Software Manual
Tritec®
Multi-Display-Manager
MDM

Software Version 2.7.5

Tritec Electronic GmbH
Carl-Zeiss-Str. 41
55129 Mainz
Germany
www.tritec.de
support@tritec.de

Version history

2.0		J.Bullacher	Manual split into two different manuals. A hardware set up and software set up manual. Changes for Model D, removed older model versions. Overlapping in 'Administration'.
2.1		J.Bullacher	Added 'Annotations' in on-screen user interface
2.2	1.10.2018	J.Bullacher	Chapter 3.2.5: Added Reset admin password Chapter 3.4.2: Added Input Stitching Chapter 3.4.4.1: Added Color Model YCbCr Chapter 3.2 TouchUI, in button arrangement tab, buttons are arranged as defined in the 'settings' tab. Chapter 3.2.3.2: larger font for on-screen menu.
2.3	12.04.2019	J.Bullacher	Chapter 4. With new 'Modern TouchUI interface'
2.4	03.07.2019	J.Bullacher	Added 'Fullscreen' and 'exchange with input channel' in Chapter 5.0 On-screen user interface.
2.5	29.7 2019	J.Bullacher	From this version on all changes are for MDM software version 2.5.x. Version 2.4.x gets bug fixes only, no new features. New feature for version 2.5.2: in chapter 3.2.2 'Display settings' added 'extended display' and correct the license handling.
2.6	2.10.2019	J. Bullacher	For software version 2.5.3 only: New feature: beta version: Streaming see chapter 3.4.5 Virtual Inputs. Extended features: Shrink Curve for region in chapter 3.4.4.1 Hardware tab New 'DNS' entry in chapter 3.2.4.1 New FPGA firmware for MDI-7 and MDI-5
2.7	31.10.2019	J.Bullacher	Clarified usage of 'Shrink Curve' algorithm.
2.8	15.11.2019	J.Bullacher	Virtual Channels Chapter 3.4.5 added streaming and made corrections
2.9	10.02.2020	J.Bullacher	Added link to latest software versions and mouse driver.
2.10	27.04.2020	J.Bullacher	Reviewed the document and corrected internal links. Chapter 3.2.1.4 added: 'Screens', 2 or 4 sub-screens per input and Center inputs. Updated Figure 35: Channel Details.
2.11	21.09.2021	J.Bullacher	New major release 2.6.0 Includes streaming; uses new Linux version: bullseye Changed: chapter 3.4.5 Virtual Inputs; all inputs can now use streaming and included NDI protocol. Opened port 5353 for mDNS Responder.
2.12		J.Bullacher	Added: 'Device Name' in 'Configuration' Tab. Added output streams in chapter 3.2.2 'Select Display Arrangement' Added Audio in/out in 'Display Settings' and 'Virtual channels'. Manufacturing date of the MDM must be October 2021 or newer.
2.13	14.03.2022	J.Bullacher	New release 2.6.2 added 'dynamic mode' in 'Display Arrangement' tab.

			Experimental implementation of a YouTube Stream, selectable in ‘Display Arrangements’.
2.14	14.03.2023	S. Philipp	Updated company name to Tritec Electronic GmbH Updated admin password reset procedure chap 3.2.5.1. Added hotkey assignment chap 3.2.1.11
2.15	13.07.2023	J.Bullacher	New release. Added 3.2.2.2 rotation and improved wording. New 3.4.4.2 MDI-10 and Etherface added Now for Hardware versions ‘D’ and ‘E’.
2.16	31.10.2023	S. Philipp	Updated composite display arrangement in legacy mode, chap 3.2.2.1 Updated display settings dialogue with auto connect mouse move feature, chap 3.2.3.3 Added input and output stream maximum size information
2.17	29.01.2024	S. Philipp	Updated Tritec ® logo Updated chap. 3.3 and chap. 3.4 administration tab Updated chap. 3.5 start arrangement Clarified chap 3.4.4.2 MDI-10 administration tab
2.18	14.03.2024	S. Philipp	Updated chap. 3.3 administration tab Added chap. 3.4.4.9 data masking
2.19	6.5.2024	S. Philipp	Updated chap 3.4.3 and 3.5.1 with information for aspect ratio control
2.20	24.9.20024	S. Philipp	Added chap 3.4.4.3 MDI-11 / Etherface-1-Tx admin. Updated chap 3.2.4.1 Network config with interface N2 Added not chap 3.2.2.1 DP to HDMI active adapter req.
2.21	24.4.2025	S. Philipp	Updated chap 1.2 Download-Link Added chap 3.2.3.1 + 3.2.3.3 TouchUI and StreamDeck support Added chap 3.2.3.3 Screenshot by keyboard hotkey Updated chap 3.2.7.1 Screenshot is now in png format.

Table of contents

List of all Figures

List of all Tables

1. Glossary

Input Channel
The physical input of a video stream. It is connected to the output of a PC or other video source. It is either a DVI or analog signal.

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 stream. 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 they are 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.

MDI-5, MDI-6, MDI-7, MDI-10, MDI-11

MDI-5 MDI-6, MDI-7, MDI-10 and MDI-11 are the names for the input boards.

- For details see the technical specification of the boards in the Tritec® *Hardware Installation Manual.*

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. There is a fixed relationship between mouse movements and cursors position on the display. MW-KVM does know about mouse movements, however does not know at which position on the display the cursor is shown. The disadvantage to Relative Mouse mode is that the user has to terminate the connection before he can establish a connection to another host PC.

Absolute Mouse Positioning: In 'Absolute Mouse Mode' there is a fixed relationship between the mouse and cursor. The mouse acceleration of the operating system is not used. In this mode, the MW-KVM does 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 display mode (two or more windows) is used. Installing a mouse filter driver on the Windows system can solve this problem. It can be found here: https://www.multi-display-manager.com/software/. Install it when the extended display functionality is used, even when only one of the extended displays is connected to the MW-KVM-1. Mac and Linux users do not need to install the driver.

Display Arrangement

Output physical displays and Stream scan be arranged in several ways and resolutions. As 8MP, 4MP or HD displays with Display Port, HDMI or DVI connections (depending on hardware capabilities)

Display arrangement is the first selection that has to be made. The system will switch the arrangement, reboot and does a reset to factory default for this arrangement.

Extended Display

Multiple physical output displays can be combined to form a single logical extended display. The extended display combines all of the arrangement area of the single displays together. This is similar to the 'extended desktop' functionality of modern operating systems.

Display Settings

Each display can be used in several ways – with an MDM-like functionality, as mirror, or with MDM-KVM-functionality. Not all of the selections may be visible for certain displays.

MDM-like functionality

In 'MDM-Mode' the display is located in the OR room. Layouts are switched by a bedside Touch PC or Table etc. No keyboard and mouse can be used to arrange or switch the layouts for this display.

Therefore, the arrangement of layouts, and the select and button assignments for this display are activated.

Mirror

Mirrors one or more inputs to one or more outputs. i.e. Output display 1 with 8 MP resolution can be mirror to one HD display (downscaled) and a second 8 MP display, or to a stream.

MDM-KVM-like functionality

In 'MDM-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 MDM-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 MDM 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. NDI.tv

1.1 How to use MDM

MDM has two interfaces: The 'Administration and Service' interface and the 'User interface'.

The Administration and Service interface needs to 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 accessed at http://mdm-ip-address.
It is used for setting up: the network, the connected display, input channels the user interface etc.

The User interface is used by the end user to switch layouts or control inputs.
There are several ways to implement a user interface:

- With a touch tablet or any PC with a browser, see chap. 4
- With a mouse and keyboard interface, see chap. 6.
- Through a touch monitor interface, see chap. 7
- Via remote control commands sent via network with REST commands. Access is provided via http(s)://mdm-ip-address/api. For details see the separate document 'External Software Interface Definition' available from Tritec Electronic.

1.2 Where to find latest updates.

Software Release notes can be found at:
https://www.multi-display-manager.com/software/mdm-v2-7-x/

The latest firmware updates, manual and data sheets can be found under this links:
https://rdrme.to/mdm5

2. Set up Instructions

Please set up the MDM-1 hardware according to the ‘Hardware Setup Manual for MDM’ before using this manual.

This manual describes all settings that can be made via the ‘Administration’ browser interface of the MDM-1.

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 will reboot.
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 MDM ships with a factory default setup with all input channels visible on screen.

Figure 1: MDM Output Monitor with Default Layout

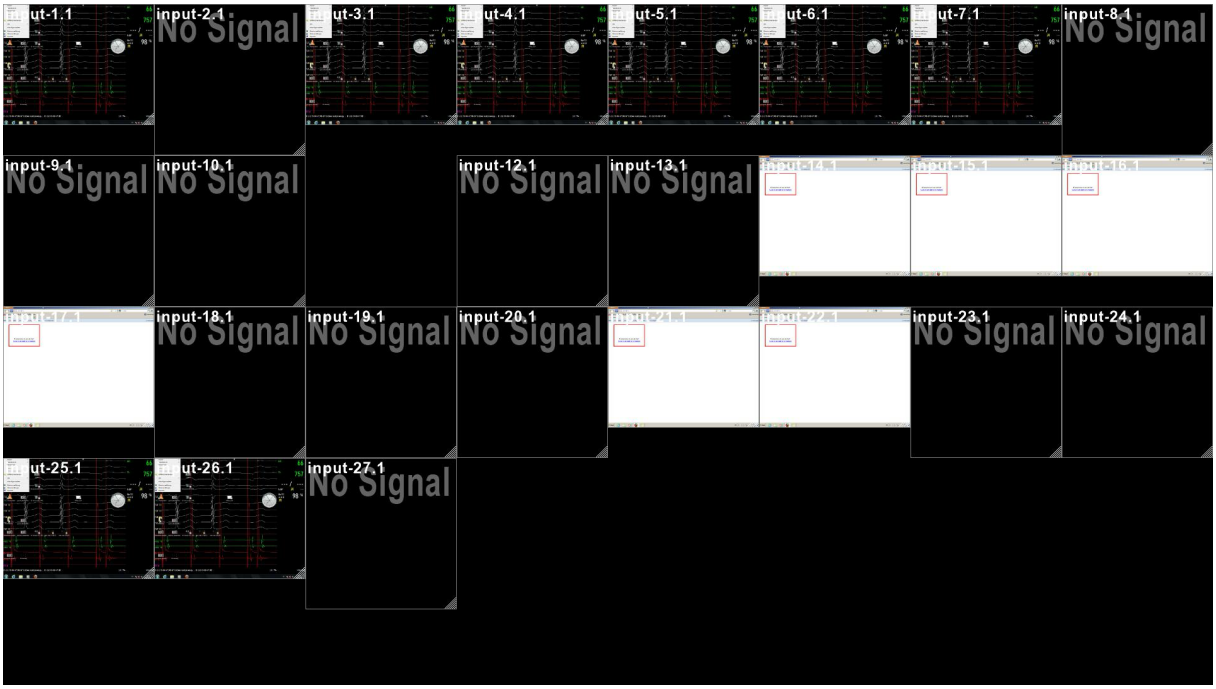


Table 1 Factory default set up

Source / Name	Default resolution	Input Connector no.	USB Input no.	Priority 1 … high x … low	Desktop arrangement
Input 1	Auto resolution EDID: 1280x1024	1	no	1	auto
Input x	Auto resolution EDID: 1280x1024	x	no	x	auto

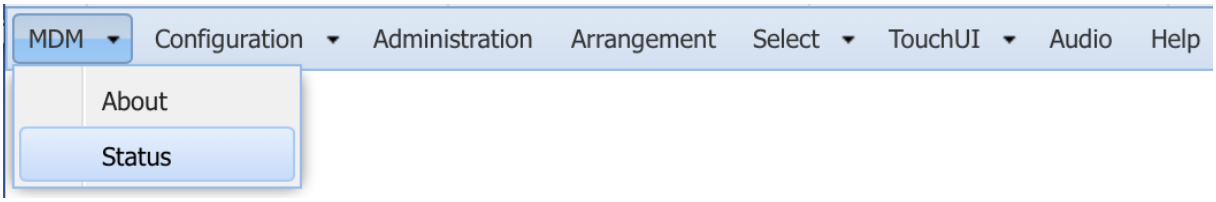
3. Administration Interface

To open the administration interface from a remote browser, use the default IP address: 169.254.213.44. Netmask 255.255.255.0. This address can never be changed but a second IP address can be specified in the network settings. This can be used for the network environment the MDM-1 is connected to.
Chrome, Edge, or Firefox work fine.

Depending on the MDM customization, the user is required to log on with username and password and the initial default password may have to be changed, see chapter 3.2.5.1 for details.

Web Interface
The Web-Interface of the MDM has 7 tabs (see Figure 2 below), which are used to set up and manage the MDM. They are described in the following sections.

Figure 2: Administration tabs



3.1 MDM Tab

The MDM tab has two sub tabs: ‘About’ and ‘Status’.

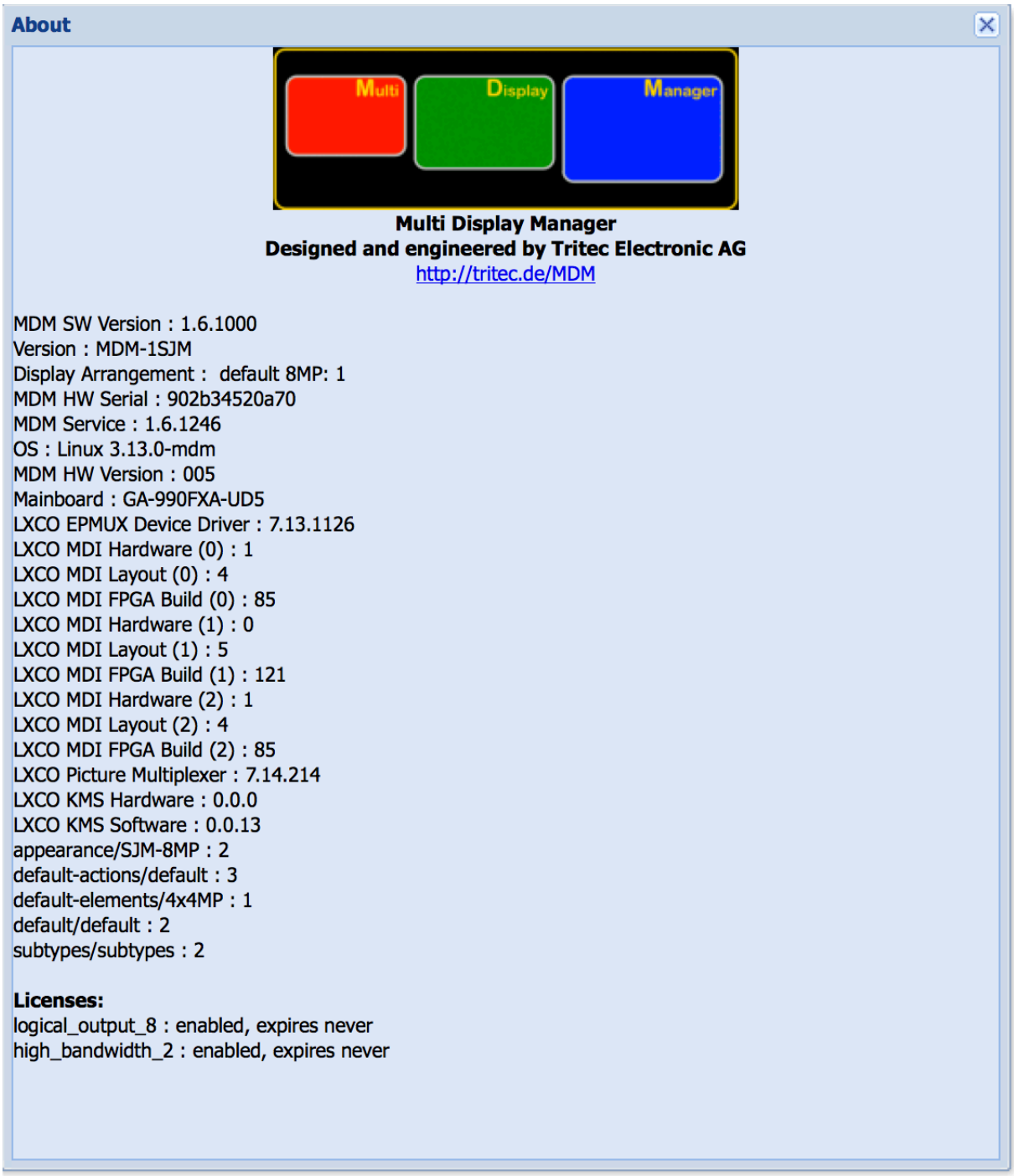
3.1.1 About

Shows all details about this Multi Display Manager System like:

- Line 3 shows the current display arrangement
- Overall version numbers
- TouchPC version number
- Custom version
- The display arrangement
- Serial number, etc.

The first line ‘MDM SW Version’ shows the active version of the software.
To check for updates, visit our Web-page:
https://www.multi-display-manager.com/software/

Figure 3: About



3.1.2 Status

Shows a detailed status of the Multi Display Manager system:
In the first line the messages shown below may be shown. If not needed they won't display.

'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.

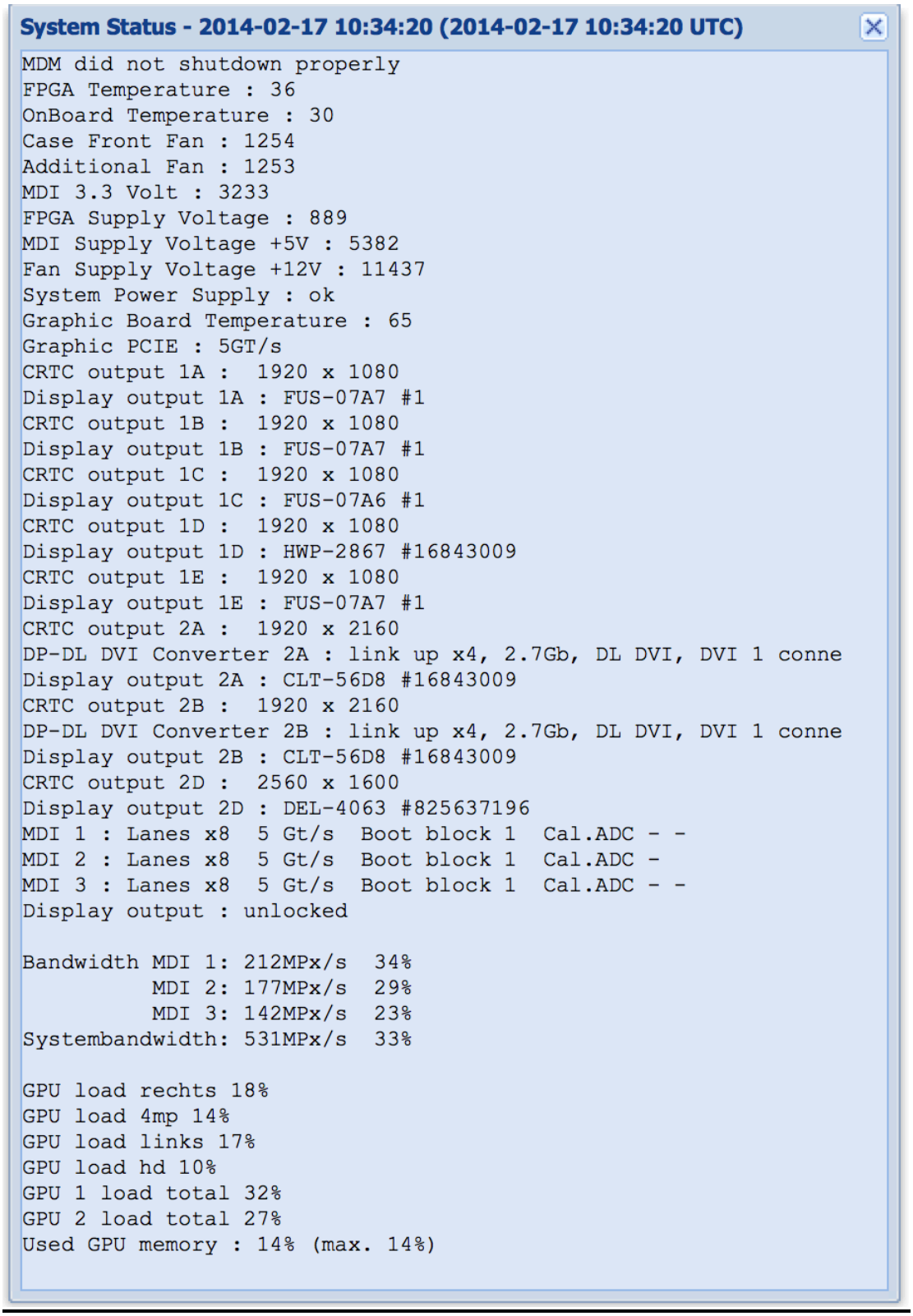
'MW-KVM booted from factory default software'

- Shown when a problem occurred during the update process and the software was not able to 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 MDM system.

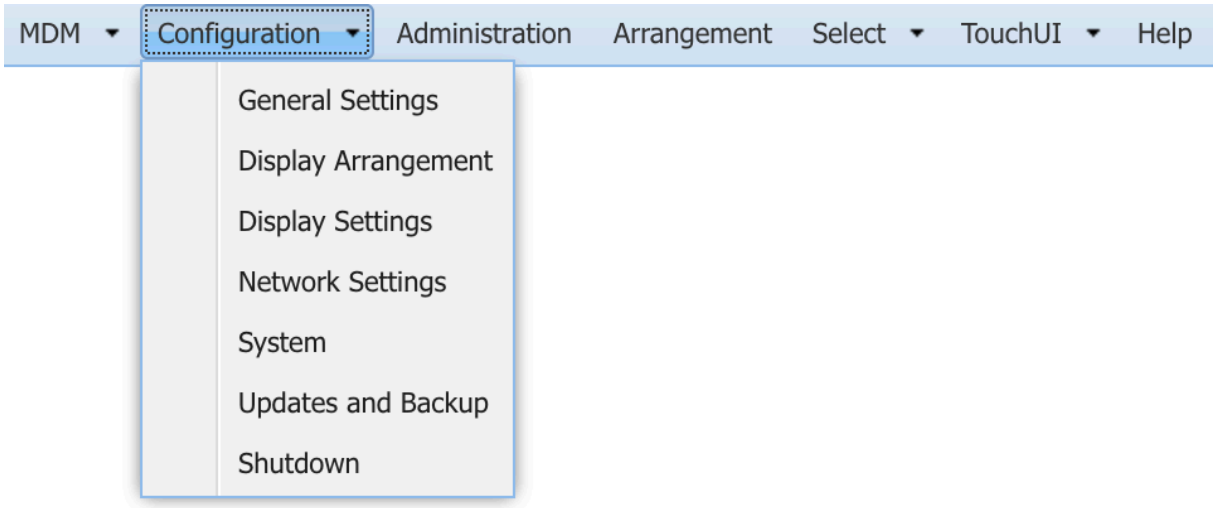
Figure 4: Status



3.2 Configuration Tab

The configuration tab shows all sub tabs to setup the MW-KVM system.

Figure 5: Configuration Sub-Tabs



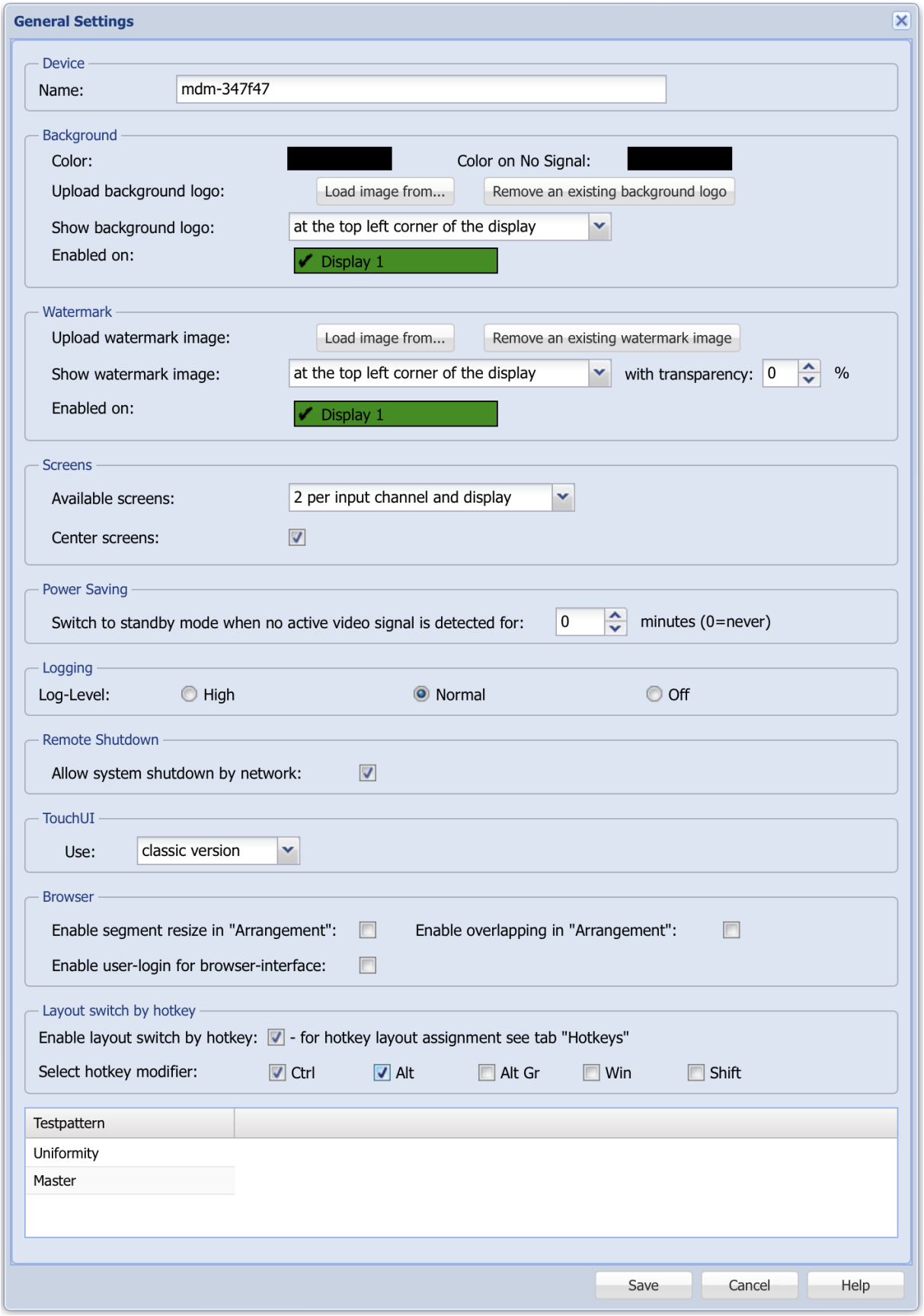
3.2.1 General Settings

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

3.2.1.1 Device Name:

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

Figure 6: General Settings

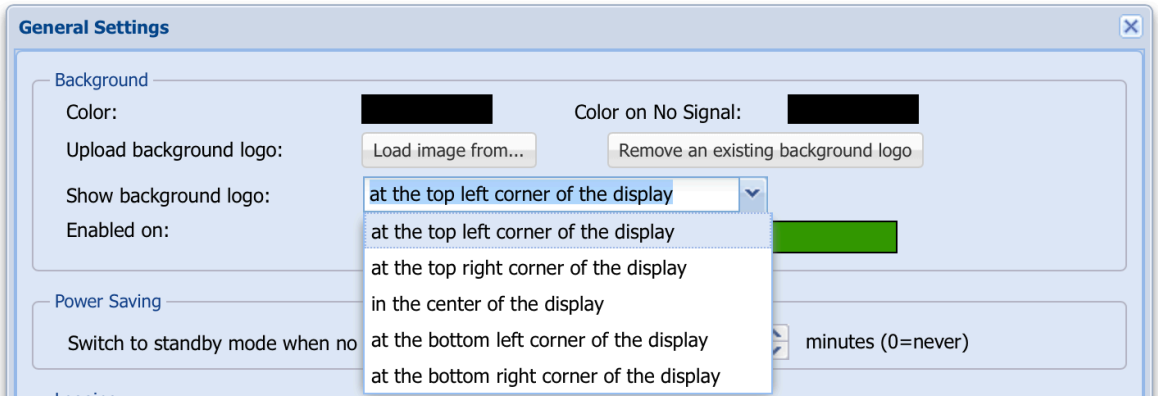


3.2.1.2 Customized Background Logo

It is possible to 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 is the more GPU bandwidth is used to draw it. So, it is better to use 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 24bit 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.
‘Enabled on’ allows the user to select on which displays the logo should be visible.

Figure 7: Customized Logo



3.2.1.3 Watermark

It’s possible to upload a logo that is shown on certain output displays with a definable transparency. It can be used to overlay logos, words etc. only for certain outputs i.e. outside of the OR, mirrors.
Refer to chapter 3.2.1.2 Customized Background Logo how to configure the watermark.

3.2.1.4 Screens

- **Available screens:** By default; all input channels have two sub-screens (Screen1 and screen 2) in the ‘Administration’ tab. The two sub-screens can be extended to 4 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.

Figure 8: Input Channel fits layout

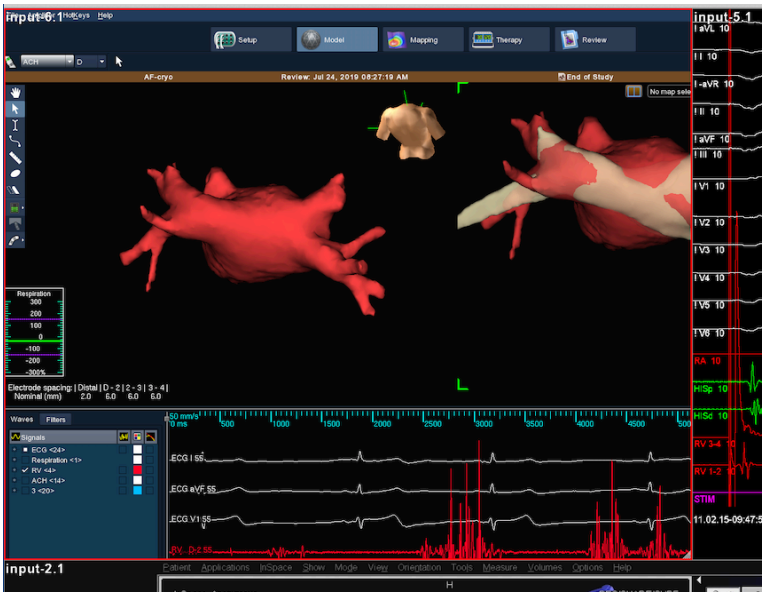


Figure 9: Input Channel fits to top left side

Figure 10: Input Channel is centered in height

3.2.1.5 Power Saving Standby Mode.

Some of the MDM models have a feature for saving energy called ‘Standby Mode’.
Standby mode reduces the power consumption of the MDM 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 MDM-KVM mode when activated (i.e. trough the TouchUI interface).
Standby is not supported with MDI-5 in hardware model ‘D’ and MDM-EL Entry Level model.
The system returns to normal mode when one of the digital video inputs has a stable signal (+5VDDC power must be connected), or in MDM-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 will power up with the same layout arrangement as set (last or default).

Figure 11: Power Modes of MDM-1

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 i.e. power switch at the back	Return of lost power i.e. 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,	

3.2.1.6 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 button 'enable logging' 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.

3.2.1.7 Remote Shutdown

Mark the check box to enable a shutdown sequence through the network (xml-interface). By default, the remote shutdown is disabled.

3.2.1.8 Enable segment resize in 'Arrangement'

If the checkbox is marked it's possible to resize the windows in the 'Arrangement' tab with the mouse. For more details see chapter: 3.5 Arrangement.

3.2.1.9 Enable overlapping in 'Arrangement'

If the checkbox is marked it's possible to overlap the windows in the 'Arrangement' tab with the mouse. For more details see chapter 3.5 Arrangement.

3.2.1.10 Enable user-login for the browser interface

If the box is marked a new sub tab is visible for the 'User Administration' in the 'Configuration' tab.
For better security, the 'HTTPS' function should be enabled and tested before the user-login is enabled. When user log-in is enabled and saved, the browser has to be reloaded.
It returns with a typical log-in screen. The default login is:
User: admin
Password: mdm4711

Depending on the MDM customization, the default password has to be changed at first logon.
If the password is lost, see chapter 3.2.5.1 for details.
If the user-login is disabled, all stored users are cleared and the default login is activated.
For more details see chapter: 3.2.5 'User Administration'

3.2.1.11 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 'MDM-with-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.

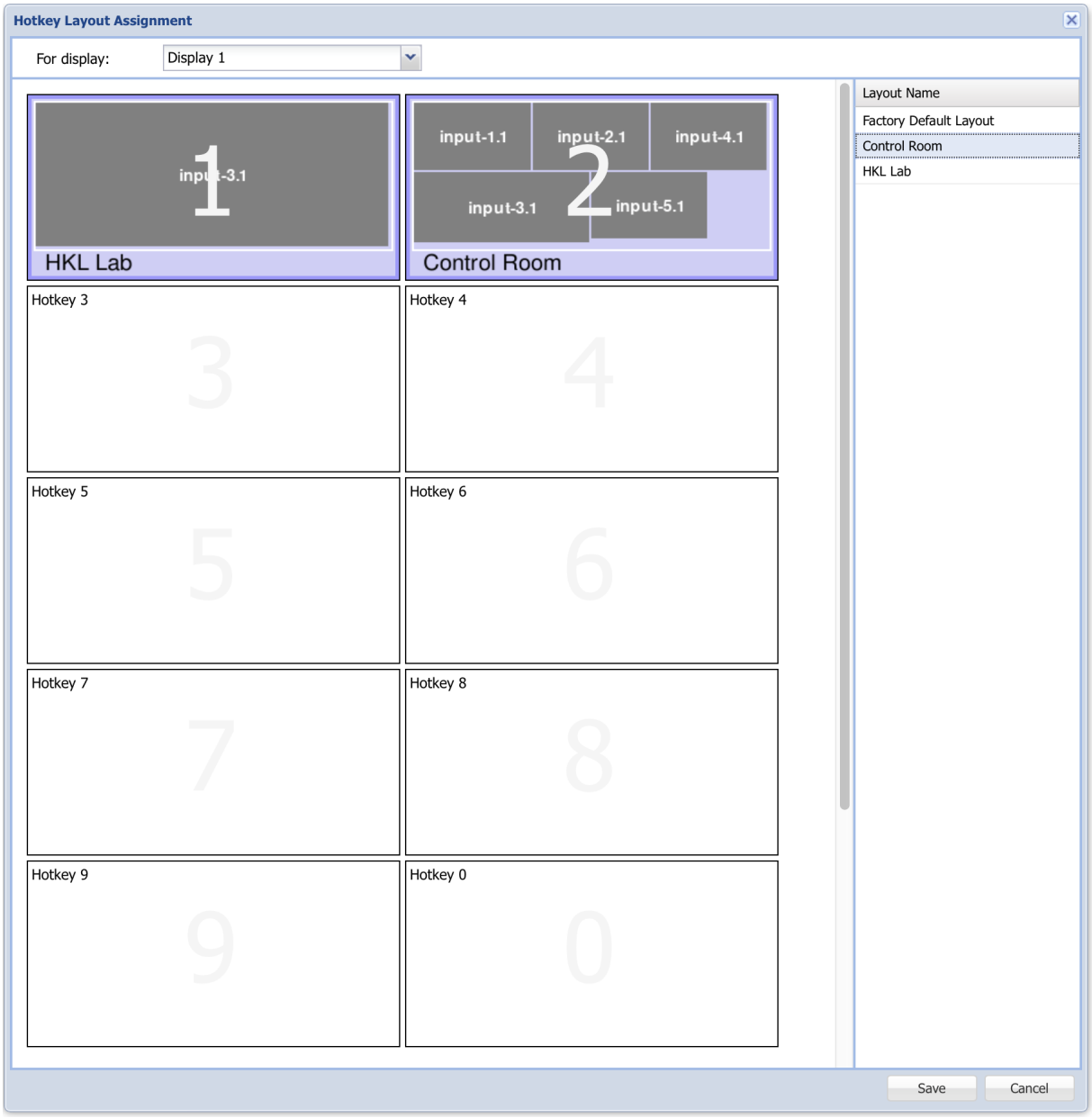
In the General Settings dialog (see Figure 6 on page 19), check 'Layout switch by hotkey' to enable hotkey layout switching. Use the check boxes to define one or multiple global hotkey modifier keys. If multiple modifier keys are defined, all keys have to be pressed together to activate a hotkey.

If hotkey layout switching is enabled, a menu tab 'Hotkeys' is displayed at the top web admin menu bar (see Figure 12).

After selecting the hotkey menu tab, choose the display for which layout hotkeys are to be defined. On the right side, select the layout to be switched to and drag the layout name with the mouse onto the hotkey identifier field 1 to 0 on the left. The hotkey identifier field is visually updated with the selected layout and the layout is assigned to the corresponding number key 1 to 0. Repeat until all desired layouts are assigned to hotkeys.

After configuration is finished, press the Save button to complete or the Cancel button to abort.

Figure 12: Hotkey Layout Assignment



3.2.1.12 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.

3.2.2 Select Display Arrangement

Select ‘Display Arrangement’ to set the connection or the arrangement of the output displays and / or streams.
This configuration should be done very early in the setup procedure, because many other tabs relate to this configuration.

There are two different ways for the display arrangement:

- Legacy mode, this is the mode with few fixed display resolutions.
- Dynamic mode, this is the mode that can handle all kinds of display resolutions.

Legacy mode is the one we used during the past and it did not change.
Dynamic mode is a new mode that can handle display arrangements like 3840x1440 or 3840x1600 etc. It can arrange displays horizontally, vertically or squares. For the maximum size please refer to the top write corner, where you can read ‘max. composite display width xxxx pixel, max height yyyy lines per board’.
I. e. 16,384 pixel by 16,384 lines allow a horizontal line of 4 UHD displays side by side.

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

Before switching to dynamic mode connect all displays and turn them on. The system will reboot and detect the displays.

3.2.2.1 Legacy Mode Display Arrangement

When opened for the first time the MDM is configured to the factory default setting.

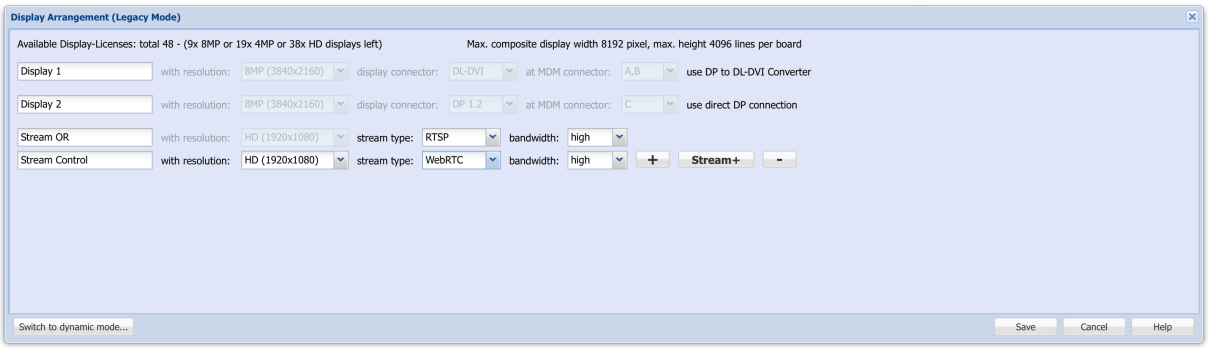
The top left corner shows the amount of available display / stream licenses. If more licenses are needed, they have to be ordered. In legacy mode, licenses are used according to the display area. Each display / stream size of 1920x1080 needs one license. An 8MP display / stream needs 4 licenses, a 4MP needs 2 licenses etc. Factory default are 4 licenses.

The left most field in each line can be filled with the name of the display. This name is used to reference the display in all further selections.

Use the buttons at the end of the line to modify the configuration:

- The last line can be remove with the ‘-‘ button. The first lines should be used for displays with the highest resolution.
- The ‘+’ button adds a new line for one more display.
- The ‘[ ]’ buttons adds a display (no stream) to the same display forming an extended display. The display can be added ‘right of’ or ‘below’ the first display. i.e. two 4MP 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). Remember the maximum number of input channels mentioned in the ‘Hardware-Installation Guide’.
- The ‘Stream+’ button adds a new line for a stream. Stream sizes of up to 8MP (3840x2160) are supported.

Figure 13: Legacy Display Arrangement



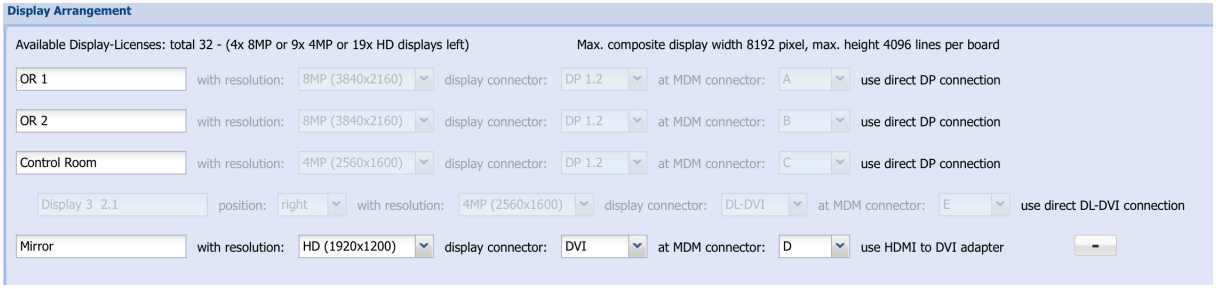
The current software supports a maximum of 3 to 6 physical displays, according to the MDM hardware model. Please refer to the *Hardware Installation Manual* of the MDM-5 for restriction due to hardware limitations.

According to the display video signal, the connector selection and the MDM hardware model, a text at the end of the line denotes eventually required video adapters.
Please note: MDM model E Basic DP outputs do not feature DP++. That results, video conversion to HDMI requires active adapters, not passive adapters! In contrast to that, MDM Mode E Advanced and Pro feature DP++ and thus passive adapters can be used.

For more information about available streams and further details please refer to this document:
https://www.multi-display-manager.com/download/application-note-video-over-ethernet-streaming/

After ‘Save’ing the setup the system will reboot 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 displays does not match the selected one.

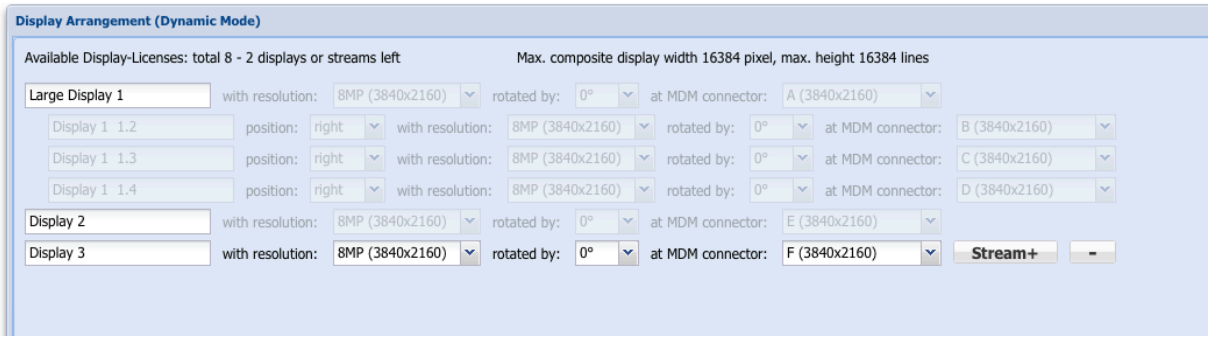
Figure 14: Legacy Display Arrangement with one Extended Display



3.2.2.2 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 15: Dynamic Display Arrangement with 4 UHD Extended Displays



When opened for the first time only one line is visible from the factory default setting. Before adding more displays; check if there are enough licenses available. In the top left corner of the display arrangement you find this 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 8MP license. Additional licenses can be ordered.
For each possible output connector or stream one line is shown.

- The left most 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 single display can be rotated. Combined outputs generated with [] cannot be rotated. Rotation feature is available only on MDM-E Advanced and Pro editions.
- Next an output connector can be choosen.

More lines (displays or stream) can be added:

- The '+' button adds a new line for one more display.
- The '[ ]' buttons adds a display (no stream) to the same display forming an extended display. The display can be added 'right of' or 'below' the first display. i.e. two 4MP 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). Remember the maximum number of input channels mentioned in the 'Hardware-Installation Guide'.
- The 'Stream+' button adds a new line for a stream. Stream sizes of up to 8MP (3840x2160) are supported.
- The last line can be remove with the '-' button. The first lines should be used for displays with the highest resolution.

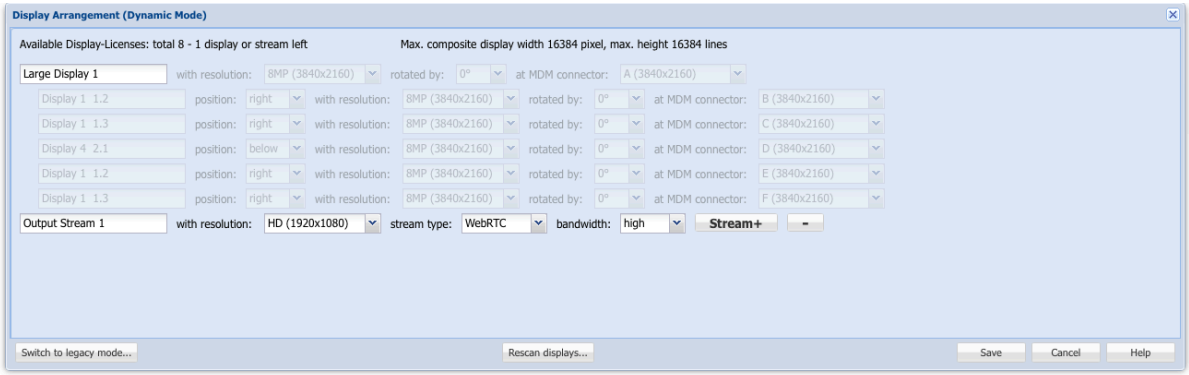
The maximum available size horizontally and vertically is shown in the top line.
For hardware model 'D' the max. is either 4x8MP as a square or two 8MP in a row.
For hardware model 'E' the maximum is either 2x3x8MP as a square or four 8MP in a row
Remember the maximum number of input channels mentioned in the 'Hardware-Installation Guide'.
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.

For more information about available streams and further details please refer to this document:
https://www.multi-display-manager.com/download/application-note-video-over-ethernet-streaming/

Please refer to the hardware manual of the MDM-1 for the number of supplied connectors.
Stream type details see:
https://www.multi-display-manager.com/download/application-note-video-over-ethernet-streaming/

After ‘Save’ing the arrangement the system will reboot and all connected displays should show the factory default layout.

Figure 16: Dynamic Display Arrangement with one 3x2 UHD rectangle

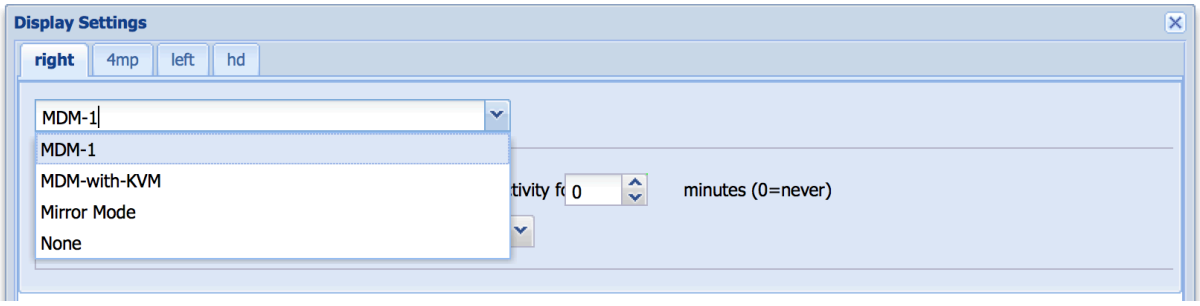


3.2.3 Display Settings

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 17: Display Settings



Pushing the ‘Identify’ button pops up the name of the display on each display for 5 seconds.

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

3.2.3.1 Display: MDM-1 Mode

In ‘MDM-Mode’ the display behaves just like an MDM, 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.

‘TouchUI’
Enables this display for the Touch-UI user interface, see chap 4.

‘StreamDeck’
If hotkeys are enabled in the general settings, the user can select a connected keypad (StreamDeck) to provide a simple layout-switch per key to the user. Multiple keypads can be assigned to the display. Currently, Elgato StreamDecks are supported.

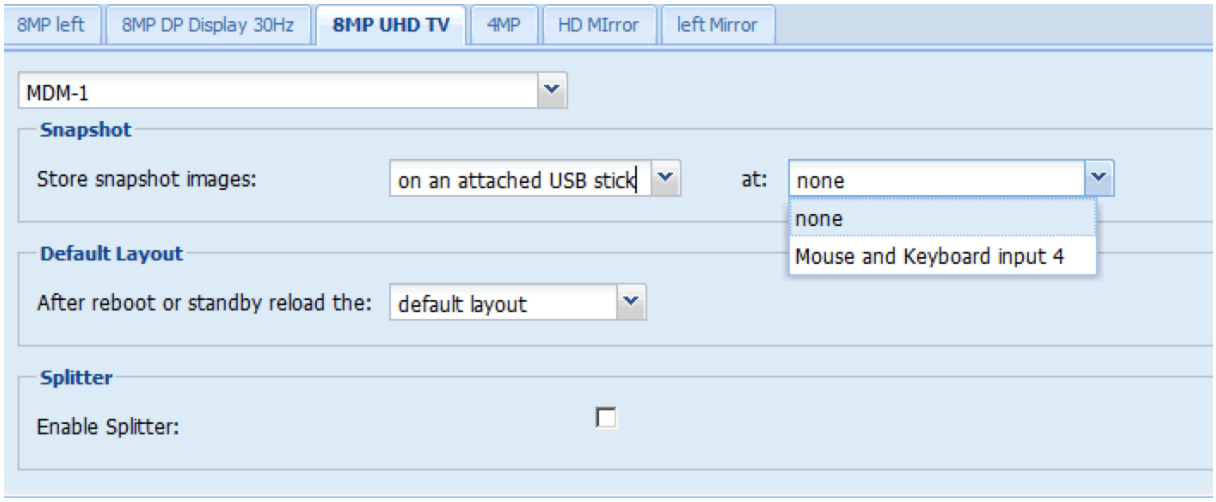
‘Screenshot’
Screenshots triggered by the Touch User interface or the keyboard screenshot hotkey can be stored to a USB stick connected to one of the USB keyboard & mouse inputs.

‘Default 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 Splitter’
is used for error reporting only. When a DisplayPort Converter with Splitter is used and this item is checked, a missing splitter is reported and the missing display is reported, which is

connected to the second output of the splitter. The ‘System’ tab and the ‘Tests’ part will use this information.
This option is for 8MP displays with a dual DVI connection only.

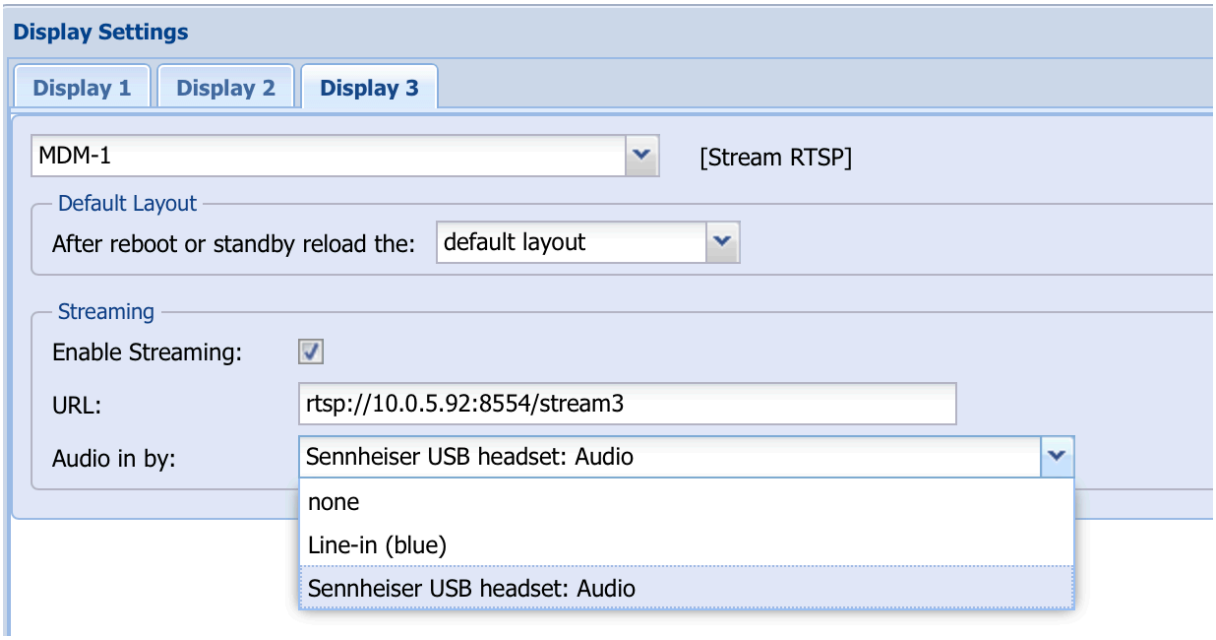
Figure 18: Display, MDM-1 Mode



3.2.3.2 Stream: MDM-1 Mode

In ‘MDM-Mode’ the stream behaves just like a physical display connected to MDM, 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 19: Stream, MDM-1 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.

3.2.3.3 Display: MDM with KVM Mode

In ‘MDM with KVM-Mode’ the display behaves just like an MDM but the windows can be moved and resized by the mouse. A double click connects keyboard and mouse to the attached PC Hardware option). The layouts (grids) are pre-arranged and activated like in MDM mode. See Figure 22.

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 is 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’
Let you disable the keyboard to prevent the on-screen error message ‘Keyboard not found’. A mouse / touch cannot be deselected (use MDM-1 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.
To use this feature either a KMS hardware board has to be installed or the input connected to the PC must use a “ADIO’ hardware (Refer to the ADIO manual from Tritec.

‘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 two items are for the ‘on-screen user interface’

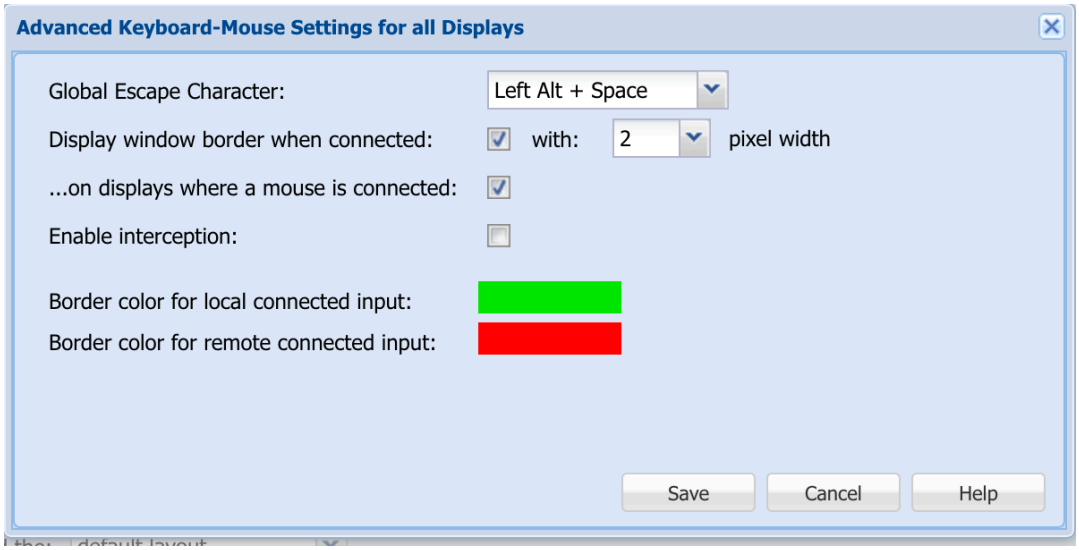
‘Mouse speed’
If faster or slower mouse movement is necessary it can be corrected here. Default and standard is ‘0’.

‘Keyboard layout’
This selection is need for on-screen keyboard usage only like ‘save layout as’ etc.

‘Enable Touch Monitor’
Enables a touch monitor for this output display. See chapter: 7 ‘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 20: 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 colour ‘Border-Color for local connected input’ of width ‘pixel width’ when a USB connection to a PC is established. If there is more than one display in KVM mode connected and if ‘Enable keyboard and mouse to connect to remote PC’ in ‘Display Settings’ ‘MDM-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 MDM and 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.

TouchUI
Enables this display for the Touch-UI user interface, see chap 4.

StreamDeck

If hotkeys are enabled in the general settings, the user can select a connected keypad (StreamDeck) to provide a simple layout-switch per key to the user. Multiple keypads can be assigned to the display. Currently, Elgato StreamDecks are supported.

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 6 On-screen user interface.

'Use a larger font for this display'
Use a larger font for the on-screen menu.

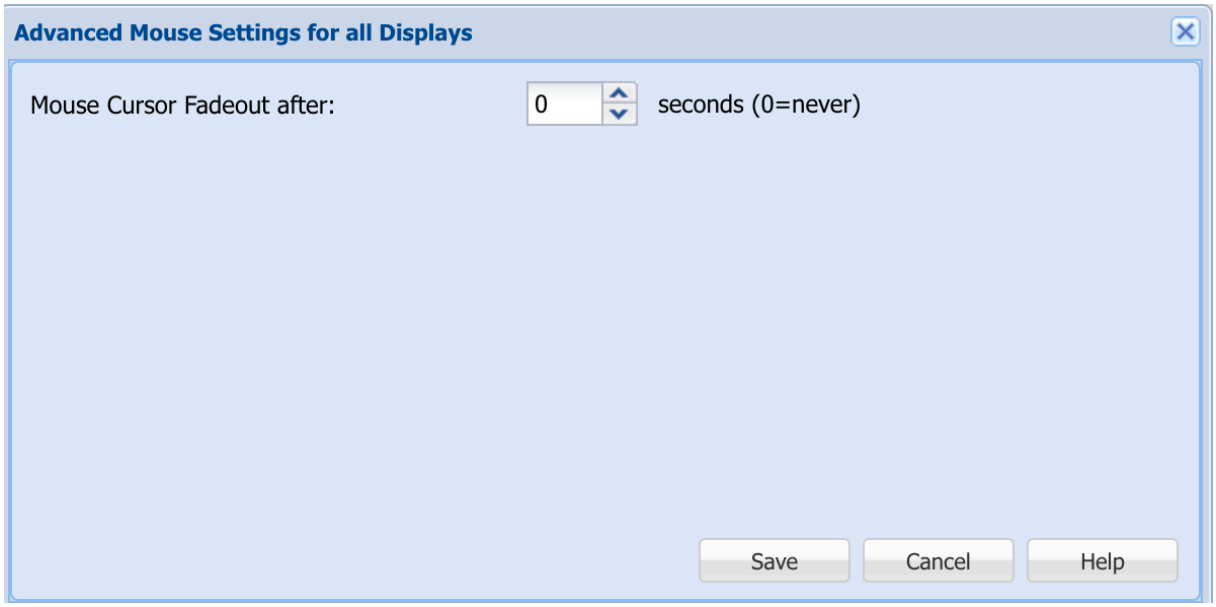
'Enable moving of windows for this display'
Enables or disables moving of all windows on this display. Enable or disable moving of a single window in the 'Arrangement' tab.

'Moved windows will swap on this window'
Dragging and dropping a window over another window will swap 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 21: 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’
on an attached USB stick connected to the same USB hub as keyboard & mouse. Or to FTP server. Screenshots can be triggered via the Touch User interface (chap. 4), via the context menu of the on-screen user interface (chap. 6) or by pressing CTRL + PRINT keys of the keyboard together.

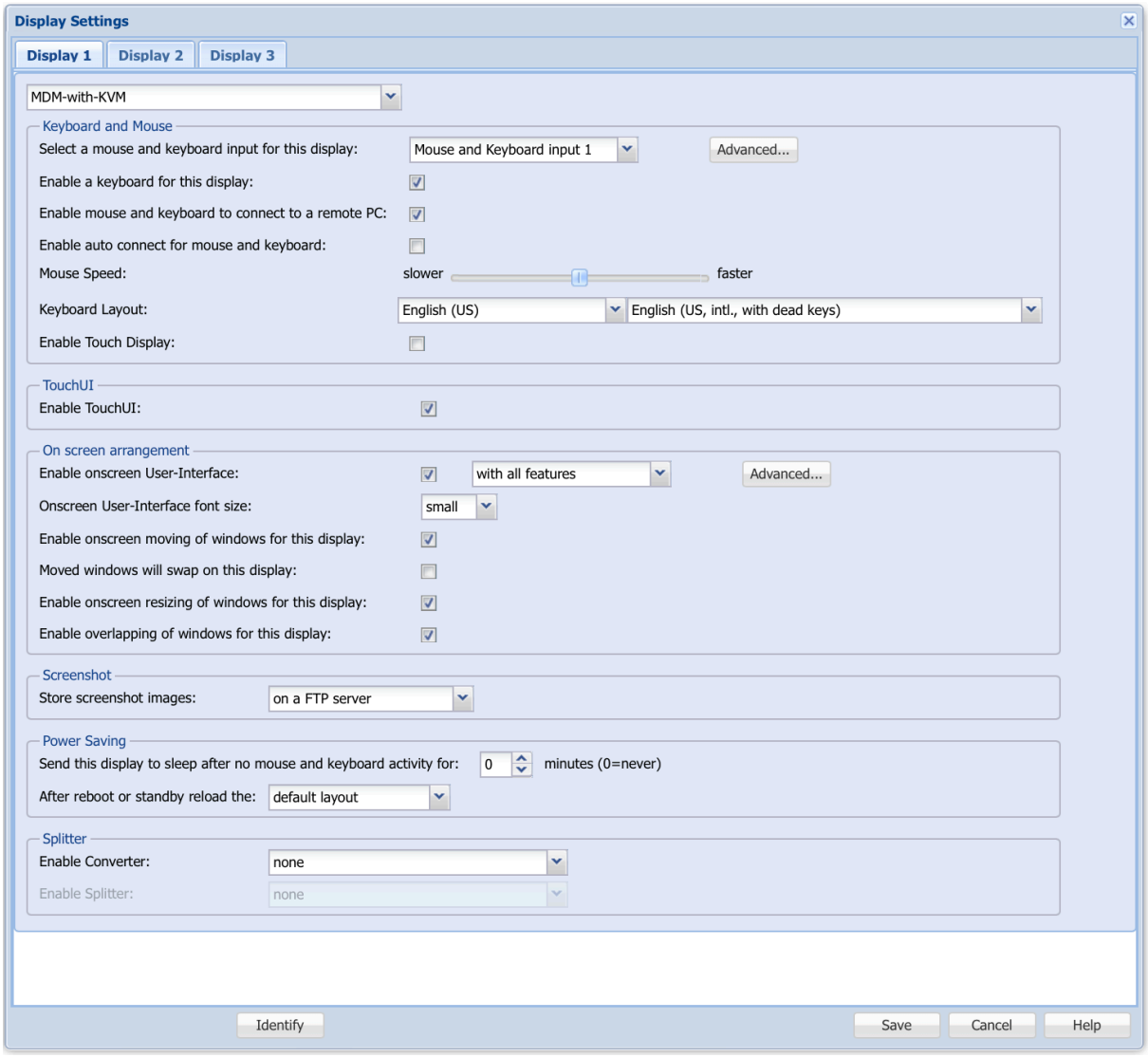
Power Saving

‘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 will activate the graphics output again.

‘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 Splitter’
is used for error reporting only. When a DisplayPort Converter with Splitter is used and this item is checked, a missing splitter is reported and the ‘missing display connected’ to the second output of the splitter. The ‘System’ tab and the ‘Tests’ part will use this information. This option is for 8MP displays with a dual DVI connection only.

Figure 22: MDM with KVM Mode



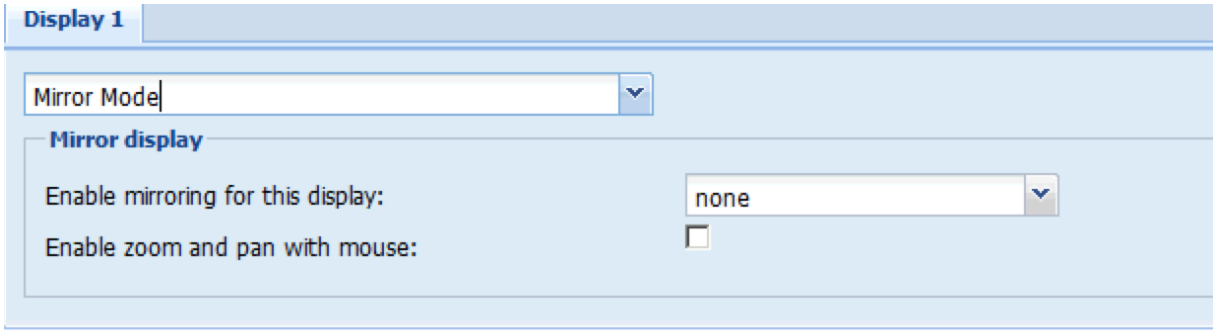
3.2.3.4 Stream: MDM with KVM Mode

There is no MDM with KVM mode for streams.

3.2.3.5 Display: Mirror Mode

This display is a mirror of the display selected. Only displays on the same output board can be mirrored. If the resolutions are different the mirror includes scaling.

Figure 23: Mirror Mode

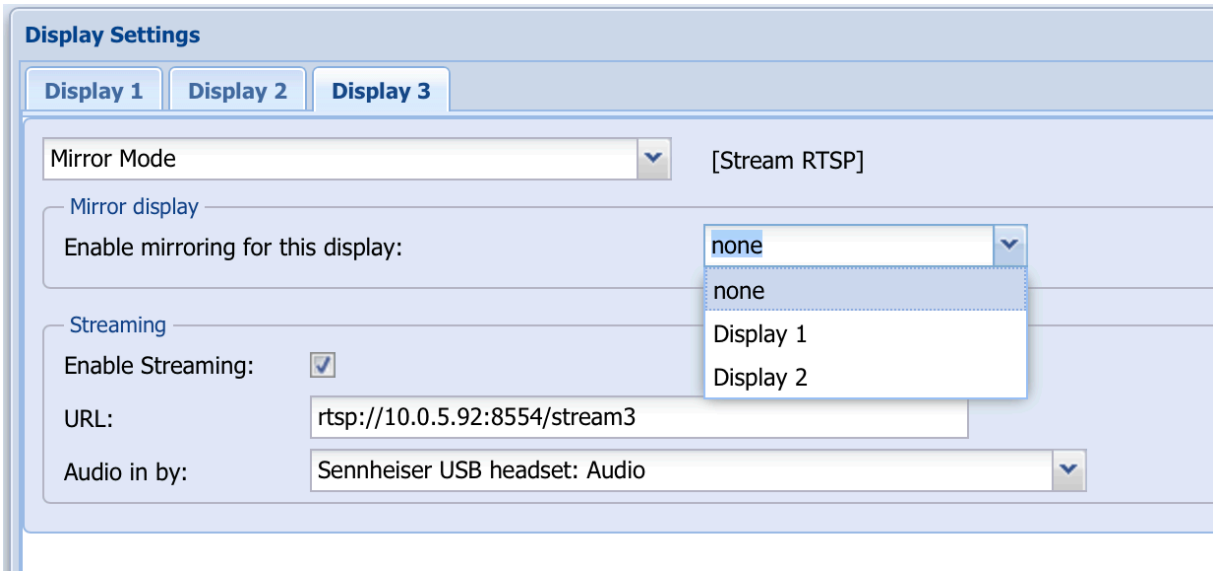


'Enable zoom and pan with mouse'
A double middle click of the mouse connected to the 'mirrored' display zooms the mirror to the original unscaled size of the 'mirrored' display. When the display of the mirror is smaller, only a part of the original image is visible. To pan to other areas, press the middle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

3.2.3.6 Stream: Mirror Mode

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

Figure 24: 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.

3.2.3.7 None

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

3.2.4 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.

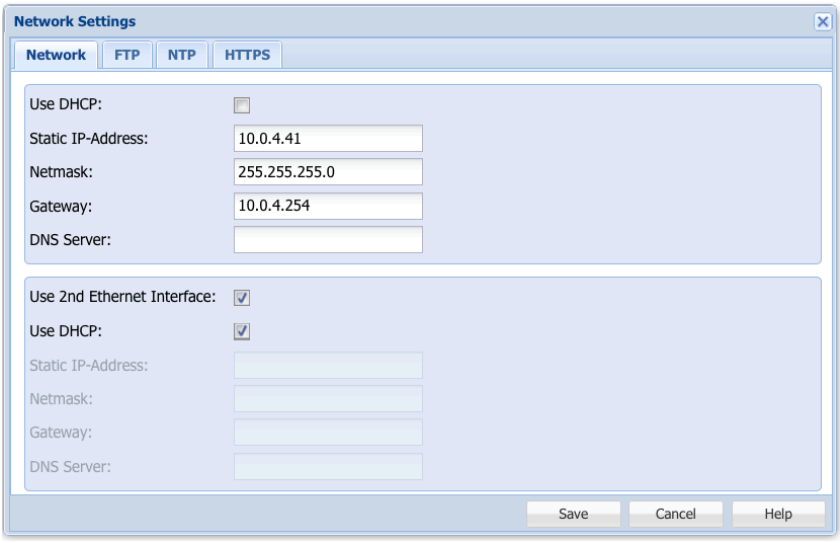
3.2.4.1 Network

The MDM ships with DHCP deactivated. The default IP configuration is IP-address 10.0.1.110 with netmask 255.255.255.0. The MDM has two external RJ45 network ports, named N1 and N2. Using N2 requires software 2.7.4 and higher (see Figure 25).

If for any reason the IP address is miss-configured or unknown, the MDM can always be re-configured under the IP-address 169.254.213.44 as follows:

1. Make a direct Ethernet connection to the MDM from another computer. On the computer, disable other network interfaces, WLANs and VPNs.
2. Set this computer to 169.254.213.1, Netmask 255.255.255.0.
3. Open a browser and enter 169.254.213.44
4. You should now see the MDM main screen, go to Configuration and set up the network as needed. Don’t forget to reboot and change your computer back to the desired network address.
5. Please note when using both network interfaces N1 and N2, the default IP above is usable only at N1.

Figure 25: Network Settings

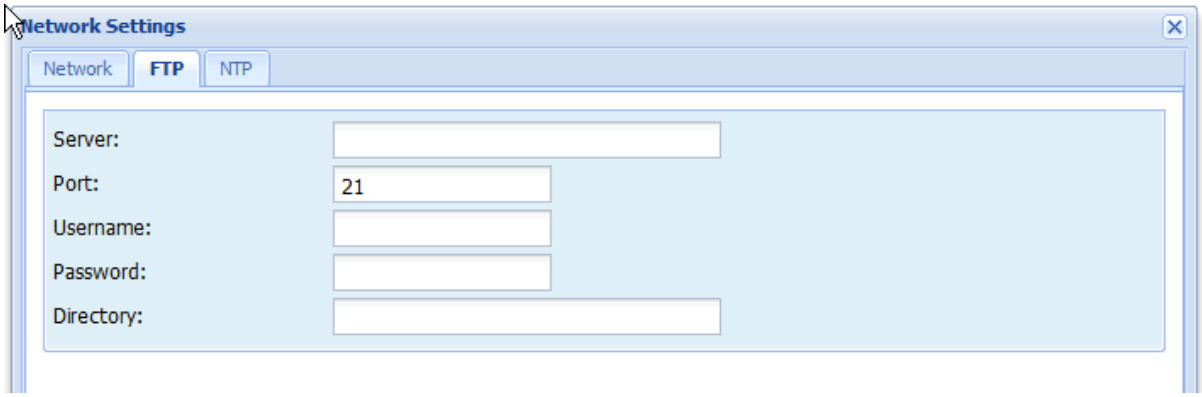


3.2.4.2 FTP-Server

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

The browser supports ‘http’ for update und configuration file store/restore from the external host PC the browser is running on.

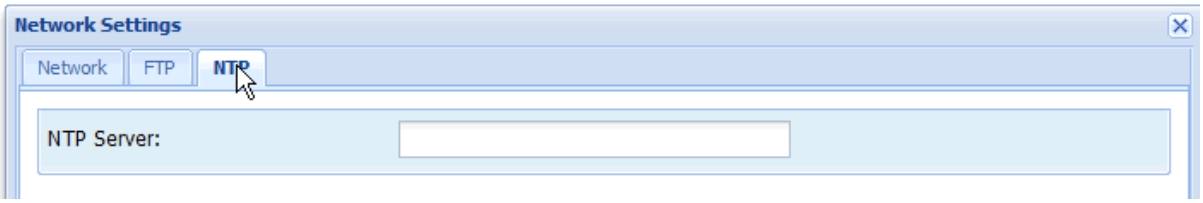
Figure 26: FTP



3.2.4.3 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.

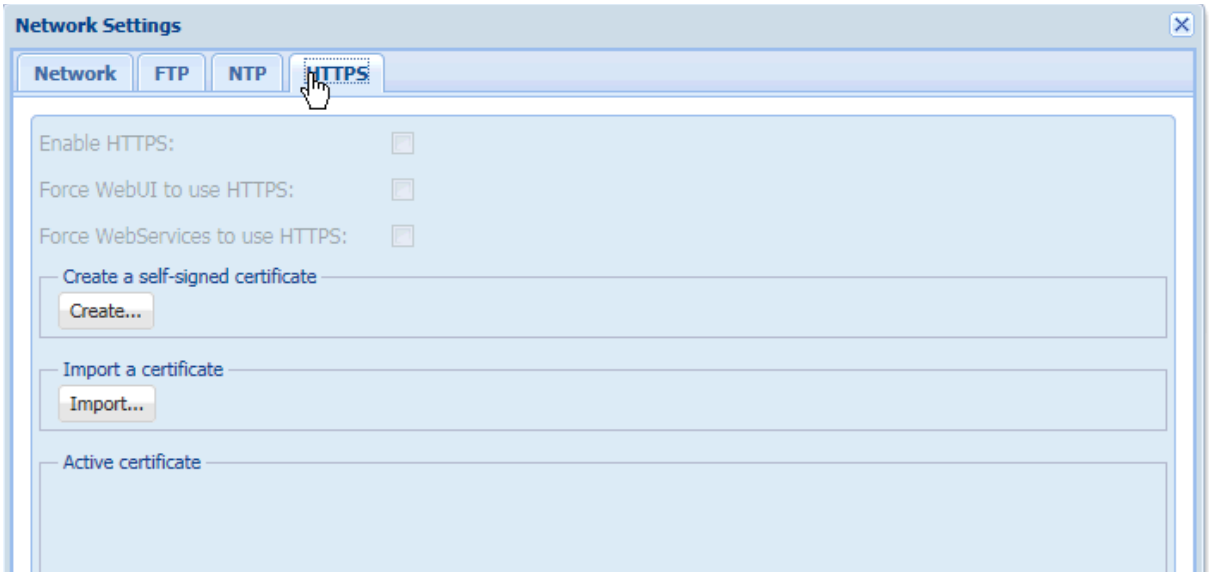
Figure 27: NTP



3.2.4.4 HTTPS

By default, MDM is not using secure browsing. Here secure browsing can be enabled. It should be used whenever possible.
Before https can be enabled either a self-signed certificate has to be created or a certificate has to be imported.

Figure 28: HTTPS



After activating a certificate, the ‘Enable HTTPS:’ button can be checked.
It enables HTTPS in parallel to HTTP.
Then there is the choice of using just the browser interface to be forced to use HTTPS or the REST-interface as well. All accesses to HTTP will then be redirected to HTTPS.
Check ‘Force Browser-interface to use HTTPS’ to use the browser interface with HTTPS.
Check ‘Force REST-interface to use HTTPS’ to use the REST-interface HTTPS.

After saving these values the system will reboot.

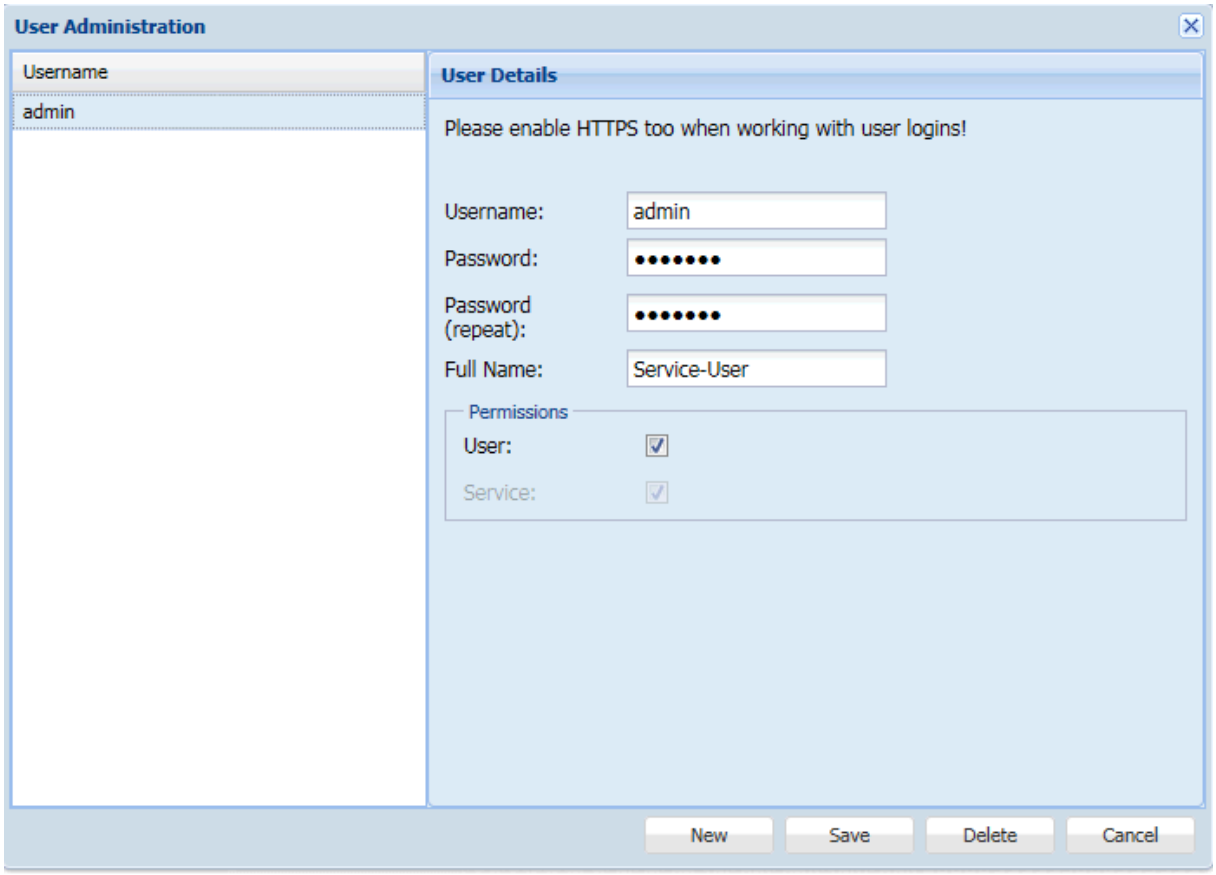
3.2.5 User Administration

Refer to chapter: 3.2.1.10 ‘Enable user-login for the browser interface’ to enable the ‘User Administration’ tab. Then 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:

- ‘MDM’ all tabs
- ‘Configuration’ ‘Shutdown’
- ‘Administration’ all tabs
- ‘Arrangement’ all tabs
- ‘Select’ all tabs
- ‘Touch UI’ ‘Button assignment’

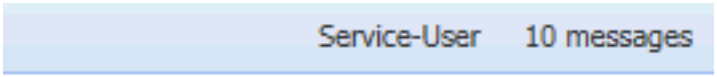
Figure 29: User Administration



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

To log-off select the user name in the top right-hand corner and ‘logoff’.

Figure 30: Logoff



3.2.5.1 Admin Password Reset

To reset the administrator password, physical access to the display connected to output 1A and access to the zero configuration IP address (which is typically not routed) is necessary.

1. Connect to the MDM system via IP address: 169.254.213.44 (no other IP address allows to reset the password).
2. Reboot the MDM, if neccessary by a hard power off.
3. For the first 5 minutes after this reboot the login window displays a button ‘Restore Admin User’.
4. After confirmation, the display connected to output 1A will show a 12-digit password reset token for 10 minutes. For security reasons, mirrors will be deactivated while the password reset token is shown.
5. 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: ‘mdm4711’. If it fails (more than 10 minutes or wrong reset token) the user can reboot the MDM and start over again.

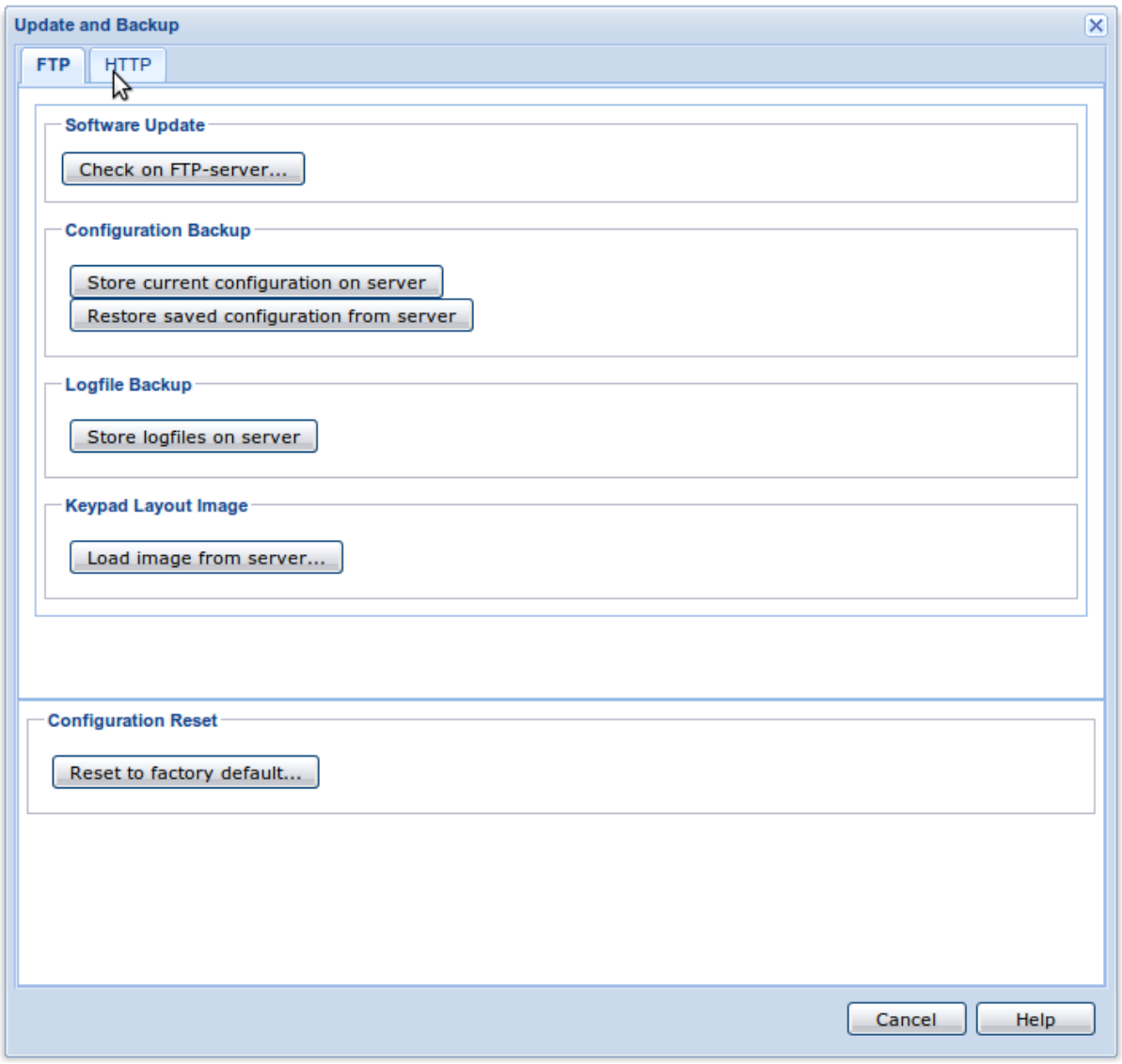
To reset the administrator password, connect to the MDM system via IP address: 169.254.213.44. A login window is visible with a button ‘Reset Admin User’. If pushed the user is set to: ‘admin’ and the password is set: ‘mdm4711’.

3.2.6 Update and Backup

Updates the software and backups the configuration and log files. All these files are located in the home directory of the FTP-server.

The tab ‘HTTP’ is available only when the administration window is opened from a remote browser running not running on the MDM itself. The selected files are stored or loaded from the local PC and not from a FTP server.

Figure 31: Update and Backup



3.2.6.1 Software Update

“Check now” searches the specified home directory of the FTP server or local file for a file of type ‘mdm-1XY-Software.tgz’, where XY is the custom identifier (OV, or empty for the Tritec version). Be sure to select a .tgz file and no other suffix.

This file is downloaded and used to upgrade or downgrade the current hardware (FPGA of the MDI boards) or software and attached Touch PCs.

The system reboots after a software update. The user has to make a power cycle after a hardware update. Wait until the message ‘It’s save to power off now’ appears on the output monitor screen.

After the system rebooted all attached Touch PC are updated, when the version numbers differ, and rebooted.

Software version 2.3.x is the only version that can be used to downgrade from higher software versions like 2.4.x. Upgrades to version 2.4.x can be done from any 2.x.x version.

3.2.6.2 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 etc.

This configuration should be stored on the specified FTP server or local file by selecting ‘Store configuration on server’. It can be restored from a FTP server or a local file by clicking ‘Restore configuration from server’.

If a configured MDM has to be exchanged, backup its configuration and restore it on another MDM. It will work exactly the same way after restoring the configuration file.

3.2.6.3 Configuration Reset

When 'Reset to factory default ..' is selected, the system resets the configuration to factory or custom default values, which ever was specified. See Table 1 Factory default set up.

3.2.6.4 Logfile Backup / Store Logfile

When ‘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 ‘.
Tritec can use this file for failure analysis.

3.2.7 System

This Tab is for debugging and screenshots only.

3.2.7.1 Screenshot

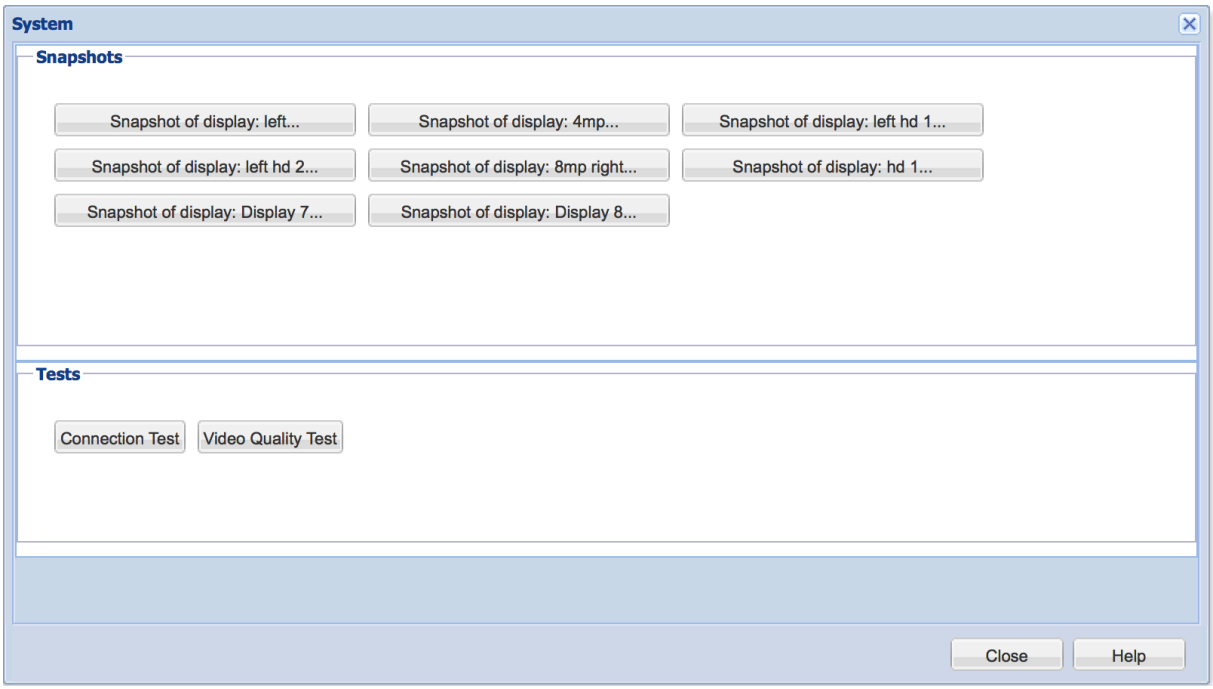
To take a screenshot click 'Screenshot of Display: exyz'.

Wait a few seconds and a window will open, which shows the output image, as it should be visible on the output display at this time. If the screenshot looks nice but the image on-screen shows errors check the connections between the graphics board and the monitor. The screenshot uses compressed ‘png’ image format.

3.2.7.2 Test

Activating the ‘Connection Test’ will check if all displays and, if defined, that all splitters 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.
Not supported on MDM model EL.
The video quality test checks if the video quality between the graphics board memory and the DisplayPort to Dual-Link DVI converters is free of pixel error.

Figure 32: System



3.2.8 System Shutdown

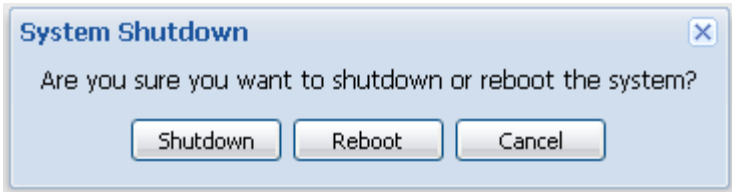
Reboot-ing or shut-ing down of the system can be selected in this tab.

If the system is shut down a message is displayed on the output monitor that it is safe to turn the power off. Note, the system itself does not turn off the power.

Wait for the message 'It's save to power off now' appears on the output monitor screen and turn off the power.

After a power cycle the default grids are shown.

Figure 33: System Shutdown



3.3 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. Numbers may be missing if MDI-6 boards are used. (the second input is used for the Dual Link DVI input at the first input channel)

The tree structure of the inputs shows the dependency of the channels (see Figure 34). On the second tree level, the MDI input boards are shown. Depending on the MDI board type, 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 Tritec Etherface-1-Tx devices. Network connections can transport one (MDI-10) or more (MDI-11) logical video channels. '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, Etherface-1 connected, no valid input signal


Channel enabled and connected with a valid input signal


Channel enabled and not connected (No signal)

Virtual channel not enabled


Virtual channel enabled

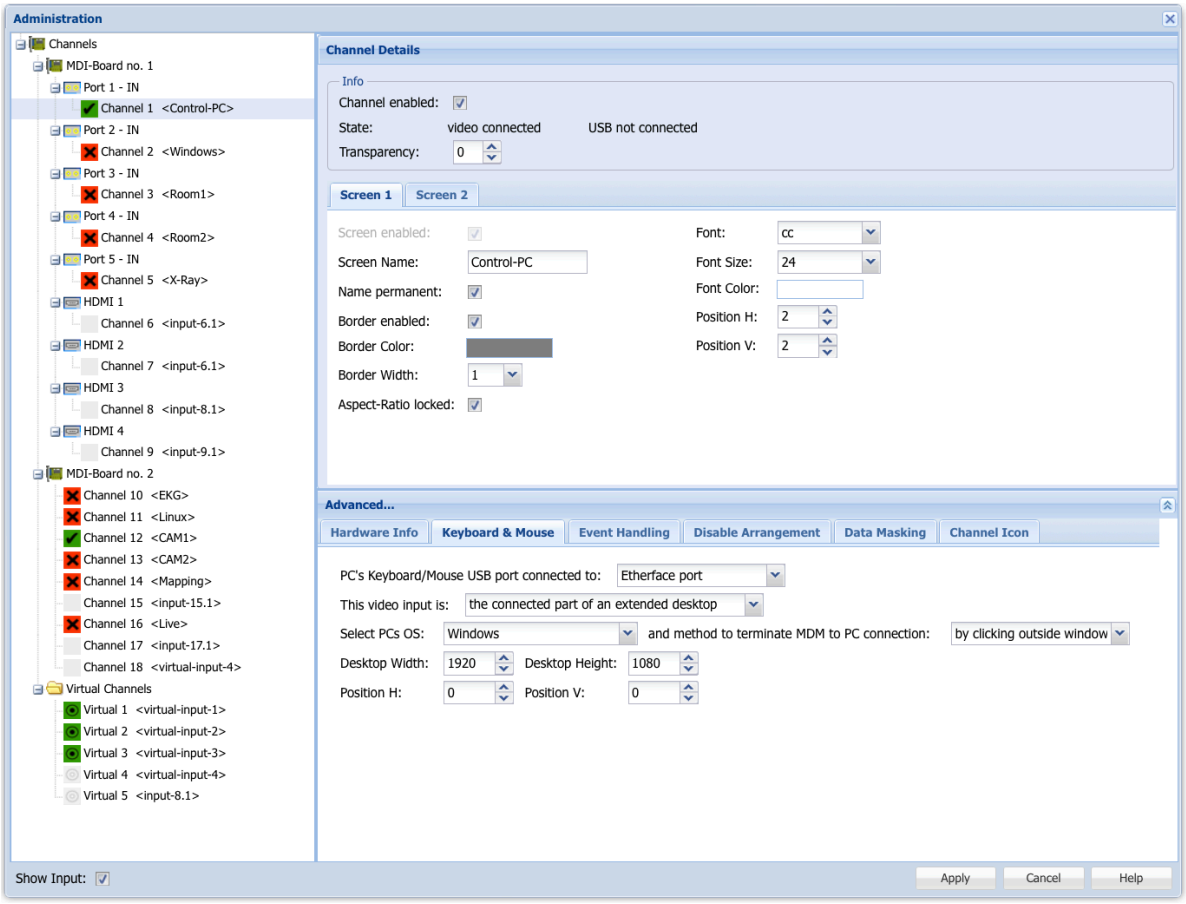
3.4 Setting up an input channel first time

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 press '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. Chapter 3.4.4.9 Data Masking

If a keyboard and mouse is connected and an USB port was assigned it is possible to 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. It is possible to access the full Windows screen of all windows, in an extended display arrangement, to make modification in Windows XP.
Windows will need approximately 7 seconds before the cursor can be moved. To exit this mode type 'Left Control' key + 'space' key.

Figure 34: Detailed view of 'Administration' tab.



Open the 'Advanced' tab on the left side, and find information about the actual data of the input channel described here:

' Hardware tab' tab: If a valid input is connected the state 'connected' should be seen. For analog inputs open the 'Analog' tab.

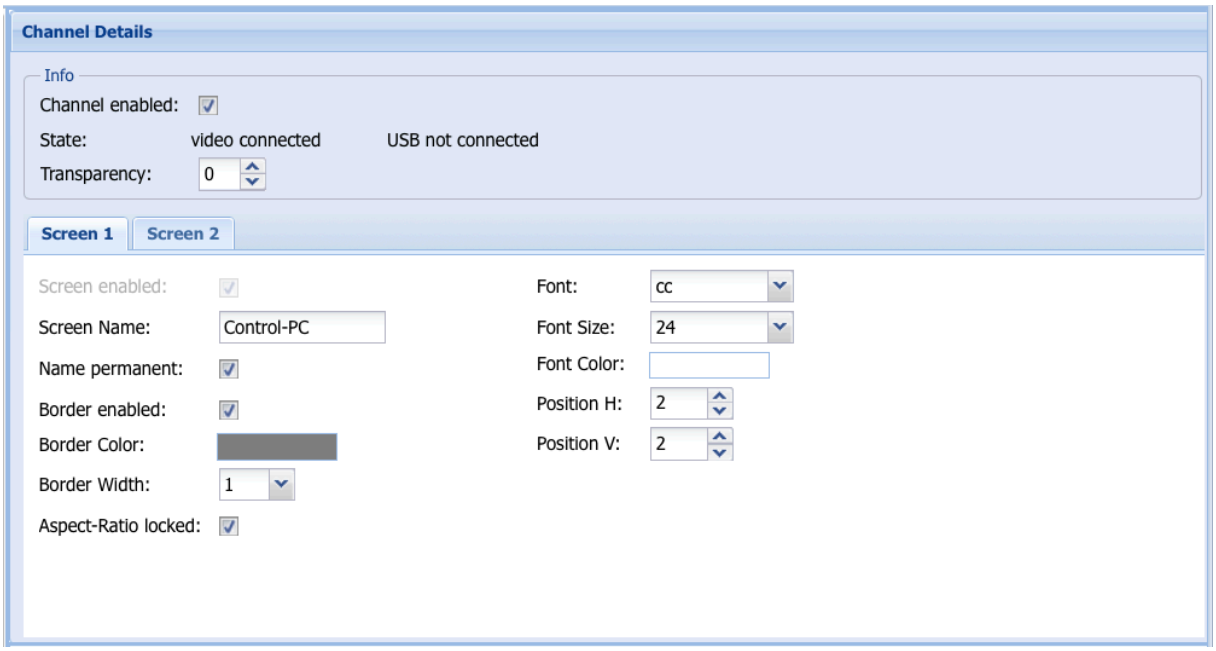
When an input is selected (single click), a window in the right part of the browser opens. This input view shows some status information of that channel and allows administration of this input channel.

3.4.1 Main Administration Tab

3.4.1.1 Info

- **Channel enable:** Enables or disables this channel in the 'Arrangement' tab. On shared channels, enabling one channel will automatically disable 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 KMS board is shown.
- **Transparency:** Sets the transparency of this window. 0 = no transparency; 100 = fully transparent.

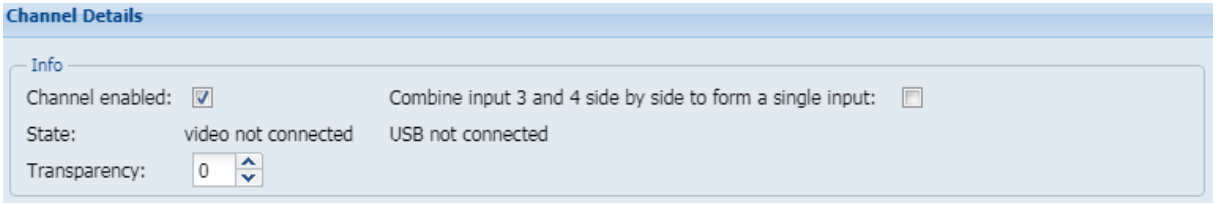
Figure 35: Channel Details



3.4.2 Input Stitching

With stitching either 2 or 4 input channels can be combined to form one 8 MP channel.
Input stitching is available only with the MDI-7 input boards.
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 etc.).
Inputs 5,6,7 and 8 can be stitched together, input 5 is the top left, input 6 the top right, input7 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 etc.).

Figure 36: Input Stitching



3.4.3 Screen 1

Note: Screen 1 is always enabled.

- **Screen Name:** is a field to 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's 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**: a click 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, see Figure 64.
- **Font/ Font Size/ Font Color/ Position H/ Position V:** are related to the name as displayed on screen and allows changing its font, the size, the color and the position.

3.4.3.1 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 of the selectable fields are the same as in screen 1.
To enable more than 2 screens go to 'Configuration' 'General settings' 'Screens' and switch to 4 input channels per display.

3.4.4 Advanced

The 'Advanced' button opens a set of 4 to 5 sub tabs. These tabs should be set up very early after connecting the input channels.

3.4.4.1 Hardware tab for MDI-7 input board

At the left side of this window, basic information about the actual input is shown and is refreshed every 2 seconds.

- **Input connectors:** When an ADIO input converter is connected all available connectors are shown. If one of the input connectors is connected the background color is highlighted green.
- **Direct connection:** The input signal is directly connected to the input connector
- **ADIO without optical connection:** The input signal is connected via an ADIO Tx-board directly to the input connector.
- **Resolution:** is the 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, on MDI-7 inputs 1-4 can handle YCbCr 4:4:4 as color model. YCbCr is visible but without color information.

Figure 37: Hardware tab, no ADIO connected

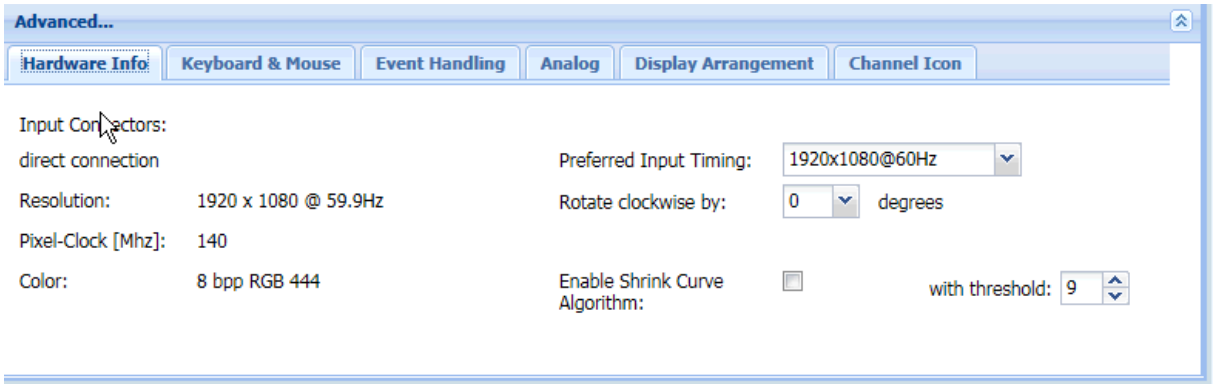
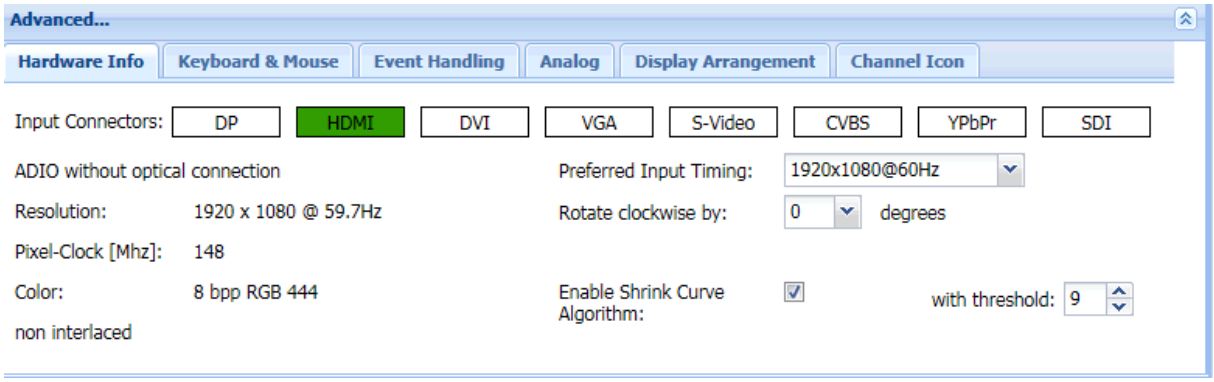


Figure 38: Hardware tab, with ADIO connected



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

- **Max. Resolution (EDID Data)**: There is a drop-down menu to 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 MDM/KVM) connected to this input channel. Default settings are digital for the digital channels, analog for the analog channels with a max. resolution of 1280 x1024 x75Hz, 1600 x1200x60Hz. For more details see Table 4: Details of EDID data sets. Using 1920x1080 includes all lower resolution data as well.
- **Rotate clockwise:** Allows the rotation of the input by 0, 90, 180 or 270 degrees.
- **Enable Shrink Curve Algorithm (optional):** only visible for channels 5,6,9 etc. 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. See 'Figure 39: Example of a Shrink Curve Region' how the result looks like when using shrink curve (left part) and not using shrink curve (right part).
    - **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 41: 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. i.e. FF0000 is a red background. If not enabled the background color is <101010 (nearly black to black).

Figure 39: Example of a Shrink Curve Region

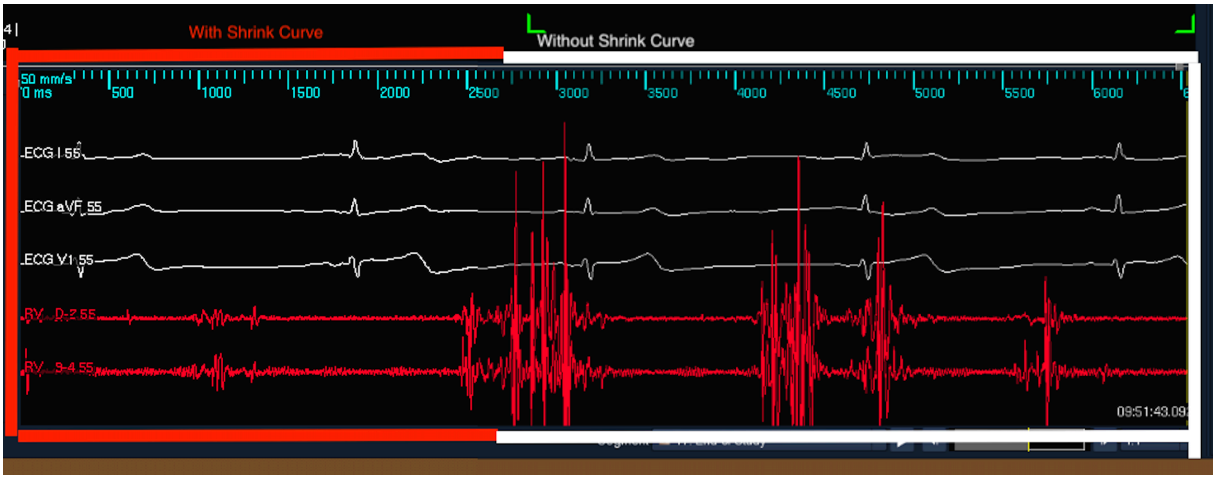


Figure 40: Shrink Curve Selection

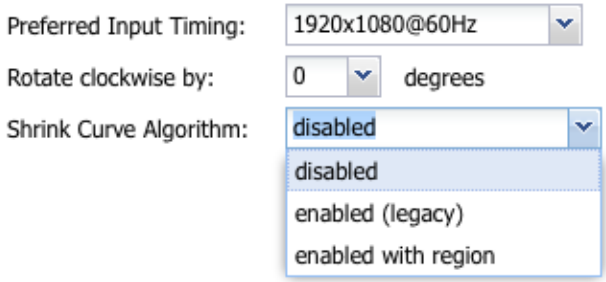
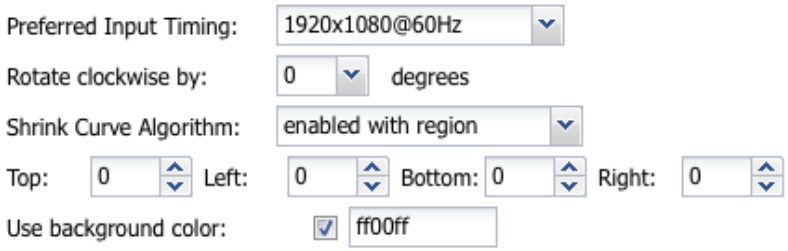


Figure 41: Shrink Curve with Region Selected



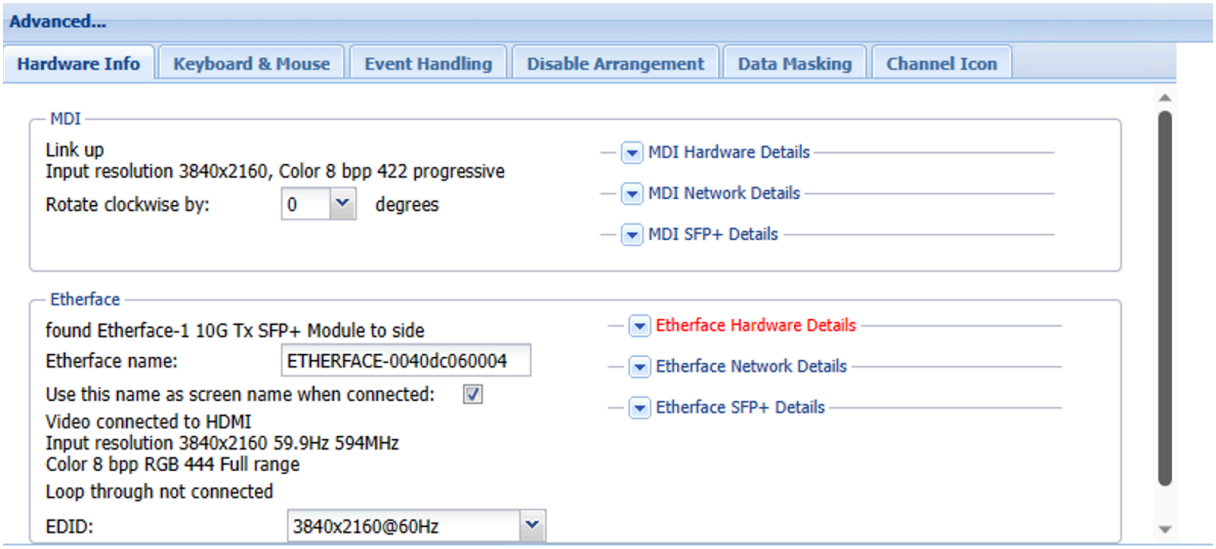
3.4.4.2 Hardware tab for MDI-10 input board

The hardware tab of an MDM with MDI-10 input board input 1 to 5 looks like Figure 42: Hardware tab with MDI-10 input board. Inputs 6 to 9 look like the hardware tab of the MDI-7 board see: 3.4.4.1 Hardware tab for MDI-7 input board.

The Shrink Curve algorithm (see chap. 3.4.4.1) can be enabled for inputs 6, 7 and 8 only.

When the hardware tab is open the 'Video Valid' LED of the connected Etherface-1 is blinking green, to identify the connected Etherface-1.

Figure 42: Hardware tab with MDI-10 input board.



The upper part marked with 'MDI' shows information of the MDI-10 input board.

- **Link up** is shown when an optical connection is established.
- **Input resolution** is shown when an Etherface-1 Tx 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** shows details of the MDI-10 board.
- **MDI-Network Details** show the MAC-Address of this MDI-10 input channel.
- **MDI SFP+ Details** show some of the parameters of the used SFP+ module.

The lower part marked with 'Etherface-1' shows details of the connected Etherface-1 module when connected.

- **Found Etherface-1 10G**
  - **Tx** is the version that sends video data to the MDI-10 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.

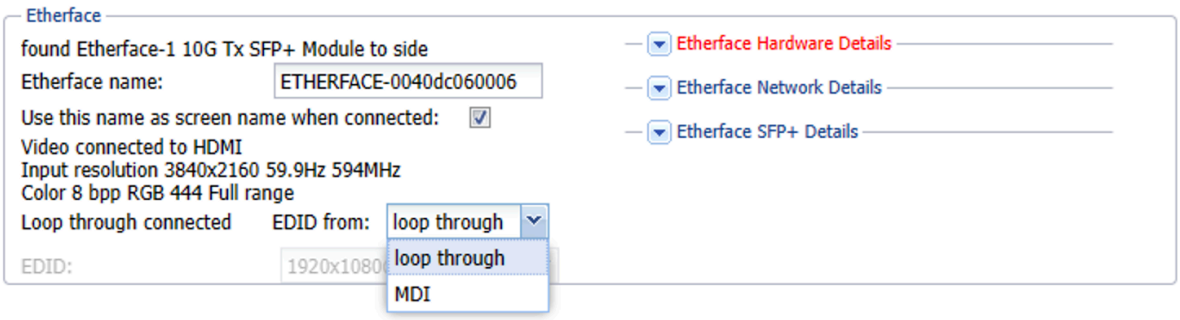
- **Use this name as screen name when connected,** when checked replaces the name of the screen with the name entered as 'Etherface name' when the Etherface is connected. This name is stored in the Etherface module. i.e. When an Etherface-1 is mounted on a mobile device like an Ultrasound caddy, its name is shown when ever it's connected to an MDM at any input.

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

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

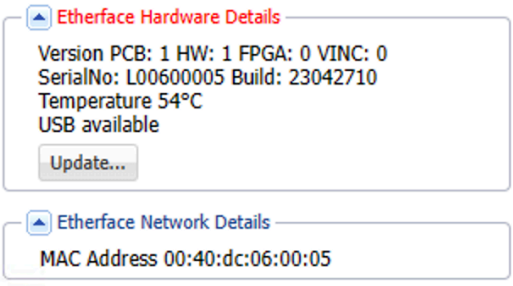
When '**Loop through is connected'** the EDID data are given by the display connected to the loop through. There is the choice to use the EDID data from the MDI board, but the user should be aware that the display connected to the loop through may not be able to display this timing.

Figure 43: Loop through connected



- **Etherface Hardware Details:** show the all kinds of version numbers and update information. It is marked in red when an update for the connected Etherface is available. Figure 44: Etherface Hardware Details. Future software updates may show more information.

Figure 44: Etherface Hardware Details.



- **Etherface Network Details** show the MAC-Address of the connected Etherface.
- **Etherface SFP+ Details** show some of the parameters of the SFP+ module use by the Etherface.

Trouble shooting MDI-10 to Etherface connections.

1. If there is no 'Link up' check the optical cables to the Etherface and the power of the Etherface (power LED must be green).
2. 'Etherface found' is the next step. If it's not visible check the Etherface 'Link/Act' LED it should light green or green blinking.

3. ‘Video connected’ is the last step. If it’s not visible check the Etherface ‘Valid Video’ LED it should light green (valid timing) or blue (video is transmitted to the MDI board).

3.4.4.3 Hardware tab for MDI-11 input board

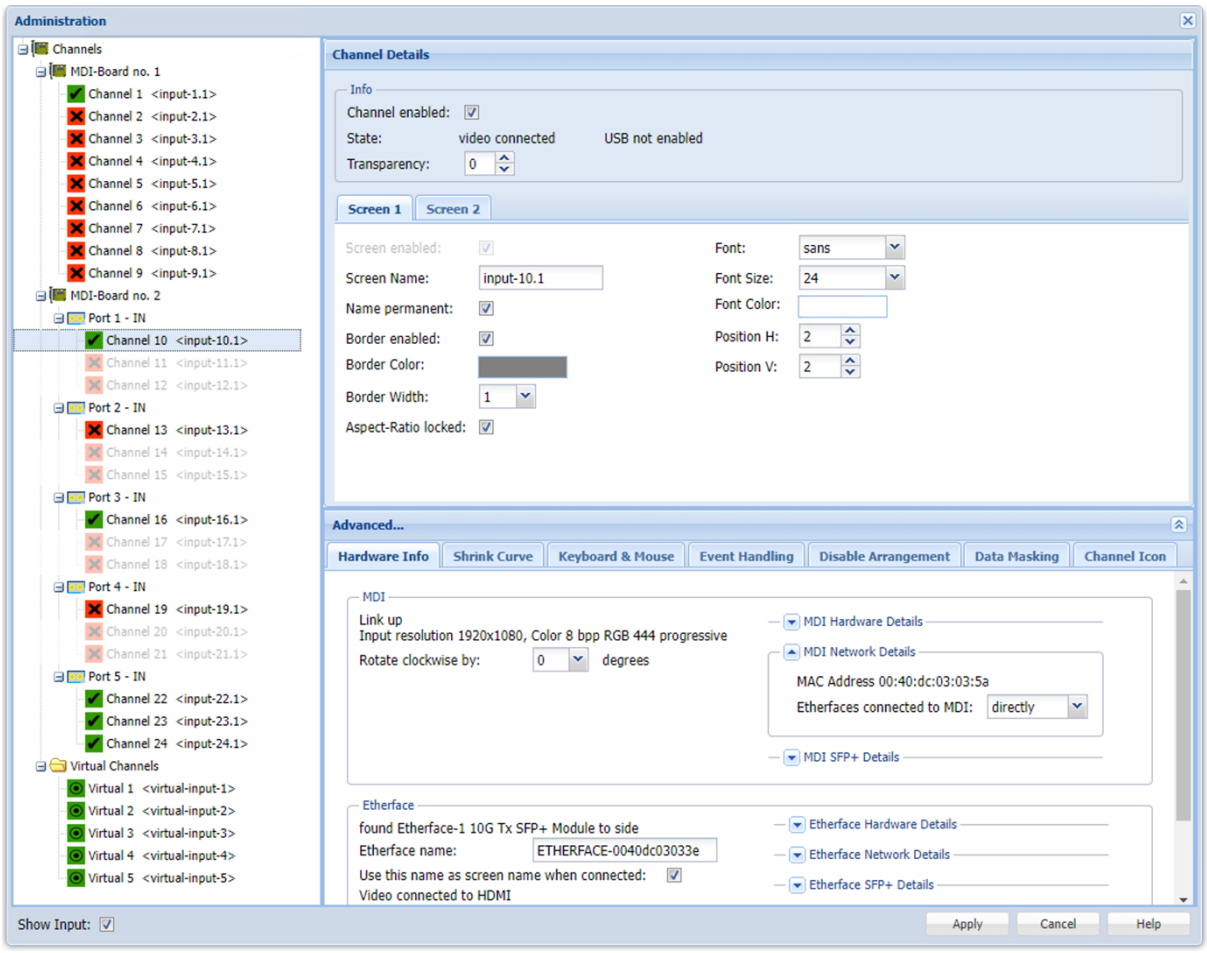
The MDI-11 input board is similar to the MDI-10 input board. It also features 5 x 10 Gbit/s optical SFP+ connections to Etherfaces. MDI-11 has no additional DVI-ports with HDMI-connectors. All ports a capable to use the Shrink-Curve algorithm with 2 areas.

In addition to MDI-10, each MDI-11 port features two different modes of operation:

- *Direct Connection*: Each port of the MDI-11 board can be directly connected to an Etherface-1 Tx interface (Factory default setting) similar to MDI-10. There is no need to setup anything special for the connection to the MDM. It’s plug and play. See input 10 of port 1 of the second MDI-11 board in Figure 45.

- *Connection via 10G Ethernet Switch:* Each port of the MDI-11 board can be connected to up to three Etherfaces-1 via a single optical SFP+ connection to a commercial Ethernet switch. See inputs 22, 23 and 24 of port 5 of the same MDI-11 board.

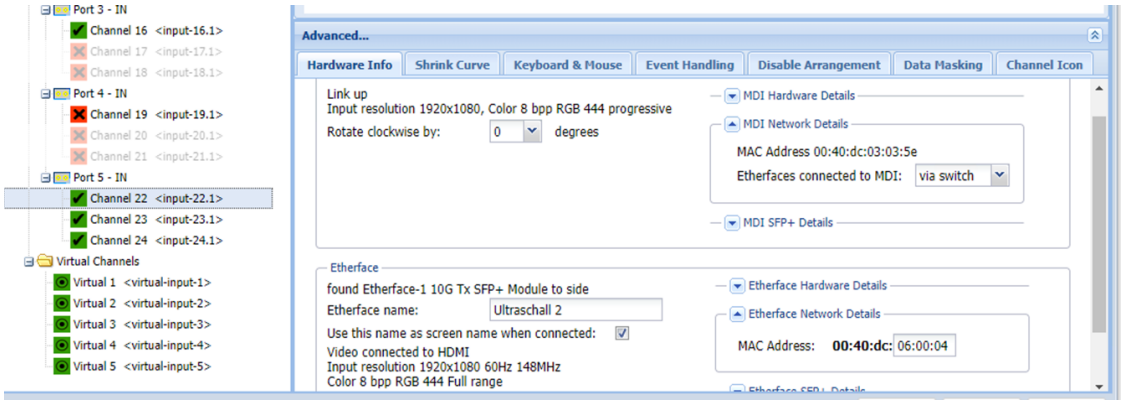
Figure 45: MDI-11 Administration Hardware Tab



To connect up to tree Etherfaces-1 to a single MDI-11 port, follow the following instructions:

- Connect the MDI-11 port with one of the switch ports.
- Connected the Etherface-1 SFP+ port to the switch ports.
- In the Administration view, select the first input of the connected port of the MDI-11 and select the ‘Hardware Info’ tab. Change the setting of the ‘Etherfaces connected to MDI:’ from ‘directly’ to ‘via switch’ (see Figure 46).
- In the second section below, open the ‘Etherface Network Details’ area and enter the MAC address of the Etherface-1-Tx that should be connected to this input port. Press ‘Apply’. Within a few seconds, the administration tab of this channel shows the details of the connected Etherface-1. The Etherface-1 becomes selected and its LEDs start blinking.
- Repeat the last step for the Etherface-1 number two and three: select the inputs two and three of the same MDI-11 port and enter the MAC addresses of the corresponding Etherfaces-1.

Figure 46: MDI-11 Port Configuration to Switch Mode



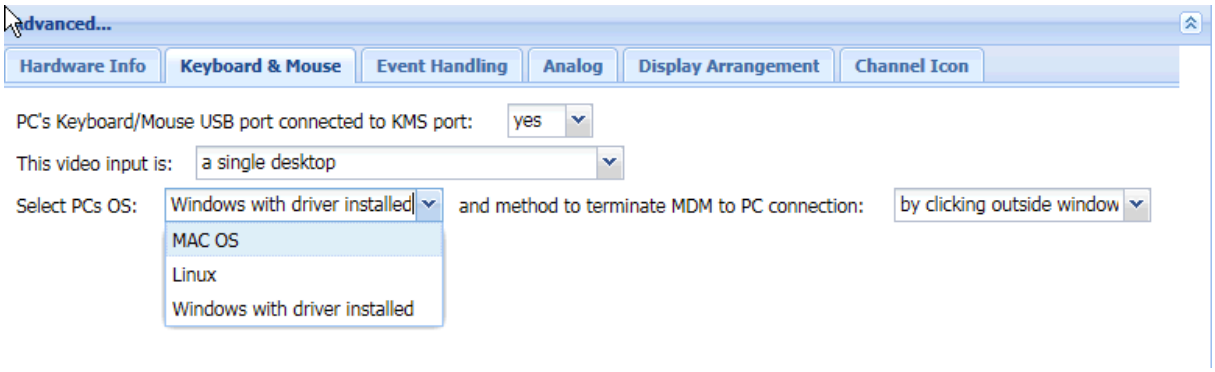
Please note that the 10Gbit/s Ethernet limits the maximum resolution of the connected Etherfaces. It’s the user’s responsibility to obey this limitation:

- When one Etherface-1 is connected to the first input of each port (in above example input 22, not 23 and 24) then the max. resolution is 4k 60Hz.
- When 3 Etherfaces are connected, the max. resolution of each Etherface-1 is limited to 1920x1080@60Hz.

3.4.4.4 Keyboard & Mouse

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

Figure 47: Keyboard & Mouse tab for single desktop



- **PC's Keyboard/Mouse USB port is connected to KMS port / Etherface-1:** a drop-down menu allows selecting one of the USB ports of the MDM to be connected to the PC. Select the USB (KMS) 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 'this Etherface-1' if the Keyboard & Mouse are connected through the Etherface-1 connection.
- **This video input is part of an extended desktop:** select this if the connected PC is part of an extended desktop setting. When selected 4 new input fields open to enter more details. Please refer to further explanations below.
- **Select PCs OS**: select the Operating System used on the PC. Please refer to further explanations below.
- **and the method to terminate MDM to PC connection: 'by clicking outside of window'** is the convenient choice but may cause some problems, or **'with 'break' character'**. For details please read below.

Figure 48: Keyboard & Mouse tab for extended desktop

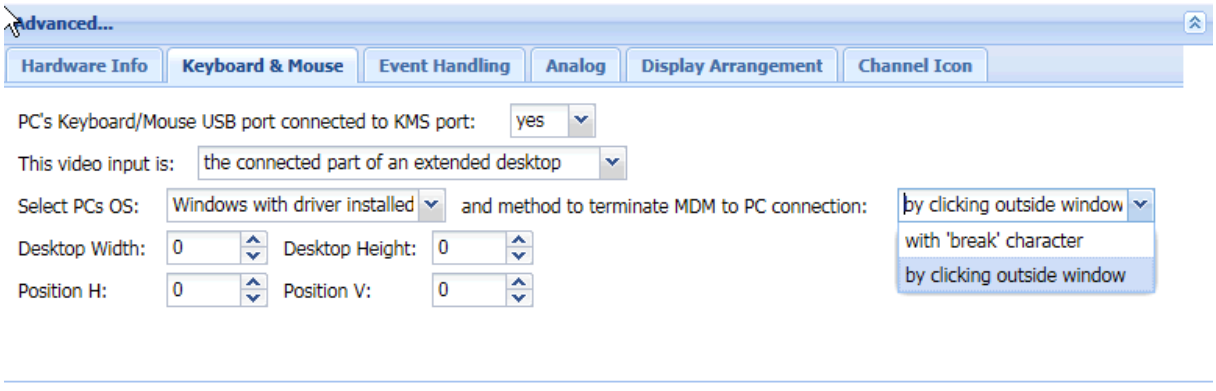


Figure 49: Mouse Modes shows the detailed flow of the possible selections.

For all OS selections:

- **'with 'break' character'** (Relative mouse mode) needs a break character to terminate the connection between the PC and the MDM. A break character is a special character

that has to be typed while connected to the PC to disconnect the mouse keyboard connection. It's defined in chapter: 3.2.3.3 Display: MDM with 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 MDM is terminated by a click outside of the connected window.

For a Windows or Linux 'single desktop'

- The settings should be:
  - This video input is: 'a single desktop'
  - Select PCs OS: 'Windows' or 'Linux'
  - Method to terminate to terminate the MDM to PC connection: 'by clicking outside window

For a 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 PCs OS: '**Windows with driver installed**'
- Method to terminate the MDM to PC connection: '**by clicking outside of window**'

A driver provided by Tritec has to be loaded on the host PC. Find the mouse driver under this link: https://www.multi-display-manager.com/software/. Follow the instructions on the found inside of the driver package.

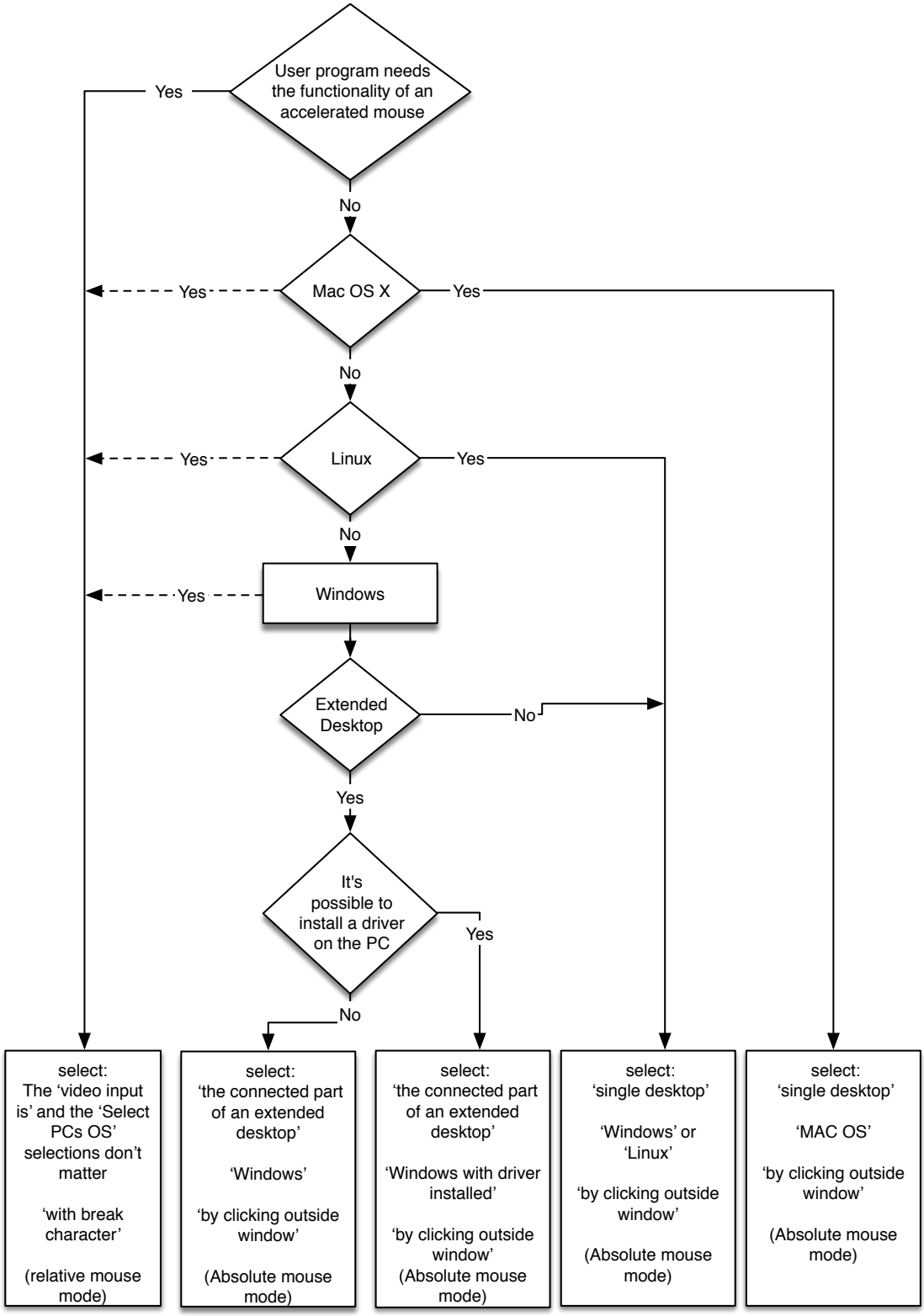
'**The connected part of an extended desktop'** is the input channel that has the USB connection to the connected PC.
'**Part of an extended desktop'** are all other video input channels that are part of the same extended desktop but have/need no USB connection.

For Windows with 'Extended Desktop' where no special driver can be installed
Settings should be:

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

This setting needs no driver but during windows login screen the mouse doesn't work properly (the keyboard works fine). In the Windows mouse properties the 'enhance pointer precision' must be turn off and 'Select a pointer speed' must be set to the middle position.

Figure 49: 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 MDM. If more than one output display is connected to the host PC, these desktop values have to be entered. This is true regardless if all of the displays are connected to the MW-KVM 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' 'settings'. 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.

In any case the ‘Desktop Size’ is the maximum horizontal number of pixels and the maximum number of vertical lines of all display enabled and attached to this host PC. This is true whether or not all displays are connected to the MDM. The desktop size is equal for all displays attached to the MDM.

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 50: Sample Windows Desktop Arrangement).

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

Figure 50: Sample Windows Desktop Arrangement

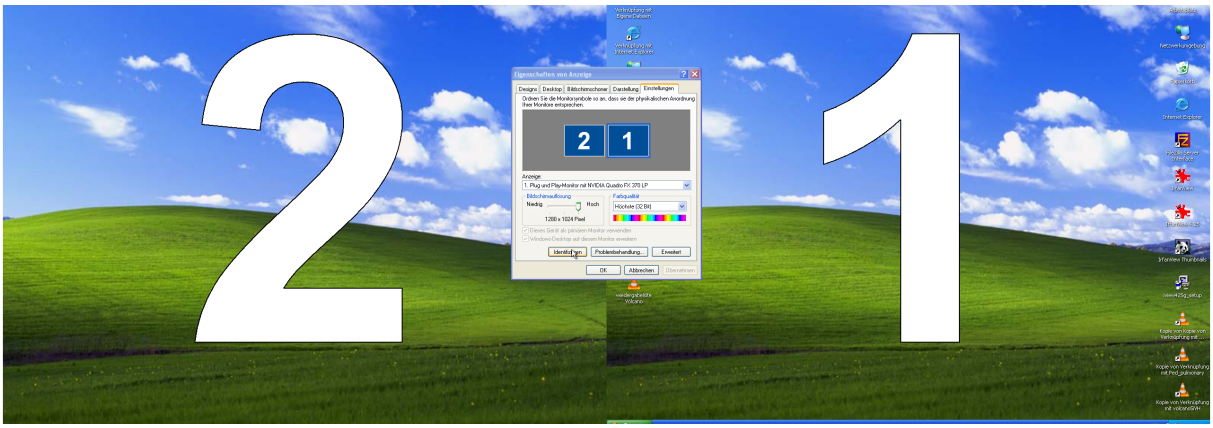
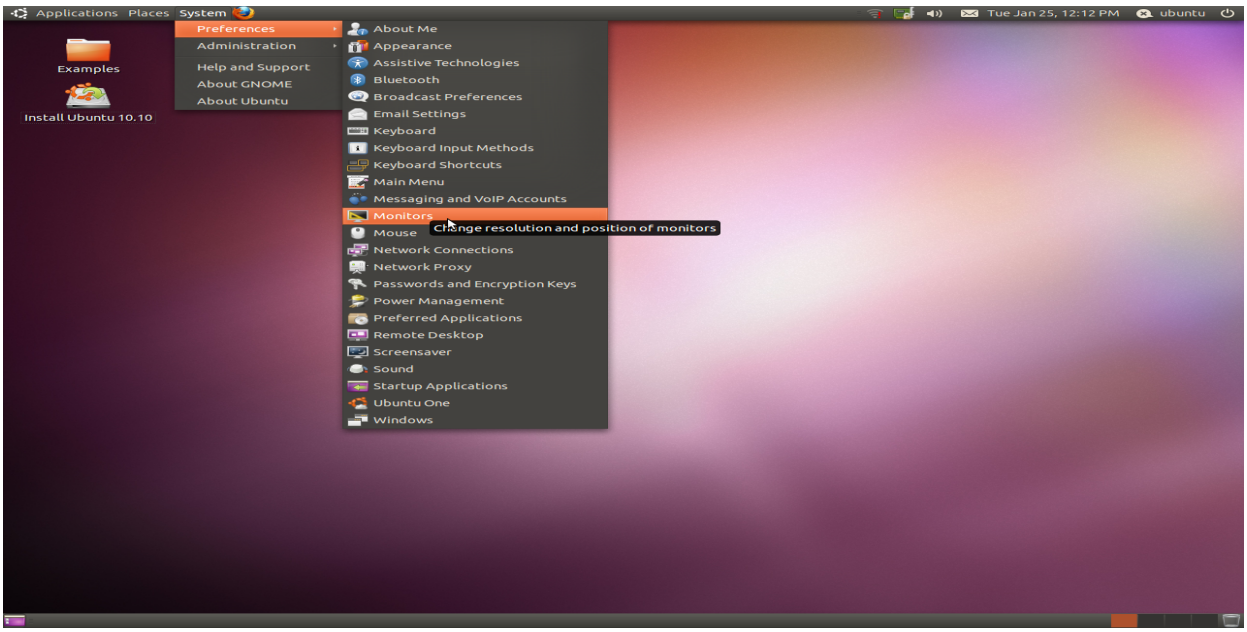


Figure 51: Desktop Parameters in Ubuntu Linux



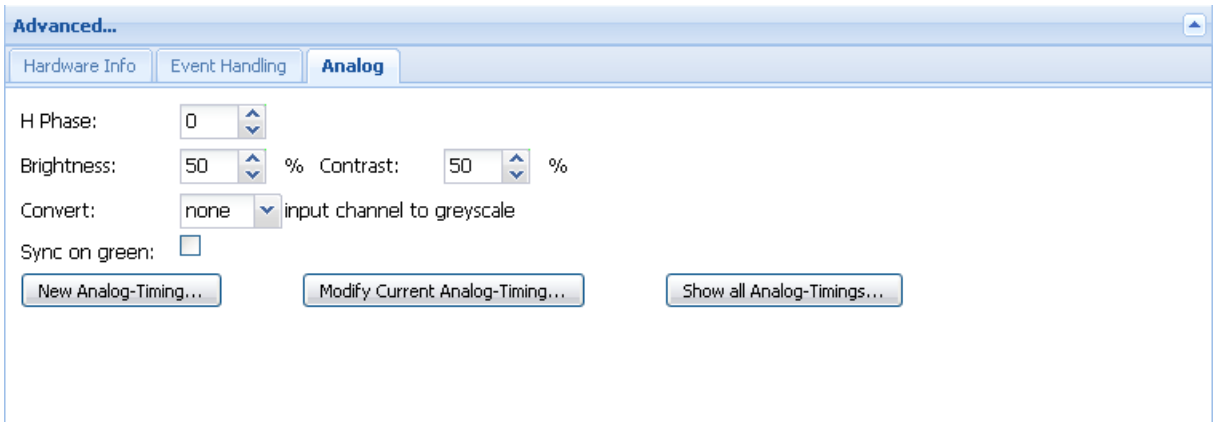
3.4.4.5 Analog (visible only with input boards that support analog inputs)

This tab is used to fine-tune the analog inputs.

The MW-KVM-1 software has a table with most of the VESA analog timings.

The incoming signal is used to find an entry in the table. When the timing is not known the output monitor may not show any image.

Figure 52: Analog Inputs



When the input signal is not detected the right way, or the user wants to check which values have been detected by the hardware use the 'Modify Current Analog-Timing'.

The upcoming window shows the current analog timing selected by the hardware. The values can be changed to modify the timing.

When 'Apply' is pressed, the timing is written to the hardware and the new timing is activated. This may take a few seconds. The new 'current' timing is shown

When a complete, new timing should be entered us the 'New Analog-Timing' button to add a new timing.

Show all Analog Timings' opens a list with all predefined and custom analog timings available.

MDI-7 with ADIO connected does not support these functions: ‘New Analog Timing…’, ‘Modify Current Analog Timing…’ and ‘Show all Analog Timings…’.

Figure 53: Modify Current Analog-Timing

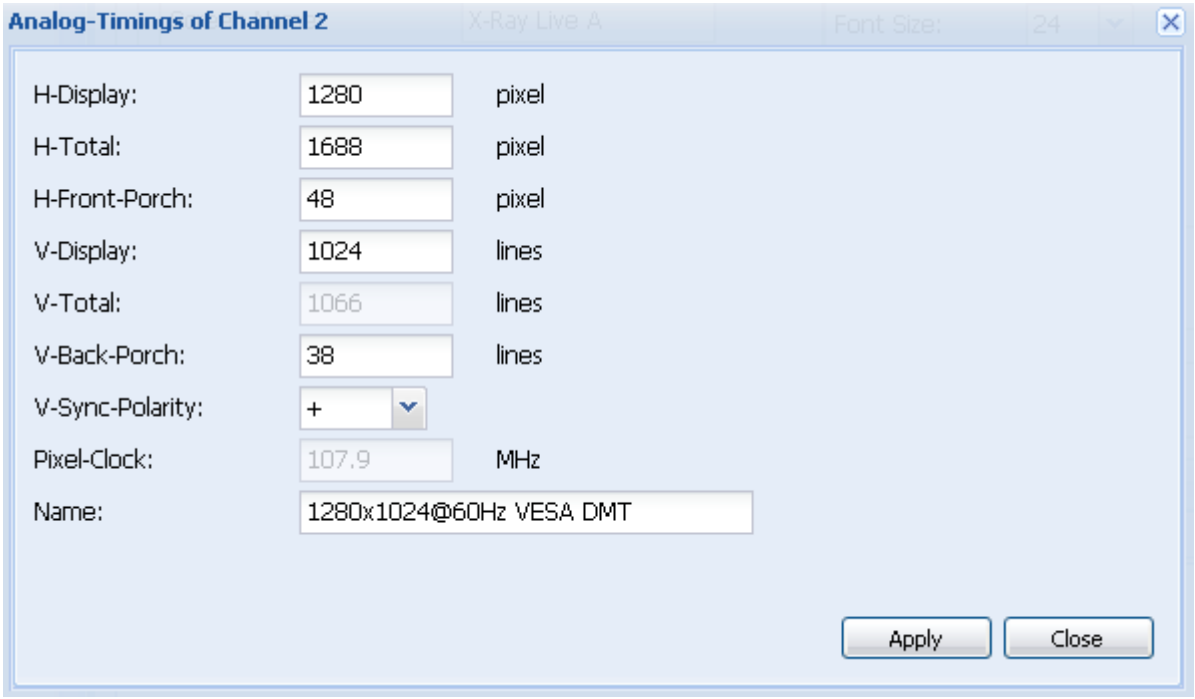
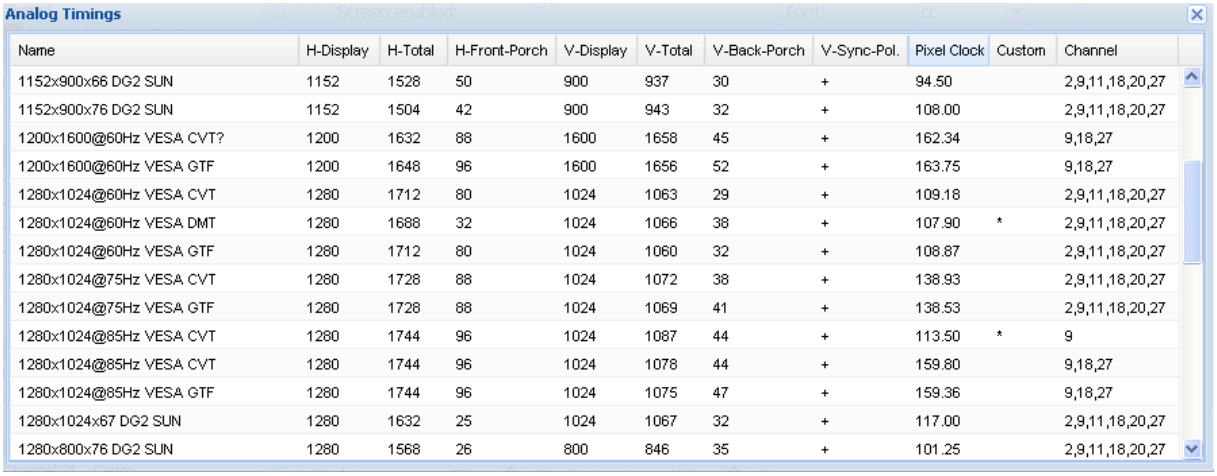


Figure 54: New Analog-Timing

Figure 55: Show all Analog-Timings



Name	H-Display	H-Total	H-Front-Porch	V-Display	V-Total	V-Back-Porch	V-Sync-Pol.	Pixel Clock	Custom	Channel
1152x900x66 DG2 SUN	1152	1528	50	900	937	30	+	94.50		2,9,11,18,20,27
1152x900x76 DG2 SUN	1152	1504	42	900	943	32	+	108.00		2,9,11,18,20,27
1200x1600@60Hz VESA CVT?	1200	1632	88	1600	1658	45	+	162.34		9,18,27
1200x1600@60Hz VESA GTF	1200	1648	96	1600	1656	52	+	163.75		9,18,27
1280x1024@60Hz VESA CVT	1280	1712	80	1024	1063	29	+	109.18		2,9,11,18,20,27
1280x1024@60Hz VESA DMT	1280	1688	32	1024	1066	38	+	107.90	*	2,9,11,18,20,27
1280x1024@60Hz VESA GTF	1280	1712	80	1024	1060	32	+	108.87		2,9,11,18,20,27
1280x1024@75Hz VESA CVT	1280	1728	88	1024	1072	38	+	138.93		2,9,11,18,20,27
1280x1024@75Hz VESA GTF	1280	1728	88	1024	1069	41	+	138.53		2,9,11,18,20,27
1280x1024@85Hz VESA CVT	1280	1744	96	1024	1087	44	+	113.50	*	9
1280x1024@85Hz VESA CVT	1280	1744	96	1024	1078	44	+	159.80		9,18,27
1280x1024@85Hz VESA GTF	1280	1744	96	1024	1075	47	+	159.36		9,18,27
1280x1024x67 DG2 SUN	1280	1632	25	1024	1067	32	+	117.00		2,9,11,18,20,27
1280x800x76 DG2 SUN	1280	1568	26	800	846	35	+	101.25		2,9,11,18,20,27

When the incoming analog signal is a ‘sync on green’ signal instead of discrete h- and v-sync signal, select the checkbox ‘sync on green’.

If the input signal is grey-scale select ‘Convert 'green' input channel to grey-scale’.

If a stable image is shown start to change values of the ‘phase’ to get the best possible image (use appropriate test patterns).

3.4.4.6 Fine tuning the analog settings.

To fine tune the analog settings some values in the "Modify Current Analog-Timing..." tab can be modified:

To move the image one pixel to the right
-> increase the "H-Front-Porch:" value by one and press "Apply"

To move the image one pixel to the left
-> decrease the "H-Front-Porch:" value by one and press "Apply"

To move the image one line up
-> increase the "V-Back-Porch:" value by one and press "Apply"

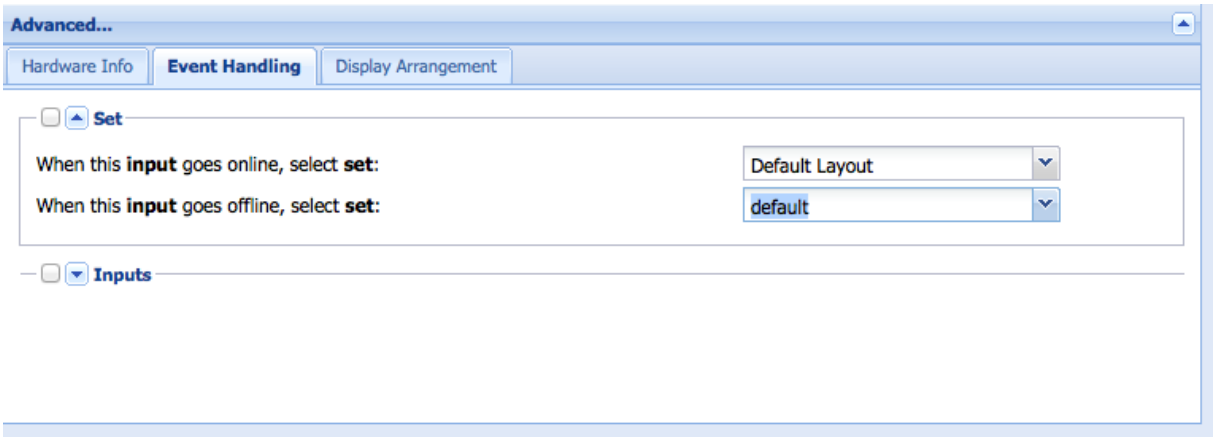
Tomove the image one line down
-> decrease the "V-Back-Porch:" value by one and press "Apply"

If vertical lines or edges are not displayed sharp the "H-Phase" value in the "Analog" tab has to be changed until the best possible sharpness is visible.

3.4.4.7 Event Handling

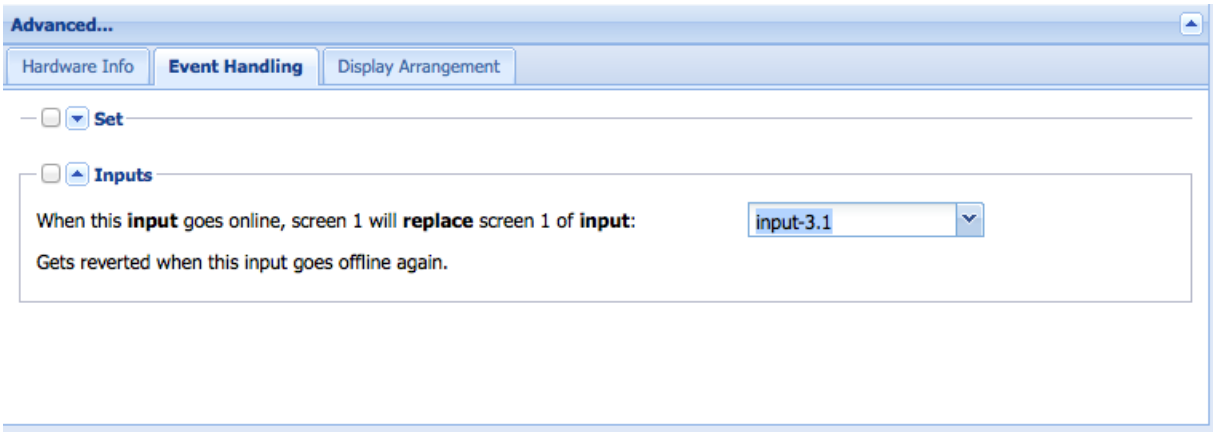
On certain events like ‘an input goes active’ or ‘in active’ either layouts (sets) can be switched automatically or inputs can be replaced.

Figure 56: 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 57: Event Handling - Inputs

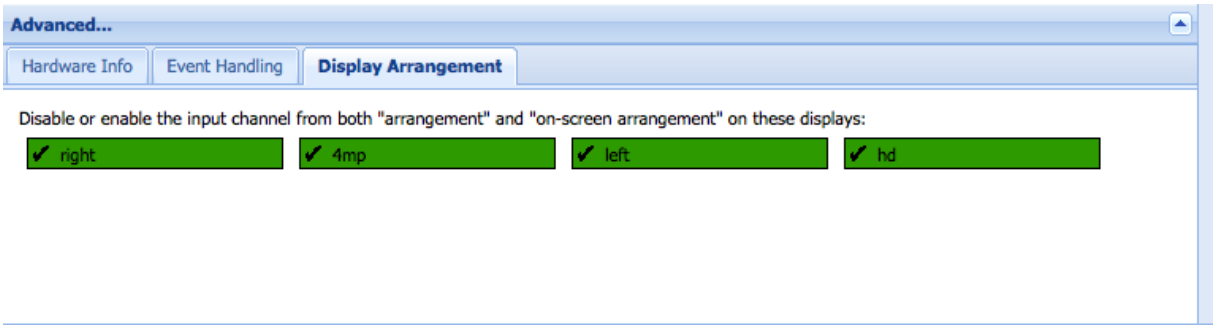


When enabling ‘Inputs’ this input will replace the selected one when going active. When going inactive the original input is displayed again.

3.4.4.8 Display Arrangement

Disable or enable this input channel and screen 1 or 2 from the ‘Arrangement’ tab and ‘on-screen- arrangement’ on these displays. So only certain inputs are visible on certain displays. If there are many inputs enabled, this may help to keep a better overview.

Figure 58: Display Arrangement inside of the input channel

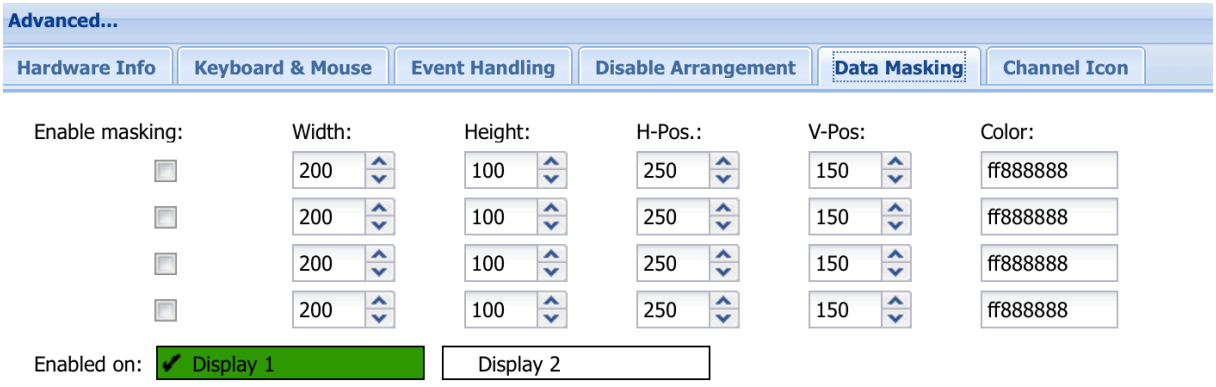


3.4.4.9 Data Masking

Allows to define up to four independent rectangular areas with arbitrary colour and transparency. The areas are drawn on top of all other input content. This feature can be used to mask out sensitive content, especially if shown on streamed output displays.

The colour value consists of four hexadecimal two-digit values for transparency (ff = opaque, 01 = see through), red, green and blue colour channel. The masking areas of the input can be independently enabled for each output display or stream, see Figure 59 for details.

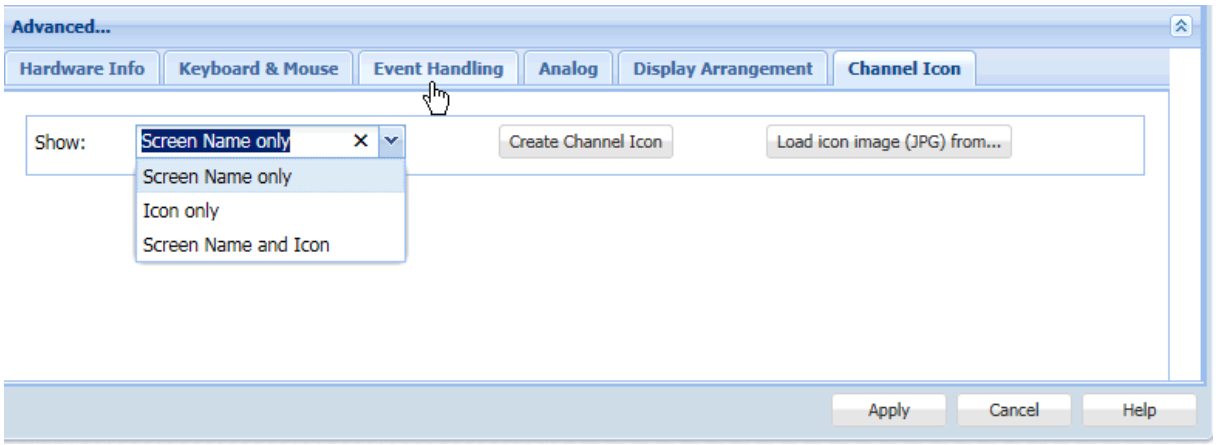
Figure 59: Data Masking of input channel configuration



3.4.4.10 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. Figure 60: Channel Icon Tab shows the details.
First there is the selection to show the ‘Screen Name’ only or the ‘Channel Icon’ only or both.
‘Create a Channel Icon’ when this input channel shows a typical view. This icon is stored locally and will be used from this moment in all layouts, it can be retaken any time.
‘Load a channel Icon from’ allows you 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 60: Channel Icon Tab



3.4.5 Virtual Inputs

Virtual inputs are inputs without a physical connection. They can be arranged as all other inputs but their content comes via 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, etc. .
Stream sizes of up to 8MP (3840x2160) are supported.
HDCP protected streams cannot be used.
To identify NDI streams on the network, click the ‘search’ symbol (at the right-hand side of the URL entry line) and a list of the available streams is displayed.

For more information about available streams and further details please refer to this document:
https://www.multi-display-manager.com/download/application-note-video-over-ethernet-streaming/

To test the ‘image’ or streaming’ just enable the channel. Predefined URLs are stored.
Don’t forget to setup 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 61: Virtual Channel

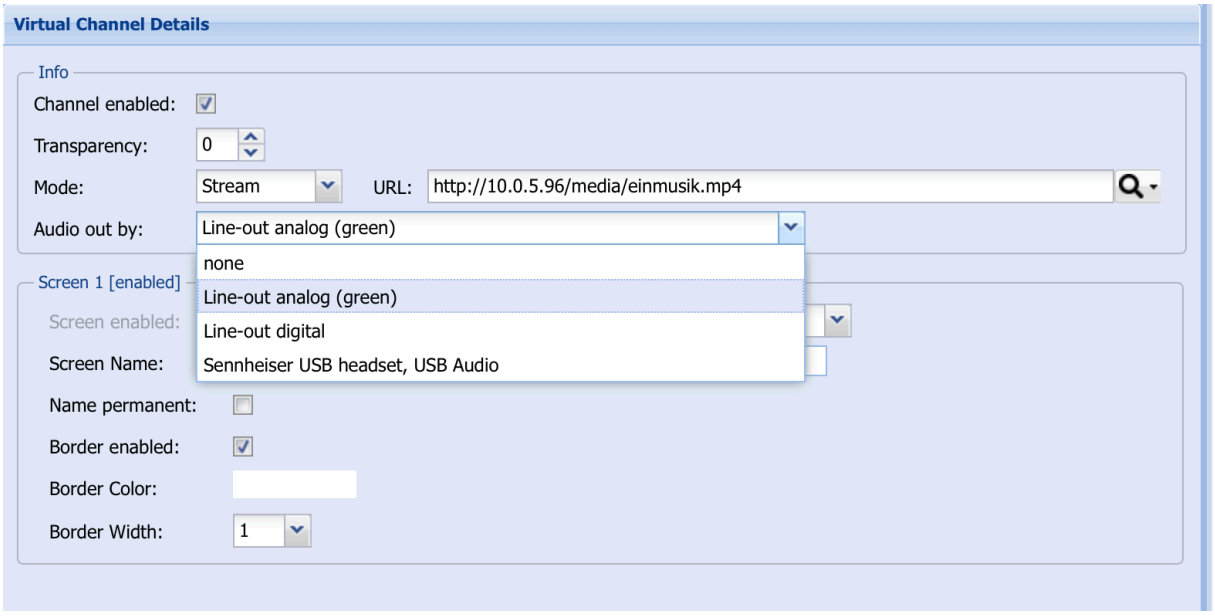
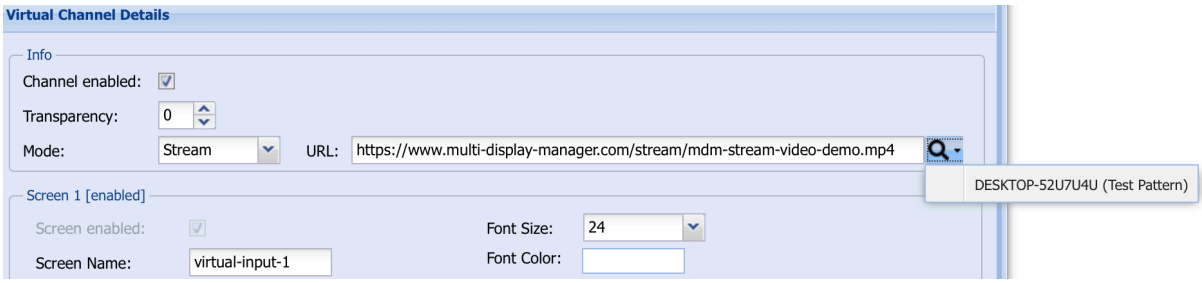


Figure 62: Virtual input channel with NDI Stream



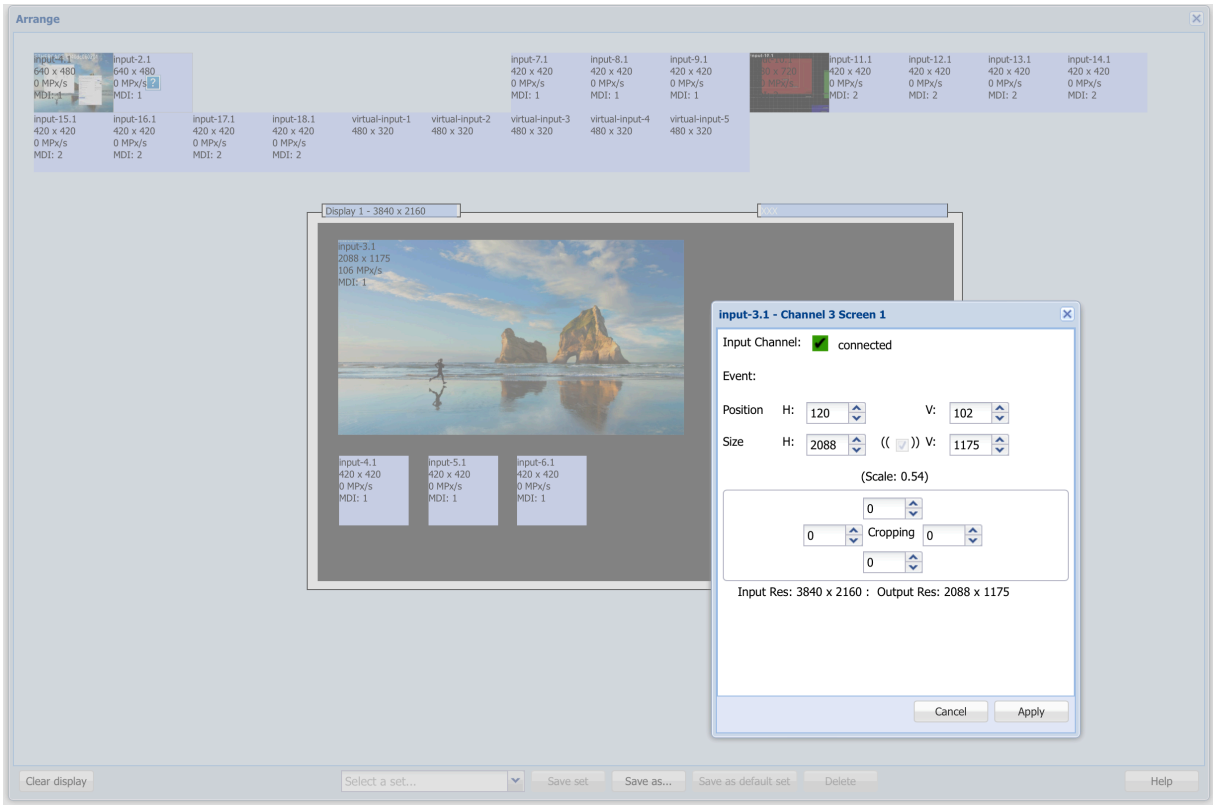
3.5 Arrangement

Arrangement allows the positioning of all enabled input streams on the output screen. It can be used to define new sets or to 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. So, each set has to 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 63: Arrangement



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 3.4.1 Main Administration Tab how to create such an input icon) it's 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.

3.5.1 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 individual input stream can be dragged and dropped over the output monitor to the place desired. 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’. Chapter 3.2.1.9

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 will 'snap' together (first to the top then to the left). ‘Shift’ plus ‘double click’ will increase the window to its maximum size without overlapping any other window. This is disabled when overlapping is enabled (Chapter 3.2.1.9).

When enabled in ‘chapter 3.2.1.8 Enable segment resize in ‘Arrangement’ the inputs can be resized at the lower right corner.

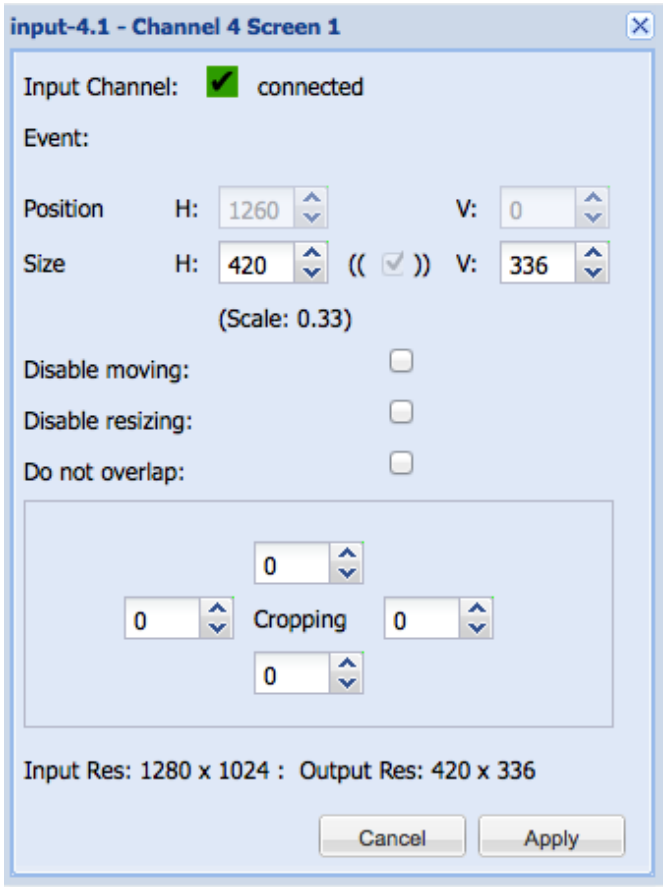
When a window should no longer be visible on the output screen, drag and drop it away.

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

Any input window can be double clicked on, and a sub window will open. 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 64: Arrangement Detailed Window



On the next line, the defined events are listed for information only. Warning: 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. Using 'shift' and the arrows, moves 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 arrows, either with or without 'shift', to scale in steps of 20 or 1. A check mark in between 'H' and 'V' indicates a locked aspect ratio, see chapter 3.4.3.

The next section can vary depending on the item selected in the 'Display settings' in 'On-screen arrangement' with 'MDM with KVM' mode enabled. There 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 check boxes. These are the possible messages:

- Disable moving
- Disable resizing
- Do not overlap
- Lock to position
- Lock to Layout

The next section is for 'Cropping' the window. The arrangement of the input fields is self-explanatory. 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 this is 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 MDI board, make it horizontally smaller, scale it down or do not use two windows of the same input stream.

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' drop down menu in the lower right corner.

3.5.2 Modifying a Set

To modify an existing set, select the set with the 'select set' drop down 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.

3.5.3 Deleting a Set

To delete a set, select the set with the 'select set' drop down menu in the lower right corner. Use the 'Delete' button to delete this set.

3.5.4 Marking a Set, a 'Default Set'

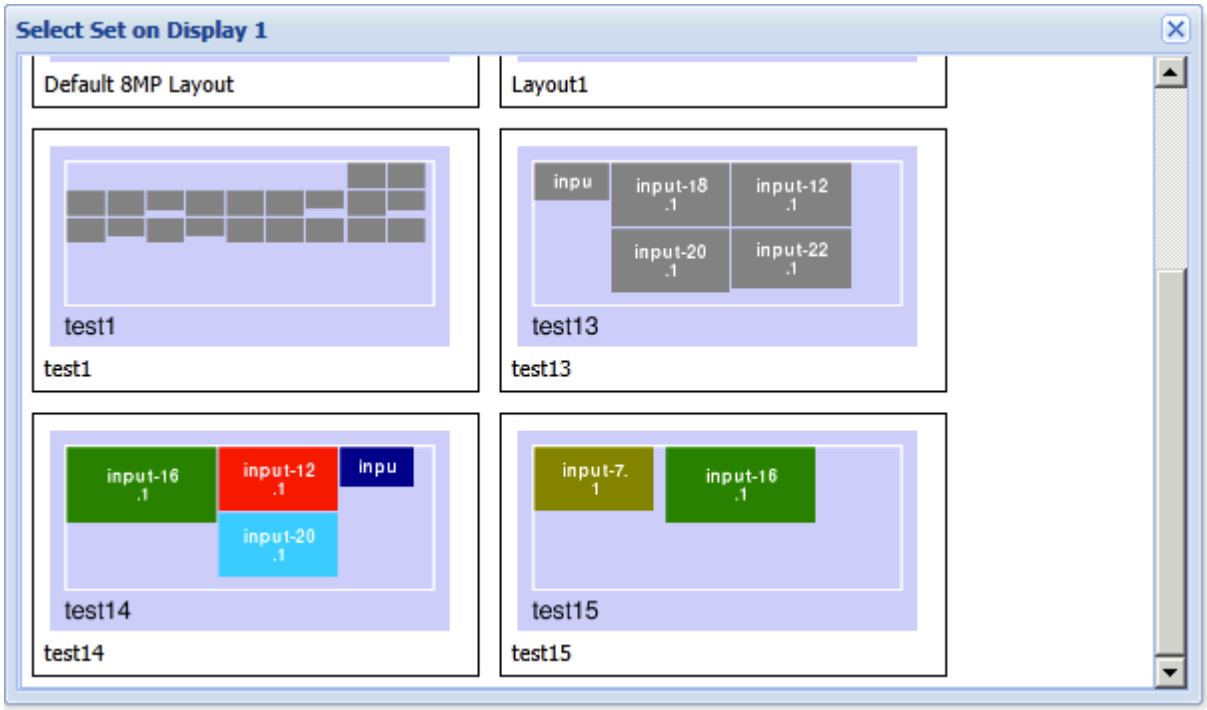
To make an existing set the default set for that display, select the display and then the set with the 'select set' drop down menu in the lower right corner.

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 etc.

3.6 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.

Figure 65: Select



4. Touch User Interface (TouchUI)

The touch user interface can be used by tablets, phones or other PCs with a monitor. Such a system must be connected via network (LAN or WLAN). It must run a browser like Chrome, (Safari and Webkit based browsers, IE and Firefox are not supported).
With release 2.4.12 and higher we offer two versions of the TouchUI interface.
The one already known is called ‘classic version’ and the newer one is called ‘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’ the user can setup all procedures and buttons. Can create his/her own layouts by moving and resizing the inputs life on-screen with a tablet.

If the ‘classic version’ is chosen it’s the default version no changes have to be made, just precede as in older versions.
For the ‘modern version’ proceed to chapter 4.2 Touch User Interface ‘Modern Version

4.1 Touch User Interface- Classic Version

The browser must be pointed the http://mdm-ip-address/touchui.

4.1.1 Using the ‘Classic Touch User Interface’

The MDM 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://mdm-ip-address/touchui the user has to 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 / case/ user and this procedure window is shown full screen. If a default procedure is defined this will open automatically when connected after the first connection.

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

Figure 66: Procedure selection window

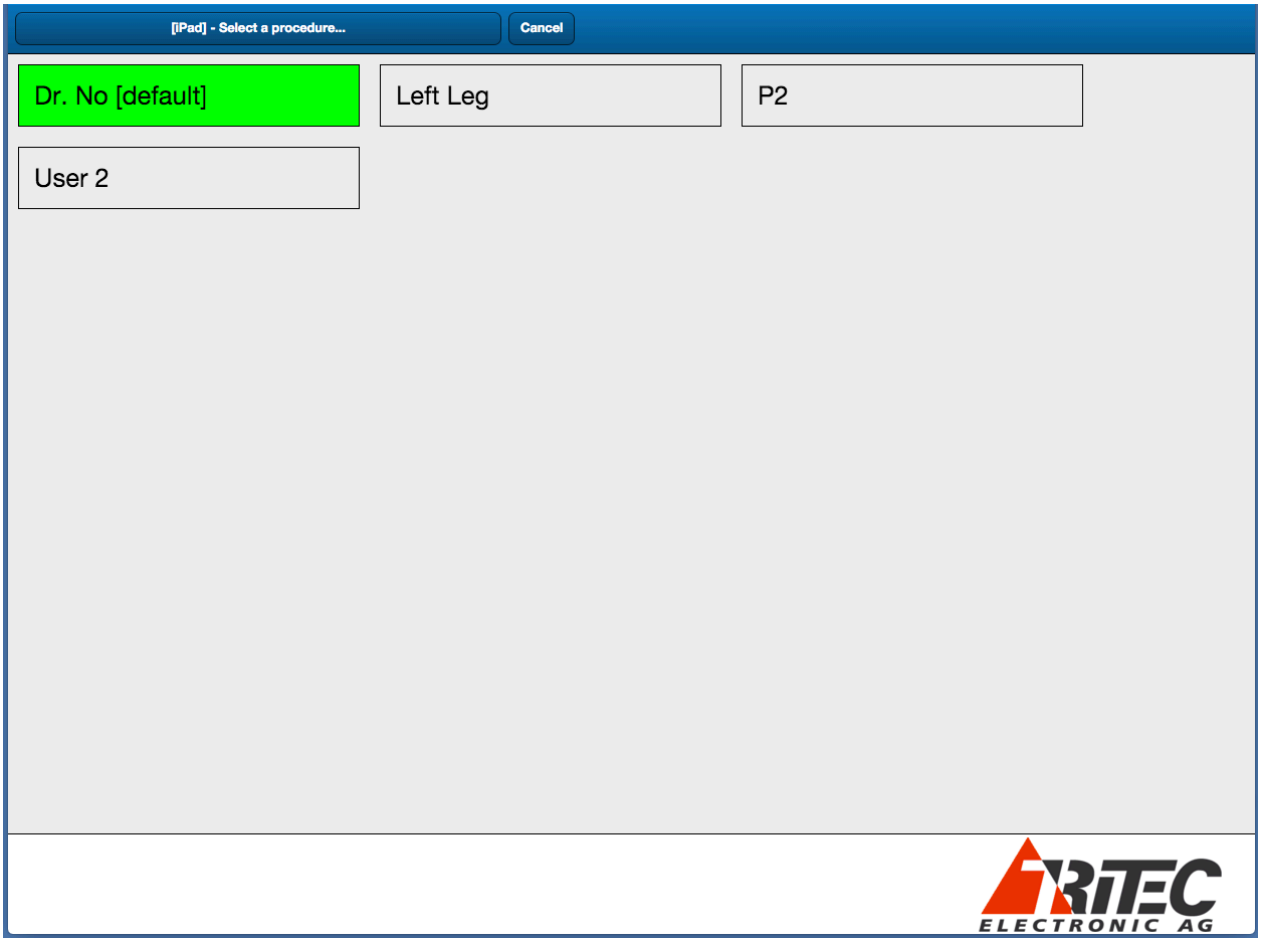
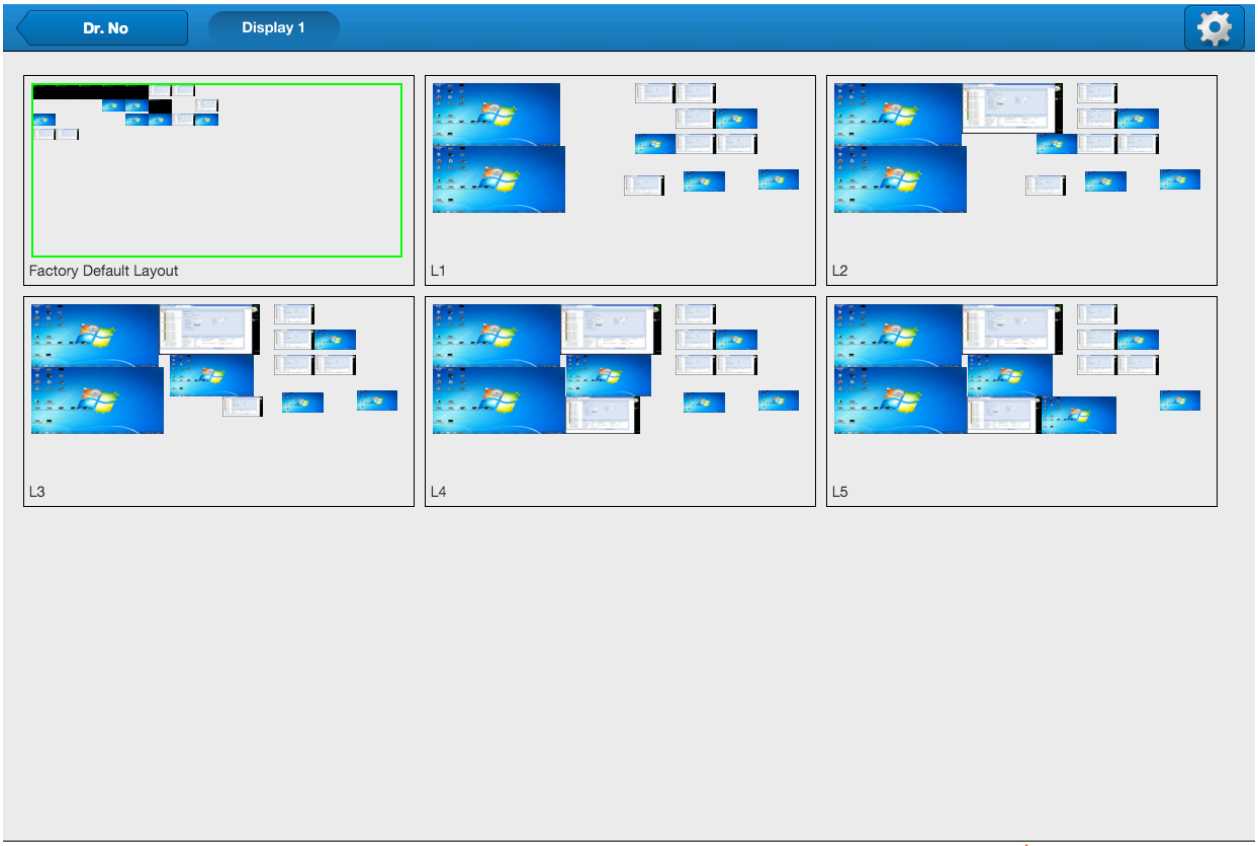


Figure 67: Procedure window

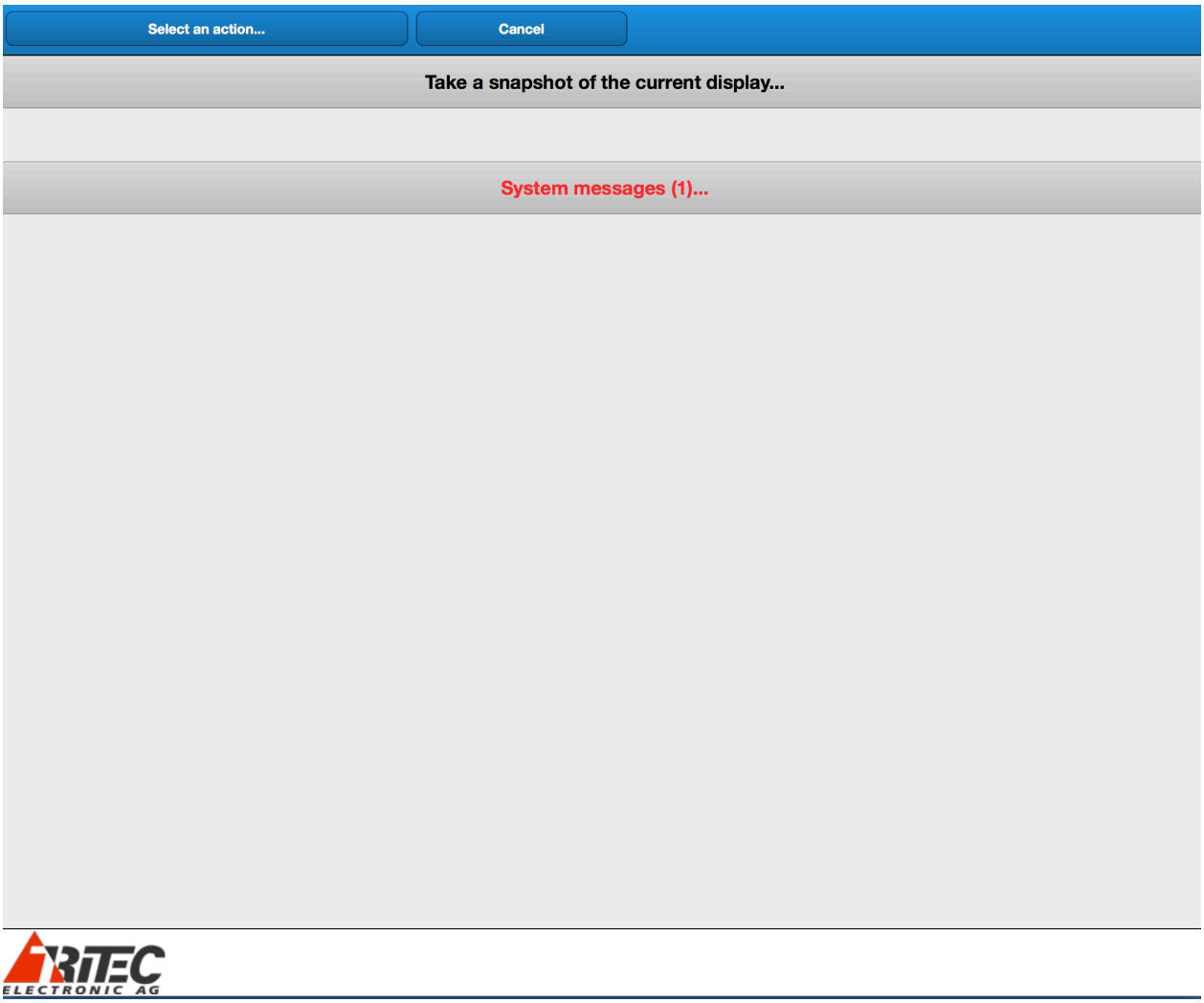


Procedure window.
Depending on the setting several layouts are shown.
A single touch of one of the layouts will switch the MDM display to this layout. The selected layout has a green border.
In the top left corner, the name of the procedure is shown and when touched it returns to the 'procedure selection window'.

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

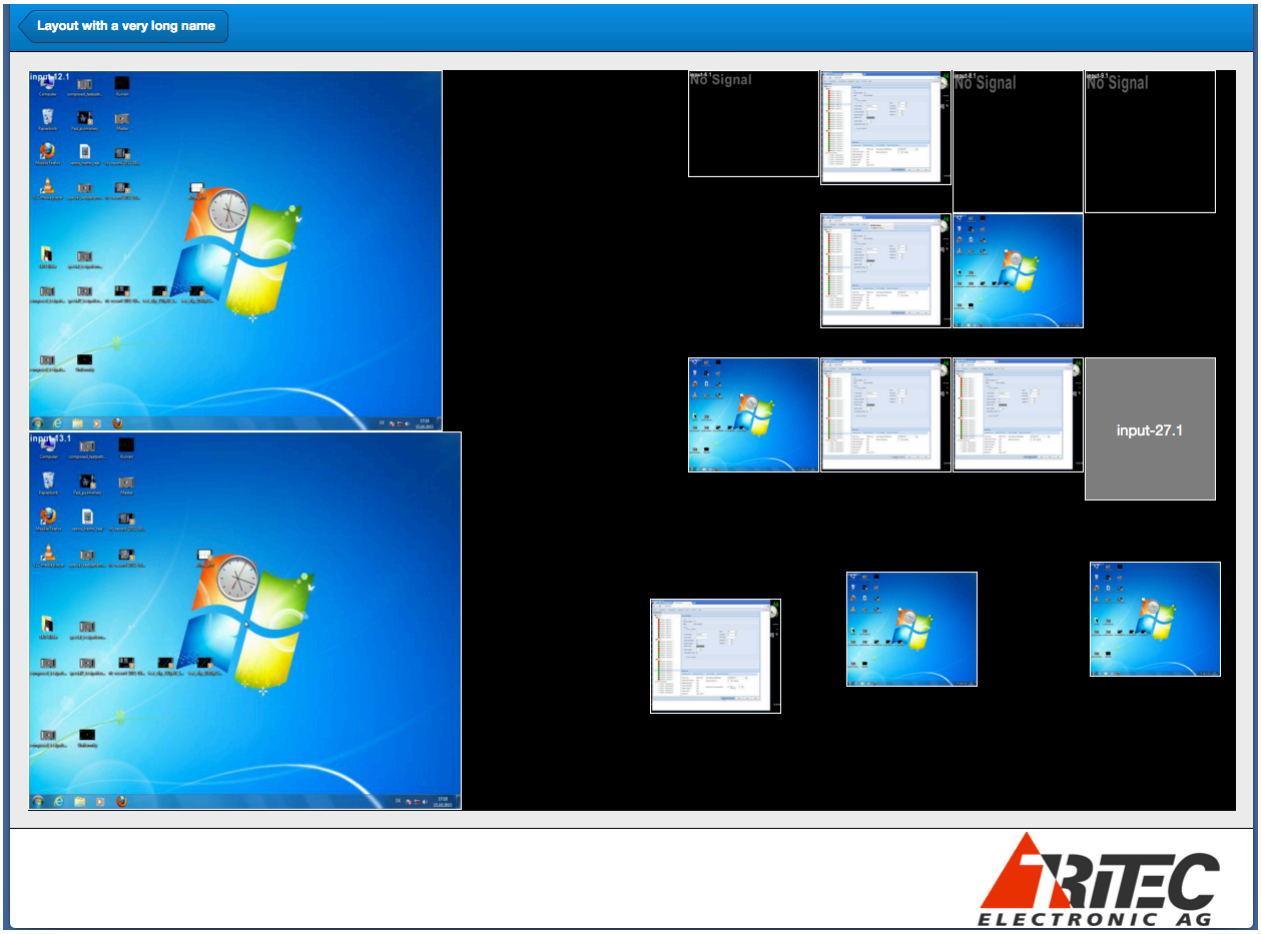
- Take a screenshot of current display. These actions will store the screenshot on an FTP server or an USB stick. For more details, see the Administration interface, 'Display Settings'
- System messages show all error messages of the system.

Figure 68: Toolkit Window



A single click to a button selects this layout on screen.
A double click to a button opens this layout full screen with all input channels. (see Figure 69: Full Screen view of a layout)

Figure 69: Full Screen view of a layout



When enabled by the administrator, click one input channel and then another to swap these channels on the MDM display. The new selection is permanent over all shut downs and reboots.
When enabled by the administrator, a double click to an input channel opens a new window displaying all input channels not used in this layout (and enabled by the administrator for selection). A touch to one of these input channels will use this input in the layout permanently and return to the layout window.

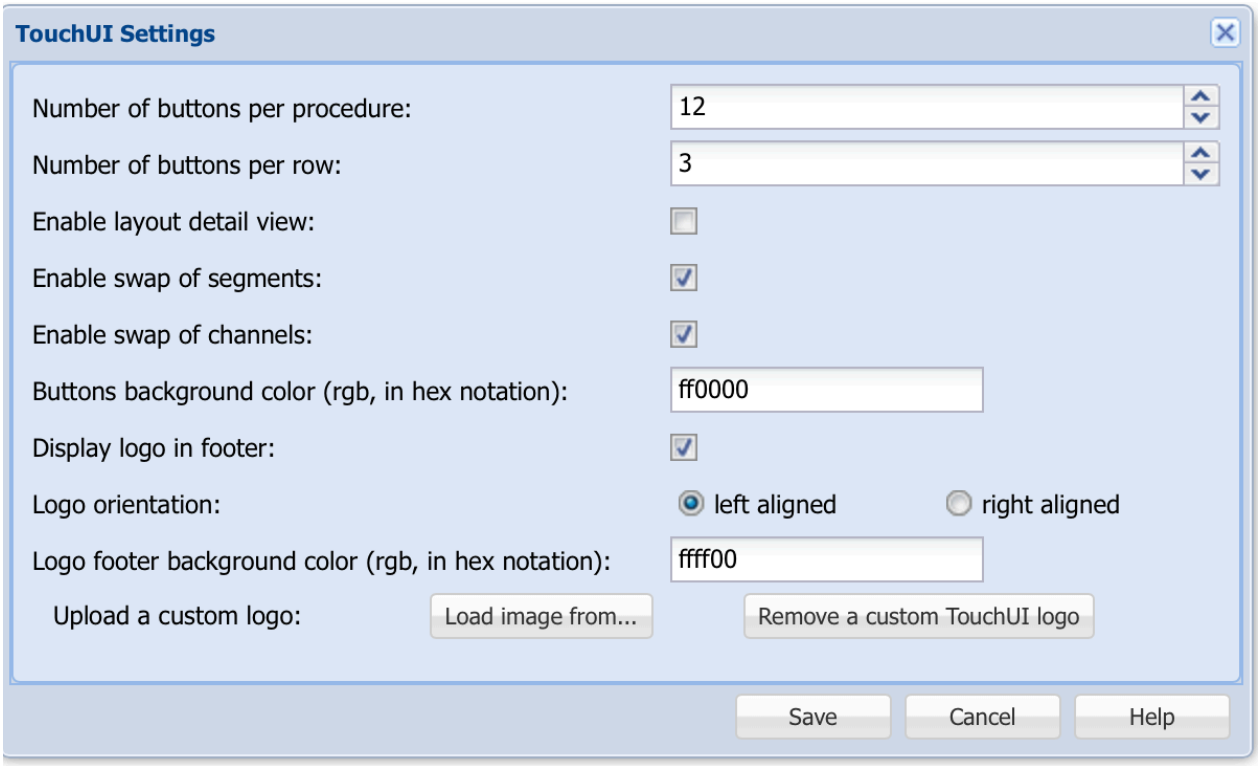
In the top left corner, the name of the layout is shown and when touched it returns to the procedure window.

4.1.2 Setting up the 'Classic Version' of the Touch User Interface

In the administration interface of the MDM open the 'TouchUI' tab.

First select the TouchUI 'settings' tab.
Arrange how many buttons you want to see in one window then how many buttons per row. Before wasting too much time proceed to the next step to be able 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 a nice arrangement. The lower part of the output window shows a Tritec logo.

Figure 70: TouchUI Setting 'Classic Mode'



The checkbox 'Enable layout details view' disables 'Enable swap of segments' and 'Enable swap of channels'. Either a single or double click to the button will change the layout on the output display. This is a work around of a problem with the browsers under Window OS.

The checkboxes 'Enable swap of segments' allows the end users to swap segments or not.

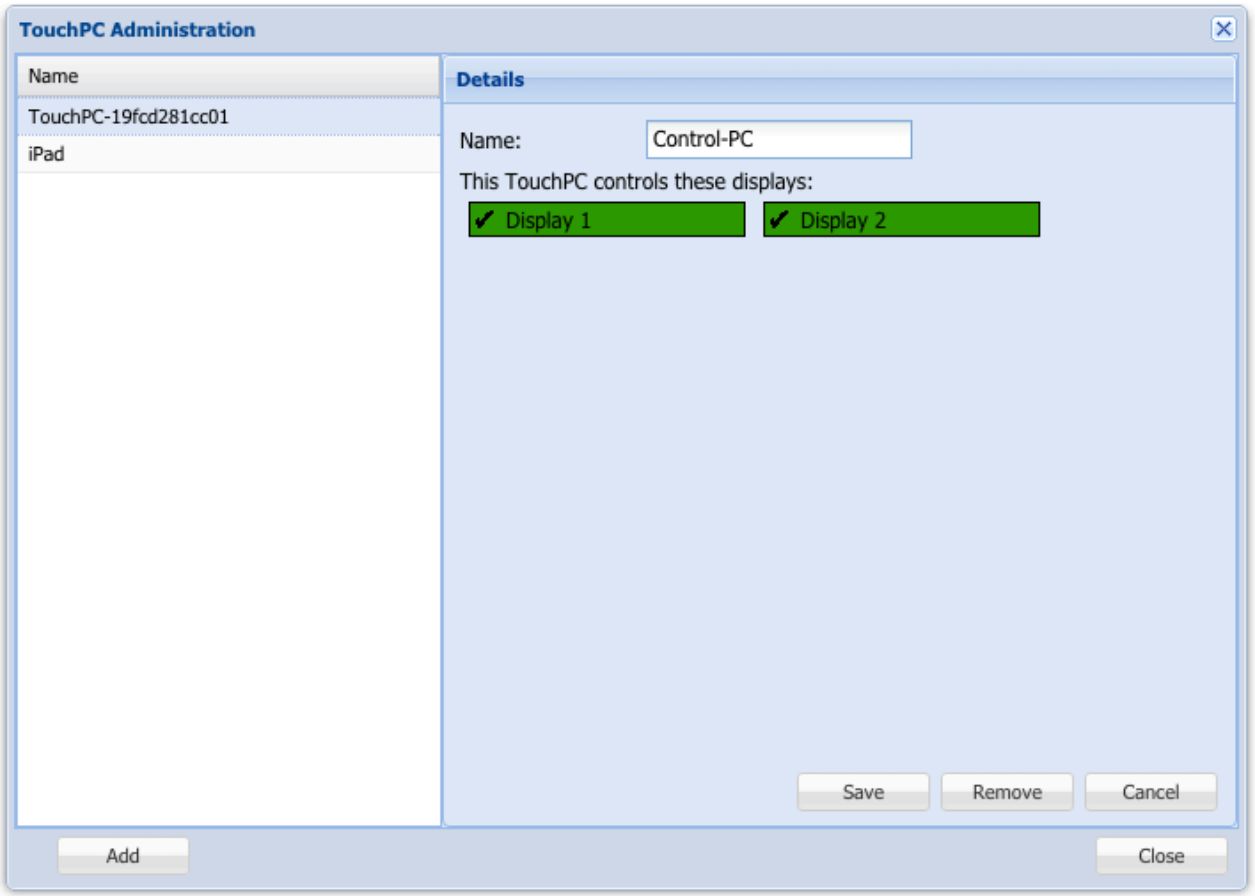
The checkboxes 'Enable swap of channels' allows the end users to swap input channels or not.

'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 it's enabled the next two lines enable you to load a custom logo (transparent, 24bit, rgb .png) and set the background color.

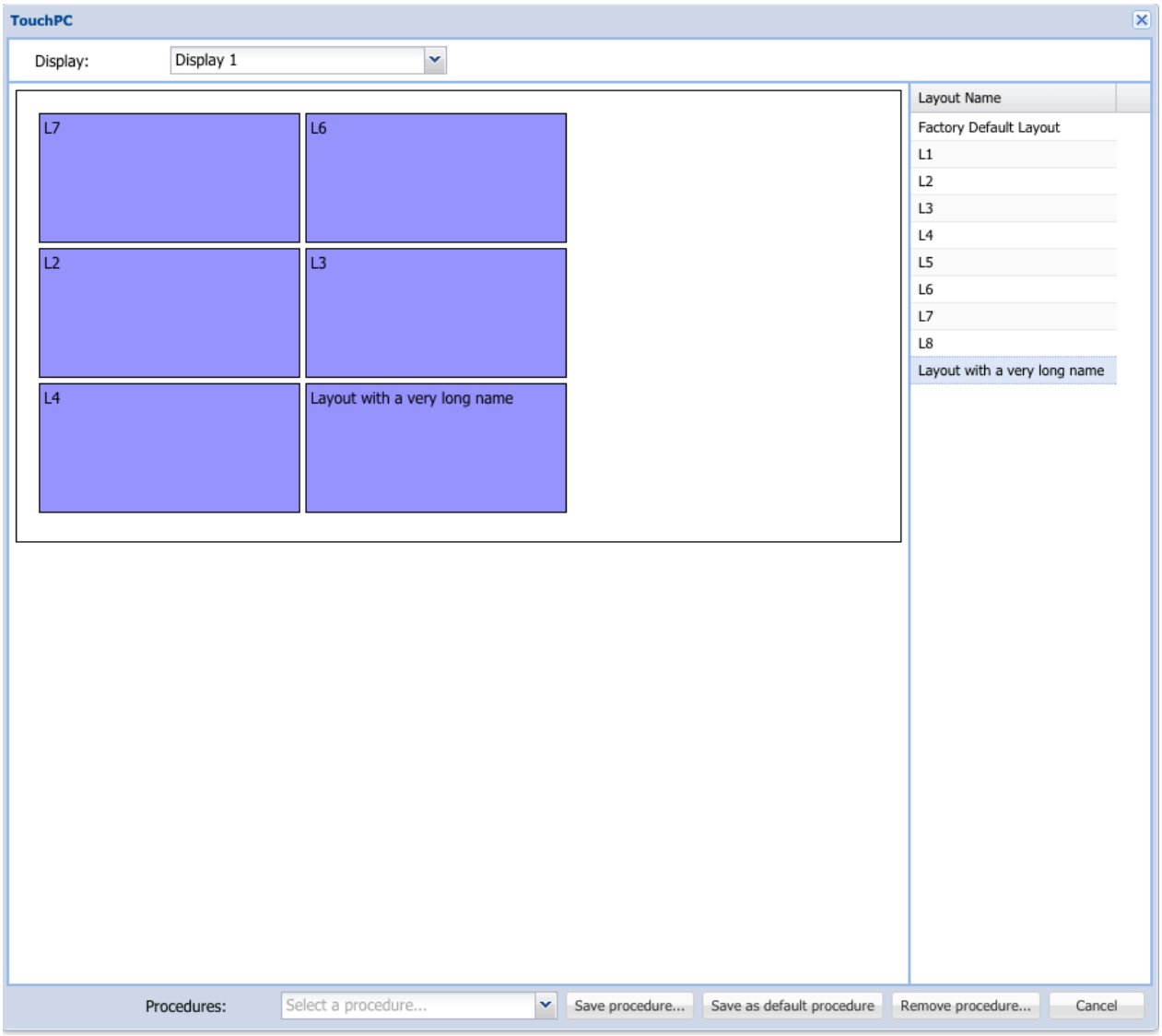
~~The next step is to define the attached devices in the TouchUI 'Administration' tab. Add devices like 'iPad in OR' and select which display this device should be able to control (see next chapter for details). The first time a device is connected via its browser interface you are asked to select which of the defined device you want to use it for. To change the name a device just select it on the left hand side, enter a new name and press 'Save'.~~
Needs to be reworked!

Figure 71: TouchUI Administration



In the last step procedures and buttons are linked together with layouts. Select the TouchUI ‘Button Assignment’.
In the top line select the display button assignment that 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.

Figure 72: Button Assignment



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 layouts for this size of the selected display. i.e. if the selected display has a size of an 8 Mega Pixel display all layouts for 8 Mega Pixel displays are shown.
Drag and drop one of the layouts from the right side over one of the buttons and the button will show a preview of the layout. Assign all buttons with layout. 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 MDM this layout of the ‘default procedure’ is selected. 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 MDM.

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 MDM ‘Display settings’ tab. The icons used to represent an input channel can be modified in the ‘Administration’ tab ‘Advance’ ‘Channel Icon’. See Chapter: 3.4.4.9 Data Masking

4.1.3 How to control several Displays.

There are three ways to control several attached displays with one or more devices.

Any device controls several displays with one button / procedure:
First 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.
First 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.
First 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.

4.2 Touch User Interface 'Modern Version'

With the 'modern version' of the TouchUI the end user can add, remove and rename his/her own 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 down loaded 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.
There are devices under Windows 10 that don't behave as expected.

4.2.1 Using the 'Modern Touch User Interface'

The browser must be pointed the http://mdm-ip-address/touchui.
A window opens with the defined procedures.
To add a procedure, press the red '+' button in the lower right corner and enter a name for the procedure. A new window open with the predefined number of buttons without any 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.
To arrange a button, drag and drop any input from the lower part to the on-screen area. After dropping it's visible on the output display. Move with single finger gesture, resize with two fingers. To save the button arrangement just press the procedure name or the display name in the top blue line.
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 press the tool symbol and select snapshot, follow the further instructions of your device.

Figure 73: TouchUI Procedure View

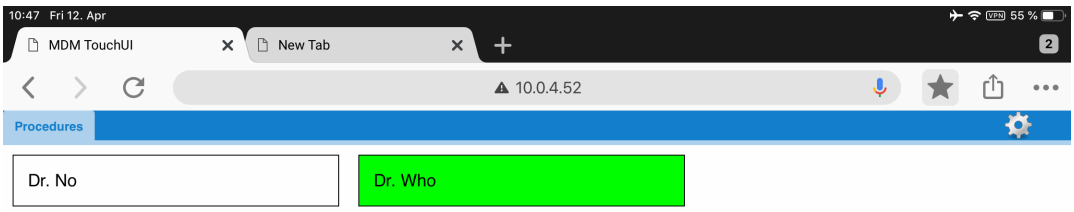
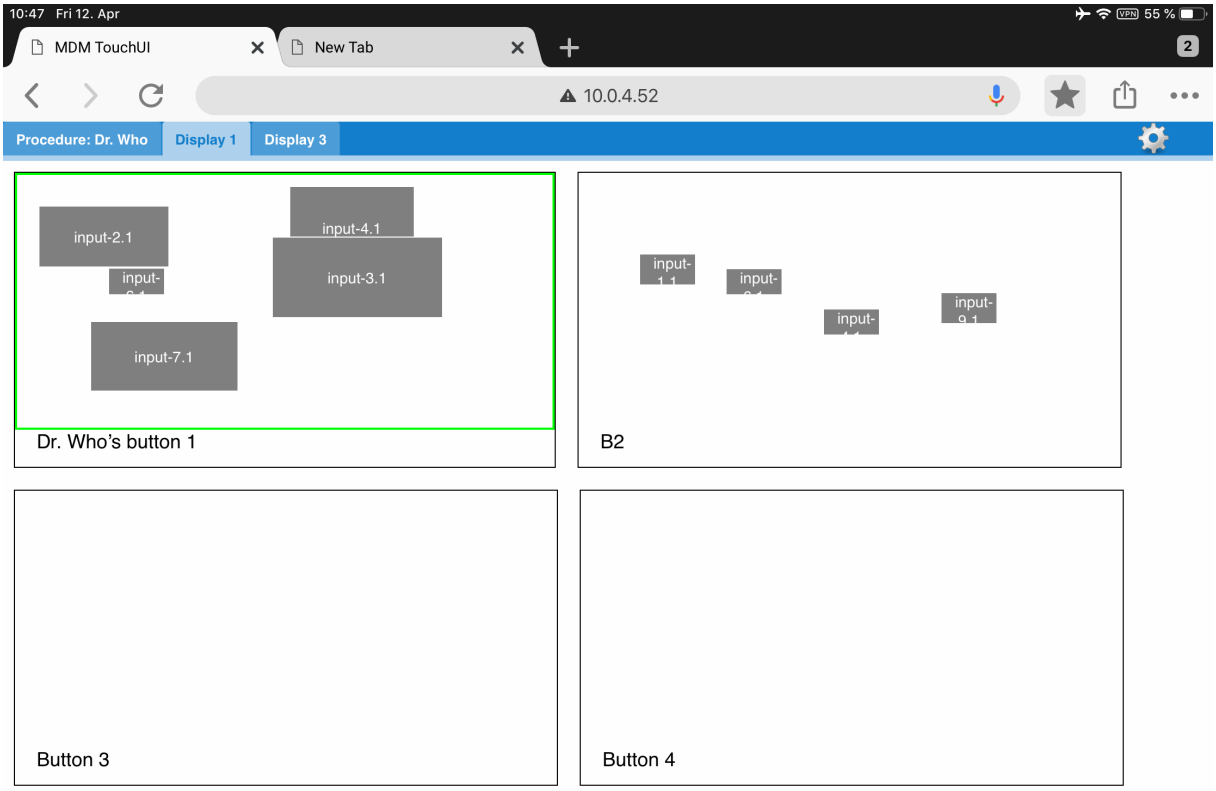


Figure 74: Procedure Dr. Who selected



As can be seen in the top blue bar, the Procedure: Dr. Who is selected and he/she can control two displays. (They maybe have been renamed in the 'Display arrangement' tab.)
If the administrator stored icons for the inputs, they can be seen here instead of just the input number.

Figure 75: Selected Button

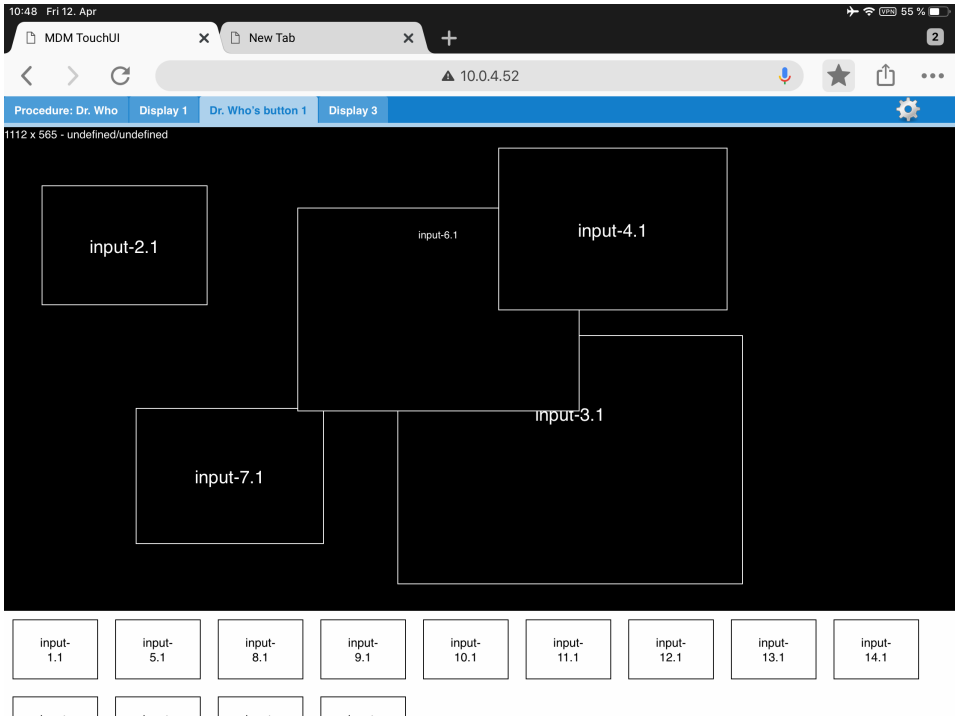
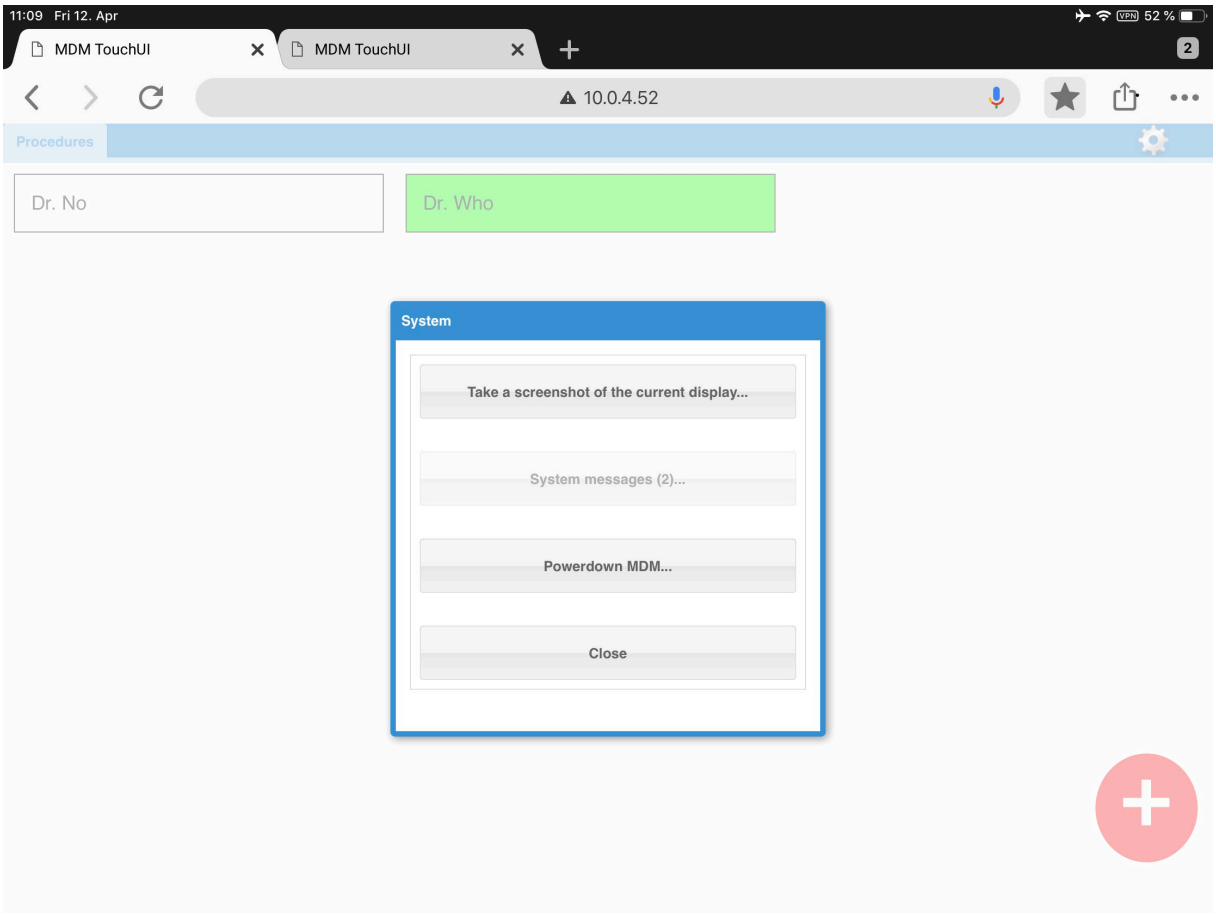


Figure 75: Selected Button: shows that procedure: ‘Dr. Who’ on ‘Display 1’ selected ‘Dr. Who’s button 1’ for rearrangement.

Figure 76: Tool Box of TouchUI Modern Version shows how to make a snapshot or how to ‘Powerdown MDM’. Wake up of MDM works only with a special program that can be loaded on Windows based devices. Please contact reseller for more information.

Figure 76: Tool Box of TouchUI Modern Version



4.2.2 Setting up the 'Modern Version' of the Touch User Interface

In the administration interface of the MDM open the 'Configuration' 'General Setting' tab under 'TouchUI' select 'modern version'.

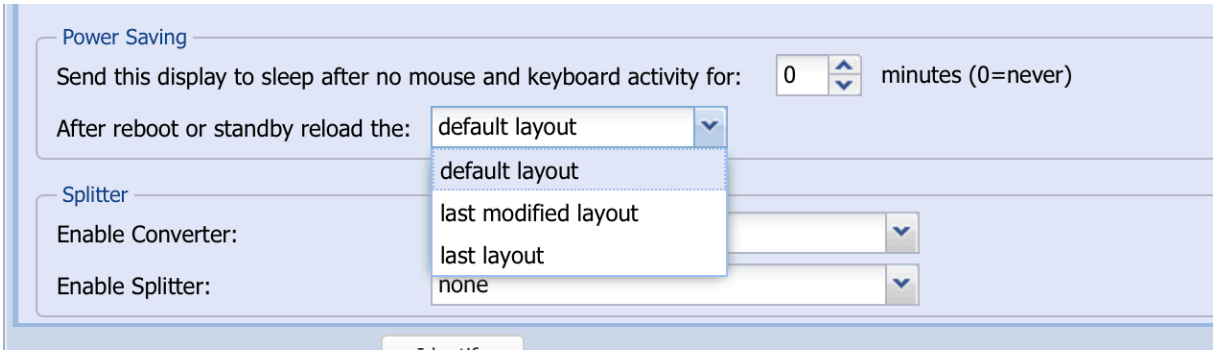
Figure 77: Selection between 'Classic' and 'Modern Version' of the TouchUI

In the 'Configuration' 'Display Setting' tab inside each 'Display' tab under 'TouchUI' you can select whether this display should be controlled by the TouchUI or not. 'MDM' or 'MDM-with-KVM' displays can be used.

Figure 78: Select if display should be controlled by TouchUi

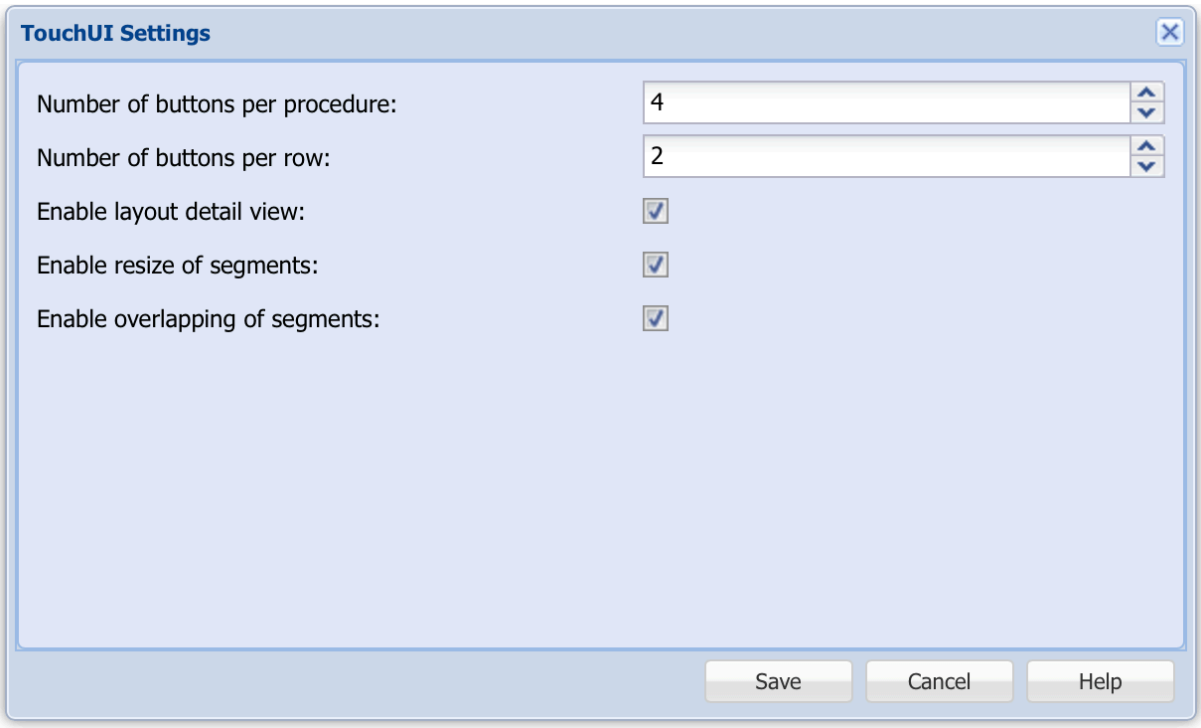
When the TouchUI is used you should select: 'After reboot or standby reload' either the 'last layout' or the 'last modified layout' to return to the last button selection.

Figure 79: Select which button is displayed after reboot



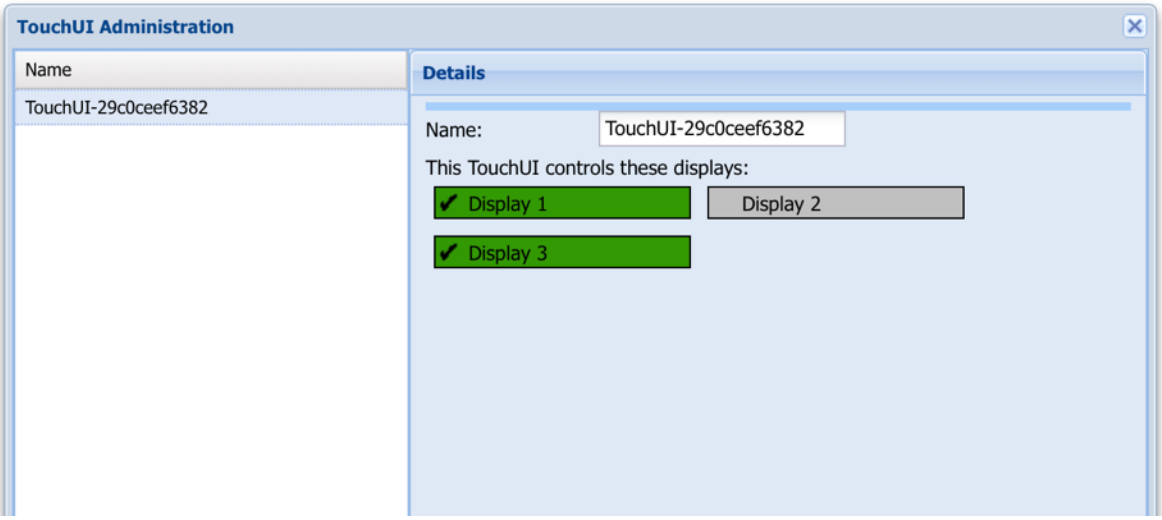
In the 'TouchUI' 'Settings' Tab arrange the total number of buttons you want to see in one window on your touch device and then how many buttons per row. You may need to change these settings depending on the resolution of the tablet/monitor size to get a nice arrangement.

Figure 80: TouchUI Setting 'Modern Mode'



'Enable layout detailed view:' should always be enabled.
'Enable resize of segments:' enables the resizing of the inputs on screen.
'Enable overlapping of segments:' allows you to move inputs on top of each other. Remember this may lead to high bandwidth consumption.

Figure 81: TouchUI Administration

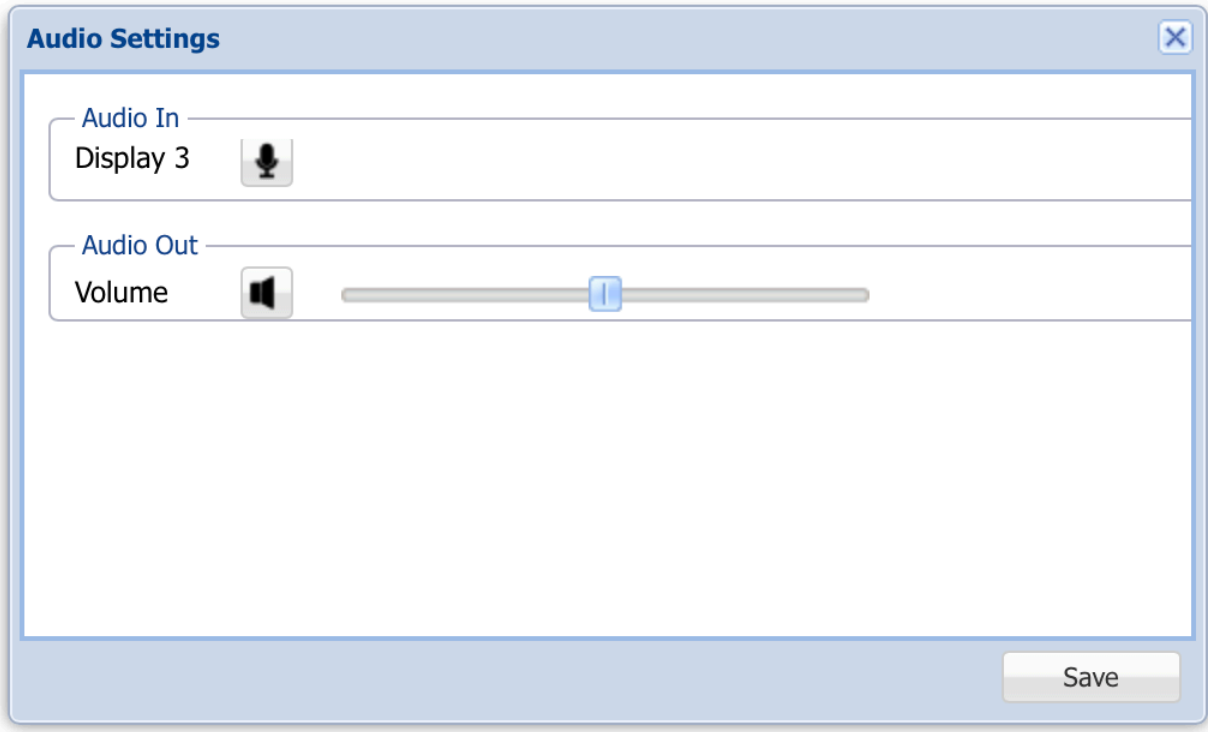


In the 'TouchUI' 'Administration tab you can select which of the connected devices can control which of the displays. Due to software restrictions all connected devices are treated the same way.
In the example Figure 81: TouchUI Administration 'Display 1' and 'Display 3' can be managed by the attached device, 'Display 2' was disabled in the 'Display Settings' from the management of the TouchUI.

5. Audio

The ‘Audio’ opens a window to control audio in and out.
Audio In mutes the input audio device as defined in i.e. ‘Display 3’.
Audio Out controls the audio out volume.

Figure 82: Audio Controls



6. Mouse and Keyboard User Interface

The MDM can provide a user interface with mouse and keyboard to switch layouts and control the connected inputs. The interface is enabled by configuring a display in the WebUI ‘display settings’ as ‘MDM with KVM’ mode. The interface features:

- Moving and resizing of windows
- Switch layouts
- Connect and disconnect to the attached inputs (inputs require USB connection to MDM via KMS board or Etherface®)
- Save display screenshots
- Open the on-screen user interface (mouse context menu)
- Enter WebUI administration menu (if configured, via context menu)
- Switch user presets
- Using the mouse to draw graphical annotations

The mouse and keyboard interface is enabled and configured during MDM setup, see chap. 3.2.3.3.

During operation, windows can be moved and resized simply by using the mouse. Connects to inputs can be made by double-click on the input window or are made automatically, dependent on configuration (see also chap. 3.4.4.4).

A keyboard can be used with connected inputs, but also allows to switch layout presets by using pre-defined hotkeys or to save a screenshot of the display by using the keyboard screenshot hotkey CTRL+PRINT.

6.1 On-Screen User Interface

The user can open an on-screen menu with a right click of the attached mouse at a screen area with no connections to inputs. These onscreen menus allow the users to use a subset of the actions available in the browser interface.

To allow several users to share one or more displays it’s possible to switch between users. Each user can save his/her own layouts. Users are selectable across all displays. Their saved layouts are visible depending on the display resolution. i.e. a layout saved on a 4Mega pixel display is not selectable on an 8Mega pixel display but on any other 4Mega pixel 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 8 users can be defined.

The following actions can be triggered on-screen:

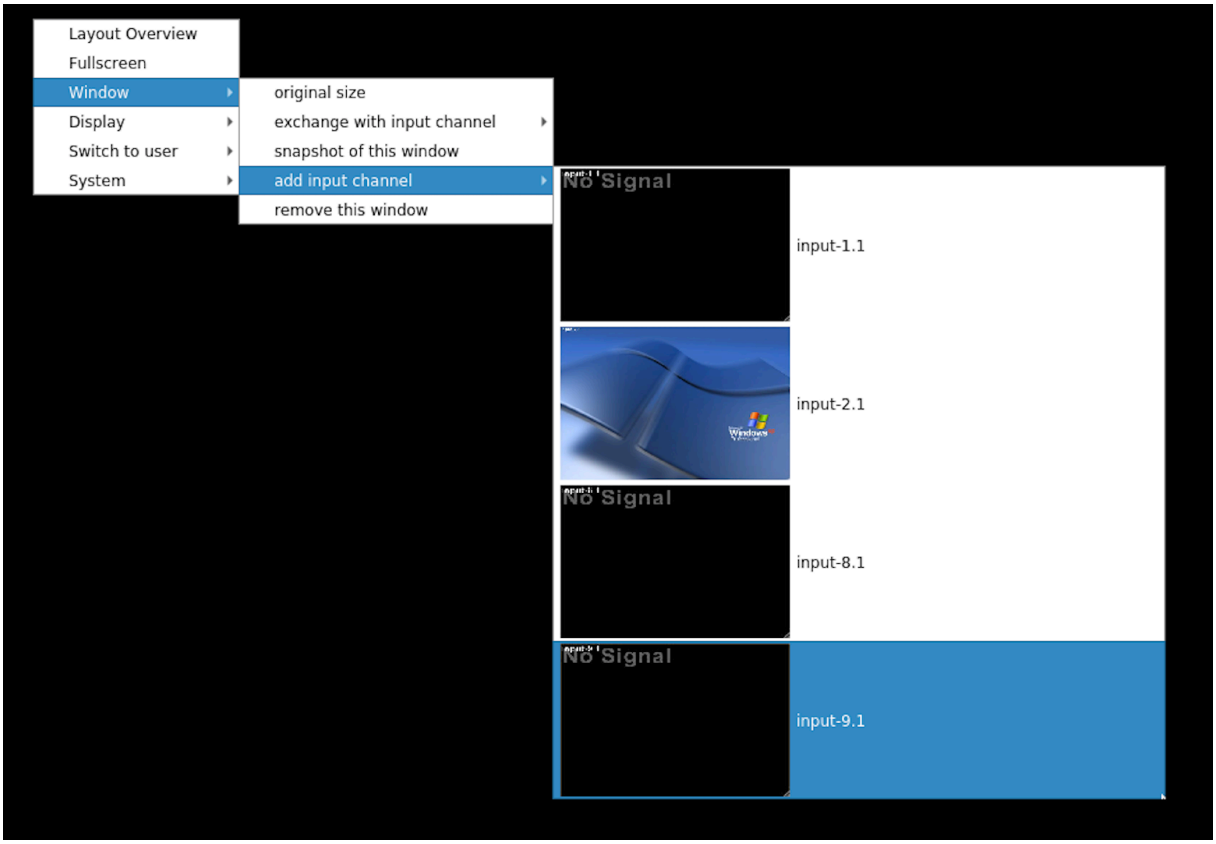
- **Layout Overview**
  Opens a window displaying 12 layouts for quick selection.

(When the cursor is over a window)

- **Fullscreen**
  Opens the under-laying window as large as possible for this display. A second click 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**: The screenshot is 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 3.4.4.8).
  - **remove this window:** Removes the under lying window from the display

Figure 83: On-screen menu. 'Window' selected



- **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:** the screenshot is 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**: the current arrangement is saved 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**: annotations can be drawn over a layout. For details please refer to chapter: 6.2 Annotations.

Figure 84: On-Screen menu. 'Annotations'

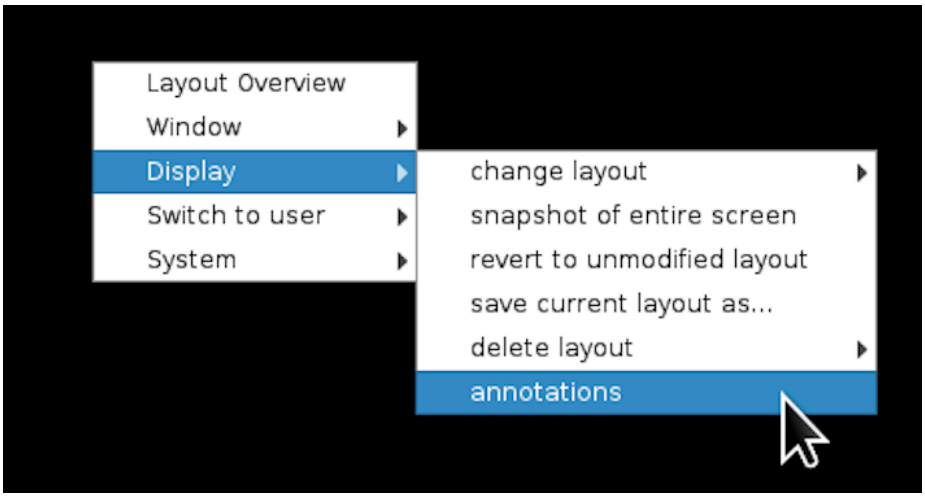
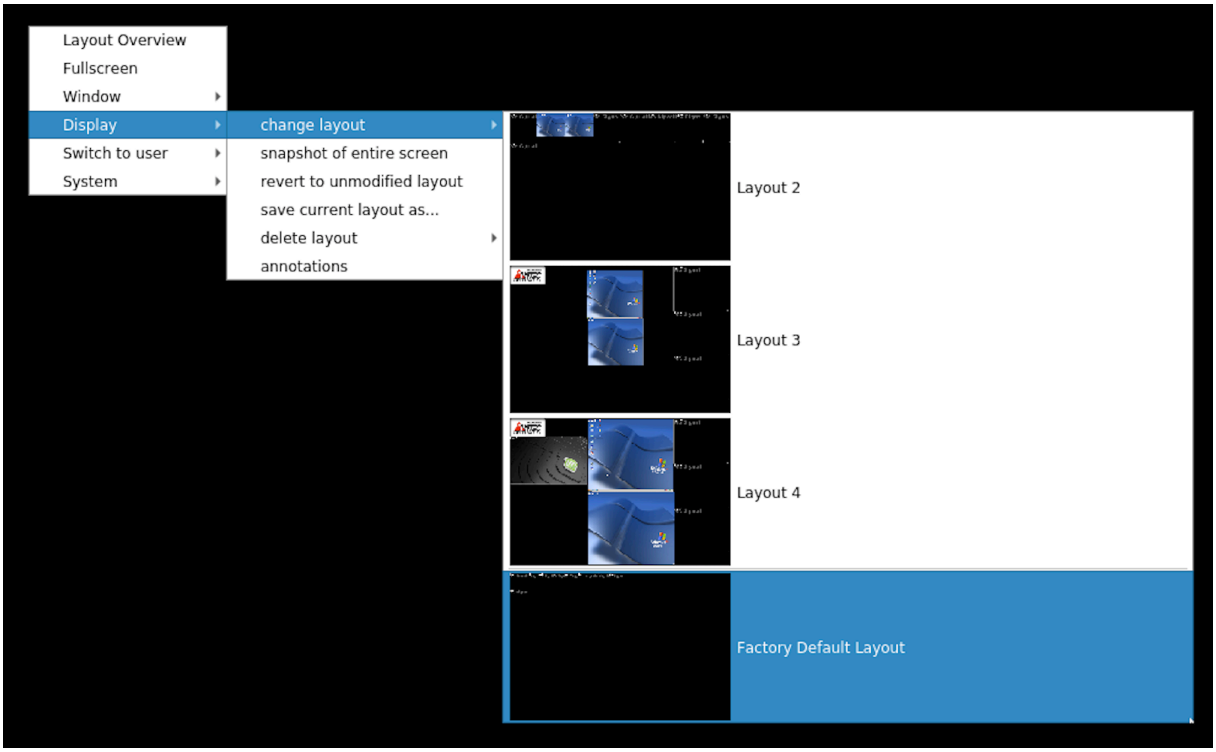
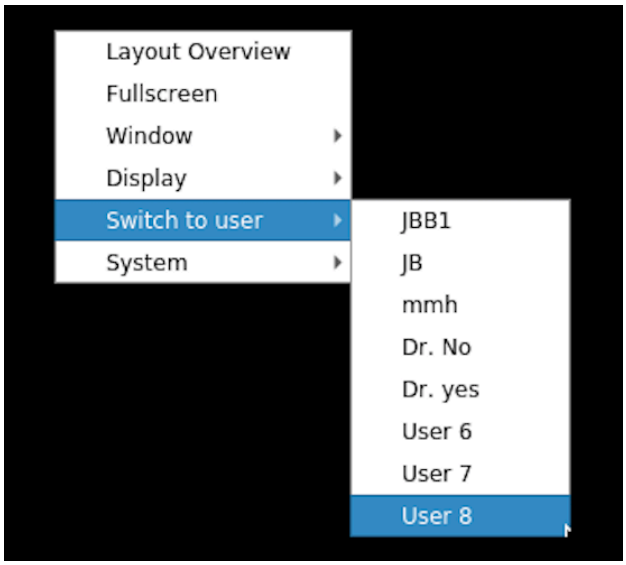


Figure 85: On-screen menu. 'Display' selected.



- **Switch to user**
  - a list of all users is displayed. Click one of them to select it. The last used and possibly modified layout of this user of this resolution is loaded.

Figure 86: On-screen menu. 'Switch to user' selected.



- **System**
  - **rename user**: a list of all available users is displayed, select the one to rename.
  - **open administration**: opens the browser page that is used to set up the MDM. This is the same browser interface as it is used from the external

internet connection. If the end-user should not be able to make changes here, you can set a password to protect the browser interface.

- **go to standby**: sends the system to standby mode

Figure 87: On-screen menu. 'System' selected

6.2 Annotations

Annotations can be used for educational and information purposes. In a class room 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 (Figure 88: On-screen menu. 'Annotation'). It is now possible, by using 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 don't modify the name. The saved annotated layout will be available after a subsequent power cycle. Note, a power cycle prior to "Save Layout As" function is executed, will result in the annotation being cleared (not saved).

Note: Layouts saved on-screen are "user" layouts and not available from the browser interface (Administrative PC).

The On-screen Annotation Menu (Figure 88: On-screen menu. 'Annotation') supports the following functions:

Table 2: Annotation Functions

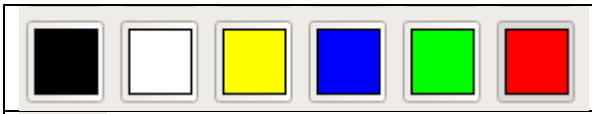
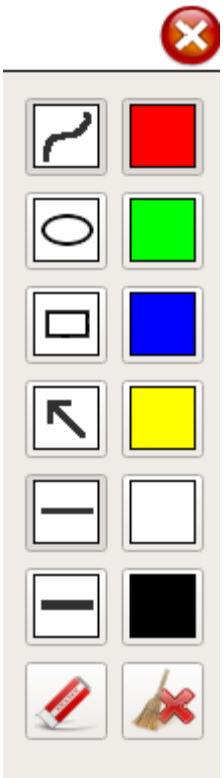
	Six colors option Default: Red
	Free-form line Default
	Rectangular and Circular Shape Creation
	Arrow
	Two Line thickness options Default: thinner
	Erase
	Clear
	Return to the on-screen user interface.

Figure 88: On-screen menu. 'Annotation'



7. Touch-Monitor Interface

With the touch-monitor interface it is possible to control the on-screen user interface of the MDM-KVM with a touch monitor.
Not supported in this version is the connection to a remote PC with the touch interface, the mouse interface only is 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: open 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 will reposition and resize the enlarged window to its original position and size and open the new window full size.

Two finger gesture: used to zoom out or in.

Hold one finger and double click with another finger: connect / disconnect from a remote PC. All further touches will be sent to the connected PC. Works fine with Windows 10, fairly good with Windows 7. Does not function with MAC OS X and Windows XP. Works with Linux but it's desktop dependent.

Hold touch for a few moments: opens the on-screen menu, for details see chapter: 6 On-screen user interface.

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 'MDM-with-KVM'. Select the USB port the touch interface is connected to and 'enable touch monitor'.

When the touch monitor is connected the very first time a calibration cycle should 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 3rd touch the touch monitor is calibrated and can be used at any MDM output. The calibration values are stored in the configuration file. The calibration cycle can be repeated any time.

If the monitor in the OR room has no touch interface a smaller monitor with a touch surface can be installed in the control room. This monitor can be defined as mirror of the OR room monitor and when its touch interface is connected to the mouse and keyboard input of the OR room monitor, the OR room monitor can be controlled from the control room.

8. Remote Control

The MDM/KVM has two remote control interfaces.
For machine and user interaction a ‘rest’ interface is included.

Detailed descriptions of these interfaces are available in a separate document under CDA.

9. Internet Security

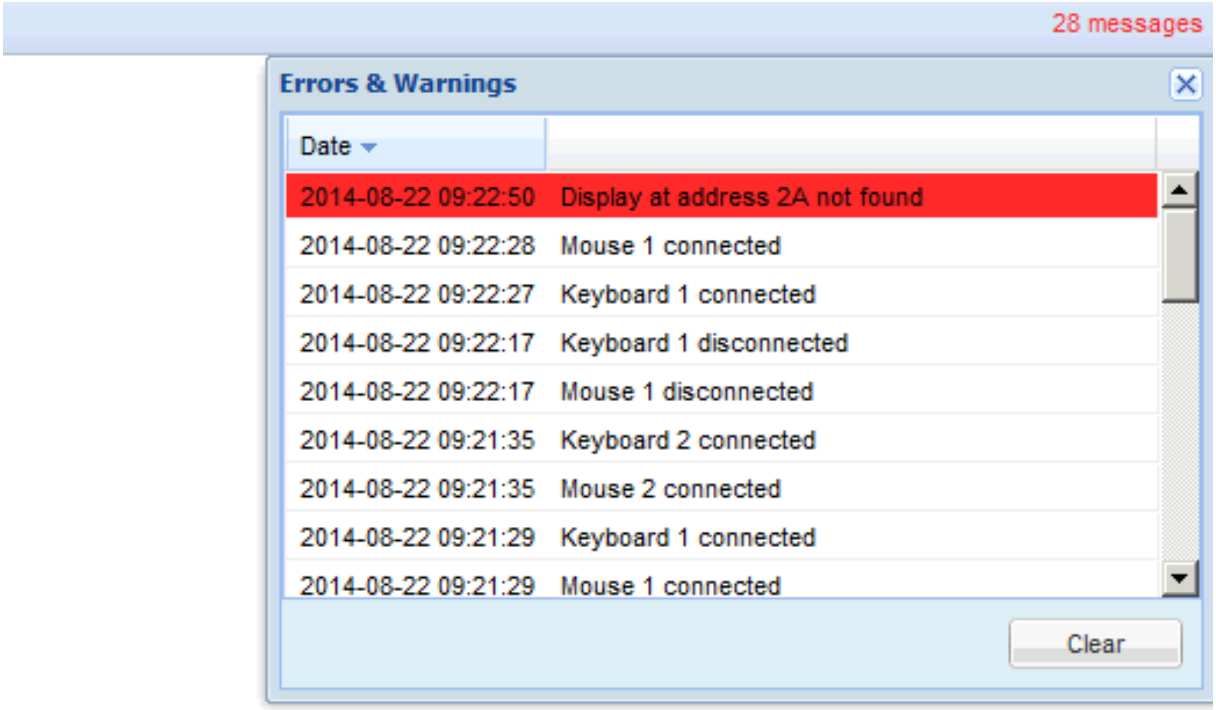
The following internet port are used by MDM-1. All other ports are not active.

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

10. 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 89: System Messages



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

Here is a list of these messages with possible suggestions how to react:

10.1 Error Messages during Booting

The following error messages are shown during booting. They are visible on the main output monitor if possible. A log entry is made for these. The first part of the message gives the details of the error the second part hints to possible solutions to solve the problem.

1. No MDI boards found.
2. MDI x has wrong ID
   a. The ID of one or more MDI boards does not fit to this MDM system.
3. MDI x swapped with MDI y
   a. The MDI boards are swapped.
4. Found more MDI boards than configured
5. MDI x of y is missing
   a. This (These) board is missing due to a hardware failure.
6. No graphics board found
   a. Log –File entry only
7. No USB-Input (KMS) board found
   a. This message is shown in KVM- systems only

If one of the above error messages appears the system needs to be serviced.

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

1. No configuration file found
2. Decrypt Error
3. No valid xml data
4. Invalid configuration data
5. Incompatible configuration version

The on screen message looks like this:

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

10.2 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 i.e. for event handling.

10.2.1 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.

10.2.2 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.

10.2.3 Notifications when KMS is connected

Notification, MW-KVM mouse connected / disconnected	The mouse connected to MW-KVM is connected or disconnected
Notification, MW-KVM keyboard connected / disconnected	The keyboard connected to MW-KVM is connected or disconnected

Notification, USB port # connected / disconnected	The KMS USB port # is connected or disconnected

10.2.4 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 log file (MW-KVMsvc).
Error, Restore of configfile was NOT successful!	For details see log file (mdmsvc).
Unable to save configuration file on local disk!	For details see log file (mdmsvc).

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

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

10.2.6 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 MDM-1 system switched back to the custom default configuration, because there is no configuration file. Use ‘Restore
Custom default config - incompatible configuration data	The MDM-1 system switched back to the custom default configuration, because the configuration file is not for this type of system. (i.e. MDM-1S not MDM-1)
Custom default config - incompatible version	The MDM-1 system switched back to the custom default configuration, because the configuration file is of the wrong version.
Custom default config - encrypted config file	The MDM-1 system switched back to the custom default configuration, because the configuration file is either defect or the decryption is not possible.

Custom default config - no valid xml config file	The MDM-1 system switched back to the custom default configuration, because the configuration file is defect.

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 MDM-1 system switched back to the factory default configuration, because there is no configuration file.
Factory default config - incompatible configuration data	The MDM-1 system switched back to the custom default configuration, because the configuration file is not for this type of system. (i.e. MDM-1S not MDM-1)
Factory default config - incompatible version	The MDM-1 system 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 MDM-1 system 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 MDM-1 system switched back to the factory or custom default configuration, because the configuration file is defect.

10.2.7 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	MDM: MDI Version check of HW layout or FPGA failed, the update package is not valid fort his MDM-Hardware
5	MDM: MDI FPGA update failed, there is a hardware problem with the MDM, 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	MDM: MD5 checksum of copied files failed, try once again, if this fails MDM hardware is defect.
10	MDM: KMS Update failed

11. Default Software and Configurations

11.1 Default Configurations

The MW-KVM-1 boots up with the specified Tritec default configuration.

12. Attachments

12.1 Build in Analog-Timings.

The following table shows the build in analog timings. The table is for reference only. The actual timings are shown as described in chapter 3.4.4.5 Analog. If one of these analog timings is detected by the hardware all parameters are set up automatically. Only the phase needs to be corrected.

Table 3: Predefined Analog-Timings

Resolution	Timing Name	
640x480@60Hz	VESA	GTF
696x480@60Hz	SC 6000	
640x480@75Hz	VESA	DMT
640x480@75Hz	VESA	GTF
640x480@75Hz	VESA	CVT
640x480@85Hz	VESA	GTF
640x480@85Hz	VESA	CVT
640x480@60Hz	SC 6802XL	
640x480@60Hz	VESA	DMT
800x600@60Hz	VESA	GTF
800x600@60Hz	VESA	CVT
800x600@75Hz	VESA	DMT
800x600@75Hz	VESA	GTF
800x600@60Hz	VESA	DMT
800x600@75Hz	VESA	CVT
800x600@85Hz	VESA	GTF
800x600@85Hz	VESA	CVT
1024x768@60Hz	VESA	GTF
1024x768@60Hz	VESA	CVT
1024x768@75Hz	VESA	DMT
1024x768@75Hz	VESA	GTF
1024x768@75Hz	VESA	CVT
1024x768@60Hz	VESA	DMT
1024x768@85Hz	VESA	GTF
1024x768@85Hz	VESA	CVT
1024x800x84Hz	DG2	SUN
1280x800x76Hz	DG2	SUN
1152x900x66Hz	DG2	SUN
1152x900x76Hz	DG2	SUN
1440x900x76Hz	DG2	SUN
1600x1000x66Hz	DG2	SUN
1280x1024@60Hz	VESA	GTF
1280x1024@60Hz	VESA	CVT
1280x1024@60Hz	VESA	DMT
1280x1024@75Hz	VESA	DMT
1280x1024x67Hz	DG2	SUN
1280x1024@75Hz	VESA	GTF
1280x1024@75Hz	VESA	CVT
1280x1024@85Hz	VESA	GTF
1280x1024@75Hz	VESA	CVT
1600x1200@60Hz	VESA	GTF
1600x1200@60Hz	VESA	CVT
1600x1200@60Hz	VESA	DMT

1200x1600@60Hz	VESA	GTF
1200x1600@60Hz	VESA	CVT
1280x1024@72Hz	A02	
1280x1024@72Hz	A02 neu	
1920x1080@60Hz		
1920x1200@60Hz		

12.2 Available EDID data sets

EDID data sets are store in EEPROM for each input channel. Each time they are changed they are written to the EEPROM. This way any PC connected can read out the EDID data even when the MDM is powered down, as it is specified for the DDC channel.

Table 4: Details of EDID data sets

Note:	Digital VGA	Digital SVGA	Digital XGA	Digital SXGA	Digital portrait 1,6k	Digital UXGA	Analog 2 SXGA
						default	
Source number:	EDID 0	EDID 1	EDID 2	EDID 3	EDID 4	EDID 5	EDID 6
"Max. Resolution" name:	"D-640x480"	"D-800x600"	"D-1024x768"	"D-1280x1024"	"D-1200x1600"	"D-1600x1200"	"A-1280x1024"
Vendor ID / Product ID	MDM1111	MDM1111	MDM1111	MDM1111	MDM1111	MDM1111	MDM1112
Analog / Digital	Digital	Digital	Digital	Digital	Digital	Digital	Analog
Preferred timing mode	x	x	x	x	x	x	x
Established Timings:							
720x400x70	.	.	.	.	.	.	x
720x400x88	.	.	.	.	.	.	.
640x480x60	x	x	x	x	x	x	x
640x480x67	.	.	.	.	.	.	.
640x480x72	.	.	.	.	.	.	.
640x480x75	.	.	.	.	.	.	x
800x600x56	.	.	.	.	.	.	.
800x600x60	.	x	x	x	x	x	x
800x600x72	.	.	.	.	.	.	.
800x600x75	.	.	.	.	.	.	.
832x624x75	.	.	.	.	.	.	x
1024x768x87	.	.	.	.	.	.	.
1024x768x60	.	.	x	x	x	x	x
1024x768x70	.	.	.	.	.	.	.
1024x768x75	.	.	.	.	.	.	x
1280x1024x75	.	.	.	.	.	.	x
1152x870x75	.	.	.	.	.	.	.
Standard Timings:							
Timing ID #1	640x480x60	800x600x60	1024x768x60	1280x1024x60	.	1600x1200x60	1280x1024x75
Timing ID #2	.	.	.		.	1280x1024x60	1024x768x85
Timing ID #3	.	.	.	.	.	1280x720x60	800x600x85
Timing ID #4	.	.	.	.	.	1400x1050x60	640x480x85
Timing ID #5	.	.	.	.	.	1440x900x60	.
Timing ID #6	.	.	.	.	.	1152x864x60	.
Timing ID #7	.	.	.	.	.	.	.
Timing ID #8	.	.	.	.	.	.	.
Detailed Timings							
Block 1	Timing:	Timing:	Timing:	Timing:	Timing:	Timing:	Timing:
	640x480x60	800x600x60	1024x768x60	1280x1024x60	1200x1600x60	1600x1200x60	1280x1024x60
	Pix Clk: 25.20MHz	Pix Clk: 39.79MHz	Pix Clk: 65MHz	Pix Clk: 108MHz	Pix Clk: 162MHz	Pix Clk: 162MHz	Pix Clk: 108MHz
	SepSync V:-,H:-	SepSync V:+,H:+	SepSync V:-,H:-	SepSync V:+,H:+	SepSync V:+,H:-	SepSync V:+,H:+	SepSync V:+,H:+
Block 2	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:
	Name:	Name:	Name:	Name:	Name:	Range Limits:	Range Limits:
	MDM Digital	MDM Digital	MDM Digital	MDM Digital	MDM Digital	V:25-76Hz, H:25-100kHz	V:50-85Hz, H:25-82kHz
						Max Pxl Clk:170MHz	Max Pxl Clk:140MHz
Block 3	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:
	unused	unused	unused	unused	unused	Name:	Name:
						MDM Digital	MDM Analog 2
Block 4	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:	Monitor:
	unused	unused	unused	unused	unused	unused	unused

Analog 9 WUXGA default for ch 9,18,27	Digital 1080p (only)	Digital "3MP"	Digital "5MP"	Digital 2Kx2K,30Hz (only)	Digital WUXGA	Digital WQXGA	Digital WQXGA MDI6 - Ch1 only	Digital WQXGA MDI6 - Ch1 only	Analog FullHD
EDID 7 "A-1920x1200" MDM1119 Analog x	EDID 8 "D-1920x1080" MDM1080 Digital x	EDID 9 "D-1536x2048,30Hz" MDM2130 Digital x	EDID 10 "D-2048x2560,25Hz" MDM2150 Digital x	EDID 11 "D-2048x2048,30Hz" MDM2222 Digital x	EDID 12 "D-1920x1200" MDM1111 Digital x	EDID 13 "D-2560x1600,30Hz" MDM2560 Digital x	EDID 14 "D-2560x1600,60Hz" MDM2560 Digital x	EDID 15 "D-2560x1440,60Hz" MDM2560 Digital x	EDID 16 "A-1920x1080" MDM1080 Analog x
x	.	.	.	.	x	x	x	x	x
.	.	.	.	.	.	.	.	.	.
x	.	x	x	.	x	x	x	x	x
.	.	.	.	.	x	x	x	x	.
.	.	.	.	.	x	x	x	x	.
x	.	x	x	.	x	x	x	x	x
.	.	.	.	.	x	x	x	x	.
x	.	.	.	.	x	x	x	x	x
.	.	x	x	.	x	x	x	x	.
.	.	x	x	.	x	x	x	x	.
x	.	.	.	.	x	x	x	x	x
.	.	.	.	.	.	.	.	.	.
x	.	x	x	.	x	x	x	x	x
.	.	x	x	.	x	x	x	x	.
x	.	x	x	.	x	x	x	x	x
x	.	.	.	.	x	x	x	x	x
.	.	.	.	.	x	x	x	x	.
1600x1200x60 1280x1024x85 1024x768x85 800x600x85 640x480x85 . .	.	1280x1024x60	1280x1024x60	.	1600x1200x60 1152x864x60 1280x720x60 1400x1050x60 1440x900x60	1600x1200x60 1152x864x60 1280x720x60 1400x1050x60 1440x900x60 1280x1024x60 1920x1080x60 1920x1200x60	1600x1200x60 1152x864x60 1280x720x60 1400x1050x60 1440x900x60 1280x1024x60 1920x1080x60 1920x1200x60	1600x1200x60 1152x864x60 1280x720x60 1400x1050x60 1440x900x60 1280x1024x60 1920x1080x60 1920x1200x60	1920x1080x60 1280x1024x75 1024x768x85 800x600x85 640x480x85 . .
Timing: 1920x1200x60 Pix Clk: 154MHz SepSync V:-,H:+ Timing: 1920x1080x60 Pix Clk: 148.50MHz SepSync V:+,H:+ Monitor: Range Limits: V:50-85Hz, H:25-100kHz Max Pxl Clk:170MHz Monitor: MDM Analog 9	Timing: 1920x1080x60 Pix Clk: 148.50MHz SepSync V:+,H:+ Timing: 1920x1080x50 Pix Clk: 148.50MHz SepSync V:+,H:+ Monitor: Name: MDM 1080p Monitor: unused	Timing: 1280x1024x60 Pix Clk: 108MHz SepSync V:+,H:+ Timing: 1536x2048x30 Pix Clk: 128MHz SepSync V:+,H:- Timing: 2048x1536x30 Pix Clk: 128MHz SepSync V:+,H:- Monitor: MDM SMD21300	Timing: 1280x1024x60 Pix Clk: 108MHz SepSync V:+,H:+ Timing: 2048x2560x25 Pix Clk: 150MHz SepSync V:+,H:- Timing: 2560x2048x25 Pix Clk: 128MHz SepSync V:+,H:- Monitor: MDM SMD21500	Timing: 2048x2048x30 Pix Clk: 148.50MHz SepSync V:+,H:+ Monitor: Name: 2k x 2k x 30p Monitor: unused Monitor: unused	Timing: 1920x1200x60 Pix Clk: 162MHz SepSync V:+,H:+ Timing: 1280x1024x60 Pix Clk: 108MHz SepSync V:+,H:+ Monitor: Name: MDM Digital Monitor: unused	Timing: 2560x1440x30 Pix Clk: 120.60MHz SepSync V:+,H:+ Timing: 2560x1600x30 Pix Clk: 134.10MHz SepSync V:+,H:+ Monitor: Name: MDM Digital Monitor: unused	Timing: 2560x1440x60 Pix Clk: 241.20MHz SepSync V:+,H:+ Timing: 2560x1600x60 Pix Clk:268.20 MHz SepSync V:+,H:+ Monitor: Name: MDM Digital Monitor: unused	Timing: 2560x1440x60 Pix Clk: 241.20MHz SepSync V:+,H:+ Monitor: Name: MDM Digital Monitor: unused	Timing: 1920x1080x60 Pix Clk: 138,5MHz SepSync V:-,H:+ Monitor: Range Limits: V:50-85Hz, H:25-83kHz Max Pxl Clk:140MHz Monitor: Name: MDM Analog HD Monitor: unused