ULTRA PORTABLE
DUAL DOMAIN PREAMPLIFIER
USB AUDIO INTERFACE

SONOSAX
SX-M2D2

USER MANUAL

Version 1.1
January 2020

Audio equipment manufacturer

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Revision History

Revision	Date	Description
1.0	October 2019	Initial release
1.1	January 2020	Updated to firmware revision 1.1 Fixed document links

Legal Notices

Product specifications and features are subject to change without prior notification.

Notes / Warnings

NOTE	
	A NOTE provides additional or special information to assist operation and maintenance personnel

WARNING	
	A WARNING indicates material to which the reader should play close attention

Compliances

WEEE Statement

This product is classed as electrical or electronic equipment within the meaning of the Waste Electrical and Electronic Equipment (WEEE) Directive 2002 / 96 / EC and must not be disposed of in domestic household waste.

RoHS

Sonosax complies fully with Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

1 Introduction

Congratulations! By choosing the SX-M2D2, you have just purchased a very high quality audio device, the result of the hard work of a team of renowned engineers. For more than forty years, Sonosax recorders and mixers have been recognized by professionals around the world for their outstanding technical features and unmatched musicality.

The latest addition to the range, which you hold in your hands, concentrates all the brand's know-how in an ultra miniaturized case. It is all at once:

- A very high quality stereo preamplifier
- An analog-to-digital and digital-to-analog converter
- A headphone and monitoring amplifier
- A USB sound card compatible with any type of computer or smartphone
- An audio mixer with integrated compressor-limiter.

An embedded digital matrix allows any input to be routed to any output or to an internal stereo mixer. The fully digital controls allow menu access to all features with only two rotary encoders. A high-brightness graphic display shows the available options and settings as well as four modulometers assignable in pairs to any signal source. The power supply from a standard battery, recharged in the device, guarantees hours of autonomy, even if the two power sources available to the SX-M2D2 are unavailable.

As with all SONOSAX products, the SX-M2D2 is build without any compromise in quality, using only the best components available and passes severe quality controls.

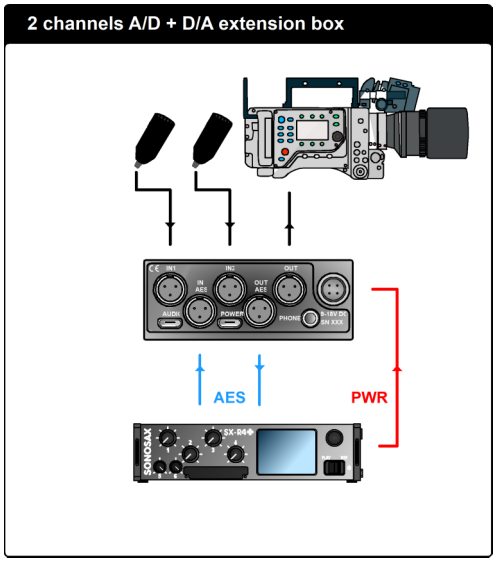
The information and instructions contained in this manual are necessary to ensure safe operations of your equipment and to maintain it in good working condition; please read it carefully.

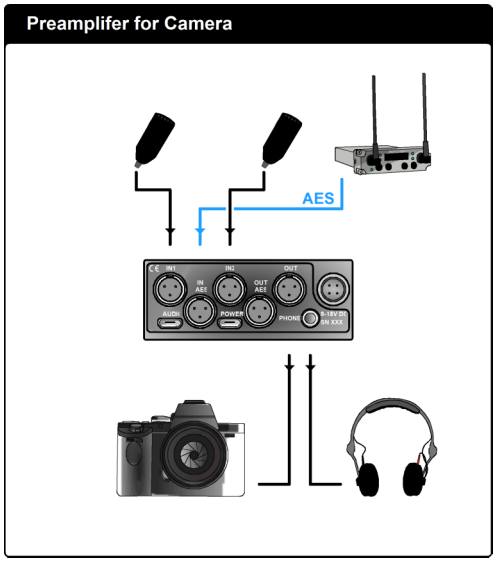
1.1 Key Features

Inputs / Outputs

- Two mic/line analog inputs with 135dB dynamic range
- Independent line and phones outputs
- AES42/AES3 input, AES3 output
- Two channels in/out USB audio 2.0 (sound card)
- Internal audio matrix allowing complex routing of any input to any output
- Internal six input mixer with fully settable compressor-limiter
- Powered by removable Li-ion battery, Hirose or USB with intelligent energy management

1.2 Typical Applications



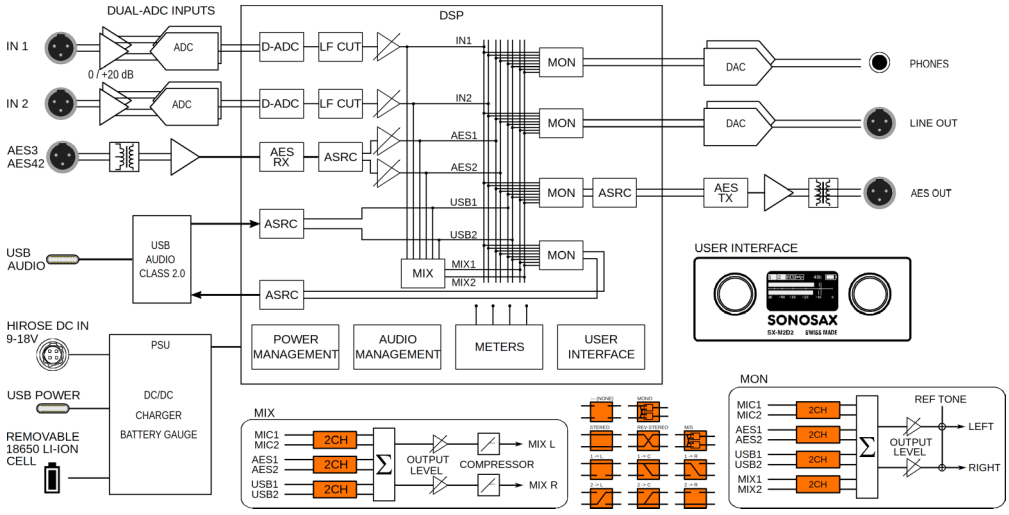


NOTE	
	See USB Application examples at page 29

1.3 Functional Block Diagram

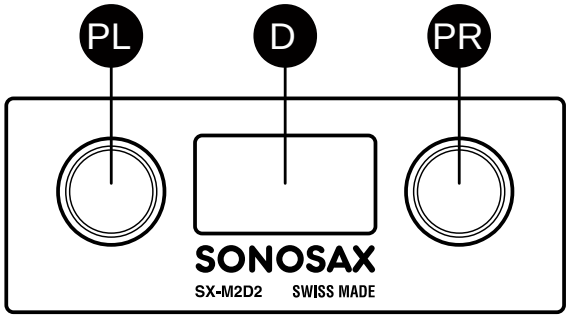
The SX-M2D2 overall block diagram consists of the following:

- 2 mic/line inputs with +20dB pre-gain, dual ADC converters, Low Frequency cut and gain stage
- AES42/AES3 digital input with Asynchronous Sample Rate Converter (ASRC) and gain stage
- USB audio interface, clock domain isolated with ASRCs
- Phones, Line and AES outputs (AES clock domain isolated)
- Power Supply Unit (PSU)
- 6 to 2 channels mixer (MIX) with compressor/limiter
- 4x 2 channel output monitoring (MON)
- 2 or 4 channels meters
- User Interface: 2 rotary encoders with push buttons and OLED screen



2 Panel Descriptions

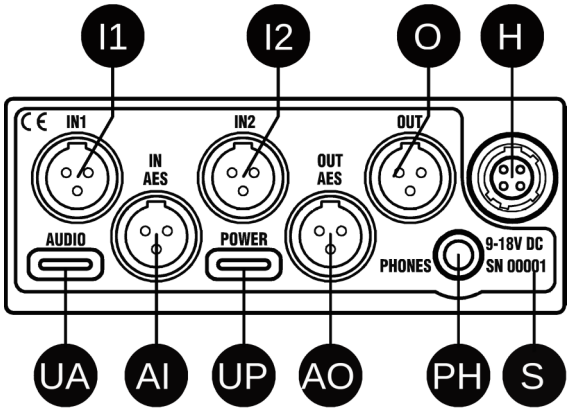
2.1 Front Panel



PL, PR
Left and right rotary encoders with push-button

D
OLED display

2.2 Rear Panel



I1, I2
Mic/Line analog audio input on TA-3M

O
Line analog audio output on TA-3M

H
External DC input on Hirose 4-pin

S
Serial number marking

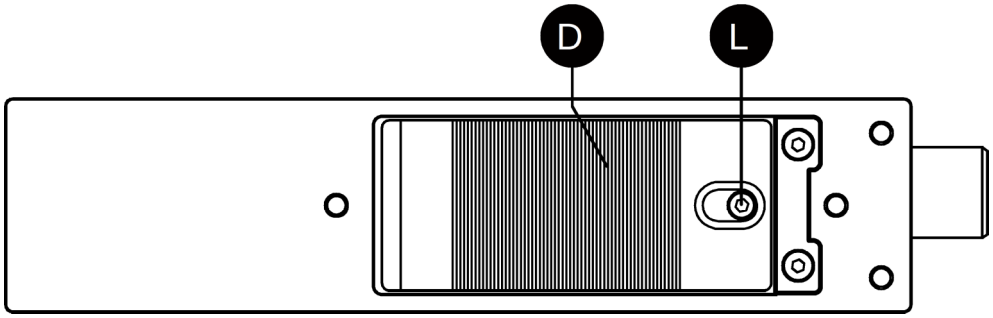
UA
USB audio 2.0 on USB type C

UP
External 5VDC input on USB type C

AI, A0
AES audio input/output on TA-3M

PH
Phones audio output on 3.5 jack

2.3 Left Panel



D
Battery door

L
Battery door lock

NOTE	
	Mechanical drawings and hole positions are in the Mechanical section.

3 Powering

3.1 Intelligent Power Management

The SX-M2D2 intelligent power management is a combination of hardware and software that optimizes the distribution and use of electrical power.

It includes the following:

- High efficiency current limited switching power supplies with automatic load prioritization
- Constant-current/constant-voltage battery charger with automatic recharge, automatic termination by safety timer, low-voltage battery preconditioning, bad cell detection and thermal monitoring for out-of-temperature charge pausing
- Ultra low standby current
- Removable battery charge state and voltage measurement
- Under-voltage automatic power-down
- Smart load shedding, which shutdown unused inputs and outputs
- Display auto-off

3.2 Power Sources

The SX-M2D2 has two external power connectors and an integrated battery.

The battery must be present in the device to ensure that all functions are always available.

These sources are independent and can be used simultaneously to prevent a power failure.

When a power source is disconnected (or fails), the SX-M2D2 automatically switches to an available power source.

This list reflects the SX-M2D2 power sourcing priority:

1. Hirose 4-pin connector
2. USB Power connector
3. Removable Li-ion battery cell

NOTE	
	USB Power input can drain up to 1A

WARNING	
	The battery must be present in the device to ensure that all functions are always available. The SX-M2D2 can be powered by an external source, without a battery for a few moments when replacing a discharged battery with a charged one.

3.3 Li-ion Battery

The SX-M2D2 is designed to use 18650 Li-ion cells that meets the following specification:

- Nominal voltage: 3.6V
- Charging (float) voltage: 4.2V
- Length: 65mm (unprotected)

The Panasonic NCR18650B is the reference battery model for the SX-M2D2.

WARNING	
	• Avoid to use batteries from a non-safe supplier • Never use batteries with a charging voltage below 4.2V • Protected batteries with length > 65mm do not fit into the SX-M2D2

Insert the battery in the SX-M2D2 with the '+' polarity visible.

3.4 Li-ion Charger

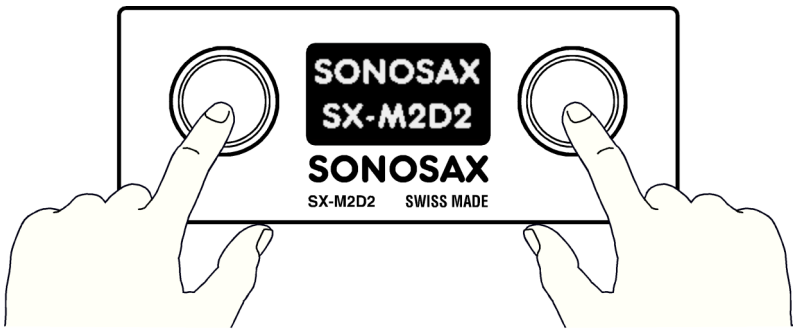
The SX-M2D2 integrates a Li-ion battery charger. When Hirose or USB power DC power is applied, the charger will start operation.

The Li-ion charger will charge the internal battery with a constant current of 500mA or 1A (user adjustable). As the charger operates in both standby and active mode, the real charge current depends on the SX-M2D2 power consumption.

When using the USB power input, the maximum current over USB is 1A (5W). If less power is required for the SX-M2D2, the charger is enabled. If more power is required, the internal battery is required and will be discharged.

3.5 Powering up the SX-M2D2

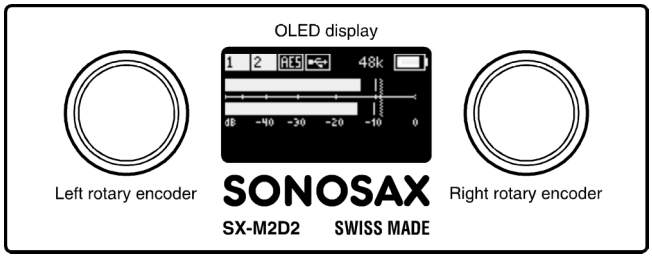
To power-up the SX-M2D2, press and hold both rotary encoder until the splash screen appears (2-3 seconds).


SONOSAX
SX-M2D2
SONOSAX
SX-M2D2 SWISS MADE

4 User Interface

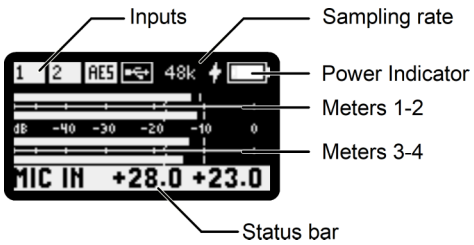
4.1 Interface Overview

The SX-M2D2 user interface is composed by two rotary encoders and a 128x64 pixels OLED display. Both rotary encoders include push-buttons.



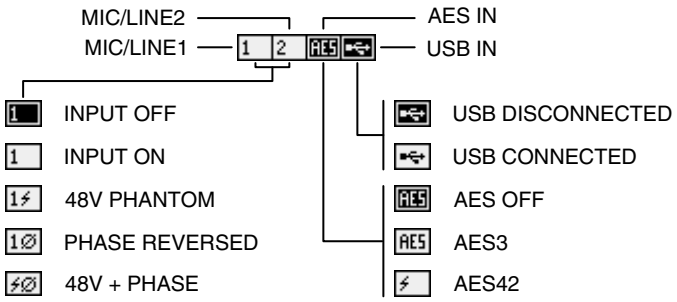
4.2 Main Screen

The main screen appears at soon as the device is booted up. It shows the following:



Upper area

The inputs status is summarized on top left of the screen.



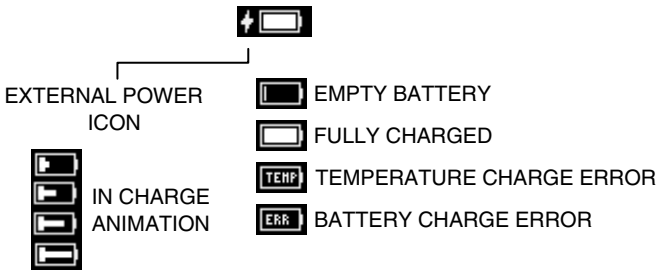
There are 4 icons for the 4 physical inputs. A dark background means the input is OFF. A white background means the input is powered up. In addition, phantom power and phase reversal are indicated.

The system sampling frequency is always indicated on top of the screen. The sampling frequency can be 48k (factory default), 96k or 192k.

The power indicator indicates the battery status.

A bolt symbol on the left of the battery indicates an external power source is connected. In this case, a left to right rising animated bar indicates that the battery is

currently under charge.



There are two errors that can occurs when charging the battery:

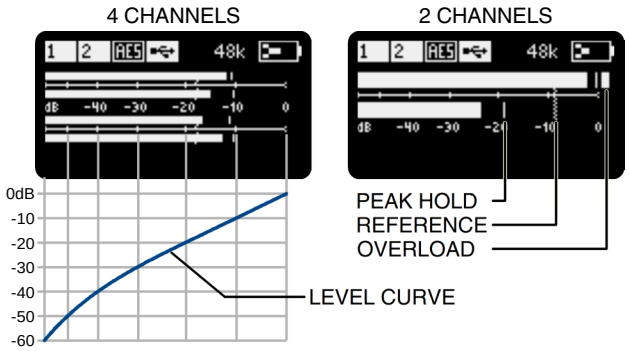
- a thermal monitoring error
- a battery error

Meters area

The SX-M2D2 metering system offers to the user the ability to observe and measure the true peak level and to log the measured audio levels information. The metering system has the following features:

- 2 or 4 channels with user assignable source
- 60dB range (see level curve below)
- user adjustable reference level
- user adjustable peak hold
- overload conditions

The following diagram summarizes the 2 and 4 channels meter screens, with peak hold, reference level, overload and meter curve:



Status bar

The bottom area default to blank, except in these conditions:

- when a rotary encoder is activated, the corresponding parameter is displayed in this area
- when the reference tone is enabled, the tone level is displayed

Rotary Encoders

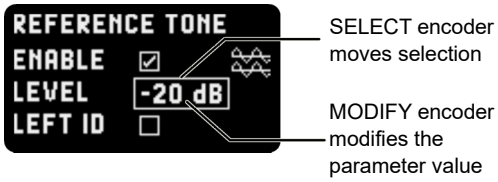
The events associated with rotary encoders are user assignable. By default, left encoder modifies the Mic/Line 1 gain, right encoder modifies the Mic/Line 2 gain.

Source	Event
Left rotary encoder	User assignable, default to Mic/Line 1 gain
Right rotary encoder	User assignable, default to Mic/Line 2 gain
Left short press	Enter main menu (left NAV mode)
Left long press	User assignable, default to Mic/Line input menu
Right short press	-do nothing- (left NAV mode)
Right long press	User assignable, default to Headphones output menu

NOTE	
	Left and right encoder push buttons assignation can be swapped (see Controls Menu)

4.3 Menu Navigation

While one of the rotary encoder is used to enter menus and select parameters (SELECT encoder), the other one is used to exit menus and modify parameter values (MODIFY encoder).

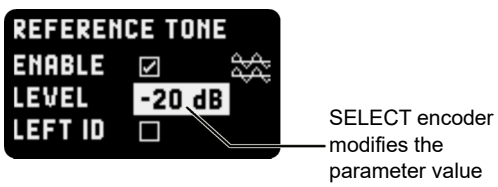


Navigation mode allows user to select which rotary encoder is used for these tasks.

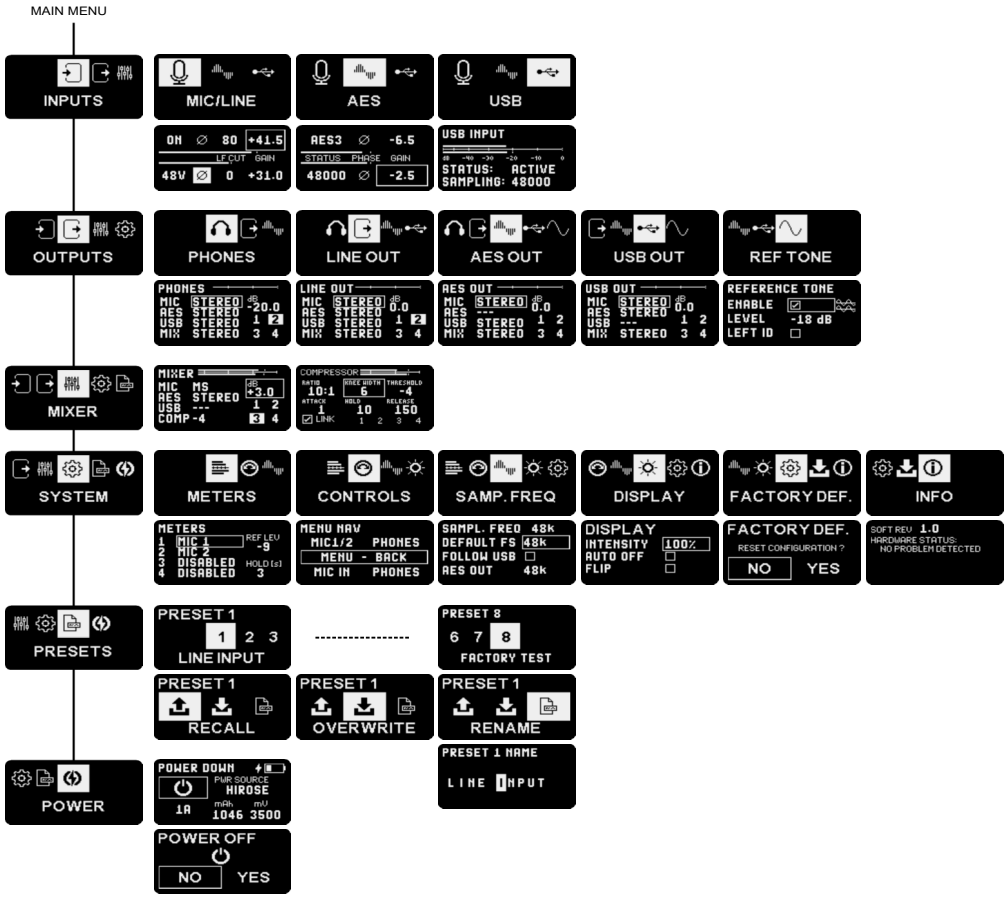
Mode	Left rotary encoder	Right rotary encoder
Left NAV	SELECT encoder: • rotate: select parameter • push: enter menu • long push: menu back	MODIFY encoder: • rotate: modify value • push: exit • long push: main screen
Right NAV	MODIFY encoder: • rotate: modify value • push: exit • long push: main screen	SELECT encoder: • rotate: select parameter • push: enter menu • long push: menu back

The factory default NAV mode is LEFT. To change the navigation mode, see Controls Menu.

As it is not always easy to navigate using two hands (or toggling encoders with the same hand), a parameter can be modified using the SELECT encoder by pushing the parameter to edit. Once background color is reversed, the parameter can be edited using the same encoder.

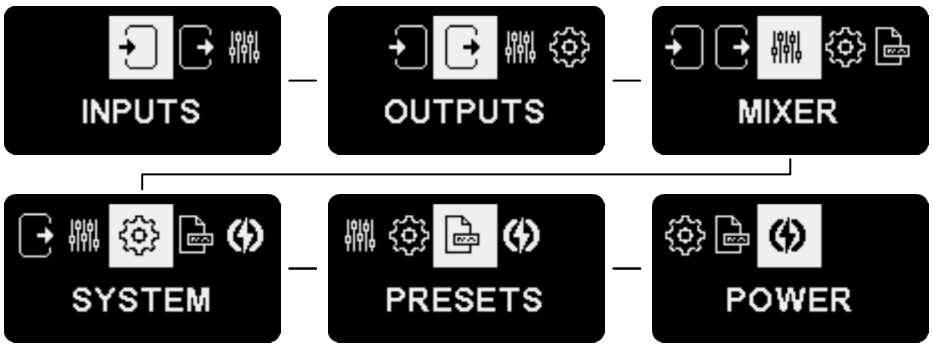


4.4 Menu Tree



4.5 Main Menu

The main menu allows user to select one of the 6 main sections of the menu:



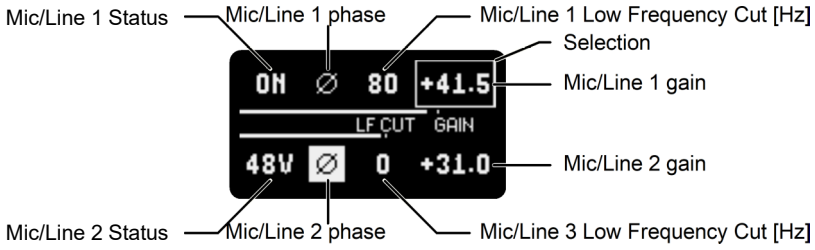
4.6 Inputs Menu

The Inputs Menu show the three inputs of the SX-M2D2.

Each input menu has an individual configuration screen.

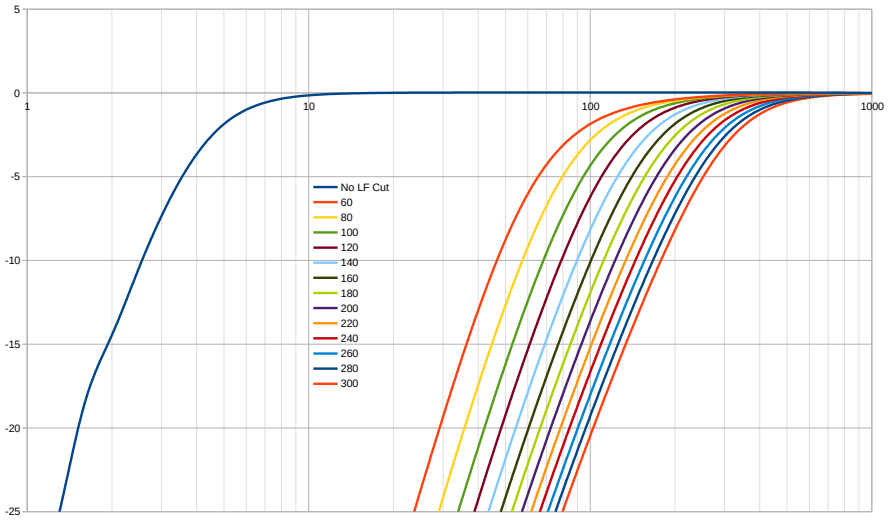
MIC/LINE

The Mic/Line input screen displays the two Mic/Line input configuration parameters and peak meters.



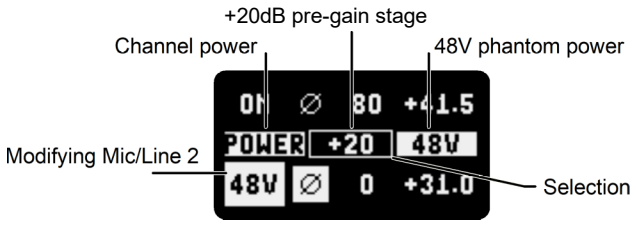
The Low Frequency Cut has the following range:

- 0 (No LF Cut)
- 60 Hz to 300 Hz, 20 Hz/step



The input gain range is -24 to +72 dB, 0.5 dB step.

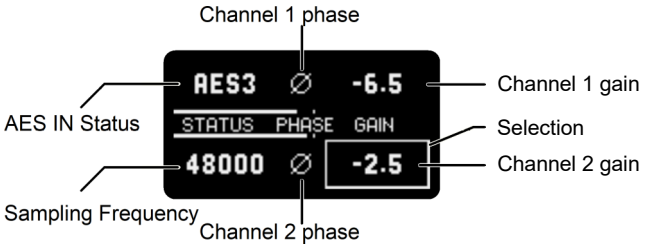
When selecting the Mic/Line status, channel power, +20dB pre-gain and 48V phantom are displayed:



The +20 pre-gain and the 48V phantom power can be activated only when the input is powered.

AES

The AES input screen display the stereo AES input configuration and channel peak meters.



The input gain range is -24 to +72 dB, 0.5 dB step.

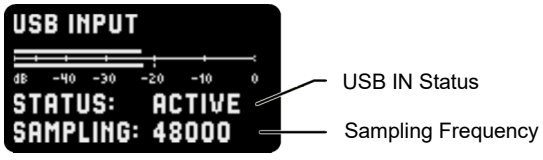
The Sampling Frequency displays the measured input sampling frequency.

NOTE	
	The AES input sampling frequency value is a measurement. The deviation is ± 0.024%, so a 48kHz input can be displayed with a range of ± 12Hz (47988, 48000 or 48012).

By selecting the AES IN status, user can choose between OFF, AES3 or AES42.

USB

The USB input screen shows the USB connection status and USB input channels meters.

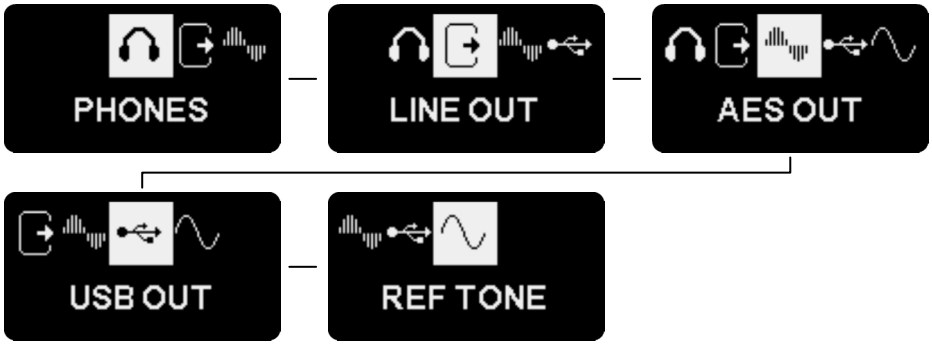


The Sampling Frequency displays the measured input sampling frequency.

NOTE	
	The USB input sampling frequency value is a measurement. The deviation is ± 0.024%, so a 48kHz input can be displayed with a range of ± 12Hz (47988, 48000 or 48012).

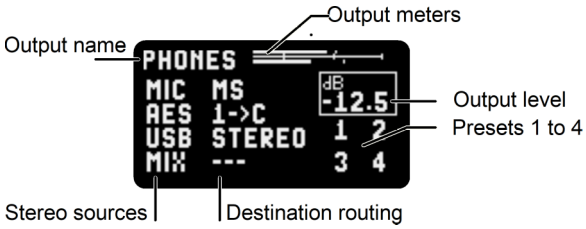
4.7 Outputs Menu

The outputs menu lists all available outputs and the reference tone generator.



4.8 PHONES, LINE OUT, AES OUT, USB OUT Menus

All outputs menu screens share the same model:

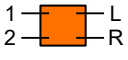


Source monitoring

All outputs are build from 4 stereo sources:

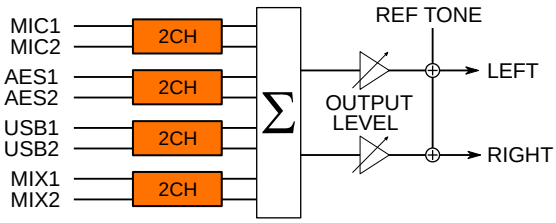
- **MIC**, the two Mic/Line inputs
- **AES**, the stereo AES input
- **USB**, the stereo USB input channels
- **MIX**, the 2-channels internal mixer

Each of these stereo sources can be routed to the output using one of the following pattern:

Dest. Routing	Description	Diagram
---	This source is not routed to the output	
MONO	Both source channels are mixed and routed to both output channels	

STEREO	Each source channel is routed to the each output channel	
REV-ST	Source channels are routed twisted stereo	
MS	M / S decoding is applied between the stereo source and the output channels	
1 → L	Source channel 1 is routed to left output	
1 → C	Source channel 1 is routed to both output channels	
1 → R	Source channel 1 is routed to right output	
2 → L	Source channel 2 is routed to left output	
2 → C	Source channel 2 is routed to both output channels	
2 → R	Source channel 2 is routed to right output	

The following diagram summarizes how an output is processed:



When the reference tone is enabled, the output level is muted so that only the reference tone is sent.

NOTE	
	When all source monitoring is set to '---' (NONE), the output is powered down

Output Level

The output level is a trim correction with a range from -30 to +20.

Presets

There are 4 presets per output. They are output dependent and can be used to recall frequently used configurations. The presets apply only on input routing, they do not affect the output level.

A video reversed preset indicates that the preset corresponds to the current configuration.

To recall a preset, just select it. To store a preset, apply a long press until it becomes video reversed.

NOTE	
	Default presets configuration (for every output): 1. No routing (output is powered down) 2. All sources STEREO 3. All sources MONO 4. Only MIX as STEREO

4.9 Reference Tone

The reference tone oscillator is a 1kHz sine wave generator with adjustable level. When enabled, it overrides all (enabled) outputs. The level can be adjusted from -30 to 0dB. To help identifying channel swap, a LEFT ID mode applies a left channel audio identification marking (level is decreased by 20 dB for 100ms every second).

NOTE	
	An output must be enabled (at least one source must be routed) in order to render the reference tone

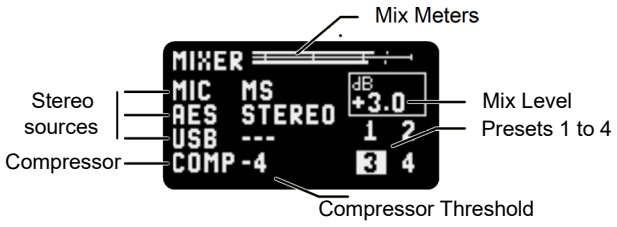
4.10 Mixer Menu

The SX-M2D2 integrates a 6 to 2 channels mixer.

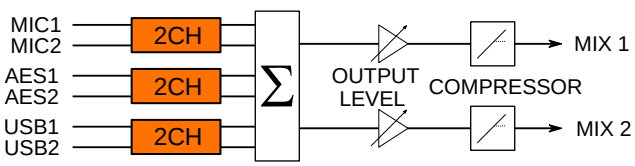
The mixer stereo channel sources are:

- **MIC**, for the two Mic/Line inputs
- **AES**, the stereo AES input
- **USB**, the stereo USB input channels

The input channels are mixed using the same way inputs are routed to outputs (---, CH1, CH2, MONO, STEREO, REV ST, MS). Same with output level and presets.

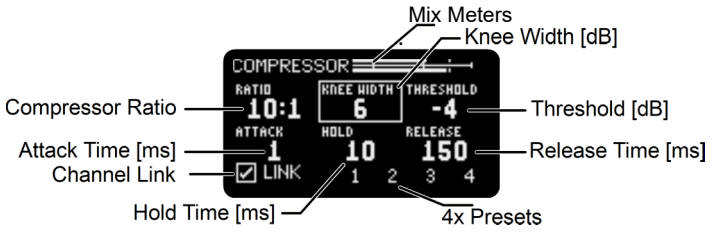


The following diagram summarizes how the mixer is processed:



4.11 Mix Compressor/Limiter

The mixer includes a compressor/limiter.

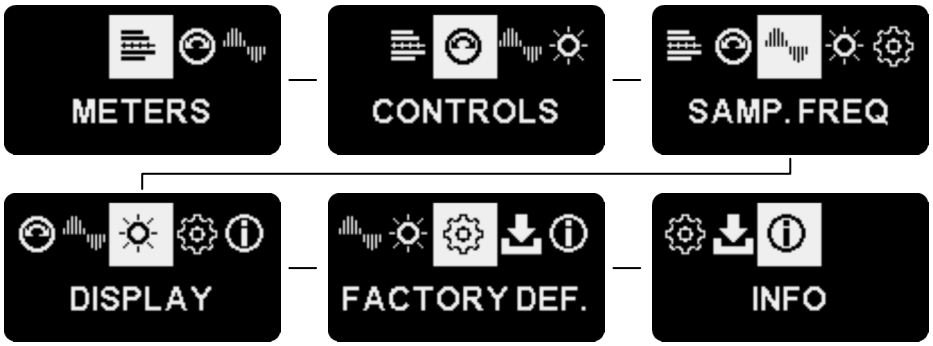


The compressor is active when the threshold value is below 0dB. The following parameters can be adjusted:

- Threshold level from -30 to 0 dB (0 value disables the compressor)
- Compressor ratio: 1.5 to 100
- Knee width: 0 to 50dB (0 = hard knee, 1 to 50 = soft knee)
- Attack, Hold and Release time
- Channel link

The compressor configuration can be stored into 4 different presets.

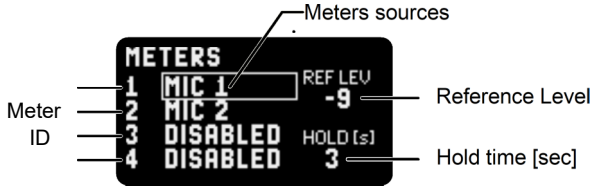
4.12 System Menu



4.13 Meters Menu

The SX-M2D2 integrates 2 or 4 peak meters on the main screen. Each meter can display any signal from input, mix and output channels.

The METERS menu is where user can select meters sources, reference level and hold time.



Meters Sources

Each meter source can be freely chosen in the following table.

Source	Description
DISABLED	No channel source for this meter channel
MIC 1	Mic/Line 1
MIC 2	Mic/Line 2
AES IN 1	AES input channel 1
AES IN 2	AES input channel 2
USB IN 1	USB input channel 1
USB IN 2	USB input channel 2
MIX 1	Mixer output channel 1
MIX 2	Mixer output channel 2
PHONES L	Phones output, left channel
PHONES R	Phones output, right channel
LINE L	Line output, left channel (1)
LINE R	Line output, right channel (2)
AES OUT L	AES output, left channel (1)
AES OUT R	AES output, right channel (2)
USB OUT L	USB output, left channel (1)
USB OUT R	USB output, right channel (2)

NOTE	
	When setting both channel pair (1 & 2 or 3 & 4) to DISABLED, that meter does not appear in the main screen.

Reference Level

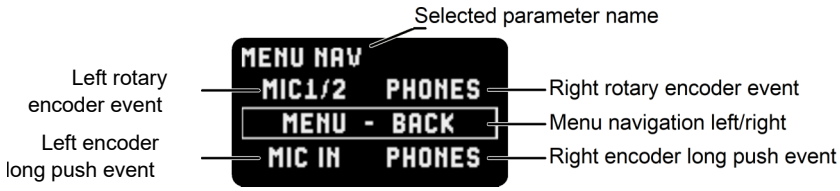
The reference level value is a vertical mark in the main screen meters. Range is -30 to 0 dB. When set to 0dB, reference level mark is not visible. Factory default is -18 dB.

Hold Time

Each meter displays as a vertical bar the highest peak value measured from a defined hold time. Range is 0 to 30 seconds. When set to 0, the hold time bar never appears. Factory default is 3 seconds.

4.14 Controls Menu

The Controls menu groups all user interface related configuration.

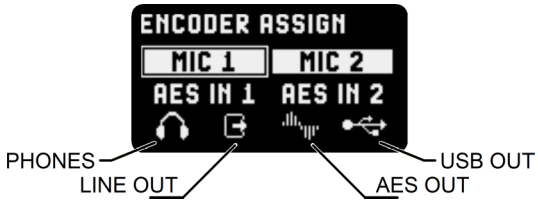


The upper text displays the selected parameter name. There are 5 parameters in this menu:

- Left rotary encoder event (LEFT ROT ENC). This defines what happens when the user rotates the left rotary encoder in the main menu.
- Right rotary encoder event (RIGHT ROT ENC). This defines what happens when the user rotates the left rotary encoder in the main menu.
- Menu navigation left/right (MENU NAV)
- Encoder long push event (LEFT LONG PUSH). This defines what happens when the user long-press the left encoder in the main menu.
- Encoder long push event (RIGHT LONG PUSH). This defines what happens when the user long-press the right encoder in the main menu.

Encoder event assignation

The left or right rotary encoder events applies 0.5dB gain steps to one or multiple inputs, or one or multiple outputs. User can choose any inputs or outputs, but cannot mix inputs and outputs. The assignation is done in the encoder assign menu:



In this screenshot, the encoder is assigned to both MIC 1 and MIC 2 input gain. Bottom icons represent outputs assignation (only stereo gain is available in this case).

Menu navigation

The menu navigation allow user to swap left and right encoder role. See Menu Navigation chapter.

Long push encoder assignation

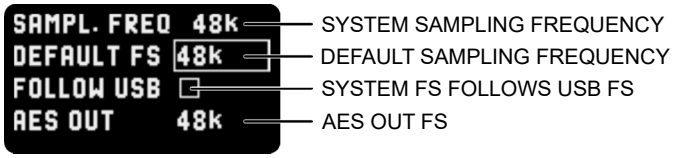
In the main screen, a long encoder push event can be assigned to both left & right encoder. The following events can be assigned:

Name	Description
NONE	No event assigned
MIC IN	Mic input menu
AES IN	AES input menu
USB IN	USB input menu
PHONES	Phones output menu

LINE OUT	Line out menu
AES OUT	AES out menu
USB OUT	USB out menu
REF TONE	Reference tone menu
MIX	Mix menu
PRESET 1..8	Recall preset 1, preset 2, ... to 8

4.15 Sampling Frequency Menu

The sampling frequency (FS) menu enable the user to configure how the SX-M2D2 samples audio. The upper right value is the system sampling frequency (that is currently sampling the A/D converters).



The default sampling frequency is the sampling frequency applied when no other constraint that sampling.

When the FOLLOW USB is checked, the system sampling frequency follows the USB input sampling frequency, according to that table:

USB sampling frequency	System sampling frequency
NONE	Default sampling frequency value
44.1, 48k	48k
88.2, 96k	96k
176.4, 192k	192k

The AES OUT sampling frequency is independent of the system sampling frequency. User can choose the following values:

- 48k (fixed to 48k)
- 96k (fixed to 96k)
- 192k (fixed to 192k)
- SYS FS (follows system sampling frequency

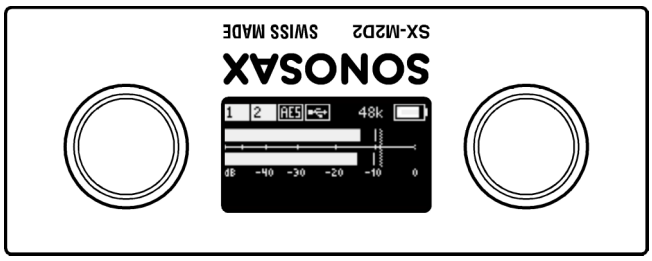
4.16 Display Menu

The display menu refers to all parameters related to the OLED display.

INTENSITY modifies the display brightness. The values range is 0 to 100% step 10%. A 0% value corresponds to the minimal display intensity (pixels are still visible).

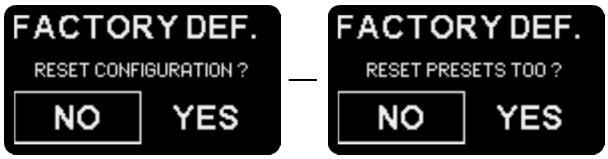
AUTO OFF disables the display after 4 seconds of user inactivity. As soon as an event is detected, the display lights up again. This mode can be used to save power or when the device must not generate light.

The FLIP checkbox flips the screen upside down. Rotary encoders are swapped for usual operation.



4.17 Factory Default Menu

The factory default menu allow user to reset the device configuration. Presets are not affected by the factory default, but a second screen asks the user if presets are to be resetted too.



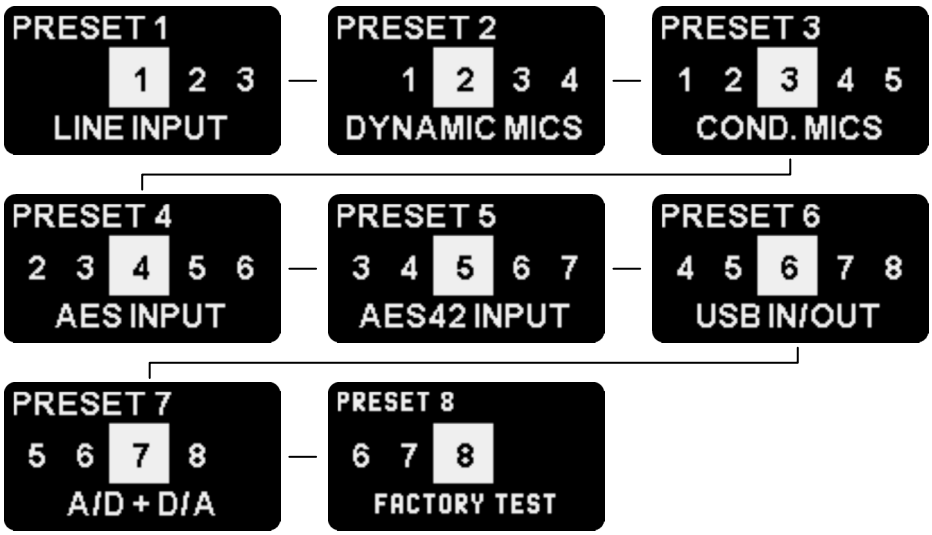
4.18 Info Menu

This menu displays the software revision and the hardware status.

4.19 Presets Menu

Full device configuration can be saved into a total of 8 presets. They are mainly used to save time: user prepares the presets he wants and recalls them according to his needs.

The following screen captures shows the default preset names:



By choosing a preset, user can then recall it, overwrite it or rename it.

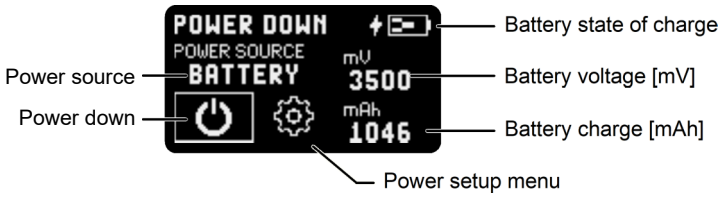
When renaming a preset, a maximum of 12 characters can be used to describe the role of the preset.

The SELECT encoder is used to select the character to be edit while the MODIFY encoder is used to change the character. Available charset is as follows:

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789+-*&/()=!?:;␣

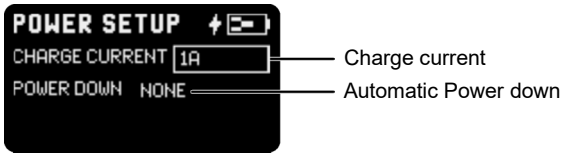
4.20 Power Menu

The power menu allows user to power down the SX-M2D2 and displays information about power status such as power source, estimated battery charge and battery voltage measurement..



4.21 Power Setup Menu

The power setup menu allows user to change the charge current (see section Li-ion Charger).



The charge current can be choosen between 1A and 0.5A. Default is 0.5A.

The Power Down menu enable automatic power down under a defined event:

1. NONE: no automatic power down
2. HIROSE CUT: device will power down when the Hirose DC voltage is removed
3. ENCODER L+R: device will power down when both encoders are kept pressed for 2-3 seconds. When enabled, the interface lock is no more available.

5 USB audio interface

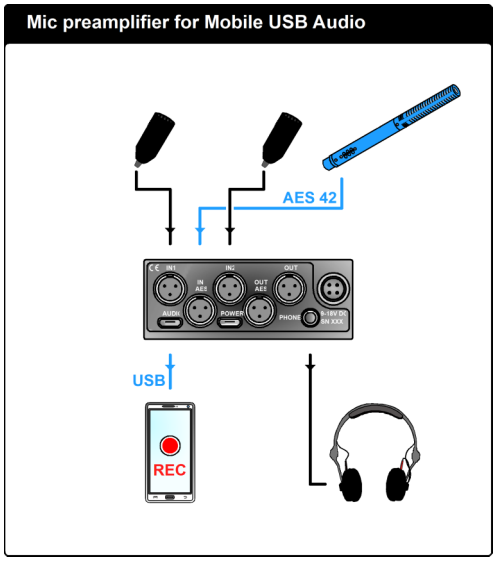
The SX-M2D2 USB audio supports the USB Audio Class 2.0 over USB 2.0, with sample rates up to 192kHz and asynchronous mode support.

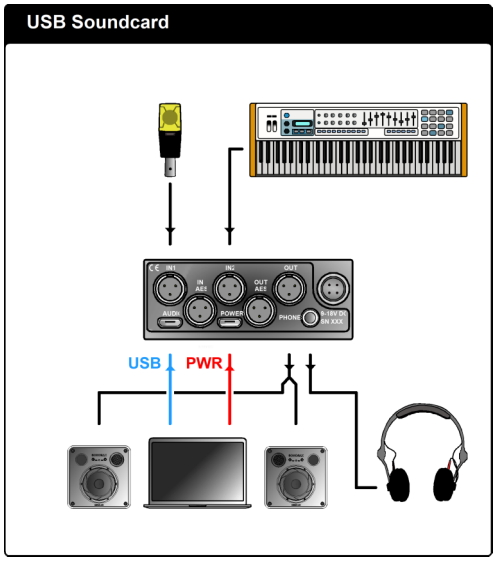
5.1 Supported Hosts

Most recent mobile devices (iPhone, iPad, Android) and workstations (Apple OSX, Windows 10, Linux) supports USB audio class 2.0. Please refer to the SX-M2D2 web page for more information about recommended software and details about compatibility.

NOTE	
	**Apple iOS cable compatibility** the Apple USB-C to Lightning cable doesn't work with the SX-M2D2. Supported cables are the Lightning to USB Camera or the Lightning to USB 3 Camera adapters.

5.2 USB Application examples





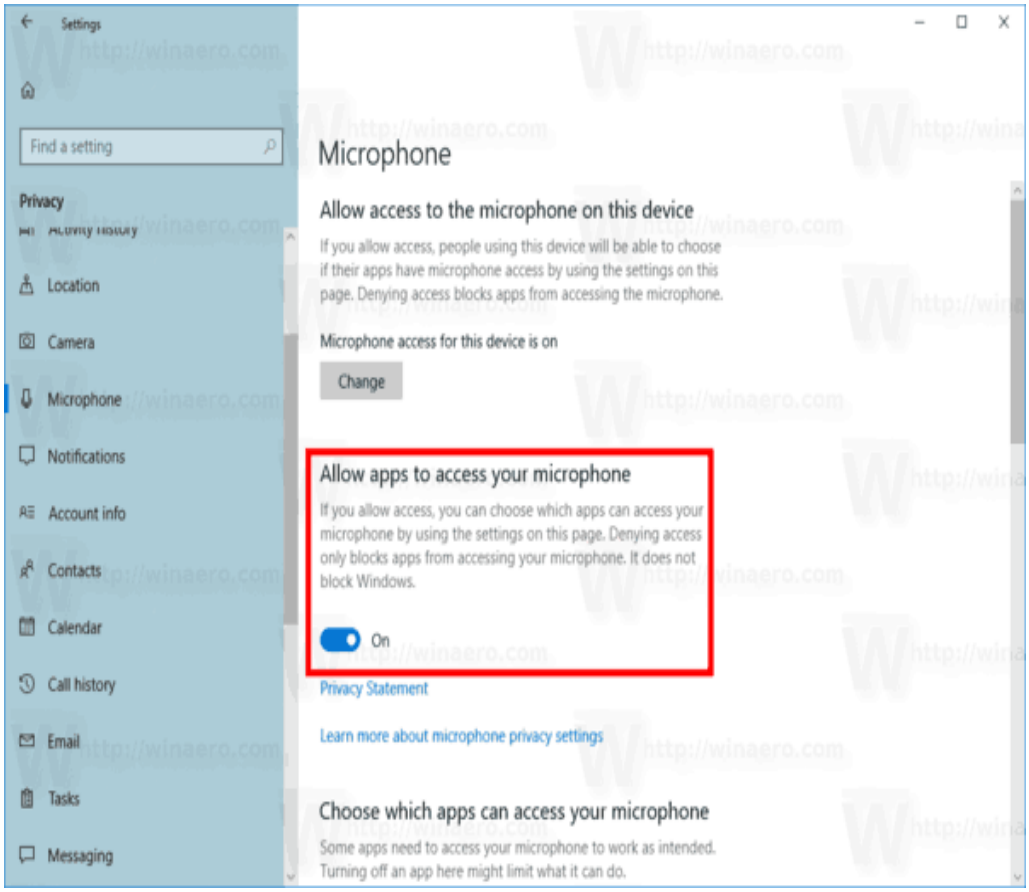
6 Troubleshooting

6.1 [USB audio] no audio input on Microsoft Windows

Depending on the privacy settings of your Microsoft Windows operating system, you'll need to allow the microphone input in order to get audio from the SX-M2D2.

To enable the microphone input, do the following:

1. Open the Settings
2. Go to Privacy – Microphone
3. On the right, enable the toggle switch under Allow apps to access your microphone.



6.2 [USB audio] USB audio ERROR status

When connecting the SX-M2D2 to a USB host, The USB input menu displays an ERROR status. In such a case ,check the following:

- Try another cable. Some cables available on the market are not suited for USB 2.0 high-speed communication (480 Mbps). Also the maximum allowed cable length of 5 meters (16 feet) should not be exceeded.
- Clean the SX-M2D2 USB connector. A dirty connector can cause bad electrical connections
- If you use a USB hub, try connecting the SX-M2D2 directly to the host
- If the problem happens after a USB firmware update, download the update file and apply the update again

7 Service Mode

The Service Mode is a special mode dedicated to service, such as updating the firmware,

7.1 Entering the Service Mode

To enter the service mode:

1. Remove all power sources (external DC, battery)
2. Press and hold both front panel encoder buttons
3. Apply power (close the battery door or connect DC input power)
4. Keep the encoders pressed until the service menu appears

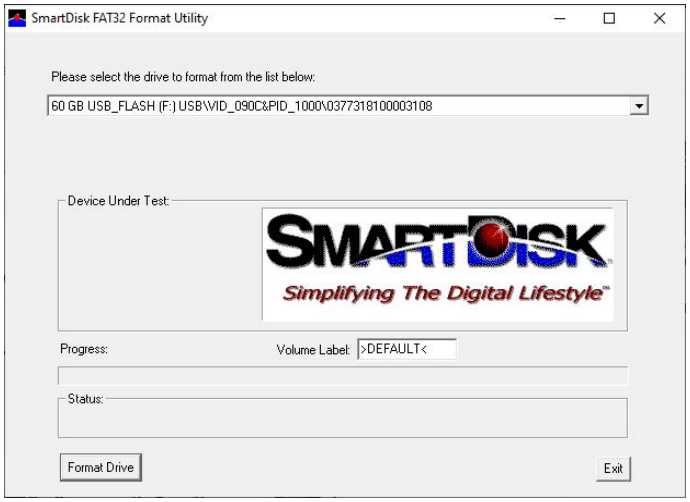
7.2 Firmware Update

A USB key is required to update the SX-M2D2 firmware. Make sure it can fit into the USB type C POWER slot, or use a cable adapter.

NOTE	
	As a USB key is connected to the USB POWER connector, power sources for firmware update is limited to **internal battery** or **external Hirose 4-pin**.

The USB media must be FAT16 or FAT32 formatted.

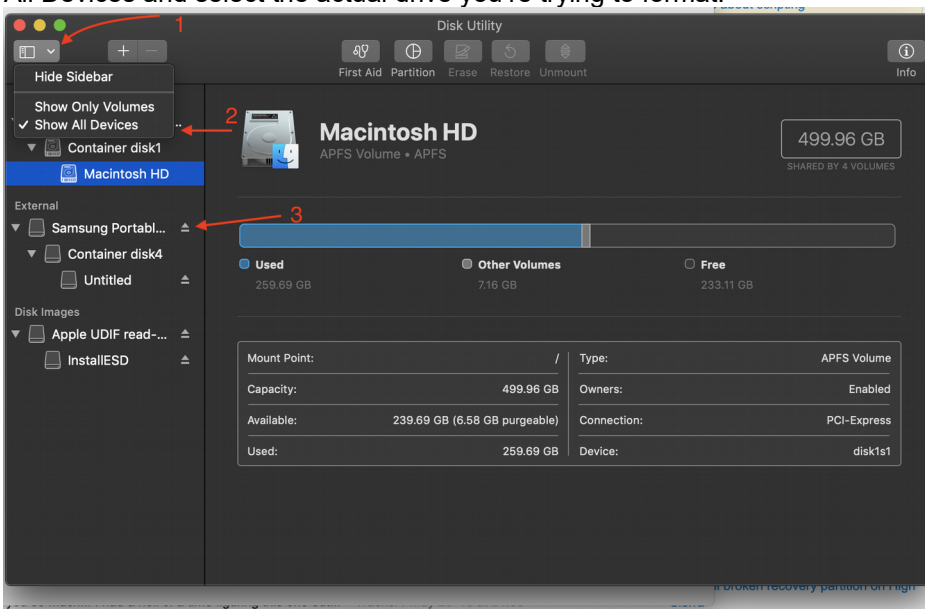
To format a USB media using Microsoft Windows, please use the tool provided by Sonosax. Refer to the SX-M2D2 web page to download that software.



To format a USB media using Mac OS:

1. Connect the USB flash drive to the Mac OS computer
2. Search for Disk Utility in Launchpad and open it
3. Select the Drive (on the left) and click ‘Erase’
4. Enter the new name (optional)
5. Select MS-DOS (FAT) for Format
6. Select Master Boot Record for Scheme

Note: if you don't see the partition scheme (GUID, MBR), select View → Show All Devices and select the actual drive you're trying to format.



7. Click 'Erase'
8. Wait for completion

Once the USB flash drive is FAT16 or FAT32 formatted, copy the upgrade file from the SX-M2D2 web page (tab: Documents) onto the disk. Then, proceed as following:

1. Enter the Service Mode (see Entering the Service Mode)
2. Select FIRMWARE UPDATE
3. Insert the USB key
4. Wait for completion
5. Exit menu, select REBOOT

7.3 Configuration Reset

The Configuration Reset will erase all user configuration of the device (including presets). It is used to set the unit back to factory default.

7.4 Test Interface Menu

The User Interface (UI) test menu allows user to test the rotary encoders, the encoder push buttons and the OLED display.

The two numbers in the middle of the screen are counters. Use them to test the rotary encoders. Rotating the encoder clockwise increases the counter and counterclockwise decreases the counter. An encoder short press highlights its counter.

A left encoder long press shows a full white display (to test all OLED pixels).

A right encoder long press exits the menu.

8 Specifications

8.1 IN1/IN2 Microphone Preamplifier

	Pre-gain 0dB	Pre-gain +20 dB
Maximum Input Level	+18 dBu (balanced) +12 dBu (unbalanced)	-2 dBu (balanced/unbalanced)
Equivalent Input Noise 20Hz - 20 kHz, 150 Ohms	-116 dBu	-126 dBu
Dynamic range (A-weighted)	135 dB	128.5 dB
THD + Noise 20 Hz – 20 kHz	< 0.001% (+18 dBu)	< 0.002% (-3 dBu)
Frequency response (192 kHz sampling)	20 Hz to 80 kHz (+/- 0.1 dB)	
Low Frequency Cut Filter	Hybrid analog/digital third order filter, 60 to 300 Hz step 20 Hz	

8.2 Digital Domain

Operating Sampling Frequency	48 kHz, 96 kHz, 192 kHz
Analog to Digital Conversion	2x 24-bit per channel (dual-ADC)
USB audio	USB 2.0 on USB type C USB Audio Class 2 compliant 2 channels in + 2 channels out asynchronous endpoint 44.1, 48, 88.2, 96, 176.4, 192 kHz 16-bit / 24-bit PCM
AES input	AES42 / AES3 transformer balanced 24 to 192 kHz with ASRC
AES output	AES3 transformer balanced 48, 96, 192 kHz (independent from internal sampling frequency)

8.3 Line Output

Topology	Unbalanced
Full scale output level	+6 dBu
Dynamic range (A-weighted)	111 dB
THD + Noise (+6dBu 600 Ohms)	< 0.002%
Frequency response (192 kHz sampling)	20 Hz to 80 kHz (+/- 0.1 dB)
Output level trim	-30 to +20 dB, 0.5 dB increments

8.4 Phones Output

Max output power	140 mW (min load impedance 13 ohms)

Full scale output level	+6 dBu
Dynamic range (A-weighted)	96 dB
THD + Noise (35 mW, 60 Ohms)	< 0.02%
Frequency response (192 kHz sampling)	10 Hz to 40 kHz (- 3 dB)
Output level trim	-30 to +20 dB, 0.5 dB increments

8.5 Power

Hirose DC input	9-18 VDC
USB DC input	5 VDC 1A maximum
Li-ion battery	Panasonic NCR18650B cell
Total power consumption (USB Audio OFF)	0.35 mW (standby) 2100 mW (without mic) 2500 mW (both mic ON)
USB Audio power	285 mW

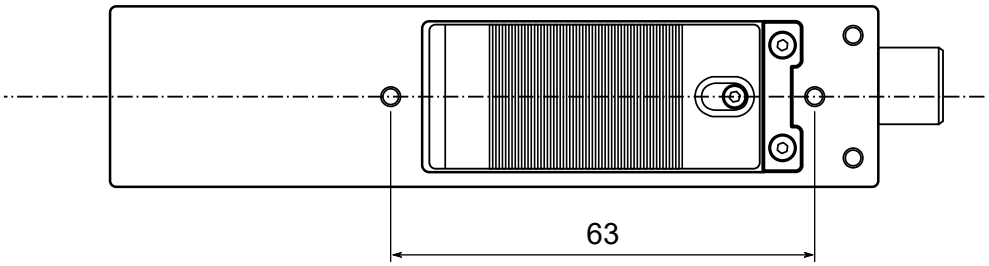
8.6 Operating Conditions

Charging Li-ion battery	0 to +45°C
Operating temperature	-20 to +70°C
Storage temperature	-20 to +70°C

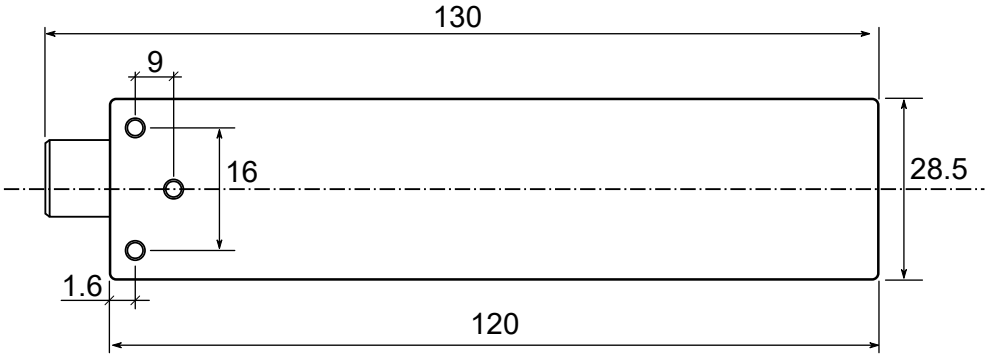
8.7 Mechanical

Size (W x H x D)	74 x 28.5 x 130 mm 2.91 x 1.12 x 5.12 ‘’
Weight	336 g with battery 0.74 lbs

Left Side Panel



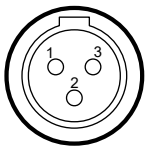
Right Side Panel



WARNING	
	When attaching an accessory, use M3 screws. Screws length in the device **must never exceed 5 mm**

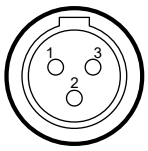
9 Connector Pin Assignments

9.1 Mic/Line analog input (TA-3M)



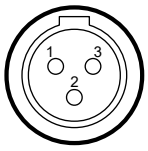
1	ground
2	signal (+)
3	signal (-)

9.2 Line output (TA-3M)



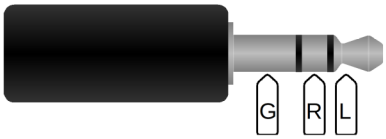
1	ground
2	left
3	right

9.3 AES input/output (TA-3M)



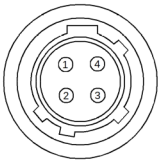
1	ground
2	signal (+)
3	signal (-)

9.4 Phones 3.5mm jack



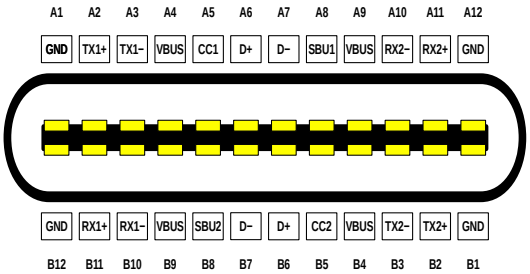
G	ground
R	headphones right
L	headphones left

9.5 Power Hirose 4-pin



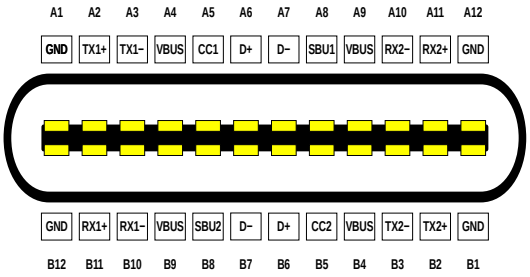
1	ground (-)
2	not connected
3	not connected
4	pos (+)

9.6 USB Audio



A1, A12, B1, B12	Ground
A4, A9, B4, B9	VBUS
A6, B6	D+
A7, B7	D-
A5, B5	CC1 & CC2 pulled down through 5K1 resistors

9.7 USB Power



A1, A12, B1, B12	Ground
A4, A9, B4, B9	5VDC IN
A6, B6	D+
A7, B7	D-
A5, B5	CC1 & CC2 Pulled down through 5K1 resistors (default mode) Pulled up with 80uA current source when operation in DFPS mode (for firmware update)