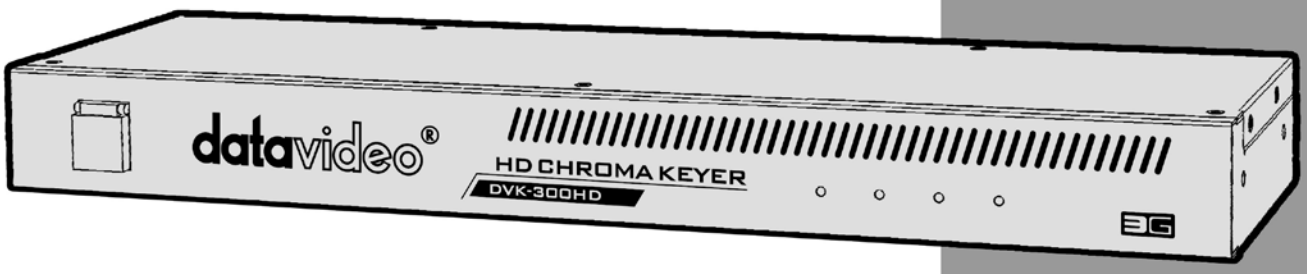
datavideo



HD/SD CHROMAKEY
DVK-300HD
Instruction Manual

www.datavideo.com

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Disclaimer of Product and Services

The information offered in this instruction manual is intended as a guide only. At all times, Datavideo Technologies will try to give correct, complete and suitable information. However, Datavideo Technologies cannot exclude that some information in this manual, from time to time, may not be correct or may be incomplete. This manual may contain typing errors, omissions or incorrect information. Datavideo Technologies always recommend that you double check the information in this document for accuracy before making any purchase decision or using the product. Datavideo Technologies is not responsible for any omissions or errors, or for any subsequent loss or damage caused by using the information contained within this manual. Further advice on the content of this manual or on the product can be obtained by contacting your local Datavideo Office or dealer.

Warnings and Precautions

1. Read all of these warnings and save them for later reference.
2. Follow all warnings and instructions marked on this unit.
3. Unplug this unit from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
4. Do not use this unit in or near water.
5. Do not place this unit on an unstable cart, stand, or table. The unit may fall, causing serious damage.
6. Slots and openings on the cabinet top, back, and bottom are provided for ventilation. To ensure safe and reliable operation of this unit, and to protect it from overheating, do not block or cover these openings. Do not place this unit on a bed, sofa, rug, or similar surface, as the ventilation openings on the bottom of the cabinet will be blocked. This unit should never be placed near or over a heat register or radiator. This unit should not be placed in a built-in installation unless proper ventilation is provided.
7. This product should only be operated from the type of power source indicated on the marking label of the AC adapter. If you are not sure of the type of power available, consult your Datavideo dealer or your local power company.
8. Do not allow anything to rest on the power cord. Do not locate this unit where the power cord will be walked on, rolled over, or otherwise stressed.
9. If an extension cord must be used with this unit, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord's rating.
10. Make sure that the total amperes of all the units that are plugged into a single wall outlet do not exceed 15 amperes.
11. Never push objects of any kind into this unit through the cabinet ventilation slots, as they may touch dangerous voltage points or short out parts that could result in risk of fire or electric shock. Never spill liquid of any kind onto or into this unit.
12. Except as specifically explained elsewhere in this manual, do not attempt to service this product yourself. Opening or removing covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks, and will void your warranty. Refer all service issues to qualified service personnel.
13. Unplug this product from the wall outlet and refer to qualified service personnel under the following conditions:
    a. When the power cord is damaged or frayed;
    b. When liquid has spilled into the unit;
    c. When the product has been exposed to rain or water;
    d. When the product does not operate normally under normal operating conditions. Adjust only those controls that are covered by the operating instructions in this manual; improper adjustment of other controls may result in damage to the unit and may often require extensive work by a qualified technician to restore the unit to normal operation;
    e. When the product has been dropped or the cabinet has been damaged;
    f. When the product exhibits a distinct change in performance, indicating a need for service.

Warranty

Standard Warranty

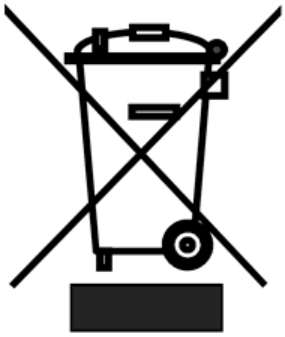
- Datavideo equipment is guaranteed against any manufacturing defects for one year from the date of purchase.
- The original purchase invoice or other documentary evidence should be supplied at the time of any request for repair under warranty.
- Damage caused by accident, misuse, unauthorized repairs, sand, grit or water is not covered by this warranty.
- All mail or transportation costs including insurance are at the expense of the owner.
- All other claims of any nature are not covered.
- Cables & batteries are not covered under warranty.
- Warranty only valid within the country or region of purchase.
- Your statutory rights are not affected.

Two Year Warranty

- All Datavideo products purchased after 01-Oct.-2008 qualify for a free one year extension to the standard Warranty, providing the product is registered with Datavideo within 30 days of purchase. For information on how to register please visit www.datavideo.com or contact your local Datavideo office or authorized Distributors
- Certain parts with limited lifetime expectancy such as LCD Panels, DVD Drives, Hard Drives are only covered for the first 10,000 hours, or 1 year (whichever comes first).

Any second year warranty claims must be made to your local Datavideo office or one of its authorized Distributors before the extended warranty expires.

Disposal



For EU Customers only - WEEE Marking

This symbol on the product indicates that it will not be treated as household waste. It must be handed over to the applicable take back scheme for the recycling of electrical and electronic equipment. For more detailed information about the recycling of this product, please contact your local Datavideo office.

1. Product Overview

Our chroma key solution ensures a high quality keying effect in the case of both green and blue backdrops. The key supports all popular video formats: 3 Gb/s, HD and SD. Multiple languages are also supported such as English, Traditional Chinese, Simplified Chinese, Polish, French, Spanish and Portuguese.

The device supports two keying modes, Chroma Key and Luma Key.

Chroma Key Mode - This function enables the DVK-300HD to be used for chroma keying. Camera input is fed with object on a green or blue backdrop. Background is generated by PC or any other media sources.

Luma Key Mode - This function enables the DVK-300HD to be used for luminance-based keying. Camera input is fed with object on a black or white backdrop. Background is generated by PC or any other media sources.

Algorithm – Strength of our solution
The principal component of the key is a unique algorithm that has been developed and improved by our company for several years now. This long-term optimization of the algorithm allows us to offer you a combination of a very good picture quality and an exceptional speed of operation.

Setting Key Parameters – It has never been so easy
The setting of keying parameters in advanced keying equipment is a complex task. Our solution uses a ground-breaking method of setting parameters that involves six simple steps, through which the user is led by a setup wizard. Using this, even a relatively inexperienced user will be able to set optimum key parameters, and the end result will be impressive. The key makes setting fast and simple as the user can just follow the steps listed below.

1. Selection of the keying colour and setting of the key mask
2. Correction of edges and sharpness of objects
3. Removal of keying colour remains (**Despill**)
4. Additional quality-boosting correction
5. Limitation of the mask area
6. Matching of the object to the conditions of the virtual background

In order to achieve perfect keying quality, the scene must be sufficiently lit and the camera signal has to be of a good quality. Full capabilities can be fully utilized for high resolution formats – HD or 3G, but very good results can also be obtained for low resolution SD signals.

2. Features

- Chrominance keyer
- Matte control
- Key noise reduction
- Tolerance correction
- Spill correction
- Edge correction
- Setup Wizard to guide the new user step by step
- Post correction – correction of picture parameters, i.e. brightness, contrast, saturation, ambient colour and intensity, applied to foreground after keying process
- Video inputs (SD, HD, and 3G)
  - Background Inputs: SDI and DVI-I (DVI / VGA); for VGA input, to achieve the best quality, VGA resolution must be as close as possible to output resolution
  - Camera Inputs (foreground): SDI and HDMI
- Video outputs (SD, HD, and 3G)
  - Output will be of the same resolution as the camera input
  - Main Output 1 (2xSDI) – Foreground on background or matte view
  - Main Output 2 (HDMI) – Foreground on background or matte view
- Garbage mask
  - Used to reduce the mask size by cutting it (in all of the possible directions: left, right, up, down)
- Hardware
  - LAN: DHCP and True Static modes
  - RS 232: remote access from PC (availability to be confirmed)
  - Signal LEDs: detects signal and input format
  - RESET: restores all settings to factory default

3. Functions

Front Panel

Power Switch

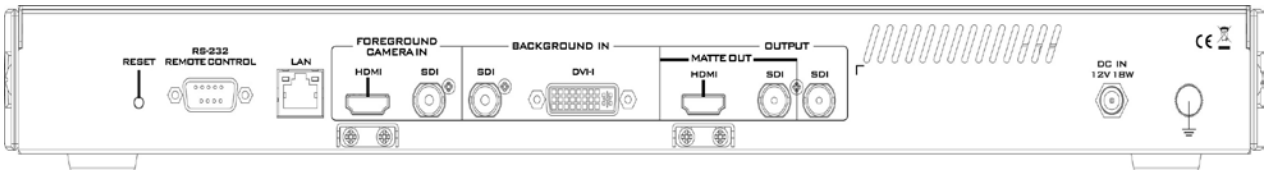
Switches DVK-300HD On/Off

Input Source Indicators

CAMERA IN – Camera Source Input Indicators (SDI / HDMI)

BACKGROUND IN – Background Input Indicators (SDI / DVI)

Rear Panel

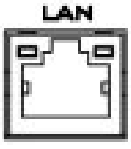


RESET

The reset button restores factory default settings.

RS-232

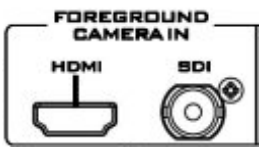
RS-232 for remote PC access (not available yet)



LAN

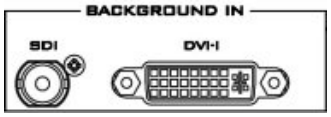
10/100Mbps Ethernet Network interface.

This port connects DVK-300HD to Laptop or PC in order to use the device functions on the utility software.



FOREGROUND CAMERA IN

Receives HDMI & SDI input signal from your HDMI or SDI equipped camera or device.



BACKGROUND IN

Receives SDI & DVI-I input signal from your SDI or DVI-I equipped camera or device.

OUTPUT

HDMI & SDI output ports (MATTE OUT is for previewing black & white level chroma key effect).

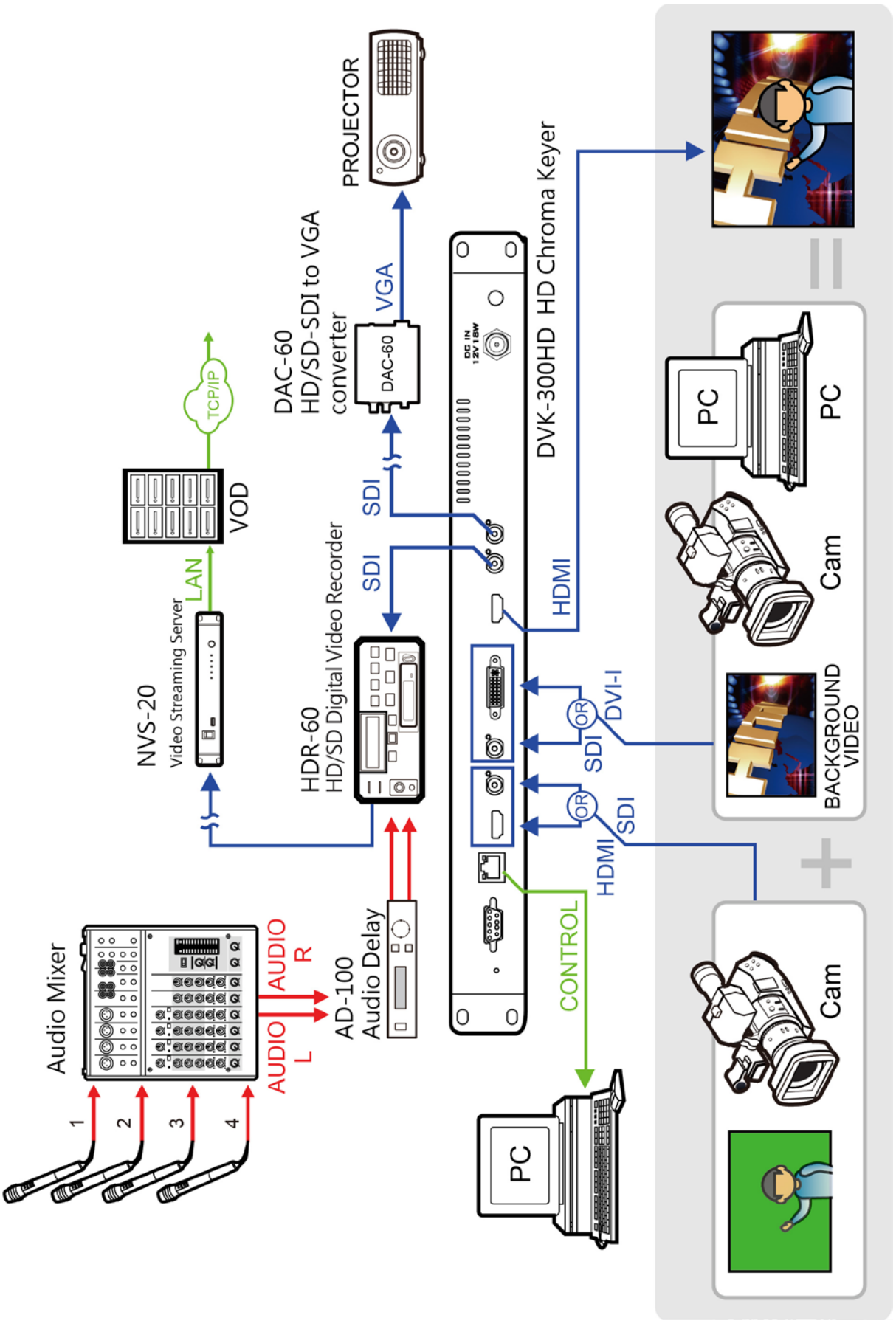
SDI output

SDI output port is for program output

DC IN

DC IN socket connects the supplied 12V PSU to the device. The connection can be secured by screwing the outer fastening ring of the DC IN plug to the socket.

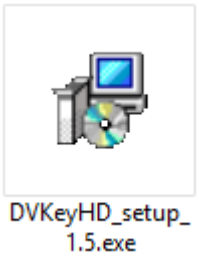
4. System Diagram



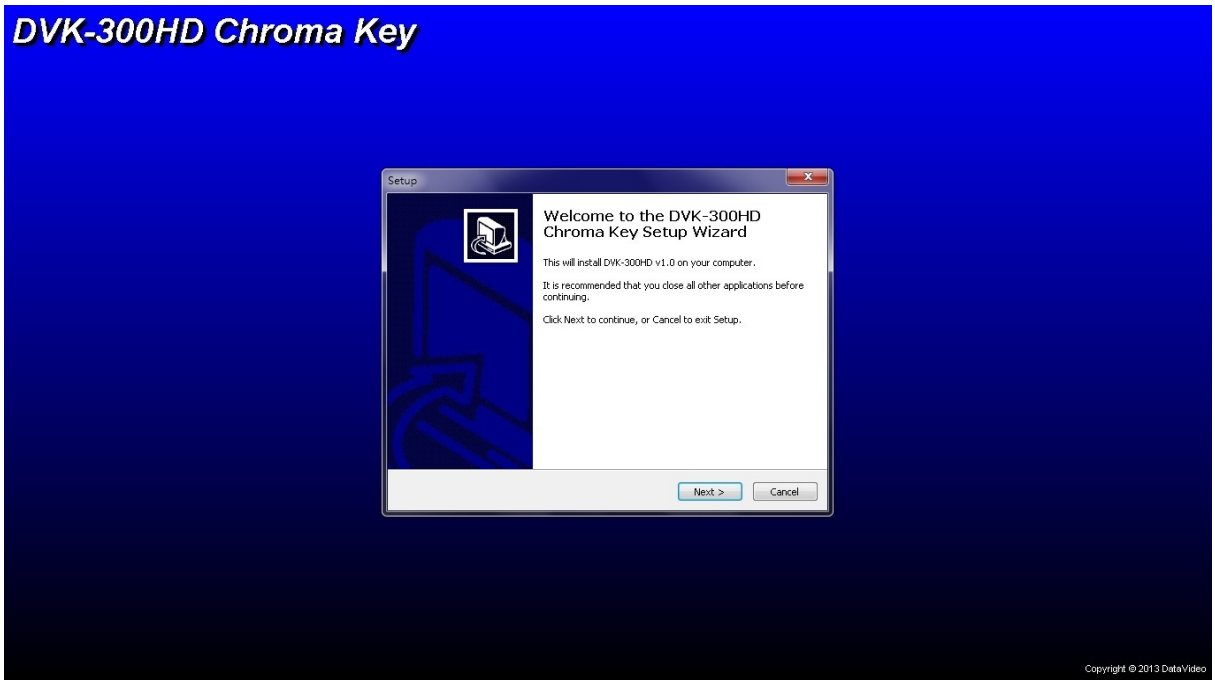
5. DVK-300HD Utility Software Installation

Connect your Laptop or PC to the DVK-300HD via Ethernet port and use the utility software to operate device functions.

Step1: Click on the utility installer icon to install DVK-300HD software.



Step 2: Install DVK-300HD software step by step by following the setup wizard.



Step 3: After installation is complete, double click on software icon to execute the utility program.

6. The Initial Settings

For proper operation, it is necessary to perform the initial setup of network parameters. Be sure to provide reliable quality connection between the DVK-300HD and the PC on which the control application is installed, in the case of firmware upgrade in particular. Please note that all settings should be preserved during firmware upgrade.

- IP network address assigned by manufacturer: **192.168.1.10**.
- The default device name is **DataVideo ChromaKey**

1. If you are working with a single device, you can connect it directly with a network cable. PC running the application should be set to the IP address of the same subnet 192.168.1.X (e.g. 192.168.1.5) as DVK-300HD.

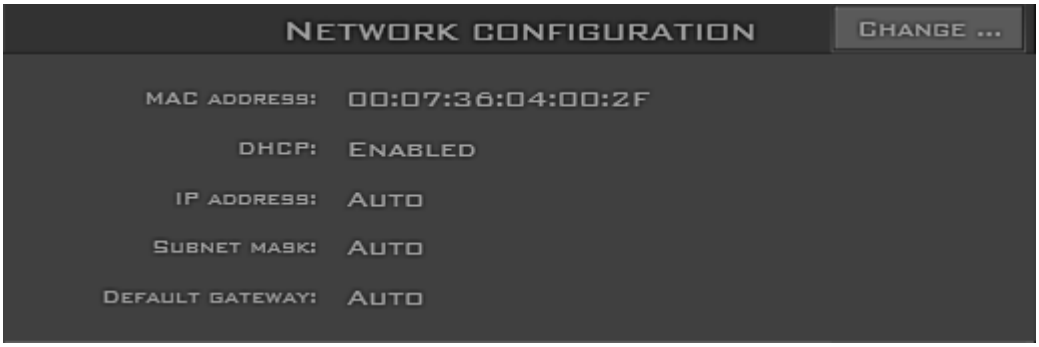
2. If you are working with multiple DVK-300HD devices, it is possible to connect each device with a network cable to the router. In this setup, the PC running the application should be configured to the same subnet as the router to which the DVK-300HD devices are connected.

Dynamic IP Address Assignment

After connecting the power and network cable, each of the devices by 30 seconds automatically attempts to retrieve the IP address of the network in accordance with the principle of dynamic IP allocation from your router. When it fails, the IP address of the device is set to the default value (192.168.1.10). In this case, check the quality of the network cable connections and repeat the procedure again by disconnecting and reconnecting the power cord to the device.

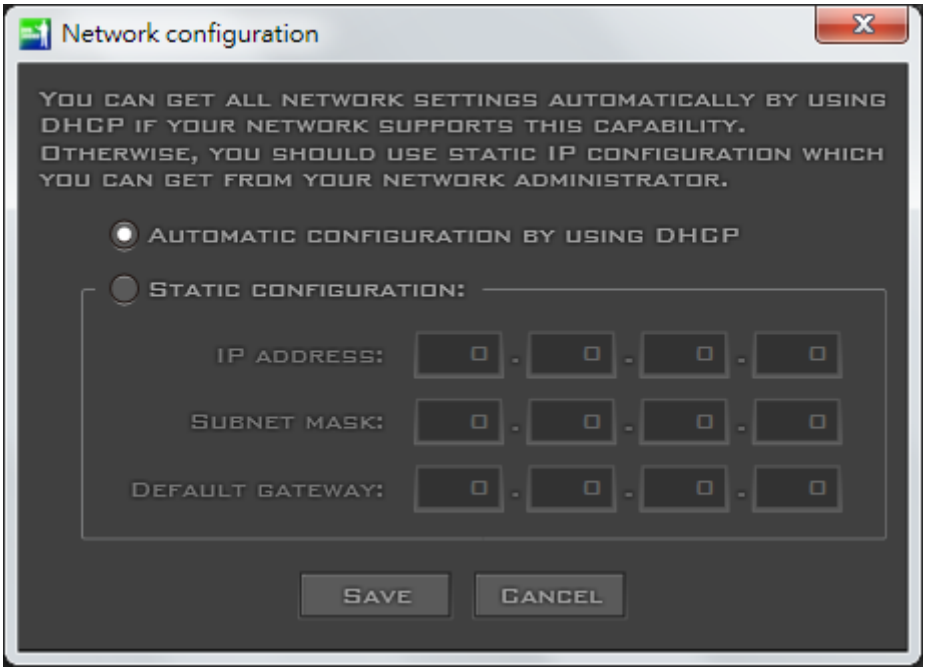
Static IP Address Assignment

- Open the DVK-300HD Chroma Key application
- Select a device from the list of available devices
- Select the Configuration button located at the bottom right of the main window
- Select the **Change** button in the Network configuration



Section of network parameter settings

- Enter the IP address and subnet mask and click on the Save button to complete the network configuration



The window for changing network parameters

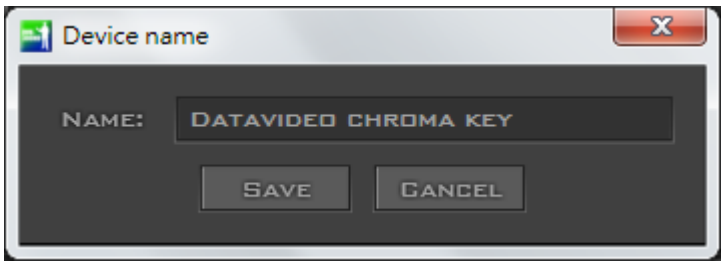
Change the Device Name

It is recommended that each time you connect the device and after assigning an IP address to the device, the following steps are carried out to change the name of the device.

- Open the DVK-300HD Chroma Key application
- Select a device from the list of available devices.
- Select the **Configuration** button located at the bottom right of the main window
- Select the **Change** button in the Device info

Section setting the device name

- Set the device name and accept the setting via the Save button

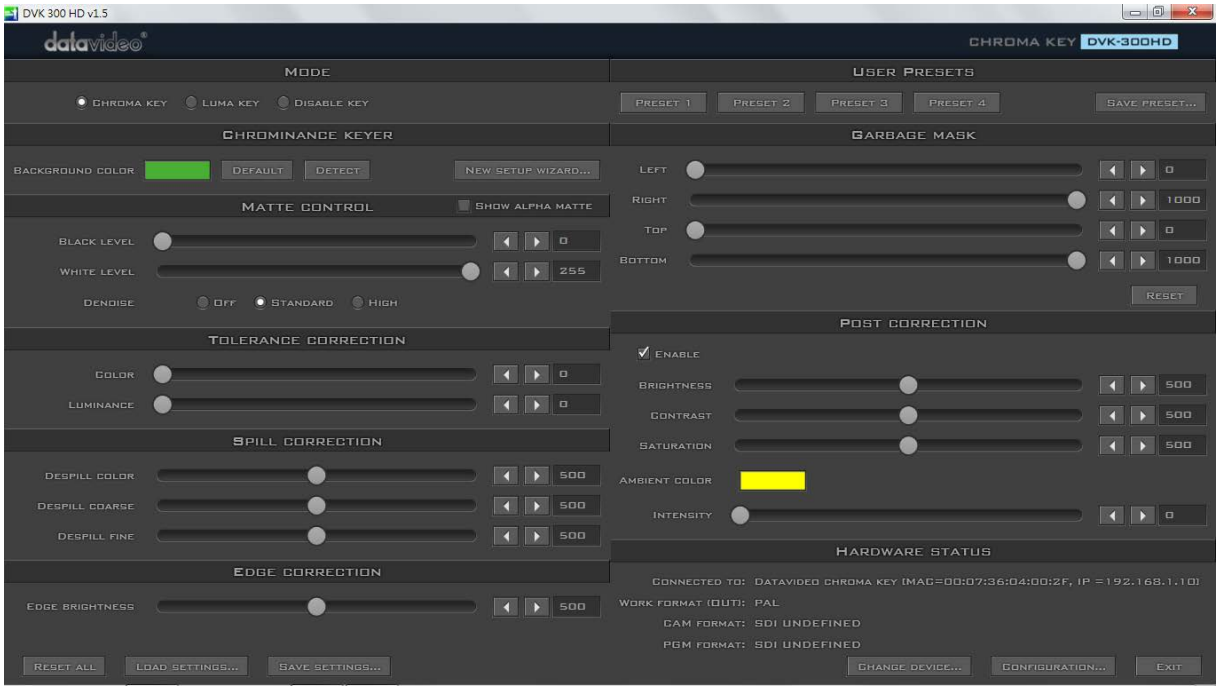


The window for changing the name of the device

Auto Settings Save Function

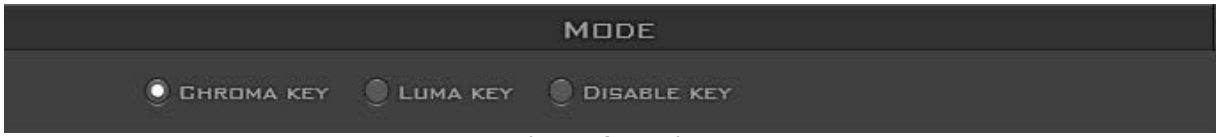
An important feature in the firmware version 2.3 and the utility program version 1.3 or later is to allow the device to automatically save the last change of settings by the user after 15 seconds of every settings change. However, if the utility program is closed or the device is shut down within 15 seconds of the last change, the last settings will be lost.

7. DVK-300HD Utility User Interface



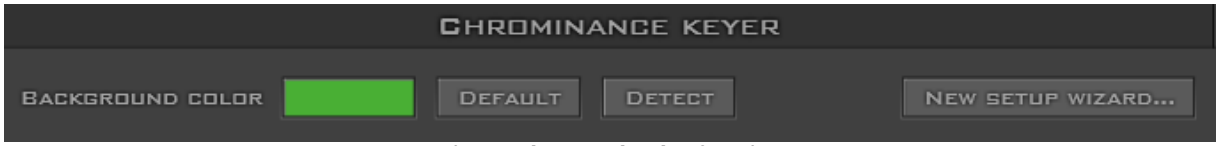
Keying Colour Selection and Key Mask Setting

The first step is to select the mode of operation in the Mode section – the Chroma key button.



The **Mode** section

Next, the colour to be keyed out should be selected. This setting depends on the keying background used. There are two possibilities: green or blue. The choice is made by clicking on **Background color** in the **Chrominance keyer** section.

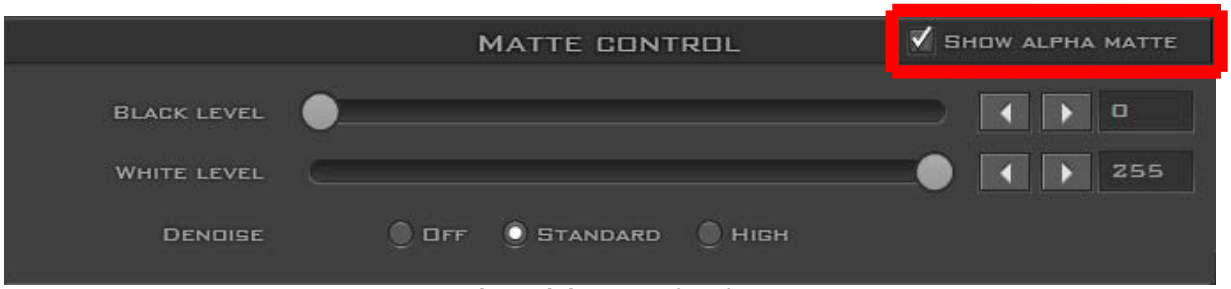


The **Background color** function

If the colour of the keyed out background is not uniform, the user can make use of the Detect button, which will calculate the background's RGB parameters using the automated average. If the parameters cannot be accessed, the user will be notified about it via a message window, after which the colour will be reset to default. The Default button is used to select the default colour.

Show Alpha Matte Function

The next step is preliminary keying setting. This is done with the **Show alpha matte** function, which – after a checkbox is checked – will show a matte view for which colours closer to white are non-transparent and those closer to black are transparent.

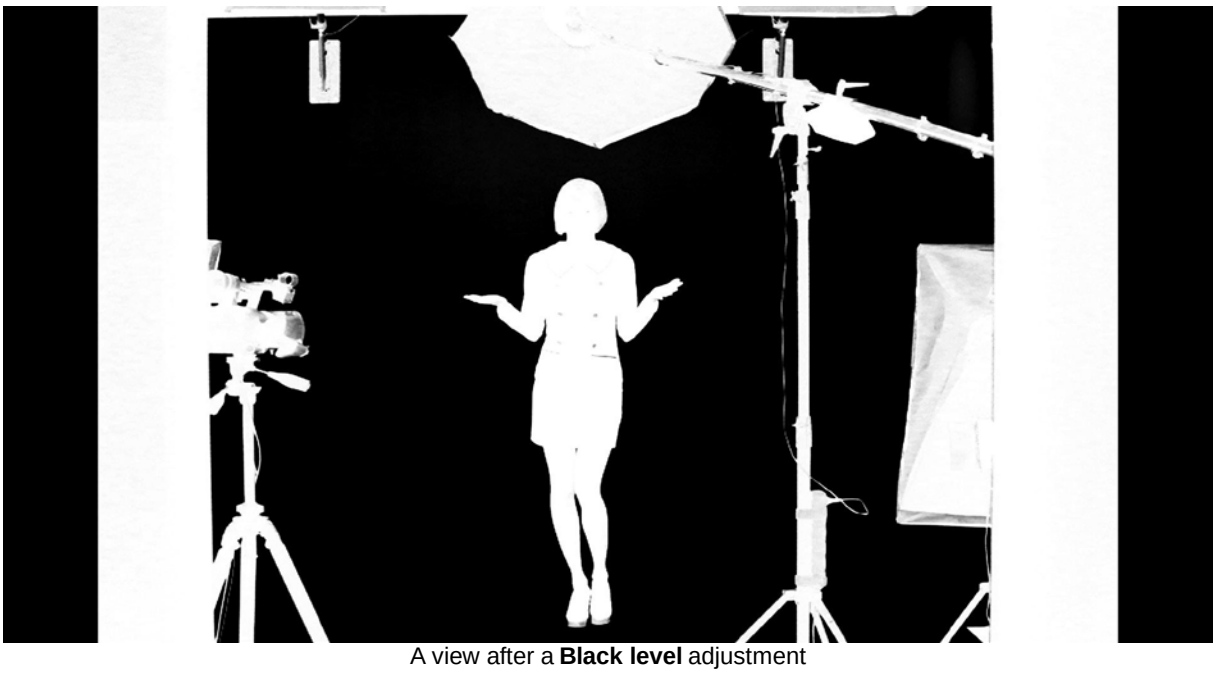


Show alpha matte function

The **Show alpha matte** view

The intended result is to make the mask background colour as close to perfect black as possible. In order to do that the **Black level** slider should be moved until black is distributed as evenly as possible on the mask background.

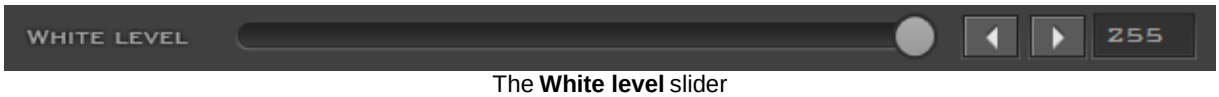
The **Black level** slider



A view after a **Black level** adjustment

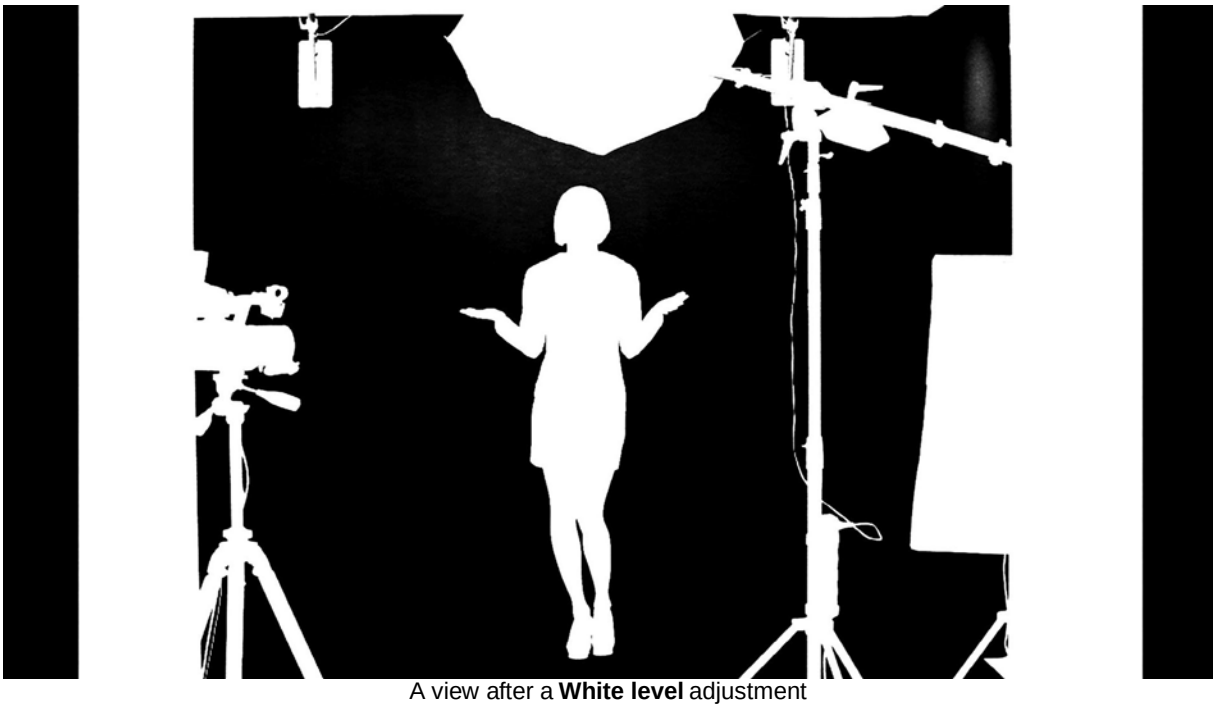
If the slider is moved to the extremes, the other objects will lose their properties and become non-transparent; this is why the function should be applied sparingly so that small differences are still discernible in the distribution of the black background.

The successive step is to obtain a uniform distribution of white on objects which will remain fully non-transparent. This uneven distribution may arise from the fact that the colours of the object may have colour components close to the keying colour. In this case an adjustment can be made using the function known as **White level**.



The **White level** slider

By moving the slider from the maximum value to the left, you can obtain a perfect distribution of white on a given object.



A view after a **White level** adjustment

In many cases, the option **White level** will be used in conjunction with the option **Black level** in order to obtain the most possible effective settings of the black background, with no losses on white objects and vice versa.

Picture from a camera will always contain some noise; the DVK 300 enables automatic correction of interference by means of the **Denoise** option, which has two settings: standard and high.

The **Denoise** buttons

Correction of Object Edges and Sharpness

As seen in the view after a White level adjustment, an extension of the range by means of the **White level** function usually results in the restoration of a uniformly black surface to slight grays.

In this case, in order to adjust the grayness, two further functions from the **Tolerance correction** section are needed. The first one is called **Color** and its use leads to the

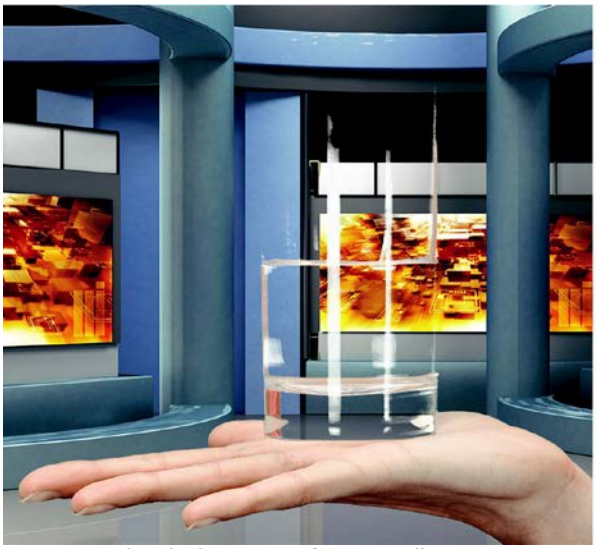
restoration to a uniform black structure of the background.

The **Color** slider

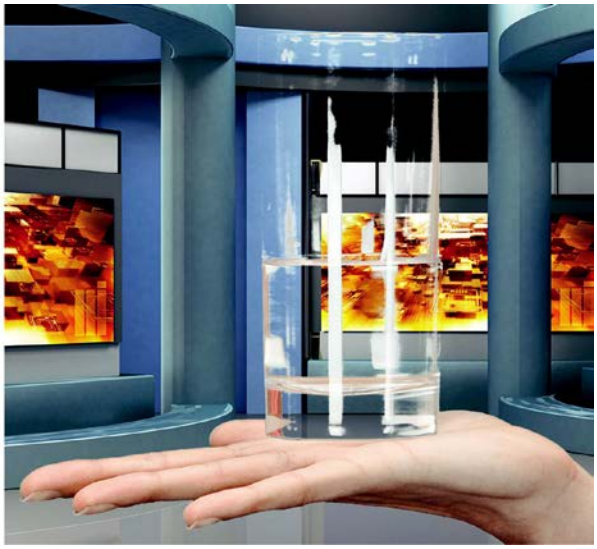
The other one, **Luminance**, improves the structure of the uniform colour of the white mask.

The **Luminance** slider

It improves in particular the visibility of an object in the case of a significant difference in luminance between the background and the object. This means that semi-transparent objects, e.g. a glass or glasses, become more distinct. A view 'before' and 'after' an adjustment is presented in the two pictures below.



A view before a **Luminance** adjustment



A view after a **Luminance** adjustment

The **Color** function is also used to bring about another effect. Once the option **Show alpha matte** is switched off and the real picture is restored, it is possible to eliminate unnatural outlines. This can be done by improving the border value between the keyed colour and the object.

A view before a **Color** adjustment

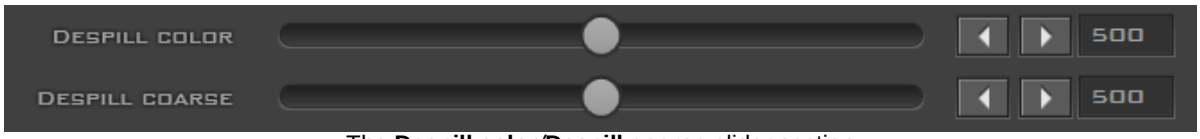
A view after a **Color** adjustment

Removal of Keying Colour Remains (Despill)

Once the correct mask is set, the functions in the **Spill correction** section will eliminate the reflection of the colour of the keyed background in the object.

Impact of the background colour on the object – a view before a **Despill** correction

Despill color and **Despill coarse** belong to the functions for the preliminary elimination of unwanted colours, and are based on the RGB space.



The **Despill color/Despill coarse** slider section

Once the **Despill color** slider is moved to position 0 (the left-hand side), the algorithm will automatically remove the green colour component if this is the keyed colour (similarly – blue if the background is blue). Once the **Despill color** slider is moved to position 1000 (the right-hand side), however, the algorithm will automatically add the red colour and the blue colour (if the keyed colour is green) or red and green (if the background is blue).

The **value** of the algorithm is controlled by means of the **Despill coarse** function.

If the keyed background is green, after a certain threshold of the **Despill coarse** function is crossed, the green component is entirely eliminated from the object in the RGB (red, green, blue) space, which results in the transition of colours into the purple (magenta) area.

A view after the green component has been eliminated

Another function enables a more accurate adjustment of the above problem. The use of the **Despill fine** function eliminates the keyed background colour from the object, but this time on the basis of the chrominance components.

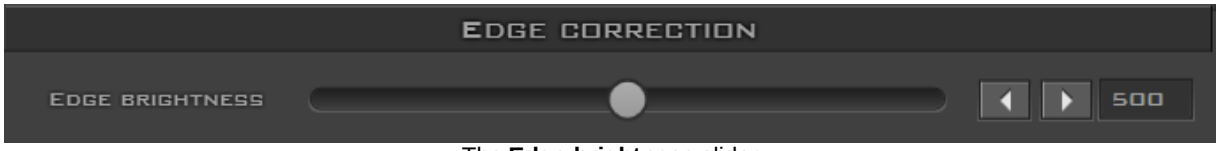
The **Despill fine** slider

After the application of **Despill coarse**, which is used for preliminary correction, more accurate adjustments can be made, and so the **Despill fine** settings may not have any significant impact on the algorithm if **Despill coarse** is set to high.

Impact of the background on the object – a view after a Despill correction

Additional Correction to Improve Quality

The **Edge brightness** function is used to correct semi-transparent areas (e.g. hair ends that need to be darkened or brightened) in order to make an object look natural.



The **Edge brightness** slider

A view before an **Edge brightness** adjustment

A view after an **Edge brightness** adjustment

Limitation of the Mask Area

Garbage mask is used to reduce the mask size by cutting it (in all of the possible directions: left, right, up, down).

The **Garbage mask** section

This function is used if the view of the keyed background is not large enough to fill in the entire object shot.

A view from the camera area

By cutting the remaining elements by means of the sliders **Left, Right, Top, Bottom**, it is possible to place the object within the area of the keyed background.

A view after a **Garbage mask** correction with the keying algorithm switched off

After enabling the chroma keying function, the following effect is obtained.

A view after the **Garbage mask** correction with the keying algorithm switched on

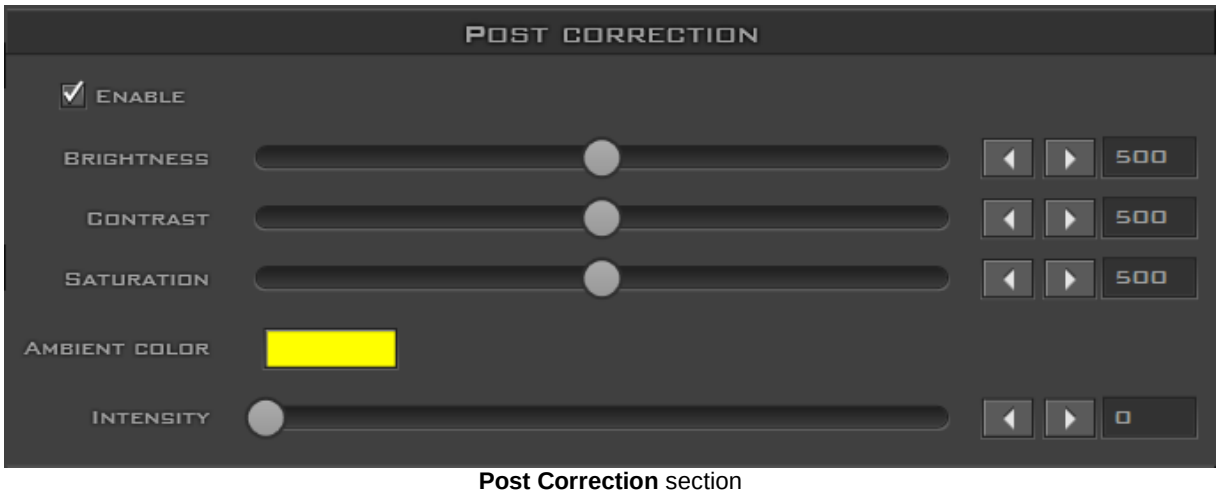
Comments: It should be kept in mind that in this case the object may only move within the area of the cut off mask – otherwise the object will disappear.

Furthermore, if the Garbage mask sliders are used, it is possible to check whether the previous settings were correct and whether they had any influence on the final look of the virtual background.

By moving for instance the Left slider within its full range, no noise, colour shifts or changes in the background grayness should be visible.

Post Correction

This function matches the object to the conditions of the virtual background. The following functions are used for post-correction of the object and have no effect on its virtual background.



Post Correction section

Enable – this enables the post-correction options to be switched on or off.

Brightness – this enables additional colour brightness to be introduced into the picture.

Contrast – this enables the contrast between colours to be increased.

Saturation – this enables colour saturation to be boosted.

Ambient Color – this enables an ambient component to be introduced into the picture.

Intensity – this enables the ambient colour intensity to be set.

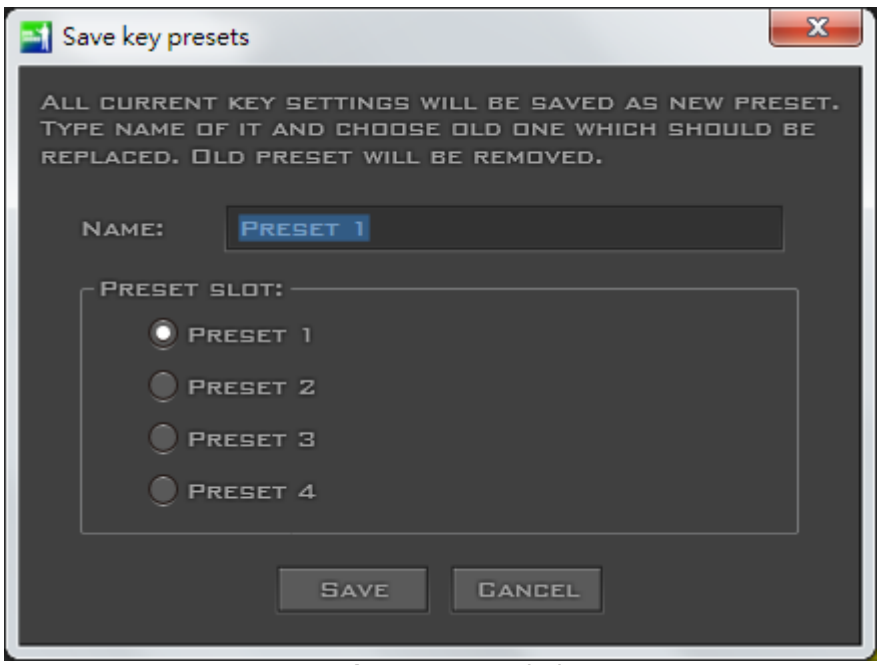
In order to match an object to a background, the correction functions should be used. This is possible by switching on an additional component of the dominating colour already in the virtual picture. For example, if an object in a studio is shown against a background in the form of a sunny beach, and so the yellow colour is added (the dominating colour of sand or the sun, which has an impact on the object), the correction functions will match the object to the existing conditions.

User Presets

User Presets section

Preset Name
These are four buttons enabling slider settings to be loaded from data recorded in the device. Each button has a name that can be modified when a given setting (preset) is saved.

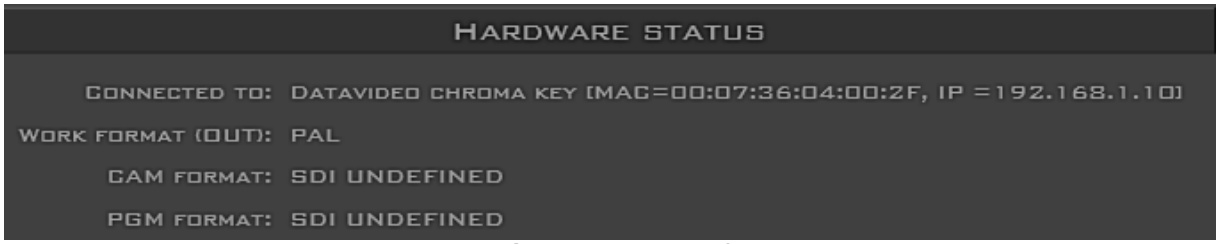
Save Preset
This function activates the OS (e.g. Windows) used to save the current settings of the sliders. It operates as one of the presets saved in the device.



Save key presets window

Hardware Status

This section displays software information, network information, and video formats.



Hardware Status section

Connected to

This option is used to show the name of the device with which **Key control** cooperates.

Work format

This is the output format of the camera.

Cam format

This is the input format of the camera.

BKG format

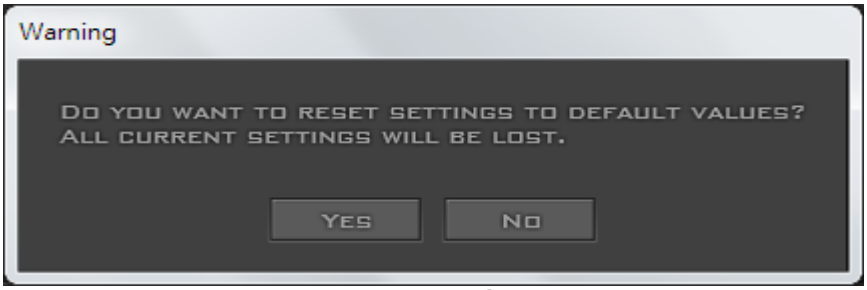
This is the input format of the background.

Main Window Functions

Main Window Functions section

Reset all

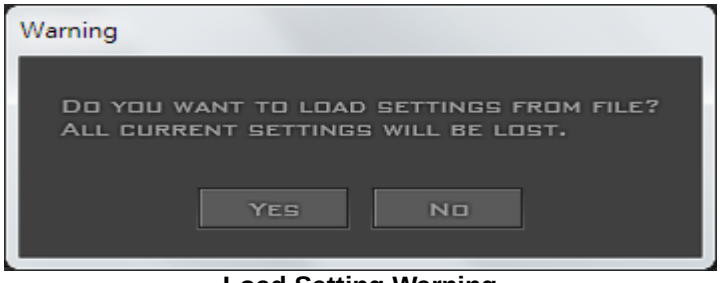
This function enables the sliders to be moved to their default positions.



Reset Warning

Load setting

This function enables slider settings to be loaded from file.



Load Setting Warning

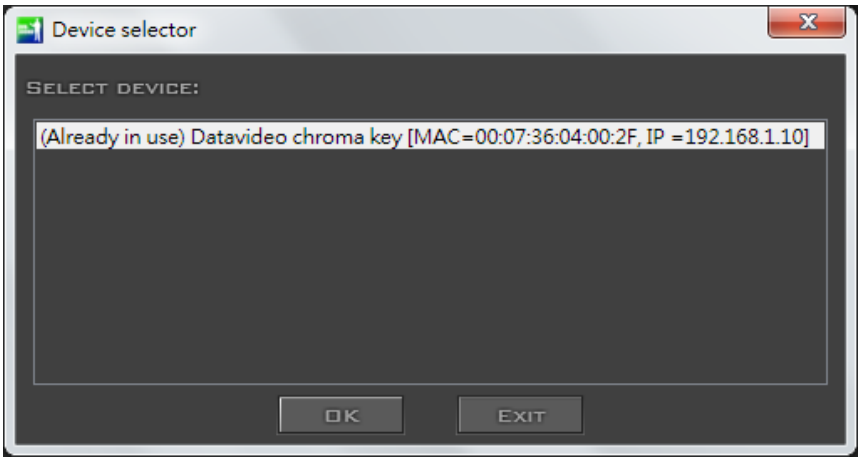
Save setting

This function enables the current slider settings to be saved to file.

Change Device

This function enables activation of the device selection window on the basis of the device's name, MAC address or allocated IP network address.

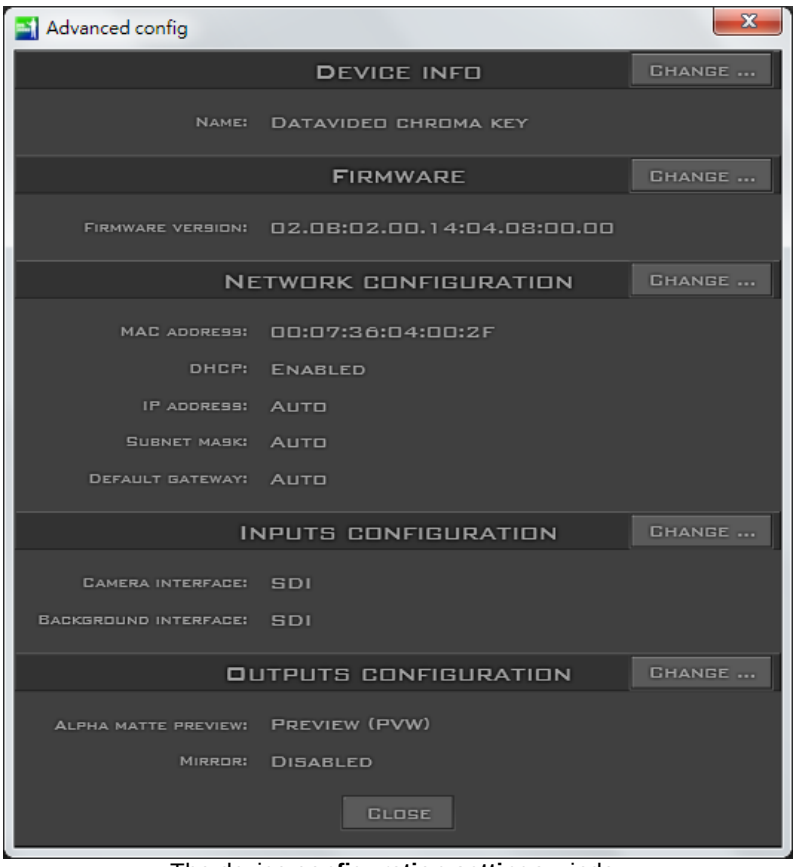
Change Device button



The **Device Selector** window

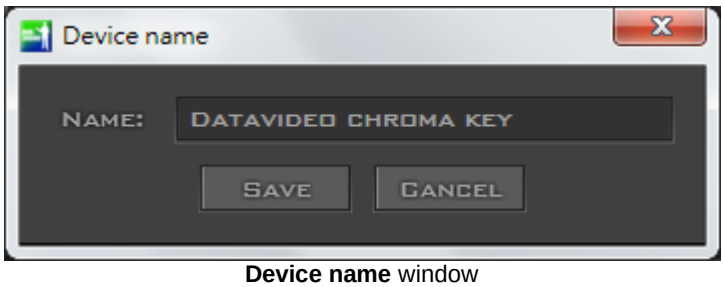
Configuration

This function opens the device configuration window.



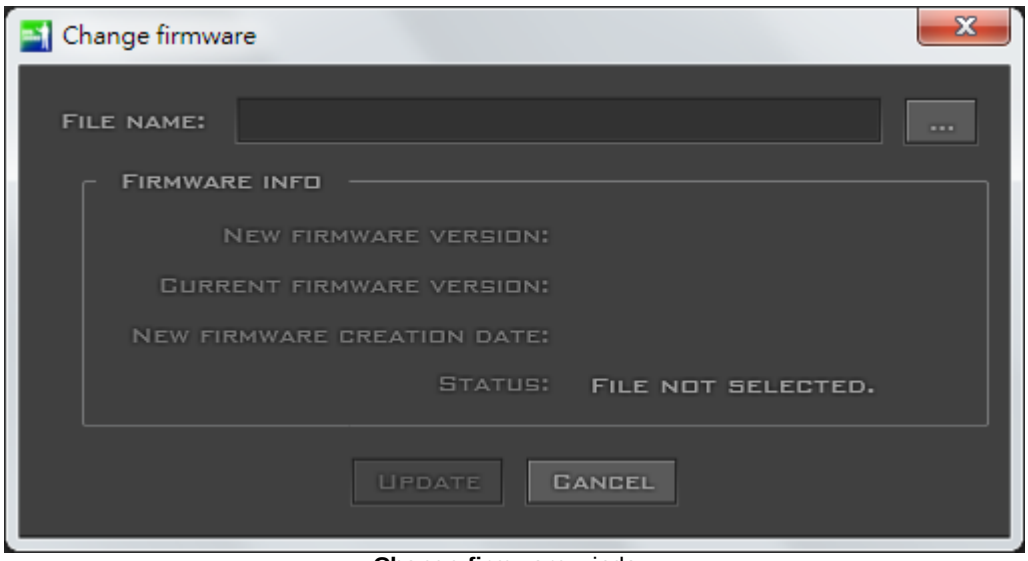
The device **configuration settings** window

Device info – this option enables the device name to be entered.



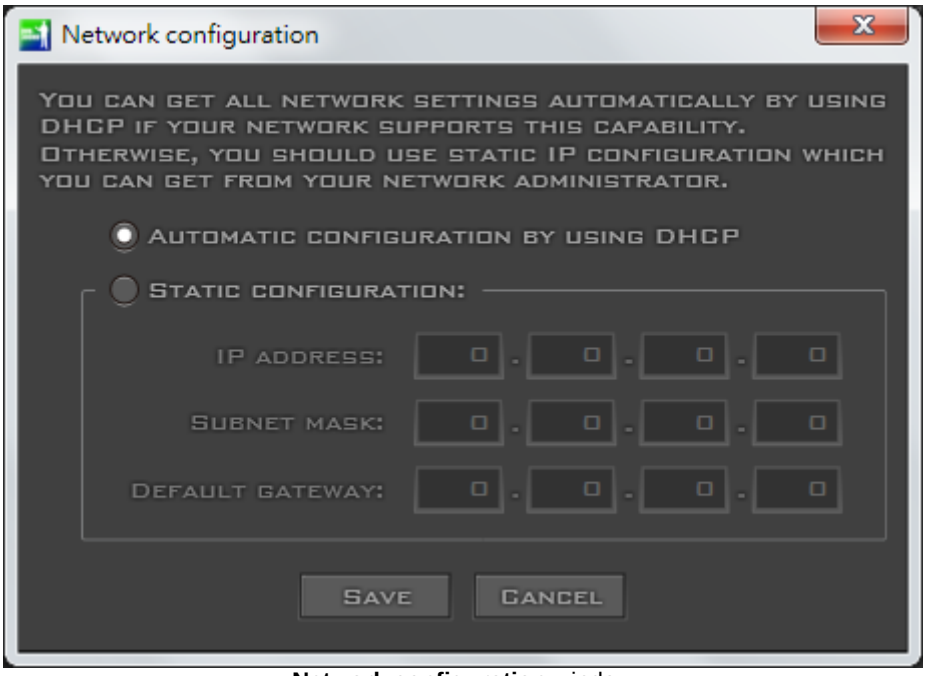
Device name window

Firmware – it shows the firmware version and click on the change button to start the firmware upgrade wizard.



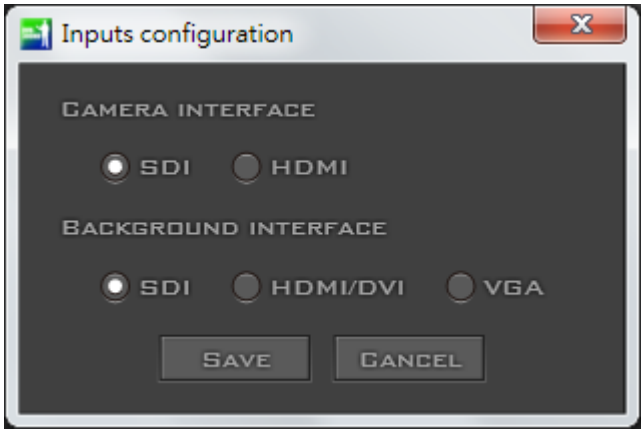
Change firmware window

Network configuration – this option enables network settings to be configured.



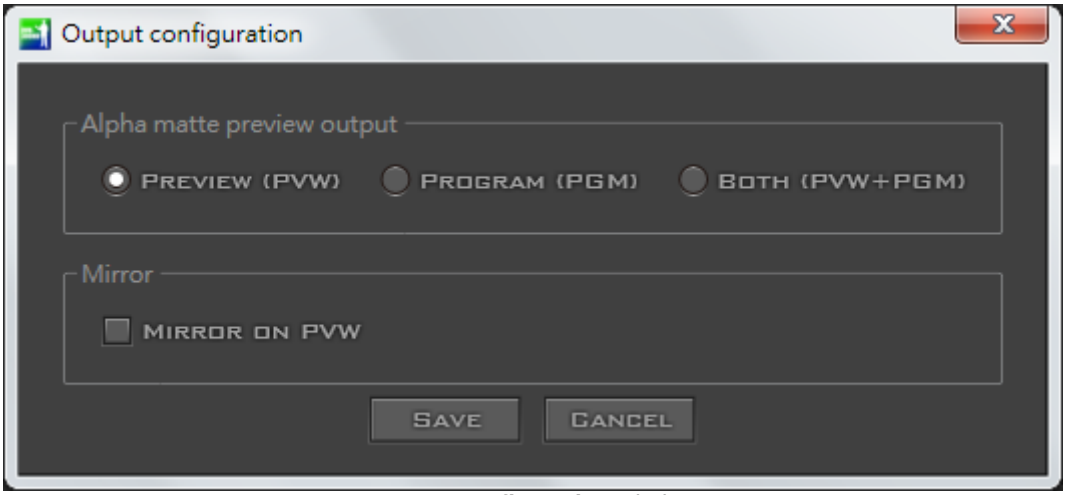
Network configuration window

Inputs configuration – this option enables the interface type to be set for the camera input and the background.



Input configuration window

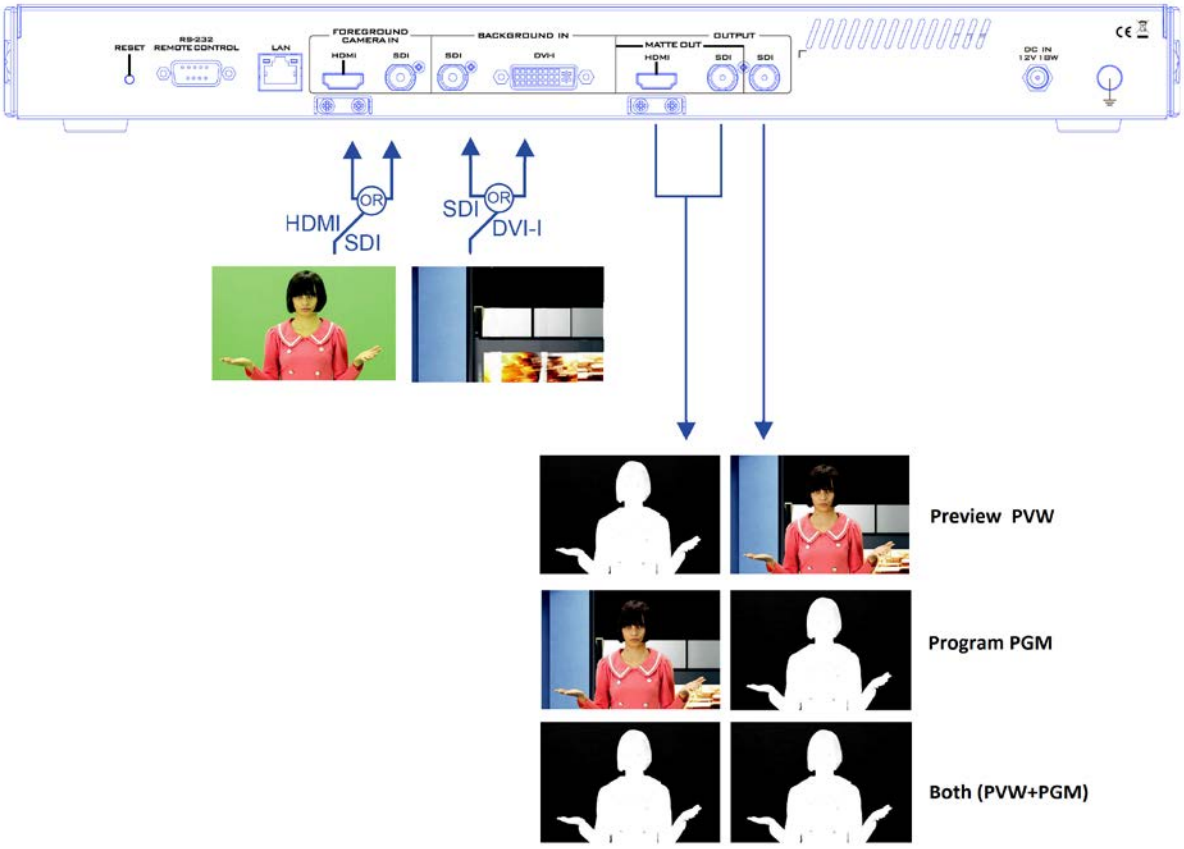
Outputs configuration – this option allows the user to select the logical output on which the MATTE is visible.



Output Configuration window

As illustrated in the diagram below,

PVW output only: HDMI or SDI
PGM output only: SDI
PVW and PGM: HDMI or SDI/SDI



Please note that in order to switch the output on which the MATTE view is shown, SHOW ALPHA MATTE mode must be selected in the main window of the application.

Mirror – Mirror function inverts the image rotation along the vertical axis (PVW out connectors, HDMI/SDI). This function is very useful for talent to see his composed preview on side monitor. Checking/Unchecking **MIRROR ON PVW** box enables/disables the mirror function. Note that mirror function introduces frame delay to the system.

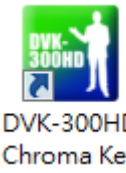
Exit

Click on this button to exit from the program

8. Connecting DVK-300HD to SE-2800 Switcher

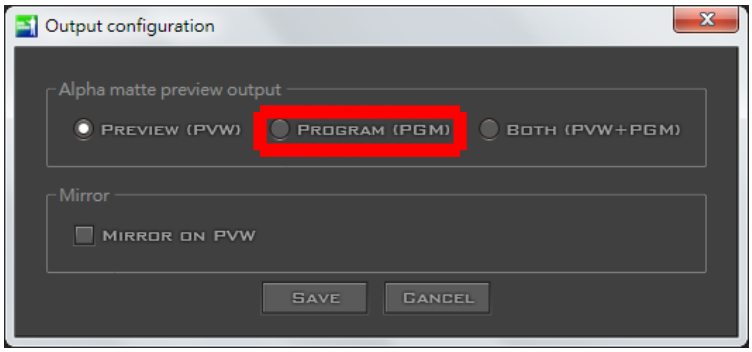
In other applications, DVK-300HD Chroma Key, for example, can be connected to SE-2800 Switcher for switching between different live backgrounds. Live backgrounds are captured using multiple cameras and fed into SE-2800 switcher. Talent, in the indoor studio, stands in front of a green background, which can be keyed out using DVK-300HD Chroma Key. The procedure of switching live backgrounds behind the talent is outlined as follows:

1. First of all, double click on the DVK-300HD icon into the DVK-300HD core.

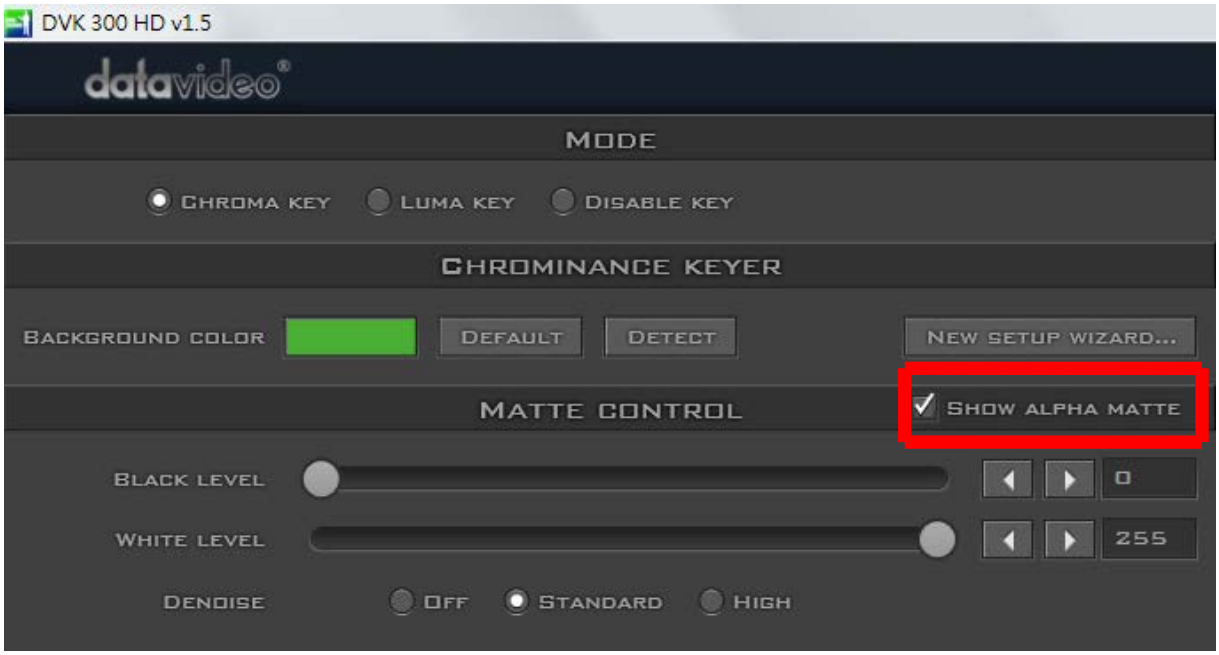


2. After you have entered the DVK-300HD Utility Program, check your SW and FW versions, and make sure they are the latest versions.

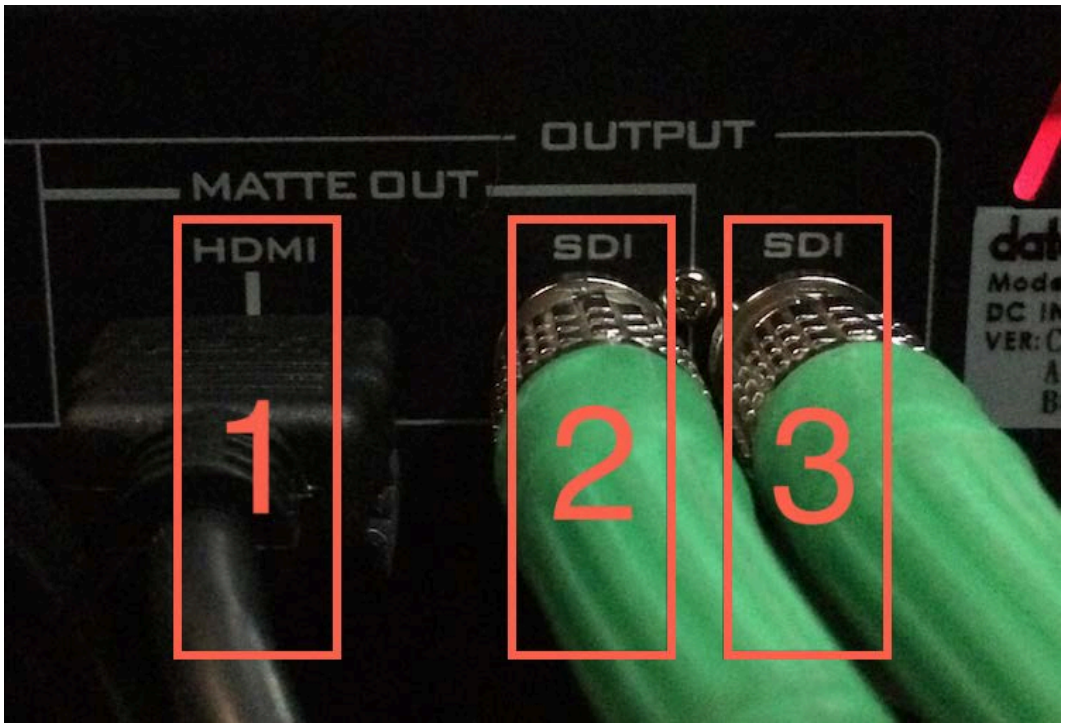
3. Click on the configuration button located at the bottom right corner to open the OUTPUT CONFIGURATION window and set Alpha Matte Preview Output to PROGRAM (PGM). Close the window after that.



4. Check “SHOW ALPHA MATTE” in the MATTE CONTROL section.

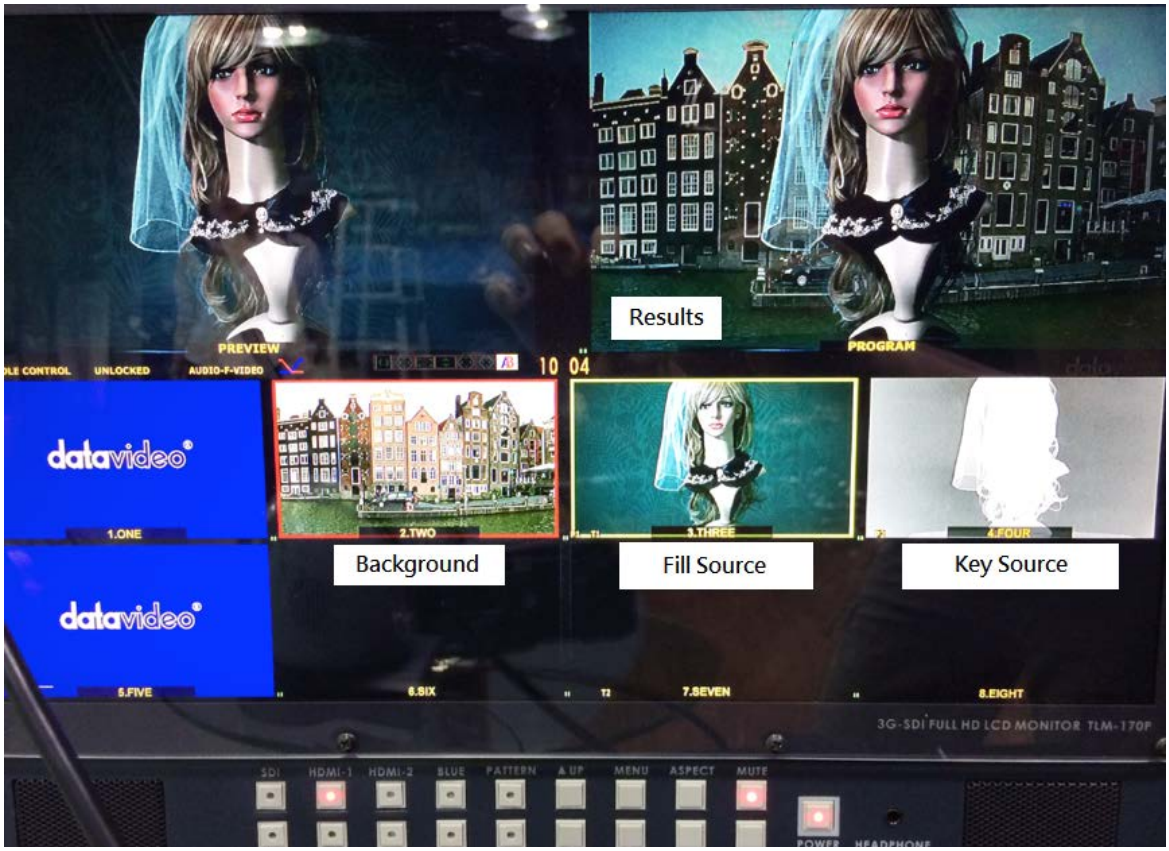


5. Physical OUTPUT ports of DVK-300HD will be:
   a. MATTE OUT:
      HDMI Out (1): Program view output (Fill Source)
      SDI Out (2): Program view output (Fill Source)
   b. Program Out:
      SDI Out (3): MATTE output (Key Source)



6. Connect Fill Source (SDI Connector 2) and Key Source (SDI Connector 3) to the SE-2800 Switcher input ports, which must be neighboring inputs. On the output screen, Fill Source is in the front and behind the fill source is the Key Source.

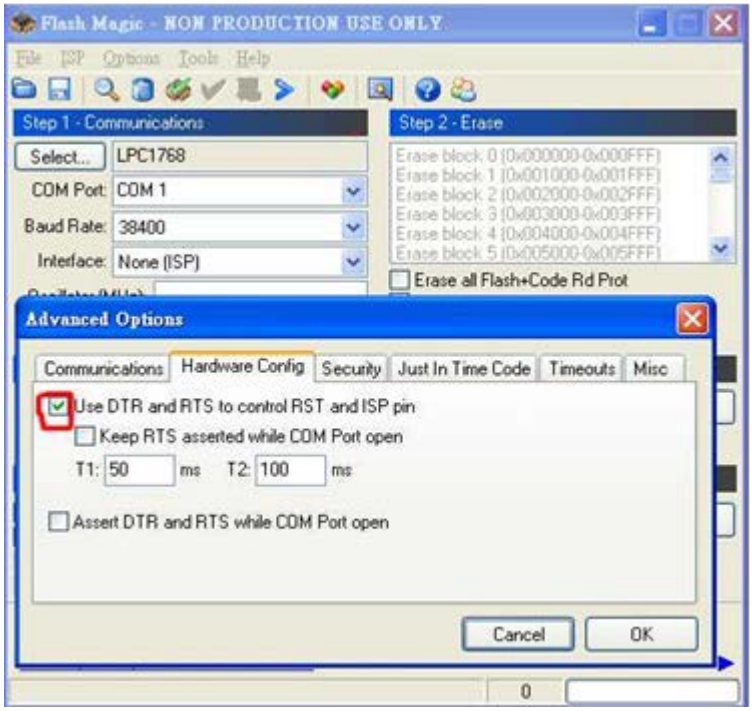
7. The SDI input connected to the Fill Source is then assigned to DSK of the SE-2800 switcher. After that, other PROGRAM sources of SE-2800 switcher can then serve as the background and be switched as the user wishes.


Results
PREVIEW
PROGRAM
UNLOCKED
AUDIO-F-VIDEO
10 04
datavideo
1.ONE
2.TWO
3.THREE
4.FOUR
Background
Fill Source
Key Source
datavideo
5.FIVE
6.SIX
7.SEVEN
8.EIGHT
3G-SDI FULL HD LCD MONITOR TLM-170P
SDI
HDMI-1
HDMI-2
BLUE
PATTERN
MENU
ASPECT
MUTE
POWER

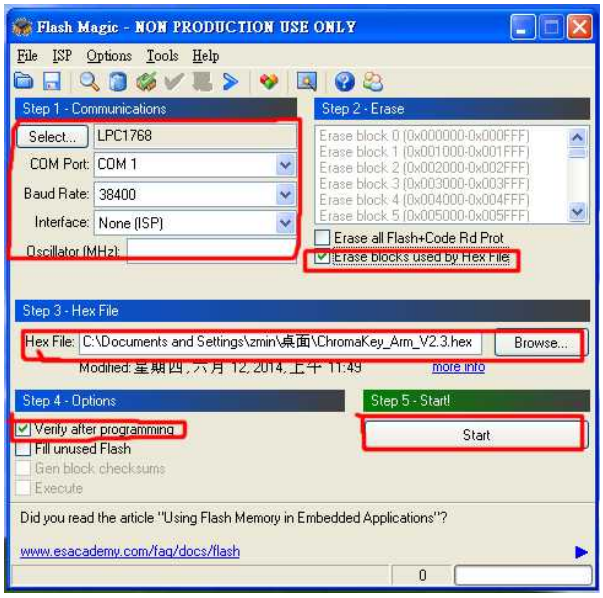
9. Firmware Update

Firmware Update via RS232

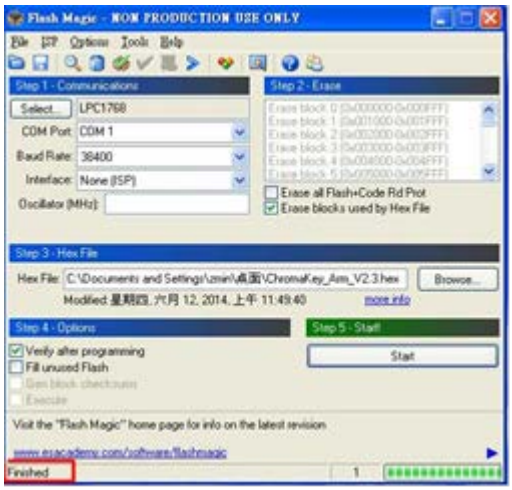
1. Connect PC's RS232 port to the RS232 port of the DVK300HD; use the standard extension cable and make sure the connectors are pin-to-pin.
2. Run NXP Flash Magic application
3. Options→ Advanced options→ Hardware Config tab→ Check the box (Use DTR and RTS to control RST and ISP pin) as shown in the diagram below



4. Close the Advanced Options dialogue box and on the main window, select LPC1768 processor, a proper COM port, and baud rate (38400) as shown below.
5. Load the correct HEX file as shown in the diagram below
6. Select the options "Erase blocks used by Hex File" and "Verify after programming" by checking the corresponding boxes
7. Click Start



8. Reboot the device when the status at the lower left-hand corner of the main window displays “Finished”



Note: For information on RS-232 protocol commands, please refer to the DVK-300HD RS-232 protocol document on the CD that comes with the product.

10. Specifications

Input Interface	Video Camera	1 x BNC connector, 75 Ohm up to 3 GB/s SDI input
		1 x HDMI v1.4 connector
	Video Background	1 x BNC connector, 75 Ohm up to 3 GB/s SDI input
		1 x DVI-I connector for HDMI/DVI/VGA input
Output Interface	Video PGM	1 x BNC connector, 75 Ohm for SDI output
	Video PRV	1 x BNC connector, 75 Ohm for SDI output
		1 x HDMI v1.4 connector
Signal Format	Camera Input	**SDI Formats:** 576i, 480i (SMPTE 259M-C) 1080i50, 1080i59.94,1080i60, 720p50,720p59.94, 720p60, 1080p25, 1080p30 (SMPTE 292M)1080p50, 1080p59.94,1080p60 (SMPTE 425M) **HDMI Formats:** 480i/576i/720p50/720p59.94/720p60/1080i50/1080i59.94/1080i60/1080p25/1080p30/1080p50 / 1080p59.94/1080p60
	Background Input	**SDI Formats:** 576i, 480i (SMPTE 259M-C) 1080i50, 1080i59.94,1080i60, 720p50,720p59.95, 720p60, 1080p25, 1080p30 (SMPTE 292M)1080p50, 1080p59.94,1080p60 (SMPTE 425M) **HDMI/DVI Formats:** 480i/576i/480p/576p/720p50/720p59.94/720p60/1080i50/1080i59.94/1080i60/1080p25/1080p30/1080p50 /1080p59.94/1080p60 **VGA Formats:** 800x600/1024x768/1152x864/1280x720/1280x1024/1360x768/1400x1050/ 1440x900/1920x1080
Remote control interface		LAN / RJ-45 port for PC access and F/W upgrade RS-232 for PC access (not available yet)
Power Consumption		12V/ 18W

Notes

Service & Support

It is our goal to make owning and using Datavideo products a satisfying experience. Our support staff is available to assist you to set up and operate your system. Contact your local office for specific support requests. Plus, please visit www.datavideo.com to access our FAQ section.

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Please refer to our website for update the latest version manual.
www.datavideo.com/Chromakeyers/DVK-300HD

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