VideoXpert Plates™ v 1.02

Automatic License Plate Recognition Software

Product Description

VideoXpert Plates™ is a software-based Automatic License Plate Recognition (ALPR) system for video streams. It detects and captures vehicle license plates, and then compares the captured plates against user-defined lists to identify VIPs or blacklist vehicles, monitor parking lot access, catalog unknown vehicles, and alert operators accordingly. It simultaneously reads plates from multiple countries, provinces, and states, so local traffic and visiting vehicles will both be recognized. VideoXpert Plates can operate as part of a VideoXpert™ Video Management System (VMS) or as a standalone product using the included browser-based user interface.

VideoXpert Plates consists of three software applications:

- VideoXpert Plates Manager™ provides centralized management of captured plate images, search engine, alert generator and notifications, video metadata, and host of the browser-based user interface.
- VideoXpert Plates ALPR™ provides the Optical Character Recognition (OCR) engine for real-time plate capturing and reading.
- VideoXpert Plates Plugin™ integrates VideoXpert Plates capture information into the VxOpsCenter Client™ (when used with Pelco VideoXpert VMS solutions).

The VideoXpert Plates Manager is available in two versions: VideoXpert Plates Manager Professional™ will manage up to 1 million plate reads before discarding reads (FIFO), and is intended for parking and small city applications; and VideoXpert Plates Manager Enterprise™ will manage up to 50 million plate reads before discarding reads and is intended for medium to large city applications.

VideoXpert Plates Features

Highly accurate plate recognition and capture:

- Captures license plates from moving vehicles up to 250 kph / 150 mph
- Captures rectangular and square plates (up to 3 lines) with any combination dark-on-light and light-on-dark color schemes
- Powerful machine learning OCR engine
- Reconstructs images of damaged/broken plates using fuzzy logic matching, to increase read confidence and accuracy
- Compensates for plate carrier obscuring of license plate
- Capable of single- or dual-lane coverage from a single camera
- Directional filtering and reporting permits single-camera capture of plates in two directions simultaneously
- Able to read up to 8 license plates on a single vehicle
- Search on Plate number, Time, Date, Camera, Zone, Country, Direction, Status, Coordinates, and Alarms in real-time
- Allows for partial plate and wildcard character searches

Adaptable to your environment or application:

- Country independent and US State independent plate capturing without the need for additional databases or engines
- Enhanced Country/State syntax grammar filters to increase local special character/design capture accuracy while allowing captures of all plates
- Multiple user defined polygon Region of Interest (ROI) zones to speed plate detection processing and eliminate repeated captures of parked vehicles
- VideoXpert Plates Manager server stores all captured metadata and images with adjustable data retention times to meet local ordinance requirements
- Distributed Client-Server configurations employing fixed and mobile camera applications; auto synchronization of black lists, white lists, authorizations, and alerts from the primary to secondary systems create a fully unified system
- Single server configurations for small installations
- Integration with third-party VMS products that require alerts from VideoXpert Plates available using API

Increased situational awareness:

- Dual camera support for license plate and driver image capture
- Wrong-way direction detection and alarms
- Multiple user-defined authorized, un-authorized, white, and black lists for vehicle identification and classification
- On-screen display of license plate and associated vehicle driver for positive identifications
- User-defined Over-time in Area schedules application to define the length of time a vehicle is permitted in specified areas and generates an alert if the vehicle exceeds this time
- Supports continuous Free Flow or motion-based Trigger Mode plate capture
- Alert notification to VideoXpert VMS Event monitor, via e-mail, and push notifications to multiple users using PushBullet third-party application

Camera Compatibility

VideoXpert Plates is compatible with most standard IP cameras and LPR cameras with either rolling or global shutters. Important items to consider for cameras selection include:

- ALPR camera must only be used for license plate detection, using a camera for plate detection and observation may lead to improper alignment and increase missed plate reads.
- Recommend the use of standard fixed cameras with IR illumination or specific ALPR camera with global shutter over standard day/night camera to increase plate capture and reading rates
- Recommended IR Illumination 850 nm typical all countries, 750 nm US State of Florida, with maximum angle of illumination 5 degrees from center of camera's field of view.

Technical Specifications

Minimum Software Requirements

• Windows 7, 32, or 64 bit or greater

• .Net 4.5.2 or greater

Minimum Hardware Requirements

Server Requirements	VideoXpert Plates ALPR Software	VideoXpert Plates Professional and ALPR Software	VideoXpert Plates Enterprise and ALPR Software
Processor	• Parking lot stop and go with 2-6 camera environments: Intel® Core™ i5-7300U with at least 4 threads or better. • Roadway and other applications: Intel® Core™ i7-7700T or Xeon® E3-1585 v5 with at least 8 threads or better.		
RAM	8 GB RAM +1 GB per camera	16 GB RAM +1 GB per camera	32 GB RAM +1 GB per camera
Free disk space	30 MB	2 TB	16 TB

ALPR processes and the Plates Manager software can be run on a single system or on two different servers. For environments with a large number of cameras, ALPR processes could run across two or more servers and connect to a single Plates Manager.

Security Features

VideoXpert Plates includes the following security features:

- HTTP and HTTPS for end to end encryption
- Administration control of user accounts
- Support with running anti-virus

Software Licenses

VideoXpert Plates consists of three software packages: VideoXpert Plates Manager, VideoXpert Plates ALPR, and VideoXpert Plates Plugin. The VideoXpert Plates ALPR is the Optical Character Recognition (OCR) engine and is licensed on a per-camera basis. The VideoXpert Plates Manager is the back-office application for queries, event, and alert processing. VideoXpert Plates Manager Professional will manage up to 1 million plate reads before a read is deleted on a First In, First Out (FIFO) basis, and is intended for parking and small city applications. VideoXpert Plates Manager Enterprise will manage up to 50 million plate reads and is intended for medium to large city applications. VideoXpert Plates Plugin for integration with VxOpsCenter is provided with no license cost.

Model Number	Description
VXPL-1C	VidoeXpert Plates per-camera license
VXPL-PRO	VideoXpert Plates Manager Professional software—stores up to 1 million license plates reads

Model Number	Description
VXPL-ENT	VideoXpert Plates Manager Enterprise software—stores up to 50 million license plate reads
VXPL-1C-SUP1	VidoeXpert Plates per-camera license software upgrade plan—one year (1YR)
VXPL-PRO-SUP1	VideoXpert Plates Professional software upgrade plan—one year (1YR)
VXPL-ENT-SUP1	VideoXpert Plates Enterprise software upgrade plan—one year (1YR)
VXPL-VXINT	VideoXpert plugin integration license for the VideoXpert Plates Manager

Plate Image Characteristics

Item	Specification/Setting
Image formats	• BMP24 (Windows Bitmap) • JPEG • YUY2 • RGB (raw) • Gray8 (raw)
Image size	5.0 MB maximum
Number of plates per image	8
Character height range	18 to 70 pixels on target
Plate rotation angle to camera	
Rotation X (pitch)	± 35° maximum
Rotation Y (yaw)	± 40° maximum
Rotation Z (roll)	± 35° maximum
Supported characters sets	• Arabic • Chinese • Hebrew • Korean • Latin (English) • Thai
Maximum additional Country/US State Syntax Grammar Filters per ALPR Server	• 8 Countries • 5 US States
Maximum Number of Stored Plate Captures (FIFO)	• VideoXpert Plates Professional: 1 Million • VideoXpert Plates Enterprise: 50 Million

Camera and Processor Recommendations

Key Considerations

- **Number of CPU threads**: Processors typically have two threads per physical core. For license plate recognition on one lane at speeds of 100 kph / 60 mph, one dedicated thread is recommended. One thread can typically support three cameras for stop and go environments such as parking lot applications. Because Intel processors are regularly updated, please see https://ark.intel.com/content/www/us/en/ark.html#@Processors.

- **Memory/RAM**: Pelco recommends one additional 1 GB of RAM for each camera. When running both ALPR and the Plates Manager on a single system, 16 GB is the recommended foundation, and then an additional GB per camera. When running ALPR processes on a separate system, then 8 GB for the base level and an additional 1 GB per camera.

- **Hard Drive**: Intel i5, i7, and i9 systems are commonly sold with up to 2 TB of storage, which is sufficient for a VideoXpert Plates Manger Professional system. The Plates Manager software typically consumes 250 kb per license plate read. For larger environments including with the Plates Manager Enterprise version, Intel Xeon® based servers are more generally available with larger storage capacities.

- **License Plate Image Complexity**: The above guidelines generally align with common license plates worldwide, such as with Latin characters on a single line. License plates with multiple cells and script-oriented characters can require additional processing power.

Running VideoXpert Plates APLR and Manager on the Same Server

The table below provides examples of server processor specifications and the number of cameras that can be managed with the same server running both the Plates ALPR processes and either VideoXpert Professional or with VideoXpert Enterprise. Intel processors are example recommendations.

Processor Cores / Threads		Number of Cameras per Approximate Vehicle Speed			
		Stop/Go (2 FPS)	30 kph 20 mph (10 FPS)	100 kph 60 mph (20 FPS)	160 kph 100 mph* (30 FPS)
Camera Frames Per Second (FPS)		2	10	20	30
2 Core / 4 Thread Intel® Core™ i5-8310Y	Single-lane	6	2	1	-
	Two-lane	4	2	-	-
4 Core / 8 Thread Intel® Core™ i7-7700T	Single-lane	20	12	6	3
	Two-lane	20	12	6	-
6 Core / 12 Thread Intel® Core™ i7-8700K	Single-lane	40	30	20	10
	Two-lane	40	18	10	5
16 Core / 32 Thread Intel® Core™ i9-9960X	Single-lane	120	90	60	30
	Two-lane	120	58	30	15

*For speeds greater than 160 kph / 100 mph, the VideoXpert Plates ALPR must be placed on a separate server not combined with the VideoXpert Plates Manager.

Running VideoXpert Plates APLR on a Dedicated Server

The table below specifies the total number of ALPR cameras managed per dedicated server or PC.

Processor Cores / Threads		Number of Camaras per Approximate Vehicle Speed				
		Stop/Go (2 FPS)	30 kph 20 mph (10 FPS)	100 kph 60 mph (20 FPS)	160 kph 100 mph (30 FPS)	250 kmh 150 mph (50 FPS)
2 Core / 4 Thread	Single-lane	12	4	4	-	-
	Two-lane	8	4	2	-	-
4 Core / 8 Thread	Single-lane	24	16	8	4	-
	Two-lane	24	16	8	-	-
6 Core / 12 Thread	Single-lane	48	36	24	12	6
	Two-lane	48	24	12	6	3
16 Core / 32 Thread	Single-lane	128	96	64	32	16
	Two-lane	128	64	32	16	8

Typical Camera Settings

Recommended settings using a standard IP camera for Plate Capture are:

Item	Single-lane	Two-lane
Camera resolution	1280 x 720	1920 x 1080
Camera angle to plate		
Parking, Stop and Go, 0- 30 kph / 0 -20 mph	Horizontal <5°, Vertical <20°	
Roadway > 30 kph / 20 mph	Horizontal <30°, Vertical <30°	
Camera shutter speeds – rolling shutter		
Parking, Stop and Go	1/250 sec	
Roadway > 30 kph / 20 mph	1/1000 sec	
Camera shutter speeds – global shutter		
Parking, Stop and Go	1/250 sec	
Roadway > 30 kph / 20 mph	1/1000 sec	

Automatic License Plate Recognition Hardware

Pelco offers a Special Modification Request (SMR) with factory installed VideoXpert Plates Pro software on the hardware described below. This hardware simplifies implementation, lowers installation time and configuration time, and is fully supported by Pelco.

Note: Software licenses are sold separately.

Technical Specifications

Item	Description
Form Factor	Tower
Processor	Intel Xeon E-2234
Memory	32 GB
Operating System	Microsoft Windows 10 IoT Enterprise 64-bit (LTSB)
OS Drive	M.2 SSD 240 GB
Storage	4 TB
RAID Level	JBOD
Optical Drive	N/A
Dell iDRAC Controller	iDRAC9 Basic
USB Ports	
USB 2.0	4x rear
USB 3.0	1x front, 2x rear

Example of VideoXpert Plates APLR and Manager Running on the Same Server

The table below provides an example of the SMR server specifications and the number of cameras that can be managed with the same server running both the VideoXpert Plates ALPR processes and VideoXpert Professional.

| Processor Cores / Threads		Number of Cameras per Approximate Vehicle Speed			
		Stop/Go (2 FPS)	30 kph 20 mph (10 FPS)	100 kph 60 mph (20 FPS)	160 kph 100 mph (30 FPS)
Camera Frames Per Second (FPS)		2	10	20	30
4 Core / 8 Thread	Single-lane	20	12	6	3
	Two-lane	20	12	6	-

Model Number

- **SM-VXPL48T-4064** SMR VideoXpert Plates Server Automatic License Plate Recognition Hardware

Installation Field of View (FOV) Examples

The examples below are typical installation parameters for a single lane, vehicle target speed of 100 kph with a 3 mm to 9 mm lens for United Kingdom plates. Individual results may vary, please contact the factory for specific applications.

Pelco Sarix IBE229-2R 1920 X 1080, 20 fps, 125 kph, 78 mph
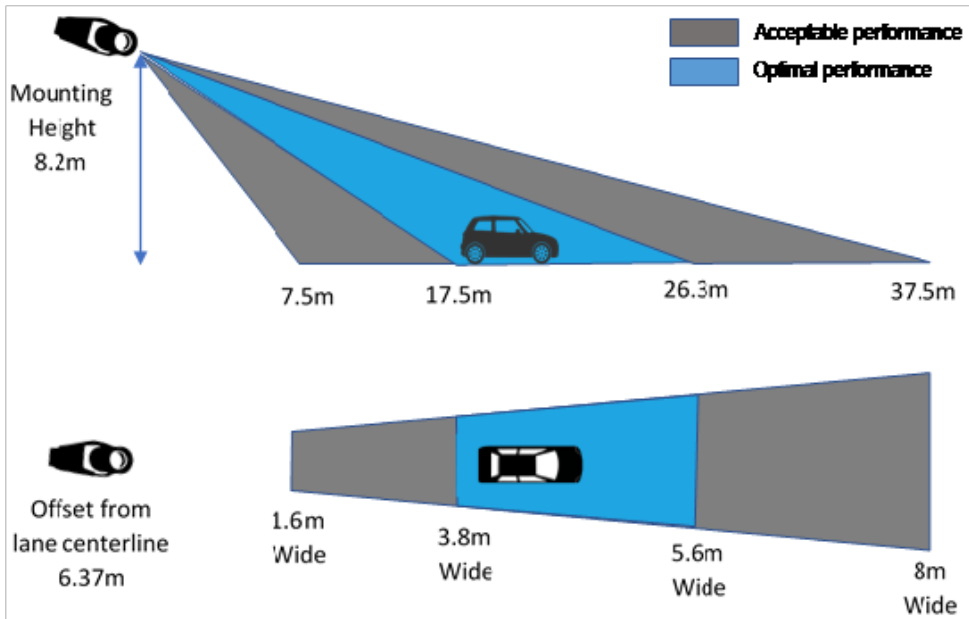
Pelco Sarix Enhanced IBE839-1ER 3840 X 2160, 20 fps, 260 kph, 162 mph

PELCO®
a Motorola Solutions Company
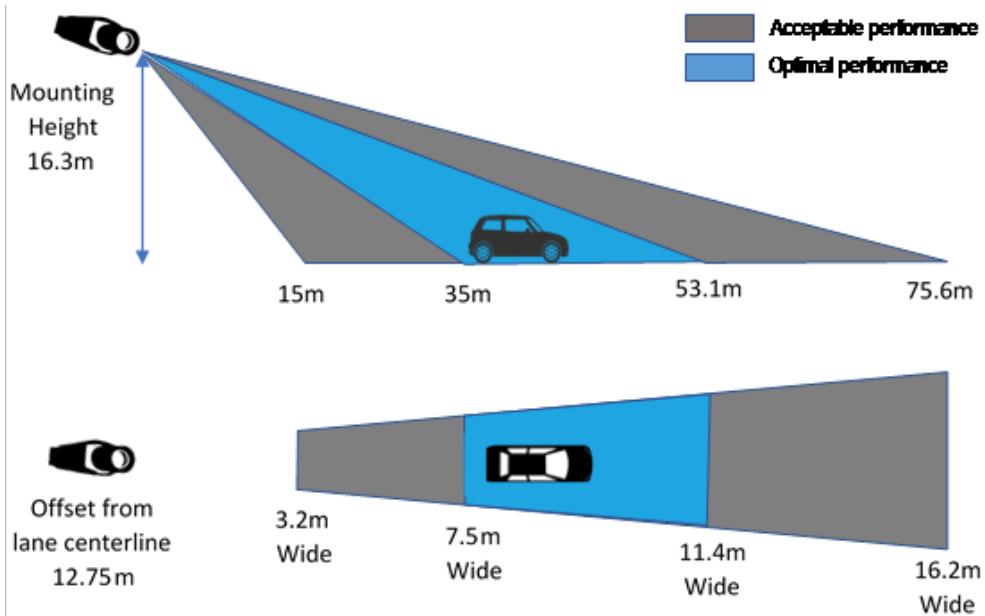
Pelco, Inc.
625 W. Alluvial Ave., Fresno, California 93711 United States
(800) 289-9100 Tel
(800) 289-9150 Fax
+1 (559) 292-1981 International Tel
+1 (559) 348-1120 International Fax
www.pelco.com

⚠ **WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov.
⚠ **ADVERTENCIA:** Cáncer y Daño Reproductivo - www.P65Warnings.ca.gov.
⚠ **AVERTISSEMENT:** Cancer et Troubles de l'appareil reproducteur - www.P65Warnings.ca.gov.