Univox SLS-1 3 5 Class D Tech Series Healthy Power Art Phased Array Loop Drivers Installation Guide

Contents

Univox SLS-1 3 5 Class D Tech Series Healthy Power Art Phased Array Loop Drivers

Product Information

Specifications

- **Model:** Class D Tech Series
- Phased array loop driver
- External power supply for increased efficiency
- **Three models available:** SLS-1, SLS-3, and SLS-5
- Three inputs, two of which are programmable
- 100V line input with priority option
- Self-test mode
- Loop monitor and monitor speaker power driver
- LED indicators for input and output levels

Description

The Class D Tech Series is a state-of-the-art phased array loop driver with an external power supply for increased efficiency. The product follows the Engineering Simplicity philosophy, offering functionality and usability in each model. The series includes three models: SLS-1, SLS-3, and SLS-5, which have different output power levels. Each model features three inputs, two of which are programmable, including a 100V line input with a priority option. The product also includes a self-test mode, loop monitor, and monitor speaker power driver. LED indicators for input and output levels make it easy to optimize system performance.

Introduction

Univox® SLS-series

The Univox® SLS phased array loop drivers series combine 50 years of experience with the newest electronic design to deliver unrivalled quality in a compact stylish housing.

In addition to the extraordinary sound clarity, power and performance, the outstanding features for these cold amplifiers are low weight, small size and exceptionally high efficiency. The high voltage follows the latest demands and statements in the IEC 60118-4 standard, giving high quality sound for music as well as for speech. The external power supply increases the total efficiency compared to traditional built-in transformers. Our Engineering Simplicity philosophy is shown in the functionality and usability of each model.

The three models SLS-1, SLS-3 and SLS-5 share the same features but with different output power. Each offers 3 inputs – 2 of which are programmable – including a 100V line input with priority option, a self-test mode, loop monitor and monitor speaker power driver. With LED indicators for input and output levels, optimizing the system performance is easy.

SLS systems

SLS systems consist of two different loop systems, together creating a more controlled field strength distribution with less overspill. They cover any size venue and transmit in several directions removing the mute effect, common for standard loop systems, when tilting head. For detailed information about SLS design, please study the Univox Loop Designer (ULD) where several different approaches are visualized in 3-D simulation for a comprehensive understanding.

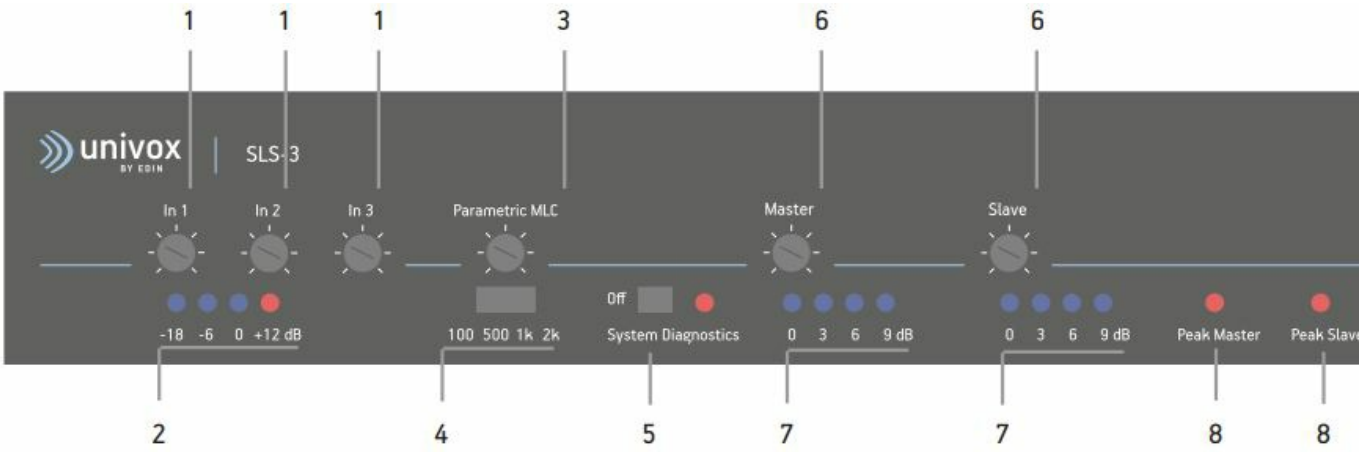
Included in package

- Loop driver

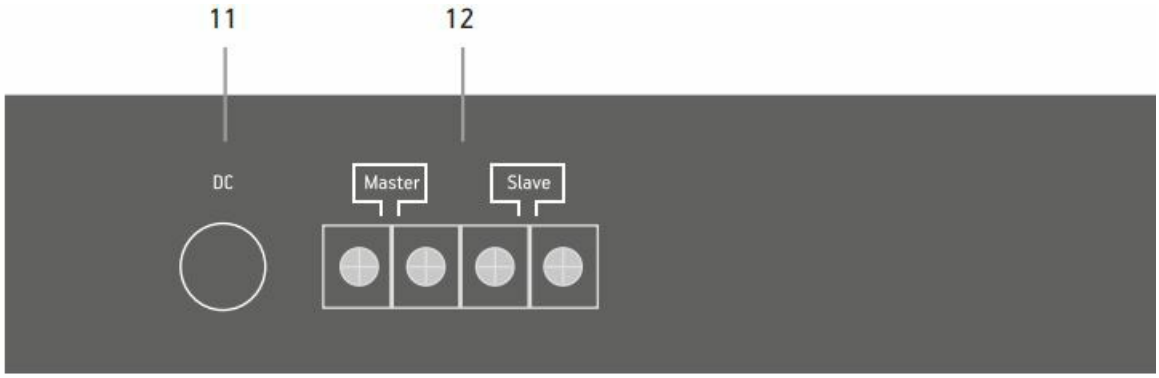
- DC Power Supply
- Power cable
- 3 pcs of phoenix screw terminals
- 4 pcs of rubber feet (preassembled)
- T-Sign according to ETSI-standard
- Rack mounting plate with 8 screws
- DC Power supply mounting plate with 4 screws
- Certificate/Measuring protocol
- Installation guide
- Labels for master-/slave loop

Connections and controls

Overview

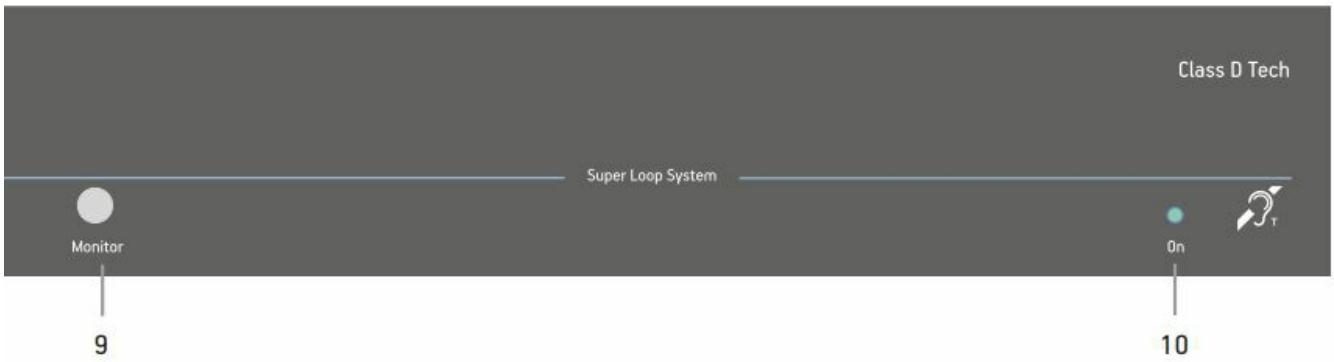


- **1.** Input level potentiometers
- **2.** Input level LED bar graph
- **3.** Parametric MLC control
- **4.** Parametric MLC knee point switch
- **5.** System diagnostics switch and LED

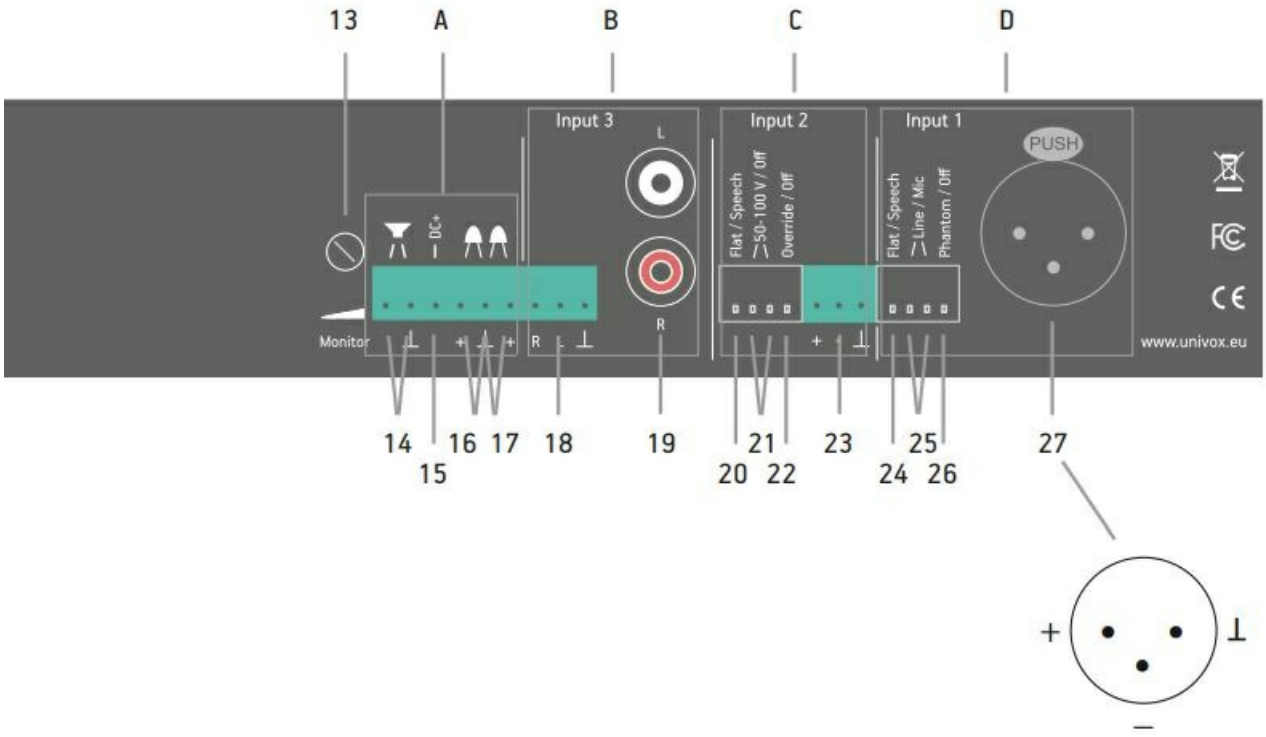


- **11.** DC supply input
- **12.** Master/Slave loop connector
- **13.** Monitor volume control for both headphones and speaker output
- **A.** MISCELLANEOUS OUTPUTS
- **14.** Monitor speaker connector

- **15.** Auxiliary DC power output
- **16.** Remote input monitor connector
- **17.** Remote output monitor connector
- **B.** INPUT 3
- **18.** Phoenix screw terminal (unbalanced)
- **19.** Unbalanced RCA



- **6.** Loop current potentiometers master/slave
- **7.** Loop current LED bar graphs
- **8.** Peak LEDs Master/Slave
- **9.** Loop monitor headphones socket
- **10.** Power LED
- **C.** INPUT 2



- **20.** Speech enhancement switch (Flat/Speech)
- **21.** 50-100 V Line switches On/Off
- **22.** Override switch On/Off
- **23.** Phoenix screw terminal (balanced)
- **D.** INPUT 1
- **24.** Speech enhancement switch (Flat/Speech)
- **25.** Line/Mic sensitivity switches
- **26.** Phantom power voltage switch On/Off

- **27.** Balanced XLR

Description

- **1-2.** Input level should be set to 0 dB. (i.e. the 0 dB LED should be lit most of the time during the audio programme.)
- **3-4.** Parametric MLC control makes it possible to fine tune the frequency response, compensating for the effects of different metal types and configurations.
- There are 4 parametric curves starting from; 2 kHz, 1 kHz, 500 Hz and 100 Hz. These set the frequency at which the metal loss correction control starts to compensate. The function is powerful, however, excessive compensation can lead to signal limiting in the treble range. If signal limiting occurs, the red peak LED illuminates.
- **5.** System Diagnostics verify the integrity and function of the loop driver – inputs, output and the loop condition.
  - **Use:** Set the switch on the front panel to right position. A built-in 1.6kHz signal pulses at 2 seconds intervals at 0 dB, regardless of the adjusted sensitivity.
  - If input and output LEDs flashes in unison, the loop driver functions are verified.
  - If only the input LEDs flashes it indicates that the loop is not connected or the current potentiometer needs to be readjusted..
  - Switch to left position Off, for normal use.
- **6.** Loop current controls set the output current, i.e. the field strength of the loop.
- **7.** Loop current LED bar graph indicates the level of the loop current, not the field strength. The field strength is measured using a Field Strength Meter, like Univox FSM.
- **8.** Peak (clip) LEDs illuminate when there is insufficient voltage to maintain a constant loop current. Momentary short term voltage clipping is unlikely to be audible in hearing aids, but if clipping occurs for any length of time (the Peak LED remains on) the audio quality will suffer. Peak clipping will typically occur when using long thin wires, 2-turn loops and for signals with high frequency spectrum, like modern music. Speech has a small amount of high frequency content. Strong compensation from the parametric MLC control may increase the risk of clipping.
  - **Note:** use ULD for simulation guidance before installation and commissioning. 9,13,14 Loop Monitor, supports headphone (9) and speaker outputs (14) representing the sound quality of the loop. Volume control for both headphones and speakers, is set by the potentionmeter (13).
- **10.** Power LED verifies power supply connection
- **11.** 4 pin DC Supply socket for secure connection of Univox approved power supplies 90-260VAC, 50-60Hz, only. Connect the power to the amplifier before connecting to the network, otherwise there is a risk of sparking.
- **12.** Loop scew terminals for Master and Slave loop connection
  - **A.** MISCELLANEOUS OUTPUTS PHOENIX SCREW TERMINAL (6 connectors/screws)
- **14.** Monitor speaker connector
  - Pin 1+2 (2=GND), speaker output 8-32 Ω
- **15.** Auxiliary DC power output 15V-24V depending on model
  - Pin 3+2 (2=GND), DC 12-18V output, 100mA
- **16.** Remote input monitor connector indicates at -6dB input level
  - Pin 4+5 (5=GND) = LED connection , indication/diagnostic test
- **17.** Remote Output Monitor Connector indicates at 0 dB output level

    - Pin 5+6 (5=GND) = LED connection, indication/diagnostic test
        - **B.** INPUT 3 (PHOENIX SCREW TERMINAL/RCA)
- **18.** Unbalanced Line: -28dBu (30mVrms) to +16.2dBu (5Vrms)
- **19.** Unbalanced RCA left/right
    - **C.** INPUT 2 (PHOENIX SCREW TERMINAL)
        - Switchable between line and 50-100V speaker line input
        - **Note:** The speaker line MUST be balanced at the Phoenix connector (connect (+) and (–) terminal)
        - Use earth ONLY for free-floating screen or leave unconnected
- **20.** Speech filter: Low cut filter 130-170Hz On/Off
    - Speech Enhancement (Flat/Speech) attenuates low frequencies (<150Hz) increasing speech intelligibility for microphone use
    - **Note:** When commissioning field strength level and frequency response this feature must be switched to Flat postition
- **21.** Speaker 50-100V balanced Line, sensitivity On/Off
    - **Caution:** 50-100 V/Line must be set prior to any further settings
- **22.** Override/Priority function on In 2 mutes the signals connected to In 1 and/or In 3, is typically used when connecting evacuation alarm signal to In 2.
- **23.** Balanced Line: -23dBu (50mVrms) to +20.6dBu (8.3Vrms)
    - **D.** INPUT 1 (BALANCED XLR)
        - Balanced XLR. Switchable between Line and Mic sensitivity and with or without Phantom voltage
        - **Note:** With unbalanced connection (not recommended) the pin not used should be grounded.
- **24.** Speech filter: Low cut filter 130-170Hz, On/Off
    - Speech Enhancement (Flat/Speech) attenuates low frequencies (<150Hz) increasing speech intelligibility for microphone use
    - **Note:** When commissioning field strength level and frequency response this feature must be switched to Flat position
- **25.** Line/Mic sensitivity switches: -55dBu (1.5 mVrms) to +10dBu (2.6Vrms)
- **26.** Phantom voltage, On/Off
- **27.** Balanced XLR

Installation

Planning

Calculations for coverage area, metal loss, signal sources, power outlets, dissipating heat and ventilation for loop driver placement and other practical installation issues, must be done prior to the on-site installation. Please refer to **www.univox.eu/planning** Use Univox Loop Designer (ULD), a free, web-based project planning and design tool that quickly and accurately assists in the design of loop systems. **www.univoxloopdesign.org**

Tools required

- Copper tape tools, e.g. crimping tool, double-sided adhesive tape, printed warning tape
- General audio installation tools, e.g. Ohmmeter
- Field strength meter, e.g. Univox FSM
- Listening device, e.g. Univox Listener

Loop cable

Always install a twin core loop cable to secure necessary connection options, especially vital in environments with uneven metal loss. Univox twin core copper tape gives top efficiency with low induction loss. Use a junction box to alternate between single, double and twin turn loop connections. Use a feed cable (twisted or twin wire) between the junction box and the loop driver, as well as between the loop figuration and the junction box or loop driver. Use the included labels to mark the loop cable or copper foil for ease of installation.

Placement of the driver

The Univox SLS-1, SLS-3 and SLS-5 loop drivers will not generate any excessive heat and can be mounted in 19″ racks on top of or below other rack components (check that these don't generate excessive heat), on a wall or another flat surface. In a rack system it is often practical to attach the external power supply on the supporting metallic construction using straps. For mounting of the wall, you need to open the chassi to get access to the holes.

Note: Although there are several built-in protection schemes for temperature, current and power etc. we recommend to plan for worst case scenario.

Use general basic audio practice while installing and mounting units and wiring, including loop cable. Avoid feedback interference between analog signal source cables and loop cable. The loop cable mustn't be placed closer than 30cm (12in) to a parallel microphone or mixer cable. Crossing is ok.

Placement of the microphones

- Microphone placement and proximity between microphone and mouth is crucial for improved speech intelligibility.
- Use shortest distance possible between microphone and mouth/sound source.

Commissioning and certification

It's important to check the system when the installation is completed. To ensure that the loop installation meets the requirements for field strength, consistency and frequency response, it must comply with the international standard IEC 60118-4. A guide how to commission a loop system to the IEC performance standard, can be found in the user guide for the Univox FSM field strength meter and in the Univox® Certificate of Conformity. These documents are also available on **www.univox.eu/certify**.

Maximum recommended segment size (to comply with IEC 60118-4)

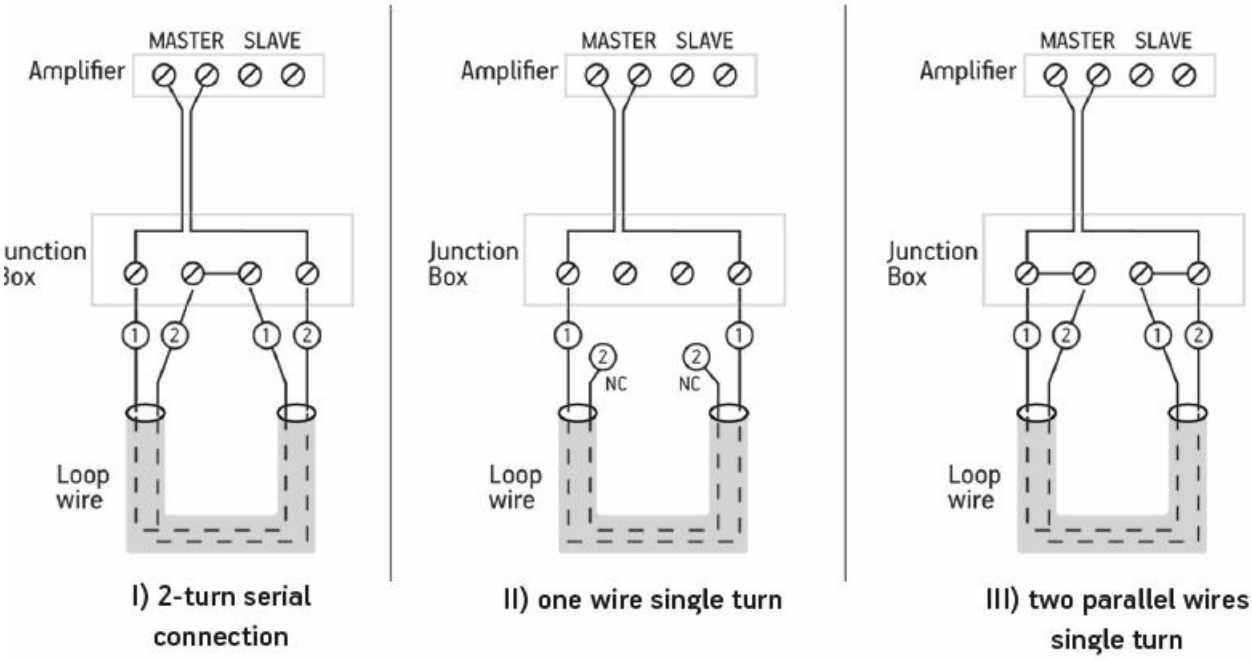
Metallic environment	Basic level (1000Hz)	IEC level (1600Hz)	Field Strength Attenuation	Important notes/requirements
No metal	22m/70ft	22m/70ft	0	
Standard reinforced concrete	7m/23ft	5m/16ft	3.5-6dB	Increased current, voltage and power
Heavily reinforced concrete	5m/16ft	4m/13ft	3.5-6dB	Increased current, voltage and power
Suspended ceiling	4.8m/16ft	3,6m/12ft	4-10 dB	Conductor must be centered in the suspended ceiling framework (longest distance to metal) Increased current
Steel deck/ Metal system floor	4m/13ft	3m/10ft	6-10dB	Increased current
Iron bar construction	3m/10ft	2m/6.5ft	4-12dB	Medium/strong damping, depending on placement of wire (avoid placement along metal bars)

System setup

Start-up procedure

1. Disconnect all input and output connections.
2. Each loop must be securely isolated (particularly to safety-ground and other loop connections). Verify the resistance of each loop (approximately 1-3 Ohm).
3. Set all level controls to minimum setting:
    - System Diagnostics (5) = Off (switch to left position)
    - Parametric MLC (4) = 2kHz (switch to right position)
4. Connect the Power supply (11) and verify Power LED indication (10)
5. Activate System Diagnostics by sliding the switch to the right. Input level bar graph peaks (2) to 0dB . Output bar graph (7) does not indicate.
6. Connect Master loop (12) and adjust the output level, making sure input and output bar graphs indicate in unison. Note: a 2-turn loop is often more efficient. See next page.
7. Check field strength for all loop segments using a field strength meter, e.g FSM. Verify low field strength directly above wires and high in between segments (peaks to approximately -2dB). If not, there might be a local short circuit between wires.
8. Disconnect Master loop and connect Slave loop (12). Repeat the procedure for Slave loop.
9. Basic function of the loop system is now verified. Turn System Diagnostics off, by sliding the switch to the left.
10. Reconnect Master slave.
    - **Input connection and adjustments**
11. Set all level controls to minimum setting:
    - System Diagnostic (5) = Off (switch to left position)
    - Parametric MLC (4) = 2kHz (switch to right position)

12. Connect the main audio source to the amplifiers input (B, C or D)
13. Adjust input level (1) to 0dB at input bar graph (2). If using a 1kHz pulsed sine wave signal, simply set to 0dB.
    - **Output connection and adjustments**
14. Field strength setting: Start with the highest efficiency connection, I) 2-turn serial connection, in junction box.
15. Set field strength (6) to -3dB to 0dB at the peaks. If Peak (8) LED flickers only momentarily the connection is acceptable. If Peak LED indicates continuously, try rewiring the connections in the junction box in subsequent order: II) one wire single turn and then III) two parallel wires single turn. With this procedure the unit will operate with the highest output possible without generating any heat.



    - **Note:** To quickly set up the field strength for a real program source, a PPM instrument is helpful. The Univox Listener has a calibrated level indicator that quickly finds the highest peak.
    - **Note:** When adjusting the field strength peaks, -2dB field strength works best, due to different dynamic headrooms in hearing aids.
16. Check basic frequency response according to IEC 60118-4, using a field strength meter, e.g FSM. If necessary, follow Frequency adjustment procedure.
17. Check the sound quality by using an external listening device (Univox Listener or FSM), Monitor speaker connector (14) or Monitor (9) for headphone (volume control on rear panel Monitor (13)). When operating at maximum output on low impedance, i.e single turn loops, the automatic limit protection circuit may cut programme peaks. This can be avoided by changing to a 2-turn loop or reduce the output current setting.
18. Start the Commissioning process to certify the installation.

Metal Loss Correction frequency setting

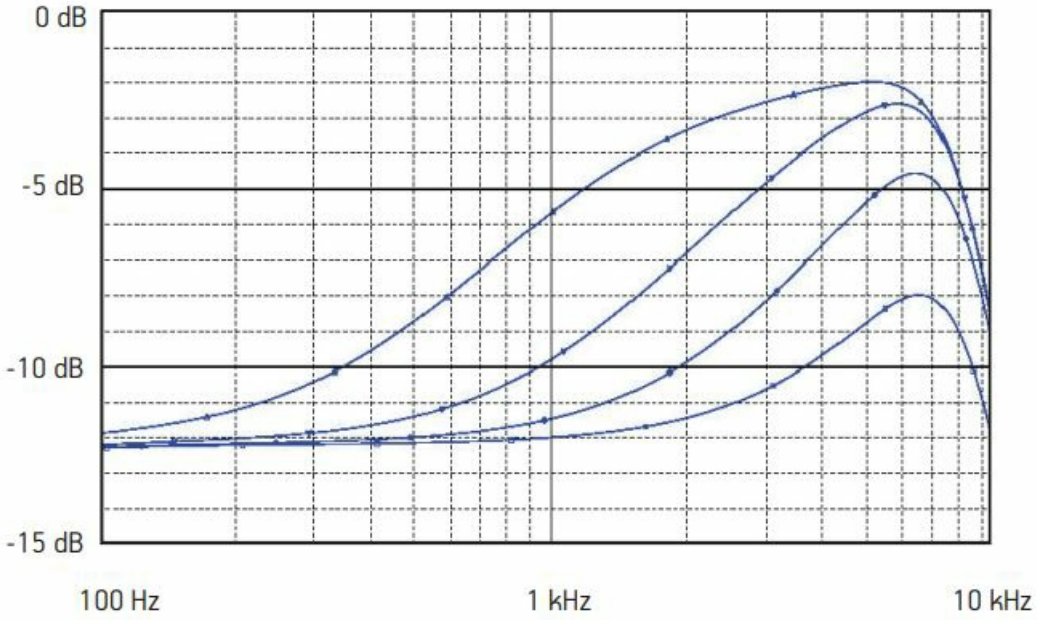
The degree of compensation for metal loss is adjusted with the MLC potentiometer (3).
The start/break frequency is set with the Parametric MLC knee point switch (4) marked: 100Hz, 500Hz, 1kHz, 2kHz.

1. Start with the break frequency set to 2kHz.
2. Adjust the level to -12dB. If this is not sufficient, move to the next lower frequency and repeat as required.
3. Verify that the loop driver’s voltage doesn’t saturate, i.e. that the peak indicator (8) only flickers temporarily.

Troubleshooting

Symptom	Possible cause	Solution
General malfunction	–	Check the system with the start-up procedure.
Power LED is off	Power supply not connected Power supply faulty	Connect power supply correctly Replace power supply
Input and output LEDs flash on and off	System Diagnostics turned on	Turn System Diagnostics off
Output current LEDs are off, input LEDs are on	Loop current turned down	Adjust Loop current
Output and input LEDs are off, power LED is on	No input signal Input signal set too low	Check if input signal is present Adjust level of input signal
Audio quality is poor, peak LED indicates	Malfunction loop cable Loop impedance is too high Loop current set too high Parametric MLC set too high	Rerun start-up procedure. Change the loop: use twin cores in parallel or use a cable with higher cross-section Turn loop current down Turn down Parametric MLC
Audio quality is poor, peak LED is off, sound quality using headphone monitor is also poor	Input signal set too high Audio source is of poor quality	Reduce input signal level and check Line/Mic level setting Change/adjust audio source

MLC function in maximum position



Symptom	Possible cause	Solution
Intelligibility of sound from microphone is poor	Low frequency masking Poor microphone user techniques	Turn speech enhancement filter on Instruct u ser/reduce speaking distance
Microphone connected, in put LEDs are off	Phantom power not turned on Input level too low Microphone needs higher phantom voltage Microphone/lead/connectors faulty	Turn phantom power on Increase input level/reduce speaking distanc e Use valid microphone or connect a microphо ne mixer (amplifier) Exchange faulty part
Alarm/priority signal is not clear	Override DIL switch not set to allow this function	Set DIL switch to correct position
Cannot achieve required f requency response at 10 0 Hz	Speech enhancement filter turned o n	Turn speech enhancement filter off
Cannot achieve required f requency response at 5 k Hz	Parametric MLC not set correctly Frequency dependent losses too hi gh for parametric compensation	Set Parametric MLC to correct level Use smaller/multiple loops

Safety

- The equipment should be installed by an audio visual technician observing ‘good electrical and audio practice’ at all times and following all the instructions within this document.
- Only use the power adapter supplied with the unit. If the power adapter or cable is damaged, replace with a genuine Univox part.
- Power adapter must be connected to a mains outlet close to the amplifier and easily accessible. Connect the

power to the amplifier before connecting to the network, otherwise there is a risk of sparking.

- The installer is responsible for installing the product in a way that may not cause risk of fire, electrical malfunctions or danger for the user. Do not cover the power adapter or loop driver. Only operate the unit in a well ventilated, dry environment.

WARNING: Do not remove any covers as there is a risk of electric shock. There are no user serviceable parts inside. Refer servicing to qualified personnel. Please observe that the product warranty does not include faults caused by tampering with the product, carelessness, incorrect connection/mounting or maintenance.

Bo Edin AB shall not be held responsible or liable for interference to radio or TV equipment, and/or to any direct, incidental or consequential damages or losses to any person or entity, if the equipment has been installed by unqualified personnel and/or if installation instructions stated in the product Installation Guide have not been strictly followed.

Warranty And Maintenance

Warranty

This loop driver is supplied with a 5 year (return to base) warranty.
Misuse of the product in any way including but not limited to:

- Incorrect installation
- Connection to non-approved power adapter
- Self oscillation resulting from feedback
- Force majeure e.g. lightning strike
- Ingress of liquid
- Mechanical impact

will invalidate the warranty.

Maintenance and care

- Under normal circumstances the product does not need any special maintenance.
- Should the unit become dirty, wipe it with a clean damp cloth. Do not use any solvents or detergents.

Service

Should the system not work as expected, please follow Check list for installation found on **www.univox.eu/support** or contact the local distributor for further instructions. Before returning a product to us for service you will need a Service Number from your distributor. They will also send you a Service Report Form which must be completed and returned with the product.

Technical data

- For additional information, please refer to product data sheet and CE certificate which can be downloaded from **www.univox.eu/products**.
- If required, other technical documents can be ordered from **support@edin.se**.

Environment

- To prevent possible harm to the environment and human health, please dispose of the product responsibly by following statutory disposal regulations.

Measuring devices

Univox® FSM Basic, Field Strength Meter

- Professional instrument for measurement and certification of loop systems in accordance with IEC 60118-4.

Univox® Listener, testing device

- Loop receiver for fast and simple check of the sound quality and basic level control of the loop.

Technical data

Technical data SLS 1/3/5

Univox SLS-1 / Univox SLS-3 / Univox SLS-5

Induction Loop Output RMS 125ms

- **Max Drive Voltage:** 27Vpp/9.6Vrms 38Vpp/13.5Vrms 50Vpp /17.7Vrms
- **Max Drive Current, each channel:** 2 x 4,5Arms 2 x 6Arms 2 x 7.5Arms
- **Peak current using (EHIMA) speech:** 2 x 10.6App 2 x 15App 2 x 18App
- **Phantom power:** +18VDC +18VDC +24VDC
- **Power supply:** 110-240VAC primary switched class VI electronic power supply;
    - Enhanced power connection with 4-pin DIN power connector
- **Frequency response:** 75-6800Hz
- **Distortion, Power Loop Driver:** < 0.05%
- **Distortion, system:** < 0.15%
- **Dual Action AGC:** Dynamic Range: > 50-70dB (+1.5dB)
    - **Attack time:** 2-500ms, Release time: 0.5-20dB/s
- **Cooling:** Fan free convection cooling (chassis cooling)
- **IP class:** IP20
- **Physical**
    - **Size:** 1U/19” rack mount
    - Width 430mm, Depth 150mm, Height 44mm (incl. rubber feet)
- **Weight (net/gross):** 1.9/2.65kg
    - 1.9/3.55kg
- **Mounting options:** Rack mount (brackets included), wall mount or freestanding (rubber feet pre-mounted)
- **Part No:** 221000
    - 223000
    - 225000

Product is designed to meet the system requirements of IEC60118-4, when correctly designed, installed, commissioned and maintained. Specification data complied according to IEC62489-1.

Contact

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Documents / Resources

	Univox SLS-1 3 5 Class D Tech Series Healthy Power Art Phased Array Loop Drivers [pdf] Installation Guide SLS-1 3 5 Class D Tech Series Healthy Power Art Phased Array Loop Drivers, SLS-1 3 5 Class D Tech Series, Healthy Power Art Phased Array Loop Drivers, Phased Array Loop Drivers, Array Loop Drivers, Loop Drivers

References

- Planning | Bo Edin AB
- Univox Loop Designer
- User Manual