# P1.5 Phono Preamplifier

## User Manual

V1.0

Dear Client,

We are honored that you have chosen the CH P1.5 Phono Preamplifier. Our team has put all of our efforts into designing and manufacturing this top quality versatile and future-proof product and is proud to present it to you. We hope your P1.5 will bring you uncountable hours of emotion from your musical collection.

But before starting your musical journey, we kindly ask you to pay attention to the information contained in this manual. The P1.5, as you will discover in the following pages, is a Swiss precision product designed for ultimate performance and flexibility. However, reaching sonic excellence requires your unit to be setup and operated correctly and this is what this manual is all about. If you have any questions or require assistance, please don't hesitate to contact your authorized dealer.

We hope you will enjoy your P1.5 Phono Preamplifier for many years.

The Concert has just begun...

Cossy F.



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# 1 Introduction

CH products are proudly designed and manufactured in Switzerland by CH Precision Sàrl. Our engineers have combined their know-how, expertise, and ingenuity to bring you the P1.5, a high-performance, modular, two-channel phono preamplifier with upgradability, featuring an Ethernet control interface and firmware updates via USB. Like all CH Precision products, the P1.5 is versatile, extracting the last bit of information from your precious record groove through your preferred mono or stereo moving coil (MC) or moving magnet (MM) cartridge, thanks to its dedicated input stages and specific mono settings. The performance of the P1.5 be further enhanced by adding an external X1 power supply.

The P1.5 features a pure Class A, discrete-transistor-based circuitry. This results in ultra low noise, high bandwidth and high slew rate performances. The signal stays in the analog domain all the way through. The P1.5 provides 3 inputs, two of which are current-sensing type, dedicated to low level low internal impedance MC cartridges. The third input reads the voltage delivered by the cartridge, accommodating both MM and higher level MC cartridges as well as low-level MC cartridges coupled through a step-up transformer. The MC1 and MC2 current mode inputs require no impedance matching. However, the MM/MC voltage mode input is fitted with a variable resistor network seen by the connected cartridge as a load for impedance matching. All the inputs have a very wide range of possible gain setting.

The P1.5 applies the standard RIAA playback equalization filter. Alternatively, a set of other EQ filters (EMI, Columbia/LP, Decca/London, DGG/Teldec, NARTB/NAB, Capitol/AES or Philips) to optimally play back older records from these labels is available as an option that can be factory fitted or retrofitted to the unit. The 50kHz Neumann pole can be activated on top of any equalization curve.

A bypassable subsonic high-pass filter can be inserted in the signal chain to remove unwanted rumble and very low frequency noises.

The P1.5 uses tight tolerance, high-grade metal film resistors throughout the audio signal path as well as custom high grade film capacitors in the filtering sections.




P1.5 Phono Preamplifier

# 2 Installation guide

**This manual will lead you through each step of the installation and setup procedure, in a clear and logical sequence. Although the operation and options might seem complex, they will quickly become second nature;**

**However, because of the sheer range of options available it is easy to overlook something unless you approach setup and configuration in a systematic way. If you take the time to follow the manual, it will ensure that you become completely familiar with the P1.5's many options and that your Phono Preamplifier delivers the best possible performance.**

## 2.1 Safety notice

Make sure to observe the following rules:

- Always handle with care. The P1.5 unit is very heavy, so have someone help you when moving them around. Improper handling of the load could lead to risk of injury.
- Install your P1.5 on a stable base.
- Do not install your P1.5 unit near water.
- Do not expose the unit to any kind of liquid.
- Use only a fully grounded AC power cord (with – live, neutral and ground).
- The building as well as the socket on which the P1.5 will be installed must be connected to earth.



- Do not install in direct sun light or near any heat source such as radiators or other sources of significant heat.
- Do not install in a confined space and make sure sufficient air can flow around the unit.
- Do not operate under high ambient temperatures (>35°C) or with extremely high humidity (>85%) such as in humid cellars.
- Only use options and accessories specified or recommended by the manufacturer.
- Do not open the unit nor try to service it by yourself. Do not try to install any option board by yourself. Always refer to a qualified technician for service, maintenance or upgrades. Failure to do so will void the unit's warranty.
- Symbols used:


High Voltage


Physical Earth


Operator's manual


Warning


Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.


Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.


Apparatet må tilkoples jordet stikkontakt.


Apparaten skall anslutas till jordat uttag.

## 2.2 Unpacking

The P1.5's box is large and contain both the component and all of its accessories. You will need an open, preferably carpeted area in which to unpack it. Please also ensure that the rack or support space on which the P1.5 will be placed has been cleared and cleaned before you start. The carton consists of an inner box and outer sleeve.

- Once you open the inner box, remove the Quick Start Guide, the Topology Diagram, the power cord, the blue suction cup and the top layer of white foam packaging. Inside you will see the component chassis and various accessories.
- With a helper, carefully lift the P1.5 out of the box and place it to one side. Then carefully remove the plastic bag in which it is sealed.
- Remove the small, brown Accessory Pack and place it with the P1.5. Also remove the four composite leveling/grounding spikes. These are inserted into the lower foam block, are easy to miss.
- We recommend storing the Accessory Pack in a readily accessible place, so don't put it back in the carton with the plastic bag when resealing it.

## 2.3 Package contents

Your P1.5 should arrive in one substantial carton. Once unpacked, this carton and packaging materials should be stored safely in case you ever need to transport your unit. When moving or transporting the P1.5, this should always be done in the original packaging.

**The audio chassis carton should contain:**

- The P1.5 Phono Preamplifier
- A Quick Start Guide and Topology Diagram
- Four two-part hardened aluminum/polymer spikes
- A suction cup (used to remove the four top covers)
- The mains power cord (adapted to location)
- An accessory box containing:
  - an infrared remote control
  - a spike adjustment screwdriver
  - a Torx T-10 screwdriver
  - four support discs
  - four stacking caps
  - a USB stick containing the latest CH Precision firmware

In case of damage to the P1.5 chassis or missing components, please contact your authorized dealer immediately. If your P1.5 is still very cold from transport, please let it warm up to room temperature in order to avoid condensation developing inside it.

## 2.4 Placing your P1.5 and installing the spikes

**Before positioning your P1.5, it is worth taking the time to make a few preliminary decisions.**

- Determine the location of your P1.5. To fully benefit from its performance, and due to its nature, it is best to keep it relatively far from any other AC power source. For example, avoid placing it near a power supply or a power strip.
- Decide how many (and which) inputs you will use. Familiarizing yourself with (and making a note of) their position on the rear panel will be extremely useful when you come to actually make connections and name/configure those inputs.
- Decide whether you will use the CH Precision supplied leveling / grounding spikes. Please note that the CH Precision casework is designed to support weight and ground energy in the corners only. If you choose to use third party supports they should be positioned in the same location as the unit's original feet and we do not recommend stacking components except using the supplied spikes and caps.
- If you do plan to use the CH spikes, use the blue suction cup to remove the four circular covers in the top plate (by pressing the suction cup down and unscrewing the covers). Gently insert the aluminum spikes into each exposed shaft and use the short red screwdriver to turn them enough to engage the threads at the bottom of each spike. Each internal thread is coated with a thin layer of grease during assembly to prevent galling between it and the aluminum spike, but adding a thin coating of grease to each thread before insertion is still a good idea, making adjustment easier and more precise.
- Do not screw the spikes in too far at this point or they will protrude from the feet and potentially damage the supporting surface. Do not replace the top-caps yet.
- Check that the voltage selector switch on the unit is set to the correct local voltage and that the power switch is off (the "0" side depressed).

Now you are ready to place your P1.5. The chassis is heavy and the feet are fitted with rubber rings to protect the supporting surface, which makes it hard to slide the unit. Having a partner to help lift and place the devices will make things considerably easier.

- The P1.5 is supplied with a set of four support discs. These have a groove machined in the upper face that fits over the rubber ring in the underside of each foot. Lift each corner of the chassis in turn and position the disc beneath each foot. The groove that interfaces with the rubber ring will ensure that the footer disc stays in place if you slide the unit.
- As well as making the units easier to position, the support discs can also offer a superior interface between the grounding spikes and the supporting surface. The spikes are designed to drain internally generated energy away from sensitive circuitry and into a dispersive support structure, but if the supporting surface is extremely hard or forms an impedance mismatch with the spike tips, the material and footprint of the support discs can function as a lossy mechanical buffer, easing the passage of mechanical energy out of the unit. As a rule, the support discs work well with very hard surfaces, but results will vary with system and supporting surface. Once set up and warmed up, compare the sound of the unit(s) with and without the discs in place.
- Use the red screwdriver to wind down each of the four spikes until you feel that they touch the surface underneath. You will feel a slight resistance due to the chassis' weight. Then turn each spike by the same amount, for instance one more full turn. This should ensure that the load is evenly applied on all four spikes.
- It is worth using a spirit level to ensure that the P1.5 is perfectly level. If it is not, adjust the spikes with the screwdriver. Once this is done, simply check that all four spikes show the same resistance to turning. This means that the spikes are rigidly coupled to the supporting surface/discs and equally loaded.
- Replace the top caps, using the suction cup to ensure that they are tightly into place.

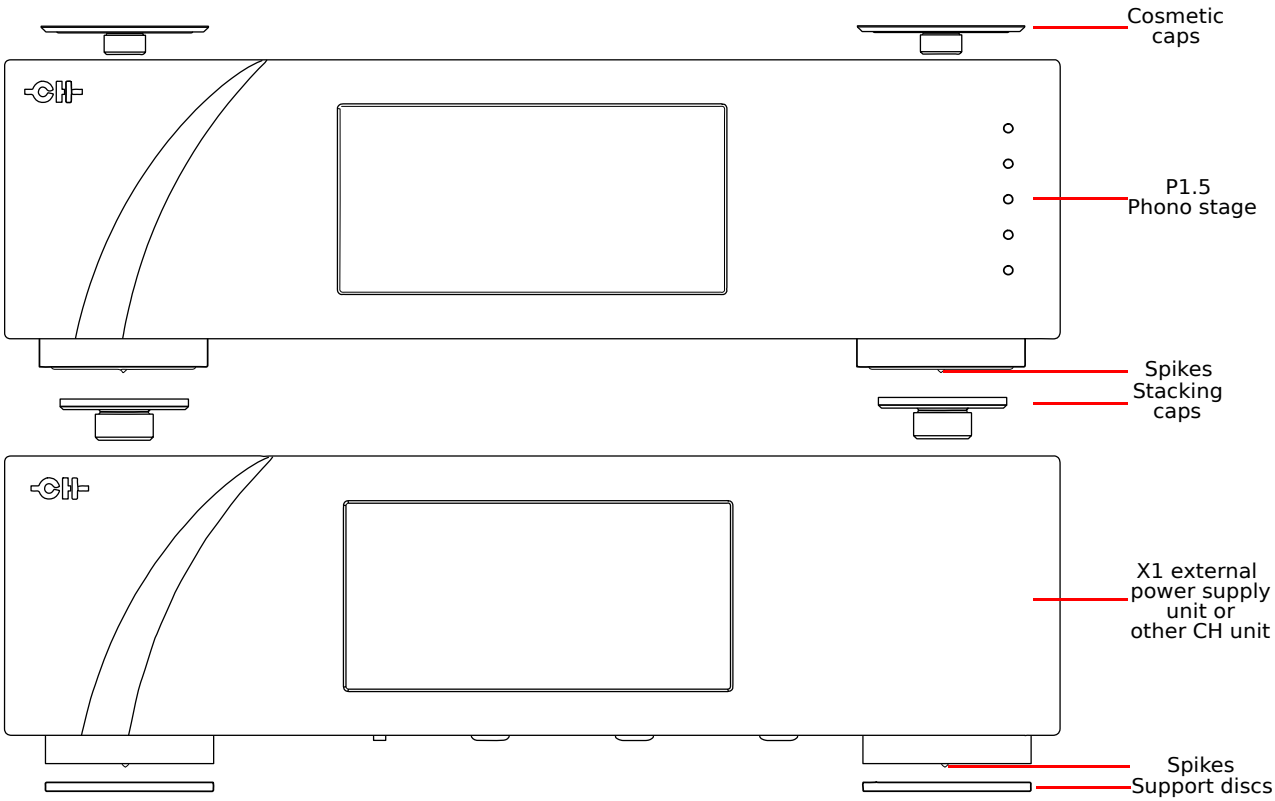
## 2.5 Stacking the P1.5

Also included in the accessory packs is a set of stacking caps. These polymer inserts allow owners to stack the P1.5 chassis on top of other CH components. The spikes and interface caps will ensure mechanical grounding of the stacked chassis. However, this will inevitably compromise performance to some extent and should only be done when space is at an absolute premium. This is especially true with phono stage that features very sensitive circuit and very high gain, and that therefore benefits from being placed as far as possible from power supplies or amplifiers.

The optimum support for any CH unit is to mechanically ground it to a stable, dispersive structure, either using the supplied spikes or an after-market solution. If lack of space absolutely mandates the stacking of CH components, then using the supplied spikes and stacking caps will provide the best possible solution.

The stacking caps simply screw into the top of the spike wells, taking the place of the cosmetic caps. When a second unit is stood on top of them, its spikes can be wound down into the wells in the caps, providing a stable, safe and easily managed stacking option that improves mechanical termination and satisfies aesthetic and practical considerations. Make sure that you retain the cosmetic top caps and store them safely as you may well require them in the future if (or rather, when) your system or circumstances change.

### Stacking the P1.5



# 3 Power Supply

All models in the CH Precision 1 series are equipped with an optimized, dedicated internal power supply. However, it is possible to power the 1 series units (except the T1 and the amplifiers) with an external power supply (X1). This upgrade allows for significantly improved performance.

In this chapter you can find all the information related to the power supply of your P1.5:

- Mains supply
- Fuses and operating voltage
- Power supply connection (standalone or with X1)

## 3.1 Mains supply

The P1.5 includes the power cord for your region. If you wish to use another power cord, make sure to use a fully grounded AC power cord (one with three terminals – live, neutral and **ground**).
Make sure that the mains voltage selection of the unit matches your local mains voltage.

Make sure your P1.5 power supply is disconnected from the AC supply/wall socket in the following cases:

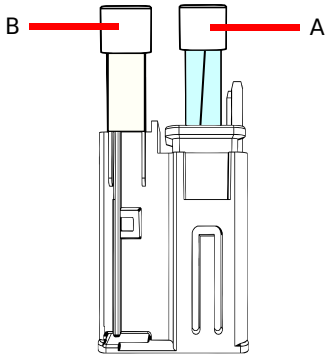
- When cleaning.
- During thunderstorm, unplug both the power cord and the Ethernet cable.
- When left unused for a long period.
- Ensure that the AC supply socket to which the unit is connected is accessible.

When making connections, we recommend switching off all components of the chain using the main switches, but leaving the power chords connected to ensure grounding.

## 3.2 Fuses and operating voltage

**The fuses are safety components for the device; we advise you, when replacing fuses, to buy them from a reputable manufacturer with all the required certifications. (UL, VDE, CB, ...)**

To change the fuses, switch off the P1.5 and remove the power cable.
The fuse holder is located to the left of the IEC power input.




**Fuses value vary with operating voltage: (Size of fuses 5x20mm)**

- $230V_{AC}$ – Fuse A : T50mA/$250V_{AC}$. Fuse B : T1.6A/$250V_{AC}$
- $100/115V_{AC}$ – Fuse A : T100mA/$250V_{AC}$. Fuse B : T3.15A/$250V_{AC}$

Never change the selectable voltage during operation.
To change operating voltage, switch off the P1.5 and remove the power cable.

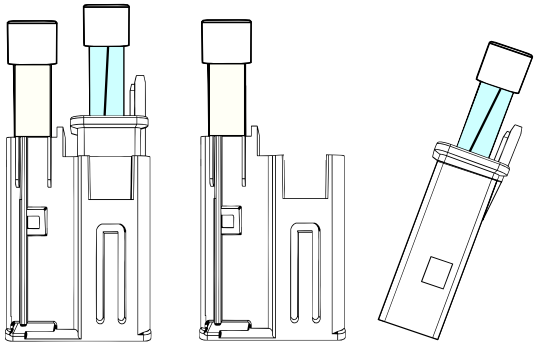
**Before changing the operating voltage first check the local voltage.**

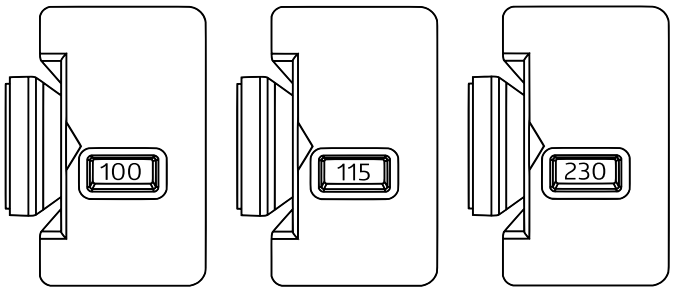
To change the operating voltage, remove the fuse holder from the P1.5 chassis.

Fuse A (see picture above) is located in a sleeve that can be slid out of the body of the fuse holder: by turning the sleeve and reinserting it, the orientation of the contact pins is altered, switching the operating voltage. The selected voltage will appear in the small window in the base of the fuse holder.

Make sure that if required, you change the fuse values to match the new voltage (as above).

You can now reinsert the fuse holder.






**Voltage selector adjustment**

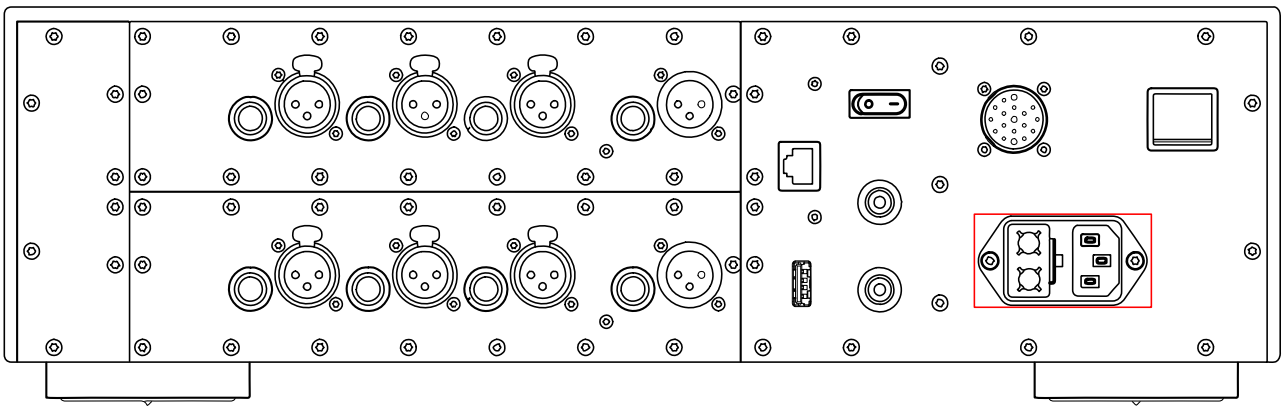
The P1.5 will be delivered to you with a voltage setting already defined according to the “normal” voltage in your country. If you use a different voltage, it will be up to you to ensure that you have the correct voltage setting.

## 3.3 Power supply connection (standalone or with X1)

All handling of the power cable must be done with the power switch(es) in the "0" position.

### 3.3.1 Standalone

In standalone mode, after verifying that the voltage selector is in the correct position according to your location, simply plug in the power cable supplied with your P1.5.

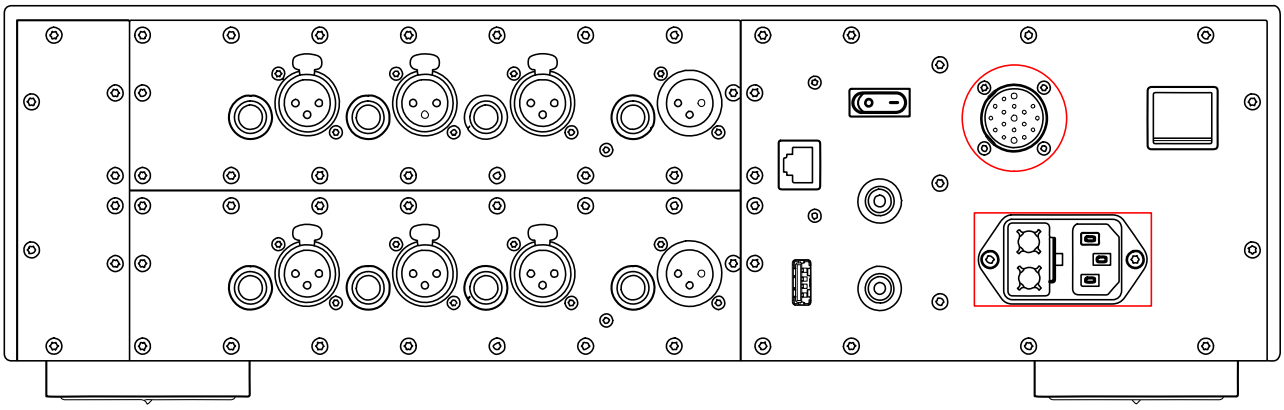


Standalone P1.5

### 3.3.2 With X1

When using an X1 external power supply with your P1.5, it is important to keep the AC power cord and add the X1 external power cable.

The external power cable is equipped with a keying feature and a threaded locking system.



P1.5 with X1

Pay attention to the orientation of the power cable between your P1.5 and your X1. (Male on the X1 side, and female on the P1.5 side.) To optimize the improvement provided by the X1, it is important to keep it away from the P1.5. If you have a wide rack, it is preferable to place the X1 next to the P1.5 rather than above or below it.

# 4 External power supply connector

The external power supply connector allows you to add the optional CH Precision X1 power supply to your P1.5 to further enhance its performance. When the X1 is used, it completely replaces the P1.5's internal power supply, minimizing noise, reducing the noise-floor and increasing dynamic range and audio quality. With the X1 connected, the (small) standby transformer of the P1.5 remains active to ensure the unit's wake up functionality, so its power cord must be left in place.

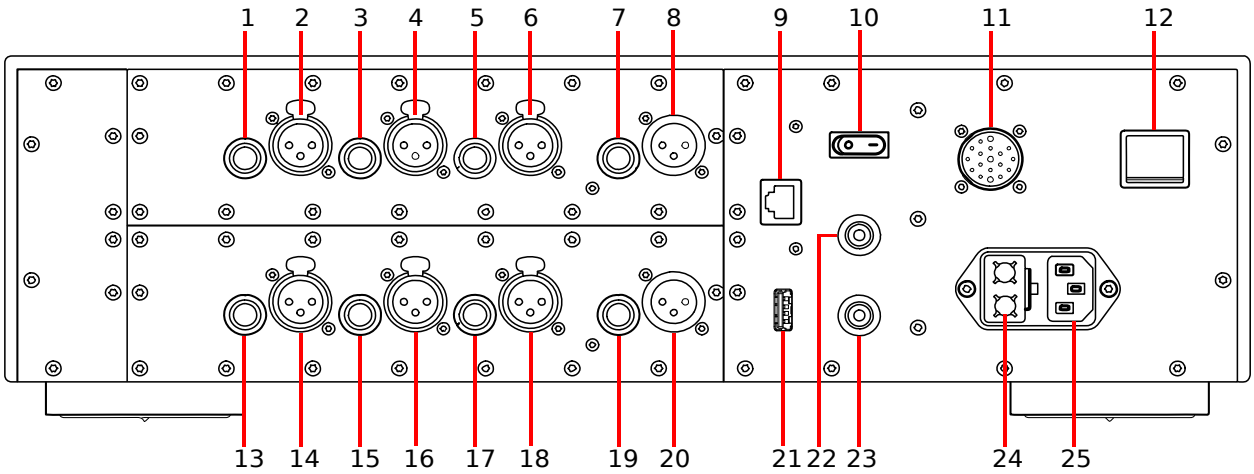
| | X1 Voltage | Power Max |
|---|---|---|
| Pos. 1 | +8V Digital | 20W |
| Pos. 2 | -8V Digital | 20W |
| Pos. 3 | GND Digital | - |
| Pos. 4 | -8V Analog | 20W |
| Pos. 5 | -19V Analog | 40W |
| Pos. 6 | GND Analog | - |
| Pos. 7 | +19V Analog | 40W |
| Pos. 8 | +8V Analog | 20W |
| Pos. 9 | +11.7V Analog | 40W |
| Pos. 10 | +5.5V Digital | 55W |
| Pos. 11 | +3.4V Digital | 75W |
| Pos. 12 | GND Digital | - |
| Pos. 13 | GND Digital | - |
| Pos. 14 | Command | - |
| Pos. 15 | +10.5V Analog | 50W |
| Pos. 16 | Command | - |
| Pos. 17 | GND Digital | - |
| Pos. 18 | +8 Digital | 20W |
| Pos. 19 | GND Analog | - |




Front view

# 5 Connections

You are now ready to connect your P1.5 to your system. Here are the connections for your P1.5.




Rear panel connections

1. MC 1 current-sensing RCA left input
2. MC 1 current-sensing XLR left input
3. MC 2 current-sensing RCA left input
4. MC 2 current-sensing XLR left input
5. MM/MC voltage-sensing RCA left input
6. MM/MC voltage-sensing XLR left input
7. RCA left output
8. XLR left output
9. Ethernet port for command interface [CONTROL board]
10. Ground lift. Switch on to connect signal ground (analog ground) to earth.
11. Multi pin socket for X1 PSU connection
12. On/Off power switch
13. MC 1 current-sensing RCA right input
14. MC 1 current-sensing XLR right input
15. MC 2 current-sensing RCA right input
16. MC 2 current-sensing XLR right input
17. MM/MC voltage-sensing RCA right input
18. MM/MC voltage-sensing XLR right input
19. RCA right output
20. RCA left output
21. USB port for firmware update only
22. Signal ground connection
23. Chassis (earth) ground connection
24. Fuse holder and voltage selector
25. IEC AC input

## 5.1 Input Stage

Three inputs are available on the P1.5. Two of them are in current mode, dedicated to low-level, low-internal-impedance MC cartridges. The third input is in voltage mode, accommodating both MM and MC cartridges as well as step-up transformer coupled MC cartridges.

### 5.1.1 MC1 and MC2 current-sensing inputs

A current mode input reads the current generated by the cartridge (instead of its voltage). Current mode inputs work best with low level, low internal impedance cartridge, which is the bulk of high end MC cartridges, and a few low output MI (moving iron) models. The current from the cartridge is amplified by a discrete transistor based trans-impedance amplifier. Using a current mode input provides a superior signal to noise ratio compared to a conventional voltage input, better immunity and by its very nature, no requirement to adjust and optimize impedance. The gain of the trans-impedance amplifier is intrinsically dependent on the internal impedance of the cartridge. The lower the internal impedance of the cartridge, the higher the gain that results. For this reason, your P1.5 provides multiple gain settings, adjustable in 3dB steps. Although a current mode input will work with a cartridge whose internal impedance measures 50Ω, this is not an appropriate match. In general, the current mode inputs will be ideal for cartridges with an internal impedance of below 10Ω. With a cartridge between 10Ω and 20Ω internal impedance then you should compare performance between the current and voltage mode inputs. Cartridges with an internal impedance above 20Ω will normally give their best performance with the voltage mode inputs – but as always, experimentation is the order of the day.

In order to help users achieve the optimum gain value and signal to noise performance, CH Precision provides the Gain Wizard, a process that measures the signal-to-noise performance of the system (cartridge and P1.5 input) in conjunction with the supplied 7” 45 RPM disc

### 5.1.2 MM/MC voltage-sensing input

A more traditional voltage mode input reads the voltage generated by the cartridge. The voltage mode input can be used with any MM or MC cartridges, as well as with step-up transformers (SUT). The cartridge output signal is amplified by a discrete, solid-state voltage amplifier. To accommodate the widest range of partnering cartridges and SUTs, gain can be adjusted from +41 to +74dB (the balanced XLR output is 6dB higher) in 3dB steps. The voltage mode input is fitted with a user-variable resistive load (variable between 20Ω and 70 kΩ), allowing users to adjust cartridge impedance loading to provide the optimum (flattest) frequency response, free of high frequency ringing.

In order to help users achieve the optimum impedance load value and gain for each input, in addition to the Gain Wizard CH Precision provides the Loading Wizard, a process that measures the frequency response of the system (cartridge, cables and P1.5 input) and displays the results of different loading values as a series of graphs showing the flatness of the system.

Chapter 8, “Phono input optimization", describes how to use these wizards.

## 5.2 RIAA playback equalization

RIAA playback equalization is a specification for the playback of phonograph records. The P1.5 is fitted with a passive implementation of the RIAA equalization, using high grade, tight tolerance metal film resistors and custom made polypropylene film capacitors. The RIAA equalization provides an accurate filtering for the playback of all the discs recorded with the RIAA equalization. However, prior to the RIAA standardization, each record label used its own specific equalization curve. Therefore, older records (up to the mid 50's and sometimes later) were recorded using different equalization.

The P1.5 can be fitted with an optional board that contains 7 extra equalization filters: EMI, Columbia/LP, Decca/London, DGG/Teldec, NARTB/NAB, Capitol/AES and Philips. Please refer to your local dealer for more information about ordering or installing the optional board into your P1.5 unit.

## 5.3 The 50kHz 'Neumann Pole'

In addition to the two zeros (turnover frequencies) and the pole normalized in the RIAA (or other) pre-emphasis curve used in cutting records, in practice production plants had to stop the ever-increasing gain at high-frequency above the audio band in order to prevent cutting equipment from overheating and cutting heads from ringing. This was done in various ways, but generally involved adding a second, high frequency pole to roll off the extreme high end – normally at around 50kHz. It was a technique used by various different lathe manufacturers, but became known as the "Neumann pole". Adding the 50kHz pole to the pre-emphasis curve suggests the use of a corresponding 50kHz zero in the de-emphasis/replay curve – often referred to as the "enhanced-RIAA" or eRIAA curve. The P1.5 allows users to add the 50kHz zero for any disc or curve on a record-by-record basis.

## 5.4 Control board

The control board features an Ethernet port, allowing connection to the CH Control app via the system's control network. This app enables remote control of all system parameters from a tablet or smartphone (Android or Apple IOS). The control board includes a USB Type-A port for firmware updates using the included USB flash drive. It does not support reading audio files.

## 5.5 Grounding

Depending on the product version, the rear side may feature different mechanisms.

- With three terminals (two analog grounds and one earth) and a jumper allowing the connection between analog ground and earth
- With two terminals (one analog ground and one earth) and a switch to connect the analog ground to earth

The grounding jumper (or ground lift) allows owners to combine or separate the signal and chassis ground. In any audio system, it is generally best to connect the signal and chassis grounds at one point only, usually in the preamplifier, in order to break ground loops and prevent potential hum.

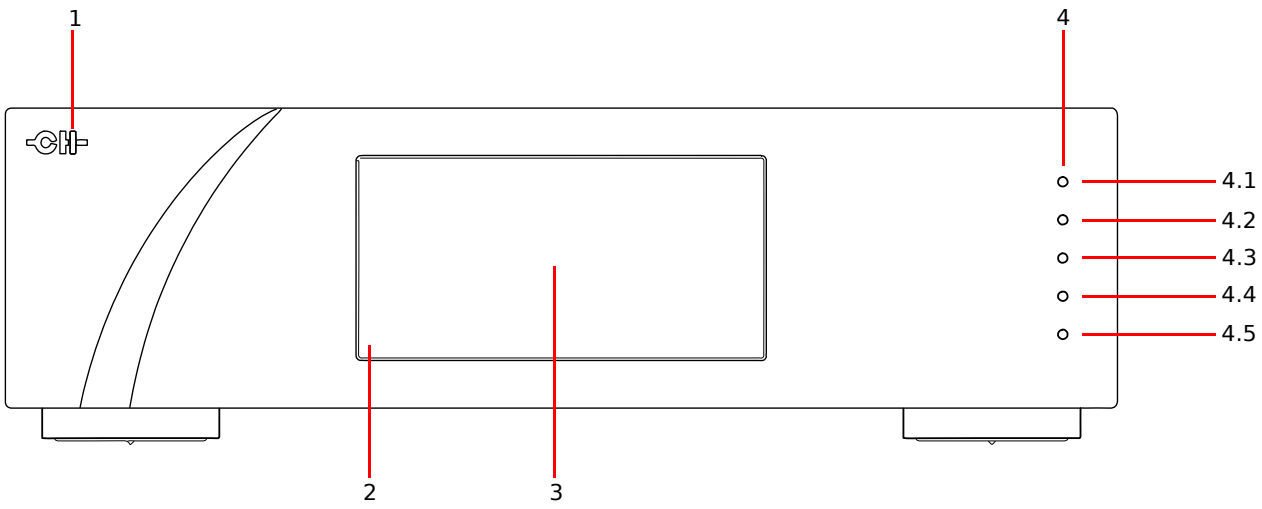
A bare banana plug for grounding is also supplied with the P1.5.

# 6 Operation

The P1.5 Phono Preamplifier can be operated from the front panel, from the Infra-red remote control or from CH Control app (Android or Apple). Feedback to the user is provided by a high-definition display with customizable colors. Setup operations are handled from the front panel or the CH Control app.

## 6.1 Front panel controls

### 6.1.1 Front panel




Front panel elements

1. Standby LED
2. IR remote control receiver
3. Display area (high-definition AMOLED display)
4. Menu control knobs (Normal push → NP/Long push → LP)
   - 4.1 Mute (NP) / Operate/standby (LP)
   - 4.2 Up
   - 4.3 Next/OK
   - 4.4 Down
   - 4.5 Cancel/Exit

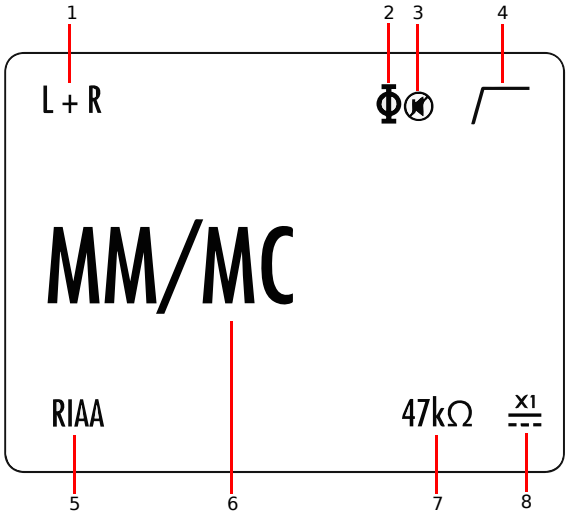
The standby LED lights up when the unit is in standby. It is normally turned-off during operation and lights briefly whenever it receives a valid IR remote control command. The LED can also be programmed to remain on during operation. The display is a high-definition 24-bit RGB panel with a very wide viewing angle, high contrast and high brightness that ensure optimal legibility. The color and brightness of the display can be configured according to the user's taste/requirements and different colors can be chosen for different EQ curves.

## 6.2 Operating modes

The P1.5 Phono Preamplifier has two main operating modes: Normal mode and Menu mode. Normal mode is used to access standard phono functions (input selection, mute,...) whereas Menu mode is used to configure the unit. The P1.5 also includes Shortcuts for quick access to selected functions. Shortcuts are user programmable and most Menu mode items can be selected as Shortcuts.

### 6.2.1 Normal mode

In normal mode, the screen will display standard phono functions(if Display mode = Status). When powered-on, the P1.5 starts in Normal mode. The status display looks as follows:




Typical screen in Normal mode (Display mode = Status)

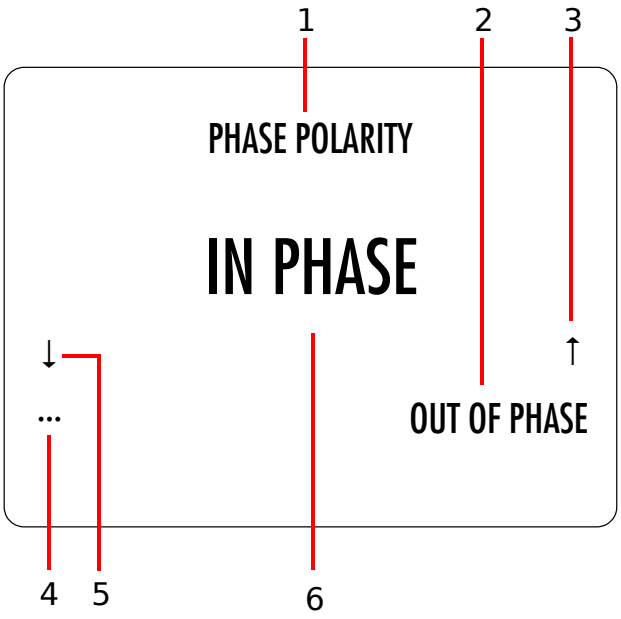
1. Channels handled by the phono.
2. Analog audio output signal polarity (phase) indication. If the Φ symbol is present, polarity is reversed.
3. Mute (⊗) or Mono (▭), if the ⊗ is present, the P1.5 output is muted. ▭ will indicate that the P1.5 is running in mono mode.
4. Subsonic filter indication. If the ⌐ symbol is present, the subsonic high-pass filter is engaged.
5. Selected record replay EQ curve. Shows use of Neumann pole (e- prefix) and selected curve if optional EQ board are installed. Whole display also changes color (auto or user selectable shades) to indicate alternative curves.
6. Input source name. Each input can be renamed through the P1.5's menu.
7. Cartridge loading indication (only for voltage mode MM/MC input).
8. External power supply indication. When an external power supply is connected and engaged, X1 symbol is displayed and internal power supply is turned off.

The displayed items depend on the installed expansion cards and user settings. In the example above, the P1.5 selects the MM/MC input with a 47kΩ load. The RIAA curve is selected. The output is currently muted. The audio signal polarity is inverted. The displayed items are similar for other configurations.

## 6.2.2 Shortcuts

The P1.5 Phono Preamplifier is configured by a set of menus as described in the next sections. To allow quick access to the most frequently used functions, the P1.5 offers the concept of Shortcuts. Shortcuts are fully programmable and the user may choose almost any configuration parameter as a Shortcut function. There are up to 6 user programmable Shortcuts. To learn how to program individual Shortcuts, please refer to the SHORTCUTS menu item in the next section.

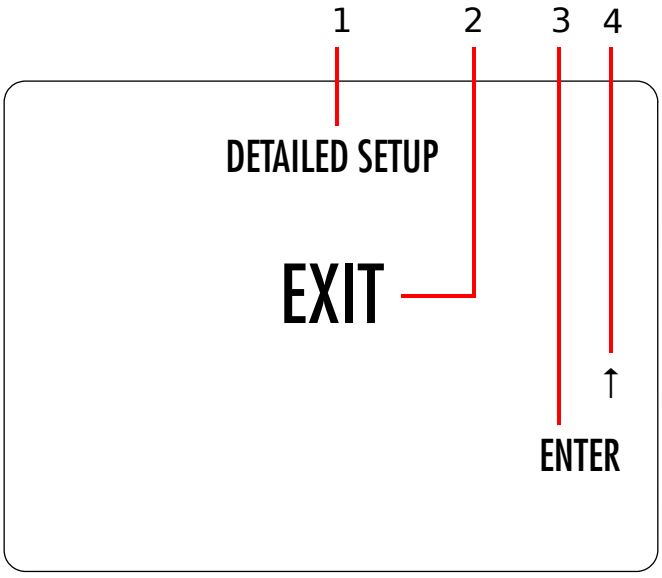
The PHASE POLARITY Shortcut gives a good illustration of how to navigate a Shortcut screen. Navigating other Shortcuts is similar.




Phase polarity Shortcut elements

1. Shortcut title (Parameter, for other Shortcuts, title changes accordingly).
2. Next Parameter Value if UP button [ ▲ ] is pushed (parameter up).
3. Arrow indicating UP button [ ▲ ] if applies. The item below indicates the next parameter value (up direction).
4. Next Parameter Value if DOWN button [ ▼ ] is pushed.
5. Arrow indicating DOWN button [ ▼ ] if applies. The item below indicates the next parameter value (down direction).
6. Current Parameter Value.

The last Shortcut (Setup) is always the same and cannot be removed or altered. It allows the Menu mode to access the detailed setup of the unit (Menu mode).




Setup Shortcut elements

1. Shortcut title. It indicates that Detailed Setup (Menu mode) can be entered at this stage.

2. Current value of the parameter. Default action is to exit (go back to Status mode).

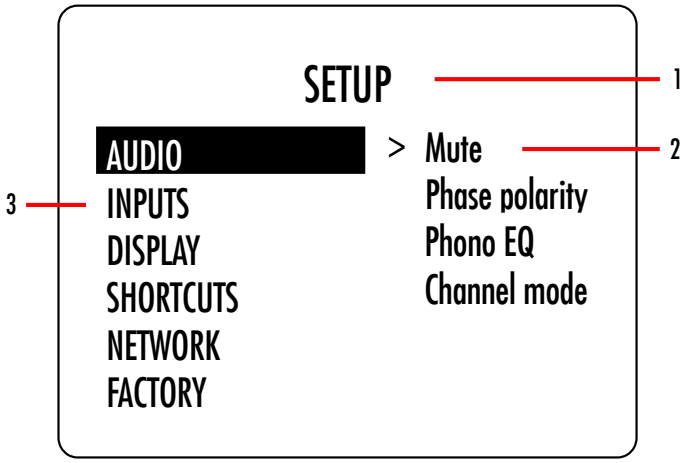
3. Next parameter value. If “Up” button is applied, the unit enters into Menu mode.

4. Arrow indicating “Up” button.

## 6.3 Menu mode

The Menu mode allows the Configuration and Setup of the P1.5 Phono Preamplifier through a set of menus. Menu mode is entered from the last Shortcut item (see above). From Status mode, enter the Shortcut mode by applying a Normal Push [OK]. By successive pushes [ ▾ ], step to the last Shortcut item (DETAILED SETUP) and push «OK» button to enter the Menu mode.

Following illustration shows the elements of the P1.5 SETUP Menu page, the entry point to the P1.5 menu structure.

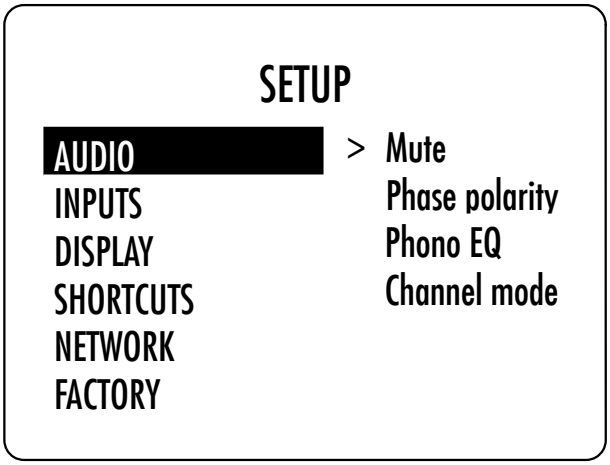



SETUP menu display elements

1. Menu title. When entering a menu item, the title also shows the parent menu. If the AUDIO menu is entered, the title line would display SETUP >> AUDIO
2. Shows the accessible parameters when entering the currently highlighted menu item. In this example, AUDIO is highlighted and the second column shows the parameters accessible in the AUDIO menu.
3. List of items in the current menu. Navigate from one item to the other using [ ▴ ] and [ ▾ ] button. To enter the highlighted menu item, use [OK]" button. To go to the previous menu level use [CANCEL] button. In this example, [CANCEL] exits the Menu mode and sets the unit back to Status mode.

### 6.3.1 Setup menu

The general setup menu is used to navigate to any setting.



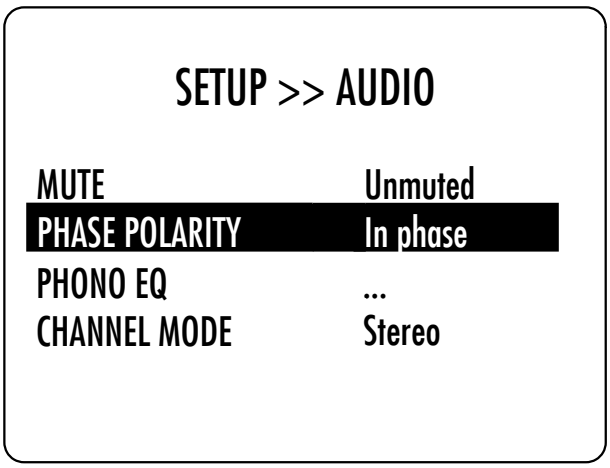

Main menu elements

There are six main menus to configure the P1.5:

- AUDIO: Allows user to adjust audio related parameters.
- INPUTS: Allows user to adjust input specific parameters.
- DISPLAY: Allows user to adjust display related parameters.
- SHORTCUTS: Allows user to assign and modify Shortcuts in order to customize the user interface.
- NETWORK: Provides information about the network setup and configuration.
- FACTORY: Indicates the software version and allows it to be updated. Shows installed option boards. Allows user and service technicians to return the unit to factory settings.

## 6.3.2 Audio menu

The audio setup menu is used to adjust the different audio-related settings.



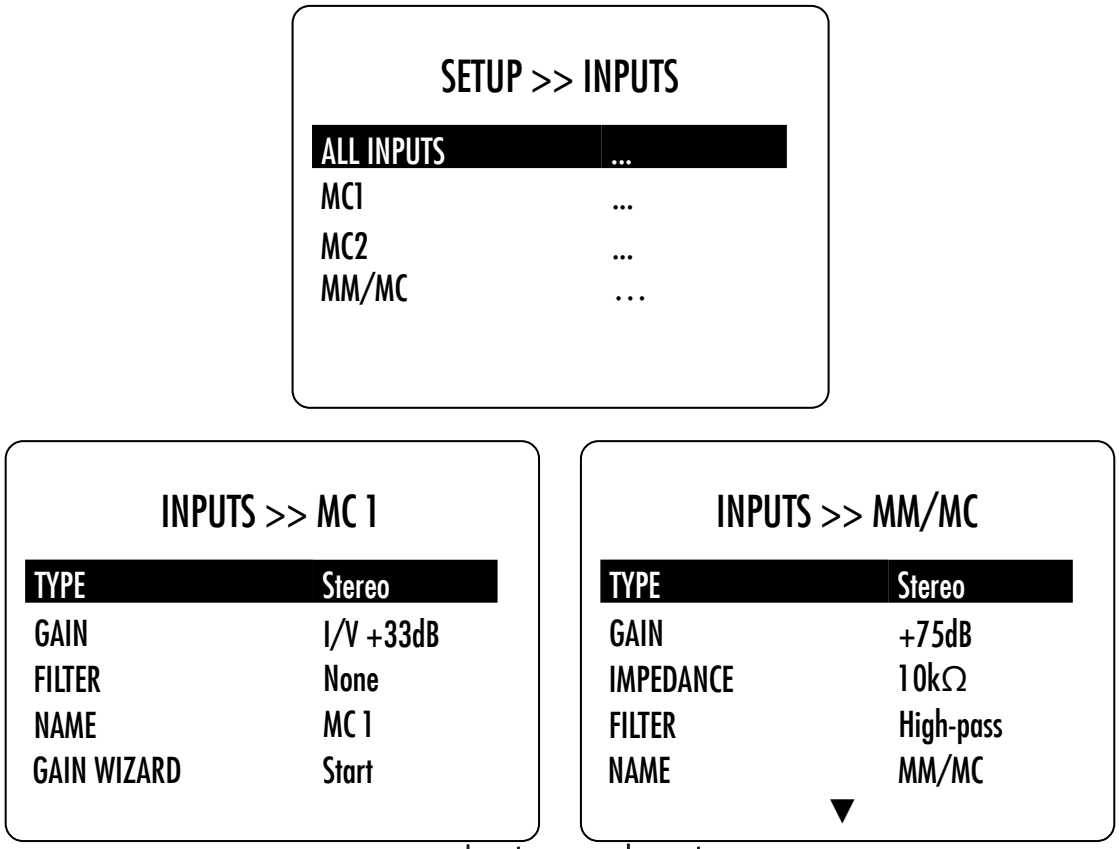

Audio menu elements

- Mute: Mutes or unmutes the audio output.
- Phase polarity: Allows users to reverse the absolute phase polarity of the audio output.
- Phono EQ* : Allows you to choose the EQ curve and engage the Neumann pole.
- Channel mode: Mono or stereo mode.

*With the EQ card (optional), you can choose different curves (EMI, Columbia, Decca/London, Teldec/DGG, NARTB/NAB, Capitol/AES or Philips). Otherwise, only the RIAA curve is available.

## 6.3.3 Inputs Menu

The inputs setup menu is used to configure any input-specific parameter.




Inputs menu elements

First select the input you want to adjust. It is also possible to configure all inputs with a given parameter value at once by selecting "all inputs".

- *Type: Each input can be configured for a stereo cartridge, a mono 2-coil cartridge, or a mono 1-coil cartridge. It is also possible to deactivate the input (it will be hidden).
- **Gain: Allows the user to adjust the input gain.
- ***Impedance : Allows the user to adjust the loading between 20Ω to 70kΩ
- Filter: Enables or disables the subsonic filter
- Name: Renames each input and displays that name when the input is selected.
- ****Gain wizard : Start the gain wizard.
- ****Loading wizard : Start the load wizard.

* Check your cartridge's documentation, or contact your dealer to find out what type it is.

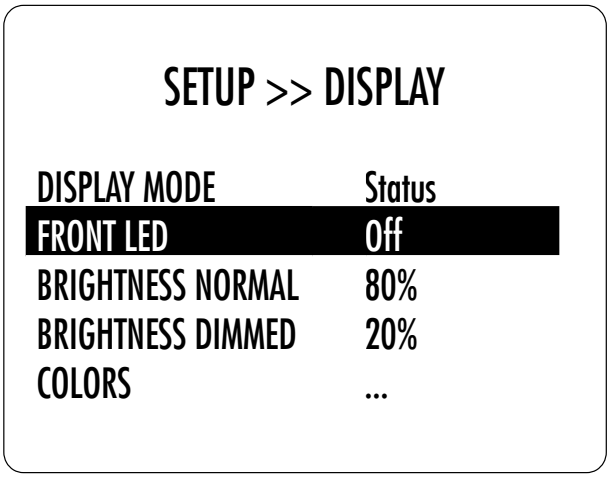
** For MM/MC input gain can be adjusted from +42dB to +75dB, and I/V+12dB to I/V+33dB for MC input.

*** Only with MM/MC input.

**** Chapter 8 Phono input optimization explains how to use wizard.

## 6.3.4 Display Menu

The Display menu is used to change screen settings.

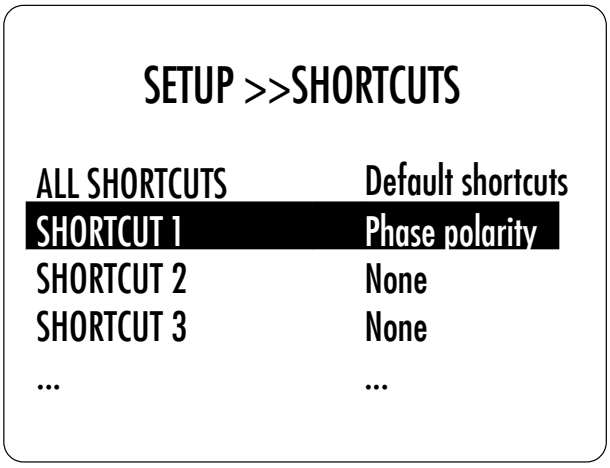



Display menu elements

- Display mode: The P1.5 screen can display a status page or be turned off.
- Front LED: Allows users to select whether the front panel LED is on or off when the P1.5 is operating.
- Brightness normal: Allows you to set the brightness of the display in operating mode (10 – 100%), and to fine tune the high brightness gamma curves to perfectly match the brightness and color of other displays.
- Brightness dimmed: Allows you to set the brightness of the display when dimmed between operations
(10 – 30%), and to fine tune the low brightness gamma curves to perfectly match the brightness and color or other displays.
- Colors: A different display color can be allocated for each different EQ curve (Teldec, RIAA, NAB, ...)
The color can be chosen from standard colors or a custom color can be created.

## 6.3.5 Shortcuts Menu

The Shortcuts menu allows you to customize your shortcuts.



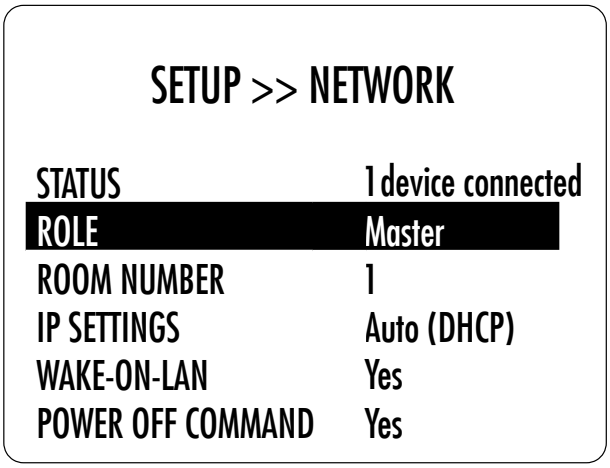

Shortcuts menu elements

- The P1.5 allows you to define up to six shortcuts, taking you directly to almost any parameter in any menu.
- **If you use "Default shortcuts", the P1.5 is preprogrammed with Mute and Phase Polarity and EQ curve as shortcuts one and two.**
- After scrolling through the last shortcut, the next screen that the P1.5 displays is the entry port to the P1.5 menu. The available shortcuts are as follows:

  1. None
  2. Phase polarity
  3. EQ curve
  4. Channel mode
  5. Input filter
  6. Input gain
  7. Input impedance
  8. Front LED
  9. Colors

## 6.3.6 Network Menu

The Network menu allows you to obtain information about the network and configure its options.

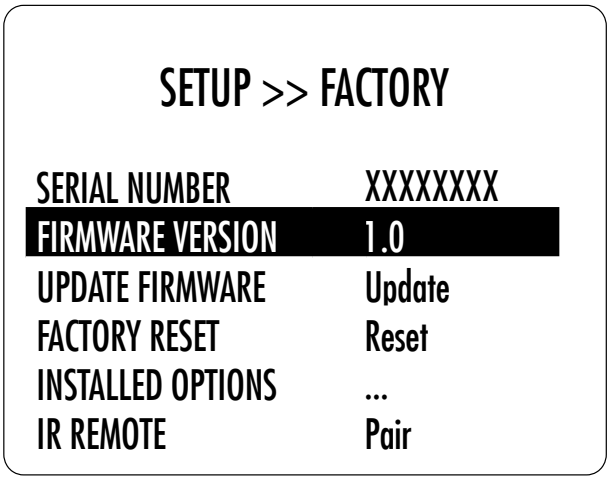



Shortcuts menu elements

- Status: Shows a list of compatible devices detected on the LAN.
- Role: When physically connected to a network, the P1.5 can ignore this network (offline) or connect to it as either the Master unit (it will transmit commands to all compatible client units) or as a Client (it will ignore entries and receive commands only from the master device). This networking facility allows system-wide sharing of commands among CH products (such as mute or power up/down)
- Room number: Defines the room in which the P1.5 is located for multi-room applications. This prevents CH Precision units connected to the same network but located in different systems/rooms to interact with each other.
- IP settings: Auto should be selected if the P1.5 is connected to a router with DHCP server feature. Direct-Link should be selected when an RJ45 Mirror lead directly connects a P1.5 to a single other CH Precision device. More advanced settings are available if needed.
- Wake-on-LAN: If 'No' is selected, the P1.5 cannot be switched on from the CH-Control App. If 'Only If POE' is selected, connecting the P1.5 to a Power Over Ethernet switch will allow it to be switched on via the CH-Control App (Standby consumption will be less than 0.5W). If 'Yes' is selected, the P1.5 can always be switched on by the CH-Control App (Standby consumption will be less than 2W).
- Power off command: If Yes is selected, the P1.5 will enter standby mode when it receives a Power Off command from the LAN. It will remain on if No is selected. This is useful if you want to keep your P1.5 on even when you turn off the rest of your system.

### 6.3.7 Factory Menu

The Factory menu provides information about firmware, options and remote control.



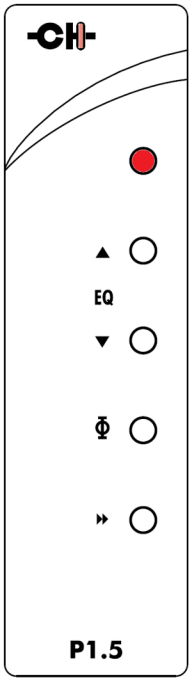

Shortcuts menu elements

- Serial number: Displays the serial number of your P1.5. This serial number is also written on a sticker at the back of your P1.5.
- Firmware version: Indicates the version of the firmware that the P1.5 is currently running. Periodically check CH Precision's website to see if a newer version is available. It could add new features or correct bugs. Note that the CH Control App indicates that a device is not up to date by displaying its name in orange instead of red.
- Update firmware: Selecting Update launches the P1.5 firmware update process. A USB flash disk drive with a valid set of firmware must be inserted in the A-shaped USB port. Please refer to the corresponding section of this manual for more detail on firmware update procedure.
- Factory reset: Resets all parameters to their default factory values. This can be useful if you made some changes that you don't know how to revert.
- Installed options: Lists the hardware configuration of your P1.5.
- IR Remote: Pair/Unpair infrared (IR) remote control. It is possible to pair the remote control to your P1.5 to prevent any unwanted effects with other machines using the same IR command. It is also possible to deactivate pairing if necessary

# 7 Handheld remote control

## 7.1 Remote control operation

The P1.5 Phono Preamplifier is delivered with an IR remote to control the unit's basic operations. The provided remote control is not intended to be used to configure the unit.




P1.5 remote control

The remote control activity LED in the CH logo illuminates when a button is pushed on the remote. The remote control buttons support dual functions by distinguishing between Normal Push [NP] and Long Push [LP] inputs. For a Normal Push [NP], the button is released immediately after pressing. A Long Push [NP] requires the button to be pressed for at least two seconds before being released.

Remote control functions are according to the following table:

| Remote Control Button | Normal Push [NP] | Long Push [LP] |
|---|---|---|
| MUTE (red button) | Mute/Unmute (also wakes-up from STANDBY) | Sets unit into STANDBY or wakes it up |
| NEXT EQ | Select next enabled EQ curve | Anti-rumble high-pass filter |
| PREVIOUS EQ | Select previous enabled EQ curve | Neumann pole selection |
| PHASE INVERTER (Φ) | Phase inversion | Mono/Stereo selection (acts only if the input is configured for stereo) |
| NEXT INPUT (⏭) | Select next enabled input | - |

## 7.2 Changing the remote control batteries

If the Remote Activity LED fails to light then you will need to change the batteries in the handset.
The back cover can be removed using the Torx T-10 screwdriver supplied in the accessory pack.
The remote takes two LR03 batteries (AAA).

**Warning: Do not ingest battery, Chemical Burn Hazard**

The remote control supplied with this product contains LR03 batteries (AAA).

If one of those batteries is swallowed, it can cause severe internal burns in just 2 hours and could lead to death.
Keep new and used batteries away from children.

If the battery compartment does not close securely, stop using the product and keep it away from children. If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

# 8 Phono input optimization

Before connecting your turntable(s), arm(s) and cartridge(s) to the P1.5, it is worth establishing a few initial performance/electrical parameters. These can normally be found in the specifications supplied by the cartridge manufacturer and if no specification sheet is available, can usually be discovered online, either at the manufacturer's website or on one of the various analog data bases.

**The key value you are looking for is the internal impedance of the cartridge.**

- If this is in the range 0-5 Ω, then the cartridge will almost certainly work best into a current-sensing input (MC1 or 2).
- If this is in the range 5-10 Ω, then the cartridge will most likely work best into a current-sensing input (MC1 or 2).
- If this is in the range 10-20 Ω, then the cartridge may still work best into a current-sensing input, but it is worth comparing the performance of the current and voltage sensing inputs.
- If this is above 20 Ω, then the cartridge will probably work best into the voltage-sensing input (MM/MC).
- If you are using an external step-up transformer (SUT), this should be connected to the voltage-sensing input (MM/MC).
- If you are using a high-output MC or MM cartridge (output >2.0 mV), this should be connected to the voltage-sensing input (MM/MC).

## 8.1 Mono and stereo records

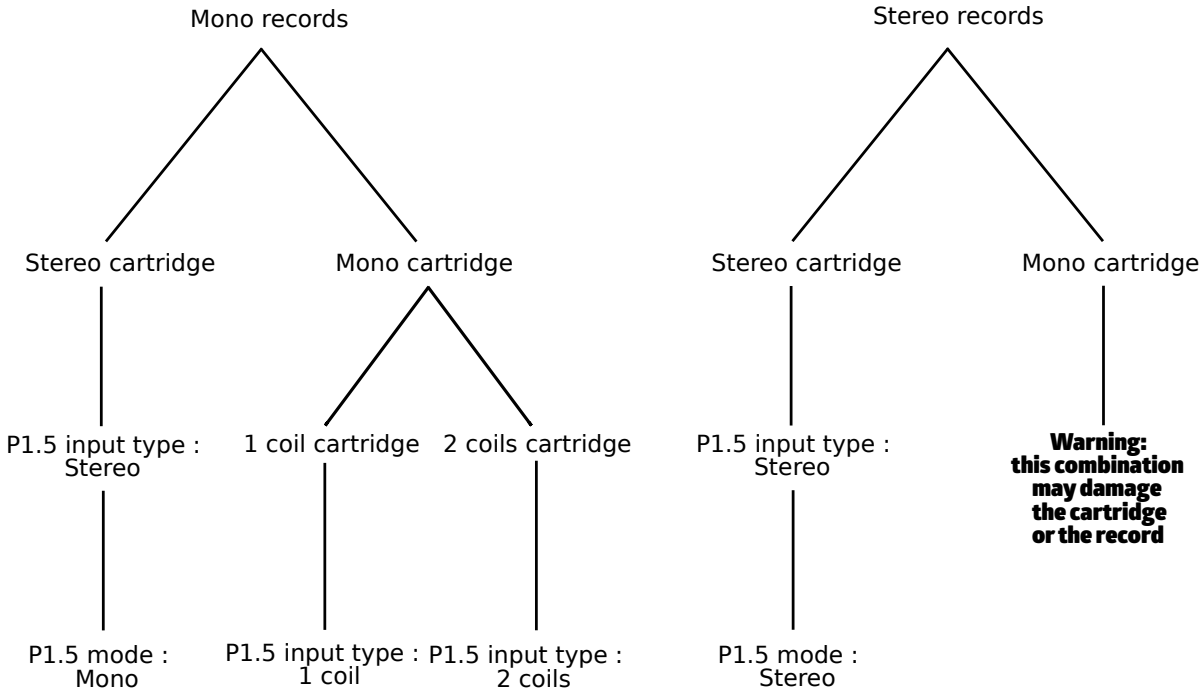
In the history of vinyl records, two recording approaches have succeeded one another: mono and stereo, each marking a significant step in the evolution of music listening.

The first records were recorded in mono, a technology that was then universal. Appreciated for its coherence and directness, mono remains sought after today for the fidelity it brings to period recordings.

With the arrival of stereo in the late 1950s, a new dimension opened up. The listening experience gained in breadth and realism. Stereo gradually established itself as the standard, accompanying the evolution of recording practices and audio systems.

If you own a large collection of records from the mono era, you may have a dedicated mono cartridge, optimized to only read the lateral modulation of the groove. Alternatively, it is also possible to read a mono record with a stereo cartridge. In that case, it is advise to apply a mono operation – summing left and right channel signals – to ensure the soundstage is perfectly centered. To make things even more complex, mono cartridges can feature a single electrical coil, or two independent coils (for the left and right inputs of a phono stage). The presence of 4 pins at the back of the cartridge do not guarantee the presence of 2 independent coils, as L+ and R+ (and L- and R-) may be internally connected to the same unique coil. To know the internal construction of the mono cartridge (1 or 2 coils), please check your cartridge manufacturer's website or contact your authorized dealer.

Indeed, the P1.5 can be optimally configured according to the type of cartridge and the record being played. The following graph helps you determine which setting should be used according to each use-case.



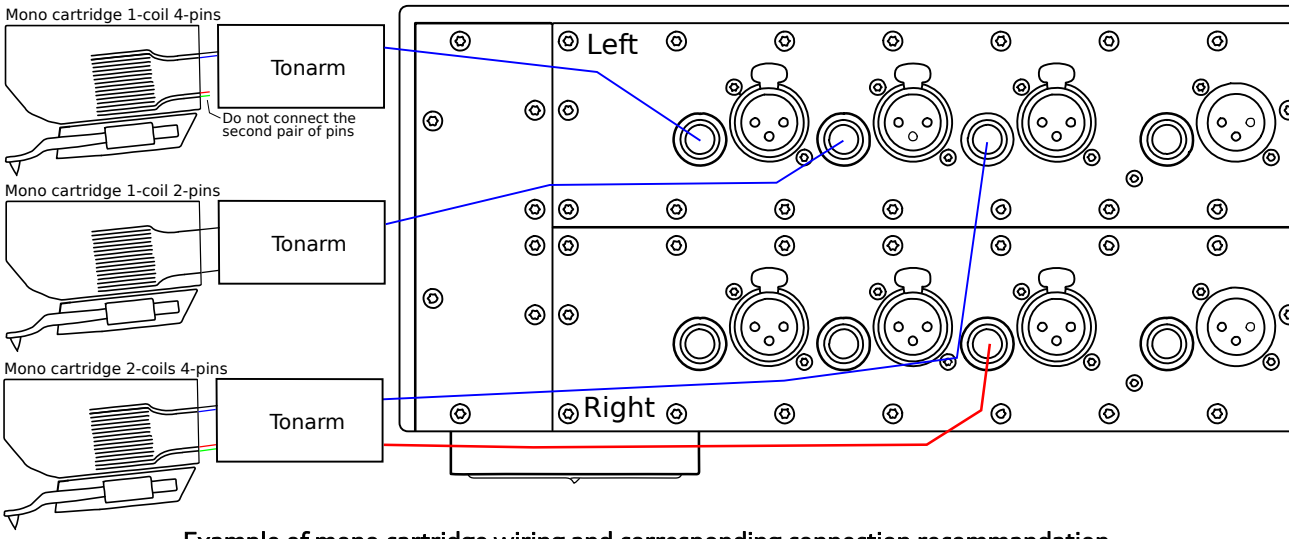

For stereo cartridges, connect all 4 cartridge pins to the tonearm, and the left and right tonearm connectors (either RCA or XLR) to the left and right connectors of one of the 3 inputs of your P1.5.

**For mono cartridges, several wiring configurations are possible depending on the cartridge. To learn how to connect your mono cartridge to P1.5, see the following chapter.**

## 8.2 Mono cartridges

Mono cartridges may have a single coil or two coils. Dual coil mono cartridges feature 4 pins to be connected to the tonearm wires, while single coil cartridges may have 2 or 4 pins. When they have 4 pins, L+ and R+ are connected together to one end of the coil, while L- and R- are connected together to the other end of the coil.

- If you have a 1 coil 4-pins mono cartridge, you must connect only one of the two pin pairs (L+ and L-) to the left input of the P1.5, the other pair should not be connected to the P1.5. It is best to leave the corresponding R+ and R- wires of the tonearm disconnected from the cartridge as it prevents the R+ and R- wires in the tonearm to act as an antenna. Alternatively, make sure you leave the right channel RCA or XLR connector of the tonearm disconnected from the P1.5 phono stage. Make sure to select “mono 1-coil” as the input type for this specific input.
- If you have a 1 coil 2-pins mono cartridge, you will need to connect both pins of the cartridge to the L+ and L- wires of your tonearm (leaving the R+ and R- wire of the tonearm disconnected), and connect the tonearm’s left RCA or XLR connector to a left channel input of your P1.5. Make sure to select “mono 1-coil” as the input type for this specific input.
- If you have a mono cartridge with 2 coils and 4 pins, connect it like a stereo cartridge: L+/L- to a left channel input of your P1.5 and R+/R- to a right channel input of your P1.5. Make sure to select “mono 2-coils” as the input type for this specific input.




Example of mono cartridge wiring and corresponding connection recommandation

## 8.3 Getting the best performance from the current-sensing inputs

If you choose to connect your cartridge to a current-sensing input, the only adjustment that you will need to make is to set the gain. A 21dB range is available, in 3dB steps, so extremely fine tuning is possible and worthwhile. You can establish the optimum signal to noise ratio using the Gain Wizard, or you can simply listen to the result, but either way, the final choice should be made by listening to your preferred music.

If, like all CH Precision preamplifiers, your line stage has variable input sensitivity, it is worth experimenting with the gain structure between the phono stage and the line stage.

## 8.4 Getting the best performance from the voltage-sensing input

If your cartridge is better suited to the voltage-sensing input of the P1.5, then you will need to adjust both the gain and impedance loading values. You should start by setting the impedance loading, as this affects the output level of the cartridge. Manufacturers will often recommend a loading range for their cartridges, but this is often too wide to be useful. We would suggest the following approach:

1. Set the impedance load to a median value in the range recommended by the cartridge manufacturer. Don't worry this value may well change, in some cases considerably.
2. Having set the initial value for impedance loading, you can now set the gain (+42dB to +75dB), either by ear or using the Gain Wizard to achieve an initial setting. Final gain should be set by listening to your preferred music.
3. Use the Loading Wizard (following the instructions below) to refine the loading value for the flattest frequency response. Loading the cartridge down has the affect of controlling the characteristic rising high-frequency output you find in all cartridges, so establishing the best value is important to also delivering the best balance of high frequency extension/energy and frequency balance.

The P1.5 allows extremely fine adjustment of the loading values (20Ω to 70kΩ in very small steps) and experimenting within the optimum range can be extremely beneficial.

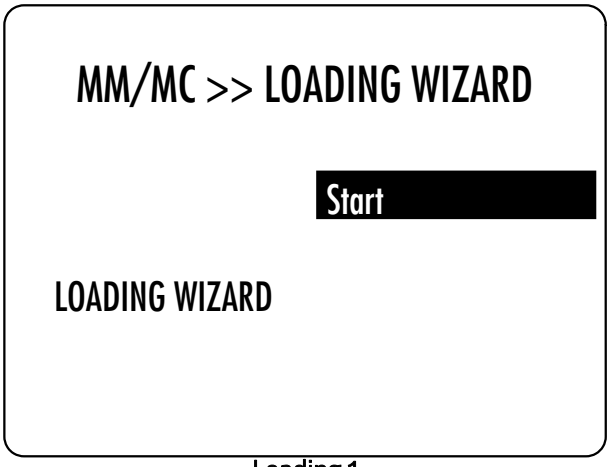
If, like all CH Precision preamplifiers, your line stage has variable input gain, it is worth experimenting with the gain structure between the phono stage and the line stage.

## 8.5 Using the Gain Wizard

- Select the input that you wish to adjust
- Select an initial impedance setting (if adjusting the voltage sensing input, MM/MC). This should be a median value from the cartridge manufacturer's recommendations.
- Put Side 2 of the Set-Up Wizard 7" 45RPM disc on your turntable and prepare to play the first track.
- Select Gain Wizard in the Input's menu.
- Start the wizard using the Middle/OK button on the P1.5. The screen will show the instructions outlined above. Start the record playing and start the acquisition process by pressing the Middle/OK button again.
- After a short time the screen will display the optimum gain setting. You can apply that setting to the input or use it as a guide/starting point for your own assessment by ear.

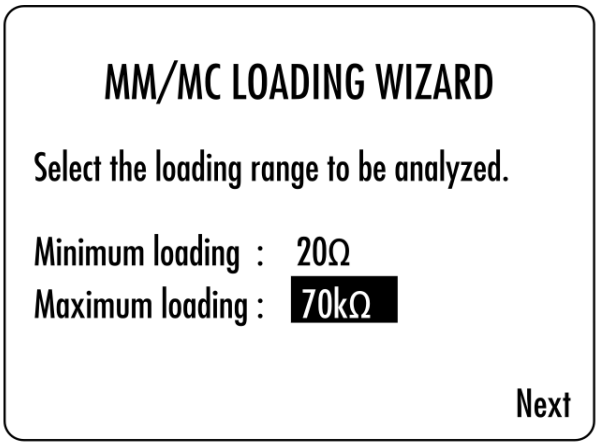
## 8.6 Using the Loading Wizard

- Select the voltage sensing input (MM/MC).
- Put Side 1 of the Set-Up Wizard 7" 45RPM disc on your turntable and prepare to play the track.
- Select Loading Wizard in the Input's menu.



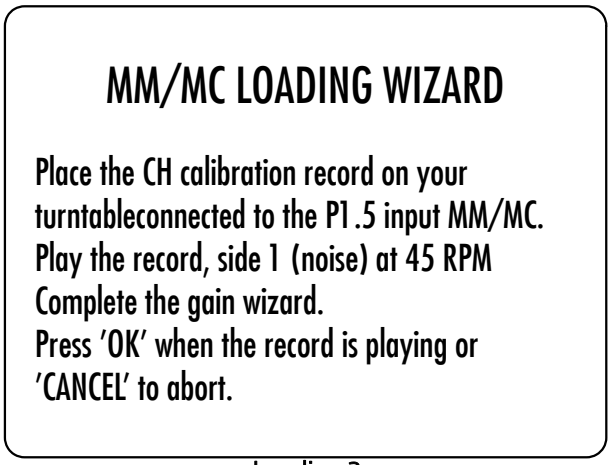

Loading 1

The on-screen display will ask you to select the upper and lower limits of the testing range, using the Up, Down and Middle/OK buttons. Once you have defined the testing range, press next.

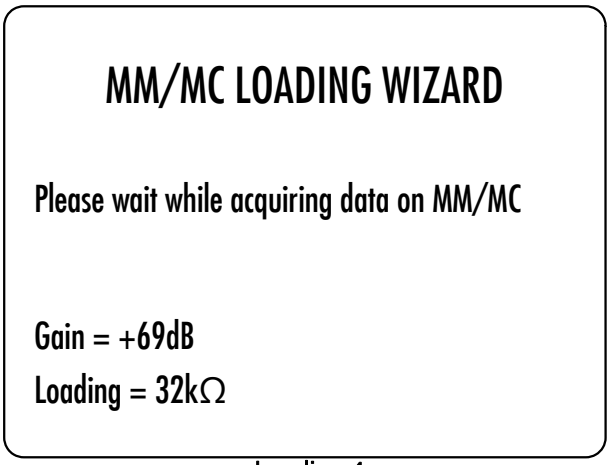



Loading 2

The on-screen instructions will ask you to play Side 1 of the setup record and once it is playing, press the Middle/OK button to start the acquisition process. This will take a short time as the Loading Wizard measures the frequency response of the cartridge at 20 different points within the loading range.

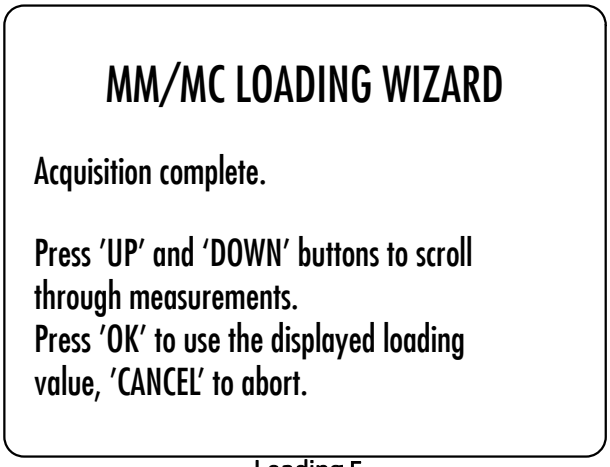



Loading 3




Loading 4

Once complete, the display will show the frequency response at each load setting, starting with the flattest response achieved. You can cycle through the different response curves using the Up and Down buttons.



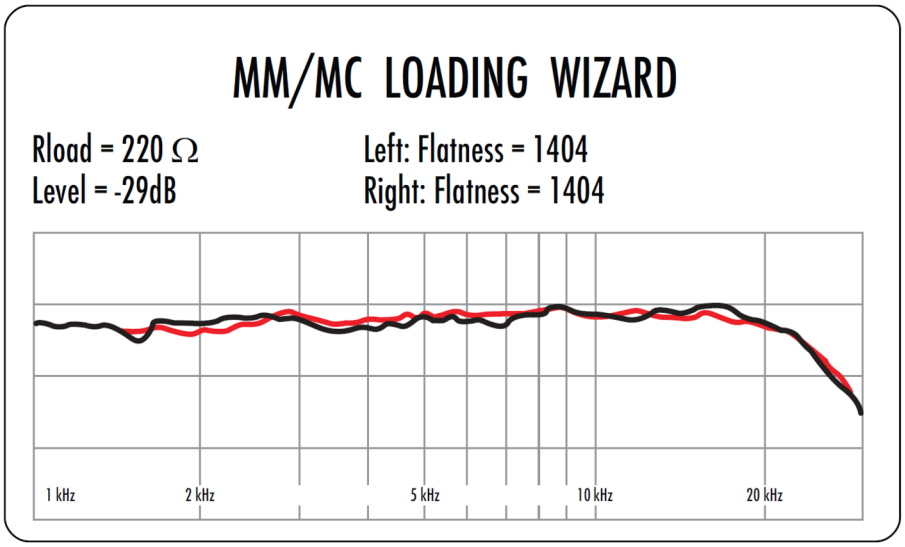

Loading 5

You can now select a particular response/impedance setting and apply it to the chosen input (by pressing the Middle/OK button), or you can use it as a guide to repeat the test with a narrower range of values, using the Bottom button to exit the program. You can repeat the process as often as you wish, but, normally two or three times is sufficient to achieve an excellent result.

Due to the extremely fine range of loading adjustment available with the P1.5, once you have set the load using the Loading Wizard, it is possible to further refine it over time by listening.

## 8.7 Interpreting the Loading Wizard display

The Loading Wizard generates frequency response curves for each cartridge, tonearm cable and load setting.




Correctly loaded cartridge

The Black line traces the Left Channel output from 1kHz to 30kHz

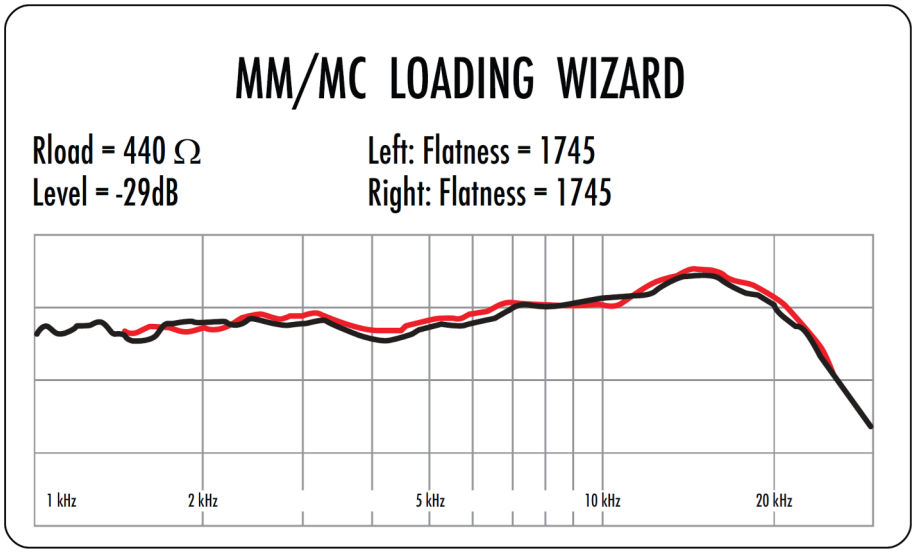
The Red line traces the Right Channel output from 1kHz to 30kHz

The goal is to achieve the flattest response possible between 1kHz and 20kHz – without losing level.

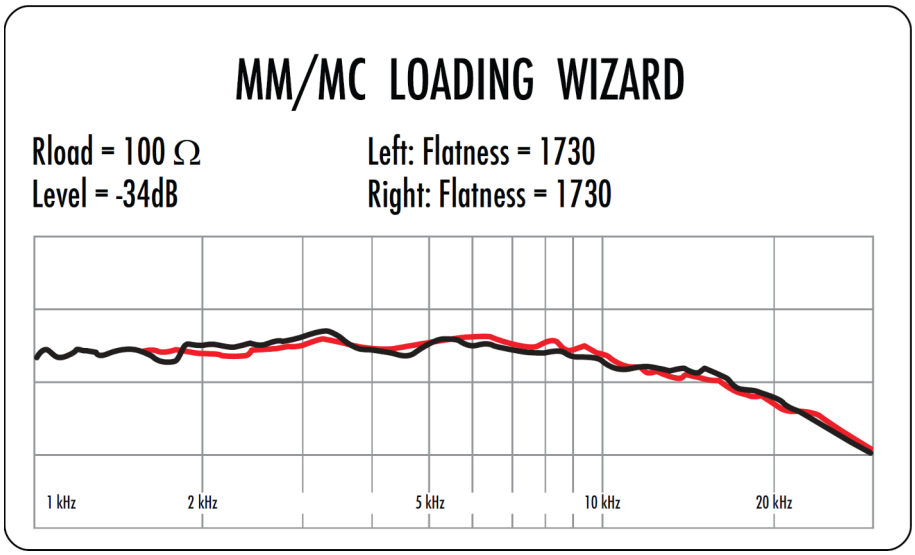
Do not be confused by the small ripples or undulations in the traces. What you are looking for is the overall shape of the trace.

An optimally loaded cartridge should show a flat overall trace at a high amplitude and with a gentle roll-off from around the 20kHz mark.

The left and right flatness numbers are computed as the standard deviation of each channel's frequency response compared to a perfectly flat one. Therefore, the smaller the number, the flattest the frequency response.




Under-loaded cartridge




Over-loaded cartridge

An under-loaded cartridge will show a distinct hump in its response, normally somewhere between 5kHz and 20kHz. An over-loaded cartridge will show a depressed level, a general downward trend in its trace or both.

# 9 Firmware update

## 9.1 Preparing the USB stick

The firmware of all the CH Precision units can be updated using the USB port located at the back of the unit. Before starting the firmware update, it is necessary to load a USB stick with files containing the new firmware. Use a FAT32 formatted USB 2.0 stick (there is one supplied with your P1.5, located in the Accessory Pack). Please note that some USB sticks might not be detected by the P1.5's USB port. The following procedure describes how to load the USB stick with the correct files:

1. Download the latest P1.5 firmware file from www.ch-precision.com.
2. Decompress the ".zip" folder and copy the decompressed files to the root of your USB stick.

Make sure all the files are present on your USB stick, and that there are no duplicates. It is easiest to delete older P1.5 firmware files from the stick before loading the new ones, as this saves any possible confusion. Any missing file will make the firmware update procedure fail, while multiple versions of the same unit's firmware can lead to unstable P1.5 behavior after update.

## 9.2 Updating the unit's firmware

1. Connect the USB stick to the USB port located at the back of your P1.5 unit.
2. Navigate to the FACTORY SETTINGS menu and select the UPDATE FIRMWARE item.
3. Start the Firmware Update process by pushing the central button. Please note that the unit will perform a Reset (the display briefly turns off and on) during the procedure.
4. Once the firmware update is complete, the unit automatically goes into Standby mode. You can now remove the USB stick and turn the unit on. The new firmware is now active. To verify that the firmware update is effective, navigate to the FACTORY SETTINGS menu and select the FIRMWARE VERSION item. The displayed firmware revision should match the firmware revision on the files copied to the USB stick.

**Note: The firmware update process lasts 6-15 minutes, do NOT interrupt it!**

When performing a firmware update, do NOT press any of the unit's front panel buttons, do NOT unplug the unit from the AC wall socket and do NOT turn the mains power switch off. Interruption of the firmware update procedure may result in corrupted firmware and a malfunctioning unit. If something goes wrong during a firmware update and the unit is malfunctioning, apply the emergency firmware update procedure described below.

## 9.3 Emergency firmware update procedure

WARNING, this procedure is not a normal update procedure, it is an emergency procedure in case of a problem with the standard update.

To perform a normal update, go to the setup menu, factory settings, then to firmware update and press the "OK" button.

Perform the following Emergency Firmware Update procedure if your unit doesn't power up normally.

1. Power the unit off (back panel mains power switch to OFF).
2. Connect the USB stick to the USB port located on the CONTROL board mounted on the back of your P1.5 unit.
3. Push and keep the encoder button pushed and power up the unit (back panel mains power switch to ON). Keep the encoder button pushed for a couple more seconds after you turn the unit on.
4. The unit performs the emergency firmware update. Once the operation is complete, the unit automatically goes into Standby mode. Remove the USB stick and turn the unit on. The new firmware is now active. To verify that the firmware update is effective, navigate to the FACTORY SETTINGS menu and select the FIRMWARE VERSION item. The displayed firmware revision should match the firmware revision on the files copied to the USB stick.
5. If the emergency firmware update procedure fails, try the same procedure again using a different USB stick. If the failure persists, turn off your unit and contact your authorized dealer for assistance.

**Note: The emergency firmware update procedure lasts 6-15 minutes, do NOT interrupt it!**

## 9.4 Background firmware update

The P1.5 supports background firmware updates, which are triggered by the CH-Control application. To use this feature, the device needs to have a USB key attached - use the provided one. It is highly recommended to keep the USB key permanently attached to ensure that the device can receive automatic firmware updates in the future. The application will notify you when a new version is ready to be installed. You can install the firmware update either by shutting down the device from the application (either individually or whole system) or by going to the device's menu under 'Factory→Update firmware' setting.

**Check only:** The application checks for firmware updates on the website and informs you if a new version is available.

**Disabled:** The entire transfer and check process is deactivated.

Minimal Android version required for this feature is 5.1 (LOLLIPOP_MR1).

This feature is not available with the IOS Control app.

# 10 Troubleshooting

| Error | Action |
|---|---|
| **No power** | Check the AC power cord.<br>Check the power button at the back of the unit.<br>Check the mains fuses on the AC power cord receptacle. |
| **Remote control does not work** | Check if the unit is connected to the AC supply and powered-on.<br>Check that the distance to the unit is not too great. Move closer and try again.<br>The P1.5's Standby LED should briefly illuminate.<br>Change the batteries in the remote control if required (Remote control LED does not illuminate).<br>Make sure the P1.5 is not configured as a Slave on the network (Settings /Network / Config).<br>Test the setting with or without remote control pairing. |
| **No sound (general)** | Check that the tonearm is connected to your P1.5 and that your turntable is playing.<br>Check that your amplifier is turned-on and speakers are connected.<br>Check that the system volume setting is not too low.<br>Check that the correct input is selected on your P1.5. |
| **No sound (🔇 is displayed)** | Your P1.5 is muted. Unmute using the first Remote Control button. |
| **Corrupted sound** | Check the setup of the selected input (stereo/1coil/2 coils).<br>Check the wiring of your cartridge and tonearm.<br>Control your impedance setup and gain setup with the wizards.<br>Check that your turntable system is properly setup (VTF, VTA, Azimuth, anti-skating, ...) |
| **Lost in the settings?** | Restore factory settings and start your setup again. |
| **Firmware update fails** | Try Emergency Software Update procedure.<br>If it fails, download the latest P1.5 firmware from www.ch-precision.com, prepare a software update on a FAT32 formatted USB stick and run the Emergency Software Update procedure again. |
| **USB flash drive for firmware update is not detected by P1.5** | Please try another brand of USB flash drive (eg. the one provided with your P1.5). |

If the error cannot be corrected using the information from the above table, disconnect the unit from AC wall power and from the rest of you system and contact your authorized dealer.

# 11 Specifications

## General

| | |
|---|---|
| User control | Five tact push buttons<br>CH Control app (Android or iOS)<br>Remote control |
| Power supply | Selectable 100V, 115V or 230V AC, 50Hz to 60Hz |
| Power consumption (Standby) | <0.5W |
| Power consumption (Normal) | 45W |
| Operating conditions | Temperature: +5C to +35C, humidity: 5% to 85% (no condensation) |
| Storage conditions | Temperature: +5C to +35C, humidity: 5% to 85% (no condensation) |
| Dimensions (W x D x H) | 440mm x 440mm x 120mm (main body)<br>440mm x 470mm x 133mm (overall including connectors and feet) |
| Weight | 20kg |
| Firmware update / Control | USB port for firmware update / Ethernet based system control |

## 2x MC current-sensing inputs

| | |
|---|---|
| Connections | 1x RCA and 1x XLR per channel on each input |
| Input impedance | < 100mΩ, virtual ground |
| Gain (@1kHz, 10Ω internal impedance cartridge) | +56dB to +77dB in 3dB steps on RCA out<br>+62dB to +83dB in 3dB steps on XLR out) |
| Equivalent input noise (20-20kHz, unweighted) | < -136Bu (< -144dBu with X1) / 1Ω termination, any gain |

## 1x MM/MC voltage-sensing input

| | |
|---|---|
| Connections | 1x RCA and 1x XLR per channel on each input |
| Input impedance | Variable form 70kΩ to 20Ω |
| Gain (@1kHz) | +42dB to +75dB in 3dB steps on RCA out<br>+48dB to +81dB in 3dB steps on XLR out |
| Equivalent input noise (20-20kHz, unweighted) | < -136dBu (< -139dBu with X1) / 1Ω termination, gain < +51dB on RCA out<br>< -138dBu (< -140dBu with X1) / 1Ω termination, gain > +54dB on RCA out |

## Equalization

| | |
|---|---|
| Playback EQ curve accuracy | ±0.1 dB |
| Standard EQ curve | RIAA |
| Optional EQ curves | EMI, Columbia (LP), Decca (London), DGG (Teldec), NARTB (NAB), Capitol/AES and Philips |
| Ultrasonic | Neumann pole at 50kHz can be engaged with any EQ curve |
| Subsonic | Anti-rumble 2nd order high-pass filter at 7Hz can be engaged with any EQ curve |

## Outputs

| | |
|---|---|
| Connections | 1x RCA and 1x XLR per channel |
| Output level balanced | 8 $V_{rms}$ max |
| Output level single-ended | 4 $V_{rms}$ max |
| THD+N | 1kHz signal, output level @3$V_{rms}$,22kHz BW |
| THD+N with MC input | Unmeasurable (below noise floor) for MC current input, any gain |
| THD+N with MM/MC input | < 0.002 %, gain < 57dB and unmeasurable with gain > 60 dB |

## Other features

| | |
|---|---|
| Mode | Stereo or multiple Mono modes |
| Phase | Absolute phase polarity inversion |

## Remote control

| | |
|---|---|
| Remote control type | Infrared. Uses NEC codes. Range: 10m (line of sight) |
| Remote control batteries | 2x LR03 type (AAA) |

Design and Specifications are subject to change without notice. Weight and dimensions are approximate.

Illustrations are informative only and may differ from the actual production model.

Enclosure designed by Mana Ishoni.

## FCC-Notice

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- adjust or relocate the receiving antenna
- increase the separation between the equipment and the receiver
- connect the equipment into a mains outlet on a circuit different from that to which the receiver is connected
- consult the dealer or an experienced ratio/TV technician for help

## Certification Body Scheme

All CH Precision products have Body Certification (CB) certification based on the IEC 62368-1 electrical safety standard.

**All certifications are visible on the official IECEE website (https://certificates.iecee.org/#/search)**




## Disposal – Environmental care

Directive 2002/96/EG of the European Parliament requires consumer electro-technical appliances to be disposed separately and have to be indicated with the following symbol. Should you dispose this component please do so in conformity with local and global legal and environmental regulations and according to best practices. We strongly encourage you to recycle any batteries used with this component.



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