

Progressive Scan Type

Color Camera

KP-F100C

OPERATION MANUAL

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

CCDカメラ

KP-F100C

取扱説明書

この取扱説明書には、あなたや他の人々への危害や財産への損害を未然に防ぎ、この機器を安全にお使いいただくために、守っていただきたい事項を示しています。ご使用になる前に、取扱説明書をよくお読みいただき、正しい使い方でご愛用ください。

お読みになった後も、この機器のそばなどいつも手元に置いてご使用ください。

 **Hitachi Denshi, Ltd.**

 **日立電子株式会社**

CONTENTS

IMPORTANT SAFETY INSTRUCTIONS	A	10. HOW TO USE ELECTRIC SHUTTER	11
IMPORTANT NOTICE	J	11. SETTING OF FRAME-ON-DEMAND FUNCTION	12
NOTES TO USERS	K	12. EXTERNAL SYNCHRONIZATION	13
Phenomena inherent to CCD imaging device ...	K	13. FRAME-ON-DEMAND FUNCTION	14
1. GENERAL	1	14. SPECIFICATIONS	17
2. MAJOR FEATURES	1	15. EXTERNAL VIEW	19
3. COMPOSITION	1		
4. NAME AND FUNCTION OF EACH SECTION .	2		
5. SIGNAL CONNECTION TO CONNECTOR ...	3		
6. HOW TO CONNECT CABLES	6		
7. OPTICAL SYSTEM	9		
8. OPTICAL FILTER	9		
9. ARRANGEMENT OF INTERNAL SWITCHES	10		

1. GENERAL

The Hitachi KP-F100C is a full-frame shutter color camera using a 2/3" CCD of all pixels read-out type. The KP-F100C features high performance, high sensitivity, and high resolution. The KP-F100C is provided with a variety of functions including a multiple

step electronic shutter, external HD/VD sync input, and Frame-on-Demand functions.

A picture suitable for image processing systems is obtained, because a CCD of square lattice unit pixels is used.

2. MAJOR FEATURES

- Digital output is RS-644
- Frame shutter function
- Multiple step electronic shutter
- Frame-on-Demand function

3. COMPOSITION

Standard composition

- (1) Camera body (w/IR cut filter)
- (2) Operation manual

Optional accessories

- (1) Lens
- (2) Tripod adaptor, TA-M1
- (3) 12-pin plug, HR10A-10P-12S(01)
- (4) Junction box, JU-M1A or JU-F1
- (5) Dummy glass (AR coated)
- (6) Camera cables
 - 2m: C-201KSM or KSS
 - 5m: C-501KSM or KSS
 - 10m: C-102KSM or KSS

4. NAME OF EACH SECTION

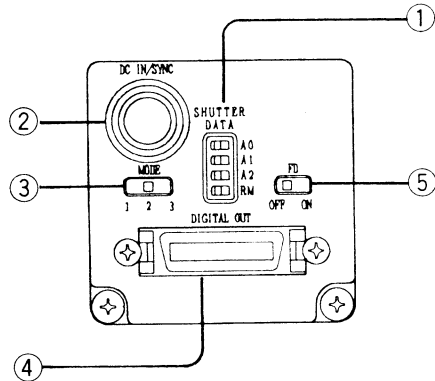


Fig. 1

(Rear)

(3) Mode switch

Set the following with Frame On Demand switch off.

- 1 : Electronic shutter off
- 2 : Electronic shutter on
- 3 : Do not use

Set the following with Frame On Demand switch on.

- 1 : Fixed shutter
- 2 : Two trigger
- 3 : Sync non-reset

(4) Digital output connector

RS-644 digital data output.

(5) Frame On Demand switch

Set to on to use Frame On Demand function.

(1) Shutter speed switches

Set shutter (readout) speed.

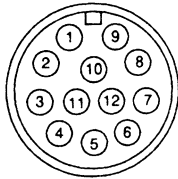
RM: fixed right position.

(2) DC In/Sync connector

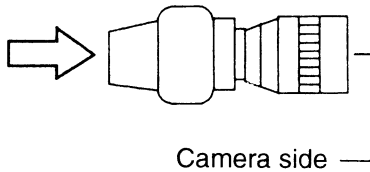
Connector for DC 12 V supply and external sync input.

5. SIGNAL CONNECTION TO CONNECTOR

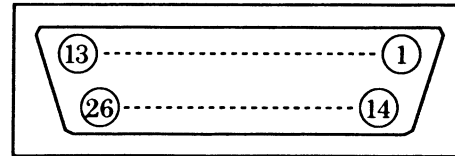
DC IN/SYNC
HR10A-10P-12S(01)
Product code : 23810AX



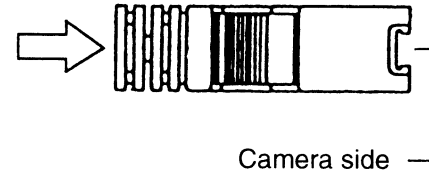
View from
this side



DIGITAL OUT
DX30AM-26P
Part code : JMD0240



View from
this side



(1)Signal connections to DC IN and SYNC

Pin No.	Internal sync mode	External sync mode			
		HD/VD	Frame-On-Demand		
			Fixed shutter	TWO Trigger	SYNC N. R.
1	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V
3	GND	GND	GND	GND	GND
4	WEN	WEN	WEN	WEN	—
5	—	EXT HD (GND)	—	—	—
6	—	EXT HD (SIGNAL)	—	—	—
7	—	EXT VD (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)
8	—	—	—	TRIG-B (GND)	—
9	—	—	—	TRIG-B (SIGNAL)	—
10	GND	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V	+12V
12	—	EXT VD (GND)	TRIG-A (GND)	TRIG-A (GND)	TRIG-A (GND)

Note:

- Supply 12V DC in the range between 11 and 13V.

(2) Signal connections to DIGITAL OUT

Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	DATA 0-H	8	DATA 3-L	15	DATA 7-H	22	VD-L
2	DATA 0-L	9	DATA 4-H	16	DATA 7-L	23	HD-H
3	DATA 1-H	10	DATA 4-L	17	DATA 8-H	24	HD-L
4	DATA 1-L	11	DATA 5-H	18	DATA 8-L	25	CLK-H
5	DATA 2-H	12	DATA 5-L	19	DATA 9-H	26	CLK-L
6	DATA 2-L	13	DATA 6-H	20	DATA 9-L		
7	DATA 3-H	14	DATA 6-L	21	VD-H		

-H : High

-L : Low

The digital out pin is not grounded.

Connect the ground terminal of a frame grabber or other equipment to the shield of the digital out cable.

6. HOW TO CONNECT CABLES

6-1 Basic connection

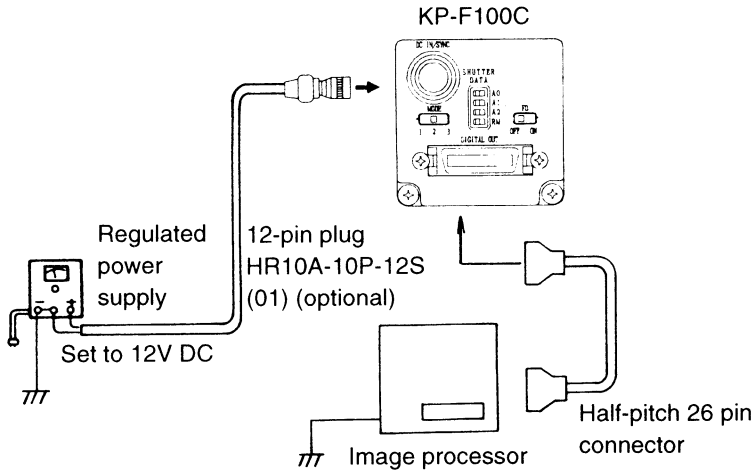
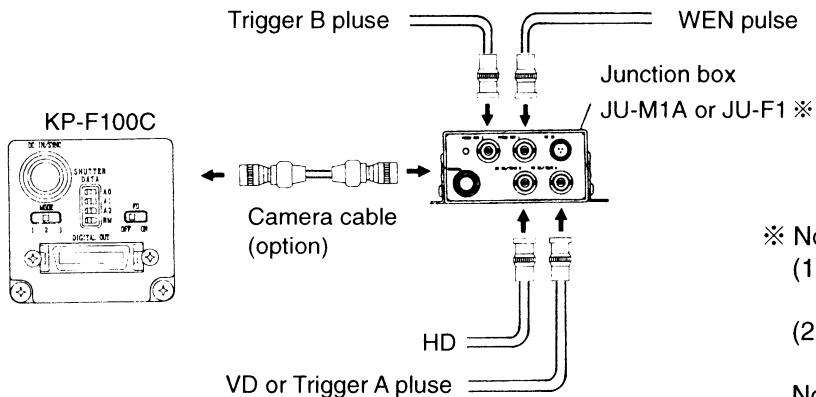


Fig. 2

- Supply sync signal (HD and VD) when using the camera with external drive.
- The permissible power supply range is 11 to 13 VDC. Supply stable power, free from ripple and noise.
- Be sure to confirm correct polarity before supplying power from an external power supply.
- For stable camera operation, ground external power supply and image processing equipment.

6-2 Connection of options



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

Fig. 3

※ Note the following when using the JU-M1A.

- (1) The WEN pulse output appears from the VIDEO OUT connector.
- (2) The video signal output is not obtained from the VIDEO OUT.

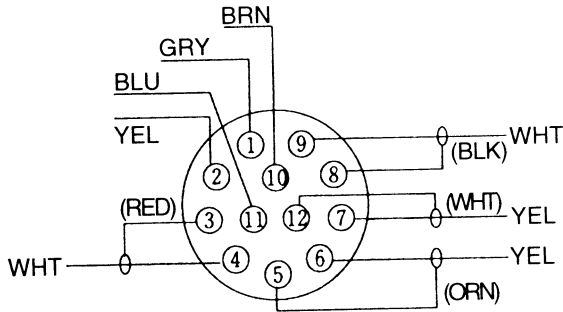
Note the following when using the JU-F1.

- (1) The WEN pulse output appears from the VIDEO 1 connector.
- (2) Apply the Trigger B pulse input to the VIDEO 2 connector.
- (3) The video signal output is not obtained from the VIDEO 1 and VIDEO 2 connectors.

6-3 Optional cables

(1) Camera cable

Cables dedicated for connecting the camera head and the junction box JU-F1 are available as option.



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

Fig. 4

- Voltage drop due to a cable is about 0.01V per meter.
- The H phase delays by about 5ns per meter.
- When using a cable only to supply power, use the cable C-201KSM (2m).

NOTE

In Europe, use the following cables.

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

7. OPTICAL SYSTEM

- Image size: 2/3-inch
- The flange focal distance is 17.526mm (in air).
- Flange focal distance cannot be adjusted.

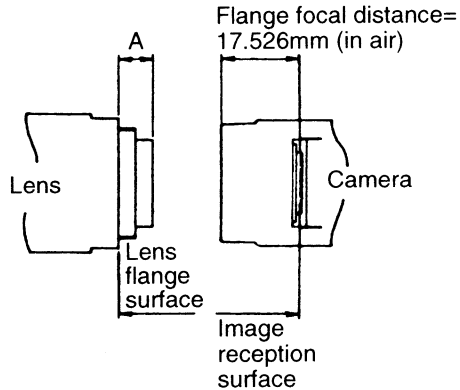


Fig. 5

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 IR cut filter.

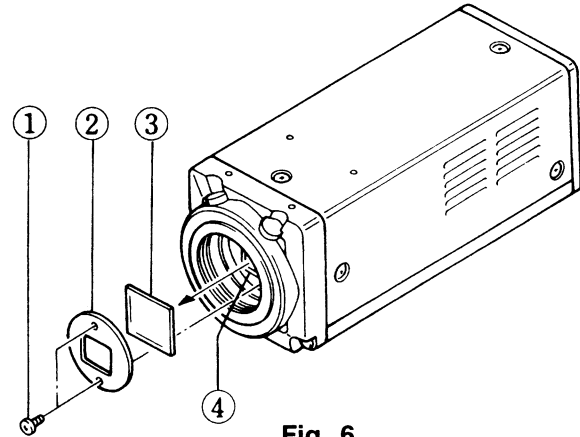


Fig. 6

How to remove the IR cut filter.

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

Caution

Prior to removal of the optical filter, be sure to turn off the power.

9. ARRANGEMENT OF INTERNAL SWITCHES

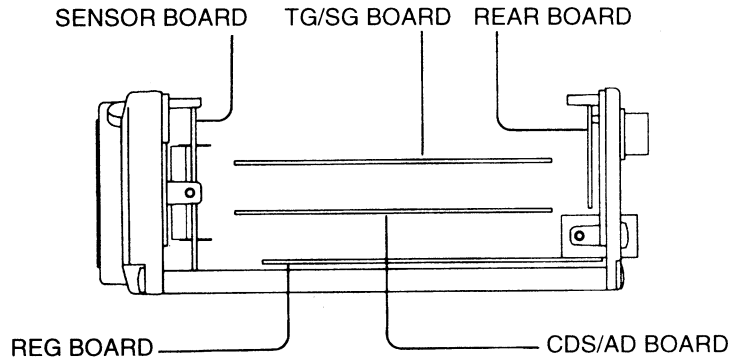
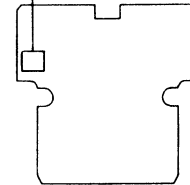


Fig. 7

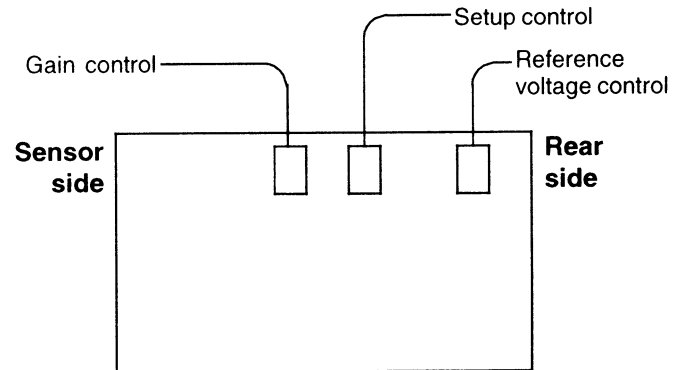
Caution

1. Prior to switching the 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.

Sub voltage setting

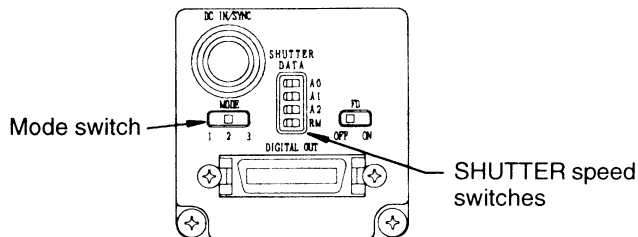


Sensor board interior



10. HOW TO USE ELECTRONIC SHUTTER

Set the FD switch to off and the mode switch to 2, then set the shutter speed switches.



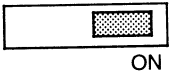
Setting of shutter speed

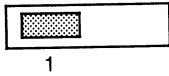
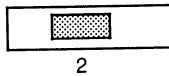
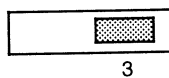
Speed (second)	1/30	1/60	1/125	1/250	1/1000
Setting position					
Speed (second)	1/2000	1/4000	1/10000		
Setting position					

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. SETTING OF FRAME-ON-DEMAND FUNCTION

The frame-on-demand function is set as follows.

1.  Set the Frame On Demand switch to on.

2.  Set the mode switch.
1 : Fixed shutter
2 : Two trigger
3 : Sync non-reset
- 
- 

Note: In the same manner, set the electronic shutter speed for the fixed shutter and sync non-reset modes.

12. EXTERNAL SYNCHRONIZATION

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 : $f(H)=12.528\text{kHz} \pm 1\%$

VD : $f(V)=12\text{Hz} [f(V)=f(H) \div 1044]$

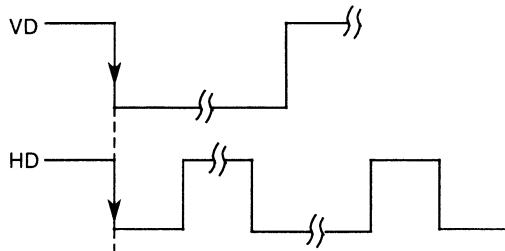
- Input level

HD 4 to 6Vp-p, negative

VD 4 to 6Vp-p, negative

- Input impedance 1k ohms

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

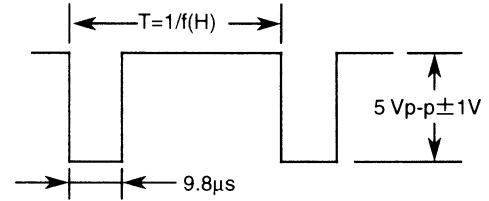


Adjust the phases so that the falling edges of HD and VD are in phase ($0 \pm 1.0\mu\text{s}$).

Fig. 8

- Input waveforms

- Horizontal drive signal (HD)



- Vertical drive signal (VD)

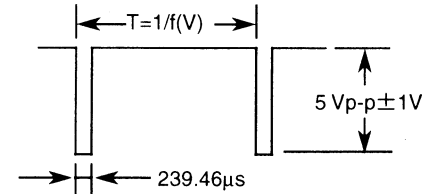


Fig. 9

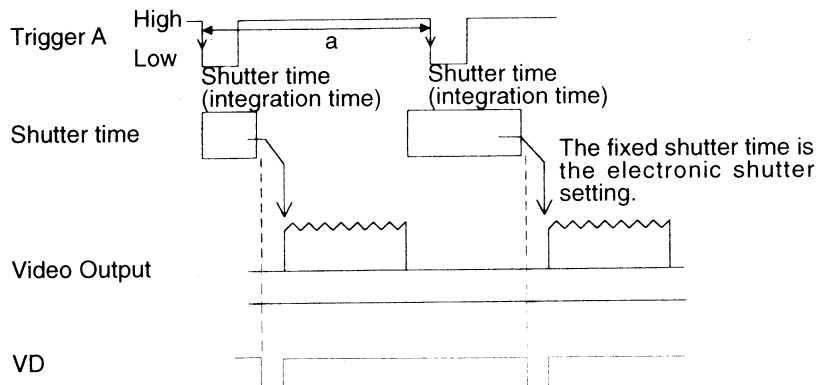
13. FRAME-ON-DEMAND FUNCTION

Frame-on-demand refers to a function for picking up rapidly moving objects by applying a trigger pulse input at a desired timing to provide a desired or a fixed exposure time. The function is effective since the object is always taken at the same position in the picture.

The camera is provided with three modes. However, one image output is obtained per trigger.

• Fixed shutter mode

At a single trigger pulse input (Trig-A), exposure starts at the pulse falling edge and ends at the pulse falling edge. The vertical sync is reset and the video output is obtained immediately.



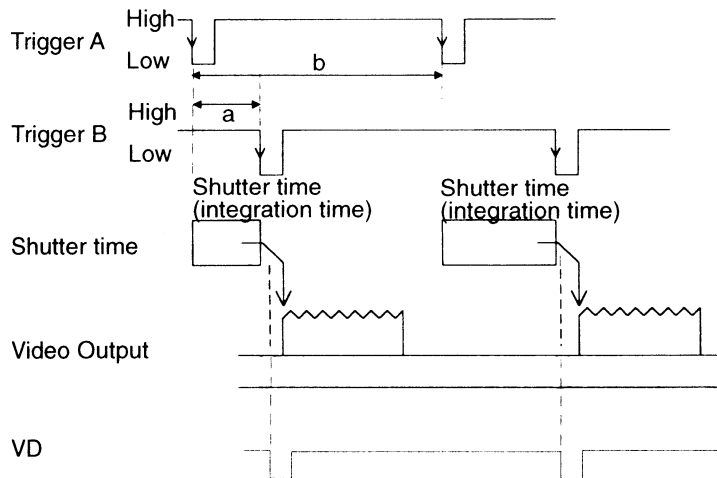
Trigger specifications

- $5V_{p-p} \pm 1.0V_{p-p}$
- $a: 170ms$ or more
Low period : $160\mu s$ or more $20ms$ or less.

Note : Use a sync signal free of noise.

•Two trigger modes

Two trigger pulses are input. Exposure starts at the Trig-A falling edge and ends at the Trig-B falling edge. The vertical sync is reset and the video output is obtained immediately. The interval between the two trigger pulses equals the exposure time.



Trigger specifications

- $5V_{p-p} \pm 1.0V_{p-p}$
- a: $1/30s \sim 1/10000s$
- Trigger A Low period : 160 μ s or more 20ms or less.
 b : 170ms or more.
- Trigger B Low period : 160 μ s or more 20ms or less.
 b : 170ms or more.

Note : Use a sync signal free of noise.

• Sync non-reset mode

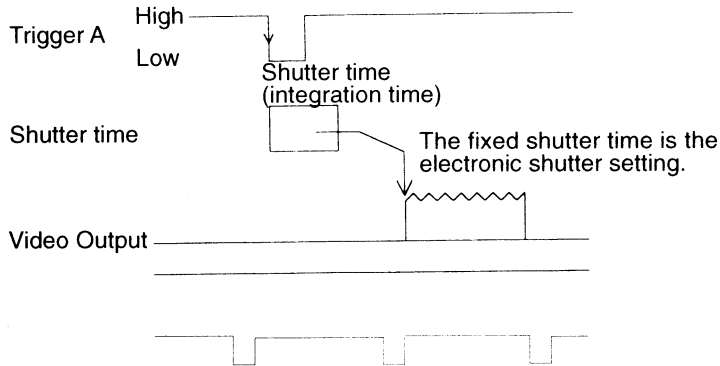
Apply one trigger pulse (TRIG-A) input.

The exposure at the pulse falling edge is the time set by the rear panel fixed shutter switch. After exposure, the video output is obtained at the next frame (V sync is not reset).

Trigger specifications


- $5V_{p-p} \pm 1.0V_{p-p}$

Note: Trigger input cannot be applied to Frames of the video output where a picture is produced (a normal picture will not be obtained).
Use a sync signal free of noise.



14. SPECIFICATIONS

(1) Imaging device:	Interline CCD		(External switch selectable)
No. of total pixels	1360(H)×1034(V)		OFF mode: Normal exposure (Factory setting)
Pixel pitch	6.7(H)×6.7(V)μm		
No. of effective pixels	1300(H)×1030(V)		
(2) Sensing area:	8.71(H)×6.9(V) mm (2/3-inch size)	(12) Gamma correction	1
(3) Lens mount	C-mount	(13) Frame-on-Demand function	ON/OFF: Externally switchable Fixed shutter and TWO trigger mode selectable by External switch.(Factory setting: OFF) External trigger input is required. SYNC non-reset can be set.
(4) Flange focal distance	17.526mm (Not adjustable)		
(5) Hor. scanning frequency	12.528kHz	(14) Power supply	12VDC±1V
(6) Vert. scanning frequency	12Hz	(15) Power consumption	300mA or less
(7) Sync system	Internal/external (automatically switchable)	(16) Ambient conditions	Operating: 0 to 40°C, 90%RH or less Storage: -10 to 50°C, 70%RH or less
(8) Int. sync operation	non-interlaced	(17) Anti-vibration	3G max. (3directions, 30 minutes each)
(9) Ext. sync input	HD/VD: 4 to 6Vp-p, negative Input impedance: 1kΩ Frequency deviation: ±1%		
(10) Video output	• Digital output RS-644 Data:single channel 10bits, 20.2MHz		
(11) Electronic shutter	1/10000, 1/4000, 1/2000, 1/1000, 1/250, 1/125, 1/60, 1/30s		



(18) Resistance to shock 30G
(Drop test, once each top,
bottom, left and right)

(19) Dimensions 44(W)×44(H)×110(D)
mm

(20) Mass 200g approx.

*Specifications are subject to change without notice.

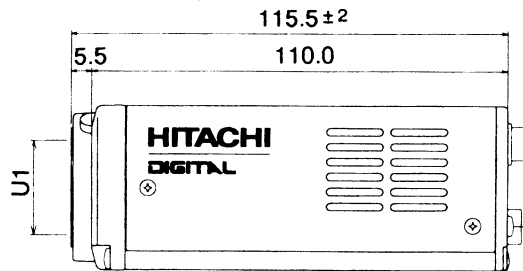
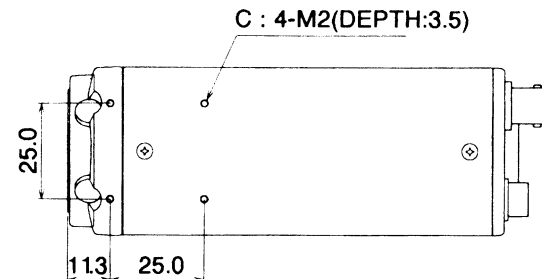
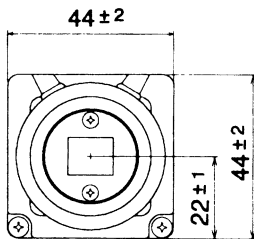
15. EXTERNAL VIEW

Camera KP-F100C

Caution

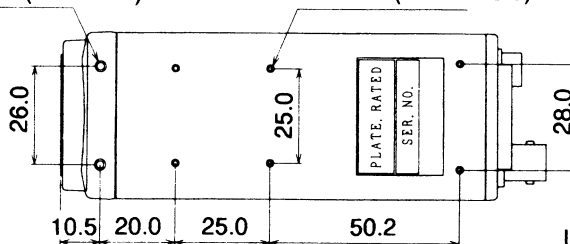
For installation of the camera use camera mounting holes A, B or C.

When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.



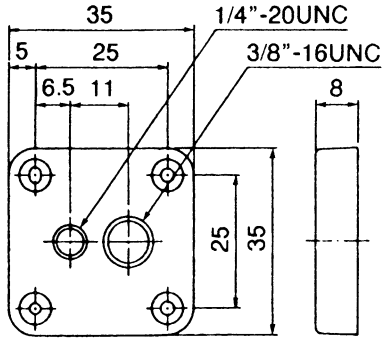
A : 2-M3(DEPTH:4)

B : 4-M2(DEPTH:3.5)



UNIT : mm

Tripod adaptor TA-M1 (option)



UNIT:mm

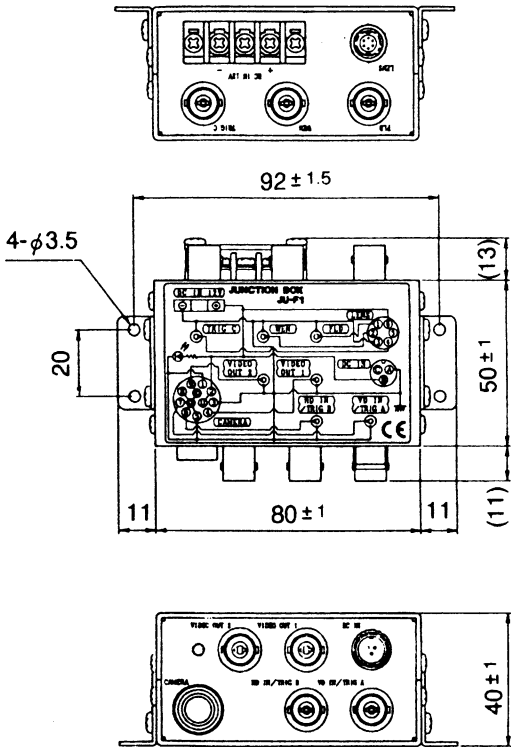
Secure the adaptor to camera mounting holes B or C, using four supplied screws(M2×5).

Note

If the screws are too long, they will cause trouble to the camera.

Be sure to check the length before use.

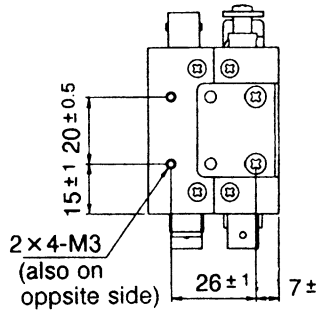
Junction box JU-F1(option)



Connect power supply to these terminal when the AP-130 is not used.

Notes:

- * Supply voltage ranged 11 to 13 V.
- * Make sure voltage polarity before connection of an external power supply.
- * Use an external power supply other then the AP-130 at your own risk.



※ See signal connections on pages 4 and 7.

MASS : APPROX. 200g
UNIT:mm

**HITACHI DENSHI, LTD.**

1, kanda izumi-cho chiyoda-ku, tokyo 101-0024, japan
phone : (03) 5821-5311, fax : (03) 5821-5394

HITACHI DENSHI AMERICA, LTD.***Headquarters and New York Office**

150 crossways park drive, woodbury, new york 11797, u. s. a.
phone : (516) 921-7200, fax : 516-496-3718, telex : 510-221-1899

Chicago Office

250 east devon ave., suite 115 itasca, illinois 60143, u. s. a.
phone : (630) 250-8050 fax : 630-250-8054

Los Angeles Office

371 van ness way, suite 120 torrance, ca. 90501, u. s. a.
phone : (310) 328-6116, fax : 310-328-6252

Dallas Office

2100 west n. w. highway suite 1145 grapevine, texas 76051, u. s. a.
phone : (817) 488-4528, fax : (817) 488-4714

Atlanta Office

3039 amwiler road, suite 118 atlanta, georgia 30360, u. s. a.
phone : (770) 242-3636, fax : 770-263-8838

HITACHI DENSHI, LTD. (CANADA)***Head Office**

1 serect avenue unit#14 scarborough, ontario m1v 5j3, canada.
phone : (416) 299-5900, fax : (416) 299-0450, telex : 652-5324

Ottawa Office

9 antares drive, nepean, ontario, k2e 7v5, canada
phone : (613) 727-3930, fax : (613) 727-3955

Eastern Office

8100 h trans canadienne, st laurent, quebec, h4s 1m5, canada
phone : (514) 332-6687, fax : (514) 335-1664, telex : 582-4768

HITACHI DENSHI (EUROPA) GmbH***Head Office**

wesikircher strabe 88, d-63110 rodgau, germany
phone : (6106) 6992-0, fax : (6106) 1690-6, telex : 417-849

HITACHI DENSHI (U. K.) LTD.***Head Office**

14 garrick industrial centre, irving way, hendon, london, nw96 aq,
united kingdom
phone : (181) 202-4311, fax : 181-202-2451

Leeds Office

brookfield house, selby road, garforth, leeds ls25 1nb united kingdom
phone : 113-287-4400, fax : 113-287-4260

HITACHI DENSHI, LTD. BEIJING OFFICE

100004 beijing fortune building
5, dong san huan bei-lu, chan yang district, beijing, china
phone : 6590-8755/8756 fax : 6590-8757

Beijing Service Center

b19, bei san huan middle road beijing china
phone : 204-3901 fax : 204-3902

HITACHI DENSHI, LTD. SINGAPORE BRANCH

10 anson road #20-15 international plaza singapore 079903
phone : 65-223-0030, fax : 65-223-0206

* subsidiaries of hitachi denshi, ltd.