Watec

Color CCD Camera

WAT-221S/231S

Operation Manual

This Operation Manual covers safety, camera functions, installation and the correct operating procedure for the WAT-221S/231S. First, we ask you to read this Operation Manual thoroughly, then install and operate the WAT-221S/231S as advised. In addition, for future reference, we also advise safekeeping of this manual.

Please contact the distributor or dealer from which the WAT-221S/231S was purchased, if you do not understand the installation, operation or safety instructions laid out in this manual. Not understanding the contents of the Operation Manual sufficiently may cause damage to the camera.

Guide to the Safety Symbols

The definitions of the symbols used in this operation manual are:

Danger — When you do not adhere to or take notice of the "Danger" sign, it may lead to a serious accident such as death or injury caused by fire or electric shock.

Warning — When you do not adhere to or take notice of the "Warning" sign, it may cause severe damage such as a physical injury.

Caution — When you do not adhere to or take notice of the "Caution" sign, it may incur injury and cause damage to peripheral objects in the immediate surroundings.

Cautions for Safety

The WAT-221S/231S is designed to be used safely; however, it may lead to a physical accident caused by fire and electric shock if not used correctly. Therefore, please keep and read the "Cautions for safety" for protection against accidents.

Danger
- **Do not disassemble and/or modify the WAT-221S/231S.**
- **Do not operate the WAT-221S/231S with wet hands.**

Warning
- **Use only the AD901-120/230 or equivalent power adaptor for the WAT-221S/231S.**
  The recommended voltage is DC+12V±10%
- **Do not expose the WAT-221S/231S to wetness or high moisture conditions.**
  The WAT-221S/231S is designed and approved for indoor use only. The WAT-221S/231S is not water-resistant or waterproof. If the location of the camera is outdoors or in an outdoor like environment, we recommend that you use an outdoor camera housing.
- **Protect the WAT-221S/231S from condensation.**
  Keep the WAT-221S/231S dry at all times during storage and operation.
- Should the camera not work properly, switch off the power immediately. Then check the camera according to the "Problems and Trouble shooting" section.

Caution
- **Avoid the striking of hard objects or dropping the WAT-221S/231S.**
  The WAT-221S/231S uses high quality electrical parts and precision components.
- **Do not connect any power supply directly to the video out terminal of the unit.**
  Do not connect the WAT-221S/231S with any monitor using a video/power single transmission terminal. The WAT-221S/231S is not designed for use with this type of equipment. We also advise you to read the operation manual of the monitor you plan to use before any connections are made.
- **Do not install the WAT-221S/231S in a position subject to direct sunlight.**
  Sunlight shinning directly onto the WAT-221S/231S lens can cause damage to the CCD.
- **Select a stable place for installation of the WAT-221S/231S.**
  Use a support of durable strength around an installation position on a ceiling or wall when a camera stand or tripod is used.
- **Do not move the WAT-221S/231S with the cables connected.**
  Before moving the WAT-221S/231S, always remove the video cable and power cable from the rear of the camera first.
- **Avoid using the WAT-221S/231S near any strong electromagnetic field.**
  After installing into main equipment, if the WAT-221S/231S exposed to electromagnetic waves causing the monitored image to become distorted, we recommend the camera be shielded by appropriate protective casing.

Problems and Trouble Shooting

If any of the following problems occur when using the WAT-221S/231S,

- An optimal picture cannot be obtained, after checking that all the cables and connections are correctly in place
- Smoke or any unusual odor emerges from the WAT-221S/231S.
- An object becomes embedded or a quantity of liquid seeps into the cam housing
- More than the recommended voltage or/and amperage has been applie to the WAT-221S/231S by mistake
- Anything unusual occurring to any equipment connected to WAT-221S/231S.

Disconnect the camera immediately according to the following procedu

①Switch off the main power supply to the camera.
②Remove the power and video cables connected to the WAT-221S/231
③Contact the distributor or dealer from which the WAT-221S/231S was purchased.

About EMC

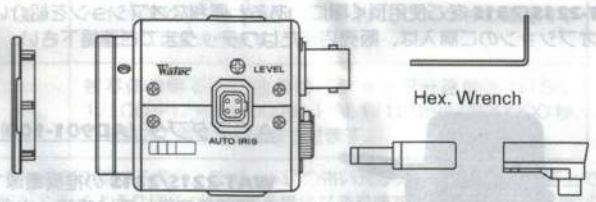
The WAT-221S/231S is in conformity with EMC test standards carried ou authorized organizations in Japan.

NTSC	FCC Part15 class B
P A L	EN61000-6-3/EN50130-4

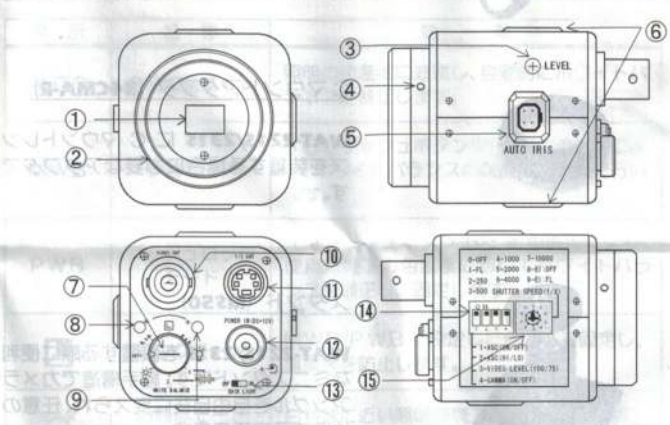
Danger — Do not modify the WAT-221S/231S. A modified camera may not conform to EMC test standards.

Contents

Using the contents figures below, check to make sure all parts are pres before use.



Description of Parts



①CCD FRONT FACE
- The light receiving face of the CCD camera
  (Dirt, water or oil deposits on the CCD will cause an unclear picture on monitor. Attach the lens cap to protect the lens and CCD f contamination and damage.)

②LENS MOUNT
- Mount for the lens (Thread type)

③IRIS LEVEL VOLUME
- By controlling the volume, the iris level of a DC iris lens can be adjuste

④FOCUSING ADJUSTMENT SCREWS
- There are 3 hex. adjustment screws each placed at intervals of 120° fine focusing of the lens.

⑤AUTO-IRIS SOCKET
- This socket is for a video or DC auto-iris lens cable connector. (Video/DC: Auto selected by the camera)

⑥TRIPOD MOUNTING SCREW HOLES
- Mounting holes for stands. The size of these threads are 1/4", 20 threads, 4.5±0.2mm, which is the same as any standard camera tripod (U1/4").

⑦WHITE BALANCE MODE SELECTOR
- The selector for the white balance mode.

⑧PUSH BUTTON (R) (MWB mode)
- The button for adjustment of the white balance to increase the red hue of a monitored image using M.W.B mode.

⑨PUSH BUTTON (B) (MWB mode)
- The button for adjustment of the white balance to increase the blue hue of a monitored image using M.W.B mode.

⑩VIDEO OUT (BNC)
- The terminal for composite video signal output

⑪Y/C OUT
- The terminal for Y/C signal output

⑫POWER IN
- The terminal designed for the DC-plug of the power adaptor

⑬BACK LIGHT
- The switch for back light compensation

⑭FUNCTION SWITCHES
- Functional switches for setting AGC, video level and gamma control.

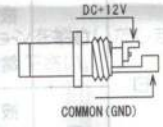
⑮AE MODE CONTROL
- The switch for the electronic shutter mode control according to the object being monitored.

Power Supply

If any other power adaptor besides the AD901-120/230 is used, please use a stabilized power adaptor designed for DC+12V±10%, with a current capacity of more than 250mA.
Use the optional DC plug if the shape or polarity of the DC plug of the power adaptor to be used is not compatible with the camera (See the drawing on the right below).

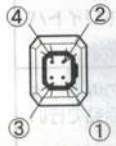
Warning Caution

The wiring on the connector must be exact.
Be careful no to touch the other terminal while wiring.
Protect the wiring portion by using insulation tape after wiring. If the above care and attention is not adhered to, damage to the WAT-221S/231S and power adaptor may occur and may also cause fire.



Auto-iris Lens

Before connecting the auto-iris lens, please make sure that the pin configuration is correct by checking with the following table. If the configuration of your iris connector is different from the following, the plug and pins will need to be rewired.



Pin No.	EIAJ Video Auto-iris Lens Arrangement	EIAJ DC Auto-iris Lens Arrangement
①	Power	Control −
②	Not used	Control +
③	Iris signals	Drive +
④	Common (GND)	Drive −

Set-up and Operation

1) Ensure that the power to the WAT-221S/231S and the peripheral equipment is turned off before making any connections.
2) Remove the lens mount cap from the WAT-221S/231S and attach the CS-mount lens. Use the optional C-mount adaptor (34CMA-R) when a C-mount lens is used.
3) Connect the iris control cable to ⑤AUTO-IRIS SOCKET on the WAT-221S/231S when an auto-iris lens is being used.
4) Connect ⑩VIDEO OUT on the WAT-221S/231S with the monitor, using a coaxial cable with 75Ω impedance, such as an RG-58/U or an RG-6/U. If the monitor has an S-terminal, high resolution imaging is possible by connecting with ⑪Y/C OUT.
※The ⑪Y/C OUT can be used together with the ⑩VIDEO OUT.
※Select a monitor with the same television system as the WAT-221S/231S NTSC or PAL. A monitor with more than 500TV lines is recommended.
5) Insert the power plug of the power adaptor to ⑫POWER IN on the back panel of the WAT-221S/231S. Confirm that the power adaptor is not connected to the power supply before insertion of the power plug into ⑫POWER IN.
6) Turn on the power to the WAT-221S/231S, monitor and all other allied equipment. When a picture cannot be obtained on the monitor, or a problem occurs, check and follow the procedure mentioned in the 【Problems and Trouble Shooting】 section.
7) After following the procedure below and the picture is still out of focus, open the iris fully and loosen ④FOCUSING ADJUSTMENT SCREWS with the hex. wrench and move the lens forwards until a clear picture is obtained.

Manual Lens	Adjust the focus and iris to the best position on the lens.
Video Auto-iris Lens	Adjust the focus on the lens.
DC Auto-iris Lens	Adjust the iris level on the camera, then adjust the focus on the lens. See below.

Iris Level Adjustment (for DC auto-iris lenses only)
Adjust ③IRIS LEVEL VOLUME placed on the side of the unit until an acceptable light level is attained. No change will occur if a video iris lens or manual iris lens is fitted.

8) Select any required shutter speed by the ⑮AE MODE CONTROL to one of its 10 positions.

No.	Mode	Shutter Speeds (Sec.) NTSC	Shutter Speeds (Sec.) PAL
0	OFF	1/60	1/50
1	FL	1/100	1/120
2	ES	1/250	
3	ES	1/500	
4	ES	1/1000	
5	ES	1/2000	
6	ES	1/4000	
7	ES	1/10000	
8	EI: OFF	1/60-1/100000	1/50-1/100000
9	EI: FL	1/100-1/100000	1/120-1/100000

AE Mode		Effect
OFF		Fixes the shutter speed to NTSC1/60、PAL1/50.
FL		Reduces the flickering phenomena occurring on the monitor screen caused by fluorescent or mercury lamps.
ES		Fixes the shutter speed in a range between 1/250-1/10000. (6 steps)
EI	OFF	Automatically selects the shutter speed in a range between NTSC1/60-1/100000, PAL1/50-1/100000 according to the lighting conditions.
	FL	Automatically selects the shutter speed in a range between NTSC1/100-1/100000, PAL1/120-1/100000 according to the lighting conditions.

※In EI mode, intense light may leave a trail on the screen longitude. This smearing is a natural phenomenon and is not due to equipment failure or fault.

9) Select any required white balance mode by ⑦WHITE BALANCE.

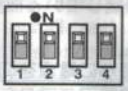
Mode	Name	Effect
AUTO	Auto-tracking	Automatically follows and adjusts to the changing color temperature of the illumination.
M.W.B.	Manual	Manual adjustment using ⑧⑨PUSH BUTTON(R)(B) as required.
P.W.B.	Push-lock	Adjusted with ⑨PUSH BUTTON(B) according to the color temperature of the environment.
	Lock	To lock your manually adjusted color temperature settings.
	Sunlight (=6300K)	Color correction to give natural color renditions under incandescent lighting.
1	Fluorescent 1 (=4300K)	Color correction to give natural color renditions under reddish fluorescent light.
2	Fluorescent 2 (=5100K)	Color correction to give natural color renditions under bluish fluorescent light.
	Incandescent (=3200K)	Used in sunlight to retain white balance.

10) Set the ⑬BACK LIGHT according to your requirements.

Mode	Effective condition
ON	When the picture of the monitored object is silhouetted due to strong lighting from above or behind.
OFF	When the illumination differences between the monitored object is narrow.

※Use an auto-iris lens if back light compensation is required using the following 0-7(OFF/FL/ES) of ⑮AE MODE CONTROL.

11) Set the ⑭FUNCTION SWITCHES according to your requirements.



Switch	Setting	Effective Condition (Example)	Upon Shipment
1. AGC	ON	· When sensitivity is more important than the SN ratio. · When an auto iris lens can not be used for general surveillance purposes.	√
	OFF	· When SN ratio is more important than sensitivity. · When adequate lighting is present or a stable lighting condition is available.	
2. AGC	ON 【HI】	· When sensitivity is more important than the SN ratio	√
	OFF 【LO】	· When SN ratio is important and AGC is also required.	
3. Video Level	ON 【100】	· When dark areas on an object with contrasting light and dark area are monitored.	√
	OFF 【75】	· When the standard video output level is required	
4. Gamma correction	ON	· Applicable to a general surveillance monitoring system	√
	OFF	· When gamma correction is not required for image processing	

Options

To purchase these options, please contact the distributor or dealer from which you purchased the WAT-221S/231S.

AC Adaptor (AD901-120/230)

The recommended AC adaptor for the WAT-221S/231S for a constant and stable power supply.

C-mount Adaptor (34CMA-R)

This lens mount adaptor is used to convert a CS-mount to a C-mount.

Mini Stand (MS50)

A convenient stand for the WAT-221S/231S. With this stand, the camera can be adjusted to any desired angle.

Bracket (B003)

This bracket is effective for a stable installation of the WAT-221S/231S.

Specifications

WAT-221S

Model	WAT-221S (NTSC)	WAT-221S (PAL)
Pick-up Element	1/2 inch interline transfer CCD image sensor	
Unit Cell Size	8.4 μm(H) × 9.8 μm(V)	8.6 μm(H) × 8.3 μm(V)
Power Consumption	1.86W (155mA)	

WAT-231S

Model	WAT-231S (NTSC)	WAT-231S (PAL)
Pick-up Element	1/3 inch interline transfer CCD image sensor	
Unit Cell Size	6.35 μm(H) × 7.4 μm(V)	6.5 μm(H) × 6.25 μm(V)
Power Consumption	1.8W (150mA)	

WAT-221S/231S

Model		WAT-221S (NTSC) WAT-231S (NTSC)	WAT-221S (PAL) WAT-231S (PAL)
Number of Total Pixels		811(H) × 508(V)	795(H) × 596(V)
Number of Effective Pixels		768(H) × 494(V)	752(H) × 582(V)
Imaging system		Ye, Cy, Mg, and G complementary color mosaic filters on chip	
Sync. System		Internal	
Scanning System		2:1 interlace	
Video Output		Composite, Y/C: 1.0 V(p-p) 75Ω (Unbalanced)	
Resolution (H)		Composite: More than 450TVL (Center) Y/C: More than 480TVL (Center)	
Minimum Illumination		0.1 lx. F1.2	
S/N		More than 50dB (AGC=8dB, γ=1.0)	
AE Mode	OFF	1/60 sec.	1/50 sec.
	FL	1/100 sec.	1/120 sec.
	ES	1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 sec.	
	EI:OFF	1/60-1/100000 sec.	1/50-1/100000 sec.
	EI:FL	1/100-1/100000 sec.	1/120-1/100000 sec.
White Balance		ATW, PWB, MWB, 3200K, 4300K, 5100K, 6300K	
AGC	ON	HI: 8-36dB / LO: 8-24dB	
	OFF	8dB	
Gamma Characteristics		γ≒0.45(ON) / γ=1.0(OFF)	
Video Level		100IRE / 75IRE	
Lens-iris		Video / DC (EIAJ arrangement, Auto-select)	
Back Light Compensation		ON / OFF	
Power Supply		DC+12V±10%	
Operating Temperature		-10 ~ +40°C (Without condensation)	
Operating Humidity		Less than 95% RH	
Storage Temperature		-30 ~ +70°C (Without condensation)	
Storage Humidity		Less than 95% RH	
Lens Mount		CS-mount	
Size		44.5(W) × 44(H) × 64(D) (mm)	
Weight		Approx. 160g	

- Design and specifications are subject to change without notice.
- Watec is not responsible for any inconvenience or the attendant damages to the video and monitoring recording equipment caused by misuse, misoperation or improper wiring of our equipment.
- If for any reason the WAT-221S/231S does not work properly, or if you have any questions regarding installation or operation, please contact the distributor or dealer from which it was purchased.

Contact information

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