

CG320 & CG640

User Manual



Revision History

Version	Date	Notes
A.0	Sep. 20, 2016	Initial Release
A.1	Nov. 29, 2016	Add some functions
A.1.1	Apr. 28, 2017	Some feature changes and incorrect expressions

Warnings and Cautions for safety

• To Connect Power

Warnings		
<p>Check the external terminals before you connect 12VDC power adaptor.</p> <p>Wrong connection may cause fire, electric shock and consequently damaged the camera.</p>	<p>Disconnect the camera from power supply if smoke rises up, burning odor smells, or abnormal heat is occurred.</p> <p>Please call the supplier of camera right away.</p> <p>If not, it may cause fire, electric shock and malfunction.</p>	<p>Please unplug the camera when it lightens and thunders.</p> <p>Unless, it may cause damage to parts inside thermal camera, due to unexpected electrical surge.</p>
Cautions		
<p>Use only after fastening firmly the power supply line to the terminal.</p> <p>Faulty connection may causer unexpected damage or fire.</p>		

• To Install

Warnings		
<p>Use adaptors included in the package to protect the camera.</p> <p>If you use the adaptor which are not provided by COX, it may cause damage or electric shock and malfunction.</p>	<p>Install lightning rod when you install the camera outside.</p> <p>If not, it may damage the camera or even cause fire or electric shock..</p>	<p>When the camera is paired with longer focal length of lens or zoom lens, fix lens on housing.</p> <p>Fixing only camera which holds heavy lens will cause damage to camera and malfunction.</p>
Cautions		
<p>Fasten the camera securely when the camera is installed on the wall or ceiling.</p> <p>It may cause injury due to unexpected drop accident.</p>	<p>Never connect more than two cameras to one adaptor.</p> <p>When it exceeds the capacity, it may cause abnormal operation of the camera or damage to camera.</p>	<p>Do not install the product by yourself.</p> <p>Only qualified person can install the camera.</p> <p>Contact supplier of the camera for installation instruction.</p>

Table of contents

1. Features.....	3
2. Components included.....	4
3. Names of camera external parts.....	5
4. Connectors, controls and indicators.....	6
5. How to install	7
6. How to control OSD menu	10
6.1 How to control OSD menu	14
6.2 DISPLAY Tab	14
6.3 VIDEO SIZE Tab	20
6.4 VIDEO Tab.....	22
6.5 IMAGE ADJUSTMENT Tab	26
6.6 NUC Tab	28
6.7 NETWORK Tab	30
6.8 ALARM-OUTPUT Tab.....	33
6.9 CORRECTION Tab.....	35
6.10 SYSTEM Tab	37
6.11 INFORMAITON Tab	42
7. Initial settings (Factory default)	42
8. Storage	44
9. When camera is not working correctly.....	44
10. Product specification	45
11. Dimensional drawing	47
12. Reference: Emissivity.....	48

1. Features

- **Thermal cameras CG320 and CG640**

New CG series thermal cameras, CG320 and CG640, are used for radiometric (thermography) application, measuring temperature of objects. They are applied for fire protection (detection), preventive maintenance, intrusion detection, temperature and temperature distribution measurement for process control, and other application.

Those cameras are with latest uncooled thermal detectors with high thermal sensitivity offering high image quality.

- **NUC (Non Uniformity Correction)**

The non-uniformity is a time-dependent noise caused by the lack of sensor equalization, and NUC (Non-uniformity Correction) is artificial sensor equalization in set time interval to keep image quality. At set time interval, camera stops transmitting video data for very short period time for NUC, and it is to keep image quality at higher level which may be acceptable for customers' requirements.

- **Easy menu control**

Using jog switch on the rear of camera, user can control menu very easily while user sees monitor. In case thermal camera is integrate into a certain system, user can control OSD menu via RS485 apart from the camera, using PELCO-D protocol or COX protocol.

- **PC software included in the package**

3 different PC software, which are thermal imaging analyzer, camera controller, and thermal report Report is provided free of charge.

Thermal imaging analyzer is for getting temperature raw data of each pixels at full frame rate and user can have different type of analysis as want.

Camera controller is program to access to the camera via Ethernet far apart from the camera to check settings and also to change settings.

Thermal report help user prepare thermal report based on the data prepared using thermal imaging report.

Some customers develops own thermal imaging analyzer to have unique function to meet project requirement, and then COX provide such customers with SDK and sample program working in Windows, developed using C++ programming language.

- **Ethernet support**

CG320 and CG640 support Giga Ethernet which can transmit bigger data.

User must use proper Ethernet cable as per CAT6.

2. Components included

Please check if all of following components are included in the package when user open packaging for the first time.

(If any of following components is not included, contact distributor supplied COX camera to you)

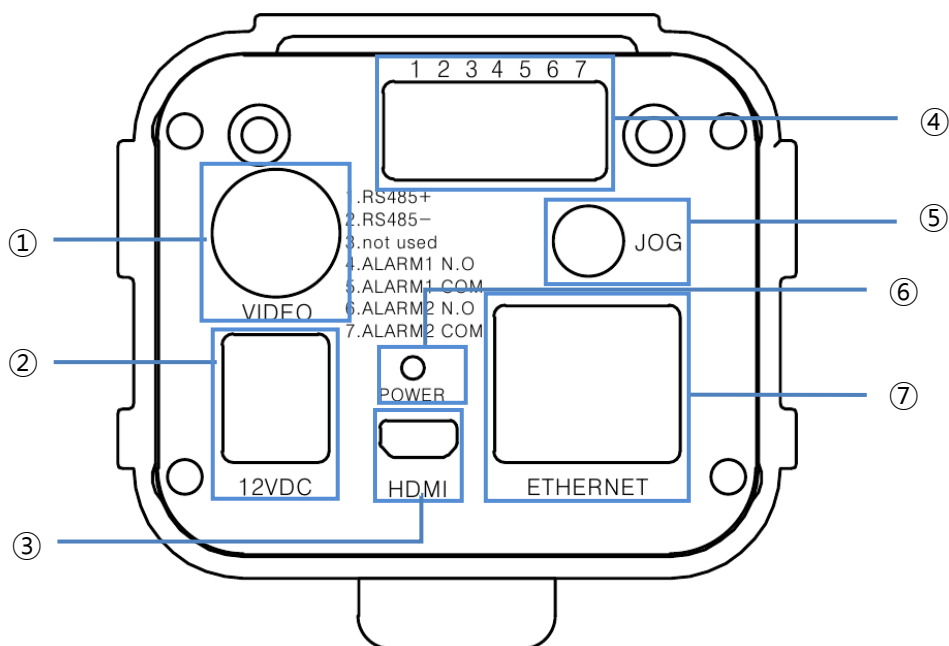
	
Cables(BNC & Giga Ethernet cable)	User manual CD
 Cables for your country included	
Power cable	110/220V to 12VDC adaptor
 Including lens cap	
CG Series thermal camera (with lens)	

3. Names of camera external parts



- ① Camera case
(lens mount, body (top, bottom), end cap)
- ② Lens
- ③ Power socket for lens motors for focus and zoom
- ④ CVBS (composite video) output(BNC port)
- ⑤ 12 VDC power in
- ⑥ Micro HDMI
- ⑦ POWER LED
- ⑧ RJ45 port
- ⑨ Jog switch
- ⑩ Digital I/O port (RS-485 terminal)

4. Connectors, controls and indicators



① CVBS (composite video) output port(BNC)

② 12VDC power in

③ Micro HDMI

④ Digital I/O ports

1	2	3	4	5	6	7
RS-485		N/A	ALARM 1		ALARM 2	
RS-485+	RS-485-		SW1 NO	SW1 COM	SW2 NO	SW2 COM

⑤ Jog switch

⑥ POWER LED

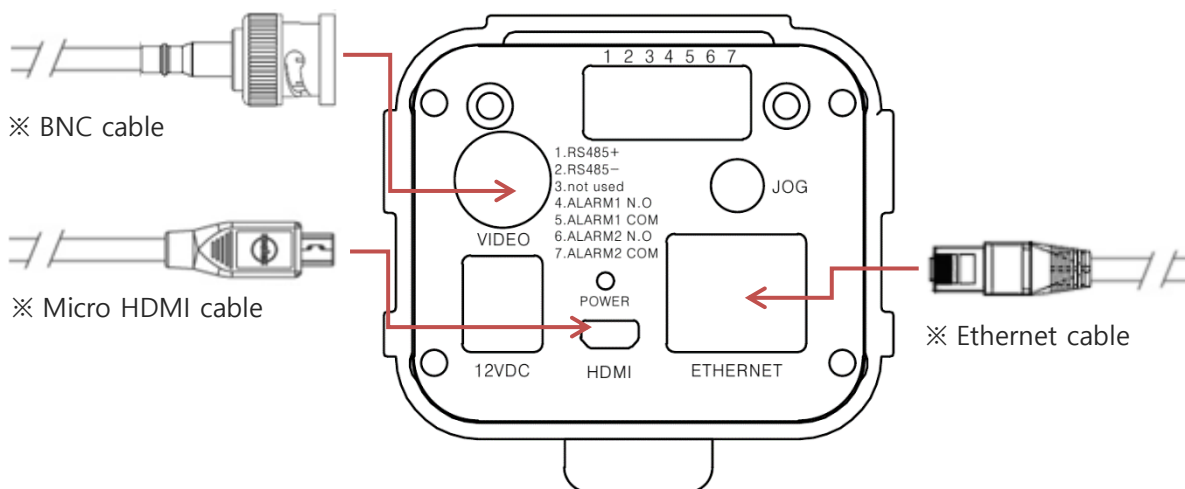
⑦ RJ45 (Giga Ethernet supported)

5. How to install

- ① **Open packaging and check all components are included (refer to page 4)**
- ② **Connect video cable(Analogue video cable or HDMI cable) and RJ45 Ethernet cable to camera.**
For Giga Ethernet, use Ethernet cable as per CAT6 standard included in the package.

Connect video cable (Analogue video cable or HDMI cable) and RJ45 Ethernet cable to camera. For Giga Ethernet, use Ethernet cable as per CAT6 standard included in the package.

- How to connect to monitor
 Use any one of analogue video cable (BNC) or micro HDMI cable to connect camera to monitor.
 HDMI image is a little better in image quality compared to CVBS video from BNC port.
- How to connect Ethernet cable
 - (1) connect RJ45 Ethernet cable included in the package to RJ45 port on the rear of the camera.
 Initial IP address setting: It is set at DHCP mode before delivery.
 - (2) Connect camera to PC directly or connect camera to IP router, and then IP address shall be assigned automatically.
 - (3) In case DHCP server is not available, set DHCP at "OFF" in OSD menu and set IP address manually.
 Setting of DHCP and other submenu like IP ADDRESS, NETMASK, GATEWAY can be done using jog switch on the rear of the camera (refer to page 28)
 - (4) For searching IP address and connection to the IP on PC, please refer to thermal imaging analyzer or camera controller on CD included in the package.



- ③ **Remove lens cap on lens**
- ④ **Connect power to camera using power cable and AC110-220V to DC 12V adaptor included in**

the package.

- Rated power of adaptor included in the package is 12VDC, 3.33A.

⑤ **About 20 seconds later power supplied to the camera, image shall be displayed in the monitor.**

⑥ **Adjust the focus of lens**

- Manual focus lens: manually turn focus ring of lens to get the right point of focus.
- Motorized focus lens: Enter SYSTEM Tab in OSD menu to adjust focus of motorized lens or zoom lens.

⑦ **Using jog switch, control OSD menu to set parameters of cameras as required.**

User can control OSD menu using jog switch on the rear of the camera or user can control it by RS485 communication when jog switch cannot be used in the field.

Refer to pages from 8 of this manual for OSD menu control by jog switch.

- Refer to page 16 of this manual to know how to use jog switch.
- For control via IP network, refer to thermal imaging analyzer or camera controller on CD included in the package.
- Control via RS-485 communication
User can control OSD menu via RS-485 communication.
(1) Control on PC (use Pelco-D protocol or Thermal Protocol)
Connect RS-485 terminals on the rear of camera to PC using RS-485 converter (USB to RS-485 converter or Ethernet to RS-485 converter).

Example) USB port or Ethernet port on PC → RS-485 converter → RS-485 terminal ("+" and "-")

(2) Control using key board controller (by Pelco-D Protocol)

Connect TRX "+" and TRX "-" connection terminals of key board controller to RS-485 terminals (RS-485 "+" and RS-485 "-") on the rear of camera.

Key board controller	RS-485 terminals on the camera
(+) terminal (TRX+)	RS-485+
(-) terminal (TRX-)	RS-485-

Control OSD menu while user sees monitor.

⑧ **Camera is now ready for use after finishing settings in OSD menu.**

※ Recommendation in use

1. After adjust focus of lens on the object at a certain distance, do not change focus open.
2. Read pages after 8 of this manual before starting OSD menu setting, if user is not familiar with CG300 or CG600 cameras.
3. NUC time interval must be set properly to get good quality of image. Shorter NUC time interval is recommended in bad weather days (rainy, snowy, and cloudy) and before the dawn in winter (refer to page 19 for NUC set-up).
4. Images users see is not created based on visible light as CCTV cameras but created based on infrared ray radiated from objects, which humans cannot see.
Therefore thermal camera image is much different from images with which humans are very familiar. In Grey tone color image, higher temperature parts are expressed in white color and low temperature parts are in black. If there are any IR ray reflective objects (humans can not recognized) in the area of image, it will make image in the monitor much different from what user expects.
5. Looking at the sun directly or open to series of flashes created very high temperature object will be harmful to normal operation of thermal camera. Do not install thermal camera staring directly at the sun, and execute NUC manually if thermal camera stared directly at the sun for a certain period of time in the process of installation.
6. Check lens if it is clean without dirties or dusts after a certain time of use. Dirties and dusts on the lens will cause poor image. Use cleaning agent and soft cloth used for cleaning of glasses for humans to clean IR lenses.
7. Distance to objects humans can detect in the image may change a lot according to environment (temperature, snow, rain, fog, wind, humidity). In bad weather condition, distance for detection, recognition, and identification shall be decreased much.
8. Use thermal camera always in acceptable atmosphere. (Refer to page 1 and 42)

6. How to control OSD menu

List of OSD menu in CG320 and CG640

Main menu	Sub-menu	Small menu	Remark
DISPLAY	DISPLAY ICON	OFF	
		ON	
	CENTER	OFF	
		ON	
	INDICATOR	OFF	
		ON	
	COLOR BAR	OFF	
		ON	
	TEMPERATURE	OFF	
		ON	
	ROI	OFF	
		EMPTY RECTANGLE	
		FILLED RECTANGLE	
	CORRECTION INFO.	OFF	
		ON	
	TRANSPARENCY	OFF	
		20%	
		40%	
		60%	
		80%	
	TEMPERATURE UNIT	CELSIUS	
		FAHRENHEIT	
VIDEO SIZE	NTSC WIDTH	600~720	Used to set size of NTSC format video
	NTSC HEIGHT	400~480	
	PAL WIDTH	600 ~ 720	Used to set size of PAL format video
	PAL HEIGHT	400 ~ 576	
	HDMI WIDTH		Refer to SYSTEM → HDMI MODE
	HDMI HEIGHT		
VIDEO	BRIGHTNESS	-40~40	
	CONTRAST	-10~10	
	ZOOM	OFF	
		x2	
		x4	
	ROTATION	OFF	
		MIRROR	

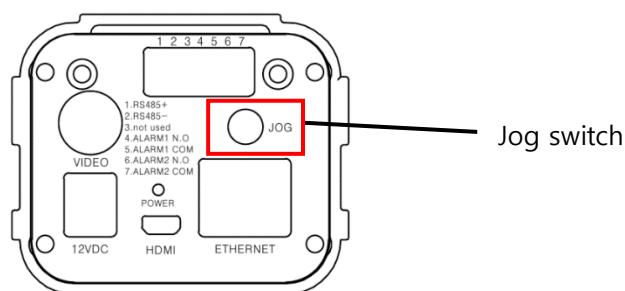
		FLIP	
		M+F	
	PALETTE	GREY	
		IRON	
		RAINBOW	
		GREY RED	
		YELLOW	
		MID GREY	
		FIRE	
		BLUE RED	
	INVERT	OFF	
		ON	
IMAGE ADJUSTMENTS	AGC MODE	AUTO	
		MANUAL	
	MANUAL MAX	0~16383	Activated when set at MANUAL
	MANUAL MIN	0~16383	Activated when set at MANUAL
	NOISE FILTER	OFF	
		NR1	
		NR2	
		NR1 + NR2	
	NR1(2) STRENGTH	HIGHEST	
		HIGH	
		MIDDLE	
		LOW	
		LOWEST	
	EDGE FILTER	OFF	
		ON	
	EE STRENGTH	HIGHEST	
		HIGH	
		MIDDLE	
		LOW	
		LOWEST	
NUC	NUC AT ONCE	RUN	
	NUC MODE	OFF	
		TIME	
		AUTO	
		TIME + AUTO	
	NUC TIME	1, 5, 10, 30, 60 MIN	

	NUC THRESH.	HIGHEST	
		HIGH	
		MIDDLE	
		LOW	
		LOWEST	
NETWORK	DHCP	OFF	
		ON	
	IP ADDRESS	000.000.000.000	
	NETMASK		
	GATEWAY		
ALARM-OUTPUT	NETWORK APPLY	RUN	
	A01 TYPE	NO	
		NC	
	A01 MODE	OFF	
		READY FOR USE	
		ALIVE PWM	
		TEMPERATURE	
		REMOTE CONTROL	
		TEST ALARM ON	
		TEST ALARM OFF	
	A01 DURATION	0 ~ 99	
	A02 TYPE	NO	
		NC	
	A02 MODE	OFF	
		READY FOR USE	
		ALIVE PWM	
		TEMPERATURE	
		TEST ALARM ON	
		TEST ALARM OFF	
	A02 DURATION	0 ~ 99	
CORRECTION	USED	OFF	
		ON	
	EMISSION	0.00 ~ 1.00	0.95
	TRANSMISSION	0.00 ~ 1.00	1
	ATMOSPHERE	-50.0~ 100.0	20
	ZERO OFFSET	-20.0 ~ 20.0	0.0
SYSTEM	DISTANCE		Different for each lens
		NORMAL	-20~120℃

	TEMPERATURE MODE	HIGH	0~500°C
	TV MODE	NTSC	
		PAL	
	HDMI MODE	480p	WIDTH 600 ~ 720 HEIGHT 400 ~ 480
		576p	WIDTH 600 ~ 720 HEIGHT 400 ~ 576
		720p 50Hz	WIDTH 1100 ~ 1280 HEIGHT 600 ~ 720
		720p 60Hz	
		1080I 50Hz	WIDTH 1700 ~ 1920 HEIGHT 900 ~ 1080
		1080I 60Hz	
		1080P 50Hz	
		1080P 60HZ	
	PROTOCOL	PELCO-D	
		COX	
	ID	0	0~255
	BAUDRATES	2400	
		4800	
		9600	
		19200	
		38400	
		57600	
		115200	
	MOTORIZED FOCUS	OFF	
		NEAR(JOG DOWN)	
		FAR(JOG UP)	
	MOTORIZED ZOOM	OFF	
		WIDE(JOG DOWN)	
		TELE(JOG UP)	
	FACTORY DEFAULT	RUN	
INFORMATION	MAC ADDRESS		
	FW VERSION		
	CORE VERSION		

6.1 How to control OSD menu

It is very easy to control OSD menu using jog switch on the rear of the camera



Press jog switch for about 1 second and OSD menu is display in the monitor, as follows.

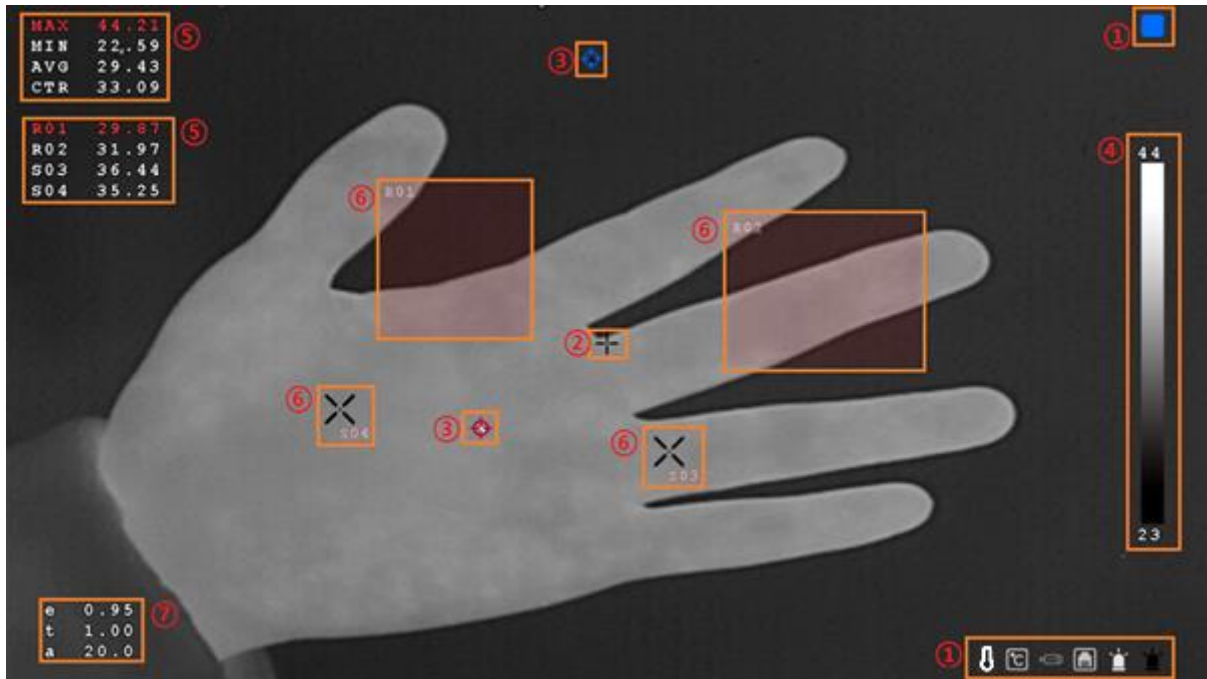
DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

- ① Move to the menu using Left/Right/Up/Down function of jog switch.
Menu selected shall be highlighted.
- ② If jog switch is pressed, values or status user can select shall be displayed.
- ③ To end control of menu, press jog switch once and then OSD menu disappeared.

6.2 DISPLAY Tab

Set display information, ICON display, temperature unit, camera ready for use and others.

DISPLAY	DISPLAY ICON	①	ON
VIDEO SIZE	CENTER	②	ON
VIDEO	INDICATOR	③	OFF
IMAGE ADJUSTMENTS	COLOR BAR	④	ON
NUC	TEMPERATURE	⑤	ON
NETWORK	ROI	⑥	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	⑦	ON
CORRECTION	TRANSPARENCY		OFF
SYSTEM	TEMPERATURE UNIT		CELSIUS
INFORMATION			



① DISPLAY ICON: Set display or not display following ICONs

- Camera ready for use
- Temperature unit
- Connection of HDMI and network
- Alarm

ON: Display all icons

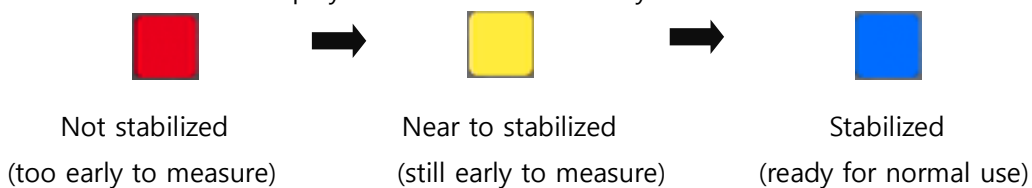
OFF: Not display those icons

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

● Camera ready for normal use:

ON: Show 3 steps of stabilization in red, yellow and blue color.

Blue color displayed mean camera is ready for normal use.



We see temperature and temperature differences!!!

OFF: do not use 'READY FOR USE' display. Does not show 3 steps of stabilization

- Temperature detection mode:

Display temperature detection mode set in the camera, that are, normal temperature detection mode (measure -20°C~120°C) or high temperature detection mode (measure 0°C~650°C)

Normal temperature detection mode:



← Point to low temperature

High temperature detection mode:



← Point to high temperature

- Unit of temperature: Fahrenheit or Celsius

Celsius:



Fahrenheit:



- HDMI icon: Display if connection to Micro HDMI port on the rear of the camera is done

Connected to HDMI port is not done:



Connection to HDMI port is done:



- Network icon: Display if camera is connected to the network

Not connected to the network:



Connected to the network:



Connected from the outside to the camera



ROI (Rectangle or Spot) will not be displayed on video output OF CVBS or HDMI if the camera is connected to the S / W (Thermal Imaging Analyzer, Camera Controller, etc.).

The exception is that the alarmed ROI is displayed on the video output OF CVBS or HDMI.

- Alarm icon: Display if alarm is ON or OFF

Alarm signal is off (before alarm):



Alarm signal is on (after alarm):



② CENTER : Display center mark in the center of the image

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

- ON: Display center mark
- OFF: Not display center mark

③ INDICATOR: Indicate max. temperature spot and min. temperature spot

- ON: Indicate max. temperature spot(HOT) and min. temperature spot(COLD) in the image
- OFF: Not display HOT spot and COLD spot

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

④ COLOR BAR: Show color bar beside image

- ON: On the left, COLOR BAR is displayed.
- OFF: Does not use COLOR BAR display.

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

⑤ TEMPERATURE: display TEMPERATURE information

- ON : Display max temperature(Max), minimum temperature(Min), and average temperature(AVG), temperature at the center (CTR), and temperature in each ROIs set by thermal imaging analyzer.
- OFF : Not display those temperature

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

⑥ ROI (Region Of Interest): Display ROI in the image set by CAMERA CONTROLLER (one of PC S/W).

- OFF: Does not display ROI in the image.
- EMPTY RECTANGLE: Show ROI in the type of empty rectangle.
- FILLED RECTANGLE: Show ROI in the type of filled rectangle.

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	EMPTY RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

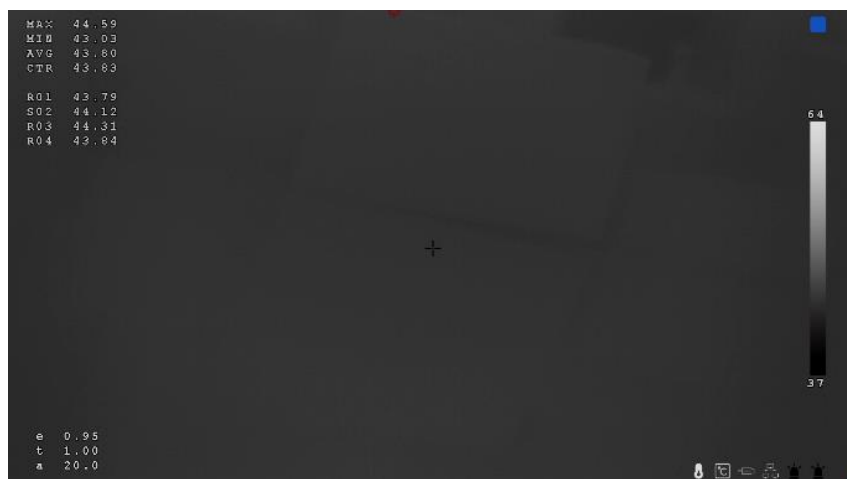
ROI (Rectangle or Spot) will not be displayed on video output OF CVBS or HDMI if the camera is connected to the S / W (Thermal Imaging Analyzer, Camera Controller, etc.).

The exception is that the alarmed ROI is displayed on the video output OF CVBS or HDMI.



<Before connection to S/W>

We see temperature and temperature differences!!!



<After connection to S/W>

⑦ CORRECTION INFO. : Display parameters which affect temperature measurement. Those parameters must be set for accuracy in measurement.

- ON: On the bottom left, EMISSIVITY, TRANSMISSION (transmission rate of atmosphere), ATMOSPHERE (AMBIENT TEMPERATURE) are displayed.
- OFF: Does not display those parameters.

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

⑧ TRANSPARENCY: set transparency of OSD menu window.

- OFF, 20%, 40%, 60%, 80% are available

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	ON
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

<OFF>

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	ON
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	20%
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

<20%>

DISPLAY	DISPLAY ICON	ON	DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON	VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	ON	VIDEO	INDICATOR	ON
IMAGE ADJUSTMENTS	COLOR BAR	ON	IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON	NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE	NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON	ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	40%	CORRECTION	TRANSPARENCY	60%
SYSTEM	TEMPERATURE UNIT	CELSIUS	SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION			INFORMATION		

<40%>

<60%>

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	ON
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	80%
SYSTEM	TEMPERATURE UNIT	CELSIUS
INFORMATION		

<80%>

⑨ TEMPERATURE UNIT: Set unit of temperature.

- CELSIUS: Set unit of temperature at Celsius(°C).
- FAHRENHEIT: Set unit of temperature at Fahrenheit (°F).

DISPLAY	DISPLAY ICON	ON
VIDEO SIZE	CENTER	ON
VIDEO	INDICATOR	OFF
IMAGE ADJUSTMENTS	COLOR BAR	ON
NUC	TEMPERATURE	ON
NETWORK	ROI	FILLED RECTANGLE
ALARM-OUTPUT	CORRECTION INFO.	ON
CORRECTION	TRANSPARENCY	OFF
SYSTEM	TEMPERATURE UNIT	FAHRENHEIT
INFORMATION		

6.3 VIDEO SIZE Tab

Set size of video displayed in the monitor.

DISPLAY	NTSC WIDTH	720
VIDEO SIZE	NTSC HEIGHT	480
VIDEO	HDMI WIDTH	1280
IMAGE ADJUSTMENTS	HDMI HEIGHT	720
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

① NTSC (PAL) WIDTH: Set width of NTSC or PAL video output

- Refer to the table below for range of input value

DISPLAY	NTSC WIDTH	720
VIDEO SIZE	NTSC HEIGHT	480
VIDEO	HDMI WIDTH	1280
IMAGE ADJUSTMENTS	HDMI HEIGHT	720
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

② NTSC (PAL) HEIGHT: Set height of NTSC or PAL video output.

- Refer to the table below for range of input value

DISPLAY	NTSC WIDTH	720
VIDEO SIZE	NTSC HEIGHT	480
VIDEO	HDMI WIDTH	1208
IMAGE ADJUSTMENTS	HDMI HEIGHT	676
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

Video format selected	Width	Height
NTSC	600 ~ 720	400 ~ 480
PAL	600 ~ 720	400 ~ 576

③ HDMI WIDTH: Set width of video of HDMI video output in selected resolution.

- Refer to the table below for range of input value at given resolution

DISPLAY	NTSC WIDTH	720
VIDEO SIZE	NTSC HEIGHT	480
VIDEO	HDMI WIDTH	1208
IMAGE ADJUSTMENTS	HDMI HEIGHT	676
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

④ HDMI HEIGHT: Set height of video of HDMI video output in selected resolution.

- Refer to the table below for range of input value at given resolution.

DISPLAY	NTSC WIDTH	720
VIDEO SIZE	NTSC HEIGHT	480
VIDEO	HDMI WIDTH	1208
IMAGE ADJUSTMENTS	HDMI HEIGHT	676
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

Video output mode	Width	Height
480p	600 ~ 720	400 ~ 480
576p	600 ~ 720	400 ~ 576
720p 50Hz	1100 ~ 1280	600 ~ 720
720p 60Hz		
1080I 50Hz	1700 ~ 1920	900 ~ 1080
1080I 60Hz		
1080P 50Hz		
1080P 60Hz		

6.4 VIDEO Tab

Set brightness, contrast, digital zoom, rotation, color palette, and invert of video.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

① BRIGHTNESS (Default value: 0)

- User can set brightness in the range of -40~+40.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

② CONTRAST (Default value: 0)

- User can set contrast in the range of -10~+10.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

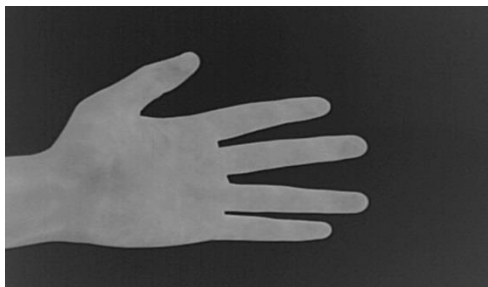
③ ZOOM: User can set digital zooming among, the original, x2 and x4.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

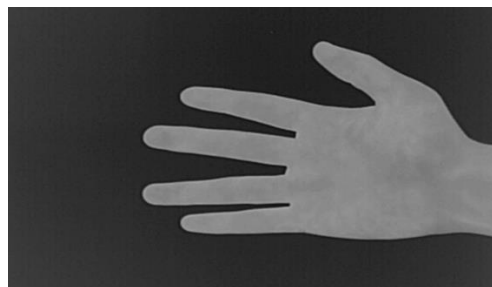
- ④ ROTATION: User can rotate or flip video.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- MIRROR: Change the side, left and right of the image.

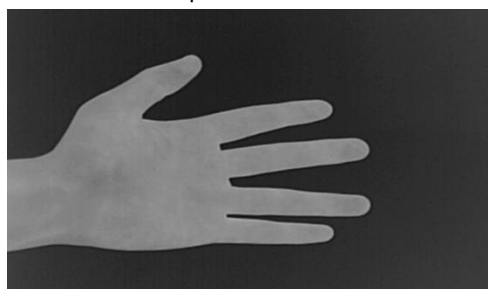


<Mirror: Off>

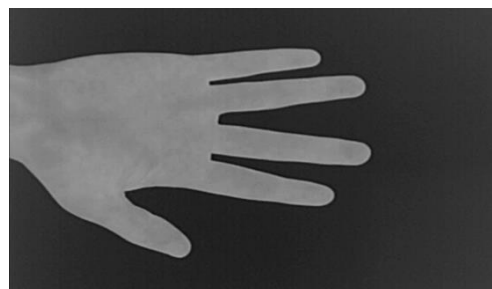


<Mirror: On>

- FLIP: Make video upside down.

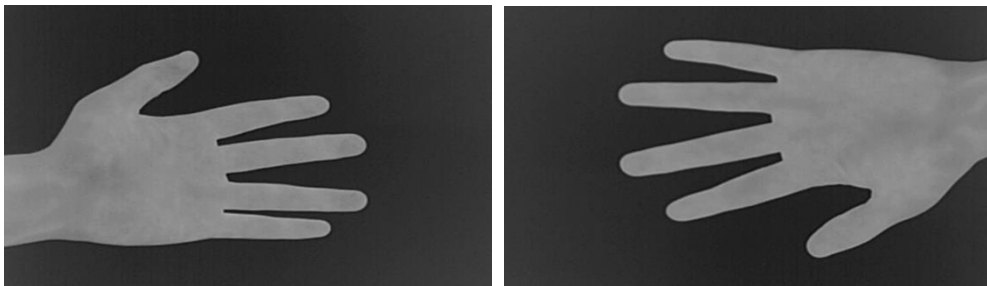


<Flip: Off>



<Flip: On>

- M + F: Execute MIRROR and FLIP at the same time.










<M + F: off>

<M + F: On>

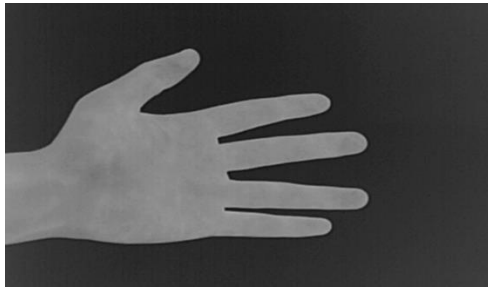
- ⑤ PALETTE: User can select different type of color palettes.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- GREY 
- IRON 
- RAINBOW 
- GREY RED 
- GLOWBOW 
- YELLOW 
- MID GREY 

- ⑥ INVERT: Reverse the color in the selected color palette.

DISPLAY	BRIGHTNESS	0
VIDEO SIZE	CONTRAST	0
VIDEO	ZOOM	OFF
IMAGE ADJUSTMENTS	ROTATION	OFF
NUC	PALETTE	GREY
NETWORK	INVERT	OFF
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		



< INVERT: OFF >



< INVERT: ON >

6.5 IMAGE ADJUSTMENTS Tab

In the IMAGE ADJUSTMENTS Tab, user can set parameters of AGC, NOISE FILTER and EDGE

DISPLAY	AGC MODE	AUTO
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

① AGC (Automatic Gain Control): Automatically adjust the input-to-output gain to a suitable value

- AUTO : Automatically adjust the input-to-output gain(brightness of image)
- MANUAL: Set value of gain manually.

※ In MANUAL setting, image become to be terribly bright or dark if not properly set.

DISPLAY	AGC MODE	MANUAL
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

② MANUAL MAX / MANUAL MIN (0 ~ 16383): Set max. level and min. level manually.

- Activated when MANUAL is selected in AGC MODE.

MANUAL MIN / MAX varies depending on the temperature mode. MANUAL MAX must be at least 5 larger than MANUAL MIN.

Ex) When MANUAL MIN is 10, MANUAL MAX can be set from 15.

DISPLAY	AGC MODE	MANUAL
VIDEO SIZE	MANUAL MAX	6209
VIDEO	MANUAL MIN	6045
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

DISPLAY	AGC MODE	MANUAL
VIDEO SIZE	MANUAL MAX	6209
VIDEO	MANUAL MIN	6045
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

③ NOISE FILTER: Decrease noise in the image.

DISPLAY	AGC MODE	AUTO
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

- NR1: Apply built-in NOISE FILTER1 to decrease FIXED PATTERN NOISE.
- NR2: Apply built-in NOISE FILTER2 to decrease GAUSSIAN NOISE.
- NR1 + NR2: Apply both NOISE FILTER1 and NOISE FILTER2 at the same time.

④ NR1 (2) STRENGTH: Adjust strength of NOISE1 (2)

- LEVEL 0 ~ LEVEL 6

DISPLAY	AGC MODE	AUTO
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

⑤ EDGE FILTER: Sharpen edge (contour) of objects in the image.

DISPLAY	AGC MODE	AUTO
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 2
SYSTEM		
INFORMATION		

- ON: EDGE FILTER is applied and sharpen edges of objects.
- OFF: Not use EDGE FILTER.

⑥ EE STRENGTH: Adjust strength of EDGE FILTER

- LEVEL 0 ~ LEVEL 6

DISPLAY	AGC MODE	AUTO
VIDEO SIZE	MANUAL MAX	
VIDEO	MANUAL MIN	
IMAGE ADJUSTMENTS	NOISE FILTER	NR1 + NR2
NUC	NR1 STRENGTH	LEVEL 2
NETWORK	NR2 STRENGTH	LEVEL 2
ALARM-OUTPUT	EDGE FILTER	ON
CORRECTION	EE STRENGTH	LEVEL 3
SYSTEM		
INFORMATION		

6.6 NUC Tab

The non-uniformity is a time-dependent noise caused by the lack of sensor equalization, and NUC (Non-uniformity Correction) is artificial sensor equalization in set time interval to keep image quality.

DISPLAY	NUC AT ONCE	RUN
VIDEO SIZE	NUC MODE	TIME
VIDEO	NUC TIME	1 MIN
IMAGE ADJUSTMENTS	NUC THRESH.	MIDDLE
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- ① NUC AT ONCE: If RUN is selected, user can execute NUC once manually whenever push jog switch upward or downward.

DISPLAY	NUC AT ONCE	RUN
VIDEO SIZE	NUC MODE	TIME
VIDEO	NUC TIME	1 MIN
IMAGE ADJUSTMENTS	NUC THRESH.	MIDDLE
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- ② NUC MODE: Set mode of NUC.

DISPLAY	NUC AT ONCE	RUN
VIDEO SIZE	NUC MODE	TIME
VIDEO	NUC TIME	1 MIN
IMAGE ADJUSTMENTS	NUC THRESH.	MIDDLE
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- OFF: Not execute NUC.
- TIME: Execute NUC at set time interval.
- AUTO: The camera executes NUC automatically by itself, by detecting temperature changes.
- TIME + AUTO: Execute NUC in both TIME mode and AUTO mode.

- ③ NUC TIME: Execute NUC in set time interval.

Time intervals are 1, 5, 10, 30, and 60 minutes.

DISPLAY	NUC AT ONCE	RUN
VIDEO SIZE	NUC MODE	TIME
VIDEO	NUC TIME	1 MIN
IMAGE ADJUSTMENTS	NUC THRESH.	MIDDLE
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

④ NUC THRESH. : Set sensitivity of NUC when AUTO MODE is selected.

DISPLAY	NUC AT ONCE	RUN
VIDEO SIZE	NUC MODE	TIME
VIDEO	NUC TIME	1 MIN
IMAGE ADJUSTMENTS	NUC THRESH.	MIDDLE
NUC		
NETWORK		
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- Set sensitivity in 5 steps (HIGHEST, HIGH, MIDDLE, LOW, and LOWEST).
The higher sensitivity means the shorter time interval in NUC.

6.7 NETWORK Tab

Set parameters of NETWORK to connect camera to PC on which thermal imaging analyzer is running, to transmit temperature raw data.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	100MB DUPLEX FULL
VIDEO	DHCP	ON
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.032
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	192.168.000.001
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

① LINK: Display if camera is connected to the network or not

It is "ON" when camera is connected to the network and "OFF" when not connected

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	100MB DUPLEX FULL
VIDEO	DHCP	ON
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.032
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	192.168.000.001
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

② LINK SPEED: Show network atmosphere when camera is connected to the network

- 0MB DUPLEX NONE : When camera is not connected to the network
- 100MB DUPLEX FULL : When camera is connected to the 100MB network
- 1GB DUPLEX FULL : When camera is connected to the 1GB network

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	100MB DUPLEX FULL
VIDEO	DHCP	ON
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.032
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	192.168.000.001
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

③ DHCP: Set if DHCP is used or not.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	100MB DUPLEX FULL
VIDEO	DHCP	ON
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.032
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	192.168.000.001
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

- ON: IP address is automatically assigned.
- OFF: Manage IP address manually.

④ IP ADDRESS: Set IP ADDRESS.

- Set IP address when DHCP is set at OFF.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	1GB DUPLEX FULL
VIDEO	DHCP	ON
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.100
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	000.000.000.000
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

⑤ NETMASK: Set NETMASK.

- Set Netmask when DHCP is set at OFF.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	1GB DUPLEX FULL
VIDEO	DHCP	OFF
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.100
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	000.000.000.000
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

⑥ GATEWAY: Set GATEWAY.

Set Gateway when DHCP is set at OFF.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	1GB DUPLEX FULL
VIDEO	DHCP	OFF
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.100
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	000.000.000.000
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

⑦ NETWORK APPLY: Apply set parameters of network.

- RUN: Push jog switch upward or downward and set parameter of network is applied.

DISPLAY	LINK	ON
VIDEO SIZE	LINK SPEED	1GB DUPLEX FULL
VIDEO	DHCP	OFF
IMAGE ADJUSTMENTS	IP ADDRESS	192.168.000.100
NUC	NETMASK	255.255.255.000
NETWORK	GATEWAY	000.000.000.000
ALARM-OUTPUT	NETWORK APPLY	RUN
CORRECTION		
SYSTEM		
INFORMATION		

6.8 ALARM-OUTPUT Tab

Set various parameters of alarm signal camera outputs.

DISPLAY	A01 TYPE	NO
VIDEO SIZE	A01 MODE	OFF
VIDEO	A01 DURATION	1
IMAGE ADJUSTMENTS	A02 TYPE	NO
NUC	A02 MODE	OFF
NETWORK	A02 DURATION	1
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

① A01 (02) TYPE: Set type of alarm signal, Normal Open or Normal Close.

DISPLAY	A01 TYPE	NO
VIDEO SIZE	A01 MODE	OFF
VIDEO	A01 DURATION	1
IMAGE ADJUSTMENTS	A02 TYPE	NO
NUC	A02 MODE	OFF
NETWORK	A02 DURATION	1
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

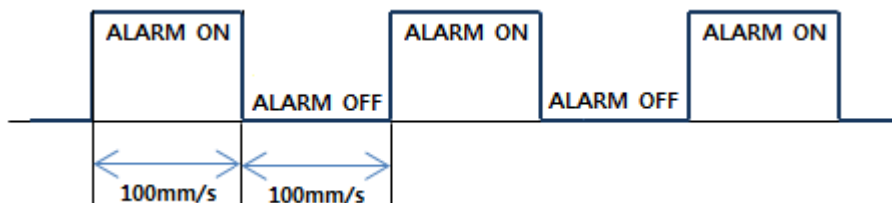
- If NO is selected: When there is no alarm, output is "0".
When there is alarm, output is "1"
- If NC is selected: When there is no alarm, output is "1".
When there is alarm, output is "0".

② A01 (02) MODE: Set # 1(2) alarm mode.

DISPLAY	A01 TYPE	NO
VIDEO SIZE	A01 MODE	READY FOR USE
VIDEO	A01 DURATION	1
IMAGE ADJUSTMENTS	A02 TYPE	NO
NUC	A02 MODE	OFF
NETWORK	A02 DURATION	1
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- OFF: Not use alarm mode.
- READY FOR USE: Send alarm signal only when camera is fully stable for measuring temperature, that is, status is 'READY FOR USE'.
- ALIVE PWM: Make alarm signal ON and OFF repeatedly in the time interval of 100msec).

Example.>



- TEMPERATURE: Execute alarm as per alarm settings set using Camera Controller which is one of PC software included in the COX camera package.
- REMOTE CONTROL: Use alarm set by Thermal Imaging Analyzer or customers' version of Thermal Imaging Analyzer developed by customers based SDK provided by COX.
- TEST ALARM ON: Execute test alarm.
- TEST ALARM OFF: Stop test alarm.

③ A01 (02) DURATION: Set duration of alarm signal after alarm condition ended.

DISPLAY	A01 TYPE	NO
VIDEO SIZE	A01 MODE	OFF
VIDEO	A01 DURATION	1
IMAGE ADJUSTMENTS	A02 TYPE	NO
NUC	A02 MODE	OFF
NETWORK	A02 DURATION	1
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- 0 : Alarm signal stops at the moment alarm condition ended

- 1 ~ 99: Keep alarm signal continued for set time after alarm condition ended.

6.9 CORRECTION Tab

Set emissivity, transmission, ambient temperature (atmosphere) in overall image, temperature correction parameter (ZERO OFFSET), and correction by distance from camera to the object.

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

① USED: Set if CORRECTION function is used or not.

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- ON: Use CORRECTION function.
- OFF: Not use CORRECTION function.

② EMISSION: Set emissivity in overall image.

- Set value : 0.00 ~ 1.00

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

③ TRANSMISSION: Set transmission rate of atmosphere.

- Set value : 0.00 ~ 1.00

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

④ ATMOSPHERE: Set ambient temperature.

- Set value : -50.0 ~ 100.0

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

⑤ ZERO OFFSET: Set temperature correction parameters.

In case camera always give temperature data a certain degrees higher or lower than real temperature, set temperature correction factor, and then camera will give temperature data higher or lower as much as ZERO OFFSET. Consequently, user can get correct temperature.

- Set value: -20.0 ~ 20.0

Camera gives temperature data higher or lower as much as set value.

Example.> When camera gives temperature data of 20°C whose real temperature is 30°C, set ZERO OFFSET value at 10, and then camera will give temperature data of 30°C.

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

- ⑥ DISTANCE: Set distance from camera to the object to get more accurate measured value.

Generally speaking, camera gives lower temperature of the same object as camera moves away from the object. DISTANCE correction is up to 25m, because measuring temperature far apart from the object is affected too much by too many parameters.

4.8mm, 8mm, 12mm, 20mm lenses only. For cameras paired with other lenses, select 'DISTANCE' does not appear

- Set value : 1 ~ 25m(Different by lens)

DISPLAY	USED	ON
VIDEO SIZE	EMISSION	0.95
VIDEO	TRANSMISSION	1.00
IMAGE ADJUSTMENTS	ATMOSPHERE	20.0
NUC	ZERO OFFSET	0.0
NETWORK	DISTANCE	3
ALARM-OUTPUT		
CORRECTION		
SYSTEM		
INFORMATION		

6.10 SYSTEM Tab

SYSTEM Tab includes TV MODE, PROTOCOL, RS-485 communication ID, BAUDRATES and control of lens motors for focusing and zooming.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 60HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

- ① TEMPERATURE MODE: Set temperature detection mode, between normal and high detection modes.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 60HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

- **NORMAL:** Measure temperature of object between -20°C and 120°C.
In case camera is calibrated for measuring temperature from -20°C to 120°C in the last process of production, the camera cannot measure temperature over this range like the camera with high temperature detection mode.
- **HIGH (option):** Measure temperature of objects between 0°C and 500°C.
If COX camera is delivered with high temperature detection mode, user can select NORMAL or HIGH mode (dual mode), depending on temperature measurement range.
NORMAL (normal temperature detection mode) mode is recommended in case measurement range is from -20°C to 120°C for more accuracy in measurement and also for better image quality. Accuracy of measuring temperature between -20°C and 120°C at HIGH (high temperature detection mode) mode is a little lower than measuring at NORMAL mode and image quality is also poor.
- **Medical (option):** Measure temperature of objects between 20°C and 50°C.
Mainly used for medical devices or detecting fever in public area like airport.

② TV MODE: Set CVBS output mode.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 60HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

- NTSC - 720*480 60Hz (Korea, USA, Japan, and others) / PAL: 720*576 50Hz (Europe, Hong Kong, and others)

※ When TV Mode is changed, the camera shall be disconnected from the network and reboot automatically.

③ HDMI MODE: Set HDMI output mode. Select any one of followings.

- 480p, 576p, 720p 50Hz, 720p 60Hz, 1080i 50Hz, 1080i 60Hz, 1080p 50Hz, 1080p 60Hz

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 60HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

※ When HDMI Mode is changed, the camera shall be disconnected from the network and reboot automatically.

④ PROTOCOL: Select PROTOCOL for RS485 communication.

- Select one of PELCO-D and COX PROTOCOL.

Control of OSD menu via RS485 communication with PELCO-D protocol is something like moving to UP/DOWN/LEFT/RIGHT direction using jog switch on the rear of the camera.

Control of OSD menu via RS485 communication with COX RPOTOCOL is direct execution of Each command, and it is more useful for customers who integrate COX thermal camera into own system and control OSD menu separately, not using jog switch.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

⑤ ID: Assign ID for RS485 communication.

- When user control several thermal cameras in RS-485 communication, it is necessary to assign different ID for each camera.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

⑥ BAUDRATE: Set Baud-rate in RS485 communication.

- 2400, 4800, 9600, 19200, 38400, 57600, 115200

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

⑦ MOTORIZED FOCUS: Adjust focus or zoom of lens, when camera is paired with motorized focus lens or zoom lens.

- Push jog switch upwards (focus FAR) or downwards (focus NEAR) to get right position of focus.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

If the camera is not paired with a motorized focus lens, the 'MOTORIZED FOCUS' menu will not appear on the OSD menu.

⑧ MOTORIZED ZOOM: Control zooming in case camera is paired with zoom lens.

- Push jog switch upwards (move to TELE) or downwards (move to WIDE) to change focal length (zooming)

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

If the camera is not paired with a zoom lens, the 'MOTORIZED ZOOM' menu will not appear on the OSD menu.

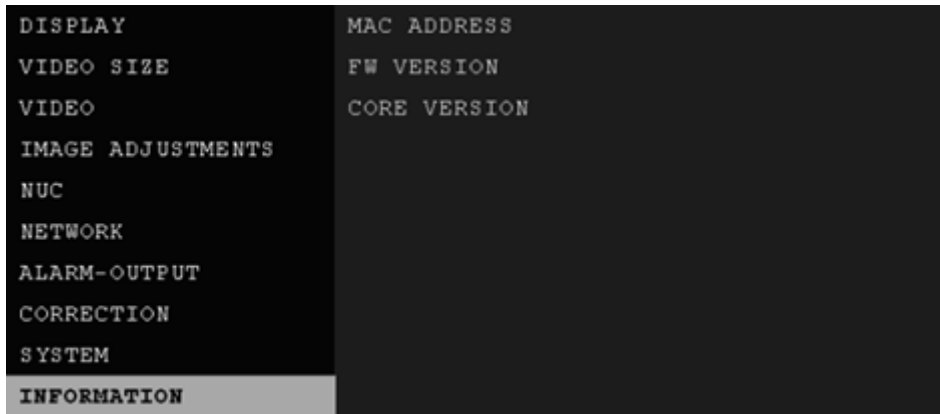
⑨ FACTORY DEFAULT: Restore all settings to factory default.

It will re-boot the camera system.

DISPLAY	TEMPERATURE MODE	NORMAL
VIDEO SIZE	TV MODE	NTSC
VIDEO	HDMI MODE	720P 50HZ
IMAGE ADJUSTMENTS	PROTOCOL	PELCO-D
NUC	ID	1
NETWORK	BAUDRATES	9600
ALARM-OUTPUT	MOTORIZED FOCUS	OFF
CORRECTION	MOTORIZED ZOOM	OFF
SYSTEM	FACTORY DEFAULT	RUN
INFORMATION		

6.11 Information Tab

Identify camera information and version.



7. Initial settings (Factory default)

Main menu	Sub-menu	Small menu	Remark
DISPLAY	DISPLAY ICON	ON	
	CENTER	OFF	
	INDICATOR	ON	
	COLOR BAR	OFF	
	TEMPERATURE	OFF	
	ROI	OFF	
	CORRECTION INFO.	OFF	
	TRANSPARENCY	OFF	
	TEMPERATURE UNIT	CELSIUS	
VIDEO SIZE	NTSC / PAL WIDTH		
	NTSC / PAL HEIGHT		
	HDMI WIDTH		
	HDMI HEIGHT		
VIDEO	BRIGHTNESS	0	
	CONTRAST	0	
	ZOOM	OFF	
	ROTATION	OFF	
	PALETTE	GREY	
	INVERT	OFF	
IMAGE ADJUSTMENTS	AGC MODE	AUTO	
	MANUAL MAX		
	MANUAL MIN		
	NOISE FILTER	NR1 + NR2	

	NR1 STRENGTH	LEVEL 2	
	NR2 STRENGTH	LEVEL 2	
	EDGE FILTER	ON	
	EE STRENGTH	LEVEL 2	
NUC	NUC AT ONCE	RUN	
	NUC MODE	TIME	
	NUC TIME	1 MIN	
	NUC THRESH.	MIDDLE	
NETWORK	DHCP	ON	
	IP ADDRESS		
	NETMASK		
	GATEWAY		
	NETWORK APPLY	RUN	
ALARM-OUTPUT	A01(02) TYPE	NO	
	A01(02) MODE	OFF	
	A01(02) DURATION	1	
CORRECTION	USED	ON	
	EMISSION	0.95	
	TRANSMISSION	1.00	
	ATMOSPHERE	20.0	
	ZERO OFFSET	0	
	DISTANCE	0	
SYSTEM	TEMPERATURE MODE	NORMAL	
	TV MODE	NTSC / PAL	
	HDMI MODE		
	PROTOCOL	PELCO-D	
	ID	0	
	BAUDRATES	9600	
	MOTORIZED FOCUS	OFF	
	MOTORIZED ZOOM	OFF	
	FACTORY DEFAULT	RUN	
INFORMATION	MAC ADDRESS		
	FW VERSION		
	CORE VERSION		

8. Storage

- ① Store camera with lens with original lens cap to protect lens from being contaminated.
- ② Store camera with lens in temperature between -40°C and 70°C, and make sure there is no dew condensation.

9. When camera is not working correctly

When camera looks like not working correctly, first check as per following instructions.

If abnormal operation is continued, contact supplier of camera for more instructions.

Problem	Check points
Nothing displayed in the image	<ul style="list-style-type: none"> ▶ Check if 12VDC power is supplied to the camera properly. ▶ Check video cable is properly connected(from BNC port or HDMI port on the rear of camera to monitor).
Camera does not start after power supply	<ul style="list-style-type: none"> ▶ If ambient temperature is too low, it will take some time to start. ▶ After storing for a long time in very low temperature (near -30°C), it will take some time (about 30 minutes) to work normally.
If you see after-images partly or images of some time ago If you see lumps here and there in the image	<ul style="list-style-type: none"> ▶ Manually execute NUC. ▶ If symptoms is not improved, remove lens from the camera and once again execute NUC manually. You can see shutter movement and hear mechanical click sound. Otherwise, NUC is not working.
Image is not clear	<ul style="list-style-type: none"> ▶ Check if dirties or dusts are on the lens. Clean lens using soft cloth and solution used for cleaning of glasses. ▶ Check monitor setting is OK and adjust settings. ▶ Check focus of lens is right.
Image is too dark	<ul style="list-style-type: none"> ▶ Check monitor setting is OK and adjust settings. ▶ Check deadening between system is done properly.
If RS-485 communication is not working	<ul style="list-style-type: none"> ▶ Check polarity of RS-485 terminal.

	► Check RS-485 communication setting including ID.
--	--

※ RS-485 communication initial setting(factory default)

Item	Camera No.	Baud-rate	Communication mode	Receiving data
Initial	1	9600	8-NONE-1	Use

10. Product specification

Item		CG320	CG640
Pixels (Resolution)		384×288 pixel	640×488 pixel
Thermal sensor	Micro-bolometer	LWIR, Uncooled a-Si micro-bolometer	
	Thermal sensitivity(NETD)	<40mK @f/1.0, 30Hz, 300K	<50mK @f/1.0, 30Hz, 300K
	Spectral range	8 - 14 μm (LWIR)	
	Operating conditions (Ambient temperature)	-10°C to 60°C (Installing camera inside housing with built-in fan and heater keeping inside housing at a certain temperature range, for example, between 15°C and 25°C, to have better accuracy in temperature measurement, in case camera is installed in the open air)	
Temperature detection mode		Normal temperature detection mode: -20 ~ 120°C High temperature detection mode(Dual): 0 ~ 650°C (-20 ~ 120°C)	
Digital zoom		2x & 4x digital zoom	
System	TV mode	NTSC/PAL compatible	
	Protocol for menu control	Pelco-D , SAMSUNG-T, THERMAL Protocol	
	Video output	Standard BNC connector(Composite), HDMI connector	
	Frame rate	BNC connector Composite): NTSC 30Hz, PAL 25Hz HDMI: 50Hz or 60Hz (selectable)	
	Ethernet	Giga Ethernet(10/100/1000Mbps) (Use Giga Ethernet cable as per CAT6 standard)	
Power input		AC(110 ~ 220V) to DC(12V) Adaptor included in the package	
PC software		<u>Thermal imaging analyzer:</u> Get temp. raw data from camera and execute various analysis on PC(1:1 connection) <u>Camera controller:</u> Access to camera via IP network to control camera	

	settings. <u>Thermal report:</u> Help user to prepare thermal report using data collected in thermal imaging analyzer.
Application	Medical/Fire prevention(detection)/Preventive maintenance in industries/Process control/R & D/PCB inspection/Intrusion detection(human/animal)

- Above specification may be subjected to changes without giving advance notices, to improve performances.

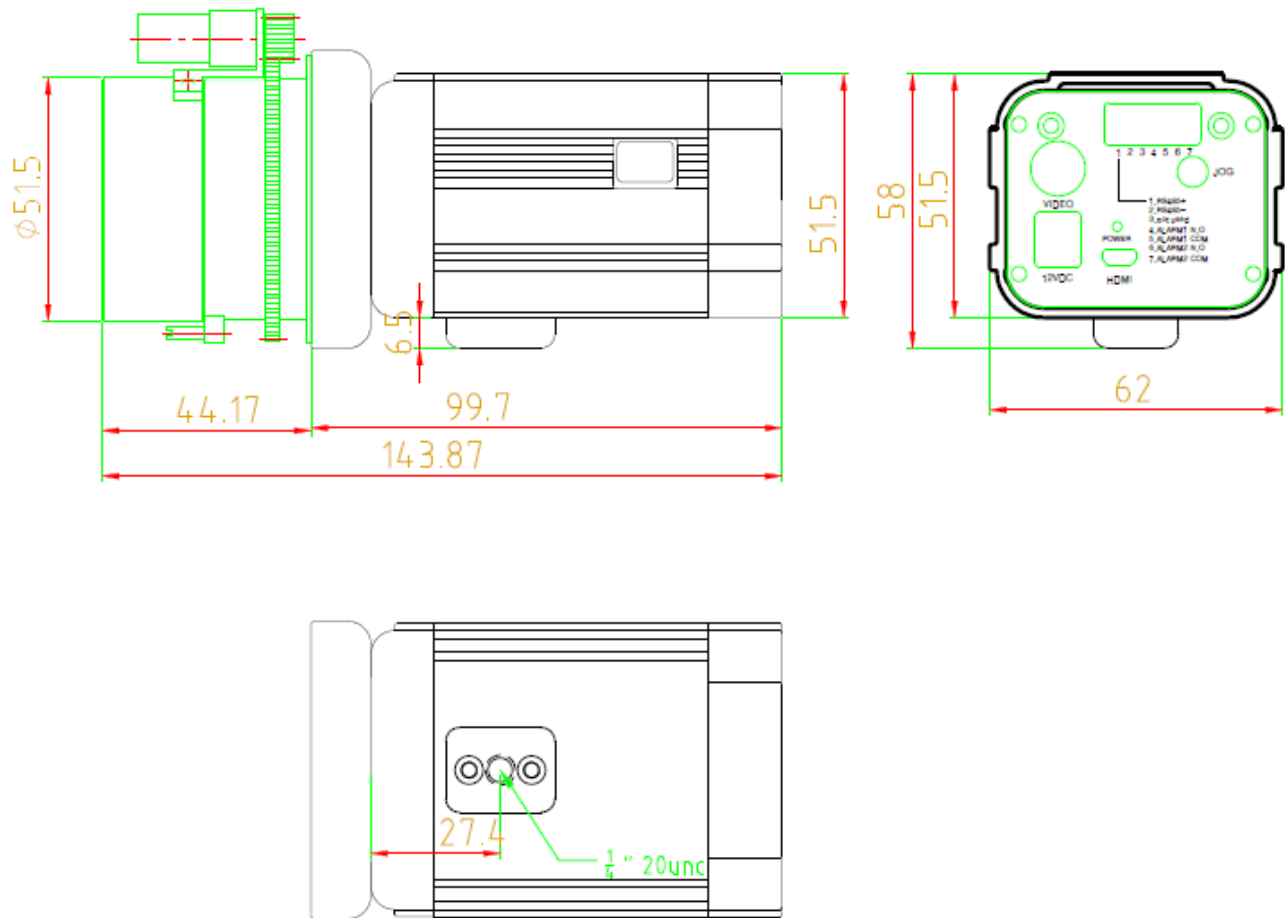
Thermal imaging cameras corresponds to strategic goods which are under control in export and import by international agreement, and customers must get export license first from local relevant government organization before shipping to a third customers in other country.

In case customers sell cameras to other customer who are going to export to a third parties in foreign countries, customers must give notice that thermal camera is strategic goods and must get export license before shipment.

All of COX thermal cameras complied with the electromagnetic emission limits specified in CE, FCC, and KC for "Measurement of Information Technology Equipment, and it is not for home use.

11. Dimensional drawing

CG320 or CG640 with 35mm f1.0 motorized lens



12. Reference: Emissivity

12.1 Radiation measurement

Any object that has an absolute temperature greater than 0 degrees Kelvin (0K or -273.15 ° C or -459.67 ° F) emits infrared radiation.

Ice-cold objects also emit infrared radiation if the temperature is above -273 ° C. The hotter the object, the more heat it emits.

The larger the temperature difference between the objects and its surroundings, the clearer the thermal image.

However, the contrast of the thermal image depends not only on the temperature but also on the emissivity of the objects.

12.2 Emissivity and Reflection

All materials have an emissivity (ϵ) of 0 to 1.

The so-called "black body" absorbs all incoming radiation, so $\epsilon = 1$.

On the other hand, high reflectance materials have lower ϵ .

Most materials such as wood, concrete, stone, human skin and vegetation have a high emissivity in the LWIR area (0.9 or higher).

However, most metals have a low emissivity (less than 0.6) with surface finish.

The higher the glare on the surface, the lower the emissivity.

Heat that is not absorbed by the material is reflected.

The higher the reflected energy, the greater the risk of misinterpreting the measurement results.

To avoid this misinterpretation, it is important to adjust the camera's angle of view to minimize reflections.

In general, if a substance acts like a mirror in a visual spectrum, it can also act as a mirror in the LWIR region.

Such materials may be difficult to monitor because the temperature is sensitive to other objects reflected in the monitored object.

In general, thermal imaging cameras in COX work best on objects with high emissions (over 0.9), and temperature measurements on objects with low emissions (below 0.6) can be inaccurate.

12.3 Accuracy in measurement

The accuracy of the measurement using thermal imaging camera depends on the surrounding situation.

In order to obtain maximum performance from such a camera, the measurement conditions must be

carefully considered.

You should observe factors such as camera angle and surroundings, as well as factors such as the material of the object and the distance to the camera.

Reflections and material properties can affect temperature.

How well you know emissivity is important for your measurement accuracy.

In general, low emissivity results in low accuracy in measurement.

Accuracy can be lowered by bad weather such as fog, snow and rain.