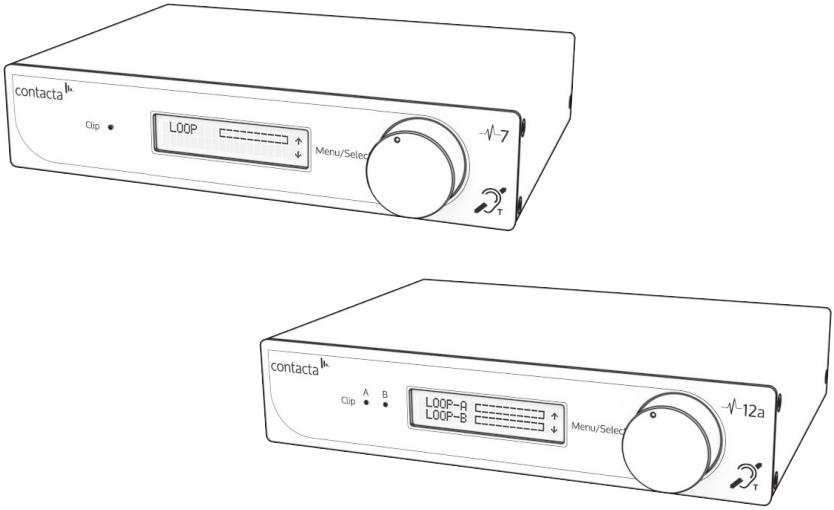
contacta

series

V7 / V12a

Hearing Loop Drivers



Installation & User Guide

October 2017

Contents

Product Overview

Our highly efficient and compact V7 and V12a hearing loop drivers are suitable for smaller facilities and venues.

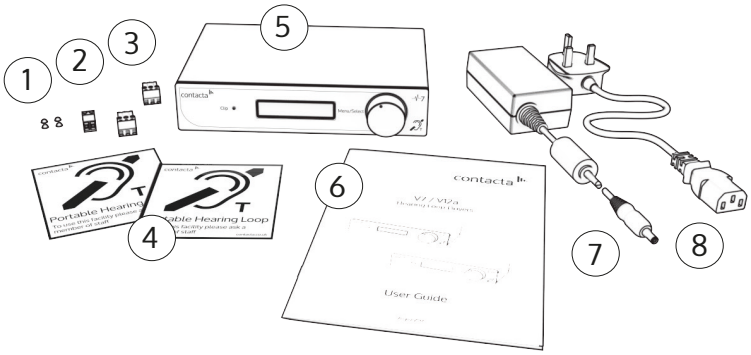
The V7 is a constant current hearing loop driver which powers perimeter hearing loops. The V12a is a constant current dual output hearing loop driver with integral phase shifter for phased array configuration.

Both hearing loop drivers have Class-D amplifier output stages and an audio subsystem built around an advanced DSP core. Combined with a powerful CPU that ensures peak performance, they use cutting edge technology proven in the pro audio world to achieve life-like speech and first-class music reproduction.

Note: For large area hearing loop installation instructions, consult the Large Area Hearing Loop Installation Guide.

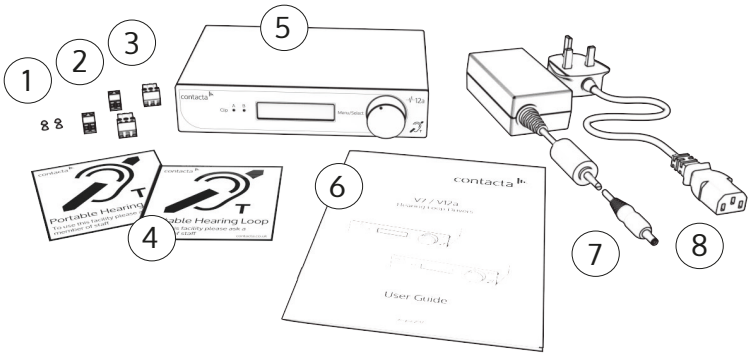
Components

V7



1. Rubber Feet x4
2. 5.08mm Euro-Block Connector
3. 3.81mm Euro-Block Connector x2
4. Signage
5. V7 Hearing Loop Driver
6. Installation & User Guide
7. Power Supply [PS-55]
8. IEC Power Lead

V12a

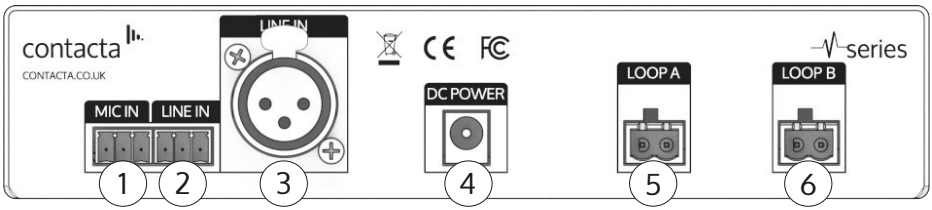


1. Rubber Feet x4
2. 5.08mm Euro-Block Connector x2
3. 3.81mm Euro-Block Connector x2
4. Signage
5. V12a Hearing Loop Driver
6. Installation & User Guide
7. Power Supply [PS-60]
8. IEC Power Lead

Cable & Equipment: A length of loop cable determined by the loop design is also required. Hearing loop drivers also require ancillary equipment for audio feeds, such as a microphone or sound system.

Connections

Rear Panel Connections



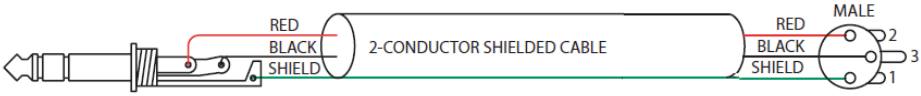
1. **Microphone Input** - 3.81mm Euro-block balanced microphone input (12V phantom power via 680Ω).
2. **Line Input 1** - 3.81mm Euro-block balanced line input/feedthrough.
3. **Line Input 2** - XLR balanced line input/feedthrough.
4. **Power Supply Input** - ***V7** DC Power Input, 2.1mm 14Vdc 2.14A
   ****V12a** DC Power Input, 2.1mm 24Vdc 4.17A.
   ⚠ **Caution:** Use only the provided Power Supply.
5. **Loop A Output** - 5.08mm Euro-block.
6. **Loop B Output** - 5.08mm Euro-block [V12a only].

Note: Only connect to one Line Input at a time.

Connection Examples

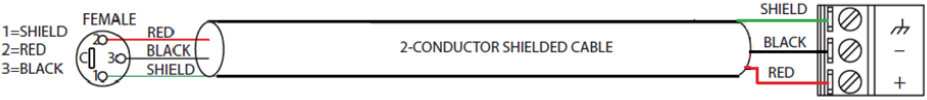
XLR to XLR (line)

TRS to XLR (line)

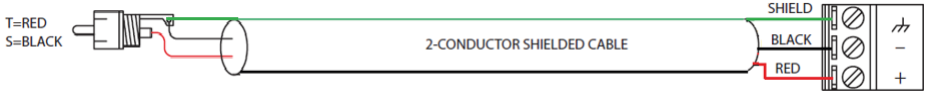


Unbalanced to XLR

XLR to Euroblock (balanced)



Unbalanced to Euroblock



Start-Up Tests

V Series drivers perform a series of tests when powered on, causing a number of indications to appear on the display screen during start-up.

The meanings of these indications are as follows:

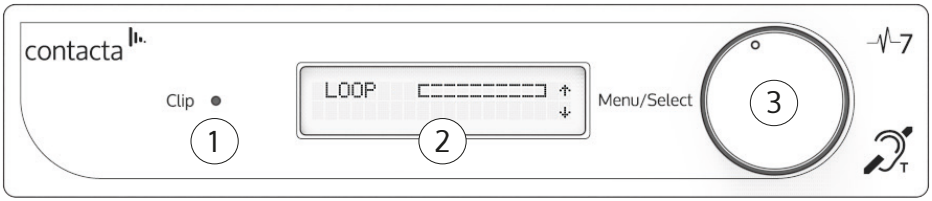
Indicator	Meaning	Remedy
V7: **Loop Good** **V12a:** **Loop A Good** **Loop B Good**	Hearing loop(s) is/are correctly connected to the driver.	None required.
V7: **Loop Open Fault** **V12a:** **Loop A Open Fault** **Loop B Open Fault**	Hearing loop(s) is/are improperly connected to the driver. An open-circuit loop will not damage the driver, and start-up will continue to the main menu.	Ensure that the loop(s) is properly connected to the driver. The loop current indication in normal operation may be used to confirm the connections.
V7: **Loop Ground Fault** **V12a:** **Loop A Ground Fault** **Loop B Ground Fault**	A ground fault with the hearing loop(s) has been found. The driver will halt operation with this message displayed on screen, as such a fault would cause stress to the driver were normal operation to continue.	Switch off the driver and carefully check the loop(s) for shorts to ground. Rectify the faults and re-apply power to the driver.
Incorrect Power	The power input supply voltage from the mains power supply is incorrect. The driver will halt operation with this message displayed on screen, as such a fault would cause stress to the driver were it to continue to normal operation.	Switch off the driver and connect the power supply which was provided with the driver. If this is not available, contact your distributor to order a new power supply.

Please note if using V12a: If connecting only one loop to a V12a, whichever loop connection has not been used (either Loop A or Loop B) will show as an "Open Fault" as default. This is the correct display for operation with only one loop; continue as normal.

Controls Overview

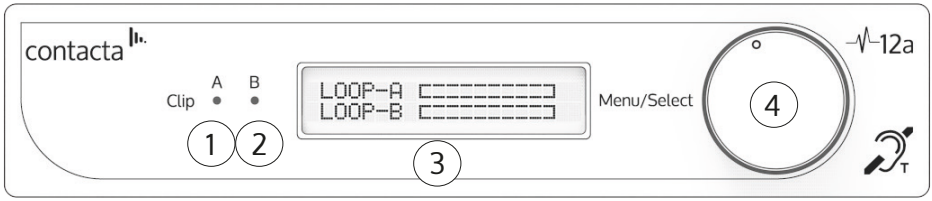
Front Panel Overview

V7



1. **Clip Status Light** - When lit, this status LED indicates the signal on the hearing loop output is clipping (see Troubleshooting on page 23 for appropriate solutions).
2. **Display Screen** - Indicates the status of the Loop Output, displays menu and adjustment options.
3. **Control Dial** - Used for unlocking and making adjustments to the V7.

V12a



1. **Clip Status Light** - When lit, this status LED indicates the signal on Hearing Loop A is clipping (see Troubleshooting on page 23 for appropriate solutions).
2. **Clip Status Light** - When lit, this status LED indicates the signal on Hearing Loop B is clipping (see Troubleshooting on page 23 for appropriate solutions).
3. **Display Screen** - Indicates the status of the Loop Output, displays menu and adjustment options.
4. **Control Dial** - Used for unlocking and making adjustments the V12a.

Unlocking the Hearing Loop Driver

The hearing loop driver will power up in Output Current Display Mode and will be locked from entering Adjustment Mode.

1. To unlock the hearing loop driver, press the control dial and when prompted "Unlock driver?" click "Yes."
2. Enter the passcode 2239:
   a. Rotate the control clockwise to select the first required digit.
   b. Press the control dial in to select the digit.
   c. Repeat steps (a) and (b) until all the digits have been selected.

Note: Entering the wrong code returns the hearing loop driver to the lock screen.

Modes

Main Menu

After being unlocked, the hearing loop driver will display the main menu. This is indicated by up and down arrows on the display screen.

When in this mode, rotating the hearing loop driver's control dial clockwise will move the screen to the next menu item and rotating the dial anti-clockwise will move it to the previous menu item.

The menu options are as follows:

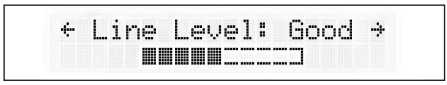
V7
1. Loop Output
2. Line Input
3. Phantom Power
4. Microphone Input
5. Current Output
6. High-Frequency Compensation

V12a
1. Loop Output
2. Line Input
3. Phantom Power
4. Microphone Input
5. Loop B Trim Adjustment
6. High-Frequency Compensation

Adjustment Mode

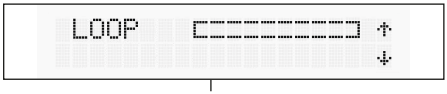
Press the control dial in to enter Adjustment Mode; the arrows on the display screen will move to a left and right position.

Rotate the dial clockwise or anti-clockwise to make the adjustment. Press the control dial in to confirm the selection and return to the main menu.

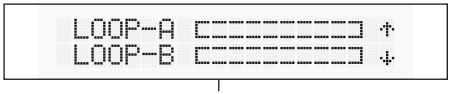


If the control dial is not used for 120 seconds when in Adjustment Mode the hearing loop driver will revert to the main menu, with Loop Output as the default screen.

Loop Output



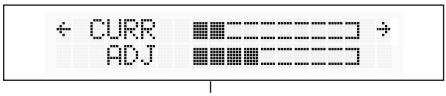
V7 Loop Output



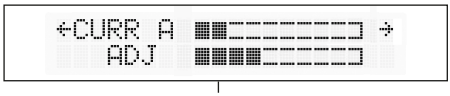
V12a Loop Output

The hearing loop driver's Loop Output section displays the real-time output current in 0.5A steps.

Adjustments



V7 Loop Output: Adjustment Mode



V12a Loop Output: Adjustment Mode

In Adjustment Mode, the real-time output current is displayed on the top line in 0.5A steps. The bottom line indicates the strength of the loop output level adjustment.

To alter the loop output level, enter Adjustment Mode:

- To increase the loop output level, rotate the control dial clockwise.
- To decrease the loop output level, rotate the control dial anti-clockwise.
- Press the control dial once to confirm the selection and return to the main menu.

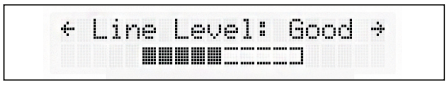
Line Input

The hearing loop driver's Line Input section displays the line input level within a range of 47dB.

The text on the display indicates if the correct line level has been achieved:

- "Low" indicates the line level is too low for the automatic gain control to operate.
- "Good" indicates the line level is at an optimum level for the automatic gain control to operate.
- "High" indicates the line level is too high and signal clipping may occur. Signal clipping will also be shown by the LED.

Adjustments

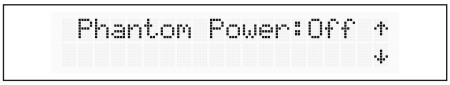


It is recommended that at least 5 blocks in the adjustment block are filled (see the above image for an example).

Enter Adjustment Mode, and alter the line input level displayed on the bar until the text displays 'Good':

- To increase the line input level, rotate the control dial clockwise.
- To decrease the line input level, rotate the control dial anti-clockwise.
- Press the control dial once to confirm the selection and return to the main menu.

Phantom Power



Phantom power for a connected microphone is set off as the default setting.

Adjustments

Rotating the control dial clockwise or anti-clockwise in Adjustment Mode will toggle the phantom power on or off. Press the control dial once to confirm the selection and return to the main menu.

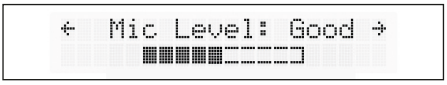
Microphone Input

The hearing loop driver's Microphone Input section displays the microphone input level within a range of 47dB.

The top line of the display indicates if the correct microphone input level has been achieved:

- "Low" indicates the microphone level is too low for the automatic gain control to operate.
- "Good" indicates the microphone level is at an optimum level for the automatic gain control to operate.
- "High" indicates the microphone level is too high and signal clipping may occur. Signal clipping will also be shown by the LED.

Adjustments



It is recommended that at least 5 blocks in the adjustment block are filled (see the above image for an example).

Enter Adjustment Mode and alter the microphone input level displayed on the bar until the text displays 'Good':

- To increase the microphone input level, rotate the control dial clockwise.
- To decrease the microphone input level, rotate the control dial anti-clockwise.
- Press the control dial once to confirm the selection and return to the main menu.

V12a Only: Loop Trim

When using a V12a, the hearing loop driver's Loop Trim function allows Loop B's output to be adjusted relative to Loop A's output.

Please note: This section is only available on the **V12a**. The equivalent V7 menu displays Current Output, to which adjustments can be made using the Loop Output section (see page 11).

-

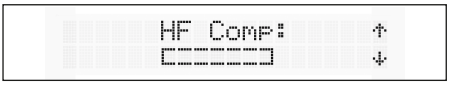
When in the Loop Trim section, adjustments are made in 1dB steps. The measured loop output current is displayed in amps RMS (accurate for sine signals).

Adjustments

Enter Adjustment Mode to alter "Loop B Trim" relative to "Loop A".

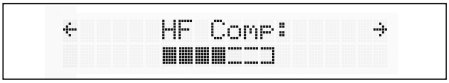
- To increase the Loop B Trim level, rotate the control dial clockwise.
- To decrease the Loop B Trim level, rotate the control dial anti-clockwise.
- Press the control dial once to confirm the selection and return to the main menu.

High-Frequency Compensation



There are 7 levels of high-frequency compensation available to adjust for metal loss. Your hearing loop driver will have high-frequency compensation turned to the lowest setting as its default.

Adjustments



To alter the high frequency compensation level, enter Adjustment Mode:

- To increase the high-frequency compensation level, rotate the control dial clockwise.
- To decrease the high-frequency compensation level, rotate the control dial anti-clockwise.
- Press the control dial once to confirm the selection and return to the main menu.

To calculate the correct high-frequency compensation level, refer to page Hearing Loop Setup (Step 1: Metal Loss) on page 17.

Hearing Loop Setup

Consult the Connections section on page 5 and the Controls Overview section on page 8 before proceeding with setup, which should be performed in following order:

Step 1: Metal Loss (see below)
Step 2: Output Level and Clipping (see page 19)
Step 3: Field Uniformity (see page 20)
Step 4: Final Output Level Adjustment (see page 20)

Required Equipment

- Contacta Test Signal Generator (TSG)
- Contacta Field Strength Meter (FSM) + Tripod

Step 1: Metal Loss

1. Connect hearing loop cables to the Loop Output connection(s) on the rear of the driver.

2. Set up the FSM on a tripod to the following height inside the hearing loop, dependent on the position of end users:

    - 1.2 metres (3.9 feet) for seated user.
    - 1.7 metres (5.6 feet) for standing users.

3. Connect the TSG to the Line Input of the hearing loop driver.

4. Set the TSG to the 1kHz setting.

5. Set the FSM to the Third Octave F= 1000Hz setting.

6. Power on the hearing loop driver.

7. Scroll to the Line Input section of the hearing loop driver display.

8. If the top bar of the Line Input section does not display 'Good', enter Adjustment Mode and raise the Line Input level until 'Good' appears.

9. Scroll to the Loop Output section of the hearing loop driver display, enter Adjustment Mode and change the loop output current to 2ARMS (4 bars on the display screen = Just ON).

11. If using a V12a:

    a. Place the tripod in the centre of a segment of the hearing loop which is connected to the hearing loop driver's Loop A output port. Take a note of the value measured by the FSM.
    b. Place the tripod in the centre of a segment of the hearing loop which is connected to the hearing loop driver's Loop B output port. Take a note of the value measured by the FSM.
    c. Confirm the recorded values are within 3dB of each other.
    d. If the recorded values are not within 3dB of each other, scroll to the Loop Trim B section of the hearing loop driver, enter Adjustment Mode and adjust the loop output currents to 2ARMS.
    e. Confirm the FSM readings are now within 3dB of each other and note their values.

12. Set the TSG to the 5kHz setting.

13. Set the FSM to the Third Octave F= 5000Hz setting.

14. Take note of the value measured by the FSM in the previously measured positions:

    a. If the difference is less than 3dB, proceed to Step 2: Output Level and Clipping.
    b. If the difference between the values measured at 1kHz and 5kHz is greater than 3dB, adjust the High-Frequency compensation:

        i. Scroll to the High-Frequency Compensation section of the hearing loop driver display and enter Adjustment Mode.
        ii. Increase the High-Frequency Compensation.
        iii. Set the TSG to 1kHz and FSM to Third Octave F= 1000Hz setting.
        iv. Repeat steps 12 to 14.

Step 2: Output Level and Clipping

1. Set the TSG to the 1kHz setting.

2. Set the FSM to the RMS/Peak A-Weighted Mode and place it on a tripod to the following height inside the hearing loop, dependant on the position of end users:

   - 1.2 metres (3.9 feet) for seated user.
   - 1.7 metres (5.6 feet) for standing users.

   Note the FSM's position when on the tripod, as this will be used again in Step 4: Final Output Level Adjustment.

3. In the Loop Output section of the hearing loop driver, enter Adjustment Mode and increase the drive level until the FSM measures 0dB +/- 0.5dB as follows:

   A-RMS: +0.0dB
   Peak: +3dB
   Note: there is no need to go higher than +0dB A-RMS.

4. Make a note of the current required to achieve the required field strength.

5. Set the TSG to 1.6kHz.

6. Confirm that the Clipping Status Light(s) remains unlit. If so, proceed to Step 3: Field Uniformity.

7. If the Clipping Status Light(s) remains lit, the hearing loop driver is clipping and the connected hearing loop is too long and the system will not meet requirements of IEC 60118-4.

   Perform the following solutions until the Clipping Status Light has turned off:

   - Reduce the length of the loop.
   - Use a larger diameter cable.
   - Create a two-turn loop.
   - Use a higher voltage hearing loop driver.

8. Once the Clipping Status Light has turned off, proceed to Step 3: Field Uniformity.

Step 3: Field Uniformity

1. Set up the FSM on a tripod to the following height inside the hearing loop, dependant on the position of end users:

    - 1.2 metres (3.9 feet) for seated user.
    - 1.7 metres (5.6 feet) for standing users.

2. In the Loop Output section of the hearing loop driver, enter Adjustment Mode and reduce the loop output current to 2 amps.

3. Set the FSM to the RMS/Peak A-Weighted Mode and note the measured value.

4. Move the FSM to another position within the looped area and note the measured value.

5. The difference measured in the second position should not be greater than +/- 3dB of that measured in the first position. Repeat steps 3 and 4 to create a suitable map of the looped area.

6. Proceed to Step 4: Final Output Level Adjustment.

Step 4: Final Output Level Adjustment

1. Set up the FSM in the same position noted in Step 2: Output Level and Clipping.

2. Set the TSG to 1kHz.

3. Adjust the output current to the level recorded in Step 2 (4).

4. Note the value recorded on the FSM – if the setup has been performed correctly, this will be 0dB +/- 0.5dB.

5. Hearing loop setup is complete.

Suitable Cable Lengths

The tables in this section show the approximate maximum cable lengths for differing maximum required currents.

Loop impedance (at 1.6kHz) should be less than:
Voltage capability of the driver (**V7**: 7.5, **V12a**: 12) divided by the required current.

This achieves 400mA/m field strength at 1kHz.

V7 (Metric)

Current	2.0A	3.0A	4.0A	5.0A

Cable Type		Cable Length			
Round (CSA)	0.5mm	85m	56m	42m	34m
	1mm	133m	89m	66m	53m
	1.5mm	155m	103m	77m	62m
	2.5mm	173m	115m	86m	69m
Flat (Width)	10mm	101m	67m	50m	40m
	12.5mm	192m	128m	96m	77m
	25mm	255m	170m	127m	102m

V7 (Imperial)

Current	2.0A	3.0A	4.0A	5.0A

Cable Type		Cable Length			
Round (AWG)	18AWG	438ft	292ft	219ft	175ft
	14AWG	593ft	395ft	296ft	237ft
Flat (Width)	18AWG (equivalent)	505ft	336ft	252ft	202ft
	14AWG (equivalent)	711ft	474ft	355ft	284ft

V12a (Metric)

Current	2.0A	3.0A	4.0A	5.0A

Cable Type		Cable Length			
Round (CSA)	0.5mm	136m	68m	68m	54m
	1mm	214m	107m	107m	85m
	1.5mm	248m	124m	124m	99m
	2.5mm	277m	138m	138m	110m
Flat (Width)	10mm	163m	81m	81m	65m
	12.5mm	308m	154m	154m	123m
	25mm	408m	204m	204m	163m

V12a (Imperial)

Current	2.0A	3.0A	4.0A	5.0A

Cable Type		Cable Length			
Round (AWG)	18AWG	701ft	467ft	350ft	280ft
	14AWG	949ft	633ft	484ft	379ft
Flat (Width)	18AWG (equivalent)	808ft	539ft	404ft	323ft
	14AWG (equivalent)	1138ft	759ft	469ft	455ft

Example of finding suitable cable length (using V12a):

A loop requiring 110m of cable needs 3A at 1kHz to achieve the required field strength.

If there are two cables in stock 0.5mm round and 1.5mm round, by looking at the above table we can see that the maximum length at 3A for the 0.5mm cable is 68m.

Using this cable will cause the driver output to clip at 1.6kHz when driven at 3A. Using the 2.5mm cable will allow the 3A to be driven at 1.6kHz without clipping.

Troubleshooting

Symptom	Possible Fault	Action
The driver does not turn on.	1) Mains power is absent. 2) Internal failure.	1) Check mains power. 2) Seek assistance.
Interference (buzzing/ whistling/hissing) is heard through induction loop.	1) Bad input signals. 2) Internal failure.	1) Power off the hearing loop driver and confirm that interference isn't from external origin. 2) Disconnect input signals. If sound disappears, check inputs.
The driver is excessively hot to touch.	1) Large amount of mains hum present on input. 2) Internal failure.	1) Check input signal source. 2) Incorrect hearing loop driver being used.
The loop output level indicates current is flowing but I hear nothing in the loop.	1) Shorted feeder cable. 2) Loop listener is not working or being used too far from loop.	1) Check feeder cable, although the hearing loop driver will usually refuse to tune to shorted feeder. 2) Check listener and location.
The sound is distorted.	1) Input level has been turned up too high for signal level at input. 2) Input signal is distorted. 3) Output signal is clipping.	1) Reduce input level setting. 2) Check signal source. 3) Refer to "The Clipping Status Light(s) is lit" below.
The Clipping Status Light(s) is lit.	The connected hearing loop is too long.	1) Reduce the length of the loop. 2) Use a larger diameter cable. 3) Create a two-turn loop. 4) Use a higher voltage driver.

Please contact your distributor (or Contacta if appropriate) if you are experiencing technical difficulties with the product.

Technical Specification

V7:

Power

2.1mm 30W 14Vdc 2.14A via External PSU (PS-55)
Class 6 External PSU (100V -240V AC 50Hz-60Hz)

Inputs

1 X Line XLR or 3.81mm Euro-block [optimised for -10dBV to 0dBv]
1 X Microphone (12V phantom power via 680Ω**)** [optimised for levels above -45dBv]

Output Characteristics

Output Voltage:	7.5Vrms (21.21Vpk-pk) @ 5Arms (14.14Apk-pk) *see notes 1 and 2*
Output Current:	5Arms (14.14Apk-pk) up to 300 seconds
Loop Connector:	5.08mm Euro-block

Audio system

Frequency Response:	80Hz to 6.5kHz
Distortion:	THD+N <1% (-40dB) Full current both outputs driven
AGC:	Peak detecting
HF Comp:	7 optimised stages

Note 1: Z=1.4Ω (133uH +0.685Ω @ 1.6kHz) **Note 2**: < 1% (-40dB) distortion)

Display & Control

Display:	LED Backlit LCD display
Control:	Single rotary control

Fault Monitoring and Protection

Main Display:	Open circuit loop (DCR measurement) Loop ground fault
Front Panel LED:	Output voltage clipping
Cooling:	Internal heatsinks with thermal protection

Physical

Height:	42mm (1.65")
Depth:	132mm (5.20") [150mm (5.90") including XLR and control knob]
Width:	198mm (7.80")
Weight:	<1kg (2.20lbs)

Technical Specification

V12a:

Power

2.1mm 100W 24Vdc 4.17A via External PSU (PS-60)
Class 6 External PSU (100V -240V AC 50Hz-60Hz)

Inputs

1 X Line XLR or 3.81mm Euro-block [optimised for -10dBV to 0dBv]
1 X Microphone (12V phantom power via 680Ω**)** [optimised for levels above -45dBv]

Output Characteristics

Output Voltage:	12Vrms (33.94Vpk-pk) @ 5Arms (14.14Apk-pk) *see notes 1 and 2*
Output Current:	5Arms (14.14Apk-pk) up to 300 seconds
Loop Connector:	5.08mm Euro-block

Audio system

Frequency Response:	80Hz to 6.5kHz
Distortion:	THD+N <0.3% (-50.5dB) Full current both outputs driven
AGC:	Peak detecting
HF Comp:	7 optimised stages

Note 1: Z=2.4Ω (212uH +1.096Ω @ 1.6kHz), **Note 2**: 1% (-40dB) distortion)

Display & Control

Display:	LED Backlit LCD display
Control:	Single rotary control

Fault Monitoring and Protection

Main Display:	Open circuit loop (DCR measurement) Loop ground fault
Front Panel LED:	Output voltage clipping
Cooling:	Internal heatsinks with thermal protection

Physical

Height:	42mm (1.65")
Depth:	132mm (5.20") [150mm (5.90") including XLR and control knob]
Width:	198mm (7.80")
Weight:	<1kg (2.20lbs)

Standards

EMC

- BS EN 55103-1: 2009 (EMC emissions)
- BS EN 55103-2: 2009 (EMC immunity)

This product has been designed and tested to comply with the following North American and Canadian standards:

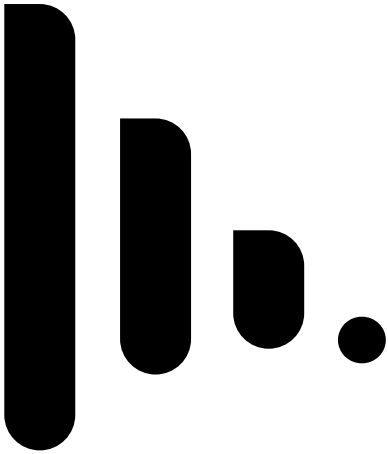
- FCC class "B" EMC (emissions)
- ICES-003

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by Contacta Systems LTD or an authorised partner could void the user's authority to operate the equipment.

Correct disposal of this product

This marking indicates that this product should not be disposed with other household waste throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal and to conserve material resources, this product should be recycled responsibly. To dispose of your product, please use your local return and collection systems or contact the retailer where the product was purchased.



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