Hz sampling rate
    - 1.A.19.c. AAC-LC, 48 kbps at 16 kHz sampling rate
    - 1.A.19.d. AAC-LC, 80 kbps at 16 kHz sampling rate
    - 1.A.19.e. Audio In signal-to-noise ratio: >47dB (A-weighting)
    - 1.A.19.f. Audio Out signal-to-noise ratio: >50dB (A-weighting)
  - 1.A.20. Access and Data Security:
    - 1.A.20.a. Three-level password protection
    - 1.A.20.b. HTTPS web browser protection
    - 1.A.20.c. Firmware updates secured by authentication
    - 1.A.20.d. On-board Trusted Platform Module (TPM) and Public Key Infrastructure (PKI)
    - 1.A.20.e. 802.1x network authentication with EAP/TLS supports TLS 1.2 with updated cipher suites including AES 256 encryption
    - 1.A.20.f. Advanced certificate handling:
      - 1.A.20.f.1) Installed Bosch Escrypt certificate ensures proof of authenticity
      - 1.A.20.f.2) Self-signed unique certificates can automatically be created
      - 1.A.20.f.3) Client and server certificates supported for authentication
      - 1.A.20.f.4) Client certificates supported for proof of authenticity
      - 1.A.20.f.5) Certificates with encrypted private keys supported
- 2.I. Software Control and Integration
- 1.A.1. View/control options: From integrated web page using web browser, Bosch Video Management System, Bosch Video Security Client, Bosch Configuration Manager, Bosch Security System mobile app, and via third party software.
  - 1.A.2. Browser compatibility: Internet Explorer web browser version 11.0 or later
  - 1.A.3. Serial protocol support: Bosch OSRD protocol, Pelco P/D, Forward Vision, and Cohu serial protocols. (For Pelco, Forward Vision, and Cohu protocols, a separate license (MVS-FCOMPRCL) is required.)
  - 1.A.4. Software Update capability: Network firmware upload
  - 1.A.5. Cloud based services: Time-based or alarm-based JPEG posting to four different accounts. Accounts can address FTP servers or cloud-based storage facilities (for example, Dropbox). Video clips or JPEG images can also be exported to these accounts. Alarm events can be set up to trigger an e-mail or SMS notification so you are always aware of abnormal events.
- 2.J. Intelligent Video Analysis
- 1.A.1. Implementation: Camera shall be capable of processing and analyzing video within the camera itself, with no extra hardware required
  - 1.A.2. Functionality: Camera shall be capable of detecting and sending alarms for events detected on both visible image and thermal images

- 1.A.3. The camera shall be capable of detecting and displaying tracking indicators for moving objects
- 1.A.4. The camera shall be capable of separating moving people in scenes where no other moving objects occur
- 1.A.5. The camera shall be able to detect the following object properties and states of tracked objects:
  - 1.A.5.a. Object class (upright person, bike, car, truck)
  - 1.A.5.b. Object size
  - 1.A.5.c. Object aspect ratio
  - 1.A.5.d. Object speed
  - 1.A.5.e. Object motion direction
  - 1.A.5.f. Object color (visible imaging only)
- 1.A.6. The camera shall be able to detect the following object events:
  - 1.A.6.a. Object entering a user defined field
  - 1.A.6.b. Object within a user defined field
  - 1.A.6.c. Object leaving a user defined field
  - 1.A.6.d. Object crossing a user defined line
  - 1.A.6.e. Object crossing up to three user defined lines in order
  - 1.A.6.f. Object following a route
  - 1.A.6.g. Object loitering
  - 1.A.6.h. Idle objects, both for moving objects that stopped and objects that were carried and placed in the scene (visible imaging only)
  - 1.A.6.i. Removed objects, both for object that started moving by themselves or were carried away (visible imaging only)
  - 1.A.6.j. Object condition change based on size, speed, aspect ratio, direction or color (visible imaging only) of the object
  - 1.A.6.k. Number of moving objects in a user defined field above user defined threshold
- 1.A.7. The camera shall be capable of counting moving objects that are currently within a user defined area
- 1.A.8. The camera shall be capable of counting objects that are moving in a user defined direction
- 1.A.9. The camera shall be able to estimate crowd density (visible imaging only)
- 1.A.10. The camera shall be able to combine object events and states for user defined events
- 1.A.11. The camera shall be capable of detecting and sending alarms for user defined events
- 1.A.12. The camera shall incorporate an Alarm Rule Engine, enabling video analytics events prompting the camera to take one or more actions such as:
  - 1.A.12.a. Trigger a relay connected to an alarm siren and/or strobe
  - 1.A.12.b. Send an e-mail with a snapshot of the video analytics event
  - 1.A.12.c. Trigger a visual alert to be displayed on the operator's screen
- 1.A.13. The camera shall support detection and display of tracking indicators for moving ships.

- 1.A.14. The camera shall allow users to set up to 16 separate video analytics profiles and assign each video analytics profile to a different pre-position. The video analytics profile will become active once the corresponding pre-position is reached and inactive once the corresponding pre-position is left.
- 1.A.15. The camera shall allow users to set up a global video analytics profile independent of pre-positions. In this global profile, the camera shall allow moving objects to be detected in specified fields and ignore moving objects in masked areas. (visible imaging only)
- 1.A.16. The camera shall offer detection and display of tracking indicators of moving objects even if the camera is panning, tilting or zooming, with low speed. (visible imaging only)

## 2.K. Metadata fusion functions

Note: Functionality of metadata fusion features are dependent on the software being used to view the video streams. Below descriptions are applicable when viewing video streams using Bosch software and when browsing directly with the camera's web page. Functionality available when viewing video using video management software offered by other manufacturers will vary based on their implementation.

- 1.A.1. The dual thermal/visible PTZ camera shall incorporate a unique metadata fusion feature where events detected by Intelligent Video Analytics on either of the imagers (either visible or thermal) will be displayed on both images.
- 1.A.2. Functionality:
  - 1.A.2.a. Intelligent Video Analytics engine will monitor both the visible and thermal image streams
  - 1.A.2.b. When an event or object is detected on either image, metadata bounding boxes and trajectory lines will be displayed on both images
  - 1.A.2.c. Bounding boxes and trajectory lines:
    - 1.A.2.c.1) Bounding boxes and trajectory lines for objects detected in the image stream currently being viewed will be displayed as solid lines
    - 1.A.2.c.2) Bounding boxes and trajectory lines for objects being detected in the image stream not being viewed will be displayed as dotted lines
    - 1.A.2.c.3) Bounding boxes will normally be displayed in yellow, red if the object is currently in alarm, and orange if the object has triggered an alarm in the past
    - 1.A.2.c.4) Trajectory lines will always be displayed in green color
  - 1.A.2.d. Support option where Video Management System (VMS) client allows operator to quickly call-up the cameo of the non-displayed image by clicking (or other method determined by VMS) within the metadata box of the image showing the alarm
  - 1.A.2.e. Support option to display events when:
    - 1.A.2.e.1) Detection is only on thermal image stream
    - 1.A.2.e.2) Detection is only on visible image stream
    - 1.A.2.e.3) Detection is active on both streams
  - 1.A.2.f. Support live and playback image streams

## 2.L. Intelligent Tracking (visible imaging only)

- 1.A.1. The camera shall offer Intelligent Tracking to continuously track a selected object using pan, tilt, and zoom actions

- 1.A.2. The camera shall allow a user to mask out areas for Intelligent Tracking to ignore any objects there
  - 1.A.3. The camera shall offer the following control options for the Intelligent Tracking feature:
    - 1.A.3.a. Off – the camera does not track moving objects
    - 1.A.3.b. Auto – the camera continuously analyzes the scene for video analytics alarms. If a video analytics alarm is detected, the camera activates Intelligent Tracking to track the object that triggered the alarm
    - 1.A.3.c. One Click – the camera allows a user to click a moving object in the live video image to activate Intelligent Tracking of this object
  - 1.A.4. Re-acquisition capability: The camera shall have the ability to restart Intelligent Tracking if a target starts moving in the same area where the initial target stopped moving or if the camera detects an object moving along the last known trajectory
- 2.M. Access and Data Security
- 1.A.1. Password protection: Three-level
  - 1.A.2. Web browser protection type: HTTPS.
  - 1.A.3. Firmware updates: Protected with authenticated secure uploads.
  - 1.A.4. Trusted Platform Module (TPM): Supported
  - 1.A.5. Public Key Infrastructure (PKI): Supported
  - 1.A.6. 802.1x network authentication with EAP/TLS: Supports TLS 1.2 with updated cipher suites including AES 256 encryption
  - 1.A.7. 802.1x authentication using a RADIUS (Remote Authentication Dial In User Service) server: Supported
  - 1.A.8. SSL certificate for use with HTTPS: Supported
  - 1.A.9. AES encryption: Supports independent encryption with 256-bit keys.
- 2.N. User Connections:
- 1.A.1. Power
    - 1.A.1.a. Network: High Power over Ethernet (Bosch 95 W midspan (NPD-9501-E))
    - 1.A.1.b. Camera: 24 VAC nominal (power supply)
  - 1.A.2. Video/Control: RJ-45 10/100 Base-TX Ethernet; Male RJ-45 on pigtail; Female-to-female RJ-45 coupler included
  - 1.A.3. Alarm/Washer I/O accessory (MIC-ALM-WAS-24) and serial protocol communication (Bosch OSRD, Pelco P/D, Forward Vision, and Cohu protocols): 3-wire RS-485 simplex, user-selectable baud rate or auto-baud
  - 1.A.4. Audio: 4-wire; Full duplex; Line In; Line Out
  - 1.A.5. Ground: Earth ground wire, terminated with lug and screw (screw fits MIC-DCAs)
- 2.O. Installation Requirements
- 1.A.1. User interface languages: English (default), Czech, Dutch, French, German, Italian, Polish, Portuguese, Russian, Spanish, Japanese, and Chinese.

- 1.A.2. Outdoor operating temperature range: -40 °C to +65 °C (-40 °F to 149 °F)
  - 1.A.3. Cold Start-up Temperature: -40 °C (-40 °F); (Requires 60-minute warm-up prior to PTZ operations at reduced max speed; Operate autopan for an additional 10 minutes to achieve full pan speeds.)
  - 1.A.4. Video/control interface: TCP/IP connection.
  - 1.A.5. Shall support the following dual, redundant power options:
    - 1.A.5.a.1) 24 VAC nominal
    - 1.A.5.a.2) High Power over Ethernet (Bosch 95 W Midspan (NPD-9501-E))
  - 1.A.6. Supported mounting orientations: Upright or Inverted
  - 1.A.7. Supported mounting options (with applicable accessories): Surface; Wall (Cables through wall); Wall (Conduit/cables down wall); Corner of a wall; Pole mounting
  - 1.A.8. Sunshield accessory (optional): Yes
  - 1.A.9. External Alarm and washer interface: Yes, via optional accessory device
  - 1.A.10. Electrical interface protection: IP67-rated weatherproofing kit available when camera is not installed on MIC Wall mount or Deep Conduit Adapter accessories
  - 1.A.11. Hinged mounting concept: Yes, using optional Hinged Deep Conduit Adapter mounting accessory
- 2.P. Service and Diagnostics
- 1.A.1. Firmware upload in field: Yes. Over the network using built-in web browser or from Bosch Configuration Manager
  - 1.A.2. Operational parameters monitoring: Integrated sensors monitor many conditions such as internal temperature, humidity level, incoming voltage level, vibration, and shock events
  - 1.A.3. Integrated Troubleshooting features: Internal diagnostic logs available and on-screen display notifications presented when critical faults are detected
- 2.Q. Other Features
- 1.A.1. Packaging:
    - 1.A.1.a. The design of the camera's packaging shall support easy access for in-the-box configuration programming
    - 1.A.1.b. The foam packaging of the camera shall support the ability to be used for temporarily standing the MIC camera on a table/bench to support configuration programming
  - 1.A.2. Video authentication: Off / Watermark / MD5 / SHA-1 / SHA-256
  - 1.A.3. Display stamping: Name / Logo / Time / Alarm Message
  - 1.A.4. Pixel Counter: Selectable area
  - 1.A.5. Local Storage:
    - 1.A.5.a. Capacity: Minimum of 4 hours
    - 1.A.5.b. Recording: Includes continuous recording of the HD 1080p visible image stream @60fps, SD thermal image stream @60 fps, and audio. Scheduled recordings and alarm/event recordings supported.
  - 1.A.6. MTBF: 79932 hours @ 25 °C

## 1.1 ACCESSORIES

### 1.A. Mounting accessories

- 1.A.1. MIC Hinged Deep Conduit Adapter, Black (MIC-DCA-HB)
- 1.A.2. MIC Hinged Deep Conduit Adapter, White (MIC-DCA-HW)
- 1.A.3. MIC Hinged Deep Conduit Adapter, Grey (MIC-DCA-HG)
- 1.A.4. MIC Hinged Deep Conduit Adapter, Black (MIC-DCA-HB); Includes M25 to  $\frac{3}{4}$ " NPT adapter (Available in specific regions only)
- 1.A.5. MIC Hinged Deep Conduit Adapter, White (MIC-DCA-HW); Includes M25 to  $\frac{3}{4}$ " NPT adapter (Available in specific regions only)
- 1.A.6. MIC Hinged Deep Conduit Adapter, Grey (MIC-DCA-HG); Includes M25 to  $\frac{3}{4}$ " NPT adapter (Available in specific regions only)
- 1.A.7. Thread Adapter, M25 to  $\frac{3}{4}$ " NPT (MIC-M25XNPT34)
- 1.A.8. Wall Mount Bracket, Black (MIC-WMB-BD)
- 1.A.9. Wall Mount Bracket, White (MIC-WMB-WD)
- 1.A.10. Wall Mount Bracket, Grey (MIC-WMB-MG)
- 1.A.11. Pole Mount Bracket (MIC-PMB)
- 1.A.12. Corner Mount Bracket, Black (MIC-CMB-BD)
- 1.A.13. Corner Mount Bracket, White (MIC-CMB-WD)
- 1.A.14. Corner Mount Bracket, Grey (MIC-CMB- MG)
- 1.A.15. Spreader Plate, Black (MIC-SPR-BD)
- 1.A.16. Spreader Plate, White (MIC-SPR-WD)
- 1.A.17. Spreader Plate, Grey (MIC-SPR-MG)
- 1.A.18. Shallow Conduit Adapter, Black (MIC-SCA-BD)
- 1.A.19. Shallow Conduit Adapter, White (MIC-SCA-WD)
- 1.A.20. Shallow Conduit Adapter, Grey (MIC-SCA-MG)

### 1.B. Power Supplies, I/O devices, and other accessories

- 1.B.1. High PoE Midspan, 95 W (NPD-9501-E)
- 1.B.2. Alarm/Washer I/O Unit (MIC-ALM-WAS-24)
- 1.B.3. 120VAC to 24VAC power supply (VG4-A-PSU1)
- 1.B.4. 230VAC to 24VAC power supply (VG4-A-PSU2)
- 1.B.5. MIC IP 9000i Sunshield (MIC-9K-SNSHLD-W)
- 1.B.6. IP67 Connector protection kit (MIC-9K-IP67-5PK)
- 1.B.7. Serial protocol eLicense (MVS-FCOM-PRCL)
- 1.B.8. Washer bracket/nozzle kit (MIC-WKT-IR)

## **PART 2 – EXECUTION**

### **2.1 EXAMINATION**

- 1.A. Examine areas to receive devices and notify adverse conditions affecting installation or subsequent operation.
- 1.B. Do not begin installation until unacceptable conditions are corrected.

### **2.2 PREPARATION**

- 2.A. Protect devices from damage during construction.

### **2.3 INSTALLATION**

- 3.A. Install devices in accordance with manufacturer's instruction at locations indicated on the floor drawings plans.
- 3.B. Perform installation with qualified service personnel.
- 3.C. Install devices in accordance with the National Electrical Code or applicable local codes.
- 3.D. Use of an Uninterruptable Power Supply (UPS) and electrically grounded conduit is required to meet EMC related conditions called out in EN 61000-4-11.
- 3.E. Ensure selected location is secure and offers protection from accidental damage.
- 3.F. Location must provide temperature range within operating specifications of the camera, and be free from sources of electrical and electromagnetic interference.
- 3.G. Always use a shielded twisted pair (STP) connection cable (CAT 5E/6) and a shielded RJ45 network cable connector where the camera is used outdoors or the network cable is routed outdoors. Also use shielded cables / connectors in demanding indoor electrical environments where the network cable is located in parallel with electrical mains supply cables, or where large inductive loads such as motors or contractors are in close vicinity to the camera or its cable.
- 3.H. Use surge/lightening protection devices (sourced locally) to protect network and power cables and camera installation site. Refer to NFPA 780, Class 1 & 2, UL96A, or the equivalent code appropriate for your country/region. Refer to the manufacturer's installation instructions and local building codes for surge protectors at the cable entrance to building, any midspan devices, and the camera side.

### **2.4 FIELD QUALITY CONTROL**

- 4.A. Test snugness of mounting screws of all installed equipment.
- 4.B. Test proper operation of all video system devices.

4.C. Determine and report all problems to the manufacturer's customer service department.

2.5 ADJUSTING

5.A. Make proper adjustment to video system devices for correct operation in accordance with manufacturer's instructions.

5.B. Make any adjustment of camera settings to comply with specific customer's need.

2.6 DEMONSTRATION

6.A. Demonstrate at final inspection that video management system and devices functions properly.

END OF SECTION