Solid State Logic

OXFORD • ENGLAND

Live

Installation Guide

Part no. 82BL5G01N

Contents

Maintenance: Dust Guards

Your Live Console may be fitted with dust guards covering the air vents beneath the faders. It is recommended that the filter foam should be regularly inspected for particular build-up.

Unscrew the M3 screws that secure the dust guards in place and inspect both sides of the guard. If necessary, vacuum clean. Extremely dirty filters may be cleaned with water and replaced when dry.

Only one layer of filter foam should be fitted.

Filter pads may last several years before needing replacement. Please contact SSL for replacement filter pads.

Note that the addition of dust guards will increase the internal temperature of the console by several degrees. SSL recommends that if dust guards are fitted the console should not be operated in an external ambient temperature in excess of 30 ºC.

Live Console Synchronisation & Clocking

The Live console and associated stageboxes are connected digitally and thus must share a common digital clock (sync) source. This section describes how to set up a Live system with multiple stageboxes and multiple consoles successfully, using both internal and external clock sources.

Clocking in General

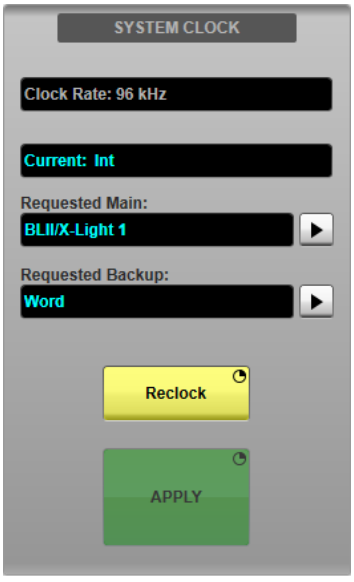
The Live console has a very high quality internal clock that can be used to clock an entire system with multiple Live consoles and stageboxes connected, so no external clock source is needed unless a specific application requires it. If there is a specific requirement for external clocking of a Live system, the external clock **must** match the sample rate at which the Live console is running (or PAL 25/NTSC 29.97 video sync).

Note: *It is also important that, if an external clock is used, only the Live console should be connected to the clock source. SSL Live stageboxes will receive their clock via the MADI stream from the console. We do not recommend connecting external clocks to each of the stageboxes in this configuration.*

ALL AES/EBU connections on the console and D32.32 stageboxes have sample rate converters and can accommodate digital devices at alternative sample rates, or those running in a different clock domain. The AES/EBU connection options and set up are detailed below.

Selecting a Clock Source

The console may be clocked internally, or externally via video, AES, wordclock, MADI, Blacklight II (in a dual SSL console system) or Dante. This is set from **MENU** > **Setup** > **Options** > **SYSTEM** tab.



Main and **Backup** clock sources can be configured. If the Main clock source is lost, the console will automatically switch to the Backup clock source. If the Backup source is lost, the console will revert to its internal clock.

Use the buttons to open the Main or Backup selection menus. Select the required clock source then press & hold the APPLY button. Ensure that the Current source matches the expected clock source.

If the requested clock source is lost, ensure the clock source is restored then use the Reclock button to attempt reclocking to the Main/Backup source.

The status bar at the top of the main screen will show a clock source change to warn the operator.

Clocking via a Blacklight II Concentrator

Two consoles may be connected to a Blacklight II Concentrator for sharing a set of stageboxes. The 'Master' console (designated as such by connecting to the Blacklight Concentrator's **A** ports) will distribute its clock to the Blacklight system and any stageboxes and consoles connected to it. The 'Slave' console (designated by connecting to the Blacklight Concentrator's **B** ports) should therefore set its clock source to the corresponding **BLII** port on the rear of the console.

The Master console should distribute either its internal clock over Blacklight II (by selecting the **Int** option), or one of the external clock source options listed above, with the exception of any Blacklight port of which it is the Master. Selecting the **BLII** clock source button will reveal a subset of buttons. The Slave console should use the **Blacklight II** option. However, the Master console may use one of the MADI options if an external MADI source is connected to the corresponding MADI input on the Blacklight Concentrator. For example, this could be a MADI feed from a third party device providing clock, or an SSL stagebox fed with a wordclock signal and set to clock from its external wordclock input. (Note that wordclock cannot be connected directly to a BLII Concentrator's MADI ports.)

Clocking over Dante

Before proceeding, ensure that the console's Dante Expander Module, BLII/X-Light Bridge (if applicable), and any stageboxes or other Dante devices appear in black text in Dante Controller. If the devices are not visible or visible in red text please see livehelp.solidstatelogic.com/Help/DanteSetup.html in the SSL Live Help System.

Dante uses its own "Clock Election" process to determine the most appropriate Leader Clock for the Dante network and a Leader Clock will be chosen automatically. For more information on the Dante Clock Election process please see the Audinate website: dev.audinate.com/GA/dante-controller/userguide/webhelp/#clock_synchronization.htm

To choose a Leader Clock manually, set this device to be the "Preferred Leader". To do this, open Dante Controller and click on the **Clock Status** tab. Check the "Preferred Leader" checkbox for your chosen Leader Clock.

If multiple devices on the network are "Preferred Leaders", the Dante Clock Election process will automatically choose a Leader Clock from the multiple "Preferred Leaders".

If the Clock Leader device's status changes, or a more suitable Leader Clock comes online, the Dante network will go through the Clock Election steps again to determine the most suitable Leader Clock for the network.

If you are not using Dante network redundancy, please use the primary connection (rather than the secondary) to ensure accurate synchronisation.

SSL Recommends: SSL recommends that the console is set to clock from the Dante network (slave mode) to benefit from the Dante clock election process.

Setting up the Console as a Slave of the Dante Network

In this configuration, a Dante device other than the console is the Leader Clock. The console and all other devices on the network will clock to this Leader.

In Dante Controller, go to the **Clock Status** tab. Check the "Preferred Leader" checkbox for the Leader Clock device(s) if you wish to set one. Dante has its own clock election process, so it is not necessary to set a Preferred Leader. For this example, ensure that "Preferred Leader" and "Sync to External" are unchecked for all devices on the network (including the console's Dante Expander and BLII/X-Light Bridge if applicable).

On the console, go to **MENU** > **Setup** > **Options** > **SYSTEM** tab. In the "SYSTEM CLOCK" section, select **Dante Expander** as the "Main" clock source and press & hold **APPLY**. Ensure that the "Current" clock source field displays "Dante Expander".

The chosen "Preferred Leader" (if set) is now the Clock Master of the network, including the console. The console is now clocking from its Dante Expander module. The Dante Expander module is clocking

from the "Preferred Leader" on the Dante network. All other devices on the network are clocking from the "Preferred Leader" on the Dante network.

Note that if selecting Dante as a clock source on the console, the console clock backup scheme will not drop back to another clock source if the Dante network clock is lost. The Dante Expander module incorporates an internal clock which will become the Clock Master of the Dante network as determined by Dante's clock election process until another device on the network is identified as a more suitable Clock Master.

Important: It is not recommended to clock from Dante if the Dante **SRC In** is engaged.
Consoles clocked from stageboxes via MADI or Wordclock are not recommended to be used as Dante network Clock Master sources.

Setting up the Console as a Master of the Dante Network

By setting the console's clock source to internal (or a non-Dante external source) and the Dante Expander module to "Preferred Leader" and "Sync to External" in Dante Controller, the console can be made master of the Dante network.

However, due to Dante's clock election process, any device subsequently connecting to the network which is also set to Preferred Leader and has a lower MAC address than the console will be elevated to network Leader Clock. In this scenario the console and Dante network clocks will no longer be in sync and could cause loss of audio.
SSL therefore recommends that this configuration is not used as it does not offer network clock redundancy.

Clocking over a BLII/X-Light Bridge

As detailed in the previous section, SSL recommends that the console is set to clock from the Dante network (follower mode) to benefit from the Dante clock election process. This should be done using the local Dante Expander port as described above, even if using a BLII/X-Light Bridge. Provided both the console and BLII/X-Light Bridge remain clocked to the Dante network they will remain synchronous.

If configured correctly the following LEDs will be seen on the BLII/X-Light Bridge:

LED	**If Folower to Dante network**	**If Leader of Dante network**
BL S	Off	Off
NET S	Redundant system: Solid Green Non-redundant system: Flashing Green & Red	Off
GM (BLII Bridge only)	Off	Green

Refer to the SSL Live Help System for further details: livehelp.solidstatelogic.com/Help/Clocking.html

Setting the Sample Rate

The Live system can run at 96 kHz (recommended) or 48 kHz sample rates. Use the **96 kHz** and **48 kHz** buttons in the System page (**MENU** > **Setup** > **SYSTEM**) to change the console's sample rate. The stageboxes must also be changed to match the console's sample rate; see below.

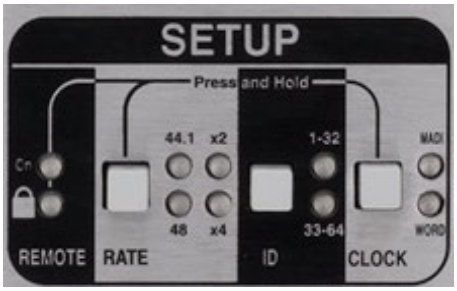
Aside from the FX Loop and optional Dante module interfaces, decreasing the sample rate to 48 kHz does not increase the total input/output count; each MADI port carries 64 channels at 48 kHz but odd-even MADI port pairs are always redundant (even-numbered ports on twin card Blacklight Concentrator are disabled).

Important: Changing the console's sample rate will interrupt audio and cause routes to be dropped as stagebox configurations will need to be changed. Muting all outputs to switch sample rate and for a further 30 seconds is recommended.

Important: The console must be rebooted following a change in Sample Rate.

Clocking MADI Stageboxes

By default, stageboxes are set to clock from the incoming MADI stream. **This is the recommended setting.** Other stagebox clock sync options are internal or external wordclock.



The clock source and sample rate can be set from the physical setup controls on the rear of each stagebox. The current clock source is displayed to the right of the SETUP area: if neither clock LED is lit, the stagebox is running on its own internal clock.

Note: The wordclock output transmits the clock signal currently in use by the stagebox (i.e. it is not a loop thru), depending on the stagebox's clock source setting).

To change the clock source, press & hold **REMOTE** and **CLOCK** simultaneously until the padlock flashes green. Press **CLOCK** until **MADI** is lit. The colour shows the following:

- Red: no MADI from master console detected.
- Red/green flashing: a single master MADI port is locked (non-redundant cabling).
- Green: both master MADI ports 1 & 2 are locked (redundant cabling).

To change the sample rate of the stagebox, unlock the controls as described above then use the **RATE** button to cycle through the available options.

Note: Only 48 x1 and 48 x2 (96 kHz) clock rates are currently supported.

Note: If running at 96 kHz sample rate (**48 x2**), the ID field must be set to **1-32**.

The controls will return to their locked state after a few seconds.

Daisy-Chaining MADI Stageboxes

Stageboxes running at 48 kHz sample rate can be daisy-chained on a single MADI stream, allowing all 64 channels of the MADI protocol to be utilised. With the controls unlocked, use the **ID** button to toggle between channels **1-32** and **33-64**.

- Connect the MADI **Out** from the console or Blacklight Concentrator to the MADI **In** of the first stagebox (ID **1-32**).
- Connect the MADI **Out** from the first stagebox to the MADI **In** of the second stagebox (ID **33-64**).
- Connect the MADI **Out** from the second stagebox to the MADI **In** of the console or Blacklight Concentrator.
- Repeat the above steps for the second set of MADI ports if connecting redundantly.

Daisy chaining MADI Stageboxes is only possible at 48 kHz.
Refer to the System Examples section below for further information.

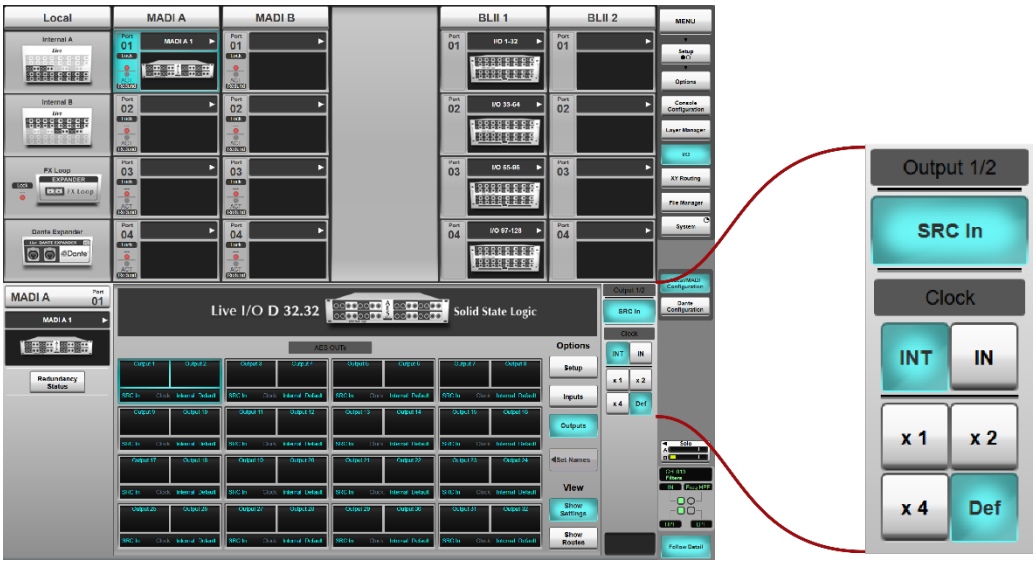
Please note: When daisy-chaining two MADI stageboxes, MIDI is not supported on the second stagebox in the chain.

AES/EBU Connections

All AES/EBU connections on the Live console's local I/O and D32.32 stageboxes have sample rate converters (SRC's) available. These are enabled via the console's local/MADI I/O menu (**MENU** > **Setup** > **I/O** > **Local/MADI Configuration**).

Select the local I/O or D32.32 stagebox in the I/O page and select the specific AES/EBU input or output you wish to sample rate convert from the lower section of the screen.

For inputs, you will be presented with a single **SRC In** button to the right middle of the screen for the selected port. The console supports the input rates listed in the Input fs column in the table below and will convert the incoming audio to 96 kHz (or 48 kHz).
The table below also shows the sample rates available for AES/EBU outputs. There are some additional controls for output ports, as shown below:



Supported Sample Rates at 96 kHz

SRC Clock Source	AES/EBU Corresponding Input fs	AES/EBU Output fs: SRC Out	AES/EBU Output fs: SRC In x1	AES/EBU Output fs: SRC In x2	AES/EBU Output fs: SRC In x4	AES/EBU Output fs: SRC In Def
INT (Console)	-	96 kHz	48 kHz	96 kHz	192 kHz	96 kHz
IN (Corresponding Input AES Pair)	44.1 kHz	96 kHz	44.1 kHz	88.2 kHz	176.4 kHz	88.2 kHz
	48 kHz	96 kHz	48 kHz	96 kHz	192 kHz	96 kHz
	88.2 kHz	96 kHz	44.1 kHz	88.2 kHz	176.4 kHz	88.2 kHz
	96 kHz	96 kHz	48 kHz	96 kHz	192 kHz	96 kHz
	176.4 kHz	96 kHz	44.1 kHz	88.2 kHz	176.4 kHz	88.2 kHz
	192 kHz	96 kHz	48 kHz	96 kHz	192 kHz	96 kHz

Supported Samples Rates at 48 kHz

SRC Clock Source	AES/EBU Corresponding Input fs	AES/EBU Output fs: SRC Out	AES/EBU Output fs: SRC In x1	AES/EBU Output fs: SRC In x2	AES/EBU Output fs: SRC In x4	AES/EBU Output fs: SRC In Def
INT (Console)	-	48 kHz	48 kHz	96 kHz	192 kHz	48 kHz
IN (Corresponding Input AES Pair)	44.1 kHz	48 kHz	44.1 kHz	88.2 kHz	176.4 kHz	44.1 kHz
	48 kHz	48 kHz	48 kHz	96 kHz	192 kHz	48 kHz
	88.2 kHz	48 kHz	44.1 kHz	88.2 kHz	176.4 kHz	44.1 kHz
	96 kHz	48 kHz	48 kHz	96 kHz	192 kHz	48 kHz
	176.4 kHz	48 kHz	Not Supported	Not Supported	Not Supported	Not Supported
	192 kHz	48 kHz	Not Supported	Not Supported	Not Supported	Not Supported

Note: The multiplier controls (**x1**, **x2** and **x4**) are relative to a base sample rate (lowest common denominator) of 44.1 or 48k, not the operating rate of the console (48 or 96k).

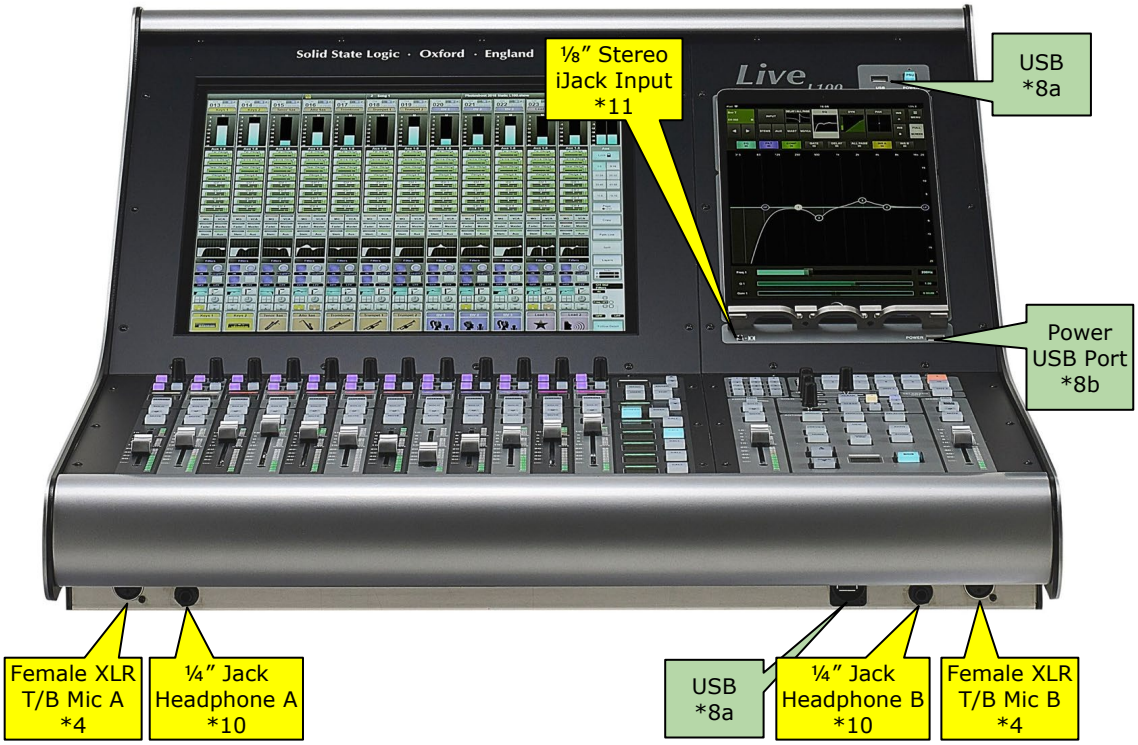
Engaging **SRC In** and setting the output clock to **IN** will clock the AES output from the corresponding AES input, at 1, 2, or 4 times the base rate (44.1 or 48k).

Setting the output clock to **INT** will use the console as the clock source. This can also be set to **x1**, **x2**, or **x4** of this base sample rate (48k).

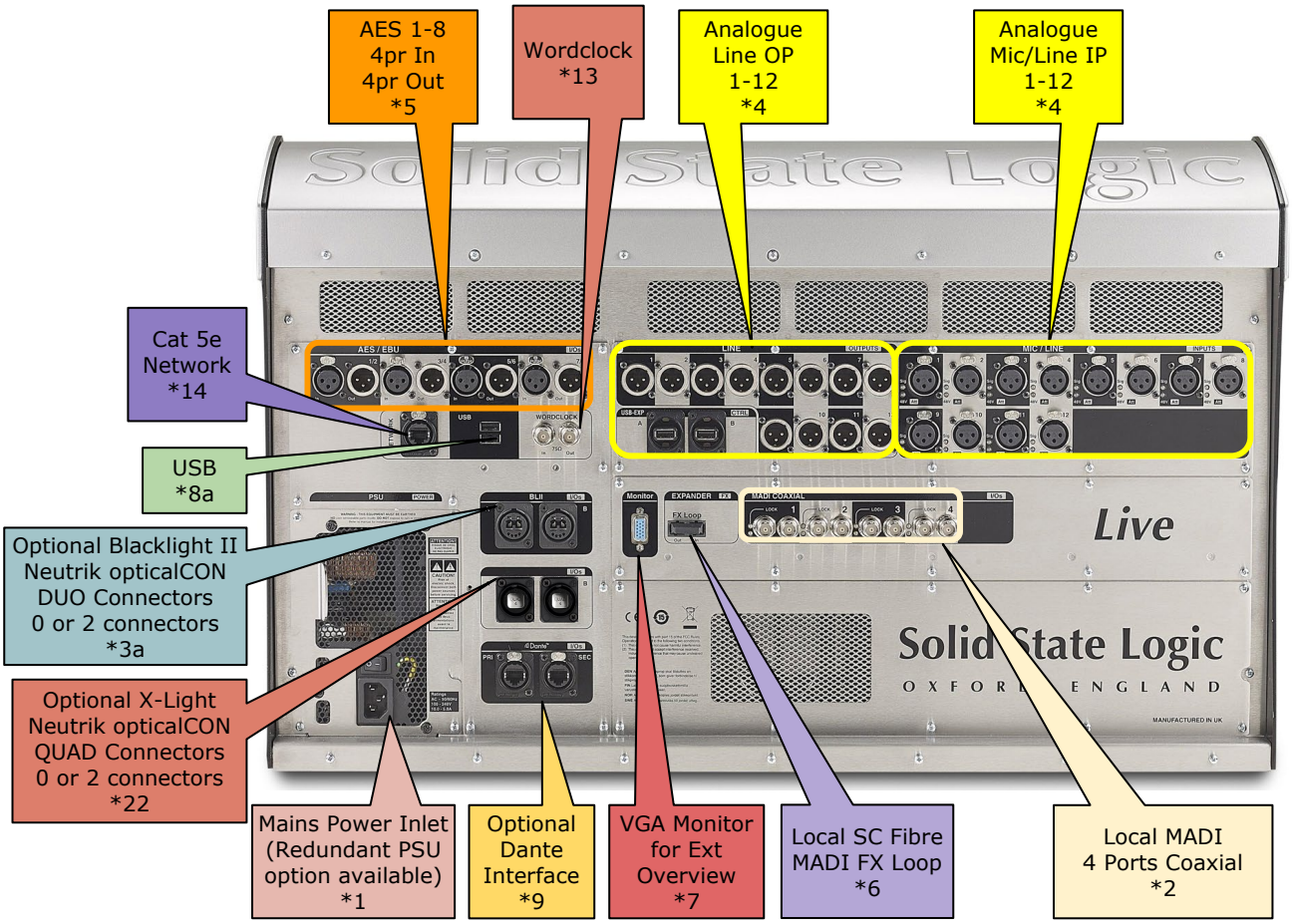
Tip: Setting the output SRC to **IN** will set this AES port's output to clock from the corresponding input rather than the console clock. This is useful if the external device has issues clocking to an external clock. This setting will allow the external device to use its internal clock, with the Live console's AES SRC locked to the external device, allowing the device to clock itself thus avoiding clocking errors. For example, if using a 96 kHz reverb, set it to internal clock and set the console's SRC settings to SRC In for both input and output AES/EBU ports. For the output port, select In and x2 (for 96k).

L100 Console (Includes L100 Plus Model)

L100 Connections - Front



L100 Console Connections - Rear



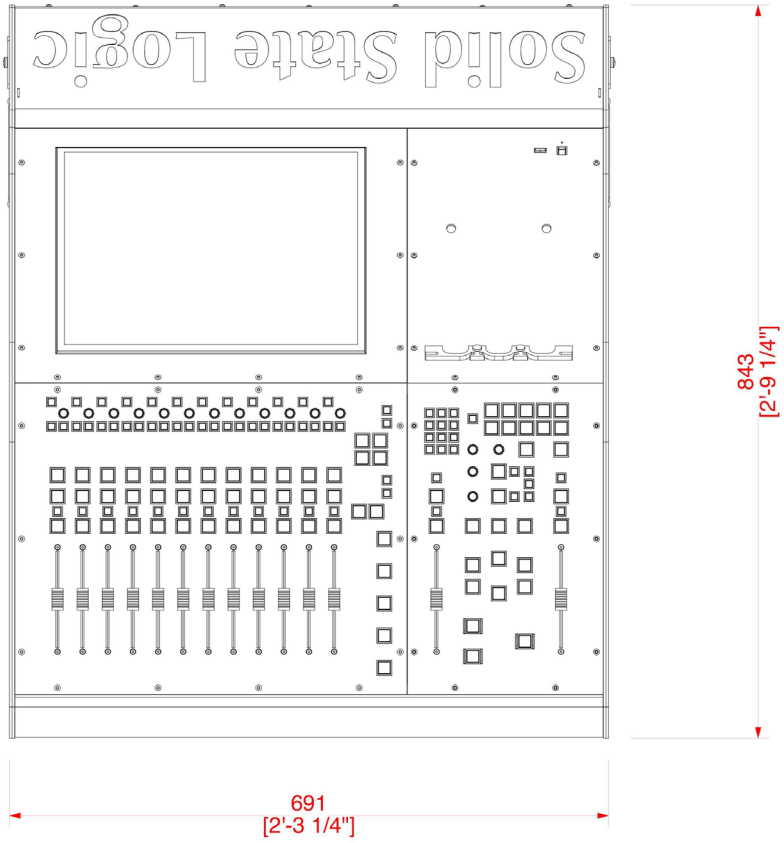
[Connections Key]

L100 Console Weight, Power & Dimensions

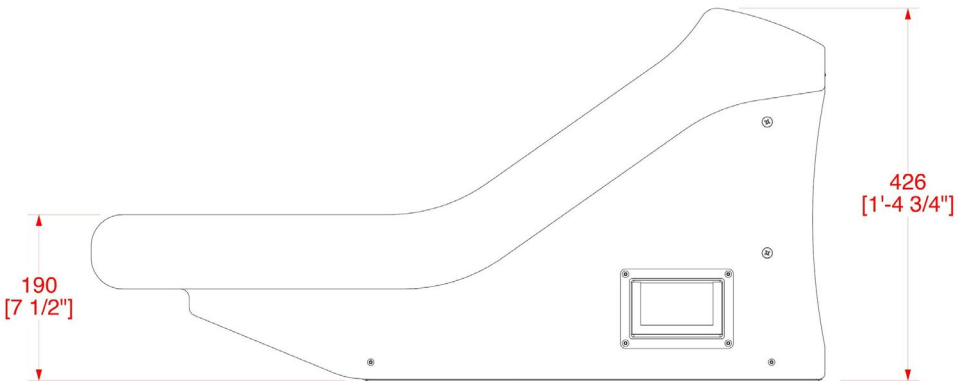
Weight (without flight case)	52 kg (114.7 lbs)
Weight (with flight case)	130 kg (286.6 lbs)
Acoustic Noise	With non-redundant PSU: = NR23 With redundant PSUs: = NR25
Typical Power	<360 W
Ratings	With non-redundant PSU: 100–240 V AC, 50/60 Hz, 10.0-5.0 A With redundant PSUs: 100–240 V AC, 50/60 Hz, 8.0-4.0 A

Console Dimensions: (upper figures in millimetres, lower figures in feet & inches) - A DXF drawing is available from SSL.

Plan View

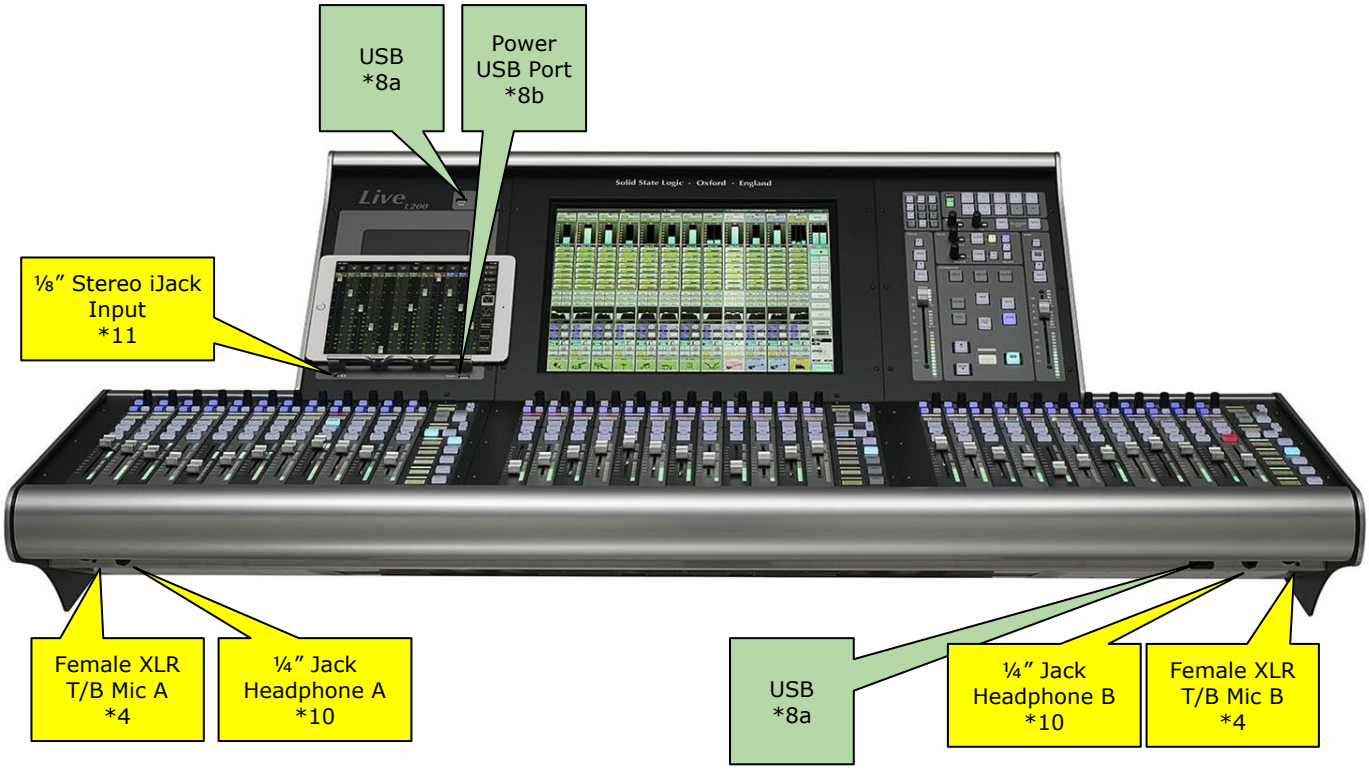


Side View

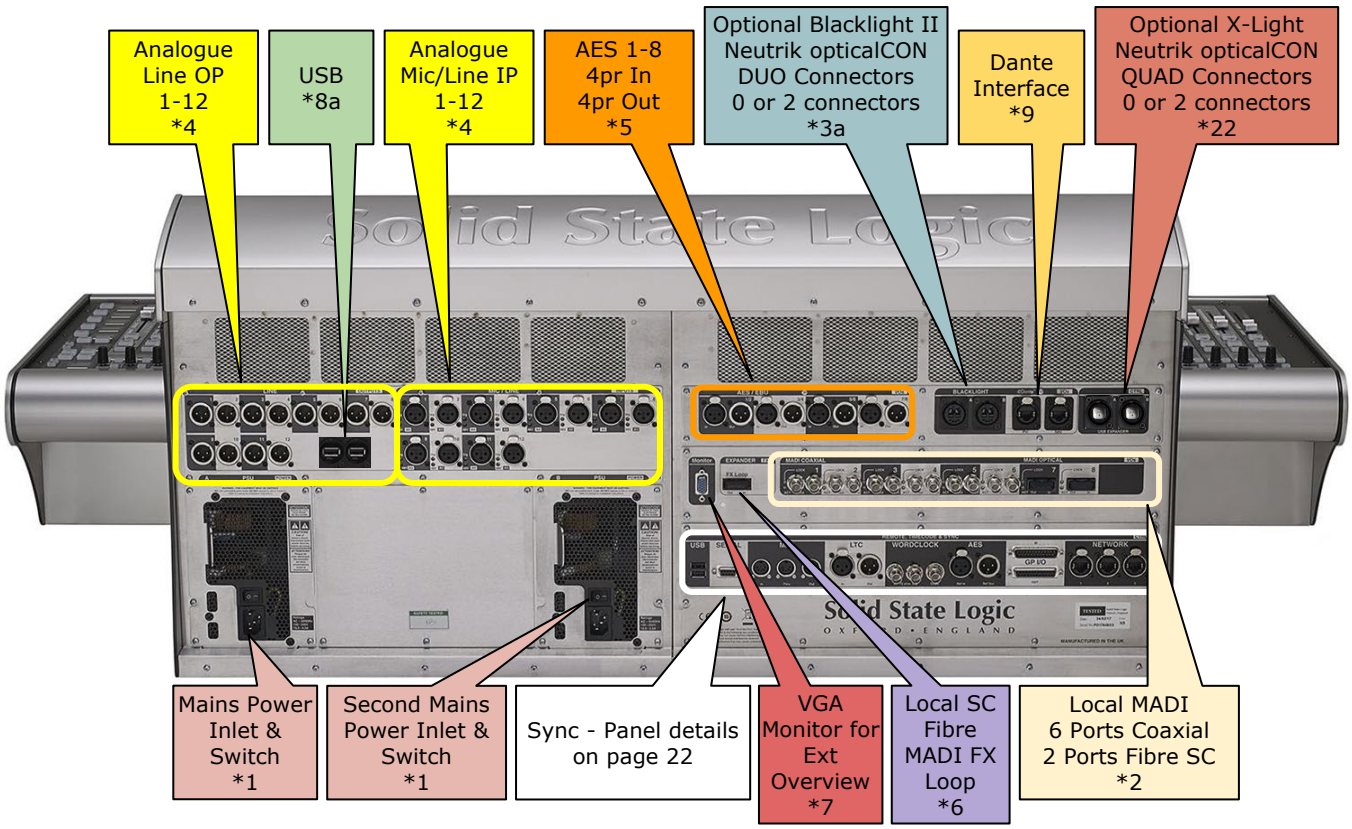


L200 Console (Includes L200 Plus Model)

L200 Connections - Front



L200 Console Connections - Rear



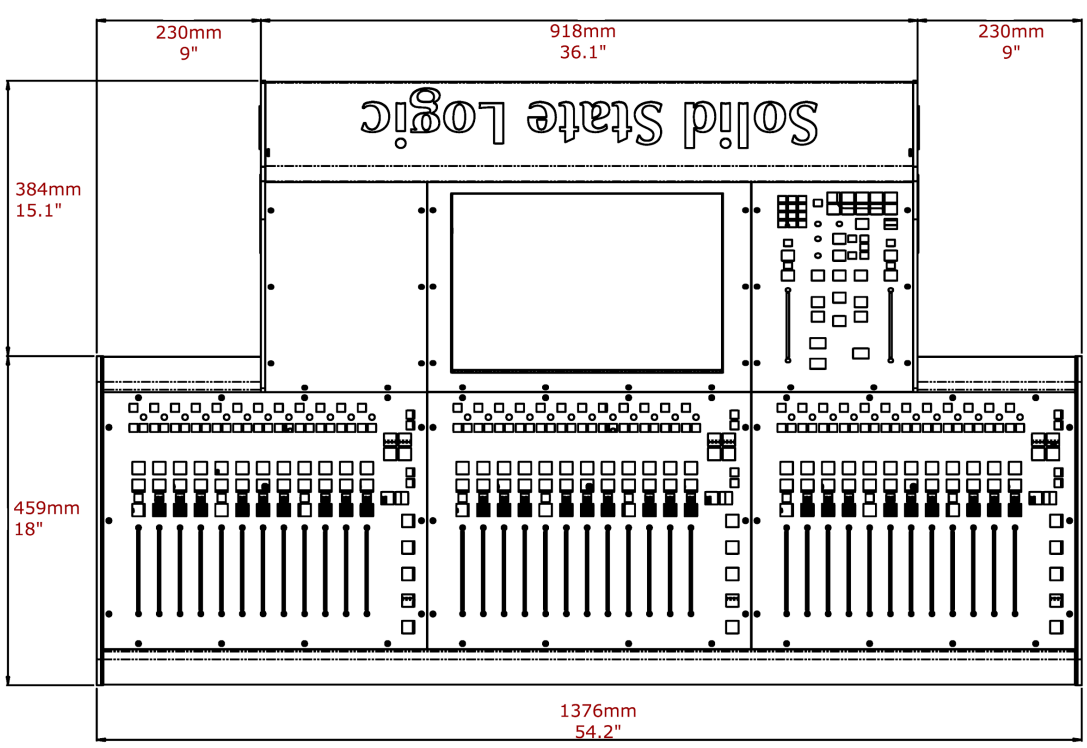
Connections Key

L200 Console Weight, Power & Dimensions

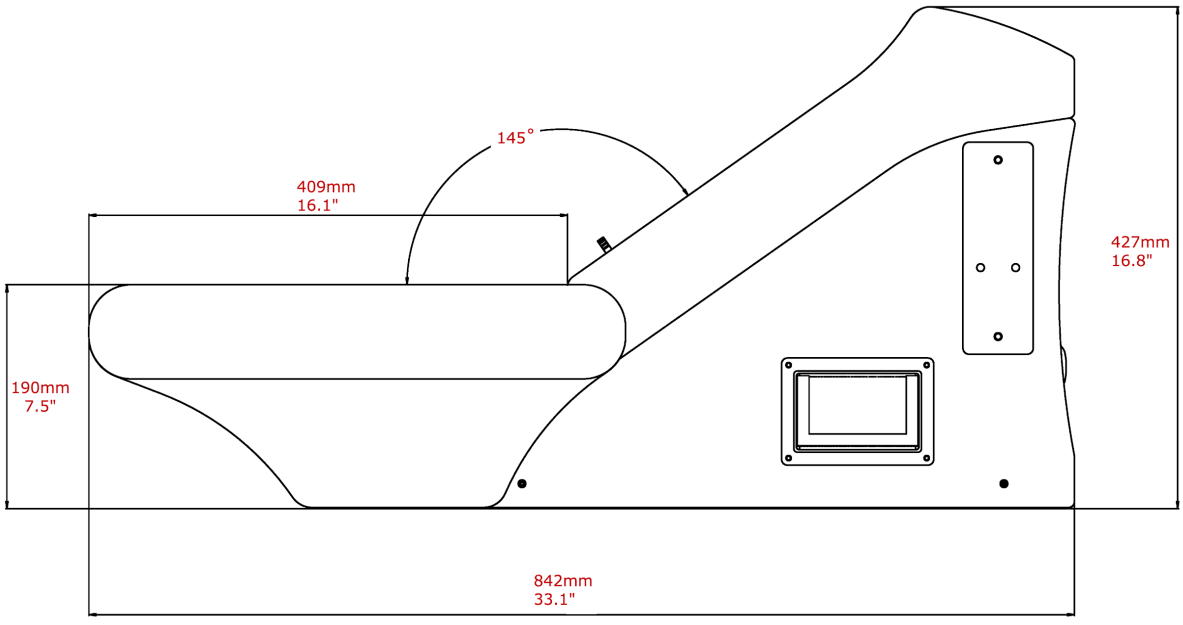
Weight (without flight case)	85 kg (188 lbs)
Weight (with flight case)	210 kg (463 lbs)
Acoustic Noise	< NR40
Typical Power	<460 W
Ratings	100–240 V AC, 50/60 Hz, 10.0-5.0 A

Console Dimensions: (upper figures in millimetres, lower figures in inches) - A DXF drawing is available from SSL.

Plan View

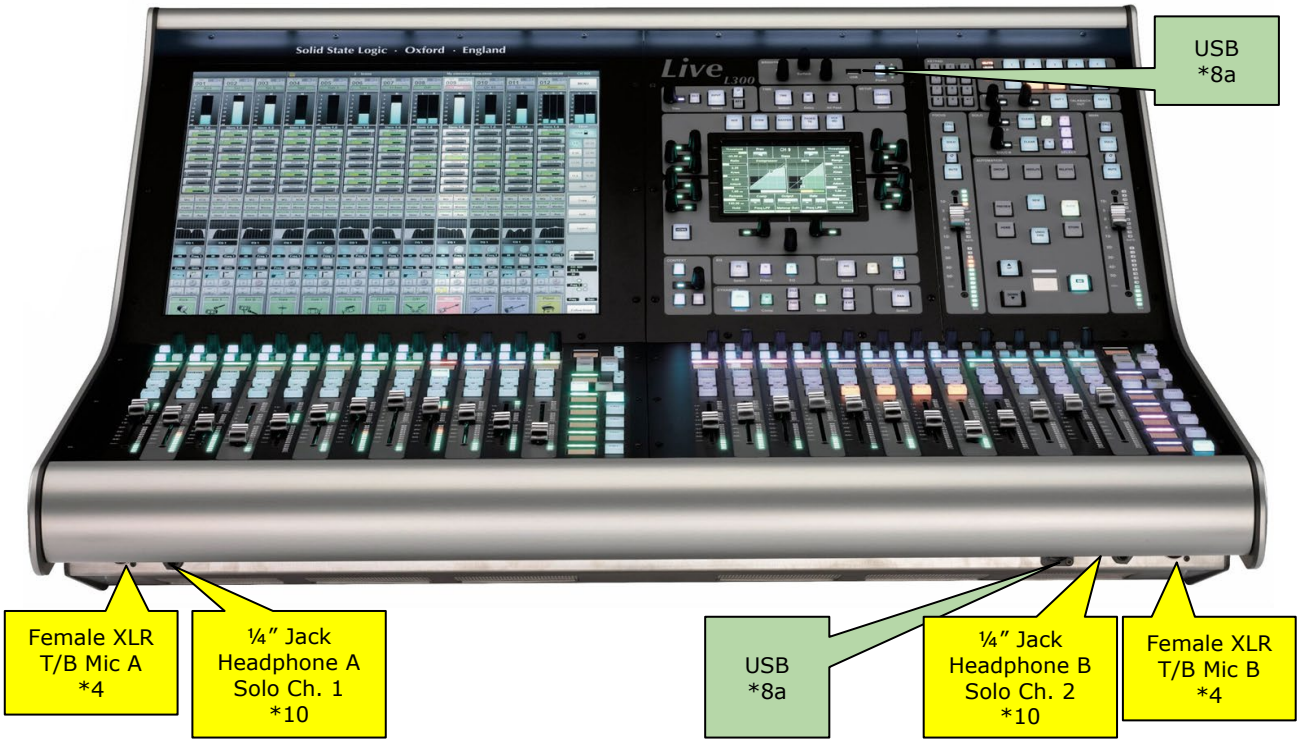


Side View

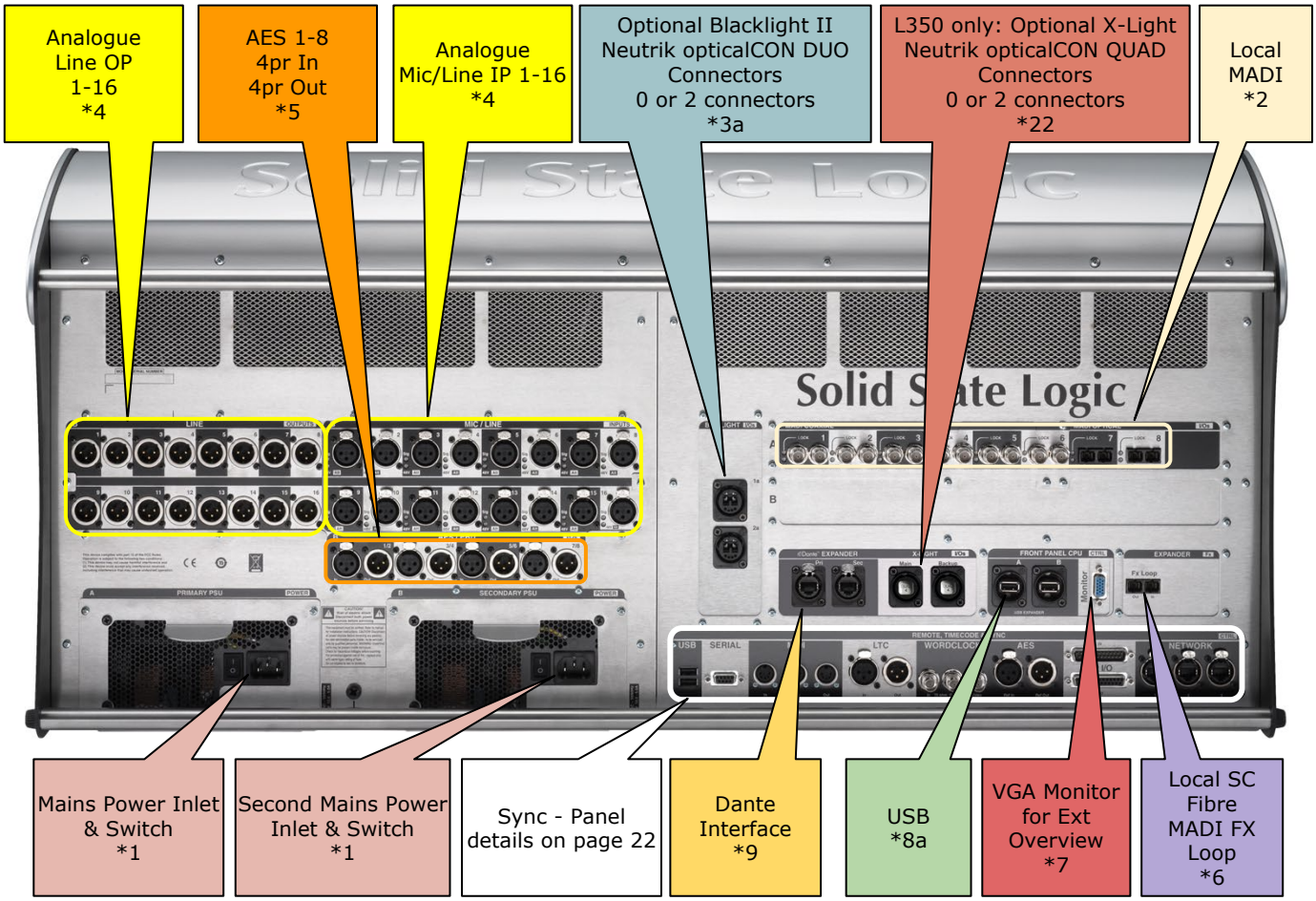


L350 Console (Includes L350 Plus Model)

L350 Connections - Front



L350 Connections - Rear



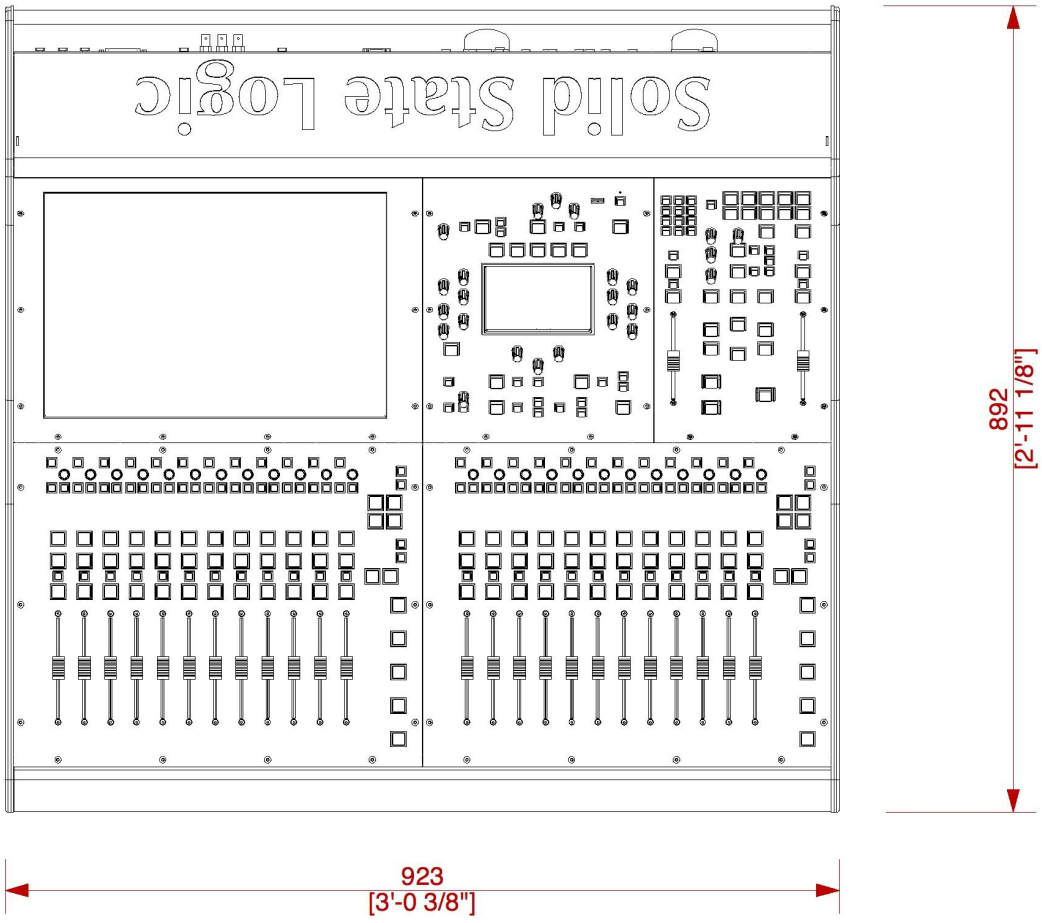
Connections Key

L350 Console Weight, Power & Dimensions

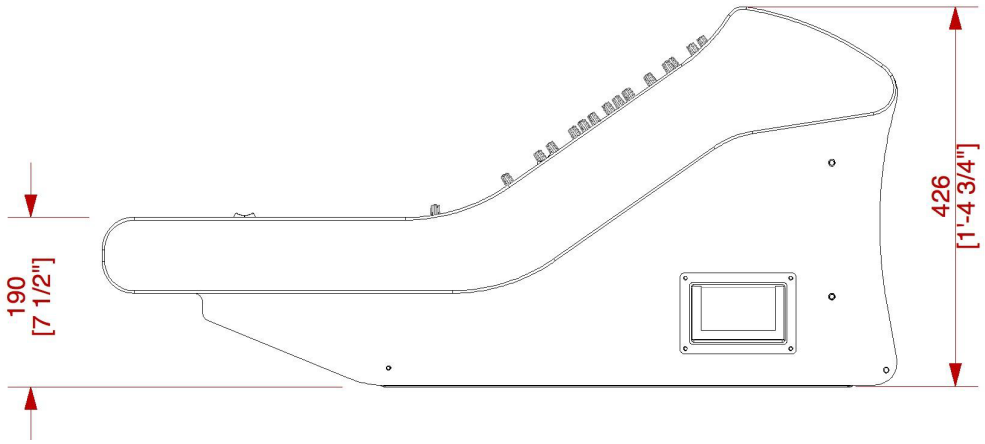
Weight (without flight case)	86 kg (190 lbs)
Weight (with flight case)	176 kg (388 lbs)
Acoustic Noise	< NR30
Typical Power	<450 W
Ratings	100–240 V AC, 50/60 Hz, 10.0-5.0 A

Console Dimensions: (upper figures in millimetres, lower figures in feet & inches) - A DXF drawing is available from SSL.

Plan View

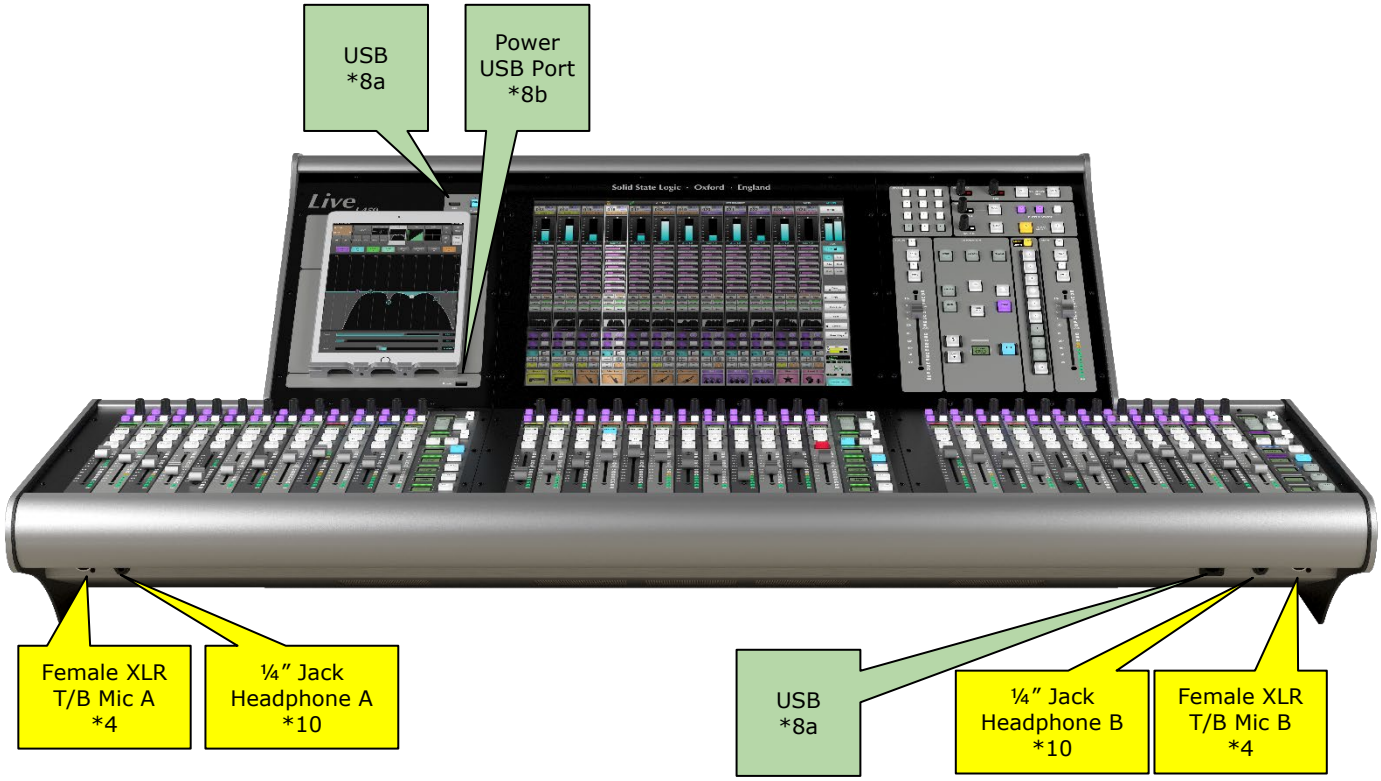


Side View

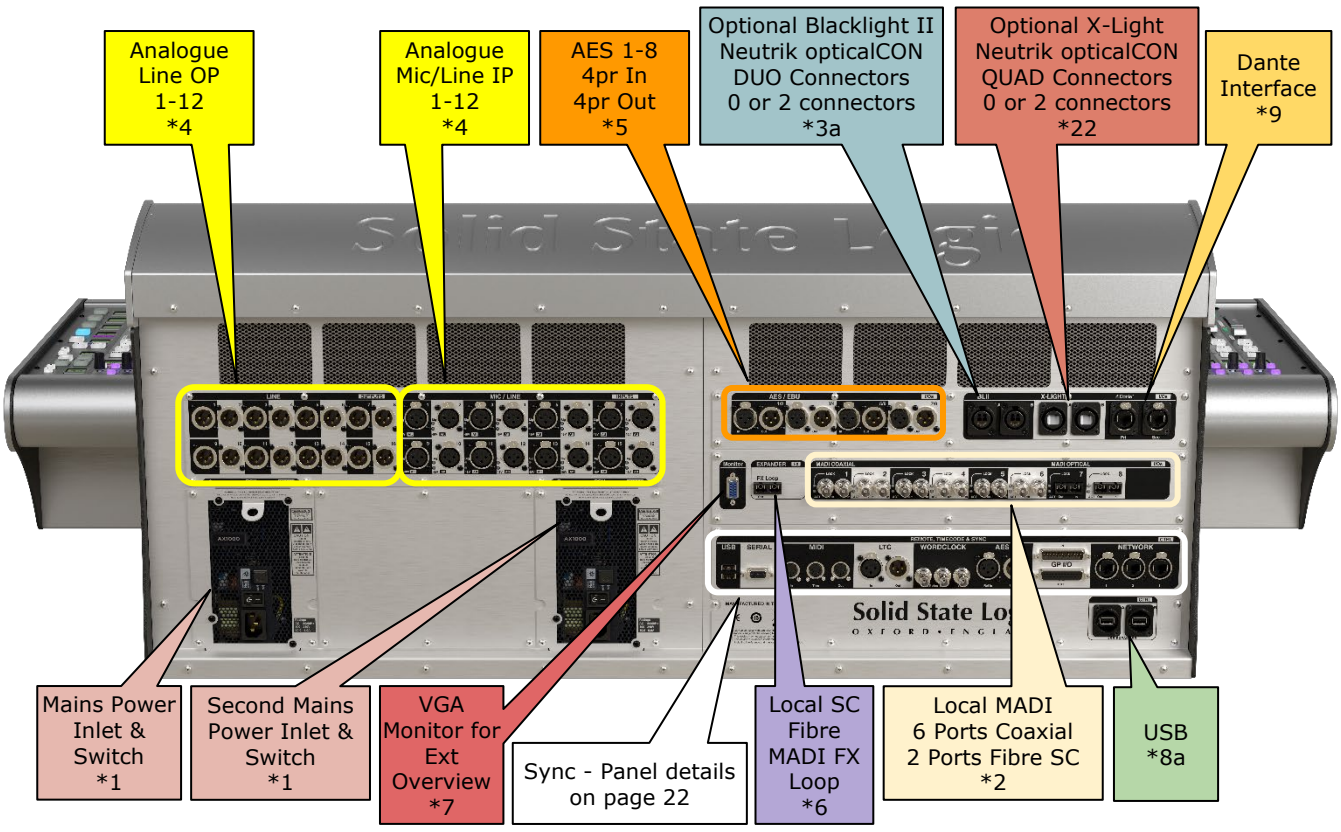


L450 Console

L450 Connections - Front



L450 Console Connections - Rear



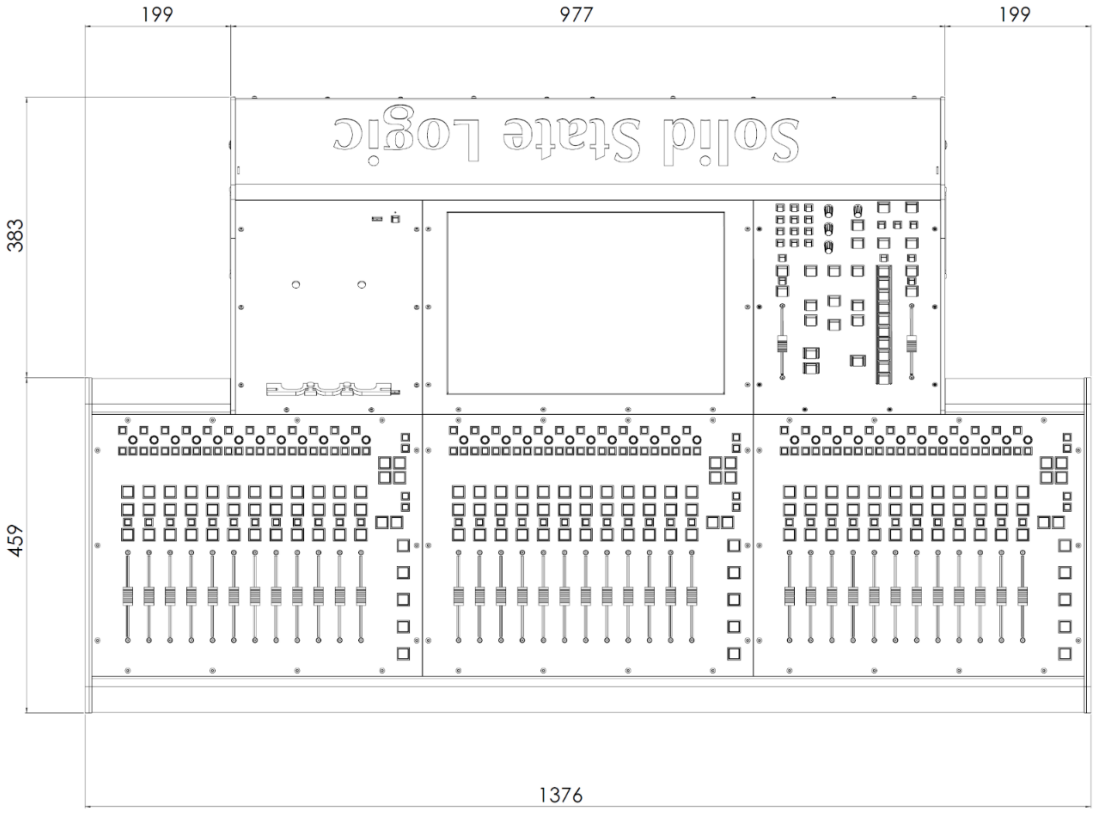
Connections Key

L450 Console Weight, Power & Dimensions

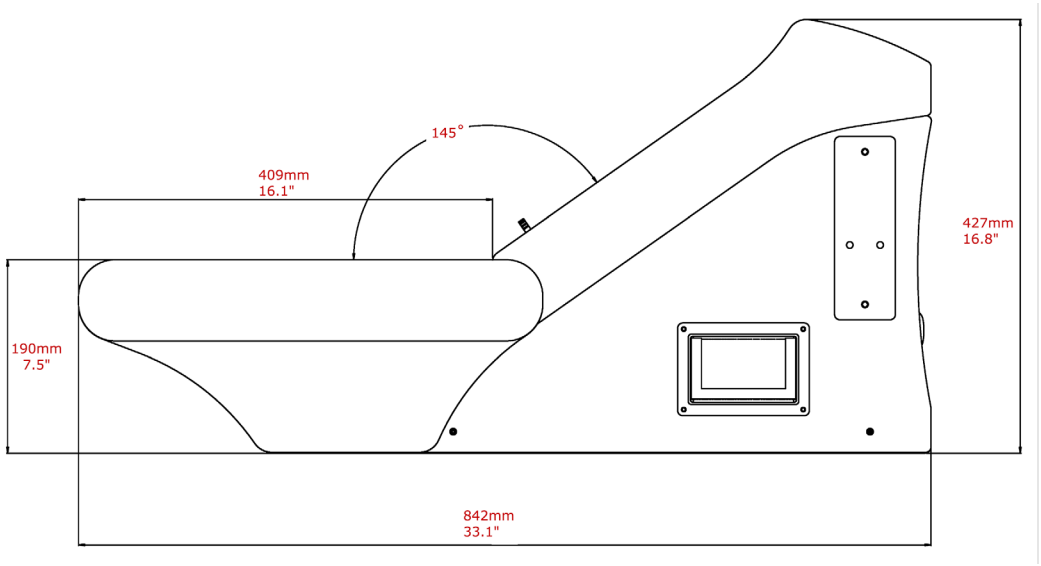
Weight (without flight case)	85 kg (188 lbs)
Weight (with flight case)	210 kg (463 lbs)
Acoustic Noise	Typically < NR30
Typical Power	<460 W
Ratings	100–240 V AC, 50/60 Hz, 10.0-5.0 A

Console Dimensions: (upper figures in millimetres, lower figures in feet & inches) - A DXF drawing is available from SSL.

Plan View

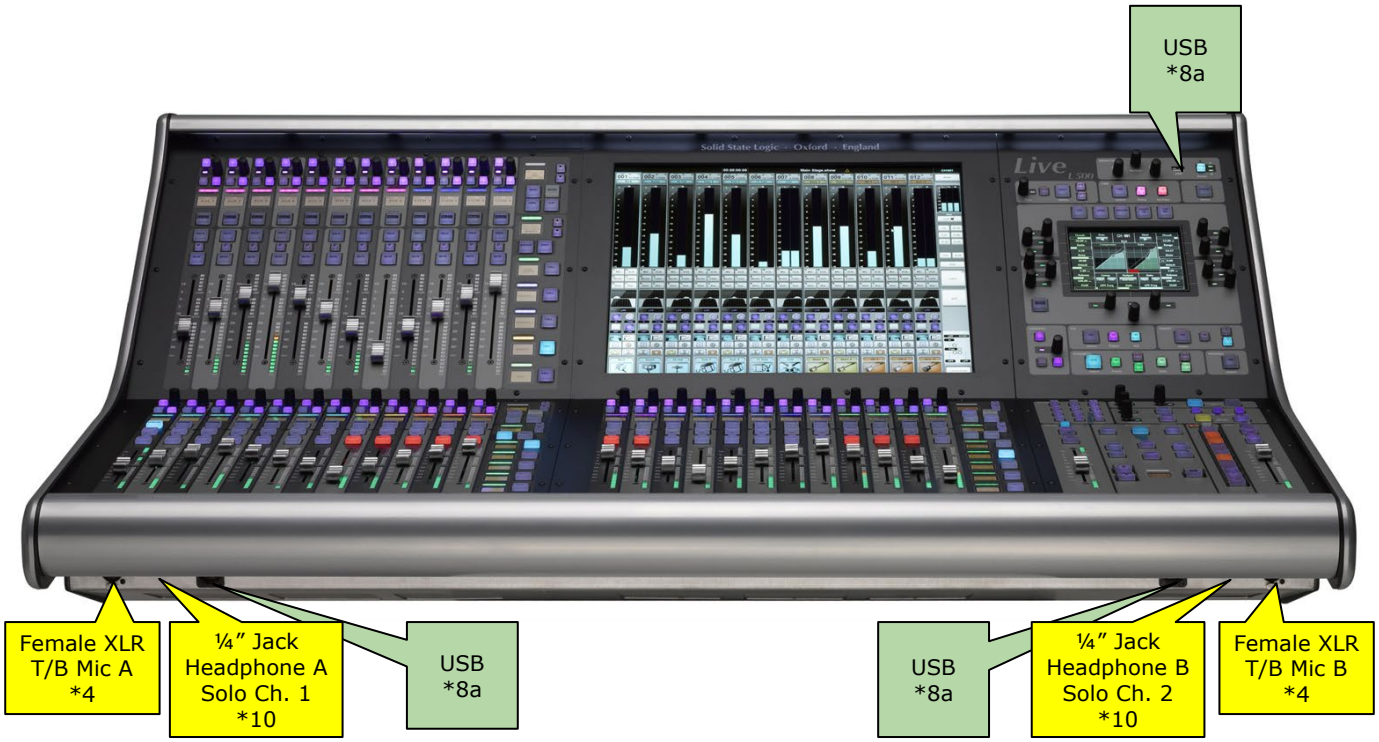


Side View

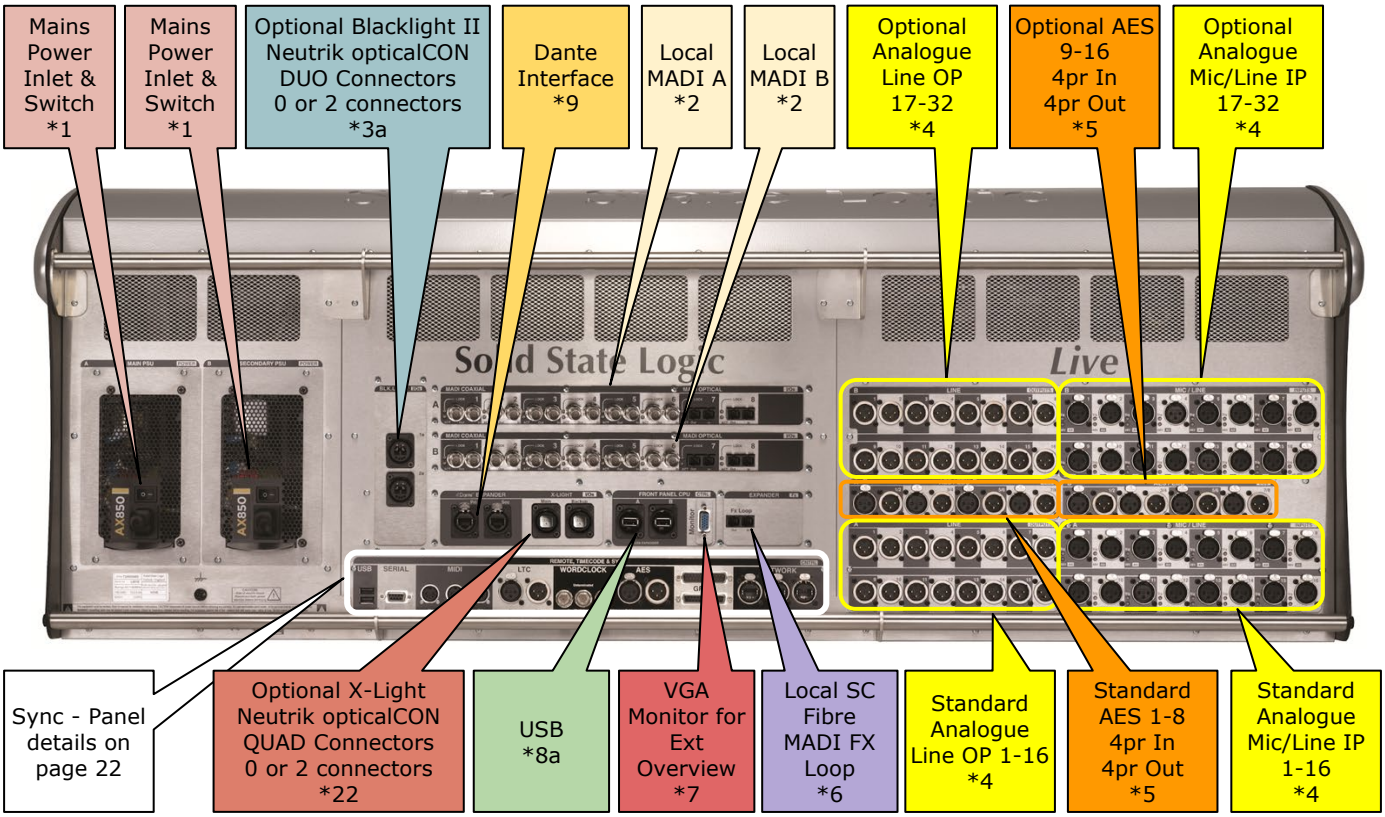


L550 Console (Includes L550 Plus Model)

L550 Connections - Front



L550 Connections - Rear



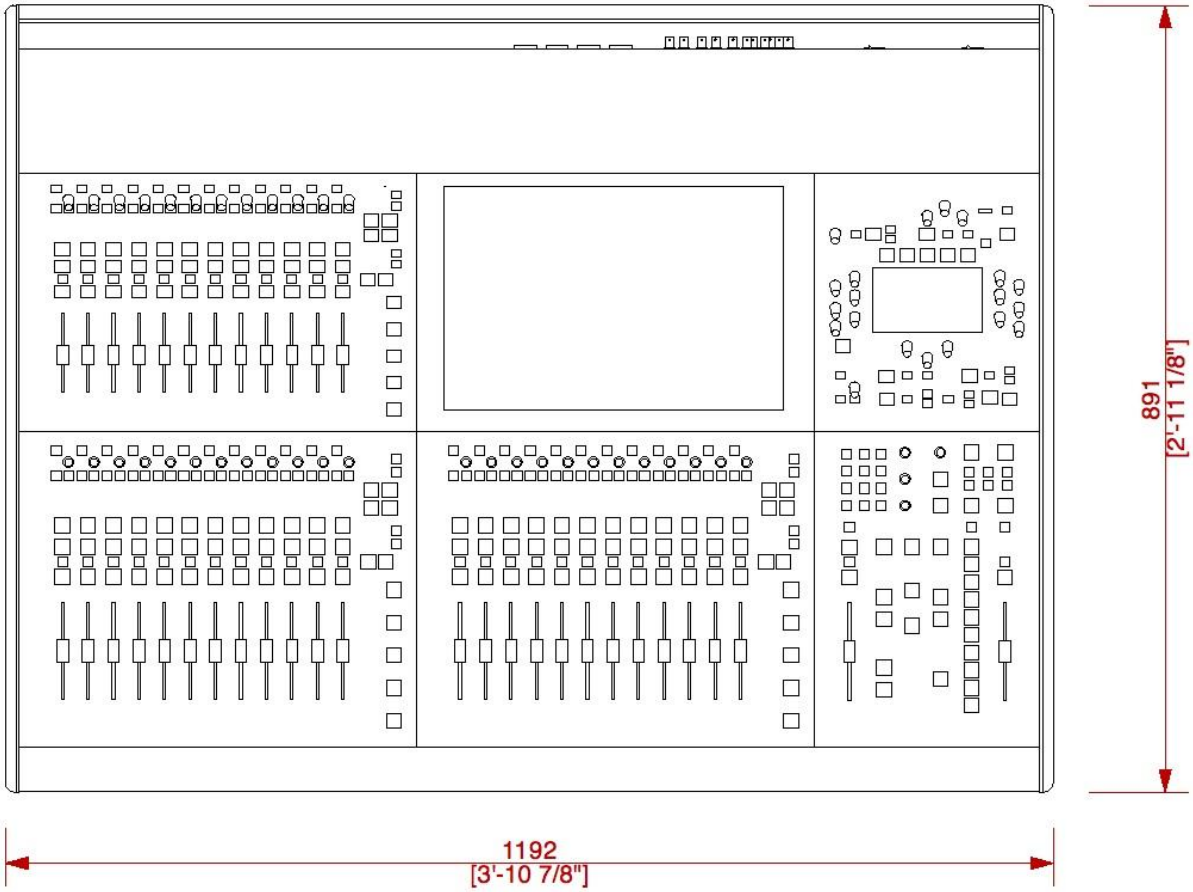
Connections Key

L550 Console Weight, Power & Dimensions

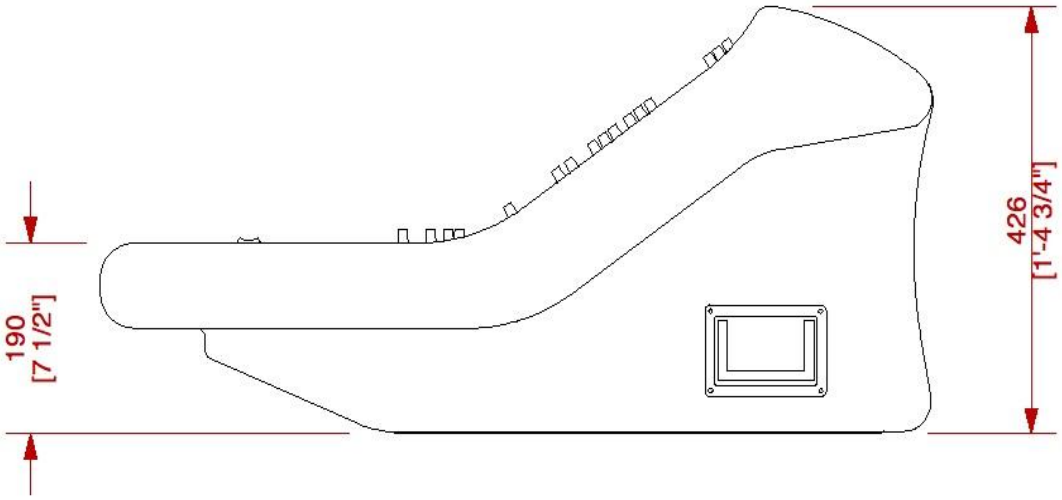
Weight (without flight case)	90 kg (198 lbs)
Weight (with flight case)	195 kg (430 lbs)
Acoustic Noise	< NR40
Typical Power	<460 W
Ratings	100–240 V AC, 50/60 Hz, 10.0-5.0 A

Console Dimensions: (upper figures in millimetres, lower figures feet & inches) - A DXF drawing is available from SSL.

Plan View

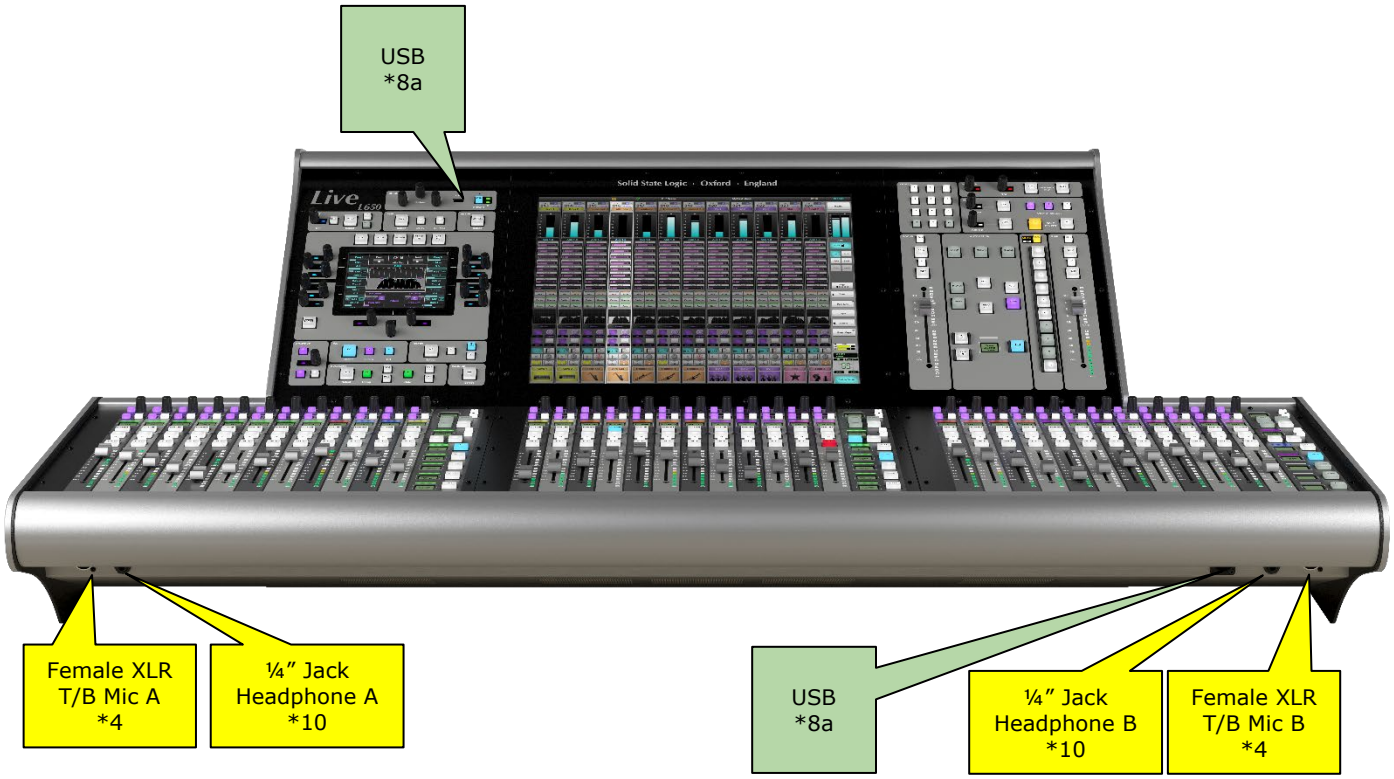


Side View

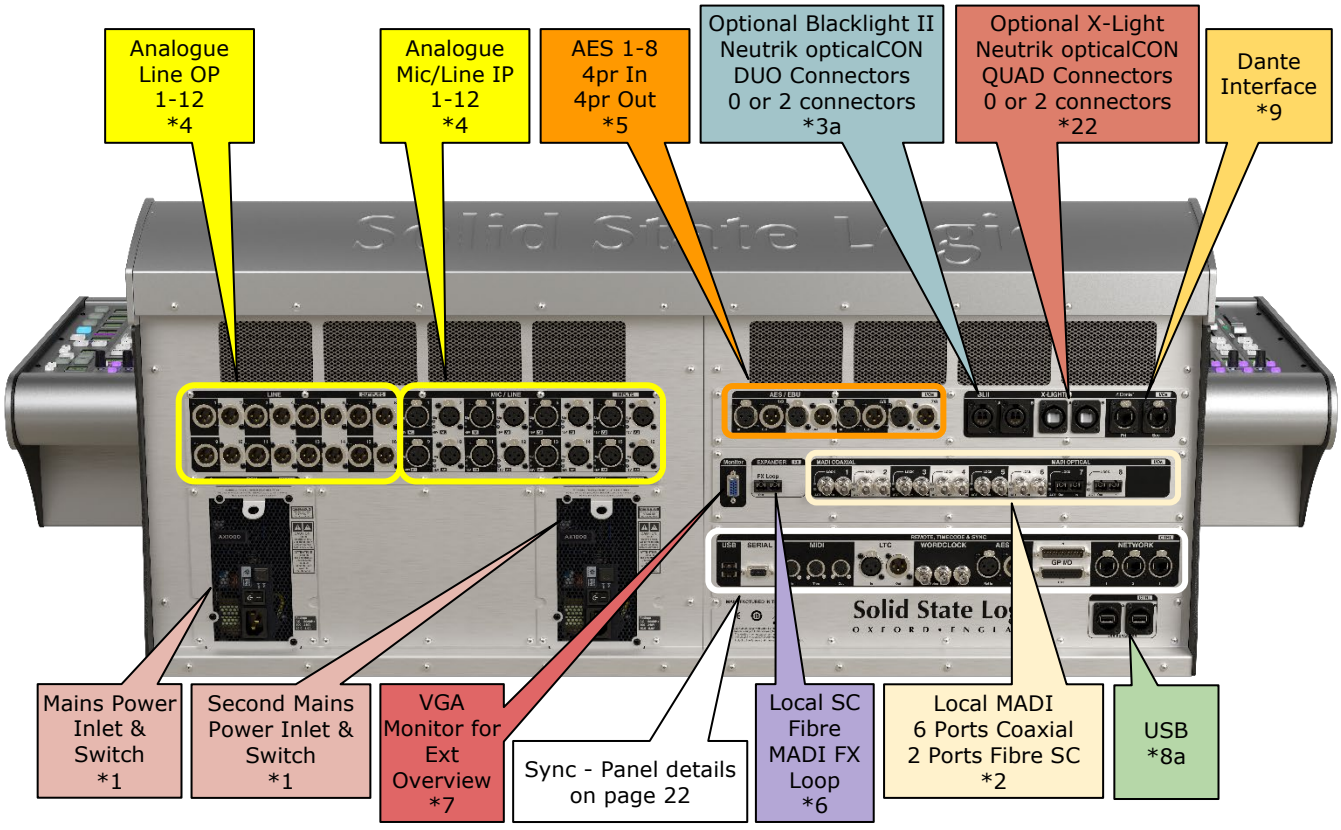


L650 Console

L650 Connections - Front



L650 Console Connections - Rear



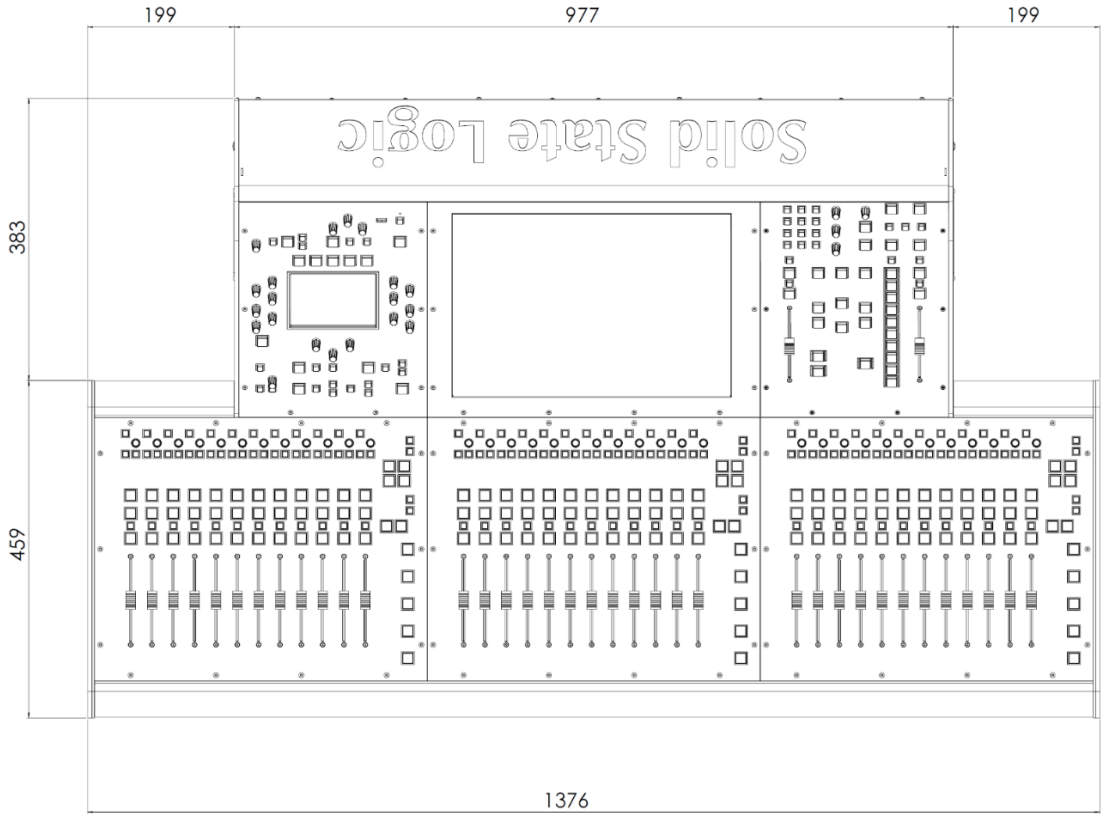
Connections Key

L650 Console Weight, Power & Dimensions

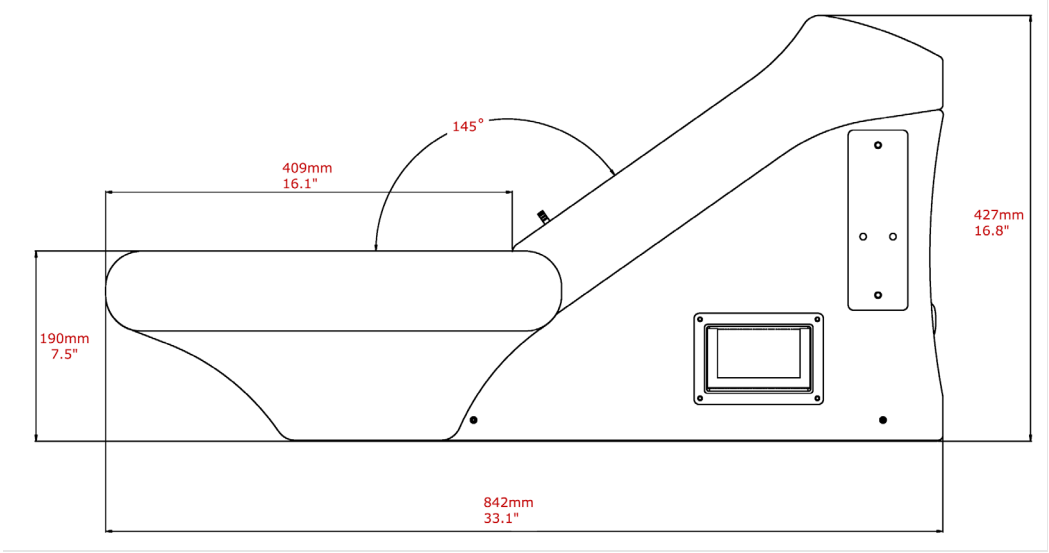
Weight (without flight case)	85 kg (188 lbs)
Weight (with flight case)	210 kg (463 lbs)
Acoustic Noise	Typically < NR30
Typical Power	<460 W
Ratings	100–240 V AC, 50/60 Hz, 10.0-5.0 A

Console Dimensions: (upper figures in millimetres, lower figures in inches) - A DXF drawing is available from SSL.

Plan View

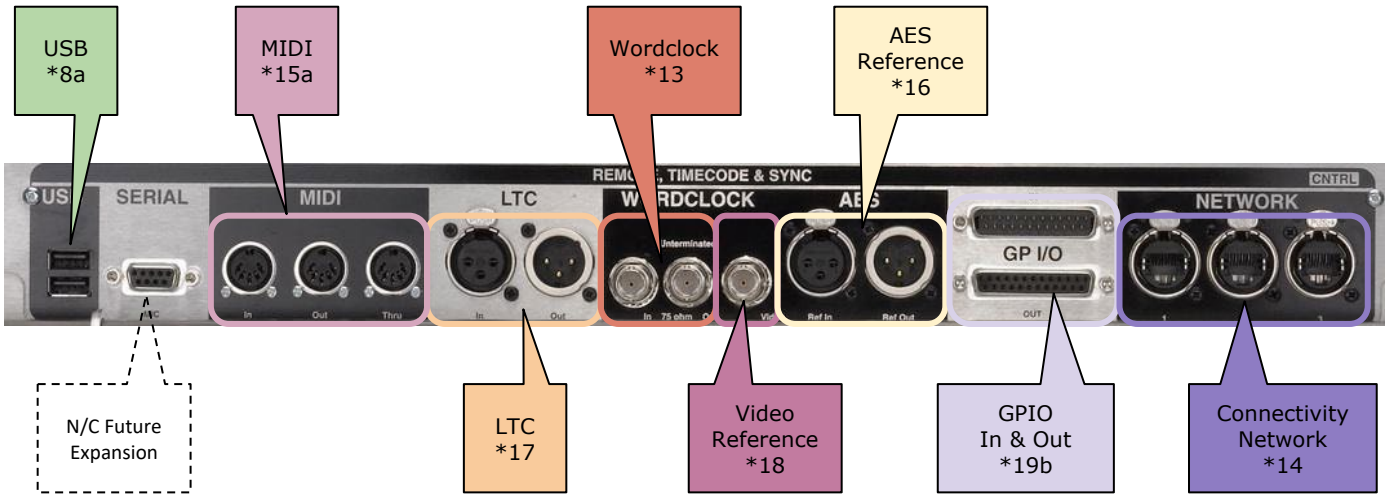


Side View



Console Remote, Timecode & Sync Panel

(L200, L350, L450, L550, L650)



Connections Key

The LTC output is a reshaped timecode feed derived from the LTC input and the MIDI output a reclocked duplicate of incoming MTC. The console does not offer LTC to MTC or MTC to LTC conversion.

Remote Tile

Rear Connections
Mains Power Inlet - *1

USB B Connection - *8c
Connects to console via USB A-B Cable (up to 5m without active repeaters)

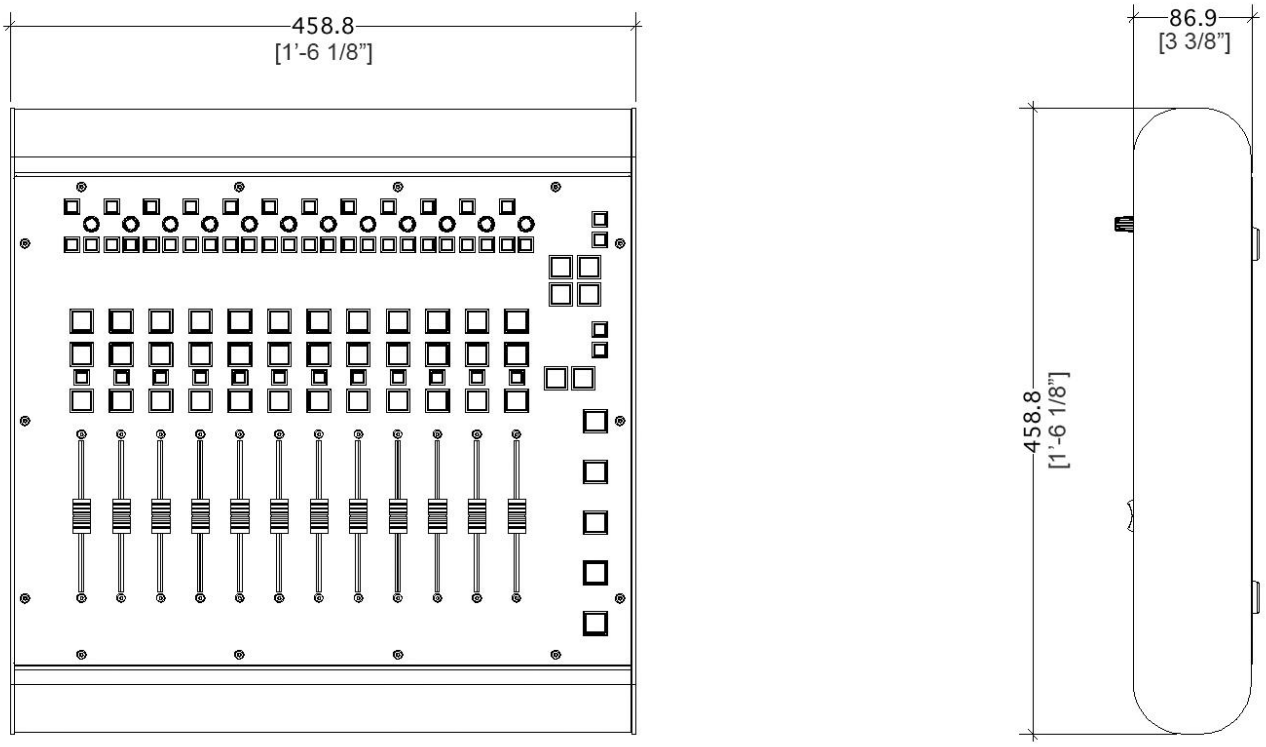
Connections Key

Remote Tile Weight, Power & Dimensions

Weight (without flight case)	9.7 kg (21.4 lbs)
Weight (with flight case)	19.7 kg (43.5 lbs)
Acoustic Noise	Fan does not start until external temperatures reach approximately 40 ºC. Above 40 ºC, NR33.
Typical Power	<100 W
Ratings	100–240 V AC, 50/60 Hz, 1.8-1.0 A

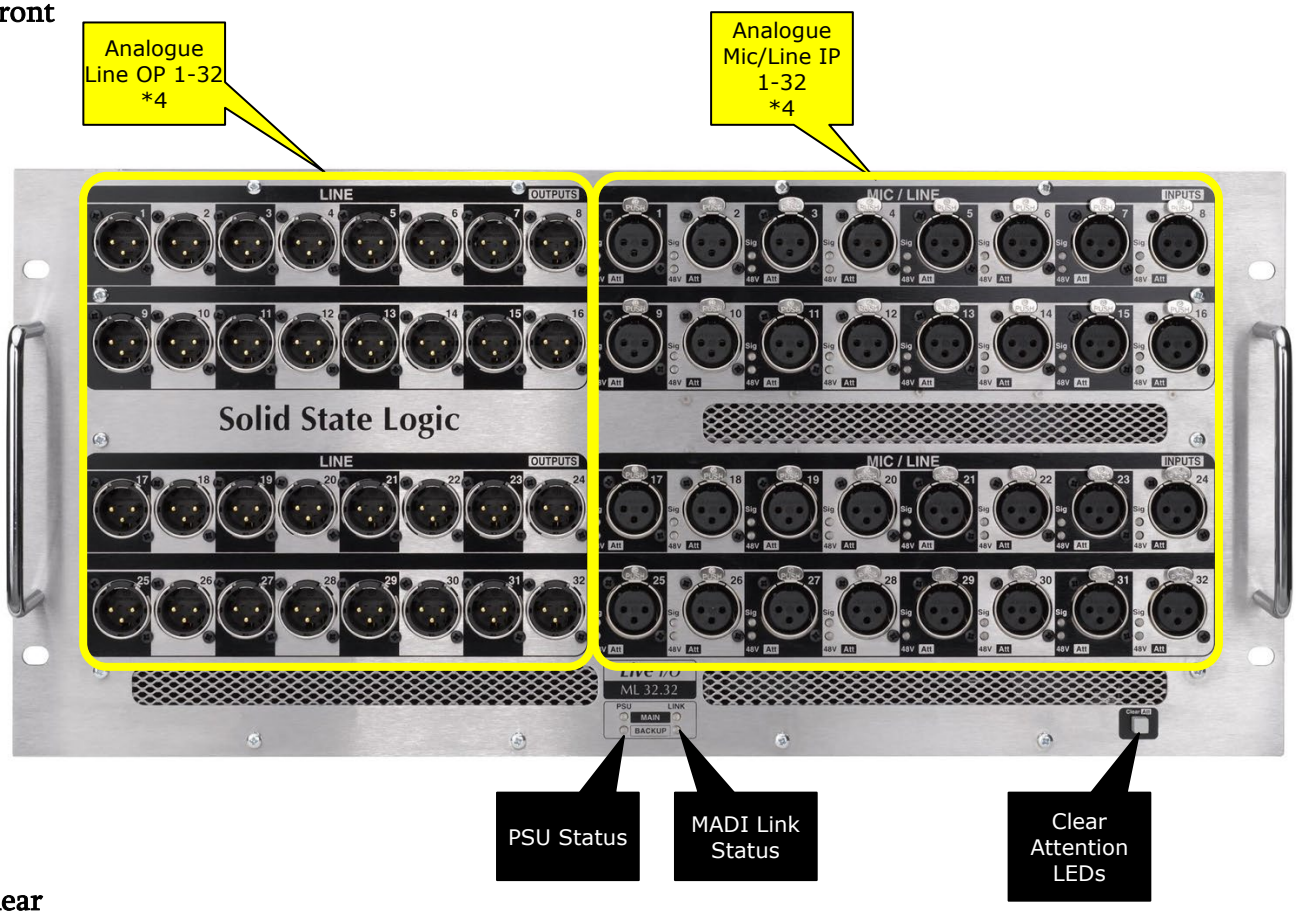
Dimensions: (upper figures in millimetres, lower figures in feet & inches) - A DXF drawing is available from SSL.

Plan & Side View

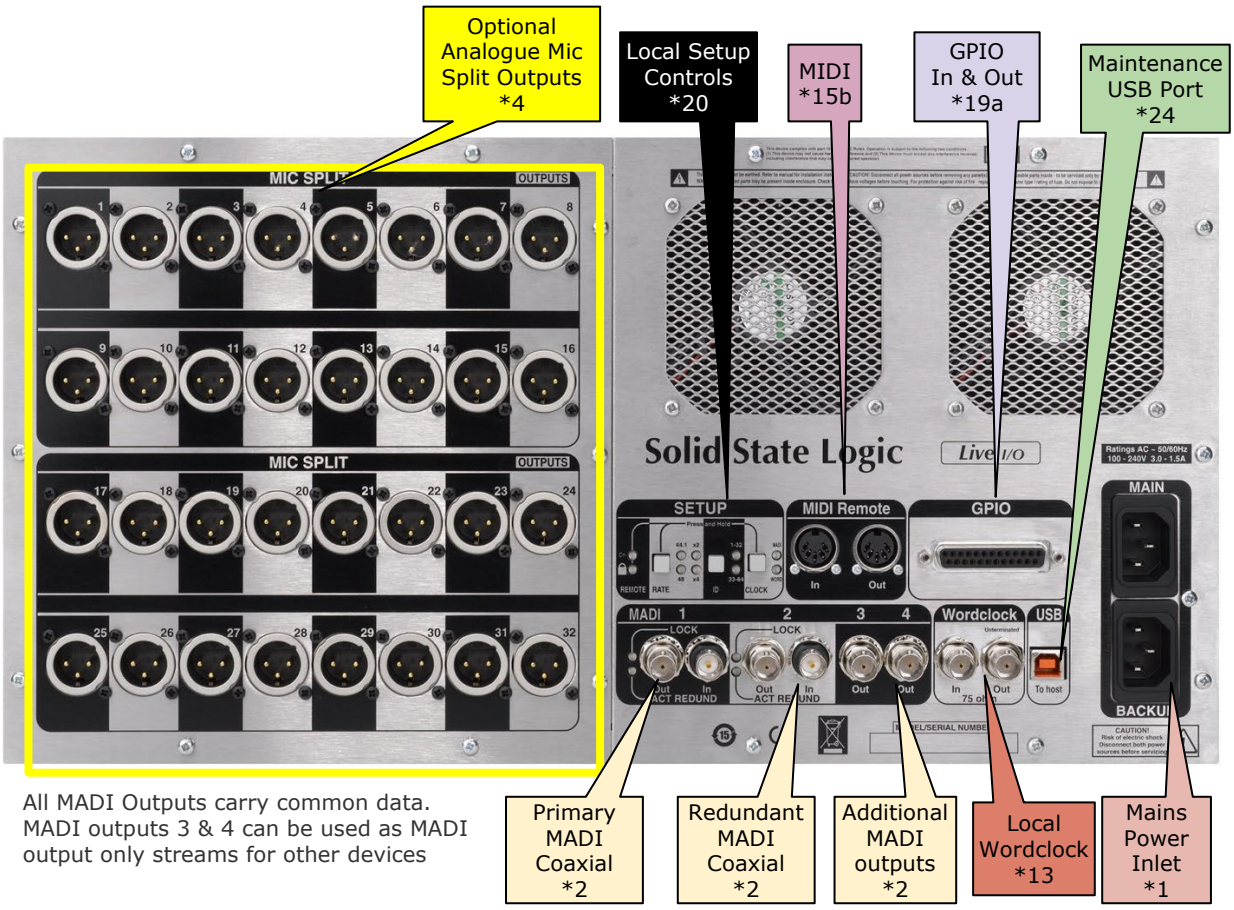


ML 32.32 5U Mic/Line Stagebox

Front



Rear

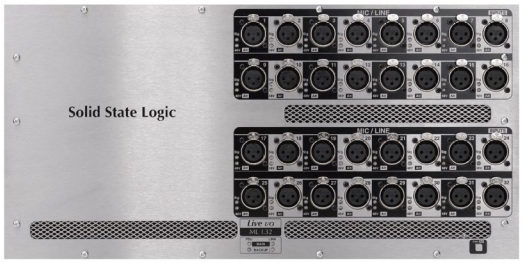


All MADI Outputs carry common data.
MADI outputs 3 & 4 can be used as MADI output only streams for other devices

Connections Key

ML I.32 5U Mic/Line Input Stagebox

Mic/Line Only version of the ML 32.32. See ML 32.32 for relevant connector details.
*Optional Mic Splits shown on rear picture.



Front

Rear

ML O.32 5U Line Output Stagebox

Special order outputs only version of the ML 32.32. See ML 32.32 for relevant connector details.

Front

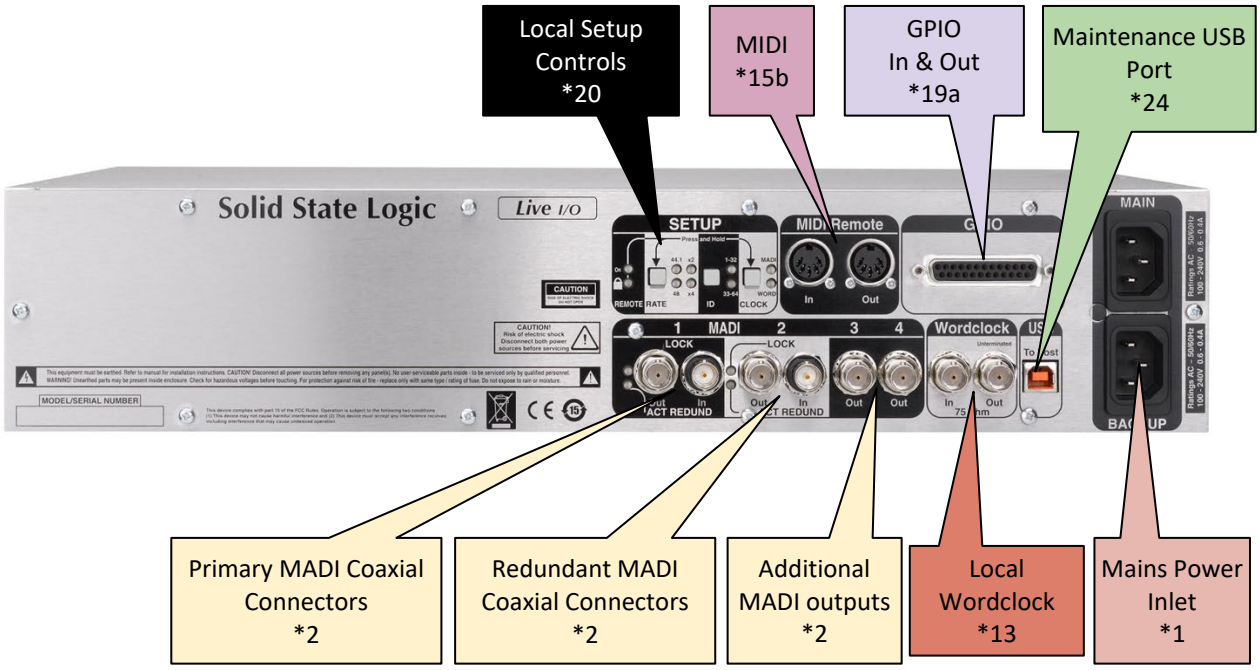
Rear

ML 32.32 Weight & Dimensions

Height	5U - 223 mm (8.75 inches)
Depth	446 mm (17.5 inches)
Width	483 mm (19 inches)
Weight	17 kg (inc. optional Split Outputs)
Power	<300 W
Ratings	100–240 V AC, 50/60 Hz, 3.0-1.5 A
Acoustic Noise	Typically NR40

D 32.32 AES Digital 2U Stagebox

32 AES Digital Inputs/Outputs
(16 AES Pairs)
Arranged as In/Out Pairs
*5

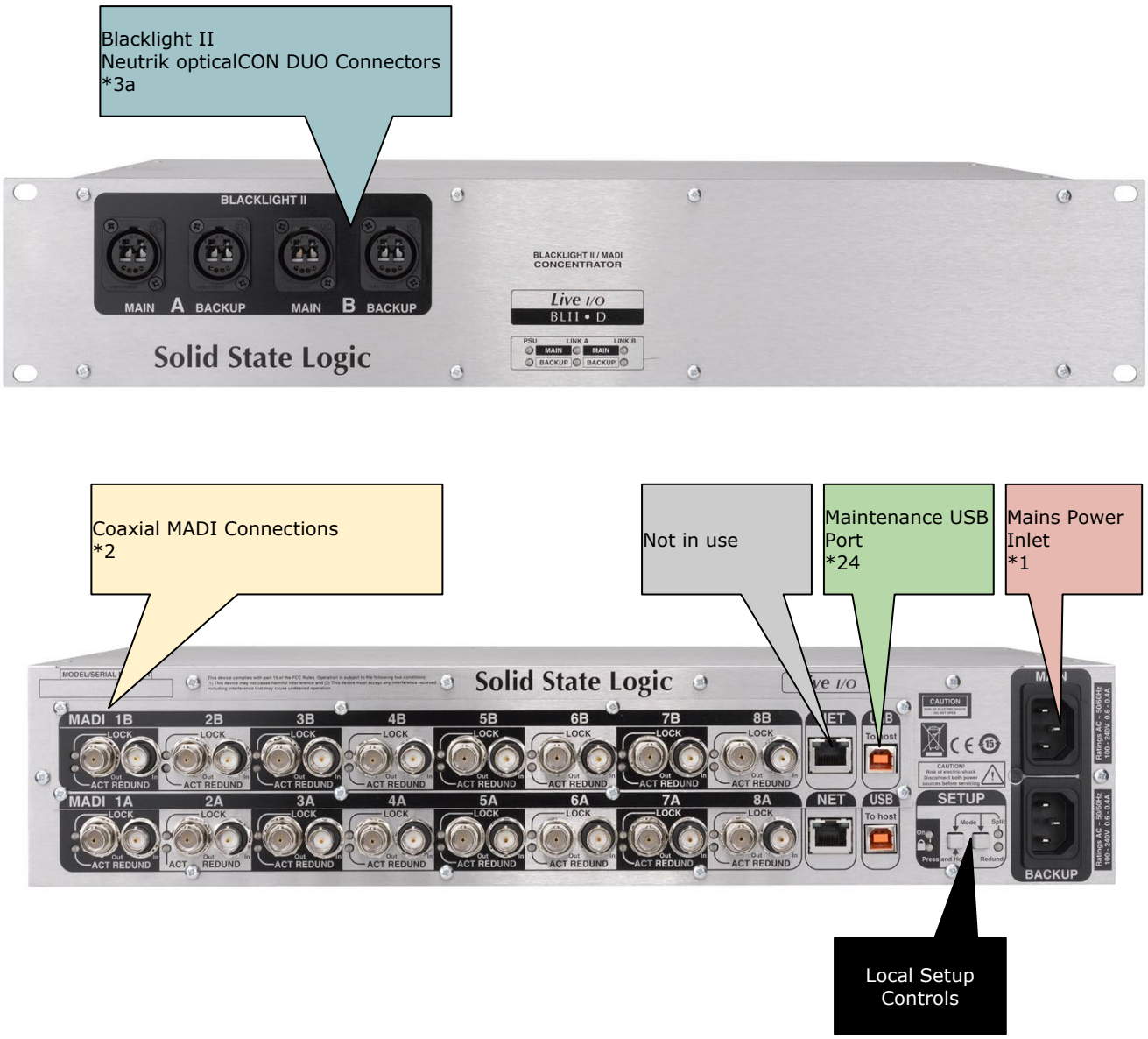


Connections Key

D 32.32 Weight & Dimensions

Height	2U - 89 mm (3.5 inches)
Depth	305 mm (12 inches)
Width	483 mm (19 inches)
Weight	6.2 kg
Power	<60 W
Ratings	100–240 V AC, 50/60 Hz, 0.6-0.4 A

BLII.D 2U Blacklight-MADI Concentrator



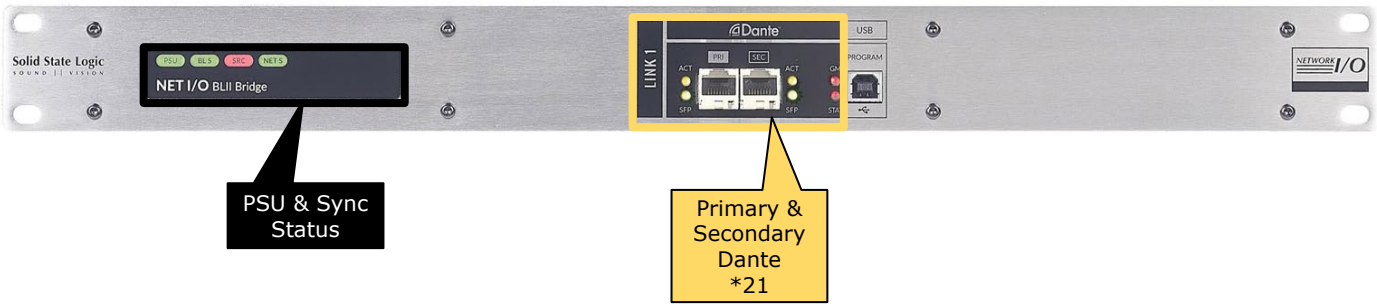
[Connections Key]

BLII.D Weight & Dimensions

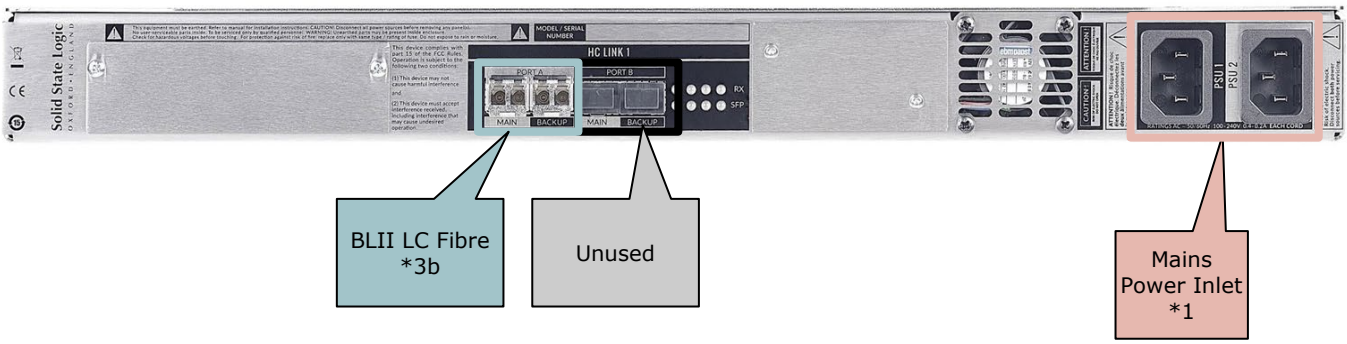
Height	2U - 89 mm (3.5 inches)
Depth	305 mm (12 inches)
Width	483 mm (19 inches)
Weight	6.5 kg
Power	<60 W
Ratings	100–240 V AC, 50/60 Hz, 0.6-0.4 A

Net I/O BLII Bridge - Blacklight II to Dante Bridge

Front



Rear



Connections Key

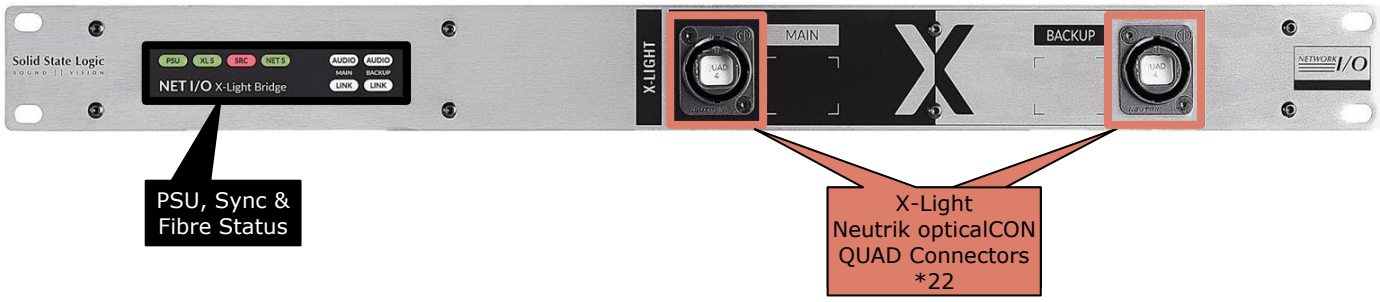
PSU Status and Sync (Clock) status LEDs. For more information on LED status meanings please see livehelp.solidstatelogic.com/Help/DanteBridges.html.

BLII Bridge Weight & Dimensions

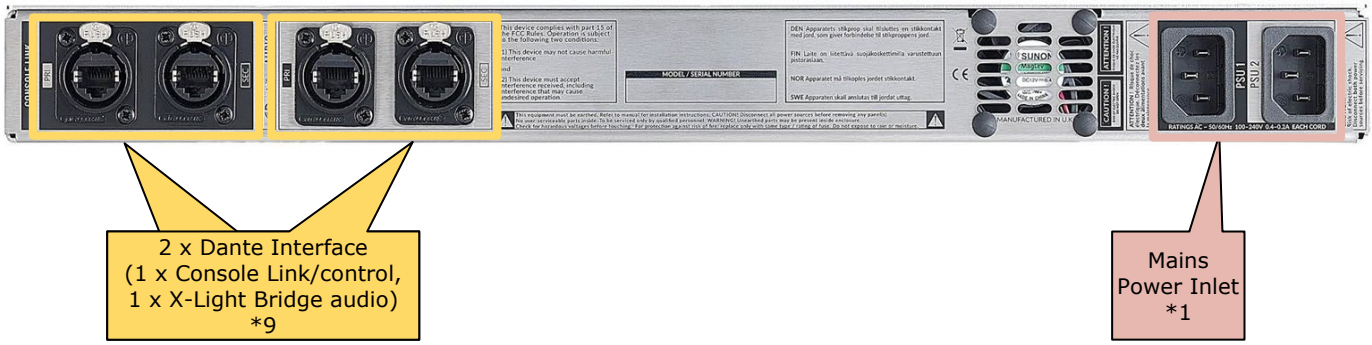
Height	1U - 44.5 mm (1.75 inches)
Depth	340 mm (13.4 inches)
Width Including Rack Ears	483 mm (19 inches)
Weight	4.5 kg (9.9 lbs)
Power	<60 W
Ratings	100–240 V AC, 50/60 Hz, 1.8-1.0 A
Acoustic Noise	Typically NR31

Net I/O X-Light Bridge

Front



Rear



Connections Key

PSU Status, Sync (Clock) and fibre status LEDs. For more information on LED status meanings please see livehelp.solidstatelogic.com/Help/DanteBridges.html.

X-Light Bridge Weight & Dimensions

Height	1U - 44.5 mm (1.75 inches)
Depth	340 mm (13.4 inches)
Width Including Rack Ears	483 mm (19 inches)
Weight	4.8 kg (10.6 lbs)
Ratings	<50 W
Power	100–240 V AC, 50/60 Hz, 0.4-0.2 A
Acoustic Noise	Typically NR23

Connections - Key

***1 - Mains Power Connector**
Connector Type - IEC 60320 - C13

Note: Some PSUs fitted have a 'Zero RPM' mode that allows the fan to remain off with low to medium loads. The PSU uses various temperature and output sensors to determine when active cooling is required. The switch is located on the rear of the PSU next to the AC power switch.

SSL Live consoles always ship with this mode disabled (Off) so that the fan is permanently running, however because of the low-noise nature of the fan, under low loads it is unlikely to be heard and so it is the choice of individual users whether this is enabled or not.

***2 - MADI**
BNC Coaxial MADI connections

Coaxial MADI
BNC connectors must conform to IEC 60169-8.

Cable should be 75 Ohm coax to at least Belden 1694F Low Loss Serial Digital Coax standard. Specification for Belden cable can be found here:
edesk.belden.com/products/techdata/metric/pdf/1694F.pdf

SSL recommends that cable assemblies should have a 360º connection between cable shield and the connector in order to maintain electromagnetic compatibility.

Cables runs between Console or Blacklight-MADI Concentrators and Stageboxes up to 75 meters. Higher quality cable/connections can support up to 100 meters.

75 m Drum of correct cable - SSL Part Number 66DR07501

Fibre MADI
Duplex SC multimode sockets

Fibre - Multimode 50/125 µm, maximum length <1000 m (quality cables, connections and no intermediate connections)

***3a - Blacklight II**
Redundant pair(s) of fibre connections. The pair consists of primary and redundant connections.

Connector Type - Neutrik opticalCON DUO for ruggedised applications (compatible with duplex LC fibre connections for non-rugged applications).

Fibre - Multimode 50/125 µm, maximum length <300 m (quality cables, connections and no intermediate connections)

Pre-terminated drums available from SSL in 150m (std) and 100m (to order) lengths.
150 m BL MM Fibre cable drum SSL Part No. 66DP15003
100 m BL MM Fibre cable drum SSL Part No. 66DP10003

Fibre - Singlemode (special order) 9/125 µm, maximum length <1 km (quality cables, connections and no intermediate connections)

Pre-terminated drums available from SSL in 150m and 300m (both to order) lengths.
150 m BL SM Fibre cable drum SSL Part No. 66DP15004
300 m BL SM Fibre cable drum SSL Part No. 66DP30004

***3b - Blacklight II LC fibre**
Redundant pair(s) of LC fibre connections. The pair consists of primary and redundant connections.

Connector Type - Duplex LC fibre connections for non-rugged applications.

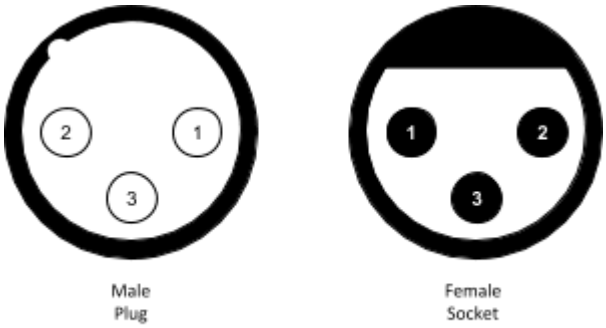
Fibre - Multimode 50/125 µm, maximum length <300 m (quality cables, connections and no intermediate connections)

***4 - Analogue**

Analogue Inputs and Outputs on 3 pin XLR connections.

Dimensions: Cable Dia: 19 x 60 mm (approx.) 8-12 mm (typical)

Pinout for balanced audio:
Pin 1 Screen/Ground
Pin 2 Hot (+ve)
Pin 3 Cold (-ve)



Connectors Viewed From Wiring Side

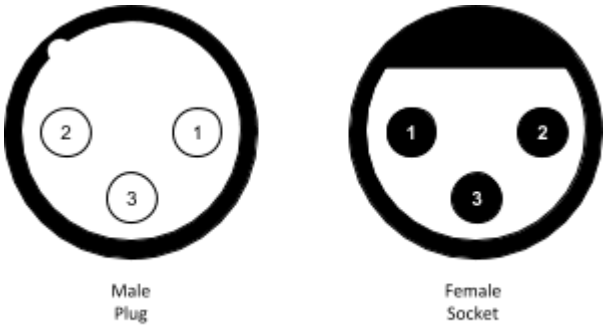
***5 - AES/EBU**

AES3 Inputs and Outputs on 3 pin XLR connections. (IEC 60958 Type I)

Dimensions: Cable Dia: 19 x 60 mm (approx.) 8-12 mm (typical)

Pinout for AES3 XLR:

Pin 1 Screen/Ground
Pin 2 Hot (+ve)
Pin 3 Cold (-ve)



Connectors Viewed From Wiring Side

***6 - MADI FX Loop**

Fibre MADI connection to external effects processor.

Duplex SC multimode socket

Fibre - Multimode 50/125 µm, maximum length <1000 m (quality cables, connections and no intermediate connections)

***7 - VGA Monitor**
Connection to optional Overview monitor
Three-row 15-pin D-type DE-15 connector
Native resolution: 1280 x 1024 pixels

***8a - USB Connections**
USB 2.0 spec. connections for optional keyboard, mouse or storage peripherals
Up to 500 mA

***8b - Power USB Connector**
USB Power connection for tablets and USB powered devices
Up to 3 A

***8c - USB B Connection**
USB B Connection. Connect to console via USB A-B cable

***9 - Dante**
1 pair of Dante network connections.

Connector type: 2 x RJ45 for Primary and Secondary Connections.

***10 - Headphone Outputs**
A pair of front panel mounted ¼" jack sockets for Headphones.

Headphone Output Pinout :
Sleeve Screen/Ground
Ring Right
Tip Left

***11 - 3.5 mm Jack Input**
3.5 mm stereo jack socket for phones or portable media players.

***12 - Reserved**

***13 - Wordclock**
BNC connections to IEC 60169-8

75 Ω Characteristic Impedance, unterminated internally.

Wordclock Output is active when no Input is present. Wordclock Output follows console selected reference source for use as a local Wordclock reference.

***14 - Connectivity Network Port**
Connector type: RJ45

Cat 5e 10/100/1000 bit/s Ethernet Ports, used to connect remote devices to console (not Dante).

***15a - Console MIDI Connections**
5-pin DIN standard MIDI connections for In, Out & Thru connections:
midi.org/techspecs/electrispec.php

Used for MIDI Timecode (MTC) and other MIDI control triggers/commands.

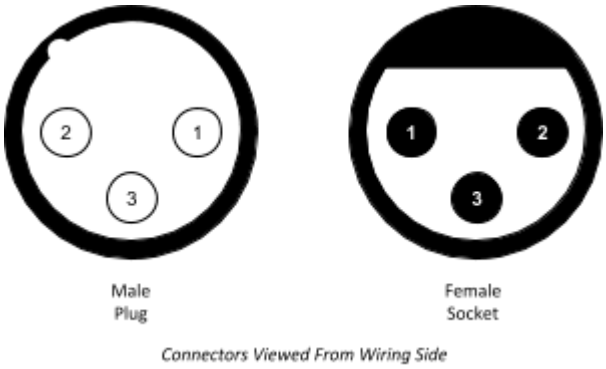
***15b - Stagebox MIDI Connections**
5-pin DIN standard MIDI connections for In & Out connections.

*16 - AES Reference

AES Sync Input and Output on 3 pin XLR connections. (IEC 60958 Type I)

Dimensions: Cable Dia: 19 x 60 mm (approx.) 8-12 mm (typical)

Pinout for AES3 XLR:
Pin 1 Screen/Ground
Pin 2 Hot (+ve)
Pin 3 Cold (-ve)



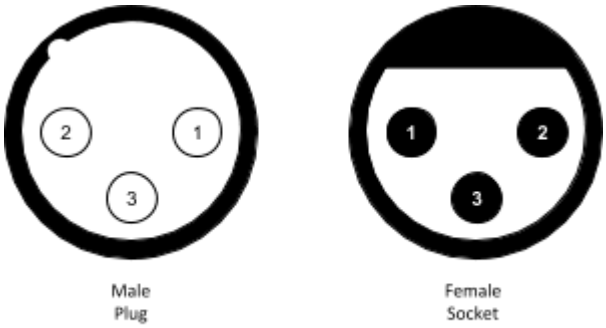
Connectors Viewed From Wiring Side

*17 - LTC Connectors

Linear Time Code (LTC) in and out using Balanced XLR connections.

Dimensions: Cable Dia: 19 x 60 mm (approx.) 8-12 mm (typical)

Pinout for LTC In and Out
Pin 1 Screen/Ground
Pin 2 Hot (+ve)
Pin 3 Cold (-ve)



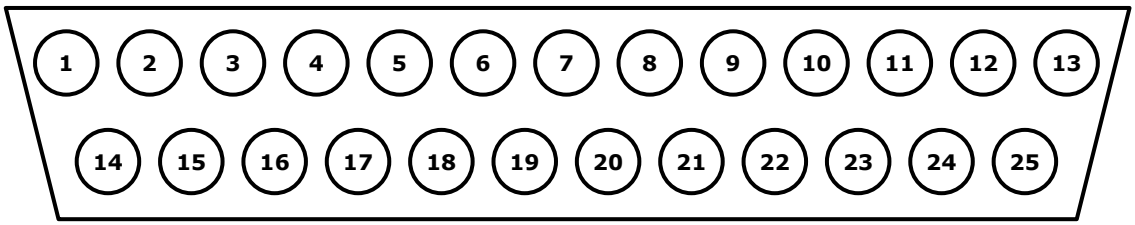
Connectors Viewed From Wiring Side

*18 - Video Reference

BNC connectors to IEC 60169-8

75 Ω Characteristic Impedance, Analogue video (1 Vp-p, PAL, NTSC, Composite, B&B)

*19a - Stagebox GPIO Connections



Socket (Female)

Connector Type:	25-Way D-Type Female (Combined Inputs & Outputs)
Dimensions: Cable Dia:	55 x 15 mm (approx.) 8 mm (typical)
Screwlock thread:	440-UNC

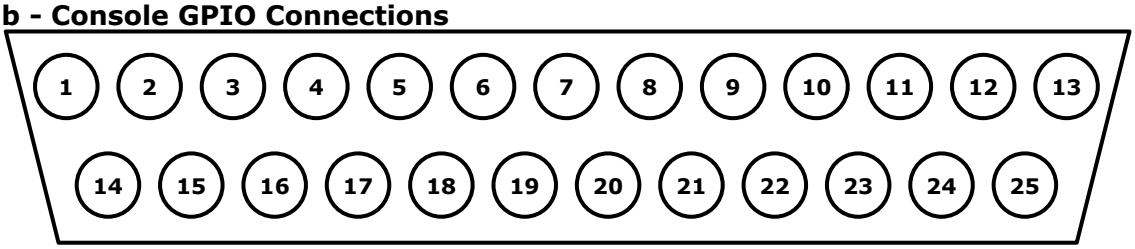
6 opto-isolated GP input and 5 relay-closure outputs

GPIO Connector Pinout

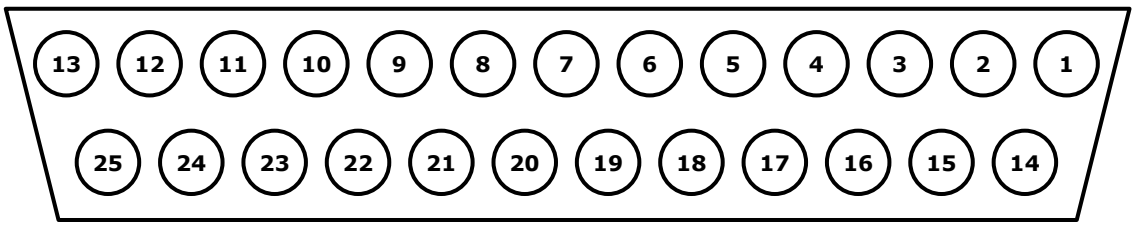
GP Output - D-type Female

Pin		Description		Pin		Description
1		Input 1A		**7**		+12V (450mA maximum)
	14	Input 1B			**20**	0V Chassis
2		Input 2A		**8**		Output 1A
	15	Input 2B			**21**	Output 1B
3		Input 3A		**9**		Output 2A
	16	Input 3B			**22**	Output 2B
4		Input 4A		**10**		Output 3A
	17	Input 4B			**23**	Output 3B
5		Input 5A		**11**		Output 4A
	18	Input 5B			**24**	Output 4B
6		Input 6A		**12**		Output 5A
	19	Input 6B			**25**	Output 5B
				13		+12V (450mA maximum)

***19b - Console GPIO Connections**



Socket (Female)



Plug (Male)

Connector Type: 25-Way D-Type Male (Inputs) and Female (Outputs)
Dimensions: Cable Dia: 55 x 15 mm (approx.) 8 mm (typical)
Screwlock thread: 440-UNC

12 opto-isolated GP input and 12 relay-closure outputs

GPIO Connector Pinout

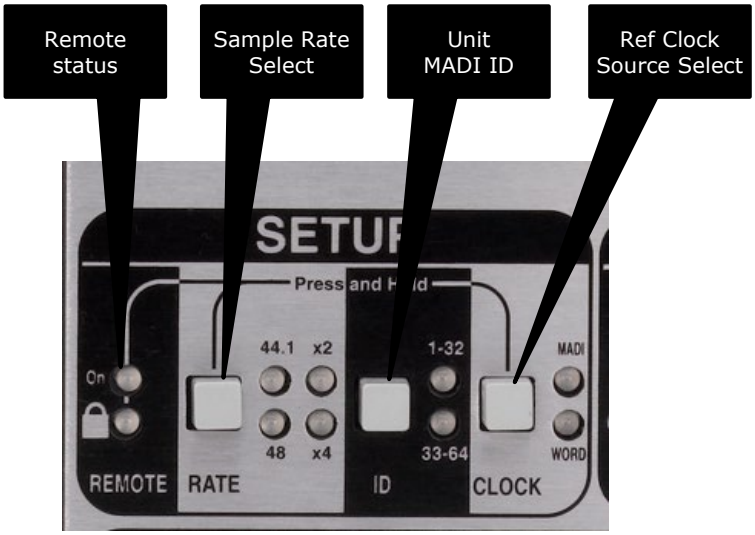
GP Input - D-type Male

Pin		Description		Pin		Description
1		Input 1A		**7**		Input 7A
	14	Input 1B			**20**	Input 7B
2		Input 2A		**8**		Input 8A
	15	Input 2B			**21**	Input 8B
3		Input 3A		**9**		Input 9A
	16	Input 3B			**22**	Input 9B
4		Input 4A		**10**		Input 10A
	17	Input 4B			**23**	Input 10B
5		Input 5A		**11**		Input 11A
	18	Input 5B			**24**	Input 11B
6		Input 6A		**12**		Input 12A
	19	Input 6B			**25**	Input 12B
				13		0V

GP Output - D-type Female

Pin		Description		Pin		Description
1		Output 1A		**7**		Output 7A
	14	Output 1B			**20**	Output 7B
2		Output 2A		**8**		Output 8A
	15	Output 2B			**21**	Output 8B
3		Output 3A		**9**		Output 9A
	16	Output 3B			**22**	Output 9B
4		Output 4A		**10**		Output 10A
	17	Output 4B			**23**	Output 10B
5		Output 5A		**11**		Output 11A
	18	Output 5B			**24**	Output 11B
6		Output 6A		**12**		Output 12A
	19	Output 6B			**25**	Output 12B
				13		+12V (450mA max)

*20 - Setup Controls: MADI



REMOTE - Padlock LED
Red indicates SETUP controls are locked

Press and hold **RATE** & **CLOCK** simultaneously to activate controls. The Padlock LED will flash green to indicate controls are unlocked. After a few moments of inactivity, the controls will lock again.

REMOTE - On LED
On LED flashes green when remote MADI control data is received.

RATE - Sample Rate
RATE button selects different box sample rates (See Live Console Synchronisation & Clocking earlier in this guide)

ID - Daisy Chaining Stageboxes
Sets Unit **ID** if stageboxes are daisy chained (See Live Console Synchronisation & Clocking earlier in this guide)

CLOCK
The **CLOCK** button selects unit clock reference to MADI, Wordclock or internal inputs.

MADI LED colour meanings are as follows:
Green - Main and Redundant are both locked
Flashing Red and Green - Only one MADI receiver is locked
Red - Neither Main or Redundant are locked
Off - Stagebox is clocking from its internal clock source

*21 - Dante SFP Cages

1 pair of Dante network connections.

SFP cages, can be fitted with RJ45 SFPs or singlemode/multimode fibre.

*22 - X-Light Fibre

Redundant pair of fibre connections. The pair consists of primary and redundant connections.

Connector Type - Neutrik opticalCON QUAD for ruggedised applications.

Fibre - Multimode 50/125 µm, maximum length <300 m (quality cables, connections and no intermediate connections)

Pre-terminated drums available from SSL in 150 m (std) and 100 m (to order) lengths.

150 m X-Light MM Fibre cable drum	SSL Part No. 66DPX1501
100 m X-Light MM Fibre cable drum	SSL Part No. 66DPX1001

Environmental (Applicable to all console models)

Temperature	Operating: +1 to 40 °C *	Storage: -20 to 50 °C
Vibration	Random vibration test as per BS EN 60068-2-64:2008, Test Fh and in accordance with ETSI E300-019-2-2 V2.3.1 (2013-04), Table 6. Specification of environmental tests; Transportation	

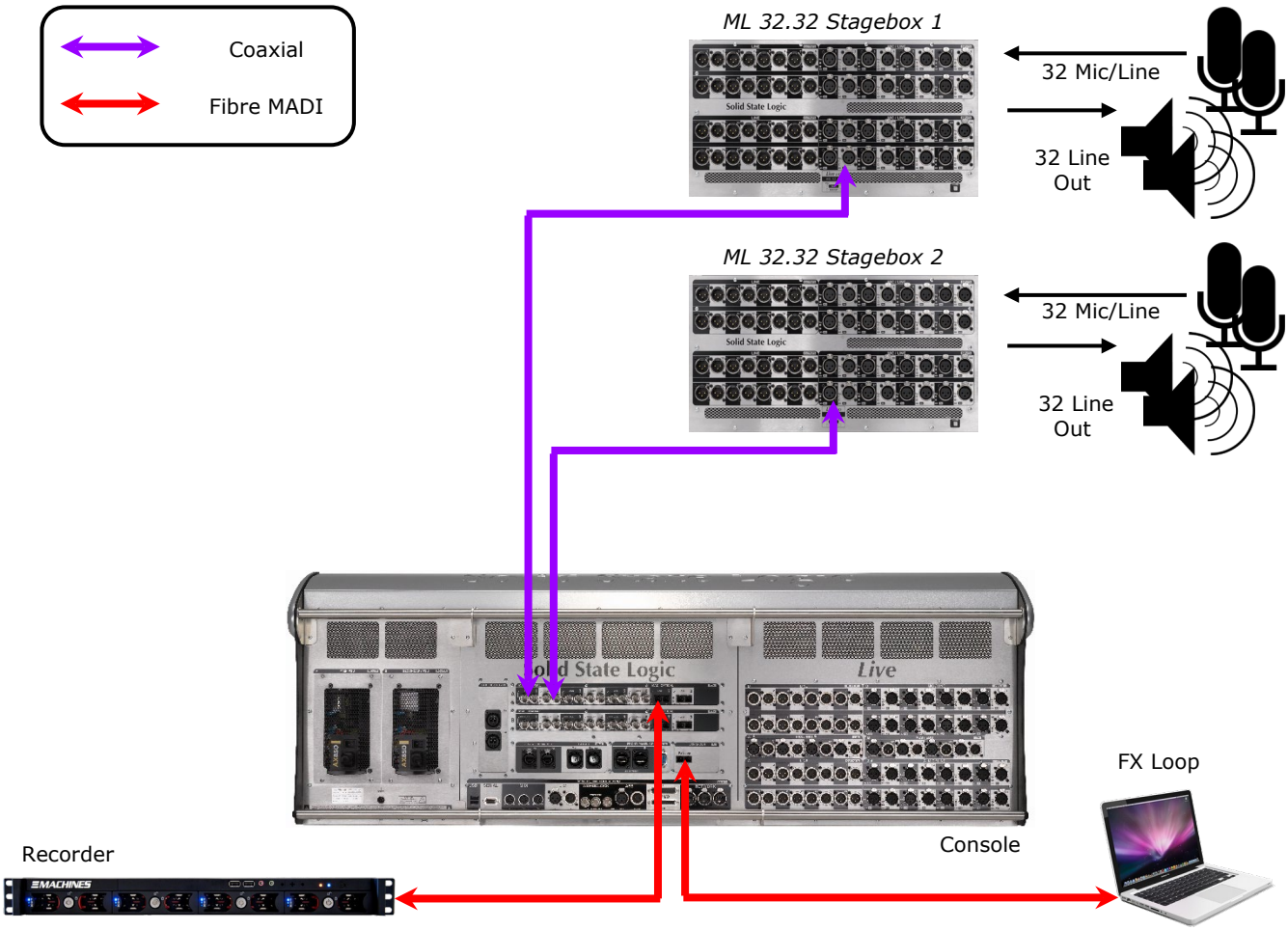
* Note that the addition of dust guards will increase the internal temperature of the console by several degrees. SSL recommends that if dust guards are fitted the console should not be operated in an external ambient temperature in excess of 30 °C.

Typical Installation Diagrams

Simple Single System

L550 Control Surface shown provides 32 analogue IO, 16 AES IO, 16 MADI ports plus MADI FX Loop at FOH position.

2 off ML 32.32 stageboxes provide 64 Mic/Line inputs and 64 line outputs on stage.



Additional/different MADI stageboxes can be connected as required.

Blacklight II Single System (with Redundancy)

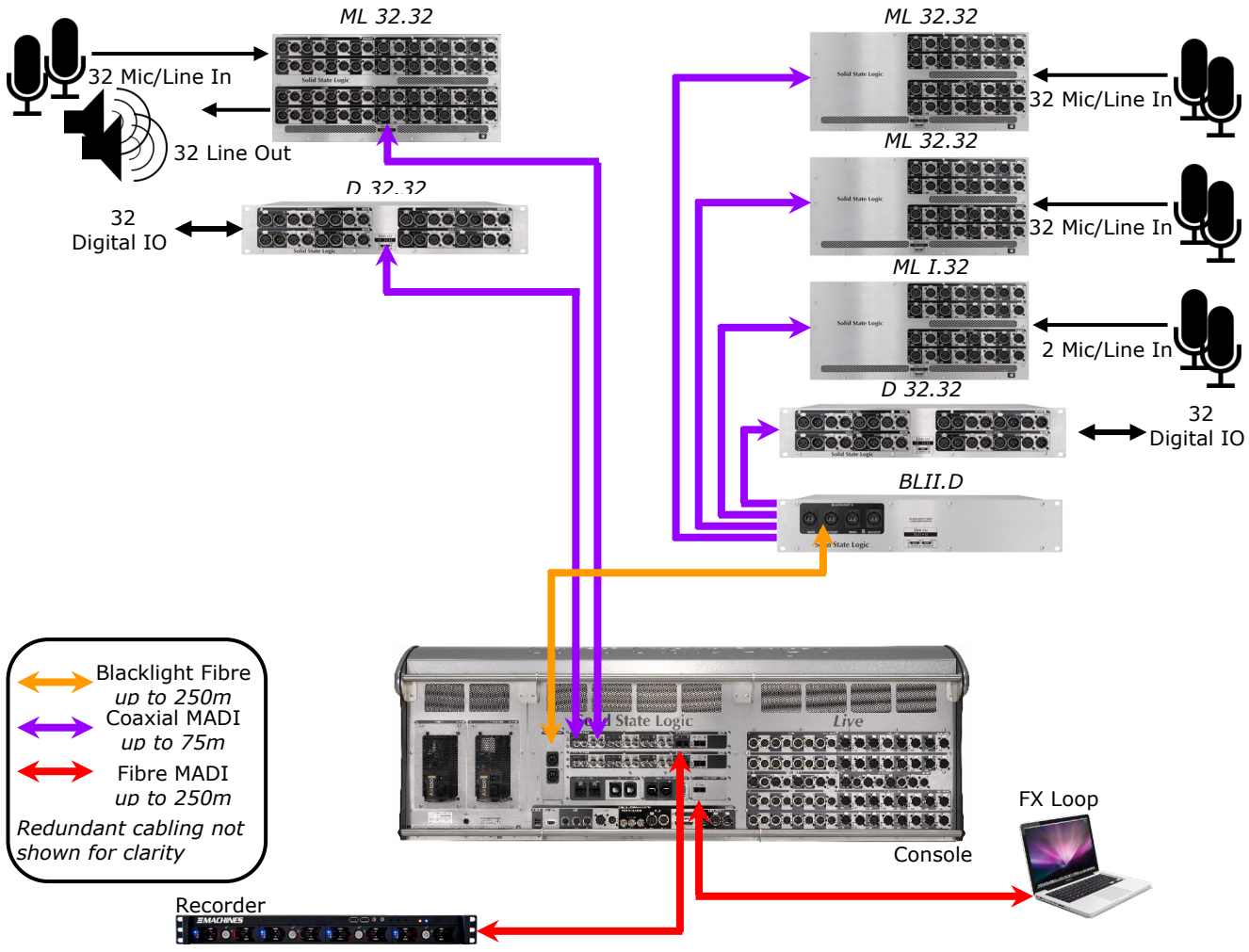
L550 Control Surface shown to provide 32 analogue IO and 16 AES IO at FOH position. 16 MADI ports plus MADI FX Loop.

1 pair of Blacklight II connections provides 256 channels to/from stage using fibre up to <300m (quality cables, connections and no intermediate connections).

1 off BLII.D Blacklight II MADI concentrator provides 4 redundant on-stage MADI ports connected to...
3 off additional I.32 stageboxes provide an additional 96 Mic/Line inputs
1 off additional D 32.32 AES boxes provide 32 AES digital IO

Coaxial MADI connected IO
1 off ML 32.32 stageboxes provide 32 Mic/Line inputs and 32 line outputs on stage
1 off additional D 32.32 AES boxes provide 32 AES digital IO

Total remote IO of 128 Mic/Line Inputs, 32 Line Outputs, 64 AES IO, 36 GP inputs, 30 GP Outputs



Dual Console MADI System

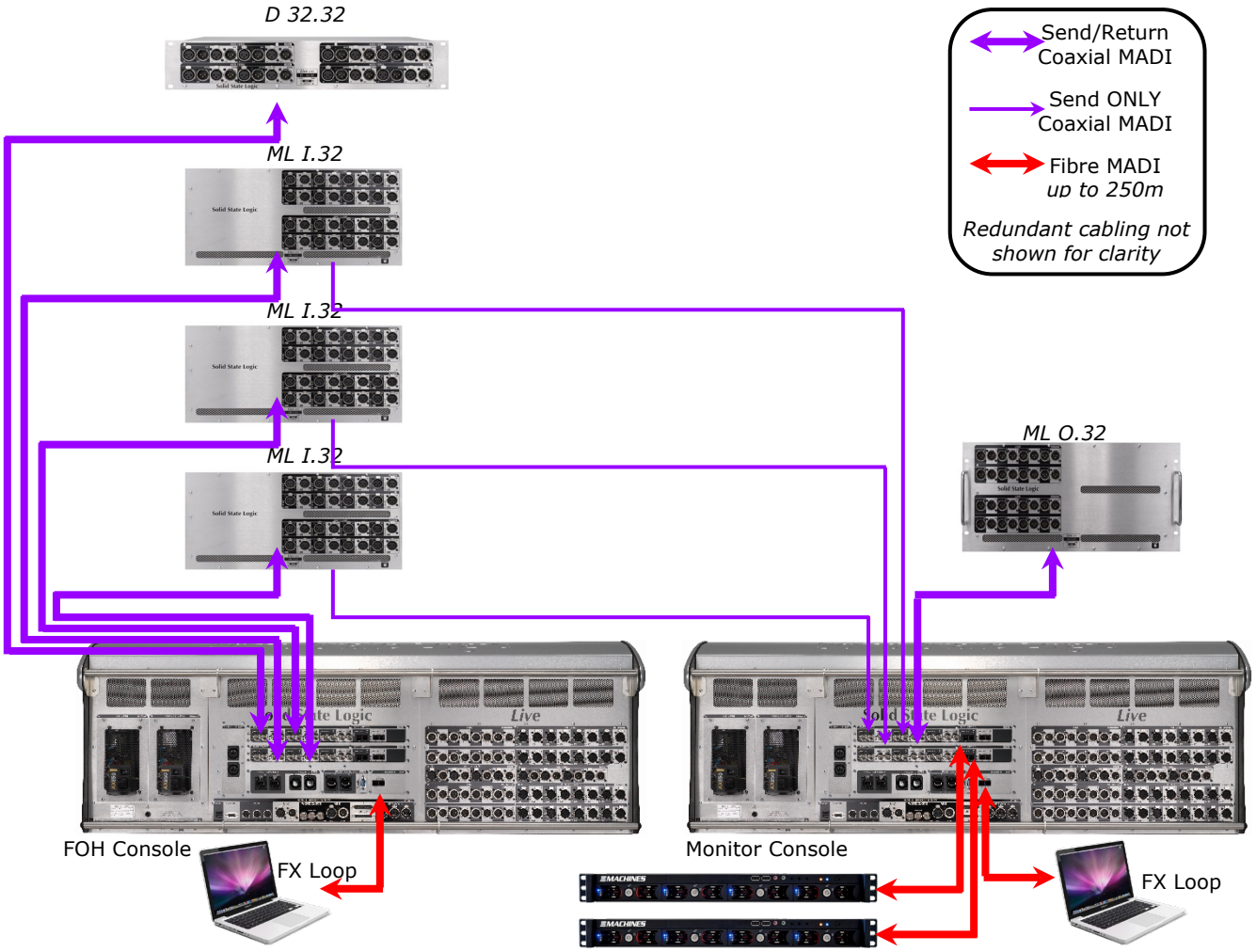
Two L550 Control Surfaces (FOH and Monitors) shown to provide 32 analogue IO and 16 AES IO at the consoles, 16 MADI ports plus MADI FX Loop.

3 off additional ML I.32 stageboxes provide an additional 96 Mic/Line inputs

FOH Console has redundant MADI RX/TX to MADI ports 1 & 2 of the ML I.32 stageboxes. Monitor Console is connected to the TX only connection from MADI ports 3 & 4. FOH console controls the Mic Amp Gain, Monitor console uses Gain Sharing to adjust local levels.

1 off additional D 32.32 AES boxes provide 32 AES digital IO to FOH console
1 off ML O.32 stageboxes provide 32 line outputs on stage from Monitor console

Total remote IO of 96 Mic/Line Inputs, 32 Line Outputs, 32 AES IO, 30 GP inputs, 25 GP Outputs



Dual Console System with Blacklight from each console

Two L550 Control Surfaces (FOH and Monitors) shown to provide 32 analogue IO and 16 AES IO at the consoles, 16 MADI ports plus MADI FX Loop.

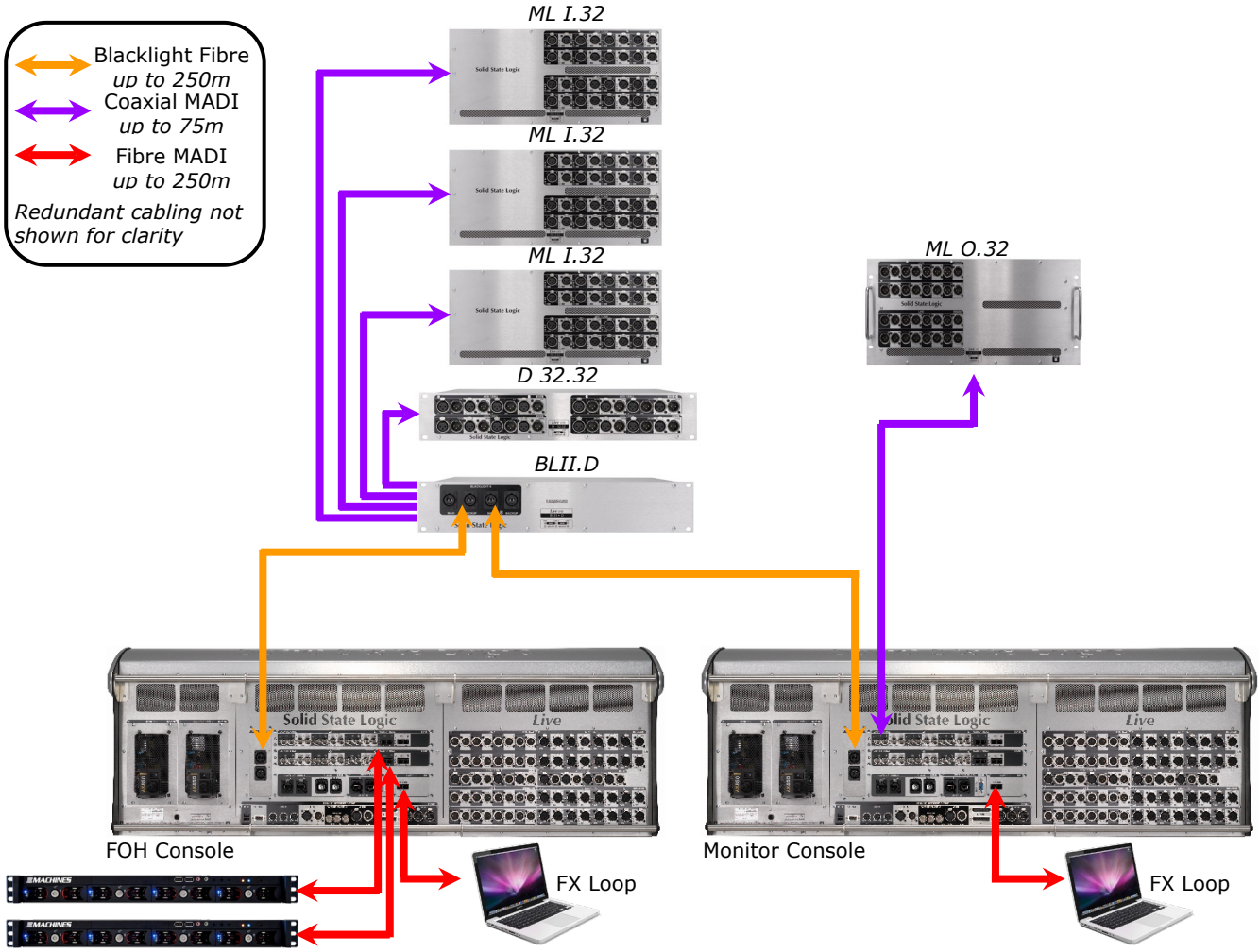
1 pair of Blacklight II connections provides 256 channels to/from stage using fibre up to <300m (quality cables, connections and no intermediate connections).

FOH Console has redundant Blacklight II Fibre connections to A port of the BL II.D Blacklight MADI Concentrator.
Monitor Console redundant Blacklight II Fibre connections to B port of the BL II.D Blacklight MADI Concentrator.
FOH console controls the Mic Amp Gain, Monitor console uses Gain Sharing to adjust local levels.

1 off BLII.D Blacklight II MADI concentrator provides 4 redundant on-stage MADI ports connected to...
3 off additional I.32 stageboxes provide an additional 96 Mic/Line inputs
1 off additional D 32.32 AES boxes provide 32 AES digital IO

Coaxial MADI connected IO
1 off ML O.32 stagebox provides 32 line outputs on stage from Monitor console

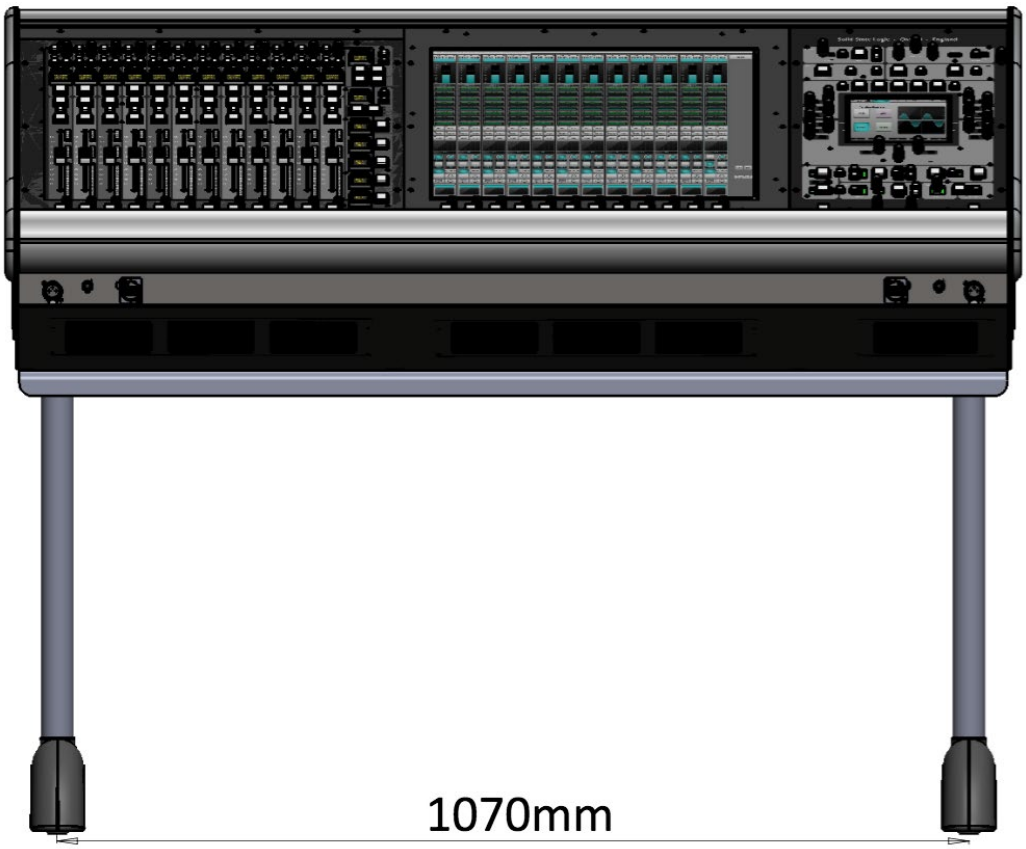
Total remote IO of 96 Mic/Line Inputs, 32 Line Outputs, 32 AES IO, 36 GP inputs, 30 GP Outputs



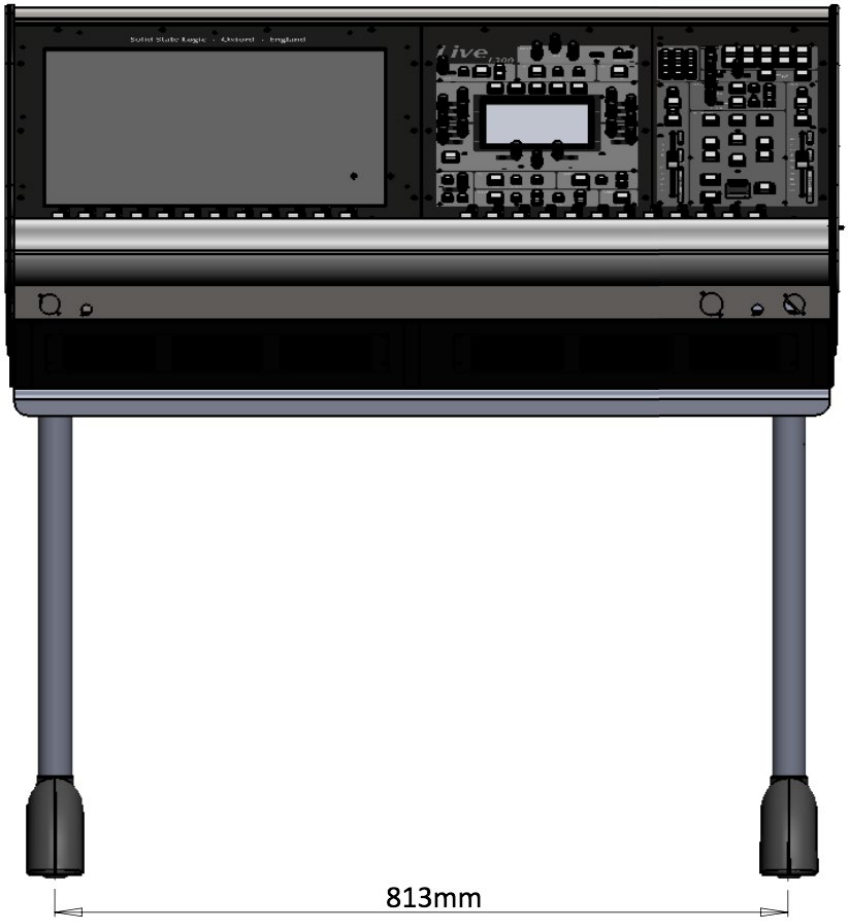
Optional Console Stand

Console Dimensions with optional stand: (figures in millimetres)

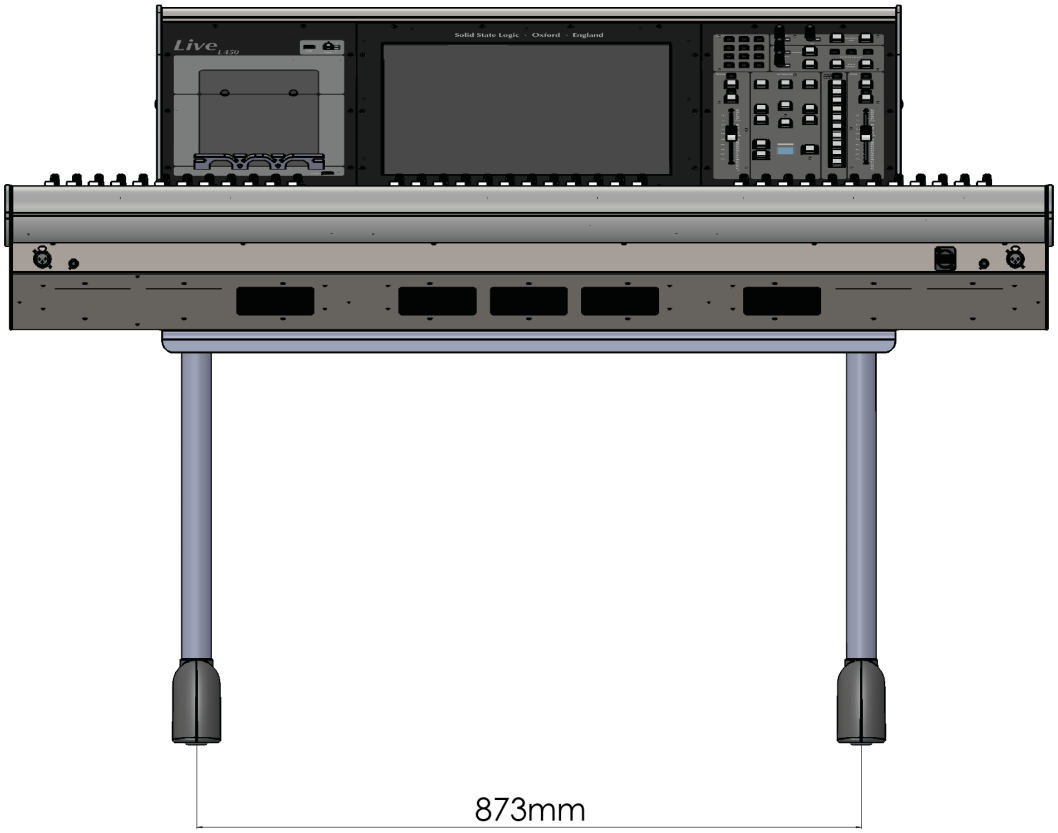
L550 Models (SSL part 62A7000XL)

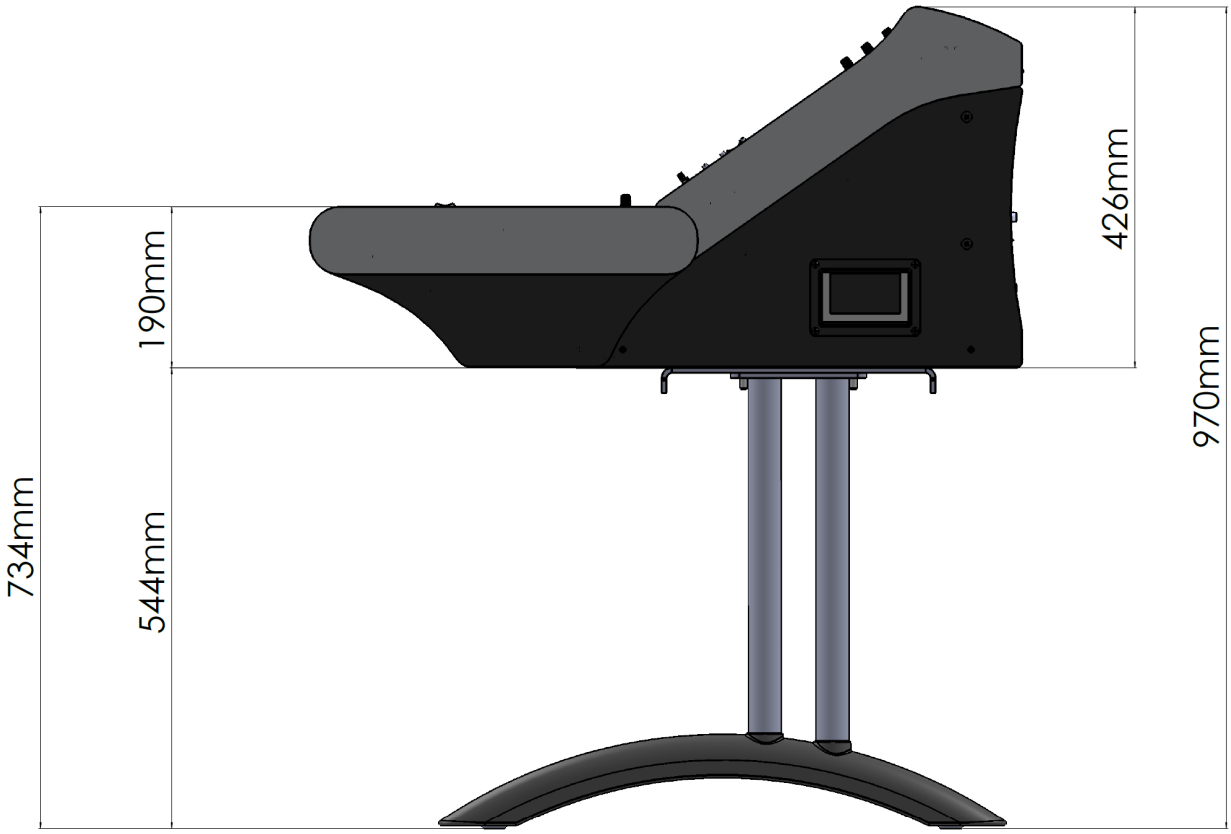


L200 and L350, L450 & L650 Models (SSL part 62A7300XL)



L450 and L650 Models (SSL part 62A7400XL)





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