Induction Loop Drivers

**D Series**
- Digital Networkable MultiLoop Drivers for areas up to 3,300m²

**MLD9**
- MultiLoop Induction Loop Driver for areas up to 3,300m²

**MLD7**
- MultiLoop Induction Loop Driver for areas up to 700m²

**MLD5**
- MultiLoop Induction Loop Driver for areas up to 420m²

**Loop Array Systems**
- Application note for arrays

**ILD1000G**
- Pro-series induction loop driver for areas over 1300m²

**ILD500**
- Pro-series induction loop driver for areas of up to 700m²

**ILD300**
- Pro-series induction loop driver for areas of up to 420m²

**ILD122**
- Pro-series induction loop driver for areas of up to 200m²

**CLS2**
- Wall mounted perimeter induction loop driver for rooms of up to 400m²

**CLS1**
- Wall mounted perimeter induction loop driver for rooms of up to 200m²

**CLD1 / CLD1 AC**
- Counters, desks and small area induction loop driver

**HLS-DM1**
- Compact Class D driver for O.E.M. applications

**HLS-DM2**
- Compact Class D driver for O.E.M. applications

**HLS-2B**
- Compact Class D driver for lift/elevator applications with battery back-up

**XA88**
- Rail and tram carriage induction loop driver for O.E.M. applications

*Induction loop driver coverage is dependant on room aspect ratio and loop layout, see product information for details.

Test Equipment

**R1**
- Smartphone Hearing Loop Receiver for Loopworks

**FSM**
- Field strength meter

**ILR3 / ILR3+**
- Loop listener / monitor

Accessories

**Microphones**
- Desktop, boundary and tie clip microphones

**Installation Accessories**
- Copper foil tape, installation warning tape, PVC extrusions, burial cables and induction loop notification logos
The D Series represents the global benchmark for digital audio induction loop systems. The compact, elegant and sturdy units not only feature digital signal processing and networking functionality, but are also the most versatile and powerful solution available. The D Series range consists of 10 and 14 Amp dual output class ‘D’ drivers; meaning a 60%+ increase in energy efficiency over existing solutions. Both drivers feature capacitive touch front panels with intuitive menus, built in test signals, and are fully networkable with a Wi-Fi accessible standard browser based control panel for remote set-up, monitoring and email alerts. The D10-2 features 10 Amps per loop output plus ample voltage headroom, making it the most flexible solution on the market, suitable for a huge range of applications. The added power of the D14-2 provides a solution for installations in environments containing very high levels of metal, previously not possible without the use of combiners. In another first for high-power Class D Induction Loop drivers, installation can be performed with total confidence, as unique multi-stage filtering ensures compatibility with both other system equipment and global EMC regulations. The D Series also boasts Dual slope Metal Loss Control that caters for a wide range of metal loss frequency characteristics.

Features

- Drives 2 output channels at 10 or 14A\text{RMS} each, featuring accurate and stable 90° phase shift
- Networkable with remote browser interface
- Digital display & intuitive ‘touch’ menu system - 3 modes; Main, Status & Quick
- Highly energy efficient Class-D amplifier with low heat dissipation
- Up to 2 x 1,300m² Perimeter Loops area coverage
- Up to 3,300m² MultiLoop™ Low Loss area coverage
- Compact 1U rack mount unit with internal transformer for simple rack installation
- Optimised for speech frequencies with unmatched intelligibility & capable of high quality musical reproduction
- AGC & Dual Slope MLC
- Active status monitoring & remote fault reporting via email
- Data compliant with: IEC 62489-1 Standard

Applications include

- Lecture Theatres & Conference facilities
- Stadia, Sports Halls, Cinemas & Theatres
- Courts Rooms, Airports & Railway Stations

MultiLoop™ System Design Configurations

MultiLoop Drivers can be used for different types of loop layout. You will need a MultiLoop system design for the loop layout which you can obtain from Amptronic, or have your own design approved by Amptronic free of charge.

Perimeter MultiLoops

Two channels drive single area loops either side by side or overlaid. Suitable for applications where there is no metal in the buildings construction, or in areas of moderate metal up to a maximum loop width of 5 meters.

Simple MultiLoops

Parallel loop segments with adjacent cables for ease of installation. Does not give the even coverage of loss control or low spill loops, with dips in level between loops. Suitable for fixed seating areas, or where dips in field strength are acceptable.

Loss Control MultiLoops

Multiple loop segments in two patterns each driven by one output channel. Best for optimum even area coverage across any area. Suitable for large areas and buildings with metal construction.

Low Spill MultiLoops

Similar in design to Low Loss MultiLoop but with a more complex pattern that requires more cable. Suitable for applications where loops are close together or where confidentiality is an issue. Low Spill MultiLoops require careful and precise design.
**D Series Product Information & Specifications**

### INPUTS

- **Power**: 220W 230V AC nominal, 45-65Hz [120V option available]
  - Power switch on front panel
- **Input 1 & 2 Programmable Microphone / Line**: XLR balanced input with programmable switchable between microphone and line via panel menu
  - Microphone specification; 200 - 600Ω, sensitivity -64dBu
  - Selectable 12V phantom power on microphone only
  - Line sensitivity: -39dBu
- **Slave In**: 6.35mm jack socket for linking more than one amplifier.
  - Inserting plug disables other inputs

### OUTPUTS

- **Loop Output Drive Voltage**: D10-2: 33.9V (45V) at maximum output current per channel
- **Loop Output Drive Current**
  - D10-2: 10A (14.1A) up to 60 seconds continuous 1kHz sine wave, peak >14.1A per channel
  - Cont. pink noise 4.7A, short term peaks >20A per ch.
  - D14-2: 14A (19.8A) up to 60 seconds continuous 1kHz sine wave, peak >14.1A per channel
  - Cont. pink noise 6.6A, short 20A per ch.
  - Level controlled via front panel menu or network
  - Drive current indicated on two 4-LED displays in 6dB increments
- **Slave Out**: 6.35mm jack socket to connect to other slave amplifiers
- **Loop Connectors**: Neutrik NL4 Speakons (supplied) for each output
- **Loop Monitor**: Provides access to monitor actual loop current via a 3.5mm stereo headphone connector on front panel
  - Channel A on left, channel B on right
- **DC Output**: Resettable, fuse protected 12V 0.1A. Operation can be configured via menu.

### AUDIO SYSTEM

- **Frequency**: 80Hz to 6.5kHz
- **Response**: THD+N <0.2% 1kHz sine at full current
- **Distortion**: THD+N <0.2% 1kHz sine at full current
- **Automatic Gain Control**: The AGC is optimised for speech. Dynamic range >36dB
- **Metal Loss Correction**: Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 4dB per octave in 0.25dB increments.
  - Custom 2 slope MLC allows different slopes and transition frequency to be set via the menu.
  - This does not compensate for signal loss from metal structures which can be significant.
- **Phase Shift**: User selectable at 0° or 90° between outputs

### ADDITIONAL FUNCTIONS

- **Fault Indicators on the front panel;**
  - Clipping – delivering over the rated voltage (per channel)
  - Error - Check status in menu
  - Temperature and loop errors reported via the status menu
- **Cooling**: Twin variable speed fan cooled. Front inlet, rear exhaust.

### PHYSICAL

- **Size**: Full width 1U 19" rack mount.
  - Width 430mm Depth 290mm Height 44mm
- **Mounting**: Freestanding
- **Options**: 1U 19" rack mount (brackets included)
- **Weight**
  - D10-2: 5.5kg
  - D14-2: 6.9kg,
- **Environment**: IP20 rated; 20 to 90% relative humidity; 0 to 35ºC

### Standards compliance

This product is designed to form part of a system that can meet all of the requirements of the international loop performance standard IEC60118-4, and the relevant parts of BS7594. To fully meet requirements of these standards, correct design, installation, commissioning and maintenance are required.

All specification data has been compiled in accordance with IEC62489-1, the international standard for audio frequency induction loop equipment. Specification data should only be compared with data compliant to this standard.

This product is CE and RCM marked to all relevant safety and EMC standards, and is NRTL (ETL) approved for sale in North America.

### Typical D-Series Max Area Coverage Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>D10-2</th>
<th>D14-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Metal Loss (0dB)*</td>
<td>2 x 1,000</td>
<td>2 x 1,300</td>
</tr>
<tr>
<td>Moderate Metal Loss (-5dB)**</td>
<td>Max 5m width</td>
<td>Max 5m width</td>
</tr>
<tr>
<td>High Metal Loss (-10dB)***</td>
<td>Max 5m width</td>
<td>Max 5m width</td>
</tr>
<tr>
<td>Severe Metal Loss (-15dB)****</td>
<td>n/a</td>
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</tr>
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</tr>
<tr>
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<td>Max 5m width</td>
<td>Max 5m width</td>
</tr>
<tr>
<td>Severe Metal Loss (-15dB)****</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Typical scenarios are based on *a building with no structural metal, **a building with reinforced concrete (re-bar) construction and ***a room with steel raised access floor tiles, ****a room with steel decked or reinforced concrete and raised access floor tiles. Special large-area system, no metal loss outdoor areas
The MLD9 is the new global benchmark for professional audio induction loop systems. The elegant, sturdy units feature the most compact design on the market, requiring only a single 19” rack mount.

The MLD9 provides the highest output available in any dual channel loop driver and is capable of driving a wide variety of multiple loop configurations from multiple simple loops to phase shifted array systems for the most challenging requirements.

With an Ampetronic MultiLoop™ Low Loss design, the MLD9 will drive an area up to 3,300m², or can be used to drive two perimeter looped areas of up to 1,300m² each. The MLD9 also features Class G technology which halves power consumption and heat dissipation.

Designed to provide optimum efficiency and ample current for standard compliant field strength, coupled with unmatched voltage headroom to ensure crystal clear sound reproduction without clipping or distortion at practical loads. MLD units are built to our exacting standards and are backed by our 5 year warranty.

Features

- Drives 2 output channels at 9.2A\textsubscript{RMS} each, featuring accurate and stable 90° phase shift
- High efficiency Class-G amplifier with low heat dissipation
- Up to 2 x 1,300m² Perimeter Loops area coverage
- Up to 3,300m² MultiLoop™ Low Loss area coverage
- Space saving 1U rack mount unit, the most space efficient loop driver available
- Front inlet & rear exhaust fan cooling for true rack mount integration
- Optimised for speech frequencies with unmatched intelligibility & capable of high quality musical reproduction
- AGC & Metal loss correction
- Active loop error monitoring & dual loop fault detection at start-up
- Tested to, and compliant with: IEC 62489-1 induction loop amplifier performance standard

Applications include

- Classrooms & Conference facilities
- Stadia, Sports Halls, Cinemas & Theatres
- Courts Rooms, Airports & Railway Stations

MultiLoop™ Applications

The flexibility of Ampetronic MLD units allows each output channel to drive separate loops, or two drive two overlaid loop patterns, with or without the selectable phase shift between the two channels.

Two separate simple area loops (or perimeter loops) can be driven at the same phase or with 90° phase shift. This can be used to cover large areas with no metal losses, or multiple different areas in the same facility.

Two loop layouts can be driven configured as multiple loop segments with or without phase shift. Simple array, low loss array or low spill array designs can create different performance to optimise field strength over any area, and minimise loop ‘spill’ for adjacent systems or for confidentiality.

Contact Ampetronic for free advice on all loop applications, design tools and support are available to check the expected performance for your application. Most commonly used design types are low loss and low spill:

**MultiLoop™ Loss Control Systems are used to:**
- Compensate for high losses due to metal structures
- Drive large areas where perimeter loops cause too much variation

**MultiLoop™ Low Spill Systems are used to:**
- Perform the same tasks as Loss Control systems, also minimises ‘spill’ – confines signal to within 1.5m of looped area, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential applications.

Maximum area coverage for MLD9 MultiLoop™ systems (m²)

<table>
<thead>
<tr>
<th>Loop Design</th>
<th>No Metal Loss*</th>
<th>Moderate Metal Loss**</th>
<th>High Metal Loss***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss Control</td>
<td>3,300</td>
<td>925</td>
<td>425</td>
</tr>
<tr>
<td>Low Spill</td>
<td>1225</td>
<td>700</td>
<td>325</td>
</tr>
<tr>
<td>1:1 Perimeter Loop</td>
<td>2 x 800</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
<tr>
<td>3:1 Perimeter Loop</td>
<td>2 x 1,300</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Typical scenarios are based on: *a building with no structural metal, **a building with reinforced concrete (re-bar).
MLD9 Product Information

Equipment supplied as standard with the MLD9

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector for each output
- Rack mount brackets
- Status Connector
- DC Connector

MLD9 optional accessories

Amptetronic can supply a range of accessories to meet the specific needs of your installation:

| Input adaptors | A range of input adaptors and interface cables to accept most audio source inputs, see table below |
| Installation Accessories | 18mm x 0.25mm copper tape, PVC extrusion to protect copper tape, Installation / warning tape to fix cable or tape to a floor |

Input adaptors

By using the appropriate input adaptor or preamplifier the MLD9 will accept multiple additional inputs or audio inputs from other sources:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Adaptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V line input</td>
<td>ATT-UX transformer</td>
</tr>
<tr>
<td>Low impedance speaker line</td>
<td>isolated attenuators</td>
</tr>
<tr>
<td>Line Level</td>
<td>MAT1 adaptor</td>
</tr>
</tbody>
</table>

Standards compliance

This product is designed to form part of a system that can meet all of the requirements of the international loop performance standard IEC60118-4, and the relevant parts of BS7594. To fully meet requirements of these standards, correct design, installation, commissioning and maintenance are required.

All specification data has been compiled in accordance with IEC62489-1, the international standard for audio frequency induction loop equipment. Specification data should only be compared with data compliant to this standard.

This product is CE marked to all relevant safety and EMC standards, and is NRTL (ETL) approved for sale in North America.

For detailed information on approvals, standards compliance and how to interpret the technical parameters on Amptetronic datasheets, please visit the support section of our website www.ampetronic.com or contact support@ampetronic.com.

### Inputs

| Power | 220V 230V AC nominal, 45-65Hz [120V option available] Power switch & LED indicator (Hearing Loop logo) on front panel |
| Input 1 & 2 Programmable Microphone / Line | XLR balanced input with programmable 15dB gain boost switchable between microphone and line on the rear panel. |
| Microphone specification | Microphone specification; 200 – 600kHz, sensitivity -55dBu. Selectable 12V phantom power on microphone only |
| Line sensitivity | Line sensitivity; -30dBu |
| Slave In | Screwdriver adjustable front panel recessed gain control |
| Slave In | 6.35mm jack socket for linking more than one amplifier. Inserting plug disables other inputs |

### Outputs

| Loop Output | 31.8V$_{\text{rms}}$ (45V$_{\text{peak}}$) at maximum output current per channel |
| Drive Voltage | 9.2A$_{\text{peak}}$ (13A$_{\text{rms}}$) up to 60 seconds continuous 1kHz sine wave |
| Drive Current | Cont. pink noise 4.6A$_{\text{peak}}$ short term peaks >19A per channel |
| Front panel | Front panel controls |
| Drive current indicated on two 6-LED displays in 3dB increments |
| Slave Out | 6.35mm jack socket to connect to other slave amplifiers |
| Loop Connectors | Neutrik NL4 Speakons (supplied) for each output |
| Status | Provides access to monitor actual loop current via a 3.5mm stereo headphone connector on front panel |
| Status | A pair of isolated relay contacts to indicate system status; fault = open circuit: system O.K. = short circuit |
| DC Output | Resettable, fuse protected 12V 0.1A |

### Audio System

| Frequency | 80Hz to 6.5kHz |
| Response | THD+$N$ <0.2% 1kHz sine at full current |
| Distortion | The AGC is optimised for speech. Dynamic range >36dB |
| Automatic Gain Control | The AGC is optimised for speech. Dynamic range >36dB |
| Metal Loss Correction | Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant. |
| Phase Shift | User selectable at 0° or 90° between outputs |

### ADDITIONAL FUNCTIONS

| Fault | Fault indicators on the front panel; |
| Monitoring | Clipping – delivering over the rated voltage (per channel) |
| | Temp – unit is too hot (temporarily mutes output signal) |
| | Loop error – short circuit / open circuit error (per channel) |
| Status Contact | A pair of relay contacts are provided for remote fault monitoring |
| Cooling | Twin variable speed fan cooled. Front inlet, rear exhaust |

### Physical

| Size | Full width 1U 19” rack mount. Width 430mm Depth 330mm Height 44mm |
| Mounting Options | Freestanding |
| Options | 1U 19” rack mount (brackets included) |
| Weight | 6.35kg |
| Environment | IP20 rated, 20 to 90% relative humidity; 0 to 35°C |

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MLD7 MultiLoop™ Driver

The MLD7 is part of the new benchmark range for professional audio induction loop systems. The elegant, sturdy units feature the most compact and most robust design on the market, requiring only a single 19” rack mount.

The MLD7 is capable of driving a wide variety of multiple loop configurations from multiple simple loops to phase shifted array systems for the most challenging requirements. With an Ampetronic MultiLoop™ Low Loss design, the MLD7 will drive an area up to 840m², or can be used to drive two perimeter looped areas of up to 700m² each.

Designed to provide optimum efficiency and ample current for standard compliant field strength, coupled with unmatched voltage headroom to ensure crystal clear sound reproduction without clipping or distortion at practical loads. MLD units are built to our exacting standards and are backed by our 5 year warranty.

Features

- Drives 2 output channels at 6.4Arms each, featuring accurate and stable 90° phase shift
- Up to 2 x 700m² Perimeter Loops area coverage
- Up to 840m² MultiLoop™ Low Loss area coverage
- Space saving 1U rack mount unit, the most space efficient loop driver available
- Front inlet & rear exhaust fan cooling for true rack mount integration
- Optimised for speech frequencies with unmatched intelligibility & capable of high quality musical reproduction
- AGC & Metal loss correction
- Active loop error monitoring & dual loop fault detection at start-up
- Tested to, and compliant with: IEC 62489-1 induction loop amplifier performance standard

Applications include

- Classrooms & Conference facilities
- Stadia, Sports Halls, Cinemas & Theatres
- Courts Rooms & Lecture Halls
- Airports & Railway Stations

MultiLoop™ Applications

The flexibility of Ampetronic MLD units allows each output channel to drive separate loops, or two drive two overlaid loop patterns, with or without the selectable phase shift between the two channels.

Two separate simple area loops (or perimeter loops) can be driven at the same phase or with 90° phase shift. This can be used to cover large areas with no metal losses, or multiple different areas in the same facility.

Two loop layouts can be driven configured as multiple loop segments with or without phase shift. Simple array, low loss array or low spill array designs can create different performance to optimise field strength over any area, and minimise loop ‘spill’ for adjacent systems or for confidentiality.

Contact Ampetronic for free advice on all loop applications, design tools and support are available to check the expected performance for your application. Most commonly used design types are low loss and low spill:

MultiLoop™ Low Control Systems are used to:

- Compensate for high losses due to metal structures
- Drive large areas where perimeter loops cause too much variation

MultiLoop™ Low Spill Systems are used to:

- Perform the same tasks as a Loss Control system, also minimises ‘spill’ – confines signal to within 1.5m of looped area, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential applications.

Maximum area coverage for MLD7 MultiLoop™ systems (m²)

<table>
<thead>
<tr>
<th>Loop Design</th>
<th>No Metal Loss*</th>
<th>Moderate Metal Loss**</th>
<th>High Metal Loss***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss Control</td>
<td>n/a</td>
<td>300</td>
<td>170</td>
</tr>
<tr>
<td>Low Spill</td>
<td>550</td>
<td>190</td>
<td>130</td>
</tr>
<tr>
<td>1:1 Perimeter Loop</td>
<td>2 x 400</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
<tr>
<td>3:1 Perimeter Loop</td>
<td>2 x 650</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Typical scenarios are based on “a building with no structural metal, “a building with reinforced concrete (re-bar).
**MLD7 Product Information**

**Equipment supplied as standard with the MLD7**

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector for each output
- Rack mount brackets
- Status Connector
- DC Connector

**MLD7 optional accessories**

Amptetronic can supply a range of accessories to meet the specific needs of your installation:

**Input adaptors**

By using the appropriate input adaptor or preamplifier the MLD7 will accept multiple additional inputs or audio inputs from other sources:

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<td>Low impedance speaker line</td>
<td>isolated attenuators</td>
</tr>
<tr>
<td>Line Level</td>
<td></td>
</tr>
<tr>
<td>Unbalanced microphones</td>
<td>MAT1 adaptor</td>
</tr>
</tbody>
</table>

**Installation Accessories**

- 18mm x 0.25mm copper tape
- PVC extrusion to protect copper tape
- Installation / warning tape to fix cable or tape to a floor

**Input adaptors**

- A range of input adaptors and interface cables to accept most audio source inputs, see table below

**Standards compliance**

This product is designed to form part of a system that can meet all of the requirements of the international loop performance standard IEC60118-4, and the relevant parts of BS7594. To fully meet requirements of these standards, correct design, installation, commissioning and maintenance are required.

All specification data has been compiled in accordance with IEC62489-1, the international standard for audio frequency induction loop equipment. Specification data should only be compared with data compliant to this standard.

This product is CE marked to all relevant safety and EMC standards, and is NRTL (ETL) approved for sale in North America.

For detailed information on approvals, standards compliance and how to interpret the technical parameters on Amptetronic datasheets, please visit the support section of our website www.ampetronic.com or contact support@ampetronic.com.

**INPUTS**

<table>
<thead>
<tr>
<th>Power</th>
<th>160W 230V AC nominal, 45-65Hz [120V option available] Power switch &amp; LED indicator (Hearing Loop logo) on front panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input 1 &amp; 2</td>
<td>XLR balanced input with programmable 15dB gain boost switchable between microphone and line on the rear panel. Microphone specification; 200 - 600Ω, sensitivity -55dBu. Selectable 12V phantom power on microphone only Line sensitivity; -30dBu Screwdriver adjustable front panel recessed gain control</td>
</tr>
</tbody>
</table>

**OUTPUTS**

| Loop Output Drive Voltage | 17V_ (24V_) at maximum output current per channel |
| Drive Voltage Loop Output | 6.4A_ (9A_) continuous 1kHz sine wave peak >9A per channel |
| Drive Current            | Cont. pink noise 3.2A _ short term peaks >13A per channel |
|                         | Front panel recessed controls |
|                         | Drive current indicated on two 6-LED displays in 3dB increments |
| Loop Connectors          | Neutrik NL4 Speakons (supplied) for each output |
| Loop Monitor             | Provides access to monitor actual loop current via a 3.5mm stereo headphone connector on front panel Channel A on left, channel B on right |
| Status                   | A pair of isolated relay contacts to indicate system status; fault = open circuit: system O.K. = short circuit |
| DC Output                | Resettable, fuse protected 12V 0.1A. |

**AUDIO SYSTEM**

| Frequency Response      | 80Hz to 6.5kHz |
| Distortion              | THD+N <0.2% 1kHz sine at full current |
| Automatic Gain Control  | The AGC is optimised for speech. Dynamic range >36dB |
| Metal Loss Correction   | Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant. |
| Phase Shift             | User selectable at 0° or 90° between outputs |

**ADDITIONAL FUNCTIONS**

| Fault Monitoring        | Fault indicators on the front panel; |
|                        | • Clipping – delivering over the rated voltage (per channel) |
|                        | • Temp – unit is too hot (temporarily mutes output signal) |
|                        | • Loop error – short circuit / open circuit error (per channel) |
| Status Contact          | A pair of relay contacts are provided for remote fault monitoring |
| Cooling                 | Twin variable speed fan cooled. Front inlet, rear exhaust. |

**PHYSICAL**

| Size                   | Full width 1U 19’ rack mount. Width 430mm Depth 250mm Height 44mm |
| Mounting               | Freestanding |
| Options                | 1U 19” rack mount (brackets included) |
| Weight                 | 4.77kg |
| Environment            | IP20 rated; 20 to 90% relative humidity; 0 to 35°C |

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Issue no UP37701-4
MLD5 MultiLoop™ Driver

The MLD5 is part of the new benchmark range for professional audio induction loop systems. The elegant, sturdy units feature the most compact and most robust design on the market, requiring only a single 19" rack mount.

The MLD5 is capable of driving a wide variety of multiple loop configurations from multiple simple loops to phase shifted array systems for the most challenging requirements. With an Ampetronic MultiLoop™ Low Loss design, the MLD5 will drive an area up to 360m², or can be used to drive two perimeter looped areas of up to 420m² each.

Designed to provide optimum efficiency and ample current for standard compliant field strength, coupled with unmatched voltage headroom to ensure crystal clear sound reproduction without clipping or distortion at practical loads. MLD units are built to our exacting standards and are backed by our 5 year warranty.

Features

• Drives 2 output channels at 5A each, featuring accurate and stable 90° phase shift
• Up to 2 x 420m² Perimeter Loops area coverage
• Up to 360m² MultiLoop™ Low Loss area coverage
• Space saving 1U rack mount unit, the most space efficient loop driver available
• Front inlet & rear exhaust fan cooling for true rack mount integration
• Optimised for speech frequencies with unmatched intelligibility & capable of high quality musical reproduction
• AGC & Metal loss correction
• Active loop error monitoring & dual loop fault detection at start-up
• Tested to, and compliant with: IEC 62489-1 induction loop amplifier performance standard

Applications include

• Classrooms & Conference facilities
• Stadia, Sports Halls, Cinemas & Theatres
• Courts Rooms & Lecture Halls
• Airports & Railway Stations

Datasheet

MultiLoop™ Applications

The flexibility of Ampetronic MLD units allows each output channel to drive separate loops, or two drive two overlaid loop patterns, with or without the selectable phase shift between the two channels.

Two separate simple area loops (or perimeter loops) can be driven at the same phase or with 90° phase shift. This can be used to cover large areas with no metal losses, or multiple different areas in the same facility.

Two loop layouts can be driven configured as multiple loop segments with or without phase shift. Simple array, low loss array or low spill array designs can create different performance to optimise field strength over any area, and minimise loop ‘spill’ for adjacent systems or for confidentiality.

Contact Ampetronic for free advice on all loop applications, design tools and support are available to check the expected performance for your application. Most commonly used design types are low loss and low spill:

MultiLoop™ Loss Control Systems are used to:

• Compensate for high losses due to metal structures
• Drive large areas where perimeter loops cause too much variation

MultiLoop™ Low Spill Systems are used to:

• Perform the same tasks as a Loss Control system, but minimises ‘spill’ – confines signal to within 1.5m of looped area, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential applications.

Maximum area coverage for MLD5 MultiLoop™ systems (m²)

<table>
<thead>
<tr>
<th>Loop Design</th>
<th>No Metal Loss</th>
<th>Moderate Metal Loss</th>
<th>High Metal Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss Control</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Low Spill</td>
<td>325</td>
<td>150</td>
<td>n/a</td>
</tr>
<tr>
<td>1:1 Perimeter Loop</td>
<td>2 x 250</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
<tr>
<td>3:1 Perimeter Loop</td>
<td>2 x 420</td>
<td>max 5m width</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Typical scenarios are based on *a building with no structural metal, **a building with reinforced concrete (re-bar)*.
### MLD5 Product Information

#### Equipment supplied as standard with the MLD5

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector for each output
- Rack mount brackets
- Status Connector
- DC Connector

#### MLD5 optional accessories

Ampetronic can supply a range of accessories to meet the specific needs of your installation:

**Input adaptors**
- A range of input adaptors and interface cables to accept most audio source inputs, see table below

**Installation**
- 18mm x 0.25mm copper tape

**Accessories**
- PVC extrusion to protect copper tape
- Installation / warning tape to fix cable or tape to a floor

**Input adaptors**

By using the appropriate input adaptor or preamplifier the MLD5 will accept multiple additional inputs or audio inputs from other sources:

**Input type** | **Adaptor**
--- | ---
100V line input | ATT-UX transformer
Low impedance speaker line | isolated attenuators
Line Level | MAT1 adaptor
Unbalanced microphones | 

#### Standards compliance

This product is designed to form part of a system that can meet all of the requirements of the international loop performance standard IEC60118-4, and the relevant parts of BS7594. To fully meet requirements of these standards, correct design, installation, commissioning and maintenance are required.

All specification data has been compiled in accordance with IEC62489-1, the international standard for audio frequency induction loop equipment. Specification data should only be compared with data compliant to this standard.

This product is CE marked to all relevant safety and EMC standards, and is NRTL (ETL) approved for sale in North America.

For detailed information on approvals, standards compliance and how to interpret the technical parameters on Ampetronic datasheets, please visit the support section of our website www.ampetronic.com or contact support@ampetronic.com.

#### INPUTS

**Power**
- 85W 230V AC nominal, 45-65Hz [120V option available]
- Power switch & LED indicator (Hearing Loop logo) on front panel

**Input 1 & 2**
- Programmable Microphone / Line
- Microphone specification; 200 - 600Ω, sensitivity -55dBu
- Selectable 12V phantom power on microphone only
- Line sensitivity: -30dBu
- Screwdriver adjustable front panel recessed gain control

**Loop Output**
- Drive voltage: 10.2Vrms (14.5Vpk) at maximum output current per channel
- Drive current: 5Arms (7Apk) continuous 1kHz sine wave >7A per channel
- Cont. pink noise: 2.5A, short term peaks >10A per channel
- Front panel recessed controls
- Drive current indicated on two 6-LED displays in 3dB increments

**Loop Connectors**
- Neutrik NL4 Speakons (supplied), one for each output

**Loop Monitor**
- Provides access to monitor actual loop current via a 3.5mm stereo headphone connector on front panel
- Channel A on left, channel B on right

**Status**
- A pair of isolated relay contacts to indicate system status; fault = open circuit; system O.K. = short circuit

**DC Output**
- Resettable, fuse protected 12V 0.1A.

#### OUTPUTS

**Audio System**
- Frequency Response: 80Hz to 6.5kHz
- Distortion: THD+N <0.2% 1kHz sine at full current
- Automatic Gain control: The AGC is optimised for speech. Dynamic range >36dB
- Metal Loss Correction: Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant.
- Phase Shift: User selectable at 0° or 90° between outputs

#### ADDITIONAL FUNCTIONS

**Fault**
- Fault indicators on the front panel;
- Clipping – delivering over the rated voltage (per channel)
- Temp – unit is too hot (temporarily mutes output signal)
- Loop error – short circuit / open circuit error (per channel)

**Status Contact**
- A pair of relay contacts are provided for remote fault monitoring

**Cooling**
- Variable speed fan cooled. Front inlet, rear exhaust.

#### PHYSICAL

**Size**
- Full width 1U 19” rack mount.
- Width 430mm Depth 220mm Height 44mm

**Mounting Options**
- Freestanding
- 1U 19” rack mount (brackets included)

**Weight**
- 3.75kg

**Environment**
- IP20 rated, 20 to 90% relative humidity; 0 to 35°C

### www.ampetronic.co

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An induction loop phased array system provides a solution where a simple loop around the room perimeter will not work. Arrays are the standard solution for buildings with metal structure or reinforcements, or for covering large areas. Arrays can also dramatically decrease the 'spill' of the magnetic signal outside of the room, allowing induction loops to be installed in adjacent rooms, and providing an improved level of confidentiality. Arrays can also be used to change the way two loops interfere with each other, providing ways of solving even the most complex installation problems. Used for:

Areas with metal structures: Large systems e.g.: Reducing spill in:
- Metal tiled flooring
- Reinforced concrete floors
- Metal suspended ceilings
- Retractable seating
- Airport terminals
- Shopping centres
- Exhibition halls
- Theatres
- Boardrooms
- Council chambers
- Classrooms / lecture halls
- Courtrooms

What are the advantages of an Ampetronic MultiLoop™ Phased Array System?
- Even field strength and frequency response in the presence of metal structures
- Even field strength over very large areas
- Can reduce spill to 1-2m from the loop edge for adjacent rooms or confidentiality
- Minimises interactions between complex systems such as theatres with balconies
- Compact form can reduce rack space requirements by up to 90% on competitive solutions

What is a Phased Array System?
A Phased Array System consists of two different conductive arrays of cable arranged in a pattern, with the two arrays running the same signal but phase shifted by 90 degrees. This prevents interaction between the two magnetic field patterns allowing creation of very even field coverage with a good loop design.

An Ampetronic MultiLoop™ Phased Array System comprises:
- A MultiLoop™ driver (amplifier)
- An array layout design
- Two arrays of cable or conductive tape

MultiLoop™ driver options are shown in the picture above, and a schematic for an array system is shown on the right.

Uses for a Phased Array System
1. Compensating for metal structures

Metal present in a building’s structure affects an induction loop magnetic field in three ways:
- Reduced signal strength
- Poor frequency response, causing loss of higher frequencies
- Variation in field strength and frequency response over the area

The larger the loop, the greater the effect. Perimeter loops can suffer dramatic loss of signal strength, and high frequencies can be lost all together, resulting in a total loss of intelligibility. Even with a mild loss, intelligibility can be poor and often a low signal ‘hole’ is found in the middle of the loop area.

These issues are all corrected by use of an Ampetronic Array System. The narrow loops in the array are much less susceptible to the effects of metal. The phase shift allows two arrays to be superimposed achieving even field strength. Metal losses are hard to predict. For certainty, we recommend a site survey which you can carry out following our instructions, or we can carry out on your behalf.
2. Controlling spill

A perimeter loop ‘spills’ magnetic field outside of the loop area by 3 or more times the loop width and similar above and below the loop. If systems are to be used independently in adjacent spaces, or if confidential discussions are taking place this ‘spill’ must be reduced.

Ampetronic Array Systems all exhibit much lower spill than a perimeter loop. Ampetronic can also provide designs for an ‘Ultra-Low Spill’ system, a special layout which controls the field with great precision. Ultra-Low Spill designs can reduced horizontal spill by 40dB within 1.5m of the loop edge. Ampetronic’s sophisticated design software accurately predicts system performance.

3. Interfering loops, large systems etc.

There are many other environments where Array Systems can provide a benefit, such as providing even coverage over very large coverage areas, or preventing interactions between loops such as between loops in the stalls and in the balcony of a theatre. An Array System gives the designer much greater control over field distribution, allowing standard-compliant performance in the most difficult installation environments.

Cable Installation

Array Systems usually require installation across, within or under the floor surface, or within a ceiling void. It is important to identify the best location for the installation before completing a loop design.

Ampetronic recommends three types of cable for the loop arrays:

**Tri-rated copper cable**

Suitable for running along skirting boards, inside conduit, ceiling cavities or behind cosmetic features. Gauges commonly used are 1.0 to 2.5mm2.

**Copper foil tape (FB1.8)**

Very flat tape designed for running underneath floor coverings e.g. carpet. Very low impedance is ideal for long cable runs and gets more from the amplifier.

Supplyed by Ampetronic, including plastic conduit and warning tape for installation.

**Direct burial cable (DBC)**

Specialist cable resistant to degradation from concrete - suitable for direct burial in screed, underground and outside use.

Supplyed by Ampetronic.
Ampetronic Loop designs for Phased Array Systems

To purchase and use an Array System you must have a suitable loop layout design for the two cable arrays. If you provide a design, Ampetronic will check it for free, otherwise Ampetronic or your distributor can supply a design for a nominal charge.

You can carry out your own loop design following Ampetronic guidance (please ask for our loop design guidance notes).

An array needs a loop design specific to the area to be installed. It is very important that this loop design takes into consideration:
- The intended use of the system
- Structural metalwork near to the system
- Requirements for low spill performance
- Dimensions and layout of the area
- Location for installation of the loop cables

### MultiLoop™ System Design Configuration Examples

MultiLoop Drivers can be used for different types of loop layout. You will need a MultiLoop system design for the loop layout which you can obtain from Ampetronic, or have your own design approved by Ampetronic free of charge.

#### Perimeter MultiLoops

Two channels drive single area loops either side by side or overlaid.

Suitable for applications where there is no metal in the buildings construction, or in areas of moderate metal up to a maximum loop width of 5 meters.

![Perimeter MultiLoops Diagram](image)

#### Simple MultiLoops

Parallel loop segments with adjacent cables for ease of installation.

Does not give the even coverage of loss control or low spill loops, with dips in level between loops.

Suitable for fixed seating areas, or where dips in field strength are acceptable.

![Simple MultiLoops Diagram](image)

#### Loss Control MultiLoops

Multiple loop segments in two patterns each driven by one output channel.

Best for optimum even area coverage across any area. Suitable for large areas and buildings with metal construction.

![Loss Control MultiLoops Diagram](image)

#### Low Spill MultiLoops

Similar in design to Low Loss MultiLoop but with a more complex pattern that requires more cable.

Suitable for applications where loops are close together or where confidentiality is an issue. Low Spill MultiLoops require careful and precise design.

![Low Spill MultiLoops Diagram](image)
ILD1000G Professional Audio Induction Loop Driver

The ILD1000G sets a new standard for high performance professional induction loop systems. Utilising a new amplification technology, the ILD1000G provides the highest output available in a single amplifier, while halving power consumption and heat dissipation. It is capable of driving the largest perimeter loops to over 1300m², and with high voltage headroom, the longest cable runs and large array systems. All of this power and performance is packaged in an elegant and space efficient 19”1U case. The ILD1000G is also designed for versatility, with 3 configurable inputs to cope with any scenario, usable freestanding, wall mounted or rack mounted with the included brackets. The ILD1000G is built to our exacting standards and is backed by our 5 year warranty.

Features

- Very high output for the largest applications
- High efficiency class-G amplifier with low heat dissipation
- Very compact 1U rack mount, wall mount or free standing
- Versatile input selection
  - 1 XLR balanced microphone
  - 1 XLR balanced mic / line switchable input
  - 1 6.3mm balanced jack line input
- Low lifetime cost
  - Excellent reliability
  - 5 year warranty
- Unparalleled sound quality
- Metal loss corrector
- Rack mount brackets included
- Free technical support

Perimeter Loops – Area Coverage

Capable of driving the largest practical perimeter loops - theoretical area coverage >1000m² for square areas, >1300m² for rectangular areas, though the practical limit may be set by the installation environment. Ampetronic design tools and support are available to check the expected performance for your application.

Low Overspill or Low Loss Systems

ILD1000G amplifiers are designed for use in combination with Ampetronic Ultra-Low Spill™ technology. Two amplifiers, an SP5 and an array design can be used to:

- minimise ‘spill’ – confines signal to within 1.5m of room, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential rooms
- compensate for high losses due to metal structures
- drive large areas where perimeter loops cause too much variation

Combined systems for very large areas

Multiple ILD1000G amplifiers can be combined using Ampetronic ILC Parallel Drive™ technology to drive systems in excess of 4000m². Contact Ampetronic support for details.

Maximum Cable Length

The ILD1000G is designed for SINGLE TURN loops for optimum audio quality.

For loops with DC resistance from 0.5 to 3.0Ω, impedance to 3.5Ω

Maximum cable length is dependent on cable type and on the application:

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Maximum Total Cable Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal use*</td>
</tr>
<tr>
<td>1.0mm² copper</td>
<td>132</td>
</tr>
<tr>
<td>2.5mm² copper</td>
<td>181</td>
</tr>
<tr>
<td>4.0mm² copper</td>
<td>188</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>233</td>
</tr>
</tbody>
</table>

* Short term speech (e.g. service counter, airport PA system) can cope with limited clipping at high frequencies – Ampetronic recommends delivery of full current up to 1.2kHz for these applications. Longer term usage or signals with music or high quality audio must deliver full current to at least 1.6kHz to prevent fatigue and give acceptable intelligibility. Many commercially available systems do not deliver sufficient voltage to reproduce critical high frequencies – ask Ampetronic for more details.
ILD1000G Product Information

Equipment supplied as standard with the ILD1000G

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector
- Rack mount brackets
- Status Connector

ILD1000G optional accessories

Ampetronic can supply a range of accessories to meet the specific needs of your installation:

**Input adaptors**
A range of input adaptors and interface cables to accept most audio source inputs, see table below

**Installation Accessories**
- 18mm x 0.25mm copper tape
- PVC extrusion to protect copper tape
- Installation / warning tape to fix cable or tape to a floor

**Wall mount brackets**
WMF1-U

**Phase shifter**
SP5 for an array system requires a design which can be provided by Ampetronic.

Input adaptors and preamplifiers

By using the appropriate input adaptor or preamplifier the ILD1000G will accept multiple additional inputs or audio inputs from other sources:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Adaptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional microphone</td>
<td>MP221</td>
</tr>
<tr>
<td>100V line input</td>
<td>ATT-LJ &amp; ATT-UX transformer</td>
</tr>
<tr>
<td>Low impedance speaker line</td>
<td>isolated attenuators</td>
</tr>
<tr>
<td>Unbalanced microphones</td>
<td>MAT1 adaptor</td>
</tr>
</tbody>
</table>

Standards compliance

The ILD1000G is CE marked to all relevant safety and EMC standards.

All Ampetronic amplifiers can be used to create a system that meets the requirements of IEC118-4 and the relevant recommendation of BS7594, however the design and installation of the system is equally important to meet these Induction Loop standards.

Some Ampetronic products are CSA registered for sale in the USA and Canada – contact Ampetronic for details.

### Inputs

<table>
<thead>
<tr>
<th>Power</th>
<th>120W 230V AC nominal, 45-65Hz [120V option available]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input 1</td>
<td>XLR balanced microphone input for 200-600Ω microphones; 15dB user selectable gain boost; + 15V DC phantom power (selectable); sensitivity – 55dBu; front panel recessed gain control</td>
</tr>
<tr>
<td>Input 2</td>
<td>XLR balanced input, switched between microphone and line on the rear panel. Microphone specifications as for input 1 Line specifications: 15dB user selectable gain boost; sensitivity -30dBu; overload protected; phantom power disabled in line mode; front panel recessed gain control</td>
</tr>
<tr>
<td>Input 3</td>
<td>6.3mm jack socket balanced line input; sensitivity -30dBu; overload protected, front panel recessed gain control</td>
</tr>
<tr>
<td>Slave I/O</td>
<td>6.3mm jack socket insert point for connection of SP5 phase shifter 0dBu signal can be used for recording</td>
</tr>
</tbody>
</table>

### Outputs

| Drive voltage          | 31.8V– 45V peak at maximum output current |
| Drive current          | • 9.2A (13A,) continuous 1kHz sine wave peak >13A |
|                        | • Short term peaks >19A |
|                        | • Front panel recessed control |
|                        | • Drive current indicated on 6-LED display in 3dB increments |
| Loop connector         | Neutrik NL4 Speakon (supplied) |
| Loop monitor           | Provides access to actual loop current via a 3.5mm stereo headphone connector on front panel |
| Status                 | A pair of isolated relay contacts to indicate system status; fault = open circuit: system O.K. = short circuit |

### Audio system

| Frequency response     | 80Hz to 6.5kHz |
| Distortion             | THD+N <0.2% 1kHz sine at full current |
| Automatic gain control | The AGC is optimised for speech. Dynamic range >36dB |
| Metal loss correction  | Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant. |

### ADDITIONAL FUNCTIONS

| Fault monitoring       | Three LED fault indicators on the front panel; |
|                        | • Overload – delivering over the rated current or voltage |
|                        | • Overheat – unit is too hot (mutes output signal) |
|                        | • Loop error – short circuit / open circuit error |
| Status Contact         | A pair of relay contacts are provided for remote fault monitoring |
| Ancillary              | To supply Ampetronic ancillary units |
| Cooling                | ±15V DC 0.15A power outlet on rear panel |

### Physical

| Size                   | Full width 1U 19” rack mount. Width 430mm Depth 220mm Height 44mm |
| Mounting options       | • Freestanding |
|                        | • 1U 19” rack mount (brackets included) |
|                        | • Wall mounting (requires additional brackets) |
| Weight                 | 3.8kg |
| Environment            | IP20 rated; 20 to 90% relative humidity; 0 to 35°C |

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Issue no ILD1000G UP35101-7
ILD500 Professional Audio Induction Loop Driver

The ILD500 is a professional audio induction loop driver capable of driving loop areas in excess of 700m² with an unsurpassed clarity of sound for both music and speech for superior intelligibility. Based on proven and highly reliable technology it is backed by an unrivalled 5 year warranty and free technical support. Improved power output provides outstanding value without compromise. It boasts all the usual features found on Ampetronic equipment such as metal loss correction and is compatible with our unique Ultra-low Spill™ technology. The ILD500 is a compact and elegant unit suitable for freestanding, wall mounting or rack mounting.

Features

• Area coverage to >700m²
• Low lifetime cost
  • Excellent proven reliability
  • 5 year warranty
• Unparalleled sound quality
  • Excellent intelligibility
  • Speech optimised gain control
  • High voltage headroom avoids high frequency clipping
• Metal loss corrector corrects frequency dependent loss from metal structures
• Rack mount brackets included
• Microphone (XLR) and line inputs
• Extensive input adaptors available for any audio input requirement
• Free technical support line for advice, design and install

Applications include

• Conference facilities
• Stadia
• Theatres
• Sports halls
• Confidential rooms
• Courts
• Lecture halls
• Cinemas

Perimeter Loops – Area Coverage (maximum)

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
<th>1:1</th>
<th>2:1</th>
<th>3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum area m²</td>
<td>420</td>
<td>525</td>
<td>700</td>
</tr>
</tbody>
</table>

For any Induction Loop System, area coverage is dependent on several factors. Please check these assumptions and contact Ampetronic for advice if required:

• Loop must be 1-2m above or below the receiver height
• There should be no metal structures in the plane of the loop
• Sufficient voltage to drive the loop – check the cable table below

Low Overspill or Low Loss Systems

ILD500 amplifiers are designed for use in combination with Ampetronic Ultra-Low Spill™ technology. This will require an SPF phase shifter and an array design – Ampetronic can provide designs or guidance for any application. Used to drive an array, two ILD500s can:

• Minimise ‘spill’ – confines signal to within 1.5m of room, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential rooms
• Compensate for high losses due to metal structures – the only effective solution for high loss environments to meet IEC60118-4

Maximum Cable Length

The ILD500 is designed for SINGLE TURN loops for optimum audio quality:

• Loops with DC resistance from 0.3 to 2.0Ω
• Impedance up to a maximum of 2.2Ω

Maximum cable length is dependent on cable type and on the application:

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Maximum Total Cable Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal use*</td>
</tr>
<tr>
<td>1.0mm² copper</td>
<td>83</td>
</tr>
<tr>
<td>2.5mm² copper</td>
<td>114</td>
</tr>
<tr>
<td>4.0mm² copper</td>
<td>118</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>147</td>
</tr>
</tbody>
</table>

* Short term speech (e.g. service counter, airport PA system) can cope with limited clipping at high frequencies – Ampetronic recommends delivery of full current up to 1.8kHz for these applications. Longer term usage or signals with music or high quality audio must deliver full current to at least 1.8kHz to prevent fatigue and give acceptable intelligibility. Many commercially available systems do not deliver sufficient voltage to reproduce critical high frequencies – ask Ampetronic for more details.
ILD500 Product Information

Equipment supplied as standard with the ILD500

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector

ILD500 optional accessories

Ampetronic can supply a range of accessories to meet the specific needs of your installation:

- Installation accessories
  - 18mm x 0.25mm copper tape
  - PVC extrusion to protect copper tape
  - Installation / warning tape to fix cable or tape to a floor
- Wall mount brackets WMF1-U
- Phase shifter SPS for an array system requires a design which can be provided by Ampetronic.
- Input adaptors A range of input adaptors and interface cables to accept most audio source inputs, see table below

Input adaptors and preamplifiers

By using the appropriate input adaptor or preamplifier the ILD500 will accept multiple additional inputs or audio inputs from other sources:

- Input type
  - Additional microphone and or line inputs
  - 100V line input
  - Low impedance speaker line
  - Unbalanced microphones

- Adaptor
  - MP221 mixer to 2 mics + 2 line inputs
  - ATT-UJ & ATT-UX transformer
  - MAT1 adaptor

Standards compliance

The ILD500 is CE marked to all relevant safety and EMC standards.

All Ampetronic amplifiers can be used to create a system that meets the requirements of IEC118-4 and the relevant recommendation of BS7594, however the design and installation of the system is equally important to meet these Induction Loop standards.

Some Ampetronic products are CSA registered for sale in the USA and Canada – contact Ampetronic for details.

INPUTS

- Power 85W 230V AC nominal, 45-65Hz [120V option available]
- Microphone XLR balanced microphone input for 200-800Ω microphones;
- Input 15dB user selectable gain boost; + 15V DC phantom power (selectable); sensitivity – 70dBu; front panel recessed gain control
- Line input 6.4mm jack socket balanced line input; sensitivity – 30dBu; overload protected; front panel recessed gain control.
- Slave I/O 6.4mm jack insert point for connection of SPS phase shifter 0dBu signal can be used for recording

OUTPUTS

- Drive voltage 14.1 Vrms (20.0Vpk) at maximum output current
- Drive current
  - 6.4 A rms (9.0Apk) continuous 1kHz sine wave
  - Short term peaks: >13A
  - Front panel recessed control
  - Drive current indicated on 6-LED display in 2dB increments
- Loop connector Neutrik NL4 (supplied)
- Loop Monitor Provides access to actual audio signal in loop 3.5mm stereo headphone connector on front panel

AUDIO SYSTEM

- Freq. response 80Hz to 6.5kHz
- Distortion THD+N <0.2% 1kHz sine at full current
- Automatic The AGC is optimised for speech. Dynamic range >36dB
- Gain Control Front panel recessed input level control
- Metal loss correction Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant.

ADDITIONAL FUNCTIONS

- Fault Three LED fault indicators on the front panel;
- Monitoring Overload – delivering over the rated current
- Overheat – unit is too hot (mutes output signal)
- Loop error – short circuit / open circuit error
- Ancillary To supply Ampetronic ancillary units ±15V DC 0.15A power outlet on rear panel
- Cooling Forced ventilation. Air intake on left panel, air ejection at rear

PHYSICAL

- Size Full width 1U 19" rack mount.
- Mounting options
  - Freestanding
  - 1U 19" rack mount (brackets included)
  - Wall mounting (requires additional brackets)
- Weight 3.2kg
- Environment IP20 protection; 20 to 90% relative humidity; 0 to 35°C
ILD300 Professional Audio Induction Loop Driver

The ILD300 is a professional audio induction loop driver capable of driving loop areas in excess of 400m² with an unsurpassed clarity of sound for both music and speech for superior intelligibility. Based on proven and highly reliable technology it is backed by an unrivalled 5 year warranty and free technical support. Improved power output provides outstanding value without compromise. It has all the usual high quality features found on Ampetronic equipment such as metal loss correction and is compatible with our unique Ultra-Low Spill™ technology. The ILD300 is very compact and elegant, suitable for freestanding, wall mounting or rack mounting.

Features

- **Area coverage to >400m²**
- **Low lifetime cost**
  - Excellent proven reliability
  - 5 year warranty
- **Unparalleled sound quality**
  - Excellent intelligibility
  - Speech optimised gain control
  - High voltage headroom avoids high frequency clipping
- **Metal loss corrector** corrects frequency dependent loss from metal structures
- **Very compact**: 215 x 220 x 44mm
- **Microphone (XLR) and line inputs**
- **Extensive input adaptors** available for any audio input requirements
- **Free technical support line** for advice, design and install

Applications include

- Conference facilities
- Theatres
- Sports halls
- Educational environments
- Confidential rooms
- Courts
- Lecture Halls

### Perimeter Loops – Area Coverage (maximum)

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
<th>Maximum area m²</th>
<th>1:1</th>
<th>2:1</th>
<th>3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>250</td>
<td>310</td>
<td>420</td>
<td></td>
</tr>
</tbody>
</table>

For any Induction Loop System, area coverage is dependent on several factors. Please check these assumptions and contact Ampetronic for advice if required:

- Loop must be 1-2m above or below the receiver height
- There should be no metal structures in the plane of the loop
- Sufficient voltage to drive the loop – check the cable table below

### Low Overspill or Low Loss Systems

ILD300 amplifiers are designed for use in combination with Ampetronic Ultra-Low Spill™ technology. This will require an SP5 phase shifter and an array design – Ampetronic can provide designs or guidance for any application.

Used to drive an array, two ILD300s can:

- Minimise ‘spill’ – confines signal to within 1.5m of room, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential rooms
- Compensate for high losses due to metal structures – the only effective solution for high loss environments to meet IEC60118-4

### Maximum Cable Length

The ILD300 is designed for SINGLE TURN loops for optimum audio quality:

- Loops with DC resistance from 0.2 to 1.2Ω
- Impedance up to a maximum of 1.3Ω

Maximum cable length is dependent on cable type and on the application:

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Maximum Total Cable Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal use*</td>
</tr>
<tr>
<td>1.0mm² copper</td>
<td>49</td>
</tr>
<tr>
<td>2.5mm² copper</td>
<td>67</td>
</tr>
<tr>
<td>4.0mm² copper</td>
<td>70</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>87</td>
</tr>
</tbody>
</table>

* Short term speech (e.g. service counter, airport PA system) can cope with limited clipping at high frequencies – Ampetronic recommends delivery of full current up to 1.2kHz for these applications. Longer term usage or signals with music or high quality audio must deliver full current to at least 1.6kHz to prevent fatigue and give acceptable intelligibility. Many commercially available systems do not deliver sufficient voltage to reproduce critical high frequencies – ask Ampetronic for more details.
ILD300 Product Information

Equipment supplied as standard with the ILD300

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector

ILD300 optional accessories

Ampetronic can supply a range of accessories to meet the specific needs of your installation:

**Installation accessories**
- 18mm x 0.25mm copper tape
- PVC extrusion to protect copper tape
- Installation / warning tape to fix cable or tape to a floor

**Wall mount brackets** WML-1U
**Rack mount brackets** RM-1U

**Phase shifter** SP5 for an array system – use of and SP5 requires a design which can be provided by Ampetronic

**Input adaptors** A range of input adaptors and interface cables to accept most audio source inputs, see table below

**Input adaptors and preamplifiers**

By using the appropriate input adaptor or preamplifier the ILD300 will accept multiple additional inputs or audio inputs from other sources:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Adaptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional microphone</td>
<td>MP221 preamp</td>
</tr>
<tr>
<td>and/or line inputs</td>
<td>2 mic + 2 line inputs</td>
</tr>
<tr>
<td>100V line</td>
<td>ATT-UJ &amp; ATT-UX transformer</td>
</tr>
<tr>
<td>Low impedance speaker line</td>
<td>isolated attenuators</td>
</tr>
<tr>
<td>Unbalanced microphones</td>
<td>MAT1 adaptor</td>
</tr>
</tbody>
</table>

**Standards compliance**

The ILD300 is CE marked to all relevant safety and EMC standards.

All Ampetronic amplifiers can be created to system that meets the requirements of IEC118-4 and the relevant recommendation of BS7594, however the design and installation of the system is equally important to meet these Induction Loop standards.

Some Ampetronic products are CSA registered for sale in the USA and Canada – contact Ampetronic for details.

**INPUTS**

| Power                      | 35W 230V AC nominal, 45-65Hz [120V option available] |
|                           | Power switch and LED indicator on front panel          |
| Microphone input           | XLR balanced microphone input for 200-600Ω microphones; |
|                           | 15dB user selectable gain boost; + 15V DC phantom power |
|                           | (selectable); sensitivity – 70dBu; front panel recessed gain control |
| Line input                 | 6.4mm jack socket balanced line input; sensitivity – 30dBu; |
|                           | overload protected; front panel recessed gain control  |
| Slave I/O                  | 6.4mm jack insert point for connection of SP5 phase shifter |
|                           | 0dBu signal can be used for recording                  |

**OUTPUTS**

| Drive voltage              | 6.4Vrms (9.0Vpk) at maximum output current          |
| Drive current              | • 4.9 Arms (7.0A) continuous 1kHz sine wave         |
|                           | • Short term peaks >10 A                              |
|                           | • Front panel recessed control                       |
|                           | • Drive current indicated on 4-LED display in 3dB increments |
| Loop connector             | Wieland ST17/2 (supplied)                           |
| Loop Monitor               | Provides access to actual audio signal in loop       |
|                           | 3.5mm stereo headphone connector on front panel      |

**AUDIO SYSTEM**

| Freq. response             | 80Hz to 6.5kHz                                      |
| Distortion                 | THD+N <0.2% with 1kHz sine at full current          |
| Automatic                  | The AGC is optimised for speech. Range >36dBu       |
| Gain Control               | Front panel recessed input level control            |
| Metal loss correction      | Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave |
|                           | This does not compensate for signal loss from metal structures, which can be significant |

**ADDITIONAL FUNCTIONS**

| Fault                      | Three LED fault indicators on the front panel:      |
|                           | Overload – delivering over the rated current        |
|                           | Overheat – unit is too hot (mutes output signal)     |
|                           | Loop error – short circuit / open circuit error      |
| Ancillary                  | To supply Ampetronic ancillary units                |
|                           | ±15V DC 0.15A power outlet on rear panel             |
| Cooling                    | Cooling is by natural convection from product casing |

**PHYSICAL**

| Size                       | Half width 1U 19” rack mount                     |
|                           | Width 215 mm Depth 220mm Height 44mm            |
| Mounting options          | Freestanding                                     |
|                           | 1U 19” rack mount (requires additional rack tray) |
|                           | Wall mounting (requires additional brackets)      |
| Weight                    | 1.8kg                                            |
| Environment               | IP20 protection; 20 to 90% relative humidity; 0 to 35°C |

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support@ampetronic.co
phone +44 (0)1636 610062
fax +44 (0)1636 610063
The ILD122 is a professional audio induction loop driver capable of driving loop areas of up to 200m² with an unsurpassed clarity of sound for both music and speech for superior intelligibility. Based on proven and highly reliable technology it is backed by an unrivalled 5 year warranty and free technical support. Improved power output provides outstanding value without compromise. It boasts all the usual features found on Ampetronic equipment such as metal loss correction and is compatible with our unique Ultra-Low Spill™ technology. The ILD122 is very compact and elegant, suitable for freestanding, wall mounting or rack mounting.

Features

- **Area coverage to >200m²**
- **Low lifetime cost**
  - Excellent proven reliability
  - 5 year warranty
- **Unparalleled sound quality**
  - Excellent intelligibility
  - Speech optimised gain control
  - High voltage headroom avoids high frequency clipping
- **Metal loss corrector** corrects frequency dependent loss from metal structures
- **Very compact**: 215 x 220 x 44mm
- **Microphone (XLR) and line inputs**
- **Extensive input adaptors** available for any audio input requirements
- **Free technical support line** for advice, design and install
- **High voltage headroom** ideally suited to arrays and long cable lengths

Applications include

- Conference facilities
- Theatres
- Sports halls
- Educational environments
- Confidential rooms
- Courts
- Lecture Halls

Datasheet

**ILD122 Professional Audio Induction Loop Driver**

### Perimeter Loops – Area Coverage (maximum)

<table>
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<tr>
<th>Room aspect ratio</th>
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<td>2:1</td>
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</table>

For any Induction Loop System, area coverage is dependent on several factors. Please check these assumptions and contact Ampetronic for advice if required:

- Loop must be 1-2m above or below the receiver height
- There should be no metal structures in the plane of the loop
- Sufficient voltage to drive the loop – check the cable table below

### Low Overspill or Low Loss Systems

ILD122 amplifiers are designed for use in combination with Ampetronic Ultra-Low Spill™ technology. This will require an SP5 phase shifter and an array design – Ampetronic can provide designs or guidance for any application.

Used to drive an array, two ILD122s can:

- Minimise ‘spill’ – confines signal to within 1.5m of room, suitable for adjacent rooms e.g. cinemas, classrooms, or confidential rooms
- Compensate for high losses due to metal structures – the only effective solution for high loss environments to meet IEC60118-4

### Maximum Cable Length

The ILD122 is designed for SINGLE TURN loops for optimum audio quality:

- Loops with DC resistance from 0.2 to 1.8Ω
- Impedance up to a maximum of 2.0Ω

Maximum cable length is dependent on cable type and on the application:

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* Short term speech (e.g. service counter, airport PA system) can cope with limited clipping at high frequencies – Ampetronic recommends delivery of full current up to 1.2kHz for these applications. Longer term usage or signals with music or high quality audio must deliver full current to at least 1.6kHz to prevent fatigue and give acceptable intelligibility. Many commercially available systems do not deliver sufficient voltage to reproduce critical high frequencies – ask Ampetronic for more details.
ILD122 Product Information

Equipment supplied as standard with the ILD122

- Handbook and installation instructions
- 197 x 252mm loop system present sign (deaf logo)
- Region specific mains cable
- Loop connector

ILD122 optional accessories

Ampetronic can supply a range of accessories to meet the specific needs of your installation:

**Input adaptors**
A range of input adaptors and interface cables to accept most audio source inputs, see table below

**Installation accessories**
- 18mm x 0.25mm copper tape
- PVC extrusion to protect copper tape
- Installation / warning tape to fix cable or tape to a floor

**Wall mount brackets** - WML-1U
**Rack mount brackets** - RM-1U
**Phase shifter** - SP5 for an array system requires a design which can be provided by Ampetronic.

Input adaptors and preamplifiers

By using the appropriate input adaptor or preamplifier the ILD122 will accept multiple additional inputs or audio inputs from other sources:

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<tr>
<td>Unbalanced microphones</td>
<td>MAT1 adaptor</td>
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</table>

Standards compliance

The ILD122 is CE marked to all relevant safety and EMC standards. All Ampetronic amplifiers can be used to create a system that meets the requirements of IEC118-4 and the relevant recommendation of BS7594, however the design and installation of the system is equally important to meet these Induction Loop standards.

Some Ampetronic products are CSA registered for sale in the USA and Canada – contact Ampetronic for details.

**INPUTS**

- **Power**
  - 35W 230V AC nominal, 45-65Hz [120V option available]
  - Power switch and LED indicator on front panel
- **Microphone**
  - XLR balanced microphone input for 200-600µA microphones;
  - 15dB user selectable gain boost; + 15V DC phantom power (selectable); sensitivity ~ 70dBu; front panel recessed gain control.
- **Line input**
  - 6.4mm jack socket balanced line input; sensitivity ~ 30dBu; overload protected; front panel recessed gain control.
- **Slave I/O**
  - 6.4mm jack socket insert point for connection of SP5 phase shifter
  - 0dBu signal can be used for recording

**OUTPUTS**

- **Drive voltage**
  - 7.1Vrms (10Vpk) at maximum current output
- **Drive current**
  - 3.5A rms (5Apk) continuous 1kHz sine waves
  - Short term peaks >7Apk
  - Front panel recessed control
  - Drive current indicated on 4-LED display in 3dB increments
- **Loop connector**
  - Wieland ST17/2 (supplied)
- **Loop monitor**
  - Provides access to actual loop current via a 3.5mm stereo headphone connector on front panel

**AUDIOSYSTEM**

- **Freq. response**
  - 80Hz to 6.5kHz
- **Distortion**
  - THD + N=0.2% 1kHz sine at full current
- **Automatic**
  - The AGC is optimised for speech. Range >36dB
- **Gain control**
  - Front panel recess input level control
- **Metal loss correction**
  - Corrects system frequency response due to metal structures in a building. Gain constant at 1kHz, adjustable gain slope from 0 to 3dB per octave. This does not compensate for signal loss from metal structures which can be significant.

**ADDITIONAL FUNCTIONS**

- **Fault Monitoring**
  - Three LED fault indicators on the front panel:
    - Overload – delivering over the rated current
    - Overheat – unit is too hot (mutes output signal)
    - Loop error – short circuit / open circuit error
- **Ancillary**
  - To supply Ampetronic ancillary units ±15V DC 0.15A power outlet on rear panel
- **Cooling**
  - Cooling is by natural convection from product casing

**PHYSICAL**

- **Size**
  - Half width 1U 19" rack mount
  - Width 215mm Depth 220mm Height 44mm
- **Mounting options**
  - Freestanding
  - 1U 19" rack mount (requires additional rack tray)
  - Wall mounting (requires additional brackets)
- **Weight**
  - 1.8kg
- **Environment**
  - IP20 protection; 20 to 90% relative humidity; 0 to 35ºC
The Ampetronic CLS2 is the second unit in a series of induction loop drivers aimed at the demands of the electrical and audio-visual contractor.

Designed for simple discreet installation, the CLS2 is the most capable driver in its class. The amplifier is very compact, yet the most powerful unit available designed specifically for wall mounting. All connections and controls are secured behind a tamper resistant, hinged, detachable cover. Combined with its small size, the range of mounting and cabling options ensure that installation is convenient and tidy in any environment. Input options are extensive, with four independent inputs for balanced microphone, balanced and unbalanced line, low impedance and 100V - line speaker systems, plus priority alarm, doorbell or telephone connections.

Backed by Ampetronic’s standard 5 year warranty and comprehensive support services, the CLS2 is truly fit and forget.

**Features**

- Quick and simple to install
- Area coverage to >400m²
- Highest power loop driver in class
- 4 independent configurable inputs
- Wall mounted
- Metal Loss Correction
- 5 Year warranty
- Cabling and controls behind tamper resistant cover
- 2 Priority alarm inputs
- Free Technical support

**Applications include**

- Community Centres
- Board rooms
- Churches
- Interview rooms
- Meeting rooms
- Classrooms

---

### Perimeter Loops – Area Coverage (maximum)

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
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<th>3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum area m²</td>
<td>250</td>
<td>310</td>
<td>400</td>
</tr>
</tbody>
</table>

For any Induction Loop System, area coverage is dependent on several factors. Please check these assumptions and contact Ampetronic for advice if required:

- Loop must be 1-2m above or below the receiver height
- There should be no metal structures in the plane of the loop
- Sufficient voltage to drive the loop – check the cable table below

### Maximum Cable Length

The CLS2 is designed for SINGLE TURN loops for optimum audio quality:

- Loops with DC resistance from 0.2Ω
- Impedance up to a maximum of 1.3Ω

Maximum cable length is dependent on cable type and on the application:

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Normal use</th>
<th>Transient speech</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0mm² copper</td>
<td>49</td>
<td>57</td>
</tr>
<tr>
<td>2.5mm² copper</td>
<td>67</td>
<td>85</td>
</tr>
<tr>
<td>4.0mm² copper</td>
<td>70</td>
<td>91</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>87</td>
<td>101</td>
</tr>
</tbody>
</table>
The CLS2 enclosure is designed for simple, permanent installation, with secure lid protecting connections and controls, while leaving operation indicators visible. The case is designed to make access simple, and to ensure the amplifier can be installed in the most constrained spaces.

Mounting

Designed for vertical panel mounting using 4 screws (6 holes provided). Template for screw placements provided. The CLS2 is compact enough to fit on a 1U rack tray with feet removed.

Enclosure access

Hinged lid, secured by 2 Phillips PH2 screws. Lid can be removed completely, if required for ease of access, or if there is no room to hinge the lid forwards.

Cable routing

Knock-outs (diameter 20mm) are provided for routing cables into the enclosure. 2 on the top edge, 4 on the rear face, 4 on the bottom edge, providing excellent installation flexibility.

Cable connections

All input cable connections are made with screw terminals mounted on one side of the PCB. Mains power connections are made to a chassis mounted screw terminal block. Loop connection is made to a screw terminal pair mounted on the PCB. Cable connections are illustrated on a detailed label on the case interior.

Indicators

3 LED indicators are visible with the case open or closed:
- AGC (Amber) LED lit when input signal is activating the automatic gain control
- Current (Green) LED lit when current is running in the loop
- Power (Green) LED lit when the unit has power

Controls

Five controls are located to be accessed only with the lid open, all screwdriver adjustable.
- Level controls for inputs 1, 2, 3 and 4
- Metal loss correction
- Loop drive current

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input 1</strong></td>
<td><strong>Drive voltage</strong></td>
</tr>
<tr>
<td>Input 1 Balanced Mic, balanced or unbalanced line</td>
<td><strong>Drive Current</strong></td>
</tr>
<tr>
<td>Input impedance 10kΩ per side</td>
<td><strong>Minimum Loop Resistance</strong></td>
</tr>
<tr>
<td>Min level (MIC / Line -73dBu / -31dBu</td>
<td><strong>Maximum Loop Impedance</strong></td>
</tr>
<tr>
<td>Max level (MIC / Line) -37dBu / +5dBu</td>
<td><strong>Frequency Response</strong></td>
</tr>
<tr>
<td>Phantom voltage MIC only +12V</td>
<td><strong>Distortion</strong></td>
</tr>
<tr>
<td><strong>Input 2</strong></td>
<td><strong>Automatic Gain Control</strong> (AGC)</td>
</tr>
<tr>
<td>Input 2 Balanced mic</td>
<td><strong>Metal loss correction</strong> (MLC)</td>
</tr>
<tr>
<td>Input impedance 10kΩ per side</td>
<td></td>
</tr>
<tr>
<td>Min level -73dBu</td>
<td></td>
</tr>
<tr>
<td>Max level -37dBu</td>
<td></td>
</tr>
<tr>
<td>Phantom voltage +12V</td>
<td></td>
</tr>
<tr>
<td><strong>Input 3</strong></td>
<td><strong>AC power input supply</strong></td>
</tr>
<tr>
<td>Balanced or unbalanced line, expansion port</td>
<td>120V option available (ETL Approved)</td>
</tr>
<tr>
<td>Input impedance 33dBu</td>
<td>Connected via chassis mounted screw terminal block</td>
</tr>
<tr>
<td>Min level -33dBu</td>
<td><strong>Input fuse</strong></td>
</tr>
<tr>
<td>Max level +3dBu</td>
<td>230V version - T250mA / 120V version - T500mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUDIO SYSTEM</th>
<th>PHYSICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Response</strong></td>
<td><strong>Cooling</strong></td>
</tr>
<tr>
<td>80Hz to 6.3kHz ±3dB</td>
<td><strong>Environment</strong></td>
</tr>
<tr>
<td><strong>Distortion</strong></td>
<td><strong>Dimensions</strong></td>
</tr>
<tr>
<td>THD+N &lt;0.5%1kHz sine at 2.33A</td>
<td><strong>Weight</strong></td>
</tr>
<tr>
<td><strong>Automatic Gain Control</strong> (AGC)</td>
<td><strong>Mounting</strong></td>
</tr>
<tr>
<td>Optimised for speech. Dynamic range &gt;36dB</td>
<td></td>
</tr>
<tr>
<td><strong>Metal loss correction</strong> (MLC)</td>
<td></td>
</tr>
</tbody>
</table>

Standards Compliance

The CLS2 is CE marked to all relevant safety and EMC standards, including EN60065 and EN55103. Safe operation is subject to correct installation. Using the CLS2-R1, an Audio Frequency Induction Loop system that meets the requirements of IEC 60118-4 can be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.

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fax +44 (0)1636 610063
The Ampetronic CLS1 is the first in a series of induction loop drivers aimed at the demands of the electrical and audio-visual contractor.

Designed for simple discrete installation, the CLS1 offers the most cost effective and capable solution in its class. The amplifier is very compact and designed specifically for wall mounting. All connections and controls are secured behind a tamper resistant, hinged, detachable cover. Combined with its small size, the range of mounting and cabling options ensure that installation is convenient and tidy in any environment. Input options are comprehensive, with three independent inputs for balanced microphone, balanced and unbalanced line, low impedance and 100V - line speaker systems.

Backed up by Ampetronic’s standard 5 year warranty and comprehensive support services, the CLS1 is truly fit and forget.

**Features**

- Quick and simple to install
- Area coverage to >200m²
- 3 independent configurable inputs
- Wall mounted
- Metal Loss Correction
- 5 Year warranty
- Cabling and controls behind tamper resistant cover
- Free Technical support

**Applications include**

- Community Centres
- Board rooms
- Churches
- Interview rooms
- Meeting rooms
- Classrooms

**Perimeter Loops – Area Coverage (maximum)**

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<td>Maximum area m²</td>
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For any Induction Loop System, area coverage is dependent on several factors. Please check these assumptions and contact Ampetronic for advice if required:

- Loop must be 1-2m above or below the receiver height
- There should be no metal structures in the plane of the loop
- Sufficient voltage to drive the loop – check the cable table below

**Maximum Cable Length**

The CLS1 is designed for SINGLE TURN loops for optimum audio quality:

- Loops with DC resistance from 0.2Ω
- Impedance up to a maximum of 1.8Ω

Maximum cable length is dependent on cable type and on the application:

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Maximum Total Cable Length (m)</th>
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</tr>
<tr>
<td>1.0mm² copper</td>
<td>68</td>
</tr>
<tr>
<td>2.5mm² copper</td>
<td>93</td>
</tr>
<tr>
<td>4.0mm² copper</td>
<td>97</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>120</td>
</tr>
</tbody>
</table>
CLS1 Product Information

The CLS1 enclosure is designed for simple, permanent installation, with secure lid protecting connections and controls, while leaving operation indicators visible. The case is designed to make access simple, and to ensure the amplifier can be installed in the most constrained spaces.

Mounting

Designed for vertical panel mounting using 4 screws (6 holes provided). Template for screw placements provided. The CLS1 is compact enough to fit on a 1U rack tray with feet removed.

Enclosure access

Hinged lid, secured by 2 Phillips PH2 screws. Lid can be removed completely, if required for ease of access, or if there is no room to hinge the lid forwards.

Cable routing

Knock-outs (diameter 20mm) are provided for routing cables into the enclosure. 2 on the top edge, 4 on the rear face, 4 on the bottom edge, providing excellent installation flexibility.

Cable connections

All input cable connections are made with screw terminals mounted on one side of the PCB. Mains power connections are made to a chassis mounted screw terminal block. Loop connection is made to a screw terminal pair mounted on the PCB. Cable connections are illustrated on a detailed label on the case interior.

Indicators

3 LED indicators are visible with the case open or closed:
- AGC (Amber) LED lit when input signal is activating the automatic gain control
- Current (Green) LED lit when current is running in the loop
- Power (Green) LED lit when the unit has power

Controls

Five controls are located to be accessed only with the lid open, all screwdriver adjustable:
- Level controls for inputs 1, 2 and 3
- Metal loss correction
- Loop drive current

Inputs

<table>
<thead>
<tr>
<th>Input</th>
<th>Balanced Mic, balanced or unbalanced line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Input impedance 10kΩ per side</td>
</tr>
<tr>
<td></td>
<td>Min level (MIC / Line) -73dBu / -31dBu</td>
</tr>
<tr>
<td></td>
<td>Max level (MIC / Line) -37dBu / +5dBu</td>
</tr>
<tr>
<td></td>
<td>Phantom voltage MIC only +12V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Balanced or unbalanced line, expansion port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Input impedance 1MΩ per channel</td>
</tr>
<tr>
<td></td>
<td>Min level -33dBu</td>
</tr>
<tr>
<td></td>
<td>Max level +3dBu</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Isolated 100V line or low impedance mono or stereo speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Input impedance 100V Line / spkr 120kΩ / 7.8kΩ</td>
</tr>
<tr>
<td></td>
<td>Min level 100V Line / spkr +14dBu / -9dBu</td>
</tr>
<tr>
<td></td>
<td>Max level 100V Line / spkr +47dBu / +27dBu</td>
</tr>
</tbody>
</table>

AC power input supply

- 230V 30W 45-65Hz
- 120V option available (ETL Approved)

Connected via chassis mounted screw terminal block

Input fuse

- 230V version - T250mA / 120V version - T500mA

Outputs

<table>
<thead>
<tr>
<th>Drive voltage</th>
<th>&gt;6.4Vrms - 9.0Vrms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Current</td>
<td>Continuous 1kHz sine wave &gt;3.3Apeak 5.0Apk</td>
</tr>
<tr>
<td>Minimum Loop Resistance</td>
<td>0.2Ω</td>
</tr>
<tr>
<td>Maximum Loop Impedance</td>
<td>1.8Ω</td>
</tr>
</tbody>
</table>

Audio System

- Frequency Response 80Hz to 6.3kHz ±3dB
- Distortion THD+N <0.5% 1kHz sine at 1.66Apeak
- Automatic Gain Control (AGC) Optimised for speech. Dynamic range >36dB
- Metal loss correction (MLC) 0 to 3dB per octave frequency correction (1kHz remains constant). Control mounted on PCB.

Physical

- Size | Cooling Natural convection
- Environment | IP20, -10°C to +40°C
- Dimensions | W, H, D: 200mm, 200mm, 44mm
- Weight | 1.8kg
- Mounting | Wall mounting, secured by 4 screws

Standards Compliance

The CLS1 is CE marked to all relevant safety and EMC standards, including EN60065 and EN55103. Safe operation is subject to correct installation. Using the CLS1, an Audio Frequency Induction Loop system that meets the requirements of IEC 60118-4 can be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.
CLD1 / CLD1-AC Compact Loop Driver

The CLD1 Compact Loop Driver is designed for counter systems and small area perimeter loop systems. Measuring only 128 x 74 x 35mm and with an output current of 2.4Arms, the CLD1 is the smallest and highest performance amplifier in its class. Designed and built to Ampetronic’s high standards of reliability, backed with a 5 year warranty and Ampetronic support, the CLD1 offers certainty of performance and the lowest lifetime cost available.

Audio quality is ensured with metal loss correction (MLC) combined with Ampetronic’s usual high standards of design. The CLD1 is designed for flexibility and convenience, featuring 2 separate microphone inputs with independent level controls, one of which can be configured as a line input. All cable connections are made on a single face of the unit, adding flexibility and further simplifying installation.

Features
- Low lifetime cost
- 5 Year warranty
- Very compact
- Choice of microphone and pre-formed loop in counter kit
- 2 independent inputs featuring 1 mic input and 1 switchable mic/line input
- Metal loss compensation
- All connections to a single face for installation convenience
- 12V DC or external AC power pack supplied as standard. CLD1-AC has integral power supply
- Free technical support

Applications include
- Ticket and service counters
- Retail counters
- Information kiosks
- Reception desks
- Interview rooms
- Small meeting rooms
- Taxis and private cars

Datasheet

Counter Loops
When supplied as a counter loop kit, the CLD1 comes with choice of microphone, a multi-turn preformed loop, power supply and simple installation instructions.

The loop should be mounted vertically in accordance with the installation instructions. Other installation methods are also available.

The CLD1 in this application will project a field to the requirements of IEC60118-4 approximately 1m from the preformed loop.

Perimeter Loops – Area Coverage (maximum)
The CLD1 is designed for small perimeter loop applications in rooms or in vehicles. Coverage with a single turn loop:

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
<th>1:1</th>
<th>2:1</th>
<th>3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum area coverage m²</td>
<td>20</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

- The loop is 1-2m above or below the receiver height
- There are no metal structures in the plane of the loop
- There is sufficient voltage to drive the cable length – check table below.

The CLD1 is DC powered making it ideal for use in small vehicles such as taxis, private cars and small boats. We recommend a multi-turn loop in the headlining of the vehicle cabin – contact Ampetronic for an application guide.

Maximum Cable Length
With maximum current output the CLD1 can drive:
- Loops with DC resistance from 0.3 to 1.0Ω
- Impedance up to a maximum of 1.3Ω

When operating below maximum output, the CLD1 can drive longer cable lengths – contact Ampetronic for more details.

Maximum cable length is dependent on cable type and on the application.

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Maximum Cable Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75mm² copper</td>
<td>44</td>
</tr>
<tr>
<td>1.0mm² copper</td>
<td>57</td>
</tr>
<tr>
<td>1.5mm² copper</td>
<td>71</td>
</tr>
<tr>
<td>1.8mm² flat copper tape</td>
<td>101</td>
</tr>
</tbody>
</table>
**Ordering Information**

The CLD1 compact loop driver can be ordered as a stand alone loop driver or as part of a kit for a specific application.

Counter loop kits comprise 1 x CLD1, 1 x preformed loop, 1 x microphone (choice), 1 x loop present sign, 1 x installation guide and 1 x power supply (region specific). The CLD1 is also available with an integral 100-240V power supply, part number CLD1-AC.

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Product Code External PSU</th>
<th>Product Code Internal PSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact loop driver</td>
<td>CLD1</td>
<td>CLD/AC</td>
</tr>
<tr>
<td>Counter loop kit + boundary microphone</td>
<td>CLD1/CB</td>
<td>CLD1/AC/CB</td>
</tr>
<tr>
<td>Counter loop kit + tie clip microphone</td>
<td>CLD1/CT</td>
<td>CLD1/AC/CT</td>
</tr>
<tr>
<td>Counter loop kit + desktop microphone</td>
<td>CLD1/CD</td>
<td>CLD1/AC/CD</td>
</tr>
</tbody>
</table>

**Input adaptors and preamplifiers**

By using the appropriate adaptor or preamplifier, the CLD1 can be used with inputs from other sources:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Adaptor required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balanced dynamic mic (XLR)</td>
<td>MAT60</td>
</tr>
<tr>
<td>Balanced capacitor phantom Power mic (XLR)</td>
<td>MAT60DC + PSU</td>
</tr>
<tr>
<td>100V line input</td>
<td>ATT-UJ &amp; ATT-UX</td>
</tr>
<tr>
<td>Low impedance speaker line</td>
<td>isolated attenuators</td>
</tr>
</tbody>
</table>

**Standards compliance**

The CLD1 is CE marked to all relevant safety and EMC standards

The CLD1 will meet the requirements of IEC60118-4 and the relevant recommendations of BS7594 if specified and installed according to Ampetronic’s instructions

---

**INPUTS**

<table>
<thead>
<tr>
<th>Power</th>
<th>12V DC @ 1.0A max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fuse fitted to PCB, type T 1.6A L</td>
<td></td>
</tr>
<tr>
<td>- Green LED Power indicator.</td>
<td></td>
</tr>
<tr>
<td>AC Power adapter</td>
<td>All integral 100-240V AC (CLD1/AC) 18W max.</td>
</tr>
<tr>
<td>- Regional plug also available</td>
<td></td>
</tr>
<tr>
<td>Input 1</td>
<td>Microphone input</td>
</tr>
<tr>
<td>- Suitable for unbalanced electret microphone</td>
<td></td>
</tr>
<tr>
<td>- 3.5mm mono jack socket</td>
<td></td>
</tr>
<tr>
<td>- Input impedance 8kΩ</td>
<td></td>
</tr>
<tr>
<td>- 6v bias via 10kΩ source</td>
<td></td>
</tr>
<tr>
<td>- Sensitivity -60dBu for max output</td>
<td></td>
</tr>
<tr>
<td>- Overload level -14dBu.</td>
<td></td>
</tr>
<tr>
<td>- Recessed control on front panel</td>
<td></td>
</tr>
<tr>
<td>Input 2</td>
<td>Switchable line / microphone</td>
</tr>
<tr>
<td>- Recessed switch on connector panel</td>
<td></td>
</tr>
<tr>
<td>- Microphone as for input 1</td>
<td></td>
</tr>
<tr>
<td>- Line input:</td>
<td></td>
</tr>
<tr>
<td>- Input impedance 820kΩ</td>
<td></td>
</tr>
<tr>
<td>- Sensitivity -20dBu for max output</td>
<td></td>
</tr>
<tr>
<td>- Overload: &gt;+20dBu.</td>
<td></td>
</tr>
</tbody>
</table>

**OUTPUTS**

| Drive voltage                        | >3.2Vrms >4.5Vpk at maximum output current |
| Drive current                        | 2.4Aasic, 3.4Aload continuous 1kHz sine wave |
| - Short term peak >4.8Amax           |                    |
| - LED indicator on front panel       |                    |
| Loop resistance                      | 0.3Ω to 1.0Ω resistive or <1.3Ω maximum reactive impedance |
| Loop connector                       | Vibration proof clamps, accept 0.5 to 1.3mm² |

**AUDIO SYSTEM**

| Frequency response                   | 80Hz to 6.3kHz ±1.5dB |
| Automatic gain control               | AGC optimised for speech |
| - Dynamic range >36dB                |                    |
| - Green LED indicator on front panel |                    |
| Metal loss correction                | 0 to 4.5dB/octave |
| - Recessed control on front panel    |                    |

**PHYSICAL**

| Cooling                              | Natural convection |
| Dimensions                           | 128mm, 74mm, 35mm |
| Weight                               | 280g (CLD1), 400g (CLD1 AC) |
| Environment                          | IP20 : 20 to 90% relative humidity, -20°C to 50°C |
| Mounting                             | Horizontal or vertical panel or wall mount, with 2 screw fixings |
HLS-DM1 Compact Class D Hearing Loop Driver

The Hearing Loop System Driver Module is an advanced Induction Loop driver for use in smaller area local applications. The unit is designed to be integrated into communication systems such as elevators, intercoms, help points and kiosk systems etc. It is backed by Ampetronic’s 5-year warranty and free technical support.

The HLS-DM1 uses efficient class D current drive technology to reduce power consumption and heat output. It is the only small area induction loop driver capable of reliably driving most practical local area loops to meet the IEC60118-4 Standard even where available power or allowable heat is limited, e.g. using PoE or in sealed plastic enclosures. The transformer isolated balanced input allows simple connection to all intercoms, help points and kiosk systems, making the HLS-DM1 the obvious choice for any quality intercom system.

**Features**

- **Compact & lightweight**
  Ideal for low profile OEM integrations
- **Low power consumption & simple integration**
- **Area coverage of up to 45m²**
  With perimeter loop
- **Localised area loops**
  Counters, walls, panels etc
- **Low lifetime cost**
  Excellent reliability, 5 year warranty & free technical support
- **Power supply**
  - 8 to 22V DC (Standard version)
  - Power-over-Ethernet option
  - 115V / 230V AC mains option
- **Transformer isolated input**
- **Metal loss correction**
- **Unrivalled intelligibility**

**Applications include:**

- **Intercom systems for most environments:**
  - Lifts / elevators
  - Help & information points
  - Refuge points
  - Door entry systems
  - Car parks & toll booths
  - Security barriers & drive throughs
- **Information points & kiosks**
- **Interactive exhibits**

---

**Small area perimeter loop applications**

For small areas a loop can be placed in the floor or ceiling where it is practical. This application is particularly suited to installation on elevator ceilings and use of flat copper tape under carpets. Installation of loop wire in concrete screed is possible with correctly specified cable/insulation.

- Small floor / ceiling loop (minimum 0.8m²)
  This is the preferred method, where viable.
- Elevator ceiling loop (maximum 1.6 x 2.4m²)
  Requires careful design due to the inherent metal loss within the structure.

**Localised vertical loop applications**

For local loops at general intercoms, information points, drive-throughs and small interactive exhibits, there are a number of solutions depending upon installation practicality.

- Small vertical loop surrounding the intercom recessed into wall / brickwork (right)
- Small vertical loop below intercom, in panel or on wall
- Smaller loop inside intercom case (see figure 3)
  Greatest field strength variation but may be only practical option
  Often not viable if enclosure is mild steel or aluminium

In all cases, the number of loop turns and wire type depends on the loop size and your application - contact Ampetronic for advice.

**Perimeter Loops Area Coverage**

The HLS-DM1 can be used to cover a small area using a perimeter loop. A two-turn loop will give best results in these small areas:

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
<th>1:1</th>
<th>2:1</th>
<th>3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum area m²</td>
<td>70</td>
<td>68</td>
<td>66</td>
</tr>
</tbody>
</table>

* Wire must be 1.5mm² for optimum audio performance in maximum areas shown - see handbook for maximum area with each wire size. Contact Ampetronic for further advice if best choice is unclear.
There are a number of power supply options:

- **8-22V DC**: Typical local DC supply inside equipment where another supply is already present.
- **115/230V AC mains option**: for use where mains power is present and no other power supply is already present.
- **PoE (Power over Ethernet) option**: allows power to be taken over the data cable of an internet intercom. A second cable can be run out, or there may be enough spare power on the existing link.

Whilst the HLS-DM1 draws less than 2.4W with typical signals, you should still check that an existing supply has enough spare capacity.

### Standards Compliance

**Safety, EMC**

The HLS-DM1 is CE marked to indicate compliance with relevant product safety and EMC standards.

**Loop Performance**

The HLS-DM1 will enable an Audio Frequency Induction Loop system that meets the requirements of IEC 60118-4:2006 to be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.

### Datasheet & Specifications

All information specified on this datasheet has been compiled in accordance with the IEC 62489-1: 2010 Standard and reflects actual performance in realistic applications.

**Installation Guide:**

Group inputs 1/2 with DC power cabling, separate from Loop feed cable.

When mounting the unit leave clearance above and below the board to meet relevant safety Standards. Mount using 4 x M3 machine screws or insulated sticky pad on the reverse side of the board.

---

**INPUTS**

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Standard format: 12V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Cage clamp for 0.5 - 1.5mm²</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>12V DC</td>
</tr>
<tr>
<td>Voltage range</td>
<td>8-22V DC</td>
</tr>
<tr>
<td>Fuse</td>
<td>1.5A PTC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>2.4W (200mA) continuous pink noise 6W (500mA) continuous sine 0.78W (83mA) quiescent 0.17W (14mA) quiescent Power Save 11W (920mA) max short term peak</td>
</tr>
<tr>
<td>Indication</td>
<td>LED on PCB</td>
</tr>
</tbody>
</table>

**Input 1**

| Connector    | Cage clamp for 0.2 - 0.75mm² |
| Rated source impedance | 1.8kΩ differential, 1500V |
| Sensitivity   | -16dBu for full output |
| Overload      | > +22dBu |
| Bias          | 12V though 11kΩ |
| Adjustment    | Level control, per channel |

**Input 2**

| Connector    | Cage clamp for 0.2 - 0.75mm² |
| Rated source impedance | 10kΩ differential, 190kΩ differential, 100Ω differential, 100Ω differential, |
| Sensitivity   | -50dBu |
| Overload      | > -23dBu |
| Bias          | 12V through 11kΩ |
| Adjustment    | Level control, per channel |

**OUTPUTS**

**Loop Output**

| Connector    | Cage clamp for 0.5 - 1.5mm² |
| Compliance voltage | 4.2V<sub>rms</sub> (6V<sub>p-p</sub>) |
| Max output current (sine) | 2.5A<sub>peak</sub> (3.5A<sub>peak</sub>) |
| Rated temperature limited | |
| Output current (pink) | 1.3A<sub>peak</sub> |
| Rated time for delivery | 1min |
| Rated THD | < 0.5% |
| Output Impedance | > 9Ω |
| Current Adjustment | Full range |
| Current Indication | LED indicates 1A<sub>peak</sub> |
| Loop Impedance | 0.3Ω to 1.0Ω, 1.3Ω reactive at 1.6 kHz |
| Rated Load | 80uH, 0.5R |

**AUDIO SYSTEM**

**Freq. Response**

100Hz to 5kHz ±1.5dB relative to 1kHz at low level, measured as loop current with no metal loss correction.

**Compression (AGC)**

Time constants optimised for speech

Dynamic range: > 36dB

Control: by adjusting input level/gain

Indication: LED on PCB

**Metal Loss Correction**

0dB to 3dB / octave boost

**PHYSICAL**

**Dimensions**

- Width: 70mm
- Length: 90.5mm
- Height: 9mm + mounting clearance

**Weight**

35g (12VDC)

**Connections**

Wago 2060/2061 cage clamp for solid core or untinned fine stranded wire.

**Environment**

IP00: (PCB for integration) <90% relative humidity, -30 to 75 °C

Heat dissipation <3W maximum, normally less

---

**AMPETRONIC**

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fax +44 (0)1636 610063
HLS-DM2 Compact Class D Hearing Loop Driver

The Hearing Loop System Driver Module is an advanced Induction Loop driver for use in smaller area local applications. The unit is designed to be integrated into communication systems such as elevators, intercoms, help points and kiosk systems etc. It is backed by Ampetronic's 5-year warranty and free technical support.

The HLS-DM2 uses efficient class D current drive technology to reduce power consumption and heat output. It is the only small area induction loop driver capable of reliably driving most practical local area loops to meet the IEC60118-4 Standard even where available power or allowable heat is limited, e.g. using PoE or in sealed plastic enclosures.

The transformer isolated balanced input allows simple connection to all intercoms, help points and kiosk systems, making the HLS-DM2 the obvious choice for any quality intercom system.

Features

• **Compact & lightweight**
  Ideal for low profile OEM integrations

• **Low power consumption & simple integration**

• **Area coverage of up to 45m²**
  With perimeter loop

• **Localised area loops**
  Counters, walls, panels etc

• **Low lifetime cost**
  Excellent reliability, 5 year warranty & free technical support

• **Power supply**
  - 8 to 22V DC (Standard version)
  - Power-over-Ethernet option
  - 115V / 230V AC mains option

• **Transformer isolated input**

• **Metal loss correction**

• **Unrivalled intelligibility**

Applications include:

• **Intercom systems for most environments:**
  - Lifts / elevators
  - Help & information points
  - Refuge points
  - Door entry systems
  - Car parks & toll booths
  - Security barriers & drive throughs

• **Information points & kiosks**

• **Interactive exhibits**

Small area perimeter loop applications

For small areas a loop can be placed in the floor or ceiling where it is practical. This application is particularly suited to installation on elevator ceilings and use of flat copper tape under carpets. Installation of loop wire in concrete screed is possible with correctly specified cable/insulation.

- Small floor / ceiling loop (minimum 0.8m square)
  This is the preferred method, where visible.

- Elevator ceiling loop (maximum 1.6 x 2.4m square)
  Requires careful design due to the inherent metal loss within the structure.

Localised vertical loop applications

For local loops at general intercoms, information points, drive-throughs and small interactive exhibits, there are a number of solutions depending upon installation practicality.

- Small vertical loop surrounding the intercom recessed into wall / brickwork (right)

- Small vertical loop below intercom, in panel or on wall
  Produces a more varying field strength but may be easier to install

- Smaller loop inside intercom case (see figure 2)
  Greatest field strength variation but may be only practical option
  Often not viable if enclosure is mild steel or aluminium

In all cases, the number of loop turns and wire type depends on the loop size and your application - contact Ampetronic for advice.

Perimeter Loops Area Coverage

The HLS-DM2 can be used to cover a small area using a perimeter loop. A two-turn loop will give best results in these small areas:

<table>
<thead>
<tr>
<th>Room aspect ratio</th>
<th>1:1</th>
<th>2:1</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Maximum area m²</td>
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<td>68</td>
<td>66</td>
</tr>
</tbody>
</table>

* Wire must be 1.5mm² for optimum audio performance in maximum areas shown - see handbook for maximum area with each wire size. Contact Ampetronic for further advice or if best choice is unclear.
HLS-DM2 Product Information

There are a number of power supply options:

- 8-22V DC: Typical local DC supply inside equipment where another supply is already present.
- 115/230V AC mains option: for use where mains power is present and no other power supply is already present.
- PoE (Power over Ethernet) option: allows power to be taken over the data cable of an internet intercom. A second cable can be run out, or there may be enough spare power on the existing link.

Whilst the HLS-DM2 draws less than 2.4W with typical signals, you should still check that an existing supply has enough spare capacity.

Standards Compliance

Safety, EMC

The HLS-DM2 is CE marked to indicate compliance with relevant product safety and EMC standards.

Loop Performance

The HLS-DM2 will enable an Audio Frequency Induction Loop system that meets the requirements of IEC 60118-4: to be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.

Datasheet & Specifications

All information specified on this datasheet has been complied in accordance with the IEC 62489-1: 2010 Standard and reflects actual performance in realistic applications.

Installation Guide:

Group inputs 1/2 with DC power cabling, separate from Loop feed cable.

When mounting the unit leave clearance above and below the board to meet relevant safety Standards. Mount using 4 x M3 machine screws or insulated sticky pad on the reverse side of the board.
HLS-2B Class D Hearing Loop Driver with Battery Back-Up

The HLS-2B hearing loop driver features a DM2 Induction Loop driver in an advanced rugged amplifier enclosure primarily designed for lift/elevator applications or other industrial environments.

The HLS series units feature efficient class D current drive technology to reduce power consumption and heat output and are the only small area induction loop solutions capable of reliably driving most practical small area loops in high metal environments to meet the IEC60118-4 Standard.

The amplifier enclosure is constructed of a robust steel housing and the solution features a battery back-up in the event of a power failure that will provide 12 hours of standby time or 2 hours in full operation. It is further protected by a 5 year warranty from Ampetronic.

The magnetic field strength and distribution in a lift car will be highly dependent on installation method and the construction of the lift car. It is strongly recommended that you contact Ampetronic for free technical support and advice on the best methodology and design for your specific application.

Features

• Compact & lightweight
• Class D Efficiency
• Unrivalled Intelligibility
• 2 transformer isolated inputs
• Simple Integration
• Full Area Coverage Lifts
• Metal loss correction
• Unrivalled intelligibility
• Low lifetime cost
  Excellent reliability, 5 year warranty & free technical support

- 1:1 Potential area coverage of up to 36m²
  Single turn 2.5mm wire floor level loop @ 1:1 ratio, 2m feed cable, no metal loss

- 3:1 Potential area coverage of up to 29m²
  Single turn 2.5mm wire, floor level loop @ 3:1 ratio, 2m feed cable, no metal loss

- 1:1 Practical lift application area coverage of up to 16m²
  Ceiling mounted lift bars @ 2.1m height, 1m feed cable, 12dB metal loss

- 1:1 Practical lift application area coverage of up to 12m²
  Ceiling mounted lift bars @ 2.1m height, 2m feed cable, 12dB metal loss

Recommended installation – full area coverage / perimeter loop

The HLS-2B is designed to provide full area coverage of the lift car by driving a single turn loop around the perimeter of the lift car positioned at ceiling height. The loop must not be behind metal panels or inside a metal enclosure in the roof space as this normally causes unacceptable reduction and distortion of the magnetic field.

There are two standard options for the loop itself:

LOOP BARS - The most robust solution is to attach custom built stainless steel loop bars to the ceiling inside the lift. Loop bars can be custom designed and supplied by Ampetronic to fit your specific requirements. Loop bars provide a robust and aesthetically pleasing solution with excellent performance.

LOOP CABLE - In some lifts it is possible to fit a single coil of 2.5 mm² loop cable inside the lift behind non-metallic trim, or in rare cases inside the roof space if non-metallic.

Localised area coverage installation

Where an area coverage loop can not be installed, the HLS-2B can be used to drive a smaller loop placed on or inside non-metallic wall panels or trim (for this type of application it is also possible to use other lower cost Ampetronic HLS series amplifiers if the high level of robustness and battery backup of the HLS-2B is not required).

This style of installation restricts the useful magnetic field to an area no more than 1m from the loop coil, making such a small loop ineffective for large lifts and for use with a Public Address system or for safety communications such as a Voice Evacuation System.

Installation behind a metal panel or metal trim will rarely produce an effective magnetic field with any amplification method. Please contact Ampetronic for detailed guidance on the best installation method for your lift car or industrial environment.
Product Information

**Power**
- Nominal supply voltage: 230V 45-65 Hz
- Fuse: 1AT (120V AC Mains), 0.63AT (230V AC Mains)
- Supply current (max): 190 mA

**Battery backup**
- Battery capacity: 2.1 Ah 12 V
- Battery life: 12 hours standby plus 2 hours full power speech operation
- Power indicator: LED inside unit indicates power status
- Charging: Custom charging circuit to optimise battery life

**Accessories**
- Loop Bars: 2 or 4 bar loop assemblies built to fit the lift and can be finished in the same colour as lift interior.

**Standards Compliance**
**Safety, EMC**
The HLS-2B is CE marked to indicate compliance with relevant product safety and EMC standards.

**Loop Performance**
The HLS-2B will allow an Audio Frequency Induction Loop system that meets the requirements of IEC 60118-4 to be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.

**Datasheet & Specifications**
All information specified on this datasheet has been compiled in accordance with the IEC 62489-1: 2010 Standard and reflects actual performance in realistic applications.

**Inputs**
- **Power Supply**
  - Supply voltage range: 90-264V AC (Mains)
  - Connector: Fused screw terminal -
  - Power consumption: 230V AC Supply into rated load 1.5mm² solid core or untinned fine stranded wire.
  - Fuse: 1AT (120V)
    0.63AT (230V)
  - Power Consumption: 12W (110mA) continuous pink noise (230V AC supply) 25W (190mA) continuous sine 3.25W (<60mA) quiescent
  - Indication: LED on PCB
- **Input 1 & 2**
  - Connector: Wago 264 cage clamp for 0.78 - 2.5mm² solid core or untinned fine stranded wire
  - Line Level
    - Rated source impedance: 1.8kΩ differential,
    - Input isolation: 1500V
    - Rated source EMF (sensitivity): -16dBu for full output
    - Overload: > +22dBu
    - SnR: >90dB
    - Adjustment: Level control, per channel

**Outputs**
- **Loop Output**
  - Connector: Wago 264 cage clamp for 0.78 - 2.5mm² solid core or untinned fine stranded wire
  - Compliance voltage: 1.1VRMS (1.6Vpk)
  - Max output current (sine): 11ARMS
  - Rated time for delivery: 1min
  - Rated temperature limited output current (pink): 6ARMS
  - Rated THD: <1%
  - Output Impedance: >1Ω
  - Current Adjustment: Full range
  - Current Indication: LED indicates >3ARMS
- **Loop Impedance**
  - 0.1Ω to 0.2Ω, 0.14Ω reactive at 1.6 KHz
  - Rated Load: 9uH, 0.1R

**Audio System**
- **Freq. Response**
  - Time constants optimised for speech
  - Dynamic range: >36dB
  - Control: by adjusting input level/gain
  - Indication: LED on PCB
- **Compression (AGC)**
  - Control: 0dB to 3dB / octave boost
- **Metal Loss**
  - Correction: Adjustable

**Physical**
- **Dimensions**
  - Power Option: 230V AC
  - Width: 158mm
  - Length: 366mm
  - Height: 49mm
- **Weight**
  - 3kg
- **Environment**
  - IP22: <90% relative humidity, -20 to +50 °C (battery float life derates by 4% per °C above 25°C)
The XA88 is a specialist Audio Induction Loop driver designed for use on rail and other transport vehicles. The unit is designed for the OEM and vehicle engineering customer, to be integrated into public address and passenger communication systems on board the vehicle. It is backed by Ampetronic’s 5-year warranty and experienced specialist technical support.

The unit has two balanced transformer-isolated inputs (for connection to line-level sources or intercom/PA speaker systems), and provides superior sound quality with metal loss frequency response correction. The XA88 meets EMC and environmental standards for use on rail vehicles. With power supply options to suit many common rail and commercial vehicle power systems, and remote enable interfaces for more complex applications, it is the obvious choice for any quality on-board audio system that requires an Audio Induction Loop.

N.B. The XA88 rail and transport solution requires a detailed application review by Ampetronic to ensure compatibility with vehicle design for optimum operation.

Features
- Area coverage (no metal) >300m²
- Area coverage (metal vehicles) 25m²-100m² Depending upon metal & loop location
- Low lifetime cost Excellent reliability 5 year warranty
- Simple integration
- Power supply options Common transport supplies: 24VDC, 72VDC, 110VDC, others possible
- 2 transformer isolated inputs for direct intercom or PA line connection or 0dBu line input
- Metal loss correction Variable up to 4dB / octave
- Unrivalled intelligibility
- Free remote technical support

Applications include
- Metro Systems
- National and Regional Railways
- Trams & Light Rail (LRVs)
- Buses & Coaches

Typical Loop Installation
In a rail vehicle or bus, the floor, walls, and roof are all usually metal. To keep away from metal sheets near the plane of the loop (and thereby minimise loss of energy), it is most common to place the loop around the upper part of the wall, typically 1.8m to 2m above floor level. This is usually some 300mm below the roof height. The best location will depend on the exact vehicle design.

Metal Loss
Most transport vehicles have metal construction - the bodyshell is usually metal panels with frames and structural supports. Although the interior may use non-metal panels, an induction loop installed inside such a vehicle will experience significant loss of energy and changed frequency response.

The XA88 has sufficient loop drive capacity to overcome the loss of loop signal in most cases. The unit’s metal loss compensation will correct the frequency response up to 4dB/octave slope.

System Testing
Each vehicle design has a different metal construction, and so the metal loss will be different. The only reliable way to determine the metal loss - which determines the loop current - is to measure the performance of a trial loop installation in the same or a very similar design of vehicle. Ampetronic can provide site survey services to help you conduct a trial installation and effectively measure the proposed system’s performance. We can also provide a package of project services, carrying out commissioning or troubleshooting as required. Measurement instruments are available to help you or your customer to regularly test the installed loop’s performance.
**XA88 Product Information**

### Power Options

**XA88-24DC**  
Nominal voltage: 24V DC  
Voltage range: 14.4 - 33.6V DC  
Coupling: Direct - no power converter  
Overcurrent Protection: Internal replaceable fuse, T 4A L  
Power Consumption: 61W (2.54 A) continuous audio  
6W (0.25 A) quiescent  
150W (6.25 A) short-term peak

**XA88-72DC**  
Nominal voltage: 72V DC  
Voltage range: 43 - 108V DC  
Coupling: Isolated - uses power converter  
Overcurrent Protection: Current foldback in power converter & non-replaceable 7A fuse in converter  
Power Consumption: 70W (0.97 A) continuous audio  
10W (0.14 A) quiescent  
150W (2.08 A) short-term peak

**XA88-110DC**  
Nominal voltage: 110V DC  
Voltage range: 65 - 150V DC  
Coupling: Isolated - uses power converter  
Overcurrent Protection: Current foldback in power converter & non-replaceable 7A fuse in converter  
Power Consumption: 70W (0.84 A) continuous audio  
10W (0.09 A) quiescent  
150W (1.36 A) short-term peak

### Input Details

**Input 1**  
Low level: 3.6kΩ  
High Level: 120kΩ  
Sensitivity: -16dBu (130mV rms)  
Overload: > 19dBu (7.3V rms)  
15dBu (4.2V rms)  
236V rms

**Input 2**  
Low level: 3.6kΩ  
High Level: 36kΩ  
Sensitivity: -16dBu (130mV rms)  
Overload: > 19dBu (7.3V rms)  
> 49dBu (236V rms)

**Input 3**  
Optional - not normally fitted.  
Details to customer requirement.

### Connectors

The XA88 uses MIL-C-5015 connectors for proven reliability.  
CON 1: Signal Inputs  
10-pin 18-1 insert  
CON 2: Enable & Status  
6-pin 14S-6 insert  
CON 3: Power in & Loop out  
4-pin 14S-2 insert  
Chassis connectors on the unit are pins in a male shell.

### Standards Compliance

**Safety, EMC**  

**Loop Performance**  
The XA88 will enable an Audio Frequency Induction Loop system that meets the requirements of EN 60118-4:2006 to be created, if the system is specified, installed and commissioned in an appropriate manner, including observing Ampetronic instructions.

### Accessories

**Mounting Bracket or Tray**  
A mounting can be supplied for the XA88 in your project, subject to agreement of a suitable design. Previous projects have used a rack tray or an asymmetric bracket arrangement to match the available mounting space.  
Connectors  
Mating MIL-C-5015 style connectors can be supplied as an optional part.  
Please contact us to discuss accessories if required.

**INPUTS**

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Options for 24V, 72V or 110V DC (other voltages possible)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication</td>
<td>LED on front panel</td>
</tr>
<tr>
<td>Connector</td>
<td>MIL-C-5015 (2 pins of CON3)</td>
</tr>
</tbody>
</table>

**Safety Ground**  
M6 chassis stud (nut & star washer supplied)

**Signal Inputs**  
Quantity: 2 (3 to special order - ask for details)  
Typical Source: Intercom / PA line  
Level selection: In converter, by alternate pin choice  
Adjustment: Front Panel control, per channel  
Connector: MIL-C-5015 (10 pins, CON1)

**Enable Inputs**  
Quantity: one per input  
Format: Opto-isolated 1500V from internal circuits (enables have common external reference)  
Level: 5-24V DC enables relevant input.  
Input load: 3.4mA@5V, 16mA@24VDC  
Connector: MIL-C-5015 (4 pins of CON2)  
Indication: LED per channel on front panel

### OUTPUTS

**Loop Output**  
Includes configurable output transformer. Values shown at 1.67:1 ratio  
Voltage: 7.1Vrms (11Vpk) at max. drive current  
Current (max): > 11Ams (15.5Apk) with 1kHz sine  
Current (short term): 21Amp absolute max  
Current Adjustment: Front panel control  
Current Indication: LED on front panel  
Connector: MIL-C-5015 (2 pins of CON3)

**Loop Impedance**  
Up to 0.49Ω reactive at 1.6kHz, with transformer ratio 1.67:1

**Monitor/Status**  
Isolated contact, closed when power present & no fault  
Isolation: 1000V DC 50/60Hz  
Contact rating: 1.25A 24V DC or 0.4A 125V AC  
Connector: MIL-C-5015 (2 pins of CON2)

**Protection**  
Thermal: Heatsink 90 to 125°C: output reduces by up to 3dB  
Heatsink >125°C: output muted. Amp Fault LED Illuminated  
Output DC Offset: Isolates output if >±0.7 Amp - Fault LED Illuminated  
Output clipping: If continuous, Loop Fault LED Illuminated  
Status relay: Contact opens when any item marked * is detected or power fails.

**AUDIO SPECIFICATION**

**Freq. Response**  
100Hz to 5kHz ±1.5dB relative to 1kHz at -12dB re: max output, measured as loop current with no metal loss correction.

**Compression**  
Response optimised for speech  
Dynamic range: >30dB input, ±1dB output over input range  
Control: By adjusting input level/gain  
Indication: LED on front panel  
Attack / Decay: 7ms / >1s

**Metal Loss**  
0dB to 4dB / octave boost  
Correction: Adjusted on front panel control

**PHYSICAL**

**Dimensions**  
Width 251mm, depth 320mm, height 89mm excluding connectors

**Weight**  
5kg

**Construction**  
Aluminium, powder coated. IP43 when mounted correctly, IP65 available on special order - ask for details.

**Environmental**  
<95% relative humidity, -25°C to +55°C

**Safety**  
M6 chassis stud (nut & star washer supplied)

**Power**  
7.1Vrms (11Vpk) at max. drive current  
15.5Apk with 1kHz sine  
21Amp absolute max  
LED on front panel

**Indication**  
LED per channel on front panel

**Connector**  
MIL-C-5015 (2 pins of CON3)
The R1 Receiver is a high quality audio induction loop receiver with a vertically mounted pick up coil designed to be used in conjunction with the Loopworks Measure App. The Loopworks Measure App and R1 Receiver together become the most accurate, dedicated field strength meter (FSM) currently available.

Features
- Calibration performed using µP device, which is not operational during measurement
- Frequency response (±0.25 dB 50Hz to 8kHz), app brick wall filter beyond 10kHz
- RMS detection with 125ms (F) integration time constant provided by host device and App
- Power supply dependent on operation mode: either energy harvested host device audio output or derived from host device mic bias
- Assessment of any system to IEC60118-4
- 1 year warranty.

Applications include
- Simple meter mode when not signed into Loopworks, tests: field strength, frequency response and background noise.

When signed in to Loopworks
- Synchronises data with Loopworks online database using host device data connection
- Commissioning test: evaluates the complete performance of a system against IEC 60118-4 for certification
- Quick check test: designed as a basic evaluation of a pre-installed system against IEC 60118-4
- Freestyle test: evaluates the functional performance of a system against IEC 60118-4
- Site assessment test: evaluates a site using a simple test loop and capture results to determine the type installation required.

Accessories
- Soft carry pouch
- User guide/handbook

Operational modes

Background Noise
- A-Weighted filter
- True RMS detection. 0dB referenced to 400mA/m
- Scale -60 to -0dB
- Audio output can be captured for analysis in signed-in, certify mode or listened to live via the headphone jack in meter mode
- For use with system on or off, sine waves and combi signals.

Field Strength
- Broad band measurement 50Hz to 8kHz
- True RMS detection referenced to 400 mA/m
- Scale -40 to +10dB
- Suitable for use with sine wave, pink noise, combi and live signals.

Frequency Response
- Third octave bands at 100Hz, 1kHz and 5kHz
- True RMS detection
- Scale resolution to 1dB
- For use with pink and combination signals.

Specifications

Magnetic field measurement
Coil orientation: Vertical when unit held upright
Reference level: 400mA/m (In field strength mode)

Frequency response
50Hz to 8kHz ±0.25dB
40Hz to 10kHz ±0.5dB
30Hz to 15kHz ±3dB
Gain stability: Better than ±0.25dB over all conditions

Audio inputs
3.5mm 4-pole jack plug for connection to Apple device
3.5mm 3-pole jack socket for monitoring with stereo headphones

Calibration Power < 100mW

Measurement Power < 1mW

Physical
Dimension: 52.0 x 27.5 x 9.5mm
Weight: 10g
Operating temp range: -10 to +45°C (Storage: -20 to +75°C)
The FSM is a cost effective and simple solution for measuring, setting up and commissioning an induction loop system to the requirements of IEC60118-4. The meter is an ergonomically designed hand held instrument for measuring loop system performance. There are three calibrated operational modes for the assessment of Background Noise, Field Strength and Frequency Response as required to ensure correct function of the loop system. The meter also doubles as a loop listener, with a headphone output to listen to the signal in the loop.

The meter is supplied in a soft case with an audio CD with the required test signals, and full operating instructions including a guide to commissioning. The Ampetronic FSM can be used to monitor, set up or commission any induction loop system regardless of the manufacturer or type.

Features

- Simple assessment of any system to IEC60118-4
- Three modes of operation for three test types
  - A-Weighted background noise
  - Broad band mode (50Hz - 8kHz)
  - Frequency response (100Hz, 1kHz, 5kHz)
- True RMS detection calibrated to 400mA/m = 0dB
- Wide viewing angle LED display
- Colour coded LEDs for simple readout
- Resolution to 1dB
- Head phone output with volume control
- Ergonomic, rugged, light weight construction
- Test signals supplied on CD
- Soft carry case
- 5 year warranty

Applications include

- Accurate set-up and commissioning
- System monitoring and maintenance
- Site surveys
- Certification to IEC60118-4
- Assessment of frequency losses due to metal
- Assessment of loop coverage and overspill
- Assessment of background noise

Operational modes

**Background Noise**

To determine the level of the background magnetic field present in the intended location for the loop system. Also used to measure low level signals to assess overspill outside a loop system.

- A-Weighted filter
- True RMS detection referenced to 400mA/m
- Scale -42 to -12dB
- Audio (headphone) output is post filter for monitoring

**Field Strength**

A broad band measurement to measure field strength delivered by the system.

- Broad band measurement 50Hz to 8kHz
- True RMS detection referenced to 400 mA/m
- Scale -22 to +8dB with 1dB intervals from -3 to +6dB
- Suitable for use with sine wave, pink noise, or combination signals (provided), or any other real signals

**Frequency Response**

Third octave filters for measuring performance across the required frequency spectrum as required by IEC60118-4. Used to confirm adequate power at high frequencies as required for good intelligibility. Used to assess frequency dependent loss due to metal structures, and to optimise frequency compensation.

- Third octave bands at 100Hz, 1kHz and 5kHz
- True RMS detection
- Scale resolution to 1dB
- For use with pink noise only (signal provided)
- Audio (headphone) output is post filter
Commissioning Procedure

The FSM allows a complete test of an induction loop system to be performed with a simple six or seven step procedure as shown in the table below. Using the FSM with the CD of test signals (included), all aspects of an installation can be examined and adjusted to meet the requirements. A Certificate of Conformity (template included) is provided to record test results from this procedure, and to certify that the installation meets the requirements of IEC 60118-4.

<table>
<thead>
<tr>
<th>Step</th>
<th>Audio Input</th>
<th>FSM settings</th>
<th>Adjustments</th>
<th>Performance requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Volume of use</td>
<td>SYSTEM OFF</td>
<td>METER off</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>Background Noise</td>
<td>SYSTEM OFF</td>
<td></td>
<td>Sources of magnetic noise</td>
</tr>
<tr>
<td>3</td>
<td>Field Strength (1)</td>
<td>Track: 1 COMBINATION*</td>
<td></td>
<td>Loop current</td>
</tr>
<tr>
<td>4</td>
<td>Frequency Response</td>
<td>Track: 2 PINK NOISE</td>
<td></td>
<td>MLC / tone control</td>
</tr>
<tr>
<td>5</td>
<td>Field Strength (2)</td>
<td>Track: 1 COMBINATION*</td>
<td></td>
<td>Loop current</td>
</tr>
<tr>
<td>6</td>
<td>Overspill (if required)</td>
<td>Track: 1 COMBINATION</td>
<td></td>
<td>Input gain</td>
</tr>
<tr>
<td>7</td>
<td>System use</td>
<td>ACTUAL SIGNALS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Other signals may be used with revised performance requirements: PINK NOISE -9 to -3dB, 1kHz SINE -3 to +3dB

Accessories

- Soft carry pouch
- User guide/handbook
- Commissioning Certificate (template)
- Designing Induction Loops handbook
- Batteries
- CD of Test Signals

3 different test signals are provided on CD to enable the set up of any induction loop system.

Tracklist
- Combination: Pink noise with 1kHz sine wave bursts (30 mins)
- Pink noise (30 mins)
- Sine wave (1 min)

Standards Compliance

The FSM field strength meter and loop receiver is CE marked to all relevant safety and EMC standards.
ILR3 / ILR3+ Audio Induction Loop Receiver

The ILR3 is a high quality audio induction loop receiver which allows the user to listen to an audio frequency induction loop system using a standard pair of stereo headphones (supplied). It has a vertically mounted pick up coil and a low cut filter function to emulate the performance of a hearing aid switched to the T position. It is therefore an essential tool for anyone installing maintaining or managing facilities fitted with induction loops providing them with immediate confirmation that the loop is running. The ILR3+ also has LED indications to show field strength, for more accurate monitoring of a loop system. (To measure the performance of an induction loop system, Ampetronic’s calibrated receiver CMR3 must be used). In addition, the ILR3 or ILR3+ can be used by anyone without a hearing aid who needs a little extra assistance to hear.

Features

- Low distortion
- Flat frequency response to 6kHz
- Low cut filter—to simulate hearing aid response
- Low and high field strength indicators according to IEC60118-4 (ILR3+)
- Volume control
- 5 year warranty
- Auto power off with headphone removal
- > 100 hours life with 2 AA batteries

Applications include

- Checking that an induction loop system is working. Essential for installers, venue managers and event organisers
- Recording the output of a loop system
- Providing assistance to people without a hearing aid
- Locating sources of interference
- Checking loop coverage and signal overspill

Datasheet

Low Cut Filter

The ILR3 incorporates a low cut filter. Switching the low cut filter on attenuates the low frequency (bass) components of the signal emulating a typical hearing aid response and helps reduce the annoying 'buzz' caused by some AC power circuits.

For best reception in general use and where there is no low frequency interference, the ILR3 should be used with the 'flat' frequency response selected.

Specification

- Frequency response
  - Standard: Flat 85Hz - 6kHz ± 0.5dB
  - Low Cut: 400Hz - 6kHz - 3dB (similar to hearing aid)
- Output power
  - >100mW into 16Ω load
- Distortion
  - <0.5% THD @ 1KHz
- Battery powered
  - 2 x Alkaline AA (included)
- Battery life
  - >100 hours with Alkaline batteries
- Magnetic field strength
  - To PPM type II referenced to 400mA/m rms:
    - Indication (ILR3+ only)
      - 'Good' 0dB Green LED 400mA/m rms with sine
      - 'Okay' -6dB Amber LED 400mA/m rms with sine
- Physical
  - Dimensions
    - width 62mm, depth 26mm, height 112mm
  - Temperature range
    - IP20 : 20 to 90% relative humidity, -10 to 45ºC
- Accessories
  - Stereo headphones
    - impedance 32Ω per side (included)
- Standards Compliance
  - The ILR3/ILR3+ is CE marked to all relevant safety and EMC standards.
ILR3+ Loop Checking System

The Ampetronic loop checking system, the ILR3+, is designed to allow any user to regularly monitor a loop system. It is simple and highly cost effective, and meets the requirements of the international loop performance standard, IEC 60118-4.

No technical skills are required to perform the basic checks, which allow an operator to listen to the system through headphones, and check that the sound level provided by the loop is sufficient.

The loop checking system comes with an easy to follow procedure for checking any loop system.

ILR3+ Product Information

Using the ILR3+ for checking a loop system

The ILR3+ is designed to make it simple for anyone to regularly check that a loop system is working, has a field strength of the correct level to provide benefit, and meets the IEC601184- standard.

Field Strength Indicators

As dictated by the international standard, the ILR3+ has two indicators and these are calibrated to illuminate when the field strength is at least 400mA/m (0dB) or higher (GREEN) and between 200 and 400mA/m (-6 and 0dB) (YELLOW)

Checking Loop System Status

The status of the loop can be easily checked by running continuous speech or music into the loop and monitoring the indicators when the ILR3+ is held in the appropriate location. A simple table on the back of the ILR3+ shows what is acceptable or not.

User Instructions

The ILR3+ comes with a simple user procedure to help guide anyone through the checking process. Using the ILR3+ requires no special knowledge of loop systems or any technical knowledge.

Who can use the ILR3+

The ILR3+ is ideal for regular use by a facilities manager or non-technical member of staff. Regular use will ensure that the provider of the service keeps the loop system working and providing a genuine benefit to the hard of hearing. The ILR3+ is an essential companion to any loop system installation.
Microphones

Ampetronic offer a small range of microphones primarily for use with one to one systems, counter systems and small area coverage systems such as the CLD1 and ILD100.

All the microphones have an unbalanced connection and derive power from the host equipment eliminating the need for batteries. By using the Ampetronic MAT1 adapter, it is possible to use the microphones with balanced lines having ±15V phantom power, such as those on Ampetronic’s preamplifiers and larger loop drivers.

### Desktop Microphone EM195 A

The desk microphone EM195A is a directional unit providing good sound pickup with reduced ambient noise and reverberation. It has a weighted base for stability when used free standing, alternatively it can be fixed to the edge of an upright panel using the rotational mounting coupling included.

- **Colour**: Black
- **Cable length**: 2m
- **Weight**: 370g
- **Accessories**: Weighted Base, Rotational mounting coupling

### Boundary Microphone Q400

The Q400 boundary microphone is small and unobtrusive, ideal for concealment on a service counter. The design fixes easily to a desk top surface, and provided the desk can be drilled, the cable can be invisible from the top. It has a directional, hypercardioid response which minimises room reverberation and background noise pickup, offering a clean, intelligible signal.

- **Colour**: Black
- **Cable length**: 3m

### Tie Clip Microphone EM-1.2

Depending on requirements, a service counter may need a small tie clip style microphone supplied with a detachable clip that can be fitted adjacent to the transparent screen, or to the counter structure as a permanent installation. For this, the Tie clip style microphone is a possible solution. The microphone has an omni-directional pickup pattern and will be less effective at excluding background noise compared to a directional microphone.

- **Colour**: Black
- **Cable length**: 3m
- **Accessories**: Tie clip
Installation Accessories

Ampetronic supply a comprehensive range of accessories to facilitate the installation of induction loop systems. The copper tape, warning tape and plastic extrusion simplify installation of loops under floor coverings such as carpets, vinyls, laminates and wood. The 19 inch rack mount accessories are compatible with all our equipment and enable simple, tidy and professional looking installations.

The logos add the finishing touch, advertising the presence of a professional induction loop system.

**Copper Foil Tape - FB 1.8**

The standard flat foil cable supplied by Ampetronic is 18mm (0.71”) wide, with a copper section of 1.8mm². The cable is supplied in 50 (164ft) or 100 metre (328ft) reels.

The construction of the cable is copper foil of 0.1mm thickness, covered in bonded Polyester film. Total thickness is 0.25mm (0.01”).

**Installation Warning Tape - PWT**

Ampetronic supply a special high quality tape, 50mm (2”) wide, colour white, printed with a warning text and deaf logo in blue. This tape is designed to fix the copper foil tape to the floor, indicating clearly the importance of the cable installed in that location. The tape is supplied in 50 metre (164ft) reels.

**PVC Extrusion - EXT**

This is a high density PVC extrusion, supplied in 3 metre sections, for covering the copper tape in areas where a high level of physical protection is needed, such as exposed floors, skirting boards etc. Colour is light grey. Normal fixing is by means of the extra heavy duty adhesive strip fitted to the edges of the extrusion, but in exceptional cases screws or special fixing pins can be used in addition. It is essential that the fixing surface should be free of grease, polish or dust.

The dimensions are given in the drawing below:

**Direct Burial Cable - DBC 1.0 / DBC 2.5**

PVC cable can not be used for burial in concrete as the corrosive effects of alkalis present in cement based compounds will lead to failure of the loop over time. This specialised EPR-CSP HOFR (Heat and Oil Resistant, Flame Retardant) cable offers more durable insulation when compared to standard PVC wire and improves protection where a loop wire needs to be installed in a concrete screed. DBC 1.0 available in 100m rolls only. DBC 2.5 available in 100m and 200m rolls.

**Logos**

Two different sizes of the deaf logo are supplied with the equipment. The large size logo is supplied with the ILD122, ILD300, ILD500 and ILD1000G. This logo is double sided, printed in standard blue colour on white rigid sheet, 0.62mm thick. The small logo is supplied with the ILD15, ILD100, CLS1, CLS2 and CLD1. It is double sided, printed in standard blue colour on 0.25mm plastic sheet, one side coated with a fully transparent adhesive for fitting to glass panels. Both logos are available for sale separately.

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