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 HD or SD 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, 525/59.94p, 525/50 (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.

**FRC-70D-D Dolby E/AC-3 Encoder**
A Dolby E and AC-3 encoder 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, 720/59.94p, 720/50p (auto detect)
- SD: 525/60, 625/50 (auto detect)

**Additional Video Formats (FRC-80PSFC)*1**
- 1080p24p, 1080/30Pf, 1080/29.97Pf, 1080/25p, 1080/23.98Pf, 1080/24p, 1080/24Pf, 1080/23.98Pf, 1080/23.98Pf, 1080/25.976Pf (auto detect)

**Frame Rate Conversion**
- 1080, 720p, 525/60, or 625/50, to 1080, 720p, 525/60, or 625/50, (selectable at menu)

**Frame Rate Conversion (FRC-80PSFC)*1**
- 1080p/PF to 1080i, 1080p/PF to 720p, 1080p/PF to 1080i, 1080p/PF to 525/60, 1080p/PF 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**
- HD: 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**
- HD: 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**
- HD: 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: +300% (+0.5% step) Chroma level: +300% (+0.5% step) Chroma phase: +300% (+0.5% step) Setup level: +300% (+0.5% step)
- Clip: Y: +10% ON/OFF, C: +10% ON/OFF, C: +10% ON/OFF

**Phase Control**
- Y: Horizontal: +1375 clock to -1375 clock +1/2 to +1/2 H, Vertical: -562 H to +562 H +1/2 to +1/2F frame

**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 1088, 525/29.97 and 525/29.97, 4 frames in 720, 400 clocks when the main output is in 625/50 or 525/50, 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**
- +5µsec to +1000µsec (1µsec step, 8 channels: 4 stereo pairs individually adjustable)

**Audio Remapping Function (FRC-80DA16) option**
- Individually adjustable for embedded output, AES/EBU output (FRC-80DA16 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 V A (290 W) (If 100 V AC supplied)

**Dimensions / Weight**
- 430 (W) x 132 (H) x 500 (D) mm, EIA3RU / Standard: 22 kg, Full option: 23 kg

**Power / Consumption**
- 100 V AC to 240 V AC ±10%, 50/60 Hz / Standard: 290 V A (290 W) (If 100 V AC supplied)

**Rear View (Full option)**

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