

**READ AND SAVE THIS BOOK**

**CCD Camera**

**KP-M31**

## **OPERATION MANUAL**

Please read this operation manual carefully for proper operation, and keep it for future reference.

 **Hitachi Denshi, Ltd.**

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# 1. GENERAL

The KP-M31 is a compact, lightweight, black and white camera using a latest high grade 1/3-inch image size CCD.

# 2. MAJOR FEATURES

- Compact: 44(W) × 29(H) × 72(D)mm  
Lightweight: 120g approx.
- Multiple-step electronic shutter function
- Internal/external synchronization, interlaced/non-interlaced operation
- Frame and field integration modes switchable

# 3. COMPOSITION

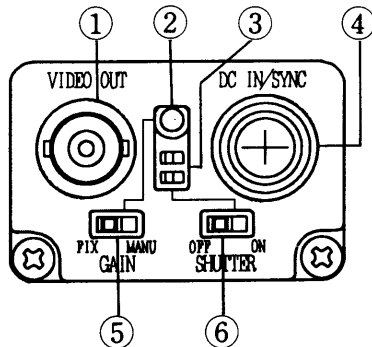
## Standard composition

- (1) Camera body
- (2) C-mount cap
- (3) Operation manual

## Optional accessories

- (1) Lens
- (2) Tripod adaptor TA-M1
- (3) 12-pin plug HR10A-10P-12S (01)
- (4) AC adaptor AP-130 or UD-240A
- (5) Junction box JU-M1A
- (6) Camera cable
  - 2m: C-201KS
  - 5m: C-501KS
  - 10m: C-102KS

## 4. NAME OF EACH SECTION



(Rear)

Fig. 1

### (1) VIDEO OUT (BNC) connector

A composite video signal (VS) is fed from this connector. Connect a 75-ohm coaxial cable between the connector and a video monitor or other video equipment.

### (2) Gain control

When the GAIN switch (5) is set to MENU, adjust gain with this control.

### (3) Shutter speed select switches

Use these switches to set a shutter speed. For details, see page 9.

### (4) DC IN/SYNC connector

This connector is for a 12V DC input, a composite video signal (VS) output and an external sync signal input.

### (5) GAIN FIX-MANU switch

Select FIX or MANU to adjust gain.

### (6) SHUTTER ON/OFF switch

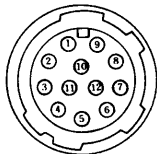
Set the SHUTTER ON/OFF switch to ON to establish the shutter mode. For details, see page 9.

## 5. SIGNAL CONNECTION TO DC IN/SYNC CONNECTOR

### Signal connection to each pin

Pin No.	Internal sync mode	External sync mode	Pin No.	Internal sync mode	External sync mode
1	GND	GND	7	–	VD input (Signal)
2	+12V	+12V	8	–	–
3	Video output (GND)	Video output (GND)	9	–	–
4	Video output (Signal)	Video output (Signal)	10	GND	GND
5	–	HD input (GND)	11	+12V	+12V
6	–	HD input (signal)	12	–	VD input (GND)

Optional 12-pin plug: HR10A-10P-12S(01)



Viewed from this side

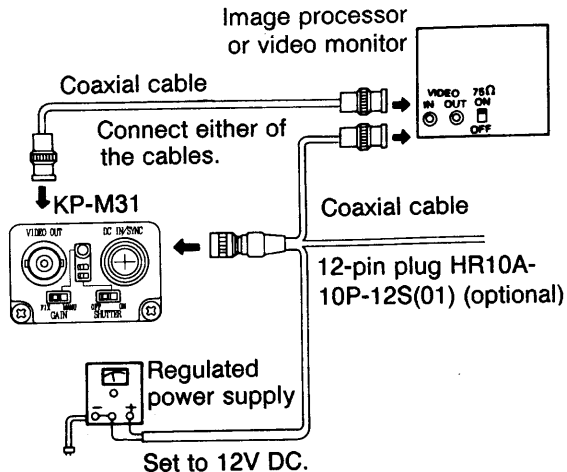


### Note:

- The video signal cannot be fed simultaneously from both the VIDEO OUT connector and the DC IN/SYNC connector. If both the outputs are connected simultaneously, a proper picture cannot be obtained.
- Supply 12V DC in the range between 11 and 13V.
- Prior to turning on the power, be sure to check the polarities of the power supply.

# 6. HOW TO CONNECT CABLES

## 6-1 Basic connection



When connecting more than one monitor, set the 75-ohm termination switch of the last unit only to ON.

When operating the camera in external sync drive mode, input the sync signal(HD/VD).

- Available voltage range is 11 to 13V.
- Before turning on an external power supply unit, be sure to check the polarities of the power supply.

**Note:** The video signal cannot be fed simultaneously from both the VIDEO OUT connector and the DC IN/SYNC connector.

Fig. 2

## 6-2 Connection of options

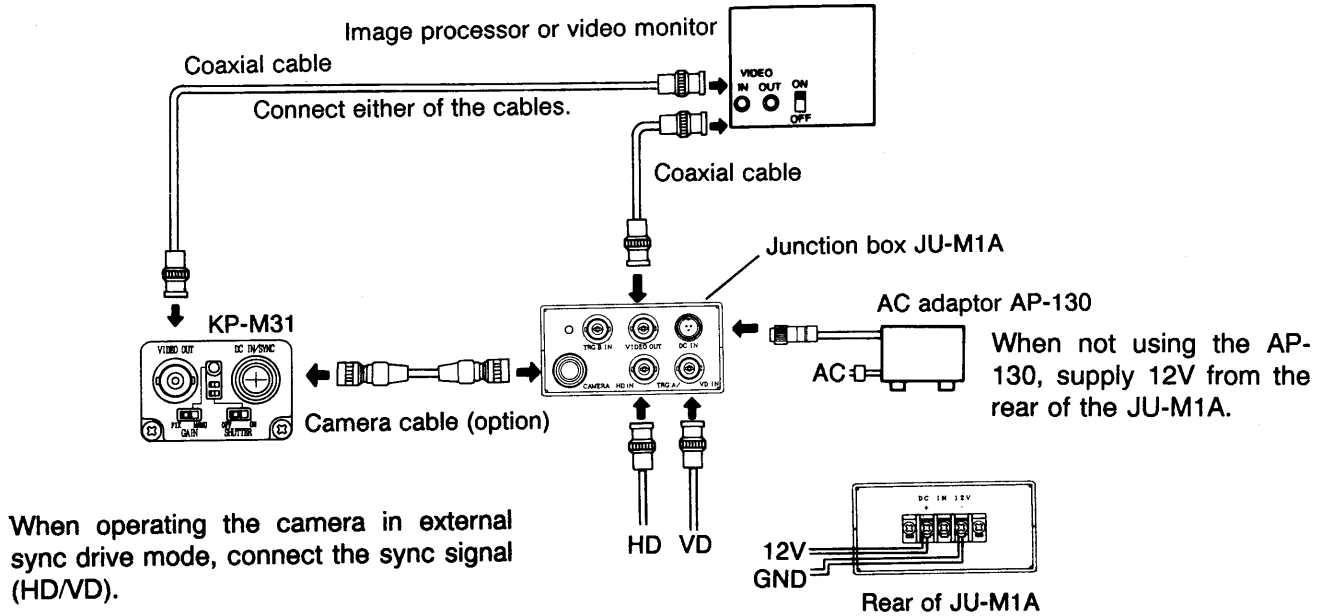
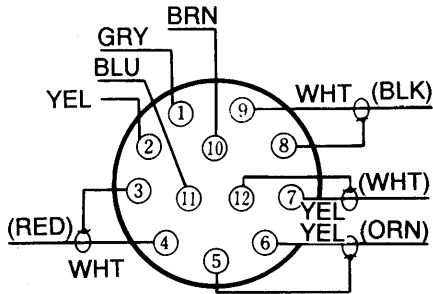


Fig. 3

### 6-3 Optional cables

Cables dedicated for connecting the camera head and the junction box JU-M1A are available as option.



Length	Type
2m	C-201KS
5m	C-501KS
10m	C-102KS

Fig. 4

- Voltage drop due to a cable is about 0.01V per meter.
- The H phase delays by about 5ns per meter.
- When an optional cable is used, the video signal cannot be fed from the VIDEO OUT connector.
- When using a cable only to supply power, use the cable C-201KS (2m).



## 7. OPTICAL SYSTEM

- Image size:1/3-inch
- The flange focal distance is 17.526mm (in air).
- Flange focal distance cannot be adjusted.

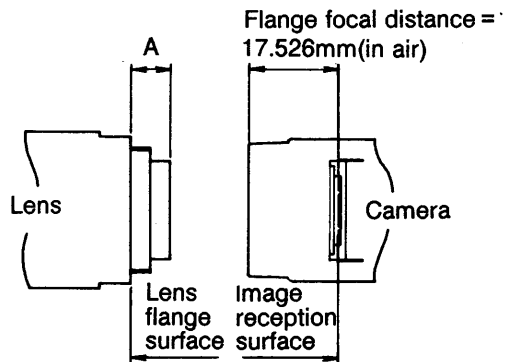


Fig. 5

### Note

Select such a lens as the length (A) from the flange surface of the lens to the end of the screw side is 8mm or less.

## 8. OPTICAL FILTER

This camera is provided with an anti-reflectance glass filter.

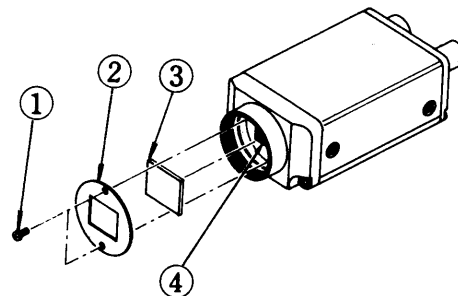


Fig. 6

### How to remove the optical filter.

- (1) Remove two screws ① shown in Fig. 6, and filter holder ② will come off.
- (2) Remove the optical filter ③ from filter frame ④ .
- (3) Then, reinstall and secure filter holder ② with two screws ①.

### Caution

1. Prior to removal of the optical filter, be sure to turn off the power.
2. Use care so that the CCD does not become dusty or scratched when the optical filter is removed.

## 9. ARRANGEMENT OF INTERNAL SWITCHES

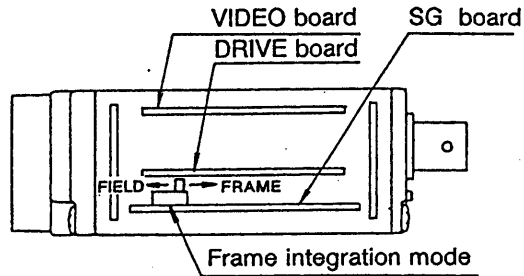
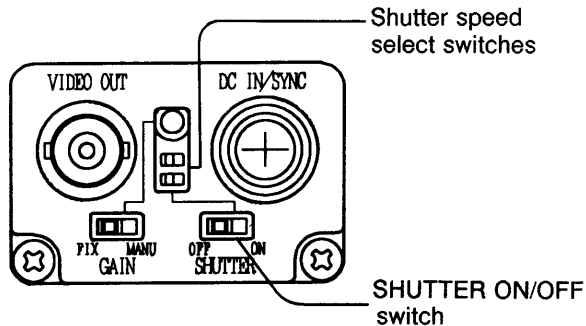


Fig. 7

### Caution

1. Prior to switching the FIELD/FRAME switch, be sure to turn off the power.
2. Do not turn on the power with the cover removed.
3. Do not touch to parts other than specified.

# 10. HOW TO USE ELECTRONIC SHUTTER



Set the SHUTTER ON/OFF switch to ON, then set a shutter speed with the shutter speed select switches. (The shutter operates in the field integration mode.)

## Shutter speed setting

Speed		OFF	1/100(1/125)	1/500	1/2000	1/10000
Setting position	Shutter speed select switch					
	Shutter ON/OFF switch					

The higher the shutter speed, the greater the effect. However, since sensitivity lowers, adjust the lens iris or increase illumination. When the shutter is used, the flicker of an object may be emphasized. In such a case, use a light such as a DC lighting lamp which causes no flicker.

# 11. EXTERNAL SYNCHRONIZATION (2:1 INTERLACED)

When operating the camera by external drive signals, connect sync drive signals (HD,VD) to the DC IN/SYNC connector, then the mode is automatically switched from the internal sync mode to the external sync mode.

- Input signals

HD and VD signals

HD EIA :  $f(H) = 15.734\text{kHz} \pm 1\%$

CCIR :  $f(H) = 15.625\text{kHz} \pm 1\%$

VD EIA :  $f(V) = 59.94\text{Hz}$  [ $f(V) = f(H) \div 262.5$ ]

CCIR :  $f(V) = 50\text{Hz}$  [ $f(V) = f(H) \div 312.5$ ]

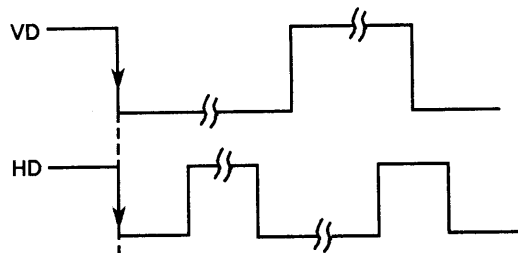
- Input level

HD 2 to 6Vp-p, negative

VD 2 to 6Vp-p, negative

- Input impedance 1k ohms

- Phase relationship between horizontal drive signal (HD) and vertical drive signal (VD)

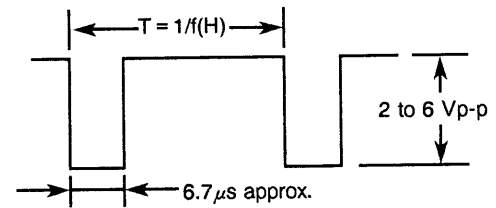


Adjust the phases so that the falling edges of HD and VD are in phase ( $0 \pm 2\mu\text{s}$ ).

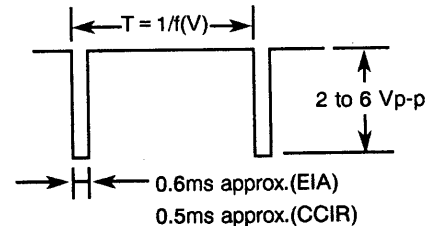
**Fig. 8**

- Input waveforms

- Horizontal drive signal (HD)



- Vertical drive signal (VD)



**Fig. 9**

## 12. NON-INTERLACED OPERATION

When non-interlaced external sync drive signals (HD/VD) are connected from an external unit, the mode is automatically switched to non-interlaced scanning mode. When the following external sync drive signals are connected, the camera operates in the non-interlaced mode.

- Input signals HD EIA :  $f(H) = 15.734\text{kHz} \pm 1\%$   
CCIR :  $f(H) = 15.625\text{kHz} \pm 1\%$   
VD EIA :  $f(V) = f(H) \div (260 \text{ to } 1023) \text{ (Hz)}$   
CCIR :  $f(V) = f(H) \div (310 \text{ to } 1023) \text{ (Hz)}$

- Input level 2 to 6Vp-p, negative
- Input impedance 1k ohms
- Waveforms of external drive signals (non-interlaced scanning)  
The waveforms are the same as those of 2:1 interlaced external sync drive signals. Refer to Fig 8.

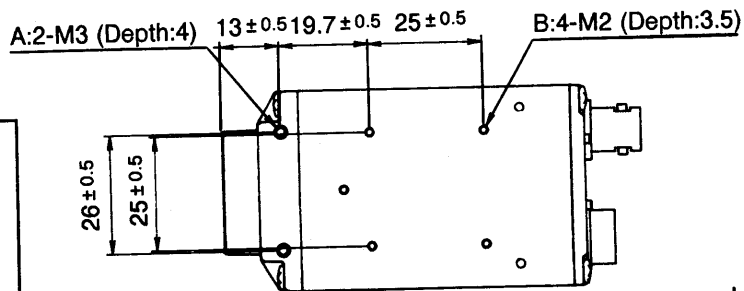
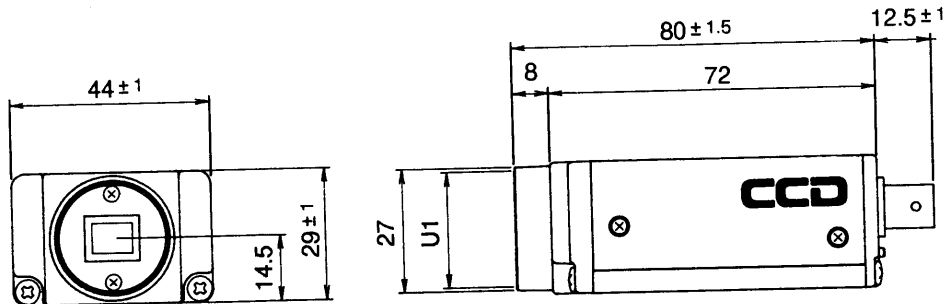
# 13. SPECIFICATIONS

- |  |  |  |
|--|--|--|
| <p><b>(1) Imaging device:</b><br/>         Total number of pixels<br/>         Pixel pitch<br/>         Number of effective pixels</p> | <p>Interline transfer CCD<br/>         EIA: 537(H) × 505(V)<br/>         CCIR: 537(H) × 597(V)<br/>         EIA: 6.00 μm(H),<br/>         4.96 μm(V)<br/>         CCIR: 9.8 μm(H),<br/>         6.3 μm(V)<br/>         EIA: 510(H) × 492(V)<br/>         CCIR: 500(H) × 582(V)</p> | <p><b>(9) Internal sync scanning system:</b><br/>         2:1 interlaced<br/>         Number of horizontal lines<br/>         EIA: 525 TV lines<br/>         CCIR: 625 TV lines<br/> <math>f(V) = 2f(H)/525(625 \text{ for CCIR})</math></p> |
| <p><b>(2) Imaging area:</b></p>  | <p>EIA: 4.89mm × 3.69mm<br/>         CCIR: 4.90mm × 3.66mm</p>   | <p><b>(10) External sync input:</b><br/>         HD/VD<br/>         Input impedance<br/>         Frequency deviation</p>   |
| <p><b>(3) Signal system:</b></p>   | <p>Based on EIA or CCIR system</p>   | <p>2 to 6Vp-p, negative<br/>         1k ohms<br/>         ± 1%</p>   |
| <p><b>(4) Lens mount:</b></p>  | <p>C mount</p>   | <p><b>(11) Video output:</b><br/>         1.0Vp-p, 75 ohms,<br/>         unbalanced<br/>         Video: 0.7Vp-p<br/>         Sync: 0.3Vp-p, negative</p>   |
| <p><b>(5) Flange focal distance:</b></p>   | <p>17.526mm</p>  | <p><b>(12) Horizontal resolution:</b><br/>         EIA: 380 TV lines<br/>         CCIR: 370 TV lines</p>   |
| <p><b>(6) Horizontal scanning frequency:</b></p>   | <p>EIA: 15.734kHz<br/>         CCIR: 15.625kHz</p>   | <p><b>Vertical resolution:</b><br/>         EIA: 485 TV lines<br/>         CCIR: 575 TV lines</p>  |
| <p><b>(7) Vertical scanning frequency:</b></p>   | <p>EIA: 59.94Hz<br/>         CCIR: 50Hz</p>  | <p><b>(13) Sensitivity:</b> 200 lx, f4, 3200K<br/> <b>(14) Minimum illumination:</b> 0.5 lx, f1.4<br/> <b>(15) S/N:</b> 56dB</p>   |
| <p><b>(8) Sync system:</b></p>   | <p>Automatic switching between internal sync and external sync modes</p>   | <p><b>(16) Electronic shutter:</b> 1/10000, 1/2000, 1/500, 1/120(CCIR), 1/100(EIA)<br/>         OFF(normal exposure)<br/>         Set to OFF at the factory.</p>   |

- |  |   |   |
|--|---|---|
| <p>(17) <b>Integration mode:</b> Field or frame integration mode<br/>Set to frame integration mode at the factory.</p> <p>(18) <b>Gamma correction:</b> Gamma = 1.0 or correction<br/>Set to 1.0 at the factory.</p> <p>(19) <b>AGC:</b> Fixed gain or AGC<br/>Set to fixed gain at the factory.</p> <p>(20) <b>Power requirement:</b> 12V DC <math>\pm</math> 1V</p> <p>(21) <b>Power consumption:</b> 120mA approx.</p> <p>(22) <b>Ambient temperature and humidity:</b><br/>       Operating            -10 to 50°C, 90% RH or less<br/>       Full specification    0 to 40°C, 50 to 70% RH<br/>       Storage                -20 to 60°C, 70% RH or less</p> <p>(23) <b>Resistance to vibration:</b> 9G max.(Cycle: 10 to 60Hz,amplitude:0.98 mm constant)<br/>7G constant (Cycle: 60 to 150Hz, amplitude-variable)<br/>(Cycle: 10 to 150Hz per</p> | <p>(24) <b>Dimensions:</b> minute, 30 min in each direction of X, Y and Z)<br/>44(W) × 29(H) × 72(D) mm</p> <p>(25) <b>Mass:</b> 120g approx.</p> | <p>※ Specifications are subject to change without notice.</p> |
|--|---|---|

# 14. EXTERNAL VIEW

## ● Camera KP-M31



### Caution

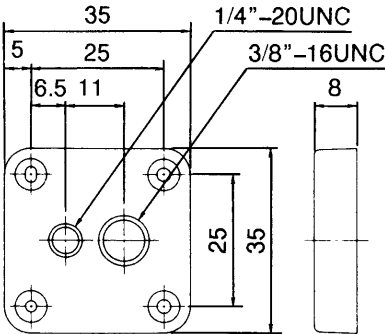
For installation of the camera, use camera mounting holes A or B. When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.

UNIT: mm





● Tripod adaptor TA-M1 (option)



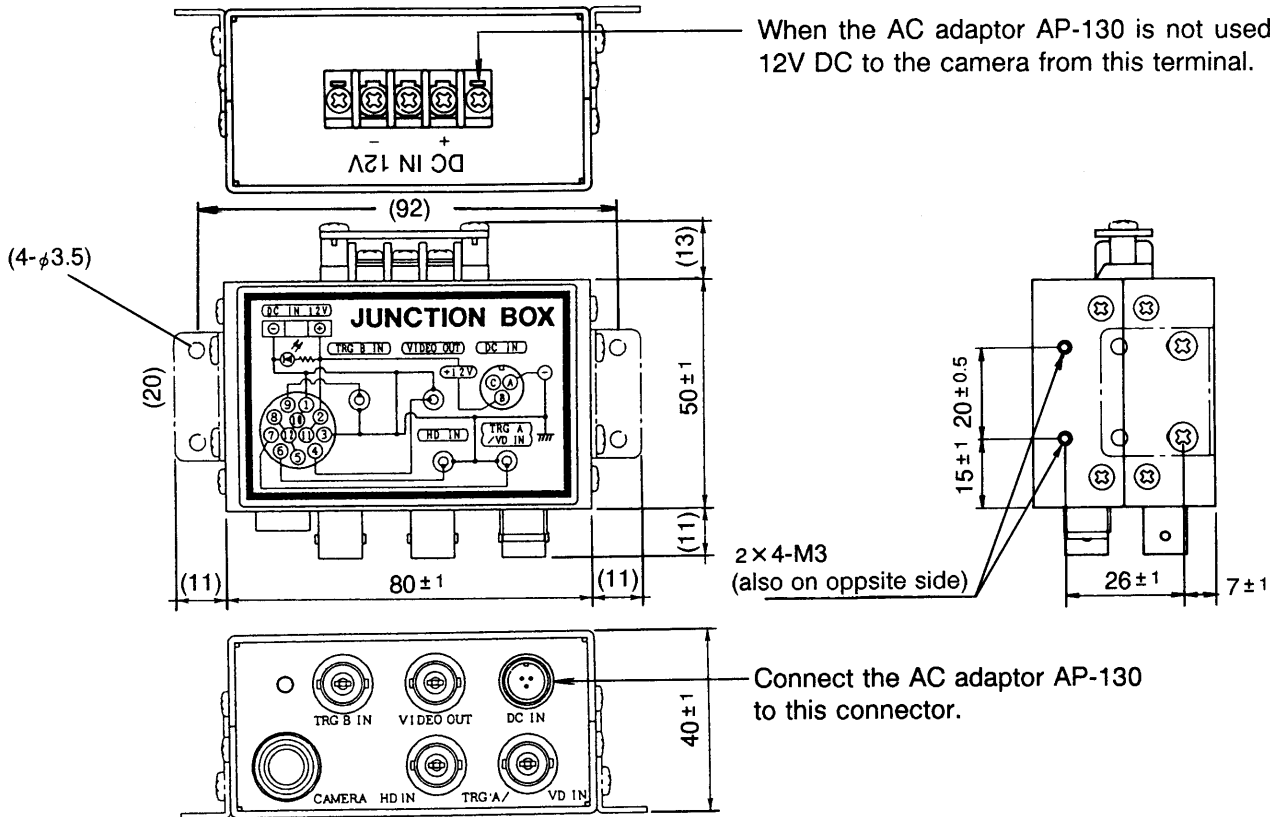
Secure the adaptor to camera mounting holes B, using four supplied screws(M2 × 5).

**Note:**  
If the screws are too long, they will cause trouble to the camera.  
Be sure to check the length before use.

UNIT: mm

● Junction box JU-M1A (option)

When the AC adaptor AP-130 is not used, supply the 12V DC to the camera from this terminal.



2 × 4-M3  
(also on opposite side)

Connect the AC adaptor AP-130 to this connector.

UNIT:mm



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