FOR.A ®

INNOVATIONS IN VIDEO
and AUDIO TECHNOLOGY

3G/HD/SD/ASI/AES Routing Switcher
MFR-5000

3G/HD/SD/ASI/AES/Routing Switcher

The MFR-5000 Series is a group of multi-format routing switchers supporting 3G-SDI, HD-SDI, SD-SDI, ASI and AES. Inside the 8 U case a matrix of up to 128 inputs/128 outputs can be configured.
It offers expansive flexibility at the core of your system, such as tally connections with peripheral devices (video switchers and multi viewers) and automatic source name tracking.

MFR-5000 Systems Specifications

● Video formats	3G HD: 1080/60p, 1080/59.94p, 1080/50p
	HD: 1080/60i, 1080/59.94i, 1080/50i, 1080/30p,
	1080/30PsF, 1080/29.97p, 1080/29.97PsF, 1080/23.98p,
	1080/23.98Psf, 1080/25p, 1080/25PsF, 1080/24PsF,
	1080/24p, 720/60p, 720/59.94p, 720/50p
	SD: 525/60, 625/50
● Input × Output	Min. 64 × 64 - Max. 128 × 128 + 4 monitoring outputs
	(Can be expanded in increments of 16 channels)
● Video Inputs MFR-16SDI	Compliant with the following (75Ω, BNC)
	· SMPTE424M (3 Gbps)
	· SMPTE292M (1.5 Gbps)
	· SMPTE259M (270 Mbps)
	· DVB-ASI
● Cable Equalization	3G/HD-SDI: 100 m (5C-FB or equivalent)
	SD-SDI: 200 m (5C-2V or equivalent)
● Video Outputs MFR-16SDO	Compliant with the following (75Ω, BNC)
	(Auto reclocking)
	· SMPTE424M (3Gbps)
	· SMPTE292M (1.5 Gbps)
	· SMPTE259M (270 Mbps)
	· DVB-ASI
● Monitoring Outputs	3G/HD/SD-SDI, DVB-ASI: 75Ω BNC × 4
	(Auto reclocking not supported)
● Audio Inputs MFR-16ADI	AES/EBU
	· BNC × 16 (Stereo × 16)
	· Sampling Frequency: 32 kHz, 44.1 kHz, 48 kHz, 96 kHz
● Audio Outputs MFR-16ADAO	AES/EBU (Only synchronized audio)
	· BNC × 8 (Stereo × 8)
	· Sampling Frequency: 48 kHz
	Embedded audio
	· BNC × 2 (Stereo × 8)
	· Sampling Frequency: 48 kHz
	Analog audio
	· 25-pin D-sub (female) (Stereo × 4) balanced or unbalanced
	· Output impedance: less than 100Ω
	· Sampling Frequency: 48 kHz

● Reference Inputs	BB: NTSC: 0.429 Vp-p/PAL: 0.45 Vp-p or Tri-level Sync: ±0.3 Vp-p
	75Ω, BNC × 2, Loop through (Terminate with 75Ω terminator, when unused)
● Interfaces	
♦ MFR-LAN:	10/100/1000 Base-T, RJ-45 × 2
	(for connecting the RU/GPI unit. Up to 128 units can be connected)
	(The second LAN port is used in the redundant CPU configuration)
♦ PC-LAN:	10/100 Base-TX, RJ-45 × 2 (for PC operation)
	(The second LAN port is used in the redundant CPU configuration)
♦ ARCNET	10Mbps 75Ω or Loop through, BNC × 2 (Terminate with 75Ω terminator, when unused)
	(for video switcher HANABI series)
♦ SERIAL	RS-232C/RS-422 (Internal switch), 9-pin D-sub (male) × 1
♦ ALARM	9-pin D-sub (female) × 1 (Input: Reset /Output: Power, Fan Alarm)
● Temperature / Humidity	0°C - 40°C / 30% - 85% (no condensation)
● Power	100 V AC - 240 V AC ±10%, 50/60Hz × 2
● Consumption	128 × 128, Dual CPU/Redundant Power Unit (Maximum Configuration):
	390 VA at 100 V AC, 462 VA at 240 V AC
● Dimensions / Weight	480 (W) × 354 (H) × 402.7 (D) mm; EIA 8 RU / Approx. 50 kg (Full option)
● Accessories	Operation manual, AC cord, Rack mount bracket, AC cord retaining clip
● Options	MFR-16RU: Remote Control Unit (16 buttons)
	MFR-16RUD: Remote Control Unit (16 buttons, LCD display)
	MFR-40RU: Remote Control Unit (40 buttons)
	MFR-18RU: Remote Control Unit (18 buttons, LCD display)
	MFR-39RU: Remote Control Unit
	(LCD 39 buttons, 10 buttons, menu display)
	MFR-GPI: GPI unit
	MFR-TALM: Tally manager
	MFR-CPU: Redundant CPU Card
	MFR-PS: Redundant Power Supply Unit
	MFR-16SDI: Digital Video Input Card
	MFR-16SDO: Digital Video Output Card
	MFR-16ADI: Digital Audio Input Card with Processing Function
	MFR-16ADAO: Digital Audio Output Card with Processing Function
	<To be released as an option>
	MFR-16AAI: Analog Audio Input Card
	MFR-16AESI: Digital Audio Input Card
	MFR-16AESO: Digital Audio Output Card

Remote Control Unit Specifications

	MFR-16RU	MFR-16RUD	MFR-40RU	MFR-18RU	MFR-39RU
● Model Name	MFR-16RU	MFR-16RUD	MFR-40RU	MFR-18RU	MFR-39RU
● Buttons/Colors	16 buttons (1 color only: green) user assignable	16 buttons (1 color only: green) user assignable	40 buttons (3-color: red/green/orange) user assignable	18 buttons (3-color: red/green/orange) user assignable	39 buttons (LCD buttons, 7-color) user assignable 10 buttons (3-color: red/green/orange) user assignable
● Name Display	None	None	None	Available (Displayed above each button) LCD display × 18 (Max. 7 characters × 2 lines)	Available (Displayed in each button) LCD display × 39 (Max. 7 characters × 2 lines)
● Menu Display	None	Available (Max. 16 characters × 2 lines)	None	None	Available (Max. 23 characters × 2 lines)
● Rotary selector	None	None	None	Available	Available
● Number of Connections	Max. 128 units				
● Interfaces					
♦ MFR-LAN:	10/100 Base-TX RJ-45 × 1 (for connection to MU; network hub required for connecting to multiple MUs)				
♦ SERVICE:	None	None	RS-232C 9-pin D-sub (male) × 1 (for maintenance)		
● Power	+12 VDC Pin-connector × 1	+12 VDC Pin-connector × 2 (redundant power supply as standard)			
● Consumption					
♦ when AC 100V	7VA	7VA	10VA	12VA	17VA
♦ when AC 240V	11VA	11VA	15VA	18VA	22VA
● Dimensions	430 × 44 × 34 mm	430 × 44 × 34 mm	430 × 44 × 42 mm	430 × 44 × 42 mm	430 × 88 × 44 mm
● Weight	1 kg	1 kg	2 kg	2 kg	3 kg
● Accessories	AC adapter × 1, AC adapter connection kit × 1, rack mount bracket, LAN cable				

MFR-GPI Specifications

● Interfaces	
♦ GPI IN/TALLY OUT	37-pin D-sub (female) × 4
	128 input/output (I/O composition is optional)
♦ Expand I/F	RS-232C/422:
	9-pin D-sub (male) × 4
● Power	See the Remote Control Unit Specifications.
● Consumption	17 VA (when 100 V AC), 22 VA (when 240 V AC)
● Dimensions	430 (W) × 44 (H) × 110 (D) mm
● Weight	2 kg
● Accessories	See the Remote Control Unit Specifications.

MFR-TALM Specifications

● Interfaces	
♦ MFR-LAN	10/100/1000 Base-T RJ-45 × 1
	(For connecting to the main unit)
♦ PC-LAN	10/100 Base-TX RJ-45 × 1
	(For connecting a PC or external device)
♦ SERIAL	RS-422: 9-pin D-sub (male) × 4
♦ GPI IN/OUT	37-pin D-sub (female) × 1
	(GPI connector for external control)
♦ REF IN	BB or Tri-level Sync, BNC × 1
● Power	See the Remote Control Unit Specifications.
● Consumption	17 VA (when 100 V AC), 20 VA (when 240 V AC)
● Dimensions	212 (W) × 44 (H) × 161 (D) mm
● Weight	2 kg
● Accessories	See the Remote Control Unit Specifications.

Main Features of MFR-5000

Multi-Format Support

Input and output support for: 3G-SDI, HD-SDI, SD-SDI and ASI, with automatic detection of signal type.

Video input/output card
- **MFR-16SDI:**
  16-input card enables support for 3G/HD/SD-SDI and ASI
- **MFR-16SDO:**
  16-output card enables support for 3G/HD/SD-SDI and ASI

Various Audio Input and Output Support

Audio input and output cards are available for the MFR-5000 in addition to video I/O cards. This allows for a combined audio/video router in a single cabinet along with A/D and D/A conversion, plus embedding and de-embedding operations.

Audio input/output card
- **MFR-16AESI (to be released in spring 2013):**
  Input card for 16 stereo-pair (32 channels) AES/EBU
- **MFR-16ADI:**
  Input card with processing function for 16 stereo-pair (32 channels) AES/EBU
- **MFR-16AESO (to be released in spring 2013):**
  Output card for 16 stereo-pair (32 channels) AES/EBU
- **MFR-16ADAO:**
  Output card enables support for 2 SDI embedded audio, 8 stereo-pair (16 channels) AES/EBU and 8ch analog audio.
- **MFR-16AAI: (to be supported in the future)**
  Input card supported for 32 channels analog audio.

Configuring Matrices (up to 128 Input/128 Output)

The input/output board has 16 channels and up to 8 boards can be installed together. As a result, matrices of up to 128 input/128 output can be configured.

Outstanding Redundancy

Since routing switchers are the core of large video systems, we have engineered a variety of features to ensure full redundancy.

Redundancy Features
- **CPU board redundancy (option):** a secondary CPU board constantly monitors the operation of the primary board. If the secondary CPU board detects any faults, operation is immediately switched to the secondary CPU to allow for continuous operation without down time.
- **Redundant power supply (option):** in the rare event of a power supply problem, the second supply takes over to avoid any interruption of router function.
- **Network redundancy (option):** a secondary Ethernet connection provides back-up for system control. With CPU redundancy, each interface can also have a backup (for details see below).
- **Direct control of main unit:** the main unit has an LED display on the front. It can display settings and alarms.

Interface details

	Connector	Standard configuration	With redundant CPU installed
Ethernet	RJ-45	2	4
Serial	9 pin D-sub (male)	1	1
Alarm output	9 pin D-sub (female)	1	1
ARCNET	BNC	2	2

Various Crosspoint Control

A variety crosspoint control features are possible in addition to normal crosspoint switching.

- **Salvo function**
  (1) Button-assigned Salvo: multiple crosspoints can be assigned to any button. Separate settings can be made for each remote unit.
  (2) Main unit storage Salvo: multiple crosspoints can be stored on the main unit side and shared by all remote units.
- **Take operation:** after presetting crosspoints, press the Take button to change the set crosspoints.
  (1) Mode-switching Take button: switches between take operation and usual operation (instant execution).
  (2) Always Take button: always performs take.
- **Link function:** this can group and link multiple crosspoints.
- **Level operation:** level switching allows separate control over different subject types.
- **Chop function:** allows user to switch between two sources for a destination.
- **Monitor out:** enables output of any destination source to a dedicated monitoring channel.
- **Prevention of incorrect operation:**
  - Inhibit: Crosspoint, Source, Destination
  - Lock: Lock Other / Lock All / Lock Local

Matrix Partition Function

One routing switcher can be virtually partitioned to build any theoretical hierarchy, creating possibilities for use in various operations.

Examples:
- **Fully independent switching:** a single unit can be used as multiple routing switchers by making multiple matrix partitions. This is effective when you wish to do multiple operations while avoiding source sharing.
- **V/Key linking switcher:** allows two inputs to be linked for routing of video and key signals together.
- **3D switcher:** partition the matrix in two and control the left and right channels from a 3D source simultaneously.
- **HD/SD simul-switcher:** provides simultaneous control of HD and SD sources. Perfect feature for HD/SD master control switching.

SNMP Support

Remote monitoring by SNMP is supported and the router can easily be integrated into an SNMP monitoring system. In this way you can monitor the status of various items including: power source, fan, CPU, presence/absence of signals, crosspoint errors and more.

Outstanding Maintainability

Designed for maintainability, all boards and power units can be accessed from the front without removing cables.

Remote Control Units

We offer several types or remote control to suit your application. The number of units that can be connected is a maximum of 128, including the main unit. This lets you build a flexible control environment by the way you partition the matrix and make operation level settings.

MFR-16RU

- 1 U compact type
- 16 buttons: light in green only
- Any function can be assigned to the16 buttons

MFR-16RUD

- 1 U compact type
- 16 buttons: lights in green only
- Any function can be assigned to the16 buttons
- Equipped with a display showing status and setting menu display

MFR-40RU

- 1 U compact type
- 40 buttons: light in 3 colors (red/green/orange)
- Any function can be assigned to any button
- Power source redundant (AC adapter)

MFR-18RU

- 1 U compact type
- 18 buttons: light in 3 colors (red/green/orange)
- Equipped with LCD display that can show source name and assigned functions for each button
  (7-color: red/green/yellow/blue/white/cyan/magenta)
- Any function can be assigned to any button
- Power source redundant (AC adapter)

MFR-39RU

- 2 U type
- 39 buttons: 13 buttons in 3 rows. Buttons with LCD display that can show source names or assigned functions
  (7-color: red/green/yellow/blue/white/cyan/magenta)
- Apart from the main buttons, there are 10 function buttons that can be freely assigned (Light in 3 colors: red/green/orange)
- Equipped with display showing status and setting menu display
- Ideal as a main control unit covering the entire crosspoint set-up
- Power source redundant (AC adapter)

Supports Combinations of Multiple Remote Control Units

Multiple remote control units can be combined to make them function as a large scale control panel.

Combination example:
- For 128 × 128 full control + system settings:
  MFR-40RU × 4 + MFR-39RU × 1

Interface Expansion Unit

The interface expansion unit lineup includes two types to suit your specific application. The number of units that can be connected is a maximum of 128, including the remote control units.

MFR-GPI: GPI Unit

Provides an interface for GPI control. This 1 RU sized unit is equipped with user-assignable GPI/O (128 channels) and 4 serial ports (9-pin D-sub male). It can be used for setting Input/Output and supports system configuration.
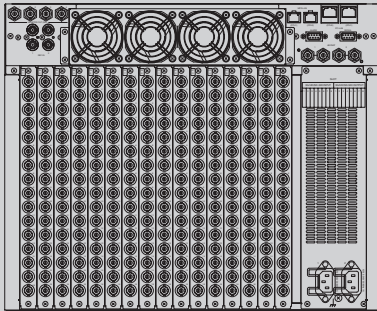
MFR-TALM: Tally Manager

MFR-TALM is a device for performing central management of tally and material names of the MFR main unit and peripheral devices (such as video switchers and multi viewers). In the tally linking system like the one shown to the right (Fig. 1), MFR-TALM performs the tally calculation, which were originally performed by the MFR main unit, so that the tally linking can be speeded up.
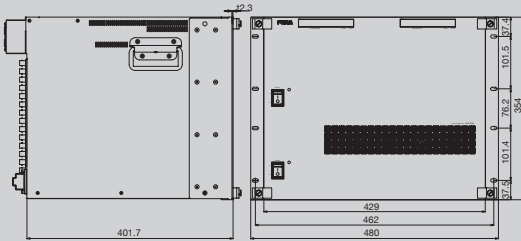
System Links with Other Products

The MFR-5000 enables tally linking with FOR-A's video switcher HANABI Series and multi viewer MV Series. And when switching between sources on the MFR-5000 side, the source name displayed by the video switcher or multi viewer can also change automatically. It supports TSL and Harris protocol, enabling linkage with 3rd party equipment.
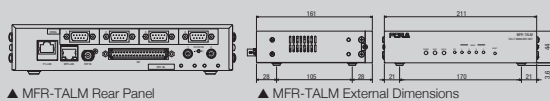

Routing Switcher MFR-5000 128 × 128 — MFR-GPI — MFR-16RU — MFR-16RUD — MFR-40RU — MFR-18RU — MFR-39RU — Ethernet Hub — MFR-TALM — Video Switcher HVS-4000 — PGM monitor — PREV monitor — Multi Viewer MV-3200 — MV monitor 1 — MV monitor 2 — MV monitor 3 — MV monitor 4 — GUI
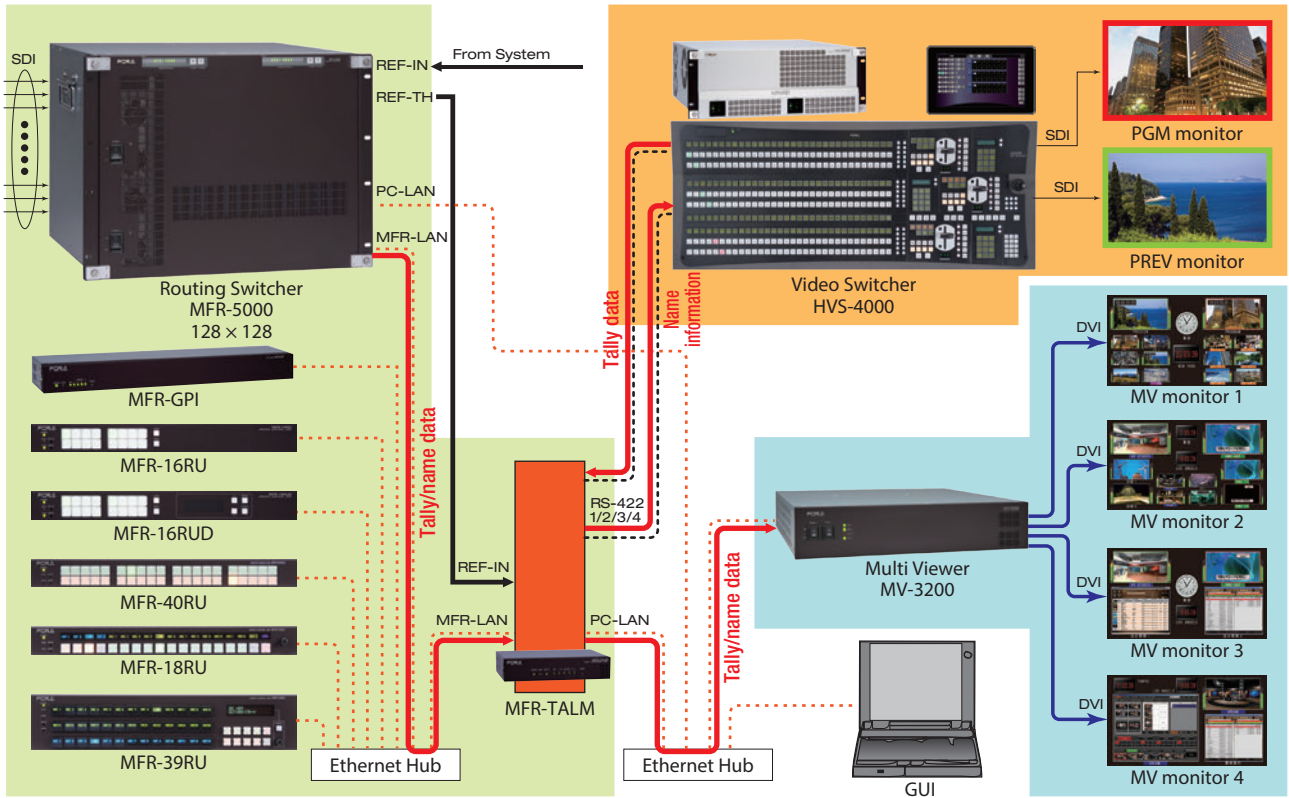
MFR-5000 Rear Panel

MFR-5000 External Dimensions

MFR-TALM External Dimensions

▲ MFR-TALM Rear Panel   ▲ MFR-TALM External Dimensions

MFR-16RU/16RUD/40RU/18RU External Dimensions

▲ MFR-16RU
▲ MFR-16RUD
▲ MFR-16RU/16RUD Rear Panel
▲ MFR-40RU
▲ MFR-18RU
▲ MFR-40RU/18RU Rear Panel
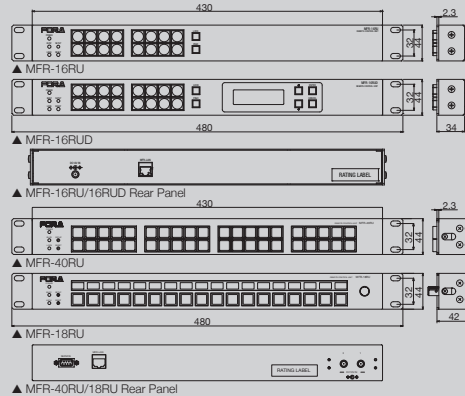
MFR-39RU External Dimensions
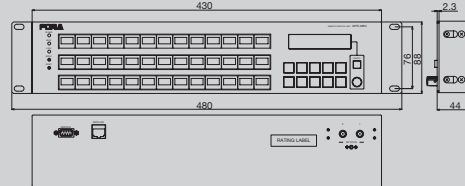
MFR-GPI External Dimensions

MFR-5000