



# LC2000 & LC4000

## Linear Frame-rate Converter

The LC2000 and LC4000 are highly cost-effective, linear motion adaptive frame-rate converters.

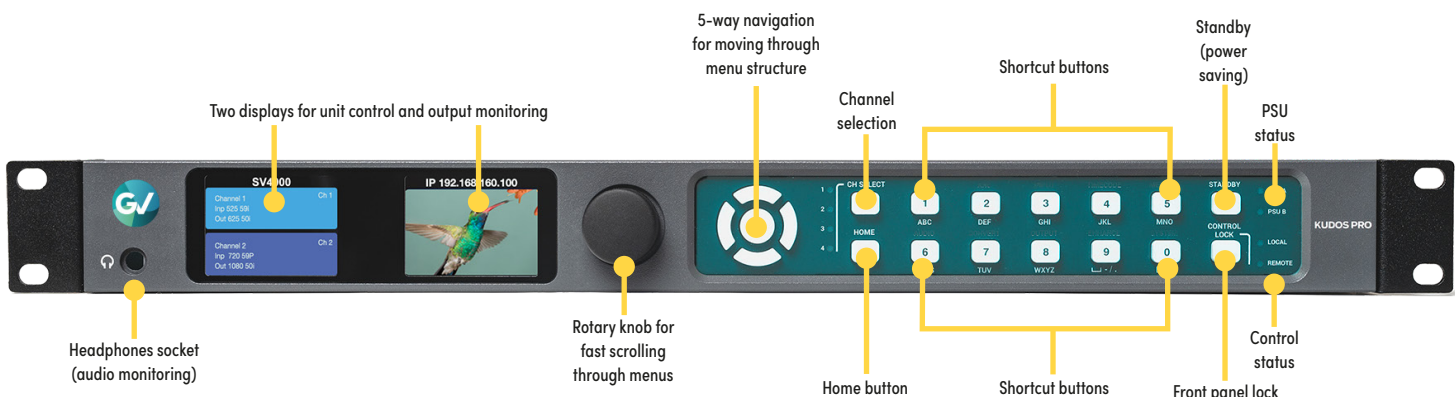
### Key Features

- Linear motion adaptive SD/HD/3G frame-rate conversion
- Independent dual-channel (LC2000) and quad-channel conversion (LC4000)
- SD/HD/3G up/down/crossconversion
- Flexible video and audio I/O configuration
- 16-channel embedded audio processing for each video channel
- Continuous output when input standard switches
- HDMI monitor output
- Dual PSU as standard
- Relay bypass on primary SDI inputs
- Automatic aspect ratio conversion (AFD, VI, L23)
- Powerful picture enhancement tools
- Front panel and remote control via GV Orbit
- Closed caption and timecode handling
- Synchronization
- User chosen line for SMPTE ST 2016
- GPI support
- Front panel control lock
- Caption generator
- Logo inserter
- Sidebar keyer
- Clean cut
- Composite input/output
- Fiber input/output

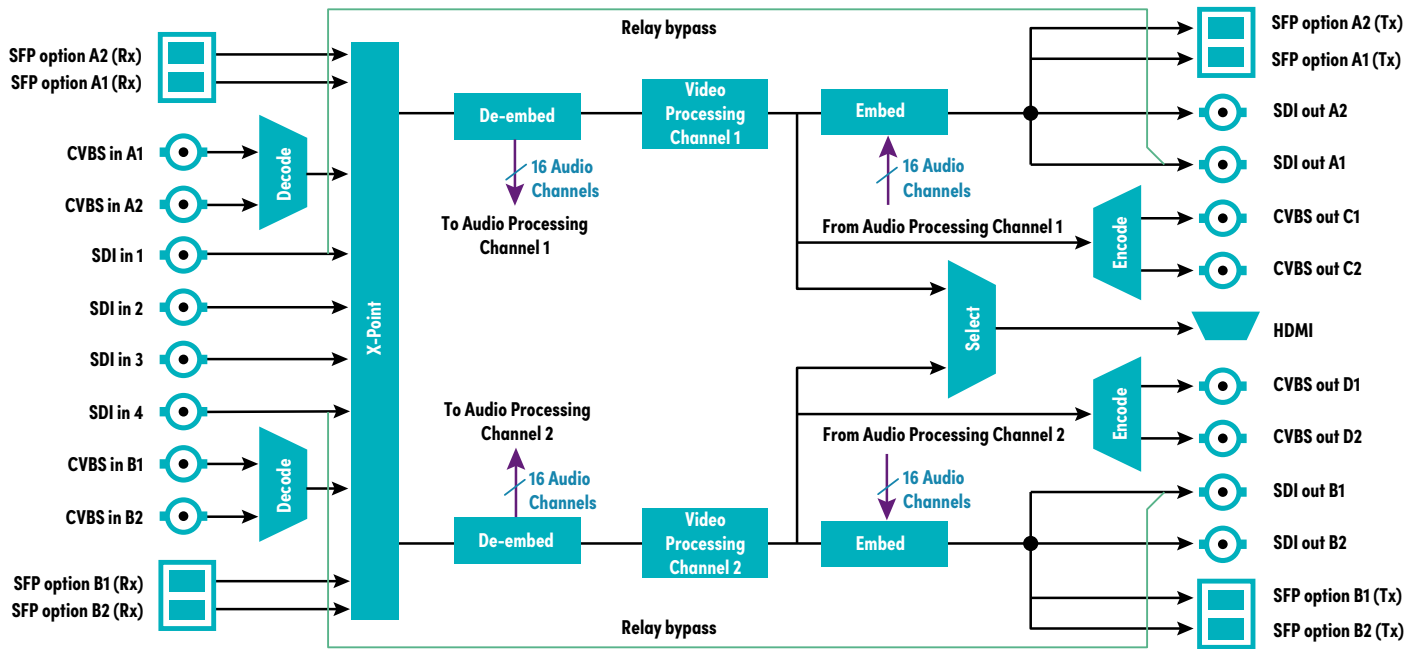
### Applications

- High-density international program distribution
- Low-cost frame-rate conversion
- International TV and video backup channels

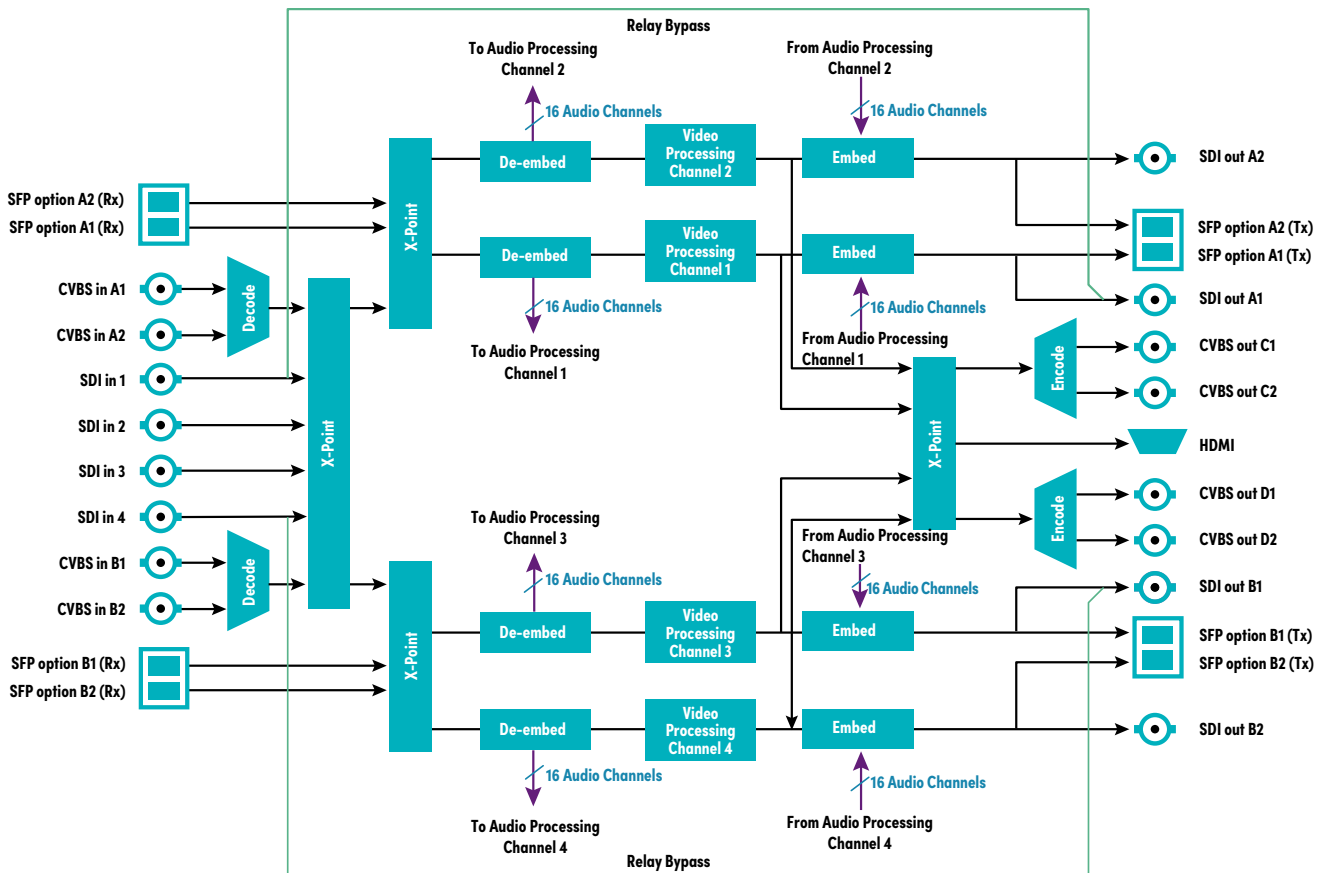
### LC2000/4000 Front Panel



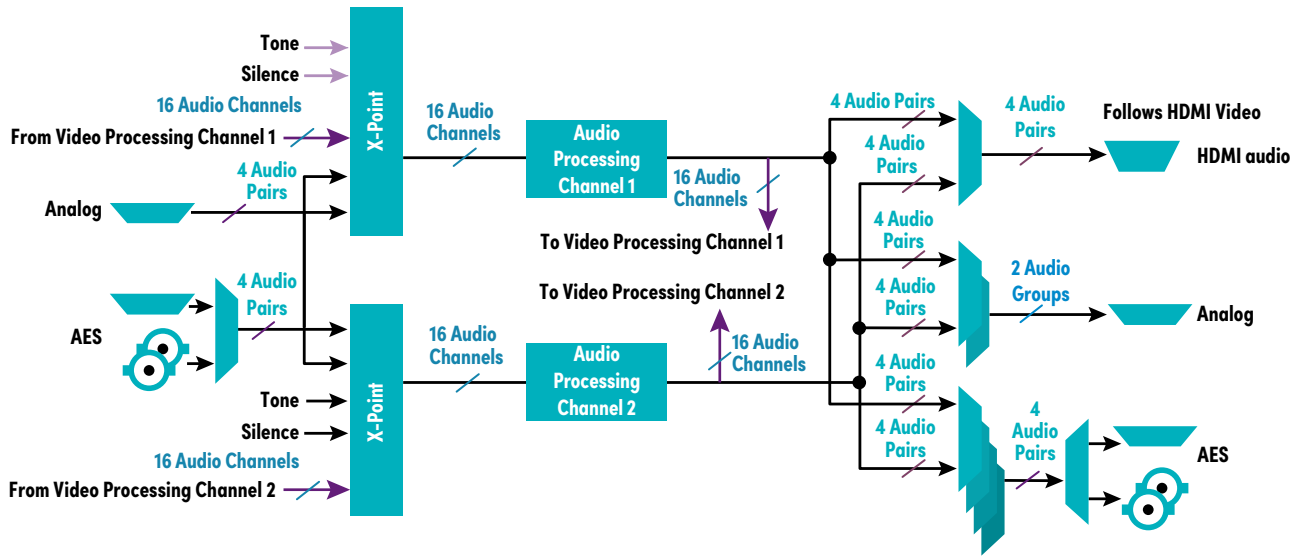
## LC2000 Video Processing



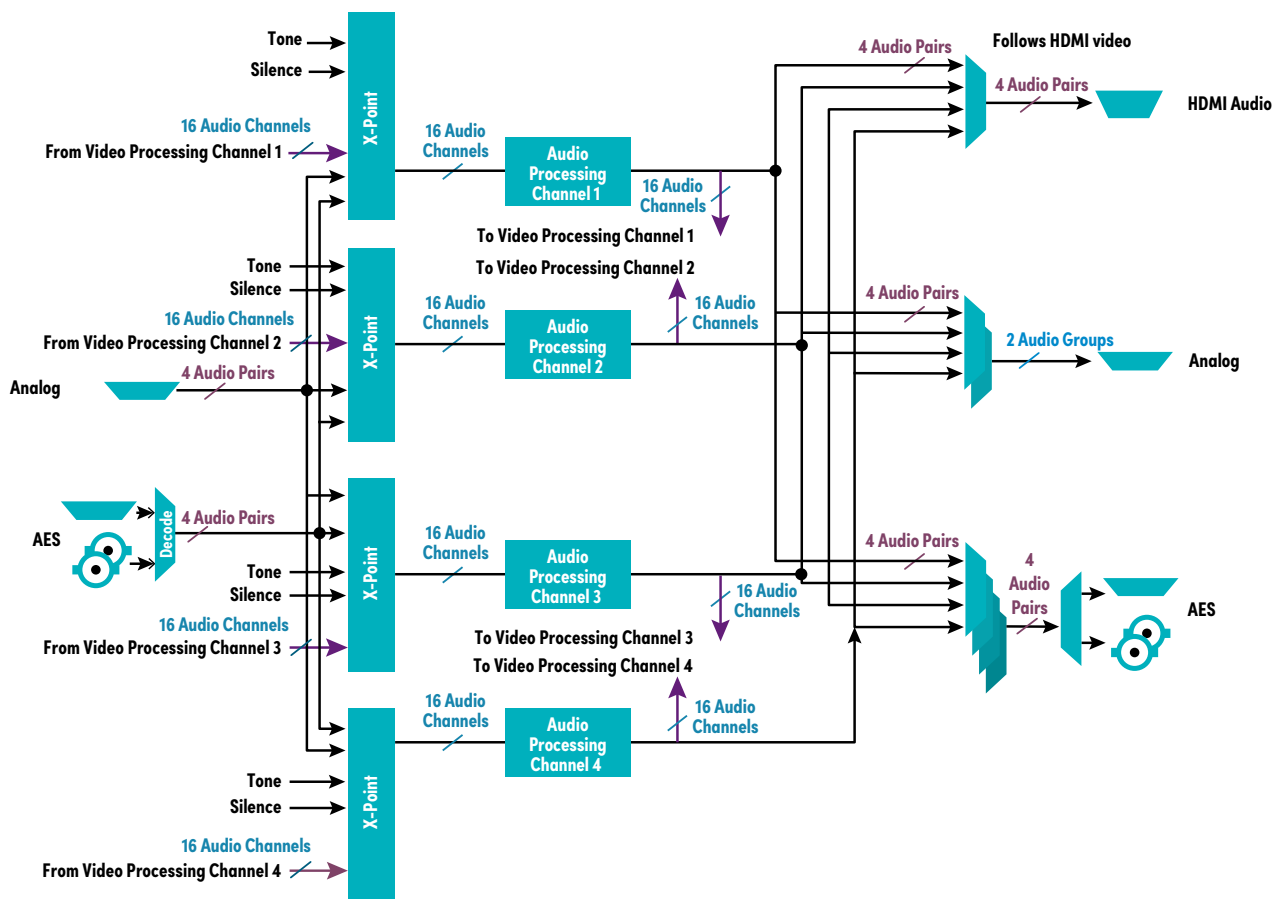
## LC4000 Video Processing



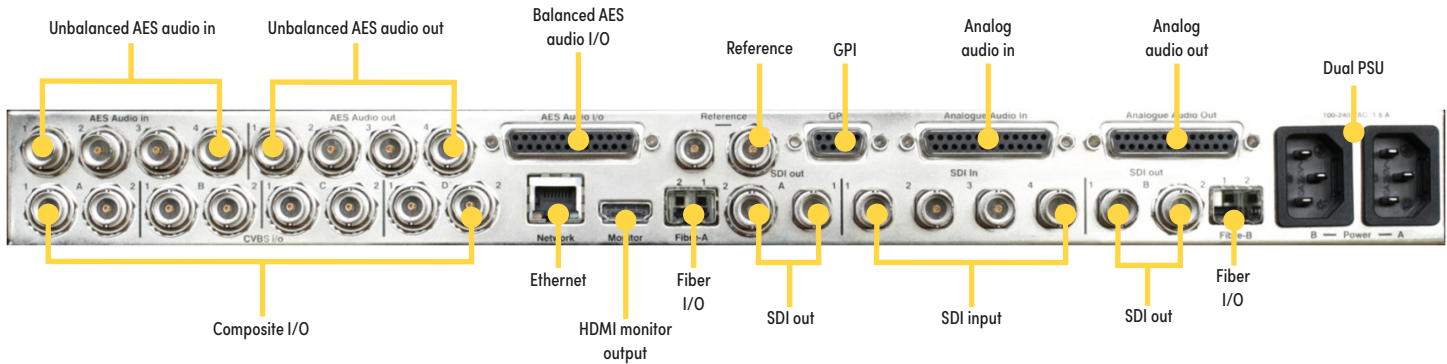
## LC2000 Audio Processing



## LC4000 Audio Processing



## LC2000/4000 Rear Panel



## Specifications

### Signal Inputs

Serial digital 4x 75Ω SD/HD/3G serial digital with embedded audio

#### Input standards:

- 3 Gb/s SD-SDI, SMPTE ST 425 level A, level B
- 1.5 Gb/s HD-SDI SMPTE ST 292/SMPTE ST 299
- 270 Mb/s SD-SDI SMPTE ST 259

Composite PAL, NTSC, NTSC-J, PAL-M, PAL-N, N4.4, SECAM

12-bit ADCs

Analog component YC

**Reference:** 1x loop-through HDTV Tri-sync/SD Bi-sync (blackburst) SMPTE ST 240/SMPTE ST 274

#### Audio AES:

- 4x balanced AES inputs – via 25-way D-type
- 4x unbalanced AES inputs – via 4x BNC

**Audio analog:** 4x stereo analog inputs via 25-way D-type

### Signal Outputs

Serial digital 4x 75Ω SD/HD/3G serial digital with embedded audio

#### Output standards:

- 3 Gb/s HD-SDI, SMPTE ST 425 level A, level B
- 1.5 Gb/s HD-SDI SMPTE ST 292/SMPTE ST 299
- 270 Mb/s SD-SDI SMPTE ST 259

Composite PAL, NTSC, NTSC-J, PAL-M, PAL-N

12-bit DACs

Analog component YC

#### Audio AES:

- 4x balanced AES outputs – via 25-way D-type
- 4x unbalanced AES outputs – via 4x BNC

**Audio analog:** 2x stereo analog outputs via 25-way D-type

### Input Standards

(auto detect) 525, 625

720 50/59.94/60p

1080 50/59.94/60i

1080 50/59.94/60p (Levels A and B)

720/1080 23.98/24/25/29/30p

1080 23.98/24/25/29.97/30PsF, with film detection and processing

### Output Standards

525, 625

720 50/59.94/60p

1080 50/59.94/60i

1080 50/59.94/60p (Levels A and B)

720/1080 23.98/24/25/29/30p

1080 23.98/24/25/29.97/30PsF, with film detection and processing

### Conversion Functions

#### Modes:

SD/HD/3G linear frame rate

Up/down/crossconversion

Frame Synchronizer

**Conversion:** Up/down/crossconversion

### Manual or Automatic ARC

AFD (SMPTE ST 2016), VI (RP186), WSS (L23)

**SD input format:** Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

**SD output format:** Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

**Auto zoom:** On/Off

**Manual zoom:** Zoom ±20%

**Safe area marker:** Off, 16:9, 4:3

**Manual controls:** Size, aspect, pan, tilt

Wide range of ARC presets including 702 sample line mode

### Audio Functions

#### Analog Audio:

Four pairs of analog inputs are individually available to any or all processing channels

Two groups (2 pairs) of analog output are separately assignable to any processing channel

Headroom +24 dBu; balanced connection

#### AES Audio:

Four AES audio inputs are individually available to any or all processing channels

Four AES audio outputs (48 kHz) are separately assignable to any processing channel

AES input is auto-detected as PCM (32-96 kHz) or non-PCM (48 kHz locked to relevant video input)

#### Embedded Audio:

Each processing channel includes 16-channel embedded audio processing

PCM audio processing includes channel level gain and delay compensation, as well as channel level routing/shuffle with audio phase inversion

Non-PCM processing features pair level routing and delay compensation

### Metadata

Closed caption CEA608 <> CEA708

Timecode conversions

WST/SMPTE RDD08/SMPTE ST 2031 conversion

## Specifications (cont.)

### Enhancement

#### Advanced Horizontal Enhancement:

Frequency band selection (Low, Med, High)  
4 preset enhancement levels (Low, Med, High, Super)  
Custom H Gain and H Noise rejection levels

#### Advanced Vertical Enhancement:

Frequency band selection (Low, Med, High)  
5 preset enhancement levels (Soft 2, Soft 1, Normal, Sharp 1, Sharp 2)

#### Horizontal Aperture:

5 preset H sharpness levels (Low 2, Low 1, Normal, High 1, High 2)  
5 preset H detail levels (Soft 2, Soft 1, Normal, Sharp 1, Sharp 2)

#### Noise reduction: Spatial, recursive

**Y/C alignment:** Corrects for upstream luma-chroma displacement

### System

Pattern Off, Black, Ramp, Bars

#### Proc amp:

Black Level: +100 to -100 mV (0) in 0.8 mV steps  
Contrast: -6 dB to +6 dB (0) in 0.2 dB steps  
Saturation: -6 dB to +6 dB (0) in 0.2 dB steps  
Y Gamma: 0.4 to 1.7 (1) in 0.1 steps

#### Freeze: On/Off

**Genlock:** Reference lock, Input lock (same format), Follow input (same frame rate), Free run

#### Memories: 16 user memories

Legalizer  
EDH support

### Communications

Remote control via GV Orbit and SNMP

#### Power (Primary and Secondary)

Input voltage range 100 – 240 VAC, 50/60 Hz 1.5A (max.) via three-pin IEC power socket

### Mechanical

**Temperature range:** 0 to 45° C (32° to 113° F) operating

**Cooling:** Internal fan, side venting

**Weight:** Approximately 4.25 kg (9.4 lbs.)

**Case type:** 1 RU, rack mounting

**Dimensions:** 44 x 430 x 400 mm (1.7 x 16.9 x 15.7 in.) (HxWxD)

Headphones socket with volume control

**GPIO:** 8 available

### Throughput Delay

#### Video processing delay:

– **Field = 16.7 or 20 ms**

– **Frame = 33.3 or 40 ms**

With scaling active in same frame rate:

– Ref lock/Free run – between 3 and 5 fields + ~200  $\mu$ s

– Input lock (SDI) – 3 fields + 1 ms

With same standard in & out and Sync mode = Enabled:

– Ref lock/Free run – between ~200  $\mu$ s and 1 frame + ~200  $\mu$ s

– Input lock (SDI) – ~1 ms

Frame-rate conversion:

– Any lock mode – 110 ms typical

#### Audio processing delay (Audio delay = 0 ms):

With scaling active in same frame rate:

– Ref lock/Free run – 1.5 frames

– Input lock – 1 frame + 1 ms

With same standard in & out and sync mode = Enabled:

– Ref lock/Free run – 0.5 frames

– Input lock – ~3 ms

Frame-rate conversion:

– Any lock mode – 110 ms typical

## Ordering

### 6122110

LC2000-CT2 Dual channel video & audio processing unit, including frame-rate/format conversion, frame synchronization, ARC control, noise reduction, side-bar keying, logo insertion, CC, WST and timecode handling, picture enhancement tools, 16 channel audio processing including gain, delay & shuffling. SDI (BNC or fiber), CVBS, GPI, AES and analog audio I/O. HDMI monitor output & dual PSUs.

### 6124110

LC4000-CT2 Quad channel video & audio processing unit, including frame-rate/format conversion, frame synchronization, ARC control, noise reduction, side-bar keying, logo insertion, CC, WST and timecode handling, picture enhancement tools, 16 channel audio processing including gain, delay & shuffling. SDI (BNC or fiber), CVBS for 2 channels, GPI, AES and analog audio I/O. HDMI monitor output & dual PSUs.

### Fiber SFP Options for Fiber – A&B

**FC1-13TR** Transceiver 1310 nm/Rx

**FC1-13T1** Single 1310 nm Tx

**FC1-13T2** Dual 1310 nm Tx

**FC1-R1** Single Rx

**FC1-R2** Dual Rx

**FC1-HDBT2** HD-BNC Dual Tx

**FC1-HDBR2** HD-BNC Dual Rx

Note: Fiber SFP type must be ordered in addition to the unit.

This product may be protected by one or more patents. For further information, please visit: [www.grassvalley.com/patents](http://www.grassvalley.com/patents)

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