

# VOT-320 Thermal IP Camera

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**BOSCH**  
Invented for life



- ▶ 320x240 VOx thermal sensor
- ▶ Genuine 24/7 outdoor solution
- ▶ Integrated IVA optimized for thermal imaging
- ▶ Up to 3.9 km (12,795 ft) detection range
- ▶ ONVIF conformant

The VOT-320 thermal IP camera provides high sensitivity, uncooled long wave thermal images. It can tri-stream video simultaneously on two H.264 streams and one JPEG stream. The camera uses a Vanadium Oxide (VOx) focal plane array with an image resolution of 320x240 pixels that delivers outstanding image quality and sensitivity. It offers a choice of various lenses—both narrow field of view (NFOV) and wide field of view (WFOV)—and is available with a frame rate of 8.33 or 30 Hz.

VOT-320 is designed to combine the benefits of thermal imaging with the well-proven Bosch IVA features. Thus a unique product was created that offers early detection and display of irregularities over large areas even with poor visibility or absolute darkness. Neither dense smoke nor bad weather conditions as heavy fog or snow affect visibility. With a VOT-320 there is no need for natural or artificial lighting of the area of interest.

Focused on heat radiating objects, crisp images are generated that are not constricted by shadows or similar effects as regular video images are. The VOT-320 camera uses advanced video processing technology for pixel-by-pixel analysis. This provides the user with the most detailed information of the scene.

Enclosed in a robust outdoor housing with integrated window heater, VOT-320 is ideal for a wide range of applications like fire defense in power plants, coast line monitoring, and traffic control in tunnels. Features such as multicast, internet streaming, and iSCSI recording are fully supported. The VOT-320 camera is designed on the state-of-the-art Bosch IP platform which conforms to the highest standards of performance and reliability in any security and surveillance scenario.

## System overview

### Range Performance

The following tables identify the approximate range performance of the respective lens for standard monitoring.

60 mm (2.36 in) NFOV lens	Human 1.8 x 0.5 m (5.9 x 1.6 ft)	Object 2.3 x 2.3 m (7.5 x 7.5 ft)
Detection	1,450 m (4,757 ft)	3,900 m (12,795 ft)
Recognition	370 m (1,214 ft)	1,040 m (3,412 ft)

<b>19 mm (0.75 in) WFOV lens</b>	<b>Human 1.8 x 0.5 m (5.9 x 1.6 ft)</b>	<b>Object 2.3 x 2.3 m (7.5 x 7.5 ft)</b>
Detection	440 m (1,444 ft)	1,240 m (4,068 ft)
Recognition	110 m (361 ft)	320 m (1,050 ft)
<b>13 mm (0.51 in) WFOV lens</b>	<b>Human 1.8 x 0.5 m (5.9 x 1.6 ft)</b>	<b>Object 2.3 x 2.3 m (7.5 x 7.5 ft)</b>
Detection	300 m (984 ft)	840 m (2,756 ft)
Recognition	74 m (243 ft)	215 m (705 ft)
<b>9 mm (0.35 in) WFOV lens</b>	<b>Human 1.8 x 0.5 m (5.9 x 1.6 ft)</b>	<b>Object 2.3 x 2.3 m (7.5 x 7.5 ft)</b>
Detection	200 m (656 ft)	590 m (1,936 ft)
Recognition	50 m (164 ft)	148 m (486 ft)

### Field of View

VOT-320 cameras are available with a choice of various lenses to match different demands. Three of them offer a wide field of view (WFOV), one a narrow field of view (NFOV).

WFOV	9 mm (0.35 in)	13 mm (0.51 in)	19 mm (0.75 in)
Field of view (H x V)	48° x 37°	34° x 26°	24° x 18°
F	1.25	1.25	1.25
Spatial resolution (mrad)	2.778	1.923	1.316
Min focus distance*	3.2 cm (1.3 in)	7.6 cm (3.0 in)	15.3 cm (6.0 in)

\* Measured with the lens unscrewed to the point just before the O-ring groove becomes visible.

NFOV	60 mm (2.36 in)
Field of view (H x V)	7.6° x 5.7°
F	1.25
Spatial resolution (mrad)	0.417
Min focus distance*	2.3 m (7.546 ft)

\* Minimum focus distance is measured one complete revolution after the lens first engages the lens flange.

## Functions

### Outstanding Image Quality

With its 320x240 VOx sensor, the VOT-320 IP camera delivers outstanding image quality. The Bosch designed digital video processing system optimally handles the thermal image format without compromise. Temperature differences of 50 mK or less are made visible. Video processing features include multiple automatic, dynamic image optimization algorithms, as well as polarity control (white hot/black hot). Automatic flat-field correction (FFC) updates correction coefficients of the camera, resulting in a more uniform array output.

### Efficient Bandwidth and Storage Management

The cameras use H.264 compression, bandwidth throttling, and multicast capabilities to manage bandwidth and storage requirements efficiently, while delivering high image quality and resolution. Bosch's innovative tri-streaming feature enables VOT-320 IP cameras to generate two independent H.264 streams and one JPEG stream simultaneously. This allows the streaming of one high-resolution H.264 stream for live viewing and recording, and a second lower resolution H.264 stream for constrained-bandwidth networks. The JPEG images can be streamed to another device at the same time. The JPEG video stream also provides easy integration with third-party JPEG compatible video management systems.

### Recording Options

VOT-320 cameras offer unparalleled recording options. Attached to the network, they can use iSCSI targets directly. The iSCSI storage target support enables the cameras to function as a conventional DVR, while streaming high-performance live video across the network. The VOT-320 cameras also provide the user with a local storage option within the camera. Users can record the streams independently on different media. Thus video can be recorded centrally on iSCSI drives managed by VRM Video Recording Manager and redundantly on the local SD card. If necessary (for example, in case of a network failure), VRM can fill the gap in the central recording using Automatic Network Replenishment (ANR). When used with a SD card, the camera is a complete, self-contained surveillance system without the need for additional equipment.

### ONVIF Conformance

The camera conforms to the ONVIF (Open Network Video Interface Forum) specification which guarantees interoperability between network video products regardless of manufacturer. ONVIF conformant devices are able to exchange live video, audio, metadata and control information. They are automatically discovered and connected to network applications such as video management systems.

### Unsurpassed Flexibility

There are many ways to access the camera's video: on a PC using a web browser, with the Bosch Video Management System, or with the supplied Bosch Video Client.

### Bosch Video Client Surveillance Software

The bundled Bosch Video Client PC surveillance software offers a user-friendly interface to support easy installation and configuration. A wizard allows the configuration of multiple cameras simultaneously using an auto detection device. Multiple cameras can be monitored in one screen and video clips on the SD card can be archived and searched in a single application.

Bosch Video Client supports up to 16 cameras without licensing and can be expanded to up to 64 cameras by adding 8- or 16-channel licenses.

**Easy Upgrade**

Remotely upgrade the camera whenever new firmware becomes available. This ensures up-to-date products, thus protecting investment with little effort.

**Access Security**

Various security levels are available for accessing the network, the camera, and the data channels. As well as password protection with three levels, 802.1x authentication using a RADIUS is supported. To secure Web browser access use HTTPS with a SSL certificate stored in the camera. For total data protection, the video and audio communication channels can be independently AES encrypted with 128-bit keys by installing the optional Encryption Site License.

**Typical Applications**

- Airports, ports, and rail infrastructure
- Traffic monitoring (air, land and sea)
- Border control
- Homeland security
- Perimeters surveillance

**Certifications and approvals**

**Approvals**

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**Safety**

Region	Number
	IEC 60950-1

**Electromagnetic Compatibility**

Region	Number
Immunity	
EU	EN50130-4
	EN55024
	EN50121-4
	EN61000-4-5
	EN50130-4/13

**Emission**

EU	EN55022 Class B
	EN61000-3-2
	EN61000-3-3
AUS/NZ	AS/NZS CISPR22
US	FCC 47 CRF Part 15 Subpart B Class B
	VCCI Class B

**Environment**

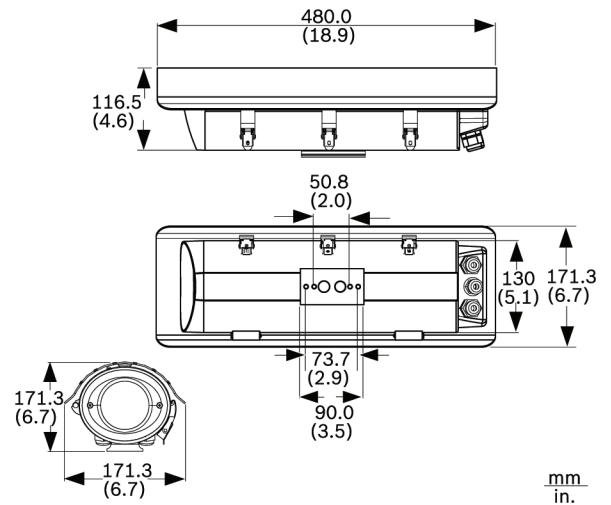
Region	Number
	EN60068-2-5 SA

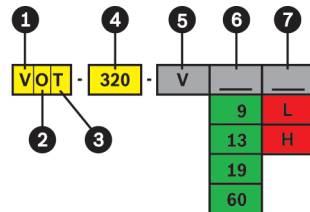
Region	Certification
Europe	CE VOT-320
USA	UL Bosch Engineering UL online certifications directory (link)

**Installation/configuration notes**

**Dimensions**



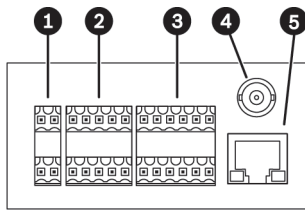
**Ordering Chart**



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|----------------------|--------------------------|
| 1 V: Video camera    | 6 9: 9 mm (0.35 in) lens |
| 2 O: Outdoor         | 13: 13 mm (0.51 in) lens |
| 3 T: Thermal         | 19: 19 mm (0.75 in) lens |
| 4 320x240 resolution | 60: 60 mm (2.36 in) lens |
| 5 V: Variant         | 7 L: 8.33 Hz             |
|                      | H: 30 Hz                 |

\* Subject to export limitations (UTIC-list)

## Interfaces



1	AC inputs and window defroster	4	Video out (NTSC)
2	PT head connections	5	10/100 Base-T Fast Ethernet
3	Alarm in, relay out, COM (RS-232/422/485)		

## Parts included

Quantity	Components
1	VOT-320 thermal IP camera
1	focusing tool for WFOV lenses
1	allen key
5	terminal blocks
10	screws
3	tamper resistant torx screws
1	torx wrench
4	cable glands
3	nuts
3	plugs
1	shielded RJ45 plug
2	washers
2	lock washers
1	Quick Installation Guide
1	mini DVD-ROM with Bosch Video Client, manuals, software and tools
1	pre-installed IVA Intelligent Video Analysis

## Technical specifications

Electrical	
Power supply	24 VAC (SELV) ±10% 50/60 Hz
Current consumption	1.4 A (24 VAC) max with all heaters on 3.1 A (24 VAC) max with all heaters on and PT at full load
Camera Module	
Image sensor	Focal Plane Array (FPA), un-cooled Vanadium Oxide (VOx) microbolometer
Picture elements	320(H) x 240(V)

Spectral response	7.5 to 13.5 μm
Thermal sensitivity	< 60 mK at F1.0
Scene range	-40 °C to +160 °C (-40 °F to +320 °F)

Lenses	
Lens types	
• WFOV	9 mm (0.35 in), 13 mm (0.51 in), 19 mm (0.75 in)
• NFOV	60 mm (2.36 in)

Input/output	
Video	1 output
• connector	BNC
• impedance	75 ohm
• signal	Analog composite, 0.7 to 1.2 Vpp, NTSC
Alarm	2 inputs
• connector	Clamp (non-isolated closing contact)
• activation resistance	10 ohm max
Relay	2 outputs
• connector	Clamp
• signal	30 Vpp (SELV), 0.2 A
COM port	Clamp, RS-232/422/485
PT head	Clamp for direct connection of LTC 9418/11 and LTC 9418/21 (or the like; max. 0.85 A per channel @ 24 VAC)

Video	
Video compression	H.264 MP (Main Profile), H.264 BP+, M-JPEG, JPEG
Data rate	9.6 kbps to 6 Mbps
Resolution (H x V)	320 x 240
Frame rate	
• VOT-320-V xxH	30 ips*
• VOT-320-V xxL	8.33 ips
Overall IP delay	240 ms max. (H.264 MP, GOP IP) 400 ms max. (H.264 BP+, GOP IP)
GOP structure	IP, IBP, IBBP
Polarity	White hot, black hot
Video Motion Analysis	MOTION+, IVA

\* Subject to export limitations (UTIC-list)

<b>Local Storage</b>	
Memory card slot	1 SD card (not included)
Recording	Continuous recording, ring recording, Alarm/events/schedule recording
<b>Software Control</b>	
Unit configuration	Via Web browser or Bosch Video Client
Software update	Flash ROM, remote programmable
<b>Network</b>	
Protocols	RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP, SNMP, RTSP, 802.1x, iSCSI, DynDNS, UPnP
Encryption	TLS 1.0, SSL, AES (licensed option)
Ethernet	10/100 Base-T, auto-sensing, half/full duplex, RJ45
<b>Mechanical</b>	
Dimensions (H x W x L)	See drawings
Weight	3.5 kg (7.7 lb)
Rear fitting	1x
• Cable diameter	4.0 to 8.0 mm (0.16 to 0.31 in) or 2.0 to 6.0 mm (0.08 to 0.24 in)
Rear fittings	2x
• Cable diameter	6.0 to 12.0 mm (0.24 to 0.47 in)
Window	3 mm (0.12 in) germanium glass
Locking clasps	Tamper-resistant screws provided
Tamper protection	Tamper switch integrated
Housing	Aluminum casing, neoprene gaskets
Color	Gray
Mounting	2 pairs of tapped holes
• Thread	1/4-20
• Inner pair	50.8 mm (2.0 in) center spread
• Outer pair	73.7 mm (2.9 in) center spread
Tripod mount	Bottom (isolated) 1/4-inch 20 UNC
<b>Environmental</b>	
Operating temperature	-50 °C to +55 °C (-58 °F to 131 °F)
Storage temperature	-55 °C to +70 °C (-67 °F to +158 °F)
Operating humidity	20% to 93% RH
Storage humidity	up to 98% RH
Enclosure protection	IP66, NEMA Type 4

## Ordering information

### VOT-320-V 9L

320x240 thermal IP camera with 9 mm (0.35 in) lens (8.33 Hz)

Order number **VOT-320V009L**

### VOT-320-V 13L

320x240 thermal IP camera with 13 mm (0.51 in) lens (8.33 Hz)

Order number **VOT-320V013L**

### VOT-320-V 19L

320x240 thermal IP camera with 19 mm (0.75 in) lens (8.33 Hz)

Order number **VOT-310V019L**

### VOT-320-V 60L

320x240 thermal IP camera with 60 mm (2.36 in) lens (8.33 Hz)

Order number **VOT-320V060L**

### VOT-320-V 9H

320x240 thermal IP camera with 9 mm (0.35 in) lens (30 Hz)

Subject to export regulations (UTIC-list)

Order number **VOT-320V009H**

### VOT-320-V 13H

320x240 thermal IP camera with 13 mm (0.51 in) lens (30 Hz)

Subject to export regulations (UTIC-list)

Order number **VOT-320V013H**

### VOT-320-V 19H

320x240 thermal IP camera with 19 mm (0.75 in) lens (30 Hz)

Subject to export regulations (UTIC-list)

Order number **VOT-320V019H**

### VOT-320-V 60H

320x240 thermal IP camera with 60 mm (2.36 in) lens (30 Hz)

Subject to export regulations (UTIC-list)

Order number **VOT-320V060H**

### LTC 9215/00 Mount

Wall mount for LTC/HSG 948x, HSG9583 and UHI/UHO housings

Order number **LTC9215/00**

### LTC 9215/00S Mount

Short wall mount for LTC/HSG 948x, HSG9583 and UHI/UHO housings

Order number **LTC9215/00S**

### UPA-2450-60 Power Supply, 120 V, 60 Hz

Indoor, 120 VAC, 60 Hz In; 24 VAC, 50 VA Out

Order number **UPA-2450-60**

### UPA-2450-50 Power Supply, 220 V, 50 Hz

Indoor, 220 VAC, 50 Hz In; 24 VAC, 50 VA Out

Order number **UPA-2450-50**

**VG4-A-PSU1 120 VAC Power Supply Unit**

120 VAC, 100 W, white, for an AutoDome Series camera

Order number **VG4-A-PSU1**

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**VG4-A-PSU2 230 VAC Power Supply Unit**

230 VAC, 100 W, white, for an AutoDome Series camera

Order number **VG4-A-PSU2**

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**BVC-ESIP08A Video Client 8-camera license**

8 IP camera add-on license for Video Client

Order number **BVC-ESIP08A**

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**BVC-ESIP16A Video Client 16-camera license**

16 IP camera add-on license for Video Client

Order number **BVC-ESIP16A**

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**Accessories**

**LTC 9418/11 Weatherproof Pre-Position Pan/Tilts**

Max. load 10 kg (22 lb), 24 VAC, 50 Hz

Order number **LTC 9418/11**

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**LTC 9418/21 Weatherproof Pre-Position Pan/Tilts**

Max. load 10 kg (22 lb), 24 VAC, 60 Hz

Order number **LTC 9418/21**

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**LTC 9219/01 J-Mount**

Feed-through J- mount for LTC/HSG 948x, HSG9583 and UHI/UHO housings

Order number **LTC9219/01**

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