HD CHROMA KEYER

DVK-300HD

Quick Start Guide

www.datavideo.com

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HD CHROMA DVK-300HD www.datavideo.com

En temps réel le Chroma pour toutes les productions virtuelles en direct. Il prend en charge Full HD, HD , SD. Il met en œuvre algorithme complexe, fournir les bons résultats avec un minimum de sensibilité à la lumière, de bruit de la caméra, et les distorsions de fond.
Chroma Key - Entrées caméra avec objet sur fond vert ou bleu. Le signal de fond généré par PC ou toute autre source des médias.
Luma Key - Entrées caméra fourniront signal généré par ne importe quel appareil avec du noir ou blanc en toile de fond ou un signal de fond généré par PC ou toute autre source des médias.

Caractéristiques
réduction du bruit
Couleur traitement
Le contrôle des bords (luminosité)
Le post-traitement - correction des paramètres de l'image (luminosité, contraste, saturation) appliquée sur signal de premier plan après le processus de saisie.
entrées vidéo (SD, HD et 3G)

Contexte entrées SDI, DVI-I (HDMI, DVI, VGA) - en VGA elle sera la meilleure qualité aussi proche que possible de la résolution de sortie.
Entrées caméra (au premier plan) SDI, HDMI
sorties vidéo (SD, HD et 3G) – la sortie idem à l'entrée de la caméra
Sortie principale 1 (2xSDI) - (au premier plan + fond) ou la vue mat
Sortie principale 2 (HDMI) - (au premier plan + fond) ou la vue mat masque de Garbage

L'utilisateur peut définir zone rectangulaire qui sera pris comme masque d'ordures pour incrustation couleur
contrôles
LAN: Compatible DHCP, au cas où aucun reçoit adresse IP définie automatiquement 192.168.1.10. Utilisateur a la possibilité de définir sa propre adresse IP en cas pas de disponibilité de DHCP et de travail dans d'autres segment de réseau.
RS 232: contrôle de PC à distance (pas encore disponible)
LED de signalisation: Signal détecte entrées / format actuel
RESET: Bouton de réinitialisation

Fonctions Panneau avant
Power Switch:ON / OFF
Source d'entrée:
CAMERA IN - Afficher la source d'entrée de la caméra (SDI / HDMI).

CONTEXTE EN - Afficher la source d'entrée de fond (SDI / DVI).

Panneau arrière
RAZ: Le bouton de réinitialisation restaure par défaut
RS-232: contrôle de PC (pas encore disponible)
LAN: réseau Ethernet. Connectez-vous à un ordinateur portable ou un PC, utilisez le logiciel de contrôler les fonctions DVK-300HD.
PREMIER PLAN DANS CAMERA
Reçoit le signal d'entrée HDMI et SDI à partir de votre appareil HDMI/SDI
ENTREE IN : SDI et DVI-I à partir de votre appareil
SORTIE: HDMI et SDI se connecte signal de sortie (OUT MATTE constitue un aperçu en noir et blanc Niveau Effet chroma key)
Sortie SDI : sortie du programme
DC IN: Branchez le bloc d'alimentation 12V

Installez le logiciel DVK-300HD
DVK-300HD utilise le réseau Ethernet pour se connecter à un ordinateur puis utilise le logiciel DVK-300HD pour l'ensemble des fonctions.
Etape 1: cliquez sur installer un logiciel DVK-300HD
Etape 2: Installation étape par étape le logiciel DVK-300HD
Etape 3: exécuter le logiciel.

Logiciel DVK-300HD
Key Mode
Sélectionnez la touche de fonction Chroma Key / Luma Key / Désactiver la touche.
Cliquez barre de couleur pour sélectionner la couleur de fond est vert ou bleu.
Cliquez sur ce bouton pour configurer le logiciel DVK-300HD.

Assurez-mat noir parfait de fond
La première étape consiste à sélectionner si vous utilisez fond vert ou bleu en cliquant sur **la couleur de fond** plus grande rectangle.
Prochain objectif pour obtenir la matte de parfaite fond noir en vue mat.
Pour basculer vue matte utilisateur besoin de cliquer **Matte Voir** case sur l'aperçu de sortie.
Exemple de vue mat avec des valeurs neutres
Pour ce faire, le meilleur moyen est d'utiliser **le niveau de noir,** et dans les cas plus difficiles, (ce est à dire lorsque bords de la cheville devient trop
forte) **Tolérance.** Dans la plupart des cas pour atteindre matte bon (noir) pour le fond de la première de deux curseurs
mentionné ci-dessus est assez.
Matte vue après le changement des valeurs neutres pour obtenir le mat de fond noir. (Noir niveau 180)
Bien que l'exemple montré le niveau de noir était assez ce ne est pas la règle selon laquelle il doit être comme ça. Il y a beaucoup de conditions comme la qualité de la

peinture, les réglages de Lights, Camera, ancre vêtements, etc. qui affecte sur la saisie et ses paramètres.

Faire blanc mat solid

Il ya quelques scénarios où après la matte de l'étape 1 ancre ne est pas solide blanc. Utilisez **le niveau de blanc** pour corriger cela.

Exemple de situation où nous avons la matte de parfaite fond noir mais pas la matte de solide point d'ancrage.

Pour aider ce mouvement **White Level** curseur à la position inférieure.

Bien sûr, si la couleur sur l'ancre sera trop similaire à la couleur de fond, probablement même le niveau de blanc curseur ne sera pas aider, car il entraînera l'arrière-plan pour être aussi à nouveau visible.

L'idée de cette étape est d'essayer d'obtenir la matte de solide point d'ancrage sans perdre noir parfait sur le fond.

Si il se est avéré impossible, alors la dernière chance est de travailler avec des curseurs de tolérance.

Maintenant le mat et de nous ancrage solide blanc ont la matte de parfaite fond noir.

La principale règle à travailler avec des curseurs est d'obtenir les meilleurs résultats avec le déplaçant le moins possible. Donc, si l'utilisateur est en mesure de réaliser la matte de solide point d'ancrage sur les différentes façons, l'une avec le mouvement du curseur plus bas doit être choisi

la suppression en cas de déversement

Après la mise en matte bon , la prochaine étape est un processus appelé suppression de déversement. Le curseur qui est utilisé sur ce étape **DeSpill** grossier.

Inférieurs à 500, il ne affectera que les pièces où la couleur a le même ton que la couleur d'arrière-plan (verdâtre ou bleuâtre).

Plus de 500 il commence lentement à affecter de plus en plus de pièces où la couleur de fond ne est pas dominante plus. Les bonnes règles est de déplacer cette valeur jusqu'à ce qu'il ne affecte pas les autres couleurs où la suppression de déversement n'a pas eu lieu.

DeSpill Couleur curseur décide le ton de l'enlèvement de la couleur de fond.

Des valeurs plus faibles vont diminuer fond couleur dominante d'un objet de premier plan.

Des valeurs plus élevées ajouter quelques couleurs différentes d'une couleur de fond.

Ce que cela signifie également que avec une grande puissance de DeSpill il peut aussi rend bords et d'autres parties proches de fond couleur plus foncée ou plus claire selon que DeSpill couleur sera inférieure ou supérieure à 500 valeur.

Bien **Despill** aide à éliminer les reste du déversement qui n'a pas été enlevé avec **Despill** grossier. Sa valeur par défaut est de 500.

Luminosité bord

Il ya aussi le contrôle qui affecte uniquement sur les bords et toutes les autres parties semi-transparentes de l'image. The **Edge**
Curseur **Luminosité** affecte directement et uniquement sur luminosité de parties d'images semi-transparentes comme le bord de l'ancre.
Ce est la position neutre est de 500 ce qui signifie qu'il n'y a pas d'éclaircissement ou d'assombrissement des bords supplémentaires. En descendant assombrit et se déplaçant jusqu'à illumine bords.

Processus post
Après le processus saisie il y a une possibilité de corriger résultat final avec le processus de poste.
Le processus de poste fonctionne par flux, pas la sortie mondiale. Pour l'utiliser, il doit d'abord être activé en cliquant sur **Activer** case.
Outre **la luminosité** standard, **Contraste** et **Saturation** paramètres, il ya des contrôles ambiantes.
Il peut être utilisé pour ajouter à l'ancre similaire tonalité de couleur que chargé studio virtuel pour aider l'ancre à regarder de plus naturel.
Pour ce faire d'abord l'utilisateur doit choisir la couleur qui est similaire à la couleur principale de la chargée mis en cliquant sur
Carré de couleur ambiante et la cueillette à partir de dialogue de couleur.
Alors la seule chose à faire est de régler **l'intensité** de la couleur ambiante.
Couleurs chaudes naturelles d'ancrage sur le plateau avec seulement couleurs bleues
La même ancrage avec une certaine ambiance bleuté ajouté dans le processus de poste.
Il est intéressant de mentionner que les paramètres ambiantes peuvent également aider à la suppression de déversement.

Presets utilisateur
Rappel des réglages de l'une des quatre mémoires utilisateur.((Toutes les préférences de l'utilisateur)
Magasins tous les paramètres actuels à quatre mémoires utilisateur. Tous les réglages et préférences sont stockées. (Cette fonction est stocké dans DVK-300HD)
masque de Garbage
Supprime les bords problématiques sur le côté droit de l'objet. 0 quitte le bord non affecté, 1000 est le masque maximale.
Etat du matériel
Il affiche la version du logiciel et le statut de vidéo, etc.
Memoires fichier :
Ce bouton permet de réinitialiser tous les paramètres.
Charge les réglages depuis le fichier des mémoires utilisateur.
Stocke tous les réglages actuels fichier souvenirs. (dans ordinateur)
Zone de configuration
Ce bouton est de changer dispositif DVK-300HD.
Configuration DVK-300HD réseau, entrée, sortie, etc.

Cette fonction permet de changer DVK-300HD nom de l'appareil.
Cette fonction est la mise à jour du firmware.
Cette fonction est pour la configuration réseau.
Cette fonction est pour la configuration d'entrée.
Cette fonction est pour la configuration de sortie.

Interface
Vidéo Caméra
1 x connecteur BNC, 75 ohms jusqu'à 3 Go / s SDI
Connecteur 1 x HDMI v1.4
1 x connecteur SDI en BNC, jusqu'à 3 Go / s
1 x connecteur DVI-I (HDMI / DVI / VGA)
Sortie interface
PGM de la vidéo
Connecteur BNC : sortie SDI
Connecteur 1 x HDMI v1.4

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)
Formats HDMI:
480i / 576i / 720p50 / 720p59.94 / 720p60 / 1080i50 / 1080i59.94 / 1080i6
0 / 1080p25 / 1080p30 / 1080p50 / 1080p59.94 / 1080p60
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)
Formats HDMI / DVI:
480i / 576i / 480p / 576p / 720p50 / 720p59.94 / 720p60 / 1080i50 / 1080i5
9,94 / 1080i60 / 1080p25 / 1080p30 / 1080p50 /1080p59.94/1080p60
VGA Formats:
800x600 / 1024x768 / 1152x864 / 1280x720 / 1280x1024 / 1360x768 / 1
400x1050 / 1440x900 / 1920x1080
Interface de contrôle à distance :
LAN / port RJ-45 pour le contrôle du PC et sa mise à niveau
RS-232 pour le contrôle de PC (pas encore disponible)

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Product Overview

A real time Chroma key and Luma key for any live virtual productions. It supports Full HD, HD and SD video signals. It implements complex algorithm, provide the good results with minimal sensitivity to light, camera noise, and background distortions.

Chroma Key - Camera inputs with object on green or blue backdrop. Background signal generated by PC or any media source.

Luma Key - Camera inputs will provide signal generated by any device with black or white backdrop. Background signal generated by PC or any media source.

Features

- Key noise reduction
- Color spill processing
- Edge control (brightness)
- Post processing – correction of picture parameters (brightness, contrast, saturation) applied on foreground signal after keying process.
- Video inputs (SD, HD, and 3G)
  - Background inputs SDI, DVI-I (HDMI, DVI, VGA)- in case of VGA input the best quality will be available when VGA resolutions will be as close as possible to output resolution.
  - Camera inputs (foreground) SDI, HDMI

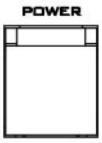
- Video outputs (SD, HD, and 3G) – output will be in same resolution as camera input
  - Main output 1 (2xSDI) – (foreground + background) or matte view
  - Main output 2 (HDMI) – (foreground + background) or matte view

- Garbage mask
  - User can define rectangle area which will be taken as garbage mask for Chroma keying process.

- Controls
  - LAN: DHCP support, in case no receives IP address automatically set 192.168.1.10. User has a possibility to set its own IP address in case no DHCP availability and work in other network segment.
  - RS 232: remote PC control (not available yet)
  - Signal LEDs: Signal detects/ inputs format present
  - RESET: Reset button will restore factory default

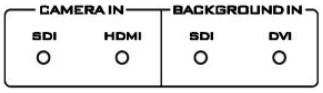
Functions

Front Panel



Power Switch

Powers the DVK-300HD On / Off.

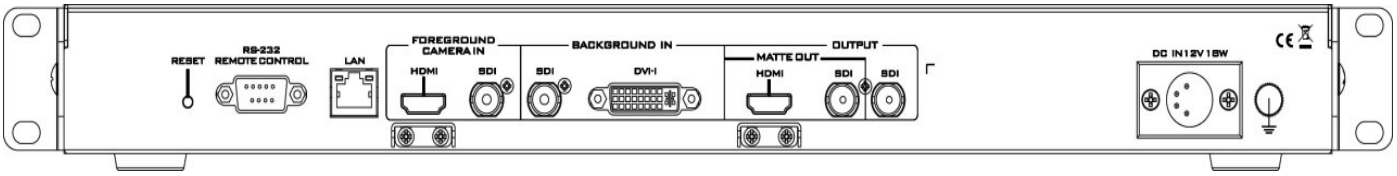


Input Source Indicate

CAMERA IN - Display the camera input source (SDI / HDMI).

BACKGROUND IN - Display the background input source (SDI / DVI).

Rear Panel



RESET

The reset button will restore factory default

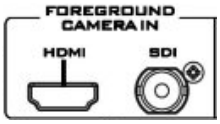
RS-232

RS-232 for PC control (not available yet)

LAN

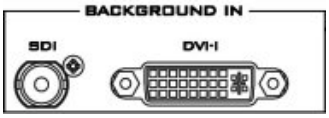
100/10M base Ethernet Network interface.

Connect to Laptop or PC, use software control the DVK-300HD functions.



FOREGROUND CAMERA IN

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



BACKGROUND IN

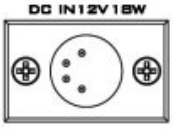
Receives SDI & DVI-I input signal from your SDI & DVI-I equipped Camera or device.

OUTPUT

HDMI & SDI output signal connects (MATTE OUT is for preview black & white Level chroma key effect).

SDI output

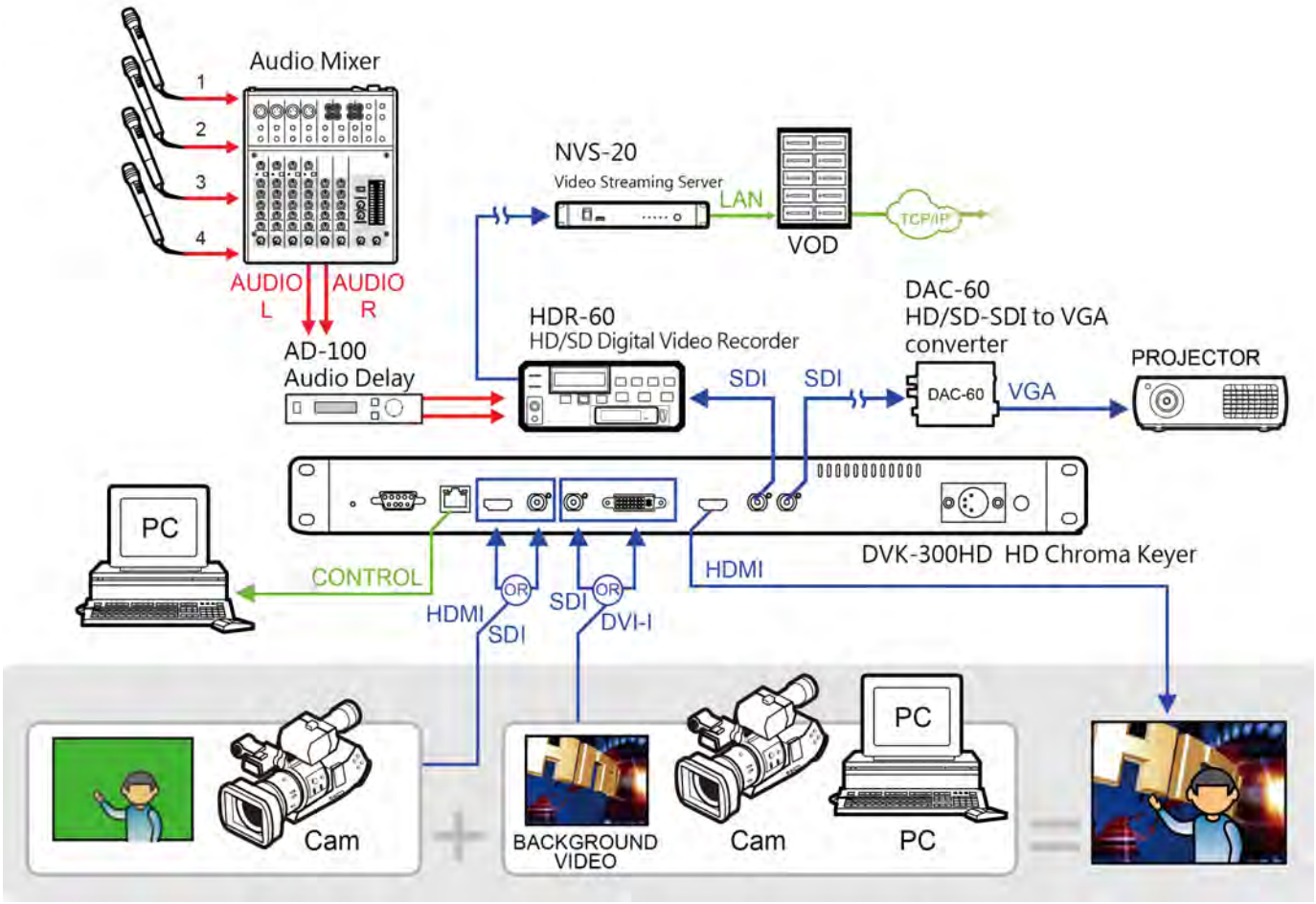
SDI connect is for program output



DC IN

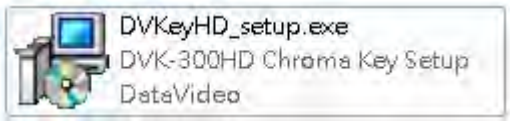
DC in socket connect the supplied 12V PSU to this socket. The connection can be secured by screwing the outer fastening ring of the DC In plug to the socket.

Typical Link Map



Install DVK-300HD software

DVK-300HD is uses Ethernet Network connect to Laptop or PC, and then uses DVK-300HD software control the all functions.

Step1: Please click 

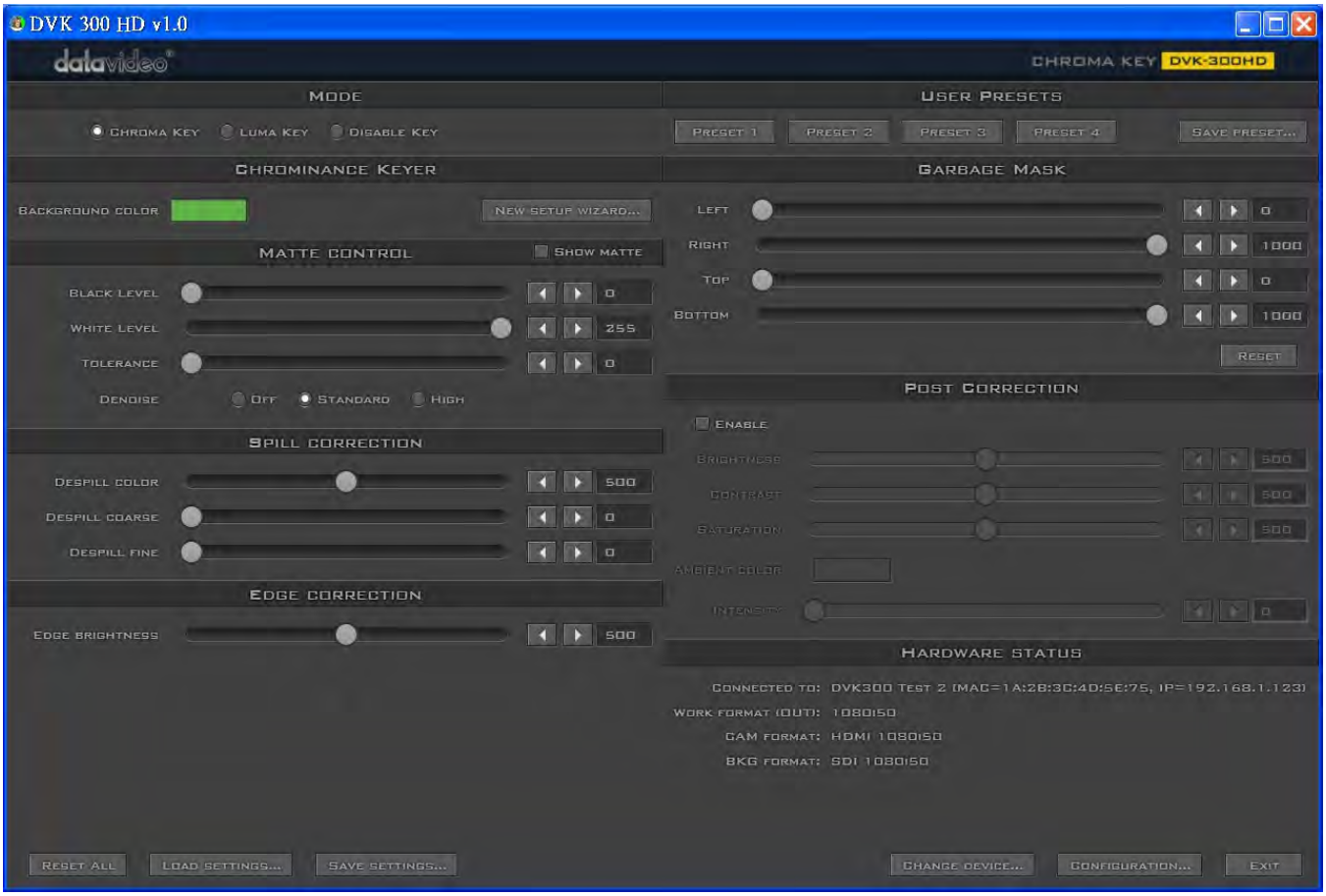
to install DVK-300HD software

Step2: Step by Step install the DVK-300HD software to finish.

Step3: When finished, please double click the

icon to execute the software.

DVK-300HD software



Key Mode

Select key function is CHROMA KEY / LUMA KEY / DISABLE KEY.

Click color bar to select background color is green or blue.

Click this button will display the how to quick setup DVK-300HD software.

Make background's matte perfect black

The first step is to select if you are using green or blue background by clicking on larger **Background Color** rectangle.

Next goal it to get perfect black background's matte in matte view.
To toggle matte view user need to click **Matte View** checkbox over the output preview.

Example of matte view with neutral values

To do this the best way is to use **Black Level**, and in harder cases, (i.e. when edge of the anchor is getting too sharp) **Tolerance**. In most cases to achieve proper matte (black) for the background the first of two sliders mentioned above is enough.

Matte view after changing neutral values to get black background's matte.
(Black level-180)

Although on the shown example the Black level was enough it is not the rule that it has to be like that. There are plenty of conditions like the quality of paint, lights settings, camera, anchors clothes, etc. which affects on keying and so on its parameters.

Making anchor's matte solid white

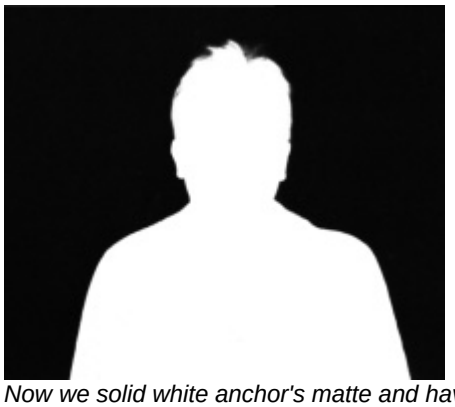
There are some scenarios when after step 1 anchor's matte is not solid white. Use **White Level** to correct this.

Example of situation where we have perfect black background's matte but not solid anchor's matte.

To help this move **White Level** slider to lower position.

Of course if the colour on anchor will be too similar to the background colour, probably even White Level slider won't help because it will cause the background to be also visible again.

The idea of this step is to try to get solid anchor's matte without losing perfect black on the background.
If it proved to be impossible then the last chance is to work with Tolerance sliders.



Now we solid white anchor's matte and have perfect black background's matte.

The main rule on working with sliders is to get the best results with moving it as less as possible. So if user is able to achieve solid anchor's matte on different ways, the one with the lowest slider's movement should be chosen

Spill suppression

After setting proper matte the next step is a process called spill suppression. The slider which is used mostly on this step is **DeSpill** Coarse.

Below 500 it will only affect the parts where colour has similar tone as background colour (greenish or bluish).

Over 500 it starts slowly to affect more and more parts where background colour is not dominant anymore. The good rule is to move this value up until it does not affect other colours where spill suppression didn't occur.

DeSpill Color slider decides the tone of background colour removal.

Lower values will decrease background dominant colour from a foreground object.

Higher values will add some colours different from a background colour.

What it also means is that with high DeSpill Power it can also makes edges and other parts close to background colour darker or brighter depending if DeSpill Color will be lower or higher than 500 value.

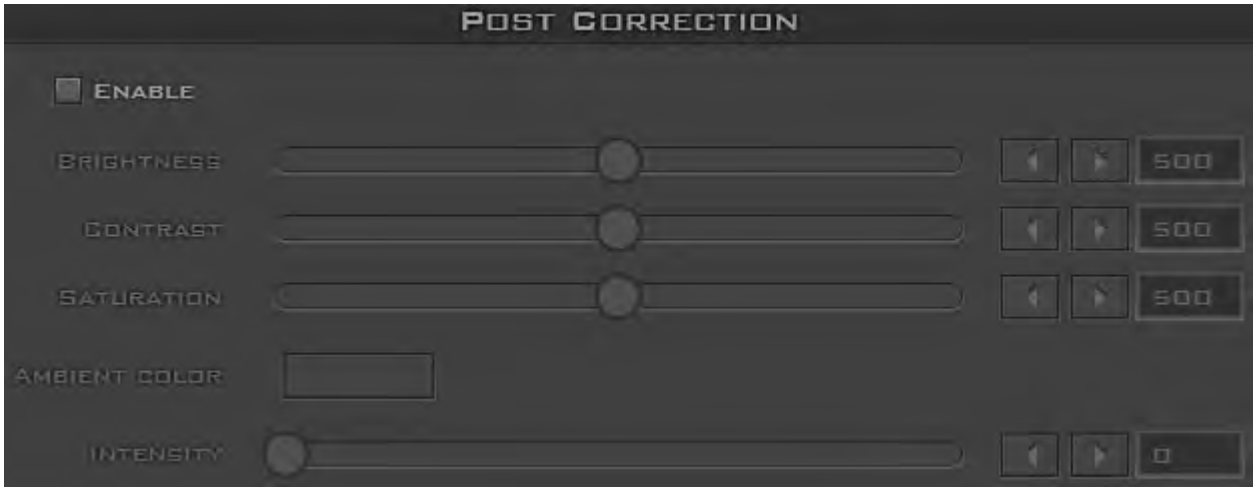
Despill fine helps to remove rest of the spill which was not removed with **Despill** Coarse. Its default value is 500.

Edge Brightness

There is also control which affects only on edges and any other semi-transparent parts of the picture. The **Edge Brightness** slider affects directly and only on brightness of semi-transparent picture parts like anchor's edge.

It's neutral position is 500 which means that there is no additional brightening or darkening of edges. Moving down darkens and moving up brightens edges.

Post process



After the keying process there is a possibility to correct final result with post process.

The post process works per stream, not the global output. To use it first it needs to be enabled by clicking on **Enable** checkbox.

Beside standard **Brightness**, **Contrast** and **Saturation** parameters, there are ambient controls.
It can be used to add to the anchor similar colour tone as loaded virtual studio to help the anchor to look more natural.

To do this first the user need to choose the colour which is similar to main colour of the loaded set by clicking on Ambient color square and picking it from colour dialog.
Then the only thing to do is to adjust the **Intensity** of the ambient colour.

Unnatural warm colours of anchor on set with blue colours only

The same anchor with some blue ambient added in post process.

It is worth to mention that the ambient settings can also help with spill suppression.

User presets

Recalls settings from one of the four user memories. All user preferences are recalled.

Stores all current settings to four user memories. All settings and preferences are stored.

(This function is stored in DVK-300HD)

Garbage mask

Removes any problematic edges on the Right side of the subject. 0 leaves the edge unaffected, 1000 is the maximum mask.

Hardware status

This menu is for information only. It displays the software version and video status etc.

Memories file

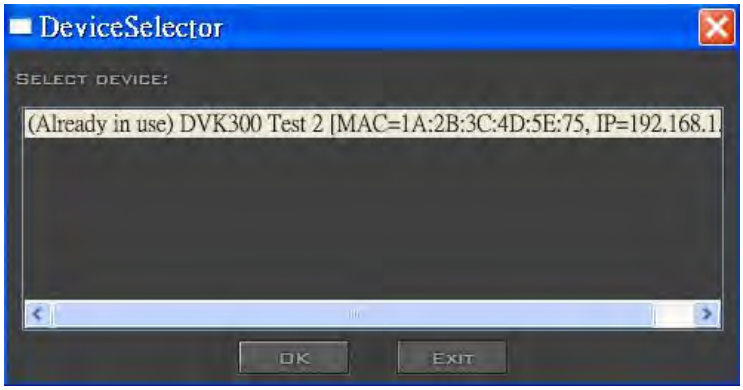
This button is for reset all settings.

Load settings from the user memories file.

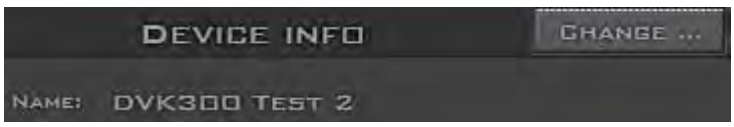
Stores all current settings to memories file. (This function is stored in your computer)

Configuration Area

This button is to change DVK-300HD device.

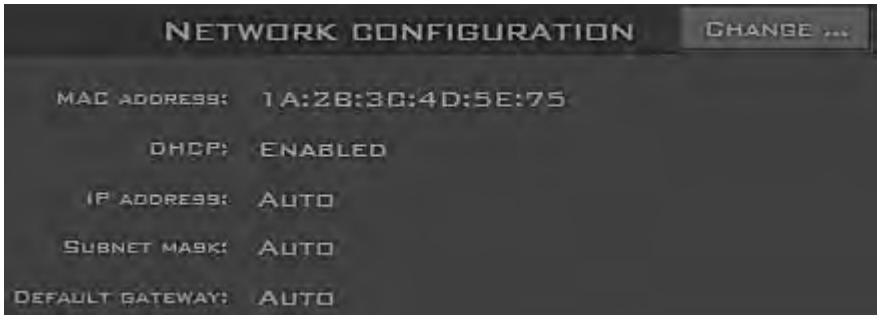


Configuration DVK-300HD network, input, output etc.



This function is to change DVK-300HD device name.

This function is for firmware update.



This function is for Network configuration.

This function is for input configuration.

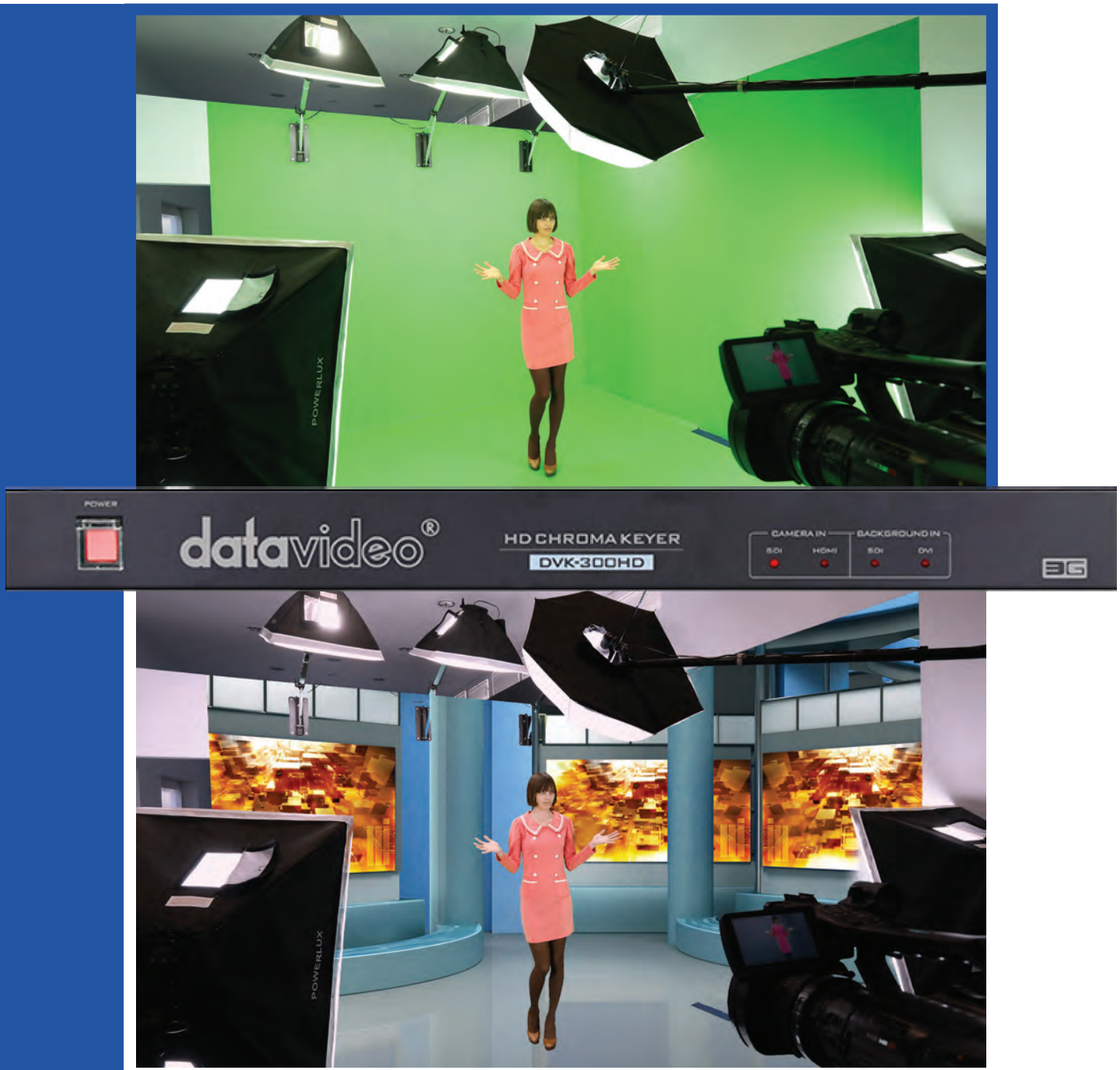
This function is for output configuration.

Specification

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 control and F/W upgrade RS-232 for PC control (not available yet)

HD/SD Chromakey

DVK-300HD



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1 Introduction

Thank you for choosing our product

DVK-300HD

Our chromatic key solution ensures a high quality keying effect in the case of both green and blue background. The key supports all popular video formats: 3 Gb/s, HD and SD.

Algorithm – a 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 has never been so easy

The setting of keying parameters in advanced keying equipment is a complex task. Our solution uses a groundbreaking method of setting parameters that involves six simple steps, through which the user is led by a special setting creator. Thanks to this, even a relatively inexperienced user will be able to set optimum key parameters, and the end result will be impressive. The key is set quickly and as simply as possible, just by following 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 ensure the perfect keying quality the scene has to be correctly lit and the camera signal has to be of good quality. Full capabilities can be achieved for high resolution formats – HD 3G, but very good results can also be obtained for low resolution SD signals.

2 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 particular in the case of 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 where is running the application should be set to the IP address of the same subnet 192.168.1.X (e.g. 192.168.1.5)

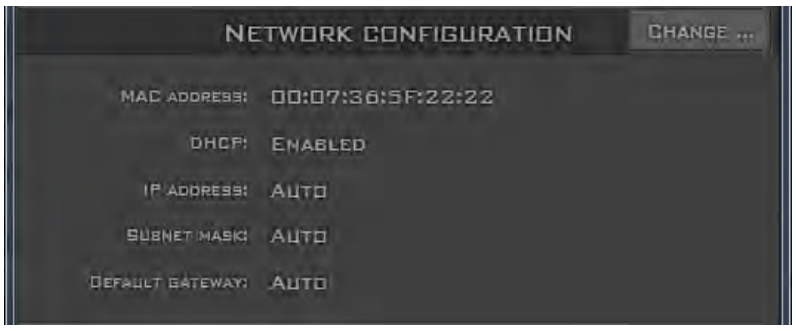
2. If you are working with multiple devices DVK-300HD, it is possible to connect each device with a network cable to the router. In this configuration, the PC where is running the application, should belong to the same subnet (connected to the router).

2.1 Dynamic IP adress 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 allocation of IP addresses your router. When it fails, the IP address of the device is set to the default value (192.168.01.10). 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

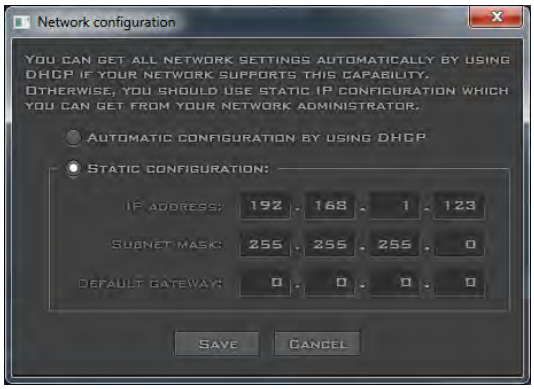
2.2 Static IP address assignment

- open the application DVK-300HD Chroma Key
- 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**



Drawing 1. Section of network parameter settings

- set network parameters and settings approved by the Save button...



Drawing 2. The window for changing network parameters

2.3 Change the name of the device

With proper configuration, it is recommended that each time you connect the device and assigning an IP address to carry out the following steps to change the name of the device

- open the application DVK-300HD Chroma Key
- 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**

Drawing 3. Section setting the device name

- set the device name and accept the settings via the Save button

Drawing 4. The window for changing the name of the device.

3 Description of successive steps for chromatic keying

The description below shows how the DVK 300 can be used for chromatic keying and helps you fully understand how individual functions operate. If you follow these guidelines you will obtain good quality picture, but you should remember that there are many different situations as far as the characteristics of objects and lighting is concerned, and so parameters for each of such situations should be selected on an individual basis.

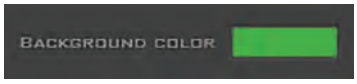
3.1 Selection of the keying colour and setting of the key mask

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

Drawing 5. The **Mode** section

The above **Mode** functions are described in the chapter 'An extended description of the functions'.

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.



Drawing 6. 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.

Drawing 7. The **Default/ Detect** function

The next step is a preliminary keying setting. This is done with the **Show alpha matte** function, which – after a checkbox is used – will show the mask colour for which colours closer to white are nontransparent and those closer to dark – transparent (Drawing 9, page 9).

Drawing 8. Checkbox – **Show alfa matte**

Drawing 9. 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.

Drawing 10. The **Black level** slider

Drawing 11. 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**.

Drawing 12. 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.

Drawing 13. 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 possibly most 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.

Drawing 14. The **Denoise** buttons

3.2 Correction of object edges and sharpness

As seen in Drawing 13, 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.

Drawing 15. The **Color** slider

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

Drawing 16. 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 Drawings 17 and 18.

Drawing 17. A view before a **Luminance** adjustment

Drawing 18. A view after a **Luminance** adjustment

Re 1. 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.

Drawing 19. A view before a **Color** adjustment

Drawing 20. A view after a **Color** adjustment

3.3 Removal of keying colour remains (Despill)

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

Drawing 21. 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.

Drawing 22. 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.

Drawing 23. 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.

Drawing 24. 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.

Drawing 25. Impact of the background on the object – a view after a Despill correction

3.4 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.

Drawing 26. The **Edge brightness** slider

Drawing 27. A view before an **Edge brightness** adjustment

Drawing 28. A view after an **Edge brightness** adjustment

3.5 Limitation of the mask area

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

Drawing 29. 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.

Drawing 30. 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.

Drawing 31. A view after a **Garbage mask** correction with the keying algorithm switched off

After enabling the chromatic keying function, the following effect is obtained

Drawing 32. A view after the **Garbage mask** correction with the keying algorithm switched on

Comments: It should be borne 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.

3.6 Matching the object to the conditions of the virtual background

The other functions are used for post-correction of the object and have no effect on its virtual background.

- **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.

Drawing 33. The **Ambient** section

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

In order to match an object with a background the correction function 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 function will match the object to the existing conditions.

4 An extended description of the functions

In order to fully understand the keying algorithm of the DVK 300 it is necessary to define the notion of the distance |x|. This is used to denote the difference between a parameter of a given colour and the keyed colour (**Background color**). The following distances are considered as parameters:

- The difference due to luminance.
- The difference due to chrominance.

4.1 Mode

4.1.1. Chroma key

This function enables the DVK 300 to be used for chromatic keying.

4.1.2. Luma key

This function enables the DVK 300 to be used for luminance-based keying.

4.1.3. Disable key

This function switches the DVK 300 off.

4.2 Chromatic key functions

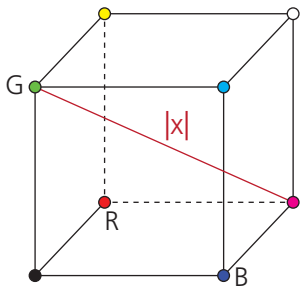
4.2.1. Chrominance keyer

4.2.1.1. Background color (Green/Blue)

This function enables the (keyed) background colour to be selected between green and blue.

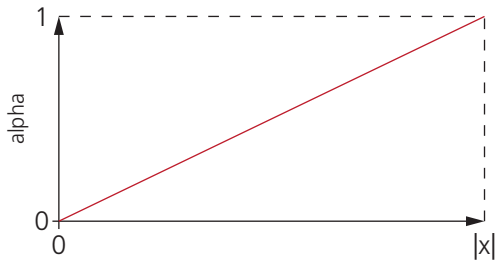
The reference colour, i.e. the keyed colour (**Background color**), should be defined at point 0 on the x-axis and then the distance |x|, which will constitute the maximum colour difference between the keyed colour and its opposite colour, should be defined.

If the keyed colour is green (0,255,0), the distance |x| in the RGB space can be depicted as follows:



Drawing 34. Depiction of the distance |x| in the RGB space

The dependence of transparency on the colour distace from keyed colour is presented in the chart on the next page.



Drawing 35. Dependence of transparency on the colour distace from keyed colour

The x-axis has been designated as 'alpha', with the parameters ranging between:
- 0 – a totally transparent colour, and
- 1 – a totally non-transparent colour.

4.2.1.2. Default

This function enables the keyed colour to be selected as default.

4.2.1.3. Detect (RGB)

This function enables automatic selection of the keyed colour as the average of the background of the RGB parameters.

4.2.1.4. New setup Wizard

This function enables the settings window together with a description of a given functionality to be activated.

4.2.2. Matte control

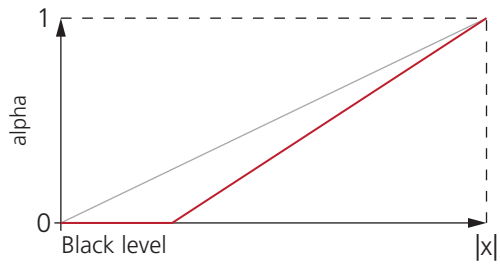
4.2.2.1. Show alpha matte

This function enables the mask view to be switched on or off; the view is presented in grayscale, where:
- an area fully transparent is black,
- an area fully non-transparent is white.

Drawing 36. The **Show alpha matte** view

4.2.2.2. **Black level**

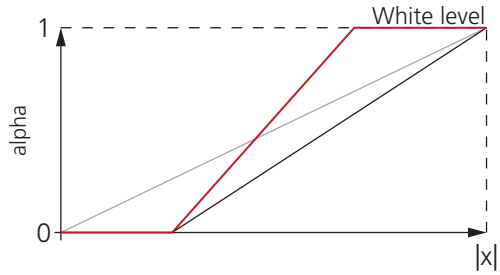
This function enables the range of transparent colours that are close to the reference colour (green or blue) to be extended.



Drawing 37. Impact of the **Black level** function on the dependence of transparency on the colour distace from keyed colour

4.2.2.3. **White level**

This function enables the range of colours distant from the reference colour (green or blue), which are fully non-transparent, to be extended.



Drawing 38. Impact of the **White level** function on the dependence of transparency on the colour distace from keyed colour

4.2.2.4. **Denoise**

This function enables picture to be denoised. It has two settings:
- Standard, and
- High.

4.2.3. **Tolerance correction**

4.2.3.1. **Luminance**

This function increases the distance of a colour from the keyed colour, taking account of differences in luminance. In the case of objects with a significant difference in luminance between the background colour and that of the object, the alpha value is increased.

4.2.3.2. **Color**

1. This function enables the colour green to be added to the algorithm if green is used as the keyed colour.

2. This function enables the colour blue to be added to the algorithm if blue is used as the keyed colour.

This function:

- improves transparency if the keyed background colour is not uniform,
- improves the edge difference between the object and the background.

4.2.4. Spill correction

4.2.4.1. Despill color and Despill coarse

This function is used to eliminate reflections of the keyed background colour in the object. It uses an algorithm based on the RGB space.

Despill color – this is used to determine the colour introduced into the algorithm.

Despill coarse – this is used to determine the value of the algorithm.

1. **Despill color** – value 0:

Drawing 39. **Despill color** set at 0

Despill coarse (range 0–1000)

If green is the keyed colour, the green component should be removed from the object on which the background colour is reflected.

(Similarly, if blue is the keyed colour, then the blue component should be removed.)

2. **Despill color** – value 1000

Drawing 40. **Despill color** set at 1000

Despill coarse (range 0–1000)

The red component is added to the object on which the background colour is reflected.

If green is the keyed colour, the blue component should be added to the object on which the background colour is reflected.

(Similarly, if blue is the keyed colour, then the green component should be added.)

4.2.4.2. Despill fine

This function is used to eliminate reflections of the keyed background colour in the object. It uses an algorithm based on chrominance components (elimination of a chrominance component down to 0).

4.2.5. Edge correction

4.2.5.1. Edge brightness

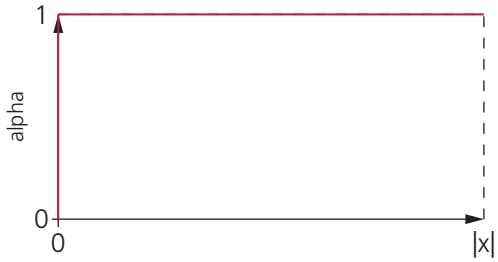
This function enables the semi-transparency of picture to be brightened or darkened.

4.3 Luminance keyer functions

4.3.1. Luminance keyer

4.3.1.1. Background color (White/Black)

This function enables white or black to be selected as the keyed background colour. The dependence of transparency on the colour distace from keyed colour due to luminance is presented in the chart below.



Drawing 41. Dependence of transparency on the colour distace from keyed colour due to luminance

4.3.2. Matte control

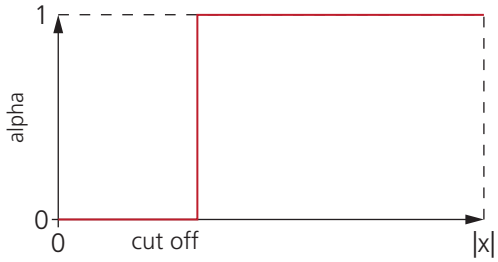
4.3.2.1. Show alpha matte

This function enables the mask view to be switched on or off; the view is presented in grayscale, where:

- an area fully transparent is black,
- an area fully non-transparent is white.

4.3.2.2. Cut off

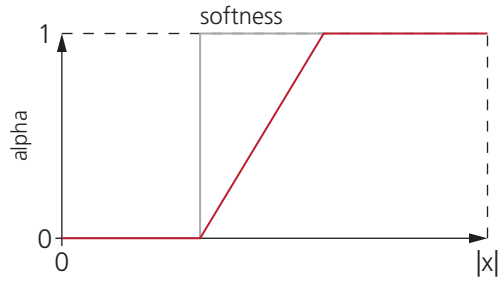
This function enables the extension of the range of transparent colours with a luminance close to that of the reference colour (white or black).



Drawing 42. Impact of the **Cut off** function on the dependence of transparency on the colour distace from keyed colour due to luminance

4.3.2.3. Softness

This function, which takes account of luminance, enables the transition range between fully transparent and fully non-transparent colours to be extended.



Drawing 43. Impact of the **Softness** function on the dependence of transparency on the colour distace from keyed colour due to luminance

4.4 Common functions for chromatic keying and luminance

4.4.1. User presets

4.4.1.1. 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.

4.4.1.2. Save preset

This function activates the window used to save the current settings of the sliders. It operates as one of the presets saved in the device.

4.4.2. Garbage mask

4.4.2.1. Left, Right, Top, Bottom

This function is used to reduce the mask size by cutting it (in the directions: left, right, up, down).

4.4.2.2. Reset

This function enables restoration of the default settings of the **Garbage mask**.

4.4.3. Post correction

4.4.3.1. Enable

This option activates and deactivates the post-correction functions.

4.4.3.2. Brightness

This function enables additional colour brightness to be introduced into the picture.

4.4.3.3. Contrast

This function enables the contrast between colours to be increased.

4.4.3.4. Saturation

This function enables colour saturation to be boosted.

4.4.3.5. Ambient color

This function enables an ambient component to be introduced into the picture.

4.4.3.6. Intensity

This function enables colour intensity to be set (reduced).

4.4.4. Hardware status

4.4.4.1. Connected to

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

4.4.4.2. Work format

This is the output format of the camera.

4.4.4.3. Cam format

This is the input format of the camera.

4.4.4.4. BKG format

This is the input format of the background.

4.4.5. Main window functions

4.4.5.1. Reset all

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

4.4.5.2. Load setting

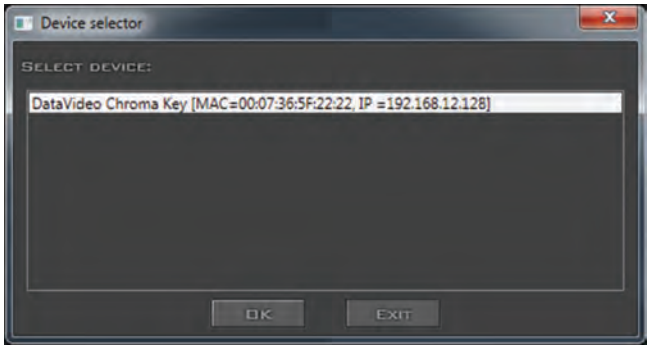
This function enables slider settings to be loaded from file.

4.4.5.3. Save setting

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

4.4.5.4. Change device

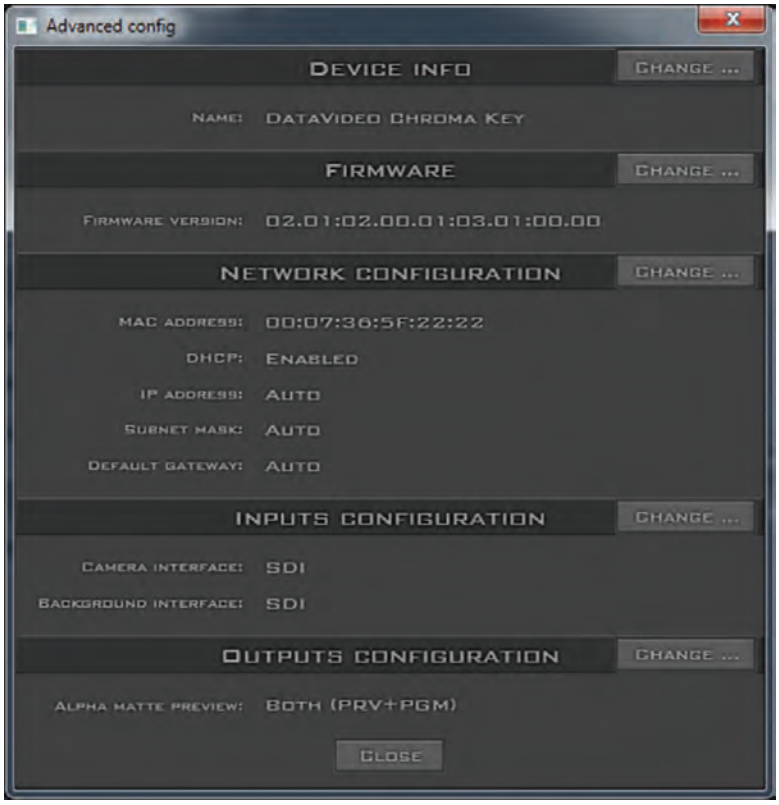
This function enables activation of the device selection window on the basis of the device's name, MAC address or allocated IP network address.



Drawing 44. The **Device Selector** window

4.4.5.5. Configuration

This function enables the device configuration window to be activated.

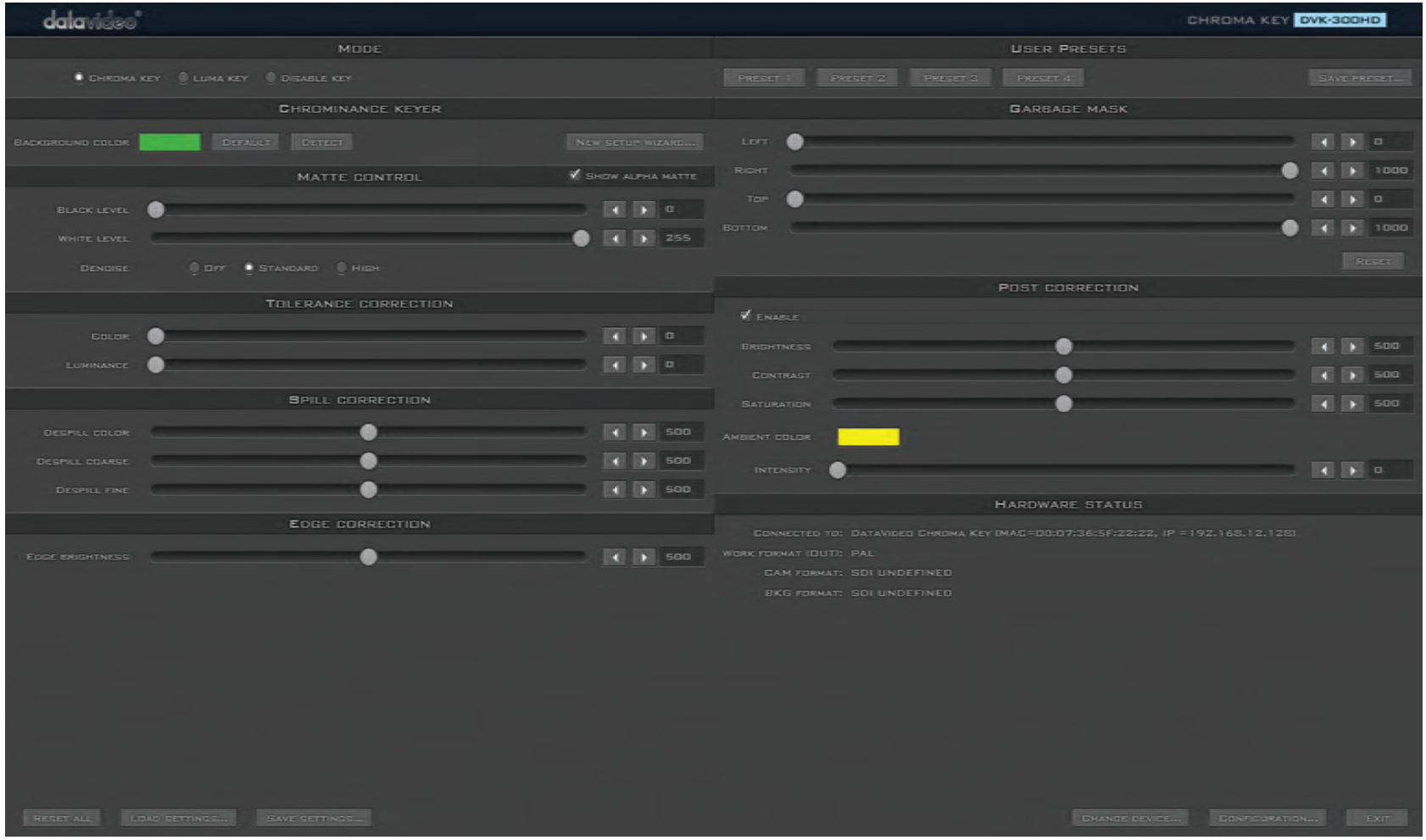


Drawing 45. The device configuration settings window

- **Device info** – this option enables the device name to be input.
- **Firmware** – it shows the firmware version.
- **Network configuration** – this option enables network settings to be configured.
- **Inputs configuration** – this option enables the interface type to be set for the camera input and the background.
- **Outputs configuration** – this is the preview output type.

4.4.5.6. Exit

This function enables exit from the program.



Drawing 46. The main **Key control** window

5 Table of functions and ranges

Lp.	Tittle bar	Name	Range	Default	Type	Desc.
1	Mode	Chroma key	on/off	on	Radiobutton	Selected only one
2	Mode	Luma key	on/off	off	Radiobutton	
3	Mode	Disable key	on/off	off	Radiobutton	
4	Chrominance keyer	New setup wizard	Pressed/unpressed	UnPressed	Button	Chroma Key
5	Chrominance keyer	Background color	Green/Blue	Green	Rectangle	Chroma Key
6	Luminance keyer	Background color	White/Black	Black	Rectangle	Luma key
7	Chrominance keyer	Default	Pressed/unpressed	UnPressed	Button	Chroma Key
8	Chrominance keyer	Detect	Pressed/unpressed	UnPressed	Button	Chroma Key
9	Matte control	Show alpha matte	on/off	off	Checkbox	Common
10	Matte control	Black level	0–255	0	Slider	Chroma Key
11	Matte control	White level	0–255	255	Slider	Chroma Key
12	Matte control	Cutoff	0–255	0	Slider	Luma key
13	Matte control	Softness	0–255	0	Slider	Luma key
14	Matte control	Denoise	off/standard/high	standard	Radiobutton	Common
15	Tolerance correction	Luminance	0–255	0	Slider	Chroma Key
16	Tolerance correction	Color	0–255	0	Slider	Chroma Key
17	Spill correction	Despill color	0–1000	500	Slider	Chroma Key
18	Spill correction	Despill coarse	0–1000	500	Slider	Chroma Key
19	Spill correction	Despill fine	0–1000	500	Slider	Chroma Key
20	Edge correction	Edge brightness	0–1000	500	Slider	Chroma Key
21	User presets	Name of preset	Pressed/unpressed	UnPressed	Button	Common
22	User presets	Save preset	Pressed/unpressed	UnPressed	Button	Common
23	Garbage mask	Left	0–1000	0	Slider	Common
24	Garbage mask	Right	0–1000	1000	Slider	Common
25	Garbage mask	Top	0–1000	0	Slider	Common
26	Garbage mask	Bottom	0–1000	1000	Slider	Common
27	Garbage mask	Reset	Pressed/unpressed	UnPressed	Button	Common
28	Post correction	Enable	on/off	off	Checkbox	Common
29	Post correction	Brightness	0–1000	500	Slider	Common
30	Post correction	Contrast	0–1000	500	Slider	Common
31	Post correction	Saturation	0–1000	500	Slider	Common
32	Post correction	Ambient color	Range color	255,255,0,	Rectangle	Common
33	Post correction	Intensity	0–1000	0	Slider	Common
34	Hardware status	Connected to	–	Device	Label	Common
35	Hardware status	Work format (out)	–	Format	Label	Common
36	Hardware status	Cam format	–	Format	Label	Common
37	Hardware status	BKG format	–	Format	Label	Common
38	Main window	Reset all	Pressed/unpressed	UnPressed	Button	Common
39	Main window	Load settings	Pressed/unpressed	UnPressed	Button	Common
40	Main window	Save settings	Pressed/unpressed	UnPressed	Button	Common
41	Main window	Change device	Pressed/unpressed	UnPressed	Button	Common
42	Main window	Configuration	Pressed/unpressed	UnPressed	Button	Common
43	Main window	Exit	Pressed/unpressed	UnPressed	Button	Common