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A BELDEN BRAND

KULA AV

PRODUCTION SWITCHER

Installation Manual

13-06512-020

2020-07-13

www.grassvalley.com

FCC Compliance

In order to comply with FCC/CFR47: Part 15 regulations, it is necessary to use high-quality, triple-screened Media or Monitor cable assemblies with integrated ferrite suppression at both ends.

Patent Information

This product may be protected by one or more patents.

For further information, please visit: www.grassvalley.com/patents/

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Title	Kula AV Installation Manual
Part Number	13-06512-020
Revision	2020-07-13, 18:03

Important Safety Information

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

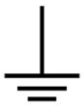
Symbols and Their Meanings

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that the user, operator or service technician should refer to the product manuals for important operating, maintenance, or service instructions.

This is a prompt to note the fuse rating when replacing fuses. The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.



Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present, which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Indicates that the equipment has more than one power supply cord, and that all power supply cords must be disconnected before servicing to avoid electric shock.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Canadian Standard Association (CSA) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Intertek Testing Services regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley product means that it complies with all applicable European Union (CE) directives.

The presence of this symbol in or on Grass Valley product means that it complies with safety of laser product applicable standards.

Warnings

A warning indicates a possible hazard to personnel, which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Appropriately listed/certified mains supply power cords must be used for the connection of the equipment to the rated mains voltage.
- This product relies on the building's installation for short-circuit (over-current) protection. Ensure that a fuse or circuit breaker for the rated mains voltage is used on the phase conductors.
- Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only.
- Do not operate the equipment in wet or damp conditions.
- This equipment is grounded through the grounding conductor of the power cords. To avoid electrical shock, plug the power cords into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- High leakage current may be present. Earth connection of product is essential before connecting power.
- Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.
- To avoid fire hazard, use only the fuse type and rating specified in the service instructions for this product, or on the equipment.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Use proper lift points. Do not use door latches to lift or move equipment.
- Avoid mechanical hazards. Allow all rotating devices to come to a stop before servicing.
- Have qualified service personnel perform safety checks after any service.

Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- This equipment is meant to be installed in a restricted access location.
- When installing this equipment, do not attach the power cord to building surfaces.
- Products that have no on/off switch, and use an external power supply must be installed in proximity to a main power outlet that is easily accessible.
- Use the correct voltage setting. If this product lacks auto-ranging power supplies, before applying power ensure that each power supply is set to match the power source.
- Provide proper ventilation. To prevent product overheating, provide equipment ventilation in accordance with the installation instructions.
- Do not operate with suspected equipment failure. If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.
- To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.
- This unit may have more than one power supply cord. Disconnect all power supply cords before servicing to avoid electric shock.
- Follow static precautions at all times when handling this equipment. Servicing should be done in a static-free environment.
- To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

Electrostatic Discharge (ESD) Protection

Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.
- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Battery Handling

This product may include a backup battery. There is a danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Before disposing of your Grass Valley equipment, please review the *Disposal and Recycling Information* at:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Cautions for LCD and TFT Displays

Excessive usage may harm your vision. Rest for 10 minutes for every 30 minutes of usage.

If the LCD or TFT glass is broken, handle glass fragments with care when disposing of them. If any fluid leaks out of a damaged glass cell, be careful not to get the liquid crystal fluid in your mouth or skin. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all times.

Mesures de sécurité et avis importants

La présente section fournit des consignes de sécurité importantes pour les opérateurs et le personnel de service. Des avertissements ou mises en garde spécifiques figurent dans le manuel, dans les sections où ils s'appliquent. Prenez le temps de bien lire les consignes et assurez-vous de les respecter, en particulier celles qui sont destinées à prévenir les décharges électriques ou les blessures.

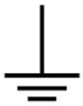
Signification des symboles utilisés

Signale la présence d'une tension élevée et dangereuse dans le boîtier de l'équipement ; cette tension peut être suffisante pour constituer un risque de décharge électrique.

Avertit l'utilisateur, l'opérateur ou le technicien de maintenance que des instructions importantes relatives à l'utilisation et à l'entretien se trouvent dans la documentation accompagnant l'équipement.

Invite l'utilisateur, l'opérateur ou le technicien de maintenance à prendre note du calibre du fusible lors du remplacement de ce dernier. Le fusible auquel il est fait référence dans le texte doit être remplacé par un fusible du même calibre.

Identifie une borne de mise à la terre de protection. Il faut relier cette borne à la terre avant d'effectuer toute autre connexion à l'équipement.



Identifie une borne de mise à la terre externe qui peut être connectée en tant que borne de mise à la terre supplémentaire.

Signale la présence de composants sensibles à l'électricité statique et qui sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

Le symbole ci-contre signifie que l'appareil comporte plus d'un cordon d'alimentation et qu'il faut débrancher tous les cordons d'alimentation avant toute opération d'entretien, afin de prévenir les chocs électriques.

La marque UL certifie que l'appareil visé a été testé par Underwriters Laboratory (UL) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque C-CSA-US certifie que l'appareil visé a été testé par l'Association canadienne de normalisation (CSA) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque C-UL-US certifie que l'appareil visé a été testé par Underwriters Laboratory (UL) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque ETL Listed d'Intertek pour le marché Nord-Américain certifie que l'appareil visé a été testé par Intertek et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

Le marquage CE indique que l'appareil visé est conforme aux exigences essentielles des directives applicables de l'Union européenne en matière de sécurité électrique, de compatibilité électromagnétique et de conformité environnementale.

Le symbole ci-contre sur un appareil Grass Valley ou à l'intérieur de l'appareil indique qu'il est conforme aux normes applicables en matière de sécurité laser.

Avertissements

Les avertissements signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire fatales. Veuillez vous familiariser avec les avertissements d'ordre général ci-dessous :

- Un cordon d'alimentation dûment homologué doit être utilisé pour connecter l'appareil à une tension de secteur de 120 V CA ou 240 V CA.
- La protection de ce produit contre les courts-circuits (surintensités) dépend de l'installation électrique du bâtiment. Assurez-vous qu'un fusible ou un disjoncteur pour 120 V CA ou 240 V CA est utilisé sur les conducteurs de phase.

- Dans le présent manuel, toutes les instructions qui nécessitent d'ouvrir le couvercle de l'équipement sont destinées exclusivement au personnel technique qualifié.
- N'utilisez pas cet appareil dans un environnement humide.
- Cet équipement est mis à la terre par le conducteur de mise à la terre des cordons d'alimentation. Pour éviter les chocs électriques, branchez les cordons d'alimentation sur une prise correctement câblée avant de brancher les entrées et sorties de l'équipement.
- Acheminez les cordons d'alimentation et autres câbles de façon à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.
- Coupez l'alimentation avant de nettoyer l'équipement. Ne pas utiliser de nettoyants liquides ou en aérosol. Utilisez uniquement un chiffon humide.
- Des tensions dangereuses peuvent exister en plusieurs points dans cet équipement. Pour éviter toute blessure, ne touchez pas aux connexions ou aux composants exposés lorsque l'appareil est sous tension.
- Avant de procéder à toute opération d'entretien ou de dépannage, enlevez tous vos bijoux (notamment vos bagues, votre montre et autres objets métalliques).
- Pour éviter tout risque d'incendie, utilisez uniquement les fusibles du type et du calibre indiqués sur l'équipement ou dans la documentation qui l'accompagne.
- Ne pas utiliser cet appareil dans une atmosphère explosive.
- Présence possible de courants de fuite. Un raccordement à la masse est indispensable avant la mise sous tension.
- Après tout travail d'entretien ou de réparation, faites effectuer des contrôles de sécurité par le personnel technique qualifié.

Mises en garde

Les mises en garde signalent des conditions ou des pratiques susceptibles d'endommager l'équipement. Veuillez vous familiariser avec les mises en garde ci-dessous :

- L'appareil est conçu pour être installé dans un endroit à accès restreint.
- Au moment d'installer l'équipement, ne fixez pas les cordons d'alimentation aux surfaces intérieures de l'édifice.
- Les produits qui n'ont pas d'interrupteur marche-arrêt et qui disposent d'une source d'alimentation externe doivent être installés à proximité d'une prise de courant facile d'accès.
- Si l'équipement n'est pas pourvu d'un modules d'alimentation auto-adaptables, vérifiez la configuration de chacun des modules d'alimentation avant de les mettre sous tension.
- Assurez une ventilation adéquate. Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation.
- N'utilisez pas l'équipement si vous suspectez un dysfonctionnement du produit. Faites-le inspecter par un technicien qualifié.
- Pour réduire le risque de choc électrique, n'effectuez pas de réparations autres que celles qui sont décrites dans le présent manuel, sauf si vous êtes qualifié pour le faire.

Confiez les réparations à un technicien qualifié. La maintenance doit se réaliser dans un milieu libre d'électricité statique.

- L'appareil peut comporter plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant toute opération d'entretien.
- Veillez à toujours prendre les mesures de protection antistatique appropriées quand vous manipulez l'équipement.
- Pour réduire le risque de choc électrique, branchez chaque cordon d'alimentation dans des circuits de dérivation distincts utilisant des zones de service distinctes.

Protection contre les décharges électrostatiques (DES)

Une décharge électrostatique peut se produire lorsque des composants électroniques ne sont pas manipulés de manière adéquate, ce qui peut entraîner des défaillances intermittentes ou endommager irrémédiablement un circuit électrique. Au moment de remplacer une carte dans un châssis, prenez toujours les mesures de protection antistatique appropriées :

- Assurez-vous que le châssis est relié électriquement à la terre par le cordon d'alimentation ou tout autre moyen disponible.
- Portez un bracelet antistatique et assurez-vous qu'il est bien en contact avec la peau. Connectez la pince de masse à une *surface non peinte* du châssis pour détourner à la terre toute tension électrostatique indésirable. En l'absence de bracelet antistatique, déchargez l'électricité statique de votre corps en touchant une surface métallique *non peinte* du châssis.
- Pour plus de sécurité, vérifiez périodiquement la valeur de résistance du bracelet antistatique. Elle doit se situer entre 1 et 10 mégohms.
- Si vous devez mettre une carte de côté, assurez-vous de la ranger dans un sac protecteur antistatique.
- Les cartes qui sont reliées à un châssis ou boîtier métallique mis à la terre ne nécessitent pas de protection antistatique spéciale.

Manipulation de la pile

Ce produit peut inclure une pile de sauvegarde. Il y a un risque d'explosion si la pile est remplacée de manière incorrecte. Remplacez la pile uniquement par un modèle identique ou équivalent recommandé par le fabricant. Disposez des piles usagées conformément aux instructions du fabricant. Avant de vous séparer de votre équipement Grass Valley, veuillez consulter les *informations de mise au rebut et de recyclage* à:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Précautions pour les écrans LCD et TFT

Regarder l'écran pendant une trop longue période de temps peut nuire à votre vision. Prenez une pause de 10 minutes, après 30 minutes d'utilisation.

Si l'écran LCD ou TFT est brisé, manipulez les fragments de verre avec précaution au moment de vous en débarrasser. veillez à ce que le cristal liquide n'entre pas en contact avec la peau ou la bouche. En cas de contact avec la peau ou les vêtements, laver immédiatement à l'eau savonneuse. Ne jamais ingérer le liquide. La toxicité est extrêmement faible, mais la prudence demeure de mise en tout temps.

Environmental Information

European (CE) WEEE directive.

This symbol on the product(s) means that at the end of life disposal it should not be mixed with general waste.

Visit www.grassvalley.com for recycling information.

Grass Valley believes this environmental information to be correct but cannot guarantee its completeness or accuracy since it is based on data received from sources outside our company. All specifications are subject to change without notice.

If you have questions about Grass Valley environmental and social involvement (WEEE, RoHS, REACH, etc.), please contact us at environment@grassvalley.com.

Lithium Batteries

Battery Warning

CAUTION
This equipment contains a lithium battery.
There is a danger of explosion if this is replaced incorrectly.
Replace only with the same or equivalent type.
Dispose of used batteries according to the manufacturer's instructions.
Batteries **shall only** be replaced by trained service technicians.

Your Grass Valley equipment usually comes with at least one button battery located on the main printed circuit board. The batteries are used for backup and should not need to be replaced during the lifetime of the equipment.

Battery Disposal

Before disposing of your Grass Valley equipment, please remove the battery as follows:

1. Make sure the AC adapter / power Cord is unplugged from the power outlet.
2. Remove the protective cover from your equipment.
3. Gently remove the battery from its holder using a blunt instrument for leverage such as a screwdriver if necessary. In some cases the battery will need to be desoldered from the PCB.
4. Dispose of the battery and equipment according to your local environmental laws and guidelines.

WARNING

- Be careful not to short-circuit the battery by adhering to the appropriate safe handling practices.
- Do not dispose of batteries in a fire as they may explode.
- Batteries may explode if damaged or overheated.
- Do not dismantle, open or shred batteries.
- In the event of a battery leak, do not allow battery liquid to come in contact with skin or eyes.
- Seek medical help immediately in case of ingestion, inhalation, skin or eye contact, or suspected exposure to the contents of an opened battery.

Mains Supply Voltage

Before connecting the equipment, observe the safety warnings section and ensure that the local mains supply is within the rating stated on the rear of the equipment.

Safety and EMC Standards

This equipment complies with the following standards:

Safety Standards

CE

Information Technology Equipment - Safety Part 1

EN60950-1: 2006

Safety of Information Technology Equipment Including Electrical Business Equipment.

UL1419 (4th Edition)

Standard for Safety – Professional Video and Audio equipment (UL file number E193966)

EMC Standards

This unit conforms to the following standards:

EN55032:2015 (Class A)

Electromagnetic Compatibility of multimedia equipment - Emission requirements

EN61000-3-2:2014 (Class A)

Electromagnetic Compatibility - Limits for harmonic current emissions

EN61000-3-3:2013

Electromagnetic Compatibility - Limits of voltage changes, voltage fluctuations and flicker

EN55103-2:2009 (Environment E2)

Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

WARNING
This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

FCC / CFR 47:Part 15 (Class A)

Federal Communications Commission Rules Part 15, Subpart B

Caution to the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note:	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. These 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.

EMC Performance of Cables and Connectors

Grass Valley products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

SIGNAL/DATA PORTS

For unconnected signal/data ports on the unit, fit shielding covers. For example, fit EMI blanking covers to SFP+ type ports; and fit 75 Ω RF terminators to BNC type ports.

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M and Belden 1694A (for 3Gbps).

D-TYPE CONNECTORS

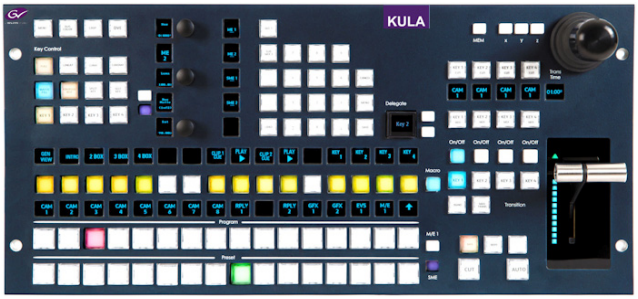
D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having “dimples” which improve the contact between the plug and socket shells, are recommended.

Table of Contents

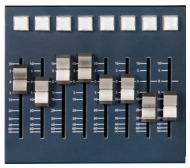
1 Introduction

About this Manual

Thank you for purchasing your new Kula AV Production Switcher. This installation manual will help you through each stage of the physical installation of each component and advise you of all relevant safety aspects. For user setup and configuration please consult the User Instruction Manual.



1M/E (19") K5P Control Surface



MAV-AUD-FADER

Kula AV AV Mainframe

If you have any questions regarding the installation of your product, please refer to the contact details listed at the rear of this manual.

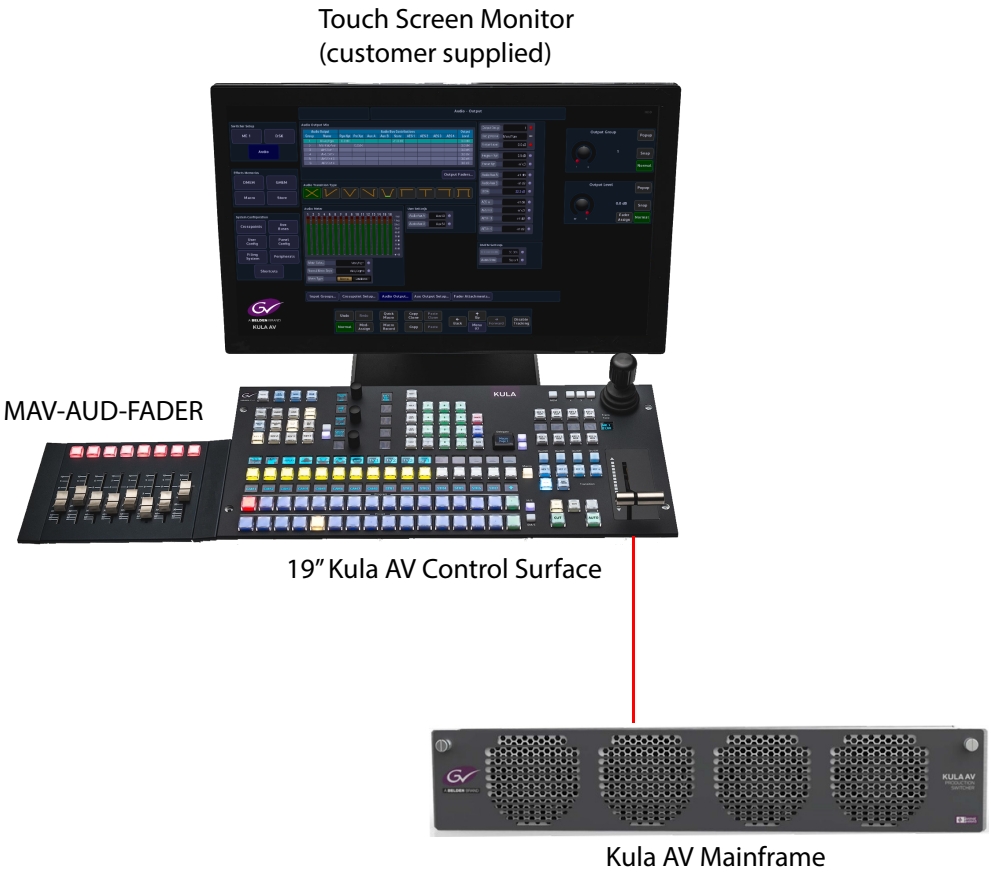
Note: Please note that all diagrams are for illustration purposes only and may differ slightly from the purchased product. Grass Valley operates a policy of continuous improvement and development. Grass Valley reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Overview

Kula AV is an “All in One” production switcher designed for the professional broadcast and AV markets. Along with a powerful production switcher feature set in a compact system, the Kula AV includes internal audio mixer functionality.

Kula AV from Grass Valley is available as a 1 M/E HD-SDI switcher in a compact 2 RU mainframe with a convenient 19”-wide rackable control surface suitable for fly-packs. Also included in the package is the MAV-AUD-FADER module.

Example of a Kula AV System



Kula AV has 1 full Mix Effect which has A/B Backgrounds, 5 Keyers which include:

Mix/Effect supports:

- Four full effects keyers with lin/luma
- Four assignable 2D DVE engines (will give eight independent boxes)
- Chromakeys available on all keys
- Transition Keyer (Mav Trans) with dedicated ClipStores for key & fill
- Mask generator per Keyer
- Separate wipe generator
- Matte generator

- Large internal ClipStore with 10 outputs holding uncompressed video and audio content that is totally routable
- Eight channels of FormatFusion3 assignable to any input or output
- Four floating resizable downstream keyers
- Internal multiviewer with four heads and 12 tiles available

Also included with the system:
Swift broadcast graphics from RT Software which is bundled with Kula AV to provide an intuitive creative tool for text, clocks, tickers/crawls, tables and video/clip handling.
80 input x 56 output audio mixer. Audio functionality includes embed/de embedding, routing with clean & quiet audio switching and audio-follow-video mode for simplified control.
MAV-AUD-FADER works with the internal audio mixer allowing control of audio channels with eight motorized faders; the MAV-AUD-FADER works with memories as well.

Kula AV System Components:

1. **Switcher Mainframe**: (2RU rack height)
2. **Control Surfaces**: 1M/E (19") Control Surface
3. **MAV-AUD-FADER** (Audio Fader Module)
4. **MAVRow Frame** (for the MAV-AUD-FADER)
5. **External Power Supplies**: 2 x PSU for the Control Surface
6. **Cables**: For each system purchased, there is 1x RJ45 Comms cable supplied.

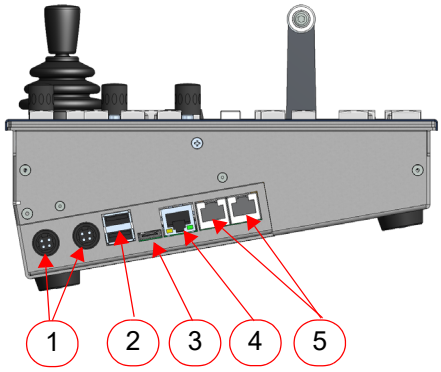
> Note: Installation and User Manuals are supplied regardless of system components purchased.

2 Cabling and Connections

Kula AV Control Surface Connectors

The Kula AV Control Surface has Power, Network, Comms, Monitor Output connectors. The monitor output is used to connect to a touch screen monitor, used as the GUI. Do not confuse the Network connection to the switcher mainframe with the "Comms" ports on the control surface, as the Comms Ports are used as power and comms to ancillary panels.

Kula AV K5P (1M/E 19" Control Surface)

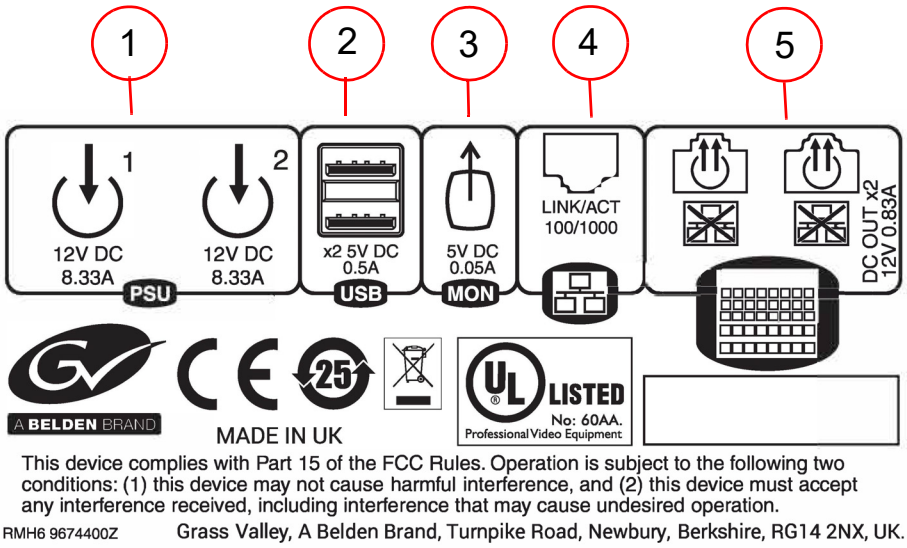


1 2x External PSU Connectors
2 2x USB Connectors
3 Monitor Out
4 Network Port to Mainframe
5 2x Comms Ports
6 4x Comms Ports

Note: The Comms Ports provide power and comms to ancillary panels. "Comms" ports not Ethernet ports. DO NOT connect any "Comms Ports" to an Ethernet Switch.
Only use CAT5 or above cables. Do not use crossover cables, they are Not suitable.

Control Surface Connections - continued

Diagram below shows the connector information for KPX, KPP and K5P Control Surfaces (LH Side)
(***Note:*** The label below is on the underside of the control surface)

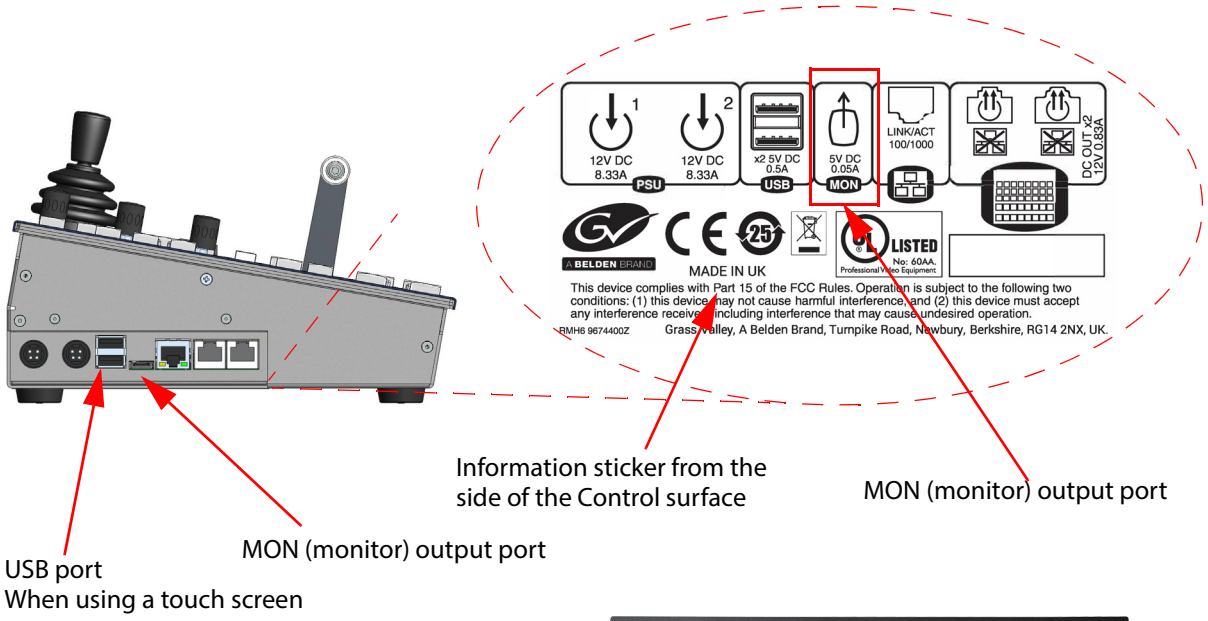


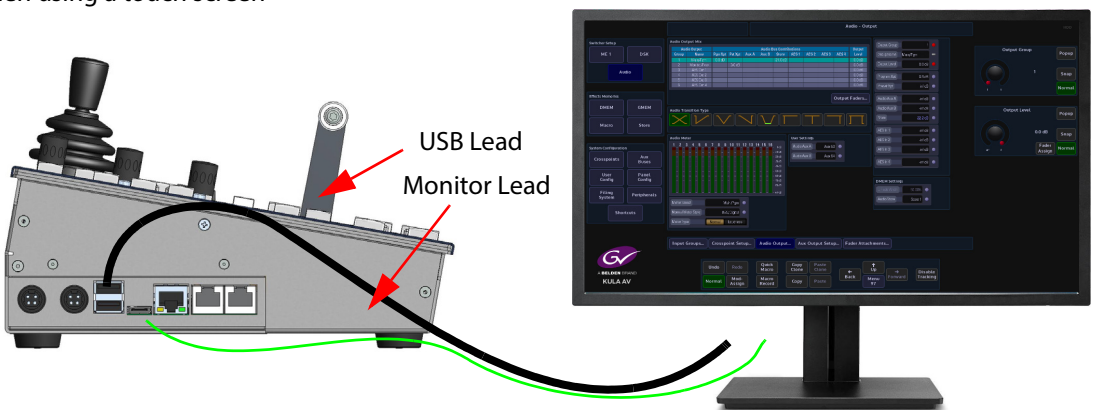
Control Surface Connectors	
Connector	**Description**
1	2x PSU Connectors - Kycon KPPX 4Pin or Compatible 12V DC 8.33A
2	2x USB 2 Connectors
3	Monitor (MON) Output - to touch screen GUI
4	10/100/1000 base T, RJ45 network connectors to the switcher mainframe
5	2x Comms Connection ***Important Note:*** **NOT** Ethernet, connections must be direct to a control surface. **Do Not** use network switches or hubs. CAT5 or above cables - crossover cables are **Not** suitable.
6	4x Comms Connection See "Important Note" above

Connecting the Touch Screen Monitor GUI

To connect a touch screen monitor to the Kula AV KPPP, KPX or K5P output port on the side near the USB ports, the monitor port is used to connect to an external "computer" touch screen or normal display monitor. The external monitor must have a 1920 x 1080 display resolution and it is recommended that the monitor be larger than 21 inches.

KPP or KPX (***Note:*** the **K5P** control surface is connected in exactly the same way).





*When using a non-touch screen monitor, connect a USB Mouse to control the menus.

*When using a touch screen monitor, connect the USB lead from the monitor to one of the USB ports.

Touch screen monitor - once the external monitor is connected to the Kula AV control surface, a USB control lead (shown above) is connected, allowing the touch screen functions to be used.

Non- touch screen monitor - once the external monitor is connected to the Kula AV control surface, a USB mouse can be used to control the Kula AV menus on the monitor screen.

Current Compatible Touch Screen Monitors

iiyama T2250-MTS

iiyama T2236-MSC B1 and B2

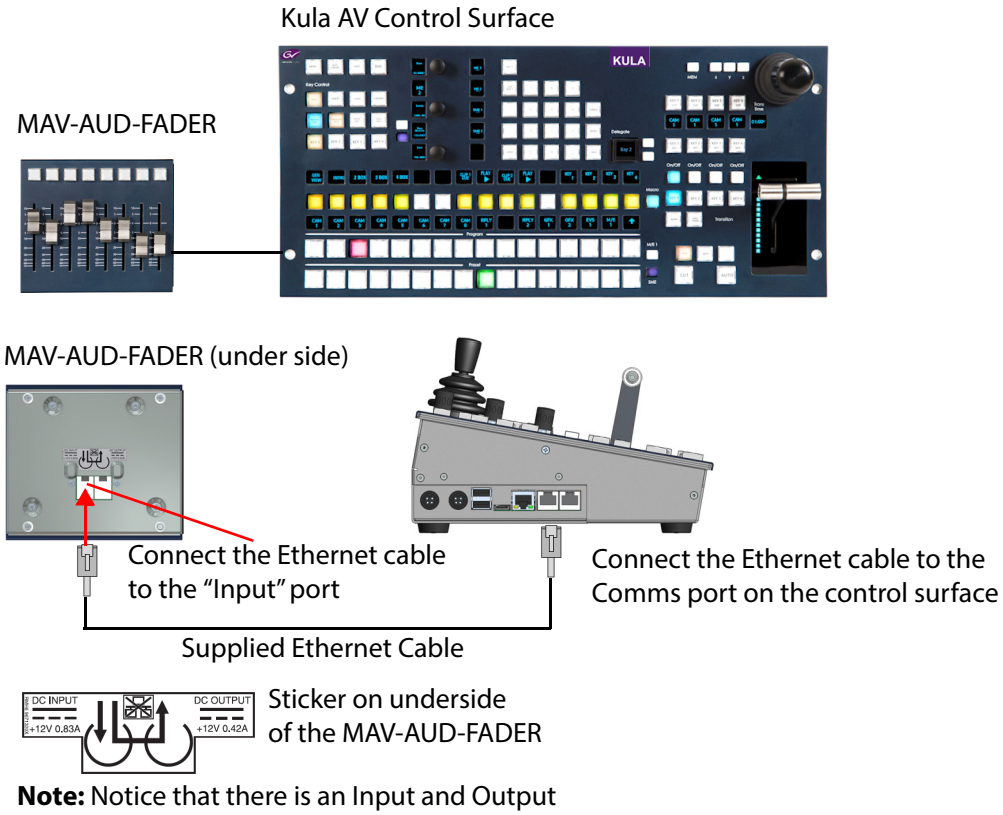
iiyama T2252-MTS

GeChic On-Lap 1502

ELO_1002L_1502L

Connecting the Control Surface to the MAV-AUD-FADER Module

Below is a diagram showing how to connect a Kula AV control surface to the MAV-AUD-FADER.



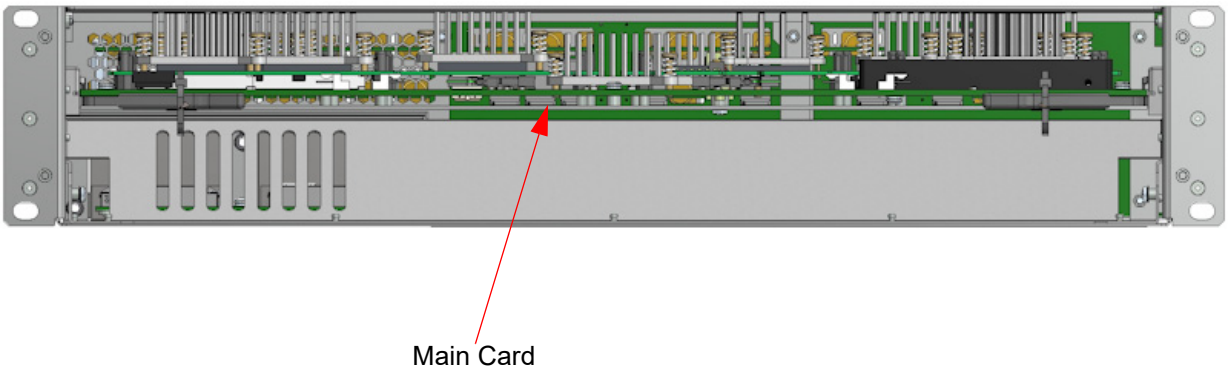
Note: Notice that there is an Input and Output socket. Use the input socket only.
The loop-through cannot be used!

Mainframe Layout and Connections

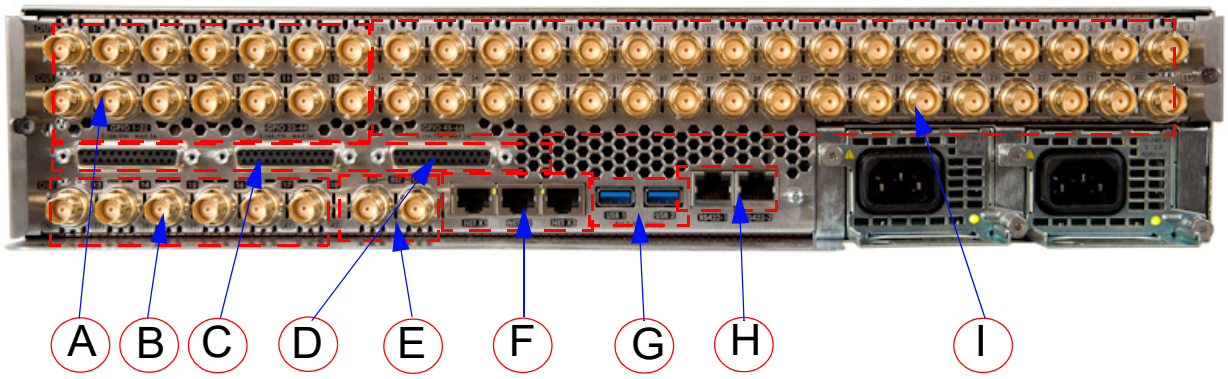
Mainframe Overview

The Kula AV mainframe has 1 card that has all the Mix Effects and Input/Output video processing.

Kula AV Mainframe Front Card Location



Kula AV Mainframe Rear Connectors



The table below outlines the mainframe connections.

Kula AV Mainframe Connectors

Connectors	Description	Connector Information
A	Output BNCs	12x SDO BNC Outputs total (numbered BNC 1 to 12)
B	Input/Output Bi-directional BNCs	4x SDI/SDO BNC Inputs plus 2x Bi-Directional Input/Outputs. Numbered: 37 to 42
C	GPIO	2x 25 Way D-type GPIO connectors (1 - 22, 23 - 44)
D	AES Input/Output	1x 25 Way D-type GPIO connectors
E	Reference	1x Ref In and 1x Ref out
F	Network	3x 10/100/1000 base T
G	USB	2x USB3 - for external memory device or hard drives USB outputs are 5 V DC, 0.9 A each
H	Serial	2X RJ45, RS422 Ethernet ports
I	Inputs	36x SDI BNC (numbered BNC 1 to 36) (18x SDI BNC Inputs on the 1M/E Mainframe)

Mainframe Connections

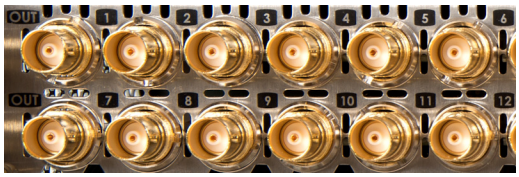
Note: The following pages that describe connectors on a Kula AV Mainframe (unless indicated otherwise).

Input BNCs

There are 36x SDI Inputs at the rear of the Kula AV mainframe.

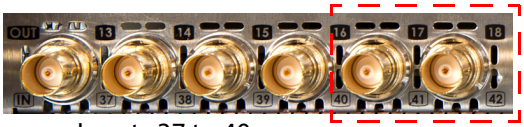
Output BNCs

There are 12x SDO Outputs at the rear of the Kula AV mainframe.



Input and Bi-directional Input/Output BNCs

The diagram below displays are bi-directional BNCs, used as Inputs or Outputs.



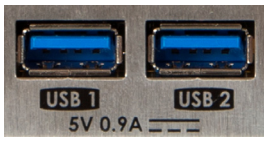
Inputs 37 to 40

Bi-directional Input/Outputs
As Outputs - 13 and 14
As Inputs - 41 and 42

All other Connectors

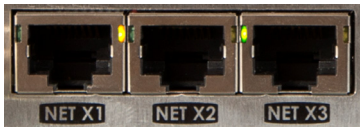
USB 3.0

Two USB 3.0 connectors for fast data transfer. USB outputs are 5 V DC, 0.9 A each.



Network

Kula AV has 3x RJ45 10/100/1000 base T network connectors.



There are 2 LED's attached to each connector, the LED's have different functions depending on the type communication they are receiving, the list below describes the functions.

Connectors with XLR shells can be used to connect with these network connectors.

In each case LED - Lit = link, Flashing = traffic.

Left LED Right LED

- 1G bit (1000 base T):GREEN GREEN
- 100Mbit (100baseT):OFFGREEN
- 10Mbit (10baseT):YELLOWGREEN

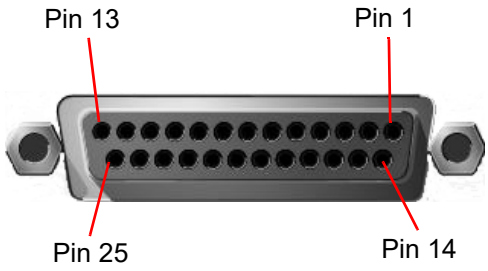
No link:OFF OFF

Reference

Analogue reference input and output:

25 Way D-type GPIO

2x 25 Way D-type GPIO connectors:
(1 - 22 and 23 - 44)

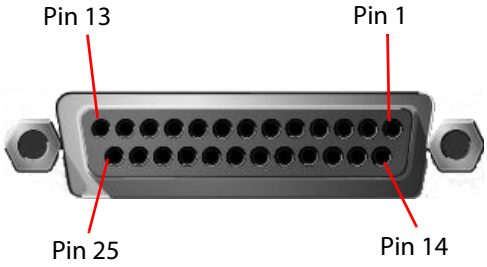


GPIO Pin-outs

GPI /GPO 1 - 22		GPI /GPO 23 - 44	
Pin	**Signal**	**Pin**	**Signal**
1	GND	**1**	GND
2	GPO 2	**2**	GPO 24
3	GPO 4	**3**	GPO 26
4	GPO 6	**4**	GPO 28
5	GPO 8	**5**	GPO 30
6	GND	**6**	GND
7	GPO 11	**7**	GPO 33
8	GPO13	**8**	GPO 35
9	GPO 15	**9**	GPO 37
10	GPO17	**10**	GPO 39
11	GND	**11**	GND
12	GPO 20	**12**	GPO 42
13	GPO 22	**13**	GPO 44
14	GPO 1	**14**	GPO 23
15	GPO 3	**15**	GPO 25
16	GPO 5	**16**	GPO 27
17	GPO 7	**17**	GPO 29
18	GPO 9	**18**	GPO 31
19	GPO 10	**19**	GPO 32
20	GPO 12	**20**	GPO 34
21	GPO 14	**21**	GPO 36
22	GPO 16	**22**	GPO 38
23	GPO 18	**23**	GPO 40
24	GPO 19	**24**	GPO 41
25	GPO 21	**25**	GPO 43

25 Way AES

1x 25 Way D-type AES connector:
(pins 1- 25)



AES Pin-outs

AES Inputs & Outputs	
Pin	**Signal**
1	Out 7/8 (+)
2	GND
3	Out 5/6 (-)
4	Out 3/4 (+)
5	GND
6	Out 1/2 (-)
7	In 7/8 (+)
8	GND
9	In 5/6 (-)
10	In 3/4 (+)
11	GND
12	In 1/2 (-)
13	NC
14	Out 7/8 (-)
15	Out 5/6 (+)
16	GND
17	Out 3/4 (-)
18	Out 1/2 (+)
19	GND
20	In 7/8 (-)
21	In 5/6 (+)
22	GND
23	In 3/4 (-)
24	In 1/2 (+)
25	GND

RJ45 - RS422 Serial Ports

There are 2 RJ45 ports which provide 4x RS422 serial control.
They can be assigned with communications protocols to communicate with number of external devices. This is used to connect for example to Servers, Editors ands other devices.

For the two RS422 ports, each one can independently either be a Master or a Slave. Master settings makes Kula AV able to control external equipment and a Slave setting lets Kula AV be controlled by external equipment.

RS422 1+3 Pin Configuration

RJ45 Pin	Color (typical)	Function (master mode)	9 pin D-Type SP1	9 pin D-Type SP3
1	Orange/White	Tx1B	3	
2	Orange	Tx1A	8	
3	Green/White	Tx3B		3
4	Blue	Tx3A		8
5	Blue/White	RX3A		2
6	Green	RX3B		7
7	Brown/White	Rx1A	2	
8	Brown	Rx1B	7	
Cable screen/GND		GND	9	9

RS422 2+4 Pin Configuration

RJ45 Pin	Color (typical)	Function (master mode)	9 pin D SP2	9 pin D SP4
1	Orange/White	Tx2B	3	
2	Orange	Tx2A	8	
3	Green/White	Tx4B		3
4	Blue	Tx4A		8
5	Blue/White	RX4A		2

RS422 2+4 Pin Configuration

RJ45 Pin	Color (typical)	Function (master mode)	9 pin D SP2	9 pin D SP4
6	Green	RX4B		7
7	Brown/White	Rx2A	2	
8	Brown	Rx2B	7	
Cable screen/GND		GND	9	9

The pin assignments for the 9-pin cable are as follows:

Pin	Master	Slave
1	Ground	Ground
2	Rx A	Tx A
3	Tx B	Rx B
4	Tx Common	Rx Common
5	Spare	Spare
6	Rx Common	Tx Common
7	Rx B	Tx B
8	Tx A	Rx A
9	Ground	Ground

3 Environment and Location

Environmental Considerations

This chapter instructs the user how to install the control surfaces, mainframe and any ancillary panels into desktop and 19 inch rack environments. Attention should be paid to the cooling information for the mainframe.
The ambient temperature for all the supplied equipment should not exceed the limits of 5 and 40°C (41 to 104°F) at a relative humidity of 10 to 90% (non-condensing).

Installing the equipment in a clean environment with moderate temperature and humidity will promote a long and trouble-free equipment life.

Control Surfaces

Mounting a Kula AV Control Surface and MAVRow frame into a Desk

Note: The Kula AV control surface should preferably be mounted in a desk which is open underneath.

Note: If the desk is not open underneath, enough room has to be left underneath for ventilation and for routing the PSU and Comms cables to the underside of the control surface.

Note: It is essential to ensure the air temperature does not exceed 40°C.

The MAVRow Frame that the MAV-AUD-FADER fits into, has a cut-out of:

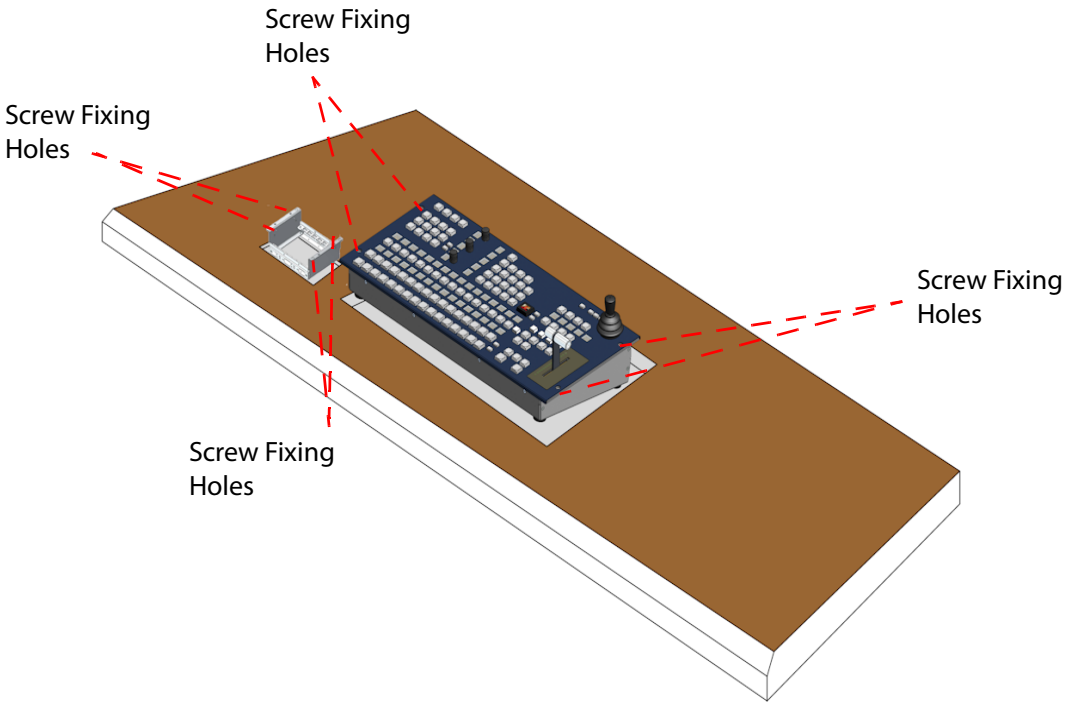
Length = 189 mm - [7.44 inches]

Height = 135 mm - [5.31]

The MAVRow Frame is secured to the desk using M4 countersunk wood screws.

Cut-out information for the Kula AV control surface can be found on page XX

The Control Surface is secured into a desk using appropriate “Pan Head” M4 screws with a Max. head diameter of 8.8mm [0.34 Inches]. At each end of each Control Surface, there are two 4.5 mm [0.18 Inches] fixing point holes for the screws.

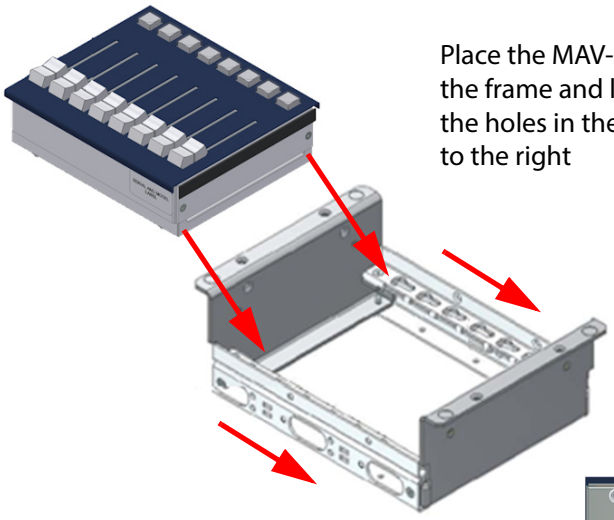


Fitting the MAV-AUD-FADER into the MAVRow Frame

The MAV-AUD-FADER fits into a MAVRow frame. The diagram below explains how it slots into the MAVRow frame.

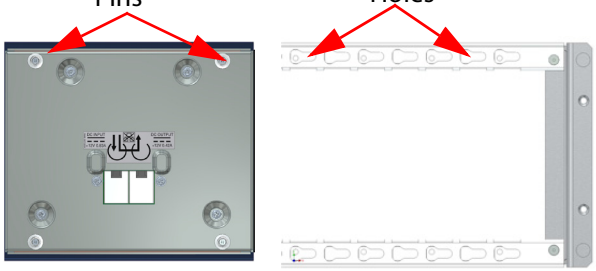
Pins on the underside of the MAV-AUD-FADER locate into the holes in the MAVRow frame. Once the pins are in the holes, gently slide the module to the right to lock it into position.

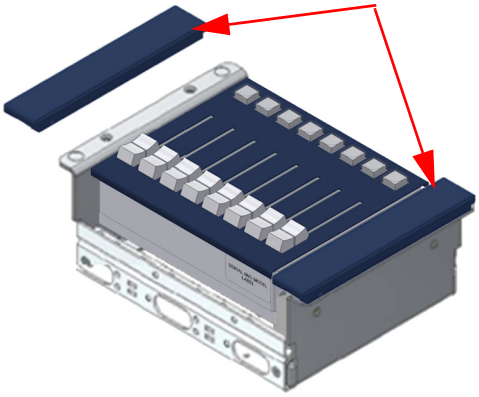
The frame Ears have small round magnets that locate into two round depressions at each end of the MAVRow frame. Carefully place the Ears into position, **being careful not to trap your fingers**.



Place the MAV-AUD-FADER into the frame and locate the pins into the holes in the frame. Then slide to the right

Pins on the MAV module fit into the holes and then slot to the right





When the MAV-AUD-FADER is placed in the frame, place the “Ears” onto the ends of the frame.
Magnets will keep the ears in place

Mainframe Location and Environment

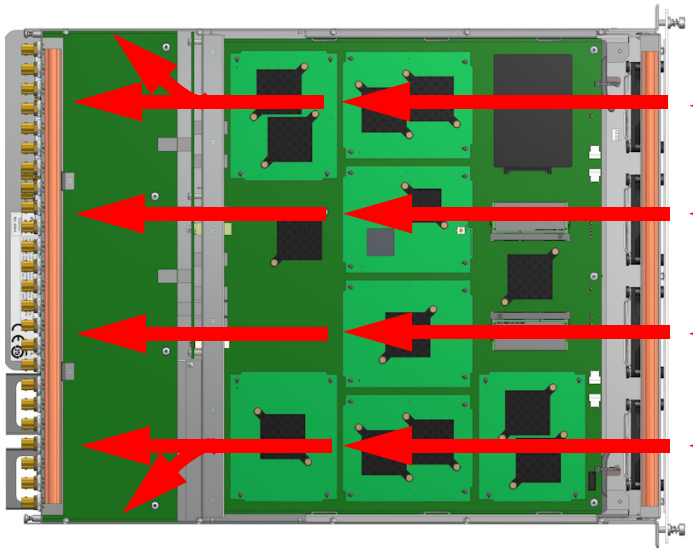
Air Flow through the Mainframe

The Kula AV mainframe can be used freestanding (tabletop configuration) or installed in a standard 483mm (19 inch) equipment rack. The following precautions should be observed:

1 The air intakes on both sides and the cooling fan exhausts at the rear of the unit must not be obstructed - a minimum clearance at the rear of the mainframe of 200mm (8 inches) is **ESSENTIAL**.

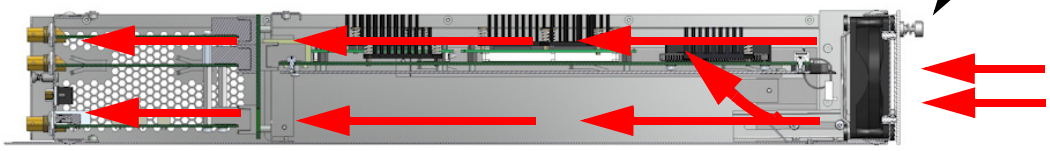
2 Air intakes situated at the front and on both sides, are to allow the inlet of cooling air and **MUST NOT BE OBSTRUCTED.**

Top view of the Kula AV mainframe showing airflow through



Fans are located on the front door of the mainframe

Side view of the Kula AV mainframe showing airflow through



Cooling Fan Failure

IF THE COOLING FANS ONTHE SWITCHER MAINFRAME SHOULD STOP FOR ANY REASON, THEN THE SYSTEM SHOULD BE SWITCHED OFF IMMEDIATELY OR PERMANENT DAMAGE MAY RESULT.
Depending on the length of time the mainframe has been run with no fan the unit may need to be returned for checking and repair. Contact Grass Valley or your Grass Valley dealer to discuss the situation.

Warning!

Note: Do not obstruct air intakes to fans and air vents on any piece of equipment listed in this manual. Please pay particular attention to the air intakes at sides and the vents at the rear of the Mainframe.

Mounting the Kula AV Mainframe into a 19" Rack

> Note: The Kula AV Mainframe is heavy (14kg – 30.3lb) and will require two people to lift into position, using correct lifting procedures. If you are unsure of the lifting procedures, ask a Health and Safety adviser for information.

The Mainframe will require an 2RU space within a rack system. Please read the above warning before attempting to fit the mainframe into a rack.

1 Check that the rack is rigid enough for the mainframe.

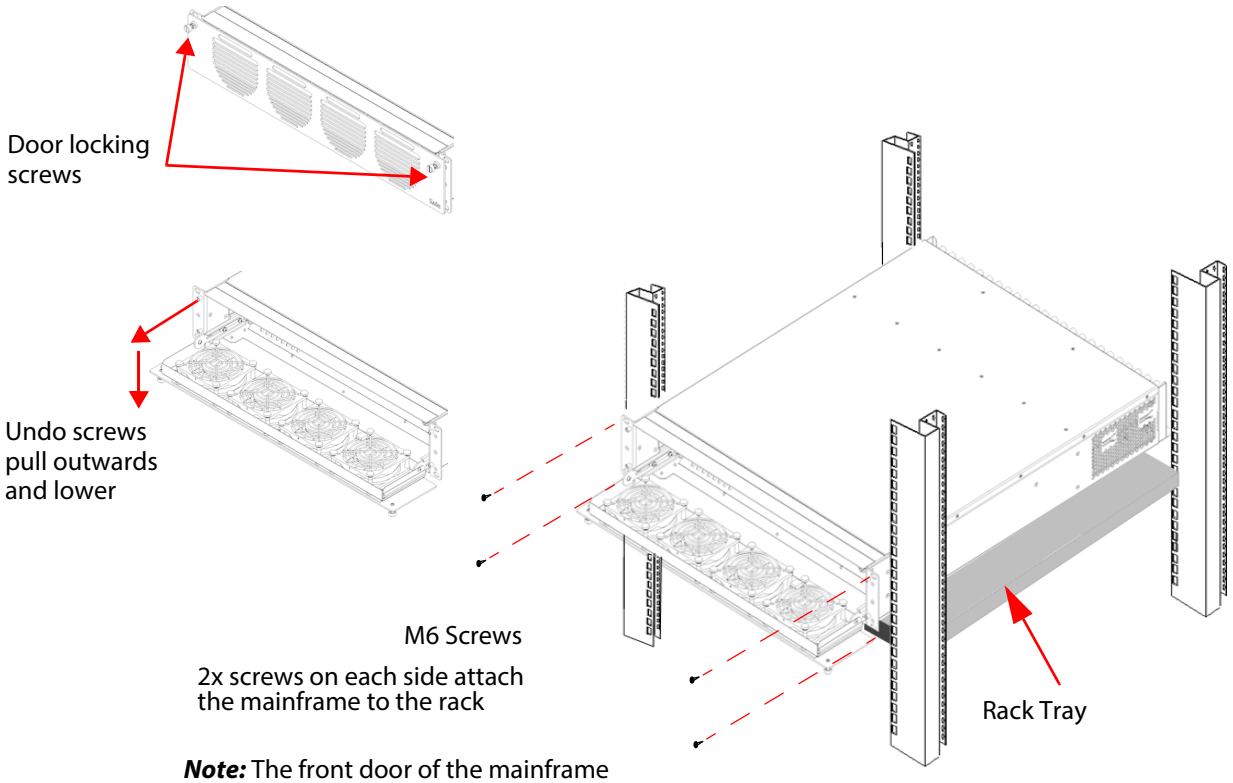
2 **A suitable rack tray will be needed in the rack to take the weight of the mainframe**. The mainframe rear will become heavier when the BNC cables are connected.

3

> Note: If the rack tray has sides, make sure that they do not block the ventilation holes on the sides of the mainframe.

4 When in position in the rack, there are 2 pre-cut slots (mounting holes) running down each side of the front of the mainframe, to access the mounting holes, the mainframe front door will have to be opened. To do this; unscrew the door locking screws on either side of the door, then pull outwards and lower (as shown in the diagram below).

5 The mainframe is fastened to the rack system using 4x M6 (1/4 inch) screws, (screws are available from rack suppliers).



Note: The front door of the mainframe has to be lowered to access the fixing holes.

Ancillary Panels

Mav Remote - Desk and 19" Rack Installation

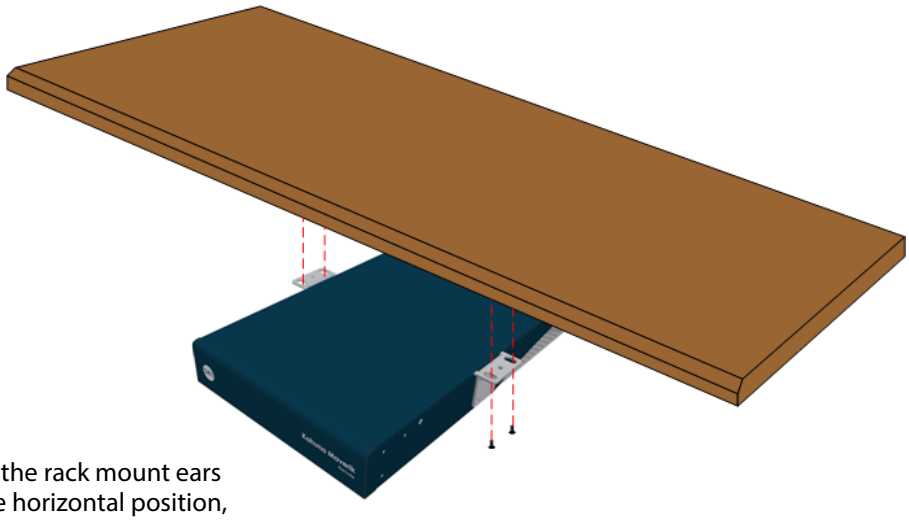
There are three ways to mount the Mav Remote:

1. Desk Mount
2. Half Rack Mount (with rack mount tray as support)
3. Rack Mount using 2x Mav Remote units with a joining plate

Desk Mount

The rack mount ear mounting brackets can be set to two different positions, horizontal with the mounting holes facing upwards, and vertically (for Rack Mount as described in the 19""Rack Mount description), this will allow the unit to be secured to the underside of a desk.

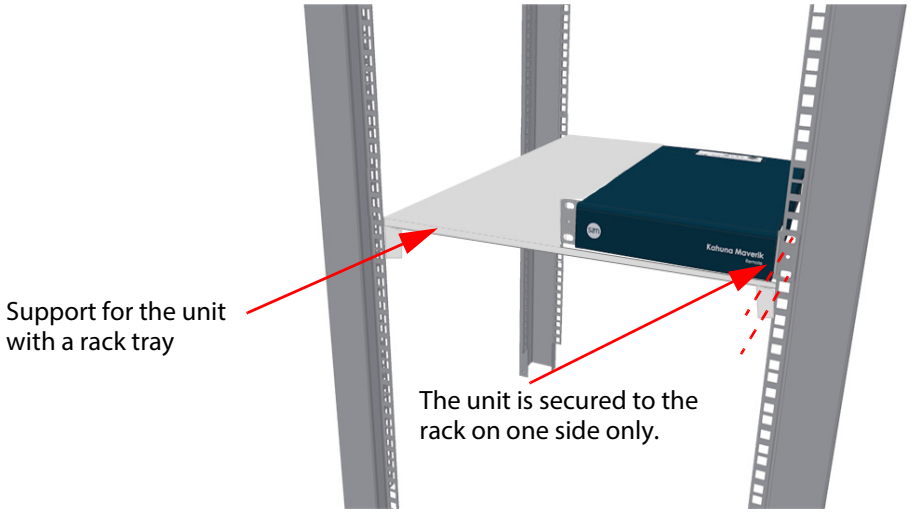
Mounting the unit to the underside of a desk



With the rack mount ears in the horizontal position, the unit can be secured to a desk using 4x screws

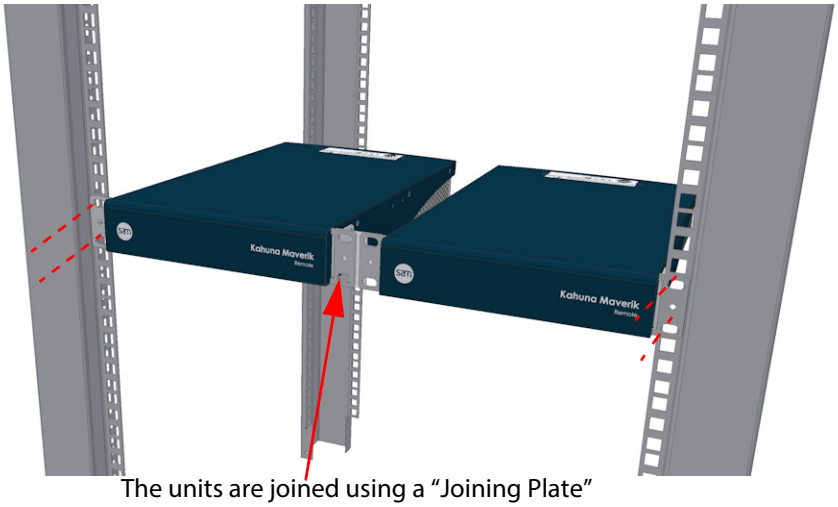
Half 19" Rack Mount

The mounting brackets may also be set to a vertical position to fit the unit into a 19" rack, the unit is 1RU high and only half 19" wide, so will need to have support from below using a rack mount tray, as only one side of the unit can be secured to the rack sides.



19" Rack Mount using two Mav Remote units with a Joining Plate

Two Mav Remote units can be joined together using a joining plate, which allows the units to span across the full width of the rack and fasten to the rack without the support of a rack tray.

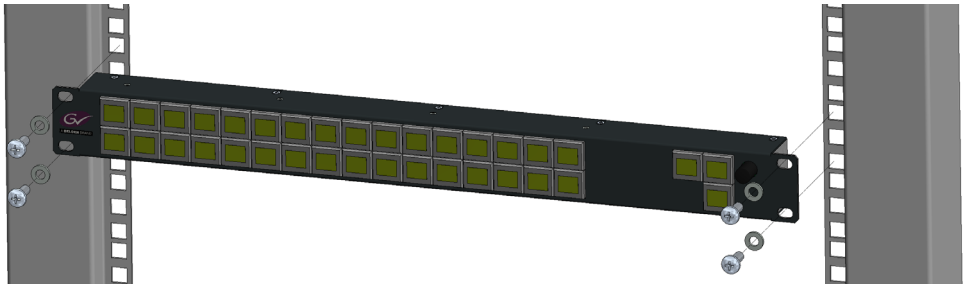


Note: The Mav Remote must have ventilation to allow cooling, and must not be installed into an enclosed space.

LCD and LED Aux Panel - 19" Rack Installation

The method of mounting the LCD and LED Aux Panels into a 19" rack is exactly the same for both Aux panels.

The ears of the Aux Panels have 2x holes on each side, use the correct rack mount screws and fixings in the 4x mounting holes, to secure the Aux panel to the rack as shown below. Make sure that enough access is allowed behind the Aux panel to connect the external PSU and network cable.



4 Power Supplies

Mainframe Internal Power Supplies

The information below gives an overview of the power supplies used in the Kula AV mainframes.

Note: To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

The **Kula AV** Mainframe is supplied as standard with two power supplies, one power supply is able to run a fully populated mainframe. The other power supply is for redundancy.

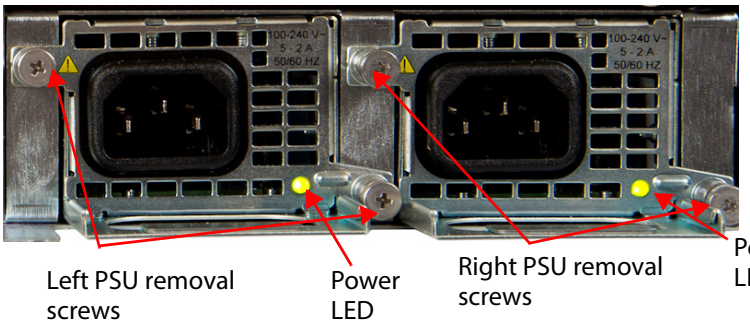
Note: To ensure full dual redundancy, the two power supplies must be powered from independent power sources.

This symbol indicates that hazardous voltages are present inside. ***No User Serviceable Parts*** inside the power supplies. This unit should only be serviced by trained personnel.

The power supplies for the Kula AV mainframe are retained within the mainframe body, there are no On/Off switches for the power supplies. The mainframe will power up as soon as the AC Power Cables are plugged into the IEC connectors and turned **On** at the AC mains supply.

Checking the Kula AV Power Supplies

Kula AV mainframe power supplies are hot-swappable. Replacing power supplies should only be attempted by qualified personnel.
To see that the power supplies are working correctly, when mains power is applied, a green power LED is lit (as shown below).



With the power supplies un-plugged from the mains supply, they can be individually removed by unscrewing the removal screws and carefully withdrawing the PSU from the body of the mainframe.

Caution!

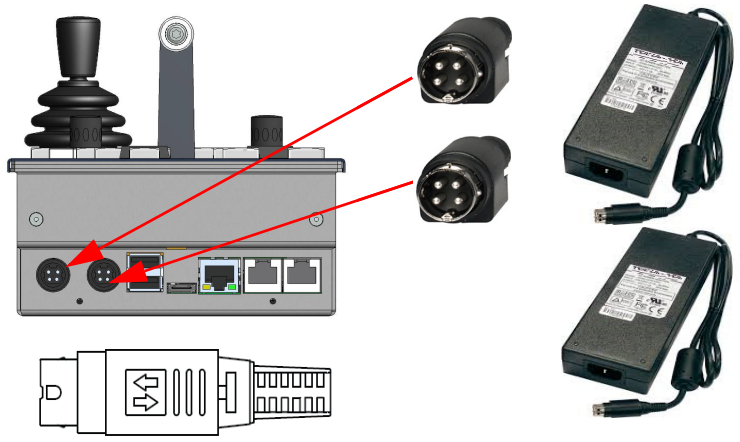
The Power Supplies have NO user serviceable parts inside and if one should become faulty, it should be replaced immediately.

Control Surface External Power Supplies

The Kula AV Control Surface is supplied with 2 external 12V power supplies. One of the power supplies powers the control surface, the other is for redundancy.

Caution!

The Power Supplies have **NO** user serviceable parts inside and are welded shut.
Do not attempt to open the power supply cases.



Snap and Lock type connector

Note: Make sure that the mains power is turned Off before connecting the PSU to the control surface.

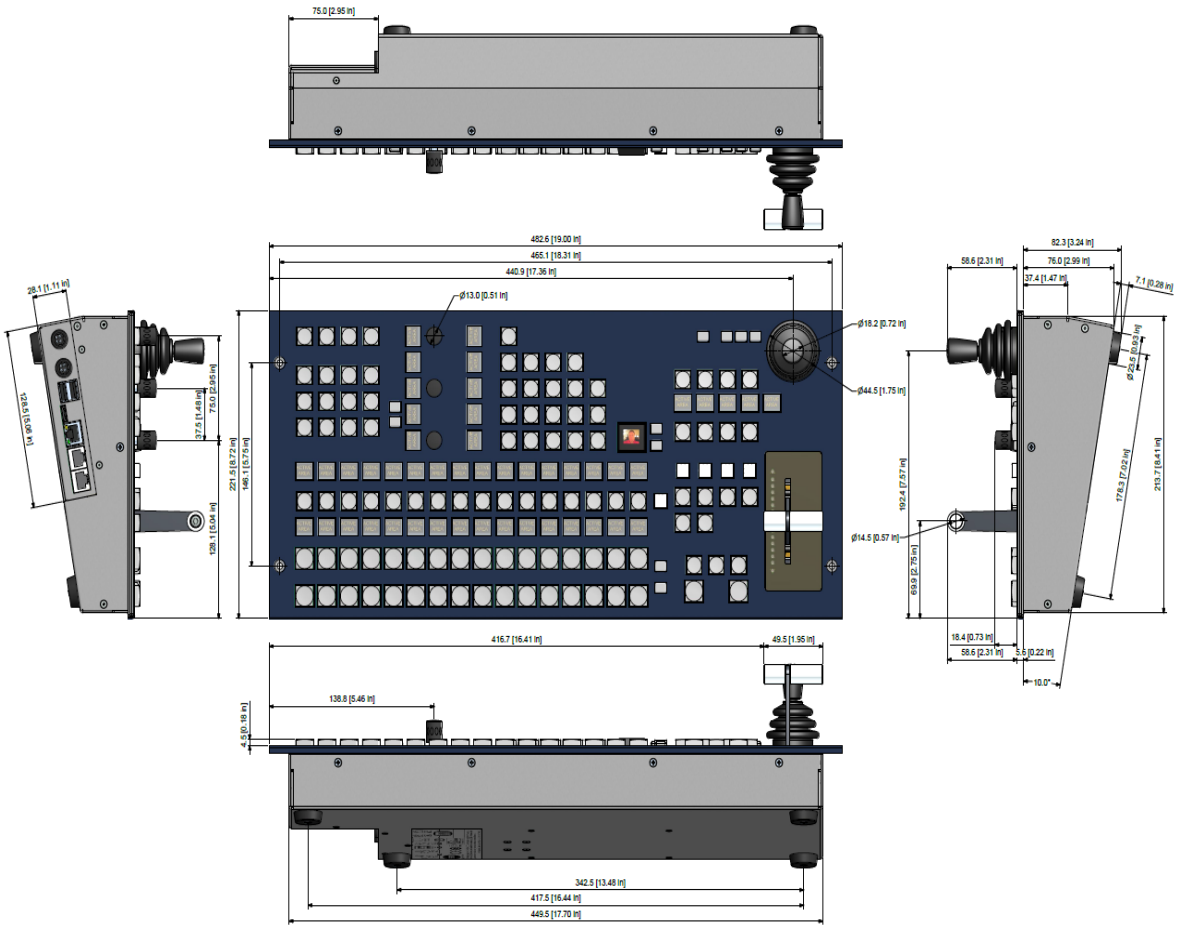
The power supply connector plug that connects to the control surface is a 4 pin “Snap and Lock” type, care should be taken when connecting and un-connecting.

Note: Do not allow the power supplies to hang freely from the control surface. Make sure that the cables are not under any stress.

5 Dimensions

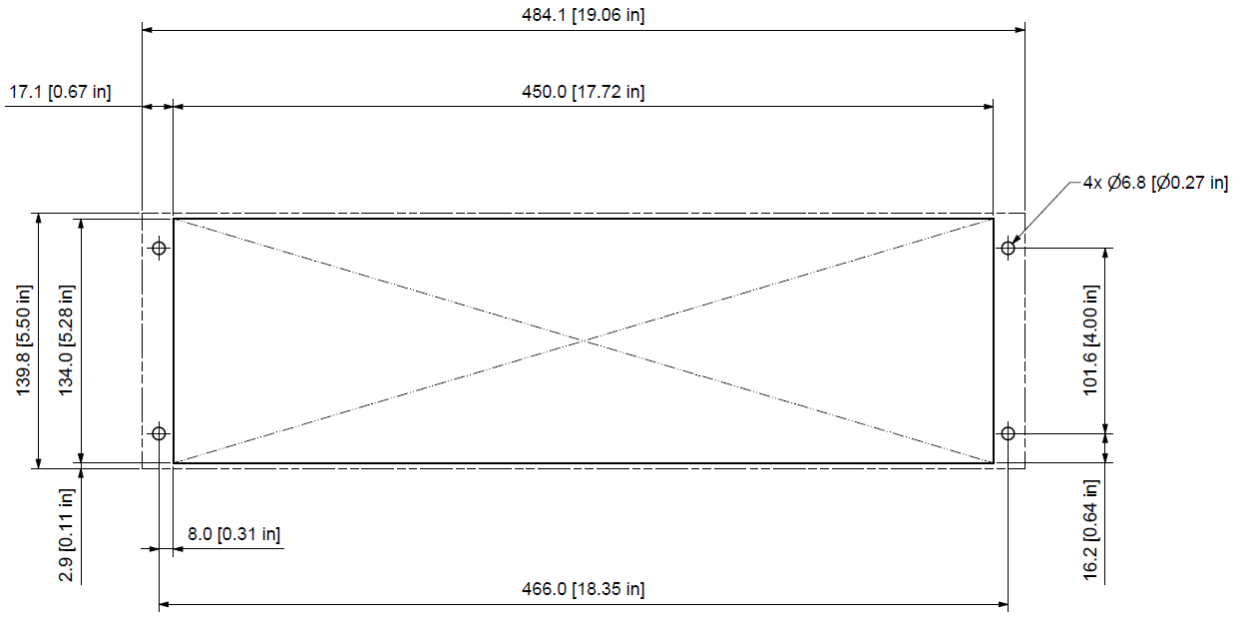
Control Surface Dimensions

Kula AV K5P 1M/E (19”) Control Surface



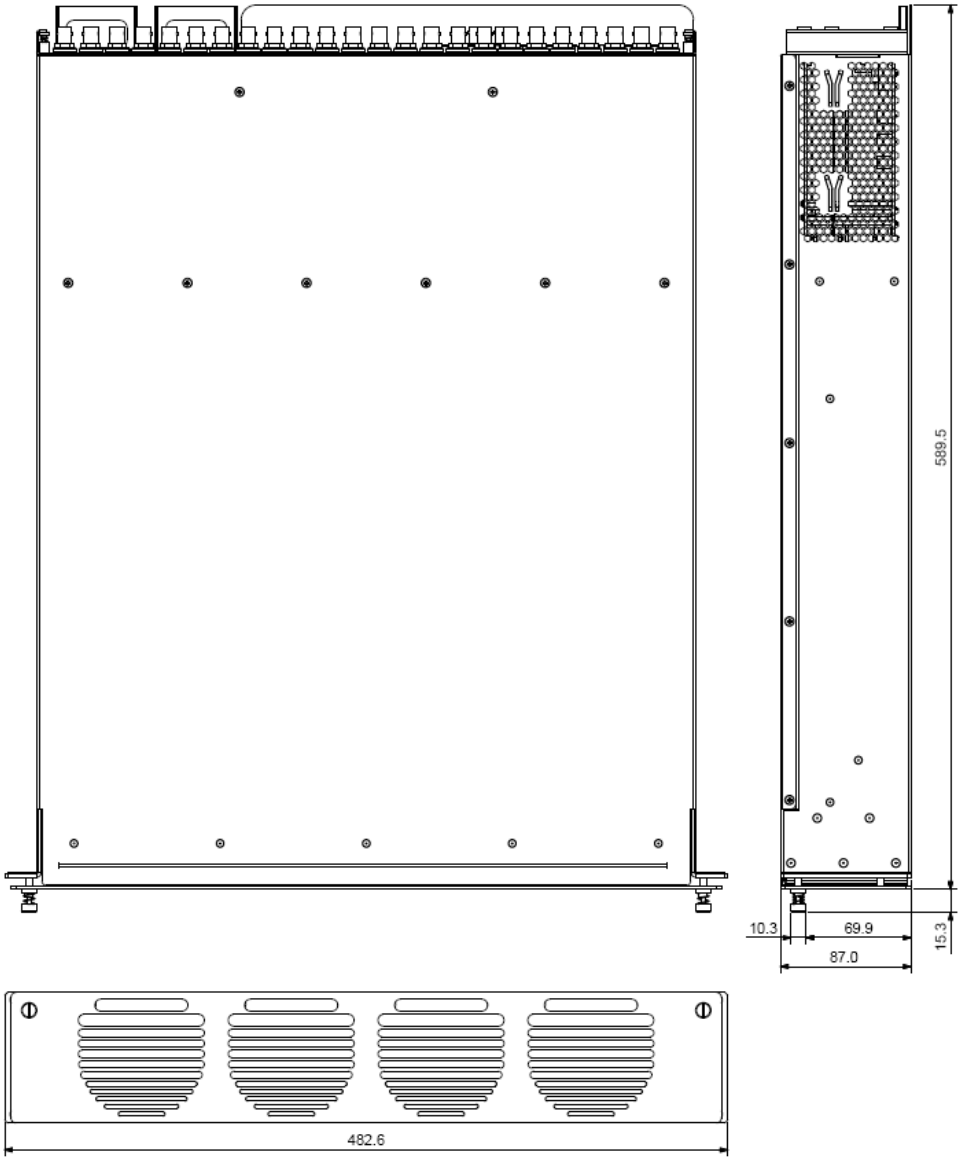
Kula AV K5P 1M/E Control Surface	
Width Depth Height	482.6 mm ~ 19 Inches 221.5mm ~ 8.72 Inches 87.9mm ~ 3.46 Inches (146.5 mm ~ 5.79 Inches total height including T-Bar)
Weight	Approx - 3.6Kg ~ 7.14lb
Environmental	41 to 104°F ~ 5 to 40°C non-condensing

Desk Cutout Dimensions for K5P 1M/E (19”) Control Surface



Mainframe Dimensions

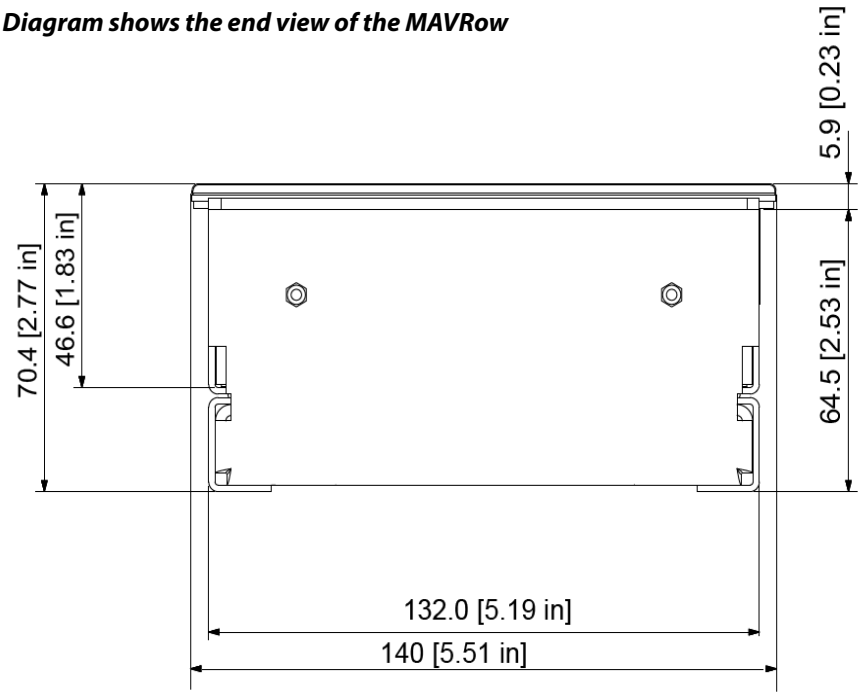
Kula AV Mainframe



Kula AV Mainframe	
Width Depth Height	482.6 mm ~ 19 Inches 604.8mm ~ 23.81 Inches 87mm ~ 3.42 Inches
Weight	Approx - 14Kg ~ 30.3lb
Environmental	41 to 104°F ~ 5 to 40°C non-condensing

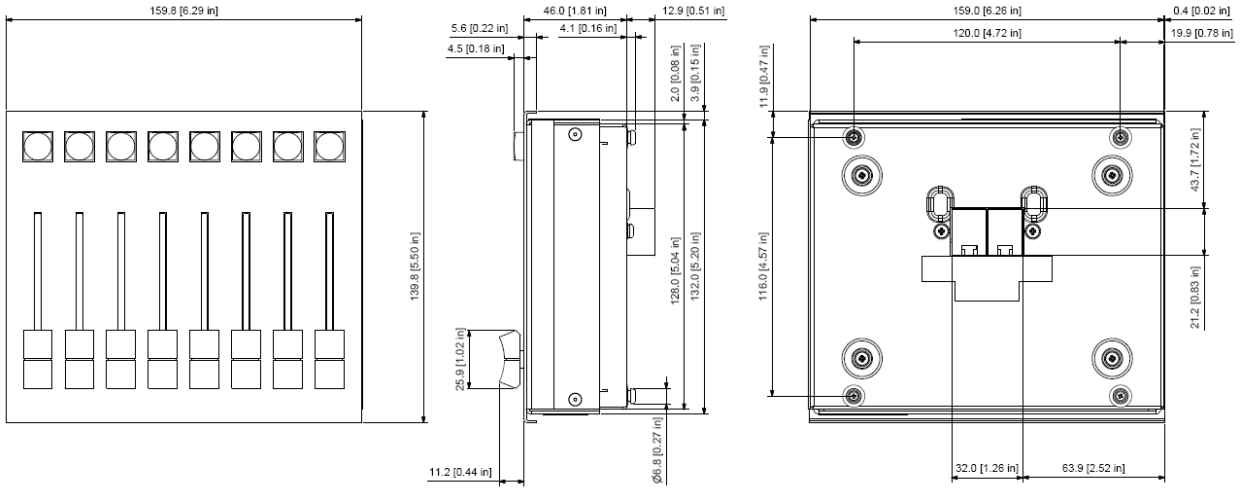
MAVRow

Diagram shows the end view of the MAVRow



MAVRow	
Depth Height	140 mm ~ 5.51 Inches 70.4 mm ~ 2.77 Inches (surface of MAV-GUI to the bottom of the body)
Weight	Approx - TBC

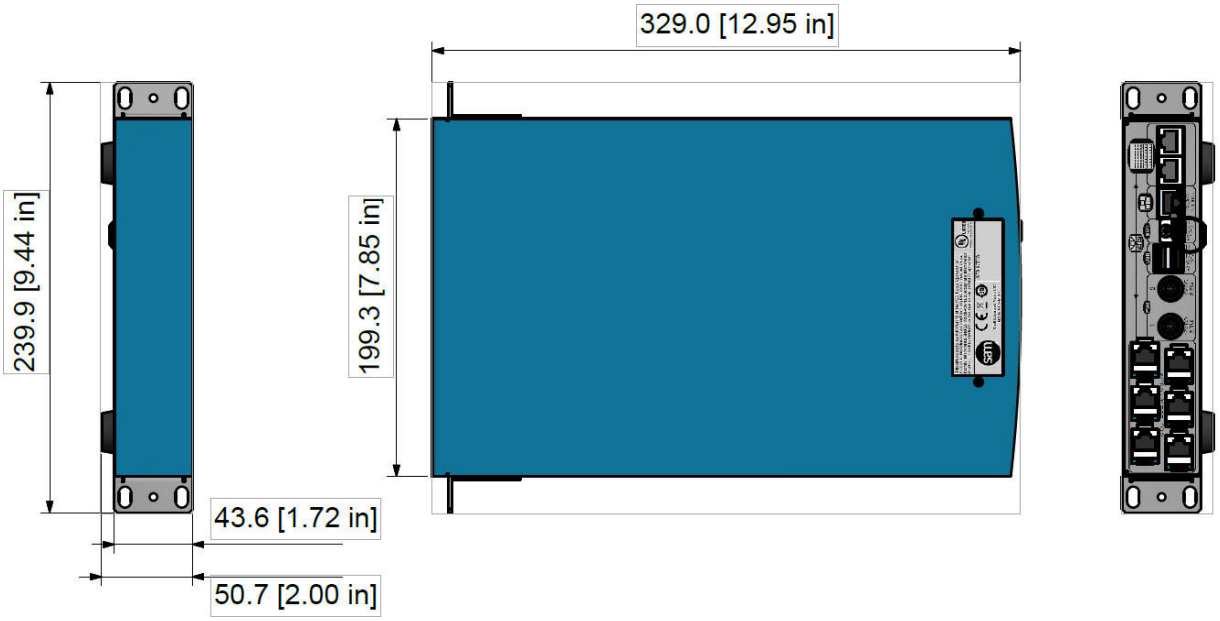
MAV-AUD-FADER



MAV-AUD-FADER	
Width Depth Height	160 mm ~ 6.29 Inches 140 mm ~ 5.51 Inches 58.9 mm ~ 2.31 Inches (surface of MAV-AUD-FADER to the bottom of the body)
Weight	Approx - 900g ~ 31.74oz
Environmental	41 to 104°F ~ 5 to 40°C non-condensing

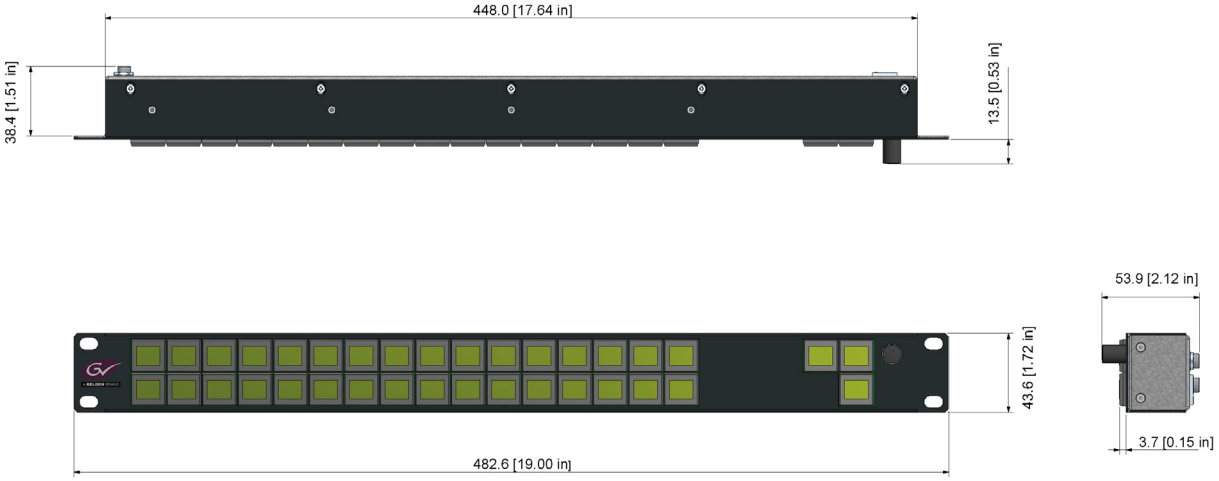
Ancillary Panels

Mav Remote Dimensions



Mav Remote Dimensions		
Width	9.44 inches	~ 239.9 mm
Depth	12.95 inches	~ 329 mm
Height	2.00 inches	~ 50.7 mm (including feet)
Weight	4.29 lbs	~ 1.95kg
Environmental	41 to 104°F	~ 5 to 40°C non-condensing

LCD and LED Aux Panel Dimensions



LCD and LED Aux Panel Dimensions		
Width	19 inches	~ 482.6mm
Depth	1.51 inches	~ 38.4mm
Height	1.72 inches	~ 43.6 mm
Weight	2.2 lbs	~ 1kg
Environmental	41 to 104°F	~ 5 to 40°C non-condensing

Note: The diagram above displays the LCD Aux Panel dimensions. The LED Aux Panel has exactly the same dimensions

6 Specifications

Kula AV Control Surface Specifications

Kula AV K5P Control Surface	
Connector	**Description**
Power Supply	2x 4 pin PSU Connectors - Kycon KPPX 4 Pin or Compatible 12V DC 8.33A
Inrush Current	8.7A
USB	2x USB 2 Connectors
Video Output	Digital Video Monitor Output (MON) connector. To connect to a touch screen GUI
Network	10/100/1000 base T, Auto - MDX/MDXI on RJ45 connectors
Comms Connectors	2x RJ45 connectors for Comms and +12V 0.42A power supply **NOT** Ethernet, connections. **Do Not** use network switches or hubs. CAT5 or above cables - crossover cables are **Not** suitable.

External Power Supplies	
Power Supply	**Description**
External PSU for the KPP Control Surface	2x Fully independent external PSU modules with separate mains power feeds via 2x 10A IEC leads. Output from each PSU = 12V DC 100W via Kycon KPPX 4 Pin or Compatible connectors to the KPX and KPP control surface. 2 supplied as standard, 2 PSUs provide dual redundancy.

External Mains Power Supply Requirements	
Voltage	100V - 240V 50/60Hz
Power	Less than 120 Watts

Kula AV Mainframe

Television Standards	
Television Standards	**2.97Gbps Video Standards (1080p)** 1080p 59.94Hz SMPTE-424M/Level A 1080p 59.94Hz SMPTE-424M/Level B 1080p 60Hz SMPTE-424M/Level A 1080p 60Hz SMPTE-424M/Level B 1080p 50Hz SMPTE-424M/Level A 1080p 50Hz SMPTE-424M/Level B **1.485 Gbps HD Video Standards** 1080i 60Hz (ANSI/SMPTE-274M (4)-292M(D)) 1080i 59.94Hz(ANSI/SMPTE-274M(5)-292M(E)) 1080i 50Hz(ANSI/SMPTE-274M(6),-292M(F)) 1035i 60Hz(ANSI/SMPTE-260M-292M(A)) 1035i 59.94Hz(ANSI/SMPTE-260M,-292M(B)) 1080p 30Hz sF(ANSI/SMPTE-274M(12) as per RP211) 1080p 29.97Hz sF(ANSI/SMPTE-274M(13) as per RP211) 1080p 25Hz sF(ANSI/SMPTE-274M(14) as per RP211) 1080p 24Hz sF(ANSI/SMPTE-274M(15) as per RP211) 1080p 23.976Hz sF(ANSI/SMPTE-274M(16) as per RP211) 1080p 30Hz(ANSI/SMPTE-274M(7)-292M(G)) 1080p 29.97Hz(ANSI/SMPTE-274M(8)-292M(H)) 1080p 25Hz(ANSI/SMPTE-274M(9)-292M(I)) 1080p 24Hz(ANSI/SMPTE-274M(10)-292M(J)) 1080p 23.976Hz(ANSI/SMPTE-274M(11)-292M(K)) 720p 60Hz(ANSI/SMPTE-296M(1)-292M(L)) 720p 59.94Hz(ANSI/SMPTE-296M(2)-292M(M)) 720p 50Hz(ANSI/SMPTE-296M(2)-292M(M)) **SD Video Standards** 525 60Hz/59.94Hz4:3/16:9 (ITU-R BT.601-5 ANSI/SMPTE-259M(2) 625 50Hz4:3/16:9 (ITU-R BT.601-5 ANSI/SMPTE-259M(2)

Mainframe Internal Processing	
Luma & Key Input/Output Rates	3G - 148.50 MHz or (148.50 /1.001)MHz HD – 74.25 MHz or (74.25/1.001)MHz SD – 13.5MHz
Pb & Pr Input/Output Rates	3G - 74.25 MHz or (74.25/1.001)MHz (4:2:2) HD – 37.125 MHz or (37.125/1.001)MHz (4:2:2) SD – 6.75MHz
Synchronization	Input line synchronizers on all paths.

Kula AV Mainframe Connections

Mainframe Outputs	
Outputs	12x SDO BNC Outputs total (14 when Bi-directional BNCs are not being used) 1080p SDI/HD-SDI/SD-SDI (270Mbps / 1.485Gbps / 2.97Gbps)

Mainframe Output Formats & Levels	
SDI Output Format	Tri Standard 3Gbps-SDI/HD-SDI/SD-SDI 1080p (270Mbps / 1.485Gbps / 2.97Gbps)
Analogue Sync	±300mV tri-level HD sync or 300mV SD sync according to system standard
Output Impedance	75 ohms

Mainframe Inputs	
Inputs	40x Tri standard, SD-SDI/HD-SDI/3Gbps-SDI each on 1x BNC

Mainframe Inputs Formats & Levels	
SDI Input Format	Tri Standard 1080p 2.97Gbps/HD 1.485 Gbits/second and SD 270Mbits/second serial digital interface as per ANSI/SMPTE-259/292M
Analogue HD Reference	±300mV tri-level sync ±6dB
Analogue SD Reference	300mV sync with optional 300mV pk-pk burst ±6dB
Impedance	75 ohms (except reference input).

Mainframe Bi-directional Inputs/Outputs	
Bi-directional Inputs and Outputs	2x Tri standard, SD-SDI/HD-SDI/3Gbps-SDI BNC Inputs (only) or 2x 1080p SDI/HD-SDI/SD-SDI (270Mbps / 1.485Gbps / 2.97Gbps) BNC Outputs

Mainframe Network/Serial/USB	
Network	3 ports 10/100/1000 base T, Auto – MDX/MDXI on RJ45 connector.
Serial Control	2 x RS-422 on RJ45.
USB	2x USB 3.0 - for external memory device or hard drive USB outputs are 5 V DC, 0.9 A each

Mainframe Reference/GPIO	
Reference/ Sync Input /Output	1x Tri-Level depending on output standard 1x On-line Switchable between analogue 3Gbps, HD Tri-level Sync and analogue SD sync
GPIO	3 x 25 Way D-type programmable GPIO Tally with TTL-level/contact-closure inputs for GPI

Mav Remote Specifications

Mav Remote	
Connector	Description
Video Output	1x Monitor Output
USB	2x USB 2 Connectors
Network	1x 10/100/1000 base T, Auto - MDX/MDXI on RJ45 connectors
Connections to MAV modules	8x RJ45 connectors for Comms and 2x +12V 0.42A power supply Connection to other MAV modules NOT Ethernet, connections must be direct to MAV modules. **Do Not** use network switches or hubs. CAT5 or above cables - crossover cables are **Not** suitable.

Mav Remote Power Supplies	
Power Supply	Description
To the Mav Remote	2x Fully independent external PSU modules with separate mains power feeds via 2x 10A IEC leads. Output from each PSU = 12V DC 100W via Kycon KPPX 4 Pin or Compatible connectors to the Mav Remote. 2 supplied as standard per Mav Remote, One PSU provides Dual Redundancy.

Mav Remote External Mains Power Supply Requirements	
Voltage	100V - 240V 50/60Hz
Power	Less than 100Watts (per Mav Remote)

Mainframe PSU Information (covering all Kula AV mainframes)

Mainframe Power Supplies	
Mainframe	Two fully independent hot-swappable PSU modules, with separate mains power feeds via 2 x IEC sockets. Dual Redundant requires two fully independent PSU modules; with separate mains power feeds via 2 x IEC socket.

Mainframe Power Supply Requirements	
Voltage	100V - 240V 50/60Hz, 5-2A
Power	400 Watts Max.

Contact Us

Grass Valley Technical Support

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

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