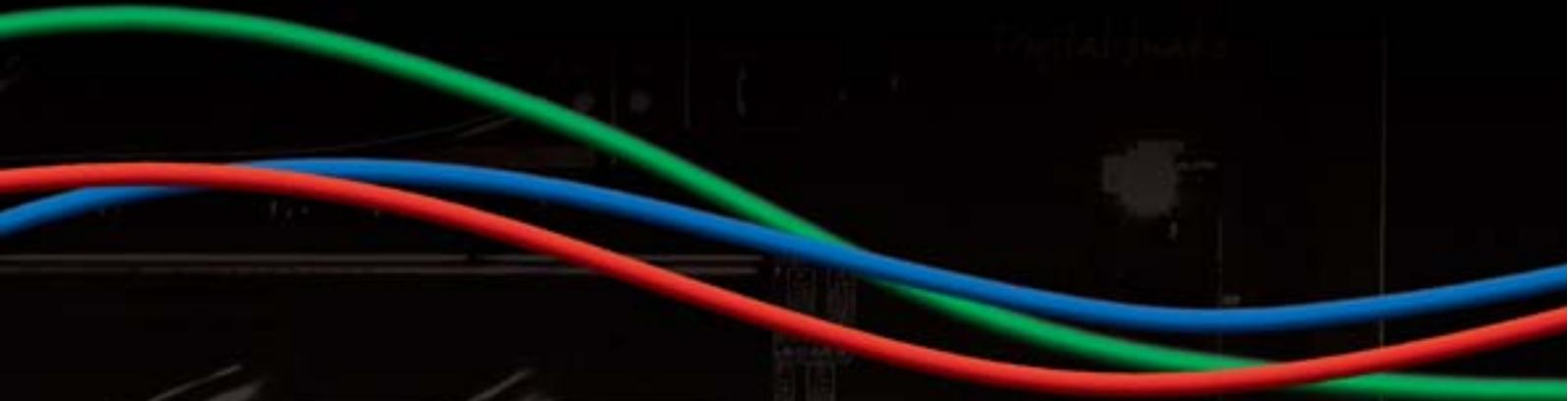# Digital Snake

Multi Channel Digital Audio Transfer System

Digital Snake : The new generation of audio transmission

S-4000 Series

Digital Snake

Multi Channel Digital Audio Transfer System

Digital Snake S-4000 Series

The S-4000 Digital Snake offers a new generation of superb sound quality. It is no longer necessary to accept the audio degradation inherent in analog snakes. The S-4000 system is immune to the hums, buzzes and general impedance and capacitive losses that plague analog snakes. Enjoy the benefits of greater sound clarity and easier installation by using a digital snake. By having the mic preamps on stage, and by avoiding the transmission losses of long runs of analog cables, your audio has a chance to sound its best throughout your whole system. Because the costs of cabling needed for even very high channel counts is extremely low, and the cable is extremely easy to run, installing an S-4000 offers incredible overall savings and an easy way to future-proof your system for later expansion. The S-4000 system provides super clear sound, great intelligibility with minimum latency and the freedom to easily split or extend your source audio. Digital Snakes are the next generation of audio quality for concerts, corporate events, houses of worship and all kinds of audio installations.

40CH I/O MODULAR RACK
S-4000S-3208

The superior quality and reliability of the S-4000 digital snake is made possible using Roland's REAC digital transmission technology. It is REAC that allows for such a low latency and high quality digital snake, providing all of the advantages of low cost, easy installation, and pristine audio with zipperless remote control of all preamp settings.

REAC Roland's original newly invented Ethernet technology

REAC (Roland Ethernet Audio Communication) is newly designed technology for digital audio transfer by Roland. The REAC spec provides a high quality and safe, redundant digital audio transfer system that can be easily installed or integrated for any audio snake application. REAC is a "plug and play" system that is easy to configure and requires no complex setup or computer operation. Plug in your mics, plug in the Ethernet cable and you're ready to go!
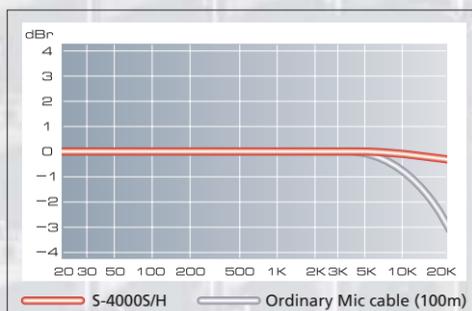
REAC

Audio → 24bit/96kHz/40ch
Data ← MIDI, Remote, Level meter

- REAC, based on the Ethernet 100BASE-TX protocol, transfers signals using Cat5e cable.
- Durable and reliable connector made by Neutrik
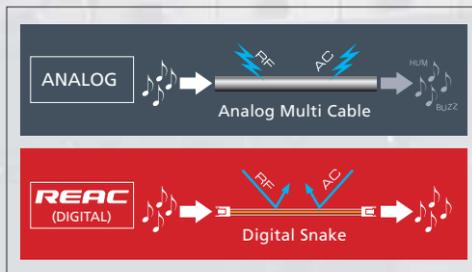- Up to 40 channels of 24bit/96kHz audio plus MIDI and remote control data can be transferred in one cable.

REAC Super Low latency digital transmission

Degradation of the audio signal is minimal in any digital transfer system. However, musicians, performers or even audiences may suffer from the excessive latency of other digital transfer systems. REAC eliminates these digital audio transmission problems with its super low latency. Even when transmitting 40 channels at 24bit/96kHz/Linear, REAC's latency is only 0.375ms*. This very low latency makes the S-4000 system perfect for all audio installations, especially in-ear monitoring systems.

■ Latency of digital transfer (one way)

Popular Ethernet transfer (48ch) — 5.33ms
REAC (40ch) — 0.375ms

0 1 2 3 4 5 6
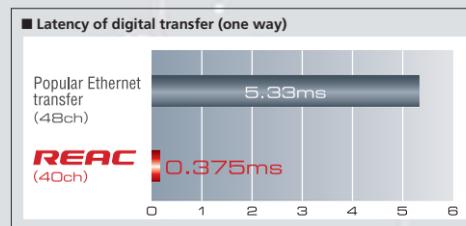
* 0.375 ms is the REAC protocol latency. The A/D and D/A conversions add a bit more for a total latency of around 1.2ms, which is very low and well within the acceptable range for all live audio applications.
* A small amount of latency is added when a switching hub is used in the system.

REAC High quality and low noise digital transfer

In the analog domain, it is impossible to avoid signal degradation during long distance audio transfer at concerts or events in large halls or arenas. Digital transfer of REAC provides extremely flat and pure audio transfer for the whole frequency bandwidth. Furthermore, additional audio benefits occur because the source signal is transferred after boosting the gain using the high quality and remote controllable XR-1 mic pre-amp designed for the S-4000S-3208.

dBr
4
3
2
1
0
−1
−2
−3
−4

20 30 50 100 200 500 1K 2K 3K 5K 10K 20K

— S-4000S/H   — Ordinary Mic cable (100m)

REAC High Quality Pre-amps on each input channel

In an analog system, low-level microphone signals are boosted using a mic preamp only after the long, arduous journey down the analog snake. For this reason it's difficult to avoid degradation and cross talk. The S-4000S-3208 is equipped with high quality and remote controllable XR-1 pre-amps that boost the input gain right at the microphone, where the highest quality signal is found. This ensures that your audio will sound its best. And of course once the signal is in digital form, it is immune to analog cabling losses. The XR-1 pre-amp has been specially designed for live audio applications and is made of high quality components carefully selected by Roland's engineers.

ANALOG ▶ Boost after transfer
degradation and cross talk can be created during analog transfer

REAC (Digital) ▶ Gain boost before transfer
The best possible source audio is then transferred in the snake

REAC Minimize a signal's damage due to "noise pollution"

Hums and buzzes from external noise sources can often be a problem for analog snake installation. It can be difficult to know where potential noise sources might be before installing a snake. And solving subsequent noise problems requires lots of experience and time. REAC provides an effective solution to these installation problems. Technically, the risk of noise pollution such as the induction of hums and buzzes into a digital snake is much lower than in an analog snake, and cross talk is minimal or non existent. This provides almost complete routing freedom for your cable installations.

ANALOG
RF AC HUM
Analog Multi Cable
BUZZ

REAC (DIGITAL)
RF AC
Digital Snake

REAC Simple and low cost installation with Cat5e cabling

REAC brings another revolution to audio installations by eliminating the need to use thick, heavy and hard to handle analog multi-pair cables by transmitting audio using light, slim and easy to handle Cat5e cable. On one very thin Ethernet cable, REAC can transfer 40 channels of high quality 24bit/96kHz audio signal plus MIDI and remote control signals. Since the cable used for REAC transfer is ordinary Ethernet cable, the low cost and easy availability of the cable is a big advantage compared with using analog cable. From temporary installations in outdoor concerts to permanent installations in arenas or halls, REAC provides the benefit of light weight, inexpensive and easy to install cable.

Analog Multi Cable

Cat5e cable

■ Comparison of cable size
Cat5e (40ch)   Analog Multi Cable (32ch)
Approx 5mm   Approx 20mm

■ **Free split and Extension with Switching Hubs**

40CH I/O MODULAR RACK S-4000S-3208

Switching Hub

100m   100m

32x8 FOH UNIT S-4000H

The 100 meter length of an S-4000 digital snake can be easily extended using Switching Hubs. Splitting your source audio to multiple recording or mixing devices is also very easy and cost effective.

Level meter displays the input levels of 40 channels

Instant recall of appropriate setup from internal memory

Gain adjustment for each input channel and phantom power settings

S-4000R

Remote Controller
S-4000R

The S-4000R can be connected to either the S-4000S-3208 or the S-4000H . It provides easy remote control of all input gain adjustments, phantom power and PAD settings. Since the remote can save up to 10 setups to internal memory, you can instantly recall the right settings for performance and stage configurations and room defaults instantly.
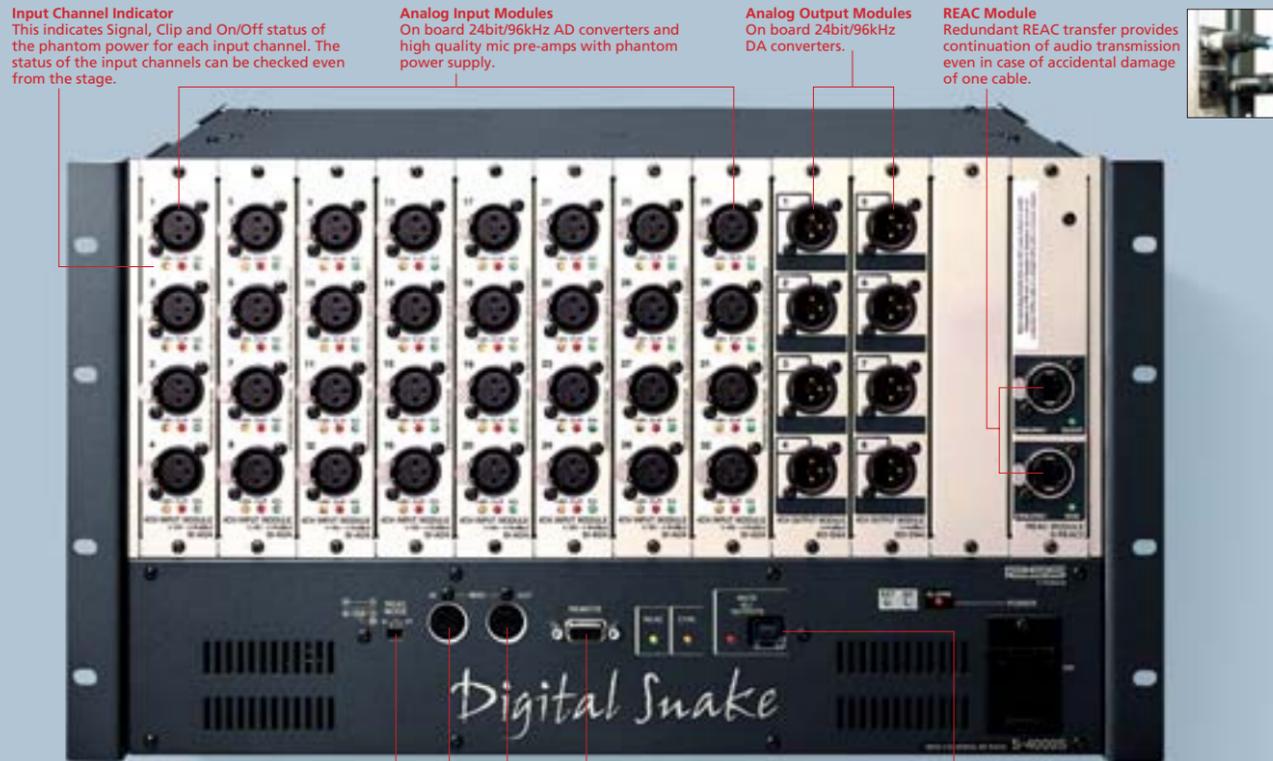
Input Channel Indicator
This indicates Signal, Clip and On/Off status of the phantom power for each input channel. The status of the input channels can be checked even from the stage.

Analog Input Modules
On board 24bit/96kHz AD converters and high quality mic pre-amps with phantom power supply.

Analog Output Modules
On board 24bit/96kHz DA converters.

REAC Module
Redundant REAC transfer provides continuation of audio transmission even in case of accidental damage of one cable.

Digital Snake

Mode Selection Switch

Master	Outputs source audio to the Slave and Split devices It receives Input from the Slave device.
Slave	Receives Input from and sends output to the Master device.
Split	Receives Input from all of the Master device's sources.

MIDI terminals
MIDI is transferred down the snake from both the In and Out MIDI connectors. These enable the remote control of mixers or musical instruments from external MIDI devices at the stage or FOH positions.

REMOTE terminal (RS-232C)
Connection for either the dedicated remote controller (S-4000R) or a computer installed with the remote control software (S-4000RCS*).
* S-4000RCS software is free and can be downloaded from www.roland.com.

Mute All Outputs button
When this button is pressed and held, all Outputs in the S-4000 system will be muted. This is convenient for changing cable connections.

Cooling fans x 3
Internal heat is exhausted using 3 fans on the rear panel reducing the operational noise of the fans.

Power Inlets
The Locking Arm is equipped to prevent accidental unplugging of the power cord. The DC power supply connection is provided for use with an optional redundant power supply in case of power supply failure.

40CH I/O MODULAR RACK
S-4000S-3208

This unit has 32 inputs + 8 outputs and is typically installed at stage side. The AD/DA conversion is 24bit/96kHz. High quality XR-1 pre-amps are provided for each input channel, which can accept both mic and line level inputs, eliminating the need for direct boxes. Phantom power and an input PAD is available for each channel.

REAC terminals   **MIDI terminals (In/Out)**   **REMOTE terminal (RS-232C)**   **Mute All Outputs button**

Digital Snake

Input terminal
8 channels of analog input with D-Sub connection.

Output terminals
32 channels of analog output with D-Sub connection. 8 channels per one D-sub.

Cable strain relief rail
Protective rail used to relieve cable strain and to prevent accidental unplugging of the D-sub cables.

Power switch protection
Cover to prevent accidental turning off of the power switch.

32x8 FOH UNIT
S-4000H

The S-4000H receives signals from the stage and is typically placed next to the FOH mixing console. Its 32 analog outputs are used to send signals from the stage to the mixing console and its 8 inputs for returning signal such as Main audio or monitor mixes to the stage. AD and DA conversions are 24bit/96kHz.

Digital Snake system provides easy and fast system setup. You will have the freedom to easily expand your system. High quality and secure digital audio transmission system that can be integrated at a very affordable price.

Remote Control by computers

A computer can be connected to the REMOTE terminals (RS-232C) of an S-4000S-3208 or an S-4000H. Once the S-4000RCS software* is installed, up to 160 channels of an S-4000 snake system can be remote controlled from your computer using up to 4 RS-232c ports.

* S-4000RCS software is free and downloadable from www.roland.com.

■ **Parameters and display on S-4000RCS**

Parameters : Input channel gain, Phantom power and PAD settings

Display : Level meters of all input channels on one screen.

RS-232C

or

Very long distance snake systems can be designed using an optical converter

If the REAC Ethernet transmission is converted to an optical signal using a approved converter compatible with 100BASE-TX, the system's digital audio can be transferred for several kilometers.
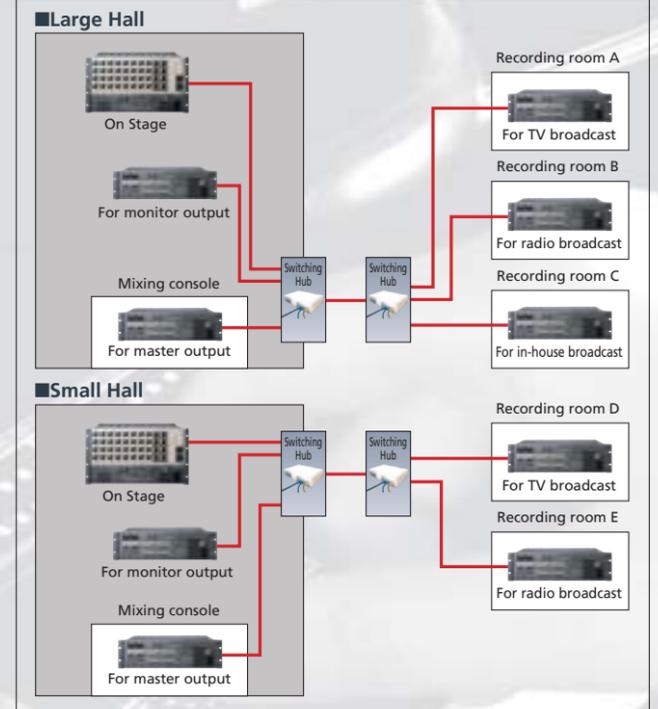
* Transfer distance differs depending on the converters and cables.

Optical converter   Optical converter
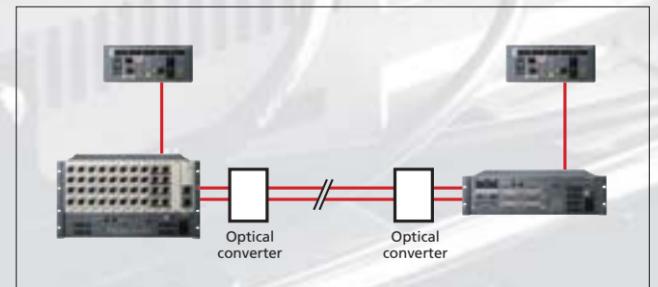
The Modularity and flexibility of the S-4000 system can be used to create very complex audio transmission systems

• System design can be very flexible using an S-4000 Digital Snake system made of many units.

• Using multiple S-4000S-3208 and S-4000H modules, large systems can be designed from 32 inputs and 8 outputs to 64x16, 96x24 and up to 160 total channels or more.

The S-4000 system is designed to provide splits of its source audio using standard Ethernet hardware. Using switching hubs, you can send source audio to multiple recording consoles, a monitor position, broadcast location and more. No signal degradation will occur from the source's master output to the recording or any other split output.

■ **Large Hall**

On Stage

For monitor output

Mixing console

For master output

Switching Hub   Switching Hub

Recording room A
For TV broadcast

Recording room B
For radio broadcast

Recording room C
For in-house broadcast

■ **Small Hall**

On Stage

For monitor output

Mixing console

For master output

Switching Hub   Switching Hub

Recording room D
For TV broadcast

Recording room E
For radio broadcast

Optional Items

SC-A41
D-Sub 25 pins ←→ XLR female (x8) cable x1
Length : 4.5 meters

D-Sub 25 pins ←→ XLR male (x8) cable x4
Length : 4.5 meters
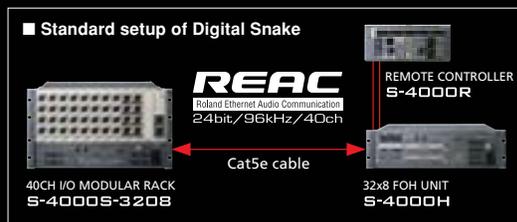
SC-W100X
100 meter Cat5e cable
Crossover cable with Ethercon connector of Neutrik (R)

S-240P
External Power Supply Unit
Supplies redundant DC power to S-4000S-3208 or S-4000H. Outputs DC24V 6A power.

Join the Revolution from Analog to Digital Snakes

Make the change from analog multi-pair cable, which is thick, heavy, difficult to install and prone to interference and audio degradation; to the next generation: a Digital Snake. Digital Technology offers lightweight, easy to install, and superb quality audio. This is the new generation of audio transmission made possible using Roland's original "REAC" Ethernet audio technology and the S-4000 Digital Snake.

■ **Standard setup of Digital Snake**

REAC
Roland Ethernet Audio Communication
24bit/96kHz/40ch

REMOTE CONTROLLER
S-4000R

40CH I/O MODULAR RACK
S-4000S-3208

Cat5e cable

32x8 FOH UNIT
S-4000H

Improve your audio with the superior clarity and intelligibility of an S-4000 system

Audio from a microphone is very low-level audio. When you run low-level signals down an analog snake you have inevitable losses from the resistance, capacitance and inductance of the audio cable. In addition, analog cables are susceptible to induced hums and buzzes from transformers, power lines and other environmental "hazards".

By placing your mic preamps right next to your sources, and converting your audio to digital right on the stage, you avoid all of these audio hazards and your sound quality, clarity and intelligibility are all greatly improved.

Very low cost and flexible installation using Cat5e Ethernet cable

Ethernet cabling is very low cost as well as very slim and lightweight. That makes installation much easier than using analog cable bundles. Also, due to digital audio's immunity to environmental hums and buzzes, you often have many more routing options for running cable. Splitting your audio is very easy with the S-4000 system. Using standard Ethernet switching hub, you can split all of your stage source audio to a recording, broadcast or monitor location. Cable runs can also be extended from the 100-meter standard Ethernet spec using these same hubs. Installation cost and time can be drastically reduced compared with installations using Analog multi-pair. And since Cat5e cable is so inexpensive and easy to run, you can add a few extra cables at the time of the installation, so that later it will be very easy to add extra input and output channels. Your customers will thank you for designing a "future-proof" system!

Simple and flexible installation/operation

The S-4000 is very easy to configure and use. Using standard 32 input and 8 output or return systems, it's easy to configure 32x8, 64x16 and 96x24 systems. To make the system work, you just plug in the cabling and turn on the power. No computer knowledge is needed! The gain of the preamps is easily controlled using the S-4000R Remote Controller from either the stage or FOH console location. You can also use a computer to control up to 160-channel systems using the free S-4000RCS software.

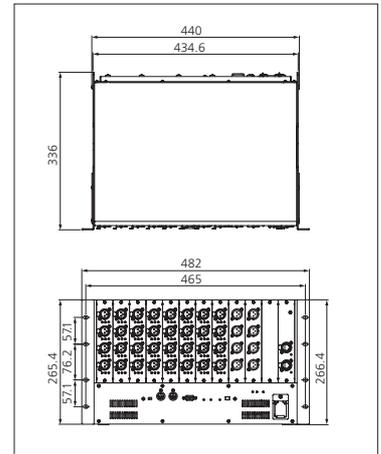## Cabling and Power Supply Redundancy provides a secure audio transmission system

The S-4000 is designed to be a trouble free system, and is equipped with various mechanisms for safety and redundancy. Heavy duty Neutrik ® connectors are provided for the Main and Backup cables on all chassis. Furthermore, redundant Main + Backup cable connections are standard, providing security and the automatic continuation of audio transfer even in case one of the cables is accidentally damaged. The S-4000H provides heavy-duty strain relief rails. All power switches and cables have security covers to prevent accidentally unplugging or turning off the power. Both the S-4000S and S-4000H can use the optional S-240P redundant backup power supply. In fact, system reliability and redundancy has been at the heart of all of the S-4000's design criteria.

32x8 FOH UNIT
S-4000H

REMOTE CONTROLLER
S-4000R

S-4000S-3208 40CH I/O MODULAR RACK

Number of Channels	32 in 8 out	Connectors	Input: 32 (XLR type, balanced, phantom power, 4 ch input module x 8)
AD Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bit		Output: 8 (XLR type, balanced, 4 ch output module x 2) REAC: MAIN, BACKUP (RJ-45 EtherCon type)
DA Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bit		Remote Connector: 1 (RS-232C, DB-9 type) MIDI Connectors: IN, OUT (5-pin DIN type)
Frequency Response	-2 dB / +0 dB (@ +4 dBu, 20 Hz to 20 kHz)	Indicator	EXT Indicator (External Power Supply Unit)
Total Harmonic Distortion + Noise	0.05 % or less (Pad: On, Input Gain: +4 dBu, 22 to 20000 Hz)		INT Indicator REAC Indicator
Dynamic Range	110 dB		CTRL Indicator
Cross Talk	-80 dB		ALARM Indicator
Nominal Input Level	-65 to -10 dBu (PAD: Off) -45 to +10 dBu (PAD: On) (1 dB step, Max. +28 dBu)		MUTE ALL OUTPUTS Indicator
		AC Power Supply	AC 115 V, AC 117 V, AC 220 V, AC 230 V, AC 240 V (50/60 Hz)
PAD	20 dB On/Off	DC Power Supply	+24 V (from optional external power supply unit : S-240P):
Input Impedance	20 k ohms	Power Consumption	130 W
Nominal Output Level	+4 dBu, Max. +22 dBu	Current Draw (for an optional external power supply unit; Model S-240P)	6 A
Output Impedance	150 ohms		
Recommended Load Impedance	10 k ohms or greater	Phantom Power	+48 V / 14 mA (each input on SI-AD4, remote controlled)
Residual Noise Level (IHF-A, typ.)	-90 dBu	Dimensions	482.0 (W) x 336.0 (D) x 266.4 (H) mm 19 (W) x 13-1/4 (D) x 10-1/2 (H) inches
Equivalent Input Noise Level (E.I.N.)	-128 dB	Weight	17.0 kg, 37 lbs 8 oz
		Operation Temperature	0 to +40 degrees Celsius +32 to +104 degrees Fahrenheit
Network Latency	375 microseconds when using REAC cable only (AD - REAC - DA Latency: about 1.2 ms)	Accessories	Power Cord, REAC cable (10 m, Cat5e crossover cable) Adhesive-backed number label sheets, REAC Connector Covers Ferrite Cores, Owner's Manual

* 0 dBu = 0.775 Vrms

S-4000H 32 x 8 FOH UNIT

Number of Channels	8 in 32 out	Indicators	EXT Indicator (External Power Supply Unit)
AD Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bit		INT Indicator REAC Indicator
DA Conversion	Sample Rate: 96.0 kHz Signal Processing: 24 bit		CTRL Indicator ALARM Indicator
Frequency Response	-2 dB / +0 dB (@ +4 dBu, 20 Hz to 20 kHz)		MUTE ALL OUTPUTS Indicator
Total Harmonic Distortion + Noise	0.05 % or less (Input Gain: +4 dBu, 22 to 20000 Hz)	AC Power Supply	AC 115 V, AC 117 V, AC 220 V, AC 230 V, AC 240 V (50/60 Hz)
		DC Power Supply	+24 V (from optional external power supply unit : S-240P):
Dynamic Range	110 dB	Power Consumption	70 W
Cross Talk	-80 dB	Current Draw (for an optional external power supply unit; Model S-240P)	6 A
Nominal Input Level	+4 dBu, Max. +22 dBu		
Input Impedance	30 k ohms		
Nominal Output Level	+4 dBu, Max. +22 dBu	Dimensions	482.0 (W) x 386.7 (D) x 133.0 (H) mm 19 (W) x 15-1/4 (D) x 5-1/4 (H) inches
Output Impedance	600 ohms		
Recommended Load Impedance	10 k ohms or greater	Weight	9.4 kg, 20 lbs 12 oz
Residual Noise Level (IHF-A, typ.)	-90 dBu	Operation Temperature	0 to +40 degrees Celsius +32 to +104 degrees Fahrenheit
Network Latency	375 microseconds when using REAC cable only (AD - REAC - DA Latency: about 1.2 ms)	Accessories	Power Cord, REAC Connector Covers, Ferrite Cores, Connector Guard, Screws for Connector Guard Installation Manual
Connectors	Input: 1 (DB-25 type, balanced, 8 channels) Output: 4 (DB-25 type, balanced, 32 channels each) REAC: MAIN, BACKUP (RJ-45 EtherCon type) Remote Connector: 1 (RS-232C, DB-9 type) MIDI Connectors: IN, OUT (5-pin DIN type)		

* 0 dBu = 0.775 Vrms
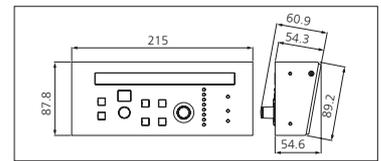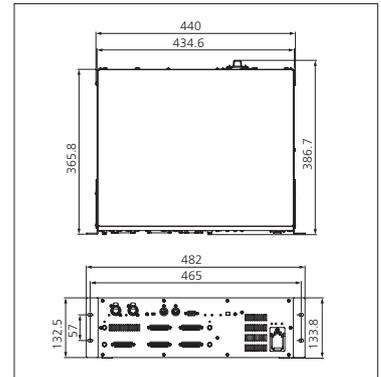
S-4000R REMOTE CONTROLLER

Connector	Remote Connector: 1 (RS-232C, DB-9 type)
Indicators	CLIP Indicators, SIG Indicators, POWER Indicator, REAC Indicator, CTRL Indicator, Level Meter
Power Supply	Supplied from connected device. (S-4000S, S-4000H; through the remote cable)
Dimensions	215.0 (W) x 87.0 (D) x 54.6 (H) mm, 8-1/2 (W) x 3-7/16 (D) x 2-3/16 (H) inches
Weight	0.8 kg, 1 lb 13 oz
Operatin Temperature	0 to +40 degrees celsius, +32 to +104 degrees Fahrenheit
Accessories	Remote Cable (3 m), Rack Mount Brackets, Installation Manual

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