The 1080p outdoor dome cameras from Bosch are professional surveillance cameras that provide high quality HD images for demanding security and surveillance network requirements. These robust domes are true day/night cameras offering excellent performance day or night. There is a version with a built-in active infrared illuminator that provides high performance in extreme low-light environments.

**System overview**

**Vandal resistant outdoor dome with varifocal lens**

Ideal for outdoor use, the IK10-rated design is suitable for installations where a vandal resistance is important. The camera is protected against water and dust to IP66 standards. The varifocal lens allows you to choose the coverage area to best suit your application. Mounting options are numerous, including surface, wall, and suspended-ceiling mounting. The automatic zoom/focus lens wizard makes it easy for an installer to accurately zoom and focus the camera for both day and night operation. The wizard is activated from the PC or from the on-board camera push button making it easy to choose the workflow that suits best. The AVF (Automatic Varifocal) feature means that the zoom can be changed without opening the camera. The automatic motorized zoom/focus adjustment with 1:1 pixel mapping ensures the camera is always accurately focused.

**Functions**

**Essential Video Analytics**

The built-in video analysis reinforces the Intelligence-at-the-Edge concept and now delivers even more powerful features. Essential Video Analytics is ideal for use in controlled environments with limited detection ranges. The system reliably detects, tracks, and analyzes objects, and alerts you when predefined alarms are triggered. A smart set of alarm rules makes complex tasks easy and reduces false alarms to a minimum. Metadata is attached to your video to add sense and structure. This enables you to quickly retrieve the relevant images from hours of stored video. Metadata can also be used to deliver irrefutable forensic evidence or to optimize business processes based on people counting or crowd density information. Calibration is quick and easy – just enter the height of the camera. The internal gyro/accelerometer sensor provides the rest of the information to precisely calibrate the video analytics.

**Fast performance**

The 60 frames per second mode provides for optimum performance in fast action scenes that ensures no critical data is lost.

**Starlight performance**

The latest sensor technology combined with the sophisticated image processing and noise suppression results in an exceptional sensitivity in color. The low-
light performance is so good that the camera continues to provide excellent color performance even with a minimum of ambient light.

**High Dynamic Range**
The camera has High Dynamic Range. This is based on a multiple-exposure process that captures more details in the highlights and in the shadows even in the same scene. The result is that you can easily distinguish objects and features, for example, faces with bright backlight.

The actual dynamic range of the camera is measured using Opto-Electronic Conversion Function (OECF) analysis according to IEC 62676 Part 5. This method is used to provide a standard result which can be used to compare different cameras.

**Content Based Imaging Technology**
Content Based Imaging Technology (CBIT) is used to radically improve image quality in all lighting conditions and to identify areas for enhanced processing. The camera examines the scene using Essential Video Analytics and provides feedback to re-tune the image processing. This provides better detail in the areas that matter and better all-round performance.

**Intelligent Auto Exposure** technology, for example, allows you to view moving objects in bright and dark areas of a scene.

**Intelligent streaming reduces bandwidth and storage requirements**
The low-noise image and the efficient H.265 compression technology provide clear images while reducing bandwidth and storage by up to 80% compared to standard H.264 cameras. With this new generation of cameras an extra level of intelligence is added with Intelligent Streaming. The camera provides the most usable image possible by cleverly optimizing the detail-to-bandwidth ratio. The smart encoder continuously scans the complete scene as well as regions of the scene and dynamically adjust compression based on relevant information like movement. Together with Intelligent Dynamic Noise Reduction, which actively analyzes the contents of a scene and reduces noise artifacts accordingly, bitrates are reduced by up to 80%. Because noise is reduced at the source during image capture, the lower bitrate does not compromise image quality. This results in substantially lower storage costs and network strain and still retain a high image quality and smooth motion.

**Area-based encoding**
Area-based encoding is another feature which reduces bandwidth. Compression parameters for up to eight user-definable regions can be set. This allows uninteresting regions to be highly compressed, leaving more bandwidth for important parts of the scene.

**Bitrate optimized profile**
The average typical optimized bitrate in kbits/s for various frame rates when in H.265 mode is shown in the table:

<table>
<thead>
<tr>
<th>fps</th>
<th>1080p</th>
<th>720p</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>712</td>
<td>525</td>
</tr>
<tr>
<td>30</td>
<td>600</td>
<td>450</td>
</tr>
<tr>
<td>12</td>
<td>438</td>
<td>329</td>
</tr>
<tr>
<td>5</td>
<td>284</td>
<td>213</td>
</tr>
<tr>
<td>2</td>
<td>122</td>
<td>92</td>
</tr>
</tbody>
</table>

**Multiple streams**
The multi-streaming feature delivers various H.264 or H.265 streams together with an M-JPEG stream. These streams facilitate bandwidth-efficient viewing and recording as well as integration with third-party video management systems.

**Tamper and motion detection**
A wide range of configuration options is available for alarms signaling camera tampering. A built-in algorithm for detecting movement in the video can also be used for alarm signaling.

**Storage management**
Recording management can be controlled by the Bosch Video Recording Manager (Video Recording Manager) or the camera can use iSCSI targets directly without any recording software.

**Edge recording**
The MicroSD card slot supports up to 2 TB of storage capacity. A microSD card can be used for local alarm recording. Pre-alarm recording in RAM reduces recording bandwidth on the network, or — if microSD card recording is used — extends the effective life of the storage medium.

**Cloud-based services**
The camera supports time-based or alarm-based JPEG posting to four different accounts. These 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. Alarms can be set up to trigger an e-mail or SMS notification so you are always aware of abnormal events.
Easy installation
Power for the camera can be supplied via a Power-over-Ethernet compliant network cable connection. With this configuration, only a single cable connection is required to view, power, and control the camera. Using PoE makes installation easier and more cost-effective, as cameras do not require a local power source.

The camera can also be supplied with power from +12 VDC/24 VAC power supplies. To increase system reliability, the camera can be simultaneously connected to both PoE and +12 VDC/24 VAC supplies. Additionally, uninterruptible power supplies (UPS) can be used, which will allow continuous operation, even during a power failure.

For trouble-free network cabling, the camera supports Auto-MDIX which allows the use of straight or cross-over cables.

Automatic image rotation
The integrated gyro/accelerometer sensor automatically corrects the image orientation in steps of 90° if the camera is mounted at right angles or upside down. The sensor image can also be rotated manually through steps of 90°.

To efficiently capture details in long hallways without loss of resolution, mount the camera at right angles. The image is displayed upright at full resolution on your monitor.

True day/night switching
The camera incorporates mechanical filter technology for vivid daytime color and exceptional night-time imaging while maintaining sharp focus under all lighting conditions.

Hybrid mode
An analog video output enables the camera to operate in hybrid mode. This mode provides simultaneous high resolution HD video streaming and an analog video output via an SMB connector. The hybrid functionality offers an easy migration path from legacy CCTV to a modern IP-based system.

DORI coverage
DORI (Detect, Observe, Recognize, Identify) is a standard system (EN-62676-4) for defining the ability of a camera to distinguish persons or objects within a covered area. The maximum distance at which a camera/lens combination can meet these criteria is shown below:

1080p camera with 3-9 mm lens

<table>
<thead>
<tr>
<th>DORI</th>
<th>DORI definition</th>
<th>Distance 3 mm / 9 mm</th>
<th>Horizontal width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detect</td>
<td>25 px/m</td>
<td>32 m / 126 m</td>
<td>77 m</td>
</tr>
<tr>
<td></td>
<td>8 px/ft</td>
<td>104 ft / 412 ft</td>
<td>252 ft</td>
</tr>
<tr>
<td>Observe</td>
<td>63 px/m</td>
<td>13 m / 50 m</td>
<td>30 m</td>
</tr>
<tr>
<td></td>
<td>19 px/ft</td>
<td>41 ft / 164 ft</td>
<td>100 ft</td>
</tr>
</tbody>
</table>

Data security
Special measures have been put in place to ensure the highest level of security for device access and data transport. The three-level password protection with security recommendations allows users to customize device access. Web browser access can be protected using HTTPS and firmware updates can also be protected with authenticated secure uploads.

The on-board Trusted Platform Module (TPM) and Public Key Infrastructure (PKI) support, guarantee superior protection from malicious attacks. The 802.1x network authentication with EAP/TLS, supports TLS 1.2 with updated cipher suites including AES 256 encryption.

The advanced certificate handling offers:
- Self-signed unique certificates automatically created when required
- Client and server certificates for authentication
- Client certificates for proof of authenticity
- Certificates with encrypted private keys

Complete viewing software
There are many ways to access the camera’s features: using a web browser, with the Bosch Video Management System, with the free-of-charge Bosch Video Client or Video Security Client, with the video security mobile app, or via third-party software.

System integration
The camera conforms to the ONVIF Profile S and Profile G specifications. This guarantees interoperability between network video products regardless of manufacturer.

Third-party integrators can easily access the internal feature set of the camera for integration into large projects. Visit the Bosch Integration Partner Program (IPP) website (ipp.boschsecurity.com) for more information.

Certifications and approvals

HD standards
Complies with the SMPTE 274M-2008 Standard:
- Resolution: 1920x1080
- Scan: Progressive
- Color representation: complies with ITU-R BT.709
- Aspect ratio: 16:9
- Frame rate: 25 and 30 frames/s

Complies with the SMPTE 296M-2001 Standard:
- Resolution: 1280x720
Video - FLEXIDOME IP starlight 5000i (IR) - outdoor

- Scan: Progressive
- Color representation: complies with ITU-R BT.709
- Aspect ratio: 16:9
- Frame rate: 25 and 30 frames/s

### Standards
- IEC 62471 (IR version)
- EN 60950-1
- UL 60950-1
- UL 60950-22
- CAN/CSA-C22.2 NO. 60950-1-03
- CAN/CSA-C22.2 NO. 60950-22
- EN 50130-4
- EN 50130-5
- FCC Part15 Subpart B, Class B
- EMC directive 2014/30/EU
- EN 55032 class B
- IEEE 802.3af (802.3at Type 1)
- PoE level: Class 3

### Installation/configuration notes

| Ø 99.3 (3.9) |
| Ø 145 (5.7) |

### Technical specifications

#### Power

- **Input voltage**: +12 VDC ±5%, 24 VAC ±10% or Power-over-Ethernet (48 VDC nominal)
- **Power consumption**
  - (DC): 7.15 W max.
  - (AC): 6.15 W max.
  - (PoE): 7 W max.
- **PoE IEEE standard**: IEEE 802.3af (802.3at Type 1)
- **Power level**: Class 3

#### Power (IR version)

- **Input voltage**: +12 VDC ±5%, 24 VAC ±10% or Power-over-Ethernet (48 VDC nominal)
- **Power consumption**
  - (DC): 10.8 W max.
  - (AC): 8.75 W max.
  - (PoE): 9.2 W max.
- **PoE IEEE standard**: IEEE 802.3af (802.3at Type 1)
- **Power level**: Class 3

### Region

<table>
<thead>
<tr>
<th>Europe</th>
<th>Regulatory compliance/quality marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>FLEXIDOME IP outdoor 4000i/5000i</td>
</tr>
<tr>
<td></td>
<td>FLEXIDOME IP starlight 5000i (IR)</td>
</tr>
</tbody>
</table>
### Platform
- **Common product platform**: CPP7.3

### Sensor
- **Sensor type**: 1/2.8-inch CMOS
- **Effective pixels**: 1920 (H) x 1080 (V); 2MP (approx.)

### Video performance - Sensitivity
- **Sensitivity** - (3100K, reflectivity 89%, 1/25, F1.3, 30IRE)
  - **Color**: 0.0225 lux
  - **Mono**: 0.0051 lux
  - **With IR**: 0.0 lux

### Video performance - Dynamic range
- **High Dynamic Range**: 146 dB WDR
- **Measured according to IEC 62676 Part 5**: 107 dB WDR

### Video streaming
- **Video compression**: H.265; H.264; M-JPEG
- **Streaming**: Multiple configurable streams in H.264 or H.265 and M-JPEG, configurable frame rate and bandwidth. Regions of Interest (ROI)
- **Camera processing latency**: <120 ms (max. average at 1080p60)
- **GOP structure**: IP, IBP, IBBP
- **Encoding interval**: 1 to 50 [60] fps
- **Encoding regions**: Up to 8 areas with encoder quality settings per area

### Video resolution (H x V)
- **480p SD**: 640 x 480
- **SD**: 768 x 432
- **D1**: 720 x 480

### Video functions
- **Day/Night**: Color, Monochrome, Auto (adjustable switch points)
- **Adjustable picture settings**: Contrast, Saturation, Brightness
- **White Balance**: 2500 to 10000K, 4 automatic modes (Basic, Standard, Sodium vapor, Dominant color), Manual mode and Hold mode
- **Shutter**: Automatic Electronic Shutter (AES): Fixed (1/25[30] to 1/15000) selectable; Default shutter
- **Backlight compensation**: On/off/Intelligent Auto Exposure (IAE)
- **Contrast enhancement**: On/off
- **Signal-to-noise ratio (SNR)**: >55 dB
- **Noise reduction**: Intelligent Dynamic Noise Reduction with separate temporal and spatial adjustments
- **Sharpness**: Sharpness enhancement level selectable
- **Intelligent defog**: Intelligent Defog automatically adjusts parameters for best picture in foggy or misty scenes (switchable)
- **Privacy Masking**: Eight independent areas, fully programmable
- **Video Analysis**: Essential Video Analytics
- **Scene modes**: Standard, Sodium lighting, Fast movement, Sensitivity boost, Dynamic backlight, Vibrant, Color only, Sports & gaming, Retail
- **Other functions**: Image mirror, Image flip, Pixel counter, Video watermarking, Display stamping, Location
- **Camera rotation**: Automatic detection with manual override (0° / 90° / 180° / 270°)

### Video content analysis
- **Analysis type**: Essential Video Analytics
### Video content analysis

| Features | Rule based alarms and tracking  
| Line crossing  
| Enter/leave field  
| Follow route  
| Loitering  
| Idle/removed object  
| People counting  
| Crowd density estimation  
| 3D tracking  
| Audio detection (if microphone used) |

| Calibration/Geolocation | Automatic based on gyro/accelerometer data and camera height |
| Tamper detection | Maskable |
| Audio detection | Detection of audio to generate an alarm |

### Night vision (IR version only)

| Distance | 45 m (148 ft) |
| LED | 10 LED high efficiency array, 850 nm |
| IR intensity | Adjustable |

### Optical

| Lens type | 3 to 9 mm Automatic Varifocal (AVF) lens, IR corrected DC Iris F1.3 - 360 |
| Lens mount | Board mounted |
| Adjustment | Motorized zoom/focus |
| Iris control | Automatic iris control |
| Day/Night | Switched mechanical IR filter |
| Horizontal field of view | 37° - 106° |
| Vertical field of view | 21° - 55° |

### Input/output

| Analog video out | SMB connector, CVBS (PAL/NTSC), 1 Vpp, 75 Ohm, approx. 500 TVL |
| Audio line in | 0.707 Vrms max, 10 kOhm typical |
| Audio line out | 0.707 Vrms at 16 Ohm typical |
| Alarm input | 1 input |

### Audio streaming

| Standard | G.711, 8 kHz sampling rate  
| L16, 16 kHz sampling rate  
| AAC-LC, 48 kbps at 16 kHz sampling rate  
| AAC-LC, 80 kbps at 16 kHz sampling rate |
| Signal-to-Noise Ratio | >50 dB |
| Audio Streaming | Full-duplex / half duplex |

### Local storage

| Internal RAM | 5 s pre-alarm recording |
| Memory card slot | Supports up to 32 GB microSDHC / 2 TB microSDXC card. (A memory card of Class 6 or higher is recommended for HD recording) |
| Recording | Continuous recording, ring recording, alarm/events/schedule recording |

### Network

| Protocols | IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP/RTCP, IGMP V2/V3, ICMP, ICMPv6, RTSP, FTP, ARP, DHCP, APIPA (Auto-IP, link local address), NTP (SNTP), SNMP (V1, V3, MIB-II), 802.1x, DNS, DNSv6, DDNS (DynDNS.org, selfHOST.de, no-ip.com), SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox™, CHAP, digest authentication |
| Encryption | TLS1.0/1.2, AES128, AES256 |
| Ethernet | 10/100 Base-T, auto-sensing, half/full duplex |
| Connectivity | Auto-MDIX |
| Interoperability | ONVIF Profile S; ONVIF Profile G |

### Mechanical

| 3-axis adjustment (pan/tilt/rotation) | 350° / 130° / 350° |
| Dimensions (Ø x H) | 145 x 131 mm (5.71x 5.14 in) |
### Mechanical

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1102 g (2.43 lb)</td>
</tr>
<tr>
<td>Color</td>
<td>RAL 9003, RAL 9017</td>
</tr>
<tr>
<td>Housing material</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Dome bubble</td>
<td>Polycarbonate, clear with anti-scratch coating</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40 ºC to +50 ºC (-40 ºF to +122 ºF) for continuous operation; -34 ºC to +74 ºC (-30 ºF to +165 ºF) according to NEMA TS 2-2003 (R2008), para 2.1.5.1 using fig. 2.1 test profile</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 ºC to +70 ºC (-40 ºF to +158 ºF)</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>5% to 93% RH non condensing; 5% to 100% RH condensing</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP66 and NEMA 4X</td>
</tr>
<tr>
<td>Impact protection</td>
<td>IK10</td>
</tr>
</tbody>
</table>

### Ordering Information

- **NDE-5502-A** Fixed dome 2MP HDR 3-9mm IP66
  Vandal resistant IP dome camera for outdoor HD 60 fps surveillance with H.265 and Essential Video Analytics.
  Order number **NDE-5502-A** | **F.01U.384.633**

- **NDE-5502-AL** Fixed dome 2MP HDR 3-9mm IR IP66
  Vandal resistant IP dome camera for outdoor HD 60 fps surveillance with H.265, Essential Video Analytics and integrated infrared.
  Order number **NDE-5502-AL** | **F.01U.384.634**

### Accessories

- **BUB-CLR-FDO** Bubble, clear, outdoor
  Clear polycarbonate bubble for dome camera
  Outdoor
  Order number **BUB-CLR-FDO** | **F.01U.319.962**

- **BUB-TIN-FDO** Bubble, tinted, outdoor
  Tinted polycarbonate bubble for dome camera.
  Outdoor
  Order number **BUB-TIN-FDO** | **F.01U.319.960**

- **NBN-MCSMB-03M** Cable, SMB to BNC, camera-cable, 0.3m
  0.3 m (1 ft) analog cable, SMB (female) to BNC (female) to connect camera to coaxial cable
  Order number **NBN-MCSMB-03M** | **F.01U.291.564**

- **NBN-MCSMB-30M** Cable, SMB to BNC, camera-monitor/DVR
  3 m (9 ft) analog cable, SMB (female) to BNC (male) to connect camera to monitor or DVR
  Order number **NBN-MCSMB-30M** | **F.01U.291.565**

- **NDA-5030-PIP** Pendant interface plate NDE-4/5000
  Pendant interface plate for outdoor FLEXIDOME 4000i / 5000i.
  Order number **NDA-5030-PIP** | **F.01U.324.951**

- **NDA-ADT4S-MINDOME** Surface mount box for dome camera
  Surface mount box (Ø145 mm / Ø5.71 in) for dome cameras (for indoor camera variant, use together with NDA-ADTVEZ-DOME).
  Order number **NDA-ADT4S-MINDOME** | **F.01U.285.200**

- **NDA-FMT-DOME** In-ceiling flush mount for dome camera
  In-ceiling flush mounting kit for dome cameras (Ø157 mm)
  Order number **NDA-FMT-DOME** | **F.01U.303.768**

- **NDA-LWMT-DOME** Wall mount, L-shaped, for dome camera
  Sturdy wall L-shaped bracket for dome cameras
  Order number **NDA-LWMT-DOME** | **F.01U.303.767**

- **NDA-SMB-MINISMB** Surface mount box for dome camera 5.87”
  Surface mount box (Ø149 mm / Ø5.87 in)
  Order number **NDA-SMB-MINISMB** | **F.01U.299.795**

- **NDA-U-CMT** Corner mount adapter
  Universal corner mount, white
  Order number **NDA-U-CMT** | **F.01U.324.946**

- **NDA-U-PA0** Surveilliance cabinet 24VAC
  Surveillance cabinet, 24 VAC input, 24 VAC output, IP66
  Order number **NDA-U-PA0** | **F.01U.324.947**

- **NDA-U-PA1** Surveilliance cabinet 120VAC
  Surveillance cabinet, 100 - 120 VAC 50/60 Hz input, 24 VAC output, IP66
  Order number **NDA-U-PA1** | **F.01U.324.948**

- **NDA-U-PA2** Surveilliance cabinet 230VAC
  Surveillance cabinet, 230 VAC input, 24 VAC output, IP66
  Order number **NDA-U-PA2** | **F.01U.324.949**

- **NDA-U-PMAL** Pole mount adapter large
  Universal pole mount adapter, white; large
  Order number **NDA-U-PMAL** | **F.01U.324.944**

- **NDA-U-PMAS** Pole mount adapter small
  Pole mount adapter small
  Universal pole mount adapter, white; small.
  Order number **NDA-U-PMAS** | **F.01U.324.943**

- **NDA-U-PMT** Pendant pipe mount, 12” (31cm)
  Universal pipe mount for dome cameras, 31 cm, white
  Order number **NDA-U-PMT** | **F.01U.324.940**

- **NDA-U-PMTE** Pendant pipe extension, 20” (50cm)
  Extension for universal pipe mount, 50 cm, white
  Order number **NDA-U-PMTE** | **F.01U.324.941**

- **NDA-U-PSMB** Pendant wall/ceiling mount SMB
  Surface mount box (SMB) for wall mount or pipe mount.
  Order number **NDA-U-PSMB** | **F.01U.324.942**

- **NDA-U-RMT** Pendant parapet mount
  Universal roof mount for dome cameras, white
  Order number **NDA-U-RMT** | **F.01U.324.945**

- **NDA-U-WMT** Pendant wall mount
  Universal wall mount for dome cameras, white
  Order number **NDA-U-WMT** | **F.01U.324.939**
NDN-IOC-30M Cable, IP66 certified, waterproof
An IP66 certified cable for easy waterproof installation
Order number NDN-IOC-30M | F.01U.313.565

NPD-5001-POE Midspan, 15W, single port, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 1-port
Weight: 200 g (0.44 lb)
Order number NPD-5001-POE | F.01U.305.288

NPD-5004-POE Midspan, 4 port x 15W, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 4-ports
Weight: 620 g (1.4 lb)
Order number NPD-5004-POE | F.01U.305.289

UPA-1220-60 Power supply, 120VAC 60Hz, 12VDC 1A out
Power supply for camera. 100-240 VAC, 50/60 Hz In; 12 VDC, 1 A Out; regulated.
Order number UPA-1220-60 | F.01U.076.155