

ruby standard configuration

User Manual

Version: 6.4.0/2

Edition: Tuesday, March 9, 2021



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1. Introduction

Welcome to **ruby standard configuration**.

About this Manual

This document describes how to install, configure and operate the system.

Look out for the following which indicate:

Notes - points of clarification.

Tips - useful tips and short cuts.

Attention - alert you when an action should *always* be observed.

Further Information

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

Lawo User Registration

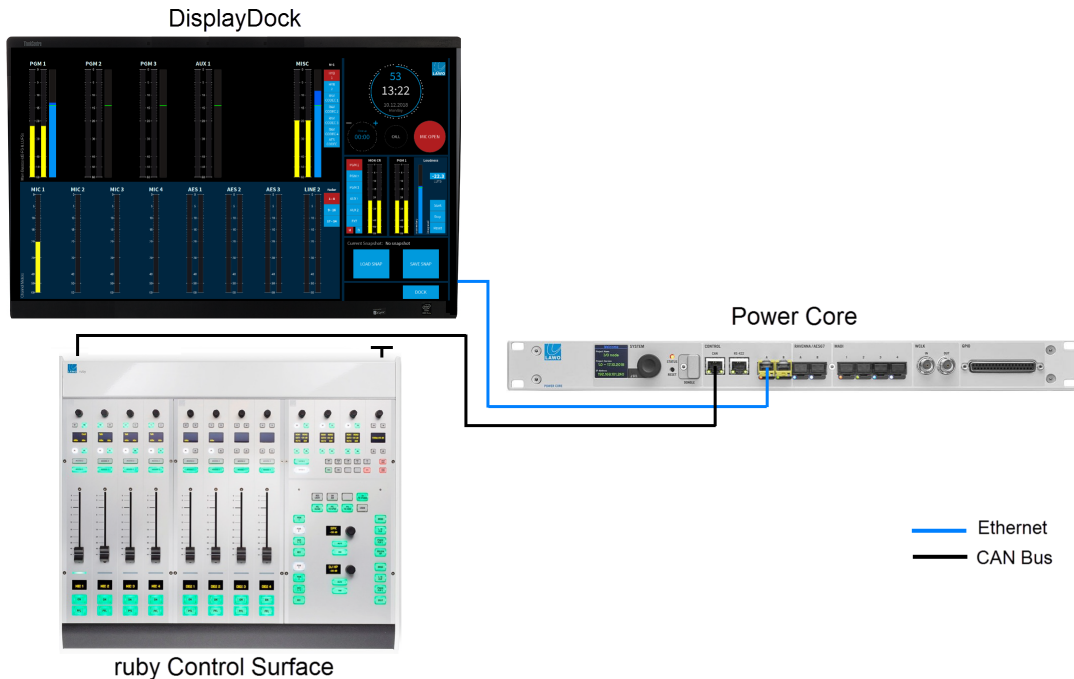
For access to the **Downloads** area and to receive regular product updates, please register at:

www.lawo.com/registration.

2. Important Safety Instructions

Please observe all of the instructions provided in the "General Safety Information for Lawo Equipment" booklet delivered with your devices. Double-click [here](#) to open the information as a pdf.

3. Product Overview



ruby standard configuration is a live mixing console for radio. It consists of three components: Power Core, ruby control surface and Display Dock. The system is available in two editions: Fader Start or Button Start.

The control surface comes in a range of frame sizes and connects to Power Core via CAN bus. DisplayDock runs on a Windows 64-bit PC connected to Power Core via Ethernet. The host PC must be provided by the customer. Suitable CAT5 cables are provided for the CAN bus and Ethernet connections.

Power Core handles all of the signal processing, system control and IO connections. The IO comprises:

- **Analog IO:** 10 mono mic/line in, 1 stereo line out, 2 stereo headphone out.
- **Digital IO:** 1 x 64-channel MAD1 (with main and redundant connections).
- **AoIP:** 1 x RAVENNA/AES67 interface (configured for 32 stereo Rx/Tx streams).
- **Expansion IO:** 6 x IO card slots supporting additional line-level and AES3 IO.

All active sources can be mixed to four stereo main outputs: **PGM 1** to **4** and two stereo auxes: **AUX 1** and **2**. The active sources are the ones assigned to the fader strips and each strip supports two layers. Thus, the maximum number of mix inputs is equivalent to the console frame size x 2.

Any available source can be assigned to either layer 1 or layer 2 on any fader strip, allowing you to change the layout of the surface and mix different inputs. All sources come with EQ, Dynamics, a Limiter and Delay. In addition, the sources MIC 1 - 10 have a De-Esser and Automix. They also support other functions such as talkback, mix minus creation and PFL/CUE monitoring. Parameters can be adjusted either from the control surface or DisplayDock GUI.

For monitoring, there is one stereo speaker output (for the control room), and a stereo headphone output (for the DJ). Two output meters are always visible: MONITOR and PGM 1. To meter inputs and other outputs you can switch to the "Metering" page.

The master functions on the right of DisplayDock include a system clock, timer, mic open indicator and telephone call signaling. Other pages include "Source Parameters" (for DSP control) and the "Advanced" page (with global options and local matrix).

To store and recall settings, the system supports five local memories (stored on Power Core) plus an unlimited number of DisplayDock snapshots (stored on the control PC).

4. The Hardware

This chapter describes the hardware components and options.

Topics include:

- [Console Editions](#)
- [Control Surface Variants](#)
- [Power Core](#)

4.1 Console Editions

ruby standard configuration is available in two editions: **Fader Start (FS)** and **Button Start (BT)**. They differ in the following ways.

Fader Strip Controls

The two large keys at the bottom of the fader strip provide:

- Fader Start (FS) - channel **ON**/off and **PFL**
- Button Start (BT) - channel **ON** and **OFF**

The soft key MF2b provides:

- Fader Start (FS) - **AMix** (auto mix enable).
- Button Start (BT) - **CUE** (pre-fade listen).

On a Button Start console, Auto Mix can be enabled from DisplayDock (or the surface Dynamics controls) when a source is in access. See [AutoMix](#).

Channel On/Off Operation

On Fader Start consoles, the fader motors are active and the channel "on" state is conditional on the fader position.

On Button Start consoles, the fader motors are inactive and the channel "on" state is independent of the fader position.

The behavior is described in more detail [later](#).

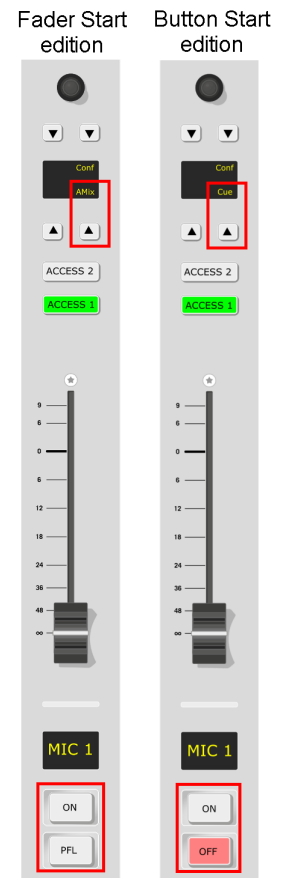
PFL / CUE

The pre-fade listen function is named **PFL** on Fader Start console and **CUE** on Button Start consoles. There are also some differences in the default behaviour (explained [later](#)).

Reference Levels

The editions use different [reference levels](#) as follows:

- Fader Start (FS) = DIN
- Button Start (BT) = SMPTE



4.2 Control Surface Variants

8-fader single frame



12-fader split-frame



ruby can exist as a single or multi-frame control surface.

A choice of four main and five extender frames are available. Frames can be combined to increase the fader count or create a split-frame surface.

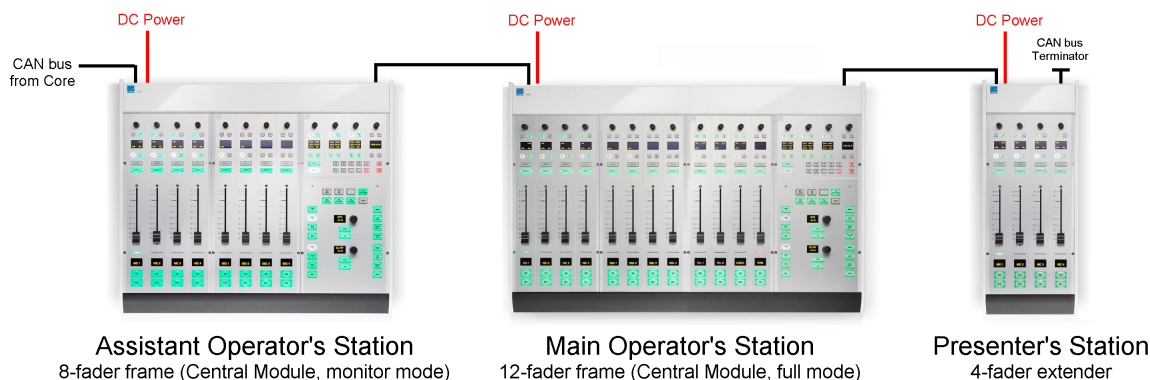
In total, the control surface can include any number of frames as long as the maximum number of faders does not exceed 60.

When connected to a standard DSP Core, the control surface must include a Central Module but this can exist only once. Thus, any additional Central Modules run in "monitor mode". In this instance, the surface supports up to 60 faders, a single Central Module (full mode) and up to 6 Central Modules (monitor mode).

If the DSP Core is a Power Core Max, then up to four full mode Central Modules are supported. In this instance, the surface supports up to 60 faders plus any of the following full/monitor mode Central Module combinations: 4+3; 3+4, 2+5; 1+6.

Each frame connects to Power Core via CAN bus, and is powered from its own 12V DC power supply (included). All frames include **CAN IN** and **CAN OUT** connectors for easy daisy-chaining. In each case, the CAN bus address of a module defines its functionality. Thus, frames can be wired in any order.

Split-frame Example



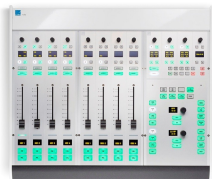
4.2.1 Main Frame Layouts

Each of the main frame layouts includes a Central Module.

4-fader



8-fader



12-fader



16-fader



4.2.2 Extender Frame Layouts

The extender frames can be added to increase the fader count or create a split surface.

4-fader extender



8-fader extender



12-fader extender



16-fader extender



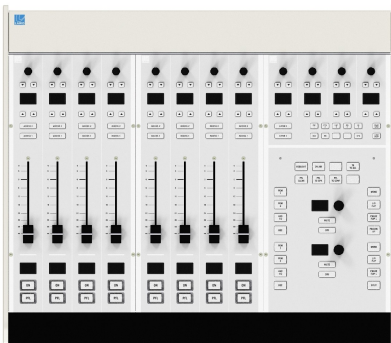
Central Module
ext.



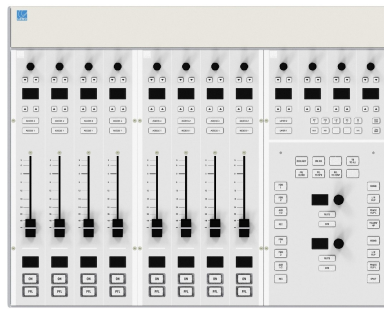
4.2.3 Placement Options

Each frame is available in one of three versions to provide different placement options. The version *must* be specified at the time of ordering; there is no possibility to convert the frame later.

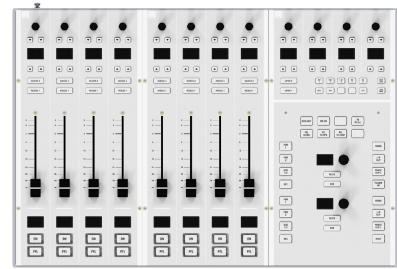
Table Top



Countersunk



Countersunk Short



The differences in construction are:

- **Table Top** - designed for table-top placement. This version includes a leather front buffer and stylish side/rear profiles.
- **Countersunk** - designed to fit flush within your studio furniture. This version comes with different front, rear and side profiles.
- **Countersunk Short** - the same as Countersunk but with shorter side profiles and no upper cover plate to hide the cables (i.e. the rear panel connectors will be visible).

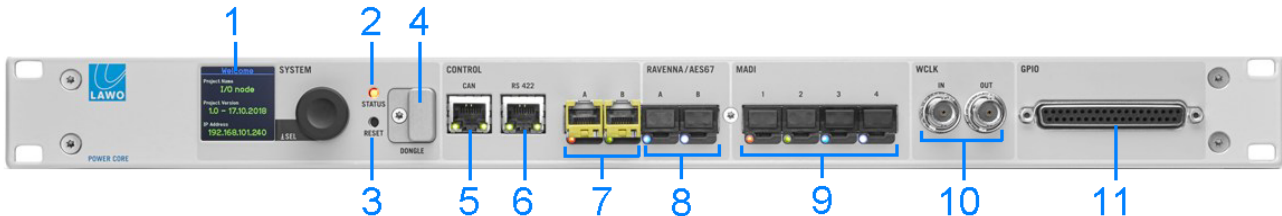
Table Top Surface (rear view)



4.3 Power Core

The 19"/1RU Power Core contains the signal processing, control system and routing matrix. It also handles all audio, control and external Wordclock connections.

4.3.1 Front View



1 SYSTEM Display & Menu Control

The front panel display can be used to edit local device parameters such as the IP address.

2 STATUS LED

The STATUS LED indicates the health of the device and sync status. If the LED is blinking at regular intervals, then the device is working properly; the LED color indicates the sync status.

3 RESET button - warm start

Press this button to perform a warm start. The button is recessed to prevent accidental operation.

A warm start will reboot the device. Do *NOT* perform a warm start while live on air!

4 DONGLE

Use this port to connect the USB memory stick containing your system's WIBU license(s). A safety cap is available to prevent accidental removal of the dongle. If fitted, you will need a T10 star tool to remove the cap.

5 CAN

The CAN bus port connects to the control surface frame.

6 RS 422

The serial port can be used for remote control (e.g. for playout systems) and for debugging. It is usually left unconnected.

7 CONTROL A & B (via SFP)

The two CONTROL ports connect other devices to the Power Core control system.

In a ruby standard configuration system, port A must connect to the host PC running the DisplayDock software; port B is unused and can be left unconnected.

8 RAVENNA/AES67 A & B (via SFP)

The two RAVENNA/AES67 interfaces stream audio to and from an IP network.

In the ruby standard configuration, 32 stereo streams are transmitted and received via port A, while port B remains unused. The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards.

Optionally, you can re-configure the system to support redundant streaming, compatible with SMPTE ST2022-7. In this instance, you must use both interfaces: A and B.

The streaming network *must* be properly managed and configured.

9 MADI 1 to 4 (via SFP)

MADI ports 1 (and 2) can be used to connect multi-channel digital audio (1 x 64-channels). The two ports provide main and redundant connections: MADI 1 is the primary port and MADI 2 is the redundant port. The redundant connection is optional.

In the ruby standard configuration, MADI ports 3 and 4 are not available for external use.

10 WCLK IN & OUT

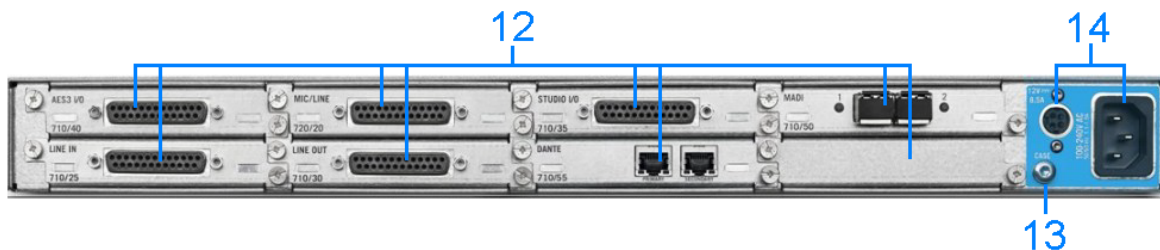
WCLK IN can be used to connect an external wordclock sync reference. Other reference options are PTP, MADI or Internal.

WCLK OUT always provides an output of the current system reference.

11 GPIO

This connector provides 8 x GPI (optocouplers) and 8 x GPO (silent and self-healing relays) for local signaling and switched functions.

4.3.2 Rear View



12 Expansion Card Slots x 8 (optional)

Up to 8 plug-in IO cards can be fitted to the expansion slots at the rear of the frame. All cards are hot-pluggable. Slot 1 is always fitted with a STUDIO IO card and slot 2 with a MIC/LINE card. Slots 3 to 8 can be freely configured with any combination of LINE IN, LINE OUT and AES3 IO.

13 CASE

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

14 12V DC Input & AC Mains Input

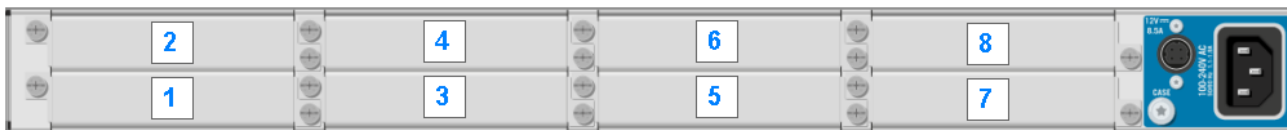
Every device comes with dual power feeds: AC and DC. To use the DC input, you will need an external 12V DC power supply. The 955/50-80 power supply can be ordered separately.

If both inputs are connected, then AC provides the main and DC the redundant power supply.

Power Core *MUST* be connected to the mains using the power cable supplied with the system.

4.3.3 IO Cards







Rear Panel Expansion Slots



Up to eight hot-pluggable IO cards can be fitted to the expansion slots at the rear of the unit.

In the ruby standard configuration, slot 1 is always fitted with a STUDIO IO card and slot 2 with a MIC/LINE card. Additional STUDIO IO and MIC/LINE cards are not permitted. Slots 3 to 8 can be freely configured with any combination of LINE IN, LINE OUT and AES3 IO. These cards are optional and must be ordered separately using the part numbers in the table below.

The permitted IO card options are as follows.

	Part Type	Description	Connector	Fitted to
STUDIO IO 	710/35	2 mono Mic/Line inputs 1 stereo Line output 2 stereo Headphone outputs	1 x DB-25*	Slot 1 (included)
MIC / LINE IN 	710/20	8 mono Mic/Line inputs	1 x DB-25*	Slot 2 (included)
LINE IN 	710/25	8 mono or 4 stereo Line inputs	1 x DB-25*	Slots 3 to 8
LINE OUT 	710/30	8 mono or 4 stereo Line outputs	1 x DB-25*	Slots 3 to 8
AES3 IO 	710/40	4 stereo AES3 inputs with SRC 4 stereo AES3 outputs	1 x DB-25*	Slots 3 to 8
	710/41	as for 710/40 but with bit transparency	1 x DB-25*	Slots 3 to 8
AES3id IO 	710/42	as for 710/41 but with HD-BNCs	8 x HD-BNC	Slots 3 to 8

*All DB-25 connectors are wired according to the AES59 (TASCAM) standard, except for the Headphone outputs on the STUDIO IO card. See [Connector Pin-Outs](#) for wiring information.

5. Specification

This chapter describes the system specification.

Topics include:

- [Available Sources](#)
- [Available Buses](#)
- [Default Audio Assignments](#)
- [GPIO Functions](#)

5.1 Available Sources

The table below describes the available sources.

All sources have EQ, Dynamics, a Limiter and Delay. In addition, MIC 01 - 10 have a De-Esser (DE) and Automix (AMx).

Source Name (all editions)	Format	Physical Input		DSP Resources				
		Connector	Input No. / Stream Name	EQ	Dyn	Lim	Dly	DE/AMx
MIC 01 & 02	mono	STUDIO IO Card (Slot 1)	Input 1 & 2	✓	✓	✓	✓	✓
MIC 03 ...10	mono	MIC/LINE IN Card (Slot 2)	Input 1 ...8	✓	✓	✓	✓	✓
IN 01 ...04	stereo	Generic IO Card (Slot 3)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
IN 05 ...08	stereo	Generic IO Card (Slot 4)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
IN 09 ...12	stereo	Generic IO Card (Slot 5)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
IN 13 ...16	stereo	Generic IO Card (Slot 6)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
IN 17 ...20	stereo	Generic IO Card (Slot 7)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
IN 21 ...24	stereo	Generic IO Card (Slot 8)	Input 1&2 ...7&8	✓	✓	✓	✓	✗
RAV 01 ...32	stereo	RAVENNA/AES67 Port A	RAV In 1... RAV In 32 All RAV sources are pool sources.	✓	✓	✓	✓	✗
MADI 01... MADI 32	stereo	MADI ports 1 (& 2)	MADI channels 1&2... MADI channels 63&64	✓	✓	✓	✓	✗

5.2 Available Buses

The tables below describes the available summing and N-1 buses.

Note that the pre-fade listen bus is called PFL on Fader Start consoles and CUE on Button Start consoles.

Summing Bus Name	Format	Pickup Point	Outputs
PGM 1 ...4	stereo	post-fader	see Default Audio .
AUX 1 & 2	stereo	pre or post-fader	"
PFL / CUE	stereo	pre-fader	Appears on MON CR and MON HP.

N-1 Bus Name	Format	Pickup Point	Outputs
N-1 IN 1 ...4	mono	post-fader N-1 (mix minus)	see Default Audio .
N-1 RAV 1 ...8	mono	"	"

5.3 Default Audio Assignments

The tables which follow list the default audio assignments for the inputs and outputs.

For the inputs, the source assignments are fixed and cannot be changed by the user. Instead, you can choose which inputs are active in the mix by changing the fader strip [assignments](#) on the surface.

For the outputs, the configuration loads the default audio assignments. These can be modified from the [local matrix](#) (in DisplayDock).

5.3.1 IO Cards (Rear Panel)

Slots 1 and 2 are *always* fitted with a STUDIO IO card (slot 1) and a MIC/LINE IN card (slot 2). The MIC/LINE IN card has inputs only; the STUDIO IO card provides both inputs and outputs.

Slots 3 to 8 can be equipped with additional LINE IN, LINE OUT or AES3 IO (as described [earlier](#)). If a slot is fitted with an output-only card, then the corresponding sources will have no audio input! Similarly, if a slot is fitted with an input-only card, then the corresponding destinations have no audio output!

STUDIO I/O (Slot 1)		
Input Number	Source Name	Format
1	MIC 1	mono
2	MIC 2	mono

STUDIO I/O (Slot 1)			
Output	Local Matrix Name	Format	Default Audio from
Line 1/2	LINE OUT	left/right	MON CR
HP 1 L/R	HP 1	left/right	MON HP
HP 2 L/R	HP 2	left/right	MON GUEST

MIC/LINE IN (Slot 2)		
Input Number	Source Name	Format
1	MIC 3	mono
2	MIC 4	mono
3	MIC 5	mono
4	MIC 6	mono
5	MIC 7	mono
6	MIC 8	mono
7	MIC 9	mono
8	MIC 10	mono

Generic IO Cards (Slots 3 to 8)			
Slot Number	Input Number	Source Name	Format
3	1/2... 7/8	IN 01... IN 04	stereo
4	1/2... 7/8	IN 05... IN 08	stereo
5	1/2... 7/8	IN 09... IN 12	stereo
6	1/2... 7/8	IN 13... IN 16	stereo
7	1/2... 7/8	IN 17... IN 20	stereo
8	1/2... 7/8	IN 21... IN 24	stereo

Generic IO Cards (Slots 3 to 8)			
Slot Number	Output Number	Local Matrix Name	Format
3	1/2... 7/8	OUT 01... OUT 04	stereo
4	1/2... 7/8	OUT 05... OUT 08	stereo
5	1/2... 7/8	OUT 09... OUT 12	stereo
6	1/2... 7/8	OUT 13... OUT 16	stereo
7	1/2... 7/8	OUT 17... OUT 20	stereo
8	1/2... 7/8	OUT 21... OUT 24	stereo

5.3.2 RAVENNA Inputs

RAVENNA/AES67 Port A (ra0)			
RAVENNA Input Number	Rx Stream Name	Source Name	Format
1/2... 63/64	RAV In 1... 32	RAV 01... 32	left/right

5.3.3 RAVENNA Outputs

RAVENNA/AES67 Port A (ra0)			
RAVENNA Output Number	Tx Stream Name	Format	Default Audio from
1/2	RAV PGM 1	left/right	PGM 1
3/4	RAV PGM 2	left/right	PGM 2
5/6	RAV PGM 3	left/right	PGM 3
7/8	RAV PGM 4	left/right	PGM 4
9/10	RAV AUX 1	left/right	AUX 1
11/12	RAV AUX 2	left/right	AUX 2
13/14	N-1 RAV 1	left/right	N-1 / N-1+TB
15/16	N-1 RAV 2	left/right	N-1 / N-1+TB
17/18	N-1 RAV 3	left/right	N-1 / N-1+TB
19/20	N-1 RAV 4	left/right	N-1 / N-1+TB
21/22	N-1 RAV 5	left/right	N-1 / N-1+TB
23/24	N-1 RAV 6	left/right	N-1 / N-1+TB
25/26	N-1 RAV 7	left/right	N-1 / N-1+TB
27/28	N-1 RAV 8	left/right	N-1 / N-1+TB
29... 64	additional Tx streams must be created using the RAVENNA Web UI.		

5.3.4 MADI Inputs

MADI 1 & 2 (Power Core front panel)		
Channel Number	Source Name	Format
1/2... 63/64	MADI 1... MADI 32	left/right

5.3.5 MADI Outputs

MADI 1 & 2 (Power Core front panel)		
Channel Number	Format	Default Audio from
1/2	left/right	PGM 1
3/4	left/right	PGM 2
5/6	left/right	PGM 3
7/8	left/right	PGM 4
9/10	left/right	AUX 1
11/12	left/right	AUX 2
13/14 ... 63/64	left/right	

5.4 GPIO Functions

The tables below describe the functionality provided by the GPIO connector. 8 x GPI (opto-couplers) and 8 x GPO (silent and self-healing CMOS relays) are supported.

GPI	Function Name	Logic
1	MIC 2 ON / OFF / COUGH	ON / OFF toggle; if ON and "push and hold" (400 ms) > mute
2	MIC 3 ON / OFF / COUGH	ON / OFF toggle; if ON and "push and hold" (400 ms) > mute
3	MIC 4 ON / OFF / COUGH	ON / OFF toggle; if ON and "push and hold" (400 ms) > mute
4	MIC 2 TALK	INPUT MUTE MIC; > DJ HP and CR
5	MIC 3 TALK	INPUT MUTE MIC; > DJ HP and CR
6	MIC 4 TALK	INPUT MUTE MIC; > DJ HP and CR
7	INCOMING CALL INPUT 1	HYBRID 1 (LOCAL)
8	INCOMING CALL INPUT 2	HYBRID 2 (LOCAL)

GPO	Function Name	Logic
1	REDLIGHT CR	
2	REDLIGHT STUDIO	
3		
4		
5	INPUT 1 ON	HYBRID 1 (LOCAL)
6	INPUT 2 ON	HYBRID 2 (LOCAL)
7	PGM 1 SILENCE	
8	MIC 1 "ON" TALLY	

6. Installation

This chapter describes how to install the control surface and Power Core.

Topics include:

- [Installing the Control Surface](#)
- [Installing Power Core](#)
- [Grounding & Power](#)
- [Wiring](#)
- [Synchronization](#)

6.1 Installing the Control Surface

6.1.1 Packing List

Each control surface frame ships with the following additional items:

- 1 x external 12V DC power supply - to power the frame.
- 1 x 2m IEC power cable (country-specific) - to connect mains to the 12V DC power supply.
- 1 x 3m RJ45 cable - to connect the CAN bus from the surface to Power Core or another frame.
- Printed sheets with "OFF" key foil printed labels (required for Button Start consoles only) - to re-label the fader strip MF Keys.

If the surface consists of multiple frames, then you will receive one set of accessories per frame (as every frame requires its own power, CAN bus and MF Key labels).

6.1.2 Preparation

A single control surface can consist of one or more frames.

Unpacking

Each frame is delivered in its own box with all included accessories.

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.

Dimensions and Weight

The dimensions and weight of the frame depend on its size and version: table-top, countersunk or countersunk short. Drawings for all frame variants are available from the **Downloads** area at www.lawo.com (after **Login**).

Temperature and Cooling

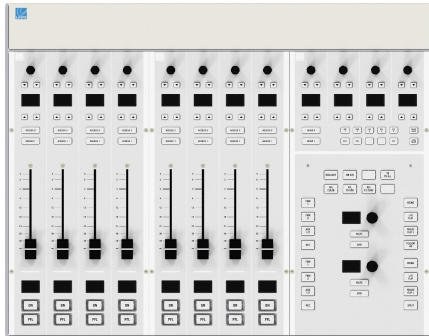
The control surface is designed for normal studio installation and needs no special air conditioning.

Power Consumption & Electrical Voltage

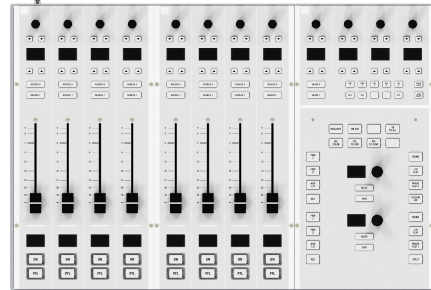
Please see the [12V DC Power Supply](#) appendix.

6.1.3 Installing Countersunk Frames

Countersunk



Countersunk Short



These consoles are optimized for easy countersunk mounting.

The frame has rounded-off edges so that it will fit smoothly into holes cut by a wood milling machine.

For the countersunk (regular) version, all cables can be hidden in the cable tray and connected to the console inlets from the open underside of the tray.

For the countersunk short version, the table must be designed to provide a small opening in order to properly cable the device.

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 see the [dimension drawings](#) for details.

6.2 Installing Power Core

6.2.1 Unpacking

Power Core is delivered in its own box with all accessories. If you have ordered IO cards for the rear expansion slots, SFP modules or a 12V DC power supply, then these will be packaged separately (in the same box).

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.

6.2.2 Packing List

Included

Power Core ships with the following accessories:

- 1 x 2m IEC power cable (country-specific) - to connect AC mains to the frame.
- 1 x USB license dongle (250-5998-000).
- 1 x serial cable (485-0700-000) - to connect to the RS 422 port (for diagnostics).
- Dust caps for the Network Interface and MADI SFP cages - these will be mounted in the frame.
- 1 x USB memory card - containing marketing materials.

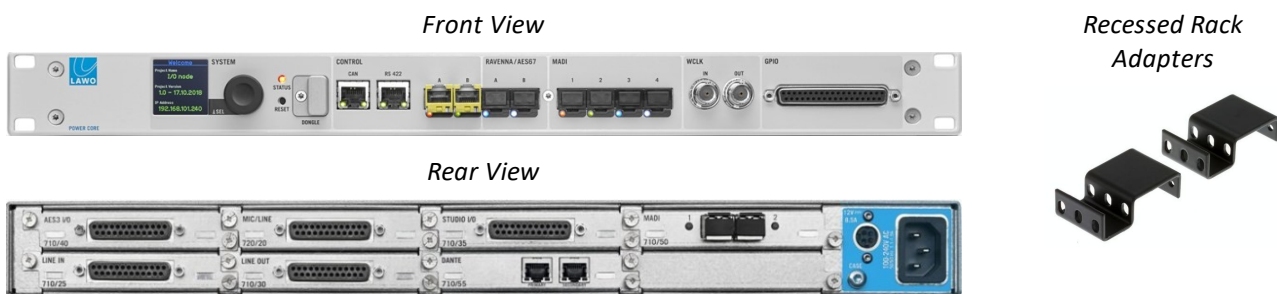
Note that the Power Core license code (for the USB dongle) and DisplayDock license code can be found on the delivery note.

Optional

The following items must be ordered separately:

- 1 x external 12V DC power supply (955/50-80) with 2m IEC power cable (country-specific) - to connect 12V DC power to the frame.
- 1 x USB license dongle safety cap.
- SFP modules - for the network interface and MADI ports.

6.2.3 Mounting the Frame



Power Core is designed to be mounted in a 19-inch rack. Please install supporting slide bars to hold the weight of the unit, and use the locking devices provided. For recessed rack-mounting, use standard, third-party, 1RU recessed rack adapters such as the ones shown above. When fitting the rack adapters and slide bars, you must make sure that there is sufficient airflow around the device for cooling.

Connectors are located at the front and rear of the unit. Therefore, when using 19-inch racks with doors please leave enough room for the cables.

If you have IO cards to install, then these should be fitted *BEFORE* installing the unit into the rack.

6.2.4 Dimensions and Weight

Width	483 mm (19")
Height	44.0 mm (1 RU)
Depth (inc locking devices)	385 mm
Weight (without expansion IO cards)	4.5 kg

A dimension drawing is included in the Appendices.

6.2.5 Temperature and Cooling

Power Core is equipped with temperature-controlled fans for minimum noise emission. Ventilation holes are provided on the left and right. There must be sufficient airflow around the device for cooling.

DO NOT obstruct the side ventilation holes as to do so will prevent efficient cooling.

The current temperature of the device's internal components can be checked on the front panel [display](#). The recommended tolerances can be found in the [data sheet](#) for the Power Core main frame. In particular, the temperature of the FPGA chip must NOT exceed 85° C.

6.2.6 Fitting the IO Cards

Rear Panel Expansion Slots "Empty"



Example Configuration



Power Core is delivered with a STUDIO IO card in slot 1, a MIC/LINE card in slot 2 and metal cover plates fitted to slots 3 to 8. Slots 3 to 8 can be fitted with LINE IN, LINE OUT or AES3 IO cards (as described [earlier](#)). To use these cards, they must be installed into the frame.

The following procedure can be used fit a new IO card or exchange an IO card once the unit is operational. All cards are hot-pluggable, and so the exchange can be performed while the device is powered.

To remove and replace the screws you will need a small flat-blade screwdriver (not supplied).

The IO cards carry highly sensitive electronic components, and should be handled with care. **ALWAYS** observe the following procedures:

- Discharge yourself before touching an IO card.
- Wear conductive safety-shoes and grounding wristbands to reduce the risk of electrostatic discharging.
- DO NOT bend the cards.

1. Using a Phillips PH1 driver, unfasten the two diagonally opposite screws which hold the card, or cover plate, in place.
2. Gently pull out the card from the frame, or remove the cover plate:



Spare cover plates should be stored safely so that they can be reused later if a card is removed.

6. Installation

3. Insert the new card into the slot, and gently slide it into the frame:



Make sure that the card glides smoothly into the side guide-rails and sits flush with the rear panel casing.

If you are hot plugging a card, then after a few seconds, the card will boot. You can check the status of the new card from the [Web UI](#) (go to the **System** -> **States** page).

4. Now fasten the two screws to fix the card in place.

CAUTION: ALWAYS secure the IO card using the screws provided. This protects the operator from contact with live parts; protects the card from being pulled out unintentionally; and reduces the emission of electro-magnetic radiation.

5. When you have fitted all the IO cards for your system, check that all cards are screwed into the frame and that any empty slots are closed with metal cover plates.

The installation is now complete, and you can wire your audio devices to the IO card connectors.

6.2.7 SFP Modules

To use a CONTROL, RAVENNA/AES67 or MAD1 port, you must fit an SFP module. All SFPs must be Lawo-certified (as listed below). SFPs are not included and must be ordered separately. You will need one SFP for each port.

If fitting SFPs to both MAD1 and network interface ports, take care not to mix up the SFP types.

➤ Network Interface SFP Modules

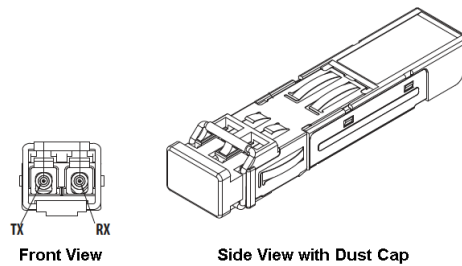
SFP Module Description	Part Number
1000 Base-SX: 850nm, -7dBm, multi-mode fiber, 550m	981/60-10
1000 Base-LX: 1310nm, -3dBm, single-mode fiber, 10km	981/60-20
1000 Base-ZX: 1550nm, 0dBm, single-mode fiber, 80km	981/60-30
1000 Base-T: RJ45, copper, 100m	981/60-60

➤ MAD1 SFP Modules

SFP Module Description	Part Number
MAD1, 1310nm, multi-mode fiber, 2km	981/60-80
MAD1, 1310nm, single-mode fiber, 20km	981/60-81
MAD1, HD-BNC (75 ohm), copper, 100m	981/60-82

Installing the SFPs

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



1. Remove the dust caps from both the port and SFP module.

Store these carefully so that they can be replaced if a module is removed.

2. Push the SFP module into the rectangular slot.
3. Press gently and firmly until the module locks into position.

Attention: Before removal, please unlock SFP modules to avoid mechanical damage to the slots.

If a module is removed, please refit the port's dust cap to protect the internal components.

You *must* use the correct fiber type for your remote device. Using the wrong fiber type or exceeding the maximum optical input power can result in malfunction of, or damage to, the optical device.

6.3 Grounding & Power

8-fader ruby Surface (rear view)



Power Core (rear view)



6.3.1 Grounding

Although operator protection is guaranteed, it is best to establish an additional ground for EMC reasons.

On the control surface, a grounding screw is provided beside the **CAN** bus connector. On Power Core, a grounding screw is provided below the **DC IN** connector on the rear of the frame.

In each case:

1. Use the M4x8 **CASE** screw to fasten the grounding cable to the housing.

Power Core and Control Surface must be on the same potential as all other system devices.

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

Grounding of Audio Interfaces

For compliance with AES3, digital interfaces should be connected to a field ground.

For microphones, the ground from the device should connect directly to the microphone via the cable shielding, otherwise phantom power cannot be transferred. Take care that the shielding does not connect to the field ground, to prevent interference and loss of signal quality.

6.3.2 Control Surface Power

The control surface is powered by its own external 12V DC power supply (955/50-80). This is an identical supply to the one used by Power Core. The PSU is delivered with its own IEC power cable (country-specific).

For dimensions, weight and electrical specification, see the [12V DC Power Supply](#) appendix.

➤ To connect DC power to the surface:

1. Connect the 12V DC power supply to the **DC IN** connector on the rear panel.
2. Using the IEC cable provided, connect your AC mains to the PSU.

The device **MUST** be connected to the mains using the power cable supplied with the system.

The surface has no on/off switch and starts automatically when power is applied.

6.3.3 Power Core Power

Power Core comes with dual power feeds: AC and DC. If both inputs are connected, then the two feeds provide main and redundant power.

AC Input

The frame includes an integrated wide-ranging AC power supply, and is delivered with a 2m IEC power cable (country-specific).

1. Using the IEC cable provided, connect your mains to the **100-240V** AC input on the rear panel.

The device *MUST* be connected to the mains using the power cable supplied with the system.

Power Core has no on/off switch and starts automatically when power is applied.

DC Input

To use the DC input, you will need the external 12V DC power supply (955/50-80). This is optional and must be ordered separately. The PSU is delivered with its own IEC power cable (country-specific).

For dimensions, weight and electrical specification, see the [12V DC Power Supply](#) appendix.

➤ To connect DC power to the frame:

1. Connect the 12V DC power supply to the **DC IN** connector on the rear panel.
2. Using the IEC cable provided, connect your AC mains to the PSU.

The PSU *MUST* be connected to the mains using the power cable supplied.

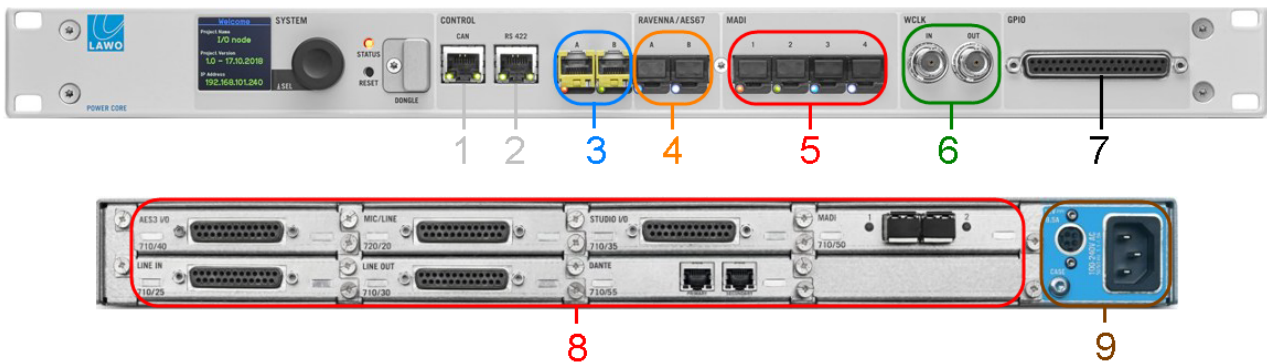
6.4 Wiring

The system should be wired from Power Core as follows. Please see [Connector Pin-Outs](#) for pinning information.

For the initial setup, only CAN (1), CONTROL A (3) and Power (9) are required.

For the audio and GPIO connections, the functionality is defined by the configuration. Therefore, before wiring these connectors, please refer to the [Default Audio Assignments](#) and [GPIO Functions](#).

Power Core (front and rear)



1 CAN (CAT 5e)

The CAN port connects Power Core to the control surface (via CAN bus).

For a stand-alone surface, use a single point-to-point connection. If the surface has an extender, then you will need to daisy-chain the CAN Bus (as described [later](#)).

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.

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

The maximum length of the CAN bus connection is 60 meters.

2 RS-422 (serial)

The serial port is usually left unconnected.

3 CONTROL Network (via SFP)

The two CONTROL ports provide a network connection to the Power Core control system. In the ruby standard configuration, only the CONTROL A port is used. It should connect to the control PC running the DisplayDock software.

The connection can be made either directly or via a network switch. 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 below are met. By using routers, or similar devices, the latency of the communication will increase. The control network *MUST* meet or exceed the following requirements:

- At least 100MBit/s; 1 GBit/s preferred
- Full Duplex

It is important to keep the control network separate from the streaming network connected to the AoIP ports (4).

To use the port you must fit a Lawo-certified SFP module (as described [earlier](#)). The SFP determines the cable type, maximum distance and connector.

To establish communication, you will need to configure the network settings on the control PC.

4 AoIP Streaming (via SFP)

The two RAVENNA/AES67 interfaces connect the AoIP streams to the IP network.

By default, 32 stereo streams are transmitted and received via port A, while port B remains unused. The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards. Optionally, you can use both interfaces (A and B) to support redundant streaming via SMPTE ST2022-7, Seamless Protection Switching. This requires some modification of the streaming configuration and a supporting network infrastructure.

The connection(s) *must* be made via a network switch and *not* directly to another streaming port. You can find more details about the data network requirements and suitable components in the [Lawo IP Networking Guide](#).

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

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

To use each port, you must fit a Lawo-certified SFP module (as described [earlier](#)). The SFP determines the cable type, maximum distance and connector.

Internally, the 32 stereo Rx streams are named RAV 1 to 32 in the available sources [list](#). A number of Tx streams are also pre-defined; their default audio assignments are listed in the [Specification](#) chapter. See [Setting Up RAVENNA/AES67](#) for details on how to set up the Rx and Tx streams.

5 MADI (via SFP)

In the ruby standard configuration, MADI ports 3 and 4 are not configured for external use.

MADI ports 1 (and 2) can be used to connect multi-channel digital audio to the system. The ports conform to AES10 and carry 64 bi-directional channels (at 48kHz).

The two ports operate as a main and redundant connection: MADI 1 is the primary port and MADI 2 is the redundant port. On the input side, the system will switch automatically to the redundant port if the primary port fails. On the output side, the two ports carry duplicate signals. If redundancy is not required, then it is recommended to connect your device port 1 and leave port 2 unconnected.

All MADI connections must be point-to-point. To use each port, you must fit a Lawo-certified SFP module (as described [earlier](#)). The SFP determines the cable type, maximum distance and connector.

Internally, the 64 MADI channels are configured for stereo operation within the available sources [list](#) and local [matrix](#). This is important to remember when assigning audio onto the 64 mono channels in the connecting device. For example, the stereo source "MADI 2" will use the audio arriving on channels 3&4; the stereo output named "MADI 3" will send audio out on channels 5&6; and so on.

6 WCLK IN & OUT (BNC)

The system can sync to external wordclock by connecting the clock signal to WCLK IN.

The WCLK OUT provides an output of the current system reference: PTP, WCLK IN, MADI or internal clock.

In both cases, connections are made using standard 75 ohm BNC connectors. The maximum cable length depends on the equipment you are connecting to.

See [Synchronization](#) for more details.

7 GPIO (SUB-D37)

The GPIO connector provides 8 x GPI (optocouplers) and 8 x GPO (silent and self-healing relays) for local signaling and switched functions:

- GPI = 8 x optocouplers (3-36V DC / 8mA @ 36V)
- GPO = 8 x Opto-MOS relays (50V AC / 120mA @ 50V)

The connector is a 37-pin D-type.

8 DIGITAL & ANALOG IO

All rear panel IO cards break out on DB-25 connectors that are wired according to the AES59 (TASCAM) standard (except for the STUDIO IO phones outputs).

All LINE IN and LINE OUT connections are electronically balanced. For LINE OUTs, the maximum analog level can be adjusted to +12, +15, +18, +21 or +24 dBu relative to digital full scale (dBFS). This is a factory-configured setting defined by the console edition: Fader Start (FS) = +15dBu, DIN; Button Start (BT) = +24dBu, SMPTE.

Each of the MIC/LINE INs features a discrete class-A preamplifier with superb performance at both low (mic) and high (line) levels. In addition to variable microphone pre-amp gain, each input comes with switchable 48V phantom power, a high-pass filter and 20dB PAD. The pre-amp gain can be automatically adjusted using the [AutoGain](#) feature. The maximum analog input level (with the PAD enabled) is +24dBu.

All AES INPUTs and OUTPUTs conform to the stereo AES3 standard. The four AES INPUTs have sample rate conversion (SRC).

9 Grounding & Power

See [Grounding & Power](#).

6.5 Synchronization

Sync Reference Options

The available sync reference options are:

- **PTP** - from the RAVENNA/AES67 streaming network.
- **Wordclock** – connected to WCLK IN on the front panel.
- **MADI** - connected to the active **MADI** port: either MADI 1 or 2 on the Power Core front panel.
- **Internal Clock** – set to 48kHz or 44.1kHz by the configuration.

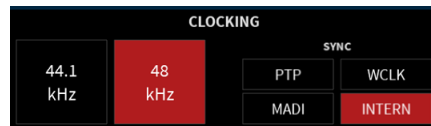
All options are always enabled and so the system will use the highest prioritized sync source (if a valid signal is present): PTP, WCLK, MADI, or internal. The switching between external sync and internal clock is handled automatically.

If external sync is not available, then Power Core can act as a sync master and distribute its internal clock to other devices (via WCLK OUT).

The internal clock generator defaults to 48kHz, but this can be changed to 44.1kHz from the DisplayDock GUI (as described below).

Checking the Sync Reference

The available and active sync sources can be checked from the DisplayDock [Advanced](#) page (in the "CLOCKING" area):



The "SYNC" fields are indicators only; you cannot change the sync source from the GUI: red = active; blue = available. In our example, the active sync source is **INTERNAL**.

Changing the Sample Rate

The sample rate of the internal clock generator can be changed from **48kHz** to **44.1kHz**, or vice versa, when all faders are closed (off-air) and UNLOCK (on the Central Module) is pressed.

Note that this operation is only possible when all faders are closed (as the change would be audible if it was permitted while on-air). In this instance, the button colors update to red = active and blue = inactive but available. Select the inactive (blue) option to make the change.

After a cold start, the internal generator will reset to the default value stored in the configuration (48kHz).

Sync Output

The WCLK OUT connector always provides an output of the current system reference.

7. System Setup

This chapter describes how to install the software and set up the system.

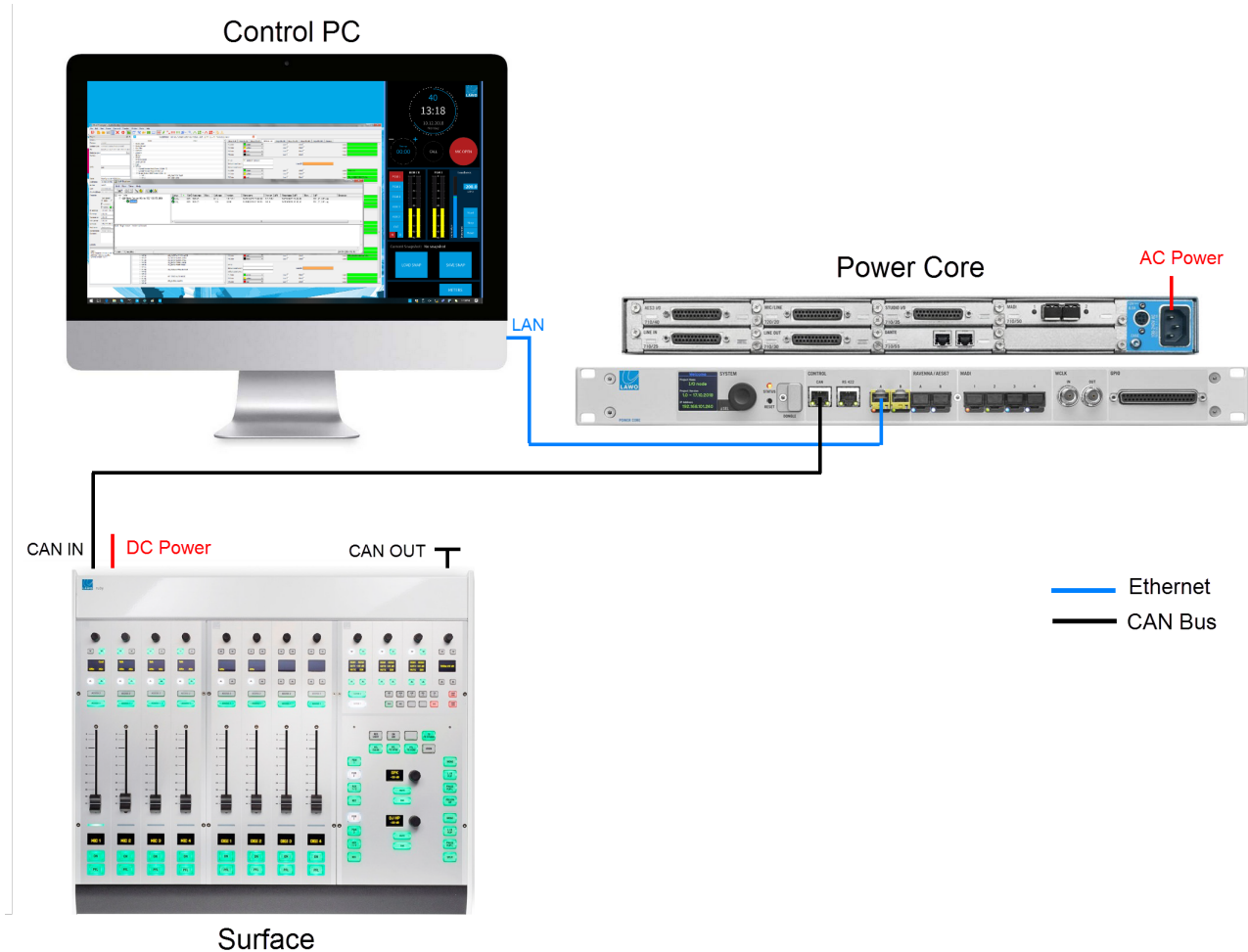
Topics include:

- [System Connections \(Required for Setup\)](#)
- [Powering On & Checking the System](#)
- [Setting Up the Control PC](#)
- [Configuring the System](#)
- [Licensing](#)
- [Editing the System IP Settings](#)
- [Setting the System Date and Time](#)
- [Setting the Time Zone](#)
- [Setting Up RAVENNA/AES67](#)

7.1 System Connections (Required for Setup)

In order to boot and configure the system, the following connections must be made: CAN bus (to the control surface), ETHERNET (to the control PC) and power to all devices. The CAN and ETHERNET connections can be hot-plugged, and so the cabling can be performed in any order.

The system ships with the required CAN bus and ETHERNET cables, 12V DC power supply (for the surface) and IEC cables to connect the AC mains.



1. Start by connecting the Power Core **CAN** port to the control surface **CAN IN**.

The connection *must* be point-to-point; a switch or hub is not allowed. If more than one frame is supplied, then the CAN bus must be daisy-chained. On the last surface in the chain, fit the CAN bus terminator (supplied with the system) to the **CAN OUT**.

2. Next, connect the PC's **LAN** port *directly* to the Power Core **CONTROL A** port.

To set up the system, you should make a direct connection (as shown above). This can be modified later to connect via a network.

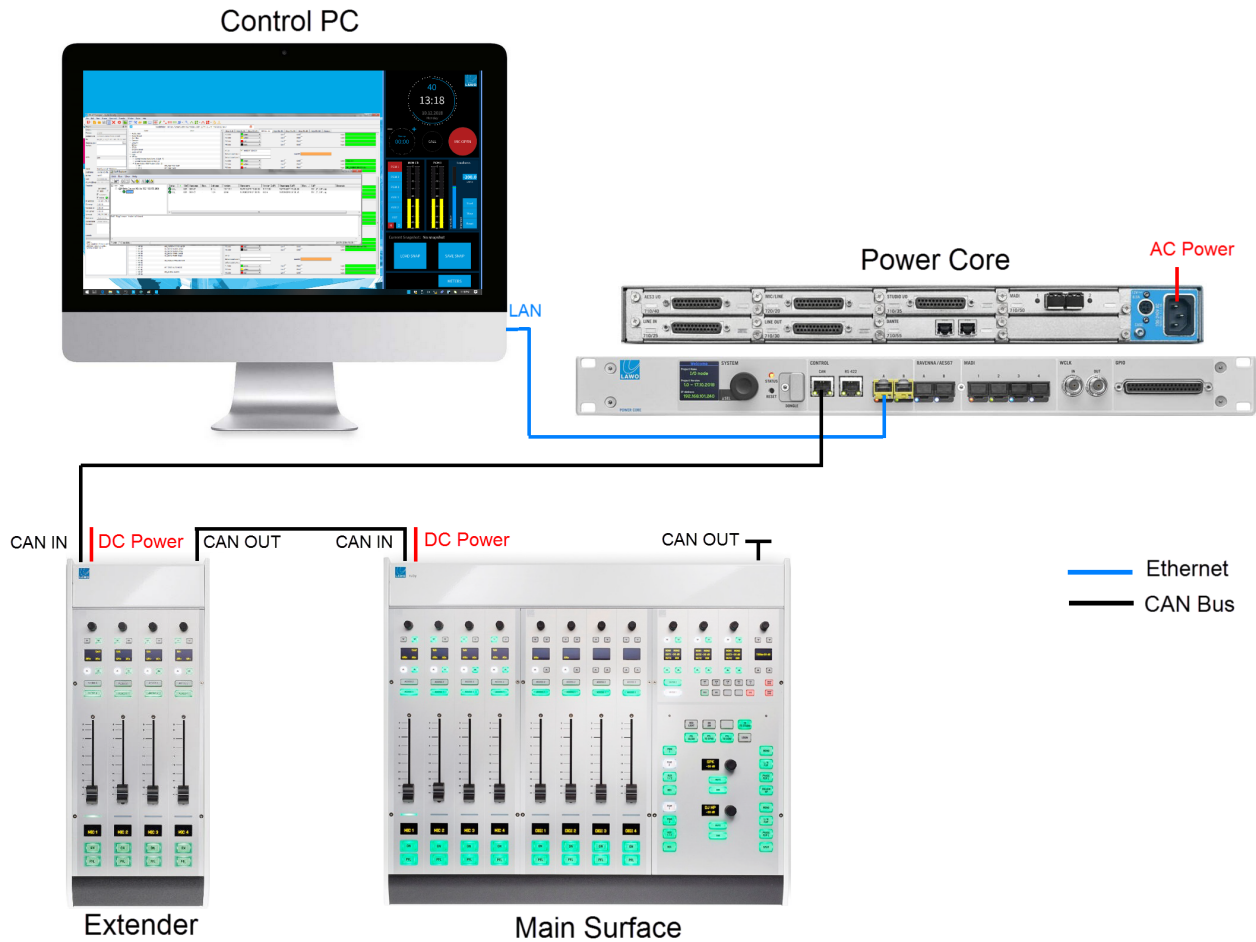
Take care to use the **CONTROL A** port and *not* either of the **RAVENNA/AES67** ports.

3. Connect the 12V DC power supply to the **DC IN** connector on the control surface. Then, using the IEC cable provided, connect your AC mains to the DC power supply.
4. Using the IEC cable provided, connect the mains supply to the **100-240V** AC input on Power Core.

The AC mains connections *MUST* be made using the power cables supplied with the system.

7.1.1 Connecting an Extender Module

If you are adding an extender module to the surface, then the CAN bus must be daisy-chained.



In this instance:

1. Connect the Power Core **CAN** port to the extender module **CAN IN**.
2. Then connect the extender module **CAN OUT** to the **CAN IN** on the main surface.
3. Fit the CAN bus terminator (supplied with the system) to the **CAN OUT** on the main surface.
4. Remember to connect power to both the main surface and extender module (using the PSU's provided).

The CAN bus must be terminated and so it is important to connect the full chain. Please do not attempt to operate the system with only an extender module connected!

7.2 Powering On & Checking the System

Power Core (front view)



The control surface and Power Core have no on/off switch but start automatically when power is applied. The components can be powered in any order.

Let's assume that you turn on both devices. You will see an initial flicker of LEDs on the control surface modules. On Power Core, you will see the boot-up progress on the front panel:

- 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 try a [restart](#) as a first step.

At the end of the boot-up process, the system loads the state of all settings at the last shut down (known as the warm start data). It means that when you turn on, you will get back to wherever you were¹ at the last power off.

¹ The last known PTP Master/Slave mode may not be reinstated if Power Core is set to operate as PTP Slave only.

The hardware components are now ready to be configured - this takes approximately 20 seconds from power on.

Please note: if you perform a cold start, then the system ignores the warm start data and resets to the default values stored in the configuration.

7.3 Setting Up the Control PC

7.3.1 PC Requirements

The control PC must meet the minimum system requirements for VisTool MK2. Please double-click [here](#) to view the requirements (as a pdf).

7.3.2 Configuring the Network Settings on the PC

To establish a network connection to Power Core, you will need to configure the network settings for the PC's LAN port. The exact steps vary depending on your OS version.

The IP Address must be unique, and set within the same range as that of Power Core's CONTROL A port. The Subnet Masks should be identical.

You can check the current network settings from Power Core's front panel [display](#). The defaults are:

- **IP Address** = 192.168.101.240
- **Subnet Mask** = 255.255.255.0
- **Gateway** = 0.0.0.0

Test the connection by opening a web browser application and typing in the default IP address = **192.168.101.240**. If the connection is successful, then the Web UI home page will appear.

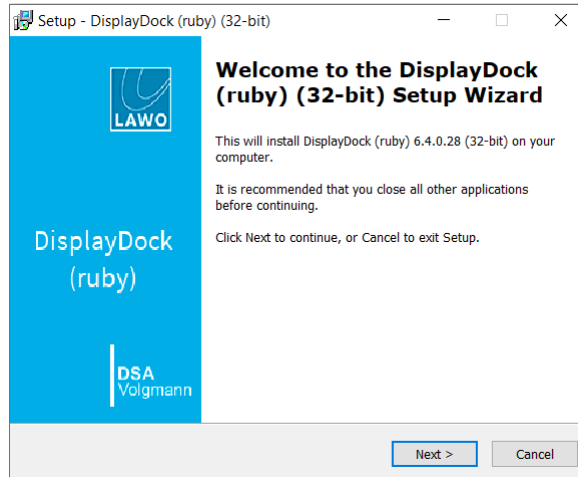
If there is a problem opening the page, then first check your web browser (see [Web UI](#) for the browser requirements). Then check the network cabling and IP settings of the control PC and Power Core.

If you are connecting via a larger network, you may need to consult your network administrator to gain access to the Lawo device.

7.3.3 Installing the Software

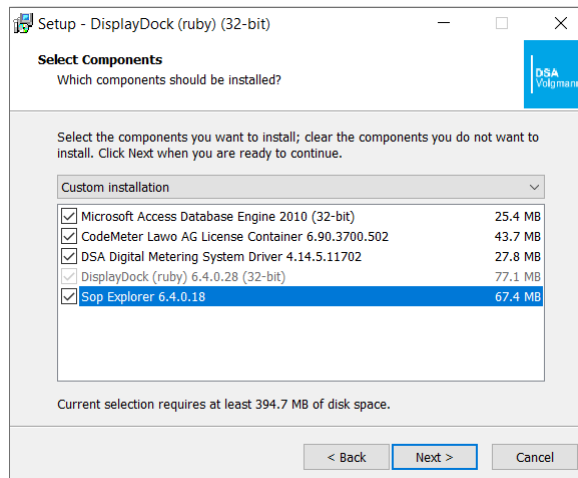
The latest version of the **displaydock_ruby.exe** installer is available from the **Downloads** area at www.lawo.com (after **Login**).

1. Copy the installer onto your control PC.
2. Double click on the installer icon - this starts the 'DisplayDock Setup Wizard':



3. Follow the Wizard's instructions accepting the default options provided.

At the 'Select Components' window, please accept all default options to install or update the components:

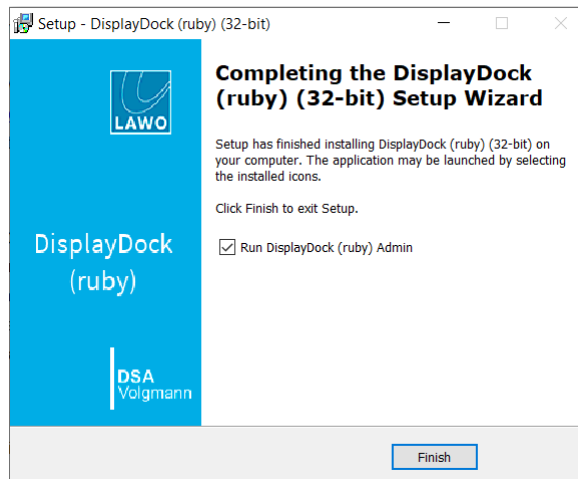


Note that the **CodeMeter Runtime** software is necessary for [licensing](#). If it is already installed, then you can deselect this option and use an existing Cm container for the license storage. Or, keep the option selected to update the CodeMeter release and create a new Cm container.

4. When you reach the 'Summary' window, check the options and click **Install** - the software components are installed onto your computer; this may take a few minutes.

By default, files are installed in the location: 'C:\Program Files\DisplayDock (Ruby)'.

5. When all of the components have been installed, the following window will appear:



Select **Finish** to exit the setup wizard and launch the **DisplayDock Admin** tool.

If you have any problems with the software installation, please contact your local Lawo representative or email support@lawo.com.

7.4 Configuring the System

DisplayDock Admin is the administrative program which configures the system. It is used for three main tasks:

- To check and update the system firmware.
- To update or change the configuration from Fader Start to Button Start.
- To select the monitor used by DisplayDock (to launch the GUI).

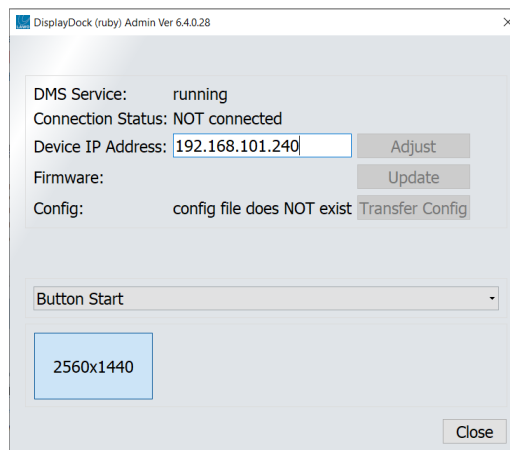
You will need to run DisplayDock Admin whenever you update to a new version of software. The latest firmware and configuration files copied onto the control PC during the software installation. When DisplayDock Admin connects to Power Core, it compares the versions and updates the status messages accordingly. Any new files can then be transferred.

7.4.1 Opening a Connection to Power Core

1. DisplayDock Admin starts automatically at the end of the software installation procedure.

Alternatively, select **Program Files -> DisplayDock (Ruby) -> DisplayDock (Ruby) Admin** from the Windows START menu.

The "DMS Service" should be **running** and the "Connection Status" will show either **connected** (if there is a valid network connection) or **NOT connected** (if there is no network connection):



2. To establish a connection, enter the IP Address of your Power Core into the "Device IP Address" field, and select **Adjust**.

You can check the current network settings from Power Core's front panel [display](#). The default IP Address = 192.168.101.240

If the "Connection Status" remains as **NOT connected**, then there is a problem with the network communication. Check that the "Device IP Address" has been entered correctly. Then check the physical connections and the TCP/IP settings of your computer's Network Interface Card.

- Once a valid network connection is detected, the program begins checking the "Firmware" and "Config" status of the device - this may take a few seconds.

If either component has a new version, then start by updating the firmware and then transferring the configuration.

Checking Firmware

DMS Service:	running	
Connection Status:	...	
Device IP Address:	192.168.101.240	<input type="button" value="Adjust"/>
Firmware:	checking...	<input type="button" value="Update"/>
Config:		<input type="button" value="Transfer Config"/>

Firmware Up to Date

DMS Service:	running	
Connection Status:	connected	
Device IP Address:	192.168.101.240	<input type="button" value="Adjust"/>
Firmware:	up to date	<input type="button" value="Update"/>
Config:	config is up to date	<input type="button" value="Transfer Config"/>

7.4.2 Updating the Firmware

If a new "Firmware" version is **available**, then update Power Core as follows.

- Click on **Update** to start the update procedure.

The "Firmware" status message shows **update in progress** while the necessary data is transferred. This may take a while.

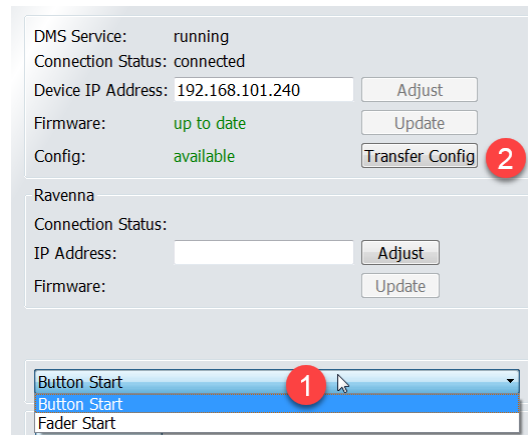
- Following the transfer, Power Core restarts and during this time you will lose the network connection ("Connection Status" = **NOT connected**).

- After the restart, the program reconnects and checks the "Firmware" and "Config" statuses again.

The "Firmware" status should now be **up to date** and you can continue on to the configuration.

7.4.3 Updating the Configuration

The "Config" status shows if a new configuration is **available**. This can occur when a new version of software is released (to support new functionality), or if you choose the alternate configuration in the **Button Start/Fader Start** drop-down menu.



1. Start by selecting the correct console edition, either **Button Start** or **Fader Start** - the "Config" status updates accordingly.
2. Click on **Transfer Config** to start the file transfer.

The "Config" status message shows **update in progress** and then **update DONE**. The transfer may take a few seconds.

2. Following the transfer, Power Core restarts and during this time you will lose the network connection ("Connection Status" = **NOT connected**).
3. After the restart, the program reconnects and checks the "Config" status again.

The status should now be **up to date** and you can continue on to the next task.

7.4.4 Selecting the DisplayDock Monitor

At the bottom of the DisplayDock Admin window, you can select the monitor which will be used for the DisplayDock GUI. If only one monitor is connected, then this is automatically selected. If the PC has more than one monitor connected, then you will see multiple entries. In each case, the resolution is shown in the monitor icon.

To change the monitor used by the DisplayDock start script:

1. Click on an icon to select the monitor you wish to use - an ID appears briefly on the connected screen.
2. Then close DisplayDock Admin to update the start script accordingly.

When you next [open](#) the DisplayDock session, the GUI will appear on the selected monitor.

7.5 Activating the Licenses

For a ruby standard configuration system, two licenses are required: one for DisplayDock and one for Power Core.

The DisplayDock license can be installed into a local container (on your PC), a remote container (on a networked server), or onto a USB dongle (for portability). If you wish to use a dongle for DisplayDock, then this must be ordered separately.

For Power Core, an "XL" license must be installed onto the USB dongle supplied with the system and connected to the front panel DONGLE port.

In both cases, the licenses are activated and managed by the CodeMeter Runtime licensing system from [WIBU systems](#). The license codes can be found on the delivery note shipped with the system.

7.5.1 About the Dongles

All dongles are specially-configured USB memory sticks which can be purchased from either [Lawo](#) or [WIBU systems](#). The dongles supplied for hardware and software products ship with different file systems, so it is important not to mix up the dongle types. If you have purchased a dongle for DisplayDock, then this will have a metal "LAWO logo" tag attached as shown below. Multiple software products can be licensed from a single dongle. The dongle supplied for Power Core is stand-alone (with no metal tag).

USB Dongle (for Lawo software)



7.5.2 Preparing for Activation

To activate a license, you will need:

- A PC with an internet connection (and USB port if using a dongle). If your PC does not have an internet connection, then the offline activation method can be used.
- The WIBU systems USB memory stick (if using a dongle).
- The license code. This can be found on the delivery note shipped with the system. It takes the form of a 25-digit ticket number such as the one shown below.

License Code Example

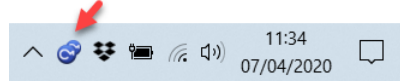
Ticket:
7MAMJ-8HZ95-N9VW5-3MKX6-LWUYM

Once activated, it is strongly recommended that you backup your licenses (using the **CodeMeter** [WebAdmin](#) portal). This will allow you to restore a license if the original is lost or damaged.

7.5.3 Installing CodeMeter Runtime

To activate a license, your PC must be installed with **CodeMeter Runtime** (from WIBU systems). The correct version is installed automatically with the setup software for your product.

You can check the installation by looking in the Windows taskbar where you should see the following icon.

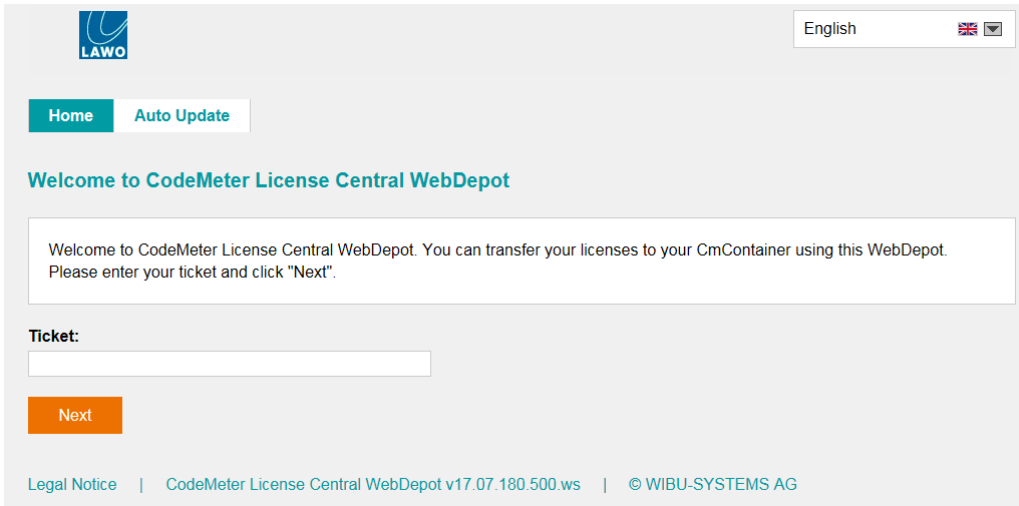


This shows that a Cm container (for local license storage) has been installed.

7.5.4 Activating a License Online

To use this method, your PC must have an internet connection. If installing onto a dongle, then this should be connected to the PC's USB port.

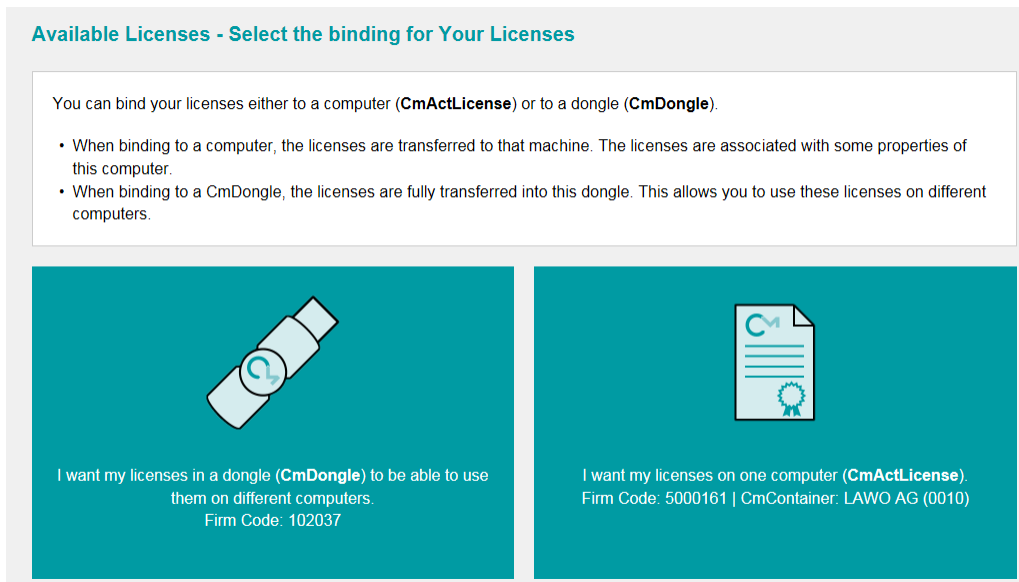
1. Open the Lawo licensing web page by copying the following URL into your web browser:
<https://licenseportal.lawo.com>



If necessary you can choose a different language using the drop-down menu at the top right of the page.

2. Copy your license ticket number - this is the 25-digit number code - into the **Ticket** field and select **Next**.
3. The WebDepot searches for and displays your licenses - select **Activate Licenses** to continue.
4. At the next page, select the storage method for your license - note that this cannot be altered later.

Choose either **CmDongle** (to create a USB dongle) or **CmActLicense** (to bind the license to the local computer).



5. At the next page, select the licenses you wish to activate and the **CmContainer** to be used for the license storage.

Available Licenses

To activate your licenses:

- Select the licenses you want to activate.
- Select the locally connected CmContainer to which you want to transfer the licenses.
- Click "Activate Selected Licenses Now".

<input checked="" type="checkbox"/>	Name	Activated On	CmContainer	Status
<input checked="" type="checkbox"/>	*Product Name* <small>(License Quantity: 1)</small>			Available

Select CmContainer

128-2311304 (LAWO AG) ↻

Activate Selected Licenses Now Offline license transfer

[← Select binding](#)
[← My Licenses](#)

You can store multiple licenses in the same container. If no Cm containers are available, then you will see an option to "Get CmContainer automatically".

6. Click on **Activate Selected Licenses Now** and wait for a few seconds - a confirmation pop-up appears once the activation is successful:

Online License Transfer

! **Please wait!** The selected licenses are transferred. **This process may take several minutes to complete.** Please do not remove the CmContainer during this process and do not reload this page.

Starting license transfer.
Creating license request.

Online License Transfer

Starting license transfer.
Creating license request.
Downloading license update.
Importing license update to CmContainer.
Creating receipt.
Uploading receipt.

✔ License transfer completed successfully!

OK

7. After selecting **OK**, a summary appears:

Home
My Licenses
Auto Update

My Licenses

Name	Activated On	CmContainer	Status
Product Name <small>(License Quantity: 1)</small>	2018-07-05 18:33:51	128-2311304	Available: 0 (1)

Re-Host Licenses

8. You can now close the browser and return to your Lawo software application or install the USB dongle. For information on re-hosting a license, offline activation, backup/restore and using a license server, please see the [Advanced Licensing Features](#) appendix.

7.5.5 Installing the Power Core Dongle

Once the Power Core license has been activated, connect the USB memory stick to the DONGLE port on the front panel:



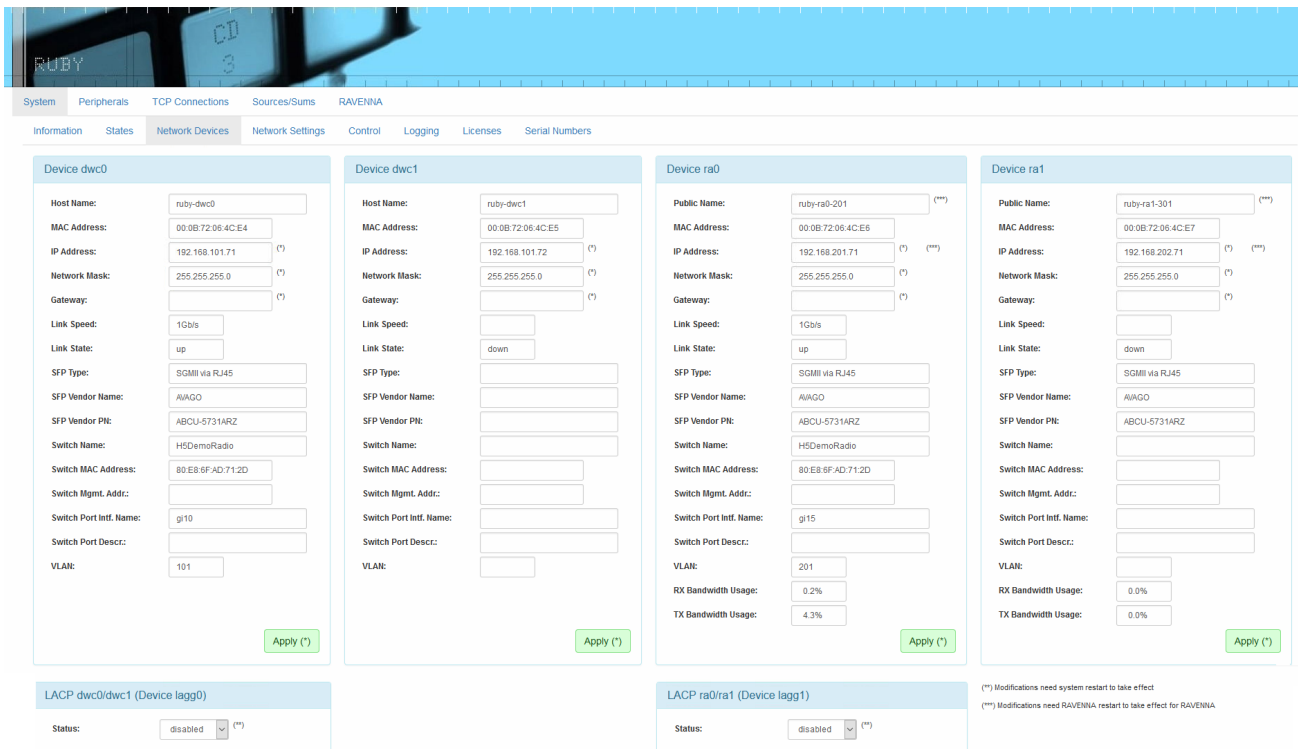
If the optional safety cap is fitted, you will need a T10 star tool to remove and replace the cap.

Once connected, all licensed features become available. If a valid license is not found, then an audible alarm sounds every few seconds.

7.6 Editing the System IP Settings

If you are installing ruby standard configuration into a network with other devices, then you will need to edit the IP settings of the Power Core's CONTROL A port. This can be achieved by opening a Web UI session as follows.

1. [Open](#) the Web UI and login as **Supervisor** (default password = *orion*).
2. Select the **System -> Network Devices** page to view the current network settings:



The screenshot shows the 'Network Devices' configuration page in the Web UI. It displays four device configuration panels: Device dwc0, Device dwc1, Device ra0, and Device ra1. Each panel contains fields for Host Name, MAC Address, IP Address, Network Mask, Gateway, Link Speed, Link State, SFP Type, SFP Vendor Name, SFP Vendor P/N, Switch Name, Switch MAC Address, Switch Mgmt. Addr., Switch Port Intf. Name, Switch Port Descr., and VLAN. Below the device panels are two LACP configuration sections: LACP dwc0/dwc1 (Device lagg0) and LACP ra0/ra1 (Device lagg1), each with a Status dropdown menu. The status for both LACP sections is currently set to 'disabled'. There are 'Apply (*)' buttons at the bottom of each device panel. A note at the bottom right states: '(**) Modifications need system restart to take effect' and '(***) Modifications need RAVENNA restart to take effect for RAVENNA'.

The four "devices" correspond to the front panel network ports as follows:

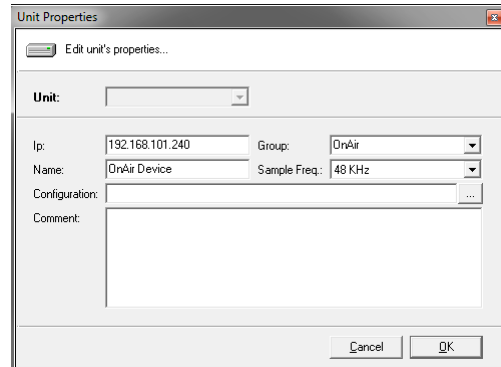
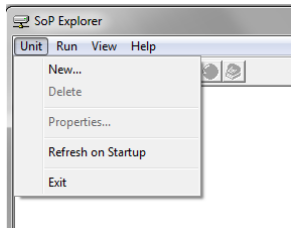
- **Device dwc0** = the CONTROL A port. **This sets the control system IP address.**
 - **Device dwc1** = the CONTROL B port, usually unused.
 - **Device ra0** = the RAVENNA/AES67 A port, the first of two AoIP ports.
 - **Device ra1** = the RAVENNA/AES67 B port, the second of two AoIP ports.
3. To change the IP Address, Network Mask and Gateway for **Device dwc0**, click in each field and type in the new value. Then click **Apply** to save the changes.
 4. If you have changed the settings, you will lose your browser connection, so enter the device's new IP address to re-establish the connection.
 5. If you are using a Name Server, NTP Server or Syslog Server then these settings can be entered on the **System -> Network Settings** tab.

If you are streaming audio over IP, then the settings for **Devices ra0** and **ra1** can also be set at this time.

7.7 Setting the System Date and Time

The system date and time is provided by your network's NTP server (if one is present), or by the unit's internal Real Time Clock (RTC). The internal clock can be set using SoP Explorer. The procedure will transfer the date and time from the control PC to the system as a one-shot snapshot. So take care to check the settings on the control PC before you begin.

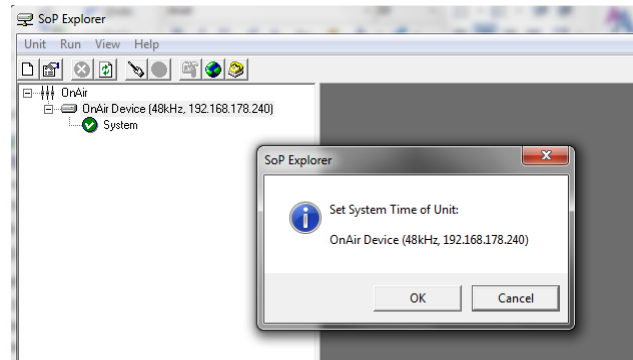
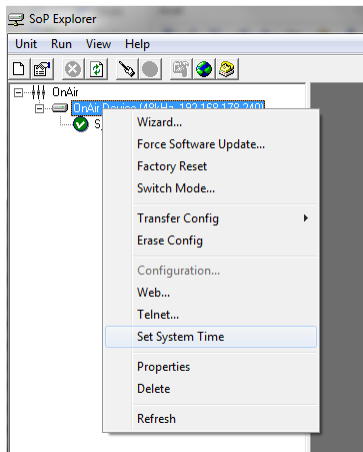
1. Start the application by selecting **START -> Program Files -> SoP Explorer**.
2. Select **Unit -> New...** from the main menus, enter the IP address of Power Core and select **OK** to add the unit.



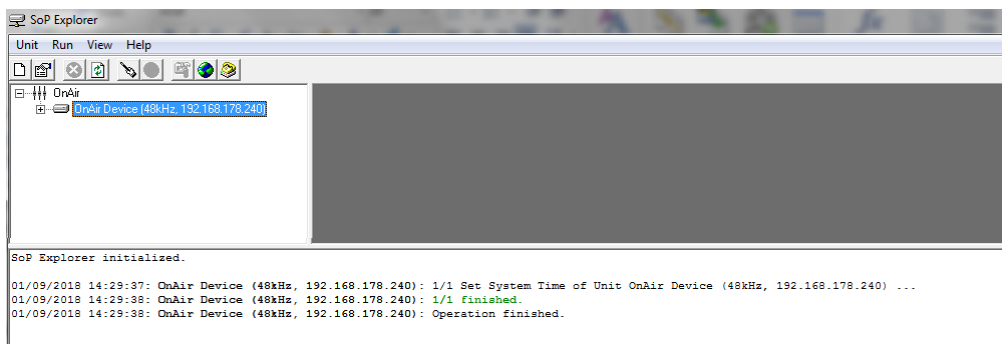
SoP Explorer connects to Power Core and analyses the current firmware revisions.

If a red **X** appears beside the unit, then there is a problem with the network connection. Check the network cabling and the IP settings of the PC and Power Core.

3. Right-click on the unit and select **Set System Time**. Then confirm by selecting **OK**.



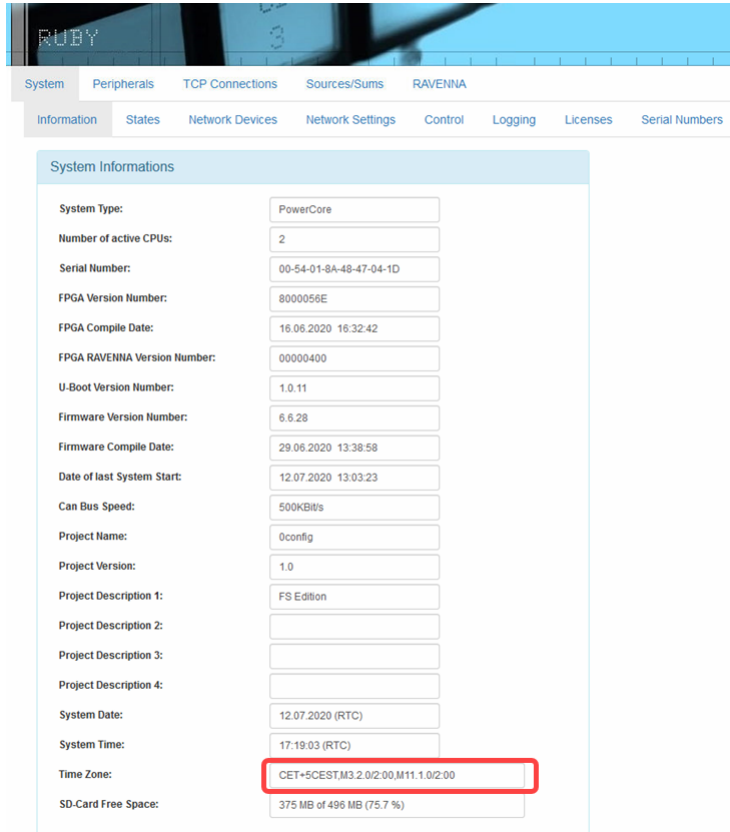
The software now sets the system date and time to match that of the control PC. The success (or failure) of the reset is shown in the SoP Explorer status area:



7.8 Setting the Time Zone

The time zone can be edited by opening a Web UI session to Power Core.

1. [Open](#) the Web UI and login as **Supervisor** (default password = *orion*).
2. Select the **System -> Information** page.



The screenshot shows the 'System Informations' page in the Web UI. The 'Time Zone' field is highlighted with a red box and contains the value 'CET+5CEST,M3.2.0/2:00,M11.1.0/2:00'. Other fields include System Type (PowerCore), Number of active CPUs (2), Serial Number (00-54-01-8A-48-47-04-1D), FPGA Version Number (8000056E), FPGA Compile Date (16.06.2020 16:32:42), FPGA RAVENNA Version Number (00000400), U-Boot Version Number (1.0.11), Firmware Version Number (6.6.28), Firmware Compile Date (29.06.2020 13:38:58), Date of last System Start (12.07.2020 13:03:23), Can Bus Speed (500KBits), Project Name (oconfig), Project Version (1.0), Project Description 1 (FS Edition), System Date (12.07.2020 (RTC)), System Time (17:19:03 (RTC)), and SD-Card Free Space (375 MB of 496 MB (75.7 %)).

3. Click to edit the **Time Zone** value - any change takes immediate effect; there is no need to restart.

The time zone should be specified relative to Central European Time (CET).

For example, "CET+5CEST,M3.2.0/2:00,M11.1.0/2:00" is suitable for US East Coast, where CET is 5 hours ahead.

The second part of the syntax specifies the start and end of Central European Summer Time (CEST). e.g. from month 3, week 2, day 0, time 2am (the second Sunday in March) until month 11, week 1, day 0, time 2am (the first Sunday in November).

7.9 Setting Up RAVENNA/AES67

7.9.1 Introduction

This section is intended as an introduction to configuring and setting up RAVENNA streams. It covers the typical configuration process and is in no way exhaustive or prescribing of how a customer should configure their system. Some questions one should ask oneself are: how redundant the network needs to be; should the audio network be standalone; how are the streams to be routed and controlled; where do all the audio streams need to be routed to; etc.

Please note that RAVENNA requires a properly configured external network infrastructure to function correctly and defining such is beyond the scope of this manual. Please refer to and consult your network administrator and architect for network specific questions and settings.

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

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

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

7.9.2 What the Configuration Provides

32 stereo Rx and Tx streams are pre-configured. The streams are fully compatible with the SMPTE ST2110, AES67 and RAVENNA standards.

By default, the 32 stereo streams are transmitted and received via port A, while port B remains unused. Optionally, you can re-configure the two ports to support redundant streaming (via SMPTE ST2022-7). This requires some modification of the streaming configuration and also a supporting network infrastructure.

7.9.3 Using Audio from the Network

The 32 stereo Rx streams are pre-labeled and connected to the sources named **RAV 01** to **RAV 32** by the configuration. See [RAVENNA Inputs](#). They can be assigned to any fader strip in the usual manner.

For each RAVENNA source, you can select a stream using the fader strip rotary control and **TAKE** button (as described earlier). See [RAVENNA Source Stream Selection](#).

7.9.4 Publishing Audio to the Network

The first 14 stereo Tx streams are pre-labeled and connected from the PGM, AUX and N-1 outputs by the configuration. See [RAVENNA Outputs](#).

The remaining Tx streams can be configured by the RAVENNA Web UI (if needed).

7.9.5 Using the Power Core Web UI

The Power Core Web UI is used to check and edit all available RAVENNA settings.

1. Start by [opening](#) a Web UI session and logging in as Supervisor.
2. Use the [Network Devices](#) tab to edit the IP settings for the two RAVENNA/AES67 ports.
3. Work through the [RAVENNA](#) tabs to view the status of all pre-configured streams, and access any additional settings such as the [retuning](#) of streams.

8. Operation

This chapter describes how to operate the system.

Topics include:

- [Basic Operations](#)
- [Fader Strip Control](#)
- [Source-Specific Functions](#)
- [The Central Module](#)
- [Assigning Fader Strips](#)
- [RAVENNA Source Stream Selection](#)
- [Bus Assign](#)
- [Input Gain & Pan](#)
- [DSP Parameters](#)
- [Metering](#)
- [Monitoring & Talkback](#)
- [Master Functions](#)
- [The Advanced Page](#)
- [Editing User Labels](#)
- [Conference Bussing \(N-1/Mix Minus\)](#)
- [Snapshots](#)
- [The SYS Menu](#)

8.1 Basic Operations

8.1.1 Starting the System

1. To start the hardware components, apply power to the control surface and Power Core.

You will see an initial flicker of LEDs on the control surface modules. On Power Core, the boot-up progress is shown on the front panel display.

At the end of the boot-up, the system loads its latest settings (stored at the last shut down). The hardware components are now ready for operation - this takes approximately 20 seconds from power on.

2. To start DisplayDock, turn on your control PC and double-click on the "**DisplayDock (ruby)**" desktop icon.

The session loads and connects to the hardware. On start up, the DOCK appears on the right of the screen. Providing there are no error messages, the GUI is ready for operation.

If audio is reaching the main PGM 1 output, you will see level on the output meters.

If Power Core performs either a warm start or cold start while DisplayDock is running, then the message "System has been restarted" appears on top of the Clock/Timer. Select the message to clear it.

8.1.2 Trouble-shooting

➤ DisplayDock Does Not Open

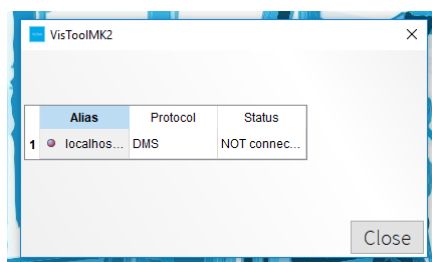
If the DisplayDock GUI does not appear, then there could be a problem with the start script or the selected monitor. Check the settings prepared earlier in [DisplayDock Admin](#).

➤ No License Found

If a software license is not found when you start DisplayDock, then an error message appears. Follow the activation procedure (described earlier) to activate your license. If the license is installed onto a USB dongle, then check that the dongle is connected to the host PC!

➤ No Hardware Connection

If the DisplayDock GUI opens but there is a problem with the network connection to Power Core, then the following window appears:



In this instance, you should check the following:

- The network cabling and IP settings of the control PC, see [Configuring the Network Settings on the PC](#).
- The IP address of Power Core, see [Editing the System IP Settings](#).

8.1.3 Working with DisplayDock

The DisplayDock GUI is designed for touch-screen operation and so you can simply touch a button to action a function. If touch-screen functionality is not available, then use your mouse and mouse keys to make selections.

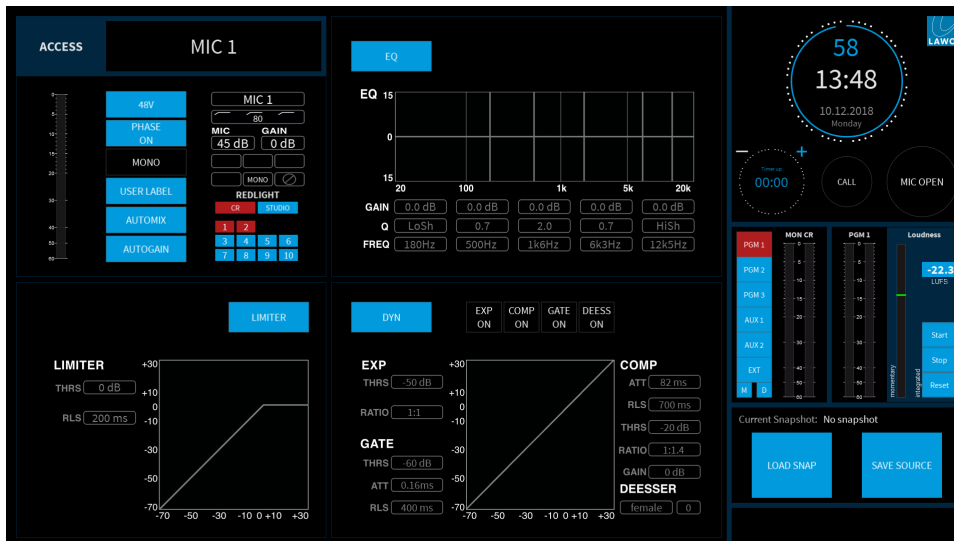
The main page, known as the DOCK, appears on the right of the screen so that it can sit alongside other applications. It provides master functions such as the system clock, timer, mic open indicator, output metering and monitoring selections.

Other pages appear alongside the DOCK as needed. For example, press a fader strip **ACCESS** key and the "Source Parameters" page appears. In each case, the full-screen pages appear to the left of the DOCK, so that the DOCK remains accessible at all times.

DOCK



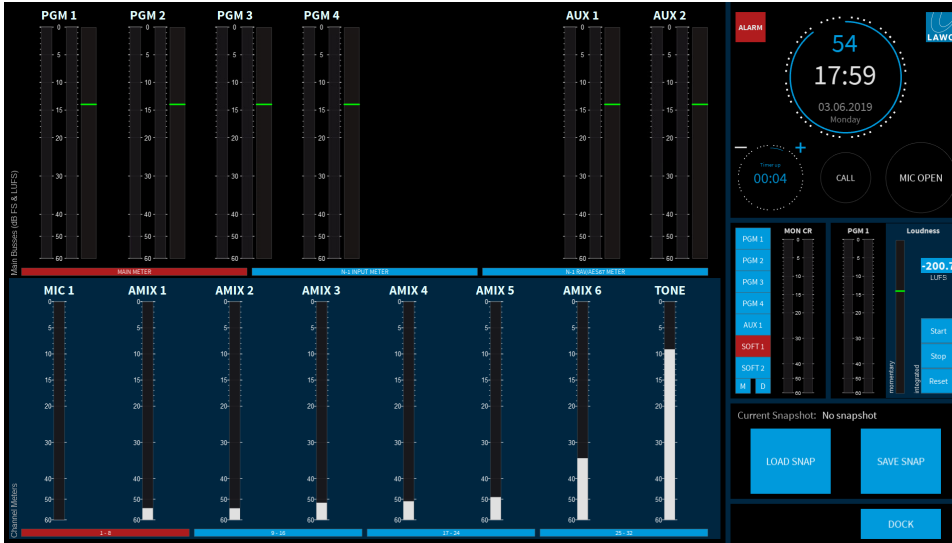
Source Parameters + DOCK



8. Operation

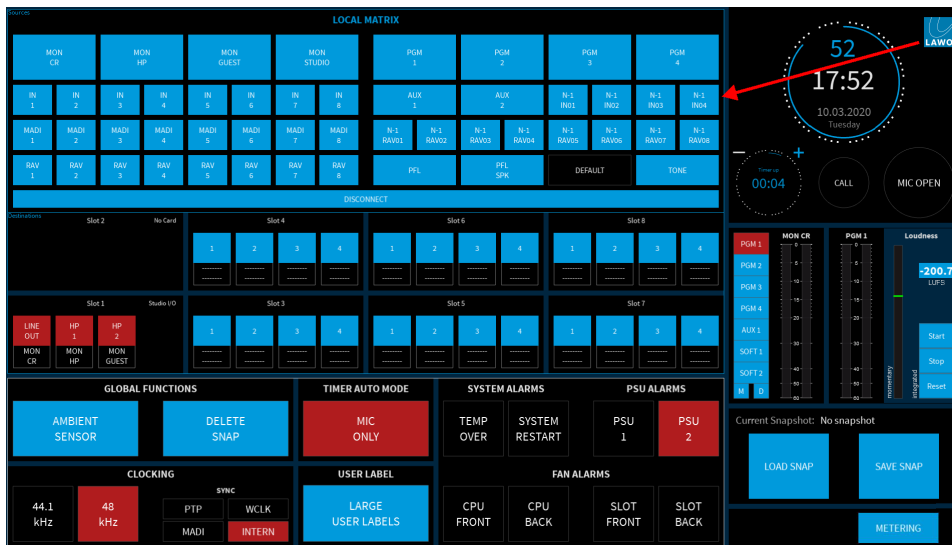
From the DOCK, select **METERING** to open the metering page:

METERING + DOCK



Click on the LAWO logo (top right) to open the advanced page:

ADVANCED + DOCK



You can change page using the **PAGE UP** and **PAGE DOWN** keys on your PC keyboard. This will scroll through all of the available pages.

8.1.4 Shutting Down the System

There is no special shutdown procedure for the hardware components, and so you can turn off the control surface and Power Core by turning off the mains power.

To close DisplayDock, press **ALT + F4** on your PC keyboard.

Note that closing DisplayDock on the control PC only closes the current session, and is not the same as restarting the system. To do this you will need to restart Power Core (described [later](#)).

8.2 Fader Strip Control

The console mixes its active sources (mono or stereo) to four stereo main buses: **PGM 1 to 4**, and two stereo aux buses: **AUX 1** and **2**. The active sources are the ones assigned to the fader strips and each strip supports two layers. Thus, the maximum number of mix inputs is equivalent to the console frame size x 2.

Each fader strip provides the following controls:

1 Input Gain, Pan & Stream Selection

Tap down on the rotary control to step through the available parameters, and then turn to adjust the current value - the parameter name and value appear briefly in the electronic display.

The available parameters vary depending on the type of source. For more details, see [Input Gain & Pan](#) and [RAVENNA Source Stream Selection](#).

2 Source-Specific Functions (e.g. CONF, TB, etc.)

The four soft keys are labeled by the electronic display, and vary depending on the type of source. The default functions are described [later](#).

In fader strip assign and bus assign modes, the rotary control (1) and soft keys (2) provide alternative functions.

3 ACCESS Keys x 2

Use the **ACCESS** keys to switch the fader strip between its two layers, select a source (for parameter control) or activate strip assign mode. The operation is as follows.

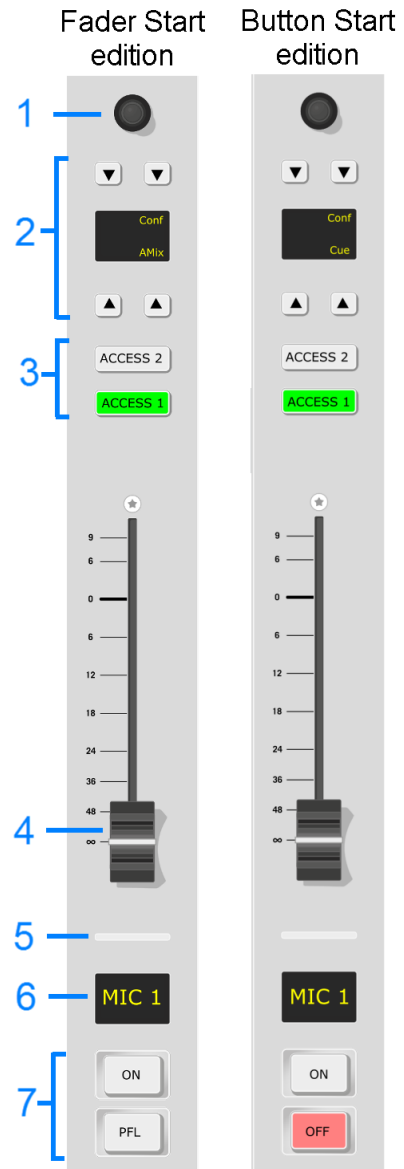
Press an unlit (or half lit) **ACCESS** key to switch the fader strip to its alternate layer - the controls update and the **ACCESS** key lights in full (green). If no source is assigned to the alternate layer, then you will switch to a blank (unused) fader strip. If an **ACCESS** key is half lit, then a source is assigned to the alternate layer but is currently hidden. The layers can be reset globally from the [Central Module](#).

Press a fully lit **ACCESS** key once to select a source - the key turns white. On DisplayDock, the "Source Parameters" page shows the source label and all of its parameters. On the surface, the upper controls on the Central Module update. You can now use either the on-screen buttons or control surface to make adjustments. Deselect the **ACCESS** key to return the console to its normal mode of operation (**ACCESS** keys fully lit green).

Double-press a fully lit **ACCESS** key to activate strip assign - the key turns yellow. On DisplayDock, the "Source Assignment" buttons appear in place of the DOCK - touch a source button to make a new assignment. Alternatively, turn the rotary control (1) to scroll through the available sources - the options appear in the electronic display (2). Press the **TAKE** key to confirm your selection. The new source label appears in the Label display (6). Once you have assigned a source, the strip assign mode cancels and the console returns to its normal mode of operation (**ACCESS** keys fully lit green).

4 Fader

Use the fader to adjust the source's mix level to the summing bus outputs. The level can be adjusted from $-\infty$ to $+9\text{dB}$. Note that **PGM** buses are always fed post-fader, while **AUX** buses can be switched between pre- and post-fader.



5 Signal Present Indicator

The color of the backlight indicates whether signal is present at the input to the source. There are three possible states:

- **Off** (not lit) = input signal level < -40dBr.
- **Green** = input signal level > -40dBr.
- **Red** = input signal level > +6dBr.

Please see [System Reference Levels](#) to see how the dBr values equate to your system's operating levels.

6 Source Label

This display shows the name of the source assigned to the fader strip. Optionally, you can add two more lines of text by [editing](#) the user labels.

For [RAVENNA sources](#), the three lines of text show the stream Group, Stream name and Source name. If a streaming connection is in progress, then you will see its status: **pending, tuning**, etc.

The size of the text can be customized by enabling (or disabling) the **LARGE USER LABELS** option in the [Advanced](#) page.

7 Channel ON/OFF & PFL

On a Fader Start console, the upper key turns the channel **ON** (or off); the lower key activates **PFL** (pre-fade listen).

On a Button Start console, the same keys turn the channel **ON** and **OFF**, and pre-fade listen (**CUE**) moves to the small soft keys described earlier (2).

When the channel "on" state is active, its post-fader signal feeds the summing bus outputs (as defined in [Bus Assign](#) mode). This allows you to quickly add (or remove) a channel from the PGM outputs.

The channel on/off operation differs in the following ways.

Fader Start Consoles

The fader motors are active and the channel "on" state is conditional on the fader position. This allows you to open and close a fader (and its audio) automatically from the **ON** key.

- 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.

Button Start Consoles

The fader motors are inactive and the channel "on" state is independent of the fader position. This allows you to prepare a level and then turn **ON** the channel's audio at a later stage.

- To quickly turn on a channel, first open the fader and then press the **ON** key - the channel turns on at the prepared level.
- To quickly turn off a channel, press the **OFF** key - the channel turns off but the fader remains open. This allows you to quickly start the channel again by pressing the **ON** key.
- To fade the level in, press **ON** and then open the fader.
- To fade the level out, press **ON** and close the fader - the **ON** key cancels and the **OFF** key lights. If you keep hold of the fader you can re-open the channel without having to prime the **ON** key again.

8.3 Source-Specific Functions

The four soft keys on each fader strip are labeled by the electronic display. Their default functions vary depending on the type of source and the console edition. The default functions for all source types are as follows.

Fader Start Consoles

	MIC 1	MIC 2 - 10	HYBRID	CODEC	PLAYER	TONE
MF 1	a b CONF	a b TB CONF	a b TB CONF	a b TB CONF	a b	a b 63 400
Display	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD
MF 2	a b AMix	a b AMix	a b TEL	a b	a b	a b 1kHz 12.5
Fader						
LAWO-Logo	Signal Present	Signal Present	Signal Present	Signal Present	Signal Present	Signal Present
Display name	ABCDEF	ABCDEF	ABCDEF	ABCDEF	ABCDEF	ABCDEF
MF 3	ON	ON	ON	ON	ON	ON
MF 4	PFL	PFL	PFL	PFL	PFL	PFL
			LINE 1 - 4	RAV 1 - 8		

- **TB** - press this key to talk to the recipient (e.g. to the guest, hybrid or codec).
- **CONF** - enable this key to create a mic mix minus for the source. You must enable **CONF** on more than one source to activate the conference. The conference system is described in more detail [later](#).
- **TEL** - this key lights when a telephone call is incoming. Press the key to capture the call on the console.
- **AMix** - enable this key to add the source to the auto mix group. You must enable more than one **AMix** key to start auto mixing. The auto mix function adjusts the levels of all sources in the auto mix group.
- On the TONE source, the 4 small keys select the frequency of the tone: 63Hz, 400Hz, 1kHz or 12.5kHz.

Button Start Consoles

	MIC DJ	MIC 2 - 10	HYBRID	CODEC	PLAYER	TONE
MF 1	a b CONF	a b TB CONF	a b TB CONF	a b TB CONF	a b	a b 63 400
Display	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD	ABCD ABCD ABCD ABCD
MF 2	a b CUE	a b CUE	a b TEL CUE	a b CUE	a b CUE	a b 1kHz 12.5
Fader						
LAWO-Logo	Signal Present	Signal Present	Signal Present	Signal Present	Signal Present	Signal Present
Display name	ABCDEF	ABCDEF	ABCDEF	ABCDEF	ABCDEF	ABCDEF
MF 3	ON	ON	ON	ON	ON	ON
MF 4	OFF	OFF	OFF	OFF	OFF	OFF
			LINE 1 - 4	RAV 1 - 8		

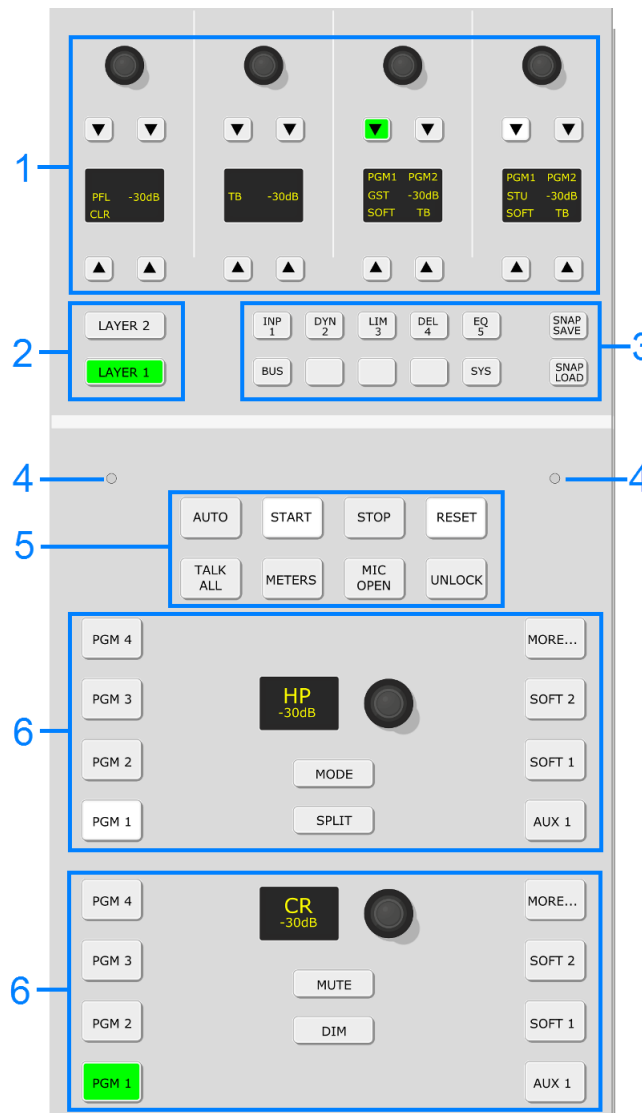
The functions are the same as above except **AMix** is replaced by **CUE**:

- **CUE** - press this key to cue a source pre-fader. See [PFL / CUE](#) for full details.

On a Button Start console you can enable or disable automix from the [Dynamics](#) source parameter controls.

8.4 The Central Module

The Central Module provides access to parameter control, layer switching, global options and monitoring controls for the loudspeakers and headphones.



1 PFL/Cue, Talkback Level, Guest & Studio Monitoring

If no functions keys (3) are pressed, then these controls perform monitoring and talkback functions:

- **PFL/Cue:**
 - Turn to adjust the level of the PFL / Cue bus.
 - Press **CLR** to cancel any active PFL / CUE selections.
- **TB** - turn to adjust the level of the talkback source.
- **Guest & Studio:**
 - Turn to adjust the level of the monitor output.
 - Use the first three keys to select the monitor source: **PGM 1**, **PGM 2** or **SOFT**.
 - Press **TB** to talk to the monitor output.

The monitoring and talkback functions are described in more detail [later](#).

When a function key (3) is pressed, the controls update to provide DSP parameter control or system options.

2 Global Layer Switching

These keys reset *all* fader strips across the surface to either Layer 1 or Layer 2. Note that the global **LAYER** keys override any individual **ACCESS** key selections on the fader strips.

3 Function Keys

The function keys are used to perform the following functions:

[Source Parameter Control](#) – press **INP**, **DYN**, **LIM**, **DEL** or **EQ** to map parameters for the source in ACCESS onto the four sets of rotary controls (1).

[Bus Assign](#) – press **BUS** and then select a page (1 to 5) to map bus assignments onto the Fader Modules.

[System Options](#) - press and hold **UNLOCK** + **SYS** to map the system options onto the four sets of rotary controls (1).

[Local Snapshots](#) – press and hold **UNLOCK** + **SNAP LOAD** + a memory number (1 to 5) to load settings from a local snapshot. **SNAP SAVE** works in a similar manner.

4 Ambient Light Detectors

The two detectors automatically adjust the brightness of buttons and displays on the control surface according to the ambient light level. Two detectors are included so that if one is covered by a script, the surface does not dim! Both detectors can be enabled or disabled from the [Advanced](#) page.

5 Timer, Talk to All, Meters, Mic Open & Unlock

These keys provide shortcuts to some common operations:

- **AUTO, START, STOP & RESET** - control the [Timer](#) on the DOCK.
- **TALK to ALL** - [talks](#) to the Guest and Studio monitoring outputs, and all available N-1s.
- **METERS** - opens the [Metering](#) page on DisplayDock.
- **MIC OPEN** - is an indicator only. It lights in red whenever a MIC source fader is [open](#).
- **UNLOCK** - this key protects the **SNAP LOAD**, **SNAP SAVE** and **SYS** keys on the surface, and the **DEFAULT AUDIO** and sample rate selection buttons on the Advanced page. For more information, see [Using the Local Snapshot Memories](#), the [SYS menu](#) and the [Advanced page](#).

6 Monitoring Controls

The remaining keys and rotary controls provide monitor source selection and volume control for the two monitor outputs: Headphones (HP) and Control Room (CR).

In each case, the monitor sources are identical, allowing you to listen to any of the **PGM** buses, **AUX 1** or two programmable monitor sources: **SOFT 1** and **SOFT 2**. Additional monitor sources and other options appear on the DisplayDock "Monitor Extender" when you press the **MORE...** key.

For the Control Room, the **MUTE** and **DIM** keys allow you to quickly mute or dim the volume of the loudspeakers.

For the Heaphones, select **SPLIT** to listen to different signals in the left and right ears of the headphones, or **MODE** to access additional headphone monitoring options (via DisplayDock).

All of the monitoring functions are described in more detail [later](#).

8.5 Assigning Fader Strips

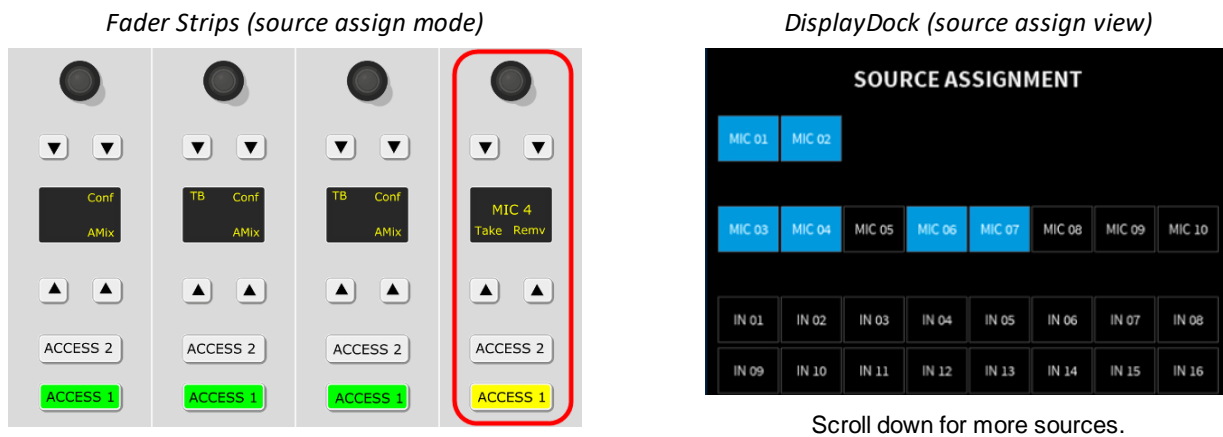
Any available source can be assigned to any fader strip. This allows you to choose which inputs/sources are active in the mix. Please note:

- A source cannot be assigned to more than one fader strip.
- A fader strip cannot be reassigned, or a source moved, if the fader is open (to prevent on-air sources being removed by accident).

8.5.1 Assigning a Source to a Fader

1. Double-press an **ACCESS** key (it turns yellow) - the fader strip switches into "strip assign" mode, and the "Source Assignment" buttons appear on DisplayDock.

Note that you can double-press either **ACCESS 1** or **ACCESS 2** to assign the main or alternate layer.



On DisplayDock, the buttons are color-coded to show the current status of each source:

- **Black** = source not assigned and available.
- **Blue** = source assigned and available (its fader is closed).
- **Red** = source assigned and NOT available (its fader is open).

If you choose a blue source, then it will move from its existing location to the fader strip in access.

You cannot choose a red source as it is deemed to be on-air. In this instance, first find the source on the surface and close its fader - the button color changes from red to blue, and the source can be selected.

2. Make the assignment using either the fader strip controls or DisplayDock:

➤ From the fader strip:

- Turn the rotary control to scroll through the available sources.
- Once you found the desired source, press **TAKE** to make the assignment - the fader label updates and the strip assign mode cancels.
- Alternatively, press **REMV** to remove the source - the fader strip is cleared and strip assign cancels.

➤ On DisplayDock:

- Select an available source (black or blue) to make the assignment - the fader label updates and the strip assign mode cancels.
- Alternatively, select **REMOVE** to remove the source - the fader strip is cleared and strip assign cancels.
- The **CANCEL** button cancels out of the strip assign mode without making any changes.

3. Once an assignment has been made, the console returns to its normal mode of operation: **ACCESS** keys green + **DOCK** in view.

➤ **Troubleshooting**

If you attempt to assign a source but nothing happens, check the following:

- Is the fader open on the strip you wish to assign? If so, you must close the fader.
- Is the source already assigned to a different fader strip and the fader open? If so, the source is deemed to be on-air, and so you must find the source and close its fader.

8.6 RAVENNA Source Stream Selection

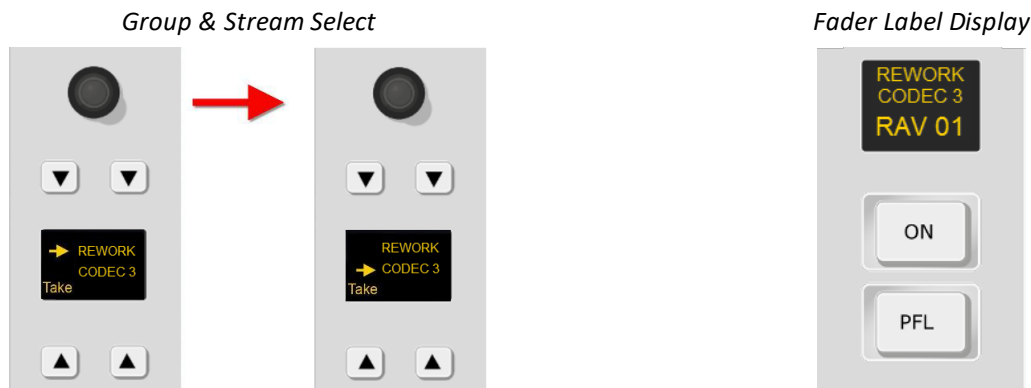
For a RAVENNA source, you can select a stream using the fader strip rotary control and **TAKE** button.

8.6.1 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 which can no longer be detected are erased.

8.6.2 Selecting a Stream from the Surface



1. Press down on the fader strip rotary control to step through the input 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** button 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 label display. The display updates to show the stream name once the subscription is successful.

In our example, the three lines of text show the following information:

- **REWORK** = the Group name (detected from the network).
- **CODEC 3** = the Stream name (detected from the network).
- **RAV 01** = the source Display Name (defined in the configuration).

8.6.3 Stream Subscription: Status Messages

Whenever you subscribe to a stream, the fader strip label display reports back on the status of the connection. Under normal circumstances, the expected sequence of messages is as follows:

"Mute" -> select a stream and press **Take** -> ("Pending") -> "Tuning" -> ("Unstable") -> "<Stream-Name>"

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

Status Message	Meaning
"Mute"	No stream is connected to the source's RAVENNA input.
ACTION: select a stream via the rotary control and press TAKE .	
("Pending")	<p>Appears IF the connected stream is not yet available. In this instance, the console will wait for the stream announcement to appear on the network, and then automatically initiate the subscription process.</p> <p>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).</p> <p>The message can appear if the source has been configured using a default subscription, if a stream is connected via VSM, or following a warmstart while restoring the last known connection.</p>
"Tuning"	<p>Appears while the console measures the streaming quality, and sets its stream receiving parameters to ensure correct audio playback.</p> <p>During the tuning cycle the audio input is muted, and then unmuted once the task is complete.</p> <p>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 a permanent memory. It is then used whenever you select the same stream, thereby speeding up all subsequent connections.</p>
("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 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:

Status Message	Meaning
"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>

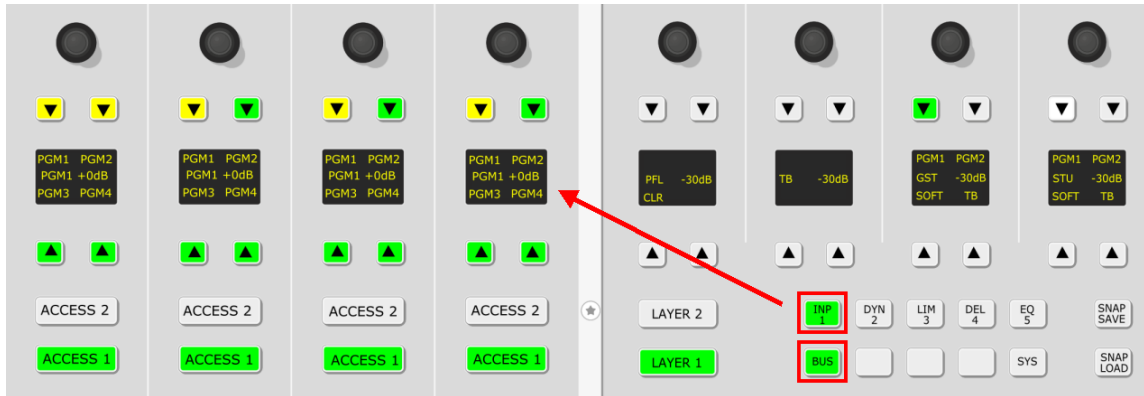
8.7 Bus Assign

Once a source is assigned to the surface, it can be routed to any of the stereo PGM and AUX outputs. The PGM buses are always fed post-fader. The AUX buses can be fed either pre or post fader, and have an independent send level. All post-fader assignments are affected by the fader level AND channel ON/OFF status.

8.7.1 Assigning a Source to a Bus

1. On the Central Module, press **BUS** and then a page number: e.g. **1** for PGM or **2** for AUX.

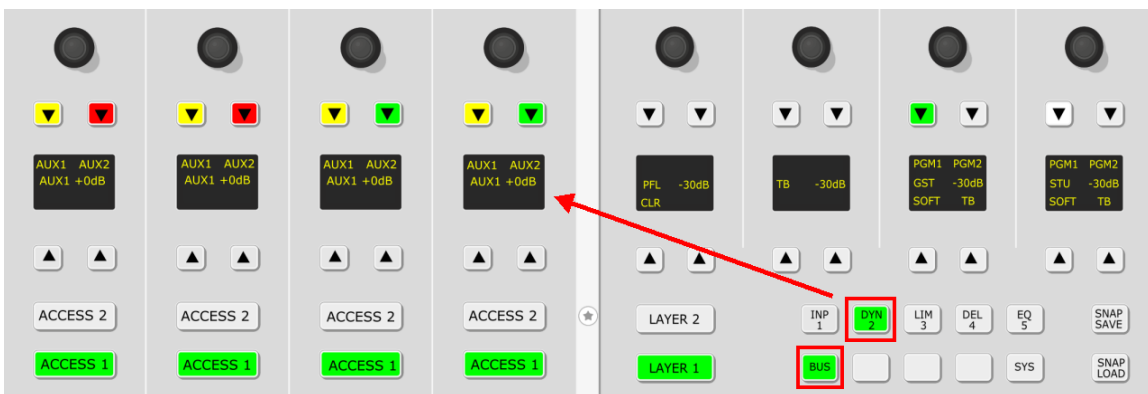
Fader Strips (PGM bus assign)



The fader strips switch into "bus assign" mode, and their soft keys show the current assignments:

- **Yellow** = post-fader.
 - **Green** = off (not assigned).
 - **Red** = pre-fader (available for AUX buses only).
2. Press a soft key to assign (or de-assign) the source from a bus - its color updates. Keep pressing to cycle through the available options.
 3. On the AUX page, you can also adjust the aux send level.

Fader Strips (AUX bus assign)



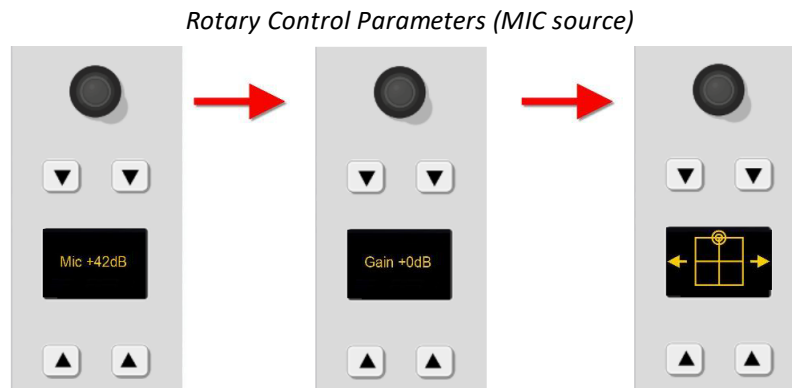
The display shows the level of the last AUX send adjusted. Tap down on the rotary control to access the alternate send. When the correct AUX is displayed, turn the control to adjust the level. Aux send levels can be adjusted from -120dB to +9dB.

4. When you have finished editing the bus assignments, deselect **BUS** (on the Central Module) - the rotary controls and soft keys return to their default functions (described [earlier](#)).

8.7.2 Assigning a Bus to an Output

By default, the summing buses are assigned to a number of physical outputs and Tx streams. These are listed under [Default Audio Assignments](#).

8.8 Input Gain & Pan



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

For MIC sources, two separate input gains are available: **Mic** gain (in the analog mic preamp) and channel **Gain** (applied in the digital domain). For other sources, only channel **Gain** is available.

For a mono source, you will see left/right pan. For a stereo source, this changes to left/right balance.

1. Turn the rotary control to adjust the first parameter - you will see both its name (e.g. **Mic** gain) and value (e.g. **+42dB**).
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. The available parameters for a mono MIC source are shown above.

To interrogate parameters without making a change, tap down on the rotary control without turning - the display will show the parameter and its current value.

For more information on gain ranges and other input parameters, please see [Input & Pan Parameters](#).

8.8.1 Using AutoGain

AutoGain is available for all of the MIC sources. When enabled, it sets the **Mic** gain automatically (in the analog preamp).

Mic gain cannot be adjusted manually while AutoGain is enabled.

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. The mic gain will then remain at the same value, until either a different value is loaded by a snapshot or AutoGain is turned off.

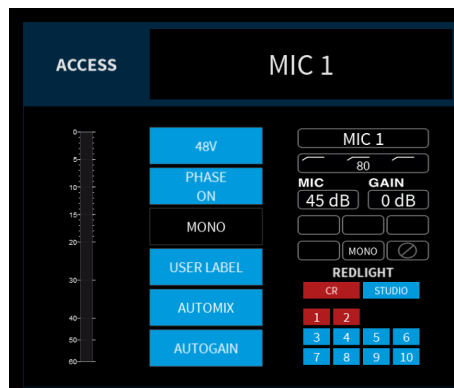
Please note:

- The gain adjustment happens automatically and so it is best to enable AutoGain *BEFORE* the channel goes on-air. Otherwise the signal may distort while AutoGain 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.

1. Start by asking the talent to speak and then turn on AutoGain by pressing the MIC source **ACCESS** key and enabling **AUTOGAIN**.

You can do this either by pressing the **AGn** soft key (on the MIC source fader strip), or pressing the MIC source **ACCESS** key and selecting **AUTOGAIN** (on DisplayDock):

DisplayDock Input Parameters



The measurement now takes place and the AutoGain value is adjusted. During this time, the **AUTOGAIN** button flashes in red to indicate that automatic gain adjustment is in progress. If the channel is turned ON, then you will hear the gain changing.

2. Once the process is complete, the **AUTOGAIN** button change to static red.

AutoGain is now set and enabled, ready for your talent to speak on-air.

3. To turn off AutoGain, press the **AUTOGAIN** button again - the button changes color (blue = off).

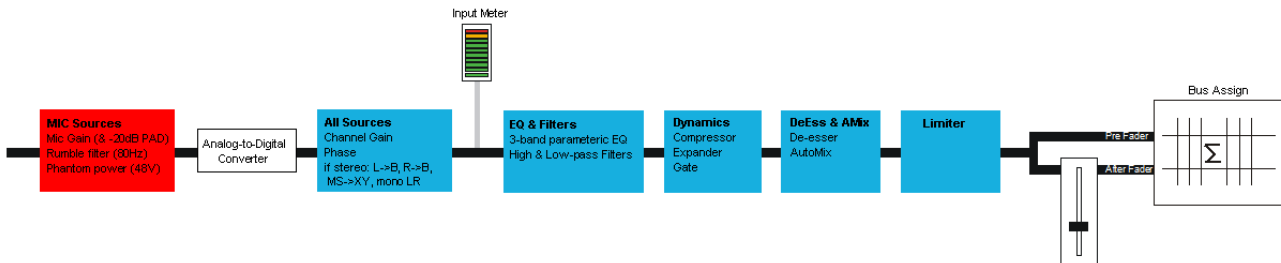
The mic gain now reverts to its previous value (before AutoGain was enabled), and [MIC gain](#) can be adjusted manually.

8.9 DSP Parameters

The remaining source parameters can be adjusted by selecting a source.

8.9.1 Signal Flow

MIC Source Signal Flow



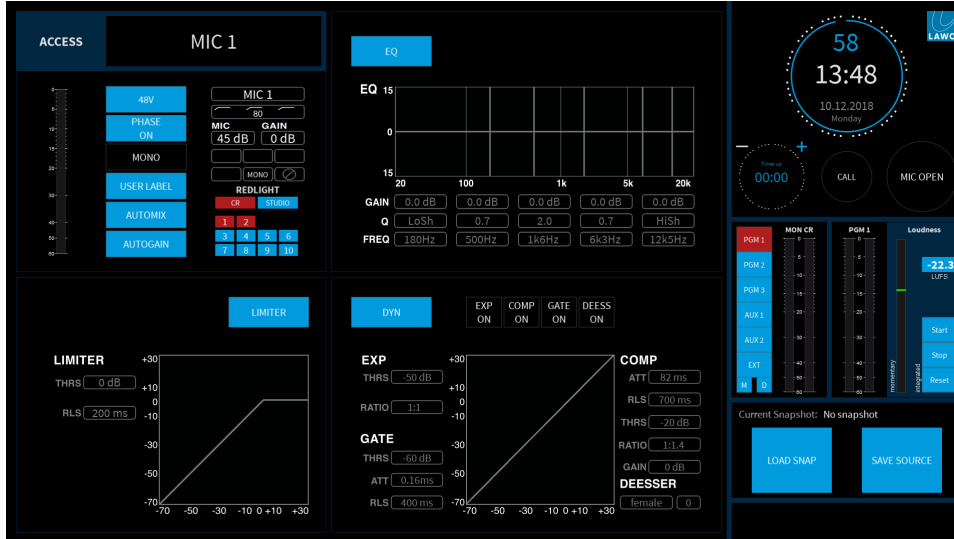
The DSP available for each source is defined by the configuration and cannot be changed by the user. All sources have EQ, Dynamics, a Limiter and Delay. In addition, MIC 1 - 10 have a De-Esser and Automix.

8.9.2 Adjusting Source Parameters

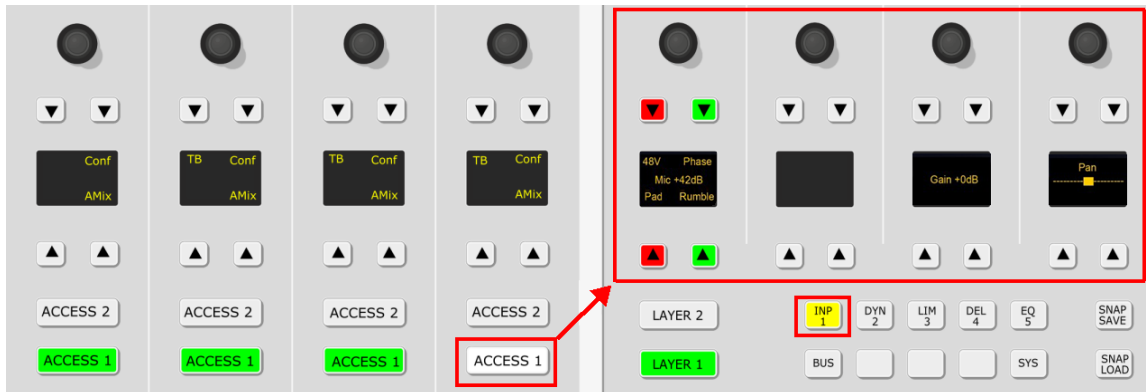
1. Select the source you wish to work on by pressing its fader strip **ACCESS** key - the key turns white.

The upper controls on the Central Module switch into "parameter control" mode, and on DisplayDock the "Source Parameters" page appears:

DisplayDock (Source Parameters page)



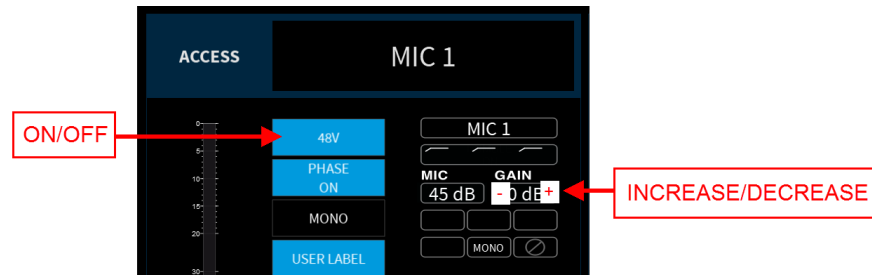
Control Surface (INPUT parameters)



DisplayDock shows all available parameters, and so this is the best way to get an overview of a source.

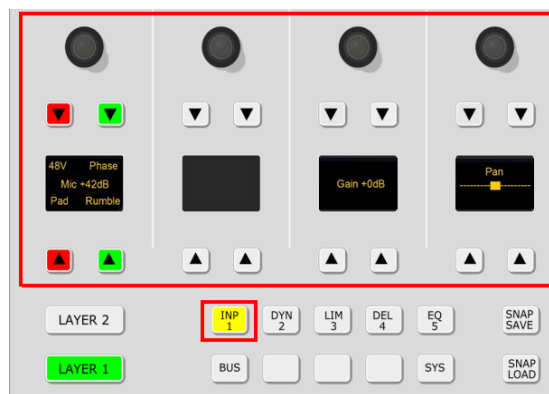
The surface controls are paged through different parameter sets using the **INP**, **DYN**, **LIM**, **DLY** and **EQ** keys on the Central Module.

2. DisplayDock is often the quickest way to make a simple change:



- For switched parameters, such as **48V**, touch the button to turn the option on or off: red = on; blue = off.
- For variable parameters, such as GAIN, you can use the hidden + and - buttons behind the value fields to increase or decrease the value.

3. Alternatively, use the surface controls as follows.



- First, choose the parameters you wish to adjust by selecting a function key on the Central Module. For example, press **INP** to adjust the input and pan parameters for the selected source. The 16 soft keys and 4 rotary controls update, and are labeled by the displays (as shown above).
 - Then press a soft key (e.g. **Pad**), to turn the option on or off: red = on; green = off.
 - Turn a rotary control (e.g. **Mic**) to adjust its value - the current value (e.g. **+42dB**) is shown in the display.
4. At any time you can press **ACCESS** on a different fader strip or alternate layer to adjust the parameters for another source.
5. When you have finished adjusting the parameters, deselect the **ACCESS** key - the upper controls on the Central Module return to their default functions (described [earlier](#)), and the DisplayDock "Source Parameters" page closes.

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

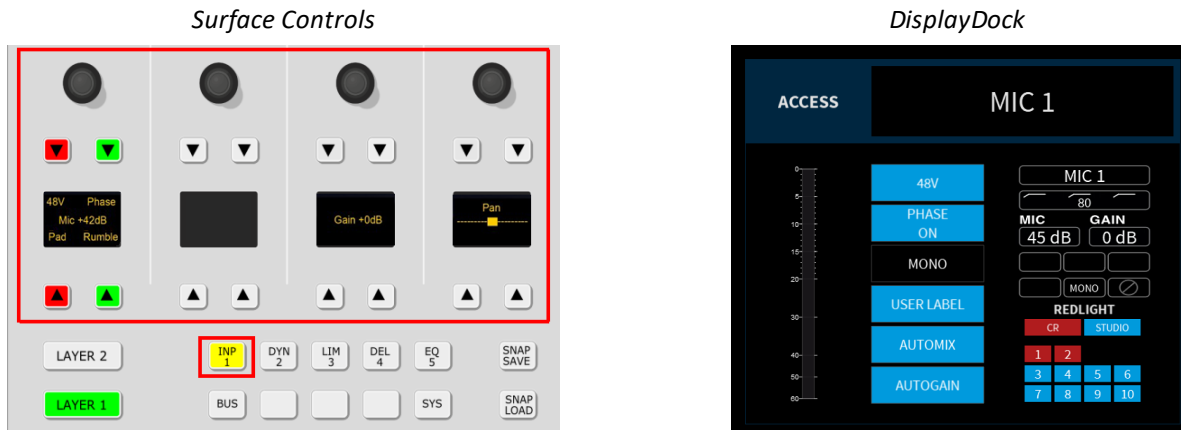
8.9.3 Input & Pan Parameters

Input and pan parameters are available for all sources. The exact parameters depend on the format of the source (mono or stereo), and how it is connected (via a mic preamp or line/digital).

➤ To access input and pan parameters, press an **ACCESS** key followed by **INP** on the Central Module.

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

MIC Sources



For a mono MIC source, you can adjust input parameters in the analog domain (before the A-D converter) AND in the digital domain (after the converter).

The analog (mic preamp) section includes:

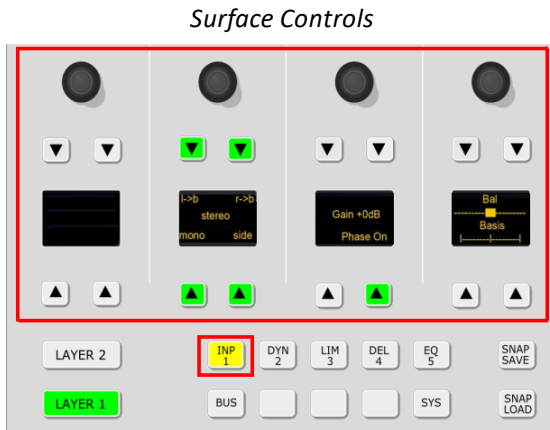
- **MIC** - mic preamp gain from . See also [AutoGain](#).
- **48V** - 48V phantom power.
- **PAD** - 20dB PAD (reduces the mic gain by 20dB). When the PAD is active, the **MIC** gain value updates accordingly.
- **RUMBLE** - a high pass 'rumble' filter to roll-off subsonic frequencies.

In the digital domain, you can also adjust:

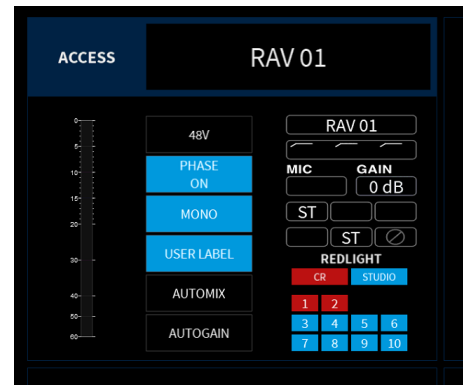
- **PHASE** - phase reverse.
- **GAIN** - channel gain from -30dB to +18dB.
- **PAN** - left/right panning onto the stereo buses. (This parameter is not shown on DisplayDock).

MIC gain, channel **GAIN** and **PAN** can also be adjusted from the fader strip rotary control (as described [earlier](#)).

Stereo Sources



DisplayDock



For stereo sources (LINE, AES, RAV, etc.), there are several additional parameters to deal with changes to the incoming audio. For example, if signal is not present at the right input, you can turn on **L->B** (Left to Both). Or, you can change the stereo input mode (from XY to MS) to decode an incoming Middle and Side signal. All parameters are applied in the digital domain.

The complete parameter list is as follows:

- **PHASE** - phase reverse for the left input.
- **STEREO** or **MS-XY** - changes the mode of operation from normal stereo to MS->XY decoding. (On the fader strips, turn the second rotary control from the left to change the mode.)
- **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).
- **GAIN** - channel gain from -30dB to +18dB.
- **BASIS** - left/right width. (On the fader strips, push down and turn the rotary control to adjust **BASIS**).
- **BAL** - left/right balance onto the stereo PGM and AUX buses. (This parameter is not shown on DisplayDock).

MS Decode

M/S is a stereo recording technique which 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 crystal system provides M-S to X-Y decoding to turn a Middle and Side signal into normal Left and Right stereo.

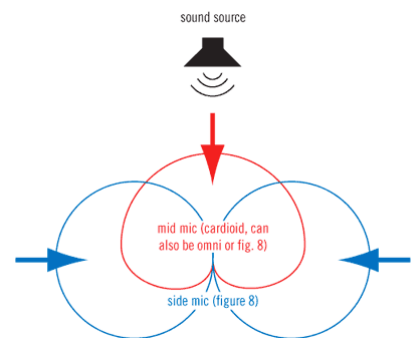
The incoming MS signal should be connected to a stereo source:

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

When the **MS** stereo mode is active, the following calculations are applied:

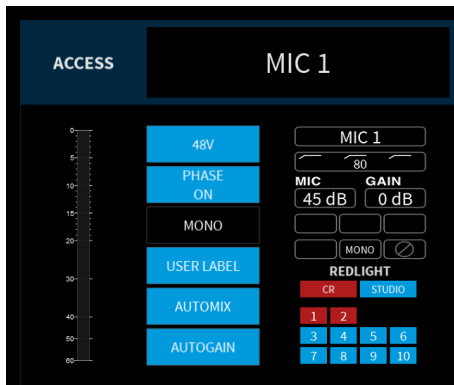
- Left channel = L+R (M+S)
- Right channel = L-R (M-S)

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



8.9.4 Redlight

CR REDLIGHT



The "REDLIGHT" options apply to all MIC sources. They determine which MIC sources will trigger the red light in the control room (CR) and which will trigger the red light in the studio. In both cases, the red light will illuminate whenever the corresponding MIC fader is open. The options allow you to configure the logic differently depending on whether both red lights are needed, and how the ten microphones are being used.

- To access the parameters, press an **ACCESS** key on any MIC source - on DisplayDock the "Source Parameters" page appears.

From the "REDLIGHT" area:

1. First choose a red light, either **CR** or **STUDIO** - the selection turns red.
2. Then assign the MIC sources using the numbered buttons: red = assigned, blue = not assigned.

Note that the selections are mutually exclusive, and so if you remove MIC 1 from the CR, it will be assigned automatically to the STUDIO.

To support the red light functionality, the GPIO connector must be correctly wired as GPOs 1 and 2 output the red light status. See [GPIO functions](#) and [Connector Pin-Outs](#).

Whenever the CR red light is active, the control room speakers will automatically mute (to prevent feedback from an open MIC).

You can bypass this functionality by assigning the MIC source to the STUDIO red light.

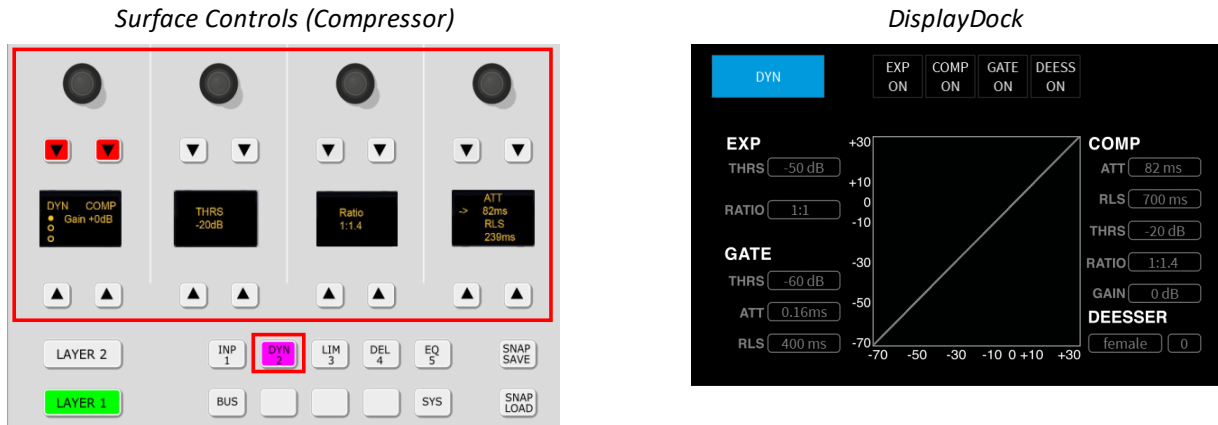
8.9.5 Dynamics

Dynamics parameters are available for all sources.

The dynamics DSP provides an independent compressor, expander and gate. For MIC 01-10, a de-esser and automix are also available.

➤ To access the dynamics parameters, press an **ACCESS** key followed by **DYN** on the Central Module.

The fader strip controls update to show the last page adjusted - in our example, the Compressor:



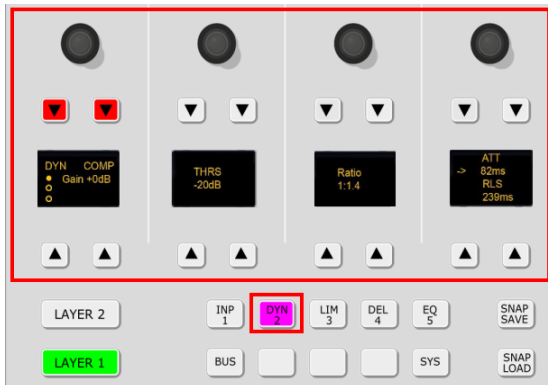
- Press down on the left (master) rotary control to cycle through the available pages: Compressor, Expander, Gate and De-Esser/AutoMix (if available).
- Keep pressing to return to the Compressor (page 1).

The Dynamics graph on DisplayDock includes a green ball which represents the output level of the complete Dynamics section: Compressor, Expander and Gate. This changes dynamically as the signal level varies, and so is extremely helpful when adjusting parameters.

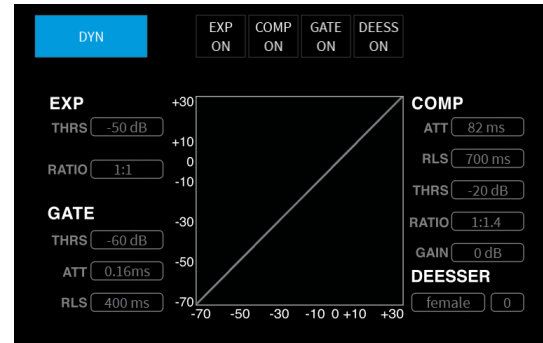
If a red ball is also visible, then this represents the output level of the De-Esser.

Compressor

Surface Controls (Compressor)



DisplayDock



The following parameters are available for the compressor:

- **DYN** - on/off for *all* dynamics sections: compressor, expander, gate (and de-esser/automix).
- **COMP** - on/off for the compressor.
- **GAIN** - makeup gain from -12dB to 0dB.
- **THRS** - threshold from -93dB to +27dB.
- **RATIO** - ratio from 1:1 to 1:16
- **ATT** - attack time from 0.16ms to 82ms.
- **RLS** - release time from 10ms to 5000ms.

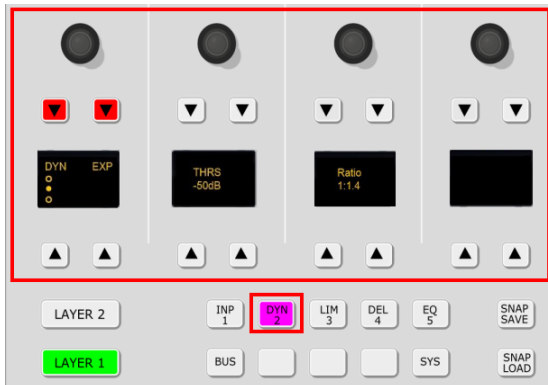
For the ATT/RLS control, turn to adjust the attack time, and then press down and turn to adjust the release time.

Both **DYN** and **COMP** *must* be enabled (red) for the compressor to be active. This is best checked by looking at DisplayDock (where you can see the **DYN** button plus on/off for the individual sections: COMP, EXP, GATE, etc.)

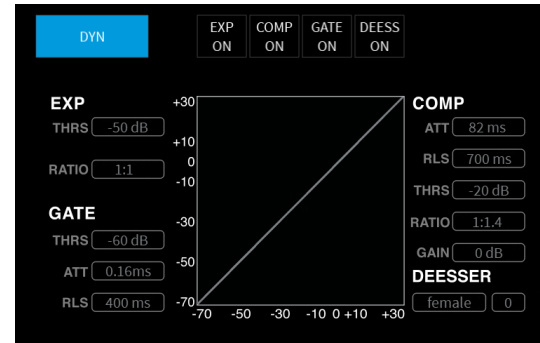
The characteristic of the compressor is optimized for radio on-air operation. The ratio pivot point moves around the working point according to the input signal level and not around a fixed threshold. This allows the ratio to adapt without having to change the level considerably.

Expander

Surface Controls (Expander)



DisplayDock



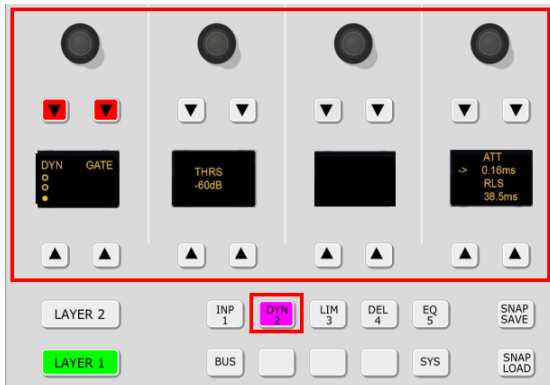
The following parameters are available for the expander:

- **DYN** - on/off for *all* dynamics sections: compressor, expander, gate (and de-esser/automix).
- **EXP** - on/off for the expander.
- **THRS** - threshold from -93dB to +27dB.
- **RATIO** - ratio from 1:1 to 1:0.1.

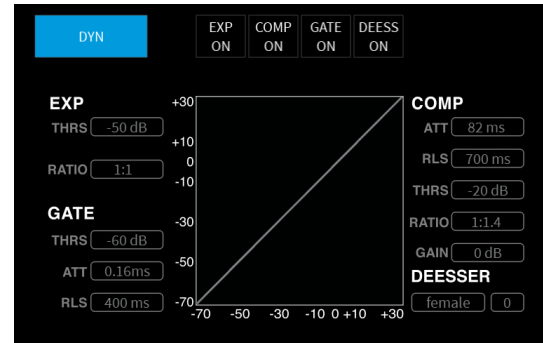
Both **DYN** and **EXP** *must* be enabled (red) for the expander to be active. This is best checked by looking at DisplayDock (where you can see the **DYN** button plus on/off for the individual sections: COMP, EXP, GATE, etc.)

Gate

Surface Controls (Gate)



DisplayDock



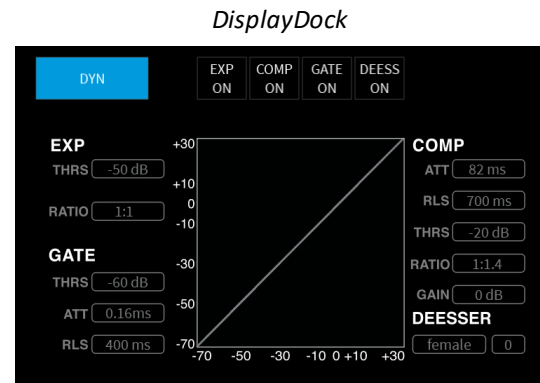
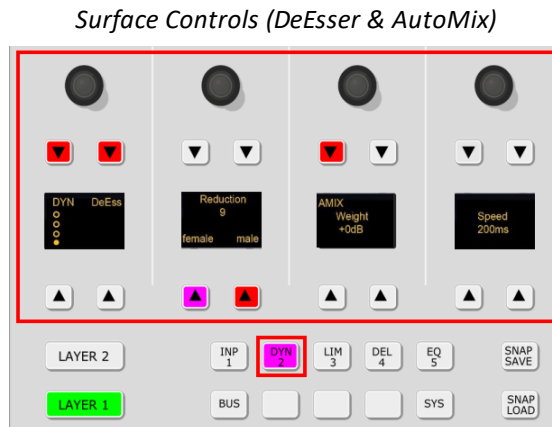
The following parameters are available for the gate:

- **DYN** - on/off for *all* dynamics sections: compressor, expander, gate (and de-esser/automix).
- **GATE** - on/off for the gate.
- **THRS** - threshold from -93dB to +27dB.
- **ATT** - attack time from 0.16ms to 82ms.
- **RLS** - release time from 10ms to 5000ms.

For the ATT/RLS control, turn to adjust the attack time, and then press down and turn to adjust the release time.

Both **DYN** and **GATE** *must* be enabled (red) for the expander to be active. This is best checked by looking at DisplayDock (where you can see the **DYN** button plus on/off for the individual sections: COMP, EXP, GATE, etc.)

De-Esser



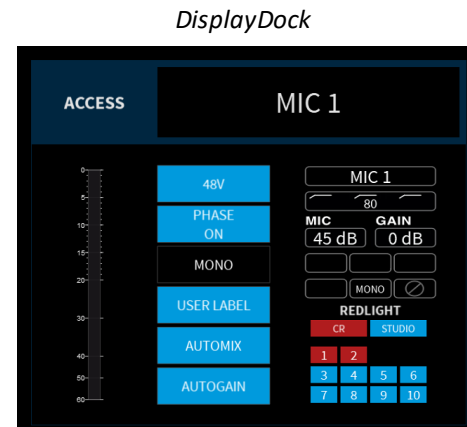
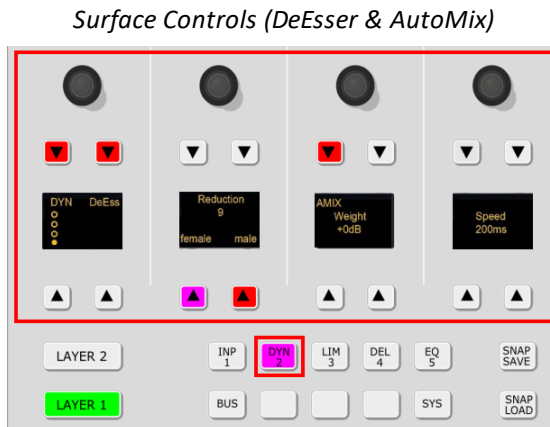
de-esser is available for MIC 01-10 sources and can be used to reduce excessive sibilance when dealing with human speech.

The following parameters are available for the de-esser:

- **DYN** - on/off for *all* dynamics sections: compressor, expander, gate and de-esser/automix.
- **DeEss** - on/off for the de-esser.
- **Reduction** – this is the amount of gain reduction applied to the sibilant frequencies:
 - Values from 1 to 6 reduce the gain of the unwanted sibilant frequencies; the higher the value, the more gain reduction.
 - Above 6, the gain reduction remains at its maximum, and the affected frequency range broadens.
- **female/male** – select **female** or **male** to change the center frequencies affected by the de-esser; these are optimised for either male or female voices.

Both **DYN** and **DeEss** *must* be enabled (red) for the de-esser to be active. This is best checked by looking at DisplayDock (where you can see the **DYN** button plus on/off for the individual sections: COMP, EXP, GATE, etc.)

AutoMix



AutoMix is available for MIC 01-10 sources. The feature is ideal for balancing active and inactive microphones such as in a panel discussion, or creating an automated voice-over.

Once AutoMix is enabled on more than one source, 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 plus the DJ, then the algorithm will automatically mute the guest sources while the DJ is speaking, and so on.

AutoMix can be enabled (and disabled) from the fader strip (via the **AMix** soft key) or from DisplayDock (via the **AUTOMIX** button). All other parameters are available from the fader strip only as follows:

The following parameters are available for AutoMix:

- **DYN** - on/off for *all* dynamics sections: compressor, expander, gate and de-esser/automixing.
- **AMix** - on/off for AutoMix.
- **Weight** - adjusts the weighting factor of each source from +9 to -9 with a default mid point = 0. Sources with a higher weight value get priority in the mix; those with the same weight are mixed equally; and 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.

- **Speed** – the speed adjusts the "smoothness" of the AutoMix, and is set in milliseconds (ms).

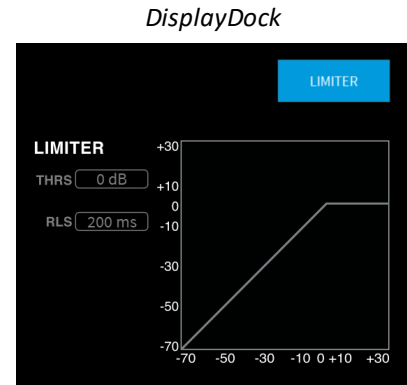
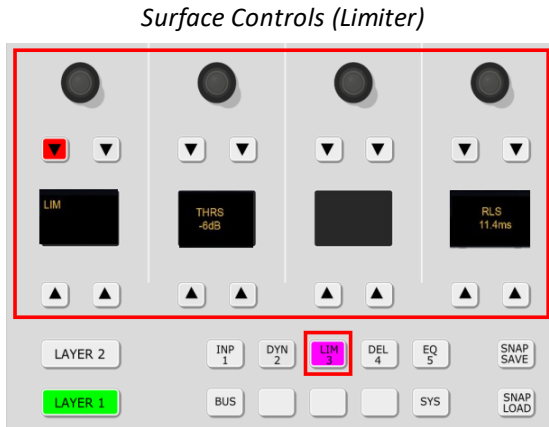
The speed defines how quickly a signal returns to its normal mix level after its gain has been suppressed. A short speed fades signals in and out quickly, but could result in "pumping" if several guests are talking in parallel. A longer speed will be smoother but may generate audible fades in and out.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

Both **DYN** and **AMix** *must* be enabled (red) for AutoMix to be active. If the master **DYN** button is not enabled, then the **AMix** button is dim to indicate that AutoMix is not yet active.

8.9.6 Limiter

A separate Limiter is available for all sources.

➤ To access the limiter parameters, press an **ACCESS** key followed by **LIM** on the Central Module.



The following parameters are available for the Limiter:

- **LIM** - on/off for the limiter: red = on.
- **THRS** - threshold from -93dB to +27dB.
- **RLS** - release time from 10ms to 5000ms.

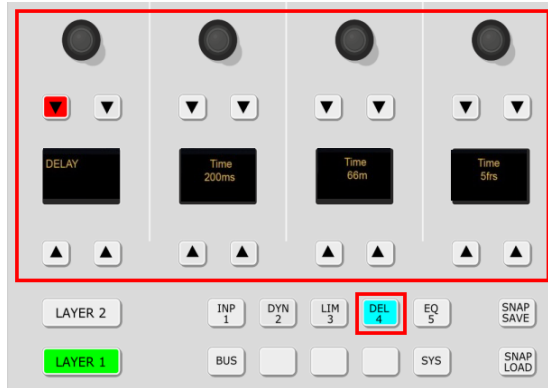
The Limiter graph on DisplayDock includes a green ball which represents the output level of the Limiter. This changes dynamically as the signal level varies, and so is extremely helpful when adjusting parameters.

8.9.7 Delay

Delay is available for all sources.

- To access the delay parameters, press an **ACCESS** key followed by **DLY** on the Central Module.

Surface Controls (Delay)



The following parameters are available for the delay module:

- **DELAY** - switches the prepared delay time in or out of circuit: red = on.
- **Time** - the delay time is displayed and adjusted in either **ms**, meters (**m**) or frames (**frms**). You can turn any of the three rotary controls to set the delay time.

	@48kHz, PAL
Delay (ms)	0 to 5300
Delay (meters)	0 to 1749
Delay (frames)	0 to 132

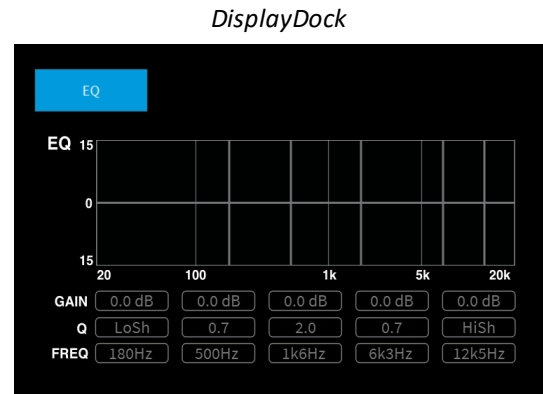
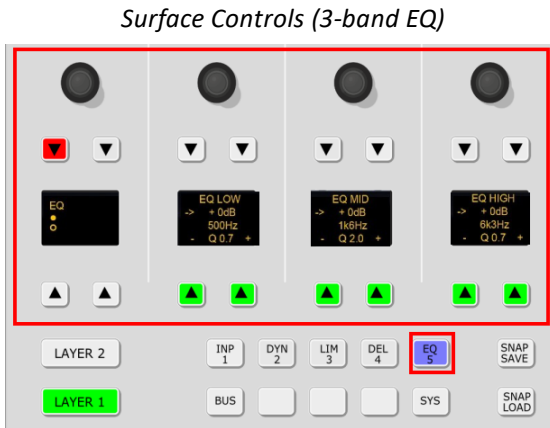
8.9.8 EQ

EQ parameters are available for all sources.

The EQ provides a 3-band parametric EQ plus high-pass and low-pass filters. The filters can be used either as fixed slope filters (12dB per octave) or shelving EQ.

➤ To access the EQ parameters, press an **ACCESS** key followed by **EQ** on the Central Module.

The fader strip controls update to show the last page adjusted - in our example, the 3-band equalizer:



- Press down on the left (master) rotary control to access the second page (for the 2-band Filters).
- Press again to return to the 3-band parametric EQ (page 1).

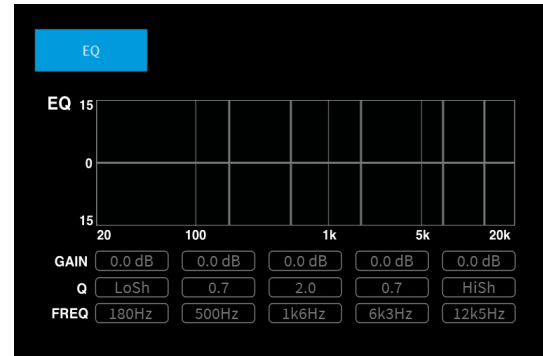
The EQ graph on DisplayDock shows all five bands of EQ simultaneously. This provides a great overview of the complete section.

3-band Parametric Equalizer

Surface Controls (3-band EQ)



DisplayDock



For the 3-band parametric EQ, each band can be adjusted separately using the three sets of controls: EQ LOW, EQ MID and EQ HIGH.

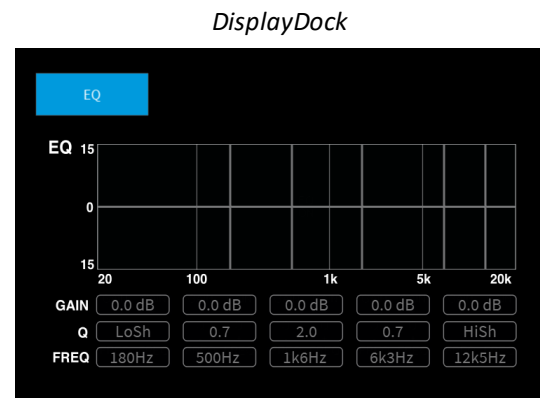
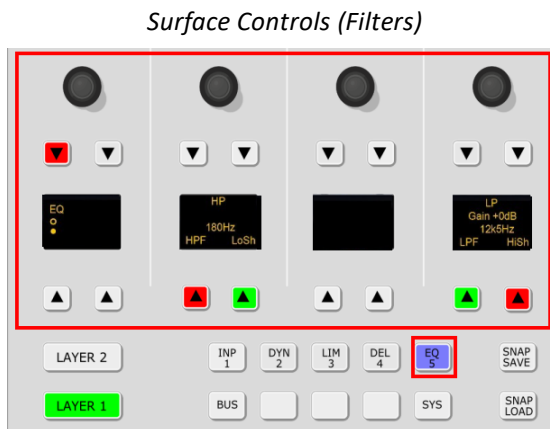
For each band, the following parameters are available:

- **Gain: Low, Mid and High** - Gain can be adjusted from -15dB to +15dB.
- **Frequency: Low, Mid and High** - Frequency can be adjusted from 20Hz to 18kHz.
- **Q** - press the + or – buttons to increase or decrease the **Q** for each band. Q can be adjusted from 0.7 to 5.0.

For the GAIN/FREQ control, turn to adjust the Gain, and then press down and turn to adjust Frequency.

The **EQ** button acts as the master on/off for the complete section: 3-band parametric EQ + 2-band filters.

2-band Filters



For the 2-band filters, each band can operate either as a fixed slope filter or as a shelving EQ:

- On the **HP** filter band, select either **HPF** to choose a high-pass filter, or **LoSh** to choose a low frequency shelf.
- On the **LP** filter band, select either **LPF** to choose a low-pass filter, or **HiSh** to choose a high frequency shelf.

High (or Low) Pass Filters

In this mode the filter slope is fixed (at 12dB per octave). Therefore, there is no Gain or Q value available. The cut-off frequency can be adjusted from 20Hz to 18kHz.

High (or Low) Shelving EQ

In this mode, the following parameters are available:

- **Gain: LoSh and HiSh** - Gain can be adjusted from -15dB to +15dB.
- **Frequency: LoSh and HiSh** - Frequency can be adjusted from 20Hz to 18kHz.

For the GAIN/FREQ control, turn to adjust the Gain, and then press down and turn to adjust Frequency.

The **EQ** button acts as the master on/off for the complete section: 3-band parametric EQ + 2-band filters.

8.10 Metering

8.10.1 Output Metering

DisplayDock includes two output meters: follow MONITOR and PGM 1:

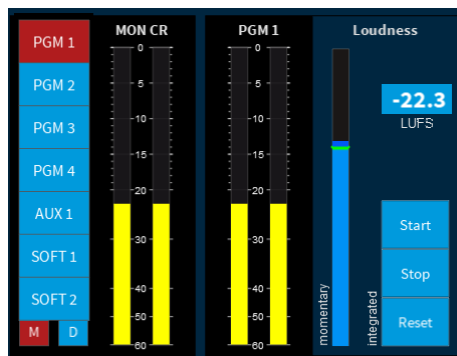
- **MONITOR** - meters the Control Room monitor source, before the CR volume and mute/dim. If a **PFL / CUE** button is active, then the meter automatically switches to the pre-fader listen bus level. It will return to the active monitor source once all PFL / CUE selections are cleared.
- **PGM 1** - *always* meters the PGM 1 output.

Both meters are stereo PPMs (Peak Program Meters) and use a digital scale relative to 0dBFS.

The PGM 1 meter also includes measurements for loudness.

8.10.2 Loudness Metering (for PGM 1)

DisplayDock (Monitoring & Metering)



On DisplayDock, there are two loudness measurements: momentary and integrated which conform to the ITU-R BS1770.

Momentary Loudness (Bargraph)

The blue bargraph represents the average energy of the summed component channels: left and right. 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.

Scale markers indicate a tolerance of +/- 1 LU/LK.

Integrated Loudness Measurement (in LUFS)

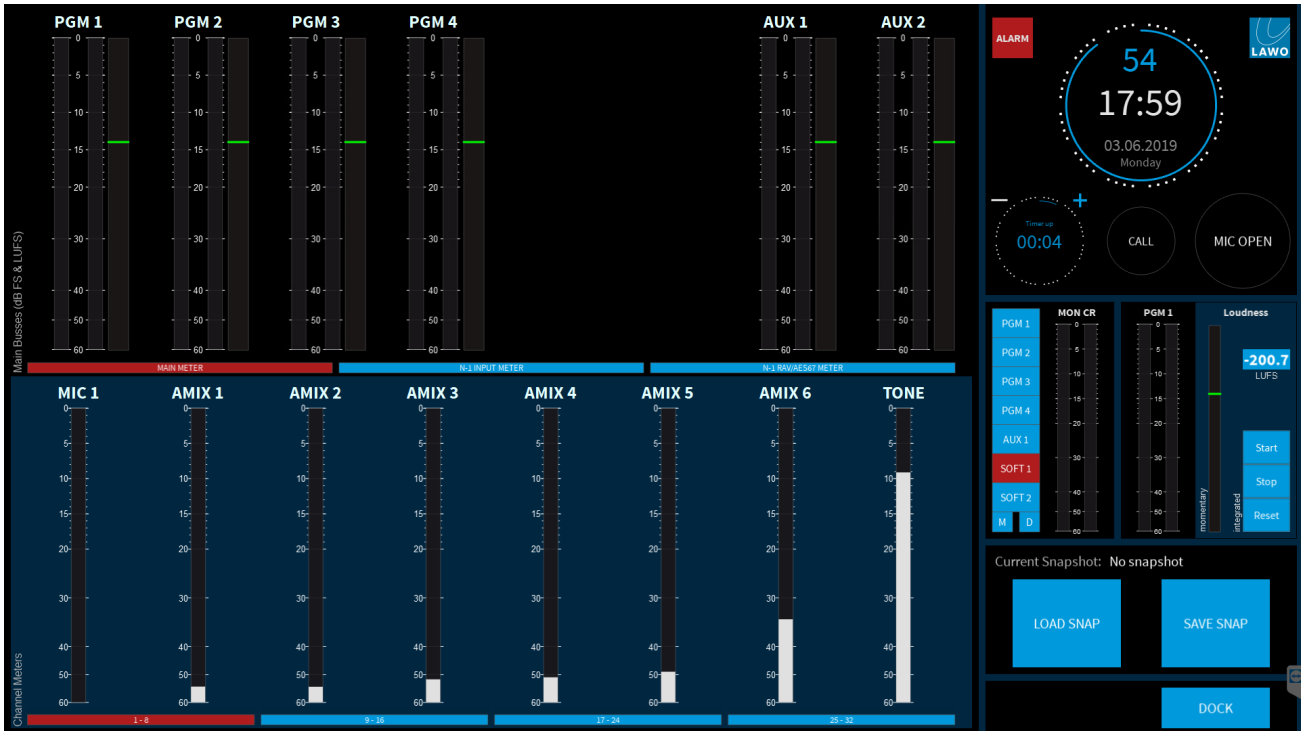
The integrated loudness measurement is controlled by the on-screen **Start**, **Stop** and **Reset** buttons. It is very useful for measuring loudness over a longer period - for example, for the duration of the show.

The measurement is displayed in LUFS (Loudness Units Full Scale).

8.10.3 The METERING Page

Other signals can be metered by pressing the **METERING** button (on the DOCK):

DisplayDock Metering page



The page is divided into two rows to meter outputs (at the top) and inputs (at the bottom). All of the PPMs are dynamic Peak Program Meters and use a digital scale relative to 0dBFS. The output meters include momentary loudness metering (as described [earlier](#)).

Output Metering

On the top row are 8 meters which are switched using the on-screen buttons: **MAIN METER**, **N-1 INPUT METER** and **N-1 RAVENNA METER**. These meter the summing buses (PGM & AUX), plus the N-1 returns for INPUT sources 1 to 4 and RAVENNA sources 1 to 8.

Input Metering

On the bottom row are 8 channel meters which are switched using the on-screen buttons: **1-8**, **9-16**, **17-24** and **25-32**. This allows you to meter up to 32 faders (for a maximum size surface).

8.11 Monitoring & Talkback

ruby standard configuration supports four stereo monitoring outputs:

- MON CR - for the control room speakers.
- MON HP - for the DJ headphones.
- MON STUDIO - for the studio speakers.
- MON GUEST - for the guest headphones.

For MON CR and MON HP, the monitor sources are identical, and so the only real differences between these sections are the dedicated **MUTE** and **DIM** buttons (on the surface) for the MON CR output; the split headphones and advanced options available for the MON HP; and the automatic dimming of the MON CR output by an active [redlight](#).

Similarly, the only differences between MON STUDIO and MON GUEST are the automatic dimming of the MON STUDIO output by an active [redlight](#).

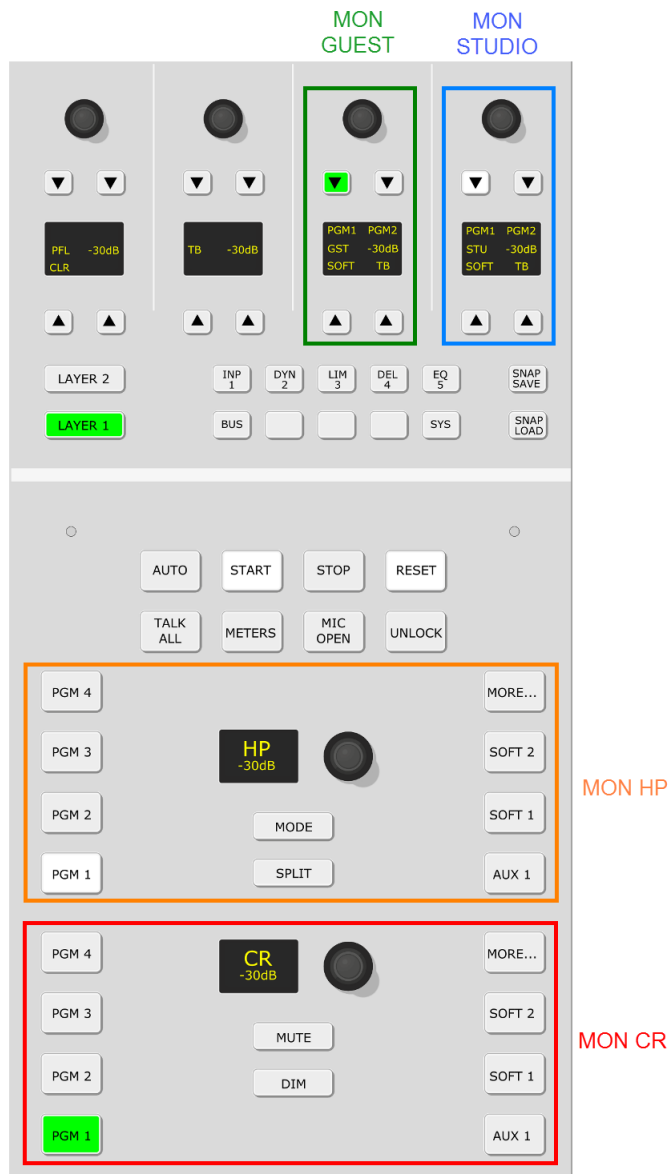
If PFL (or CUE) buttons are active, the PFL bus is switched automatically to the MON CR and MON HP outputs.

8.11.1 Default Audio Assignments

The default audio assignments are as follows. These can be edited using the [local matrix](#).

Monitor Section	Local Matrix Output	Connector Location	
MON CR	LINE OUT	IO Card Slot 1 (STUDIO IO)	Line Output 1
MON HP	HP 1	IO Card Slot 1 (STUDIO IO)	Phones 1
MON GUEST	HP 2	IO Card Slot 1 (STUDIO IO)	Phones 2
MON STUDIO	not assigned		

8.11.2 Monitoring Controls (on the Surface)



MON CR & MON HP

For MON CR and MON HP, the monitor sources are identical, and can be selected independently. The current selections are shown in green (MON CR) and white (MON HP).

Seven monitor sources can be selected directly from the surface: **PGM 1** to **PGM 4**, **AUX 1**, **SOFT 1** or **SOFT 2**. The two SOFT key sources are freely assignable via the local matrix. To access the assignment page, press and hold any SOFT key. Additional monitor sources are then available via the "Monitor Extension" [pop-ups](#) on DisplayDock. To access these, press the **MORE...** key.

In each case, turn the rotary control to adjust the monitor volume.

For the MON CR output, the **MUTE** and **DIM** keys allow you to quickly mute or dim the volume of the loudspeakers. Use a short press to toggle the function, or a long press for momentary operation. The MUTE key will also light if the control room output is automatically muted (due to an active [Redlight](#) status). The amount of dim applied is always 20dB.

The MON CR stereo PPM on [DisplayDock](#) follows the control room monitor source selector. The meter shows the level *before* the Volume, Mute and Dim.

For the MON HP output, select **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 say the main PGM output while cueing up another source. The **MODE** key opens another DisplayDock pop-up called "**HP_EFX**". This provides additional settings for the headphone output such as mono, phase reverse, etc.

MON STUDIO & MON GUEST

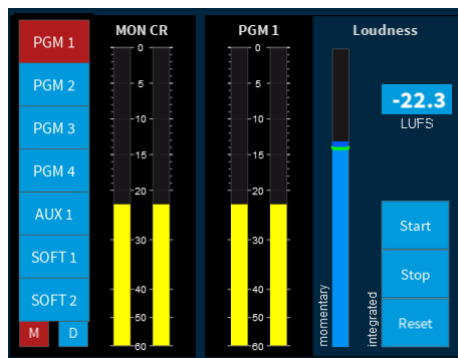
For MON STUDIO and MON GUEST, there is a choice of three monitor sources: **PGM 1**, **PGM 2** or **SOFT**. As above, the SOFT keys are freely assignable via the local matrix. The current selections are shown in green (MON GUEST) and white (MON STUDIO).

In each case, turn the rotary control to adjust the monitor volume.

Use the **TB** key to talk to the Guests or Studio. The selected monitor source is dimmed by 20dB while talkback is active.

8.11.3 Monitoring Controls (on DisplayDock)

DisplayDock (Monitoring & Metering)

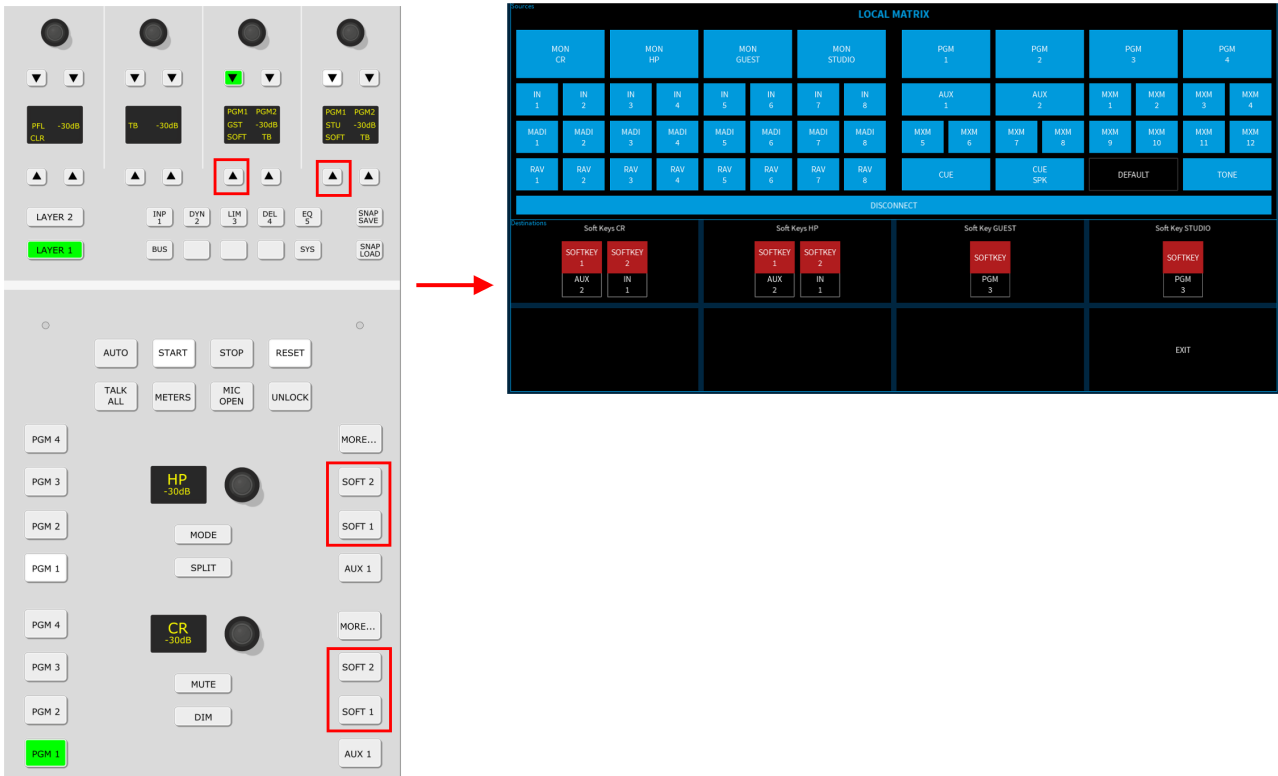


On DisplayDock, the buttons to the left of the MON CR meter work in parallel with the controls on the Central Module. You can use these to change the monitor source, or mute (M) and dim (D) the control room monitor output.

8.11.4 Assigning the SOFT Keys

The SOFT keys allow you to prepare additional monitor source(s) for each output. They are freely assignable via the local matrix as follows:

1. On the Central Module, press and hold any **SOFT** key until the LOCAL MATRIX appears on DisplayDock:



In the "Sources" area you will see all available sources.

In the "Destinations" area are the **SOFT** keys on the console: two for MON CR, two for MON HP, one for MON GUEST and one for MON STUDIO.

Below each of the "Destination" buttons, you will see the current source - for example, MON CR SOFT KEY 1 is assigned to AUX 2. If a "Destination" button is blue, then there is no monitor source connected, and the **SOFT** key will have no function when it is pressed.

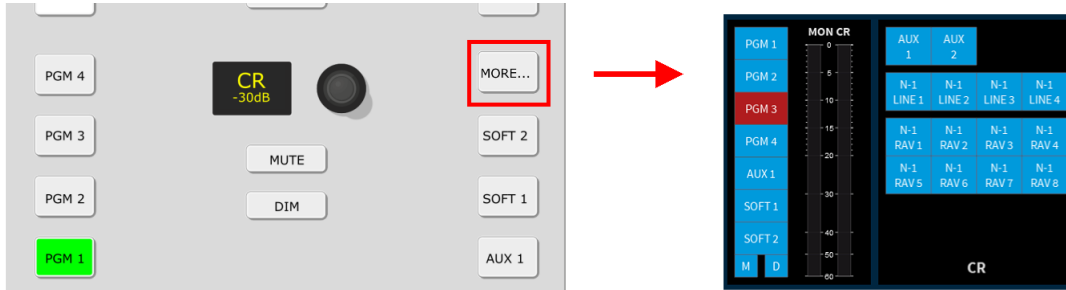
2. To change an assignment: first, select a destination button - it starts to flash. Then select an available source - the connection is made and the source name below the button updates.
3. To cancel out of the assign mode, press and hold the **SOFT** key on the Central Module again.

8.11.5 Using the Monitor Extensions

To access additional monitor sources DisplayDock supports a "Monitor Extension" for each of the MON CR and MON HP sections.

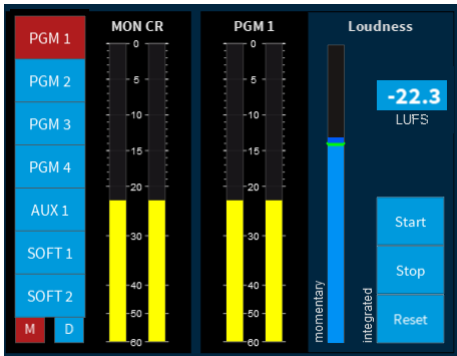
To open an extension, press the **MORE...** key on the Central Module:

Monitor Extension for MON CR

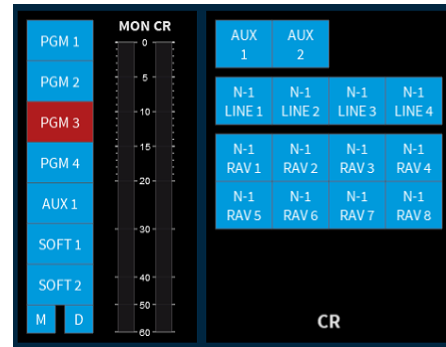


The extension will replace the PGM 1 metering and loudness controls, and be clearly labeled (e.g. CR for control room):

DOCK (default)



DOCK (with MON CR Extension)



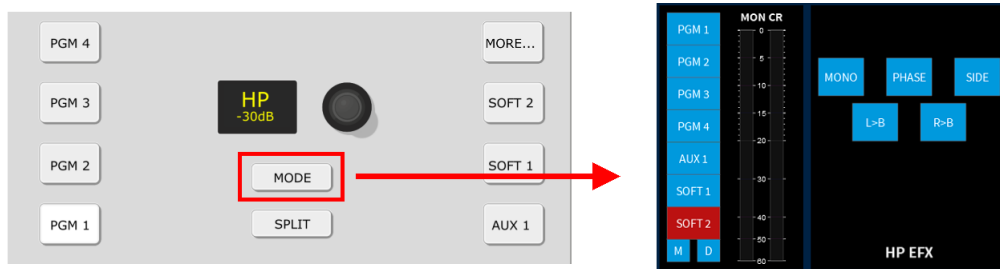
Use the on-screen buttons to select the desired monitor source.

To close the extension, turn off the **MORE...** key - the DOCK returns to its default state (with PGM 1 metering).

8.11.6 Additional Settings for MON HP

For the MON HP output, there is another pop-up called "HP EFX". This provides additional settings for the headphone output.

To open the EFX pop-up, press the **MODE** key on the MON HP section of the Central Module:

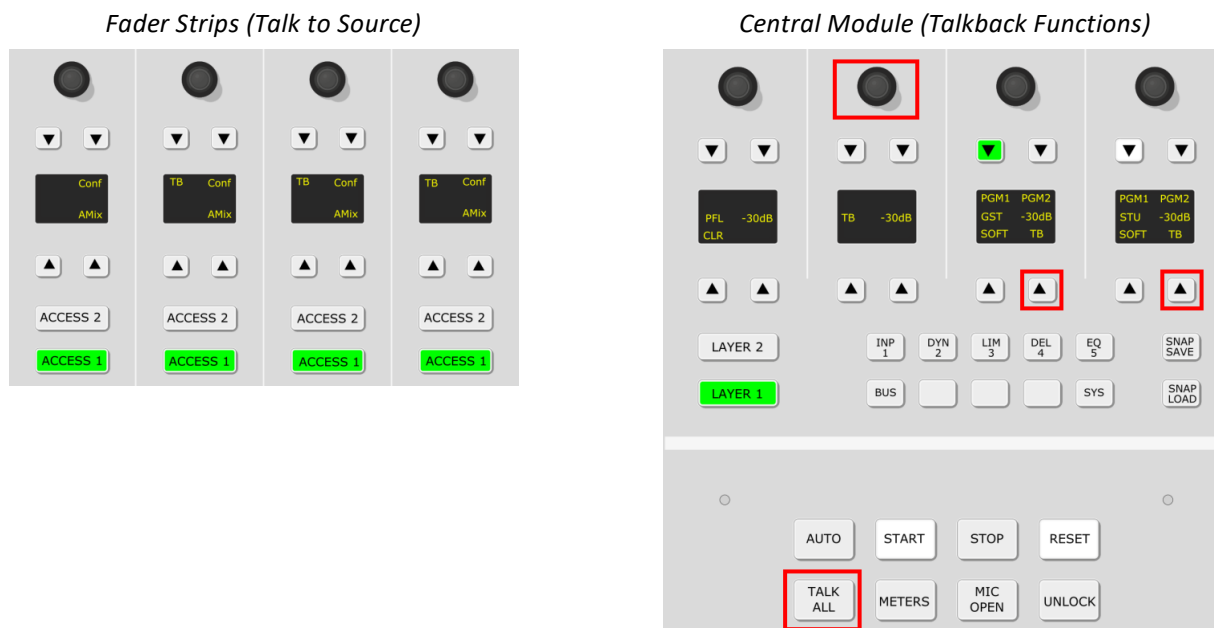


The extension will replace the PGM 1 metering and loudness controls, and be clearly labeled as HP EFX.

Use the on-screen buttons to select the desired option.

To close the extension, turn off the **MODE** key - the DOCK returns to its default state (with PGM 1 metering).

8.11.7 Talkback



You can talk to any of the following sources by pressing the **TB** key on the corresponding fader strip:

- Guest mics: MIC 2 to 10
- Hybrids: LINE IN 1 to 4
- RAVENNA CODECS: RAV 1 to 8

In addition, you can talk to the Guest or Studio Monitoring outputs by pressing the **TB** keys at the top of the Central Module.

The **TB** keys are momentary, so hold the key down for as long as you wish to speak. **TALK to ALL** (on the Central Module) talks to the Guest and Studio monitoring outputs, and all available N-1s.

The talkback source is always **MIC 1**. The talkback level can be adjusted from the **TB** control at the top of the Central Module.

When talkback is added to the return, the main signal is dimmed by 20dB.

8.11.8 PFL / CUE

The pre-fade listen function varies slightly depending on the console edition.

Fader Start Edition

On Fader Start consoles, the function is called **PFL** and can be found on the large key at the bottom of the fader strip. Multiple **PFLs** can be active to listen to a number of sources:

- On a closed fader, press **PFL** to route the source onto the stereo PFL bus; the **PFL** automatically cancels when you open the fader.
- On an open fader, press **PFL** to put the channel into "PFL Prepare". Nothing happens until you close the fader; once the fader is closed, **PFL** becomes active.

Button Start Edition

On Button Start consoles, the pre-fade listen function is called **CUE** and can be found on one of the small buttons by the electronic display. Multiple **CUEs** can be active to listen to a number of sources.

- On any fader (open or closed), press **CUE** to route the source onto the stereo cue bus. To remove the source from the cue bus, deselect the **CUE** button.

Note that on a Button Start console, there is no automatic cancellation of PFL and no "PFL Prepare".

Monitoring Options

Whenever PFL (or CUE) is active, the bus is switched to the control room speakers and DJ headphones. The monitor outputs will return to their active monitor source once all PFL (or CUE) selections are cleared.

Select **CLEAR PFL** on the Central Module to cancel all active PFLs quickly.

The default PFL mode can be changed from the [SYS menu](#).

8.12 Master Functions

This section describes the master functions which appear on DisplayDock and/or control surface: global alarm indicator, system clock, timer, telephone call signaling for hybrid sources and mic open indicator.

8.12.1 Global Alarm

On DisplayDock, a global **ALARM** indicator appears if any of the individual alarm states is active.

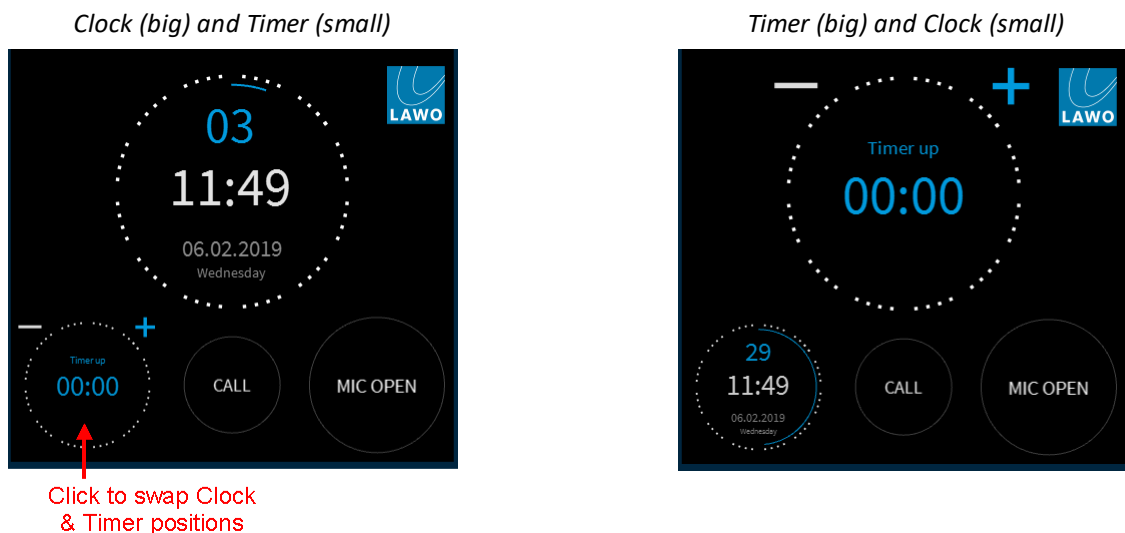
Select the **ALARM** indicator to open the [Advanced](#) page - under "SYSTEM, PSU & FAN ALARMS" you will be able to see which alarms are active.

The global **ALARM** indicator disappears once all active alarm states are either resolved or acknowledged on the "Advanced" page.

8.12.2 System Clock & Timer

DisplayDock includes both a system clock and count-up/count-down timer.

By default, the clock appears (big) with the timer (small). However, the functions can be reversed by clicking on the smaller of the two elements:



8.12.3 System Clock

The system clock shows the internal date and time running on Power Core. This can be set using SoP Explorer (as described [earlier](#)).

The time is given using a 24 hour digital clock where hours and minutes appear in white and seconds in blue. In our first example on the left, the current time is 11 hours, 49 minutes and 03 seconds. For greater visibility, the "seconds" are also represented by the blue line/circle around the circumference of the display.

8.12.4 Timer Operation

The DisplayDock timer can be set to Count-Up or Count-Down, and be triggered either automatically or manually.

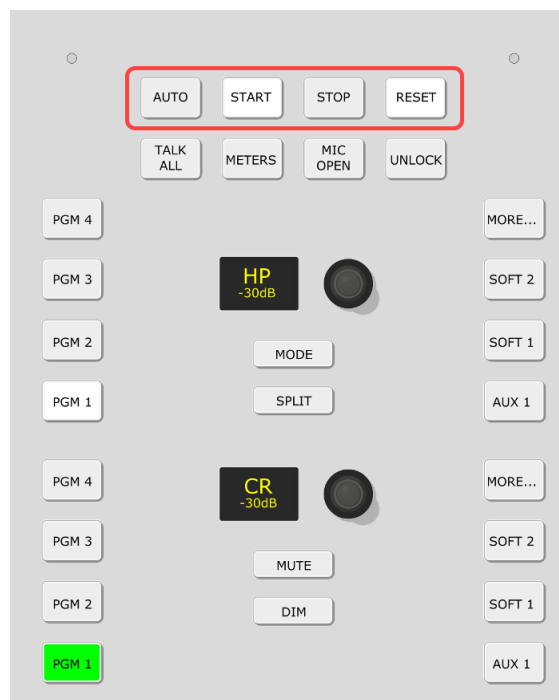
The Count-Up or Count-Down mode is selected from the GUI by clicking on the + and - signs (which are visible when the timer is [big](#)):



- Click on the + sign (it turns blue) to use the timer in count-up mode.
- Click on the - sign (it turns red) to change the timer to count-down mode.

The triggering method is selected from the Central Module using the **AUTO** key: **AUTO** (on) = automatic timer mode; **AUTO** (off) = manual timer mode.

Central Module Timer Keys



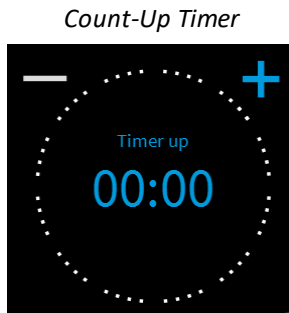
For the operation, there are actually three possibilities (indicated by the timer label):

- "Mics up" or "Mics Down" = the timer is set to AUTO mode and to count only when a MIC fader is open (applies to all ten MIC sources).
- "Faders up" or "Faders down" = the timer is set to AUTO mode and to count when any fader is open.
- "Timer up" or "Timer down" = the timer is set to manual mode.

Manual Timer Operation

To use the timer manually:

1. First make sure that the **AUTO** key (on the Central Module) is turned off.
2. Then set your count-up or count-down mode using the **+** and **-** signs (on the GUI):



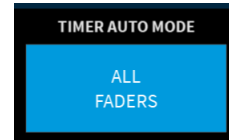
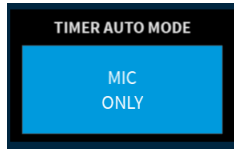
In count-up mode, the timer will count up from 00:00. In count-down mode, the timer will count down from a **Preset** value (described [later](#)).

3. Use the **START**, **STOP** and **RESET** keys (on the Central Module) to operate the timer:
 - **START** - starts the timer from the last stop position/time.
 - **STOP** - stops the timer.
 - **RESET** - resets the timer, either to 00:00 (count-up) or the **Preset** value (Count-down).

Automatic Timer Operation

To trigger the timer automatically:

1. First make sure that the **AUTO** key (on the Central Module) is turned on.
2. Then open the [Advanced](#) page to set the "TIMER AUTO MODE". There are two possible states:

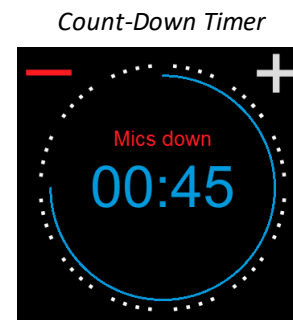
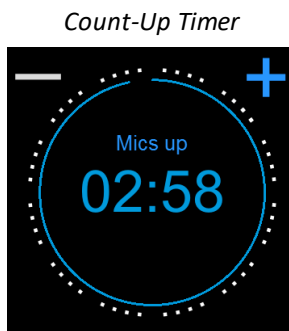


- **MIC ONLY** = the timer will count only when a MIC fader is open (on MIC 1 to 4).
- **ALL FADERS** = the timer will count when any fader is open.

Note that this option *only* becomes active once you have enabled the **AUTO** key in step 1. Otherwise the timer operates in manual mode. The color of the "TIMER AUTO MODE" option indicates this: red = auto mode on; blue = auto mode off.

3. Set your count-up or count-down mode using the + and - signs (on the GUI).

In our example, **MIC ONLY** is selected (in step 2) and so you will see either "Mics up" or "Mics down" as the timer label:



4. Start and stop the timer by opening and closing the faders on the surface.

For our example, open one of the MIC source faders. If another MIC fader opens, then the timer continues to run. The timer will stop once all MIC source faders are closed.

Depending on the mode, the timer will count-up from 00:00 or count-down from a **Preset** value (described [later](#)).

Note that the current time remains on-screen until the timer is reset.

5. To reset the timer, press the **RESET** key (on the Central Module).

Count-Down Timer Operation

In this mode, the timer will count-down from a starting value (called the **Preset** time), and turn red once a mid-point (the **Alarm** time) is reached:

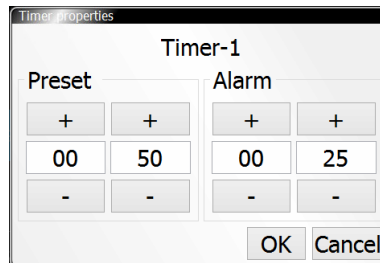
Count-Down (before Alarm)



Count-Down (Alarm active)



1. To set the **Preset** and **Alarm** time values, select the current count-down time - the Timer properties window opens:



The **Preset** value defines the starting time. When you reset the timer, it will return to this setting - in our example, to 50 seconds.

The **Alarm** value is used for the signalisation. When the count-down reaches this time, it turns red - for example, at 25 seconds.

In both cases, use the minute and second fields to type in a value, or select the **+** and **-** buttons to increase and decrease the current values. Then select **OK** to confirm.

2. For our example, open one of the MIC source faders to start the count-down from the **Preset** time.

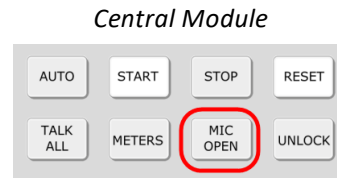
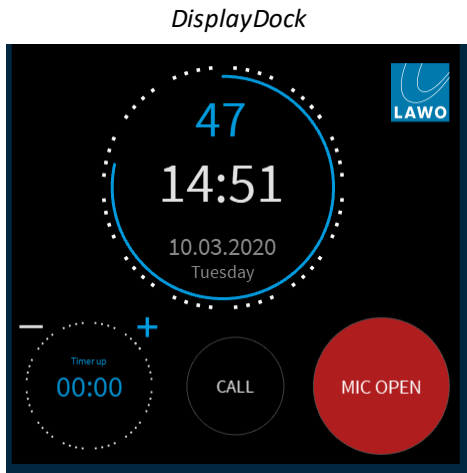
When the count-down reaches the **Alarm** time, the numbers turn red to warn you that you are almost out of time. If the count-down reaches 00:00, then the timer starts to count back up. This shows you by how much you are overrunning! In this instance, the Alarm status remains active until the timer is reset.

3. For our example, the timer stops once all MIC source faders are closed.

Note that the current time remains on-screen until the timer is reset.

4. To reset the timer, press the **RESET** key (on the Central Module).

8.12.5 MIC OPEN Indicator

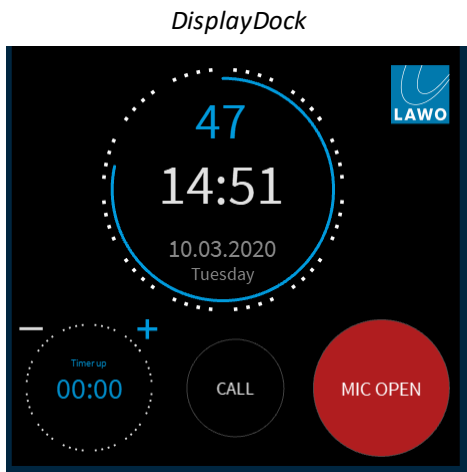


The **MIC OPEN** indicator lights in red whenever at least one MIC source fader is open. If no MIC faders are open, then the indicator goes out.

The state is triggered by the ten MIC sources, and is applied independently from the channel status (ON/OFF).

The **MIC OPEN** status can also trigger two external red lights, one in the control room and one in the studio, by preparing the **REDLIGHT** options in DisplayDock.

8.12.6 CALL Signaling



Fader Strip (HYBRID source)



The **CALL** indicator (on DisplayDock) blinks in yellow if there is an incoming call to a hybrid source. Press the **TEL** key on the source's fader strip to answer the call.

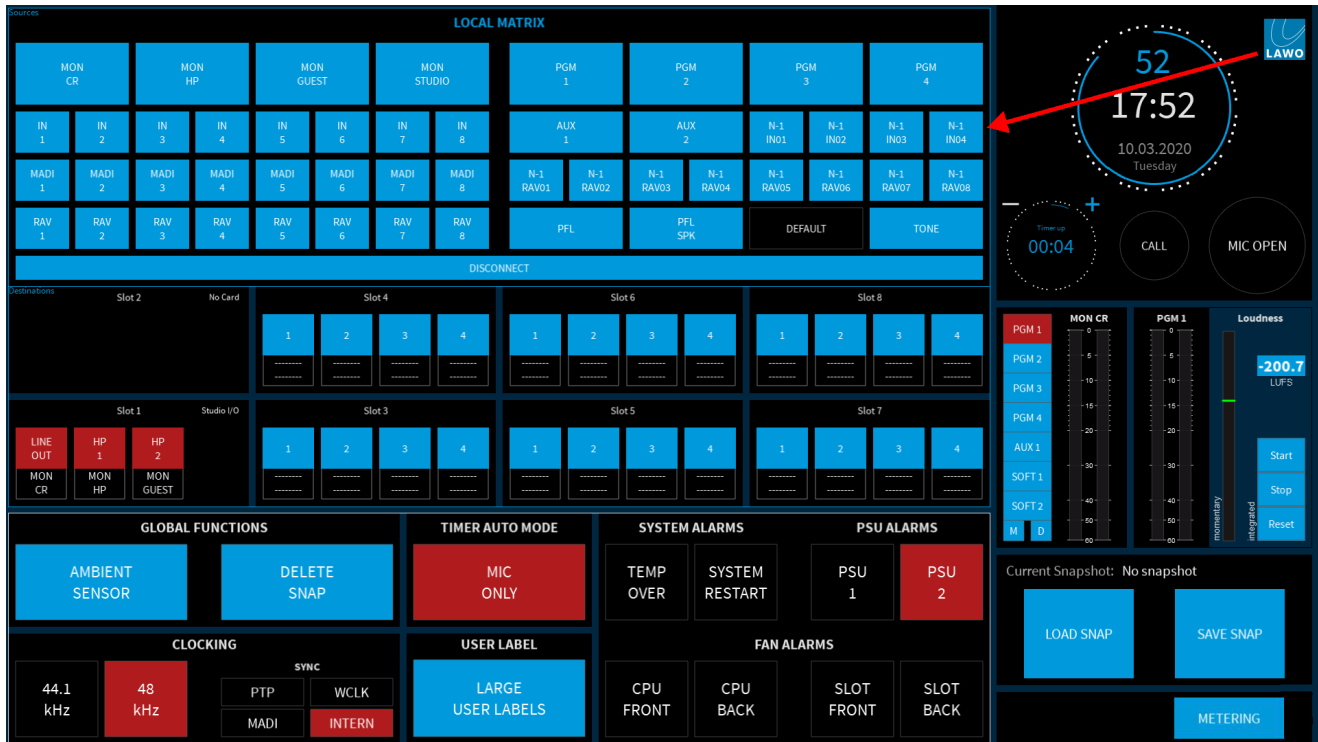
To support this function, the GPIO connector must be correctly wired as GPIOs 7 and 8 are used to trigger the incoming calls. See GPIO functions and Connector Pin-Outs.

8.13 The Advanced Page

The Advanced page (on DisplayDock) provides access to the local matrix and global options.

To open the page, click on the Lawo logo at the top right of the DOCK - the Advanced page appears in full-screen view:

ADVANCED + DOCK



The local matrix is described in the [next](#) topic. The other options and indicators are as follows.

AMBIENT SENSOR

Use this option to turn the ambient light detectors on the [Central Module](#) on or off: red = on; blue = off. When enabled, the detector automatically adjusts the brightness of the buttons and displays on the control surface according to the ambient light level.

DELETE SNAP

Use this button to delete a DisplayDock snapshot. Snapshots are described in more detail [later](#).

CLOCKING

The "CLOCKING" area shows the active sync source and sample rate.

The "SYNC" fields are indicators only; you cannot change the sync source from the GUI: red = active; blue = available. In our example, the active sync source is **INTERNAL**.

The **48kHz** and **44.1kHz** buttons indicate the sample rate of the internal clock generator: red = active. The sample rate can be changed when all faders are closed (off-air) and UNLOCK (on the Central Module) is pressed. In this instance, the button colors update to red = active and blue = inactive but available. Select the inactive (blue) option to make the change. Once a fader is opened, the blue state cancels showing that it is no longer possible to change the sample rate. After a cold start, the internal generator will reset to the default value stored in the configuration (48kHz).

See [Synchronization](#) for more details.

TIMER AUTO MODE

This option sets the automatic mode for the count-up/count-down timer. There are two possible states:

- **MIC ONLY** = the timer will count only when a MIC fader is open.
- **ALL FADERS** = the timer will count when any fader is open.

Note that the option *only* becomes active if the timer mode is set to **AUTO** (automatic) on the [Central Module](#). Otherwise the timer operates in manual mode. The color of the option indicates this: red = auto mode on; blue = auto mode off.

For more information, see [Timer Operation](#).

USER LABEL

This option sets the size of the user labels displayed at the bottom of the [fader strips](#). The button will toggle between the two possible states: blue = regular size labels; red = large user labels.

SYSTEM, PSU & FAN ALARMS

These buttons show the current status of the individual alarms. If an alarm is triggered, then the corresponding button starts to blink in red. You can press to acknowledge the alarm - the button changes to static red. Once the alarm is resolved, the button color turns black (off).

8.13.1 The Local Matrix

The local matrix allows you to change the default audio assignments for the local IO card slots 1 to 8.

Advanced Page (Local Matrix)



The matrix is divided into two halves: "Sources" at the top and "Destinations" at the bottom.

The available "Sources" are:

- The monitor outputs: MON CR, MON HP, MON GUEST & MON STUDIO.
- IN 1 to 8 - the eight stereo inputs from IO Card Slots 3 & 4.
- MADI 1 to 8 - the first eight stereo inputs from the active MADI port.
- RAV 1 to 8 - the first eight stereo inputs from the RAVENNA streams.
- The summing bus outputs: PGM 1 to 4 and AUX 1 & 2.
- The N-1 bus outputs: for IN 1 to 4 and RAV 1 to 8.
- PFL - the PFL bus before its level control on the Central Module.
- PFL SPK - the PFL bus after its level control on the Central Module.
- Internal TONE.

Each of the "Destination" buttons represents a local stereo output connected to the IO Cards at the rear of Power Core:

- Slot 1 (Studio IO) - one LINE OUT plus two headphone outs: HP 1 & HP 2.
- Slot 2 (No card) - no outputs are available (as this slot is always fitted with a MIC/LINE input card).
- Slots 3 to 8 - four stereo outs per card. Note that audio can only be connected if the IO Card slot is fitted with an output card!

The label below the "Destination" button shows the assigned source (e.g. MON CR, MON HP, etc). If a destination is already assigned, then its button is red. If no audio is assigned, then the button is blue.

To change an output assignment:

1. Select a "Destination" button - the button starts to flash.
2. Select an available "Source" (e.g. PGM 1) - the routing assignment is made and the button changes to static (red).
3. Alternatively, repeat step 1 and then select **DISCONNECT** - the current audio source is removed and the button changes to static (blue).

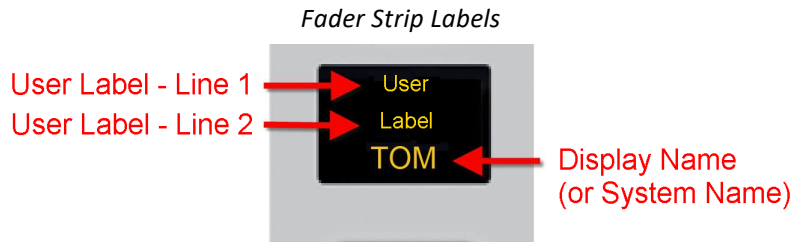
DEFAULT Audio

The **DEFAULT** button can be used to reset the matrix to the default audio assignments (shown on the previous page).

Note that you will need to press and hold **UNLOCK** (on the [Central Module](#)) before you can select **DEFAULT** (on the GUI). This prevents an accidental reset of the output matrix.

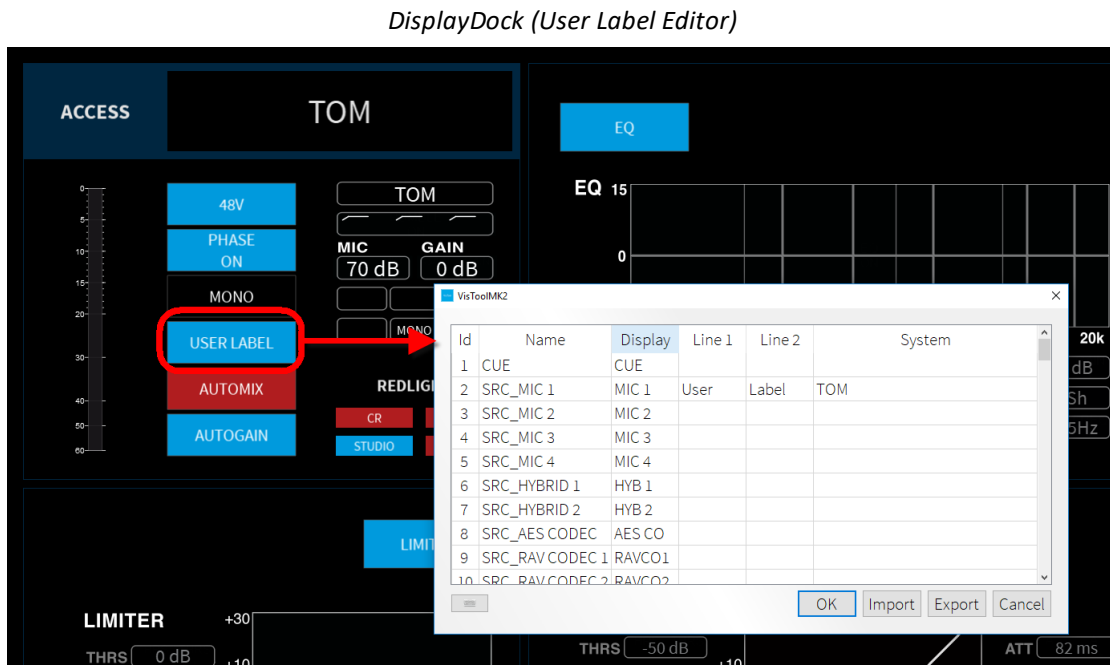
8.14 Editing User Labels

The displays at the bottom of each fader strip can show up to three lines of text:



To edit the text:

1. Start by pressing an **ACCESS** key (on any fader strip) - the key turns white and the "Source Parameters" page appears on DisplayDock.
2. Select the **USER LABEL** button (on DisplayDock) to open the editor:



From here you can edit the labels for all sources. The **Id**, **Name** and **Display** fields are defined by the ON-AIR Designer configuration and cannot be changed. By default, a source uses its **Display** name unless a **System** name is entered.

3. Use the **Line 1** and **Line 2** fields to edit the two user label lines (up to 8 characters per line).
4. To replace the **Display** name, enter text into the **System** field. The **System** name replaces the **Display** name until such time as the **System** field is cleared.
5. Once you have finished editing, select **OK** to transfer the labels to the system - the editor closes and the labels on the control surface update.

The **Export** button will save all labels into an **.xml** file. This allows to copy the file to another DisplayDock PC and then select **Import** to import the labels. When using import, the labels are applied to sources with an identical source **Name** field.

8.15 Conference Bussing (N-1/Mix Minus)

The conference system can be used to generate N-1/mix minus feeds for the following sources: MIC 1 to 10, IN 1 to 4 and RAV 1 to 8.

Each source added to the conference system receives an automatically switched mix minus feed. When their source fader is open (on-air), they will hear PGM 1 minus themselves. When their source fader is closed (off-air), they will hear the conference bus minus themselves - this allows members of the conference to hear each other while they are off-air.

Let's assume you wish to use the conference system for 3 sources: **MIC 1** (the DJ), **MIC 2** (a studio guest) and **IN 1** (a phone-in guest).

Setting Up the Monitoring

The first step is to set up the monitoring so that the mix minus feed for each source is returned to the correct destination. For our example, we will assume:

- The DJ is listening on his/her headphones (controlled via MON HP).
- The studio guest is also listening on his/her headphones (controlled via MON GUEST).
- The phone-in guest is receiving the IN 1 mix minus return (there are no separate level controls for this output).

You can check and edit the audio assignments from the [local matrix](#). If the system is set to the DEFAULT audio, then:

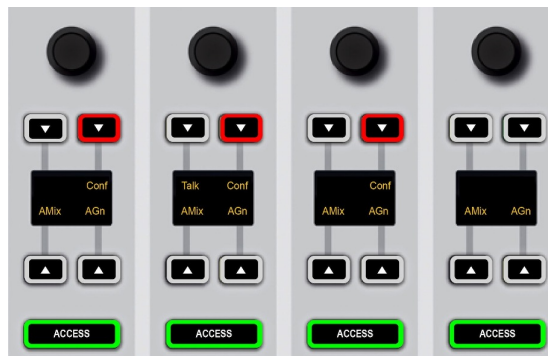
- Connect the DJ headphones to HP 1 (Power Core STUDIO IO Card).
- Connect the guest headphones to HP 2 (Power Core STUDIO IO Card).
- Connect the phone-in guest's return to the IN 1 n-1 return (i.e. Power Core Slot 3 output 1).

Working with the Conference System

Once the monitoring returns are in place, then the conference system operates as follows:

1. Turn on the **CONF** bus assign buttons for all sources within the conference – in our example, on the **MIC 1**, **MIC 2** and **IN 1** fader strips.

This routes each source onto the conference bus; the **CONF** buttons will turn red, yellow (flashing) or white depending on the status of the faders:



For the conference system to work you must have at least two sources with **CONF** enabled.

Each source within the conference system now receives an automatically switched mix minus feed; what they hear will depend on the status of the three source faders.

2. Close all three source faders.

The **CONF** buttons become red and all sources will hear the conference bus minus themselves. In other words, they can hear each other, but not themselves, and chat off-air.

- Open one of the faders – e.g. the DJ's fader.

The MIC 1 source is now assumed to be on-air, and the DJ's monitor feed is automatically switched to PGM 1 minus themselves. This is reflected by the flashing (yellow) **CONF** button:



The **CONF** buttons on the studio and phone-in guest fader strips remain red. This is because their faders remain closed, and so the two guests are still hearing the conference bus minus themselves and can continue their off-air conversation. Also, if you close the DJ fader, the DJ's monitor feed reverts to a conference bus mix minus, so they can rejoin the off-air conversation if required.

- Finally, open both the MIC 1 and MIC 2 faders.

Both the DJ and studio Guest are now on-air, and so they will hear PGM minus themselves (yellow flashing **CONF** buttons):



In this mode, there are less than two active conference sources and so the conference is cancelled. The phone-in guest's monitor feed is automatically switched to a PGM 1 mix minus. This state is reflected by the white **CONF** button.

- To cancel the conference for any of the sources, deselect the **CONF** button.

The **CONF** buttons turn green (off) and the source's monitor feed receives PGM 1 minus themselves at all times.

8.16 Snapshots

The snapshots system includes five local memories (stored on Power Core) plus an unlimited number of DisplayDock snapshots (stored on the control PC).

The local memories always save and load settings globally, while DisplayDock snapshots come in two types: Full snapshots (to save settings globally) or Source snapshots (to save only the settings for the source in access).

It is not recommended that snapshots are loaded during a live broadcast, as to do so may result in sources being taken off air!

8.16.1 What's Stored in a Snapshot?

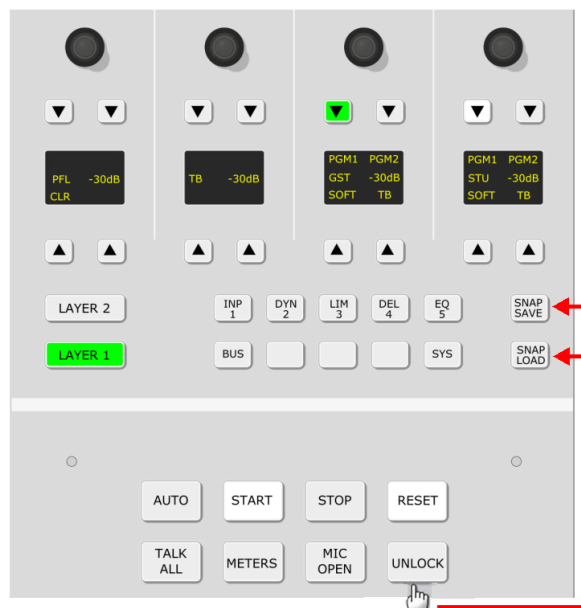
The following settings are stored (and recalled) by all snapshots:

- **Fader Strip Assignment** – the assignment of sources to fader strips.
- **User Labels** – the two User Label text lines for all sources.
- **DSP settings** – Input Parameters, EQ, Dynamics, Limiter, Delay and De-Esser for all sources.
- **Bus Assignment** – the assignment of sources onto the console's summing buses and their AUX send levels.
- **Local Matrix Assignments** – the assignment of the destinations in the local matrix (including the monitor section SOFT keys).

Note that fader levels are not stored (and recalled) so that snapshots can be used during a live transmission without affecting the current channel levels.

8.16.2 Using the Local Snapshot Memories

The five local snapshot memories always reset the console globally, and are stored, recalled and cleared using the keys on the Central Module. For each operation you will need to press **UNLOCK** to unlock **SNAP LOAD** and **SNAP SAVE**.



8. Operation

➤ To store settings in a local memory:

1. Press and hold **UNLOCK** followed by **SNAP SAVE**.

If a memory has been used, then the numbered buttons, **1** to **5**, illuminate in red. A green button indicates a free memory. If you select a used memory, then its contents will be overwritten.

2. Keep holding **SNAP SAVE** and select a memory - e.g. number **4**.

The **SNAP SAVE** button flashes magenta to indicate a successful operation.

➤ To recall settings from a local memory:

1. Press and hold **UNLOCK** followed by **SNAP LOAD**.

You can see which memories contain data by looking at the lit buttons.

2. Keep holding **SNAP LOAD** and select a memory - e.g. number **4**.

The **SNAP LOAD** button flashes magenta to indicate a successful operation and the console resets.

➤ To clear a local snapshot memory:

1. Press and hold **UNLOCK** followed by both **SNAP LOAD** and **SNAP SAVE**.

You can see which memories contain data by looking at the lit buttons.

2. Keep holding **SNAP RECALL** and **SNAP STORE** and select a memory - e.g. number **4**.

The snapshot memory is cleared.

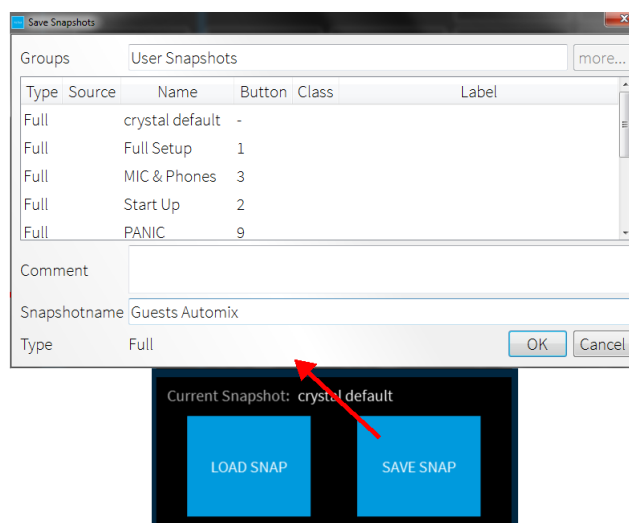
3. To check if the operation has been successful, press and hold **SNAP RECALL** - the memory number should now be clear (unlit).

8.16.3 Saving a DisplayDock Snapshot

When you save a DisplayDock snapshot, you can choose to save either a **Full** snapshot (to save settings globally across the console) or **Source** snapshot (to save only the settings for the source in access). The **SAVE SNAP** button (on the DOCK) supports both operations as follows.

➤ To save a Full snapshot:

1. Check that there is no source in access and select **SAVE SNAP** - the "Save Snapshot" window appears:



2. Enter a snapshot name (e.g. **Guests Automix**) and select **OK** - the window closes and the settings are saved.

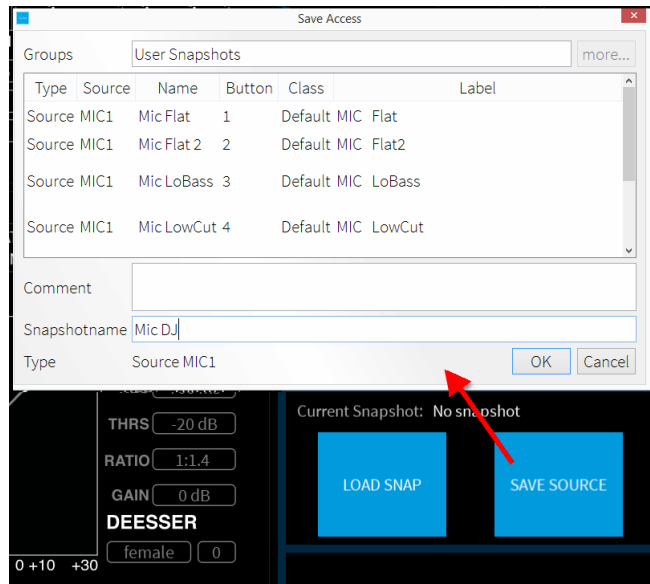
Note that the snapshot **Group** and **Type** cannot be changed. You can enter text to describe the snapshot into the **Comment** field if you wish.

➤ **To save a Source snapshot:**

1. Press an **ACCESS** key (on the control surface) to select the source you wish to save.

The **ACCESS** key turns white and the [Source Parameters](#) page appears on DisplayDock. Notice that the **SAVE SNAP** button has updated to **SAVE SOURCE**.

2. Select **SAVE SOURCE** - the "Save Access" window appears:



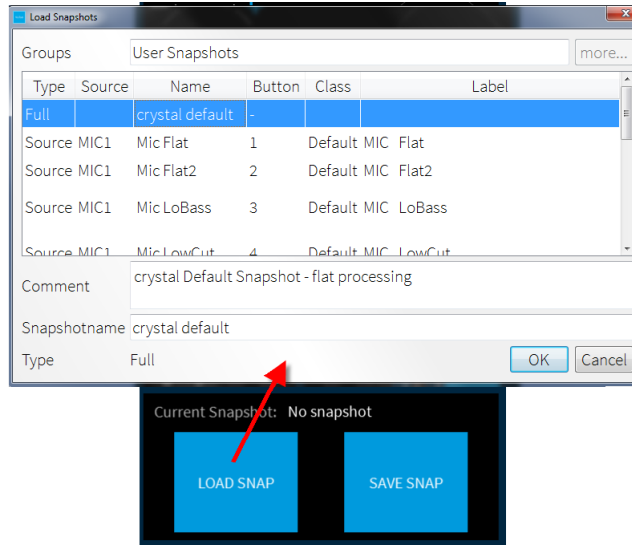
2. Enter a snapshot name (e.g. **Mic DJ**) and select **OK** - the window closes and the settings are saved.

Note that the snapshot **Group** and **Type** cannot be changed. You can enter text to describe the snapshot into the **Comment** field if you wish.

8.16.4 Loading a DisplayDock Snapshot

➤ To load either a **Full** or **Source** snapshot:

1. Select **LOAD SNAP** - the "Load Snapshot" window appears:



This window lists all of the snapshots stored in the current user group. In a ruby standard configuration system, one group is available: **User Snapshots**.

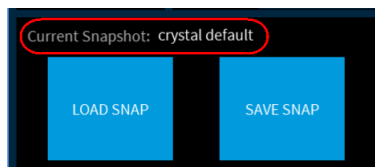
In the **Type** column you can see that two types of snapshot are available:

- **Full** snapshots store and recall settings globally across the console.
- **Source** snapshots store settings for a specific source.

Note that **Source** snapshots can be loaded either to the source in access OR to their original source (if nothing is in access). The original source is identified in the **Source** column.

2. Select a snapshot from the list and select **OK** - the window closes and the settings are loaded to the system.

The console surface resets accordingly and "Current Snapshot" field on DisplayDock updates:



8.16.5 Deleting a DisplayDock Snapshot

You can delete a DisplayDock snapshot from the [Advanced](#) page using the "GLOBAL FUNCTIONS":



1. Select **DELETE SNAP** - the "Delete Snapshot" window appears.

This window lists all of the snapshots stored in the current user group. In a ruby standard configuration system, one group is available: **User Snapshots**.

2. Select a snapshot from the list and select **OK** - the window closes and the snapshot is deleted.

8.16.6 Backing Up DisplayDock Snapshots

DisplayDocksnapshots are stored on the control PC in a file named "VisConfigurations.mdb". After a standard installation of the DisplayDock software, the file can be found at:

C:\ProgramData\DSA\DisplayDock (Ruby)\database\VisConfigurations.mdb

If you wish to backup your DisplayDock snapshots, then make a copy of the file and store it in a secure location.

8.17 The SYS Menu

The **SYS** key on the Central Module provides access to a number of system-wide options. These options are stored in the DSP Core's warm start data. Therefore, if you make changes they will affect all users.

Press and hold **UNLOCK + SYS** to map the system options onto the four sets of rotary controls at the top of the Central Module.

8.17.1 Fader Options

Fader Speed

Turn the **Fader** rotary control to change the fader speed. You can select **Slow**, **Medium** or **Fast** to change the speed at which faders will open or close in response to external control signals such as a fader start, or when loading snapshots. Only the physical fader speed is affected, not the response time of any changes to audio level.

Fader Notch

Enables or disables the fader notch. With the notch enabled, you will feel a notch at 0dB when you move a fader.

Fader Hot mode

Enables or disables 'hot fader' mode. When disabled, the faders motors are active and so the faders will move when you turn a channel on or off. When enabled, the fader motors are inactive; this allows you to open faders without passing audio, and then start channels at a later stage.

8.17.2 PFL Mode

Turn the **PFL Mode** rotary control to change the PFL mode for the PFL / Cue bus. The mode affects whether you can select multiple PFL / CUE buttons, and what happens when you open or close faders with PFL enabled.

The available options are:

- **SUM** (default mode) – multiple PFL buttons may be selected. Where faders are closed, sources are summed onto the PFL Bus; when a fader is opened, PFL is cancelled. Where faders are open, sources are put into 'PFL Prepare' and will be summed onto the PFL Bus once the fader is closed.
- **SUM R** – identical to **PFL Mode SUM** but PFL recurs if you open the fader (cancel the PFL) and then close the fader. In this mode, PFL is only cancelled by deselecting the PFL button.
- **PFL** – identical to PFL SUM, but PFL buttons intercancel such that only one source may ever be in PFL or PFL prepare.
- **PFL R** - identical to **PFL Mode PFL** but PFL recurs if you open the fader (cancel the PFL) and then close the fader. In this mode, PFL is only cancelled by deselecting the PFL button.
- **PFL A** - this mode is called PFL Always and is identical to **PFL Mode SUM** with the exception that it allows open faders to be put into PFL rather than PFL Prepare.
- **PFL AR** - this mode is a combination of PFL Always and PFL Recurring which means that PFL is never cancelled by opening a fader.
- **PFL PUSH** – PFL is momentary. This means PFL is active when you press the PFL button, and cancels on release.
- **PFL DJ** - allows you to prepare a fader level which is applied when you put the fader on-air. Press PFL and adjust the fader level. Then deselect PFL and press START to put the fader 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 START again - the fader jumps to 0dB as normal.)
- **AFL** - the channel's PFL buttons operate as AFL (After Fade Listen). The channel's after-fader signal is routed to the PFL bus. Multiple AFLs may be summed. AFL is only cancelled by deselecting the AFL button.
- **AFL/PFL** - as for **AFL**, but the channel's PFL signal is heard when the fader is closed; when the fader opens, the listen bus receives AFL.

9. The Web UI

This chapter describes the Web UI.

Topics include:

- [Introduction](#)
- [Opening a Session & Logging In](#)
- [The System Menu](#)
- [The Peripherals Menu](#)
- [The TCP Connections Menu](#)
- [The Sources / Sums Menu](#)
- [The RAVENNA Menu](#)
- [Preparing a Secure Connection \(for https\)](#)

9.1 Introduction

The Web UI provides status information about the system. It is accessed by entering the IP Address of the Power Core you wish to examine into a Web browser. The computer you use must be part of the same network and subnet as Power Core.

9.2 Opening a Session & Logging In

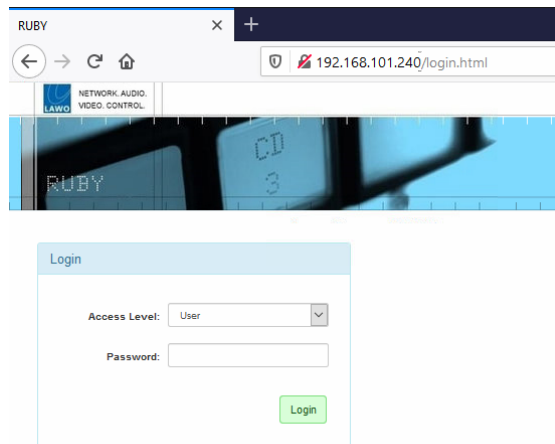
To open a Web UI session:

1. Open a browser application and enter the current system IP address into the URL field.

To ensure all graphics are correctly displayed, we recommend the following minimum browser requirements: Internet Explorer 10 or Edge 12; current Versions of Firefox, Safari or Chrome.

You can view the Power Core IP address on the front panel display. The default IP = **192.168.101.240**.

Following a successful connection, the "Login" screen appears:



2. Select an **Access Level** and enter the **Password** (as described below).
3. Click on the green **Login** button.

Following a successful login, the current information is loaded from the device. Once loading is complete, the [System Information](#) tab appears.

Power Core has many system parameters, and it will take a few seconds for the information to load completely. Some of the information is displayed as a "snapshot" of the current data, which is only as current as the latest refresh. So, remember to use your browser's Refresh function to keep up to date.

9.2.1 User Modes (Access Levels)

The Power Core Web UI has three Access Levels:

- **User** (no password required).

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 [Network Devices](#) tab.

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

As for Supervisor, but with access to Supervisor and Administrator passwords in the [Control](#) tab.

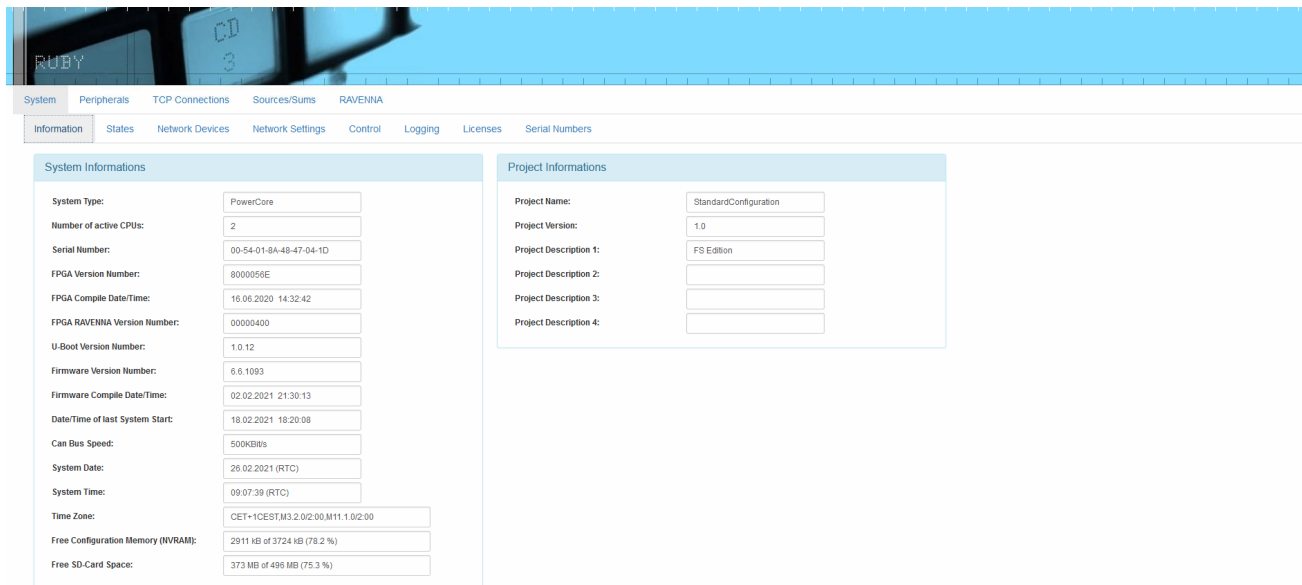
For security reasons, it is recommended to change the Administrator and Supervisor passwords from the defaults once the device is set up.

The remainder of this chapter assumes you are logged in as a Supervisor unless otherwise stated.

9.3 The System Menu

There are eight informational tabs in the System menu. Most of these tabs are status displays for the main unit and its peripherals. Values which can be modified are noted for each tab.

9.3.1 Information Tab



The screenshot shows the 'Information' tab in the System menu. It is divided into two main sections: 'System Informations' and 'Project Informations'.

System Informations		Project Informations	
System Type:	PowerCore	Project Name:	StandardConfiguration
Number of active CPUs:	2	Project Version:	1.0
Serial Number:	00-54-01-9A-48-47-04-1D	Project Description 1:	FS Edition
FPGA Version Number:	8000059E	Project Description 2:	
FPGA Compile Date/Time:	16.06.2020 14:32:42	Project Description 3:	
FPGA RAVENNA Version Number:	00000400	Project Description 4:	
U-Boot Version Number:	1.0.12		
Firmware Version Number:	6.6.1093		
Firmware Compile Date/Time:	02.02.2021 21:30:13		
Date/Time of last System Start:	18.02.2021 18:20:08		
Can Bus Speed:	500KB/s		
System Date:	26.02.2021 (RTC)		
System Time:	09:07:39 (RTC)		
Time Zone:	CET+1CEST,M3.2.0/2:00,M11.1.0/2:00		
Free Configuration Memory (NVRAM):	2911 KB of 3724 KB (78.2 %)		
Free SD-Card Space:	373 MB of 496 MB (75.3 %)		

The **Information** tab is the first tab to be shown following a successful login. It displays basic data such as the unit's serial number, software / firmware version numbers, and system date and time. In User mode, all fields are non-editable. Entering Supervisor mode permits editing of the time zone.

If the unit has not yet been configured, then the project name and description will be a default description. After configuration, these fields display the information entered using the ON-AIR Designer software.

The system date and time is provided by your network's NTP server. If an NTP server is not present, then the internal Real Time Clock (RTC) is used. This can be reset using SoP Explorer as described [earlier](#).

Setting the Time Zone

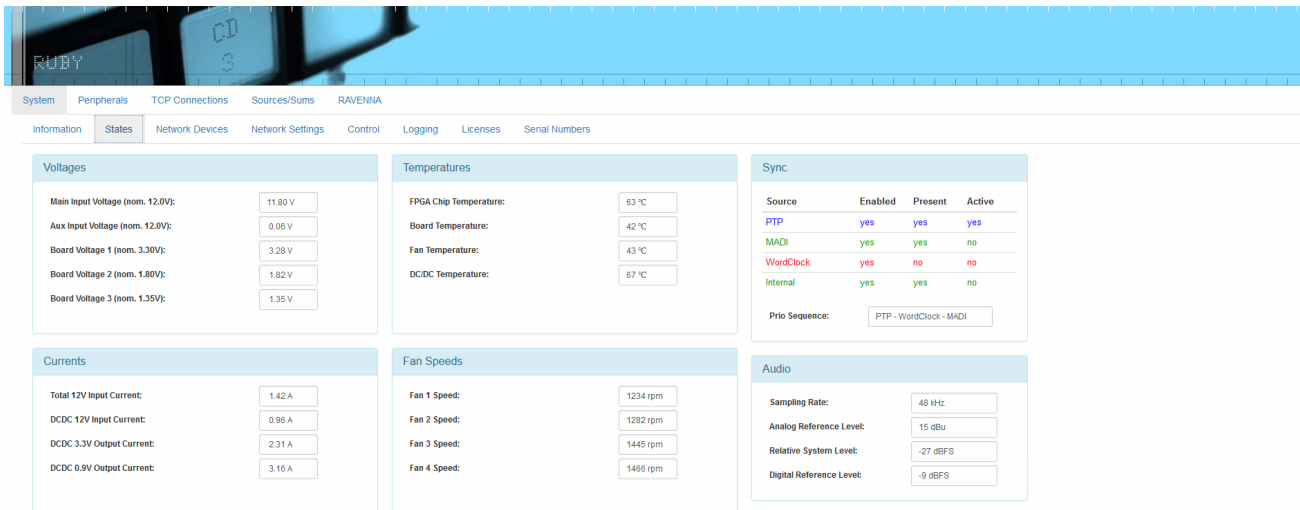
By entering Supervisor (or Administrator) mode you can edit the current **Time Zone** value - any change takes immediate effect without needing to restart.

The time zone should be specified relative to Central European Time (CET).

For example, "CET+5CEST,M3.2.0/2:00,M11.1.0/2:00" is suitable for US East Coast, where CET is 5 hours ahead.

The second part of the syntax specifies the start and end of Central European Summer Time (CEST). e.g. from month 3, week 2, day 0, time 2am (the second Sunday in March) until month 11, week 1, day 0, time 2am (the first Sunday in November).

9.3.2 States Tab



The screenshot shows the 'States' tab in the web UI. The top navigation bar includes 'System', 'Peripherals', 'TCP Connections', 'Sources/Sums', and 'RAVENNA'. Below this, a secondary navigation bar has 'Information', 'States', 'Network Devices', 'Network Settings', 'Control', 'Logging', 'Licenses', and 'Serial Numbers'. The main content area is divided into several panels:

- Voltages:**
 - Main Input Voltage (nom. 12.0V): 11.80 V
 - Aux Input Voltage (nom. 12.0V): 0.06 V
 - Board Voltage 1 (nom. 3.30V): 3.28 V
 - Board Voltage 2 (nom. 1.80V): 1.82 V
 - Board Voltage 3 (nom. 1.35V): 1.35 V
- Temperatures:**
 - FPGA Chip Temperature: 63 °C
 - Board Temperature: 42 °C
 - Fan Temperature: 43 °C
 - DC/DC Temperature: 67 °C
- Currents:**
 - Total 12V Input Current: 1.42 A
 - DCDC 12V Input Current: 0.96 A
 - DCDC 3.3V Output Current: 2.31 A
 - DCDC 0.9V Output Current: 3.16 A
- Fan Speeds:**
 - Fan 1 Speed: 1234 rpm
 - Fan 2 Speed: 1282 rpm
 - Fan 3 Speed: 1445 rpm
 - Fan 4 Speed: 1468 rpm
- Sync:**

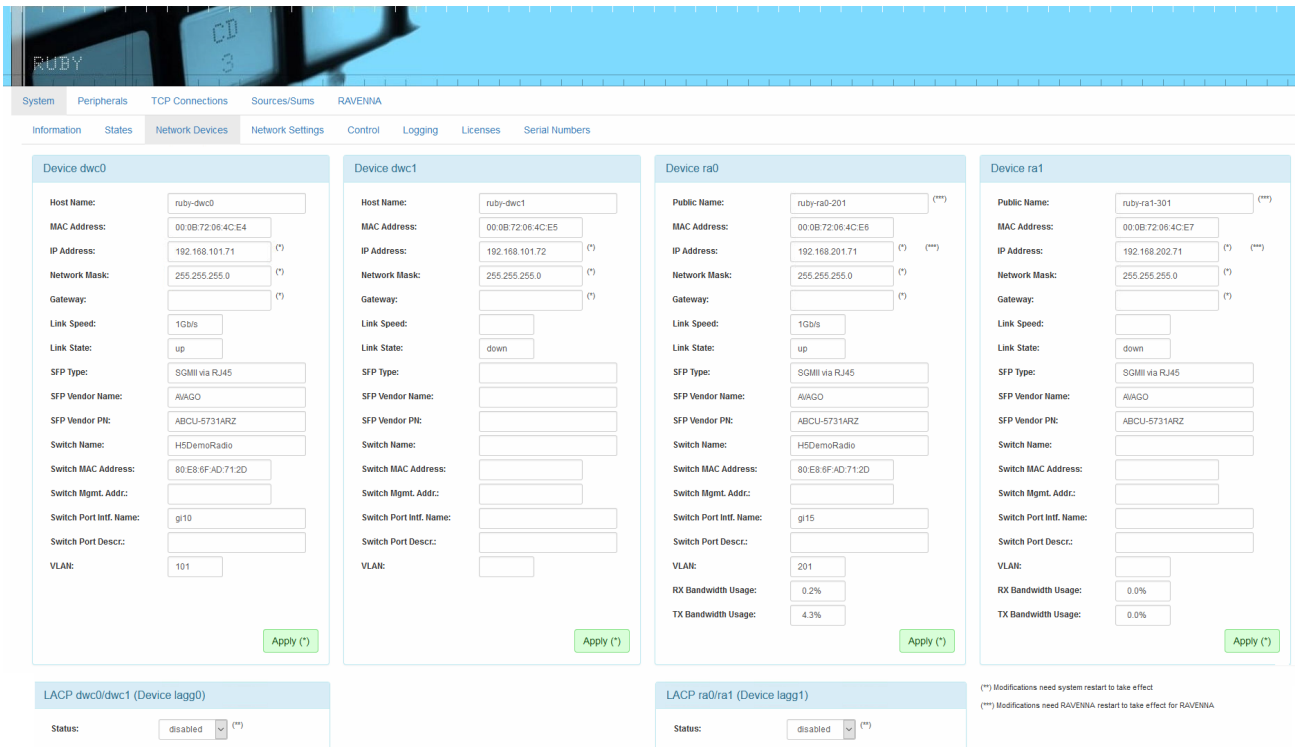
Source	Enabled	Present	Active
PTP	yes	yes	yes
MADI	yes	yes	no
WordClock	yes	no	no
Internal	yes	yes	no

Prio Sequence: PTP - WordClock - MADI
- Audio:**
 - Sampling Rate: 48 kHz
 - Analog Reference Level: 15 dBu
 - Relative System Level: -27 dBFS
 - Digital Reference Level: -9 dBFS

The **States** tab gives information about the physical state of the Power Core hardware. It is for diagnostic use only; there are no editable fields. Information displayed here may be used by Lawo technical support to assist you if needed.

The PTP, MADI and WordClock settings displayed here are defined using the ON-AIR Designer software.

9.3.3 Network Devices Tab



The front panel of Power Core contains four network interfaces, two for control and two for Audio over IP (RAVENNA/AES67). The four "devices" shown on this screen correspond to the ports as follows:

- **Device dwc0** = the CONTROL A port, used for system administration and control.
- **Device dwc1** = the CONTROL B port, usually left unconnected unless you are using LACP (for redundant control).
- **Device ra0** = the RAVENNA/AES67 A port, the first of two AoIP ports.
- **Device ra1** = the RAVENNA/AES67 B port, the second of two AoIP ports.

Each Device section displays the port's Host Name (defined using the ON-AIR Designer software), its MAC address and network IP address and netmask, and gateway (if used). The Link State box shows port connection / activity status.

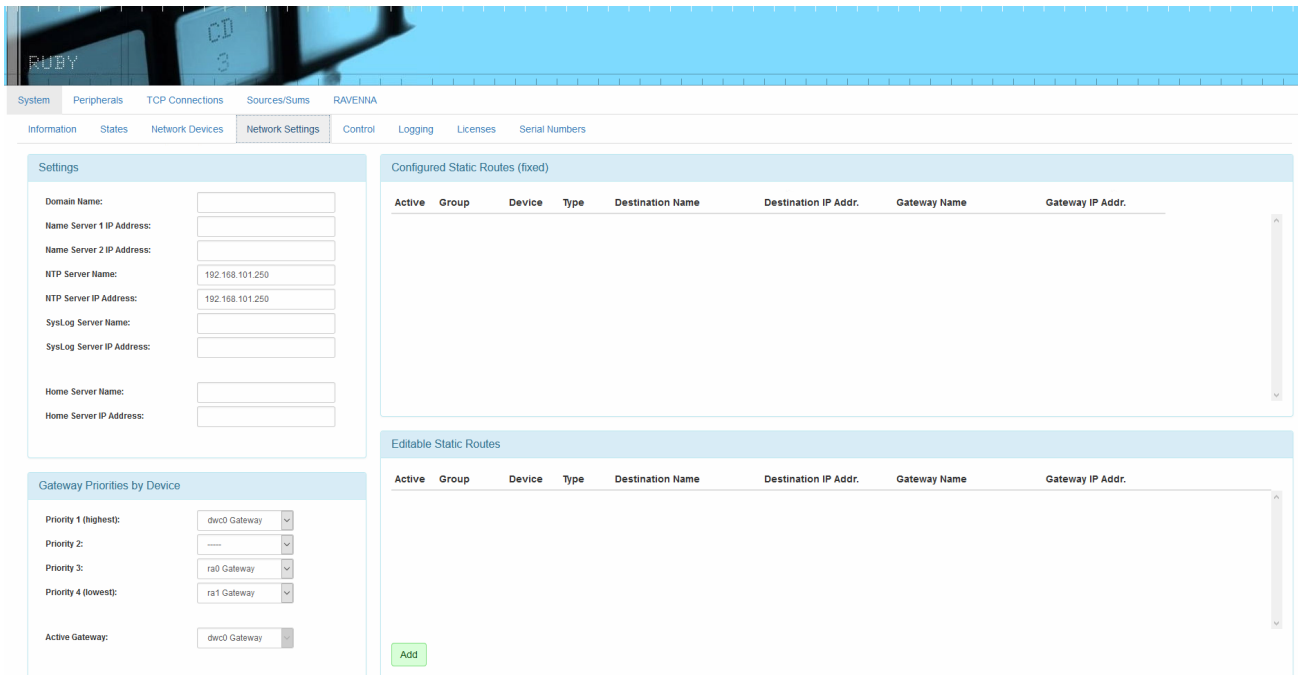
In User mode, all fields are non-editable. Entering Supervisor mode permits changing the IP Address and Network Mask value for each of the three ports, and the Public Name (a friendly name displayed during network searches) of each RAVENNA port.

If any settings are changed, you must click **Apply** to save the changes. IP Address changes are made immediately. If you change the IP Address of **dwc0** then you will lose your browser connection, so enter the device's new IP address into your browser to continue the system administration.

Using LACP

LACP *MUST* be configured in the network switch as well as in Power Core. Otherwise you will not be able to reach Power Core via its CONTROL ports.

9.3.4 Network Settings Tab

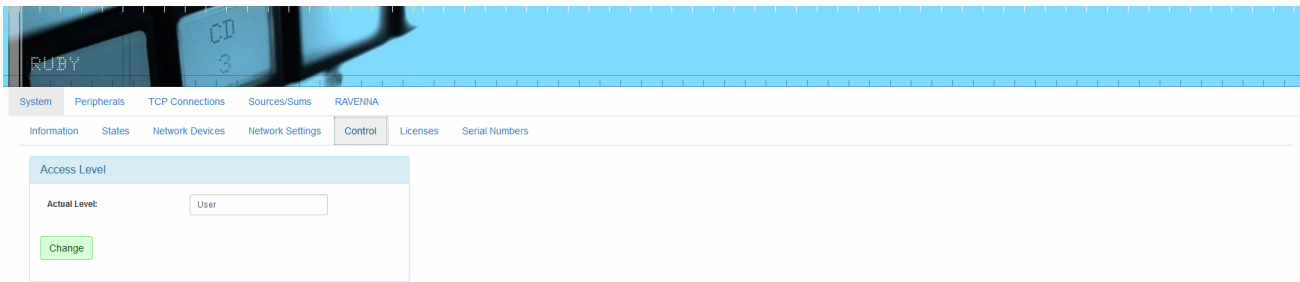


As the name implies, this screen permits access to Power Core's control network settings.

- **Settings.** Using the fields in this box, you can enter the Domain Name of your network and DNS Name Server IP Addresses. In addition, you can configure settings for a NTP, SysLog and Home server.
 - Your NTP server can be configured either by entering its name in the Server Name box, or its IP Address in the Address box. If you type “ntp.internal” in the Server Name box, the IP Address will be automatically filled.
 - Your Syslog and Home server can be configured in a similar manner. Type “syslog.internal” or “home.internal” into the Server Name box to complete the IP address automatically.
- **Gateway Priorities By Device.** These options allow you to determine which of Power Core's front-panel Ethernet ports will be used as the control port should the primary link be interrupted. Priority 1 is generally assigned to the “dwc0” port; use the remaining Priority fields to prioritize fallback ports.
- **Configured Static Routes (fixed).** This area shows any static routes which have been configured for your network (via the Logic -> Static Network Route element).
- **Editable Static Routes.** Here you can add an editable static route by clicking **Add** and completing the dialog box.

If a Home server is defined, then the following information is made available (via MQTT heartbeat): system_type; project_name; project_version; serial_number; ember_target; timestamp; and timestamp_utc. The ember_target is always Provider 1. Therefore, it is mandatory to configure the Ember+ Local Provider (in "System -> Definition -> Parameter = Control Settings" and anything else used by Home) to Provider 1.

9.3.5 Control Tab



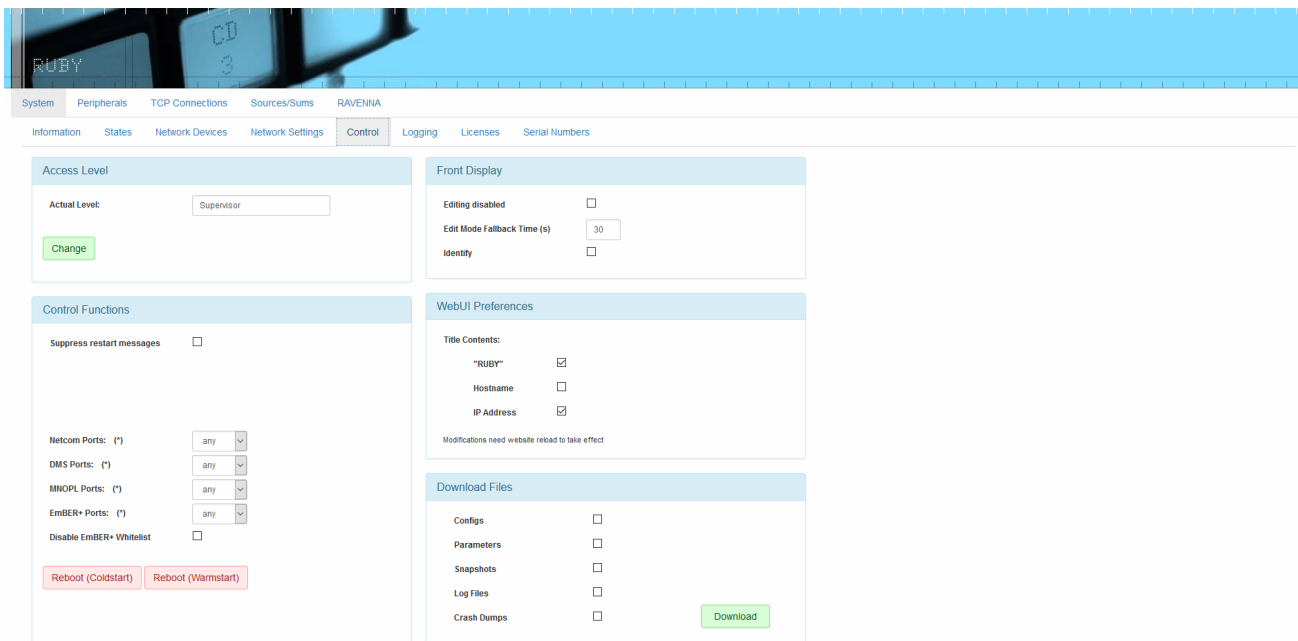
This tab provides access to the control options for the current **Access Level** (user mode).

To change the level, click on the green **Change** button to return to the [Login](#) screen, select a different **Access Level** and enter the **Password**:

- **User** (no password required).
- **Supervisor** (default password = *orion*).
- **Administrator** (default password = *hydra*).

On re-opening the **Control** tab, the new user mode is displayed in the **Actual Level** field.

Supervisor Mode



In **Supervisor** mode, the following sections become visible.

➤ Control Functions

By default, an on-screen message appears whenever the system restarts. You can turn the messages off by checking the "Suppress restart messages" box.

The next four options define which network port(s) can be used for Netcom, DMS, MNOPL and EmBER+ communication. In each case, you can choose either **any** (to allow access via any network port) or **dwc0** (to restrict access to CONTROL A only). Note that if you choose **dwc0**, then the restriction also applies to the local host and so access is not permitted via 127.0.0.1. The default setting for all protocols is **any**.

The Ember+ Whitelist (configured in ON-AIR Designer) can be used to restrict the access to the Ember+ providers so that only devices with a defined IP can talk to Power Core (via Ember+). For convenience, you can turn on the "Disable EmBER+ Whitelist" option to temporarily deactivate the whitelist. This will allow access from consumers with any IP address.

The two red buttons at the bottom of the area can be used to restart the system as follows:

- **Reboot (Coldstart)**. Reboots the unit and loads the base configuration parameters (as defined by the ON-AIR Designer software). This will clear any temporary changes made from the Web UI.
- **Reboot (Warmstart)**. Reboots the unit keeping temporary changes intact.

➤ Front Display

The "Editing disabled" box is checked by default. If unchecked, the unit's IP Address and other settings can be changed using the display and selection knob on the Power Core's front panel. Lawo recommends keeping front panel editing disabled.

When using the front panel controls, inactivity causes the display to return to its normal status. You may set a timeout period for this action by entering a value, in seconds, in the "Edit Mode Fallback Time" field.

The "Identify" box can be used to send a message to the [front panel display](#) so that the Power Core can be easily identified. The message shows the dwc0 IP address.

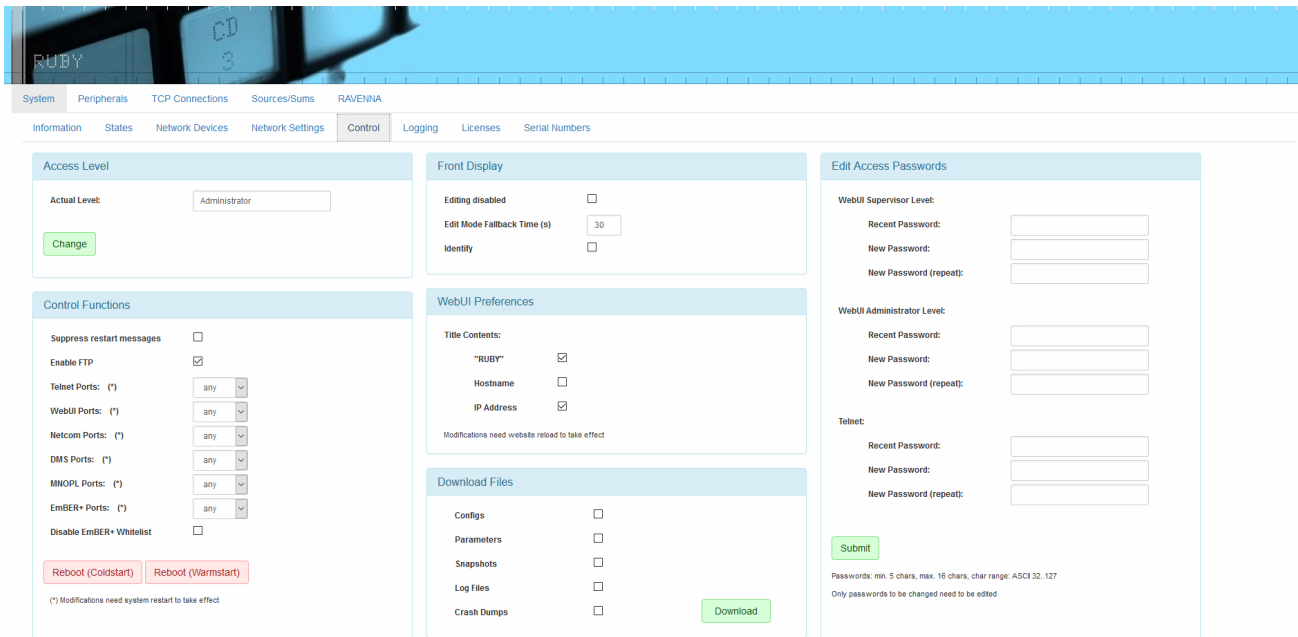
➤ Web UI Preferences

Use these options to adjust what is shown in the browser's "title" for the session.

➤ Download Files

You can use these options to download files from Power Core onto your computer. To proceed, first select the tick boxes and then click on the green **Download** button.

Admininstrator Mode



In **Administrator** mode, you can access all of the Supervisor options plus the following.

➤ **Control Functions**

By default, the “Enable FTP” box is checked to allow file transfers to Power Core via FTP. Uncheck this option to prevent FTP access.

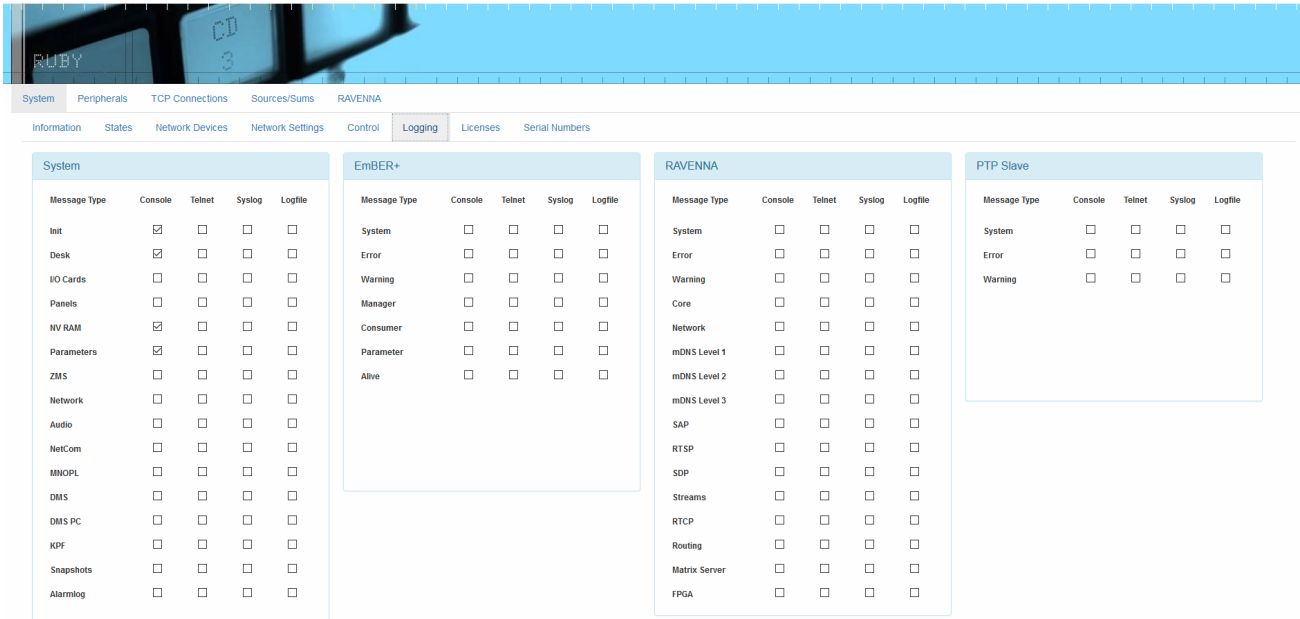
The "Telnet Ports" and "WebUI Ports" are added to the list of network communication protocols. This allows you to restrict Telnet and Web UI access to only the CONTROL A port (**dwc0**) if necessary.

➤ **Edit Access Passwords**

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, character range: ASCII 32..127. Click on **Submit** to apply the changes - an on-screen message appears to confirm (or deny) the operation.

9.3.6 Logging Tab



Message Type	Console	Telnet	Syslog	Logfile
Init	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Desk	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IO Cards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Panels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NV RAM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parameters	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ZMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NetCom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MNOPL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DMS PC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KPF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snapshots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alarmlog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Message Type	Console	Telnet	Syslog	Logfile
System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parameter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

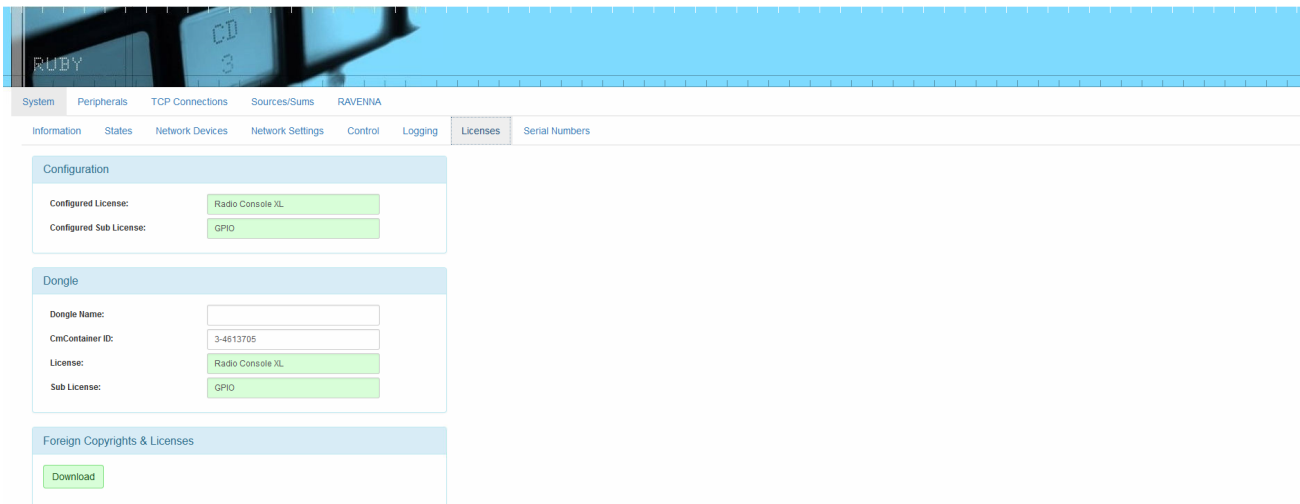
Message Type	Console	Telnet	Syslog	Logfile
System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mDNS Level 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mDNS Level 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mDNS Level 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RTSP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SDP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RTCP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Routing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Matrix Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FPGA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Message Type	Console	Telnet	Syslog	Logfile
System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The options here are used for diagnostics. Please do not change these settings from default unless instructed to do so by Lawo support.

A special serial cable, article number **485-0700-000**, is required to obtain logs from the system. Should this cable be needed, please contact Lawo Support to obtain one. The customer must provide a serial to USB converter if necessary.

9.3.7 License Tab



Configuration

Configured License: Radio Console XL
 Configured Sub License: GPIO

Dongle

Dongle Name:
 CmContainer ID: 3-4613705
 License: Radio Console XL
 Sub License: GPIO

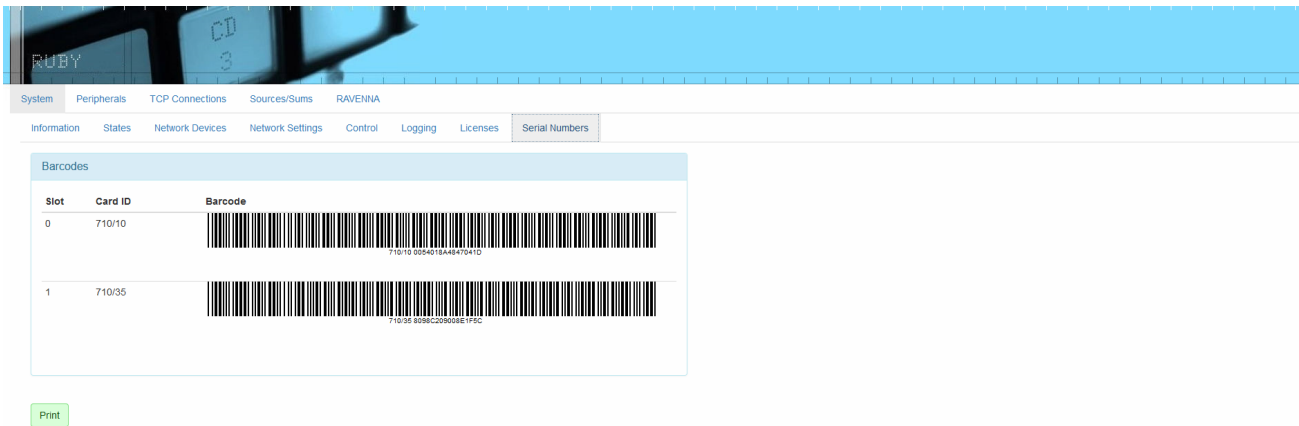
Foreign Copyrights & Licenses

[Download](#)

This tab displays the license configuration of your Power Core, once the license has been installed via the USB dongle. Please see [Licensing](#) for instructions on how to activate and install your Power Core license.

You can use the **Download** button to download copyright and license information to your computer.

9.3.8 Serial Numbers Tab

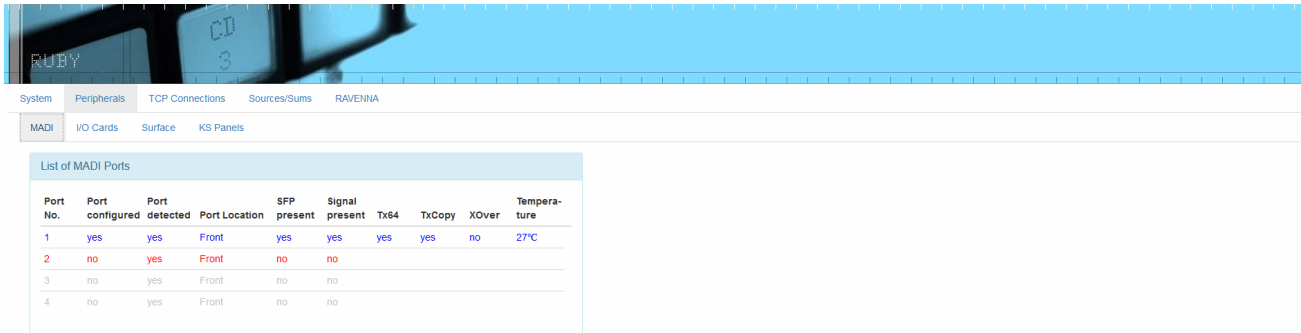


This tab shows the barcodes and serial numbers of the Power Core and any optional I/O cards installed in the Power Core. This may be printed and archived as a part of your system documentation.

9.4 The Peripherals Menu

There are four informational tabs in the Peripherals menu, which display the status of installed hardware extensions and connected ports.

9.4.1 MADI Tab



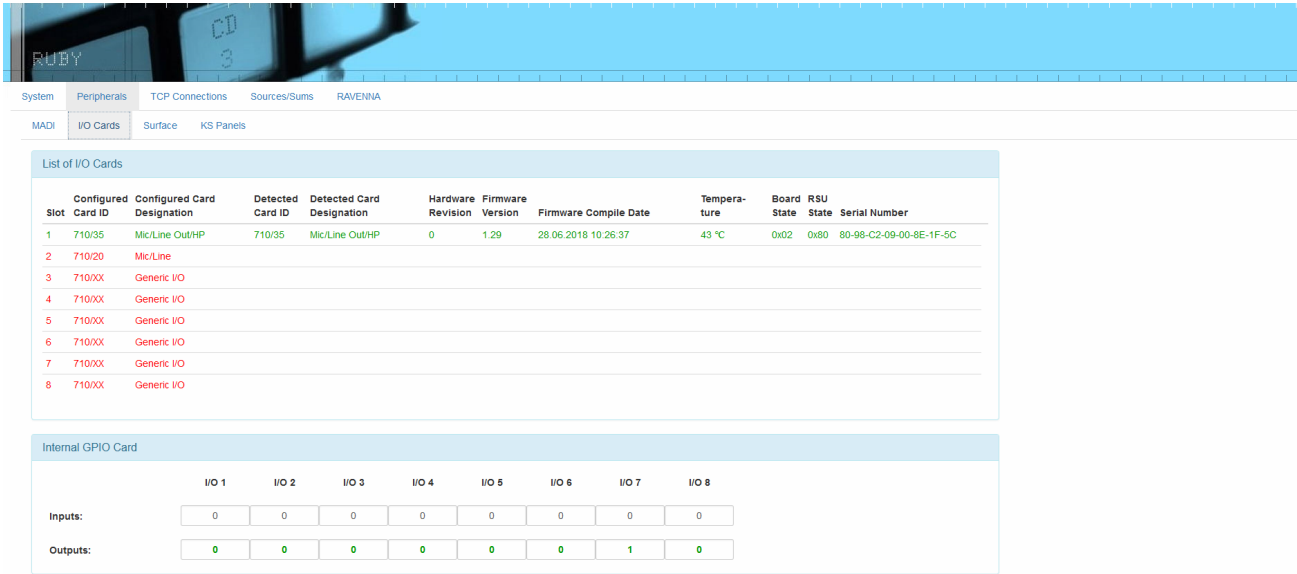
The **MADI** tab gives information on the present state of MADI connections to the Power Core. The ports are color-coded as follows:

Port Color	Meaning
Grey	not configured
Red	signal not present
Green	signal present
Blue	signal present & active
Light Blue	signal present & not active

For each port, you will see the following information:

- **Port Configured:** Shows whether the port has been configured properly using the ON-AIR Designer.
- **Port Detected:** Shows whether the port has been detected correctly by the hardware.
- **Port Location:** Indicates the physical location of the port on the Power Core unit.
- **SFP Present:** Shows whether an SFP connection has been installed on the specified port.
- **Signal Present:** Confirms port signal activity.
- **Tx64:** “Yes” if Tx64 mode is active; blank if Tx56 mode is in use.
- **TxCopy & XOver:** Indicates whether this port is mirrored with another port for signal redundancy. This setting is selected using the ON-AIR Designer software.
- **Temperature:** If an SFP is installed, displays current temperature.

9.4.2 I/O Cards Tab



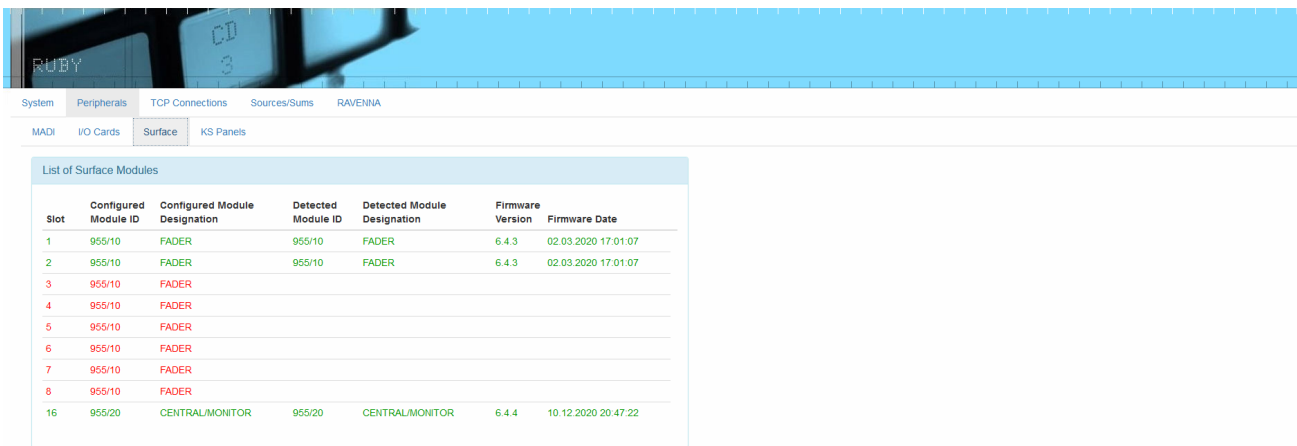
Slot	Configured Card ID	Configured Card Designation	Detected Card ID	Detected Card Designation	Hardware Revision	Firmware Version	Firmware Compile Date	Temperature	Board State	RSU State	Serial Number
1	710/35	MicLine OutHP	710/35	MicLine OutHP	0	1.29	28.06.2018 10:26:37	43 °C	0x02	0x80	80-98-C2-09-00-8E-1F-5C
2	710/20	MicLine									
3	710/XX	Generic I/O									
4	710/XX	Generic I/O									
5	710/XX	Generic I/O									
6	710/XX	Generic I/O									
7	710/XX	Generic I/O									
8	710/XX	Generic I/O									

	I/O 1	I/O 2	I/O 3	I/O 4	I/O 5	I/O 6	I/O 7	I/O 8
Inputs:	0	0	0	0	0	0	0	0
Outputs:	0	0	0	0	0	0	1	0

The top portion of this tab displays optionally-installed I/O cards and their serial numbers, and other information which may be used by Lawo Support for diagnostic purposes. Green indicates an installed, configured and active IO card. Red indicates a slot position which has been defined using the ON-AIR Designer, but which is not physically present in the Power Core frame.

The bottom portion of this tab shows high/low state for each of the built-in GPIO closures.

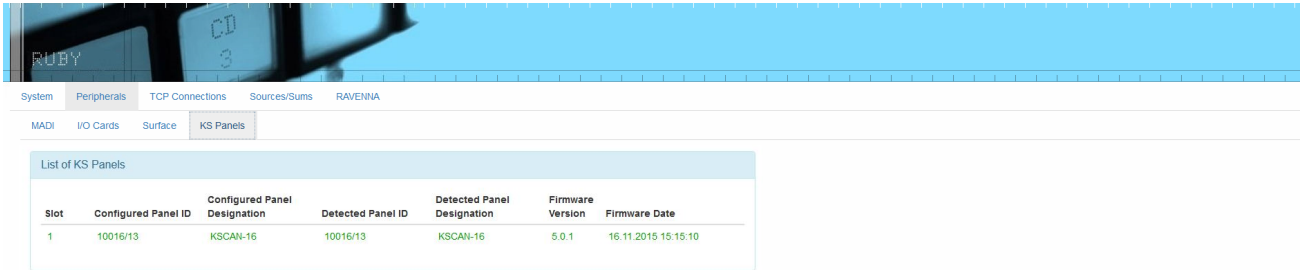
9.4.3 Surface Tab



Slot	Configured Module ID	Configured Module Designation	Detected Module ID	Detected Module Designation	Firmware Version	Firmware Date
1	955/10	FADER	955/10	FADER	6.4.3	02.03.2020 17:01:07
2	955/10	FADER	955/10	FADER	6.4.3	02.03.2020 17:01:07
3	955/10	FADER				
4	955/10	FADER				
5	955/10	FADER				
6	955/10	FADER				
7	955/10	FADER				
8	955/10	FADER				
16	955/20	CENTRAL/MONITOR	955/20	CENTRAL/MONITOR	6.4.4	10.12.2020 20:47:22

This tab lists the modules installed in the connected surface (if applicable) and their firmware versions. Green indicates an installed, configured and active module. Red indicates a module position which has been defined using the ON-AIR Designer, but which is not physically present in or connected to the console frame.

9.4.4 KS Panels Tab

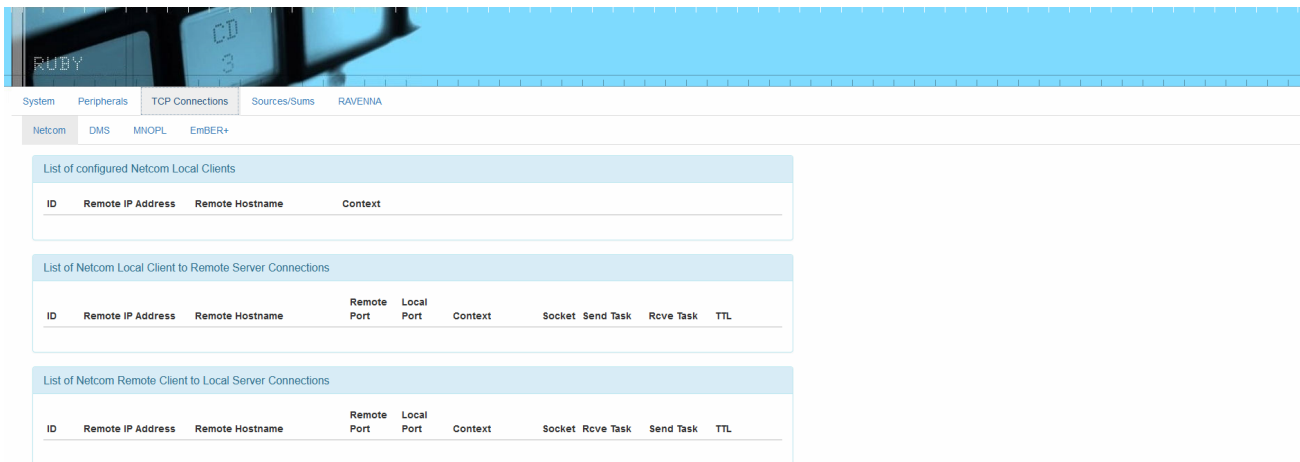


This tab lists any external key panels which are defined in the configuration. Green indicates that the key panel is connected and active. Red indicates a key panel which has been defined using the ON-AIR Designer, but which is not physically present or connected to the CAN bus.

9.5 The TCP Connections Menu

There are four informational tabs in the TCP Connections menu which display network connections to Power Core, and the state of those connections.

9.5.1 Netcom Tab

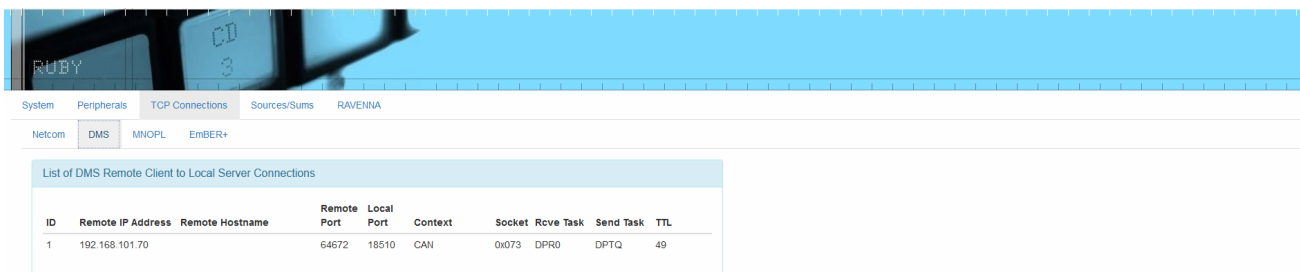


The screenshot shows the 'Netcom' tab selected. It contains three tables:

- List of configured Netcom Local Clients:** A table with columns: ID, Remote IP Address, Remote Hostname, Context.
- List of Netcom Local Client to Remote Server Connections:** A table with columns: ID, Remote IP Address, Remote Hostname, Remote Port, Local Port, Context, Socket, Send Task, Rcv Task, TTL.
- List of Netcom Remote Client to Local Server Connections:** A table with columns: ID, Remote IP Address, Remote Hostname, Remote Port, Local Port, Context, Socket, Rcv Task, Send Task, TTL.

This tab displays systems connected via Netcom, such as GPIO connections made via GNET (GPIO Network).

9.5.2 DMS Tab

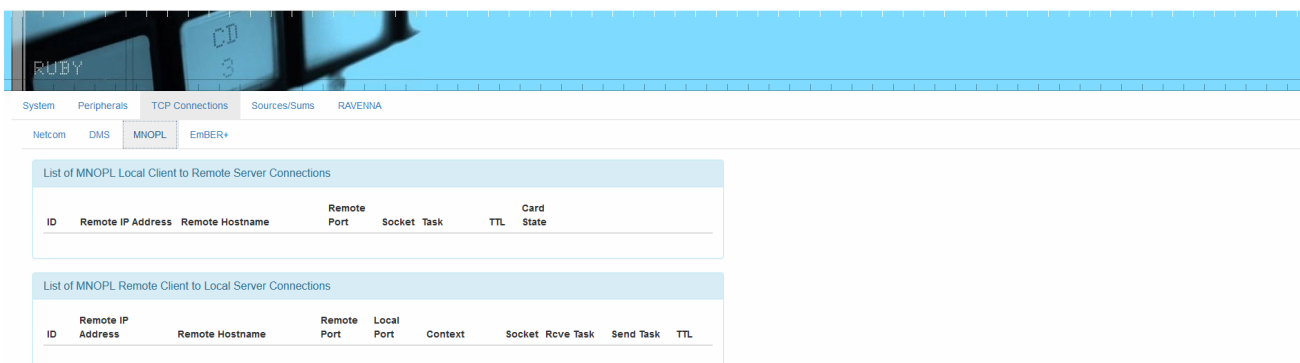


The screenshot shows the 'DMS' tab selected. It contains one table:

- List of DMS Remote Client to Local Server Connections:** A table with columns: ID, Remote IP Address, Remote Hostname, Remote Port, Local Port, Context, Socket, Rcv Task, Send Task, TTL. One row is visible with ID 1, Remote IP Address 192.168.101.70, Remote Hostname, Remote Port 64672, Local Port 18510, Context CAN, Socket 0x073, Rcv Task DPR0, Send Task DPTQ, and TTL 49.

This tab displays systems connected via DMS, for example VisTool PCs.

9.5.3 MNOPL Tab

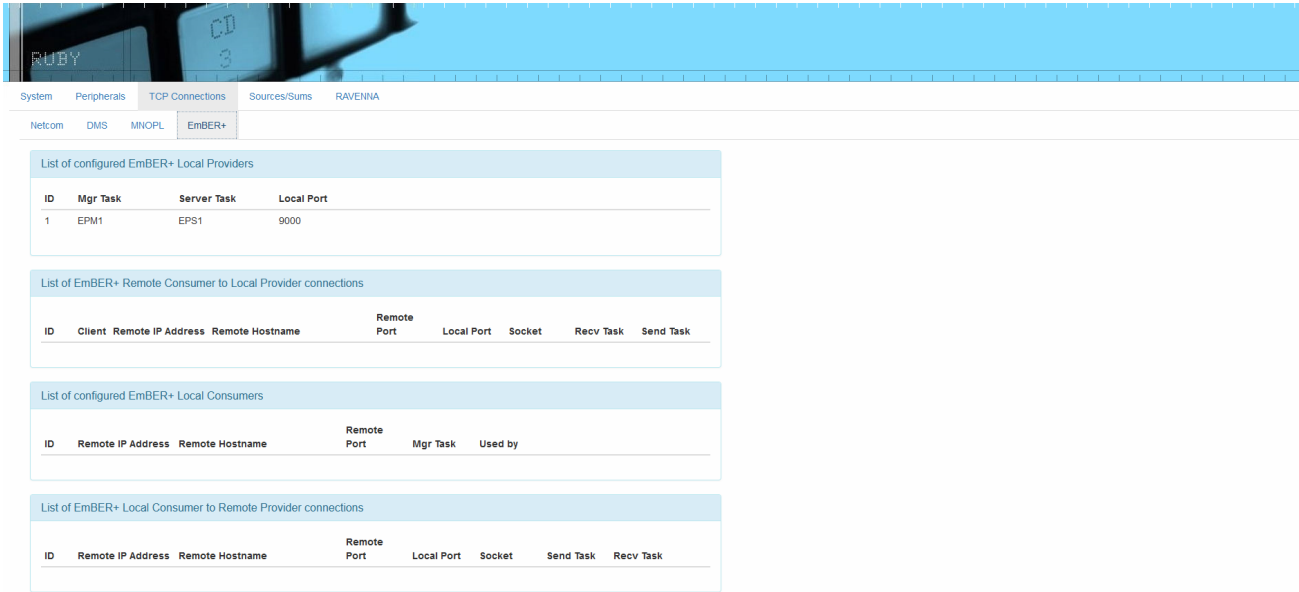


The screenshot shows the 'MNOPL' tab selected. It contains two tables:

- List of MNOPL Local Client to Remote Server Connections:** A table with columns: ID, Remote IP Address, Remote Hostname, Remote Port, Socket, Task, TTL, Card State.
- List of MNOPL Remote Client to Local Server Connections:** A table with columns: Remote IP Address, Remote Hostname, Remote Port, Local Port, Context, Socket, Rcv Task, Send Task, TTL.

This tab displays systems connected via MNOPL, such as Lawo's Nova series of routers.

9.5.4 Ember+ Tab



The screenshot shows the Ember+ configuration page with the following sections:

- List of configured Ember+ Local Providers**

ID	Mgr Task	Server Task	Local Port
1	EPM1	EPS1	9000
- List of Ember+ Remote Consumer to Local Provider connections**

ID	Client	Remote IP Address	Remote Hostname	Remote Port	Local Port	Socket	Recv Task	Send Task
- List of configured Ember+ Local Consumers**

ID	Remote IP Address	Remote Hostname	Remote Port	Mgr Task	Used by
- List of Ember+ Local Consumer to Remote Provider connections**

ID	Remote IP Address	Remote Hostname	Remote Port	Local Port	Socket	Send Task	Recv Task

This tab displays Ember+ control connections to other devices on the network.

9.6 The Sources / Sums Menu

Sys No.	Name	Type	Display Name	Alias Name	List Enabled	Access Enables	Access Group	Access States	Fader No.	Sum No.	EQ No.	DYN No.	DSS No.	LIM No.	DEL No.	INS No.	EQ En.	DYN En.	DSS En.	LIM En.	DEL En.	EmBER+ Provider No.	RAVENNA Pool No.
2	SRC_MIC 01	mono	MIC 01		Y	1---	1	----	1	96	128	128	128	128	--	Y	Y	Y	Y	Y	1	--	
3	SRC_INPUT 01	stereo	IN 01		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
4	SRC_INPUT 02	stereo	IN 02		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
5	SRC_INPUT 03	stereo	IN 03		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
6	SRC_INPUT 04	stereo	IN 04		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
7	SRC_INPUT 05	stereo	IN 05		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
8	SRC_INPUT 06	stereo	IN 06		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
9	SRC_INPUT 07	stereo	IN 07		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
10	SRC_INPUT 08	stereo	IN 08		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
11	SRC_INPUT 09	stereo	IN 09		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
12	SRC_INPUT 10	stereo	IN 10		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
13	SRC_INPUT 11	stereo	IN 11		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
14	SRC_INPUT 12	stereo	IN 12		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
15	SRC_INPUT 13	stereo	IN 13		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--
16	SRC_INPUT 14	stereo	IN 14		Y	1---	--	----	--	--	--	--	--	--	--	--	Y	Y	Y	Y	Y	1	--

The **Sources/Sums** tabs provide a comprehensive listing of Power Core’s input sources and summing buses:

- **Sources** shows configured sources, whether they are actively assigned to a fader on the surface, which fader they are assigned to, and whether DSP has been applied.
- **Sums** lists all of the configured summing buses, each bus’ name, channel configuration, whether it is assigned to a fader on the surface, and whether DSP has been applied.

Inp. Sys No.	Source Name	Fader No.
1	---	-
2	---	-
3	---	-
4	---	-
5	---	-
6	---	-
7	---	-
8	---	-
9	---	-
10	---	-
11	---	-
12	---	-
13	---	-
14	---	-
15	---	-
16	---	-
17	---	-
18	---	-
19	---	-
20	---	-
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68	---	-
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72	---	-
73	---	-
74	---	-
75	---	-
76	---	-
77	---	-
78	---	-
79	---	-
80	---	-
81	---	-
82	---	-
83	---	-
84	---	-
85	---	-
86	---	-
87	---	-
88	---	-
89	67 MIC 08	12
90	66 MIC 07	11
91	65 MIC 06	10
92	64 MIC 05	9
93	63 MIC 04	4
94	62 MIC 03	3
95	61 MIC 02	2
96	2 MIC 01	1

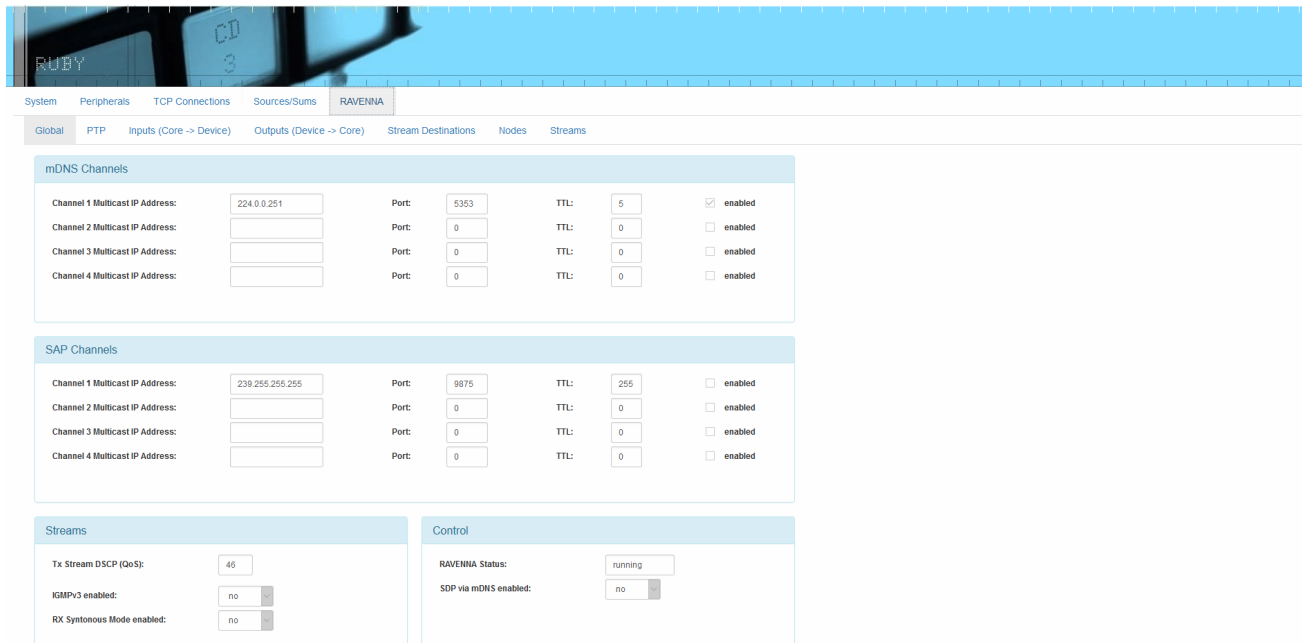
Allocated Sum Inputs Count: Maximum:

The **Sum Inputs** tab lists the available summing points and shows how they are utilised. The **Maximum** number of parallel mix inputs is determined by your Power Core license.

9.7 The RAVENNA Menu

The RAVENNA menu contains seven tabs. Most of these are informational in nature, although it is possible to change a few options in some of the tabs. The information can be used for troubleshooting and to determine the presence and activity of configured streams.

9.7.1 Global Tab



mDNS Channels						
Channel 1 Multicast IP Address:	<input type="text" value="224.0.0.251"/>	Port:	<input type="text" value="5353"/>	TTL:	<input type="text" value="5"/>	<input checked="" type="checkbox"/> enabled
Channel 2 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled
Channel 3 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled
Channel 4 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled

SAP Channels						
Channel 1 Multicast IP Address:	<input type="text" value="239.255.255.255"/>	Port:	<input type="text" value="9875"/>	TTL:	<input type="text" value="255"/>	<input type="checkbox"/> enabled
Channel 2 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled
Channel 3 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled
Channel 4 Multicast IP Address:	<input type="text"/>	Port:	<input type="text" value="0"/>	TTL:	<input type="text" value="0"/>	<input type="checkbox"/> enabled

Streams	
Tx Stream DSCP (QoS):	<input type="text" value="46"/>
IGMPv3 enabled:	<input type="text" value="no"/>
RX Synthes Mode enabled:	<input type="text" value="no"/>

Control	
RAVENNA Status:	<input type="text" value="running"/>
SDP via mDNS enabled:	<input type="text" value="no"/>

The **Global** tab displays Power Core's global RAVENNA settings. The parameters are configured by the ON-AIR Designer; there are no editable fields.

➤ mDNS / SAP Channels

The first two areas define the mDNS and SAP channels used for stream announcement:

- **mDNS Channels** use the multicast Domain Name System defined in IETF RFC 6762.
- **SAP Channels** use the Session Announcement Protocol defined in IETC RFC 2974.

For each channel, you will see the "Multicast IP Address", "Port" number and "TTL" value (in seconds). The "enabled" checkbox shows if the channel is enabled or disabled.

➤ Streams

This area shows the global options for streams.

➤ Control

Here you will see the status of the RAVENNA service and the global options for control.

9.7.2 PTP Tab

This tab shows statistics and options pertaining to your system's PTP clocking.

➤ Configuration / Control

This area defines the PTP mode and associated parameters as defined by the ON-AIR Designer. Power Core supports two possible PTP modes: slave only and master-slave. If **Slave only** is enabled, then Power Core is forced to operate as a PTP slave at all times. If **Slave only** is disabled, then Power Core will operate in PTP master-slave mode, whereby the PTP priorities set within the device itself and all other streaming nodes determine the current PTP master.

For convenience, you may enter new temporary PTP settings. However, for permanent changes it is recommended to edit the base configuration using the ON-AIR Designer. Any temporary changes require a PTP restart to take effect.

➤ Slave-Only Engine

The two graphs in this area monitor PTP jitter across the system. This is useful for system analysis and debugging in conjunction with a Lawo Support technician. As a rule of thumb, the "Clock Connection Value" display should be stable with little variance over time as an indication of good system health. High activity in the "Time Difference" display is normal and to be expected.

For Power Core to sync correctly to PTP, PTP 2-step must be used (as opposed to PTP 1-step). In PTP 2-step, the time stamp message is sent separately after the sync message. This allows devices such as Power Core to calculate the network delay of the route.

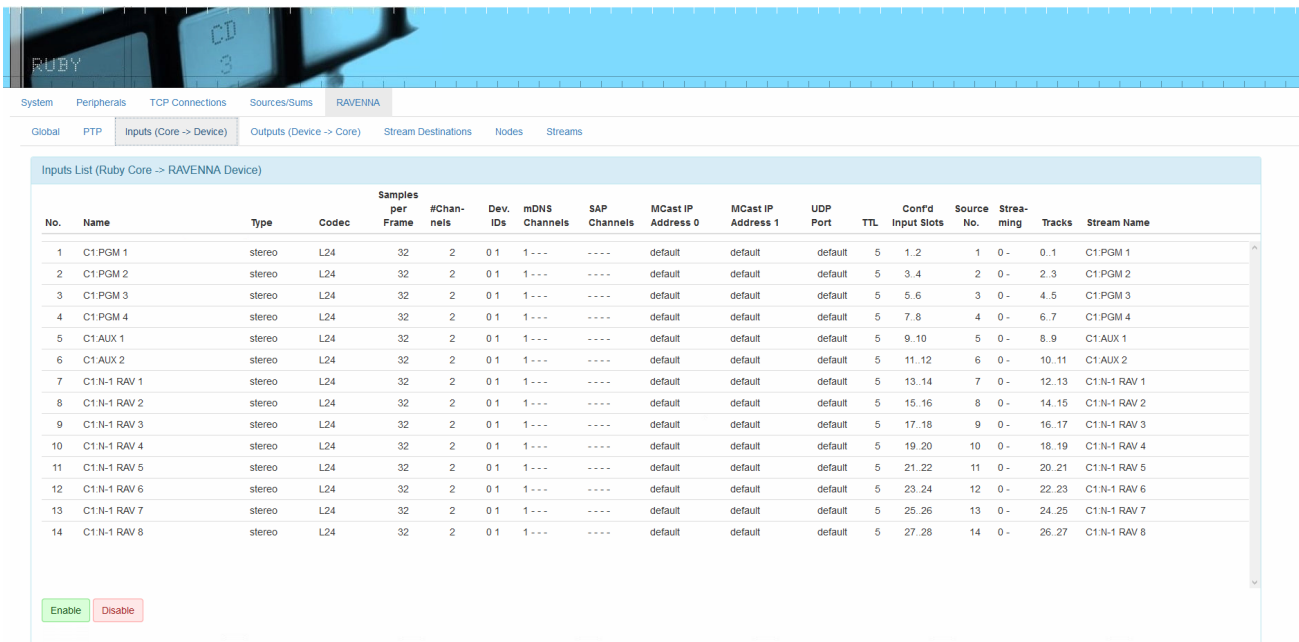
➤ Global Data

This area shows the system's PTP mode, the active clock ID and address, and the grandmaster clock ID. These IDs may differ if your system uses a boundary clock.

➤ Master-Slave Engine

This area shows whether the master-slave engine is active, and displays the clock ID if this mode is enabled.

9.7.3 Inputs Tab



The screenshot shows the RUBY web interface with the 'Inputs (Core -> Device)' tab selected. The main content area displays a table titled 'Inputs List (Ruby Core -> RAVENNA Device)'. The table lists 14 RAVENNA streams with various parameters. At the bottom of the table, there are 'Enable' and 'Disable' buttons.

No.	Name	Type	Codec	Samples per Frame	#Channels	Dev. IDs	mDNS Channels	SAP Channels	MCast IP Address 0	MCast IP Address 1	UDP Port	TTL	Conf'd Input Slots	Source No.	Streaming	Tracks	Stream Name
1	C1:PGM 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	1.2	1	0 -	0..1	C1:PGM 1
2	C1:PGM 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	3.4	2	0 -	2.3	C1:PGM 2
3	C1:PGM 3	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	5.6	3	0 -	4.5	C1:PGM 3
4	C1:PGM 4	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	7.8	4	0 -	6.7	C1:PGM 4
5	C1:AUX 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	9..10	5	0 -	8.9	C1:AUX 1
6	C1:AUX 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	11..12	6	0 -	10.11	C1:AUX 2
7	C1:N-1 RAV 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	13..14	7	0 -	12..13	C1:N-1 RAV 1
8	C1:N-1 RAV 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	15..16	8	0 -	14.15	C1:N-1 RAV 2
9	C1:N-1 RAV 3	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	17..18	9	0 -	16.17	C1:N-1 RAV 3
10	C1:N-1 RAV 4	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	19..20	10	0 -	18.19	C1:N-1 RAV 4
11	C1:N-1 RAV 5	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	21..22	11	0 -	20.21	C1:N-1 RAV 5
12	C1:N-1 RAV 6	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	23..24	12	0 -	22.23	C1:N-1 RAV 6
13	C1:N-1 RAV 7	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	25..26	13	0 -	24.25	C1:N-1 RAV 7
14	C1:N-1 RAV 8	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	27..28	14	0 -	26.27	C1:N-1 RAV 8

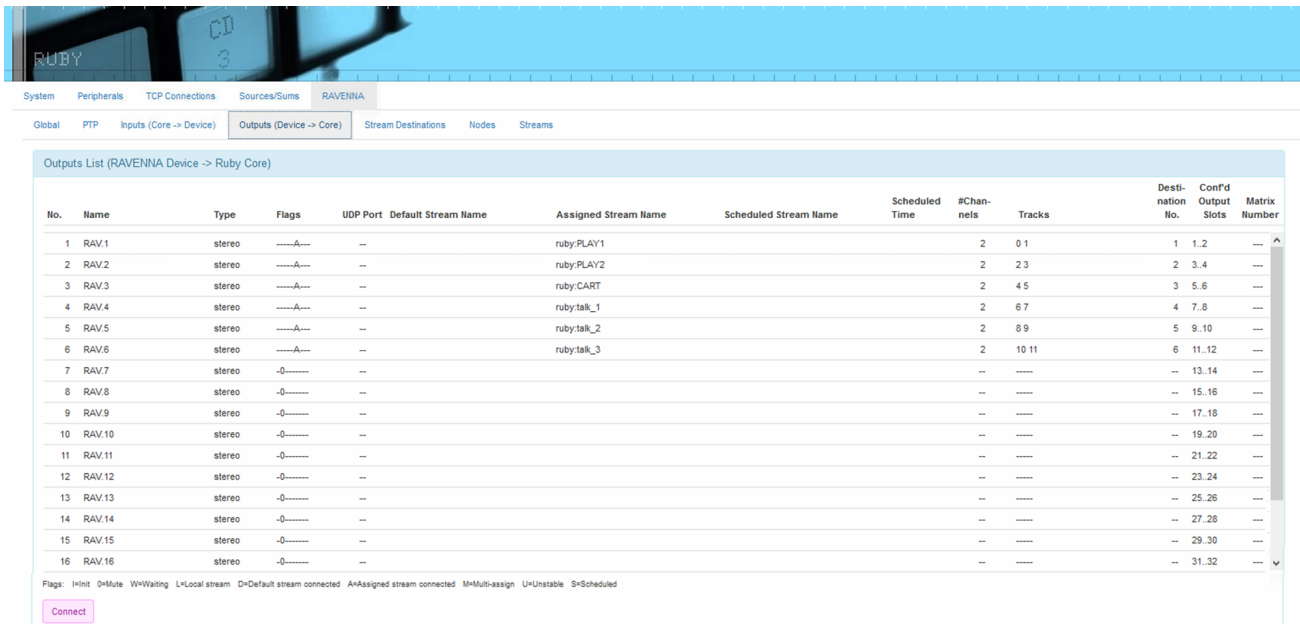
This tab lets you view all of the local RAVENNA streams supplied by Power Core to external devices. The parameters are configured by the ON-AIR Designer; there are no editable fields.

Stream information includes the number of audio channels, codec type used, audio sample rate, RAVENNA announcement protocol used, multicast stream address, UDP port number, stream TTL value (in seconds), the input slots of the RAVENNA device, and the Track numbers of RAVENNA streams being output by Power Core.

The “Streaming” column shows whether streams are in fact actually being transmitted from Power Core’s RAVENNA interfaces; “0” value corresponds to front-panel port **ra0**, and “1” corresponds to port **ra1**. If both numerals are present, this indicates that the RAVENNA channel is streaming from both front panel ports.

At the bottom of the page, the **Enable** and **Disable** buttons can be used to manually start and stop RAVENNA streams. They should be used for troubleshooting only, and not for controlling stream outputs while on-air. In each case, the button opens a pop-up window where you can select the stream you wish to enable or disable. If all streams are in the opposite state, then the Input Name selector list will be empty.

9.7.4 Outputs Tab



No.	Name	Type	Flags	UDP Port	Default Stream Name	Assigned Stream Name	Scheduled Stream Name	Scheduled Time	#Channels	Tracks	Destination No.	Conf'd Output Slots	Matrix Number
1	RAV.1	stereo	----A---	--		ruby:PLAY1			2	0 1	1	1.2	---
2	RAV.2	stereo	----A---	--		ruby:PLAY2			2	2 3	2	3.4	---
3	RAV.3	stereo	----A---	--		ruby:CART			2	4 5	3	5.6	---
4	RAV.4	stereo	----A---	--		ruby:talk_1			2	6 7	4	7.8	---
5	RAV.5	stereo	----A---	--		ruby:talk_2			2	8 9	5	9.10	---
6	RAV.6	stereo	----A---	--		ruby:talk_3			2	10 11	6	11.12	---
7	RAV.7	stereo	-0-----	--					--	-----	--	13.14	---
8	RAV.8	stereo	-0-----	--					--	-----	--	15.16	---
9	RAV.9	stereo	-0-----	--					--	-----	--	17.18	---
10	RAV.10	stereo	-0-----	--					--	-----	--	19.20	---
11	RAV.11	stereo	-0-----	--					--	-----	--	21.22	---
12	RAV.12	stereo	-0-----	--					--	-----	--	23.24	---
13	RAV.13	stereo	-0-----	--					--	-----	--	25.26	---
14	RAV.14	stereo	-0-----	--					--	-----	--	27.28	---
15	RAV.15	stereo	-0-----	--					--	-----	--	29.30	---
16	RAV.16	stereo	-0-----	--					--	-----	--	31.32	---

Flags: I=Init D=Mute W=Waiting L=Local stream D=Default stream connected A=Assigned stream connected M=Multi-assign U=Unstable S=Scheduled

Connect

This tab lets you view all of the streams from your RAVENNA network which are being consumed by your Power Core. The parameters are configured by the ON-AIR Designer; there are no editable fields. Of particular note are:

- **Name & Type** show the name and format of the RAVENNA input (i.e. the receiver for the stream).
- **Flags** show information about stream stability and availability. There is a key at the bottom of the page which explains the meaning of each flag.
- **Default Stream Name** shows the name of the stream you wish to subscribe to.
- **Assigned Stream Name** shows the name of the assigned stream following a successful subscription.
- **Scheduled Stream Name** shows the name of the scheduled stream (if make-before-break is enabled for the receiver).

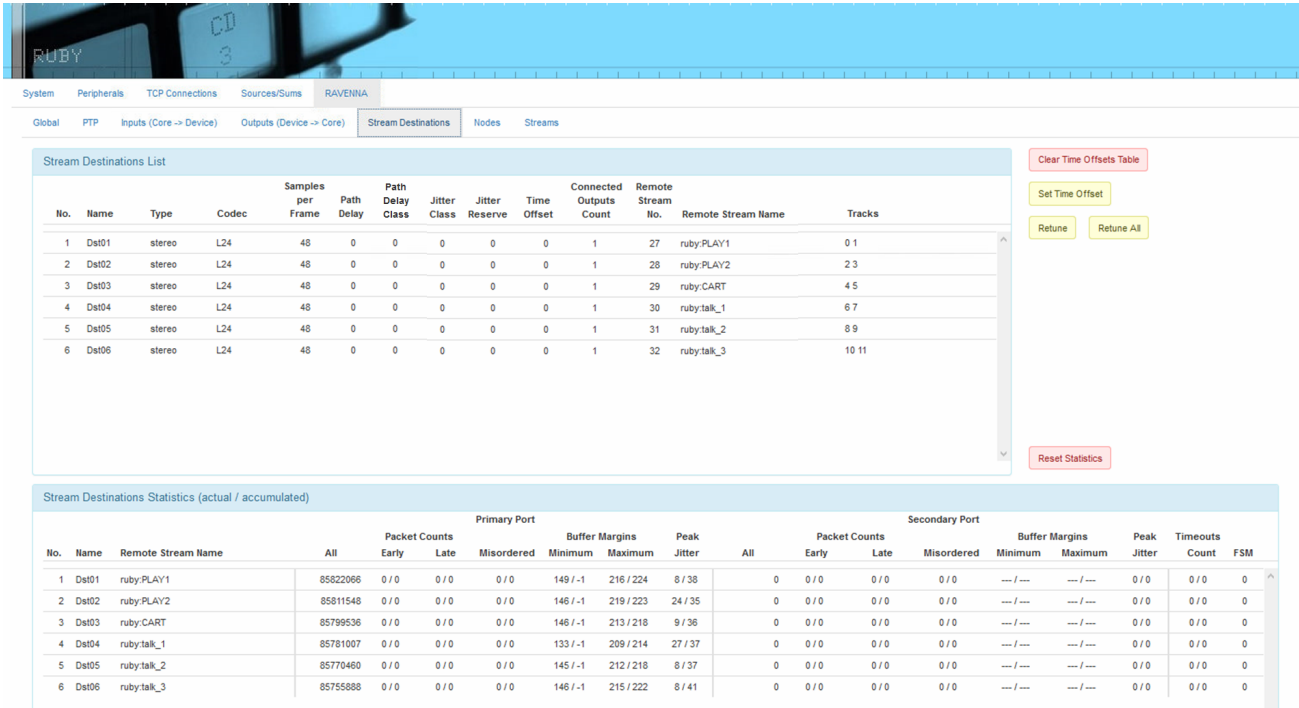
The Default Stream Name is optional and can be used to permanently link the receiver to a stream. If a matching stream name is found, the receiver will automatically subscribe to it. In this instance, you will see the same name in both columns. If a Default Stream name is not entered, then a stream subscription must be established using a different method. For example, by selecting a pool source on the console surface; using internal logic or external control via Ember+; or by manually connecting a stream via the **Connect** button.

Other information includes the UDP Port number, the number of Channels and Track numbers in use.

Clicking on a name in the "Name" column opens a pop-up window containing further information about the receiver and its connected stream.

At the bottom of the page, the **Connect** button can be used to connect an incoming stream from the network to one of the configured RAVENNA inputs. It should be used for troubleshooting only, and not as an operational tool while on-air. The button opens a pop-up window where you can select the RAVENNA input you wish to assign, followed by the stream you wish to subscribe to. The list of available streams is determined by the mDNS or SAP channel announcement.

9.7.5 Stream Destinations Tab



Stream Destinations List

No.	Name	Type	Codec	Samples per Frame	Path Delay	Path Delay Class	Jitter Class	Jitter Reserve	Time Offset	Connected Outputs Count	Remote Stream No.	Remote Stream Name	Tracks
1	Dst01	stereo	L24	48	0	0	0	0	0	1	27	ruby:PLAY1	0 1
2	Dst02	stereo	L24	48	0	0	0	0	0	1	28	ruby:PLAY2	2 3
3	Dst03	stereo	L24	48	0	0	0	0	0	1	29	ruby:CART	4 5
4	Dst04	stereo	L24	48	0	0	0	0	0	1	30	ruby:talk_1	6 7
5	Dst05	stereo	L24	48	0	0	0	0	0	1	31	ruby:talk_2	8 9
6	Dst06	stereo	L24	48	0	0	0	0	0	1	32	ruby:talk_3	10 11

Stream Destinations Statistics (actual / accumulated)

No.	Name	Remote Stream Name	Primary Port				Secondary Port				Peak Jitter	Timeouts Count	FSM	
			All	Early	Late	Misordered	All	Early	Late	Misordered				
1	Dst01	ruby:PLAY1	85822066	0 / 0	0 / 0	0 / 0	149 / -1	216 / 224	8 / 38	0	0 / 0	0 / 0	0 / 0	0
2	Dst02	ruby:PLAY2	85811548	0 / 0	0 / 0	0 / 0	146 / -1	219 / 223	24 / 35	0	0 / 0	0 / 0	0 / 0	0
3	Dst03	ruby:CART	85799536	0 / 0	0 / 0	0 / 0	146 / -1	213 / 218	9 / 36	0	0 / 0	0 / 0	0 / 0	0
4	Dst04	ruby:talk_1	85781007	0 / 0	0 / 0	0 / 0	133 / -1	209 / 214	27 / 37	0	0 / 0	0 / 0	0 / 0	0
5	Dst05	ruby:talk_2	85770460	0 / 0	0 / 0	0 / 0	145 / -1	212 / 218	8 / 37	0	0 / 0	0 / 0	0 / 0	0
6	Dst06	ruby:talk_3	85755888	0 / 0	0 / 0	0 / 0	146 / -1	215 / 222	8 / 41	0	0 / 0	0 / 0	0 / 0	0

This tab shows the statistics for all of the stream destinations which are in use (i.e. all subscribed streams). It can be used to view information about stream latency and stability, and to “retune” streams which are not performing properly.

➤ Stream Destinations List

This section shows information pertaining to individual RAVENNA streams. Data includes the number of audio channels, codec used, sample rate, number of subscribers listening to the stream, the Remote Stream name and number, and the numerical designations for the audio channels supplied. Streams with blank Remote Stream Name values are inactive or unavailable.

Of particular note are the Jitter Class, Path Delay Class and Time Offset values which are applied during [stream tuning](#).

The Time Offsets for all streams can be cleared by clicking on the **Clear Time Offsets Table** button.

The **Set Time Offset**, **Retune** and **Retune All** buttons can be used to manually retune streams (as described [later](#)).

➤ Stream Destinations Statistics

This section provides statistics that report on the health of the received Primary and Secondary streams. Data includes the Packet Count, Early, Late and Misordered Packets, Buffer Margins and Peak Jitter.

Of particular importance are the Primary Early Packets Count and Primary Late Packets Count. If large numbers are seen in these columns, along with degraded audio performance, the stream should be retuned to fix the problem.

The stream statistics can be cleared by clicking on the **Reset Statistics** button.

Stream Tuning

Each time a stream connects it goes through an automatic "tuning" process whereby a Time Offset is applied to compensate for network latency and jitter.

The Time Offset is calculated as follows:

$$\text{Time Offset} = \text{Samples per Frame (packet size)} + \text{Path Delay} + \text{Jitter Reserve}$$

where the Jitter Reserve is determined by the following ON-AIR Designer parameters:

$$\text{Jitter Reserve} = \text{Time-Offset Base Margin} + \text{Time Offset Addition (for Jitter Class)} + \text{Time Offset Addition (for Path Delay Class)}$$

Power Core supports five jitter classes, where Class 1 is for low-jitter devices (such as a ruby / Power Core), and Class 5 is for high-jitter devices (such as a R3LAY PC with a RAVENNA virtual sound card). Similarly, there are five path delay classes, where Class 1 is for close network nodes (connected to the same switch), and Class 5 is for distant network nodes (passing through several switches or routers). The class allocation is dependent on the Jitter and Path Delay values measured by the receiver (shown in the Stream Destinations Statistics). The resultant Jitter Class, Path Delay Class, Jitter Reserve and Time Offset values are all shown in the Stream Destinations List.

The screenshots below illustrate the following example:

$$\text{Time Offset (57)} = \text{Samples per Frame (48)} + \text{Path Delay (6)} + \text{Jitter Reserve (3)}$$

ON-AIR Designer: "System -> Definition" RAVENNA parameters

Web UI (RAVENNA -> Stream Destinations List)

Stream Destinations List													
No.	Name	Type	Codec	Samples per Frame	Path Delay	Path Delay Class	Jitter Class	Jitter Reserve	Time Offset	Connected Outputs Count	Remote Stream No.	Remote Stream Name	Tracks
1	Dst01	stereo	L24	48	6	1	1	3	57	1	1527	SRV1 PTG:var	0 1
2	Dst02	stereo	L24	48	6	1	1	3	57	1	1449	SRV2 PTG:var	2 3

High Time Offset values mean high latency which may affect stream performance.

Retuning Streams

If changes are made to the network infrastructure after the initial tuning process, then the Jitter Class, Path Delay Class and Time Offset values may no longer be correct. In this instance, audio from the RAVENNA streams may be degraded or inaudible, and you should manually retune the streams as follows:

- **Retune** - select this button to individually retune a stream.
- **Retune All** - select this button to retune all streams.
- **Set Time Offset** - this button allows manual entry of a Time Offset for a single selected stream. This is an advanced function which should only be used when instructed by Lawo Support personnel. Values entered using this button are cleared after every reboot.

The retuning process goes through three phases which are displayed on-screen. If audio on a selected stream was not previously present, it should be restored immediately. Once 8 has been reached, retuning is complete and the stream's new **Time Offset** value is shown in the Stream Destinations List.

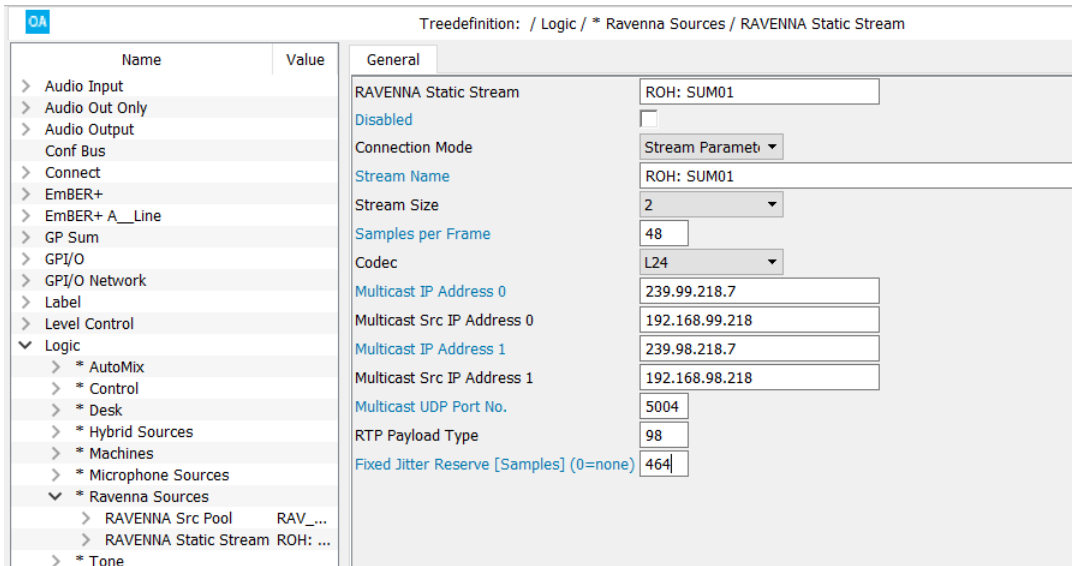
If Power Core is NOT set to slave only in the [PTP Engine](#), streams are retuned on every reconnect.

Stream Tuning Options

➤ Defining a Fixed Time Offset

By configuring a RAVENNA Static Stream element, it is possible to define a fixed Time Offset using the **Fixed Jitter Reserve** field:

Logic -> RAVENNA Static Stream



Once a non-zero value is entered, a fixed Time Offset is applied (instead of automatic or manual tuning). The value entered must include the path delay and desired minimum buffer margin as follows:

Fixed Jitter Reserve = Path Delay + minimum Buffer Margin.

The resulting Time Offset is then calculated from the configured value and the packet size of the incoming stream:

Time Offset = Samples per Frame (packet size) + Fixed Jitter Reserve

If you want to define a fixed playout time, you have to subtract the packet size from the fixed jitter reserve.

In the Stream Destinations List, the Path Delay is displayed as 0 (as there is no measurement) and is included in the displayed Jitter Reserve.

Web UI (RAVENNA -> Stream Destinations List)

Stream Destinations List													
No.	Name	Type	Codec	Samples per Frame	Path Delay	Delay Class	Jitter Class	Jitter Reserve	Time Offset	Connected Outputs Count	Remote Stream No.	Remote Stream Name	Tracks
13	Dst13	stereo	L24	48	103	0	0	400	551	1	116	R3LAY-A2:100bar	24 25
14	Dst14	stereo	L24	48	0	0	0	464	512	1	83	ROH:SUM01	26 27

You can tell whether a fixed Time Offset has been defined by the configuration or Web UI by looking at the Path Delay and Jitter Reserve fields:

- Path Delay = 0 and Jitter Reserve > 0 indicates that the ON-AIR Designer **Fixed Jitter Reserve** field is active (> 0).
- Path Delay = 0 and Jitter Reserve = 0 indicates that the Web UI **Set Time Offset** button has been used to set the offset.

If the Time Offset of a stream with a Fixed Jitter Reserve is changed via the Web UI, then it will be reset to the configured value (instead of automatic tuning) if late packets arrive repeatedly at the receiver.

➤ **Defining Jitter in the SDP Information**

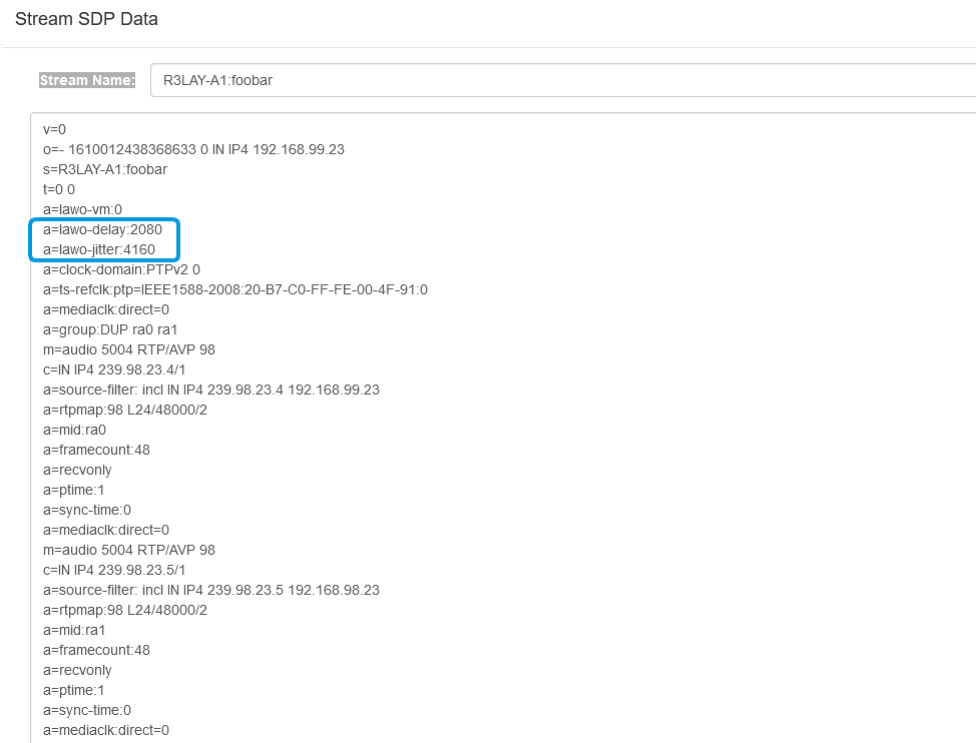
If the parameters "lawo-delay" and "lawo-jitter" are contained in a stream's SDP information, then Power Core measures only the Path Delay and not the Jitter. This allows you to keep the Time Offset Addition values low (for the Jitter Classes), while still connecting computer-based stream sources (such as R3LAY).

Start by measuring the jitter on the sending device (using a third-party tool), and enter the following parameters into the stream's SDP information:

- a = lawo-delay: 2080
- a = lawo-jitter: 4160

The SDP parameters must be defined in microseconds. The screenshot below shows an example.

SDP Information (with "lawo-delay" and "lawo-jitter")



In R3LAY the values can be configured via the ini file:

```

[DEBUG]
StreamLawoDelayMicrosecs = 2080
StreamLawoJitterMicrosecs = 4160
    
```

If Power Core receives a stream containing this SDP information, then only the Path Delay is measured and the Jitter Class is set to 0. This results in a single Time Offset Addition (for the Path Delay Class). In this instance, the Jitter Reserve is calculated as follows:

Jitter Reserve = lawo-delay (from SDP) + lawo-jitter (from SDP) + Time Offset Addition (for Path Delay Class)

The Time Offset is then calculated in the usual manner:

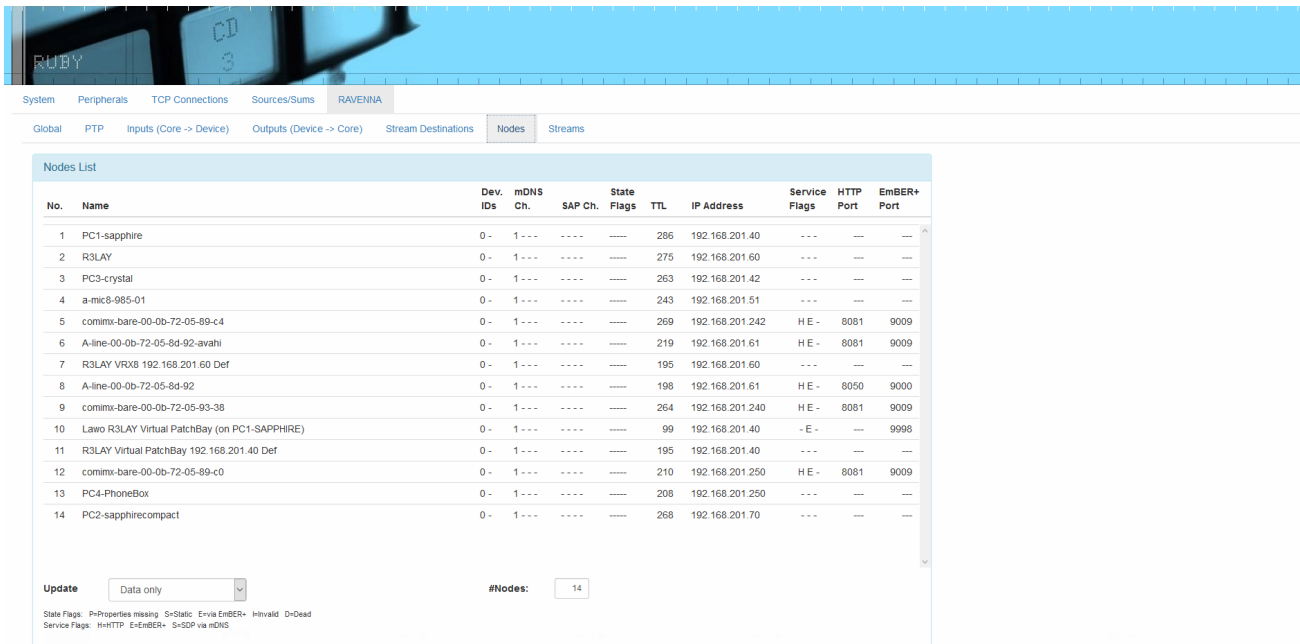
Time Offset = Samples per Frame (packet size) + Path Delay + Jitter Reserve

Streams that have been tuned using the new parameters are marked with a Jitter Class of 0 in the Stream Destinations List:

Web UI (RAVENNA -> Stream Destinations List)

Stream Destinations List													
No.	Name	Type	Codec	Samples per Frame	Path Delay	Path Delay Class	Jitter Class	Jitter Reserve	Time Offset	Connected Outputs Count	Remote Stream No.	Remote Stream Name	Tracks
1	Dst01	stereo	L24	48	6	1	1	3	57	1	1527	SRV1 PTG:var	0 1
2	Dst02	stereo	L24	48	6	1	1	3	57	1	1449	SRV2 PTG:var	2 3
3	Dst03	stereo	L24	48	5	1	1	3	56	1	911	R204:Sum02	4 5
4	Dst04	stereo	L24	48	71	3	0	330	449	1	106	R3LAY-A1:foobar	6 7

9.7.6 Nodes Tab



No.	Name	Dev. IDs	mDNS Ch.	SAP Ch.	State Flags	TTL	IP Address	Service Flags	HTTP Port	EmBER+ Port
1	PC1-sapphire	0 -	1 - - -	- - - -	- - - -	286	192.168.201.40	- - -	- -	- -
2	R3LAY	0 -	1 - - -	- - - -	- - - -	275	192.168.201.60	- - -	- -	- -
3	PC3-crystal	0 -	1 - - -	- - - -	- - - -	263	192.168.201.42	- - -	- -	- -
4	a-mic8-985-01	0 -	1 - - -	- - - -	- - - -	243	192.168.201.51	- - -	- -	- -
5	comims-bare-00-0b-72-05-89-c4	0 -	1 - - -	- - - -	- - - -	269	192.168.201.242	H E -	8081	9009
6	A-line-00-0b-72-05-84-92-avahi	0 -	1 - - -	- - - -	- - - -	219	192.168.201.61	H E -	8081	9009
7	R3LAY VRX8 192.168.201.60 Def	0 -	1 - - -	- - - -	- - - -	195	192.168.201.60	- - -	- -	- -
8	A-line-00-0b-72-05-84-92	0 -	1 - - -	- - - -	- - - -	198	192.168.201.61	H E -	8050	9000
9	comims-bare-00-0b-72-05-93-38	0 -	1 - - -	- - - -	- - - -	264	192.168.201.240	H E -	8081	9009
10	Lawo R3LAY Virtual PatchBay (on PC1-SAPPHIRE)	0 -	1 - - -	- - - -	- - - -	99	192.168.201.40	- E -	- -	9998
11	R3LAY Virtual PatchBay 192.168.201.40 Def	0 -	1 - - -	- - - -	- - - -	195	192.168.201.40	- - -	- -	- -
12	comims-bare-00-0b-72-05-89-c0	0 -	1 - - -	- - - -	- - - -	210	192.168.201.250	H E -	8081	9009
13	PC4-PhoneBox	0 -	1 - - -	- - - -	- - - -	208	192.168.201.250	- - -	- -	- -
14	PC2-sapphirecompact	0 -	1 - - -	- - - -	- - - -	268	192.168.201.70	- - -	- -	- -

Update: #Nodes: 14

State Flags: P=Properties missing S=Static E=via EmBER+ H=Invalid D=Dead
Service Flags: H=HTTP E=EmBER+ S=SDP v=via mDNS

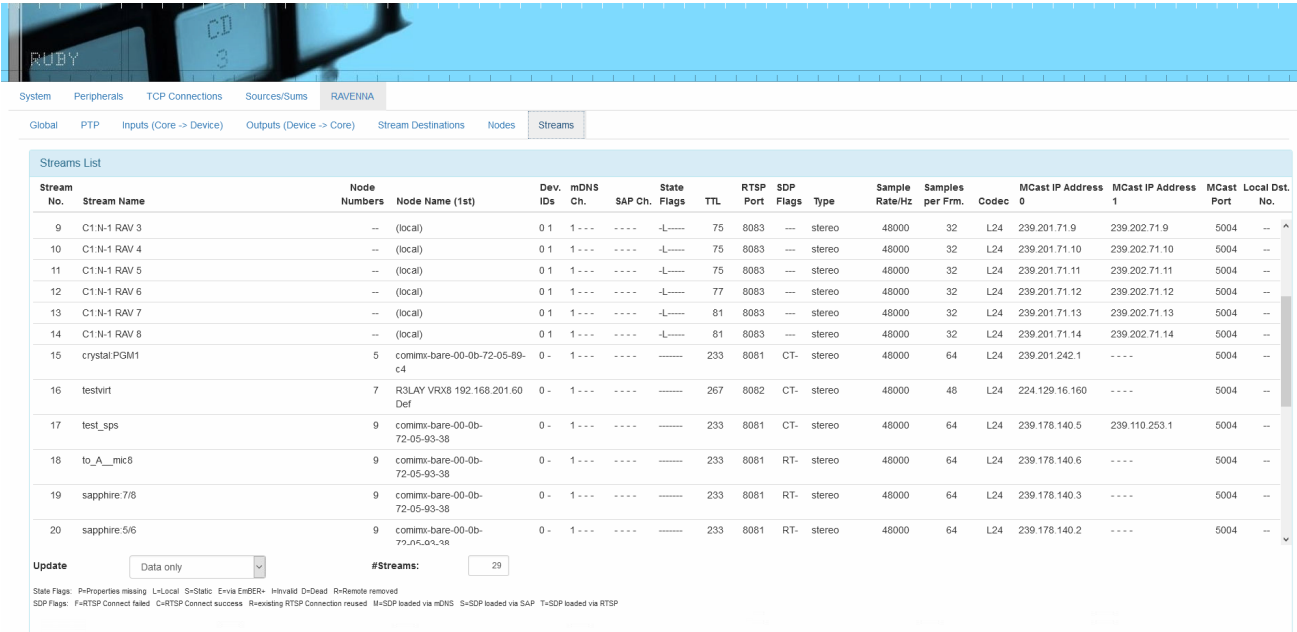
This tab lists all available network Nodes, showing their Device ID, announcement method (mDNS or SAP), TTL (in seconds), and IP address. You may create static streams using Ember+, and these streams are shown in the list as well.

Clicking on a name in the "Name" column opens the device's Web page. You can use this to access further information.

Pay particular attention to the "State Flags" which show the condition of the network node. There is a key at the bottom of the page which explains the meaning of each flag.

Above the flag descriptions is the **Update** selector. This can be set to one of two possibilities: **Data only** (the default) or **Data + TTL**. This defines what happens when the transmitter's MDNS / SAP announcement for a stream is made. If **Data + TTL** is selected, then the TTLs will be reset to the "Nodes List TTLs" value defined in ON-AIR Designer. Once the TTL count-down has expired, the node will remove the associated stream. This is generally needed only for diagnostic purposes.

9.7.7 Streams Tab



Stream No.	Stream Name	Node Numbers	Node Name (1st)	Dev. IDs	mDNS Ch.	SAP Ch.	State Flags	TTL	RTSP Port	SDP Flags	Type	Sample Rate/Hz	Samples per Frm.	Codec	MCast IP Address 0	MCast IP Address 1	MCast Port	Local Dst. No.
9	C1:N-1 RAV 3	--	(local)	0 1	1---	----	-L----	75	8083	---	stereo	48000	32	L24	239.201.71.9	239.202.71.9	5004	--
10	C1:N-1 RAV 4	--	(local)	0 1	1---	----	-L----	75	8083	---	stereo	48000	32	L24	239.201.71.10	239.202.71.10	5004	--
11	C1:N-1 RAV 5	--	(local)	0 1	1---	----	-L----	75	8083	---	stereo	48000	32	L24	239.201.71.11	239.202.71.11	5004	--
12	C1:N-1 RAV 6	--	(local)	0 1	1---	----	-L----	77	8083	---	stereo	48000	32	L24	239.201.71.12	239.202.71.12	5004	--
13	C1:N-1 RAV 7	--	(local)	0 1	1---	----	-L----	81	8083	---	stereo	48000	32	L24	239.201.71.13	239.202.71.13	5004	--
14	C1:N-1 RAV 8	--	(local)	0 1	1---	----	-L----	81	8083	---	stereo	48000	32	L24	239.201.71.14	239.202.71.14	5004	--
15	crystal:PGM1	5	comix-bare-00-0b-72-05-99-c4	0-	1---	----	-----	233	8081	CT-	stereo	48000	64	L24	239.201.242.1	----	5004	--
16	testvirt	7	R3LAY VRX8 192.168.201.60 Def	0-	1---	----	-----	267	8082	CT-	stereo	48000	48	L24	224.129.16.160	----	5004	--
17	test_sps	9	comix-bare-00-0b-72-05-93-38	0-	1---	----	-----	233	8081	CT-	stereo	48000	64	L24	239.178.140.5	239.110.253.1	5004	--
18	to_A_mic8	9	comix-bare-00-0b-72-05-93-38	0-	1---	----	-----	233	8081	RT-	stereo	48000	64	L24	239.178.140.6	----	5004	--
19	sapphire:7/8	9	comix-bare-00-0b-72-05-93-38	0-	1---	----	-----	233	8081	RT-	stereo	48000	64	L24	239.178.140.3	----	5004	--
20	sapphire:5/6	9	comix-bare-00-0b-72-05-93-38	0-	1---	----	-----	233	8081	RT-	stereo	48000	64	L24	239.178.140.2	----	5004	--

Update: #Streams:

State Flags: P=Properties missing L=Local S=Static E=via EntER= Invalid D=Dead R=Remote removed
 SDP Flags: F=RTSP Connect failed C=RTSP Connect success R=existing RTSP Connection reused M=SDP loaded via mDNS S=SDP loaded via SAP T=SDP loaded via RTSP

This tab lists all available network streams which have been announced to Power Core.

Clicking on a name in the "Stream Name" column opens a pop-up where you can view and copy the stream's SDP.

Pay particular attention to the stream "State Flags" which show the condition of the stream. There is a key at the bottom of the page which explains the meaning of each flag.

Above the flag descriptions is the **Update** selector. This can be set to one of two possibilities: **Data only** (the default) or **Data + TTL**. This works in a similar manner to the **Update** function in the [Nodes Tab](#), but the TTLs are reset to the "Streams List TTLs" value (defined in ON-AIR Designer).

9.8 Preparing a Secure Connection (for https)

The Web UI can be opened with a secure connection (SSL) if the required certificates are stored on the Power Core device. The setup requires you to create the keys, requests and, if required, a self-signed certificate (using OpenSSL). The commands can be entered using a PC connected to Power Core either via telnet or the device's serial (RS 422) port. You will also need to a suitable FTP client in order to perform the file transfers.

You can find more information about OpenSSL at the following website: <https://www.freebsd.org/cgi/man.cgi?query=openssl>.

It is recommended not to use keys larger than 1024 bit, as to do so may affect the system performance.

In summary, the steps are:

- Create or adapt a config file, and copy this to Power Core using a suitable [FTP client](#).
- Create the necessary keys, requests and, if required, a self-signed certificate (using OpenSSL). To enter the commands, you can either:
 - Connect your PC to the control network and open a [telnet session](#).
 - Connect your PC directly to the RS 422 port and open a [serial connection](#).
- Let an external CA sign the certificate - by downloading, signing and uploading the certificate.
- Clean up the files.
- Cold start the Power Core device.

In more detail...

1. Create or adapt a config file (.conf), and copy this to the Power Core using your [FTP client](#).

In our example, the config file is named "request.conf". The file should be created on, or copied to, the root directory.

Power Core (root directory)

Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..					
dev		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
etc		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
media		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
request.conf	503	CONF File	7/15/2020 10:4...	-rw-r--r--	0 0

A sample configuration is as follows.

```
[req]
distinguished_name=req_distinguished_name
req_extensions=req_ext
prompt=no
```

```
[req_distinguished_name]
C=DE
ST=Nordrhein-Westfalen
L=Troisdorf-Spich
O=DSA-Volgmann
OU=Development
CN=RUBY-DSA-DWC0-240.internal
```

```
[req_ext]
extendedKeyUsage = clientAuth,serverAuth
subjectAltName = @alt_names
```

```
[alt_names]
DNS.1 = RUBY-DSA-DWC0-240.internal
#DNS.2 = [fqdn2]
#DNS.3 = [fqdn3]
#DNS.4 = [fqdn4]
IP.1=192.168.101.240
#IP.2=192.168.101.242
#IP.3=192.168.101.243
#IP.4=192.168.101.244
```

- Now open either a [telnet session](#) to the Power Core control system.

Alternatively, you can connect your PC directly to the RS 422 port and open a [serial connection](#).

- Once login is complete, type the following command to create a RSA key with openssl genrsa.

openssl genrsa -out webs.key.pem 1024

Press ENTER. The confirmation message "Generating RSA private key..." appears.

- Type the following command to create a request with openssl.

openssl req -batch -new -key webs.key.pem -out webs.csr -config request.conf

Press ENTER. There is no message following this command.

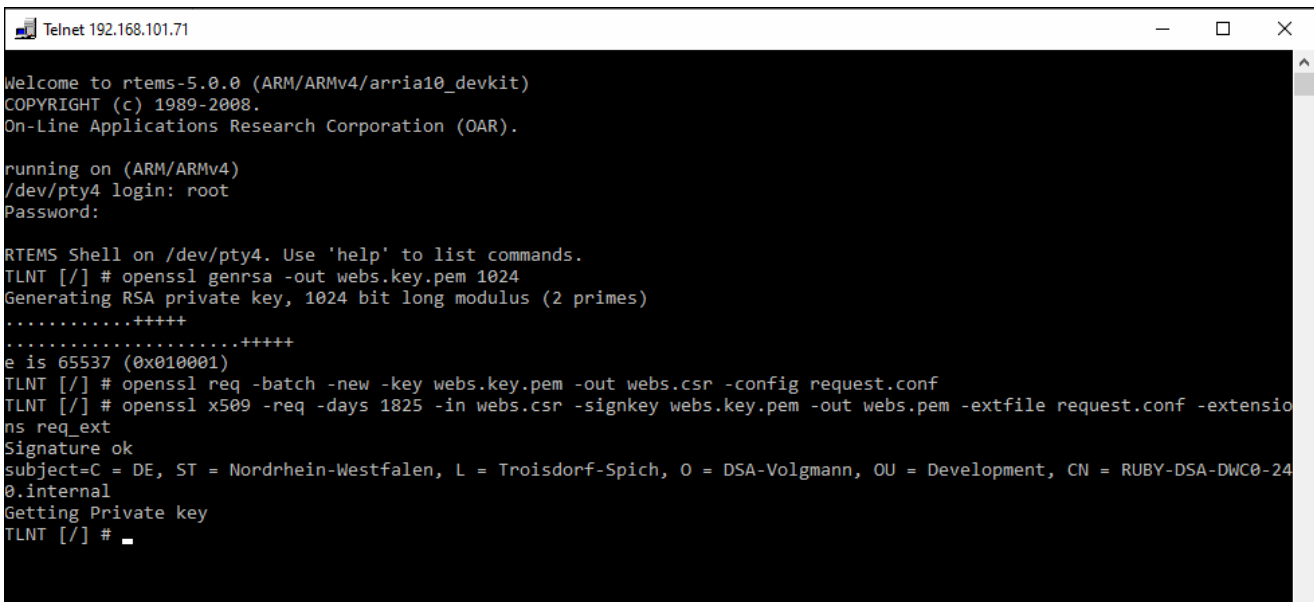
- Type the following command to create a self-signed certificate with openssl.

openssl x509 -req -days 1825 -in webs.csr -signkey webs.key.pem -out webs.pem -extfile request.conf -extensions req_ext

Press ENTER. The confirmation message "Signature ok...." appears.

The screenshot below shows the complete session.

OpenSSL commands (via telnet)



```
Telnet 192.168.101.71
Welcome to rtems-5.0.0 (ARM/ARMv4/arnia10_devkit)
COPYRIGHT (c) 1989-2008.
On-Line Applications Research Corporation (OAR).

running on (ARM/ARMv4)
/dev/pty4 login: root
Password:

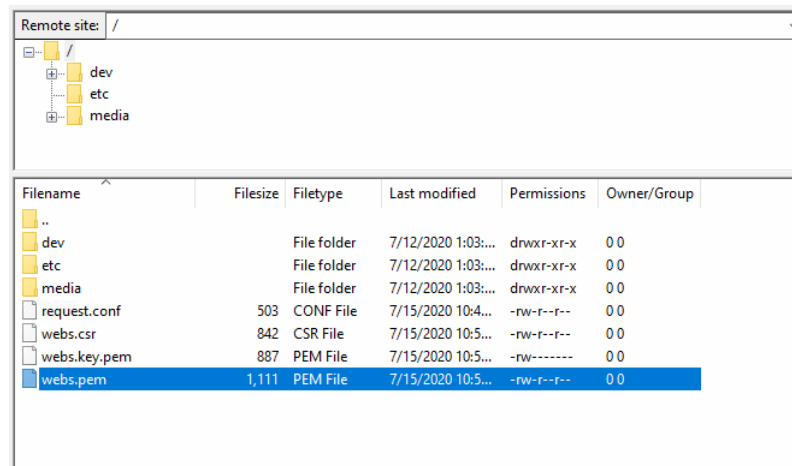
RTEMS Shell on /dev/pty4. Use 'help' to list commands.
TLNT [/] # openssl genrsa -out webs.key.pem 1024
Generating RSA private key, 1024 bit long modulus (2 primes)
.....+++++
.....+++++
e is 65537 (0x010001)
TLNT [/] # openssl req -batch -new -key webs.key.pem -out webs.csr -config request.conf
TLNT [/] # openssl x509 -req -days 1825 -in webs.csr -signkey webs.key.pem -out webs.pem -extfile request.conf -extensions req_ext
Signature ok
subject=C = DE, ST = Nordrhein-Westfalen, L = Troisdorf-Spich, O = DSA-Volkmann, OU = Development, CN = RUBY-DSA-DWC0-240.internal
Getting Private key
TLNT [/] #
```

6. Using your FTP client, copy the resulting certificate "webs.pem" (in the root directory) to "/media/mmcscd-0-0/certs".

You will need to create the "certs" directory (via a right-click), and refresh the FTP client connection to see the new files.

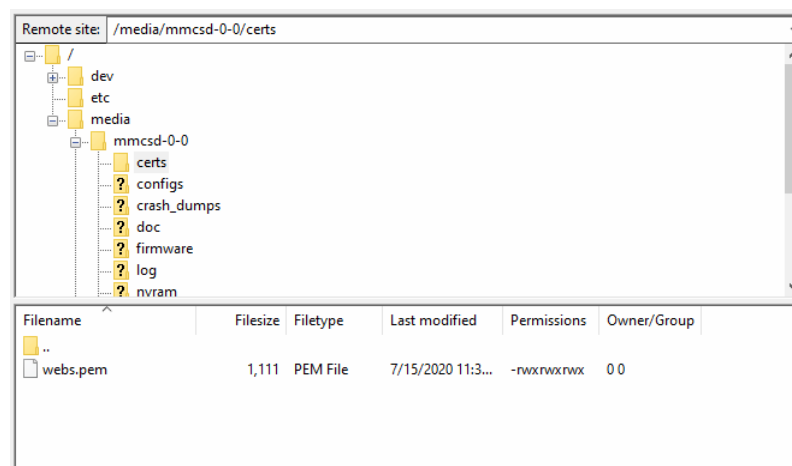
To copy a file, download it to your computer (via a right-click); navigate to the new location on Power Core; then upload the file (via a right-click).

From



Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..					
dev		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
etc		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
media		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
request.conf	503	CONF File	7/15/2020 10:4...	-rw-r--r--	0 0
webs.csr	842	CSR File	7/15/2020 10:5...	-rw-r--r--	0 0
webs.key.pem	887	PEM File	7/15/2020 10:5...	-rw-----	0 0
webs.pem	1,111	PEM File	7/15/2020 10:5...	-rw-r--r--	0 0

To



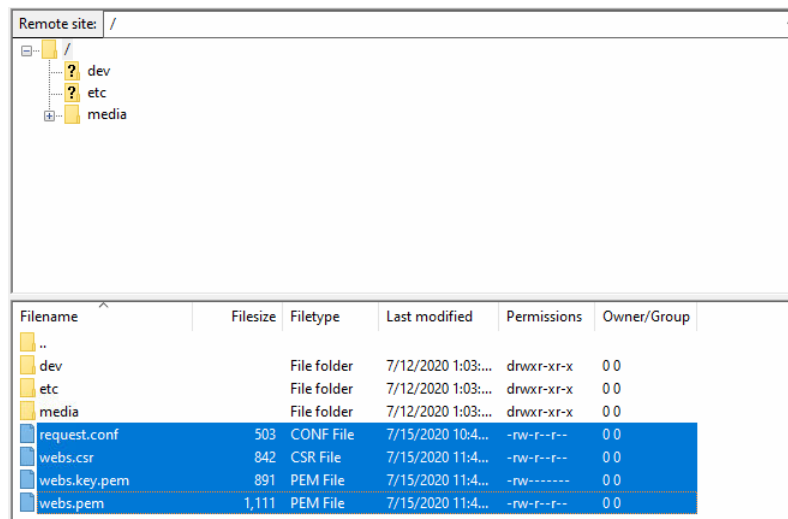
Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..					
webs.pem	1,111	PEM File	7/15/2020 11:3...	-rwxrwxrwx	0 0

7. Let an external CA sign the certificate:
- Using your FTP client, download the file "request.csr"
 - Let it sign from CA
 - Upload the certificate "webs.pem" to "/media/mmcscd-0-0/certs"

8. Using your FTP client, clean up the files.

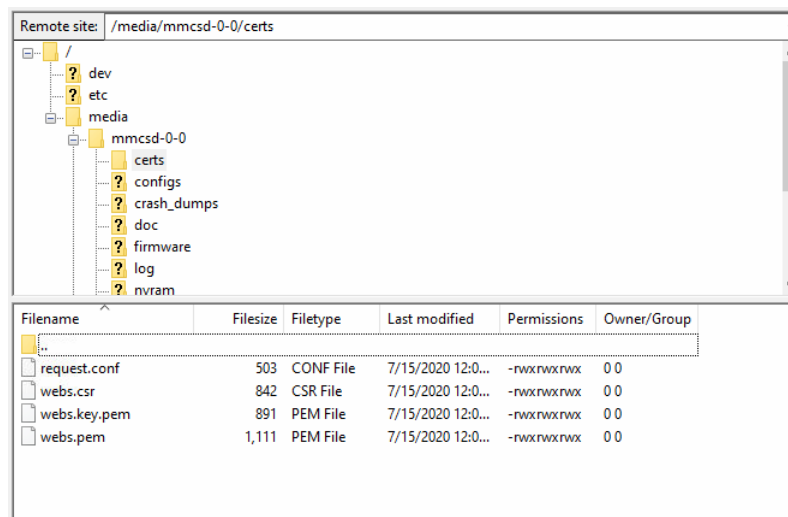
Copy all of the files "webs.pem", "webs.key.pem", "webs.csr" and "request.conf" to "/media/mmcscd-0-0/certs", and delete the originals.

From



Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..					
dev		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
etc		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
media		File folder	7/12/2020 1:03:...	drwxr-xr-x	0 0
request.conf	503	CONF File	7/15/2020 10:4...	-rw-r--r--	0 0
webs.csr	842	CSR File	7/15/2020 11:4...	-rw-r--r--	0 0
webs.key.pem	891	PEM File	7/15/2020 11:4...	-rw-----	0 0
webs.pem	1,111	PEM File	7/15/2020 11:4...	-rw-r--r--	0 0

To



Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..					
request.conf	503	CONF File	7/15/2020 12:0...	-rwxrwxrwx	0 0
webs.csr	842	CSR File	7/15/2020 12:0...	-rwxrwxrwx	0 0
webs.key.pem	891	PEM File	7/15/2020 12:0...	-rwxrwxrwx	0 0
webs.pem	1,111	PEM File	7/15/2020 12:0...	-rwxrwxrwx	0 0

9. Cold start the Power Core control system (from the telnet/serial connection).

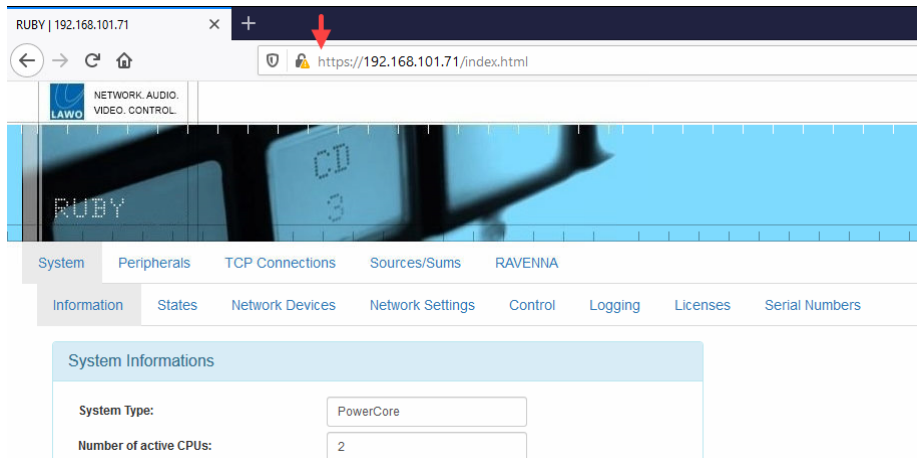
Type: **sys_cs** (press ENTER). Then type **YES** (and ENTER) to confirm.

If you are connected via telnet, then you will lose your connection.

If you are connected to the serial port, then you will see the following confirmation messages.

```
28.06.2020 20:18:24 DSK system: init: ----- Starting Webserver -----
28.06.2020 20:18:24 DSK system: init: Web Server started, result = 0
28.06.2020 20:18:24 DSK system: init: Starting Webserver completed
28.06.2020 20:18:24 WEBS system: init: Webserver bind https (certificate found)
```

10. Test the connection by [opening](#) a Web UI session and logging in.
 The padlock icon and "https" prefix indicates that the connection is secure.



10. Maintenance

This chapter describes the maintenance procedures.

Topics include:

- [Restarting the System](#)
- [Power Core Procedures](#)
- [Control Surface Procedures](#)
- [Cleaning the Devices](#)

10.1 Restarting the System

When Power Core boots-up it can perform either a warm or cold start.

10.1.1 Warm Start

Every time the system shuts down it stores the current state of all settings so that they can be loaded on boot-up (known as a warm start).

A warm start is used whenever you power cycle the device to ensure that the device returns to its last known state if power is cut and then re-applied.

You can also force a warm start by pressing the **RESET** button on the front panel. The button is recessed to prevent accidental operation.

Front View



A warm start will reboot the device. Do **NOT** perform a warm start while live on air!

Note that the last known PTP Master/Slave mode may not be reinstated if Power Core is set to operate as PTP Slave only.

10.1.2 Cold Start

Alternatively, the system can boot using a cold start. A cold start ignores the warm start data, and resets all internal logic states and audio parameters to the default values stored in the configuration.

For most systems a cold start can be triggered by transferring a new configuration onto the device or updating its firmware. The exception is the **Nova29** which must be cold started by opening a telnet session.

A cold start will reboot the device. Do **NOT** perform a cold start while live on air!

10.2 Power Core Procedures

10.2.1 The Front Panel Display



The front panel display and rotary control can be used to view or edit device parameters. The same parameters can be accessed via the [Web UI](#).

There are four navigation levels:

1. Page Select.

Turn the encoder to scroll through the available pages. Push down to select the highlighted page.

2. Parameter Select.

Turn the encoder to scroll through the available parameters. Push down to select the highlighted parameter, or return to the previous level (if nothing is highlighted).

3. Parameter Edit.

Turn the encoder to scroll through the parameter fields/characters. Push down to edit the highlighted character, or return to the previous level (if nothing is highlighted).

4. Character Edit.

Once a character is highlighted, turn the encoder to change its value. Push down to accept the change.

Once all characters have been edited, push down and hold to save the changes. Alternatively, push down (when no character is highlighted) to cancel and return to the previous level.

You can use the following commands to insert, delete or clear all characters:

- Select the up arrow to insert a new character.
- Select the down arrow to delete the selected character.
- Select "␣" to clear all.

If you push down and hold the encoder during boot-up, the device will reset to a default firmware image and empty configuration.

Identifying a Power Core

The "Identify" function can be used to send a message to the front panel display so that a Power Core can be easily identified. The message can be sent in one of three ways:

- via Ember+ - using Provider 1: / Ruby / System / Identify (1.29.20)
- via the Web UI - select "Identify" on the [System -> Control](#) tab.
- via the "console" command: `sys_id [y | n]`

Once activated, the display shows "HELLO I AM [dwc0 IP Address]". The message disappears once you deactivate "Identify" or push down on the encoder.

10.2.2 The STATUS LED

The **STATUS** LED indicates the health of the device and sync status.

➤ LED Static

If the LED is lit and static, then either the device is booting or there is an internal problem:

Static LED	System Status
Off	System powered off
White	System starting
Color (not white)	System failure

➤ LED Blinking

If the LED is blinking at regular intervals, then the device is working properly and the LED indicates the sync status.

Note that if the LED is blinking from white to a color, then this indicates that Power Core is running as a PTP Master. The table below describes the possible states:

Blinking LED	Sync Status
Blue <-> Off	Synchronized to PTP master
Yellow <-> Off	Trying to sync to PTP master
Red <-> Off	Synchronized to internal clock
Green <-> Off	Synchronized via Wordclock
Magenta <-> Off	Synchronized via MADI
Red <-> white	Device is PTP Master, sync source = internal
Green <-> white	Device is PTP Master, sync source = Wordclock
Magenta <-> white	Device is PTP Master, sync source = MADI

10.2.3 Replacing Defective Parts

All rear panel IO cards are hot-pluggable which means that they can be exchanged during uptime. This allows fast replacement of a card in the case of a hardware failure. Providing the card is of the same type and fitted to the same rear panel slot as the faulty card, the new card will immediately take over the same functions.

Other components can be serviced by removing the top cover of the Power Core frame. You must disconnect the unit from its power source to perform these operations.

Do **NOT** remove the cover while the device is powered.

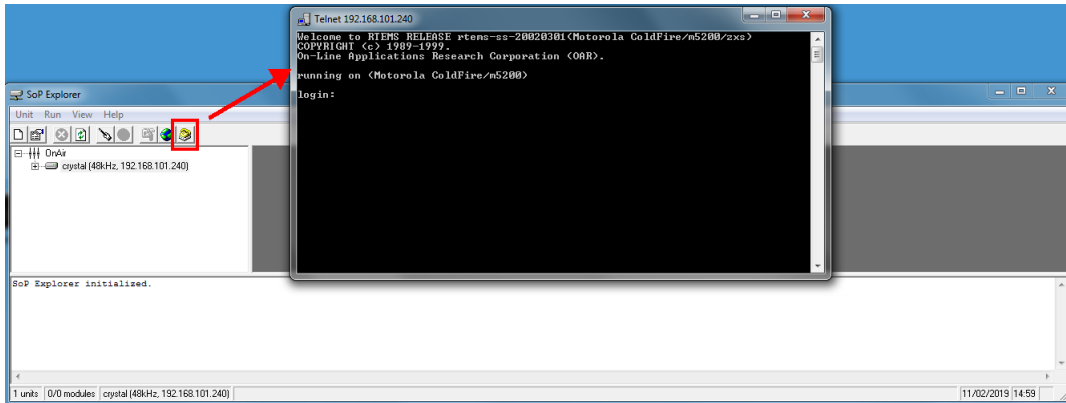
For more information on these procedures, please contact your local Lawo representative or email support@lawo.com.

10.2.4 Opening a Telnet Session

To adjust certain parameters on Power Core, you may need to open a telnet session to the control system.

1. Start by connecting your PC to the Power Core control network.
2. Open SoP Explorer, select the system you wish to connect to, and then click on the "run telnet application" icon:

SoP Explorer - run Telnet:



If the telnet window does not appear, then the "Telnet Client" option may be disabled in Windows. This can be remedied by turning on Telnet Client in your Windows Control Panel.

If the Telnet Client option is activated and a Telnet session still does not appear, then try disabling any Anti-virus or Firewall applications running on the PC.

2. When prompted, enter the login name: "**root**" (press ENTER), and password "**tomtom**" (press ENTER).

The session opens, and you will see the command prompt for the control system.

3. Now follow the specific instructions for the task you wish to perform.

The telnet password can be changed from the Web UI (via the [System -> Control](#) tab) in Administrator mode.

10.2.5 Opening a Connection to the Serial Port

In some cases, you will need to make a direct connection to the **RS 422** serial port, otherwise known as the "console" port.

1. Install a suitable ssh/telnet client on your computer. We recommend using **Tera Term Pro Web 3.1.3**, a free ssh/telnet client for Windows, which can be downloaded from www.ayera.com/teraterm/
2. Connect your PC directly to the **RS 422** port on Power Core's [front panel](#).

A suitable cable is delivered with every unit (article number 485-0700-000). This provides a RJ45 connector (for Power Core) and a Sub D connector (for the PC).

If your PC does not support a Sub D connector, then you will need to provide a serial to USB converter such as the one shown below.

Serial to USB Adapter



3. Set up the Serial connection for the COM port using the following credentials.
 - Speed: 115200 baud
 - Data bits: 8
 - Stop bits: 1
 - Parity: none
 - Flow control: none
4. Now follow the specific instructions for the task you wish to perform.

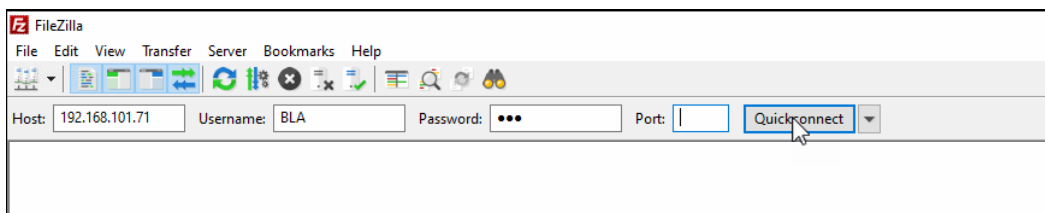
10.2.6 Transferring Files (via FTP)

All files stored on the Power Core control system can be accessed by a suitable FTP client.

To perform a file transfer:

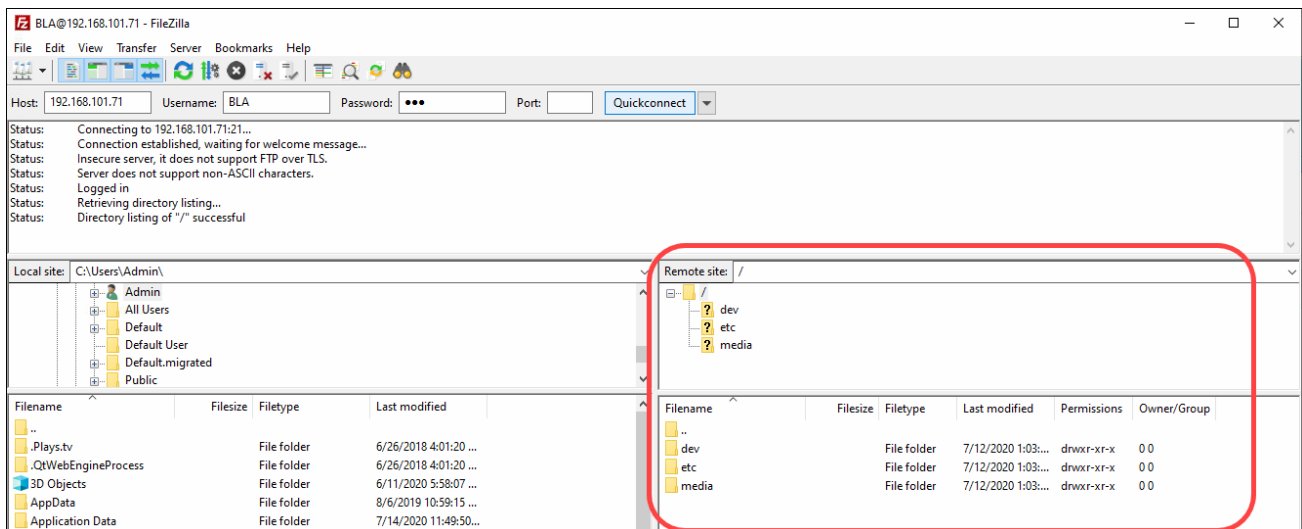
1. Install a suitable FTP client on your computer. We recommend using **Filezilla**, a free FTP client for all platforms, which can be downloaded from www.filezilla-project.org
2. Connect your PC to the Power Core control network and configure the [TCP/IP settings](#) for the PC's LAN port.
3. Open the **Filezilla** FTP client, and enter the following information:
 - Host = the IP address of your control system
 - Username = **BLA**
 - Password = **BLU**

If you leave the **Port** field blank, then the default port number of 21 will be used.

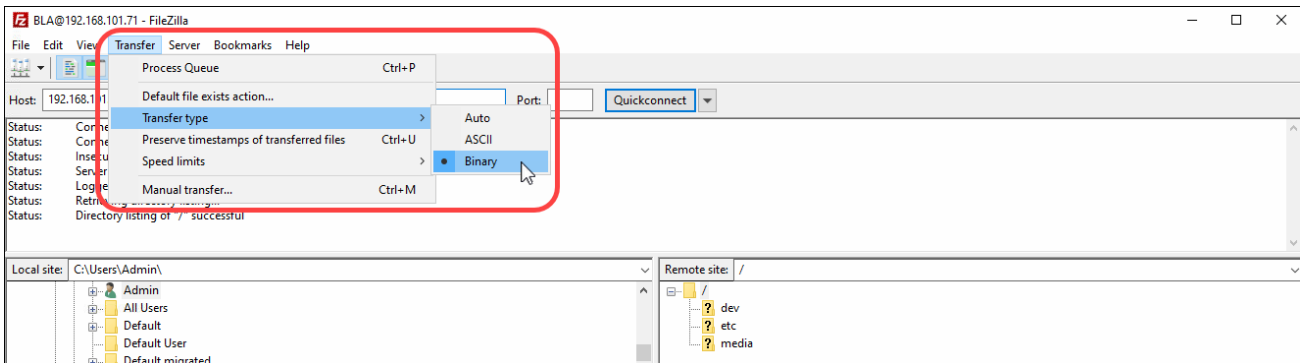


4. Click on **Quickconnect** to make the connection.

The session opens, and you will see the filing system of Power Core on the right (under **Remote Site**).



5. *BEFORE* transferring files, check that the **Transfer Type** is set to **Binary**.



It is *VERY* important that file transfers use "Binary" mode, and not "ASCII".

6. You can now transfer files from Power Core (**Remote site**) to your computer (**Local site**), or vice versa:

- Use the upper areas to navigate through the filing structure - the contents of the selected folder are displayed beneath (under **Filename**).
- Right-click on a filename and select **Upload** or **Download** - the file is transferred to/from the selected folder.

10.3 Control Surface Procedures

10.3.1 The Special Functions Mode

Each of the control surface modules offers a “special functions” mode. This can be used to adjust system settings and test the module's components (lamps, buttons, etc.)

Double-click on the links below to open the special functions mode documentation (as a pdf):

- [ruby Fader Module SF mode](#)
- [ruby Central Module SF mode](#)

10.3.2 Replacing Defective Parts

The CAN bus is hot-pluggable which means that the control surface can be connected and disconnected during uptime. This allows fast replacement of a frame in the case of a hardware failure. Providing the replacement frame is set to the correct CAN bus addresses, it will immediately take over the same functions as the exchanged frame.

10.4 Cleaning the Devices

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

Our console surfaces and panels are not entirely approved for treatment with chemical cleaning agents and disinfectants. Component surfaces 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 unauthorized use of disinfectants on radio products and console surfaces.

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

- Before you clean 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 which 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.

10.4.1 Cleaning the Control Surface

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

- Antistatic
- Fluff-free
- Without emery pieces

DO NOT spill liquids into any system components!
DO NOT clean the mixing console with sharp instruments!

11. Appendices

This chapter includes further information which you may find useful.

Topics include:

- [Part Numbers](#)
- [System Reference Levels](#)
- [Dimension Drawings](#)
- [Connector Pin-Outs](#)
- [The 12V DC Power Supply](#)
- [Advanced Licensing Features](#)

11.1 Part Numbers

System Component		Part Number
ruby	Fader Module	954/45
	Central Module	954/50
Power Core	Main Frame	710/11
	MIC / LINE IN	710/20
	ANALOG LINE IN	710/25
	ANALOG LINE OUT	710/30
	STUDIO IO	710/35
	AES3 IO	710/40
	AES3 IO (with bit transparency)	710/41
Accessories	SFP Modules - please see accessories .	981/60-xx
	12V DC power supply	955/50-80

Control Surface Frame	Part Number		
	Table Top	Countersunk	Countersunk Short
ruby 4-fader	RU4FTT	RU4FCS	RU4FCSS
ruby 8-fader	RU8FTT	RU8FCS	RU8FCSS
ruby 12-fader	RU12FTT	RU12FCS	RU12FCSS
ruby 16-fader	RU16FTT	RU16FCS	RU16FCSS
ruby 4-fader Extender	RU4FEXTT	RU4FEXCS	RU4FEXCSS
ruby 8 fader Extender	RU4FEXTT	RU8FEXCS	RU8FEXCSS
ruby 12-fader Extender	RU12FEXTT	RU12FEXCS	RU12FEXCSS
ruby 16-fader Extender	RU16FEXTT	RU16FEXCS	RU16FEXCSS
ruby Central Module Extender	RUCMEXTT	RUCMEXCS	RUCMEXCSS

11.1.1 Data Sheets

Further technical information can be found in the product data sheets. The system part numbers will help you locate the data sheets for the main system components.

All documentation is available from the **Downloads** area at www.lawo.com (after **Login**).

11.2 System Reference Levels

	DIN	SMPTE
Relative System Level	- 27	- 38
Analog Reference Level	15	24
Operating Level (analog)	+6 dBu	+ 4 dBu
Operating Level (digital)	- 9 dBFS	-20dBFS

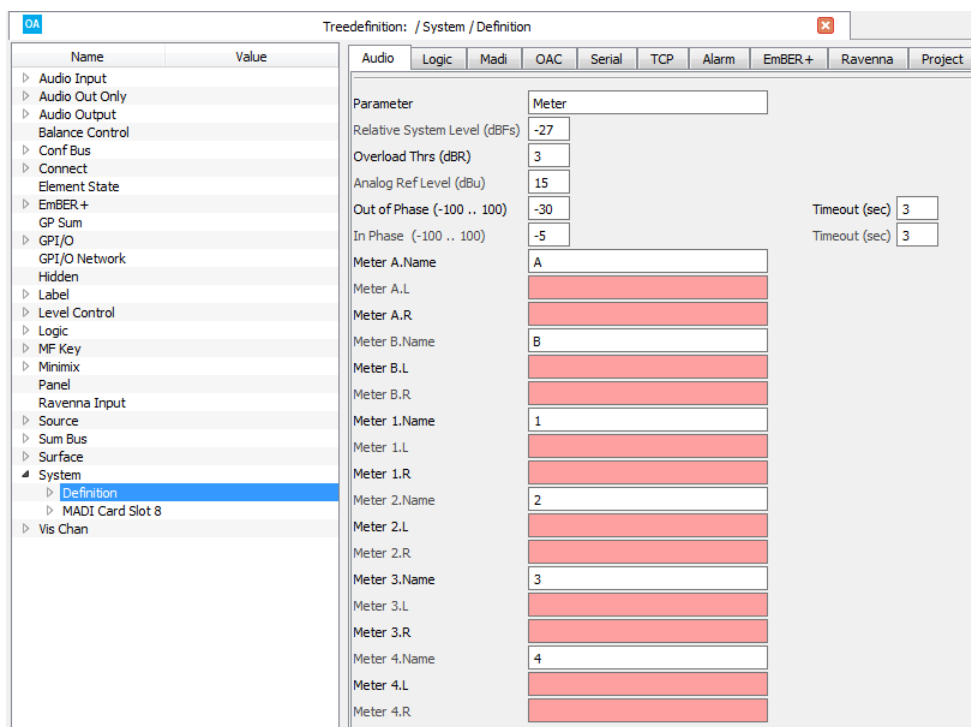
The **Relative System Level** and **Analog Reference Level** are options defined in the configuration. They combine to set the operating levels (analog and digital) for the system.

With **Relative System Level** (dBFS) you define the relative working point internally within the system. This value can be calculated with the formula "RSL = - digital headroom - 18" or "RSL = working point - 18dB".

For example, the working point (0 dB_r) for the ARD (German Broadcasters' Network) is at -9 dBFS. From this follows a **Relative System Level** (dBFS) of -27. Note that the working point is important as dynamics and limiter modules refer to this value. When the threshold value is set to 0 dB, the absolute level equals the working point.

If required, the **Relative System Level** and **Analog Reference Level** can be edited using the ON-AIR Designer. Start by opening the existing configuration, and then edit the **Relative System Level (dBFS)** and **Analog Ref Level (dBu)** options in the 'Tree Definition' (shown below).

ON-AIR Designer Tree Definition: "System -> Definition -> Parameter = Meter"



The screenshot shows the ON-AIR Designer configuration tool. The title bar reads "Treedefinition: / System / Definition". The left pane shows a tree view with "System" expanded to "Definition". The right pane shows the configuration for the "Meter" parameter. The "Relative System Level (dBFS)" is set to -27, and the "Analog Ref Level (dBu)" is set to 15. Other parameters include "Overload Thrs (dB_r)" at 3, "Out of Phase (-100 .. 100)" at -30, and "In Phase (-100 .. 100)" at -5. There are two "Timeout (sec)" fields, both set to 3. The "Meter A.Name" is set to "A", and "Meter B.Name" is set to "B". There are four "Meter 1" through "Meter 4" entries, each with a "Name" field and two "L" and "R" channels.

Then save and transfer the edited configuration to the DSP Core. For more information about the configuration tool, please see the "ON-AIR Designer User Guide". This is available from the **Downloads** area at www.lawo.com (after **Login**).

11.3 Dimension Drawings

Please use the links below to open the dimension drawing as a pdf:

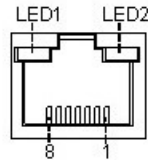
- [Power Core Dimension Drawing](#)
- [Ruby Desk Table Top Dimension Drawing](#)
- [Ruby Desk Countersink STD Dimension Drawing](#)
- [Ruby Desk Countersink Short Dimension Drawing](#)

The control surface drawings show an 8-fader main frame. Drawings for other frame sizes are available from the **Downloads** area at www.lawo.com (after **Login**).

11.4 Connector Pin-Outs

11.4.1 CAN

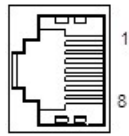
8-pin RJ45 connector, female.



PIN No:	FUNCTION
1	BUS high
2	BUS low
3	GND
4	n.c.
5	n.c.
6	n.c.
7	n.c.
8	n.c.
LED1	CAN Rx
LED2	CAN Tx

11.4.2 RS-422

8-pin RJ45 connector, female.

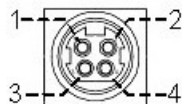


SERIAL RS422

PIN No.	RAS/NTP.(1)	DEBUG
1	n.a.	Tx +
2	n.a.	Tx -
3	n.a.	Rx +
4	Tx +	n.a.
5	Tx -	n.a.
6	n.a.	Rx -
7	Rx +	n.a.
8	Rx -	n.a.

11.4.3 DC Power Input

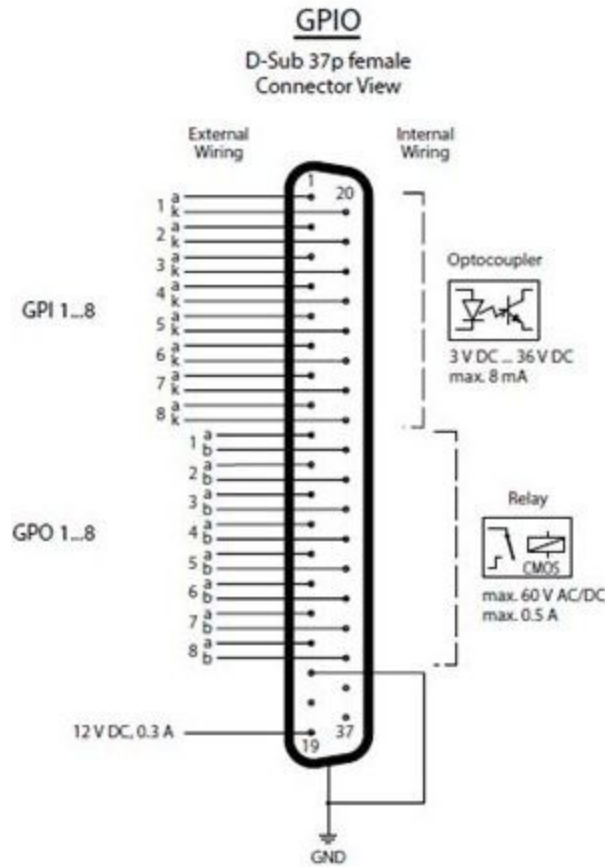
4-pin Kycon connector, female.



PIN No:	FUNCTION
1	+ 12 VDC
3	+ 12 VDC
2	GND
4	GND

11.4.4 GPIO

37-pin D-type connector, female.





ATTENTION !

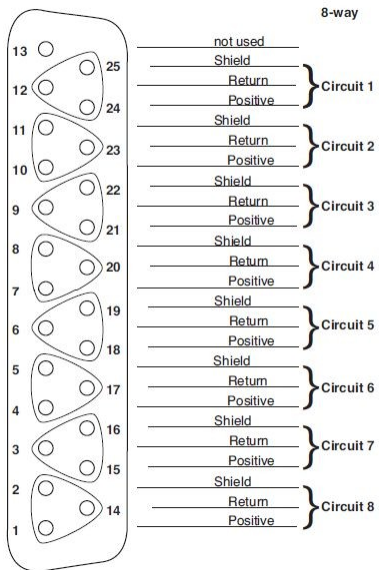
For an inductive load, please use a self-induction recuperation diode.

WARNING

11.4.5 IO Cards

MIC/LINE IN (710/20), LINE IN (710/25), LINE OUT (710/30)

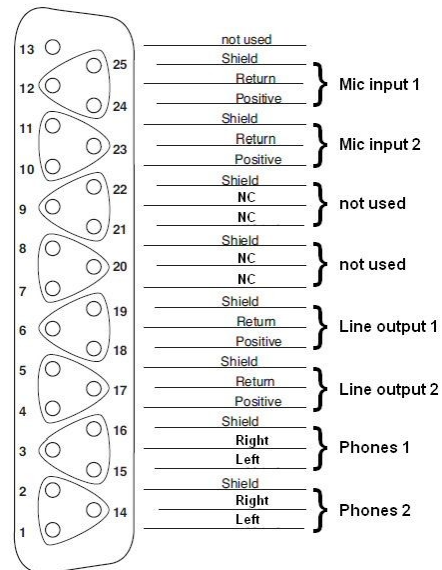
25-pin D-type connector (DB25), female.



Pinning and gender according to AES59 (TASCAM) standard.
All shields are internally connected to system ground.

STUDIO IO (710/35)

25-pin D-type connector (DB25), female.

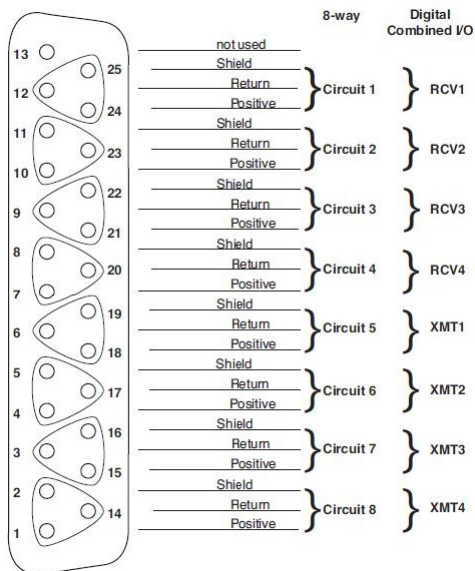


Pinning and gender according to AES59 (TASCAM) standard, except for Phones.
All shields are internally connected to system ground.

AES3 IO (710/40 and 710/41)

25-pin D-type connector (DB25), female.

AES3 inputs 1..4 (RCV1..4), AES3 outputs 1..4 (XMT1..4)



Pinning and gender according to AES59 (TASCAM) standard.
All shields are internally connected to system ground.

AES3id IO (710/42)

8 x HD-BNC, 75 ohm.

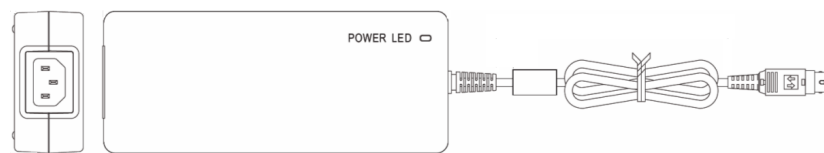
AES3 inputs 1..4, AES3 outputs 1..4.



11.5 The 12V DC Power Supply

12V DC Power Supply (955/50-80)

DC Plug Pinning



IEC 320-C14 plug

PIN No:	FUNCTION
1	+ 12 VDC
3	+ 12 VDC
2	GND
4	GND

Dimensions and Weight

Parameter	Conditions		Unit
Mechanical data			
Width		72	mm
Height		35	mm
Length		175	mm
Weight		670	g
Cable length	without plug	1200	mm

Electrical Specification

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage		85		264	VAC
Frequency		47		63	Hz
Input Current		1,85A/115VAC 1A/230VAC			AAC
Inrush Current		120A/230VAC			AAC
Efficiency		89			%
Output Voltage		12±5%			VDC
Output Current				11.5	ADC
Leakage Current				0,75	mA

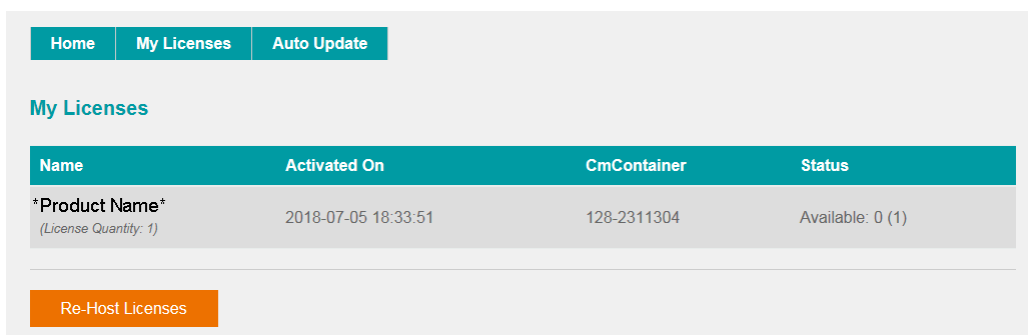
11.6 Advanced Licensing Features

This section describes the more advanced features of the CodeMeter Runtime licensing system.

11.6.1 Re-Hosting a License

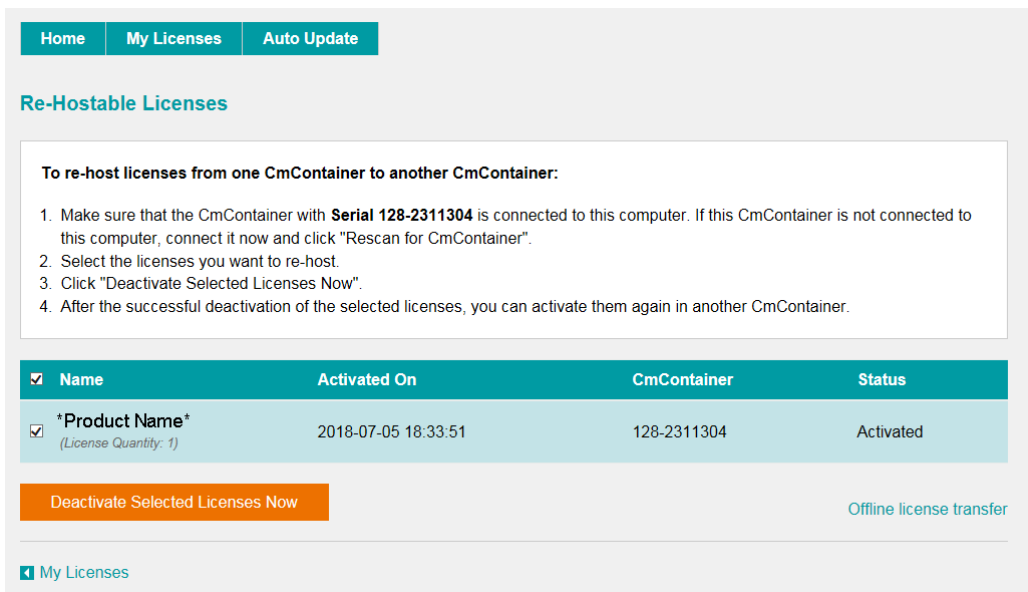
To move a license from one Cm container to another, you will need to re-host the license as follows. This requires you to first de-activate the license from its existing Cm container, and then choose the new storage container.

1. Follow the first two steps from the [online activation](#) method:
 - Open the 'Lawo License' web browser page at <https://licenseportal.lawo.com>.
 - Copy your license ticket number - this is the 25 number code - into the **Ticket** field and select **Next**.
2. At the "My Licenses" summary window, select **Re-Host Licenses**:



Name	Activated On	CmContainer	Status
Product Name <small>(License Quantity: 1)</small>	2018-07-05 18:33:51	128-2311304	Available: 0 (1)

3. Make sure that the Cm container is connected to the computer, select the licenses you wish to re-host and select **Deactivate Selected Licenses Now**.



To re-host licenses from one CmContainer to another CmContainer:

1. Make sure that the CmContainer with **Serial 128-2311304** is connected to this computer. If this CmContainer is not connected to this computer, connect it now and click "Rescan for CmContainer".
2. Select the licenses you want to re-host.
3. Click "Deactivate Selected Licenses Now".
4. After the successful deactivation of the selected licenses, you can activate them again in another CmContainer.

<input checked="" type="checkbox"/> Name	Activated On	CmContainer	Status
<input checked="" type="checkbox"/> *Product Name* <small>(License Quantity: 1)</small>	2018-07-05 18:33:51	128-2311304	Activated

Wait for a few seconds - a confirmation pop-up appears once the de-activation is successful.

You can follow steps 3 to 7 from the [online](#) activation method, or perform an [offline](#) license transfer, to activate the license using a new storage container.

11.6.2 Activating a License Offline

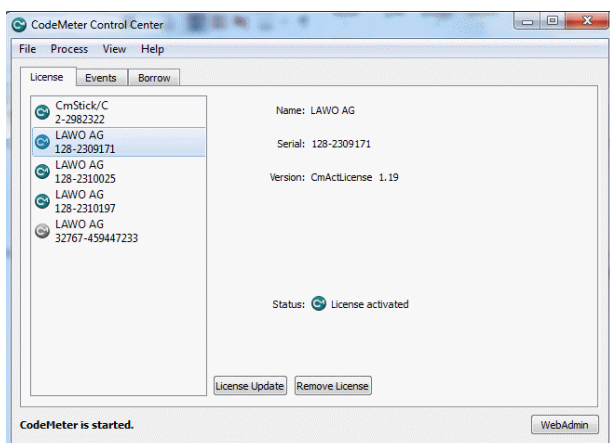
If your PC has no internet access, then you can activate a software license offline. This method involves three stages:

- **Create a license request file** - for the Cm storage container. Then copy the file onto a computer with internet access.
- **Activate the license** - using the 'Lawo License' web portal, copy the license update file back to the original computer.
- **Import the license update file** - to the Cm storage container.

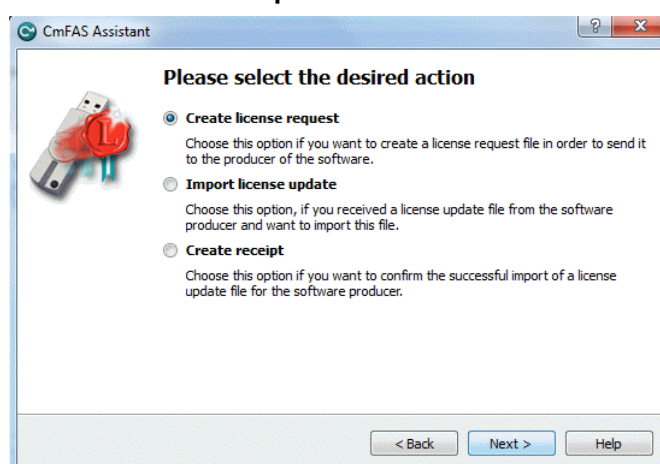
Creating the License Request File

On the computer you wish to license:

1. Open the '[CodeMeter Control Center](#)' (by clicking on the Cm taskbar icon), and select the container you wish to use for the license storage.
2. If the container is empty, select **Activate License**. Or, if the container already holds an active license, select **License Update**. This starts the 'CodeMeter Field Activation Service (CmFAS) assistant':

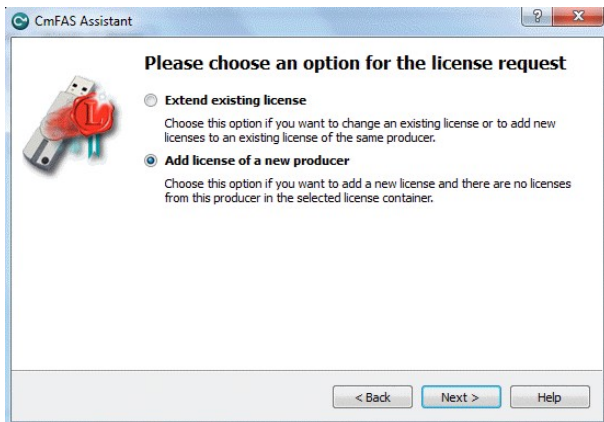


3. Select **Next:** and then **Create license request:**



At this stage, there are two additional steps (to add the correct firmcode) if you have selected a **CmStick** container. Enter the following Lawo FirmCode to create the license request file:

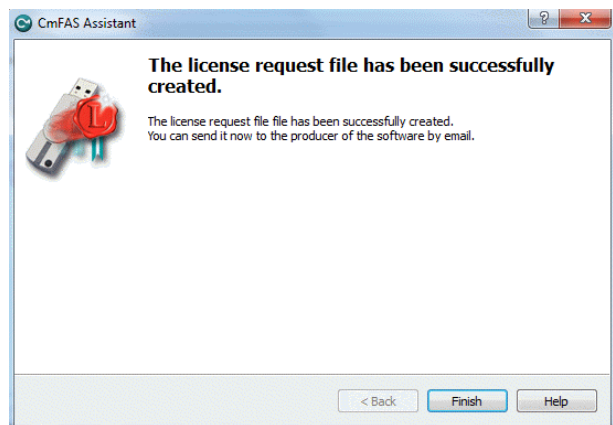
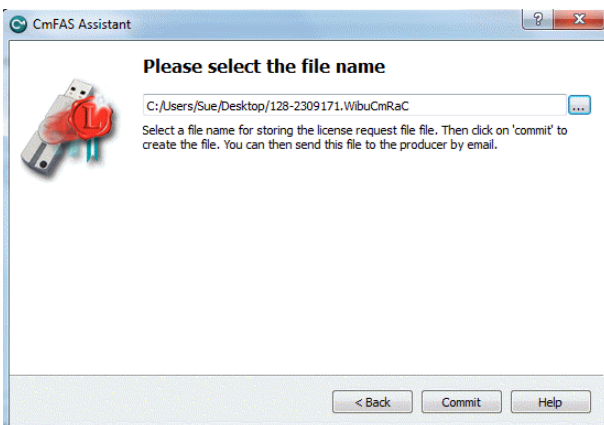
Select **Add license of a new producer**



Enter the Lawo FirmCode = 102037



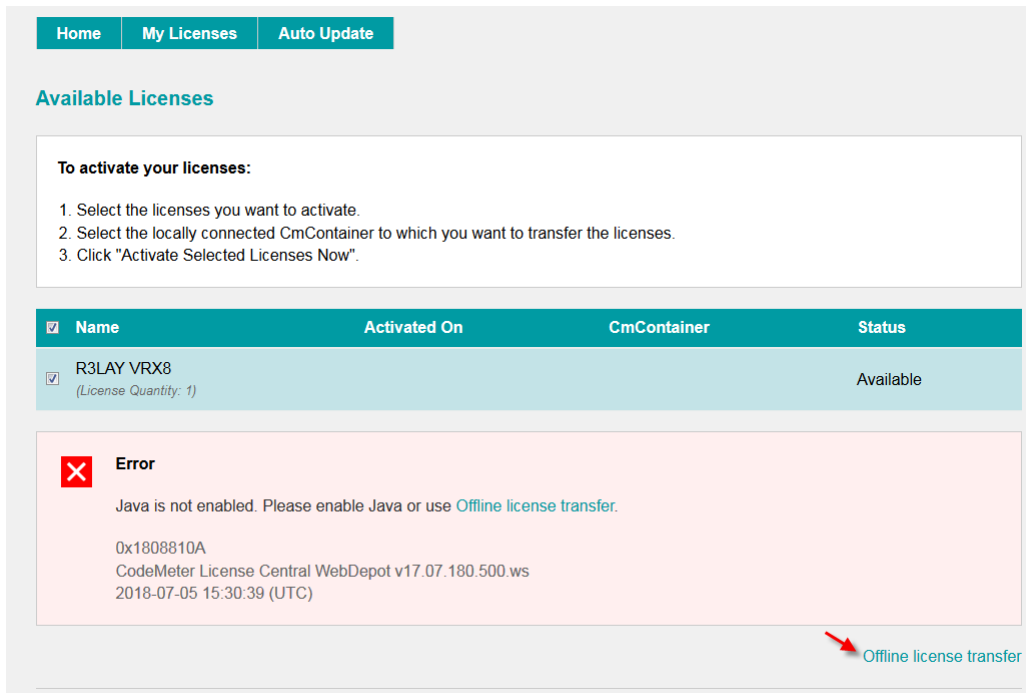
4. Select **Next**, and using Windows Explorer, enter a file path for the license request file. Choose somewhere easy to find, such as the Desktop. Then select **Commit** to create the request file:



5. Select **Finish** and copy the request file onto a computer with internet access. You will need both the license request file and the 25-digit ticket number (received with your license purchase).

Activating the License

1. On a computer with internet access, follow the first four steps from the [online activation](#) method:
 - Open the 'Lawo License' web browser page at <https://licenseportal.lawo.com>.
 - Copy your license ticket number - this is the 25 number code - into the **Ticket** field and select **Next**.
 - When your license is displayed, select **Activate Licenses** to continue.
 - Select the storage method for your license - either USB dongle or single computer.
2. At the **Available Licenses** page, select **Offline license transfer** to continue:



Home My Licenses Auto Update

Available Licenses

To activate your licenses:

1. Select the licenses you want to activate.
2. Select the locally connected CmContainer to which you want to transfer the licenses.
3. Click "Activate Selected Licenses Now".

<input checked="" type="checkbox"/>	Name	Activated On	CmContainer	Status
<input checked="" type="checkbox"/>	R3LAY VRX8 <small>(License Quantity: 1)</small>			Available

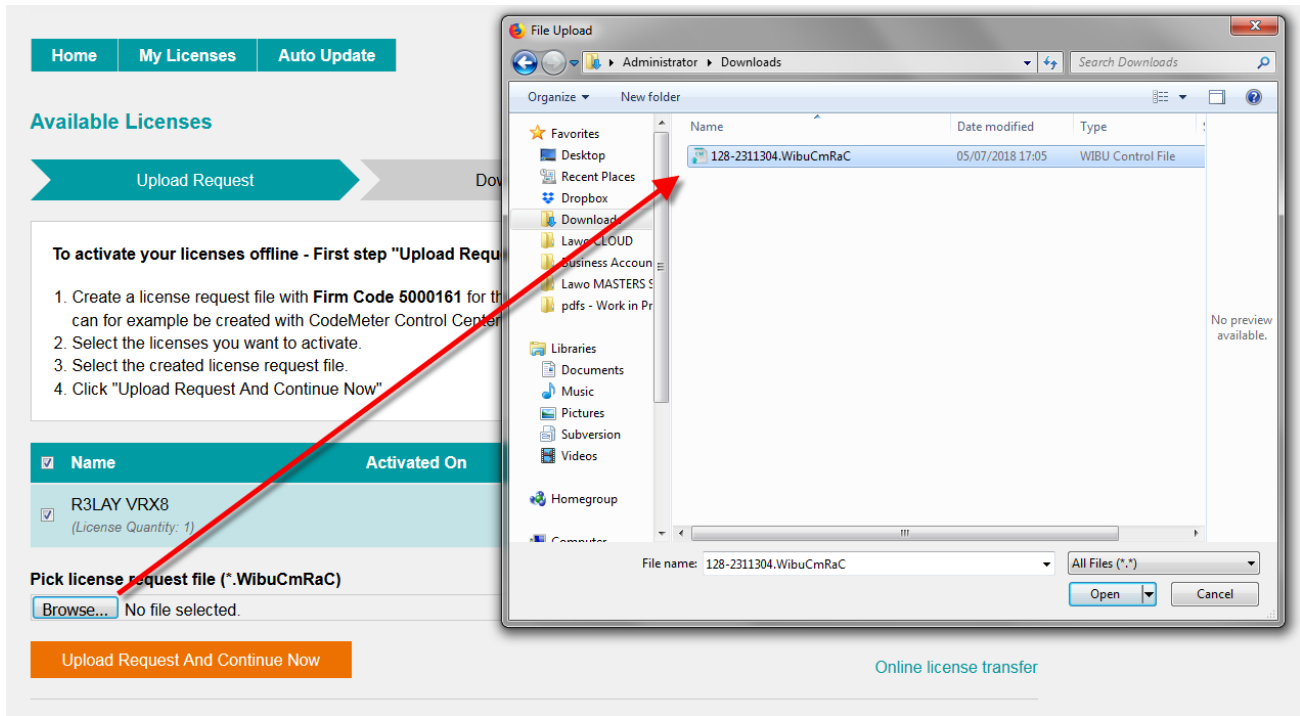
Error

Java is not enabled. Please enable Java or use [Offline license transfer](#).

0x1808810A
CodeMeter License Central WebDepot v17.07.180.500.ws
2018-07-05 15:30:39 (UTC)

[Offline license transfer](#)

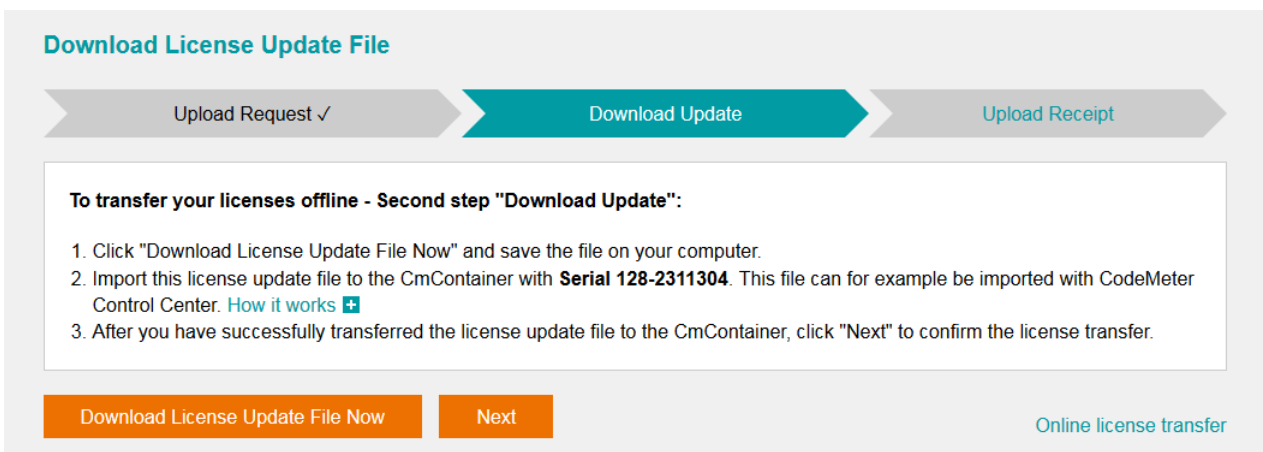
- On the next page, select the license(s) you wish to activate, select **Browse...** and, using Windows Explorer, choose the request file (created earlier):



The screenshot shows a web interface for license management. On the left, there are tabs for 'Home', 'My Licenses', and 'Auto Update'. Below these is a section titled 'Available Licenses' with a large teal arrow labeled 'Upload Request'. A text box provides instructions for offline activation, including creating a license request file with Firm Code 5000161. Below the instructions is a table with columns 'Name' and 'Activated On'. One license, 'R3LAY VRX8', is listed with a quantity of 1. Below the table is a section 'Pick license request file (*.WibuCmRaC)' with a 'Browse...' button and the text 'No file selected.' At the bottom of this section is an orange button labeled 'Upload Request And Continue Now' and a link for 'Online license transfer'.

Overlaid on the right is a Windows File Upload dialog box. The address bar shows 'Administrator > Downloads'. The file list contains one entry: '128-2311304.WibuCmRaC' with a date modified of '05/07/2018 17:05' and a type of 'WIBU Control File'. A red arrow points from the 'Browse...' button in the web interface to this file in the dialog box. The dialog box also shows 'File name: 128-2311304.WibuCmRaC' and 'All Files (*.*)' in the file type dropdown. 'Open' and 'Cancel' buttons are at the bottom right.

- Then select **Upload Request And Continue Now** - the license request is processed and, if successful, you will have the option to Download the update:

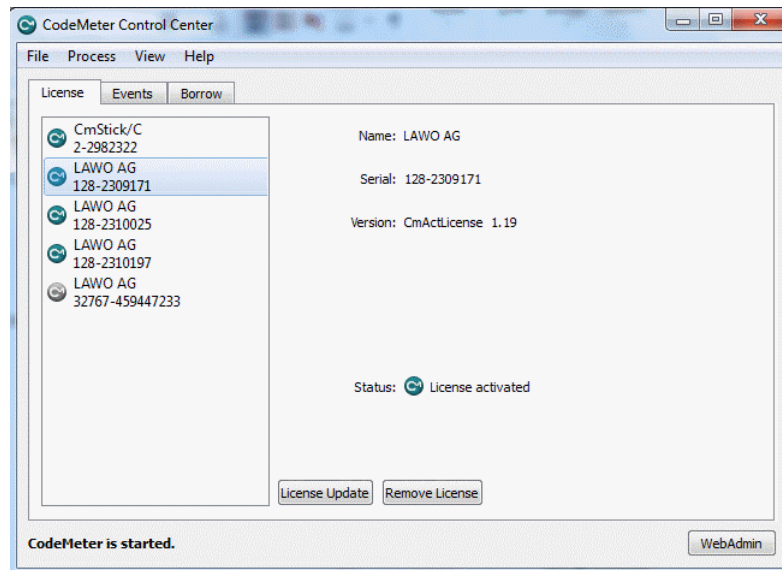


The screenshot shows the 'Download License Update File' step in the license management process. At the top, there is a progress bar with three steps: 'Upload Request' (checked), 'Download Update' (highlighted in teal), and 'Upload Receipt'. Below the progress bar is a text box with instructions for the second step: 'To transfer your licenses offline - Second step "Download Update":'. The instructions are: 1. Click "Download License Update File Now" and save the file on your computer. 2. Import this license update file to the CmContainer with Serial 128-2311304. This file can for example be imported with CodeMeter Control Center. [How it works](#) + 3. After you have successfully transferred the license update file to the CmContainer, click "Next" to confirm the license transfer. At the bottom of the text box are two orange buttons: 'Download License Update File Now' and 'Next'. To the right of these buttons is a link for 'Online license transfer'.

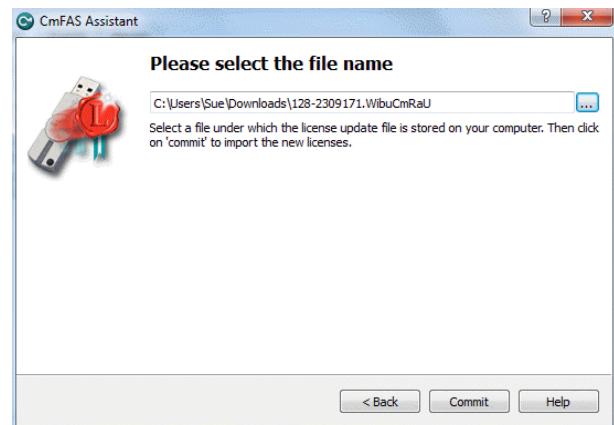
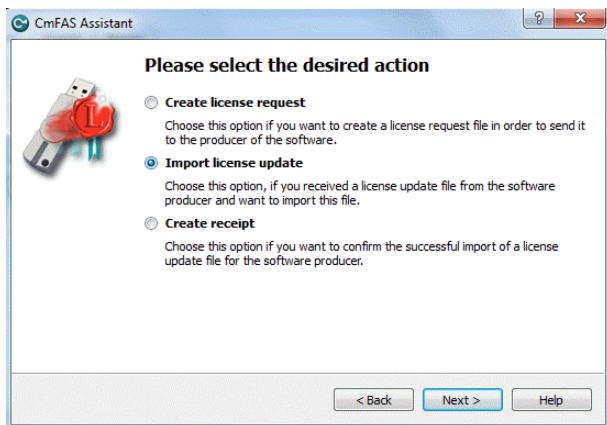
- Select **Download License Update File Now** and, when prompted, choose the **Save** file option - the file is downloaded.
- Copy the License Update file back to the original PC.

Importing the License Update

1. On the original computer re-open the 'CodeMeter Control Center' and select the Cm container for the license update. Note that this must be the same container as the one selected earlier (during the License Request).



2. Select **License Update** and follow the instructions given by the 'CmFAS Assistant' - when prompted, select Import License update and choose the update file (downloaded from the License portal):

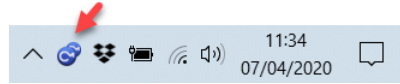


3. Select **Commit** to action the update - the license is activated and you can close the 'CodeMeter Control Center'.
4. You can now return to your Lawo application or install your USB license dongle - all licensed features should be available.

11.6.3 The CodeMeter Control Center

The 'CodeMeter Control Center' is used to manage the license containers and perform a backup or restore.

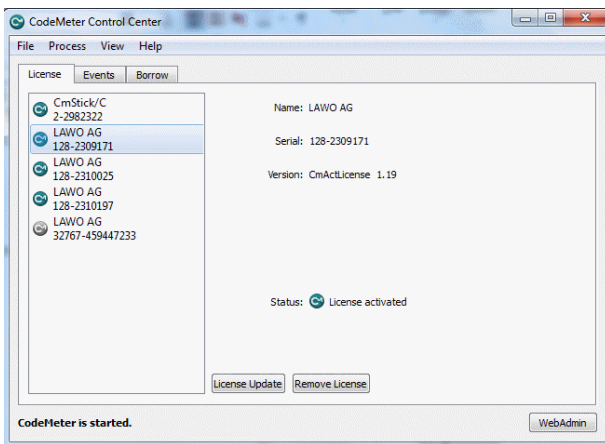
1. Click on the Windows taskbar Cm icon to open the 'CodeMeter Control Center' - the icon may be hidden from view or vary in color (depending on your taskbar configuration).



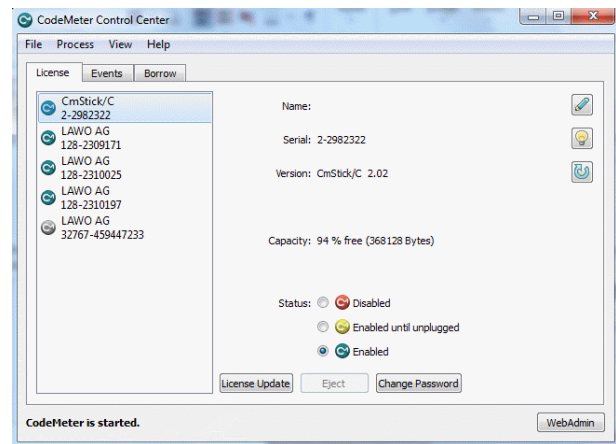
The 'CodeMeter Control Center' shows all the Cm containers which can be used for license storage.

A new local computer container is created each time you run the **CodeMeter Runtime** install wizard. Therefore, if you have installed multiple Lawo products or software versions, you will see several **LAWO AG** containers. If a USB dongle is connected, you will see a container labelled **CmStick**.

Local Computer Container (LAWO AG)



USB Dongle Container (CmStick)

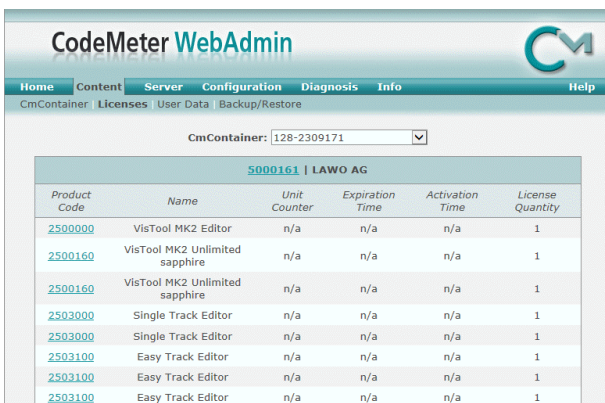


The **Serial** numbers identify each container. The icon colours indicate: green = license activated; grey = container is empty; red = license deactivated.

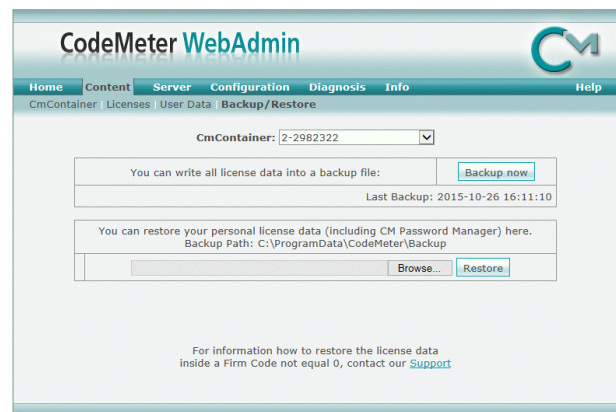
A single Cm container can contain multiple licenses - simply select the same container during the [activation](#) process.

2. Select **WebAdmin** (bottom right) to open the WebAdmin portal in your default browser. The portal has many functions including license interrogation, and backup/restore functions for licenses stored on a **CmStick** (USB Dongle):

WebAdmin Content Cm Container



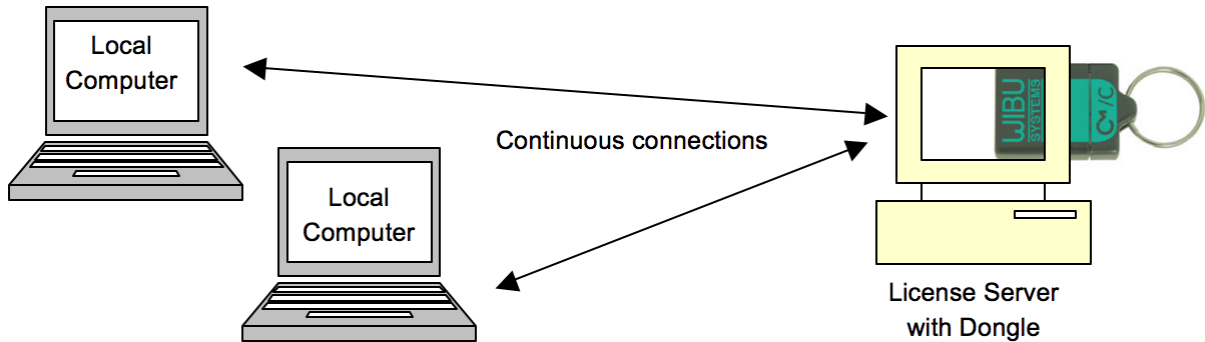
WebAdmin Backup/Restore



For further information, please refer to the **CodeMeter Runtime** documentation at wibu.com.

11.6.4 License Configuration via a Central Server

This license storage method can be used to administrate licenses centrally within a local network. For example, when starting a Lawo application such as **VisTool**, the local computer asks the server to borrow the relevant license. The license is then used by the **VisTool** client until the application is closed. On closing, the license is handed back to the server where it may then be used by a different **VisTool** client.



Preparing the License Server

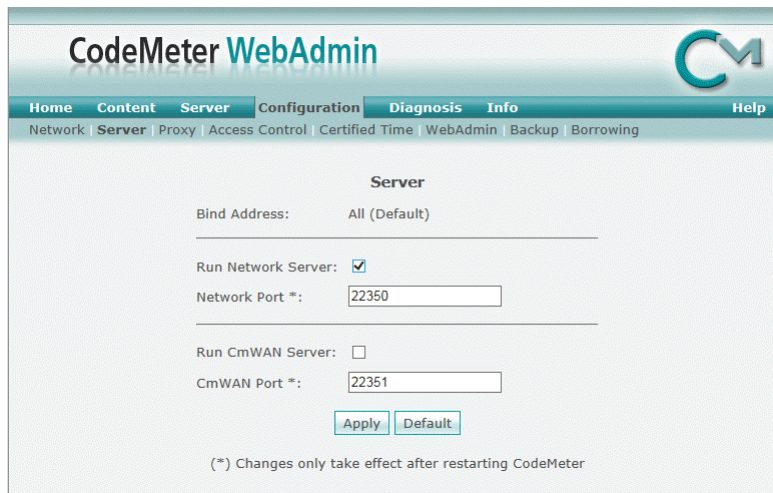
1. First, install the **Codemeter Runtime** software (Version 5.10 or above) on the central server. (Or, on a virtual machine on the server).

The latest release of CodeMeter Runtime can be downloaded from WIBU systems at wibu.com.

2. Activate all licenses in the usual manner.

If a virtual machine is being used, set up a connection between the virtual machine and USB dongle.

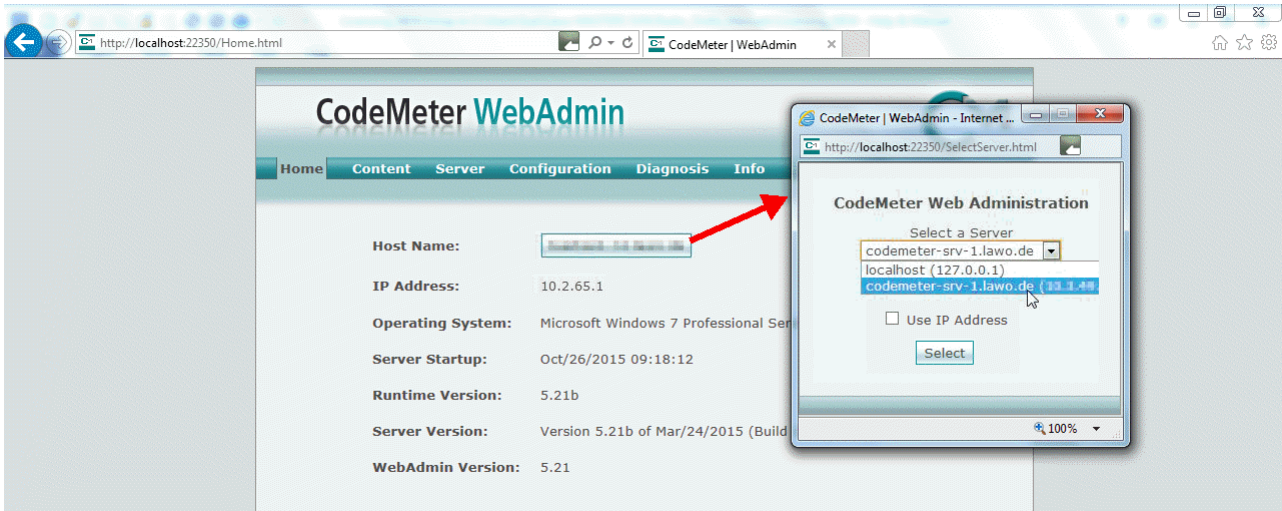
3. Open the [CodeMeter Control Center](#) and select **WebAdmin**.
4. Under **Configuration** -> **Server**, select the **Run Network Server** checkbox:



5. Click **Apply** and restart the **CodeMeter Runtime** software.

Preparing the Clients

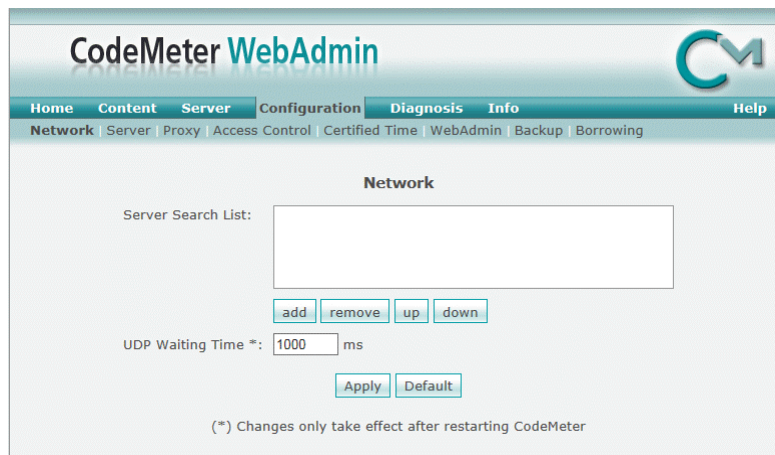
1. Install the **Codemeter Runtime** software (Version 5.10 or above) on each of the client computers.
2. Connect the clients (and server) to the network - on startup, the **CodeMeter Runtime** software sends a broadcast message across the network to find all license servers.
3. On each client computer, open the [CodeMeter Control Center](#) and select **WebAdmin**.
4. From the **Home** page, select the name of the computer - a dialogue box should appear listing all the available license servers:



5. Choose the correct server from the drop-down list and click on **Select**.

If the license server is not found, then your firewall or network policy may not allow messages to be broadcast. In this case, you will need to add the server's IP settings to the search list, manually, as follows:

Under **Configuration** -> **Network**, add the correct IP settings into the **Server Search** list:



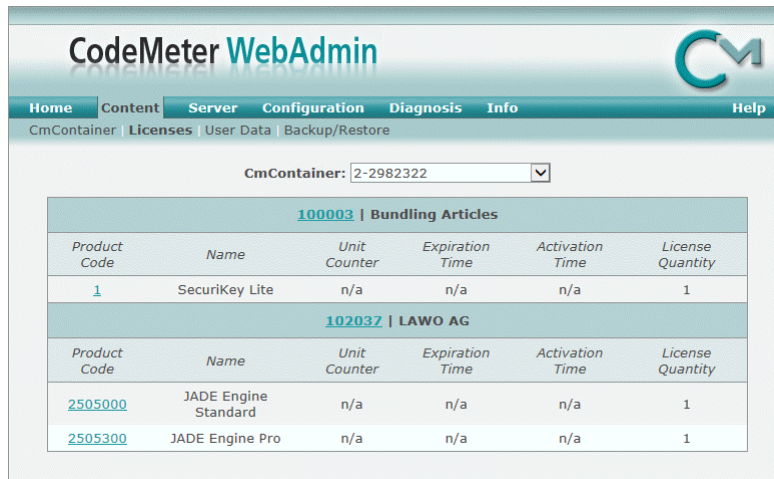
Click **Apply** and restart the **CodeMeter Runtime** software.

Note that once the **Server Search** list has an entry, all other license servers (announced automatically to the network) will be ignored.

Choosing a License

Once a connection to the license server is established, you can borrow one of the server licenses as follows:

1. On the client computer, open the [Codemeter Control Center](#) and select **WebAdmin**.
2. Under **Content** -> **Licenses**, choose the **CmContainer** (holding the server licenses) and select the desired license file:




The screenshot shows the CodeMeter WebAdmin interface. The 'Content' menu is selected, and the 'Licenses' sub-menu is active. A dropdown menu shows 'CmContainer: 2-2982322'. Below this, there are two tables of licenses. The first table is for '100003 | Bundling Articles' and the second is for '102037 | LAWO AG'.

100003 Bundling Articles					
Product Code	Name	Unit Counter	Expiration Time	Activation Time	License Quantity
1	SecuriKey Lite	n/a	n/a	n/a	1

102037 LAWO AG					
Product Code	Name	Unit Counter	Expiration Time	Activation Time	License Quantity
2505000	JADE Engine Standard	n/a	n/a	n/a	1
2505300	JADE Engine Pro	n/a	n/a	n/a	1

If the licenses is in use, then a warning message appears.

You can check which licenses are available (free) by selecting **Server** and **Cluster**:



The screenshot shows the CodeMeter WebAdmin interface. The 'Server' menu is selected, and the 'Cluster' sub-menu is active. The page title is 'Available Network Licenses at 'codemeter-srv-1.lawo.de''. Below this, there is a table showing the status of licenses.

Product Code	Name	Feature Map	Licenses	Status						
				User Limit (Borrowed)	No User Limit	Exclusive	Shared	Free		
102037 LAWO AG										
2503000	Single Track Editor	0x0	1	0 (-)	0	0	0	1	Details	
2505400	JADE VST Option (Dongle)	0x0	1	0 (-)	0	0	0	1	Details	