



# Vela Rack SDI User Manual

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Thank you for choosing Science Image!

Our mission is to build reliable audio and video devices with professional features that exceed your expectations. We value your feedback! Please send us your suggestions at [support@science-image.com](mailto:support@science-image.com) to tell us your comments and your expectation for the improvement of our products.

## Warranty

All Science Image devices are warrantied for three years from the date of purchase.

## Technical Support

Science Image's products are supported by our dedicated professional team. For assistance, please contact us through the following channel:

- Send an email to **[support@science-image.com](mailto:support@science-image.com)**

Before reaching out to us, please gather as much relevant information as possible about your issue to help us assist you more effectively. This may include:

- Description of the Issue
- Details of your video or audio source (type, connection method, resolution, frame rate, etc.)
- Product serial number
- Product firmware version
- Product indicator status

## 1. Interface and Display



- ① 12V DC Power Port.
- ② Line in
- ③ POE/Ethernet
- ④ USB: Universal Serial Bus interface.
- ⑤ HDMI OUT (Output encoded and decoded video images as well as those in Media directory)
- ⑥ SDI OUT(SDI Loop Out)
- ⑦ SDI IN
- ⑧ Optical TX/RX
- ⑨ SDI Input Indicator
- ⑩ TFT Touch Screen
- ⑪ Headset/Mic
- ⑫ 1/4 Inch Screw Hole
- ⑬ Factory Reset
- ⑭ PCIe SSD Slot

## 2. Start the Device

### 2.1 Insert and Remove the Hard Drive

Vela Rack SDI does not support hot plugging of hard drives. Please ensure the device is powered off before inserting or removing the hard drive. Follow the steps below to install the hard drive correctly.

- ① Press the TFT screen panel to make it pop open automatically.
- ② Install the hard drive into the C1 drive enclosure.
- ③ Insert the enclosure into the slot, ensuring that the Science Image logo faces upward and the side labeled 'C1' faces downward.
- ④ Press the screen panel again to lock it in place.

## 2.2 Power Supply

Vela Rack SDI is compatible both **DC** and **POE** power supply options.

- When using DC power supply, please use the standard power adaptor provided by Science Image.
- Use a POE + switch when powering the device via POE.

When the device is powered on successfully, the green indicator next to the DC interface will light up.

## 3.TFT Touch Screen

### 3.1 Main Menu

The main menu includes eight modules: Monitor, Video, Audio, Network, Encode, Decode, Media, and System.



### 3.2 Main Page

Monitor is used to display and configure various parameters in real time. It supports monitoring encoded and decoded images as well as locally stored video images. Under the Monitor page, there are two submenus. Users can easily switch between them by clicking the blank area.



- ① SDI input source information: Displays the resolution and format of the current input source.
- ② Display the name of the stream or video being encoded, decoded, or played back, enabling users to easily identify the active operation in real time.

- ③ Display of current recording duration, allowing users to accurately grasp the recording progress.
- ④ Streaming status display: When pushing SRT/RTMP/RTSP, the 'ON AIR' turns red.
- ⑤ Used to hide the upper and lower menu bars to monitor the video image in full screen
- ⑥ Sleep mode: Click here to sleep with black screen, click the screen again to wake up.
- ⑦ Menu bar: Click here to enter the main menu settings page.
- ⑧ IP Address: Click here to display the current IP address of the device (green means connected to the Internet).
- ⑨ Encoding status display: The Enc indicator turns green to signify active encoding.
- ⑩ Decoding Status Display: The Dec indicator turns green to signify active decoding.
- ⑪ Audio Settings: Click here to jump to the audio settings page.
- ⑫ Screen capture function: Take a screenshot and save it in PNG format.
- ⑬ Upload rate: Displays the current upload rate.
- ⑭ Download rate: Displays the current download rate.
- ⑮ Progress bar: used to view the playback progress.



- ⑯ When playing back local files in Media, click here to play the previous file in the local file list.
- ⑰ Pause video playback of the current file.
- ⑱ When playing back local files in Media, click here to play the next file in the local file list.
- ⑲ Record button: Click to record or stop recording the currently encoded file.
- ⑳ Stop playing the current local file in Media.
- ㉑ Enable loop playback for local files in Media
- ㉒ Media Directory: Click to jump to the local video directory.
- ㉓ Device Storage Space: View current storage capacity.
- ㉔ Volume Bar: Displays current volume level.

## 4. Encoding

Vela Rack SDI currently supports encoding protocols: FULL NDI, NDI|HX2, NDI|HX3, RTSP, RTMP, SRT. Configure encoding parameters in Menu—>Encode.

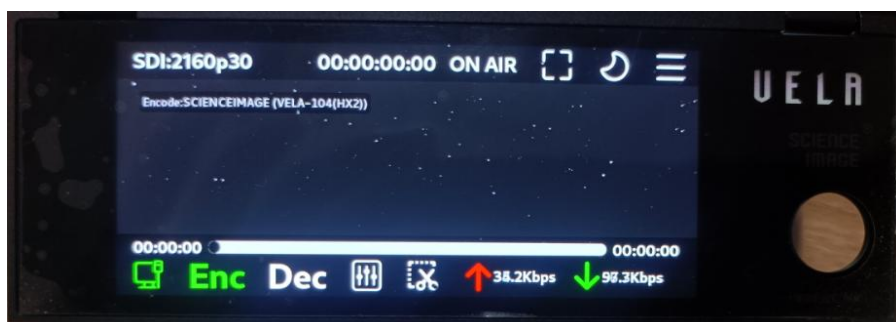
### ● Enable Encoding:

- ① Set Encoding Type: Navigate to Menu—>Encode—>NDI, select the desired type (NDI|HB / NDI|HX2 / NDI|HX3). The green slider indicates the active encoding type.

- ② Start Encoding: Connect an SDI source. Vela Rack SDI will automatically begin encoding.

Status Indicators:

- Enc at the bottom of the Monitor Page turns green.
- The top-left corner displays the resolution and stream name.



- Disable Encoding: Navigate to **Menu—>Encode—>NDI**, click the green slider corresponding to the active encoding type to turn it gray. This action stops encoding.  
(Status: Green = Active / Gray = Disabled)

#### 4.1 Main Stream Settings

Configure parameters under **Menu—>Encode—>Setting—>Main Stream**.

- **Bandwidth:**

Range: Up to 120 Mbps | Default: 80 Mbps.

- **Encoding Format:**

Supported: H.264 (default) / H.265.

- **Picture quality level:**

Options: baseline、main、high

- (1) H264 + HDR, Forced to high-10;
- (2) HEVC + HDR, Forced to main-10;
- (3) H264 + SDR, User-selectable (baseline/main/high)
- (4) HEVC + SDR, Forced to main.

- **Bitrate Control:**

Options: CBR (Constant Bitrate), VBR (Variable Bitrate), CVBR (Constrained VBR).  
When streaming NDI/HX3: Fixed to CBR.

- **I-frame interval (GOP):**

Range: Up to 200 frames | Default: 60 frames.

- Smaller key frame intervals reduce buffering but increase file size.
- Recommended:  $\leq 60$  frames for live streaming smooth and clarity.

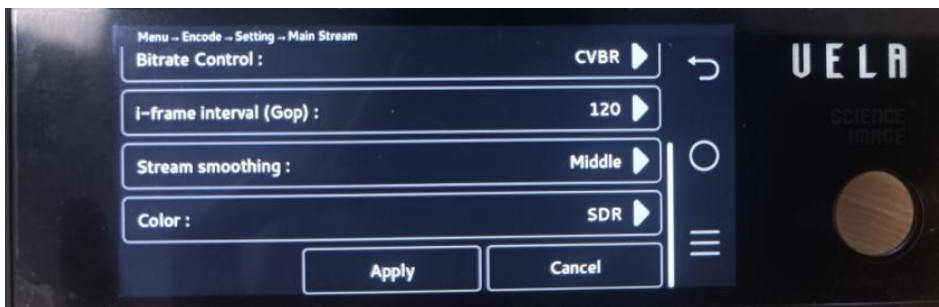
When streaming NDI|HX3: **Fixed to 20 frames.**

- **Stream smoothing:**

Levels: Very Low, Low, Middle, High, Very High

- **Color:**

Supported standards: SDR / HDR.



**Note:** Changes will not take effect until you click **Apply** at the bottom of the page.

## 5. Streaming

### 5.1 NDI Settings

Configure the following under **Menu—>Encode—>NDI**:

- **Enable or disable** NDI|HB, NDI|HX2, or NDI|HX3 encoding types.

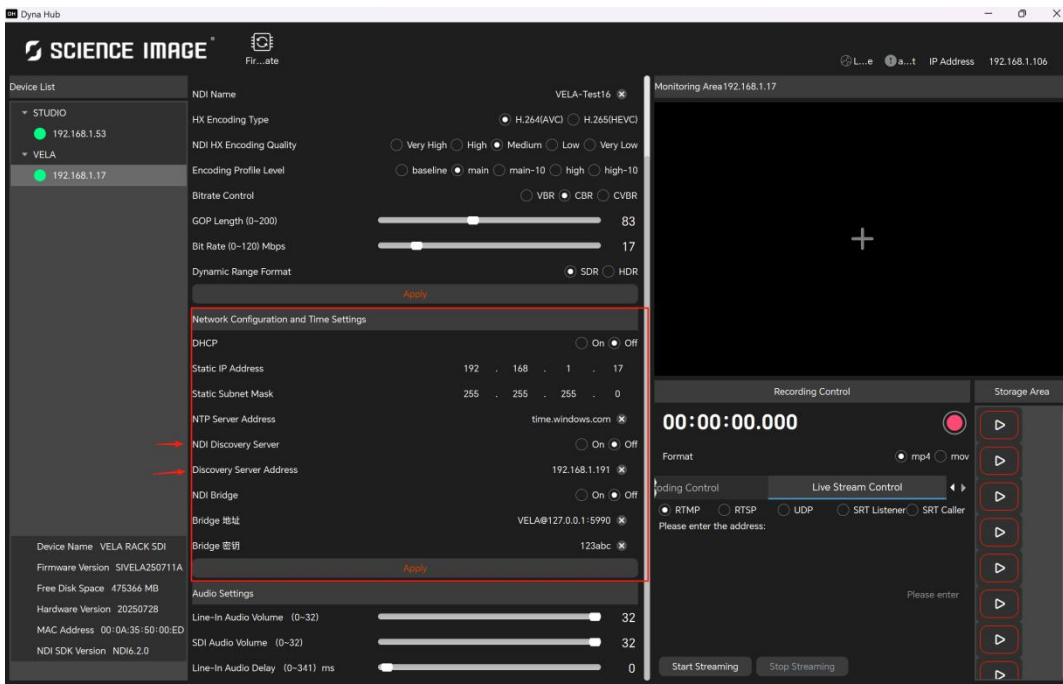
*(Note: These three encoding types cannot be enabled simultaneously.)*

- **NDI Name:** Set the name for the NDI stream. Changes take effect immediately.

### 5.2 NDI Discovery Settings

- **Group Name:** NDI access group name. Default: Public.
- **Discovery Services:** Turn on/ off NDI discovery. Default: Off.
- **Server IP Address:** Enter the NDI multicast address.
- **Configuration in Dyna Hub:**

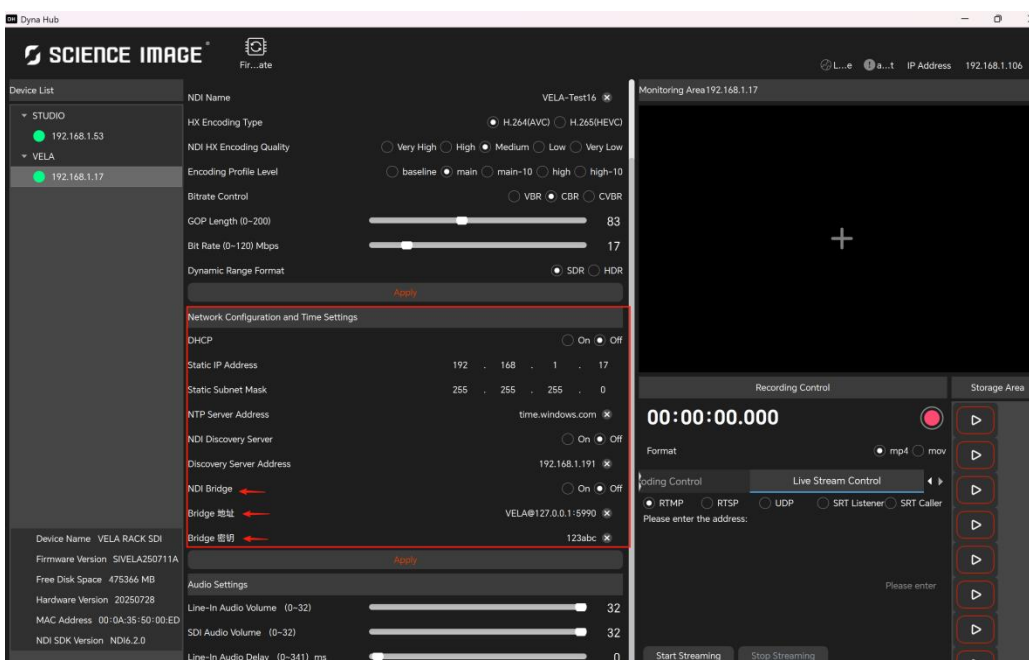
Apply the above settings in the corresponding section shown below. **Click Apply** in Dyna Hub for changes to take effect.



### 5.3 NDI Bridge Settings

Click **Bridge Setting** to enter the NDI Bridge configuration page.

- **Bridge Setting:** NDI Bridge on/off toggle. **Default setting:** Off.
- **Address:** The public IP address of the target network where the NDI stream should be transmitted.
- **Key:** Connection key.
- Configure the corresponding settings in Dyna Hub as shown in the diagram below. Click "**Apply**" for the changes to take effect.



## 5.4 RTMP / RTSP / SRT / UDP Streaming Settings

### Access Settings Path:

Click **Menu > Encode > Live Server** to enter the settings page. Select the desired streaming protocol to proceed to its specific settings page.

- RTMP, RTSP, SRT, and UDP **cannot be streamed simultaneously** (mutually exclusive).
- When streaming RTMP/RTSP/SRT/ UDP, one NDI|HX stream is simultaneously pushed.
- **RTMP** requires **H.264** encoding (set via *Encode Mode*).

### Protocol Configuration Settings:

- **RTMP:** Only contains a toggle switch and an address input field.

If a **steam key** or **authentication token** is required, append it directly to the end of the URL using the format:

Address format: `rtmp://[server_address]:[port]/live/<stream_key>`

Example: `rtmp://192.168.1.106:1935/live/VELA-XP`

- **RTSP:** Only contains a toggle switch and an address input field.

Address format: `rtsp://[IP_address]:[port]`

Example: `rtsp://192.168.1.69:8554/vela`

- **SRT Caller:** Only contains a toggle switch and an address input field.

Address format: `srt://[IP_address]:[port]?streamid=#!::r=[stream_name],m=publish`

Example: `srt://192.168.1.69:8890?streamid=#!::r=live/VELA-XP,m=publish`

- **SRT Listener:** Only contains a toggle switch and a port input field. The address defaults

to `srt://[Vela's_Own_IP_Address]:[Port]`

Example: `srt://192.168.0.100:9000`

- **UDP:** Currently only supported on Dyna Hub.

If a **steam key** or **authentication token** is required, append it directly to the end of the URL.

- **Multicast Address Format:** `UDP://[Multicast_IP]:[Port ]` (Address range: 224.0.0.0 to 239.255.255.255).

Example: `UDP://239.255.1.1:1234`

- **Unicast Address Format:** `UDP://[Target_Address]:[Port]/live/<stream_key>`

Example: `UDP://192.168.1.101:1234/live/VELA-XP`

### Use Cases:

Live television broadcasting, multicast-based video distribution (e.g., conference room multi-screen streaming), and real-time financial market data delivery.

### Key Requirements

- Network devices (switches/routers) must support the **IGMP protocol**.

- Receivers must join the same multicast group.

Example: In VLC player, input udp://@239.0.0.1:5000

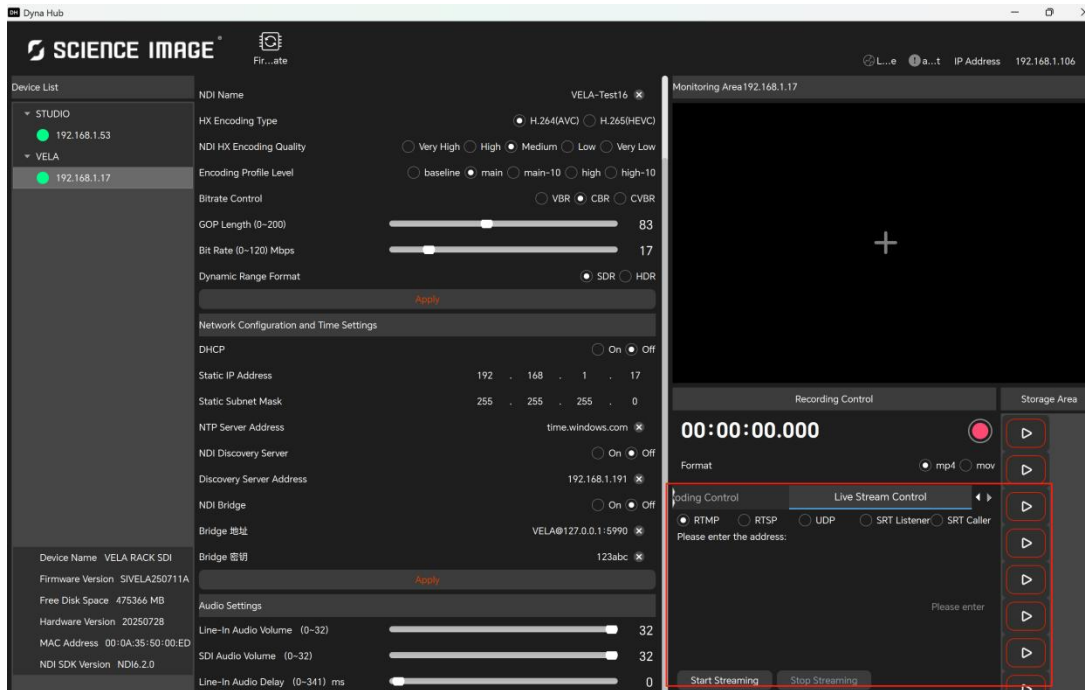
**Note:** Click “**Start Streaming**” to begin pushing the stream after entering the URL.

The ON AIR indicator on the Vela Rack SDI Monitor interface will turn red when streaming is activated.

### Dyna Hub Specifics:

The corresponding settings for the protocols mentioned above are configured in the location shown in the Dyna Hub diagram.

**Note:** Dyna Hub requires clicking "Start Streaming" for the settings to take effect.




## 6. Recording



Vela Rack SDI employs H.264 or H.265 encoding technology to capture high-efficiency video recordings., enabling capture in both MP4 and MOV video formats. Recorded files are stored in the Media directory. During MP4/MOV recording, the system simultaneously records a TS-format video stream for backup.

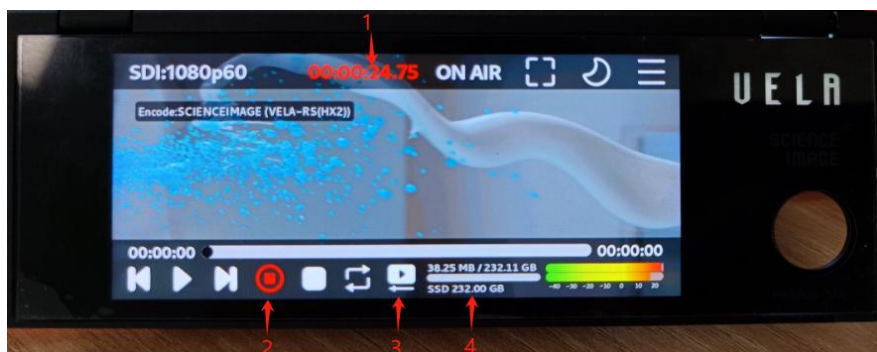
### 6.1 Starting/ Stopping a Recording

#### 1. Start Recording

- Click the **Recording icon**  (Marked as Arrow 2 in the diagram)
- **Status Indicators:**
  - **Recording duration** is displayed at the top of the screen ( Arrow 1).
  - **File size and remaining storage capacity** are shown at the bottom ( Arrow 4).

## 2. Stop Recording

- Click the **Stop Recording icon**  (Arrow 2) .
- The recorded file is automatically saved to the **Media directory**.
- To view files, click the **Media icon**  (Arrow 3) directly



## 6.2 Setting the Recording Format

### 1. Access Configuration Menu

- Navigate to Menu—>Encode—>Record to configure the recording file format.

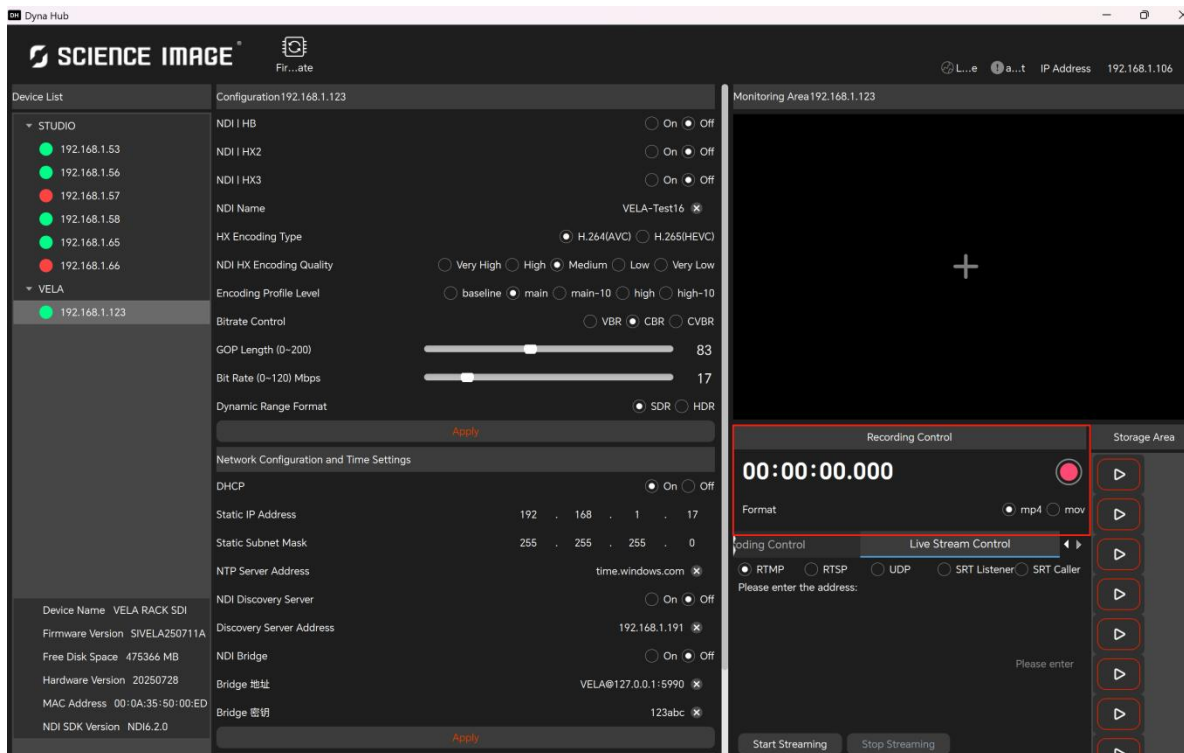
### 2.Supported Formats

**MP4** and **MOV**. Furthermore, during MP4/MOV video recording, Vela simultaneously generates a concurrent TS-format backup file.



## 6.3 Recording on Dyna Hub

Dyna Hub enables independent recording initiation, operating separately from the Vela system. Recordings started on Vela cannot be terminated via Dyna Hub due to system incompatibility. All files controlled through Dyna Hub are physically stored on the M.2 NVMe SSD. Users can select video formats (e.g., MP4/MOV) and monitor real-time recording duration within the Dyna Hub interface.



## 6.4 Storage

### Key Specifications

#### 1. SSD Compatibility

- Install an **SSD** into **C1 drive enclosure** and insert it into Vela Rack SDI SSD slot.
- **Supported Brands** : Samsung, Kingston, Seagate, Great Wall, Cusink, BIWIN, COLORFUL, HereYou, Kingchuxing

#### 2. File system Requirements

- **Supported Formats:** exFAT or Fat32 ( must be on the **first partition** of the SSD).
- **Limitation:** Files exceeding 4GB cannot be copied to Fat32.
- **Recommendation:** Use partitioning tools ( e.g., DiskGenius) to format/ partition SSDs.

#### 3. Critical Warnings

- **No Hot-Swapping:** Always power off the device before inserting/ removing SSD.
- **Data Integrity:** Improper removal may corrupt files or damage hardware.

## 7. Local Video Files

All recorded video files are stored in the Media directory, supporting local playback and deletion. Users can remotely access these files through DynaHub software for online playback or downloading.  
For physical file extraction:

1. Power off Vela Rack SDI before removing the hard drive.
2. Note: The C1 SSD does not support hot-swapping and requires system shutdown prior to removal.



## 7.1 Local Video Playback

To play back locally stored videos:

### 1. Access Media Interface

- Click the playback icon "📺" on the **Monitor Interface**, or navigate to **Menu—>Media** via "☰" in the top-right corner.

### 2. Initiate Playback

- Select the desired video file to start playback. A dedicated NDI|HX video source named "**PLAY**" will be generated simultaneously.

## 7.2 Local Video Deletion

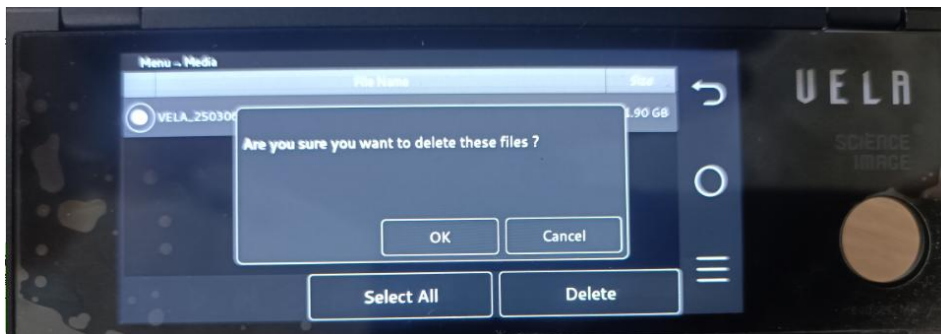
To remove stored video files:

### 1. Select Target File

- Check the circular selector left to the video file in the **Media Interface**.

### 2. Execute Deletion

- Click the **Delete** button to permanently erase the file.



## 7.3 Local Video Export

To export recorded video files from the Media directory:

### Method 1: Physical Drive Extraction

## 1. Power Down System

- Safely shut down the Vela Rack SDI.

## 2. Extract Storage Drive

- Remove the SSD and connect it to a computer via a compatible interface cable.

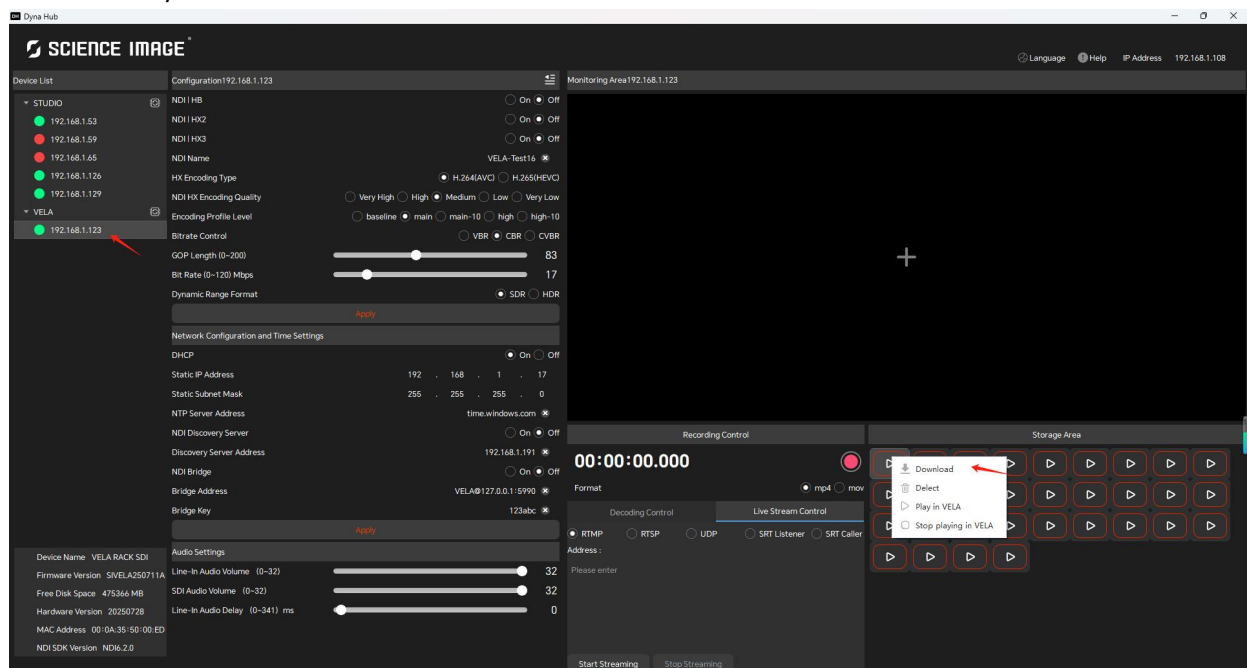
## Method 2: Remote Download via DynaHub

### 1. Initialize Connection

- Launch Dyna Hub software and locate the target device in the device list.

### 2. Download Files

- Identify the target video file in the **Storage Area** and right-click the mouse to access to Download button to transfer to your local machine.



## 7.4 Video Upload to VELA Storage

Dyna Hub supports uploading locally stored videos from your computer to VELA's hard drive via two methods:

### Method 1:

Right-click any empty space in the **Storage Area**> Select **Upload** > Choose file(s) (supports multi-selection)

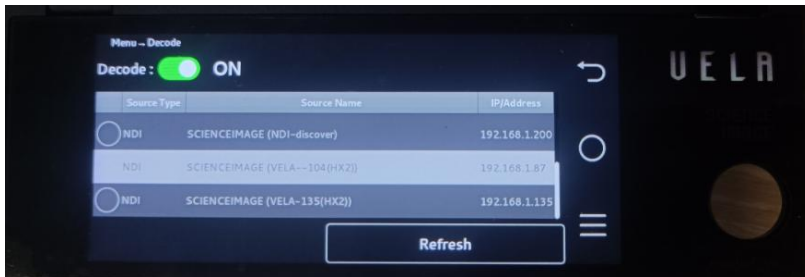
### Method 2:

Drag and drop videos directly into the **Storage Area**

## 7.Decoding

Vela supports decoding of NDI|HX2 and NDI|HX3 streams, with synchronized output to both the TFT screen and external HDMI displays. Users can activate decoding through two methods.

### Method 1: On-Device Decoding via Touchscreen



### 1. Access Decode Interface

- Navigate to **Monitor > Dec** or select **Menu→Decode** from the top-right corner.

### 2. Select Source

- Tap the target NDI source name to initiate decoding.
- Tap **Refresh** to update available sources.

### 3. Terminate Decoding

- Click the slide on the right side of **Decode** to switch it from green ( active ) to gray ( inactive ).

## Method 2: Remote Decoding via DynaHub

### 1. Establish Connection

- Launch **DynaHub** and select the corresponding device IP in the **Device List**.

### 2. Enter Decode Control

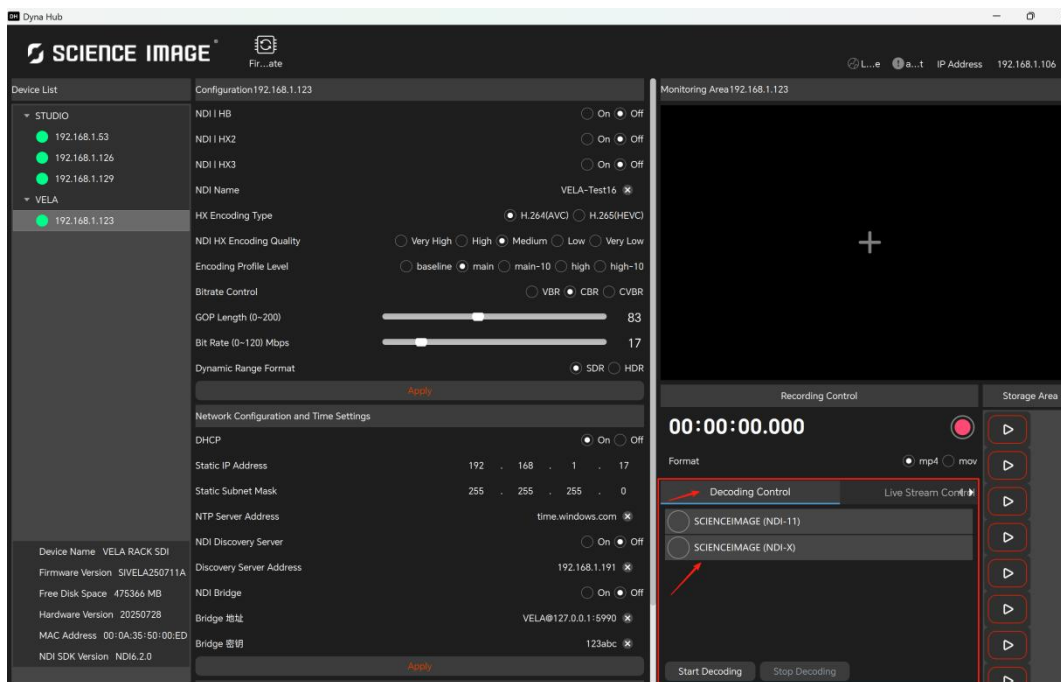
- Click the **Decoding Control** module ( as shown in the figure below ).

### 3. Configure Stream

- Choose the desired NDI source from the source list.

### 4. Activate Decoding

- Click **Start Decoding** to start decoding.



## 9. Firmware Upgrade

Vela Rack SDI latest firmware download address: <https://www.science-image.com/support/download>

### 9.1 Firmware Upgrade via DynaHub

#### Pre-Upgrade Preparation

##### 1. Install DynaHub

- Download and install the latest DynaHub software from official sources.

##### 2. Network Validation

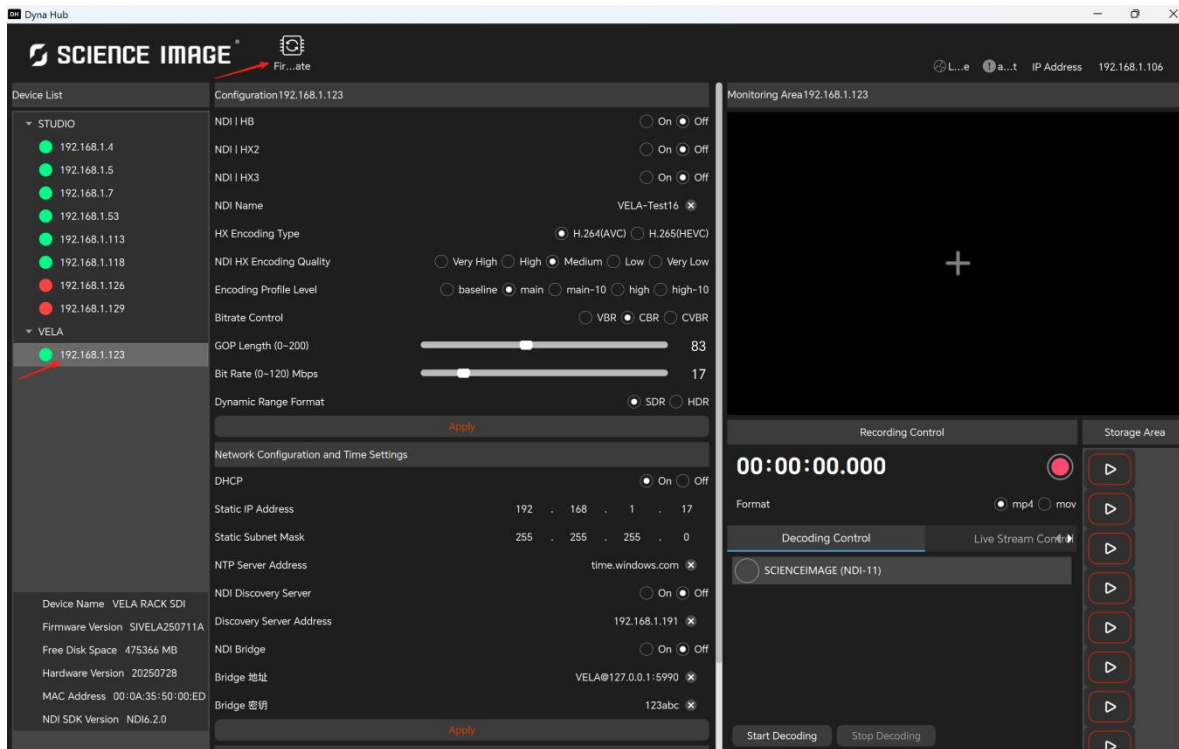
- Ensure all target devices are on the same subnet with stable connectivity.

#### Upgrade Procedure

- Launch **DynaHub** and select the target Vela devices for upgrade from the **Device List**; multiple selection is supported.
- Click **Firmware Update**
- Select the target firmware file; the upgrade process completes in 3-5 minutes.

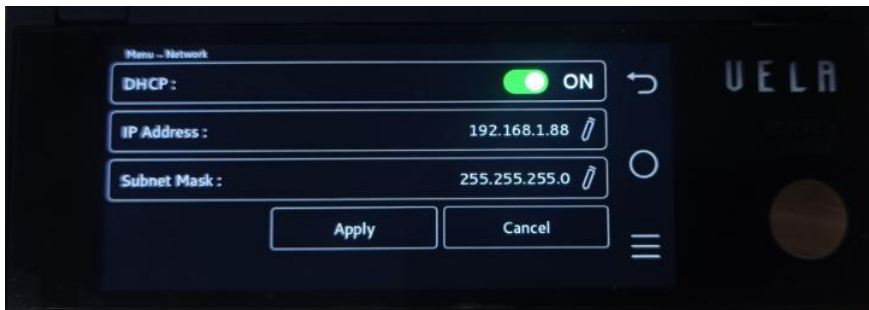
Notes: 1. The device will restart automatically after the completion of upgrading.

- Do not power cycle devices or any other operation during this phase.



## 10. Network Settings

Vela supports two modes: DHCP and static IP. When there is no router in the network, Vela will generate an IP address of 169.254.X.Y by default in DHCP mode.



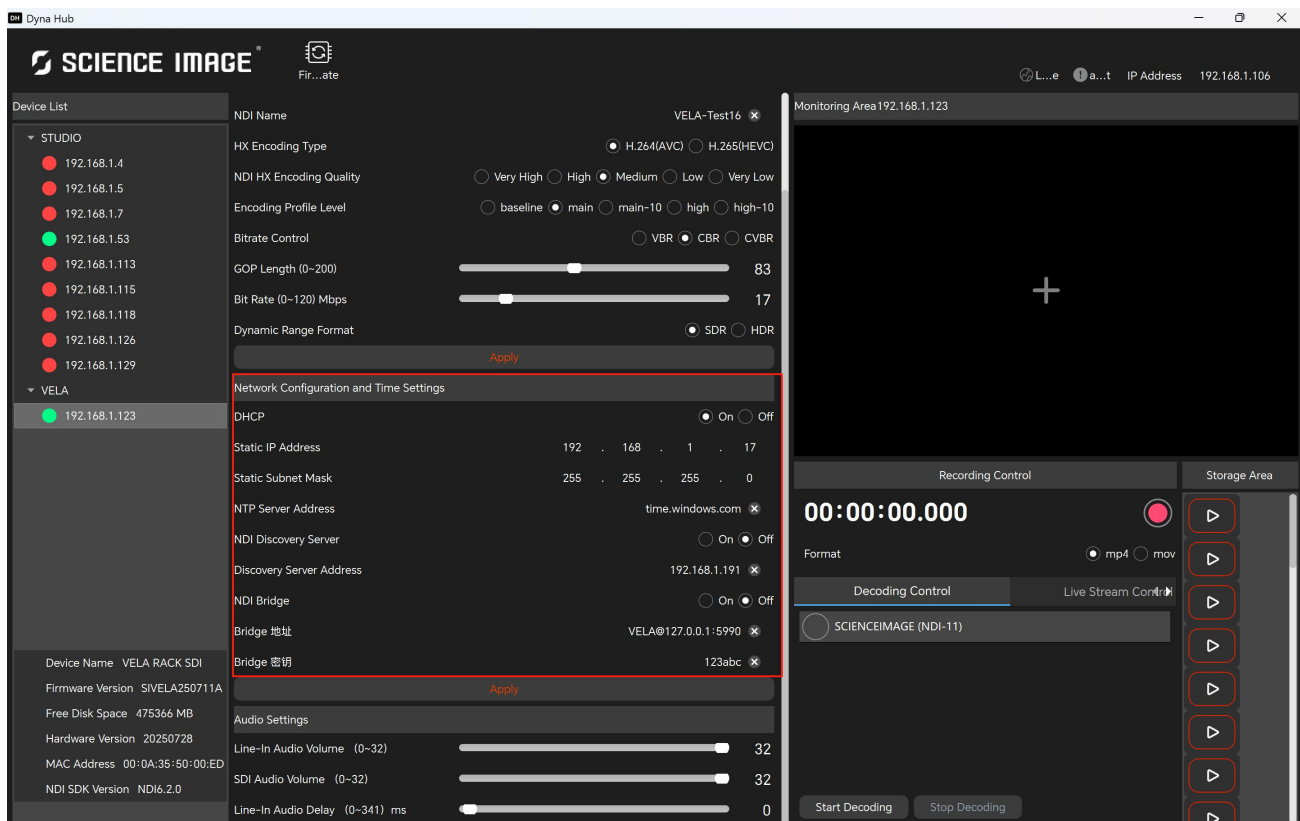
### 10.1 DHCP Mode Configuration Procedure

1. Navigate to **Menu**→ **Network** on the TFT touchscreen.
  2. Click the slider on the right side of **DHCP** to turn it into the active ( green ) position.
  3. Click **Apply**, confirm with **OK** in the dialog.
- The device will reboot automatically to take effect all the settings.

### 10.2 Static IP Configuration Procedure

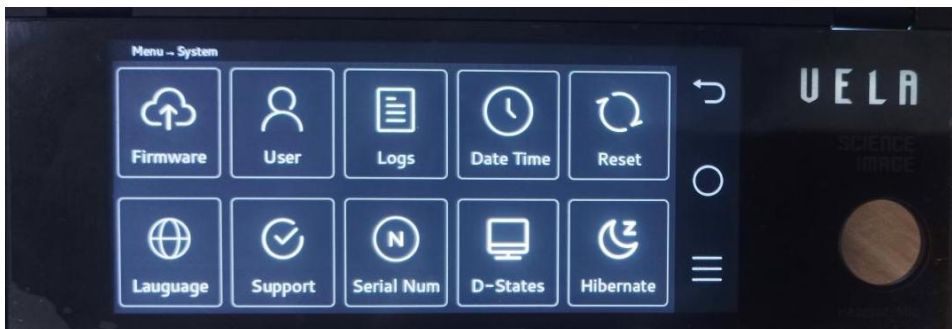
1. Click the slider on the right side of **DHCP** to turn it into the inactive ( gray ) position.
  2. Input correct **IP Address** and **Subnet Mask**.
  3. Click **Apply**, confirm with **OK** in the dialog.
- The device will reboot automatically to take effect all the settings.

- Configure settings via Dyna Hub at the target location shown in the diagram below; click '**Apply**' to activate changes.



## 11. System Settings

In the system interface, users can check the firmware version, set time synchronization and NTP server, restart the device, etc.



### 11.1 Device Restart and Restore Default Parameters

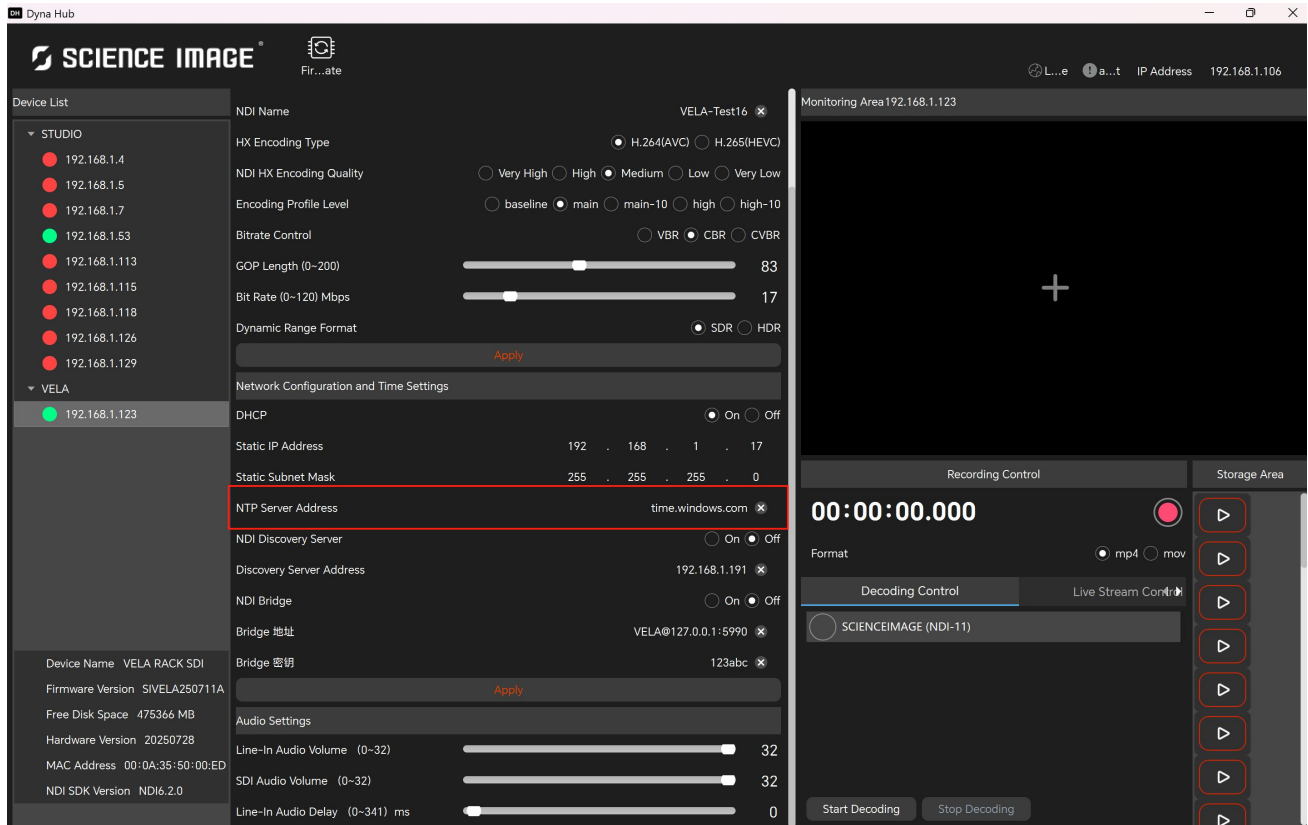
- Navigate to Menu—>System—>Reset, tap Device Restart and confirm with OK in the dialog to restart Vela Rack SDI.
- Tap **Default Settings** and confirm with **OK**, then Vela RACK SDI will reboot with default parameters reactivated.

Note: The reboot mechanism on Dyna Hub differs from Vela's. Dyna Hub can remotely command hardware-level reboots of Vela devices, which require longer waiting periods.

## 11.2 Configuration of NTP Server and System Time

Navigate to **Menu—>System—>Date Time** to configure **System Time**, **Network Time Sync** and **NTP Server**.

Configure settings via Dyna Hub at the target location shown in the diagram below; click '**Apply**' to activate changes.

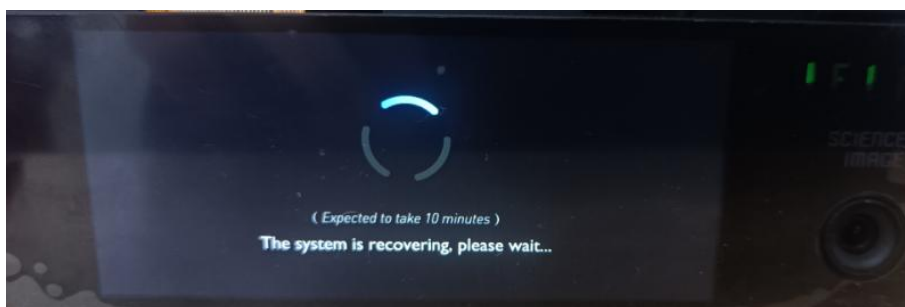


## 12. Factory Reset

To recover Vela Rack SDI from critical failure ( crashes/ freezes ):

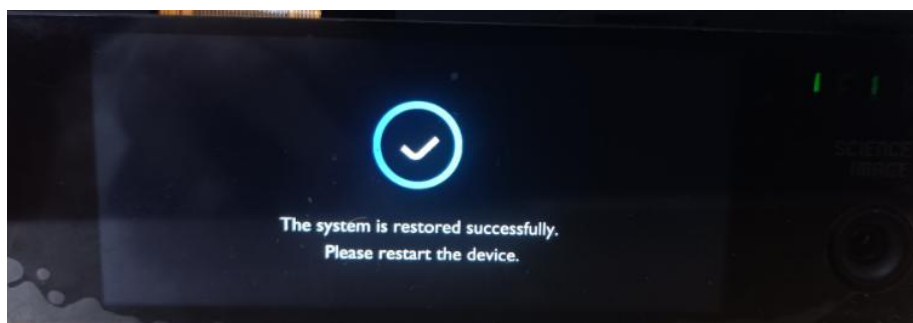
### Physical Reset Procedure

1. Gently press and release the TFT screen panel to unlatch it.
2. Prepare a ejector needle, locate the pinhole above the **SSD slot**, insert the ejector needle and maintain pressure.
3. Connect power while holding the ejector, release the needle after 3 seconds, wait for the prompt of " The system is recovering, please wait..."



4. After about 10 minutes, there will be a prompt "The system is restored successfully. Please restart the

device.”



5. At this time, power Vela off and on again. After Vela starts up, please go to “<https://www.science-image.com/support/download>” to download the latest Vela firmware for upgrading.

### 13. SSD Usage Guidelines

1. It is recommended to use **Kingston** or **Samsung** NVMe SSD. Format the SSD to **exFAT** file system before use, and verify the partition integrity during formatting.
2. Prior to format the SSD, test the drive via computer or other tools to ensure normal functionality.

#### SSD compatibility testing result list

##### Recommended SSD for Recording 4K or High Bit Rate Videos

	Brand	Type	Capacity
1	Kingston	NV2 PCIe 4.0 NVMe M.2	256GB
2	Kingston	NV3 PCIe 4.0 NVMe M.2	2TB
3	Samsung	V-NAND SSD 980 NVMe M.2	500GB
4	Samsung	V-NAND SSD 980 NVMe M.2	250GB
5	Samsung	V-NAND SSD 990 Pro NVMe M.2	2TB

### Recommended SSD for Recording 1080P and Low Bit Rate Videos

	Brand	Type	Capacity
1	Kingston	NV2 PCIe 4.0 NVMe M.2	256GB
2	Kingston	NV3 PCIe 4.0 NVMe M.2	2TB
3	Samsung	V-NAND SSD 980 NVMe M.2	500GB
4	Colorful	CN600 PLUS PCIE 3.0 NVME M.2	512G
5	Kingchuxing	Kingchuxing M.2 NVME 256GB	256GB
6	Barracuda	BarraCuda 530 SSD PCIe G4 x4 NVle	1024GB
7	QUANXING	Quanxing NVMe SSD M.2 2280	512GB
8	Great Wall	GW330 PCIe 3.0 NVe m.2	128GB
9	Fanxiang	Fanxiang 8500Pro ssd m2pcie3	256GB
10	XISHUO	XISHUO 8500 nvme PCIe Gen 3x4	128GB
11	CoolFish	Coolfish T3	256GB
12	Lenovo	SL700	256GB

### Incompatible SSD Brand

	Brand	Type	Capacity
1	Sormarbulist	Sommambulist M.2 NVME SSD PcleGen3X4	256GB
2	WesternDigital	WD Blue SN5000 NVe SSD	1TB

### SSD Formatting Via DiskGenius

#### 1. Download DiskGenius (English Version)

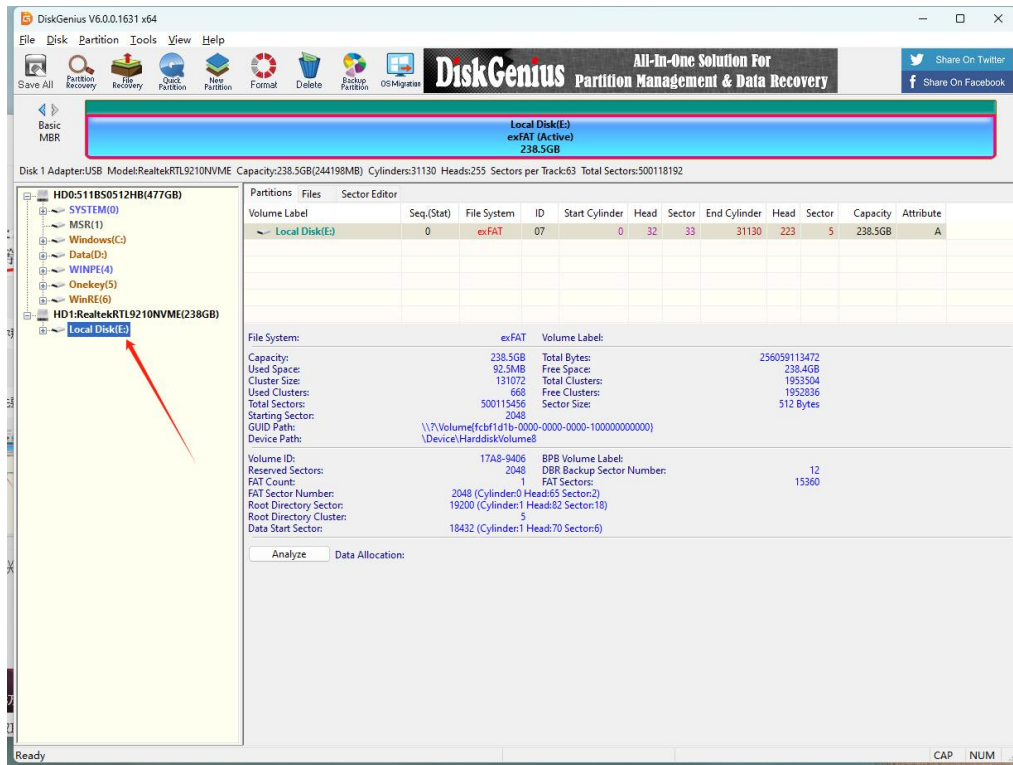
Official download link: <https://www.diskgenius.com/download.php>

*Note:* The free version provides essential formatting and partition management features without requiring payment.

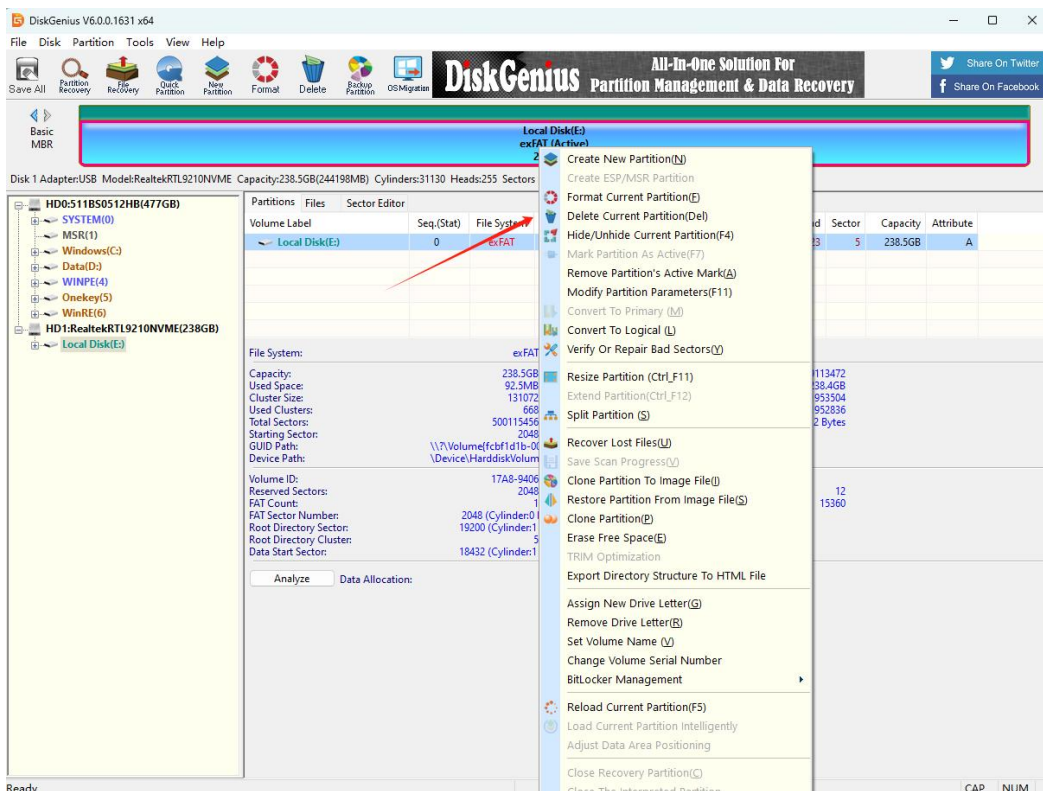
## Launch DiskGenius and Select Target Disk

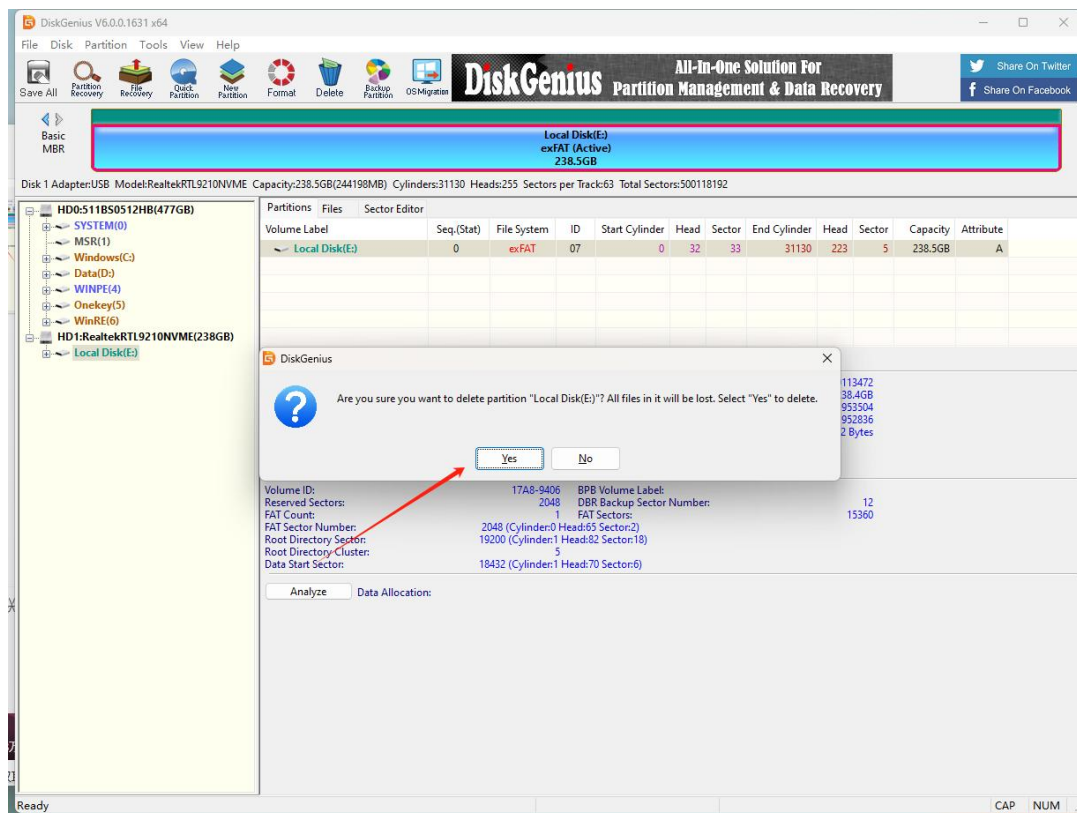
### 1, After installation, open DiskGenius.

In the software interface, locate and **right-click** the target disk (identified by capacity or partition labels) to begin formatting

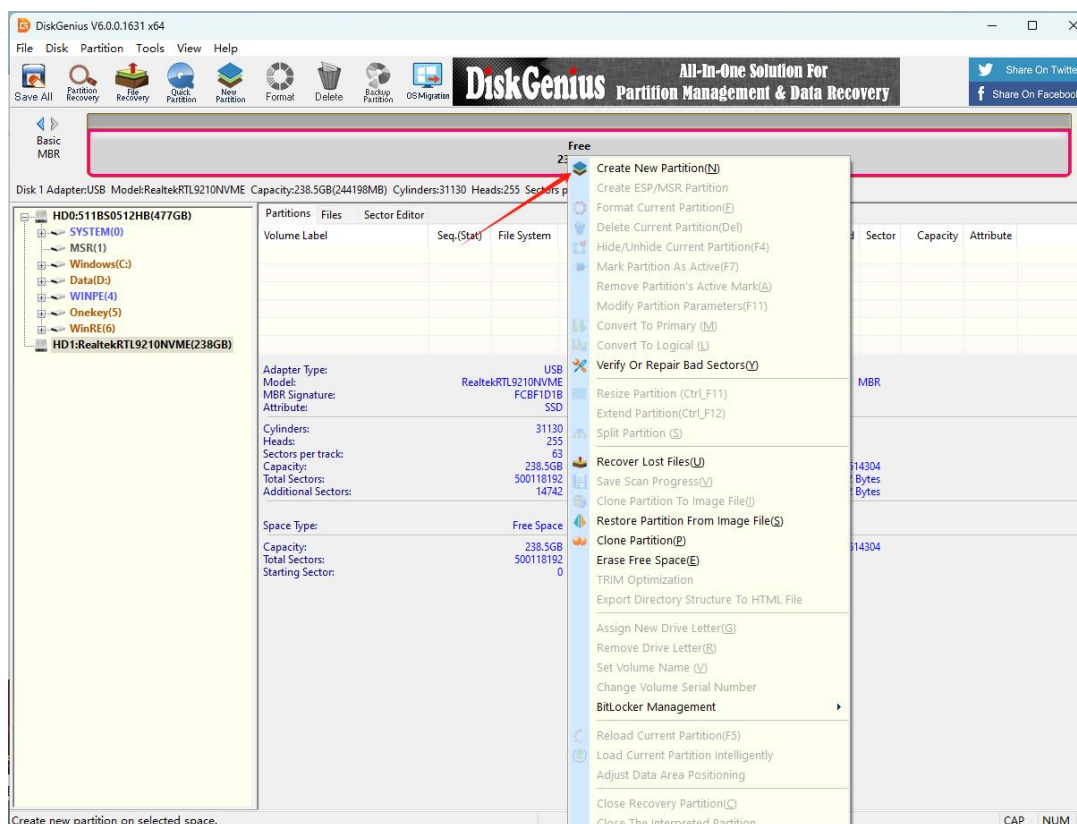


### 2. Right-click the blue area and select "Delete Current Partition"

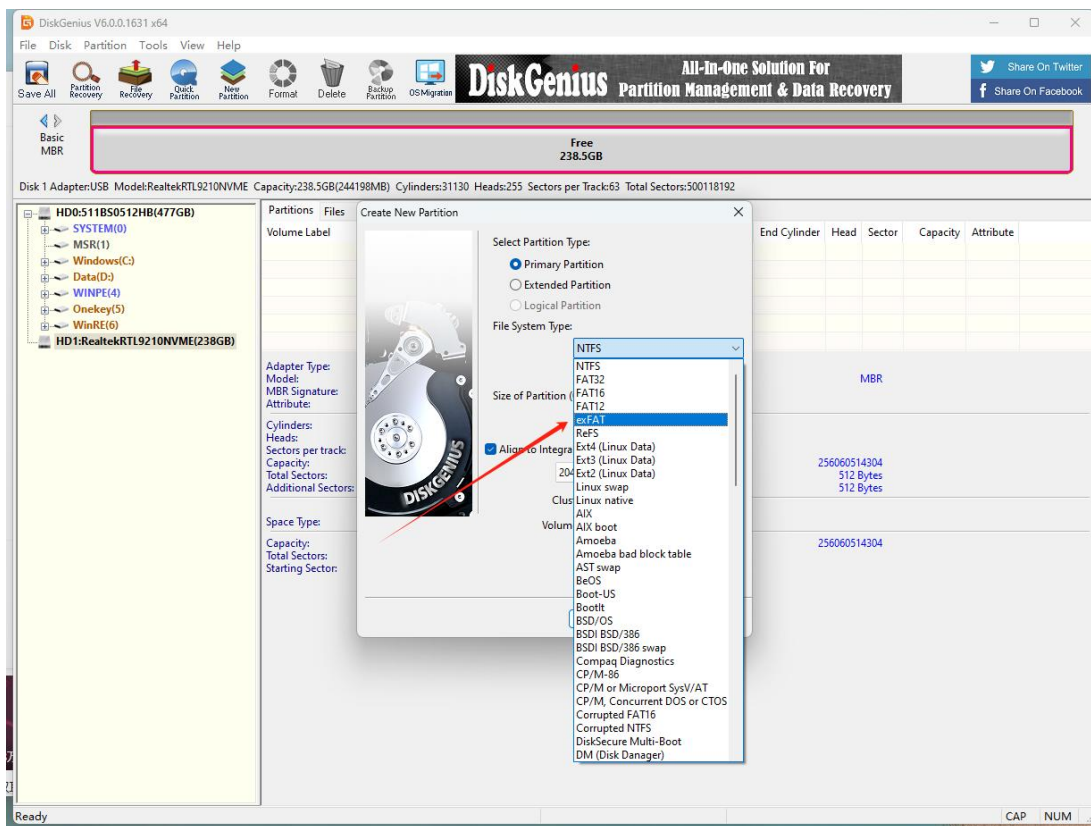




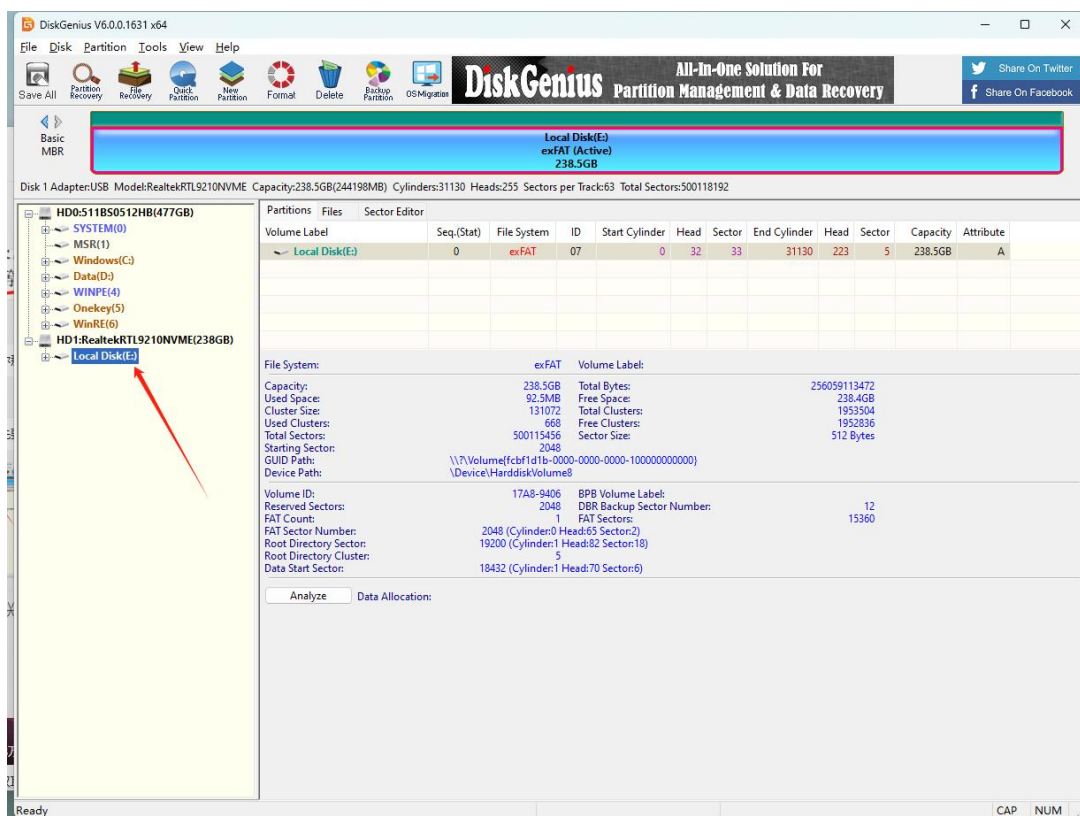
3. Right-click the unallocated space (gray/black area in DiskGenius) → Select "Create New Partition"

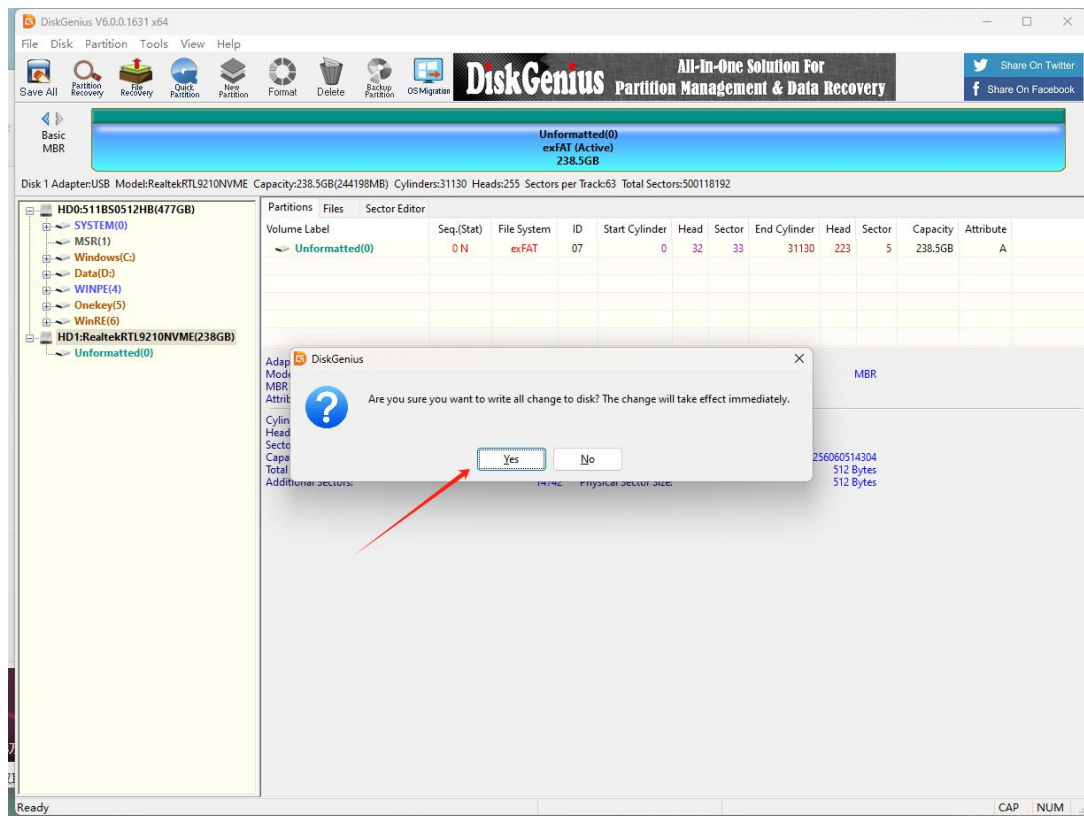


- 4, Select the primary disk partition, choose "exFAT" as the file system type, set the new partition size to the maximum available space, and keep all other settings as default.



- 5, Click "Save All" and wait for the process to complete.





## SSD Formatting Via Windows

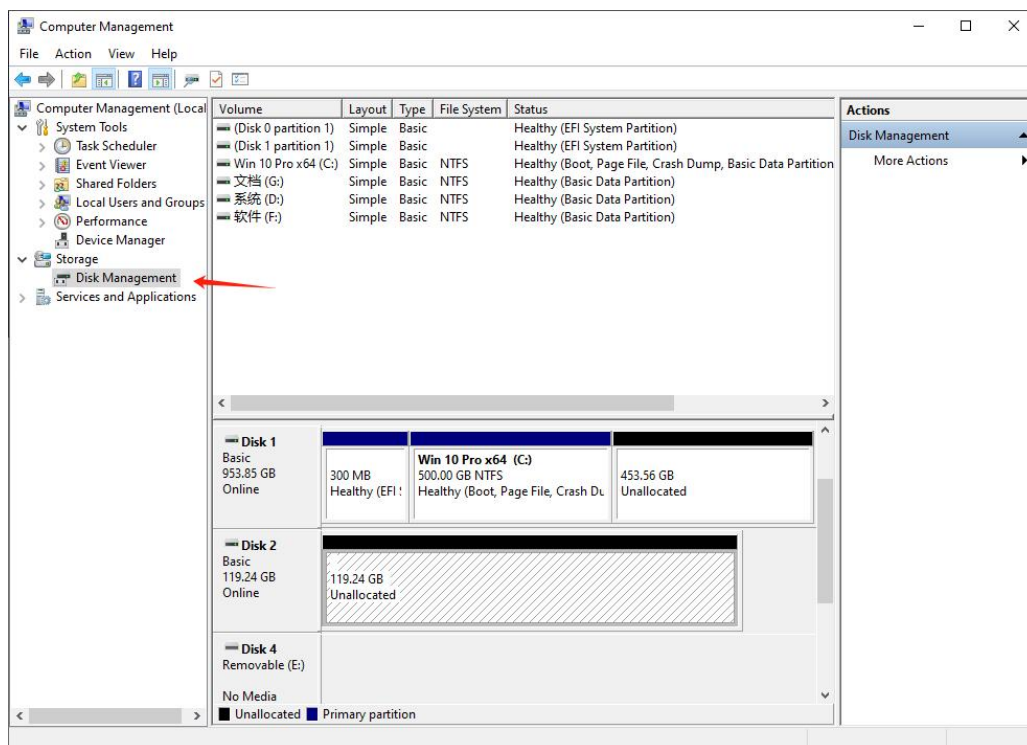
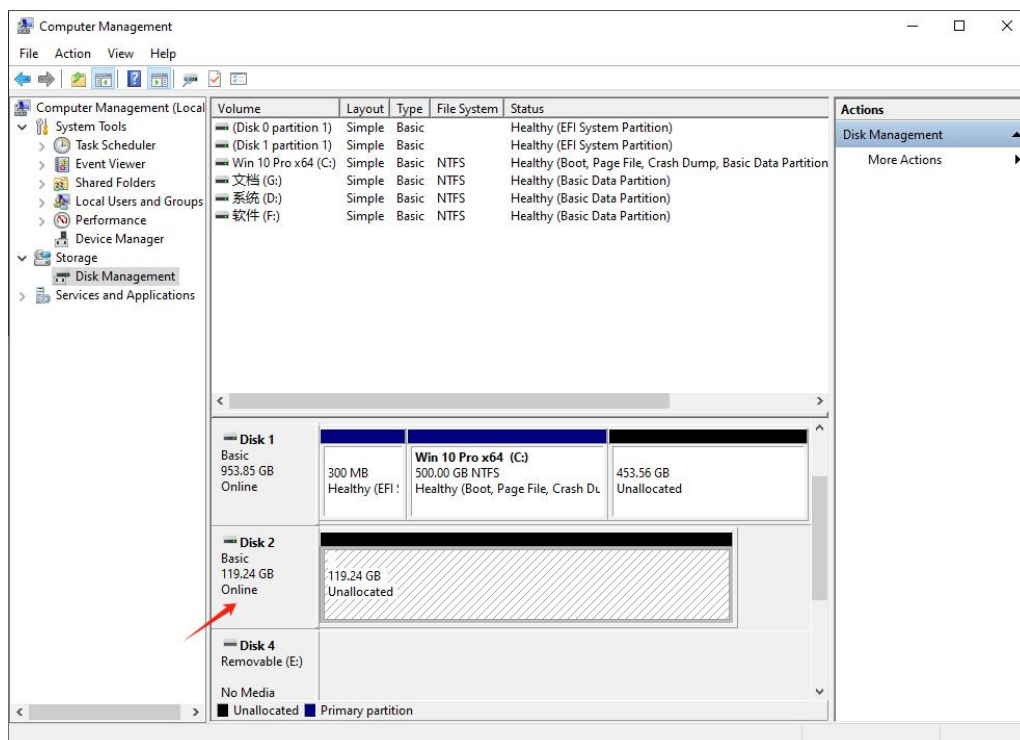
Install the SSD into C1 enclosure, connect C1 enclosure to computer with a USB-C cable.

The following guide applies to brand-new unformatted SSD. If using a pre-owned drive, some steps may differ. The end goal remains to format the file system to exFAT.

Step 1: Right-click 'This PC' / 'My Computer' and select 'Manage'.

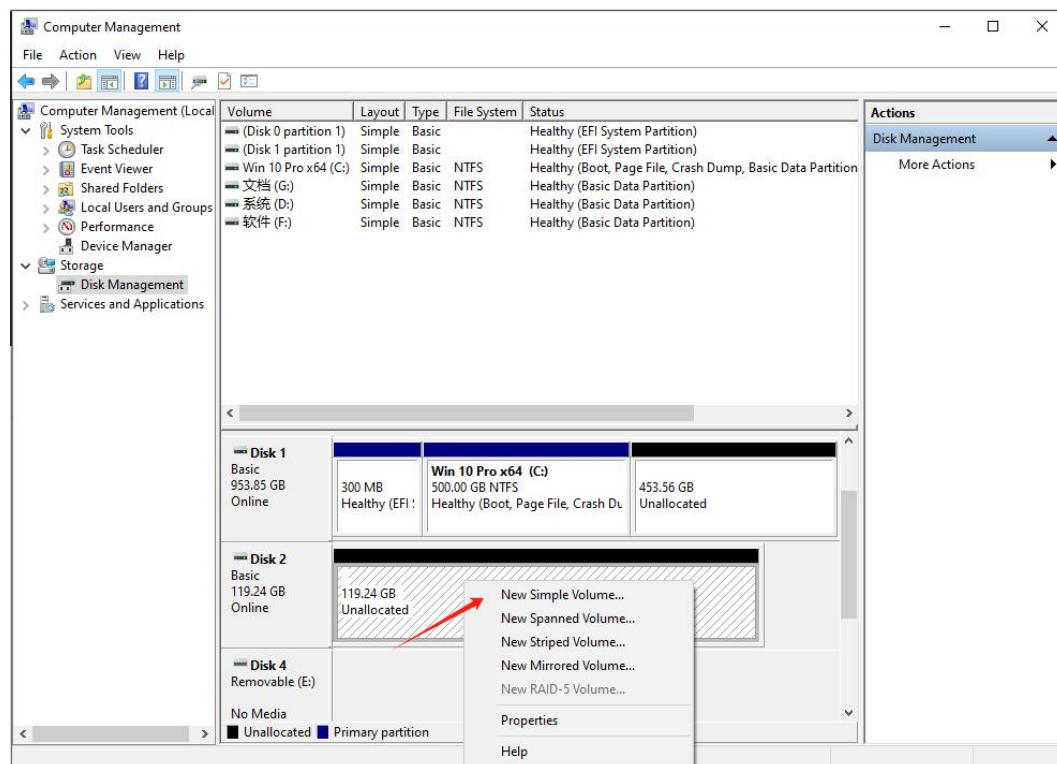


Step 2: Click 'Disk Management' and locate the target drive for formatting.

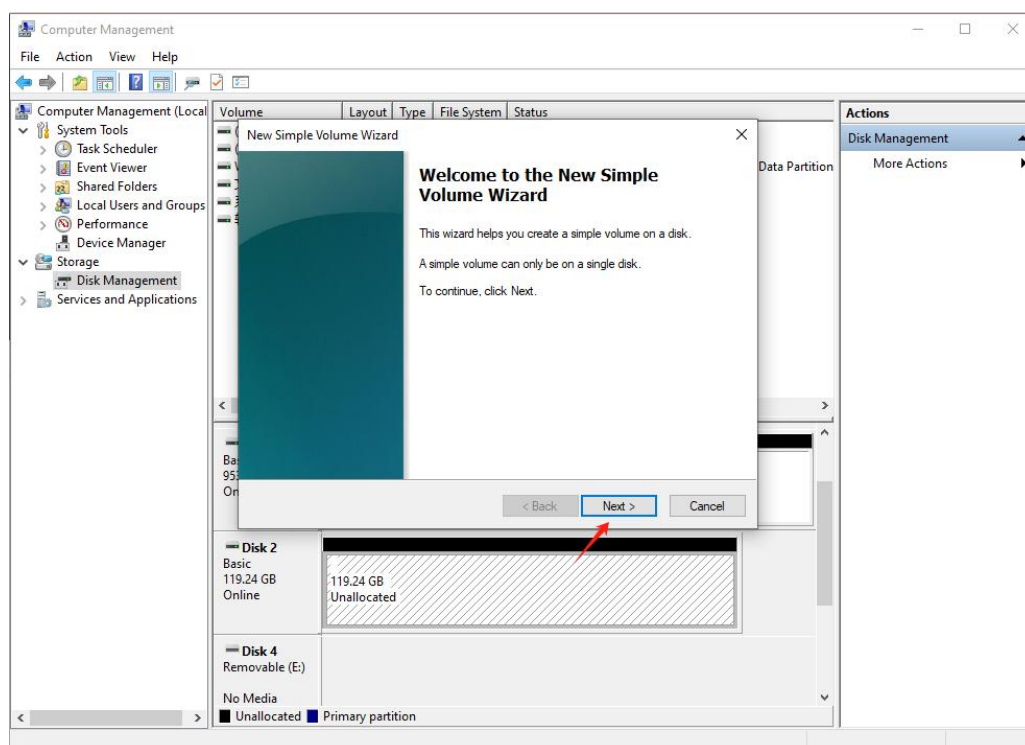


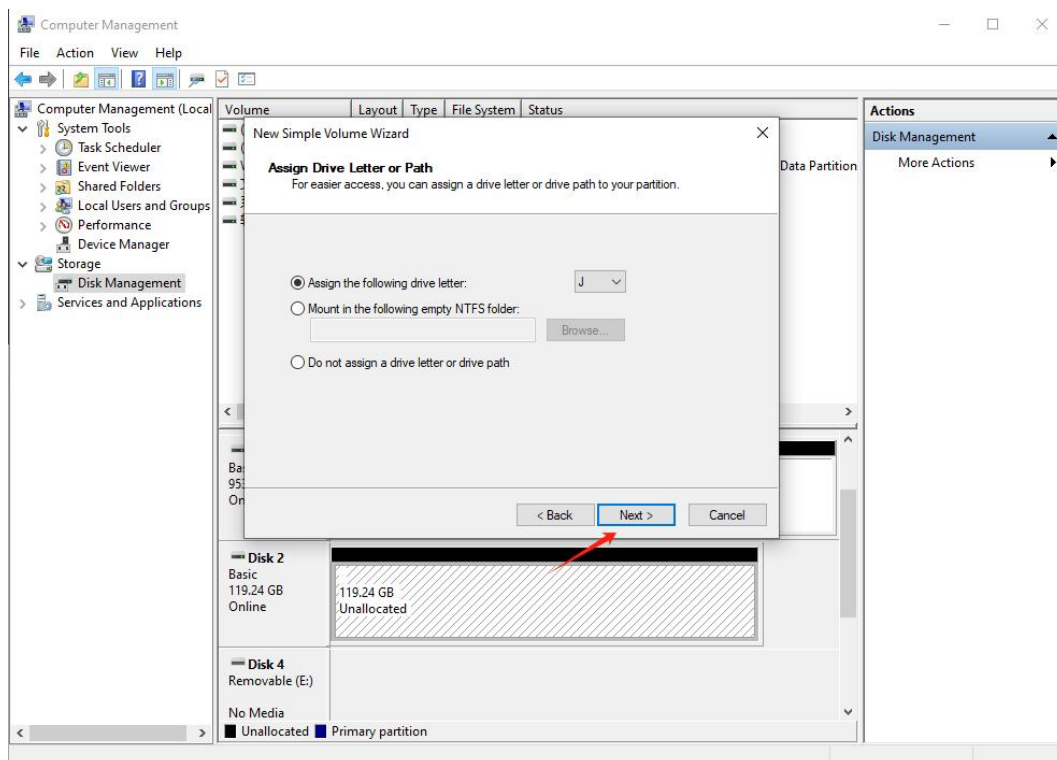
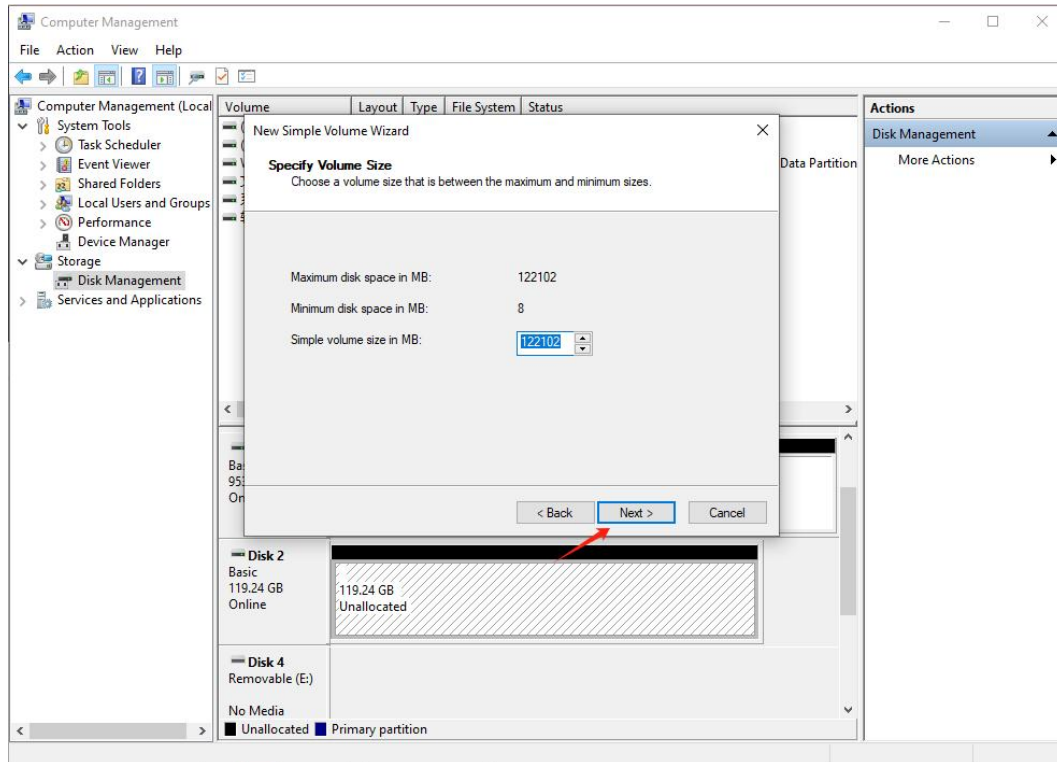
Step 3: Right-click and select 'Initialize Disk'. If the new drive is already initialized (and recognized by the computer), skip this step.

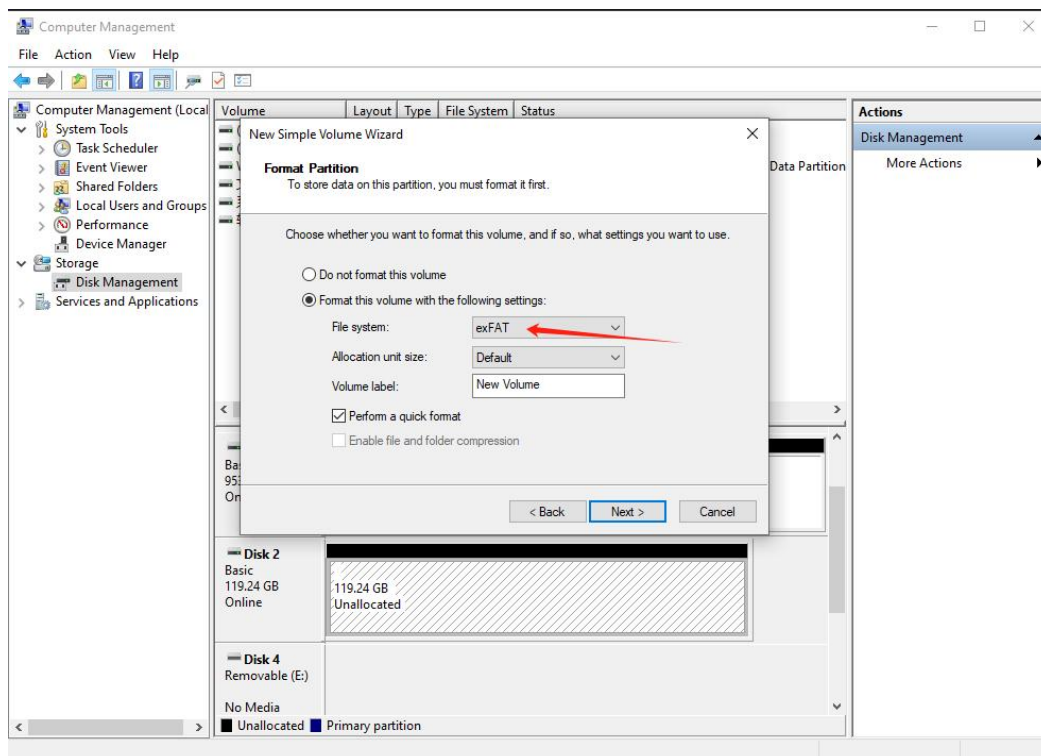
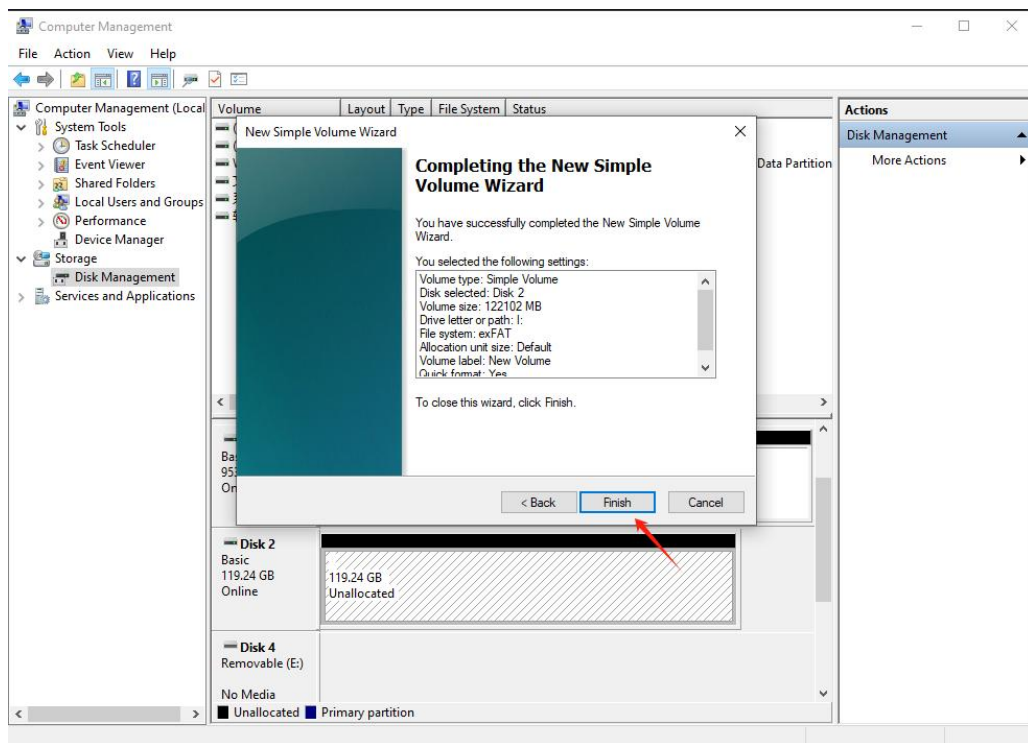
Step 4: Create New Simple Volume



Step 5: Follow the wizard to configure the simple volume size and drive letter. Select exFAT as the file system; leave allocation unit size and volume label at default values.







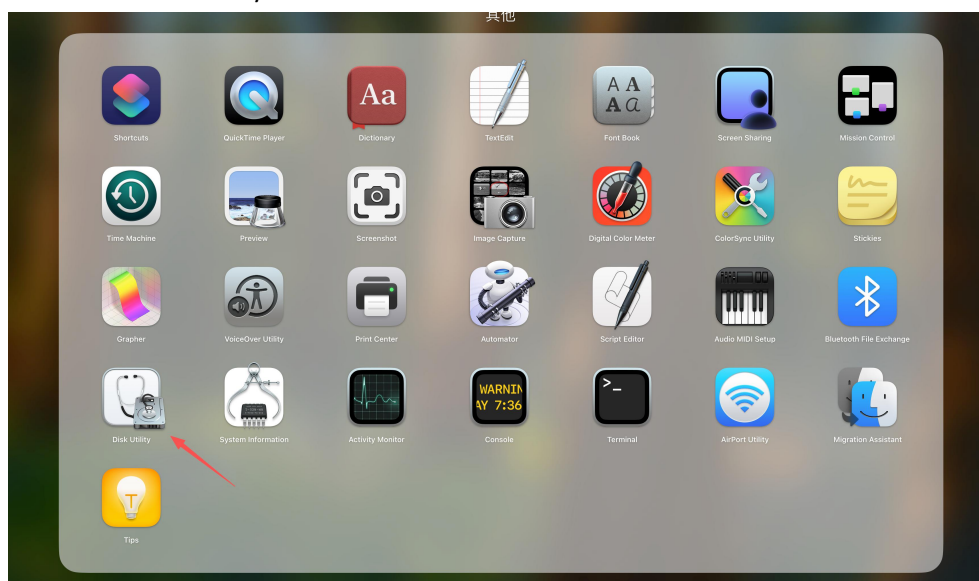
Finally, wait for the process to complete — the drive will be ready for use.



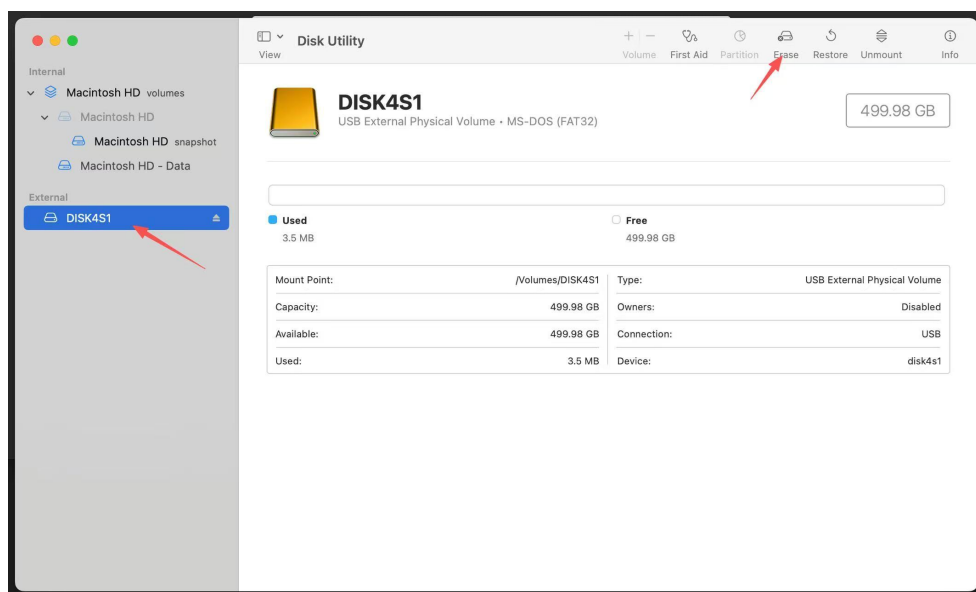
## SSD Formatting Via Mac

Insert the prepared hard drive into the C1 SSD enclosure. Prepare a USB-to-Type-C data cable and connect the enclosure to your computer. This tutorial is for a newly purchased, unpartitioned hard drive. If you're using an old hard drive, the process may differ slightly, but the ultimate goal is to reformat the file system to exFAT/ FAT32.

1. Find the Disk Utility tool included with macOS.



2. Select the hard drive to format, Click 'Erase' in the top-right corner



3. Select ExFAT/ FAT32 format, then click 'Erase'

