KHAV

Cabling Diagrams & Specifications

Standard Installation

Table of Contents

Introduction 3
Network Cabling Infrastructure 4
Audio Cabling Infrastructure 5
Video Cabling Infrastructure 6
Control Cabling Infrastructure 7
CAMX Controller Wiring 8
A/V System Locations & Cable Routing 9
Components List 10
A/V System Components 10
Specifications Cat5e Cabling 13
Specifications RG6/HDMI Cabling 14
Cable Termination 15
Cat5e Cable Terminations 15
RG6 Video Cable Terminations 15
SDI Audio Extractor (25) 16
HDMI to SDI Converter (14) 17
SDI Splitter Connections (15) 17

Introduction

This document contains a template for a possible configuration of a Kingdom Hall Audio / Video system based on the KHAudio application.

KHAudio is a single monolithic application with the following completely integrated features:

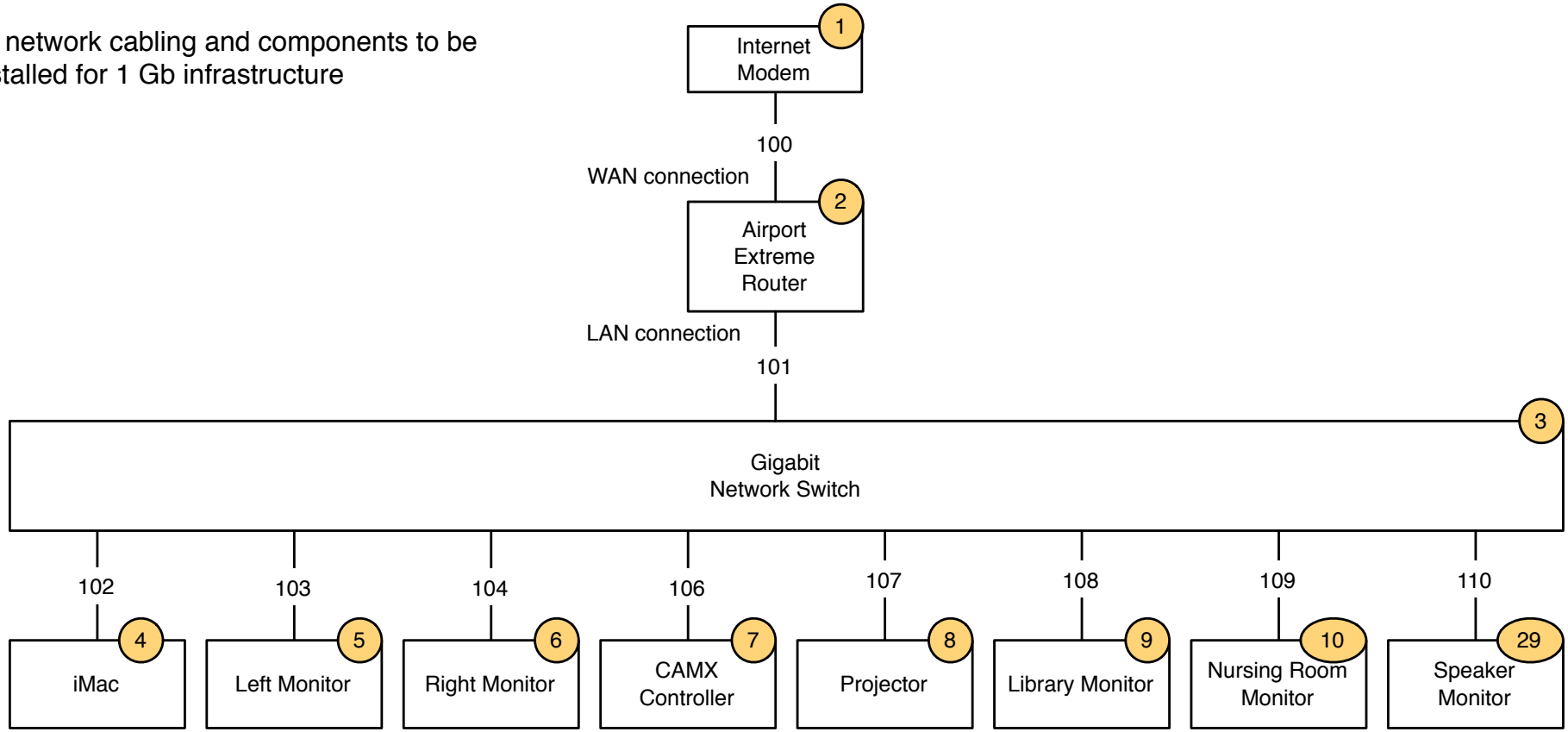
- microphone signal mixing (up to 16 channels)
- song-, background music and external track playback
- recording to date/time stamped MP3 files
- internet based conferencing for shut-ins (eliminating old style telephone lines)
- video, slides and streaming media playback
- playlist handling for more complex presentations (compatible with KHAV Playlist Editor, SL Studio Personal/Group/KH/AH and Cobalt Sound System for AHs)
- direct digital audio connections to KHs on same network (double KHs) or over internet for overflow situations or special programs
- fully configurable audio processing including dyn. voice compression, parametric filtering, equalization, bandpass filtering, tel. compression, FM compression, delays, etc.
- optional auto gating and auto mixing (avoiding unnecessary feedback)
- specific features for KH use like Auto Mute Roving Mics, Auto Recording & Splitting, Auto Conf Connection, etc.
- KHConf and MetroConf real-time callers list and count
- fast setup and configuration with built-in spectrum analyzer
- optional integration with SL Studio KH, leveraging video equipment already present in KHs with sign language congregations
- optional integration with the KH Control System, automatic shutdown of equipment, lighting controls for media presentations

In this doc you will find all the necessary schematics (following branch proposed video infrastructure) for a completely integrated system along with routing schemes, components lists, cable lists, etc. Budgeting can be derived easily from those lists by researching the given part numbers or other specs. Many components can be viewed as optional (dashed outlines) and you can obviously mix and match your specific configuration to your needs. If your KH happens to have an SL Studio KH system and/or a KH Control system, then KHAudio can be configured to integrate with those systems leveraging the already installed infrastructure. This can be useful for automatically switching off lights that interfere with certain presentations, switching certain equipment or sharing video equipment. In such cases all equipment can be controlled from within the KHAudio application. No running around with IR remotes etc.

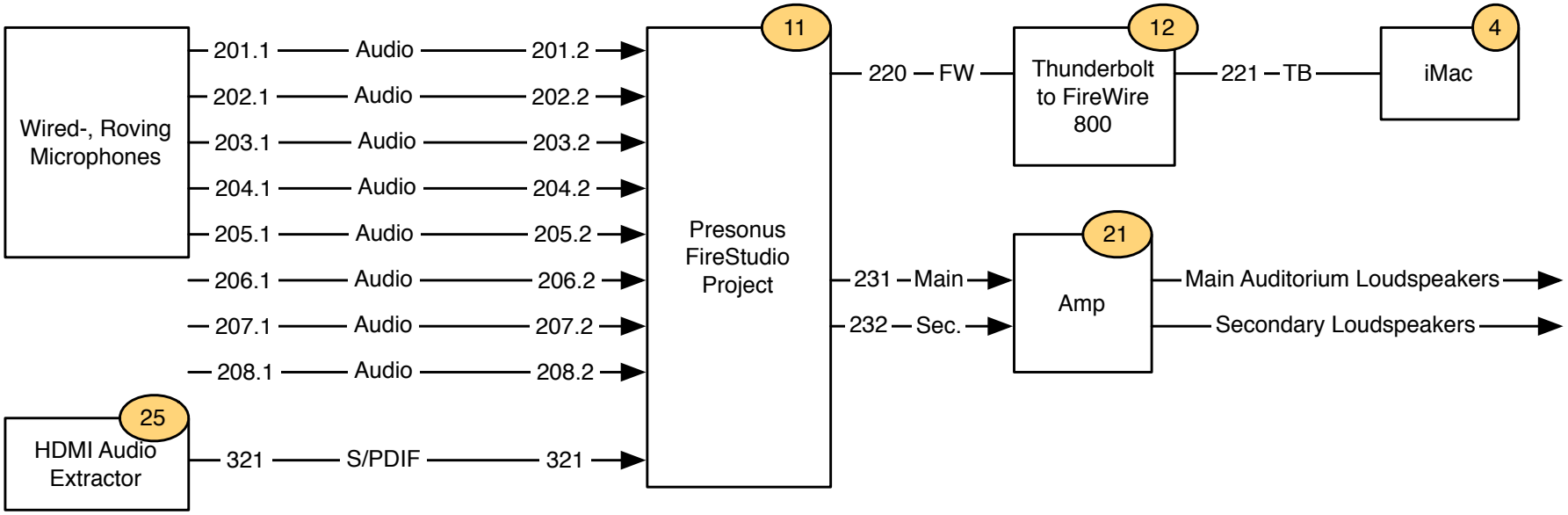
Network Cabling Infrastructure

The system uses an Ethernet network to allow for fast pre-meeting media downloads, presentation control from the KHAV Player app (see Apple App Store), and integration with SL Studio KH, the KH Control System and/or other equipment controllers and devices. IP protocol controllable monitors can be turned on and properly configured by KHAudio if such protocols are publicly available (coming soon). For equipment that is controllable over serial connections, KHAudio will use the CAMX Controller to control such equipment. Any KHs that have SL Studio KH, already have such controller (or the older model that can also be used).
The network connections are also leveraged for Voice over IP (VOIP) based telephone connections to conferencing systems like KHConf or MetroConf.

All network cabling and components to be installed for 1 Gb infrastructure

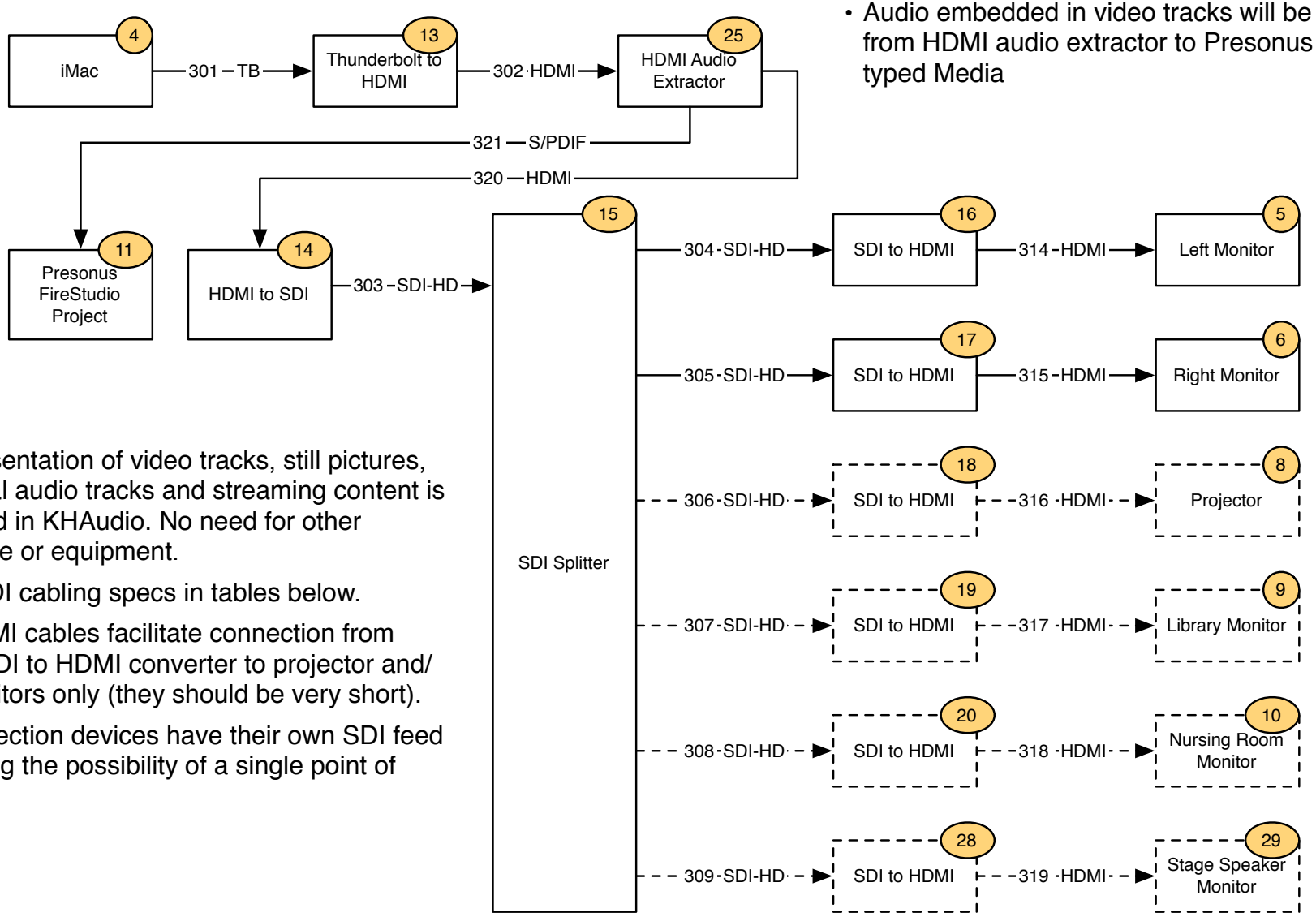


Audio Cabling Infrastructure



- Conferencing connections to services like KHConf and MetroConf are all established using internet connections. No need for telephone interfaces.
- Recording is handled in software. No need for recording equipment.
- Playback of songs, background music in multiple languages and external tracks is handled in software. No need for playback equipment.
- All mixing, sound processing, filtering, etc is done in software. No need for external mixers or sound processing equipment other than an interface and an amp.
- Very straightforward microphone to interface wiring and interface to amplifier and FM transmitter wiring (virtually the only analog wiring).
- Very simple configuration. Templates can be copied from KH to KH. Backup of a complete KH setup can be saved in seconds.

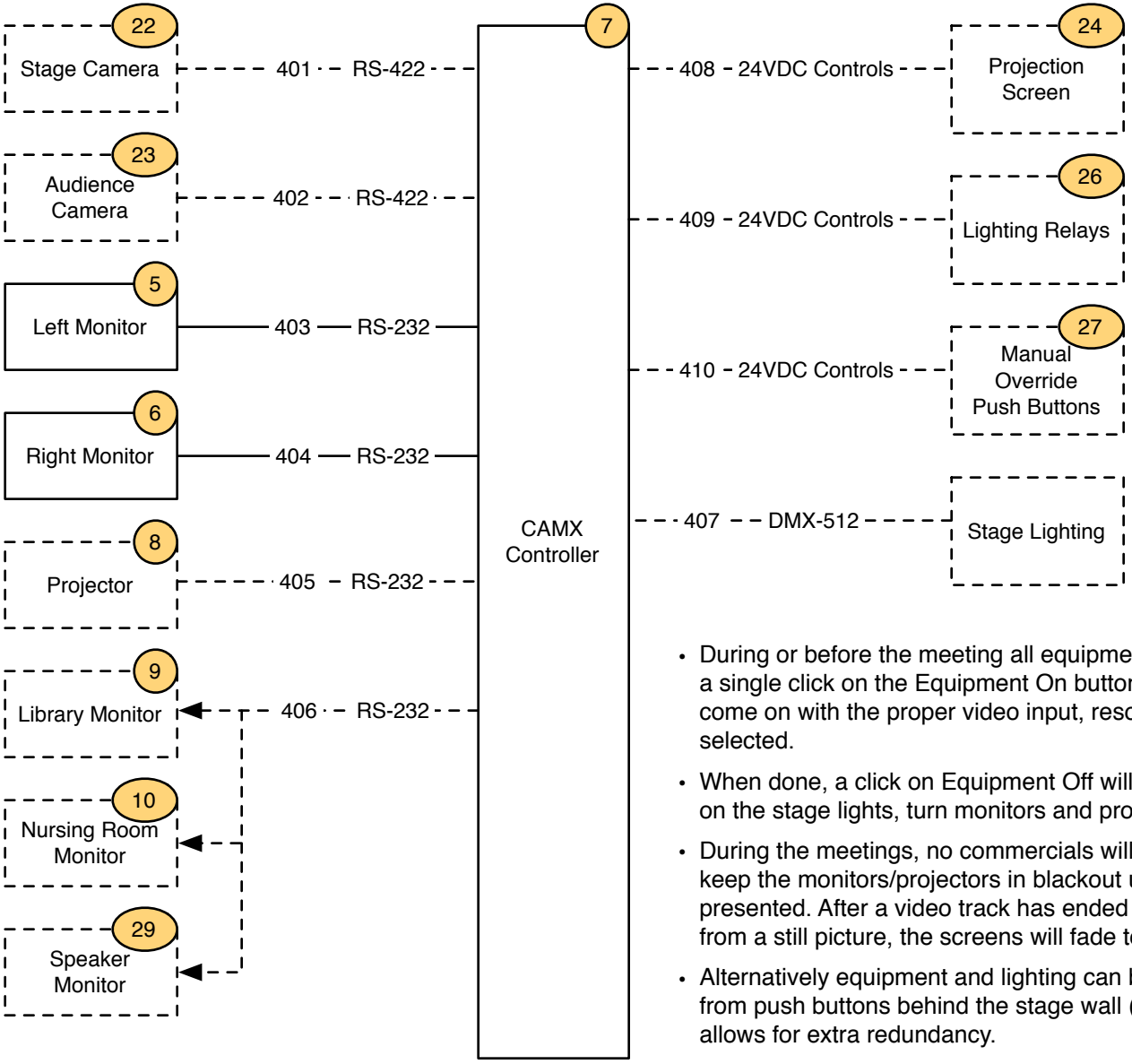
Video Cabling Infrastructure



- Audio embedded in video tracks will be routed from HDMI audio extractor to Presonus input typed Media

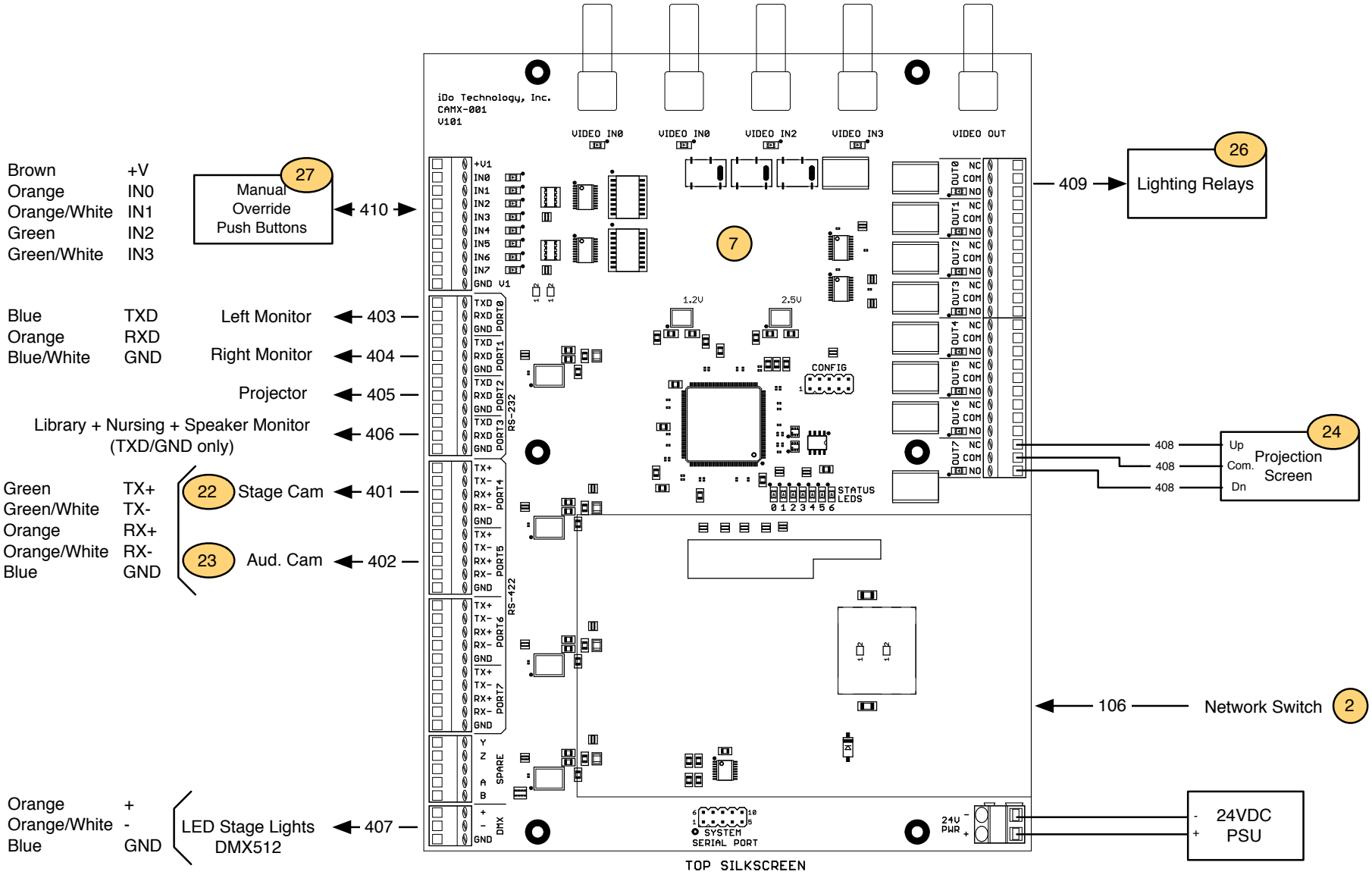
- All presentation of video tracks, still pictures, external audio tracks and streaming content is handled in KHAudio. No need for other software or equipment.
- See SDI cabling specs in tables below.
- All HDMI cables facilitate connection from local SDI to HDMI converter to projector and/ or monitors only (they should be very short).
- All projection devices have their own SDI feed reducing the possibility of a single point of failure.

Control Cabling Infrastructure



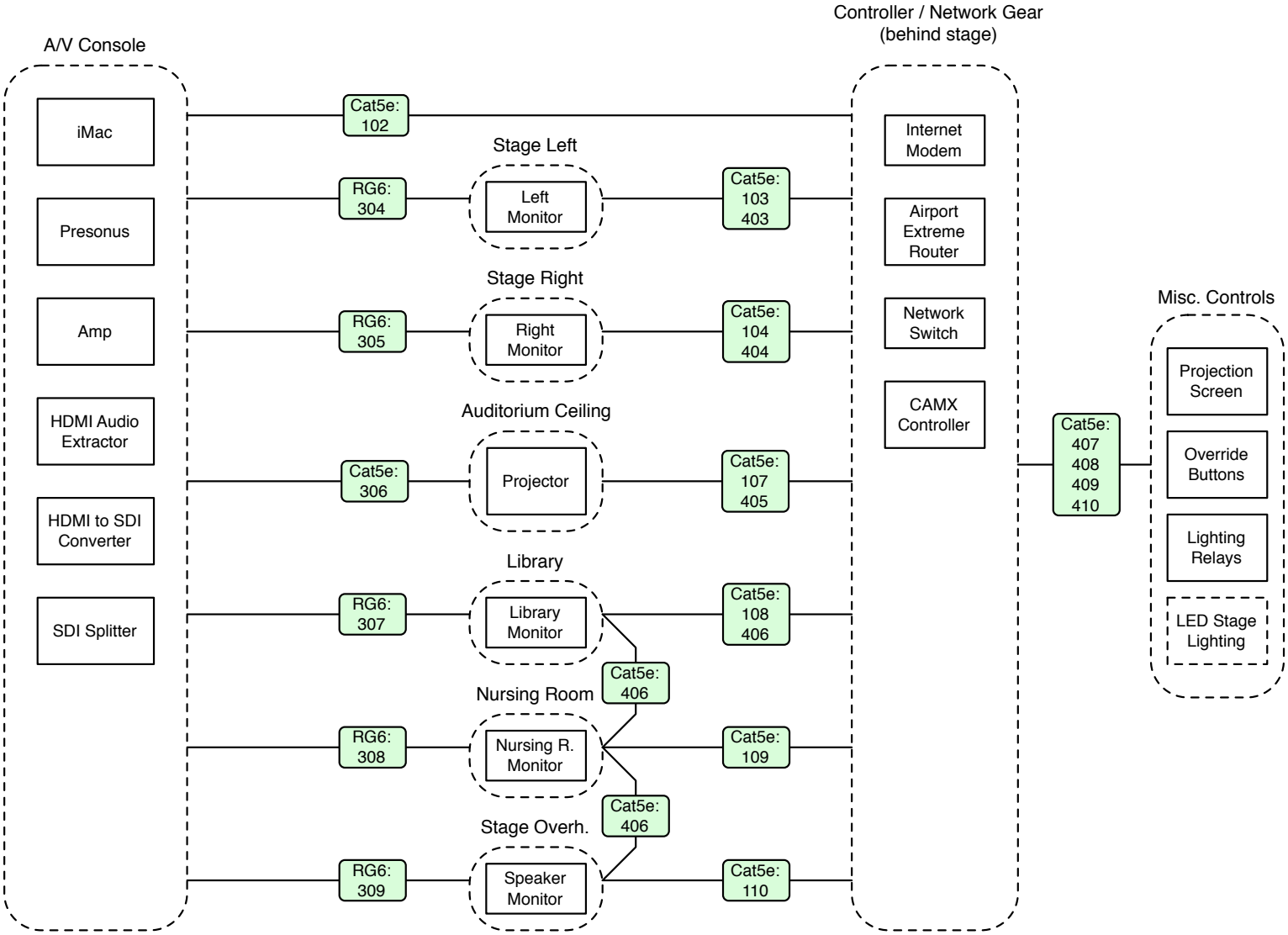
- During or before the meeting all equipment can be turned on with a single click on the Equipment On button. Monitors/projector will come on with the proper video input, resolution, aspect ratio, etc selected.
- When done, a click on Equipment Off will pull up the screen, turn on the stage lights, turn monitors and projectors off.
- During the meetings, no commercials will appear as KHAudio will keep the monitors/projectors in blackout until actual media is presented. After a video track has ended or the speaker proceeds from a still picture, the screens will fade to black.
- Alternatively equipment and lighting can be controlled directly from push buttons behind the stage wall (optional install). This allows for extra redundancy.

CAMX Controller Wiring



A/V System Locations & Cable Routing

(Example to be adapted to local configuration)



Components List

A/V System Components

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
	Network components				
1	Internet modem (delivered by provider but might need to be replaced with a real modem. Don't accept routers unless configured to be modems)				
2	Router, Airport Extreme (Latest generation)	Apple		Apple	1
3	16 port 1 Gb network switch	Netgear		Amazon	1
	Cat5e Cable	Belden	Belden 1213		
	OR: Cat5e Cable	Belden	Belden 1583A		
	RJ45 Connectors - RJ45 CAT-5E				20
	Audio/Video components				
12, 221	Thunderbolt to FireWire 800 adapter	Apple	MD464LL/A	Apple	1
220	FireWire 800 to 400 cable	Belkin	F3N404-06-APL	B&H PhotoVideo	1
11	Digital Audio Workstation Interface	Presonus	FireStudio Project		1
13	MiniDisplayPort to HDMI adapter	Belkin	F2CD021EB (or similar)	Amazon	1
25	HDMI to S/PDIF (RCA Coax) Audio Extractor	My Cable Mart	HA-HH51AU4 (or similar)	Amazon	1
14	HDMI to SDI converter	Monoprice	11749	Monoprice	1
15	SDI Splitter	Monoprice	10323	Monoprice	1
16,17,18,19, 20,28	SDI to HDMI converter	Monoprice	10318	Monoprice	2

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
302, 314, 315, 316, 317, 318, 319, 320	HDMI Cable 8 ft (shorter possible if SDI to HDMI converters planned close or behind equipment)				8
5,6	LCD/LED Flatscreen Monitor (min 65”), check alternatives that are either IP or RS232 controllable with published protocols. Sharp is already out of the TV business !	Sharp	LC65LE654U		2
9,10	LCD/LED Flatscreen (min 42”), check alternatives that are either IP or RS232 controllable with published protocols. Sharp is already out of the TV business !	Sharp	LC40LE653U		2
29	LCD/LED Flatscreen (22”)	LG or Samsung ?			1
303,304,305, 306,307,308, 309	RG6 Cable -Belden 1964A (as needed)	Belden	1694A	Belden	
	BNC Connectors	F-CONN	FS6BNCPL2	Digikey	14
22,23	Optional cameras (needed for SL Studio KH only)	Sony	EVI-D70		2
	CAMX Controller components				
7	A/V Equipment Controller	iDo Technology	CAMX	iDo Technology	1
	Power Supplies 24 V (in Cam Controller)	Meanwell	DR-60-24		1
	DB9 Male	TE Connectivity	5-747904-4 / A102056-ND	DigiKey	6
	DB9 connector enclosures	AMPLIMITE	5749914-1 / 5749914-1-ND	Digikey	6

Item Numbers	Description	Manufacturer	Man. Part Nr	Supplier	Min. Amount
	SL Studio KH ONLY: **Stage lighting components**				
	LED wash light, controllable color and intensity	Chauvet	Slim PAR Pro VW		2
	XLR 3 pin male				2
	XLR 3 pin female				2
	120 Ohm 1/4W Carbon Resistor				2
	Computer components				
4	**KHAudio ONLY:** 27-inch iMac Retina 5K display, 3.2GHz quad-core Intel Core i5 8GB 1867MHz DDR3 SDRAM 256GB Flash Storage Magic Mouse 2 Apple Keyboard with Numeric Keypad (English)	Apple		Apple Store	1
4	**KHAudio + SL Studio KH:** 27-inch iMac Retina 5K display, 3.2GHz quad-core Intel Core i5 16GB 1867MHz DDR3 SDRAM 1 TB Fusion Drive Magic Mouse 2 Apple Keyboard with Numeric Keypad (English)	Apple		Apple Store	

Specifications Cat5e Cabling

CableID	Type	Signal	.1 Device (From)	.1 Connector	.2 Device (To)	.2 Connector
100	Cat5e	1G Ethernet	House Network Switch	RJ45	Airport Extreme Router	RJ45
101	Cat5e	1G Ethernet	Airport Extreme Router	RJ45	Network Switch	RJ45
102	Cat5e	1G Ethernet	Network Switch	RJ45	iMac at A/V Console	RJ45
103	Cat5e	1G Ethernet	Network Switch	RJ45	Left Monitor	RJ45
104	Cat5e	1G Ethernet	Network Switch	RJ45	Right Monitor	RJ45
106	Cat5e	1G Ethernet	Network Switch	RJ45	CAMX Controller	RJ45
107	Cat5e	1G Ethernet	Network Switch	RJ45	Projector	RJ45
108	Cat5e	1G Ethernet	Network Switch	RJ45	Library Monitor	RJ45
109	Cat5e	1G Ethernet	Network Switch	RJ45	Nursing Room Monitor	RJ45
110	Cat5e	1G Ethernet	Network Switch	RJ45	Speaker Monitor	RJ45
401	Cat5e	RS422	CAMX Controller		Stage Camera	Phoenix 9 pin
402	Cat5e	RS422	CAMX Controller		Audience Camera	Phoenix 9 pin
403	Cat5e	RS232	CAMX Controller		Left Monitor	
404	Cat5e	RS232	CAMX Controller		Right Monitor	
405	Cat5e	RS232	CAMX Controller		Projector	
406	Cat5e	RS232	CAMX Controller		Library + Nursing + Speaker (daisy chained)	
407	Cat5e	DMX512	CAMX Controller		First LED Stage Light	Male XLR
408	Cat5e	Controls	CAMX Controller		Projection Screen	
409	Cat5e	Controls	CAMX Controller		Lighting Relays	
410	Cat5e	Controls	CAMX Controller		Manual Override Push Buttons	

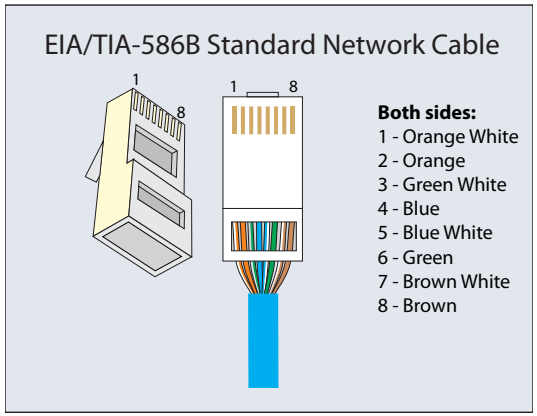
Specifications RG6/HDMI Cabling

CableID	Type	Signal	Part Number	Approx Length (ft)	.1 Device (From)	.1 Connector	.2 Device (To)	.2 Connector	Notes
303	RG6	SDI	Belden 1694A		HDMI To SDI Converter (14)	BNC	SDI Spitter (15)	BNC	
304	RG6	SDI	Belden 1694A		SDI Spitter (15)	BNC	SDI to HDMI Converter (16)	BNC	
305	RG6	SDI	Belden 1694A		SDI Spitter (15)	BNC	SDI to HDMI Converter (17)	BNC	
306	RG6	SDI	Belden 1694A		SDI Spitter (15)	BNC	SDI to HDMI Converter (18)	BNC	
307	RG6	SDI	Belden 1694A		SDI Spitter (15)	BNC	SDI to HDMI Converter (19)	BNC	
308	RG6	SDI	Belden 1694A		SDI Spitter (15)	BNC	SDI to HDMI Converter (20)	BNC	
309	RG6	SDI	Belden 1694A	6	SDI Spitter (15)	BNC	SDI to HDMI Converter (28)	BNC	
302	HDMI	HDMI		1	MiniDisplay to HDMI Adapter (13)	HDMI	HDMI Audio Extractor (25)	HDMI	
314	HDMI	HDMI		1	SDI to HDMI Converter (16)	HDMI	Left Monitor (5)	HDMI	
315	HDMI	HDMI			SDI to HDMI Converter (17)	HDMI	Left Monitor (6)	HDMI	
316	HDMI	HDMI			SDI to HDMI Converter (18)	HDMI	Projector (8)	HDMI	
317	HDMI	HDMI			SDI to HDMI Converter (19)	HDMI	Library Monitor (9)	HDMI	
318	HDMI	HDMI			SDI to HDMI Converter (20)	HDMI	Nursing Monitor (10)	HDMI	
319	HDMI	HDMI			SDI to HDMI Converter (28)	HDMI	Speaker Monitor (29)	HDMI	
320	HDMI	HDMI			HDMI Audio Extractor (25)	HDMI	HDMI to SDI Converter (14)	HDMI	

Cable Termination

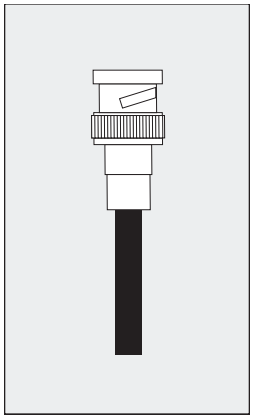
Cat5e Cable Terminations

Each end an RJ45 connector:

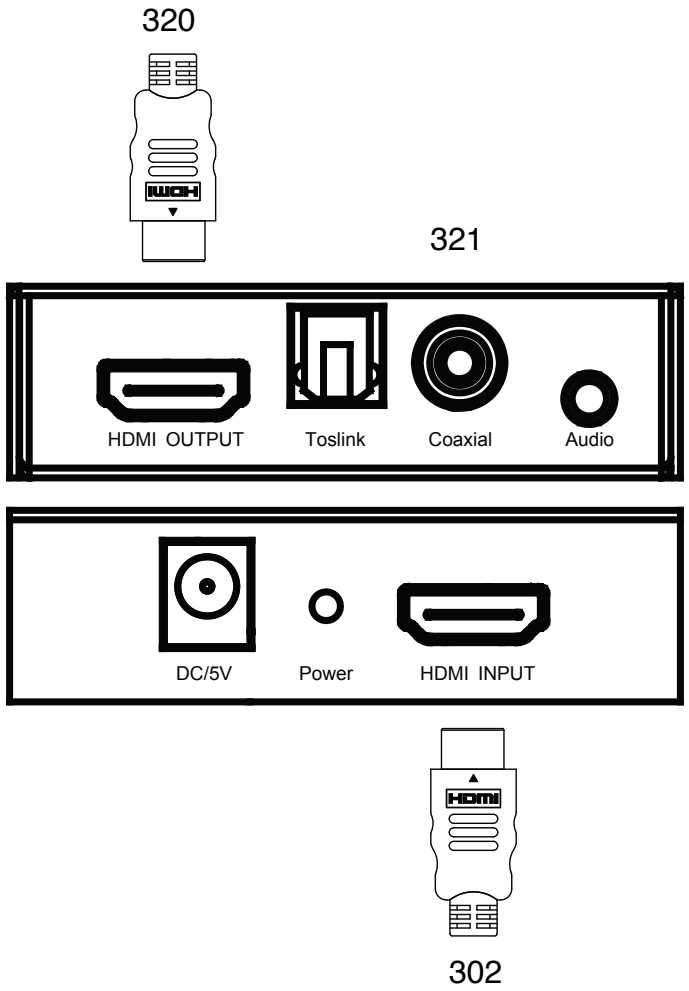


RG6 Video Cable Terminations

Each end a BNC connector:



SDI Audio Extractor (25)

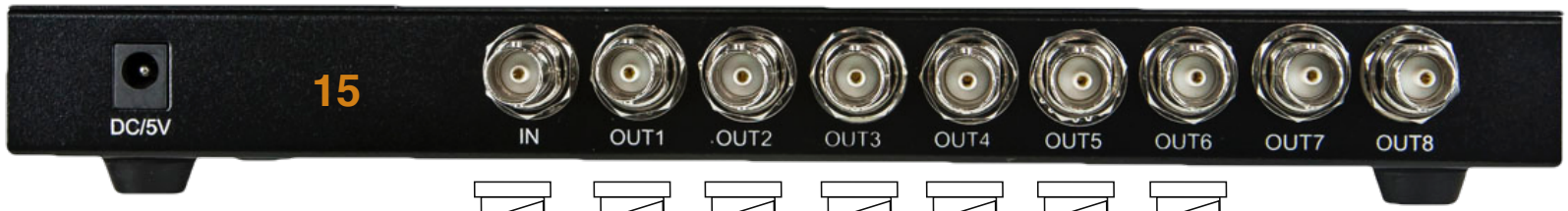


HDMI to SDI Converter (14)

320

303

SDI Splitter Connections (15)



303 314 315 316 317 318 319