



diamond

User Manual

Version: 8.0.0/1

Exported on: 24 October, 2023

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This user manual describes all aspects of the diamond console. It contains information for users, technicians and system integrators.



1 diamond - General Information

Before you start working with diamond, please read the following information.

- [diamond - About this Documentation](#)
- [diamond - Important Safety Instructions](#)
- [diamond - Important Cleaning Instructions](#)



1.1 diamond - About this Documentation

This documentation represents the latest state of information. Subject to availability, manuals covering former versions are provided via the [Lawo Download-Center](#) (after login).

General Safety & Important Notes

When working with our hardware components, it is important to read and observe all of the instructions provided in the "[General Safety Information for Lawo Equipment](#)" booklet delivered with your devices.

The same symbols are used in the product documentation so please look out for them as follows. The letter in brackets before the signal word denotes the language version: e.g. (E) = English.



(E) WARNING - warnings or mandatory actions.

These instructions **must always be observed** to ensure the personal safety of the user, and to protect your system and the work environment from potential damage.



(E) IMPORTANT NOTE - important information for proper functioning.

Other Informational Icons

When reading about our software or the general operation, you may also see the following icons.



General information and points of clarification. Please take note.



Useful tips and shortcuts. Feel free to follow if you like.



Notes. To avoid getting stuck, make sure you follow.



Important actions. To keep the system operational, you should always follow.

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.



1.2 diamond - 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.

Click on the link below to read or download the booklet as a pdf.

[Lawo_Safety.pdf](#)

1.3 diamond - Important Cleaning Instructions

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

(E) ATTENTION

DO NOT spill liquids into any system components!

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

(F) ATTENTION

NE PAS renverser de liquides dans les composants du système!

NE PAS nettoyer les panneaux avant ou les surfaces opérationnelles avec des instruments pointus.

(E) IMPORTANT NOTE

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 diamond Surface

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

- Antistatic
- Fluff-free
- Without emery pieces



2 diamond - Getting Started

If you are new to diamond, then please read the following topics to get started.

- [diamond - Powering On](#)
- [diamond - Fader Strip Control](#)
- [diamond - Central Controls](#)
- [diamond - Fader Strip Assign](#)
- [diamond VX - Operating Principles](#)



3 diamond - Hardware

This chapter describes the diamond frame and its hardware components.

- [diamond - Surface Description](#)
- [diamond - Frame Expansion](#)
- [diamond - Mounting Options](#)
- [diamond - Control Surface Modules](#)
- [diamond - Virtual Extension](#)
- [diamond - Power Supplies](#)
- [diamond - Grounding](#)
- [diamond - Cabling Considerations](#)
- [diamond - Multi-frame Surfaces](#)
- [diamond - Frame Variants](#)

3.1 diamond - Surface Description

diamond can exist as a single-frame or multi-frame surface, where each frame is available in a range of sizes and layouts. The images below show three examples.



The surface is modular. All slots are equal in width: 1 ME = 168mm, equivalent to 4-faders. There are two module depths: full height (336mm) for standard frames, and half-height (168mm) for the upper slots in extended frames. The standard sizing allows modules to be repositioned to achieve the desired layout.

The smallest surface consists of a single module (2-fader Combo). This can be expanded by adding standard modules to increase the width, and extension modules to increase the depth. Optionally, the Virtual Extension (VX) can be added to either standard or extended frames. The Virtual Extension occupies the space above two modules, and so is only available for certain frame widths: 2 ME, 4 ME, 6 ME or 8 ME. The images in the [next topic](#) show the frame expansion stages. Each frame is available in one of two versions to support different mounting options: either tabletop or countersunk.

diamond is specified using a range of main frame and extender frame layouts. To create a single-frame surface, choose one of the main frame options. Extender frames can be added to increase the fader count or create a split-frame surface. In total, the control surface can include any number of frames as long as the [maximum slot allocations](#) are not exceeded.

Each frame is powered from an external DC power supply. Frame widths of 5 ME or above require two supplies. If the Virtual Extension is included, each VX module also requires its own power supply.

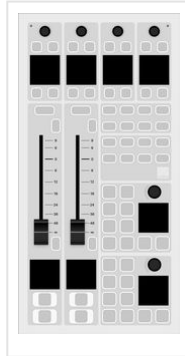
Frames are convection cooled and so there are no fans inside the surface or VX modules.

- i** The frame construction must be specified at the time of order; there is no possibility to convert the frame later. Blind plates are available for both standard and extension module slots. These can be fitted to a larger frame to allow for future expansion.

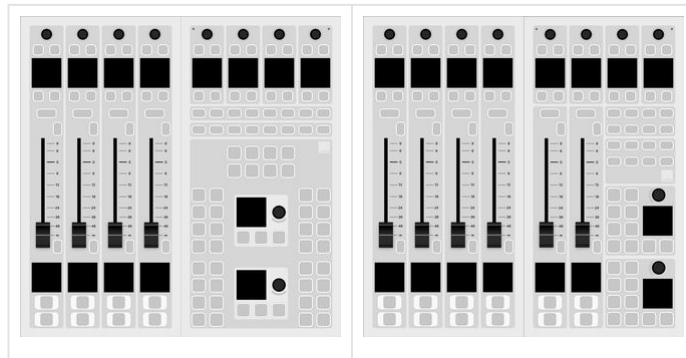
3.2 diamond - Frame Expansion

This topic explains how a diamond frame can be expanded.

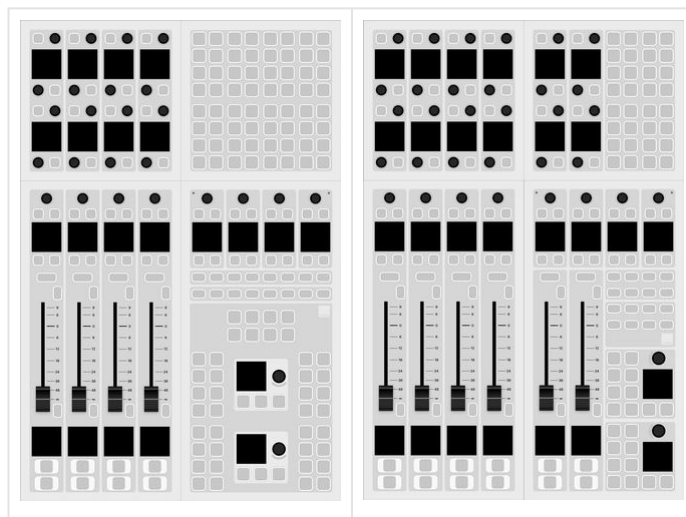
1. The minimum width = 2-faders.



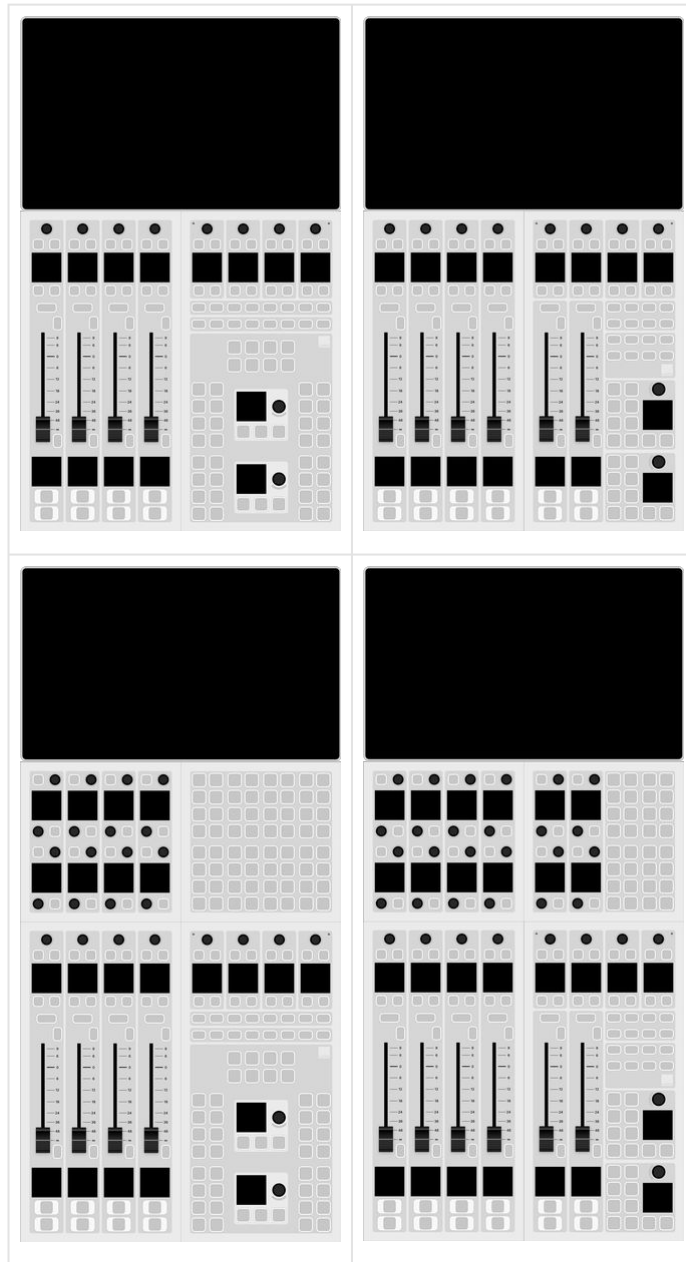
2. The width increases in 2-fader steps by adding standard modules.



3. The depth can be increased by adding extension modules.



4. The Virtual Extension (VX) can be added to both standard and extended frames. It occupies the space above two modules, and so is only available for certain frame widths: 2 ME, 4 ME, 6 ME or 8 ME.



3.3 diamond - Mounting Options

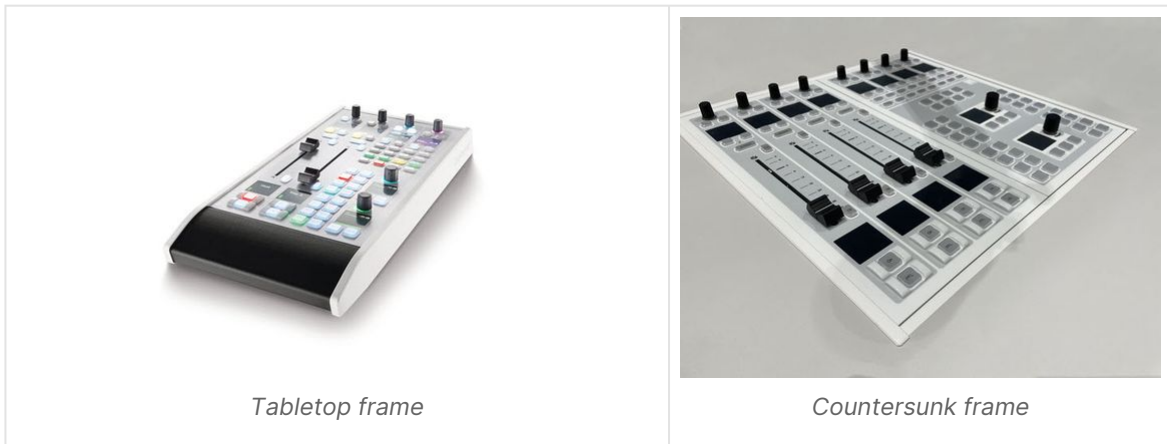
Each frame can be ordered in one of two versions: either tabletop or countersunk. The version must be specified at the time of ordering; there is no possibility to convert the frame later.

The **Tabletop** version is designed for tabletop placement. This version includes a leather hand rest and stylish side/rear profiles.

The **Countersunk** version is designed to fit flush within your studio furniture. This version comes with different front, rear and side profiles.

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

The images below show some examples.



3.4 diamond - Control Surface Modules

The diamond surface is modular. All slots are equal in width: 1 ME = 168mm, equivalent to 4-faders. There are two module depths: full height (336mm) for standard frames, and half-height (168mm) for the upper slots in extended frames. The standard sizing allows modules to be repositioned to achieve the desired layout.

i The operation of each module is defined by its slot ID, and not the physical position in the frame. This means that a module can be positioned anywhere in the frame and still offer the same functionality.

Maximum Slot Allocations

When combining more than one frame, or exchanging modules, it is important that the maximum slot allocations are not exceeded:

1. The **maximum number of physical faders is 60** (equivalent to 15 Fader modules).
2. For the central controls, **up to 7 Central** and **4 Combo** modules are supported. Each Combo takes the place of a Fader module (in slots 12 to 15), and the following conditions must be observed:
 - a. Power Core (single-console license) - supports one Access Group, controlled from either a Central or Combo module.
 - b. Power Core (Max license) - supports up to 4 Access Groups, controlled from any combination of Central and Combo modules (access group numbers must be unique).
 - c. Any additional Central and Combo modules run in monitor mode.
3. For **extension modules**, the following rules apply:
 - Up to 15 Rotary Fader Extension Modules (in slots 33 to 47).
 - Up to 4 Combo Extension Modules (in slots 44 to 47). Each Combo Extension replaces a Rotary Fader Extension.
 - Up to 6 Rotary Central Extension or Key Extension Modules (in slots 49 to 54).
 - Up to 7 additional Key Extension Modules (in slot 48 and slots 20 to 25).

The slot allocations can be checked by opening the "Frames → Surface" configuration in the ON-AIR Designer.

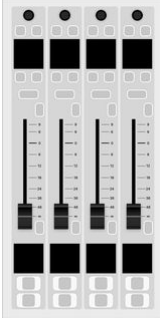
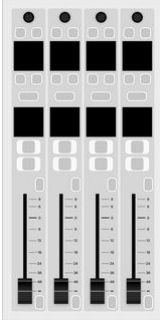
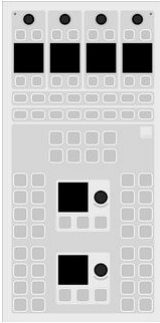
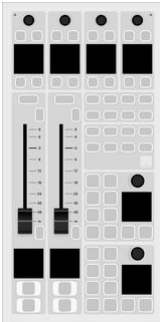
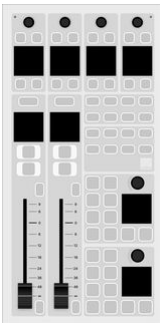
Standard Modules

All standard modules are 168mm x 336mm (full height). They can be fitted to a standard frame or the lower slots in an extended frame.

In summary, the options are:

- **Fader Module A** - 4 x fader strips (layout A).
- **Fader Module B** - 4 x fader strips (layout B).
- **Central Module** - dedicated central controls for maximum functionality.
- **Combo Module A** - 2 x fader strips (layout A) + condensed central controls.
- **Combo Module B** - 2 x fader strips (layout B) + condensed central controls.
- **Blind Plate (full height)** - can be fitted to a larger frame to allow for future expansion.

The table below provides more information.

<p>Fader Module A (711/10)</p> <ul style="list-style-type: none"> • 4 x 100mm faders • 4 x rotary encoders • 8 x TFT displays • 36 control keys 	
<p>Fader Module B (711/12)</p> <ul style="list-style-type: none"> • 4 x 100mm faders • 4 x rotary encoders • 8 x TFT displays • 36 control keys 	
<p>Central Module (711/20)</p> <ul style="list-style-type: none"> • 6 x rotary encoders • 6 x TFT displays • 78 control keys • 2 x ambient light detectors 	
<p>Combo Module A (711/21)</p> <ul style="list-style-type: none"> • 2 x 100mm faders • 6 x rotary encoders • 8 x TFT displays • 44 control keys • 2 x ambient light detectors 	
<p>Combo Module B (711/22)</p> <ul style="list-style-type: none"> • 2 x 100mm faders • 6 x rotary encoders • 8 x TFT displays • 44 control keys • 2 x ambient light detectors 	

Blind Plate (711/11)

- 1 ME (full height)



Extension Modules

All extension modules are 168mm x 168mm (half-height). They can be fitted to the upper slots in an extended frame, or to a standard frame / lower slot (if a special mounting bar is fitted).

In summary, the options are:

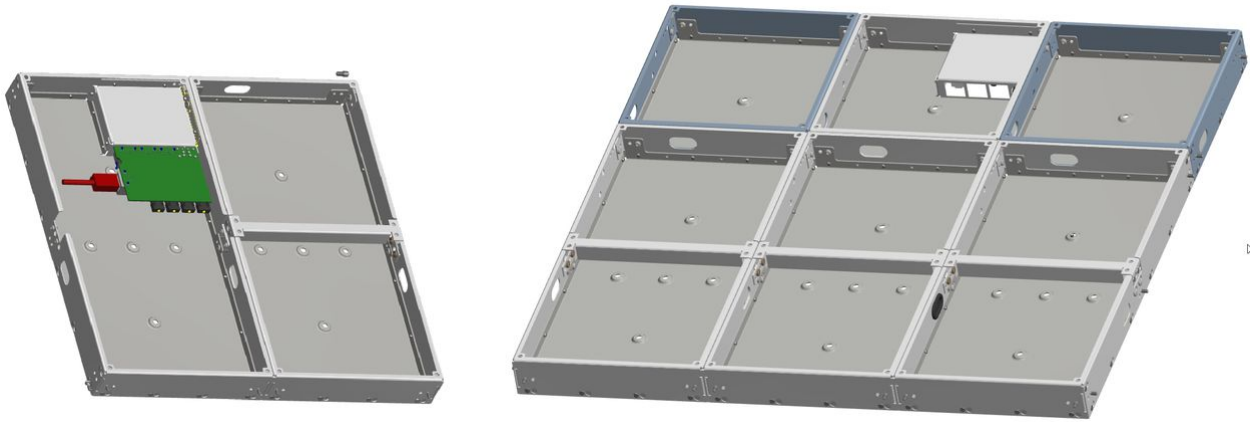
- **Rotary Extension Module** - 16 x rotary controls (with control keys).
- **Key Extension Module** - 64 programmable control keys.
- **Combo Extension Module** - 8 x rotary controls (with control keys) + 32 programmable control keys.
- **Blind Plate** (half-height) - can be fitted to a larger frame to allow for future expansion.

The table below provides more information.

<p>Rotary Extension Module (711/15)</p> <ul style="list-style-type: none"> • 16 x rotary encoders • 8 x TFT displays • 16 control keys 	
<p>Key Extension Module (711/25)</p> <ul style="list-style-type: none"> • 64 control keys 	
<p>Combo Extension Module (711/26)</p> <ul style="list-style-type: none"> • 8 x rotary encoders • 4 x TFT displays • 32 control keys 	
<p>Blind Plate (711/16)</p> <ul style="list-style-type: none"> • 1 ME (half-height) 	

Mounting Extension Modules in a Standard Frame

It is possible to mount two extension modules into a full-height slot if a special mounting bar is fitted. The images below show mounting bars fitted to both a standard and extended frame.



Specifications for the Physical Controls

The following general information applies to the physical controls.

- All rotary encoders are touch-sensitive and include an LED indicator ring (for color-coding).
- All faders are touch-sensitive and motorized.
- All control keys can be configured to light in a range of colors and states. Some keys are labeled by the TFT displays and others use foil-printed labels.

You can find more technical information about each module in the corresponding data sheets.

3.5 diamond - Virtual Extension

Both standard and extended frames can be ordered with the **Virtual Extension (VX)**. This option adds integrated touch-screen displays to the console. If the Virtual Extension is not included, then similar functionality can be achieved by running the **Desktop App** on an external display.

Permitted Frame Size

Each VX display occupies the space above two control surface modules, and so this option is available for certain frame widths: 2 ME, 4 ME, 6 ME or 8 ME.



Viewing Angle

The display(s) are secured to the special side profiles that are part of the VX frame. This allows the viewing angle to be adjusted to one of three positions by the user. For instructions, please see [diamond VX - Changing the Viewing Angle](#).



Host PC Requirements

The VX software runs on a Windows PC that must be supplied by the customer. A license to run the standard configuration (for the Virtual Extension or Desktop App) is included with every console.

A single host PC can support multiple displays, depending on its specification. If the control surface includes multiple frames with more than 6 displays, then it is recommended to install a second host PC. The following document contains more information about the PC requirements: [Vistool PC Config.pdf](#).

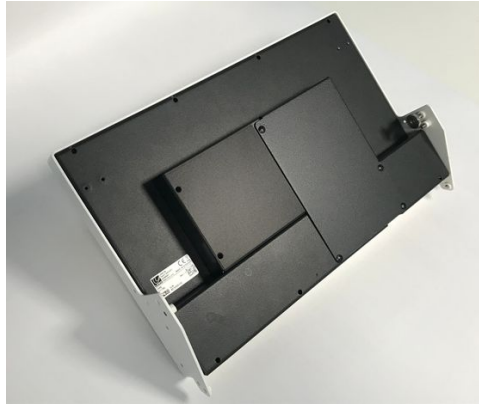
Physical Connections

The host PC connects to Power Core via the IP network. Each VX display connects to the host PC via Display Port and USB, and is powered by its own external DC power supply.

If the control surface is fitted with more than one VX display, then the host PC must support multiple Display Port and USB connections.

Cable Cover

Optionally, a cable cover can be fitted to protect the connections and make the rear of the console look nicer. The cable cover is not included and must be ordered separately. The image below shows the rear of a VX display with the cable cover fitted.



VX Module Specifications

Frames ordered with the Virtual Extension option come with special side profiles and the correct number of VX modules to fit the frame. The specification of each module is as follows.

Virtual Extension Module (711/30)

- 1 x high-resolution TFT display with touch-screen control.
- Dimensions: 336mm x 226mm x 66mm.



3.6 diamond - Power Supplies

Each frame is powered by an external DC power supply (954/99). The PSU comes with an IEC power cable that is country-specific. For frame widths of 5 ME or above, a second power supply and IEC power cable are provided.

If the Virtual Extension is included, then each VX display also requires an external DC power supply (SP4851209). This is different from the frame's supply, so take care not to mix up the part numbers (if you need to order a replacement power supply).

PSU Type	Part Number
12V DC Power Supply for a diamond frame	954/99
12V DC Power Supply for a diamond VX module	SP4851209

Ordering Information

For a new system, the power supplies are included with the frame(s). To order a spare part, please use the part numbers listed above.

Specifications

For dimensions, weight and electrical specifications, please refer to the data sheets for the power supplies. These are available from the [Lawo Download-Center](#) (after login).

IEC Power Cables

Each external DC power supply is delivered with an IEC power cable that is 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 DC Power Supplies

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

(E) WARNING

The AC input(s) MUST be connected to the mains using the power cable(s) supplied with the system.

Disconnect all power sources to completely disconnect power from the system. e.g. before you open the unit for maintenance and service.

Take care that the protective earth (PE) connection of each PSU is individually connected to the PE connection of the building installation (e.g. wall socket). It is forbidden to use IEC Y-cables, or connect both PSUs to the same multiple-socket outlet. This measure guarantees that there is no shared PE connection (whose failure would lead to a summation of the leakage current from both PSUs to the housing).

(F) AVERTISSEMENT

La ou les entrées CA DOIVENT être connectées au secteur à l'aide du ou des câbles d'alimentation fournis avec le système.

Déconnectez toutes les sources d'alimentation pour couper complètement l'alimentation du système, par exemple avant d'ouvrir l'unité pour la maintenance et l'entretien.

Veillez à ce que la connexion de terre de protection (PE) de chaque PSU soit connectée individuellement à la connexion PE de l'installation du bâtiment (par exemple, une prise murale). Il est interdit d'utiliser des câbles en Y IEC, ou de connecter les deux PSU à la même prise multiple. Cette mesure garantit qu'il n'y a pas de connexion PE partagée (dont la défaillance entraînerait une sommation du courant de fuite des deux PSU vers le boîtier).

For each diamond frame, the DC input is located on the connector board (on the underside of the frame).



Cabling instructions:

1. Connect the frame's external DC power supply to the 12V IN on the connector panel.
2. Using the IEC cable provided, connect your AC mains to the PSU.
3. If the frame includes more than one connector panel, then repeat the steps to apply power to each section of the frame.
4. If the Virtual Extension is included, then repeat the steps to apply power to each of the VX displays.

The surface and VX modules have no on/off switch and start automatically when power is applied. What happens next is described later. See [Powering On & Starting the GUI](#).

3.7 diamond - Grounding

Each diamond frame must be grounded for EMC reasons and to ensure the correct operation of the physical controls.

If the frame is not properly grounded, then you may see some odd behaviours once the console is operational. For example, the faders do not move as expected.

Grounding Instructions

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.

(E) CAUTION

Each frame must be on the same potential as all other system devices.

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

The device must be connected to an additional fixed protective ground if it is conductively connected with more than 20 other devices. i.e. more than 20 copper I/O connections. For more information, please refer to the "General Safety Information for Lawo Equipment" booklet delivered with your devices.

For each diamond frame, a grounding screw is provided on the connector board (on the underside of the frame).



Use the M4x10 screw to fasten the grounding cable to the housing. You should use a Torx T20 driver for this purpose.

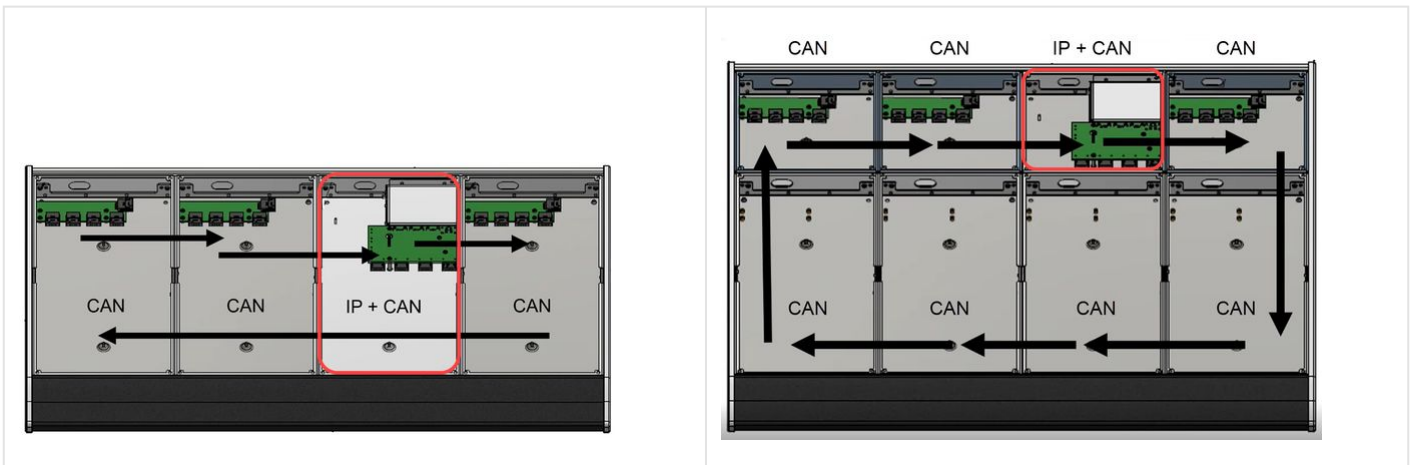
If the frame includes more than one connector panel, then it is important to ground each section of the frame.

3.8 diamond - Cabling Considerations

All external connections are made to the frame's connector board which is located on the underside of the frame.

Connector Board Position

The connector board can be located beneath any module and its position is specified at the time of order. The images below show two examples: a standard frame (on the left) and extended frame (on the right). The position of the frame's IP module/connector board is highlighted in red.



When specifying the position, please consider the following points.

- All external cabling is made to the frame's connector board, so you must make sure that the cable tray is accessible.
- The slot above the connector board must be fitted with an active module (and not an empty slot / blind plate). This is because the ETHERNET connector on the board plugs into the module above. So if there is no module, then the ETHERNET port is inactive.
- For frame widths of 5 ME or above, a second power distribution and connector board are required. In this instance, a second external power supply is provided and the two parts of the frame must be connected externally. There are two possibilities:
 - The first part of the frame connects to Power Core via IP, and the second part daisy-chains to the first using an external CAN bus cable. Usually, this is the preferred option.
 - Each part of the frame connects individually to Power Core via IP.
- If the surface consists of more than one frame, then the additional frames are treated in a similar manner: either each frame can connect individually to Power Core (via IP) or daisy-chain to the main frame (via CAN bus).

Internal Wiring

Internally, the control surface modules are connected via high-speed CAN in a daisy-chain fashion.

- The CAN bus wiring starts from the termination on the frame's connector board, and then daisy-chains to and from each module, before returning to CAN A on the connector board.
- Each module has three wired connections: 1 x power to the frame's power distribution board, and 2 x CAN bus to the next/previous module.
- For the module that sits above the frame's connector board, there is a fourth connection to the external Ethernet port. This connection is made by a series of pins on the underside of the module that plug into the connector board when the module is mounted into the frame. This is why it is important that a module is always fitted to this slot position (to ensure that the external Ethernet connection to Power Core can be made).

As part of the system setup, a communication mode must be selected for each control surface module. There are three possible options: CAN, IP or CAN+IP.



For more information about how to configure the communication modes, and the IP connection to Power Core, see the [System Setup](#) chapter.

3.9 diamond - Multi-frame Surfaces

diamond is specified using the main frame and extender frame layouts described [later](#). More than one frame can be combined to increase the fader count or create a split-frame surface.

Any additional frames can either daisy-chain to the main frame (via CAN bus) or connect individually to Power Core (via the IP network). The former is ideal for split frames within the same studio. The latter allows frames to be installed remotely from each other in different locations.

This topic describes how to specify a diamond surface for three different scenarios.

Increasing the Fader Count

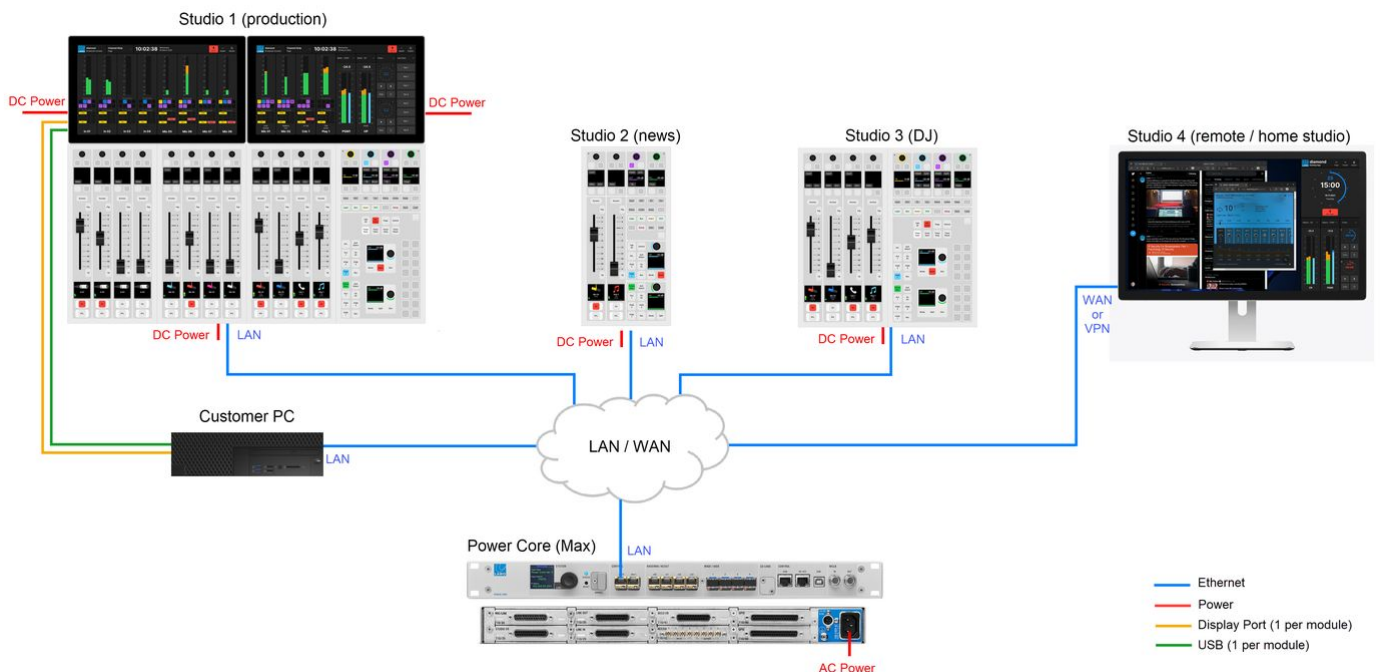
If more than 30 physical faders are required, then two frames can be butted together: 1 x main frame + 1 x extender. The maximum number of physical faders must not exceed 60, and any additional central controls must follow the maximum slot allocations (described [earlier](#)). The two frames can connect individually to Power Core via IP. However, usually, it makes more sense to daisy-chain the two frames using an external CAN bus cable.


Creating a Split-frame Surface

To create a wrap-around layout or additional operating stations, the surface can be split into more than one frame. In total, the control surface can include any number of frames as long as the [maximum slot allocations](#) are not exceeded.

Creating a Multi-studio Solution

If Power Core is running a Max license, then it is possible to create up to 4 completely independent consoles, each with separate Access Group functions. This means that each operator can control their own Function Keys (for independent layer switching, DSP parameter control, bus assignment, etc). Each console can be physical or virtual. The diagram below shows an example system.



 When configuring Power Core Max...

Please note that the real-time input measurement for the channel in ACCESS is supported by Access Group 1 only, and not Access Groups 2 to 4. This affects the dynamic signal level visualizations on the GUI such as the bouncing balls in the [Dynamics](#) 'Source Parameter' dialog box. So, in the example above, these visualizations are available for Studio 1 only, and not Studios 2 to 4.

For this reason, it is recommended to use Access Group 1 for the most important surface / the surface with a Virtual Extension.

3.10 diamond - Frame Variants

This topic describes all of the main and extender frame variants.

Each main frame includes either a Central or Combo Module. The frame widths scale from 2 to 30 physical faders in 2-fader increments (as illustrated [earlier](#)).

Extender frames can be added to increase the fader count or create a split-frame surface. The frame widths scale from 4 to 32 physical faders in 4-fader increments. There is also an option for a stand-alone Central Module.

Mechanical drawings for all frame variants are available from the [Lawo Download-Center](#) (after login). Use the following part numbers to help locate the correct drawings:

- 711/50-0x.yy = standard frame.
- 711/51-0x.yy = extended frame.
- 711/60-0x.yy = standard frame with Virtual Extension.
- 711/61-0x.yy = extended frame with Virtual Extension.

x = the module width, from 1 to 8 ME.

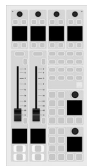
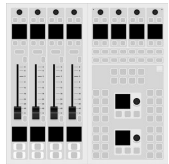
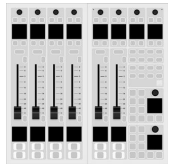
yy = the frame version, either 10 for tabletop or 20 for countersunk.

i For frame widths of 5 ME or above, a second power distribution and connector board are required. In this instance, a second external power supply is provided and the two parts of the frame must be connected externally.

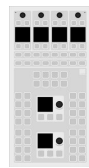
The tables below list the variants for each frame type.

- [Standard Frame Variants \(711/50-0x.yy\)](#)
- [Extended Frame Variants \(711/51-0x.yy\)](#)
- [Standard Frame Variants with Virtual Extension \(711/60-0x.yy\)](#)
- [Extended Frame Variants with Virtual Extension \(711/61-0x.yy\)](#)


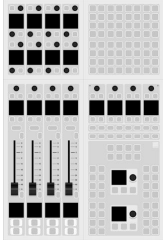
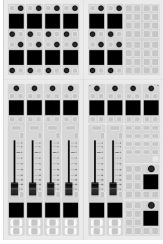
Standard Frame Variants (711/50-0x.yy)

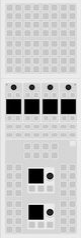
Standard Frame	Part Number	Modules Fitted	
2-fader Combo	711/50-01.yy	1 x Combo	
4-fader Central	711/50-02.yy	1 x Fader + 1 x Central	
6-fader Combo	711/50-02.yy	1 x Fader + 1 x Combo	
8-fader Central	711/50-03.yy	2 x Fader + 1 x Central	

Standard Frame	Part Number	Modules Fitted
10-fader Combo	711/50-03.yy	2 x Fader + 1 x Combo
12-fader Central	711/50-04.yy	3 x Fader + 1 x Central
14-fader Combo	711/50-04.yy	3 x Fader + 1 x Combo
16-fader Central	711/50-05.yy	4 x Fader + 1 x Central
18-fader Combo	711/50-05.yy	4 x Fader + 1 x Combo
20-fader Central	711/50-06.yy	5 x Fader + 1 x Central
22-fader Combo	711/50-06.yy	5 x Fader + 1 x Combo
24-fader Central	711/50-07.yy	6 x Fader + 1 x Central
26-fader Combo	711/50-07.yy	6 x Fader + 1 x Combo
28-fader Central	711/50-08.yy	7 x Fader + 1 x Central
30-fader Combo	711/50-08.yy	7 x Fader + 1 x Combo
Central Extender	711/50-01.yy	1 x Central
4-fader Extender	711/50-01.yy	1 x Fader
8-fader Extender	711/50-02.yy	2 x Fader
12-fader Extender	711/50-03.yy	3 x Fader
16-fader Extender	711/50-04.yy	4 x Fader
20-fader Extender	711/50-05.yy	5 x Fader
24-fader Extender	711/50-06.yy	6 x Fader
28-fader Extender	711/50-07.yy	7 x Fader
32-fader Extender	711/50-08.yy	8 x Fader



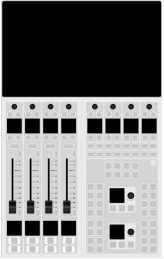
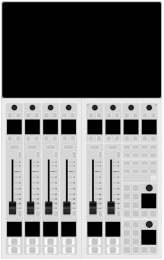
Extended Frame Variants (711/51-0x.yy)

Extended Frame	Part Number	Modules Fitted	
2-fader Combo Extended	711/51-01.yy	Upper: 1 x Combo Extension Lower: 1 x Combo	
4-fader Central Extended	711/51-02.yy	Upper: 1 x Rotary Extension + 1 x Key Extension Lower: 1 x Fader + 1 x Central	
6-fader Combo Extended	711/51-02.yy	Upper: 1 x Rotary Extension + 1 x Combo Extension Lower: 1 x Fader + 1 x Combo	
8-fader Central Extended	711/51-03.yy	Upper: 2 x Rotary Extension + 1 x Key Extension Lower: 2 x Fader + 1 x Central	
10-fader Combo Extended	711/51-03.yy	Upper: 2 x Rotary Extension + 1 x Combo Extension Lower: 2 x Fader + 1 x Combo	
12-fader Central Extended	711/51-04.yy	Upper: 3 x Rotary Extension + 1 x Key Extension Lower: 3 x Fader + 1 x Central	
14-fader Combo Extended	711/51-04.yy	Upper: 3 x Rotary Extension + 1 x Combo Extension Lower: 3 x Fader + 1 x Combo	
16-fader Central Extended	711/51-05.yy	Upper: 4 x Rotary Extension + 1 x Key Extension Lower: 4 x Fader + 1 x Central	
18-fader Combo Extended	711/51-05.yy	Upper: 4 x Rotary Extension + 1 x Combo Extension Lower: 4 x Fader + 1 x Combo	
20-fader Central Extended	711/51-06.yy	Upper: 5 x Rotary Extension + 1 x Key Extension Lower: 5 x Fader + 1 x Central	

Extended Frame	Part Number	Modules Fitted	
22-fader Combo Extended	711/51-06.yy	Upper: 5 x Rotary Extension + 1 x Combo Extension Lower: 5 x Fader + 1 x Combo	
24-fader Central Extended	711/51-07.yy	Upper: 6 x Rotary Extension + 1 x Key Extension Lower: 6 x Fader + 1 x Central	
26-fader Combo Extended	711/51-07.yy	Upper: 6 x Rotary Extension + 1 x Combo Extension Lower: 6 x Fader + 1 x Combo	
28-fader Central Extended	711/51-08.yy	Upper: 7 x Rotary Extension + 1 x Key Extension Lower: 7 x Fader + 1 x Central	
30-fader Combo Extended	711/51-08.yy	Upper: 7 x Rotary Extension + 1 x Combo Extension Lower: 7 x Fader + 1 x Combo	
Central Extender	711/51-01.yy	Upper: 1 x Key Extension Lower: 1 x Central	
4-fader Extender	711/51-01.yy	Upper: 1 x Rotary Extension Lower: 1 x Fader	
8-fader Extender	711/51-02.yy	Upper: 2 x Rotary Extension Lower: 2 x Fader	
12-fader Extender	711/51-03.yy	Upper: 3 x Rotary Extension Lower: 3 x Fader	
16-fader Extender	711/51-04.yy	Upper: 4 x Rotary Extension Lower: 4 x Fader	
20-fader Extender	711/51-05.yy	Upper: 5 x Rotary Extension Lower: 5 x Fader	
24-fader Extender	711/51-06.yy	Upper: 6 x Rotary Extension Lower: 6 x Fader	
28-fader Extender	711/51-07.yy	Upper: 7 x Rotary Extension Lower: 7 x Fader	

Extended Frame	Part Number	Modules Fitted
32-fader Extender	711/51-08.yy	Upper: 8 x Rotary Extension Lower: 8 x Fader

Standard Frame Variants with Virtual Extension (711/60-0x.yy)

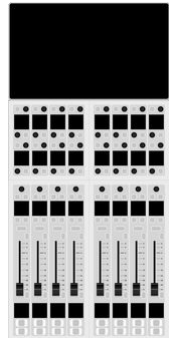
Standard Frame with VX	Part Number	Modules Fitted	
4-fader Central with VX	711/60-02.yy	1 x VX 1 x Fader + 1 x Central	
6-fader Combo with VX	711/60-02.yy	1 x VX 1 x Fader + 1 x Combo	
12-fader Central with VX	711/60-04.yy	2 x VX 3 x Fader + 1 x Central	
14-fader Combo with VX	711/60-04.yy	2 x VX 3 x Fader + 1 x Combo	
20-fader Central with VX	711/60-06.yy	3 x VX 5 x Fader + 1 x Central	
22-fader Combo with VX	711/60-06.yy	3 x VX 5 x Fader + 1 x Combo	
28-fader Central with VX	711/60-08.yy	4 x VX 7 x Fader + 1 x Central	
30-fader Combo with VX	711/60-08.yy	4 x VX 7 x Fader + 1 x Combo	

Standard Frame with VX	Part Number	Modules Fitted	
8-fader Extender	711/60-02.yy	1 x VX 2 x Fader	
16-fader Extender	711/60-04.yy	2 x VX 4 x Fader	
24-fader Extender	711/60-06.yy	3 x VX 6 x Fader	
32-fader Extender	711/60-08.yy	4 x VX 8 x Fader	

Extended Frame Variants with Virtual Extension (711/61-0x.yy)

Extended Frame with VX	Part Number	Modules Fitted	
4-fader Central Extended with VX	711/61-02.yy	1 x VX Upper: 1 x Rotary Extension + 1 x Key Extension Lower: 1 x Fader + 1 x Central	
6-fader Combo Extended with VX	711/61-02.yy	1 x VX Upper: 1 x Rotary Extension + 1 x Combo Extension Lower: 1 x Fader + 1 x Combo	
12-fader Central Extended with VX	711/61-04.yy	2 x VX Upper: 3 x Rotary Extension + 1 x Key Extension Lower: 3 x Fader + 1 x Central	

Extended Frame with VX	Part Number	Modules Fitted
14-fader Combo Extended with VX	711/61-04.yy	2 x VX Upper: 3 x Rotary Extension + 1 x Combo Extension Lower: 3 x Fader + 1 x Combo
20-fader Central Extended with VX	711/61-06.yy	3 x VX Upper: 5 x Rotary Extension + 1 x Key Extension Lower: 5 x Fader + 1 x Central
22-fader Combo Extended with VX	711/61-06.yy	3 x VX Upper: 5 x Rotary Extension + 1 x Combo Extension Lower: 5 x Fader + 1 x Combo
28-fader Central Extended with VX	711/61-08.yy	4 x VX Upper: 7 x Rotary Extension + 1 x Key Extension Lower: 7 x Fader + 1 x Central
30-fader Combo Extended with VX	711/61-08.yy	4 x VX Upper: 7 x Rotary Extension + 1 x Combo Extension Lower: 7 x Fader + 1 x Combo
8-fader Extender	711/61-02.yy	1 x VX Upper: 2 x Rotary Extension Lower: 2 x Fader
16-fader Extender	711/61-04.yy	2 x VX Upper: 4 x Rotary Extension Lower: 4 x Fader
24-fader Extender	711/61-06.yy	3 x VX Upper: 6 x Rotary Extension Lower: 6 x Fader
32-fader Extender	711/61-08.yy	4 x VX Upper: 8 x Rotary Extension Lower: 8 x Fader





4 diamond - Installation

This chapter describes how to install the diamond control surface.

i To install a complete system, you must install both the control surface and Power Core. The installation of Power Core is covered separately in the "Power Core - User Manual" (available [here](#)).

- [diamond - Installation Instructions](#)
- [diamond - Unpacking](#)
- [diamond - Installing the Frame](#)
- [diamond - Mounting the VX Modules](#)
- [diamond - Exchanging a Control Surface Module](#)
- [diamond - Wiring](#)
- [diamond - MF Key Labels](#)

4.1 diamond - 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).

(E) WARNING

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

(F) AVERTISSEMENT

Veuillez lire et respecter TOUTES [les consignes de sécurité importantes](#) AVANT d'installer ou d'entretenir un composant.

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

- [Unpack](#)
- [Install the Frame](#)
- [Mount the VX Modules](#) (if applicable)
- [Rearrange the Surface Modules](#) (if applicable)
- [Connect the Cables](#)
- [Exchange the MF Key Labels](#) (if applicable)

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.

4.2 diamond - Unpacking

A single control surface can consist of one or more frames. Each frame is delivered in its own box with all included accessories. All modules except VX modules are pre-installed. If the Virtual Extension is included, then each VX module is shipped separately.

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 frame:

- 1 x desktop power supply (954/99) - to power the frame.
- 1 x 2m IEC power cable (country-specific) - to connect mains to the desktop power supply.
- Printed sheet with foil-printed labels - to re-label the MF Keys.
- 1 x tool case + tools - for performing service procedures.
- 1 x USB memory card - containing the latest software and configuration files.

For extender frames, a suitable CAN bus cable is also provided:

- 1 x 3m RJ45 cable - to connect the extender to the main frame.

For the Virtual Extension option, each VX module comes with the following items:

- 1 x desktop power supply (SP4851209) - to power the VX display.
- 1 x 2m IEC power cable (country-specific) - to connect mains to the desktop power supply.


Not Included

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

- Ethernet cable(s) - to connect the control surface frame(s) to Power Core, either directly or via the network.
- CAN bus cable(s) - to connect additional control surface frame(s) or external KSC or GPIO panels.

For the Virtual Extension option, the following items are also required:

- Windows 64-bit host PC - to run the Lawo GUI application VisTool.
- Display Port cable(s) - to connect the VX module(s) to the host PC.
- USB cable(s) - to connect the VX module(s) to the host PC.

 The following document contains more information about the host PC requirements: [Vistool PC Config.pdf](#).



4.3 diamond - Installing the Frame

Tabletop frames should be mounted on a flat, horizontal surface.

Countersunk frames are designed to fit flush within your studio furniture:

- The frame has rounded-off edges so that it will fit smoothly into holes cut by a wood milling machine.
- All cables can be hidden in the cable tray and connected to the console inlets from the open underside of the tray.
- All countersunk frames have flat side parts without edges. Therefore, the installer must provide some kind of support onto which the surface will rest.
- Please refer to the mechanical drawing for the frame variant for details.

In both cases, all plug-in connectors are located on the frame's connector board* and at the rear of the Virtual Extension displays. When installing, please leave enough room for the cables (and sufficient airflow around the frame for cooling).

* The position of the frame's connector board can be specified at the time of order (as described [earlier](#)).

The external connections for the surface are described in [diamond - Wiring](#). In particular, **each diamond frame must be properly grounded**.

If the Virtual Extension is included, then each VX module is shipped separately. These must be mounted into the frame once the frame is installed. For information about the cabling to the VX displays, see [diamond - Configuring the Virtual Extension](#).

Dimensions and Weight

The dimensions and weight of each frame vary depending on its size and specification.

Mechanical drawings for all frame variants are available from the [Lawo Download-Center](#) (after login). Use the following part numbers to help locate the correct drawings:

- 711/50-0x.yy = standard frame.
- 711/51-0x.yy = extended frame.
- 711/60-0x.yy = standard frame with Virtual Extension.
- 711/61-0x.yy = extended frame with Virtual Extension.

x = the module width, from 1 to 8 ME.

yy = the frame version, either 10 for tabletop or 20 for countersunk.

Airflow Requirements

The control surface is designed for normal studio installation and needs no special air conditioning.

You must make sure that there is sufficient airflow around the frame for cooling.

Power Consumption and Electrical Voltage

See [diamond - Power Supplies](#).

4.4 diamond - Mounting the VX Modules

If the Virtual Extension is included, then each VX module is shipped separately. The VX modules must be mounted into the frame, once the frame is installed. All VX modules are identical and so they can be mounted in any order.

Overview

The VX frame comes with special side profiles that hold each VX module. The profiles include two pre-drilled channels into which the module slides. On the rear of each VX module are two fastening screws and two spring-loaded bolts that secure the module to the frame: one screw and bolt for each side.

Once the VX module is installed, the viewing angle can be adjusted to one of three positions by loosening the two fastening screws and gently tilting the display. This allows users to change the viewing angle to suit their own personal preference. Click [here](#) to see how the user adjustment of the viewing angle should work.

Mounting Instructions

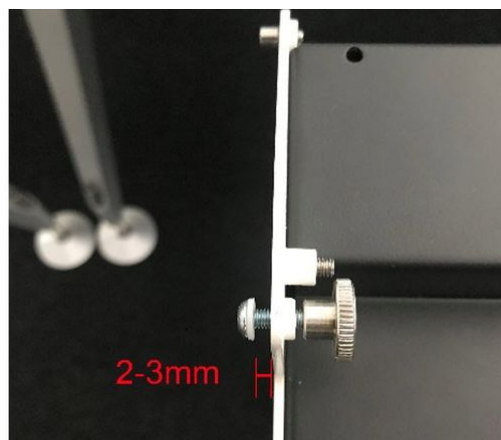
1. On the rear of the VX frame, remove the two black circular stands from the end of the side profiles.

There are two stands to remove: one on the left and one on the right. The image below shows the left side.



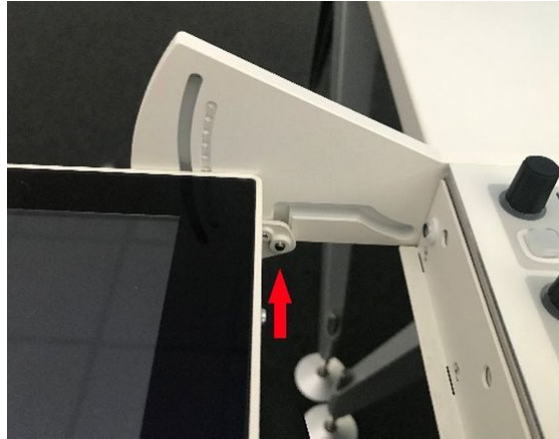
2. At the bottom of the VX module, loosen the fastening screws by turning the knurled-head end until the distance is about 2-3mm.

There are two screws to loosen: one on the left and one on the right. The image below shows the left side.



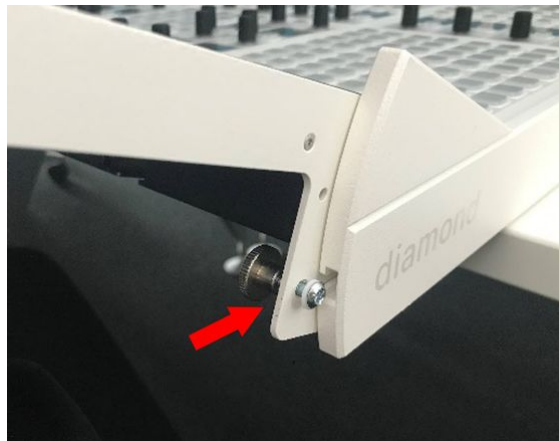
3. Lift the VX module and fit the first liner, from bottom to top, into the inner channel on one of the side profiles. Then repeat for the other side.

The image below shows the left side.



4. Raise the VX module slightly and push the second liner, from the back, into the outer channel on one of the side profiles. Then repeat for the other side.

The image below shows the right side.



5. Raise the VX module so that it slides fully into the two channels, and clamp by turning the knurled-head screws in a **left-hand /anticlockwise** direction.

There are two screws to clamp: one on the left and one on the right. The image below shows how to clamp the left side.



6. Secure the VX module to the frame by tightening the spring-loaded bolts using an Allen 2.0 screwdriver. You should tighten until the bolt is flush with the side plate. Do not overtighten or use excessive force.

There are two bolts to tighten: one on the left and one on the right. The image below shows how to tighten the left side.



7. Replace the two black circular stands (removed in step one). Once in place, the stands act as feet to support the rear of the frame and prevent any downward movement of the VX module.

8. Check the movement of the VX module when the viewing angle is adjusted, and adjust the spring-loaded bolts and knurled-head screws if necessary.

Full instructions for the user adjustment of the viewing angle can be found [here](#).

Fitting the Cable Cover

Optionally, a cable cover can be fitted to protect the connections and make the rear of the console look nicer. The cable cover is not included and must be ordered separately.

The cable cover should be fitted once the VX module is connected and the system is fully tested.

There are four plastic pins that hold the cover in place. The image below shows the rear of a VX module with the cable cover fitted.



4.5 diamond - Exchanging a Control Surface Module

This topic describes how to change the physical position of a module in the diamond frame. For example, to move the central controls to the middle of the surface.

Overview

Each module is held in place by four corner posts (that push-fit into the frame from above), and either one or two fixing screws (accessed from underneath).

To exchange a module, you must loosen the fixing screw(s), lift out the module and unplug the connectors. Then fit the replacement module in the reverse order.

Once the new module is in place, it is important to remember to tighten the fixing screws. In particular, pay attention to the module that sits above the frame's connector board. If the screws are not tight, then this module may lose its connection to the Ethernet port and the IP connection to Power Core will be lost.

Instructions

1. Power off the surface.
2. From underneath the frame, remove the module's fixing screw(s).

Standard modules have two screws and extension modules have one. The image below shows the screw positions in an extended frame.



3. From above, pull the module up to release it from the frame.

You can use the rotary controls to help get a good grip. Start by popping out the upper posts. Then use your hands to ease the module up and pop out the lower posts. Take care not to crush any of the cables.



4. Remove the three connectors: 1 x power and 2 x CAN bus, taking note of which cables are the CAN in and CAN out.

5. Fit the replacement module in the reverse order.

Take care to push the module fully into the frame from above; it should snap into place.

6. Replace all of the fixing screws (from underneath the frame) and tighten them securely.

The screws must be tightened to secure the module to the frame and ensure a good connection (for modules mounted above a connector board).

4.6 diamond - Wiring

This topic describes all possible connections to the frame's connector board (on the underside of the frame).



In summary, the connectors are:

- **ETHERNET** (100 Mb/s) - connects to the network/Power Core via IP (essential for the main frame).
- **CAN B** (low speed, 500Kb/s) - can be used to connect a Lawo KSC or GPIO panel (optional).
- **CAN A** (high speed, 1Mb/s) - can be used to connect to another diamond frame (optional).
- **12V IN** (Kycon) - connects to the external DC power supply.
- **M4x10 Grounding Screw** - must be used to ground the frame.

The descriptions below provide more information.

ETHERNET (RJ45)

The ETHERNET port provides a network connection to the diamond IP module. This is the module that sits above the frame's connector board. It is used for the IP connection to Power Core and for the diamond Web UI administration.

If your surface consists of a **single frame**, then this port must connect to the network/Power Core (via IP).

If your surface consists of **multiple frames**, then this port must connect to the network/Power Core (via IP) on the main frame AND on any additional frames that also connect via IP. If a frame is daisy-chained to the main frame (via CAN bus), then its ETHERNET port should be left unconnected.

When connecting via a network, then this can be shared with other devices, such as in the regular "house network" of a typical broadcast facility. Routers are permitted as long as the minimum requirements of the network interfaces are met. By using routers, or similar devices, the latency of the communication will increase.

The diamond network interface operates at 100 BASE-T, and so the network switch/router port **MUST** meet the following requirements:

- **Speed = 100Mb/s**
- **Duplex mode = Full Duplex**

Choose an Ethernet cable that meets the following specification.

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

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



CAN A & CAN B (RJ45)

diamond supports two CAN bus speeds: CAN A (high speed) and CAN B (low speed).

- **CAN A** operates at 1Mb/s and is used, internally, to daisy-chain the control surface modules and, externally, to connect another diamond frame.
- **CAN B** operates at 500Kb/s and is included to support products that cannot operate at a higher speed such as Lawo's KSC and GPIO panels.

All CAN bus connections must be point-to-point; a switch or hub is not allowed.

Use a standard (straight 1:1) network cable: STP-CAT 5e with RJ45 connectors.

When daisy-chaining more than one frame, the **CAN A cable length must not exceed 13 meters** including the internal wiring. This is explained in more detail [below](#).

The maximum CAN B (low-speed) cable length must not exceed 60 meters.

The CAN bus can be hot-plugged and so the cabling can be performed while the frames are powered.

12V In (Kycon)

The 12V IN port connects to the external DC power supply (to power the frame).

See [diamond - Power Supplies](#).

M4x10 Grounding Screw

The M4 grounding screw **must be used to ground the frame**. If not, then you may see some odd behaviours once the console is operational.

See [diamond - Grounding](#).

CAN A Bus Cable Length

To ensure the correct operation of the hardware components, the maximum CAN A (high-speed) cable length must not exceed 13 meters including the internal wiring.

This becomes important when daisy-chaining more than one frame, as you must include the length of both the internal and external cables.

The table below provides the internal CAN bus cable lengths for frames from 1 ME to 4 ME. These figures can be summed to calculate the cable lengths for larger frames from 5 ME to 8 ME.

Frame Width	Internal CAN A Bus Cable Length	
	without Extension Modules	with Extension Modules
1 ME	0.903m +/- 10mm	1.203m +/- 10mm
2 ME	1.803m +/- 10mm	2.703m +/- 10mm
3 ME	2.703m +/- 20mm	3.303m +/- 25mm
4 ME	4.403m +/- 30mm	4.403m +/- 30mm



Once you know the internal CAN bus cable length, you can calculate a safe value for the external cabling.

Example 1 - single diamond frame (8ME) with extension modules.

The internal CAN bus cable length equals $4.403\text{m} \times 2 = 8.806\text{m}$.

A safe length for the external CAN bus cable $\leq 4\text{m}$.

Example 2 - two diamond frames: 1 x 5ME and 1 x 3ME. Both frames are standard depth without extension modules.

The internal CAN bus cable length is calculated as follows:

- Frame 1 (5ME) = $4.403\text{m} + 0.903\text{m} = 5.306\text{m}$.
- Frame 2 (3ME) = 2.703m .

Thus, the total internal CAN bus cable length equals $5.306\text{m} + 2.703\text{m} = 8.009\text{m}$.

A safe combined length for the two external CAN bus cables $\leq 4.9\text{m}$.



4.7 diamond - MF Key Labels

By default, the control surface ships with the correct MF key labels for the standard configuration. The labels for each control surface module can be viewed [here](#).

If you change the MF key functionality, then you will need to exchange the foil-printed labels. Printed sheets with the most common labels are included with each frame.

Ordering Custom Labels

If you wish to order some custom labels, then edit the "diamond_project_key_labels.xlsx" spreadsheet and attach it in an email to tastenschilder@lawo.com.

Please remember to add the Customer name, Project name and shipping details.

The spreadsheet can be opened or downloaded using the link below:

https://lawo.com/Downloadery//20_Radio_Consoles/Documentation/Technical_Documentation/Key_Templates/diamond_project_key_labels.xlsx

Exchanging the MF Key Labels

1. First remove the button cap.

It helps to use a small screwdriver to lift up the button cap (as the caps are recessed). However, you must take care not to scratch the surface.

2. Insert the foil plate between the button body and the transparent button cap.

3. Fasten the button cap back onto the button body by pressing it!



5 diamond - System Setup

This chapter describes how to set up the system once all of the hardware components are installed.

- [diamond - Setup Quick Start](#)
- [diamond - Configuration Tools](#)
- [diamond - Opening a Web UI Session](#)
- [diamond - Control Network Requirements](#)
- [diamond - Network Settings](#)
- [diamond - Configuring the IP Connection to Power Core](#)
- [diamond - Control Interface Settings](#)
- [diamond - Communication Modes](#)
- [diamond - Slot IDs](#)
- [diamond - Configuring the Virtual Extension](#)



5.1 diamond - Setup Quick Start

This topic describes the recommended workflow to configure a system from scratch.

Prerequisites

The instructions below assume that the customer is connecting a single diamond frame to Power Core. The connection must be made via TCP/IP Ethernet, either directly or via a network (LAN or WAN).

When connecting via a network, it is expected that all switches/routers meet the control network requirements described [here](#).

If the diamond surface consists of more than one frame, then you will need to decide how to connect the additional frames: using a CAN bus daisy-chain to the main frame OR making individual IP connections to Power Core. All possible options are explained [here](#)

i The IP connection(s) to Power Core may use either a Multicast or Unicast IP address scheme. If you wish to use Unicast IPs for more than one frame, then this requires some additional configuration (in the ON-AIR Designer).

Instructions

To set up the system you will need a PC that is installed with a suitable web browser and Lawo's ON-AIR Designer software. How to prepare the configuration PC is described later in [diamond - Configuration Tools](#).

1. To boot and configure the system, the following connections must be made:

- The diamond frame must be grounded.
- The diamond frame must be connected via Ethernet to the network/Power Core.
- Both components must be powered.

Once power is applied, the system boots in a few seconds:

- On the surface, the displays show information about each module and then, after a few seconds, the Lawo logo.
- On Power Core, the boot-up progress is shown on the front panel display.

While the diamond frame is booting up, check the communication modes shown on the surface displays:

- The module that plugs into the frame's IP connector board must show **CAN+IP** (or **IP** if the frame has only one module).
- All other modules must show **CAN**.

If you need to reset a module's communication mode, then this can be done from the surface. See [diamond - Communication Modes](#).

2. Start the configuration by connecting your PC's LAN port directly to diamond frame.

This is done using the frame's ETHERNET port. For the cabling and network requirements, see [diamond - Wiring: ETHERNET](#).

3. Configure the network settings for the frame's IP module.

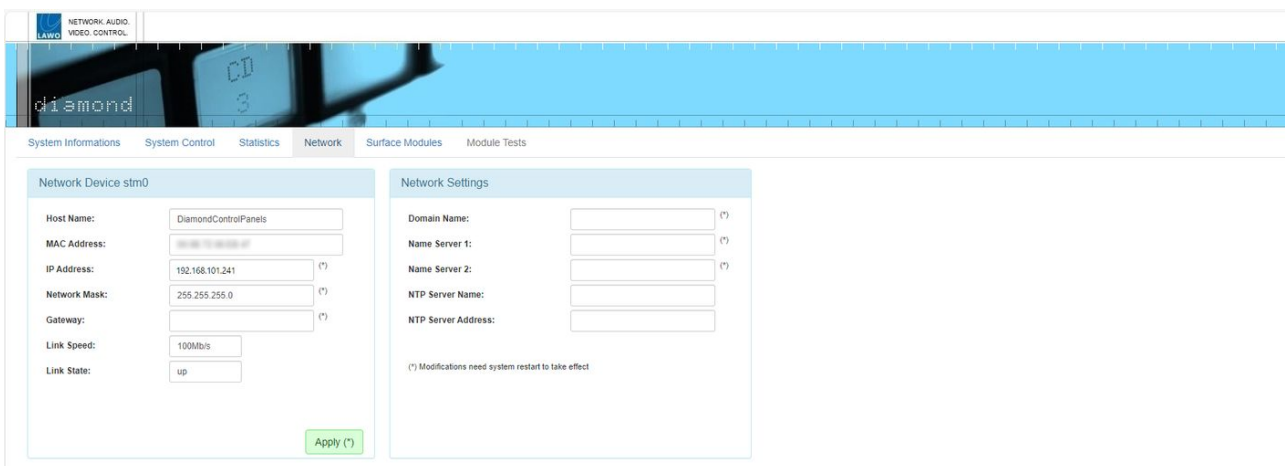
This step is necessary if you wish to fit diamond into an existing network OR install more than one device (to avoid IP conflicts).

The settings are edited by opening a Web UI connection to the frame and adjusting the parameters in the "Network" tab.

- The Web UI can be reached by entering the current IP address: **192.168.101.241**
- Log in as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.
- Open the "Network" tab and enter the required network settings.

The following fields can be edited: **IP Address**, **Network Mask** and **Gateway**. Type in the new value(s) and select **Apply** to save the changes.

The screenshot below shows an example.



At this stage, you can reconnect your devices via the control network OR continue on (if you plan to connect the frame directly to Power Core).

It is recommended to check the network connection to your configuration PC by re-opening the diamond Web UI.

4. Configure the surface modules.

This step ensures that the IP module knows about all other modules in the frame, and that the correct slot IDs are assigned.

Start by opening the "Surface Modules" tab in the diamond Web UI - you will see all modules connected to the IP module (via high-speed CAN). If the list is empty, press the **Scan Modules** button (at the bottom of the page).

The screenshot below shows an example where the frame is populated with six modules.

ID No.	Serial No.	Mode	Type	BOOT Version	BOOT Compile Date	BETR Version	BETR Compile Date	Act. Slot	Dflt.	Map 1	Map 2	Map 3	Map 4	Ctrl
08-EC-5C	80-98-82-00-14-CE-B0-F4	M	71115 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	35	35	0	0	0	0	Set Slot Identify Test Reboot
08-EC-69	80-98-82-00-14-CE-60-2C	S	71115 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	34	34	5	0	0	0	Set Slot Identify Test Reboot
08-EC-60	80-98-02-10-04-2E-40-40	S	71110 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	1	1	6	4	0	0	Set Slot Identify Test Reboot
08-EC-61	80-98-02-10-04-2E-7F-40	S	71110 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	2	2	0	6	0	0	Set Slot Identify Test Reboot
08-EC-80	80-98-82-00-14-CE-60-CC	S	71120 CENTRAL	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	16	16	19	0	0	0	Set Slot Identify Test Reboot
08-EB-15	80-98-02-10-04-9E-C4-F8	S	71125 KEY_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	48	48	48	0	0	0	Set Slot Identify Test Reboot

The **Mode** column can be used to identify the master (**M**) module. This is the module that connects to Power Core via IP. During boot-up, the communication mode of the master module must show as **CAN+IP** (or **IP** if the frame has only one module). All of the slave (**S**) modules must be set to **CAN**. If you need to reset a module's communication mode, then this can be done from the surface. See [diamond - Communication Modes](#).

The **Act. Slot** column shows the module's active slot ID. This is important as it determines the functionality of the module (as explained [later](#)).

During the initial setup, you should use the **Dflt** value to assign the correct slot ID to each physical module.

- Start by entering the required slot ID into the **Dflt** field - the edited value and **Set Slot** button highlight in yellow.
- Press **Set Slot** to make the assignment.
- Wait for the **Act. Slot** field to update and check its value.
- Repeat these steps for each module.

Note that the alternate mappings (**Map 1** to **4**) can be used to change the slots ID during operation. For now, it is recommended to leave these values at **0**.



5. Configure the IP connection between the diamond frame and Power Core.

This is done by opening a Web UI connection to both the diamond frame and Power Core. Then editing the "Control Interface" parameters (in the "System → Control" tab). It is important to check both sides of the connection, so open a separate browser window for each device.

The **Mode** must be set to **CAN+IP** in Power Core and either **CAN+IP** (or **IP**) in diamond. (The **IP** option should be used if the frame has only one module.)

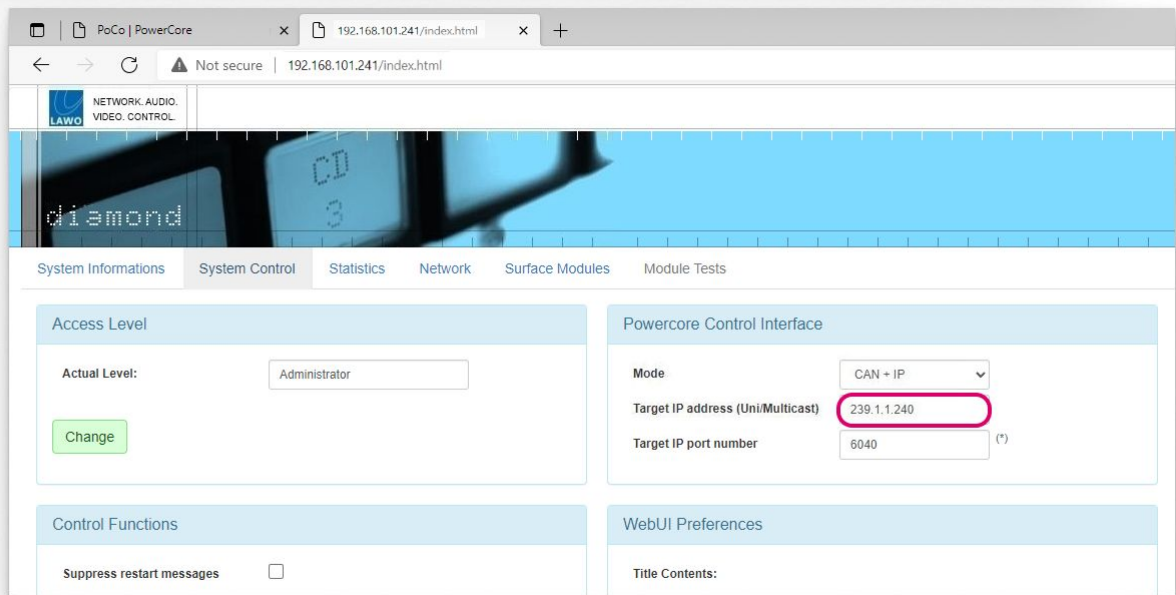
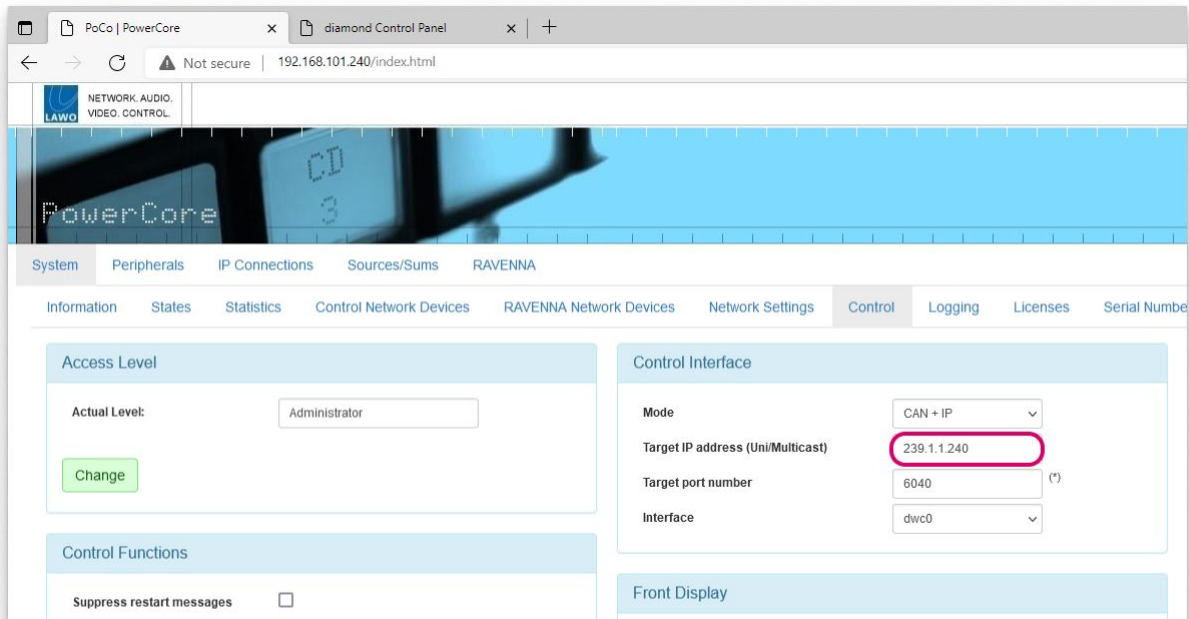
The **Target IP address** determines the IP address scheme.

- To use Multicast, the **Target IP Addresses** in Power Core and diamond must be identical. So, enter a suitable IP address group in Power Core and then copy it to diamond. The default setting is 239.1.1.240
- To use Unicast, you must enter the reciprocal IP addresses. So, enter the diamond control port IP address (in Power Core) AND enter the Power Core control port IP address (in diamond).

The other fields can be left at their default values.

If you make any changes to the "Control Interface" settings, then you must reboot the device(s).

The screenshots below shows an example of a multicast configuration using the default multicast IP address group.



If everything is correctly connected and configured, the surface synchronizes to Power Core once the IP connection is made.

6. Once the IP connection to Power Core is established, the basic setup of the diamond surface is complete.

The next steps are to check the software version(s) running on the hardware components, activate the license(s) and upload a configuration. These are done in the same way as for any other Power Core system, so please follow the links below for more information.

- Start by using SoP Explorer to upgrade Power Core to the required software release. See [Power Core - Updating the Firmware](#).
- Activate the software license(s) using the online license portal. The license(s) must be installed onto the USB memory stick that connects to the Power Core DONGLE port. See [Power Core - License Activation](#).
- Using ON-AIR Designer, create a diamond configuration and export it to Power Core (via "Transfer Config to Unit"). The configuration does not have to be the final version, but should define the correct surface layout and main license package. See [Power Core - Uploading a Configuration](#).
- Return to SoP Explorer and check that it can see the surface.
- Finally, use SoP Explorer to check the status of the surface components. If upgrades are required, run the "Software Update Wizard" until all surface components are shown in green.

⚠ Important: When preparing the system configuration, please note the following points.

- It is important that the configured options match the licensed feature set. Otherwise, if the license limits are exceeded, the Power Core alarm will sound.
- Never assign a Central and Combo module to the same DSP access group. If both modules are fitted, one must be configured to run in monitor mode.

Next Steps

Once you have completed the steps above, the system is ready for operation.

You can use the "Surface Modules" tab (in the diamond Web UI) to check the status of the individual modules.

Then go to [diamond - Operation](#) to learn more about the functionality of the device.

Troubleshooting

The message "Not Connected" appears on the surface displays.

This message appears if there is a problem with the network connection to Power Core.

- Check the network cabling from the surface, and the IP addresses of the diamond frame and Power Core.
- Check the "[Control Interface](#)" settings in both diamond and Power Core.
- Check that the module above the frame's connector board is fitted correctly, with all screws tightened. If the screws are not fixed properly, then the module may not be plugged fully into the connector board underneath. This can lead to an intermittent network connection.

5.2 diamond - Configuration Tools

This topic describes how to prepare the configuration PC.

Overview

To set up the system, you will need a PC with a network interface card (NIC). The PC must be installed with a suitable web browser and Lawo's ON-AIR Designer software.

The web browser is used to open the diamond and Power Core Web UIs. The Lawo software installs two applications: ON-AIR Designer and SoP Explorer. During the initial setup, these tools are used as follows.

- The Web UIs are used to edit the network settings (to add the devices to an existing network) and "Control Interface" settings (to configure the method of communication). The diamond Web UI is also used to setup the surface modules.
- ON-AIR Designer is used to edit and upload a configuration to Power Core (to define the functionality of the system).
- SoP Explorer is used to check and update the firmware (for all hardware components).

Host PC Requirements

To install and run the ON-AIR Designer, your PC must meet the following requirements:

- Windows 10 or 11 operating system*
- Core-I5 (or higher) CPU
- 2GB RAM, minimum

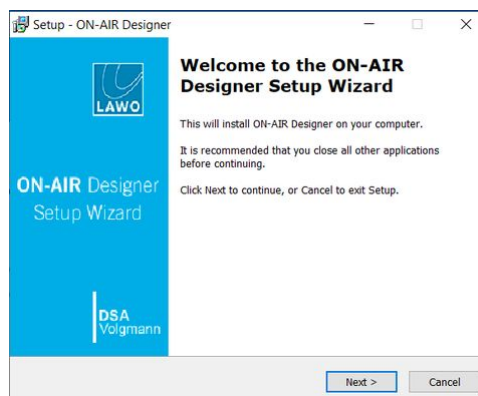
*For the operating system, we recommend Windows 10 or Windows 11, although the ON-AIR Designer software will also run on Windows 7, 8 and 8.1.

If you are planning to install a VisTool application on the same machine, then please also refer to the VisTool MK2 requirements (in the [VisTool](#) documentation).

Installing the Software

The latest version of the **onair-designer.exe** installer is available from the [Lawo Download-Center](#) (after login).

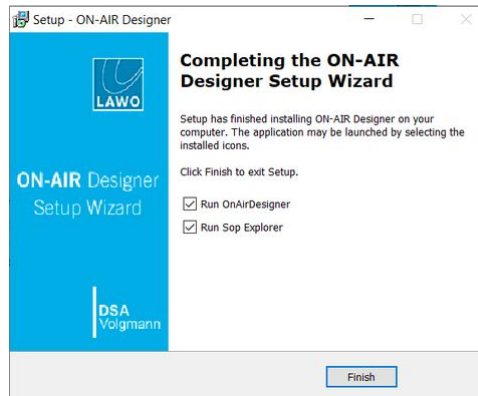
1. Copy the installer onto your PC and double-click on its icon to start the software setup wizard.



2. Follow the on-screen instructions, accepting the default options provided.
3. When you reach the 'Summary' window, check the options and click **Install** - the software is installed onto your computer; this may take a few minutes.

By default, files are installed in the location: 'C:\Program Files\OnAirDesigner'.

4. When the installation is complete, the following window appears.



5. It is recommended to leave the default "Run" options selected and click on **Finish**.

This launches the ON-AIR Designer and SoP Explorer applications. In both cases, the next step is to configure a valid network connection to the Lawo system.

Getting Connected

To establish a network connection to the Lawo system, you will need to configure the network settings for your PC's LAN port.

The **IP Address** must be unique and set within the same range as that of the port you are connecting to (i.e. the first three fields must match).

You can check the current network settings for Power Core on its front panel display, and those for diamond from the surface displays during boot-up.

The default IP addresses are:

- Power Core = 192.168.101.240
- diamond = 192.168.101.241

The **Subnet Mask** should be identical to that of the port you are connecting to.

The default subnet mask = 255.255.255.0

A **Default Gateway** setting is required if data packets are to be redirected. For example, if the computer is connected via a network switch with Layer 3 routing capability.

If redirection is not required, then the Default Gateway can be left blank.

To test the connection, open a web browser application and enter the system's IP address into the URL field. e.g. 192.168.101.240 - if the connection is successful, the Web UI "Login" screen appears.

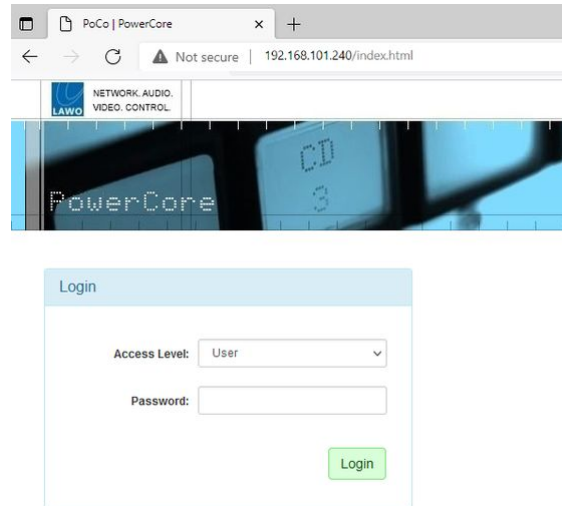
5.3 diamond - Opening a Web UI Session

This topic describes how to open a Web UI connection and log in.

1. Open a web browser application and enter the system's IP address into the URL field.

For example, enter **192.168.101.240** for Power Core or **192.168.101.241** for diamond.

Following a successful connection, the "Login" screen appears. The example below shows the login screen for Power Core.



2. Select an Access Level and enter the Password.

There are three possible Access Levels.

- **User** (no password required, leave blank).

Information is displayed as "read-only" with no editable fields.

- **Supervisor** (default password = *orion*).

Allows pertinent fields to be edited, such as the IP settings in the "System → Network Devices" tab.

- **Administrator** (default password = *hydra*).

As for Supervisor, but with access to Supervisor and Administrator passwords in the "System → Control" tab.

For security reasons, it is recommended to change the Administrator and Supervisor passwords from the defaults after the device is set up.

3. Click on the green **Login** button.

Following a successful login, the current information is loaded from the device, and the "System → Information" tab appears.

Power Core has many system parameters and so it will take a few seconds for the information to load. Some of the information is displayed as a "snapshot" of the current data, so it is only as current as the latest refresh.



5.4 diamond - Control Network Requirements

The diamond surface always connects to Power Core via TCP/IP Ethernet. This connection can be made either directly (point-to-point) or via a network (LAN or WAN).

When connecting via a network, then this can be shared with other devices, such as in the regular "house network" of a typical broadcast facility. Routers are permitted as long as the minimum requirements of the network interfaces are met. By using routers, or similar devices, the latency of the communication will increase.

The diamond network interface operates at 100 BASE-T, and so the network switch/router port **MUST** meet the following requirements:

- **Speed = 100Mb/s**
- **Duplex mode = Full Duplex**

The control network interfaces can operate at 1000, 100 or 10 BASE-T, depending on the SFP. The network switch/router port(s) **MUST** meet the following requirements:

- **Speed = 1Gb/s, 100Mb/s or 10Mb/s; 1Gb/s is recommended**
- **Duplex mode = Full Duplex**



5.5 diamond - Network Settings

This topic describes how to configure the network settings for the diamond frame(s) and Power Core control ports.

Active Network Ports

Each diamond frame is equipped with a single ETHERNET port. The communication mode of the IP module determines whether the ETHERNET port is active.

- ETHERNET (active) when mode = IP or CAN+IP.
- ETHERNET (inactive) when mode = CAN.

Power Core is equipped with two control ports that are always active: dwc0 and dwc1.

Default Network Settings

By default, the network interfaces are assigned the following IP addresses. Note that Power Core can handle static IP addresses only; DHCP is not supported.

Network Port	IP Address	Subnet Mask	Gateway
diamond - ETHERNET	Static only 192.168.101.241	255.255.255.0	0.0.0.0
Power Core - dwc0	Static only 192.168.101.240	255.255.255.0	0.0.0.0
Power Core - dwc1	Static only 192.168.102.240	255.255.255.0	0.0.0.0

Current Network Settings

You can check the current network settings as follows.

- For Power Core, the dwc0 settings are shown on its front panel display.
- For diamond, the IP module (ETHERNET port) settings are shown on the surface displays during boot-up. See [diamond - Powering On](#).

On the diamond surface, you can reset the ETHERNET port to its default IP address by pressing the 3 upper left buttons on the IP module (during boot-up). Note that this also resets the communication mode of the module to **IP**.

Editing the Network Settings

The network settings can be edited by opening a Web UI connection to Power Core and then diamond. You will need to do this if you are installing more than one system (to avoid any IP conflicts).

1. For the initial setup, best practice is to connect your configuration PC directly to each device.
 - For Power Core, it is recommended to use the first control port (dwc0).
 - For diamond, use the ETHERNET port.
2. The Web UI can be reached by entering the IP address of the connected port.
 - For Power Core (dwc0 port), the default IP = 192.168.101.240
 - For diamond (ETHERNET port), the default IP = 192.168.101.241

Log in as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.

3. In the Power Core Web UI, select the "System → Control Network Devices" tab.

This page shows the settings for both of the control network interfaces: **Device dwc0** and **Device dwc1**.

The screenshot displays the 'Control Network Devices' configuration page in the PowerCore web UI. It features two side-by-side panels for 'Device dwc0' and 'Device dwc1'. Each panel contains a list of configuration fields, some of which are marked with an asterisk (*) to indicate they are editable. The fields include Host Name, MAC Address, IP Address, Network Mask, Gateway, Link Speed, Link State, AutoNegotiation, Link Flags, SFP Type, SFP Vendor Name, SFP Vendor PN, Switch Name, Switch MAC Address, Switch Mgmt. Addr., Switch Port Intf. Name, Switch Port Descr., and VLAN. Below the panels, there is a section for 'LACP dwc0/dwc1 (Device lagg0)' with a 'Status' dropdown menu. A note at the bottom states: '(**) Modifications need system restart to take effect'.

⚠ Important: After updating the system to a new version, it is recommended to clear the cache of the web browser (to avoid old information being displayed).

The editable fields are marked with an asterisk (*) and include the **IP Address**, **Network Mask** and **Gateway**.

4. Type in the new value(s) and click **Apply** to save the changes.

IP address changes are made immediately, and so you will lose your browser connection once settings are applied. It is recommended to check the communication by re-opening the Web UI using the new IP address.

The configuration of the Power Core control port(s) is now complete.

i A Domain Name Server can be entered via the "System → Network Settings" tab.

5. In the diamond Web UI, select the "Network" tab.

NETWORK AUDIO VIDEO CONTROL

diamond

System Informations System Control Statistics Network Surface Modules Module Tests

Network Device stm0

Host Name: DiamondControlPanels

MAC Address: [redacted]

IP Address: 192.168.101.241 (*)

Network Mask: 255.255.255.0 (*)

Gateway: [redacted] (*)

Link Speed: 100Mbps

Link State: up

Apply (*)

Network Settings

Domain Name: [redacted] (*)

Name Server 1: [redacted] (*)

Name Server 2: [redacted] (*)

NTP Server Name: [redacted]

NTP Server Address: [redacted]

(*) Modifications need system restart to take effect

In this instance, there is only one Network Device (for the ETHERNET port).

As before, you can edit the **IP Address**, **Network Mask** and **Gateway**. Remember to click **Apply** to save any changes, and re-open the Web UI to check a change of IP address.

The configuration of the diamond control port is now complete.

6. Once the correct network settings are in place, you can connect the devices to the control network.
7. To continue with the setup, enter the new IP addresses into your browser and log in again (as described above).



5.6 diamond - Configuring the IP Connection to Power Core

This topic describes how the IP communication with Power Core is achieved.

If the surface consists of a single diamond frame, then this must connect to Power Core via IP. The Ethernet connection can be made directly (point-to-point) or via a network (LAN or WAN).


If the surface consists of more than one frame, then the network communication with Power Core can be achieved in one of two ways:

1. The first diamond frame connects to Power Core via IP, and the second frame is daisy-chained to the first using an external CAN bus cable (CAN A).
2. Each diamond frame connects individually to Power Core via IP.

If you have a diamond frame that is wider than 4 modules, then it behaves like two separate frames (with two ETHERNET / CAN connector boards).

The rest of this topic explains how to connect and configure each scenario.

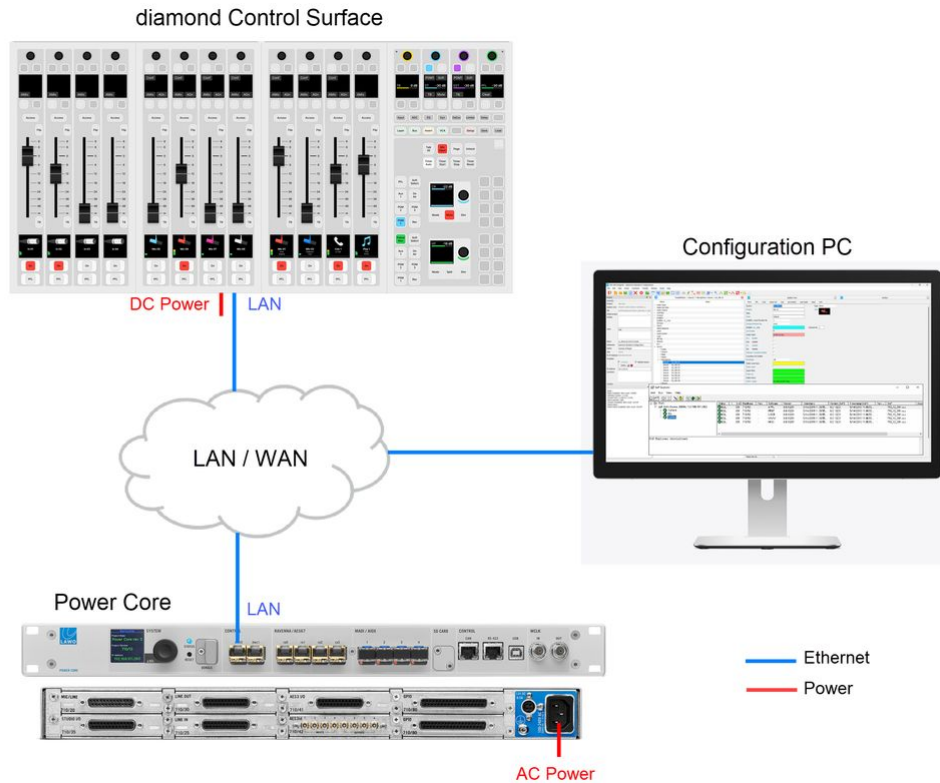
- [Configuring a Single Frame](#)
- [Configuring a Surface with Multiple Frames](#)

 The IP connection(s) to Power Core may use either a Multicast or Unicast IP address scheme. If you wish to use Unicast IPs for more than one frame, then this requires some additional configuration (in the ON-AIR Designer).

Configuring a Single Frame

The diagram below shows the connections for a single diamond frame. The Ethernet connection can be made directly (point-to-point) but is more usual to connect via a network.

- To connect the diamond frame, use the ETHERNET port (on the underside of the frame).
- To connect Power Core, it is recommended to use the first control port: dwc0.



While the diamond frame is booting, the modules show their communication mode (on the surface displays).

- The module that sits above the frame's connector board must show **CAN+IP** (or **IP** if the frame has only one module).
- All other modules must show **CAN**.

If you need to reset a module's communication mode, then this can be done from the surface. See [diamond - Communication Modes](#).

The IP connection from the surface to Power Core is configured using the "[Control Interface](#)" parameters stored on each device.

To check or edit the settings, open a Web UI connection to both the diamond frame and Power Core, and log in as either Supervisor or Administrator. Then look for the "Control Interface" parameters (in the "System → Control" tab). It is important to check both sides of the connection, so open a separate browser window for each device.

The **Mode** must be set to **CAN+IP** in Power Core and either **CAN+IP** (or **IP**) in diamond. (The **IP** option should be used if the frame has only one module.)

The **Target IP address** determines the IP address scheme.

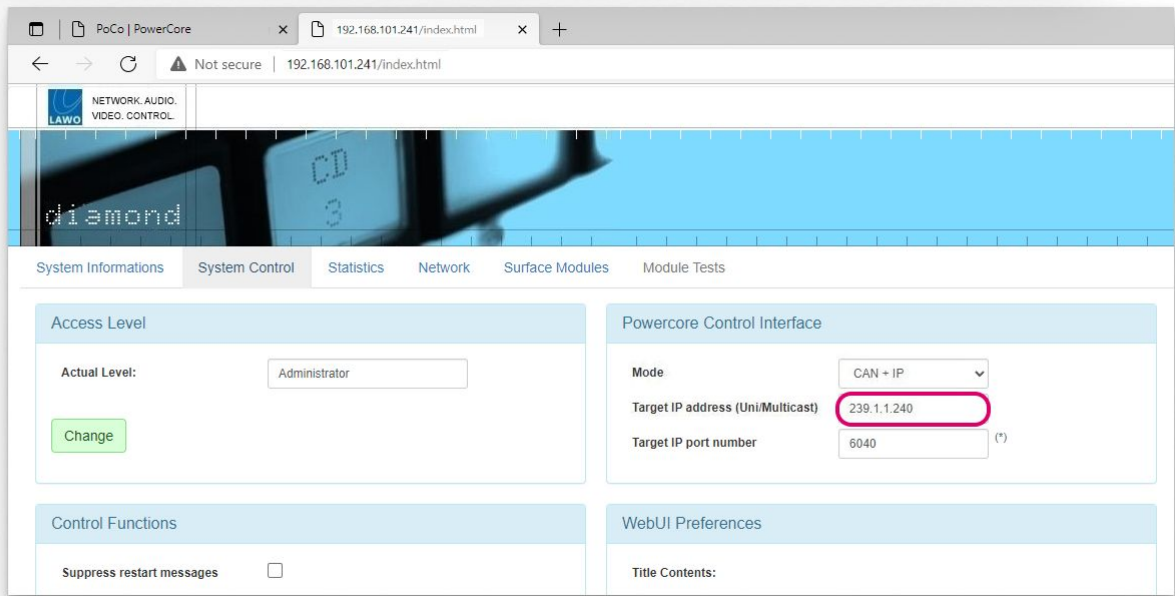
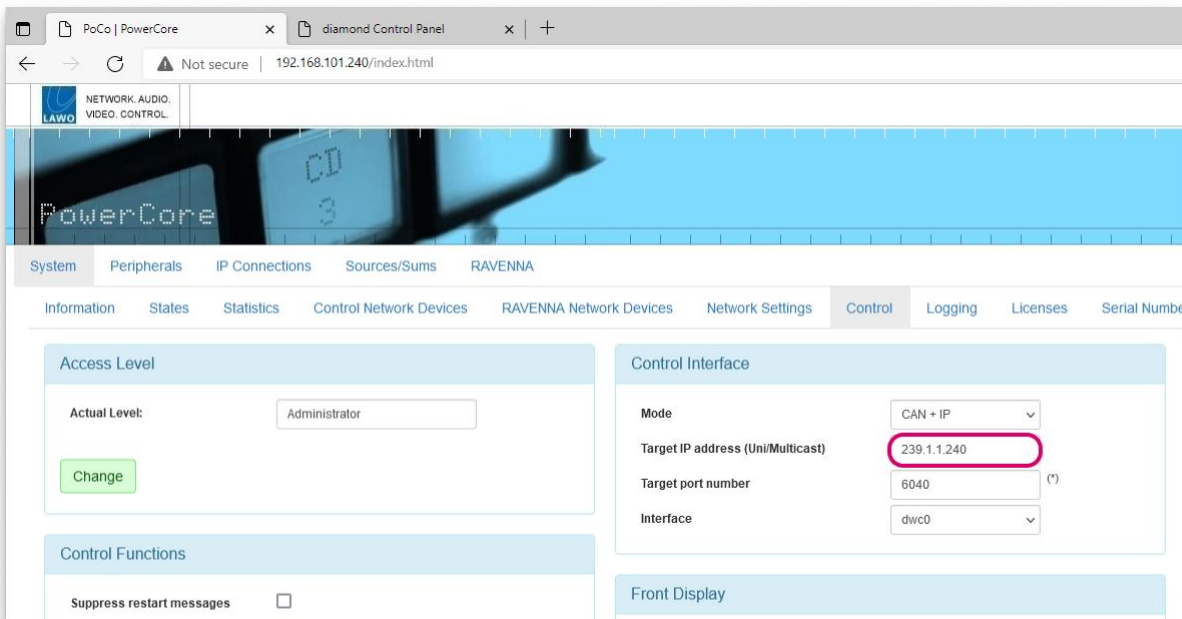
- To use Multicast, the **Target IP Addresses** in Power Core and diamond must be identical. So, enter a suitable IP address group in Power Core and then copy it to diamond. The default setting is 239.1.1.240
- To use Unicast, you must enter the reciprocal IP addresses. So, enter the diamond control port IP address (in Power Core) AND enter the Power Core control port IP address (in diamond).

The other fields can be left at their default values.



If you make any changes to the "Control Interface" settings, then you must reboot the device(s).

The screenshots below shows an example of a multicast configuration using the default multicast IP address group.



If everything is correctly connected and configured, the surface synchronizes to Power Core once the IP connection is made.

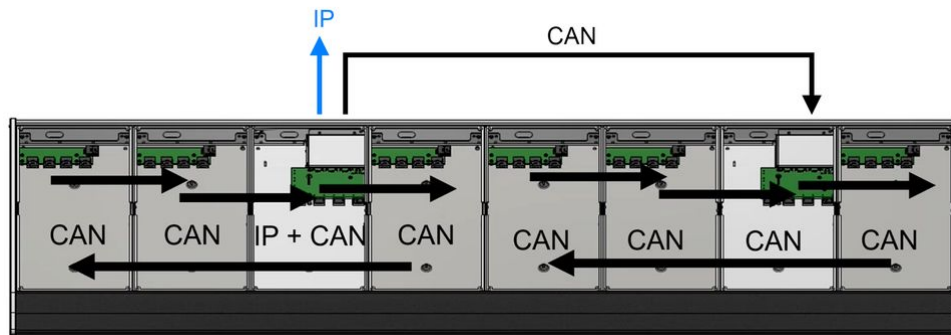
Configuring a Surface with Multiple Frames

The following options apply if the diamond surface has more than one connector board. For example, if there is more than one frame OR the frame is wider than 4 modules (5ME or above).

Option 1: IP to Power Core + CAN bus daisy-chain

In this example, the first frame connects to Power Core via IP, and the second frame daisy-chains to the first using an external CAN bus cable. If you have a third frame, then it is possible to add this to the CAN A daisy-chain by re-plugging the internal CAN connectors.

This option is ideal for split frames within the same studio or wider frames with two connector boards (5ME or above).



The communication modes (shown on the surface during boot-up) are similar to those on a single-frame console.

- The module above the frame's Ethernet connector board must show **CAN+IP** (or **IP**).
- All other modules must show **CAN**. This includes the module above the second connector board on the right of the frame.

The IP connection to Power Core is also configured in the same way as for a single-frame console, so configure the "Control Interface" settings (as described [above](#)).

Once the IP connection is configured, use a CAT 5e cable to connect CAN A on the first frame to CAN A on the second frame.

If you have a third frame, then this can be added to the daisy-chain as follows: inside the second frame, connect the internal CAN A to the CAN B output; then run an external cable from CAN B on the second frame to CAN A on the third frame.

⚠ When daisy-chaining more than one frame, the **CAN A cable length must not exceed 13 meters** including the internal wiring. For more information about how to calculate the CAN A bus cable length, see [diamond - Wiring](#).

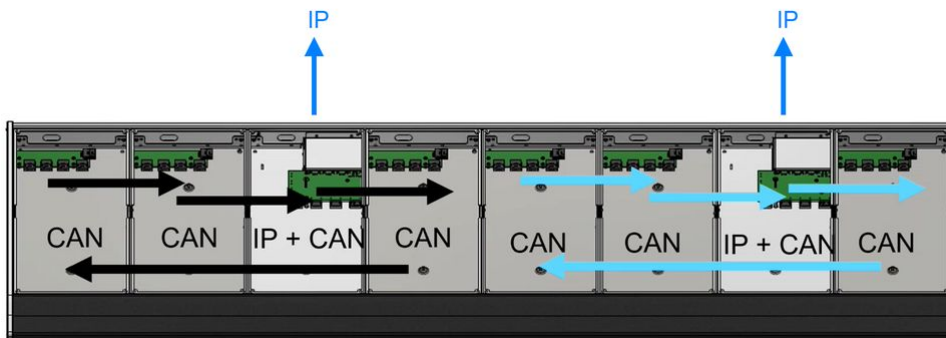
If you wish to connect a KSC or GPIO panel, then this must be connected to CAN B on the last frame. On the last key panel in the chain, fit the CAN bus terminator supplied with the system.

If everything is correctly connected and configured, the surface synchronizes to Power Core once the IP connection to the first frame is made.

Option 2: Individual IP connections to Power Core

In this example, each frame connects individually to Power Core via the IP network.

This option can be used to install frames remotely from each other in different studios / locations.



This time the communication modes (shown on the surface during boot-up) will be slightly different.

- All modules that sit above an Ethernet connector board must show **CAN+IP** (or **IP**).
- All other modules must show **CAN**.

For the IP connections to Power Core, it is possible to use either a Multicast or Unicast IP address scheme.

- To use Multicast IPs, the **Target IP address** fields in the "Control Interface" settings must be identical. Take care to check all of the diamond IP frames and Power Core. For the example above, open three Web UI sessions: one for Power Core and one for each diamond frame, and remember to reboot the devices if you make changes to the "Control Interface" settings.
- If you wish to use Unicast IPs, then this requires some additional configuration (in the ON-AIR Designer). More information will follow.

For the wiring, when frames are connected via IP, there is no need for an external CAN connection and so the CAN A ports must be terminated.

The CAN B ports can be used to connect a KSC or GPIO panel; you can make this connection from either frame. On the last key panel in the chain, fit the CAN bus terminator supplied with the system.

If everything is correctly connected and configured, each frame synchronizes independently to Power Core, This happens as soon as each IP connection is made.

5.7 diamond - Control Interface Settings

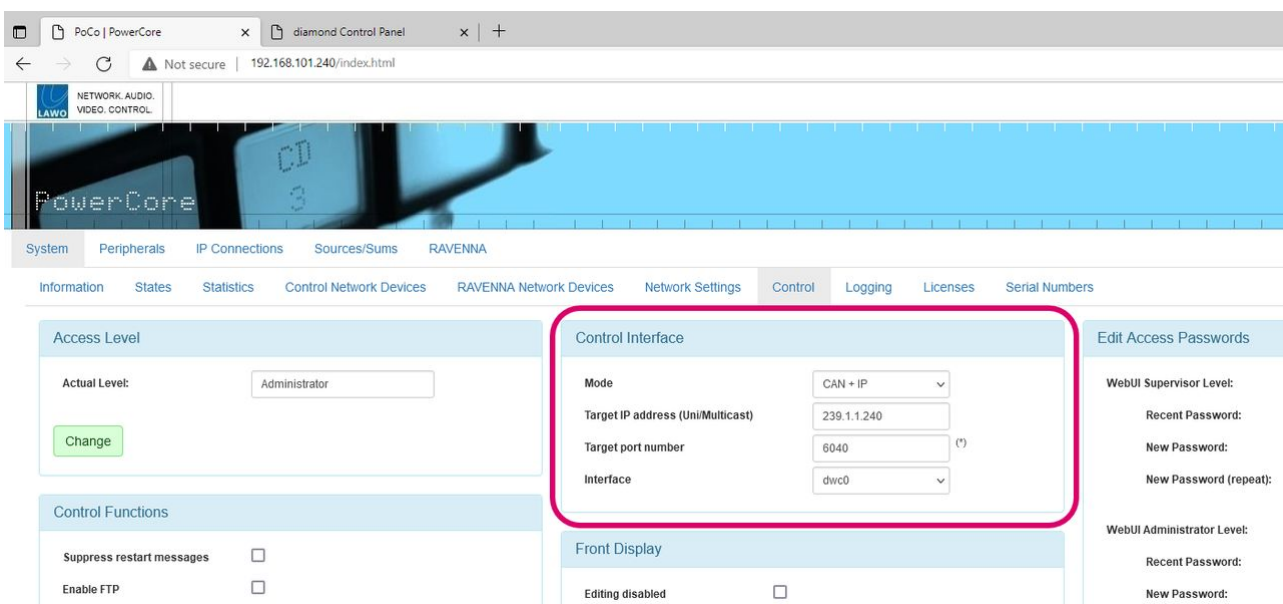
This topic describes the "Control Interface" parameters that are used to configure the IP connection between the surface and Power Core.

The correct settings for your system will depend on the number of diamond frames that make up the surface and how you wish to connect them. All possible options are described [here](#).

To check or edit the settings, open a Web UI connection to each device, log in as either Supervisor or Administrator, and look for the "Control Interface" parameters (in the "System → Control" tab). It is important to check both sides of the connection, so open a separate browser window for each diamond frame and Power Core.

If you make a change to the "Control Interface" settings, then you must reboot the device(s).

On Power Core...



On the Power Core side, there are four parameters: **Mode**, **Target IP Address**, **Target port number** and **Interface**.

Mode - sets the communication mode for the surface connection. There are three possible options: CAN+IP, CAN or IP.

- The default setting is CAN+IP. In this mode, Power Core can communicate with locally connected CAN bus panels (via its CAN port) and with diamond (via Ethernet).
- Choose CAN if there is no Ethernet connection to a diamond or IP radio panel.
- Choose IP if there is no local CAN port connection to a CAN bus panel.

Target IP Address (Uni/Multicast) - sets the IP address for the surface connection.

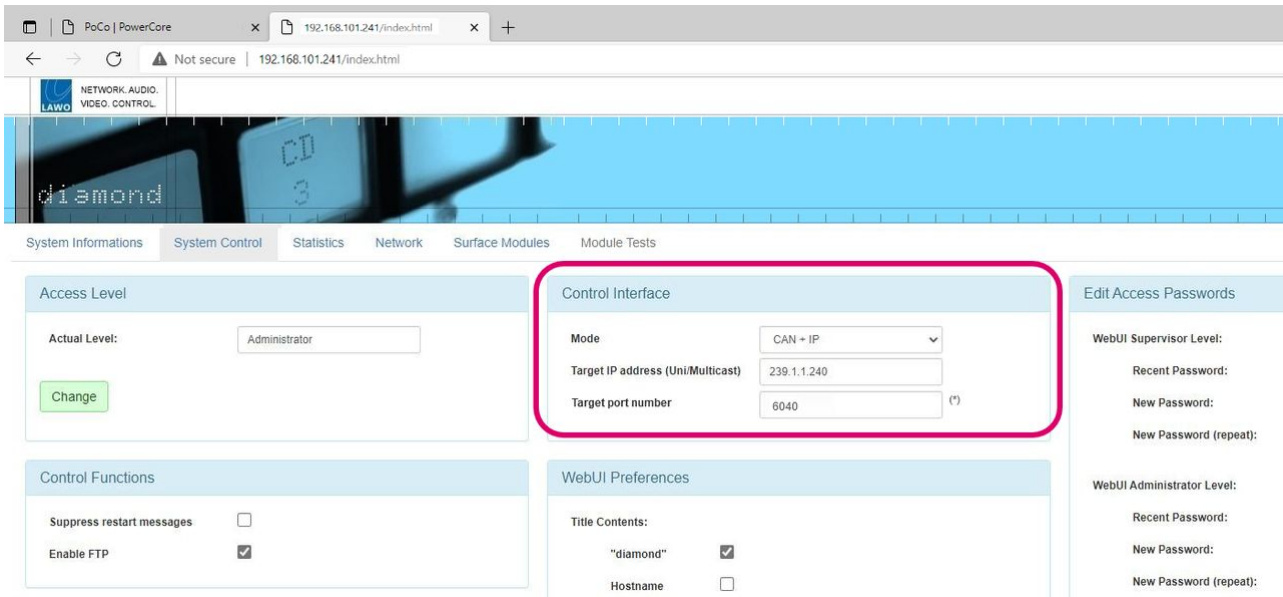
- To use Multicast, the **Target IP Addresses** in Power Core and diamond must be identical. So, enter a suitable IP address group here and then copy it to diamond. The default setting is 239.1.1.240
- To use Unicast, you must enter the reciprocal IP address. So, enter the diamond control port IP address here.

Target Port Number - sets the port number for the surface connection. The default is 6040.

Interface - selects the network interface for the surface connection.

- The default is dwc0.
- To use a different interface, choose an option from the drop-down menu: dwc0, dwc1, ra0, ra1, ra2 or ra3.

On diamond...



The screenshot shows a web browser window with the URL 192.168.101.241/index.html. The page displays the diamond web interface with a navigation menu at the top: System Informations, System Control, Statistics, Network, Surface Modules, and Module Tests. The main content area is divided into several panels. The 'Control Interface' panel is highlighted with a red box and contains the following fields:

- Mode:** A dropdown menu set to 'CAN + IP'.
- Target IP address (Uni/Multicast):** A text input field containing '239.1.1.240'.
- Target port number:** A text input field containing '6040'.

Other visible panels include 'Access Level' (Actual Level: Administrator, Change button), 'Control Functions' (Suppress restart messages: , Enable FTP:) and 'WebUI Preferences' (Title Contents: 'diamond' , Hostname:). On the right side, there is an 'Edit Access Passwords' section with fields for WebUI Supervisor Level, WebUI Administrator Level, and their respective Recent and New Passwords.

On the diamond side, there are three parameters: **Mode**, **Target IP Address** and **Target port number**.

Mode - sets the communication mode of the module that sits above the frame's Ethernet connector board. There are three possible options: CAN+IP, CAN or IP.

- The default setting is CAN+IP. In this mode, the module communicates with Power Core via Ethernet, and with all other modules in the frame via CAN.
- Choose CAN if there is no IP connection from the module to Power Core. (e.g. if the frame is daisy-chained to another frame via CAN).
- Choose IP if the frame consists of a single module that communicates with Power Core via Ethernet. In this instance, there are no other modules within the frame and so there is no need for CAN.

Target IP Address (Uni/Multicast) - sets the IP address for the Power Core connection.

- To use Multicast, this **must match** the IP address group entered in Power Core. The default setting is 239.1.1.240
- To use Unicast, enter the reciprocal IP address. So, enter the Power Core control port IP address here.

Target Port Number - sets the port number for the Power Core connection. The default is 6040.

Note that there is no **Interface** field in diamond (as there is only one Ethernet interface per connector board).



Using a Different Network Interface on Power Core

It is possible to use any of the Power Core network ports for the IP connection to the diamond surface. For simplicity, it is recommended to use dwc0.

If you wish to configure a different network interface, then work through the following steps:

1. Start by connecting via dwc0 (to access the Power Core Web UI).
2. From here, edit the IP settings of the port you wish to use (via the "[Network Devices](#)" tab).
3. Then edit the **Interface** option (under "Control Interface" in the "System → Control" tab).
4. Reboot Power Core and check the communication.

5.8 diamond - Communication Modes

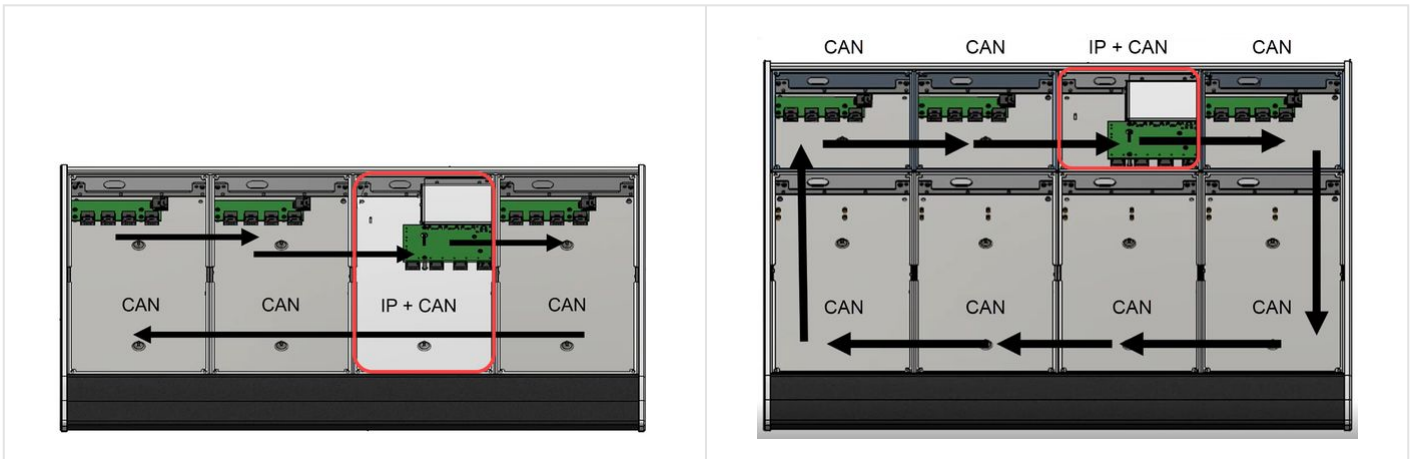
As part of the system setup, a communication mode must be assigned to each control surface module.

There are three possible options: CAN+IP, CAN or IP.

- **CAN+IP** - allows a module to communicate with other modules via CAN, and Power Core via IP. This is the default setting for the frame's IP module (that sits above the Ethernet connector board).
- **CAN** - supports CAN only and not IP. Choose this mode for all modules that connect to an IP module via CAN, either internally or externally.
- **IP** - supports IP only and not CAN. This option can be used if the frame includes a single module and that module communicates with Power Core via IP.

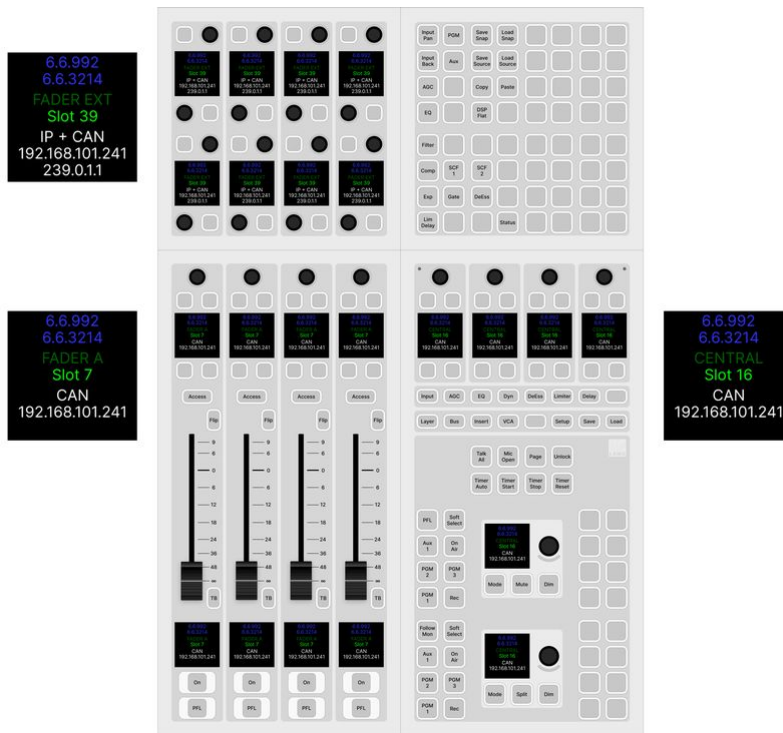
Either CAN+IP, or IP, must be selected for the frame's IP connector board (to handle the IP connection to Power Core). All other modules must be set to CAN.

The images below show the internal wiring and communication modes for two examples: a standard frame (on the left) and extended frame (on the right). The position of the frame's IP module/connector board is highlighted in red.





The communication modes are shown on the surface displays during boot-up. In the example below, the frame's IP module is the upper Fader Extension module (assigned to slot 39).

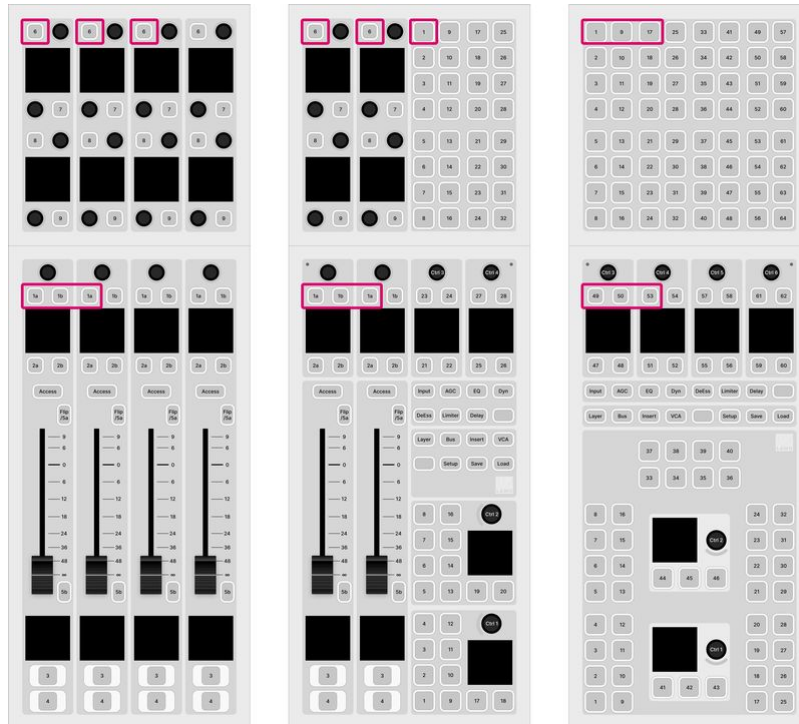


How to Reset the Communication Mode(s)

A module can be reset to either IP or CAN using the following key combinations (while the module is booting).

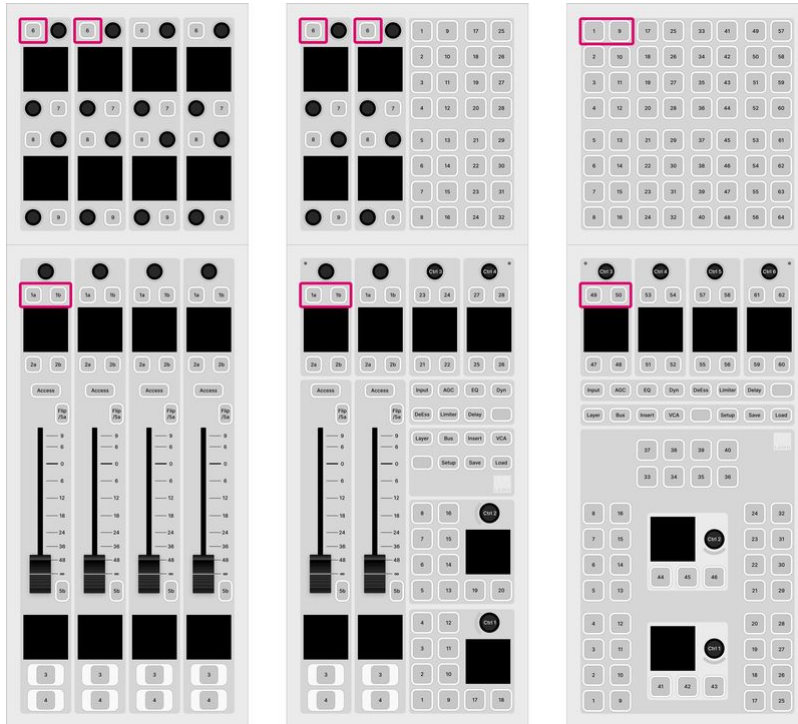
Reset to IP

To reset a module's communication mode to "IP" and IP address to the default (192.168.101.241), press and hold the 3 upper left keys (during boot-up). The images below show the correct key combinations.



Reset to CAN

To reset a module's communication mode to "CAN" and slot ID to "0", press and hold the 2 upper left keys (during boot-up). The images below show the correct key combinations.



Reset to CAN+IP

The mode CAN+IP can be assigned to an IP module by opening a Web UI connection and changing the **Mode** parameter in the "Control Interface" settings.



Practical Examples

In practice these operations can be used as follows.

To set up the frame's IP module:

1. Press and hold the 3 upper left keys (during boot-up) - the communication mode is set to "IP".
2. Connect your configuration PC directly to the IP module (using the ETHERNET port on the underside of the frame).
3. Open a [Web UI connection](#) using the default IP address of 192.168.101.241.
4. Log in as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.
5. Select the "System Control" tab and enter the correct **Mode** parameter in the "Control Interface" settings.: either **CAN+IP** or **IP** (if the frame has only one module).
6. Reboot the IP module/frame (using the **Reboot System** button in the "System Control" tab).
7. Select the "Network" tab and enter the required network settings. See [diamond - Network Settings](#).
8. You can now connect the diamond frame to the network.

To set up a CAN-bus module:

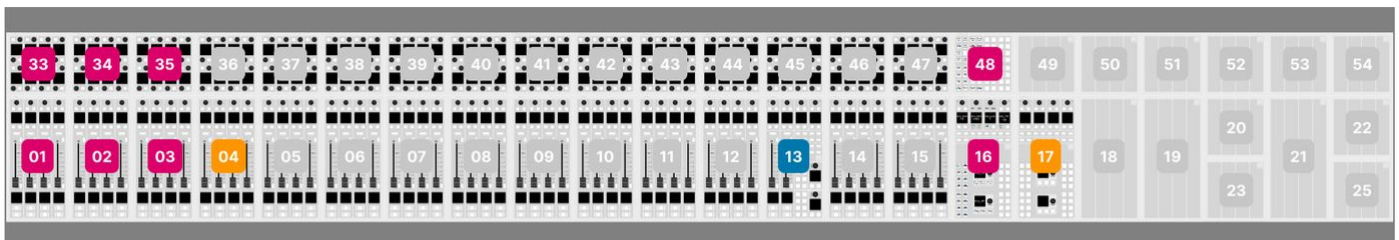
1. Press and hold the 2 upper left keys (during boot-up) - the communication mode is set to "CAN".
2. Open a Web UI connection to the diamond frame (using the network settings assigned to the IP module).
3. Log in as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.
4. Select the "Surface Modules" tab and enter the correct slot ID for the module. See [diamond - Slot IDs](#).
5. In this instance, the module is ready for operation as soon as the correct slot ID is assigned. A reboot is not required.

5.9 diamond - Slot IDs

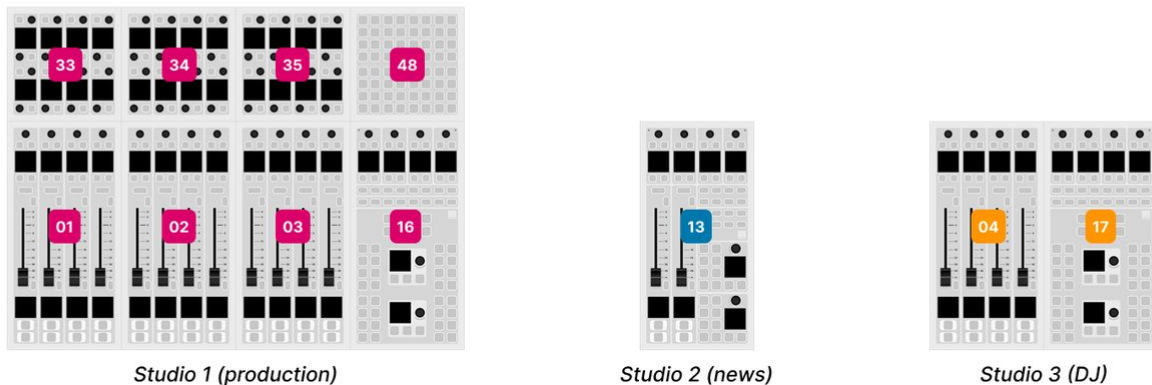
As part of the system setup, a slot ID must be assigned to each control surface module. This determines the functionality of the module according to the matching slot ID/address defined in the configuration.

The image below shows how this works for a diamond surface with multiple frames. You can see the ON-AIR Designer 'Frame → Surface' configuration (at the top) and the console frames (below). The slot IDs are highlighted in different colors to show the assignments to each diamond frame.

ON-AIR Designer: 'Frame → Surface' configuration



diamond Surface: Slot IDs



On the surface, the active slot IDs affect which fader numbers are controlled (from the Fader/Combo Modules) and which Access Group a console belongs to (via the Central/Combo Modules).

In our example, the studio 1 console controls faders 1 to 24, in two layers, (via IDs 1 to 3) and belongs to Access Group 1 (via ID 16); studio 2 controls faders 97 to 100 and belongs to Access Group 3 (via ID 13); studio 3 controls faders 25 to 32 (via ID 14) and belongs to Access Group 2 (via ID 17).

For more information about the 'Frame → Surface' configuration, please refer to ON-AIR Designer User Manual. Here we deal with the assignment of the slot IDs to the surface modules.

⚠ Important: each module's address must be unique. It is not permitted to assign the same slot ID to more than one module. If more than one module has the same slot ID, then you may see some odd behaviours once the console is operational.

How to Check and Assign the Slot ID(s)

The active slot IDs are shown on the surface displays during boot-up, and are configured using the "Surface → Modules" tab in the Web UI.

To check the settings:

1. Open a Web UI connection to the diamond frame.

- Log in as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.
- Select the "Surface Modules" tab and look at the **Act. Slot** values - these show the active slot ID for each module.

ID No.	Serial No.	Mode	Type	BOOT Version	BOOT Compile Date	BETR Version	BETR Compile Date	Act. Slot	Dflt	Map 1	Map 2	Map 3	Map 4	Ctrl
08-EC-5C	80-98-82-00-14-CE-B0-F4	M	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	35	35	0	0	0	0	Set Slot Identify Test Reboot
08-EC-69	80-98-82-00-14-CE-60-2C	S	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	34	34	5	0	0	0	Set Slot Identify Test Reboot
08-EC-60	80-98-02-10-04-2E-40-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	1	1	6	4	0	0	Set Slot Identify Test Reboot
08-EC-61	80-98-02-10-04-2E-7F-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	2	2	0	6	0	0	Set Slot Identify Test Reboot
08-EC-80	80-98-82-00-14-CE-60-CC	S	711/20 CENTRAL	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	16	16	19	0	0	0	Set Slot Identify Test Reboot
08-EB-15	80-98-02-10-04-9E-C4-F8	S	711/25 KEY_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	48	48	48	0	0	0	Set Slot Identify Test Reboot

The active slot ID can be changed either, permanently, by editing the **Dflt** (default) value or, temporarily, by loading one of the alternate mappings (**Map 1 to 4**).

Editing the Default Slot IDs

During the initial setup, you should use the **Dflt** value to assign the correct slot ID to each physical module. This is done as follows.

- Type the required slot ID into the **Dflt** field - the edited value and **Set Slot** button highlight in yellow.
- Press **Set Slot** to make the assignment.
- Wait for the **Act. Slot** field to update and check its value.
- Repeat these steps for each module.

The screenshot below shows how the Web UI looks when a default value is changed but not yet saved.

ID No.	Serial No.	Mode	Type	BOOT Version	BOOT Compile Date	BETR Version	BETR Compile Date	Act. Slot	Dflt	Map 1	Map 2	Map 3	Map 4	Ctrl
08-EC-5C	80-98-82-00-14-CE-B0-F4	M	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	35	35	0	0	0	0	Set Slot Identify Test Reboot
08-EC-69	80-98-82-00-14-CE-60-2C	S	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	34	34	5	0	0	0	Set Slot Identify Test Reboot
08-EC-60	80-98-02-10-04-2E-40-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	1	1	6	4	0	0	Set Slot Identify Test Reboot
08-EC-61	80-98-02-10-04-2E-7F-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	2	2	0	6	0	0	Set Slot Identify Test Reboot
08-EC-80	80-98-82-00-14-CE-60-CC	S	711/20 CENTRAL	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	16	16	19	0	0	0	Set Slot Identify Test Reboot
08-EB-15	80-98-02-10-04-9E-C4-F8	S	711/25 KEY_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	48	48	48	0	0	0	Set Slot Identify Test Reboot



Using the Alternate Mappings

The alternate mappings (**Map 1 to 4**) can be used, during operation, to provide access to different sets of faders and/or central controls. For example, if an assistant has a frame with two Fader Modules, they can use mappings to access up to four different sets of faders. In this instance, the mapping data is stored globally and recalled using the **Slot Map Selection** option (at the bottom of the page) or via Ember+ (for more convenient control).

1. Start by entering the required slot IDs into the **Map #** fields - the edited values and **Set Slot Map Data** button highlight in magenta.
2. To save all of the changed values, press the **Set Slot Map Data** button. (Or to cancel all changes, press **Cancel Slot Map Changes**).
3. To load a mapping, click on **Slot Map Selection** and choose an option from the drop-down menu. You can choose any of the four alternate mappings (**Map 1 to 4**) or revert to the **Default** slot IDs (defined in the **Dflt** fields).
4. Wait for the **Act. Slot** fields to update and check their values. Note that all zero (0) values are ignored.

The screenshot below show how the Web UI looks when some of the mapping values are changed but not yet saved.

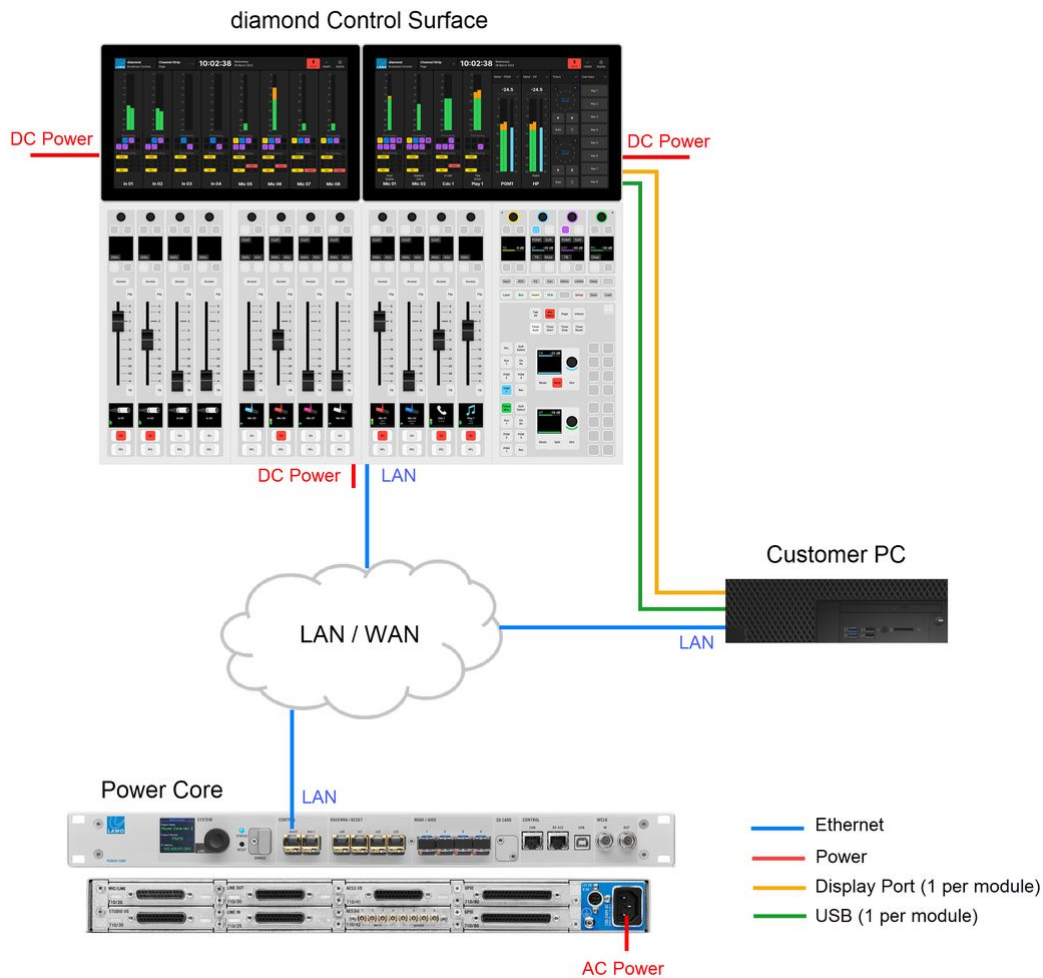
ID No.	Serial No.	Mode	Type	BOOT Version	BOOT Compile Date	BETR Version	BETR Compile Date	Act. Slot	Dflt.	Map 1	Map 2	Map 3	Map 4	Ctrl
08-EC-5C	80-98-82-00-14-CE-B0-F4	M	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	35	35	0	0	0	0	Set Slot Identify Test Reboot
08-EC-69	80-98-82-00-14-CE-60-2C	S	711/15 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	34	34	5	0	0	0	Set Slot Identify Test Reboot
08-EC-60	80-98-02-10-04-2E-40-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	1	1	6	4	6	0	Set Slot Identify Test Reboot
08-EC-61	80-98-02-10-04-2E-7F-40	S	711/10 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	2	2	0	6	7	0	Set Slot Identify Test Reboot
08-EC-80	80-98-82-00-14-CE-50-CC	S	711/20 CENTRAL	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	16	16	19	0	0	0	Set Slot Identify Test Reboot
08-EB-15	80-98-02-10-04-9E-C4-F8	S	711/25 KEY_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	48	48	48	0	0	0	Set Slot Identify Test Reboot

The screenshot below shows the options in the **Slot Map Selection** menu. Once an option is selected, the active slot IDs update to match. So, in this example, the **Act. Slot** and **Dflt** values should be the same.

5.10 diamond - Configuring the Virtual Extension

If the console includes the Virtual Extension option, then the GUI software runs on a host PC that must be provided by the customer. The host PC connects to Power Core via the IP network. Each VX module connects to the host PC via Display Port and USB. A single host PC can support up to 6 VX displays.

The example below shows a single diamond frame fitted with two VX modules.



The instructions below describe how to configure the host PC and make the connections.

1. The diamond VX software runs on a Windows PC that must be supplied by the customer.

A single PC can support multiple displays, depending on its specification. For information about the host PC requirements, please read the following document: [Vistool PC Config.pdf](#).

If the diamond surface includes multiple frames with more than 6 displays, then it is recommended to install a second host PC (with an additional license).

2. The host PC must connect to Power Core via the control network.

To configure the system, you will need to know the IP address of the Power Core control port. This is described in [diamond - Network Settings](#).

3. Each VX display connects to the host PC via Display Port and USB, and is powered by its own external DC power supply.

For more information about the DC power supply, see [diamond - Power Supplies](#).



On the rear of each VX module are the following connectors:

- **Power (Kycon)** - connects to the external DC power supply.
- **Display Port** - connects to the host PC (for graphics).
- **USB** - connects to the host PC (for touch-screen control).

If the control surface is fitted with more than one VX display, then the host PC must support multiple Display Port and USB connections.

4. On the host PC, you must install the VisTool software and generate a runtime session from either the standard configuration ("vis_diamond_SC") or a custom project.

Please refer to the [VisTool](#) documentation for how to do this.

5. Before you can launch the VisTool session, you must install and activate the VisTool license. A license for the standard configuration is included with the system.

See [License Activation](#) for instructions.

6. Once everything is installed and connected, the diamond VX app can be launched from the host PC.

See [diamond - Powering On](#).

6 diamond - Operation

This chapter describes the operation once the system is installed and configured.

Where applicable, the examples used describe the standard configuration. If your surface or GUI looks different, then you may be running a custom configuration. You can learn more about how to customize the console, using ON-AIR Designer, in [diamond - Configuration](#).

- [diamond - Control Surface Overview](#)
- [diamond - Fader Strip Control](#)
- [diamond - Source-Specific Functions](#)
- [diamond - Central Controls](#)
- [diamond - Powering On](#)
- [diamond - Fader Strip Assign](#)
- [diamond - Input Gain and Pan](#)
- [diamond - Auto Gain](#)
- [diamond - Stream Selection](#)
- [diamond - Bus Assign](#)
- [diamond - Source Parameters](#)
 - [diamond - Input and Pan Parameters](#)
 - [diamond - Automatic Gain Compensation](#)
 - [diamond - EQ](#)
 - [diamond - Dynamics](#)
 - [diamond - De-Esser](#)
 - [diamond - Limiter](#)
 - [diamond - Relative System Level and the Dynamics Processing](#)
 - [diamond - Delay](#)
- [diamond - Sum Bus Parameters](#)
- [diamond - Metering](#)
- [diamond - Monitoring](#)
- [diamond - PFL and AFL](#)
- [diamond - Talkback](#)
- [diamond - Conference and N-1](#)
- [diamond - VCA Grouping](#)
- [diamond - Snapshots](#)
 - [diamond - Snapshot Settings](#)
 - [diamond - Using the System Snapshots](#)
 - [diamond - Using the GUI Snapshots](#)
- [diamond - The Setup Menu](#)
- [diamond - Working with Extension Modules](#)

6.1 diamond - Control Surface Overview

diamond comes in a range of flexible sizes and layouts, scaling from 2 to 60 physical faders. The smallest frame consists of a single module (2-fader Combo). This can be expanded by adding 4-fader modules to increase the width, and/or extension modules to increase the depth. Optionally, the Virtual Extension (VX) can be added to either standard or extended frames. The images below show three examples.



Configurable Functions

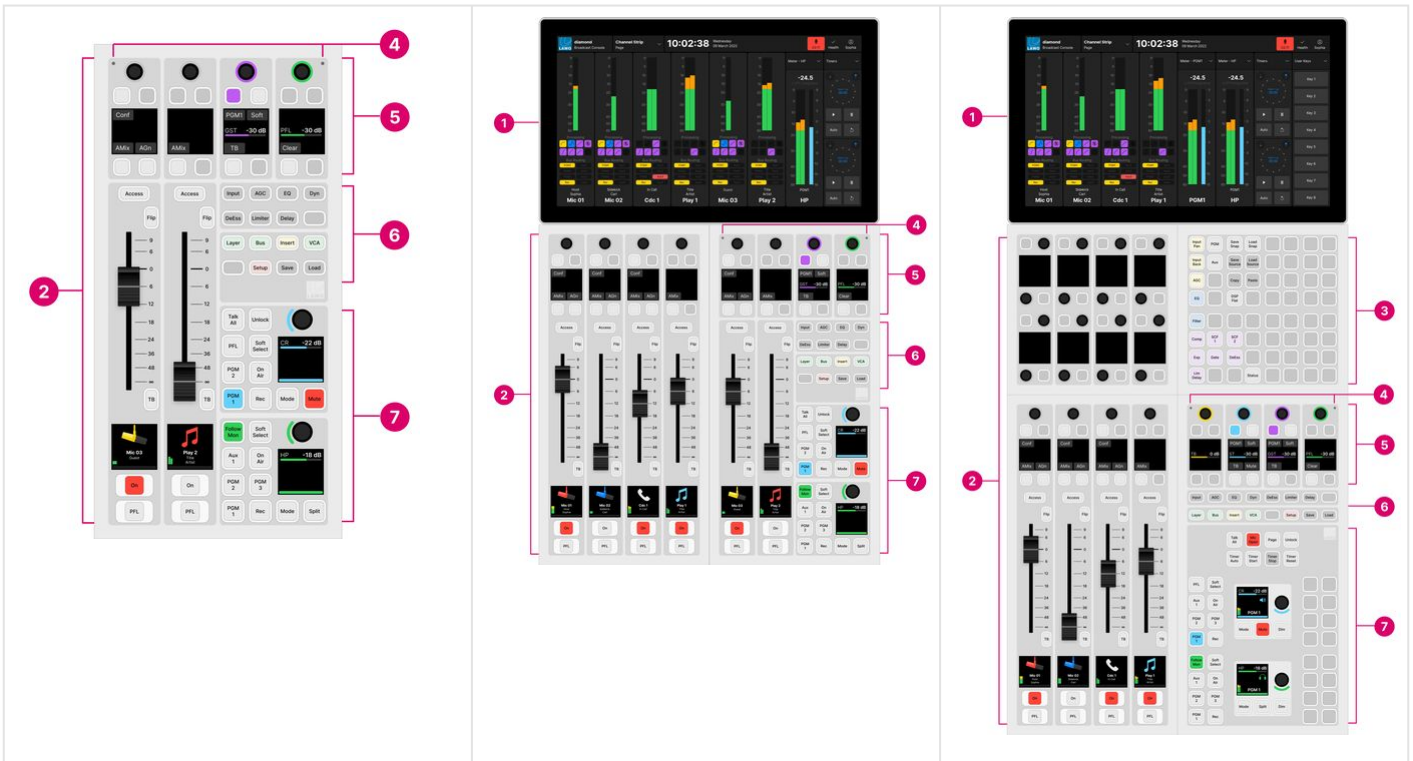
For each control surface module, some of the functionality is fixed and some is configurable.

All configurable functions are defined by the system configuration. This is stored on Power Core and read during boot-up. A **standard configuration** is included with every console. The configuration can be edited using the [ON-AIR Designer](#) software and uploaded to Power Core via the network. The configuration possibilities are extensive and include the definition of audio inputs and outputs; sources and sum busses; signal processing; logic; and control key functions.

Control keys that are configurable are known as MF (Multi-Function) keys. In most cases, the small MF keys are labeled by the electronic displays while the large MF keys use foil-printed labels. By default, the control surface ships with the correct labels for the standard configuration functions. If you change the MF key functionality, then you will need to exchange the foil-printed labels. See [Exchanging the MF Key Labels](#).

Front Panel Controls

The front panel controls vary depending on the modules fitted to the console. The images below show three examples.



In each case, the controls are divided into the following areas:

- 1. Virtual Extension (optional)** - visual feedback and touch-screen operation. The functionality is defined by the configuration.
- 2. Fader Strips** - dedicated mixing controls for each channel. Some of the functionality is fixed and some is configurable. If a Rotary Extension module is included, then this provides four extra rotary controls per fader.
- 3. Key Extension (optional)** - additional MF keys for central functions. The functionality is defined by the configuration.
- 4. Ambient Light Detectors** - automatic adjustment of the surface brightness. This function can be disabled by the configuration.
- 5. Central Rotary Controls** - four sets of rotary controls that are dual-purpose:
 - When all Function Keys (6) are off, the controls are configurable. The functionality is defined by the configuration.
 - When a Function Key (6) is selected, the controls update to adjust the selected function. For example, press **Input** to adjust the input parameters for the channel in access. In this mode, the functionality is system-defined, and the controls work in the same way regardless of the configuration.
- 6. Central Function Keys** - 16 control keys for central functions. These functions are system-defined and include source parameter control, layer switching, bus/insert/VCA assign, setup options and snapshot save/load.
- 7. Central MF Keys & Rotary Controls** - configurable MF keys and large rotary controls. The functionality is defined by the configuration.

i To use an external keyboard for naming operations, such as editing user labels, connect the keyboard to the host PC (running the Lawo GUI application VisTool).



Module Options

There are five main options that affect how the surface looks and operates:

- the fader strip version: A or B;
- the module used for central controls: Central or Combo;
- whether the frame includes the Virtual Extension option;
- whether the frame is extended;
- whether the frame includes additional Central or Combo modules.

Fader Strip Version

diamond supports two different layouts for its fader strip controls:

- **Fader A** - the source display and MF keys 3 & 4 are below the fader.
- **Fader B** - the source display and MF keys 3 & 4 are above the fader.

In each case, it is only the physical layout that differs; there is no difference in the operation.

Both Fader and Combo Modules are available in A and B versions. Different versions can be mixed within the same surface if this is desired.

Central vs Combo Module (for the central controls)

For the central controls, diamond must include either a Central or Combo module:

- The **Central** module is dedicated to central controls and provides the most functionality.
- The **Combo** module provides two additional fader strips as well as central controls, and so there is some reduction in functionality. The Combo Module can be specified in either Fader A or Fader B versions. The fader strip version has no effect on the central controls.

Virtual Extension (VX)

The Virtual Extension can be specified for standard or extended frames. It occupies the space of two 4-fader modules and, therefore, is only permitted for certain frame widths. If the Virtual Extension is not included, then similar functionality can be achieved by running the Desktop App on an external display.

Extension Modules

If the frame is fitted with **Rotary Extension** modules, then these can operate in one of two modes:

- Rotary Fader Extension - adds an extra four rotary controls to each fader strip.
- Rotary Central Extension - adds more rotary controls to the centre section.

In both cases, the functionality is defined by the configuration.

The **Key Extension** and **Combo Extension** modules provide more MF keys. The functionality is defined by the configuration. Functions can include global page switching for the Rotary Fader Extension modules.

Additional Central or Combo Modules

If the frame is fitted with additional Central or Combo Modules, then these must run in what is known as "monitor mode". In this instance, all MF keys and rotary controls are defined by the configuration. Typically, they are used to provide additional monitoring for larger installations.

6.2 diamond - Fader Strip Control

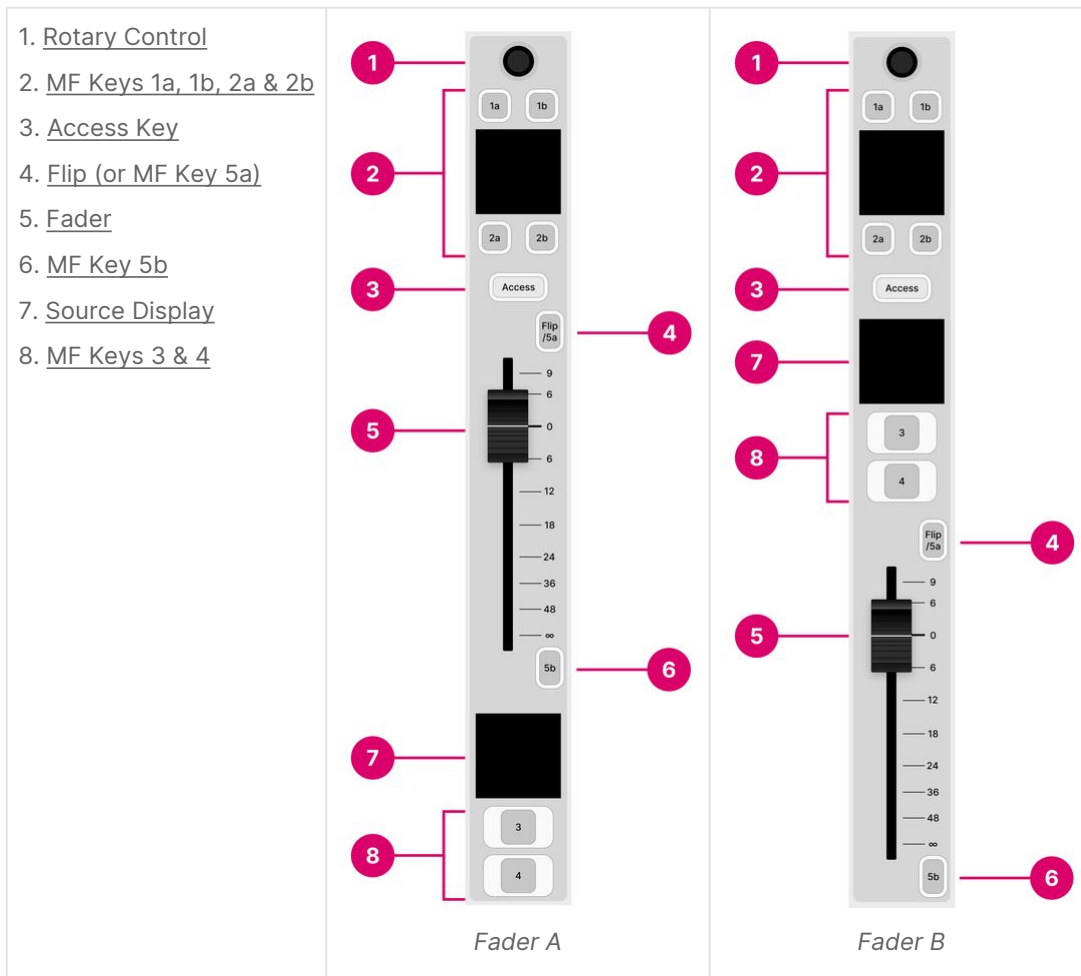
Any fader strip can control any type of source and, depending on the configuration, supports layer switching and fader mapping. This enables lots of signals to be controlled by very few physical faders.

diamond supports two different layouts for its fader strip controls: either **Fader A** or **Fader B**. In each case, it is only the physical layout that differs; there is no difference in the operation.

If the frame includes a **Rotary Fader Extension** module, then this adds 4 extra rotary controls to the fader strip. The operation of these controls is described later. See [Working with Extension Modules](#).

Controls Overview

Each fader strip is divided into the following areas.



The operation of the following controls is system-defined: rotary control (1), Access key (3), Flip key (4), fader (5) and source display (7). The MF keys (2, 6 and 8) are defined by the configuration. The Flip key (4) can be configured as another MF key if layer switching is disabled.

There are no differences in operation between the Fader A and B modules.

Operation

1. Rotary Control

The rotary control adjusts input gain and pan (plus stream selection for Ravenna sources). The operation is system-defined and provides the same fixed functionality regardless of the configuration.

Press down on the rotary control to step through the available parameters and turn to adjust the current value. The parameter name and value appear briefly in the display.

The available parameters vary depending on the type of source. See [Input Gain & Pan](#) and [Stream Selection](#).

2. MF Keys 1a, 1b, 2a, & 2b

The four small MF keys are labeled by the display. They are programmed by the configuration and are defined per source. Typical functions include **Conf** (Conference), **AMix** (Automix) and **AGn** (Auto Gain).

3. Access Key

The **Access** key is used to select a source (for parameter control) or activate strip assign mode. These operations are system-defined and provide the same fixed functionality regardless of the configuration.

The key has four possible states. The colors used can be modified by the ON-AIR Designer (under "System → Definition → Colors"). The following colors are used in the standard configuration:

- Off (unlit) = there is no source assigned to the fader strip.
- Dim white = a source is assigned to the fader strip but is not in access.
- Full white = a source is assigned to the fader strip and is selected (for source parameter control).
- Full yellow = the fader strip is in source assign mode.

The operation is as follows.

Press **Access** once (full white) to place the source in access. The Source Parameter Control keys in the centre section update accordingly and the 'Source Parameter' dialog box appears on the GUI. For more details, see [Source Parameters](#).

Press **Access** twice in quick succession (full yellow) to activate strip assign mode. The 'Assign Source' dialog box appears on the GUI. From here you can touch an available source to make an assignment. Alternatively, turn the fader strip rotary control (1) to select a source and then press the **Take** key (2). For more details, see [Fader Strip Assign](#).

4. Flip (or MF Key 5a)

By default, this key is labeled **Flip** and is used to switch the fader strip between its two layers.

The key has two possible states. The colors used can be modified by the ON-AIR Designer (under "System → Definition → Colors"). The following colors are used in the standard configuration:

- Dim white = layer switching is off, Layer 1 is in view.
- Full green = layer switching is on, Layer 2 is in view.

The layers can also be flipped globally using the **Layer** key in the centre section. Note that the global **Layer** key resets any individual **Flip** selections.

If Layer 2 is disabled by the configuration, then the same physical key operates as MF Key 5a. In this instance, there is no layer switching and the key can be configured to perform a different function using the ON-AIR Designer.

Layer 2 can be disabled, individually, for each Fader or Combo Module (under "Surface → Fader Module → Source"). Thus, it is possible to have some modules with two layers and others with one layer. In this instance, the global Layer key flips all modules with Layer 2 enabled.

5. Fader

The fader adjusts the channel level from $-\infty$ to +9dB.

The fader is motorized and touch-sensitive. It also has a notch that is set to 0dB and an overpress function that is triggered when you pull back on the fader.

The notch and overpress can be enabled or disabled, by the operator, from the [Setup](#) menu.

The overpress function is programmed by the configuration and is defined globally for all fader strips. In the standard configuration, it triggers **PFL** (pre-fader listen).

6. MF Key 5b

This MF key is programmed by the configuration and is defined per source. Typically, it provides talkback to sources such as Mics and Codecs.

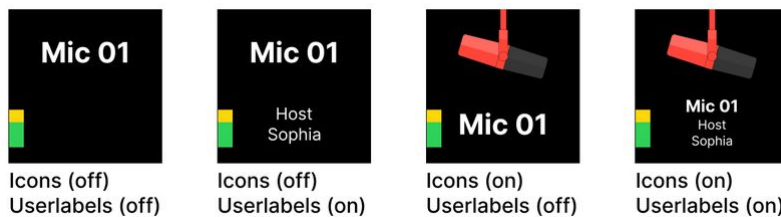
7. Source Display

This display always shows the name of the source controlled by the fader strip, its input level and color.

In the standard configuration, the following options can be enabled or disabled from the '[Settings](#) → Surface' dialog box (on the GUI):

- **Show Icons in Fader Displays** - shows the icon assigned to the source.
- **Show Userlabels** - shows the two user label lines. The text can be edited by opening the [user labels editor](#).

The images below show the four possible states of the 'Source Display'.



For Ravenna sources, the two user label lines show the Group and Stream name of the incoming stream. If a streaming connection is in progress, then you will see its status: pending, tuning, etc. The source name, icon and color can be edited using the ON-AIR Designer (under "Sources → Source Parm"):

- Source Name = the "Display Name" field.
- Source Color = the "Source Color" field.
- Source Icon = the "Source Icon" field.

8. MF Keys 3 & 4

The two large MF keys are programmed by the configuration and are defined per source. Typically, they are used to turn the channel **ON** and activate **PFL** (pre-fader listen).

6.3 diamond - Source-Specific Functions

The MF keys on each fader strip are programmed by the configuration and are defined per source. They can be used to customize the functionality of the console. For example, to have PFL on a large or small MF key.

This topic describes the available keys and their most common functions.

MF Keys

On a standard frame, each fader strip has 8 MF keys:

- MF keys 1a, 1b, 2a and 2b are labeled by the display. This makes them suitable for functions that vary depending on the type of source.
- MF keys 3, 4, 5a* and 5b are labeled by foil-printed inserts and so, usually, they are configured for the same function for all sources. The exception is if the surface supports more than one operating station. In this instance, each frame can be labeled differently and have access to a different set of sources with different MF key functions.

*MF key 5a is only available if Layer 2 is disabled by the configuration.

If the frame is fitted with a **Rotary Fader Extension** module, then this adds another 4 sets of controls to the fader strip. The main purpose is to provide localized source parameter control (described [later](#)). However, when source parameter control is switched off, they operate as MF keys 6 to 9.

- MF keys 6, 7, 8 and 9 are labeled by the displays, making them suitable for functions that vary depending on the type of source. Note that, in this mode, the four rotary controls cannot be configured and have no function.

The image below shows the MF key layout.

MF keys for Fader A (with extension module)



Standard Configuration



MF Key Layout

Typical Functions

Depending on the configuration, you may have access to some or all of the following functions.

Conf (Conference)

This key assigns the source onto the conference bus. Once **Conf** is enabled on more than one source, an N-1 mix is created. This can be routed back to the source (e.g. to their earpiece) so that they can hear the conference mix minus themselves while off-air.

The **Conf** key has four possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = conference off.
- Dim yellow = conference on for one source (Conf active).
- Full yellow = conference on for more than one source (Conf audio).
- Full green = conference on and fader open (Conf prepare).

"Conf prepare" occurs if you select **Conf** on an open fader. Nothing happens until you close the fader; once the fader is closed, **Conf** becomes active.

The conference system is described in more detail later. See [Conference & N-1](#).

AMix (Automix)

This key enables automixing. Once **AMix** is enabled on more than one source, the mix levels are adjusted automatically.

The **AMix** key has two possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = automix off.
- Full yellow = automix on.

In diamond, up to 4 independent automix groups can be configured. The group number, and other parameters, are adjusted from the **AGC** controls when a source is in access.

The automix parameters are described in more detail later. See [Automix](#).

AGn (Auto Gain)

This key enables auto gain (on mic sources). It can be used to set the analog (mic preamp) gain automatically.

The **AGn** key has two possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = autogain off.
- Flashing yellow = autogain adjustment is in process.

How to use auto gain is described later. See [Using Auto Gain](#).

TB (Talkback)

This key talks to the source via its N-1 return.

In the standard configuration, the operation is momentary so press and hold the **TB** key to activate talkback.

The **TB** key has two possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = talkback off.
- Full red = talkback on (active).



ON (Channel On/Off)

This key turns the channel on or off.

The **ON** key has two possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = channel off.
- Full red = channel on.

In the standard configuration, the channel "on" state is conditional on the fader position. This allows you to open and close a fader automatically as follows:

- To quickly turn on a channel, press the **ON** key - it lights in red and the fader opens to 0dB.
- To quickly turn off a channel, press the **ON** key again - the light goes out and the fader closes.
- To fade the level in or out, move the fader - the channel **ON** key indicates the on/off status.

PFL (Pre-Fader Listen)

This key assigns the source to the PFL bus. It can be used to listen to a source before opening its fader.

The **PFL** key has three possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = PFL off.
- Full green = PFL on and fader closed (PFL active).
- Dim green = PFL on and fader open (PFL prepare).

"PFL prepare" occurs if you select **PFL** on an open fader. Nothing happens until you close the fader; once the fader is closed, **PFL** becomes active.

In the standard configuration, the PFL bus is switched to the headphone (HP) monitoring whenever a PFL is active. The previous monitor source is re-instated once all active PFLs are cleared.

The PFL system is described in more detail later. See [PFL](#).

6.4 diamond - Central Controls

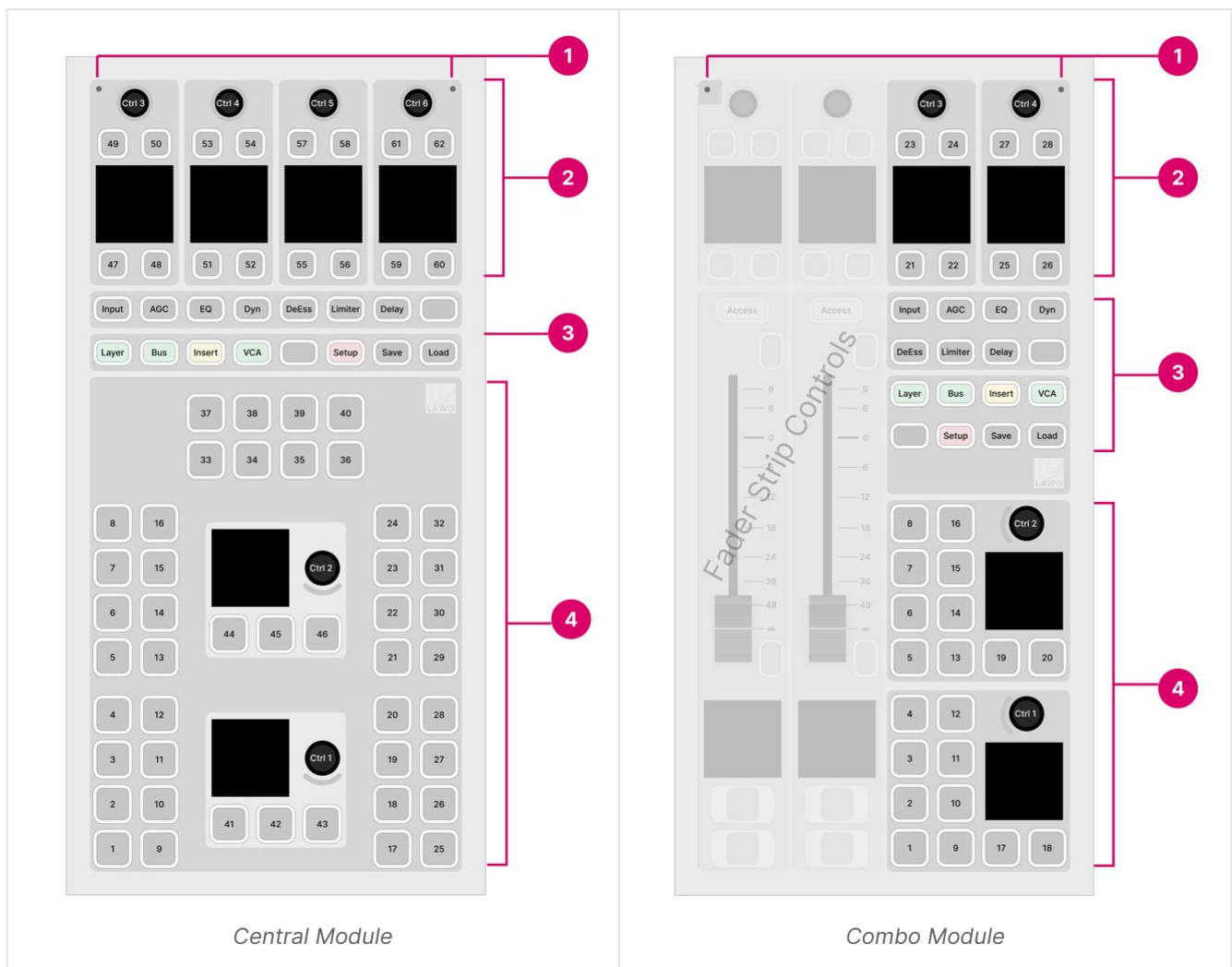
For the central controls, diamond must include either a Central or Combo module:

- The **Central** module is dedicated to central controls and provides the most functionality.
- The **Combo** module provides two additional fader strips as well as central controls, and so there is some reduction in functionality. The Combo Module can be specified in either Fader A or Fader B versions. The fader strip version has no effect on the central controls.

If the frame is fitted with additional Central or Combo Modules, then these must run in what is known as "monitor mode". The differences between this and the main module are explained at the end of this topic.

Controls Overview

The central controls are divided into the following areas.



1. [Ambient Light Detectors](#)
2. [Central Rotary Controls](#)
3. [Central Function Keys](#)
4. [MF Keys & Rotary Controls](#)

The operation of the Ambient Light Detectors (1) and Central Function Keys (3) are system-defined. The MF keys and rotary controls (4) are defined by the configuration. The Central Rotary Controls (2) are configurable (when all Function Keys are off) and system-defined (when a Function Key is selected).

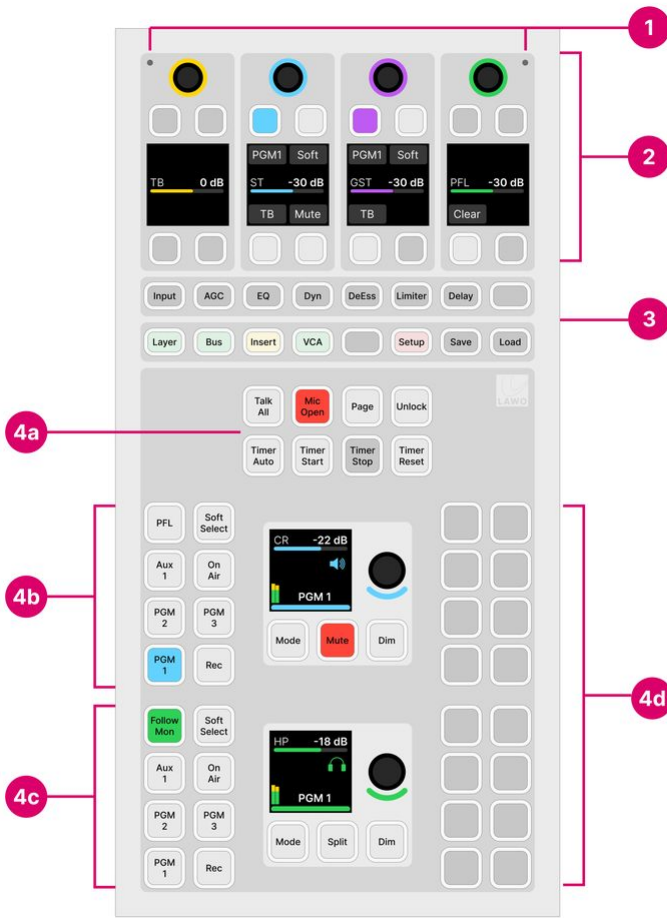
The table below compares the Central and Combo modules. The differences are highlighted in **bold**.

	Central Module	Combo Module
1 ·	2 x ambient light detectors.	2 x ambient light detectors.
2 ·	4 x small rotary controls with label displays. Each control has 4 x small MF keys.	2 x small rotary controls* with label displays. Each control has 4 x small MF keys.
3 ·	16 x function keys.	16 x function keys.
4 ·	40 x large MF keys (in five blocks of 8). 2 x large rotary controls with label displays. Each control has 3 x large MF keys .	16 x large MF keys (in two blocks of 8). 2 x large rotary controls with label displays. Each control has 2 x large MF keys .

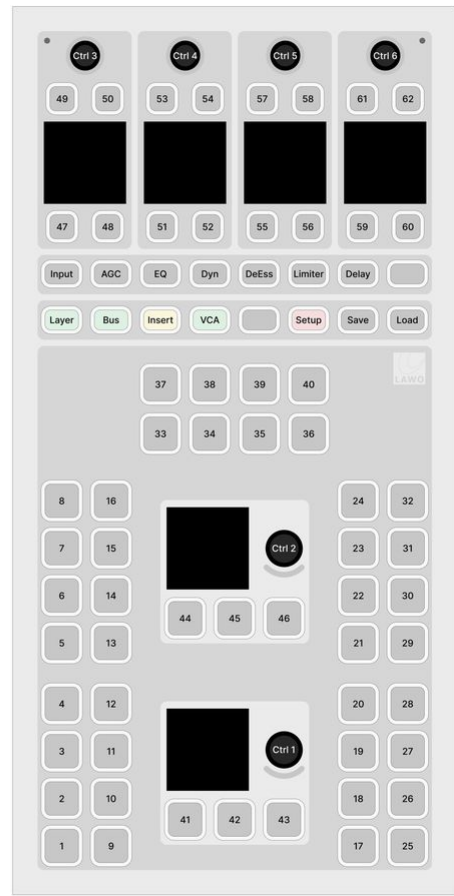
* On a Combo module, the upper controls from the two fader strips are borrowed whenever a Function Key is active. This ensures that, in this mode, there are four sets of Central Rotary Controls for system-defined functions.

The images below show the standard configuration for each module.

Standard Configuration - for Central module

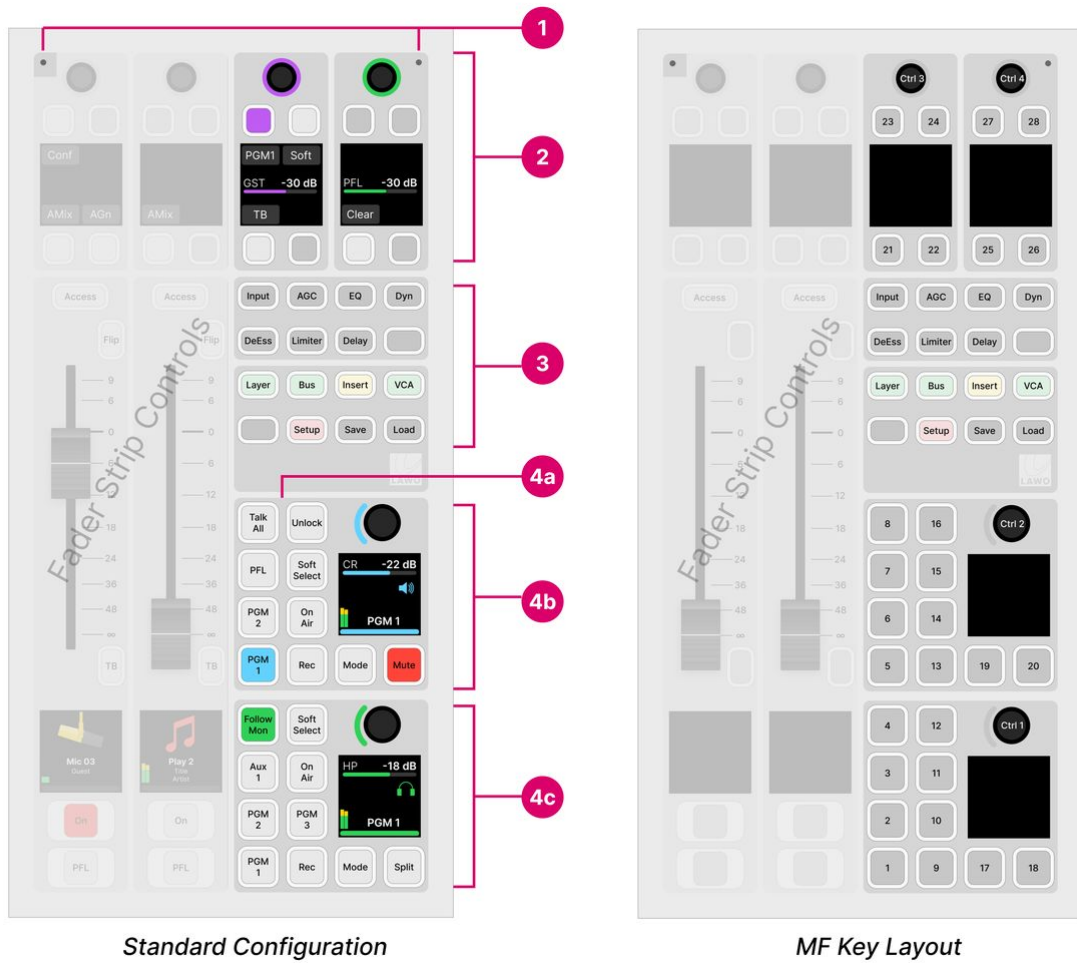


Standard Configuration



MF Key Layout

Standard Configuration - for Combo module



Operation

1. Ambient Light Detectors

The two detectors provide automatic adjustment of the surface brightness according to the ambient light levels. The detector receiving the most light always wins. So if something covers just one of the detectors by accident, this is ignored.

This function can be disabled by the configuration. In the standard configuration, it is enabled or disabled using the **Surface Ambient Light Sensor** option in the 'Settings → Surface' dialog box (on the GUI).

2. Central Rotary Controls

Each of the upper rotary controls comes with a display and four small MF keys. The controls are labeled by the display and have two modes of operation:

- When all Function Keys (3) are off, the controls are configurable.
- When a Function Key (3) is selected, the controls update to adjust the selected function. For example, press **Input** to adjust the input parameters for the channel in access. In this mode, the functionality is system-defined, and the controls work in the same way regardless of the configuration.

The Central module provides four sets of controls, while a Combo module provides two. Note that, on a Combo module, the upper controls from the two fader strips are borrowed whenever a Function Key is active. This ensures that, in this mode, the operation is identical for both types of module.

Talkback & Monitoring

In the standard configuration, when all Function Keys are off, the Central Rotary Controls are defined for talkback and monitoring.

The Central Module provides four sets of functions:

- **TB** (talkback) - input level control.
- **ST** (studio monitors) - monitor level control, source selection and talkback.
- **GST** (guest headphones) - monitor level control, source selection and talkback.
- **PFL** (pre-fader listen) - PFL bus level control and clear (cancels all active PFL selections).

A Combo module supports the last two functions: **GST** and **PFL**.


For more details, see [Talkback](#), [Monitoring](#) and [PFL](#).

3. Central Function Keys

The 16 function keys are system-defined and work in the same way regardless of the configuration.

The first 8 keys provide source parameter control for the channel in access. The second 8 keys are used for global functions. With the exception of layer switching, VCA and Snapshot Management, the function keys work in conjunction with the Central Rotary Controls (2). Please follow the links below for more information.

- **Input, AGC, EQ, Dyn, DeEss, Limiter, Delay** - press to adjust [source parameters](#) for the channel in access.
- **Layer** - press to flip all fader strips to the second layer. Note that this key resets any individual fader [Flip](#) selections.
- **Bus** - press to select a [bus assign](#) page.
- **Insert** - press to select the [insert assign](#) page.
- **VCA** - press to select a [VCA assign](#) page.
- **Setup** - press **Setup** to adjust the surface [setup options](#).
- **Save, Load** - press and hold **Unlock + Save** (or **Load**) to save (or load) a [system snapshot memory](#).

 If a Central or Combo module is running in monitor mode, then the Central Function Keys are not supported. This means that there is no access to source parameter control, layer switching, bus assign, etc.

4. MF Keys & Rotary Controls

The remaining MF Keys and rotary controls are defined by the configuration. If you are running the standard configuration, then the controls provide master functions and monitoring.

Master Functions (4a)

On a Central module, the first 8 MF keys provide master functions:

- **Talk All** - press to talk to the Guest and Studio monitoring outputs, and all available N-1 returns.
- **Mic Open** - is an indicator only. It lights in red whenever a Mic source fader is open.
- **Page** - press to toggle the VX GUI page between '[Playout](#)' and '[Channel Strip](#)'. This key has no function if you are working with the Desktop App.
- **Unlock** - press to unlock the **Save** and **Load** keys (in the Central Function Keys area).
- **Timer Auto, Start, Stop & Reset** - press to control the first [timer](#) on the GUI (Timer 1).

A Combo module supports two of these functions: **Talk All** and **Unlock**. The other functions can be operated from the GUI.

Monitoring (4b & 4c)

The two large rotary controls adjust the level/balance of the Control Room (CR) and headphone (HP) monitor outputs. The rotary controls are color-coded for easy identification: cyan = CR; green = HP. Each control can adjust two parameters: turn to adjust the first (monitor level); push down and turn to adjust the second (monitor balance). The displays show the

control's function and current value. The surrounding MF keys provide monitor source selection and other options for each output.

On a Combo module, there are fewer monitor source selection keys for the CR output (6 instead of 8), and there are no dedicated **Dim** keys for the CR and HP outputs. In all other respects, the controls are identical.

For more details, see [Monitoring](#).

Customer-defined Functions (4d)

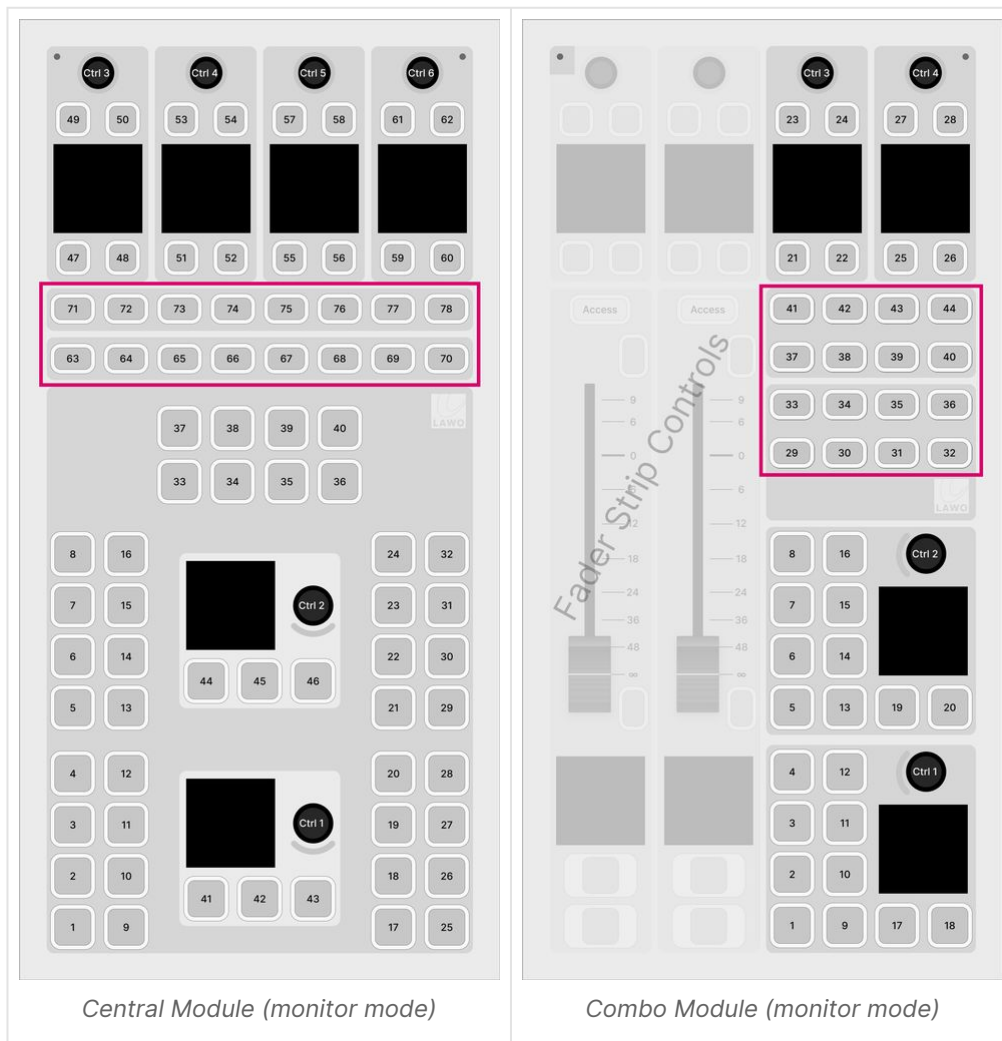
The Central module includes another 16 MF keys that can be configured for other functions. Unless otherwise specified, these keys are left undefined and come with blank labels.

On a Combo module, all of the MF keys are defined and so there are no spare keys for other functions.

Additional Central or Combo Modules

If the frame is fitted with additional Central or Combo Modules, then these must run in what is known as "monitor mode".

In this instance, all controls have a single mode of operation that is defined by the configuration. The MF key layout is the same as that of the main module, except for the 16 additional MF Keys (shown in the images below).



6.5 diamond - Powering On

To get the system operational, you will need to power on the hardware and start the GUI application. This topic describes the most efficient procedure and how to power off / shutdown.

Powering On

1. Turn on power to each of the control surface components and Power Core.
 - Each control surface frame and Virtual Extension is powered by its own external DC power supply. See [diamond - Power Supplies](#).
 - Power Core comes with dual power feeds: AC and DC. Both connections can be found at the rear of the frame. See [Power Core - Power Supplies](#).
2. Once power is applied, the system boots in a few seconds.
 - On the surface, the displays show information about each module and then, after a few seconds, the Lawo logo.
 - On Power Core, the boot-up progress is shown on the front panel.

To learn more about the boot-up information, please read the [FAQs](#) (below).

3. At the end of the boot-up, Power Core loads the latest settings (stored at shut-down). This is known as the warm start data.
 - On the surface, the Lawo logos are replaced by operational displays. The console is now ready for operation.

If the control surface is powered after Power Core, then it synchronizes to the latest settings once the IP connection to Power Core is made. In this instance, you will see the surface reset once the connection is made.

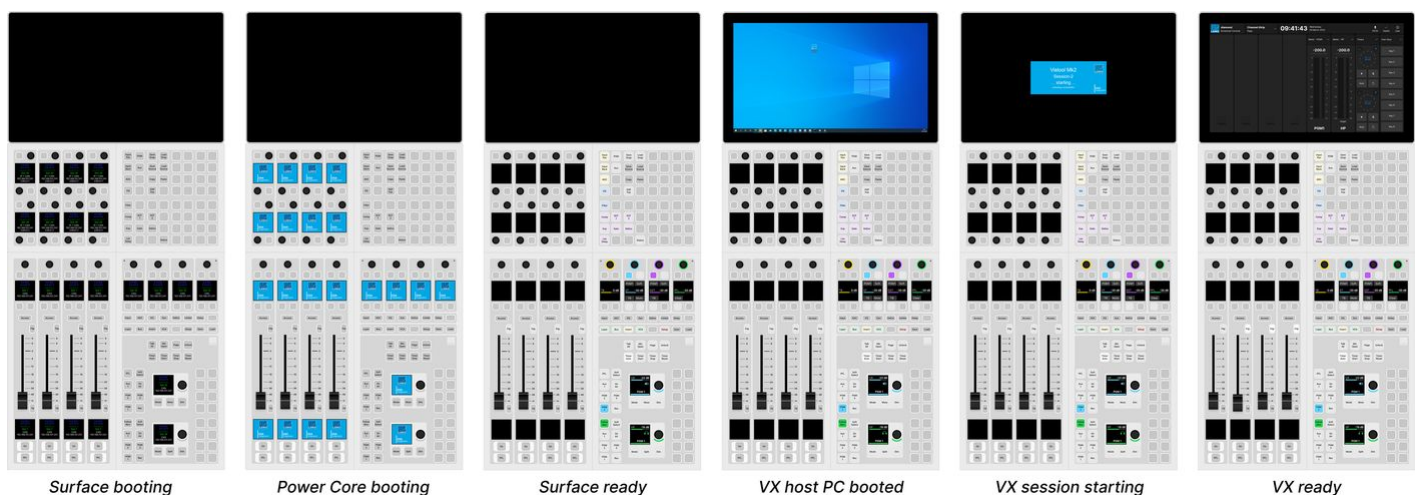
If you see the message "Not Connected" on the surface displays, then there is a problem with the network connection to Power Core. Please follow the [Troubleshooting](#) steps (below).

4. To start the Virtual Extension (VX) GUI, turn on the host PC and double-click on the Start diamond desktop icon.

If the surface is not fitted with the Virtual Extension option, then similar functionality can be achieved by starting the diamond Desktop App.

- The session loads and connects to the hardware. Providing there are no error messages, the GUI is ready for operation.

The images below show the complete process.



Troubleshooting

The message "Not Connected" appears on the surface displays.

This message appears if there is a problem with the network connection to Power Core.

- Check the network cabling from the surface, and the IP addresses of the diamond frame and Power Core.
- Check the "[Control Interface](#)" settings in both diamond and Power Core.
- Check that the module above the frame's connector board is fitted correctly, with all screws tightened. If the screws are not fixed properly, then the module may not be plugged fully into the connector board underneath. This can lead to an intermittent network connection.

The displays on the surface look blank.

This can happen if there are no sources assigned to the fader strips. Either load a snapshot (to recall an existing setup) or assign some sources manually to the fader strips.

The correct pages do not appear on the GUI display(s)

If the correct pages do not appear on the GUI, then there could be a problem with the start script. Check the settings prepared in VisTool Admin.

The message "No License Found" appears on the GUI display(s).

If a software license is not found when you start the GUI, then this error message appears. Follow the [online activation procedure](#) to activate your license. If the license is installed onto a USB dongle, then check that the dongle is connected to the host PC!

The message "Not Connected" appears on the GUI display(s).

This message appears if the host PC loses its network connection to Power Core. You should check the network cabling from the host PC, and the IP addresses of the host PC and Power Core.

FAQs

Q: What information is shown on the surface displays during boot-up?

A: The following information is shown on the control surface modules during boot-up:

- Firmware revision
- Module Type (e.g. FADER A).
- Module ID (e.g. Slot 7).
- Method of Communication to the Control Interface (e.g. CAN).
- IP Address of the Control Interface. This is the control IP for diamond.
- Multicast Address group for the Control Interface. This is shown on the frame's IP module only.

Q: What information is shown on Power Core during boot-up?

A: The Power Core front panel changes shows the boot-up progress as follows:

- First, the display and **STATUS** LED are black and unlit.
- Then, the Lawo logo appears and the **STATUS** LED lights in white.
- As soon as boot-up is complete, the **Welcome** page appears and the **STATUS** LED starts to blink; its color reflects the sync status.

If the **STATUS** LED does not start to blink, then the device has an internal problem. Please reboot the device as a first step.

Q: What is a warm start?

A: When Power Core loads its warm start data, it means that the system returns to whatever the settings were at the last power off.

Please note:



- The last known PTP Master/Slave mode may not be reinstated if Power Core is set to operate as PTP Slave only.
- If you perform a cold start, then the system ignores the warm start data and resets to the default values stored in the configuration.
- If this is the first time you have powered the device "out of the box", then the system loads a very basic configuration that allows Power Core to boot. To get the system operational, you will need to upload the standard configuration or a custom configuration using the ON-AIR Designer.

Q: Why does the message "System has been restarted" appear on the GUI display(s)?

A: If Power Core restarts while the GUI application is running, then the message "System has been restarted" appears. Touch or click on the message to clear it.

Powering Off / Shutdown

There is no special shutdown procedure for the hardware. So, to power down the control surface components and Power Core, turn off the mains power.

To close the GUI application, click on the User menu (top right) and select **Close App**.

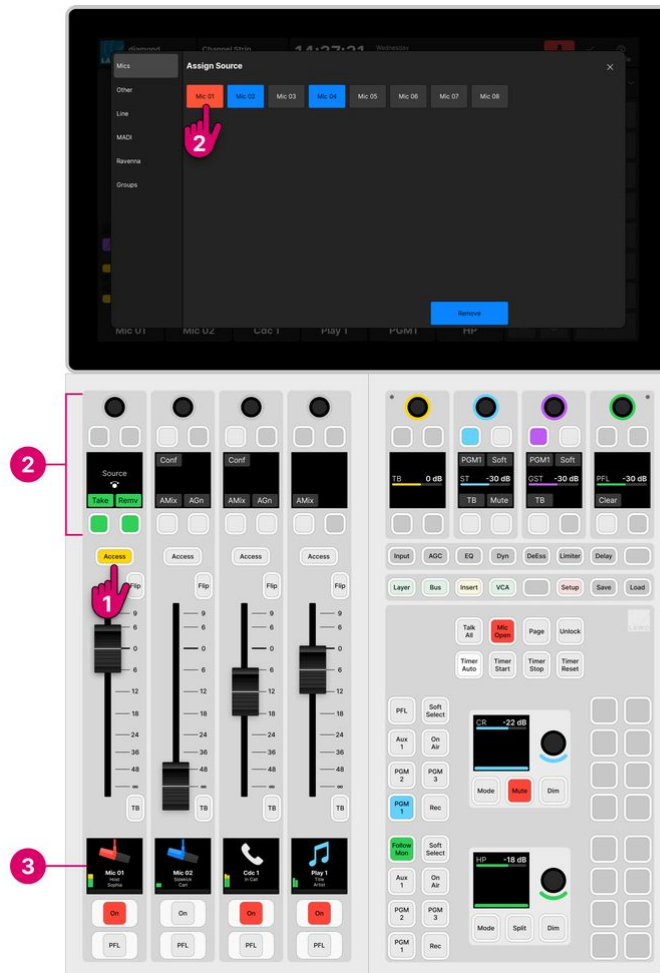
6.6 diamond - Fader Strip Assign

Any available source can be assigned to any fader strip. This allows you to choose which sources are active in the mix.

The list of available sources is defined by the configuration and may include any source, sum bus or VCA master.

Operation

The steps below describe the **Access** key colors and available sources defined in the standard configuration. These aspects may vary if the configuration is customized.



1. Select the fader strip you wish to assign by pressing an **Access** key twice in quick succession (double-press).

The **Access** key lights (full yellow), the fader strip switches into "strip assign" mode and the 'Assign Source' dialog box appears on the GUI.

In the standard configuration, the available sources are grouped into pages, and the buttons are color-coded to show which sources are already assigned to the surface:

- **Red** = the source is assigned to a fader strip and the fader is open.
- **Blue** = the source is assigned to a fader strip and the fader is closed.
- **Grey** = the source is not assigned to the surface.

2. Select a source using either the fader strip controls or on-screen buttons.

On the fader strip...

- Turn the rotary control to scroll through the available sources, and press **Take** to assign the selected source.
- Alternatively, press **Remv** to remove the current source (and leave a blank fader strip).



- To cancel out of strip assign mode without changing the current assignment, press the **Access** key once - it returns to low white (the default mode).

On the GUI...

- Select a page (e.g. **Mics**) and touch an available source to assign it to the fader. If you choose a red or a blue source, then it is moved to the new fader strip at its current level.
- Alternatively, select **Remove** to remove the current source (and leave a blank fader strip).
- Select **X** to close the dialog box and cancel out of strip assign mode without changing the current assignment.

3. Once an assignment is made, the fader strip updates and you should see the new source name/label/icon in the Source Display.

The fader strip controls return to their default functions, and the 'Assign Source' dialog box closes.

Source Pages (on the GUI)

In the standard configuration, the available sources are grouped into six pages:

- **Mics** - microphone inputs (connected directly to Power Core).
- **Other** - other audio inputs (connected directly to Power Core).
- **Line** - line-level inputs (connected directly to Power Core).
- **MADI** - MADI inputs (connected directly to Power Core).
- **Ravenna** - RAVENNA inputs (connected to the IP network). Each input is configured as a stereo stream receiver.
- **Groups** - VCA masters.

6.7 diamond - Input Gain and Pan

The quickest way to adjust input gain, or the left/right pan position, is to turn the fader strip rotary control.

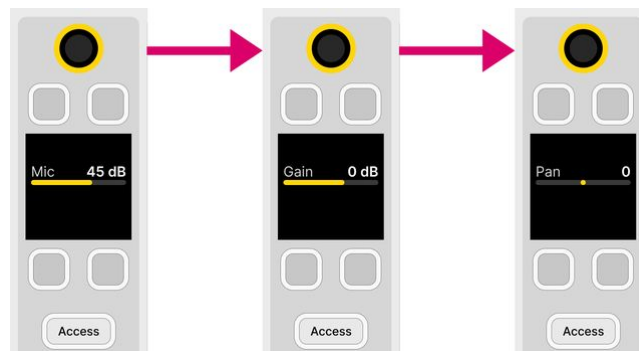
For a microphone source, two separate input gains are available: mic gain in the analog domain (before the A-D converter) and channel gain in the digital domain (after the converter). For other source types, only the channel gain is available.

For a mono source, you can adjust the left/right pan position. This changes to input balance on a stereo source.

The gain ranges and other input parameters are described later. See [Input & Pan Parameters](#).

Operation

The steps below describe how to adjust input gain and pan from the fader strip rotary control.



1. Turn the fader strip rotary control to adjust the first parameter - you will see both its name (e.g. **Mic** gain) and value (e.g. **45dB**).
2. Press down on the rotary control to step to the next parameter (e.g. channel **Gain**).
3. Press down again to reach the next parameter (e.g. left/right **Pan**).
4. If you keep tapping down, then the sequence repeats.

On a Ravenna source, the parameter sequence is extended to include the [stream selection](#) for the receiver.

✓ **Tip:** To interrogate parameters without making a change, touch the rotary control for 1 second - the display shows the parameter and its current value.

6.8 diamond - Auto Gain

Auto Gain is available for all mic sources. It can be used to set the analog (mic preamp) gain automatically.

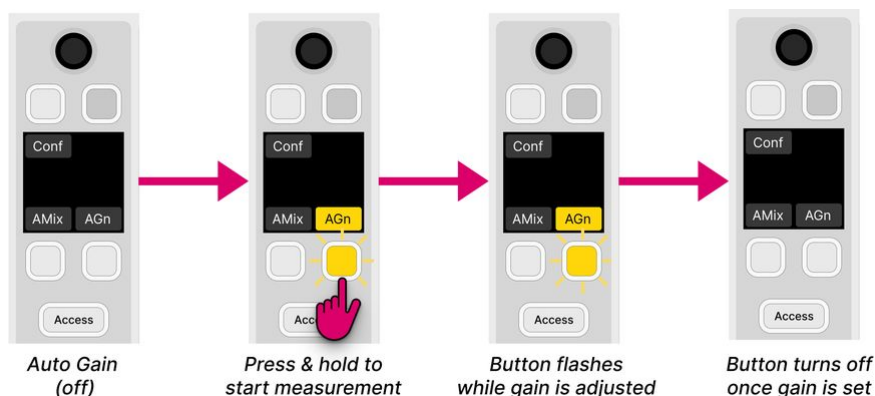
The system works by measuring the incoming signal level over a period of 5 seconds. Using an average of that measurement, it then sets the mic gain value automatically.

Please note:

- The gain adjustment happens automatically and so it is best to enable Auto Gain before the channel goes on-air. Otherwise, the signal may distort while Auto Gain finds the ideal level.
- To use the system effectively you will need to ask the talent to speak into the microphone at their intended "on-air" level.

Operation

The steps below describe how to use the Auto Gain feature.



1. Start by asking the talent to speak and then turn on Auto Gain for the Mic source.

The simplest method is to use the **AGn** soft key on the source's fader strip. Alternatively, you can put the Mic source into access and enable **Auto Gain** from the [Input](#) page on the GUI.

In both cases, you must press and hold the button for more than one second.

2. The measurement now takes place and the Auto Gain value is adjusted.

During this time, the **AGn** button flashes in yellow to indicate that automatic gain adjustment is in progress. If the channel is turned **ON**, then you will hear the gain changing.

3. After 5 seconds, the Auto Gain value is applied.

The **AGn** button turns off showing that the process is complete. The mic source is now ready for your talent to speak on-air.

i At any time, you can use the fader strip rotary control to adjust the **Mic** gain manually. If you do this while Auto Gain is active, then the automatic gain adjustment is canceled.

6.9 diamond - Stream Selection

On a Ravenna source, it is possible to select a stream from the network using the fader strip rotary control and soft keys. This allows you to change which streams are active in the mix quickly and easily.

Stream Naming & Organization

To support this feature, streams must be announced to the network using the following naming convention: "Group:Stream". When using dynamic input switching, this provides a two-step navigation process: first select the Group, and then browse through all available Streams within that Group. Both the Group and Stream labels can be up to 8 characters.

By default, the labels are retrieved automatically from the network. Streams with the same Group name are combined into a single Group even if they are provided by different devices. The list presented to the operator is updated automatically so that newly discovered streams are added, and streams that can no longer be detected are erased.

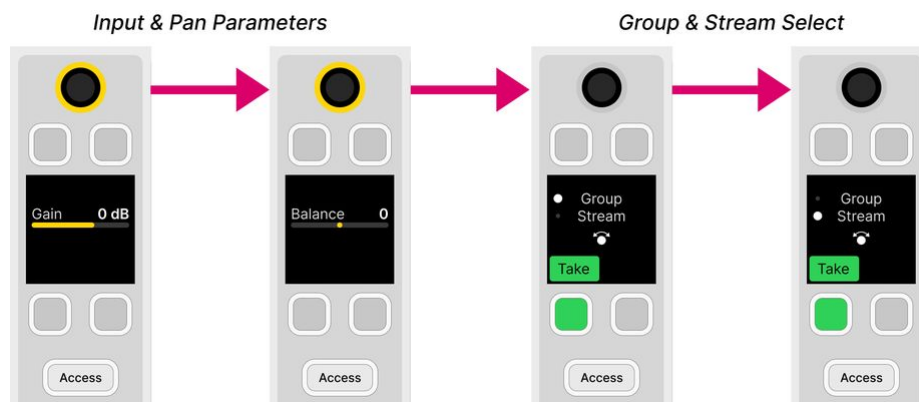
To prevent access to certain streams, filters can be applied in the configuration.

In cases where streams cannot be named using the above convention, it is possible to map specific streams to pre-configured labels. In this instance, the list of streams presented to the operator is fixed and is independent of stream availability.

Operation

1. On a Ravenna source, press down on the fader strip rotary control to step through the parameters until you reach the stream selection menu.

The display shows either the current Group and Stream name, or the text "not in pool".



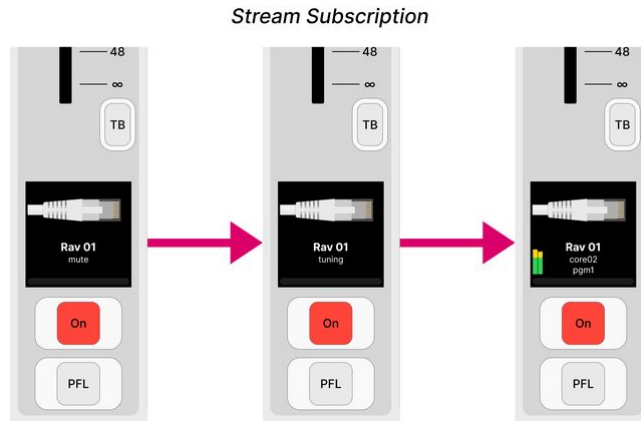
2. Turn the rotary control to scroll through the available Groups and press down to make a selection.
3. Turn the rotary control again to scroll through all available Streams with that Group.

If your network supports dynamic stream detection, then the list of available streams updates automatically.

4. Once you are happy with the selection, press the **Take** key to start the subscription process.

There will be a brief pause in the audio while the streaming connection is configured. During this time, the connection status is shown in the fader strip Source Display. The meaning of each message is described in the table [below](#).

If a stream is being received for the first time, then the tuning process can take a couple of seconds. The initial tuning information is then re-used whenever you select the same stream, thereby speeding up all subsequent connections.



Once the subscription is successful, the Source Display updates to show the Group name, Stream name and Source name. For example:

- core02 = the Group name (detected from the network).
- pgm1 = the Stream name (detected from the network).
- Rav 01 = the Source name (defined in the system configuration).

If signal is present, then you will see the input level on the Source Display meter.

Stream Subscription: Status Messages

Whenever you subscribe to a stream, the fader strip Source Display reports back on the status of the connection.

Under normal circumstances, the expected sequence of messages is as follows:

Mute -> (Pending) -> Tuning -> (Unstable) -> <Stream-Name>

Note that messages shown in () may or may not appear. The table below explains the meaning of each message.

Status Message	Meaning
Mute	This indicates that no stream is connected to the Ravenna input.
Pending	Appears if the connected stream is not available. In this instance, the console will wait for the stream announcement to appear on the network, and then automatically initiate the subscription process. Typically, this message does not appear when selecting a stream from a RAVENNA source pool, as the list presented to the operator is constantly updated (in the background). The message can appear if the source has been configured using a default subscription. For example, if a stream is connected via VSM, or following a warm start (while restoring the last known connection).
Tuning	Appears while the console measures the streaming quality, and sets its stream receiving parameters to ensure correct audio playback. During the tuning cycle the audio input is muted, and then unmuted once the task is complete. If a stream is being received for the first time, then the tuning process can take a couple of seconds. This initial tuning information is stored in permanent memory. It is then used whenever you select the same stream, thereby speeding up all subsequent connections.



Status Message	Meaning
Unstable	<p>Appears if the stream jitter is extremely high and cannot be dealt with; if the stream stops for some reason; or if the PTP clock information is missing. You can open the RAVENNA pages (in the Web UI) to view additional information on specifics.</p> <p>In this instance, the console will attempt to heal itself, and mute the audio input until the stream reaches stable conditions.</p> <p>Typically, it is very rare to see this message during the subscription phase.</p> <p>If an unstable stream is due to a PTP problem, then the console will start a new "Tuning" cycle before the audio input is unmuted.</p>
<Stream-Name>	Once the subscription is successful, the name of the connected stream is displayed.
On rare occasions, the following error messages may also appear.	
PoolErr	<p>Appears if there is a problem connecting to the stream.</p> <p>This can occur if the selected stream is not available on the network any longer, but is still presented in the console's list of streams. Since this list is updated cyclically, the problem should not persist.</p> <p>If you see this error, please repeat the subscription process. If the issue persists, check your network settings.</p> <p>The audio input will be muted while the error message is displayed.</p>
RavErr	<p>Appears if there is an invalid combination of status flags for the RAVENNA stream.</p> <p>Since the flags are updated cyclically, the error should heal itself. If the issue persists, then check the RAVENNA pages (in the Web UI).</p> <p>The audio input will be muted while the error message is displayed.</p>

6.10 diamond - Bus Assign

Once a source is assigned to the surface, it can be routed to any of the available summing buses.

The list of available summing buses is defined by the configuration. Up to 32 buses are supported, where each one can be mono, stereo or 5.1. The configuration defines the name of each bus plus whether the bus can be assigned pre or post-fader, or post-fader only; and which page the bus assignment is made from.

Up to eight bus assign pages can be configured, where each page can access up to four buses.

From each source, the operator can adjust:

- Bus assign on/off.
- Bus assign pre/post (if the bus is configured for pre or post-fader assignments).
- Bus send level - from -120dB to +9dB.

Operation

The standard configuration defines 8 stereo summing buses and two bus assign pages: PGM and Aux.

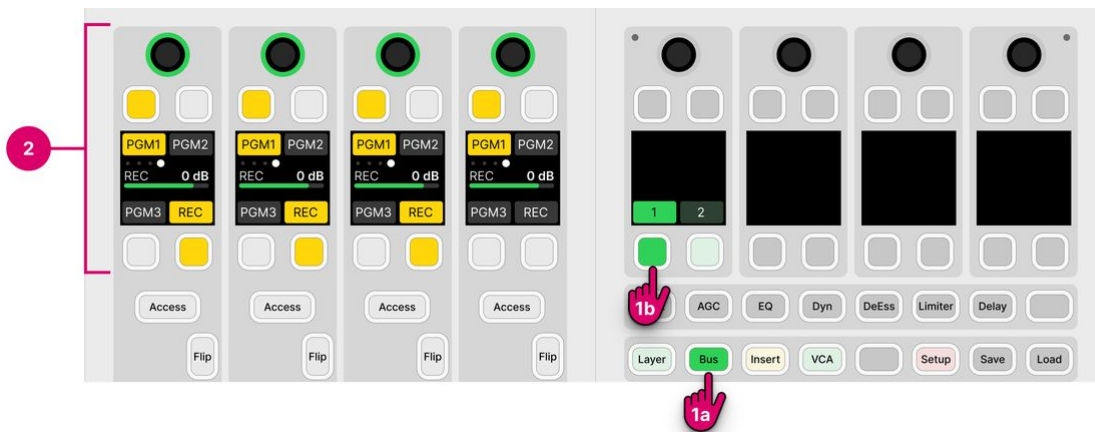
- Page 1 (PGM) - handles the assignments to the four main buses: PGM 1 to 3 & REC.
- Page 2 (Aux) - handles the assignments to the four auxiliary buses: Aux 1 to 4.

The assignments can be either pre- or post-fader for Aux 1 to 4, and post-fader only for PGM 1 to 3 & REC.

The 'Channel Strip' page (on the GUI) provides the best overview of the current assignments. Note that this page is for information only; you cannot edit the bus assignments from here.

To edit the assignments, you can use either the surface or 'Source Parameter' dialog box as follows.

On the surface...



1. From the central controls, press **Bus** and select a page (e.g. 1).

The upper controls on each fader strip switch into "bus assign" mode. The four soft key labels show the name of the available buses. If a soft key has no label, then there is no bus allocated (in the configuration).

The soft key colors show the assignment status:

- Dim white = source is not assigned (off).
- Yellow = source is assigned (post-fader).
- Red = source is assigned (pre-fader).

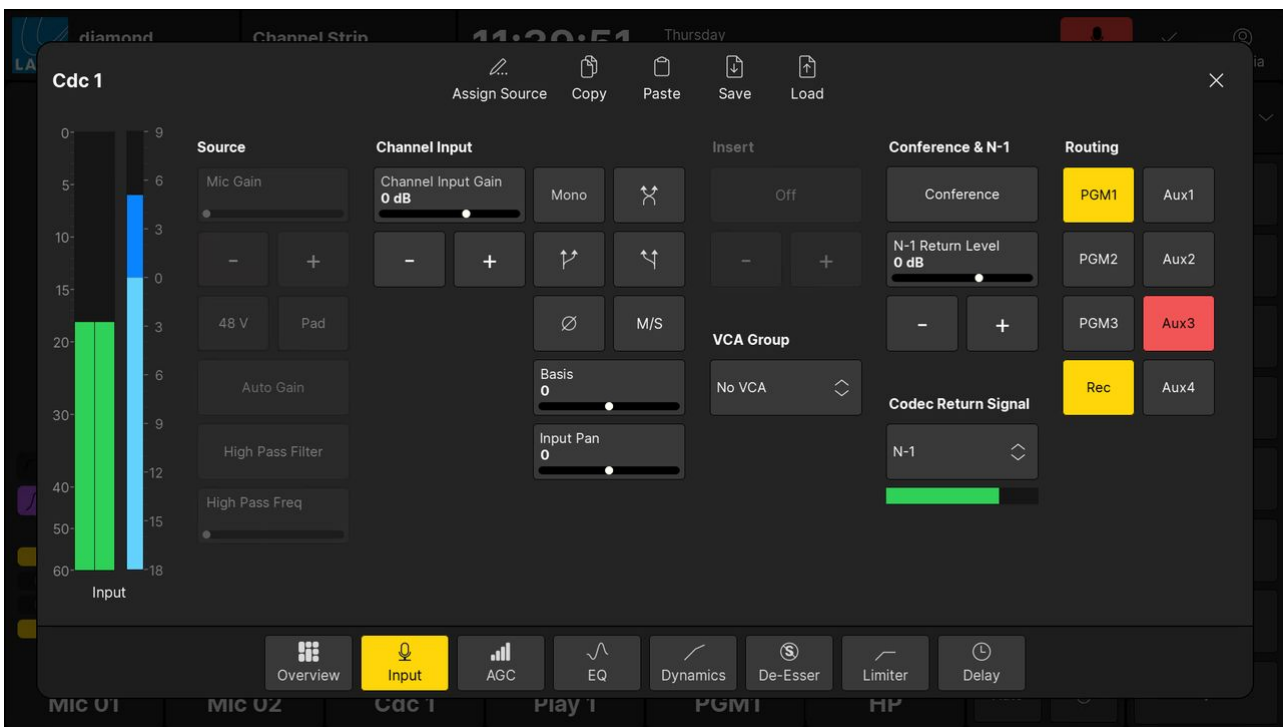
At any time, you can select a different page to access more assignments. If a page key is unlit, then there are no buses allocated to the page (in the configuration).

- Use the fader strip soft keys (and rotary control) to change the assignments (and adjust the send levels).
 - To toggle an assignment (on/off), press the soft key.
 - To change an assignment to pre-fader, touch the rotary control for about 1 second and, while holding, press the soft key. If a bus is configured for post-fader assignments only, then the pre-fader option cannot be selected.
 - To change a bus send level, press down on the rotary control until the display shows the correct bus name (e.g. REC). Then turn the control to adjust the level.
- When you have finished editing the assignments, deselect **BUS** (on the central controls module).

The fader strip controls return to their default functions.

On the GUI...

Open the 'Source Parameter' dialog box by pressing a fader strip **Access** key, and choose the **Input** page.



- Use the buttons under 'Routing' to change the bus assignments.
- If a bus supports both pre and post-fader assignments, then keep pressing to cycle through the options.

The button colors are the same as on the surface:

- Grey = source is not assigned (off).
- Yellow = source is assigned (post-fader).
- Red = source is assigned (pre-fader).

Connecting a Bus to an Output

Usually, the configuration defines some default audio connections from the summing buses. This can be checked or edited using the ON-AIR Designer (under "Audio Output → <I/O> Out → Default Audio"). The default audio connections are described later in the [Standard Configuration Specification](#).

If you are running the standard configuration, then you can also use the 'Routing' page (on the GUI) to connect a bus to a destination:

- Select **Routing** (from the GUI page menu) to open the 'Routing' page.
- Under 'Sources', select the **Busses** tab and choose a bus (e.g. **Rec**) - the selection flashes in blue.



3. Under 'Destinations', select an output category (e.g. **Ravenna Outputs**) and choose an output (e.g. **Rav Out 02**) - the selection flashes in blue.
4. Press **Connect** - the connection is made.

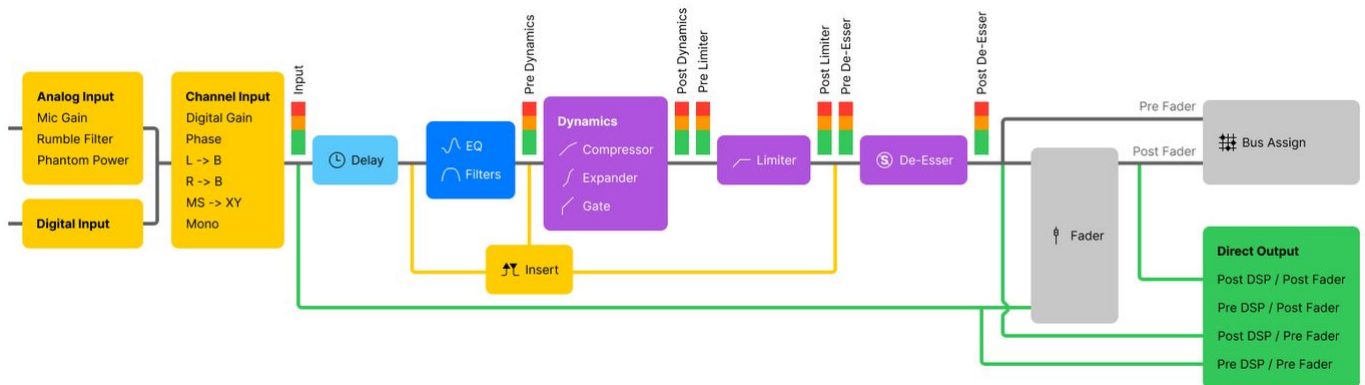
6.11 diamond - Source Parameters

The number of available sources, and whether 5.1 is supported, is determined by the Power Core [license](#). Note that a stereo source uses 2 resources and a 5.1 source uses 6 resources.

By default, all source channels come with a full complement of DSP. If you wish to simplify the operation, then it is possible to disable the individual DSP blocks (per source). This is done by editing the system configuration using the ON-AIR Designer (under "Source → Parm").

Signal Flow

The diagram below shows the signal flow for a diamond source.



The signal processing blocks are:

- **EQ:** 3-band parametric EQ plus 2-band filters.
- **Dynamics:** Compressor, Expander and Gate.
- **Limiter:** independent Limiter.
- **Delay:** up to 5.3 seconds, adjustable in ms, meters or frames.
- **De-Esser:** gain reduction for sibilant frequencies.
- **AutoMix:** automatic level adjustment for a group of sources.

In addition, the source's **insert point** can be used to insert an external device. This works by assigning one of the 16 available inserts defined by the configuration. Thus, at any one time, up to 16 external inserts are possible.

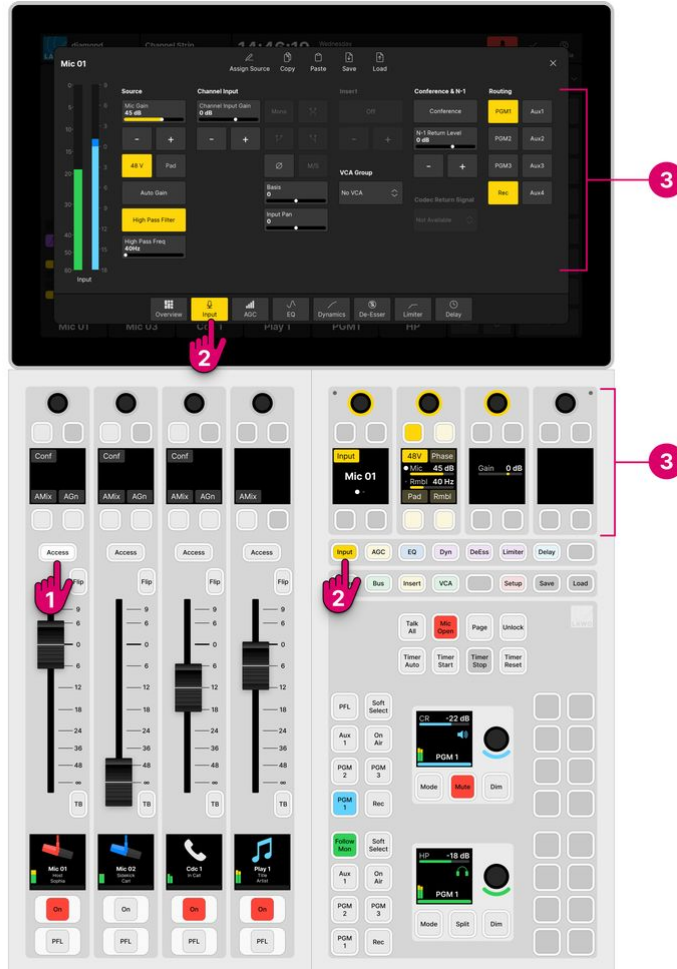
Every source channel also includes an **input section** and **metering**, plus a **direct out** is available for each fader. The pick-up points for these elements are as follows:

- **Input meter** - is fixed and comes after the input section and before all processing. This meter is shown in the fader strip Source Display and on the GUI Channel Strip page (in the standard configuration).
- **Pre/Post Dynamics & Limiter meters** - are fixed and show the level at the input and output of the Dynamics and Limiter sections. The meters are used on the GUI Source Parameter pages (in the standard configuration).
- **External insert point** - can be switched to one of three positions by the operator:
 - pre-EQ
 - post-EQ
 - post Dynamics (or post Dynamics and Limiter if both are configured)
- **Direct out** - is defined per fader (and not per source). Its position is defined by the configuration and remains fixed during the operation. There are four possible options:
 - post-processing + post-fader
 - pre-processing + post-fader
 - post-processing + pre-fader
 - pre-processing + pre-fader

Operation

The steps below describe the **Access** key colors and GUI pages defined in the standard configuration. These aspects may vary if the configuration is customized.

If the console is fitted with extension modules, then these can be used to adjust parameters for more than one source at a time. The operation of these controls is described later. See [Working with Extension Modules](#).



1. Select a source by pressing a fader strip **Access** key.

The **Access** key lights (full white), the Central Rotary Controls switch into "source parameter" mode and the 'Source Parameter' dialog box appears on the GUI. The last viewed page opens automatically.

2. Choose the parameters you wish to adjust by pressing a Central Function Key (on the surface) or a page button (on the GUI).

For example, press **Input** to adjust the input and pan parameters.

There are seven DSP functions to choose from. The controls use the Lawo LUX color-coding for easy identification: **Input** (yellow), **AGC** (yellow), **EQ** (blue), **Dyn** (magenta), **DeEss** (magenta), **Limiter** (magenta) and **Delay** (cyan).

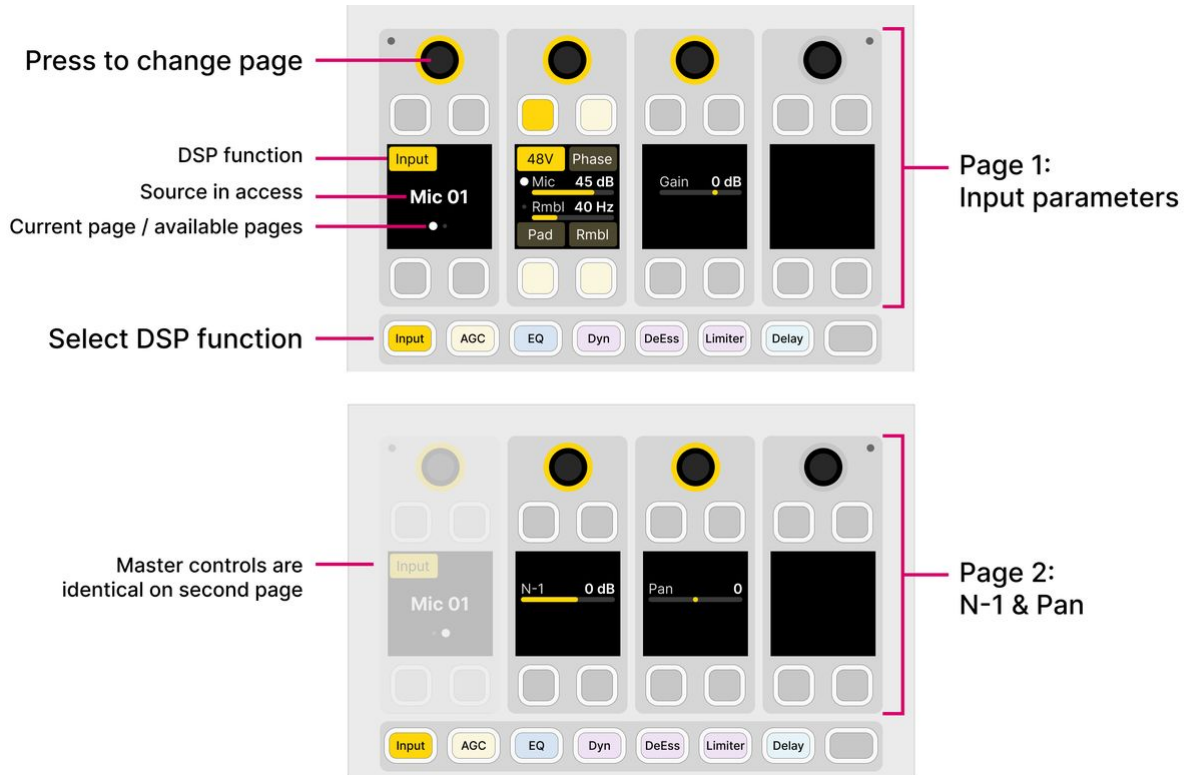
The surface and GUI pages are selected independently. This allows you to adjust different parameters in parallel - for example, EQ on the surface and Dynamics on the GUI. If a DSP block is disabled in the configuration, then the corresponding controls are unlit (on the surface) and greyed out (on the GUI).

The **Overview** page appears only on the GUI and is for information only. If you touch something on the **Overview**, then the corresponding parameter page opens.

DSP parameters can be protected so that only certain users can make changes. If this is the case, then you must be logged in (with DSP parameter rights) in order to open the relevant pages. The rights can be edited by an administrator of the user access rights system.

3. Adjust the parameters from either the surface or GUI.

On the surface...



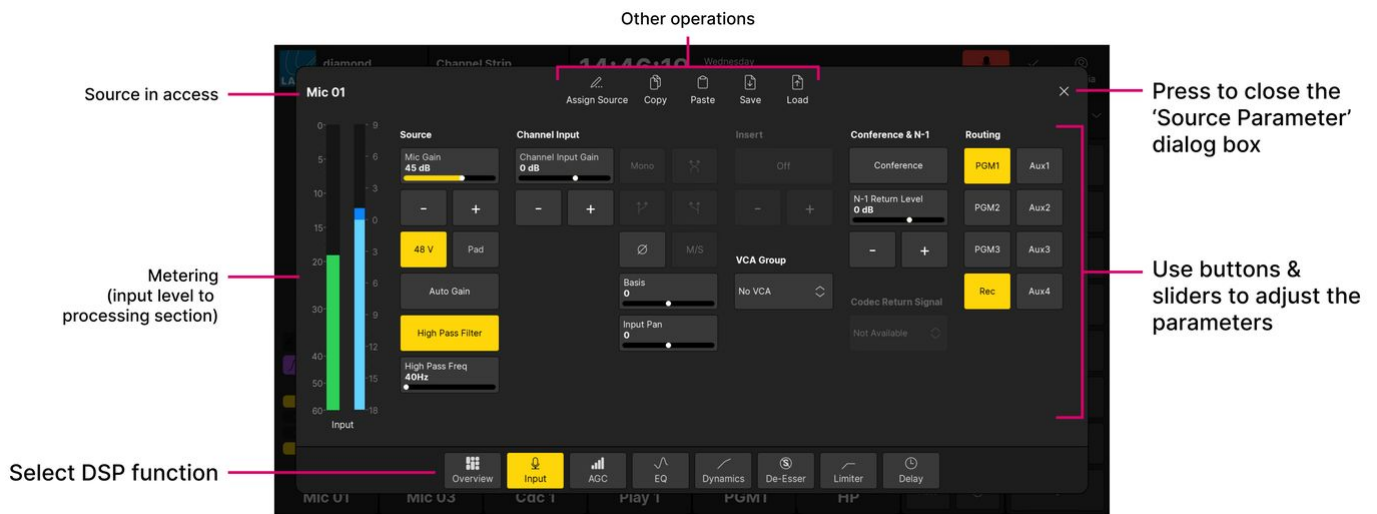
The master controls (on the left) provide information and page switching:

- The display shows the selected function (e.g. **Input**) and source (e.g. **Mic 01**).
- If the processing section has a master on/off key, then this also appears here. (Applies to all DSP functions except Input).
- If there is more than one page of parameters, then a dot appears below the source name. This indicates the current page and the number of available pages. Press down on the rotary control to step through the pages.

The remaining controls are used to adjust the parameters:

- For switched parameters, press the soft key to turn the option on or off: lit (full) = on; lit (dim) = off.
- For variable parameters, turn the rotary control to adjust the value - the current value is shown in the display. If a second parameter is available, then push down and turn to adjust the second function. The dot indicates the current function.
- If a rotary control or soft key is unlit, then it has no function.

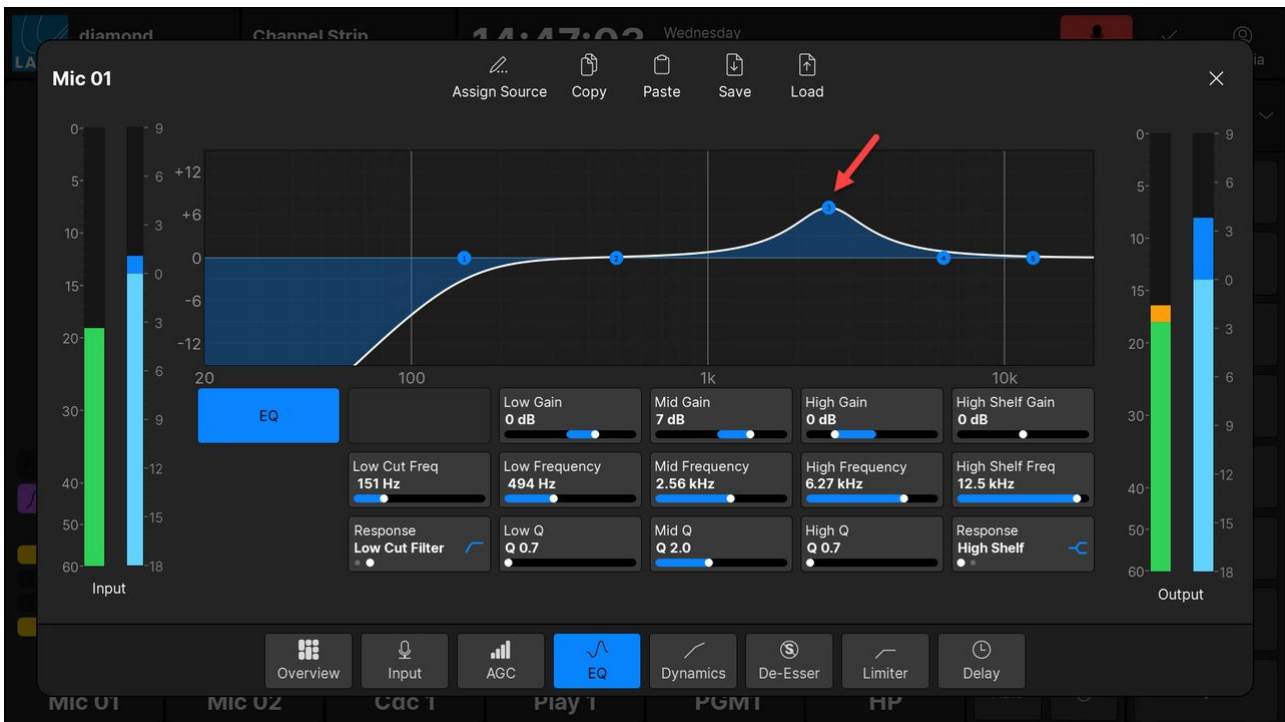
On the GUI...



All of the parameters are shown on a single page:

- For switched parameters, touch the button to turn the option on or off: lit = on; unlit = off.
- For variable parameters, touch and drag anywhere inside the parameter box: either left/right or up/down. Or use the on-screen + and - buttons.
- If an option is greyed out, then the parameter is not available. For example, the stereo input options are not available for a mono source.

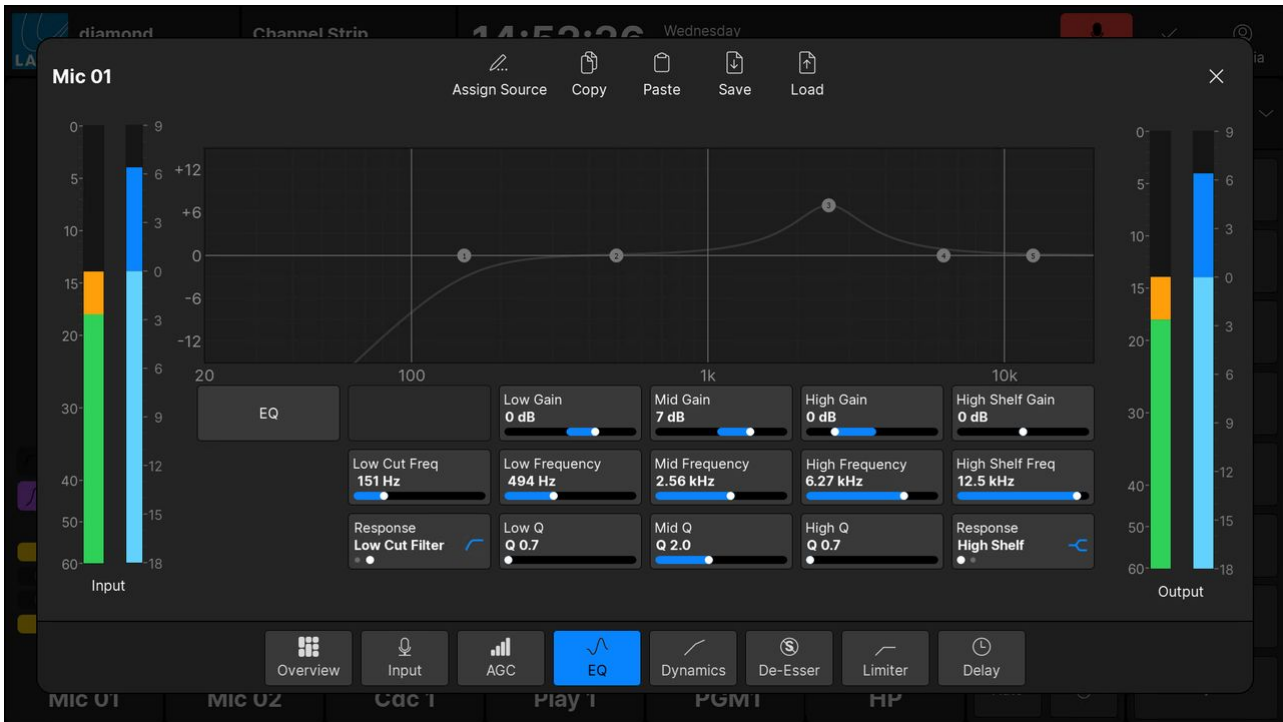
On the **EQ** page, you can touch and drag the numbered points on the EQ curve to adjust the gain and frequency of each band.



On the **EQ** and **Dynamics** pages, the curve provides an easy way to check if the processing is turned on or off:

- Curve (filled) = processing on.
- Curve (not filled) = processing off.

In the example below, the EQ is turned off.



For convenience, the following operations can be accessed from the top of every page:

- **Assign Source** - press to open the 'Assign Source' dialog box. From here you can assign a different source to the selected fader strip.
- **Copy** - press to copy settings from the source in access to the clipboard.
- **Paste** - press to paste settings from the clipboard to the source in access.
- **Save** - press to open the 'Save Snapshot' dialog box.
- **Load** - press to open the 'Load Snapshot' dialog box.

When using **Copy** and **Paste**, note that all of the parameter sections are included and not just the one in view.

4. At any time you can press **Access** on a different fader strip to adjust the parameters for another source.
5. When you have finished adjusting the parameters, deselect the **Access** key.

The surface controls return to their default functions, and the 'Source Parameter' dialog box closes.

- ✓ You can quickly check which DSP sections are enabled by looking at the 'Processing' area on the GUI Channel Strip page.

The next few topics describe the source parameters in more detail.

diamond - Input and Pan Parameters

Input and pan parameters are available for all sources. The exact parameters depend on the format of the source and how it is connected.

Mono Sources

For a microphone source, you can adjust input parameters in the analog domain (before the A-D converter) AND in the digital domain (after the converter). For other source types (line-level, IP, AES3, MADI), only the digital domain parameters are supported.

The analog (mic preamp) section includes:

- **Mic** - mic preamp gain from +0dB (or -20dB with Pad) to +70dB.
- **48V** - 48V phantom power.
- **Pad** - 20dB Pad (reduces the mic gain by 20dB). When the Pad is active, the Mic gain value updates accordingly.
- **High Pass Filter** - a high pass 'rumble' filter to roll-off subsonic frequencies. The roll-off point can be set to 40Hz, 80Hz or 140Hz.

In the digital domain, you can adjust:

- **Phase** - phase reverse.
- **Gain** - channel gain from -30dB to +18dB.
- **Pan** - left/right panning onto the stereo buses.

Stereo Sources

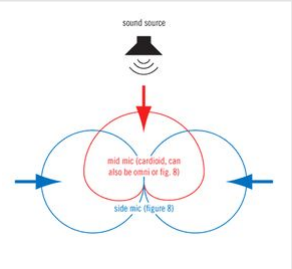
For a stereo source, there are some additional parameters to deal with changes to the incoming audio. For example, if there is no signal present at the right input, you can turn on L->B (Left to Both).

The complete parameter list is as follows:

- **Phase** - phase reverse for the left input.
- **Gain** - channel gain from -30dB to +18dB.
- **Basis** - left/right width.
- **Stereo or M/S** - changes the mode of operation from normal stereo to MS->XY decoding (described below).
- **L->B** - the left input is routed to both sides of the stereo channel.
- **R->B** - the right input is routed to both sides of the stereo channel.
- **Mono** - left and right inputs are summed with a -3dB gain offset.
- **Side** - the left input and right input are reversed (left input to right side of channel, and right input to left side of channel).
- **Pan** - left/right panning (balance) onto the stereo buses.

M/S Decode

M/S is a stereo recording technique that uses two coincident microphones, one pointing to the front (Middle) and the other (bi-directional) at right angles to provide the stereo ambience (Side). The system provides M-S to X-Y decoding to turn a Middle and Side signal into normal Left and Right stereo.



The incoming M/S signal should be connected to a stereo source:

- Left Input - from the Middle (M) signal.
- Right Input - from the Side (S) signal.

When the M/S stereo mode is active, the following calculations are applied:

- Left channel = L+R (M+S)
- Right channel = L-R (M-S)

By adjusting the **Pan** (Balance) control, you can vary the ratio of Middle to Side, and thereby adjust the width of the stereo field.

Surround Panning

If surround panning is enabled for a source, then the pan parameters are extended as follows:

- **LCR Pan** - left/center/right pan position.
- **F/B Pan** - front/back pan position.
- **Slope** - from 0.0 to 1.0.
- **LFE** - low-frequency effect (subwoofer) level, from -120 to +9 dB.

The **Slope** adjusts signals feeding the discrete center channel within the surround field. It may be used to balance between discrete and phantom center signals. To see the effect, position the source at front center, and adjust the slope to a setting of 1.0; the signal feeds only the discrete center output. Now set the slope to a value of 0.0; the signal feeds only left and right (phantom center).

On a stereo source, you can adjust the left/right balance, front/rear pan and LFE level. Center slope is not available.

On a surround source, you can adjust LFE level only; the surround source is assigned directly to the surround bus (e.g. left to left, center to center, etc.)

If a surround source is assigned to a stereo bus, then the source is mixed onto the bus according to the surround downmix parameters set within the configuration. If a surround source is assigned to a mono bus, then the stereo downmix is converted to mono by subtracting 3dB from, and then summing, the L and R channels.

Operation

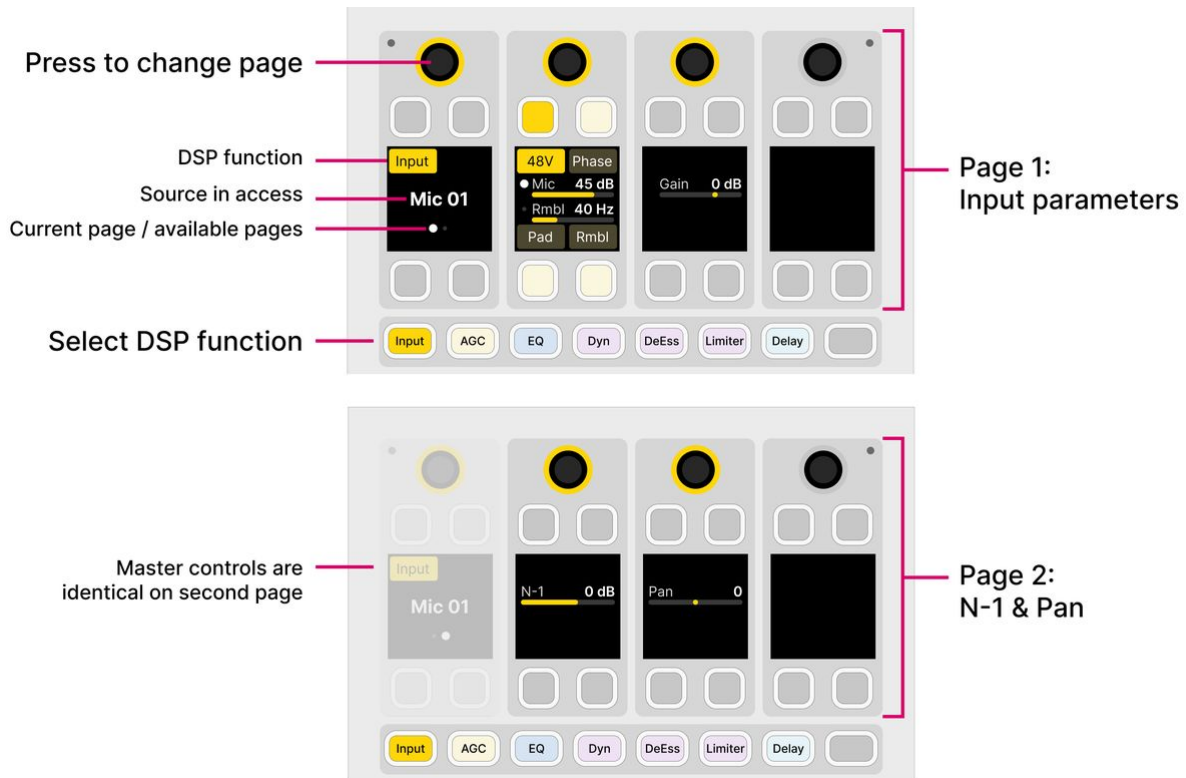
To access the parameters, press an **Access** key (on the fader strip) followed by **Input** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

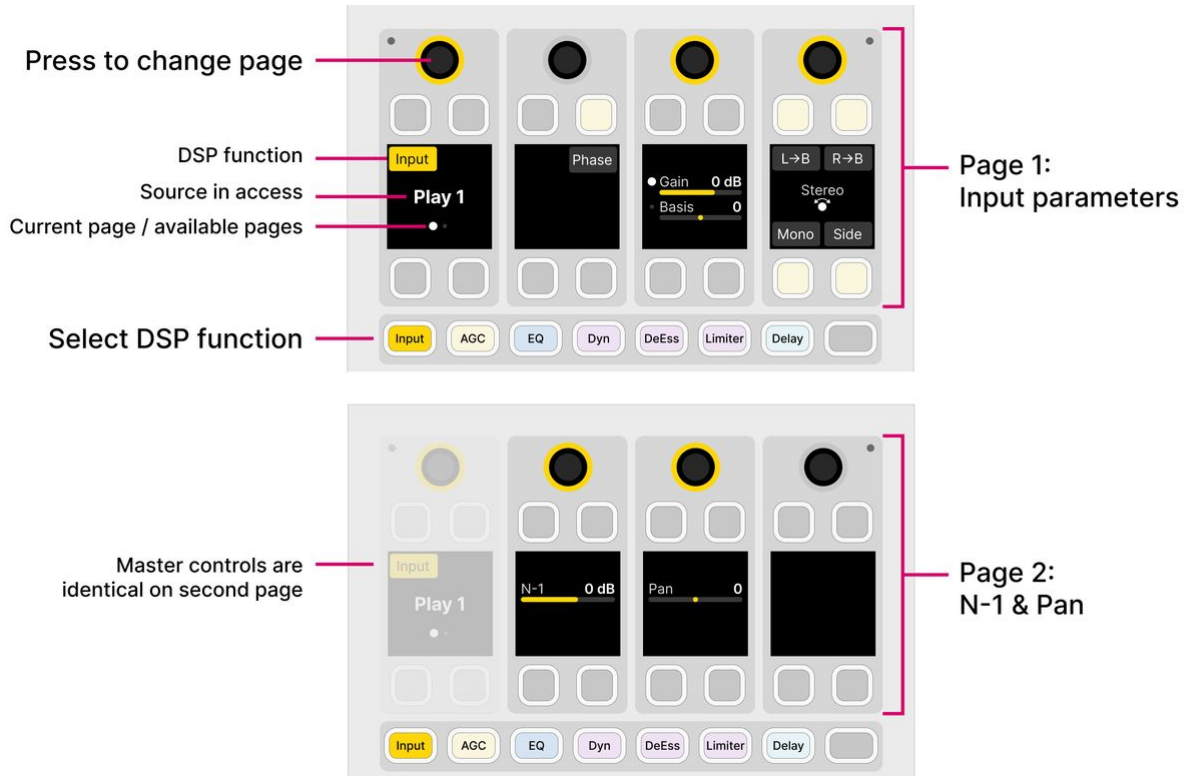
There are two pages of parameters: one for the input section and one for pan.

The example below shows the parameters for a mono mic source.



- Press down on the left (master) rotary control to toggle between the input and pan pages.
- For the Mic/Rmbl control: turn to adjust Mic gain; press down and turn to adjust the rumble filter cut-off frequency.
- For convenience, the second page includes the N-1 level. This sets the level of the N-1 return to the source. See [Conference & N-1](#).

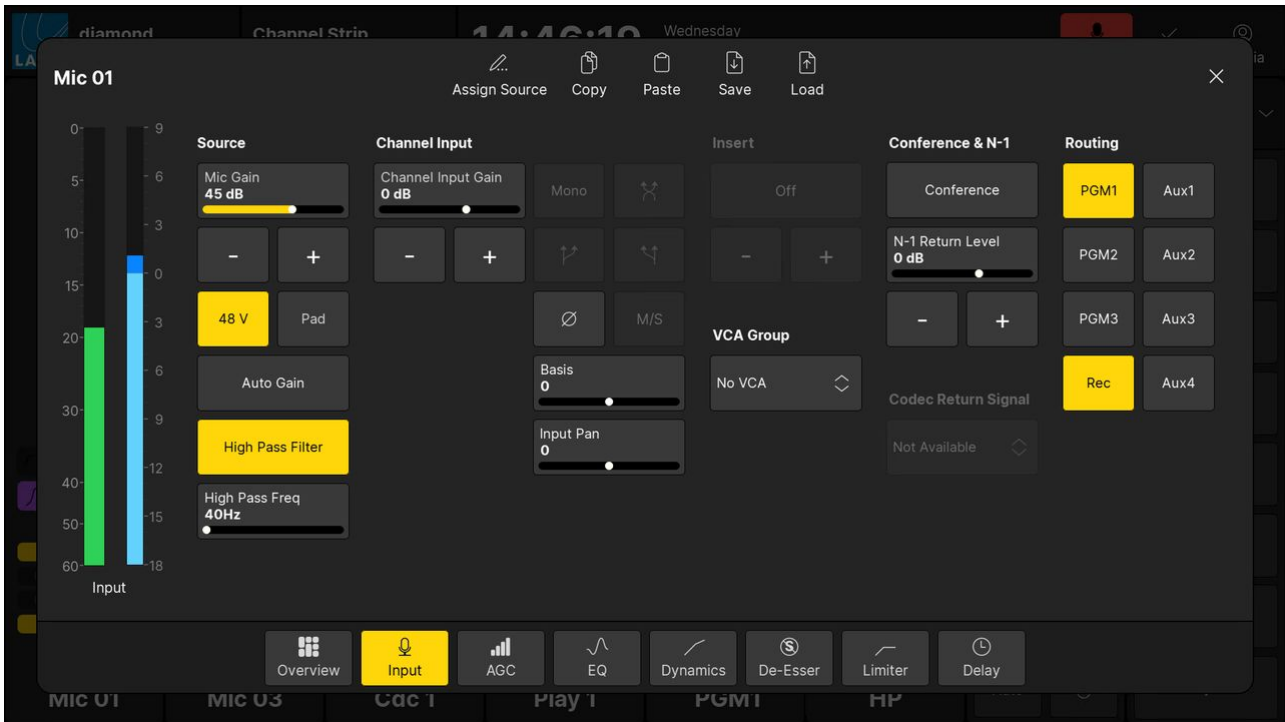
When a stereo source is in access, the parameters are as follows.



- For the Gain/Basis control: turn to adjust channel Gain; press down and turn to adjust Basis (width).
- To change the mode from **Stereo** to **M/S**, turn the rotary control.

On the GUI...

All of the parameters are shown on a single page.



- If an option is greyed out, then the parameter is not available. For example, the stereo compatibility options are not available for a mono source.
- For convenience, the page includes input and pan parameters plus the following functions: Auto Gain (on/off), Insert (on/off and send level), VCA Group (assign), Conference (enable), Codec Return Signal (selection) and Routing (bus assign).

✔ When adjusting input gain, use the input meter (on the GUI) to help set a good input level. If the meter turns red repeatedly, then the input level is overloading and you should reduce the Mic gain (or channel Gain) value.



diamond - Automatic Gain Compensation

The Automatic Gain Compensation (**AGC**) page provides access to the automix parameters. The number of available automixers is determined by the Power Core [license](#). At maximum capacity, up to 4 independent automix groups can be configured.

Automix

Automix can be enabled for any collection of mono and stereo sources. Once enabled, an internal algorithm monitors the signal power of each channel, and then automatically adjusts the mix levels accordingly. For example, if there are three guests and a host, the algorithm automatically mutes the guest sources while the host is speaking. The feature is ideal for balancing active and inactive microphones, such as in a panel discussion, or creating an automated voice-over.

For each source, there are four parameters:

- **Group** - assigns the source to an automix group (from 1 to 4).
- **AMix** - enables (or disables) the automix function. When disabled, the mix level is adjusted manually from the source fader.
- **Weight** - sets the weighting factor of the source, from +9 to -9 with a default midpoint = 0.
- **Speed** - sets the "smoothness" of the automixing, in milliseconds (ms).

Sources with a higher weight value get priority in the mix; those with the same weight are mixed equally; those with a lower value get reduced priority. For example, in a panel discussion, you might want to give the host leading the discussion a higher weight value than that of the guests. Or, to create an automated voice-over, adjust the weight of the playout material to a much lower value than that of the voice.

The speed defines how quickly a signal returns to its normal mix level after its gain has been suppressed. A short speed fades signals in and out quickly, but could result in "pumping" if several guests are talking in parallel. A longer speed will be smoother but may generate audible fades in and out. The ideal value depends on the material.

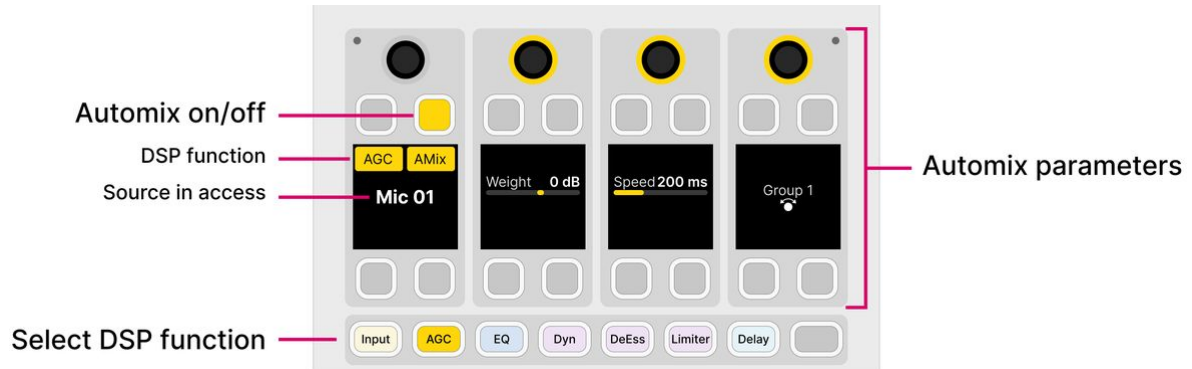
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **AGC** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

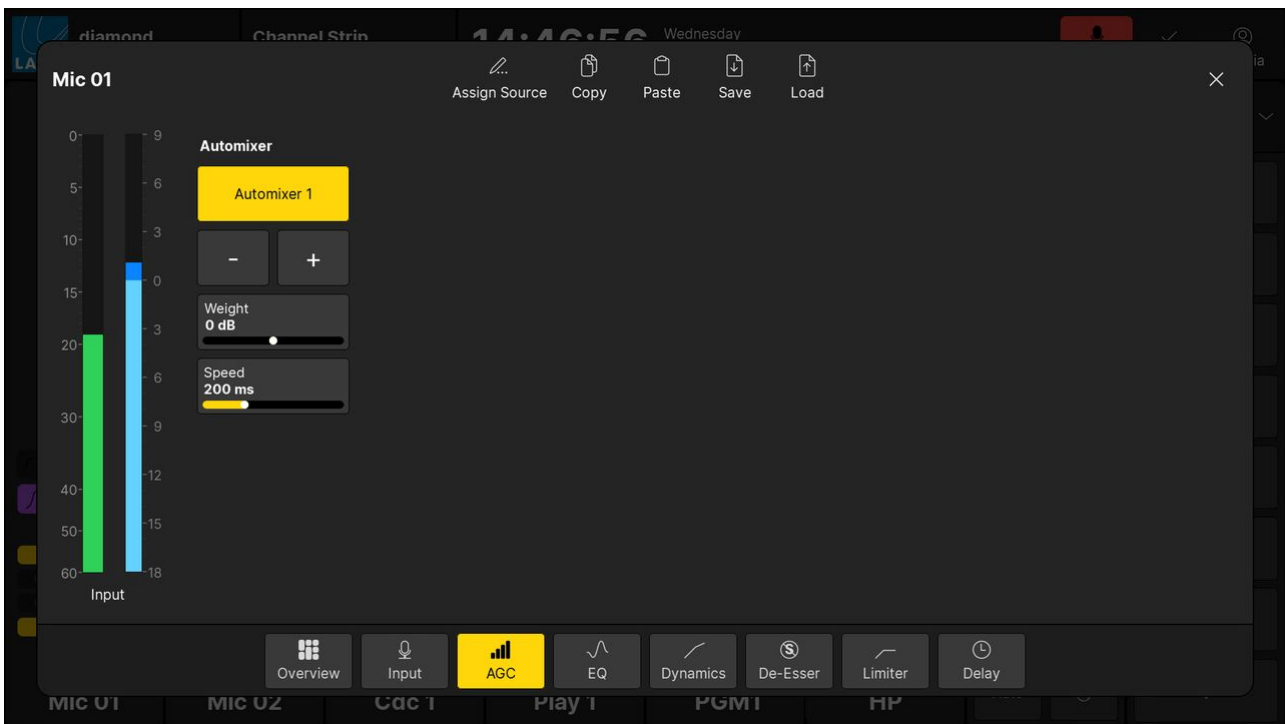
There is one page of parameters.



- Turn the **Group** rotary control to choose the automix group.
- Enable the **AMix** soft key to turn on the automixing.
- Turn the **Weight** and **Speed** rotary controls to adjust the behavior.

On the GUI...

All of the parameters are shown on a single page.



- Press the **+** and **-** buttons to choose the automix group.
- Enable the **Automixer** button to turn on the automixing.
- Touch and drag the **Weight** and **Speed** parameter values to adjust the behavior.

diamond - EQ

EQ processing is available for all sources. The EQ section includes a 3-band parametric EQ plus 2-band filters.

Parametric EQ

There are three bands of parametric EQ: Low, Mid and High. Each band can operate across the full frequency range and is set independently. The following parameters can be adjusted:

- **Gain** - from -15dB to +15dB.
- **Frequency** - from 20Hz to 18kHz.
- **Q** - from 0.7 to 15.

Filters / Shelving EQ

For the 2-band filters, each band can operate either as a fixed slope filter (High Pass/Low Pass) or as a shelving EQ (Low Shelf/High Shelf).

In High Pass/Low Pass mode, the filter slope is fixed at 12dB per octave. The cut-off frequency can be adjusted from 20Hz to 18kHz.

In Low Shelf/High Shelf mode, the slope of the shelving EQ is defined by the gain value. Thus, there are two parameters that can be adjusted: gain (from -15dB to +15dB) and frequency (from 20Hz to 18kHz).

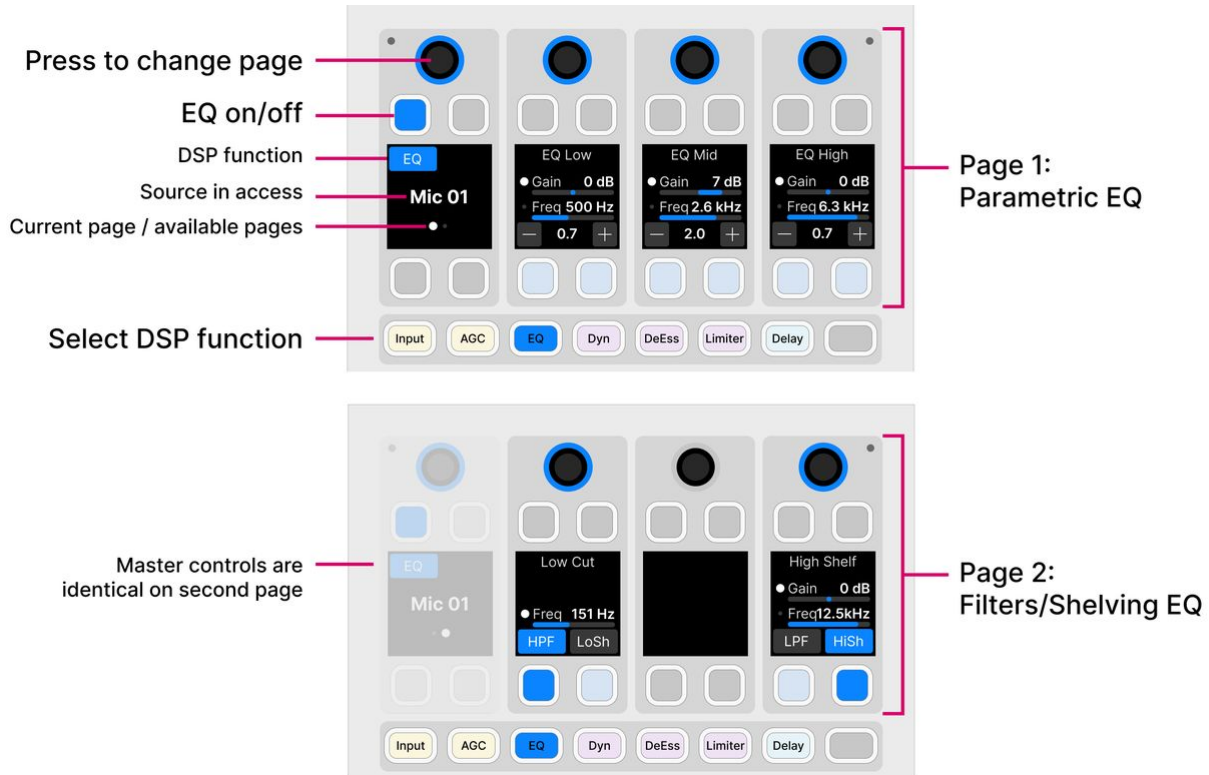
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **EQ** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

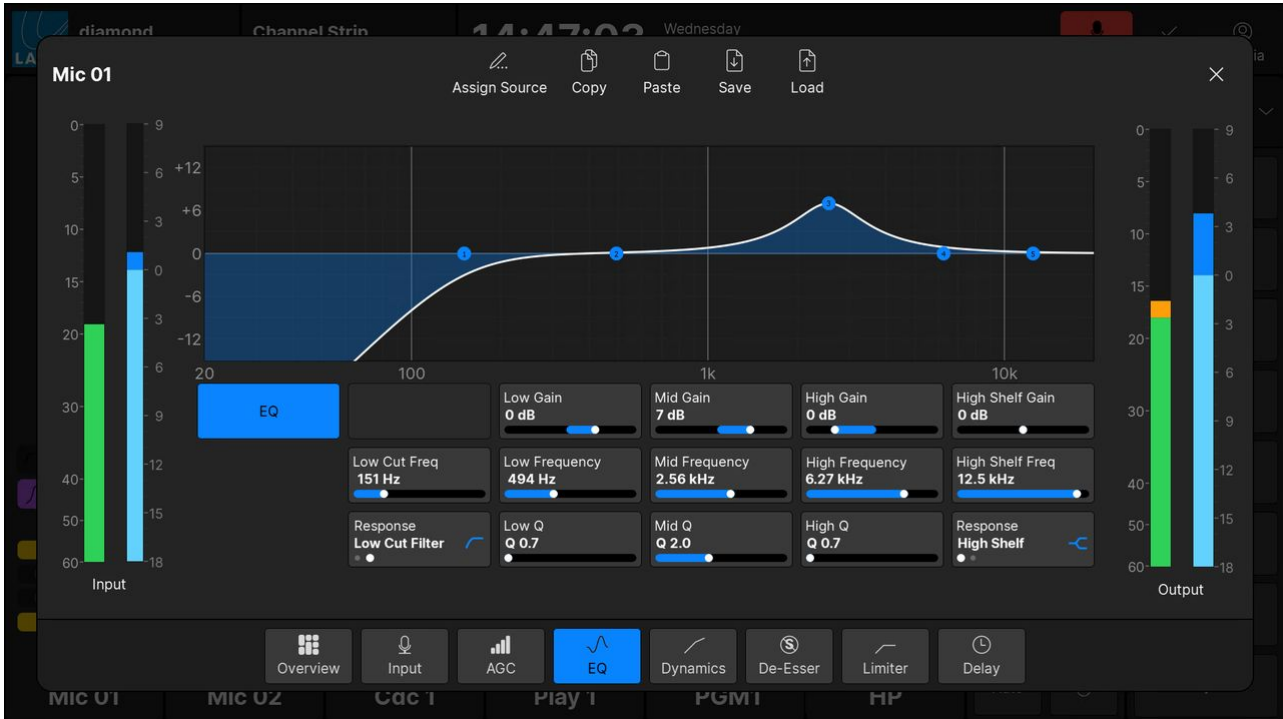
There are two pages of parameters: one for the parametric EQ and one for the filters.



- Press down on the left (master) rotary control to toggle between the pages.
- The **EQ** soft key acts as the master on/off for the complete section: 3-band parametric EQ + 2-band filters. This key appears in the same position on both pages.
- For the Gain/Freq controls: turn to adjust Gain; press down and turn to adjust Frequency.
- To adjust the Q, press the + or – soft keys to increase or decrease the Q value.
- On the second page, use the soft keys to set the EQ type for the filter bands:
 - Lower band - select either **HPF** (High Pass Filter) or **LoSh** (Low Shelf).
 - Higher band - select either **LPF** (Low Pass Filter) or **HiSh** (High Shelf).

On the GUI...

The parameters for all five bands are shown simultaneously, and there is a visualization that shows the overall frequency response.



- The **EQ** button acts as the master on/off for the complete section: 3-band parametric EQ + 2-band filters.
- The EQ curve provides an easy way to check if the processing is turned on or off:
 - Curve (filled) = EQ on.
 - Curve (not filled) = EQ off.
- To adjust each of the five bands, you can either touch and drag a numbered point on the EQ curve, or touch and drag the values inside the parameter boxes:
 - Band 1 = Low Cut (High Pass) Filter or Low Shelf.
 - Band 2 = Low band Parametric EQ.
 - Band 3 = Mid band Parametric EQ.
 - Band 4 = High band Parametric EQ.
 - Band 5 = High Cut (Low Pass) Filter or High Shelf.
- For the two filter bands, use the **Response** parameter to set the EQ type.
- The meters show the levels at the input and output of the EQ section.

diamond - Dynamics

Dynamics processing is available for all sources. The dynamics section includes a compressor, expander and gate. (Limiting can be applied via the independent [limiter](#).)

Each processor has its own on/off, plus there is a master on/off for the complete section. The on/off status is best checked by looking at the [GUI](#) (where you can see the **Dynamics** on/off plus the on/off for the individual sections: **Compressor**, **Expander** and **Gate**).

Compressor

The following parameters are available for the compressor:

- **Threshold** - threshold in dBr, range is dependent on [RSL](#).
- **Ratio** - ratio from 1:1 to 1:16.
- **Attack** - attack time from 0.16ms to 82ms.
- **Release** - release time from 10ms to 5000ms.
- **Gain** - makeup gain from -12dB to 0dB.

The characteristic of the compressor is optimized for radio on-air operation. The ratio pivot point moves around the working point according to the input signal level and not around a fixed threshold. This allows the ratio to adapt without having to change the level considerably.

Expander


The following parameters are available for the expander:

- **Threshold** - threshold in dBr, range is dependent on [RSL](#).
- **Ratio** - ratio from 1:1 to 1:0.1.

Gate

The following parameters are available for the gate:

- **Threshold** - threshold in dBr, range is dependent on [RSL](#).
- **Attack** - attack time from 0.16ms to 82ms.
- **Release** - release time from 10ms to 5000ms.

 The dynamics elements of Power Core use relative decibels, or dBr, as opposed to dBFS. So when you are using the dynamics elements (compressor, expander, gate, limiter, de-esser), the threshold values for those elements are in dBr, not dBFS. What this means in practice is explained in more detail [later](#). For now, it is useful to know that the threshold range will vary depending on the Relative System Level (RSL) defined in the ON-AIR Designer.

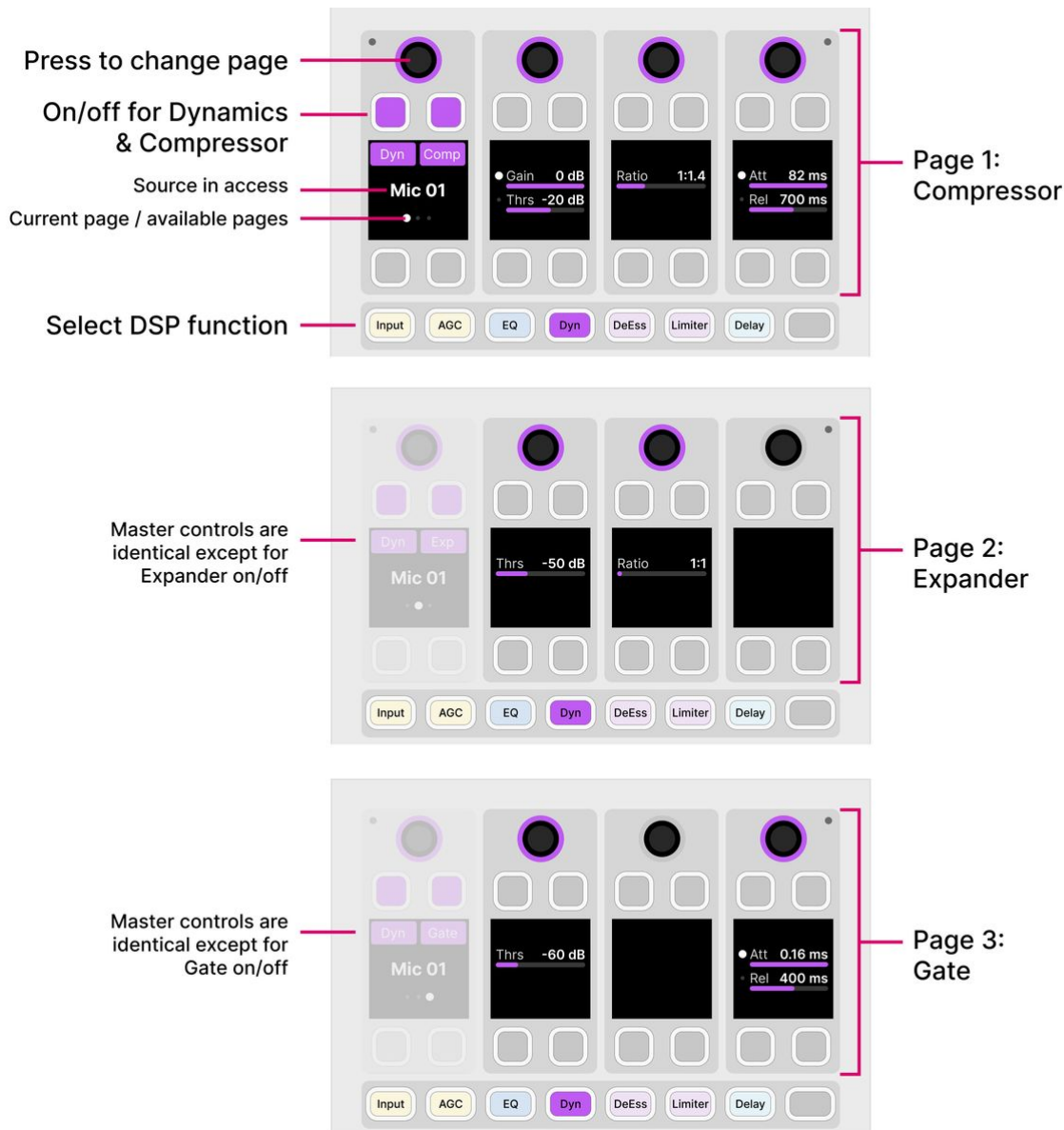
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **Dynamics** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

There are three pages of parameters: one for each processor.

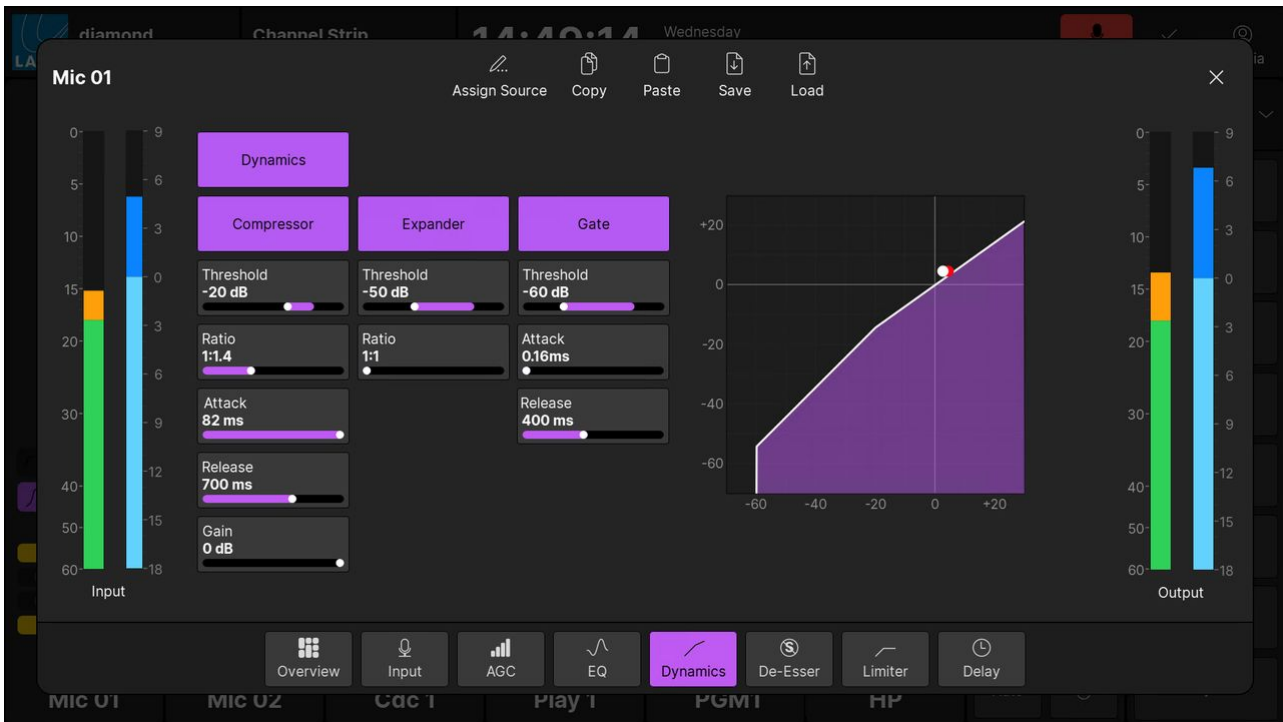


- Press down on the left (master) rotary control to step through the pages.
- The **Dyn** soft key acts as the master on/off for the complete section. This key appears in the same position on all pages.
- The **Comp**, **Exp** and **Gate** soft keys allow you to enable (or disable) each individual processor. For a processor to be active, the master **Dyn** key must also be enabled.
- For the Gain/Thrs control: turn to adjust Gain; press down and turn to adjust Threshold.
- For the Att/Rel controls: turn to adjust the Attack time; press down and turn to adjust the Release time.

On the GUI...

All of the dynamics parameters are shown simultaneously, and there is a visualization that shows the overall response (input versus output level).

The visualization includes a white ball that represents the output level of the dynamics section (Compressor, Expander and Gate). This changes dynamically as the signal level varies. If a red ball is also visible, then this represents the output level of the de-esser. The balls can be extremely helpful when adjusting parameters, as you can see which part of the curve is active as the signal level changes.



- The **Dynamics** button acts as the master on/off for the complete section.
- The **Compressor**, **Expander** and **Gate** buttons allow you to enable (or disable) each individual processor. For a processor to be active, the master **Dynamics** button must also be enabled.
- The dynamics curve provides an easy way to check if the processing is turned on or off:
 - Curve (filled) = Dynamics on.
 - Curve (not filled) = Dynamics off.
- The meters show the levels at the input and output of the dynamics section.

diamond - De-Esser

A de-esser is available for all sources. It can be used to apply gain reduction for sibilant frequencies, and is a useful tool for dealing with human speech.

De-esser Parameters

The following parameters are available for the de-esser:

- **Reduction** – is the amount of gain reduction applied to the sibilant frequencies:
 - Values from 1 to 6 reduce the gain of the unwanted frequencies; the higher the value, the more gain reduction.
 - Above 6, the gain reduction remains at its maximum, and the affected frequency range broadens.
- **Type** – changes the center frequencies affected by the de-esser. There are two possible options: either female or male. Each option is optimized for either female or male voices.

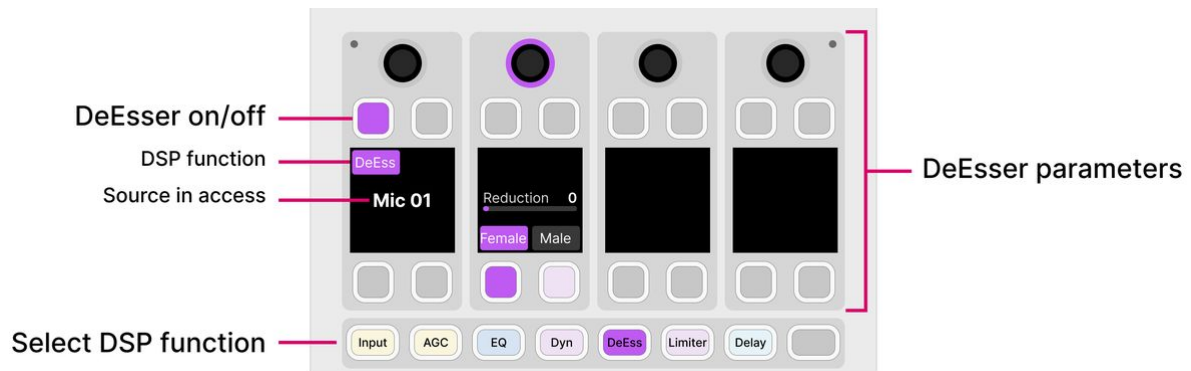
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **De-Esser** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

There is one page of parameters.



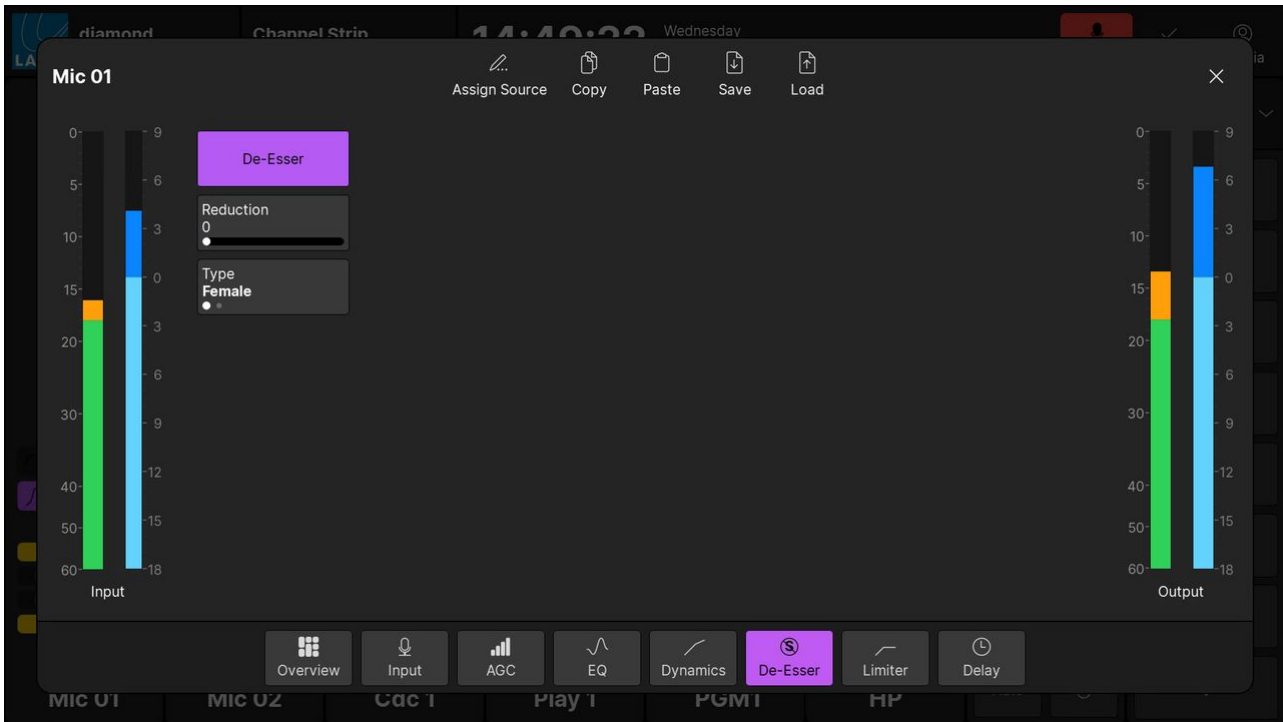
- Enable the **DeEss** soft key to turn on the processing.
- Select either the **Female** or **Male** soft key to set the voice type.
- Turn the **Reduction** rotary control to increase (or decrease) the amount of gain reduction.

The behavior of the de-esser can be seen by looking at the [Dynamics](#) page on the GUI. If the de-esser is enabled, then a red ball appears on the dynamics graph. This represents the output level of the de-esser, and changes dynamically as the signal level varies.

- ✓ If you select the **Dynamics** page (on the GUI) and **DeEss** (on the surface), then you can adjust the de-esser parameters while looking at the dynamics graph.

On the GUI...

All of the parameters are shown on a single page.



- Enable the **De-Esser** button to turn on the processing.
- Touch and drag the **Type** parameter to set the voice type.
- Touch and drag the **Reduction** parameter to increase (or decrease) the amount of gain reduction.
- The meters show the levels at the input and output of the de-esser.

diamond - Limiter

In addition to the dynamics processing, a separate limiter is available for all sources.

Limiter Parameters

The following parameters are available for the limiter:

- **Threshold** - threshold in dBr, range is dependent on [RSL](#).
- **Release** - release time from 10ms to 5000ms.

i The dynamics elements of Power Core use relative decibels, or dBr, as opposed to dBFS. So when you are using the dynamics elements (compressor, expander, gate, limiter, de-esser), the threshold values for those elements are in dBr, not dBFS. What this means in practice is explained in more detail [later](#). For now, it is useful to know that the threshold range will vary depending on the Relative System Level (RSL) defined in the ON-AIR Designer.

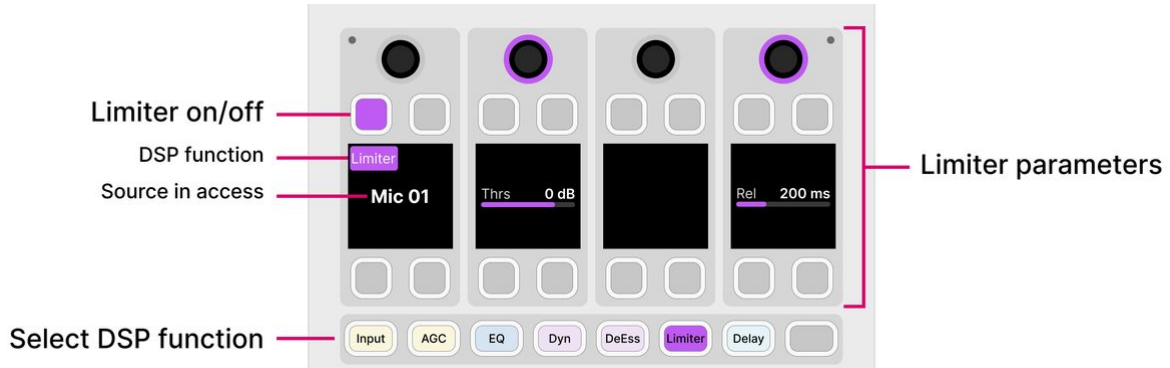
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **Limiter** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

There is one page of parameters.

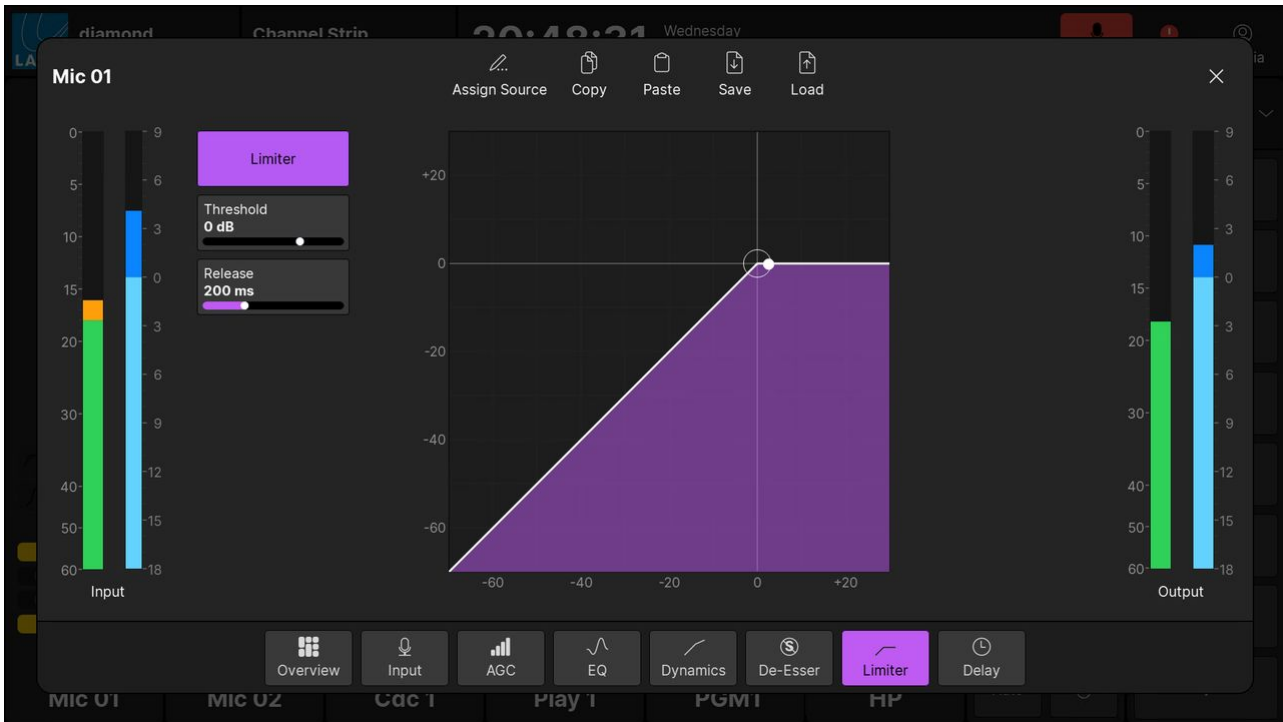


- Enable the **Limiter** soft key to turn on the processing.
- Turn the rotary controls to adjust the behavior.

On the GUI...

All of the parameters are shown on a single page, and there is a visualization that shows the overall response (input versus output level).

The visualization includes a white ball that represents the output level of the limiter. This changes dynamically as the signal level varies. The ball can be extremely helpful when adjusting parameters, as you can see which part of the curve is active as the signal level changes.



- Enable the **Limiter** button to turn on the processing.
- The limiter curve provides an easy way to check if the processing is turned on or off:
 - Curve (filled) = Limiter on.
 - Curve (not filled) = Limiter off.
- Touch and drag parameter values to adjust the behavior.
- The meters show the levels at the input and output of the limiter section.

diamond - Relative System Level and the Dynamics Processing

This topic explains how the Relative System Level, defined by the ON-AIR Designer configuration, affects the operation of the dynamics processing.

Overview

The dynamics elements of the Power Core use relative decibels, or dBr, as opposed to dBFS. So when you are using the dynamics elements (compressor, expander, gate, limiter, de-esser), the threshold values for those elements are in dBr, not dBFS.

How dBr is referenced to dBFS is dependent on the value you choose for the Relative System Level (RSL) in ON-AIR Designer. This value is calculated using the following formula:

- $RSL = \text{working point} - 18\text{dBFS}$

The working point (or reference level, or alignment level), is a level that represents a normal audio level. In the US, the SMPTE RP155-2004 standard specifies that the working point should be -20dBFS. In Europe, EBU R68-2000 specifies the working point should be -18dBFS, and in Germany the working point is -9dBFS.

The -18dBFS offset exists because the Power Core has an additional 18dB/3bits of digital headroom in the DSP section. This allows the user to compensate for very dynamic input signals that require low gain to avoid clipping the microphone pre-amp. It is very important that the level of the signal is reduced below 0dBFS before being connected to an audio output.

RSL Values

The default Relative System Level is set to -27, which corresponds to a working point of -9dBFS, which is valid for German broadcasters.

For the US, if you want to adhere to the SMPTE RP-155-2004 standard, you should choose an RSL of -38dBFS. This will ensure that your working point, or 0dBr, is at -20dBFS. This will also ensure that the level of the internal tone generator is set to 0dBr/-20dBFS.

For Europe, if you wish to adhere to EBU R68-2000, you should choose an RSL of -36dBFS.

What this means in practice

As a practical example, if you set the threshold of the limiter to -10dBr on a source using the internal tone generator, you have a pre-limiter level of -20dBFS, and post-limiter level of -30dBFS.

If the RSL is set to -38dBFS, then the dynamics processors have a maximum threshold of +38dBr/+18dBFS; this is because of the additional 18dB of headroom available within the DSP processor.

The de-esser uses a fixed threshold of 0dBr. This means it will activate anytime a signal reaches 0dBr/-20dBFS or greater.

The compressor in the Power Core operates slightly differently to traditional compressors. In a traditional compressor, the output gain of the signal will be reduced anytime the input signal level is above the desired threshold. This reduces the dynamic range of the signal, but also means that the overall level of the signal is lower, and therefore you must apply makeup gain to compensate.

Power Core also reduces the output gain of a signal anytime the input level is above the specified threshold. However, if the threshold is set below the working point of the system, the Power Core Compressor automatically increases the output gain anytime the input level is below the working point of the system (in correlation with the ratio). Practically speaking, this allows a user to very quickly and easily compress a signal without dramatically changing the on-air sound. Additionally, it ensures that the output signal level will always be automatically compressed around the defined working point of the system.

diamond - Delay

Delay can be added to all sources.

The delay time can be adjusted in milliseconds (ms), meters (m) or frames (frs). The maximum delay time is 5.3 seconds.

Delay Parameters

For a 48kHz, PAL system, the values can be adjusted as follows:

- Delay time (in ms) = 0 to 5300
- Delay time (in meters) = 0 to 1749
- Delay time (in frames) = 0 to 132

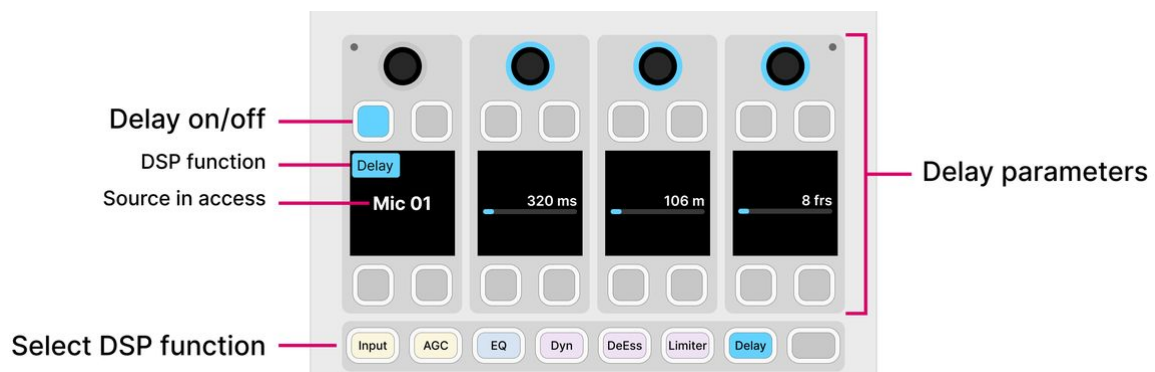
Operation

To access the parameters, press an **Access** key (on the fader strip) followed by **Delay** (on the Central Function Keys and/or GUI).

Then adjust the parameters from either the surface or GUI.

On the surface...

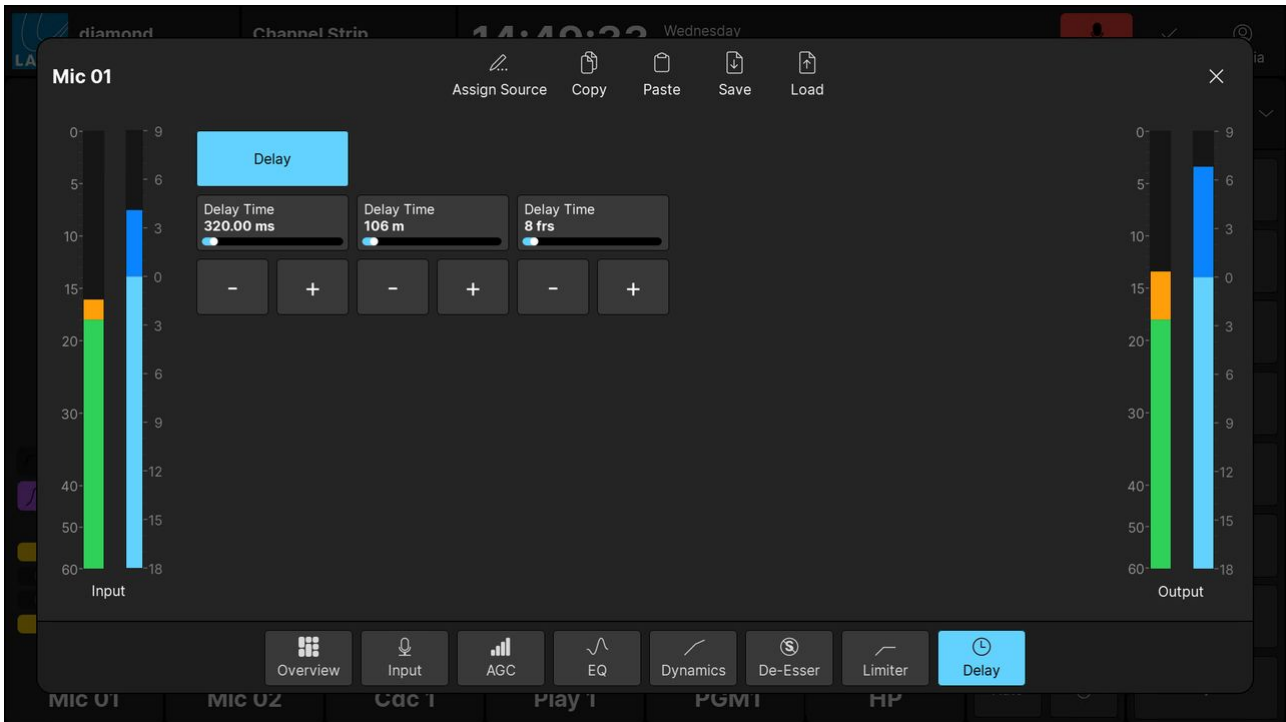
There is one page of parameters.



- Press the **Delay** soft key to switch the prepared delay time in or out of circuit.
- Turn any of the three rotary controls to set the delay time.

On the GUI...

All of the parameters are shown on a single page.



- Press the **Delay** button to switch the prepared delay time in or out of circuit.
- Touch and drag any of the three parameter values, or use the on-screen + and - buttons, to set the delay time.
- The meters show the levels at the input and output of the delay section.



6.12 diamond - Sum Bus Parameters

The number of available sum buses, and whether 5.1 and DSP are supported, is determined by the Power Core [license](#). Note that a stereo bus uses 2 resources and a 5.1 bus uses 6 resources.

By default, all sum buses come with DSP disabled. The individual DSP blocks are enabled by editing the system configuration using the ON-AIR Designer (under "Sum Bus → Parm").

Depending on the license, up to 32 DSP blocks (EQ, Dyn, Lim) and Delay are supported.

Signal Flow

The signal flow is identical to that of a source, except there is no input section or external insert point.

For each sum bus, the signal processing blocks are:

- **EQ:** 3-band parametric EQ plus 2-band filters.
- **Dynamics:** Compressor, Expander and Gate.
- **Limiter:** independent Limiter.
- **Delay:** up to 5.3 seconds, adjustable in ms, meters or frames.

Operation

The operation and parameters are identical to those of a source.

See [diamond - Source Parameters](#).

6.13 diamond - Metering

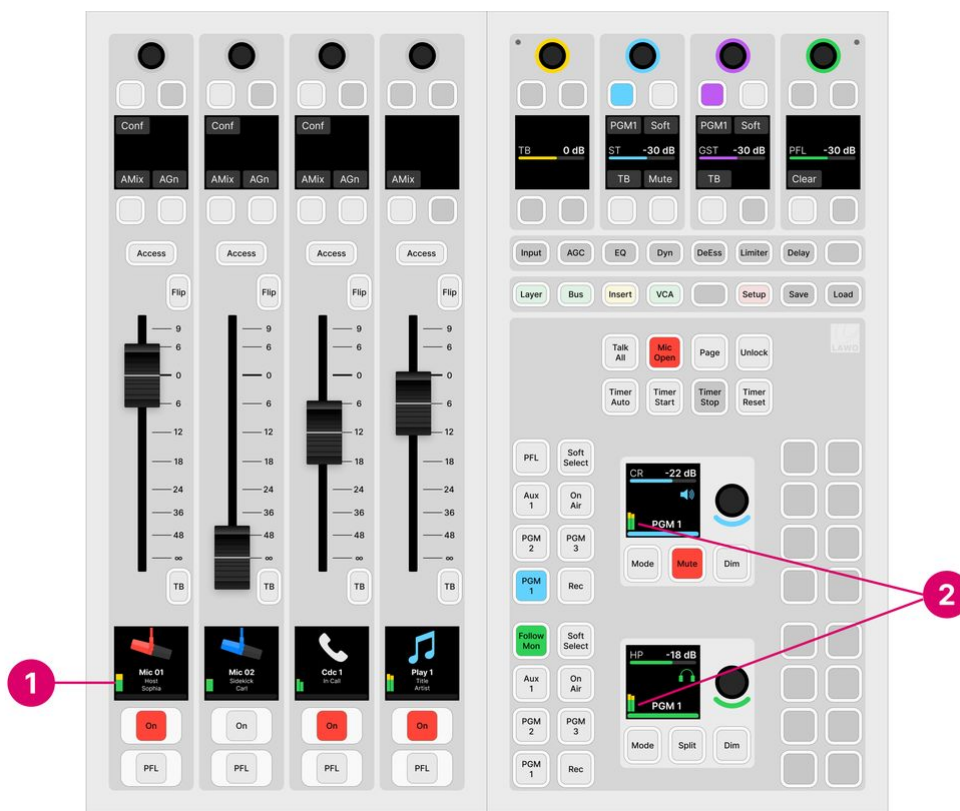
diamond supports a number of metering elements that can be used to configure input and output metering. The number of meters, and their design, are determined by the configuration. Options include the meter type, source, scale and color-coding.

Metering Locations

The diamond surface includes a signal present meter on every fader strip. All other meters are optional according to the configuration.

The information below describes the metering defined in the standard configuration. The operation may vary if the configuration is customized.

Metering on the Surface



1. Fader Strip Meters

diamond includes a signal present meter in the Source Display on every fader strip.

The metering point is fixed and comes after the source's input section and before all processing.

2. Central/Combo Module Meters

A mono or stereo meter can appear in the two large displays on the Central or Combo module. These meters are defined by the configuration and so their operation can vary.

In the standard configuration, the meters show the level of the CR and HP monitor outputs. The metering point comes after the monitor source selector and before the volume (including mute/dim).

Metering on the GUI



Channel Strip Meters

In the standard configuration, the 'Channel Strip' page provides dedicated metering for every fader strip. The metering point is fixed and comes after the source's input section and before all processing.

The user can decide to show peak metering, momentary loudness or both (using the **Channel Strip** option in the 'Settings → Meters' dialog box). Note that there is no integrated loudness measurement for a source.

Master Slot Meters

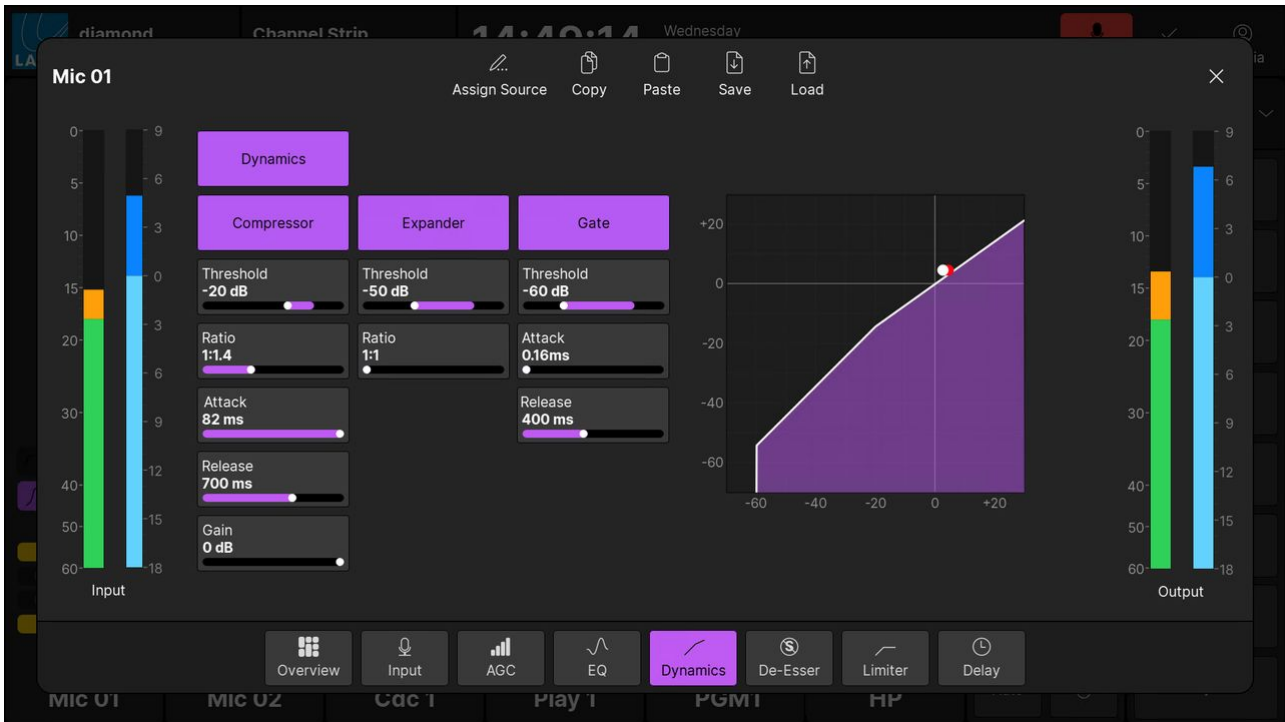
Any of the master slots on the 'Channel Strip' page can be assigned to an output meter. This allows you to meter the main bus outputs and/or a monitoring section. For the bus outputs, the metering point comes after all processing including the fader. For the monitoring outputs, the metering point comes after the monitor source selector and before the volume (including mute/dim).

There are no user options for the output meters, so both peak and momentary loudness bargraphs are always displayed. The numerical readout shows the integrated loudness measurement (in LUFS).

Source Parameter Dialog Box

In the standard configuration, the 'Source Parameter' dialog box includes meters that show the level at the input and output of the processing section. The metering points are shown on the signal flow diagram for a source.

To open the dialog box, press an **Access** key (on the fader strip) followed by a page option (on the GUI) - e.g. **Dynamics**.



Peak Metering

In the standard configuration, all of the peak meters are dynamic Peak Program Meters (PPMs). The number of individual bargraphs is defined automatically by the format of the source/bus: 1 for mono; 2 for stereo.

The meters use a digital scale relative to 0dBFS, and provide three color-coded areas: green, orange and red. When signals peak within the orange area, they are at a good operating level. If a meter turns red, then the signal level is overloading.

Loudness Metering

The system provides loudness metering conforming to the ITU-R BS1770. There are two types of measurement: momentary and integrated.

In the standard configuration, both measurements are shown for all outputs, while momentary loudness can be enabled or disabled for all sources.

Momentary Loudness (Bargraphs)

A single blue bargraph represents the average energy of the summed component channels: mono, stereo or surround. The average is measured using either a Momentary (400ms sliding window) or Short term (3s sliding window) integration time.

The color indicates whether loudness is above or below the Target Level:

- Light Blue = equal to, or below, the Target Level.
- Dark Blue = above the Target Level.

The scale markers indicate a tolerance of +/- 1 LU.

Integrated Loudness Measurement (Text Readout)

The integrated loudness measurement is very useful for measuring loudness over a longer period.

The measurement is displayed in LUFS (Loudness Units Full Scale).



The integrated loudness measurement is always on, for all outputs, once the GUI App starts. To comply with the ITU standard, the signal's loudness must be greater than -70 LUFS before an integrated measurement is registered. From hereon, the reading will continue to update over time and represents the average loudness of the output since the start.

The integrated loudness measurement for all outputs can be reset by touching the LUFS value (on any meter) for more than one second.

Compliance with Metering Standards

Version 1.0 of the diamond standard configuration is compliant with EBU meters and levels. Other variants will follow to support SMPTE and other regions. The table below describes the relevant parameters.

diamond Standard Configuration	Europe	North America
Standard	EBU	SMPTE
PPM meter scale	dBFS	dBFS
PPM mark low	-18	-20
PPM mark high	-9	-3 (+17 dBR)
Loudness meter (channel, access and slots)	LU EBU +9 (short)	LU EBU +9 (short)
Loudness value LUFS (slots)	LUFS -23 (integrated)	LUFS -23 (integrated)
Relative System level (OAD)	-36	-38
Analog Ref Level (OAD)	18	24
Operating Level (analog)	0 dBU	+4 dBU
Operating Level (digital)	-18 dBFS	-20 dBFS

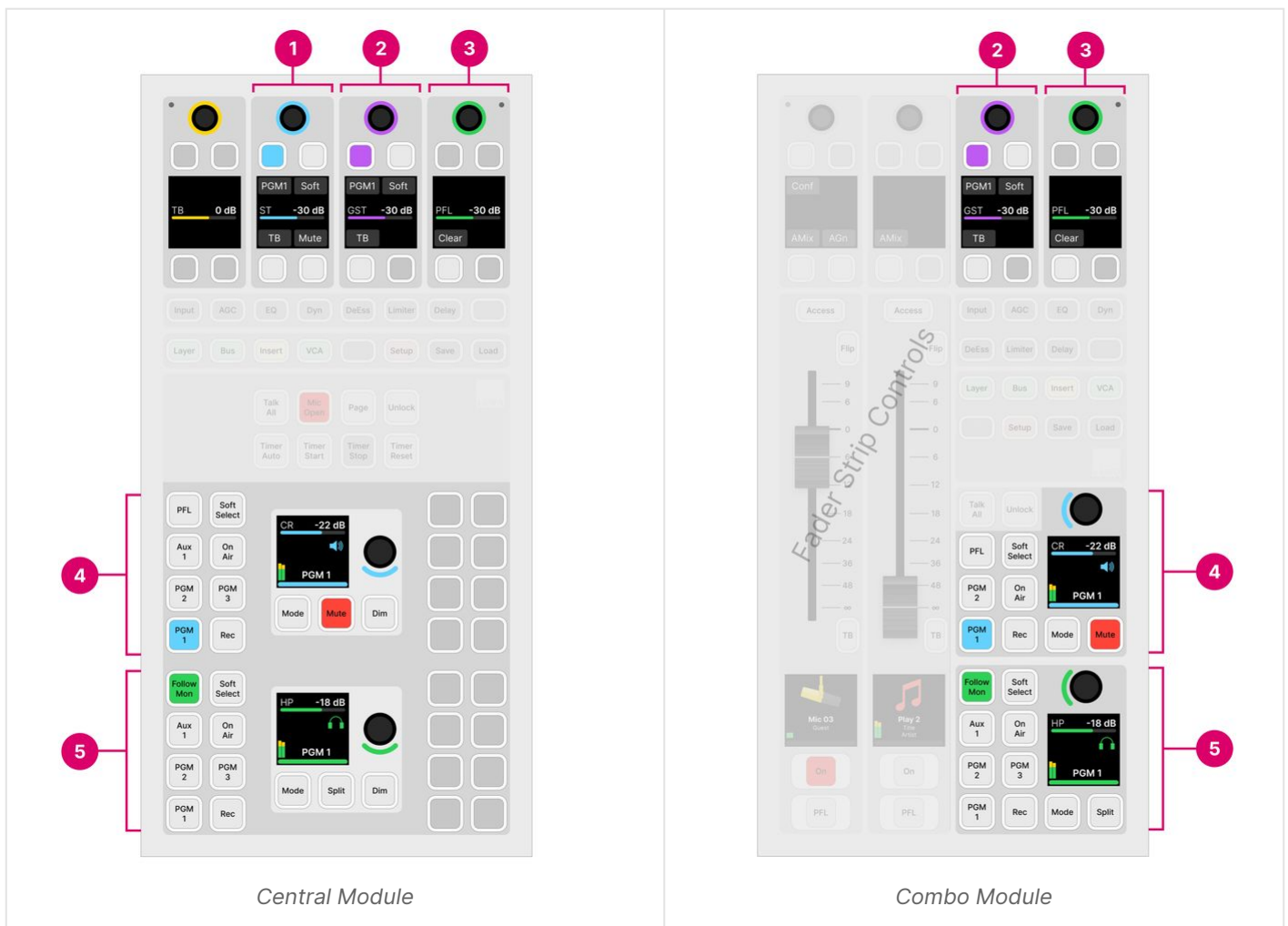
6.14 diamond - Monitoring

diamond supports a number of audio elements that can be used to configure monitor source selection and master control. The number of monitor outputs, and their operation, is determined by the configuration. Usually, there are two main monitor outputs controlled from the lower part of the Central or Combo module. If additional monitor outputs are required, then these can be configured onto the upper Central Rotary Controls, or from additional Central/Combo modules running in monitor mode.

The rest of this topic describes the monitoring defined in the standard configuration. The operation may vary if the configuration is customized.

Controls Overview

The standard configuration provides five stereo monitor outputs that are controlled from the surface as follows.



The two main monitor outputs are for the speakers in the **Control Room (4)** and host **Headphones (5)**. The controls are color-coded for easy identification: cyan = **CR** (Control Room); green = **HP** (Headphones). Each rotary control can adjust two parameters: turn to adjust monitor level; push down and turn to adjust monitor balance. The surrounding MF keys provide monitor source selection and other options.

The three additional outputs are for the speakers in the **Studio (1)**, the **Guest (2)** headphones and **PFL** speaker (3). The controls become available when all Function Keys are off, and are color-coded as follows: cyan = **ST** (Studio); purple = **GST** (Guest); green = **PFL**. Each rotary control adjusts a single parameter: turn to adjust the output level. The soft keys provide monitor source selection, talkback and other options.



The Central and Combo modules offer identical functionality apart from the following. On a Combo module, the Studio controls (1) are not supported, there are fewer monitor source selection keys for the Control Room output (4), and there are no dedicated Dim keys for the Control Room (4) or Headphone (5) outputs.

i By default, the PFL output is switched automatically to the headphones (HP) whenever a PFL is active. The previous monitor source is re-instated once all active PFLs are cleared. If **PFL** is selected (as a Control Room monitor source), then PFL is switched to both outputs: HP and CR.

The Control Room and Studio output mute automatically when the Mic Open status is active (i.e. a Mic source fader is open).

Audio Connections

The default audio connections are described later in the [Standard Configuration Specification](#). The connections can be edited using the ON-AIR Designer (under "Audio Output → Out → Default Audio").

If you are running the diamond VX app, then you can use the '[Routing](#)' page (on the GUI) to connect a monitor output to a destination:

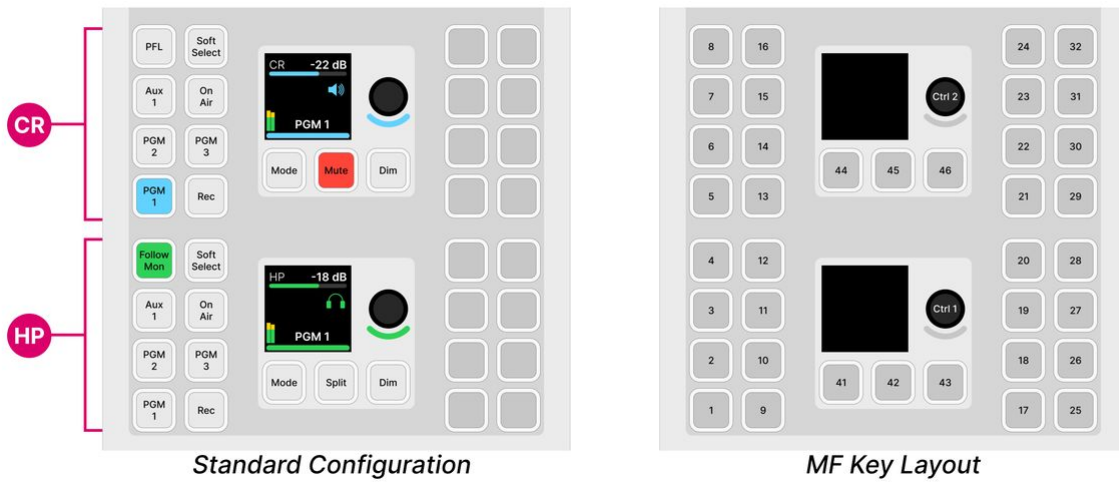
- Select **Routing** (from the GUI page menu) to open the 'Routing' page.
- Under 'Sources', select the **Monitor Outputs** tab and choose a monitor section (e.g. **Mon PFL**) - the selection flashes in blue.
- Under 'Destinations', select an output category (e.g. **Slot 1**) and choose an output (e.g. **Line Out 03**) - the selection flashes in blue.
- Press **Connect** - the connection is made.

Control Room & Headphone Monitoring

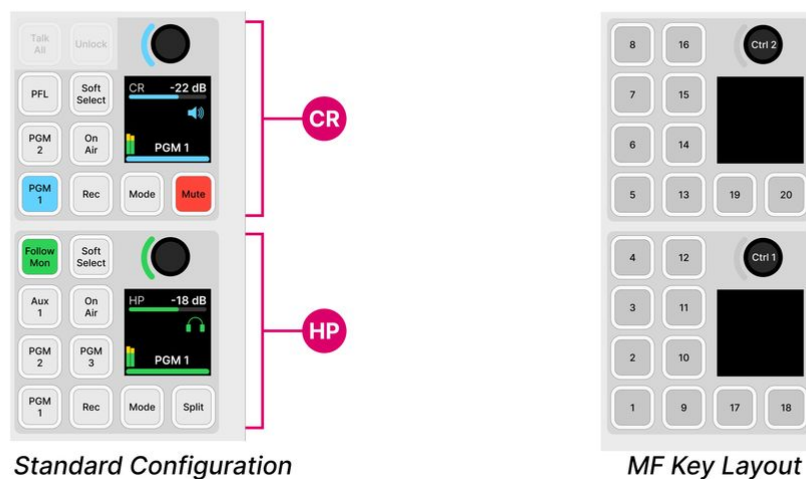
Most monitoring functions are operated from the surface. In some cases, pressing a key on the surface opens an overlay box on the GUI. The GUI also provides metering for the CR and HP outputs (via the master slots on the '[Channel Strip](#)' page).

The images below show the functionality of the Central and Combo modules defined by the standard configuration.

CR & HP - Central Module



CR & HP - Combo Module



Monitor Source Selection

For the Control Room and Headphone outputs, there are 16 monitor sources available. The current selection lights in cyan (for CR) and green (for HP).

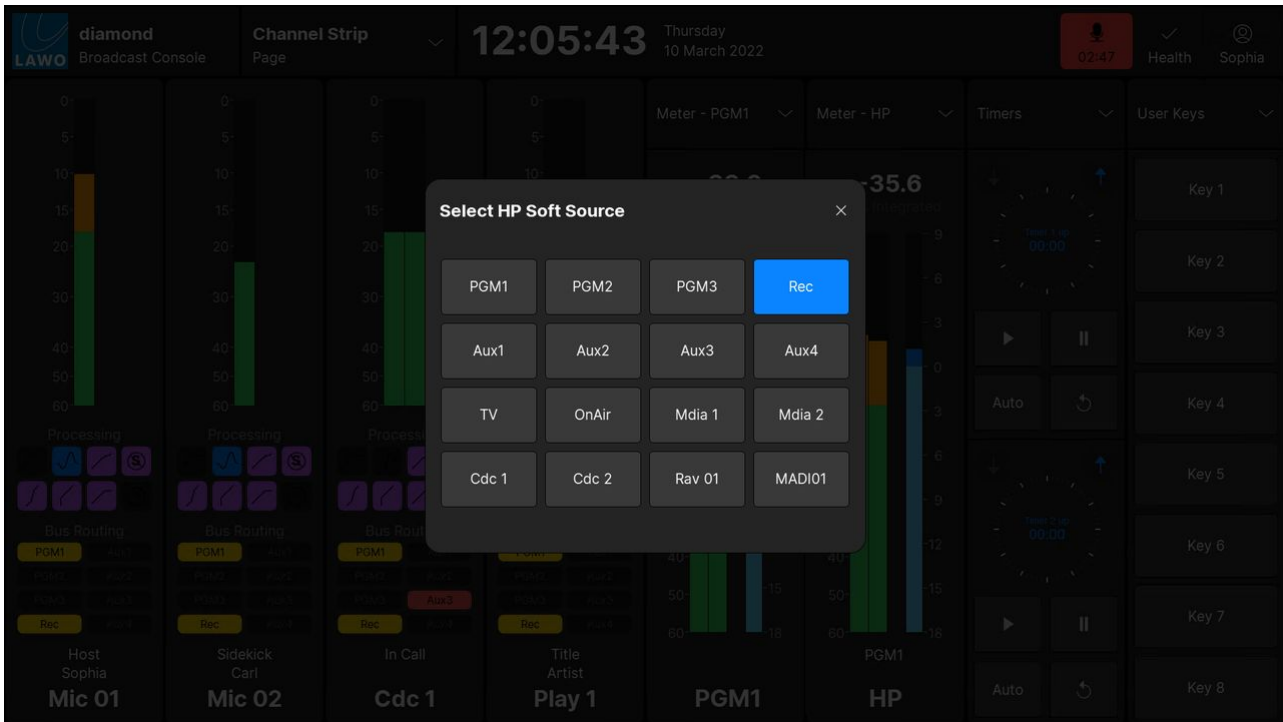
The first six sources can be selected directly from the surface: **PGM 1**, **PGM 2**, **PGM 3**, **Rec**, **Aux 1** and **On Air**. On a Combo module, for the CR output, this drops to four sources: **PGM 1**, **PGM 2**, **Rec** and **On Air**. The **Soft Select** key provides access to the other sources. This key works in conjunction with the GUI as described below.

If you wish the headphones to follow the CR monitor source selection, then press **Follow Mon** (in the HP section).

If you wish to monitor PFL on the CR output, then press **PFL** (in the CR section).

Using the Soft Select key

1. Press and hold the **Soft Select** key to open the assignment window (on the GUI) - the key turns yellow to indicate that "assign mode" is active.



2. Choose an option using the on-screen buttons and then touch **X** to close the window.
3. Press the **Soft Select** key quickly to monitor the assigned source - the key turns cyan or green to indicate that the monitor source is selected.

The **Soft Select** key assignments, for CR and HP, are stored in the system's warm start data. This means that the last selection is remembered until you cold start the system.

The 16 monitor sources are defined by the configuration. See Standard Configuration Specification for details.

Monitor Level & Other Functions

Each rotary control can adjust two parameters: turn to adjust the first (monitor level); push down and turn to adjust the second (monitor balance). The display shows the control's function and current value, plus a media icon (to help with identification); output metering (pre-volume); and the current monitor source (e.g. PGM 1).

For the CR output:

- Press **Mode** to change the monitoring mode. This key works in conjunction with the GUI as described below.
- Press **Mute** to mute the Control Room output. The output mutes automatically when the Mic Open status is active (i.e. a Mic source fader is open).
- On the Central module, press **Dim** to dim the Control Room output. The amount of dim applied is always 20dB. This function is not supported by a Combo module.

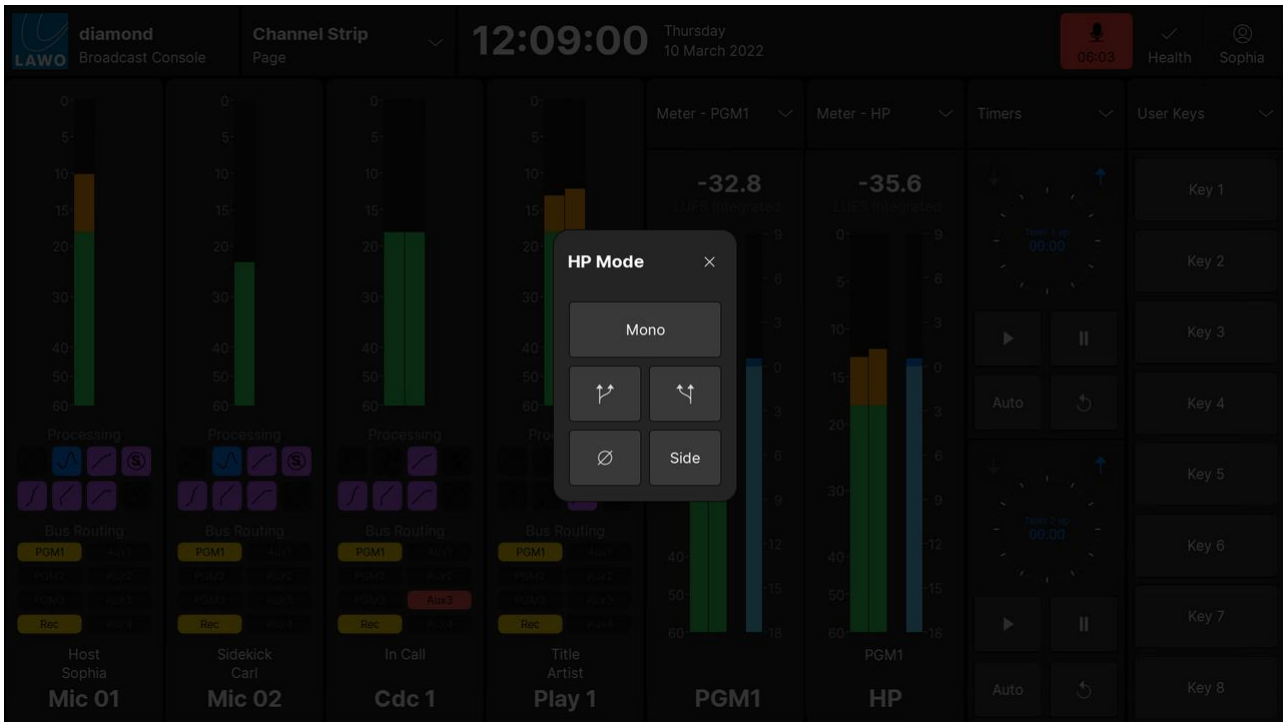
For the HP output:

- Press **Mode** to change the monitoring mode. This key works in conjunction with the GUI as described below.
- Press **Split** to listen to different signals in the left and right ears of the headphones: left = the selected monitor source (in mono); right = the PFL bus (in mono). You can use this to keep listening to a monitor source (e.g. PGM 1) while cueing up another source.
- On the Central module, press **Dim** to dim the Control Room monitor level. The amount of dim applied is always 20dB. This function is not supported by a Combo module.



Using the Mode key

1. Press the **Mode** key to open the mode options (on the GUI).



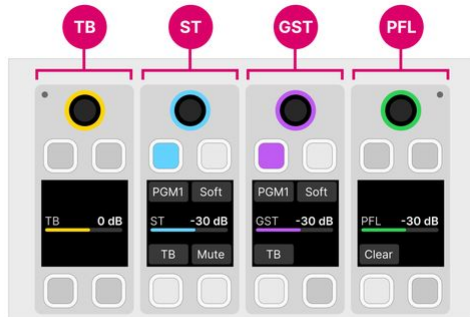
2. Choose an option using the on-screen buttons and then touch **X** to close the window.

The selected **Modes**, for CR and HP, are stored in the system's warm start data. This means that the last selection is remembered until you cold start the system.

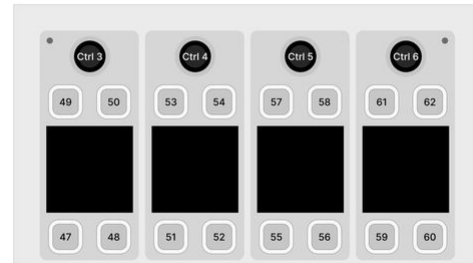
Studio & Guest Monitoring

The images below show the functionality of the Central Rotary Controls defined by the standard configuration.

Central Rotary Controls - Central Module

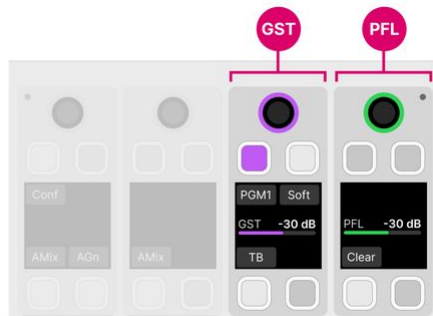


Standard Configuration

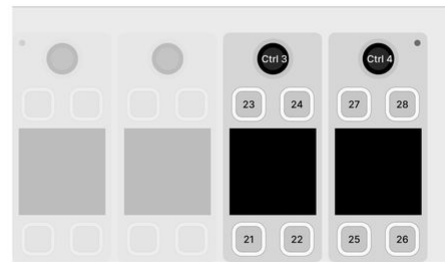


MF Key Layout

Central Rotary Controls - Combo Module



Standard Configuration



MF Key Layout

For the Studio and Guest outputs, there are two monitor source select keys: either **PGM 1** or **Soft**. The **Soft Select** key works in the same way as for the CR and HP outputs: press and hold to pre-select a monitor source (from the GUI); press quickly to monitor the assigned source.

The other controls operate as follows:

- Turn the rotary control to adjust the monitor volume.
- Press **TB** to talk to the monitor output. The selected monitor source is dimmed by 20dB while talkback is active.
- Press **Mute** to mute the Studio output. The output mutes automatically when the Mic Open status is active (i.e. a Mic source fader is open).

PFL Monitoring

In the standard configuration, the PFL output is switched automatically to the headphones (HP) whenever a PFL is active. The previous monitor source is re-instated once all active PFLs are cleared.

If **PFL** is selected (as a Contol Room monitor source), then PFL is switched to both outputs: HP and CR.

The **Mon PFL** output can be connected to a separate PFL speaker, either by editing the default audio connections (using ON-AIR Designer) or by making a connection from the 'Routing' page (on the GUI).

You can use the PFL master controls (on the Central or Combo module) to adjust the master PFL level or **Clear** all active PFLs.

6.15 diamond - PFL and AFL

diamond supports up to 5 monitoring buses that can be used to configure PFL and AFL.

- PFL (Pre-Fader Listen) can be used to listen to a source while its fader is closed (off-air). This allows you to check an incoming signal before opening the fader.
- AFL (After-Fader Listen) can be used to listen to a source in isolation (at its mix level).

What is possible?

Up to 5 PFL/AFL buses can be configured (using the ON-AIR Designer). The number of available PFL/AFL buses is determined by the Power Core [license](#). Usually, a single PFL bus is sufficient. If independent PFL outputs are required, or you need both PFL and AFL monitoring, then multiple buses can be defined. This is explained in more detail [later](#). For now, it is useful to know that:

- Each source can feed up to two monitoring buses simultaneously. For example, to feed both PFL and AFL.
- On each fader strip, the PFL 1 bus can be swapped with another listen bus (from 2 to 5). This is useful if the surface supports multiple operating stations, as you can configure independent PFL outputs from each set of faders.
- The PFL mode defines how the surface keys operate: as PFL, AFL, or a combination. The PFL mode can be changed by an operator (from the [Setup](#) menu).
- Each PFL/AFL bus can feed a dedicated speaker or be switched to the main monitoring automatically when a PFL (or AFL) is active.

The rest of this topic describes how PFL is defined in the standard configuration. The operation may vary if the configuration is customized.

Operation

In the standard configuration, PFL can be selected by pressing MF Key 4 (on the source's fader strip) or pulling back on a fader (to activate the overpress).

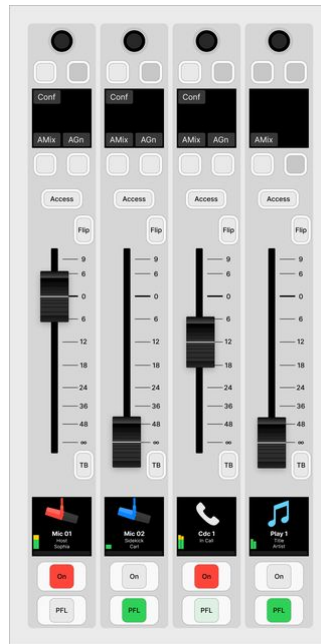
All sources feed a single PFL bus (PFL 1) and the default mode is "PFL SUM". This means that:

- Multiple PFLs can be selected.
- Where faders are closed, sources are summed onto the PFL bus.
- When a fader opens, PFL is canceled.
- Where faders are open, sources are put into "PFL Prepare". In this instance, nothing happens until the fader is closed. Once the fader is closed, PFL becomes active.

The **PFL** key has three possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = PFL off.
- Full green = PFL on and fader closed (PFL active).
- Dim green = PFL on and fader open (PFL prepare).

In the example below, the sources **Mic 02** and **Play 1** are in "PFL active", while **Cdc 1** is in "PFL Prepare".



Fader Overpress / Backstop PFL

The fader overpress can be enabled or disabled from the [Setup](#) menu. When enabled, the operation is momentary:

- Pull back on a fader to activate **PFL**.
- Release the fader to cancel **PFL**.

PFL Monitoring

In the standard configuration, the PFL output is switched automatically to the headphones (HP) whenever a PFL is active. The previous monitor source is re-instated once all active PFLs are cleared.

If **PFL** is selected (as a Contol Room monitor source), then PFL is switched to both outputs: HP and CR.

The **Mon PFL** output can be connected to a separate PFL speaker, either by editing the default audio connections (using ON-AIR Designer) or by making a connection from the 'Routing' page (on the GUI).

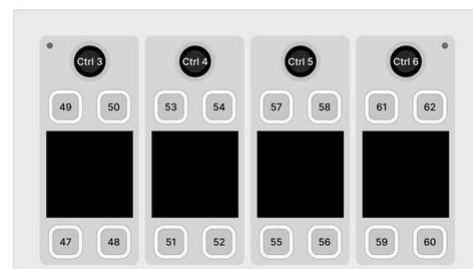
You can use the PFL master controls (on the Central or Combo module) to adjust the master PFL level or **Clear** all active PFLs.

The images below show the functionality of the Central Rotary Controls defined by the standard configuration.

Central Rotary Controls - Central Module



Standard Configuration

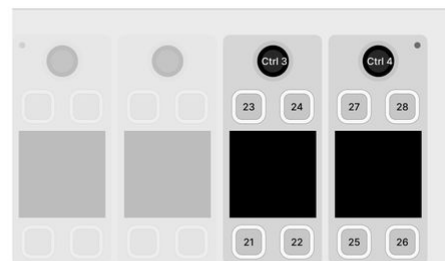


MF Key Layout

Central Rotary Controls - Combo Module



Standard Configuration



MF Key Layout

PFL Modes

The PFL mode defines how the surface keys operate: as PFL, AFL, or a combination.

The default PFL mode is "SUM", but this can be changed by editing the configuration (using the ON-AIR Designer). The PFL mode can also be changed by an operator (from the [Setup](#) menu).

The table below describes all possible options.

1	SUM (default) Multiple PFLs can be selected. Where faders are closed, sources are summed onto the PFL bus. When a fader opens, PFL is canceled. Where faders are open, sources are put into "PFL Prepare". In this instance, nothing happens until the fader is closed. Once the fader is closed, PFL becomes active.
2	SUM R Known as SUM Recurring. Identical to SUM mode, but PFL recurs if you open and then close the fader. In this mode, you must turn off PFL by deselecting the PFL key.
3	PFL Identical to SUM mode, but the PFL keys inter-cancel. This means that only one source can ever be in "PFL Active" or "PFL Prepare".
4	PFL R Known as PFL Recurring. Identical to PFL mode, but PFL recurs if you open and then close the fader. In this mode, you must turn off PFL by deselecting the PFL key.
5	PFL A Known as PFL Always. Identical to SUM mode, except that sources are always put into "PFL Active" even if their faders are closed. i.e. there is no "PFL Prepare".
6	PFL AR Combines PFL Always and PFL Recurring. Sources are always put into "PFL Active", and PFL recurs if you open and then close the fader.
7	PFL PUSH Changes the operation of the PFL keys from latching to momentary. In this instance, you must press and hold a key to make PFL active. PFL cancels when you release the key.
8	PFL DJ A special mode for DJs that can be used to prepare a fader level before the source goes on-air. Start by pressing PFL to monitor the source and adjust the fader level. Then deselect PFL and press channel ON (to put the source on-air) - the fader jumps to the prepared level. Note that the prepared level is applied only once. So, if you take the fader off-air, and then press channel ON again, the fader jumps to 0dB as normal.
9	AFL Changes the operation of the PFL keys from pre-fader listen to after-fader listen. In this mode, multiple AFLs can be selected. AFL must be turned off by deselecting the AFL key.
10	AFL/PFL Combines AFL and PFL operation. The PFL keys operate as AFL when a fader is open and PFL when a fader is closed.

6.16 diamond - Talkback

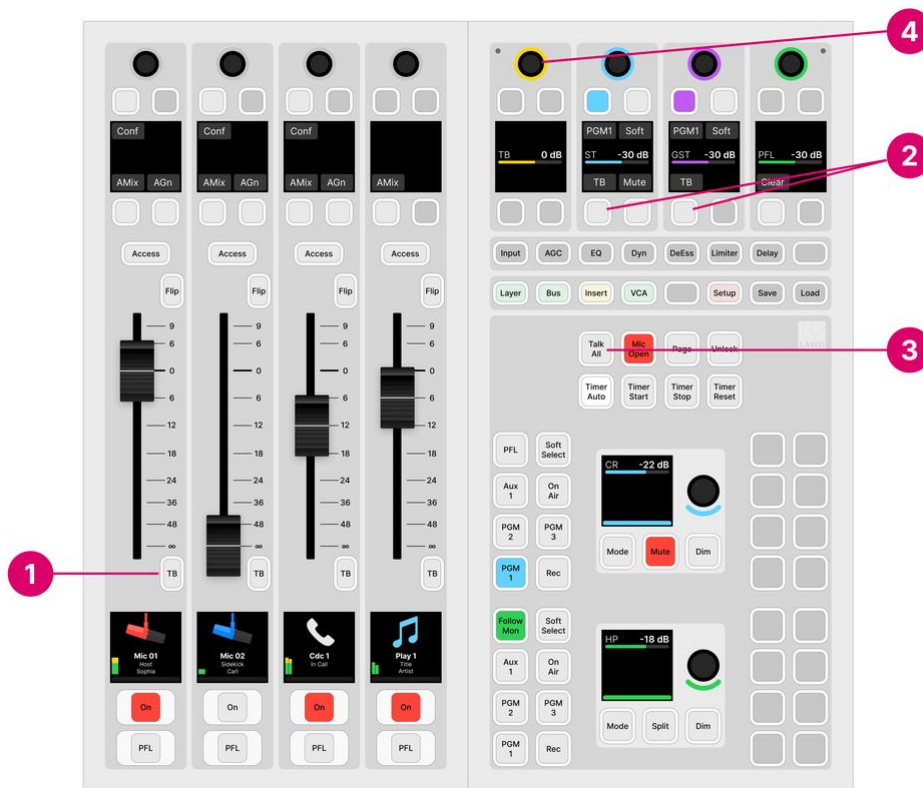
The **TB** or **Talk** keys can be used to talk to a source or monitor output. The number of talkback keys, and their operation, is determined by the configuration. The configuration possibilities are explained [later](#). For now, it is useful to know that:

- Up to 8 talkback sources can be configured (to support more than one talkback mic).
- A central rotary control can be configured to adjust talkback level.
- The operation of the talkback keys can be either momentary or latching.
- While talkback is active, the main signal can be either dimmed or muted.

The rest of this topic describes how talkback is defined in the standard configuration. The operation may vary if the configuration is customized.

Operation

In the standard configuration, the following operations are possible.



1. Talk to Source

Press and hold **TB** on a fader strip to talk to a source. This function is supported for all sources with an N-1 return. i.e. all microphone and codec sources.

2. Talk to Guest or Studio

Press and hold **TB** on the Central Rotary Controls to talk to the guest or studio monitor outputs.

3. Talk to All

Press and hold **Talk All** on the Central or Combo module to talk to the guest and studio monitor outputs, and all available N-1 returns.



4. Talkback Level

On a Central module, the talkback level can be adjusted from the first Central Rotary Control. This function is not supported by a Combo module. In both cases, the initial level is set to 0dB.

All of the talkback keys are momentary so press and hold for as long as you wish to speak. In each case, the main signal is dimmed by 20dB while talkback is active.

Each talkback key has two possible states. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = talkback off.
- Full red = talkback on (active).

Talkback Source

In the standard configuration, the talkback source is defined as Mic Input 1 (from the Studio I/O card). This can be changed by editing the configuration (using the ON-AIR Designer).

6.17 diamond - Conference and N-1

The number of N-1/mix minus returns is determined by the configuration.

By default, each source's N-1 is generated from the programme bus so that the source hears PGM 1 minus themselves.

The conference system allows one or more conference buses to be configured for particular sources. Each source added to the conference then receives an automatically switched mix-minus feed:

- When a conference member is on-air, they hear PGM 1 minus themselves.
- When two or more conference members are off-air, they hear the conference bus minus themselves. This allows the sources to hear each other before they go on-air.

The rest of this topic describes the N-1s and conference system defined in the standard configuration. The operation may vary if the configuration is customized.

Operation

In the standard configuration, each of the following sources supports an N-1 return: Mic 1 to 8, Tel 1 & 2, Codec 1 to 6.

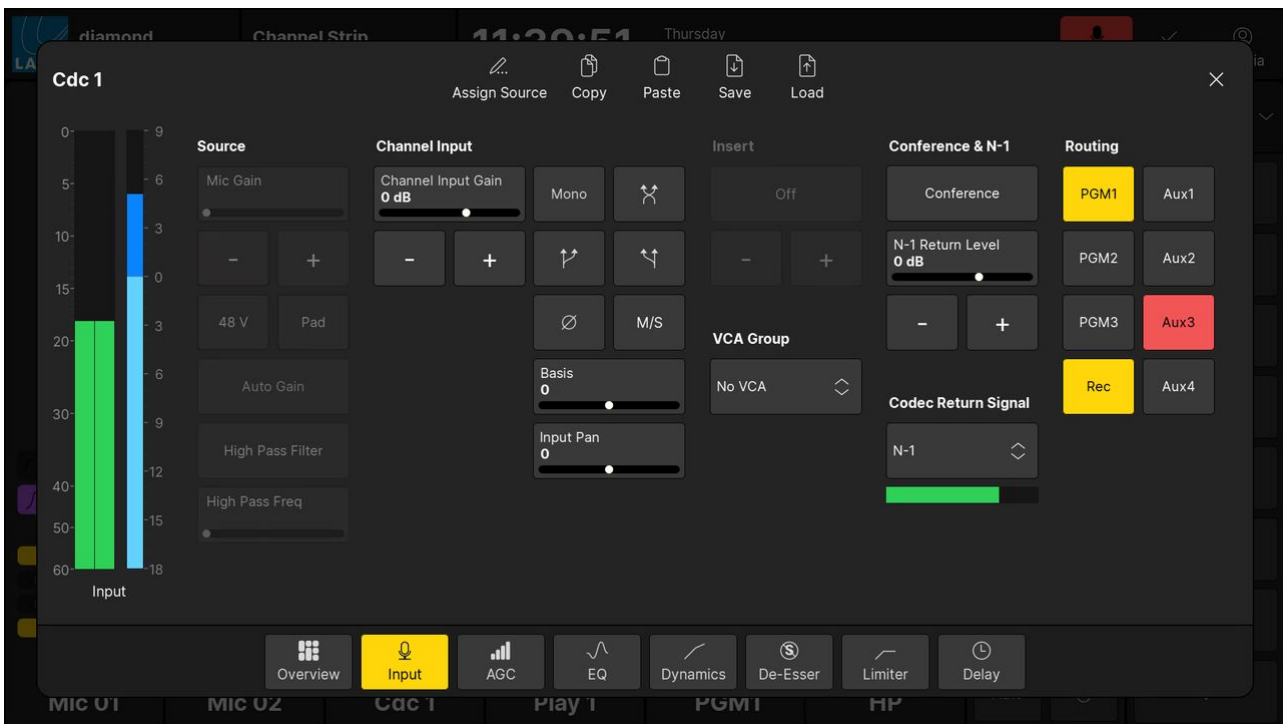
By default, each source receives PGM 1 minus themselves. Sources can be added to the conference system using the **Conf** keys (on the fader strips) or **Conference** buttons (on the GUI).

The N-1 return level can be adjusted (from the GUI), or you can talk to a source, via its N-1 return, by pressing the fader strip **TB** key.

Note that, for each codec source, it is possible to change the return signal (from the GUI). This allows you to send a sum bus or internal tone instead of the N-1 signal.

On the GUI...

1. Open the 'Source Parameter' dialog box by pressing a fader strip **Access** key, and choose the **Input** page.





2. Use the buttons under 'Conference & N-1' as follows. If an option is greyed out, then the parameter is not available.
 - **Conference** - touch this button to add or remove the source from the conference system. The button colors are the same as on the surface (described below).
 - **N-1 Return Level** - touch and drag anywhere inside the parameter box to adjust the N-1 level: either left/right or up/down. Or use the on-screen + and - buttons.
 - **Codec Return Signal** - touch this field to select a signal from the dialog box. The following options are supported: N-1, PGM 1 to 3, REC, AUX 1 to 4 and Tone. The on-screen meter can be used to confirm that signal is present.

On the surface...

The **Conf** key assigns a source onto the conference bus. What the source receives depends on the status of the source fader and that of the other conference members.

The **Conf** key color indicates the current state. The colors used can be modified by the ON-AIR Designer. The following colors are used in the standard configuration:

- Dim white = conference off. Source receives PGM 1 minus themselves.
- Full green (Conf prepare) = conference on and fader open. Source receives PGM 1 minus themselves.
- Dim yellow (Conf active) = conference on and fader closed on a single source. Source receives PGM 1 minus themselves.
- Full yellow (Conf audio) = conference on and fader closed on more than one source. All conference members receive the conference bus minus themselves.

Conference System Example

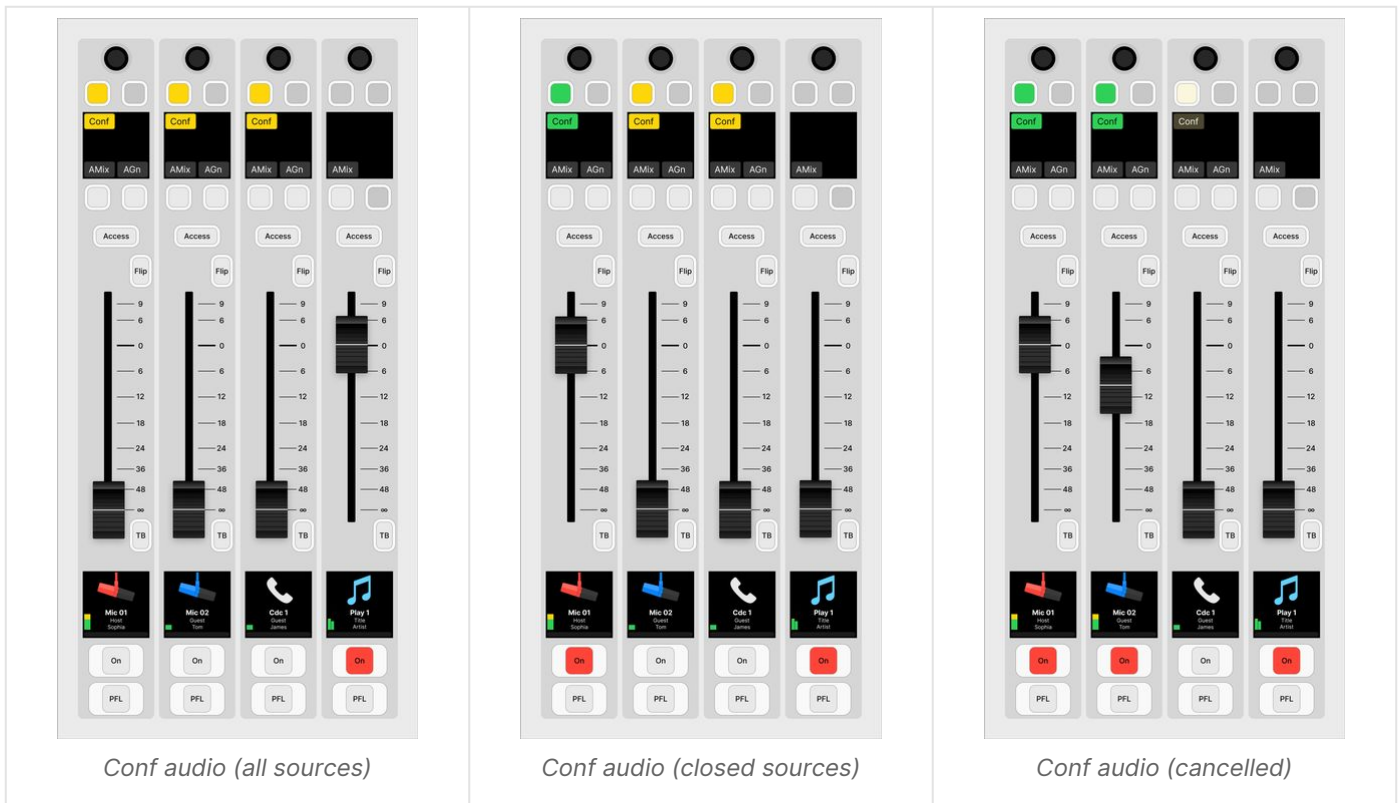
In the example that follows, there are three conference members: Mic 01 (the host), Mic 02 (a studio guest) and Codec 1 (a phone-in guest).

When all three source faders are closed, the **Conf** keys turn full yellow and the sources receive the conference bus minus themselves. In other words, they can hear each other, but not themselves, and chat off-air.

If you open the Mic 1 (host) fader, the source goes on-air. The **Conf** key turns full green, to indicate that this source is in "Conf prepare", and the source's N-1 is switched back to a programme mix minus. The other two sources remain in "Conf audio". This allows the studio and phone-in guest to continue their off-air conversation. At any time you can close the Mic 1 fader so that the host can rejoin the off-air conference.

If you open the Mic 1 (host) and Mic 2 (studio guest) faders, then two out of the three sources go on-air. The **Conf** keys turn full green, to indicate "Conf prepare", and each source's N-1 is switched back to a programme mix minus. In this instance, there are less than two active conference members and so the conference is canceled. The Cdc 1 source's N-1, for the phone-in guest, is switched back to a programme mix minus and its **Conf** key turns dim yellow to indicate "Conf active".

The images below show how this looks on the surface.



At any time you can remove a source from the conference by deselecting its **Conf** key. The key turns dim white and the source's N-1 switches back to a programme mix minus.

6.18 diamond - VCA Grouping

A VCA group can be used to control the level of several sources or summing buses from a single fader.

Up to 8 VCAs can be configured (using the ON-AIR Designer). The number of available VCAs is determined by the Power Core [license](#).

In the standard configuration, a single VCA is defined. More VCAs can be added by editing the configuration (using the ON-AIR Designer). The configuration possibilities are explained later. For now, it is useful to know that:

- Each VCA group can control any number of faders.
- A fader cannot be assigned to more than one VCA.
- VCA groups cannot be nested. i.e. VCA 2 cannot be assigned to VCA 1.
- VCA groups use non-moving faders.

Setting Up a VCA Group

To set up a VCA group, there are two steps. First, assign the VCA group to a fader strip. Then, assign the VCA group members.

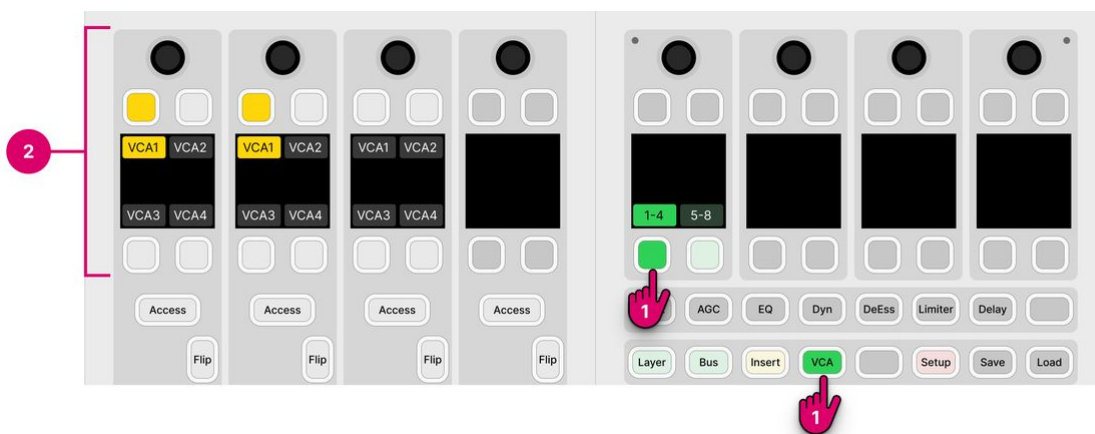
VCAs are available as sources when you activate source selection from a fader strip. This means that you can assign a VCA group to any fader strip in the usual manner, see [Fader Strip Assign](#). Once assigned, the fader strip 'Source Display' updates to show the name and icon defined in the configuration. In the standard configuration, there is a single VCA group called VCA 1.

To make the VCA assignments, you can use either the surface or 'Source Parameter' dialog box (on the GUI).

On the surface...

If your system supports at least one VCA group, then the **VCA** key (on the central controls module) opens the VCA assign pages. The number of pages depends on the number of VCAs defined in the configuration. If all eight VCAs are configured, then there are two pages: **1-4** and **5-8**. The page labels can be edited using the ON-AIR Designer (via the "System → Definition → AccessGrp → VCA Group Menu" options in the 'Tree Definition').

The assignments work in a similar manner to the bus assign pages.



1. From the central controls, press **VCA** and select a page (e.g. **1-4**).

The upper controls on each fader strip switch into "VCA assign" mode. The four soft key labels show the name of the available VCAs. If a soft key has no label, then there is no VCA defined (in the configuration).

The soft key colors show the assignment status:

- Yellow = assigned (on).
- Dim white = not assigned (off).

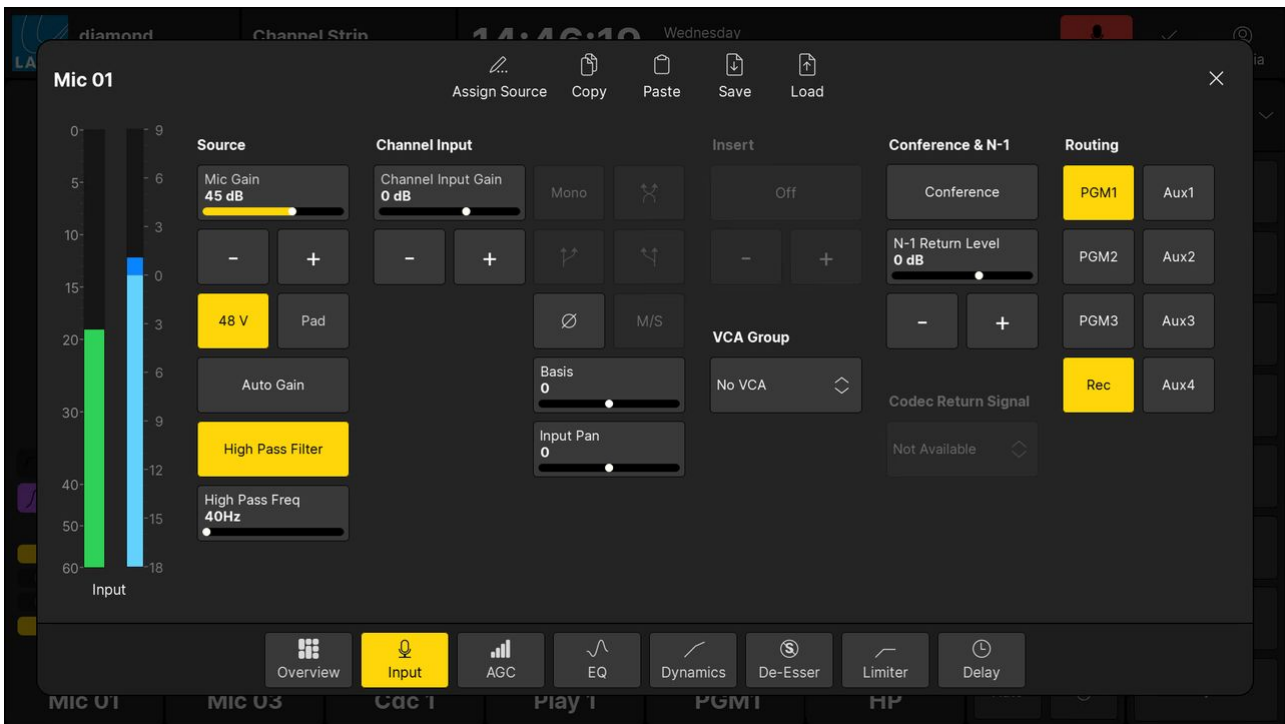
If more than four VCAs are defined (in the configuration), then press **5-8** to access the second page.

2. Press the fader strip soft keys to toggle the assignments (on/off).
3. When you have finished editing the assignments, deselect **VCA** (on the central controls module).

The fader strip controls return to their default functions.

On the GUI...

1. Open the 'Source Parameter' dialog box by pressing a fader strip **Access** key, and choose the Input page.



2. Touch the button under 'VCA Group' to open the 'VCA assign' overlay.

3. Touch a button to toggle the assignments (on/off).

- Yellow = assigned (on).
- Grey = not assigned (off).

4. Touch **X** to close the 'VCA Assign' overlay.

The button under 'VCA Group' updates to show either the name of the VCA group or "No VCA" (if there is no group assigned).

VCA Group Operation

The VCA grouping applies to the fader level and channel on/off status.

In Lawo radio systems, VCA groups use non-moving faders. This means that when you move a VCA group, its member faders remain stationary even though their level is changing.

If you press the channel **ON** key on the VCA group, then the channel **ON** keys on the group members follow accordingly. This allows you to close a VCA group and adjust its mix levels while the group is off-air.



6.19 diamond - Snapshots

Snapshots can be used to reset the console by storing and recalling settings.

There are eight system snapshots (stored on Power Core) plus an unlimited number of GUI snapshots (stored on the host PC or in a datacenter database).

The eight system snapshots are managed from the surface using the **Save** and **Load** keys (on the central controls module). They always save and load settings globally, and are ideal for tasks such as resetting the console to a default starting point. Usually, an **Unlock** key is configured to prevent accidental save or load snapshot operations.

The GUI snapshots are managed by the Lawo application VisTool. Two types of snapshot are supported: full snapshots (to save all settings) and source snapshots (to save settings for the source in access). The operation is determined by the configuration. Optionally, the User Access Rights system can be used to manage the snapshot access for different users. In the standard configuration, there are save and load buttons in the user menu (for full snapshots) and in the 'Source Parameter' dialog box (for source snapshots); users must be logged in to save and load full snapshots.

The following topics describe the operation.

- [diamond - Snapshot Settings](#)
- [diamond - Using the System Snapshots](#)
- [diamond - Using the GUI Snapshots](#)



diamond - Snapshot Settings

This topic describes what is saved and loaded by snapshots.

What's Stored in a Snapshot?

The following settings are saved in all snapshots:

- **Fader Strip Assignments** – the assignment of sources and buses to all fader strips.
- **User Labels** – the two user label text lines for all sources and buses.
- **Stream subscriptions** – the AoIP stream subscriptions handled by a RAVENNA pool.
- **Input Parameters** – mic gain, 48V, etc. for all sources.
- **DSP Parameters** – EQ, Dynamics, etc. for all sources and buses.
- **Fader Levels** – the fader levels for all sources and buses.
- **Bus Assignments** – the assignment of sources to summing buses and their send levels.
- **Insert Assignments** – the assignment of insert devices.
- **VCA Assignments** – the assignment of slave faders to VCA groups.
- **Logical States** (optional) – up to 32 logical states defined by the ON-AIR Designer configuration (via "System -> Definition -> Parameter = Logic Snapshot").
- **Matrix Connects** (optional) – up to 128 matrix connections defined by the ON-AIR Designer configuration (via "System -> Definition -> Parameter = Matrix Snapshot").

Snapshot Recall Options

The following options control what happens when a snapshot loads. They can be used to protect fader levels, isolate fader strips, or make the loading of source parameters dependent on the fader status.

All options apply to both the system and GUI snapshots. They are set by the system configuration and can be edited using the ON-AIR Designer.

Production Mode (Save Value)	
	<p>Treedefinition path: "System → Definition → Parameter = Fader"</p> <p>This option determines whether fader levels are reset by a snapshot load:</p> <ul style="list-style-type: none"> • Production Mode (disabled) = fader levels are ignored (not loaded). Recommended for on-air systems. • Production Mode (enabled) = fader levels are loaded. Recommended for production systems.
Load max. Fader No. Load Audio Always	
	<p>Treedefinition path: "System → Definition → Parameter = Snapshots"</p> <p>The "Load max. Fader No." option can be used to isolate all fader strips above a certain number. This can be useful if there is more than one operator and you wish to use snapshots to reset some faders and not others.</p> <ul style="list-style-type: none"> • Load max. Fader No. - defines the maximum fader number you wish to reset. Any fader above this number is excluded from snapshot loads. Leave the field blank to apply snapshot loads to all faders. • Load Audio Always - overrides the "Load max. Fader No." option for audio-related parameters. This allows audio parameters to be reset for all faders while fader strip assignments are excluded above the "Load max. Fader" number.
SnapLoad disable	

Treedefinition path: "Surface -> Fader Module" (via Snapshots tab)

This option can be used to isolate specific fader strips. It can be used as an alternative, or in addition, to the "Load max. Fader No."

- **SnapLoad disable (Default Map)** - when active, snapshot loads are disabled for the fader strip.

Enable Load Groups Logic

Treedefinition path: "System → Definition → Parameter = Snapshots"

This option can be used to make the loading of source parameters dependent on the fader status. For example, to allow snapshots to reset input parameters only if source faders are closed.

When the "**Enable Load Groups Logic**" option is ticked, all snapshot loads become dependent on the fader status. By default, all parameters load if source faders are closed, and do not load if source faders are open. You can modify this behavior by assigning control signals to the **FC: Disable...** and **FO: Enable...** fields. For example, if **FC: Disable Input Load** is set to active, then input parameters are not loaded if source faders are closed.

In each case, FC = Fader Closed and FO = Fader Open, and control signals can be applied to each of the following source parameter groups:

- Input - input parameters (mic gain, 48V, etc).
- DSP - EQ, Dynamics, Limiter and Delay.
- Bus - summing bus assignments.
- Insert/VCAGrp - insert and VCA Group assignments.

Note that the **FC: Disable...** and **FO: Enable...** fields are hidden until the "Enable Load Groups Logic" option is enabled (ticked).

diamond - Using the System Snapshots

The eight system snapshots are stored on Power Core and are managed from the surface using the **Save** and **Load** keys (on the central controls module). They always save and load settings globally, and are ideal for tasks such as resetting the console to a default starting point.

In the standard configuration, an **Unlock** key is configured to prevent accidental operation. This option can be disabled by editing the configuration (via the "System -> Definition -> Parameter = Snapshots" branch of the 'Tree Definition'). In the examples below, it is assumed that "Snap Unlock" is enabled.

Saving a Snapshot

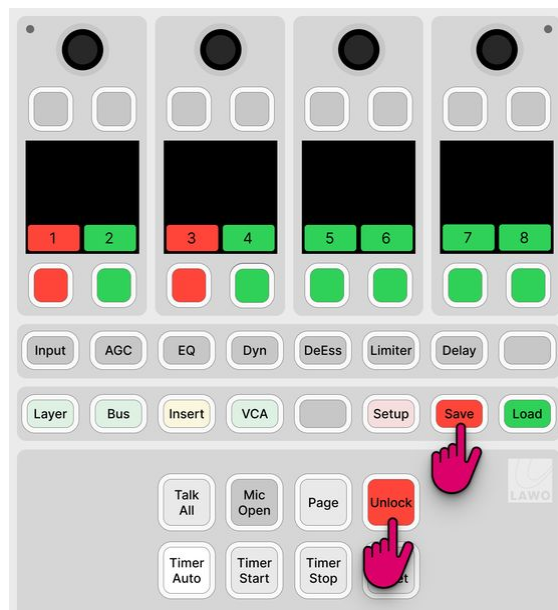
The steps below describe how to save a system snapshot.

1. Press and hold **Unlock** followed by **Save**.

The eight soft keys light up to show which memories are used:

- Red = used.
- Green = empty.

In the example below, snapshots 1 and 3 contain existing settings, while the others are free to use. If you select a used memory, then its contents are overwritten.



2. Keep holding **Save** and select a memory number - e.g. **4**.

The **Save** button flashes magenta to indicate a successful operation.

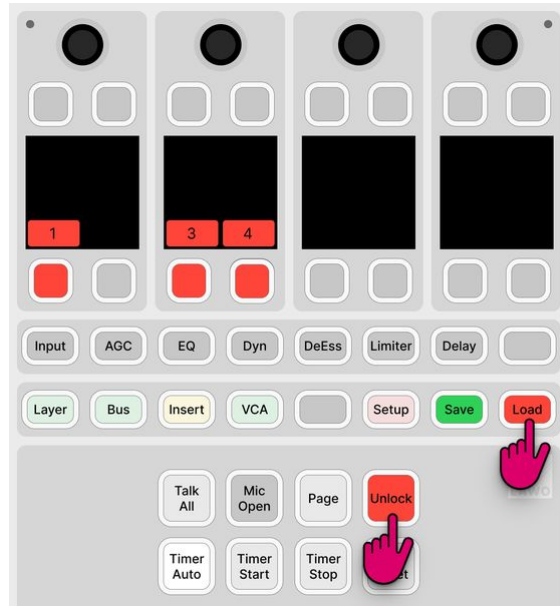
Loading a Snapshot

The steps below describe how to load a system snapshot.

1. Press and hold **Unlock** followed by **Load**.

You can see which memories contain data by looking at the color of the numbered soft keys:

- Red = contains settings.
- Black (unlit) = the memory is empty.



2. Keep holding **Load** and select a red memory number to load its contents - e.g. **4**.

The **Load** key flashes magenta to indicate a successful operation and the console resets according to the snapshot recall options (described earlier).

Clearing a Snapshot Memory

The steps below describe how to clear a system snapshot memory.

1. Press and hold **Unlock** followed by both **Save** AND **Load**.

You can see which memories contain data by looking at the color of the numbered soft keys.

2. Keep holding **Save** and **Load** and select a red memory number - e.g. **4**.

The snapshot memory is cleared.

You can check the success of the operation by pressing and holding **Unlock** followed by **Load** - the relevant soft key should now be black (unlit) to show that the memory is empty.


diamond - Using the GUI Snapshots

The GUI snapshots are managed by the Lawo GUI application VisTool. They are stored in the "Visconfigurations.mdb" file defined in VisTool Editor's 'Global Settings'. Usually, this is located on the host PC so that there is one set of GUI snapshots for each VisTool instance. If you wish to allow different VisTools to access the same snapshots, then a centralized database can be specified. The setup for this is described later in the VisTool MK2 documentation.

There is no limit on the number of GUI snapshots and two types are supported: full snapshots (to save all settings) and source snapshots (to save settings for the source in access). The operation is determined by the configuration. Optionally, the User Access Rights system can be used to manage the snapshot access for different users. In the standard configuration, there are save and load buttons in the user menu (for full snapshots) and in the 'Source Parameter' dialog box (for source snapshots); users must be logged in to save and load full snapshots.

The rest of this topic describes the GUI snapshot operation defined in the standard configuration. The operation may vary if the configuration is customized.

- [Saving a Full Snapshot](#)
- [Loading a Full Snapshot](#)
- [Saving a Source Snapshot](#)
- [Loading a Source Snapshot](#)
 - [Loading Settings to the Source in Access](#)
 - [Loading Settings to the Original Source](#)

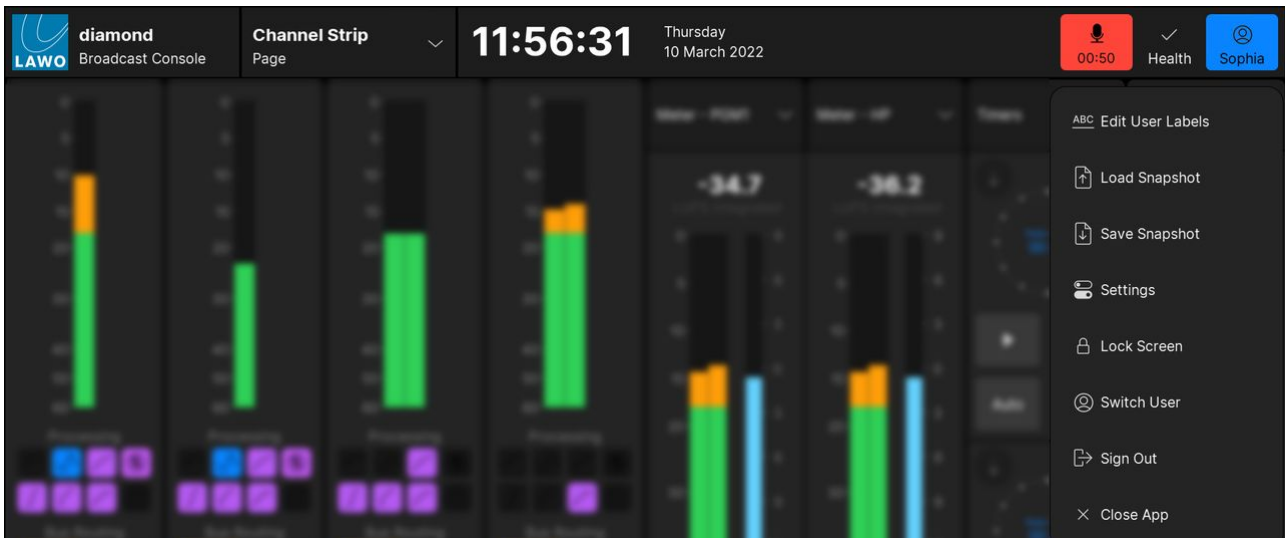
 Full snapshots save all of the settings described [earlier](#) plus the functions and position of the master slots on the 'Channel Strip' page.

Saving a Full Snapshot

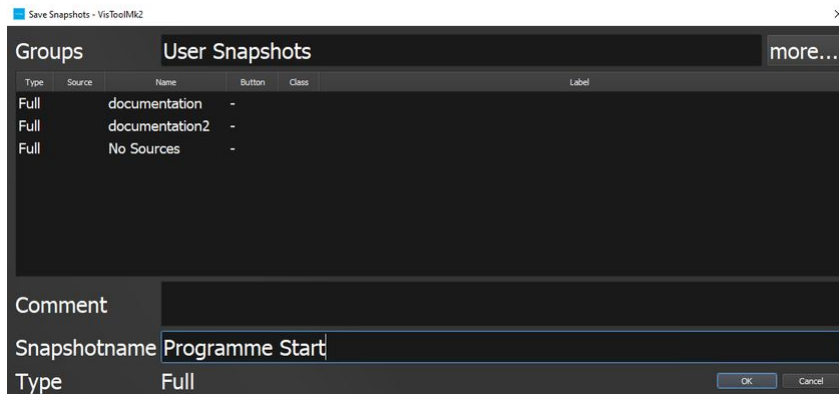
In the standard configuration, you must be logged in to save and load full snapshots.

1. Select **Sign In** (from the user menu) and login in the usual manner.

Following a successful login, you can select your username (top right) to access the **Load Snapshot** and **Save Snapshot** buttons.



2. Choose **Save Snapshot** to open the 'Save Snapshots' dialog box.



3. Enter a snapshot name and, optionally, a comment. Then select **OK**.

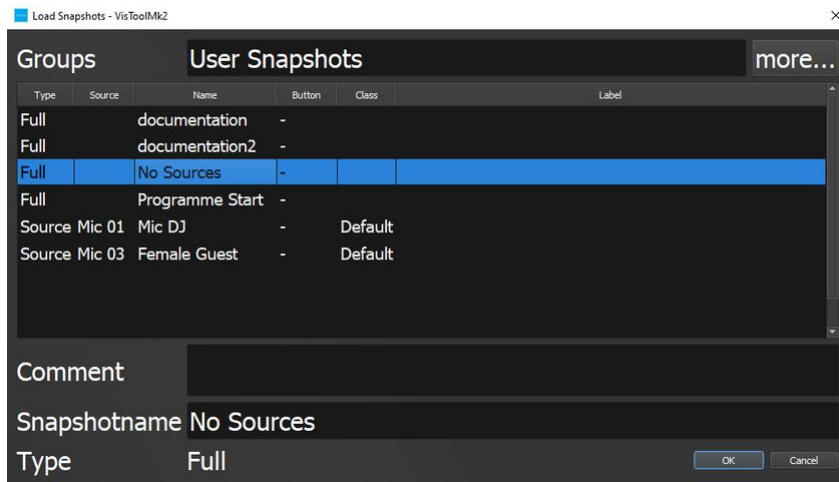
The dialog box closes and the settings are saved.

If you enter the same name as an existing snapshot, then a confirmation box appears - select **Yes** to overwrite or **No** to cancel.

i By default, all snapshots are saved into the "User Snapshots" group. If other groups are available, then these can be selected via the **more...** button (top right). If this button is greyed out, then it is not available to the current user. The access to snapshot groups is determined by the [User Access Rights](#) system (described in the VisTool MK2 documentation).

Loading a Full Snapshot

1. Select **Load Snapshot** (from the user menu) to open the 'Load Snapshots' dialog box.



Here you will see all of the snapshots stored in the "User Snapshots" group. If your system supports other snapshot groups, then these can be selected via the **more...** button (top right).

The 'Type' column shows the type of snapshot, either **Full** or **Source**.

2. Select a full snapshot and select **OK**.

The dialog box closes and the console resets according to the snapshot recall options (described earlier).

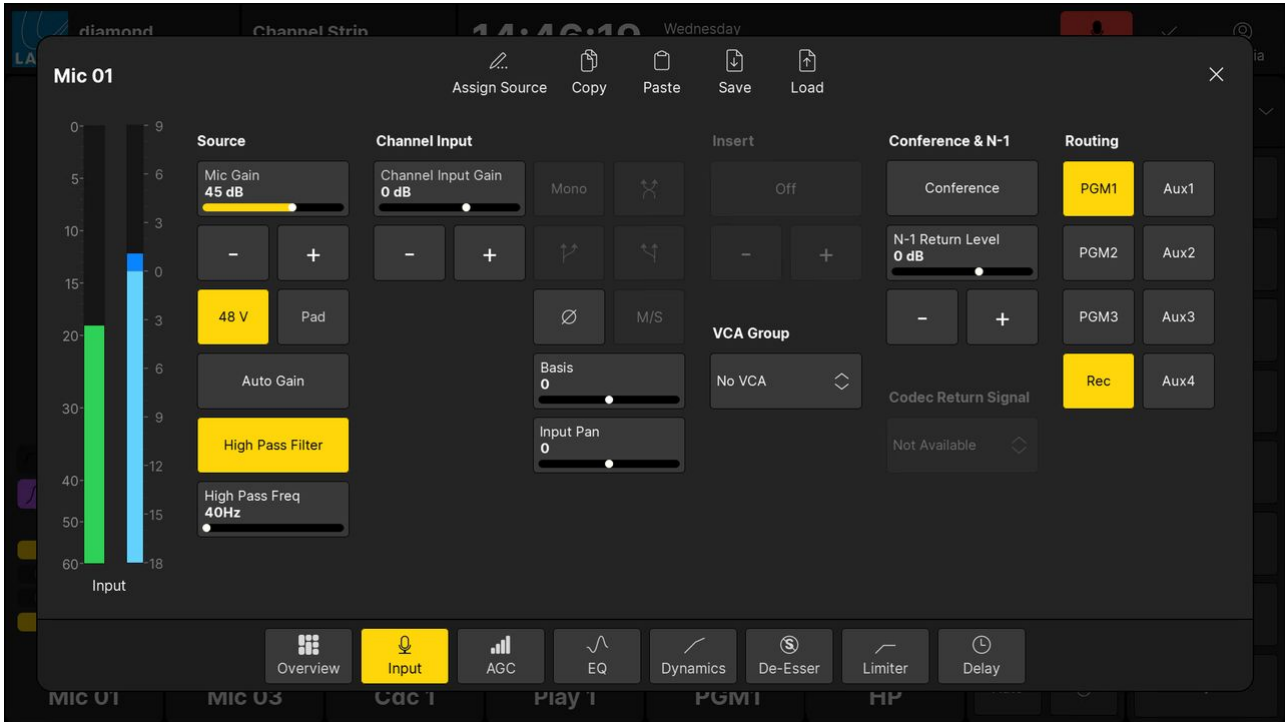
i If you load a source snapshot when no source is in access, then its settings are loaded to the original source (shown in the 'Source' column). For example, loading the snapshot named "Mic DJ" will reset the Mic 01 source.

Saving a Source Snapshot

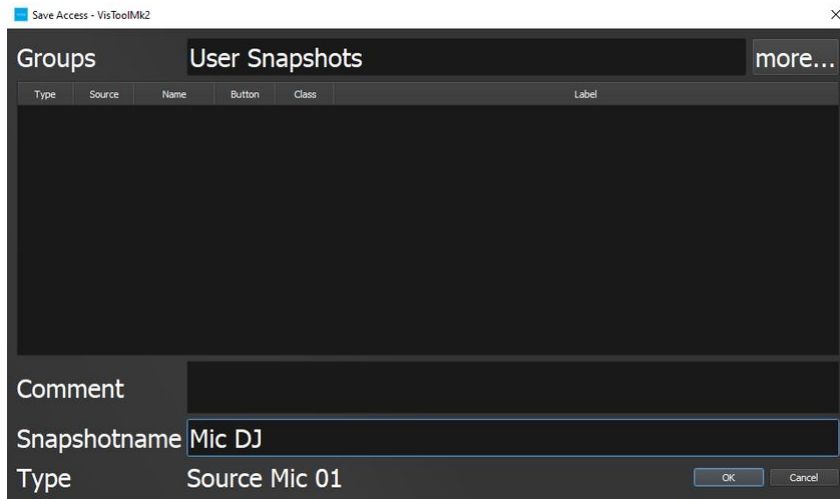
In the standard configuration, source snapshots are saved from the 'Source Parameter' dialog box. This opens automatically when a source is in access.

1. On the surface, press a fader strip **Access** key to select the source you wish to save.

The 'Source Parameter' dialog box opens on the GUI.



2. Select **Save** (from the top row of buttons) to open the 'Save Access' dialog box.



3. Enter a snapshot name and, optionally, a comment. Then select **OK**.

The dialog box closes and the settings are saved.

If you enter the same name as an existing snapshot, then a confirmation box appears - select **Yes** to overwrite or **No** to cancel.

i As before, the snapshot is saved into the "User Snapshots" group. If other groups are available, then these can be selected via the **more...** button (top right).

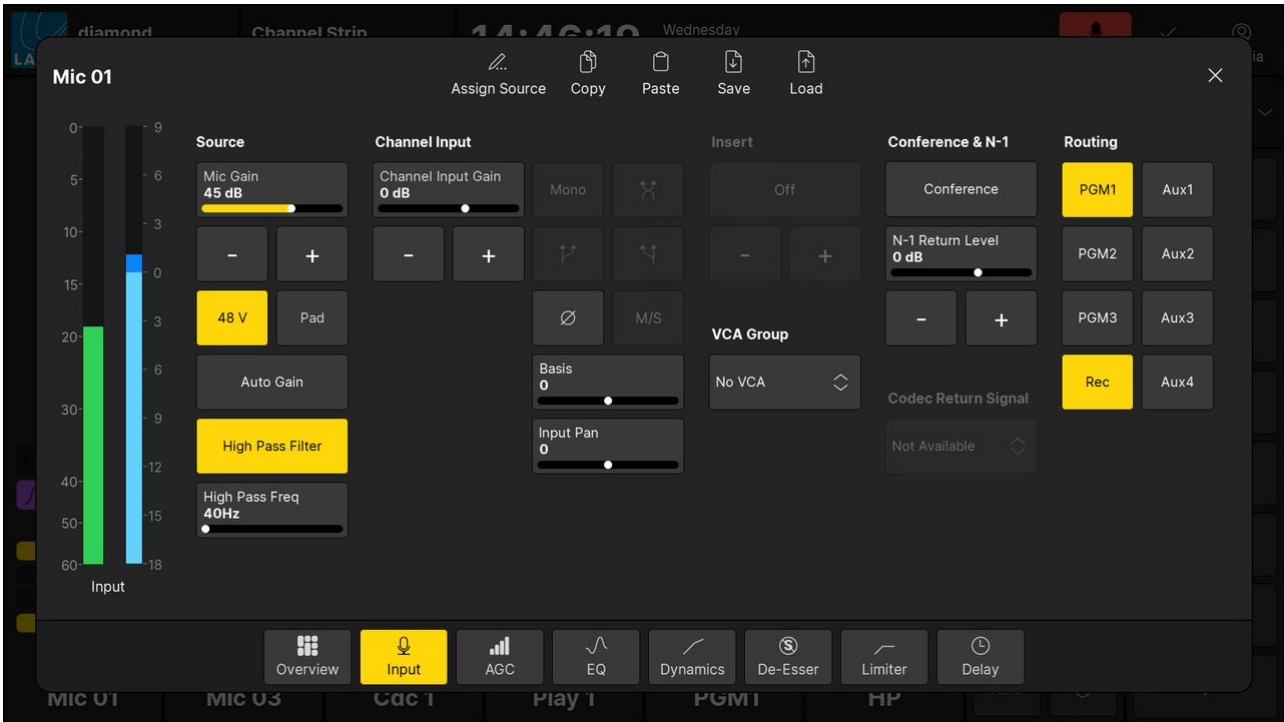
Loading a Source Snapshot

Source snapshots can be loaded either to the source in access or to the original source. The first option is particularly useful if you have saved a library of source snapshots, or wish to copy and paste settings between sources.

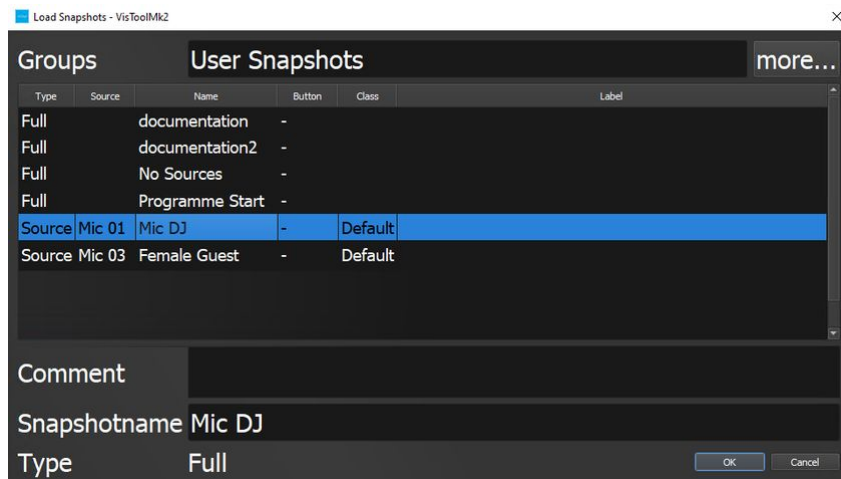
Loading Settings to the Source in Access

1. On the surface, press a fader strip **Access** key to select the source you wish to reset.

The 'Source Parameter' dialog box opens on the GUI.



2. Select **Load** (from the top row of buttons) to open the 'Load Snapshots' dialog box.



3. Select a source snapshot and select **OK**.

The dialog box closes and the source in access resets according to the snapshot recall options (described [earlier](#)).

4. Turn off the fader strip **Access** key to close the 'Source Parameter' dialog box and return the surface controls to their default functions.



Loading Settings to the Original Source

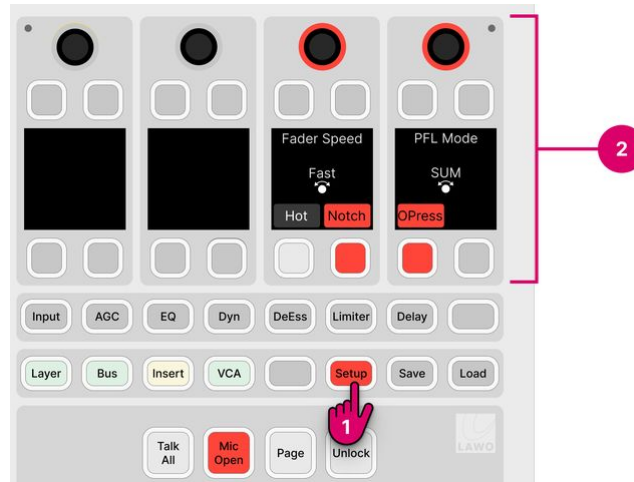
1. Select **Load Snapshot** (from the user menu) to open the 'Load Snapshots' dialog box.
2. Select a source snapshot and select **OK**.

In this instance, there is no source in access and so the snapshot settings are loaded to the original source (shown in the 'Source' column). For example, loading the snapshot named "Mic DJ" will reset the Mic 01 source.

6.20 diamond - The Setup Menu

The **Setup** menu can be used to change the fader options or PFL mode. The current values are stored in the system's warm start data (on Power Core). This means that any changes affect all users and remain in place until the next cold start.

The options are adjusted from the Central Rotary Controls as shown below.



1. To open the menu, press the **Setup** key on the central controls module.

The Central Rotary Controls update to show the available options.

2. Turn a rotary control to adjust the adjust fader speed or PFL mode. Press a soft key to enable or disable 'Hot' faders, the fader **Notch** or the fader **OPress** (Overpress).

Fader Options

There are four options for the faders. Each one affects all faders across the surface.

1 Fader Speed

This option sets the speed at which the faders move in response to a snapshot load or external control signal such as a fader start. Only the physical movement of the faders is affected (and not the response time of the audio).

There are three possible values: Slow, Medium or Fast.

2 Fader Hot Mode

This option determines whether the faders move, or remain stationary, in response to the channel on/off state.

There are two possible values:

- Hot Faders (disabled) = the fader motors are active; faders open and close automatically in response to the channel on/off.
- Hot Faders (enabled) = the fader motors are inactive; the channel on/off state can be changed without faders moving. This allows you to position a fader to the desired level before turning the channel on.

3 Fader Notch

This option enables or disables the fader notch. When the notch is enabled, you will feel a small resistance at 0dB when you move a fader.

The initial state (notch on/off) can be modified by the ON-AIR Designer (under "System → Definition → AccessGrp → Faders").

4 Fader OverPress

This option enables or disables the fader overpress. When enabled, you can pull back on a fader to trigger the overpress function (e.g. PFL). Note that the faders move up (or down) slightly when the option is turned on (or off).

The overpress function is programmed by the configuration and is defined globally for all fader strips. The initial state (overpress on/off) and function can be modified by the ON-AIR Designer (under "System → Definition → AccessGrp → Faders").

PFL Mode

The PFL mode defines how the "PFL" keys operate (as described earlier).

The table below describes all possible options.

1	SUM (default) Multiple PFLs can be selected. Where faders are closed, sources are summed onto the PFL bus. When a fader opens, PFL is canceled. Where faders are open, sources are put into "PFL Prepare". In this instance, nothing happens until the fader is closed. Once the fader is closed, PFL becomes active.
2	SUM R Known as SUM Recurring. Identical to SUM mode, but PFL recurs if you open and then close the fader. In this mode, you must turn off PFL by deselecting the PFL key.
3	PFL Identical to SUM mode, but the PFL keys inter-cancel. This means that only one source can ever be in "PFL Active" or "PFL Prepare".
4	PFL R Known as PFL Recurring. Identical to PFL mode, but PFL recurs if you open and then close the fader. In this mode, you must turn off PFL by deselecting the PFL key.
5	PFL A Known as PFL Always. Identical to SUM mode, except that sources are always put into "PFL Active" even if their faders are closed. i.e. there is no "PFL Prepare".
6	PFL AR Combines PFL Always and PFL Recurring. Sources are always put into "PFL Active", and PFL recurs if you open and then close the fader.
7	PFL PUSH Changes the operation of the PFL keys from latching to momentary. In this instance, you must press and hold a key to make PFL active. PFL cancels when you release the key.
8	PFL DJ A special mode for DJs that can be used to prepare a fader level before the source goes on-air. Start by pressing PFL to monitor the source and adjust the fader level. Then deselect PFL and press channel ON (to put the source on-air) - the fader jumps to the prepared level. Note that the prepared level is applied only once. So, if you take the fader off-air, and then press channel ON again, the fader jumps to 0dB as normal.



9 AFL

Changes the operation of the PFL keys from pre-fader listen to after-fader listen. In this mode, multiple AFLs can be selected. AFL must be turned off by deselecting the **AFL** key.

10 AFL/PFL

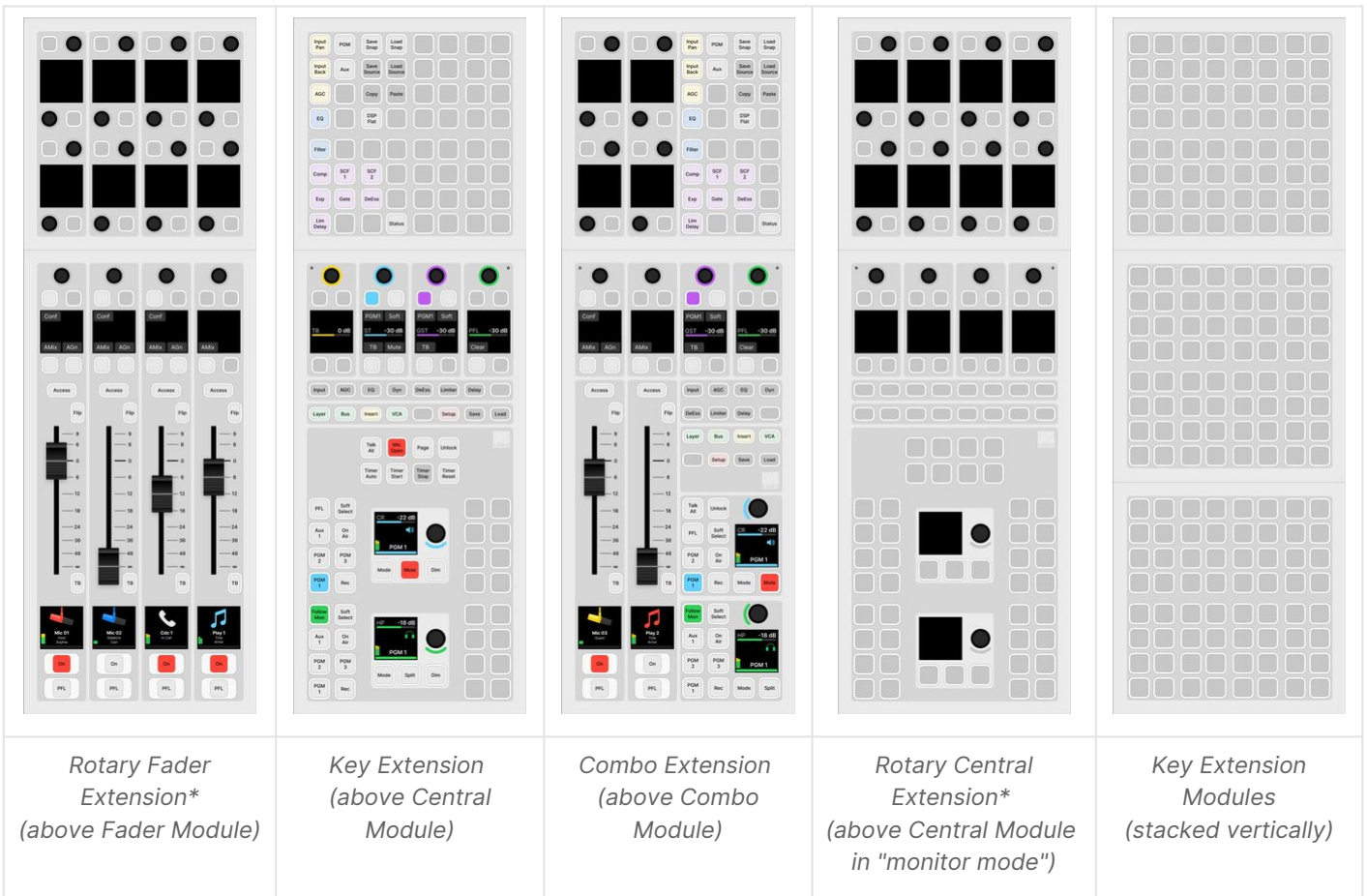
Combines AFL and PFL operation. The PFL keys operate as AFL when a fader is open and PFL when a fader is closed.

6.21 diamond - Working with Extension Modules

The diamond surface supports three extension modules that can be used to extend the fader strip and central controls.

- **Rotary Extension** - 16 x rotary controls (with control keys).
- **Key Extension** - 64 control keys.
- **Combo Extension** - 8 x rotary controls (with control keys) + 32 control keys.

The modules can be fitted to the upper slots in an extended frame, or to a standard frame / lower slot if a special mounting bar is installed. In each case, the possible slots are defined by the configuration. The images below show some examples.



* Physically, the two **Rotary Extension** modules are identical. However, their operation varies according to the slot IDs defined in the configuration. There are two possibilities: a **Rotary Fader Extension** adds 4 sets of controls to each fader strip, while a **Rotary Central Extension** can be freely configured for central functions.

The slot allocations can be checked by opening the "Frames → Surface" configuration in the ON-AIR Designer.

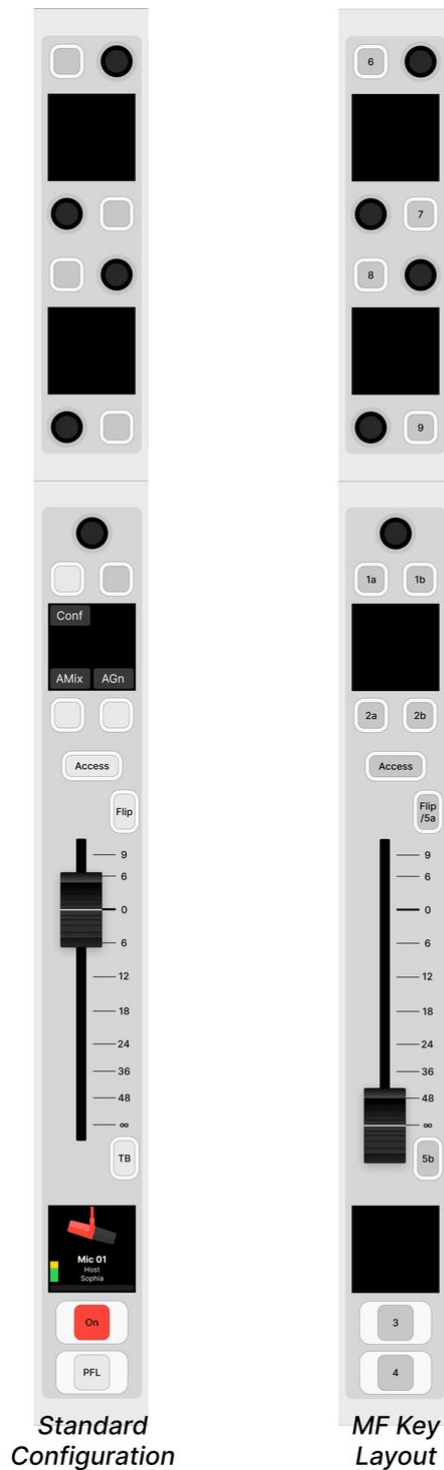
When using blind plates, the slot above the frame's connector board must be fitted with an actual module (and not a blind plate). This is important in a single module-width frame (1 ME), where the connector board position is fixed (in the upper slot position).

Fader Extension Modules

The **Rotary Fader Extension** and **Combo Extension** modules add 4 sets of controls to each fader strip. Their main purpose is to provide source parameter control. When this is switched off, the control keys operate as MF keys 6 to 9.

The image below shows the MF Key layout for the default mode of operation. In the standard configuration, there is nothing defined for MF keys 6 to 9, but each key can be configured for a source-specific function. Note that the rotary controls cannot be configured and have no function.

Extended Fader Strip - Controls



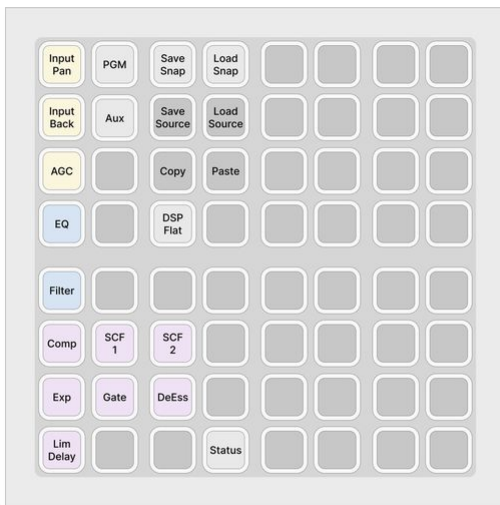
Central Extension Modules

The number of central controls can be extended by adding a **Key Extension**, **Combo Extension** or **Rotary Central Extension** module.

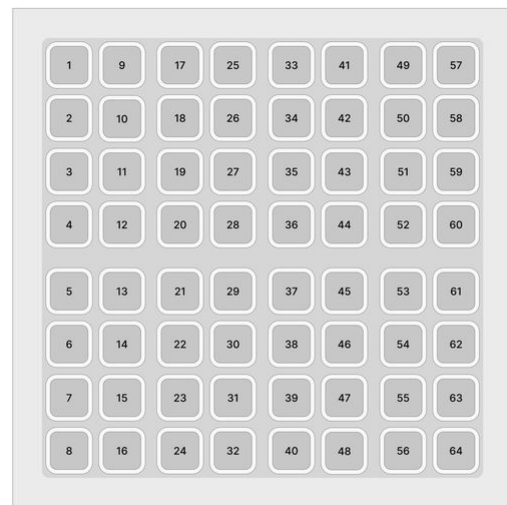
The **Key Extension** and **Combo Extension** modules provide MF keys that can be freely configured for central functions. The functions are defined by the configuration, and usually include the global "page" switching for the **Rotary Fader Extension** modules.

The **Rotary Central Extension** module provides 16 rotary controls (with control keys) that can be freely configured for central functions. The functions are defined by the configuration. The image below shows the MF key layout. Note that only 8 of the 16 rotary controls can be configured.

Key Extension - Controls

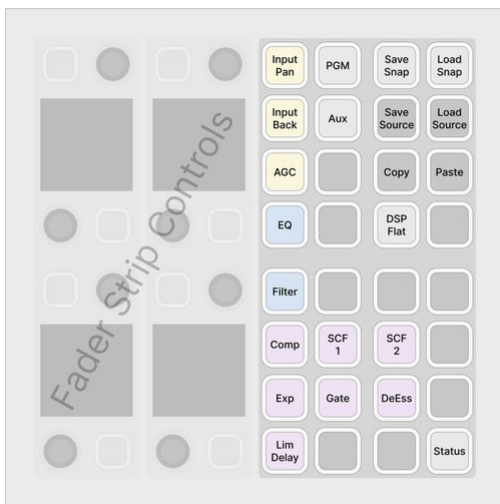


Standard Configuration

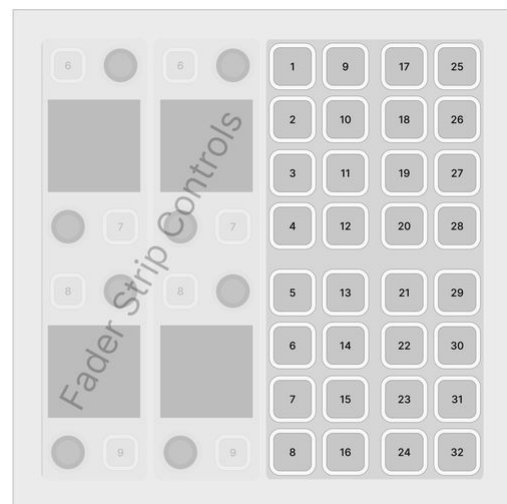


MF Key Layout

Combo Extension - Controls

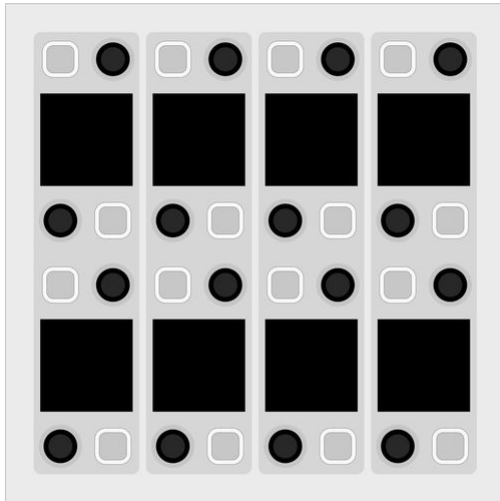


Standard Configuration

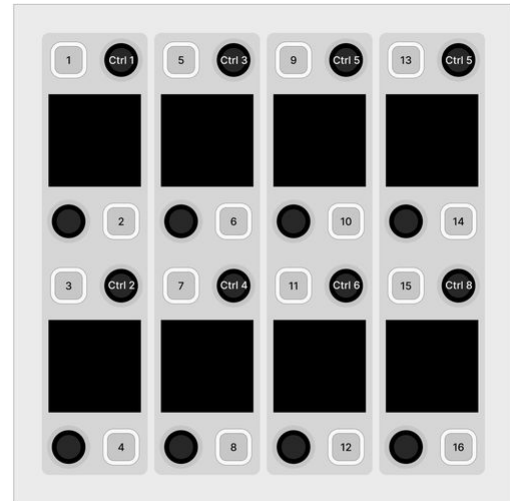


MF Key Layout

Rotary Central Extension - Controls



Standard Configuration



MF Key Layout

Source Parameter Control

If the console is fitted with Fader Extension modules, then it is possible to adjust source parameters directly from the fader strip. This allows users to adjust parameters, such as EQ or Dynamics, for more than one source at a time.

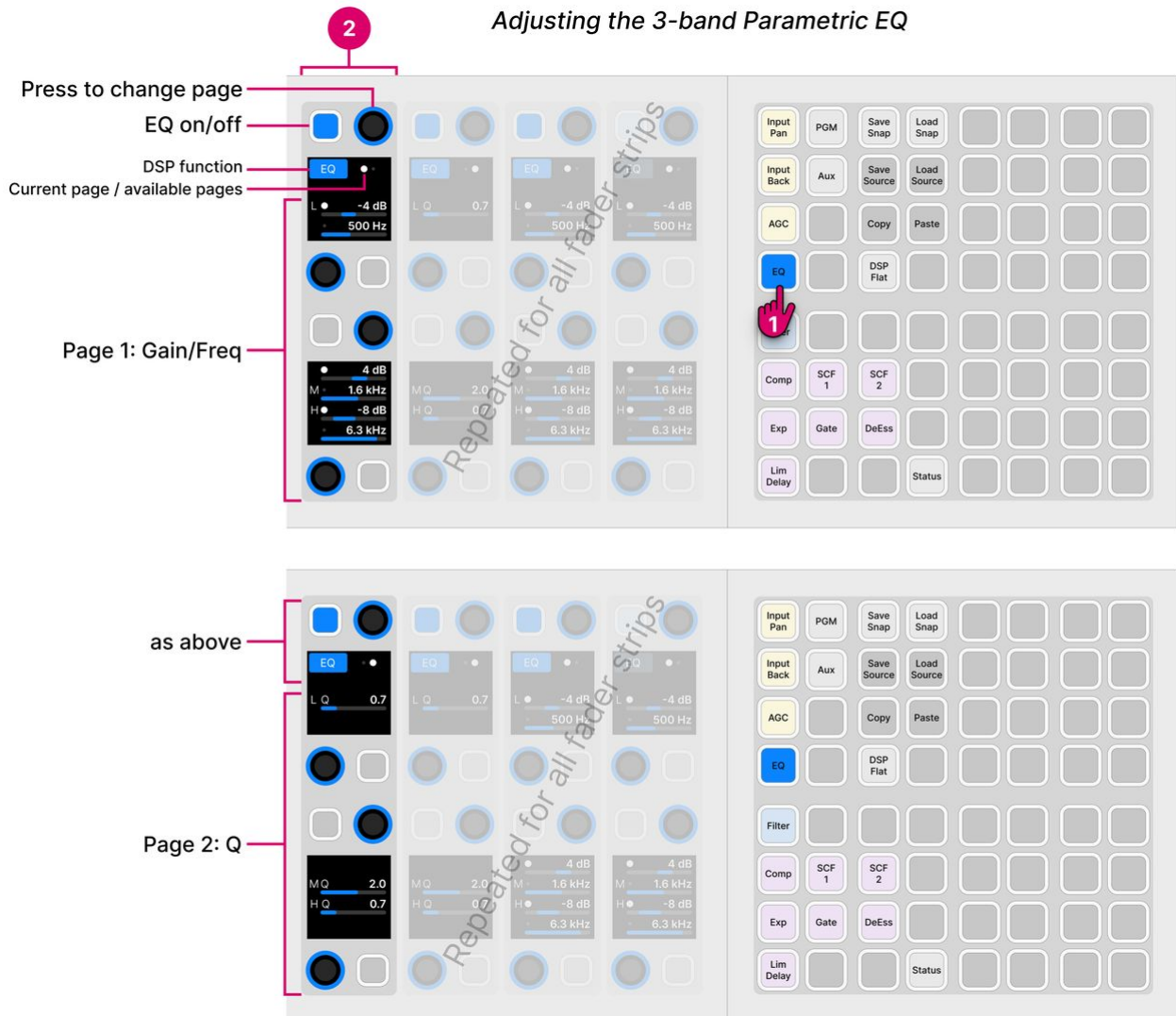
The parameters are assigned globally across the console using "page" keys that are defined by the configuration. Any MF key (on the surface or GUI) can be configured as a page key; the mapping of parameters within each page is system-defined. This means that the number and location of the page keys may vary, while the operation of the Fader Extension controls is always the same (regardless of the configuration).

In the standard configuration, the page keys are programmed onto the **Key Extension** or **Combo Extension** module.

DSP parameters can be protected so that only certain users can make changes. If this is the case, then you must be logged in (with DSP parameter rights) in order to open the relevant pages. The rights can be edited by an administrator of the user access rights system.

Source Parameter Control Operation

The steps below describe how to adjust source parameters from the extended fader strips using the MF keys defined in the standard configuration. The number and location of the page keys (1) may vary if the configuration is customized.



1. On the Central Extension module, select a page of parameters – for example, **EQ**.

The Fader Extension controls update globally across the console. The controls use the Lawo LUX color-coding for easy identification, so yellow for input and pan, blue for EQ, magenta for Dynamics and cyan for Delay.

2. Use the Fader Extension controls to adjust the parameters.

The controls on each fader strip work independently and can be adjusted at the same time.

The operation varies slightly depending on the selected page. In general:

- The upper soft key and rotary control are used for the master on/off and subpage switching.
- If there is more than one page of parameters, then a dot appears below the upper rotary control. This indicates the current page and the number of available pages. Press down on the rotary control to step through the pages.
- For switched parameters, press the soft key to turn the option on or off: lit (full) = on; lit (dim) = off.
- For variable parameters, turn the rotary control to adjust the value - the current value is shown in the display. If a second parameter is available, then push down and turn to adjust the second function. The dot indicates the current function.
- If a rotary control or soft key is unlit, then it has no function.

For **EQ** and **Dynamics**, the on/off affects the complete module. So:



- **EQ on** – enables both the 3-band parametric EQ and 2-band Filters.
- **Dynamics on** – enables the master on state for the dynamics: compressor, gate and expander.

The **Status** page provides a quick way to turn each of the following DSP modules on or off: EQ, Limiter, Dynamics and Delay. In this instance, press a soft key to toggle the state of the DSP module.

The **PGM** and **Aux** pages can be used to adjust the bus assignments and aux send levels. The operation is identical to the Bus Assign mode described earlier.

3. At any time you can switch to another page (from the Central Extension module).
4. When you have finished adjusting the parameters, turn off the page key (on the Central Extension module).

The Fader Extension controls return to their default functions. Note that, in the standard configuration, the controls go blank as MF keys 6 to 9 have no function.

Source Parameter Control Pages

The "page" keys are configured using the "System -> Definition -> Parm -> Extension Ctrl Menu" branch of the 'Tree Definition'. You may have access to all pages, or a subset, depending on the number of MF keys available.

In the standard configuration, there are 12 pages as follows:

- **Input Pan** – input and pan (LCR).
- **Input Back** – additional input parameters including the Rumble Filter, PAD and N-1 level.
- **AGC** – automix.
- **EQ** – 3-band parametric EQ.
- **Filter** – 2-band filters.
- **Comp** – compressor.
- **Exp** – expander.
- **Gate** – gate.
- **DeEss** – de-esser.
- **Lim Delay** – limiter and delay.
- **Status** - on/off for the EQ, Limiter, Dynamics and Delay.
- **PGM** – bus assign for PGM 1-3 & Record.
- **Aux** – bus assign for Aux 1-4.

Other pages that can be configured are:

- **Surr Pan** – surround panning.
- **Bus #** - additional bus assign pages.
- **VCA #** - VCA assign pages.
- **Insert** - insert parameters.



7 diamond VX - Operation

This chapter describes how to operate the diamond VX GUI.

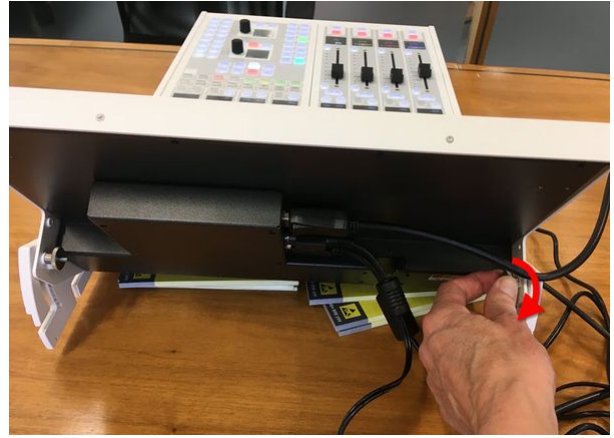
The examples used in this chapter describe the standard configuration delivered with every system. If your GUI looks different, then you may be running a custom configuration. You can learn more about how to customize the GUI, using VisTool Editor, in the "VisTool User Guide" (available [here](#)).

- [diamond VX - Changing the Viewing Angle](#)
- [diamond VX - Getting Started](#)
- [diamond VX - Operating Principles](#)
- [diamond VX - Channel Strip Page](#)
- [diamond VX - Playout Page](#)
- [diamond VX - Browser Page](#)
- [diamond VX - Routing Page](#)
- [diamond VX - System Health](#)
- [diamond VX - Timer Operation](#)
- [diamond VX - User Menu](#)
- [diamond VX - Login and Logout](#)
- [diamond VX - Edit User Labels](#)
- [diamond VX - Load Snapshot and Save Snapshot](#)
- [diamond VX - Settings](#)
- [diamond VX - Initial Settings](#)

7.1 diamond VX - Changing the Viewing Angle

The viewing angle of each Virtual Extension module can be adjusted to one of three positions to suit your own personal preference.

1. From the rear of the frame, loosen the two fastening screws by turning them in an anticlockwise direction.



2. Gently pull the display towards you, or push the display away from you.



3. Once you are happy with the angle, tighten the two fastening screws at the rear by turning them in a clockwise direction.

The two fastening screws must be tightened to prevent the display from tilting when the touch-screen is used.

7.2 diamond VX - Getting Started

The Virtual Extension is designed for touch-screen operation. The viewing angle can be adjusted by the operator (as described [here](#)). The functionality is defined by the configuration.

This section describes the diamond VX standard configuration included with every console. The operation may vary if the configuration is customized.

Prerequisites

The VX software runs on a Windows 64-bit PC that must be supplied by the customer. A license to run the standard configuration is included with every console.

It is expected that the customer has prepared and connected the host PC. How to do this is described in [diamond - Configuring the Virtual Extension](#).

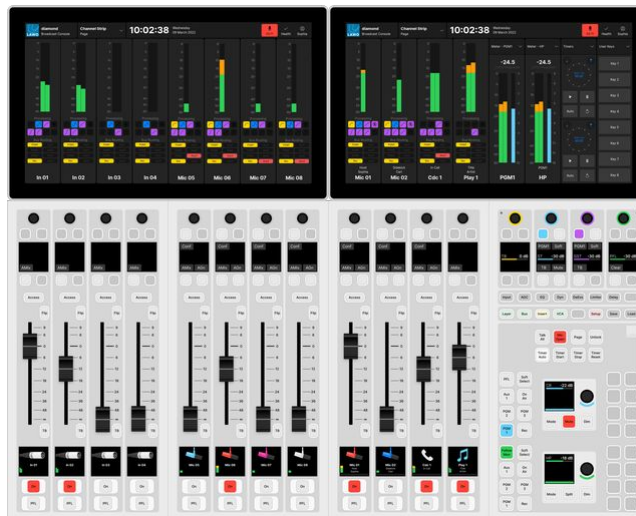
Starting the Software

The VX runtime session can be started by double-clicking on the start script icon. The session loads and connects to the hardware. Providing there are no error messages, the VX displays are ready for operation.

If the displays do not look operational, then try the troubleshooting tips in [diamond - Powering On](#).

Configuring the VX Main Display

Once the session is running and connected to the hardware, check the configuration of the VX main display (above the central controls).



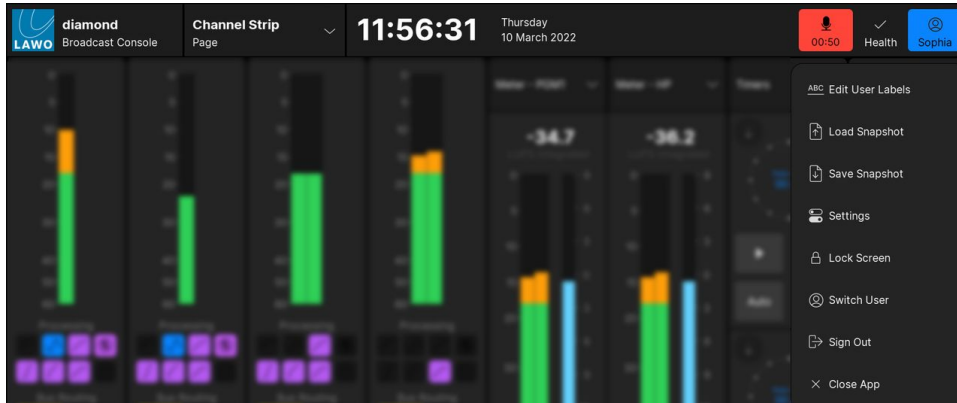
All VX displays have the same top bar and page options. The only difference is in the 'Channel Strip' page where two types of strip are supported:

- **Channel Strips** - are designed to appear above the fader strips. They provide visual feedback for the sources assigned to the faders.
- **Master Slots** - are designed to appear above the central controls. They provide assignable slots for functions such as output metering.

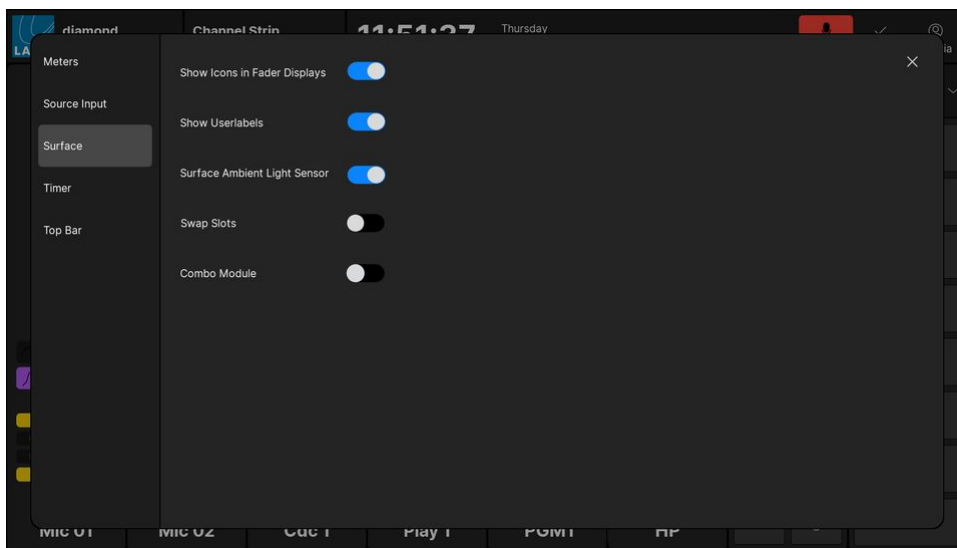
The number and position of the channel strips can be adjusted so that the layout matches the surface hardware. If there is a mismatch, then the layout should be modified as follows.

1. Touch the user name (e.g. **Sophia**) and select **Settings** (from the user menu).

You must be logged in to access the **Settings** button.



2. Select the **Surface** tab (to access the 'Settings → Surface' options).



3. Use the **Swap Slots** and **Combo Module** options as follows.

- **Swap Slots** - swaps the position of the channel strips from left to right. This option should be enabled if the Fader module is fitted to the right of the central controls.
- **Combo Module** - changes the layout from 4 channel strips + 4 master slots to 6 channel strips + 2 master slots. This option should be enabled if the surface is fitted with a Combo module instead of a Central module.

The images below show the correct settings for each possible layout.



Swap Slots (off)
Combo Module (off)



Swap Slots (on)
Combo Module (off)



Swap Slots (off)
Combo Module (on)

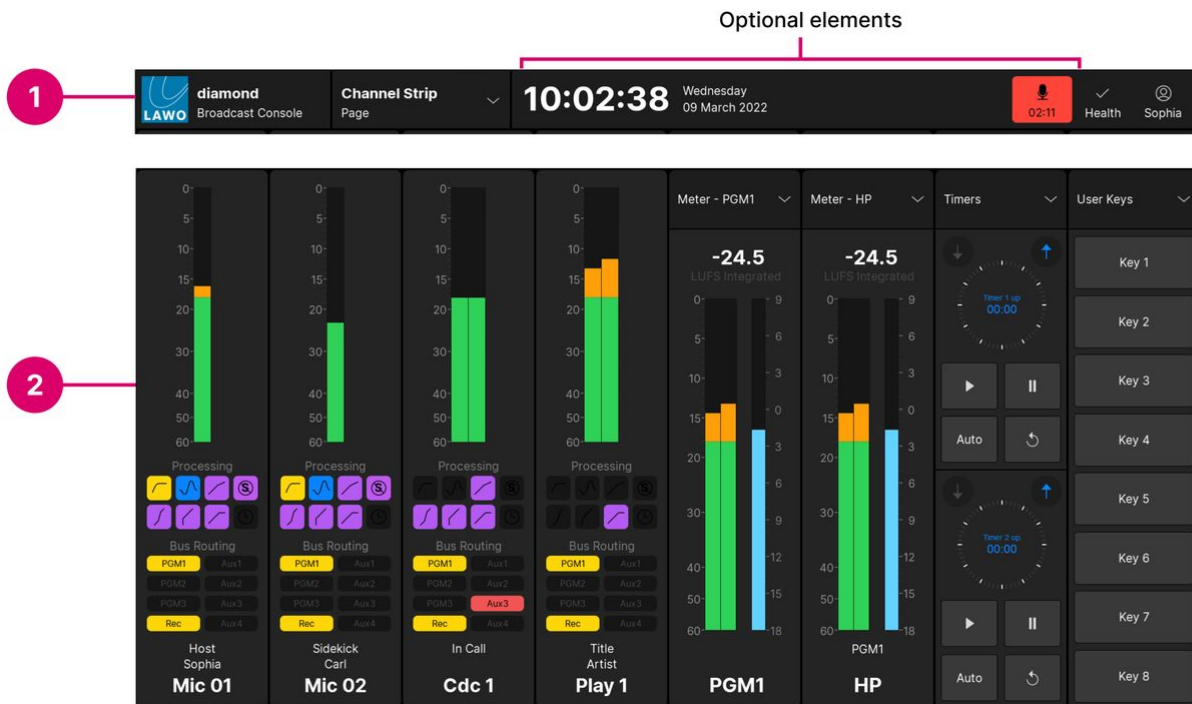


Swap Slots (on)
Combo Module (on)

Please note that any changes made from the "Settings" dialog box are not persistent, and are reset to the default values once the app restarts. Therefore, to make the changes permanent for all users, you should edit the Swap Slot positions and Combo Module options in the "Emberdefault.ini" file.

7.3 diamond VX - Operating Principles

Each VX display is divided into two areas. The top bar (1) is always visible, while the main working area (2) is switched between different pages.



1. Top Bar

The top bar includes some elements that are always displayed and some that are optional. Each of the optional elements can be enabled (or disabled) from the '[Settings](#) → Top Bar' dialog box.

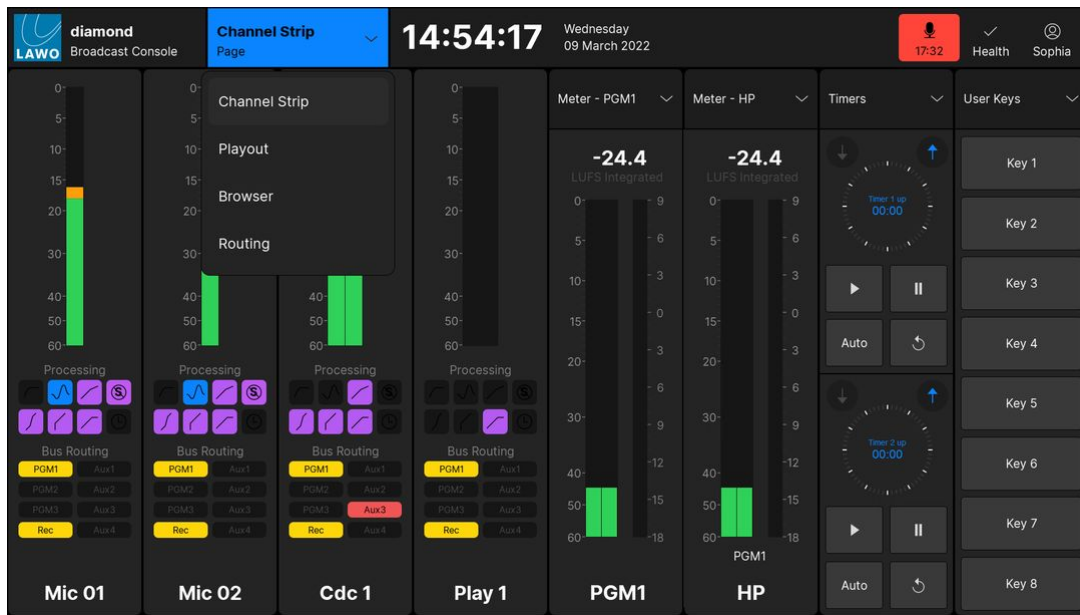
Working from left to right, the elements are:

- **LAWO logo** and product name (**diamond Broadcast Console**) - for information only.
- **Current page name** (e.g. Channel Strip). Touch the **Page** button to change the page.
- **System Clock** (optional) - for information only. The system clock shows the time and date running on the host PC. This can be transferred to Power Core using SoP Explorer (as described later).
- **Mic Timer** (optional) - for information only. The indicator lights in red and counts up from 00:00 whenever a Mic source fader is open. The timer resets to 00:00 once all Mic source faders are closed.
- **Notifications indicator** (optional) - is reserved for future implementation.
- **Health indicator** - shows the health of the system. A white tick shows that everything is ok. If there is a problem, then an exclamation mark appears. In each case, touch the indicator to view more information.
- **User name** (e.g. Sophia). Touch the user name to open the user menu. From here you can sign in (or sign out) and close the VX App. In addition, the following buttons become available after login: **Edit User Labels**, **Load Snapshot**, **Save Snapshot**, **Settings** and **Lock Screen**.

2. Current Page

The main working area can be switched to one of four pages.

To change the page, touch the **Page** button (below the current page name) and choose an option from the drop-down menu.



There are four available pages as follows.

- [Channel Strip](#) - visual feedback for the sources assigned to the fader strips and/or central functions.
- [Payout](#) - a specific web page.
- [Browser](#) - web browser including bookmarks.
- [Routing](#) - control of the system's output routing.

If your console is fitted with multiple VX modules, then you can show a different page on each display.



Dialog Boxes (Overlays)

The following dialog boxes appear automatically in response to an operation from either the surface or GUI. In each case, the dialog box appears on top of the current page (as an overlay).

Dialog Box Name	Function	How to Open
<u>Source Parameters</u>	View and control parameters for the source in access.	Press a fader strip Access key once.
<u>Assign Source</u>	Assign a source to a fader strip.	Press a fader strip Access key twice in quick succession.
<u>Load / Save Snapshot</u>	Load or Save a GUI snapshot.	Select Load or Save Snapshot from the GUI user menu.
<u>Select Mon Source</u>	Select a monitor source.	Press and hold the Soft Select key (for CR or HP).
<u>Select Mon Mode</u>	Change the monitoring mode.	Press the Mode key (for CR or HP).
<u>Settings</u>	Customize the operation for the current user.	Select Settings from the GUI user menu.
<u>User Labels Editor</u>	Edit the user labels for any source.	Select Edit User Labels from the GUI user menu.
<u>User Login</u>	Access protected functions (by logging in).	Select Login from the GUI user menu.

7.4 diamond VX - Channel Strip Page

The 'Channel Strip' page is divided into 8 vertical strips that provide an extension of the surface controls.

Two types of strip are supported: channel strips (above the faders) and master slots (above the central controls).

In the example below, there are 4 channel strips (on the left) and 4 master slots (on the right). If your surface is fitted with a Combo module, or the faders are on the right of the central controls, then the layout can be modified using the **Combo Module** and **Swap Slots** options (in the 'Settings → Surface' dialog box).



Channel Strip Elements

Each channel strip provides visual feedback for the source assigned to the fader.

Working from top to bottom, there are four areas: input metering, processing, bus routing and the source name / user labels. For security reasons, it is not possible to change settings from these elements. For example, you cannot turn off an EQ by touching its icon.









Input Metering

This area provides dedicated input metering for every fader strip. The user can decide to show peak metering, momentary loudness or both using the **Channel Strip** option (in the 'Settings → Meters' dialog box).

For more information about the metering scales and characteristics, see [diamond - Metering](#).

Processing

This area shows the on/off status of each DSP module: unlit = off, lit = on. The icons use the Lawo LUX color-coding as follows:

<i>High Pass Filter</i>	<i>EQ</i>	<i>Compressor</i>	<i>De-Esser</i>
			
			
<i>Expander</i>	<i>Gate</i>	<i>Limiter</i>	<i>Delay</i>

To turn a module on/off, or adjust its settings, press a fader strip **Access** key to open the Source Parameters and then choose the relevant page.

Bus Routing

This area shows the assignments to the 8 summing buses (defined in the standard configuration). The icons are color-coded to indicate the current status:

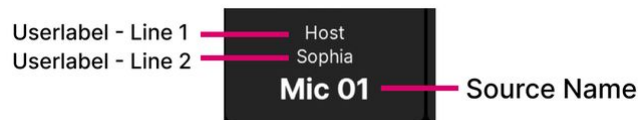
- Unlit = source is not assigned (off).
- Yellow = source is assigned (post-fader).
- Red = source is assigned (pre-fader).

To change the bus assignments, press **Bus** and a page number from the central controls, or press a fader strip **Access** key to open the Source Parameters.

For more information on editing the bus assignments, see diamond - Bus Assign.

Source Name & Userlabels

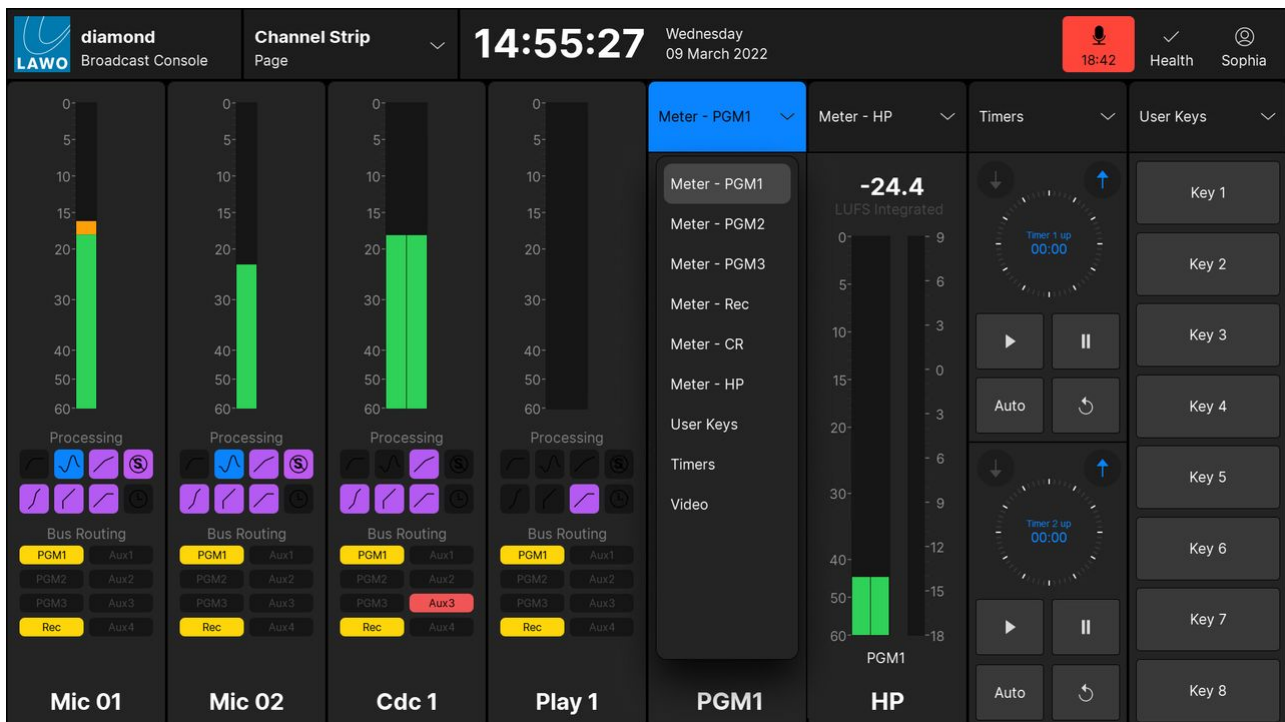
This area shows the source name (in large text) and user label lines (in small text).



The text can be edited by the user labels editor . In each case, up to 8 characters are supported.

Master Slots

Each master slot is assigned by touching the arrow (at the top right of the slot) and choosing an option.



The following functions are supported:

- **Meter - PGM x** - output metering for a programme bus.
- **Meter - Rec** - output metering for the record bus.
- **Meter - CR** - output metering for the control room monitoring.
- **Meter - HP** - output metering for the headphone monitoring.
- **User Keys** - 8 programmable user keys (requires configuration).
- **Timers** - two count-up/count-down timers.
- **Video** - four video previews (requires configuration).

Output Metering

There are no user options for the output meters and so both peak and momentary loudness bargraphs are always displayed. The numerical readout shows the integrated loudness measurement (in LUFS).

For each of the main bus outputs, the metering point comes after all processing including the fader. For the monitoring outputs, the metering point comes after the monitor source selector and before the volume (including mute/dim).

For more information about the metering scales and characteristics, see [diamond - Metering](#).

User Keys

The 8 user keys are defined by the configuration. In the standard configuration, nothing is programmed and so the functions must be configured using VisTool Editor and the ON-AIR Designer.

Timers

Each timer has two modes of operation: count-up or count-down, and can be triggered either automatically or manually. The full operation is described later in [Timer Operation](#).



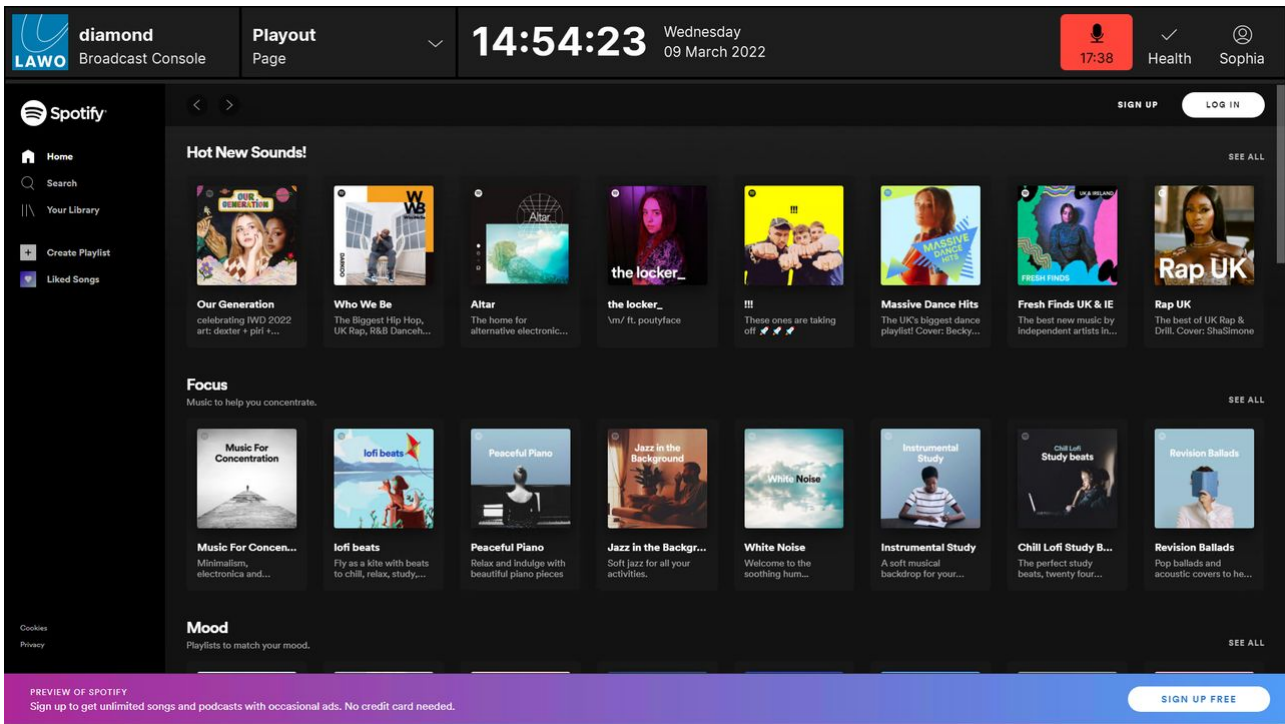
Video

The four video thumbnails are defined by the configuration. In the standard configuration, nothing is assigned and so each preview must be configured using VisTool Editor.



7.5 diamond VX - Playout Page

The 'Playout' page displays a specific web page where the "web address" is defined by the configuration. Typically, it is used to access the studio's playout server. An example is shown below.



Playout Sessions

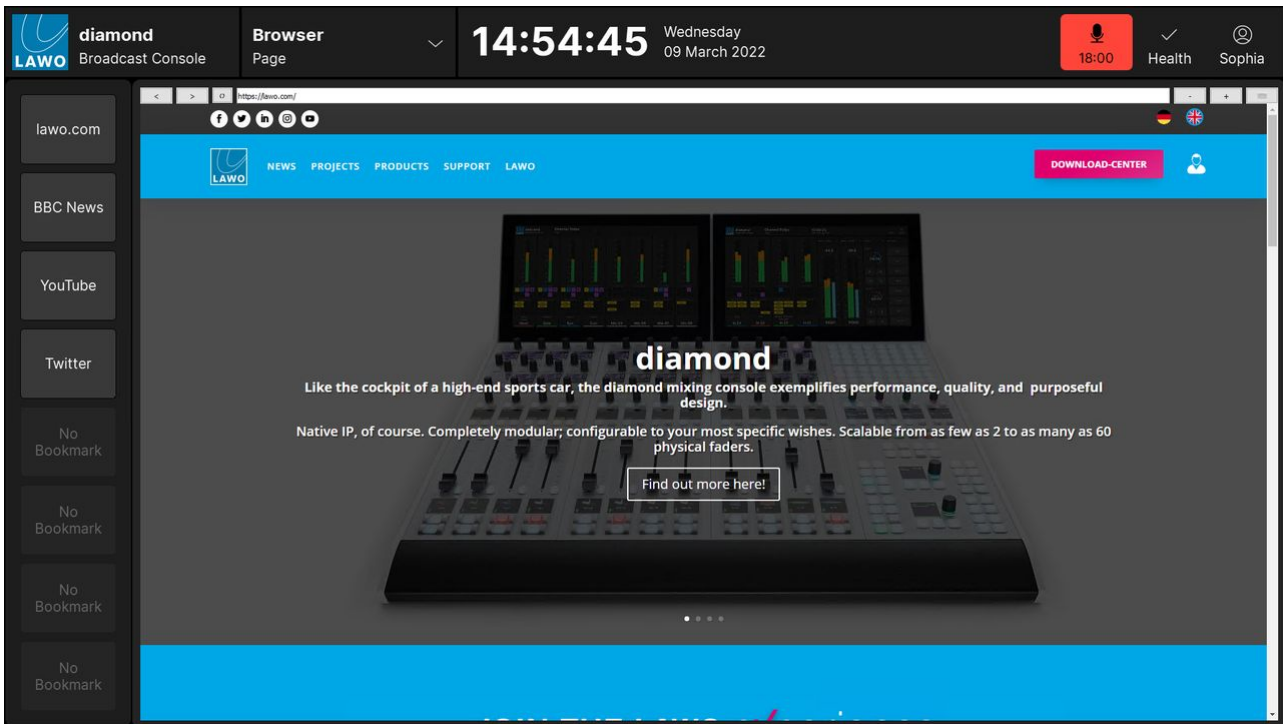
It is possible to define up to four 'playout' page sessions.

The web address and label for each session are defined in the "Emberdefault.ini" file.



7.6 diamond VX - Browser Page

The 'Browser' page opens a generic web browser where you can open any web page. The operation is controlled using two elements: the navigation bar (at the top) and bookmarks (on the left).



Navigation Bar

Working from left to right, the navigation bar provides the following functions:

- < and > buttons - navigate forward or backward to the next or previous page.
- **Refresh** button - reloads the current page.
- **Address Bar** - displays the web address (URL) of the page. A new address can be entered from the keyboard. For touch-screen operation (with no physical keyboard), open the on-screen keyboard to enter an address.
- + and - buttons - zoom in or out on the current page.
- **Show Keyboard**- select this icon to open the on-screen keyboard.

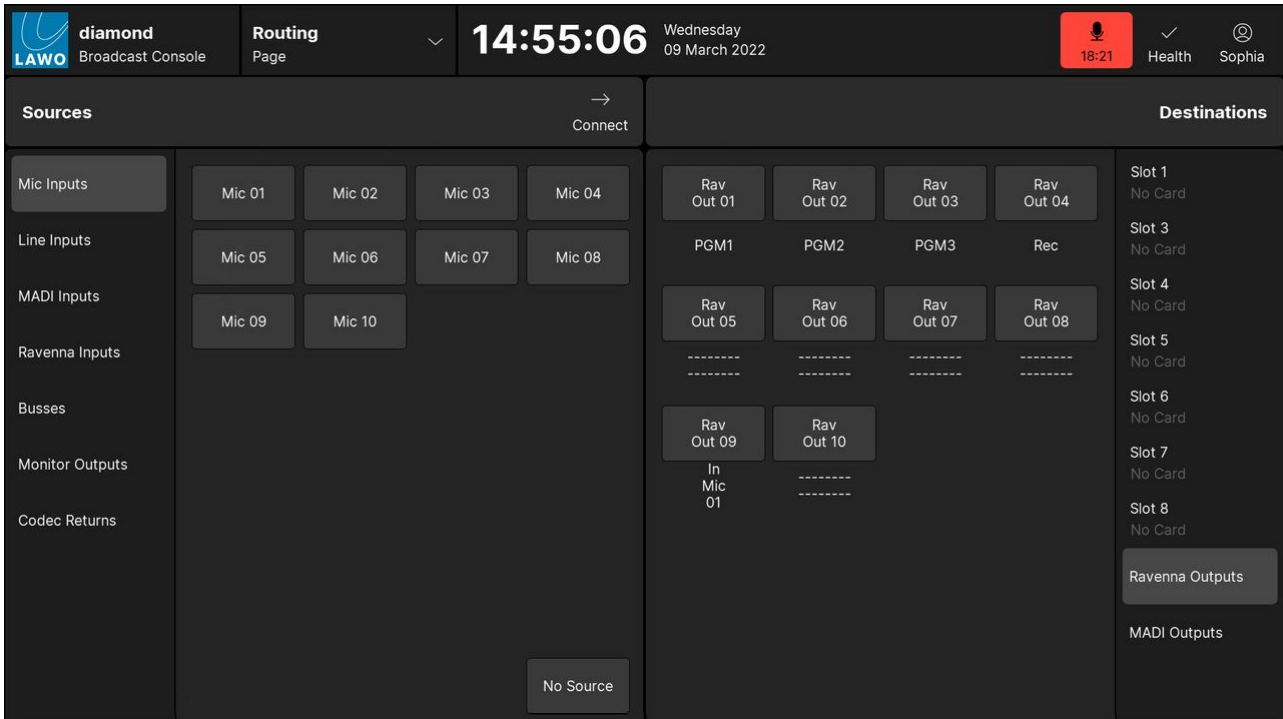
Bookmarks

The eight bookmarks (on the left) provide fast access to a pre-configured page. Select a bookmark to load the page.

The web address and label for each bookmark are defined in the "Emberdefault.ini" file.

7.7 diamond VX - Routing Page

The 'Routing' page can be used to edit the audio connections to the Power Core outputs. The page is divided into two halves: Sources (on the left) and Destinations (on the right). The available sources and destinations are defined by the configuration and are divided into categories using the side panel tabs.



To interrogate the existing connections:

1. Under 'Destinations', select an output category (e.g. Ravenna Outputs).
2. If a destination is connected, then the source name appears below the output. For example, PGM1 is connected to Rav Out 01.
3. If a destination has no source, then you will see two dashed lines.

To make a connection:

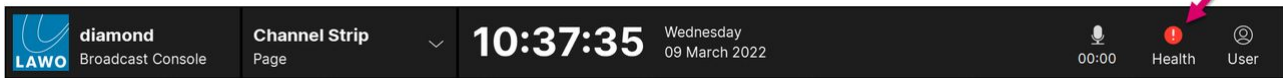
1. Under 'Sources', select an input category and choose a source - the selection flashes in blue.
2. Under 'Destinations', select an output category and choose an output - the selection flashes in blue.
3. Press **Connect** - the connection is made.

To disconnect an output:

1. Under 'Destinations', choose the output you wish to disconnect - the selection flashes in blue.
2. Under 'Sources', select **No Source**.
3. Press **Connect** - the source is removed.

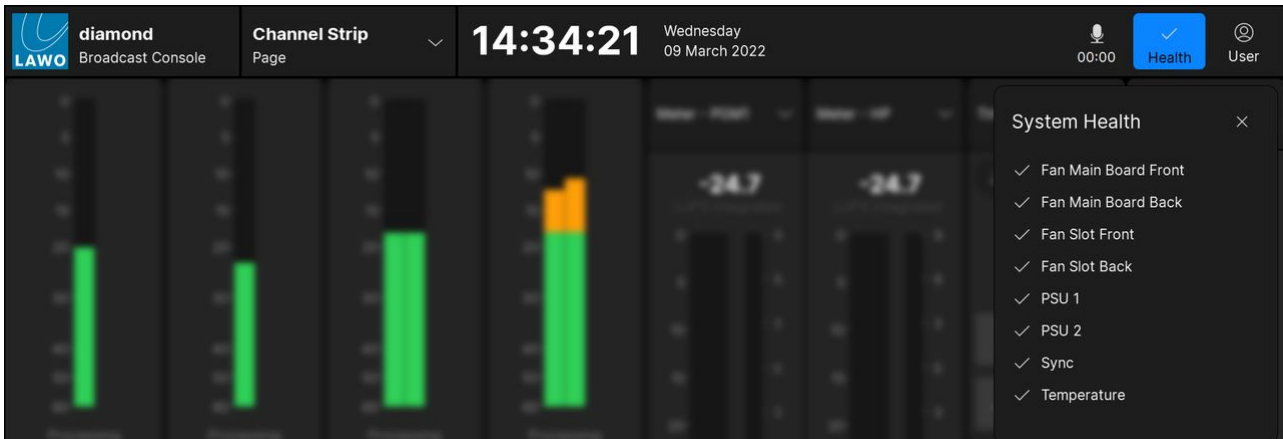
7.8 diamond VX - System Health

The **Health** indicator shows the health of the system. A white tick shows that everything is ok. If there is a problem, then a red exclamation mark appears.

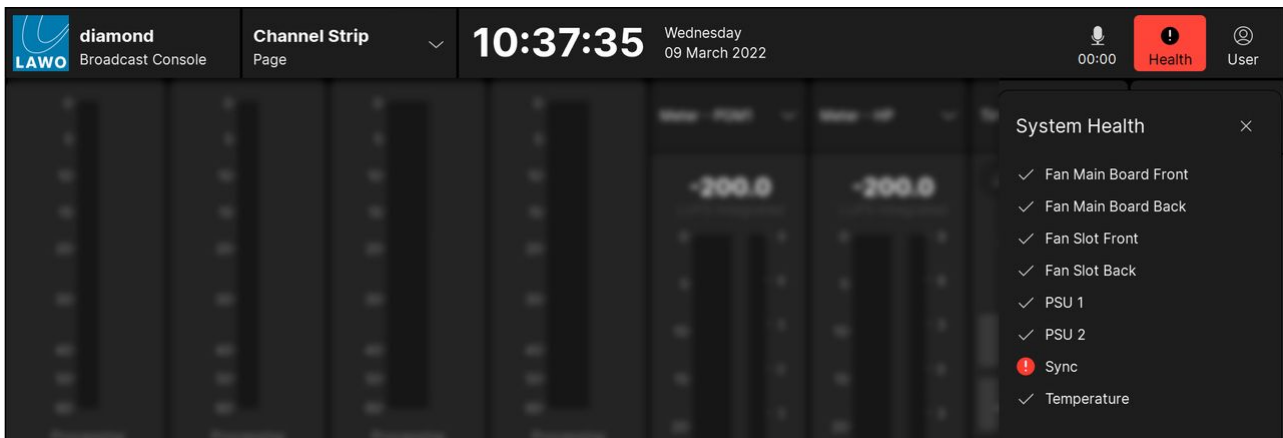


1. In each case, touch the **Health** indicator to show more information (in the 'System Health' dialog box).

In the following example, the system health is ok.



In the next example, there is a synchronization error.



The individual components are named as follows:

- **Fan Main Board & Fan Slot** - the four cooling fans inside Power Core. A health error is triggered by a reduction in the fan speed.
- **PSU 1 & PSU 2** - the dual power feeds to Power Core: PSU 1 = the AC input; PSU 2 = the DC input. A health error is triggered by a drop in the input voltage.
- **Sync** - the sync signal connected to Power Core. In the standard configuration, Power Core is set to operate as a PTP slave, and so a health error indicates a problem with the incoming PTP signal. The sync source can be modified by editing the configuration (using the ON-AIR Designer). For more information, see [Power Core - Synchronization](#).
- **Temperature** - the status of the temperature inside Power Core. A health error is triggered when the internal temperature exceeds 71° Celsius.

2. Touch the **X** (top right) to close the 'System Health' dialog box.

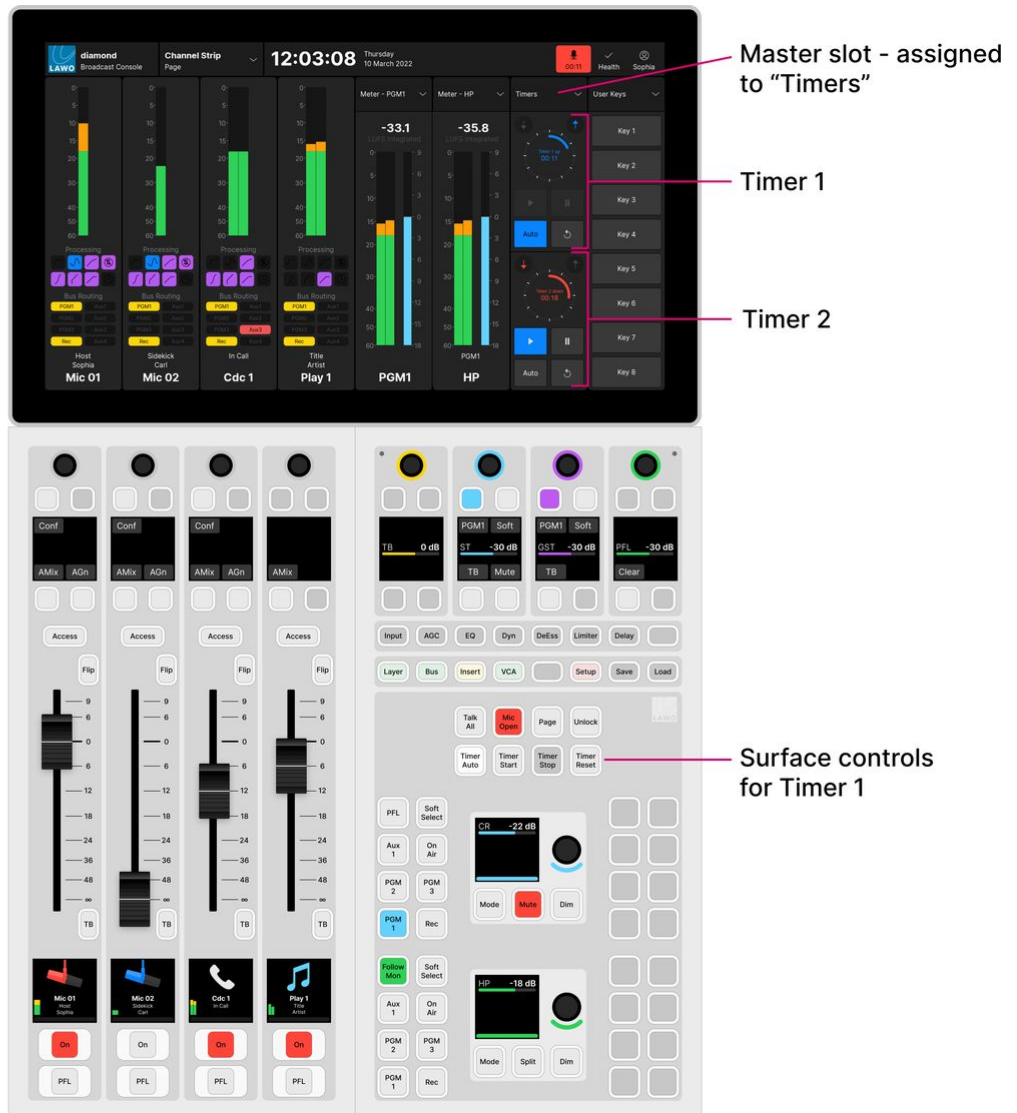
7.9 diamond VX - Timer Operation

The standard configuration supports two independent timers: Timer 1 and Timer 2. Both timers can be displayed on the GUI's 'Channel Strip' page by assigning one of the master slots to **Timers** (as described earlier).

Each timer has two modes of operation: count-up or count-down, and can be triggered either automatically or manually. When a timer is triggered automatically, the operation is defined by the **Timer x Auto Mode** option (in the 'Settings' → Timer' dialog box). There are two possibilities:

- **Mic Only** = the timer counts only when a Mic source fader is open (applies to all Mic sources).
- **All Faders** = the timer counts when any fader is open (applies to all faders).

The operation is handled from the GUI's touch-screen (for both timers). If the surface is fitted with a Central module, then Timer 1 can also be operated from the MF keys (as shown below).



Setting the Timer Mode

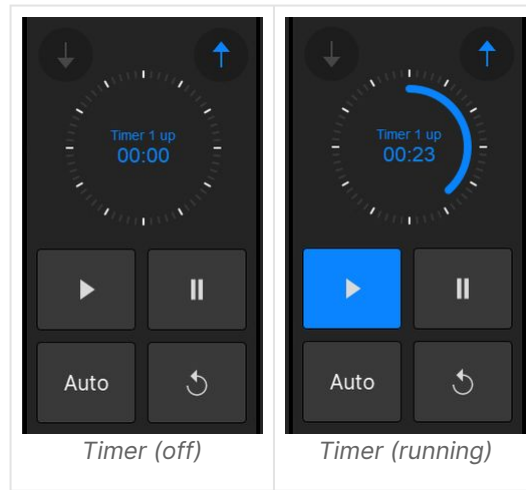
The count-up or count-down mode is selected from the GUI using the arrows above each timer:

- Touch the up arrow (top right) to choose count-up mode.
- Touch the down arrow (top left) to choose count-down mode.

The color of the arrow and timer label indicate the mode: blue = count-up; red = count-down.

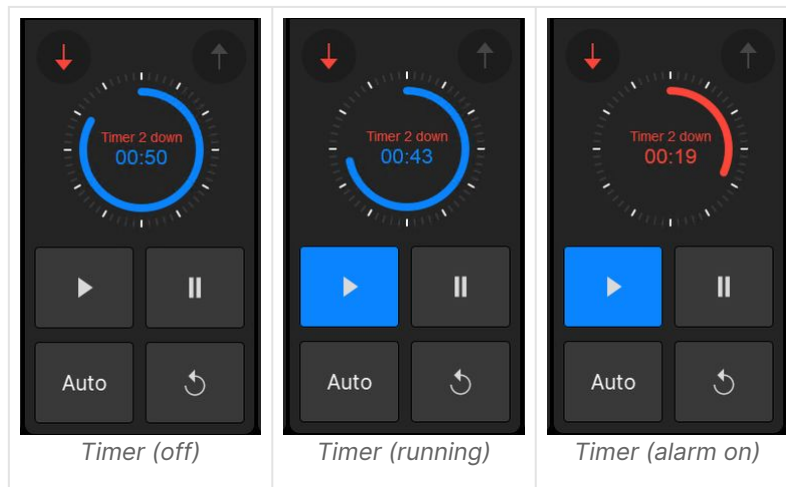
Count-up Mode

In count-up mode, the timer counts up from 00:00 and continues counting until the timer is stopped or reset.

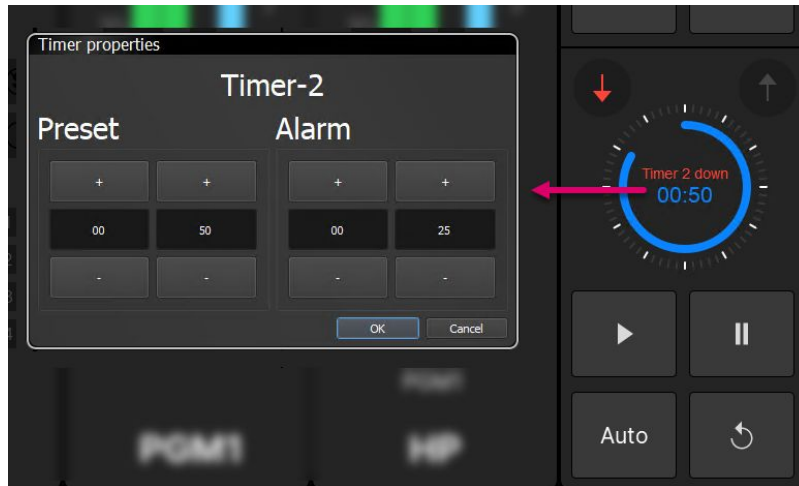


Count-down Mode

In count-down mode, the timer counts down from a starting value (called the **Preset** time) and turns red once a mid-point (the **Alarm** time) is reached. If the count-down reaches 00:00, then the timer starts to count back up. This shows how long the timer has been overrunning! In this instance, the Alarm status remains active until the timer is reset.



To set the **Preset** and **Alarm** times, touch the current time value to open the 'Timer Properties'!



Type a number into the minute and second fields, or touch the **+** and **-** buttons to increase and decrease the current values. Then select **OK** to confirm.

Setting the Triggering Method

The triggering method is selected using the **Auto** button (on the GUI) or **Timer Auto** key (on the Central module):

- **Auto** on (lit) = automatic start/stop.
- **Auto** off (unlit) = manual start/stop.

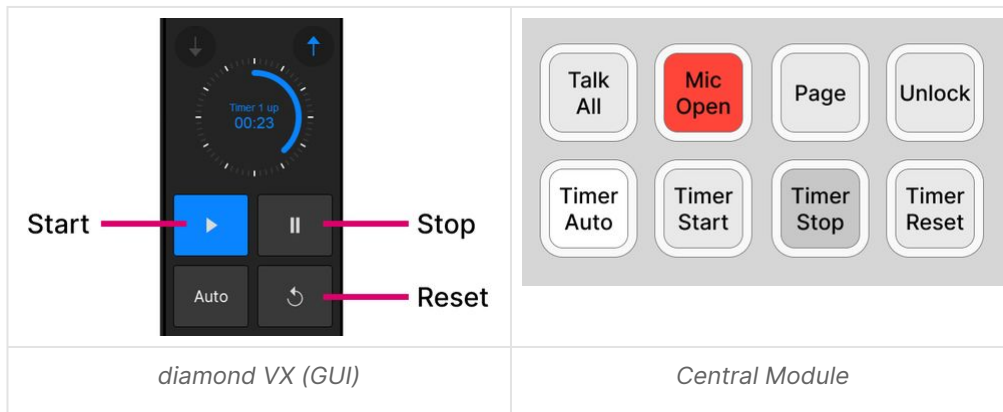
Manual Timer Operation

To use a timer manually:

1. First make sure that the **Auto** button is turned off (unlit).
2. Then set the count-up or count-down mode using the up and down arrows.

In count-up mode, the timer counts up from 00:00. In count-down mode, the timer counts down from the **Preset** time (described earlier).

3. Use the start, stop and reset buttons (on the GUI or Central module) to operate the timer as follows.



- **Start** - starts the timer from the last stop position/time.
- **Stop** - stops the timer. The current time remains on-screen until the timer is restarted or reset.
- **Reset** - resets the timer, either to 00:00 (count-up) or to the **Preset** time (count-down).

In count-down mode, the timer value turns red once the **Alarm** time is reached. If the count-down reaches 00:00, then the timer starts to count back up.

Automatic Timer Operation

To trigger the timer automatically:

1. First make sure that the **Auto** button is turned on (lit).
2. Then open the 'Settings → Timer' dialog box (from the user menu).
3. Use the **Timer Auto Mode** option to set which faders are used:
 - **Mic Only** = the timer counts only when a Mic source fader is open (applies to all Mic sources).
 - **All Faders** = the timer counts when any fader is open (applies to all faders).

Note that this option only becomes active once **Auto** mode is enabled. If **Auto** is turned off, then the timer operation is manual.

4. Now set the count-up or count-down mode using the up and down arrows.

In count-up mode, the timer counts up from 00:00. In count-down mode, the timer counts down from the **Preset** time (described earlier).

5. Start and stop the timer by opening and closing the faders on the surface.



In our example, **Mic Only** is selected (in step 3) and so the timer starts automatically when a Mic source fader opens. If another Mic source fader opens, then the timer continues to run. The timer stops once all Mic source faders are closed.

6. To reset the timer, press the **Reset** button.

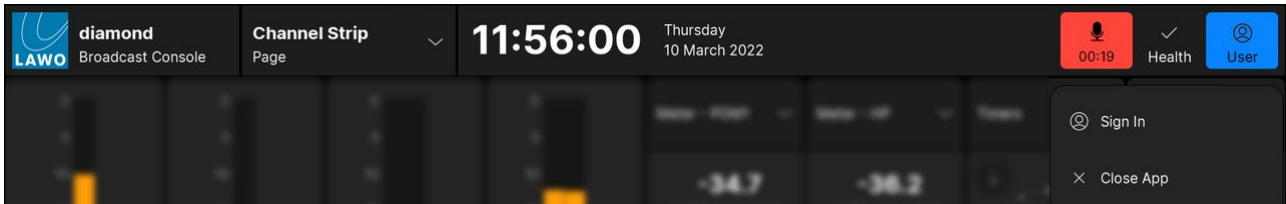
7.10 diamond VX - User Menu

The user icon shows the name of the current user. In the example below, the user "Sophia" is signed in. If no one is signed in, then the icon shows the text "User".



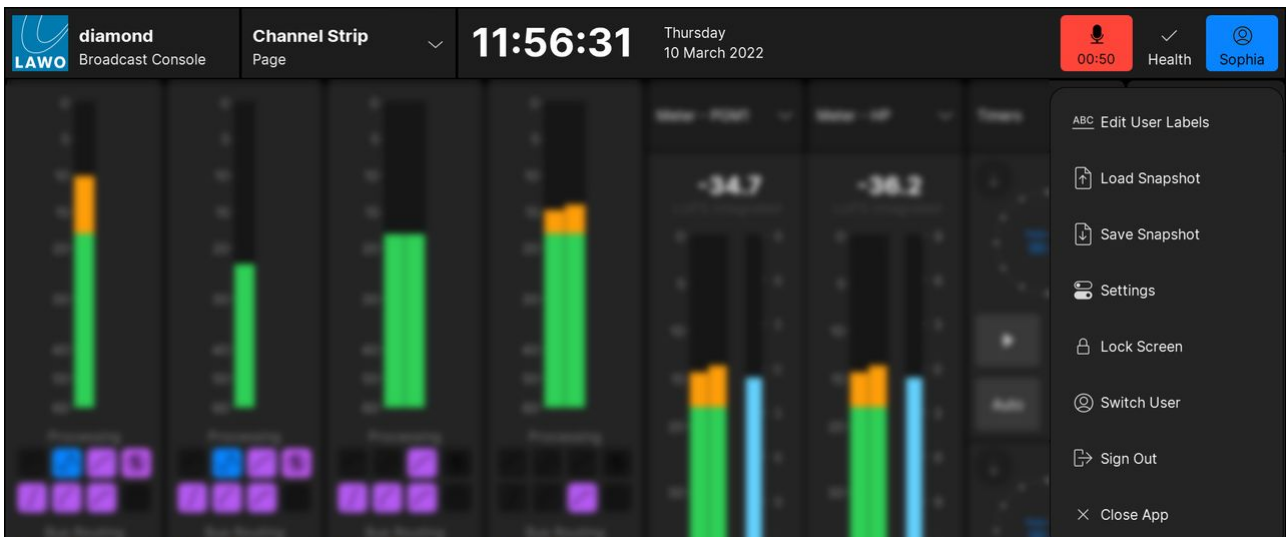
In each case, touch the icon to open the user menu. The available functions depend on the sign-in status.

User Menu (signed out)



If no one is signed in, then there are only two functions: **Sign In** and **Close App**. Choose **Sign In** to open the 'Login' dialog box where you can enter your username and password.

User Menu (signed in)



After a successful login, the following functions become available:

- **Edit User Labels** - open the [user labels editor](#).
- **Load & Save Snapshot** - load or save a [full snapshot](#).
- **Settings** - open the 'Settings' dialog box.
- **Lock Screen** - lock the screen. This function can be used to protect the touch-screen for a short period of time. For example, to clean the display or adjust the viewing angle. The screen is unlocked by swiping the "unlock" slider.
- **Switch User** - open the 'Login' dialog box to switch user or change the current user password.
- **Sign Out** - sign out.
- **Close App** - close the diamond VX app.

7.11 diamond VX - Login and Logout

In the standard configuration, some functions are protected by the User Access Rights system. This means that you must be logged in before they become available.

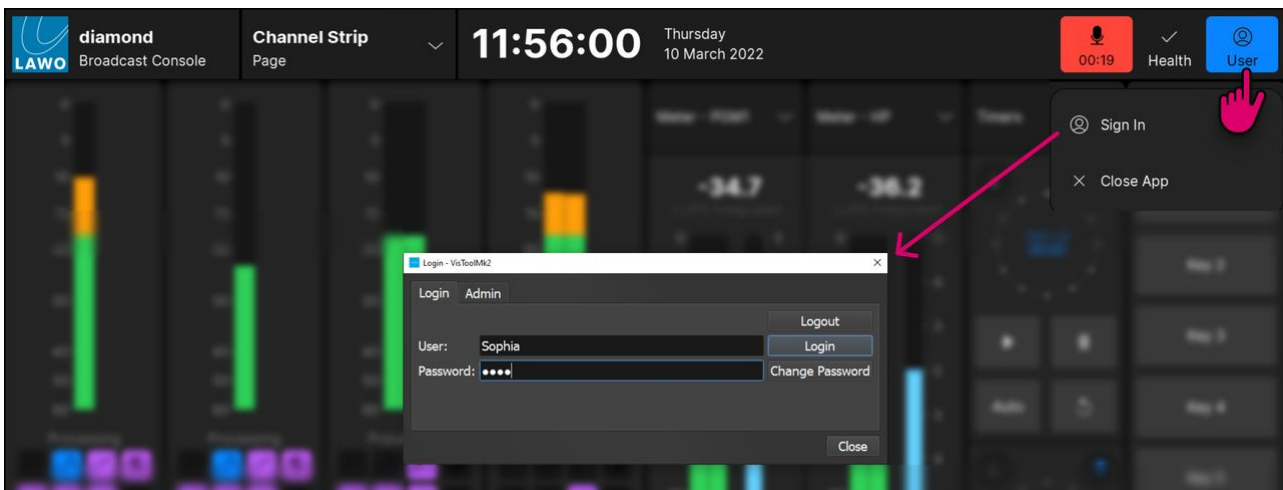
By default, every system comes with a single "admin" user. Once the "admin" user is logged in, they can add more users from the 'Admin' pages. The user setup is described in more detail in the VisTool MK2 documentation. For now, it is useful to know that:

- Usernames and passwords are NOT case sensitive.
- If you have forgotten your password, then an administrator can reset it to "0000".
- The initial administrator username = "admin" and password = "default".

Logging In

The steps below describe how to log in. When a new user logs in for the first time, the password = "0000".

1. Touch the user icon and select **Sign In** (from the user menu).



Alternatively, if someone else is already signed in, touch the user icon and select **Switch User**.

2. Enter your username and password, and select the **Login** button.

Providing the credentials are accepted, you will see the message "Login successful!".

3. Select **OK** (to acknowledge the message) and then either **OK** or **Close** (to close the dialog box).

i The 'Login' dialog box has two tabs: **Login** and **Admin**.

- From the **Login** tab, you can logout, switch user or change your password.
- From the **Admin** tab, you can open the 'Admin' pages (if you have administrator rights). If the page options are greyed out, then they are not available to the current user.

Logging Out

The steps below describe how to log out. It is recommended to log out before leaving the system unattended.

1. Touch the user icon and select **Sign Out** (from the user menu).
2. You are asked to confirm - select **Sign Out** to continue.

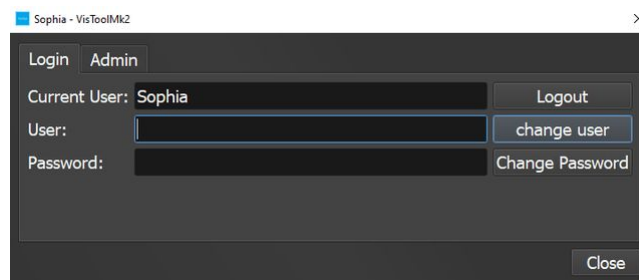
After a successful logout, the user icon updates to show the text "User" and the user menu functions are restricted.

Changing Your Password

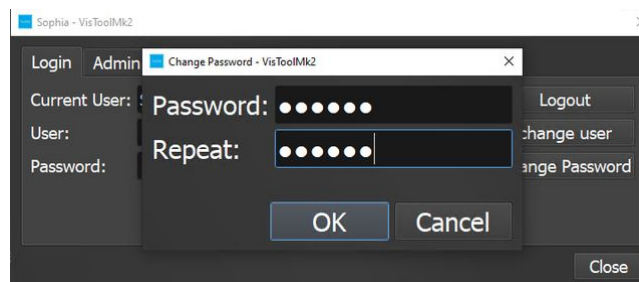
After a successful login, you can change your password as follows.

1. Re-open the 'Login' dialog box by touching the user icon and selecting **Switch User** (from the user menu).

The dialog box shows your username as the 'Current User'.



2. Select **Change Password** to open the 'Change Password' dialog box.



3. Enter a new password into both the 'Password' and 'Repeat' fields, and select **OK**.

There are no restrictions on the characters used, but it is recommended to keep passwords short and memorable!

4. Test the new password by logging out and logging in.

After a successful login, you should have access to all of the user menu functions.

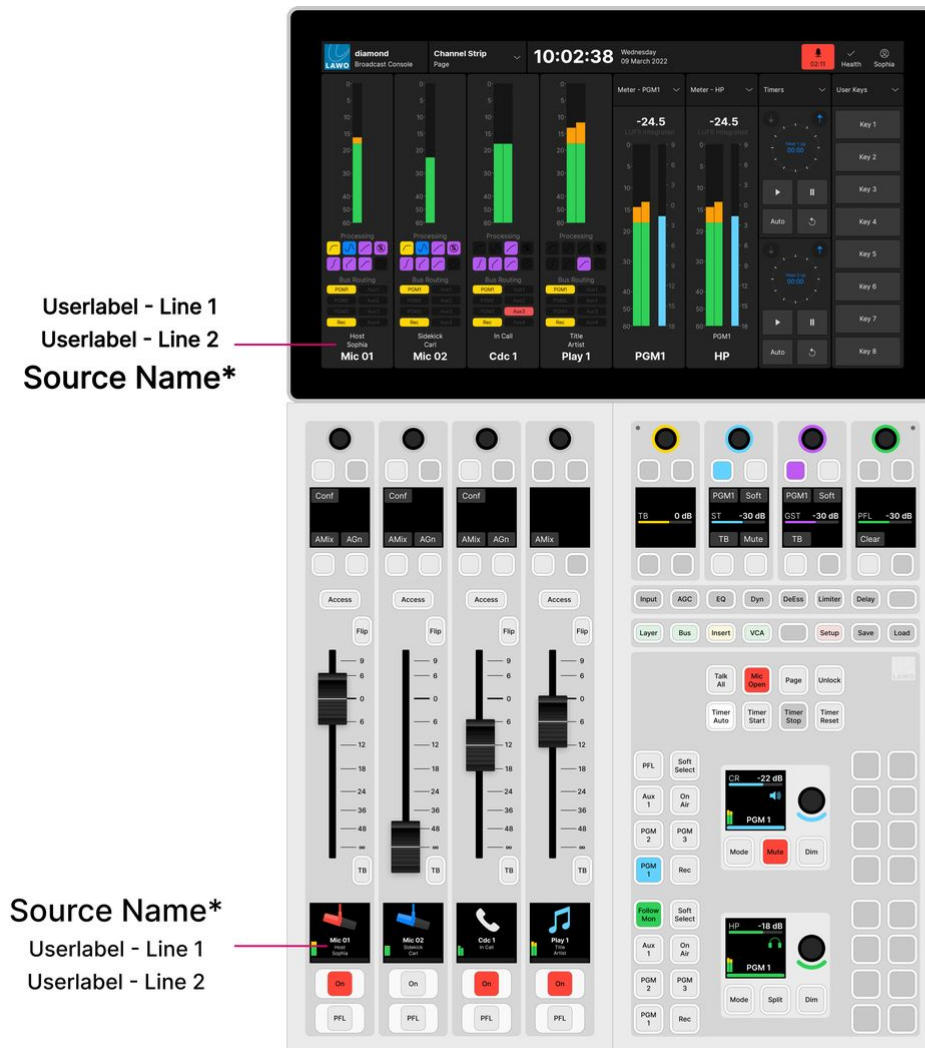
7.12 diamond VX - Edit User Labels

The user labels editor can be used to edit the system name and user labels for each source and summing bus. Note that you must be logged in to access the editor.

Where are User Labels displayed?

Each source and bus is identified by three lines of text: a source name that is always present and two user label lines that are optional. The text lines are displayed on the GUI (in the 'Channel Strip' page) and on the surface (in the fader strip 'Source Display'). Note that you can choose to show (or hide) the two user label lines by changing the **Show Userlabels** option (in the 'Settings' → Surface' dialog box).

The image below shows how the editor's text fields are displayed on the surface. Each line can show up to 8 characters.



*The Source Name shows the "Display" name unless a "System" name is entered in the editor.

Source Name

By default, each source and summing bus is identified by its "Display" name, unless a "System" name is entered in the editor. The "Display" name is defined by the configuration and can only be edited using the ON-AIR Designer. Therefore, if you wish to change the source name there are two options: enter a "System" name in the editor OR edit the source's "Display" name in the configuration (using the ON-AIR Designer).

Note that each source and summing bus must have a "Display" name and so the source name is never empty.

Userlabel Line 1 & 2

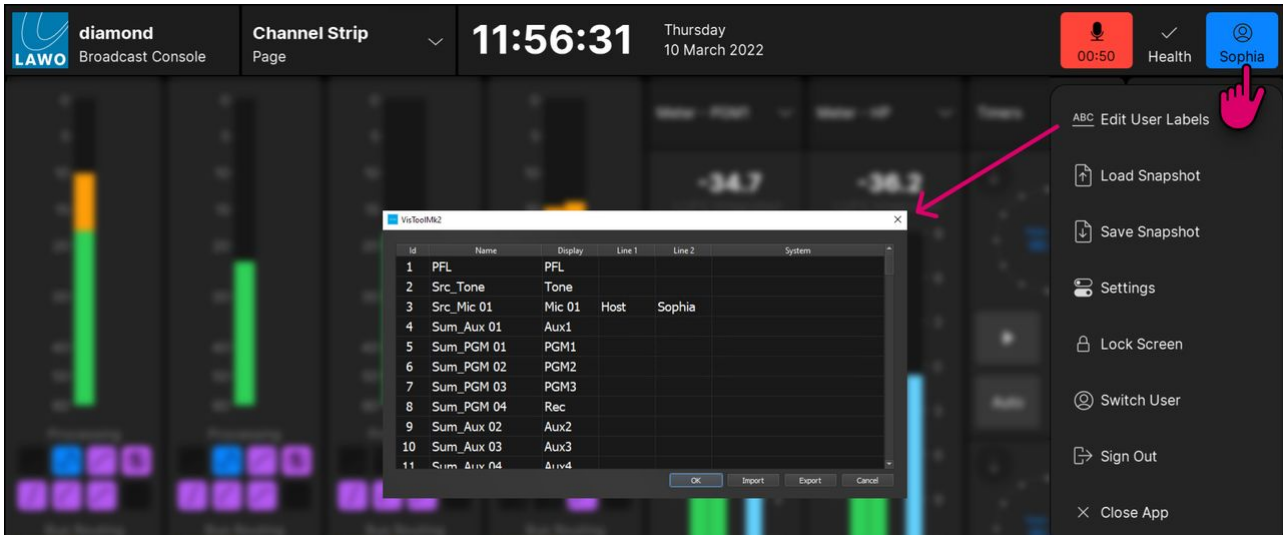
The two userlabel lines are optional and can be completed as required. Remember to turn on the **Show Userlabels** option in the '[Settings](#) → Surface' dialog box to see the labels on the surface and GUI.

Editing a User Label

The steps below describe how to edit the system names and user labels.

1. Touch the user icon and select **Edit User Labels** (from the user menu).

You must be logged in to access the **Edit User Labels** button.



The user labels editor shows every source and summing bus defined in the configuration. This allows you to prepare all of the user labels before assigning sources to the surface.

The "Id", "Name" and "Display" fields are defined by the configuration and cannot be changed. The "Line 1" and "Line 2" fields define the two user label lines. The "System" field defines the source name (in place of the "Display" name) until such time as the "System" field is cleared.

2. Edit the "Line 1", "Line 2" and "System" fields as follows.
 - To overwrite the current text, touch or click once and then start typing.
 - To edit the existing text, touch or click twice in quick succession.
 - Press Enter or select another field to confirm the current entry - the field highlights in red to show that changes have been made but are not yet transferred.
3. Repeat for each source and summing bus you wish to edit.
4. To confirm all of the entries (highlighted in red), select **OK**.

The dialog box closes and the new labels are transferred to the GUI and surface. Alternatively, select **Cancel** to close the editor and discard all changes.

How to Transfer or Backup User Labels

The **Export** button saves the contents of the editor into a ".xml" file. This can be used to transfer user labels to another system or create a backup that is stored independently from snapshots.

To transfer user labels to another system:

- Select **Export** to save the contents of the editor into a ".xml" file.
- Copy the ".xml" file to the VisTool host PC (connected to the other system).
- Open the user label editor and select **Import** and then the ".xml" file. The imported text fields are applied to all sources and summing buses with an identical "Name".
- Check the changes and select **OK** to confirm.



Saving & Loading User Labels

The contents of the editor are saved and loaded by all snapshots. This allows you to save different sets of labels for different applications or programmes.



7.13 diamond VX - Load Snapshot and Save Snapshot

The **Load Snapshot** and **Save Snapshot** buttons (in the user menu) can be used to load or save a full snapshot. These functions are described later. See Using the GUI Snapshots.



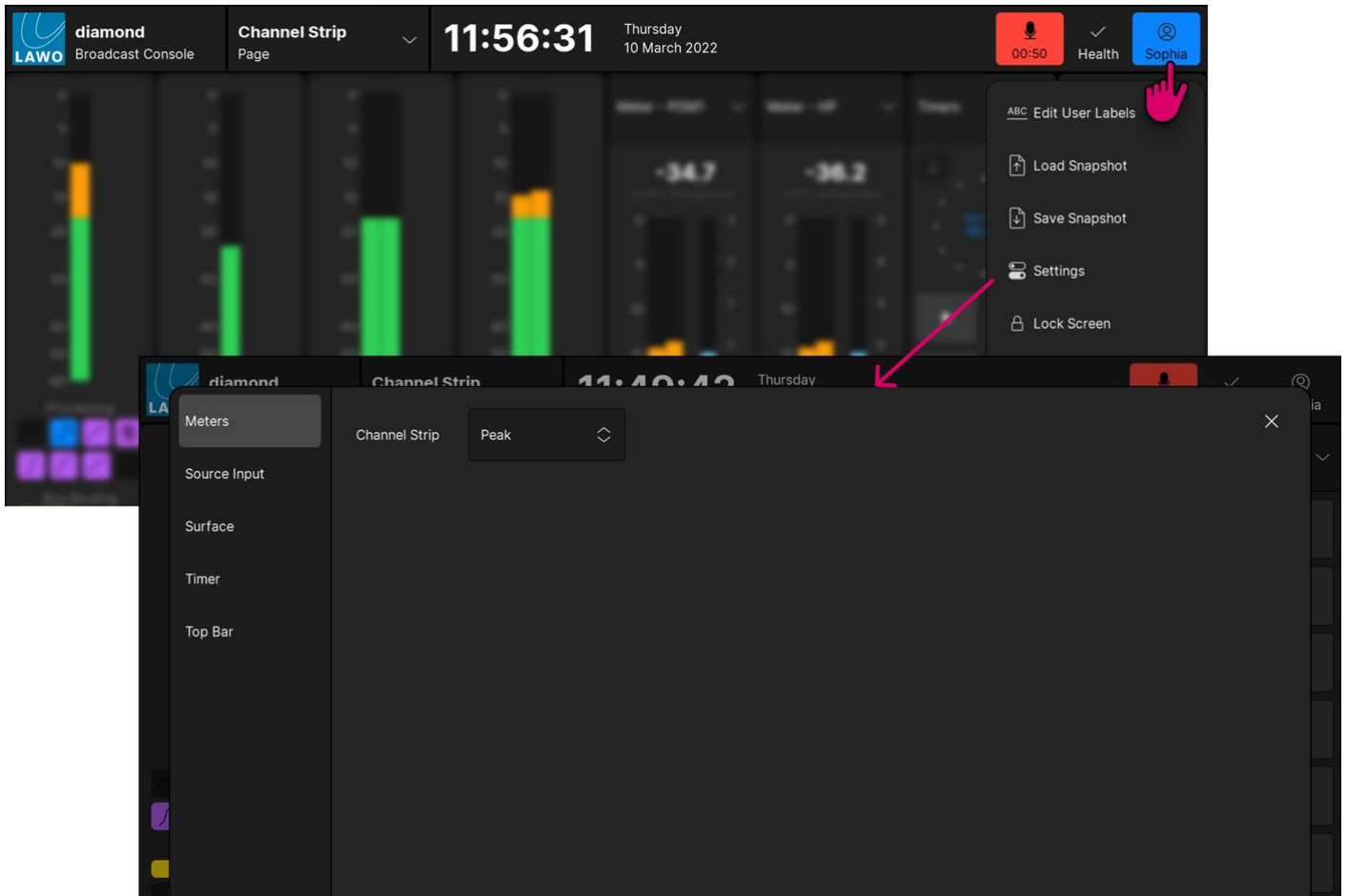
7.14 diamond VX - Settings

The 'Settings' dialog box can be used to customize the operation for the current user.

Please note that any changes made are not persistent, and are reset to the default values once the app restarts. The default values can be changed by editing the "Emberdefault.ini" file (as described [later](#)).

1. To open the dialog box, touch the user icon and select **Settings** (from the user menu).

You must be [logged in](#) to access the **Settings** button.



2. Use the tabs on the left to select a page of settings.
3. To close the dialog box, select the **X** icon (top right).

In the current release, there are five pages of settings.

'Settings -> Meters'

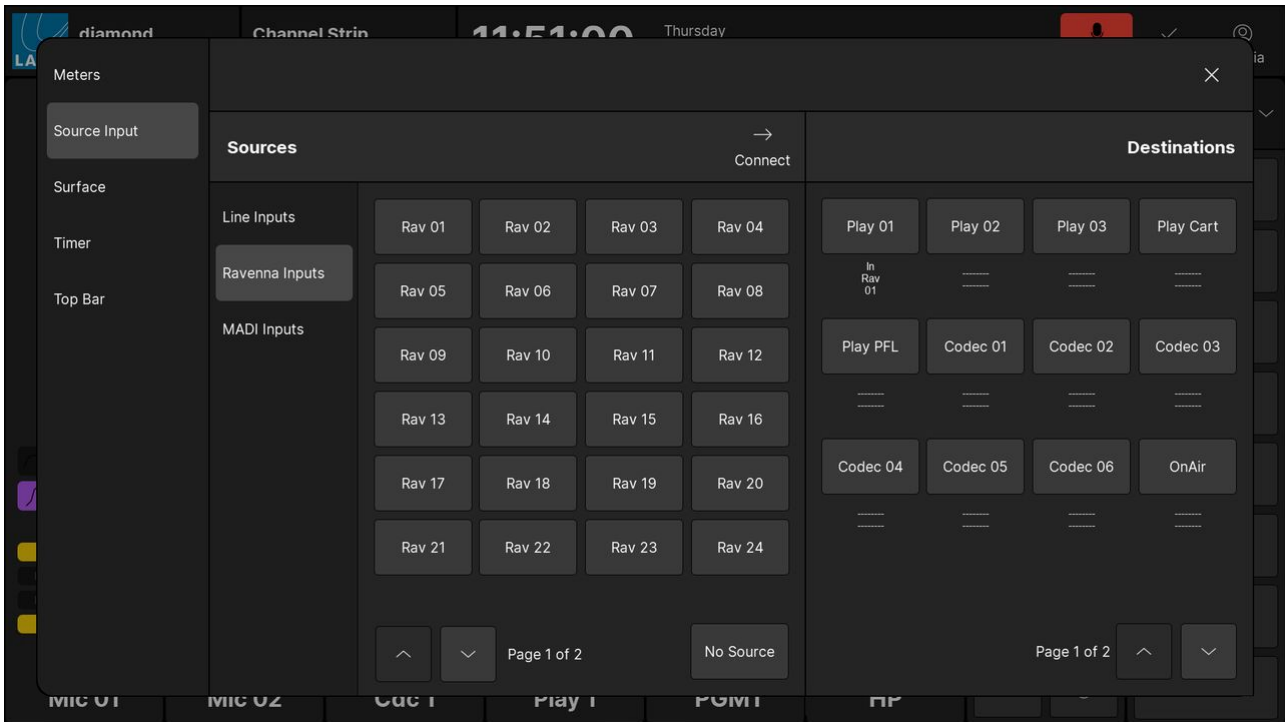
This tab includes a single option: 'Channel Strip'. It defines whether the input meters on the '[Channel Strip](#)' page show peak metering, momentary loudness or both.

To make a change, touch the current value and select an option from the drop-down menu:

- **Peak** = peak metering only.
- **Loudness** = momentary loudness only.
- **Peak & Loudness** = peak metering + momentary loudness.

'Settings -> Source Input'

This tab opens the 'Source Input' page. It can be used to assign a Power Core input to a source.



It is designed so that any Line, Ravenna or MADI input can be assigned to the more generic sources, such as Playouts and Codecs. The page is divided into two halves: Sources (on the left) and Destinations (on the right). The available sources and destinations are defined by the configuration. Note that, in this instance, the Sources are all Power Core inputs, and the Destinations are "sources" that can be assigned to a fader strip.

On the left, the Sources are divided into categories using the side panel tabs. On both sides, you can page through the available options using the up/down arrows beside "Page x of y".

To interrogate the existing connections:

1. Under 'Destinations', use the up/down arrow buttons to select a page.
2. If a destination is connected, then the source name appears below the output. For example, the Power Core input "In Rav 01" is connected to the source "Play 01".
3. If a destination has no source, then you will see two dashed lines.

To make a connection:

1. Under 'Sources', select an input category and page, and choose a source - the selection flashes in blue.
2. Under 'Destinations', select a page and choose an output - the selection flashes in blue.
3. Press **Connect** - the connection is made.

To disconnect an output:

1. Under 'Destinations', choose the output you wish to disconnect - the selection flashes in blue.
2. Under 'Sources', select **No Source**.
3. Press **Connect** - the source is removed.



'Settings -> Surface'

This tab includes five options that affect the displays on the surface or the GUI layout.

The first two options change what is shown in the fader strip 'Source Display'. Each option can be turned on or off independently.

- **Show Icons in Fader Displays** - shows the icon assigned to the source.
- **Show Userlabels** - shows the two user label lines.

The next option changes the behavior of the ambient light detectors on the central controls module:

- **Surface Ambient Light Sensor** (on) = surface brightness adjusts automatically according to the ambient light levels.
- **Surface Ambient Light Sensor** (off) = surface brightness remains the same.

The last two options can be used to change the layout of the 'Channel Strip' page so that it matches the surface hardware. Each option can be turned on or off independently.

- **Swap Slots** - swaps the position of the channel strips from left to right. This option should be enabled if the Fader module is fitted to the right of the central controls.
- **Combo Module** - changes the layout from 4 channel strips + 4 master slots to 6 channel strips + 2 master slots. This option should be enabled if the surface is fitted with a Combo module.

'Settings -> Timer'

This tab defines the trigger for each timer when **Auto** mode is enabled. The option can be set independently for Timer 1 and Timer 2. In each case, there are two possibilities:

- **Mic Only** = the timer counts only when a Mic source fader is open (applies to all Mic sources).
- **All Faders** = the timer counts when any fader is open (applies to all faders).

Note that this option only becomes active once **Auto** mode is enabled. If **Auto** is turned off, then the timer operation is manual.

'Settings -> Top Bar'

This tab controls what is visible in the top bar (of the GUI). Each option can be turned on or off independently.

- **Show Clock** - shows the system time and date.
- **Show Mic timer** - shows the mic timer. This lights in red and counts up from 00:00 once a Mic source fader is open.
- **Show Notifications** - shows the status of any system notifications.

7.15 diamond VX - Initial Settings

The "Emberdefault.ini" file stores the initial settings for the diamond VX app. The settings load whenever the diamond VX app starts. This allows you to customize the operation by editing and saving the file, and then restarting the app.

After a standard install, the file is located at: C:\ProgramData\DSA

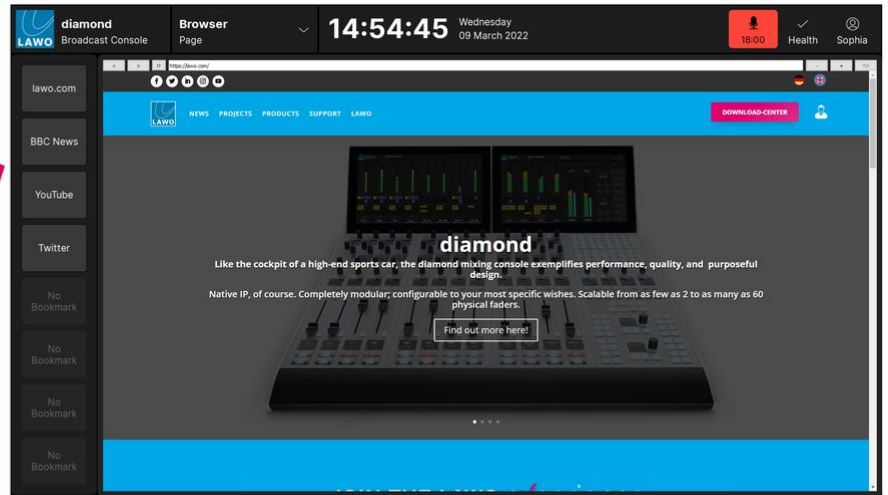
You can use any suitable text editor to edit the file.

The example below shows how to define the bookmarks on the 'Browser' page.

```

[Project]
gpio/Boolean-1=true
gpio/Boolean-2=true
gpio/Boolean-3=false
gpio/Boolean-4=
gpio/Boolean-5=
gpio/Boolean-6=
gpio/Boolean-7=
gpio/Boolean-8=
gpio/Boolean-9=
gpio/Boolean-10=
gpio/Boolean-11=
gpio/Boolean-12=
gpio/Boolean-13=
gpio/Boolean-14=
gpio/Boolean-15=false
gpio/Boolean-16=false
gpio/String-1=www.lawo.com
gpio/String-2=lawo.com
gpio/String-3=www.bbc.co.uk/news
gpio/String-4=BBC News
gpio/String-5=www.youtube.com
gpio/String-6=YouTube
gpio/String-7=www.twitter.com
gpio/String-8=Twitter
gpio/String-9=
gpio/String-10=
gpio/String-11=
gpio/String-12=
gpio/String-13=
gpio/String-14=
gpio/String-15=
gpio/String-16=
    
```

"Emberdefault.ini" file



diamond VX - 'Browser' page

The tables below describe the available parameters.

- [Boolean Parameters](#)
- [String Parameters](#)

Boolean Parameters

The following parameters can be set to a boolean value: either **true** or **false**.

Name	Description	Default	Additional Information
gpio/Boolean 1	Top Bar - Show Clock	true	-
gpio/Boolean 2	Top Bar - Show Mic Timer	true	-
gpio/Boolean 3	Top Bar - Show Notifications	false	-
gpio/Boolean 4 to 14	-	-	-
gpio/Boolean 15	Combo Module Setup	false	setup independent
gpio/Boolean 16	Swap Slot position	false	-

String Parameters

The following parameters can be used to enter a text string. For example, to define the 'Browser Page' bookmark URLs and labels.

Name	Description	Default	Additional Information
gpio/String 1	Bookmark 01 URL	-	-
gpio/String 2	Bookmark 01 Label	-	-
gpio/String 3	Bookmark 02 URL	-	-
gpio/String 4	Bookmark 02 Label	-	-
gpio/String 5	Bookmark 03 URL	-	-
gpio/String 6	Bookmark 03 Label	-	-
gpio/String 7	Bookmark 04 URL	-	-
gpio/String 8	Bookmark 04 Label	-	-
gpio/String 9	Bookmark 05 URL	-	-
gpio/String 10	Bookmark 05 Label	-	-
gpio/String 11	Bookmark 06 URL	-	-
gpio/String 12	Bookmark 06 Label	-	-
gpio/String 13	Bookmark 07 URL	-	-
gpio/String 14	Bookmark 07 Label	-	-
gpio/String 15	Bookmark 08 URL	-	-
gpio/String 16	Bookmark 08 Label	-	-
gpio/String 17 to 20	-	-	-
gpio/String 21	default URL Playout Session 01	-	-
gpio/String 22	default URL Playout Session 02	-	-
gpio/String 22	default URL Playout Session 03	-	-
gpio/String 24	default URL Playout Session 04	-	-
gpio/String 25	Default PPM View in Channel Overview	01	01 = PPM 02 = LU 03 = PPM + LU



Name	Description	Default	Additional Information
gpio/String 26	Sync between Sessions for PPM View	!! NO DEFAULT	this information is written in the session to sync Sessions. Not available for changes!
gpio/String 27	Topbar Line 01	diamond	
gpio/String 28	Topbar Line 02	Broadcast Console	
gpio/String 29	Default Slot 01	01	PGM 1 Meter
gpio/String 30	Default Slot 02	02	PGM 2 Meter
gpio/String 31	Default Slot 03	05	CR Meter
gpio/String 32	Default Slot 04	06	HP Meter
gpio/String 33 to 39	-	-	-
gpio/String 40	I/O Information for Routing Page Slot 01	!! NO DEFAULT	this information is written to the routing page of other sessions. Not available for changes!
gpio/String 41	I/O Information for Routing Page Slot 02	!! NO DEFAULT	"
gpio/String 42	I/O Information for Routing Page Slot 03	!! NO DEFAULT	"
gpio/String 43	I/O Information for Routing Page Slot 04	!! NO DEFAULT	"
gpio/String 44	I/O Information for Routing Page Slot 05	!! NO DEFAULT	"
gpio/String 45	I/O Information for Routing Page Slot 06	!! NO DEFAULT	"
gpio/String 46	I/O Information for Routing Page Slot 07	!! NO DEFAULT	"
gpio/String 47	I/O Information for Routing Page Slot 08	!! NO DEFAULT	"
gpio/String 48 to 64	-	-	-



8 diamond - Configuration

The operation of the diamond console can be customized using the ON-AIR Designer, Lawo's configuration tool for radio on-air systems.

Please refer to the [ON-AIR Designer](#) documentation for more information.



9 diamond - Software Tools and Diagnostics

This chapter describes the tools available for fault finding and diagnostics.

- [diamond - Software Revisions and Updating Firmware](#)
- [diamond - Web UI](#)



9.1 diamond - Software Revisions and Updating Firmware

It is important that all system components, including the control surface modules, are running the correct firmware.

For information about the current release, including the release notes and installers, please see [Radio Products - Software Versions](#).

After downloading and installing a new version of ON-AIR Designer, you can check and update the system using the firmware update tool [SoP Explorer](#).



9.2 diamond - Web UI

The diamond Web UI can be used to provide status information about the surface components and perform a number of administrative and diagnostic tasks.

It can be reached by entering the IP address or hostname of the diamond frame into a web browser (e.g. **192.168.101.241** if the default IP is in use). The computer you use must be connected to the same network as the diamond frame. For more information, see [diamond - Configuration Tools](#) and [Opening a Web UI Session](#).

i If the surface has more than one frame connected via IP, then each frame's IP module has a different IP address. In this instance, you will need to open a separate Web UI session for each section of the surface.

In User mode, information is displayed as "read-only" with no editable fields. If you wish to edit or access the permitted options, then you must login as either Supervisor or Administrator. The default passwords are *orion* for Supervisor and *hydra* for Administrator.

Once you have opened a connection and logged in, you will see the available pages/tabs. In the current release, there are six pages/tabs.

- [System Information](#)
- [System Control](#)
- [Statistics](#)
- [Network](#)
- [Surface Modules](#)
- [Module Tests](#)

Quick Links

The table below provides quick links to some of the most useful functions.

How to...	
Check the status of the surface modules.	Open the " Surface Modules " tab.
Test the keys, displays, faders and encoders.	Open the " Module-Tests " tab.
Change the IP address of the frame's ETHERNET port	Edit the IP Address field in the " Network " tab.
Reboot the frame.	Press the Reboot System button in the " System Control " tab.
Reboot an individual module.	Press the Reboot button (for the module) in the " Surface Modules " tab.
Change the passwords (for Supervisor and Administrator)	Use the Edit Access Passwords area in the " System Control " tab.



System Information

The screenshot shows the 'diamond' web interface. At the top left, there is a logo for 'LAWO NETWORK AUDIO VIDEO CONTROL'. Below the logo, the word 'diamond' is displayed in a stylized font. A navigation bar contains the following tabs: 'System Informations', 'System Control', 'Statistics', 'Network', 'Surface Modules', and 'Module Tests'. The 'System Informations' tab is active, displaying a table of system parameters:

System Informations	
System Type:	Diamond ControlPanels
Series Unit ID:	711/00
Serial Number:	80-88-82-05-1A-CE-80-F4
FPGA Version Number:	2.07
FPGA Compile Date:	24.05.2023 16:55:55
Firmware Version Number:	8.0.1
Firmware Compile Date:	21.09.2023 08:17:37
Can Bus 1 Speed:	500 KBit/s
Can Bus 2 Speed:	1 MBit/s

The **System Information** tab is the first tab to be shown following a successful login. It displays basic information about the frame such as the serial number, software / firmware version numbers and speed of the two CAN bus connections. It is for diagnostic use only; there are no editable fields.

System Control

The **System Control** tab can be used to configure the device's external control options. For example, to permit access via FTP, reboot the system, define the Power Core control interface and/or edit the passwords for the various user modes.

The options shown are determined by the current "Access Level". In User mode, this is the only section visible. In Supervisor mode, you will also see "Control Functions". In Administrator mode, there are more options in the "Control Functions" plus sections for the "Powercore Control Interface", "WebUI Preferences" and "Edit Access Passwords".

Access Level

The current user mode is displayed in the **Actual Level** field.

To change the current access level, click on **Change** - this opens the Login screen. Select a different **Access Level** and enter the **Password**:

- **User** (no password required).
- **Supervisor** (default password = *orion*).
- **Administrator** (default password = *hydra*).

Now re-select the "System Control" tab to return to this page.

Control Functions

In Supervisor and Administrator modes, the "Control Functions" section becomes visible. Note that the **Enable FTP** option is only visible in Administrator mode.

- **Suppress restart messages** - by default, an on-screen message appears whenever the surface restarts. You can turn the messages off by selecting this option.
- **Enable FTP** - by default, this option is turned on to allow file transfers to the diamond surface via FTP. Turn this option off to prevent FTP access.

The **Reboot System** button at the bottom of this area can be used to reboot the frame's IP module. During this time you will see the "boot-up" screen on the IP module and "Connection Lost" on all other modules (connected via CAN). Once the reboot is complete, all modules refresh and the controls return to their former positions/state.



Power Core Control Interface

In Administrator mode, the "Powercore Control Interface" section becomes visible. These parameters define the IP connection to Power Core (as described [earlier](#)).

Web UI Preferences

In Administrator mode, the "Web UI Preferences" section becomes visible. These options adjust what is shown in the browser's "title" for the Web UI session. If nothing is selected, then the page address (URL) is shown. Any changes take affect after a refresh of the browser page.

Edit Access Passwords

In Administrator mode, the "Edit Access Passwords" section becomes visible.

This area can be used to edit the passwords for the Supervisor and Administrator modes in the Web UI, and/or the device's Telnet login. In each case:

- Enter the current password into the "Recent Password" field, followed by the new password into the two "New Password" fields.
- The new password must meet the following requirements: minimum of 5 characters; maximum of 16 characters; permitted character range: ASCII 32..127.
- Click on **Submit** to apply the changes - an on-screen message appears to confirm (or deny) the operation.

Statistics

The screenshot shows the 'Statistics' tab in the diamond software interface. The interface is divided into two main sections: 'High-Speed CAN' and 'Low-Speed CAN'. Each section contains a list of statistics and a 'Reset' button.

High-Speed CAN	Low-Speed CAN
Bus Speed: 1 MBits/s / 8 MBits/s	Bus Speed: 500kBits/s
TX Messages: 68657	TX Messages: 1
RX Messages: 2137	RX Messages: 0
Bus Off Errors: 0	Bus Off Errors: 0
Passive Errors: 0	Passive Errors: 1
Warnings: 0	Warnings: 1
Status Flags: 0x00000000	Status Flags: 0x00800000

The **Statistics** tab shows information about the CAN bus. It can be used to analyse the number of messages sent and received, and if there are any TX or RX problems.

To reset all of the message/error/flag counters to zero, click on the **Reset** buttons at the bottom of the page.

Network

NETWORK AUDIO VIDEO CONTROL

diamond

System Informations System Control Statistics Network Surface Modules Module Tests

Network Device stm0

Host Name: DiamondControlPanels (*)

MAC Address: [REDACTED]

IP Address: 192.168.101.241 (*)

Network Mask: 255.255.255.0 (*)

Gateway: (*)

Link Speed: 100Mb/s

Link State: up

Apply (*)

Network Settings

Domain Name: (*)

Name Server 1: (*)

Name Server 2: (*)

NTP Server Name:

NTP Server Address:

(*) Modifications need system restart to take effect

The **Network** tab provides access to the network settings for the frame's ETHERNET port.

Network Device

This section displays the port's Host Name (defined by the ON-AIR Designer configuration) and MAC address, plus the network IP Address, Network Mask and Gateway (if used). The Link Speed and State show the speed of the connection and its current status (up or down).

In User mode, all fields are non-editable. In Supervisor or Administrator mode, you can enter a new IP Address, Network Mask and/or Gateway. If any settings are changed, you must click **Apply** to save the changes. IP Address changes are made immediately and so you will lose your browser connection once the settings are applied. To continue with the system administration, enter the device's new IP address into your browser and login again (from the Login screen).

Network Settings

Using the fields in this area, you can enter the Domain Name of your network and DNS Name Server IP Addresses, plus the settings for your network's NTP server. As above, remember to click **Apply** to save the changes.

To configure a NTP server, either enter its name in the Server Name box, or its IP Address in the Server Address box. If you type "ntp.internal" in the Server Name box, the IP Address will be automatically filled.

Surface Modules

ID No.	Serial No.	Mode	Type	BOOT Version	BOOT Compile Date	BETR Version	BETR Compile Date	Act. Slot	Dflt.	Map 1	Map 2	Map 3	Map 4	Ctrl
08-EC-5C	80-98-82-00-14-CE-B0-F4	M	711115 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	35	35	0	0	0	0	Set Slot Identify Test Reboot
08-EC-69	80-98-82-00-14-CE-60-2C	S	711115 FADER_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	34	34	5	0	0	0	Set Slot Identify Test Reboot
08-EC-60	80-98-02-10-04-2E-40-40	S	711110 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	1	1	6	4	0	0	Set Slot Identify Test Reboot
08-EC-61	80-98-02-10-04-2E-7F-40	S	711110 FADER A	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	2	2	0	6	0	0	Set Slot Identify Test Reboot
08-EC-80	80-98-82-00-14-CE-60-CC	S	711120 CENTRAL	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	16	16	19	0	0	0	Set Slot Identify Test Reboot
08-EB-15	80-98-02-10-04-9E-C4-F8	S	711125 KEY_EXT	8.0.1	21.09.2023 08:19:12	8.0.1	21.09.2023 08:17:37	48	48	48	0	0	0	Set Slot Identify Test Reboot

The **Surface Modules** tab lists all of the modules fitted to the surface and their firmware versions. The important fields are as follows.

Mode - can be either M or S:

- M - identifies the master module (connected to Power Core via IP).
- S - identifies the slave modules (connected internally, or externally, via CAN).

Act. Slot - shows the module's active slot ID. This is important as it determines the functionality of the module (as described [earlier](#)).

The active slot ID can be changed either, permanently, by editing the **Dflt** (default) value or, temporarily, by loading one of the alternate mappings (**Map 1 to 4**). How to do this is described in [diamond - Slot IDs](#).

Identify - click to identify a module - the top left button on the module flashes three times.

Test - opens the "Module Test" tab.

Reboot - reboots the module.

Module Tests

The **Module Tests** tab can be used to test the components on a module.

Module - enter a slot number to choose a module.

Keys/LEDs - click on a key to light its LED; click on **Test all LEDs** to light all keys; click on **AutoTest** to start the auto test sequence.

TFT Displays - click on an option to display an image on the module's displays.

Faders - choose either **From Panel** or **To Panel** to set the direction and then perform the test. For example:

- From Panel + move a fader on the surface = the on-screen fader should follow.
- To Panel + click Start / Stop = the fader on the surface should open / close.

You can use **Auto Test** or **Calibrate** to start the auto test sequence or fader calibration.

Incremental Encoders - works in a similar manner to the faders.



10 diamond - Service Procedures

At this time, there are no specific service procedures for the diamond control surface.

Should you require 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.



11 diamond - Data and Specifications

This chapter contains data to work with such as specifications, drawings and schematics.

- [diamond - Part Numbers](#)
- [diamond SC - Specification](#)

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

Please use the [diamond - Part Numbers](#) to locate the correct information.

11.1 diamond - Part Numbers

This topic lists the part numbers for the diamond surface and Power Core.

diamond Surface		Part Number	Description
Frames	Standard Frame	711/50-0x.yy	
	Extended Frame	711/51-0x.yy	
	Standard Frame with Virtual Extension	711/60-0x.yy	
	Extended Frame with Virtual Extension	711/61-0x.yy	
	x = module width, from 1 to 8 ME. yy = frame version, either 10 for tabletop or 20 for countersunk.		
Modules	Fader Module A	711/10	
	Fader Module B	711/12	
	Central Module	711/20	
	Combo Module A	711/21	
	Combo Module B	711/22	
	Rotary Extension Module	711/15	
	Key Extension Module	711/25	
	Combo Extension Module	711/26	
	Blind Plate (1 ME, full height)	711/11	
	Blind Plate (1 ME, half-height)	711/16	
	Virtual Extension Module (VX)	711/30	
Accessories	DC power supply	954/99	for diamond frame
	DC power supply	SP4851209	for diamond VX module

Power Core		Part Number	Description
Frames	Main frame (revision 3)	710/13	See Power Core - Hardware Revisions .
	Main frame (revision 2)	710/11	See Power Core - Hardware Revisions .
I/O Cards	MIC / LINE IN	710/20	8 x mono mic/line in
	LINE IN	710/25	4 x stereo line in
	LINE OUT	710/30	4 x stereo line out
	STUDIO I/O	710/35	2 x mono mic/line in 1 x stereo line out 2 x stereo headphones out
	AES3 I/O	710/41	4 x stereo AES3 inputs with SRC 4 x stereo AES3 outputs Bit-transparent
		710/40	as for 710/41 but without bit transparency. This card is discontinued; existing cards can be replaced with the 710/41.
	AES3id I/O	710/42	as for 710/41 but with HD-BNCs
	MADI I/O	710/50	2 x MADI ports (64 I/O channels per port); can be configured for dual-redundant operation.
	MADI SRC I/O	710/60	1 x MADI port (64 I/O channels with SRC)
	DANTE I/O	710/55	2 x DANTE ports, dual-redundant (64 I/O with SRC)
	GPIO	710/80	8 x GPI (optocouplers) 8 x GPO (silent and self-healing relays) 2 x VCA (voltage-controlled inputs)
Software Licenses	RAVENNA Plus (RAV+) Add-on License	250-7130-000	See Power Core - Licensed Feature Sets .
Accessories	SFP modules	981/60-xx	See Power Core - SFP Transceivers .
	DC power supply	955/50-80	See Power Core - Power Supplies .
Spare Parts	USB dongle	250-5998-000	1 x LAWO USB dongle for Power Core.
	Replacement screws for I/O card	271A0106-000	2 x screws for new type I/O card/cover plate. See Power Core - Replacing an I/O Card .



11.2 diamond SC - Specification

This topic describes the specification of the diamond standard configuration.

Audio I/O

Sources & Destinations.

Internal

Busses, Monitor Outputs, etc.

GPIO

Front panel & Ember+

diamond VX

Source groups, User Keys, etc.

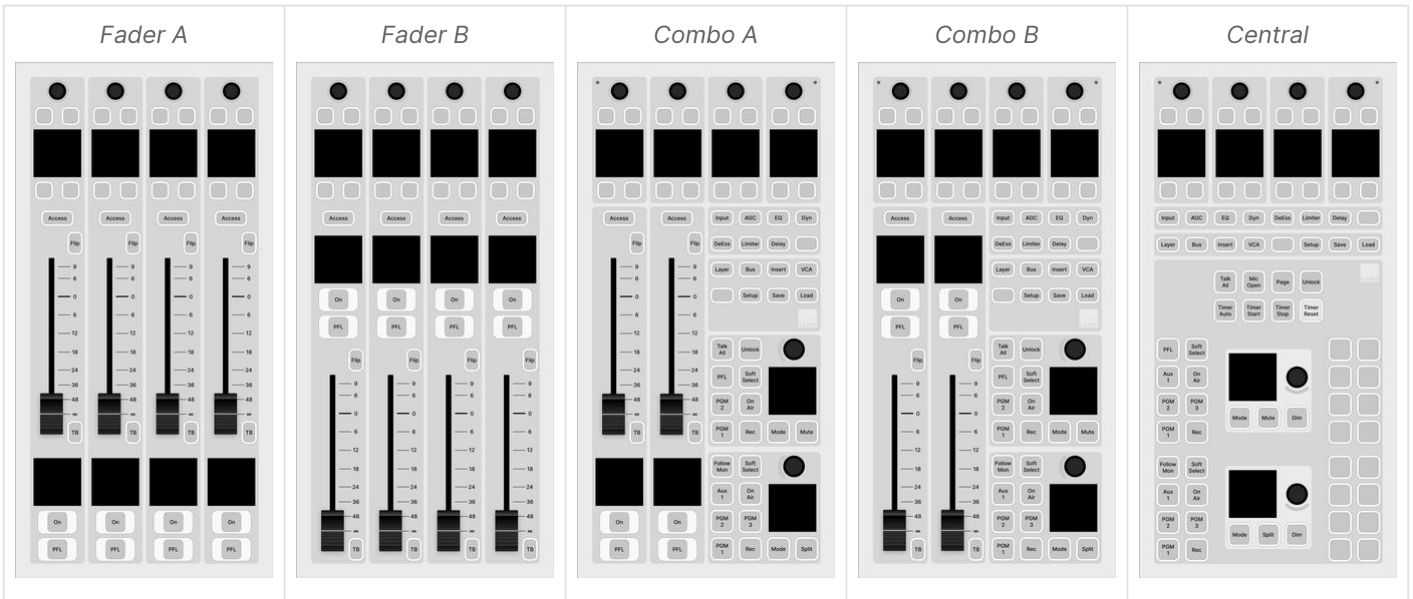
Metering

Version 1.0 of the diamond standard configuration is compliant with EBU meters and levels. Other variants will follow to support SMPTE and other regions. The table below describes the relevant parameters.

diamond Standard Configuration	Europe	North America
Standard	EBU	SMPTE
PPM meter scale	dBFS	dBFS
PPM mark low	-18	-20
PPM mark high	-9	-3 (+17 dBR)
Loudness meter (channel, access and slots)	LU EBU +9 (short)	LU EBU +9 (short)
Loudness value LUFS (slots)	LUFS -23 (integrated)	LUFS -23 (integrated)
Relative System level (OAD)	-36	-38
Analog Ref Level (OAD)	18	24
Operating Level (analog)	0 dBU	+4 dBU
Operating Level (digital)	-18 dBFS	-20 dBFS

MF Key Labels

Standard Modules



Extension Modules

