# Intelligent Transportation Systems

## Video detection and monitoring solutions for traffic applications




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## FLIR Systems: the world leader in thermal imaging cameras

FLIR Systems is the world leader in the design, manufacturing and marketing of thermal imaging systems for a wide variety of commercial, industrial and government applications.

FLIR Systems' thermal imaging systems use state-of-the-art infrared imaging technology that detects infrared radiation - or heat. Based on detected temperature differences, thermal imaging cameras can create a crisp image. Sophisticated algorithms also make it possible to read correct temperature values from this image. We design and manufacture all of the critical technologies inside our products, including detectors, electronics, and special lenses ourselves.

*FLIR Systems, Stockholm, Sweden*

*FLIR Systems, Portland, USA*

*FLIR Intelligent Transportation Systems, Marke, Belgium*

*FLIR Systems, Santa Barbara, USA*

**Rapidly emerging markets and organization**
Interest for thermal imaging cameras has grown considerably the last few years in a large variety of markets. More and more professionals are discovering that thermal imaging cameras are powerful tools that can help them to solve problems they are faced with.

Through an active acquisition strategy FLIR Systems wants to be present in all emerging markets where thermal imaging can play a pivotal role.

**Traffic video detection**
One of the markets that is rapidly discovering the benefits thermal imaging has to offer is the traffic video detection market. To ensure full presence in this market, FLIR Systems acquired the former Traficon. The company has been a major player in the traffic market for more than 25 years.

**FLIR Intelligent Transportation Systems**
FLIR Intelligent Transportation Systems, as the company is known today, has all the know-how to offer you the most advanced solutions for traffic video detection and monitoring. The ability to offer thermal imaging technology will position FLIR Intelligent Transportation Systems even stronger in the market.

# FLIR Intelligent Transportation Systems

## Video detection and monitoring solutions for traffic applications

Traffic managers all over the world use technology from FLIR Intelligent Transportation Systems to monitor and manage traffic streams. Be it for monitoring motorists and pedestrians in urban areas, for detecting incidents on highways and in tunnels, or for traffic data collection purposes.

FLIR's intelligent detection and monitoring solutions enhance traffic safety and mobility on a daily basis, worldwide.

FLIR Intelligent Transportation Systems offers both the hardware and software for intelligent traffic detection and monitoring. The combination of a video camera or thermal imaging camera with intelligent video analytics provides traffic managers worldwide a perfect solution for managing and monitoring traffic streams.

FLIR ITS has all the tools to monitor traffic, detect hazardous incidents, and to provide data and information that improves traffic safety and mobility.

**Key benefits of video detection**

- Above-ground detection
- Combination of data, alarms and video images
- High reliability
- Flexible configurations
- Wide-area detection
- No road closure needed for installation and configuration
- Low maintenance cost

*Traditional video cameras as well as thermal cameras can be combined with FLIR's traffic video analytics.*

**Real-time analysis**

Real-time analysis of video or thermal camera images allows for more efficient traffic management in tunnels, on highways and in urban areas. Traffic lights can be adapted in real time according to the current traffic flow. And in case of incidents, early detection enables fast intervention of rescue teams and prevents secondary accidents.

**Video detection - seeing is believing**

The combination of both numerical data and a visual image sets video detection apart from all other detection systems. The immediate visual feedback received from a video detection system on a monitor is invaluable for the traffic manager or operator.

Having a visual image of the situation also allows the traffic manager to assess what is happening and to take appropriate action.

**Cost-effective**

Video detection systems for monitoring traffic streams are a very cost-efficient solution. Installation costs are low. All cameras can be easily installed on existing structures like traffic lights or on other existing poles.

Since all installations are done above the ground, there is no need for civil works. Nothing needs to be installed into the road surface so there is no need for road closures or other disturbances. Detection zones can be easily moved or adapted if the traffic situation changes.

**Efficient and reliable**

FLIR Systems' video detection and monitoring systems are used all over the globe. Traffic managers appreciate their high incident detection rate and high detection speed. Moreover, the incidents are detected very fast. This is translated into a low Mean Time to Detect (MTTD) and a low False Alarm Rate (FAR).

**Proven technology**

Traffic managers worldwide have embraced the technology from FLIR Intelligent Transportation Systems for managing traffic streams. More than 100,000 video detectors are operational worldwide in over 70 countries.

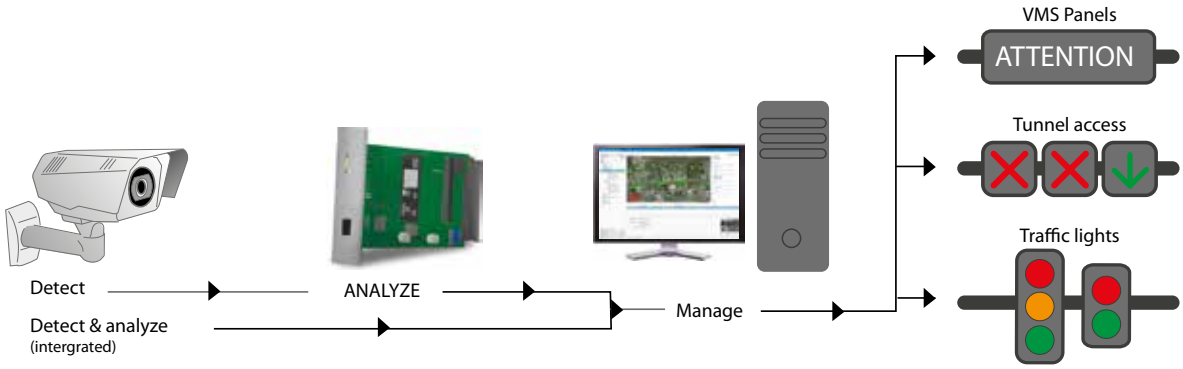
FLIR has Automatic Incident Detection (AID) installations in more than 600 tunnels. More than 750 kilometers of tunnels are continuously being monitored by our systems.

FLIR solutions are being used for traffic light management at more than 20,000 intersections worldwide.

*FLIR SafeWalk for pedestrian detection*

# How video detection works

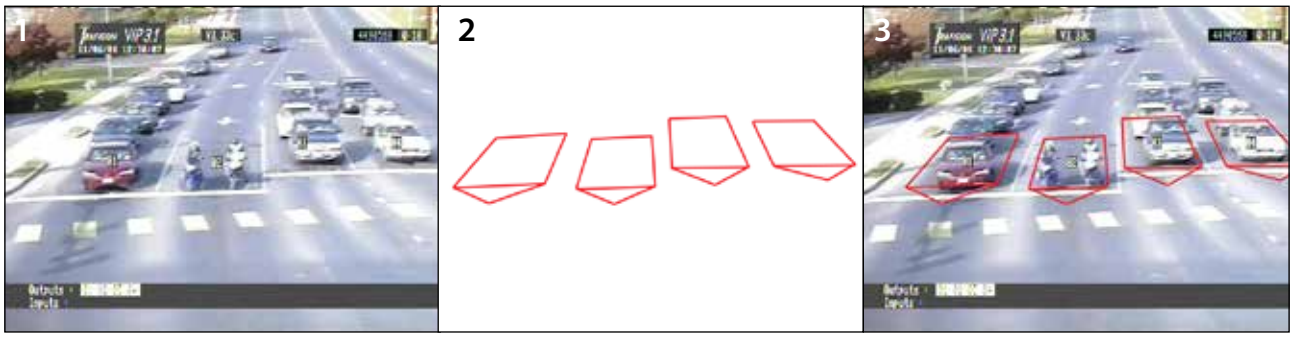
An installed video or thermal imaging camera sends an input signal to a detection unit. This unit can either be on board of the camera or integrated into a standard 19-inch rack. When the camera or the video image processing modules are set, detection zones are superimposed onto the video image.



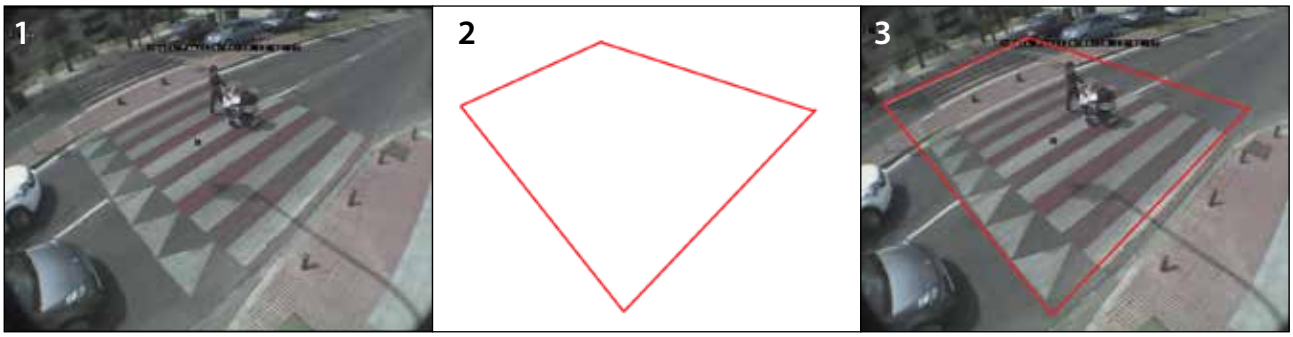

When a vehicle or a pedestrian enters a detection zone, a detection is activated by the system. Dedicated algorithms generate various types of traffic information: presence and incident-related data, data for statistical processing, and data for pre- and post-incident analysis.

Traffic data, compressed images and alarms are transmitted to the technical control room. The system can be installed so that the video image processor triggers a third party system such as a traffic light, electronic traffic sign or any other VMS panel. When an alarm is generated, the traffic manager in the control room will receive a visual image of the scene, so that he or she can decide to take appropriate actions.

## Vehicles




## Pedestrians




1. *A video camera is monitoring traffic. Its video signal is used as input for the detection unit.*
2. *During set-up of a video detector, detection zones are superimposed onto the video image.*
3. *Vehicles, pedestrians or bicyclists crossing the detection zones are detected.*

# Video detection and monitoring for any traffic environment

No matter if you are using video or thermal cameras, or a combination of both, FLIR solutions can be installed in any traffic environment. No matter if you want to monitor intersections, analyze what is happening on highways or perform automatic incident detection in tunnels, FLIR has the correct hardware and software for your specific application.

**Urban areas**

Urban areas are very challenging for traffic managers. Traffic lights at numerous intersections need to be controlled so that traffic flows smoothly through the city. In order to smoothen urban traffic flows, traffic control needs to be respected and enforced. Pedestrians and bicyclists need to be detected in order to avoid accidents. Data is collected in order to optimize traffic streams. FLIR Systems has a solution for all of these urban applications.

**Highways**

Traffic flows on highways have become increasingly complicated over the past years. A small incident can have far reaching consequences. Traffic jams need to be avoided as much as possible. Not only is there an economical cost involved but an ecological one as well. If an incident takes place it needs to be detected and corrected immediately.

Traffic streams are monitored continuously so that appropriate actions can be taken when necessary. Data about traffic density and speed is collected for analysis and future improvements.

**Tunnels**

Tunnels are among of the most dangerous traffic environments. In a tunnel, a seemingly small event — smoke, spilled cargo, a pedestrian — can cause a traffic incident that quickly escalates into a major tragedy. Investments in incident management are necessary as effective incident management can save lives.

**More and more traffic managers are convinced that, whatever traffic situation they want to monitor, video detection can offer a cost-effective and life-saving solution.**

# A FLIR solution for any traffic application

Whether you are monitoring traffic in an urban area, on highways or in tunnels, FLIR Systems offers a solution to ensure and safe smooth traffic.

## Intersection control

FLIR's video and thermal detection technology is a highly reliable and accurate alternative to loops and other detection technologies. FLIR sensors, both daylight and thermal, provide information on approaching or waiting vehicles at the intersection.

Vehicle and pedestrian detectors from FLIR Systems turn traffic lights into active management devices.

Thanks to smart intersection control, vehicle waiting times can be reduced so that traffic flows smoother. This reduces $CO_2$ emissions and enhances safety and mobility for vulnerable road users.

## Pedestrian safety and mobility

Pedestrians are also very vulnerable in urban areas. Next to traffic light management, pedestrian detection can be used to activate in road warning lights or flashing beacons. Compared to continuously flashing lights, detection-based warning signal activation is much more effective in alerting motorists and enhancing the visibility of pedestrians.


## Automatic Incident Detection (AID)

Effective incident management depends entirely on fast incident detection and fast incident verification. With each passing minute, the risk of another accident compounding the first one rises dramatically. The time to clear the original incident is critical.

Stopped vehicles, wrong-way drivers, queues, slow-moving vehicles, fallen objects… FLIR's AID solution analyses camera images in real-time and detects all major incidents within seconds.

This results in a substantially reduced risk of secondary incidents.

## Data collection & flow monitoring

Traffic is becoming more and more congested in all parts of the world. FLIR Systems accurately monitors traffic flow speed to help keep highways safe by differentiating levels of service: fluid, dense, congested or stop & go.

Queues during road-works can be monitored and travel time can be calculated based on information flows from Video Image Processors (VIPs).

## Law enforcement

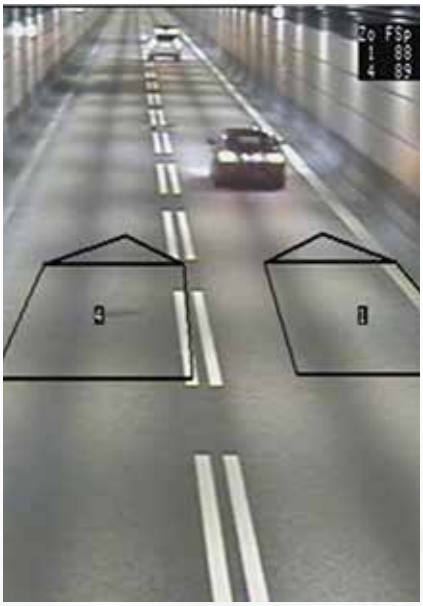
Transportation authorities worldwide want to reduce number of seriously injured people, encouraging enforcement for serious offences e.g. red light runners.

FLIR's Automatic Number Plate Recognition (ANPR) cameras can be linked to the traffic light controller to capture vehicles that are ignoring a red traffic light.

Thanks to the ANPR equipment, fines can be sent to offenders in a fast and automated way.

# FLIR ITS applications

## Smooth traffic between Denmark and Sweden



*As a link between Copenhagen (Denmark) and Malmö (Sweden), the 16.4 km Öresund bridge-tunnel is one of the longest in Europe. FLIR technology provides direct incident detection with more than 180 cameras, including stopped vehicle detection, vehicle counting, queue detection and detection of wrong-way drivers.*

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## TrafiCam vehicle presence sensors for Lima city streets

*TrafiCam vehicle presence sensors help streamline traffic at 218 road intersections in Lima, Peru. Thanks to FLIR technology, vehicle density levels can be monitored, determining the peaks and throughs in the day's traffic, which in turn allows city authorities to regulate the traffic lights' green waves.*

## Real-time traffic updates for Singapore roads

*Singaporean transport authorities are increasingly coping with congestion and road safety issues. The country is a vast urban area and thus a perfect fit for FLIR's urban vehicle detection technologies, designed to enhance safety and alleviate congestion. 350 video image processing boards installed along Singapore's arterial roads help provide motorists with real-time information on traffic conditions.*

## Enhanced pedestrian safety for Auckland, New Zealand


*FLIR's pedestrian presence sensors are the preferred solution to help enhance safety of vulnerable road users in Auckland, New Zealand. The detection of pedestrians by C-Walk and SafeWalk sensors activates in-road lighting, making crossing pedestrians extra visible for oncoming motorists.*

## FLIR's AID system monitoring 22 tunnels in Paris region



*FLIR Intelligent Transportation Systems delivered its Automatic Incident Detection (AID) solution to the Direction Inter-Départementale des Routes d'Ile-de-France (DIRIF) for integration in 22 tunnels in the Paris Region. Some 1,400 cameras linked to FLIR AID system are monitoring the heavy traffic driving through the Paris tunnels.*

# Thermal imaging cameras for traffic applications

Traditionally, CCTV cameras are being used for video monitoring. Although CCTV cameras are reliable tools for video analysis, they need additional algorithms to overcome the limitations of traditional video cameras. In order to work at night, light needs to be installed. CCTV cameras can also be blinded by light from the sun. Vehicles or pedestrians that are moving in shadows are sometimes not detected.

Thermal imaging cameras do not have these issues. A thermal imaging camera creates a crisp image based on subtle temperature differences. They do not need any light whatsoever. They are also not blinded by direct sunlight.

FLIR's high-performance thermal imaging cameras give you uninterrupted 24-hour detection of vehicles, pedestrians and cyclist regardless of the amount of light available.

**Sun glare**
Glare from the sun blinds conventional video cameras, effectively hiding vehicles, people, and animals. Thermal cameras ignore this glare, and only respond to the heat signatures they detect.


**Headlights**
Headlights are confusing to CCTV cameras.. This causes false and missed calls and makes accurate observation of highway traffic at night impossible. Thermal cameras are immune to headlight glare, so they see clearly.


**See through shadows**
Video cameras can miss pedestrians, cyclists, animals, and even cars if they're in the shadows. But since thermal cameras see heat, not light, there are no shadows in a thermal world.


**Long-range night viewing**
At night, a highway looks like an indistinct row of lights to a video camera, making meaningful data collection and incident assessment impossible. But thermal cameras see the heat signatures of vehicles clearly from miles away. They also provide clear video of the roadsides for awareness of parked vehicles or other hazards.

# FLIR FC-Series T

## **FLIR FC-series T -** Thermal imaging cameras for traffic monitoring

FLIR thermal imaging cameras are commonly integrated in traffic video detection and monitoring solutions. Needing no light at all to produce an image they can be used for a wide vatiety of traffic applications


**High image quality**
The FLIR FC-Series T are equipped with a maintenance free uncooled microbolometer detector that produces accurate images on which the smallest detail can be seen.

**Different lens options**
FLIR Systems offers the FLIR FC-Series T with different lens options. They are available with a 9 mm, 13 mm or 19 mm lens. Longer lenses offer a narrower field of view so that you can see farther.

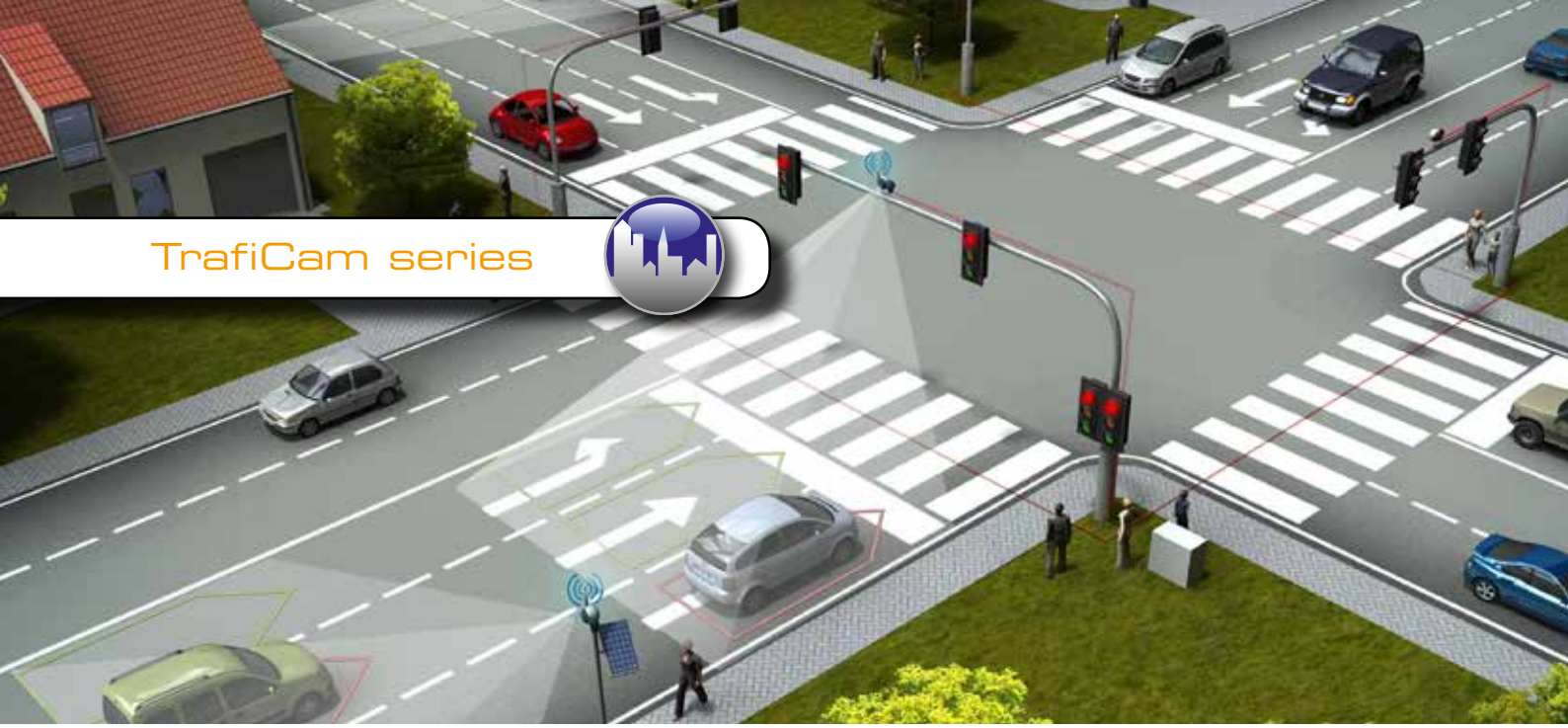
**Easy to install**
All FLIR FC-Series T thermal imaging camera can be installed on existing infrastructure.

**Designed for use in harsh environments**
The FC-Series T are extremely rugged systems. Their vital core is well protected, meeting IP66 requirements, against dust and water ingress. They operate between -50 ºC and +75 ºC. Perfect for all climates.

**Video analytics**
Just like all thermal imaging cameras, the FLIR FC series T works perfectly together with video analytics.

**Thermal imaging cameras:**

- Need no light to operate
- See in total darkness in practically all weather conditions
- Can be used in daylight as well
- Eliminate problems which visible camera detection systems are faced with such as missed or false calls
- Serve as a simple plug and play replacement for existing daylight cameras
- Are extremely affordable and easy-to-use



TrafiCam series

## **TrafiCam Series -** Vehicle presence sensor

The TrafiCam series of vehicle presence sensors combines a CMOS camera and video detector in one. The series includes two products:

- **TrafiCam:** vehicle presence sensor for standalone use
- **TrafiCam x-stream:** vehicle presence sensor and data collector with video streaming

Both the TrafiCam and TrafiCam x-stream sensors are used for detection and monitoring of moving and stationary vehicles at signalized intersections. Via detection outputs or via IP protocol, vehicle presence information is transmitted to the traffic controller so that signal timing can be adjusted dynamically. This way, vehicle waiting time at traffic lights is reduced and traffic flows are optimized. The smart TrafiCam sensors are a cost-effective and reliable alternative to inductive loops.

*Presence zones can be easily implemented and changed on a video image.*

**Direct visual verification of presence zones**

The TrafiCam series allows you to exactly position and verify the vehicle presence detection zones. Since these zones are displayed on a video image, you can easily reposition them in case of changing traffic situations.

**Multiple & direction sensitive vehicle detection zones**

TrafiCam and TrafiCam x-stream detect vehicles, day and night, in up to 16 zones. This allows vehicle presence detection over different lanes. The TrafiCam series has detection zones indicating presence of vehicles moving in a specific direction.

**Easy installation and fast configuration**

TrafiCam is easy to install. You can simply mount it on the existing infrastructure.

*TrafiCam is an esthetic product that combines a CMOS camera and video detector in one. It is the ideal tool for intersection management in urban areas.*

## TrafiCam x-stream

Compared to the standalone TrafiCam sensor, TrafiCam x-stream offers a number of additional functionalities.

**Video streaming**
TrafiCam x-stream offers streaming video at full frame rate which can be used for system and traffic monitoring in your control room. TrafiCam x-stream offers MPEG-4 or H.264 video compression. A user-friendly web interface allows TrafiCam x-stream users to manage their video sources online.

**Traffic data collection**
TrafiCam x-stream is also a cost-effective solution for traffic data collection (volume, speed, occupancy, gap time, headway and classification on multiple lanes), queue detection and traffic flow monitoring on highways and inter-urban roads. It can be used for temporary or permanent applications.

## TrafiCam Series

| | TrafiCam | TrafiCam x-stream |
|---|---|---|
| **Camera** | CMOS black & white | CMOS color |
| **Data streaming** | Single image | MPEG-4 or H.264 |
| **Direction sensitive detection zones** | yes | yes |
| **Vehicle detection zones** | 8 | 16 |
| **Data collection** | no | up to 4 lanes |

*TrafiCam x-stream is an above-ground sensor providing a wide range of traffic data on up to 4 lanes.*

**Key functionalities:**
- Vehicle presence detection at intersections
- Data collection (Traficam x-stream only)

**Key benefits:**
- All-in-one sensor (camera + video detection)
- Non-intrusive, above-ground installation
- Real-time verification and monitoring
- Real-time traffic view

# Pedestrian presence sensors

## C-Walk / SafeWalk

FLIR ITS pedestrian sensors are improving safety and efficiency in urban areas all around the world. Detection of pedestrians allows for the dynamic control of traffic lights and warning lights, such as flashing beacons or in-road lighting. The result? More safety, and at the same time less unnecessary delays to both pedestrians and motorists.

**FLIR ITS pedestrian sensor portfolio offers integrated solutions combining a camera and detector in one:**

- C-Walk: detection of crossing pedestrians
- SafeWalk: detection of waiting and approaching pedestrians

FLIR ITS C-Walk and SafeWalk sensors make use of predefined detection zones ("virtual loops"). As soon as a pedestrian enters the predefined zone, a detection output will trigger the traffic light controller or activate a warning signal.

**Main benefits:**

- All-in-one sensors (camera + detector)
- Above-ground installation
- Accurate zone positioning
- IP-addressable
- Reliable detection 24/7
- Cost-effective solution

**Pedestrian detection for traffic light control**

Crossing at signalized intersections can be dangerous for pedestrians. C-Walk and SafeWalk sensors can reduce the risk and enhance safety by adapting traffic light green times based on pedestrian presence information. C-Walk and SafeWalk also significantly reduce waiting time for both pedestrians and motorists.

**Pedestrian detection for activation of warning lights**

Warning lights are very effective in enhancing driver awareness and reducing risks for pedestrians. However, traditional, continuously flashing warning signals will have a reduced effect, as motorists do not receive any real stimulus to change driving behavior. C-Walk and SafeWalk are more effective, because they activate warning lights, such as in-road lighting or flashing beacons, only when pedestrians enter a pre-defined detection zone.

## **C-Walk -** Pedestrian presence sensor

*C-Walk is designed to improve pedestrian protection.*

## **SafeWalk -** Stereovision pedestrian presence sensor

*SafeWalk has been designed to detect stationary pedestrians, adjacent to the pole on which it is mounted.*

**Fast & easy installation**

SafeWalk and C-Walk sensors have been designed to avoid expensive installation and maintenance costs. As such, the installation process is quick and simple: install it, connect it and start analyzing the pedestrian detection zone. The sensors can simply be mounted on existing infrastructure.

**User-friendly system configuration**

Configuration of the sensor is done via portable PC with pre-installed user-friendly software. It takes less than five minutes and requires no specialist knowledge.

Using camera images, virtual pedestrian detection zones can be positioned accurately. Verification and viewing of the detection is possible via MPEG-4 streaming video.


## **VIP series -** Multi-functional video detection boards

The VIP series offers multi-functional Video Image Processing modules for traffic control. VIP boards integrate automatic incident detection, data collection, recording of pre and post incident image sequences and streaming video in one board. VIP modules have been installed for road and tunnel projects all over the world.

### VIP-T

*Multi-functional video detection board for analog cameras*

### VIP-IP

*Multi-functional video detection board for network cameras*

### VIP-TX

*Video encoder with multi-functional video detection*

*Stopped vehicle detection*

**Key benefits**

- Instant operator warning, logging and recording of events, data and video sequences
- On-board digital recording of pre- and post incident video sequences
- Extensive interfacing and reporting capabilities
- Field-proven video detection experience
- Fast and reliable 24/7
- Easy to install, trouble-free system integration
- High lifetime, low power, easy maintenance


## **TrafiBot -** Box camera with integrated video analytics and dual H.264 video streaming

The TrafiBot solution combines field-proven video detection algorithms with advanced camera optics and powerful processing technology in a single housing. TrafiBot is a network box camera that provides superior image quality, embedded AID analytics as well as multi-stream encoding. This combination of technologies makes for a very cost-effective solution which at the same time delivers top-level performance.


TrafiBot's advanced processing unit generates traffic data and incident detection information and thus supports traffic operators with alerts on stopped vehicles, wrong-way drivers, pedestrians, lost cargo, smoke, and traffic flow data.

Stopped vehicle


Inverse direction


Data collection

Fallen object


**Key benefits**

- All-in-one, cost-effective camera solution for Automatic Incident Detection
- Field-proven AID algorithms
- For indoor & outdoor applications
- Superb image quality
- Multi-codec (H.264, MJPEG) and multi-streaming
- Ethernet, direct optical fibre or IP over coax
- Focus-assist for easy & accurate installation
- ONVIF-compliant




| | VIP-T | VIP-IP | VIP-TX | TrafiBot |
|---|---|---|---|---|
| **Description** | Video analytics module for analog cameras | Video analytics module for network cameras | Encoder with embedded video analytics | Box camera with embedded H.264 video streaming and video analyt-ics |
| **Automatic incident detection** | ✓ | ✓ | ✓ | ✓ |
| **Data collection** | ✓ | ✓ | ✓ | ✓ |
| **Multi-codec & multi-streaming** | - | - | ✓ | ✓ |
| **Advanced camera optics** | - | - | - | ✓ |
| **Encoding format** | MPEG-4 | H.264, MPEG-4, MJPEG | H.264, MPEG-4, MPEG-2, MJPEG | H.264, MJPEG |
| **ONVIF compliant** | - | - | ✓ | ✓ |

## High-precision detection

### Automatic incident detection

**Traffic events**
Stopped vehicle
Speed drop
Levels of service
Overspeed
Wrong-way drivers
Traffic congestion
underspeed

**Non-traffic events**
Smoke in tunnel
Pedestrian
Fallen object

**Technical alarms**
Image quality
Camera tampering

### Traffic data collection

**Traffic flow data per lane**
Traffic flow speed, zone occupancy

**Integrated vehicle traffic data**
Average speed per vehicle class per lane (headway, gap time per length, class per lane), occupancy

**Individual vehicle traffic data**
Speed, gap time, headway, vehicle classification

**Edge-based analytics**
In traditional traffic monitoring systems, the video images captured by traffic cameras are first sent to a central server where the actual video analytics is being performed. The drawback of this approach is that high-quality video needs to be transmitted to the server over a network, which results in an increase in network traffic load. In an edge-based approach, the analytics functionality is positioned closer to the traffic camera, to the edge of the network so to speak.

With FLIR's VIP-TX board, video encoding and analytics are integrated into one unit. This means that if analytics is running on the edge, the network traffic is heavily reduced. In fact, there is no traffic as long as nothing relevant happens. Analytics can even be integrated into the actual camera, taking the edge-based principle one step further. This is the case with FLIR's box camera TrafiBot.


## **EYE-D -** Automatic Number Plate Recognition (ANPR) camera

EYE-D is a powerful ANPR camera that recognizes license plates from all over the world with the highest accuracy. Front or rear views of the vehicle are captured by the camera, processed by the powerful integrated Optical Character Recognition (OCR) software and then sent to a control center for further use.

**Key benefits**

- Detects on 2 lanes, up to 60 meter distance
- Powerful recognition software
- Worldwide license plate library
- Freedom of positioning
- Easy to set up
- Expandable functionality

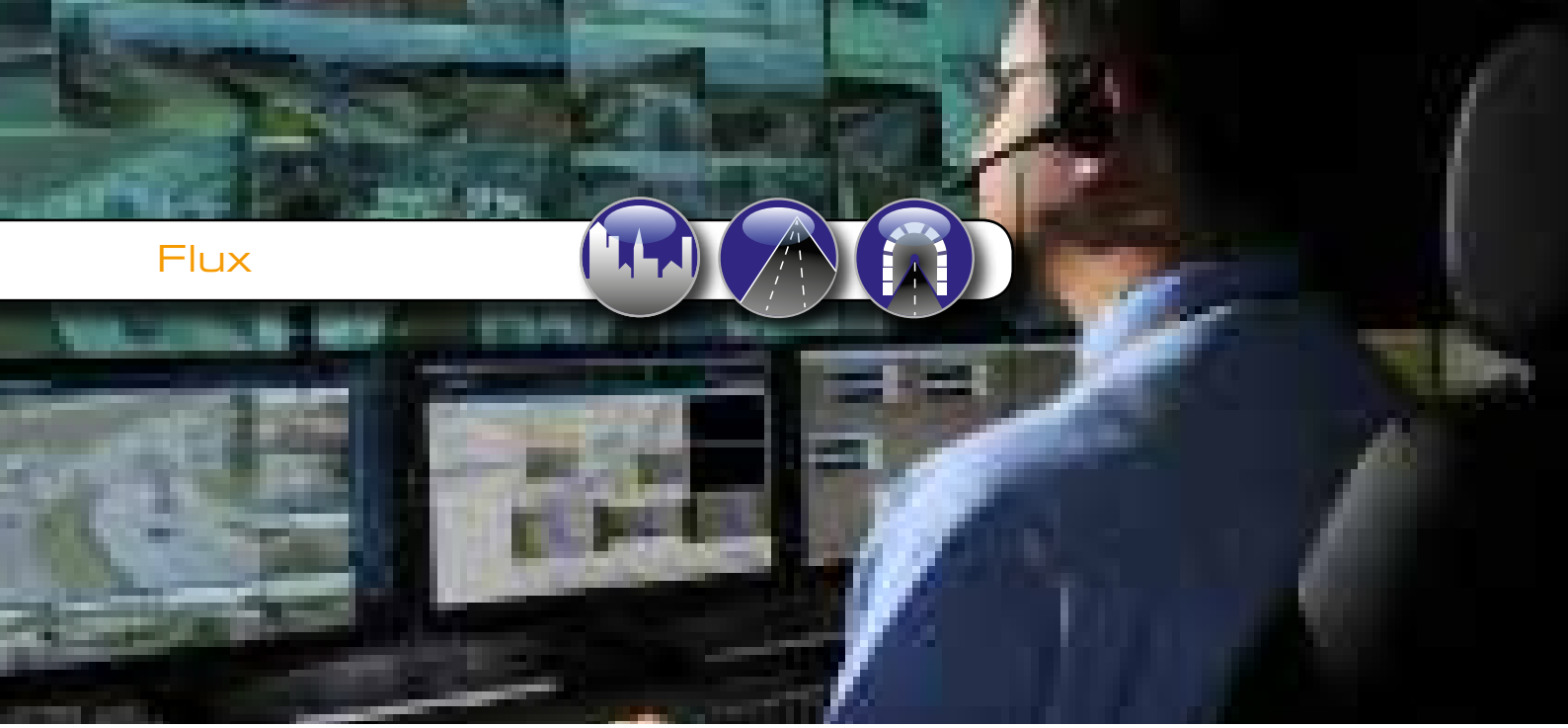
**Two cameras in one housing**
The EYE-D unit combines one dedicated ANPR camera with an overview camera in one housing. This allows users to integrate additional functionality, such as automatic incident detection.

**Infrared Illumination**
EYE-D is equipped with infrared illumination, which enables it to monitor two lanes simultaneously up to a range of 60 meters, day and night.

**Powerful OCR**
The EYE-D has the most powerful Optical Character Recognition (OCR) engine, and a vast library of worldwide license plates and alphabet types. It will process images of fast moving vehicles in all weather conditions with the highest accuracy.

**More positioning freedom**
Many ANPR cameras need to be installed under a certain angle in order to capture license plates correctly. EYE-D makes use of a very efficient de-skewing and de-rotation algorithms, which will auto-rotate the captured number plate and align it so an accurate OCR is possible. This gives customers and installers more freedom of camera positioning in the real world.

**Easy set-up**
EYE-D is very easy to set up. The user-friendly graphical user interface will make it easy to perform a correct configuration in the least amount of time.




## **Flux -** Video detection management software

Flux is an intelligent software platform for use with a FLIR video detection system. Flux collects traffic data, events, alarms and video images generated by the video detectors.

**Management, control and visualisation of traffic data and events**
The main goal of Flux is to manage and control all traffic information generated by various detectors and to make it useful, meaningful and relevant to the user.

Flux provides a user-friendly interface composed of a monitoring and a reporting application. Flux enables real-time monitoring of events and alarms. All event info is automatically documented and visualised in a straightforward way, allowing the operator to manage each traffic situation efficiently.

**Browser-based graphical user interface (GUI)**
The client of Flux is a web-based application. This means users only need a web-browser installed on their PC that is connected to the network of the video detection system to access the traffic management system.

**Event recording and immediate replay**
As Flux is used to store and collect data, events and video, an operator can immediately retrieve these recorded video sequences comprehending pre- and post-incident images. This direct visual information is not only extremely valuable for the operator to take all necessary actions in case of an incident but also for traffic analysis and evaluation afterwards.


*Flux collects and visualizes a wide range of traffic data, events and alarms*

*Flux can easily record video sequences.*


**Key features**

- Collection, visualization and storage of traffic data, events and alarms
- Graphical user interface for stand-alone use with powerful event alerting and extensive event logging
- Intelligent filter management
- Streaming video from multiple cameras simultaneously
- Instant recording with pre- and post-event information

**Key benefits**

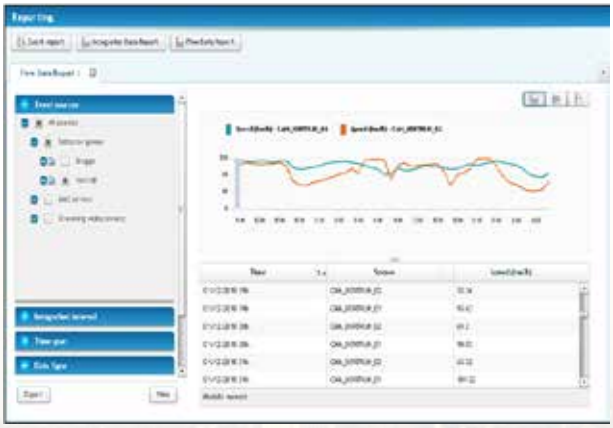
- Fast, reliable and stable system
- Easy installation, Windows and Linux compatible
- User-friendly configuration and operation
- Browser-based Graphical User Interface
- Expandable, scalable system
- Open architecture for easy integration with larger traffic management systems

**Powerful event alerting and intelligent filtering**

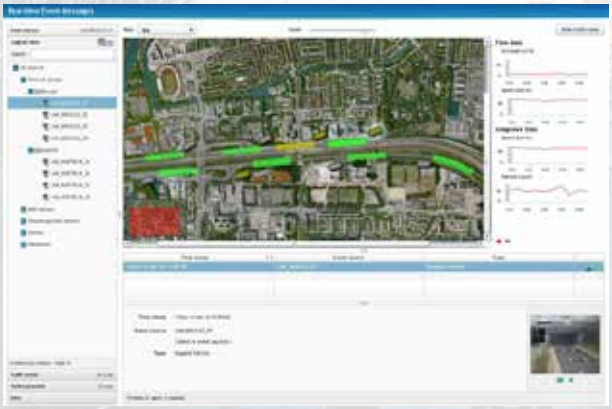
Flux uses advanced filters to ensure relevant alerting. A filter is a set of inhibitions to be launched for a group of cameras. Each inhibition is characterized by events that must be filtered on one or more zones. These filters can be triggered directly from the Flux user interface, automatically from digital inputs from the video detection system or the built-in Flux scheduler or remotely from a larger management system.

**Versatile traffic management platform for any size system**

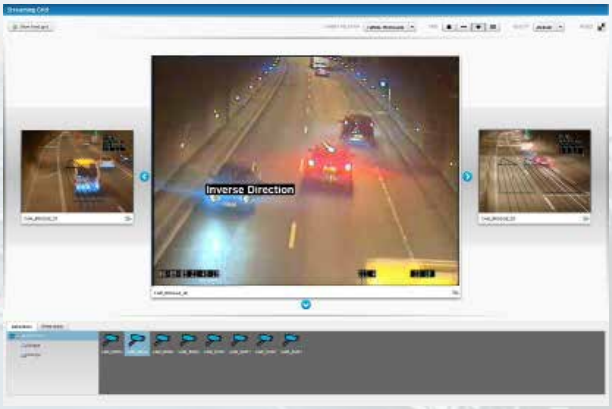
From small-scale video detection to large-scale systems with hundreds of detection devices, the open architecture of Flux allows scaling the system to the exact requirements of the project.



*Extensive traffic data reports*



*Real-time traffic monitoring*




*Simultaneous, real-time video from multiple cameras*

## **VUU -** Real-time visualization software

VUU software visualizes your video sources from your city's traffic sensors and surveillance cameras in real time. With VUU, you can easily mix live video, traffic data indicators and an overview of the system's technical status into one layout. You can view real-time video from several cameras on one or multiple displays simultaneously. VUU allows you to mix and configure your sources in a hierarchical way.

*Mix live video and data into one layout*

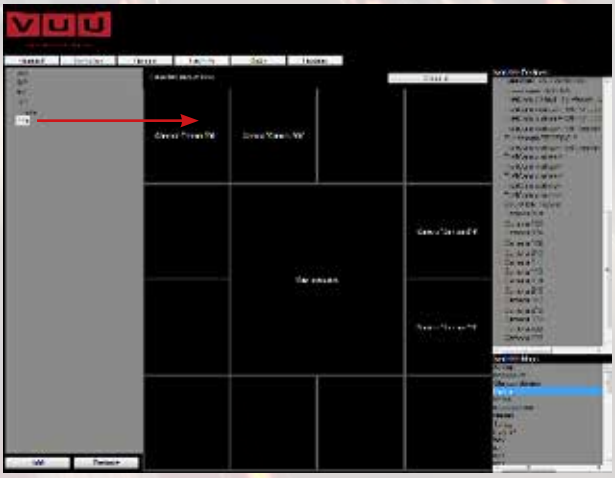
*Define your layouts*

**Key features**

- Real-time traffic visualization and alerting
- Streaming video from multiple cameras simultaneously
- Graphical user interface for stand-alone use
- Multiple map levels

**Key benefits**

- Easy to configure and operate
- Supports IP cameras
- Adapts to any type of network
- Easy installation, Windows compatible
- Cost-effective visualization solution



*Drag and drop your sources*

# Training

## FLIR Infrared Training Center

The Infrared Training Center is the perfect place to get high-quality interactive thermography training from the most qualified international thermography instructors. ITC offers IR training, certification, and recertification in all aspects of infrared thermography use. From ITC Level I-III and EN473 IT certifications to specialized instruction in building diagnostics, electrical, roofing, and other application areas like security. ITC is ISO 9001 certified.

The mission of the ITC is to make our customers and partners successful by enhancing their knowledge of IR technology, thermal imaging products, and relevant applications. The ITC offers a portfolio of courses that presents the right mix of theoretical and practical content to help professionals quickly apply thermal imaging technology to real life applications.

*Each ITC course is a pefect combination of theoretical fundamentals and practical excercises. It guarantees participants a real hands-on learning experience.*

## FLIR Traficon Academy

The FLIR Intelligent Transportation Systems product portfolio and the ITS market in general are constantly changing. That's why FLIR Traficon Academy offers you a wide range of trainings to keep you up to date with the latest state of the art.

**Product trainings**

- VIP product range (VIP-T, VIP-IP, VIP-TX)
- Integrated sensors (TrafiCam, TrafiCam x-stream, C-Walk, SafeWalk)
- Software (Flux, Watts SDK, VUU)

**Solution trainings**

- Highway, bridge and tunnel safety
- Vehicle presence at intersections
- Pedestrian presence
- Knowing your traffic

**Seminars & workshops**

- Safer and smoother traffic on highways, bridges and in tunnels
- Safer and smoother traffic in urban environment

*FLIR Traficon Academy keeps you up to date with the latest in ITS Technology.*

# FLIR FC-Series T


## Technical specifications

| | |
|---|---|
| **Camera model** | |
| Camera Platform Type | Fixed |
| **Thermal camera specs** | |
| Array Format (NTSC) | 320x240 |
| Detector Type | Long-Life, Uncooled VOx Microbolometer |
| Effective Resolution | 76,800 |
| Pixel Pitch | 25 µm |
| Focal Length | 9 mm, 13 mm, 19 mm |
| Field Of View | FC-348 T = 48° × 37° (9 mm) |
| | FC-334 T = 34° × 26° (13 mm) |
| | FC-324 T = 24° × 18° (19 mm) |
| Spectral Range | 7.5 to 13.5 µm |
| Focus Range | athermalized, focus-free |
| **Outputs** | |
| Composite Video NTSC or PAL | yes |
| External Analytics Compatible | yes |
| **General** | |
| Weight (with sun shield) | 2.1 kg (4.7 lbs) with sun shield |
| Dimensions (L,W,H) | 275 mm x 129 mm x 115 mm with sun shield, without cable egress |
| Input Voltage | 90-240VAC single phase 50-60Hz |
| Power Consumption | 1.7W nominal at 110VAC |
| | 18W Peak Power with heaters |
| Mounting Provisions | Two 1/4-20" threaded holes, 1" spacing along centerline front to back |
| **Mechanical** | |
| Shipping weight | 2.6 kg (5.8 lbs) |
| Shipping Dimensions | 14 3/4"(L) x 7 3/4"(W) x 7 3/4"(H) |
| **Environmental** | |
| IP rating | IP66 |
| Operating temperature range | -50 °C to 75 °C (continuous operation) |
| | -40 °C to 75 °C (cold start) |
| Storage Temperature range | -55 °C to 85 °C |
| Humidity | 0-95% relative |
| Shock | MIL-STD-810F "Transportation" |
| Vibration | 10g shock pulse with a 11ms half- sine profile |
| NEMA TS 2 | Environmental testing for FC Series T was conducted in accordance with Section 2.1 of NEMA TS 2-2003 and either meets or exceeds those requirements for the following categories: Operating Voltage, Operating Frequency, Ambient Temperature, Humidity, Vibration & Shock |
| Approvals | FCC Part15, Subpart B, Class B |
| | EN 55022 Class B |
| | EN 50130 - 4 |
| | EN 60950 |

# TrafiCam Series

## Technical specifications

| | TrafiCam | | TrafiCam x-stream | |
|---|---|---|---|---|
| **DETECTION** | | | | |
| Detection Functionalities | Vehicle presence | | Vehicle presence + data | |
| # Detection Zones | 8 | | 16 presence zones<br>4 data zones | |
| # Detection Outputs | 4 direct<br>4 via interface TI 10 wires<br>4 via interface 1TI<br>8 via interface 4TI ETH | | 16 via interface TI x-stream | |
| **CAMERA** | | | | |
| Resolution | 640x480 pixels (VGA) | | 640x480 pixels (VGA) | |
| Frame rate | 20 FPS | | 25 FPS | |
| Lens Types | Wide Angle | Narrow Angle | Wide Angle | Narrow Angle |
| Focal Distance | 2,1mm | 6,0mm | 2,1mm | 6,0mm |
| Detection Distance | 0-20m | 15-70m | 0-20m | 15-70m |
| Mounting Height | 3,5-12m | | 3,5-12m | |
| CMOS type | 1/4" black & white | | 1/4" color | |
| Compression | (M)JPEG | | MJPEG, MPEG-4, H.264 (dual stream) | |
| **Housing** | | | | |
| Material | Aluminum | | Aluminum | |
| Dimensions | Vertically mounted 45 cm x 16 cm x 12 cm,<br>Horizontally mounted 41 cm x 18 cm x 12 cm | | Vertically mounted 45 cm x 16 cm x 12 cm,<br>Horizontally mounted 41 cm x 18 cm x 12 cm | |
| Sunshield | Optional | | Optional | |
| **Power, outputs, communication** | | | | |
| Consumption | 12-26VAC/DC | | 24-48VAC/DC | |
| IP Address | No | | Yes | |
| Communication PC - Sensor | Via interface | | Via interface | |
| Interface(s) | TI 10 wires, 1TI, 4TI ETH | | TI x-stream | |
| Outputs<br>(Pmax=300m>, Imax=50mA, Umax=48VDC) | 8 | | 16 | |
| PC Tool for Setup | TrafiCam PC Tool | | Traficon Configuration Tool (TCT) | |
| **Regulatory, environmental** | | | | |
| EMC | Electromagnetic Compatibility<br>2004/108/EG | | Electromagnetic Compatibility 2004/108/EG | |
| FCC | FCC Part 15 Class A | | FCC Part 15 Class A | |
| Temperature Range | -34°C to +80°C | | -34°C to +80°C | |
| Weatherproof | Weatherproof (UV-resistant) | | Weatherproof (UV-resistant) | |
| Waterproof | IP67 | | Housing = IP68, connectors = IP67 | |

# C-Walk / SafeWalk

## Technical specifications

| | C-Walk Ethernet version | | C-Walk BPL version | | SafeWalk Ethernet version | SafeWalk BPL version |
|---|---|---|---|---|---|---|
| **DETECTION** | | | | | | |
| Detection Functionalities | Moving pedestrians (on-crossing) | | Moving pedestrians (on-crossing) | | Waiting pedestrians (kerbside) | Waiting pedestrians (kerbside) |
| Detection Zones | 1 | | 1 | | 1 | 1 |
| Detection Outputs | 1 direct<br>1 via ETH interface | | 1 via interface TI x-stream | | 2 direct<br>2 via ETH interface | 2 direct<br>4 via interface TI x-stream |
| **CAMERA** | | | | | | |
| Resolution | 640 x 480 pixels (VGA) | | 640 x 480 pixels (VGA) | | 640 x 480 pixels (VGA) | 640 x 480 pixels (VGA) |
| Frame rate | 25 FPS | | 25 FPS | | 25 FPS | 25 FPS |
| Lens Types | Wide Angle | Narrow Angle | Wide Angle | Narrow Angle | Wide Angle | Wide Angle |
| Focal Distance | 2,1 mm<br>IR pass | 6,0 mm<br>IR block | 2,1 mm<br>IR pass | 6,0 mm<br>IR block | 2,5 mm | 2,5 mm |
| Detection Distance | 0-12 m | 10-25 m | 0-12 m | 10-25 m | 4 m by 6 m | 4 m by 6 m |
| Mounting Height | 3,5-12 m | | 3,5-12 m | | 3-5m | 3-5m |
| CMOS type | 1/4" color | | 1/4" color | | 1/4" black & white, stereovision | 1/4" black & white, stereovision |
| Compression | MPEG-4 | | MPEG-4 | | MPEG-4 | MPEG-4 |
| **Housing** | | | | | | |
| Material | Aluminum | | Aluminum | | Fiber reinforced polycarbonate | Fiber reinforced polycarbonate |
| Dimensions | Vertically mounted 450 mm x 160 mm x 120 mm, Horizontally mounted 410 mm x 180 mm x 120 mm | | Vertically mounted 450 mm x 160 mm x 120 mm, Horizontally mounted 410 mm x 180 mm x 120 mm | | 230 mm x 310 mm x 180 mm | 230 mm x 310 mm x 180 mm |
| Sunshield | Optional | | Optional | | Standard | Standard |
| **Power, outputs, communication** | | | | | | |
| Consumption | 12-48VDC, 24-48VAC | | 24-48VAC/DC | | 12-48VDC, 24-48VAC | 24-48VAC/DC |
| IP Address | Yes | | Yes | | Yes | Yes |
| Communication PC - Sensor | Direct ETH via interface | | Via interface | | Direct ETH via interface | Via interface |
| Interface(s) | ETH interface | | TI x-stream | | ETH interface | TI x-stream |
| Outputs (Pmax=300m>, Imax=50mA, Umax=48VDC) | 1 | | 1 | | 3 | 3 |
| PC Tool for Setup | FLIR ITS Configuration Tool | | FLIR ITS Configuration Tool | | FLIR ITS Configuration Tool | FLIR ITS Configuration Tool |
| **Regulatory, environmental** | | | | | | |
| EMC | Electromagnetic Compatibility 2004/108/EG | | Electromagnetic Compatibility 2004/108/EG | | Electromagnetic Compatibility 2004/108/EG | Electromagnetic Compatibility 2004/108/EG |
| FCC | FCC Part 15 Class A | | FCC Part 15 Class A | | FCC Part 15 Class A | FCC Part 15 Class A |
| Temperature Range | -34°C to +80°C | | -34°C to +80°C | | -34°C to +80°C | -34°C to +80°C |
| Weatherproof | Weatherproof (UV-resistant) | | Weatherproof (UV-resistant) | | Weatherproof (UV-resistant) | Weatherproof (UV-resistant) |
| Waterproof | Housing = IP68, connectors = IP67 | | Housing = IP68, connectors = IP67 | | Housing = IP68, connection box = IP65 | Housing = IP68, connection box = IP65 |

# VIP / TrafiBot

## Technical specifications




| Model | VIP-T | VIP-IP | VIP-TX | TrafiBot |
|---|---|---|---|---|
| **General** | | | | |
| Description | AID module for analog cameras | AID module for IP cameras | Encoder with embedded AID | IP camera with embedded AID |
| Video input | Analog PAL / NTSC | IP video: VGA, 4CIF or D1 H.264 @ min 2 Mbps or MPEG-4 @ min 4 Mbps | Analog PAL / NTSC | 1/3" CMOS (Pixim Seawolf) |
| Encoding format | MPEG-4 | H.264, MPEG-4, MJPEG | H.264, MPEG-4, MPEG-2, MJPEG | H.264, MJPEG |
| Max. resolution | 4CIF @ 30 fps | D1 @ 30 fps | D1 @ 30 fps | D1 @ 30 fps |
| Multi-streaming | Single MPEG-4 | Single H.264 or MPEG-4 or MJPEG | Triple streaming: 1 x H.264 (BP) + 2 x MJPEG or MPEG | Dual streaming: H.264 (HP-MP) or MJPEG |
| Max. Streams | 1 | Max 4 unicast or multicast | Unicast and/or multicast, max 20 | Unicast and/or multicast, max 20 |
| Audio | no | no | 2 full duplex stereo | 1 full duplex stereo |
| Boards per rack | 4 (1/2 19" rack) or 8 (19" rack) | 4 (1/2 19" rack) or 8 (19" rack) | 11 (19" rack) | N/A |
| **Power supply, outputs & communications** | | | | |
| Power | 4W | < 4W | < 5W | 8W |
| Stand-alone form | Box, 24V DC (+/- 15%) | Box, 24 V DC (+/- 15%) | Box, 11 to 19V DC | 12V DC or 24V AC ot 802.3af PoE |
| Connector type | 10/100 Mbps RJ45 | 10/100 Mbps RJ45 | 10/100 Mbps RJ45 SFP for fibre or IP over coax (ECO)" | 10/100 Mbps RJ45 SFP for fibre or IP over coax (ECO) |
| Digital inputs | 1 | 1 | 2 | 2 |
| Digital outputs | 2 (+ optional 8) | 2 | 2 | 2 |
| Data | no | no | RS232 + RS422/485 | RS232 or RS422/485 |
| PTZ control | no | no | Yes | Yes |
| Comm. Standards | - | SNMP | ONVIF profile S, NTCIP, SNMP | ONVIF profile S, NTCIP, SNMP |
| **Additional features** | | | | |
| AID | AID overlay<br>Vehicle presence detection | AID overlay | AID + customizable overlay video motion detection<br>image monitor (quality measurement) tamper detection privacy masks | AID + customizable overlay video motion detection image monitor (quality measurement) tamper detection privacy masks |
| Operating temperature | -34 °C to +74 °C<br>-29 °F to 165 °F | -34 °C to +74 °C<br>-29 °F to 165 °F | -40 °C to +74 °C<br>-40 °F to +165 °F | -30 °C to +50 °C<br>-22 °F to +122 °F |
| MTBF | 200,000 hrs | 200,000 hrs | > 200,000 hrs | > 300,000 hrs |
| Dimensions (HxWxD) | 130 mm x 41 mm x 190 mm | 130 mm x 41 mm x 190 mm | 128 mm x 34 mm x 190mm | 64 mm x 64 mm x 150mm |
| Weight | 180 g | 200 g | 450 g | 390 g |

# EYE-D

## Technical specifications

| General | |
|---|---|
| Description | All-in-one ANPR detector, combining cameras and processing unit in one compact and esthetical housing |
| Housing | Black anodized extruded Aluminum<br>Infrared Illumination in front<br>Mounting possibilities for two cameras<br>Processing module mounted behind the cameras<br>Connectors at the back of the camera for power and communication<br>Sunshield |
| Dimensions (LxBxW) | 460 x 165 x 165mm (Sunhood included)<br>315 x 124 x 124mm (Sunhood not included) |
| Weight | Approximately 4.7 kg (bracket not included) |
| Cameras | Monochrome camera with 1280x1024 resolution for license plate detection<br>Colour camera with 1280x1024 resolution for additional applications and overview<br>Megapixel manual Iris and focus |
| Infrared Array | IR array illuminating a range up to 30 meters or<br>IR array illuminating a range up to 60 meters |
| Processing unit | Processor: 2+2 Core<br>Memory: 2GB<br>Storage capacity: 32GBOperating system: Linux |
| Communications | Ethernet: 1x 10/100 Ethernet<br>3G modem supporting HSUPA / GPRS<br>I/O module |
| Power | 22 - 48W depending on configuration<br>12-26 VDC - 4A |

| Software | |
|---|---|
| Set-up and user interface | Operating system: Linux<br>Configuration of the unit<br>Viewing/download of the database |
| OCR engine | ANPR engine supporting up to 44 different detection libraries, allowing detection of most of the worlds license plates |
| Additional applications | Additional 3rd party applications can be loaded onto the system as long as these are Operating system compliant. |

| Regulatory issues | |
|---|---|
| Shock and Vibration | Compliant with NEMA II specifications |
| EMC / EMI | Compliant with CE directive 85/336/EEC ; product standard EN55022 Class A |
| Water resistance | Default configuration: Compliant with IP67<br>When equipped with Wifi: Compliant with IP67 |
| Temperature range | Operating temperature -20°C -> 55°C |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