

FRC-8000

HD/SD Frame Rate Converter



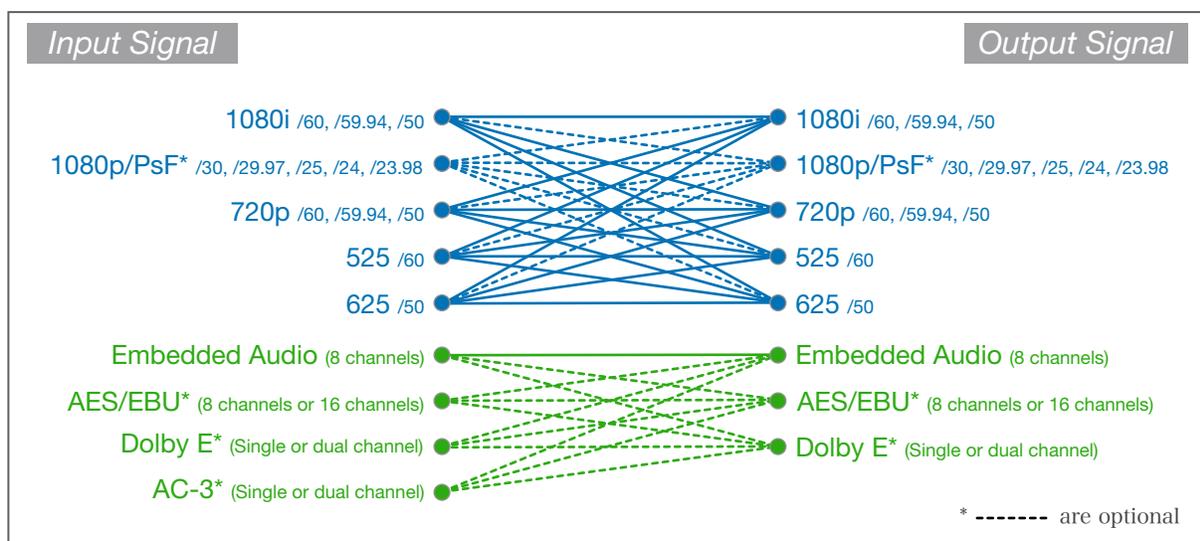
The FRC-8000 is a multi-format frame rate converter for both HD and SD. Based on FOR-A's highly successful HD Frame Rate Converter FRC-7000 with motion compensation technology, the FRC-8000 features a host of advanced functions as well as excellent image quality. In addition to HD format conversion, the new image processing board in the FRC-8000 also enables SD format conversion. Up converter, down converter, and cross converter functions are also provided for converting to various formats.

HD/SD multi-format support:

The FRC-8000 features HD-SDI and SD-SDI input and output for input and frame rate conversion of a wide range of format SDI signals, including 1080/59.94i, 1080/50i, 720/59.94p, 720/50p, 525/60 and 625/50.

Up, down, and cross converters:

Up, down, and cross converters are included standard not only for frame rate conversion, but also up conversion from SD signals to HD signals, down conversion from HD signals to SD signals, and cross conversion between 1080i and 720p, all using a single FRC-8000 unit.



Conversion with Motion Compensation Processing:

With linear converters that do simple frame rate conversion, there has been a problem of doing appropriate conversion for moving objects. FOR-A's FRC series, with our proven image processing technology, realizes motion compensation processing by using motion vectors. It detects motion vectors of objects and generates the object's motion in interpolated frames from the amount of vector fluctuation in the frames before and after, realizing frame rate conversion with minimal juddering.

Scene Cut Detection:

Another issue with frame rate conversion is the processing of scene changes. Since conversion generates interpolated frames from the frames before and after, the scene changes become images that are composites of the frames before and after and appropriate images cannot be acquired. With its function to detect scene cuts, the FRC-8000 detects scene changes automatically so that frame rate conversion is performed without using motion compensation processing on unrelated data for the frames before and after scene cuts.

Progressive Format Support:

With improved motion estimate/compensation ability, smooth motion conversion is now possible even for conversions from a small number of frames to a large number of frames such as conversion from 1080/23.98PsF to 1080/59.94i. (option)

Text Field Automatic Detection:

Automatically detects rolling text superimposed on the video and can make optimal conversion for uncompromised character depiction. Also allows manual specification of fields for static superimposed text (date, time, program title, logo, etc.), so that these portions can be treated alone without performing motion compensation processing.

Genlock:

The video and audio signals in frame rate conversion are output in synchronization with sync supplied internally or externally. Two independent input terminal channels are provided for sync, and tri-level sync and BB can be selected for input.

Proc Amp:

Process control can be done to converted images. It is possible to send optimal images by adjusting video level, chroma level, chroma phase, set up level and various clips.

Embedded audio support:

Compatible with 48kHz, 24-bit embedded 8 channel audio signal. It is also equipped with delay function to adjust audio for image processing. One can make adjustments without phase difference between video and audio. (Concerning when our product will support asynchronous embedded audio, please inquire.)

AES/EBU digital audio support:

By installing optional FRC-70DA or FRC-70DA16, it becomes possible to input asynchronous/synchronous digital audio signals. One can also build flexible audio systems combining the sample rate conversion/individual delay adjustment function and remap function.

Options

FRC-80PSFC 1080p/PsF and Timecode support

The addition of expanded format options makes it possible to support conversion of various frame rates. This includes not only conversion from the 1080/24P format that is commonly used in the field of digital cinema to 1080/59.94i format, which is the broadcasting format, but also mutual conversions between various frame rates regardless of differences between progressive and interlace.

FRC-80SO Simultaneous output

This option adds HD and SD simultaneous output. It can be used for HD output. Two channels of SD or HD cross converted output (distribution output) have been added in addition to the two regular output channels (distribution output).

- Supported formats: 1080/60i, 1080/59.94i, 1080/50i, 720/60p, 720/59.94p, 720/50p, 525/60, 625/50 (If a format other those listed here is set as output format, simultaneous output will not work.)
- Aspects that can be set: Squeeze, 16:9, 14:9, 13:9, 4:3 (when SD output is selected)

*If SD output is selected, simultaneous output will not work.

FRC-80FP Front Control Panel

A control panel that can be installed in place of the standard front panel. With its touch panel type large size LCD panel and various direct buttons, it enables a visually intuitive display of format selection as well as audio processing and delay processing, which otherwise tend to become complicated.

- Equipped with a tilt mechanism to enable adjusting the angle of the operating interface.
- Equipped with 5.7-inch LCD touch panel.
- Equipped with user shortcut buttons. Frequently used functions can be accessed with just a touch by registering them in advance.



FRC-80RU Remote Control Unit

A remote control unit common for FRC-8000.

- Lets the user change various parameter settings of the FRC-8000.
- Saves one to four events of the FRC-8000 and accesses them again.
- One remote control unit can control up to four connected FRC-8000.



Dolby E, AC-3 support:

By adding FRC-70D-D and FRC-70DE-E to FRC-80DA or FRC-80DA16 as an option, one can decode and encode Dolby E data and decode AC-3 with just one FRC-8000. FRC-80DA and FRC-80DA16 are also equipped with a BB output terminal that is synchronized to input/output signals. It is also possible to supply sync signals to outside Dolby E/AC-3 devices. So even if you already have a Dolby E decoder/encoder, building a Dolby E system which would otherwise be complicated with rate conversion can be greatly simplified.

Dolby E 2-channel encode/decode support:

Two Dolby E Encoder FRC-70DE-E cards and two Dolby E/AC-3 Decoder FRC-70D-D cards can be installed on the optional Digital Audio Card FRC-80DA16 for enabling the encoding and decoding of two channels of Dolby E data. The FRC-8000 by itself can support multi-channel audio conversion. (FRC-80DA is supported only single encoding/decoding)

FRC-70D-D Dolby E/AC-3 Decoder

A Dolby E and AC-3 decoder card that can be installed to the FRC-80DA and FRC-80DA16. Input Dolby E or AC-3 signals can be output as AES/EBU or embedded into HD-SDI signals.

FRC-70DE-E Dolby E encoder

A Dolby E encoder card that can be installed to the FRC-80DA and FRC-80DA16. Enables output of audio signal embedded in HD-SDI signal, or AES/EBU input signal, as Dolby E signal.

FRC-80DA/80DA16 Digital Audio Input/Output Card

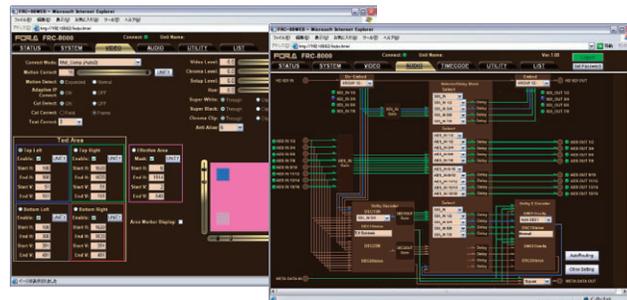
An audio expansion card for the FRC-8000, supporting up to 8 (FRC-80DA) or 16 (FRC-80DA16) channels of audio signals.

- 4 AES/EBU input/output support (FRC-80DA): supports connection to multi-channel audio devices.
- 8 AES/EBU input/output support (FRC-80DA16): supports connection to multi-channel audio devices such as HDCAM-SR.
- Equipped with individual delay adjustment function.
- Equipped with automatic assignment function for input/output including Dolby signals, and automatic delay adjustment function.
- Audio channel remap function.
- Equipped with BB output terminal synchronized to input/output SDI signals. It can supply sync signals to the outside, so when there is already a Dolby E device in the system, building a Dolby E system that would otherwise be complicated with conventional frame rate conversion can be greatly simplified.

FRC-80WEB WEB Browser Control

Control option for FRC-8000. Enables remote control and status monitoring of FRC-8000 from an Internet browser on a PC.

- Enables changes of various parameter settings of FRC-8000.
- Saves one to four events of FRC-8000 and controls access to them.
- No software installation: There is no need to install special software since the Internet browser is used for remote control and status monitoring.



Specifications

Video Formats	HD: 1080/60i, 1080/59.94i, 1080/50i, 720/60p, 720/59.94p, 720/50p (auto detect) SD: 525/60, 625/50 (auto detect)
Additional Video Formats (FRC-80PSFC)*1	1080/30p, 1080/30PsF, 1080/29.97p, 1080/29.97PsF, 1080/25p, 1080/25PsF, 1080/24p, 1080/24PsF, 1080/23.98p, 1080/23.98PsF (auto detect)
Frame Rate Conversion	1080i, 720p, 525/60, or 625/50, to 1080i, 720p, 525/60, or 625/50, (selectable at menu)
Frame Rate Conversion (FRC-80PSFC)*1	1080p/PsF to 1080i, 1080p/PsF to 720p, 1080p/PsF to 1080p/PsF, 1080p/PsF to 525/60, 1080p/PsF to 625/50
Video Inputs	HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps or SD-SDI: 270 Mbps, 75Ω BNC x 1
Genlock Input	BB: 0.429 Vp-p (NTSC) / 0.45 Vp-p (PAL) or Tri-level sync: ±0.3 V, BNC x 1, loop-through (Terminate with 75Ω terminator, if unused.)
Reference Outputs (FRC-80DA)*2	BB: 0.429 Vp-p (NTSC) / 0.45 Vp-p (PAL), 75Ω BNC x 2 (Input sync / output sync switchable) * SC phase is not locked to the reference signal.
Reference Outputs (FRC-80DA16)*2	BB: 0.429 Vp-p (NTSC) / 0.45 Vp-p (PAL), 75Ω 15-pin D-sub (male) x 2 (Includes 15-pin D-sub to BNC connector) (Input sync / output sync switchable)
Video Outputs	HD-SDI: 1.485 Gbps or 1.485/1.001 Gbps or SD-SDI: 270 Mbps BNC x 4 (Output 1 functions as bypass output)
Quantization	Y: 10-bit, C: 10-bit
Sampling Frequency	Y) HD-SDI: 74.25 MHz or 74.25/1.001 MHz SD-SDI: 13.5 MHz, C) HD-SDI: 37.125 MHz or 37.125/1.001 MHz SD-SDI: 6.75 MHz
Proc Amp	Video level: ±30% (0.5% step) / Chroma level: ±30% (0.5% step) / Chroma phase: ±30° (0.5° step) / Setup level: ±30% (0.5% step) Clip: Y100% ON/OFF, Y0% ON/OFF, C100% ON/OFF
Phase Control	System Phase: Horizontal: -1375 clk to +1375 clk -1/2 to +1/2 H, Vertical: -562 H to +562 H -1/2 to +1/2 F rame
I/O Delay	+100 to +340 ms (Based on input/output format) (e.g., approx. 105 msec when converting 1080/59.94i to 1080/50i)
Simul Out Delay	Simultaneous output will have a delay; 2 frames in 1080i, 652/50 and 525/60, 4 frames in 720p, 400 clocks when the main output is in 625/50 or 525/60, although the simultaneous output is in the same format.
Audio Input	Embedded Audio: 2 groups (8 channels: 4 stereo pairs)
Automatic Embedded Audio Detection	Performs sampling rate conversion for the embedded audio signals.
Audio Input (FRC-80DA)*2	1/2 to 7/8: AES/EBU Unbalanced, 75Ω BNC x 4 (4 stereo pairs) AUX (AES/EBU 1 channel or Dolby E): Unbalanced, 75Ω BNC x 1
Audio Input (FRC-80DA16)*2	1/2 to 15/16: AES/EBU Unbalanced, 75Ω BNC x 8 (8 stereo pairs: Dolby data of max. 2 stereo pairs can be input) Meta Data In: 9-pin D-sub (female) x 1
Audio Output	Embedded audio: 2 Groups (4 stereo pairs)
Audio Output (FRC-80DA)*2	1/2 to 7/8: AES/EBU Unbalanced, 75Ω BNC x 4 (4 stereo pairs) AUX: AES/EBU, unbalanced, 75Ω, BNC x 1 (one stereo pair, a Dolby E, or a AC-3 signal)
Audio Output (FRC-80DA16)*2	1/2 to 15/16: AES/EBU Unbalanced, 75Ω BNC x 8 (8 stereo pairs: Dolby data of max. 2 stereo pairs can be input) Meta Data Out: 9-pin D-sub (female) x 1
Audio Sampling Frequency / Quantization	48 kHz (Exceptionally AES/EBU input can be 32 kHz or 44.1 kHz.) / 24-bit, 20-bit, 16-bit
Audio Delay	+5msec - +1000msec (1msec step, 8 channels: 4 stereo pairs individually adjustable)
Audio Remapping Function (FRC-80DA/DA16 option)	Individually adjustable for embedded output, AES/EBU output (FRC-80DA/DA16 option), and Built-in Dolby E encoder input
Time Code I/O (FRC-80PSFC)*1	Reader / generator for ancillary time code.
Ancillary Data	Audio and time code (only if FRC-80PSFC is installed) data outputs are supported.
Interfaces	Alarm output: 15-pin D-sub (female) x 1 (Power, fan, temperature alarm) RS-422/Remote: 9-pin D-sub (female) x 1
Temperature / Humidity	0°C to 45°C / 30% to 85% (no condensation)
Power / Consumption	100 VAC to 240 VAC ±10%, 50/60 Hz / Standard: 290 VA (290 W) (If 100 VAC supplied)
Dimensions / Weight	430 (W) x 132 (H) x 500 (D) mm, EIA3RU / Standard: 22 kg, Full option: 23 kg
Accessories	Operation manual, AC cord, Rack mount brackets
Options	FRC-80PSFC: 1080p/PsF and timecode support / FRC-80SO: Simultaneous outputs / FRC-80DA: Digital audio card (8ch) / FRC-80DA16: Digital audio card (16ch) / FRC-70D-D: Dolby Digital/AC-3 Decoder / FRC-70DE-E: Dolby E encoder / FRC-80RU: Remote Control Unit / FRC-80FP: Front Control Panel / FRC-80WEB: WEB Browser Control

*1: If the FRC-80PSFC option is installed. *2: If the FRC-80DA or FRC-80DA16 option is installed.

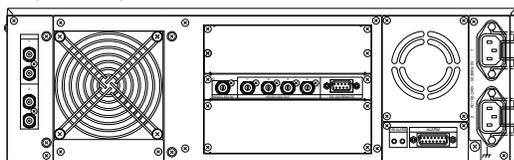
*The FRC-70DE-E/FRC-70D-D is an additional option for the FRC-80DA and FRC-80DA16.

*Check with your FOR-A representative for details on when support will become available for 1080i to 1080p/PsF conversion and time code-related functions.

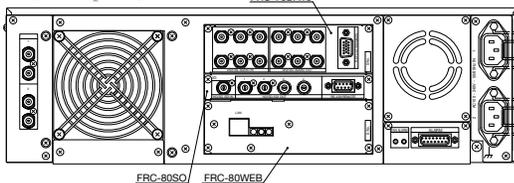
Dolby is a registered trademark of Dolby Laboratories.

Rear View

Rear View (Standard)

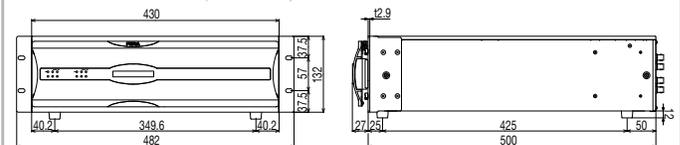


Rear View (Full option)

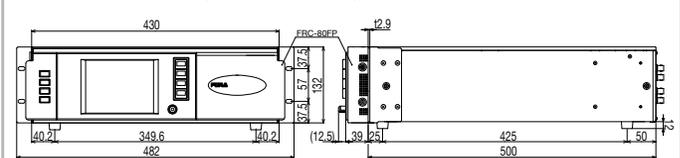


External Dimensions

External Dimensions (Standard)



External Dimensions (With FRC-80FP)



FOR-A COMPANY LIMITED

Head Office : 3-8-1 Ebisu, Shibuya-ku, Tokyo 150-0013, Japan

FOR-A America Corporate Office : 11155 Knott Avenue, Suite G&H, Cypress, CA 90630, USA

FOR-A America East Coast Office : 2 Executive Drive, Suite 670, Fort Lee Executive Park, Fort Lee NJ 07024, USA

FOR-A America Distribution & Service Center : 2400 North East Waldo Road, Gainesville, FL 32609, USA

FOR-A Latin America & the Caribbean : 5200 Blue Lagoon Drive, Suite #760, Miami, FL 33126, USA

FOR-A Corporation of Canada : 346A Queen Street West, Toronto, Ontario M5V 2A2, Canada

FOR-A UK Limited : UNIT C71, Barwell Business Park, Leatherhead Road, Chessington Surrey, KT9 2NY, UK

FOR-A Italia S.r.l. : Viale Europa 50 20093, Cologno Monzese (MI), Milan, Italy

FOR-A Corporation of Korea : 801 Dangsang Building, 53-1 Dangsang-Dong, Youngdeungpo-Gu, Seoul 150-800, Korea

FOR-A China Limited : 708B Huateng Building, No. 302, 3 Discript, Jinsong, Chaoyang, Beijing 100021, China

ISO 9001 and 14001 certified (Sakura R&D)

Homepage: <http://www.for-a.com/>

Tel : +81 (0)3-3446-3936 Fax : +81 (0)3-3446-1470

Tel : +1 714-894-3311 Fax : +1 714-894-5399

Tel : +1 201-944-1120 Fax : +1 201-944-1132

Tel : +1 352-371-1505 Fax : +1 352-378-5320

Tel : +1 305-931-1700 Fax : +1 305-264-7890

Tel : +1 416-977-0343 Fax : +1 416-977-0657

Tel : +44 (0)20-8391-7979 Fax : +44 (0)20-8391-7978

Tel : +39 02-254-3635/6 Fax : +39 02-254-0477

Tel : +82 (0)2-2637-0761 Fax : +82 (0)2-2637-0760

Tel : +86 (0)10-8721-6023 Fax : +86 (0)10-8721-6033