Hera

User manual

www.apex-audio.eu

APEX NV

Schoebroekstraat 62
3583 Beringen (Paal)
BELGIUM

Tel: + 32 (0)11 28 61 91
Fax: + 32 (0)11 25 56 38
e-mail: info@apex-audio.eu
website: www.apex-audio.eu

Hera

Class 2 Sound Level Meter

February 2013

Serial number of this product:

Important safety instructions

CAUTION: to reduce the risk of electric shock, do not remove cover (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.

The lightning flash with arrowhead symbol, within equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Instructions

Before installing or operating the equipment, read all safety instructions, warnings and operating instructions. Heed all warnings. Follow all instructions. Keep all safety, installing and operating instructions for future reference.

Installing and operation location

Do not use this apparatus near water. Do not expose this apparatus to drips or splashes. Do not place any objects filled with liquids, such as vases, on the apparatus.

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. No naked flames, such as lighted candles, should be placed on the apparatus.

Do not install the apparatus in a confined space such as a book case or similar unit. Do not block any ventilation openings.

Ensure that foreign objects and liquids cannot get into the equipment.

Install in accordance with the manufacturer's instructions. Only use attachments/accessories specified by the manufacturer.

Use only with the cart, stand, tripod, bracket or table specified by the manufacturer, or sold with the apparatus.

When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

The apparatus should be located close enough to the AC outlet so that you can easily grasp the power cord plug at any time.

The mains plug, the appliance coupler or the mains switch is used as the disconnect device. Either device shall remain readily operable when the apparatus is installed or used.

Power source and grounding

This product should be operated only from the power source indicated on the apparatus or in the operating instructions. If you are not sure of the type of power supply to your home, consult your product dealer or local power company.

Do not defeat the safety purpose of the polarised or grounding-type plug. A polarised plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Connect Class I construction apparatus to an AC outlet with a protective grounding connection.

Do not overload wall outlets, extension cords or integral convenience receptacles, as this can result in a risk of fire or electric shock.

Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles and the point where they exit form the apparatus.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Batteries (battery pack or batteries installed) should not be exposed to excessive heat such as sunshine, fire or the like. Never dispose of batteries in a fire as they may explode and cause injury.

CAUTION:
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

Cleaning, maintenance and servicing

Unplug the apparatus from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personal.

Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.

Intended use

The equipment may only be used for the purpose described in the operation instructions. Never carry out any work on the equipment other than as specified in the operating manual.

Never push objects of any kind into this product through openings, as they may touch dangerous voltage points or short-cut parts, which could result in a fire or electric shock.

Children should never use the apparatus without close adult supervision.

WARNING:
excessive sound pressure can cause hearing loss.

Environmental precaution

Electrical and electronic equipment may contain hazardous substances for humans and their environment.

The “crossed out wheelie bin” symbol present on the device and represented above is there to remind one of the obligation of selective collection of waste. This label is applied to various products to indicate that the product is not to be thrown away as unsorted municipal waste. At the end of life, dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling of electric and electronic devices.

Customer participation is important to minimize the potential affects on the environment and human health that can result from hazardous substances that may be contained in this product.

Please, dispose of this product and its packaging in accordance with local and national disposal regulations including those governing the recovery and recycling of waste electrical and electronic equipment. Contact your local waste administration, waste collection company or dealer.

Table of content

Register your product

Please take the time to register your product on-line by typing the following URL in your browser:

http://productregistration.apex-audio.eu/

As well as registering the product on-line, please take the trouble to record the serial number of the unit in the space provided on page 3 of the manual, and keep the manual in a safe place.

Dear customer,

Thank you for buying the Apex Hera.

Hera is a microprocessor based class 2 sound level meter and controller. Hera can be used either as a standalone unit or combined with the Apex Argos. Applications include noise level logging and control in bars, theatres, concert venues,… in compliance with the 2003/10/EC “Noise at work” directive, or the new Belgian Flemish regulations on sound level (VLAREM).

Product highlights

- Complies with IEC 61672 class 2 sound level meter standard
- Factory calibrated for accurate measurement
- Measurement of the RMS sound level (L_{slow})
- Measurement and logging of the equivalent continuous (L_{eq}) and peak (L_{max}) sound levels over a user adjustable time frame
- Selectable A or C frequency-weighting
- 30-day sound level log (when measurements are logged at 15 minute intervals)
- All settings may be made from the front panel and are security-code protected
- Two separated logic outputs for controlling external devices and mains power cut relays, all set/reset times are adjustable
- System tamper detection and logging
- Ability to schedule multiple threshold parameters covering any time or day of the week
- Easy computer log read-out through standard serial port
- Exptional external 19’ rack-mounting level display (Leto)

Foreword

Hera offers sound level monitoring and logging of events. As a standalone unit it can be used as a cut-off device, as is required by some authorities. Combined with Argos, the Argos/Hera combination operate as a single system providing sound level control with integral measurement and logging facilities.

Hera will log the equivalent continuous (L_{eq}) and peak (L_{max}) sound level pressure over a user defined time period, from 1 to 59 min (adjustable in 1 min steps) and from 1 hour to 8 hours (adjustable in 1 hour steps). Frequency weighting is selectable between A-filter type and C-filter type.

Hera will also detect and log any attempts that are made to tamper with the device (for example disconnection of the microphone). The resulting log can be viewed from the front panel or downloaded to a computer for printing.

Hera also offers two logic outputs that may be used to control external devices or mains cut-off if a certain threshold is being exceeded. This threshold value may be scheduled to allow for different sound levels at set times.

All settings are security code protected and can easily be set from the devices’ front panel.

Apex Hera is delivered with a measurement microphone and this is factory calibrated for perfect accuracy.

Hera also offers an automatic calibration function for remote microphone distance compensation. This is imperative in most venues, since the measurement microphones should be placed out of reach.

Optionally you can connect the Apex Leto large deported display to the Hera so that the audience, FOH engineer, band or DJ may have visual sight on the sound pressure levels at any time.

The Hera may be used together with the Apex Argos. The Argos will then be slaved onto the Hera's measurement and threshold settings.

Use the Hera together with the Apex Argos; they will be your neighbours dream team !

About this manual

Carefully read all instructions and warnings before operating this appliance. Keep this manual in a safe place so that it can be referred to when required.

This manual describes Hera internal software version v3.0.

Latest manual revision can be downloaded from:
http://www.apex-audio.eu

Inspection and unpacking

This appliance has been carefully packed in the factory and the packaging was designed to withstand rough handling. Should the unit appear to have been damaged in transit, do not discard any of the packing material and notify the carrier immediately as they will be responsible.

Save all the packing materials for future use if you ever need to ship the unit again.

Please check the list below against the contents of the packaging. If any items are missing or damaged, contact the Apex dealer or distributor where you purchased the unit.

In the box:

- **Hera unit**
- **Hera Measurement Mic (HMM)**
- **IEC AC power cable with mains plug**
- **Multi-conductor D-sub 15 data cable for use with Argos**
- **This manual**

Operating environment

This appliance is designed to operate in most normal climates, at a temperature between 0 °C and 50 °C (32 - 122 °F), with relative humidity between 10% and 60%.

Power requirements

BEFORE you connect any unit to the mains, please make sure that the voltage of your local AC supply is within the acceptable range of the unit.

The Hera is designed to work from an AC supply between 90V and 240 V, at a frequency between 50 and 60 Hz. No AC voltage selector is provided as the device automatically adjusts to the incoming AC voltage.

Precautions should be taken so that the appliance is properly grounded at all times. **This unit must be earthed.**

Installation

If the unit is brought into a warm room from a cold environment, internal condensation may occur. Ensure that the unit has been allowed to reach ambient temperature before switching it on.

Although this unit is intended for installation in a standard 19-inch rack it can nevertheless be used freestanding. If the unit is installed in a fight-case or in an equipment rack, fix the unit with all four screws through the front panel holes. For normal use no extra support is needed, but in more extreme conditions, such as on the road, we recommend the unit is supported at the rear.

Allow at least 10 cm (4 inches) at each side of the unit for sufficient ventilation.

Measurement microphone and the microphone chain

Upon completion of tests following manufacture, Hera and its HMM (Hera Measurement Mic) are calibrated to ensure correct performance in standard use. **Use only the measurement microphone supplied with Hera**.

In specific cases it may be necessary to carry out recalibration of the complete measurement chain. In the such cases, calibration should be performed with the aid of a **sound calibrator**:

- When extending the microphone cable between the HMM and Hera.
- By linking the Hera with an Argos noise limiter

In the following case, an offset correction would need to be applied by means of a sine / noise generator:

• When installing the HMM at a position a considerable distance away from the recommended measurement location (e.g., the microphone is installed far enough away so it can not be touched by the public).

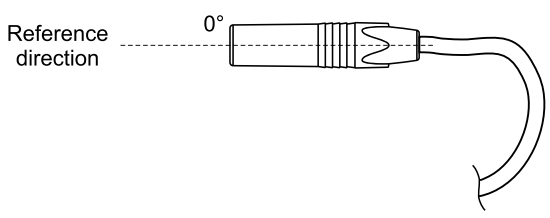
Recalibration and offset correction can be performed in the Installer menu.

The Apex Hera in combination with the Hera Measurement Mic has a fixed, unchangeable measurement range from 55 to 130 dB_{SPL}. When the sound level falls below the minimum measurable (55dB_{SPL}) the display will show '_LO_ '. When the noise level exceeds the maximum measurable range (130dB_{SPL}) the display will show '_HI_ '.

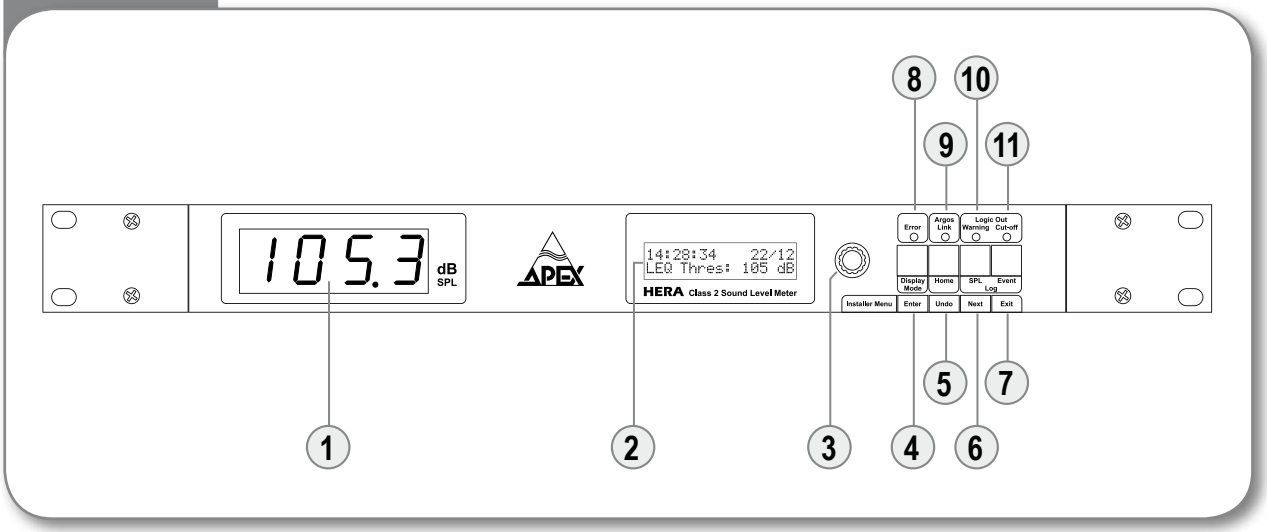
The HMM Apex Hera Measurement Mic must be installed such that the primary measuring sound source reaches the microphone capsule at an angle of no more than 90 °.

The microphone capsule is located at the end of the long side of the microphone body (the opposite end of the 3-pin XLR connector) and points outward.

HMM Measurement microphone



Front panel



Front panel

① **LED display**
L_{slow} of LEQ sound level display

② **LCD display**
This display is used in conjunction with the rotary encoder and the push-buttons. It shows settings, adjustments and provides a readout of control data.

③ **Rotary Encoder**
Used to change settings and to navigate through menus and lists.

④ **Display Mode / Enter** push-button

⑤ **Home / Undo** push-button

⑥ **SPL Log / Next** push-button

⑦ **Event Log / Exit** push-button

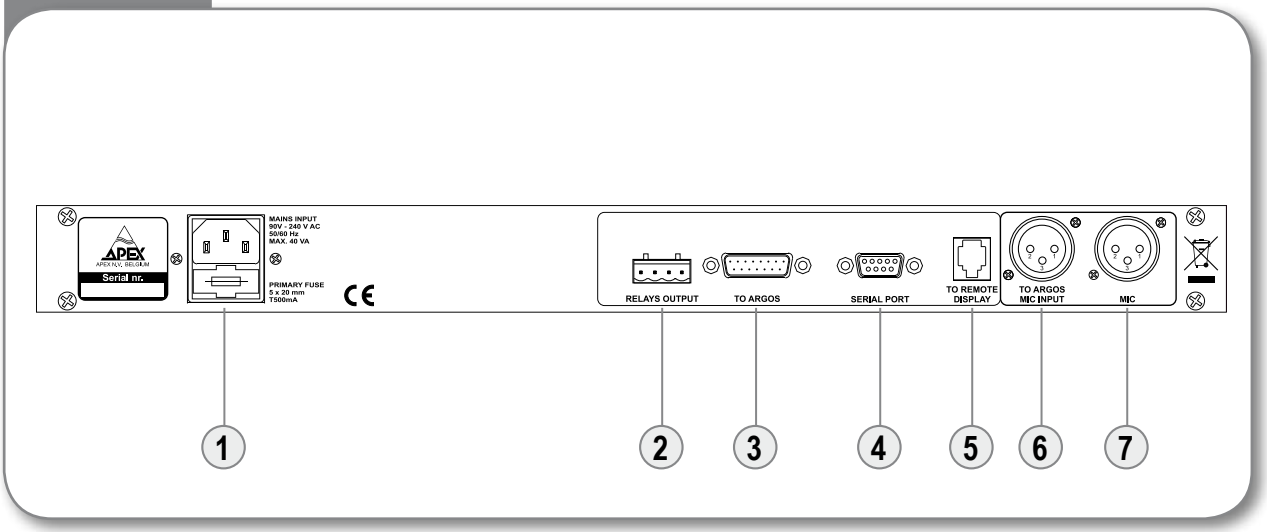
⑧ **Error** red LED indicates any system tampering or failure. Consult the error log to know the origin of the error.

⑨ **Link** green LED indicates a proper connection with the Apex Argos.

⑩ **Logic Out Warning** yellow LED indicates the warning relay output is activated.

⑪ **Logic Out Cut-Off red LED indicates the alarm relay output is activated.**

Rear panel



Rear panel

① **AC connector and fuse**

② **Relays output**

WARNING: under no circumstances should mains AC voltage be plugged into these outputs.

The connections are (seen from left to right): ground, power cut relay, warning relay, +12 Vdc.

For an example of how to connect the relay outputs, see "Wiring the unit" in the next pages.

③ **To Argos**
This connector must ONLY be used for connection with the Apex Argos.

④ **Serial port**
Enables connection with an external computer in order to read the Hera's memory.

⑤ **To remote display**
This connector allows on or more Leto deported display to be connected. Leto will mimic the information shown on the front-panel LED display (1).

⑥ **To Argos Mic input**
This connector must ONLY used for connection with the Argos.

⑦ **Microphone input**
Connect here the microphone SUPPLIED WITH Hera.

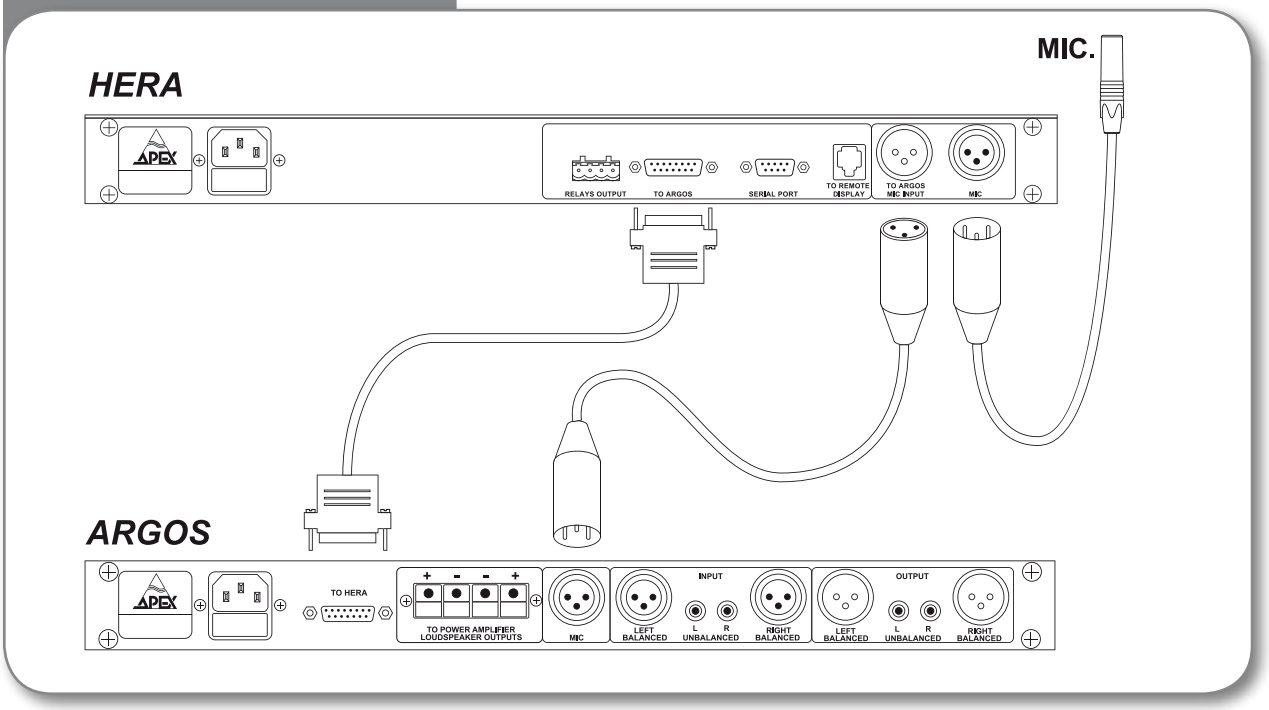
CONNECTING THE HERA WHEN USED AS A STAND-ALONE DEVICE

Connect the microphone supplied with the Hera to the microphone input located on the rear panel (see rear panel drawing).

In the installer menu, the operation mode must be set in 'standalone'. Refer to the section "installer menu" for details.

CONNECTION WHEN THE HERA IS USED TOGETHER WITH THE ARGOS

Connection Hera with Argos



Connect the **microphone supplied with the Hera** to the microphone input socket located on the rear panel of the Hera. Connect an XLR cable from the connector marked 'To Argos MIC INPUT' on the Hera to the microphone input on the Argos. Connect the data cable to the 'TO Argos' socket on the Hera to the connector marked 'TO Hera' on the Argos.

The data cable is type DB15 male to DB15 female cable pin to pin in direct numbering sequence (1 to 1, 2 to 2, and so on up to 15). The XLR cable should be connected in the same manner. Be very careful NOT TO CONNECT the earth to the chassis and definitely be especially careful not to make any solder links between pin 1 and the metal chassis of the socket. The wiring protocol is 1 = GROUND, 2 = HOT, 3 = COLD.

CAUTION: To comply with the IEC-61672 standard, the microphone delivered with the Hera and the Hera itself are a complementary pair, i.e., they are calibrated together at the factory.

ALWAYS USE THE MICROPHONE SUPPLIED WITH THE HERA !

The Hera must be set in 'Argos attached' operation mode. Refer to the section "Installer menu" for details.

The Argos must be set up as follows:

- **'Source' switch in 'micro' position**
- The setting of the THRESHOLD potentiometer is not important because the threshold is fully controlled by the Hera
- 'Speed' switch set to 'slow'
- 'Noise' switch set to 'OFF'
- For the 'Hold' switch, choose the setting most appropriate for your application (see the Argos manual for more information).

CONNECTING RELAYS TO HERA

Hera has two open-collector logic outputs. The first is for signalling (warning output) that the sound level threshold has been exceeded and the second usually used to cut off the electrical power (alarm/cut-off output) if the sound level has not been reduced after the warning.

As these outputs are open-collector outputs, they can be used to provide control over two external relays or also be used to drive logic systems such as a Programmable Logic Controller (PLC) in industrial environments.

Relays can be connected using the connector labelled 'RELAY OUTPUTS'. Only use 12 V DC relays. No external power supply is required, so do not connect any form of power to the Hera's relay outputs.

The different signals available at the connector are :

Pin 1	Pin 2	Pin 3	Pin 4
Ground	POWER CUT relay	Warning relay	+12 V dc

This numbering is arranged looking at the rear panel, from left to right.

WARNINGS:

1. Hera relay outputs are current limited to 60 mA. Some electromechanical relays or contactors may require a higher current to enable activation. In such situations, a smaller relay, requiring less pull-in current should be wired between the Hera and the contactor. We recommend the use of solid-state relays, which require very small pull-in and holding currents.

2. Under no circumstances should mains AC voltage be plugged into these outputs !

Relay warning diagrams

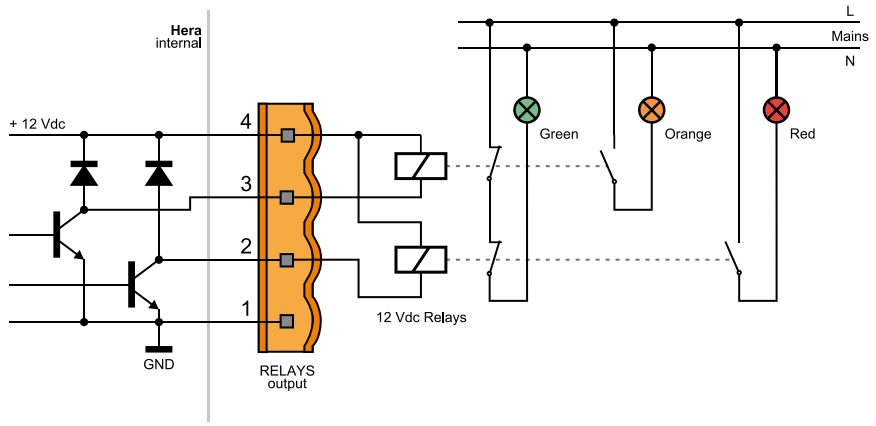


Diagram 1: Traffic light mode

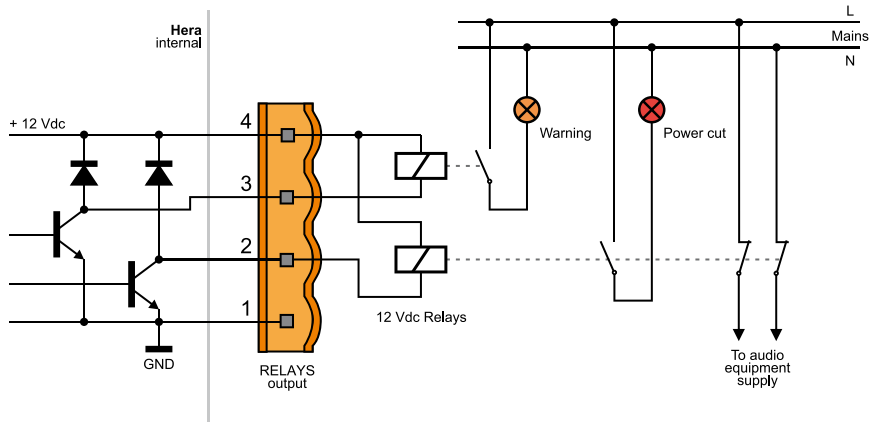


Diagram 2: Warning and cut-off mode

CONNECTION TO A PC

Connection to a PC allows data stored in the Hera's memory to be downloaded. The connection is made using an RS-232 serial port on the PC.

Most of today's PC and laptop don't have a serial port. Nevertheless inexpensive USB to RS-232 converters are available at most computer stores.

It is also possible to interconnect the Hera with a PC over an Ethernet network. A whitepaper detailing this topic is available on the Apex website.

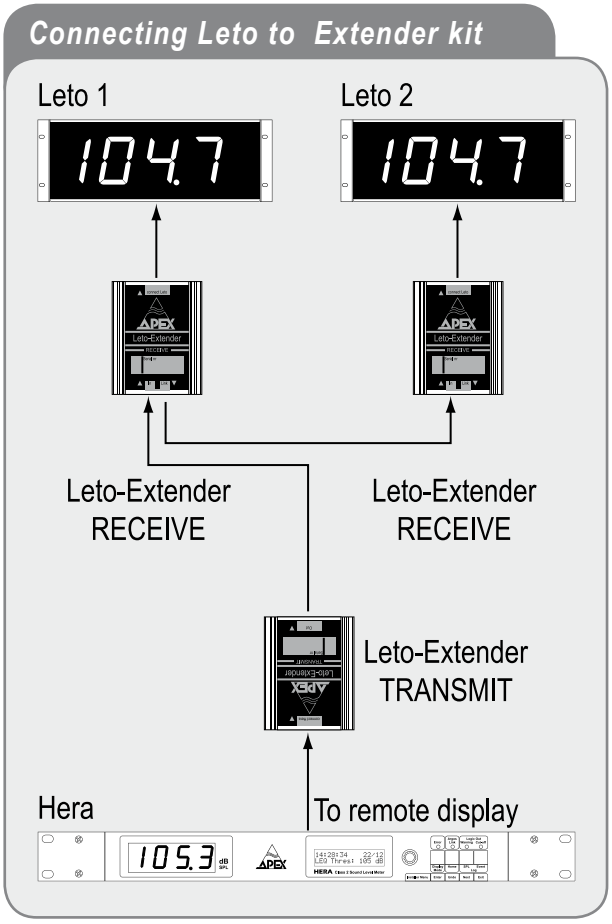
CONNECTION WITH THE APEX LETO

The Leto's large display provides a copy of the LED sound level display of the Hera for use at a remote location.

The optional Leto display is connected to Hera using a supplied RJ-12 cable. This cable length is limited to just a few meters (see the Leto user manual for more information).

If longer distances between Leto and Hera are required, then the Leto Extender kit can be purchased. Using the Extender kit enables cable lengths up to 200 m to be used. The kit consists of one transmitter and one receiver unit and standard RJ-45 FTP network cable should be used to connect the two together (cable not supplied). Be aware that this signal does not conform in any way to Ethernet standards !

A maximum of two Leto displays may be slaved to the Hera by daisy-chaining two receiver units together, see drawing below.



PRINCIPLES OF OPERATION

The Apex Hera shows the instantaneous or equivalent continuous sound level after applying a frequency weighting. The available frequency weightings are A-weighting and C-weighting. The applied weighting is set via the Installer menu.

The Apex Hera shows the instantaneous sound level with a time-weighting of 1 second (LAslow / LCslow).

The 7-segment display of the Hera is refreshed once per second. The equivalent sound level is computed using a "running averager". The average is thus continuously updated and the display is refreshed once per second, showing the equivalent level of the last set period (e.g., the last 15 minutes for LAeq 15').

The equivalent continuous sound level (L_{eq}) and maximum level ($L_{Amax,\ slow}$ / $L_{Cmax,\ slow}$) are computed over a user adjustable time period. Setting this period is achieved using the Installation menu. The Hera is capable of saving (HOLD function) both of these values for a certain time period in its memory (logging). At the end of each measurement period, a new measurement period of equal duration is automatically started. When the time period expires, the current values are first written in the SPL log and then reset (CLEAR HOLD). Then, a new set of values are computed, recorded and displayed. In the Installer menu, the function "Clear log" can be used to erase the log records (SPL Log and Event Log).

NOTES:

Clearing the log is irreversible. We advise to first download the log to a computer and save it to a file before the log is cleared.

The computer read-out function can also be used if the measurement stored in the SPL log must be retained for longer than the Hera's internal memory can offer; for example to meet the legal requirements imposed by VLAREM.

TURNING ON

Hera does not have an on/off switch. It lights up when the AC power is connected. At boot-up, the LCD screen will briefly displays the unit's firmware version. Contact an Apex-approved dealer for any firmware updates which may become available.

STANDARD OPERATIONS

The LED indicator on the left side of the front panel displays the sound pressure level in dBspl. This can be pre-selected to show the instantaneous RMS or equivalent continuous level as follow.

L_{Aslow} / L_{Cslow}
: instantaneous sound level (level at the time of display), measured with a slow time-weighting (1 second) and frequency-weighting according to the A-curve or C-curve as set in the Installer menu

$L_{Aeq\ 1'}$/ $L_{Ceq\ 1'}$
: equivalent continuous sound pressure level integrated over a period of 1 minute and frequency-weighting according to the A-curve or C-curve as set in the Installer menu

$L_{Aeq\ 15'}$/ $L_{Ceq\ 15'}$
: equivalent continuous sound pressure level integrated over a period of 15 minutes and frequency-weighting according to the A-curve or C-curve as set in the Installer menu

$L_{Aeq\ XX'}$/ $L_{Ceq\ XX'}$
: equivalent continuous sound pressure level integrated over the period of time and frequency-weighting as set in the Installer menu

The LED display mode is changed by pressing the 'Display mode' button. The selection is shown on the LCD display when in 'Home' mode.

When the Leto deported display is used, it will mimic the LED display.

NOTES:

When the sound level falls below the minimum measurable ($55dB_{SPL}$) the display will show '_LO_ '. When the sound level exceeds the maximum measurable range ($130dB_{SPL}$) the display will show '_HI_ '.

The LCD screen in the middle of the front panel has three different display modes:

- "HOME" mode
- "SPL LOG" mode
- "EVENT LOG" mode

The current mode is selected by pressing the corresponding push-button. See below for details about each mode.

Messages on this display can be in English, French, Dutch or German. Language selection is made from the Installer menu.

The 4 LEDs located just above the push buttons have the following functions:

- **Red LED "Error":** lights in the event of any fault. This could, for example, come from the seal of the Argos. If this happens, the message will be stored in the list of errors (cf. 'error' mode). The LED will go out a few seconds after the problem disappears.

- **Green LED "Link":** when the Hera is properly connected to an Argos, this LED shows that the connection is good. It should be lit up at all times when the Argos is in use.

- **Yellow LED "Logic Out Warning":** lights when the 'alert' relay is triggered.

- **Red LED "Logic Out Cut-Off":** lights when the 'cut' relay is triggered.

LCD IN HOME MODE

This is the normal mode of operation. In this case, the display will look something like this:

In the upper left corner you can see MAX xx, which is the maximum/peak sound level measured since the beginning of the current measuring period. The peak value is reset after the expiration of the time period and written to the SPL Log. Then a new maximum computation is started.

In the lower left corner, you will see the current mode of the 7-segment LED displays (and optional Leto display). See previous section "Standard operations".

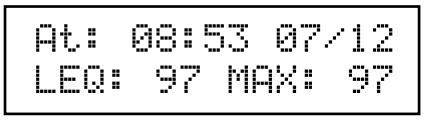
In the upper right corner you can see the current threshold, eventually alternated with the corresponding Belgian VLAREM-class (Category 2 ≤ L_{Aeq}, 15min 95dBA, Category 3 ≤ L_{Aeq}, 60min 100dBA).

NOTES:

When used together with an Argos, Argos will start limiting when the sound level exceeds the threshold set. If the logic outputs are in operation and the equivalent continuous sound level (LEQ) exceeds the threshold, the logic outputs are activated.
The threshold can be set via the Installer menu.

In the upper right corner you can see the current date (DD:MM) alternating with the current time (HH:MM)

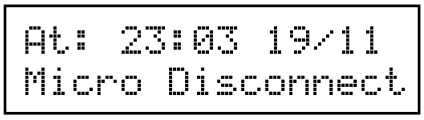
LCD IN SPL LOG MODE



Hera stores a record of the **equivalent continuous level (LEQ) and maximum sound pressure** level over a user adjustable period of time into its memory. The memory can contains up to 2880 items. When the memory is filled, the newest measurement will replace the oldest. The time interval between each item of this list is adjustable in the installer menu. Interval can be from 1 minute to 8 hours. By default, the interval between each record is of 15 minutes, giving a total memory of 30 days.

When the LCD display is in 'measurement list mode', you can inspect all records stored in the memory. Turn the 'Data Encoder' knob to view the different measurements.

LCD IN EVENT LOG MODE



Hera can also detect if anyone has disconnected any cables from it, or even if anyone has opened the security cover, which prevents access to the Argos controls. Should any of these events take place, notification is automatically stored in the list of errors and events. This list, as with the record of sound pressure levels, can be inspected at any time by the user and can even be transferred to a computer. Thus, it is extremely easy to see if anyone has tried to cheat!

Turning the rotary encoder allows the operator to scroll through any errors and events taking place in the system, showing the date and time at which they occurred.

If the system generates an error, the 'error ' LED (see the front panel) illuminates. This error is instantly recorded in the error list. The LED extinguishes when the problem is resolved.

The list of messages, and their meanings, can be found below:

MESSAGE	MEANING
Log Started	Commencement of recording of errors and events.
Power Switch ON	Hera started up.
Power Switch OFF	Hera shut down.
Micro Disconnect	Microphone disconnected from Hera.
Micro Connected	Microphone connected to Hera.
Argos SealRemove	The Argos front panel security cover has been opened.
Argos Seal OK	The Argos front panel security cover is correctly fitted.
Argos Disconnect	Data cable between Argos and Hera has been disconnected.
Argos Connected	The Argos is connected to the Hera.
Argos Mic. Discon	The XLR cable between Argos and Hera has been disconnected.
Argos Mic. Conn.	The XLR cable is connected.
Clip Detection	Argos VCA (level reducing device) overloaded.
Installer setting	Hera settings have been modified by the installer.
Warning Relay ON	The 'Warning' output relay has been activated.
Alarm Relay ON	The 'Alarm' output relay has been activated.
Warn. Relay OFF	The 'Warning' relay output has been deactivated.
Alarm Relay OFF	The 'Alarm' relay output has been deactivated.
Warn. Relay Disc	The 'Warning' relay has been disconnected.
Alarm Relay Disc	The 'Alarm' relay has been disconnected.
In Stand Alone	Hera has been configured to work in stand-alone mode, but will detect if an Argos has been connected.
Transmis. Start	Data transmission to the PC has begun.
Transmis. End	Data transmission to the PC has been completed.

THRESHOLD SCHEDULLING

The threshold can be constant or be scheduled over 4 periods per weekday. Threshold scheduling allows for automatic adjustment of the sound level over time. For example, it is possible to automatically set a different threshold during working hours, the evening and at night or even program multiple thresholds to cover the period of time a club is open during the night.

Threshold setup is carried out through the installer menu.

LOGIC OUTPUTS

Logic outputs can be used to trigger relays or control external devices according to the sound pressure level and set threshold. There are 3 different modes:

- **Disabled:** logic outputs not used

- **Traffic-light:** external visual indication in the form of a tricolour traffic-light

- **Warning & cut-off:** a first warning lamp indicates that the sound level threshold has been exceeded and the second output can be used to cut-off the mains supply to equipment

TRAFFIC LIGHT MODE

The logic outputs must be wired according to diagram 1 in the section 'Connecting relays to the Hera' earlier in this manual.

In this mode, the logic outputs respond to short LEQ measurements of 1 minute ($L_{Aeq\ 1'}$ or $L_{Ceq\ 1'}$). Logic outputs will be triggered as follow:

- **Green light on:**
  the sound level is more than 1.5 dB below the threshold

- **Orange lamp on:**
  the sound level is less than 1.5 dB below the threshold

- **Red light on:**
  the sound level is higher than the threshold

In this mode, is still possible for the threshold to be exceeded. It is the responsibility of the DJ or sound engineer to ensure that the sound level stays within permissible limits.

The traffic-light mode is an efficient tool to keep long duration equivalent continuous level (Leq) under control. It allows quick reaction to level excess. Immediately reducing the level as the orange warning lamp turns on, ensures that the average sound level over a longer period (e.g. L_{Aeq} 95dB_{SPL} A maximum of 15 minutes) will remain under the set maximum (threshold).

WARNING & CUT-OFF MODE

In this mode, the first logic output called Warning is used for signalling that the average sound level has exceeded the threshold for a short period time (user adjustable). The second output, called Alarm (or cut-off) is usually used to cut the electricity off if the sound level has not been reduced after the warning period has expired.

Logic outputs are triggered if the equivalent continuous sound level (LEQ) over a user adjustable period of time exceeds the threshold. In the installer menu, installers have the ability to setup three time periods as follow:

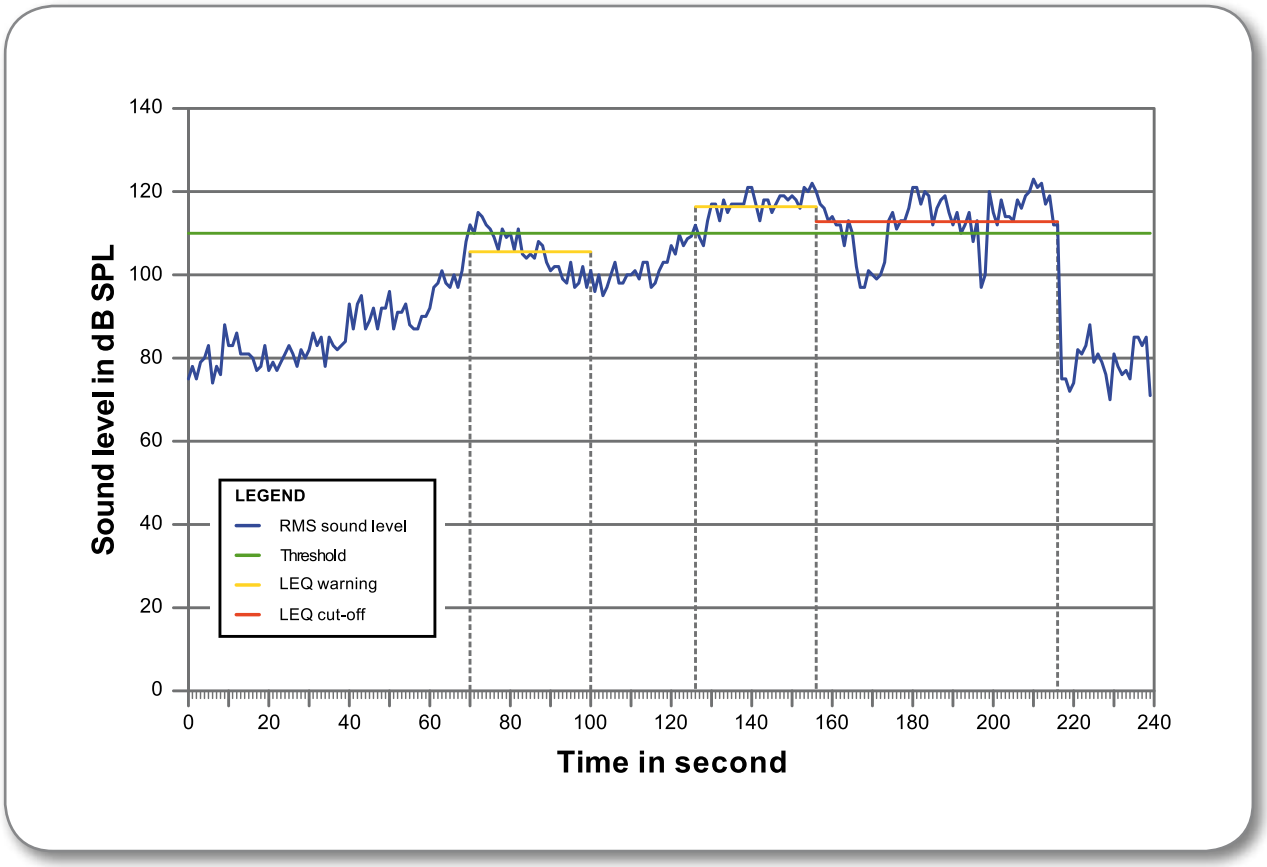
- **Warning time period:** if the LEQ value over this period exceeds the actual threshold, the first logic output is triggered.

- **Cut-off time period:** despite the warning, if the LEQ value over this period exceeds the actual threshold, the second logic output is triggered.

- **Recover-after time period:** then, if the LEQ value over this period is under the actual threshold, both warning and cut-off outputs are resettled. The recovering time can also be set in 'manual' so that only an operator knowing the installer menu's pin code can reset the logic outputs.

NOTE:

AIf the microphone is disconnected the warning relay will operate. If the microphone is not reconnected within 10 seconds the alarm relay will activate.



The graph above illustrates the principle of operation of the logic outputs. In this example, the threshold has been set to 110 dB (green line), the warning time period to 30 seconds (yellow lines) and the cut-off time period to 1 minute (red line).

At 70 seconds, the music has exceeded the threshold and the warning time period has commenced. The LEQ has been computed over the following 30 seconds but the final result was below the threshold. Therefore nothing happened.

At 126 seconds, the DJ exceeds the threshold once again, so averaging the SPL level has commenced. 30 seconds later, the Warning lamp has been switched on because the LEQ value was over the threshold. So, at that time, the cut-off time period starts counting.

The DJ has seen the warning and has directly reduced the level, but unfortunately a few seconds later, he pushed the volume up again. As a result, 1 minute later the LEQ value is still higher than the threshold and the Alarm/cut-off relay has been activated, cutting the mains electricity supply to the power amplifier.

ADDITIONAL FUNCTIONS WHEN USED WITH ARGOS

When connected to the Argos limiter, the Hera measures the microphone signal and sends the appropriate commands to the Argos, which can then reduce the sound pressure level if necessary.

The Hera can also control the pink noise generator in the Argos. Pink noise is used as a reference for calibrating the Hera should it be necessary to take into account differences in sound pressure level between the actual position of the microphone and the position at which the authorities measure.

MICROPHONE DISTANCE COMPENSATION

The measurement microphone is often located where it cannot be interfered with. Consequently there is a good chance that the sound pressure level at the microphone will be different from that on the dance floor, which is where the authorities take their level measurements. To get round this problem the Hera can calculate the difference and factor it into its measurements. The calibration procedure is fully described in the “Installer menu” section.

INSTALLER MENU

The installer menu allows the Hera to be set up and adjusted for optimum performance. To access the installer menu simply press and then release the 'enter' and 'next' buttons on the front panel at the same time. The Hera then asks you to enter your security code (PIN number). The default code is 1234.

You can change the number under the cursor using the rotary encoder. To go to the next number, press 'enter'. To go back to the preceding number, press 'undo'. When the four numbers have been entered press 'enter' again to go into the menu.

NOTE:

We strongly recommend that you change the PIN number immediately to a code of your choice (option 11 in the menu). Do not write this code down and do not leave it where the end user can find it !

MENU MENU STRUCTURE

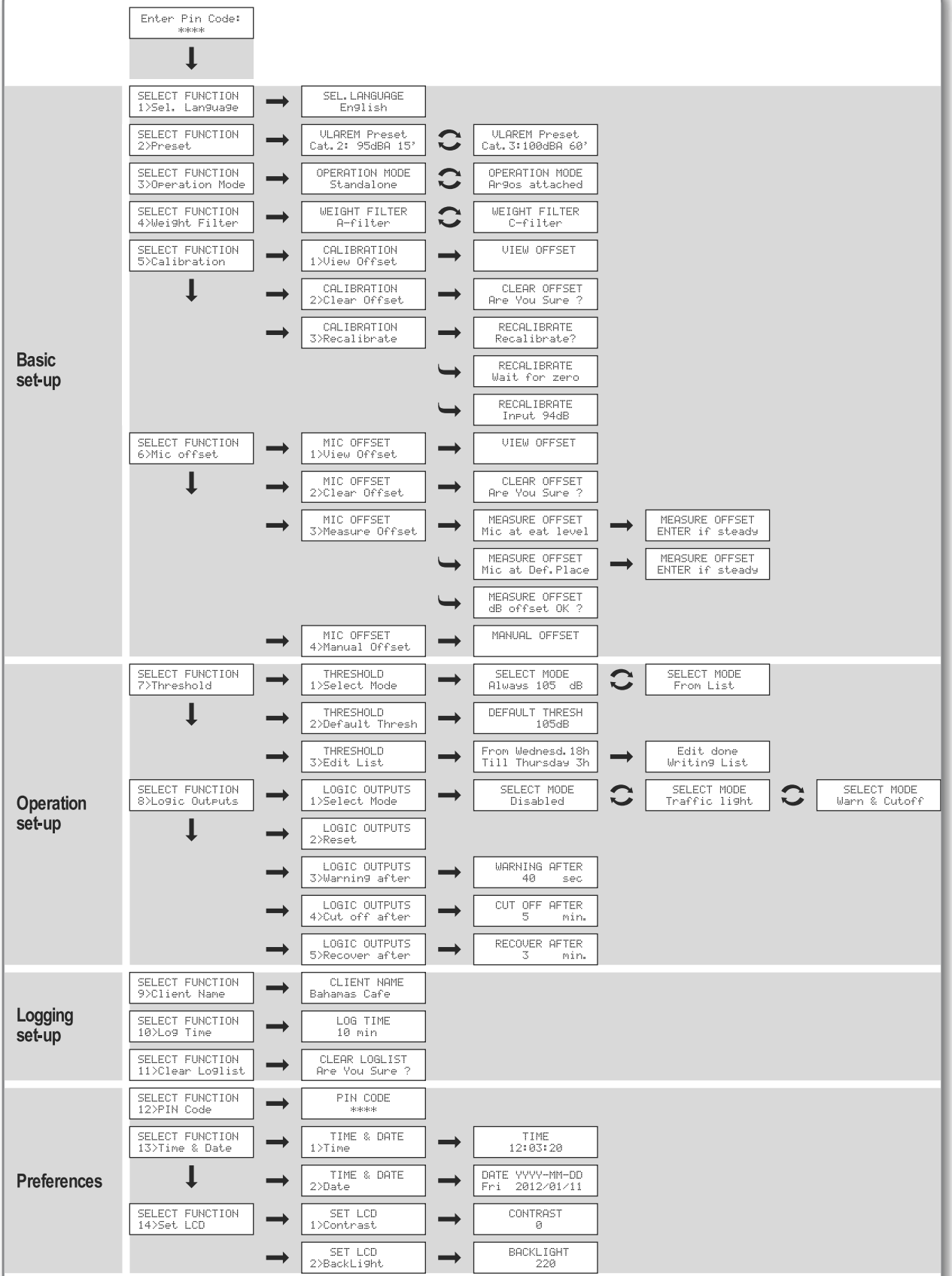
The diagram below shows the complete menu structure.

To move down the page, use the rotary encoder.

To move across the page, press 'enter' to go to the right and 'undo' to go to the left.

The following chapters describe each of the menu options in detail.

HERA installer menu overview



BASIC SET-UP

Function 1: Choice of language

This option allows you to choose the language in which messages will be displayed. All types of messages are affected, including both error/event list and measurement list. The available languages are English, Dutch, German and French.

Press 'enter', select the desired language using the rotary encoder and then push 'enter' again to store your choice.

Function 2: Preset

This function allows users requiring to comply with the Belgian VLAREM act to change all relevant parameters at once.

Press 'enter', select 'VLAREM Cat.2' for Class 3 or 'VLAREM Cat.3' for Class 2 and then press 'enter' to confirm your choice. Hera will ask you to confirm your choice using the 'enter' key or to cancel using 'undo'.

The following parameters are automatically modified:

VLAREM Cat.2

Frequency-weighting:	A-filter
Threshold:	95 dB, mode 'Always'
Log time:	15 min
Warning relay: 15 min	

VLAREM Cat.3

Frequency-weighting:	A-filter
Threshold:	100 dB, mode 'Always'
Log Time:	60 min
Warning relay:	60 min

For more information, refer to the "Technische handleiding - nieuwe geluidsnormen voor muziekactiviteiten" (Technical manual - new noise regulation for music activities).

Function 3: Choice of operational mode

This option allows you to choose between operating the Hera as a stand-alone device or in connection with the Apex Argos limiter. **This option is vital for the proper functioning of the Hera. If this option is not set up correctly, the Hera will definitely generate error messages.**

Press 'enter', turn the encoder to select either 'Hera only' or 'with Argos' and press 'enter' again to confirm your selection.

Function 4: Frequency weighting filter

With this option, you can choose which frequency weighting filter is applied to the measurement. Choices are A-filter or C-filter. The default is A-filter as it is the most commonly used filter curve.

IMPORTANT NOTICE:

If the Hera is used together with an Argos, you need to change the weighting filter of the Argos as well. This can be done by changing the position of a jumper inside the Argos. Argos is by default always set on A-filter. Please refer to the Argos user manual for detailed information.

Function 5: Calibration

It is important to regularly check the accuracy of the measured values. In specific cases, it may also be necessary to calibrate the measurement chain before use (see section 'Measurement microphone and the measurement chain' earlier in this manual). The calibration shall be performed using an IEC 60942 class 1 or class 2 sound calibrator (1/2", 1 kHz, 94 dB). To ensure accuracy, perform a calibration only if it is quiet !

Apex recommends the following calibrator:

- Brüel & Kjaer Type 4231

Function 5.1: Viewing the calibration setting
This function displays the current calibration offset in decibels on the LED display.

Function 5.2: Clear the calibration setting
This function is used to the clear the calibration setting and return to the factory calibration. Press 'enter' to confirm and 'undo' to cancel.

Function 5.3: Calibration procedure
With this function you can recalibrate the measuring chain.

Step 1: Place the microphone in the sound calibrator. Make sure the microphone correctly fits in and no gap remains. Keep the sound calibrator off for the moment. Ensure the place is quiet. When you are ready press 'enter' or 'undo' to cancel.

Step 2: Hera shows "Wait for zero" and will perform the first step of the calibration process automatically. Do NOT touch the microphone and keep the sound calibrator off.

Step 3: When Hera has completed, the message "Input 94dB" is displayed. You can now switch the calibrator on. Once more, do not touch the microphone. Hera will continue the process automatically.

Step 4: At the end of the procedure Hera shows the calibration offset in decibels. Press 'enter' to confirm and 'undo' to cancel.

At any time you can cancel the recalibration procedure by pressing 'undo'.

NOTE: The calibration offset is different for the 'sand-alone' operating mode and for the 'Argos attached' mode. If you change from operation mode (function 3), the calibration should be performed again!

Function 6: Microphone position compensation

The measuring microphone is normally installed somewhere where it cannot easily be reached, to prevent it from being covered. However there is likely to be a difference in sound pressure level between the microphone point and – for example - the dance floor. This procedure allows you to calculate this difference so that the Hera can compensate for it in its measurements.

Positional compensation allows level differences between the actual position of the microphone and the place where sound pressure level is tested (by the authorities) to be taken into account.

Function 6.1: Viewing compensation setting
This option simply shows the actual compensation in decibel on the LED display.

Function 6.2: Erasing the compensation setting
This option is used to erase the compensation setting and to return to direct measurement of sound at the microphone position. Press 'enter' to confirm and 'undo' to cancel.

Function 6.3: Measuring the difference
The calibration of positional compensation requires a pink-noise or sinus generator. In case Hera is used together with Argos, no external generator is required. Indeed, the Apex Argos has a built-in pink-noise generator. The Argos generator will be remotely controlled by the Hera.

If you use a tone generator, we recommend you to use a sinus of a 1 kHz frequency.

NOTE: Hera and its microphone are calibrated together at the factory and are a pair. If you install a Hera and an Argos together, ONLY USE THE MICROPHONE SUPPLIED WITH THE HERA.

To calibrate the Hera proceed as follows:

• Turn the amplifiers down to their lowest setting.

• Press 'enter'. Hera will ask you to place the measuring microphone at the point where the sound is normally tested (Microphone level at ear), for example in the middle of the dance floor or wherever the authorities normally make their level tests.

• Press 'enter'. If Hera is used together with Argos, it will now supply a pink- noise. If not, the Hera will ask you to supply one. Press 'enter' again when you are ready.

• Slowly raise the amplifier gain to give a level of around 80dB. When the level is stable press 'enter'.

• **Do not touch the amplifier gain until the calibration procedure is over!**

• If no Argos is connected: Turn the pink-noise off and press 'enter'.

• Hera then asks you to place the microphone where it will be normally used (definitive microphone placement), for example on the ceiling. When ready press 'enter'.

• The Argos will once again generate pink-noise. Or you will be asked to turn on your external pink-noise generator. Press 'enter' when you are ready.

• Hera will display the level measured, which is likely to be different from the level on the dance floor. When the level has stabilised press 'enter'.

• If no Argos is connected. Turn the pink-noise off and press 'enter'.

• The Hera will display the level difference between the two positions and will ask you to accept by pressing 'enter' or to reject by pressing 'undo'.

NOTES:

pressing the 'undo' switch allows you to return at any time to the previous setting or to cancel the operation.

If you use Hera together with Argos and you don't hear any noise, please make sure to set the correct operation mode in option 2.

If you use an external tone or pink-noise generator, be sure to not modify its output level during the calibration procedure.

Function 6.4: Manual compensation setting
This option is used to manually enter the compensation. The actual compensation in decibel is shown on the LED display. Turn the rotary encoder to adjust it. Press 'enter' to confirm and 'undo' to cancel.

Adjustment range goes from -20 to +20 dB per tenth of dB step.

OPERATION SET-UP

Function 7: Adjust threshold

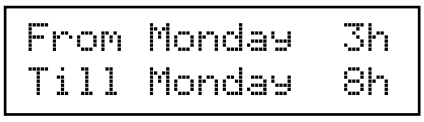
Function 7.1: Selecting threshold mode
The limit threshold can be either constant or can vary following a weekly list. You can choose between 'Always xxx dB' or 'follow list'. Select by turning the encoder and then pressing 'enter'.

Function 7.2: Threshold by default
This option enables you to set the threshold when you have chosen the option 'Always xxx dB'. Select by turning the encoder to the desired value and then press 'enter'.

Adjustment range is from 70 to 110 dB.

Function 7.3: Editing the weekly list
The weekly list allows the 7-day week to be sliced into 4 daily time periods, making a total of 28. The threshold can be different for each of these periods. The beginning of one period marks the end of another.

Press 'enter' and the Hera will display the following message:



This shows the first period, which begins Monday at 3 a.m. and ends at 8 a.m. Using the rotary encoder you can adjust the threshold for this period. This will be shown on the LED display at the left of the Hera front panel.

Only the time shown on the first line can be changed on this screen. It can be changed using the 'next' and 'exit' buttons, 'exit' to increase the time in hourly intervals and 'next' to decrease it by the same amount. The end time, shown on the second line, indicates the start time of the next period. The one period's end time cannot overlap the next period's start time.

To go to the next time period, press 'enter', change the start time using the 'next' and 'exit' buttons and change the threshold using the rotary encoder.

To go back to the preceding period press 'undo'.

When the start times for all periods have been set, Hera requires a few moments to store the new list.

Function 8: Logic outputs

Relay outputs are triggered on time-averaged sound level value. Time-averaged sound level is also called **equivalent continuous sound level (Leq)**. It is nothing more than an averaging of each RMS sample values measured over a certain period of time (each sample being taken every 125 mS). This Leq value is then compared with the actual threshold and relays are switched on or off as explained bellow.

Function 8.1: Logic outputs mode
With this function you can choose from the following mode:

- Disabled: the outputs will never be activated
- Traffic-light: see the 'Traffic-light mode' section earlier in this manual
- Warning & cut-off: see the 'Warning & cut-off' section earlier in this manual

Function 8.2: Reconnecting the AC mains supply
This option resets both relays and thus re-establishes the AC electric supply and switches off the warning lamp.

This is the only way to reconnect the AC supply if function 8.5 has been set to 'Manual'.

Function 8.3: Warning time-averaged period
This function allows you to set up the time-averaged period before the 'alert relay' signalisation is set. As soon as the actual threshold is exceeded once, this period starts counting and the average sound level is computed. If this average is then higher than the threshold, the 'alert relay' will be switched on and the 'cut' time-averaging begins. If the average is below the threshold, nothing happens.

Adjustment range is from 10 sec to 60 sec by 10 sec steps.

Function 8.4: Cut-off time-averaged period
Enables adjustment of the averaging period before the 'alarm/cut relay' operates. If the average sound level over this period is higher than the threshold, the 'cut relay' is activated and the AC supply is cut off. If it is lower than the threshold, both 'alert' and 'cut' relays are deactivated.

Adjustment range is from 1 min to 20 min by 1 min steps.

Function 8.5: Recover after period
This option is used to configure the averaging period before the AC supply can be recovered. If the equivalent sound level over this period is below the threshold, both 'warning' and 'alarm/cut' relay will be reset. If not, this period starts running again.

By choosing the 'Manual' option you can opt for manual reset. In this case the PIN number must be known to enable access to the installer menu. Function 8.2 should then be used to bring the AC supply back on line.

Adjustment range is from 1 min to 60 min or manual recover.

LOGGING SET-UP

Function 9: Client's name
This function allows you to store the client's name in the Hera's memory.
Press 'enter', turn the encoder to select a character and press 'enter' again to go to the next character.
The name must be 16 characters long; all character positions must be filled, either using a letter, number or a space.

Function 10: Measurement log time
As explained in the user manual, Hera logs the equivalent level (Leq) and peak level over regular time interval. It is also the time interval between each updating of the level indicated on the Hera's LED display if the LEQu display mode has been chosen by the user.

This option allows this time interval to be adjusted. By default, the value is 15 minutes. Adjustment range is from 1 min to 59 min in 1 min steps and from 1 hour to 8 hours in 1 hour steps.

Hera's memory is large enough to store up 2880 log items. If the values are stored every 15 minutes, the memory will allow a roll-back of the 30 last days. When the memory is full, the oldest record is replaced by the newest one. That's what we call a ring memory.

Function 11: Erase logging lists
Enables the error and events list, as well as the measurement list, to be erased. Hera will then ask you to confirm by pressing 'enter' again, or 'undo' to cancel.

PREFERENCES

Function 12: Pin number
Enables the security code, which gives access to the Installer menu to be changed. WE ADVISE YOU TO CHANGE IT IMMEDIATELY! Do NOT give the end user the PIN code.

Function 13: Date and Time

Function 13.1: Changing the time
Press 'enter'. The Hera will display the time in the format HH:MM:SS. This can be adjusted using the rotary encoder and the 'enter' switch, which enables you to go from Hours to Minutes and then Minutes to Seconds. To store, press 'enter'.

Function 13.2: Changing the date
Press 'enter'. Hera displays the date like this: YYYY-MM-DD. The date can be adjusted using the rotary encoder, the 'enter' switch enables to go from Year to Month and then Month to Day. Hera automatically displays the corresponding day of the week. To store the new date press 'enter'.

Function 14: Adjusting the LCD display

Function 14.1: Adjusting the contrast
Allows the contrast on the LCD screen to be adjusted. Press 'enter', turn the rotary encoder to select the required value and then store by pressing 'enter'.

Function 14.2: Adjusting the back lighting
Allows adjustment of the back-light for the LCD screen. Press 'enter', turn the rotary encoder to select the required value and then store by pressing 'enter'.

TO EXIT

To exit the menu at any time, press 'exit'.

NOTES:

We strongly advise you not to cut off the AC supply when in the Installer menu. When the Installer menu is entered the Hera stops writing into the error and measurement lists until such time as you exit the menu. This explains the appearance of the message 'List error OFF' in the error list. When the AC supply is restored the list will not be re-activated and data will not be written into it!

If this happens for any reason, go back to the Installer menu when the AC power is restored and use the 'exit' button to go back to normal operating mode.

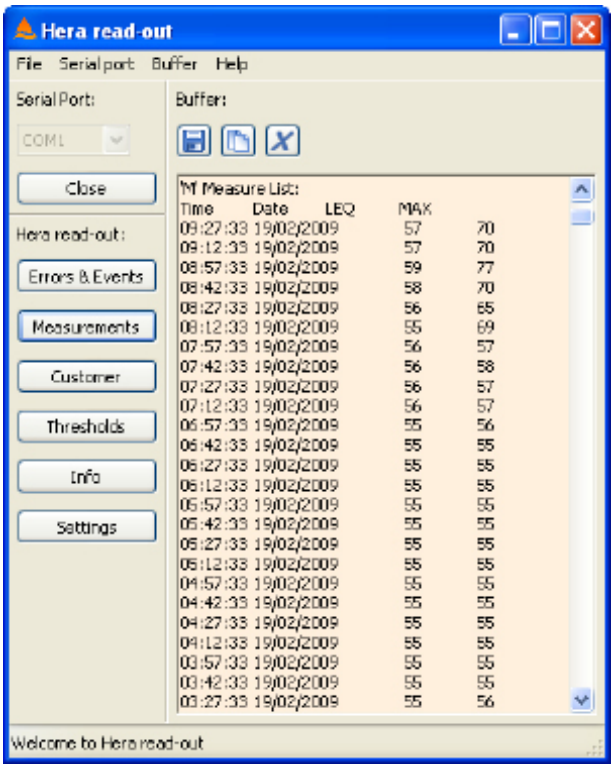
MEMORY READ-OUT

Hera's internally stored SPL Log and Event Log can be forwarded to an external PC for study and archiving. A free software called "Hera Read-out" is available to download on the Apex's website. This software is the only one that may be used for that purpose.

Using Hera read-out, it is possible to retrieve the LEQ and MAX measurements list, the events list and other information such as firmware version. These data can be saved to a file or directly be copied and pasted into a spreadsheet or a database.

Connection with a PC can be made using a serial port or USB and even network using the appropriate adapter. Check the section Connection with a PC earlier in this manual for details.

The latest version of the Hera read-out PC application can be downloaded from the Apex website. This software doesn't require any installation.



Properties and electrical specifications

Reference environmental conditions

Air temperature	23°C
Static pressure	101.325 kPa

Specifications

Class	IEC 61672 Class 2 sound level meter, group Z
Microphone type	1/2-inch free-field condenser (0 ° incidence)
Time-weighting	slow (1s)
Frequency-weighting	A filter: 125Hz to 8kHz, deviation within Class 2 limits C filter: 125Hz to 8kHz, deviation within Class 2 limits
Range	single range 55-130dB SPL (A-weighted)
Reference	94dBSPL SPL (1 Pa), 1 kHz

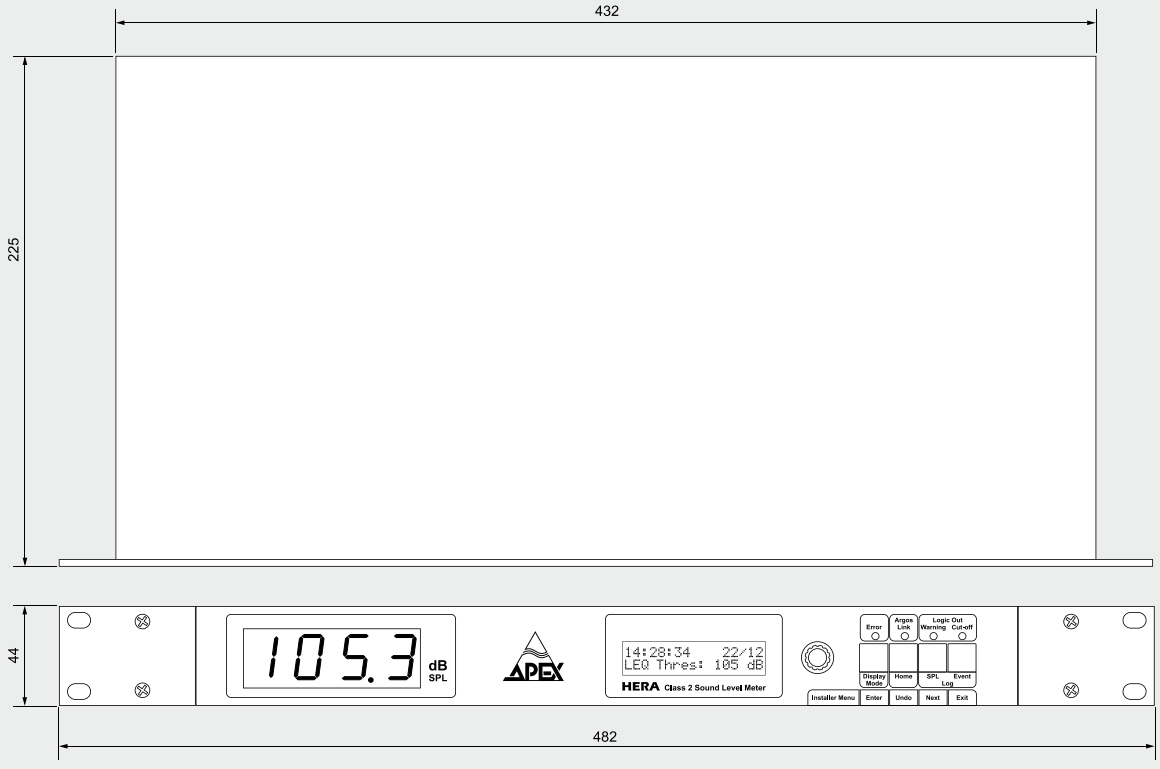
Relay outputs

Pin-out	Ground, output 1, output 2, +12 V
Output Type	Open Collector
Maximum current	60mA maximum for each output

Power requirements

Voltage	auto-detect 90-240V - 50/60 Hz
Power consumption	40 VA

Mechanical specifications



Dimensions

Unit	Width	482 mm (19-inch)
	Height	44 mm (1U)
	Depth	225 mm

Weight

Unit (Netto)	2,9 kg
Unit + Package	4,5 kg

In the interest of product development, Apex reserve the right to modify or improve specifications of this product at any time, without prior notice and without any obligation to change or update equipment already delivered.

Limited warranty

Apex N.V. (“Apex”) warrants you, the original purchaser, or any party that purchases the device from you, that its products are free from defects in material and workmanship under normal use for a period of two (2) years from the date of original purchase. The date of purchase is the date which appears on the first invoice or any other proof of purchase provided by an Apex approved dealer.

Subject to the conditions and limitations set forth below, Apex will, at its discretion, either repair or replace any part of its products that prove to be defective, provided that the product is returned with proof of purchase, shipping prepaid, to an authorised Apex approved service facility.
Warranty cover of any repairs will only extend to the end of the original warranty period.
We will be happy to provide you with a list of authorised dealers to whom you can return the defective unit or who will give you a returns note to enable you to send the unit to the factory.
Service turn-around time will be as fast as reasonably possible. If you are not satisfied with the repair, contact Apex.

Exclusions and limitations
This limited warranty covers only repair or replacement for defective products manufactured by Apex. Apex is not liable for, and does not cover under warranty, any loss of data or any costs associated with determining the source of system problems or removing, servicing or installing Apex products. This warranty excludes 3rd party software, connected equipment or stored data. Apex does not warrant that the operation of the product will be uninterrupted or error-free. In the event of a claim, Apex’s sole obligation shall be replacement of the hardware.
This limited warranty does not cover:

(1) any damage to this product that results from improper installation, accident, abuse, misuse, natural disaster, insufficient or excessive electrical supply, abnormal mechanical or environmental conditions or other external causes;
(2) any damage caused by operating the product outside the permitted or intended uses described by Apex;
(3) any damage caused by any unauthorized disassembly, repair, or modification;
(4) consumable parts, such as batteries;
(5) any cosmetic damage.

Apex is not liable for consequential damages.
This limited warranty also does not apply to any product on which the original identification information (including serial number) has been altered, obliterated or removed or any product that has not been handled or packaged correctly.
Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer’s invoice.
Warranty claims other than those indicated above are expressly excluded