

## Additional Information

# HITACHI

## *CAMERA CONTROL UNIT* **CU-UHD4000-S7**

### *OPERATING INSTRUCTIONS*



Please read these additional Information and operating instructions carefully for proper operation and keep them for future reference.

## Hitachi Kokusai Electric Inc.

# New Functions

The camera control unit CU-UHD4000-S7 has the additional new functions to the standard model by connection with the SK-UHD4000-S7 and CA-UHF4000-S7.

- Two 12G-SDI outputs for 4K signal
- Simultaneous 2K SDR and 4K HDR signal outputs
- Independent 2K DTL function
- BT.2020 matrix function for 4K signal
- HD output signal format display on Color Bars
- Moving Color Bars
- Audio test tones (400Hz & 1000Hz) on Color Bars
- CAM ID SUB display with up to twenty characters on Color Bars
- Return SDI signal with embedded audio can be output at the camera head and be mixed in the intercom headset
- Optical level of both of the camera head and CCU display on PIX OUT

**These New Functions are available with the following version or later version.**

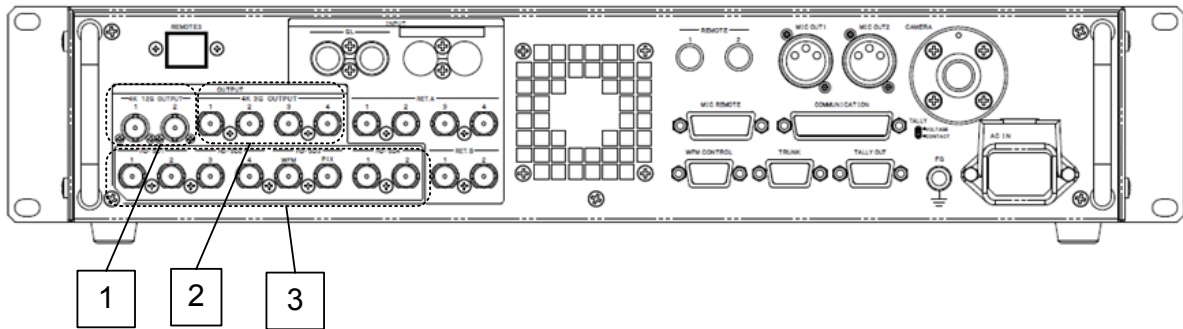
CPU software version: V1.00C or later version.

FPGA software version: V4.200 or later version.

**Note**

*SD-SDI outputs are eliminated from the standard model specifications.*

# Facility names and functions (Rear)



**1 4K 12G OUTPUT connectors (BNC)**

4K video signal is fed out through single BNC cable.

**2 4K 3G OUTPUT connectors (BNC)**

Outputs 4K video signals. Each 4K video is mapped into four 3G-SDI/HD-SDI signals or two 3G-SDI signals.

**3 HD SDI connectors (BNC)**

Six (6) sets of HDTV SDI video signals are output.

The MENU and DIAGNOSTIC characters are superimposed on the PIX output.

In the table below, the signal outputs are selected via the CCU MENU.

Output Signals		SYSTEM FORMAT				
		59.94Hz	50.00Hz	29.97Hz	25.00Hz	23.98Hz
4K 3G OUTPUT	Scanning	2160/59.94p	2160/50p	2160/29.97p	2160/25p	2160/23.98p
	Signal Link	Quad (3Gx4)	Quad (3Gx4)	Quad (1.5Gx4) or Dual (3Gx2)	Quad (1.5Gx4) or Dual (3Gx2)	Quad (1.5Gx4) or Dual (3Gx2)
	Image Division	Square Div. or 2-Sample Interleave Div.	Square Div. or 2-Sample Interleave Div.	Square Div. or 2-Sample Interleave Div.	Square Div. or 2-Sample Interleave Div.	Square Div. or 2-Sample Interleave Div.
	3G-SDI format	Level A or B	Level A or B	Level B (Dual link)	Level B (Dual link)	Level B (Dual link)
4K 12G OUTPUT	Signal	12G-SDI	12G-SDI	6G-SDI	6G-SDI	6G-SDI
HD OUTPUT	HD Down-Convert	1080/59.94p, 1080/59.94i, 720/59.94p,	1080/50p, 1080/50i, 720/50p,	1080/59.94p, 1080/59.94i, 1080/29.97PsF, 720/59.94p,	1080/50p, 1080/50i, 1080/25PsF, 720/50p,	1080/59.94p, 1080/59.94i, 1080/23.98PsF, 720/59.94p,
	HD Cut-Out	1080/59.94p, 1080/59.94i	1080/50p, 1080/50i	1080/29.97p	1080/25p	1080/23.98p

# Facility names and functions (Rear)

## 4K 12G OUTPUT / 4K 3G signal output combinations

System Format	OUTPUT			
	4K 12G OUTPUT		4K 3G OUTPUT	
	1	2	1	2
59.94Hz 50.00Hz Note-1	12G	12G	2SI[A]	
	-	-	2SI[B] / SQD[A] / SQD[B]	
29.97Hz 25.00Hz 23.98Hz Note-2	6G	6G	2SI[DUAL]	2SI[DUAL]
	-	-	SQD[DUAL]	SQD[DUAL]
	-	-	SQD[QUAD]	

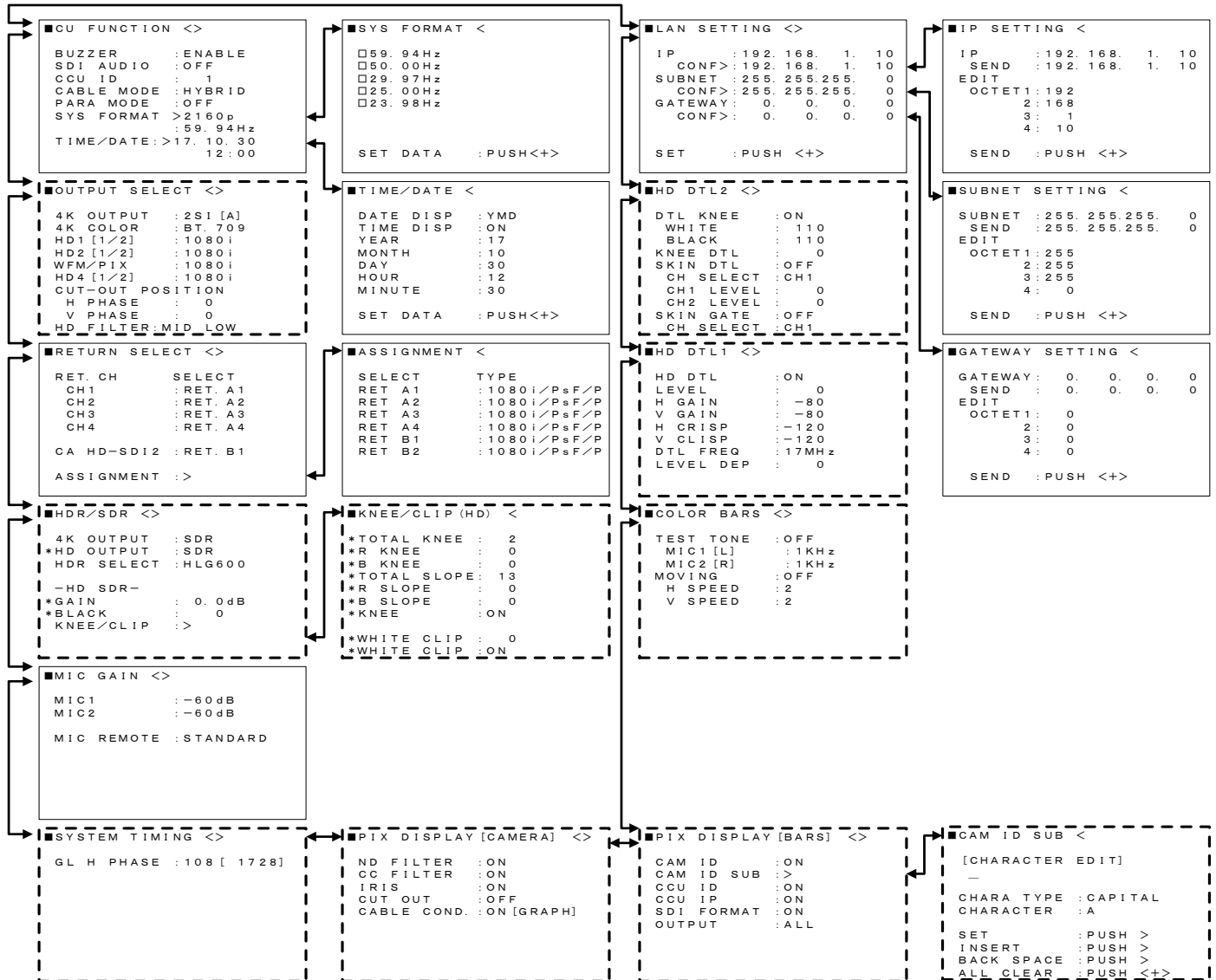
Note-1: To use both 12G output and Quad output simultaneously, set Image Division to **2-Sample Interleave (2SI)** and 3G-SDI Format to **Level A (A)** in OUTPUT SELECT menu in the CCU.

Note-2: To use both 6G output and Dual/Quad output simultaneously, set Image Division to **2-Sample Interleave (2SI)** and 3G-SDI Format to **DUAL** in OUTPUT SELECT menu in the CCU.

# Function menu

New functions are in the additional menu.

## CCU MENU structure



The menus marked by the dotted lines are new or have been changed from the standard model.

# Function menu

## 1. OUTPUT SELECT menu

```

■OUTPUT SELECT <>

4K OUTPUT      : 2SI [A]
4K COLOR       : BT. 709
HD1 [1/2]     : 1080i
HD2 [1/2]     : 1080i
WFM/PIX       : 1080i
HD4 [1/2]     : 1080i
CUT-OUT POSITION
H PHASE       : 0
V PHASE       : 0
HD FILTER     : MID LOW
    
```

Item	Setting		Factory setting		Description
	59.94, 50.00	29.97, 25.00, 23.98	59.94, 50.00	29.97, 25.00, 23.98	
4K OUTPUT	SQD[B], 2SI[B], SQD[A], 2SI[A]	SQD[QUAD], SQD[DUAL], 2SI[DUAL]	2SI[A]	2SI[DUAL]	Assigns output signal of 4K OUTPUT connector. (*1) SQD: Square division 2SI: 2-Sample Interleave division A/B: SMPTE425M Level-A/B QUAD/DUAL: Mapping link
4K COLOR	BT.709, BT.2020		BT.709		Sets the color matrix for 4K output only.
HD1[1/2]	1080p, 1080i, 720p, CUT-OUT[p], CUT-OUT[i]	1080p, 1080i, 1080PsF, 720p, CUT-OUT	1080i	1080i	Assigns signal of HD1[1/2] connector.
HD2[1/2]					Assigns signal of HD2[1/2] connector.
HD4[1/2]					Assigns signal of HD4[1/2] connector.
WFM/PIX	1080p, 1080i, 720p	1080p, 1080i, 1080PsF, 720p	1080i	1080i	Assigns output signal of WFM/PIX connectors.
CUT-OUT POSITION					Specifies the position of HD screen cut from 4K screen, when CUT-OUT signal is selected on HD1, 2, 4.
H PHASE	-120 to +120		0		Specifies horizontal phase.
V PHASE	-135 to +135		0		Specifies vertical phase.
HD FILTER	HIGH, MID HIGH, MID LOW, LOW		MID LOW		Changes frequency of low-pass filter for HD down-converter.

## 2. HDR/SDR menu

```

■HDR/SDR <>

4K OUTPUT      : SDR
*HD OUTPUT     : SDR
HDR SELECT     : HLG600

-HD SDR-
*GAIN          : 0.0dB
*BLACK         : 0
KNEE/CLIP     : >
    
```

Item	Setting	Factory setting	Description
4K OUTPUT	SDR, HDR	SDR	Sets SDR/ HDR for 4K output.
HD OUTPUT	SDR, HDR	SDR	Sets SDR/ HDR for HD output.
Note-1			
HDR SELECT	HLG600, HLG1200, HPQ	HLG600	Sets HDR curve.
HD SDR			
GAIN	0.0 to -18dB, 0.1 steps	0dB	Adjusts SDR signal level only when setting simultaneous SDR and HDR output.
BLACK	-128 to 127	ON	Adjusts BLACK level of SDR signal only when setting simultaneous SDR and HDR output.
KNEE/CLIP			Moves to KNEE/CLIP (HD) menu.

**Note-1** When selecting SDR as the 4K signal output mode, HDR is NOT AVAILABLE on the HD outputs.

# Function menu

## 3. KNEE/CLIP (HD) menu

KNEE/CLIP (HD) menu is enabled only when setting simultaneous SDR and HDR are output.

```

■KNEE/CLIP (HD) <
*TOTAL KNEE : 2
*R KNEE : 0
*B KNEE : 0
*TOTAL SLOPE : 13
*R SLOPE : 0
*B SLOPE : 0
*KNEE : ON
*WHITE CLIP : 0
*WHITE CLIP : ON
    
```

Item	Setting	Initial setting	Description
TOTAL KNEE	-128 to +127	2	Adjusts Total Knee level
R KNEE	-128 to +127	0	Adjusts R individual channel knee level
B KNEE	-128 to +127	0	Adjusts B individual channel knee level
TOTAL SLOPE	-128 to +127	13	Adjusts Total slope level
R SLOPE	-128 to +127	0	Adjusts R individual channel slope level
B SLOPE	-128 to +127	0	Adjusts B individual channel slope level
KNEE	ON,OFF	ON	Knee function ON and OFF
WHITE CLIP	-128 to +127	0	Adjusts White Clip level
WHITE CLIP	ON,OFF	ON	White Clip function ON and OFF

## 4. SYSTEM TIMING menu

```

■SYSTEM TIMING <>
GL H PHASE : 108 [1728]
    
```

Item	Setting	Initial setting	Description
GL H PHASE	-128(-2048) to +127(2047)	108 (1728)	Adjusts whole system phase against genlock signal.

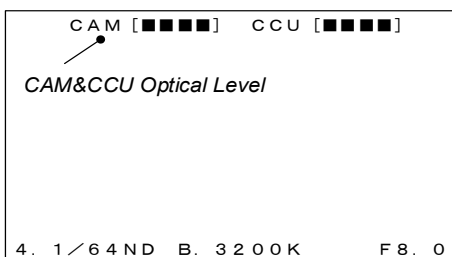
## 3. PIX DISPLAY [CAMERA] menu

```

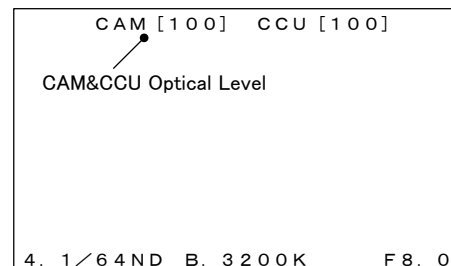
■PIX DISPLAY [CAMERA] <>
ND FILTER : ON
CC FILTER : ON
IRIS : ON
CUT OUT : OFF
CABLE COND : ON [GRAPH]
    
```

Item	Setting	Initial setting	Description
ND FILTER	OFF, ON	ON	Displays ND filter type on PIX OUT.
CC FILTER	OFF, ON	ON	Displays Color Temperature Correction filter type on PIX OUT.
IRIS	OFF, ON	ON	Displays F-number of lens iris on PIX OUT.
CUT OUT	OFF, WIRE, CORNER	OFF	Displays marker of CUT-OUT area, when CUT-OUT signal is selected on HD/SD1,2. <b>OFF</b> : No display <b>WIRE</b> : Displays the area with rectangle <b>CORNER</b> : Displays four corners of the area
CABLE COND.	OFF ON[NUMBER], ON[GRAPH]	OFF	Sets the display for the receiving optical level of both the camera head and CCU. <b>OFF</b> : No display <b>ON[NUMBER]</b> : Data[0 to 100] display <b>ON[GRAPH]</b> : Four segments display

CABLE COND.:ON[GRAPH]



CABLE COND.:ON[NUMBER]



Segment indicator is same as CCU LED optical indicators.

# Function menu

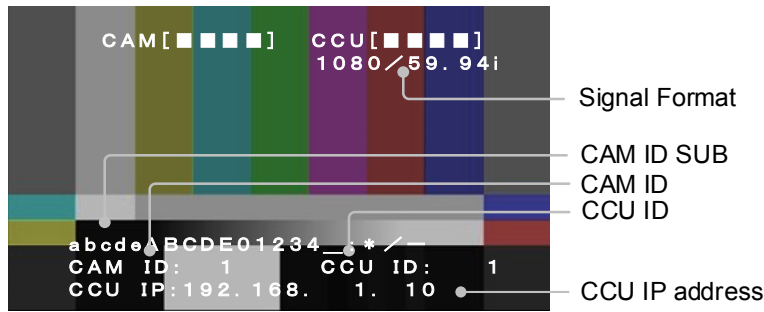
## 4. PIX DISPLAY [BARS] menu

```

■ PIX DISPLAY [BARS] <>
CAM ID      : ON
CAM ID SUB  : >
CCU ID      : ON
CCU IP      : ON
SDI FORMAT  : ON
OUTPUT      : ALL
    
```

Item	Setting	Initial setting	Description
CAM ID	OFF, ON	ON	Displays Camera ID number on color bars.
CAM ID SUB			Moves to CAM ID SUB menu.
CCU ID	OFF, ON	ON	Displays CCU ID on color bars.
CCU IP	OFF, ON	ON	Displays CCU IP address on color bars.
SDI FORMAT	PFF, ON	ON	Displays SDI FORMAT information on color bars.
OUTPUT	ALL, PIX	ALL	Selects output channels that display CAM ID/CCU ID/CCU IP on color bars.

PIX OUT display on BAR



## 5. CAMERA ID SUB menu

CAMERA ID SUB with up to twenty characters is set in this menu.

```

■ CAM ID SUB <
[CHARACTER EDIT]
-
CHARA TYPE : CAPITAL
CHARACTER  : A
SET        : PUSH >
INSERT     : PUSH >
BACK SPACE : PUSH >
ALL CLEAR  : PUSH <+>
    
```

Item	Setting	Initial setting	Description
[CHARACTER EDIT]			Moves the cursor by ◀ and ▶ buttons to edit character.
CHARA TYPE	CAPITAL SMALL NUMBER SYMBOL	CAPITAL	Selects a kind of character. CAPITAL: A to Z SMALL: a to z NUMBER: 0 to 9 SYMBOL: _ ! % ' [ ] * + , - . / : ; < > ?
CHARACTER		A	Selects character by ◀ and ▶ buttons.
SET			Pushes ▶ button to set the character.
INSERT			Moves the cursor to the insert position and then pushes ▶ button to insert.
BACK SPACE			Pushes ▶ button to delete the left character of the cursor.
ALL CLEAR			Pushes ◀ and ▶ buttons simultaneously to delete all characters.



# Function menu

## 6. COLOR BARS menu

■COLOR BARS <>	
TEST TONE	: OFF
MIC1 [L]	: 1KHz
MIC2 [R]	: 1KHz
MOVING	: OFF
H SPEED	: 2
V SPEED	: 2

Item	Setting	Initial setting	Description
TEST TONE	OFF, ON	OFF	Audio test tone ON/OFF
MIC1[L]	400Hz, 1KHz	1KHz	Selects the test tone frequency for Lch.
MIC2[R]	400Hz, 1KHz	1KHz	Selects the test tone frequency for Rch.
MOVING	OFF, ON	OFF	Moving color bars ON/OFF
H SPEED	-9 to 9	2	Adjusts the horizontal moving speed and direction (-): Left, (+): Right
V SPEED	-9 to 9	2	Adjusts the vertical moving speed and direction. (-): Up, (+): Down

## 7. HD DTL1

■HD DTL1 <>	
HD DTL	: ON
LEVEL	: 0
H GAIN	: -80
V GAIN	: -80
H CRISP	: -120
V CLISP	: -120
DTL FREQ	: 17MHz
LEVEL DEP	: 0

Item	Setting	Initial setting	Description
DETAIL	ON,OFF	ON	Detail On and OFF
LEVEL	-128 to +127	0	Adjusts Detail level
H GAIN	-128 to +127	-80	Adjusts H. detail gain
V GAIN	-128 to +127	-80	Adjusts V. detail gain
H CRISP	-128 to +127	-120	Adjusts H detail crisp
V CRISP	-128 to +127	-120	Adjusts V detail crisp
DTL FREQ	13, 14, 15, 16, 17, 18, 19	17 MHz	Sets the boost frequency of detail.
LEVEL DEP	-128 to +127	0	Adjusts the level dependent of detail

## 8. HD DTL2

■HD DTL2 <>	
DTL KNEE	: ON
WHITE	: 110
BLACK	: 110
KNEE DTL	: 0
SKIN DTL	: OFF
CH SELECT	: CH1
CH1 LEVEL	: 0
CH2 LEVEL	: 0
SKIN GATE	: OFF
CH SELECT	: CH1

Item	Setting	Initial setting	Description
DTL KNEE	OFF, ON	ON	DETAIL KNEE ON and OFF
WHITE	-128 to +127	110	Adjusts Positive limit of the detail level
BLACK	-128 to +127	110	Adjusts Negative limit of the detail level
KNEE DTL	-128 to +127	0	Adjusts the detail level in a highlight knee area.
SKIN DTL Note-1	ON, OFF	OFF	Skin tone Detail ON and OFF
CH SELECT	CH1,CH2, CH1+2	CH1	Selects CH for skin tone detail
CH1 LEVEL	-128 to +127	0	Adjusts CH1 skin tone detail level
CH2 LEVEL	-128 to +127	0	Adjusts CH2 skin tone detail level
SKIN GATE	OFF, ON	OFF	Skin Tone Detail gate ON and OFF
CH SELECT	CH1, CH2	CH1	Selects the skin tone detail area where gate marker is displayed.

**Note-1** The HD signal SKIN-TONE DTL detection settings are adjusted in the CAMERA HEAD MENU.

# Specifications

## ■ Input output signals (CU-UHD4000-S7)

Camera Control Unit CU-UHD4000-S7		
4K 12G OUTPUT 1/2	12G-SDI or 6G-SDI <ul style="list-style-type: none"> <li>• 2 Sample Interleave division</li> <li>• 2 channels embedded audio available               <ul style="list-style-type: none"> <li>• 12G-SDI: SMPTE ST 2082-1</li> <li>• 6G-SDI: SMPTE ST 2081-1</li> </ul> </li> </ul>	BNC x2
4K 3G OUTPUT 1/2/3/4	3G-SDI/HD-SDI x4 or 3G-SDI x2 <ul style="list-style-type: none"> <li>• Square Division or 2 Sample Interleave division</li> <li>• 2 channels embedded audio available               <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A/B</li> <li>• HD-SDI: SMPTE292M</li> </ul> </li> </ul>	BNC x4
HD OUT HD1(1/2) HD2(1/2) HD4(1/2)	3G-SDI or HD-SDI <ul style="list-style-type: none"> <li>• Down-converted (1080p/1080i/1080PsF/720p)</li> <li>• HD Cut-out (1080p/1080i)</li> <li>• 2 channels embedded audio available               <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A</li> <li>• HD-SDI: SMPTE292M</li> </ul> </li> </ul>	BNC x6 (x2 + x2 + x2)
HD OUT HD3 (WFM)	3G-SDI or HD-SDI <ul style="list-style-type: none"> <li>• Down-converted (1080p/1080i/1080PsF/720p)</li> <li>• 2 channels embedded audio available               <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A</li> <li>• HD-SDI: SMPTE292M</li> </ul> </li> </ul>	BNC x1
HD OUT HD3 (PIX)	3G-SDI or HD-SDI <ul style="list-style-type: none"> <li>• Down-converted (1080p/1080i/1080PsF/720p)</li> <li>• 2 channels embedded audio available               <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A</li> <li>• HD-SDI: SMPTE292M</li> </ul> </li> </ul>	BNC x1
RET.A IN (1/2/3/4)	3G-SDI or HD-SDI (1080p/1080i/1080PsF/ 720p) <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A</li> <li>• HD-SDI: SMPTE292M</li> </ul>	BNC x4
RET.B IN (1/2)	3G-SDI or HD-SDI (1080p/1080i/1080PsF/ 720p) <ul style="list-style-type: none"> <li>• 3G-SDI: SMPTE424/425 Level-A</li> <li>• HD-SDI: SMPTE292M</li> </ul>	BNC x2

Camera Control Unit CU-UHD4000-S7		
MIC OUT 1	0dBm/600Ω	XLR-3pin
MIC OUT 2	0dBm/600Ω	XLR-3pin
INTERCOM (HEAD SET)	0dBu MAX+15dB	XLR-5pin(Female)
Remote 1	1.5Vp-p	4pin
Remote 2	1.5Vp-p	4pin
Remote 3		RJ-45
COMMUNICATION		D-sub 25pin
·INTERCOM	0dBm , 600Ω at 4Wire 0dBu or -15dBu ,200Ω at 2Wire	
TALLY OUT(R/G)	Contact	D-sub 9pin
	24Vdc, 10mA	
WFM CONTROL	WFM 0-7      0/5V	D-sub 15pin
MIC REMOTE	MIC1,2 Gain	D-sub 15pin
TRUNK	RS-422 (150k baud) (RS-232C : Option)	D-Sub 9 pin