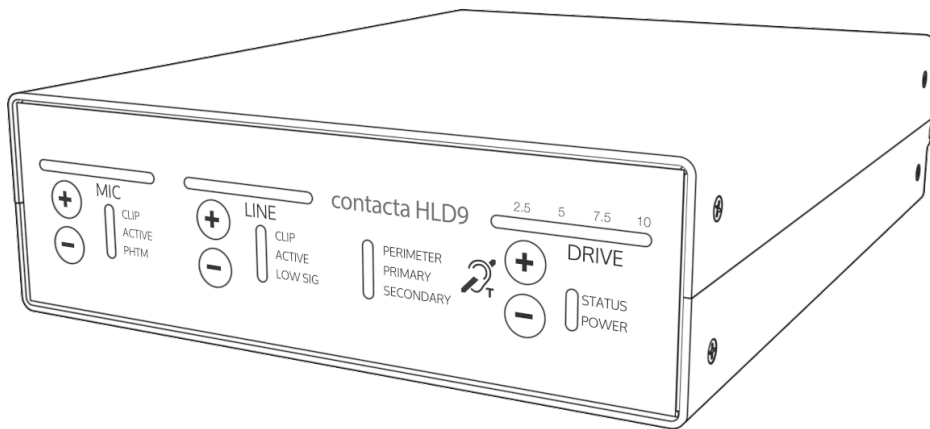




HLD9

Hearing Loop Driver



User Guide

April 2018

Contents

Product Overview	3
Components	3
Connections	4-5
Suitable Cable Lengths (Metric)	6
Suitable Cable Lengths (Imperial)	7-8
Controls	9
Set-Up	14-19
Troubleshooting	20-21
Technical Specification	22
Standards	23

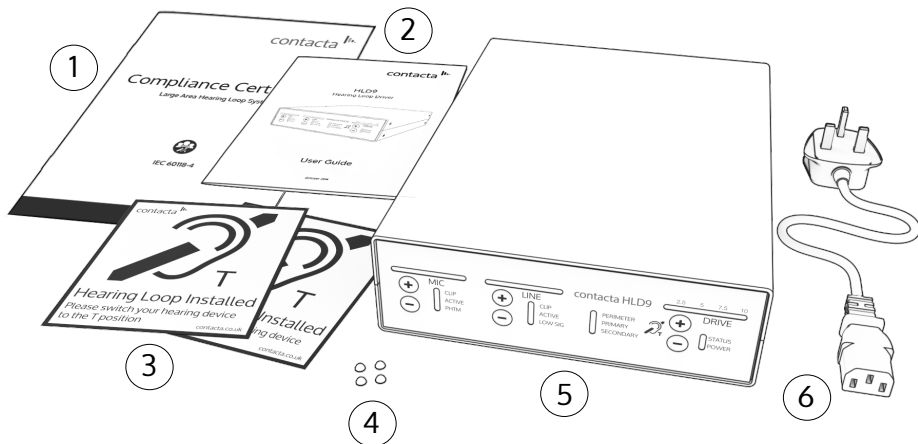
Contacta has a policy of continuous product development, therefore small specification changes may not be reflected in this manual. Images, labels, packaging, accessories and product colours are subject to change without notice.

Product Overview

Our HLD9 is a pioneering modular hearing loop driver for perimeter or phased array configurations, suitable for large area applications such as theatres, conference facilities, sports arenas, concert halls and auditoria.

The HLD9 uses cutting edge switching converter technology to deliver high efficacy and high performance with low noise.

Components



- | | |
|------------------------------|-------------------------------|
| 1. Compliance Certificate | 4. Rubber Feet x 4 |
| 2. User Guide | 5. Hearing Loop Driver (HLD9) |
| 3. Hearing Loop Stickers x 2 | 6. IEC Power Lead* |

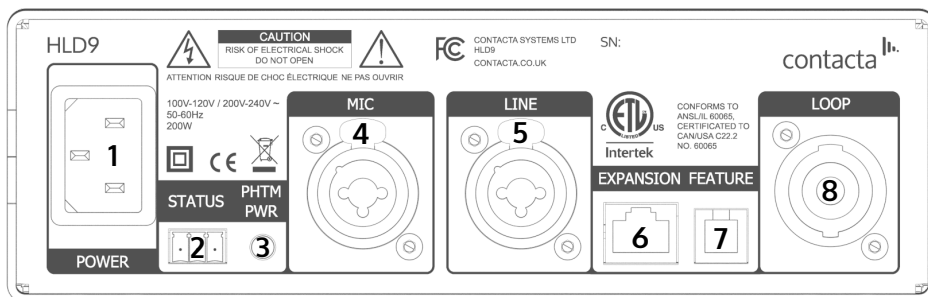
Cable & Equipment: A length of loop cable determined by the loop design is also required. Hearing loop drivers also require ancillary equipment for audio feeds, such as a microphone or sound system.

*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*:



*HLD9-ETL rear panel text shown. All connections are the same on the standard HLD9.

1. Power Supply Input.

Power Sources - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. The primary method of isolating the amplifier from the mains supply is to disconnect the mains plug. Ensure that the mains plug remains accessible at all times. Unplug the AC power cord from the AC outlet if the unit will not be used for several months or more.

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.

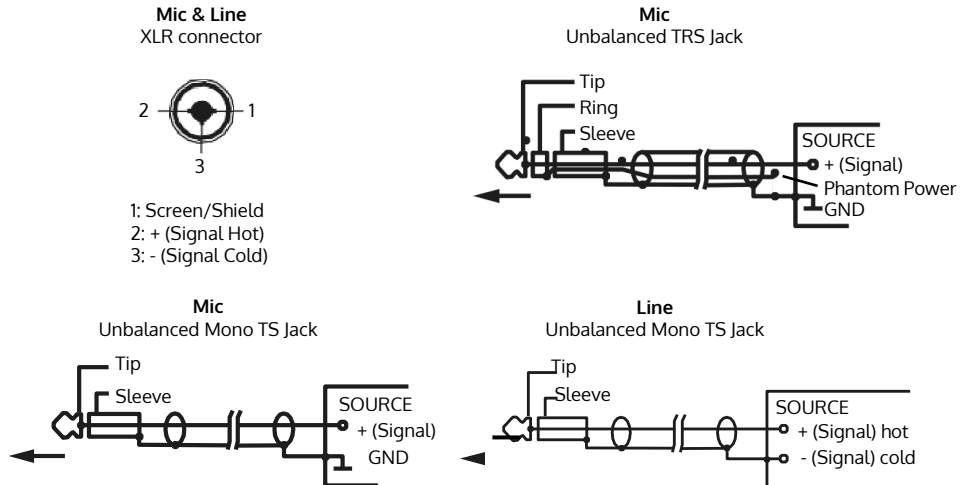
CAUTION: For connection to other Contacta systems only.

7. Feature - External monitor & control, Contacta communications processor.

CAUTION: This is not a telecommunications port.

8. NL4 Loop Output Connection.

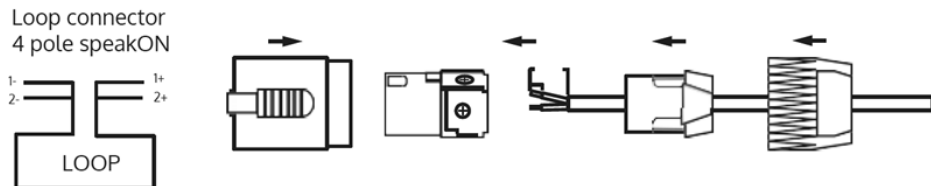
Audio Connections:



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:



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 **520m of 25mm flat single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **5 amps or greater, the driver is clipping.**

Single-Turn Loop

			Current	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Cable Type			Cable Length										
Maximum Cable Length	Round Cable (CSA)	1mm ²	1319m	659m	440m	330m	264m	220m	188m	165m	147m	132m	
		1.5mm ²	1547m	773m	516m	387m	309m	258m	221m	193m	172m	155m	
		2.5mm ²	1739m	870m	580m	435m	348m	290m	248m	217m	193m	174m	
	Flat Cable (Width)	10mm	979m	489m	326m	245m	196m	163m	140m	122m	109m	98m	
		12.5mm	1851m	925m	617m	463m	370m	308m	264m	231m	206m	185m	
		25mm	2450m	1225m	817m	613m	490m	408m	350m	306m	272m	245m	

Double-Turn Loop

			Current	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Cable Type			Cable Length										
Maximum Cable Length	Round Cable (CSA)	1mm ²	959m	479m	320m	240m	192m	160m	137m	120m	107m	96m	
		1.5mm ²	1036m	518m	345m	259m	207m	173m	148m	130m	115m	104m	
		2.5mm ²	1089m	544m	363m	272m	218m	181m	156m	136m	121m	109m	
	Flat Cable (Width)	10mm	856m	428m	285m	214m	171m	143m	122m	107m	95m	86m	
		12.5mm	1324m	662m	441m	331m	265m	221m	189m	166m	147m	132m	
		25mm	1568m	784m	523m	392m	314m	261m	224m	196m	174m	157m	

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 **850 feet of 18AWG (round) single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **5 amps or greater, the driver is clipping.**

Single-Turn Loop

Cable Type			Cable Length									
Current			1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Maximum Cable Length	Round Cable (AWG)	18AWG	4067ft	2033ft	1356ft	1017ft	813ft	678ft	581ft	508ft	452ft	407ft
		14AWG	5429ft	2715ft	1810ft	1357ft	1086ft	905ft	776ft	679ft	603ft	543ft
	Flat Cable (Width)	18AWG (equivalent)	4574ft	2287ft	1525ft	1144ft	915ft	762ft	653ft	572ft	508ft	457ft
		14AWG (equivalent)	7229ft	3614ft	2410ft	1807ft	1446ft	1205ft	1033ft	904ft	803ft	723ft

Double-Turn Loop

Cable Type			Cable Length									
Current			1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Maximum Cable Length	Round Cable (AWG)	18AWG	2971ft	1485ft	990ft	743ft	594ft	495ft	424ft	371ft	330ft	297ft
		14AWG	3395ft	1697ft	1132ft	849ft	679ft	566ft	485ft	424ft	377ft	339ft
	Flat Cable (Width)	18AWG (equivalent)	3592ft	1796ft	1197ft	898ft	718ft	599ft	513ft	449ft	399ft	359ft
		14AWG (equivalent)	4713ft	2356ft	1571ft	1178ft	943ft	785ft	673ft	589ft	524ft	471ft

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

No clipping below 5kHz (Pro):

Example:

If an installed cable is **268 feet of 18AWG (round) single turn** and the required current noted in Step 3 (7) of Set-Up (see page 14) is **7 amps or greater, the driver is clipping.**

Single-Turn Loop

Current			1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Cable Type			Cable Length									
Maximum Cable Length	Round Cable (AWG)	18AWG	1783ft	891ft	594ft	446ft	357ft	297ft	255ft	223ft	198ft	178ft
		14AWG	1863ft	932ft	621ft	466ft	373ft	311ft	266ft	233ft	207ft	186ft
	Flat Cable (Width)	18AWG (equivalent)	2290ft	1145ft	763ft	572ft	458ft	382ft	327ft	286ft	254ft	229ft
		14AWG (equivalent)	2638ft	1319ft	879ft	660ft	528ft	440ft	377ft	330ft	293ft	264ft

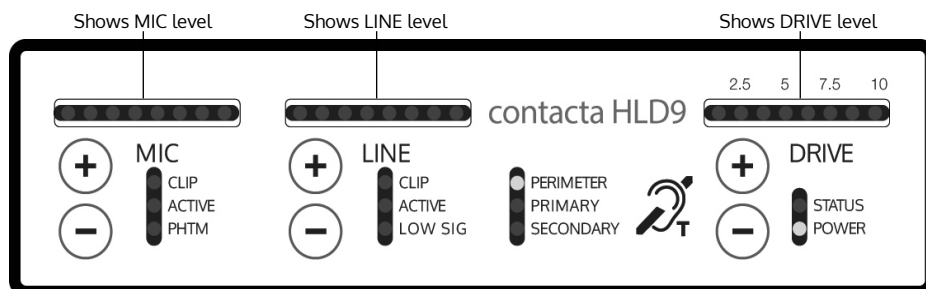
Double-Turn Loop

Current			1A	2A	3A	4A	5A	6A	7A	8A	9A	10A
Cable Type			Cable Length									
Maximum Cable Length	Round Cable (AWG)	18AWG	1097ft	549ft	366ft	274ft	219ft	183ft	157ft	137ft	122ft	110ft
		14AWG	1115ft	558ft	372ft	279ft	223ft	186ft	159ft	139ft	124ft	112ft
	Flat Cable (Width)	18AWG (equivalent)	1442ft	721ft	481ft	360ft	288ft	240ft	206ft	180ft	160ft	144ft
		14AWG (equivalent)	1588ft	794ft	529ft	397ft	318ft	265ft	227ft	199ft	176ft	159ft

Controls

Note: Before entering a driver mode or making any changes, a loop must be connected to the HLD9.

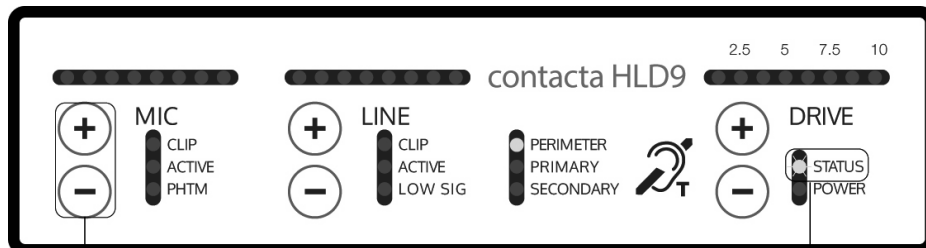
Front Panel Overview:



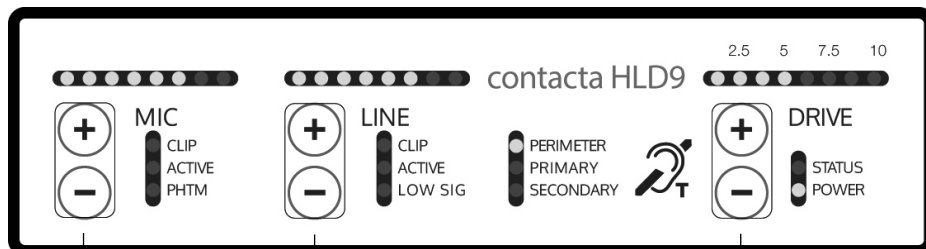
Driver Modes:

Normal Operation Mode – The driver is fully functional. However, 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.

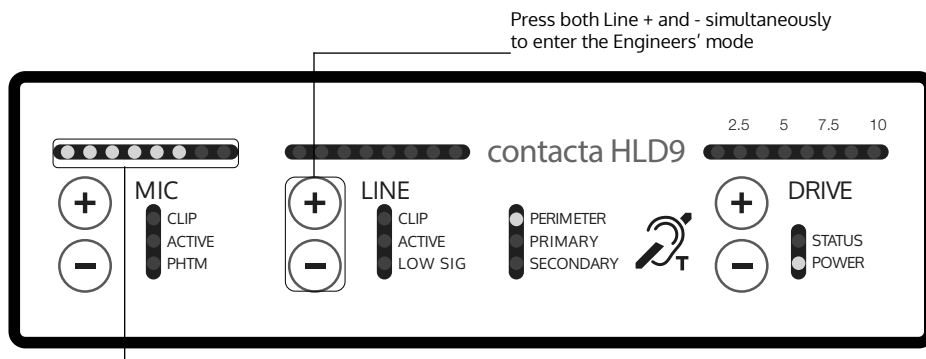


To enter adjustment mode press both MIC + and - simultaneously



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

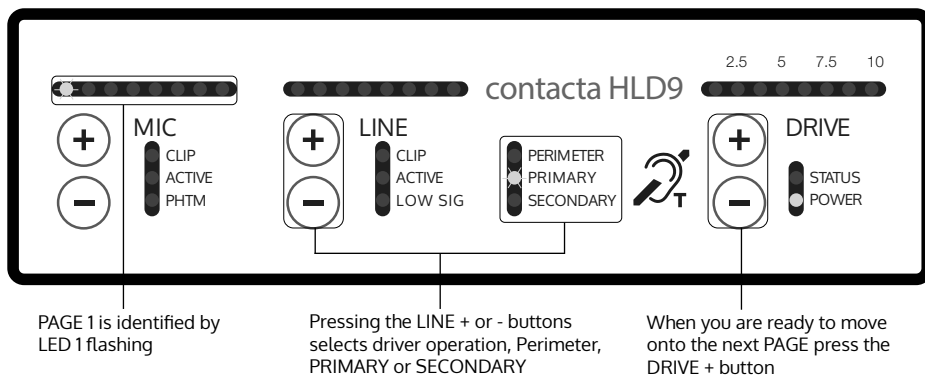
You must first be in adjustment mode (see page 9). Then, to enter the engineers mode, simply press both Line + and - simultaneously.



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

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.

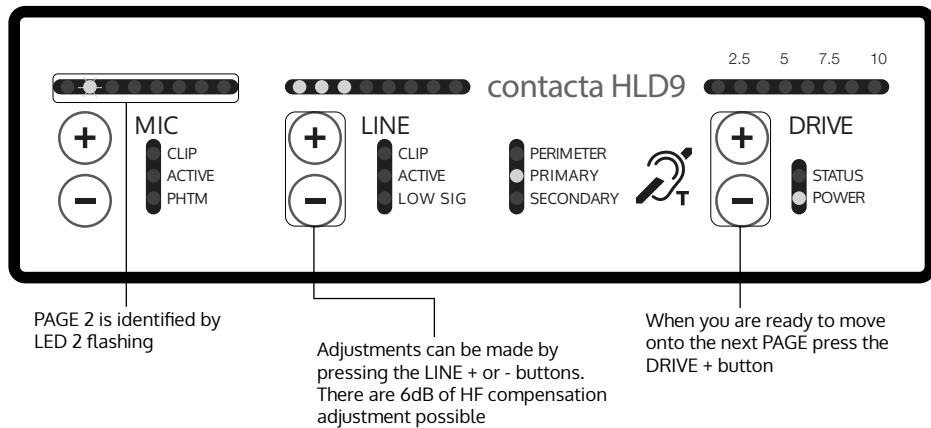
- When only this first light is illuminated and the driver is in the engineers mode, press either the LINE \oplus or \ominus to change the driver type from PERIMETER, PRIMARY OR SECONDARY.
- When finished setting up the driver type, press the DRIVE \ominus button to take the driver out of the engineers mode and put it back into the adjustment mode. The status light will begin to flash.
- Pressing the MIC (\oplus and \ominus) 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 (with a secondary driver) two widely separated loops.
- **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.

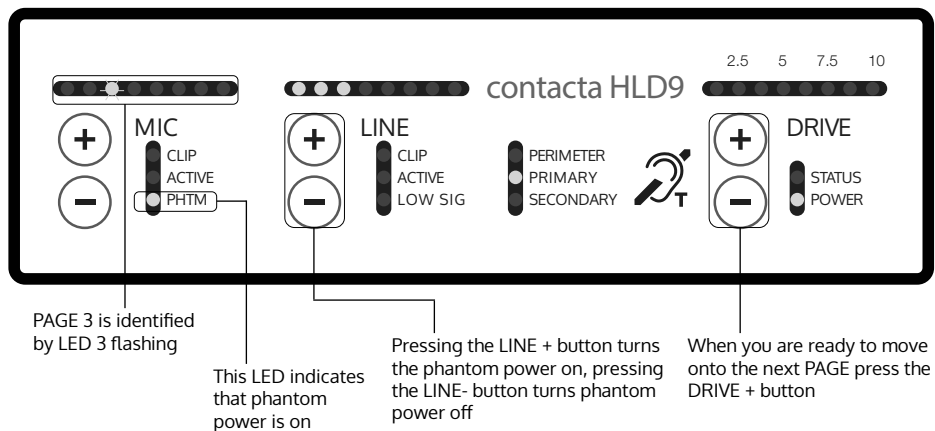
High Frequency Compensation (PAGE 2)

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.



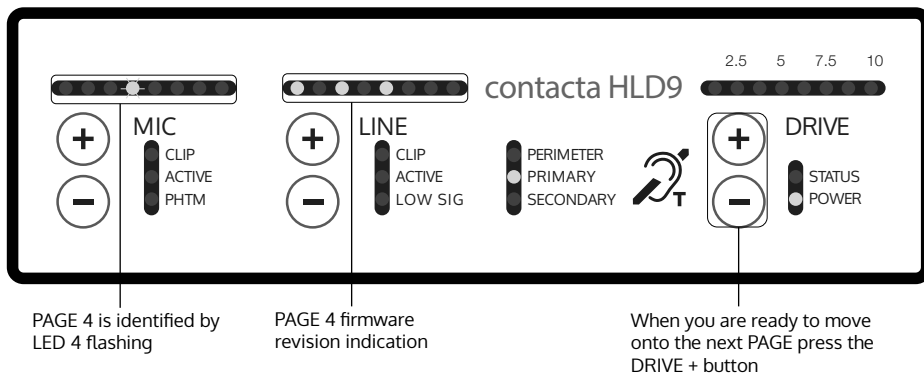
Microphone Phantom Power (PAGE 3)

PAGE 3 settings are for the microphone phantom power selection.



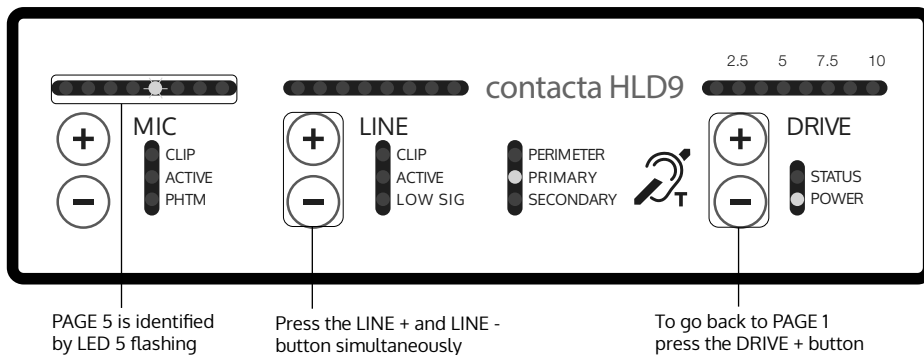
Firmware Revision Indication (PAGE 4)

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



Restore to Factory Settings (PAGE 5)

PAGE 5 is for restoring settings.



To exit Engineers mode press the DRIVE \ominus button.

Set-Up

To ensure optimal performance of an HLD9 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 used again.

Note: If more than 14.0dB 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 5 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	
-10.00dB	6.32A	10	
-11.00dB	7.10A	11	
-12.00dB	7.96A	12	
-13.00dB	8.93A	13	
-14.00dB	10.02A	14	

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 indicates 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: 100V-120V / 200V-240V AC (Universal auto switching)

Frequency: 50Hz/60Hz

Power: 200W

Connection: IEC

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 too maximum in 63 1dB increments

Loop drive current

10A RMS compliance current @ 1kHz sine wave (loop dependant)

Loop drive voltage

36V RMS compliance voltage (loop dependant)

Loop current frequency response

100 Hz – 5kHz (±3dB) (loop dependant)

Distortion

Better than -51dB, 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 – 2.48" (2U 19" rack mount)

Width – 7.87" (19" half rack)

Depth – 10.47"

Weight 3.8lbs

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

- UL 60065: 2015 8th edition
- CAN/CSA C22.2 No. 60065:2016 2nd Edition
- IEC 60065: 2014 8th Edition
- EN 60065: 2014 8th edition



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.



Local dealer:

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