G&D PersonalWorkplace-Controller

EN Configuration and Operation

A9100395-1.30

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2 Glossary

Input channel

The physical input of a video signal. It is connected to the output of a PC or other video source.

Virtual channel

Similar to an input channel, but the input signal does not come through a connector. The input information may come through the network (text, streaming etc.).

Output monitor

When a *set* is selected, it is the monitor on which all input channels are displayed during set-up and after arrangement.

Channel enable

When a channel is enabled and all parameters are set up, it is visible in the arrangement window and can be part of an arrangement (see also *Screen enable*).

Channel connected

Indicates the status of the input channel. When there is a stable input signal (h- and v-total are constant for several frames), then the channel is ‘connected’ or ‘online’.

Screen

An input channel can be displayed as 1 or 2 screens:

- Screen 1 is always enabled and is the original input channel signal. It may be cropped.
- Screen 2 is a copy of the input channel. It may be cropped and positioned differently. It does not reduce the bandwidth.

Screen enable

Enabled screens take part in the arrangement. If disabled, they are not displayed in the arrangement window.

Arrangement

The way input channels are arranged on the output monitor.

Layout/set

A saved arrangement. For each *layout* or *set*, any input screen can vary in position, size, scaling and cropping. The input screens and layout configuration screens are limited only by bandwidth and output monitor resolution. A *layout* or *set* can be selected by the browser interface or a remote interface.

Default layout/set

The default *layout/set* displayed after booting, as long as no other *layout/set* is selected.

Absolute/relative mouse positioning (modes)

Relative mouse positioning: When a mouse is connected to a computer, it is used in the *so-called* relative mouse mode. The position of the cursor (pointer) is determined by relative mouse movements. Most operating systems have special settings that accelerate the cursor when the mouse is moved faster. A fixed relationship exists between mouse movements and the cursor position on the display. KVM variants of PersonalWorkplace-Controller are aware of mouse movements, however they are not aware of the position on the display where the cursor is shown. The disadvantage to relative mouse mode is that the user must terminate the connection before establishing a connection to another host PC.

Absolute Mouse Positioning: In *Absolute Mouse Mode* a fixed relationship exists between the mouse and cursor. The mouse acceleration of the operating system is not used. In this mode, the KVM variants of PersonalWorkplace-Controller do know where the cursor is shown. This mode mimics a more intuitive feeling by the user (hand-mouse-cursor-eye). It is much easier to control, and more predictable. The disadvantage this mode has is that a few programs control the mouse acceleration of the operating system and behave differently in absolute mouse mode. The Windows operating system has another problem when the extended desktop mode (two or more windows) is used.

Installing a mouse filter driver on the Windows system can solve this problem. It is available on the website *www.gdsys.com* in the section *More from G&D > Tools & Drivers*.

Install it when the extended desktop functionality is used, even when only one of the extended desktops is connected to a KVM variant of PersonalWorkplace-Controller. Mac and Linux users do not need to install the driver.

Display arrangement

Output physical displays and signals can be arranged in several ways and resolutions.

As 8MP, 4MP or HD displays with HDMI Port, Display Port or DVI connections.

Display arrangement is the first selection that is applied. The system will switch the arrangement, reboot and reset to factory default for this arrangement.

Display Settings

Each display can be used in several ways – without KVM functionality, as mirror, or with KVM functionality. Not all of the selections may be visible for certain displays.

Mirror

Mirrors one or more inputs to one or more outputs such as output display 1 with 4k resolution can be mirror to one HD display (downscaled) and a second 4k display, or to a stream.

PersonalWorkplace-Controller with KVM functionality

In *PWC KVM* mode the display is located in the control room and keyboard and mouse can be used to arrange and switch layouts. The behavior is similar to the *PWC Video* mode but the windows can be moved and resized by the mouse. A double click connects keyboard and mouse to the attached PC. The layouts (grids) can be pre-arranged like in PWC Video mode.

Screenshot

Is a copy of the current content of the display to a storage device in .png format.

NDI®

Network Device Interface (NDI) is a high-performance standard that allows anyone to use real time, ultra-low latency video on existing IP video networks.

3 How to use the PersonalWorkplace-Controller

The PersonalWorkplace-Controller has various interfaces including the Administration/Service interface and the User interface.

The Administration and Service interface must be used once during set up and in service cases. It is accessed through a browser interface (Firefox, Chrome, or IE 10) and needs keyboard and mouse to be used. It is used for setting up: the network, the connected display, input channels, the user interface and so on. For more details refer to the Installation Guide.

The User interface is used by the end user to switch layouts.

There are several ways to implement a user interface:

- Through a touch monitor interface, or with a mouse and keyboard interface.
  For details see below.
- With a tablet or any PC with a touch monitor or monitor and mouse.
  For details see below.
- Using remote control commands sent via network with REST commands.
  For details, please contact G&D sales.

4 Set up instructions

Set up the PersonalWorkplace-Controller hardware according to the Installation Guide before using this manual.

This manual describes all settings that can be made using the Administration browser interface of the PersonalWorkplace-Controller.

Follow these rules to set up the system:

1. Choose the *Display Arrangement* from the configuration tab.
   - This configures the number of displays, the resolution (8MP or lower) and the connectors.
   - During this set up the output connector numbers are shown to connect the displays correctly.
   - The system reboots.
2. Chose the *Display Settings* form configuration tab and follow the selections.
3. Change the network setting if necessary.
4. Set up the input channels.
5. Set up all other parameters.

The PersonalWorkplace-Controller ships with a factory default setup with all input channels visible on screen.

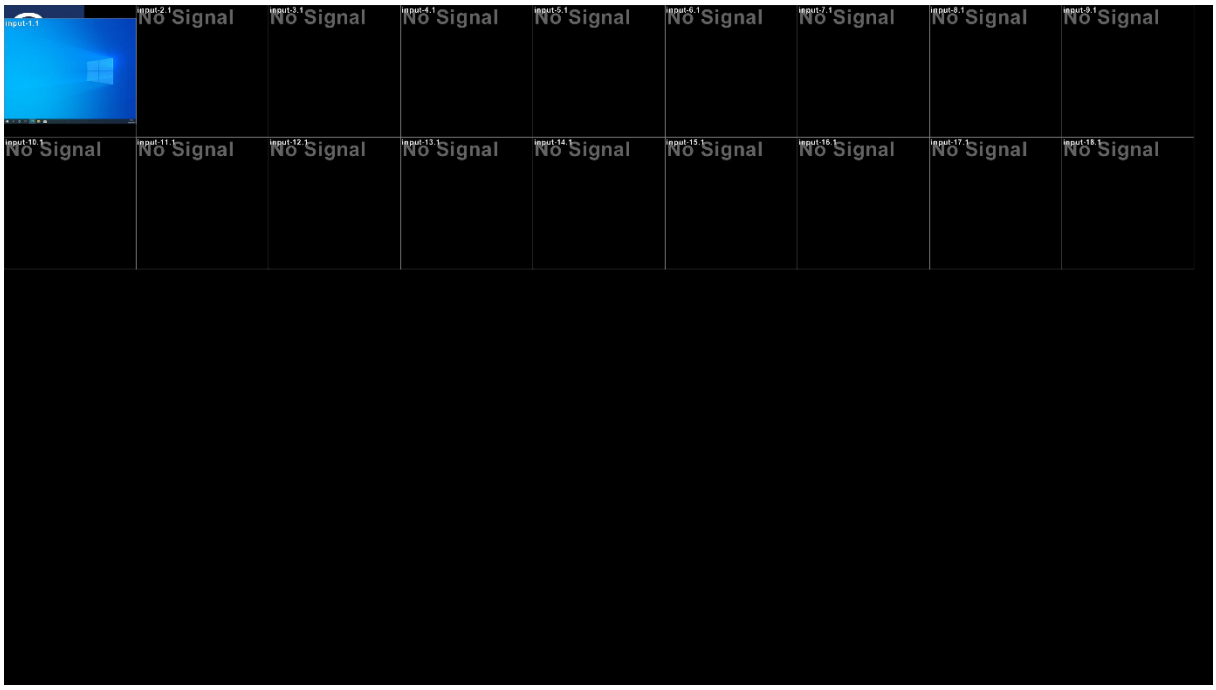


Figure: PersonalWorkplace-Controller output monitor with default layout (example)

5 Administration web-interface

To open the web-interface from a remote browser, use the fallback IP address **169.254.213.44**. Chrome, Edge or Firefox work fine. Through *Automatic Private IP Addressing*, this IP address should be reachable without configuration. It cannot be changed, but a second IP address can be specified in the network settings.

Note: If the IP address cannot be reached after all, check the IP address of the computer and, if necessary, set it to 169.254.213.1, Netmask 255.255.255.0.

The credentials for the first login are:

- User: Admin
- Password: 4658

The Web-Interface of the PersonalWorkplace-Controller has 7 tabs (see Figure below), which are used to set up and manage the device. They are described in the following sections.

Figure: Administration tabs

5.1 PWC tab

The PWC tab has two sub tabs: *About* and *Status*.

5.1.1 About

Shows all details about this PersonalWorkplace-Controller like:

- Current display arrangement
- Overall version numbers
- TouchPC version number
- Custom version
- Serial number, and so on

The first line *PWC Version* shows the active version of the software.

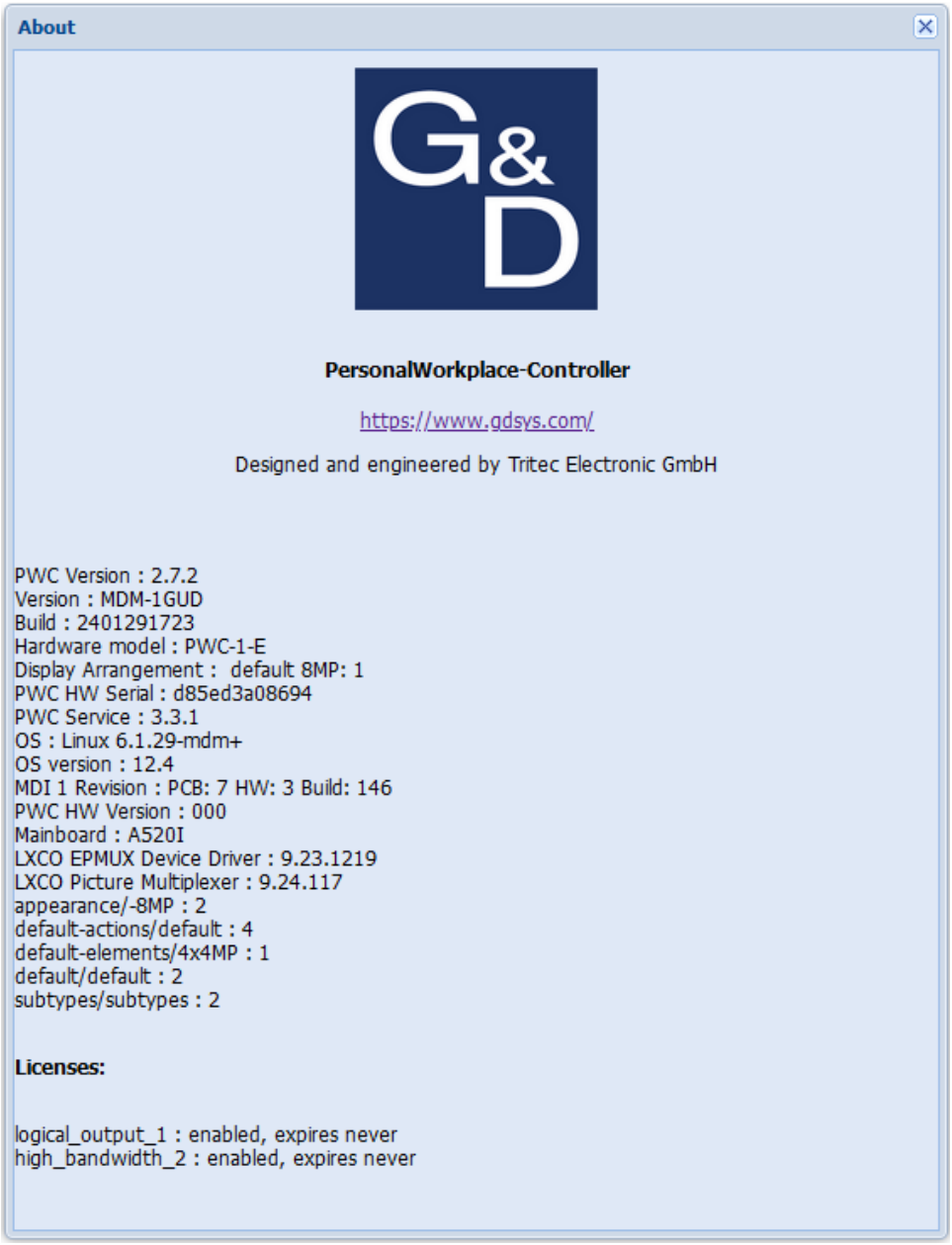


Figure: About (example)

5.1.2 Status

Status presents operating details for the PersonalWorkplace-Controller.

In the first line the messages shown below may be observed. If not required, the messages will not be displayed.

Default configuration file used

- This is shown before the first set up is saved or when an error occurred while restoring the configuration file.
- If the default configuration is not used this line is not visible.

PWC booted from factory default software

- Shown when a problem occurred during the update process and the software could not boot from the new version, instead it booted from a factory default version.
- Either try to update again or use the previous update version.

Unexpected power failure or *reboot triggered by the watchdog*

- FPGA temperature (Celsius)
- On Board temperature (Celsius)
- CPU temperature (Celsius)
- Graphics board temperature (Celsius)
- Front Fan speed in rpm
- Internal fan speed in rpm
- Fsck.ext3 passed: 0 = the fsck passed; 1 = the fsck failed.
- Monitor outputs show the Vendor ID and Product ID of the attached monitors and the resolution set up by the PersonalWorkplace-Controller.

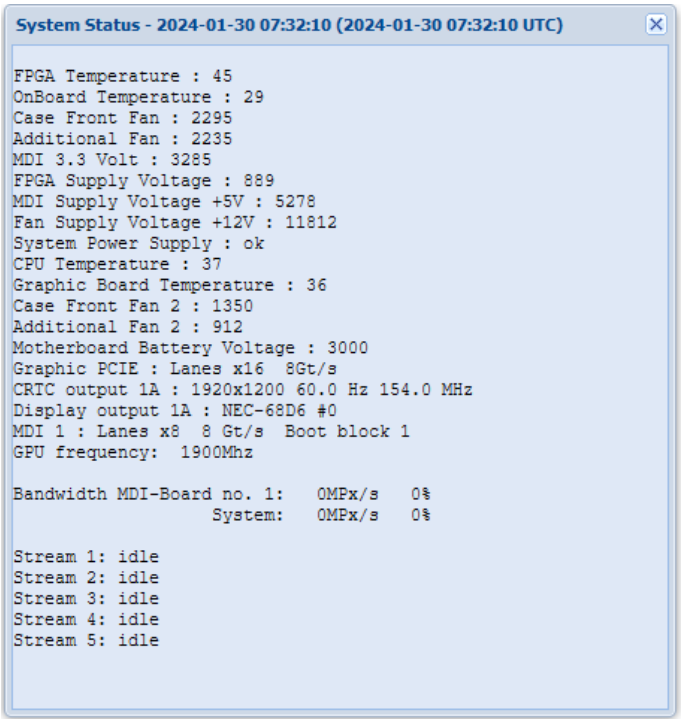


Figure: Status (example)

5.2 Configuration tab

The configuration tab shows all sub tabs to setup the PersonalWorkplace-Controller system.

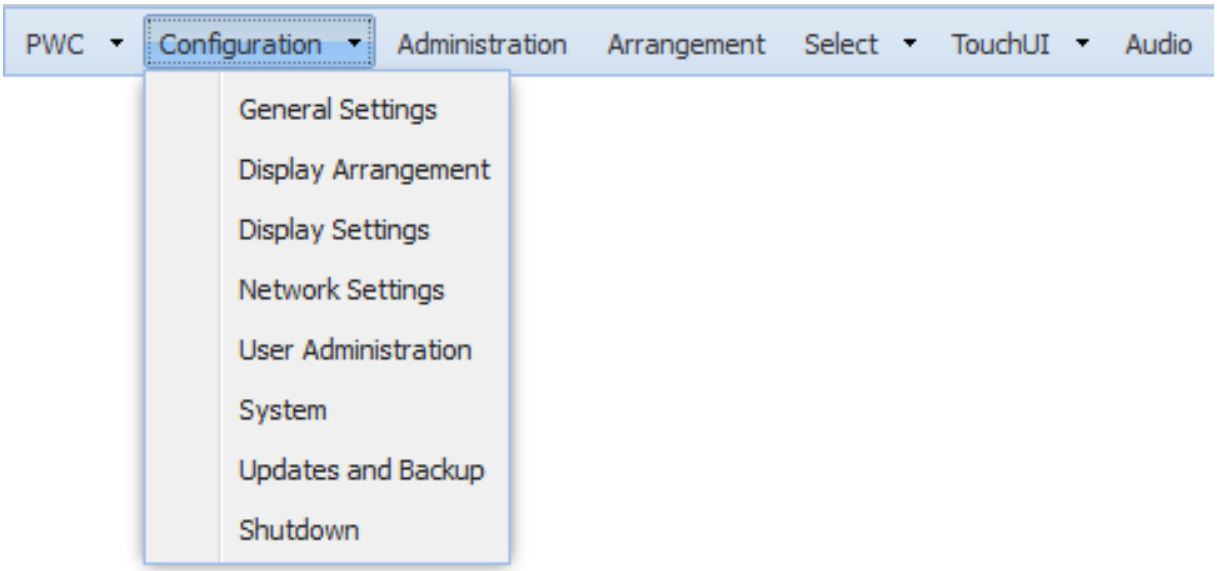


Figure: Configuration sub-tabs

5.2.1 General settings

General Settings should be set up once at the beginning and are used system wide.

5.2.1.1 Device name

This name is used in network communication. By default, it is unique by using a part of the MAC-address of this PersonalWorkplace-Controller. It can be changed but should be unique in the local network.

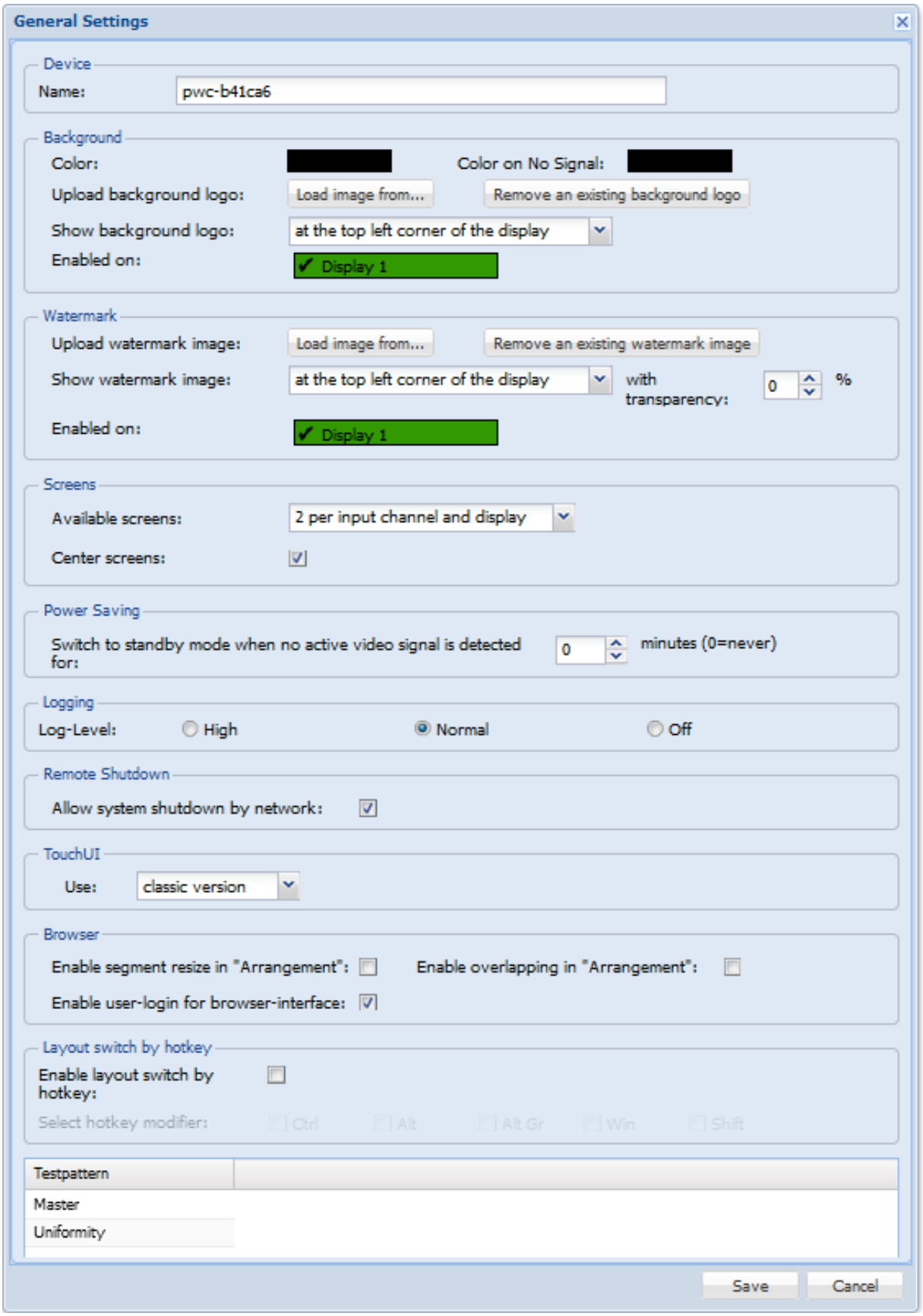


Figure: General settings (example)

5.2.1.3 Customized background logo

You can upload one logo that is shown on the output displays in the background. It is covered when any input window is move to the same position. The larger the logo, the more GPU bandwidth is used to draw it. We recommend using a smaller size logo.

To administrate the background logos, go to *General Settings*.

Use *Load image from* to upload the logo from your PC with the browser. The logo is stored in the configuration file. The format of the logo must be 24 bit colors, transparent PNG.

To remove an existing logo use *Remove an existing background logo*.

To position the logo, use the *Show background logo* selection. The logo is positioned as selected independent of the display resolution.

Use the *Enabled on* feature to select on which displays the logo should be visible.

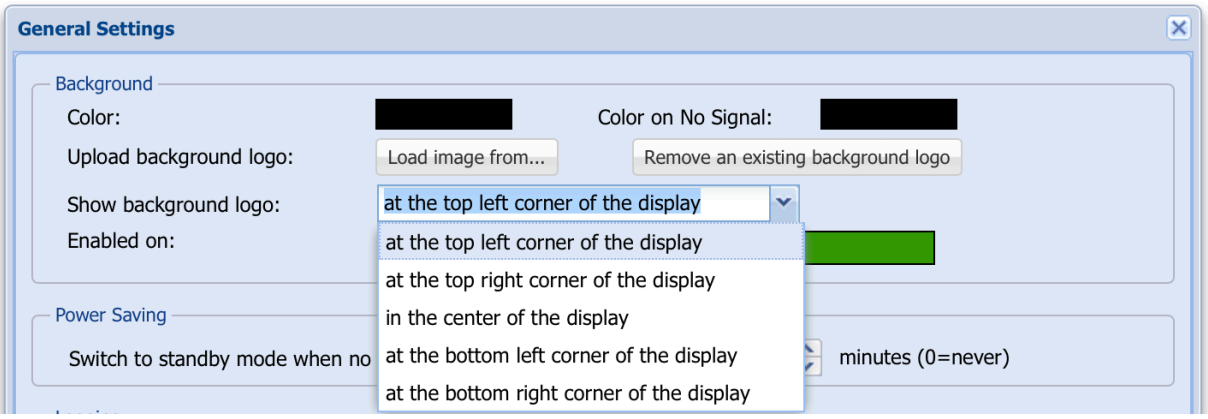


Figure: Customized logo

5.2.1.4 Watermark

You can upload a logo that is shown on certain output displays with a definable transparency. It can be used to overlay logos, words and so on only for certain outputs such as mirrors.

Refer to chapter *Customized background logo* how to configure the watermark.

5.2.1.5 Screens

- **Available screens:** By default; all input channels have two sub-screens (Screen 1 and Screen 2) in the *Administration* tab. The two sub-screens can be extended to four sub-screens per input channel and display. All input channel settings and layout information are *reset to factory* when changed.
- **Center screens:** By default; all inputs with a different aspect-ratio as given in the layout are top left adjusted. Now they can be centered. A reboot is needed after the change.

5.2.1.6 Power saving standby mode

Standby mode reduces the power consumption of the PersonalWorkplace-Controller significantly. The monitor is sent to sleep mode as well.

Standby mode is entered when no video signal is active for a given, user defined, time. It is also used in PWC KVM mode when activated (such as through the TouchUI interface).

The system returns to normal mode when one of the digital video inputs has a stable signal (+5VDDC power must be connected), or in PWC KVM mode, when a mouse click is made or *Wake on LAN* is used.

The time to enter normal mode is approximately 35 seconds. When normal mode is resumed, the layout will either be the last set layout, or if no layout was set, the default layout (see chapter *Display settings*)

When power is turned off/on while the system is in standby mode, the system powers up with the same layout arrangement as set (last or default).

Power mode	Normal (User mode)	Normal mode (during administration)	Standby mode	Power off
Activated by	When not in administration, sleep, standby or power off mode	When administration window is open	After predefined time of no video signal on any video input (in normal user mode only)	When selected in administration mode or when enabled by software
Deactivated by	By activating one of the other modes	Closing the administration window	Any active digital video signal, Wake on LAN, return of lost power such as power switch at the back	Return of lost power such as power switch at the back
After deactivating restore to	-	Last/default user defined layout,		
Time to return to normal mode	-	-	35s	35s
Power consumption	Nominal	Nominal	12W	Nominal
What happens when (unexpected) power is lost in this mode	This is an unexpected power off. Reboot to the default/last layout (configuration file)	This is an unexpected power off. This is very dangerous; the system may be corrupted. If everything goes well: same as normal user mode	Reboot to last / default layout,	

Figure: Power Modes

5.2.1.7 Enable logging

Disable or *enable logging* stops or starts the storing of the log files on the hard disk.

It should be disabled during normal operation (the *Enable Logging* button is displayed).

When logging is enabled, care should be taken when powering off the system.

Use the *System Shutdown* button before turning off the power.

5.2.1.8 Remote shutdown

Clear the checkbox to disable a shutdown sequence through the network (xml-interface). By default, the remote shutdown is enabled.

5.2.1.9 TouchUI

Choose between the Classic or the Modern Touch User Interface.
For more details see chapter: *Touch User Interface (TouchUI)*.

5.2.1.10 Enable segment resize in arrangement

If the checkbox is marked, you can resize the windows in the *Arrangement* tab with the mouse. For more details see chapter: *Arrangement*.

5.2.1.11 Enable overlapping in arrangement

If the checkbox is marked, you can overlap the windows in the *Arrangement* tab with the mouse. For more details see chapter *Arrangement*.

5.2.1.12 Enable user login for the browser interface

By default, the box is marked, and a new sub tab is visible for the *User Administration* in the *Configuration* tab.

For better security, the *HTTPS* function is also enabled.

It returns with a typical login screen. The default login is:

- User: Admin
- Password: 4658

If the user login is disabled, all stored users are cleared, and the default login is activated.

For more details see chapter: *User Administration*

5.2.1.13 Layout switch by hotkey

Hotkeys are used to switch to a certain layout by pressing one or multiple global ‘hotkey modifier’ keys together with the layout-specific number key 1, 2 .. 0.

Hotkeys can only be used for displays that are configured in ’PWC KVM’ mode and are controlled by the keyboard that is selected as the corresponding input in the Display Settings dialog.

If a hotkey should change the layouts of multiple monitors, the monitors can first be combined to a single logical output display using the Display Arrangement dialog.

Switching the layout using a hotkey is disabled by default.

When the check box is marked, you can select one or more hotkey modifiers. If multiple modifier keys are defined, all keys must be pressed together to activate a hotkey.

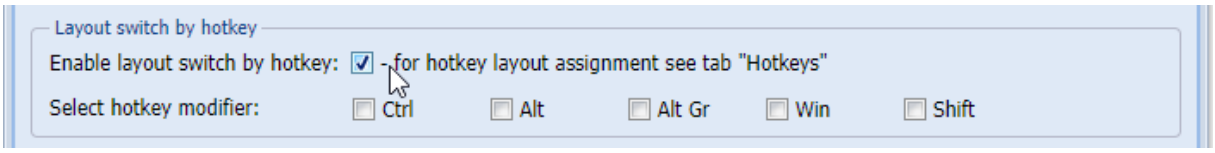


Figure: Layout switch by hotkey

Additionally, a new tab *Hotkeys* appears.

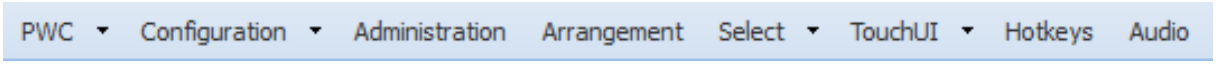


Figure: Administration Web-Interface with Hotkeys tab

On the *Hotkeys* tab, choose the display for which layout hotkeys are to be defined. On the right side, select the existing layouts to a hotkey by a drag and drop into the hotkey number fields. To remove assignments, the applied layout must be drag and drop back into the empty field. After configuration is finished, press the *Save* button to complete or the *Cancel* button to abort.

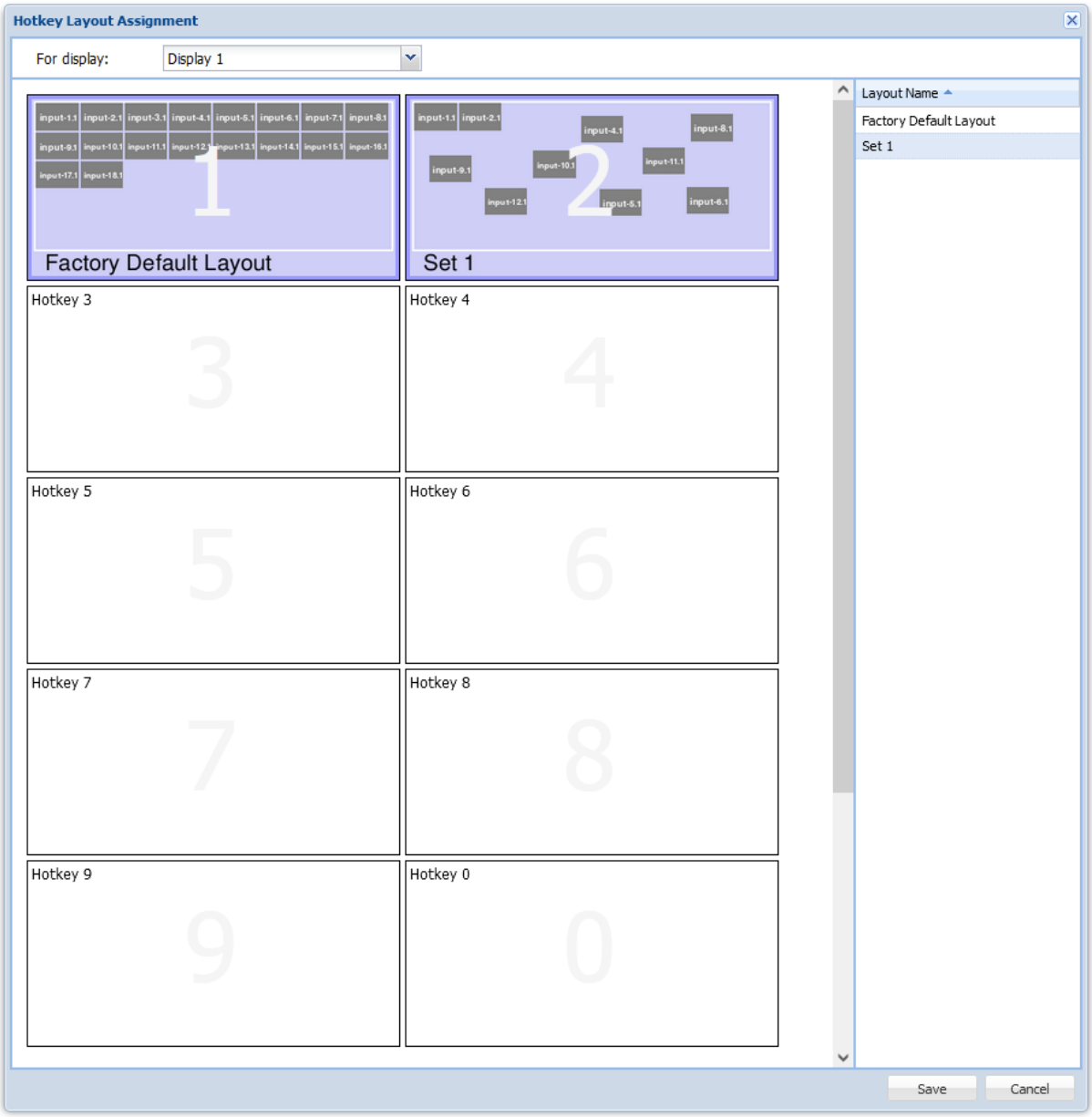


Figure: Hotkey layout assignment (example)

5.2.1.14 Test pattern

Double-click to select a test pattern from the list. The test pattern is displayed on all output displays full size.

When no longer needed type any key to continue. The test pattern size is adjusted to the resolution of the displays.

5.2.2 Select display arrangement

Select *Display Arrangement* to set the connection or the arrangement of the output displays and/or streams.

This configuration must be done early in the setup procedure because other configurations relate to this setup.

There are two different ways for the display arrangement:

- Dynamic mode, this is the mode that can handle all kinds of display resolutions. Each connector or stream needs one 8MP license – regardless of the resolution.
- Legacy mode, this is the mode with few fixed display resolutions.

Legacy mode is the compatibility mode for typical 16:9 or 16:10.

Note: The options explained below depend on the different PersonalWorkplace-Controller variants and the activated Display-Licences. In some cases, not all the options are available.

Dynamic mode is a mode that can handle display arrangements like 3840x1440 or 3840x1600 and so on. It can arrange displays horizontally, vertically or squares. For the maximum size refer to the top right corner, where you find *Max. composite display with xxxxx pixel, max. height xxxxx lines per board*, for example, 16384 pixels by 16384 lines allow a horizontal line of four UHD displays side by side, or a vertical row of four 5K displays or 2 by 2 5K displays.

Note: A horizontal line of four 5K displays is not possible because of the limited pixel area.

To switch between both modes, check the lower left side for a button *Switch to legacy mode* or when in legacy mode *Switch to dynamic mode*.

Before switching to dynamic mode connect all displays and turn them on. The system reboots and detects the displays.

5.2.2.1 Dynamic mode display arrangement

Before switching to dynamic mode, connect and turn on all displays.

For any arrangement of more than one display remember that the displays must be of the identical type (EDID data must be identical).

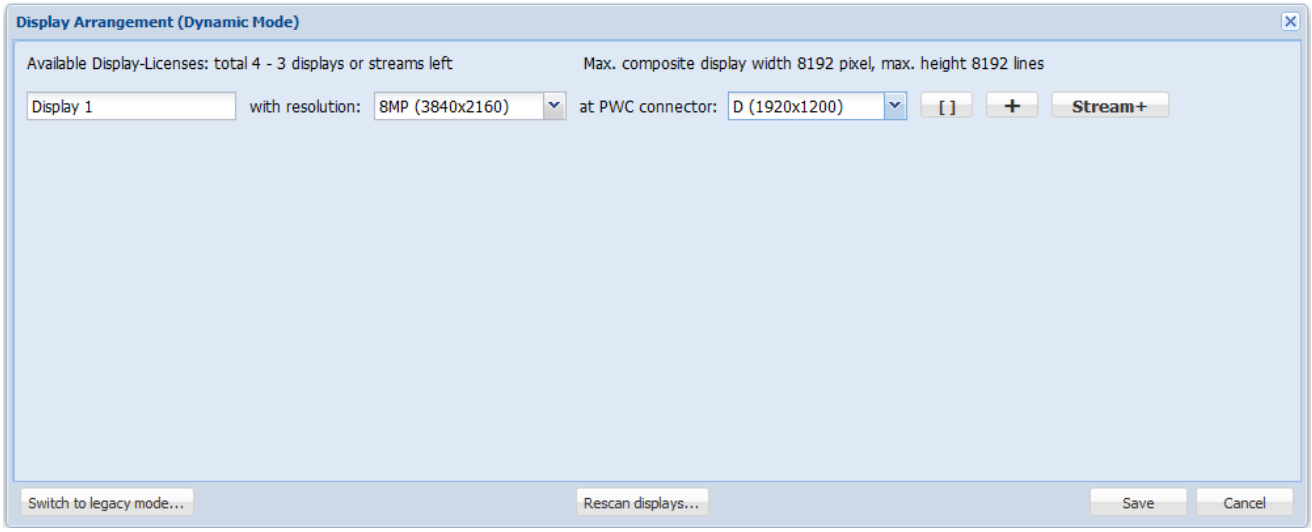


Figure: Display Arrangement – Dynamic Mode (example)

When opened for the first time only one line is visible from the factory default setting. Before adding more displays, check if enough licenses are available. In the top-left corner of the display arrangement locate the line: *Available Display Licenses: total xx – yy display or streams left*.

This means this system has a total of xx licenses; yy licenses can still be configured. Each connector or stream needs one 8 MP license. Additional licenses can be ordered.

For each possible output connector or stream one line is shown.

- The leftmost field in each line can be filled with the name of the display. This name is used in all further selections.
- Next a resolution can be selected. Set this value to the desired resolution. If the display does not support this resolution the software tries to set up the next smaller resolution the display offers.
- The output of a single display can be rotated. Combined outputs generated with square brackets [ ] cannot be rotated.
  Note: Rotation feature is not available with *PersonalWorkplace-Controller Standard* variant.
- Next an output connector can be chosen.

More lines (displays or streams) can be added:

- The plus sign (+) adds a new line for one more display.
- The square brackets [ ] adds a display (no stream) to the same display forming an extended desktop. The display can be added right of or below the first display. For example two 4 MP displays of 2560x1600 can be combined to one display of either 5160x1600 or 2560x3200. To form a square the second display is right of the first display. The third is below and the forth is right of the third display. The maximum available size horizontally and vertically is shown in the top line. All displays must have the same timing (EDID data).
  Note: The square brackets are not available with *PersonalWorkplace-Controller Standard* variant.

- The *Stream+* button adds a new line for a stream. Stream sizes of up to 8 MP (3840x2160) are supported.
  Note: See appendix *Stream type details* for more information about available streams and further details.
- The last line can be removed with the minus sign (-). The first lines should be used for displays with the highest resolution.

Refer to the to the *Installation Guide* concerning hardware limitations and the maximum number of input channels.

The maximum available size horizontally and vertically is shown in the top line.

When adding or changing displays use the *Rescan* button in the middle of the lower part. Otherwise, the new displays and their resolution are not visible.

Enter the name of the display in the left-most field in each line. This name is used in all further selections.

After saving the arrangement the system reboots and all connected displays should show the factory default layout.

5.2.2.2 Legacy mode display arrangement

When opened for the first time the two lines reflect the factory default setting.

- The last line can be removed with the minus sign (-). The first lines should be used for displays with the highest resolution.
- The plus sign (+) adds a new line for one more display.
- The square brackets [ ] adds a display (no stream) to the same display forming an extended desktop. The display can be added right of or below the first display. For example, two 4 MP displays of 2560x1600 can be combined to one display of either 5160x1600 or 2560x3200. To form a square the second display is right of the first display. The third display is below and the fourth is right of the third display. The maximum available size horizontally and vertically is shown in the top line. All displays must have the same timing (EDID data).
  Note: The square brackets are not available with *PersonalWorkplace-Controller Standard* variant.
- The *Stream+* button adds a new line for a stream. Stream sizes of up to 8MP (3840x2160) are supported.
  Note: See appendix *Stream type details* for more information about available streams and further details.

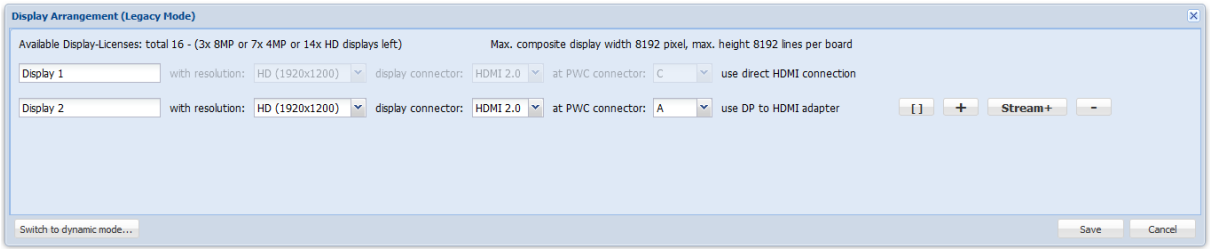


Figure: Display Arrangement – Legacy Mode (example)

Refer to the to the *Installation Guide* concerning hardware limitations and the maximum number of input channels.

The top-left corner shows the amount of available display/stream licenses. If more licenses are needed, they have to be ordered. Each display/stream size of 1920x1080 needs a license. One 8MP license corresponds to 4 Full HD licenses.

Enter the name of the display in the left-most field in each line. This name is used in all further selections.

After saving the setup the system reboots and all connected displays should show the factory default layout. The message box in the top left corner may show errors if the resolution of one of the displays does not match the selected one.

5.2.3 Display settings

The *Display Settings* tab is used to set up each display or stream individually, after the arrangement of the displays or streams was selected in the *Switch Display Arrangement* tab.

According to the displays arranged in the *Display Arrangement* the displays/streams are shown here.

Use the *Identify* button in the lower left corner to show the name of the display on the display.

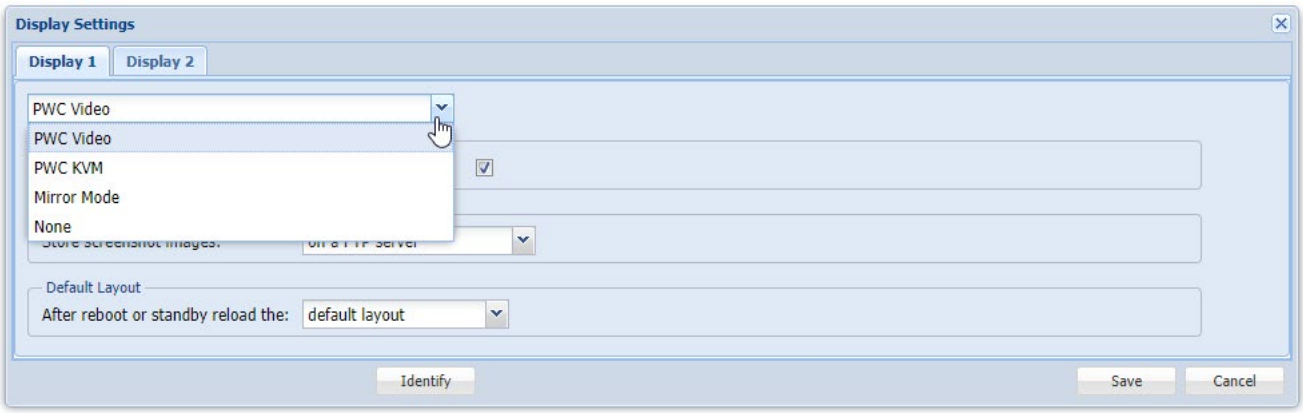


Figure: Display Settings

Pushing the *Identify* button pops up the name of the display on each display for five seconds.

Select one of the following modes for each display or stream:

5.2.4 Display: PWC video mode

In *PWC Video mode* the display behaves just like a video wall controller; therefore, the arrangement of layouts, and the select and button assignments for this display are active. No keyboard and mouse can be used for this display. Layout switching needs either a Touch User Interface or remote-control commands send via network with REST commands.

Screenshot
Store Screenshot images
Only screenshots triggered by the Touch User interface can be stored to a USB stick connected to one of the USB keyboard & mouse inputs.

After reboot or standby reload the last layout
Select which layout should be used after reboot, standby or power off.

Default layout is the layout marked as *default* in the arrangement tab.

Last layout is the layout as defined in the arrangement tab, without any further user changes.

Last modified layout is the layout as it was visible on-screen.

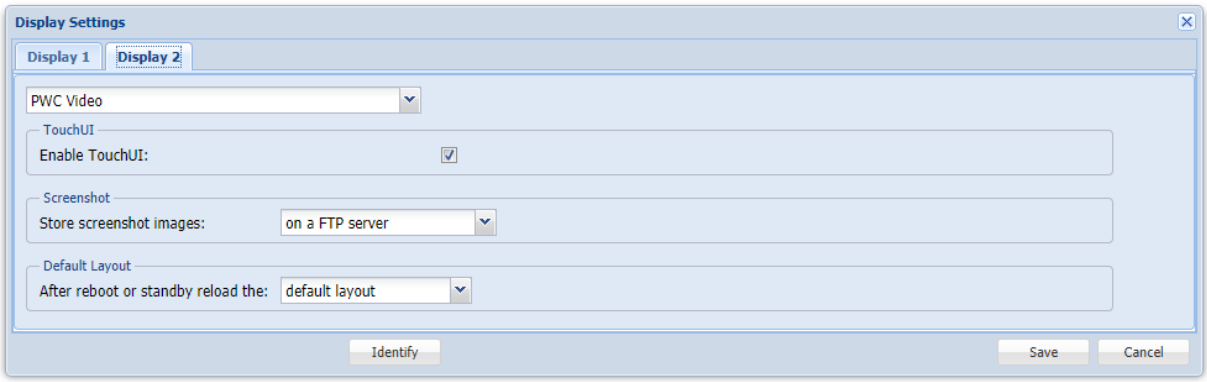


Figure: Display, PWC Video mode

5.2.4.1 Stream: PWC video mode

In *PWC Video mode* the stream behaves just like a physical display connected to the PersonalWorkplace-Controller; therefore, the arrangement of layouts, and the 'Select 'and 'button assignments' for this stream are active. No keyboard and mouse can be used for this display. Layout switching needs either a Touch User Interface or remote-control commands send via network with REST commands.

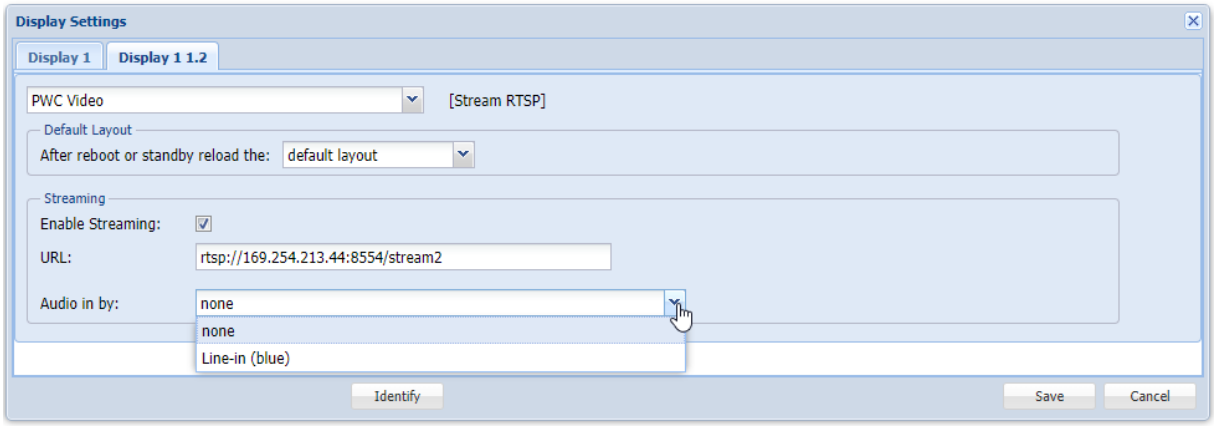


Figure: Stream, PWC Video mode

After reboot or standby reload the last layout
Select which layout should be used after reboot, standby or power off.

Default layout is the layout marked as *default* in the *Arrangement* tab.

Last layout is the layout as defined in the arrangement tab, without any further user changes.

Last modified layout is the layout as it was visible on-screen.

Enable Streaming
Enable/disable this stream.

URL
Copy this URL to the appropriate program/browser to receive the stream.

Audio in by
Enables an audio in source for this stream. Select either from a local Line-in or an USB device. USB devices are not hot pluggable. Only one audio input device can be selected at any time.

5.2.4.2 Display: PWC KVM mode

In *PWC KVM mode* the display behaves just like a video wall controller with additional KVM functionality, but the windows can be moved and resized by the mouse. Double-clicking connects keyboard and mouse to the attached PC Hardware option. The layouts (grids) are pre-arranged and activated like in *PWC Video* mode.

Keyboard and mouse section

Select a mouse and keyboard input for this display
Let you select which of the four USB inputs are used for this display. A hub has to be used when keyboard and mouse are used. One mouse and one keyboard are allowed per input only. The touch USB output of a touch monitor can be connected in parallel to the mouse.

Enable keyboard for this display
You can disable the keyboard to prevent the on-screen error message *Keyboard not found*. A mouse/touch device cannot be deselected (use *PWC Video mode* instead) and when it is not connected an error message *Mouse/Touch not found* is displayed on screen.

Enable mouse and keyboard to connect to a remote PC
Let you disable such connections for all windows on this display, even though a USB connection is defined for some input channels (windows) in the *Administration* tab.

Enable auto connect for mouse and keyboard
When enabled, moving the mouse cursor across visible windows will switch the mouse and keyboard input focus automatically to the underlaying window without further interaction. Mouse cursors of deselected windows are hidden such that only a single mouse cursor is always visible. Note that local UI access is limited when the display area is fully occupied.

These features do not work with the *PersonalWorkplace-Controller Video* variant.

The following two items are for the *on-screen user interface.*

Mouse speed
If faster or slower mouse movement is necessary, it can be corrected here. Default and standard is 0.

Keyboard layout
Use this selection for on-screen keyboard usage only *like save layout as* and so on.

Enable touch monitor
Enables a touch monitor for this output display. See chapter: *Touch-monitor interface* for more details.

Advanced in keyboard and mouse section

These settings are valid only when *Enable mouse and keyboard to connect to a remote PC* is activated.

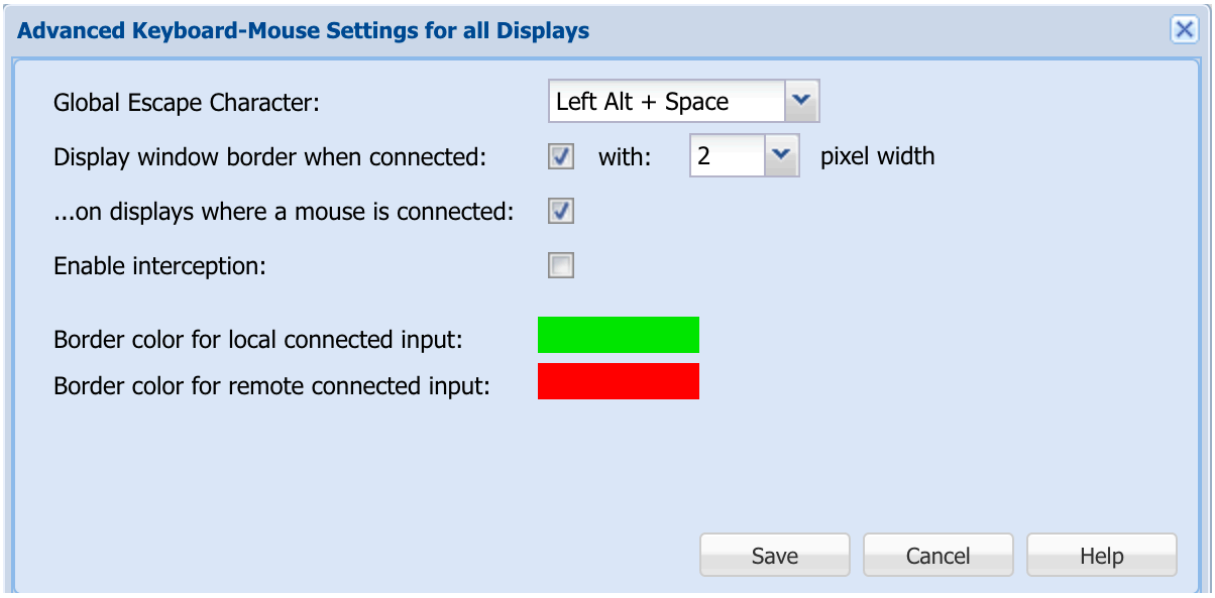


Figure: Advanced in keyboard and mouse section

Global escape character

If a window has a keyboard mouse connection to a PC type use the *Global Escape Character* to open/break the connection.

Display window frame when selected

Enables a border of the color *Border-Color for local connected input* of width *pixel width* when a USB connection to a PC is established. If more than one display in KVM mode is connected and if *Enable keyboard and mouse to connect to remote PC* in Display Settings, *PWC KVM mode* is marked, and the same input channel is on-screen a border of *Border-Color for remote connected input* is shown.

On screens with keyboard/mouse connected only

In a system with PWC Video and PWC KVM displays the border on a selected input is shown on the KVM display only.

Enable interception

In a system with two or more KVM displays with a connection established on one display, a user on the other display can either intercept the connection when turned on or cannot intercept the connection.

On-screen arrangement

On-screen user interface

Enables the on-screen user interface with a right-click of the mouse. For more details see chapter *On-screen user interface*.

Use a larger font for this display

Use a larger font for the on-screen menu.

Enable moving of windows for this display
Enables or disables moving of all windows on this display. Enable or disable moving of a single window in the *Arrangement* tab.

Moved windows will swap on this window
Dragging and dropping a window over another window swaps the position of these windows. Windows cannot be resized.

Enable resizing of windows for this display
Enables or disables resizing of all windows on this display. Enable or disable resizing of a single window in the *Arrangement* tab. Windows cannot be swapped.

Advanced in on screen arrangement
These settings are valid only when *On-screen user interface* is activated.

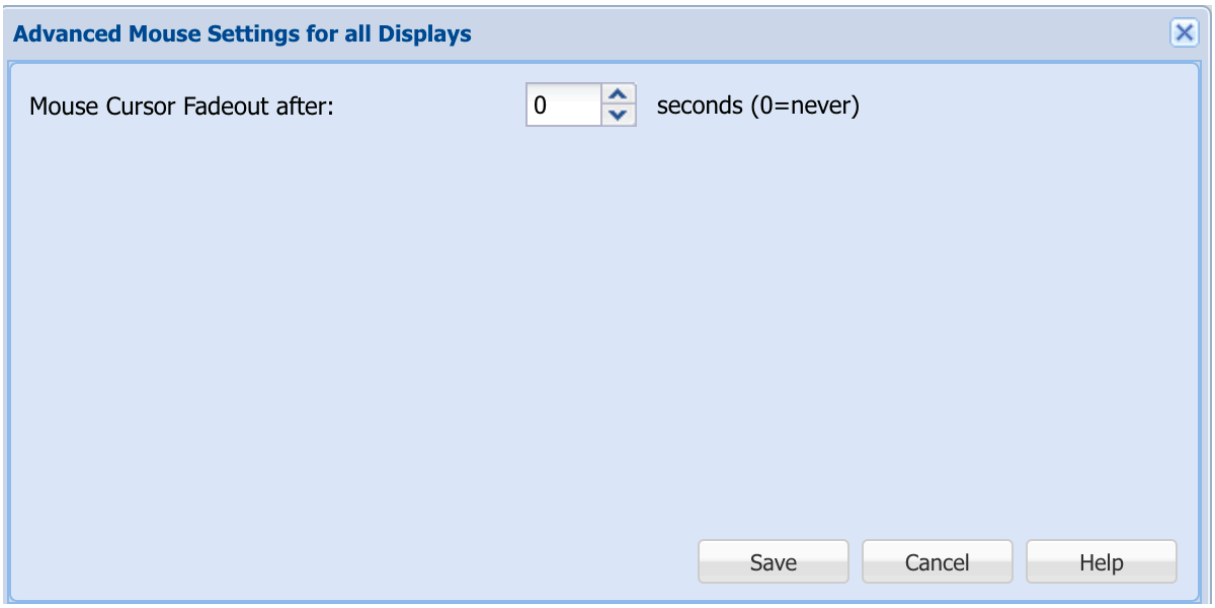


Figure: Advanced in on screen arrangement

Mouse Cursor Fadeout after
When the mouse or touch monitor is not touched for this number of seconds, the cursor is turned off. Touching the mouse turns it on again.

Screenshot

Store screenshot images on
Store images on an attached USB stick connected to the same USB hub as keyboard & mouse or to FTP server.

Power Saving

Send this display to sleep after no mouse and keyboard activity for xy minutes
The graphics output is stopped, and the display goes to sleep, a mouse or keyboard click activates the graphics output again.

Reload the last layout

After reboot or standby reload the last layout
Select which layout should be used after reboot, standby or power off.

Default layout is the layout marked as *default* in the *Arrangement* tab.

Last layout is the layout as defined in the arrangement tab, without any further user changes.

Last modified layout is the layout as it was visible on-screen.

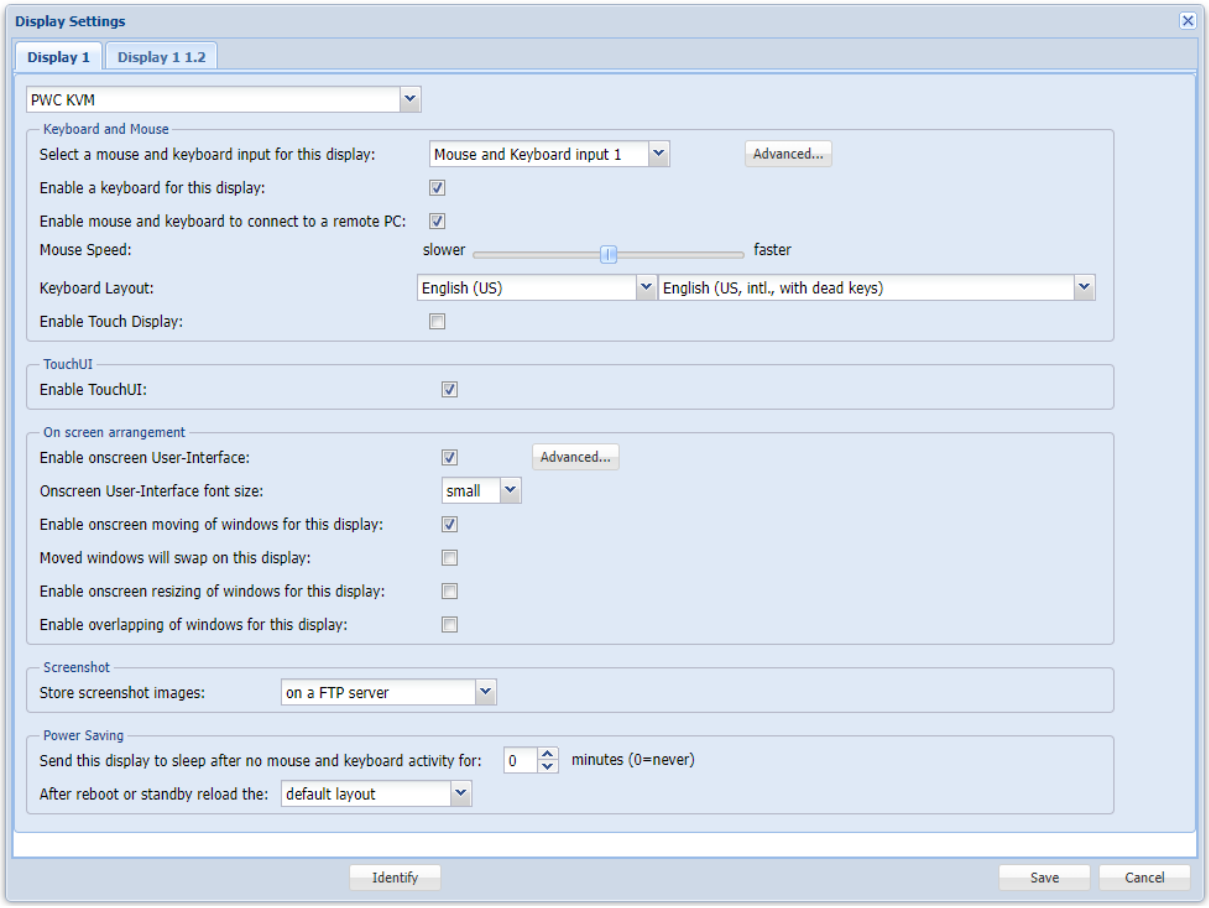


Figure: PWC KVM mode (example)

5.2.4.3 Stream: PWC KVM mode

PWC KVM mode does not support streams.

5.2.4.4 Display: mirror mode

This display is a mirror of the display selected. If the resolutions are different the mirror includes scaling.

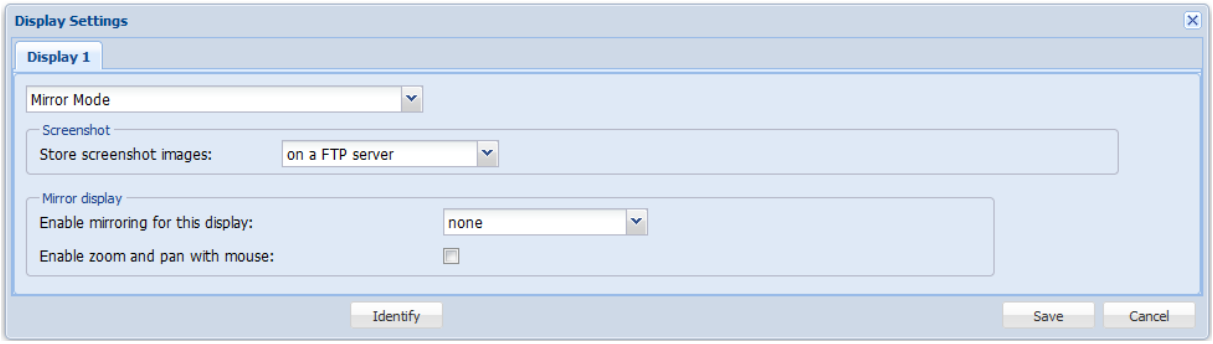


Figure: Mirror Mode (example)

Enable zoom and pan with mouse
A double middle click of the mouse connected to the mirrored display zooms the mirror to the original unscaled size of the mirrored display. When the display of the mirror is smaller, only a part of the original image is visible. To pan to other areas, press the middle mouse button and move it. Another double click of the middle mouse button returns to the scaled image.

5.2.4.5 Stream: mirror mode

This stream is a mirror of the display/stream selected. If the resolutions are different the mirror includes scaling.

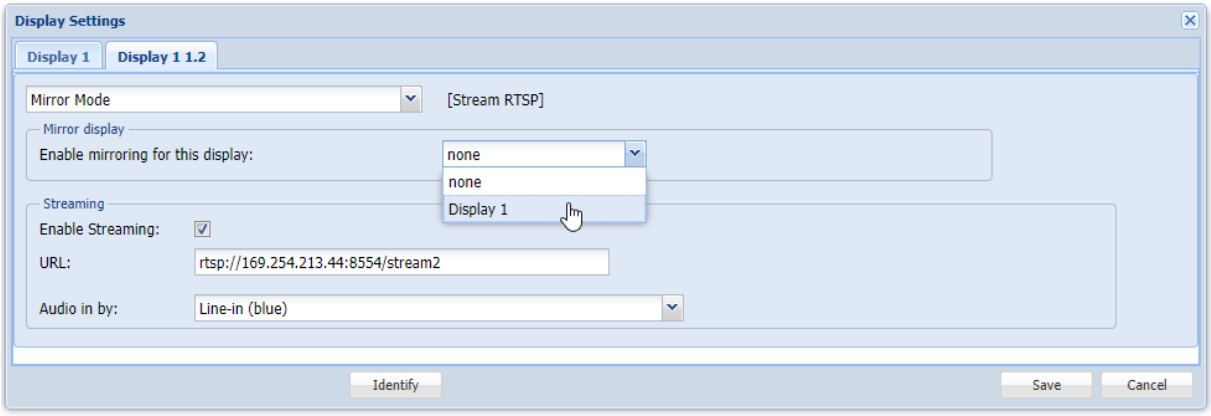


Figure: Stream: Mirror Mode

Enable Streaming
Enable/disable this stream.

URL
Copy this URL to the appropriate program/browser to receive the stream.

Audio in by
Enables an audio in source for this stream. Select either from a local Line-in or an USB device. USB devices are not hot pluggable.

5.2.4.6 None

Use *None* if no display is connected to avoid unnecessary error messages.

5.2.5 Network Settings

The network settings tab allows setting up the networking itself, a NTP server address where exact time can be fetched from, if available. The time is used for the log-information only.
For the initial configuration of the network settings use the *Installation Guide*.

5.2.5.1 Network

The PersonalWorkplace-Controller ships with DHCP activated. The assigned IP address is not displayed anywhere. Contact your network administrator to obtain the IP address assigned by the DHCP server.

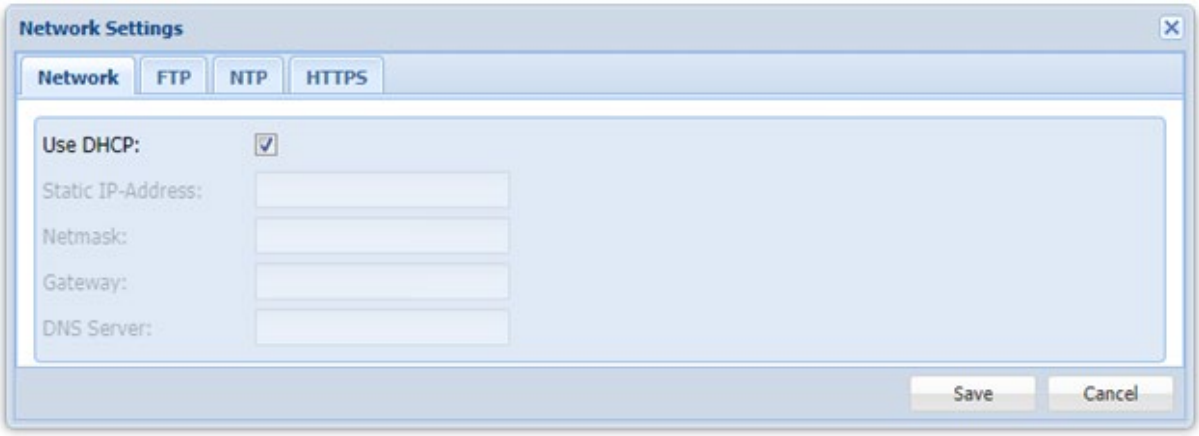


Figure: Network Settings (example)

For commissioning, access via the fallback IP address is recommended:

- Make a one-to-one Ethernet connection to another computer.
- Open a browser and enter **169.254.213.44**. Through Automatic Private IP Addressing, this address should be reachable without configuration.
  If the IP address cannot be reached after all, check the IP address of the computer and, if necessary, set it to 169.254.213.1, Netmask 255.255.255.0.
- To use a static IP address instead:
  - Open the network settings in the Configuration tab.
  - Clear the Use DHCP check box.
  - Enter the desired static IP address (e.g., 192.168.0.1).
  - Enter the network netmask (e.g., 255.255.255.0).
  - Enter the IP address of the gateway.
  - Enter the IP address of the DNS server.
  - Click **Save**.
  - Click **Reboot now**.

5.2.5.2 FTP server

The FTP service is used to store/restore the configuration file and for software updates. When a screenshot is triggered using a Touch PC or on-screen the screenshots are stored on the FTP server as well. They are stored under the name: *snapshot-displayname-date-time.png.*

The browser supports *HTTPS* for update and configuration file store/restore from the external host PC the browser is running on.

Figure: FTP

5.2.5.3 Network time

The NTP service is used to synchronize the internal clock to an external NTP Server. Enter an IP address. Do not enter a name. If a NTP server is found the NTP time is used as system time and the hardware clock is updated, if no server is found the internal clock is used. A NTP server is not mandatory.

Figure: NTP

5.2.5.4 HTTPS

By default, the PersonalWorkplace-Controller uses secure browsing. Secure browsing can be disabled here. It should be used whenever possible. A self-signed certificate is stored for this purpose in the factory default state.

You can choose between using the browser interface to force using HTTPS for the REST interface.

You can also select HTTPS to encrypt webRTC streams.

It is possible here to create a new self-signed certificate via the interface or to import an existing certificate.

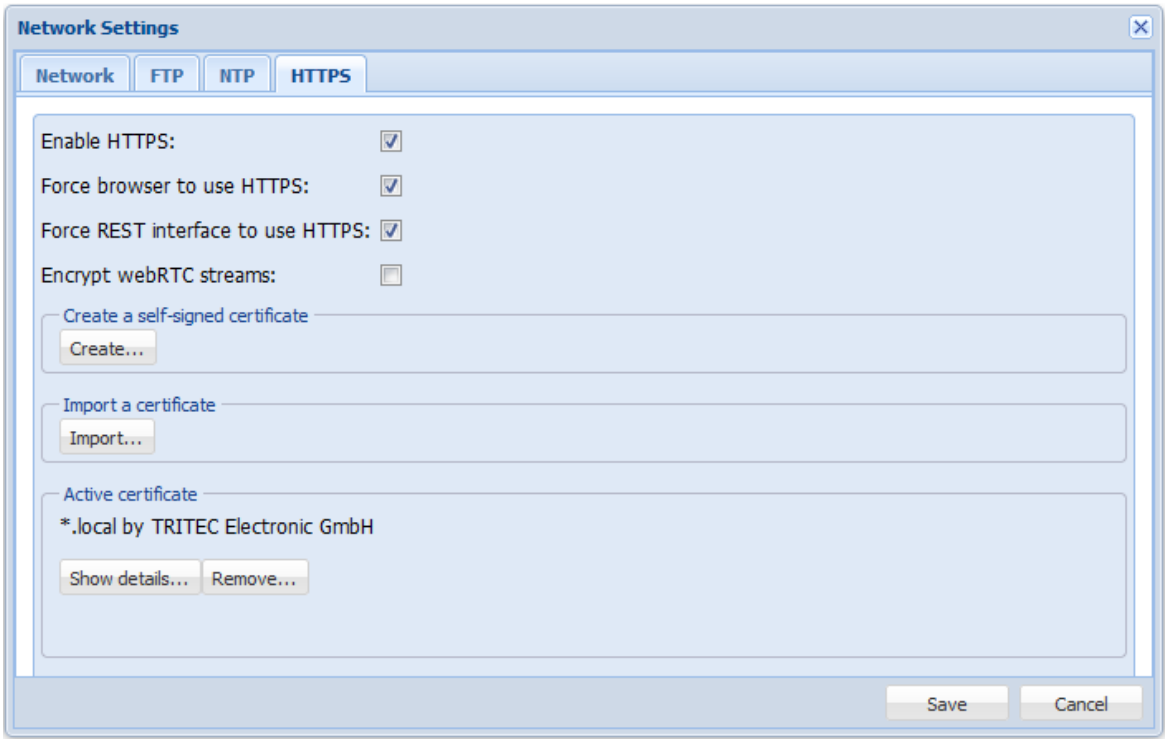


Figure: HTTPS

5.2.6 User administration

Note the following:

- Only one administrator can be logged in at the same time to avoid competing actions. The later one will kick out the older one. If an administrator is logged in (rights level *service*), a user with *user* rights level cannot log in at all. If a user is logged in, a logging in service user will kick out the user.

Refer to chapter *Enable user login for the browser* interface to enable the *User Administration* tab. Reload the browser.

A new tab under the *Configuration* tab becomes visible: *User Administration*.

Two permission levels of users can be defined: *Service* and *User*. Service users can access all items without restrictions. Users can access the following tabs only:

- *PWC*: all tabs
- *Configuration*: *Shutdown*
- *Administration*: all tabs
- *Arrangement*: all tabs
- *Select*: all tabs
- *Touch UI*: *Button assignment*
- *Audio*: all tabs

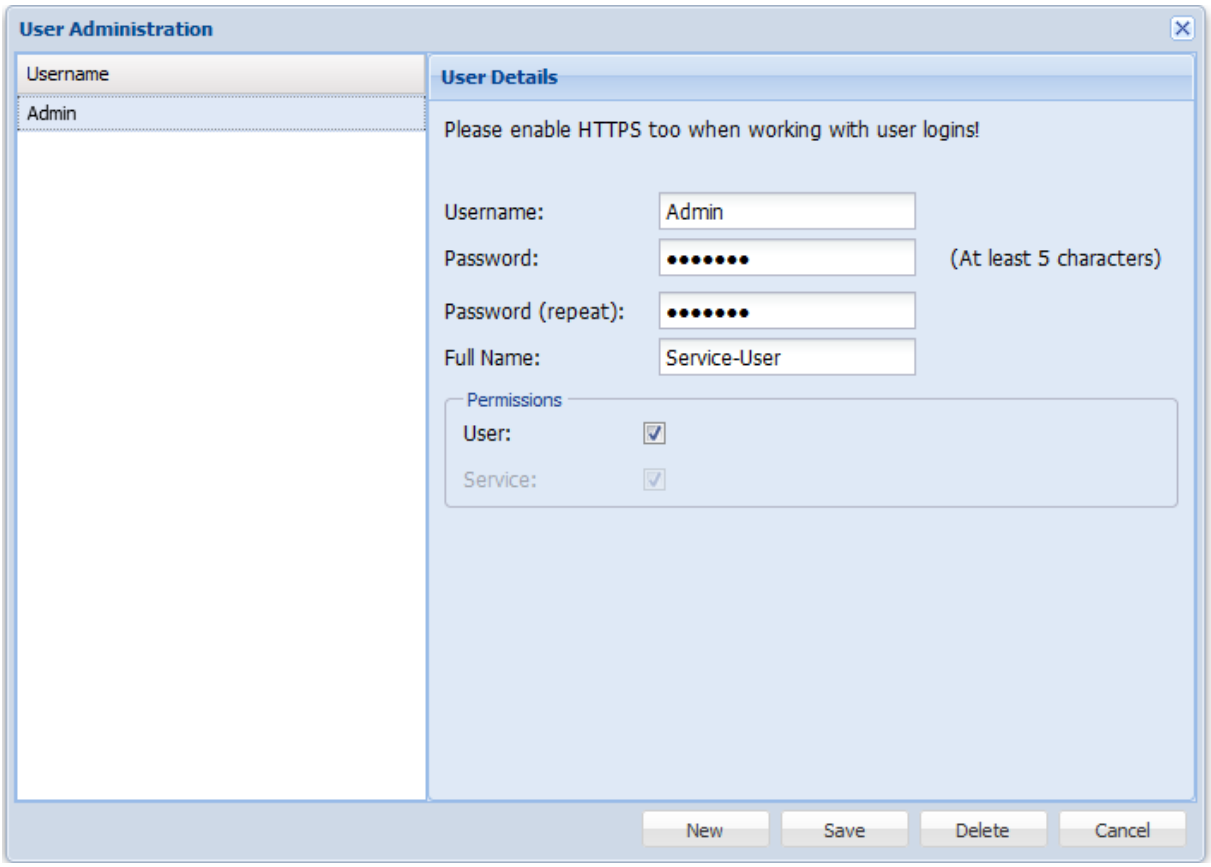


Figure: User Administration (example)

To modify a user, fill in the fields and select *Save*.
To add a new user, select *New*, fill in all fields and select *Save*.
To delete a user, select it on the left-hand side and select *Delete*.

To log-off a user, select the user name in the top right-hand corner and *logoff*.

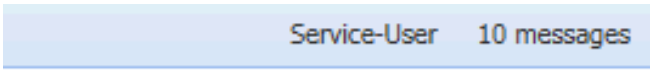


Figure: Logoff

5.2.6.1 Administrator password reset

To reset the administrator password, physical access to the display connected to output *1 A* and access to the administrator web interface using fallback IP address (**169.254.213.44**) is necessary.

- Reboot the PWC device, if necessary, by a hard power off.
- For the first five minutes after this reboot the login window displays a button *Restore Admin User*.
- After confirmation, the display connected to output *1 A* will show a 12-digit password reset token for ten minutes. For security reasons, mirrors will be deactivated while the password reset token is shown.

- Enter the token in the web application and proceed. If the reset was successful, the user and password are set to the default values. Default user is set to *Admin* and the password is set to *4658*. If it fails (more than ten minutes or wrong reset token) the user can reboot the PWC device and start over again.

5.2.7 Update and backup

Updates the software and backups the configuration and log files.

The selected files are stored or loaded from the local PC.

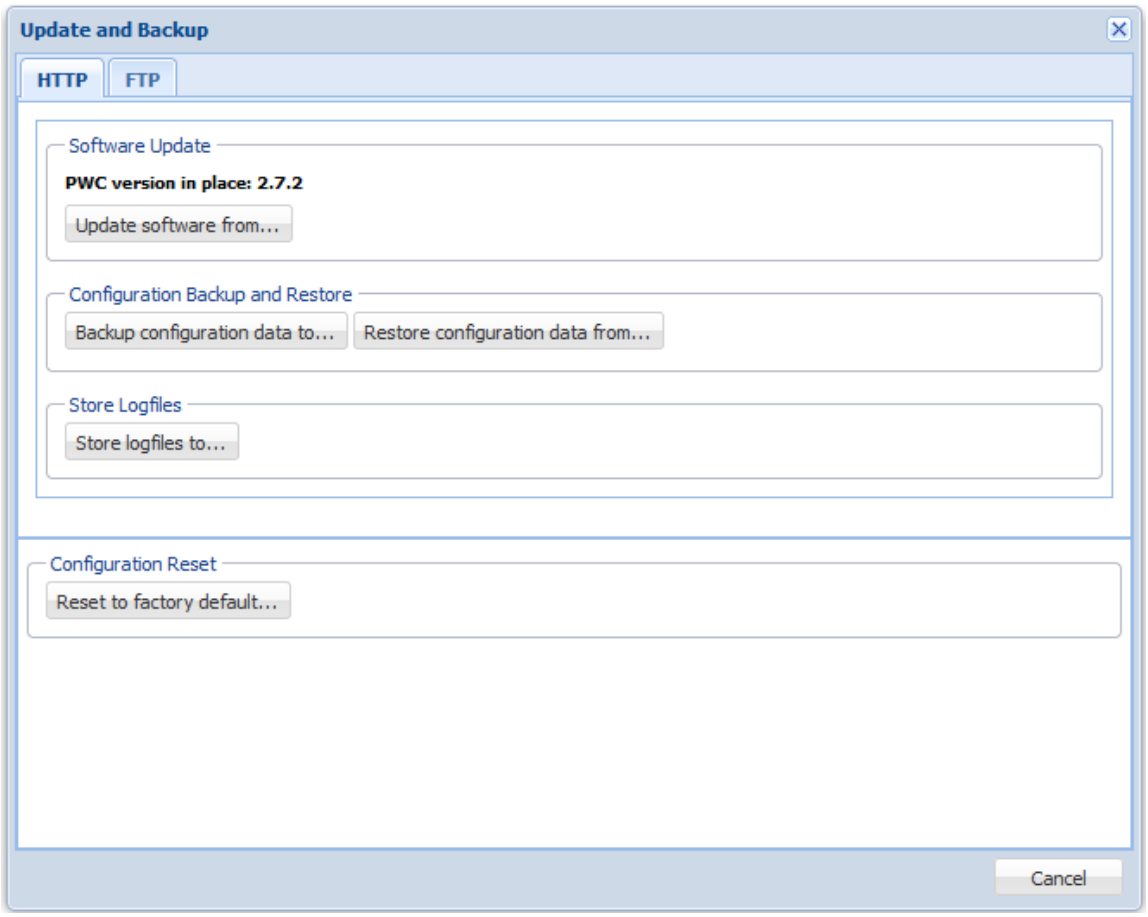


Figure: Update and Backup

If configured, a FTP server can also be used for updates and backups.

5.2.7.1 Configuration backup and restore

The configuration contains all variable data made during the use of this software, such as network set up, input specifications, arrangements and sets and so on.

This configuration should be stored on the specified FTP server or local PC by selecting *Backup configuration data to…* or *Store current configuration on server*. It can be restored from an FTP server or a local PC by clicking *Restore configuration data from…* or *Restore saved configuration from….*

If a configured PersonalWorkplace-Controller has to be exchanged, backup its configuration and restore it on another PersonalWorkplace-Controller. It works the same way after restoring the configuration file.

5.2.7.2 Configuration reset

When *Reset to factory default* is selected, the system resets the configuration to factory or custom default values, whichever was specified.

5.2.7.3 Logfile backup/store logfile

When *Store logfiles to…* or *Store logfiles on server* is clicked, a copy of the local log files is made and stored on the FTP server or local PC as *logfiles-YYYY-MM-DD-hh-mm-ss.tgz*. G&D support uses this file for failure analysis.

5.2.8 System

This Tab is for debugging and screenshots only.

5.2.8.1 Screenshot

To take a screenshot select *Screenshot of Display*.

Wait a few seconds and a window opens, which shows the output image, as it should be visible on the output display at this time. If the screenshot appears as expected but the image on-screen shows errors check the connections between the graphics board and the monitor.

5.2.8.2 Test

Activating the *Connection Test* checks if all displays are connected. The connection test is reading the EDID data from the display for several seconds to detect possible problems on the I2C bus of the DVI/DP connection.

The video quality test checks if the video quality between the graphics board memory and DisplayPort to Dual-Link DVI converters is free of pixel error.

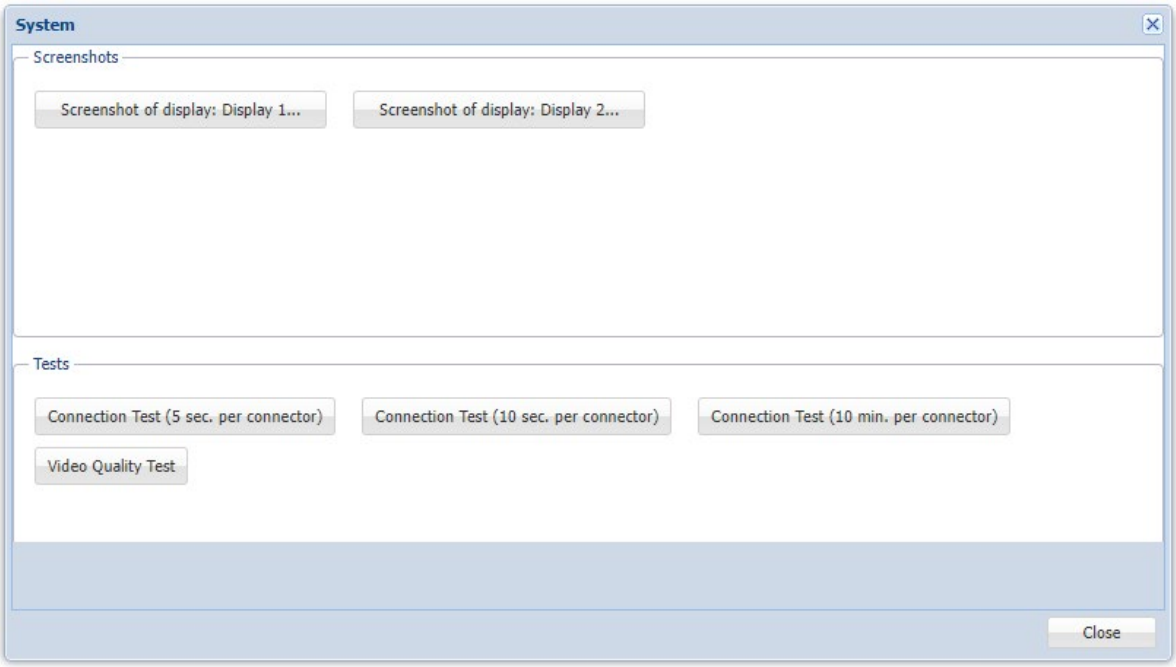


Figure: System

5.2.9 System shutdown

Rebooting or shutting down of the system can be selected in this tab.

If the system is shutdown, a message is displayed on the output monitor that you can turn the power off.

Note the following:

- The system does not turn off the power.
- Wait for the message *It's safe to power off now* to appear on the output monitor screen and turn off the power.

After a power cycle the default grids are shown.

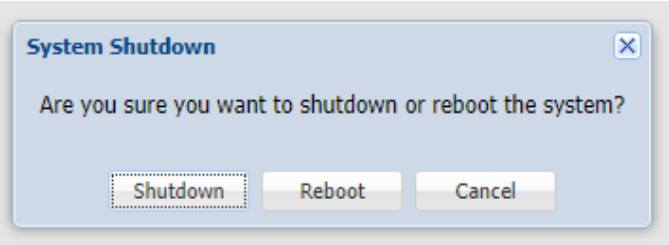


Figure: System Shutdown

5.3 Administration

Administration is the tab to set up all input channels.

On the left-hand side all input channels are shown. The number of the input channel shown is related to the connector at the back of the system.

The tree structure of the inputs shows the dependency of the channels. On the second tree level, the input boards are shown. Depending on the PersonalWorkplace-Controller variant, it features either native video inputs (HDMI etc.) or network ports (optical SFP+ connectors).

Network ports have to be connected directly or via an optical network switch to *PersonalWorkplace-CPU-Fiber(M/S)* devices.

Virtual inputs are inputs without a physical connection. They can be addressed by *REST* commands and used as streaming input.

The icons in front of the input channel number change depending on the status of the input channel.

 Channel not enabled

 Channel enabled and connected with a valid input signal

 Channel enabled and not connected (No signal)

 Virtual channel not enabled

 Virtual channel enabled

5.4 Setting up an input channel for the first time

Select an input channel by clicking into one of the channel icons at the left side.
These icons show the channel number and an assigned name.

When an input is selected first time, it has to be enabled first (select *channel enable* and then select *Apply*).

Use the checkbox *Show Input*, to have selected the inputs to be shown on the output display, which is defined in the first line of the *Display Arrangement*.

For each input channel, an icon can be taken at any time. This icon is used in the *Touch User Interface* and the *Arrangement* tab to represent this input. To create such an icon, go to the *Channel Icon* tab in the *Advanced* area.

If a keyboard and mouse is connected and USB port was assigned the input, you can move the cursor over the displayed input channel and double-click to connect keyboard and mouse to this input.

The connection is made differently from the normal connection mode. You can access the full Windows screen of all windows, in an extended screen arrangement, to make modification in Windows.

Windows will need approximately seven seconds before the cursor can be moved. To exit this mode, enter *Left Control* key + *space* key.

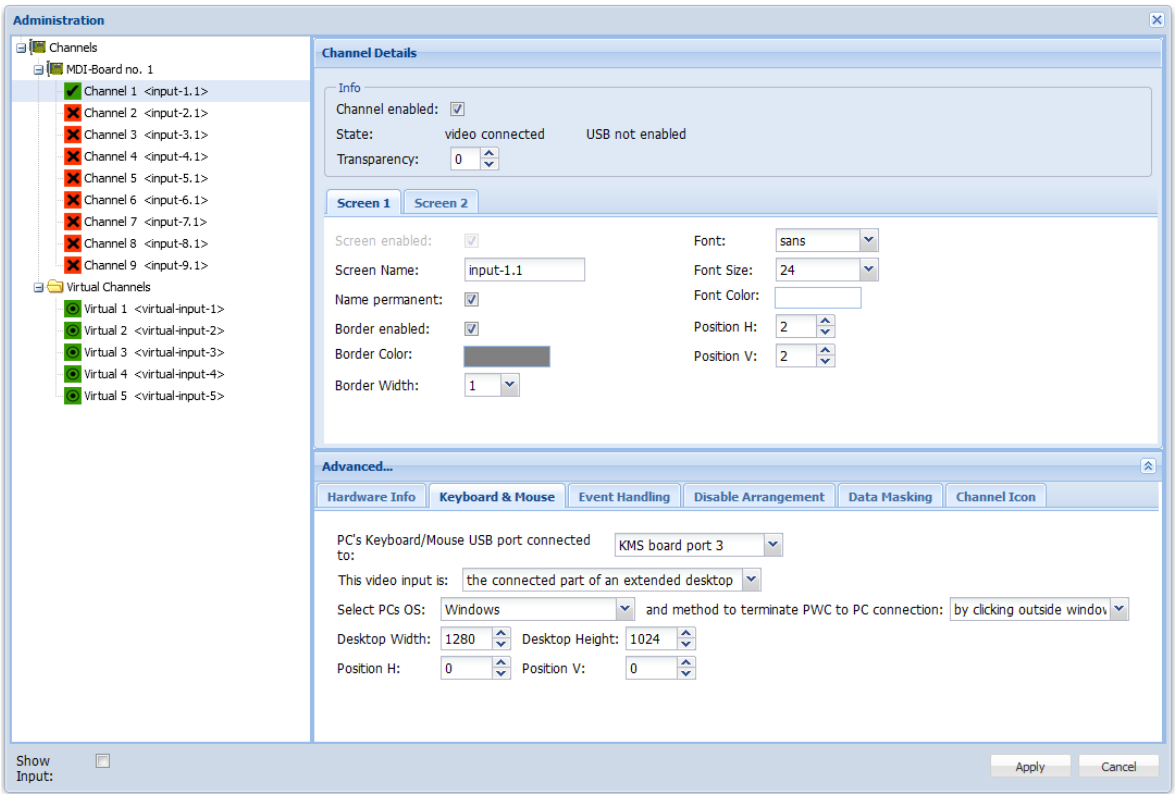


Figure: Detailed view of Administration tab (example)

Open the *Advanced* tab on the left side and find information about the data of the input channel described in the *Hardware* tab.

If a valid input is connected the state *connected* should be seen.

When an input that is selected (single click), a window in the right part of the browser opens. This input view shows some status information of that channel and allows administration of this input channel.

5.4.1 Main administration tab

5.4.1.1 Info

- **Channel enable:** Enables or disables this channel in the *Arrangement* tab. On shared channels, enabling one channel automatically disables the other shared channel and vice versa.
- **State:** gives a quick overview of the channel:
    - If there is an active video connection at this input, the message *connected* is shown and the resolution and refresh rate is shown.
    - If there is an active USB connection at this input, the message *connected* is shown and the port of the K/M board is shown.
- **Transparency:** Sets the transparency of this window. 0 = no transparency; 100 = fully transparent.

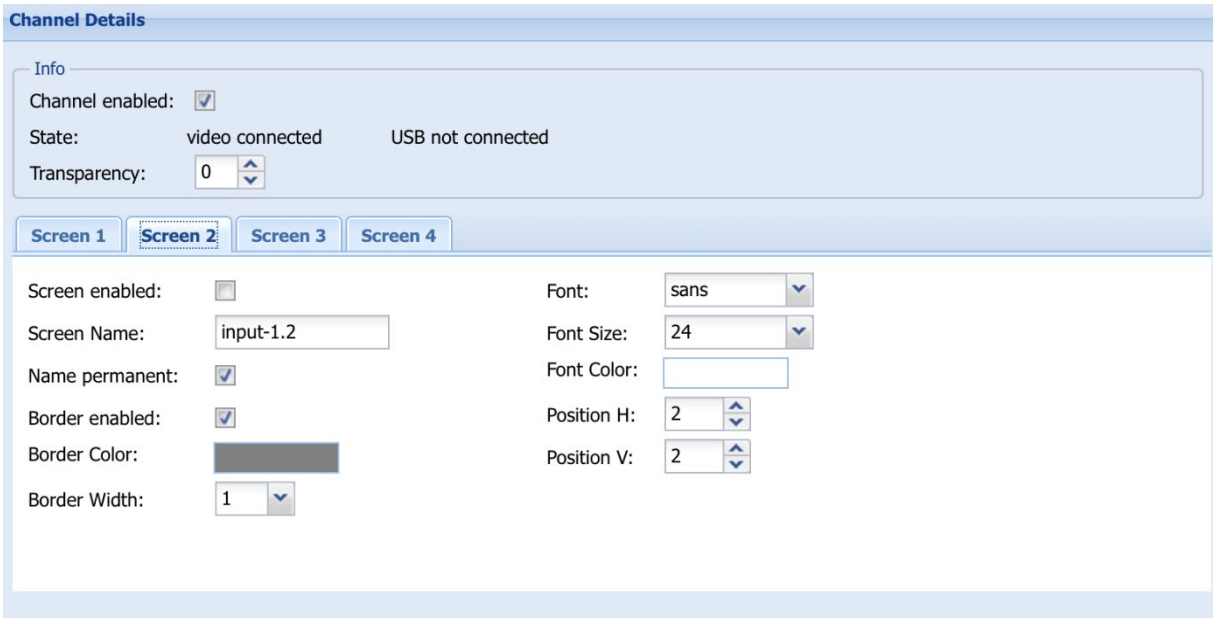


Figure: Channel details (example)

5.4.2 Input stitching

With stitching either two or four input channels can be combined to form one 4K channel.

Note: Input stiching is not available for *PersonalWorkplace-Controller Advanced Max F(M/S)* and *PersonalWorkplace-Controller Professional Max F(M/S)* variants.

Inputs 3 and 4 can be stitched together side by side (input 3 is left side, input 4 the right side) to form an input that is twice as wide.

Input 3 can be used for all further settings, input 4 can be used only to check the input signal (resolution and so on).

Inputs 5, 6, 7, and 8 can be stitched together, input 5 is the top left, input 6 the top right, input 7 the bottom left and input 8 the bottom right of combined input window.

Input 5 can be used for all further settings, inputs 6, 7 and 8 can be used only to check the input signal (resolution and so on).

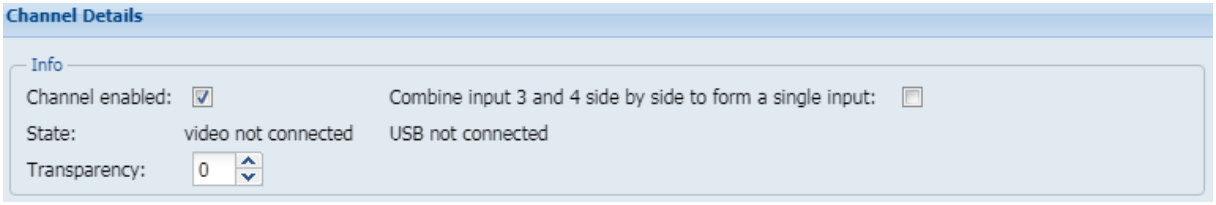


Figure: Input Stitching

5.4.3 Screen 1

Note the following:

- Screen 1 is always enabled.
- **Screen Name:** Enter a name for the channel and screen. This name is used in all following communication and as title bar on the output screen.
- **Screen Alias:** If a name is entered it is displayed on screen instead of the name.
- **Name permanent:** Enables or disables displaying of the name on-screen.
- **Border enable:** Enables or disables the border of a window.
- **Border Color**: Opens a file to select the color of the window bar, which displays the name and the grids.
- **Border width**: Defines the width of the border.
- **Aspect-Ratio Locked:** Enables or disables the ability to break the aspect ratio size/height of the input to allow anamorphic stretching. Can be controlled in tab of screen 1 and is equal for all screens of an input. Use the detailed window of an input in the arrangement view to set the size and heigh values.
- **Font/ Font Size/ Font Color/ Position H/ Position V:** Related to the name as displayed on screen and allows changing its font, the size, the color and the position.

5.4.4 Screen 2 to 4

A second screen can be enabled. It shows the same content as screen 1. It can be used during the arrangement to crop certain areas of the input and display these at different locations on screen.

All the selectable fields are the same as in screen 1.

To enable more than two screens go to *Configuration* > *General settings* > *Screens* and switch to four input channels per display.

5.4.5 Advanced

The *Advanced* button opens a set of four to six sub tabs. Set up these tabs early after connecting the input channels.

5.4.5.1 Hardware tab – for all variants, except PersonalWorkplace-Controller Advanced Max F(M/S) and PersonalWorkplace-Controller Professional Max F(M/S)

At the left side of this window, basic information about the actual input is shown and is refreshed every two seconds.

- **Direct connection:** The input signal is directly connected to the input connector.
- **Resolution:** Actual resolution and the refresh rate measured at this moment in the input board.
- **Pixel-Clock**: Shows the pixel clock of the selected input in MHz.
- **Color:** Color model of the input. All inputs allow RGB 888 as color model. Additionally inputs one to four can handle YCbCr 4:4:4 as color model. YCbCr is visible but without color information.

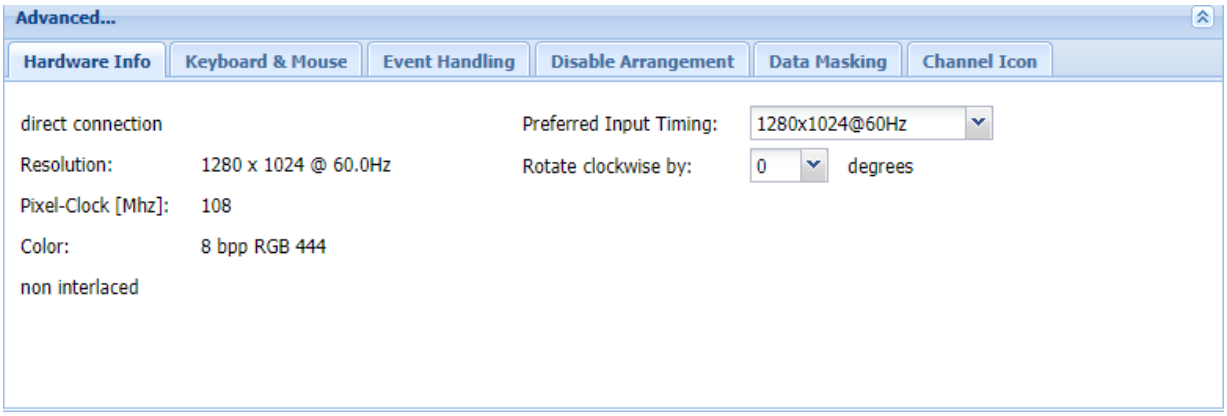


Figure: Hardware tab (example)

The following set up should only be done once at the beginning after all connections are made and the input signals are active (although they do not need to be active to do the set up).

- **Preferred input timing**: Select a maximum resolution that is presented to the system (graphics board) connected to this input (The same way a monitor presents its resolution to the system via EDID data.). A refresh rate of 60Hz or 30Hz is used. The maximum selectable resolution depends on the capabilities of the input channel. Use this to limit the size of the input channel; this is the better solution then using a scaler to resize the input. You may need to reboot the computer (not the PersonalWorkplace-Controller) connected to this input channel. Default settings are digital with a max. resolution of
  1280 x1024@75Hz, 1600 x1200@60Hz. Using 1920x1080 includes all lower resolution data as well.
- **Rotate clockwise**: Allows the rotation of the input by 0, 90, 180 or 270 degrees. This feature is not available with *PersonalWorkplace-Controller Standard* variant.

- **Enable shrink curve algorithm (optional):** only visible for channels 5, 6, 9, and so on. It can be used with a special algorithm that enhances thin curves (1 pixel wide) with a dark background when the input is scaled down (shrink) below 1:1. Shrink Curve algorithm is active with *segment_identifier x.1* only. In other words, it is used only on *Display 1* and screen 1.
    - **Disabled:** Disables shrink curve behavior.
    - **Enabled (legacy):** Enables the automatic detection of areas with thin curves in the same way as previous versions. Background color is black (<101010).
    - **Enabled with region:** Enables the shrink curve behavior in a region specified by the Top/Left and Bottom/Right corners. For details see Figure: *Shrink curve with region* selected (This setting has shown excellent results with St. Jude Mapping system.). The selected region is highlighted on the output display.
    - **Use background color:** Can be enabled with the *region* mode. Enter the background color of the shrink curve region as RGB hexadecimal values, such as FF0000 is a red background. If not enabled the background color is <101010 (nearly black to black).

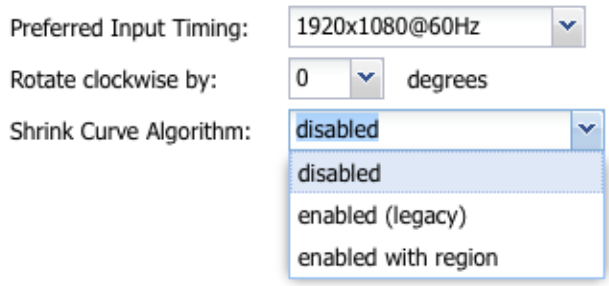


Figure: Shrink curve selection (example)

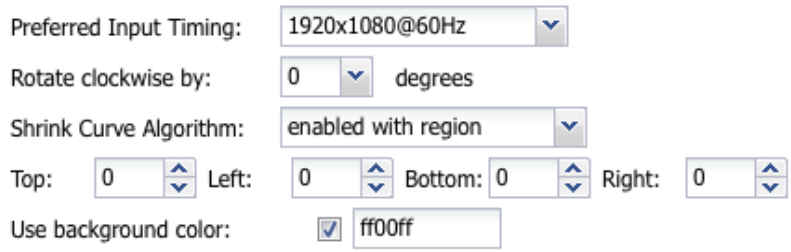


Figure: Shrink curve with region selected (example)

5.4.5.2 Hardware tab – for PersonalWorkplace-Controller Advanced Max F(M/S) and PersonalWorkplace-Controller Professional Max F(M/S))

The hardware tab for input 1 to 5 of the *PersonalWorkplace-Controller Advanced Max F(M/S)* and of the *PersonalWorkplace-Controller Professional Max F(M/S)* looks like shown in the following figure. For inputs 6 to 9 the tab looks like shown in the figure in 5.4.5.1.

The Shrink Curve algorithm can be enabled for inputs 6, 7 and 8 only.

When the hardware tab is open the *Video Valid* LED of the connected *PersonalWorkplace - CPU-Fiber(M/S)* is blinking green to identify the connected device.

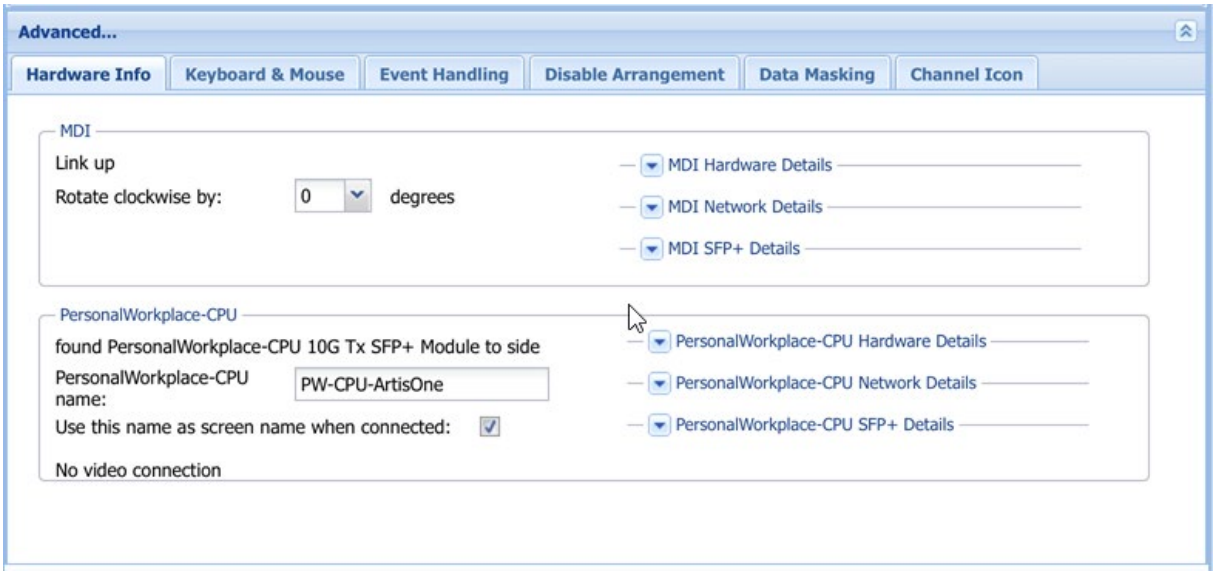


Figure: Hardware tab for Max variants of the PersonalWorkplace-Controller (example)

The upper part marked with *MDI* shows information of the input board.

- **Link up** is shown when an optical connection is established.
- **Input resolution** is shown when an *PersonalWorkplace--CPU-Fiber(M/S)* is found and a video input is active.
- **Rotate clockwise**: Allows the rotation of the input by 0, 90, 180 or 270 degrees.
- **MDI Hardware Details** show details of the input board.
- **MDI Network Details** show the MAC address of this input channel.
- **MDI SFP+ Details** show some of the parameters of the used SFP+ module.

The lower part marked with *PersonalWorkplace-CPU* shows details of the *connected PersonalWorkplace-CPU-Fiber(M/S)* module.

- **Found PersonalWorkplace-CPU 10G**
  - **Tx** is the version that sends data to the input card.
  - **SFP+ Module to side** has the SFP+ module at the left side.
  - **SFP+ Module to front** has the SFP+ module to the front.
- **Use this name as screen name when connected**: when checked replaces the name of the screen with the name entered as *PersonalWorkplace-CPU name* when the *PersonalWorkplace-CPU-Fiber(M/S)* is connected. This name is stored in the *PersonalWorkplace-CPU-Fiber(M/S)* module. For example, when a *PersonalWorkplace-CPU-Fiber(M/S)* is mounted on a mobile device like an Ultrasound caddy, its name is shown whenever it`s connected to a PersonalWorkplace-Controller at any input.

The next few lines give more details about the connected video signal:
HDMI, DP or SDI signal is connected, the resolution, and the color details.

When *Loop through is not connected* the preferred EDID timing can be chosen in the next line.

When *Loop through is connected* the EDID data are given by the display connected to the loop through. There is the choice to use the EDID data from the input board, but the user should be aware that the display connected to the loop through may not be able to display this timing.

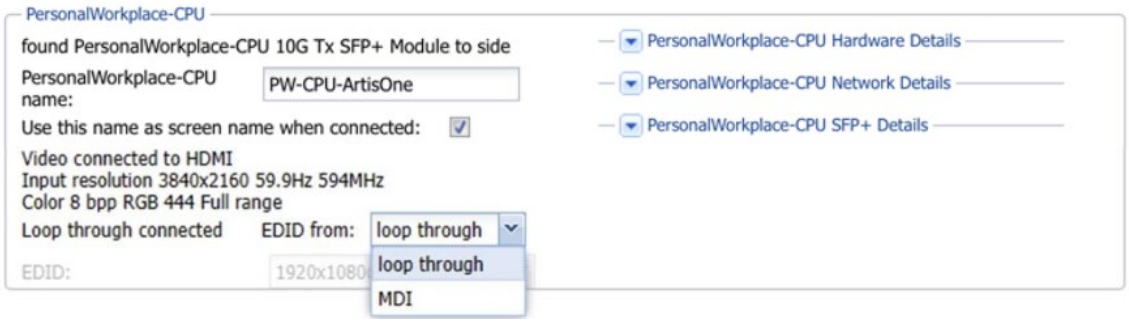


Figure: Loop through connected (example)

- **PersonalWorkplace-CPU Hardware Details** show all kinds of numbers and update information. It is marked in red when an update for the connected *PersonalWorkplace-CPU-Fiber(M/S)* is available. Future software updates may show more information.

Figure: PersonalWorkplace-CPU Hardware Details (example)

- **PersonalWorkplace-CPU Network Details** show the MAC address of the connected *PersonalWorkplace-CPU-Fiber(M/S)*.
- **PersonalWorkplace-CPU SFP+ Details** show some of the parameters of the SFP+ module used by the *PersonalWorkplace-CPU-Fiber(M/S)*.

Trouble shooting *PersonalWorkplace-Controller* to *PersonalWorkplace-CPU-Fiber(M/S)* connection

- If there is no *Link up*, check the optical cables to the PersonalWorkplace-CPU-Fiber(M/S) and the power of the device (power LED must be green).
- *PersonalWorkplace-CPU found* is the next step. If it is not visible check the *Link/Act* LED of the *PersonalWorkplace-CPU-Fiber(M/S)*. It should light green or green blinking.
- *Video connected* is the last step. If it is not visible check the *Valid Video* LED of the *PersonalWorkplace-CPU-Fiber(M/S)*. It should light green (valid timing) or blue (video is transmitted to the input board).

5.4.5.3 Keyboard & mouse

Select this tab to configure the connection to the PC when a mouse and keyboard is used.

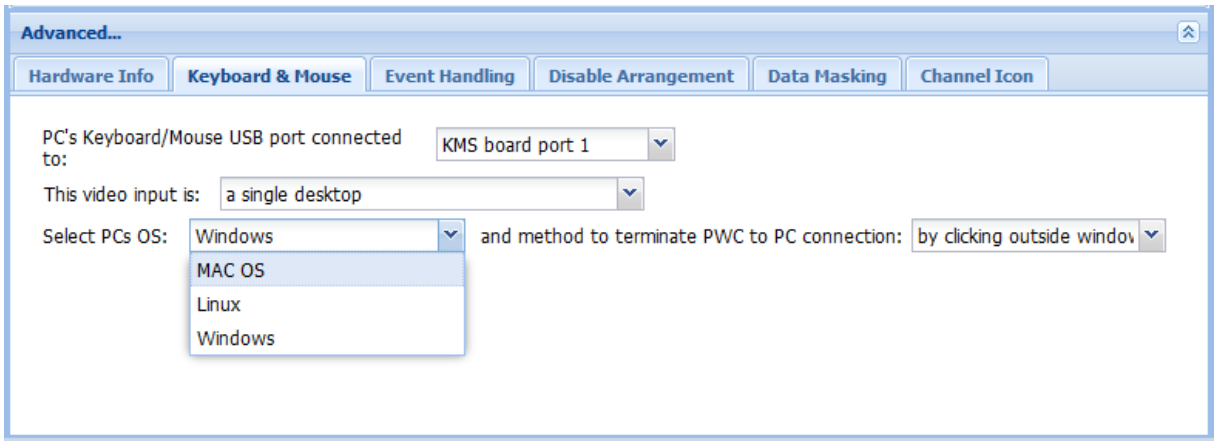


Figure: Keyboard & mouse tab for single desktop

- **PC Keyboard/mouse USB port is connected to K/M port or via PersonalWorkplace-CPU-Fiber(M/S):** A drop-down menu allows selecting one of the USB ports of the PersonalWorkplace-Controller to be connected to the PC. Select the USB (K/M) port number, which is connected to the same PC as this video connection. Select *none* when this video input has no USB connection or select *PersonalWorkplace-CPU-Port* if the keyboard & mouse are connected through the *PersonalWorkplace-CPU-Fiber(M/S)* connection.
- **This video input is part of an extended desktop:** Select if the connected PC is part of an extended desktop setting. When selected four new input fields open to enter more details. Refer to further explanations below.
- **Select PC OS**: Select the Operating System used on the PC. Refer to further explanations below.
- **Method to terminate PWC to PC connection:** Use *with break character* option or the *by clicking outside window* option; however, the second option can cause issues. For details read below.

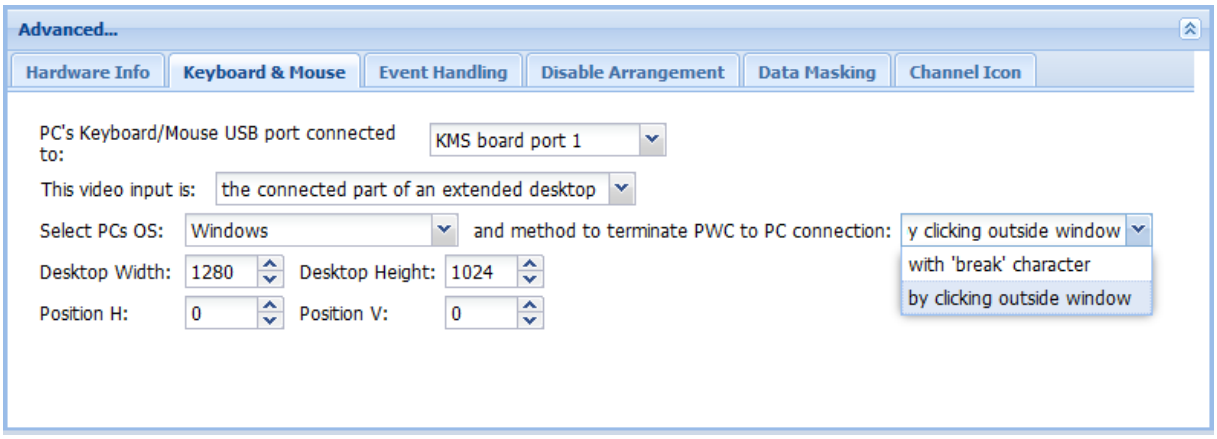


Figure: Keyboard & mouse tab for extended desktop

The Figure: *Mouse* modes shows the detailed flow of the possible selections.

For all OS selections:

- **With break character** (relative mouse mode): Needs a break character to terminate the connection between the PC and the PWC. A break character is a special character that must be typed while connected to the PC to disconnect the mouse keyboard connection. For more information, see chapter *Display: PWC KVM mode*. Use this mode when the user program needs one of these Window properties: *Enhance pointer precision* or *Select a pointer speed*. This selection works under all conditions in all operating systems.
- **By clicking outside of window** (absolute mouse mode): The connection between the PC and the PWC is terminated by clicking outside of the connected window.

For Windows or Linux single desktop, the settings should be:

- This video input is *a single desktop*.
- Select PC OS *Windows* or *Linux*.
- Method to terminate to terminate the PWC to PC connection *by clicking outside window*.

For Windows with extended desktop where a special driver can be installed

This should be the preferred method for an extended desktop. Settings should be:

- This video input is *the connected part of an extended desktop*.
- Select PC OS *Windows with driver installed*.
- Method to terminate the PWC to PC connection *by clicking outside of window*.

A driver provided by G&D has to be loaded on the host PC. It is available on the website *www.gdsys.com* in the section *More from G&D > Tools & Drivers*.

Follow the instructions on the found inside of the driver package.

The connected part of an extended desktop is the input channel that has the USB connection to the connected PC.

Part of an extended desktop are all other video input channels that are part of the same extended desktop but have/need no USB connection.

For Windows with *Extended Desktop* where no special driver can be installed, the settings should be:

- This video input is *the connected part of an extended desktop*.
- Select PC OS *Windows*.
- Method to terminate the PWC to PC connection *by clicking outside of window*.

This setting does not need a driver but during Windows login the mouse does not work properly (the keyboard works fine). In the Windows mouse properties the *enhance pointer precision* must be turned off and *Select a pointer speed* must be set to the middle position.

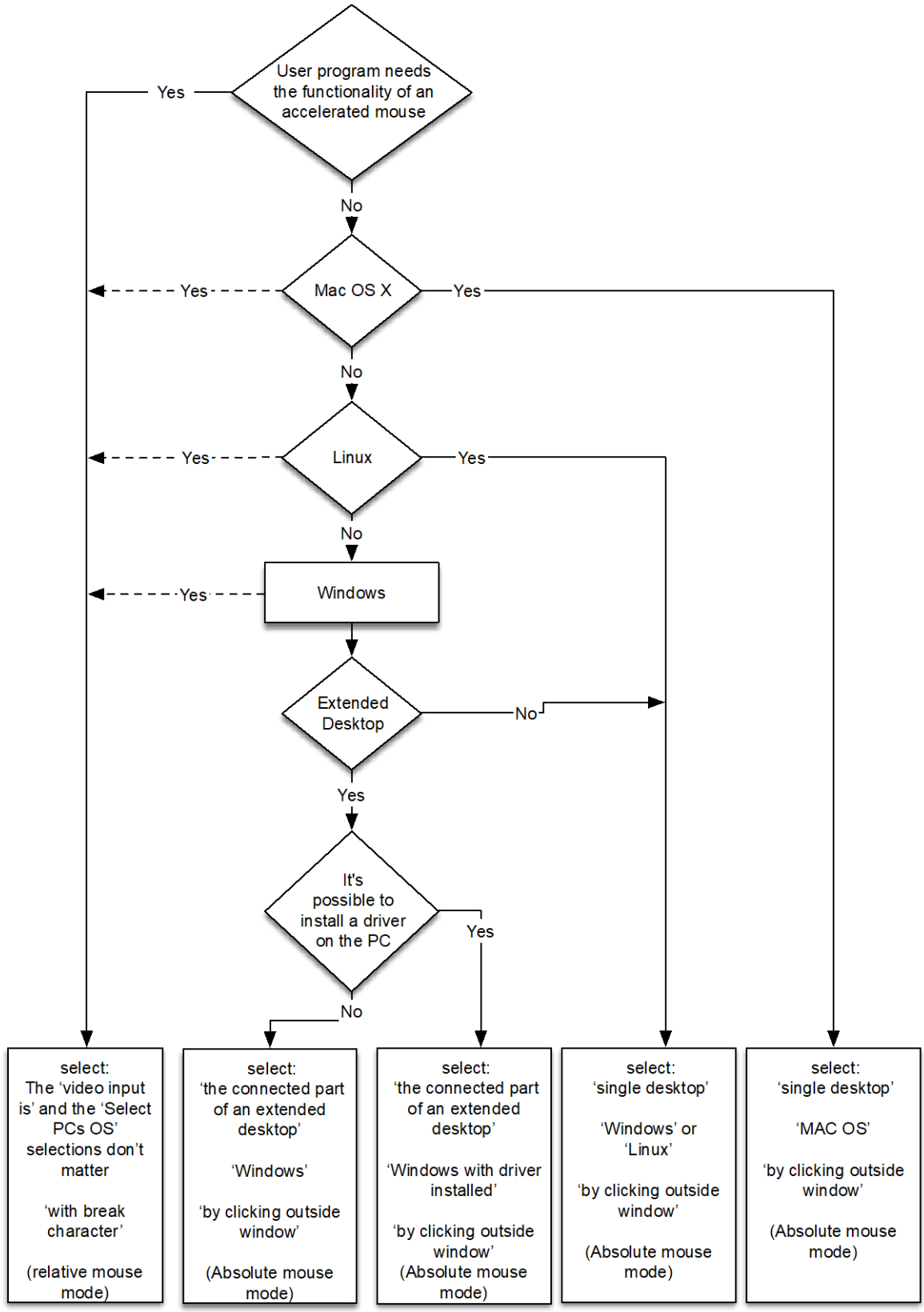


Figure: Mouse modes

If the PC uses *extended desktop mode* the following values have to be filled in carefully.

The desktop arrangement is needed to adjust the cursor position of the host and the PersonalWorkplace-Controller. If more than one output display is connected to the host PC, these desktop values have to be entered. This applies regardless of whether all displays are connected to the PersonalWorkplace-Controller or not.

- **Desktop Width:** Is the sum of all horizontal pixels of all windows arranged under Windows horizontally, or the widest.
- **Desktop Height:** Is the sum of all vertical pixels of all windows arranged under Windows vertically or the highest.
- **Position H:** is the horizontal position of this monitor.
- **Position V:** is the vertical position of this monitor.

To determine the size and the position of the monitor under Windows:

- Right-click on the Windows Desktop background.
- Select *properties*, then *display properties > setting'*. All connected monitors are shown.

Only the enabled ones are used for the desktop size calculation.

To determine the size and the position of the monitor under OS X select *System Preferences > Displays*. For Linux open the *System Preferences > Monitors*. There are similar set up as under Windows.

The *Desktop Size* is the maximum horizontal number of pixels and the maximum number of vertical lines of all displays enabled and attached to this host PC. This is true whether or not all displays are connected to the PersonalWorkplace-Controller. The desktop size is equal for all displays attached to the PersonalWorkplace-Controller.

Example:

> If two 1280x1024 monitors were arranged side-by-side, the desktop width would be 1280+1280 = 2560; the desktop height would be 1024 for both monitors.
>
> If one monitor is 1280x1024 and the other is 1920x1080 and they are arranged side-by-side, the desktop size H would be 1280 + 1920 = 3200 and V would be the maximum of 1024 and 1080 ➔1080.
>
> If two monitors of 1280x1024 and 1600x1200 are arranged side-by-side the desktop width and height is 1280+1600=2880 by 1200.

The position of the monitors is different for each display attached to the KVM.

The position of the display is related to the top left corner of the desktop size entered, which is at position 0/0.

The position of each display is the number of pixels horizontally and the number of lines vertically of the top left corner of the display relative to the top left corner of the desktop size.

The position of the monitors in Windows Operating System can be found in the *Windows Display settings* (see figure *Sample Windows desktop arrangement*).

In this case the left monitor gets the positions 0/0 the right, monitor 1280/0 (Windows displays -1280/0 and 0/0 as coordinates.).

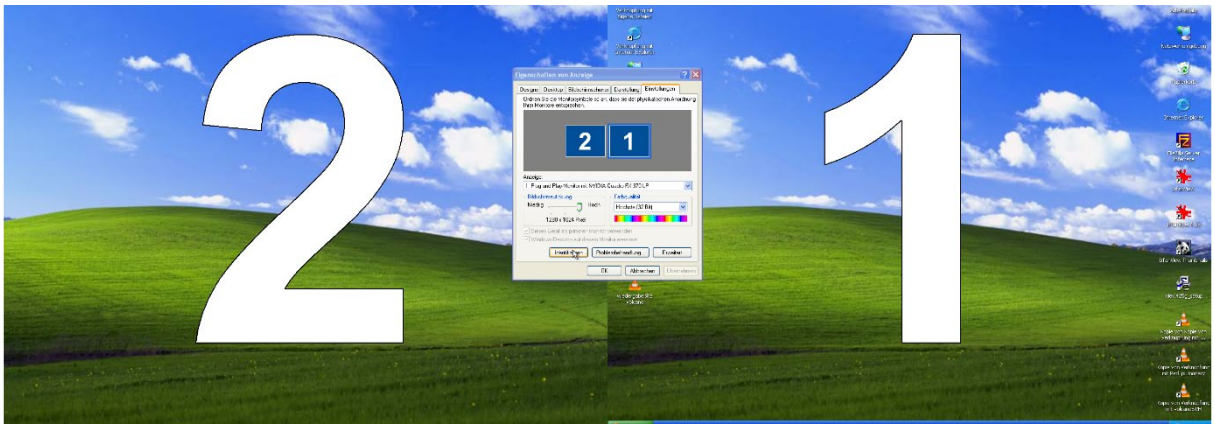


Figure: Sample Windows desktop arrangement

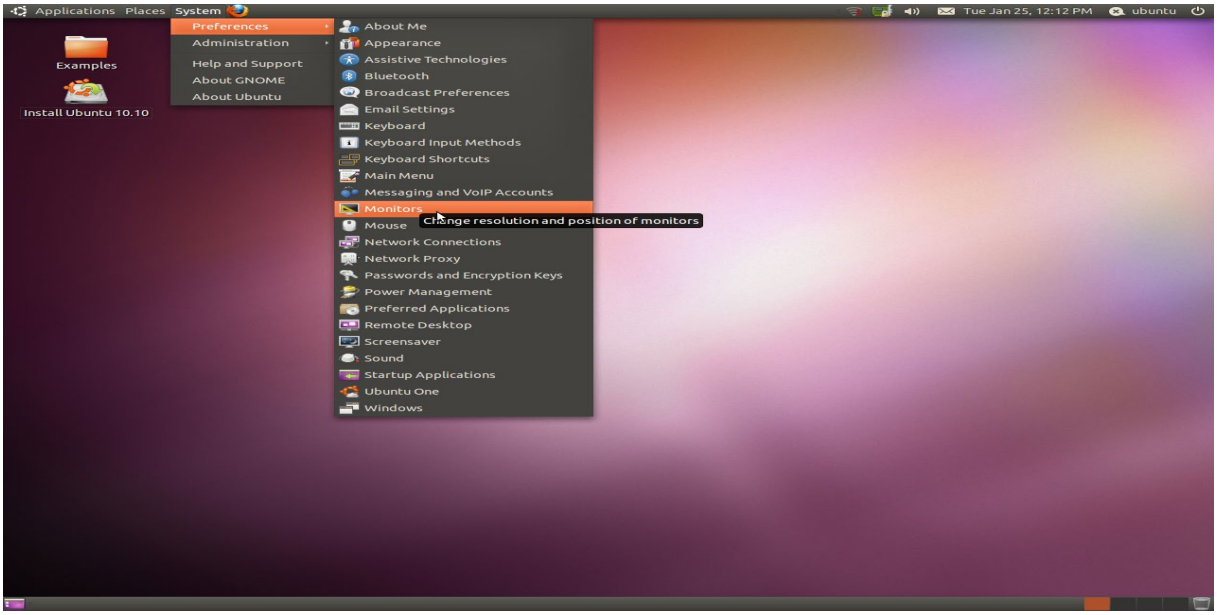


Figure: Desktop parameters in Ubuntu Linux

5.4.5.4 Event handling

On certain events such as *an input goes active* or *in active* either layouts (sets) can be switched automatically, or inputs can be replaced.

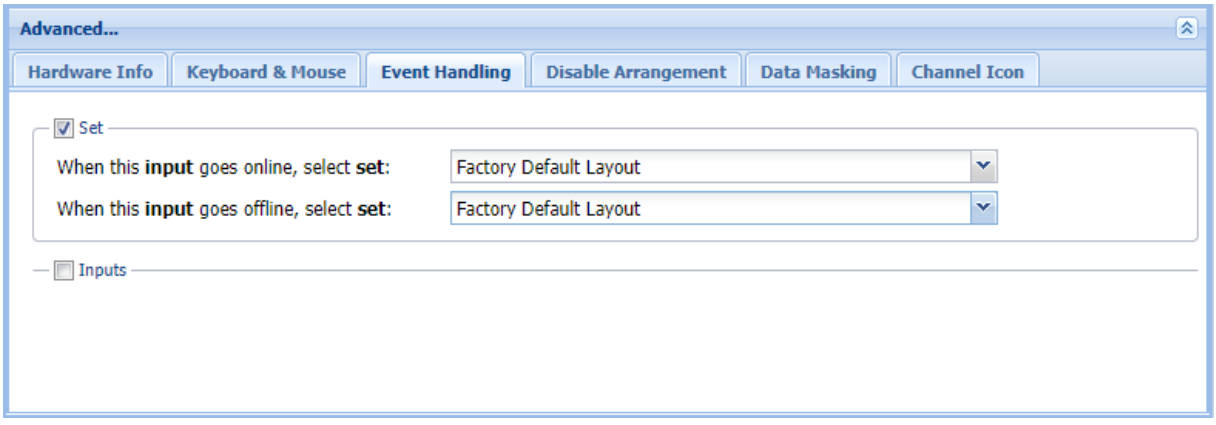


Figure: Event handling - set

When enabling *Set* the set switches to the selected set when this input goes online (valid input signal) and switches to another set when the input goes offline (no valid input signal).

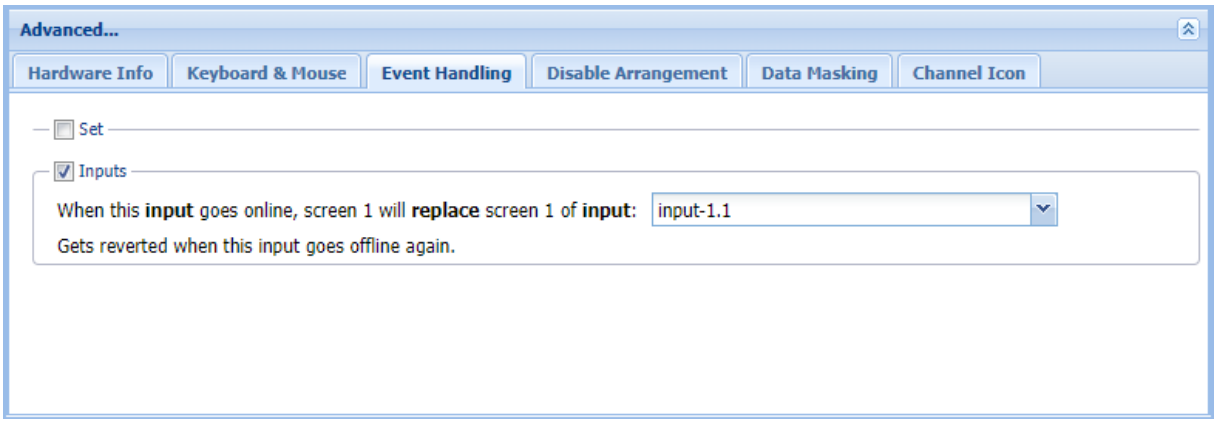


Figure: Event handling - inputs

When enabling *Inputs* this input replaces the selected one when going active. When going inactive the original input is displayed again.

5.4.5.5 Disable arrangement

Disable or enable this input channel and screen 1 or 2 from the *Arrangement* tab and *on-screen arrangement* on these displays. Only certain inputs are visible on certain displays. If several inputs are enabled, this may provide a better overview.

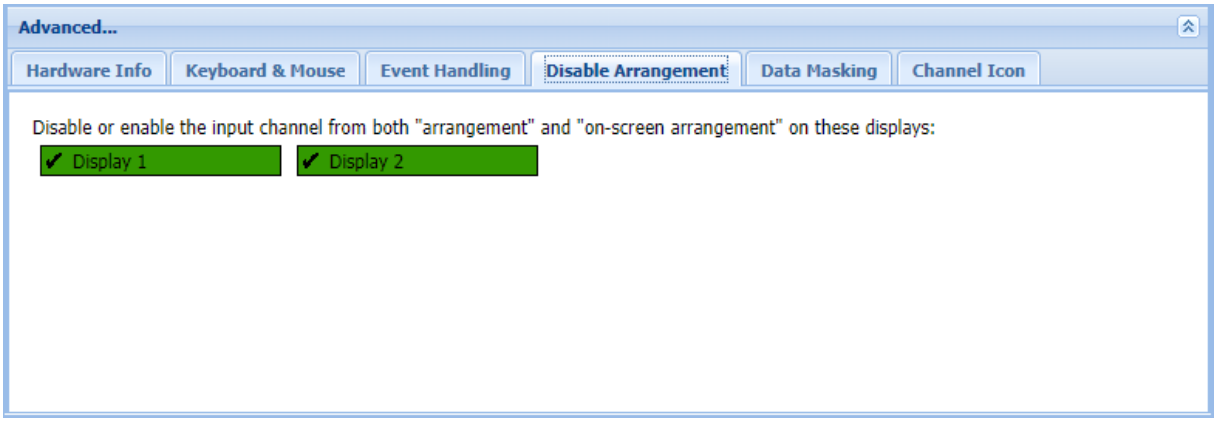


Figure: Disable Arrangement inside of the input channel

5.4.5.6 Channel icon

For each input channel either an icon or the *Screen Name* or both can be used to represent this input in the *Touch User Interface* and the *Arrangement* tab. The Figure: *Channel icon* tab shows the details.

You can show only the *Screen Name*, only the *Channel Icon*, or both.

Create a Channel Icon when this input channel shows a typical view. This icon is stored locally and is used in all layouts. It can be retaken any time.

Use the *Load a channel Icon from* to load a self-created icon, which is used the same way as an internally created icon. For best results the image should have the same resolution as the input channel and the format should be .jpeg.

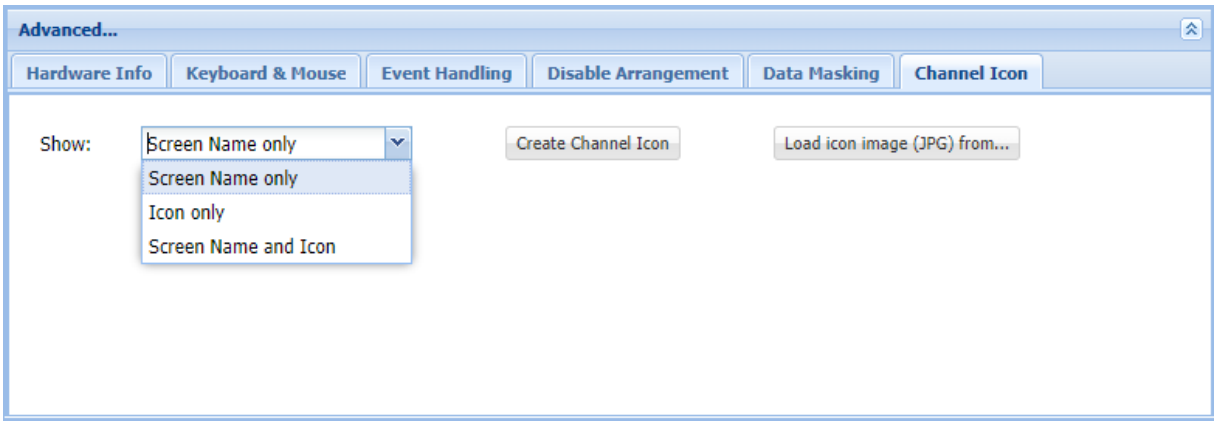


Figure: Channel icon tab

5.4.6 Virtual inputs

Virtual inputs are inputs without a physical connection. They can be arranged as all other inputs, but their content comes using REST interface or over network connections.

Select *Text* and type any text in the field right next to it.
Select *Image* and enter an URL with an image to download.
Select *Stream* and enter an URL with a stream address like *https://youtu.be/*.
A stream can be of the following formats: H264, RTSP, NDI, and so on.
HDCP protected streams cannot be used.
To identify NDI streams on the network, select *Search* (on the right-hand side of the URL entry line) and a list of the available streams is displayed.

See appendix *Stream type details* for more information about available streams and further details.

To test the image or streaming, enable the channel. Predefined URLs are stored. You must set the DNS server in the *Network* section. It may need a few moments until the image is downloaded or the stream is buffered.

Select an *Audio out by* to listen to the stream audio channel. USB devices are not hot pluggable. Only one audio out can be select in any of the virtual inputs.

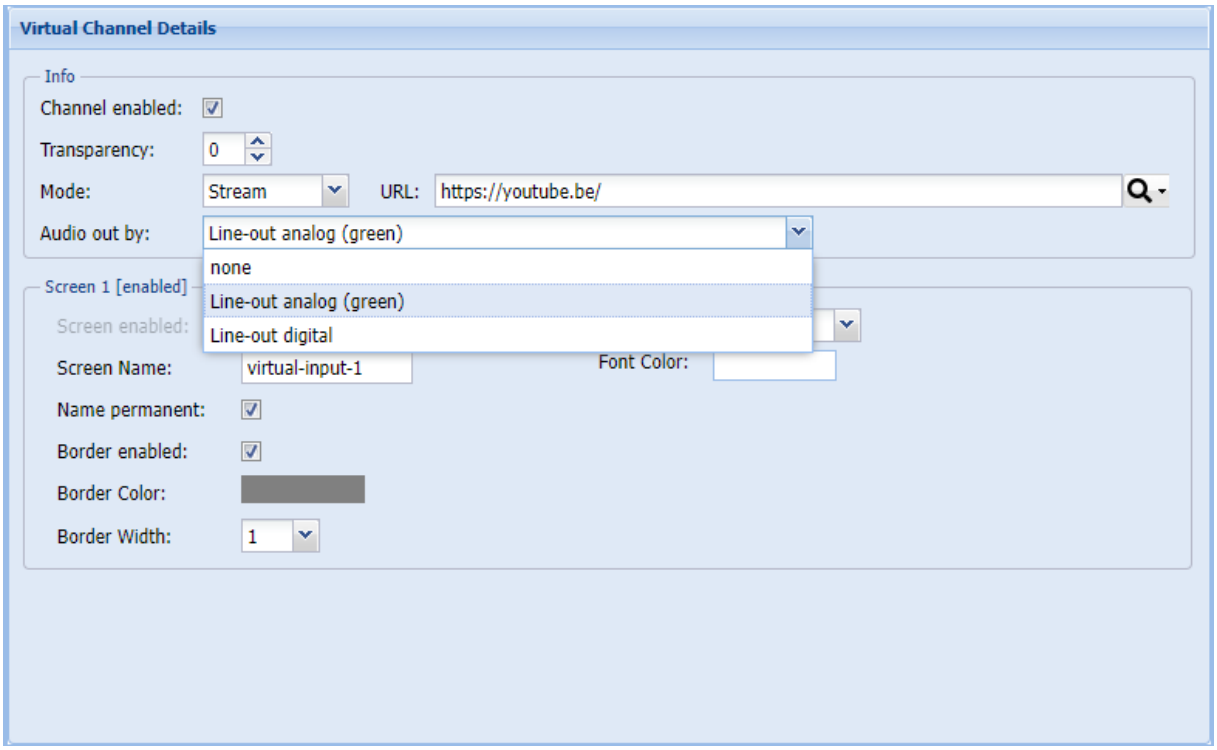


Figure: Virtual channel

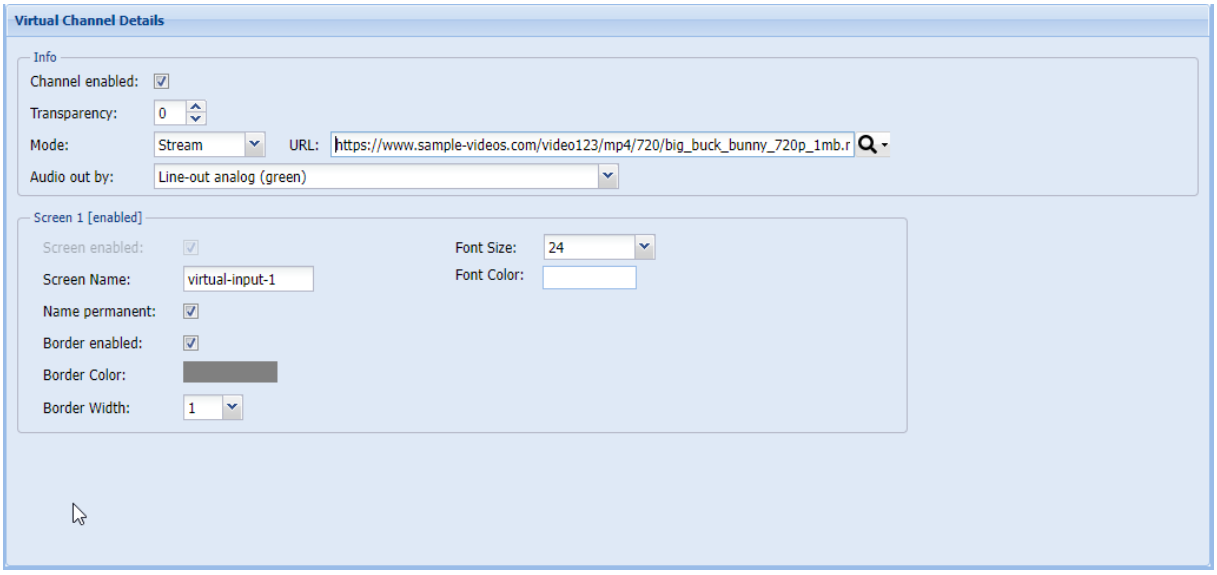


Figure: Virtual input channel with NDI stream

5.5 Arrangement

Use the Arrangement feature to position the enabled input signals on the output and define new sets or change existing sets. The cropping and scaling of the input channels can be modified as well.

Set definitions for a certain resolution can be selected on any display with the same resolution. Each set must be defined just once for a certain resolution. Definitions are not bound to any specific display, to resolutions only.

In the top-left corner, the display can be selected, to select the right resolution for the layout definition.

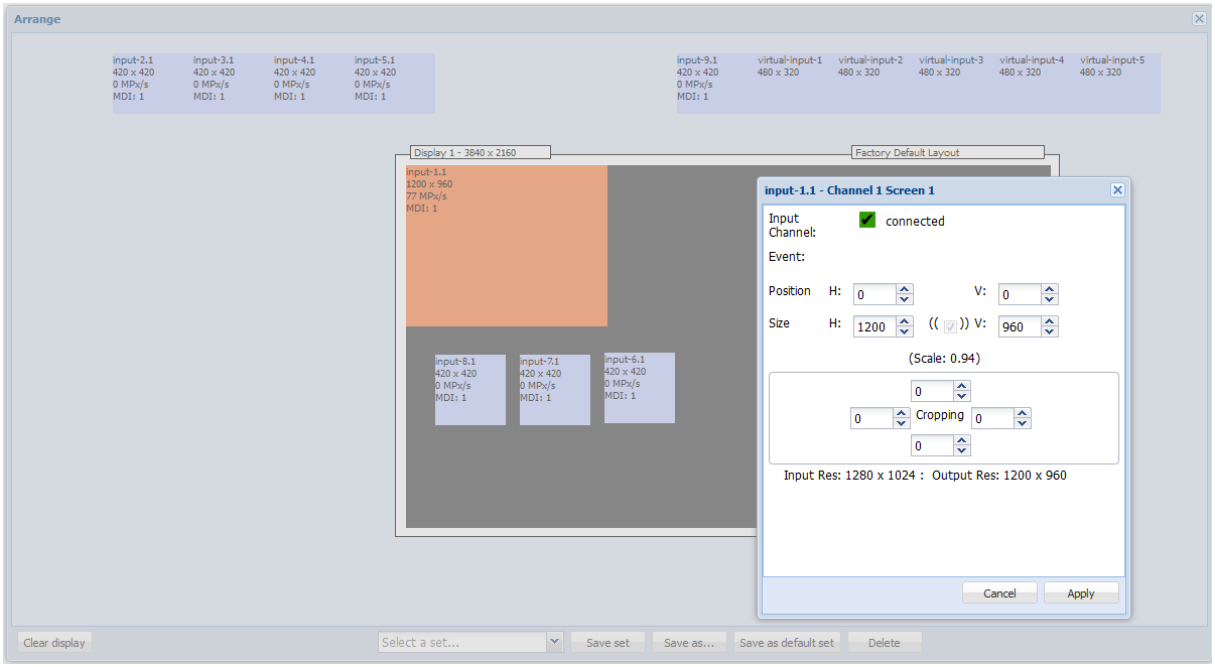


Figure: Arrangement (example)

A dark rectangle in the lower part of the browser window symbolizes the output monitor screen, and some smaller rectangles above symbolize the input screens.

The input screens show their name; the size; the board number; and the bandwidth used to calculate the used bandwidth. When an icon has been stored (see chapter 5.4.1*Main administration tab*), it is used to represent the input.

The output screen shows its name and size and the name of the selected set if a set is selected.

The resolution of the output screen and the resolution of the output monitor have a fixed relation. For example, an 8 Mega-pixel monitor one pixel on the output screen, relates to 6 pixels on the output monitor.

5.5.1 Arrangement of a new set

The button *Clear Display* can be used to start an arrangement from scratch. Alternatively, the *Factory Default Layout* set can be selected from the combobox right next to it to create an arrangement containing all available inputs.

Each input signal can be dragged and dropped over the output monitor to the required place. When the input screen is picked with the mouse, it is expanded to fit the size of the output window shown in the browser. Overlapping can be enabled in the *Configuration* tab in *General Settings*.

When the window is dropped over the output monitor the window is shrunk to fit on the monitor or between other dropped windows. When two windows are arranged fairly close to each other they snap together (first to the top then to the left). *Shift* plus *double click* increases the window to its maximum size without overlapping any other window. This is disabled when overlapping is enabled.

When enabled in the *Enable Logging* feature (see chapter *Enable segment resize in arrangement*) the inputs can be resized at the lower right corner.

When a window is no longer visible on the output screen, drag and drop it away.

At the same time the input window is dropped on the output screen, the real output monitor shows this as well.

Double-click any input window to open a sub window. This window allows the resizing, cropping and positioning of the input channel on the output monitor.

In the upper portion of this sub-window, the status information of that input channel as specified in *Administration* tab, is shown. A red square means *no signal* at the input channel; a green square means input signal is in range.

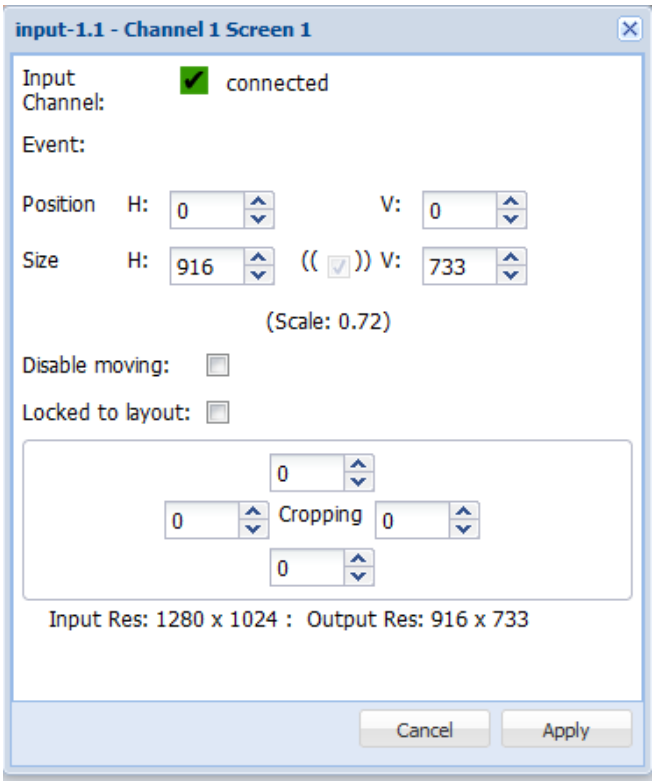


Figure: Arrangement detailed window (example)

On the next line, the defined events are listed for information only. Do not use the arrow keys up and down too fast, or the browser may hang up.

The position of the input window on the output screen can be changed in the next section.

H: Moves the position of the output screen horizontally. Moving the arrow up moves the position to the right, and down to the left by one pixel. Use *Shift* and the arrow keys to move the position by 20 pixels at a time.

V: Moves the position vertically. The up arrow moves the position up; down arrow moves the position down. Changes below 6 (4, 3) pixels may not be seen on the browser and will only appear on the output screen. The origin is in the left lower corner. At any time, an absolute number can be entered followed by a tab.

On the next line the *Size* can be changed. The *Size* is the size of the output window including cropping and scaling. Either the *H* or *V* size can be changed. Use arrow keys (with or without using the *Shift* key) to scale in steps of 20 or 1. A check mark in between *H* and *V* indicates a locked aspect ratio.

The next section can vary depending on the item selected in the *Display settings* in *On-screen arrangement* with *PWC KVM mode* enabled. The on-screen functionalities are enabled for all layouts and inputs on the selected display. To restrict these functions to the currently selected input channel and layout, use the following checkboxes.

The following are the possible messages:

- Disable moving
- Disable resizing
- Do not overlap
- Locked to position
- Locked to layout

The next section is for *Cropping* the window. In the last line the input resolution and the output resolution, including headers, is shown for reference.

As soon as an input window is put on the output screen, a check is made to see if the internal bandwidth of the system is still sufficient to show all windows without problems. If not possible, the last screen put on the output window is removed and an error message is shown. To solve such problems, move the input to another video board, make it horizontally smaller, scale it down or do not use two windows of the same input signal.

Once an arrangement has been made, use the *Save Set* button to save the arrangement under the same name. Unicode UTF-8 characters set are allowed. Use the *Save As* button to save this arrangement under a new name. Use *Save As Default* button to save the arrangement as the default set. *Default Sets* are marked by an asterisk (*). When the set is stored a message in the browser appears. To select a previously defined set, use the *Select Set* menu in the lower-right corner.

5.5.2 Modifying a set

To modify an existing set, select the set with the *Select Set* menu in the lower-right corner. The set is loaded in the browser on the output screen.

Modify the set and use the *Save Set* button. If the set should get a new name use the *Save Set As* button and enter a new name.

5.5.3 Deleting a set

To delete a set, select the set with the *Select Set* menu in the lower-right corner. Use the *Delete* button to delete this set.

5.5.4 Marking a set, a default set

To make an existing set the default set for that display, select the display and then the set with the *Select Set* menu in the lower-right corner.

Use the *Save As Default Set* button to save this set as the ‘default set’ under the same name. This is activated when the system is turned on. Default Sets are marked by an asterisk (*) for the first display and as **2* or **3* for display 2 and 3 and so on.

5.6 Select

Selects the set shown on the output monitor by double-clicking it. There is a select window for each display, which has not been set up for mirroring. Only sets with the right resolution for this display are shown. To see all sets, choose *Show all available Sets*.

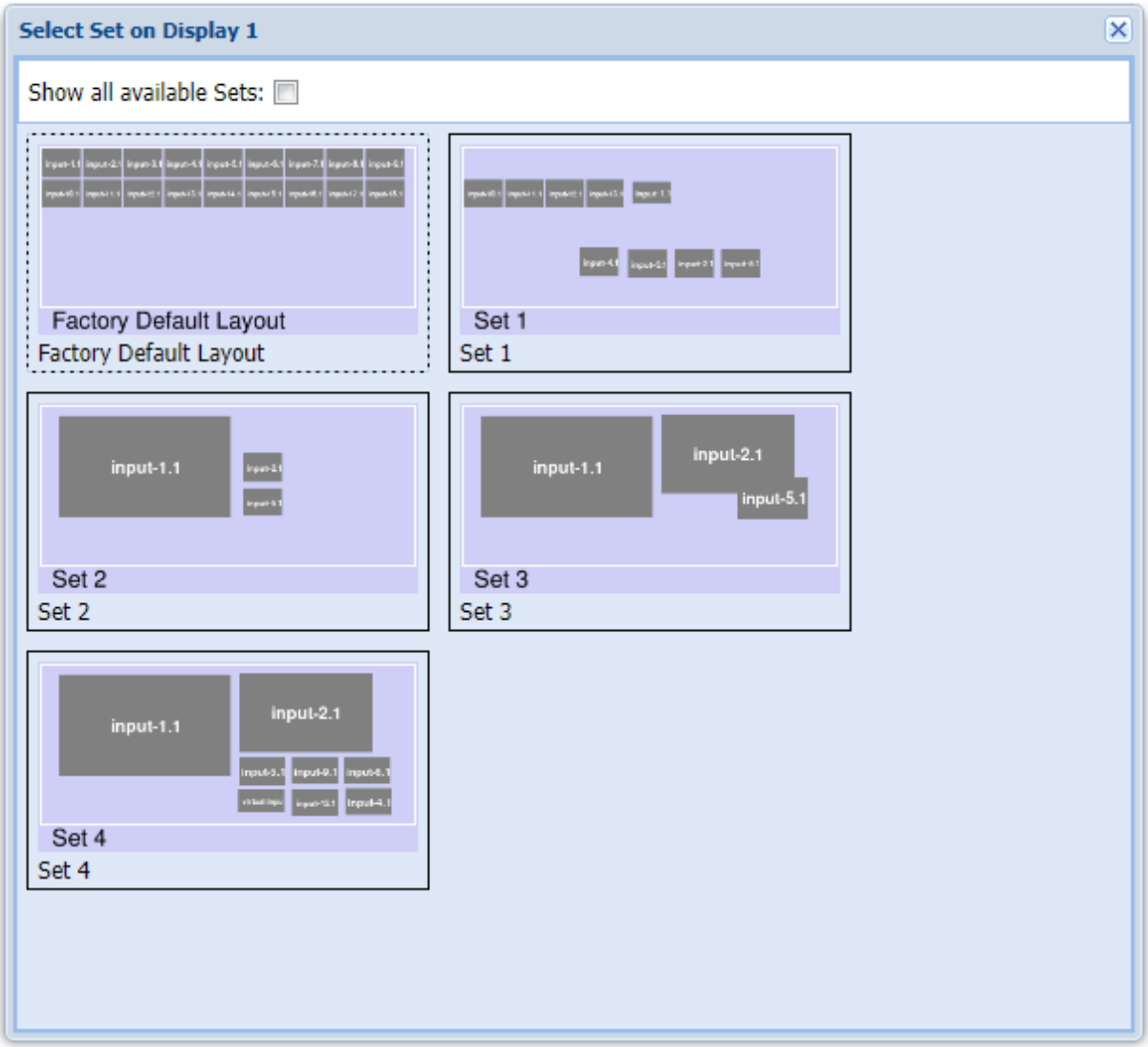


Figure: Select (example)

6 Touch user interface (TouchUI)

The touch user interface (TouchUI) can be used by tablets, phones or other PCs with a monitor. Such a system must be connected using a network (LAN or WLAN). It must run a browser such as Chrome (Safari and Webkit based browsers, Internet Explorer and Firefox are not supported).

Two versions of the TouchUI interface are offered: a classic version and a modern version.

In the classic version the administrator sets up all procedures and buttons and the end user cannot modify these.

In the modern version users can setup all procedures and buttons and can create their own layouts by moving and resizing the inputs life on-screen with a tablet.

6.1 Touch user interface – classic version

With the classic version of the TouchUI the end users cannot add, remove and rename their own procedures.

The administrator has to set up all procedures and buttons and the end users cannot modify these.

6.1.1 Setting up the classic version of the touch user interface

In the administration interface of the PersonalWorkplace-Controller open the *TouchUI* tab.

First select the TouchUI *Setting* tab.

Arrange how many buttons you want to see in one window then how many buttons per row.

Proceed to the next step to view one procedure on the tablet or monitor. You may need to change these settings depending on the resolution of the tablet/monitor size to get the required arrangement.

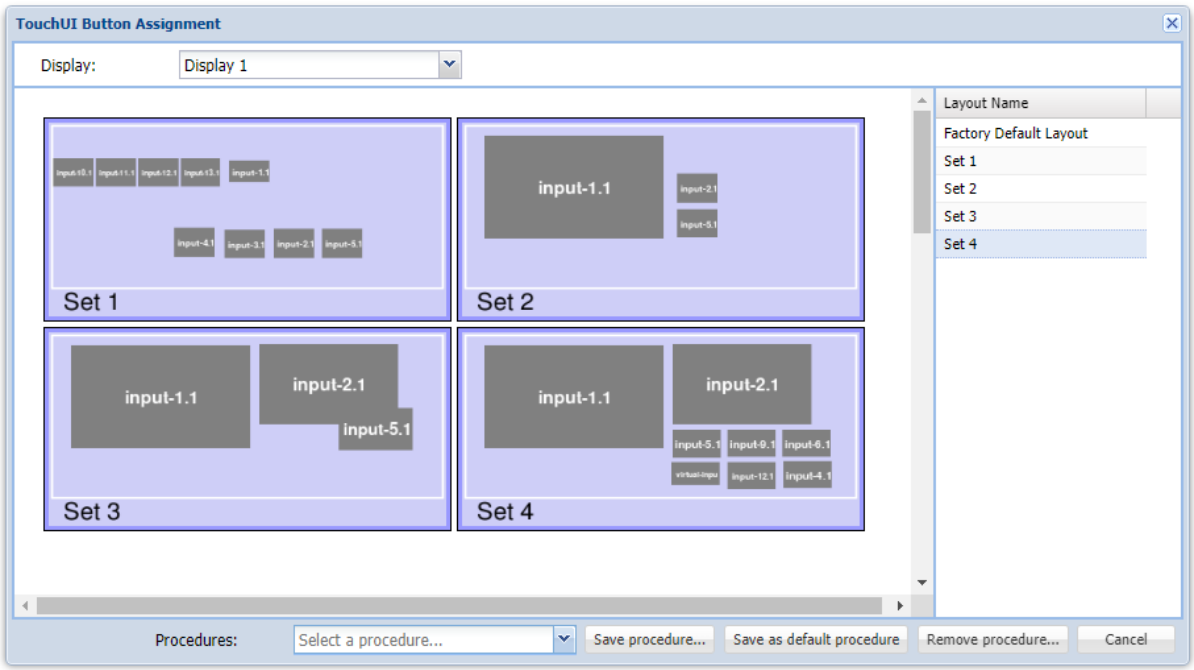


Figure: TouchUI Settings (example)

Enable swap of segments checkboxes allow end users to swap segments or not.
Enable swap of channels checkboxes allow end users to swap input channels or not.

Buttons background color changes the color behind the buttons, use any hex number between 000000 (black) and ffffff (white).

Display logo in footer disables the logo in the footer. If enabled, the next two lines allow you to load a custom logo (transparent, 24bit, rgb .png) and set the background color.

The next step is to define the attached devices in the TouchUI *Administration* tab. Add devices like an iPad and select which display this device should be able to control. The first time a device is connected using its browser interface you are asked to select which of the defined device you want to use it for.

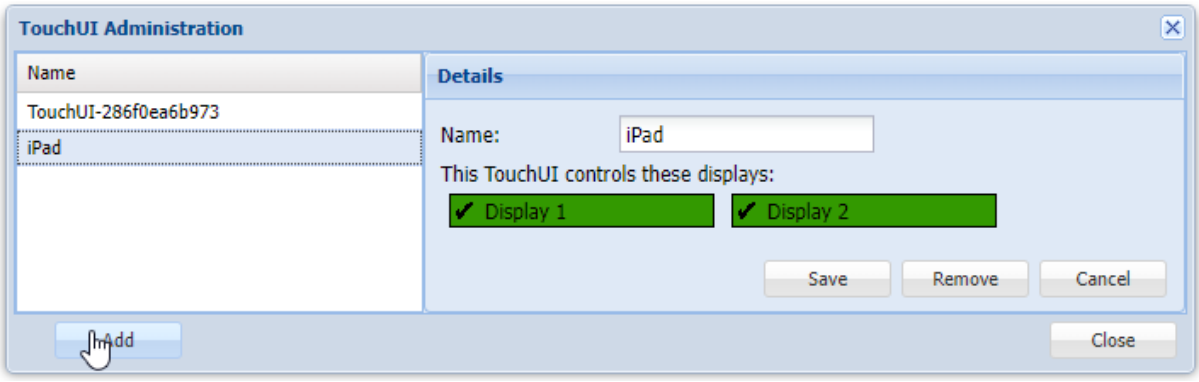


Figure: TouchUI Administration

In the last step, buttons are linked together with sets/layouts. Select TouchUI *Button Assignment*.

In the top line, select the display button assignment it should work with (see next chapter for details). If more than one display needs to be controlled by one procedure, step through the button assignment of each display before saving this procedure.

On the left-hand side, the tab shows buttons arrangement as defined in step one. On the right-hand side, the tab shows all defined sets/layouts for this size of the selected display (see chapter *Arrangement*); for example, if the selected display has a size of an 8 MP display all layouts for 8 MP displays are shown.

Drag and drop one of the sets/layouts from the right side over one of the buttons and the button shows a preview of the layout. Assign all buttons with the sets/layouts. Select the next display and assign the buttons.

The top left button is the *Default* button. When switching to a procedure this layout is selected. After rebooting the PersonalWorkplace-Controller this layout of the default procedure is selected.

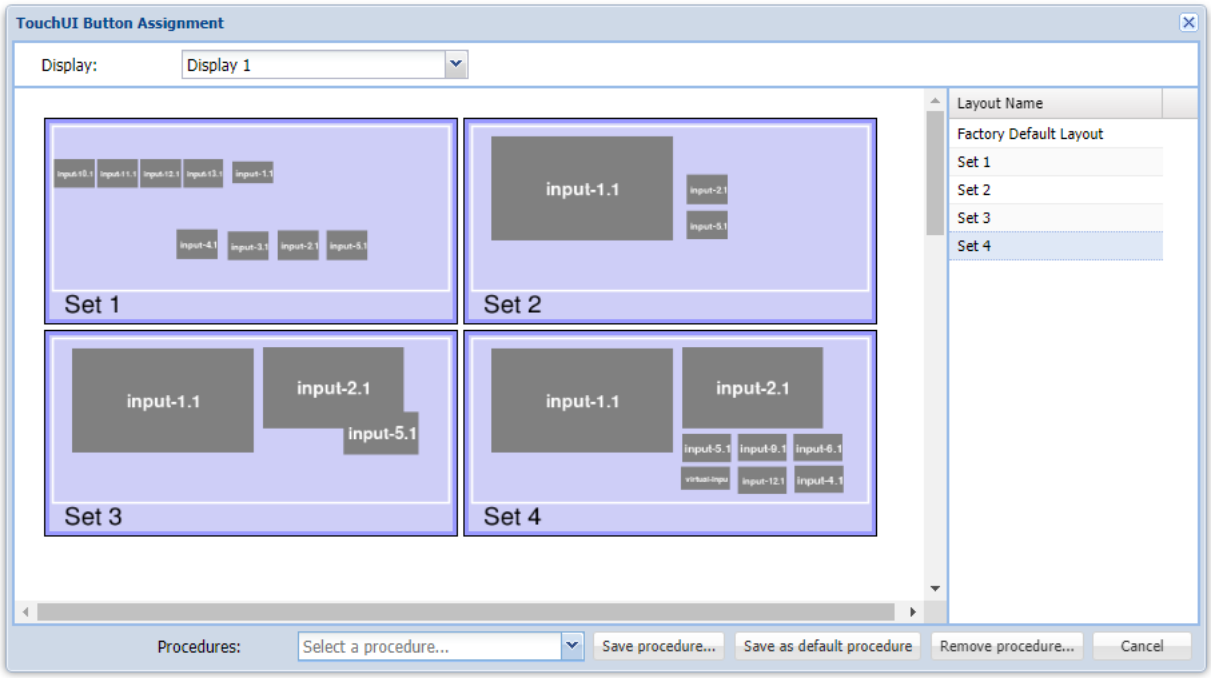


Figure: Button assignment (example)

When all buttons are assigned, select *Save procedure* and give it a name. Or save it as *default procedure*. A default procedure is selected after rebooting the PersonalWorkplace-Controller. To remove a procedure, first select the procedure and then use *Remove procedure* to delete it.

Do not forget to set up the destination for the screenshots in the PersonalWorkplace-Controller *Display settings* tab. The icons used to represent an input channel can be modified in the *Administration* tab > *Advance* > *Channel Icon* (see chapter: *Channel icon)*.

6.1.2 How to control several displays

Using various methods, you can control several attached displays with one or more devices.

Any device can access several displays using a web interface.

Save several displays in the button assignments with one procedure. When such a procedure is selected from a device all displays are updated, independent of any restrictions defined for the device in the *Administration* tab.

One device controls one display with one button/procedure only.

Save only one display in the button assignments with the procedures. Then restrict the device in the *Administration* tab to control this display.

One device controls several displays with one button/procedure only.

Save only one display in the button assignments with the procedures. Repeat this with all displays you want to control. Then restrict the device in the *Administration* tab to the display you want to control with this device. A *Display x* button is shown in the top line of the user window. Use this button to select the display you want to control.

6.1.3 Using the classic touch user interface

The browser must be pointed the *http://pwc-ip-address/touchui* (*pwc-ip-address* represents a variable in this case).

The PersonalWorkplace-Controller Touch User Interface supports multiple tables or PC when defined in the administration interface. When the tablet or PC is first time connected to the URL: *http://pwc-ip-address/touchui* the user must select which of the defined presets this tablet should be used with. This has to be done just once or when the tablet is changed.

After this selection the *Procedure Selection* window opens. Select a procedure and this procedure window is shown full screen. If a default procedure is defined, this automatically opens when connected after the first connection.

When a procedure is selected the layout of the top left button is shown always.

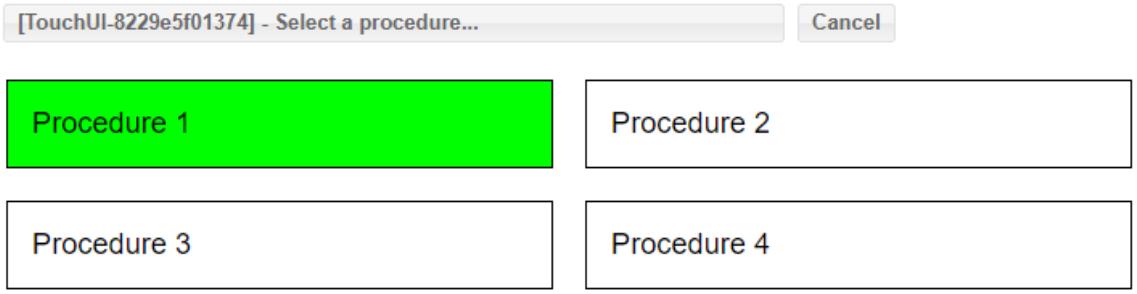


Figure: Procedure selection window

Figure: Procedure window (example)

Depending on the setting several sets/layouts are shown.

A single touch of one of the sets/layouts switches the PersonalWorkplace-Controller display to this set/layout. The selected set/layout has a green border.

Double-clicking a button opens this set/layout full screen with all included input channels.

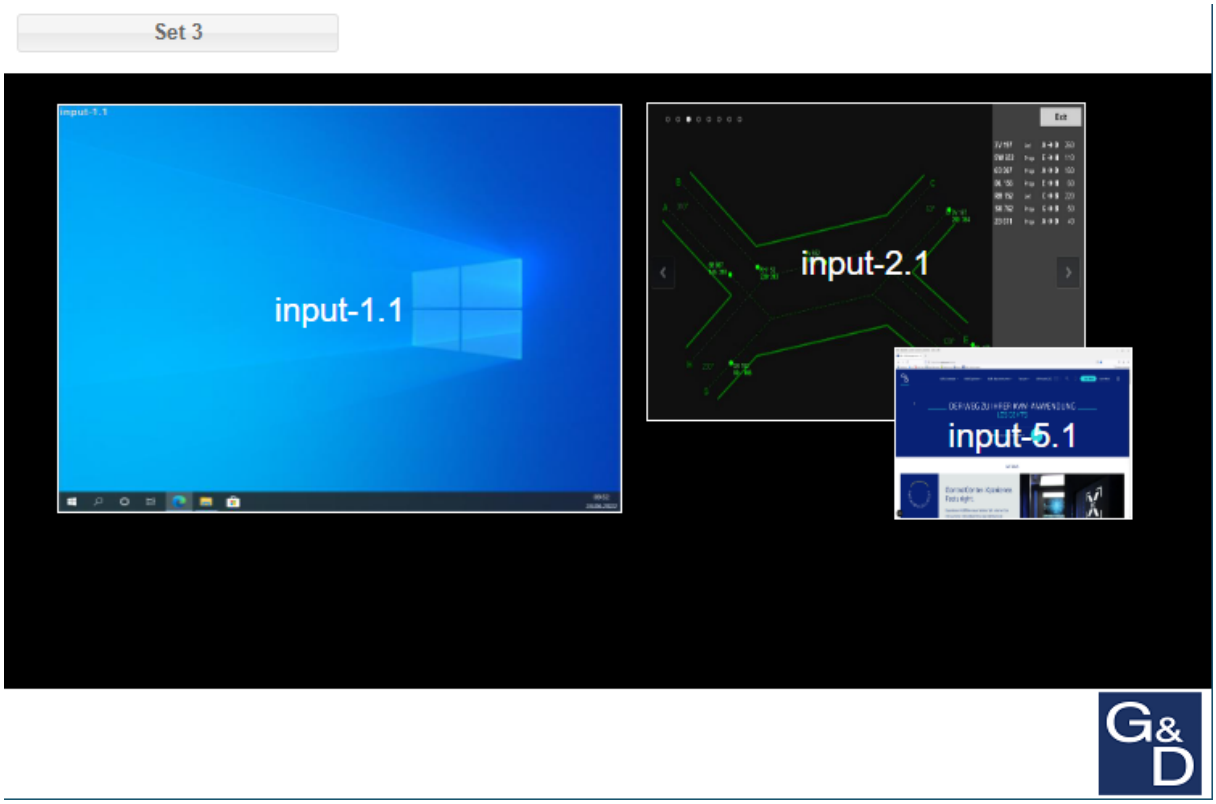


Figure: Full Screen view of a set/layout (example)

When enabled by the administrator, select one input channel and then another to swap these channels on the PersonalWorkplace-Controller display. The new selection is permanent over all shut downs and reboots.

When enabled by the administrator, double-clicking an input channel opens a new window displaying all input channels not used in this layout (and enabled by the administrator for selection). Double-clicking one of these input channels uses this input in the layout permanently and return to the layout window.

In the top-left corner, the name of the layout is shown and when touched it returns to the procedure window.

In the top-left corner of the Procedure window (see figure *Procedure window*), the name of the procedure is shown and when touched it returns to the *Procedure Selection* window.

The top-right corner shows the tool kit symbol for more functions.

- Take a screenshot of current display. These actions store the screenshot on an FTP server or an USB stick. For more details, see the Administration interface, *Display Settings*.
- System messages show all error messages of the system.

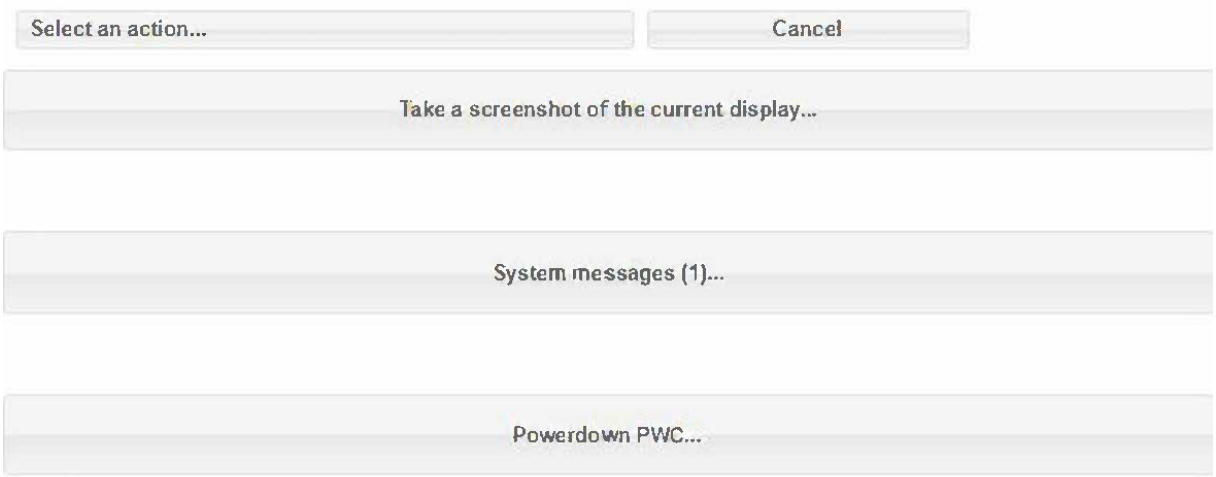


Figure: Toolkit window

6.2 Touch user interface – modern version

With the modern version of the TouchUI, end users can add, remove, and rename their procedures.

The user can define buttons with any number, position and size of inputs.

Layouts can be modified on the fly in real-time.

Snapshots can be taken and downloaded to the TouchUI device and from there they can be further handle with the tools the device offers.

The interface was tested with Chrome on iOS on iPad and certain Windows 10 devices. Some devices used on Windows 10 do not behave as expected.

6.2.1 Setting up the modern version of the touch user interface

Go to *General Settings* in the *Configuration* tab. Select *modern version* and select *Save*.

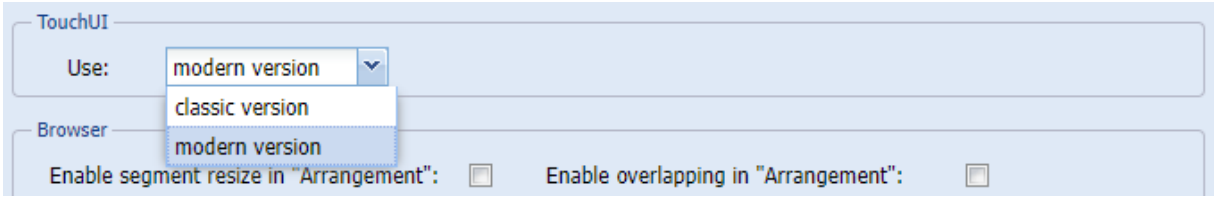


Figure: Selection between 'Classic' and 'Modern Version' of the TouchUI

Go to *Display Settings* in the *Configuration* tab. Choose for each display whether it should be controlled by the TouchUI or not. *PWC Video* or *PWC KVM* displays can be used.

Figure: Select if display should be controlled by TouchUI

When the TouchUI is used, select *After reboot or standby reload* either the *last layout* or the *last modified layout* to return to the last button selection.

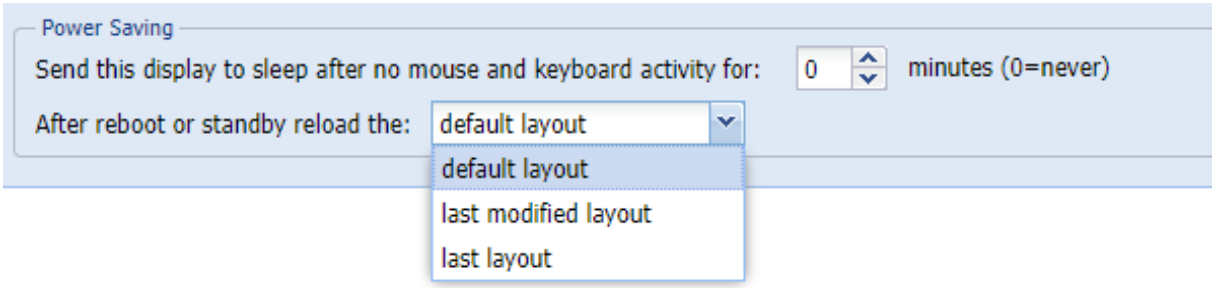


Figure: Select which button is displayed after reboot

Go to *Settings* in the *TouchUI* tab. Arrange the total number of buttons you want to see in one window on your touch device and how many buttons per row. You may need to change these settings depending on the resolution of the tablet/monitor size to get a nice arrangement.

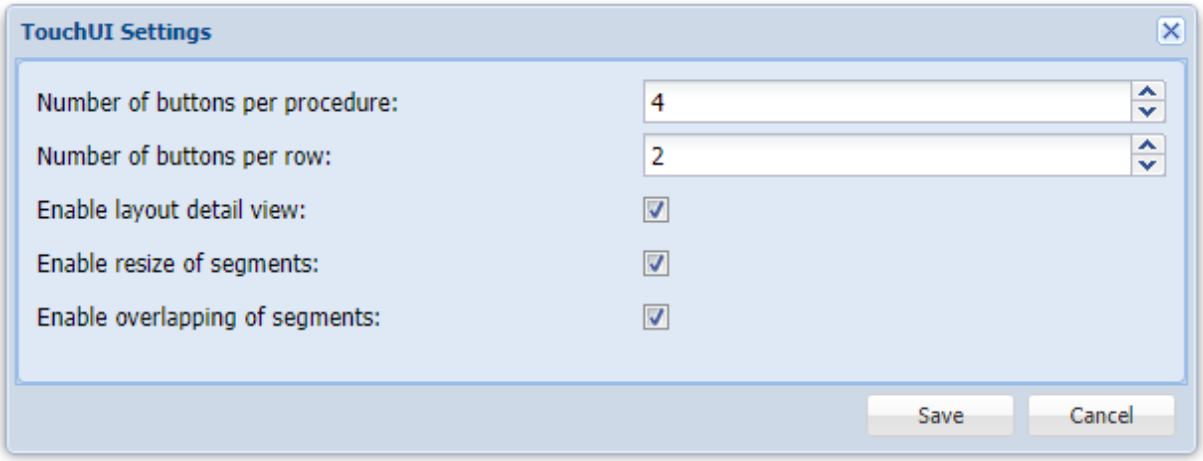


Figure: TouchUI setting modern mode

- *Enable layout detail view* should always be enabled.
- *Enable resize of segments* enables the resizing of the inputs on screen.
- *Enable overlapping of segments* allows moving inputs on top of each other. Remember this may lead to high bandwidth consumption.

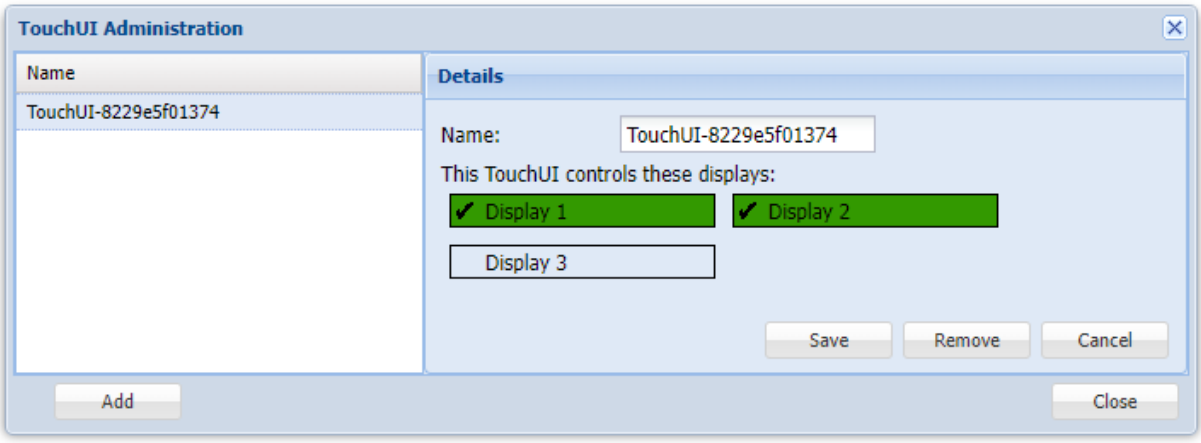


Figure: TouchUI Administration

Go to *Administration* in the *TouchUI* tab and select which of the connected devices can control which of the displays. Due to software restrictions, all connected devices are treated the same way.

In the figure above, *Display 1* and *Display 2* can be managed by the attached device, *Display 3* cannot be managed by the attached device.

6.2.2 Using the modern touch user interface

The browser must be pointed the *http://pwc-ip-address/touchui* (*pwc-ip-address* represents a variable in this case).

A window opens with the defined procedures, if any have already been defined.

To add a procedure, press the red plus sign (+) button in the lower-right corner and enter a name for the procedure. A new window opens with the predefined number of buttons without any sets/layouts assigned in the buttons.

Double-click any button to add or modify a button assignment. When the button is used the first time, a name has to be entered.

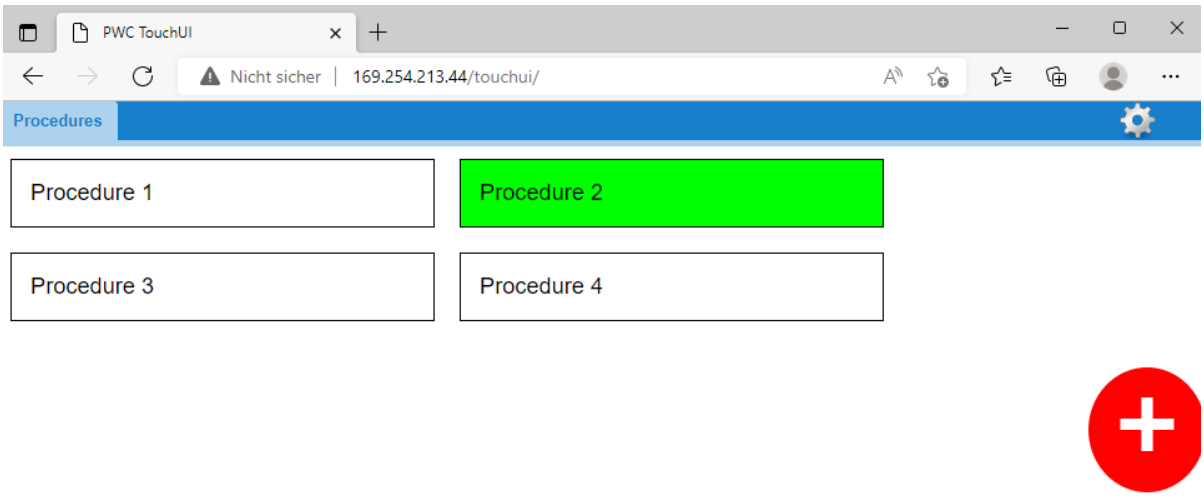


Figure: TouchUI Procedure View

To arrange a button, drag and drop any input from the lower part to the on-screen area. After dropping, it is visible on the output display. Move with single finger gesture, resize with two fingers. To save the button arrangement just select the procedure name or the display name in the top blue line.

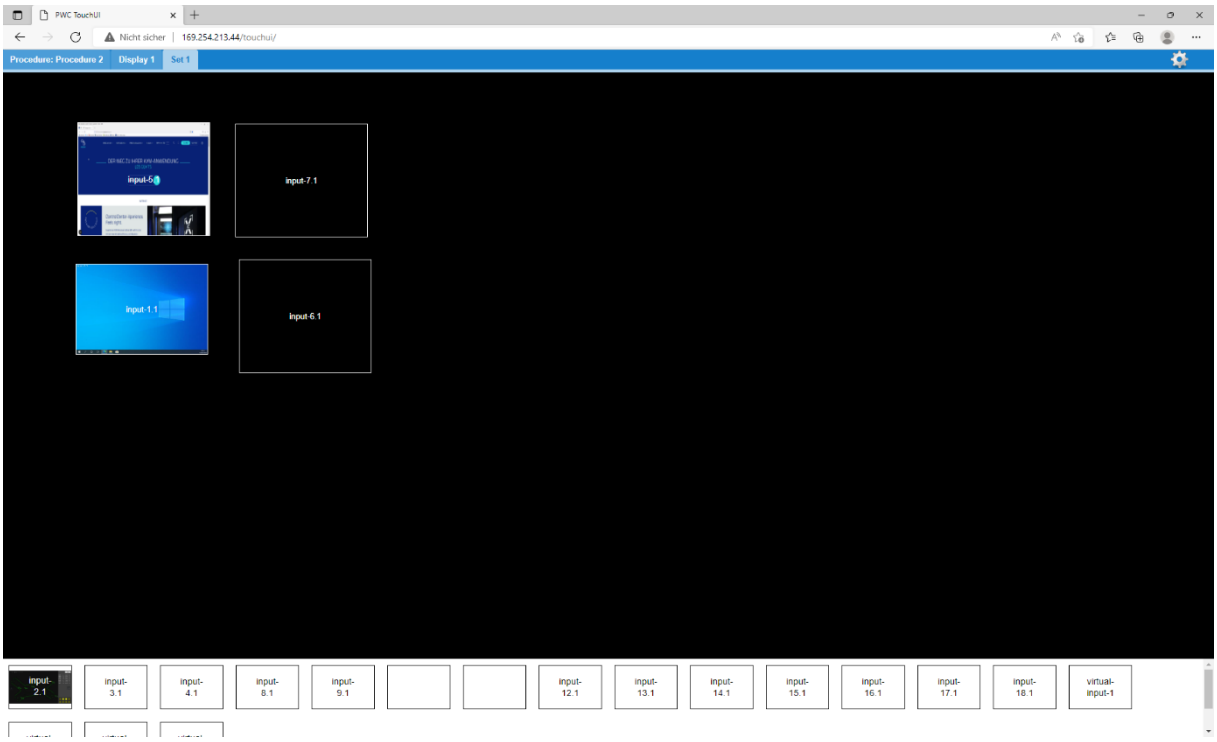


Figure: Selected button (example)

The figure above shows the user on *Display 1* selected *Set 1* for rearrangement.

To rename or delete a procedure or button make a long press on the procedure or button and a window opens. Follow the instructions.

To make a snapshot select the tool symbol and select snapshot, follow the further instructions of your device.

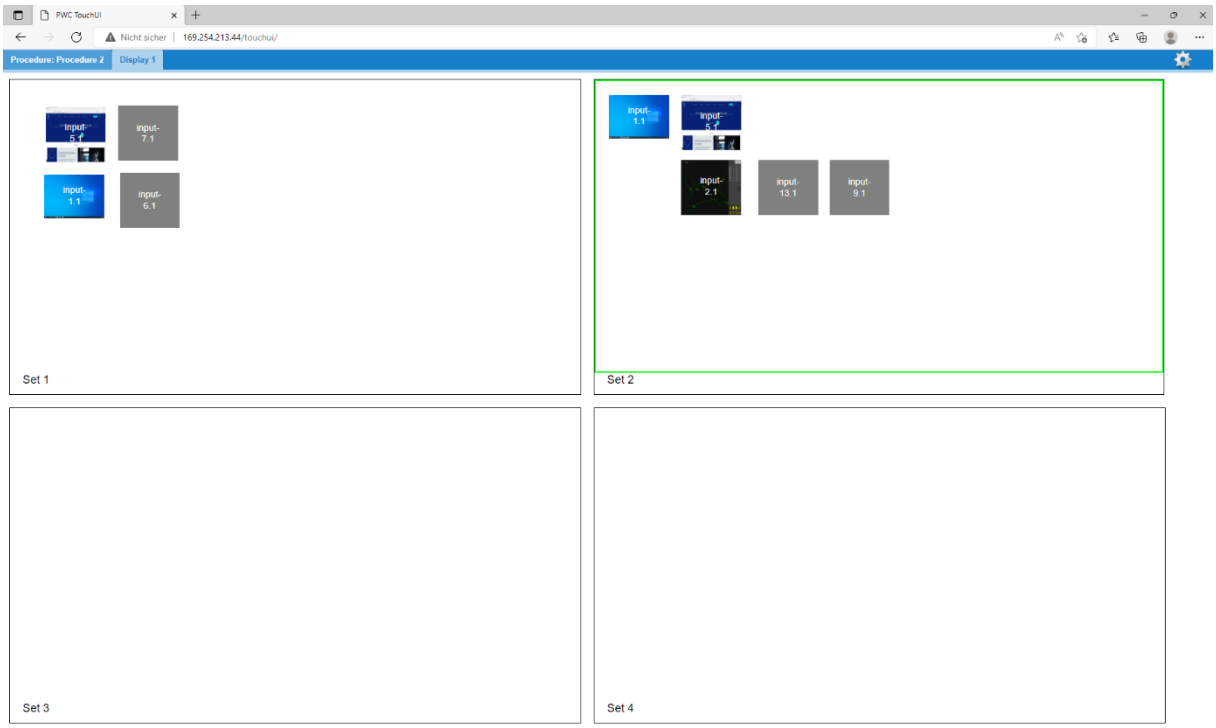


Figure: Procedure 1 selected (example)

As can be seen in the top blue bar, the user can control one display. If the administrator stored icons for the inputs, they can be seen here instead of just the input number.

The figure below shows how to make a snapshot or how to ‘Powerdown MDM’. Wake up of the PersonalWorkplace-Controller works only with a special program that can be loaded on Windows based devices. Contact G&D support for more information.

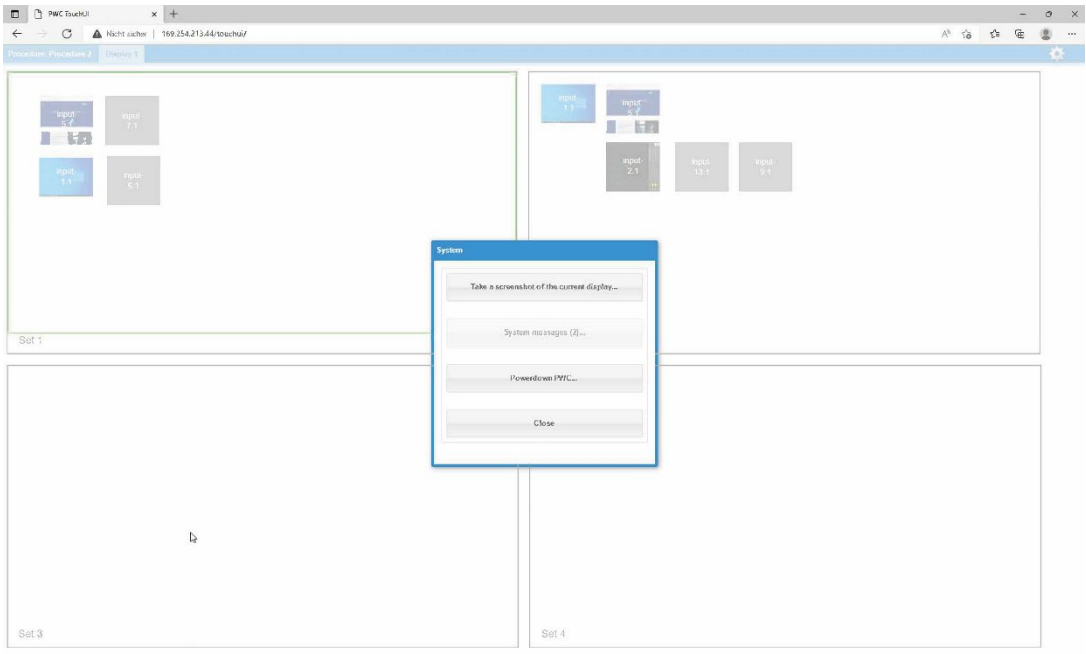


Figure: Tool box of TouchUI modern version (example)

7 Audio

The *Audio* feature opens a window to control audio in and out.

- *Audio In*: Mutes the input audio device as defined in for example, *Display 3*.
- *Audio Out*: Controls the audio out volume.

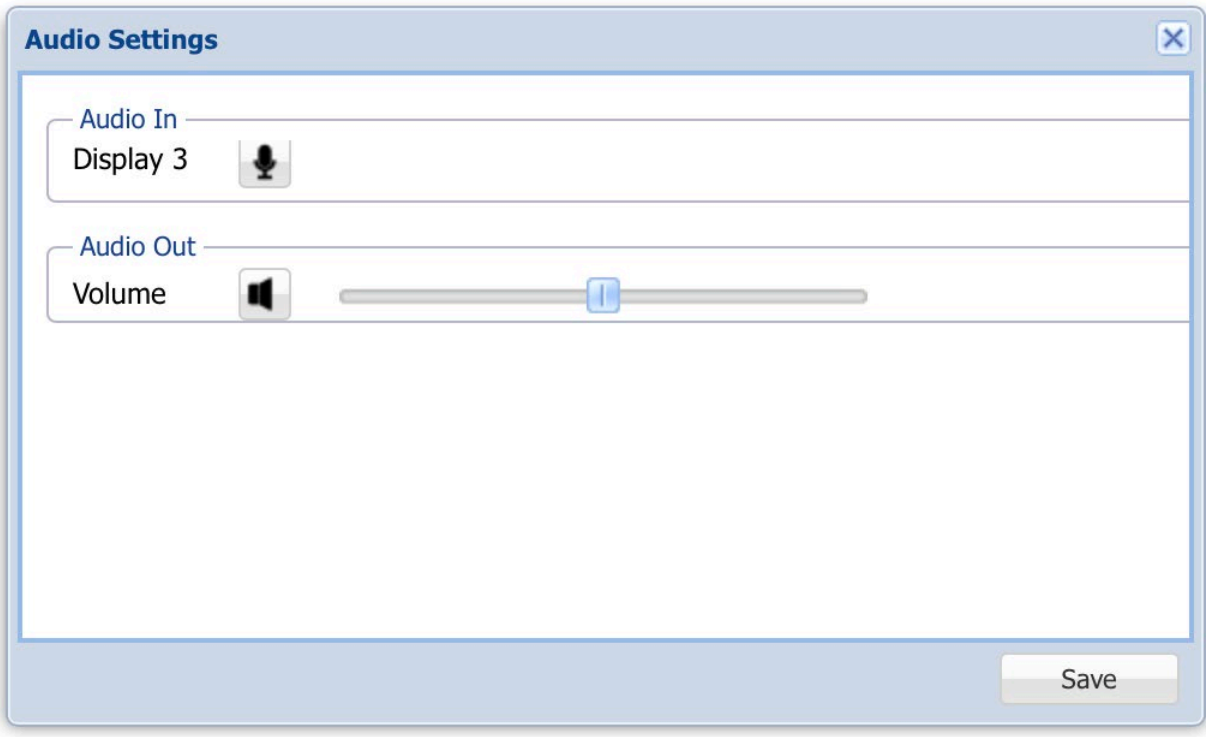


Figure: Audio controls

8 On-screen user interface

When enabled *PWC KVM* mode in the *Display Settings* the user can open an on-screen menu with a right click of the attached mouse. These on-screen menu allows the users to use a subset of the actions available in the browser interface.

To allow several users to share one or more displays, you can switch between users.

Each user can save their own layouts. Users are selectable across all displays. Their saved layouts are visible depending on the display resolution, such as a layout saved on a 4MP display is not selectable on an 8MP display but on any other 4MP display.

- Layouts saved by the administrator in the browser interface are visible to all users - display resolution dependent. These layouts can be deleted by the administrator only.
- Layouts saved by one user
  - Are visible for this user only
  - On displays of the same resolution
  - Can be deleted by this user only.
- Set up the *Last modified layout* selection in the *power saving part* of the *Display Settings* tab to return all displays and users to the last used screen after reboot or power save.
- The number of users supported can be selected in the *General Settings* tab.
  A maximum of eight users can be defined.

The following actions can be triggered on-screen:

- **Layout Overview**

  Opens a window displaying up to twelve layouts for quick selection.

Move the cursor over an input window and do a right click for the following actions:

- **Fullscreen**

  Opens the under-laying window as large as possible for this display. A second click on ‘Fullscreen’ reduces the window to the previous size.

- **Window**
  - **original size:** Reverts the under lying window to its original input size.
  - **exchange with input channel:** Exchanges the under-laying window with the input selected here.
  - **screenshot of this window**: Stored on a USB stick plugged into the same USB hub as this keyboard and mouse. The name of the stored screenshots is combined from the display name, the window name and date and time.
  - **add input channel**: Shows a live image of all inputs enabled for this display that can be selected (for more details how to disable input channels on a display refer to chapter *Disable Arrangement*.
  - **remove this window:** Removes the under lying window from the display.

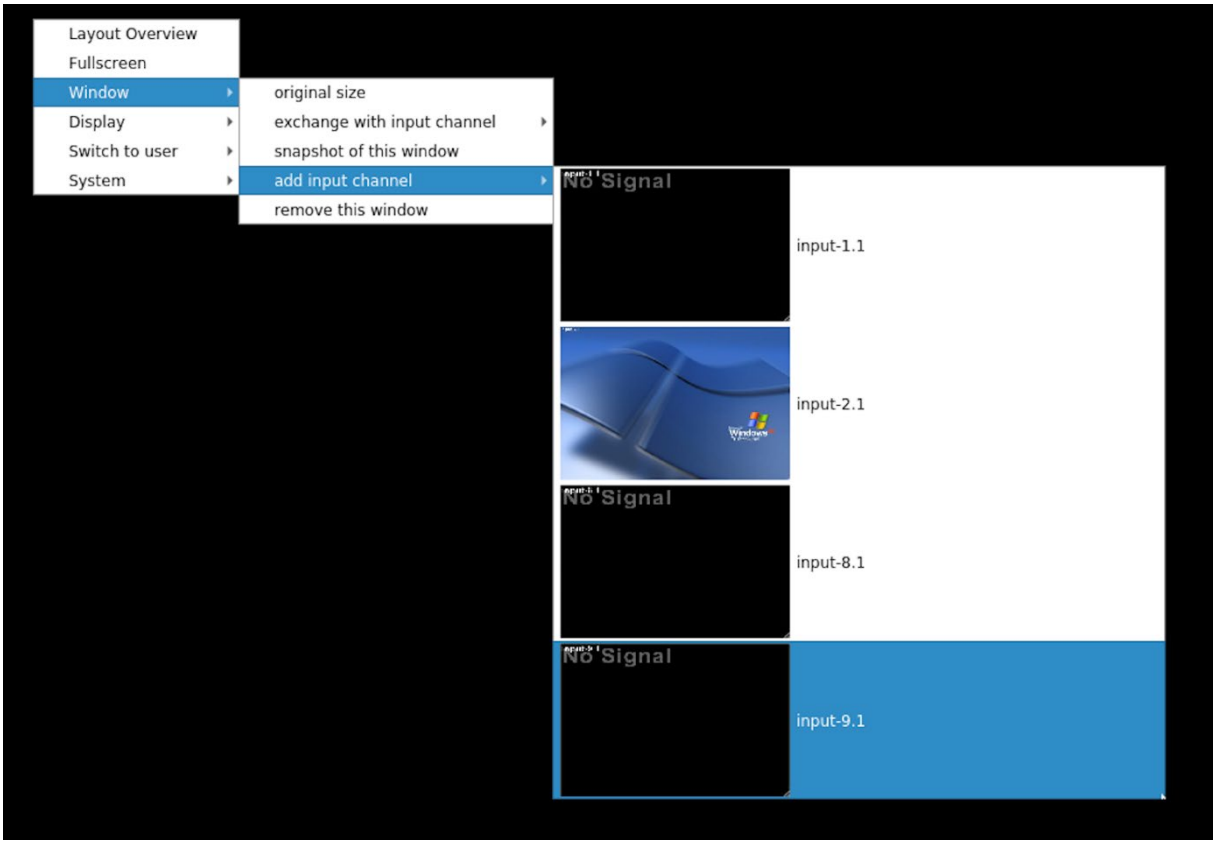


Figure: On-screen menu. 'Window' selected (example)

- **Display**
    - **change layout**: Opens a list of available layouts of the display's resolution to select. The upper part of the list of layouts are those saved by the current user; the lower part of the list of layouts are the layouts defined by the administrator.
    - **screenshot of entire screen:** Stored on a USB stick plugged into the same USB hub as this keyboard and mouse.
    - **revert to unmodified layout**: Reverts all resizes and moves of the windows.
    - **save layout as:** Saves the current arrangement as layout, and a window opens to enter a name for this layout. Layouts with the same name are overwritten. Saved layouts are user and resolution dependent.
    - **delete layout:** Opens a list of layouts of the current user and resolution. Select one to delete the layout. Layouts defined by the administrator cannot be deleted by a user.
    - **annotations**: Draws annotations over a layout.
      Annotations can be used for educational and information purposes. In a classroom setting, Annotations can be created real-time on an active layout. To create an Annotation, from User Interface with Keyboard and Mouse, open the *Display* on screen menu. Select *Annotation* to open the On-screen Annotation Menu (see the above figure). You can use a mouse to select an annotation tool, thickness and associated color.

      Annotations appear as an overlying graphic that can be stored with the associated layout for recall upon selecting the annotated layout at a later time. Annotations are visible on mirrored displays as well on Screen Shots. To save an annotated layout, select the *Save Layout As* function and do not modify the name. The saved annotated layout will be available after a subsequent power cycle.

      Note the following:

      - A power cycle prior to *Save Layout As* function is executed, results in the annotation being cleared (not saved).
      - Layouts saved on-screen are user layouts and not available from the browser interface (Administrative PC).

      The On-screen Annotation menu supports the functions you can see in *On-screen menu* above.

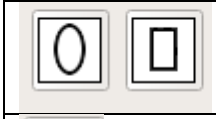
	Six colors option Default: Red
	Free-form line Default
	Rectangular and Circular Shape Creation
	Arrow
	Two Line thickness options Default: thinner
	Erase
	Clear
	Return to the on-screen user interface.

Table: Annotation Functions

- **Switch to user**
  - Displays a list of all users. Click one of them to select it. The last used and possibly modified layout of this user of this resolution is loaded.
- **System**
  - **Rename user**: Select a user from the list to rename it.
  - **Open administration**: Opens the browser page used to set up the PersonalWorkplace-Controller. This is the same browser interface as it is used from the external internet connection. Set a password to protect the browser interface so the end user cannot make changes.
  - **Go to standby**: Sends the system to standby mode.

9 Touch-monitor interface

With the touch-monitor interface you can control the on-screen user interface of the *PersonalWorkplace-Controller* (except the *PersonalWorkplace-Controller Video* variant) with a touch monitor.

The connection to a remote PC with the touch interface is not supported; only the mouse interface supported.

The following devices have been tested with this interface:

NEC MultiSync P403 SST

- Input device name: *Baanto SDW-424W1-M6L-XXX-XX-PRD*
- Input device vendor 0x2453 product 0x100 version 0x110

LindenGroup Display RAP 2122 AM

- Input device name: *eGalax Inc. eGalaxTouch EXC2203-41v01*
- Input device vendor 0xeef product 0x2203 version 0x210

Devices with similar touch controller interface should work as well.

The touch interface USB connector must be connected in parallel or instead of the mouse USB connection. Mouse and touch interface work in parallel.

The following gestures are supported:

- **Touch a window and move**: Moves the window or swaps the window, depends on the setting in the KVM settings tab.
- **Double touch on a window:** Opens this window in full screen mode centered, the next double touch to the same window will reposition and resize this window to its original position and size. A double touch to another window repositions and resizes the enlarged window to its original position and size and open the new window full size.
- **Two finger gesture:** Zooms in or out.
- **Hold one finger and double click with another finger:** Connects or disconnects from a remote PC. All further touches are sent to the connected PC. This works fine with Windows 10; however, Windows 7 may present a few issues. It does not function with MAC OS X and Windows XP. It can work with Linux but is desktop dependent.
- **Hold touch for a few moments:** Opens the on-screen menu.

The touch monitor interface must be enabled in the administration interface. Under the *Configuration* tab select *Display Settings*:

- Select the display the touch interface should be connected to and select *PWC KVM*.
- Select the USB port the touch interface is connected to and *enable touch monitor*.

When the touch monitor is connected the first time, a calibration cycle must be run for proper positioning of the touch location.

- Open the on-screen menu and go to *System*, *Calibrate touch*.
- Touch the circles shown on screen.

After the third touch the touch monitor is calibrated and can be used at any PersonalWorkplace-Controller output. The calibration values are stored in the configuration file. The calibration cycle can be repeated any time.

If the primary monitor has no touch interface, another monitor with a touch surface can be installed as a supplement. This additional monitor can be defined as a mirror of the primary monitor. For this purpose, the touch interface must be connected to the mouse and keyboard inputs of the primary monitor.

10 Remote control (API)

For machine and user interaction a Representational State Transfer (rest) Interface is included.

The interface returns information about the system, or about defined layouts as XML-fragments.

This interface can be used with any browser. The common way of calling this interface looks like this:

https://pwc-ip-address/rest (*pwc-ip-address* is the current IP address of the device).

10.1 Definitions

- **MDM:** Subsystem of the PWC processor that interacts with control commands.
- **REST API:** Representational State Transfer Application Programming Interface, is a set of rules and conventions for building and interacting with web services. It is an architectural style that defines a standardized approach for creating and consuming web services over the HTTPS protocol.
- **Channel:** Channel information is used to describe inputs and outputs.
- **Segment:** Segments identify an input channel presented on an output channel (display).
- **Layout:** Layouts have definitions for presentation of segments on output channels.
- **Outputs:** Outputs are identified by a *logical_output_channel_identifier*. This identifier is related to one or more output connectors; which form a logical display to work with, such as connectors 1A and 1B with a resolution of 2560x1600 each are arranged as one logical display of 3840x1600. By default the *logical_output_channel_identifier* is named *Display 1*, *Display 2*, and so on.

10.2 Interface Specification

1. **GetDefaultLayouts**
   GetDefaultLayouts returns the defined default layouts for all available displays as an XML fragment.
   Result: Returns the defined default layouts for all available displays. Returns logical_output_channel_identifier
   Example: *https://pwc-ip-address/rest?command=GetDefaultLayouts*

2. **GetLayouts**
   GetLayouts returns a list of saved layouts and the segments included. To load a layout use the LoadLayout command.
   Parameters:
   - with_userdefined: when *true* GetLayouts returns all user defined layouts. Value: true|yes|1; false|no|0
     Default: false
   - names_only: when *true* GetLayouts will return the names of the layouts only.
     Value: true|yes|1; false|no|0
     Default: false

   Result: with_userdefined *true* <users>), 0..n <layout> elements, each containing 0..n
   Attributes:
   - enable: layout is enabled or disabled
     Value: string of UTF-8
   - default: this is the default layout
     Value: true|yes|1; false|no|0
     Default: false
   - segment: information about the layout
     Value: true|yes|1; false|no|0
     Default: false

   Example: *https://pwc-ip-address/rest?command=GetLayouts*

3. **LoadLayout**
   This function should be used to load a saved layout. It clears all output screens, initializes all segments within that layout and activates all output screens.
   Parameters:
   - layout_identifier: UTF-8 string to identify the layout
   - logical_output_channel_identfier: the output channel the layout is loaded
     Note the following:
     If empty this layout is activated on all logical-outputchannels.

   Result: ok or fail, with adequate error description
   Example: Load a layout onto Display1, called Default
   https://pwc-ip-address/rest?command=LoadLayout&layout_identifier=Default&logical_output_channel_identifier=Display1&override=true

4. **ActiveLayout**
   Returns the active layout name of this logical output channel, when not present *Display 1* is used.
   Parameters:
   - layout_identifier: UTF-8 string to identify the layout
   - logical_output_channel_identfier: the output channel the layout is loaded

   Result: Returns the active layout for a given LogicalOutput or an empty layoutidentifier if no layout is active.
   Example: *https://pwc-ip-address/rest?command=ActiveLayout*

5. **LoadPreviousLayout**
   Switches back to the previous layout.
   Parameters:
   - logical_output_channel_identfier: switch back to the previous layout of this output channel (Default = 1).

   Result: ok or fail, with adequate error description.
   Example: *https://pwc-ip-address/rest?command=LoadPreviousLayout*

6. **ExchangeSegments**
   Exchanges one segment against another one.
   Parameters:
   - logical_output_channel_identifier: the output where the action should be handled.
     Value: UTF-8 string
     Default: *Display 1*
   - source: segment_identifier of the segment to be replaced.
   - replacement: segment_identifier of the segment to be placed instead of the source.
   - blocking: when *true* ExchangeSegments returns when all operations are processed and are drawn on-screen. When *false* it returns after all operations have been send for further processing to the drawing engine.
     Value: true|yes|1; false|no|0
     Default: true

   Result: ok or fail, with adequate error description.
   Example: Change the Input in the window on Display1 occupied by source input 1.1 with source input 3.1
   https://pwc-ip-address/rest?command=ExchangeSegments&source=1.1&replacement=3.1&logical_output_channel_identifier=Display1&override=true

7. **SaveLayout**
Saves the current segment arrangement under a given name. All configuration data are stored in the configuration file.
Parameters:
    - logical_identfier: UTF-8 string to identify the layout
    - overwrite: an eventually already existing layout with this layout_identifier (boolean:).
    - handling: *normal* mode or *grid* mode. Should be set to *normal* mode.

Result: ok or fail, with adequate error description.
Example: Save layout with name NewLayout
https://pwc-ip-address/rest?command=SaveLayout&logical_output_channel_identifier=Display1&layout_identifier=NewLayout

8. **RenameLayout**
Renames a stored layout. All configuration data are stored in the configuration file.
Parameters:
    - old_layout_identfier: UTF-8 string to identify the saved layout
    - new_layout_identifier: UTF-8 string to identify the new name of the layout

Result: ok or fail, with adequate error description.
Example: Rename layout with name layout OldLayout to be NewLayout
https://pwc-ip-address/rest?command=RenameLayout&logical_output_channel_identifier=Display1&old_layout_identifier=OldLayout&new_layout_identifier=NewLayout

9. **DeleteLayout**
Deletes a stored layout. All configuration data are stored in the configuration file.
Parameters:
    - layout_identfier: UTF-8 string to identify the layout

Result: ok or fail, with adequate error description.
Example: Delete layout with name DiscardedLayout
https://pwc-ip-address/rest?command=DeleteLayout&logical_output_channel_identifier=Display1&layout_identifier=DisgardedLayout

10. **GetSystemStatus**
GetSystemStatus: Returns current system/error state. When used with filter: fail this method can be used as *alive* check when it returns an empty result when no failures are present and/or as *GetErrors* check. The same *ID* as used in the notification event is returned.
Parameters:
    - <filter>

    Values:
        - all: returns all states
        - fail: returns all failed states, empty result when no errors found.

Result: 0..n of the following elements.
Elements:
    - Type: <state>
    - Attributes: id (integer)
    - Condition: (UTF-8 string)
        - fail: if the corresponding state has a failure, an event notification is active.
        - good: the corresponding state has no failure.
        - info: the corresponding state is for information only and has no fail or good state.
    - hw_indentifier:
        - For errors with id 60-69 the keyboard/mouse number
        - For errors with id 70-89 the address
        - For errors with id 90-99 the power supply number
    - text: identifier, such as *CPU 1 temperature* (UTF-8 string)
    - value: empty or for example the corresponding temperature value (integer)
    - boundary_low (integer)
    - boundary_high (integer)
    - Logging: true/false, reflects the status of the buffered logging flag
    - EDID: returns all implemented EDID data sets.

Example: *https://pwc-ip-address/rest?command=GetSystemStatus*

11. **SystemReboot**
SystemReboot reboots the system.
Parameters: none
Result: ok
Example: *https://pwc-ip-address/rest?command=SystemReboot*

12. **SystemShutdown**
SystemShutdown halts the system but does not turn off power. Power has to be turned off manually and turn on manually by the user.
Parameters: none
Result: ok, please refer to the output monitor when ready to turn off
Example: *https://pwc-ip-address/rest?command=SystemShutdown*

11 Internet security

The following internet port are used by the PersonalWorkplace-Controller. All other ports are not active.

Port	Service
22:	SSH
80:	PWC-Service Browser interface
443	if https browser interface is used
5353	mDNS Resolver
9222:	Touch-PC Update Server
12340:	PWC-Tester
12341:	PWC-Validator (not used)
12351 and higher:	PWC-UID 1

12 Error messages and warnings

The system shows several error messages and warnings in the browser. They appear as drop-down windows for several seconds and as *System messages* in the top right corner of the browser.

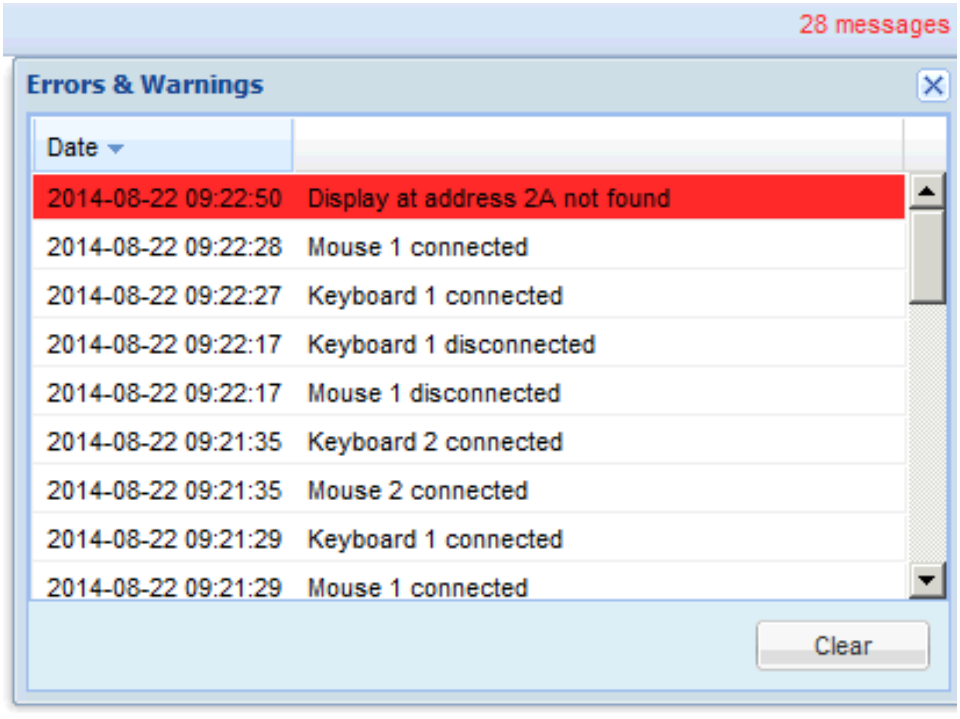


Figure: System Messages

They are not displayed on the local browser, only with a remote browser.

The following sections list the messages and possible responses.

12.1 Error Messages during Booting

Error messages displayed during booting are visible on the main output monitor. A log entry is created for them. The first part of the message contains details of the error, the second part gives hints on possible solutions to fix the problem.

For further assistance, contact G&D support.

In one of the following situations the system executes a 'Reset to Default' command.

- No configuration file found
- Decrypt Error
- No valid xml data
- Invalid configuration data
- Incompatible configuration version

The on-screen message looks like the following:

No configuration found.
Resetting to default configuration.
Please wait….

12.2 General messages and warnings

Error or Warning as shown in browser	Reason and possible solution
Channel xy is now DISABLED, as it is shared with the enabled channel yx!	For information only. If the second channel of a shared channel is enabled this message informs that the other channel is disabled and cannot be used such as for event handling.

12.2.1 Messages seen during resizing of input channels.

Overrun #1	Reduce input size of that channel or Crop left or right side of that channel.
Overrun #2	The bandwidth limit exceeded, one or more of the windows had to be removed. This may happen during arrangement or while a layout is displayed and one of the inputs reconnects with a different resolution or refresh rate. Check all inputs, especially the refresh rate. The windows removed are not necessarily the ones, which caused the problem.

12.2.2 Notifications

Notification, Input channel #x is now connected.	Input channel #x is now connected (online), which means a signal is received. This may trigger events if events have been activated.
Notification, Input channel #x is now disconnected.	Input channel #x is now disconnected (offline), which means no signal is received. This may trigger events if events have been activated.
Notification, Layout *Name of the layout* activated…	The layout with the name *Name of the layout* is now activated. The activation was triggered either by the user in the browser interface or by the remote control or by events.

12.2.3 PWC KVM notifications

Notification, mouse connected / disconnected	The mouse connected to PWC is connected or disconnected
Notification, keyboard connected / disconnected	The keyboard connected to PWC is connected or disconnected
Notification, USB port # connected / disconnected	The USB port # is connected or disconnected

12.2.4 Alarm messages displayed in the browser

Alarm, Fan #x is now at value 12345	Alarm message for fans if they rotate to slow and maintenance is necessary.
Alarm, Temperature is now at value 123	Alarm message for temperature. The temperature is too high. Either ambient temperature should be reduced or maintenance is necessary.
Error, Configfile NOT stored on server!	For details see the log file.
Error, Restore of configfile was NOT successful!	For details see the log file.
Unable to save configuration file on local disk!	For details see the log file.

12.2.5 Messages visible in the ‘Status’ tab of the browser

PWC booted from factory default software	An error occured during the update process and the system booted from an older version of the software. Try to update again.
Default config file used	The PWC software found a problem with the configuration file and uses a default configuration file. For more details see next chapter.

12.2.6 Messages written to the output monitor

When a custom default config error is shown, use the custom default IP address to restore a valid Configuration from the FTP server.

Custom default config - no configuration found	The PWC switched back to the custom default configuration, because there is no configuration file. Use *Restore*.
Custom default config - incompatible configuration data	The PWC switched back to the custom default configuration, because the configuration file is not for this type of system.
Custom default config - incompatible version	The PWC switched back to the custom default configuration, because the configuration file is of the wrong version.
Custom default config - encrypted config file	The PWC switched back to the custom default configuration, because the configuration file is either defective or the decryption is not possible.
Custom default config - no valid xml config file	The PWC switched back to the custom default configuration, because the configuration file is defective.

When a factory default config error is shown, use the factory default IP address, set up a FTP server and restore a valid configuration from the FTP server.

Factory default config - no configuration found	The PWC switched back to the factory default configuration, because there is no configuration file.
Factory default config - incompatible configuration data	The PWC switched back to the custom default configuration, because the configuration file is not for this type of system.
Factory default config - incompatible version	The PWC switched back to the factory or custom default configuration, because the configuration file is of the wrong version.
Factory default config - encrypted config file	The PWC switched back to the factory or custom default configuration, because the configuration file is either defect or the decryption is not possible.
Factory default config - no valid xml config file	The PWC switched back to the factory or custom default configuration, because the configuration file is defective.

12.2.7 Update error messages

The following messages may appear during the update process, they are stored in the *update.log* file.

1	Update successful Power cycle needed
2	Update successful Reboot needed
3	MD5sum check failed for files in archive, the update file is corrupted.
4	PWC: Video input board version check of HW layout or FPGA failed, the update package is not valid for this PWC-hardware
5	PWC: FPGA update failed, there is a hardware problem with the PWC, try once again to update.
6	SMfit: untar of smfitupd.tar failed, SMfit update failed.
7	SMfit: script 'updatesmfit.sh' does not exist, SMfit update failed.
8	SMfit: updatesmfit.sh returns failure for 2nd time
9	PWC: MD5 checksum of copied files failed, try once again, if this fails PWC hardware is defect.
10	PWC: K/M board update failed

13 Troubleshooting

13.1 Using PWC in combination with extender or matrix system from G&D

If you use the PWC in combination with an extender or matrix system from G&D, it may happen that the mouse does not work correctly.

In this case you should disable the reinitialization of USB input devices (USB auto refresh) for the console modules.

Detailed information on this topic is given in the separate manual for operating the web application of the extender.

14 Appendix

14.1 Stream type details

14.1.1 Introduction

PersonalWorkplace-Controller is capable of receiving and transmitting various video protocols over ethernet. This section provides information about available streams and all kinds of necessary background information.

To receive video inputs, go to the *Administration* tab and select a virtual input. For more details see chapter *Virtual Inputs*.

To Transmit streams start with the tab *Display Arrangement* and then proceed with *Display Setting*.

14.1.2 Output Streaming

Set up output streaming on the *Display Arrangement* tab.
There the resolution and the protocol can be selected.

14.1.2.1 Supported encodings, protocols

The PersonalWorkplace-Controller supports the following stream encodings, protocols as input or output:

- RTSP with standard H.264 encoding
- RTSP with standard H.265/HEVC encoding
- WebRTC with standard H.264 encoding
- NDI
- YouTube

The following table lists some of the differences when using inputs/outputs with standard cable connections or streaming protocols. Best practices and tips for selecting and using different streaming formats are identified following the table.

Streaming consider-ation	Cable	NDI	RTSP with H.264/ H.265	WebRTC / YouTube	Remark as applicable
Reliability of the connection	Very high	High	Lower	low	A cable is always the most reliable connection, the more network connections with switches and router are added the lower is the reliability of the connection.
Image quality	Excellent	Good	Fair	low	Using a cable every pixel of the sender is visible on screen. NDI does some compression but not visibly under normal circumstances. All other protocols use much higher compression rates often depending on the transmitter and the available bandwidth between transmitter and receiver.
Bandwidth (such as HD)	Appr. 3Gb/s	200Mb/s	<20Mb/s	Is negotiated between sender and receiver	
Typical distance between sender/ receiver	< 30m	<500m	intranet	Worldwide (internet)	
Latency [frames]	2-3	Input: 3-4 Output: TBD Both: TBD	30+	30+	The latency is the time a frame needs from the sender to the display of the receiver. Or in other words, the additional time needed if a PersonalWorkplace-Controller and the network protocol is in between the sender and the display. The numbers given are when used as IP input and cable output, cable input and IP output and both input and output with the same IP protocol.
Jitter [frames]	1	+/-2	-	-	
CPU/Net-work load	Low/Low	High/High	Low/ Medium	High/Low	CPU and network load for cable connections are low, similar to the RTSP as they use the GPU for protocol decoding. NDI produces high network loads so no more than four HD streams can be used on a 1 Gb Ethernet network and the CPU load is high because the protocol decoding is done by the CPU.
Encrypted	No	No	No	Yes	
Audio support on way	No	Yes	Yes	Yes	

Table: Cable verses stream protocols

14.1.2.2 RTSP

RTSP streams cannot be used with standard browsers. Programs like VLC have been tested with the streaming software of the PersonalWorkplace-Controller. VLC can be downloaded from: *https://www.videolan.org/vlc/.*

VLC is available for Windows, Mac, iOS, Android etc.

For Windows user it is recommended to change the hardware acceleration for HEVC/H.265.

In VLC Tab Preferences *Input/Codecs* select Codec *DirectX Video Acceleration (DXVA) 2.0* or similar.

RTSP can be used with two encodings: H.264 or HEVC/H.265.

H.264 is the standard encoding and works well for resolutions up to HD (1920x1080).

H.265 is the newer codec. It delivers better compression; therefore, it works better for all resolutions up to UHD 3840x2160.

RTSP works well in local area networks. There are problems with router/modems etc. The protocol sends peak loads which are much higher than average. These peaks are not handled well by some network devices.

14.1.2.2.1 RTSP Bandwidth Settings

The following table shows the bandwidths that can be expected in average for RTSP encoding. Peak loads though are higher and may exceed the input buffer of some network devices (router/modems).

Encoding	Resolution	Bandwidth Setting	Bit Rate [Mbit/s]	Note
RTSP standard, h.264	Up to HD	Low	5	
RTSP standard, h.264	Up to HD	Medium	10	
RTSP standard, h.264	Up to HD	High	20	
RTSP standard, h.264	Up to UHD	Low	10	Not recommended
RTSP standard, h.264	Up to UHD	Medium	20	Not recommended
RTSP standard, h.264	Up to UHD	High	40	Not recommended
RTSP HEVC/h.265	Up to HD	Low	3	
RTSP HEVC/h.265	Up to HD	Medium	5	
RTSP HEVC/h.265	Up to HD	High	10	
RTSP HEVC/h.265	Up to UHD	Low	8	
RTSP HEVC/h.265	Up to UHD	Medium	15	
RTSP HEVC/h.265	Up to UHD	High	30	

Table: RTSP Bandwidth Setting

14.1.2.2.2 How many RTSP can be used simultaneously

The CPU and Graphics load is fairly low, so about four output streams can be handled at the same time, depending on the bandwidth.

14.1.2.3 NDI

NDI is special protocol widely used in broadcasting.

Find more details on *NDI.tv*.

For testing a device called BirdDog (*Bird-Dog.tv*) was used with HDMI inputs and outputs.

Four input streams with 1280x1024 resolution were tested.

Use of 4k resolution streams is not recommended.

NDI requires use of significant CPU power.

14.1.2.4 WebRTC

Was tested with all modern browsers like Safari, Chrome, Edge, and so on.

Quality and bandwidth are negotiated between the server and the browser and depend on the total available bandwidth.

The stream is encrypted. Authentication can be enabled. Username and password are generated by the PersonalWorkplace-Controller. The *username* is fixed. A new password can be generated at any time.

RTSP quality has been observed to be superior to WebRTC.

WebRTC works well with an output resolution set to 1280x1024.

Higher resolutions overload the CPU.

14.1.2.5 YouTube

To stream to a larger audience worldwide in real-time, use YouTube. The PersonalWorkplace-Controller feeds a HD stream to a local YouTube entrance and YouTube with their high speed worldwide network distributes this stream. Only users that have been invited can watch the stream.

The current implementation is experimental only and feedback is welcome.

14.1.2.5.1 How to stream with YouTube.

Prerequisites

a [https://account.google.com/ Google-Account] is necessary

- on !YouTube "Your Channel" must be configured in the context menu or "!YouTube Studio" be opened
- within "!YouTube Studio" a live stream can be started using the ‘Create’ button. To use this function, it has to be unlocked by Google, this may take 24 - 48 hours.

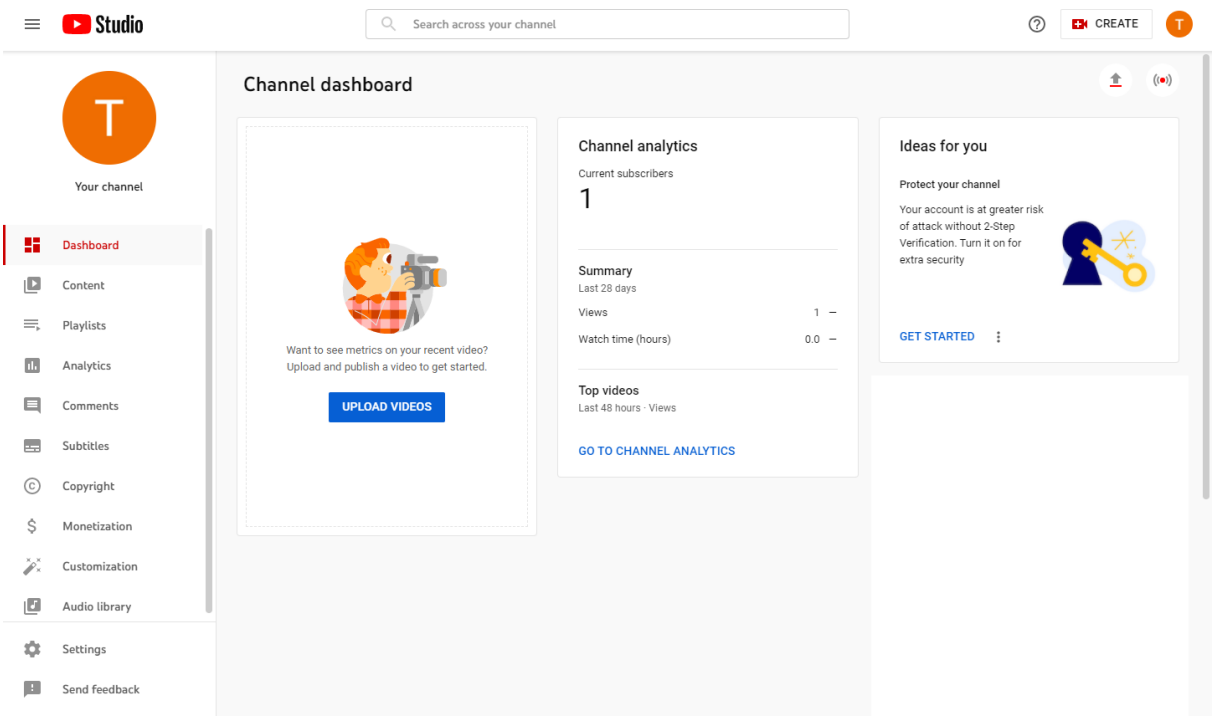


Figure: YouTube Studio

- When the Livestream menu is accessible, a **stream key** can be copied there and added in the PWC configuration interface to the YouTube Stream Display located in *Display Settings* tab.

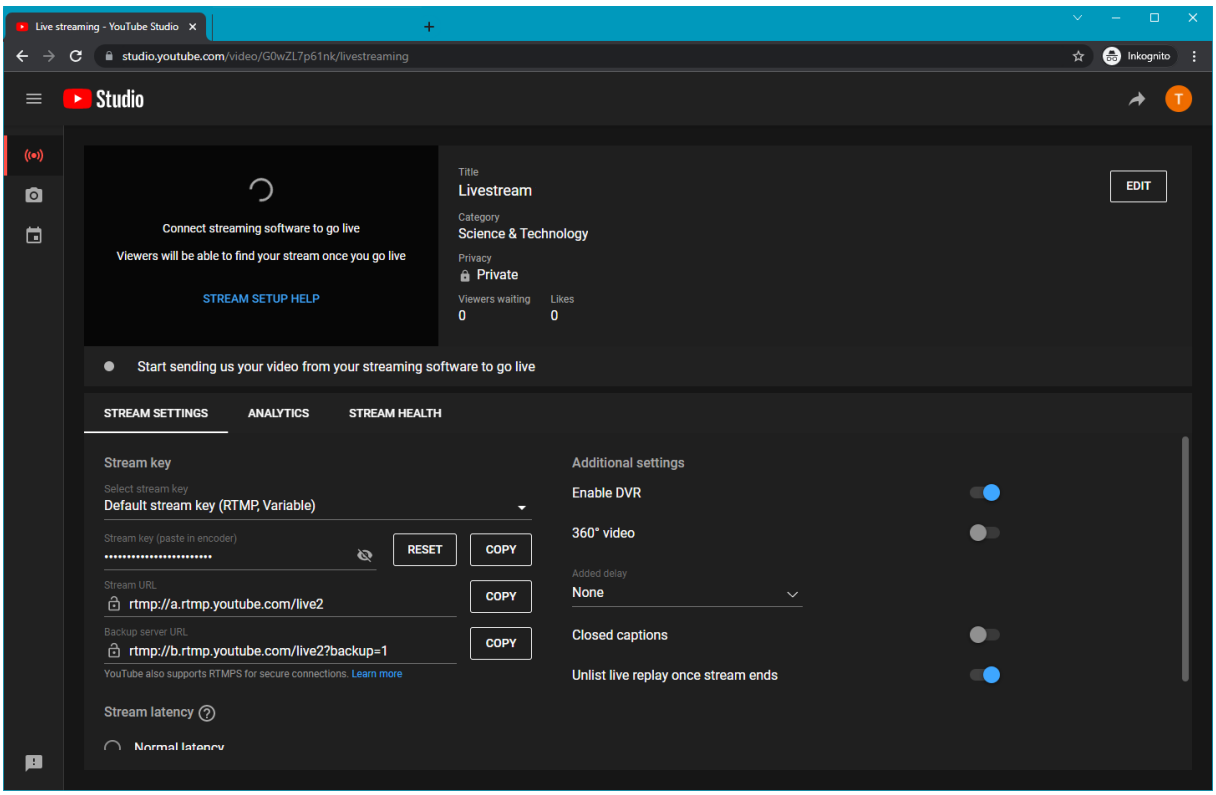


Figure: Livestream menu

The stream, its visibility, and other meta data can be changed by selecting *Modify*. Having a visibility of *Private* makes the stream accessible for invited Google-Accounts only.

- From within *Display Settings* the streaming of the stream can be activated using the [Start stream] button.

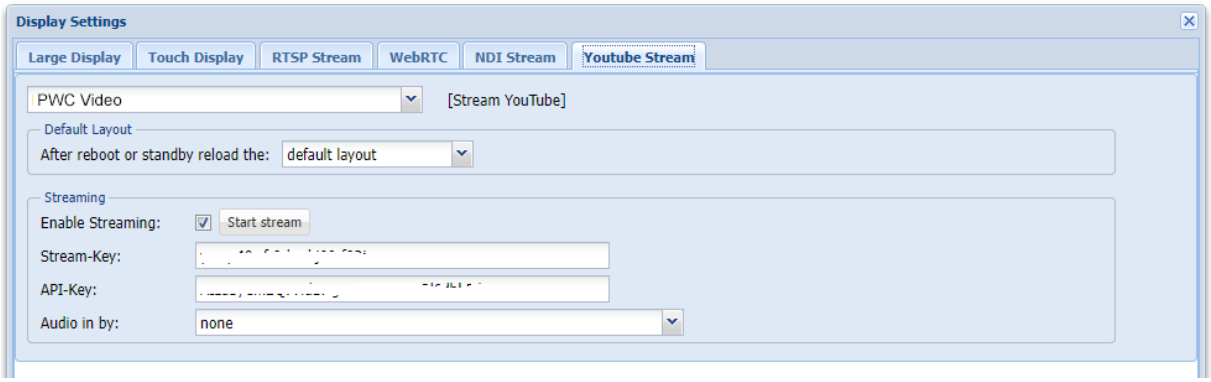


Figure: Streaming

- As soon as a connection exists and the stream data is processed by YouTube, the preview window in *YouTube Studio* reflects the screen.

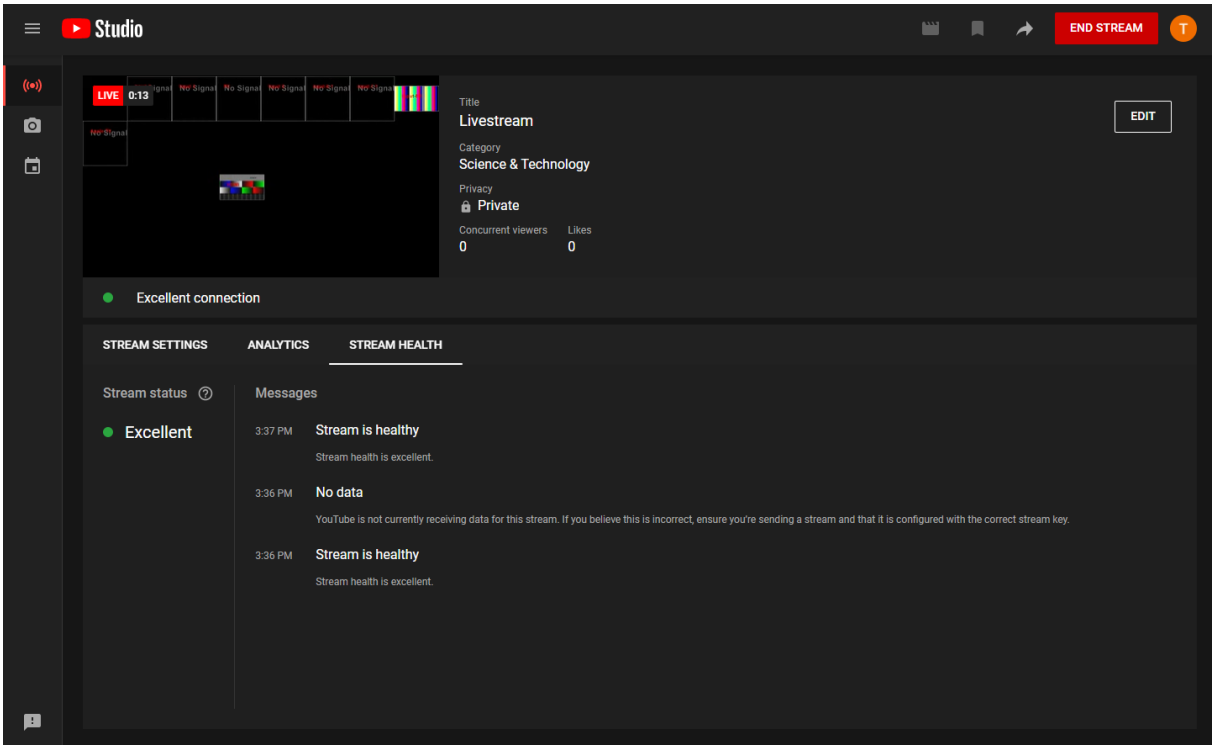


Figure: Preview

Using the arrow or the share symbol on the upper right on the YouTube Studio page, next to the *End stream button*, the access of the stream can be shared.

- The stream must always be terminated in the PersonalWorkplace-Controller browser *Display Settings* using the [Stop stream] button, because it is still producing, but not accessible using YouTube.

G&D. FEELS RIGHT.

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