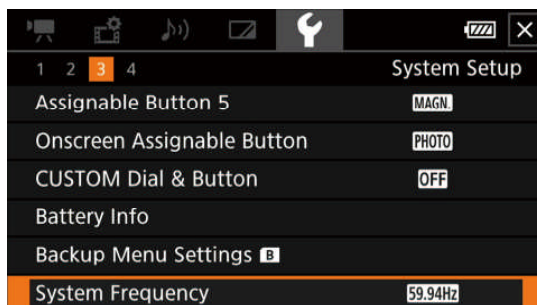# Switching the System Frequency

After upgrading the camcorder, you can use the **MENU** ❯❯ [�("✓) ③ System Setup] ❯❯ [System Frequency] setting to switch the camcorder's system frequency to [59.94Hz 59.94 Hz] or [50.00Hz 50.00 Hz]. In playback mode, clips recorded with a system frequency that differs from the camcorder's cannot be played back. Make sure that the camcorder's system frequency is set to that of the clip to be played back.

Some settings and functions will differ depending on the selected system frequency. The major differences are explained below. For details, download the latest version of the instruction manuals for the 59.94 Hz ("NTSC") camcorder or 50.00 Hz ("PAL") camcorder as necessary.

1 Frame Rate

Available frame rates will differ depending on the system frequency your camcorder is set to.

For a system frequency of 59.94 Hz

MP4 clips

Resolution (Bit rate)	Frame rate		
	59.94P	29.97P	23.98P
3840x2160 (150 Mbps)	—	●	●
1920x1080 (35 Mbps)	●	●	●
1920x1080 (17 Mbps)	●	●	●
1280x720 (8 Mbps)*	●	—	—

* The frame rate is fixed and cannot be changed. Also, the audio format is automatically set to [2CH AAC 16bit 2CH].

XF-AVC clips

Resolution (Bit rate)	Frame rate			
	59.94P	59.94i	29.97P	23.98P
3840x2160 (160 Mbps)	—	—	●	●
1920x1080 (45 Mbps)	●	●	●	●

For a system frequency of 50.00 Hz

MP4 clips

Resolution (Bit rate)	Frame rate	
	50.00P	25.00P
3840x2160 (150 Mbps)*	—	●
1920x1080 (35 Mbps)	●	●
1920x1080 (17 Mbps)	●	●

* The frame rate is fixed and cannot be changed.

XF-AVC clips

Resolution (Bit rate)	Frame rate		
	50.00P	50.00i	25.00P
3840x2160 (160 Mbps)*	—	—	●
1920x1080 (45 Mbps)	●	●	●

* The frame rate is fixed and cannot be changed.

2 Slow & Fast Motion Recording

Available slow/fast motion rates depend on the recording mode and frame rate. Refer to the table below that applies to the system frequency your camcorder is set to.

<u>For a system frequency of 59.94 Hz</u>

MP4 clips

Resolution	Frame rate	Available slow/fast motion rates
3840x2160	29.97P	x2, x4, x10, x20, x60, x120, x600, x1200
	23.98P	x0.8
1920x1080	59.94P	x2, x4, x10, x20, x60, x120, x600, x1200
	29.97P	x0.5
	23.98P	x0.4, x0.8
1280x720	59.94P	x2, x4, x10, x20, x60, x120, x600, x1200

XF-AVC clips

Resolution	Frame rate	Available slow/fast motion rates	Playback bit rate
3840x2160	29.97P	x2, x4, x10, x20, x60, x120, x600, x1200	160 Mbps
	23.98P	x0.8	150 Mbps
1920x1080	59.94P	x2, x4, x10, x20, x60, x120, x600, x1200	45 Mbps
	29.97P	x0.5	
	23.98P	x0.4, x0.8	

<u>For a system frequency of 50.00 Hz</u>

MP4 clips

Resolution	Frame rate	Available slow/fast motion rates
3840x2160	25.00P	x2, x4, x10, x20, x60, x120, x600, x1200
1920x1080	50.00P	x2, x4, x10, x20, x60, x120, x600, x1200
	25.00P	x0.5

XF-AVC clips

Resolution	Frame rate	Available slow/fast motion rates	Playback bit rate
3840x2160	25.00P	x2, x4, x10, x20, x60, x120, x600, x1200	160 Mbps
1920x1080	50.00P	x2, x4, x10, x20, x60, x120, x600, x1200	45 Mbps
	25.00P	x0.5	

3 Shutter Speed

The following shutter speeds are available depending on the shooting mode used.

For a system frequency of 59.94 Hz
1/6 (23.98P only), 1/8, 1/9, 1/10, 1/12, 1/15, 1/17, 1/20, 1/24, 1/25, 1/30, 1/34, 1/40, 1/48, 1/50, 1/60, 1/75, 1/90, 1/100, 1/120, 1/150, 1/180, 1/210, 1/250, 1/300, 1/360, 1/420, 1/500, 1/600, 1/720, 1/840, 1/1000, 1/1200, 1/1400, 1/1700, 1/2000

For a system frequency of 50.00 Hz
1/6, 1/7, 1/8, 1/10, 1/12, 1/14, 1/17, 1/20, 1/25, 1/29, 1/30, 1/33, 1/40, 1/50, 1/60, 1/75, 1/90, 1/100, 1/120, 1/150, 1/180, 1/210, 1/250, 1/300, 1/350, 1/400, 1/500, 1/600, 1/700, 1/800, 1/1000, 1/1200, 1/1400, 1/1600, 1/2000

4 Time code

For a system frequency of 59.94 Hz
With the **MENU** ❯ [🖬 ③ Recording Setup] ❯ [DF/NDF] setting, you can select between a drop frame (DF) or non-drop frame (NDF) time code, depending on how you plan to use your recording. When the frame rate is set to 23.98P, the time code will be set to non-drop frame.

For a system frequency of 50.00 Hz
You cannot select between a drop frame or non-drop frame time code.

5 Color bars

For a system frequency of 59.94 Hz
You can choose between SMPTE and ARIB color bars.

For a system frequency of 50.00 Hz
You can choose between EBU and SMPTE color bars.

6 Video Output Configuration

The video signal output from the SDI OUT terminal (**XA55** only) and HDMI OUT terminal depends on the clip's video configuration and on various menu settings.

<u>For a system frequency of 59.94 Hz</u>

Video Output Configuration (Recording)

Recording video configuration		Scan mode[1]	Maximum output resolution[2]	Video output configuration		
Resolution	Frame rate			Resolution	Frame rate	Color sampling
3840x2160	29.97P 23.98P	P	1920x1080	1920x1080	Same as the recording	YCbCr 4:2:2 8 bit
			1280x720 (59.94P)	1280x720	59.94P	
		PsF	—	1920x1080	HDMI output: 59.94i **XA55** SDI output: 29.97PsF/59.94i	
1920x1080	59.94P	P	1920x1080	1920x1080 720x480[3]	59.94P	YCbCr 4:2:2 10 bit
			1280x720 (59.94P)	1280x720		
		PsF	—	1920x1080	59.94i	
	29.97P 23.98P	P	1920x1080	1920x1080	Same as the recording	
			1280x720 (59.94P)	1280x720	59.94P	
		PsF	—	1920x1080	HDMI output: 59.94i **XA55** SDI output: 29.97PsF/59.94i	
	59.94i[4]	—	1920x1080	1920x1080	59.94i	
			1280x720 (59.94P)	1280x720	59.94P	
1280x720[5]	59.94P	—	—	1280x720	59.94P	

[1] **MENU** ❯ [☑ Display Setup] ❯ [SDI/HDMI Scan Mode] (**XA55**) or [HDMI Scan Mode] (**XA50**).

[2] HDMI output: **MENU** ❯ [☑ Display Setup] ❯ [HDMI Max Resolution],
XA55 SDI output: **MENU** ❯ [☑ Display Setup] ❯ [SDI Output].

[3] HDMI output only. The output signal will change automatically depending on the capabilities of the external monitor.

[4] XF-AVC clips only.

[5] MP4 clips only.

Video Output Configuration (Playback)

Recording video configuration		Scan mode[1]	Maximum output resolution[2]	Video output configuration		
Resolution	Frame rate			Resolution	Frame rate	Color sampling
3840x2160	29.97P 23.98P	P	3840x2160[3]	3840x2160[3]	Same as the recording[3]	YCbCr 4:2:2 8 bit[4]
			1920x1080	1920x1080	Same as the recording	
			1280x720 (59.94P)	1280x720	59.94P	
		PsF	—	1920x1080	HDMI output: 59.94i **XA55** SDI output: 29.97PsF/59.94i	
1920x1080	59.94P 29.97P 23.98P	P	3840x2160[3]	3840x2160[3]	Same as the recording[3]	
			1920x1080	1920x1080	Same as the recording	
			1280x720 (59.94P)	1280x720	59.94P	
		PsF	—	1920x1080	HDMI output: 59.94i **XA55** SDI output: 29.97PsF/59.94i	
	59.94i[5]	—	3840x2160[3]	1920x1080[3]	59.94i[3]	
			1920x1080	1920x1080	59.94i	
			1280x720 (59.94P)	1280x720	59.94P	
1280x720[6]	59.94P	—	—	1280x720	59.94P	

[1] **MENU** ❯ [Display Setup] ❯ [SDI/HDMI Scan Mode] (**XA55**) or [HDMI Scan Mode] (**XA50**).

[2] HDMI output: **MENU** ❯ [Display Setup] ❯ [HDMI Max Resolution],
XA55 SDI output: **MENU** ❯ [Display Setup] ❯ [SDI Output].

[3] HDMI output only.

[4] YCbCr 4:2:0 video recorded on the card is output as a YCbCr 4:2:2 signal.

[5] XF-AVC clips only.

[6] MP4 clips only.

5

For a system frequency of 50.00 Hz

Video Output Configuration (Recording)

Recording video configuration		Scan mode[1]	Maximum output resolution[2]	Video output configuration		
Resolution	Frame rate			Resolution	Frame rate	Color sampling
3840x2160	25.00P	P	1920x1080	1920x1080	Same as the recording	YCbCr 4:2:2 8 bit
			1280x720 (50.00P)	1280x720	50.00P	
		PsF	—	1920x1080	HDMI output: 50.00i XA55 SDI output: 25.00PsF/50.00i	
1920x1080	50.00P	P	1920x1080	1920x1080 720x576[3]	50.00P	YCbCr 4:2:2 10 bit
			1280x720 (50.00P)	1280x720		
		PsF	—	1920x1080	50.00i	
	25.00P	P	1920x1080	1920x1080	Same as the recording	
			1280x720 (50.00P)	1280x720	50.00P	
		PsF	—	1920x1080	HDMI output: 50.00i XA55 SDI output: 25.00PsF/50.00i	
	50.00i[4]	—	1920x1080	1920x1080	50.00i	
			1280x720 (50.00P)	1280x720	50.00P	

[1] **MENU** ❯ [Display Setup] ❯ [SDI/HDMI Scan Mode] (**XA55**) or [HDMI Scan Mode] (**XA50**).

[2] HDMI output: **MENU** ❯ [Display Setup] ❯ [HDMI Max Resolution],
  XA55 SDI output: **MENU** ❯ [Display Setup] ❯ [SDI Output].

[3] HDMI output only. The output signal will change automatically depending on the capabilities of the external monitor.

[4] XF-AVC clips only.

Video Output Configuration (Playback)

Recording video configuration		Scan mode[1]	Maximum output resolution[2]	Video output configuration		
Resolution	Frame rate			Resolution	Frame rate	Color sampling
3840x2160	25.00P	P	3840x2160[3]	3840x2160[3]	Same as the recording[3]	YCbCr 4:2:2 8 bit[4]
			1920x1080	1920x1080	Same as the recording	
			1280x720 (50.00P)	1280x720	50.00P	
		PsF	—	1920x1080	HDMI output: 50.00i **XA55** SDI output: 25.00PsF/50.00i	
1920x1080	50.00P 25.00P	P	3840x2160[3]	3840x2160[3]	Same as the recording[3]	
			1920x1080	1920x1080	Same as the recording	
			1280x720 (50.00P)	1280x720	50.00P	
		PsF	—	1920x1080	HDMI output: 50.00i **XA55** SDI output: 25.00PsF/50.00i	
	50.00i[5]	—	3840x2160[3]	1920x1080[3]	50.00i[3]	
			1920x1080	1920x1080	50.00i	
			1280x720 (50.00P)	1280x720	50.00P	

[1] **MENU** ❯ [🖵 Display Setup] ❯ [SDI/HDMI Scan Mode] (**XA55**) or [HDMI Scan Mode] (**XA50**).

[2] HDMI output: **MENU** ❯ [🖵 Display Setup] ❯ [HDMI Max Resolution],
   XA55 SDI output: **MENU** ❯ [🖵 Display Setup] ❯ [SDI Output].

[3] HDMI output only.

[4] YCbCr 4:2:0 video recorded on the card is output as a YCbCr 4:2:2 signal.

[5] XF-AVC clips only.