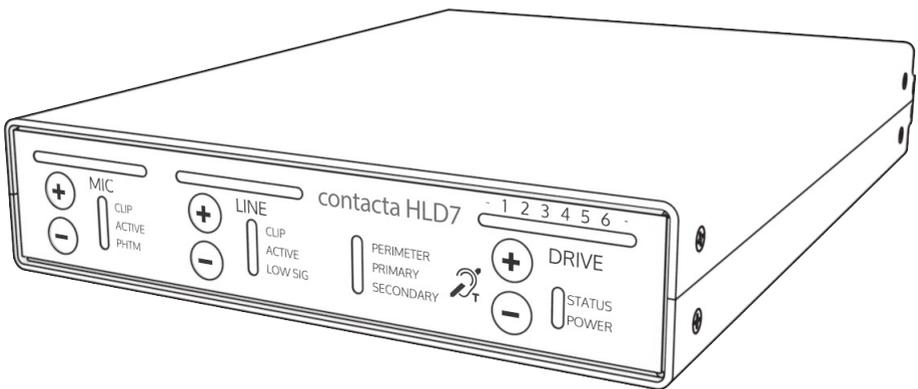


HLD7

Hearing Loop Driver



User Guide

Contents

Product Overview	3
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Suitable Cable Lengths (Metric)	6
Suitable Cable Lengths (Imperial)	7-8
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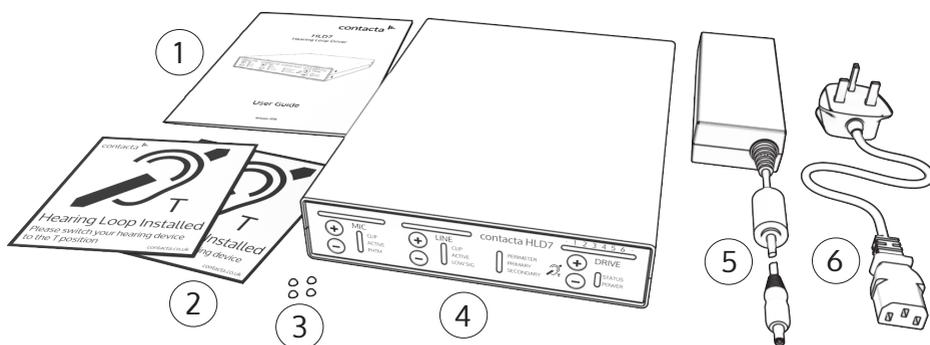
Contacta has a policy of continuous product development, therefore small specification changes may not be reflected in this manual. Images, labels, packaging, accessories and product colours are subject to change without notice.

Product Overview

Our HLD7 is a pioneering modular hearing loop driver for perimeter or phased array configurations, designed for medium sized facilities such as meeting rooms, lecture halls, places of worship and small theatres.

The HLD7 is a high efficiency hearing loop driver, meaning that it emits very little heat from its compact packaging.

Components



1. User Guide
2. Hearing Loop Stickers x 2
3. Rubber Feet x 4
4. Hearing Loop Driver
5. Power Supply
6. IEC Power Lead*

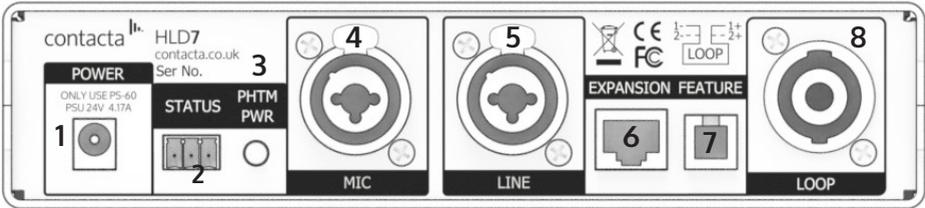
Cable & Equipment: A length of loop cable determined by the loop design is also required. Hearing loop drivers also require ancillary equipment for audio feeds, such as a microphone or sound system.

*Plug type varies by country.

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

Connections

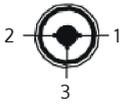
Rear Panel Connections:



1. Power Supply Input.
Power Sources - The use of unauthorised power supplies may cause damage to the unit and may invalidate the warranty.
2. External Port - Status Indicator (Volt-free relay contacts).
3. Phantom power indication for microphone.
4. Input 1 (Microphone) - Balanced XLR with switchable 12VDC phantom power or ¼" unbalanced TRS jack for electret microphone with 5VDC power via 680Ω load.
5. Input 2 (Line) - Balanced XLR or ¼" TRS jack to ohmically isolated input.
6. Expansion.
CAUTION: For connection to other Contacta systems only.
7. Feature - External monitor & control, Contacta communications processor.
CAUTION: This is not a telecommunications port.
8. NL4 Loop Output Connection.

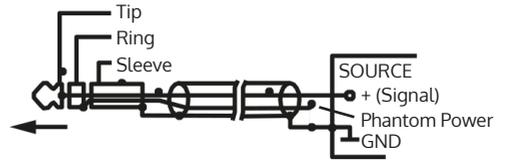
Audio Connections:

Mic & Line
XLR connector

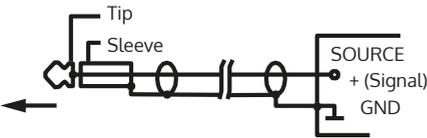


- 1: Screen/Shield
- 2: + (Signal Hot)
- 3: - (Signal Cold)

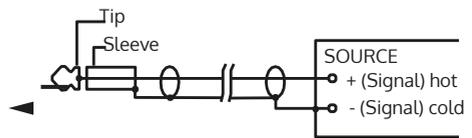
Mic
Unbalanced TRS Jack



Mic
Unbalanced Mono TS Jack



Line
Unbalanced Mono TS Jack

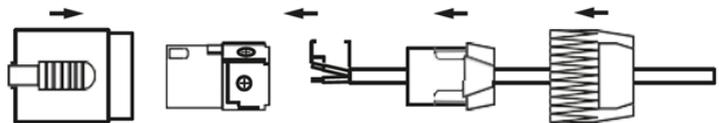


Loop Connections:

Connect a twisted pair or quad core loop feeder cables to the supplied NL4 connector (diagram below). Insert into the NL4 Loop Output Connection on the rear of the driver.

NL4 connector:

Loop connector
4 pole speakON



CAUTION: Route loop output cables as far away as possible from the driver audio input cables.

Suitable Cable Lengths (Metric)

The tables in this section show the metric maximum cable lengths for different maximum required currents.

No clipping below 1.6kHz (IEC specifications):

Example:

If an installed cable is **166m of 1.5mm² (round) single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **4 amps or greater**, the below table indicates that **the driver is clipping**.

Single-Turn Loop

Cable Type			Cable Length					
Maximum Cable Length	Round Cable (CSA)		1A	2A	3A	4A	5A	6A
	Round Cable (CSA)	1mm ²	531m	266m	177m	133m	106m	89m
		1.5mm ²	623m	311m	208m	156m	125m	104m
		2.5mm ²	700m	350m	233m	175m	140m	117m
	Flat Cable (Width)	10mm	394m	197m	131m	99m	79m	66m
		12.5mm	746m	373m	249m	186m	149m	124m
		25mm	987m	493m	329m	247m	197m	164m

Double-Turn Loop

Cable Type			Cable Length					
Maximum Cable Length	Round Cable (CSA)		1A	2A	3A	4A	5A	6A
	Round Cable (CSA)	1mm ²	386m	193m	129m	97m	77m	64m
		1.5mm ²	417m	209m	139m	104m	83m	70m
		2.5mm ²	439m	219m	146m	110m	88m	73m
	Flat Cable (Width)	10mm	345m	172m	115m	86m	69m	57m
		12.5mm	533m	267m	178m	133m	107m	89m
		25mm	632m	316m	211m	158m	126m	105m

Suitable Cable Lengths (Imperial)

The tables in this section show the imperial maximum cable lengths for different maximum required currents.

No clipping below 1.6kHz (IEC specifications):

Example:

If an installed cable is **420 feet of 18AWG (round) single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **4 amps or greater**, the below table indicates that **the driver is clipping**.

Single-Turn Loop

			Current	1A	2A	3A	4A	5A	6A
Cable Type			Cable Length						
Maximum Cable Length	Round Cable (AWG)	18AWG	1638ft	819ft	546ft	409ft	328ft	273ft	
		14AWG	2187ft	1093ft	729ft	547ft	437ft	364ft	
	Flat Cable (Width)	18AWG (equivalent)	1843ft	921ft	614ft	461ft	369ft	307ft	
		14AWG (equivalent)	2912ft	1456ft	971ft	728ft	582ft	485ft	

Double-Turn Loop

			Current	1A	2A	3A	4A	5A	6A
Cable Type			Cable Length						
Maximum Cable Length	Round Cable (AWG)	18AWG	1197ft	598ft	399ft	299ft	239ft	199ft	
		14AWG	1367ft	684ft	456ft	342ft	273ft	228ft	
	Flat Cable (Width)	18AWG (equivalent)	1447ft	723ft	482ft	362ft	289ft	241ft	
		14AWG (equivalent)	1898ft	949ft	633ft	475ft	380ft	316ft	

See next page for “No clipping below 5kHz (Pro)” maximum cable lengths .

No clipping below 5kHz (Pro):

Example:

If an installed cable is **406 feet of 18AWG (round) single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **3 amps or greater**, the below table indicates that **the driver is clipping**.

Single-Turn Loop

Current	1A	2A	3A	4A	5A	6A
---------	----	----	----	----	----	----

Cable Type		Cable Length						
Maximum Cable Length	Round Cable (AWG)	18AWG	718ft	359ft	239ft	180ft	144ft	120ft
		14AWG	750ft	375ft	250ft	188ft	150ft	125ft
	Flat Cable (Width)	18AWG (equivalent)	922ft	461ft	307ft	231ft	184ft	154ft
		14AWG (equivalent)	1063ft	531ft	354ft	266ft	213ft	177ft

Double-Turn Loop

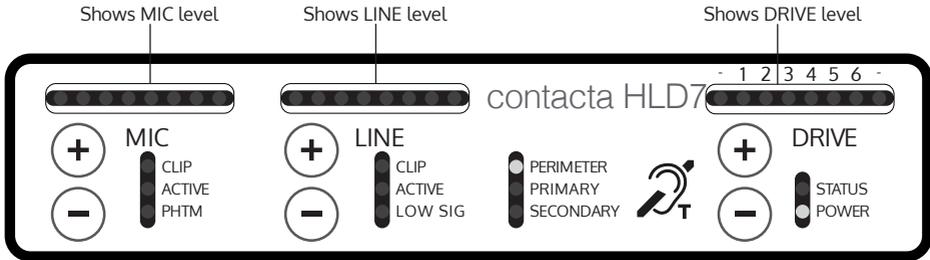
Current	1A	2A	3A	4A	5A	6A
---------	----	----	----	----	----	----

Cable Type		Cable Length						
Maximum Cable Length	Round Cable (AWG)	18AWG	442ft	221ft	147ft	110ft	88ft	74ft
		14AWG	449ft	225ft	150ft	112ft	90ft	75ft
	Flat Cable (Width)	18AWG (equivalent)	581ft	290ft	194ft	145ft	116ft	97ft
		14AWG (equivalent)	640ft	320ft	213ft	160ft	128ft	107ft

Controls

Note: Before entering a driver mode or making any changes, a loop must be connected to the HLD7.

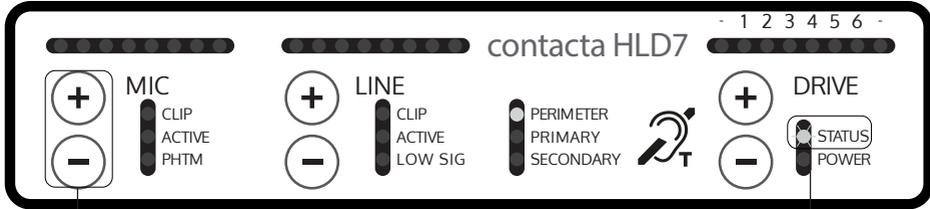
Front panel overview:



Driver modes

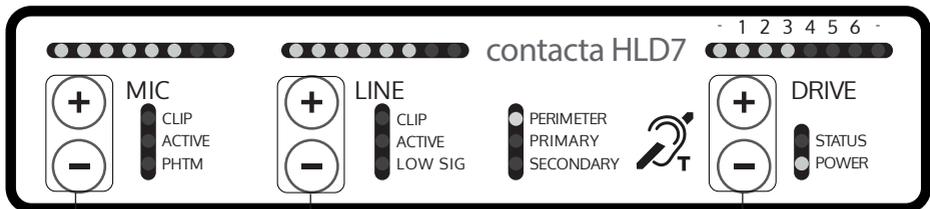
Normal operation mode – The driver is fully functional. The controls on the front do not change the driver operation.

Adjustment mode – In this mode one can adjust all of the levels using the ⊕ or ⊖ buttons.



To enter adjustment mode press both MIC + and - simultaneously

In adjustment mode the STATUS LED will flash



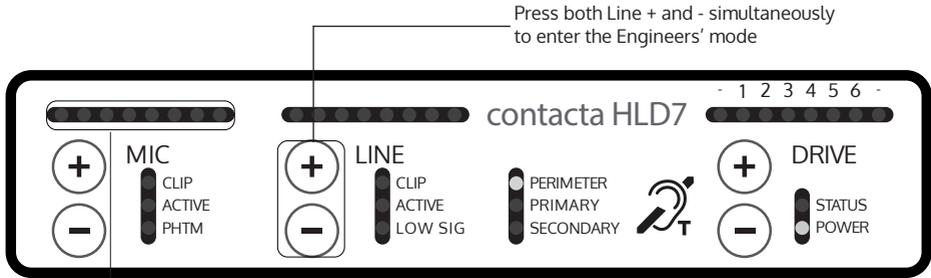
Pressing the MIC + or - will adjust the MIC input gain; adjustments are in 1dB steps. LEDs show the MIC's level after fader

Pressing the LINE + or - will adjust the LINE input gain; adjustments are in 1dB steps. LEDs show the LINE level after fader. If input is low the LOW SIG LED will illuminate

Pressing the Drive + or - will adjust the Drive output by 1dB steps. LEDs show the approximate DRIVE level.

Engineers mode – In this mode there are additional items that can be adjusted, such as driver type, phantom power and high frequency compensation.

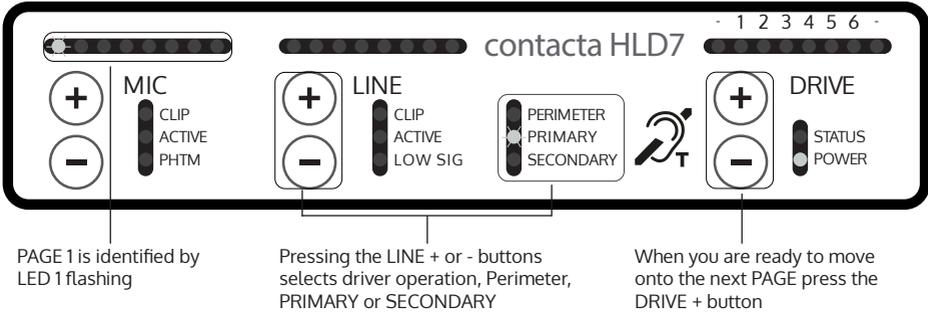
You must first be in adjustment mode (see page 7). To enter the engineers mode, press both Line + and - simultaneously.



There are 5 PAGE settings, each identified by a flashing MIC LED: PAGE 1 is LED 1, PAGE 2 is LED 2, etc.

Driver Operation Selection (PAGE 1)

PAGE 1 allows you to select the driver operation; either perimeter, primary or secondary. Always select the driver operation mode before installing the driver in its rack mount bracket.



Changing the driver type

You must be in engineers mode to change the driver type.

Ensure you have selected PAGE 1.

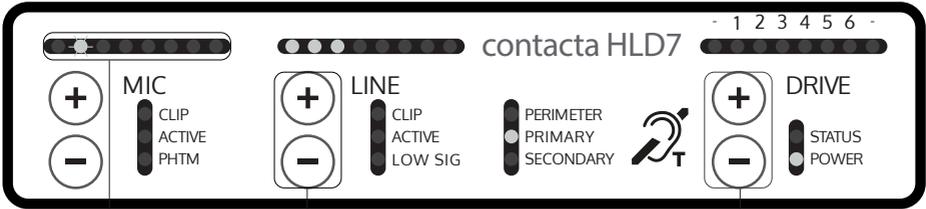
- When only this first light is illuminated and the driver is in the engineers mode, press either the LINE (+) or (-) to change the driver type from PERIMETER, PRIMARY OR SECONDARY.
- When finished setting up the driver type, press the DRIVE (-) button to take the driver out of the engineers mode and put it back into the adjustment mode. The status light will begin to flash.
- Pressing the MIC (+) and (-) buttons simultaneously will take the driver back to the normal operation mode where the controls are non-functional.

The three operating modes are:

- **PERIMETER mode**, for a single loop or a double-turn loop.
- **PRIMARY mode**, the first and controlling driver of two in a phased array loop layout.
- **SECONDARY mode**, the second driver of two in a phased array loop layout.

High Frequency Compensation (PAGE 2)

PAGE 2 settings are for the high frequency compensation which is required to compensate for loss of high frequencies due to the presence of metal within the proximity of the loop.



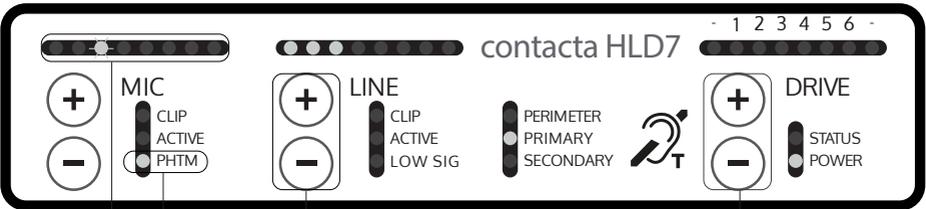
PAGE 2 is identified by LED 2 flashing

Adjustments can be made by pressing the LINE + or - buttons. There are 6dB of HF compensation adjustment possible

When you are ready to move onto the next PAGE press the DRIVE + button

Microphone Phantom Power (PAGE 3)

PAGE 3 settings are for the microphone phantom power selection.



PAGE 3 is identified by LED 3 flashing

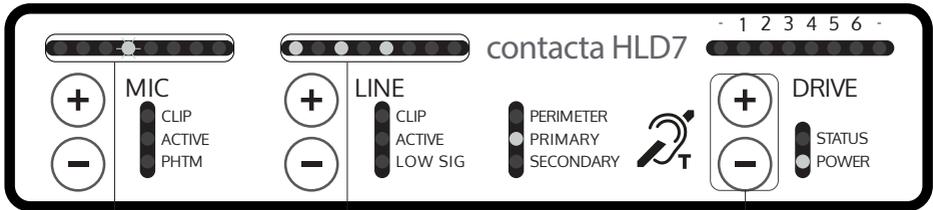
This LED indicates that you are in the phantom power selection

Pressing the LINE + button turns the phantom power on, pressing the LINE- button turns phantom power off

When you are ready to move onto the next PAGE press the DRIVE + button

Firmware Revision Indication (PAGE 4)

THIS MODE IS DISPLAY ONLY: NO SETUP CAN BE CHANGED.



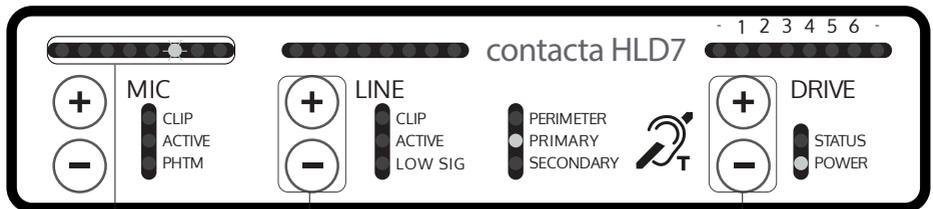
PAGE 4 is identified by LED 4 flashing

PAGE 4 firmware revision indication

When you are ready to move onto the next PAGE press the DRIVE + button

Restore to Factory Settings (PAGE 5)

PAGE 5 is for restoring settings.



PAGE 5 is identified by LED 5 flashing

Press the LINE + and LINE - button simultaneously

To go back to PAGE 1 press the DRIVE + button

To exit Engineers mode press the DRIVE ⊖ button.

Set-Up

To ensure optimal performance of an HLD7 hearing loop driver, set-up should be performed in following order:

Step 1: Background Noise Level (see page 15)

Step 2: Metal Loss (see pages 15-16)

Step 3: Output Level and Clipping (see page 16-17)

Step 4: Field Uniformity (see page 17)

Step 5: Final Output Level Adjustment (see page 18)

Step 6: Input Signal Level Adjustment (see page 18)

Required for Set-Up

- TSG - Contacta Test Signal Generator (TSG1)
- FSM - Contacta Field Strength Meter (IL-CONTACTA-FSM)
- Tripod or similar for mounting the FSM is recommended
- 'Compliance Certificate' document

Note:

Throughout set-up, record values on the provided Compliance Certificate document whenever you see the following icon:



The Compliance Certificate document confirms compliance with IEC-60118:4 if your values are within acceptable levels.

It is highly recommended that you retain a copy of the completed Compliance Certificate document for your records and provide a copy to the relevant facilities manager.

Step 1: Background Noise Level

This test should be performed prior to loop installation.

1. Set up the FSM, ensuring that the two vertical arrows in the top-right corner of the device are placed at the correct height:

-  • 1.2 metres (3' 9") for seated user.
• 1.7 metres (5' 6") for standing users.

A tripod or similar for mounting the FSM is recommended.

2. Any lights or equipment normally active in the surrounding area should be turned on to ensure an accurate testing environment.
3. Set the FSM to the Background Noise mode – "A-weighted".
4.  Measure and note the background noise level throughout the looped area on the Compliance Certificate document.
5. Listen to the loop through the FSM (A-weighted) or a loop listener (A-weighted). Note and demonstrate any interference to the customer which may not be heard through a hearing instrument.
6. Background magnetic noise must be between -32dB and -60dB. If the readings noted pass the Compliance Certificate document's requirements, move on to Step 2: Metal Loss.

Step 2: Metal Loss

1. Set up the FSM, ensuring that the two vertical arrows in the top-right corner of the device are placed at the correct height:

-  • 1.2 metres (3' 9") for seated user.
• 1.7 metres (5' 6") for standing users.

A tripod or similar for mounting the FSM is recommended.

2. Connect the TSG to the line input of the HLD driver.

3. Set the TSG to the 1kHz setting.
4. Set the FSM to the Third Octave F= 1000Hz setting.
5. Adjust the line level until the only the first orange LED is turned on.
6. Adjust the drive level to achieve 2 amps of output current, as indicated by the driver LEDs.
7.  Set the TSG to the pink noise setting and record the value measured by the FSM.
8.  Set the FSM to the Third Octave F= 100Hz setting and record the value measured.
9.  Set the FSM to the Third Octave F= 5000Hz setting and record the value measured.
10.  If the difference between the values measured at 1000Hz and 5000Hz is less than 3dB, record the results and move on to Step 3: Output Level and Clipping. If the difference is higher than 3dB, move on to step 11.
11. Increase the HF comp and repeat steps 3 to 10.

Step 3: Output Level and Clipping

 Note: This test should be performed as briefly as possible.

1. Set the TSG to the 1kHz setting.
2. Set the FSM to the RMS/Peak A-Weighted mode.
3. Adjust the drive level to achieve 2 amps of output current.
4.  Measure the field strength using the FSM, and use this and Note 1 (see page 19) to determine the extra current required. Record the current and number of steps required, as these will be needed again.

Note: If more than 9.0dB is required to achieve 0dB, a different loop design or more powerful driver is required. This is potentially due to metal loss.

5. Use the Suitable Cable Lengths guide (see pages 6 to 8) to confirm the installed cable length is less than the value for the current that was recorded in Step 3: Output Level and Clipping (4).
6. If the cable length does not exceed the value recorded in Step 3: Output Level and Clipping (4), move on to Step 4: Field Uniformity.

If the cable length exceeds the value recorded in (4), the driver is clipping. This means the loop connected is too long; therefore:

1. The system is not IEC60118-4 compliant.
2. The sound will be distorted.
3. The driver may be susceptible to damage and warranty voided.

Perform one of the following and repeat until there is no clipping:

1. Reduce the loop current,
2. Reduce the length of the loop,
3. Use a higher diameter of cable or flat copper tape,
4. Try a two-turn loop,
5. Use a higher voltage driver.

Step 4: Field Uniformity

1. Set up the FSM. Ensure that the two vertical arrows in the top-right corner of the FSM are placed at the correct height:

-  • 1.2 metres (3' 9") for seated user.
• 1.7 metres (5' 6") for standing users.

A tripod or similar for mounting the FSM is recommended.

2. Reduce the loop output current to 2 amps.
3.  Set the FSM to the RMS/Peak A-Weighted mode and record the value measured by the FSM in the centre of the loop.
4.  Move the FSM to other user positions within the looped area and record the values measured by the FSM.
5. The differences measured in other positions should not be greater than +/- 3dB of that measured in the first position.
6. Repeat Step 4: Field Uniformity (3 to 5) to create a suitable map of the area looped.

Step 5: Final Output Level Adjustment

1. Disconnect the TSG.
2. Adjust the output current to the level recorded in Step 3: Output Level and Clipping (4) on page 16 by pressing the DRIVE + or – buttons; each button press alters the current by 1dB.

Example: If the measured field strength on the FSM is (A-RMS) -6dB (i.e. 6 presses of the + button) extra current will be required to achieve 0dB (indicated on Note 1).

Step 6: Input Signal Level Adjustment

1. Connect the system signal source.
2. Adjust the input level (line/mic) level until the last green or first orange LED is lit on audio peaks.
3. The system is now set up.

Note 1:

When adjusting the output current, if a level of 3 amps is reached and yet **the field strength is still below -6dB**, the correct field strength **will not** be achieved.

This is caused by either an incorrect loop design or installation, more metal loss than expected or an incorrectly specified driver.

There is no need to go higher than +0dB ARMS.

Adjustment to drive current/level required based on the measured field strength:

Measured Field Strength	Output current that will achieve 0dB	Steps to increase Drive	Steps to decrease Drive
6.00dB	1.00A		6
5.00dB	1.12A		5
4.00dB	1.26A		4
3.00dB	1.42A		3
2.00dB	1.59A		2
1.00dB	1.78A		1
.00dB	2.00A	0	0
-1.00dB	2.24A	1	
-2.00dB	2.52A	2	
-3.00dB	2.83A	3	
-4.00dB	3.17A	4	
-5.00dB	3.56A	5	
-6.00dB	3.99A	6	
-7.00dB	4.48A	7	
-8.00dB	5.02A	8	
-9.00dB	5.64A	9	

Troubleshooting

Symptom	Possible Fault	Action
I've adjusted the HF comp and see no change.	1) The driver is working close to maximum output so there is not enough headroom for the HF comp to make a difference.	1) Check loop characteristics. If response OK at 1 amp, the headroom is inadequate.
I start the driver and immediately the status light turns on. I start the driver and the test sequence starts, but the status light turns on after it's completed. I've connected the loop and the driver doesn't work, the status light comes on. My driver has been working well for a couple weeks and now the status light is on.	1) Loop shorted or open, too small or too large. 2) Internal self-test failure.	1) Check loop and connections, try known good loop. 2) Check loop DC resistance with an ohm meter: 0.33 ohms minimum.
The power light doesn't come on.	1) Mains power absent. 2) Internal failure.	1) Check mains power. 2) Seek assistance.
I can't get my driver out of adjustment mode.	1) Button presses not coinciding. 2) Internal failure.	1) Press both buttons together to exit mode. 2) As a last resort, cycle power off/on. New settings should have been saved.
Interference (buzzing/whistling/hissing) is heard through induction loop.	1) Bad input signals. 2) Internal failure.	1) Power off driver and confirm that interference isn't from external origin. 2) Disconnect input signals. If sound disappears, check inputs.
My driver is very hot.	1) Large amount of mains hum present on input. 2) Internal failure.	1) Check input signal source. 2) Incorrect driver being used.

Symptom	Possible Fault	Action
No signal on the line input.	1) No input signal connected. 2) HLD in secondary mode. 3) Equipment failure.	1) Check "active" light: if unlit check source, if lit, adjust level. 2) HLD must be in PERIMETER or PRIMARY. 3) Seek assistance.
The low signal light is on.	1) The HLD is having to use very high gain to process the input signal.	1) Increase the input signal level at source, reduce the HLD input level setting.
The Drive level indicate current is flowing but I hear nothing in the loop.	1) Shorted feeder cable (unlikely). 2) Loop listener not working or being used away from loop.	1) Check feeder cable, although the HLD will usually refuse to tune to shorted feeder. 2) Check listener and location.
The sound is very distorted.	1) Input level has been turned up too high for signal level at input jack. 2) Input signal is distorted.	1) Reduce input level setting. 2) Check signal source.

HLD = Hearing Loop Driver.

If no action is successful please seek assistance from your distributor or a Contacta installer.

Technical Specification

Mains input

Voltage: 24V DC @ 4.1A

Power: 100W

Connection: 2.1mm DC Jack

Audio Inputs

Input 1

(Microphone) Balanced XLR with switchable phantom power or ¼" TRS jack for electret microphone with 12VDC power via 680Ω load

Adjustment range: Off, then to maximum in 50x 1dB increments

Input 2

(Line) Balanced XLR or ¼" TRS jack (TRS gives ohmic isolation) input

Adjustment range: Off, then to maximum in 50x 1dB increments

Loop output

Loop connection NL4 connector

Adjustment range

Off, then to maximum in 63 1dB increments

Loop drive current

6A RMS compliance current @ 1KHz sine wave (loop dependant)

Loop drive voltage

15V RMS compliance voltage (loop dependant)

Loop current frequency response

100 Hz – 5kHz (±3dB) (loop dependant)

Distortion

Better than -40dB, inputs at nominal level

Expansion

Contacta interconnect Input or output to or from additional Contacta products with 90° phase shift selectable

Status

Volt-free relay contacts SPCO

Feature

External monitor & control Contacta communications processor interface

Displays

Microphone level 8 level bar graph with peak hold, 6dB steps

Line level 8 level bar graph with peak hold, 6dB steps

Output drive level 8 level bar graph with peak hold

Other indications LEDs for all setup and status indications

Dimensions

Height – 1.75" (2U 19" rack mount)

Width – 7.87" (19" half rack)

Depth – 10.24"

Weight 5.5lbs

Construction/Finish

Front & Rear: Mild Steel / Top & Bottom: Aluminium Powder Coated Black

Continual improvement policy

Contacta has a policy of continual improvement for its products. This means that designs and specifications are subject to change without notice.

Standards

EMC

BS EN 55103-1: 2009 (EMC emissions)

BS EN 55103-2: 2009 (EMC immunity)

FCC class "B" EMC (emissions)



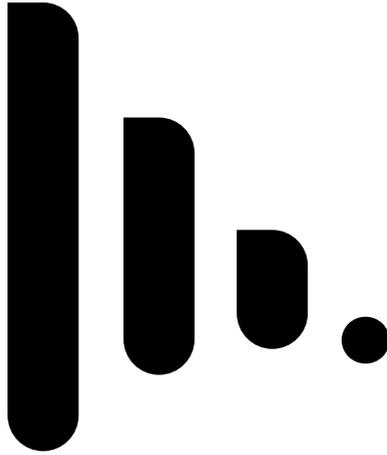
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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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