KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

VP-460
Video Scaler

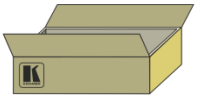
P/N: 2900-300146 Rev 4

VP-460 Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

- The **VP-460** Video Scaler
- IR remote control transmitter with batteries
- 1 Power supply (5V DC)
- 1 Quick start guide
- 4 Rubber feet



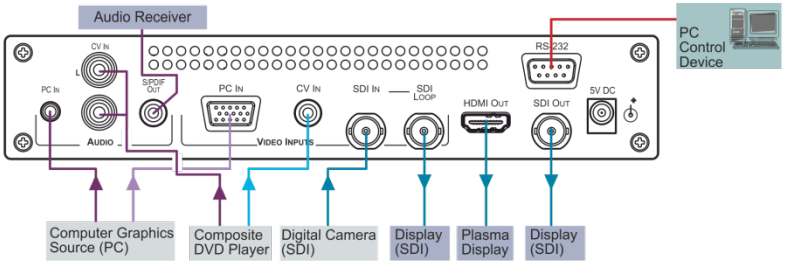
Save the original box and packaging materials in case you need to return your product for service.

Step 2: Install the VP-460

Mount the machine in a rack (using the RK-1 rack adapter) or place on a table.

Step 3: Connect inputs and outputs

Always switch OFF the power on each device before connecting it to your **VP-460**.



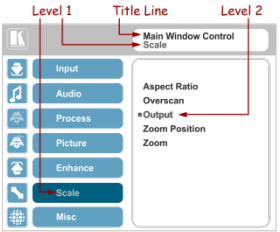
For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **VP-460**.

Step 4: Connect the power

Connect the 5V DC power adapter to the **VP-460** and plug the adapter into the mains electricity.

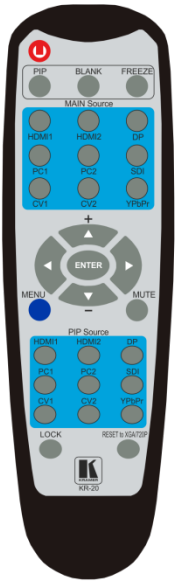
Step 5: Set operation parameters via OSD menu

Enter the OSD menu via the MENU button on the front panel or the IR remote control transmitter.
Select a menu item and set parameters as required.



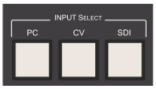
Step 6: Operate via the front panel buttons and the remote control transmitter

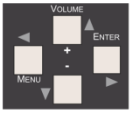
POWER
Cycles power



Press one of the 3 INPUT (MAIN Source) buttons to select an input signal

Note that only the PC, CV and SDI buttons are applicable.





The MENU button shows the main OSD menu. The arrow buttons and ENTER button let you navigate within the OSD menu

Press the PIP button (to toggle the PiP mode). and then press one of the 3 INPUT (PIP Source) buttons to select the PiP window

Note that only the PC, CV and SDI buttons are applicable.

Press and hold to reset to the default resolution (helpful if you fail to see the input signal on the display)

If you cannot see any images, verify that the output cable to your display, TV, or projector is in good working order and is connected to the **VP-460**.

If you still don't see an image, press and hold the RESET TO 720P button for 2 seconds to reset the output to the 720p resolution.

Contents

Figures

1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your Kramer **VP-460** Video Scaler. This product, which incorporates HDMI™ technology, is ideal for:

- Projection systems in conference rooms, boardrooms, auditoriums, hotels and churches, production studios, rental and staging
- Any application where high quality conversion and switching of multiple and different video signals to graphical data signals is required for projection purposes

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VP-460** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: No operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The Kramer **VP-460** is a high quality Video Scaler. It accepts one of three inputs: a computer graphics signal on a 15-pin HD connector, a composite video signal on an RCA connector and an SDI signal on a BNC connector. It scales the video, embeds the audio and simultaneously outputs the signal to the HDMI output, as well as to the SDI output together with a digital audio output.
The **VP-460** Video Scaler features:

- K-Storm™ Scaling Technology - Kramer's extremely high performance scaling technology. High-quality 3:2 and 2:2 pull down de-interlacing and full up and down scaling of computer graphics video input signals
- State-of-the-art video processing technology, with the highest quality de-interlacing, noise reduction, and scaling performance for both standard-definition and high-definition signals
- K-IIT XL™ Picture-in-Picture Image Insertion Technology - Ultra stable picture−in−picture, picture−and−picture and split screen capability, or fully customizable windows' size and position control: any source can be inserted into or positioned next to an SDI source and resized as desired
- Ultra Fast Fade-Thru-Black (FTB™) Switching - Video switching transitions are clean and ultra-fast. The video fades to black and the new input fades from black for smooth, glitch-free switching. The output signal provides constant sync so the display never glitches
- Advanced deinterlacing functions - including 3D comb filtering, film mode, diagonal correction and motion detection
- Scaled Outputs –HDMI and SDI outputs simultaneously
- Output Resolutions – HDTV and Computer Graphics up to 2K and 1080p/UXGA with selectable refresh rates
- Multiple Aspect Ratio Selections – Follow input, follow output, best fit, letterbox, and user definable settings
- Multi-Standard SDI support - SDI (SMPTE 259M), HD-SDI (SMPTE 292M) and 3G HD-SDI (SMPTE 424M)
- Looping 3G HD-SDI Input

- SDI channeling, letting you select one active audio signal from eight embedded stereo audio channels
- Multi-Standard Video support - NTSC (3.58/4.43), PAL (M/N/60) and SECAM
- Built-in Time Base Corrector - Stabilizes unstable video sources
- Built-in Proc-Amp with enhanced functions such as color correction, gamma and dither
- Input and output level adjustment
- Digital (S/PDIF) audio output
- Selectable Power Save modes for energy efficient usage
- SDI channeling, letting you select one active audio signal from eight embedded stereo audio channels

In addition, the **VP-460** Video Scaler:

- Includes luma keying via the PiP window
- Includes advanced EDID management per input
- Analyzes the EDID of a selectable Master connection to one of the outputs
- Supports picture zooming both on main and PiP window from 100% to 1600%, including separate V and H sharpness control
- Provides input and output colorspace control
- Supports HDMI deep color for output
- Features vertical keystone operation
- Is HDTV and computer graphics compatible and the resolution can be up- or down-scaled as required (see output resolutions in Section 9)
- Comes with an On-Screen Display (OSD) for easy setup and adjustment, accessible via the IR remote control and via the front-panel buttons
- Has a non-volatile memory that retains the last settings used
- Supports firmware upgrade via RS-232
- Has an external 5V DC power source

Control your **VP-460**:

- Directly, via the front panel push buttons
- By RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- Remotely, from the infrared remote control transmitter

The **VP-460** is housed in a desktop enclosure, letting 2 units to be rack mounted side-by-side in a 1U rack space with the optional **RK-1** rack adapter.

3.1 Defining the VP-460 Video Scaler

This section defines the **VP-460**.

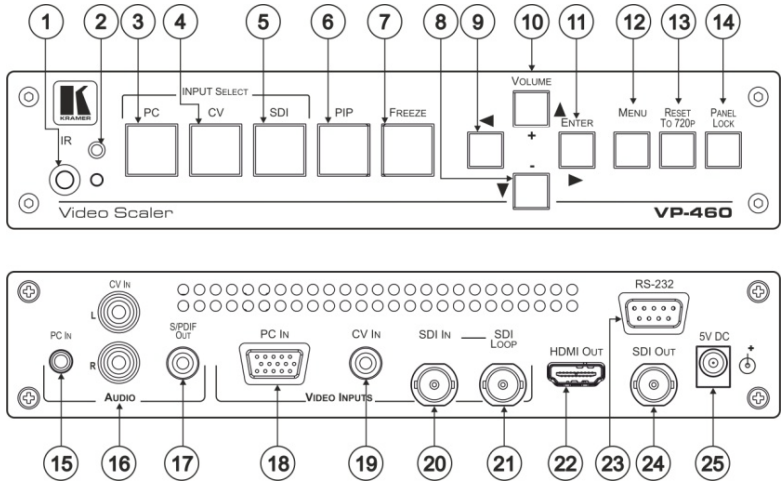


Figure 1: VP-460 Video Scaler

#	Feature		Function
1	*IR Receiver*		Accepts IR remote commands
2	*IR LED*		Lights red when the unit accepts IR remote commands
3	*INPUT SELECT* Buttons	*PC*	Press to select the computer graphics input
4		*CV*	Press to select the composite video input
5		*SDI*	Press to select the SDI input
6	*PIP* Button		Toggles the dual window mode (Picture-in-Picture) function (see Section 6.2)
7	FREEZE Button		Press to freeze/unfreeze the output video image
8	Navigation Buttons	▼/- VOLUME Button	Press to move down the menu list (see Section 7.1.1) and to decrease numerical values. When not within the OSD menu mode, press to reduce the output volume
9		◄ Button	Press to access the OSD menu, exit the OSD menu and, when in the OSD menu, move to the previous level in the OSD screen (see Section 7.1.1)
10		▲/+ VOLUME Button	Press to move up the menu list values (see Section 7.1.1) and to Increase numerical values. When not within the OSD menu mode, press to increase the output volume
11		► ENTER Button	Press to access sub-menu items and select from several settings (see Section 7.1.1)
12	MENU Button		Press to access/exit the menu
13	*RESET TO 720P* Button		Press to reset the video resolution to 720p and change the deep color settings to off on the output (see Section 5.7) Press and hold for about 3 seconds to reset to 720p
14	PANEL LOCK Button		Press and hold for about 2 seconds to lock/unlock the front panel buttons
15	AUDIO PC IN 3.5mm Mini Jack Connector		Connect to the unbalanced audio of the computer graphics source
16	AUDIO CV IN (L, R) RCA Connector		Connect to the unbalanced stereo audio of the composite video source
17	AUDIO S/PDIF OUT RCA Connector		Connect to a digital audio acceptor
18	VIDEO INPUT Connectors	PC IN 15-pin HD	Connect to the computer graphics source
19		CV IN RCA	Connect to the composite video source
20		SDI IN	Connect to the SDI source
21		SDI LOOP	Connect to a local display
22	HDMI OUT Connector		Connect to an HDMI acceptor
23	RS-232 9-pin D-sub Port		Connect to the PC or the remote controller
24	SDI OUT BNC Connector		Connect to an SDI acceptor
25	5V DC		+5V DC connector for powering the unit

4 Connecting the VP-460

Always switch off the power to each device before connecting it to your **VP-460**. After connecting your **VP-460**, connect its power and then switch on the power to each device.

You do not have to connect all the inputs and outputs, connect only those that are required.

To connect the **VP-460**, as illustrated in the example in Figure 2, do the following:

1. Connect a computer graphics source to the PC IN VIDEO 15-pin HD INPUT connector.
2. Connect a composite video source (for example, a composite video player) to the CV IN VIDEO INPUT RCA connector.
3. Connect an SDI source (for example, an SDI digital camera) to the SDI IN VIDEO INPUT BNC connector.
4. Connect the audio input signals to the AUDIO IN connectors: PC IN (3.5mm mini jack) and CV IN (RCA connectors), as required (not shown in Figure 2).
5. Connect the HDMI OUT connector to an HDMI acceptor (for example, a plasma display).
6. Connect the SDI LOOP BNC connector to an SDI monitor (for example, an SDI display).
7. Connect the SDI OUT BNC connector to an SDI acceptor (for example, an SDI display with speakers).
8. Connect the S/PDIF OUT RCA connector to an audio acceptor (for example, a receiver), not shown in Figure 2.
9. If required, you can connect a PC and/or controller to the RS-232 terminal block (see Section 7.2.1)

10. Connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 2).

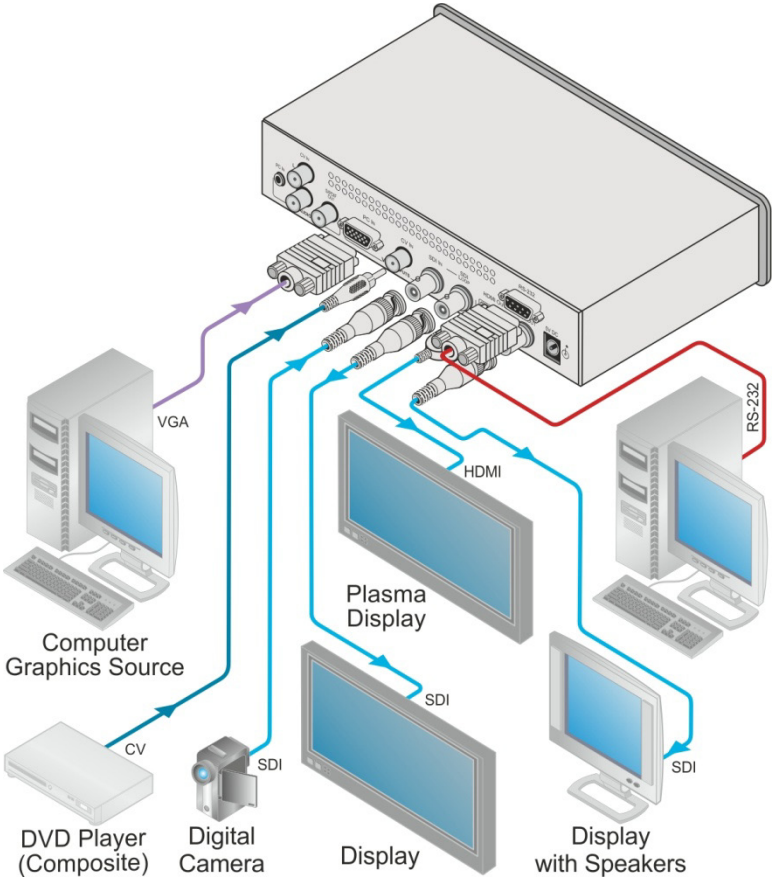


Figure 2: Connecting the VP-460 Video Scaler

5 The OSD Menu

The **VP-460** OSD menu lets you set the operation parameters for the:

- Main Window Control
- PIP Window Control
- Entire System Control

The nature of the operation setup appears in the OSD title, as shown in the example in Section 5.1:

- The title line shows the control mode (Main, PIP or Entire system)
- Level 1 lists the main menu items
- Level 2 includes the second hierarchy level, below level 1
- Level 3 includes the third hierarchy level, below level 2
- Function, is the selectable parameter or numerical value and can appear either under level 2 or 3

5.1 OSD Menu Operation Example

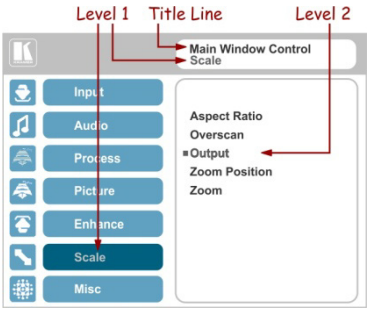
In the example illustrated below, the Master Connection is set to SDI (see Section 5.7).

The table below shows function 632 (from the Protocol in Section 10.2.1):

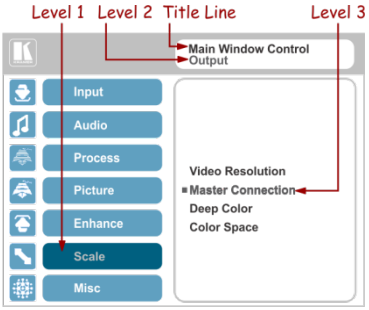
- 6 in the hundreds, represents “Scale” which is the 6th menu item in the main menu list
- 3 in the tens, represents “Output” which is 3rd in the Scale menu
- 2 in the units, represents “Master Connection” which is second in the Output menu

Level 1	Level 2	Level 3	Level 4 (Function)	Range	Function
Scale (6)	Output (3)	Master Connection (2)	HDMI	0	632
			SDI	1	

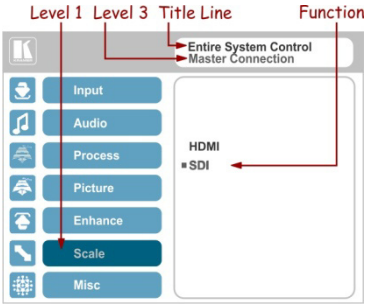
The subtitle, below the title line shows the current level accessed (Scale in this example)



After selecting Output (which is the second Level), it appears in the subtitle



Once Master Connection is selected, the Title changes to “Entire System Control” indicating that the selection will affect the entire system. The subtitle shows the current, Level 3, selection and the menu list shows the function (SDI)



If the display layout includes a PiP window, you can set the OSD menu to control the main source window and the PIP window separately (by defining Window Control, see Section 5.8).

General characteristics which apply to the entire system (for example, setting the volume) are changed without needing to shift control (the title line will state: Entire System Control).

Note that:

- A selected parameter that turns gray becomes valid immediately (there is no need to press Enter to save the changes)
- Exiting the menu saves the parameter to the memory
- Data is saved per window and per input (to a dedicated input + window memory), as applicable

The control buttons let you control the **VP-460** via the OSD menu. Press the:

- MENU (or ◁) button to enter the menu, exit the menu, and when in the OSD menu, move to the previous level and change menu settings in the OSD screen.
- ENTER (or ▷) button to access sub-menu items
- Arrow buttons to move through the OSD menu
- Up or down arrows to change settings (changes are immediate)

Note that when the exiting menu, all the changes are automatically saved to the non-volatile memory.
The default OSD timeout is set to 30 seconds and can be changed (see Section 5.8).

5.1.1 OSD Control Icons

The following three icons: M, P, and E are included to indicate when functionality applies to the Main window, the PiP Window or the entire system:

- M for Main Window Control
- P for PiP window Control
- E for Entire System Control

5.2 The Input Menu

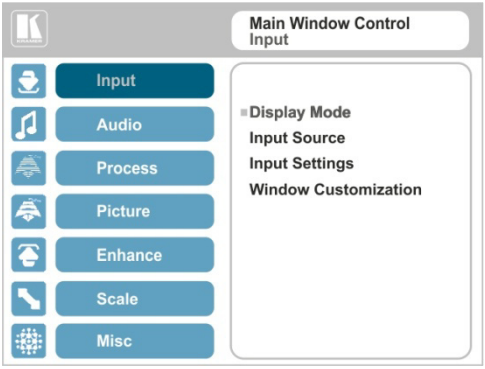


Figure 3: Input Menu

Setting	Function
Display Mode	Select the display mode (see Figure 4): **Single Window** – single window mode operation with one channel displayed E **Picture in Picture** (**PiP**) – dual window mode operation, a smaller window superimposed over a full screen image (see Section 6.2) E **Picture + Picture** (**PoP**) – dual window mode operation, both images appear side-by-side and the aspect ratios of both images are maintained (see Section 6.2) E **Split** (**SbS**) – dual window mode operation, both images are placed side-by-side with the same height (see Section 6.2) E When selecting a PiP configuration, set the Main window or the PiP window parameters via Misc -> OSD -> Window Control (see Section 5.8) **Customized** – Indicates that the image size is customized (read only) E After customizing the position and size of the main or PiP windows, the display mode can no longer be labeled as one of the first four categories above, and a new category "Customized" appears for indication purposes only. Note that any change in the display mode and/or the output resolution cancels the zoom setting and window customization, and may cancel the freeze and blank settings as well.
Input Source	Select the input source: PC, CV or SDI M/P Note that any change in the input source may cancel the freeze and blank settings.

Setting	Function
Input Settings	Set the: **H Image Shift** – to set the horizontal position of the image within the window M/P Volatile parameter **V Image Shift** – to set the vertical position of the image within the window M/P Volatile parameter **Auto Positioning** – to search the input image during the tuning process and automatically position it on the output window in a perfect fit. Set to Off to disable auto positioning Set to Normal Scan to perform a normal range image search Set to Wide Scan to perform a wide range image search M/P In the Normal/Wide Scan option, the machine automatically adjusts the PC input video resolution. For the other inputs, the machine automatically adjusts all the input video resolutions except for HD/SD (CEA 861 standard) video resolutions **HDCP Mode** –N/A **EDID Select** – to select the native resolution on each input to be read by the video source connected to that input: 1024x768@60, 1280x800@60, 1280x1024@60, 1366x768@60, 1440x900@60, 1400x1050@60, 1600x900@60, 1600x1200@60, 1680x1050@60, 1920x1200@60RB, 720p50, 720p60, 1080p50, 1080p60, 2K50 or 2K60 **Color Space** – to select the color space for the PC input: RGB, YPbPr or Follow Input  If the machine is set to the dual display mode, and the both the Main and PiP windows display the PC input, set the same input color space value for both windows
Window Customization	Select the position and the size of the selected window: H Position, H Width, V Position and V Height (see Section 5.2.1.2 and Section 5.2.1.1) M/P The value range is dynamic. The FW prevents windows from exceeding the boundaries or over-sizing. The position and size of the windows are saved to the system. The size and position of the customized window (main or PiP) remain valid even when toggling the PIP button (front panel, Remote control transmitter or protocol command). The customized setup is cancelled only by explicitly selecting a preset Display Mode (see first item in this table) or if a new customized setup is created. Use the front panel + and – buttons or the IR remote control transmitter to set the position and height of the Main and/or PiP windows  The PiP window maximum horizontal active image area is 1600 pixels

The display mode setup, shown in Figure 4, is part of the entire system control and the selected Single Window also shows the current aspect ratio (Best Fit):

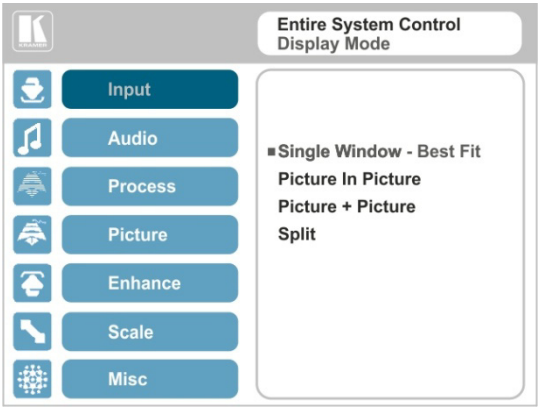


Figure 4: Select the Display Mode

5.2.1 Window Customization

Window customization lets you change the position and size of a selected window. Make sure that you have control over the window that requires customization (Main Window Control or PiP Window Control). If not, select it via the OSD item in the Miscellaneous menu, see Section 5.8.

Note that if the **VP-460** is set to the single window display mode, only the Main Window control applies. If the **VP-460** is set to any of the dual window display modes, you have to select Main/PiP window control to move and/or resize the selected window.

In the following examples, PiP Window Control is selected, but the same procedure applies to Main Window Control.

5.2.1.1 Changing the Size of the Main and/or PiP Window

Use the H Width and V Height to change the size of the window using the + and – buttons on the front panel or remote control transmitter (as illustrated in Figure 5).

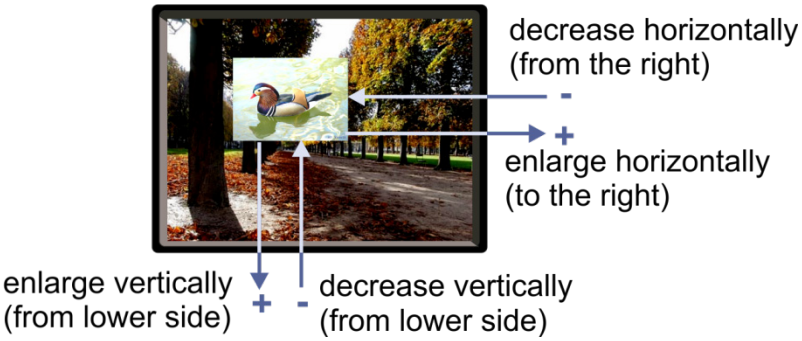


Figure 5: changing the size of the Window

To change the size of the window, do the following:

1. Check that window control is set as required (for example, PiP Window Control).

2. Select Window Customization (see Figure 9).

3. Select H width (an OSD slide bar appears) and press + to increase the width, or – to decrease the width, see Figure 6.
   The following example shows how to decrease the width of the window

Figure 6: Increasing the Width

4. Select V Height (an OSD slide bar appears) and press + to increase the height, or – to decrease the height, see Figure 7.

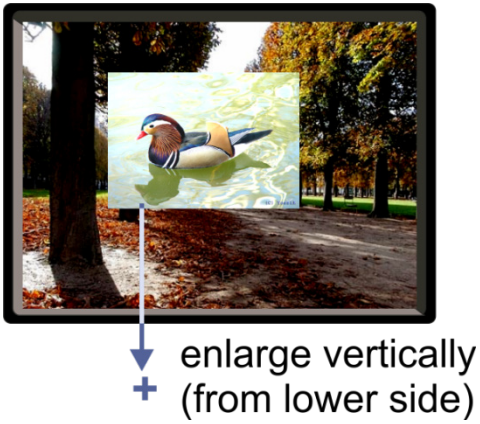


Figure 7: Increasing the Height

5.2.1.2 Moving the Position of the Main and/or PiP Window

Use the H Position and V Position items in the OSD to change the position of the window using the + and – buttons on the front panel or remote control transmitter (as illustrated in Figure 8).

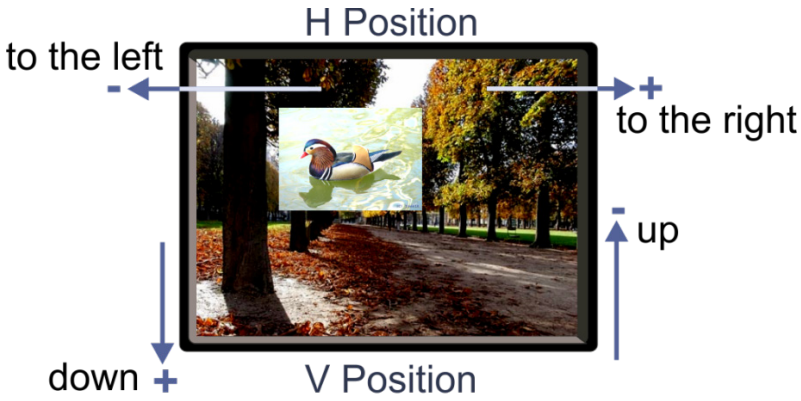


Figure 8: Positioning the Window

To move the position of the window, do the following:

1. Check that window control is set as required (for example, PiP Window Control).

2. Select Window Customization.
   The following Window appears:

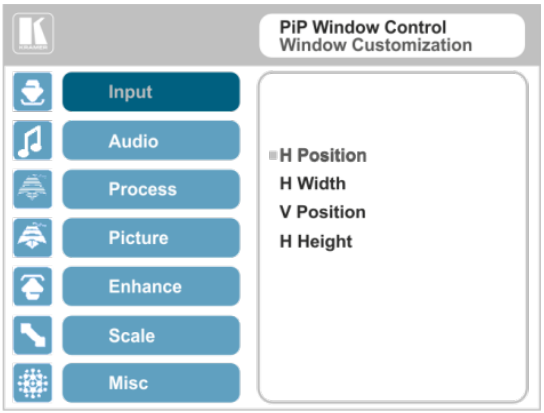


Figure 9: Window Customization

3. To move the picture to the right, select H Position.
   An OSD slide bar appears:

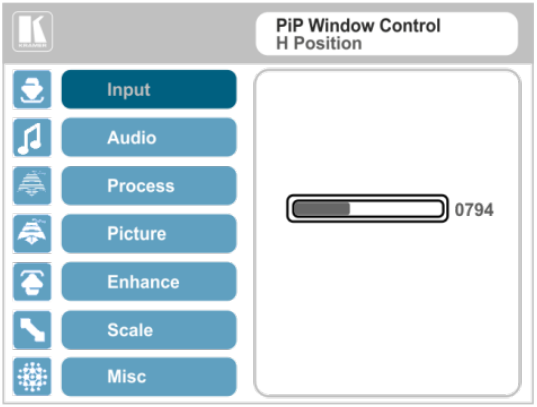


Figure 10: H-Position Slide Bar

4. Press the +/- buttons to move the PiP window horizontally.
   Use the V Position menu item in the same way to move the PiP vertically, see Figure 11.

Figure 11: Moving the PiP Window

Note that the sequence in which you change the size and position of the window is insignificant, as long as you make sure that the resized image does not go beyond the window boundaries.

5.3 The Audio Menu

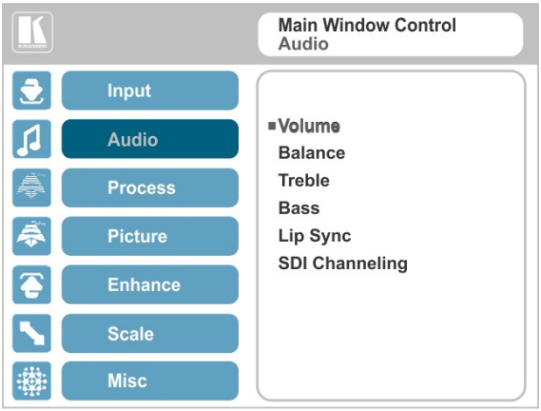


Figure 12: Audio Menu

Setting	Function
Volume	Set the volume level [dB], see Figure 13. Set the: **Input Volume** [dB] – to adjust the audio input level **Output Volume** [dB] – to adjust the audio output level The output audio level can also be set via the + and – buttons on the front panel buttons (when not in the OSD mode) and/or the IR remote control transmitter buttons (see Section 7.3)
Balance	Set the balance [ratio]
Treble	Set the treble [dB]
Bass	Set the bass level [dB]
Lip Sync	Set the Lip Sync delay value [msec]
SDI Channeling	Set the SDI channeling for groups A, B, C and D and connect the active channels (see Section 5.3.1). By default, group A is connected and groups B, C and D are disconnected Set the SDI channeling for groups A, B, C and D to: Activate CH1 or Activate CH2 If other groups are set to Activate, the remaining groups are read as None

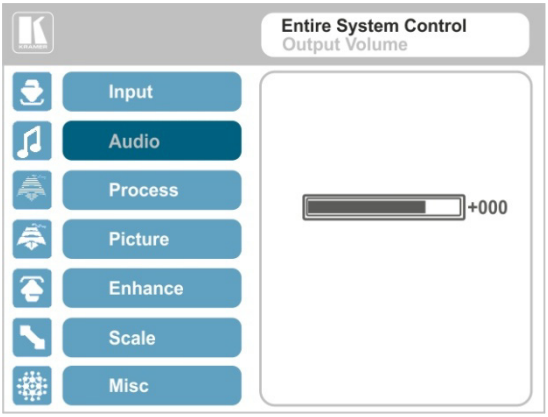


Figure 13: Set the Output Volume Level

5.3.1 SDI Channeling

SDI channeling includes four groups with two stereo channels each. One group is always connected and the other three are disconnected. You can select (via the OSD) one of the eight SDI embedded stereo audio channels to be routed to the input of a connected machine with SDI audio channels as Group A, CH1 (for example, the Kramer **6810HDXL** SDI/HD−SDI/3G Audio Embedder/De−embedder, or the Kramer **6809HD** HD/SD-SDI AES Embedder).

Within a connected group, one channel can be activated and the other channel becomes mute.

In the example illustrated in Figure 14, groups A, C and D are disconnected (None) and channel B is connected (CH1 in group B is mute and CH2 in group B is active). The CH2 active channel is input to the Kramer **6810HDXL** as Group A, CH1, processed and output to an audio acceptor.

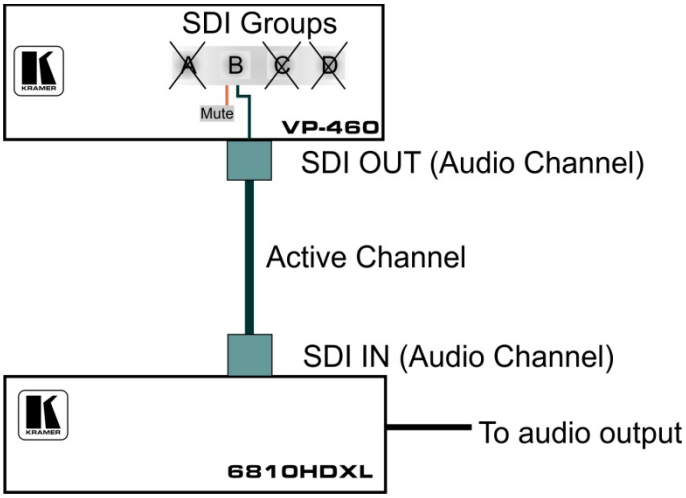


Figure 14: SDI Channeling Example

The active channel is selected via the OSD menu.

Figure 15 shows the SDI Channeling menu:

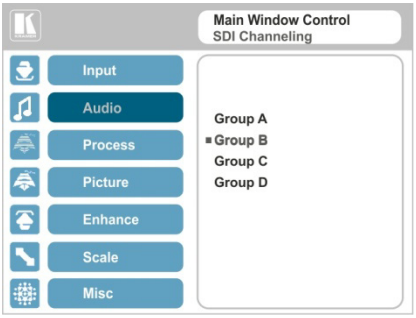


Figure 15: The SDI Channeling Menu

In the OSD setup that is illustrated in Figure 16, CH 2 in group B (active) is routed via the **VP-460** SDI output to the input of **6810HDXL**; CH1 in group B is muted; groups A, C and D are disconnected (see example in Figure 14).

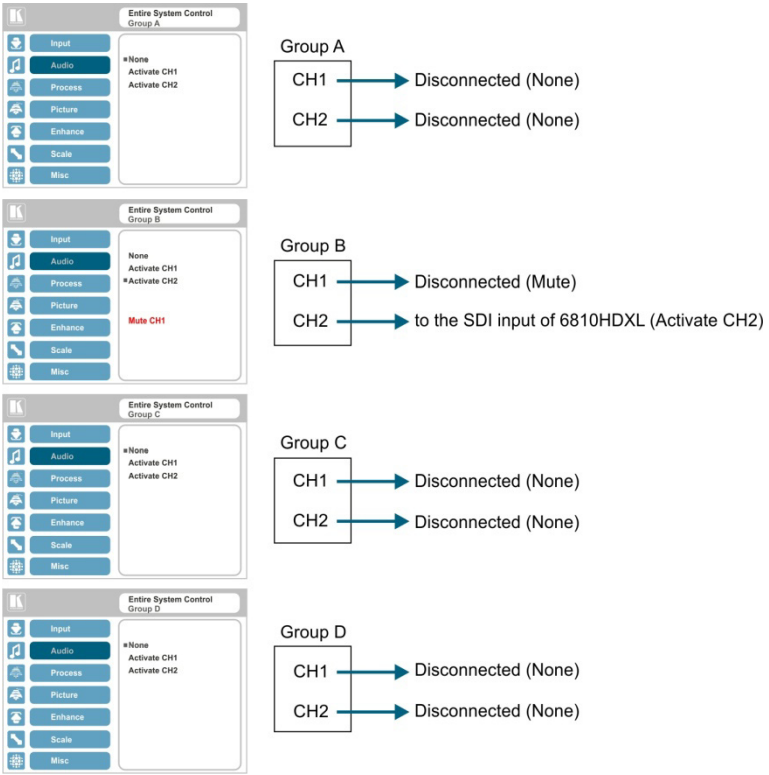


Figure 16: SDI Channeling Example

If a different channel within a connected group is activated, the other channel will automatically become mute.

If a channel in a disconnected group is activated, the system will automatically disconnect the other groups as well as the other channel in the active group.

5.4 The Process Menu

The Process menu functions are available for interlaced video processing only and not for progressive scan.

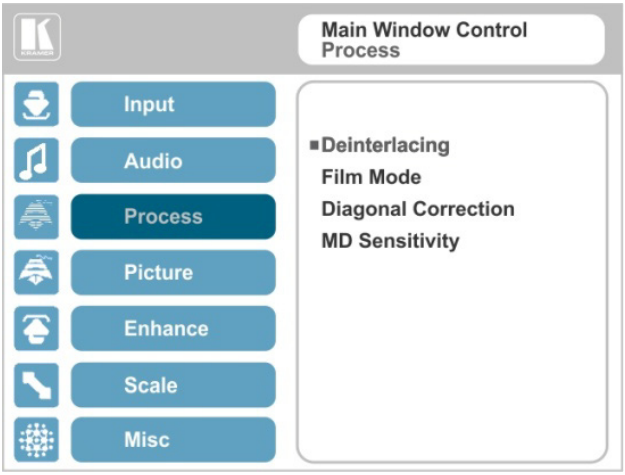


Figure 17: Process Menu

Setting	Function
Deinterlacing	Set the deinterlacing method to: **Line Doubler** – reduces the flicker and improves the quality of the image to some extent M/P Line doubler takes an interlaced scan, doubles the lines. The additional lines provide a better quality image and a brighter output **Motion adaptive** – to produce a brighter smoother and higher resolution image M/P Set the deinterlacing (per window) sync to: **Current Field** – for a long delay M/P **Older Field** – for a short delay M/P When selecting Older Field, diagonal correction is disabled
Film Mode	Set to: **Off** – for no pull-down M/P **Follow Input** – to automatically identify the required pull-down (2:2 or 3:2 pull-down) M/P **24PsF** – to force 24PsF pull-down M/P
Diagonal Correction	Set the level of diagonal interpolation from 0 to 3. When set to the lower level, the diagonal image does not appear smooth M/P
MD Sensitivity	Set (from Level 1 to Level 5) M/P Select the motion detection sensitivity for filtering of interlaced images. Set a high value for video where there is generally a large amount of motion, or a low value for little motion

5.5 The Picture Menu

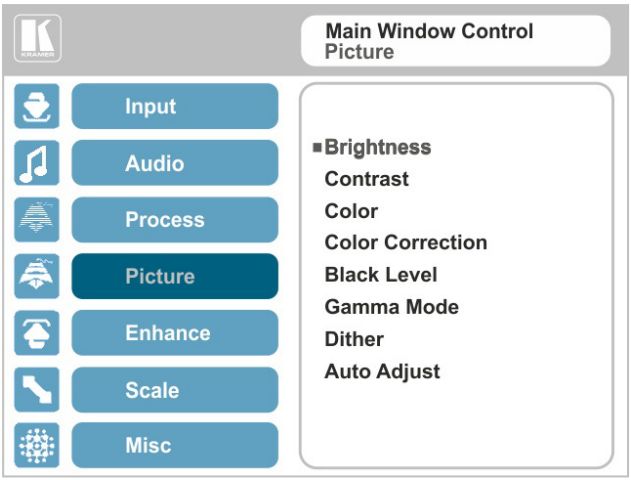


Figure 18: Picture Menu

Setting	Function
Brightness	Set the brightness level M/P
Contrast	Set the contrast level M/P
Color	Set the color level M/P
Color Correction	Set the blue, green and flesh color levels from 0 to 4 M/P
Black Level	Set the black level M/P
Gamma Mode	Set the gamma correction factor to Off, 0.4, 0.8, 1.2, 1.6, 2.0, 2.4 or 2.8 E The higher the value, the darker the image
Dither	Set the error diffusion E: Mode0: Disable error diffusion Mode1: In-frame 8:6 conversion Mode2: Intra-frame 8:6 conversion Mode3: In-frame 10:8 conversion Mode4: Intra-frame 10:8 conversion Mode5: In-frame 12:10 conversion Mode6: Intra-frame 12:10 conversion
Auto Adjust	Set the image color (back to its default values) and position per window (centers it correctly on the screen) M/P See Auto Positioning menu item in Section 5.2 Note that Auto Adjust is disabled when in the Freeze state

5.6 The Enhance Menu

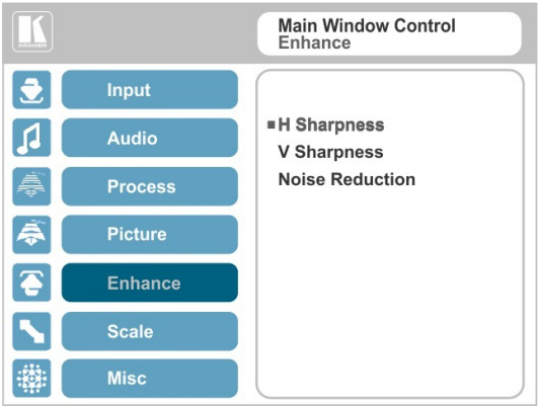


Figure 19: Enhance Menu

Setting	Function
H Sharpness	Select the horizontal sharpness level M/P
V Sharpness	Select the vertical sharpness level M/P
Noise Reduction	Set the input noise reduction levels: **Mosquito NR** – the higher the level, the stronger the filtering of the image M/P **Combing NR** – set to improve the quality of the subtitles M/P **Temporal NR** – the higher the level, the stronger the filtering of the image. Useful when the noise is visible to the eye M/P **Block NR** – as the level is set higher, the block noise disappears and the image appears softer M/P Input noise reduction (except for Temporal NR) is enabled for interlaced video processing only and is inactive in the progressive scan.

5.7 The Scale Menu

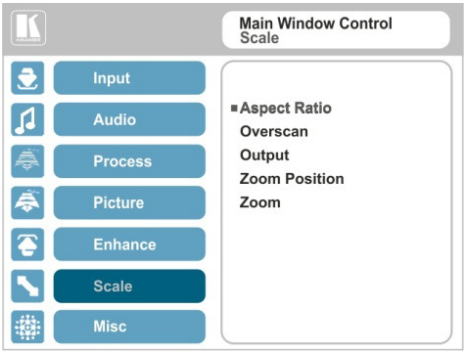


Figure 20: Scale Menu

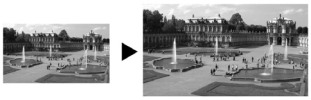
Setting	Function
Aspect Ratio	Set (see Section 5.7.1) to: **Follow Input** – If the input ≤ output, display with a blank border. input > output is denied and the aspect ratio automatically changes to Follow Output M **Follow Output** – If the input ≤ output, scale up the picture. If the input ≥ output, scale down the picture M **Best Fit** – the best possible compromise between the input and the output aspect ratios M **Letterbox** – to compress the top and bottom edges of the input signal, but fill the width of the screen M Applies to the Single Window display mode only
Overscan	Set the overscan (per window) to Off, 5% or 10% M/P
Output	Set the: **Output Resolution** – to Native, 640x480@60, 640x480@75, 800x600@50, 800x600@60, 800x600@75, 1024x768@50, 1024x768@60, 1024x768@75, 1280x768@50, 1280x768@60, 1280x800@60, 1280x1024@50, 1280x1024@60, 1280x1024@75, 1360x768@60, 1366x768@50, 1366x768@60, 1400x1050@50, 1400x1050@60, 1600x900@60, 1600x1200@50, 1600x1200@60, 1680x1050@60, 1920x1200@60, 480i60, 480p60, 576i50, 576p50, 720p50, 720p59.94, 720p60, 1080p23.976, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 2K50, 2K60 E Note that any change in the output resolution will cancel the zoom setting and window customization, and may cancel the freeze and blank settings as well **Master Connection** – to HDMI or SDI to determine the machine's behavior (see Section 5.7.2) E If the native resolution is not supported by the selected Master Connection, the system searches for the best supported resolution. If the search fails (for example, if the master connection is disconnected or EDID is unreadable), the fallback resolution will be set to XGA. **Deep Color** – to Off (the default) for 8bit color depth or to Follow Output for applying deep color automatically on the HDMI output if supported by the display A change in the Deep Color setting will take effect after there is a hotplug on the HDMI output or if the user selects a new output resolution. **Color Space** – to RGB, YPbPr422 or YPbPr444
Zoom Position	Set H Position and V Position, the horizontal and vertical zoom positions respectively, to zoom into certain areas of the image M/P Lets you "move" the zoom area (same as scanning an area with a magnifying glass)
Zoom	Set the zoom M/P Zooms into the center of the display
	Note that any change in the display mode, the input source and/or the output resolution will cancel the zoom setting.

5.7.1 Selecting the Correct Aspect Ratio

You can configure the aspect ratio of any output image to fit your application. The **VP-460** offers four different aspect ratio settings: Follow Input, Follow Output, Best Fit and Letterbox. Here is how each of these settings works.

FOLLOW INPUT – The aspect ratio and resolution of the input video or graphics signal are both preserved (no scaling). For example, a composite video image with a 4:3 aspect ratio will appear with the same aspect ratio on a 1080p (16:9) output image, surrounded by black bars

FOLLOW OUTPUT – The aspect ratio and resolution of the input signal is re-sized to precisely match the aspect ratio and resolution of the **VP-460** output signal. This may result in some distortion to the input signal images



BEST FIT – This setting re-sizes the video or graphics input signal to "best fit" the output resolution while maintaining the aspect ratio of the input signal. For example, a composite video signal (4:3 aspect ratio) will "best fit" to the top and bottom of a widescreen output image, resulting in black pillars on either side.

LETTERBOX – This setting compresses the top and bottom edges of the input signal, but fills the width of the screen.

5.7.2 Master Connection Settings

The Master Connection (HDMI or SDI) is usually set to the main output display so that the optimal resolution for that display can be obtained. By setting the output resolution to Native, the **VP-460** is triggered to read the EDID of the main display and change the output resolution value according to the native resolution of the display.

Note that when the output resolution is set to Native:

- Selecting SDI as the Master Connection results in an output resolution of 720p @60
- If SDI is selected as the Master Connection, hot plugging the HDMI output will not change the output resolution
- If HDMI is selected as the Master Connection, and a new display is connected to the Master Connection output (hot plug), the **VP-460**

automatically reads the EDID of that display and updates the output resolution accordingly

- If the **VP-460** cannot find the EDID of the Master Connection output, it cannot obtain the Native resolution, and the output resolution is set to 720p @60 (default)

5.8 The Miscellaneous Menu

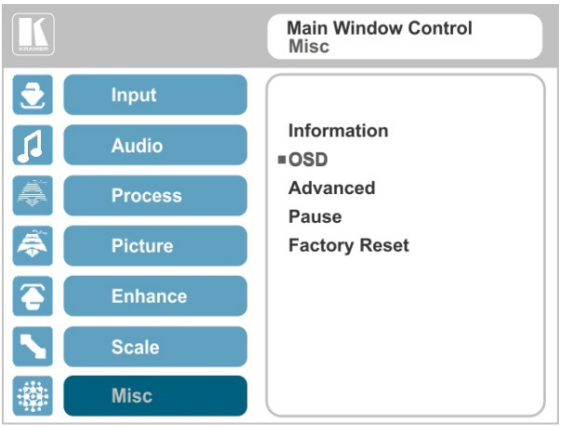


Figure 21: Misc Menu

Setting	Function
Information	Displays the input resolution and frequency, the output resolution and firmware versions E If the selected output is the native output resolution, it will be displayed under "Native Output:"; in case of an explicit output resolution the title will be "Output:"
OSD	Set: **Window Control** – to Main Window Control to set the OSD menu to control the Main window (letting you select the input and other parameters for the main window) or to PiP Window Control to control the PiP window (letting you select the input and other parameters for the PiP window) E **H Position** – to set the horizontal position of the OSD E **V Position** – to set the vertical position of the OSD E **Transparency** – to set the transparency to On or Off E **Transparency Gain** – to set the transparency level (once set to transparent) E **Transparency Bias** – to set the transparency level E **Blink** – to On for the selected item in the OSD to blink, or Off E **Blink Period** – to determine the blinking rate E **Timeout** – to 30 seconds before OSD timeout, 60 seconds before OSD timeout or OFF (Off means that that the OSD appears continuously) E

Setting	Function
Advanced	Set: **V Keystone** – to set the vertical keystone level E Useful if the projector is located at an angle above or below the screen. In the OSD menu the value range shows -80 to 80. This feature is disabled on interlaced input **Auto Sync Off** – to turn the auto sync On/Off. When ON, 2 minutes after not detecting a valid video signal on the selected input (or both inputs in the dual window mode), the unit will disable the syncs and the audio on all the outputs, until a valid input is again detected or any keypad button is pressed E  When using the **VP-460** for audio only, we recommend that you turn this feature off **Luma Keying** – to set the transparency level of the PIP window (see Section 5.8.1) E Volatile parameter; screen may flicker
Pause	Set: **Freeze** – to ON to freeze the window (freezing the main window will also mute the audio output) M/P **Blank** – to ON to display a blank window (blanking the main window will also mute the audio output) M/P  Note that any change in the display mode, the input source and/or the output resolution may cancel the freeze and blank settings. **Mute** – to ON to mute the audio output E A mute icon appears on screen **Disable Output** – to turn the sync and audio On/Off. When ON, the unit will disable the syncs and mute the audio output until any keypad button is pressed E Once Disable Output is enabled, a countdown appears, letting you cancel the process and revert to the previous state
Test Pattern	Set the Test pattern to Slide Bar (non-HDCP), Color Bar (HDCP) or Off. Each test pattern includes a sinusoid audio signal at 10dB @1kHz. We recommend that you set the Display Mode to Single Window (see Section 5.2) and set the Output Resolution to 1080p (see Section 5.7). Note that the Color Bar test pattern changes the OSD menu coloring and the following message appears on the display: “Ignore OSD Coloring”  Changing the output resolution will not cancel the test pattern
Factory Reset	Reset to factory default values (see Section 9.1) E Once Factory Reset is enabled, a countdown appears, letting you cancel the process and revert to the previous state

5.8.1 The Luma Keying Feature

The luma keying feature lets you display the PiP window (the key image) as semi-transparent over the main window. This feature can be used to have the PiP window display a static or dynamic logo, for example, which will appear on a transparent background.

To apply the luma keying feature, first set the PiP window to the desired size and location and then turn luma keying On. The PiP image will show without its background.

The lower the luminance in the PIP window, the more transparent it becomes, thus letting the main window image show. The higher the luminance, the less transparent it becomes, not letting the main window show through. To use this feature it is recommended to set the PIP image as follows: use low-luminance colors for the background (the key image portion) and high-luminance colors for the logo.

For certain displays, the screen may flicker once for about a second after adding or changing the luma keying setting.

Since luma keying is a volatile parameter, it may reset unexpectedly following a change in the setup. So we recommend that you activate it after completing the setup.

When the luma keying feature is On, any change in the setup (either by the user or by resetting due to a setup change) may cause the screen to flicker once. The luma keying will recover automatically after resetting.

6 The Display Modes

The **VP-460** can function in the single window display mode (the factory default setup) or the dual window display mode.

6.1 The Single Window Display Mode

The single window mode shows one window on the screen. The window size can be customized, and its parameters modified via the OSD menu.

6.1.1 Activating the Single window Mode

Set the **VP-460** to the single window display mode in any of the following ways:

- Press and hold (for 3 seconds) the illuminated front panel PIP button until the button no longer illuminates
- Access the OSD menu, select INPUT>Display Mode, and then choose Single Window
- Press the PIP window on the remote control transmitter (see Section 7.3)

6.2 The Dual Window Display Mode

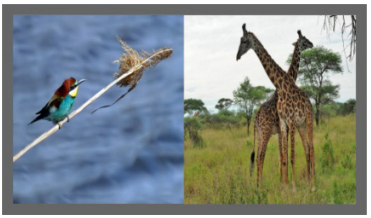
The **VP-460** dual window mode feature lets you show two images on one screen: the main window and the PiP window. For example, you can show a live video window on top of a graphic background, or show two images on screen of the same input channel. The PiP window appears even if no input signals are connected. In this case the PiP window appears in dark gray and the main window appears in light gray.

The dual window mode appears in the following preset PiP configurations:

Picture-in-Picture, with a smaller PiP window superimposed over a full main window image

Picture + Picture, where both images appear side-by-side and the aspect ratios of both images are maintained

Split, where both images are placed side-by-side with the same height



The window customization feature (see Section 5.2) lets you customize the dual window mode layout (main window and PiP window) to any size.

You can superimpose any input type over any or the same input type except for the limit below:

Note that you cannot superimpose PC over CV or CV over PC.

6.2.1 Activating the Dual window Mode

You can activate the dual window mode (indicated by an illuminated PIP front panel button) in any of the following ways:

- Press and hold (for 3 seconds) the front panel PIP button
  The latest PiP configuration appears
- Press the PIP button on the IR remote control transmitter (see Section 7.3)
  The latest PiP configuration appears
- Access the OSD menu, select INPUT>Display Mode, and then choose one of the preset PiP configurations (Picture in Picture, Picture + Picture or Split)

6.2.2 Setting the OSD Menu to PiP Window Control

When the OSD menu is set to PiP Window Control, you can control the PiP window and change its parameters (for example, select the PiP input, size, position and so on). Section 6.2.3.3 shows how to select the PiP source via the OSD menu.

To set the OSD menu to PiP control:

1. Press the MENU button to access the OSD menu.
2. Scroll down to the Misc menu and press ENTER.
3. Select the OSD submenu and press ENTER.
4. Select Window Control and choose PIP WINDOW.
   The OSD menu controls the PiP source
5. Press the MENU button to exit and accept changes.
   The OSD menu title will show PiP Window Control.
6. You can press the MENU button several times to exit the menu and save changes, or modify PiP window parameters via the other menu items.

To return to Main Window control, repeat the procedure above but select Main Window in the Window Control submenu.

6.2.3 Selecting the PIP Source

To select a PiP source you have to set the **VP-460** to any of the PiP display mode configurations and then select the desired input.

6.2.3.1 Selecting the PiP Source via the Front Panel Buttons

Press and hold the PIP front panel button while pressing the input button of the required PiP source.
For example, to select SDI as the PiP source over PC as the main source, press the PIP front panel button while pressing the SDI front panel button.
In this example, the PC button is illuminated and the SDI button blinks

When selecting, for example, PC to be both in the background and as the PiP source (see Figure 22), press the PC input button while the PIP button is not selected (the button is illuminated) and then press the PIP button to enter the PiP mode. Press and hold the PIP button while pressing the PC input button.
In this example, the PC is illuminated first and then blinks after selecting it again as the PiP source

Figure 22: PC 1 superimposed over PC 1

6.2.3.2 Selecting the PiP Source via the IR Remote Control Transmitter

Press the PIP button on the IR transmitter (the PIP front panel button is illuminated). Press the desired PiP source button on the IR transmitter (see Section 7.3).

6.2.3.3 Selecting the PiP Source via the OSD Menu

You can select an input source only after you set the display mode to one of the PiP configurations (see Section 6.2.1).

To set the PiP source via the OSD menu, do the following:

1. Press the MENU button to access the OSD menu.
2. Scroll through the menu, and for window specific submenus check the menu title:
   - If PiP Window Control appears, continue to step 7
   - If not, continue to the next step
3. Press the ▼ button to move to the Misc menu and press ENTER.
4. Select the OSD submenu and press ENTER.
5. Select Window Control and choose PiP Window Control.
   The OSD menu controls the PIP source
6. Press the MENU button a number of times to return to the main OSD menu (and accept changes).
7. Scroll to the Input menu and press ENTER.
8. Select Input Source and press ENTER.
9. Choose the input for the PiP window.
10. Press the MENU a few times until you exit the OSD menu (changes are saved upon exit).

7 Controlling the VP-460

The **VP-460** can be controlled via:

- The front panel buttons (see Section 7.1)
- The OSD menu (see Section 7.2)
- The infrared remote control transmitter (see Section 7.3)

7.1 Controlling via the Front Panel Buttons

The **VP-460** includes the following front panel buttons:

- Input selector buttons for selecting the required input: PC, CV and SDI (see Section 7.1.1)
- PIP and FREEZE buttons (note, these buttons illuminate when selected)
- MENU (left arrow), ENTER (right arrow), and up, down, arrow buttons
- Output Volume up and down buttons (when not in the OSD mode)
- RESET TO 720p and PANEL LOCK buttons

7.1.1 Using the INPUT Front Panel buttons

When selected, an INPUT front panel button behaves as follows:

Selecting the:	Causes the button to:
Main input button	Illuminate continuously
PiP input button	Blink (the light On period is shorter than the light Off period)
Same Main input button and PiP button	Blink (the light On period is longer than the light Off period)

If you want to adjust the image of a selected input in a window, press that input button again (up to 3 times) for fast tuning. Pressing that input button for the fourth time initiates full tuning of the window.

7.2 Controlling via the OSD Menu

You can change PiP Window parameters, main window parameters and entire system parameters via the OSD menu, as described in Section 5.

7.2.1 Connecting to the VP-460 via RS-232

You can connect to the **VP-460** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VP-460** via RS-232, Connect the RS-232 9-pin D-sub rear panel port on the **VP-460** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

7.3 Controlling via the Infrared Remote Control Transmitter

This IR remote control transmitter is compatible with various Kramer machines, therefore not all its buttons are applicable to the **VP-460**. The table below defines buttons that are relevant to the **VP-460**; the functionality of the other buttons is marked N/A.

You can control the **VP-460** from the infrared remote control transmitter:

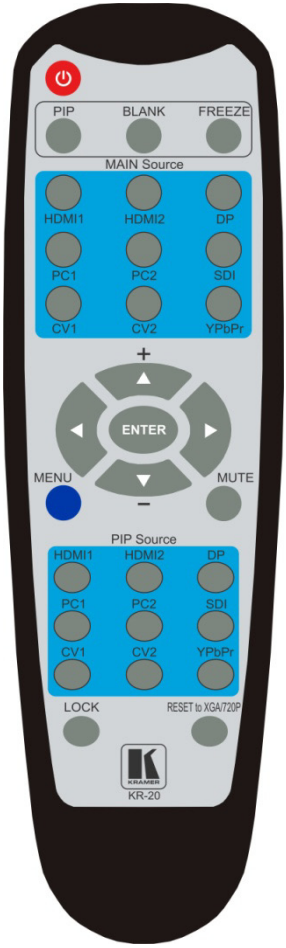
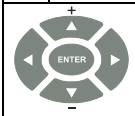


Figure 23: Infrared Remote Control Transmitter

Keys		Function
POWER		Toggle the power save mode ON or OFF
PIP		Enter the dual window mode (the latest setting), see Section 6.2
BLANK		Toggle between a blank screen, black screen and the display (for both windows)
FREEZE		Freeze/unfreeze the output video image (for both windows)
MAIN Source Inputs	HDMI1	N/A
	HDMI2	N/A
	DP	N/A
	PC1	Select the UXGA input
	PC2	N/A
	SDI	Select the SDI input
	CV1	Select the composite video input
	CV2	N/A
	YPbPr	N/A
		Press ENTER to access menu levels (right arrow) Use the up and down arrows to adjust numerical values and adjust the output volume level (when not within the OSD)
MENU		Enter/Exit the OSD menu and return to the previous menu level
MUTE		Toggle between muting (blocking out the sound) and enabling the audio output
PIP Source Inputs	HDMI1	N/A
	HDMI2	N/A
	DP	N/A
	PC1	Select the UXGA input
	PC2	N/A
	SDI	Select the SDI input
	CV1	Select the composite video input
	CV2	N/A
	YPbPr	N/A
LOCK		Lock the front panel buttons
RESET to XGA/720P		Press and hold to reset 720p

8 Flash Memory Upgrade

You can upgrade the **VP-460** via the Kramer K-UPLOAD software. Three types of upgrade files are available for upgrade: video core, peripherals and audio/graphics.

The latest firmware version, the Flash Memory Upgrade user guide, as well as the latest version of K-UPLOAD and installation instructions can be downloaded from the Kramer Web site at www.kramerelectronics.com

9 Technical Specifications

INPUTS:	1 VGA on a 15-pin HD connector 1 composite video (1V/75Ω) on an RCA connector 1 SDI on a BNC connector 1 PC IN unbalanced stereo audio (1Vrms nom/100kΩ) on a 3.5mm mini jack connector 1 L and R unbalanced stereo audio ((1Vrms nom/100kΩ) on 2 RCA connectors
OUTPUTS:	1 SDI on a BNC connector 1 HDMI (deep color) connector 1 S/PDIF digital audio on an RCA connector
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI (deep color)
OUTPUT RESOLUTIONS:	640x480@60, 640x480@75, 800x600@50, 800x600@60, 800x600@75, 1024x768@50, 1024x768@60, 1024x768@75, 1280x768@50, 1280x768@60, 1280x800@60, 1280x1024@50, 1280x1024@60, 1280x1024@75, 1360x768@60, 1366x768@50, 1366x768@60, 1400x1050@50, 1400x1050@60, 1600x900@60, 1600x1200@50, 1600x1200@60, 1680x1050@60, 1920x1200@60, 480i60, 480p60, 576i50, 576p50, 720p50, 720p59.94, 720p60, 1080p23.976, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 2K50, 2K60
CONTROLS:	Front panel buttons, OSD, IR remote control, RS-232 on a 9-pin D-sub connector
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F) 40°C
STORAGE TEMPERATURE:	-40° to +70°C (-49° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
POWER CONSUMPTION:	5V DC 2.90A
DIMENSIONS:	21.5cm x 16.3cm x 4.4cm (8.5" x 6.4" x 1.7") W, D, H
WEIGHT:	0.9kg (1.98lbs) approx.
ACCESSORIES:	Power adapter (5.2V / 4A), IR remote control
OPTIONS:	RK-1 rack adapter
Specifications are subject to change without notice For the most updated resolution list, go to our Web site at http://www.kramerelectronics.com	

9.1 Default Communication Parameters

RS-232	
Protocol	**3000 (Default)**
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Example (Set display mode to Picture in Picture):	#Y 0,110,1<CR>
Full Factory Reset	
Front panel buttons	Turn power off. Turn power on again while holding the RESET TO 720p front panel button. The LEDs light. Full factory reset is complete once the LEDs turn off one after the other and react normally
OSD	Factory Reset through the Misc menu item
Protocol 3000	Use “Factory” command or #Y 0,760,1<CR>

9.2 Input Resolutions

This section defines the input resolutions for each input

9.2.1 PC Input Resolutions

PC Input Resolutions				
640X480_60	800x600_75	625_P50	1280x1024_60	1400x1050_75
640x480_72	800x600_85	525_P60	1280x1024_75	1600x900_60
640x480_75	1024x768_60	720_P50	1280x1024_85	1600x1200_60
640x480_85	1024x768_70	720_P60	1360x768_60	1680x1050_60
800x600_56	1024x768_75	1280x800_60	1366x768_60	1920x1200_60RB
800x600_60	1024x768_85	1280x960_85	1440x900_60	1080_P50
800x600_72	1152x864_75	1280x768_60	1400x1050_60	1080_P60

9.2.2 SDI Input Resolutions

SDI Input Resolution			
NTSC	720_P60	1080_P24	1080_P50
PAL	1080_I50	1080_P25	1080_P60
720_P50	1080_I60	1080_P30	

9.2.3 CV Input Resolutions

NTSC and PAL

9.3 Output Resolutions

This section defines the output resolutions

9.3.1 HDMI Output Resolutions

Technical Specifications of the HDMI Output Signal			
Resolution	Resolution	Resolution	Resolution
640x480@60	1280x1024@50	1680x1050@60	1080p25
640x480@75	1280x1024@60	1920x1200@60	1080p29.97
800x600@50	1280x1024@75	480i60	1080p30
800x600@60	1360x768@60	480p60	1080p50
800x600@75	1366x768@50	576i50	1080p59.94
1024x768@50	1366x768@60	576p50	1080p60
1024x768@60	1400x1050@50	720p50	2K50
1024x768@75	1400x1050@60	720p59.94	2K60
1280x768@50	1600x900@60	720p60	
1280x768@60	1600x1200@50	1080p23.976	
1280x800@60	1600x1200@60	1080p24	

9.3.1 SDI Output Resolutions

Technical Specifications of the SDI Output Signal	
Resolution	Resolution
480i60	1080p25
576i50	1080p29.97
720p50	1080p30
720p59.94	1080p50
720p60	1080p59.94
1080p23.976	1080p60
1080p24	

10 The VP-460 RS-232 Communication Protocol

The Kramer Protocol lets you control the **VP-460** from any standard terminal software (for example, the Windows® HyperTerminal Application).

This section describes the:

- Protocol 3000 common commands, see Section 10.1
- Audio video control commands (via protocol 3000), see Section 10.2
- The button functions (on the front panel and remote controller), see Section 10.3

The protocol 3000 communications protocol uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

10.1 The Protocol 3000 Common Operation Commands

Operation commands		
Command	**Syntax**	**Response**
Lock front panel	**LOCK-FP** *LOCK-MODE*	**LOCK-FP** *LOCK-MODE* *RESULT*
Get front panel locking state	**LOCK-FP?**	**LOCK-FP** *LOCK-MODE*
Parameters Description: LOCK-MODE = Front panel locking state: "0" or "off" to unlock front panel buttons. "1" or "on" to lock front panel buttons.		
Power state	**POWER** *POWER-MODE*	**POWER** *POWER-MODE* *RESULT*
Get power state	**POWER?**	**POWER** *POWER-MODE*
Parameters Description: POWER-MODE = power state: "0" or "off" to enter standby mode. "1" or "on" to power up.		
Restart device	**RESET**	**RESET OK**
Peripheral firmware update execute*	**UPGRADE**	**UPGRADE OK**
Usually the firmware will upload to the device via a command such as LDFW A device reset may be needed to complete the process		
Video core Firmware	**UPGRADES**	**UPGRADES OK**

Operation commands		
Command	**Syntax**	**Response**
update execute*		
Reset configuration to factory default	**FACTORY**	**FACTORY** *RESULT*
Set SN #	**FCT-SN** *SN#*	**FCT-SN** *SN#* *RESULT*

Audio/video common commands		
Command	**Syntax**	**Response**
Output volume	**VOLUME** *VOLUME-PARAMETER*	**VOLUME** *VOLUME-PARAMETER* *RESULT*
Get output volume	**VOLUME?**	**VOLUME** *VOLUME-VALUE*
Parameters Description: VOLUME-PARAMETER = output volume parameters: [VALUE] either positive or negative digits (minus sign precedes negative values). "+" increase current value, "-" decrease current value		
Win-customization	**WIN-CUST** *WINDOW*, *HPOS*, *HW* , *VPOS*, *VH*	**WIN- CUST** *WINDOW*, *HPOS*, *HW* , *VPOS*, *VH* *RESULT*
Parameters Description: fast window customization [WINDOW] "0" for main window; "1" for PiP window [HPOS] horizontal position value [HW] horizontal width value [VPOS] vertical position value [VH] vertical height value		
Set dual window state	**PIP** *PIP-MODE*	**PIP** *PIP-MODE* *RESULT*
Get dual window state	**PIP?**	**PIP** *PIP-MODE*
Parameters Description: PIP-MODE = Dual window state: "0" or "off" for single window. "1" or "on" to for dual window.		

Identification commands		
Command	**Syntax**	**Response**
Protocol Handshaking	**#CR**	**~OK CRLF**
Read device model	**MODEL?**	**MODEL** MACHINE_MODEL
Read device serial number	**SN?**	**SN** SERIAL_NUMBER
Read device firmware version	**VERSION?**	**VERSION** MAJOR .MINOR .BUILD .REVISION
Read device build date	**BUILD-DATE?**	**BUILD-DATE** YYYY/MM/DD HH:MM:SS
Read device protocol	**PROT-VER?**	**PROT-VER** 3000:*MAJOR*

Identification commands		
Command	**Syntax**	**Response**
version		.*MINOR*
Set machine name	**NAME** *MACHINE_NAME*	**NAME** MACHINE_NAME RESULT
Read machine name	**NAME?**	**NAME** MACHINE_NAME
Reset machine name to factory default*	**NAME-RST**	NAME-RST *RESULT*

Load firmware	Step 1: **LDFW** *SIZE* Response 1: **READY** or **LDFWS** *SIZE* *ERR###* Step 2: If **ready** was received, send *FIRMWARE_DATA* P Response 2: **LDFWS** *SIZE* *RESULT*
Load new audio\graphics memory file.	Step 1: **LDMF** *SIZE* Response 1: **READY** or **LDMFS** *SIZE* *ERR###* Step 2: If **ready** was received, send *FIRMWARE_DATA* P Response 2: **LDMFS** *SIZE* *RESULT*

10.2 Audio/Video Communication Protocol

The audio/video protocol commands defines all the function numbers, their valid parameters can be used with protocol 3000.

Using the Communication Protocol with Protocol 3000 (the "Y" Command)

Set Command:

Type in: "Y Control_Type=0,Function,Param"
Reply: "~id=01Y Control_Type=0,Function,Param OK"

Set command example, set window control (721) to PiP:
Send: "#y 0,721,1"
Reply: "~01@Y 0,721,1 OK"

Get Command:

Type in: “Y Control_Type=1,Function”

Result: “~id=01Y Control_Type=1,Function,Param”

Get command example: get window control setup (721):

Send: “#y 1,721”

Result: “~01@y 1,721,1”

You can add a **last parameter**, to be located fourth in SET or third in GET, to define a specific window.

For example:

Set H Sharpness value to 10 on the PiP window (**1**): “#y 0,510,10,**1**”
Get H sharpness of the Main window (**0**): “#y 1,510,**0**”

10.2.1 Audio/Video Protocol Table

You can associate a function number to its description and valid parameters intuitively by navigating the OSD menu according to the following logic: A function number is directly related to its location in the OSD menu.
For example, the third menu on the OSD is Process (3 in the hundreds). The second menu item in Process is Film Mode (2 in the tens), therefore the function number for it will be 320 (3rd item on the Main Window Control and the 2nd item in the Process submenu (see also Section 5.1). When navigating in the OSD MENU you will be able to see the Film Mode valid parameters.
The following table defines the protocol commands:

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
Input	Display Mode	Single Window		0	110	Single window also displays the aspect ratio in the OSD MENU
		Picture in Picture		1		
		Picture + Picture		2		
		Split		3		
		Customized		4 (read only)		
	Input Source	CV		9	120	In case the window is inactive -1 will be returned
		PC		11		
		SDI		17		
	Input Settings	H Image Shift		20:790	131	Volatile Parameter
		V Image Shift		4:240	132	
		Auto Positioning	Off	0	133	Not applicable to HD/SD video types
			Normal Scan	1		
			Wide Scan	2		

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
		HDCP Mode	On	1	134	Not applicable
			Off	0		
		EDID Select	1024x768@60	0	135	Applicable to input types with EDID only
			1280x800@60	1		
			1280x1024@60	2		
			1366x768@60	3		
			1440x900@60	4		
			1400x1050@60	5		
			1600x900@60	6		
			1600x1200@60	7		
			1680x1050@60	8		
			1920x1200@60RB	9		
			720p50	10		
			720p60	11		
			1080p50	12		
			1080p60	13		
			2K50	14		
			2K60	15		
		Color Space	RGB	0	136	Applicable to PC inputs only
			YPbPr	1		
			Follow Input	2		
	Window Customization	H Position		0:2048	141	The value range is dynamic. The FW prevents window overlapping and exceeding of boundaries
		H Width		0:2048	142	
		V Position		0:2048	143	
		V Height		0:2048	144	
Audio	Volume	Input Volume		-20:4 [dB]	211	
		Output Volume		-80:20 [dB]	212	
	Balance			-10:10 [Ratio]	220	
	Treble			-18:18 [dB]	230	
	Bass			-18:18 [dB]	240	
	Lip Sync			0:90 [ms]	250	
	SDI Channeling	Group A	None	0 (read only)	261	
			Activate CH1	1		
			Activate CH2	2		
		Group B	None	0 (read only)	262	
			Activate CH1	1		
			Activate CH2	2		
		Group C	None	0 (read only)	263	
			Activate CH1	1		
			Activate CH2	2		
		Group D	None	0 (read only)	264	
			Activate CH1	1		
			Activate CH2	2		
Process	Deinterlacing	Method	Line Doubler	0	311	Volatile parameter unavailable in progressive scan
			Motion Adaptive	1		

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
		Sync	Current Field	0	312	Unavailable in progressive scan.
			Older Field	1		
	Film Mode	Off		0	320	Unavailable in progressive scan
		Follow Input		1		
		24PsF Mode		2		
	Diagonal Correction			0:3	330	Unavailable in progressive scan. Unavailable when deinterlacing sync is older field
	MD Sensitivity	LEVEL1		0	340	Unavailable in progressive scan
		LEVEL2		1		
		LEVEL3		2		
		LEVEL4		3		
		LEVEL5		4		
Picture	Brightness			-400:400	410	In the OSD menu the range appears as -80:80
	Contrast			0.1:1.6	420	
	Color			0.1:1.6	430	
	Color Correction	Blue		0:4	441	
		Green		0:4	442	
		Flesh		0:4	443	
	Black Level			-80:80	450	
	Gamma Mode	Gamma Off		0	460	
		Gamma 0.4		1		
		Gamma 0.8		2		
		Gamma 1.2		3		
		Gamma 1.6		4		
		Gamma 2.0		5		
		Gamma 2.4		6		
		Gamma 2.8		7		
	Dither	Mode0: Disable error diffusion		0	470	
		Mode1: In-frame 8:6 conversion		1		
		Mode2: Intra-frame 8:6 conversion		2		
		Mode3: In-frame 10:8 conversion		3		
		Mode4: Intra-frame 10:8 conversion		4		
		Mode5: In-frame 12:10 conversion		5		
		Mode6: Intra-frame 12:10 conversion		6		
	Auto Adjust			0:1	480	Self-clearing
Enhance	H Sharpness			-10:10	510	
	V Sharpness			-10:10	520	
	Noise Reduction	Mosquito NR		0:3	531	unavailable in progressive scan
		Combing NR		0:3	532	
		Temporal NR		0:3	533	
		Block NR		0:3	534	unavailable in progressive scan

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
Scale	Aspect Ratio	Follow input		0	610	1. Single window only 2. Customization lost 3. In “Follow Input”, output must be bigger than input
		Follow Output		1		
		Best Fit		2		
		Letterbox		3		
	Overscan	Off		0	620	
		5%		1		
		10%		2		
	Output	Video Resolution	Native	0	631 1. GET command in native mode returns the determined resolution of the master connection 2. Special OSD MENU screen, follow OSD instructions	
			640x480@60	1		
			640x480@75	2		
			800x600@50	3		
			800x600@60	4		
			800x600@75	5		
			1024x768@50	6		
			1024x768@60	7		
			1024x768@75	8		
			1280x768@50	9		
			1280x768@60	10		
			1280x800@60	11		
			1280x1024@50	12		
			1280x1024@60	13		
			1280x1024@75	14		
			1360x768@60	15		
			1366x768@50	16		
			1366x768@60	17		
			1400x1050@50	18		
			1400x1050@60	19		
			1600x900@60	20		
			1600x1200@50	21		
			1600x1200@60	22		
			1680x1050@60	23		
			1920x1200@60	24		
			480i60	25		
			480p60	26		
			576i50	27		
			576p50	28		
			720p50	29		
			720p59.94	30		
			720p60	31		
			1080p23.976	32		
			1080p24	33		
			1080p25	34		
			1080p29.97	35		
			1080p30	36		
			1080p50	37		

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
			1080p59.94	38		
			1080p60	39		
			2K50	40		
			2K60	41		
		Master Connection	HDMI	0	632	
			SDI	1		
		Deep Color	Off	0	633	
			Follow Output	1		
		Color Space	RGB	0	634	
			YPbPr422	1		
			YPbPr444	2		
	Zoom Position	H Position		0:2047	641	Value range is dynamic, FW prevents zoom from exceeding the boundaries
		V Position		0:2047	642	
	Zoom			1.0:16.0	650	
Misc	Information	NTSC		0	710	READ ONLY: In the OSD MENU - Input, Output video formats & FW version. In the protocol – Get command returns the Input video format only
		PALM		1		
		PAL60		2		
		N443		3		
		NTSC_4		4		
		SECAM		5		
		PAL		6		
		PALNC		7		
		NTSC_8		8		
		N\A		9		
		N\A		10		
		N\A		11		
		N\A		12		
		N\A		13		
		525p60		14		
		625p50		15		
		720p60		16		
		720p50		17		
		720p24		18		
		720p25		19		
		720p30		20		
		1080i60		21		
		1080i50		22		
		N\A		23		
		1080i100		24		
		1080p60		25		
		1080p50		26		
		1080p30		27		
		1080p23_976		28		
		1080p24		29		

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
		1080p25		30		
		N\A		31		
		N\A		32		
		640X480@60		33		
		N\A		34		
		N\A		35		
		N\A		36		
		640x480@72		37		
		640x480@75		38		
		848x480@60		39		
		640x480@85		40		
		N\A		41		
		800x600@56		42		
		800x600@60		43		
		N\A		44		
		800x600@72		45		
		800x600@75		46		
		800x600@85		47		
		1024x768@60		48		
		1360x768@60		49		
		1280x768@60		50		
		1024x768@70		51		
		1024x768@75		52		
		1280x800@60		53		
		1024x768@85		54		
		1400x1050@60		55		
		1400x1050@75		56		
		1440x900@60		57		
		1152x864@75		58		
		1600x900@60		59		
		1280x1024@60		60		
		1280x1024@75		61		
		1280x960@85		62		
		1920x1200@60RB		63		
		1280x1024@85		64		
		1600x1200@60		65		
		1680x1050@60		66		
		NONE		0XF5 or 0XFF		
	OSD	Window Control	Main Win	0	721	When in the single window mode, only Main Win is valid
			PiP Win	1		
		H Position		0:2047	722	The value range is dynamic, FW prevents exceeding of boundaries
		V Position		0:2047	723	
		Transparency	ON	1	724	
			OFF	0		
		Transparency		0.1:1.6	725	

1st Level	2nd Level	3rd Level	4th Level	Range	Func.	Note
		Gain				
		Transparency Bias		-400:400	726	
		Blink	ON	1	727	
			OFF	0		
		Blink Period		0.1:1.6	728	
		Timeout	Off	0	729	
			30 Sec	1		
			60 Sec	2		
	Advanced	V Keystone		-400:400	731	In the OSD menu the value range shows -80:80. Unavailable for interlaced output
		Auto Sync Off	On	1	732	Two idle minutes are required to trigger screen shutdown
			Off	0		
		Luma Keying	On	1	733	Volatile parameter. Screen may flicker. Keying the PiP window
			Off	0		
	Pause	Freeze	On	1	741	
			Off	0		
		Blank	On	1	742	
			Off	0		
		Mute	On	1	743	
			Off	0		
		Disable Outputs	On	1	744	
			Off	0		
	Test Pattern	Off		0	750	
		Slide Bar		1		Non-HDCP content sinusoid sound
		Color Bar		2		HDCP content sinusoid sound
	Factory Reset			0:1	760	Special OSD MENU screen, follow OSD instructions. Self-clearing.

10.3 Keystroke Codes

The keystroke codes operate in the following way:

SET command third param =0,

Syntax example: "#Y 0,10,0<CR>" => MENU keystroke

GET command for keystrokes will return ERR

The following table defines the keystroke function codes:

Button	Keystroke Code	Button	Keystroke Code	Button	Keystroke Code
MENU	10	FREEZE	17	CH2_SDI	36
ENTER	11	LOCK	18	MUTE	37
MINUS	12	CH1_CV1	19	POWER	38
PLUS	13	CH1_VGA1	21	LEFT	39
RESET	14	CH1_SDI	27	RIGHT	40
PIP	15	CH2_CV1	28	DUMMY	99
BLANK	16	CH2_VGA1	30		

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300146 Rev: 4