



User's Manual

Ultra Low Latency Video Encoder

Smart-telecaster Zao-X

Model No. **STC-ZAOX-A-S**

Please read these instructions carefully before using this product, and save this manual for future use.

2022-03-19

Rev 0.2

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 70° C (158° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
17. The power supply cord(s) must be plugged into socket-outlet(s) that is/are provided with a suitable earth ground.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Soliton Systems disclaims all responsibility for the accuracy of any statements contained herein.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products. Please contact your local supplier for ordering information.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FM

This equipment has passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. This equipment is compliant with the specifications of Class I, Division 2, Groups A, B, C and D indoor hazards.

VCCI-A

This device is Class A information technology equipment. Using this equipment within a residential area may cause radio interference. In this case, the user may be required to take appropriate measures.

Notes

- The contents of the Smart-telecaster Zao-X User's Guide (hereinafter referred to as this manual) may differ depending on the version of Zao-X you are using.
- For Zao View and HD View V5, refer to the applicable user's guide.
 - Zao View is a Linux application and HD View V5 is a Windows application.
- Windows is a trademark of Microsoft Corporation.
- The contents of this manual are subject to change without notice.
- Please check our web site for the latest manual.

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1 For Your Safety

This page contains important information to prevent users and others from harm, such as electric shock and injuries, as well as fire and other property damage that may result from incorrect use. Please read all information before use.

1.1 Warning labels

The following warning labels are used in this document.



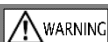
Failure to observe the instructions under this label will cause extremely hazardous situations which may result in serious injury or death.



Failure to observe the instructions under this label will cause unexpected hazardous situations which may lead to serious injury or death.



Failure to observe the instructions under this label will cause unexpected hazardous situations which may lead to personal injury or property damage.



Do not use if damaged

Stop using the device if damaged.

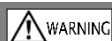


Do not use if an abnormality occurs

When using the device, in case of;

- Strange noise
- Abnormal smell
- Smoke
- Excessive heat
- Objects or liquids getting inside the device

Turn the power off immediately and remove the AC adapter.



Do not use if an abnormality occurs

Failure to observe the following instructions may cause hazards that lead to fire, serious injury, or death.

- Do not disassemble or modify the device.
- Do not damage or excessively bend/twist the power cable.
- Do not plug the AC adapter into an overloaded outlet.

- Do not leave the device under direct sunlight for a long time.
- Do not drop the device or subject it to strong shock.
- Do not place heavy objects on the device.
- Use the designated AC adapter.
- Do not heat or throw the device into fire.
- The power cord must be plugged into socket-outlet that is / are provided with a suitable earth ground.
- This equipment is not suitable for use in locations where children are likely to be present.

2 Restrictions and Special Instructions

- "Smart-telecaster" is a copyrighted work of Soliton Systems K.K. and the copyright and other rights related to these are the property of Soliton Systems K.K..
- All other product names or trademarks are properties of their respective owners.
- The contents of this product are subject to change without notice due to product improvement.
- The connection types shown in this manual are for reference only and do not guarantee all combinations.
- The device may heat up when it is in continuous use, but this is not a malfunction.
- The accompanying AC adapter supports 100 VAC to 240 VAC (50 Hz/60 Hz), but the power cable appropriate for the area is required.
- Unplug the AC adapter when the device is not in use for a long time.

1 Pour votre sécurité

Cette page contient des informations importantes pour éviter que les utilisateurs et d'autres personnes ne subissent des dommages, tels qu'un choc électrique et des blessures, ainsi qu'un incendie et d'autres dommages matériels pouvant résulter d'une utilisation incorrecte. Veuillez lire toutes les informations avant l'utilisation.

1.1 Étiquettes d'avertissement

Les étiquettes d'avertissement suivantes sont utilisées dans ce document.



Le non-respect des instructions de cette étiquette entraînera des situations extrêmement dangereuses pouvant entraîner des blessures graves ou mortelles.



Le non-respect des instructions de cette étiquette entraînera des situations dangereuses inattendues pouvant entraîner des blessures graves ou la mort.



Le non-respect des instructions de cette étiquette entraînera des situations dangereuses inattendues pouvant entraîner des blessures corporelles ou des dommages matériels.



Ne pas utiliser s'il est endommagé

Arrêtez d'utiliser l'appareil s'il est endommagé.



Ne pas utiliser si une anomalie se produit

Lors de l'utilisation de l'appareil, en cas de ;

- Bruit étrange
- Odeur anormale
- Fumée
- Chaleur excessive
- Objets ou liquides pénétrant dans l'appareil

Coupez immédiatement l'alimentation hors tension et retirez l'adaptateur secteur.



Ne pas utiliser si une anomalie se produit

Le non-respect des instructions suivantes peut entraîner des risques d'incendie, de blessures graves ou de mort.

- Ne pas démonter ou modifier l'appareil.
- N'endommagez pas et ne pliez/tordez pas excessivement le câble d'alimentation.

- Ne branchez pas l'adaptateur secteur sur une prise surchargée.
- Ne laissez pas l'appareil au soleil pendant une longue période.
- Ne laissez pas tomber l'appareil et ne le soumettez pas à un choc violent.
- Ne posez pas d'objets lourds sur l'appareil.
- Utilisez l'adaptateur secteur désigné.
- Ne chauffez pas l'appareil et ne le jetez pas au feu.
- Le cordon d'alimentation doit être branché dans une prise de courant dotée d'une mise à la terre appropriée.
- Cet équipement n'est pas adapté à une utilisation dans des endroits où des enfants sont susceptibles d'être présents.

2 Restrictions et instructions spéciales

- "Smart-telecaster" est une œuvre protégée par le droit d'auteur de Soliton Systems K.K. et les droits d'auteur et autres droits liés à ceux-ci sont la propriété de Soliton Systems K.K..
- Tous les autres noms de produits ou marques sont la propriété de leurs propriétaires respectifs.
- Le contenu de ce produit peut être modifié sans préavis en raison de l'amélioration du produit.
- Les types de connexion indiqués dans ce manuel sont fournis à titre indicatif uniquement et ne garantissent pas toutes les combinaisons.
- L'appareil peut chauffer lorsqu'il est utilisé en continu, mais ce n'est pas un dysfonctionnement.
- L'adaptateur secteur fourni prend en charge 100 Vca à 240 Vca (50 Hz/60 Hz), mais le câble d'alimentation adapté à la zone est requis.
- Débranchez l'adaptateur secteur lorsque l'appareil n'est pas utilisé pendant une longue période.

3 Overview

This document describes how to operate the low latency streaming system Zao-X.

4 Video Streaming System Configuration

Zao-X can transmit videos (including embedded sounds) input through HDMI or SDI to a remote receiver (Zao View or HD View V5) via LAN or the Internet. Up to six telecommunication lines can be used. Figure 4-1 shows a block diagram.

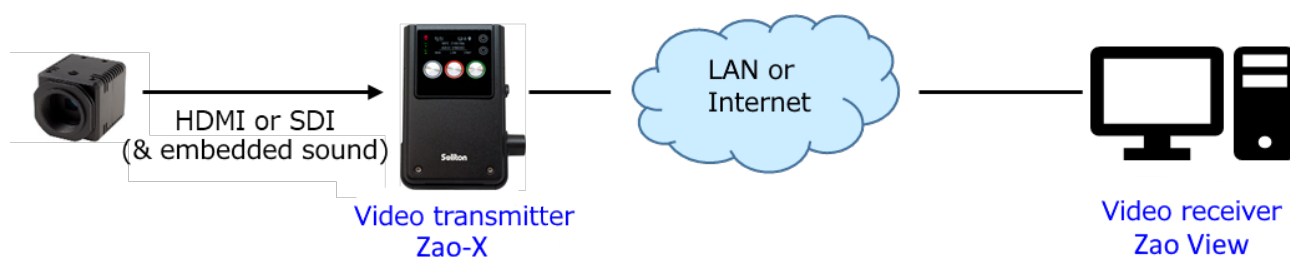


Figure 4-1 Minimum Configuration for a Video Streaming System

* For details on Zao View or HD View V5, see the app's manual.

5 List of Accessories

Table 5-1 shows the list of accessories.

Table 5-1 List of Accessories

Detailed item	Quantity	Note
Zao-X device	1	
AC adapter	1	For this unit only
Power cord	1	For AC adaptor It varies depending on the country.
Lok-U-Plug USB/HDMI cable holder	3	ATEN 2X-EA12
M3 screw for fixing the Lok-U-Plug cable holder	3	Length 10 mm (0.39")
Sound BlasterX G1	1	USB audio device
Getting Started Guide	1	README for the international version

Note:

- Use the supplied AC adaptor. Do not use the AC adaptor of another device.
- The supplied power cable is dedicated for this unit. Do not use with other device. Also, do not use power cable from other device on this unit.
- Use a power cord that conforms to the standards of the country in which the unit is used.

6 Parts of Zao-X

Figure 6-1 shows the Zao-X device.



Figure 6-1 Zao-X

Note:

■ Tripod receptacle

Use a tripod with a screw length of less than 5.5 mm (7/32 inch).

You will be unable to firmly secure the Zao-X to tripods having screws longer than 5.5 mm (7/32 inch), and may damage the Zao-X.

■ Réceptacle de trépied

Utilisez un trépied avec une longueur de vis inférieure à 5,5 mm.

Vous ne pourrez pas fixer solidement le Zao-X aux trépieds ayant des vis de plus de 5,5 mm et vous risquez d'endommager le Zao-X.

7 Specifications

7.1 Hardware Specifications

Table 7-1 show the hardware specifications of Zao-X.

Table 7-1 Hardware Specifications

Item	Detailed item	Description
Hardware specifications	Weight	Approx. 560 g
	Size	W 100.2 mm x H 161 mm x D 42.8 mm (Protrusions not included)
	Power input rating	DC 12V / 3A
	Operating environment	-5 to +40 °C / 10 to 95 %RH (Non-condensing)
	Storage environment	-20 to +70 °C / 10 to 95 %RH
	Video input port	BNC x 1, HDMI x 1
	USB port	USB2.0 Type-A x 2
	Built-in Ethernet port	RJ-45 jack

7.2 Functional Specifications

Table 7-2 show the functional specifications of Zao-X.

Table 7-2 List of Functional Specifications

Item	Detailed item		Description
Supported View App	—		Zao View (Linux) , HD View V5 (Windows)
Transmission method	—		Delay priority mode (Low-latency) / Bandwidth priority mode (Bandwidth)
Coding method	—		H.265 Main Profile
Video streaming	Encoding system		HEVC (512 to 32,000 kbps)
	Encoding mode		Normal, ULL * The supported screen resolution varies (See Table 8-1 and Table 8-2).
	Input interface		HDMI, SDI (DIN port) * When both SDI and HDMI signals are input at the same time, SDI is given priority.
Audio streaming	Forward direction	Channel	Stereo
		Encoding	Opus (16 to 320 kbps)
		Sampling rate	Embedded:48000Hz
		Input	Embedded (HDMI, SDI) USB audio, Bluetooth (MLU)
	Backward direction	Channel	Stereo/Mono (L)
		Encoding	Opus (16 to 320 kbps)
		Sampling rate	16000, 48000 Hz
Serial communication	Baudrate		1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
	Parity		None, even, odd * Data bit: 8, stop bit: 1 (fixed)
	Packetize Mode		None, COBS
LAN tunneling	Internet protocol		IPv4
	Packet		TCP, UDP, ICMP
Passphrase authentication	—		12 digit number * It is necessary to turn on authentication on the View side.

8 Supported Video Formats

Zao-X has two encoding modes: Normal mode and ULL mode. 3840 x 2160 is supported only for encoding in Normal mode. Table 8-1 and Table 8-2 show the supported video formats.

8.1 Video Formats Supported in ULL Mode

Table 8-1 Video Formats Supported in ULL Mode

Input interface	Screen resolution	Progressive	Interlace
HDMI	1920x1080	25p/29.97p/30p/50p/59.94p/60p	50i/59.94i/60i
	1280x720	50p/59.94p/60p	-
SDI	1920x1080	25p/29.97p/30p/50p/59.94p/60p	50i/59.94i/60i
	1280x720	50p/59.94p/60p	-

8.2 Video Formats Supported in Normal Mode

Table 8-2 Video Formats Supported in Normal Mode

Input interface	Screen resolution	Progressive	Interlace
HDMI	3840x2160	25p/29.97p/30p/50p/59.94p/60p	
	1920x1080	25p/29.97p/30p/50p/59.94p/60p	50i/59.94i/60i
	1280x720	50p/59.94p/60p	
SDI	1920x1080	25p/29.97p/30p/50p/59.94p/60p	50i/59.94i/60i
	1280x720	50p/59.94p/60p	

* 3840 x 2160 is supported only in Normal mode.

9 Turning the Power On and Off

9.1 Turning the power on

When power starts being supplied, the device starts up. The power button is located on the side of the Zao-X device. It is used as an alternate switch. When it is pressed, the device turns on, and when it is pressed again, the device turns off. When you plug the power cable and turn on the power button, power starts being supplied, starting the device. You may leave the power button on the side of the device on when power is not connected and start the device by plugging the power cable to start supplying power.

9.2 Turning the power off

When power stops being supplied, the device is turned off (because it has no internal battery). Turn off the power button (alternate switch) on the side of the device or unplug the power cable to turn off the device. If you unplugged the power cable with the power button on, you need to turn on or off the power button according to the next power-on method.

10 Button Functions and OLED Panel

The device has three functional buttons and the UP and DOWN buttons. Use these buttons to configure the Zao-X settings. The bottom of the OLED panel displays the functions corresponding to the three functional buttons.

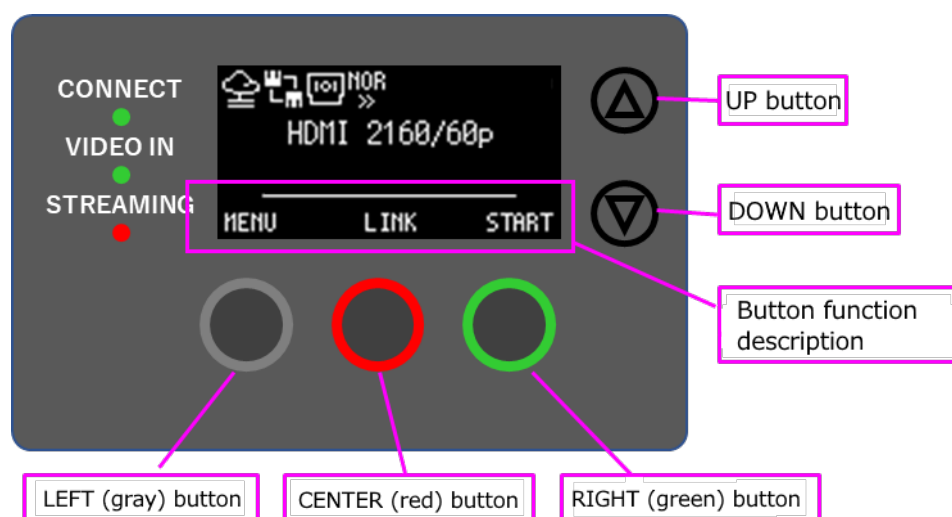


Figure 10-1 Zao-X Buttons

If no operations are performed for more than 30 seconds, the OLED panel automatically turns off. To turn on the OLED panel again, press any button. This power-saving function does not work during FW update or reboot.

11 HOME Screen and MENU Screen (OLED Panel)

Zao-X has the **HOME** screen and the **MENU** screen. You can switch between the **HOME** screen and the **MENU** screen using buttons. Pressing **MENU (LEFT)** in **OFFLINE** mode takes you to the **MENU** screen.



Figure 11-1 HOME Screen and MENU Screen

The **HOME** screen allows you to check the connected device and the input video source by looking at icons (See Figure 11-2). For details on the icons, see Table 11-1. The display contents and button functions differ between the modes (**OFFLINE**, **CONNECTING**, and **STREAMING**). **STREAMING** displays the bit rate and frame rate of video streaming. In **STREAMING** mode, pressing the **STOP (RIGHT)** button returns you to **OFFLINE** mode. In **CONNECTING** mode, pressing the **CANCEL (RIGHT)** button returns you to **OFFLINE** mode. When you press the **START (RIGHT)** button in **OFFLINE** mode, the device enters **STREAMING** mode.

The **MENU** screen allows you to check and change the settings (See 13). When you press the **BACK** button on the **MENU** screen, you will return to the **HOME** screen.

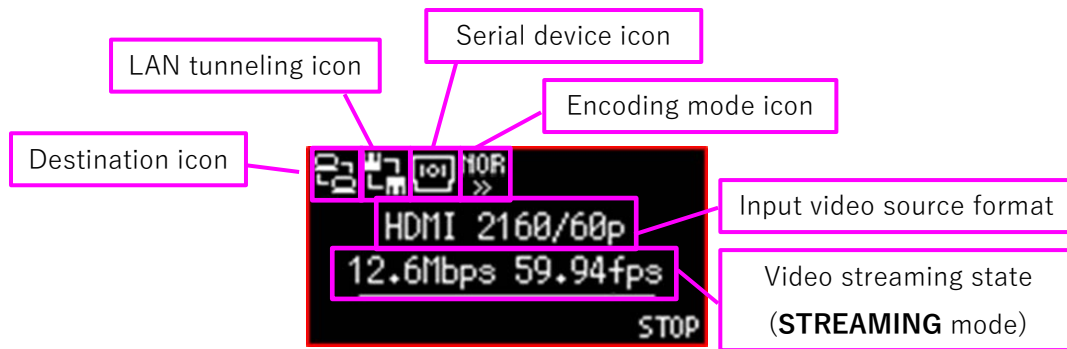


Figure 11-2 Contents Displayed on the HOME Screen (STREAMING Mode)

Table 11-1 Icon Types

Icon	Description
	The device is connected to Zao View.
	LAN tunneling is available.
	A serial device is connected.
	Encoding mode is ULL.
	Encoding mode is Normal.

12 Starting Zao-X

When Zao-X starts up, it automatically connects to Zao View (If Zao View is not running or the connection setting is different, the screen does not change from "CONNECTING..."). When the device enters STREAMING mode, it displays the bit rate and frame rate of video streaming.



Figure 12-1 Starting Zao-X

13 Changing the Settings

The settings can be changed on the **MENU** screen. When you press the **MENU (LEFT)** button in **OFFLINE** mode on the **HOME** screen, you will go to the **MENU** screen.

13.1 Encoding mode setting

Zao-X has two encoding modes: **Normal mode** and **ULL mode**. You can check the current encoding mode by looking at the OLED icon.

- Normal mode
- ULL mode

The encoding mode setting can be changed on the **MENU** screen. If you change the encoding mode, you will need to reboot Zao-X.

1. On the **HOME** screen, press the **MENU (LEFT)** button to go to the **MENU** screen. Check the current encoding mode by looking at the icon on the MENU screen.

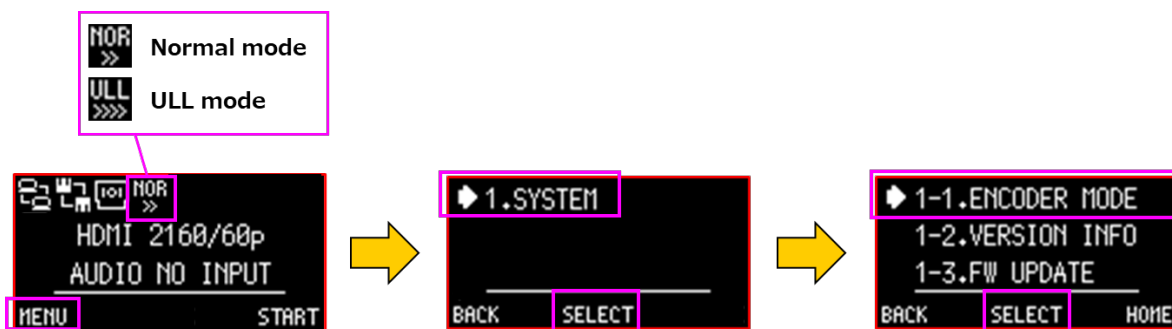


Figure 13-1 Encoding Mode Setting 1

2. In **1.SYSTEM**, press the **SELECT (CENTER)** button.
3. Select **1-1.ENCODER MODE** and press **SELECT (CENTER)**. You can move  (cursor) with the **UP/DOWN** button.
4. The **VIDEO ENCODE MODE** screen appears. [*] indicates the current setting.

5. Move the cursor with the **UP/DOWN** button to select **1.NORMAL MODE** or **2.ULL MODE** and press **SELECT (CENTER)**. When the confirmation screen appears, select **OK (CENTER)**. When the confirmation screen appears again, select **YES (CENTER)** to reboot the device. When the reboot starts, "Rebooting..." appears.

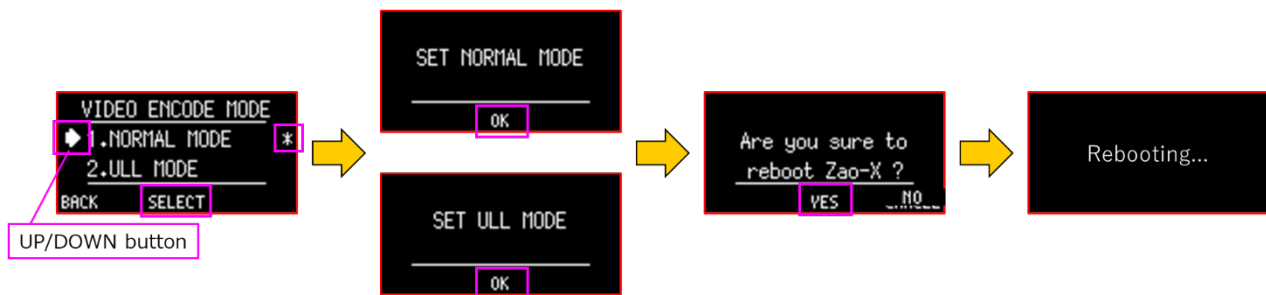


Figure 13-2 Encoding Mode Setting 2

13.2 Version number check

In **1.SYSTEM** on the **MENU** screen, select the **SELECT (CENTER)** button. Select **1-2.VERSION INFO**. The version number and SUID of Zao-X are displayed. When you press **BACK (LEFT)**, you will return to the **MENU** screen.

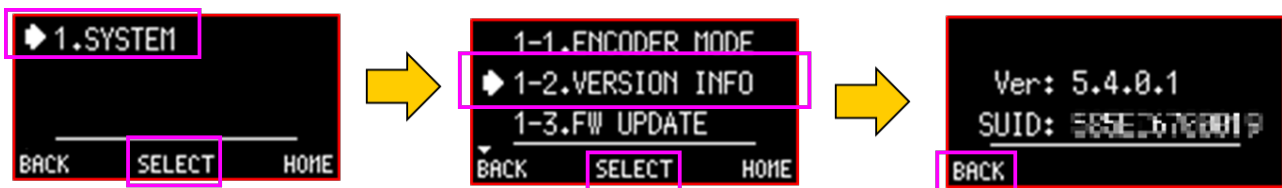


Figure 13-3 Version Information

13.3FW Update

1. Connect a USB flash drive that stores FW data to the USB port of Zao-X.
2. In **1.SYSTEM** on the **MENU** screen, press the **SELECT (CENTER)** button. Select **1-3.FW UPDATE** and press the **SELECT (CENTER)** button to check the data on the USB flash drive. (If data is unreadable because no USB flash drive is connected, "USB device not connected" appears.)

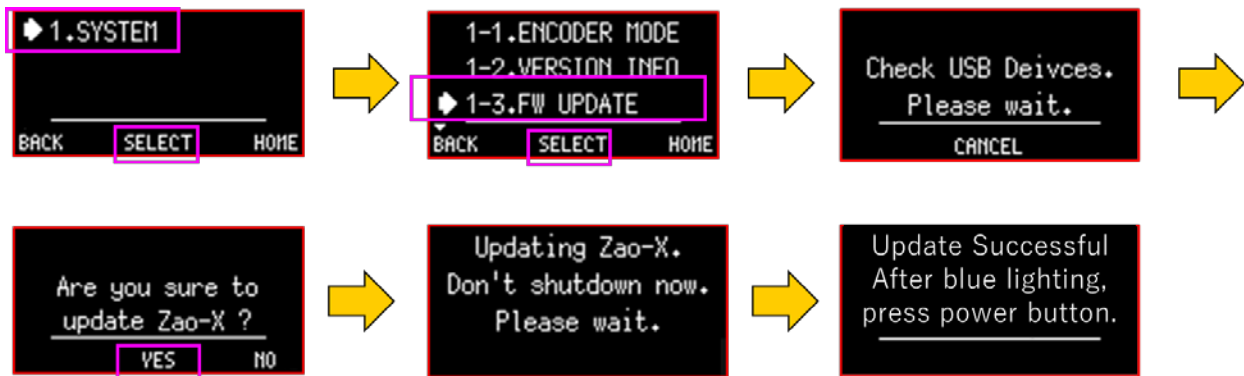


Figure 13-4 FW Update

3. When "Are you sure to update Zao-X ?" appears, select **YES (CENTER)** to start updating Zao-X (If you select **NO**, Zao-X is not updated). After the device is successfully updated, you will need to press the power button to turn off Zao-X.
4. When "Update Successful" appears and the power button LED turns on in blue, turn off the power button.

13.4Reboot

In **1.SYSTEM** on the **MENU** screen, select the **SELECT (CENTER)** button. Select **1-4.REBOOT**. When "Are you sure to reboot Zao-X ?" appears, select **YES (CENTER)** to reboot Zao-X. If you select **NO (RIGHT)**, you will return to the **MENU** screen without a reboot.

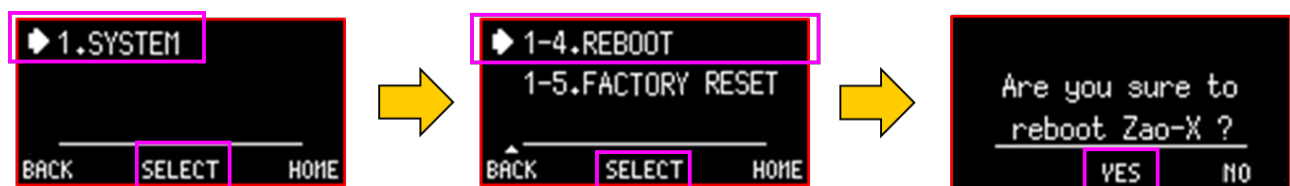


Figure 13-5 Reboot

13.5Factory Reset

When you perform **Factory Reset**, the device is reset to the factory settings (default settings).

In **1.SYSTEM** on the **MENU** screen, select the **SELECT (CENTER)** button. Select **1-5.FACTORY**

RESET. When "Wipe out all user data ?" appears, select **YES (CENTER)** to clear the user setting values to the default settings. When the user setting values are cleared, "Rebooting..." appears, rebooting the device.

If you select **NO (RIGHT)** for "Wipe out all user data ?", you will return to the **MENU** screen without clearing the setting values.

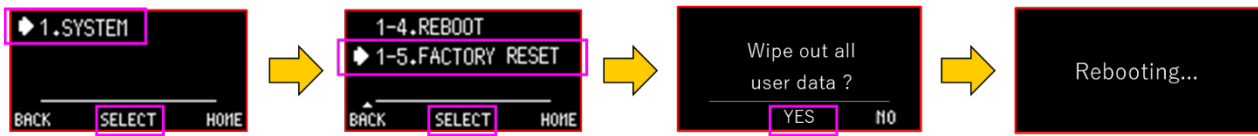


Figure 13-6 Factory Reset

Revision History

Revision	Date	Description
0.1	2021/7/19	First version
0.2	2022/3/18	Added safety-related description

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