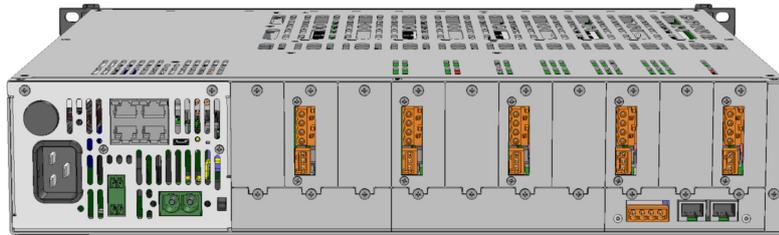




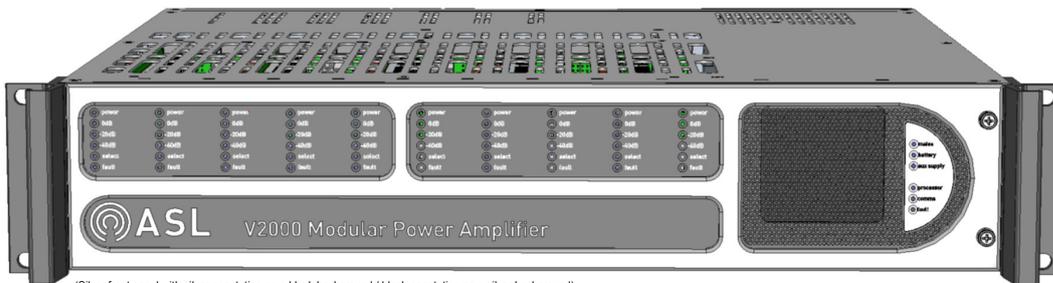
Sold in Australia by
Morrison's Public Address
Phone 0407442822
Email: Sales@morrison sav.com.au

V2000

Modular Amplifier Mainframe



(LSZDC and V2000-STBY Interface Cards shown as example.)



(Silver front panel with silver annotation on a black background / black annotation on a silver background)

Installation Guide

ASL Document Ref.: U-0623-0291.docx
Issue: 04 complete, approved - Date: 10/07/15
Part Number: M0623_26





This equipment is designed and manufactured to conform to the following EC standards:

EMC: EN 55103-1/E1, EN 55103-2/E5, EN 50130-4, EN 50121-4, EN 61000-6-2 and EN 61000-6-3

Safety: EN 60950-1 (Class I, Over-voltage category 2, pollution degree 2)

Professional equipment (not intended for sale to the general public) with rated power greater than 1 kW.

A 'Declaration of Conformity' statement to the above standards is available on request.

Failure to use the equipment in the manner described in the product literature will invalidate the warranty.



This product must be disposed of in accordance with the WEEE directive.

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Additional User Documentation:

- 1) V2000 User's Manual (ASL U-0623-0383)
- 2) ASL System Design Guide (ASL T-0667-0185)
- 3) Additional reference information is available from the ASL's website: www.asl-control.co.uk

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1 Introduction

This document describes how to install the V2000 Amplifier Mainframe and associated Interface Cards into a pre-wired equipment rack.

The diagram below provides an overview of the installation sequence.

	Summary of Task	Section	Step(s)	Page
Safety and Precautions	Read the safety and precautions instructions and guidelines.	2	All	4
Preparation	Gather documentation, tools, equipment and rack.	3	All	7
Unpacking and Handling	Unpack equipment.	4	All	8
Installation	<ol style="list-style-type: none"> 1. Place the required equipment close to the rack. 2. Remove the front panel. 3. Remove the lid. 4. Check the DIP switch settings. 5. Set the Earth Lift Switch. 6. Remove the LSZDC Surveillance Blanking Plates. 7. Install V2000-STBY Interface Cards (if used). 8. Cover unused standby interface card slots with blanking plate. 9. Set standby links. 10. Cover unused surveillance interface card slots with blanking plate. 11. Install LSZDC Interface Cards. 12. Re-fit the lid. 13. Check rotary switch settings. 14. Isolate power supplies. 15. Install mainframe into the rack. 16. Switch the mainframe MAINS and POWER switched off. 17. Fit Amplifier Modules. 18. Connect field wiring to interface cards and control ports. 19. Connect auxiliary DC power supply cable. 20. Connect AC mains supply cable. 21. Connect battery supply cable. 22. Connect thermistor cable. 23. Commission V2000 mainframe.  No commissioning instructions are provided in this document. Refer to V2000 User's Manual (ASL U-0623-0383). 24. Fit the front panel. 	5	<ol style="list-style-type: none"> 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 	<ol style="list-style-type: none"> 9 10 10 11 11 11 12 13 14 16 17 18 19 19 20 20 21 23 23 24 24 25 25

2 Safety and Precautions

Observe all safety information both on the equipment and in this section.

Environmental



Always ensure adequate ventilation is provided for the equipment by following the rack design rules and guidelines provided in the ASL System Design Guide.



The temperature and humidity ranges shown in the specifications for this equipment must not be exceeded.



This equipment must not be installed in an area that is subject to a corrosive atmosphere, excessive moisture or may allow water or other liquids to come into contact with the unit or its external connections.



Objects containing liquids should not be placed upon the equipment.

Weight Safety



The V2000 mainframe with amplifier and interface cards fitted is heavy (max. 15 kg). Move and handle with care to avoid strain or impact injuries. Install amplifier modules after mounting mainframe into the equipment rack.



Do not use the handles to lift or carry the mainframe. The handles are designed for sliding the unit into and out of the equipment rack, and not to support its weight.

Use the underside edges of the mainframe to lift and carry it.



The supporting rails must be capable of safely bearing the weight of the equipment (max. 15 kg).

ESD Precautions



The V2000 mainframe, interface cards and amplifier modules contain static-sensitive devices. Observe ESD precautions when handling the mainframe with the lid removed, the interface cards or amplifier modules.

Battery Handling



Work on the batteries should be carried out by qualified personnel only.



Always use insulated tools.



Batteries shall not be exposed to excessive heat such as sunshine, fire etc.

EMC

In the close proximity of some radio frequency transmitters, the signal to noise ratio of this equipment may be reduced. If this occurs, re-location of the equipment or the signal cables is recommended.

Electrical Safety



The V2000 is designed for professional use only and must be installed in a restricted access location such that there is no operator access to the V2000 equipment, wiring or battery.



Ensure power supply cabling is adequately rated for the unit's operating current and temperature, and is protected against short-circuit by a correctly rated fuse or circuit breaker. This is particularly important for supply feeds from the 24 V backup batteries which can deliver short-circuit currents exceeding 1000 amps.

Using too thin a cable can cause a safety hazard and will give excessive voltage drop and operational failure.



Always ensure that the equipment is correctly earthed by connection to an AC mains supply with a protective earthing connection.



Note that if the V2000 is connected as a system which is permanently connected to the mains, then an all-pole mains isolator with a separation of 3 mm in each pole shall be incorporated in the electrical installation.



The V2000 is protected from overload by single pole phase fusing. If connected to an unpolarised mains the building installation must provide double pole phase/neutral fusing of appropriate rating.



Always replace blown fuses with the correct type and rating.



This equipment contains wiring that is energised to 230 V AC mains and 100 V RMS audio signals at up to 20 kHz.

Terminals marked with the ⚡ symbol are hazardous, and the external wiring connected to these terminals requires installation by instructed personnel.



External 24 V DC batteries connected to this unit can deliver very high currents that could cause fire or burns.

Take care to avoid short-circuits of the battery supply by tools or jewellery.

Do not allow tools or unconnected cables to rest on top of batteries.



The V2000 may be energised after operation of a fuse or power off by the front panel MAINS and BATTERY supply switches.

Always isolate the mains and battery supplies by switching off the rack mains and battery supply isolation switches before installation, servicing or maintenance. In installations where the rack mains and/or battery supply isolation switches are not accessible, unplug the power supply cables from the V2000.



The V2000 may still be energised after isolating the mains and battery supplies.

After the mainframe 'processor' LED has stopped flashing leave the V2000 for another 5 minutes before attempting internal servicing.



The D150 and D500 amplifier modules may be plugged or unplugged with power still connected.

To protect against electric shock and damages to the equipment:

- Always use the ejector lever and the slot guides (bottom and top of mainframe) to plug or unplug an amplifier module.
- Do not touch the circuit board, any component or adjacent hardware.
- Do not allow the amplifier module to come in contact with any adjacent hardware.



The LSZDC Surveillance Card may be plugged or unplugged with power still connected if necessary. Wherever possible, to avoid the risk of short-circuit with adjacent hardware, disconnect the power supply to the V2000 backplane before plugging or unplugging the LSZDC card.

Disconnect power supply to the V2000 backplane by switching off the MAINS and BATTERY switches on the mainframe front panel behind the removable front panel.

Fire / Burn Safety



Batteries contained within the rack can deliver very high currents that could cause fire or burns.

Take care to avoid short-circuits of the battery terminals by tools or jewellery.

Do not allow tools or unconnected cables to rest on top of batteries.



Use caution when working with the V2000 mainframe. The mainframe case temperature can exceed 70°C.

Ground Loops

It is possible to form a ground loop (earth loop or hum loop) when connecting pieces of audio equipment using unbalanced connections that provide alternative earth connections via their cable screens.

Such ground loops result in audible 'hum' from the system.



Never disconnect the mains earth from the plug to attempt to cure a ground loop. In the event of a fault, the equipment casing could become live.

Blanking Plate Disposal



Any blanking plates removed from the V2000 as part of the installation process ideally should be recycled as metal or otherwise responsibly disposed of by following WEEE protocols.



3 Preparation

1. Read and observe the safety instructions and guidelines in Section ‘2 Safety and Precautions’ (page 4).



Failure to follow these instructions and guidelines may cause personal injury and/or damage to the equipment.

2. Gather the following documentation and tools:
 - The system design documentation of the specific location
 - A small flat-bladed screwdriver
 - Pozidriv screwdrivers (No 1, 2 and 3)
 - A pair of wire cutters/strippers
 - 19-inch rack-mount fixing screws as required by the system design
 - Ferrules and crimping tool
 - ESD wrist strap or other grounding device
 - Antistatic mat or antistatic foam
3. Gather the equipment (in their original packing):
 - The V2000 Amplifier Mainframe
 - D500 and/or D150 amplifier module(s) as required by the system design
 - Interface cards as required by the system design: LSZDC V2000 Line Surveillance Interface Card and V2000-STBY V2000 Standby Interface Card
 - Surveillance blanking plates as required by the system design
 - Thermistor cable assembly as required by the system design (if not part of the rack build)
4. A standard 19-inch rack is required for the installation.

The rack should be fitted with battery backup system (if used), supporting rails for the V2000 mainframe, fan trays (if required), cooling ducts (if required), ventilation panels (if required) and wired with power supply, signal, and control wiring to suit the requirements of the specific system design and should meet the rules and guidelines provided in the ASL System Design Guide (ASL T-0667-0185).

Note that the installation of fan trays, cooling ducts, and/or ventilation panels depend on the system design; refer to the ASL System Design Guide for further details.

4 Unpacking and Handling

1. Observe any markings or warnings on the package prior to handling and opening.



Do not use the handles to lift or carry the mainframe. The handles are designed for sliding the unit into and out of the equipment rack, and not to support its weight.

Use the underside edges of the mainframe to lift and carry it.

2. Check the equipment package for signs of damage during transport. Report problems to the carrier or supplier.

3. Unpack the equipment in a dry area handling the equipment with care.



The V2000 mainframe, interface cards and amplifier modules contain static-sensitive devices. Observe ESD precautions when handling the mainframe with the lid removed, the interface cards or amplifier modules.

4. Check the equipment package contents for completeness. Report any missing items immediately.

V2000 package contents:

- 1 x V2000 mainframe (fitted with handles)
- 1 x V2000 front panel
- 3 x Surveillance Blanking Plates (fitted)
- 2 x Standby Blanking Plates (fitted)
- 1 x mains cable (one end terminated IEC 60320 C19 female connector with and one unterminated end)
- 1 x IEC 60320 C20 straight cable mount connector (16 A / 250 V AC)
- 1 x 2-way Phoenix plug
- 1 x V2000 Installation Guide

5. It is advisable to retain the original equipment packing (containers and materials) in the event that the equipment ever needs returning for service.
6. If the packing is not to be retained, the packing materials should be either recycled or disposed of according to local regulations.
7. Ensure that the name and address of the Authorised Distributor from whom you purchased the product is recorded on the 'Service and Warranty' page of this document for future reference.
8. Repacking instructions are provided in Section '10 Packing for Return' (page 36).

5 Installation

1. Place the mainframe, amplifier modules, interface cards and the required connectors and fixings on the floor or on a sturdy table as close as possible to the rack.

The main components are shown in the illustration below. Note that types and quantities depend on the system design of the specific location.

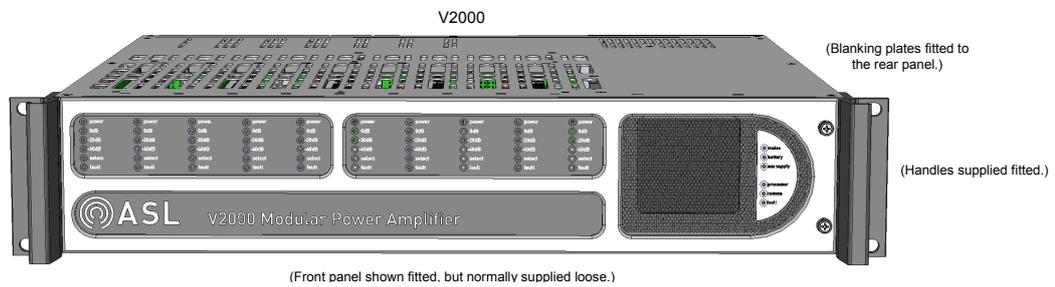


Do not use the handles to lift or carry the mainframe. The handles are designed for sliding the unit into and out of the equipment rack, and not to support its weight.

Use the underside edges of the mainframe to lift and carry it.



Do not connect cables or other wiring to the V2000 until instructed.

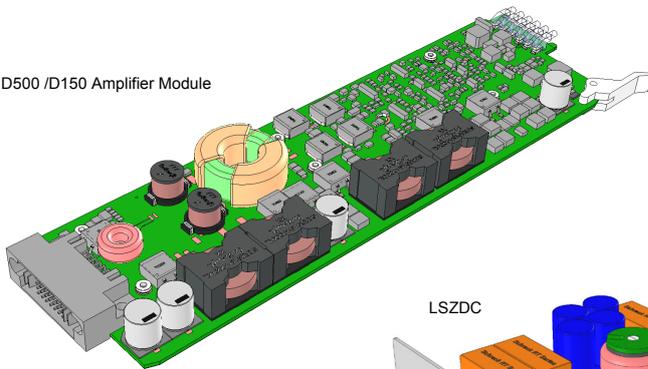


(Front panel shown fitted, but normally supplied loose.)

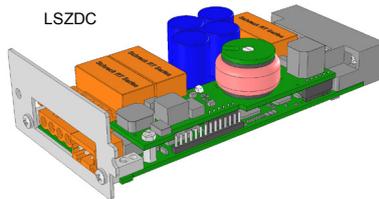


Observe precautions for handling electrostatic sensitive devices.

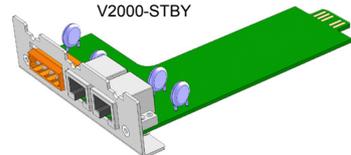
D500 /D150 Amplifier Module



LSZDC



V2000-STBY



Surveillance Blanking Plate



Thermistor Assembly Cable

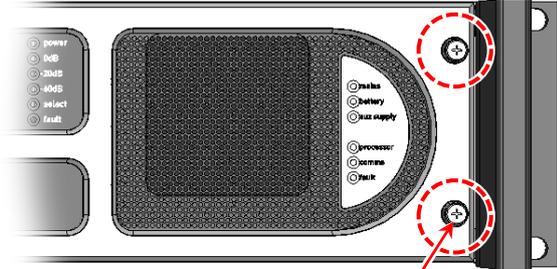


(Illustrations not to scale. Only main components shown, screws, connectors and cable omitted for clarity.)

- If fitted, remove the V2000 front panel by undoing the 2 x captive screws on the right-hand side of the front panel.

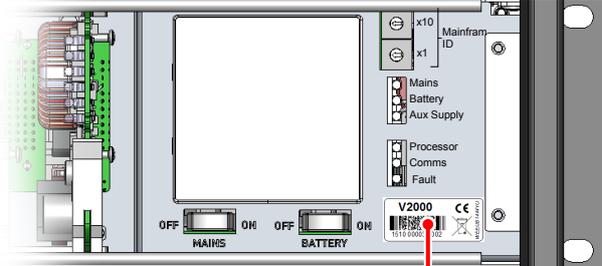
Note that the V2000 Build Standard (BS) is the last section of the product's barcode which is located on the mainframe front panel (behind the removable front panel); see example below. The Build Standard should be quoted in all enquiries regarding the unit.

V2000 front panel



Captive M3 Pozidriv screw

(V2000 front panel removed)



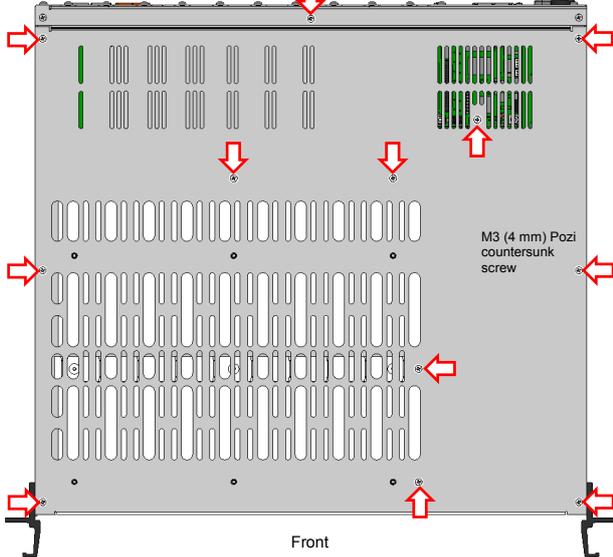
Barcode label



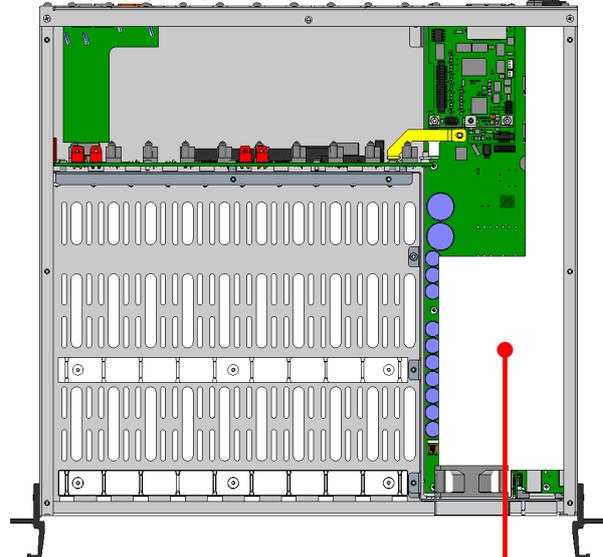
The last section of the barcode indicates the Build Standard (BS) of the unit.
Example: 1510 000036 002 → BS = 002

- Remove the lid by undoing 12 x screws.

Mainframe Top View (lid fitted)



Mainframe Top View (lid removed)

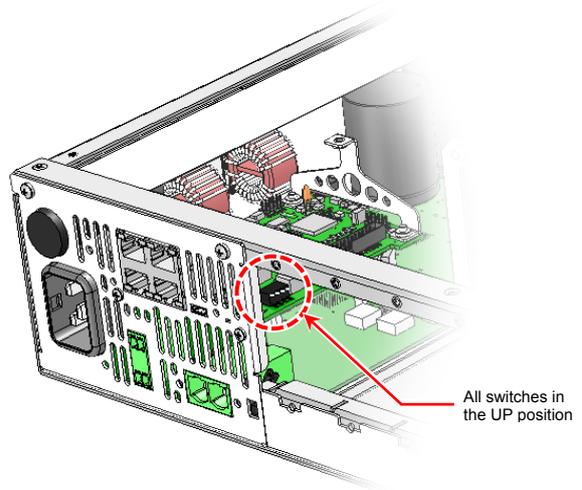


 The white insulating sheet must not be damaged or tampered with in any way for safety reasons.

 Observe precautions for handling electrostatic sensitive devices when handling the mainframe with the lid removed.

4. Ensure all DIP switches on the mainframe controller board are in the UP position.

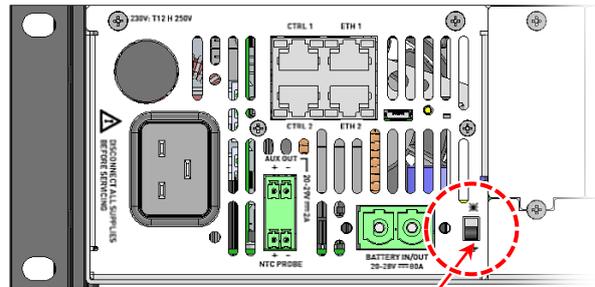
The mainframe controller board is located on the rear left-hand corner.



5. Set the rear-panel EARTH LIFT switch to the DOWN (⚡, ON) 'grounded' position.
Set the EARTH LIFT switch to the UP (⚡, OFF) position to remove the mains earth from the signal circuit if a +ve ground battery system is used, or it is necessary to avoid a ground loop problem.

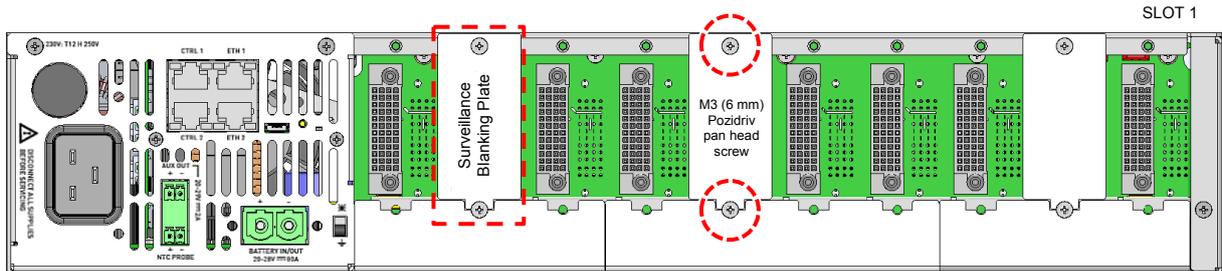


Never disconnect the mains earth from the plug to attempt to cure a ground loop. In the event of a fault, the equipment casing could become live.



Earth Lift switch down (factory default)

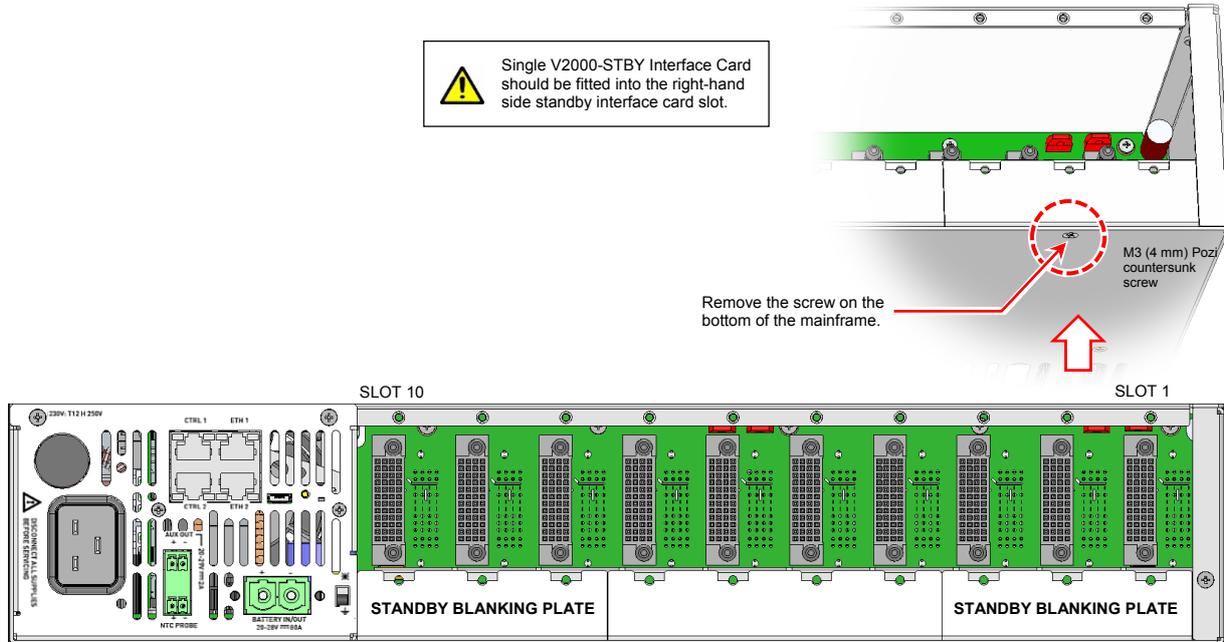
6. Remove all Surveillance Blanking Plates from the rear panel by undoing 2 x screws.



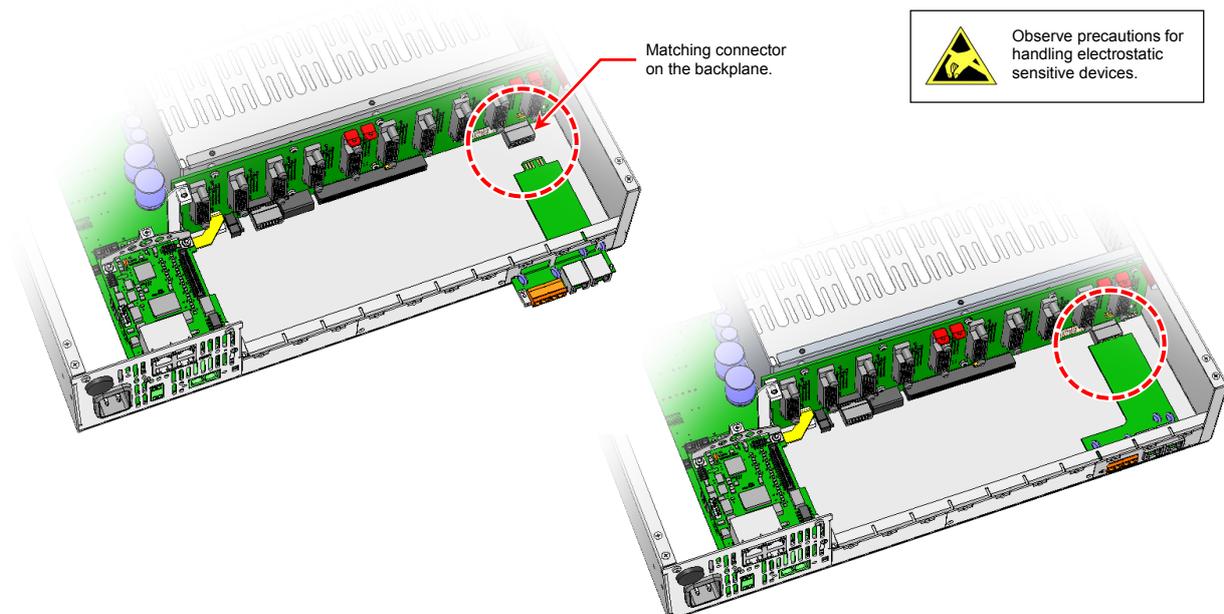
7. If used, fit one or two V2000-STBY Interface Cards to the rear panel standby interface card slots as required by your system design.

 If the mainframe is to be fitted with a single V2000-STBY Interface Card, the interface card should be fitted into the right-hand side standby interface card slot as illustrated below.

- a. Remove the Standby Blanking Plate by undoing 1 x screw at the bottom of the mainframe.



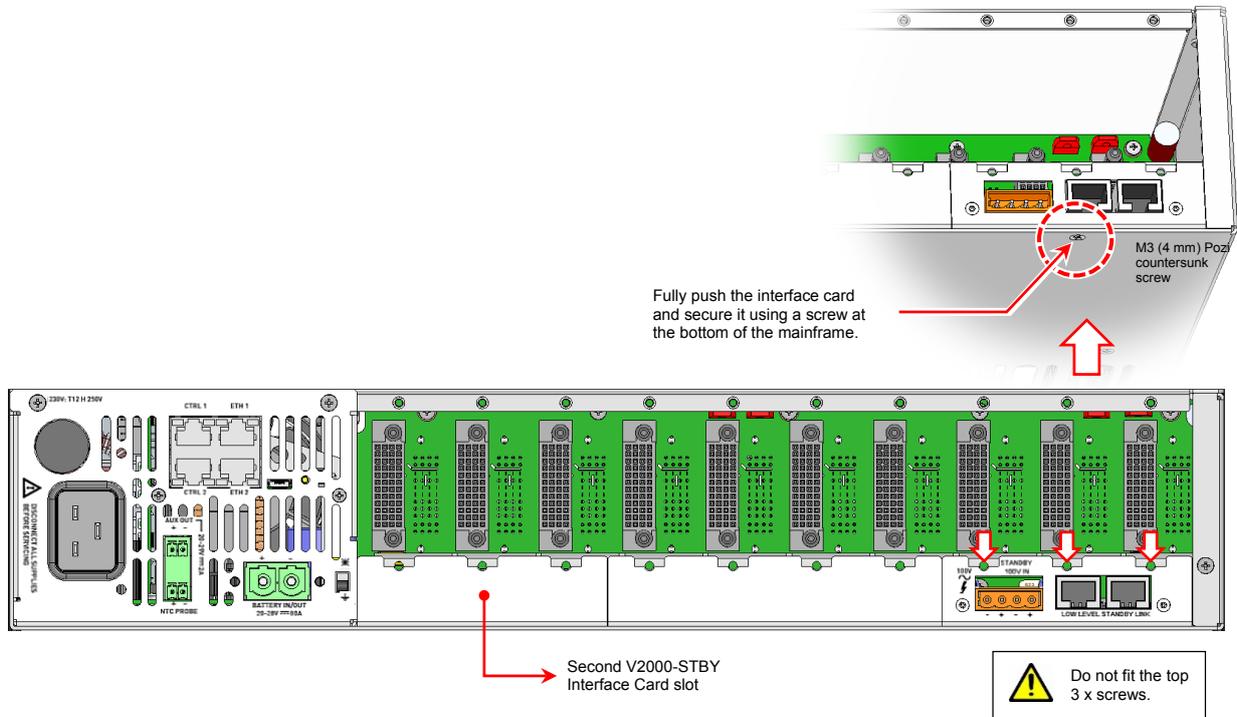
- b. Insert the V2000-STBY Interface Card so that its rear connector mates the matching connector on the backplane.



- c. Ensure that the interface card is fully pushed, and secure the interface card in position using 1 x screw at the bottom of the mainframe.



Do not fit the top 3 x screws as they are used to secure the LSZDC Surveillance Interface Card (or the Surveillance Blanking Plate).

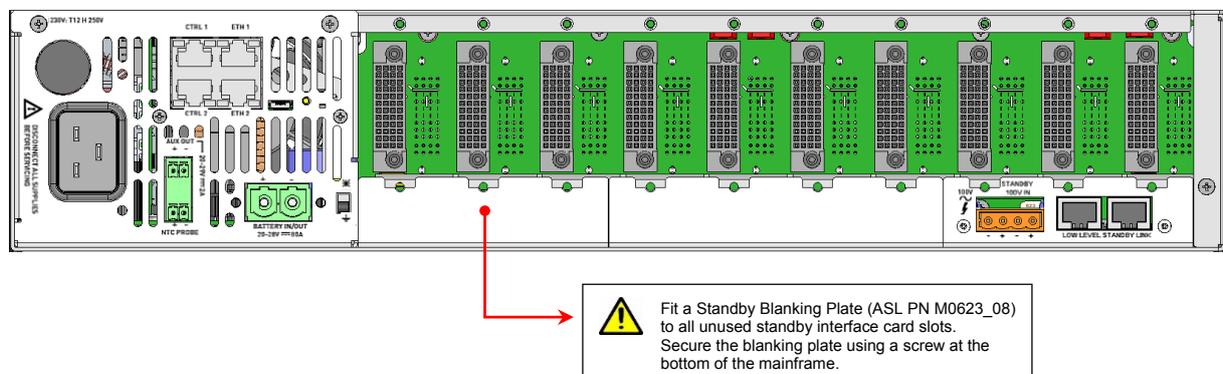


- d. If used, repeat the above procedure for the second V2000-STBY Interface Card.

8. Ensure that all unused standby interface card slots are covered with a Standby Blanking Plate.



Any blanking plates removed from the V2000 as part of the installation process ideally should be recycled as metal or otherwise responsibly disposed of by following WEEE protocols.

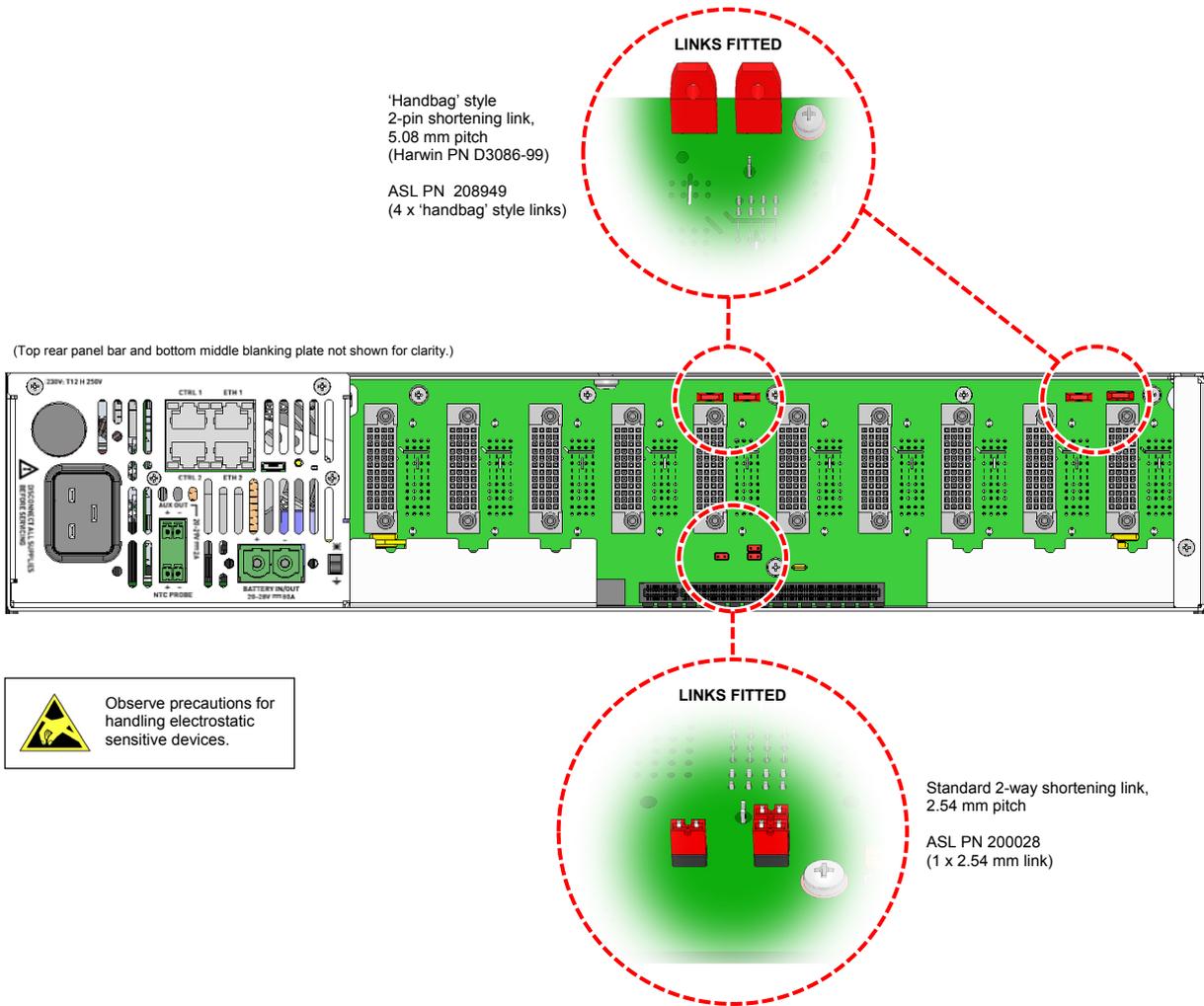


9. Set the standby links on the rear side of the backplane according to the number of V2000-STBY Interface Cards fitted to the mainframe.



Ensure the standby links are correctly set on the V2000 backplane. If incorrectly set, amplifiers may get damaged when a standby amplifier changes over.

- a. No V2000-STBY Interface Card fitted: factory default link settings



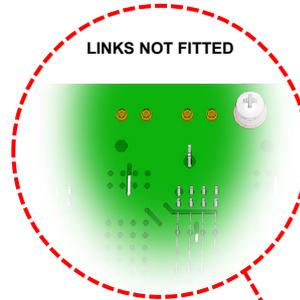
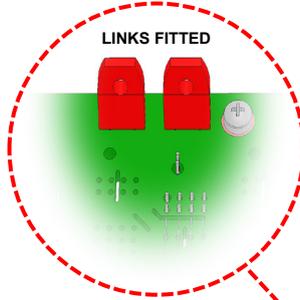
Observe precautions for handling electrostatic sensitive devices.

b. 1 x V2000-STBY Interface Card fitted:

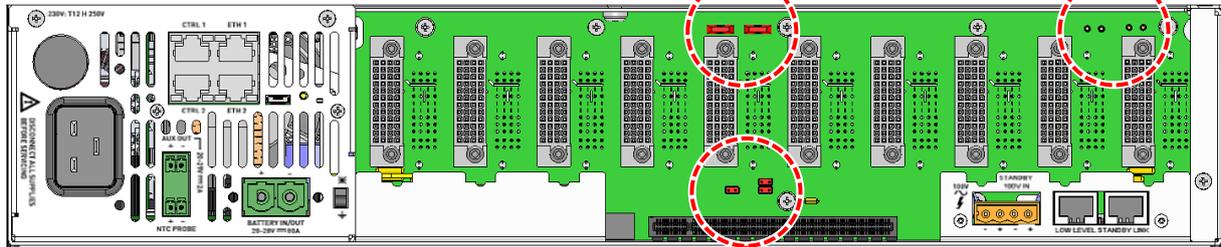
 Ensure these links are NOT FITTED. If fitted, amplifiers may get damaged when the standby amplifier switches over.

'Handbag' style
2-pin shortening link,
5.08 mm pitch
(Harwin PN D3086-99)

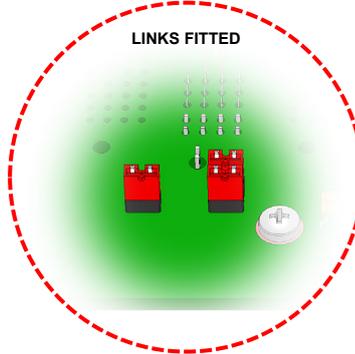
ASL PN 208949
(4 x 'handbag' style links)



(Top rear panel bar and bottom middle blanking plate not shown for clarity.)



 Observe precautions for handling electrostatic sensitive devices.

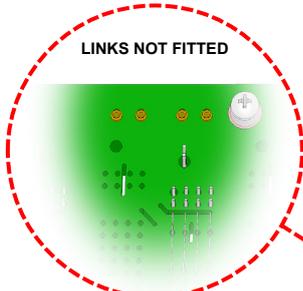


Standard 2-way shortening link,
2.54 mm pitch

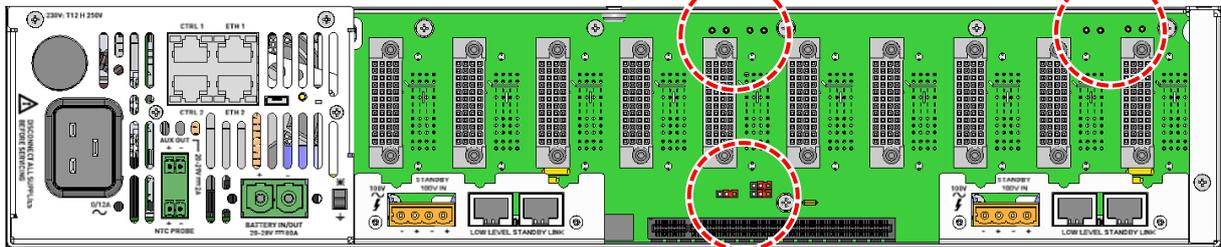
ASL PN 200028
(1 x 2.54 mm link)

c. 2 x V2000-STBY Interface Cards fitted:

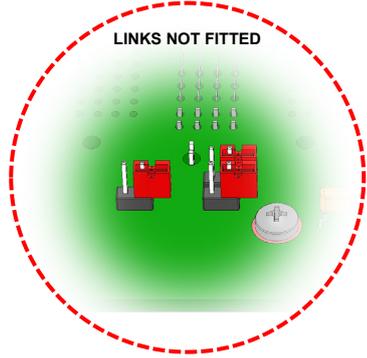
 Ensure that all standby links are NOT FITTED. If fitted, amplifiers may get damaged when a standby amplifier switches over.



(Top rear panel bar and bottom middle blanking plate not shown for clarity.)



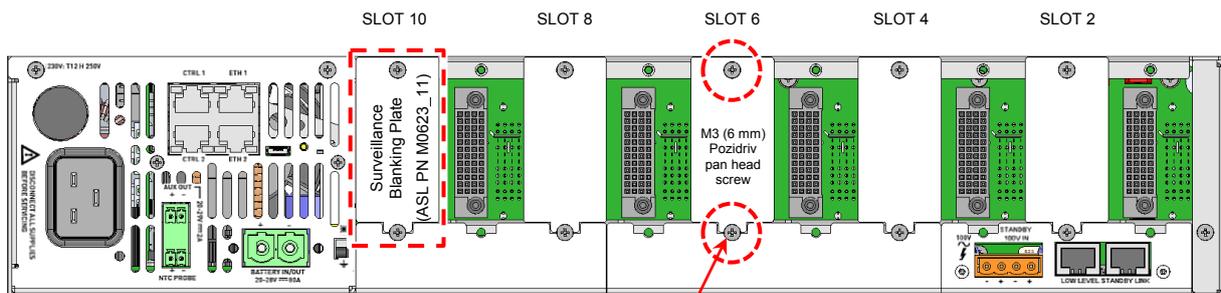
 Observe precautions for handling electrostatic sensitive devices.



10. Cover all unused LSZDC Interface Card slots with a V2000 Surveillance Blanking Plate as specified in your system design.

The example below shows a blanking plate covering slots 2, 4, 6, 8 and 10.

 Any blanking plates removed from the V2000 as part of the installation process ideally should be recycled as metal or otherwise responsibly disposed of by following WEEE protocols.



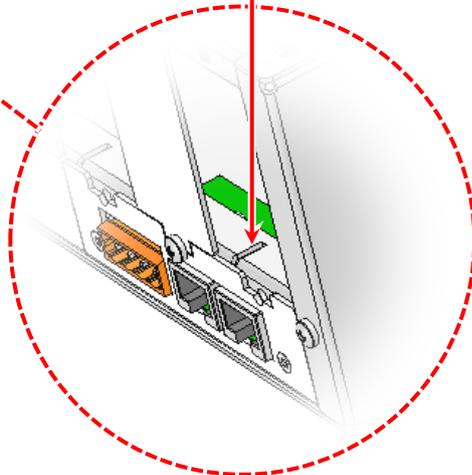
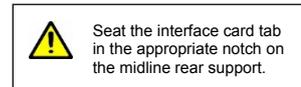
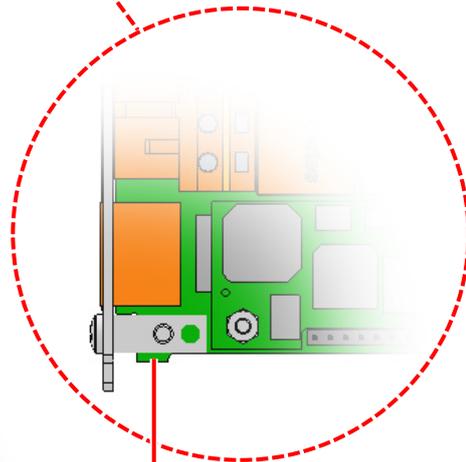
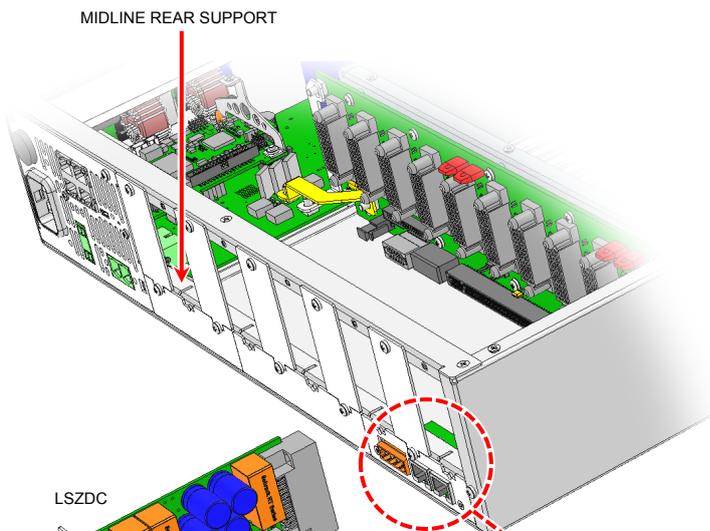
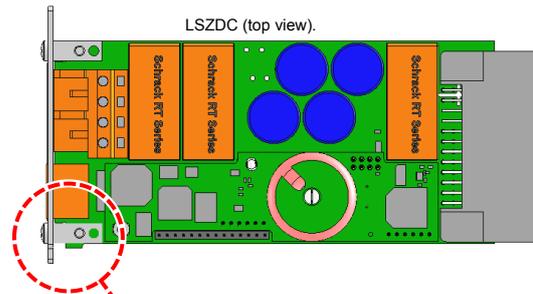
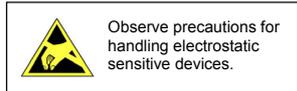
Secure the blanking plate using 2 x screws.

 Only use zinc-plated steel screws.

11. Fit the LSZDC Interface Cards to the rear panel surveillance interface card slots as required by your system design.

The illustrations below show a LSZDC Interface Card being fitted into slot 1.

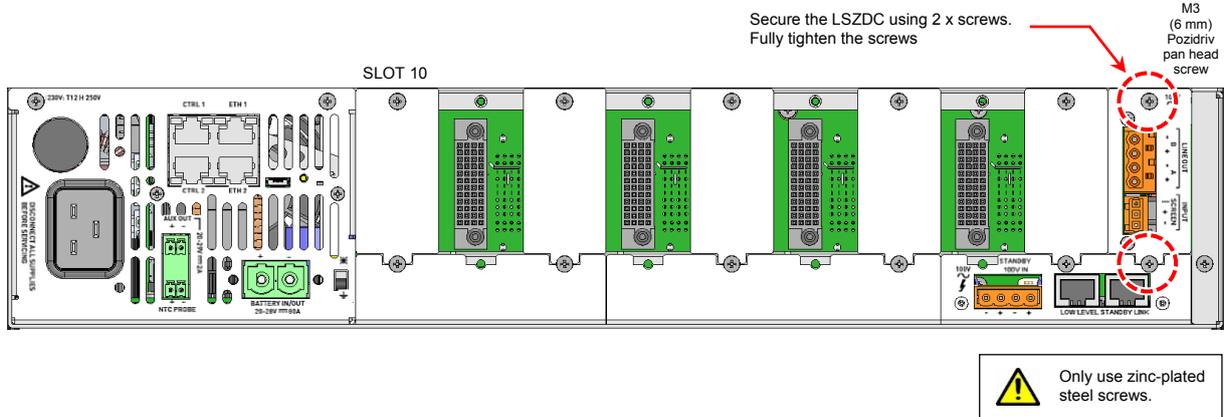
- a. Insert the LSZDC Interface Card so that its rear connector mates the matching connector on the backplane by seating the tab at the bottom of the interface card in the appropriate notch on the midline rear support.



- b. Ensure that the interface card is fully pushed, and then secure it using 2 x screws.



Ensure all securing screws are fully tightened to bond the interface card to the amplifier mainframe chassis. It is important to make sure the screws are fully tightened to prevent dangerous voltages being present on the panel.

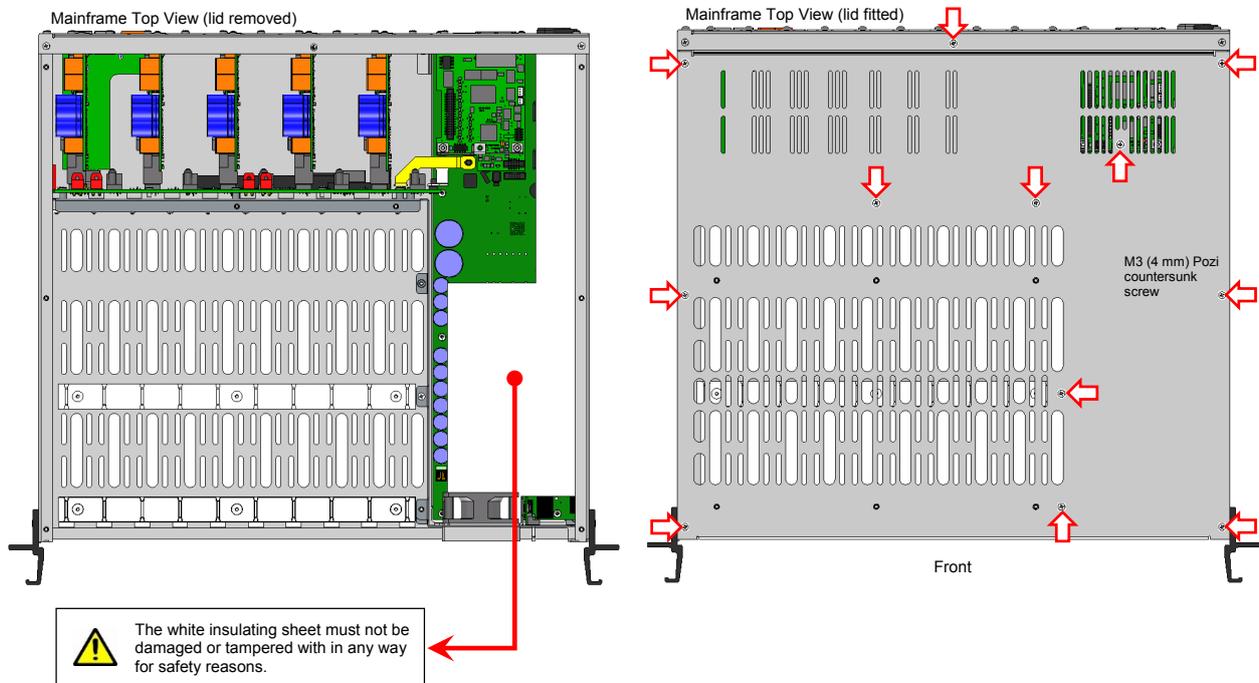


- c. Repeat the procedure for the remaining LSZDC Interface Cards.

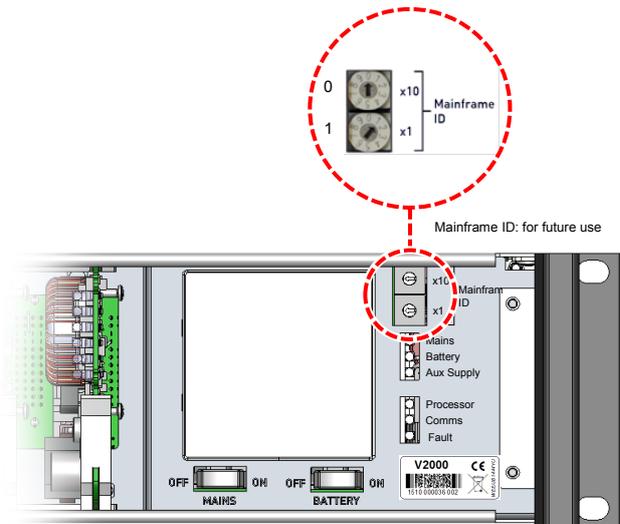
12. Re-fit the lid using 12 x screws.



Ensure all tools and debris are removed from the mainframe case before re-fitting the lid.



13. Ensure that the mainframe ID is set to '01' (factory default).

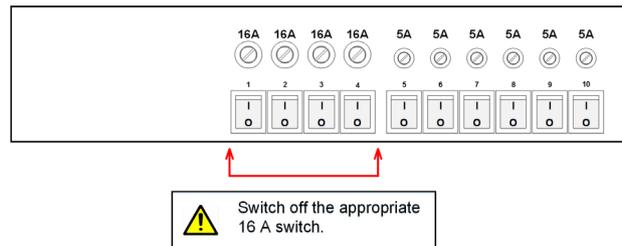


14. Ensure that the mains and battery supplies to the mainframe are isolated.

- a. Isolate the AC mains supply to the unit by switching off the rack mains isolator.

In racks fitted with ASL MDIST-V2000 (Mains Power Distribution Assembly), switch off the appropriate 16 A switch on the MDIST-2000; see example on the right.

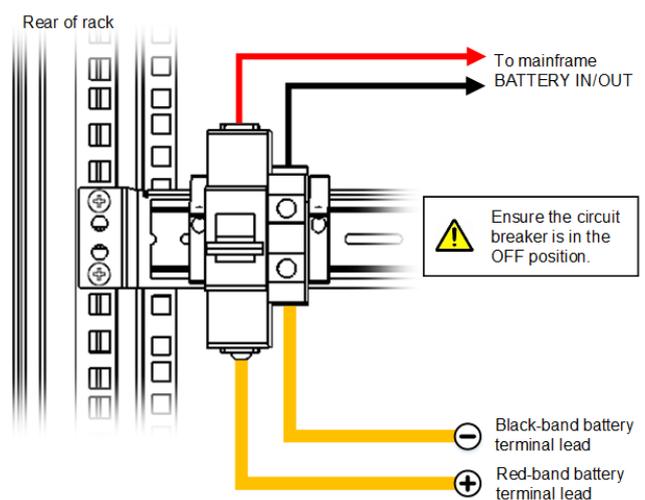
Mains supply isolator: example using ASL MDIST-V2000



- b. Isolate the DC supply to the unit by switching off the battery supply circuit breaker (if used).

In racks fitted with ASL BDIST-V2000 (Battery Power Distribution Assembly), switch off the circuit breaker on the BDIST-V2000; see example on the right.

DC supply isolator: example using ASL BDIST-V2000



15. Fit the mainframe into a 19-inch standard equipment rack on supporting rails, and secure the mainframe in position using fixing screws and washers.

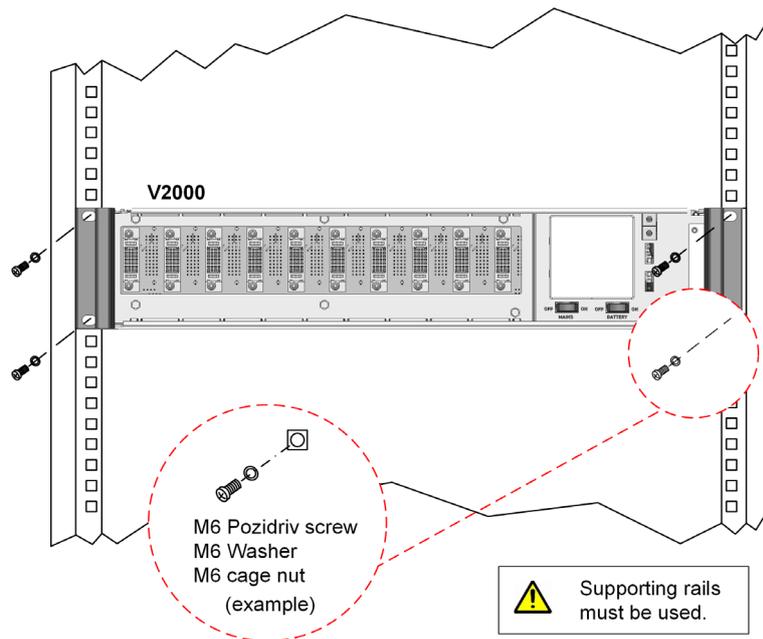


The V2000 mainframe with amplifier and interface cards fitted is heavy (max. 15 kg). Move and handle with care to avoid strain or impact injuries.



Do not use the handles to lift or carry the mainframe. The handles are designed for sliding the unit into and out of the equipment rack, and not to support its weight.

Use the underside edges of the mainframe to lift and carry it.

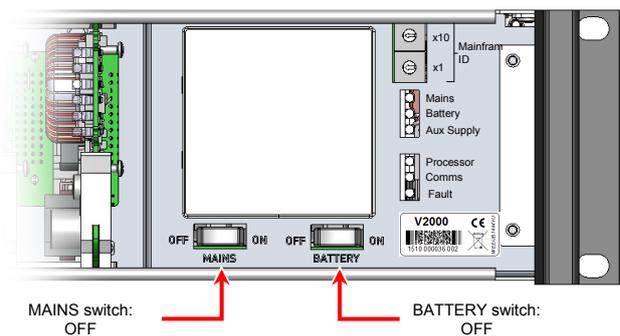


16. Ensure that the MAINS and BATTERY switches on the mainframe front are switched off.



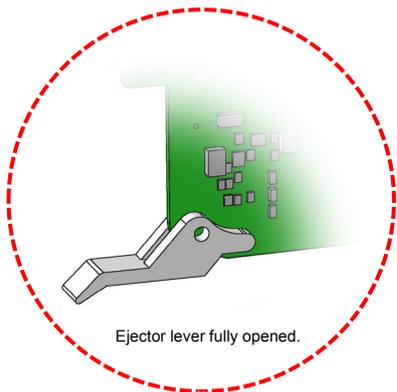
The MAINS and BATTERY switches do not isolate the power supply to the unit.

Isolate the power to the unit by using the rack mains and battery power isolation switches; see step 14 above.

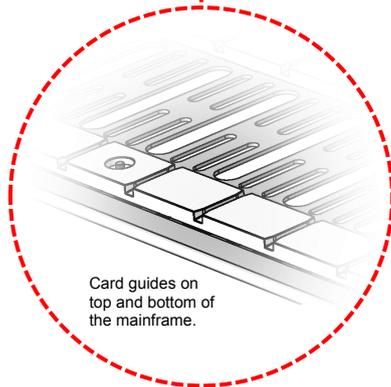
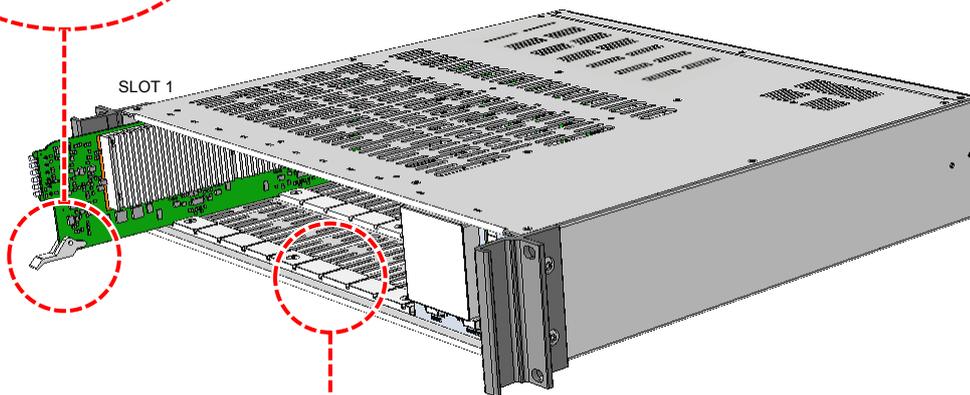
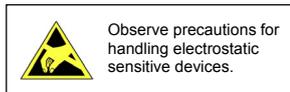


17. Install the amplifier modules as required by your system design.

- a.** Fully open the ejector lever of the amplifier module.
- b.** Position the amplifier module in the slot through the front of the mainframe.
Align the sides of the module with the card guides on top and bottom of the mainframe to locate it correctly.

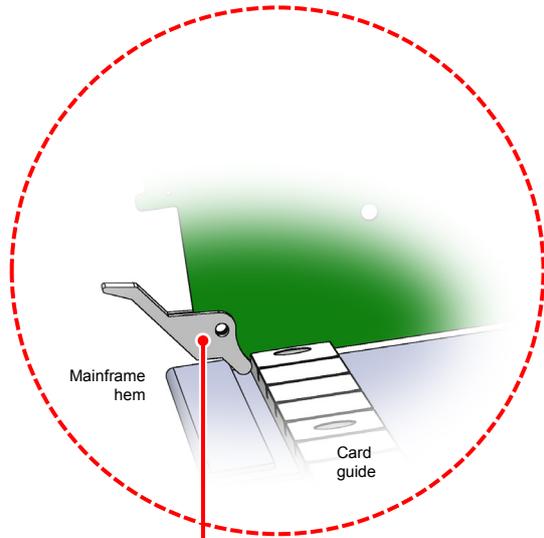


Ejector lever fully opened.



Card guides on top and bottom of the mainframe.

- c. Carefully slide the amplifier module into the slot until the ejector lever meets the card guide at the bottom.
- d. Pivot the ejector lever up just so that the ejector lever hook fits into the gap between the bottom card guide and the mainframe hem.

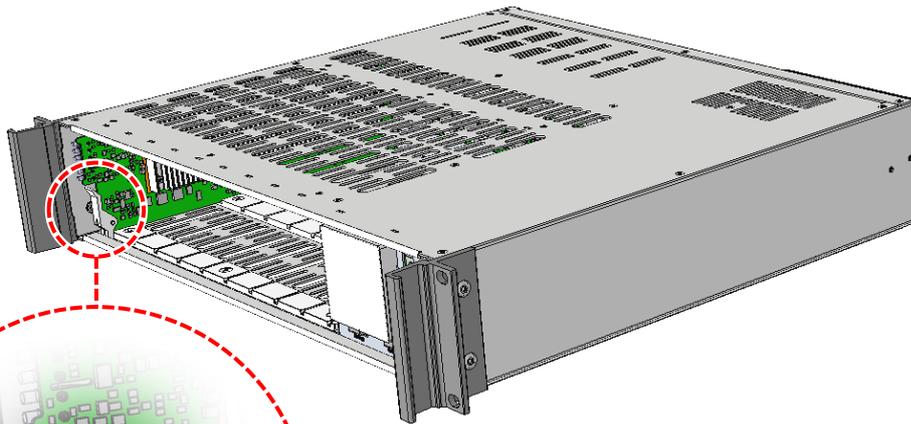


 Ejector lever hook fitted into the gap between the card guide and mainframe hem.

- e. Pivot the ejector lever up to fully seat the amplifier module in the mainframe backplane connector.



Do not force the ejector lever up if the ejector lever hook is not fitted in the gap between the bottom card guide and the mainframe hem as this may damage the connectors. If required, re-insert the amplifier module.



Ejector lever fully closed.

18. Connect the field wiring to the installed interface cards and control ports.

Refer to Section ‘6 Connections’ (page 26) for pinout details.

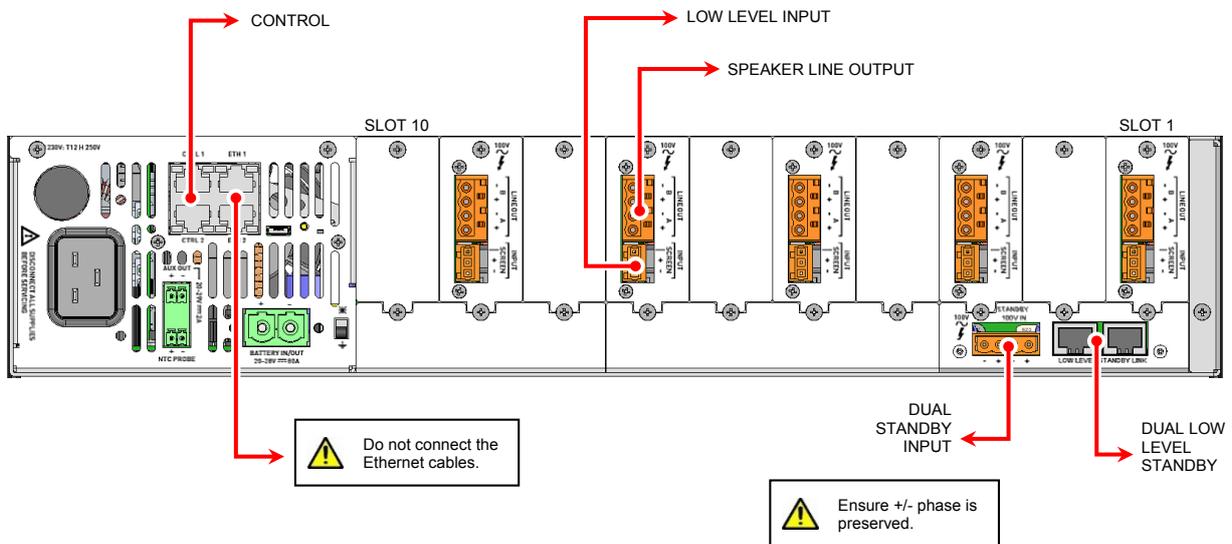


This equipment contains wiring that can be energised to 100 V RMS audio signals at up to 20 kHz.

Terminals marked with the ⚡ symbol are hazardous, and the external wiring connected to these terminals requires installation by instructed personnel.

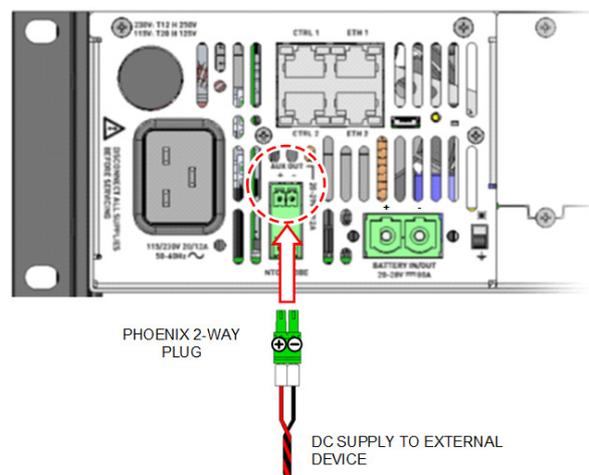


The Ethernet cables should not be connected to the V2000 until system commissioning as all V2000 units are supplied with same IP settings (factory default).

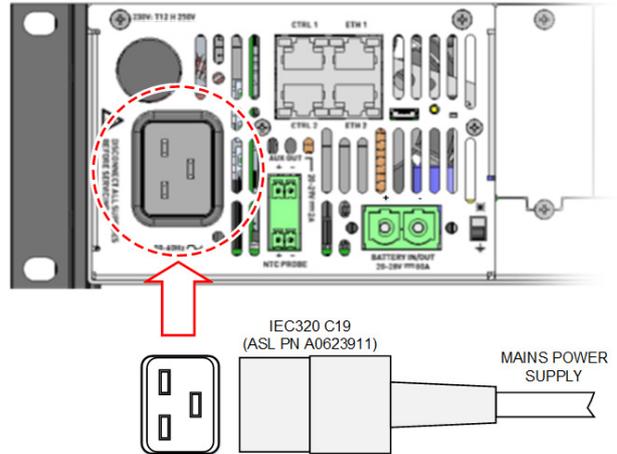


19. If used, connect the auxiliary DC power supply cable to the rear panel connector AUX OUT.

- a. If required, cut the cable pair to length and terminate it with a suitable ferrule.
- b. Terminate the cable with a Phoenix 2-way plug noting the correct polarity:
3.81 mm pitch plug (Phoenix MC 1,5/2-ST-3,81 – PN 1803578)
- c. Ensure that the power cable is tied neatly and clear from any sharp edges or other risk of chafing.



20. Connect the AC mains power supply cable to the rear panel mains connector.



21. If battery power supply is used, connect the battery power cable from the battery supply circuit breaker to the rear panel connector BATTERY IN/OUT.

If required, cut the battery supply cable to length ensuring it does not exceed 1 metre, and terminate it with a Phoenix PC16 plug.



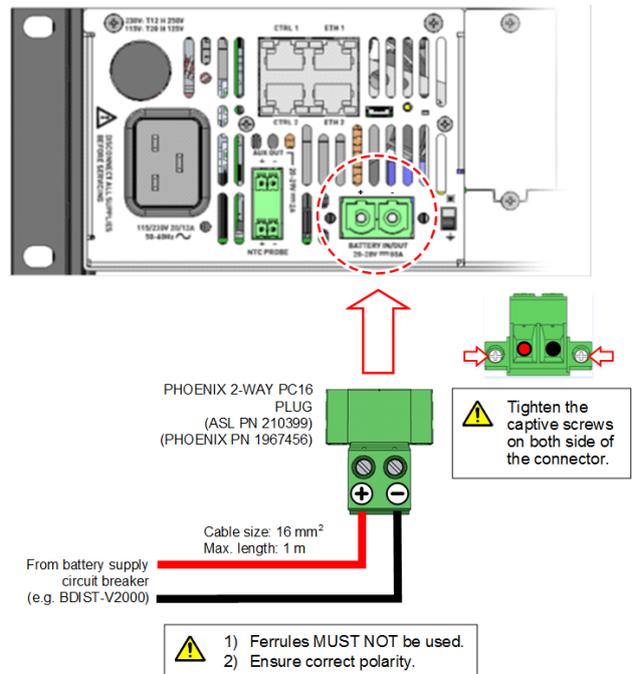
External 24 V DC batteries unit can deliver very high currents that could cause fire or burns. Take care to avoid short-circuits of the battery supply by tools or jewellery.



High current: Ferrules MUST NOT be used as they can restrict the available contact area.



Secure the DC supply connector to the mainframe by tightening the captive screws available on both sides of the connector.



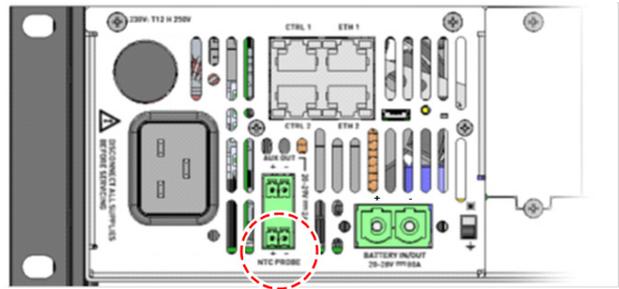
22. If battery power supply is used, connect the thermistor cable assembly to the real panel connector NTC PROBE.

Note that the thermistor cable assembly is supplied with the BDIST-V2000.

Ensure the thermistor probe is positioned close to the batteries (fixed to the battery tray or similar).

Adjust the cable length as required by looping the cable and securing the loop portion with standard cable ties.

 Take care not to plug the thermistor cable assembly into the top AUX OUT socket.



THERMISTOR CABLE ASSEMBLY
(ASL PN A0623910)



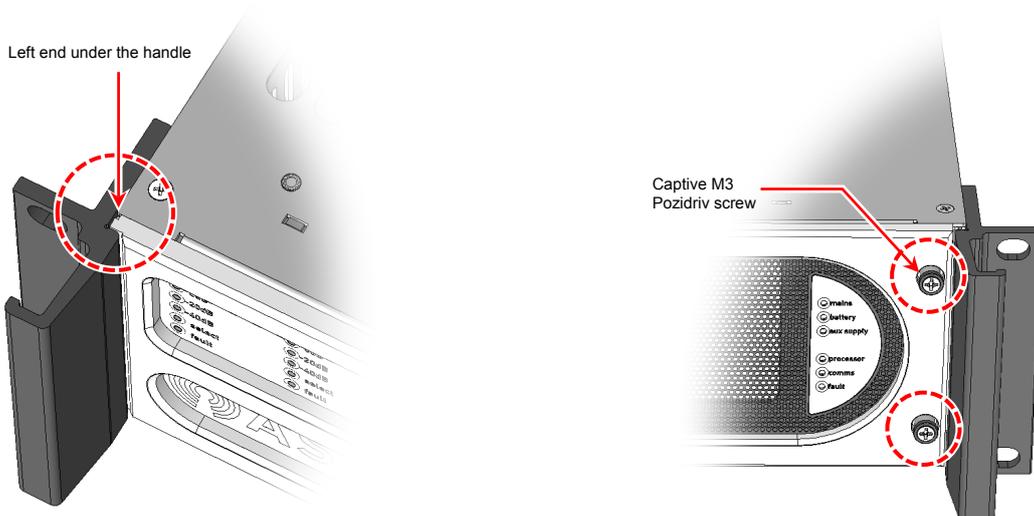
23. Commission the mainframe by following the instructions on the V2000 User's Manual (ASL U-0623-0383).

 The power supply to the unit should remain isolated until system commissioning. Follow the instructions on the V2000 Quick Start Guide to power up the unit.

 The Ethernet cables should not be connected to the V2000 until system commissioning as all V2000 units are supplied with same IP settings (factory default). Follow the instructions on the V2000 User's Manual to configure the unit's IP address.

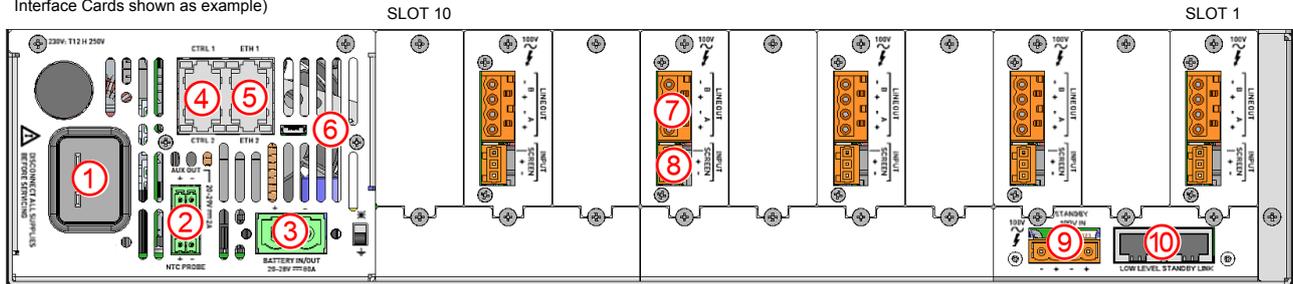
 Do not fit the V2000 front panel until connections to the mainframe and peripherals have been made and the system commissioned and tested. Once the front panel is fitted, the power ON/OFF switches will not be accessible.

24. Fit the V2000 front panel by sliding its left end under the left handle, and fixing its right end using the two captive screws.



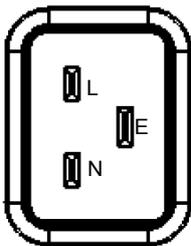
6 Connections

V2000 rear panel (LSZDC and V2000-STBY Interface Cards shown as example)



6.1 V2000 Mainframe Connectors

① AC Mains Supply

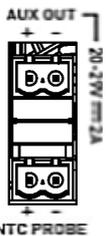


IEC 60320 C20 (male)

IEC 60445 – Conductor and Terminal Marking			
Marking		Wiring Colour	Description
L	Live	Brown	230 V AC +10% / -15% (T12 H 250 V fuse) 50 - 60 Hz
E	Earth	Green / Yellow	
N	Neutral	Blue	

Cabling	
Type	1 x 3-core mains standard cable Current rating (230 V): 15 A
Termination	IEC 60320 C19
Suggested Type	Suitably rated 3-core mains cable such as Niltox LF-319 (LSHF)

② AUX OUT / NTC PROBE: Auxiliary DC Supply Output and Thermistor Probe

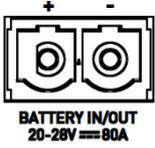


3.81 mm pitch plug
(Phoenix MCD 1,5/2-G1-3,81,
male)

Connector	Signal	Description
AUX OUT	+	+V auxiliary DC output (20 - 29 V) / 2 A internal cut-off
	-	0 V supply
NTC PROBE		For connection of the thermistor lead assembly terminal. The polarity is not relevant when wiring the thermistor lead. A 2-metre thermistor cable assembly (ASL PN A0623910) is supplied with the BDIST-V20000.

AUX OUT Cabling	
Type	1 x 2-core
Termination	3.81 mm pitch plug (Phoenix MC 1,5/2-ST-3,81 - PN 1803578)
Suggested Type	Suitably rated 2-core cable

③ **BATTERY IN/OUT: Battery Supply Input and Charger Output**

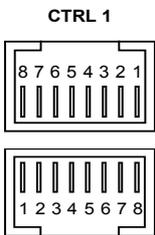


Phoenix PC 16/
2-STF-10.16 (male)

Signal	Description
+	Battery positive input/output (21 - 28 V). External fusing of up to 80 A is required.
-	Battery negative input/output

Cabling	
Type	1 x 1-core red and 1 x 1-core black Current rating: 80 A / Min. size: 16 mm ² / Max. length: 1 m
Termination	Phoenix PC 16/ 2-STF-10,16 female connector (PHOENIX PN 1967456)
Suggested Type	Suitably rated 1-core cable (red and black) such as FS LF-249 (LSHF)

④ **CTRL 1 and CTRL 2: Audio-CAN, Amplifier Control Port and Relay**



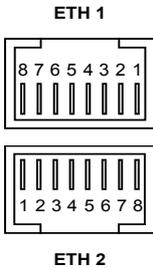
Standard RJ45 jack

CTRL 1			
Pin	CAT5 Cable (EIA 568-B)	Signal	Description
1	white/orange	CAN_H	Controller Area Network (High) (for future use)
2	orange	CAN_L	Same as above, but Low
3	white/green	GND	0 V Reference
4	blue	AUDIO MON+	Audio Monitor Bus (-10 dBu nominal, +ve)
5	white/blue	AUDIO MON-	As above, but -ve
6	green	Relay COM	Relay COM contact (for future use)
7	white/brown	DXP	EIA RS485 38400 baud (Data+)
8	brown	DXN	As above, but Data-

CTRL 2			
Pin	CAT5 Cable (EIA 568-B)	Signal	Description
1	white/orange	CAN_H	Controller Area Network (High) (for future use)
2	orange	CAN_L	Same as above, but Low
3	white/green	GND	0 V Reference
4	blue	AUDIO MON+	Audio Monitor Bus (-10 dBu nominal, +ve)
5	white/blue	AUDIO MON-	As above, but -ve
6	green	Relay NO (*)	Relay NO contact
7	white/brown	DXP	EIA RS485 38400 baud (Data+)
8	brown	DXN	As above, but Data-

Cabling	
Type	Twisted pairs, individually screened
Termination	Screw-in terminals (ASL BOA) or RJ45
Suggested Type	Suitably rated cable with required number of individually screened pairs

⑤ **ETH1 and ETH2: 100BASE-T Ethernet Ports**



Standard RJ45 jack

Pin	CAT5 Cable (EIA 568-B)	Signal	Description
1	white/orange	TRANSMIT+	100BASE-T Ethernet Transmitted Data
2	orange	TRANSMIT-	Same as above
3	white/green	RECEIVE+	100BASE-T Ethernet Received Data
4	blue	–	Not used
5	white/blue	–	Not used
6	green	RECEIVE-	Same as above
7	white/brown	–	Not used
8	brown	–	Not used

Cabling	
Type	Standard LAN cable
Termination	RJ45
Suggested Type	CAT5 E

⑥ **USB Port (for future use)**



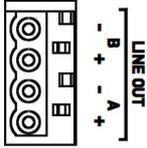
USB Micro-AB socket

Pin	Signal	Description
1	VBUS	+ V Supply (output)
2	D-	Data-
3	D+	Data+
4	ID	Permits distinction of host connection from slave connection: <ul style="list-style-type: none"> • Host: connected to Signal ground • Slave: not connected
5	GND	Signal ground

Cabling	
Type	Micro USB OTG serial data cable
Termination	USB Micro-AB
Suggested Type	As required to connect to the external device being used

6.2 LSZDC Line Surveillance Interface Connectors

⑦ LINE OUT: Audio Output



4-way pluggable Wago cage clamp (female)

Signal	Description	
A	+	100 V line audio output to speaker circuit A (+ve)
	-	As above, but -ve
B	+	100 V line audio output to speaker circuit B (+ve)
	-	As above, but -ve

The audio output is configurable to 100, 70 or 50 V RMS.

Cabling	
Type	1 x 2-core, twisted
Termination	4-way pluggable Wago cage clamp terminal (5.08 mm) (male)
Suggested Type	Suitably rated 2-core cable

⑧ INPUT: Audio Input



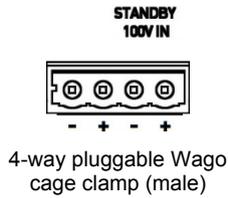
3-way pluggable Wago cage clamp (male)

Signal	Description
Screen	Cable screen
+	Balanced audio input at 0 dBu (+ve)
-	As above, but -ve

Cabling	
Type	1 x 2-core, twisted, screened
Termination	3-way pluggable Wago cage clamp terminal (3.81 mm) (female)
Suggested Type	Suitably rated 2-core cable

6.3 V2000-STBY Standby Interface Card Connectors

9 STANDBY 100V IN: Audio from Standby Amplifier

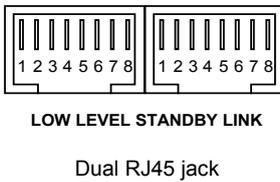


Signal	Description
+	100 V line audio from standby amplifier (+ve)
-	As above, but -ve

Two sets of connections are provided for 'daisy-chain' wiring from amplifier to amplifier.

Cabling	
Type	1 x 2-core, twisted, screened
Termination	4-way pluggable Wago cage clamp terminal (5.08 mm) (female)
Suggested Type	Suitably rated 2-core cable

10 LOW LEVEL STANDBY LINK: Low Level Standby Link



Pin	CAT5 Cable (EIA 568-B)	Signal	Description	
1	orange/white	+	Standby I/P	Balanced audio input to standby amplifier at 0 dBu (+ve)
2	orange	-	Standby I/P	As above, but -ve
3	green/white	-		Not used
4	blue	-		Not used
5	blue/white	-		Not used
6	green	Standby lockout		For future use
7	brown/white	-		Not used
8	brown	-		Not used

Two sets of connections are provided for 'daisy-chain' wiring from mainframe to mainframe.

Cabling	
Type	Overall foil screened
Termination	RJ45
Suggested Type	CAT5 STP or FTP LSZH

7 Technical Specification

7.1 V2000 Amplifier Mainframe

Supply Voltage.....	230 V AC +10% / -15% (T12 H 250 V fuse)
Supply Frequency.....	50 - 60 Hz
Inrush Current (worst case).....	21 A
Maximum AC VA Rating (50% full power sinewave).....	2200 VA
Maximum AC Power Consumption (1 minute max.)	3800 VA (V2000 fully configured and all amplifier modules delivering 100 V 1 kHz sinewave into rated resistive loads)
DC Supply Input/Output Voltage	21 to 28 V (from/to nominal 24 V lead acid battery pack)
Quiescent DC Current (no amplifiers, at 24 V supply)	80 mA
Maximum DC Current Consumption.....	28 A per 1 x D500 Amplifier Module (500 W power configuration) (21 V supply, module delivering 100 V 1 kHz sinewave into rated resistive loads)
Auxiliary DC Supply Output	20 V to 29 V depending on AC or DC supply, and battery conditions / 2 A internal cut-off
Battery Charger	
Rated Continuous Maximum Output Current ($I_{max. a}$).....	2 A
Minimum Loading of the Equipment (I_{min}).....	0 A
Maximum value of internal battery resistance for which rack functionality can be maintained ($R_{i max}$)	60 m Ω
Charging Time	less than 18 hours to charge to 80% capacity less than 36 hours to charge to 100% capacity
Temperature Compensation.....	-36 mV/ $^{\circ}$ C
Audio Input.....	0 dBu sensitivity balanced audio inputs
Audio Outputs	100 / 70 / 50 V RMS outputs
Temperature Range¹	
Operating Temperature Range	-10 $^{\circ}$ C to +55 $^{\circ}$ C
Storage Temperature Range.....	-20 $^{\circ}$ C to +55 $^{\circ}$ C
Humidity Range	0% to 93% non-condensing
Ingress Protection.....	IP20
Dimensions (H x W x D)	86 mm x 436 mm x 425 mm (excluding handles) / 2U height 19-inch rack mounting
Weight.....	7.7 kg (V2000 frame only) / 15 kg (max, frame fitted with 10 x D500/D150 and 10 x LSZDC)
Colour	silver front panel with silver annotation on a black background / black annotation on a silver background

¹ If rack internal ambient temperature can exceed 40 $^{\circ}$ C then additional forced cooling is required. Refer to ASL System Design Guide (ASL T-0667-0185).

7.2 D150 Amplifier Module

Type	transformerless class D amplifiers
Output Power ¹	5 W to 150 W (down to 21 V battery supply)
Output Voltage ² and Input sensitivity	100 / 70 / 50 V RMS into 150 W load for 0 dBu 1 kHz input signal
Regulation.....	no load to full load, <0.5 dB
Efficiency	> 80%
Quiescent Current (at 24 V supply)	16 mA
Full Power Current (worst case 21 V battery supply)	8.3 A
Frequency Response.....	100 Hz to 20 kHz, ±3 dB
THD (at 100 V RMS output, full load).....	<0.5%
Residual Noise.....	better than 80 dB (A-weighted) below full output
Dimensions (H x W x D) / Weight	80 mm x 29 mm x 274 mm / 525 g

7.3 D500 Amplifier Module

Type	transformerless class D amplifiers
Output Power ¹	5 W to 500 W (down to 21 V battery supply)
Output Voltage ² and Input sensitivity.....	100 V RMS into 500 W load 70 V RMS into 350 W load 50 V RMS into 250 W load for 0 dBu 1 kHz input signal
Regulation.....	no load to full load, <0.5 dB
Efficiency	> 80%
Quiescent Current (at 24 V supply)	16 mA
Full Power Current (worst case 21 V battery supply)	28 A
Frequency Response.....	100 Hz to 20 kHz, ±3 dB
THD (at 100 V RMS output, full load).....	<0.5%
Residual Noise.....	better than 80 dB (A-weighted) below full output
Dimensions (H x W x D) / Weight	80 mm x 29 mm x 274 mm / 525 g

¹ Output power: configurable in 5 W steps

² Output voltage: configurable

7.4 LSZDC Line Surveillance Interface Card

Current Consumption (average, without changeover, 24 V supply)	
Normal	7.5 mA
Loop Return Mode	39 mA
Current Consumption (average, with relays operating, 24 V supply)	39 mA with one isolation relay
	39 mA with standby changeover
	63 mA with isolation and standby changeover
Maximum Amplifier Output Power	refer to amplifier specifications
Surveillance Tones	low frequency (20 Hz) / high frequency (20 kHz)
Loudspeaker Line Surveillance	DC line surveillance, loop return or impedance ¹
	single (A) or dual (A&B) speaker circuits
Earth Leakage Current Fault Threshold	2 mA (configurable)
Audio Processing	gain, gate and 10-band parametric equaliser
Dimensions (H x W x D) / Weight	64 mm x 30 mm x 121 mm / 145 g

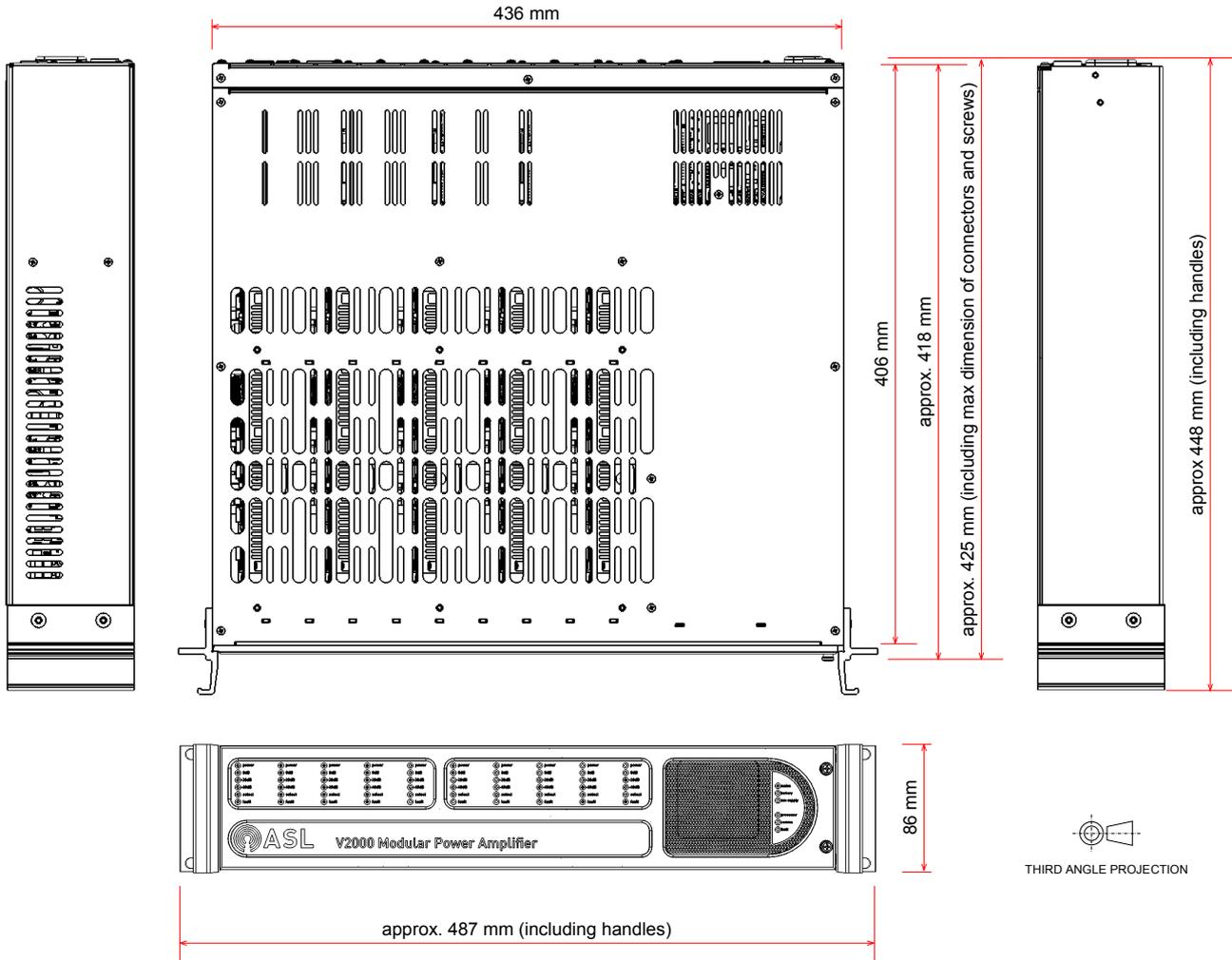
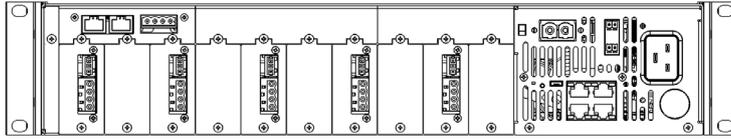
7.5 V2000-STBY Standby Interface Card

Current Consumption	0 mA
Maximum Standby Input	refer to amplifier specifications
Standby Amplifier Interface	standby audio input (up to 100 V RMS) / 0 dBu low level audio
	'daisy-chain' wiring from mainframe to mainframe
Dimensions (H x W x D) / Weight	26 mm x 90 mm x 118 mm / 60 g

¹ Impedance monitoring: refer to ASL for availability.

8 Mechanical Dimensions

(Interface cards shown as example)



9 Storage and Preservation

This product should be packed for storage in the original packing as described in the Section '10 Packing for Return' (page 36) and stored in the following environmental conditions:

- Away from harsh environmental conditions, such as areas that are subject to corrosive atmosphere, excessive moisture or may allow water or other liquids to come into contact with the unit or its external connections.
- In a heated and humidity controlled storage areas where the temperature and humidity are within the equipment specification.

10 Packing for Return



The V2000 mainframe, interface cards and amplifier modules contain static-sensitive devices. Observe ESD precautions when handling the mainframe with the lid removed, the interface cards or amplifier modules.

If a product is being returned for servicing, try to use the containers and materials of the original packaging. Attach a tag indicating the type of service required, return address, equipment type and full serial number.

If the original packing can no longer be used, the following general instructions should be used for repacking with commercially available materials:

- All electronics assemblies must be properly packed in ESD protective packing for transport, to prevent physical and ESD damage.
- The filler material used for packing must be antistatic or static dissipative, as this may come into contact with exposed connectors, wiring, or PCB assemblies. The use of non-conductive filler material may cause damage to the electronic assemblies reducing their operational life, or even destroying them.
- Use a sturdy cardboard box that will support the weight and size of the equipment.
- Attach a tag indicating the type of service required, return address, equipment type and full serial number.
- Completely wrap the equipment in bubble wrap (all sides must be protected) and secure the wrap in place with tape.
- Place the wrapped equipment inside the box surrounded by filler material, ensuring that there is no room for movement.
- Seal the box securely with packing tape.

Service and Warranty

Name and Address of Authorised Distributor:

This product carries a full warranty. For full details of warranty and service agreements, please contact the Authorised Distributor who supplied the product to you.

Exclusions

The warranty does NOT cover:

1. Customer misuse, including incorrect installation.
2. Damage other than manufacturing defects.
3. Transit / Courier damage.
4. Incorrect voltage or power supply used.
5. Incorrect input signal.
6. Abnormal environmental operating conditions.
7. Damage incurred by accident, fire, lightning or other hazard.
8. Modification to the unit or inexpert / attempted repair.
9. No fault found – where no fault can be found after extensive testing, indicating user error or failure in ancillary equipment.
10. Electronic assemblies which are improperly packed when returned for repair or service. All electronics assemblies must be properly packed in ESD protective packing for transport to prevent physical and ESD damage.

Should any of the above apply, Application Solutions (Safety and Security) Limited reserves the right to raise any relevant charges to the customer.

Application Solutions (Safety and Security) Limited shall not be liable for any indirect, special or consequential loss or damage (including without limitation any loss of profits) arising from the use of this product or for any breach of this warranty.

In the interest of continual product development, Application Solutions (Safety and Security) Limited reserves the right to make changes to product specification without notice or liability.

