

# EX-SDI / HD-SDI / CVBS Mini Square Camera

## OPERATION MANUAL



Thank you for choosing our high quality camera. Before attempting to connect operate this unit, please read and follow these instructions.

## 2. FOR YOUR SAFETY

- All warnings and instructions in this manual should be followed.
- Save this manual for future reference.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with a dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- To help prevent electric shock, plug the equipment and peripheral power cables into properly polarized or grounded electrical outlets. These cables are equipped with the wide blade or the third prong to ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If the provided plug does not fit your outlet, consult an electrician.
- Ensure that nothing rests on your equipment's cables and that the cables are not located where they can be stepped on, tripped over, or pinched.
- Only use attachments or accessories as specified.
- Only use the equipment with the cart, stand, tripod, bracket, or table that is specified by the manufacturer or sold with the apparatus. When a cart is used, use caution to prevent the cart from tipping over and to avoid injury.
- Do not connect or disconnect during lightning storms due to risk of electric shock.
- If any of the following conditions occur, unplug the equipment from the electrical outlet and replace the part or contact your trained service provider.
  - The power cable, extension cable, or plug is damaged.
  - An object has fallen into the equipment.
  - The equipment has been exposed to water.
  - The equipment has been dropped or damaged.
  - The equipment does not operate correctly when you follow the operating instructions.



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### CAUTION

These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Use Class 2 Power Supply Only

## 3. FEATURES

- High resolution  
1/2.8" SONY EXMOR R Progressive Scan CMOS
- Support various digital video output  
1080p@30fps / 1080p@25fps / 720p@60fps / 720p@50fps / 720p@30fps / 720p@25fps
- EX-SDI (1.0\_2.0\_2.1) / HD-SDI Output is suitable for long reach transmission over single coaxial cable.  
Transmission Distance  
HD-SDI : COLOR 150m (5C-HFBT)  
EX-SDI 1.0 : COLOR 300m (5C-HFBT), EX-SDI 2.0 / 2.1 : COLOR 500m (5C-HFBT(A))
- True WDR (Wide Dynamic Range)
- Digital Zoom
- DSS (Digital Slow Shutter)
- HLC
- Motion Detection
- Privacy masking 16 zones
- RS-485
- 3DNR
- Option : Cable Joystick (OSD)
- Multi Language OSD menu  
(ENGLISH / JAPANESE / RUSSIAN / SPANISH / GERMAN / FRANCE / PORTUGUESE / KOREAN)

## 1. NOTICES

### This device complies with Part 15 of the FCC Rules.

#### Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

#### Note -


This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### Caution -

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### CAUTION

- A regulated DC12V 300mA power supply is recommended for use with this camera to ensure the best picture quality and stable operation.  
**An unregulated power supply may cause damage to the camera. Using an unregulated power supply will void the product warranty.**
- It is recommended that the camera is used with a monitor that has a CCTV quality 75 video impedance level.  
If your monitor is switched to high impedance, then please adjust accordingly.
- Do not attempt to disassemble the camera to access internal components. Refer servicing to your dealer.
- Never face the camera towards the sun or any bright or reflective light, which may cause smear on the picture and possible damage to the image sensor.
- Do not remove the serial sticker for the warranty service.**




**Correct Disposal of This Product**  
(Waste Electrical & Electronic Equipment)

(Applicable in the European Union and other European countries with separate collection systems)


This marking shown on the product or its literature indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product or their local government office for details of where and how to safely recycle the item.  
Business users should contact their supplier and check the terms and conditions of the purchase contract.

This product should not be mixed with other commercial wastes for disposal.





**CAUTION**








**RISK OF ELECTRIC SHOCK.**  
DO NOT OPEN

CAUTION : TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

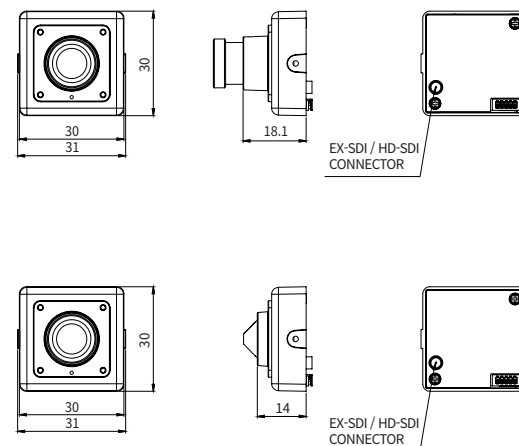
-  This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
-  This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instruction in the literature accompanying the appliance.

## 4. COMPONENTS

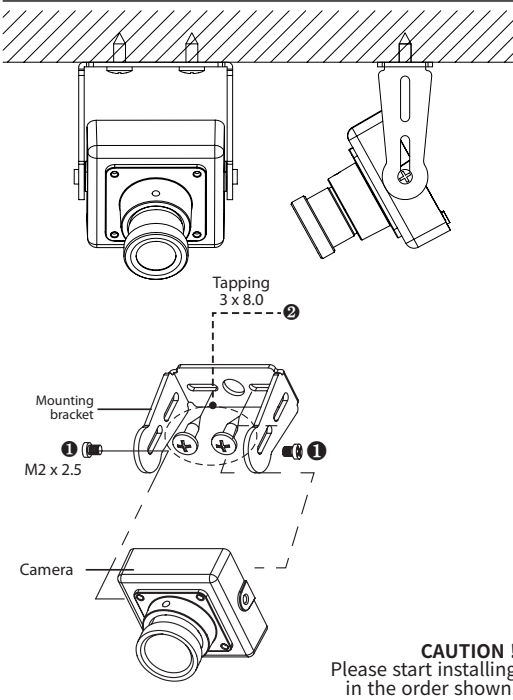
Square Camera	
Mounting Bracket	
Screw 4ea	Tapping 3 x 8.0  M2 x 2.5
Operation Manual	
DIY cable	

## 5. DIMENSIONS

Unit(mm)

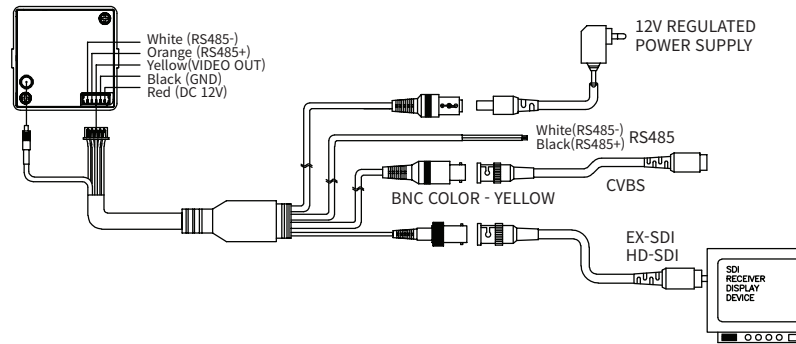


## 6. CAMERA MOUNTING POSITION

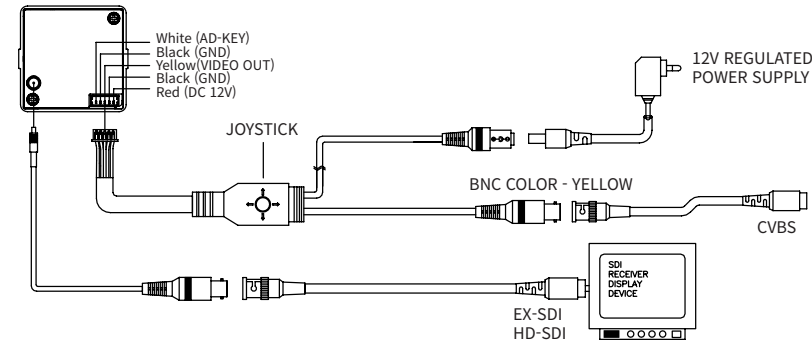


## 7. CONNECTION

### • Basic specification



### • Option specification



## 9. OSD MENU STRUCTURE

### • Menu structure

1'ST ITEM	2'ND ITEM	3'RD ITEM or DATA	4'TH ITEM or DATA	5'TH ITEM or DATA	
LENS	LENS TYPE	ELC			
	LENS MODE	NORMAL/DEBLUR			
	RETURN				
EXPOSURE	BRIGHTNESS	0-20			
	SHUTTER MODE	AUTO/MANUAL/ FLICKER			
	SHUTTER SPEED	1/30(25),1/60(50),1/120(100),1/250,1/500,1/1000,1/2000,1/4000,1/8000,1/16000,1/30000			
	DSS	OFF/X2/X4/X8/X16/ X32			
	AGC MAX	OFF,3dB-45dB			
	INITIAL				
	RETURN				
WHITE BALANCE	WB MODE	AUTO/AUTO EXT/PUSH LOCK/MANUAL			
	PUSH AUTO	[ ]			
	COLOR GAIN	0-20			
	KELVIN	LOW/MIDDLE/HIGH			
	RED GAIN	0-20			
	BLUE GAIN	0-20			
	INITIAL				
RETURN					
WDR/BLC	MODE	OFF/BLC/HLC/WDR			
	LEVEL	0-20			
	X-POSITION	0-20			
	Y-POSITION	0-20			
	X-SIZE	0-20			
	Y-SIZE	0-20			
	COLOR	BLACK/WHITE/YELLOW/CYAN/GREEN/MAGENTA/RED/BLUE			
	INITIAL				
	RETURN				
	DAY&NIGHT	MODE	AUTO/DAY(COLOR)/NIGHT(BW)		
DWLL TIME	0-20 sec				
D>N THRES	1-35				
N>D THRES	0-34				
INITIAL					
RETURN					

1'ST ITEM	2'ND ITEM	3'RD ITEM or DATA	4'TH ITEM or DATA	5'TH ITEM or DATA
IMAGE	SHARPNESS	0-10		
	GAMMA	0.45/0.50/0.55/0.6 0/0.65/0.70/0.75		
	FLIP	OFF/H-FLIP/ V-FLIP/HV-FLIP		
	D-WDR	OFF/ON		
	DNR	OFF/LOW/MIDDLE/ HIGH		
	DZOOM	x1.0 ~ x16		
	DEFOG	OFF/ON	MODE	AUTO/MANUAL
	INITIAL		LEVEL	LOW/MIDDLE/HIGH
	RETURN		RETURN	
	SPECIAL	CAM TITLE	OFF/ON	EDIT PANEL
			↓	
			ABCDEFGHIJKLMN	
			OPQRSTUVWXYZ?	
			0123456789-()^	
			SP>	
			<BK	
			POSITION	[POSITION EDIT]
			RETURN	
			ZONE NO	0~15
SPECIAL	PRIVACY	OFF/ON	MASK MODE	OFF/ON
			X-POSITION	0-60
			Y-POSITION	0-34
			X-SIZE	0-60
			Y-SIZE	0-34
			COLOR	WHITE/YELLOW/ CYAN/GREEN/ MAGENTA/RED/ BLUE
			TRANSPARENCY	0%/33%/66%/100%
			INITIAL	
			RETURN	

1'ST ITEM	2'ND ITEM	3'RD ITEM or DATA	4'TH ITEM or DATA	5'TH ITEM or DATA
SPECIAL	MOTION	OFF/ON	ZONE NO	0-3
			WINDOW USE	OFF/ON
			X-POSITION	0-60
			Y-POSITION	0-34
			X-SIZE	0-60
			Y-SIZE	0-34
			SENSITIVITY	0-10
			ALAM MODE	OSD/TEXT
			INITIAL	
			RETURN	
SPECIAL	SYSTEM	FREMARATE	1080p30/1080p25/720p60/720p50/720p30/720p25	
		SDI OUT	HD-SDI/EX-SD 1.0/ EX-SD 2.0/ EX-SD 2.1	
		ANALOG OUT	CVBS	
		APPLY	YES	
		LANGUAGE	English / Japanese / Russian / Spanish / German / France / Portuguese / Korean	
		RETURN		
		INITIAL		
		RETURN		
		FACTORY DEF		
		EXIT		

## 10. HIDDEN MENU

### • CONVERT SDI OUTPUT MODE

#### STEP 1. ENTER

RS485 : Press [LEFT] → [LEFT] → [RIGHT] → [RIGHT] key.  
AD-KEY : Press UP/DOWN/LEFT/RIGHT key 3 times.

#### STEP 2. SELECT

Press UP key 5 times : EX-SDI 2.1  
Press DOWN key 5 times : EX-SDI 2.0  
Press LEFT key 5 times : HD-SDI  
Press RIGHT key 5 times : EX-SDI 1.0

#### STEP 3. CONFIRM

If the 'YES' is not checked within 30sec, the value returns to the previous setting.

## 8. SPECIFICATION

Image Sensor	1/2.8" SONY EXMOR R Progressive Scan CMOS
Effective Pixels	1945(H) x 1097(V)
Unit cell size (um)	2.9(H) x 2.9(V)
Video Output	EX-SDI/HD-SDI: 1080p@25(30)fps/720p@50(60)fps/720p25(30)fps TV out: CVBS NTSC / PAL (720H)
Transmission Distance	HD-SDI: Color 150m(5C-HFBT) EX-SDI1.0: Color 300m(5C-HFBT) EX-SDI 2.0_2.1 Color 500m(5C-HFBT(A))
Minimum Illumination	0.2 Lux (F2.0, AGC:33dB, DSS:x2)
Shutter speed	1/30(25)s ~ 1/30,000s
Day/Night	AUTO, COLOR, BW
Back/High Light Compensation	OFF / BLC / HLC / WDR selectable
Motion Detection	OFF / ON
Privacy Masking	16 selectable zones
White Balance	AUTO / AUTO EXT / PUSH LOCK / MANUAL
Functions	FLIP(OFF, H, V, H/V), 3DNR, DEFOG, DSS, Digital Zoom, RS-485
Lens	Fixed Board / Pinhole Lens
Operating Temperature	-10°C ~ +50°C (14°F ~ 122°F)
Storage Temperature	-20°C ~ +60°C (-4°F ~ 140°F)
Humidity	Less than 80%
Power Consumption	12VDC(±10%), Max.150mA
Dimension(mm)	30mm X 30mm
Weight	Approx. 28.9g (Board lens)

• Design and specification are subject to change without notice.

## RS-485

### 1. Communication Specification

RateBaud	Default 9600bps
Data bits	8 bits
Stop bits	1 bits
CAM ID	Default "1"
Parity Check	None
Supported Protocol	PELCO-D, PELCO-P

### 2. PELCO protocol for OSD remote control

#### • PELCO-D

	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
UP KEY	0 x FF	Cam ID	0 x 00	0 x 08	0 x 00	0x0B-0x3F	ChkSum
DOWN KEY	0 x FF	Cam ID	0 x 00	0 x 10	0 x 00	0x0B-0x3F	ChkSum
LEFT KEY	0 x FF	Cam ID	0 x 00	0 x 04	0x0B-0x3F	0 x 00	ChkSum
RIGHT KEY	0 x FF	Cam ID	0 x 00	0 x 02	0x0B-0x3F	0 x 00	ChkSum
MENU ENTER KEY	0 x FF	Cam ID	0 x 00	0 x 07	0 x 00	0 x 5F	ChkSum

- Cam ID : 0x00 ~ 0x1F

- ChkSum : The Check Sum is the 8 bit (modulo 256) sum of the payload bytes (Byte2 ~ Byte6) in the Command.

- [ 0x0A-0x3F ] means accept any value(between 0x0A ~ 0x3F) on command action.

#### • PELCO-P

	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7	BYTE 8
UP KEY	0 x A0	Cam ID	0 x 00	0 x 08	0 x 00	0x0B-0x3F	0 x AF	ChkSum
DOWN KEY	0 x A0	Cam ID	0 x 00	0 x 10	0 x 00	0x0B-0x3F	0 x AF	ChkSum
LEFT KEY	0 x A0	Cam ID	0 x 00	0 x 04	0x0B-0x3F	0 x 00	0 x AF	ChkSum
RIGHT KEY	0 x A0	Cam ID	0 x 00	0 x 02	0x0B-0x3F	0 x 00	0 x AF	ChkSum
MENU ENTER KEY	0 x A0	Cam ID	0 x 00	0 x 07	0 x 00	0 x 5F	0 x AF	ChkSum

- Cam ID : 0x00 ~ 0x1F

- ChkSum : The Check Sum is an XOR sum of Byte1 ~ Byte7

- [ 0x0A-0x3F ] means accept any value(between 0x0A ~ 0x3F) on command action.