



# United Vision Solutions



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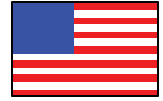
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United Vision Solutions, Co.

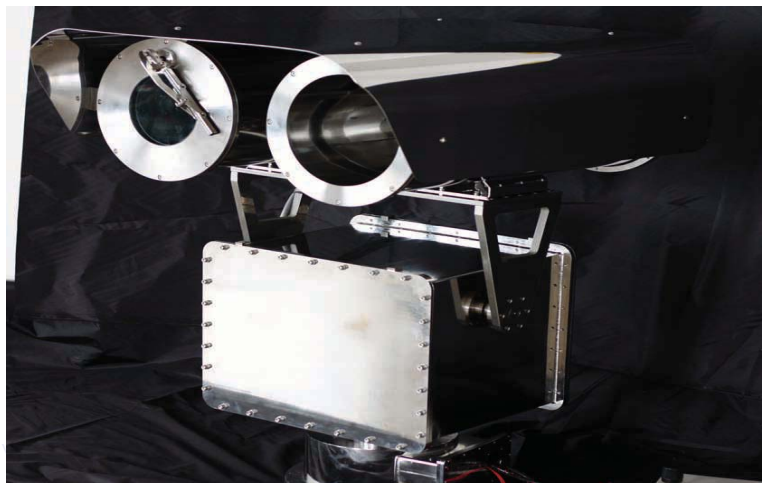
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# HomeLand Security Products & Solutions

# Eagle Vision EV3000-D IR

Dual camera system for 24/7 surveillance  
Stainless Steel 316L enclosure and Pan/Tilt



**Forget rust and salt air corrosion**

United Vision Solutions, Co.  
10 Center St., Chicopee, MA, 01013, USA.  
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## System Highlights

### Thermal Imager Tri-FOV

- 3-5 micron InSb detector
- 640X480 format
- DFOV
- 100/500 mm lenses

### Pan/Tilt resolution

High performance, brushless, maintenance-free step motors provide very precise, extremely effective motion control with preset and 0-360 degree endless rotation

### Video Stabilizer

- Digital Real Time Video Stabilization
- Sharp details for high quality video

### Day/Night Camera

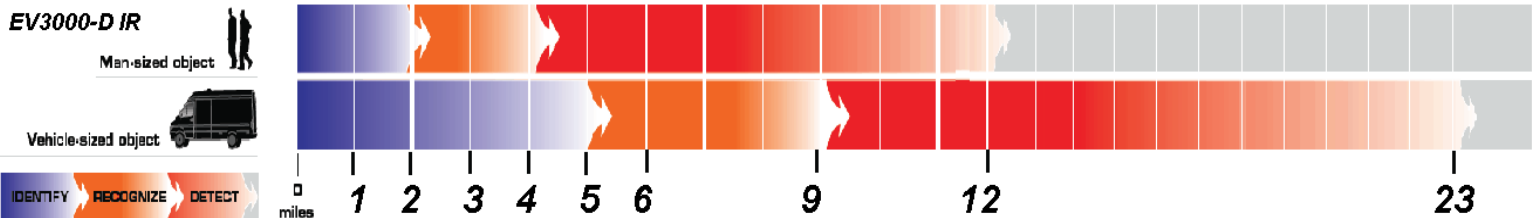
- 1/2" High-Resolution EMCCD
- 0.00025 Lux Minimum Illumination
- Lens 10-500mm / 20-1000mm
- Reproduces full colour, full motion images in starlight conditions

### Sensor Platform

- Heavy Duty, Stabilized Pan/Tilt
- Stainless Steel Enclosure
- Heavy duty enclosure for marine use with blower, heater, and sunshield
- Anti-rust, Anti-salt air, anti corrosion use with blower, heater, and sunshield

### CCTV software with TCP/IP

- Full control of Thermal / Day-Night / Pan/Tilt
- Using standard Protocol Pelco-D
- SDK software library for developing Control Software locally

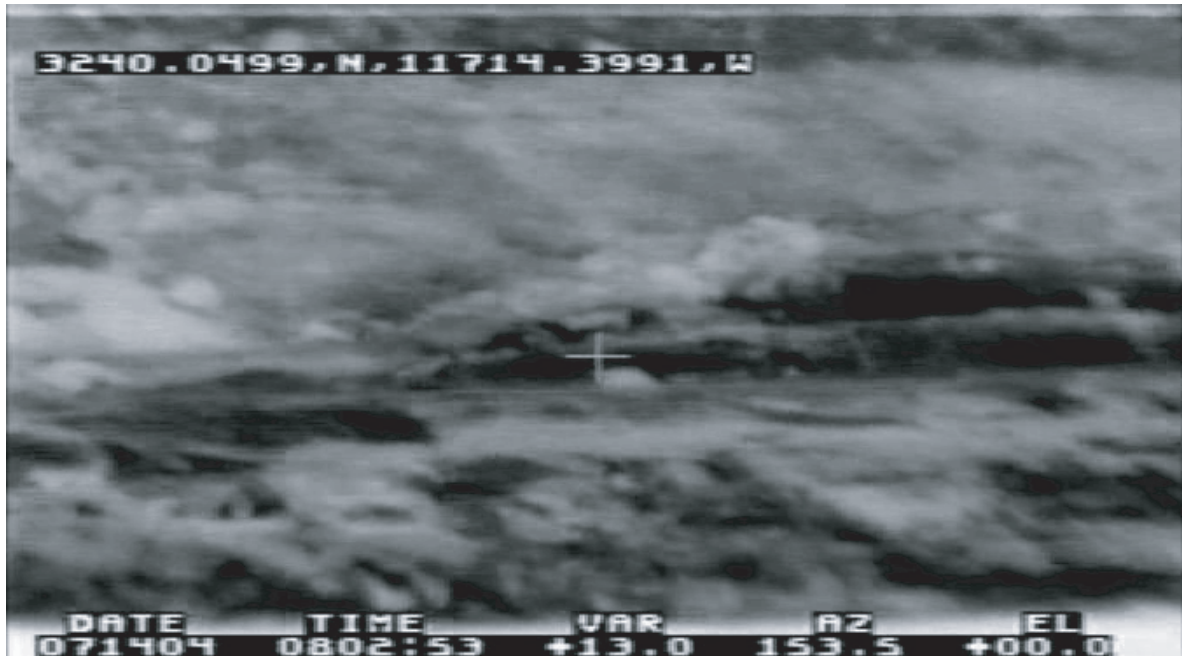


Detection	Human at 12 miles
	Truck at 23 miles
Recognition	Human at 4 miles
	Truck at 9 miles
Identify	Human at 2 miles
	Truck at 5 miles

Thermal Imager and Day-Night camera



Reproduces full colour, full motion images in starlight conditions



Truck at 22km



Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

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## Eagle Vision Surveillance System

### Highlights

**Hi-Resolutions Color Camera at day time.**

**Thermal Imaging at dark and bad weather.**

**Stainless Steel Enclosure for ultimate protection.**

**Stainless Steel Pan/Tilt unit, with precise step rotation 0.1 degree.**

**Low power Consumption, perfect choice when solar power is required.**

**Long Range wireless using Hi-tech codec system.**

**Stander Pelco D-Protocol to integrate with any off-shelf CCTV products.**

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Selection of the EV3000 series is the lowest risk choice for user required 24/7 surveillance system, EV's **mature design**, broadly accepted **performance advantages**, and UVS's **proven integration capability**. Eagle vision Systems offers a very low schedule risk based on current production capacity, inventory and vertical integration. Low life-cycle cost and logistical experience also make Eagle Vision the low-risk choice, with its commitment to a carefully implemented, long-term support program. UVS's unique vertical integration insures that we can provide critical replacement components and servicing faster and at lower prices than other suppliers who depend on third parties.

### TECHNICAL DATA

The EV3000-D IR model is a self-contained day and thermal imaging system, the EV-ST IR camera which detects radiation in the 3.4 to 5.1-micron infrared band. The EV-ST is capable of target discrimination and recognition in total darkness or through daylight obscurants and was designed for short- or long-term stationary surveillance applications. The EV3000-D IR model imager is contained in an environmentally sealed stainless steel enclosure permitting deployment in severe climatic and weather conditions. Its DFOV (Dual Field-of-View) lens and low power consumption is ideal for use in field operations. The EV3000's Hi-resolution color camera brings sharp, crispy images around the clock, combined with AC or DC power sources and remote control capability, makes it well suited for long-range surveillance applications requiring remote operation.

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Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

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Delivering outstanding imaging performance, advanced features of the EV3000-D IR model include:

- 640 x 480 Pixel InSb Focal Plane Array with ultra-fine 15 µm detector pitch for high resolution imagery
- Auto-focus
- Ruggedized weatherproof Stainless Steel environmental enclosure
- High durability coated front lens
- Lens defroster
- 100/500mm, dual field-of-view optical zoom
- 2x and 4x digital zoom
- Internal NUC paddle
- Freeze frame
- Color or Monochrome video output
- Auto gain and level control
- Three integration times
- Tethered lens cover
- RS-422 interface
- S-video and RS170 outputs

The EV3000-D IR model is UVS Systems' next generation imager benefiting from unique developments aimed at improving signal processing and imaging performance. Using High Resolution Video Processor (HRVP) generates the EV3000-D IR model's high quality images and long-range performance.

This multi-layer PCB (printed circuit card) is a unique feature and provides the user with an advanced suite of capabilities including:

- Advanced digital signal processing with temporal noise filters
- True multi-mode sensitivity (user selectable for hot or cold scenes)
- Histogram equalization
- Digital zoom
- Color palettes
- Freeze frame

The EV3000-D IR model imager also includes easily accessible and automated image processing software that automatically adjusts contrast and brightness levels for the scenes being viewed, simplifying operation by the agent. For more specialized situations, operators can choose between different sensitivity levels in the IR imaging system depending on the environmental conditions that affect the thermal contrast of people and vehicles under observation.

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Long Range Day Night Camera

CCTV Surveillance Systems

*SkyCam & Eagle Vision*

## EV3000-D IR camera system

EV3000-D IR with Focal Length 100/500 mm

<b>F number</b>		f/4
<b>WFOV</b>	<b>NFOV</b>	5.5° x 4.1° 1.1° x 0.8°
<b>IFOV,</b>	<b>Wide / Narrow</b>	0.15 mrad 0.03 mrad

<b>Range miles</b>		
	<b>Man Size Target</b>	
	Identification	2
	Recognition	4
	Detection	12
	<b>truck Size Target</b>	
	Identification	5
	Recognition	9
	Detection	23

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Long Range Day Night Camera

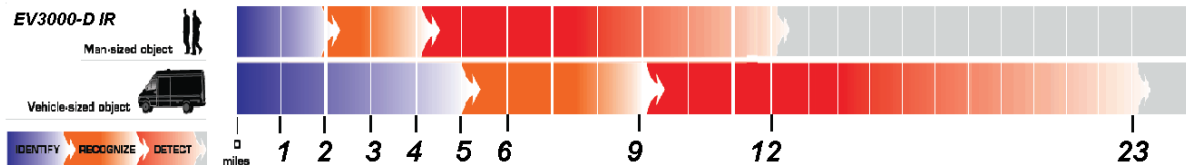
CCTV Surveillance Systems

SkyCam & Eagle Vision

Hyperfocal distance is the distance beyond which all objects are acceptably

Min focus and hyperfocal are parameters related to focus adjustment not for range
When you are zooming in range 10 meters to 1500 meters you will find image crispy and really you will need to adjust focus. And for range greater than hyperfocal, the focus of lens start to have effect, and user sometimes need to refocus the lens to get crispy images

Range of EV-3000 D IR high resolution with 640x480 resolutions



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Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

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## High Resolution Video Processor

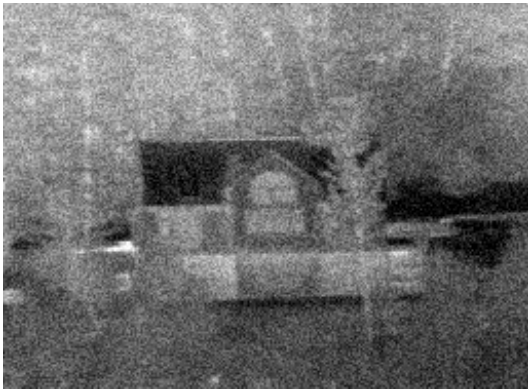
The HRVP (High Resolution Video Processor) board is a powerful digital image processing platform that provides an array of features designed for use in the EV3000-D IR model thermal imagers.

The HRVP will output corrected IR video in color (or monochrome), NTSC/PAL video format.

Basic display options will include manual gain, manual level, and image polarity. More sophisticated display options include continuous or on-demand auto-span (gain and level), digital zoom and histogram equalization. Auto-span and histogram equalization are based on programmable Regions Of Interest.

The 2x and 4x digital zoom is capable of operating in either pixel replication mode or bilinear interpolation mode. Pan capability within the zoomed image is supported. In addition, the HRVP contains the video processing hardware required to convert the FPA data to the final video stream output to the monitor.

The photographs below demonstrate the improved imaging performance the advanced HRVP video processor provides to the end user. Cleaner edges, sharper contrast and smoother images all work together to provide the user a more useable picture on the monitor contributing to better target recognition and minimized user strain and eye fatigue.



*Original Image*



*Filtered Image*

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Long Range Day Night Camera  
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## NETD

The EV3000-D IR model has an NETD of less than 40mk@23°C. Most camera systems will exceed the requirement, and the typical system NETD is 35mk. This sensitivity is a result of a highly sensitive detector array, efficient f/4 optics and high-performance electronics.

EV3000-D IR model provides additional sensitivity and target recognition capability through Digital Detail Enhancement (DDE). DDE is an electronic image processing algorithm that allows the system operator to see image details in even the most difficult conditions. In uniformly hot scenes of very high contrast (like those encountered in the desert) it can be hard for an imager to break out the detail an operator needs to recognize a human target at long range. Such details are often lost in the surrounding clutter, allowing targets to escape detection. Even in scenes without any discernable target contrast, DDE brings details out for classification, providing a distinct tactical advantage to EV3000-D IR model users.

## A c c e p t a n c e

*United Vision Solutions shall plan, perform and report acceptance testing in accordance with United Vision Solutions' Acceptance Plan to be approved by the buyer. United Vision Solutions has extensive experience working with customers around the world, and we are committed to the delivery of products that are in conformance with the requirements.*



*The topmost picture shows raw imagery with DDE off, while the bottom image demonstrates the effects of having DDE on.*

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# EM-CCD Day-Night

High sensitivity color camera



## High sensitivity color camera KP-DE500

### 100 Times More Sensitive Than A Normal Camera

- A new 1/2 inch EM-CCD with electron multiplication is used to achieve exceptional sensitivity.

Color in full motion mode	0.009 lx
Color accumulation mode	0.00015 lx
Monochrome in full motion mode	0.0005 lx
Monochrome accumulation mode	0.000008 lx

### Hitachi Technology Enables Superior Image Reproduction In Low Light Levels

- Thermoelectric cooling used on the EM-CCD to reduce the effects of dark current noise along with a new digital signal processor (DSP) that provides digital noise reduction of the luminous signal yields sharp clear pictures with a high S/N ratio.

## High sensitivity monochrome camera KP-E500

### For Even Greater Sensitivity A Monochrome Version of the Camera is Available Allowing Use in Even Lower Light Levels

- In the normal mode of operation the camera provides higher sensitivity as compared to a normal camera. In the accumulation mode unmatched sensitivity is achieved allowing use in extremely low light situations.

Monochrome in full motion mode	0.0003 lx
Monochrome accumulation mode	0.000005 lx

### Electron Multiplication used in the EM-CCD Improves Performance While Reducing Technical Issues

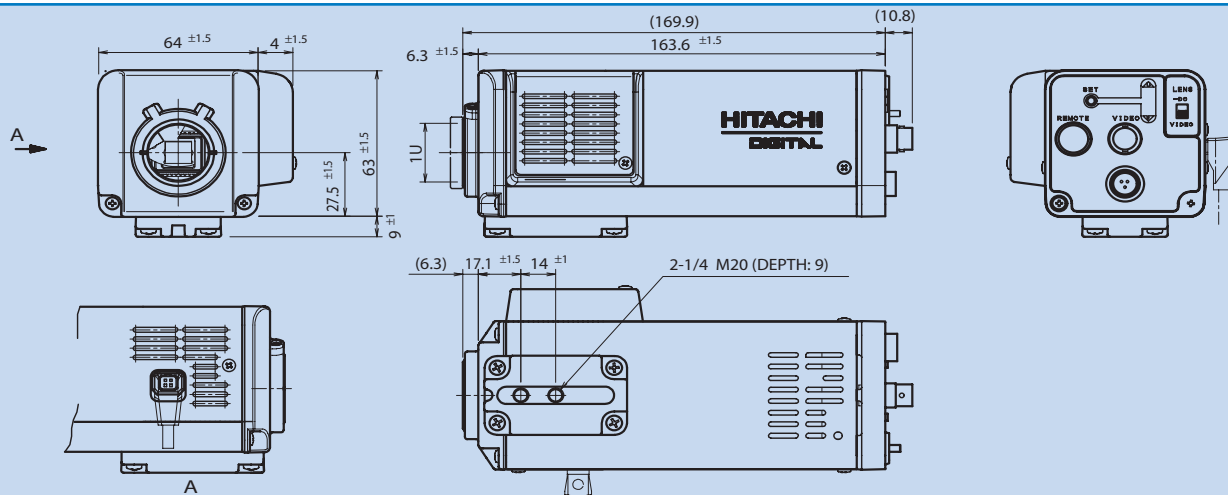
- Typical high sensitivity cameras use an Image Intensifier Tube that is subject to burn in, afterimage (lag) and short life span. These problems are eliminated with the use of the EM-CCD.



## Main Specifications

<b>Pickup element</b> ☒	1/2-inch interline EM-CCD	<b>The output for auto iris lenses</b>	(Square shape 4 pin, JEITA conformity) A galvanometer system/video signal
<b>Total pixels</b> ☒	680(H) x 500(V)	<b>White balance control</b> ☒	From the following three modes to selection (factory set-ATW) *Only KP-DE500 (color) ATW: The mode which follows automatically AWC: The mode which holds a white balance after an ☒ automatic setup MANUAL: They are red and the mode which carries out blue gain adjustment and unites a white with manual operation
<b>Effective pixels</b> ☒	658(H) x 496(V)	<b>Camera title character display</b> ☒	A display is possible to 22 characters in an alphanumeric character and a sign A setup to either of two upper and lower sides of a screen is possible in the position of a character.
<b>Imaging area</b>	6.58(H) x 4.96(V) mm	<b>B/W Mode</b>	OFF: The mode of fixation on a color image
<b>Pixel pitch</b>	10.0(H) x 10.0(V) μm (Square pixel)	<b>*Only KP-DE500 (color) ☒</b>	On: In high sensitivity black image mode AUTO: With luminous intensity OFF of high sensitivity black ☒ image, the mode where ON changes automatically In addition, it changes, as for luminous intensity from 3 stages of the HI, the MID and the LOW selective possibility
<b>Scanning system</b> ☒	2 : 1 Interlace	<b>Picture quality adjustment menu</b> ☒	Following to the menu indication of the picture, various ☒ picture quality adjustments and mode selection are possible
<b>Scanning frequency</b> ☒	Horizontal 15.734 kHz      Vertical 59.94 Hz	<b>DNR</b>	Change of AUTO / MANU (8 steps) (factory set-AUTO)
<b>Synchronization</b> ☒	Internal	<b>Power supply voltage</b> ☒	DC 12V ±1 V
<b>Video output</b>		<b>Current consumption</b> ☒	Approximately 1.5 A (excluding lens load)
<b>VBS output</b> ☒	Video 0.7 Vp-p Plus terminal nature	<b>Lens mount</b> ☒	The C / CS mount (flange back adjustment mechanism it is attached)
<b>Sync</b>	0.3 Vp-p Negative polarity	<b>Ambient, operating</b> ☒	- 10 °C - + 50 °C / 30 - 80% RH *when in order for you to use with the efficiency which long time is stabilized, it continues uses by all means +40 °C please use at below.
<b>Burst</b>	0.3 Vp-p, More than 8 cycles	<b>Ambient, storage</b> ☒	Retention: 20 °C - + 60 °C / 20 - 90% RH
<b>Impedance</b> ☒	75 Ω Un-balancing.	<b>Vibration endurance</b> ☒	24.5 m/s <sup>2</sup> (10 - 200Hz XYZ direction each 30 minute) *Please do not add the strong vibration over long time.
<b>Signal-processing system</b> ☒	Digital processing (Input 10 bit)	<b>External dimensions</b> ☒	78(W) x 63(H) x 170(D) mm (The lens and the projection section are excluded)
<b>Signal to noise ratio (S/N)</b> ☒	50 dB or more (luminosity signal, Gamma OFF, minimum gain, without detail boost)	<b>Mass</b>	Approximately 53g (The lens is excluded)
<b>Resolution</b> ☒	Horizontal: 480 lines      Vertical: 350 lines (In the central part)		
<b>Minimum photographic subject illumination</b> ☒	0.009 lx (Color in full motion, maximum sensitivity setup, F1.4, 50 IRE)		
<b>KP-DE500</b>	0.005 lx (Monochrome in full motion maximum sensitivity ☒ setup, F1.4, 50 IRE) 0.00015 lx (Color 64 time accumulation, maximum sensitivity setup, F1.4, 50 IRE) 0.000008 lx (Monochrome 64 time accumulation, maximum sensitivity setup, F1.4, 50 IRE)		
<b>Sensitivity (Gain) setup</b> ☒	Auto or a manual (factory set-AUTO)		
<b>Electronic shutter</b> ☒	Shutter: 7 steps /AES (factory set-OFF) OFF(1/60), 1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000 sec		
<b>Accumulation magnification setup</b> ☒	Auto or a fixed change is possible. (factory set-AUTO) 2, 4, 6, 8, 10, 16, 32, 64 times		
<b>Backlight compensation</b> ☒	An ON/OFF change is possible (factory set-OFF) Light-measurement area: Nine area to selection is possible.		

## Dimensions



# ***SUPER TELE PHOTO***

Amazing 50X Motorized Zoom Lens



# Technical Information

Motorized Zoom Lens is one of the most complicated products among various kind of optical products.

While having been engaged in development and manufacture of zoom lenses for the broadcasting services, Tokina has tried to establish an essential method in the approach for developing optical products, which is neither based on super cially clever style nor aiming at easily achieved mass-production. In doing so, Tokina has worked hard for cultivating the most re ned techniques and has accumulated a vast amount of valuable know-how in this area.

The surveying activity using long focal-distance lens is not an application that is very special in nature for sophisticated surveillance and border patrol but one that is widely used in the whole world.

From such an analysis, Tokina set out the aim of producing a "standard" lens for the long focal-distance surveillance application by ourselves. The goal was to o er it to the users to allow them to build the surveying system at a more reasonable cost. Tokina has now succeeded to develop this lens, which has literally accomplished this purpose.

## ● High magni cation and long focal length

This model features high magni cation of 50X and long focal length of 1000mm at telephoto(2X Ext.) with compact body of 124(W) x 108(H) x 300(L)mm and light weight of 3.2kg.

These features o er outstanding advantages to your applications.

## ■ Di erent angle eld of View

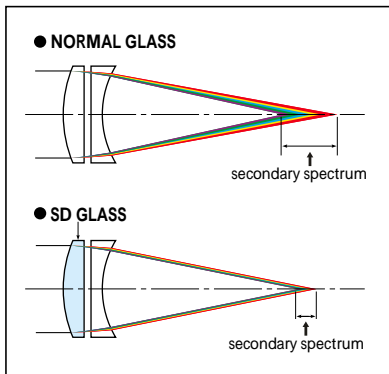


# So sticated Tokina's designing and manufacturing technologies are incorporated with compact and light weight body.

## ● Superapochromat using the SD glass

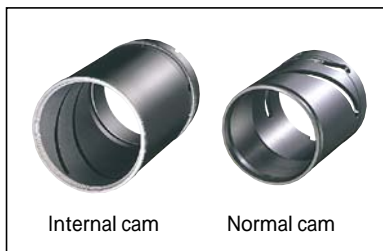
Expensive super low dispersion glass which has been used for TV Broadcast lenses is used in the frontal part of the lens to eliminate in an ideal manner the secondary aberration occurring at the telephoto side.

### ■ SD (Super Low Dispersion) GLASS



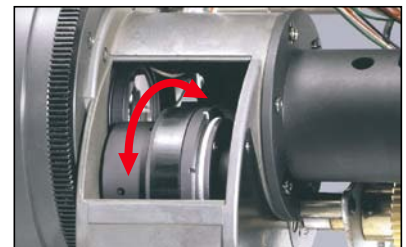
## ● Employment of the internal cam system

The system allows the cam grooves to be cut by an easier gradient. This will permit at the same time the strength of the cam barrel to be increased relative to that of the conventional system. An increase of precision in the direction of the optical axis has made it possible for an ideal optical performance to be achieved at a value almost identical with that of the design. With a decrease of the load to the zooming and focusing motors, the overall durability has significantly enhanced.



## ● Remote extender

Tokina employed the extender system which has been used for TV broadcast zoom lenses in contrast to conventional extenders attached to the rear end of a lens, this extender has been incorporated into its optical system itself from the designing stage to ensure that an optimal extender most appropriate for the lens should be developed. Moreover, use of a motorized system for moving of the extender has allowed it to be remotely controlled.



## ● Triplet compensator

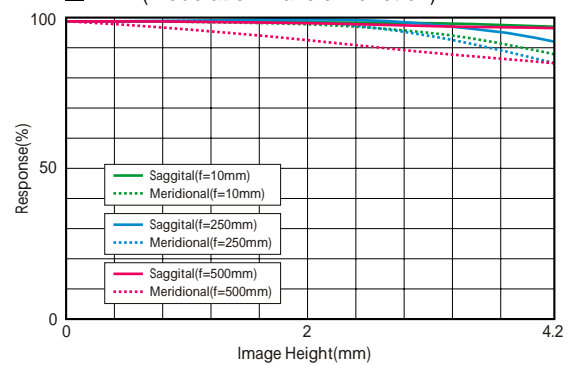
Tokina has solved the problem of a deterioration of the center performance at around halfway of the zooming range with this compensator. The deterioration is a characteristic commonly observed in telescopic lenses with a high magnifying power. A result of the Tokina's advanced optical technologies, the compensator prevents the deterioration from occurring and achieves a high resolution over the entire zooming range.

## ● High resolution suitable for 3CCD cameras

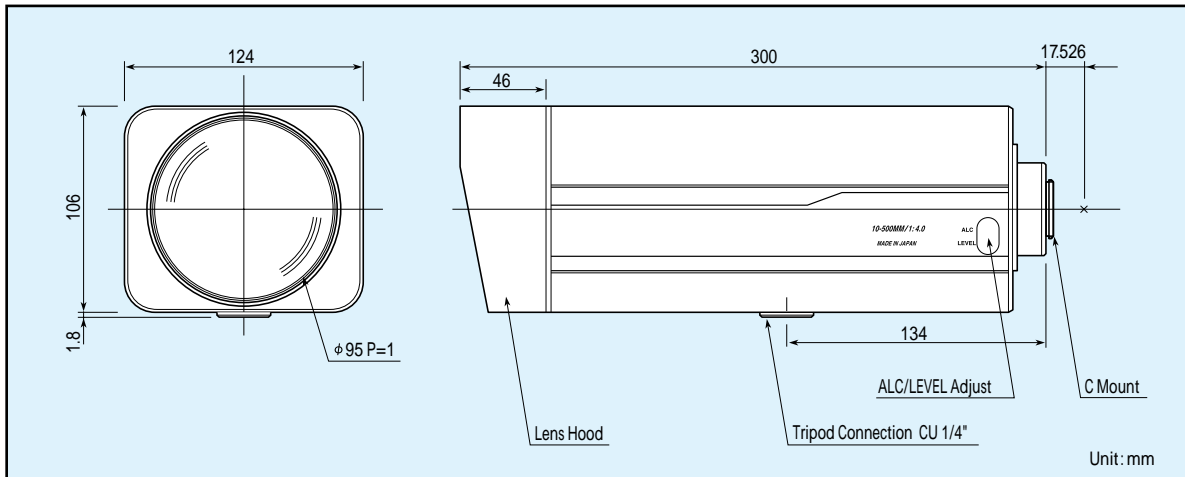
The progress in the use of 3CCD cameras is remarkable in recent years. Provided with a high resolving power, the lens will allow you to fully utilize the camera's performance to obtain images in bright colors with high resolution.



### ■ MTF (Modulation Transfer Function)



## Dimensions



## General Specifications

Model No.		EV3000-D-500 lens	
Format		1/2 inch	
Focal Length		10-500mm/20-1000mm(with Extender)	
Zoom Ratio		50x	
Iris Range		F4.0-125(360) / F#8.0-250(720) (with Extender)	
Angle of View (H x V)		35.5° x 27.0°(10mm) 18.2° x 13.7°(20mm) 0.7° x 0.6°(500mm) 0.4° x 0.3°(1000mm)	
Filter Screw Size		M95 P=1mm	
Dimensions		124mm x 106mm x 300mm	
Weight		3.2Kg	
Mount		C Mount F.B=17.526mm(in air)	
Operation	Iris (Auto)	Metering Method	Continuously Adjustment(Peak-Average)
		Input Voltage	DC8 ~ 16V(Max.40mA)
		Input Signal	V or VS Signal
		Iris Accuracy	±15% at Image Signal
		Sensitivity Adjustment	0.5 ~ 1.0Vp-p at Video
		Respond Speed	Approx. 4sec.
		Input Impedance	High Impedance
	Zoom (Motorized)	Control Voltage	DC12V(Max.120mA)
		Motorization Speed	Approx. 6Sec.
		Potential Meter	5K
	Focus (Motorized)	Control Voltage	DC12V(Max.120mA)
		Motorization Speed	Approx. 7Sec.
		Potential Meter	5K
	Extender (Motorized)	Control Voltage	DC12V(Max. 50mA)
Motorization Speed		2Sec.	
Operating Temperature		-10 ~ +50°C	

\*1ND360 is available

Specifications are subject to change without notice.



# Video Stabilizer Specification Sheet

## Video Input

- 1 input channel
- Auto-detect composite PAL or NTSC
- 75 Ohm BNC connector

## Video Output

- 1 output channel
- Output automatically adapted to input format
- 75 Ohm BNC connector

## Power

- External power supply included
- 12VDC, 1.2A
- DC Power Plug 2.5x5.5x14mm, Center+

## Operating Conditions:

- Temperature: 30 – 120°F (0 – 50°C)
- Humidity: 20 – 95%, non-condensing

## Dimensions and Mechanics:

- Height: 2.2" (5.5 cm)
- Width: 6.7" (16.9 cm)
- Length: 7.3" (18.5 cm)
- Weight: 2.4 lbs (1.1 kg)
- Finish: Black powder-coated aluminum
- Protection: Classification IP 65

## EMC compliance

- FCC part 15B class A
- EN55022 class A
- EN61000-3-2
- EN61000-3-3
- EN61000-6-2

## Power Failure Safe

- All user settings stored in EEPROM

## Application Setup

- 12 DIP-switches for parameter selection
- 6-key keypad for control of OSD.

## Board Features:

- Equator 300 MHz BSP-15 DSP
- Coprocessor
- 64 MB SDRAM
- 4 MB Flash
- 4 kbit parameter memory
- Video decoder, ITU 656 YUV 4:2:2 format
- Video encoder, ITU 656 YUV 4:2:2 format
- Extension slot

## Stabilization Correction

- X/Y correction
- Rotation correction
- Zoom correction

## Shake Capture Range Presets

- Small/medium/large

## Output Video Latency

- approx. 100 milliseconds

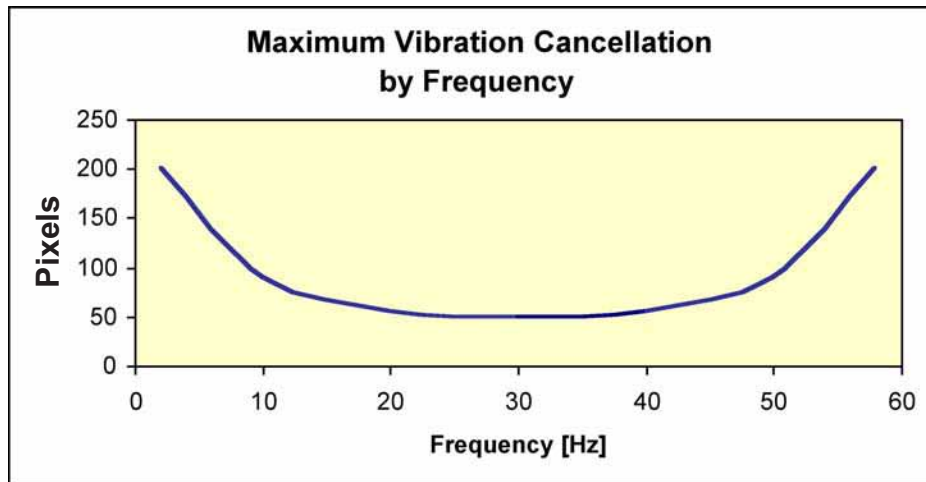
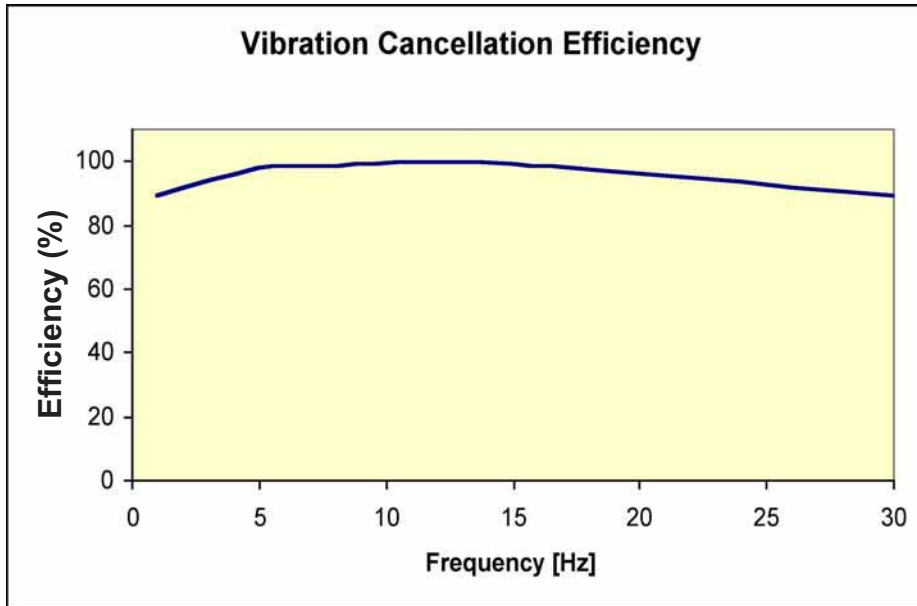
## Exclusion Areas

- Default Region of Interest is entire Frame
- Definition of top and bottom frame exclusion areas (exclude lettering)

## Demo Modes

- Picture-in-picture demo mode
- Side-by-side demo mode
- Manual Toggle with front cancel button

# Video Stabilizer Performance



## CCTV Software

The new *CCTV Software*, is to serve as a viewer-controller-recorder vision solution for Camera System

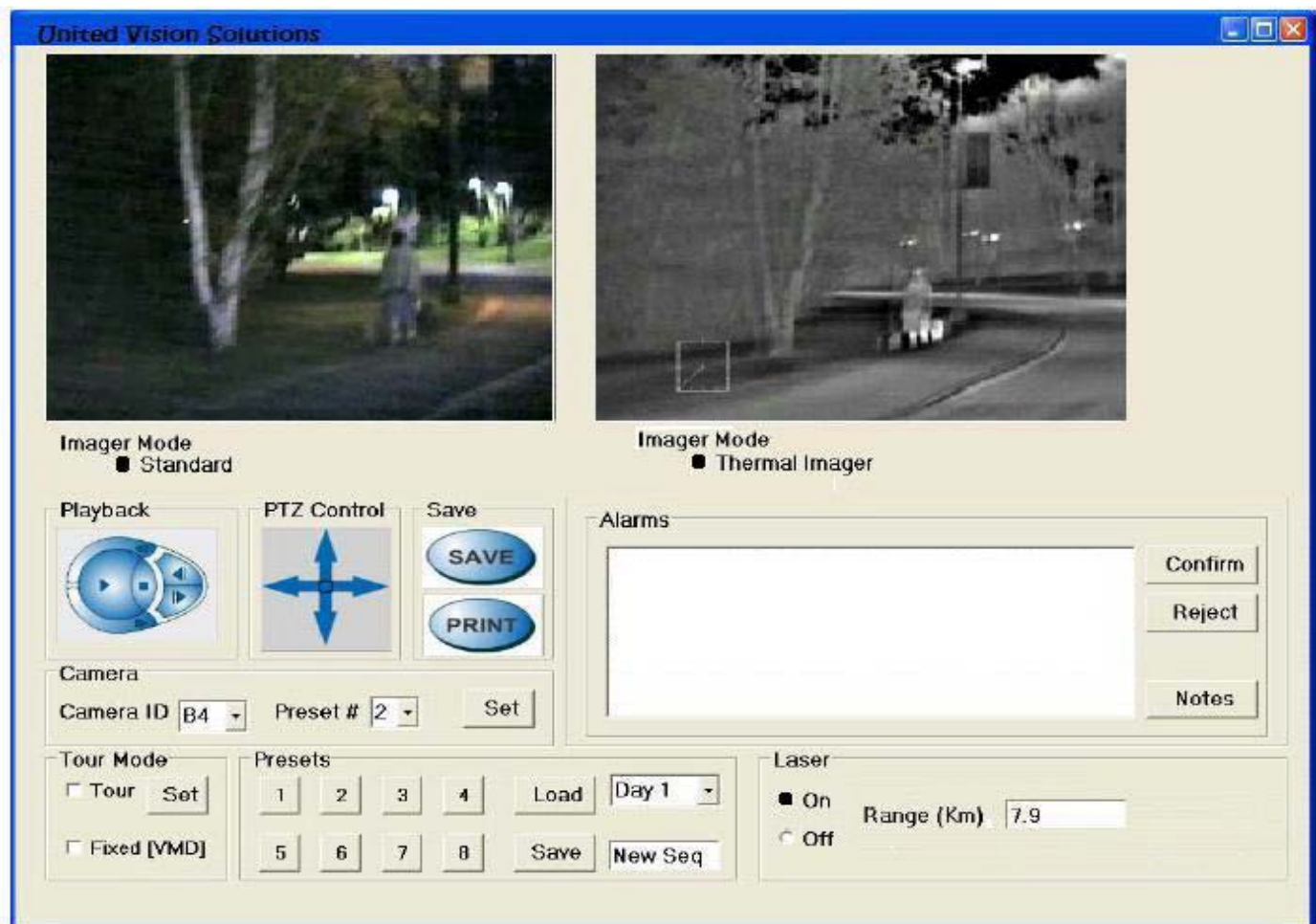
The system shall integrate with controllable pan-Tilt, Thermal (IR) , laser rangfinder, and Day/Night camera. All of the control, recorder and viewer software components shall operate on a single workstation.

### Features

- Control IR camera settings from software application
- Control IR zoom from software application
- Control pan/Tilt (orientation) from software application with a joystick
- Read Range finder info and display on software application
- Control Daylight zoom from software application
- Target Tracking
- Display Daylight and IR Images live
- Recording to hard drive capabilities of both cameras along with Range finder information

**Command Control System**  
**CCS-CCTV software**

**Multi sensors IP S/W**





# **Long Range Dual Camera System**

## **Eagle Vision**

### **USER'S MANUAL**

#### **EV3000-D**

## **Important Notice**

**The manual is organized into two main sections, section A describes the system components, system installation, and section B describes system operation.**

### **EXPORT CONTROL**

Equipment described herein may require US Government authorization for export purposes. Diversion contrary to US law is prohibited.

### **PROPRIETARY**

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## **Safety Summary**

This manual describes processes that may cause injury or death to personnel, or damage to equipment if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment. Prior to performing any task, the WARNINGS, CAUTIONs and NOTEs included in that task shall be reviewed and understood.

### **WARNINGS, CAUTIONS, NOTES**

#### **WARNING**

Used to indicate a location, equipment or system where a potential hazard exists capable of producing injury to personnel if approved procedure is not followed.

#### **CAUTION**

Used to indicate an operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to or destruction of equipment or loss of mission effectiveness or long term health hazards to personnel.

**NOTE: Used to indicate an essential operating or maintenance procedure, condition, or statement.**

**Section A**

**Installation's Manual**



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- 1. Introduction**
- 2. EV3000-D Specifications**
- 3. EV3000-D installation Notes**
- 4. EV3000-D Drawing**
- 5. EV3000-D wiring**
- 6. EV3000-D Enclosure Wiring**
- 7. EV3000-D Protocol & Control command list**
- 8. EV3000-D Address & Baud rate Setting**
- 9. Warranty**
- 10. Appendix**

## 1. Introduction

The EV3000-D is a Dual Camera system with Pan Tilt Driver & Camera System with two Cameras and Camera Control Unit.










The 1<sup>st</sup> camera is infrared (IR) camera intended for use during dark or night time, as a long range thermal imaging surveillance system and the other is Day/Night camera plus zoom lens.

This product can be used where the rugged system is required for harsh-environment as ports, offshore, and marine applications, it is apt to be corroded in salt such as shore or ship due to its material Stainless Steel 316 against corrosion.

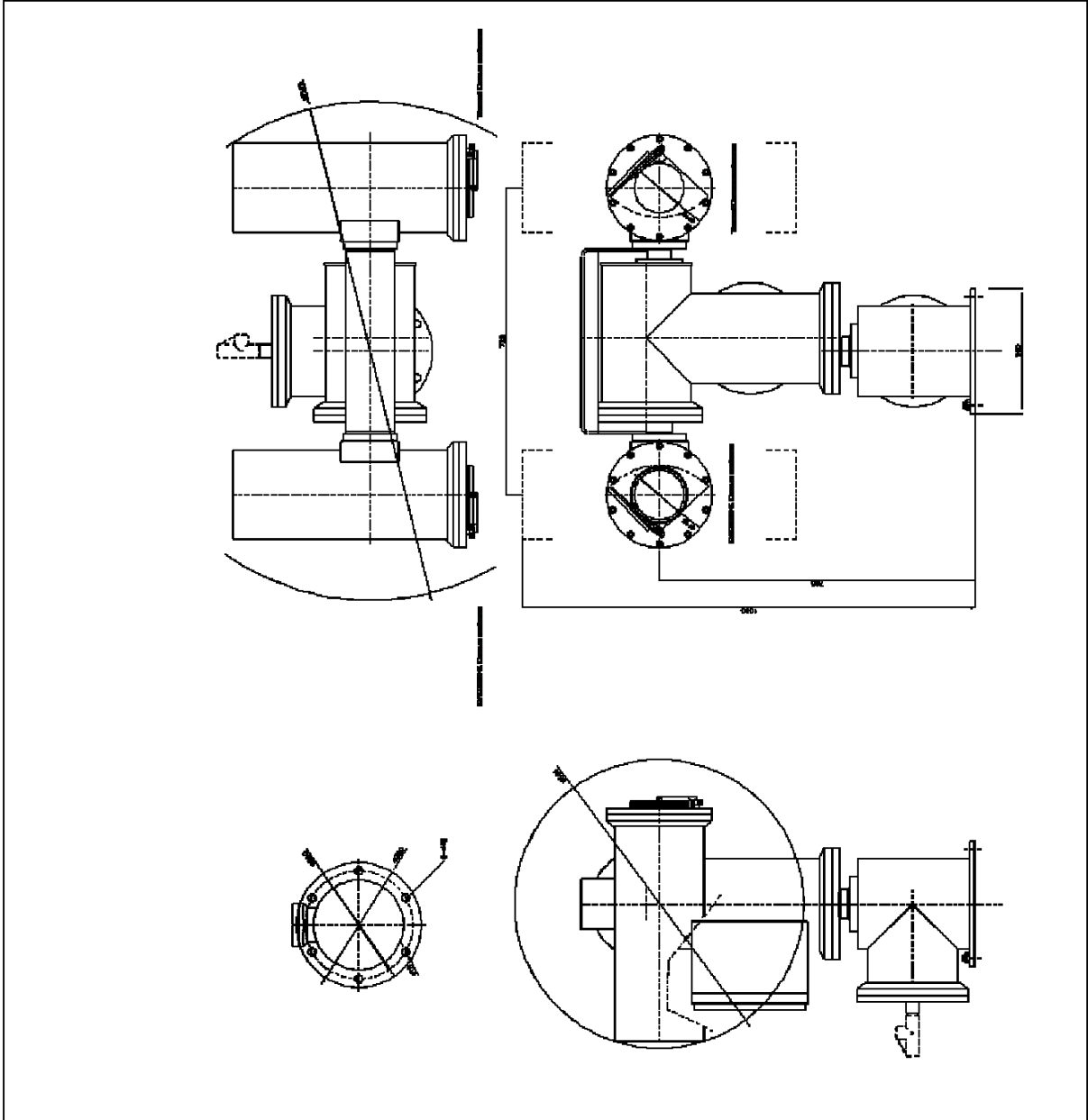
And this product is used in border surveillance for military, police, emergency services incorporating thermal imager.

The remote-control unit can rotate this product vertically or horizontally through the built-in receiver.

### 3. EV3000-D installation Notes

	Before operation the unit, you must read this user's Manual thoroughly and retain it for future reference.
	Before cleaning the unit, you must remove it from the wall or bracket. You must clean it with a wet cloth. Never use liquid cleanser.
	Enough space must be ensured to installation of this P/T and never rotate PAN/TILT housing forcibly without driving by remote controller.
	Be careful not to put this unit on an unstable stand, tripod, shelf, or Table.
	Do not leave the unit in a location near heat sources or humidifier.
	Be careful of electric overload on the electric terminal or extension cable, otherwise there can be risk of permanent damage.
	<p>You must stop operation this unit and never connect the connector of the cable to the unit in case of the following situations.</p> <ul style="list-style-type: none"> <li>● In case of the control cable being damaged.</li> <li>● When any liquid or unfavorable materials fall into the unit.</li> <li>● When the unit doesn't work properly according to the instruction.</li> <li>● When the unit fell down or the P/T was damaged.</li> </ul>
	You must make an expert examine the accessories whether they have the same specific character when you need replacement of them.
	<p>You must install AC24V power source near the EV3000-D (within 10m)          Otherwise The EV3000-D will probably malfunction due to AC voltage drop or critical noise etc.</p>

### 4. EV3000-D Drawing





## 6. EV3000-D Enclosure Wiring

### 6-1. Thermal camera connection at thermal camera terminal

TERMINAL No.	SIGNAL NAME	FUNCTION	PIN NAME
1	GND_IR	12V DC SUPPLY RETURN FOR IR CAMERA	a
2	GND_IR	12V DC SUPPLY RETURN FOR IR CAMERA	e
3	GND_IR	12V DC SUPPLY RETURN FOR IR CAMERA	s
4	GND_IR	12V DC SUPPLY RETURN FOR IR CAMERA	t
5	VDC+_IR	12V DC FOR IR CAMERA\	M
6	VDC+_IR	12V DC FOR IR CAMERA	N
7	VDC+_IR	12V DC FOR IR CAMERA	h
8	VDC+_IR	12V DC FOR IR CAMERA	i
9	NONE	NONE	
10	RS422EN	RS-422 ENABLE	p
11	GNDD	GROUND REFERENCE FOR THE SERIAL COMM. LINES	A
12	GND_SHASSIS	CHASSIS GROUND	K
13	RXD1_422+	RS-422 RECEIVE+(FROM 804D TO CAMERA)	n
14	RXD1_422-	RS-422 RECEIVE-( FROM 804D TO CAMERA)	T
15	TXD1_422+	RS-422 TRANSMIT+(FROM CAMERA TO 804D)	B
16	TXD1_422-	RS-422 TRANSMIT-(FROM CAMERA TO 804D)	W
17	NONE	NONE	
18	NONE	S-VIDEO SHIELD WIRE(Not used)	
19	SVIDEO_GND	S-VIDEO LUMINANCE GND	u
20	SVIDEO_GND	S-VIDEO CHROMINANCE GND	H
21	SVIDEO_Y	S-VIDEO LUMINANCE	v
22	SVIDEO_C	S-VIDEO CHROMINANCE	J
23	RS170GND	COMPOSITE VIDEO GND	F
24	CVIDEO_1	COMPOSITE VIDEO	b
25	GND_DF	GROUND RETURN FOR DEFROSTER	C
26	GND_DF	GROUND RETURN FOR DEFROSTER	X
27	GND_DF	GROUND RETURN FOR DEFROSTER	m
28	GND_DF	GROUND RETURN FOR DEFROSTER	q
29	GND_DF	GROUND RETURN FOR DEFROSTER	CC
30	GND_DF	GROUND RETURN FOR DEFROSTER	DD
31	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	S
32	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	k
33	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	AA
34	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	BB
35	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	FF
36	VDC+_DF	DC 12V SUPPLY FOR DEFROSTER	HH

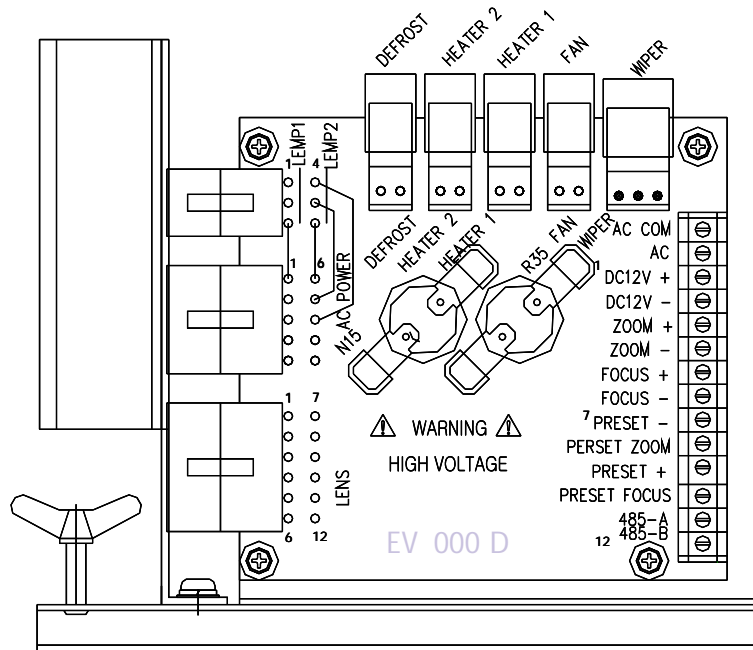
Please connect lead wires from thermal camera correctly to these terminals.

Otherwise, Electronic devices in EV3000-D receiver may be damaged.

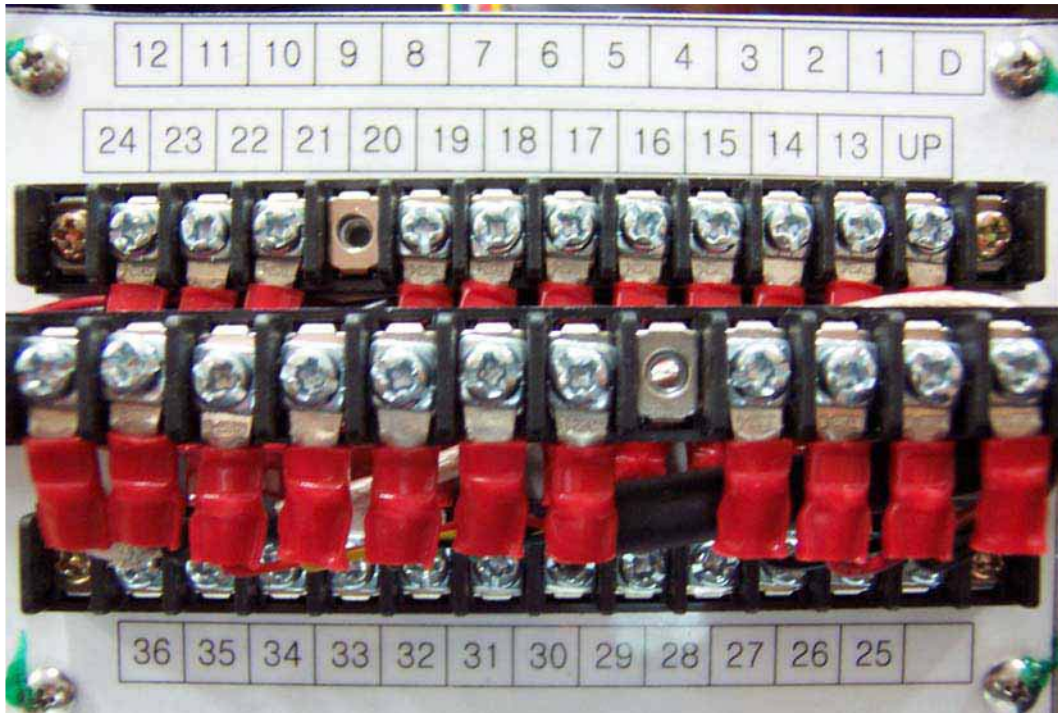
### 6-2 Day/night camera connection at Day/night camera terminal

SIGNAL NAME	FUNCTION
DC 12V +	DC 12V CAMERA POWER
DC 12V -	DC 12V CAMERA POWER RETURN
ZOOM+	ZOOM MOTOR+
ZOOM-	ZOOM MOTOR-
FOCUS+	FOCUS MOTOR+
FOCUS-	FOCUS MOTOR-
PRESET -	DC 5V POTENTIOMETER POWER RETURN
PRESET ZOOM	ZOOM_PRESET
PRESET +	DC 5V LENS POTENTIOMETER POWER
PRESET FOCUS	FOCUS_PRESET

Camera & lens will be mounted on a bracket with connection PCB as below.



### 36-pin connection terminals in thermal camera enclosure



(only 33 terminals are used)

- a. “D” of 36-pin Terminals means down-side(lower-side) 12 ea of terminals(Terminal No.1~12).  
**You can find that Pin No.9 is empty (Not connected) on above Fig 1**
- b. “UP” of 36-pin Terminals means up-side(upper-side) 12 ea of Terminals(Terminal No.13~24).  
**You can find that Pin No.17 is empty (Not connected) on above Fig 1**
- c.”SIGNAL NAME,FUNCTION, & PIN NAME of the above 36-Pin Terminal Description Table is same as the pin name of 55-pin system cable of thermal camera manual.
- d.”TERMINAL No.”of above 36-Pin Terminal Description Table is same as Number of above Figure 1.
- e.Don’t connect any lead wire to ” TERMINAL No. 18(SVIDEO SHIELD WIRE).  
Because thermal Camera has no SVIDEO SHIELD terminal.



## 7. EV3000-D Protocol & Control command list

Protocol: PELCO-D

BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
FF	Address	Command1	Command2	DATA 1	DATA 2	Checksum

- 1) Data Communication Speed: Selectable among 2400, 4800, and 9600 BPS  
(Default baud rate: 2400 BPS)
- 2) Byte Format: 1 START, 8 DATA, 1 STOP BIT
- 2) Receiver Address Range: 000~254  
(Default address: 001)

### Note: Bit Definition of Byte 3

Bit 6 is used to select Camera Between "DAY/NIGHT" Camera with Lens and the thermal Camera.  
If set to "1", the Camera is Selected to DAY/NIGHT Camera.  
If set to "0", the Camera is Selected to "THERMAL" Camera.

## 1. Command List for EV3000-D(Basic format is PELCO-D) :

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
1	Pan Left	Command	FFh	Receiver ID	00h	<b>04h</b>	<b>P1</b>	<b>00h</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed						
2	Pan Right	Command	FFh	Receiver ID	00h	<b>02h</b>	<b>P1</b>	<b>00h</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed						
3	Tilt Up	Command	FFh	Receiver ID	00h	<b>08h</b>	<b>00h</b>	<b>P2</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed						
4	Tilt Down	Command	FFh	Receiver ID	00h	<b>10h</b>	<b>00h</b>	<b>P2</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed						
5	Pan Left & Tilt Up	Command	FFh	Receiver ID	00h	<b>0Ch</b>	<b>P1</b>	<b>P2</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed						
6	Pan Right & Tilt Up	Command	FFh	Receiver ID	00h	<b>0Ah</b>	<b>P1</b>	<b>P2</b>	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
7	Pan Left & Tilt Down	Command	FFh	Receiver ID	00h	14h	P1	P2	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed						
8	Pan Right & Tilt Down	Command	FFh	Receiver ID	00h	12h	P1	P2	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed						
9	Pan/Tilt/ Zoom & Focus Stop at camera 1 & camera 2	Command	FFh	Receiver ID	00h or 40h	00h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Pan, Tilt, Zoom and Focus driving will be stopped at both camera 1 & camera 2 <b>regardless of bit6 of Byte 3.</b>						
10	Zoom Wide at Camera 1	Command	FFh	Receiver ID	40h	40h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.)						
11	Zoom Tele at Camera 1	Command	FFh	Receiver ID	40h	20h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.)						
12	Wide field of view at camera 2	Command	FFh	Receiver ID	00h	40h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
13	Narrow field of view at camera 2	Command	FFh	Receiver ID	00h	20h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
14	Focus Far at Camera 1	Command	FFh	Receiver ID	40h	80h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.)						
15	Focus Near at Camera 1	Command	FFh	Receiver ID	41h	00h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.)						
16	Focus Near (Increments IR Focus closer) at camera 2	Command	FFh	Receiver ID	01h	00h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
17	Focus Far (Increments IR Focus farther) at camera 2	Command	FFh	Receiver ID	00h	80h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
18	Set Preset	Command	FFh	Receiver ID	00h	03h	00h	P_ID	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P_ID=00~7Fh,The Receiver Stores Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM.						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
19	Clear Preset	Command	FFh	Receiver ID	00h	05h	00h	P_ID	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P_ID=00~7Fh, The Receiver Clears Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM.						
20	Goto Preset Position	Command	FFh	Receiver ID	00h	07h	00h	P_ID	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, P_ID=00~7Fh, The Pan, Tilt, Zoom & Focus Position of Camera 1 Will be Moved to Stored Preset Position.						
21	Turn on Wiper at Camera 1	Command	FFh	Receiver ID	40h	09h	00h	09h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be Driven for Several Seconds)						
22	Turn off Wiper at Camera 1	Command	FFh	Receiver ID	40h	0Bh	00h	09h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be stopped.)						
23	Turn on Pump	Command	FFh	Receiver ID	00h	09h	00h	0Ah	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 0Ah of Byte 6=Pump. The Pump Will be Driven for Several Seconds.						
24	Turn off Pump	Command	FFh	Receiver ID	00h	0Bh	00h	0Ah	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 0Ah of Byte 6=Pump. The Pump Will be stopped.						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
25	Turn on Wiper at Camera 2	Command	FFh	Receiver ID	00h	09h	00h	0Bh	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2. Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be Driven for Several Seconds.)						
26	Turn off Wiper at Camera 2	Command	FFh	Receiver ID	00h	0Bh	00h	0Bh	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2.Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be stopped.)						
27	Toggle Polarity	Command	FFh	Receiver ID	00h	09h	00h	01h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
28	Toggle auto span/His togram Linear	Command	FFh	Receiver ID	00h	09h	00h	02h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2)						
29	NUC on the internal shutter	Command	FFh	Receiver ID	00h	09h	00h	03h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
30	Menu selection one position down	Command	FFh	Receiver ID	00h	09h	00h	04h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
31	Menu selection left pressed	Command	FFh	Receiver ID	00h	09h	00h	05h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
32	Menu selection Right pressed	Command	FFh	Receiver ID	00h	09h	00h	06h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
33	Show menu/accept	Command	FFh	Receiver ID	00h	09h	00h	07h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
34	Power state on	Command	FFh	Receiver ID	00h	09h	00h	08h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
35	Toggle palette	Command	FFh	Receiver ID	00h	0Bh	00h	01h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						
36	Toggle sensitivity	Command	FFh	Receiver ID	00h	0Bh	00h	02h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.)						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
37	Toggle e-zoom	Command	FFh	Receiver ID	00h	0Bh	00h	03h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
38	One position up	Command	FFh	Receiver ID	00h	0Bh	00h	04h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
39	Move menu selection left released	Command	FFh	Receiver ID	00h	0Bh	00h	05h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
40	Move menu selection Right released	Command	FFh	Receiver ID	00h	0Bh	00h	06h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
41	menu selection cancel/exit	Command	FFh	Receiver ID	00h	0Bh	00h	07h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						
42	Power state sleep	Command	FFh	Receiver ID	00h	0Bh	00h	08h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.)						



No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
43	AGC auto/on/off	Command	FFh	Receiver ID	00h	2Fh	00h	00~02h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Byte 6 = 1 (It will set to continuous auto adjust),Byte6=2 (It will set to manual adjust)						
44	Set shutter speed	Command	FFh	Receiver ID	00h	37h	00h	00~02h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Select sensitivity in Byte 6.[0 – low,1 – medium,2 - high]						
45	Adjust white balance(R-B)	Command	FFh	Receiver ID	00~01h	3Bh	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using the internal shutter.						
46	Adjust white balance(M-G)	Command	FFh	Receiver ID	00~01h	3Dh	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using an external surface.						
47	Adjust gain	Command	FFh	Receiver ID	00~01h	3Fh	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute gain.						
48	Adjust auto iris level	Command	FFh	Receiver ID	00~01h	41h	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute level.						

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
49	Camera Power on at camera 2	Command	FFh	Receiver ID	00h	09h	00h	0Ch	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned On by EV3000-D Receiver Without any command sending to thermal camera (default state).But DC12V Defroster supply will always be turned on state.						
50	Camera Power off at camera 2	Command	FFh	Receiver ID	00h	0Bh	00h	0Ch	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned Off by EV3000-D Receiver without any command sending to thermal camera. But DC12V Defroster supply will always be turned on state.						
51	Initialize PAN/TILT	Command	FFh	Receiver ID	00h	0Fh	00h	00h	Checksum
		EV3000-D Response	None						
		Description	Receiver ID=00h~FEh, Pan/Tilt will go to Preset position No."0" which is stored in EEPROM of EV3000-D receiver when manufactured in factory.						

## 2. Command List for Thermal camera (Basic format is PELCO-D) :

Internal Communication Commands between EV3000-D Receiver and Thermal camera(4-Bytes command response)

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
1	Toggle Polarity	Command	FFh	Receiver ID	00h	09h	00h	01h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
2	Toggle auto span/Histogram Linear	Command	FFh	Receiver ID	00h	09h	00h	02h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
3	NUC on the internal shutter	Command	FFh	Receiver ID	00h	09h	00h	03h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
4	Menu selection one position down	Command	FFh	Receiver ID	00h	09h	00h	04h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
5	Menu selection left pressed	Command	FFh	Receiver ID	00h	09h	00h	05h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
6	Menu selection Right pressed	Command	FFh	Receiver ID	00h	09h	00h	06h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
7	Show menu/accept	Command	FFh	Receiver ID	00h	09h	00h	07h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
8	Power state on	Command	FFh	Receiver ID	00h	09h	00h	08h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
9	Toggle palette	Command	FFh	Receiver ID	00h	0Bh	00h	01h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
10	Toggle sensitivity	Command	FFh	Receiver ID	00h	0Bh	00h	02h	Checksum
		Thermal camera Response	FFh	Receiver ID	00h	0Eh			
11	Toggle e-zoom	Command	FFh	Receiver ID	00h	0Bh	00h	03h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
12	One position up	Command	FFh	Receiver ID	00h	0Bh	00h	04h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
13	Move menu selection left released	Command	FFh	Receiver ID	00h	0Bh	00h	05h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
14	Move menu selection Right released	Command	FFh	Receiver ID	00h	0Bh	00h	06h	Checksum
		Thermal camera Response	FFh	Receiver ID	00h	12h			
15	menu selection cancel/exit	Command	FFh	Receiver ID	00h	0Bh	00h	07h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			

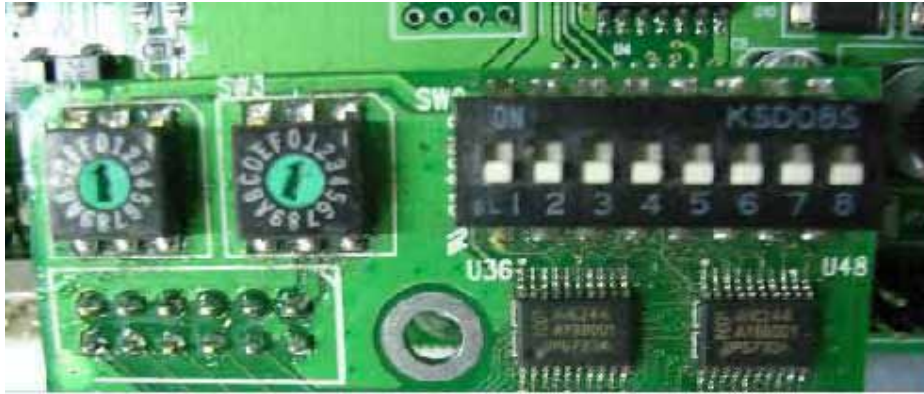
No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
16	Power state sleep	Command	FFh	Receiver ID	00h	0Bh	00h	08h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
17	Narrow field of view	Command	FFh	Receiver ID	00h	20h	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
18	Wide field of view	Command	FFh	Receiver ID	00h	40h	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
19	Focus Near (Increments IR Focus closer)	Command	FFh	Receiver ID	01h	00h	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
20	Focus Far (Increments IR Focus farther)	Command	FFh	Receiver ID	00h	80h	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
21	AGC auto/on/off	Command	FFh	Receiver ID	00h	2Fh	00h	00~02h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
22	Set shutter speed	Command	FFh	Receiver ID	00h	37h	00h	00~02h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
23	Adjust white balance(R-B)	Command	FFh	Receiver ID	00~01h	3Bh	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			

No	Command	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	
24	Adjust white balance(M-G)	Command	FFh	Receiver ID	00~01h	3Dh	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
25	Adjust gain	Command	FFh	Receiver ID	00~01h	3Fh	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			
26	Adjust auto iris level	Command	FFh	Receiver ID	00~01h	41h	00h	00h	Checksum
		Thermal camera Response	FFh	Receiver ID	18h	B9h			

[Note for Byte 2]

Byte 2 is EV3000-D receiver address which can be adjusted from "0~254".

## 8. EV3000-D Address & Baud rate Setting



### A) Baud rate Setting

- Set the Switch No.1 & No.2 of 8 POLE DIP Switch as bellows.

Baud rate	Switch No1	Switch No2
2400 BPS	OFF	OFF
4800 BPS	ON	OFF
9600 BPS	ON	ON

- **Default: 2400 BPS**

### B) Receiver Address Setting

- Set the SW3 and SW4 Hex-decimal Switches as bellows.

LSB SIDE (SW3): NO. 0 TO NO. 15, MSB SIDE (SW4): NO. 16 TO NO. 255.

Receiver address (Decimal number)	Sw4(Hexadecimal switch) MSB of hex-decimal Number	Sw3(Hexadecimal switch) LSB of hex-decimal Number
15	" 0" POSITION	" F" POSITION
28	" 1" POSITION	" C" POSITION
100	" 6" POSITION	" 4" POSITION

- **Default Address: Set to "1" at factory.**

## 9. WARRANTY

### ● Product Warranty

MODEL No.		EV3000-D
SERIAL No.		
Date of purchased		
Place of Purchased		
c u s t o m e r	n a m e	
	a d d r e s s	

If the product breaks down during proper use, it will be repaired within 1 year from the date of purchase free of charge

Please contact us:

Tel. (413)592-8477

E-mail: [tech@unitedvisionsolutions.com](mailto:tech@unitedvisionsolutions.com)

Http://www.unitedvisionsolutions.com

Address: 10 Center st., Suite 401 & 402, Chicopee, MA 01013 USA

(Pleas refer to our web-site)

date	Detail	Agency	Repairman

Design and specifications are subject to change without notice for improving quality.



## Appendix A Care and Handling of EV3000-D

### A.1 Cleaning Optics

Follow the lens cleaning instructions below.

a. Examine lens surfaces carefully.

**NOTE: Removal of the thin film coating will seriously degrade optical performance. A change in apparent color indicates the loss of coating.**

- Remove all dust and debris with a soft bristle brush.
- Gently wipe the surface with a single stroke using pads moistened with a 50/50 mixture of isopropyl alcohol and acetone.

**CAUTION: DO NOT rub lens hard!**

d. Drag lightly across surface just fast enough for the liquid to evaporate behind the moving pad. Refer to the figure on the next page.

This should leave no streaks.

**CAUTION: DO NOT clean the lens in a circular motion!**

Follow above procedure with dust cloth to remove any remaining dust.

### A.2 Other External Surfaces

Clean as required with nonabrasive household cleaner.

### A.3 Handling

Use care to ensure that the EV3000-D is not excessively bumped or dropped. Even though the EV3000-D is a rugged instrument, it should be treated very carefully like any other sophisticated camera.

## Appendix B

### Glossary

**Atmospheric Attenuation** – The amount of radiated IR energy that is absorbed by the atmosphere. It is a function of the temperature and humidity, particles in the air (i.e. fog, smoke, smog, etc.) and wavelength, among other factors.

**CCIR** - Video standard for monochrome, 50 field/sec interlaced video output (i.e. European standard black and white video).

**Critical Dimension** – The dimension of a target used in calculating the DRI performance. It is a function of length, width and height, as well as what face of the target is presented to the imager.

**DRI (Detection-Recognition-Identification)** – A method of characterizing the range performance of a thermal imager according to a standard set of criteria using a standard atmospheric model, and a target of alternating black and white stripe (cycles) at different temperatures.

**Detection** – The minimum distance at which an imager can reproduce a single cycle (black/white stripe) of a target. Typically used to represent the distance at which the imager can first detect a given target (i.e. a hot blob). In addition to the imager, the detection range is also a function of the target size and temperature difference from the background.

**Field of View (FOV)** – The area in space that is seen by the lens of a thermal imager. Usually expressed in degrees, and specified for both horizontal and vertical dimensions. The FOV is a characteristic of the lens.

**FLIR 92** – A set of standards defined by the Night Vision Laboratories for calculating DRI information.

**F-Number** – Focal Length/Diameter of Lens (same as in a visible lens). A lower F-number means that more IR radiation passes through, but the lens is larger.

**Focal Plane Array (FPA)** – An integrated circuit with a two dimensional matrix of detector elements that sits in the focal plane of the thermal imager. An imager that uses an FPA is referred to as a “staring” imager because the entire array stares at the scene to collect IR energy to make an image.

**Hyperfocal Distance** – The distance beyond which all objects are in focus when an imagers’ focus adjust is set to infinity.

**Infrared Imager** – An Instrument that collects infrared energy and produces a video image where the gray scale values correspond to differences in temperature.

**Indium Antimonide (InSB)** – Semiconductor material used in the fabrication of a cooled FPA. Typically pronounced “Inns-Bee”, these detectors must be cooled to 77°K to operate.

**Identification** – The distance at which an imager can resolve six cycles across a given target. Used to describe the distance at which a target can be clearly identified (in the case of a truck, the ability to discriminate between a T-72 and a Humvee). In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**Infrared (IR)** – The portion of the electromagnetic spectrum located just above visible light. The infrared spectrum extends from just above red (0.7 micron) to about 12 micron.

**Instantaneous Field of View (IFOV)** - A measure of the spatial resolution of an IR detector. It is defined as the angle seen by an individual pixel in the FPA and is measured in milliradians.

**Kelvin Temperature Scale** - Absolute temperature scale related to the Celsius (or Centigrade) scale. 0° Kelvin (absolute zero) is equal to -273° C. The units of Kelvin are equal to Centigrade degrees. Therefore, room temperature (23°C) is equal to 296° K.

**Long Wave Infra Red (LWIR)** - The section of the infrared band from 7 microns to 12 microns.

**Micro-Cooler** - A miniature Sterling Cycle cooler used to provide cryogenic temperatures for the Focal Plane Array.

**Micron** – One millionth of a meter (10<sup>-6</sup> m); Micron units are used to express the wavelength of light.

**Milliradian (mr)** – A measure of angle equal to one thousandth of a radian (1 radian = 180°/pi).

Typically used to express the IFOV of an imager (1 mr = 0.0573°).

**Mid Wave Infra Red (MWIR)** – The portion of the infrared spectrum from 3 to 5 microns.

**Minimum Resolvable Temperature Difference (MRTD)** – A figure of merit for a particular FPA based imager, it defines the minimum temperature difference that can be resolved by the detector.

**Narcissus Reflection** - The reflection back into the image of the cooled detector. Because the detector is cooled to cryogenic temperatures, it will reflect back as an intense spot in the center of the image (black spot in white-hot mode).

**Narrow Field of View (NFOV)** – In a dual field of view lens, the NFOV is the smaller of the two fields (more magnification) and is used for identification, recognition and detection at longer ranges.

**Noise Equivalent Temperature Difference (NETD)** – A figure of merit for an FPA based imager, it defines the temperature difference that produces a signal just equal to the RMS noise signal.

**Non-Uniformity Correction** – A built in correction routine that calculates a set of field correction coefficients to apply to each pixel in the array to normalize their response for a given scene temperature.

**NTSC** – Video standard for color, 60 field/sec interlaced video output (i.e.

**US standard color video).** **PAL** - Video standard for color, 50 field/sec interlaced video output (i.e. European standard color video).

**Pixel** – Abbreviation for Picture Element, or each individual element that comprises a picture. Typical FPA's are arrays of 640 x 480, 320 x 480, or 256 x 256 pixels.

**Radian** – The angular measurement equal to the ratio of the arc length of a circle divided by the radius. A circumference of a complete circle is 2 pi times the radius, so a complete circle (360°) equal 2 pi radians, and pi radians = 180°. 1 radian = 57.3°.

**Recognition** – The distance at which an imager can resolve three cycles across a given target. Typically used to define the distance at which an imager can distinguish between a specific object in a group of similar objects. In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**RS170** – Video standard for monochrome, 60 field/sec interlaced video output (i.e. US standard black and white video).

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**RS232** - Serial communication standard using two wires – transmit and receive – and a common ground. Used for relatively short (<10 meter) cable runs.

**RS422** – Serial communication standard using four wires – a transmit differential pair and a receive differential pair. For use where transmission cable runs go beyond ten meters.

**Short Wave Infra Red (SWIR)**- The portion of the infrared spectrum from 0.70 microns to 3 microns.

**Wide Field of View (WFOV)** – In a dual field of view lens, the WFOV is the wider of the two fields (less magnification) and is used for scanning a broader area at reduced resolution.

<b>Contact us</b>	<b>For repair/service, or if problem(s) still exist after troubleshooting</b>	<b>Call Customer Service +1-413-592-8477 tech@unitedvisionsolutions.com</b>
	<b>To order additional items and/or accessories</b>	<b>Call sales 1-413-250-0903 sales@unitedvisionsolutions.com</b>
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