

VSDxxDVI Matrix switch

applies to VSD44, VSD48, VSD84 and VSD88

Installation instructions & technical manual

Congratulations! You purchased a powerful DVI digital matrix switch, capable of switching up to 8 DVI signal sources to up to 8 displaying devices like beamers, LCD monitors or other displaying units.

This manual will describe the installation procedure and give operating instructions. The explanations will help you to understand the usage of the unit and give you all necessary informations to combine the VSDxx with your existing environment.



Please read this manual carefully. It will contain necessary information you will need for safe and secure operation of the unit!

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1 Overview about features

VSDxx is a pure digital crosspoint switch (resp. matrix switch) for digital DVI video signals. It simultaneously connects up to eight DVI sources to up to eight displaying devices. For each video source, you can either use a "point-to-point" mode (where you connect exactly one source to exactly one displaying device) or a "point-to-multipoint" configuration, where the video signal of one input is distributed to several displaying devices.

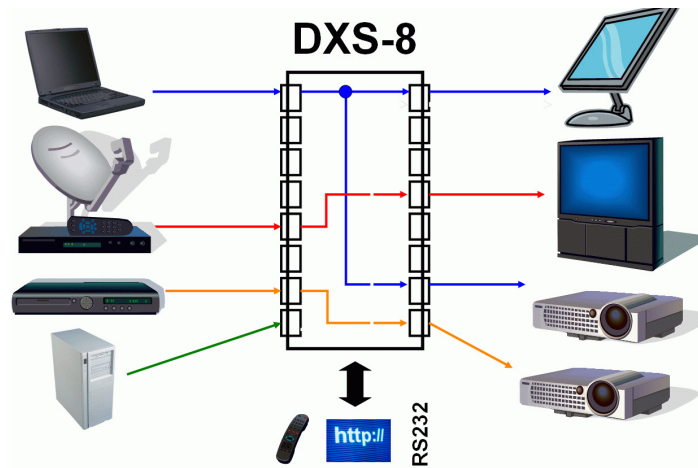


Figure 1: typical application of VSDxx

You can operate the VSDxx by:

- manually using the front switches (buttons)
- remotely using RS-232 control
- remotely using an (optional) infrared remote control (not included)
- remotely using the build-in webserver (and your preferred internet browser)
- remotely using a telnet console

The VSDxx has a blue character display in the frontside faceplate, which normally shows the actual switching state, i.e. the current connections between the inputs and outputs. When operated remotely using the web interface, the current switching state of the matrix is displayed graphically, with console control (RS-232 or telnet), you can query the switching state using a command language.

When changing DVI connections between video sources and displaying devices, it is not only necessary to switch the video connections/informations, but also to properly handle so called EDID-Information, which is mandatory in the DVI standards. VSDxx will manage this automatically, according your setup configuration.

2 Setup and cabeling instructions

2.1 Unpacking

Please take VSDxx out of the shipping box, take away plastic shock protection and transportation bag. Strip of front panel protection tape, starting at one corner of the front panel. Unpack power cord and all other material supplied with the shipment, and keep it ready for use.

2.2 Packing list

Please check shipment for all parts, listed in the packing list below:

- one VSDxx-unit (size 435,0x260,0x44,0 mm)
- two side protection covers (foam, white)
- one power cord, length 2m
- one serial RS-232 cable, length 2m, one side DSUB9 male, other side DSUB9 female. Connected 1:1
- four black rubber stickers, to be attached, when unit is operated desktop
- optional (if ordered): one infrared remote control
- two 19-inch rack mount brackets, one with additional center cutout to support ventilation. This bag will also have eight screws (black, M4x5mm).
- one operation manual (this document)

2.3 Operation location requirements

The VSDxx has an IP 40 degree of protection against dust and humidity (according to IEC529).

You have to ensure a mounting or operation location, where no danger of entering fluids will exist.

Furthermore you must ensure compliance with the specified environment conditions (see chapter 8.2), especially temperature and relative humidity.

2.4 Setup and mounting

You can operate VSDxx „desktop“ on a shelf or tabletop, by sticking the four rubber stickers to each corner of the bottom of the VSDxx unit. With that stickers, small roughness of your table is compensated and the unit will not slide away on flat surfaces.

Alternatively, you can mount the VSDxx into a 19-inch rack, using the brackets supplied. The mounting of the brackets is simple, you just need a screwdriver (size PH2). Start on the left hand side of the unit (front is the side with the buttons, top is top when reading the front panel tags correctly) and unmount the two front and the two middle screws completely. Take the one bracket with the center cutout and attach it to the left hand side of VSDxx, using the longer M4x5 screws contained in the bracket's bag. After that, the ventilation cutout of the VSDxx chassis should not be blocked significantly by the newly attached bracket. Repeat procedure on the right hand side, using the remaining bracket.

When operated desktop or rack-mount, please ensure that nothing will cover the ventilation cutouts on the lefthand side of the unit.

2.5 Electrical connections

2.5.1 mains connection

Please attach mains cord (supplied with shipment) into the IEC-320 connector of the VSDxx. This connector is located on the back side of the unit. Now plug the mains plug into the wall outlet of your installation.

The VSDxx has no power switch, it will immediately start operation when plugged into a “hot” wall outlet. The unit will boot and ready for operation after 10..15 seconds.

The blue LED of the power button (caption: O/I, rightmost front button) will be permanently on, when unit is powered and active. Each time, the main power fails and returns, the VSDxx will return to the ACTIVE state!



As the unit has no main power switch, it will be ON after attaching the unit to a powered wall outlet. To have the VSDxx de-energised, please detach mains power cable!



Never expose any cables to mechanical stress like strong bending or pull. This can damage cables and impact security!

2.5.2 Attaching DVI video sources

Next step in setup procedure is attaching video sources.



To avoid damages to VSDxx and your existing video sources, all connections between components are to be done when ALL units are powered off. Now ensure that you have powered off all video sources and the VSDxx.

Now connect your DVI video sources to VSDxx, using your DVI-D-video cables (not with the shipment), one after another. All inputs of VSDxx will be labeled with "Input 1" to "Input 8". You are free to use any input you like for a specific source, all inputs are electrically identical.

It is a good idea to denote all input connections, i.e. which source goes to which input number.

You can use any DVI-D cable, with high quality cable you can have your video source up to 35m away from the VSDxx. Each input has a signal equalizer that refreshes the signal to standard levels.

If you are having your VSDxx licensed only with four inputs (i.e. VSD44 or VSD48), the inputs labeled "Input 5" to "Input 8" are out of functionality and should not be used, i.e. you can not route signals from these inputs to any output. But there is not problem or damage, if you attach video sources there by accident.



Mechanically fix the connections by using the screws of the male DVI connector. This will ensure reliability of the system.

2.5.3 Attaching DVI displaying devices

Now connect your displaying devices (i.e. monitors, LCDs or beamers) to the outputs of the VSDxx, using your DVI-D cables (not with the shipment). All outputs of the unit are labeled "Output 1" to "Output 8". You are free to use any of the available outputs for your devices, all are electrically identical.

Complete your written notes by denoting the output assignment, i.e. which output goes to which of your displaying devices.

Use no DVI cables longer than 5 m as output cables when using maximum video resolutions like 1600x1200 Pixels.

If you are having a VSDxx licensed only to four outputs (i.e. VSD44 or VSD84), only "Output 1" to "Output 4" will be active. All other outputs will carry no active video signals, but provide signal levels according to DVI standard.



Mechanically fix the connections by using the screws of the male DVI connector. This will ensure reliability of the system.

2.5.4 RS232 connection

If you intend to control the VSDxx matrix switch by a PC or Laptop using the RS-232 serial interface, please connect the serial cord supplied to the DSUB9F-connector at the back of VSDxx, to the connector labeled "RS-232". The other end of the cable should be connected to the serial interface of your PC/Laptop. If your equipment does not have a serial interface or connector, you can use either control by network/TCP or using a USB/RS-232 converter dongle available in some shops. You can find pin connection diagram and configuration data of the serial interface in section 8.1.5 of this document.

2.5.5 TCP/IP connection

Using a TCP/IP network connection, you can control VSDxx remotely either using a web interface or using a telnet console session.

If you intend to use this kind of control, please connect a standard network cable (for 100MBit/s CAT5 or higher) to the port labeled "TCP/IP" at the rear of the unit and your network. The unit will support 10MBit/s and 100MBit/s TCP/IP networks, but does not have a so called "Auto-MDX"-mode, i.e. when you like to connect it directly to a PC's network interface, you have to use a "crossed" network cable or your PC's network adaptor must be capable of Auto-MDX.

2.5.6 Checking your cabling

After doing all connections, your overall system (containing the VSDxx) should look like this:

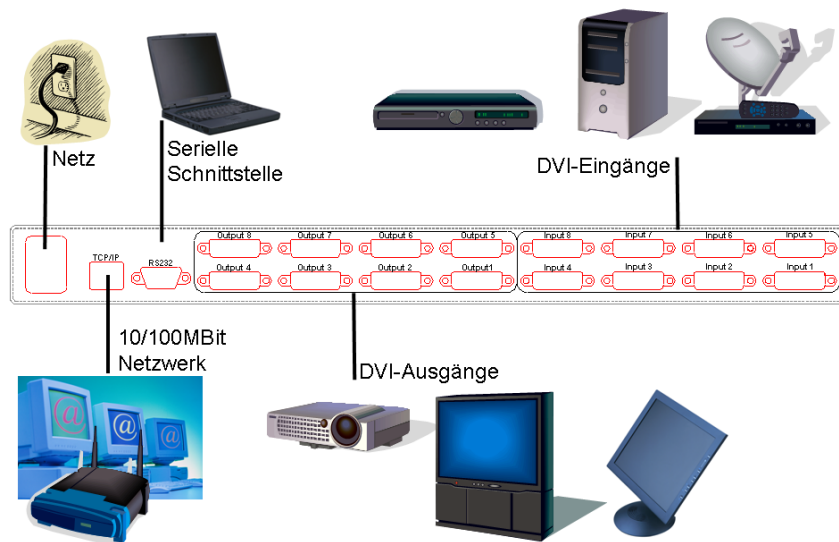


Figure 2: VSDxx cabling

3 Operating instructions

3.1 Powering on/off, Standby-operation

When VSDxx is connected to a hot wall socket, it will start and boot automatically. All button LEDs will flash for a short period of time and the text display will show a short welcome message (from the boot-loader). After that, the unit tries to reach a TCP/IP network (if cable connected).

After 10 seconds max., the unit is up and ready for operation. The text display will switch to a "status display" mode (see figure 3). You can read all active routing connections from that status display. All outputs available are written in the top row, starting with "OUT:". The lower row displays the number of the input connected to the output above. A minus sign says, that the output has NO connection to any input. Reading a number gives the number of the input channel, that is actually connected to the output.



Figure 4: Routing status display (example)

The example in figure 5 reads:

- Outputs # 1,4 and 6 are off
- Output #2 shows video connected to input #6
- Output #3 shows video connected to input #4
- Output #5 shows video connected to input #5
- Output #7 shows video connected to input #3
- Output #8 shows video connected to input #1

By pressing the "O/I"-button on front panel longer than 3 seconds, the VSDxx will quit active mode and go to a standby mode of operation. All active connections break and the unit will turn off most of its internal functions.

If the unit is in standby, you can activate it by pressing the "O/I"-button longer than about 1 second. Then, all previous routing connections are re-established (both video and EDID-connections).

3.2 Outline of operation

As mentioned shortly in chapter Fehler! Verweisquelle konnte nicht gefunden werden., the VSDxx can be operated by different methods. These methods differ in complexity and level of control, so rookies and professional users will find their appropriate control method.

To ease handling of the VSDxx and have a quick start, let's outline the next sections:

- make and break video routing connections
- save and recall setups scenarios with "presets"
- control system's menu tree
- control system's features through remote interfaces like console or web interface

3.3 Set up video connections between inputs and outputs

3.3.1 Making a connection

First, select the output number of the connection you intend to make by pressing one of the numeric buttons "1" to "8" (resp. „1" to „4", if you only licensed 4 Outputs). Now, the LED of the selected output will flash slowly. And the cursor in the text display will flash the number of the selected output channel.

Now pressing one of the numeric buttons "1" to "8" (resp. "1" to "4", if you licensed only 4 inputs) will make the connection to the selected input number. The former flashing LED will blank and the status text display will show the newly established connection.

3.3.2 Modifying or breaking an existing connection

An existing connection can be modified by re-establishing a new connection/routing, just like described in the previous section. If you intend to break an existing connection, just press the number of the output you want to turn off (break connection), after the LED light flashing, press the "P"-button. This will break the

connection and turn off the LED. The text display will show a minus sign under the selected output number, to show the "off"-connection.

3.4 Save and recall of presets

You can save or recall a routing setup any time you like. By saving a preset, you can preserve a complex setup for later use. By recalling a setup, you can switch several channels synchronously.

3.4.1 Saving a preset

For preserving the routing state of VSDxx, i.e. which inputs are connected to which outputs, VSDxx system offers eight so called "presets". These presets are non-volatile, i.e. even after power-loss you can restore your system routing, if you have saved it to a preset bank before.

To save a setup as preset, make all connections you like to do. Then press the "P"-button ("P" like preset) longer than a second. The text displays then switches to the "PRE-SAVE" mode, like in figure 6.



Figure 7: Saving a preset

The display now shows eight available preset banks (storage locations) in the top row, the lower row shows the usage status of the bank. A carret says, that the preset bank is already used, but can be overwritten, a minus sign says, the preset bank is free.

The cursor and the eight LEDs (on the eight numeric buttons) invite you to select the preset bank you desire, by pressing the appropriate numeric button. After successfully selecting a preset bank, the text display will return to the status display of figure 8 and all flashing LEDs will stop flashing.

If you like to cancel saving instead, just press the "P" button instead of one of the numeric buttons. Then preset save dialog will be canceled and text display will return to standard status display of figure 9.

Attention:

- Only the actual routing information will be stored into a preset bank. No EDID-content will be saved (and recalled later) using the preset functions!

3.4.2 Recalling a preset setup

To load (recall) a saved preset, just press the "P"-button shortly. The text display will switch to a "PRE-LOAD" mode, as printed in figure 10.



Figure 11: Loading a preset

Like when saving (see section 3.4.1), the top row will display all eight preset banks, the lower row will show all used banks with carets, unused free banks are shown as minus sign.

All LEDs of those numeric buttons will flash slowly, that represent used banks, i.e. those banks that can be recalled. Just choose the preset number desired by pressing the numeric button on the front panel. The load process is immediate, i.e. the video routing is modified immediately according to the saved routing configurations. After successful loading, the text display will return to status display mode like in figure 12.

If you like to cancel the recall process, just press "P" button instead of one of the numeric buttons, then the text display will return to standard status display and LEDs will stop flashing.

3.5 Menu functions

3.5.1 Menu system

Using the built in menu system, more complex system functions are available.

To handle the menu system, you have to use the four cursor buttons (arrows up, down, left, right) and the "enter" button, located right of the "right" cursor button. With those buttons, you can navigate through a menu tree, to access more complex system functions.

To operate the menu, these "rules" apply:

- The menu will open after you press the "right", "up", "down" or "enter" button, if the text display is showing the standard status information like in figure 13.
- Using "up" and "down" buttons, you can navigate through the menu items. If there are more than two menu items, advancing in one direction will scroll the menu tree.
- The current, active menu item will have a blinking cursor in the rightmost column of the text display.
- After pressing the "right" or the "enter" button, the active menu function is executed or a submenu is opened, depending on the menu item.
- Using the "left"-button, you can close a submenu or quit a function, returning to the next upper menu, or even closing the menu system, if you are already in the topmost menu level.
- For certain function, the menu system has "option" functions, i.e. you are allowed to select one of several possibilities. With "up" and "down" you scroll through the options available. The actual selected active option has a caret in the rightmost column of the text display. You select your option by navigating to the line with your option, then pressing "right" or "enter" button.
- For menu items requiring numerical entry (like IP addresses), you will have a cursor and be able to modify each digit with the "up" and "down" keys and navigate through the positions with "left" and "right" keys. Pressing "right" at the rightmost position of entry, you will acknowledge your entry, leaving entry "left" will cancel your input.

3.5.2 Menu tree

VSDxx MAIN MENU

Routing	Leads back to the switching matrix
Presets	
Load	Recalls / Loads a saved preset from a bank
Save	Saves a preset to a preset bank
Clear	Clears a single preset bank
Clear ALL	clears ALL preset banks (after prompt message)
DDC/EDID	
Input Config	Adjust EDID behaviour of an input
EDID manager	Manage EDID storage banks
Status	
Input Status	
Connection	Displays used/unused input ports
DDC/EDID mode	Displays EDID mode of all inputs (static, follow, etc.)
Output Status	
Connection	Displays connected/unavailable output ports
Overcurrent	Displays overcurrent status of output supply 5V
Network Status	
IF	TCP/IP network: current network interface state
IP	TCP/IP network: current IP address of VSDxx
MSK	TCP/IP network: current netmask of network interface
GWY	TCP/IP network: current default gateway of network IF
Version Info	
HW	hardware revision number
SW	firmware revision number
Boot	bootloader software revision number
Link	display of the http-address of the manufacturer
System Info	
System Setup	
Network Setup	
DHCP	set DHCP usage (ON/OFF)
IP	set IP-Adress, when no DHCP active/available
MSK	set netmask, when no DHCP active/available
GWY	set default gateway, when no DHCP active/available

3.6 Console and TELNET access

3.6.1 Introduction to Console/Telnet

Console and Telnet connection to the unit is different in terms of electrical connectivity, but both access methods share the same command set and handling.

For serial remote control, please use the serial cable shipped with the unit. The cable is to be connected to any available serial port (i.e. COM1) of your PC/Laptop. At the unit, please attach the serial cable to the DSUB9-connector labeled „RS 232“ on the back side of the unit.

The serial interface parameters are 57600 8N1, which is:

- baudrate: 57600 Baud
- data bits: 8
- stop bits: 1
- parity: None

You can use „Hyperterminal“ which is shipped with Microsoft Windows® operating systems or any other terminal application programs available on your operation system preferred.

For Telnet connection, please attach the unit to your local network (LAN) via a STP/UTP cable (not included with the unit). At the unit, use rear connector labeled „TCP/IP“. Any TCP/IP network with 10MBit/s or 100MBit/s is supported. Please refer section 3.5 for adjustment network connectivity via menu buttons/front panel or use a serial console connection (and commands listed below) to adjust network parameters correctly. If your LAN is supporting DHCP, then the unit will be assigned automatically and you simply can read the IP address assigned with front panel menus (Status/Network Status/IP).

To control unit via TELNET, please use a special telnet application like „PUTTY“ or use the windows command line „telnet aaa.bbb.ccc.ddd“ while using the unit’s IP address as aaa.bbb.ccc.ddd in dotted numerical format, i.e. „telnet 192.168.0.100“.

Both access methods (serial or telnet) will open a console application, where you can type in commands and get back replies.

First of all, you have to authenticate to the unit, because configuration access is protected with password to avoid unauthorised use of the unit. By default (factory setting), login is possible using:

Login: any

Password: any

Please mind upper case / lower case writing. Any command line ends by typing the ENTER-key at your keyboard.

Here are some hints for console control:

- you can add additional users using the „sys_addusr“ command (see below)
- you can get a list of all commands available by typing „help“ or „?“
- a short help message to any command is available by typing „? <command>“ where <command> is the command string you’re interested in. Don’t forget the space in between the question mark and the command.
- Issuing „exit“ command will log off serial console (you have to re-login) respectively will close the TELNET session.

3.6.2 Console command description

3.6.2.1 *edid_clear*

Format: **edid_clear N**

Clears the content of EDID-bank #N. All EDID information stored is discarded. Caution: there is no request dialog, command is executed immediately.

3.6.2.2 *edid_list*

Format: **edid_list**

Lists the usage status of the EDID banks. If a bank contains no EDID information, the status is „empty“. If a bank is used, the EDID monitor name (if available) of the bank content is displayed. If there is no name contained in the EDID data but valid EDID data (i.e. checksum is OK), just „valid“ is displayed as bank status.

Using the web interface of the unit, you can even assign a own name of the bank, but this is not available via Console or Telnet.

3.6.2.3 edid_mode

Format 1: `edid_mode`

Displays the behaviour of EDID/DDC for each input. This is a typical printout (factory setup):

```
IN:  1 2 3 4 5 6 7 8
DDCM:S S S S S S S S
```

When reading the example, the first row will list all inputs available at the unit and the second row will show a character abbreviation for the input number the row above.

All eight inputs (of the example) are configured to „S“ (=STATIC). Please use this table for interpretation of the abbreviations used:

char	EDID-mode
-	OFF: no EDID available at input, Hotplug is off. An external video source will not read any EDID info, as long unit is powered. When power is off, any input of the unit will behave like „static“ (see below) to be DVI compliant.
S	STATIC: a static EDID data set is presented at the input. Hotplug signal is always ON. A video source is able to read EDID/DDC data at any time.
F	FOLLOW: see chapter 7.2
T	THROUGH: see chapter. 7.2

Table 1: abbreviations for EDID mode

Format 2: `edid_mode in mode`

Parameter:

`in` = [1..input count available]: number of input used
`mode` = mode character (see table 1)

Modify the EDID operation mode of input number #`in`. Command is executed directly. The new mode of EDID behaviour is stored persistently, so even after power reset, the input will behave the same way.

3.6.2.4 `edid_read`

Format 1: `edid_read N`

Parameter:

`N` = [1..input count] read back EDID to console from output #`N`
`N` = [11..(10+input count)] read back EDID from input EEPROM of input #(N-10)
`N` = [21..28] read back EDID from internal bank manager bank # (N-20)

This command displays EDID-information. These infos (read back) will be printed onto console.

This is a typical printout:

```
>edid_read 11
Reading internal DDC from input #1
0000: 00 ff ff ff ff ff ff 00 08 ed 10 01 00 00 00 00
0010: 25 11 01 03 80 00 00 00 6d ee 91 a3 54 4c 99 26
0020: 0f 50 54 af cf 00 61 59 71 4f 81 80 81 40 31 59
0030: 45 59 a9 40 01 01 48 3f 40 30 62 b0 32 40 40 c0
0040: 13 00 67 1f 11 00 00 1e 00 00 00 fd 00 32 78 1e
0050: 6e 11 02 00 20 20 20 20 20 20 28 3c 80 a0 70 b0
0060: 23 40 30 20 36 00 00 00 00 00 00 1a 00 00 00 fc
0070: 00 43 52 4f 53 53 42 41 52 20 38 0a 20 00 00 0b
0080: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0090: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00a0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00b0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00c0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00d0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00e0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00f0: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
EDID is valid!
EDID monitor name: 'CROSSBAR 8'
```

All data is printed in hexadecimal format. If available, the EDID monitor string is printed, too. The message "EDID is valid!" says, that edid checksum is OK and EDID is valid.

Format 2: `edid_read N M`

Parameter:

`N` = [1..output count]
`M` = [1..8]

Reads back EDID data from output #`N` and saves this data to internal bank manager bank #`M`, if read back data is valid, i.e. checksum is OK.

Caution: If bank #`M` is already use, the new data will overwrite the old information with user request.

3.6.2.5 `edid_write`

Format: `edid_write N M`

Parameter:

`N` = [0, 1..8]
`M` = [1..input count]

Copys EDID data from bank manger's bank #`N` to input #`M`'s EDID-EEPROM. If bank #`N` (the source of copy) is empty, an error message is displayed.

If using `N=0`, the unit will use factory EDID as source for the copy. Using this systax will reset input #`M` to factory setting.

The input EEPROM #M is overwritten immediately, independent of the EDID mode (-,S,F,T) of the input #M. When EDID mode is "follow" (F), the input EEPROM is overwritten again after next change of routing which concerns input #M (because fulfilling the Follow-behaviour).

Preferred application of this command is using it with inputs in „static“ (S) EDID mode. If your video source is not sourcing video data because it does not like the "factory" EDID info of the input, you can read back EDID data of a displaying device (important: that is WORKING with the source) from the output and store it on a bank manager's bank available, using "edid_read" command. Then, copy the bank content to the input where your source is attached (using "edid_write") and then ensure, desired input is in static mode. In doing so, your video source will get exactly the same EDID information as when connected to the display directly.

3.6.2.6 exit

Format: **exit**

Quits the console application. For serial console, the user is logged off. For Telnet terminal session, the session is closed. To reconnect, you have to start a new telnet session again.

3.6.2.7 gettime

Format: **gettime**

Displays actual system's clock time.

3.6.2.8 help

Format 1: **help**

Lists all commands available.

Format 2: **help <command>**

Displays additional help text for command <command>.

3.6.2.9 ifstat

Format: **ifstat**

Displays network connectivity status of TCP/IP network interface.

Example:

```
>ifstat
IF      IP addr      Def Gtway      state  type      H/W addr
0       10.0.1.61    10.0.1.2       UP     Ethernet  0 :60:35:6 :26:29
```

Please read it:

Parameter	Interpretation
IF	number of network interface. Reads always „0“ with this unit.
IP addr	actual IP address of the unit.
Def Gtway	default gateway's IP address
state	internal (! of the unit) network interface status. Even saying "UP", this does not mean that a network LINK is UP, just the internal network components are up.
type	reads always „Ethernet“
H/W addr	MAC-Adresse of network interface. ReadOnly, because used as system identification. Please use this MAC address, if you want to assign a static IP address to the unit using a DHCP server (static DHCP). Please ask your network administrator for more information.

Table 2: Interpretation of ifstat's parameters

3.6.2.10 ip_setadr

Format: `ip_setadr DHCP IPAdr Netmask Gateway`

Parameter:

DHCP = [0..1]

IPAdr = aaa.bbb.ccc.ddd

Netmask = aaa.bbb.ccc.ddd

Gateway = aaa.bbb.ccc.ddd

Sets the parameters of IP network interface.

Setting DHCP=1, you determine the unit to try to address a DHCP server in your local network after boot/reset. If there is a DHCP server, and it is responding, the unit will assign the network configuration (reported by DHCP server) to its network interface. If communication with a DHCP server fails with timeout, the network operation mode is switched to static mode and parameters IPAdr, Netmask and Gateway are used for network configuration.

If you have assigned a new IP Address for the unit using your DHCP administration panel, you have to reboot the unit to restart DHCP renegotiation.

Setting DHCP=0 you will disable DHCP and always use static IP parameters IPAdr, Netmask und Gateway for network configuration. In doing so, bootup time of the unit can be faster because it does not try to communicate with a DHCP server.

All command parameters must be entered in IPv4-dotted-format (decimal), i.e. 192.168.0.1. The unit is not supporting name resolution (DNS = domain name services), so only dotted numerical format is available.

For netmask, use standard form, like for class C subnets: 255.255.255.0.

Example: `ip_setadr 1 192.168.0.100 255.255.255.0 192.168.0.1`

Enabled DHCP and configures IP-address 192.168.0.100 using a class-C subnet and IP 192.168.0.1 as gateways to access external networks.

Remark: this example is exactly the factory setting of the unit's network interface

All IP parameters are stored persistently. To make changes effective, unit has to be rebooted. Please use command `reboot` (siehe section 3.6.2.15).

3.6.2.11 Ping

Format: `ping IPAdr`

Parameter:

IPAdr = aaa.bbb.ccc.ddd

Send out Ping-messaged (ICMP-Messages ECHO) to IP-adress ,IPAdr' reports reply messages.

When there is no network connectivity (i.e. no cable, misconfigured setting, etc.) display text reads like this:

```
>ping 10.0.1.1
ZTP2.0.0(C) ZiLOG Inc. [ping utility]
PING#1
PING#2
PING#3
Ping Stats:
Sent:3
Recv:0
Success:0%
No response from 10.0.1.1
```

When target IP address is reachable, display will be:

```
[x8]>ping 10.0.1.2
ZTP2.0.0(C) ZiLOG Inc. [ping utility]
PING#1, Reply from 10.0.1.2 :rtt < 50 ms
PING#2, Reply from 10.0.1.2 :rtt < 50 ms
PING#3, Reply from 10.0.1.2 :rtt < 50 ms
PING#4, Reply from 10.0.1.2 :rtt < 50 ms
```



```
Ping Stats:
Sent: 4
Rcvd: 4
Success: 100%
Avg RTT (Approx): 0.00 sec
```

You can use this command to test network connectivity.

3.6.2.12 *pre_clear*

Format 1: **pre_clear N**

Parameter:

N = [1..8]

Erase routing preset #N and free memory usage. This command is executed directly.

Format 2: **pre_clear ***

When using an asterisk, '*' as parameter, this command erases all preset banks. But there will be a security question that has to be answered with 'y' (mind: lower case) like 'yes' and ENTER for command being executed.

3.6.2.13 *pre_load*

Format 1: **pre_load**

Displays the usage status of all routing preset banks available (i.e. 8).

This is a typical output:

```
>pre_load
Preset bank status:
PRE: 1 2 3 4 5 6 7 8
STAT * - * - * * - *
OK
```

Row, 'PRE:' displays the numbers of all routing preset banks available (here: one to eight)

All routing presets used read an asterisk, (*) the line below, all unused/free bank positions read as minus sign ('-').

Format 2: **pre_load N**

Parameter:

N = [1..8]

Recalls routing preset #N from memory to direct execution in the switching matrix of DVI signals.

If preset bank #N is empty, there will be an error message like:

```
>pre_load 2
Error: bank 2 is empty
```

If recalling from preset is executed successfully, the new switching status of the unit is displayed:

```
>pre_load 8
Matrix routing state:
OUT: 1 2 3 4 5 6 7 8
IN:  - - - - - 4 -
OK
```

3.6.2.14 *pre_save*

Format: **pre_save N**

Parameter:

N = [1..8]

Saves the actual routing state of the DVI signal to routing preset bank #N. The bank contents are persistent, i.e. the routing is available even after power off and reset.

Remark: The preset stored the last before system power down will be used as boot configuration after power reset. This means, that if you modify the routing AFTER the last "pre_save" command (or a similar menu/web command), you will lose your modifications after power down.

3.6.2.15 *reboot*

Format: **reboot**

Reboots the system immediately. Same as power off and on again.

You will lose all your telnet and web connections when rebooting your system. And you will be logged off the serial console, but reboot messages are still displayed in serial terminal.

Remark: when rebooting, system is first starting a so called "Bootloader", which is intended for supporting firmware upgrades and system management. If Bootloader recognizes a "good" system configuration, it will continue booting the unit's systems to normal operation. If front panel display still showing "Bootloader" after about 20 seconds, please contact your sales rep for technical support.

3.6.2.16 *settime*

Format: **settime year month day DayOfWeek hours minutes seconds**

Parameter:

year	= [2000...2199]
month	= [1..12]
day	= [1..28] to [1..31] depending on month
DayOfWeek	= [0..6]: 0=sunday, 1=monday, etc.
hours	= [0..23] Caution: european 24 hours notation (NOT: 1PM etc.)
minutes	= [0..59]
seconds	= [0..59]

Sets the system's clock. The unit has an internal real time clock. This setting is optional, because no function of the unit is dependent on correct system time.

3.6.2.17 *switch*

Format 1: **switch**

Displays the actual routing state.

Example:

```
>switch
Matrix routing state:
OUT: 1 2 3 4 5 6 7 8
IN:  - - - - - 2 5 6
```

The example reads:

- output #6 is connected to input #2
- output #7 is connected to input #5
- output #8 is connected to input #6
- all other outputs are not connected to any inputs, i.e. do not show any video data.

Format 2: **switch N M**

Parameter:

N = [1..output count]
M = [-, 1..input count]

Switches output #N to input #M. If M is the minus sign ('-'), output N is switched off.

This command executes immediately. After command execution, console displays new switching state, according to "Format 1" command result (see above).

Format 3: **switch * M**

Parameter:

M = [1..Anzahl Eingänge]

Switches ALL available Outputs to input #M. Same behaviour as syntax "Format 2".

Format 4: **switch * -**

Switches ALL available Outputs to OFF, i.e. not connected to any inputs.

Same behaviour as syntax "Format 2".

3.6.2.18 *sys_addusr*

Format: **sys_addusr** name password

Parameter:

name = user name, 15 characters max.
password = password, 15 characters max.

Adds a new user to user management. After successful command execution (no message) the new user can connect to the unit using the new name and password.

If entered name or password do not fulfill length and format requirements, an error message is displayed.

Remark: Do use ASCII characters only and avoid any special characters in name and password. This makes your login compatible with any terminal or Telnet application software.

3.6.2.19 *sys_delusr*

Format: **sys_delusr** name

Parameter:

name = (user-)name of an user existing.

Discards the user 'name' from system's user management. If user is connected to the unit while deleting its record, existing connections won't break, but the user can not open any new connections.

If user ,name' is unknown to the unit, an error message will appear.

Remark: Do not delete your own actual user from user management, because you won't be able to connect to the unit again!

3.6.2.20 *sys_fan*

Format 1: **sys_fan**

Displays the current status of the system's fan.

Under normal operating conditions, the fan is off. It will be turned on automatically when system's temperature requires cooling.

Please read table 3 for interpretation of fan speed result.

fan speed	rotation
0	off
1	25%
2	50%
3	75%
4	100%

Table 3: fan speed index

Format 2: **sys_fan** N

Parameter:

N = [0..4] like in table 3.

Sets the system's minimum fan speed. If unit requires higher fan speed for keeping its internal temperature in valid ranges, it rises actual fan speed.

3.6.2.21 *sys_temp*

Format: **sys_temp**

Displays system's temperature sensors readings. Units are degrees Celsius.

Example:

```
>sys_temp  
Temp (0) = +37.875  
Temp (1) = +28.000
```

Sensor 0 is located near main DVI processor and in thermal contact with it. Sensor 1 is located near the unit's internal power supply.

Remark: Reading values up to 70°C for „Temp(0)“ are OK.

3.6.2.22 *www_lang*

Format: **www_lang N**

Parameter:

N = [0,1] = see table 4

Sets the unit's web server user interface language (s. Kap. 3.7).

Remark: only for web user interface, console style interface like serial or Telnet are always in English language.

N	Language
0	Englisch
1	German

Table 4: WWW language settings

3.7 Webserver

The built-in webserver can be reached using any browser: [http://\(ip-adr\)](http://(ip-adr)) .

If VSDxx is connected to a TCP/IP network, you can query the current IP address using the menu tree unter: STATUS/ NETWORK STATUS/ IP

Because VSDxx uses "Javascript" as http extension, your browser must support Javascript. Manufacturer qualifies current versions of Microsoft Internet Explorer, Opera and FireFox.

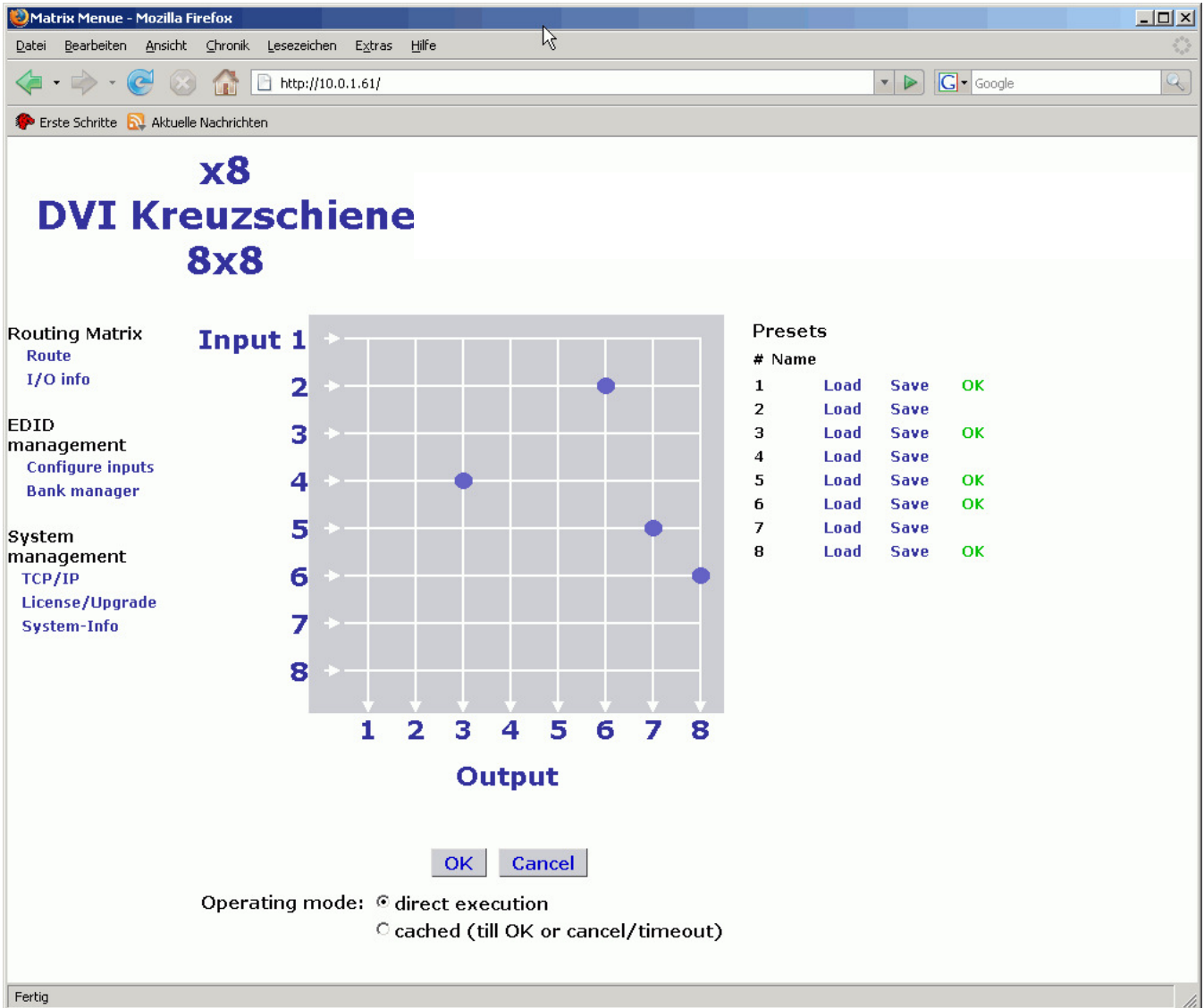


Figure 14: Webinterface (main menu) of VSDxx

4 Safety requirements



VSDxx unit only may be operated on mains systems having power earth (PE) for grounding the system chassis. The power earth contact of the power cord never must be covered or destroyed when plugged to the unit or the mains outlet.

5 Electromagnetic compatibility (EMC)

VSDxx was tested and qualified successfully according CENELEC EN 60601-1-2 (1993).

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual (see section Fehler! Verweisquelle konnte nicht gefunden werden.), may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

6 Maintenance, repair and cleaning

6.1 Maintenance and repair

VSDxx operates without any mechanical or electrical maintenance.



In case of failures or defects, please return complete device set (see bill of materials in section Fehler! Verweisquelle konnte nicht gefunden werden.) to repair to your supplier. The unit has no serviceable parts.



Do not try to open the VSDxx unit. There is hazard of electrical stroke or mechanical injuries.

6.2 Cleaning the unit

When the unit is de-energized (by unplugging the mains cord!), you can clean the mechanical surface on top, bottom, front, back, left and right with a clean and dry cloth. You can use a damp cotton cloth (with general purpose cleaner), too. But power up the system only when all humid surfaces went dry.

Avoid mechanical stress when cleaning, especially the blue front cover of the text display is sensitive, scratches may occur.



Do not use aggressive cleaners to clean the unit.

7 Technical manual

7.1 DVI routing

VSDxx is build to route DVI video signals (and their implicit display info) from inputs to outputs. It approves DVI1.0 standard, having the maximum transfer rate of 1.65Gbit/s on every video data differential line. With that, you can have video resolutions of up to 1920x1200 Pixels (at 60Hz repetition rate) on each of the inputs and outputs.

Transporting that high data rates over copper cables will lead to signal (and content) degradation, the more the longer the cables become and the higher the resolutions are. To compensate that "cable loss", VSDxx has adaptive cable equalizers on every input port. As the equalisation is adjusted permanently and automatically, no user interaction is required. Using this equalizers will extend the cable length at each input to more than 35m at maximum DVI resolution, high quality cables assumed.

After the signal improvement the video signal of each input is routed to a dedicated, special crosspoint routing chip. This chip is able to route the video signal to one or many of its outputs. When routing only to one output, this will set up a point-to-point interconnection, if it routes one signal to many outputs, this makes a point-to-multipoint connection (diversity function).

The routing chip is a non-blocking switch, i.e. existing routings do not block / prevent new routings of other inputs or outputs. Only one major rule will apply: one output can only show maximum one input. If you select a new input for an output, the existing routing will break before making the new connection.

If you add a new output to a already routed input (i.e. already leads to another output port, too), the existing routing will not show any interrupt or signal errors.

All output signals leaving the routing chip are buffered with line drivers before going the the port's DVI connector. This will allow maximum cable length with good signal integrity at each output.

7.2 EDID handling

The DVI standard defines, that every DVI video source has to be able to find out the video features of a DVI compliant displaying device. The idea behind is, that the source will find out, what resolutions (in size and timing) are supported by the display, and then only send out "supported" timings and signals, so that the display will always show best possible content.

To find out the display's information dataset, there has to be a so called "DDC" (display data channel), which is implemented between source and sink of a DVI video system. Technically speaking, there is a I²C-Interface between source and sink, and a protocoll specification, how the source can read and interpret display's information data. Many publications call this dataset "EDID", an acronym for "extended display information data". This manual will follow this definition.

As mentioned above, every displaying device has to provide EDID information when it is compliant to DVI standard. As VSDxx acts as display device, seen from any video sources (like PCs), VSDxx must provide EDID info compliant to DVI standards at any time. Even if VSDxx is de-energized, it has to provide that info! To fulfill these requirements, a sophisticated EDID handling is built into VSDxx.

EDID handling is required for every input separately, so setup of EDID behaviour is available for each of the inputs present separately. You can set up these modes of operation:

A) EDID emulation („STATIC“):

The DVI input has a valid, static EDID information, that never changes automatically. The EDID content can be a factory default or any EDID information that is read back from an attached displaying device (which MUST provide an EDID). The static information on each DVI input port is available for a video source even if VSDxx is de-energized; the video source provides a small supply voltage through the DVI cable.

B) EDID follow („FOLLOW“):

Having that mode, the DVI input holds a copy of the currently assigned output display's EDID info. If the input is routed to two or more outputs (point-to-multipoint configuration) , the output with the lowest channel number will be the one used as source of EDID. If a change in routing occurs (with respect to the input), the new EDID is copied to that input and the source will receive a hotplug event to read the new EDID data.

If the input is unused (i.e. not routed to ANY output), then consequently there is no EDID available at that input, and the presence signal (hotplug) is removed for that input.

C) **EDID pass-through („THROUGH“):**

In that mode, the DVI input's display data channel (DDC) is electrically connected to the DDC of the output it is connected to. The video source is now reading the EDID directly from the displaying device, without any modification. In doing so, VSDxx is supporting HDCP encrypted video content, because this encryption requires that video source and displays permanently negotiate the current encryption keys for the video content.

The pass-through mode works out only if the input is in a point-to-point configuration. If the routing switches to point-to-multipoint (including the current input), then the first routed connection will continue direct connection, but the additional display will show no video info or only white noise, because on the addition output, HDCP decryption won't work.

If such a point-to-multipoint configuration is realized using presets, then the DDC connection will always go to the output with the lowest number assigned to that input.

If the input is unused (not connected) or connected to an output without an display attached, the source will read no EDID information.

At power off system state, all inputs fall back to static mode (A). They will show their last valid EDID content if read by a DVI source.

You can configure each input's EDID behaviour using console ("edid_mode" command) or via WEB interface (using the "configure inputs" menu item).

To handle the static EDIDs, the VSDxx has a so called "EDID bank manager", where you can read and store EDIDs from your displaying devices and assign it to some or all inputs. You can handle this by console access (commands "edid_read" and "edid_write") or even more simple by WEB interface.

7.3 Labels and Symbols

7.3.1 Markings on the faceplates

On VSDxx's front faceplates you can read these symbols and buttons, this is the meaning:

label	meaning
Arrow buttons: "up", "down", "left" and "right"	Navigate through menu functions.
Enter button (right of "right" button)	Enter key, acceptance functionality in menu and value entry.
Preset-button "P"	Button used for save and recall of presets.
Channel buttons "1" to "8"	Buttons for quick make or break of routing connections, and easy selection for preset save or recall.
"OK" button	Button for acknowledge of value changes, to be used in future versions of firmware. Currently not used.
cutout labeled "IR"	Receiver open eye for infrared remote control.
"O/I" button	Power off/on pushbutton

The rear faceplate has these labels:

label	meaning
TCP/IP	TCP/IP interface for control via ethernet 10/100MBit/s
RS232	Serial interface for control of VSDxx via RS-232
INPUT 1 ... INPUT 8	DVI input ports for up to 8 DVI video sources
OUTPUT 1 ... OUTPUT 8	DVI output ports for up to 8 DVI displaying devices

8 Technical data

8.1 VSDxx

8.1.1 Mechanical data

Width	436 mm
Depth	260 mm
Height	44 mm (1HE)
Weight	Ca. 2400 g
Colour	Black (powdered) with white printing
mounting orientation	desktop horizontal on rubber stands rack mount 19-inch with additional brackets

8.1.2 Electrical data

Supply voltage	100-240V AC, 47-63Hz
	Max. 2.0 A
power connection	IEC 320 connector, rear side
operation indicator	blue LED integrated in power pushbutton (labeled "O/I")
DVI inputs	DVI 1.0 compliant, resolutions 640x480 to 1920x1200 and HDTV 720p, 1080i, 1080p
DVI outputs	DVI 1.0 compliant, resolutions 640x480 to 1920x1200 and HDTV 720p, 1080i, 1080p power supply at each output: 2,5W (5V/500mA)

8.1.3 Approvals

Emmision	DIN EN 55022
Noise immunity	DIN EN 61000-4-2 DIN EN 61000-4-4 DIN EN 61000-4-5
Protection classification	Class I
Protection against dust and humidity	IP40
continuous operation	VSDxx is designed for continuous operation

8.1.4 Supported input signals

Video formats	all DVI1.0 compliant
Pixel rate	18-165 MPixel/s
Supported video resolutions	DOS (640x480@60Hz) up to WUXGA (1920x1200@60Hz)
DDC standard	EDID 1.3

8.1.5 "RS232" connector

Connector	DSUB 9 pin, female									
Protocol	RS-232 compatible, 57600 Baud, 8N1, RXD/TXD-2-wire mode with XON/XOFF-Handshake									
Application	User: remote control Manufacturer: system maintenance, updates									
Pin connection	<table border="1"> <thead> <tr> <th>Pin</th> <th>Usage</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>Transmitting data TXD</td> </tr> <tr> <td>3</td> <td>Receiving data RXD</td> </tr> <tr> <td>5</td> <td>System's ground</td> </tr> </tbody> </table>		Pin	Usage	2	Transmitting data TXD	3	Receiving data RXD	5	System's ground
Pin	Usage									
2	Transmitting data TXD									
3	Receiving data RXD									
5	System's ground									

8.1.6 "TCP/IP" connector

Connector	RJ45 8 pins (10M/100M), female																			
Protocol	10/100MBit/s Ethernet with TCP/IP																			
Application	Remote control																			
Pin connection	<table border="1"> <thead> <tr> <th>Pin</th> <th>Usage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TX+</td> </tr> <tr> <td>2</td> <td>TX-</td> </tr> <tr> <td>3</td> <td>RX+</td> </tr> <tr> <td>4</td> <td>connected to pin 5</td> </tr> <tr> <td>5</td> <td>connected to pin 4</td> </tr> <tr> <td>6</td> <td>RX-</td> </tr> <tr> <td>7</td> <td>connected to pin 8</td> </tr> <tr> <td>8</td> <td>connected to pin 7</td> </tr> </tbody> </table> <p>The pairs 4+5 and 7+8 are terminated to the center termination of the TX+/- pair. Termination is 75 Ohm each.</p>		Pin	Usage	1	TX+	2	TX-	3	RX+	4	connected to pin 5	5	connected to pin 4	6	RX-	7	connected to pin 8	8	connected to pin 7
Pin	Usage																			
1	TX+																			
2	TX-																			
3	RX+																			
4	connected to pin 5																			
5	connected to pin 4																			
6	RX-																			
7	connected to pin 8																			
8	connected to pin 7																			

8.2 Environmental conditions

8.2.1 Storage conditions

VSDxx and each of its parts can be **stored** following these conditions:

Parameter	Valid range
Temperature	0°C to 65°C
Relative Humidity	20% to 80%
Air pressure	700hPa to 1060hPa

8.2.2 Operation conditions

VSDxx and each of its parts can be **operated** following these conditions:

Parameter	Valid range
Temperature	10°C to 40°C
Relative Humidity	30% to 75%
Air pressure	700hPa to 1060hPa

9 Bill of materials

VSDxx is sold as a set/kit, containing these items:

Quantity	Part	Part code
1	VSDxx unit (19-inch)	
1	power cord (IEC 320 to your local wall outlet), 2m	
1	serial cord, DSUB9 female to DSUB9 male, connected 1:1	
1	19-inch mounting bracket set, consisting of two brackets and 8 screws (M4x5)	
4	rubber stickers (used as units stands)	
1	this manual	