



grass valley

A **BELDEN** BRAND

MASTERPIECE

MASTER CONTROL SWITCHER

Installation Manual

Issue 3 Rev 4

2020-01-29

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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A Grass Valley manual may have been revised to reflect changes made to the product during its manufacturing life. Thus, different versions of a manual may exist for any given product. Care should be taken to ensure that one obtains the proper manual version for a specific product serial number.

Information in this document is subject to change without notice and does not represent a commitment on the part of Grass Valley.

Warranty information is available from the Legal Terms and Conditions section of Grass Valley's website (www.grassvalley.com).

Title	Masterpiece Installation Manual
Part Number	Issue 3 Rev 4
Revision	2020-01-29, 13:54

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 nettoyeurs 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.

Laser Safety - Fiber Output SFP and QSFP Modules Warning

LASER SAFETY



The average optical output power does not exceed 0 dBm (1mW) under normal operating conditions. Unused optical outputs should be covered to prevent direct exposure to the laser beam.

Even though the power of these lasers is low, the beam should be treated with caution and common sense because it is intense and concentrated. Laser radiation can cause irreversible and permanent damage of eyesight. Please read the following guidelines carefully:

- Make sure that a fiber is connected to the board's fiber outputs before power is applied. If a fiber cable (e.g. patchcord) is already connected to an output, make sure that the cable's other end is connected, too, before powering up the board.
- **Do not** look in the end of a fiber to see if light is coming out. The laser wavelengths being used are totally invisible to the human eye and can cause permanent damage. Always use optical instrumentation, such as an optical power meter, to verify light output.

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



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.

toc

Table of Contents

FCC Compliance	ii
Patent Information	ii
Copyright and Trademark Notice	ii
Lithium Batteries	x
Battery Disposal	x
Laser Safety - Fiber Output SFP and QSFP Modules Warning	xi
Mains Supply Voltage	xi
Safety and EMC Standards	xii
Safety Standards	xii
EMC Standards	xii
EMC Performance of Cables and Connectors	xiii
1 About this Manual	1
Overview	1
2 Cabling and Connections	3
Masterpiece Control Surface Connectors	3
Control Surface Connections - continue	4
Connecting the Touch Screen Monitor GUI	5
Mainframe Layout and Connections	6
Mainframe Overview	6
Masterpiece Mainframe Front Card Location	6
12G-SDI Mainframe Rear Connectors	7
12G-SDI Mainframe Connections	8
Inputs	8
Outputs	8
IP Mainframe Rear Connectors	9
IP Input and Output Connectors	11
USB 3.0	12
Network	12
NEX X4 and X5	12
Reference	12
25 Way GPIO	13
25 Way AES/LTC	14
RJ45 - RS422 Serial Ports	15
3 Location and Environment	17
Environmental Considerations	17
Mounting the Masterpiece Control Surface into a Desk	17
Mounting the Control Surface into a 19" Rack	18
Mainframe Location and Environment	19
Location Instructions	19
Cooling Fan Failure	19
Mounting the Masterpiece Mainframe into a 19" Rack	20

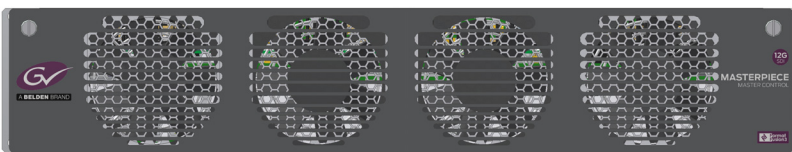
4 Power Supplies	21
Mainframe Internal Power Supplies	21
Checking the Masterpiece Power Supplies	21
Control Surface External Power Supplies	22
5 Dimensions	23
Masterpiece Control Surface	23
Control Surface Desk Cutout Information	24
Masterpiece Mainframe Dimensions	25
6 Specifications	27
Masterpiece Control Surface	27
Masterpiece 12G-SDI and IP Mainframes	28
12G-SDI Mainframe Connections	29
IP Mainframe Connections	30
Contact Us	33

About this Manual

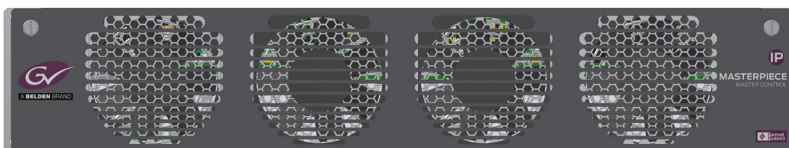
Overview

Thank you for purchasing your new Masterpiece Master Control 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.

Masterpiece 12G-SDI Mainframe



Masterpiece IP Mainframe



Masterpiece Control Surface



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. SAM operates a policy of continuous improvement and development. SAM reserves the right to make changes and improvements to any of the products described in this document without prior notice.

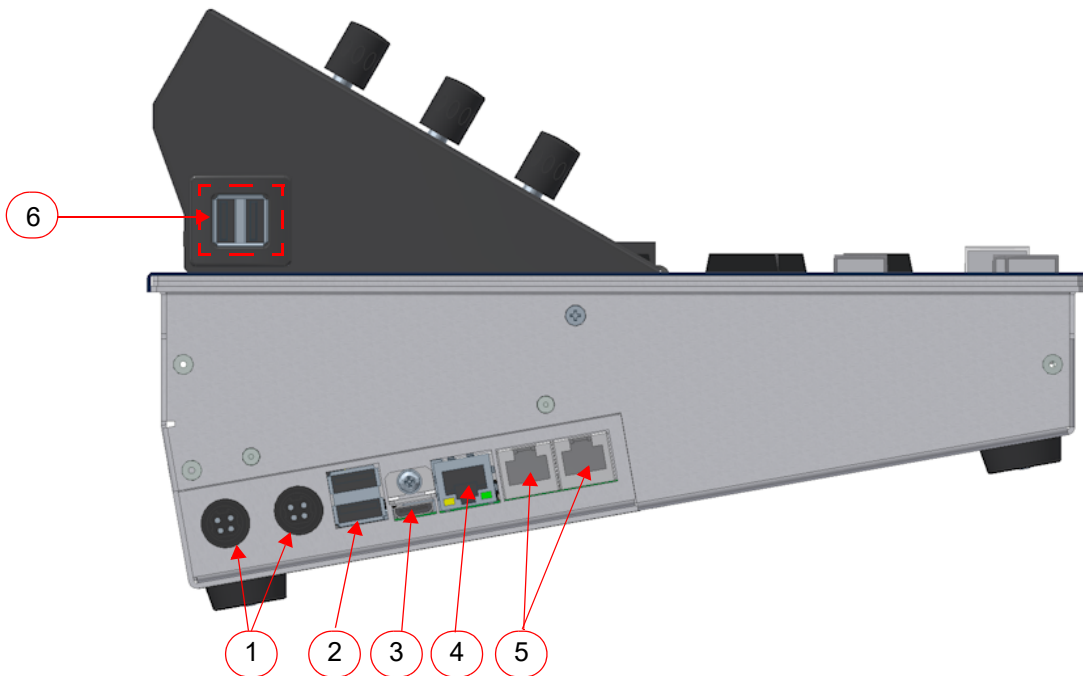
Cabling and Connections

2

Masterpiece Control Surface Connectors

The Masterpiece Control Surface has Power, Comms, a Monitor Output connector (connection to local touchscreen), USB ports and a Network connection to the mainframe. The “Comms” ports on the Masterpiece Control Surface allow external control MAV modules to be connected.

Masterpiece Control Surface Connectors

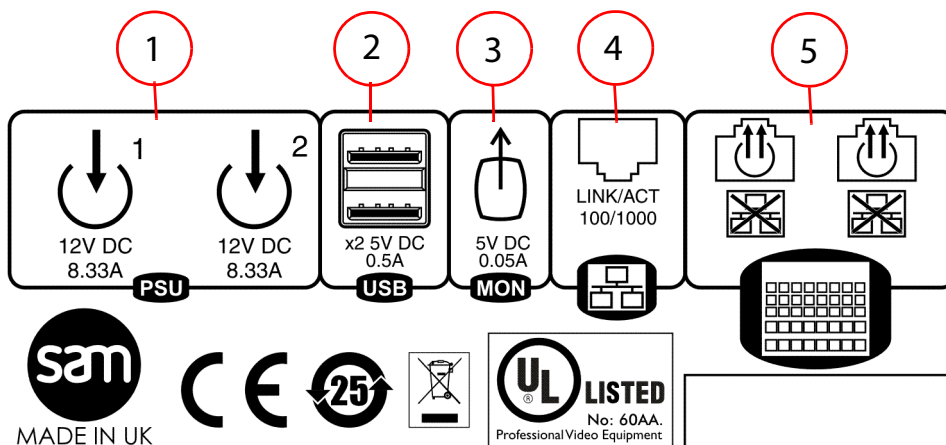


- | | | | |
|---|----------------------------|---|---------------------------|
| 1 | 2x External PSU Connectors | 2 | 2x USB Connectors |
| 3 | Monitor Out | 4 | Network Port to Mainframe |
| 5 | 2x Comms Ports | 6 | 2x USB Connectors |

Note: The Control Surface “Comms Ports” are Comms ports not Ethernet ports. **DO NOT** connect a Network Switch or Hub to any of the Comms ports. Use CAT5 or above cables. Crossover cables are **Not** suitable.

Control Surface Connections - continued

Diagram below shows the connector information for the Masterpiece Control Surface (LH Side)
(Note: The label below is on the underside of the Control Surface)



This device complies with 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.

Snell Advanced Media, Turnpike Road, Newbury, Berkshire, RG14 2NX, UK.

Control Surface Connectors

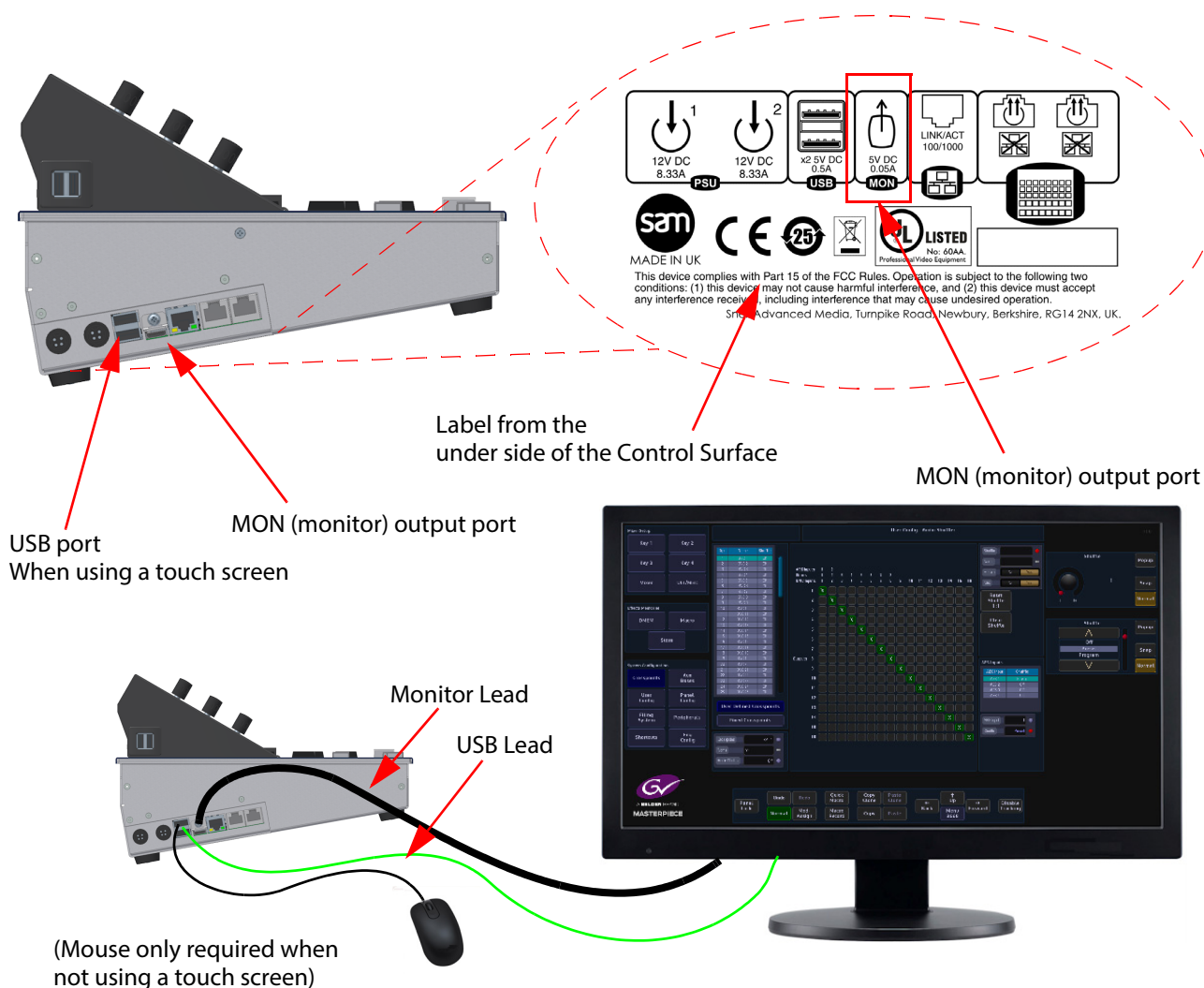
Connector	Description
1	2x PSU Connectors - Kycon KPPX 4Pin or Compatible 12V DC 8.33A
2	2x USB 2 Connectors
3	Monitor (MON) Output - to external touch screen
4	1x 10/100/1000 base T, RJ45 network connectors to the switcher mainframe
5	2x Comms Connection Important Note: NOT Ethernet, connections must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

Connecting the Touch Screen Monitor GUI

An external monitor has to be connected to the Masterpiece Control Surface to be used as an external touch screen GUI. The external monitor must have a 1920 x 1080 display resolution and can be a touch screen or a non touch screen display.

For touch screen monitors, connect the USB lead from the monitor to a USB port on the Control Surface and the HDMI to DVI (for example) lead to the monitor port.

For non touch screen displays, the user can connect a USB mouse to a USB port on the Control Surface and the HDMI to DVI (for example) lead to the monitor port.



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

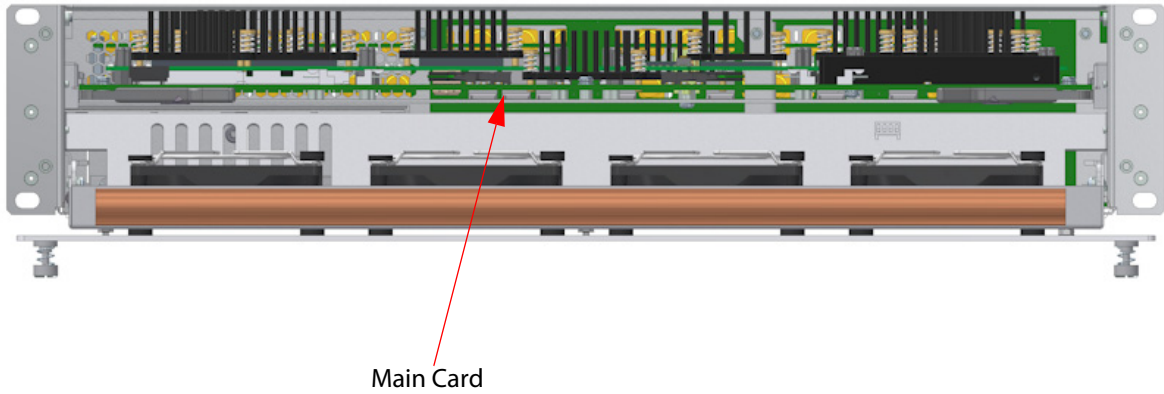
Non- touch screen monitor - once the external monitor is connected to the Masterpiece Control Surface, a USB mouse (shown above) is used to control the Masterpiece menus on the monitor screen.

Mainframe Layout and Connections

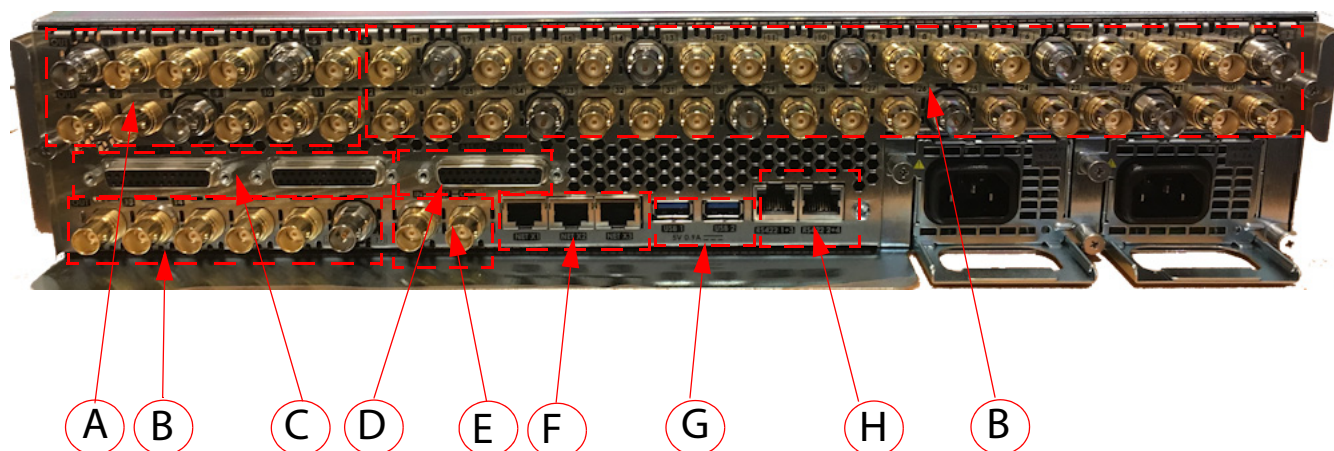
Mainframe Overview

The Masterpiece mainframe has 1 card which has all the Input/Output video processing.

Masterpiece Mainframe Front Card Location



12G-SDI Mainframe Rear Connectors



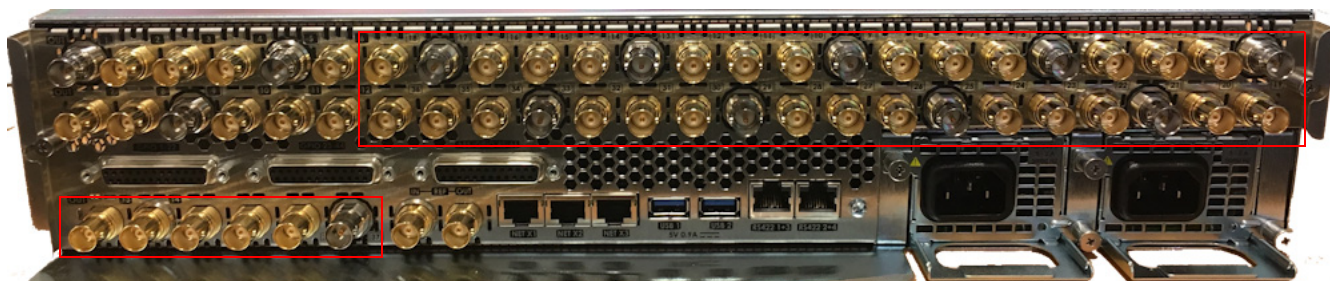
12G-SDI Mainframe Connectors

Connectors	Description	Connector Information
A	Output BNCs	12x HD/1080p (1.485Gbps / 2.97Gbps) Outputs. Serial digital interface As REC601/ SMPTE/292M / SMPTE424M via BNC connectors. Including 3 x 12G-SDI (11.88Gbps SMPTE 2082) single link BNC connectors (silver BNCs)
B	Input BNCs	42 x HD/SD/1080p (1.485Gbps / 2.97Gbps) Inputs. Serial digital interface As REC601/ SMPTE/292M / SMPTE424M via BNC connectors. Including 10 x 12G-SDI (11.88Gbps SMPTE 2082) single link BNC connectors (silver BNCs).
C	GPIO	44 GPI Tally/GPO Outputs Assignable GPI / GPO Isolated contact closures via 2 x 25 way D Type. Assignable as GPI or GPO.
D	AES/LTC	4 x AES inputs and 3 x AES outputs with 1 x LTC input. (AES formal name is AES3-2003). LTC is Linear (or Longitudinal) Timecode.
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
H	Serial	2X RJ45, 4 x RS422 serial ports

12G-SDI Mainframe Connections

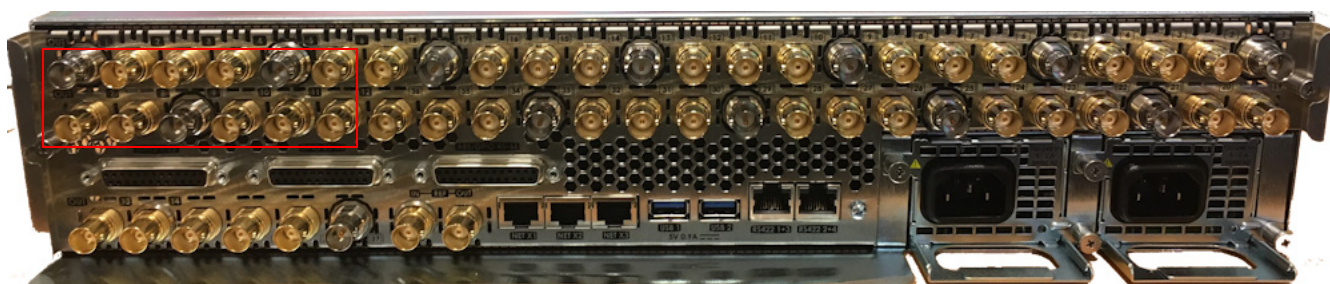
Inputs

There are 42x SDI inputs in total that can output HD and 1080p (1.485Gbps/2.97Gbps). Ten of those inputs with **“silver colored BNCs”** are inputs for 12G-SDI (SMPTE 2082) single link.

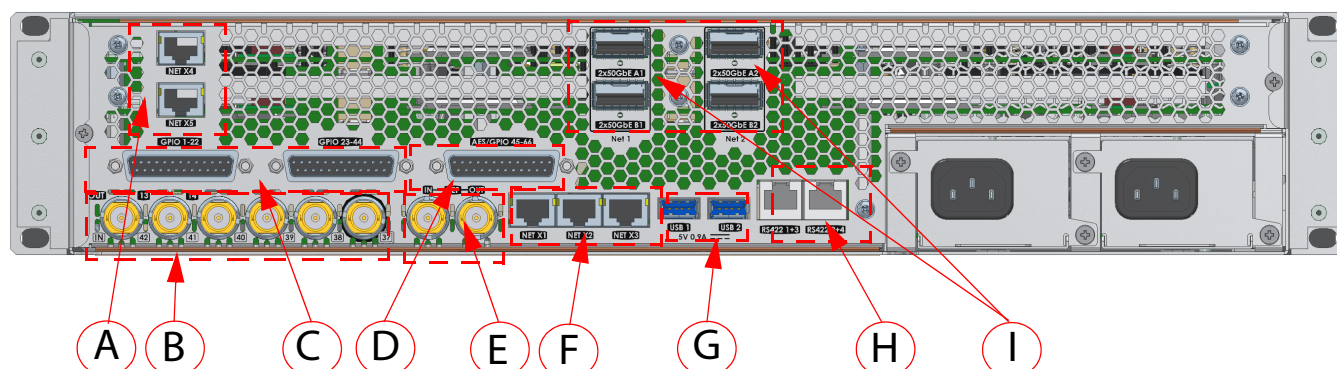


Outputs

There are 12x SDI Outputs in total that can output HD and 1080p (1.485Gbps/2.97Gbps). Three of those outputs with **“silver colored BNCs”** are outputs for 12G-SDI (SMPTE 2082) single link.



IP Mainframe Rear Connectors



IP Mainframe Connectors

Connectors	Description	Connector Information
A	Network (NOT for connection to Control Surface or LAN/WAN networks)	NET X4 and NET X5 are used for direct connection from a laptop or PC for software updates to the IP Fins via RollCall.
B	Input BNCs For inputs 37 to 42	6x HD/1080p (1.485Gbps / 2.97Gbps) Inputs. Serial digital interface As REC601/ SMPTE/292M / SMPTE424M via BNC connectors.
C	GPIO	44x GPI Tally/GPO Outputs Assignable GPI / GPO Isolated contact closures via 2 x 25 way D Type. Assignable as GPI or GPO.
D	AES/LTC	4 x AES inputs and 3 x AES outputs with 1 x LTC input. (AES formal name is AES3-2003). LTC is Linear (or Longitudinal) Timecode.
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
H	Serial	2X RJ45, 4 x RS422 serial ports

IP Input and Output Connectors

QSFP Input/Outputs

2x50GbE **A1/B1** is the Primary QSFP connection of the Upper 'A' and Lower 'B' card.

Inputs - 18 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs across two 50GbE links. Each 50GbE link transports 9 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs.

Outputs - 6 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs across two 50GbE links. Each 50GbE link transports 3 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs.

2x50GbE **A2/B2** is the Secondary QSFP connection of the Upper 'A' and Lower 'B' card giving redundancy.

Duplex, signals supported over RTP streams via 2x QSFP 28 (Transceivers QSPF28)

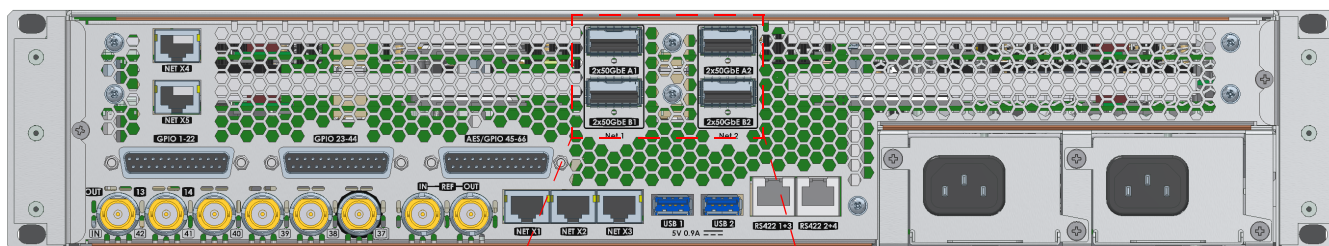
SMPTE ST 2022-6, SMPTE ST 2022-7, VSFTR-03, VSFTR-04, SMPTE 2110

Up to 10 inputs – 1.485 Gb/s format sources

Up to 10 inputs – 2.970 Gb/s format sources

Up to 12 outputs – 1.485 Gb/s format sources

Up to 12 outputs – 2.970 Gb/s format sources



IP Connector A1 (primary)

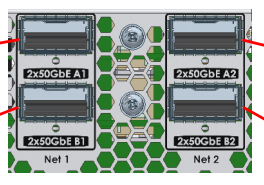
Inputs - 1 to 18

Outputs - 1 to 6

IP Connector B1 (primary)

Inputs - 19 to 36

Outputs - 7 to 12



IP Connector A2 (secondary)

Inputs - 1 to 18

Outputs - 1 to 6

IP Connector B2 (secondary)

Inputs - 19 to 36

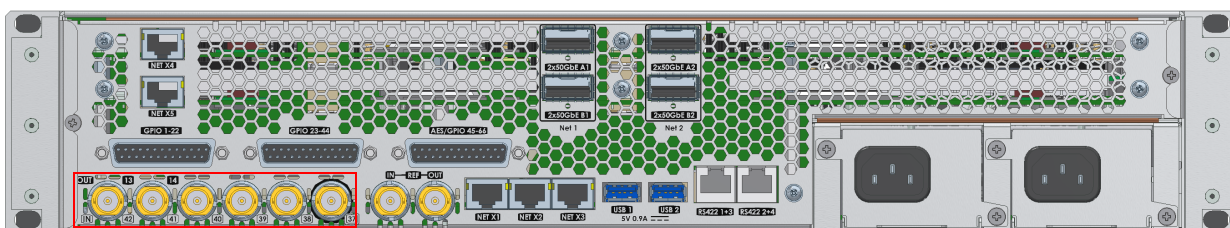
Outputs - 7 to 12

Input BNCs

6 x HD/SD/1080p (270Mbps / 1.485Gbps / 2.97Gbps) Inputs.

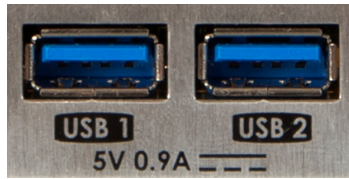
Serial digital interface As REC601/ SMPTE/292M / SMPTE424M via BNC connectors.

Including 1 x 12G-SDI (SMPTE 2082) single link BNC connectors (silver BNC).



USB 3.0

Two USB 3.0 connectors for fast data transfer.



Network

Masterpiece has 3 RJ45 10/100/1000 base T network connectors.



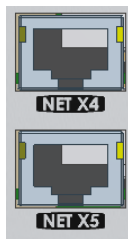
There are 2 LED's attached to each connector, the LED's have different functions depending on the type communication they are receiving, the list below describes the functions. Connectors with XLR shells can be used to connect with these network connectors.

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

	Left LED	Right LED
1G bit (1000 base T):	GREEN	GREEN
100Mbit (100baseT):	OFF	GREEN
10Mbit (10baseT):	YELLOW	GREEN
No link:	OFF	OFF

NEX X4 and X5

NET X4 and NET X5 are used for direct connection from a laptop or PC for software updates to the IP Fins via RollCall. (**NOT** for connection to Control Surface or LAN/WAN networks).



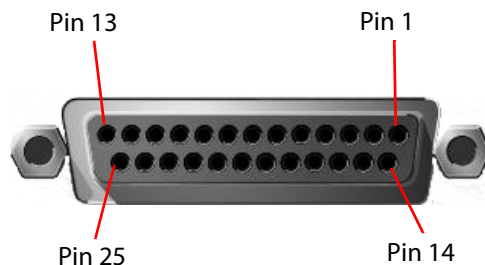
Reference

Analogue reference input and output:



25 Way GPIO

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

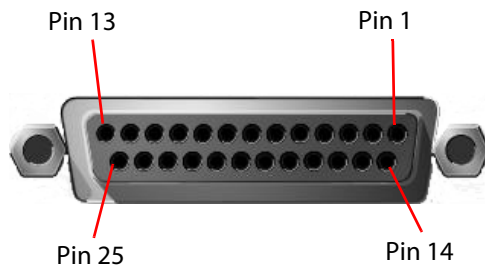


GPIO Pin-outs

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/LTC

1x 25 Way D-type AES/LTC connector:
(pins 45 - 66)



AES/LTC Pin-outs

AES/LTC 45 - 66	
Pin	Signal
1	LTC (+)
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	LTC (-)
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 and other devices.



For the two RS422 ports, each one can independently either be a Master or a Slave. Master settings makes Masterpiece able to control external equipment and a Slave setting lets Masterpiece 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
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 Location and Environment

Environmental Considerations

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.

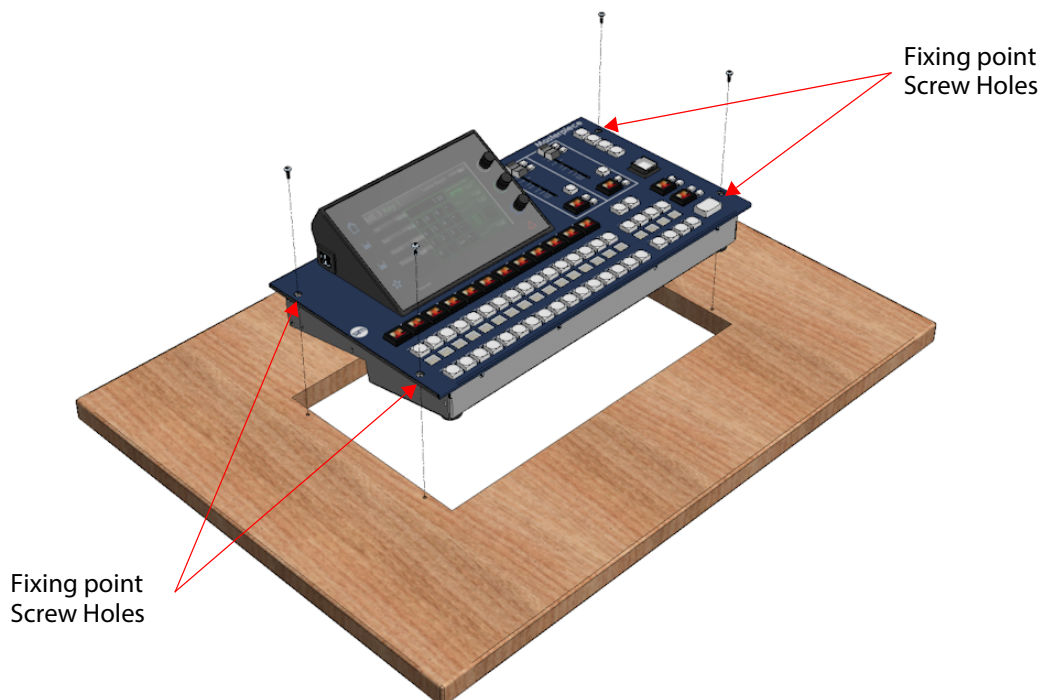
Mounting the Masterpiece Control Surface into a Desk

Note: The Masterpiece Control Surface should preferably be mounted in a desk which is open underneath.

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.

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

With the desk cut to the correct size (desk cut-out information can be found on page 24). 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 the Control Surface, there are two 4.5 mm [0.18 Inches] fixing point holes for the screws (as shown on the diagram below).



Mounting the Control Surface into a 19" Rack

The Masterpiece Control Surface can be mounted into a standards 19" rack.

- Check that there is enough clearance for the connectors on the left side of the Control Surface.
- The Control Surface is fastened to the rack system using 4x M6 (1/4 inch) screws (screws are available from rack suppliers).
- Once fastened to the rack insert all of the connectors making sure that the external PSUs do not hang from the side of the Control Surface, the PSUs have to be supported.

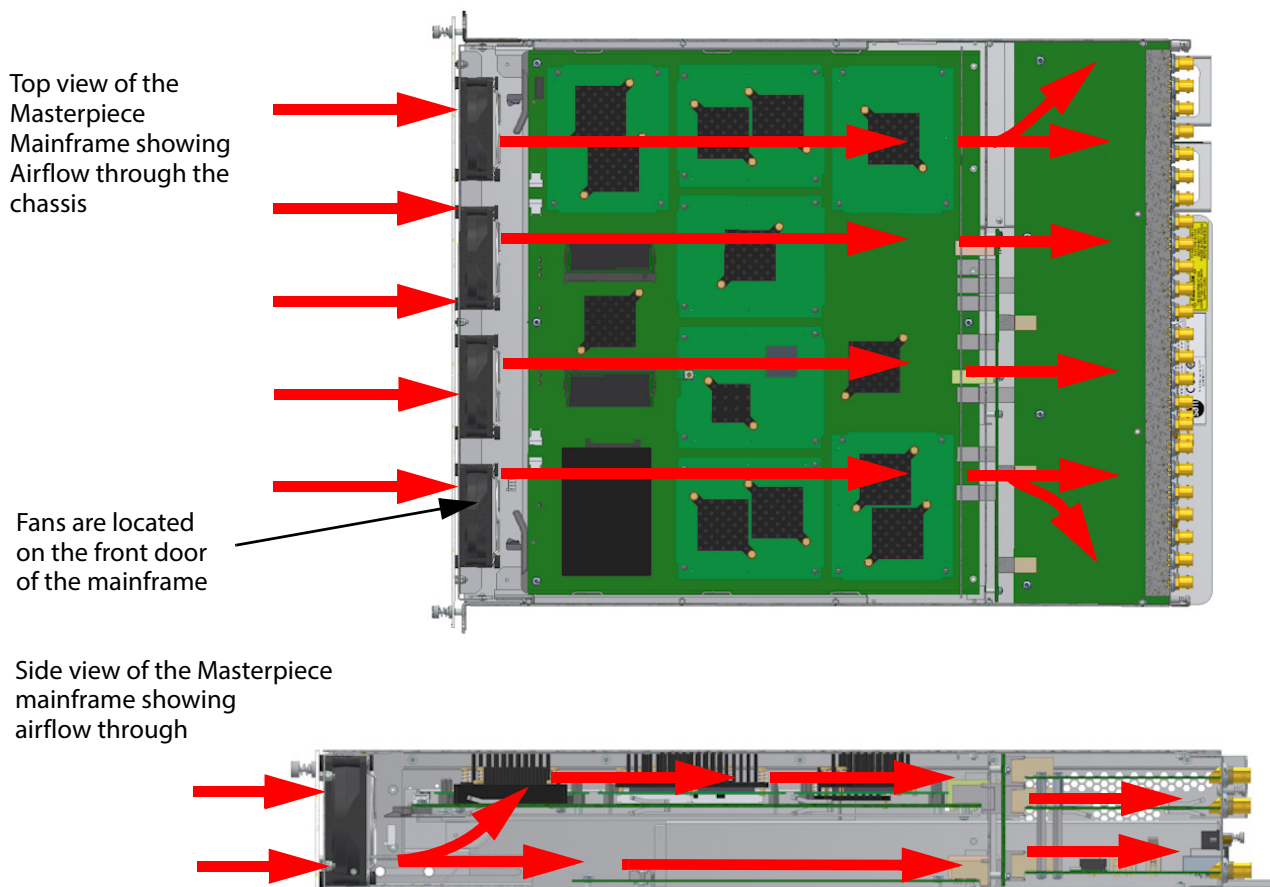


Mainframe Location and Environment

Location Instructions

The Masterpiece 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**.



Cooling Fan Failure

IF THE COOLING FANS ON THE 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 SAM or your SAM 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 Masterpiece Mainframe into a 19" Rack

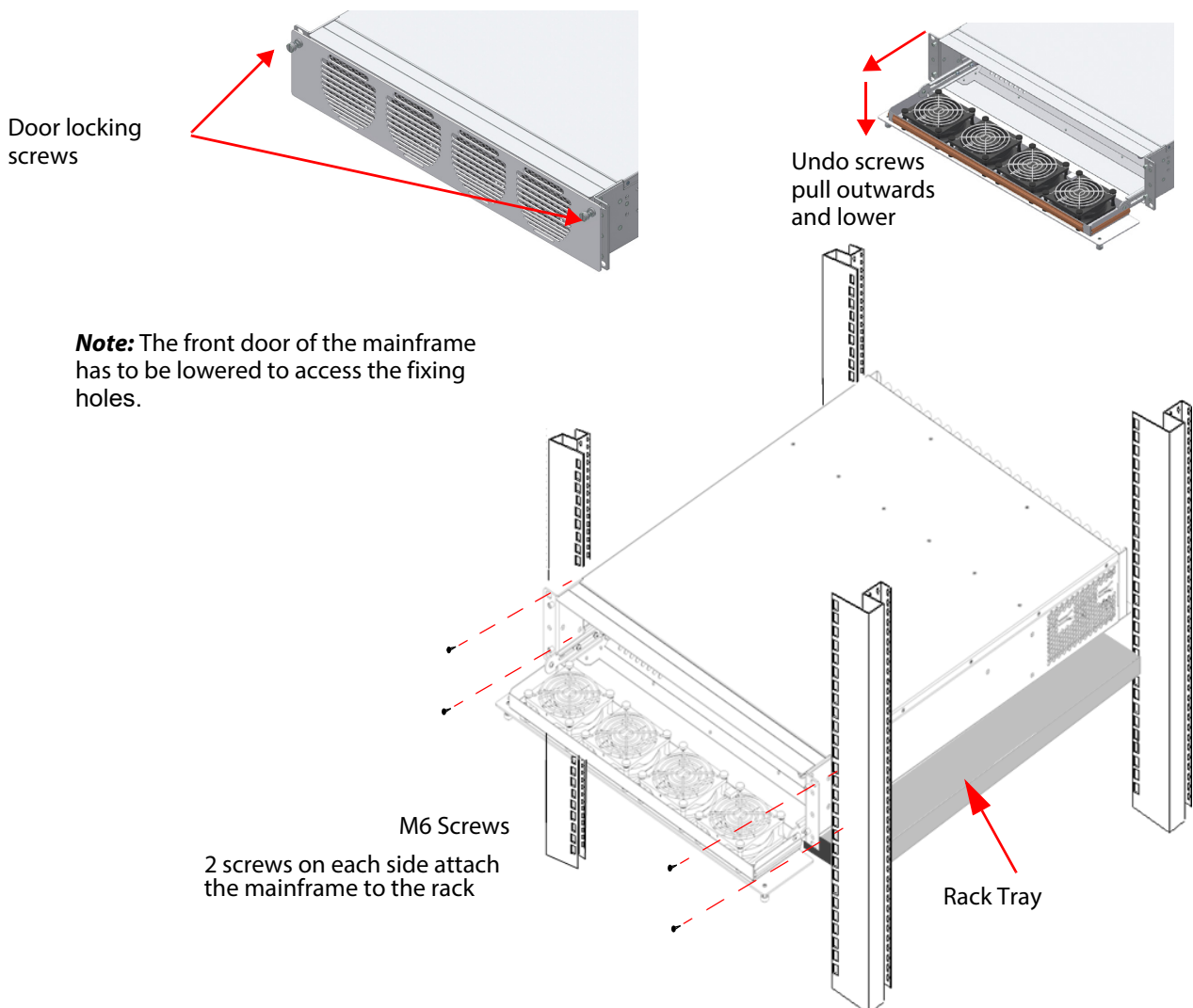
Note: The **Masterpiece Mainframe** is heavy (14.5kg – 31lb) and will require two people to lift into position, using correct lifting procedures. If you are unsure of the lifting procedures, ask a Health and Safety adviser for information.

The Mainframe will require a 2RU space within a rack. 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.

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

- 3 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).
- 4 The mainframe is fastened to the rack system using 4x M6 (1/4 inch) screws (screws are available from rack suppliers).



4 Power Supplies

Mainframe Internal Power Supplies

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

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

The **Masterpiece** 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.

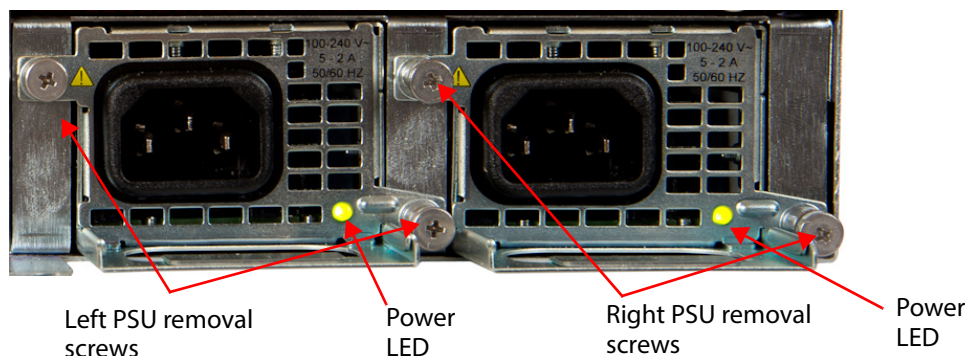


This symbol indicates that hazardous voltages are present inside. **No User Serviceable Parts** inside the power supplies. This unit should only be serviced by trained personnel. The power supplies for the Masterpiece mainframe are retained within the mainframe body, there are no On/Off switches for 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 Masterpiece Power Supplies

Masterpiece 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.

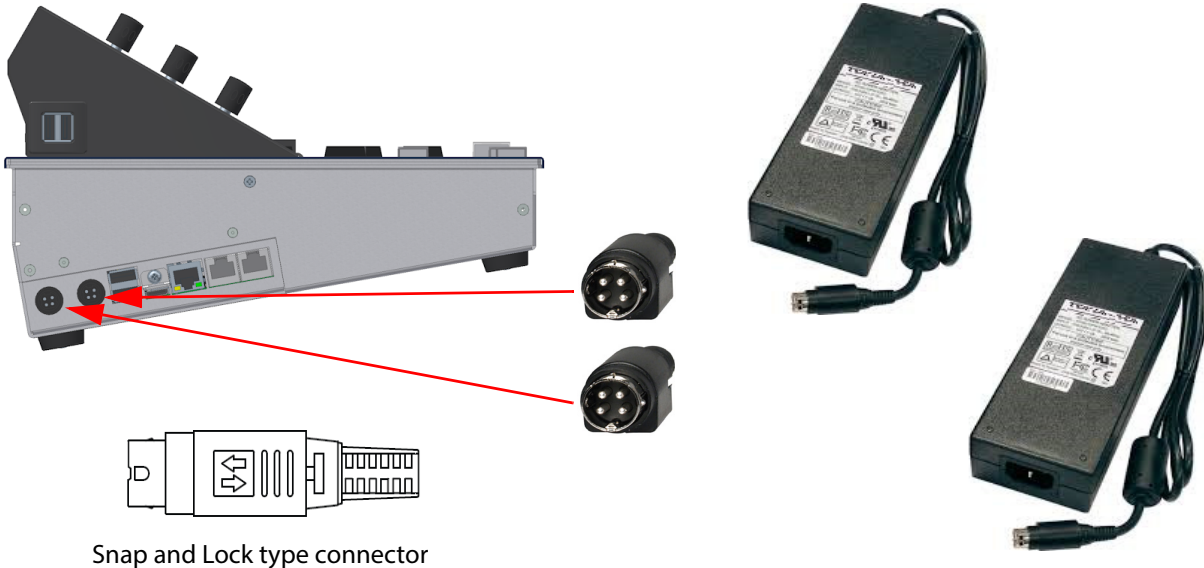
Control Surface External Power Supplies

The Masterpiece 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

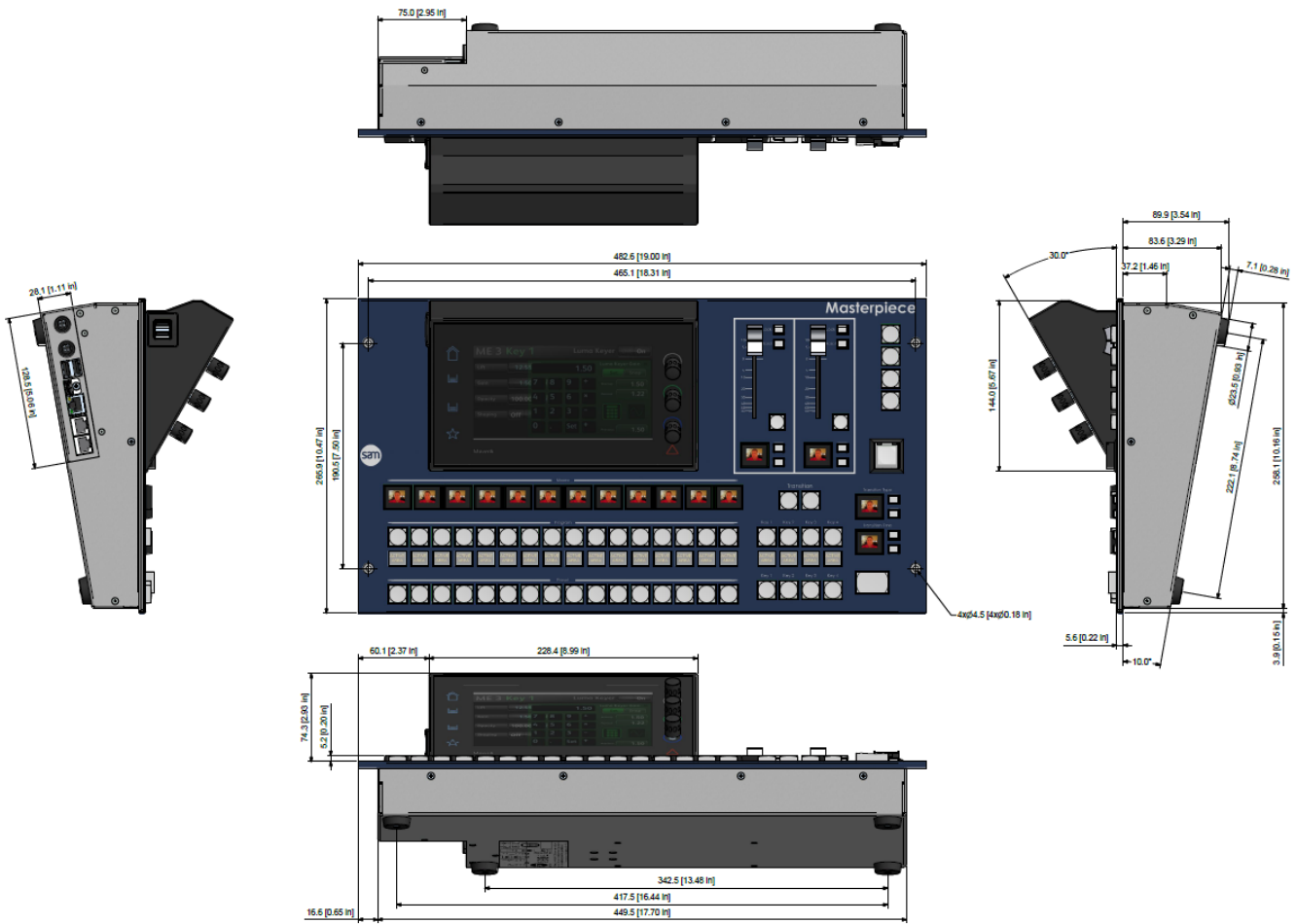
Note: Make sure that the mains power is turned **Off** before connecting the PSU to the Control Surface.

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

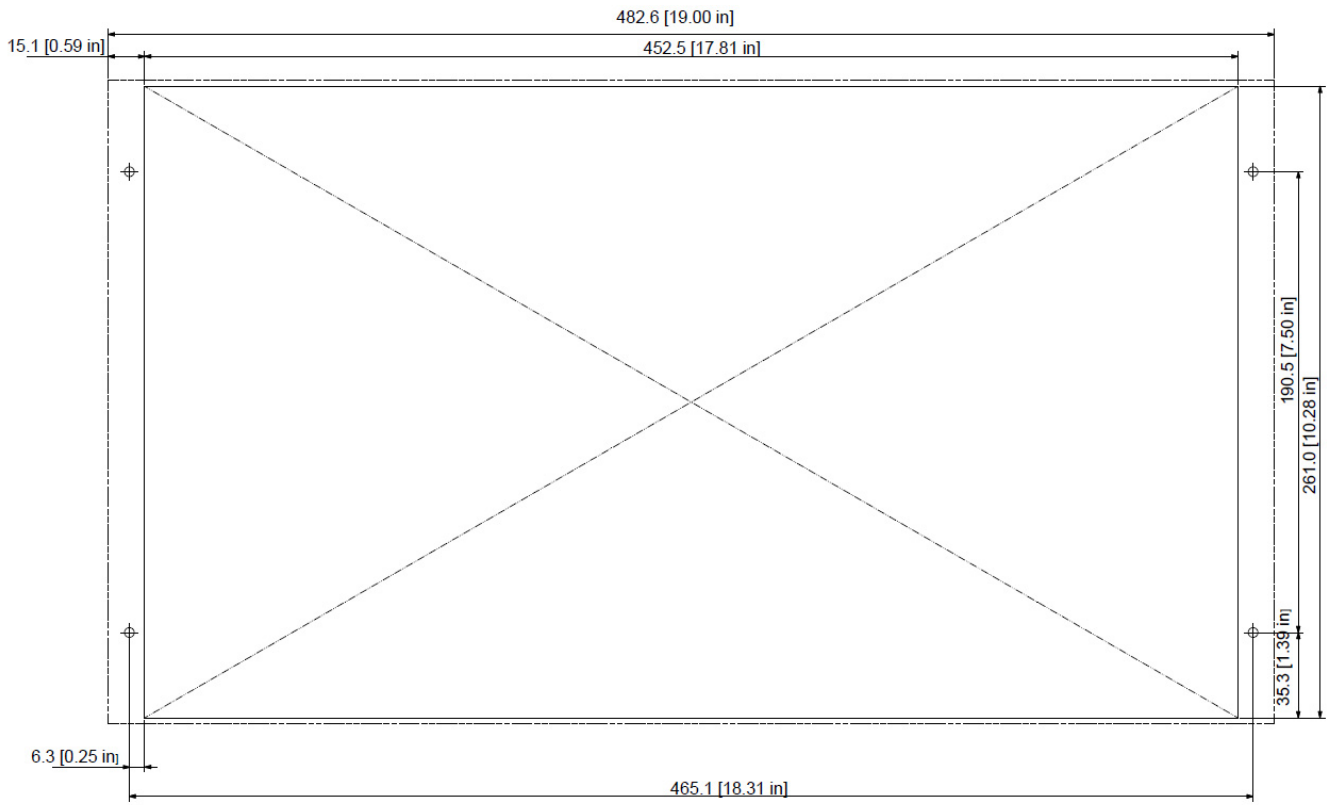
Masterpiece Control Surface



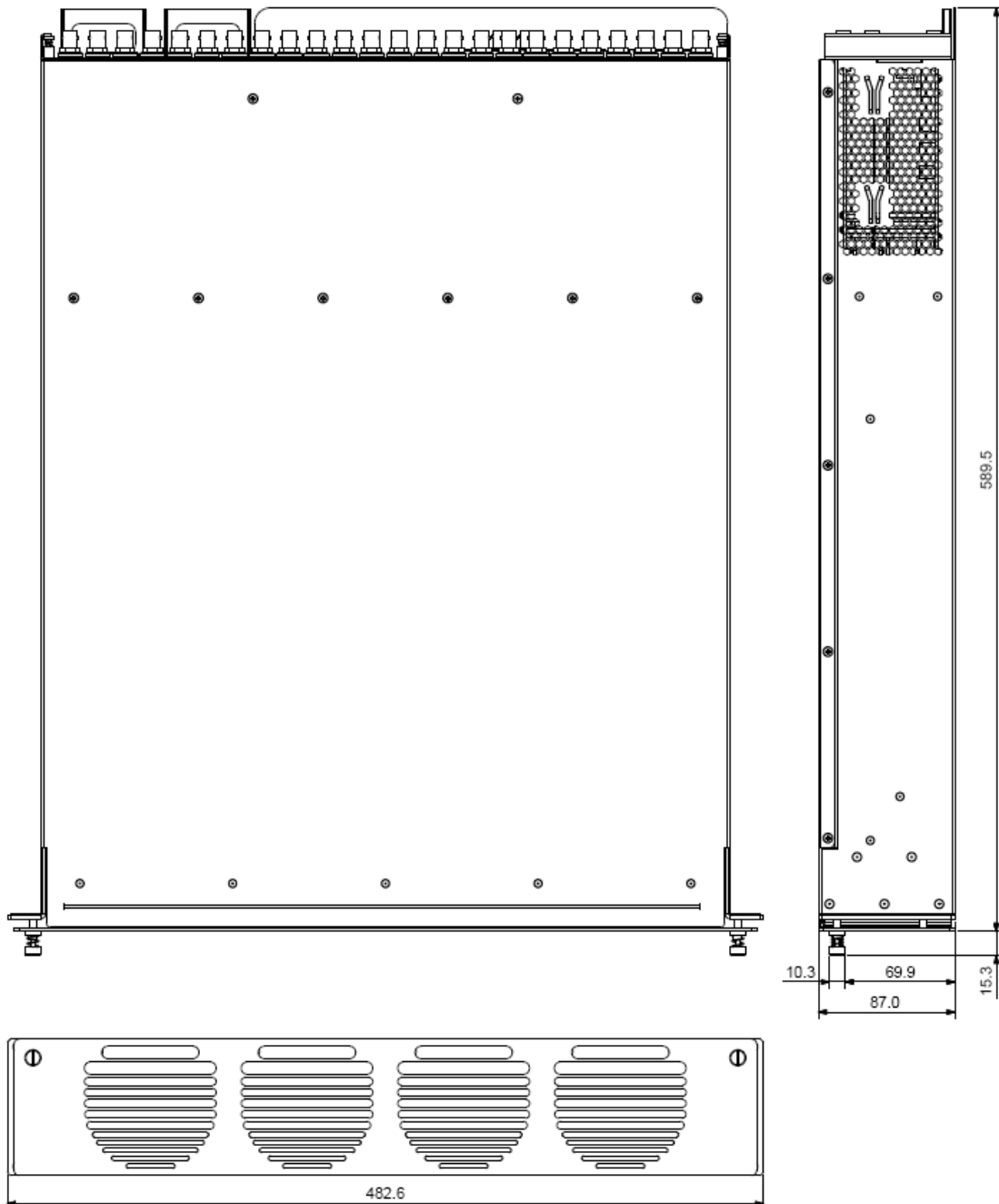
Masterpiece Control Surface	
Width	482.3mm ~ 19 Inches
Depth	265.9mm ~ 10.47 Inches
Height	169.8mm ~ 6.69 Inches
Weight	Approx - 4.7Kg ~ 10.36lb
Environmental	41 to 104°F ~ 5 to 40°C non-condensing

Control Surface Desk Cutout Information

The desk cutout diagram for the Masterpiece Control Surface.



Masterpiece Mainframe Dimensions



Masterpiece Mainframe	
Width	482.6 mm ~ 19 Inches
Depth	604.8mm ~ 23.81 Inches
Height	87mm ~ 3.42 Inches
Weight	Approx - 14.5Kg ~ 31.96lb
Environmental	41 to 104°F ~ 5 to 40°C non-condensing

6 Specifications

Masterpiece Control Surface

Masterpiece Control Surface	
Connector	Description
Power Supply	2x 4 pin PSU Connectors - Kycon KPPX 4 Pin or Compatible 12V DC 8.33A
Inrush Current	8.2A
USB	4x USB 2 Connectors (including 2x USB connectors on the side of the GUI)
Video Output	Digital Video Monitor Output (MON) connector. To connect to a touch screen
Network	10/100/1000 base T, Auto - MDX/MDXI on RJ45 connectors
Comms Ports	2x RJ45 connectors (in total) for Comms and +12V 0.83A power supply Do Not connect network switches or hubs to these ports. Use CAT5 or above cables. Crossover cables are Not suitable.

External Power Supplies	
Power Supply	Description
External PSU for the 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

Masterpiece 12G-SDI and IP Mainframes

Television Standards				
Television Standards	11.88Gbps Video Standards (2160p)			
	2160p	60Hz	SMPTE	-2082M
	2160p	59.94Hz	SMPTE	-2082M
	2160p	50Hz	SMPTE	-2082M
	2.97 Gbps 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)

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
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)
Synchronization	Input line synchronizers on all paths.

12G-SDI Mainframe Connections

Mainframe Outputs	
Outputs	12 x HD/1080p (1.485Gbps / 2.97Gbps) Outputs Serial digital interface As SMPTE/292M / SMPTE424M via BNC connectors. Including 3 x 12G-SDI (SMPTE 2082) single link BNC connectors

Mainframe Formats & Levels	
SDI Output Format	Tri Standard 3Gbps-SDI/HD-SDI/1080p (1.485Gbps / 2.97Gbps) and 12G-SDI (SMPTE 2082) Single Link
Analogue Sync	±300mV tri-level HD sync
Output Impedance	75 ohms

Mainframe Network/Serial/USB	
Network	3 ports 10/100/1000 base T, Auto – MDX/MDXI on RJ45 connector.
Serial Control	4 x RS-422 on 2x RJ45.
USB	2x USB 3.0 - for external memory device or hard drive

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
GPIO	2 x 25 Way D-type programmable GPIO Tally with TTL-level/contact-closure inputs for GPI
AES/LTC	1 x 25 Way D-type AES/LTC connector. Signals: 1/2, 3/3, 5/6, 7/8 (+/-) In 1/2, 3/4, 5/6 (+/-) Out LTC (+/-)

Mainframe Inputs	
Inputs	42 x HD/1080p (1.485Gbps / 2.97Gbps) Inputs. Serial digital interface As SMPTE/292M / SMPTE424M via BNC connectors. Including 10 x 12G-SDI (SMPTE 2082) single link BNC connectors

Mainframe Inputs Formats & Levels	
SDI Input Format	Tri Standard 1080p 2.97Gbps and HD 1.485 Gbits/second serial digital interface as per ANSI/SMPTE-259/292M and 12G-SDI (SMPTE 2082) Single Link
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).

IP Mainframe Connections

IP Mainframe Inputs/Outputs	
QSFP Inputs/Outputs	<p>2x50GbE A1/B1 is the Primary QSFP connection of the Upper 'A' and Lower 'B' card.</p> <p>A1 Inputs - 18 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs across two 50GbE links. Each 50GbE link transports 9 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs.</p> <p>B1 Inputs - 18 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs across two 50GbE links. Each 50GbE link transports 9 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p inputs.</p> <p>A1 Outputs - 6 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs across two 50GbE links. Each 50GbE link transports 3 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs.</p> <p>B1 Outputs - 6 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs across two 50GbE links. Each 50GbE link transports 3 x SMPTE 2022-6 or VSF TR-03 (SMPTE 2110) SD/HD/1080p outputs.</p> <p>2x50GbE A2/B2 is the Secondary QSFP connection of the Upper 'A' and Lower 'B' card giving redundancy.</p>

IP Mainframe Input BNCs	
Input BNCs	Input BNCs 4 x HD/SD/1080p (270Mbps / 1.485Gbps / 2.97Gbps). Serial digital interface as REC601/ SMPTE/292M / SMPTE424M via BNC connectors. Including 1 x 12G-SDI (SMPTE 2082) single link BNC connector (silver BNC).

IP Mainframe QSFP Inputs/Outputs Formats & Levels	
IP Input and Output	Signals supported over RTP stream per rear module with 2 x 50GbE QSFP Cages. QSFP+ Optical 2 x 50G Ethernet Conforms to IEEE 802.3ba - 100GBASE-SR4 100Gigabit over fiber. QSFP+ direct attached copper (DAC) cable 100GBASE-CR4 100Gigabit Ethernet over twin axial cables
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).

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

IP Mainframe Network/Serial/USB	
Network	<p>3x Ports - NET X1 to NET X3 10/100/1000 base T, Auto – MDX/MDXI on RJ45 connector.</p> <p>2x Ports - NET X4 and NET X5 These are Network 10/100/1000 base T for each IP rear card control (RollCall). 'A' card is NET X4 'B' card is NET X5</p>
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 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.
Inrush Current	6.0A

Mainframe Power Supply Requirements	
Voltage	100V - 240V 50/60Hz, 5-2A
Power	400 Watts Max. (12G-SDI and IP Mainframes)



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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