



Wafian HR-2-DS

Setup and User Guide

1.4.0

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CAUTION: Safety Instructions: Wafian HR-2-DS

Use the following safety guidelines to help ensure your own personal safety and to help protect your HR-2-DS and working environment from potential damage.

SAFETY: General

To help prevent electric shock, plug the HR-2-DS and device power cables into properly grounded electrical outlets. These cables are equipped with 3-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.

To help avoid the potential hazard of electric shock, do not use your HR-2-DS during an electrical storm.

To help avoid the potential hazard of electric shock, do not connect or disconnect any cables or perform maintenance or reconfiguration of this product during an electrical storm.

Before you clean your HR-2-DS, disconnect the HR-2-DS from the electrical outlet. Clean your HR-2-DS with a soft cloth dampened with water. Do not use liquid or aerosol cleaners, which may contain flammable substances.

To help avoid possible damage to the system board, wait 5 seconds after turning off the HR-2-DS before disconnecting a device from it.

To avoid shorting out your HR-2-DS when disconnecting a network cable, first unplug the cable from the network adapter on the back of your HR-2-DS, and then from the network jack. When reconnecting a network cable to your HR-2-DS, first plug the cable into the network jack, and then into the network adapter.

To help protect your HR-2-DS from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

Ensure that nothing rests on your HR-2-DS's cables and that the cables are not located where they can be stepped on or tripped over.

Do not push any objects into the openings of your HR-2-DS. Doing so can cause fire or electric shock by shorting out interior components.

Keep your HR-2-DS away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath your HR-2-DS; do not place your HR-2-DS in a closed-in wall unit or on a bed, sofa, or rug.

SAFETY: When Using Your HR-2-DS


As you use your HR-2-DS, observe the following safe-handling guidelines.

 **CAUTION: Do not operate your HR-2-DS with any cover(s) removed.**

 **CAUTION: Do not attempt to service the HR-2-DS yourself, unless you are a trained service technician or as explicitly approved and instructed by Wafian.**

Refer all servicing to qualified servicing personnel. Servicing is required when the HR-2-DS has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects

have fallen into the HR-2-DS, the HR-2-DS has been exposed to rain, moisture, extreme temperatures, does not operate normally, or has been dropped.

 **NOTICE:** To help avoid possible damage to the system board, wait 5 seconds after turning off the HR-2-DS before disconnecting a device from the HR-2-DS.

In addition, take note of these safety guidelines when appropriate:

*When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

*Handle components with care. Do not touch the components or contacts on a card.

SAFETY: Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your HR-2-DS. To prevent static damage, discharge static electricity from your body before you touch any of your HR-2-DS's electronic components. You can do so by touching an unpainted metal surface on the HR-2-DS chassis.

 **CAUTION:** Any changes or modifications not expressly approved in this manual could void your warranty.

WAFIAN HR-2-DS

Thank You for choosing Wafian[®]. This document will help you setup and use the Wafian HR-2-DS. For additional information please visit us at www.wafian.com/Support.htm.

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1. Introduction

Congratulations, you now have one of the industry's most powerful High Definition 3D production and post-production tools available. The Wafian HR-2-DS is a direct-to-disk high definition stereoscopic video disk recorder that offers easy-to-use features in order to make the stereo video acquisition and playback process seamless. Offering HD-SDI inputs and HD-SDI and component outputs, the HR-2-DS can record Standard Definition or High Definition 4:4:4 10-bit video for over 17 hours. For Stereo workflows, the HR-2-DS records two streams of full 1920x1080 4:2:2 video in stereo, or a single stream of 4:4:4 video in resolutions up to 2K in a variety of frame rates. The HR-2-DS records multiple channels of embedded and EBU/AES digital audio. And for optimal communication and compatibility with storage devices, the HR-2-DS offers Ethernet, IEEE 1394, USB2 and optional fibre channel ports for data sharing, as well as component, HD-SDI, DVI and VGA outputs for monitoring.

With the HR-2-DS recorder, your video is recorded in one of the most efficient and highest quality formats available. The HR-2-DS's easy operation allows you view the footage as it is recorded and to immediately review the footage via its touch-screen interface. For information not covered within this manual, please visit www.wafian.com/Support.htm or contact Wafian Customer Support at support@wafian.com.

The hardware and software features and specifications may change, please contact sales@wafian.com if you have a specific requirement.

2. In the Box

Please verify that you have received the following components along with your HR-2-DS recorder.

The Wafian HR-2-DS Dual-Stream HD-SDI HD Video Recorder.



- Mini BNC-to-BNC cable for Dual-Stream HD-SDI
- Component Video Output and AES/EBU Audio Input & Output Breakout Cable



Accessory Pack with:

- Power Cable
- VGA Loop back Cable
- Users Guide

3. Connections

With the power disconnected:

- Connect the short VGA loopback cable from the graphics card DVI output to the VGA connector on the back panel using a DVI to VGA adaptor that is included with your HR-2-DS. This connection activates the front LCD monitor.
- To record from an HDSDI source, connect the Dual-Stream HDSDI input cable to the top two BNC connectors on the capture card. The bottom two BNC connectors are HDSDI output ports.



* Current hardware specifications may differ from image

4. Power and the Front Panel

Make sure the power cable is plugged in and the power switch on the back of the unit is in the on position. Press the Power button inside the lockable plate next to the LCD to turn on the unit.

To turn off the system, press and hold the same Power button next to the LCD for five seconds.

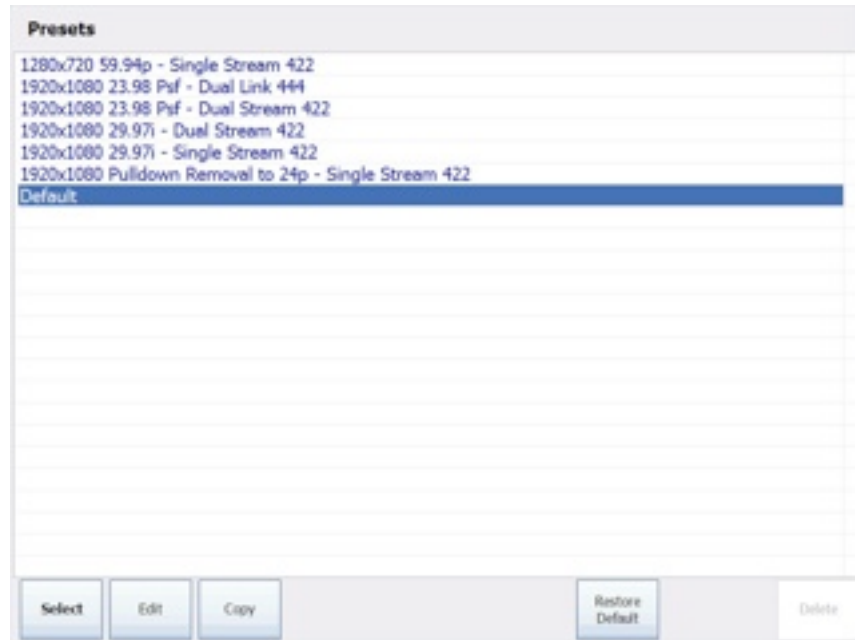
The top red button above the power switch resets the system. The bottom red button locks/unlocks keyboard functionality.

The blue buttons adjacent to the touch-screen LCD allow you to modify your LCD settings.



5. Settings

Before recording, the system must be setup to match your desired video settings. Access the Presets window to select preset settings, or to specify your own settings. To do so click on the media path and record settings link on the record mode window. This will open the Presets dialog. Note that users may select the Keyboard button to type in text within any of the available fields within the Presets.



Presets dialog

Within the Presets window chose any of the available presets by selecting it and pressing Select. You may also choose to copy a preset and then customize its configuration further by selecting the new preset and pressing Edit. To restore the Default preset back to its original (out of the box) state, simply press Restore Default. For instructions on creating presets for recording in stereo, please see the Video Tab section on this guide.

Once you have selected to edit an existing preset, or to create a new one, the Edit Preset window will display.

Recorder tab

Within the Recorder tab you may select to record .AVI or .MOV files. The wrapper format you select should be determined by your workflow, although most video editing tools understand both wrapper formats. Note that .MOV format must be selected for recording in stereo. To play back your video clips on a computer, you will need to have a CineForm Intermediate decoder installed on that system. These free decoders are available at www.wafian.com/Support.htm.

Within the Recorder tab the path for recording clips to (within your recorder or onto external storage) can be specified. Likewise, custom name rules can be specified for the clips that you will record. Clip filenames are automatically built from a name rule. The default name rule will create clips named

Scene-1-Take-###.mov in the Scene-1 folder under the Media Path. Users may specify their own recording path, and create their own name rules using the following guidelines.

Name Rules

Name rules are a flexible and powerful way for the HR-2-DS to create unique clip names without constant user interaction.

When starting to record, the HR-2-DS creates the clip name from the text in the Name Rule field and replaces variables (text enclosed in curly brackets, {variable}) with their current value. Variables allow you to provide meaningful clip names, specify sub-directories, and uniquely identify clips. If a clip name is not unique, the HR-2-DS will increment the right most numeric field or append "-001" to the end of the name.

Sub-directories

Name rules can specify sub-directories within the media directory for clips by naming the directory followed by the backslash (\) character. The sub-directory will automatically be created if it does not exist.

Variables

You can use the following variable names with the HR-2-DS:

{date} - The current system date (YYYY-MM-DD)
{datetime} - The current system date and time (YYYY-MM-DD_HH-MM-SS)
{extension} - AVI
{scene} - The value of the Scene field
{serialnumber} - This unit's serial number
{take} - The value of the Take field
{time} - The current system time (HH-MM-SS)
{recordertakenumber} – The number of times this particular recorder has started recording

Examples:

WF-{serialnumber}-{datetime}.{extension}
{Scene}\{Scene}-{Take}-001.{extension}

Legal characters

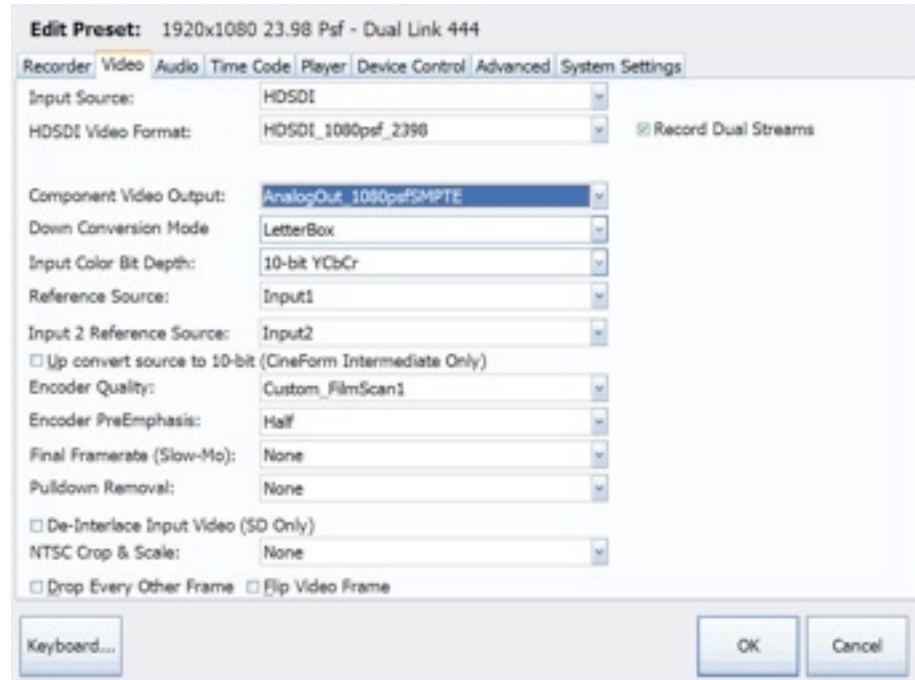
Name Rules should not include characters that are invalid in filenames (<> \ / : ? * | ").

Freeze Frame

Within the Recorder tab of the presets you can specify the path and name rules to apply in recording freeze frames. The same guidelines that apply for creating clip name rules, apply for creating freeze frame name rules. Please see the Recording section of this document for details regarding freeze frame capturing. Active in single stream mode only.

Video tab

It is important to note that your recorder's audio and video settings must match those of your input source.

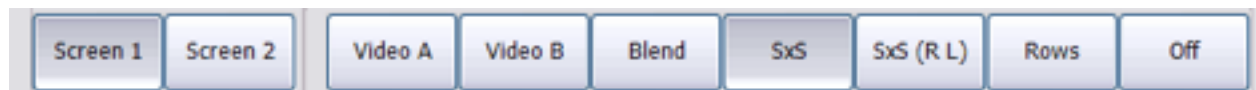


HDSDI Video Format

The selection of this field determines the mode of input for the video format coming into the HR-2-DS (the board's frame buffer geometry or RAM on the input board). Users may select Standard Definition or High Definition settings within this field.

Record Dual Streams

Selecting the "Record Dual Stream" checkbox activates stereo recording. When selected, the Confidence view and External view control buttons will display on the video display while in preview, and record mode. This will allow you to monitor each video stream individually or both of them simultaneously (blended).



Component Video Output

This setting controls the resolution and frame rate on the component video outputs of the breakout cable.

Down Conversion Mode

When recording HD Video, you can set the Component Video Output field to the appropriate SD resolution to monitor the video with a SD component monitor.

The down conversion settings control how the HD image is scaled to SD as follows:

Setting	Description
LetterBox	Scale frame to fit screen, maintains aspect ratio (black borders).
Crop	Crop into frame, do not scale.
Anamorphic	Stretch frame to fill screen, does not maintain aspect ratio.

The following HD → SD conversions are supported:

HDSDI Video Input	Down-converted SD Output
720p 5994	NTSC (480i)
1080i 5994	NTSC (480i)
720p 50	PAL (576)
1080i 50	PAL (576)
1080p 25	PAL (576)
1080 25psf	PAL (576)

Input Color Bit Depth

Within the Input Color Bit Depth field users select 8 bit or 10 bit, RGB 4:4:4 or YUV 4:2:2 color depth for recording.

Reference Source fields

Option	Description
External	Use Ref-In connection on the breakout cable for reference
Input1	Use HDSDI Input A signal reference
Input2	Use HDSDI Input B signal reference
FreeRun	Do not use a reference source

In general the operator should select Input1 for the Reference Source field, and Input2 for the Input 2 Reference Source field when recording in stereo. When linking one HR-2-DS to another HR-2-DS, be sure to set the reference source of the second HR-2-DS to Input1 and Input2 respectively.

Up convert 8-bit source to 10-bit (Cineform Intermediate Only)

Users select this check box only when using a camera that outputs an 8 bit image. When selected, the HR-2-DS compresses 8 bit video with the 10 bit video codec in order to increase precision and preserve quality. This mode increases the bit rate and disk consumption.

Encoder Quality

Settings within this field determine the bit rate of each recorded clip. The default and the recommended setting is High. Custom_ChromaKey is used to preserve chroma information around the edges of what is being recorded, and is the best setting when recording footage that will be used for green screening.

Note that lowering the encoding quality will allow you to record continuously for longer durations. Please visit www.cineform.com for more detailed information regarding these settings.

Encoder PreEmphasis

This field controls encoder noise roll-off. The different selectable values can help reduce your bit rate by telling the HR-2-DS's encoder to roll off more or less noise.

Option	Result
Half	Default – Normal setting for a good balance between noise and bit rate
Third	More noise but still high quality
Quarter	More noise but less quality than Third
Fifth	More noise but less quality than Quarter
Sixth	More noise but less quality than Fifth
Off	Turns this feature off – no pre-emphasis

Final Frame Rate (Slow-Mo)

Within this field users select the frame rate in which recorded clips are played out. Depending on this setting, the HR-2-DS performs real-time undercranking that provides the user with 2.5, 2.x, 1.5x slow motion effects among others, a powerful special effect for recording at one frame rate and playing out at another. Active in single stream mode only.

Example: Results from 720p 60:

Option	Motion Effect
FPS_23_976	Used to play out clips at 2.5x (slow motion)
FPS_29_97	Used to play out clips at 2.0x (slow motion)
FPS_48	Used to play out clips at 1.25x (slow motion)

Pulldown Removal

This field tells the HR-2-DS to remove duplicate fields (pulldown) from the incoming video signal. In addition the standard 2:3 pulldown, this field allows recording true 24p clips from cameras such as the Canon XL H1 and JVC Pro HD 250. For example:

Camera & Mode	Pulldown Removal Setting	Result
Canon XL H1 / F2 (24F)	Extract24FramesFrom30i	1080 23.976p
JVC ProHD GY-250 24/48p	Extract48pFrom60p	720 48p
JVC ProHD GY-250 24/48p	Extract24pFrom60p	720 23.976p
JVC ProHD GY-250 60p	Extract30pFrom60p	720 30p

Active in single stream mode only.

De-Interlace Input Video (SD Only)

Selecting this feature will de-interlace the interlaced fields in SD input such that they become progressive. Active in single stream mode only.

NTSC Crop & Scale

The options within this field allow incoming 720X486 video to be recorded cropped or cropped and scaled. This is only active with NTSC input. Active in single stream mode only.

Drop Every Other Frame

When this checkbox is selected, every other frame coming into the HR-2-DS is dropped and the rest are recorded. Active in single stream mode only.

Flip Video Frame

Select this checkbox to flip the video being recorded. For example, this option is useful when using a Redrock Micro lens adapter with your camera. Active in single stream mode only.

Audio tab

Record Type

Select video only, audio-only, or both. Note that audio-only still required video input to record.

Audio Source

Users select whether they are recording audio from an AES-EBU (digital audio) or HDSDI embedded. The HR-2-DS breakout cable includes inputs for eight-channels for AES-EBU audio. The HR-2-DS records 16-bit 48k audio.

Embedded Audio Channels

Within this field users select the number of channels being used for audio recording. The HR-2-DS supports eight channels at 48k (16-bit) when using AES/EBU audio, and eight channels at 48k (16-bit) when using embedded HDSDI audio. It is important to mention that the eight channel audio requires Prospect HD build 2.2.86 or newer for editing, and that Adobe Premiere Pro 2.0 only currently supports six channels of audio.

Note that the option ChannelsAllMixedDownToTwo only mixes down channels one through six, it does not include channels seven and eight. Also note that the mixdown is equal for all channels. In other words, back channels are not lowered more than front channels.

Time Code tab

Users may select to record the time code embedded in the HDSDI input signal. Alternatively, time of the day may be used to generate a time code, or the HR-2-DS's recording time code may be selected. Note that Record Run is a global setting stored by the system for any presets. In other words, this time code will be consistent across presets and when reset or modified, the changes will apply to all presets.

When selecting Time Of Day or Record Run time code, users may select to use drop-frame time code for 29.97 or 59.95 frame rates. Time code for video is displayed in drop frame coding as HH;MM;SS;FF format. The semi-colon denotes drop frame coding. Note that frames are not dropped when selecting drop-frame time code, only the count of frames 01 and 02 is dropped after the first minute of recording, with the exception of every tenth minute. In other words, the time code for the first minute goes from 00;00;59;29 to 00;01;00;02. The next 9 minutes are similar. The 10th minute time code goes from 00;09;59;29 to 00;10;00;00. The cycle repeats as if it was at time code 00;00;00;00.

By default, the HR-2-DS stores the time code of the first frame it records on every capture. This information is appended to the end of the files it generates. The HR-2-DS recognizes this information and regenerates a time code based on the clock for the given file during playback. User bits are not saved. Also note that AVI clip's time code is only readable in Adobe Premiere using Prospect HD. Please visit www.cineform.com for more information.

Optional LTC Time Code

The Wafian HR-2-DS can be optionally upgraded to include LTC time code in/output. This option allows the recorder to read time code from an external source, and to also send it out onto external devices. Please contact Wafian Sales for more information at sales@wafian.com.

Player tab

Reference sources can be selected for playback of your clips, which is independent from the reference source specified within the Video tab of your preset. In general the operator should use FreeRun for this field.

Option	Description
External	Use Ref-In connection on the breakout cable for reference
Input1	Use HDSDI A signal reference
Input2	Use HDSDI B signal reference
FreeRun	Do not use a reference source

Play all clips consecutively

When selecting this checkbox, all clips displayed in the media bin will play back consecutively. When the last clip has been played back, playback will stop. If Loopback Playback is also selected, all clips will be played consecutively and after the last clip has been played back, the first clip will begin to play back in again. This playback pattern will continue until playback is stopped manually.

Loopback Playback

When selecting this checkbox, selected clips will be played back in a loop. If Play all clips consecutively is also selected, all clips will be played consecutively and after the last clip has been played back, the first clip will begin to play back in again. This playback pattern will continue until playback is stopped manually.

Output Video Format

By default, the recorder will use each clip's video format (that in which it was recorded) during playback using the decoder's metadata. Users may select to use a different format for playback, and to regenerate playback time code using the clip's first frame as its starting time code.

Device Control tab

Device Control

To enable device control, connect your RS422 controller to the back panel of the HR-2-DS using the RS422 to RS232 adaptor provided with the HR-2-DS. Within the Device Control tab select the Allow Remote Control checkbox and select the Communication Port that your controller will be communicating with, in most cases COM1. The Wafian HR-2-DS recorder accepts standard commands such as Record, Stop, Playback, Pause, Go To Time Code, Fast Forward and Rewind. Other device control features will be available in the future as a software upgrade.

Options

The Wafian HR-2-DS records video containing both continuous or broken time code. Users can send Go To commands from a controller in order to cue specific points within the clips in the media bin. When doing this, the recorder will cue to the first matching time code within all of the clips in your media bin. Selecting the "Only CUE within active clip" checkbox causes the recorder to cue the first matching time code within the clip currently loaded for playback.

The Wafian HR-2-DS allows the user to select different speeds for fast forwarding and rewinding, from 2x to 128x. Note that this setting will affect the speed for fast forwarding and rewinding both through device control and through the use of the user interface buttons.

Advanced tab

Within the Advanced tab, users may specify different read and write speeds for recording and playing back clips to/from a SAN (via an optional fibre channel port). These settings affect the size of the packets of information being sent across your network. Please contact your network administrator in order to determine the optimal settings for your recorder.

System Settings tab

Within the System Settings tab users may specify a port to use on the recorder for network device control over an Ethernet connection. Basic authentication can also be established by specifying a User Name and Password for remote users to enter before connecting to the recorder remotely. Please contact Wafian Customer Support at support@wafian.com for the API to use this function.

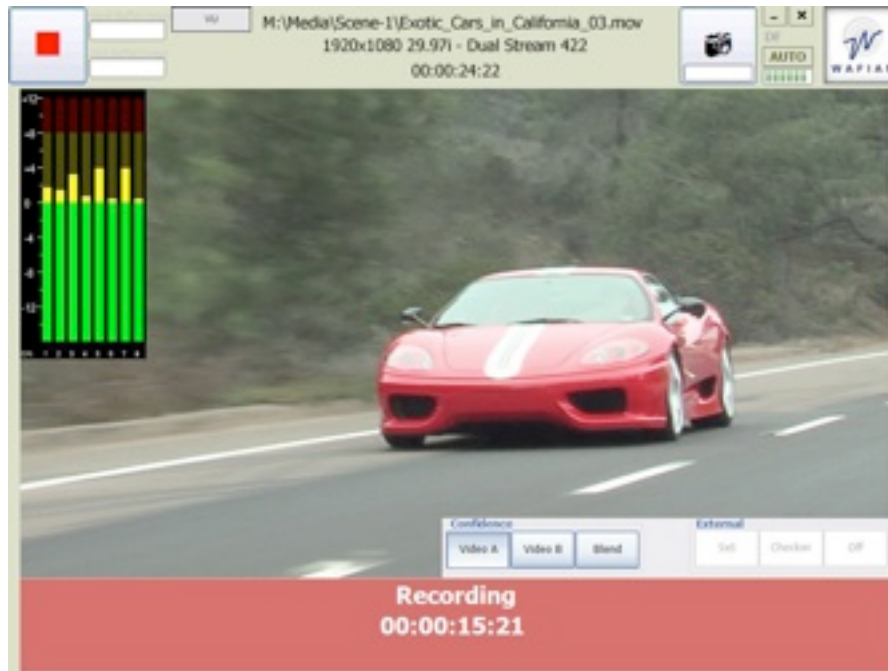
Within the Operations section of the System Settings tab, users may choose to empty the contents of their media folder, restart the HR-2-DS system, or restart the Interface. Within the Media Library section, users can select to sort the clips in the media bin based on their creation date, or their file name. Access to the HR-2-DS's Event Log is also present in this tab.

HR-2-DS Event Log

Selecting to view the Event log displays the Event Viewer window. Within this window, selecting Wafian from the tree on the left displays all logged events on the right panel. Double clicking on each of these event logs displays their details. Note that the exact time codes of dropped frames are logged as individual events, which can be viewed by selecting the Warning log for such event.

6. Recording

Press the Record button on the top left of the screen to start recording. The system will show the record duration on the bottom of the screen. Pressing this button again will stop recording and add the clip to the media bin on the bottom of the screen.



Other Recording Features

Buffer Indicators

The two progress meters next to the Record button indicate the amount of memory buffer space used by the recorder. The meter on the top indicates the amount of memory coming in from the HDSDI inputs into the system. The one on the bottom indicates the amount of memory being used to write to disk. In other words, frames come in from the HDSDI inputs, get buffered, go through the compressor, and then get written to disk, which is the slowest of the above processes. Hence, the meter on the bottom (disk buffer) will get full before the one on the left is triggered. These meters are helpful for tuning and diagnosing settings that may cause frame dropping. Because the HR-2-DS is a tool for professionals pushing the hardware's performance, there are setting options that the hardware may not be able to sustain.

Error Indicators

•**DF** - Drop Frames – Turns red if the system falls behind and drops a frame. If you are dropping frames, try adjusting the encoder quality settings of your preset. Extreme temperatures is another possible reason for the CPU to slow down and cause the system to drop frames. Another option is to reconfigure your media drives to RAID-0.

-**SYN** - Stereo Sync Lost - Lights if the system detects lost of stereo sync. Check your input source.

•**System Error** – A System Error dialog will display if the system detects an internal error. If you have adjusted your settings to minimize the stress on the system and the errors persist, please report the problem to support@wafian.com. When reporting a system error, please include:

- Wafian HR-2-DS serial number
- Steps to reproduce the problem, including the error message displayed and the resulting problem
- Manufacturer and model number of the camera/system that you were using to connect to the HR-2-DS
- Media format, resolution, and frame rate

AUTO Recording

To start and stop recording at specific time codes embedded in the incoming HDSDI video, click the AUTO button and specify in point and out point time codes.



As soon as you click OK, the recording time code settings will go into effect. The AUTO button will turn orange when auto recording is enabled. To disable it, simply click on the AUTO button once again and deselect Auto Record.



Keyboard Controls

If you have a keyboard connected to your HR-2-DS, pressing Ctrl+r will cause recording to start, while pressing Ctrl+s will cause recording to stop.

Freeze Frames

To record freeze frames while previewing or recording, press the freeze frame button in the upper right corner of the screen. You may press this button as many times and as frequently as you wish. Freeze frames are recorded into the JPG format and using the name rules and location specified in the Recorder tab of your preset.

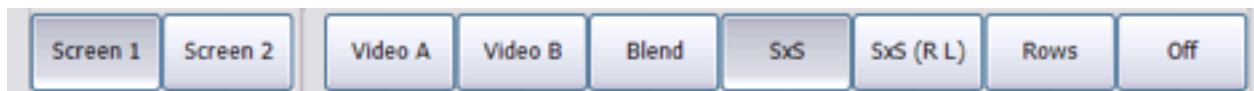


Audio Monitoring

During preview and recording, audio can be monitored with headphones connected to the rear of the recorder. On models equipped with a front panel audio port, the headphone may be connected there also. Audio monitoring on this port is available only while recording or previewing live video. Audio is not available on this port during playback. To monitor audio during playback, use the HD-SDI Embedded or AES-EBU audio.

Confidence and External Viewing

When Record Dual Streams is selected within the Video tab of your preset and two incoming video signals are present, the Confidence and External display control bar appears within the video display area. Selecting Video A or Video B allows you to monitor each of the video signals independently. Selecting Blend displays both signals overlaying each other, which allows for real-time convergence calibration and stereo monitoring.

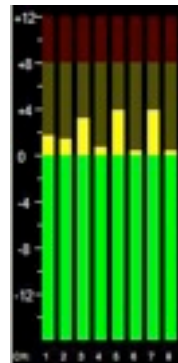


When the SxS button is selected, the recorder sends out the two incoming video signals side by side for external monitoring during preview, record, and playback. To connect the Wafian HR-2-DS to an external monitor, please follow the detailed instructions provided in our Support site's Knowledgebase at www.wafian.com/Support.htm.

VU Meters

Monitoring audio visually can be done through the Wafian HR-2-DS's vu meters. Pressing the vu button above the video display area displays the vu meter within the top left corner of the video display area. Pressing the vu button again causes the meter to display on different corners of the screen and pressing it a fifth time causes it to hide once again. Each of the bars on the meter represents volume units (intensity) within each channel of audio being played.

Audio can be monitored by connecting headphones to the front or rear headphone port of the recorder, or via any device capable of receiving AES/EBU digital audio.



7. Playback

When there are .MOV or .AVI files in CineForm format within your recording path, thumbnails representative of each clip display under the video display area in the media bin. To play each clip simply click its thumbnail, then click the Play button on the top left corner of the screen to begin playback. During playback, the Play button becomes a Pause button. You can press this Pause button to pause playback, pressing it again resumes playback. Pressing the video camera button to its right sets the system back into preview/record mode.



While in playback mode, press anywhere within the progress bar (above the video display area) to jump to that part of the clip. Users can also press the Rewind, Previous Frame, Next Frame and Fast Forward buttons above the progress bar to step between frames or to quickly move through the contents of each file. Clicking the time code just right of the progress bar toggles between the clip's duration, and its end time code. During playback, the clip's remaining playtime is displayed above its duration time code.

Note that the storage path for the clips being displayed within the media bin is above the media bin. To browse other folders, click the icons on the bottom right side of the media bin.

Clip Properties

To view the properties of any of your clips, click and hold (or right click if you have a mouse) on the desired clip's thumbnail in the Media Bin and select Properties... Currently the clip's path, resolution, time code, bit rate, date of creation and size are displayed in this window. Click and hold again to delete or rename clips.

Deleting and Renaming Clips

To delete a clip, click and hold (or right click if you have a mouse) on the clip's thumbnail in the Media Bin and select Delete Clip. To rename a clip, click and hold (or right click if you have a mouse) on the clip's thumbnail in the Media Bin and select Rename.

Freeze Frames

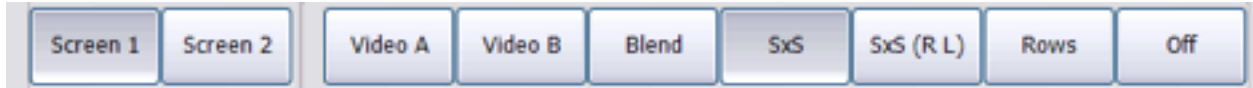
To record freeze frames while playing back, press the freeze frame button in the upper right corner of the screen. You may press this button as many times and as frequently as you wish. Freeze frames are recorded into the JPG format and using the name rules and location specified in the Recorder tab of your preset.

Keyboard Controls

If you have a keyboard connected to your HR-2-DS, pressing certain shortcut keys will allow you to skip to different parts of your clips. The right or left arrow keys on your keyboard will display the next or previous frame. You can also press the Home or End keys to go to the beginning or the end of a clip. Lastly, press Ctrl + left/right keys to skip one full second back/forward.

Confidence and External Viewing

When Record Dual Streams is selected within the Video tab of your preset and a stereo paired clip is selected within the media bin, the Confidence and External display control bar appears on the video display area. Selecting Video A or Video B allows you to monitor each of the video signals independently. Selecting Blend displays both signals overlaying each other, which allows for stereo monitoring during playback.



When the SxS button is selected, the recorder sends out the two video signals being played side by side for external monitoring. To connect the Wafian HR-2-DS to an external monitor, please follow the detailed instructions provided in our Support site's Knowledgebase at www.wafian.com/Support.htm.

VU Meters

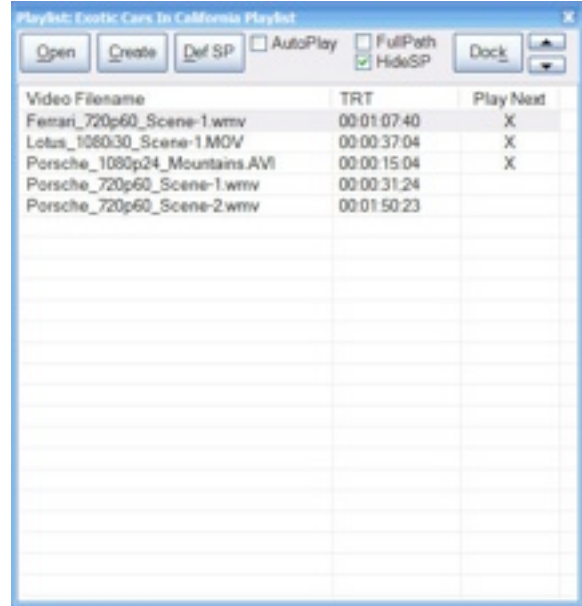
As in record mode, monitoring audio visually can be done through the Wafian HR-2-DS's vu meters. Pressing the vu button above the video display area displays the vu meter within the top left corner of the video display area. Pressing the vu button again causes the meter to display on different corners of the screen and pressing it a fifth time causes it to hide once again. Each of the bars on the meter represents volume units (intensity) within each channel of audio being played.

Audio can be monitored by connecting headphones to the front or rear headphone port of the recorder, or via any device capable of receiving AES/EBU digital audio.

Playlists

The HR-2-DS offers the ability to create playlists. To open a playlist click the Open Playlist button left of the Media Bin path on the lower left corner of the screen. Select a Wafian-playlist file, which contains the information required to load your playlist. Upon selecting the Wafian-playlist file the playlist console displays on top of the video display area. Note that this console can be moved by dragging and dropping it, or it can be docked by clicking the Dock button. When docked, the video displays on the left of the screen.

To create a new playlist, click Create and select the folder that contains the clips that you would like to use as your playlist, name your playlist and click OK. You can modify the order in which clips are played back by selecting each one with in the playlist console and clicking the up and down arrows to organize your clips in the desired order.



To begin playback of your playlist, simply double click the clip that you would like to begin playback with, and then click the Play button on the top left corner of the screen. Again, clips will play back in the order they display within the playlist console. If you select the Auto Play checkbox within the playlist console and double click any clip within your playlist, playback will begin automatically. Stereo Pairs can be defined through the Def SP button, and can be hidden within the playlist as pairs so that they display as single clips by selecting the Hide SP checkbox.

At the end of playing back each clip on the playlist, playback automatically stops. To play clips sequentially select the Play Next cell on the right column. When selecting Play Next for a clip, the clip will play and the next clip on the list will play immediately after. To play all clips on the playlist, select the Play Next cell for all clips.

The playlist console can be closed at any time. To reopen it, as described above, simply click the Open Playlist button within the left side of the Media Bin and select the desired playlist file, or press Ctrl + P if using a keyboard. Users may also create a playlist based on the current contents of the Media Bin by clicking the Save Media Bin as Playlist button in the same location, or by pressing Shift + Ctrl + P is using a keyboard.

IMPORTANT: The "Play all clips consecutively" and "Loop Playback" options must be deselected within the Player tab of your preset.

8. Wafian Shell

The Wafian Shell is the central control console for system management of your recorder. The Wafian Shell can be accessed by closing the Wafian recorder application. Within the Wafian Shell, users can reopen the Recorder application, explore the recorder's internal redundant storage (Media) drive, and access a series of system management modules for maintenance and configuration.



For Advanced users, the bottom of the Wafian Shell offers a command field in which most Windows based commands can be typed and executed.

9. System Configuration & Optional Components

Accessing Your Media Remotely

The Wafian HR-2-DS can show up as a node on your local network. Each Wafian HR-2-DS is given a unique name based on its serial number. For example, if your serial number is HR2-DS-003, the system name will be Wafian-HR2-DS-003. Computers on your network can access your recorder with that name. To use the HR-2-DS on a network, a DHCP server must be available to assign an IP Address. Alternatively, you may configure the unit to use a fixed IP address, please consult the Windows documentation for instructions.

By default, the recorded media is stored in M:\Media. This folder is also shared for read access on the network, so that computers can access the recorded media with the following path:

```
\\wafian-hr2-ds-003\media
```

Replace hr2-ds-003 in the name above with your HR-2-DS's serial number.

Fibre Channel Port

Wafian HR-2-DS recorders are offered with an optional fibre channel port for gigabit-speed access to a network. This option is typically used for recording, playback and general access to/from a SAN storage server. Please contact Wafian Sales for more information at sales@wafian.com.

Linear Time Code (LTC) In/Out Ports

Wafian HR-2-DS recorders are offered with optional Linear Time Code (LTC) Input/Output ports. This option allows the recorder to read time code from an external source, and to also send it out onto external devices. Please contact Wafian Sales for more information at sales@wafian.com.

Copying Your Media onto an External Drive

Once you have recorded footage, you can copy your media onto an external drive. To do so simply connect your IEEE 1394A (Firewire) or USB 2 drive to a corresponding port on the front or rear panel of the HR-2-DS. Open an Explorer window and notice that your external drive will now appear as an available drive on the system. Simply drag and drop your AVI or MOV media files from their location

within M:\Media onto your drive. Once the copying process is complete, disconnect your external drive and continue normal operation of the HR-2-DS.

Monitoring Video with External Monitors

To connect your Wafian HR-2-DS to a VGA, HDSDI, or DVI device for external monitoring (including meshed, and side by side video pairs), please follow the detailed instructions provided in our Support site's Knowledgebase at www.wafian.com/Support.htm.

10. System Specifications

Connectors:	Dual Link HDSDI: 2 Inputs, 2 Outputs (Mini-BNC)
Breakout Cable:	HD Component Output SD Component/Composite Output 8ch 48k AES
Video Formats:	SDI, HD-SDI, Dual-Stream HDSDI 1920x1080: 23.98psf, 24psf, 25psf, 23.98p, 24p, 25i, 25p, 29.97i, 29.97p, 30i, 30p 1280X720: 50p, 59.94p, 60p NTSC PAL 4:2:2 and 4:4:4 - 10 bit color Time code RP188, generated, time-of-day, LTC (optional)
Audio Formats:	8 channel 48 kHz AES/EBU or Analog 8 channel 48 kHz HDSDI Embedded
Recording Formats:	CineForm Digital Intermediate™ AVI & MOV RGB 4:4:4 (10 bit) YUV 4:2:2 (10 bit)
Storage Configurations & Capacity:	17 Hours - 4x750 GB mirrored (4:4:4 at 40 MB/s) 34 Hours - 4x750 GB (4:4:4 at 40 MB/s) 1TB removable disk drive bay (optional) Fibre Channel port for external record/playback (optional)
Interfaces:	IEEE 1394A USB 2 Gigabit Ethernet RS 422
Dimensions:	482 mm (W) x 545 mm (D) x 177 mm (H)
Case:	Ruggedized Steel Chassis Shock-resistant Disk Drive Bay 8.4in touch-screen color display (1024x768) Lockable Front Cover Plate Shock Mount External Case (optional)
Operating Temperature:	32-104° F or 0-40° C

NOTE: Specifications are subject to change.

11. Notes and Troubleshooting

Thank you for using the Wafian HR-2-DS, please know that we always appreciate your feedback regarding the current features and functionality of the HR-2-DS, as well as suggestion for future improvements. Be sure to visit our knowledgebase at www.wafian.com/Support.htm or contact us at support@wafian.com.

Recording Length and Storage Capacity

The length of uninterrupted recording that the HR-2-DS is capable of performing varies depending on the format that you select, as well as other variables such as remaining disk capacity and environmental conditions. For example, under normal conditions and using a 1920 X 1080 23.97psf preset (10-bit YUV), the HR-2-DS can record up to 8 hour clips. For other formats such as 720p60 (10-bit YUV) the HR-2-DS can record up to 6.5 hour clips. However, recording length may vary if the HR-2-DS is exposed to extreme heat, or if its disks are close to being full. For longer continuous recording duration, lower the encoding quality. Please contact our Customer Support group at support@wafian.com or visit our website at www.wafian.com for more information regarding recording duration capabilities for different configurations.

The HR-2-DS can store and play back 17+ hours of footage at full resolution 1920 X 1080 24P 10-bit RGB clips. Please contact our Customer Support group at support@wafian.com or visit our website at www.wafian.com for more information regarding storage capacity for different configurations. Note that the system will stop recording and display a warning message when it has only 500 MB of storage capacity left on disk.

IMPORTANT DISCLAIMERS

GOOD ADVICE FOR DIGITAL ACQUISITION: While the Wafian HR-2-DS gives you the confidence of a mirrored configuration, as with any form of digital acquisition, it is recommended that you back up your media frequently. There are various ways of extracting your media from the recorder, the HR-2-DS can be connected to an external storage device via Firewire, USB 2, or Ethernet. Your footage is your most valuable asset, keep multiple copies of it at all times.

Third party software and system configuration changes: We don't recommend and cannot support installing and running 3rd party software on the HR-2-DS as that may affect the performance of the Wafian HR-2-DS. Because of the broad range of configuration changes that can be made to the Operating System and its components, we do not recommend that you make any configuration changes to your HR-2-DS system. We cannot support HR-2-DS systems where the original configuration has been modified. Do so at your own risk.

Playback of media generated by other tools: While in most cases the HR-2-DS will play back media generated by a variety of professional video/audio tools, we currently only support the correct playback of media generated by the HR-2-DS.

Internet use and vulnerability: Because it is possible to connect the Wafian HR-2-DS to a network and/or the Internet, it can become vulnerable to viruses, spyware, and other harmful programs. Please be aware that protecting the HR-2-DS from such risks is the responsibility of its user. Addressing problems that may derive from this risk is not covered by the product's warranty or any Support agreement.

External monitoring: The Wafian HR-2-DS can be connected to VGA, HDSIDI, or DVI enabled devices for external monitoring. Although we are always willing to help, we cannot support software or hardware configurations outside of the tested guidelines provided in our Support site at <http://www.wafian.com/Support.htm>.

Rough handling: Even though the HR-2-DS has been designed to work on-set, as with any electronic equipment we recommend the use of caution when moving the HR-2-DS while in use and transporting the system. As an additional safety measure please inquire about the HR-2-DS's SKB case.

Temperature range: Operate the HR-2-DS in proper temperature environments (32-104° F or 0-40° C). As a result of extreme temperatures and overheating the system may perform poorly, including dropping frames.

Bit rate modifications: Because of the variable bit rate, the codec will expand to preserve quality, which may cause to overload the system and consequently it may drop frames. To reduce this risk lower the gain on your camera to reduce noise, or change the encoder quality settings within the Recording Format tab of the Application Preferences window. Selecting the default setting of High is recommended, Custom_FilmScan1 and Custom_FilmScan2 should only be used for special circumstances. Please contact our Support team if you would like additional information at support@wafian.com. You can also select to stripe your disks rather than mirror them. For optimal performance, the highest bit rate at which your media files should be recorded is 30 MB/sec average or less. To view the bit rate of each recorded media file, right click (or click and hold) on its thumbnail within the media bin and select "Properties..." Some of the factors that will affect the bit rate of your footage are level of detail in your images, light, gain on your camera, and encoder quality settings among others. Please visit www.wafian.com for further information.

Power source and cabling: Before operating the HR-2-DS, be sure that it is connected to a proper (clean) source of power, and that each of your cables, barrels (tubes), and converters are in proper working condition. Please know that the quality of the image that the HR-2-DS receives can be affected if you are connected to an irregular source of power or if your peripherals have been damaged.

Front Panel LCD: If video does not appear on the front panel LCD, make sure the loopback cable in the back panel is connected and secured. Should the image displayed within the touch-screen LCD ever shift, simply open the front panel and press the top blue button next to the LCD labeled AUTO to readjust the image.

12. Software License Agreement

1. This is an agreement between Wafian Corporation ("Wafian") and Licensee, who is being licensed to use the Wafian HR-2-DS software and accompanying user documentation ("Software"). Use of the Software constitutes acceptance of this agreement.
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9. License acknowledges that Licensee purchased a license to use the Software as part of an overall hardware and software solution that includes system components from third parties. Use of the Wafian HR-2-DS system requires accepting license agreements and hardware terms from multiple vendors. Licensee agrees to adhere to all other relevant vendor license agreements that are applicable to third party components of the system.

10. This agreement shall be governed by and shall be interpreted in accordance with the laws of the state of California (excluding its conflict of laws provisions) except that Wafian may enforce its intellectual property rights before the competent courts of any jurisdiction where an act of infringement has occurred. Licensee agrees that the courts located in the county of San Diego, California, USA, will constitute the sole and exclusive forum for the resolution of any and all disputes arising out of or in connection with this agreement and Licensee hereby irrevocably consents to the personal jurisdiction and venue of such courts and irrevocably waives any objections thereto. The United Nations Convention on Contracts for the International Sale of Goods is expressly excluded from this agreement. In the event of any dispute between the parties to this agreement, the prevailing party shall be entitled to recover attorneys' fees and costs of suit from the other party in addition to such other relief as may be granted.

11. This agreement is valid without Wafian's signature. It becomes effective upon clicking "Agree" or Licensee's use of the Software.

12. Failure by either party to enforce any of its rights under this agreement shall not be taken as or deemed to be a waiver of such. No waiver or amendment of any provisions of this agreement shall be valid or binding against either party unless the waiver or amendment is made in writing and signed by the duly appointed representatives of both parties. If any provision of this agreement is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable, and the remainder of this agreement shall nonetheless remain in full force and effect.

13. Licensee agrees not to export the Software or any part or direct product thereof in violation of U.S. export laws and regulations. Licensee may not assign this agreement to any third party without first obtaining the express written consent of Wafian, and any assignment by Licensee without such consent shall be null and void.

13. HR-2-DS 90 Day Limited Warranty

Wafian's warranty obligations are limited to the terms set forth below:

Wafian Corporation ("Wafian") warrants the hardware product against defects in materials and workmanship for a period of 90 days from the date of original purchase. If a defect exists, Wafian will, at its option, (1) repair the product at no charge, using new or refurbished replacement parts, (2) exchange the product with a product that is at least functionally equivalent to the original product. A replacement product/part assumes the remaining warranty of the original product or 30 days from the date of the replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes Wafian's property.

Prior to returning a product to Wafian, you must request a RMA number. Please contact Wafian at 858-863-4166 option 2 or support@wafian.com to explain the problem and request an RMA number. The RMA number must be included with the package and be labeled on the box. Upon receiving the RMA number, deliver the product at your expense to Wafian.

When you contact Wafian for warranty service, please be prepared to provide your name, address, telephone number, and a copy of the bill of sale bearing the appropriate Wafian serial numbers as proof of date of the original purchase. In addition, you will need to include the RMA number for processing and tracking as mentioned above.

This Limited Warranty applies only to hardware products manufactured by or for Wafian that can be identified by the "HR-2-DS" trademark, trade name, or logo affixed on them. **Wafian software is warranted pursuant to a separate Software License Agreement included with the software.** This Limited Warranty does not apply to any non-Wafian products even if packaged or sold with Wafian hardware. Non-Wafian products may provide their own warranty. This warranty does not apply and maybe void if the product has been damaged by accident, abuse, misuse, or misapplication; if the product has been modified without the written permission of Wafian; or if any Wafian serial number has been removed or defaced. Wafian reserves the right to use both new and refurbished components during the repair process for any unit under warranty that has been approved for repair.

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BEEN PAID IN FULL, NO WARRANTY WILL BE AVAILABLE FOR THE PRODUCT OR PRODUCTS UNTIL THE ACCOUNT IS PAID IN FULL.

NOTE: Before delivering your product for warranty service, it is your responsibility to keep a separate backup copy of the software and data, and disable any security passwords. Data recovery is not included in the warranty service and Wafian is not responsible for data that may be lost or damaged during transit or repair.

14. Contact Wafian

Wafian Corporation Technical Support

3525 Del Mar Heights Rd. #417

San Diego, CA 92130

858-863-4166 option 2

support@wafian.com

www.wafian.com/Support.htm

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