



# TruVision ANPR IP Camera Installation Guide

P/N 1073574-EN • REV C • ISS 27JUL21

**Copyright** © 2021 Carrier. All rights reserved. Specifications subject to change without prior notice.

This document may not be copied in whole or in part or otherwise reproduced without prior written consent from Carrier, except where specifically permitted under US and international copyright law.

**Trademarks and patents** TruVision names and logos are a product brand of Aritech, a part of Carrier.

Other trade names used in this document may be trademarks or registered trademarks of the manufacturers or vendors of the respective products.

**Manufacturer** PLACED ON THE MARKET BY:

Carrier Fire & Security Americas Corporation Inc.  
13995 Pasteur Blvd, Palm Beach Gardens, FL  
33418, USA

AUTHORIZED EU REPRESENTATIVE:

Carrier Fire & Security B.V.

Kelvinstraat 7, 6003 DH Weert, Netherlands

**Certification**



**FCC compliance**

**Class A:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of

this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**FCC conditions** This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This Device must accept any interference received, including interference that may cause undesired operation.

**ACMA compliance** **Notice!** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

**Canada** This Class A digital apparatus complies with CAN ICES-003 (A)/NMB-3 (A).

Cet appareil numérique de la classe A est conforme à la norme CAN ICES-003 (A)/NMB-3 (A).

**European Union directives** This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the EMC Directive 2014/30/EU, the RoHS Directive 2011/65/EU.



**2012/19/EU (WEEE directive):** Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: [www.recyclethis.info](http://www.recyclethis.info).



**2013/56/EU & 2006/66/EC (battery directive):** This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: [www.recyclethis.info](http://www.recyclethis.info).

**Product warnings  
and disclaimers**

THESE PRODUCTS ARE INTENDED FOR SALE TO AND INSTALLATION BY QUALIFIED PROFESSIONALS. CARRIER FIRE & SECURITY CANNOT PROVIDE ANY ASSURANCE THAT ANY PERSON OR ENTITY BUYING ITS PRODUCTS, INCLUDING ANY "AUTHORIZED DEALER" OR "AUTHORIZED RESELLER", IS PROPERLY TRAINED OR EXPERIENCED TO CORRECTLY INSTALL FIRE AND SECURITY RELATED PRODUCTS.

For more information on warranty disclaimers and product safety information, please check <https://firesecurityproducts.com/policy/product-warning/> or scan the following code::



**Contact information**

EMEA: <https://firesecurityproducts.com>

Australian/New Zealand:

<https://firesecurityproducts.com.au/>

**Product  
documentation**

Please consult the following web link to retrieve the electronic version of the product documentation. The manuals are available in several languages.





# Content

## **Introduction 3**

Product overview 3

Contact information and manuals /tools /firmware 3

## **Installation 4**

Installation environment 4

Package contents 5

Cable requirements 7

Camera description 8

Setting up the camera 9

IR illumination 9

Accessing the SD card 10

Mounting the bullet camera 10

Using the camera with a TruVision recorder or another  
system 11

Using the camera with TruVision Navigator 11

## **Installation recommendations 11**

Camera angle 12

Camera height 14

Camera lens selection 15

Tilt of the license plate 16

License plate recognition 16

Depth of field 18

Wiegand interface 19

Network connection 20





# Introduction

## Product overview

This is the installation guide for ANPR IP camera models:

- TVB-5412 (2 MP ANPR IP camera, 2.8 to 12 mm)
- TVB-5413 (2 MP ANPR IP camera, 8 to 32 mm)

## Contact information and manuals / /firmware

For contact information and to download the latest manuals, tools, and firmware, go to the web site of your region:

---

EMEA:	<a href="https://firesecurityproducts.com">https://firesecurityproducts.com</a> Manuals are available in several languages.
Australian/New Zealand:	<a href="https://firesecurityproducts.com.au/">https://firesecurityproducts.com.au/</a>

---

# Installation

This section provides information on how to install the cameras.

## Installation environment

When installing your product, consider these factors:

- **Electrical:** Install electrical wiring carefully. It should be done by qualified service personnel. Always use a proper PoE switch or a 12 VDC UL listed Class 2 or CE certified power supply to power the camera. Do not overload the power cord or adapter.
- **Ventilation:** Ensure that the location planned for the installation of the camera is well ventilated.
- **Temperature:** Do not operate the camera beyond the specified temperature, humidity or power source ratings. The operating temperature of the camera is between -30 to +60°C (-22 to 140°F). Humidity is below 90%.
- **Moisture:** Do not expose the camera to rain or moisture or try to operate it in wet areas. Turn the power off immediately if the camera is wet and ask a qualified service person for servicing. Moisture can damage the camera and create the danger of electric shock.
- **Servicing:** Do not attempt to service this camera yourself. Any attempt to dismantle or remove the covers from this product will invalidate the warranty and may also result in serious injury. Refer all servicing to qualified service personnel.
- **Cleaning:** Do not touch the sensor modules with fingers. If cleaning is necessary, use a clean cloth with some ethanol and wipe the camera gently. If the camera will not

be used for an extended period, put on the lens cap to protect the sensors from dirt.

## Package contents

Check the package and contents for visible damage. If any components are damaged or missing, do not attempt to use the unit; contact the supplier immediately. If the unit is returned, it must be shipped back in its original packaging.

### ANPR IP VF bullet camera

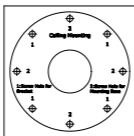
- Camera



- Back box



- Template



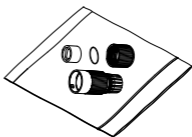
- Screws M4.8 × 18  
(4 pcs) to attach the back box



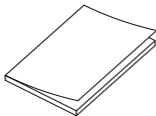
- Screws (4 pcs)



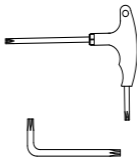
- Water joint: Provide water resistance to network connection



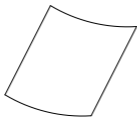
- Installation manual



- Wrench



- WEEE and Battery Disposal sheets



---

**CAUTION:** Use direct plug-in UL listed power supplies marked Class 2/CE certified or LPS (limited power source) of the required output rating as listed on the unit.

---

---

**CAUTION:** Risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

---

## Cable requirements

For proper operation, adhere to the following cable and power requirements for the cameras. Category 5 cabling or better is recommended. All network cabling must be installed according to applicable codes and regulations.

Table 1 below lists the requirements for the cables that connect to the camera.

**Table 1: Recommended power cable requirements**

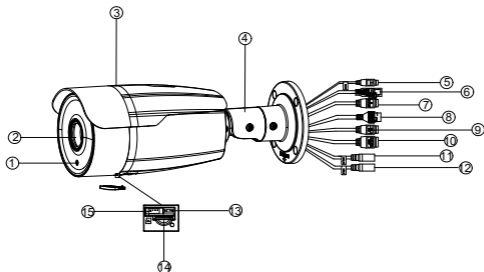
---

VF bullet camera:	12 VDC power wires or PoE+ (802.3at)
-------------------	--------------------------------------

---

## Camera description

Figure 1: ANPR IP VF bullet camera



- |                           |                  |
|---------------------------|------------------|
| 1. Light sensor           | 9. Power supply  |
| 2. Lens                   | 10. Alarm I/O    |
| 3. Shield                 | 11. Audio output |
| 4. Mounting base          | 12. Audio input  |
| 5. DC 12V output          | 13. Reset button |
| 6. BNC output             | 14. TF card slot |
| 7. Wiegand interface      | 15. Serial port  |
| 8. Ethernet RJ45 PoE port |                  |

## Setting up the camera

**Note:** If the light source where the camera is installed experiences rapid, wide variations in lighting, the camera may not operate as intended.

### To quickly put the camera into operation:

1. Prepare the mounting surface.
2. Mount the camera on the mounting surface using the appropriate fasteners. See “Mounting the bullet camera” on page 10.
3. Set up the camera's network and streaming parameters so that the camera can be controlled over the network. For further information, please refer to the “TruVision ANPR IP Camera Configuration Manual”.
4. Program the camera as appropriate for its location. For further information, please refer to the “TruVision ANPR IP Camera Configuration Manual”.

## IR illumination

The camera's built-in IR illuminators provides high-quality video in low-light environments, even when there is no other illumination available.

You can configure the IR illuminators using a web browser or a client software, such as TruVision Navigator. If the function is enabled, the IR light is On when the camera enters night (black and white) mode. If disabled, the IR light is always Off.

The visible IR range may vary due to multiple factors such as weather, IR reflection level of objects in frame, lens adjustment, and camera settings. Please refer to the camera datasheet for the standard IR range.

**Note:** Avoid installing the IR camera closely facing a solid object such as a tree or wall. The reflection will cause over-exposure and loss of visibility of detail in field of view.

## Accessing the SD card

Insert a Micro SD card with up to 128GB to use the camera as an additional recording device, or as a backup in case of failure of communication with the network video recorder (see Figure 1 on page 8). The card is not supplied with the camera.

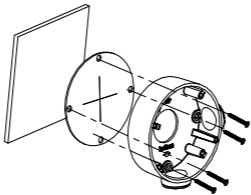
Recorded video and log files can be accessed via the web browser or via TruVision Navigator.

## Mounting the bullet camera

Mount the camera on a ceiling or wall.

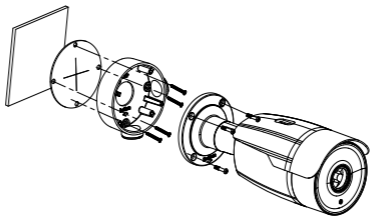
**To mount the bullet camera:**

1. Use the supplied template to mark out the mounting area. Drill the screw holes on the ceiling or wall. If you need to route the cables from the camera base, drill a cable hole in the ceiling or wall.
2. Secure the back box to the ceiling or wall with the supplied screws.





3. Hook the camera to the back box with the safety cable.  
Use the screws to fix the camera to the back box.



## Using the camera with a TruVision recorder or another system

Please refer to the NVR/DVR user manuals for instructions on connecting and operating the camera with these systems.

## Using the camera with TruVision Navigator

A camera can either be connected to a TruVision, or it can be added directly to TruVision Navigator. Please refer to the TruVision Navigator user manual for instructions on operating the camera with TruVision Navigator.

## Installation recommendations

When installing the camera, please follow these recommendations:

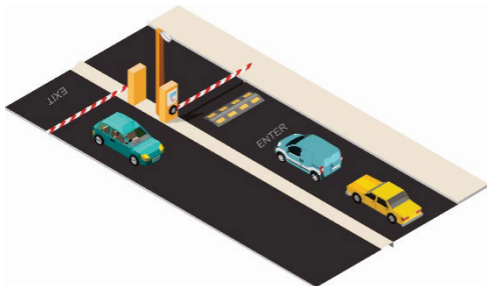
- Use one camera for each lane.

- The recommended minimum height of a license plate should be between 20 to 30 pixels in the image captured by the 2-megapixel resolution camera.

## Camera angle

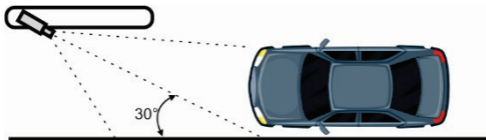
It is important that the camera is correctly installed to ensure the accuracy of the license plate detection.

- **Entrance**



### Horizontal angle

The viewing angle of the camera should be within 30 degrees to the path of movement.



## Vertical angle

The angle between the lens direction and the horizontal should be less than 30 degrees.

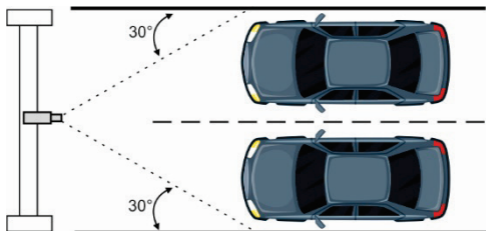


- **Road**



## Horizontal angle

The viewing angle of the camera should not exceed 30 degrees.



### Vertical angle

The angle between the lens direction and the horizontal should be less than 30 degrees



### Camera height

You must first determine the installation height and then the detection range (L). Use the following formula to calculate the detection range:

$$L = \tan 30 \times H$$



$$L = \tan 30 \times H = 1.7 \times H$$

**Table 2: Camera height and detection range examples**

Height (m)	Min. L (m)
1.5	4
2	4
3	5.1
3.5	6
4	6.8

When installing the camera at entrances, it is recommended that the camera height is between 1.5 m and 4 m and that the detection range is less than 4 m.

## Camera lens selection

The distance required to recognize the license plate is determined by the focal length of the lens. You must select the correct lens to have enough pixels in the frame.



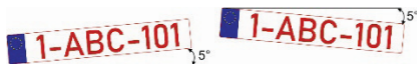
See Table 3 below for guidance.

**Table 3: Recognition distance by camera type**

Camera	Lens (mm)	Min. recognition distance (m)	Max. recognition distance (m)
TVB-5412	2.8-12	2.5	12
TVB-5413	8-32	7.2	28.9

## Tilt of the license plate

The license plate should be as horizontal as possible. The recommended tilt angle is +/-5 degrees.



Vehicles should also be directly facing the camera and not at an angle.

## License plate recognition

Before you start the installation, please ensure that:

- To reduce the impact of the vehicle's headlights at night, the shutter speed should be at least 1/1000 s. To ensure that the lines are not obscured, the shutter speed should not be greater than 1/4000 s.
- To avoid overexposing the license plate, the recommended Gain value is 20. You may need to adjust the value depending on the environment and camera position.

- Disable the WDR and BLC functions to ensure details are visible. You may need to adjust the value depending on the environment and camera position.
- The digital noise reduction (DNR) should be between 10 and 20. You may need to adjust it depending on the environment and camera position.

Invalid information may occasionally be detected as a license plate, such as advertisements or parts of images with numbers and letters. To avoid this from happening, please follow these guidelines:

- Adjust the ROI to avoid including the parts of an image that may be falsely detected.
- Adjust the minimum and maximum license plate pixel settings.
- Adjust the angle of the lens or camera.
- Set the exposure time according to the values shown below. It is assumed that the camera is mounted at a horizontal angle of 30 degrees.

<b>Exposure time (s)</b>	<b>Max. vehicle speed (km/h)</b>
1/100	5
1/500	40
1/1000	100
1/2000	200
1/4000	400

Please refer to the ANPR camera configuration manual to configure the exposure time.

## Depth of field

You need to set up the camera for the minimum depth of field (DOF) to ensure that the vehicle image is clearly captured. The DOF is the distance between the nearest and furthest objects giving an acceptable focused image.

Use the following formula to calculate the DOF:

$$L_{\text{dof}} = \frac{4 \times T_{\text{rec}} \times V_{\text{max}}}{3600} \text{ m}$$

Where:

Ldof = L (depth of field) in meters (m)

Trec = Recognition time per vehicle plate in milliseconds (ms)

Vmax = Maximum vehicle speed in kilometers per hour (kmph)

See Table 4 below for examples of calculation results for the depth of field.

**Table 4: Examples of calculation results for the depth of field**

Vmax (km/h)	Trec (ms)				
	100	200	300	400	500
	Ldof (m)				
40	4	9	13	18	22
80	9	18	27	36	44
100	11	22	33	44	56
120	13	27	40	53	67
140	16	31	47	62	78



## Notes:

- The minimum height of a vehicle license plate on the edge of the sharpness zone should be between 20 to 30 pixels in the image captured by the 2-megapixel resolution camera.
- The DOF depends on the F-number of the lens diaphragm. However, this may automatically change depending on the illumination. Either set the iris control to **Manual** and not **Auto**, or ensure that the DOF length is enough for the worst possible illumination situation.
- Before focusing the lens, under **Exposure Settings** change the iris mode to **Manual**. Once the adjustment is done, change the setting back to **Auto**.

## Wiegand interface

The camera can be connected to an access control system with Wiegand reader interface. Please refer to the ANPR camera configuration manual to configure the bit format of the camera Wiegand interface.

Camera Wiegand interface	Connection	Access Control Wiegand reader interface
1 D0	—————	D0 (Data 0)
2 D1	—————	D1 (Data 1)
3 GND	—————	GND

# Network connection

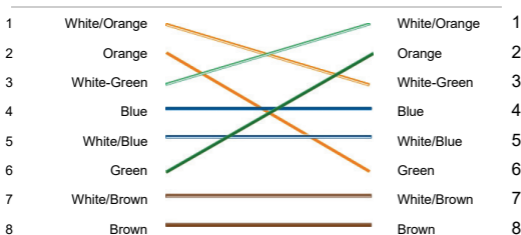
## Pin definitions

There are eight wires on a standard UTP/STP cable, and each wire is color-coded. The following shows the pin allocation and color of straight and crossover cable connection:

**Figure 2: Straight-through cable**



**Figure 3: Cross-over cable**



Please make sure your connected cables have the same pin assignment and color as above before deploying the cables in your network.

## Specifications

---

### Electrical

---

Voltage input	12 VDC, PoE+ (IEEE 802.3at)
Power consumption	Max. 16 W

---

### Miscellaneous

---

Connectors	Audio In/Out, Alarm In/Out, 12 VDC Power Input, Network Port (PoE), CVBS Output, AUX Power Output Wiegand Interface
Operating temperature	-30 to +60 °C (-22 to +140 °F)
Dimensions	Ø 115.8 × 291.8 mm (Ø 4.56 × 11.5 in.)
Weight	1675 g (3.69 lb)
Environmental rating	IP66

---

