

[ Confidential ]

Sony IP&S Inc.

No. HDCM19-058R

Technical Memo

Class [3] Issued : October 2, 2019  
Revised : October 2, 2019

Subject: Software Release [V2.30]

<< Revised Point(s) >>

[Applicable Model ]

Model / Destination	Serial Number	Number of Unit
HDRC-4000 SYL	10001 - 10733	733

## 【Description】

Updated software for HDRC-4000 is released. (APP V2.30)

Upgrade it as necessary.

(APP V2.30, SDI PLD V2.30, DCP PLD V2.31, DEC PLD V2.32, 4K POST PLD V2.33, 2K POST PLD V2.34, SDP PLD V2.30)

## 【Change point】

<New Function>

### 1. SR Live Metadata Output

Added the ability to embedded HDR SDR Relation Item (a set of items to be immobilized to generate an SDR signal from HDR signals) in the SDI signal VANC area below.

Item No.	Name of the item	Contents
1	Table Version	Table format version information
2	OETF	OETF format adapted to video signal
3	Transfer Matrix	Transfer matrix adapted to video signal
4	Color Gamut	Color gamut of video signal
5	Conversion Mode	Conversion mode to be adapted during video conversion
6	HDR Look	LOOK mode settings adapted to HDR video signal
7	HDR Black Compression	ON/OFF setting of Black compression function adapted to HDR video
8	SDR Gain	Gain difference setting between HDR and SDR video signal
9	SDR Master Black	Master (SDR) Black Level Setting [Absolute Value]
10	HDR Black Offset	HDR Black level offset from Master (SDR) Black
11	Gamma Table	Gamma table number adapted to SDR video signal
12	Gamma Step	Gamma steps adapted to SDR video signal
13	Gamma Level	Gamma level adapted to SDR video signal [Absolute value]
14	Knee	ON/OFF setting of Knee function adapted to SDR video signal
15	Knee Point	Knee Point value for SDR video signal [Absolute Value]
16	Knee Slope	Knee Slope value for SDR video signal [Absolute value]
17	Knee Saturation	ON/OFF setting of Knee Saturation function for SDR video signal
18	Knee Saturation Level	Knee Saturation value for SDR video signal [Absolute Value]
19	Soft Knee	ON/OFF setting of Soft Knee function adapted to SDR video signal (HDRC-4000 not supported)
20	Knee Radius	Value of Soft Knee function adapted to SDR video signal [Absolute Value] (HDRC-4000 not supported)
21	SDR White Clip	ON/OFF setting of white clip adapted to SDR video signal
22	SDR White Clip Level	White clip level for SDR video [absolute value]
23	HDR Knee	ON/OFF setting of HDR Knee function adapted to HDR video signal
24	HDR Knee Point	HDR Knee Point value adapted to HDR video signal [Absolute Value]
25	HDR Knee Slope	HDR Knee Slope value adapted to HDR video signal [Absolute value]

You can set the line number to embedded SR Live Metadata between 9 and 20.

By default, SR live metadata is embedded on the 14th line. When the output format is 3G-SDI Level B/HD-SDI, SR live metadata is superimposed on the 2nd Field.

\*SR Live recommends that Knee and Gamma be set to RGB common settings, so Knee and Gamma in SR Live Metadata only transmit Master values. Please note that G is transmitted as a Master value, but RB is not transmitted.

## 2. SR Live Metadata Input

Added the ability to reflect the data of HDR SDR Item Relation included in the input signal in the setting value. There are two modes to reflect:

- (1) APPLY ONCE: Reflect input metadata only once.
- (2) APPLY CONTINUOUSLY: Continue to reflect input metadata continuously.

\* There is a few Frames delay to reflect the data.

We've also added the ability to show whether SR Live Metadata is embedded on the input signal.

\*Currently, HDRC-4000 only supports Meta transmission. It assumes transmission between lines, such as between OB VAN and receiving sub stations. SR Live Metadata transmits control values at absolute values rather than relative values, so it's okay to have different Reference Files for the two HDRC-4000 from which they're sourced and received.

## 3. Display Referred HDR →SDR Conversion

Previously, only SDR → HDR Display Referred conversion is supported, but it supported HDR → SDR Display Referred conversion from this version.

The functions that can and cannot be used during HDR →SDR Display Referred conversion are as follows.

### **List of functions available for HDR→SDR conversion of Display Referred**

Availability	Function	Menu
Yes	HDR→SDR Gain	SETUP - 2.HDR→SDR
Yes	Knee	SETUP - 2.HDR→SDR
Yes	White Clip	SETUP - 2.HDR→SDR
Yes	Additional Paint Item General *1	ADDITIONAL PAINT
No	Master Black	SETUP - 2.HDR→SDR
No	HDR Black Offset	SETUP - 2.HDR→SDR
No	Gamma	SETUP - 2.HDR→SDR
No	HDR De-Knee	SETUP - 2.HDR→SDR

\*1 Look Conversion excluded

## 4. HDR Look

Added HDR Look function.

Look is a setting that represents the relationship between the camera-captured value (Scene-Linear) and the display brightness (Display-Linear) in HDR, and you can choose from three things: Live, Mild, and Natural.

Live : Look when the camera's HDR output setting is set to S-Log3 and the display input setting is S-Log3 (Live HDR). If you make HDR Look live on AIR Matching ON, it will be the same as the previous AIR Matching ON painting.

Mild: Because Live looks a little flashy, it looks a little less contrast than Live.

Natural : Look when the Camera OETF is set to Hybrid Log Gamma (HLG\_BT.2100) and the display setting is HLG(Var1.2).

HDR Look applies to both input and output Look settings. (Except for SDR.)

HDR Look selection is only enabled when AIR Matching is ON.

The correspondence between the new version and the settings value in the previous version is as follows. (CAM/BPU/CCU output is also included.)

**Setting up in the old version**

Model	CAM/BPU/CCU	HDRC-4000	
Setting items	OETF	AIR Matching	Input OETF
Recommended settings for S-Log3	S-Log3	ON	S-Log3 (Live HDR)
Recommended settings for HLG_Live	HLG_Live	ON	HLG (Var1.2)
Recommended settings for HLG_BT.2100	HLG_BT.2100	OFF	HLG (Var1.2)

**Setting up in the new version**

Model	CAM/BPU/CCU	HDRC-4000		
Setting items	OETF	AIR Matching	Input OETF	HDR Look
Recommended settings for S-Log3	S-Log3	ON	S-Log3 (Live HDR)	Live
Recommended settings for HLG_Live	HLG_Live	ON	HLG (Var1.2)	Live
Recommended settings for HLG_BT.2100	HLG_BT.2100	OFF	HLG (Var1.2)	---

\*HLG→HLG converter, HLG→SDR conversion " AIR Matching OFF " and "AIR Matching ON, HDR" Look:Natural" will have the same output.

Model	CAM/BPU/CCU	HDRC-4000			
Setting items	OETF	AIR Matching	INPUT OETF	OUTPUT OETF	HDR Look
Set value	HLG_BT.2100	OFF	HLG (Var1.2)	SDR or	---
		ON		HLG (Var1.2)	Natural

\* Natural applies only to HLG. Other OETF will be forced live

**HDR Look-compatible/non-compliant combination operation of panel and HDRC-4000**

The behavior of the remote control panel and HDRC-4000's old and new software is as follows:

	HDRC-4000 Old Software (OETF only)	HDRC-4000 New Software OETF+HDR Look
Panel Old Software (OETF only)	All OETF display and selection	Only OETF can be display and selected <b>HDR Look can't be selected or displayed</b>
Panel New Software OETF+HDR Look	All OETF display and selection	View and select OETF and HDR look

**5. Look Conversion**

Added Look Conversion to the Additional Paint menu.

In HDR → HDR conversion, you can output it with a different Look/Black Compression setting than the Look and Black Compression settings of the input.

Example) Input Look : Live, Black Compression : OFF → Output Look : Mild, Black Compression : ON

To use the Look Conversion feature, you must turn on AIR Matching and Additional Paint. When Look Conversion ON, the Channel A/B Settings page of the Configuration menu, HDR Black Compression and HDR Look items are displayed as "---".

\* Mild is only supported by HDRC-4000 V2.30 at the time of release, and CAM/BPU/CCU is not supported. So if you want to make the final output Look Mild, convert it using the HDRC-4000 Look Conversion feature.

## 6. Skin Tone Detail for 4K→HD conversion

Skin Tone Detail with the camera, because it seems to be hardly working when 4K → HD conversion, skin tone detail function that works during 4K → HD conversion has been added to HDRC-4000. Same as the base camera, but no Zoom Link and Auto Hue capabilities.

(Note) Skin Tone Detail is slightly different in detecting color areas, so the camera and settings are slightly different.

## 7. BAR TYPE

Changed to allow BARS TYPE to be set independently in HDR and SDR.

- Bar 16:9 100% and BAR 16:9 (75%) respectively, SDR-LOOK BAR 16:9 100%, SDR-LOOK BAR 16:9-75%, respectively.
- Added HDR BAR listed in ITU-R BT.2111 to HDR BAR TYPE.
- Added the following BARS so that the selection of SDR BAR TYPE is CCU equivalent.  
SMPTE 16:9 (BLACK), SMPTE 16:9 (-I/Q), SMPTE 4:3 (BLACK), SMPTE 4:3 (-I/Q)  
MF-ARIB (75%), MF-ARIB (100%), MF-ARIB (+I), MF-SMPTE (-I, Q), MF-SMPTE (75%, Q),  
MF-SMPTE (100%, Q), MF-SMPTE (+I, Q), HD-CUSTOM, HD-CUSTOM2

## 8 . 2SI Diamond Marker Output

When 2SI is selected as a split method in the 4K output, the 2SI diamond marker can be displayed on the color bar output.

### <Specification changes >

1. After starting, it is now possible to output a gray picture instead of a Color Bar in the case of no input. It can be set in the Others page of the Configuration menu and the STARTUP VIDEO SIGNAL item.
  - BARS: After starting, the color bar is output until the input image enters.
  - GRAY: After starting, output a gray picture until the input image enters.
2. Review the items in the reference file.
  - SDR Gain was removed from the reference file.
  - Press Standard to clear all items in the Additional Paint menu except Detail.
3. Changed the specification to display a warning on the remote control panel when FAN is stopped.

### <Bug Fix>

1. The error that 12G-SDI setting is not set in rare case is corrected.
2. The error that CRC values of embedded Audio Channel Status Bit are wrong in rare case is corrected .
3. Fixed an issue where the HD output was shifted to 1Line when the frequency was 30 or less.
4. When the system frequency starts at 50Hz, 25Hz, or 24Hz, or when the synchronization signal is disturbed, the system frequency is changed between "50Hz, 25Hz, 24Hz" and "59.94Hz, 29.97Hz, and 23.98Hz". Fixed an issue where SDR gain and HDR Knee (HDR De-Knee) and Highlight Creation settings reflected in the 4K output terminal picture would be cleared.

### <Notes>

1. If the system frequency is 29.97Hz, 25Hz, 23.98Hz, and 24Hz, when the through mode is turned on and the input is 6G-SDI/3G-SDI 2SI, the HD MONI output terminal is formatted for 1080P. Please note that it is not 1080PsF.

## 【Notes on settings value】

When you upgrade, the setting value of SDR BAR TYPE will be the default value, so please set it again.

**【Preparation】**

## &lt;Software File&gt;

File name : hsrc4000\_app.pkg - software files  
 hsrc4000\_sdi.pkg - PLD file  
 hsrc4000\_dec.pkg - PLD file  
 hsrc4000\_dcp.pkg - PLD file  
 hsrc4000\_4kpost.pkg - PLD file  
 hsrc4000\_2kpost.pkg - PLD file  
 hsrc4000\_sdp.pkg - PLD file

\* Please contact to your local Sony's service office for obtaining the software file.

## &lt;Others&gt;

USB memory 1 piece

**【Installation Procedure】**

As for the procedure, refer to the section of “Software Upgrade” of SERVICE MANUAL.

**[Confirmation / Adjustment]**

Confirm the version of HDRC-4000 in HDRC-4000 MENU, DIAGNOSIS - <ROMVERSION>(D2) page.

APP	V2.30 (Change item)
OS	V1.00
UPDATER	V1.00

PLD	
SY	V1.00
SDI	V2.30 (Change item)
DEC	V2.32 (Change item)
DCP1	V2.31 (Change item)
DCP2	V2.31 (Change item)
4K-POST	V2.33 (Change item)
2K-POST	V2.34 (Change item)
SDP	V2.30 (Change item)

## 【Software History】

	First Release	HDCM 17-029	HDCM 17-058	HDCM 17-075	HDCM 18-007	HDCM 18-031	HDCM 18-071
APPLICATION	<b>V1.02</b>	V1.02	<b>V2.00</b>	<b>V2.10</b>	V2.10	V2.10	<b>V2.20</b>
Os	<b>V1.00</b>	V1.00	V1.00	V1.00	V1.00	V1.00	V1.00
Updater	<b>V1.00</b>	V1.00	V1.00	V1.00	V1.00	V1.00	V1.00
Sy	<b>V1.00</b>	V1.00	V1.00	V1.00	V1.00	V1.00	V1.00
Sdi	<b>V1.01</b>	V1.01	<b>V1.10</b>	<b>V1.12</b>	V1.12	<b>V1.14</b>	<b>V1.23</b>
DEC	<b>V1.01</b>	V1.01	<b>V1.10</b>	V1.10	V1.10	V1.10	<b>V1.23</b>
Dcp	<b>V1.02</b>	V1.02	<b>V1.10</b>	V1.10	V1.10	V1.10	<b>V1.23</b>
4K-POST	<b>V1.01</b>	V1.01	<b>V1.10</b>	<b>V1.13</b>	<b>V1.14</b>	<b>V1.17</b>	<b>V1.23</b>
2K-POST	<b>V1.01</b>	V1.01	<b>V1.10</b>	<b>V1.15</b>	<b>V1.17</b>	<b>V1.20</b>	<b>V1.24</b>
Sdp	<b>V1.04</b>	<b>V1.05</b>	<b>V1.10</b>	<b>V1.14</b>	V1.14	<b>V1.15</b>	<b>V1.22</b>

	HDCM 19-09	HDCM 19-058
APPLICATION	<b>V2.21</b>	<b>V2.30</b>
Os	V1.00	V1.00
Updater	V1.00	V1.00
Sy	V1.00	V1.00
Sdi	V1.23	<b>V2.30</b>
DEC	V1.23	<b>V2.32</b>
Dcp	V1.23	<b>V2.31</b>
4K-POST	V1.23	<b>V2.33</b>
2K-POST	V1.24	<b>V2.34</b>
Sdp	V1.22	<b>V2.30</b>

\* The version name described in **red bold characters** shows the version that the upgrading is announced by the technical memo.

## 【Reference information】

### ◆Changes due to HDR Look support for CAM/BPU/CCU

The OETF configuration of CAM/BPU/CCU and panels will also be changed as HDR Look is added. The correspondence relation of the old and new is as follows. The response time varies from set to set.

Current		Future	
OETF		OETF	HDR Look
S-Log3	→	S-Log3	Live
---		S-Log3	Mild
HLG Live	→	HLG	Live
---		HLG	Mild
HLG_BT.2100	→	HLG	Natural

### Panel and CAM/BPU/CCU/HDR Look compatible/Non-compatible combination operation

	CAM/BPU/CCU Old Software (OETF only)	CAM/BPU/CCU New Software (OETF+HDR Look)
Panel Old Software (OETF only)	View and select all OETF	HLG Live, HLG_BT.2100 not available HLG, S-Log3, SDR only display and selectable HDR Look cannot be selected or displayed
Panel New Software OETF+HDR Look	View and select all OETF	View and select OETF and HDR look

CAM: HDC5500, HDC3500, HDC3100, HDC4300, HDC-P50

BPU: BPU4000, BPU4500A

CCU: HDCU5500, HDCU3100, HDCU3100

Panel: RCP15xx, MSU1x00 Series

### Setting combination with HDRC-4000

Model	CAM/BPU/CCU		HDRC-4000		
Setting items	OETF	HDR Look	AIR Matching	INPUT OETF	HDR Look
Set value	S-Log3	Live	ON	S-Log3 (Live HDR)	Live
	HLG	Live	ON	HLG (Var1.2)	Live
	HLG	Natural	OFF.	HLG (Var1.2)	---
			ON	HLG (Var1.2)	Natural

\*2 HDRC-4000 OUTPUT OETF for HLG(Var1.2), SDR

**Do not disclose any further information to customers or authorized dealers. In particular, the second use of the image is prohibited.**

### ■ Version upgrade plan including HDR Look support for related models

BPU4000/BPU4500A : January 2020

HDC4300 : January 2020

HDC5500/HDC3500/HDC3100 : December 2019

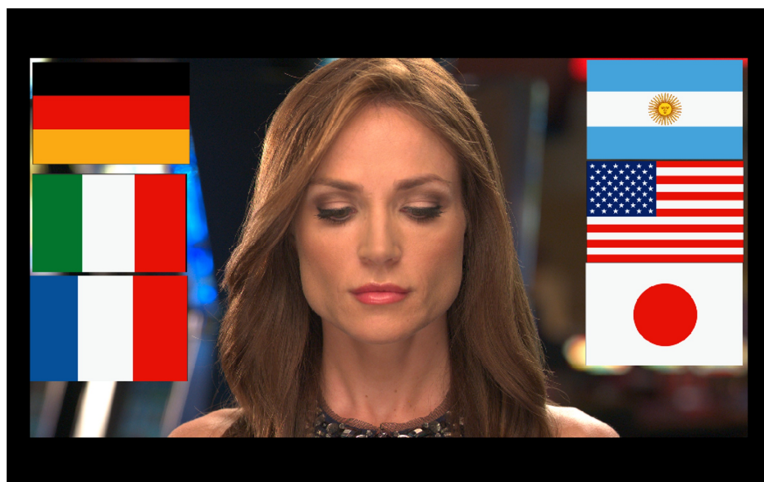
HDCU3100/3500/5500 : December 2019

RCP15xx, MSU1x00 Series : November 2019

\*Other HDR Look compatible models have not been decided when to release new software yet.



◆HDR Look : Comparison of “Live”、”Mild”、”Natural”



HDR Look: **Live**

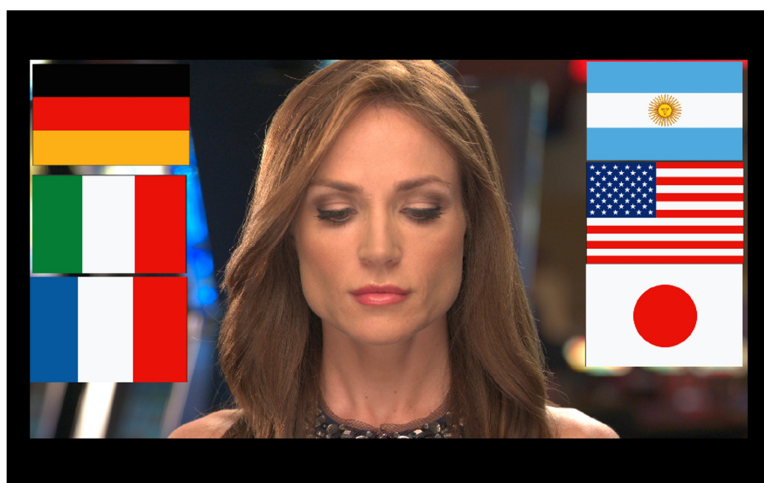
Recommended SDR Gain : -5.2dB

RGB Gamma

Look of RGB Gamma method derived from conventional SDR images. \*Traditional Look\*

Strong color

High contrast ratio of light and dark (face engraving is deep)



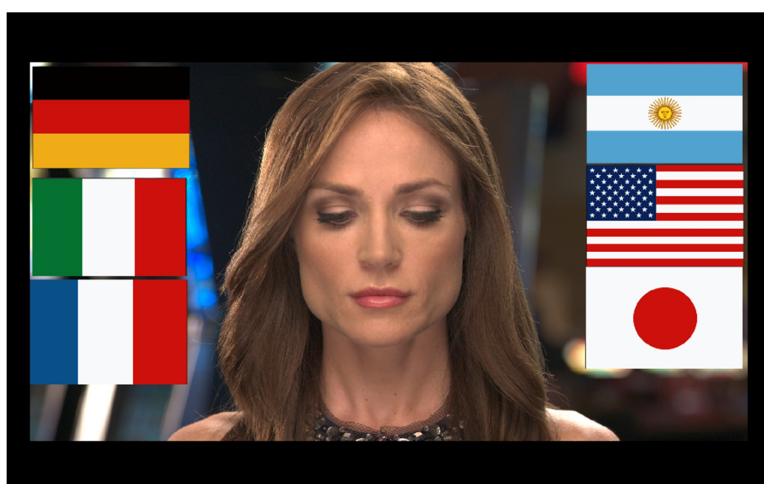
HDR Look: **Mild**

Recommended SDR Gain : -5.7dB

RGB Gamma

[Live] similar, RGB Gamma look.  
\*Traditional Look\*

Color development is milder than Live  
Contrast ratio is shallower than Live  
Face tone becomes brighter



HDR Look: **Natural**

Recommended SDR Gain : -10.1dB

Y Gamma

Look of Y Gamma method from HLG.  
• Natural Look

Color is thin.

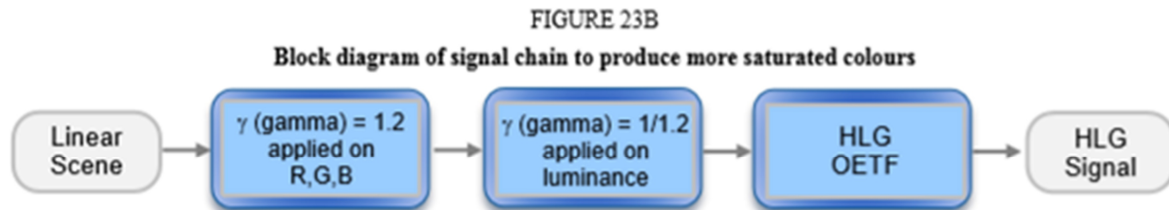
High contrast ratio of light and dark (face engraving is deep)

\* The SDR Gain number is set to align HDR Base white With 203nit.

\*Traditional Look “[Live] , [Mild]” is ITU-R BT.2390 { 6.5 Traditional color reproduction for camera signals }  
This is a video derived from the method described in.

## 6.5 Traditional colour reproduction for camera signals

The HLG OETF (system gamma applied on luminance) produces natural scene colours for scene referred camera signals. This differs from the traditional colour reproduction provided by the HDTV and UHDTV OETFs, which produce more saturated colours. Should such a traditional colour reproduction be desired, a gamma of 1.2 could be applied on the RGB components of a camera signal to produce more saturated colours. This approach is illustrated in the following Figure.



In this Figure (linear) light from the camera is first processed by applying a gamma curve ( $\gamma = 1.2$ ) independently to the red, green and blue colour components. Applying gamma separately to red, green and blue components does two things. Firstly, it adjusts the overall tone curve. Secondly, because it is applied separately to the colour components, the colour saturation is increased. The second processing block undoes the modification of the tone curve by applying an inverse gamma ( $\gamma=1/1.2$ ) to the luminance component of the signal. Applying gamma to the luminance component only (as in the HLG OETF) leaves the ratio of the red to green to blue components unchanged and, hence, does not change the saturation.