Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

SW4 3G HD-SDI

Multi-rate SDI Switcher

Precautions

Safety Instructions • English

⚠ This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

⚡ This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français

⚠ Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

⚡ Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions • Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ou d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Sicherheitsanleitungen • Deutsch

⚠ Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

⚡ Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español

⚠ Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

⚡ Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrian implicar riesgos.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Avertissement

Alimentations• Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de le contourner ni de le désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'il y a remplactment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose entfernen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puenteraia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligroso u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

⚠ 这个符号提示用户该设备用户手册中有重要的操作和维护说明。

⚡ 这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线，避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。 为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。 必须使用与厂家推荐的相同或相近型号的电池。 按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE *This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.*
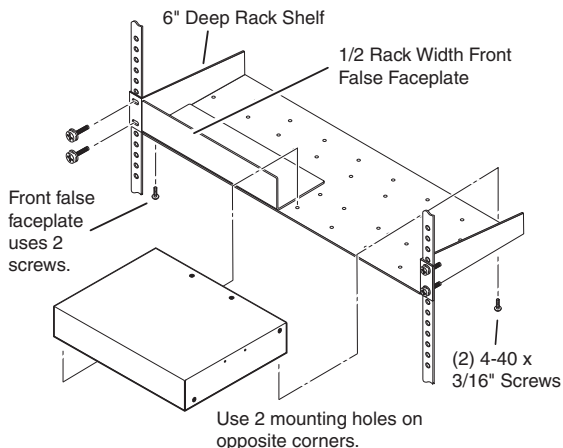
Quick Start Guide — SW4 3G HD-SDI

Installation

Step 1

Turn off all of the equipment and disconnect it from the power source.

Step 2
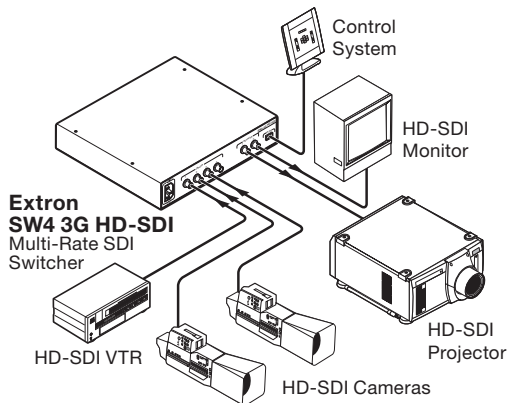
(Optional) Mount the switcher on one of the rack options.

6" Deep Rack Shelf

1/2 Rack Width Front False Faceplate

Front false faceplate uses 2 screws.

(2) 4-40 x 3/16" Screws

Use 2 mounting holes on opposite corners.

Step 3

Connect the video input cable(s). Connect up to four video inputs to the switcher's BNC input connectors 1 through 4. See "Rear Panel Connections" in chapter 2, "Installation and Operation."

Step 4

Attach the video output cable(s). Connect one or two video output devices to the switcher's BNC output connectors (SDI, HD-SDI, or 3G-SDI).

Control System

HD-SDI Monitor

Extron SW4 3G HD-SDI Multi-Rate SDI Switcher

HD-SDI VTR

HD-SDI Cameras

HD-SDI Projector

NOTE *Outputs 1 and 2 output identical signals.*

Step 5

If the switcher is to be connected to a computer or host controller for remote control, wire the provided 3-pole captive screw connector to an RS-232 cable. Connect the cable to the RS-232 port on the switcher's rear panel and to the host's RS-232 port (see the serial port pinout on the next page).
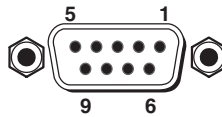
The RS-232 port has the following protocol:

- 9600 baud
- No parity
- 1 stop bit
- 8 data bits
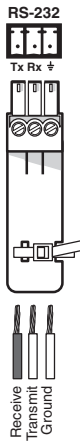
Switcher

RS-232

Tx Rx ⏚

Receive
Transmit
Ground

Computer

5   1

9   6

**DB9 connector (female)
pinout to control equipment**

Pin	RS-232	Function
1	—	—
2	RX	Receive data (+)
3	TX	Transmit data (−)
4	—	—
5	Gnd	Signal ground
6	—	—
7	—	—
8	—	—
9	—	—

See chapter 3, "Serial Communication," for Simple Instruction Set (SIS™) commands to communicate with the switcher via RS-232.

Step 6

Power up the input and output devices, then connect power to the switcher by connecting the provided IEC power cord to the switcher's power connector and to an AC outlet.

Operation — Connecting an Input to the Outputs

Step 1

Determine the necessary operation mode for the switcher (the default mode is **normal**). Choose **auto-input switch mode** (④) to automatically switch to the highest numbered input with active sync pulses. Choose **normal mode** (③) to manually change the input. For details on how to change modes, see "Selecting Auto-input Switch Mode" in chapter 2, "Installation and Operation."

Step 2

Select an input.

- If you are using **normal** mode, select the desired input by pressing and releasing its input button (⑤). The LED (⑦) for the selected input lights.

  To switch to another input, press a different input button.

- If you are using **auto-input switch** mode, no action is necessary. The switcher automatically switches to the highest numbered active input.

  NOTE *Outputs 1 and 2 output an identical signal.*
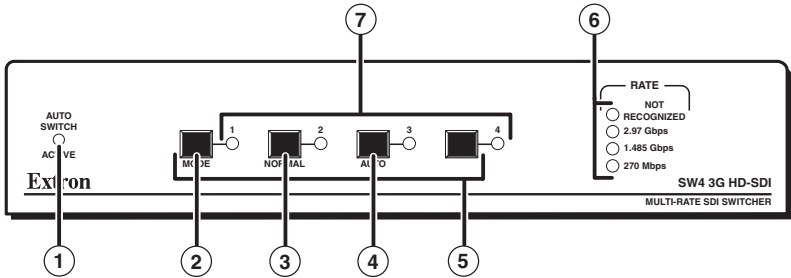
Step 3

If needed, you can create a remote connection via RS-232 (see chapter 3, "Serial Communication").

Quick Start Guide — SW4 3G HD-SDI, cont'd

Table of Contents

Table of Contents, cont'd

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1

Chapter One

Introduction

About this Manual

Features

Introduction

About this Manual

The Extron SW4 3G HD-SDI switcher is a four-input, two parallel output, multi-rate switcher. It allows up to four SDI or HD-SDI video input sources to be switched to two identical outputs on female BNC connectors.
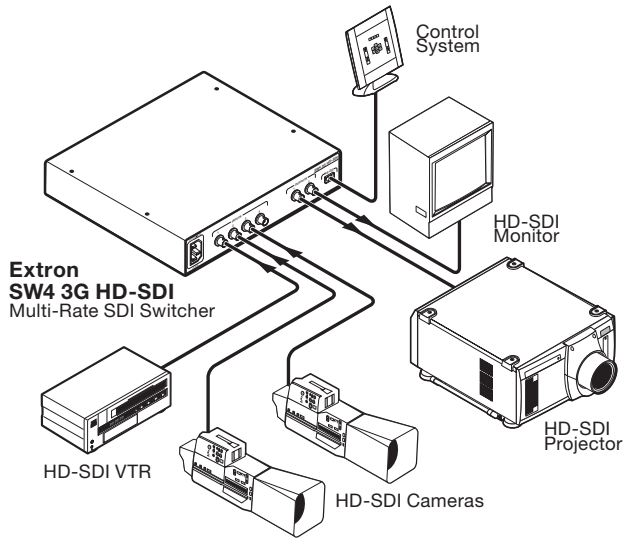
The SW4 HD-SDI supports multiple SDI rates, including 270 Mbits per second, 1.485 Gbps, and 2.97 Gbps.

The switcher can be controlled via the front panel buttons, or via RS-232 communication, using Extron's Simple Instruction Set (SIS™).

It also features an auto-input switch mode that automatically switches to the highest numbered input with active sync pulses present. Executive mode is available to lock out the front panel as a security measure.

Features

- Switches video signals of all common serial digital data rates up to 3G-SDI.

- Inputs: four inputs on female BNC connectors for SDI, HD-SDI, or 3G-SDI digital component video

- Input equalization: each input is equalized, regardless of its rate.

- Outputs: two parallel outputs on female BNC connectors for simultaneous monitor and projector viewing

- Output re-clocking: when the input rate is recognized as 270 Mbps, 1.485 Gpbs, or 2.97 Gbps, the output is re-clocked to the recognized rate.

- An RS-232 port for serial communication and control

- Retention of unit settings after power loss

- Flash upgradeable firmware

- Auto-input switching capability

- 1U, half rack width metal enclosure

- Internal 100-240 V, 50/60 Hz power supply

Control System

HD-SDI Monitor

HD-SDI Projector

Extron
SW4 3G HD-SDI
Multi-Rate SDI Switcher

HD-SDI VTR

HD-SDI Cameras

Application diagram for the SW4 3G HD-SDI switcher

Introduction, cont'd

2

Chapter Two

Installation and Operation

Installation and Operation

Installation Overview

To install and set up the SW4 3G HD-SDI switcher,

1 Mount the switcher on a 6" or 9.5" deep rack shelf, if desired.

2 Connect up to four video inputs to the switcher's BNC input connectors 1 through 4.

3 Connect one or two video output devices to the switcher's BNC output connectors (SDI, HD-SDI, or 3G-SDI).

4 (Optional) Wire the provided 3-pole captive screw plug to your RS-232 cable, and connect the other end of the cable to your computer. (See "Rear Panel Connections," later in this chapter.)

5 Power up the input and output devices.

6 Plug the provided power cord into the switcher's IEC power connector and into an AC outlet.

Rack Mounting

The 1U high, half rack width, SW4 3G HD-SDI switcher can be mounted on a rack shelf or placed on a tabletop. For optional rack mounting, use any of the following rack shelves:

- 1U, 6" deep Universal Rack Shelf Kit, part **#60-190-10** (RSU 126)
- 1U, 6" deep Basic Rack Shelf, part **#60-604-11** (RSB 126)
- 1U, 9.5" deep Universal Rack Shelf Kit, part **#60-190-01**, (RSU 129)
- 1U, 9.5" deep Basic Rack Shelf, part **#60-604-02** (RSB 129)

UL rack mounting guidelines

The following Underwriters Laboratories (UL) requirements pertain to the safe installation of the switcher on a rack.

1. **Elevated operating ambient temperature** — If the equipment is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the switcher in an environment compatible with the maximum ambient temperature (Tma = +122 °F, +50 °C) specified by Extron.

2. **Reduced air flow** — Install the equipment in the rack so that the amount of air flow required for safe operation of the equipment is not compromised.

3. **Mechanical loading** — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.

4. **Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Consider equipment nameplate ratings when addressing this concern.

5. **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

Rack mounting instructions

For optional rack mounting, do not install the rubber feet. Mount the switcher to a rack shelf as follows:

1. If rubber feet are installed on the bottom of the unit, remove them.

2. Mount the switcher on the rack shelf, using two 4-40 x 3/16" screws in opposite (diagonal) corners to secure the switcher to the shelf.

3. Install blank panel(s) or other unit(s) to the rack shelf.
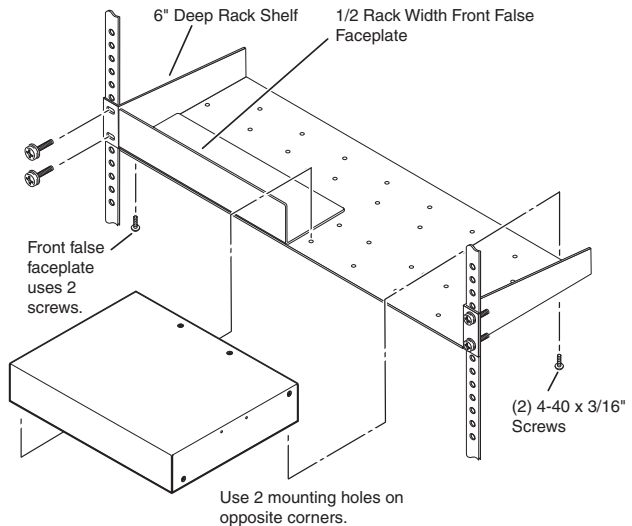
Mounting the switcher on a 6-inch deep rack shelf
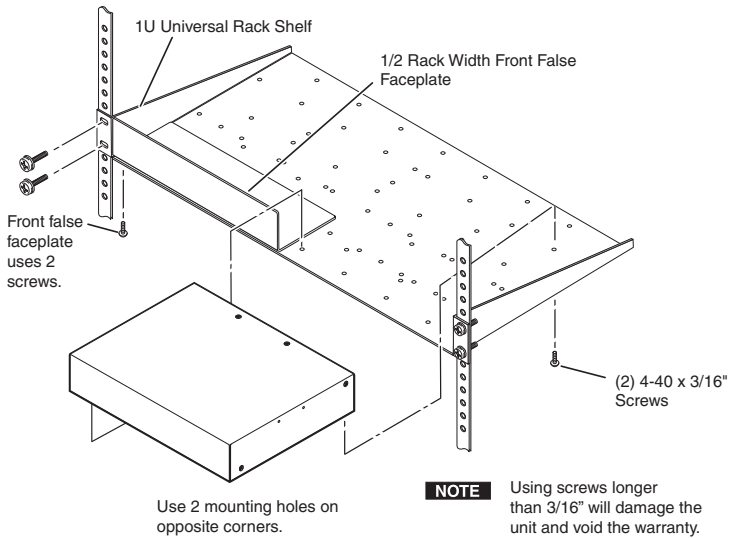
Mounting the switcher on a standard rack shelf

Rear Panel Connections
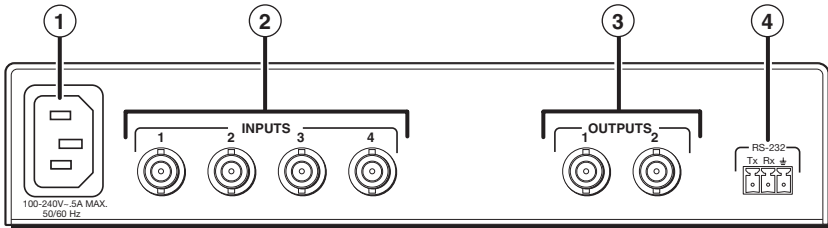
SW4 3G HD-SDI switcher rear panel

1. **Power connector** — Plug the supplied power cord into this male IEC receptacle and into an AC outlet.

2. **SDI Inputs 1 through 4** — Connect SDI, HD-SDI, and/or 3G-SDI video sources to these 75 ohm female BNC connectors.

   NOTE *Each input is equalized, regardless of the rate.*

3. **SDI Outputs 1 and 2** — Connect one or two SDI, HD-SDI, or 3G SDI display devices to these 75 ohm female BNC connectors. The switcher outputs two identical re-clocked SDI signals.

When the input rate is recognized as 270 Mbps, 1.485 Gpbs, or 2.97 Gbps, the output is re-clocked to the recognized rate.

Outputs 1 and 2 simultaneously output identical signals.

④ **RS-232 connector** — Connect a cable with a 3.5 mm, 3-pole captive screw connector to this port for bidirectional RS-232 communication. Wire the connectors as shown in the following figure.

Switcher
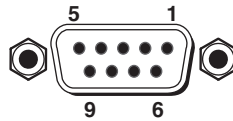
RS-232

Tx Rx ⏚

Receive
Transmit
Ground

Computer

5   1

9   6

**DB9 connector (female)
pinout to control equipment**

Pin	RS-232	Function
1	—	—
2	RX	Receive data (+)
3	TX	Transmit data (−)
4	—	—
5	Gnd	Signal ground
6	—	—
7	—	—
8	—	—
9	—	—

RS-232 connector wiring

This port has the following RS-232 protocol:

- 9600 baud
- 1 stop bit
- No parity
- 8 data bits

See chapter 3, "Serial Communication," for Simple Instruction Set (SIS) commands to communicate with the switcher via RS-232.

Front Panel Controls and Indicators

SW4 3G HD-SDI switcher front panel

① **Auto Switch Active LED** — When lit, this green LED indicates that the switcher is in auto-input switch mode. In this mode, the switcher automatically switches to the highest numbered input with active sync pulses. When this LED is unlit, the switcher is in normal (manual) mode.
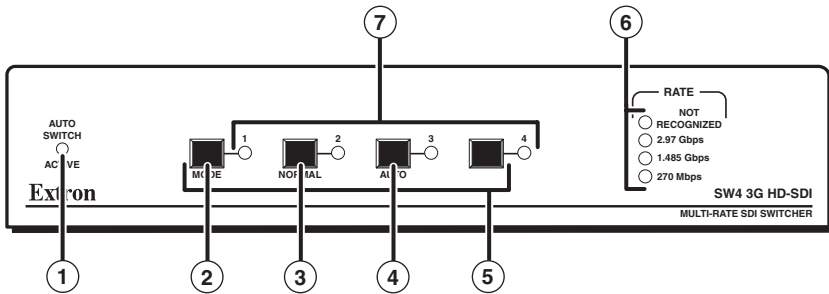
② **Mode button** — The Mode button is used with the Normal button (③) or Auto button (④) to select the switching mode. Mode is a secondary function of the Input 1 button. See "Selecting Auto-input Switch Mode," on the next page.

③ **Normal button** — The Normal button is used with the Mode button (②) to select normal mode. Normal is a secondary function of the Input 2 button.

④ **Auto[switch] button** — The Auto button is used with the Mode button (②) to select the auto-input switch mode. Auto is a secondary function of the Input 3 button.

⑤ **Input buttons 1 through 4** — These buttons select inputs 1 through 4. They are also used to access auto-input switch and executive modes, and to reset the unit to factory defaults.

The Input 1 (②), Input 2 (③), and Input 3 (④) buttons are also used to toggle auto-input switch mode on and off (see "Selecting Auto-input Switch Mode," on the next page).

⑥ **Rate indicator LEDs** — These four LEDs light to indicate the incoming SDI rate: Not Recognized (a rate other than those represented by the other three LEDs), 2.97 Gbps, 1.485 Gbps, or 270 Mbps (Mbits per second).

When the switcher detects a valid rate on the input, the signal is equalized and re-clocked to that rate on the output. If the rate is not a valid one, the input is equalized, but is not re-clocked.

⑦ **Input 1 through 4 LEDs** — The Input LEDs indicate the selected input.

Connecting an Input to the Outputs

To create a tie between an input and the outputs,

1. Select the operation mode for the switcher (the default mode is **normal**).

   • Use **auto-input switch mode** if you want the switcher to automatically switch to the highest numbered input with active sync pulses. (See "Selecting Auto-input Switch Mode," later in this chapter.)

   • Use **normal mode** if you want to change the input manually.

2. Select an input.

   • If you are using **normal** mode, select the desired input by pressing and releasing its input button on the front panel. The LED for the selected input lights.

     To switch to another input, press a different input button.

   • If you are using **auto-input switch** mode, no action is necessary. The switcher automatically switches to the highest numbered active input.

   `NOTE` *Outputs 1 and 2 output identical signals.*

3. If needed, create a remote connection via RS-232 (see chapter 3, "Serial Communication").

Selecting Auto-input Switch Mode

To select auto-input switch mode,

1. Press and hold the **Mode (Input 1)** button.

2. While holding down the Mode button, press and hold the **Auto (Input 3)** button.

3. Release the Mode and Auto buttons simultaneously.

See the illustration on the next page.
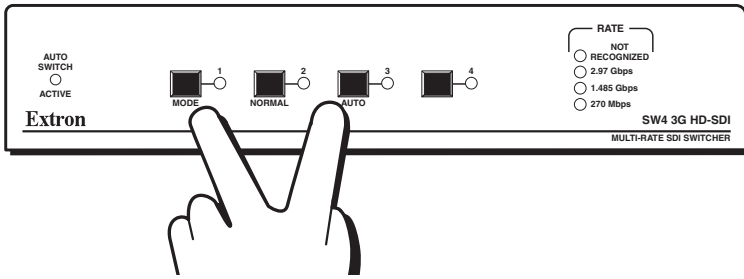
Turning on *auto-input switch mode*

The Auto Switch Active LED lights, indicating that auto-input switching is enabled.

To select normal mode (turn auto-input switch mode off),

1. Press and hold the **Mode (Input 1)** button.

2. While holding down the Mode button, press and hold the **Normal (Input 2)** button.

3. Release the Mode and Normal buttons simultaneously.
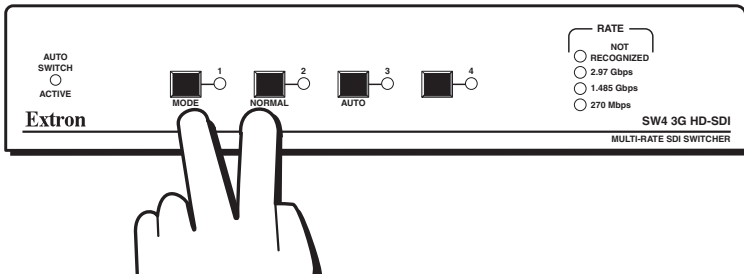
Turning off *auto-input switch mode*

The Auto Switch Active LED turns off, and the switcher switches to the previously selected input.

NOTE *If power is disconnected from the switcher, the unit retains mode and input settings.*

Locking the Front Panel

To prevent front panel input buttons being pressed accidentally or by unauthorized users, you can place the switcher in executive mode.

T**o toggle executive mode on and off**, press the Input 1 button and the Input 4 button simultaneously, and hold them down for 3 seconds. All front panel LEDs flash three times, indicating the mode switch.

If an input button is pressed while the switcher is in executive mode, all front panel LEDs flash once, then the switcher reverts to the currently selected input.

NOTE *RS-232 communication remains enabled while the switcher is in executive mode.*

Resetting

If the switcher needs to be reset to factory defaults, press the Input 1 button and hold it while applying power. All front panel LEDs blink once to indicate that the switcher has been reset.

NOTE *When the switcher is reset, the current build of firmware is used instead of the version that was loaded at the time of manufacture.*

3

Chapter Three

Serial Communication

Setting Up RS-232 Communication

Using Simple Instruction Set (SIS) Commands

Updating the Firmware

Serial Communication

Setting Up RS-232 Communication

The SW4 3G HD-SDI switcher can be configured and controlled by SIS (Simple Instruction Set) commands via the switcher's RS-232 port. This port is used to connect the switcher to a host or external controlling device, such as a computer or control system, that can generate the proper command codes and recognize the switcher's responses.

Wire the RS-232 connector as shown below.

Switcher
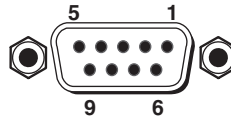
RS-232

Tx Rx ⏚

Receive Transmit Ground

Computer

5   1

9   6

DB9 connector (female)
pinout to control equipment

Pin	RS-232	Function
1	—	—
2	RX	Receive data (+)
3	TX	Transmit data (–)
4	—	—
5	Gnd	Signal ground
6	—	—
7	—	—
8	—	—
9	—	—

RS-232 connector wiring

The serial port has the following RS-232 protocol:

- 9600 baud
- 1 stop bit
- No parity
- 8 data bits

Using Simple Instruction Set (SIS) Commands

Host-to-switcher communications

The Extron Simple Instruction Set (SIS) commands consist of one or more characters per field. No special characters are required to begin or end a command character sequence. When a command is valid, the switcher executes the command and sends a response to the host device. All responses from the switcher to the host end with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. A string is one or more characters.

Switcher-initiated messages

When a local event such as a front panel operation or error condition occurs, the switcher responds by sending a message to the host. The switcher-initiated messages are listed below:

(c) Copyright 2008, Extron Electronics, SW4 3G HD-SDI, V*x.xx*↵

The switcher issues the copyright message when it first powers on. V*x.xx* is the firmware version number.

In*n*↵

The switcher sends the In*n* message whenever the selected input is changed using the front panel buttons. "*n*" is the input number.

Error responses

When the switcher receives a valid SIS command, it executes the command and sends a response to the host device. If the switcher is unable to execute the command because the command is invalid or it contains invalid parameters, the switcher returns an error response to the host. The error response codes are:

E01 – Invalid input channel number (out of range)

E06 – Invalid input channel change (auto-switch active)

E10 – Invalid command

E13 – Invalid parameter

Timeout

Pauses of 10 seconds or longer between command ASCII characters result in a timeout. The command operation is aborted with no other indication.

Serial Communication, cont'd

Using the command/response table

The "Command/response table for SIS commands" begins on page 3-5. The symbols used throughout the table represent variables in the command/response fields. Lower- and uppercase letters are interchangeable, and command and response examples are shown throughout the table.

The ASCII to HEX conversion table below is for use with the command/response table.

ASCII to HEX Conversion Table												Esc	1B	CR	ØD	LF	ØA
	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F
@	4Ø	A	41	B	42	C	43	D	44	E	45	F	46	G	47
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F
P	5Ø	Q	51	R	52	S	53	T	54	U	55	V	56	W	57
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F
`	6Ø	a	61	b	62	c	63	d	64	e	65	f	66	g	67
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F
p	7Ø	q	71	r	72	s	73	t	74	u	75	v	76	w	77
x	78	y	79	z	7A	{	7B			7C	}	7D	~	7E	DEL	7F

Symbol definitions

↵   = CR/LF (carriage return with line feed)

←   = carriage return

•   = space

X1   = Input number (1 through 4)

X2   = On/Off status
     0 = off
     1 = on

X3   = Switch mode
     0 = normal mode
     1 = auto-input switch mode

X4   = Input rate (0 through 3)
     0 = not recognized
     1 = 2.97 Gbps
     2 = 1.485 Gbps
     3 = 270 Mbps (megabits per second) = 0.270 Gbps

Command/response table for SIS commands

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Input selection			
Select an input	X1 !	In X1 ↵	Select input X1. For X1: 1 = input 1. 2 = input 2. 3 = input 3. 4 = input 4.
Video mute			
Mute/unmute video output	X2 B	Vmt X3 ↵	For X3: 0 = off; 1 = on.
Read mute status	B	X3 ↵	Show video mute status.
Front panel lockout			
Turn executive mode on	1x	Exe X2 ↵	For X2: 1 = front panel lockout is on. 0 = front panel lockout if off.
Turn executive mode off	0x	Exe X2 ↵	
View executive mode status	X	X2 ↵	Display front panel lockout on/off status. For X2: 1 = on; 0 = off.
Mode selection			
Normal/auto-input switch mode	X3 #	F X3 ↵	Set to normal or auto-input switch mode. For X4: 1 = normal, 2 = auto.

Command/response table for SIS commands, continued

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
View input signal presence and re-clocker rate			
Request status of all inputs	0LS	$\boxed{X2}$ $\boxed{X2}$ $\boxed{X2}$ $\boxed{X2}$ * $\boxed{X4}$ ↵	Each $\boxed{X2}$ response is the signal status of an input, in order from input 1 to 4. For $\boxed{X2}$: 0 = no signal 1 = signal detected. For $\boxed{X4}$: 0 = unrecognized 1 = 2.97 Gbps 2 = 1.485 Gbps 3 = 270 Mbps
Example	0LS	1011 * 2	Inputs 1, 3, and 4 each have a signal present. Input 2 has no signal. The input signal rate is 1.485 Gbps.
Information requests			
General information	I	In$\boxed{X1}$ • F$\boxed{X3}$ • Vmt$\boxed{X2}$ • Rate $\boxed{X4}$ ↵	
			$\boxed{X1}$ = current selected input 1-4. $\boxed{X3}$ = current mode: 1 = normal; 2 = auto-input switch. $\boxed{X2}$ = video mute status: 0 = off; or 1 = on.
Example	I	In3 • F1 • Vmt0 • Rate1↵	Video is selected on input 2 (V2); switcher is in normal mode (F1); video mute is off (Vmt0); rate is 2.97 Gbps.
Query firmware version	Q	x.xx ↵	View the firmware version number.
Query part number	N	60-xxx-xx↵	View the switcher's part number.

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Updating firmware			
Upload firmware	␛Esc Upload↵	...go Upl↵	Upl ↵ appears after the upload is complete.
Resetting			
Reset switcher to factory settings	␛Esc Zxxx←	Zpx↵	Reset the unit to factory default settings (except for the firmware).

Serial Communication, cont'd

Updating the Firmware

Extron periodically updates product firmware in conjunction with the release of new software revisions. When updating any Extron software to the latest revision level, be sure to read the supplied release notes or contact an Extron Application Engineer to determine if your Extron product requires a firmware update.

You can find out what version of firmware is currently loaded on your switcher by entering the SIS "Q" command via the RS-232 interface (see "Using Simple Instruction Set (SIS) Commands," earlier in this chapter).

Downloading the firmware

To obtain the latest version of firmware for your switcher,

1. Go to the Extron Web site at **www.extron.com** and click the **Download** tab.

2. From the left sidebar menu, click the **Firmware** link.

3. On the next Download Center screen, click the **Download** link for the SW4 3G SD-HDI.

4. On the next screen, enter the requested information, then click the **Download** button below.

5. Follow the instructions on the rest of the download screens to save the executable file to your computer. Note the folder to which you saved the file.

6. In Windows Explorer or another file browser, locate the downloaded executable file, and double-click it to open it.

7. Follow the instructions on the Installation Wizard screens to install the new firmware on your computer. A Release Notes file, giving information on what has changed in the new firmware version, along with a set of instructions for updating the firmware, are also loaded.

Loading the firmware to the switcher

To load a new version of firmware to your SW4 3G SD-HDI, use the Extron Firmware Loader software. Your computer's serial port must be connected to the switcher's RS-232 serial port. See "Rear Panel Connections," in chapter 2, "Installation and Operation," for information on connecting to the serial port.

1. If you have not already done so, download the Firmware Loader installer executable file to your computer (see "Downloading the firmware," earlier in this chapter).

2. If necessary, browse to locate the Firmware Loader executable file in your computer's file system, and double-click on it to open it.

3. Follow the instructions on the Installation Wizard screens to install the Firmware Loader on your computer. Unless you specify otherwise, the installer program places the Firmware Loader file, "FWLoader.exe" at **c:\Program Files\Extron\FWLoader**.

   If the Extron and FWLoader folders do not yet exist in your Program Files folder, the installer creates them.

4. Access the FWLoader.exe file via your desktop Start menu by making the following selections: **Start > All Programs > Extron Electronics > Firmware Loader > Firmware Loader**

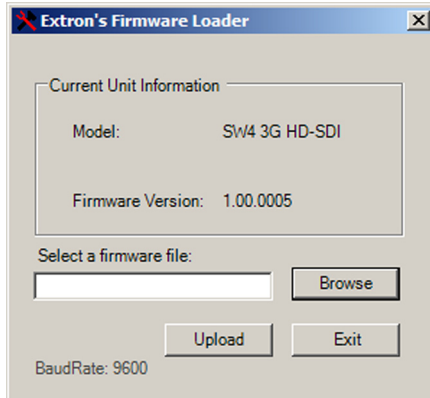5. On the first screen that appears, select the RS-232 tab.

   NOTE *The SW4 3G HD-SDI has no LAN port. Do not select the TCP/IP tab.*

6. From the drop-down menus on the RS-232 screen, select the appropriate Com port number and baud rate (the default is 9600). (The Device selection is optional.)
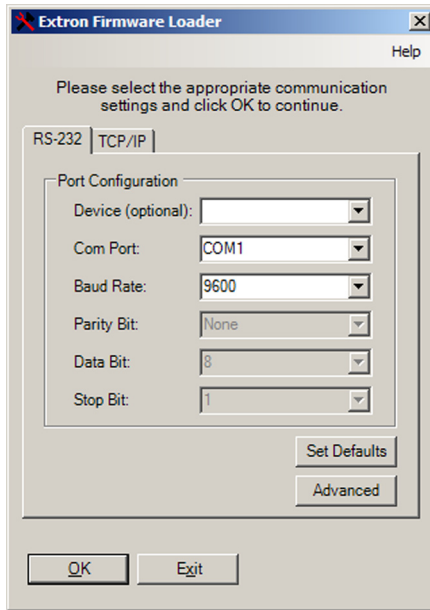
7. Click **OK**. The firmware selection screen appears.
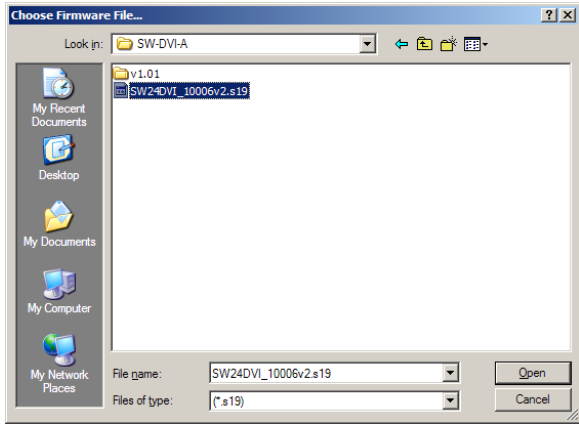

8. Click **Browse** to open the Choose Firmware File window, and locate the firmware file that you downloaded. (By default, the firmware file is placed at **c:\Program Files\ Extron\Firmware** when downloaded from the Extron site.)

CAUTION   *The firmware file must have a .s19 extension. Uploading any other file type could cause the switcher to stop functioning.*

9. On the Choose Firmware File window, double-click on the new firmware file to open it. The Choose Firmware File window closes, and the path to the selected firmware file is displayed in the "Select a firmware file" field on the firmware file selection screen.

10. Click the **Upload** button. A status bar, which shows the progress of the upload, appears in the Firmware Loader window. The firmware upload to the switcher may take several minutes. Once the status bar has progressed fully from left to right, the firmware loader resets the switcher.
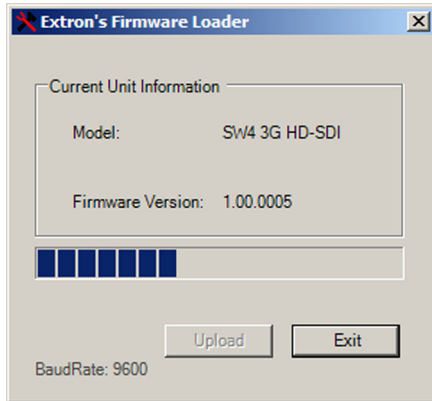
In addition, messages appear on the firmware loader window, indicating when the unit is uploading the firmware, then resetting itself.

CAUTION *Do not interrupt the firmware upload before it is 100% complete. Interrupting the upload corrupts the firmware and the switcher will not operate properly afterwards.*

Serial Communication, cont'd

When the firmware upload process is completed, the message "Transfer Complete!" is displayed, and the new firmware version number appears in the Current Unit Information field.
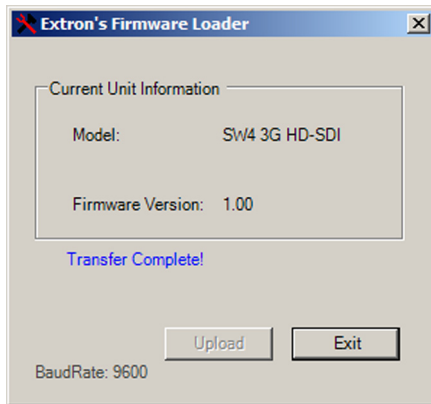
CAUTION *If the Firmware Loader utility exits before the status bar has progressed completely across the indicator window, the firmware may be corrupted and may no longer respond to commands.*

11. Click **Exit** to close the Firmware Loader.

Appendix A

Specifications, Part Numbers, and Accessories

Specifications

Part Numbers

Specifications, Part Numbers, and Accessories

Specifications

Video

Gain .... Unity

Resolution.. 8 or 10 bits, automatic

Operation standards .... SMPTE 259M, SMPTE 292M,
SMPTE 424M, ITU-R BT.601,
ITU-R BT.1120

Auto data rate lock........................ Yes

Video input

Number/signal type..................... 4 single link SDI, HD-SDI, or 3G-SDI
digital component video

Connectors .... 4 female BNC

Data rates.. 19 Mbps to 2.97 Gbps

Input cable equalization............... Automatic for up to -30 dB of cable loss

    HD-SDI .... 120 m (400') using Extron RG6 cable
60 m (200') using Extron RG59 cable

    SDI .... 150 m (500') using Extron RG6 cable
120 m (400') using Extron RG59 cable

Nominal level .... 0.8 Vp-p ± 10%

Minimum/maximum levels........ 0.5 V to 1.0 Vp-p with no offset

Impedance .... 75 ohms

Return loss..................................... <-15 dB, DC @ 1 MHz to 1.5 GHz

Video output

Number/signal type..................... 2 single link SDI, HD-SDI, or 3G-SDI
digital component video

Connectors .... 2 BNC female

Re-clocking..................................... Automatic for 270 Mbps, 1.485 Gbps,
2.97 Gbps, or bypassed for other rates

Nominal level .... 0.8 Vp-p ± 10%

Minimum/maximum levels........ 0.5 V to 1.0 Vp-p

Impedance .... 75 ohms

Return loss .... <-15 dB, DC @ 1 MHz to 1.5 GHz

DC offset .... ±5 mV with input at 0 offset

Control/remote — switcher

Serial control port .... 1 RS-232, 3.5 mm captive screw connector,
3 pole

Baud rate and protocol................. 9600 baud, 8 data bits, 1 stop bit, no parity

Program control............................. Extron's Simple Instruction Set (SIS[™])

General

Power .... 100 VAC to 240 VAC, 50/60 Hz, 4 watts, internal

Temperature/humidity .... Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing

Cooling .... Convection, no vents

Rack mount .... Yes, with optional 1U, 9.5" deep rack shelf, part #60-190-01 (RSU 129) or 60-604-02 (RSB 129); or 1U, 6.0" deep rack shelf, part #60-190-10 (RSU 126) or 60-604-11 (RSB 126)

Enclosure type .... Metal

Enclosure dimensions .... 1.7" H x 8.7" W x 6.0" D (1U high, half rack wide)
(4.3 cm H x 22.1 cm W x 15.2 cm D)
(Depth excludes connectors.)

Product weight .... 1 lb (0.5 kg)

Shipping weight .... 2 lbs (1 kg)

Vibration .... ISTA 1A in carton (International Safe Transit Association)

Regulatory compliance

    Safety .... CE, CUL, UL, C-tick

    EMI/EMC .... CE, C-tick, FCC Class A, VCCI, ICES

    Environmental .... WEEE

MTBF .... 30,000 hours

Warranty .... 3 years parts and labor

NOTE *All nominal levels are at ±10%.*

NOTE *Specifications are subject to change without notice.*

Specifications, Part Numbers, and Accessories

Part Numbers

Included parts

These items are included in each order for an SW4 3G HD-SDI switcher:

Included parts	Part number
SW4 3G HD-SDI	60-956-01
IEC power cord	
(1) Female 3.5 mm, 3-pole captive screw connector with tail	100-456-01
Tweeker (small screwdriver)	
(4) Rubber feet (not attached)	
SW4 3G SD-HDI User's Manual	

Optional accessories

These items are optional accessories that can be used with the SW4 3G HD-SDI switcher:

Accessories	Part number
RG6 non-plenum bulk cable	22-098-0x
RG6 plenum bulk cable	22-164-0x
CTU 300 Universal Crimp Tool	100-241-02
RG6 Universal Crimp Termination Kit	100-267-02
CTU 100 Universal Compression Tool	100-181-01
RG6 Universal Compression Termination Kit	60-538-02
3.5 mm 3-pole captive screw connector, blue, with tail	100-456-01
RSB 126 1U 6" Deep Basic Rack Shelf	60-604-11
RSU 126 1U 6" Deep Universal Rack Shelf Kit	60-190-10
RSU 129 1U 9.5" Deep Universal Rack Shelf Kit	60-190-01
RSB 129 1U 9.5" Deep Basic Rack Shelf	60-604-02

Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America,
and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805, USA

Europe, Africa, and the Middle East:
Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands

Asia:
Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363

Japan:
Extron Electronics, Japan
Kyodo Building
16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.6383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.