C1.2 Digital to Analog Controller

User Manual

Dear Client,

We are honored that you have chosen the CH C1.2 Digital to Analog Controller. 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 C1.2 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 C1.2, 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 C1.2 D/A Controller for many years.

The Concert has just begun...

Cossy F.

Heeb T.

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1 Introduction

CH products are designed and manufactured in Switzerland by CH Precision Sàrl. We use sophisticated digital processing combined with fully discrete, fully balanced, fully complementary, ultra-short signal path analog circuitry and extensive software monitoring and control to ensure the highest possible levels of performance, operational consistency and versatility.

As a result, your C1.2 offers versatility and a number of operational features that are unique and probably unfamiliar. For that reason it is essential that you fully understand every aspect of the C1.2's operation and options if you are to enjoy its maximum possible performance.

As a 'card-cage' design, users can specify what inputs they require when ordering the C1.2, and can add additional digital or analog inputs at a later date as required. Please also note that the C1.2 can be used as a single chassis unit, a true monaural three-chassis unit and it can be combined with additional X1 power supplies, the T1 Time Reference 10MHz clock and the D1.5 player/transport, allowing users to upgrade or expand performance to suit their needs and musical ambitions. The basic instruction for handling and placing units is identical in all cases. Configuring multi-box systems will be covered in the appropriate section of this manual.

1.1 Digital input options

- DIGITAL-IN HD – provides CH Link HD, AES/EBU, S/PDIF (RCA) and TosLink optical input options.

- ETHERNET-IN HD – provides an Ethernet connection for replaying high-resolution streamed sources. The Streaming input accepts services such as Tidal or Qobuz, or locally stored files (PCM audio up to 768kHz/32bit - twice the DXD rate, and DSD up to 22.5792MHz - also called DSD512), as well as connecting the C1.2 to the dedicated audio/control network for remote control of all functionality via the CH Control Android App. To play music from a roon server, select the Roon Ready input. To play music from a UPnP server, Qobuz or Tidal, select the STREAMING input.

- There is also a USB socket on the ETHERNET-IN HD input board. This is NOT a USB audio input connection and is dedicated to the C1.2's firmware update procedure.

- USB-IN – allows connection of USB audio sources, with PCM data rates up to 24bit/384kHz (DXD) and DoP-encoded DSD up to DSD128 (1bit/5.6448MHz).

1.2 Analog input and Clocking options

- ANALOG-IN – each ANALOG-IN board (up to two can be fitted to the C1.2) provides one pair of balanced XLR and one pair of RCA inputs for line-level analog sources.

- SYNC-IO – provides one input and a pair of outputs (on BNC connectors) for use with an external master clock (such as the T1 Time Reference) or to synchronize the internal clock in the C1.2 with a second, external unit, such as the D1.5 player/transport.

1.3 Global audio options

- Mute

- Absolute phase polarity

- Mono mode

- Balance / channel gain (up to 6dB of gain on either channel in 0.5dB steps)

- Maximum starting volume / global volume limit

1.4 Input-specific options

- Input configuration: active, hidden or bypass

- Analog Input gain: ±6dB in 0.5dB steps

- Input naming

1.5 More user configurable options

- Display: color, content and brightness

- Define shortcut functions

- Network configuration

- Firmware version and update

1.6 Chassis configurations/extension

- The C1.2 DAC Controller is fully compatible with both the X1 external power supply and the T1 Time reference external clock, further upgrading musical performance.

- As well as being highly configurable in terms of inputs and operation, the C1.2 can also be expanded into a multi-box True Monaural DAC Controller. In this form (the C1.2 Mono) becomes a three-chassis unit, with a common Controller and separate left and right channel DACs. This topology offers increased performance but also increases upgrade options, introducing the possibility of up to three X1 power supplies, one dedicated to each of the three C1.2 units.

- As with all CH Precision products, any C1.2 can be converted to C1.2 Mono, three-chassis configuration, for the difference in the retail price of the two units.

2   Setting up your C1.2

This manual will lead you through each step of the installation and set up 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 set up 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 C1.2's many options and that your DAC/Controller delivers the best possible performance.

2.1 Safety notice

Like any piece of sensitive audio electronics, there are certain precautions that you should take in handling and installing your CH Precision C1.2, in order to protect yourself, your new equipment and your system.

- Always handle with care. The C1.2 DAC/Controller is surprisingly heavy, so have someone to help you when unpacking, re-packing or moving it around.

- Install your C1.2 on a strong, stable support capable of holding its weight. It is best to clear/prepare the supporting surfaces in advance.

- Do not install your C1.2 near water. Do not expose the unit to any kind of liquid.

- Do not install it under direct sunlight or near any heat source, such as a radiator or other apparatus generating heat.

- Do not install it in a confined space and make sure there is sufficient ventilation and airflow around and beneath the unit.

- Do not operate it during periods of high ambient temperature (>40°C) or in extremely high humidity conditions. Only use options and accessories specified or recommended by CH Precision.

- Do not open the units or try to service them yourself. Always refer to a qualified technician for service, maintenance or upgrades. Failure to do so will void the unit's warranty

2.2 Unpacking

The C1.2's carton is large and contains 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 C1.2 will be placed has been cleared and cleaned before you start. At this point it is also worth ensuring that the connectors on any interconnect cables are cleaned and that the power to your system is turned off. The carton consists of an inner box and outer sleeve.

- Once you open the inner box, remove Quick Start Guide, 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 C1.2 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 C1.2. Also remove the four composite leveling/grounding spikes. These are inserted into the lower foam block and, being white, 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 C1.2 should arrive in a 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 C1.2, this should always be done in the original packaging.

The carton should contain:

- The C1.2 DAC/Controller

- Four two-part hardened aluminum/polymer spikes

- A suction cup (used to remove the four top covers)

- 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 C1.2 chassis or missing components, please contact your authorized dealer immediately. If your C1.2 unit 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 C1.2 and installing the spikes

- Before positioning your C1.2, it is worth taking the time to make a few preliminary decisions.

- 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.

- If you do plan to use the CH spikes, use the blue suction cup to remove the four circular covers in the top plate of each unit. Gently insert the hardened aluminum composite 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 C1.2. 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 chassis will make things considerably easier.

- The C1.2 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 a disc beneath each foot. (Using an AirWedge or similar lifting bladder will make this considerably easier.) The groove that interfaces with the polymer 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 C1.2 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 screwed tightly into place.

2.5 Stacking the C1.2 (or not)

Also included in the accessory packs is a set of stacking caps. These polymer inserts allow owners to stack the C1.2 chassis on top of other CH 1 Series 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.

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. But 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 in the lower unit(s), 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.

Like any high-resolution, digital component, your C1.2 can be sensitive to mechanical vibration, so when stacking units, always aim to position it above those units with moving parts (like the D1.5) or units with large internal components that are likely to vibrate (power amps and power supplies).

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 C1.2

cosmetic
caps

C1.2 DAC/
Controller

stacking
caps

X1 external
power supply
unit or other
CH unit

support
discs
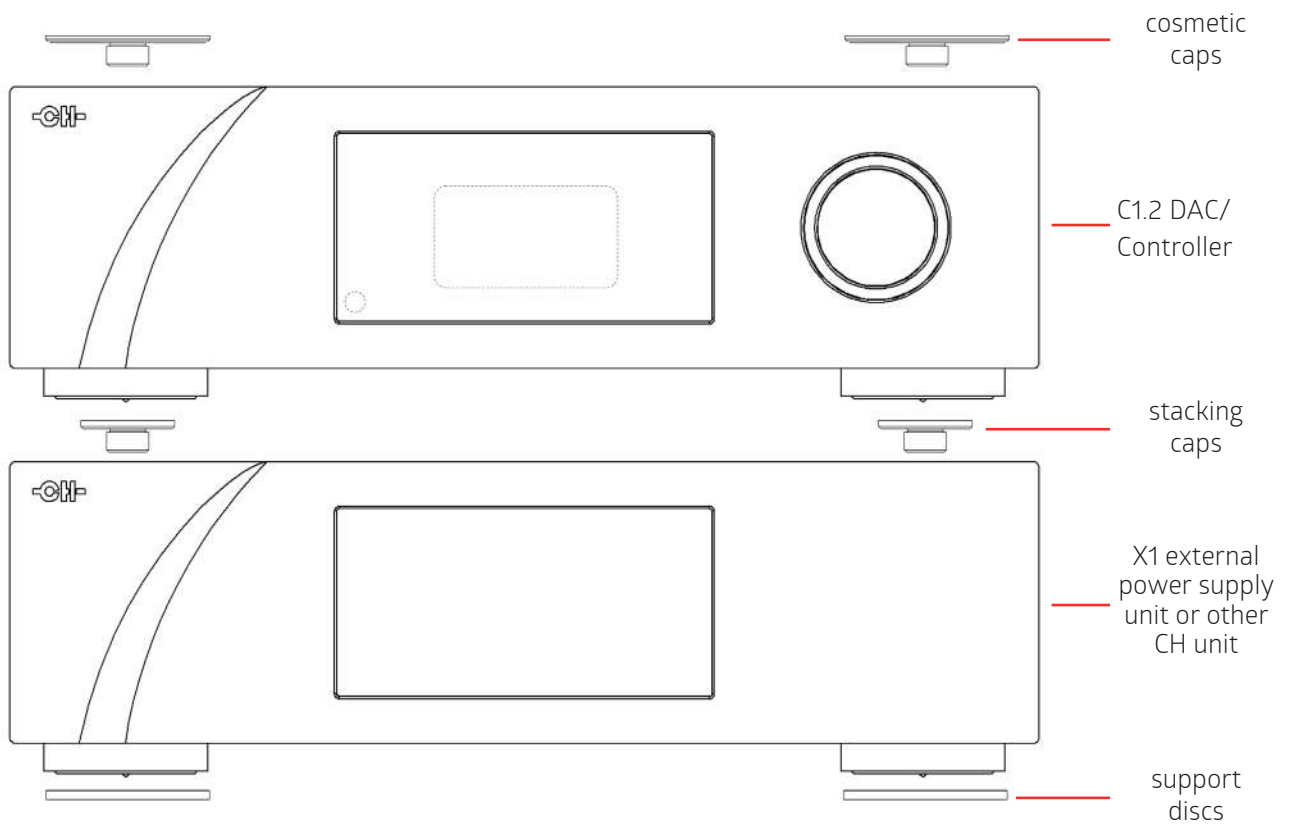
3 Connections

You are now ready to connect your C1.2 to your system. Given the differences between systems and the modular nature of the C1.2, with its range of input options, your range of source components and system configuration will almost certainly differ from the example below. However, we have selected a 'fully-loaded' C1.2 to show the widest range of connections.

Rear panel connections

1. 75 Ohm RCA single-ended analog output for right channel
2. 50 Ohm BNC single-ended analog output for right channel
3. 75 Ohm RCA single-ended analog output for left channel
4. 50 Ohm BNC single-ended analog output for left channel
5. RCA single-ended analog input for left channel [optional ANALOG_IN board, here fitted in Slot 1]
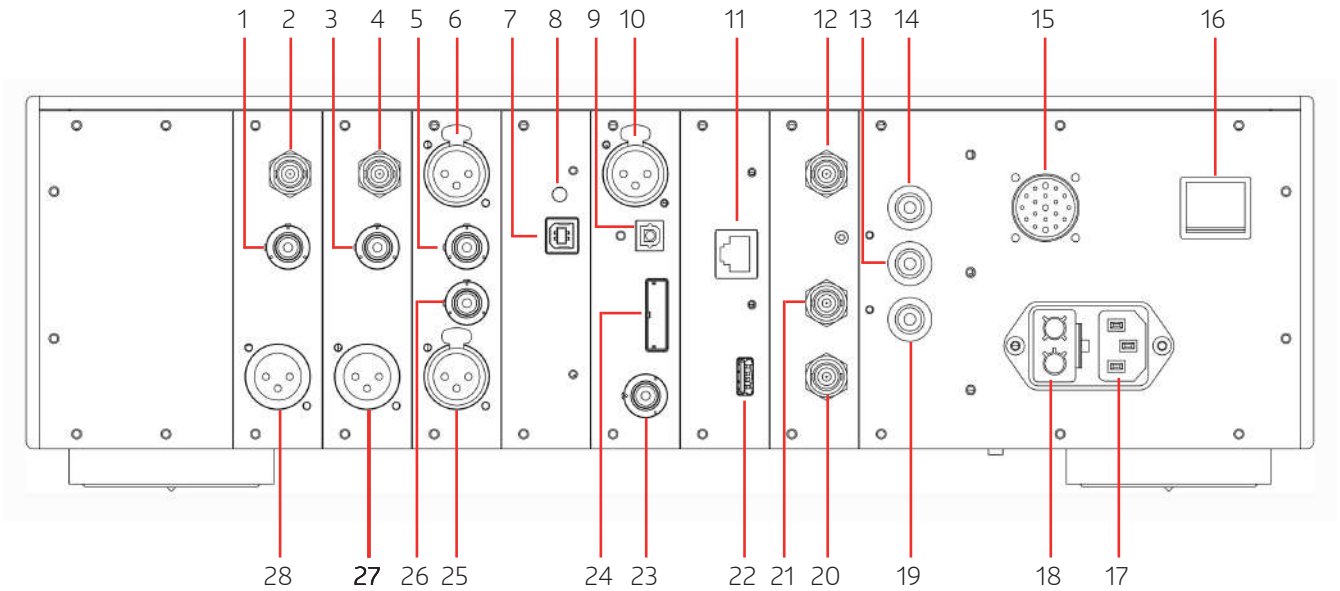6. XLR balanced analog input for left channel. [optional ANALOG_IN board, here fitted in Slot 1]
7. USB audio input socket [optional USB_IN board, here fitted in Slot 2]
8. USB audio status LED (Orange: playing, Green: ready: Red: booting: Off: unpowered) [optional USB_IN board]
9. TOSLINK (S/PDIF) digital input [DIGITAL_IN_HD #1 board, here fitted in Slot 3]
10. AES-EBU digital input [DIGITAL_IN_HD #1 board, here fitted in Slot 3]
11. Ethernet port for command interface [CONTROL board] or for audio playback and commands [optional ETHERNET-IN HD board]
12. BNC clock input. Provides 75Ohm or Hi-Z input. [optional SNYC_IO board]
13. Analog ground connector 2.Can be connected to digital ground (Earth) using provided jumper
14. Analog ground connector 1. Ground lift jumper can be plugged between the 2 Analog ground connectors for convenient storage
15. External power supply connector for X1 power supply option
16. Power on/off switch
17. Power cord receptacle
18. Power fuse and voltage selection
19. Earth connector. Internally connected to digital ground
20. BNC 75 Ohm clock output 2. [optional SYNC_IO board]
21. BNC 75 Ohm clock output 1. [optional SYNC_IO board].
22. USB port for software upgrades. [CONTROL board or optional ETHERNET-IN HD board]
23. Coaxial (S/PDIF) digital input [DIGITAL_IN_HD #1 board, here fitted in Slot 3]
24. CH Link HD digital input [DIGITAL_IN_HD #1 board, here fitted in Slot 3]
25. XLR balanced analog input for right channel [optional ANALOG_IN board, here fitted in Slot 1]
26. RCA single-ended analog input for right channel [optional ANALOG_IN board, here fitted in Slot 1]
27. XLR balanced analog output for left channel
28. XLR balanced analog output for right channel

3.1 ETHERNET-IN HD

This board connects the C1.2 to the dedicated audio network and allows you to stream music and/or locally stored files as well as access the CH Control app, which allows you to adjust or set any system parameter from a compatible Android tablet. It converts the C1.2 into a network renderer capable of playing local audio files from a UPnP/DLNA server (such as a NAS), music from online streaming services (such as Tidal or Qobuz), as well as music from a Roon server, all of it through a single physical connection to a local area network. Connection should be to the dedicated audio system, internet connected Ethernet switch and that switch should be placed as close to the system as possible. There is an increasing number of audiophile grade Ethernet switches and cables available and these will make a significant contribution to the sonic and musical quality of file replay. Please speak to your dealer about the best hardware solution for your system and situation. For information regarding format and data rate compatibility, please see the relevant section of the C1.2's specifications (p36).

There is also a USB type A connector on the ETHERNET-IN HD board. This is NOT enabled for USB file replay and serves only as an access point for Firmware upgrades, using the supplied USB stick. To allow USB audio replay, you need to specify/fit the optional USB-IN card for your C1.2 (please see below).

3.2 CONTROL BOARD

If the C1.2 is not fitted with the ETHERNET-IN HD board, then the CONTROL BOARD will be fitted instead. This also carries an Ethernet socket, but in this case it is to allow connection to the CH Control app via the system control network, which allows remote control of all system parameters via a compatible Android tablet. Each C1.2 will have either an ETHERNET-IN HD board OR a CONTROL BOARD. It is not possible to mount both. Once again, CONTROL BOARD includes a USB type A socket to enable Firmware upgrades using the supplied USB stick. It does NOT facilitate USB file replay.

3.3 DIGITAL-IN HD

Your C1.2 comes factory fitted with one DIGITAL-IN HD board. This gives you connections for balanced digital (AES/EBU on XLR), coaxial digital (S/PDIF on RCA), optical (TosLink) and our proprietary CH-LINK HD high-resolution digital input. You can connect multiple sources simultaneously and the C1.2 allows you to switch between them. The CH-LINK HD can be used to accept high-resolution data from a similarly equipped source, such as native DSD or MQA from SACDs or MQA-CDs played on the D1.5 transport. If you need additional digital inputs, you can mount another DIGITAL-IN HD board (or even two) in the C1.2's option slots – please see below. For information regarding format and data rate compatibility, please see the relevant section of the C1.2's specifications (p36).

3.4 Positioning and number of optional input boards

The two slots to the left of the factory-fitted DIGITAL-IN HD board can be used to install selected, optional inputs. These options can be chosen from the DIGITAL-IN HD (should you require additional digital inputs), the USB-IN and ANALOG-IN, in any combination of the three. Alternatively, one or both of the option slots can be left for later use, in which case they will be covered with a blanking plate.

3.4.1 USB-IN

This optional board can be mounted in either of the two available option slots (Slots 1 and 2) and allows the C1.2 to accept high-resolution files from a USB source. For information regarding format, operating system and data rate compatibility, please see the relevant section of the C1.2's specifications (p36).

3.4.2 ANALOG-IN

Each ANALOG-IN board accepts and allows you to switch between two line-level analog inputs. Each board is fitted with pair of balanced XLR sockets and one pair of single-ended RCA sockets. You can fit up to two ANALOG-IN boards to your C1.2 (assuming that both the option slots are free), allowing you to connect two balanced and two single-ended analog sources to your C1.2 Controller.

3.5 SYNC-I/O

The SYNC-I/O board allows for external clock synchronization, either with an external master clock (such as the T1 Time Reference) or with a second unit with a clock synchronization capability. That might be the D1.5 player/transport or another digital source component.

The SYNC-I/O board provides a BNC clock input that can be configured as 75 Ohm input impedance (recommended with the CH Precision T1) or high input impedance through the C1.2's menu. Supported input frequencies on this connector are all standard audio Wordclocks (44.1, 48, 88.2, 96, 176.4 192, 352.8, 384, 705.6 and 768 kHz), audio Masterclocks (22.5792 and 24.576 MHz), DSD bitclock (2.8224 MHz) and atomic-clock multiples (100 kHz and 10 MHz).

The SYNC-I/O board also provides a pair of 75 Ohm clock output connectors. Use these connectors to synchronize an external device to your C1.2. The use of high-quality, genuine 75Ω BNC cables will also help maximize performance.

3.6 ANALOG OUTPUT

Your C1.2 is fitted with independent left and right channel DACs, each with its own set of analog outputs. Each channel offers a balanced XLR socket, a single-ended RCA and a 50Ω output on BNC.

3.7 Power cord receptacle and voltage selection

Make sure that the voltage selection is set to the correct value with respect to the AC voltage in your location and that the power switch is in the Off position (0 side of the switch depressed). Connect the IEC plug to the power cord receptacle and plug the power plug into the AC wall outlet or distribution block.

3.8 External power supply connector

The external power supply connector allows you to connect the X1 optional external power supply. When the X1 is used, it completely replaces the C1.2's internal power supply, resulting in minimized noise and enhanced audio quality. Note that only the (small) standby transformer of the C1.2 remains active in this case to ensure the C1.2's wake up functionality. The C1.2 therefore still requires a power cord.

3.9 A word about cables...

Although it is now widely accepted that audiophiles cables can make a valuable contribution to system performance, there is still one aspect of system cabling where many users remain sceptical. There is a widely held belief that digital cables "only carry ones and noughts" and that therefore they can't make a difference. This is not the case. Digital cables actually carry voltage square waves (an analog signal) and are thus not only prone to distortion but different forms of distortion to the conventional analog cables in your system. They are particularly susceptible to impedance variation and yet few low-grade digital cables achieve much better than ±10% tolerance when it comes to their impedance rating, while the number of audiophile connectors that comply with 75Ω or 110Ω digital connection standards is vanishingly small.

Our CH-LINK HD is carefully engineered to maximize performance when it comes to digital data transfer. If you are using the AES/EBU, S/PDIF or TosLink inputs to your C1.2, connecting it via Ethernet or USB cabling, or using clock cables between units, then we strongly advise that you experiment or consult with your dealer over your choice of cables. Using high-quality, properly engineered digital cabling with accurately realized impedance characteristics cannot increase the performance of the C1.2 - but using poor quality digital cabling will definitely erode performance and undermine your investment.

4 Operation

The C1.2 DAC/Controller can be operated from the front panel, from the IR remote control or from CH Control Android app. 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 Android app.

4.1 Front panel controls

4.1.1 Front panel
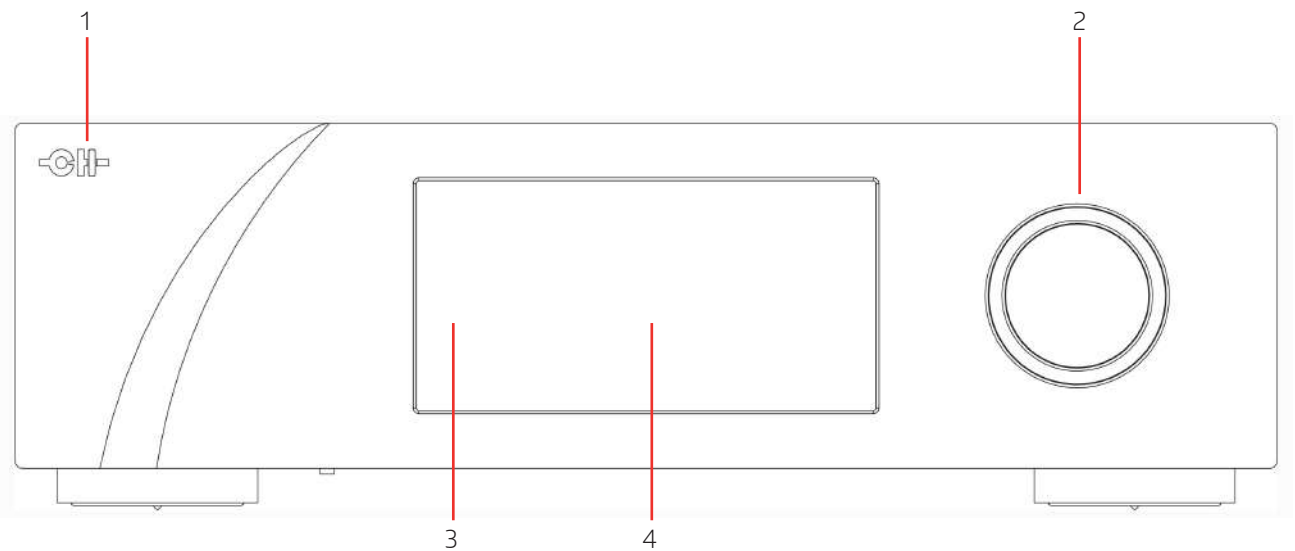
Front panel elements

1. Standby LED
2. User control knob (dual concentric rotatory knob with push function)

3. IR remote control receiver
4. Display area (high-definition AMOLED display)

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 PCM, DSD, MQA, MQA Studio or analog input playback.

4.1.2 User control knob

The user control knob is the main user input device. It is build around a dual concentric rotatory knob with push function mounted on precision bearings. Both the central and the external part of the knob can be moved to the left (counter-clockwise) or the right (clockwise) independently, giving four movements: External Rotate Left/Right [<<E]/[E>>] and Central Rotate Left/Right [<<C]/[C>>]. The central part of the knob also supports a push functionality. There are two types of push: Normal Push [NP] and Long Push [LP]. For a Normal Push, just press the central part of the knob and release it immediately. For a Long Push, press and hold the central part of the knob for two seconds or more.
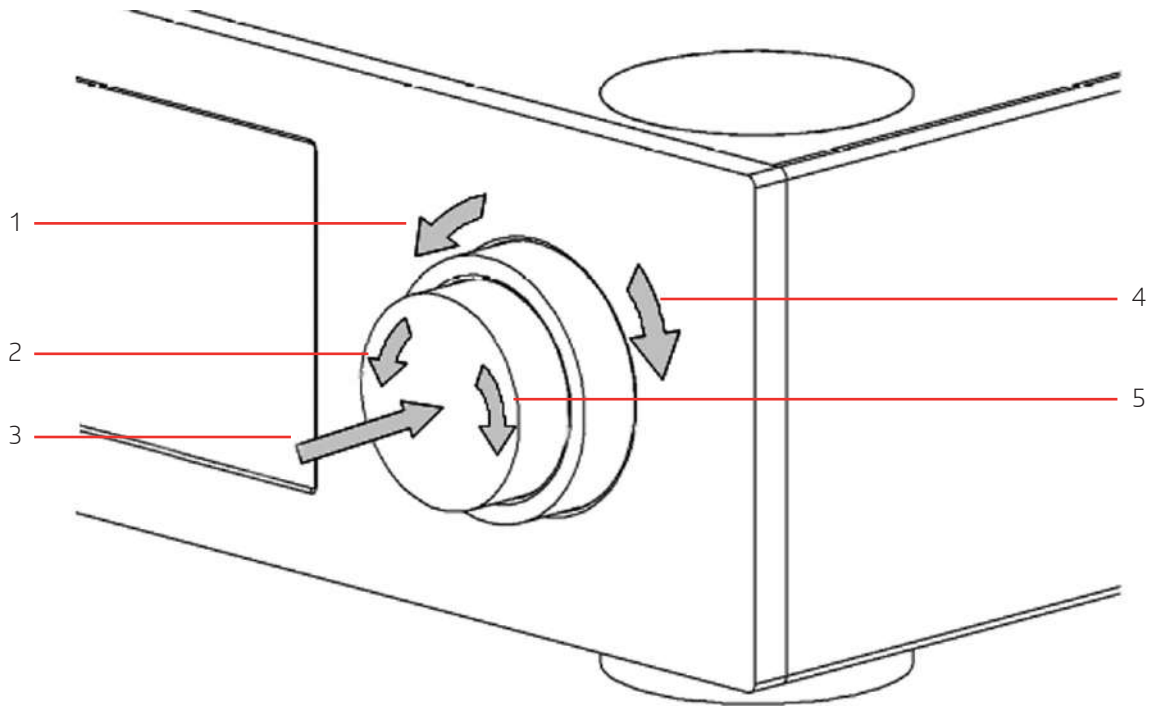
User control knob movements

1. External ring rotate Left [<<E]
2. Central knob rotate Left [<<C]
3. Central knob push. There are two types of push:

Normal Push [NP] and Long Push [LP]
4. External ring rotate Right [E>>]
5. Central knob rotate Right [C>>]

4.2 Operating modes

The C1.2 DAC/Controller has two main operating modes: Normal mode and Menu mode. Normal mode is used to access standard preamplifier controls (selection, switching and setting level) whereas Menu mode is used to configure the unit. The C1.2 also includes Shortcuts for quick access to selected Menu mode items. Shortcuts are user programmable and most Menu mode items can be selected as Shortcuts.

4.2.1 Normal mode

Normal mode is used for standard preamplifier functions. When powered-on, the C1.2 starts in Normal mode. The display looks as follows:

Normal mode display elements

1. Data type (PCM, DSD, MQA or MQA Studio) and the incoming audio stream's original sample rate.
2. Mute indication. If the ⊗ symbol is present, the output is muted
3. Analog output level. Only displayed when the C1.2 is used as a preamplifier. When C1.2 is used as a pure DAC (selectable through the Factory Settings menu), output level is set to 0 dB and "DAC" is displayed.
4. Analog audio output signal polarity (phase) indication. If the Φ symbol is present, polarity is reversed

5. External power supply indication. When an external power supply is connected and engaged, ⏚ symbol is displayed and internal power supply is turned off
6. Clock source indication (internal, audio in, or clock frequency when an external clock is selected as the clock source)
7. Lock indication (🔒 or ⌐). Tells if the unit is locked to a clock source or not
8. Input source name. Each input source can be renamed through the C1.2's menu

Displayed elements depend on the installed option boards and user settings. In the example above, the C1.2 is playing PCM audio coming from its first AES-EBU input at the rate of 44.1 kHz. The output level is -18.5 dB, but is currently muted. The C1.2 has locked its 22.5792 MHz (512 x 44.1 kHz) DCXO to the incoming audio stream. The polarity of the audio signal is inverted, and the C1.2 is powered by an X1 external DC power supply. Displayed elements for other configurations are similar.

The following table shows the actions of the user control knob in Normal mode.

User Control Knob Action	Unit State	Unit Action
[NP] Normal Push	STANDBY	Wake from STANDBY
	Any other state	Enter Shortcuts mode
[LP] Long Push	STANDBY	Wake from STANDBY
	Any other state	Go to STANDBY
[C>>] Center Rotate Right	D/A Controller (preamplifier)	Increase volume (1st by 0.5 dB steps, then faster)
	D/A Converter (pure DAC)	Select next available input
[<<C] Center Rotate Left	D/A Controller (preamplifier)	Decrease volume (1st by 0.5 dB steps, then faster)
	D/A Converter (pure DAC)	Select previous available input
[E>>] External Rotate Right	Any state	Selects next available input
[<<E] External Rotate Left	Any state	Select previous available input

4.2.2 Shortcuts

The C1.2 DAC/Controller is configured by a set of menus as described in the next sections. To allow quick access to the most frequently used configuration menu items, the C1.2 offers the concept of Shortcuts. Shortcuts are fully programmable and the user may choose any configuration parameter as a Shortcut. 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.

Shortcuts are accessed from Normal mode by a Normal Push [NP]. Additional Normal Push [NP] skips to the next Shortcut. The last Shortcut is always dedicated to entering the Menu mode (SETUP). On this last Shortcut, a Normal Push [NP] will return to Normal Mode and an External Rotate Right [E>>] (or Central Rotate Right [C>>]) will enter the Menu mode. The individual parameter for a given Shortcut is modified using External Rotate Left [<<E] (or Central Rotate Left [<<C]) and/or External Rotate Right [E>>] (or Central Rotate Right [C>>]). If there is no user action for about 10s the unit will revert to Normal mode.

Following table shows the actions of the user control knob for Shortcuts.

User Control Knob Action	Unit State	Unit Action
[NP] Normal Push	Shortcut (except last) Last Shortcut (SETUP) or after current Shortcut has been modified	Skip to next Shortcut Exit Shortcuts mode (Normal mode)
[LP] Long Push	STANDBY Any other state	Wake from STANDBY Go to STANDBY
[C>>] Center Rotate Right	Shortcuts (except last) Last Shortcut (SETUP)	Modify parameter up (when available) Enter Menu mode
[<<C] Center Rotate Left	Shortcuts	Modify parameter down (when available)
[E>>] External Rotate Right	Shortcuts (except last) Last Shortcut (SETUP)	Modify parameter up (when available) Enter Menu mode
[<<E] External Rotate Left	Shortcuts	Modify parameter down (when available)

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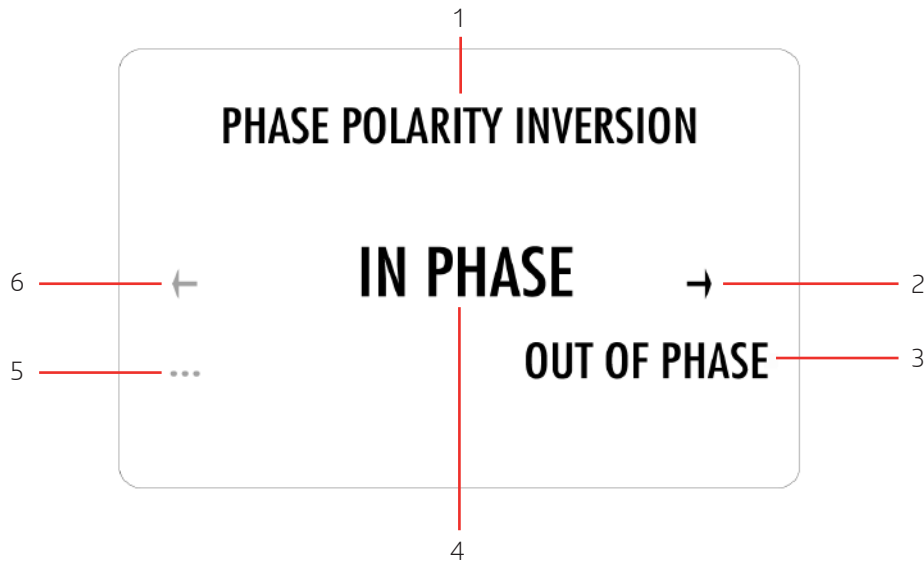
PHASE POLARITY Shortcut display elements

1. Shortcut title (Parameter, for other Shortcuts, title changes accordingly)
2. Arrow indicating External Rotate Right [E>>] if applies. The item below indicates the next parameter value (up direction)
3. Next Parameter Value if External Rotate Right [E>>] is applied (parameter up)
4. Current Parameter Value (for other Shortcuts the current Value of the Parameter is displayed on this line)
5. Next parameter value if External Rotate Left [<<E] is applied (parameter down)
6. Arrow indicating External Rotate Left [<<E] if applies. The item below indicates the next parameter value (down direction)Bridge)

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.

1

DETAILED SETUP

EXIT ————————————— 2

→ ————————————— 3
ENTER ————————— 4
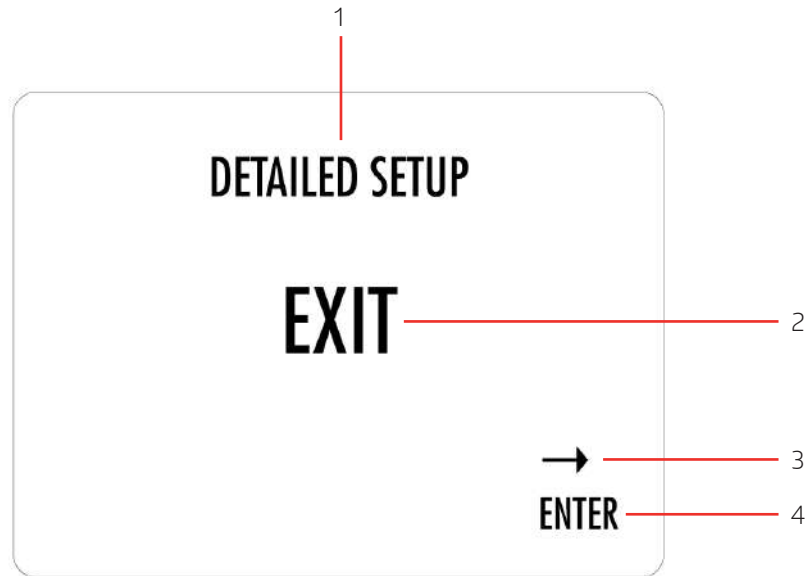
SETUP Shortcut display elements

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 Normal mode)

3. Arrow indicating External Rotate Right [E>>] (or Central Rotate Right [C>>])
4. Next parameter value. If External Rotate Right [E>>] is applied, the unit enters into Menu mode

4.2.3 Menu mode

The Menu mode allows for Configuration and Setup of the C1.2 DAC/Controller through a set of menus. Menu mode is entered from the last Shortcut item (see above). From Normal mode, enter the Shortcut mode by applying a Normal Push [NP]. By successive Normal Pushes [NP], step to the last Shortcut item (DETAILED SETUP) and apply an External Rotate Right [E>>] to enter the Menu mode.

Navigation in Menu mode is based on Central Rotate Left/Right [<<C]/[C>>] to select a given menu item and External Rotate Left/Right [<<E]/[E>>] to change menu level.

User Control Knob Action	Unit Action
[NP] Normal Push	Enter next menu level or Validate choice (save setting)
[LP] Long Push	Puts the unit into Standby
[C>>] Center Rotate Right	Move to next menu item downward
[<<C] Center Rotate Left	Move to next menu item upward
[E>>] External Rotate Right	Enter next menu level
[<<E] External Rotate Left	Return to previous menu level without saving

Following illustration shows the elements of the C1.2 SETUP Menu page, the entry point to the C1.2 menu structure.
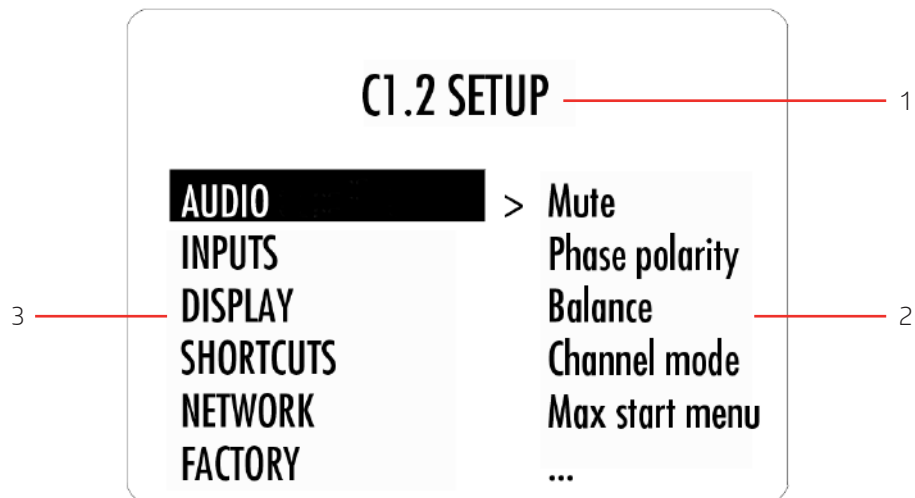
C1.2 SETUP menu display elements

1. Menu title. When entering a menu item, the title also shows the parent menu. If the AUDIO SETTINGS menu is entered, the title line would display C1.2 SETUP >> AUDIO SETTINGS.
2. Shows the accessible parameters when entering the currently highlighted menu item. In this example, AUDIO SETTINGS is highlighted and the second column shows the parameters accessible in the AUDIO SETTINGS menu.

3. List of items in the current menu. Navigate from one item to the other using Central Rotate Left/Right [<<C]/[C>>]. To enter the highlighted menu item, use External Rotate Right [E>>] (or a Normal Push [NP]). To go to the previous menu level use External Rotate Left [<<E]. In this example, External Rotate Left [<<E] exits the Menu mode and sets the unit back to Normal mode.

Once a terminal Parameter (e.g. a Parameter not giving access to a further sub-menu) is selected by External Rotate Right [E>>], the C1.2 displays the corresponding Parameter adjustment screen. The following example shows the AUDIO >> PHASE POLARITY Parameter adjustment screen. Other Parameters are similar but may show more (or less) choices for the Parameter value. Once a Parameter is set to the desired value, a Normal Push [NP] saves the new Parameter Value and gets back to the parent level (save and exit). On the other hand, an External Rotate Left [<<E] gets back to the parent menu (in the case of this example: AUDIO SETUP), but possible modifications of the Parameter Value are discarded (exit without saving).
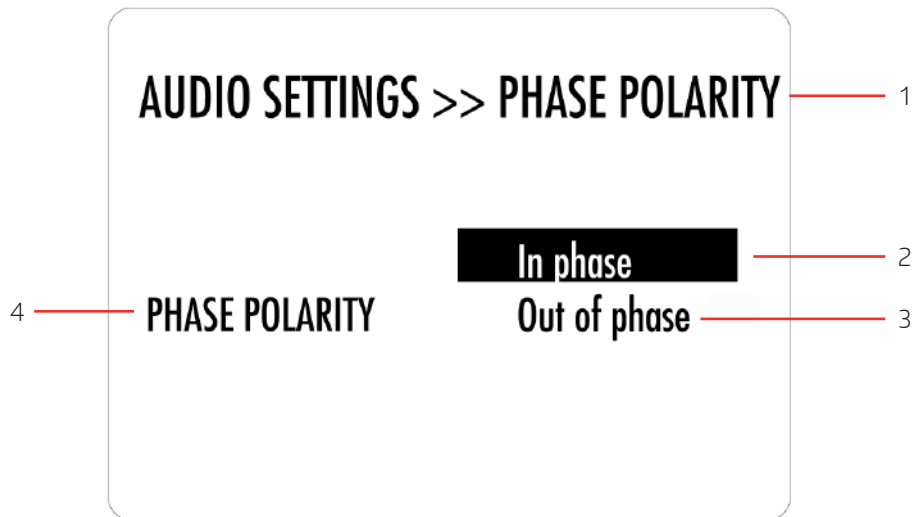
AUDIO >> PHASE POLARITY menu display elements

1. Menu title. AUDIO >> PHASE POLARITY shows that the parent menu is AUDIO SETUP. To access the parent menu, use External Rotate Left [<<E]
2. The current Parameter Value is highlighted. Use Central Rotate Left/Right [<<C]/[C>>] to navigate through Parameter Values
3. Other possible Parameter Value(s). Number of other Parameter Value(s) depends on Parameter
4. Other possible Parameter Value(s). Number of other Parameter Value(s) depends on Parameter

The following section gives detailed information about the menu structure and the various Parameters. Note that certain Parameters may or may not appear in the menu depending on installed options. For instance if no ANALOG_IN board is installed, menu items related to the RCA and XLR inputs (enable, gain, renaming) do not appear in the menu.

5 Configuration

Configuration of your C1.2 DAC/Controller is accomplished by setting parameters in the Menu mode (see previous section for how to access Menu mode and how to navigate menu items).

C1.2 DAC/Controller menu structure

There are six main menus used for configuring the C1.2:

- AUDIO: Allows users to adjust audio related parameters

- INPUT: Allows users to adjust input specific parameters

- DISPLAY SETTINGS: Allows users to adjust display related parameters

- SHORTCUTS: Allows users to assign and modify Shortcuts in order to optimize the user interface

- NETWORK: Provides information about the network setup and configuration

- FACTORY SETTINGS: Indicates the software version and allows it to be updated. Shows installed option boards. Allows users and service technicians to return the unit to factory settings and calibrate the C.2. Also allows the user to configure the unit as a DAC (with fixed output) or preamplifier (with variable output)

5.1.2 AUDIO SETTINGS

- Mute: Mutes or unmutes the audio output.

- Polarity: Allows users to reverse the absolute phase polarity of the audio output.

- Balance: Left-right balance control.

- Channel mode: Mono or stereo mode.

- Max start volume: Limits the C1.2 startup volume.

- Max volume: Limits the C1.2 volume.

- USB audio class: Class 1 is compatible with any computer but sampling rate is then limited to 96kHz. Class 2 requires a quite recent computer but allows higher quality audio playback.

- USB audio power: Allows users to shut down the USB audio section when it is not being used.

5.1.3 INPUT SETTINGS

- Type: Disabled (this input is hidden), normal (the global volume control operates for this input) or bypass (the global volume control does not apply to this input and a fixed output level of 0dB gain is used instead). **Please note that the bypass setting should only be used in conjunction with an external processor or other, volume control equipped unit.**

- Clock source: Allows user to synchronize the C1.2 to an external clock, to the incoming audio stream, or to act as clock master. There is more information about optimizing clock configuration in the Advanced clocking chapter of this manual.

- Gain: Adjusts level for each input

- Name: Renames each input and displays that name when the input is selected

5.1.4 DISPLAY

- Display mode: The C1.2 screen can display a status page, a volume bar, or be turned off.

- Front LED: Allows users to select whether the front panel LED is on or off when the C1.2 is operating.

- Brightnesss 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 type of audio stream type (PCM, DSD, MQA, MQA Studio and Analog input).

5.1.5 SHORTCUTS

- The C1.2 allows you to establish up to six shortcuts, taking you directly to almost any parameter in any menu.

- The C1.2 is preprogrammed with Mute and Phase Polarity as shortcuts one and two. After scrolling through the last shortcut, the next screen that the C1.2 displays is the entry port to the C1.2 menu. It reads Detailed Setup.

5.1.6 NETWORK

- Status: Shows a list of compatible devices detected on the LAN.

- Role: When physically connected to a network, the C1.2 can ignore this network (offline) or connect to it as either the Master unit (it will transmit push-button commands to all compatible client units) or as a Client (it will ignore push-button 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 C1.2 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 C1.2 is connected to a router with DHCP server feature. Direct-Link should be selected when an RJ45 Mirror lead directly connects a C1.2 to a single other CH Precision device. More advanced settings are available if needed.

- Wake-on-LAN: If 'No' is selected, the C1.2 cannot be switched on from the CH-Control App. If 'Only If POE' is selected, connecting the C1.2 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 C1.2 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 C1.2 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 C1.2 on even when you turn off the rest of your system.

5.1.7 FACTORY SETTINGS

- Serial number: Displays the serial number of your C1.2. This serial number is also written on a sticker at the back of your C1.2.

- Firmware version: Indicates the version of the firmware that the C1.2 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 C1.2 firmware update process. A USB flash disc 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 C1.2.

- Remote control code: Selects to which set of RC5 commands the C1.2 will respond to. Pre1 is the standard RC5 Preamplifier set, Pre2 is an alternate RC5 Preamplifier set (it corresponds to the set of commands the C1.2 remote control sends by default). When 'None' is selected, the C1.2 cannot be controlled by a remote control anymore.

- Device mode: Preamplifier (volume control on) or Converter (volume control off)

- Calibrate: Launch automated calibration left and right channel DAC stage. It takes about 40s per channel to complete. For optimal performances, please make sure the C1.2 is warmed-up (i.e. turned on for more than an hour) before running calibration.
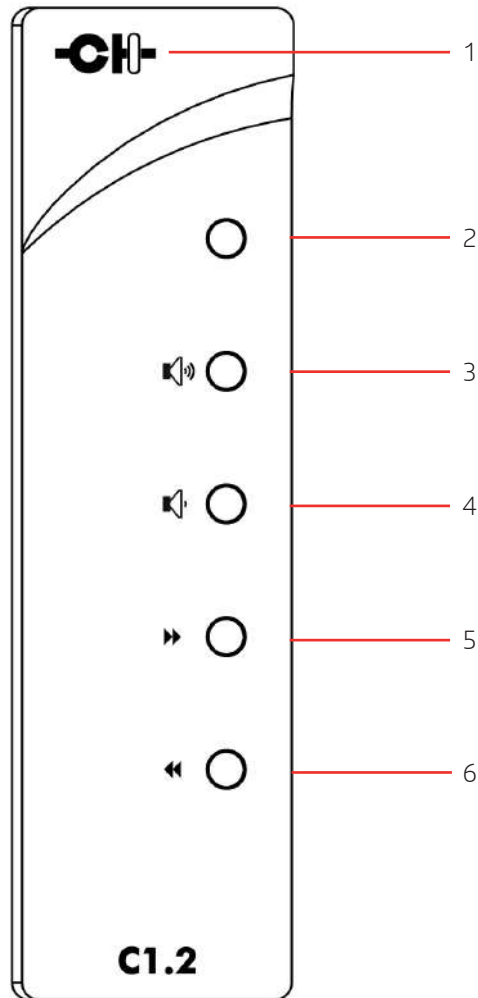
6 Handheld remote control

6.1 Remote control operation

The C1.2 DAC/Controller 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..

C1.2 D/A Controller remote control

1. Remote control activity LED
2. Mute/Standby (long push) button
3. Volume up button
4. Volume down button

5. Next input button / Phase polarity inversion (long push)
6. Previous input button / Mono/Stereo switch (long push)

The remote control activity LED 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	Mute/Unmute (also wakes-up from STANDY)	Sets unit into STANDBY or wakes it up
VOLUME UP	+0.5 dB	Increase volume by larger steps
VOLUME DOWN	-0.5 dB	Decrease volume by larger steps
NEXT INPUT (»»)	Select next enabled input	Phase inversion
PREVIOUS INPUT (««)	Select previous enabled input	Mono/Stereo switch

6.2 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 AAA batteries.

Warning: Do not ingest battery, Chemical Burn Hazard

The remote control supplied with this product contains AAA batteries.

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.

7 Advanced clocking

Many audio sources can be connected to the C1.2. Depending on their type, and your C1.2 options, different clocking schemes might be used, but errors in clock priority/configuration will result in no sound, periodic dropping of the signal or sub-optimal results.

Correct clock synchronization can make a huge difference to the musical results and communicative qualities you obtain from digital sources and it is essential to take the time and care to get these set up parameters right. Recommended use cases for various configurations are detailed in the following paragraphs. Even though this chapter is quite technical, we kindly ask you to take the time to read it in order to get the best sound out of your CH system. Do not hesitate to seek assistance from your authorized dealer, should you be unsure of the best configuration for your setup.

7.1 General clocking considerations

In any configuration, **there must always be no more and no less than one clock master** (unless an asynchronous sample rate converter isolates two clock masters). In the CH product range, the clock master is the unit clocked on its own internal clock (clock source parameter is INTERNAL) or an external clock generator such as the T1. If more than one clock master is used/designated, the system cannot synchronize (at some point a unit will display CLOCKING ERR to let you know that the current clocking scheme is wrong). If the DAC is not working synchronously to its source, its input buffer will get completely full (if the source is slightly faster than the DAC) or completely empty (if the source is slightly slower than the DAC). Either situation will generate a CLOCKING ERR notification.

If there is no clock master, there will be no synchronization. This kind of system is not stable, and will either output no sound, or lose lock after some time. If the configured clock source (e.g. SYNCHRO BNC 75Ω) is not connected or has no synchronization signal, the C1.2 cannot lock (open padlock symbol displayed) and mutes its output.

If more than one clock master is used, the system will not be fully synchronized (at some point a unit will display "CLOCKING ERR."). If you don't define a clock master, each unit gets synchronization from a unit that is itself a clock slave, an arrangement that is not stable in terms of overall clocking. If the configured clock source (e.g. SYNCHRO BNC 75 Ohm) is not connected or has no synchronization signal, the C1.2 cannot lock (the open padlock symbol will be displayed) and mutes its output.

7.2 Without SYNC-I/O board

When a C1.2's DIGITAL-IN HD inputs are used together with a CH D1.5 or D1 CD/SACD transport (or other standard S/PDIF audio source) and no SYNC-I/O board is fitted, both audio data and clocking goes from the source to the DAC. More precisely, clocking is sent with the audio stream. It is either carried on dedicated lines in the CH Link HD (while audio data is carried on other lines in the same cable) or embedded in S/PDIF's bi-phase modulated signal. The schematic below shows the optimal way to connect such a system:

Simple D1.5 - C1.2 connection

D1.5   Ground link   AC input   CH LINK HD   C1.2   Ground link   AC input
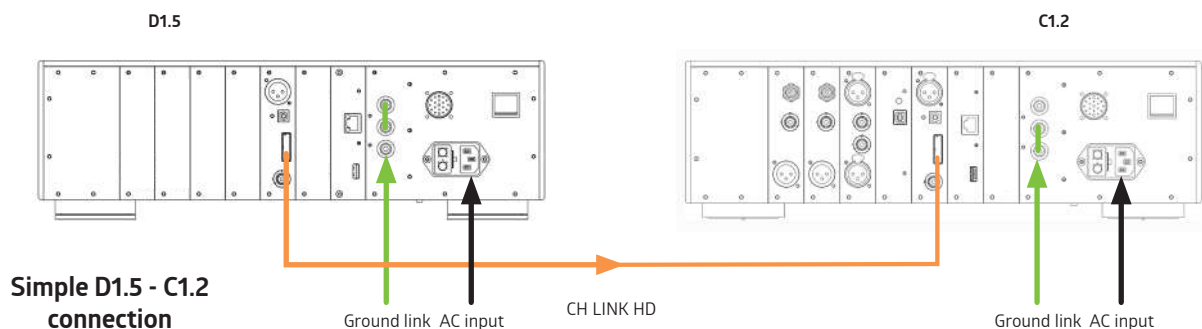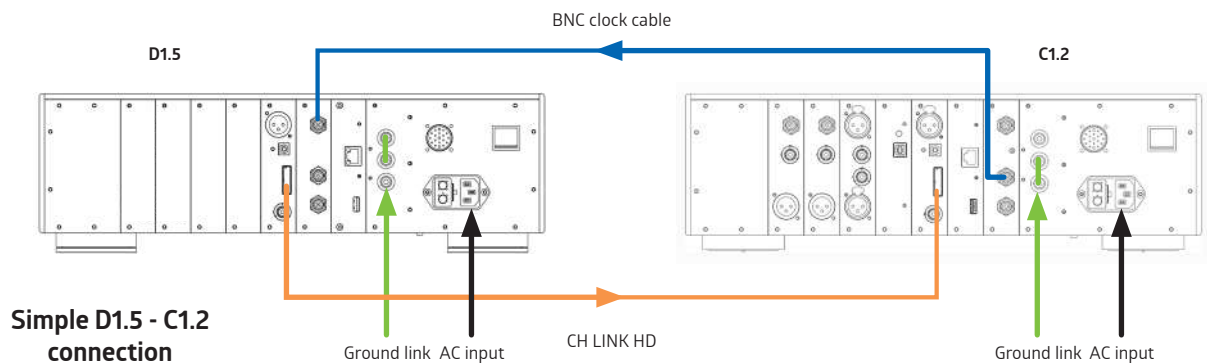
More generally, when a C1.2 has no SYNC-I/O board, it can only clock itself to the incoming audio stream (clock source is AUDIO IN) when playing a CH-Link HD, AES EBU, COAXIAL or OPTICAL input.

- D1.5 clock source: INTERNAL
- C1.2 clock source (for this input): AUDIO IN

If in this configuration (clock source = AUDIO IN) the C1.2 is unable to lock (open padlock) on an incoming S/PDIF audio stream but properly detects its sampling frequency (a valid Fs is displayed instead of "Fs UNKNOWN" in the upper left corner of its display), it probably means that the S/PDIF source does not comply with AES standards and/or has too much jitter. To overcome this problem, set the clock source as Sample Rate Convertor (SRC) for this input. It will add an asynchronous sample rate conversion stage that has a wider locking range.

7.3 C1.2 DAC/Controller (with SYNC-I/O board) + D1.5 or D1 CD/SACD transport (with SYNC-I/O board)

When both the C1.2 and the D1.5/D1 are equipped with a SYNC-I/O board, optimum performance is obtained when the C1.2 DAC is the clock master, and the D1.5/D1 transport is the clock slave. The audio stream goes from the D1.5/D1 to the C1.2, but the clock signal goes the other way. The schematic below shows how to connect such a system: When paired with a D1 or D1.5 player (equipped with both Digital and Analog outputs) recommended setup is still the same (i.e. the clock signal goes from the C1.2 to the D1.5/D1). In such a case:

BNC clock cable

D1.5   C1.2

Simple D1.5 - C1.2 connection

Ground link AC input   CH LINK HD   Ground link AC input

- D1.5/D1 clock source: SYNCHRO BNC 75Ω
- C1.2 clock source (for this input): INTERNAL

7.4 C1.2 with D1.5/D1 (both with SYNC-I/O board) and T1 Time Reference (or other 10MHz external master clock)

When both the D1.5/D1 and the C1.2 are equipped with a SYNC-I/O board, and an ultra-high stability clock generator such as the CH Precision T1 10MHz Time Reference is available, optimum performance is obtained when both the D1.5/D1 and C1.2 lock themselves to the external clock generator. Direct clock connections from the T1 to the individual devices are preferred over daisy-chaining. The audio stream goes from the D1.5/D1 to the C1.2, and the clock signal is distributed to both the D1.5/D1 and C1.2 from the T1. The schematic below shows how to connect such a system:
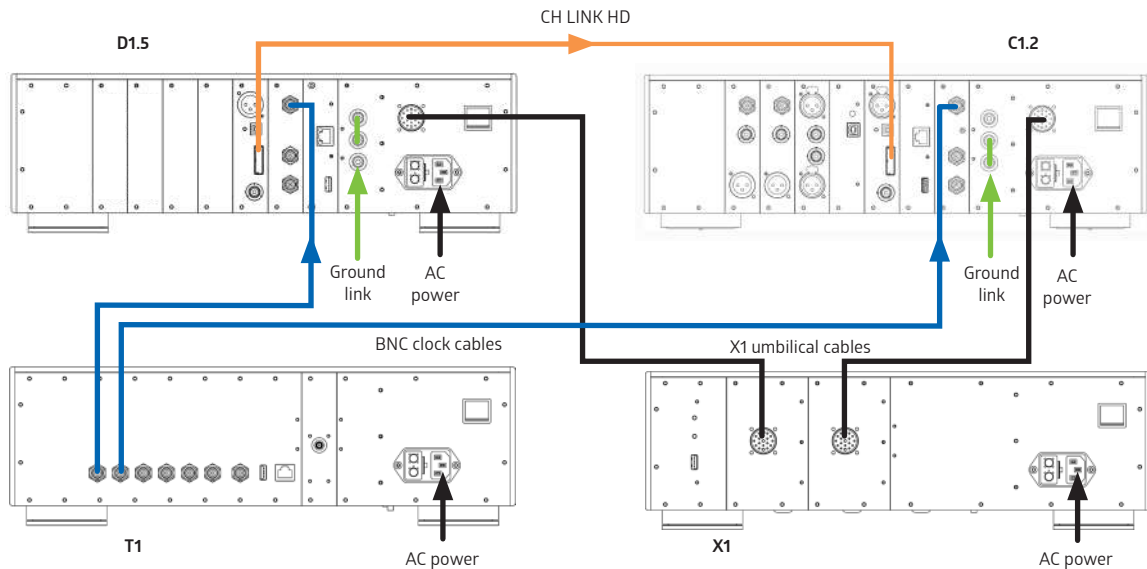
D1.5 – C1.2 – T1 connection when SYNC-I/O equipped

- D1.5 clock source: SYNCHRO BNC 75Ω

- C1.2 clock source (for this input): SYNCHRO BNC 75Ω

If in this configuration the C1.2 is unable to lock (open padlock) on an incoming S/PDIF audio stream but properly detects its sampling frequency (a valid Fs is displayed instead of "Fs UNKNOWN" in the upper left corner of its display), it probably means that the S/PDIF source does not comply with AES standards and/or has too much jitter. To overcome this problem, set the clock source as Sample Rate Convertor (SRC) – Sync 75Ω for this input.

7.5 C1.2 DAC/Controller + Computer (USB audio input)

When a C1.2 equipped with a USB-IN board is used together with a computer or music server for audio file playback, a type A (computer/server side) to type B (C1.2 side) USB 2.0 cable is used to connect the two. This single link enables data to flow from the computer to the C1.2, while the C1.2 dictates the pace of the data transfer, thus acting as the clock master. The Schematic below shows how to connect such a system:

USB Computer to C1.2 connection

- C1.2 clock source (for this input): INTERNAL
- C1 clock source when using T1 (for this input): Synchro BNC 75Ω

Computer with USB port (e.g. Laptop)

Clock

Audio
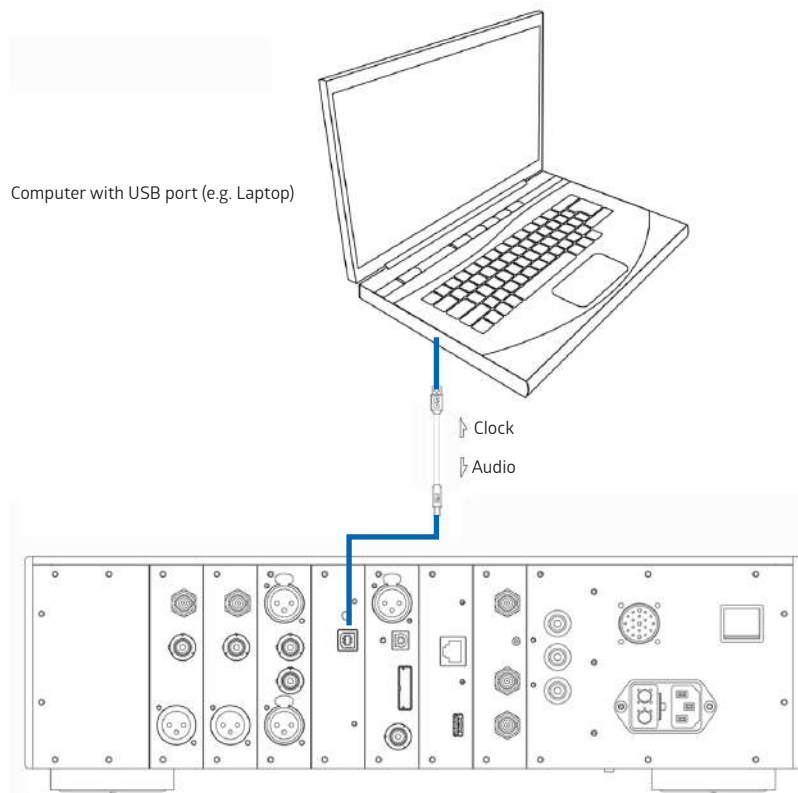
USB Computer to C1.2 connection

## 7.6 C1.2 DAC/Controller + Server (Ethernet streaming input)

When a C1.2 equipped with an ETHERNET-IN HD board is used together with a Roon or a UPnP server or with an online streaming service, an RJ45 Ethernet cable is used between the C1.2 and the LAN(local area network). This cable enables data to flow from the network to the C1.2, while the C1.2 dictates the pace of the data transfer, thus acting as clock master. Two Ethernet streaming inputs are available with the ETHERNET-IN HD board: Roon Ready (for connection to a Roon server) and STREAMING (for connecting to a UPnP server or to Internet streaming services). Both share the same RJ-45 connection to the network, but two separate inputs appear in the C1.2's input list.

When using Roon as the music management and file server, select Roon Ready as the digital input on the C1.2. A Roon Server attached to the same LAN (local area network) as the C1.2 will recognize the ETHERNET-IN HD card as a Roon Ready end-point and allow the C1.2 to be selected as a Roon audio zone.

If you are using a LAN attached UPnP/DLNA music server, then select the STREAMING input to stream files to the C1.2. The schematic below shows how to connect such systems:

C1.2 connection to home network

- C1.2 clock source (for this input): INTERNAL
- C1.2 clock source when using T1 (for this input): Synchro BNC 75Ω
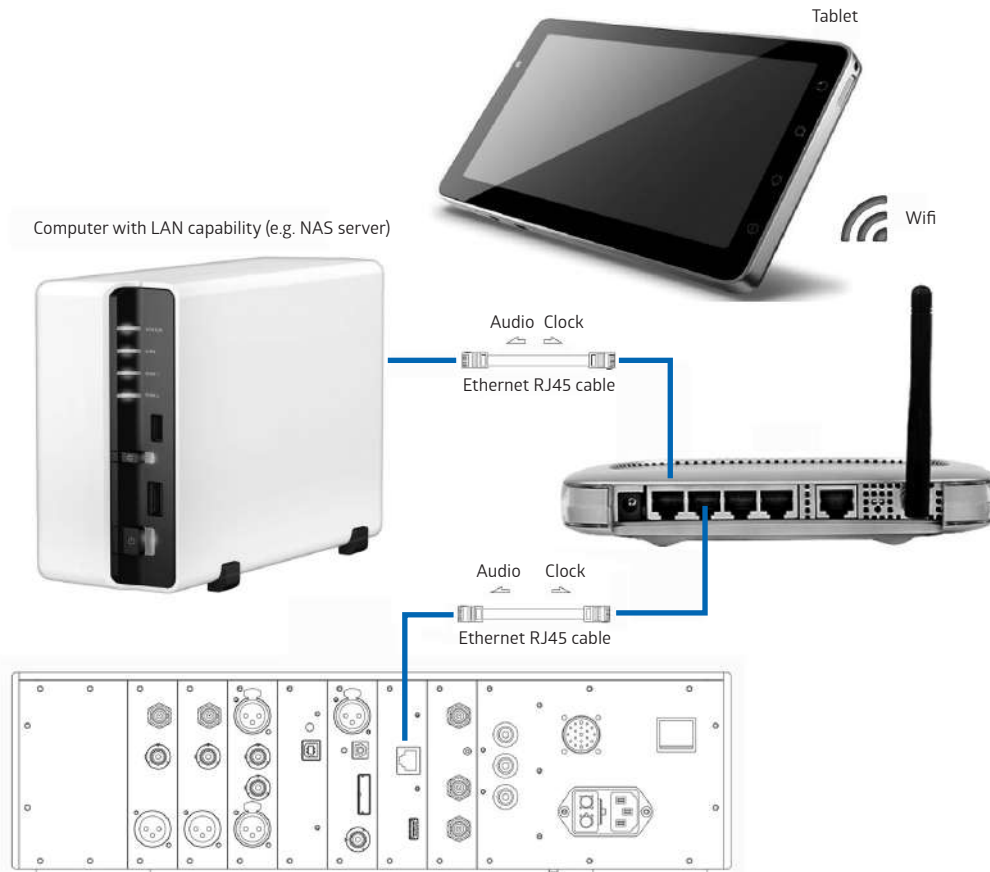
C1.2 connection to home network

8 Returning to factory defaults

The unit can be reset to Factory default settings by using the RESET ALL SETTINGS item of the FACTORY SETTINGS menu.

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 C1.2, located in the Accessory Pack). Please note that some USB sticks might not be detected by the C1.2's USB port. The following procedure describes how to load the USB stick with the correct files:

1. Download the latest C1.2 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 C1.2 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 C1.2 behavior after update.

9.2 Updating the unit's firmware

1. Perform the operations described in section 9.1

2. Connect the USB stick to the USB port located at the back of your C1.2 unit.

3. Navigate to the FACTORY SETTINGS menu and select the UPDATE FIRMWARE item.

4. Start the Firmware Update process by pushing the encoder button. Please note that the unit will perform a Reset (the display briefly turns off and on) during the procedure.

5. Once the firmware update 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.

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

When performing a firmware update, do NOT press or turn the unit's front panel button/encoder, 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

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

1. Perform the operations described in section 9.1.

2. Power the unit off (back panel mains power switch to OFF).

3. Connect the USB stick to the USB port located on the ETHERNET-IN HD or CONTROL board mounted on the back of your C1.2 unit.

4. 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.

5. 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.

6. 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!

10 Troubleshooting

Error	Action
No power	Check the AC power cord Check the power button at the back of the unit Check the mains fuse on the AC power cord receptacle
Remote control does not work	Check if the unit is connected to the AC supply and powered-on Check that the distance to the unit is not too great. Move closer and try again. The C1.2's Standby LED should briefly illuminate Change the batteries in the remote control if required (Remote control LED does not illuminate) Make sure the C1.2 is not configured as a Slave on the network (Settings / Network / Config) Make sure Factory Settings / Remote Control parameter matches your RC5 remote control (Pre2 by default)
No sound (general)	Check that your source is playing Check that your amplifier is turned-on and speakers are connected Check that the system volume setting is not too low Check that the correct input is selected on your C1.2
No sound (⊗ is displayed)	Your C1.2 is muted. Unmute using first RC button
No sound (FS Unknown is displayed)	There is no incoming digital stream for the selected input, or it is at an unsupported sampling frequency. Check supported audio format in the specification table (chapter 11). Try switching to another input to verify that your C1.2 works well on other inputs
No sound ("INVALID SIGNAL IN" is displayed)	Incoming audio stream is non-PCM (e.g. AC3 or DTS). Only play PCM or DoP on standard digital input, and PCM or DSD on CH-Link and ethernet streaming inputs
No sound (⌂ is displayed)	C1.2 is not locked to its clock source (🔒) Please refer to advanced clocking chapter7. for details on valid clocking combinations If you are using a clocking scheme involving external clock in/out (SYNC-I/O option board), make sure that the 75Ω BNC cable is properly connected and not damaged
No sound ("CLOCKING ERR." is displayed)	The source (e.g. D1.5 CD/SACD drive) and the C1.2 are not synchronized Please refer to Advanced clocking chapter 7. to make sure a valid clocking scheme is used. If you are using a clocking scheme involving external clock in/out (SYNC-IO option board), make sure that the 75Ω BNC cable is properly connected and not damaged.

Error	Action
Lost in the settings?	Restore factory settings and start your setup again
Firmware update fails	Try Emergency Software Update procedure If it fails, download the latest C1.2 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 C1.2	Please try another brand of USB flash drive (e.g. Sandisk).

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

Basic digital input compatibility

Standard digital inputs
Each DIGITAL-IN HD board provides three standard digital inputs: AES-EBU (carrying consumer encoding), Coaxial (S/PDIF) and Optical (TOSLINK). Audio format supported are 16 or 24 bits, 44.1, 48, 88.2, 96, 176.4, 192 kHz sampling frequency.

CH Link HD digital audio interface
Each DIGITAL-IN HD board includes a CH Link HD proprietary digital audio interface. This interface carries both complete audio stream and control information. Use this link as the preferred interface when connecting your C1.2 to CH sources such as the D1.5/D1 SACD/CD unit.

The proprietary CH Link HD digital audio interface allows for high definition uncompressed digital audio transfer and supports both DSD and PCM (up to 705.6 / 768 kHz). For digital content protection reasons, the native DSD stream is cyphered on the CH Link HD interface. Of course, all CH sources (such as D1.5) and receivers (such as C1.2) use the same encoding/decoding key.

ETHERNET-IN HD Board
The optional ETHERNET-IN HD board allows connection of the C1.2 to a LAN (local area network).

If this LAN has internet access, it is possible to stream directly from your Tidal or Qobuz account, using the CH Control Android app.

If you have a UPnP/DLNA server connected to your network (like minimserver running on a NAS), you can play your audio files directly to the C1.2. A UPnP controller (like the CH Control Android app or any third-party iOS and Android UPnP/DLNA controller app) acts as a front end to browse your music library and build playlists.

If a Roon server is connected to your network, select the *Roon Ready* input of the C1.2 and select the CH C1.2 as the audio output device in Roon's control software.

USB-IN board
The optional USB-IN board provides connectivity to a USB port on a computer. Audio is sent from the computer to the C1.2 at a rate that is synchronous to the C1.2's precision internal Masterclock.

All recent Apple, Windows and Linux computers, including audio file players now natively support USB Audio Class 2.0, allowing 24bit/384kHz files playback.

DSD files need USB Audio Class 2.0 to be active and they are packed into a 24bit/176.4kHz (for DSD64; 352.8kHz for DSD128) PCM carrier signal for bitstreaming. The C1.2 supports the DSD over PCM (DoP1.0) format, automatically unpacks it and converts the DSD bitstream without any loss.

General

Supported audio formats	Standard digital inputs (AES-EBU, coaxial and optical):
	- Stereo consumer S/PDIF encoded PCM; 16 to 24 bits; 44.1, 48, 88.2, 96, 176.4 or 192 kHz
	- Stereo DSD (DoP) 1bit; 2.8224 MHz (DSD64)
	- MQA encoded data
	CH-Link HD:
	- Stereo I2S PCM; 16 to 32 bits; 44.1, 48, 88.2, 96, 176.4, 192, 352.8 (DXD), 384 (DXD), 705.6 or 768 kHz
	- Stereo cyphered DSD 1bit; 2.8224 (DSD64) or 5.6448 MHz (DSD128)
	- MQA encoded data
	USB (audio class 1.0):
	- Stereo PCM; 16 to 24 bits; 44.1, 48, 88.2, 96 kHz
	- MQA encoded files
	USB (audio class 2.0):
	- Stereo PCM; 16 to 24 bits; 44.1, 48, 88.2, 96, 176.4, 192, 352.8 (DXD) and 384 (DXD) kHz
	- Stereo DSD (DoP) 1bit; 2.8224 MHz (DSD64) and 5.6448 MHz (DSD128)
	- MQA encoded files
	ETHERNET-IN HD:
	- Stereo PCM; 16 to 32 bits fixed and floating point; 44.1, 48, 88.2, 96, 176.4, 192, 352.8, 384 (DXD), 705.6 and 768 kHz, WAV, AIFF, FLAC, ALAC, MP3 and AAC files
	- Stereo DSD 1bit; 2.8224 (DSD64), 5.6448 (DSD128), 11.2896 (DSD256) and 22.5792 (DSD512) MHz, DFF and DSF files
	- MQA encoded files
User control	Dual concentric rotary knob with push function (control knob) and CH Control Android app
Power supply	Selectable 100V, 115V or 230V AC, 47Hz to 63Hz
Power consumption (Standby)	< 1W
Power consumption (Normal operation)	Max 100W
Operating conditions	Temperature: +5C to +35C, humidity: 5% to 85% (no condensation)
Dimensions (L x D x H)	440mm x 440mm x 120mm (main body)
	440mm x 492mm x 160mm (overall including connectors and feet)
Weight	25kg
Firmware update / Control	USB port for firmware update / Ethernet based system control

Analog output stage

Balanced outputs	XLR connectors
Single-ended outputs	RCA connectors
	BNC connectors
Output level	5.1Vrms (balanced)
	2.55Vrms (unbalanced)
Frequency response (-3dB point)	DC-120kHz (balanced and unbalanced, digital filter and sample rate dependent)
Dynamic Range (DNR)	120dB (balanced and unbalanced)
Signal to Noise Ratio (SNR)	123dB (balanced and unbalanced)
Total Harmonic Distortion + Noise (THD+N)	<0.0015% (balanced and unbalanced)

Digital Audio inputs (DIGITAL_IN board, four stereo inputs per board)

CH LINK HD	Proprietary high-definition link supporting high-definition uncompressed audio and control. LVDS signaling for all I2S audio signals (incl. clocks).
	PCM 16-32 bits / 44.1-768 kHz; DSD 2.8224 or 5.6448 MHz
AES-EBU (consumer format)	XLR connector, 0.5-5Vpp diff., 110 Ohm
	PCM 16-24 bits / 44.1-192 kHz
	DSD (DoP) 1bit 2.8224 MHz
Coaxial (S/PDIF)	RCA connector, 0.1-1Vpp, 75 Ohm
	PCM 16-24 bits / 44.1-192 kHz
	DSD (DoP) 1bit 2.8224 MHz
Optical TOSLINK (S/PDIF)	Standard TOSLINK optical connector
	PCM 16-24 bits / 44.1-192 kHz
	DSD (DoP) 1bit 2.8224 MHz

USB Audio input (USB_IN board, one connector per board)

USB Audio Class 1.0 (A-type plug)	Asynchronous playback (C1.2 master, computer slave)
	PCM 16-24 bits / 44.1-96 kHz
USB Audio Class 2.0 (A-type plug)	Asynchronous playback (C1.2 master, computer slave)
	PCM 16-24 bits / 44.1-384 kHz
	DSD (DoP) 1bit 2.8224-5.6448 MHz

ETHERNET-IN HD board)

Audio file types	WAV, AIFF, FLAC, ALAC, MP3, AAC, DFF, DSF
Audio formats	Stereo PCM 16-24 bits / 44.1-384 kHz
	Stereo DSD 1bit / 2.8224-11.2896 MHz

Analog Audio inputs (ANALOG_IN board, two stereo inputs per board)

Balanced input pair   True balanced XLR connectors
Single-ended input pair   RCA connectors
Maximum input level   4Vrms (balanced)
                                    2Vrms (single-ended)
A/D conversion stage   1 bits / 5.6448 kHz

Synchronization inputs and output (SYNC_IO board)

Clock input   1x BNC connector, 0.5Vpp to 5Vpp, 75 Ohm or high input impedance
                                    Wordclock (44.1, 48, 88.2, 96, 176.4, 192, 352.8, 384, 705.6,768 kHz),
                                    Masterclock (22.5792, 24.476 MHz),
                                    DSD bitclock (2.8224 MHz),
                                    High stability external clock (100 kHz, 10 MHz),
                                    40% to 60% duty cycle square wave
Clock output   2x BNC connectors, 2Vpp, 75 Ohm output impedance
                                    Buffered Clock input or Audio Wordclock
                                    50% duty cycle square wave

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Remote control

Remote control type   Infrared. Uses RC5 codes. Range: 10m (line of sight)
Remote control batteries   2x AAA type

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

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.