Digital Snake

S-2416
STAGE UNIT

Owner's Manual

Roland

Before using this unit, carefully read the sections entitled "IMPORTANT SAFETY INSTRUCTIONS," "USING THE UNIT SAFELY" (p. 3), and "IMPORTANT NOTES" (p. 5). These sections provide important information concerning the proper operation of the unit. Additionally, in order to feel assured that you have gained a good grasp of every feature of your new unit, read Owner's Manual in its entirety. This manual should be saved and kept on hand as a convenient reference.

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

ATTENTION: RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS.

IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

WARNING - When using electric products, basic precautions should always be followed, including the following:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturers instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

─────── For the U.K. ───────

WARNING: THIS APPARATUS MUST BE EARTHED
IMPORTANT: THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE.
              GREEN-AND-YELLOW: EARTH, BLUE: NEUTRAL, BROWN: LIVE
   As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
   The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW.
   The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.
   The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

USING THE UNIT SAFELY

INSTRUCTIONS FOR THE PREVENTION OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS

About ⚠ WARNING and ⚠ CAUTION Notices

⚠ **WARNING**	Used for instructions intended to alert the user to the risk of death or severe injury should the unit be used improperly.
⚠ **CAUTION**	Used for instructions intended to alert the user to the risk of injury or material damage should the unit be used improperly. * Material damage refers to damage or other adverse effects caused with respect to the home and all its furnishings, as well to domestic animals or pets.

About the Symbols

⚠	The △ symbol alerts the user to important instructions or warnings. The specific meaning of the symbol is determined by the design contained within the triangle. In the case of the symbol at left, it is used for general cautions, warnings, or alerts to danger.
🚫	The ◯ symbol alerts the user to items that must never be carried out (are forbidden). The specific thing that must not be done is indicated by the design contained within the circle. In the case of the symbol at left, it means that the unit must never be disassembled.
🔌	The ● symbol alerts the user to things that must be carried out. The specific thing that must be done is indicated by the design contained within the circle. In the case of the symbol at left, it means that the power-cord plug must be unplugged from the outlet.

ALWAYS OBSERVE THE FOLLOWING

⚠ WARNING

Make sure that the power cord is grounded

Connect mains plug of this model to a mains socket outlet with a protective earthing connection.

To completely turn off power to the unit, pull out the plug from the outlet

Even with the power switch turned off, this unit is not completely separated from its main source of power. When the power needs to be completely turned off, turn off the power switch on the unit, then pull out the plug from the outlet. For this reason, the outlet into which you choose to connect the power cord's plug should be one that is within easy reach and readily accessible.

Do not disassemble or modify by yourself

Do not carry out anything unless you are instructed to do so in the owner's manual. Otherwise, you risk causing malfunction.

Do not repair or replace parts by yourself

Refer all servicing to your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information."

Do not use or store in the following types of locations

- Subject to temperature extremes (e.g., direct sunlight in an enclosed vehicle, near a heating duct, on top of heat-generating equipment); or are
- Damp (e.g., baths, washrooms, on wet floors); or are
- Exposed to steam or smoke; or are
- Subject to salt exposure; or are
- Exposed to rain; or are
- Dusty or sandy; or are
- Subject to high levels of vibration and shakiness.

Do not place in an unstable location

Otherwise, you risk injury as the result of the unit toppling over or dropping down.

⚠ WARNING

Connect the power cord to an outlet of the correct voltage

The unit should be connected to a power supply only of the type described as marked on the rear side of unit.

Use only the supplied power cord

Use only the attached power cord. Also, the supplied power cord must not be used with any other device.

Do not bend the power cord or place heavy objects on it

Otherwise, fire or electric shock may result.

Avoid extended use at high volume

Use of the unit at high volume for extended periods of time may cause hearing loss. If you ever experience any hearing loss or ringing in the ears, you should immediately stop using the unit and consult a specialized physician.

Do not allow foreign objects or liquids to enter unit; never place containers with liquid on unit

Do not place containers containing liquid (e.g., flower vases) on this product. Never allow foreign objects (e.g., flammable objects, coins, wires) or liquids (e.g., water or juice) to enter this product. Doing so may cause short circuits, faulty operation, or other malfunctions.

⚠ WARNING

Turn off the unit if an abnormality or malfunction occurs

Immediately turn the unit off, remove the power cord from the outlet, and request servicing by your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" when:

- The power cord has been damaged; or
- If smoke or unusual odor occurs; or
- Objects have fallen into, or liquid has been spilled onto the unit; or
- The unit has been exposed to rain (or otherwise has become wet); or
- The unit does not appear to operate normally or exhibits a marked change in performance.

Be cautious to protect children from injury

Always make sure that an adult is on hand to provide supervision and guidance when using the unit in places where children are present, or when a child will be using the unit.

Do not drop or subject to strong impact

Otherwise, you risk causing damage or malfunction.

Do not share an outlet with an unreasonable number of other devices

Otherwise, you risk overheating or fire.

Do not use overseas

Before using the unit in overseas, consult with your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" sheet.

USING THE UNIT SAFELY

⚠ CAUTION

Place in a well ventilated location

The unit should be located so that its location or position does not interfere with its proper ventilation.

When disconnecting the power cord, grasp it by the plug

To prevent conductor damage, always grasp the power cord by its plug when disconnecting it from this unit or from a power outlet.

Periodically clean the power plug

An accumulation of dust or foreign objects between the power plug and the power outlet can lead to fire or electric shock.

At regular intervals, be sure to pull out the power plug, and using a dry cloth, wipe away any dust or foreign objects that may have accumulated.

Disconnect the power plug whenever the unit will not be used for an extended period of time

Fire may result in the unlikely event that a breakdown occurs.

Route all power cords and cables in such a way as to prevent them from getting entangled

Injury could result if someone were to trip on a cable and cause the unit to fall or topple.

Avoid climbing on top of the unit, or placing heavy objects on it

Otherwise, you risk injury as the result of the unit toppling over or dropping down.

Never connect/disconnect a power plug if your hands are wet

Otherwise, you could receive an electric shock.

Disconnect all cords/cables before moving the unit

Before moving the unit, disconnect the power plug from the outlet, and pull out all cords from external devices.

Before cleaning the unit, disconnect the power plug from the outlet

If the power plug is not removed from the outlet, you risk receiving an electric shock.

Whenever there is a threat of lightning, disconnect the power plug from the outlet

If the power plug is not removed from the outlet, you risk receiving an electric shock.

Keep small items out of the reach of children

To prevent accidental ingestion of the parts listed below, always keep them out of the reach of small children.

- Included Parts
  Rubber feet (p. 7)

- Removable Parts
  Rack-mount angle mounting screws (p. 7)

⚠ CAUTION

Handle the ground terminal carefully

If you remove the screw from the ground terminal, be sure to replace it; don't leave it lying around where it could accidently be swallowed by small children. When refastening the screw, make that it is firmly fastened, so it won't come loose.

Precautions concerning use of phantom power supply

Always turn the phantom power off when connecting any device other than condenser microphones that require phantom power. You risk causing damage if you mistakenly supply phantom power to dynamic microphones, audio playback devices, or other devices that don't require such power. Be sure to check the specifications of any microphone you intend to use by referring to the manual that came with it.

(This instrument's phantom power: +48 V DC, 14 mA Max)

IMPORTANT NOTES

Power Supply

- Do not connect this unit to same electrical outlet that is being used by an electrical appliance that is controlled by an inverter or a motor (such as a refrigerator, washing machine, microwave oven, or air conditioner). Depending on the way in which the electrical appliance is used, power supply noise may cause this unit to malfunction or may produce audible noise. If it is not practical to use a separate electrical outlet, connect a power supply noise filter between this unit and the electrical outlet.

Placement

- Using the unit near power amplifiers (or other equipment containing large power transformers) may induce hum. To alleviate the problem, change the orientation of this unit; or move it farther away from the source of interference.

- This unit may interfere with radio and television reception. Do not use this unit in the vicinity of such receivers.

- Noise may be produced if wireless communications devices, such as cell phones, are operated in the vicinity of this unit. Such noise could occur when receiving or initiating a call, or while conversing. Should you experience such problems, you should relocate such wireless devices so they are at a greater distance from this unit, or switch them off.

- Do not expose the unit to direct sunlight, place it near devices that radiate heat, leave it inside an enclosed vehicle, or otherwise subject it to temperature extremes. Excessive heat can deform or discolor the unit.

- When moved from one location to another where the temperature and/or humidity is very different, water droplets (condensation) may form inside the unit. Damage or malfunction may result if you attempt to use the unit in this condition. Therefore, before using the unit, you must allow it to stand for several hours, until the condensation has completely evaporated.

- Depending on the material and temperature of the surface on which you place the unit, its rubber feet may discolor or mar the surface.
  You can place a piece of felt or cloth under the rubber feet to prevent this from happening. If you do so, please make sure that the unit will not slip or move accidentally.

- Do not place containers or anything else containing liquid on top of this unit. Also, whenever any liquid has been spilled on the surface of this unit, be sure to promptly wipe it away using a soft, dry cloth.

Maintenance

- For everyday cleaning wipe the unit with a soft, dry cloth or one that has been slightly dampened with water. To remove stubborn dirt, use a cloth impregnated with a mild, non-abrasive detergent. Afterwards, be sure to wipe the unit thoroughly with a soft, dry cloth.

- Never use benzine, thinners, alcohol or solvents of any kind, to avoid the possibility of discoloration and/or deformation.

Repairs and Data

- Before sending the unit away for repairs, be sure to make a backup of the data stored within it; or you may prefer to write down the needed information. Although we will do our utmost to preserve the data stored in your unit when we carry out repairs, in some cases, such as when the memory section is physically damaged, restoration of the stored content may be impossible. Roland assumes no liability concerning the restoration of any stored content that has been lost.

Additional Precautions

- Any data stored within the unit can be lost as the result of equipment failure, incorrect operation, etc. To protect yourself against the irretrievable loss of data, try to make a habit of creating regular backups of the data you've stored in the unit.

- Roland assumes no liability concerning the restoration of any stored content that has been lost.

- Use a reasonable amount of care when using the unit's buttons, sliders, or other controls; and when using its jacks and connectors. Rough handling can lead to malfunctions.

- When disconnecting all cables, grasp the connector itself—never pull on the cable. This way you will avoid causing shorts, or damage to the cable's internal elements.

- A small amount of heat will radiate from the unit during normal operation.

- To avoid disturbing others nearby, try to keep the unit's volume at reasonable levels.

- When you need to transport the unit, pack it in shock-absorbent material. Transporting the unit without doing so can cause it to become scratched or damaged, and could lead to malfunction.

Licence/Trademarks

- MMP (Moore Microprocessor Portfolio) refers to a patent portfolio concerned with microprocessor architecture, which was developed by Technology Properties Limited (TPL). Roland has licensed this technology from the TPL Group.

- Roland, REAC, and V-Mixer are either registered trademarks or trademarks of Roland Corporation in the United States and/or other countries.

- Company names and product names appearing in this document are registered trademarks or trademarks of their respective owners.

Contents

Before Installing

Changing Where the Rack-Mount Angles Are Attached

- You can shift the location where the rack-mount angles are installed by 16 millimeters.
- Attaching the rack-mount angles at the back lets you change the orientation in which the unit is mounted on a rack.

NOTE

Before carrying out this operation, detach all connections.

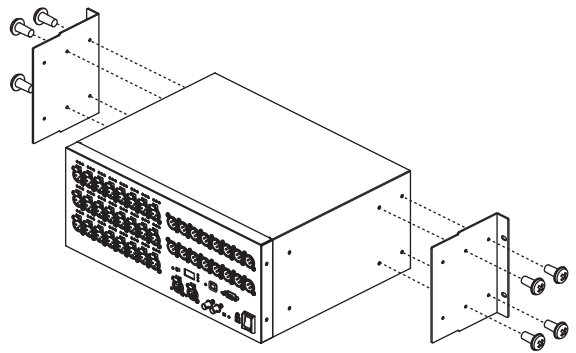**1.** **Remove the rack-mount angle mounting screws (8) and detach the rack-mount angles.**
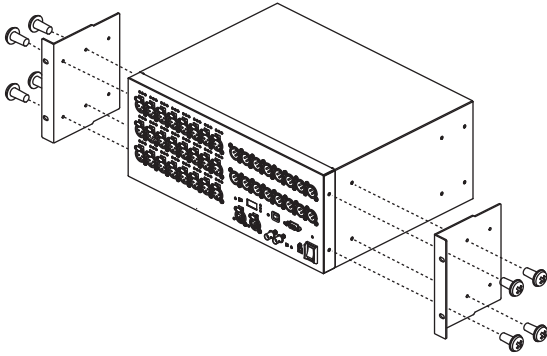
2. **Using the screws (8) removed in step 1, attach the rack-mount angles.**

   * Be sure to use the screws removed from the unit to secure the angles in place. Using different screws might cause damage to the unit or malfunction.

Shifting the mounting location by 16 mm
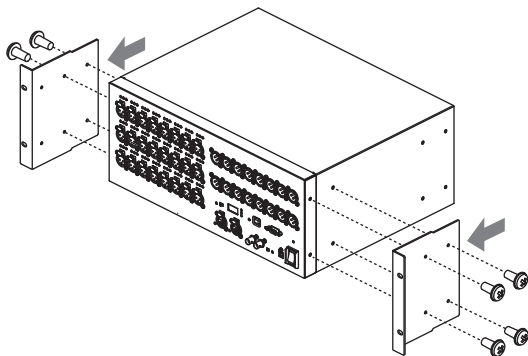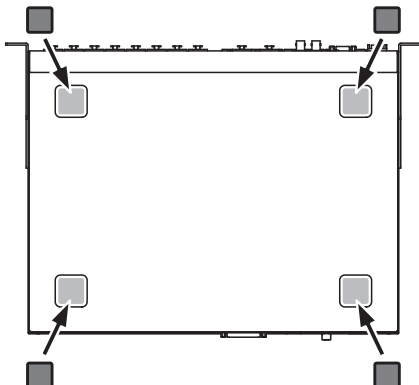

Attaching at the back

Attaching the Rubber Feet

Attach these as required, such as when you're using the S-2416 without mounting it on a rack or the like.
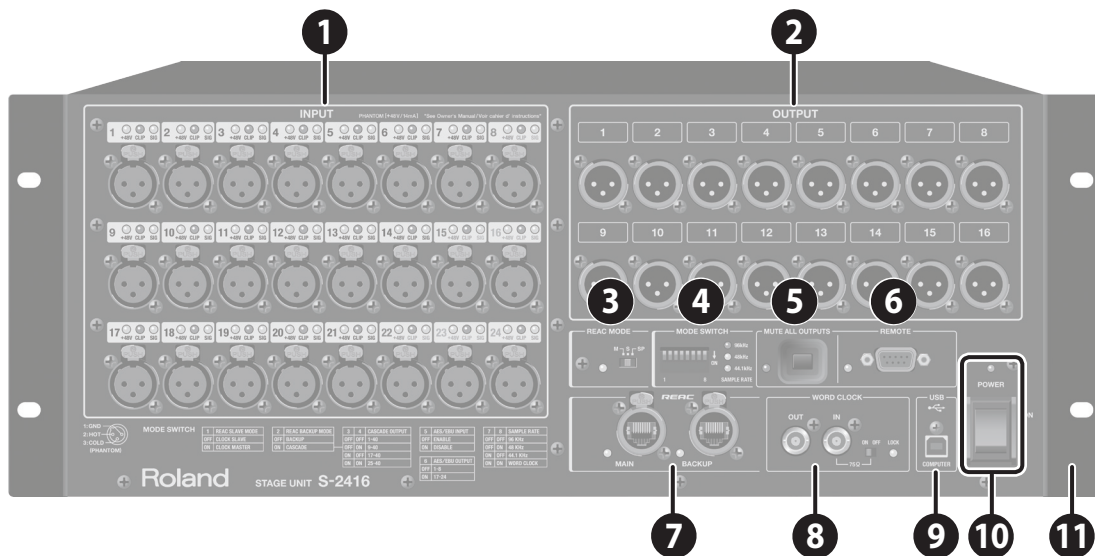
Peel off the double-sided tape from the rubber feet and affix the rubber feet at the locations shown in the following figure.

   * When turning the unit over, handle the unit carefully; do not drop it.

Panel Descriptions

Front Panel

No.	Name	Explanation
1	**INPUT connector**	Various input devices are connected to these. The inputs include a variable-gain preamp that can accept signals from -65 through +10 dBu (nominal, maximum input: +28 dBu). The status of the connectors is displayed on 3 indicators. **CLIP** — Lights in red when the input signal exceeds 0 dB (digital full scale). **SIG** — Lights in green when the input signal is greater than -40 dB. **+48 V** — Lights in orange when +48 V phantom power is supplied from the channel. **MEMO** You can adjust preamp gain and set phantom power on or off by remote control from an S-4000R unit or a computer.
2	**OUTPUT connector**	These are balanced male XLR connectors. Amps and powered speakers are connected here. The signal level that is output is +4 dBu (nominal, maximum output: +22 dBu).
3	**[REAC MODE] switch**	This sets the REAC's operation mode. For the correct operation of the system, the mode settings of REAC devices must be made correctly. Making the wrong settings may result in incorrect audio input and output. **M** — The unit functions as a REAC master device. **S** — The unit functions as a REAC slave device. **SP** — The unit functions as a REAC split device. **NOTE** When changing the setting of the [REAC MODE] switch, first turn off the power to the S-2416. The mode is set according to the state of the switch at startup, and so changing the switch setting once the unit is running does not change the mode.
	REAC MODE indicator	The indicator lights up when communication with the connected REAC device is established. It flashes during standby.
4	**[MODE] switches**	These set the operation mode of the S-2416. For details, refer to "[MODE] switches" (p. 10).
	SAMPLE RATE indicator	This displays the sampling rate at which the unit is operating.
5	**[MUTE ALL OUTPUTS] button**	This mutes (silences) the system's global audio output. When the unit is muted, you can disconnect and connect input/output or REAC cables without producing noise. When this is pressed, all output is muted within a second or two. Releasing the button cancels muting.
	MUTE ALL OUTPUTS indicator	

No.	Name	Explanation
6	**REMOTE connector**	This is a female 9-pin D-sub connector. It is used to connect a dedicated remote controller for digital snake devices (the S-4000R) or a computer installed with dedicated remote control software (S-4000RCS).
	REMOTE indicator	The REMOTE indicator lights in orange when an S-2416 is communicating with S-4000R or computer via the RS-232C connection. If no S-4000R or computer is connected, or if a problem occurs in transmitting via the RS-232C connection, the indicator flashes or goes off.
7	**REAC MAIN port** **REAC MAIN indicator**	Connect REAC device here. This is used as the main line of a REAC connection. The REAC MAIN indicator flashes in green when communication with the connected REAC device is established.
	REAC BACKUP port **REAC BACKUP indicator**	Connect REAC device here. This functions as a backup for the REAC MAIN port. If the REAC MAIN connection experiences a problem, REAC communication is automatically switched to the REAC BACKUP port. The REAC BACKUP indicator lights up in green during backup operation, and flashes during communication. **MEMO** You can make the BACKUP port function as a CASCADE port by changing the settings of the MODE switches.
8	**WORD CLOCK IN connector**	When syncing to an external word clock, you connect the word-clock source device (such as a word-clock generator) here.
	[75 Ω] switch	Set this switch to ON when the S-2416 is used as a word-clock input terminal.
	WORD CLOCK OUT connector	This is the word-clock output connector. The word clock of the sampling rate shown by the SAMPLE RATE indicator is output.
	LOCK indicator	This displays the lock status of the word clock. It lights up when the clock is correctly locked. It flashes when the lock experiences a problem.
9	**USB port**	This is for connecting a computer on which dedicated remote-control software (S-4000RCS) is installed and set up.
10	**[POWER] switch** **POWER indicator**	This turns the power on and off. When the power is turned on, the POWER indicator lights up.
11	**Rack-mount angles**	These are used when mounting the unit on a 19" rack. Attaching these at the back lets you change the orientation in which the unit is mounted on a rack.

Rear Panel
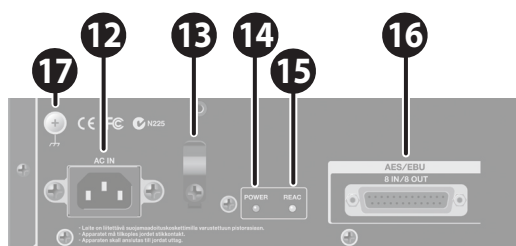
No.	Name	Explanation
12	**AC IN connector**	This is for connecting the included power cord.
13	**Cord hook**	You use this to prevent inadvertent disconnection of the power cord.
14	**POWER indicator**	This lights up when the power is turned on.
15	**REAC indicator**	This lights up when communication with the connected REAC device is established. It flashes during standby.
16	**AES/EBU connector**	This is the input/output connector for AES/EBU signals. The unit has four inputs and four outputs, and you can convert this to XLR connectors by using a commercially available breakout cable.

Panel Descriptions

No.	Name	Explanation
⑰	Ground terminal	This is for connecting a ground wire. Use this connector when the power cord cannot be connected to a ground. **NOTE** Do not ground the S-2416 to locations such as the following. • Water pipes (may result in shock or electrocution) • Gas pipes (may result in fire or explosion) • Telephone-line ground or lightning rod (may be dangerous in the event of lightning) * Depending on the circumstances of a particular setup, you may experience a discomforting sensation, or perceive that the surface feels gritty to the touch when you touch this device, microphones connected to it, or the metal portions of other objects. This is due to an infinitesimal electrical charge, which is absolutely harmless. However, if you are concerned about this, connect the ground terminal with an external ground. When the unit is grounded, a slight hum may occur, depending on the particulars of your installation. If you are unsure of the connection method, contact the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" sheet.

[MODE] Switches

NOTE

When changing the setting of the [MODE] switch, first turn off the power to the S-2416.

The mode is set according to the state of the switch at startup, and so changing the switch setting once the unit is running does not change the mode.

No.	Mode	Explanation			
1	REAC SLAVE MODE	When the REAC mode of the S-2416 is set to "slave," this makes the master/slave setting for the sync signal.			
		OFF	CLOCK SLAVE		The REAC master device is the master of the sync signal.
		ON	CLOCK MASTER		The S-2416 is the master of the sync signal. You set this when syncing to a word-clock signal from an external device, such as when using AES/EBU input.
2	REAC BACKUP MODE	This determines the functioning of the REAC BACKUP port on the S-2416.			
		OFF	BACKUP		The connector functions as a BACKUP port.
		ON	CASCADE		The connector functions as a CASCADE port.
3	CASCADE OUTPUT	When [MODE] switch 2 is set to ON, this sets the REAC audio signal sent to the output of the REAC CASCADE slave device.			
		3: OFF	4: OFF	1–40	Output channels 1 through 40 are sent.
		3: OFF	4: ON	9–40	Output channels 9 through 40 are sent.
4		3: ON	4: OFF	17–40	Output channels 17 through 40 are sent.
		3: ON	4: ON	25–40	Output channels 25 through 40 are sent.
5	AES/EBU INPUT	This sets whether AES/EBU input is used. * Syncing to the word-clock signal from an external device is necessary when using AES/EBU input.			
		OFF	ENABLE		AES/EBU input is used. * When set to ENABLE, AES/EBU input is the audio signals on the S-2416's INPUT 25 through 32.
		ON	DISABLE		AES/EBU input is not used.
6	AES/EBU OUTPUT	This sets the channels used for outputting AES/EBU output.			
		OFF	1–8		Output channels 1 through 8 are output. The same signals as on OUTPUT 1 through 8 are output.
		ON	17–24		Output channels 17 through 24 are output.
7	SAMPLE RATE	This sets the sync signal when the REAC mode of the S-2416 is set to "master," or when the REAC mode is set to "slave" and [MODE] switch 1 is set to ON.			
		7: OFF	8: OFF	96 kHz	The internal 96-kHz sync signal is used.
		7: OFF	8: ON	48 kHz	The internal 48-kHz sync signal is used.
8		7: ON	8: OFF	44.1 kHz	The internal 44.1-kHz sync signal is used.
		7: ON	8: ON	WORD CLOCK	The unit is synced to the word-clock signal from an external device.

Preparations for Power-Up

Connecting the Power Cord

Connect the included power cord to the AC IN connector on rear panel. Be sure to use the included power cord for connecting the power supply.
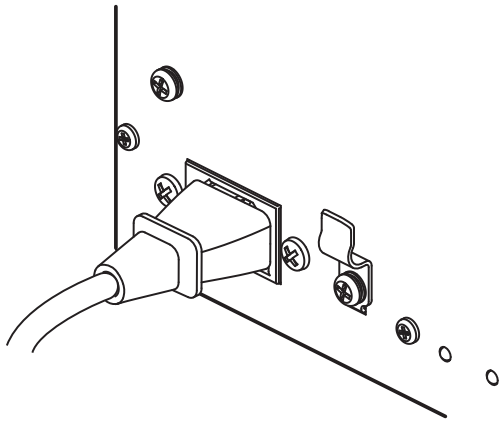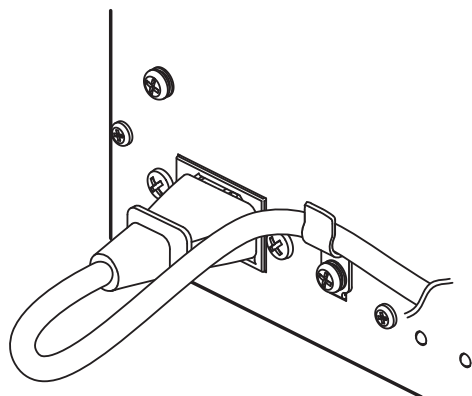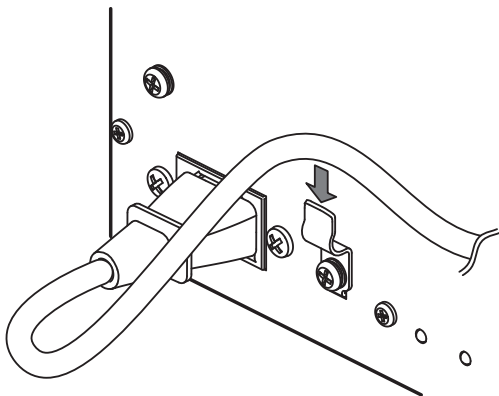
NOTE

Be sure to connect the power plug only to a power outlet that meets the specifications given on the rating plate. The rating plate is located on the rear panel.

About Cord Hook

Secure the power cord in place using the cord hook as shown below.

This can help prevent power loss due to the plug being pulled out if the power cord is accidentally yanked.

Turning the Power On and Off

* Before turning the unit on/off, always be sure to turn the volume down. Even with the volume turned down, you might hear some sound when switching the unit on/off. However, this is normal and does not indicate a malfunction.

Turning the power on

* Once everything is properly connected (p. 17), be sure to follow the procedure below to turn on their power. If you turn on equipment in the wrong order, you risk causing malfunction or equipment failure.

1. **Turn on the power to equipment connected to INPUT on the S-2416.**

2. **Turn on the [POWER] switch on the S-2416.**
   The POWER indicators (front and rear) light up.

   Rear panel
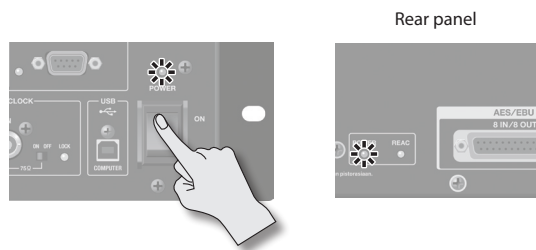
   * This unit is equipped with a protection circuit. A brief interval (a few seconds) after turning the unit on is required before it will operate normally.

3. **Turn on the power to equipment (such as power amplifiers and monitor speakers) connected to OUTPUT on the S-2416.**

Turning the power off

1. **Lower the volume and turn off the power to equipment (such as power amplifiers and monitor speakers) connected to OUTPUT on the S-2416.**

2. **If you're using an S-4000R unit, press the [LOCK] button on the S-4000R to switch locking on or off.**
   This turns locking off if currently on, or on if currently off.

   The parameter settings on the S-2416 are saved in the S-2416 unit when this switching takes place.

3. **Turn off the [POWER] switch on the S-2416.**
   The POWER indicators (front and rear) go dark.

4. **Turn off the power to equipment connected to INPUT on the S-2416.**

   * If you need to turn off the power completely, first turn off the unit, then unplug the power cord from the power outlet. Refer to "To completely turn off power to the unit, pull out the plug from the outlet" (p. 3).

Connecting REAC Devices

Cables for REAC Connections

With Digital Snake and V-Mixing Systems, digital transmission of audio signals is performed by means of REAC (Roland Ethernet Audio Communication). Compared to analog transmission, this system is extremely resistant to external noise, but in very rare instances, noise can occur. Selection of the wrong cable and incorrect cable handling can cause noise. Observe the following points when using cables.

- Ensure that the cables used for connections conform to the Cat5e (Enhanced Category 5) standard.
- Ensure that cable length does not exceed 100 meters per connection.
- When using a terminal plate or other such passive-type cable-extending connector, problems can occur even when length is less than 100 meters. Keep the total cable length of the entire chain as short as possible.
- Do not use cables with cut or torn covering.
- Do not step on cables or subject them to undue stress.
- Do not wind cables too tightly or sharply bend them.

To maintain transmission quality, use of the following optional REAC cables is recommended.

100 m	SC-W100S (cable only) or W100S-R (with reel)
20 m	SC-W20F

Connecting to an V-Mixer

When Not Using AES/EBU INPUT

S-2416: Slave

V-Mixer: Master

S-2416 settings

[REAC MODE] switch	**Setting**	S (Slave)

[MODE] switch		**Setting**	
1	REAC SLAVE MODE	OFF	CLOCK SLAVE

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

V-Mixer settings

Set the REAC mode to FOH.

When Using AES/EBU INPUT

AES/EBU

IN

S-2416: Slave

IN

Mixer, etc.

Word-clock generator

V-Mixer: Master
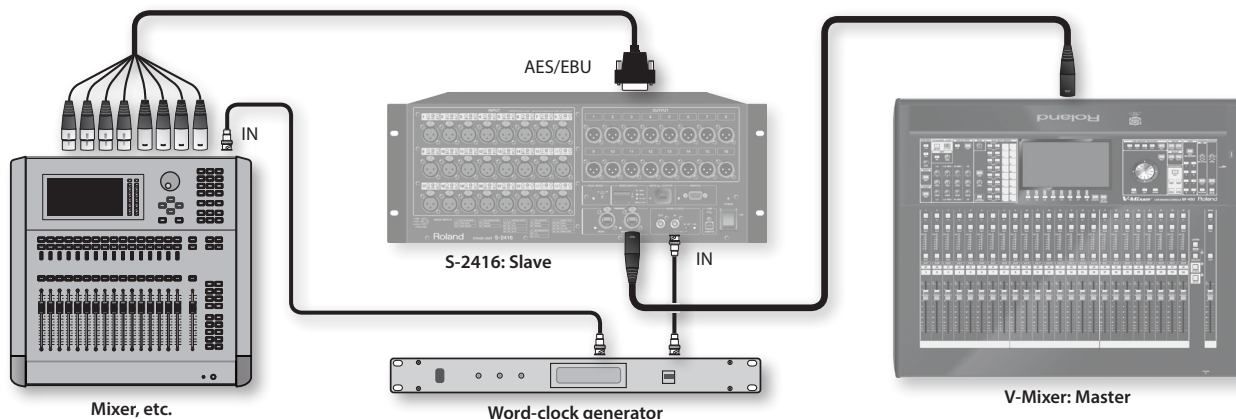
S-2416 settings

[REAC MODE] switch	Setting	S (Slave)

[MODE] switch		Setting	
1	REAC SLAVE MODE	ON	CLOCK MASTER
5	AES/EBU INPUT	OFF	ENABLE
7	SAMPLE RATE	ON	WORD CLOCK
8		ON	

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

V-Mixer settings

Set the REAC mode to FOH A (External Clock) or FOH B (External Clock).

NOTE

- Word-clock frequencies that can be used for synchronization are 96, 48, and 44.1 kHz.
- Some V-Mixer models do not support 96 kHz.

When Making a Cascade Connection

With the S-2416, you can make a cascade connection using the REAC BACKUP port.

This section gives an overview of the settings when connecting the V-Mixer with a cascade connection to an S-1608 unit.

S-1608: Slave

S-2416: Slave

V-Mixer: Master

S-2416 settings

[REAC MODE] switch	Setting	S (Slave)

[MODE] switch		Setting	
2	REAC BACKUP MODE	ON	CASCADE
3	CASCADE OUTPUT	Set according to the application	
4			
5	AES/EBU INPUT	ON	DISABLE

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

V-Mixer settings

Set the REAC mode to FOH.

S-1608 settings

Set the [REAC MODE] switch to S (slave).

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

With these connections and settings, the S-2416 adds the 16 inputs of the S-1608 after the S-2416's 24 inputs, and sends them to the V-Mixer.

When Also Using AES/EBU INPUT with a Cascade Connection

This gives an overview of the settings when connecting the V-Mixer with a cascade connection to an S-0816 unit.
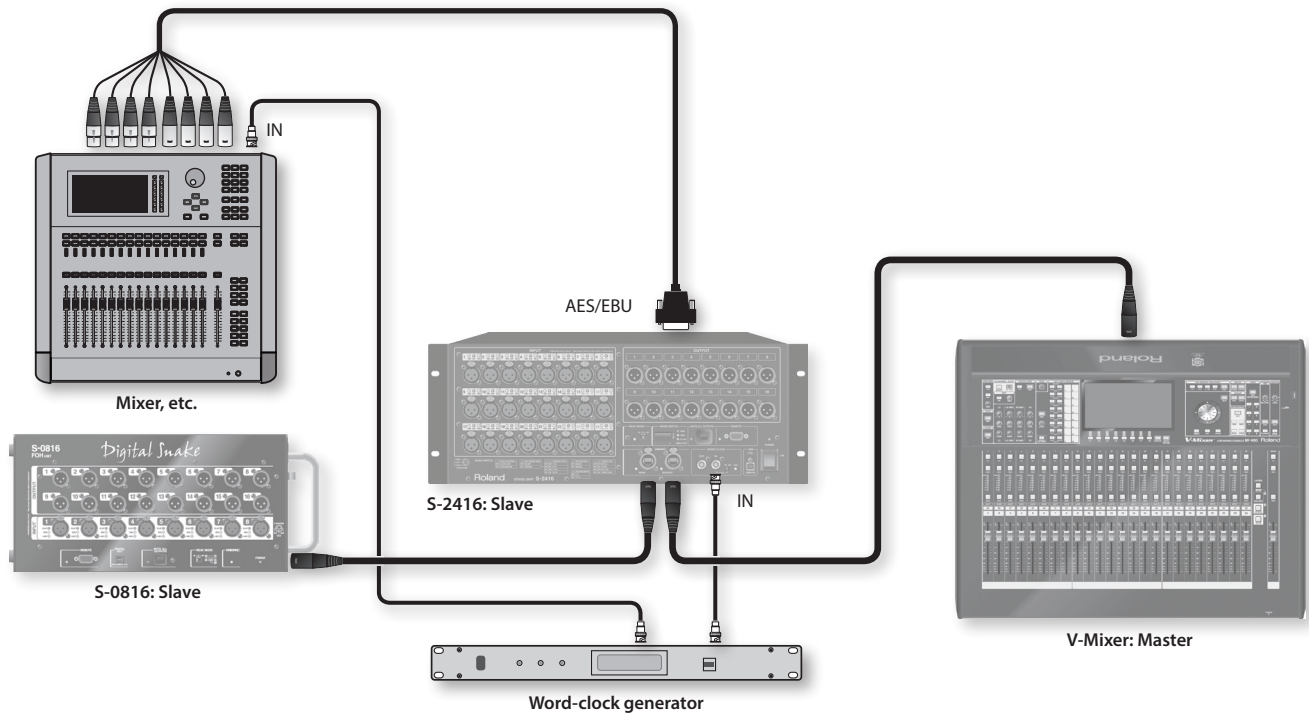
AES/EBU INPUT is the audio signals of inputs 25 through 32 on the S-2416.

S-2416 settings

[REAC MODE] switch	Setting	S (Slave)

[MODE] switch		Setting	
1	REAC SLAVE MODE	ON	CLOCK MASTER
2	REAC BACKUP MODE	ON	CASCADE
3	CASCADE OUTPUT	Set according to the application	
4			
5	AES/EBU INPUT	OFF	ENABLE
7	SAMPLE RATE	ON	WORD CLOCK
8		ON	

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

V-Mixer settings

Set the REAC mode to FOH A (External Clock) or FOH B (External Clock).

NOTE

• Word-clock frequencies that can be used for synchronization are 96, 48, and 44.1 kHz.

• Some V-Mixer models do not support 96 kHz.

S-0816 settings

Set the [REAC MODE] switch to S (slave).

NOTE

Change the setting of the [REAC MODE] switch while the S-0816 is powered down.

With these connections and settings, the S-2416 adds the 8 inputs of the S-1608 after the S-2416's 32 inputs, and sends them to the V-Mixer.

When Using Duplex REAC Lines

If the REAC MAIN signal is interrupted, communication automatically switches to REAC BACKUP.
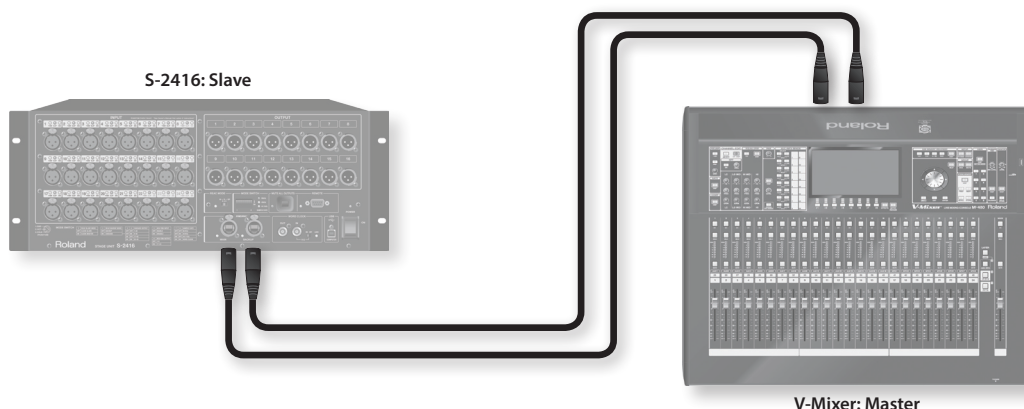
S-2416: Slave

V-Mixer: Master

S-2416 settings

[REAC MODE] switch	Setting	S (Slave)

[MODE] switch		Setting	
1	REAC SLAVE MODE	OFF	CLOCK SLAVE
2	REAC BACKUP MODE	OFF	BACKUP

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

When Using a Split Connection

S-2416: Split

S-2416: Slave

S-4000D
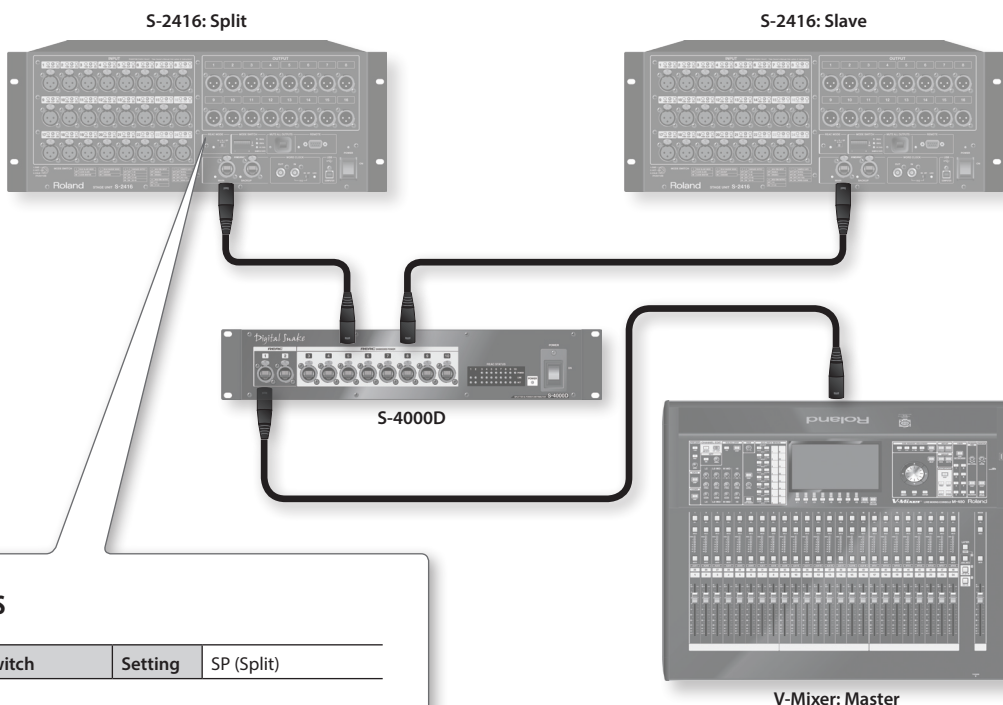
S-2416 settings

[REAC MODE] switch	Setting	SP (Split)

V-Mixer: Master

NOTE

- Change the setting of the [REAC MODE] switch while the S-2416 is powered down.
- When a split connection is used, incoming audio signals at INPUT on the S-2416 are not sent to the V-Mixer. They are output only from OUTPUT (including AES/EBU OUTPUT).

When Connecting S-2416 Units to One Another
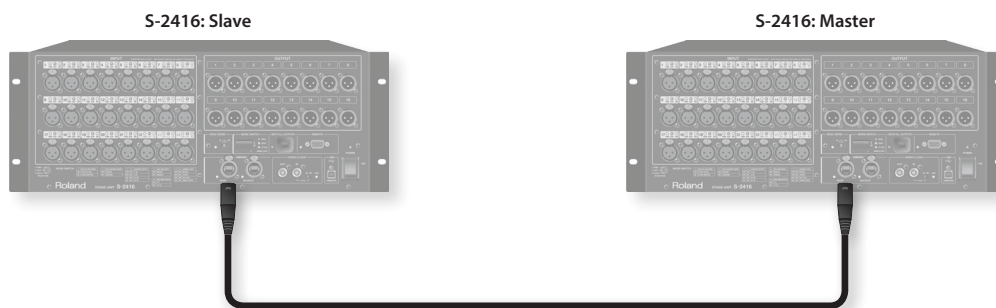
S-2416: Slave   S-2416: Master

NOTE

Change the setting of the [REAC MODE] switch and [MODE] switch while the S-2416 is powered down.

Slave-unit settings

[REAC MODE] switch	Setting	S (Slave)

[MODE] switch		Setting	
1	REAC SLAVE MODE	OFF	CLOCK SLAVE
2	REAC BACKUP MODE	OFF	BACKUP
6	AES/EBU OUTPUT	ON	17-24

Audio signals input via INPUT 17 through 24 on the master unit are output from AES/EBU OUTPUT on the slave unit.

Master-unit settings

[REAC MODE] switch	Setting	M (Master)

[MODE] switch		Setting	
6	AES/EBU OUTPUT	ON	17-24

Audio signals input via INPUT 17 through 24 on the slave unit are output from AES/EBU OUTPUT on the master unit.

Connecting Devices

* To prevent malfunction and equipment failure, always turn down the volume, and turn off all the units before making any connections.

* This instrument is equipped with balanced (XLR) type jacks. Wiring diagrams for these jacks are shown on "INPUT/OUTPUT Connector" of "Connector Information"(p. 25). Make connections after first checking the wiring diagrams of other equipment you intend to connect.

Microphone

Powered speaker

Speaker

Power amp
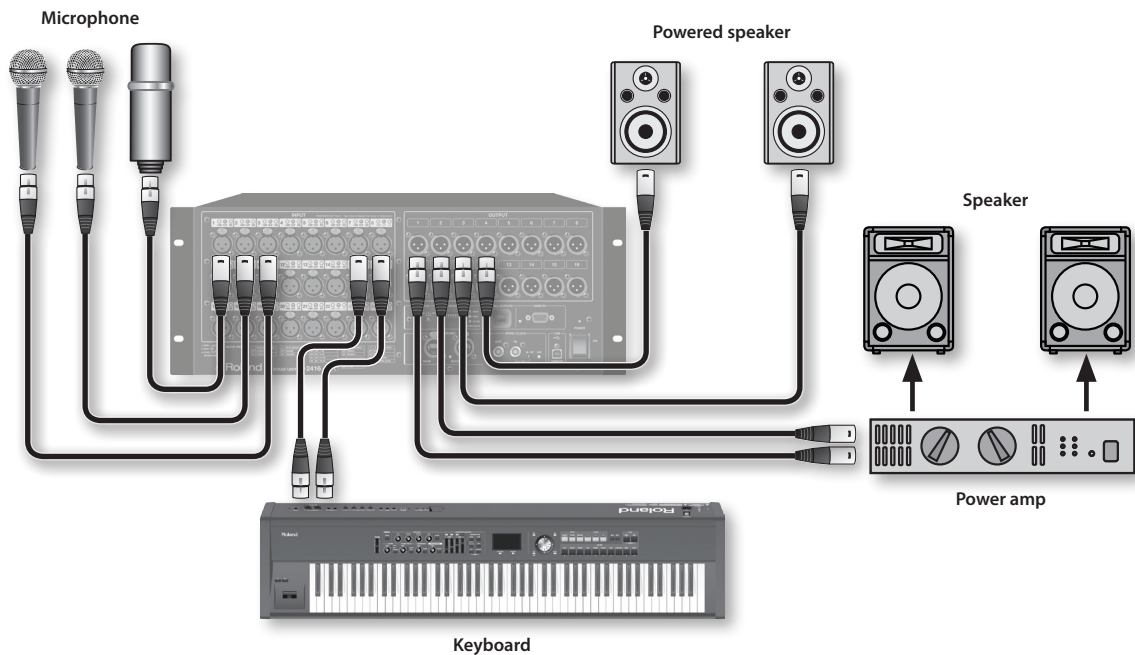
Keyboard

Connecting Input Devices

Connect microphones and keyboards to INPUT 1 through 24.

Use male XLR connectors to make the connections.

* When connection cables with resistors are used, the volume level of equipment connected to the inputs (INPUT 1–24) may be low. If this happens, use connection cables that do not contain resistors.

* When connecting equipment that has unbalanced output, actual volume is lower than the volume level set using the preamp on the S-2416 (This is not a malfunction).

MEMO

• You can supply +48 V phantom power from the XLR connectors at INPUT 1 through 24. When a condenser microphone or the like is connected and supplying phantom power is required, switch it on by remote control. Refer to "Making Settings for the Input Channels"(p. 19).

• Preamp gain and phantom power on/off settings made by remote control remain in memory after the power to the S-2416 is switched off. You can ensure that the settings are stored in memory by locking the remote control before switching off the power.
(Example) If you're using the S-4000R:
Press the [LOCK] button to make it light up, wait several seconds, then power off the S-2416.

Connecting Output Devices

Connect amps and powered speakers to OUTPUT 1 through 16.

OUTPUT 1 through 16 on the S-2416 are male connectors. Use female XLR connectors to make the connections.

The signal level that is output is +4 dBu (nominal, maximum output: +22 dBu).

If the input to the connected amps or powered speakers is too high and the audio output is distorted, adjust the gain using the input attenuator for the amp.

* Acoustic feedback could be produced depending on the location of microphones relative to speakers. This can be remedied by:

• Changing the orientation of the microphone(s).

• Relocating microphone(s) at a greater distance from speakers.

• Lowering volume levels.

Connecting Digital Devices

When connecting digital equipment, use a commercially available breakout cable and make the connection to the AES/EBU connector.

* The AES/EBU connector is a 25-pin D-sub female connector wired as shown in "AES/EBU connector" in "Connector Information"(p. 25). Check the wiring of cables and equipment before connecting them.

* When using a commercially available breakout cable, check its wiring before purchase.
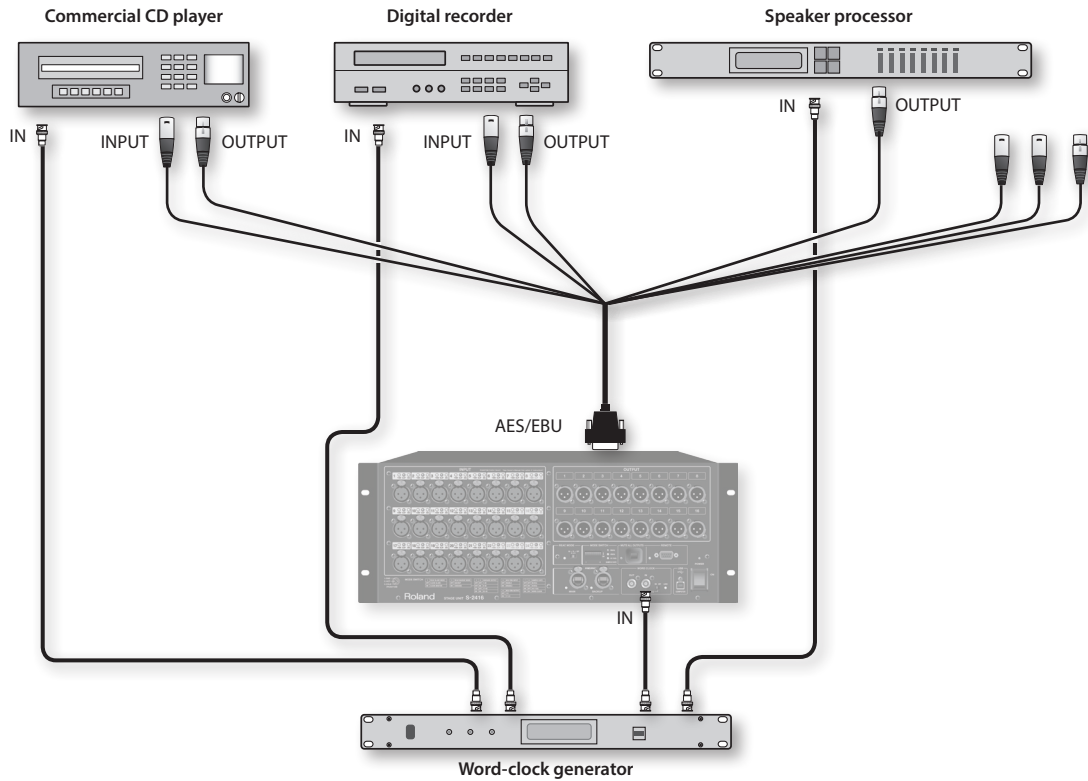
AES/EBU INPUT Settings

NOTE

The S-2416 has no built-in sampling-rate converter.

When using AES/EBU INPUT, sync the S-2416 to the word-clock signal from the external device.

When using AES/EBU INPUT, set the [MODE] switches on the S-2416 as shown below.

[MODE] switch		Setting	
5	REAC BACKUP MODE	OFF	BACKUP
7	SAMPLE RATE	ON	WORD CLOCK
8		ON	

AES/EBU INPUT is the audio signals of inputs 25 through 32 on the S-2416.

* No gain setting can be made for AES/EBU INPUT.

AES/EBU OUTPUT Settings

The output channels for AES/EBU OUTPUT are set using [MODE] switch 6.

Making Settings for the Input Channels

Making Settings Using an S-4000R

The S-4000R is a dedicated remote controller for digital snake devices.

Connect the S-4000R to the REMOTE connector on the S-2416 using the RS-232C cable.
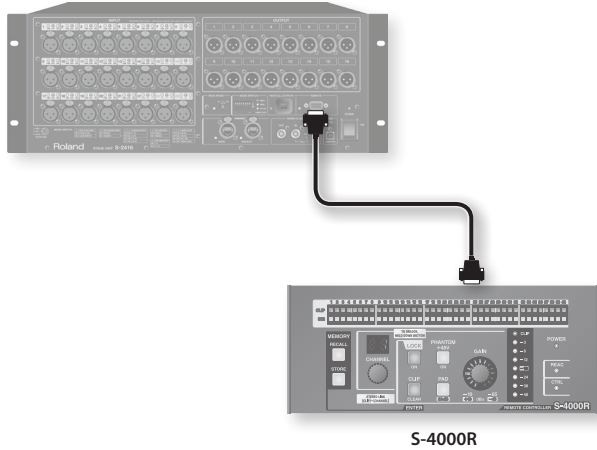
S-4000R

Unlocking

To change various settings on the digital snake device, unlock the S-4000R.

When the [LOCK] button is illuminated, operation is locked and no setting operations can be carried out.

Hold down the [LOCK] button for few seconds, and make sure its light goes dark.
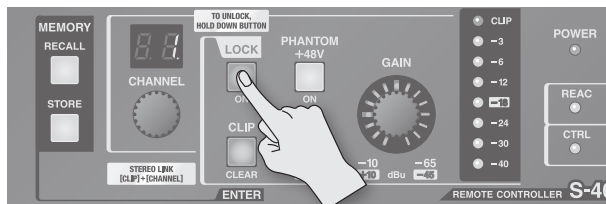
MEMO

To keep settings from being changed by inadvertent operation, it's a good idea to engage the lock when you have finished making the input channel settings. Press the [LOCK] button to engage the lock and make the button light up.

NOTE

When a V-Mixer is connected as a REAC master device, using an S-4000R or S-4000RCS to control the S-2416 is not possible.

In such cases, make the settings using the V-Mixer.

Adjusting the Preamp Gain

You can adjust the preamp gain on the S-2416 before sending the signal to a mixer.

1. Turn the [CHANNEL] knob to select the number of the channel whose settings you want to change.
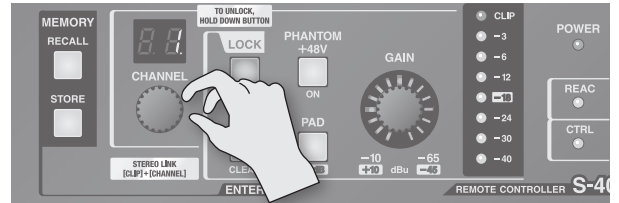
2. Input the audio on the selected channel from the source devices.

3. Turn the [GAIN] knob to adjust the gain level.

The indicators around the knob indicate the gain level. The input level on the select channel is displayed by the input level meter.

4. Turn the [CHANNEL] knob to select another channel.

5. Repeat steps 2–4.

MEMO

• If the input level reaches 0 dB, the [CLIP] area of the input level meter and the [CLIP] area of the signal status indicator light up. If this happens, the audio may be distorted. To transmit high-quality audio, adjust the preamp gain so that the peak level on the input level meter fluctuates between -18 and -3 dB.

• To make the illuminated [CLIP] indicators go dark, press the [CLIP CLEAR/ENTER] button.

Switching the Gain Range (Pad)

You can switch the pad on and off to change the variable range of the preamp gain for individual channels.

When the pad is on, a pad of 20 dB is applied to the input level on the channel.

If CLIP lights up even when the [GAIN] knob has been turned all the way counterclockwise to minimize the preamp gain, engage the pad on the channel.

1. **Turn the [CHANNEL] knob to select the number of the channel whose settings you want to change.**
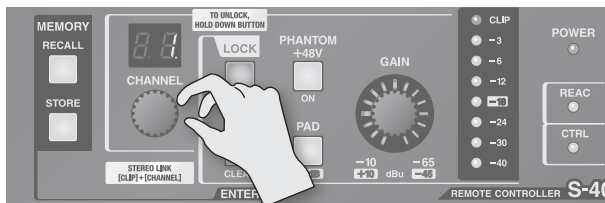
2. **Press the [PAD] button.**

The button lights up and the input level on the channel is lowered.
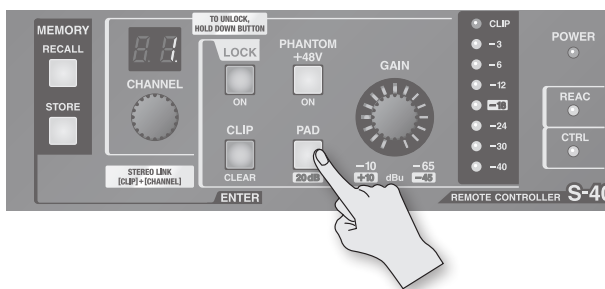
* To suppress noise when the pad is switched on or off, the audio on the selected channel is momentarily muted.

3. **If you want to engage pads on other channels as well, repeat the steps 1 and 2.**

Supplying Phantom Power

You can supply phantom power from the S-2416 when a condenser microphone or other device requiring +48 V of power is connected.

NOTE

Be sure to switch off phantom power when no device requiring +48 V phantom power is connected. Inadvertently supplying phantom power to a dynamic microphone, audio playback device, or other equipment may cause malfunction. Carefully check the documentation included with the microphone or other equipment you're using to determine its specifications.

(Phantom power supplied by the S-2416: +48 V DC at 14 mA maximum on each channel)

1. **Turn the [CHANNEL] knob to select the number of the channel on which you want supply phantom power.**
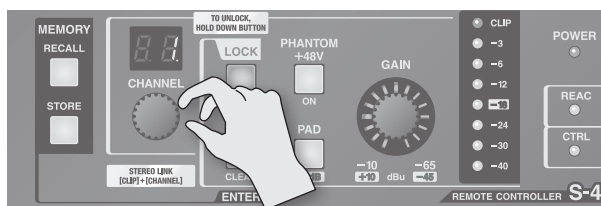
2. **Press the [PHANTOM/+48 V] button.**

The button lights up and +48 V phantom power is supplied on the selected channel.
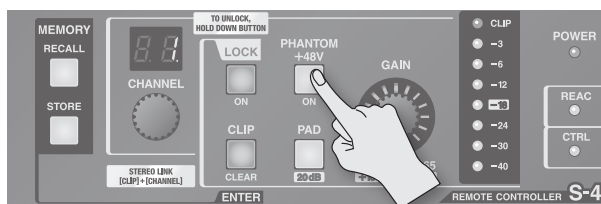
* To suppress noise when phantom power is switched on of off, the audio on the selected channel is temporarily muted.

3. **If you want to supply phantom power on other channels as well, repeat the steps 1 and 2.**

Manipulating Two Channels As a Pair (Stereo Link)

Using the Stereo Link feature lets you simultaneously manipulate two adjacent channels, one odd-numbered and one even (1 and 2, 3 and 4, 5 and 6, or 7 and 8).

Use this when you're inputting a stereo sound source to the S-0808. When Stereo Link is on, the gain, pad, and other settings made on the odd-numbered channel are automatically copied to the even-numbered channel.

Switching On Stereo Link

1. **Turn the [CHANNEL] knob to select one of the channels you want to link.**

If you want to link channels 7 and 8, choose [07] or [08].
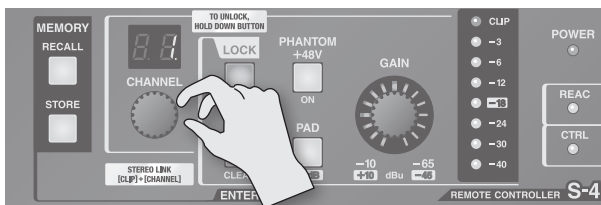
2. **Hold down the [CLIP CLEAR/ENTER] button and turn the [CHANNEL] knob clockwise.**

This switches on Stereo Link.

3. **Release the [CLIP CLEAR/ENTER] button.**

When you release the [CLIP CLEAR/ENTER] button, while the stereo link is on, two periods (".") appear in the channel number shown on the numerical display.

(Example) When ch 7 and 8 are linked

Switching Off Stereo Link

NOTE

Switching off Stereo Link does not make the values and other settings go back to what they were before Stereo Link was switched on. The values made while linked remain in effect.

1. **Turn the [CHANNEL] knob to select one of the channels you want to unlink.**

2. **Hold down the [CLIP CLEAR/ENTER] button and turn the [CHANNEL] knob counterclockwise.**

This switches off Stereo Link.

3. **Release the [CLIP CLEAR/ENTER] button.**

When you release the [CLIP CLEAR/ENTER] button, while the stereo link is off, the two periods that are displayed disappear from the numerical display.

MEMO

Even when Stereo Link is on, you can still switch +48 V phantom power on and off independently for individual channels.

Making Settings Using S-4000RCS

You can also use the dedicated S-4000RCS remote-control software for digital snake devices to make the various settings for the input channels.

Making settings using S-4000RCS offers the following advantages.

- You can view a list of the input levels on all channels.
- You can set and view a list of parameters (phantom power, pad, etc.) on all channels.
- You can save and recall up to 100 settings.
- If your computer has multiple RS-232C ports or USB ports, you can control more than one system (up to four).

Download S-4000RCS software and the user guide from the following Roland website.

http://www.roland.com/support/

* Refer to the User Guide of S-4000RCS for details of operations and system requirements.

Connecting a Computer to the REMOTE Connector

Make the connection to the computer using an RS-232C cable (9-pin D-sub, female-male, straight).

* RS-232C cable length should be 15 meters or shorter.
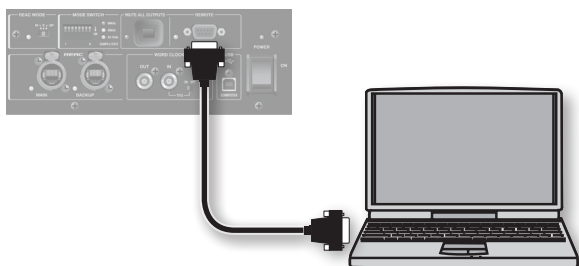
Connecting a Computer to the USB Port

Make the connection to the computer using a commercially available USB cable.

NOTE

Using S-4000RCS with a computer connected via USB requires first installing system files on the computer.

Download them from the Roland website.

Making Settings Using the V-Mixer

You can make various settings for the input channel at the operation screen on the Roland V-Mixer.

Connect the V-Mixer to the S-2416, then make various settings at the CHANNEL DISPLAY screen.
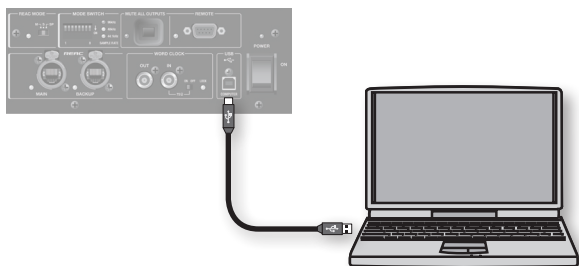
Appendix

Troubleshooting

Problem	Items to check	Action	Page
power won't turn on	A power cord other than the included item is being used.	Use the included power cord.	–
	The power cord is damaged.	Replace with a new power cord. Consult with your retailer, the nearest Roland Service Center, or an authorized Roland distributor, as listed on the "Information" sheet.	–
No input or output is possible	The operation mode has not been set correctly.	REAC has the following three operation modes, and the mode setting for each connected REAC device must be made correctly. Making the wrong settings may result in incorrect audio input and output. M — The unit functions as a REAC master device. S — The unit functions as a REAC slave device. SP — The unit functions as a REAC split device.	p. 8
	Output patching has not been set correctly.	If the unit is connected to a V-Mixer, check Output Patchbay on the V-Mixer.	–
The volume of the device connected to INPUT 1–24 is too low	Connection cables that contain resistors are being used.	Use a connection cable that does not contain a resistor.	–
	The gain has not been set correctly.	Adjust the preamp gain for the channels.	p. 19 p. 22
No sound is input via AES/EBU INPUT	The unit is not synced to the word-clock signal from an external device.	When using AES/EBU INPUT, sync the S-2416 to the word-clock signal from the external device, and input AES/EBU signals synced to the word-clock signal from the external device.	p. 13 p. 18
	[MODE] switch 5 is set to ON (DISABLE).	Set the [MODE] switch 5 to OFF (ENABLE).	p. 10
Cascade connection is not working	[MODE] switch 2 is set to OFF (BACKUP).	Set the [MODE] switch 2 to ON (CASCADE).	p. 10
The sound contains much noise or distortion	The preamp gain has not been set correctly.	Adjust the preamp gain for the channels. Audio distortion can occur when the preamp gain is too high. The noise ratio rises when the preamp gain is too low.	p. 19 p. 22
	Phantom power is set to ON.	Set phantom power to OFF for devices that do not require phantom power. Supplying phantom power to equipment that does not require such power can cause audio distortion.	p. 20 p. 22
The input channel cannot be set using the S-4000R	The wiring of the connection cable does not match the pin assignment of the REMOTE connector.	Try using the connection cable included with the S-4000R.	–

Main Specifications

Roland S-2416: STAGE UNIT

Number of Channels	32 in 24 out
AD Conversion	Sample Rate: 96.0 kHz, 48 kHz, 44.1 kHz Signal Processing: 24 bits
DA Conversion	Sample Rate: 96.0 kHz, 48 kHz, 44.1 kHz Signal Processing: 24 bits
Frequency Response	-2 dB/+0 dB (Input Gain: +4 dBu, 10 Hz–40 kHz, Sample Rate: 96 kHz, typ.)
Total Harmonic Distortion + Noise	0.007 % (Pad: Off, Input Gain: -10 dBu, 20 Hz–20 kHz, typ.)
Dynamic Range	INPUT jacks (1–24): 110 dB (typ.)
Channel Separation (1 kHz)	INPUT jacks (1–24): 103 dB (Input Gain: +4 dBu, IHF-A, typ.) OUTPUT jacks (1–16): 110 dB (typ.)
Nominal Input Level (Variable)	-65–-10 dBu (PAD: Off) -45–+10 dBu (PAD: On)
Non Clip Maximum Input Level	INPUT jacks (1–24): +28 dBu (1 kHz, 10 kΩ load, typ.)
Input Impedance	INPUT jacks (1–24): 7 kΩ
Nominal Output Level	OUTPUT jacks (1–16): +4 dBu (Load impedance: 10 kΩ, typ.)
Maximum Output Level	OUTPUT jacks (1–16): +22 dBu (Load impedance: 10 kΩ, typ.)
Output Impedance	OUTPUT jacks (1–16): 600 Ω (typ.)
Recommended Load Impedance	OUTPUT jacks (1–16): 10 kΩ or greater
Residual Noise Level (IHF-A, typ.)	OUTPUT jacks (1–16): -84 dBu
Equivalent Input Noise Level (E.I.N.)	INPUT jacks (1–24): -128 dB (Input Gain: -65 dBu, IHF-A, typ.)
Network Latency	375 µs when using REAC cable only (AD to REAC to DA Latency: about 1.2 ms) *1
Connectors	INPUT jacks (1–24): XLR type, balanced, phantom power OUTPUT jacks (1–16): XLR type, balanced AES/EBU connector: DB-25 type REAC port: RJ-45 EtherCon type WORD CLOCK connector: BNC type REMOTE connector: DB-9 type COMPUTER port: USB type B * XLR type: 1 GND, 2 HOT, 3 COLD * Phantom power: DC +48 V (unloaded maximum), 14 mA (maximum load) (All XLR type inputs)
Power Consumption	62 W
Dimensions	482 (W) x 348 (D) x 177 (H) mm 19 (W) x 13-3/4 (D) x 7 (H) inches (EIA-4U rack mountable)
Weight	9.7 kg 21 lbs 7 oz
Operation Temperature	+0–+40 degrees Celsius +32–+104 degrees Fahrenheit
Accessories	Power cord Owner's manual Rubber foot x 4

*1 When a REAC Splitter S-4000D or a switching hub is used in-line with REAC cables, the network latency will increase by the amount of processing delay introduced by the splitting device itself. The actual delay is dependant upon the specifications of the splitting device, though the maximum delay amount for a single splitting device should be about 200 µs.

* 0 dBu = 0.775 Vrms

* In the interest of product improvement, the specifications and/or appearance of this unit are subject to change without prior notice.

Connector Information

REAC connector

Cat5e crossover wiring

TX+	①	①	TX+
TX-	②	②	TX-
RX+	③	③	RX+
	④	④	
	⑤	⑤	
RX-	⑥	⑥	RX-
	⑦	⑦	
	⑧	⑧	

Cat5e straight wiring

TX+	①	①	TX+
TX-	②	②	TX-
RX+	③	③	RX+
	④	④	
	⑤	⑤	
RX-	⑥	⑥	RX-
	⑦	⑦	
	⑧	⑧	
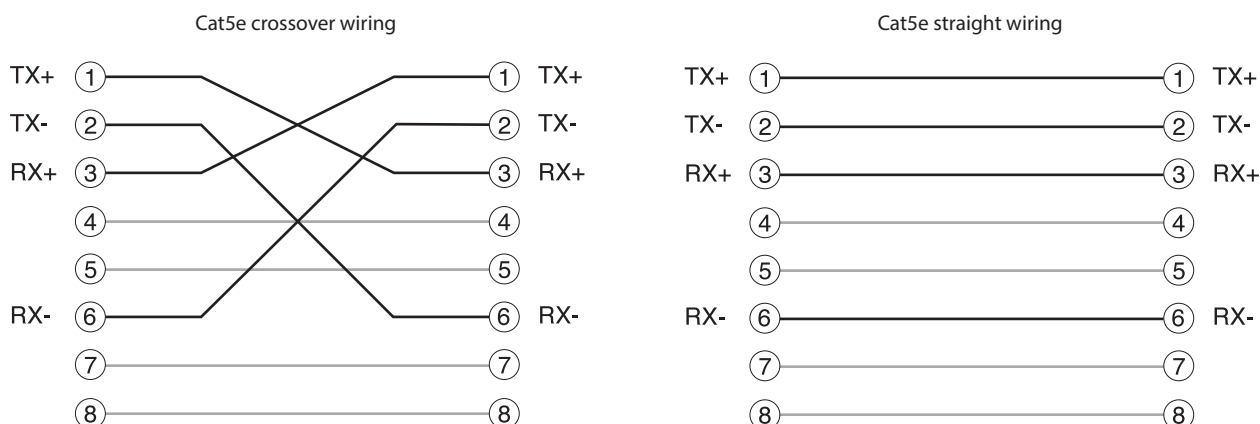
REMOTE connector

* Cable length should be 15 meters or shorter.

Pin No.	Signal
1	NC
2	TxD (Data Out)
3	RxD (Data In)
4	NC
5	GND
6	+5V
7	Short to pin 8
8	Short to pin 7
9	NC

Pins

Included RS-232C cable

INPUT/OUTPUT connector

XLR balanced

GND
1
3 — COLD
2
HOT

XLR unbalanced

GND
1
3
2
HOT
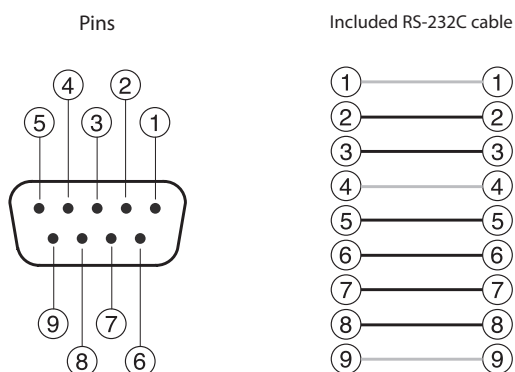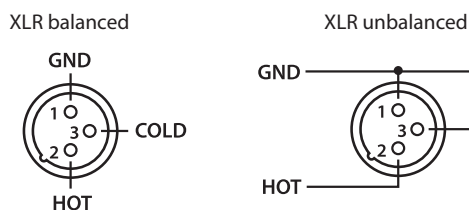
* Connect COLD and GND when connecting XLR unbalanced.

AES/EBU connector

Signal		Data In ch				Data Out ch				Open	GND
		1-2	3-4	5-6	7-8	1-2	3-4	5-6	7-8	9, 11	10, 12, 13, 22, 23, 24, 25
Pin	Hot	1	2	3	4	5	6	7	8		
	Cold	14	15	16	17	18	19	20	21		

Pins

Dimensions

430

328.2

337.2

7

465

101.6

177

482

UNIT: mm

─── **For China** ───

有 关 产 品 中 所 含 有 害 物 质 的 说 明

本资料就本公司产品中所含的特定有害物质及其安全性予以说明。

本资料适用于 2007 年 3 月 1 日以后本公司所制造的产品。

环 保 使 用 期 限

10 此标志适用于在中国国内销售的电子信息产品，表示环保使用期限的年数。所谓环保使用期限是指在自制造日起的规定期限内，产品中所含的有害物质不致引起环境污染，不会对人身、财产造成严重的不良影响。
环保使用期限仅在遵照产品使用说明书，正确使用产品的条件下才有效。
不当的使用，将会导致有害物质泄漏的危险。

产 品 中 有 毒 有 害 物 质 或 元 素 的 名 称 及 含 量

部件名称	有毒有害物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr（VI））	多溴联苯（PBB）	多溴二苯醚（PBDE）
外壳（壳体）	×	○	○	○	○	○
电子部件（印刷电路板等）	×	○	×	○	○	○
附件（电源线、交流适配器等）	×	○	○	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

因根据现有的技术水平，还没有什么物质能够代替它。