

mc²36 xp

Installation & Service Guide

Version: 1.0/1

Edition: 16 August 2023



To obtain the latest documentation and software downloads, please visit:

www.lawo.com/lawo-downloads

Copyright

All rights reserved. Permission to reprint or electronically reproduce any document or graphic in whole or in part for any reason is expressly prohibited, unless prior written consent is obtained from the Lawo AG.

All trademarks and registered trademarks belong to their respective owners. It cannot be guaranteed that all product names, products, trademarks, requisitions, regulations, guidelines, specifications and norms are free from trade mark rights of third parties.

All entries in this document have been thoroughly checked; however no guarantee for correctness can be given. Lawo AG cannot be held responsible for any misleading or incorrect information provided throughout this manual.

Lawo AG reserves the right to change specifications at any time without notice.

© Lawo AG, 2023



Table of Contents

1. About this Documentation	4
2. Important Safety Instructions	5
3. Important Cleaning Instructions	6
4. The Hardware	7
5. Installation	25
6. Service Procedures	36
7. Appendices	53

1. About this Documentation

This document describes the hardware, installation and service procedures for the **mc²36xp** control surface.

Look out for the following which indicate:

Notes - points of clarification.

Tips - useful tips and short cuts.

Attention - alert you when an action should *a/ways* be observed.

Further Information

Mechanical drawings and data sheets (including weights and dimensions) are available from the [Lawo Download-Center](#) (after login). We also recommend that you carefully observe the release notes for your product/system.

Lawo User Registration

For access to the [Lawo Download-Center](#), and to receive regular product updates, please register at: www.lawo.com/registration.

Contact Details

If you need further assistance, the Lawo Support Department can be contacted by email at support@lawo.com, or by telephone during normal working hours - please visit the [Support](#) area of the Lawo website for the most up-to-date contact details.

2. Important Safety Instructions

When working with our hardware components, please read and observe all of the instructions provided in the "General Safety Information for Lawo Equipment" booklet delivered with your devices. Double-click [here](#) to open the same information (as a pdf).

Please also observe the "Safety Information" included in the product data sheets. There are available from the [Lawo Download-Center](#) (after login).

3. Important Cleaning Instructions

Before cleaning your Lawo devices, please read and observe all of the following instructions.

Attention.

DO NOT spill liquids into any system components!

DO NOT clean the front panels or operational surfaces with sharp instruments

General Cleaning / Disinfecting Requirements

Lawo hardware products are made from a variety of different materials, and each material might have specific cleaning requirements. Therefore, a general allowance for the disinfection of product surfaces with disinfectants containing alcohol cannot be given.

Our front panels and operational surfaces are not entirely approved for treatment with chemical cleaning agents and disinfectants. Component surfaces, buttons and electronics can be permanently damaged by treatment with such agents and the lifespan can be dramatically shortened. Please note that some substances can lead to discoloration of surfaces.

Lawo is not responsible for damage caused by the unauthorized use of disinfectants on our products and surfaces. Damages caused by unspecified treatment of modules and components are not covered by regular or extended warranties or SLA regulations.

This is a general instruction and recommendation for cleaning that applies to all Lawo products:

- Before cleaning the device, unplug all external power sources.
- Clean the device with a soft cloth, dipped lightly in warm to hot soapy water.
- Do not use any liquid cleaning agents or spray cleaners that may contain flammable materials.
- Do not get moisture into any openings.
- Do not use aerosol sprays, bleaches, or abrasives.
- Do not spray cleaners directly onto the item.

The above information and our technical application advice are given to the best of our knowledge.

Cleaning the Control Surface

To clean a Lawo control surface please use a cleaning cloth with the following properties:

- Antistatic
- Fluff-free
- Without emery pieces

4. The Hardware

This chapter describes the control surface frame and its hardware components.

- [Introduction](#)
- [Centre Section / 16F Controls](#)
- [Channel Controls \(for 32F / 48F\)](#)
- [Mounting Options](#)
- [Overbridge Options](#)
- [Frame Variants](#)
- [Console Rear Panel](#)
- [Power Supplies](#)
- [Grounding](#)
- [Local I/O](#)
- [Internal Wiring](#)
- [Script Tray](#)

4.1 Introduction

The mc²36 xp comes in three predetermined frame layouts: 16, 32 or 48-fader.

All variants include a central bay with 16 faders. To make the 32-fader and 48-fader variants, a channel bay is added to the left of the central bay. This adds 510 mm to the width of the console. In the 48-fader variant, the channel bay is fitted with the dual-fader option.



16-fader frame



32/48-fader frame

Every frame includes integrated local I/O and dual redundant power supplies. The frame can be ordered in one of two versions: either Studio or OB-van. The version affects the width of the side panels and whether the frame is prepared for table-top or crossbar mounting.

To provide cooling at extreme temperatures, the frame is fitted with slow turning, low noise fans. The fans are temperature controlled and so, under normal operating conditions, they are inactive.

Key Facts

- Frame size / layout: 16, 32 or 48 faders.
- Frame width / mounting version: either Studio or OB-van.
- Dual-redundant AC power supplies are included (as standard).
- Temperature-controlled cooling fans are included (as standard).
- Integrated local I/O is included (as standard).
- A removable script tray is available (as an optional extra).

Components

Each frame has the following user-serviceable components:

- Control surface panels and touch-screen displays.
- Individual faders in the centre section or channel bay.
- 2 x power supplies as a complete PSU block (mounted internally).
- Local I/O board (mounted internally).
- Network switch (mounted internally).

For more information, see [Service Procedures](#).

Further Information

For dimensions, weight, power, etc. see [Frame Variants](#) and [Power Supplies](#).

For installation information, see [Installing the Frame](#).

Mechanical drawings and data sheets are available from the [Lawo Download-Center](#) (after login). There is a single data sheet covering all of the frame variants.

4.2 Installing a Complete System

For the console to become fully operational, there must be a valid network connection to the A__UHD Core.

- Firstly, the mc² control system is hosted on the Gateserver inside the control surface. This means that the surface can boot and run the control aspects without a Core.
- Once a control connection to the Core is established, the audio parts of the system will start to function: the DSP channels and routing matrix. This connection can be made using either in-band or out-of-band control.
- To use the local I/O, there must be a media network connection to the Core.
- In both cases, the network configuration is handled by HOME, Lawo's IP management tool.
- The network connections support Layer 3 routing. This allows the surface to be installed remotely from the Core.

You can find more information in the "mc² Systems" documentation. In this manual, we describe the hardware.

4.3 Centre Section / 16F Controls

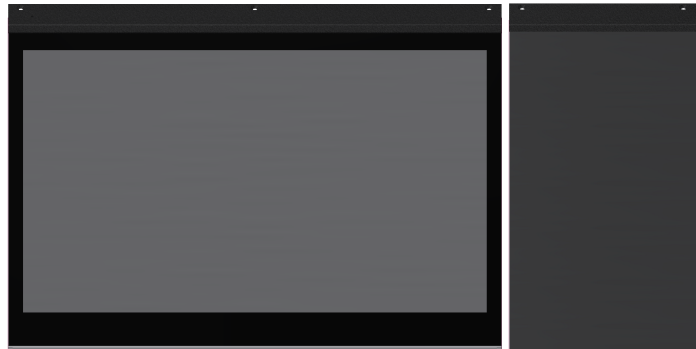
All consoles come with a centre section which provides 16 faders. In the 16-fader variant, these are the only controls.

1 x "Channel Display" (977/13)

A high resolution, touch-screen TFT display.

1 x Blanking Panel OVB (976/15)

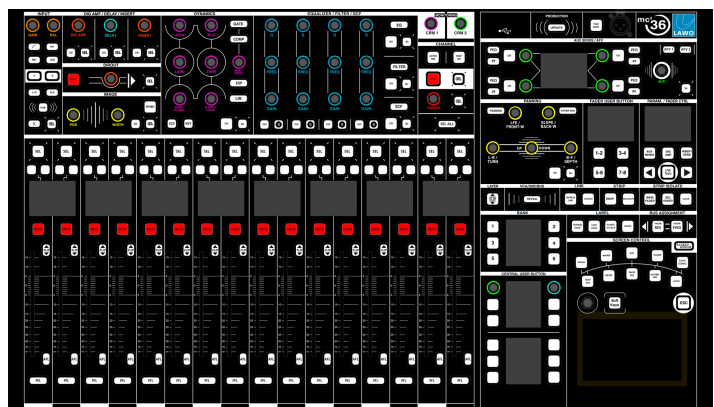
A full height blanking panel for the overbridge.



1 x Central Panel (976/20)

with:

- 16 x 100mm motorised faders (touch-sensitive)
- 43 x rotary encoders (touch-sensitive)
- 14 x mini TFT displays
- 240 x push-buttons
- 1 x XLR connector
- 1 x USB port
- 1 x trackpad with integrated left & right "mouse" buttons



For more information about the individual panels and displays, please refer to the 36MKII xp data sheet.

4.4 Channel Controls (for 32F / 48F)

For the 32- and 48-fader variants, a channel bay is added to the left of the central bay. This is fitted with either a single-fader panel in the 32-fader variant, or a dual-fader panel in the 48-fader variant.

Please note:

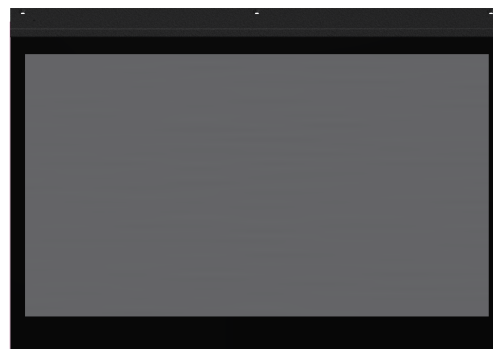
- The frame size is identical for both variants.
- The position of the channel and central bays cannot be altered, and so the channel controls are always on the left of the centre section.
- The dual-fader panel provides a second row of short-scale fader strips at the expense of the rotary controls and FC Preset / Bank & Layer / ISO Bay buttons.
- The single- and dual-fader panels can be exchanged. This makes it possible to convert from 32F to 48F, or vice versa, at a later date.

32F Channel Controls

In the 32-fader variant, the channel bay is fitted with 16 single fader strips.

1 x Channel Display (977/13)

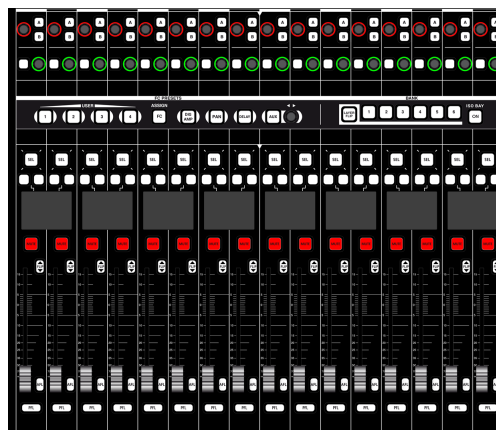
A high resolution, touch-screen TFT display (identical to the one in the centre section).



1 x Fader Panel (976/10)

with:

- 16 x 100mm motorised faders (touch-sensitive)
- 33 x rotary encoders (touch-sensitive)
- 8 x mini TFT displays
- 177 x push-buttons

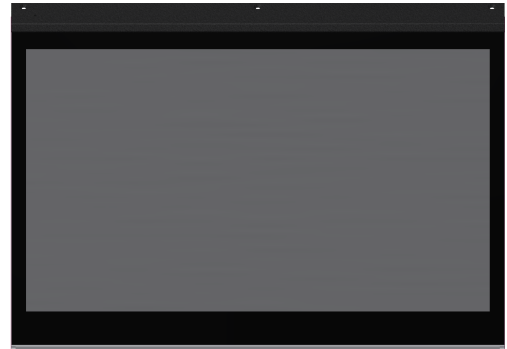


48F Channel Controls

In the 48-fader variant, the channel bay is fitted with the dual-fader panel to provide 32 fader strips.

1 x Channel Display (977/13)

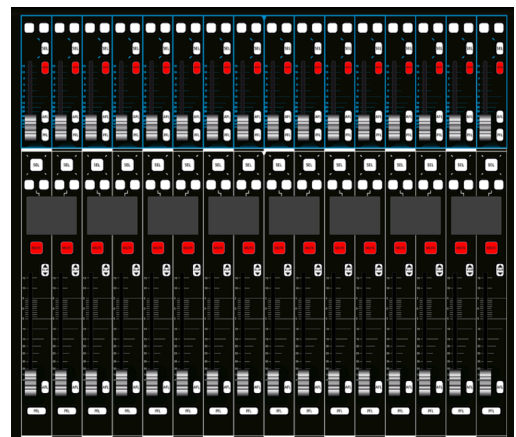
A high resolution, touch-screen TFT display (identical to the one in the centre section).



1 x Double Fader Panel (976/11)

with:

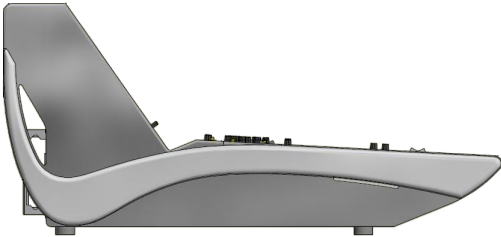
- 16 x 60mm motorised faders (touch-sensitive)
- 16 x 100mm motorised faders (touch-sensitive)
- 8 x mini TFT displays
- 208 x push-buttons



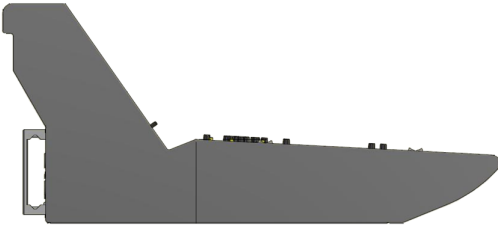
For more information about the individual panels and displays, please refer to the 36MKII xp data sheet.

4.5 Mounting Options

Each frame can be ordered for either Studio or OB-van (mobile) mounting.



Studio / Live Version



OB Truck Version

The Studio version comes with wider side panels and is ready for table-top mounting.

The OB-van version is fitted with narrow aluminum side plates and is designed for crossbar mounting (i.e. no feet are supplied).

Option	Part Number
Studio Side Panels	976/60
OB-van Side Panels	976/61




4.6 Overbridge Options



The space to the right of the Central GUI is fitted with a full height blanking panel (976/15). This provides a general utility space to mount other devices (e.g. an external tablet).

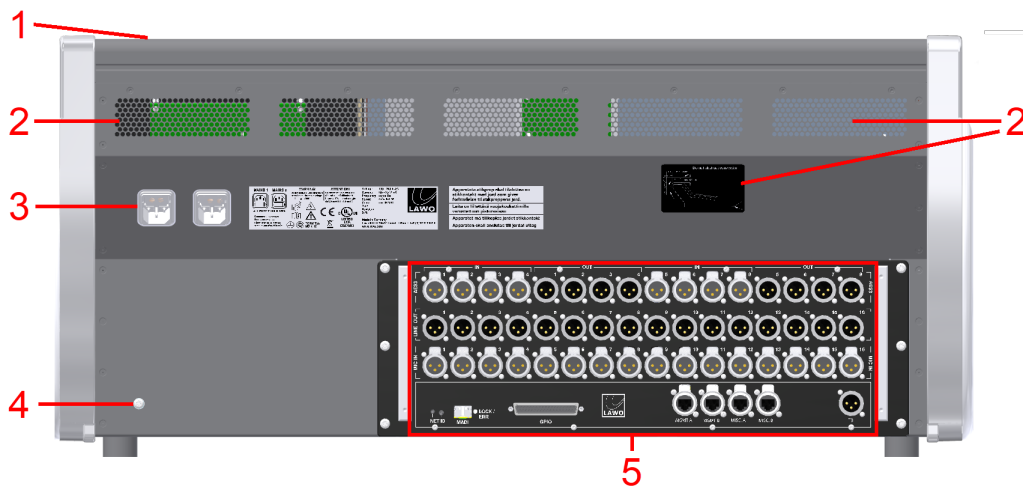
4.7 Frame Variants

The table below describes all possible frame variants.

mc ² 36 xp	Frame Variant	Part Number	Mechanical Data
	16-fader Studio	976/16S_xp	Dimensions: 833 x 820 x 380 mm / 32.8 x 32.3 x 15.0 " Weight: 38 kg / 83.4 lbs
	16-fader OB-van	976/16V_xp	Dimensions: 765 x 820 x 380 mm / 30.1 x 32.3 x 15.0 " Weight: 37 kg / 81.6 lbs
	32-fader Studio	976/32S_xp	Dimensions: 1343 x 820 x 380 mm / 52.9 x 32.3 x 15.0 " Weight: 54 kg / 119.1 lbs
	32-fader OB-van	976/32V_xp	Dimensions: 1275 x 820 x 380 mm / 50.2 x 32.3 x 15.0 " Weight: 53 kg / 116.9 lbs
	48-fader Studio	976/48S_xp	Dimensions: 1343 x 820 x 380 mm / 52.9 x 32.3 x 15.0 " Weight: 56 kg / 123.5 lbs
	48-fader OB-van	976/48V_xp	Dimensions: 1275 x 820 x 380 mm / 50.2 x 32.3 x 15.0 " Weight: 55 kg / 121.3 lbs

Mechanical drawings are available [here](#). A data sheet covering all of the frame variants is available from the [Lawo Download-Center](#) (after login).

4.8 Console Rear Panel



1 Removable Script Tray (optional)

One or more removable script trays may be ordered. The script tray glides across the top of the frame, and can be lifted on or off for removal.

2 Ventilation Holes & Sticker

The sticker shows the direction of airflow (required for convection cooling) and the minimum distance requirements (for installing the frame).

3 MAINS 1 & 2

The **MAINS 1** & **MAINS 2** connectors supply AC mains power to the frame.

4 CASE

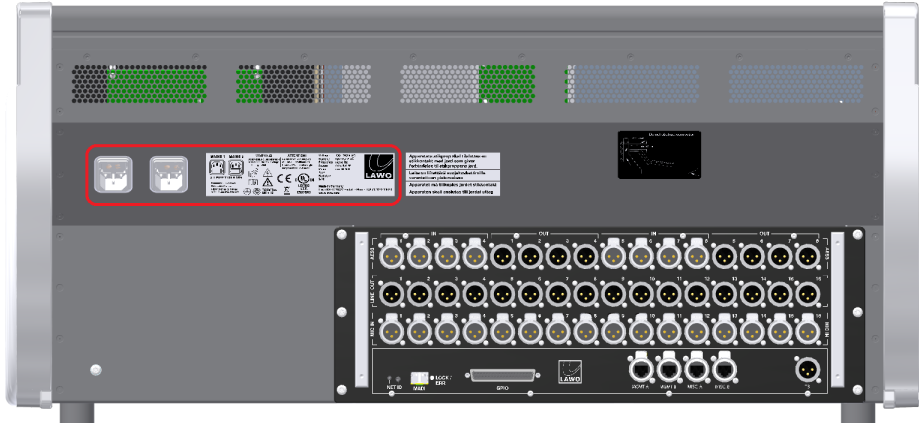
The CASE grounding screw should be used to ground the frame.

5 Connector Panel

Here you will find the four network ports plus the breakouts for the local I/O.

4.9 Power Supplies

The control surface is powered by dual-redundant power supplies which are fitted internally within the frame. The **MAINS** connectors are located on the frame's rear panel. There are two connectors, one for each of the internal supplies.



To operate the console, only one of the power supplies is required. When both supplies are operational, the load is shared. For redundancy it is recommended to use both supplies, and connect each one to a separate phase of the AC mains circuit.

The supplies have no on/off switch, and so it is recommended that you install a master power switch to control all of the power supplied to the frame.

The status of each PSU can be monitored from the Central GUI. If you need to replace a faulty supply, then this must be done by replacing the complete "PSU block". See [Replacing the Power Supplies](#) for instructions.

Ordering Information

The two supplies come as a complete "PSU block". To order a spare part, please use the following part number:

- **976/44** - PSU block, double

Note that it is not possible to replace an individual power supply.

Electrical Specification

The power consumption varies depending on the frame variant, so please refer to the 36MKII xp data sheet.

The sticker on the rear of the frame provides a summary of the input voltage and power requirements.

<p>MAINS 1 MAINS 2</p> <p>ALL FUSE T 10A H 250V</p> <p>Disconnected both power lines bevor switches. Débranchez les deux fiches secteur avant d'ouvrir la boîte.</p>	<p>WARNING! Do not open. No user serviceable parts inside! Hazardous voltage and energy inside!</p> <p>ATTENTION! Ne pas ouvrir. Aucune pièce réparable par l'utilisateur à l'intérieur! Tension et énergie dangereuses à l'intérieur!</p>	<p>Voltage: 100 - 240 V AC Current: 6,5 - 2,7 A AC Frequency: 50/60 Hz Power: max. 650 W Model: mc²36 MKII Type: Revision: S/N:</p>	
<p>TORX T25 M5 x 12</p>	<p>CE</p> <p>UL US</p> <p>LISTED I.T.E. E507293</p>	<p>Made in Germany Lawo AG • D-76437 Rastatt • Phone +49 (0) 7222 1002-0 www.lawo.com</p>	

IEC Power Cables

The control surface is delivered with 2 x IEC power cables that are country-specific. The table below describes all permitted options.

Name	Part Number	Description
IEC Lock Schuko	436-7206-000	Power Cord with European connector for e.g. D, AU, F, Benelux.
IEC Lock Open Ends	436-7207-000	Power Cord with open wire ends.
IEC Lock US	436-7208-000	Power Cord with connector for USA.
IEC Lock UK	436-7209-000	Power Cord with connector for United Kingdom.
IEC Lock AUS	436-7218-000	Power Cord with connector for Australia.
IEC Lock JPN	436-7219-000	Power Cord with connector for Japan.

Using the AC Supplies

Before connecting power to the frame, please read and observe all of the instructions in the "[General Safety Information for Lawo Equipment](#)" booklet delivered with your devices.

The AC input(s) MUST be connected to the mains using the IEC power cable(s) supplied with the system. When running with two mains supplies, make sure that both circuits lie on the the same ground potential. Otherwise, an internal bridge of two grounding wires can lead to a ground loop!

Powering On

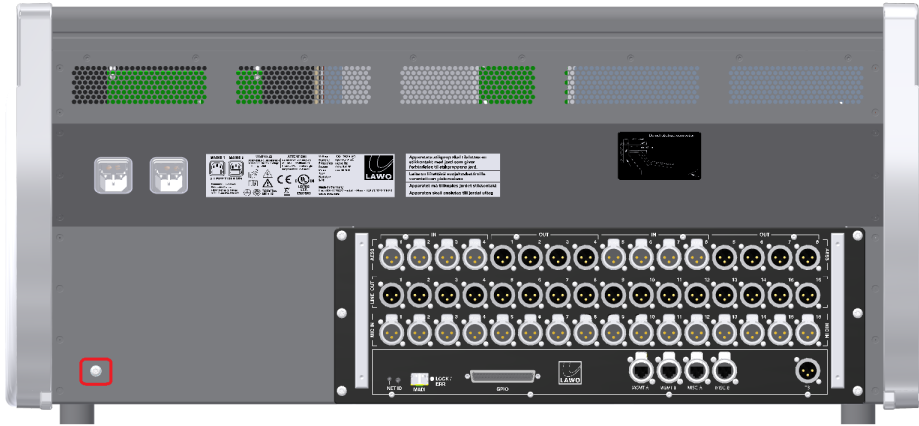
The frame has no on/off switch and so the console starts automatically when power is applied. Once the control system has booted, you can check the status of each supply from the Central GUI.

4.10 Grounding

The control surface frame must be grounded for EMC reasons.

Grounding Instructions

A grounding screw is provided on the frame's rear panel.



To ground the frame, please read and observe all of the instructions in the "[General Safety Information for Lawo Equipment](#)" booklet delivered with your devices.

The control surface must be on the same potential as all other system devices/modules.

ALWAYS use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

The M5x12 screw must be used to fasten the grounding cable to the housing. You should use a Torx T25 driver for this purpose.

4.11 Local I/O

Every mc²36 xp control surface includes built-in I/O known as the "Local IO". This is designed for local connections such as loudspeakers, metering, talkback and headphones.

In total, there are 16 x Mic/Line in, 16 x Line out, 8 x AES3 IO, 1 x MADI (AES10), 1 x Phones, 8 x GPI and 8 x GPO. The local I/O signals are streamed to and from the Core via the media network (connected to MISC A).

The local I/O board is located inside the control surface (beneath the centre section). All connectors are accessed from the console's rear panel, except for the headphones which breakout on the front buffer.



Console Rear Connector Panel

Connections for External Devices

On the rear panel, the local I/O connectors are arranged as follows;

- 16 x Mic/Line IN - wired to 16 x XLR (female).
- 16 x Line OUT - wired to 16 x XLR (male).
- 8 x AES3 IN - wired to 8 x XLR (female).
- 8 x AES3 OUT - wired to 8 x XLR (male).
- 1 x 64-channel MADI - available via SFP (see below).
- 8 x GPIO - wired to 1 x 37-pin, D-type (female).

For more information, see [Connector Pin-Outs & I/O Specifications](#).

Note that:

- The **TB** connector is wired from the female talkback XLR (on the front panel).
- You will find the stereo headphones socket on the front buffer.

MADI Port

The MADI interface conforms to AES 10, and supports up to 64 bi-directional channels at 48kHz, or 32-channels at 96kHz.

To use the MADI port, you must fit a Lawo-certified SFP module. This is not included and must be ordered separately. All permitted options are described in the table below. The SFP determines the cable type and connector. The maximum distance depends on the cable type.

SFP Module Description	Part Number
MADI, 1310nm, multi-mode fiber, 2km	981/60-80
MADI, 1310nm, single-mode fiber, 20km	981/60-81
MADI, HD-BNC (75 ohm), copper, 100m	981/60-82

The LOCK / ERR LED indicates the status of the MADI link:

- Green = valid MADI signal detected.
- Red = MADI signal or link error.
- Off = no signal detected.

Connection to the Core

The local I/O signals are streamed to and from the media network via the **MISC A** port (on the rear panel). Once the physical connections are in place, you must use HOME to configure the senders and receivers, and then connect the streams to the Core. Both the physical connections and streaming configuration must be in place before the local I/O will work.

Internally, the local I/O has a single RAVENNA/AES67 interface and so redundant streaming is not supported.

The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards.

All connections *must* be made via the media network (i.e. to and from a RAVENNA-compatible network switch). This ensures that the network's PTP clock signal is available to all streaming ports.

The **Ethernet cable** must meet the following specification:

- Cable: CAT 5 or better (CAT 5e/6/7); straight (1:1).
- Connector: RJ45.
- Network Speed: 1000, 100 or 10 Base-TX LAN. 1000 Base-TX (Gigabit Ethernet) is recommended.
- Length: up to 100m.

The **RAVENNA/AES67 interface** provides:

- RAVENNA: multi-channel digital audio-over-IP.
- Up to 256 bi-directional channels at 48kHz AND 96kHz.
- Up to 128 TX and 128 RX streams.

RAVENNA provides full SMPTE ST2110-30 and AES67 compatibility, since these protocols are a subset of the RAVENNA specification.

The media network *must* be properly configured and managed. i.e. it must use a suitable network architecture; all components must support multicast (as opposed to unicast); a proper Quality of Service (QoS) must be configured; and so on.

Please *DO NOT* attempt to connect the streaming ports using an unqualifying IP network, as correct operation cannot be guaranteed.

You can find more details about the data network requirements and suitable components in the [Lawo IP Networking Guide](#).

Default IP Address

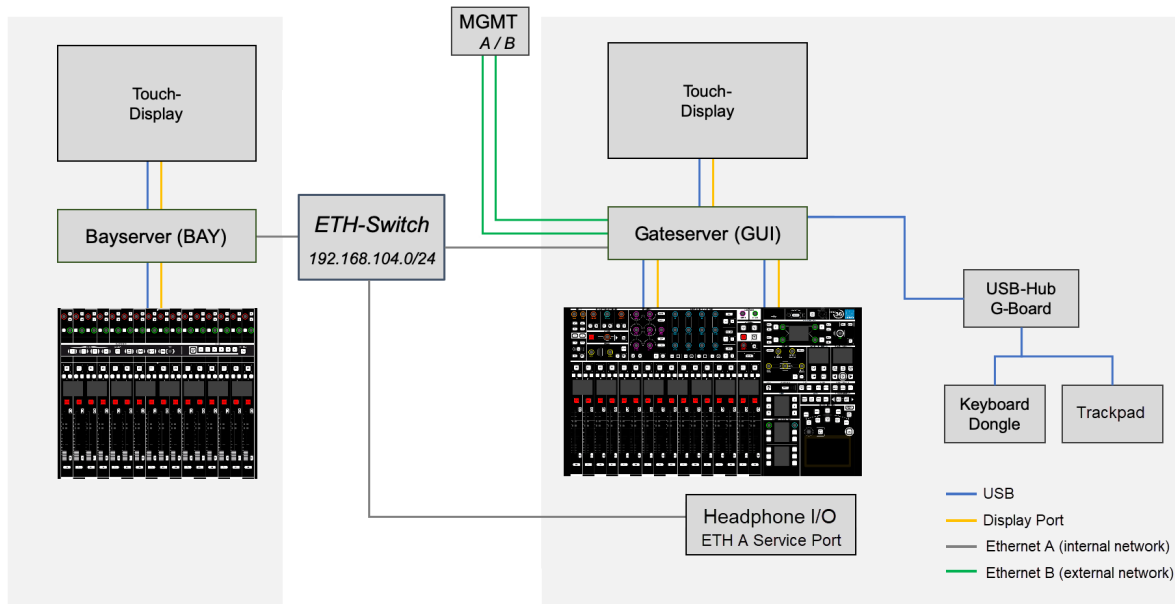
The **NET ID** button and LED can be used to reset the service IP address of the RAVENNA/AES67 interface to its default = **192.168.110.253**. Note that, for safety reasons, a press and hold is required; a quick press of the button performs no action.

To perform a reset: first, make sure that the interface is booted and operating normally - the **NET ID** LED should be blinking yellow. Then, using a pointed object, press and hold the recessed button until the LED lights continuously. When the LED switches off, the reset is complete.

4.12 Internal Wiring

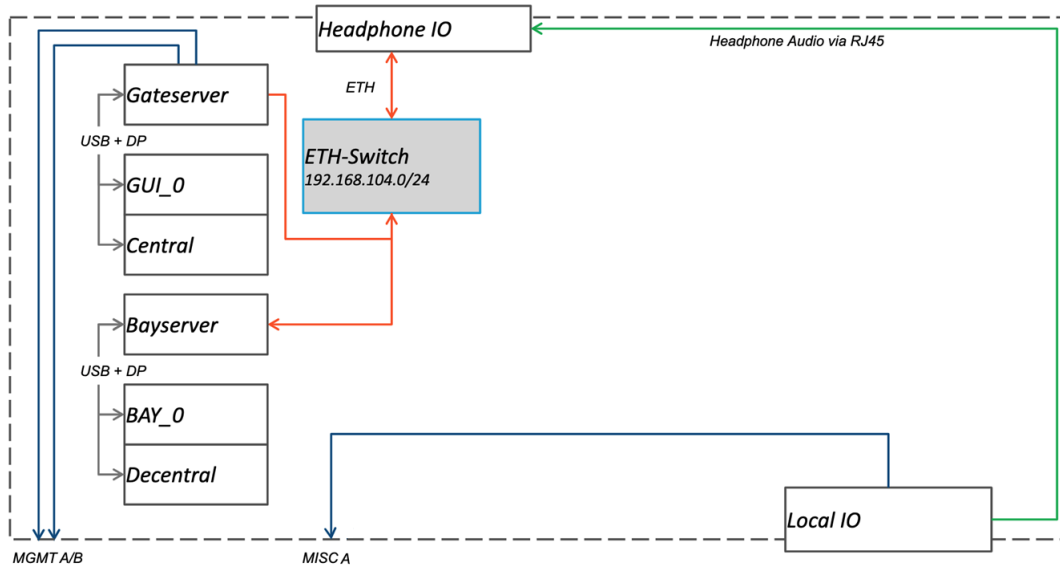
Internally, the control surface uses point-to-point connections, within each bay, to provide fault tolerance and convenient servicing. Any bay or panel can be isolated from the rest of the console, allowing panels and displays to be replaced during operation.

Firstly, within each bay, individual panels and displays connect to an Ethernet server mounted inside the frame: either a Bayserver (in channel bays) or Gateserver (in the centre section). The connections are made using both USB and Display Port. In the centre section, there is also a USB hub which connects to the console keyboard and trackpad.



Secondly, each server connects to an Ethernet switch to form what is known as the internal network or ETHERNET A.

The Gateserver acts as a bridge between the internal and external networks. It handles all of the control data for the complete surface and also hosts the mc² control system.



Externally, the following network connections are available:

- **ETH A** (front buffer) - wired from the internal network switch.
- **MGMT A & B** (rear panel) - wired from the Gateserver.
- **MISC A** (rear panel) - wired from the Local I/O RAVENNA/AES67 interface.

How to use each port is described later, see [Wiring](#).

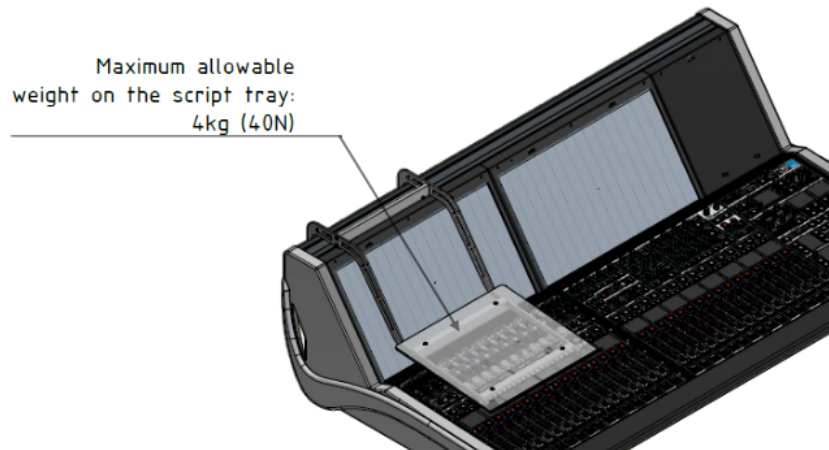
Additional Notes for the Gateserver

The Gateserver provides a sophisticated computing engine that can boot on its own once power is supplied to the control surface. To achieve this, the Gateserver has its own SSD storage containing the boot image. This must be updated separately using the mxUpdater utility (included with mxGUI).

4.13 Script Tray

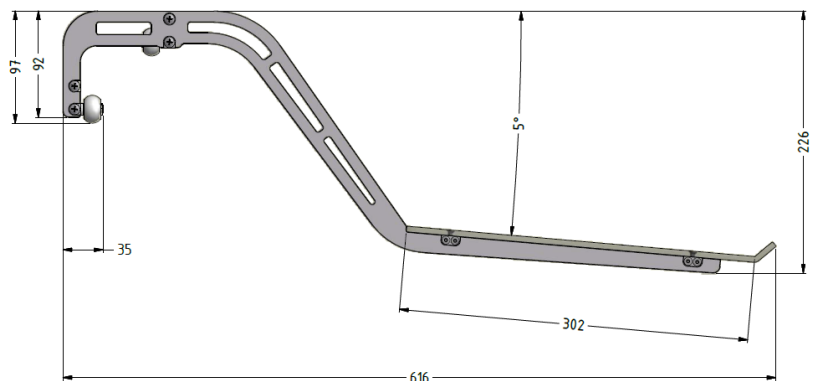
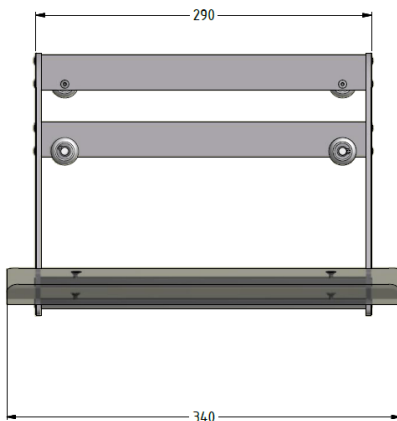
The script tray (959/41) is optional and must be ordered separately from the frame. It is designed to be easily lifted on and off the console so that it may be removed when not required. Please note that there is no locking mechanism to anchor the script tray to the console, and so it *must* be removed for transportation.

When fitted, the tray glides to the left or right. The maximum load of the script tray is 4kg.



DO NOT press down, sit on or place objects > 4kg onto the script tray, as to do so may damage the script tray and console surface.

Mechanical Drawings (Rear View & Side Profile)



5. Installation

This chapter describes how to install the control surface.

- [Installation Instructions](#)
- [Unpacking](#)
- [Installing the Frame](#)
- [Installing the Console Keyboard](#)
- [Fitting the SFP Module](#)
- [Wiring](#)

5.1 Installation Instructions

This topic describes how to use the installation instructions.

We recommend that you read all of this chapter in full before starting the installation. Any product-specific tools, such as Torx drivers, can be found in the Lawo tool case delivered with your system.

Mechanical drawings and data sheets (including weights and dimensions) are available from the [Lawo Download-Center](#) (after login).

Please read and observe ALL of the [Important Safety Instructions](#) BEFORE installing or servicing any component.

Once you are ready to begin, it is recommended to complete the tasks in the following order.

- [Unpack](#)
- [Install the Frame](#)
- [Install the Console Keyboard](#)
- [Fit the MADI SFP transceiver](#) (if applicable)
- [Connect the Cables](#)

The rest of this chapter describes each task in more detail.

If you need further assistance, the Lawo Support Department can be contacted by email at support@lawo.com, or by telephone during normal working hours - please visit the [Support](#) area of the Lawo website for the most up-to-date contact details.

To install a complete system, you must install both the control surface and Core. The installation of the A__UHD Core is covered separately in the "A__UHD Installation and Service Guide".

5.2 Unpacking

The console is delivered as a fully assembled unit. All included accessories are shipped in the "Accessories" box. Any optional components are delivered in their own packing boxes.

Please check the contents of the shipping boxes, and in the event of any transport damage, contact your local Lawo representative or email support@lawo.com.

A list of serial numbers for all components is included with the shipment. Please keep this list for your records.

Packing List

The contents of the shipment will vary depending on the component(s) ordered.

Included

The following items are included with each control surface:

- 2 x 2m IEC power cables (country-specific) - to connect mains power to the frame.
- 1 x USB keyboard - to be installed as the console keyboard.
- 1 x dust-cover - to protect the console when not in use.
- 1 x tool case + tools - for performing service procedures.
- 1 x USB memory card - containing the latest software and configuration files.

Optional

The following items must be ordered separately.

- SFP module - for the MADi port (on the Local I/O connector panel).
- Removable Script Tray (959/41).

Not Included

The following items are not included and must be provided by the customer or installer:

- Ethernet cable(s) - to make the network connections to the frame.
- Audio and GPIO cable(s) - to connect external devices to the local I/O.

5.3 Installing the Frame

The console is designed for indoor use in a dust-free environment.

The studio version comes ready for table-top mounting. The OB-Van version is designed for mounting onto a crossbar (not supplied). Note that a separate OB-Van mounting kit is not required, as the screw threads are integrated into the frame.

The frame *must* be mounted so that the faders work in a horizontal manner. It is forbidden to use the device in any other position, due to the convection airflow through and along the device.

All plug-in connectors are located on the front buffer and rear panel. Therefore, when installing, please leave enough room for the cables. You must also make sure that there is sufficient airflow around the device for cooling.

Dimensions and Weight

The dimensions and weight vary depending on the frame variant.

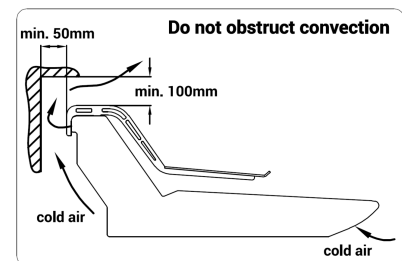
Mechanical drawings and data sheets for all frame variants are available from the [Lawo Download-Center](#) (after login).

Temperature and Cooling

Proper operation of the control surface can only be guaranteed at an ambient temperature between 10° C and 40° C and a relative humidity between 15% and 85% (not condensing).

To keep the control surface cool in extreme conditions, the front panel is fitted with slow turning low noise fans which are temperature controlled.

When relying on convection cooling, it is vital to observe the minimum distances around the frame. The sticker on the rear of the frame summarizes the requirements.

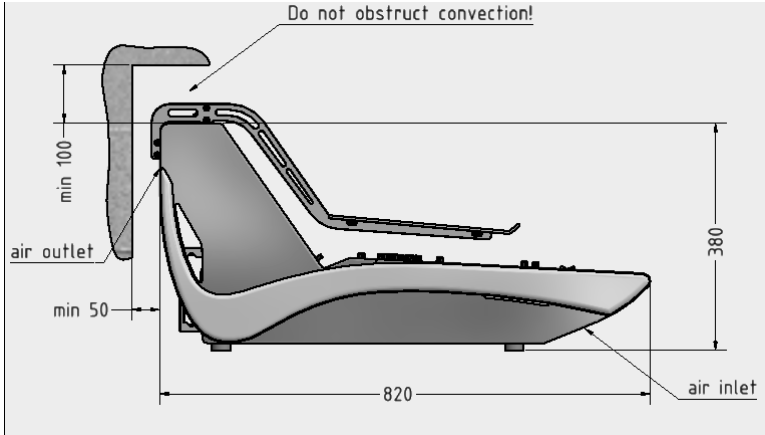


ALWAYS observe the [minimum distances](#) around the console frame to allow for ventilation and cable ducting. Take care that no devices or cables obstruct the flow of air and, thereby, hinder cooling.

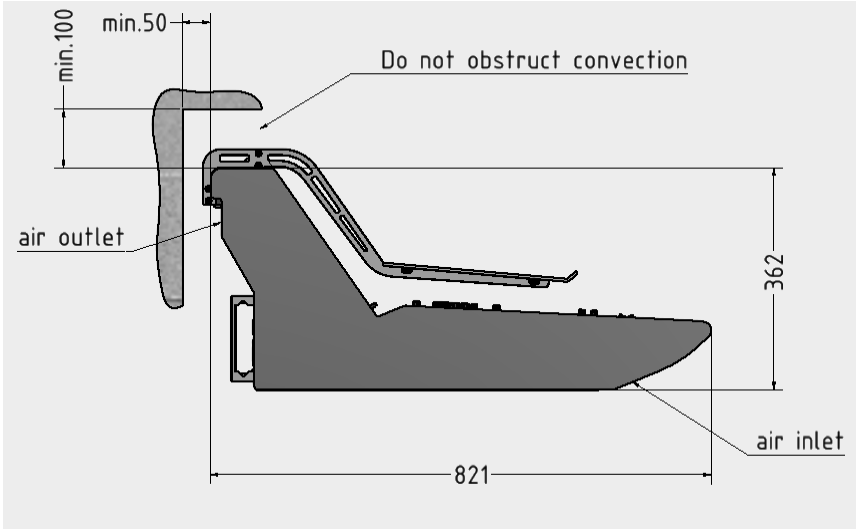
Power Consumption and Electrical Voltage

See [Power Supplies](#).

5.3.1 Minimum Distances for Control Surface Mounting



Studio Frame



OB Van Frame

5.4 Installing the Console Keyboard

The USB keyboard (included in the "Accessories" box) is designed to be floating and positioned on top of the control surface when it is needed. Usually it is connected to one of the USB ports on the [front buffer](#) (below the centre section arm rest). A suitable cable is provided.

The keyboard is available in one of two layouts: either English (default) or German. Following installation, be sure to select the correct layout from the Central GUI's **System Settings** display (in the **Global** -> **System options**).

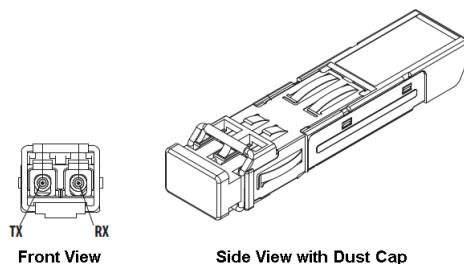
5.5 Fitting the SFP Transceiver

In order to connect the MADi interface to an external device, it must be fitted with an SFP module. The SFP must be Lawo-certified (as described [earlier](#)).

Overview

The SFPs are hot-pluggable, so they can be fitted or exchanged while the device is powered.

The image below shows an example of an optical transceiver.



SFP Installation

Before fitting or removing a transceiver, please read and observe the following important safety information.

This equipment may use Class 1 Laser products. It emits invisible laser radiation that may lead to eye injury.

- Never look directly into optical components or optical fibre cables.
- Keep optical components closed by protection plugs when unused.
- For your safety connect all fibre cables first before turning on the equipment.

- Before removal, please unlock the transceiver to avoid mechanical damage to the slots.
- If a transceiver is removed, please refit the device's dust cap to protect the internal components.
- When fitting an optical transceiver, you must use the correct fiber type for your remote device. Using the wrong fiber type, or exceeding the maximum optical input power, can result in a malfunction of, or damage to, the device.

Instructions (for insertion)

SFP modules must only be inserted when there is no cable connected.

1. Disconnect the cable from the SFP module or remove its dust cap (as applicable).

We recommend that you label the cable before it is disconnected (for easy reconnection to the correct port at a later time).

Please watch out for locks on the cable connector, and unlock these to release the cable. In some cases, this must be done while pulling the cable out of the SFP.

You must take care to prevent electrostatic discharge to the SFP module. This can be done by grounding yourself and taking ESD measures. Do not touch the contacts of the SFP.

When disconnecting the cable from an optical transceiver, take care to cover the unplugged optical cable with a dust cap.

2. Remove the dust cap from the SFP cage on the device.

Any spare dust caps should be stored carefully so that they can be replaced if a module is removed.

3. Before inserting the SFP, flip the extraction lever (at the front) up to its rest position.

4. Slide the SFP gently into the slot.

Please note: if the SFP is upside down, then it will not glide in easily.

The SFP module must slide in smoothly without force. When done correctly, the contacts of the SFP glide into the contacts of the device. At this moment, press firmly until the module locks into position (you will hear a click).

5. Check that the SFP is locked by pulling on it without lifting the extraction lever.

If the module cannot be removed, it is installed correctly.

If the module can be removed, then check its orientation: perhaps the SFP is inserted upside down. Repeat step 4 until the module is securely latched into the SFP cage.

6. After inserting an optical transceiver, take care to immediately connect the optical cable or fit a dust cap.

When connecting a cable, make sure that the cable connector locks into position correctly (you will hear a click).

Instructions (for removal)

SFP modules must only be removed when there is no cable connected.

1. Disconnect the cable from the SFP module.

We recommend that you label the cable before it is disconnected (for easy reconnection to the correct port at a later time).

As before, watch out for locks on the cable connector, and unlock these to release the cable. In some cases, this must be done while pulling the cable out of the SFP.

You must take care to prevent electrostatic discharge to the SFP module. This can be done by grounding yourself and taking ESD measures. Do not touch the contacts of the SFP.

When disconnecting the cable from an optical transceiver, take care to cover the unplugged optical cable with a dust cap.

2. Before removing the SFP, flip the extraction lever (at the front) down. Then use the lever to pull out the SFP.
3. Pull firmly until the contacts of the SFP glide out of the contacts of the device.

From this point onwards, the SFP must slide out smoothly without force.

4. After removing the SFP module, take care to refit a dust cap immediately to the device's SFP cage (to protect the internal components) and to the SFP module (if the transceiver is optical).

5.6 Wiring

Once the control surface is mounted, you are ready to cable the frame.

This section describes all possible connections. To configure the system, only power and control are required.

Before connecting the network(s), it is useful to understand the possible control schemes.

5.6.1 Network Control Schemes

The mc² control system supports two possible control schemes:

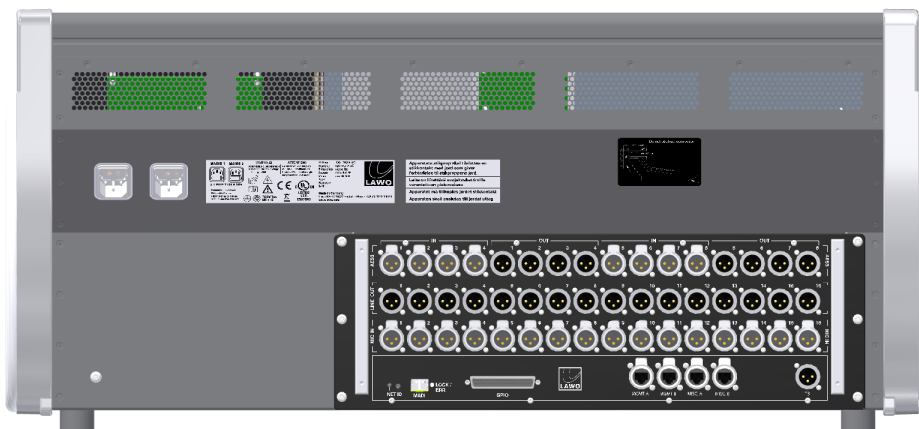
- **Out-of-band** - control data arrives via the management ports (MGMT A & B). This scheme requires a dedicated management network. Only one connection is required for operation; the second provides redundancy.
- **In-band** - control data arrives the Local I/O media port (MISC A). This scheme can be used if there is no separate management network. Redundancy is not possible (as there is only one connection).

The method of control determines how the network ports on the rear panel should be used. There are two possible cabling scenarios:

- **MISC A** (only) to the media network - for local I/O streaming AND in-band control, both non-redundant.
- **MGMT** ports to the management network for out-of-band control (can be redundant) AND **MISC A** to the media network for local I/O streaming (non-redundant).

In both cases, the network connections support Layer 3 routing. This allows the surface to be installed remotely from the Core.

5.6.2 Rear Panel Connections



The following connections are made from the rear panel.

- MAINS inputs (2 x IEC) - see [Power Supplies](#).
- Grounding screw (M5x12) - see [Grounding](#).
- MIC/LINE in, LINE OUT, AES3, MADI & GPIO (various) - see [Local I/O](#).
- MGMT & MISC ports (3 x 1GbE) - as follows.

Management Network Ports (2 x 1GbE)

The two **MGMT** ports provide a connection to the mc² control system (hosted on the Gateserver). Only one connection is essential for operation. A second connection can be installed to support redundancy.

At least one port must be connected initially, to configure the console's network settings. The ports can then be used to connect a dedicated management network if you are using out-of-band control.

Connections are made via TCP/IP Ethernet.

A single computer or device can connect directly. However, it is more common to install a network switch to create a dedicated management network.

Lawo may deliver a suitable network switch with the system. This could be replaced by any other suitable switch fabric that provides comparable performance.

You must use a network switch and *NOT* a hub, and keep the management network separate from other traffic within the installation. The switch should support 1GB for best performance.

The **Ethernet cable** must meet the following specification.

- Cable: CAT 5 or better (CAT 5e/6/7); straight (1:1) or crossed cable*.
- Connector: RJ45.
- Network Speed: 1000, 100 or 10 Base-TX LAN. 1000 Base-TX (Gigabit Ethernet) is recommended.
- Length: up to 100m.

*For a direct connection, you will need a crossed network cable. When connecting to a network switch, use a straight (1:1) cable.

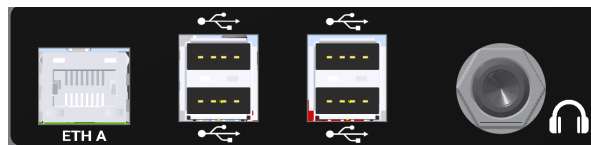
Media Network Port (1 x 1GbE)

The **MISC A** port provides a connection to the RAVENNA/AES67 interface of the Local I/O. It is used to stream the local I/O signals to and from the Core (via the media network). It can also be used to address the management network interfaces if you are using in-band control. In both cases, redundancy is not possible (as there is a single network interface / port).

For more information about the cable and network requirements, see [Local I/O](#).

Note that the **MISC B** port is unused.

5.6.3 Front Buffer Connections



The following connections can be found on the front buffer (beneath the trackpad).

- **1 x ETH A Network Port** - connects to the control surface internal network (ETHERNET A).
- **4 x USB 2.0 Ports** - connect to the mc² control system. The ports can be used to connect a USB memory stick (to save and load user data).
- **1 x Stereo Phones** - can be used to connect a pair of stereo headphones. The socket is wired from the Headphone 1 output which, by default, follows the CRM 1 source selector.

5.6.4 Connecting a Talkback Mic



Talkback User Button & Connector



Rear Panel Connectors

The female XLR on the Central Panel (976/20) can be used to connect a talkback microphone.

It is wired directly to the male XLR (marked TB) on the console's rear panel. Note that the console does not include a dedicated talkback mic preamp, and so the rear panel TB connector must be wired either to an external communications system (via a mic preamp), or to one of the console's local IO mic/line inputs.

6. Service Procedures

This chapter describes the service procedures available for the control surface hardware.

- [Using the Service Procedures](#)
- [Restarting a Bayserver or Gateserver](#)
- [Replacing a Panel](#)
- [Using the Hood Fastener](#)
- [Replacing a Fader](#)
- [Replacing a TFT Display](#)
- [Bayserver & Gateserver Switch Settings](#)
- [Replacing the Power Supplies](#)
- [Replacing the Local I/O](#)
- [Replacing the Network Switch](#)

6.1 Using the Service Procedures

This topic describes how to use the service procedures.

We recommend that you read each topic in full before starting a procedure. Any product-specific tools, such as Torx drivers, can be found in the Lawo tool case delivered with your system.

Please read and observe ALL of the [Important Safety Instructions](#) BEFORE installing or servicing any component.

The system carries highly sensitive electronic components, and therefore should only be handled by authorized personnel, and with the utmost care.

In particular, ALWAYS observe the following procedures:

- The workspace must be ESD proof.
- Before removing parts of the casing, shields, etc. the device MUST be switched off and disconnected from the mains supply.
- Check the unit for electrical safety after completing the work.

Mechanical drawings and data sheets are available from the [Lawo Download-Center](#) (after login).

The following procedures are covered in this chapter.

- [Restarting a Bayserver or Gateserver](#)
- [Replacing a Panel](#)
- [Using the Hood Fastener](#)
- [Replacing a Fader](#)
- [Replacing a TFT Display](#)
- [Bayserver & Gateserver Switch Settings](#)
- [Replacing the Power Supplies](#)
- [Replacing the Local I/O](#)
- [Replacing the Network Switch](#)

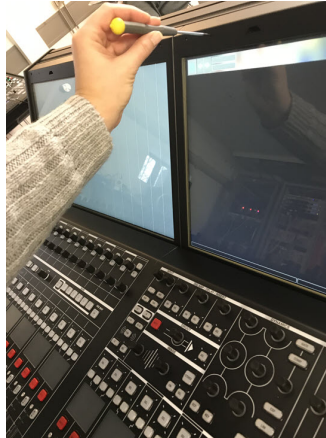
If you need further assistance, the Lawo Support Department can be contacted by email at support@lawo.com, or by telephone during normal working hours - please visit the [Support](#) area of the Lawo website for the most up-to-date contact details.

6.2 Restarting a Bayserver or Gateserver

Each bay has its own Ethernet server which can be restarted from the front panel. The procedure is the same for Bayservers (in channel bays) and the Gateserver (in the centre section). Note that if you restart the Gateserver, then this will affect the whole console.

You should perform this procedure if the graphics on an individual display freeze or look odd. Or, if the controls and indicators on a panel do not respond or update. These symptoms can sometimes occur if the server loses its Ethernet connection to the mc² control system.

1. Using a pointed object, press the recessed button at the top of the display:



The server restarts in a few seconds; during this time you will see the boot-up screen on the display. Once complete, communication with the control system is re-established, and the Channel Display (or Central GUI) is reinstated.

6.3 Replacing a Panel

Each control surface panel can be replaced without affecting the rest of the system. Channel bays are fitted with one 16-fader panel per bay. The centre section is fitted with one central panel connecting to two circuit boards.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the screws at the bottom of the panel using a T20 Torx driver.

The number of screws vary depending on the panel type: Fader Panels have three screws, while the Central Panel has four.



You should remove the screws completely and place them carefully to one side, so that they do not fall into the frame when the panel is lifted. The springs beneath the panel will raise it slightly from the frame.

2. Gently lift the panel using your fingers:



3. Use the [Hood Fastener](#) to keep the panel in place while you work:



Fader Panel (976/10)

4. Remove the connectors, taking note of where each one is fitted.

The Fader Panel (976/10) has 1 x Display Port, 1 x USB and 1 x power.

The Double Fader Panel (977/11) has 2 x Display Port, 2 x USB and 1 x power.

The Central Panel (976/20) has 2 x Display Port, 2 x USB and 2 x power, plus two further connectors for the panel's Talkback XLR and USB port.

5. Carefully remove the panel by lifting it out of the frame. Lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.
6. Check that the rotary switch settings on your replacement panel are correct - they should both be set to 0, irrespective of the frame position. For more details, please see the 36MKII xp data sheet.
7. Insert and reconnect the replacement panel, and fasten the screws back into place.

Once the control surface is powered, the panel will boot within a few seconds.

8. [Restart](#) the bay's server to refresh the communication with the control system.

6.4 Using the Hood Fastener

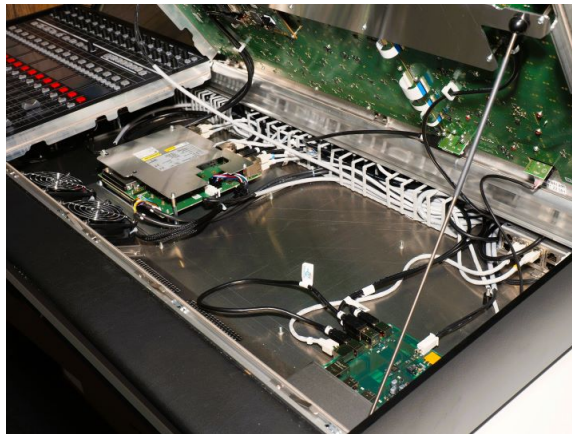
The Hood Fastener can be used to keep a Fader or Central Panel in place while you work.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Follow the previous section's steps to [lift](#) the panel.

You will see the Hood Fastener stowed safely within the frame.

2. Release the fastener from its catch, and place the "ball" end into the cut-out in the metal plate.



When you have finished working inside the frame, replace the hood fastener safely back into its catch, before lowering the panel back into place.

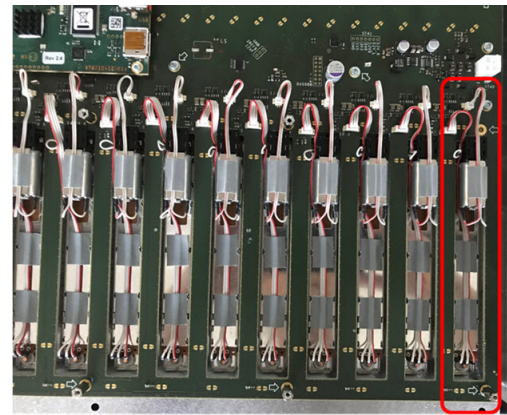
6.5 Replacing a Fader

An individual fader unit can be replaced by removing the panel from the console.

In our example, it is the left-hand fader with the panel face-up which is being replaced:



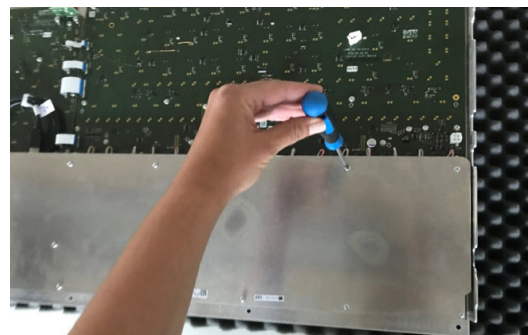
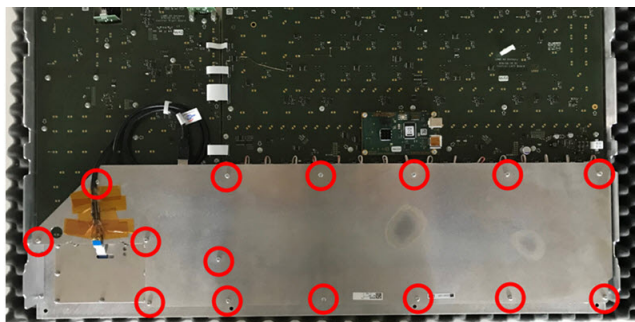
Panel Face-up



Panel Face-down

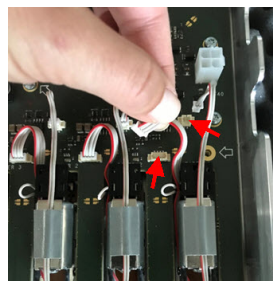
DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the panel from the console frame as described [earlier](#), and lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.
2. Remove the metal cover plate by unfastening the screws shown below. Take care not to damage the trackpad cable.



Place the metal cover plate carefully to one side.

3. Using a small flat-blade screwdriver, release the catches to disconnect the fader unit cables - there are two cables to release:

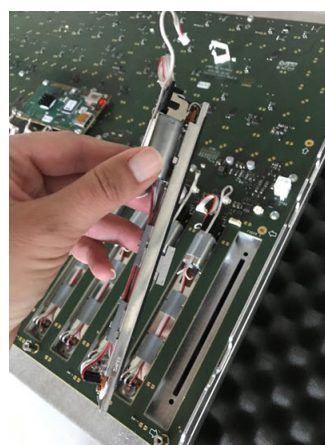
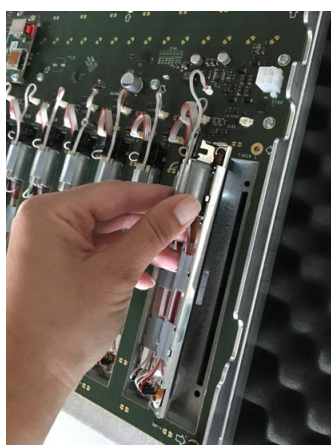


6. Service Procedures

4. Turn the panel face-up and remove the fader cap.
5. Remove the two screws holding the fader unit in place (using a T10 Torx driver):



6. Turn the panel face-down and remove the fader unit. Note that the unit will be loose, and so it helps to support it from behind as you turn the panel.



You are now ready to fit the replacement.

7. Insert the new fader unit into position.
8. Carefully lift the panel onto its side, supporting the fader from behind, and replace the two front panel screws:



9. Turn the panel face-down once more and reconnect the two fader unit cables (see step 3).
10. Fit the panel back into the console frame, apply mains power and then [restart](#) the server (to refresh the communication). Then test the new fader's functionality.

6.6 Replacing a TFT Display

Each of the touch-screen displays can be replaced without affecting the rest of the system.

If you need to replace the centre section display, then connect an mxGUI computer so that it can run online and provide continued access to central GUI operations.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Unfasten the three screws at the top of the display using a long T20 Torx driver, and gently tilt the unit forwards:



The Torx driver shaft **MUST** be long enough to turn the countersunk screws without scratching the front panel. If you attempt to use a short driver, or driver attachment, damage can occur.

2. Remove the connectors, taking note of where each one should be fitted.

Each display has 1 x Display Port, 1 x USB and 1 x power connector.

3. Carefully remove the display by lifting it out of the frame. Lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.
4. Fit the replacement in the reverse manner.

Once the control surface is powered, the display will refresh within a few seconds.

5. [Restart](#) the bay's server to refresh the communication with the control system.

The touch-screen displays are calibrated before leaving the factory and require no further calibration by the customer.

6.7 Bayserver & Gateserver Switch Settings

Within each channel and central bay, individual panels and displays connect to an Ethernet Bayserver or Gateserver (mounted inside the frame). In both cases, the servers have a number of switches which you may need to adjust if you are replacing a TFT display.

Switch Settings

The switch settings are used as follows.

- **S1 DIP Switch 1 (One PSU only)** – set to ON if only one PSU is connected.
- **S1 DIP Switch 2 (PSU Connected)** – set to ON if a PSU block is installed in the bay.
- **S1 DIP Switch 4 (GUI Mode)** – sets the GUI mode: ON = Central GUI, OFF = Channel Display.
- **S1 DIP Switch 3, 5, 6, 7, 8** – are unused and should be set to OFF.
- **SW1 Rotary Switch (Address)** – sets the bay index, counted from left to right (in two's) as viewed from the front of the frame starting at 0.

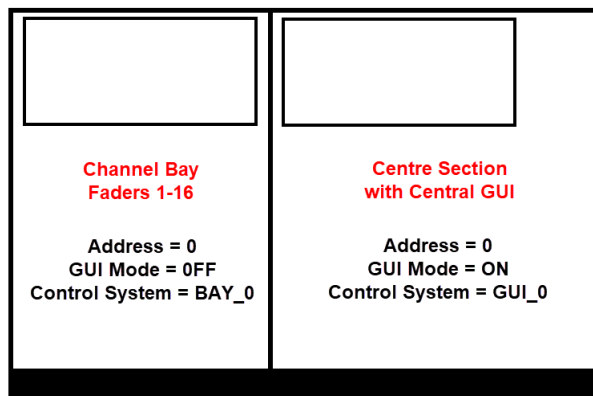
Example Configuration

Start by setting the **S1 DIP Switches 1 and 2** to the correct positions.

If the server is fitted to a central bay, set the **S1 DIP Switch 4 (GUI Mode)** to **ON** and the **SW1 Rotary Switch (Address)** to **0**.

If the server is fitted to a channel bay, then set the **S1 DIP Switch 4 (GUI Mode)** to **OFF** and the **SW1 Rotary Switch (Address)** to the correct index number (**0** or **2**).

The example below shows the correct settings for a 32-fader frame:



How to Adjust the Server Switch Settings

In each case, the Bayserver or Gateserver is mounted inside the console frame. Therefore, you will need to lift a panel to access its switches.

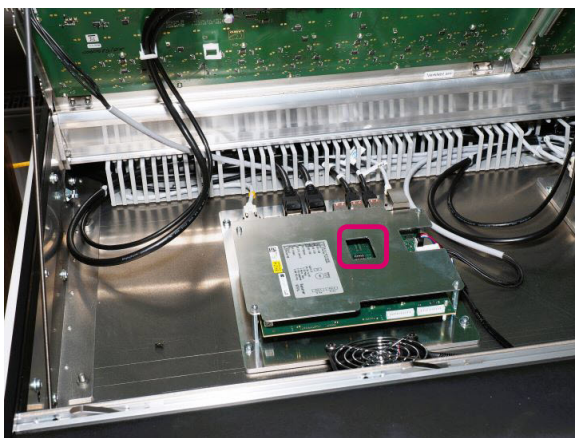
DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Lift either the Fader or Central Panel in the bay you wish to adjust as described [earlier](#), and secure it in place using the [Hood Fastener](#).

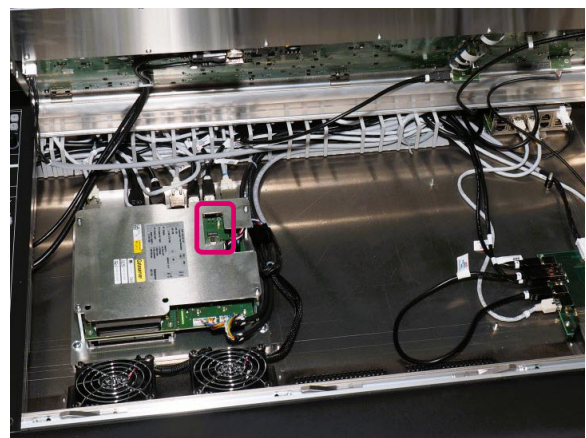
As soon as you lift the panel, you will see the server mounted inside the frame. Note that you do not need to disconnect any cables.

The function of the connectors and switches is explained on the sticker.

2. Locate the S1 DIP switches and SW1 rotary switch. They can be accessed through a cut-out in the protective cover plate (highlighted below):



Channel Bayserver

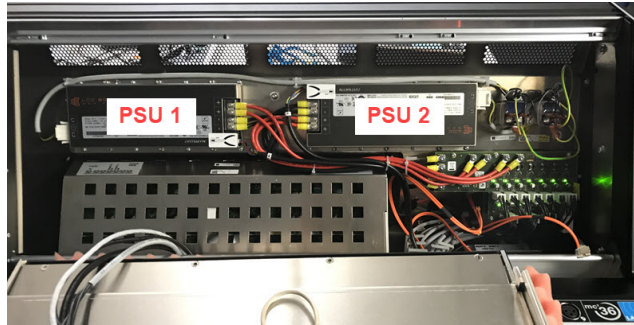


Central Gateserver

3. Set the **S1** DIP switches to the desired ON/OFF positions. Check the positions carefully as the switches are mounted upside down when viewed from the front buffer.
4. Set the **SW1** rotary switch to the required address.
5. Replace the panel.

6.8 Replacing the Power Supplies

The control surface is powered by dual-redundant power supplies which are fitted inside the frame behind the Central GUI TFT display and Overbridge:



The two supplies come as a complete "PSU block" which can be replaced in its entirety - i.e. it is not possible to replace an individual supply.

All of the standard frame sizes are powered from a single PSU block (fitted to the central bay).

To replace the PSU block you will need to remove the Central GUI display and Overbridge blanking panel.

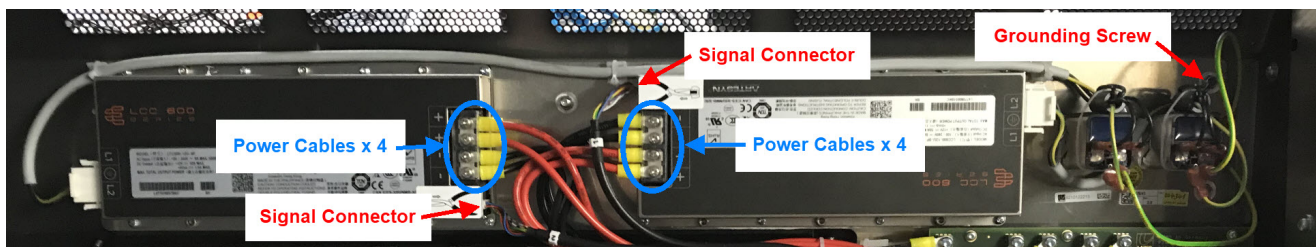
1. Turn off the power to the control surface by [disconnecting ALL MAINS](#) connectors - press the red button on the IEC connector to release the plug.

You must remove the **MAINS** connectors from the frame, rather than from the wall, as the IEC sockets form part of the PSU module. If you do not, then the PSU module will get stuck during step 8.

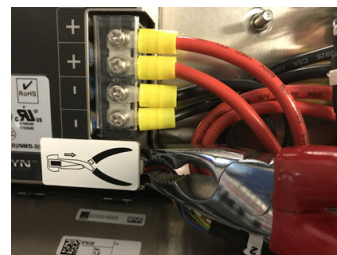
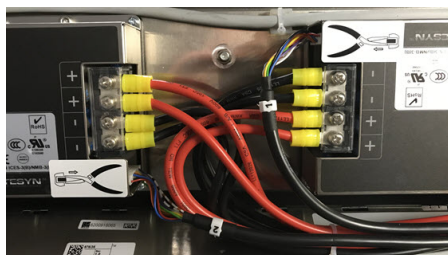
2. In the central bay, remove the TFT display as described [earlier](#).
3. Then remove the Overbridge blanking panel to the right of the display.

You will see the PSU block mounted at the rear of the frame.

4. Using a T20 Torx driver, disconnect the PSU block from its distribution board by loosening the 8 screws shown in blue below.
5. Remove the grounding cable by loosening its screw.
6. Using a small pair of pliers, remove the two signal connectors (which go to the GateServer):



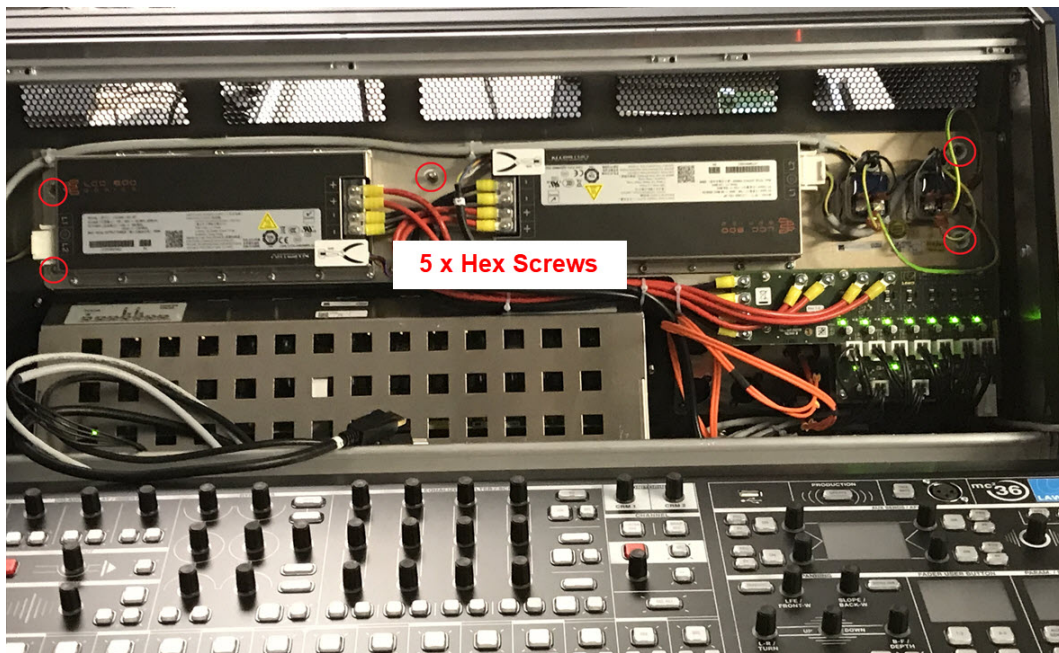
Note that you will need to carefully pinch the signal connector, using your pliers, to remove it from the PSU:



Steps 4, 5 and 6 allow the PSU block to be removed with all of its cables (power, grounding and signal).

Do **NOT** disconnect any wires other than those shown.

7. Using a 8mm hex socket, remove the five nuts holding the PSU block in place:

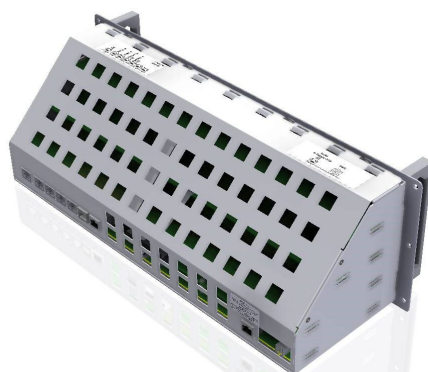


Take care *NOT* to drop any nuts or washers into the desk.

8. Remove the PSU block from the frame.
9. Now fit the replacement and secure using the five hex nuts shown in step 7.
10. Replace the power, signal and grounding cables (see steps 4 to 6).
11. Replace the Overbridge panel and TFT display.
12. When everything is back in place, re-connect the rear mains IEC power connectors, and power on.

6.9 Replacing the Local I/O

The local I/O exists as a self-contained unit which is mounted inside the control surface behind the Central GUI and Overbridge.



Local I/O Unit (profile)

To replace the local I/O unit, you will need to disconnect all of its cabling from the rear panel, and remove the Central Panel, Central GUI display and Overbridge blanking panel.

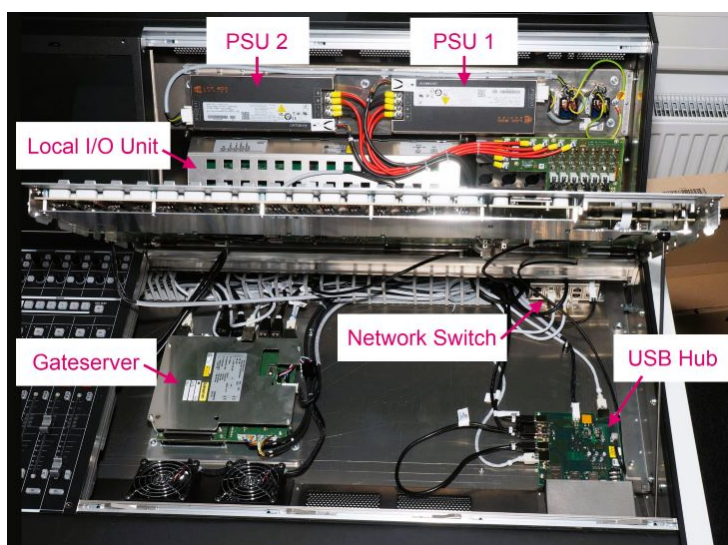
DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Disconnect all of the local I/O cabling from the console's rear panel.



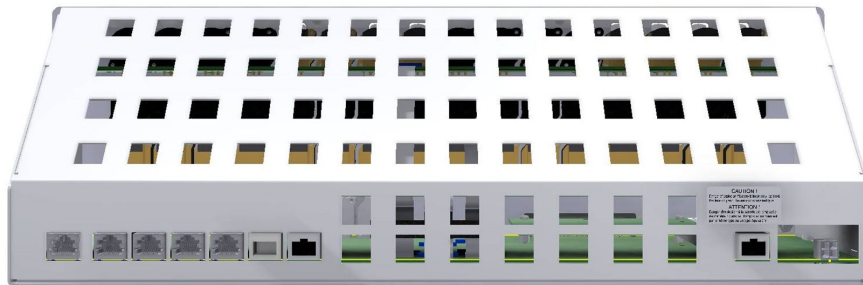
2. Remove the Central Panel, Central GUI display and Overbridge blanking panel as described earlier. See [Replacing a Panel](#) and [Replacing a TFT Display](#).

In each case, the panel should be removed completely. You will see the local I/O carrier unit mounted at the rear of the frame:

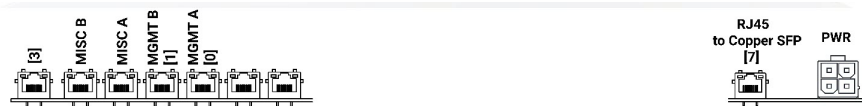


3. Disconnect all of the internal connectors from the front of the unit, taking note of where each one should be fitted.

There are five RJ45 connectors on the left, and one RJ45 connector plus two power connectors on the right. The function of each connector is explained on the stickers attached to the unit.



Internal View (from front)



Local I/O Unit (internal connections)

4. Now move to the rear of the console and loosen the local I/O unit from the frame.

There are six screws, three on each side, holding the unit in place. Remove all of the screws using a T20 Torx driver.



5. Carefully remove the unit by sliding it out of the rear of the console frame. Take care that the frame does not scrape the unit, and that the cables do not get caught.
6. Slide the replacement into the console frame, taking care not to scratch the unit or get any cables caught underneath.
7. Replace the six screws to hold the unit in place (see step 4).
8. Replace the internal connectors (see step 3).
9. Replace all panels and the TFT display (see step 2).
10. Replace the local I/O connections on the rear panel.
11. When everything is back in place, re-connect the rear **MAINS** IEC power and **MISC A** port connector, and power on. Then check the functionality of the local I/O.

6.10 Replacing the Network Switch

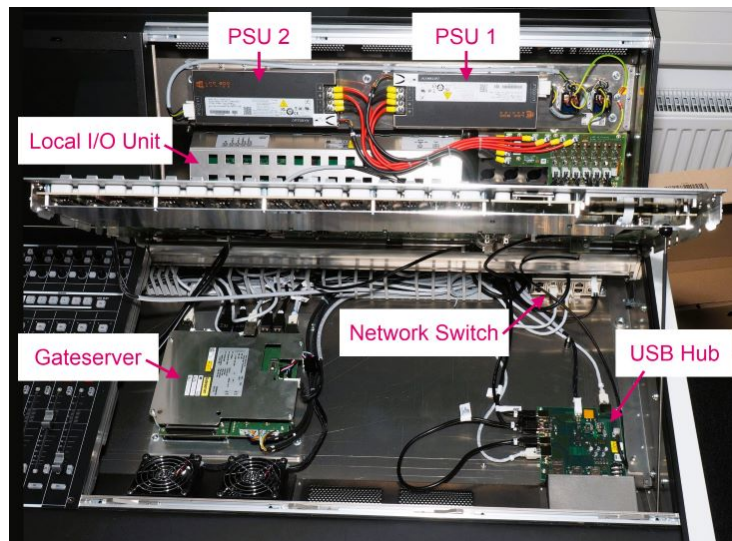
The internal network switch, which distributes the ETHERNET A connections, is mounted inside the control surface below the Overbridge.

To replace the switch, you will need to remove the Central Panel, Central GUI display and Overbridge blanking panel.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the Central Panel, Central GUI display and Overbridge blanking panel as described earlier. See [Replacing a Panel](#) and [Replacing a TFT Display](#).

In each case, the panel should be removed completely. You will see the network switch mounted at the rear of the frame:

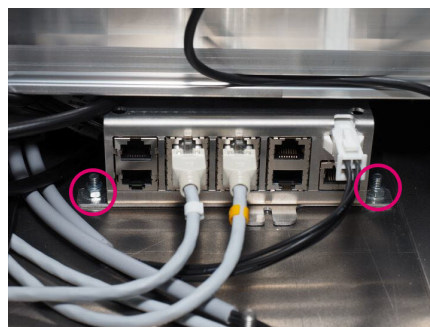


2. Disconnect all of the internal connectors from the front of the unit, taking note of where each one should be fitted.

There are several RJ45 network connectors on the left plus a single power connector on the right.

3. Now loosen the unit from the console frame. There are two hex nuts on each side of the unit holding it in place.

The image below shows the position of the hex nuts with the connectors still in place.



4. Once the connectors are unplugged and the hex nuts loosened, carefully remove the unit by sliding it forwards and out of the console frame.

Take care that the frame does not scrape the unit, and that the cables do not get caught.

5. Slide the replacement unit into the console frame, taking care not to scratch the unit or get any cables caught underneath. Tighten the nuts to hold the unit in place.

6. Replace all panels and the TFT display (see step 1).

Once the control surface is powered, the switch will boot within a few seconds.

7. [Restart](#) the Gateserver to refresh the communication with the control system.

7. Appendices

This chapter includes further information which you may find useful.

- [Part Numbers](#)
- [Mechanical Drawings](#)
- [Wiring Diagrams](#)
- [Connector Pin-Outs & I/O Specifications](#)

7.1 Part Numbers

System Component		Part Number
mc ² 36 xp Console	16-Fader, Studio	976/16S_xp
	16-Fader, OBVan	976/16V_xp
	32-Fader, Studio	976/32S_xp
	32-Fader, OBVan	976/32V_xp
	48-Fader, Studio	976/48S_xp
	48-Fader, OBVan	976/48V_xp
Mounting Options	Studio Side Panels	976/60
	OB Van Side Panels	976/61
Control Surface Modules	Fader FC Panel (976/32 only)	976/10
	Double Fader Panel (976/48 only)	976/11
	Central Panel	976/20
	Channel Display	977/13
	Overbridge Blanking Panel	976/15
Internal Components	Local I/O	976/35
	PSU block, double	976/44
	Ethernet Bayserver	977/14
	Ethernet Gateserver	977/15
	Ethernet Sw itch (internal netw ork)	978/42
	G-Board	978/45-10
Accessories	Script Tray	959/41

7.1.1 Data Sheets

Further technical information can be found in the 36xp data sheet available from the [Lawo Download-Center](#) (after login).

7.2 Mechanical Drawings

The following diagrams show the mechanics of each control surface variant. In each case, double-click on a link to open the diagram (as a pdf).

- [16-Fader OB-Van](#)
- [16-Fader Studio](#)
- [32-48-Fader OB-Van](#)
- [32-48-Fader Studio](#)

7.3 Wiring Diagrams

The following diagrams show the control surface internal wiring in more detail. In each case, double-click on a link to open the diagram (as a pdf).

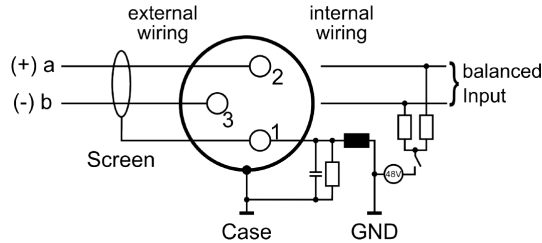
- [Cabling: Control & Power](#)

7.4 Connector Pin-Outs & I/O Specifications

The following connectors appear either on the rear panel or front buffer.

7.4.1 Mic/Line In

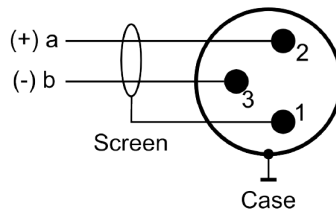
3-pin XLR connector, female.



All MIC/LINE IN connections are electronically balanced and floating (suitable for balanced or unbalanced use). They feature a discrete class-A preamplifier with superb performance at both low (mic) and high (line) levels. In addition to variable microphone pre-amp gain, each input comes with switchable 48V phantom power, a high-pass filter and 20dB PAD. The maximum analog input level (with the PAD enabled) is +24dBu.

7.4.2 Talkback (TB)

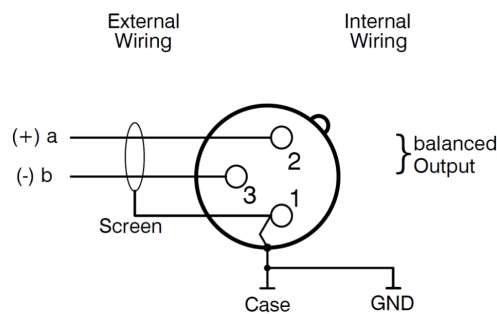
3-pin XLR connector, male.



This connector is wired from the 3-pin female XLR Talkback connector on the front panel.

7.4.3 Line Out

3-pin XLR connector, male.

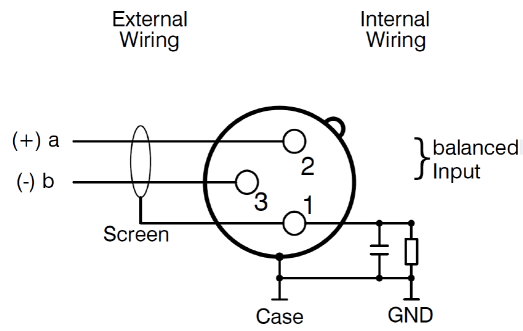


All LINE OUT connections are electronically balanced and floating (suitable for balanced or unbalanced use). For LINE OUTs, the maximum analog level can be adjusted to +12, +15, +18, +21 or +24 dBu relative to digital full scale (dBFS). This is a factory-configured setting; +24dBu is recommended.

For connection to an unbalanced input stage one line needs to be shorted to ground (hot or cold) like with a transformer-coupled output stage. The level will remain the same as with a balanced load.

7.4.4 AES3 In

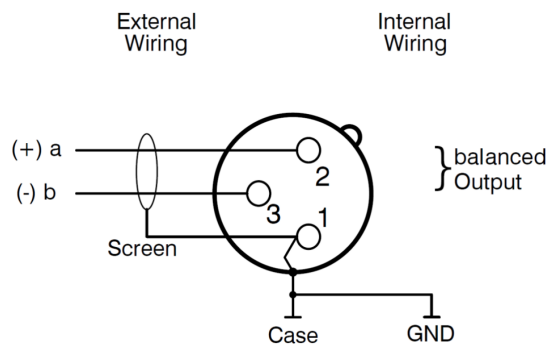
3-pin XLR connector, female.



All AES3 IN connections conform to the stereo AES3 standard. The inputs have sample rate conversion (SRC).

7.4.5 AES3 Out

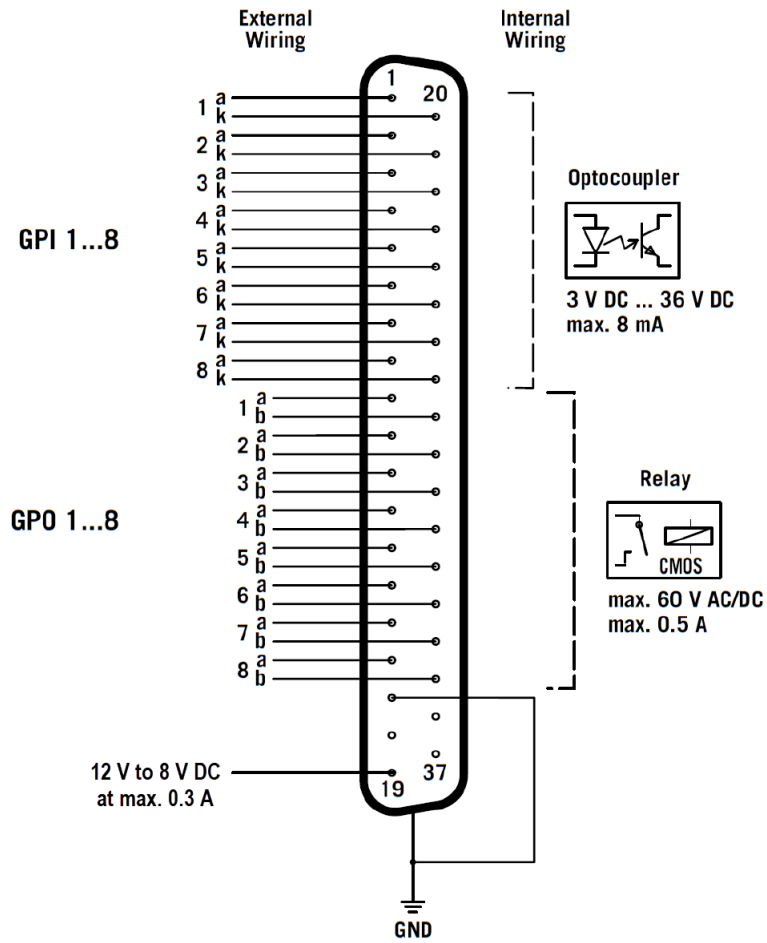
3-pin XLR connector, male.



All AES3 OUT connections conform to the stereo AES3 standard.

7.4.6 GPIO

37-pin D-type connector (DB37), female.



7.4.7 Headphones

6.35mm stereo jack connector.

