vsm SmartHub Interface

User Manual

Version: 4.0/1

Edition: 31 March 2017

Revision History

Version	Edition	Changes	Firmware Version
1	2014-05-5	Initial draft	0.26
2	2014-06-13	Initial Release	0.26
3	2014-07-08	SmartHub 244 - port type description modified	0.26
4	2016-04-06	Added "Known Issues"	0.37
4.0/1	2017-03-31	New Overview graphics & template	0.37

To obtain the latest documentation and software downloads, please visit:

www.lawo.com/downloads

Table of Contents

1. Welcome

About this Manual

This document describes how to install and setup the **vsm SmartHub** within a VSM system.

Note that a system may comprise several software and hardware components.

Other useful documents include the:

- **vsm Software User Manual** - more about **vsmStudio**, the main configuration and administration tool, plus other software components: **vsmPanel**, **vsmWebPanel**, **vsmTimeSync**, etc.
- **vsm Gear User Manuals** - more about other hardware panel and interface options.

All Lawo manuals are available from the **Download-Center** at www.lawo.com (after **Login**).

Look out for the following which indicate:

Notes - points of clarification.

Tips - useful tips and short cuts.

Warnings

Alert you when an action should *always* be observed.

Lawo User Registration

For access to the **Download-Center** and to receive regular product updates, please register at:

www.lawo.com/user-registration.

2. Important Safety Instructions

General Safety

Warning

Exposure to excessive sound pressure levels can lead to impaired hearing and cause damage to the ear.

Please read and observe ALL of the following notes:

- Check all of the hardware devices for transport damage.
- Any devices showing signs of mechanical damage or damage from the spillage of liquids MUST NOT be connected to the mains supply or disconnected from the mains immediately by pulling out the power lead.
- All devices MUST be grounded. Grounding connectors are provided on all devices. In addition, all low-voltage devices external to the system must also be grounded before operation.
- For Scandinavian countries, ALWAYS use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.
- Do NOT use the system at extreme temperatures - observe the temperature range and humidity specified in the installation instructions.
- Do NOT expose devices to liquids which may drip or splash.
- Do NOT place objects filled with liquids, such as vases, upon a device.
- Only service staff may replace batteries.
- CAUTION: Danger of explosion if battery is incorrectly replaced - Replace only with the same or equivalent type.

Servicing of components inside a device MUST only be carried out by qualified service personnel according to the following guidelines:

- Before removing parts of the casing, shields, etc. the device MUST be switched off and disconnected from all mains.
- Before opening a device, the power supply capacitor MUST be discharged with a suitable resistor.
- Components that carry heavy electrical loads, such as power transistors and resistors, should NOT be touched until cool to avoid burns.

Servicing unprotected powered devices may only be carried out by qualified service personnel at their own risk. The following instructions MUST be observed:

- NEVER touch bare wires or circuitry.
- Use insulated tools ONLY.
- DO NOT touch metal semi-conductor casings as they can bear high voltages.

Eye Safety

Warning

This equipment may use Class 1 Laser products which emit invisible laser radiation that may lead to eye injury.

- NEVER look directly into optical components or optical fibre cables.
- Fit protection caps to close any unused optical components.
- Connect all optical fibre cables BEFORE turning on the equipment.

Defective Parts/Modules

Warning

vsm SmartHub contains no user-serviceable parts. Therefore DO NOT open the devices other than to perform the procedures described in this manual.

In the event of a hardware defect, please send the system component to your local service representative together with a detailed description of the fault. We would like to remind you to please check carefully whether the failure is caused by erroneous configuration, operation or connection before sending parts for repair. Please contact our service department before sending parts for repair.

First Aid (in the case of electric shock)

Warning

DO NOT touch the person or his/her clothing before power is turned off, otherwise you risk sustaining an electric shock yourself.

Separate the person as quickly as possible from the electric power source as follows:

- Switch off the equipment.
- Unplug or disconnect the mains cable.
- Move the person away from the power source by using dry insulating material (such as wood or plastic).

If the person is unconscious:

- Check their pulse and reanimate if their respiration is poor.
- Lay the body down and turn it to one side. Call for a doctor immediately.

Having sustained an electric shock, ALWAYS consult a doctor.

3. Introduction

A **vsm SmartHub** interfaces between Ethernet and serial RS422/RS232 ports. All devices which only have a serial interface and need to be controlled using an Ethernet network can be connected through a SmartHub. Several varieties of SmartHub can be ordered as listed below.

The SmartHub can be easily configured as serial RAW-mode or as a serial protocol converter with a variety of different protocols (please refer to section 3.3 for supported protocols).

4. Overview

SmartHub 111

Number of serial ports	1xRS422 + 1xRS232 configurable via vsmDiscover
Communication port	1xEthernet
Dimensions	483mm x 43,7mm x 50,1mm (WxHxD): 1RU
Weight	approx. 0,8KG
Power Consumption	< 2,3W @12VDC/0,19A max
Working Environment	0°C-60°C non condensing humidity

SmartHub 208

Number of serial ports	8xRS422 configurable via vsmDiscover
Communication port	2xEthernet (1xEthernet per 4 RS422-ports)
Dimensions	483mm x 43,7mm x 50,1mm (WxHxD): 1RU
Weight	approx. 1,0KG
Power Consumption	< 4,8W @12VDC/0,4A max per power-supply (2x)
Working Environment	0°C-60°C non condensing humidity

SmartHub 244

Number of serial ports	4xRS232 (DSub 9P) + 4xRS422 (RJ45) configurable via vsmDiscover
Communication port	2xEthernet (1xEthernet per 4 RS422-ports and 1xEthernet per 4 RS422)
Dimensions	483mm x 43,7mm x 50,1mm (WxHxD): 1RU
Weight	approx. 1,0KG
Power Consumption	< 4,8W @12VDC/0,4A max per power-supply (2x)
Working Environment	0°C-60°C non condensing humidity

SmartHub 280

Number of serial ports	8xRS232 configurable via vsmDiscover
Communication port	2xEthernet (1xEthernet per 4 RS232-ports)
Dimensions	483mm x 43,7mm x 50,1mm (WxHxD): 1RU
Weight	approx. 1,0KG
Power Consumption	< 4,8W @12VDC/0,4A max per power-supply (2x)
Working Environment	0°C-60°C non condensing humidity

5. Operating Conditions

This device is built to be used in a non-condensing environment within a temperature range of 0-60°C. Under or overshooting this working temperature range may cause fast aging of components or even malfunction of the whole device.

Spillage of any liquids e.g. coffee, coke, water... onto/into the device may cause damage.

The storage temperature of the device must be within -20°C to 60°C with a maximum of 75% non-condensing relative humidity at 60°C @ 0VDC supply-voltage.

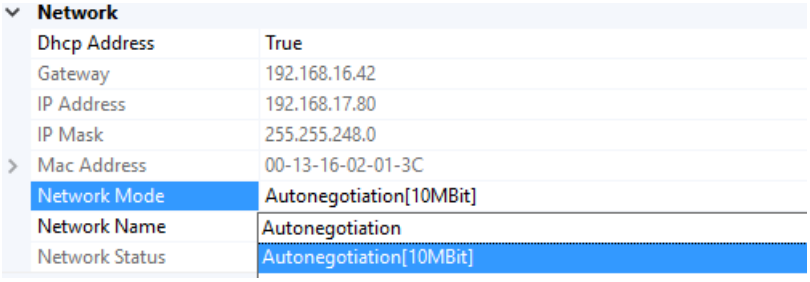
DO NOT throw, drop or bend the unit and make sure that there is no strong permanent mechanical pressure on any side of the housing at any time.

Before installing or using this device, always read and observe the Important Safety Instructions.

6. Known Issues

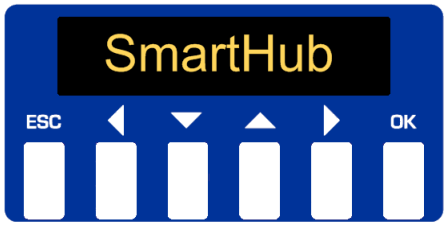
The combination of SmartHub 2xx and Cisco switch might lead to communication problems. If the SmartHub does not appear in vsmDiscover after the startup please try to switch to the “Auto-Negotiation [10Mbit]” mode. This mode enables only the 10 Mbit Full- and Half-Duplex for the Auto-Negotiation process. This speed satisfies the use of all 4 ports of a SmartHub simultaneously.

Connect the SmartHub direct to your Laptop or PC and change the “Network Mode” field via vsmDiscover and connect the SmartHub back to your Cisco switch. The “Network Mode” field is available since SmartHub 2xx version 0.37.



7. Operating Principles

7.1 Display



Status LEDs:

Blue: Device is connected to Primary and Secondary Server.

Purple: Device is connected to Primary Server only.

Red: Device is not connected to any Server.

Display Error Messages:

“Check Network Connection”: Ensure the device is physicaly connected via RJ45 Ethernet to your network and has a valid link.

“Lost Connection to CPU”: Display unit has lost its connection to the main CPU unit. Please use the reset button located on the left below the front display to reset the whole device.

7.2 Menu structure

The four arrow buttons allow you to navigate through the menu. With a long press on the“ESC” button a quick jump to the main infoscreen is possible. The current display version is read only.

Main Infoscreen/Screensaver:

A few important settings are shown cyclical on this screen: IP Address/MAC Address, Location/Comment and the company brand. Use the Up/Down buttons to navigate through this screen. Display becomes idle after 60 seconds without using any button.

Menu

Green marked Items are writeable via vsmDiscover.

Network Settings

- Server IP’s
  - Server 1 (IPAddress)
  - Server 2 (IPAddress)
  - Server 3 (IPAddress)
  - Server 4 (IPAddress)
- Device IP
  - DCHP (boolean)
  - IPv4 (IPAddress)
  - Subnet (IPAddress)
  - Gateway (IPAddress)
  - MAC (MACAddress)
  - DNS (String)

Serial Settings

- Port xx (up to 4 ports)
  - Type (String)
  - Protocol (Enumeration)
  - TCP-Port (String)
  - Tx Idle Disconnect (Integer)
  - Rate Tx (B/s) (Integer)
  - Rate Rx (B/s) (Interger)
  - Baudrate (Enumeration)
  - DataBit (Enumeration)
  - StopBit (Enumeration)
  - Parity (Enumeration)
  - Swap Rx/Tx Pin (boolean), RS422 only

General Settings

- Comment (String)
- Location (String)
- Primary (IPAddress)
- Secondary (IPAddress)

General Info

- Moniker (String)
- Version (String)
- Temperature (String)
- Hardware Revision (String)
- Hardware ID (String)
- Software ID (String)
- Serial Mode (String)
- OS Version (String)

8. Preparing for Operation

SmartHub supports up to 7 protocols and may be configured via vsmDiscover. Ask our Support Team if you do not have a copy of vsmDiscover.

Following protocols are available:

- RAW: Serial data to IP
- TunnelMode: Most commonly used for Sony MVS8000 Editor Port
- Probel-sw-p-08: Common Probel-sw-p-08 connection
- MPK-Proxy: MPK master bus
- Pesa-Proxy: Remote Control Panel (RCP) - Pesa master bus
- UMD-Proxy: Master bus for Lawo UMDs
- MI3040: MPK slave bus simulating a MI3040

All Lawo vsm devices will be shipped with DHCP enabled network configuration. If you do not have a DHCP network ask your administrator for the static network settings and edit the “Network” section if required.

Do the following settings in VSM Discover: 

Network	
Dhcp Address	False
Gateway	192.168.16.5
IP Address	192.168.18.47
IP Mask	255.255.248.0
Mac Address	00-13-16-02-00-98
Network Name	SmartHub

Press the “Apply” button once the settings are correctly entered. The device will automatically perform a reboot to apply the network configuration.

To connect the device to a vsmStudio Server (Server 1 – 4 depending on redundancy) use the “Application” section. This connection will be used by the proxy protocols and for firmware update.

Application	
Server 1	192.168.17.38
Server 2	192.168.17.39
Server 3	192.168.17.40
Server 4	192.168.17.41

Once this has been done the serial settings can be configured. Caution, after a change has been applied to the “Protocol-Name” field the device will perform a reboot automatically to load the needed driver.

Settings for each Protocol

RAW

Free configurable serial interface. To connect this port with vsmStudio use the given value for “Protocol-TCP Port” below and the SmartHub IP Address. Use “Tx Idle Disconnect Time” to define how long the TCP socket should be maintained before a socket timeout occurs.

Application	
1 - RS232	Raw - 8001 [115200-N-8-1]
Connections	0
Protocol - Name	Raw
Protocol - TCP Port	8001
Protocol - Tx Idle Disconnect Time(sec.)	1
Serial - Baudrate	_115200
Serial - Data Bits	_8
Serial - Parity	None
Serial - Stop Bits	_1

Tunnel Mode

Free configurable serial interface. To connect this port to vsmStudio read the application note for Sony MVS8000 Editor Port and use the given value for “Protocol-TCP Port” below and the SmartHub IP Address. Use “Tx Idle Disconnect Time” to define how long the TCP socket should be maintained before a socket timeout occurs.

Application	
1 - RS232	Tunnel Mode - 8101 [115200-N-8-1]
Connections	0
Protocol - Name	Tunnel Mode
Protocol - TCP Port	8101
Protocol - Tx Idle Disconnect Time(sec.)	1
Serial - Baudrate	_115200
Serial - Data Bits	_8
Serial - Parity	None
Serial - Stop Bits	_1

Probel-sw-p-08

Free configurable serial port to interface Probel-sw-p-08 devices. To connect this port with vsmStudio use the given value for “Protocol-TCP Port” below and the SmartHub IP Address. Use “Tx Idle Disconnect Time” to define how long the TCP socket should be maintained before a socket timeout occurs.

Application	
1 - RS232	Probel-sw-p-08 - 8001 [38400-N-8-1]
Connections	0
Protocol - Name	Probel-sw-p-08
Protocol - TCP Port	8001
Protocol - Tx Idle Disconnect Time(sec.)	30
Serial - Baudrate	_38400
Serial - Data Bits	_8
Serial - Parity	None
Serial - Stop Bits	_1

MPK-Proxy

Master bus to interface MPK devices. To connect this port with vsmStudio use Server 1-4 fields in the “Application” section. This protocol is only available for RS422 ports with preconfigured serial settings. Every reboot will discard any changes for Baudrate, Data Bits, Parity, Stop Bits and Swap Rx/Tx fields.

Application	
1 - RS232	Probel-sw-p-08 - 8001 [38400-N-8-1]
2 - RS422	MPK-Proxy [38400-E-8-1]
Connections	0
Protocol - Name	MPK-Proxy
Protocol - TCP Port	vsmStudio(Server 1-4)
Protocol - Tx Idle Disconnect Time(sec.)	0
Serial - Baudrate	_38400
Serial - Data Bits	_8
Serial - Parity	Even
Serial - Stop Bits	_1
Serial - Swap Rx/TX	False

Verified and supported MPK devices are:

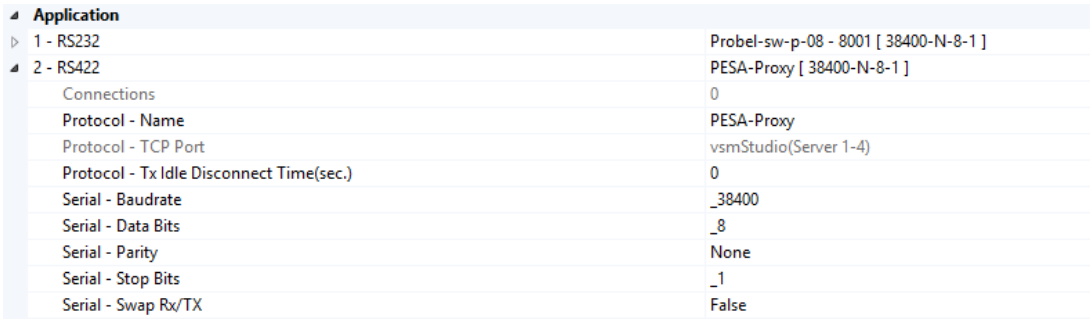
- CP-310/-330-328 with BTS and Philips label
- CP-3832 with Grass Valley and Philips label
- CP-3864 with Philips label
- CP-3020 with Philips label
- UMD3A with BTS and Philips label

Up to 12 panels and 32 UMDs per Port.

Bus Limitation: Max. 2 CP38xx panels on same bus.

Pesa-Proxy

Master bus to interface Pesa panels. To connect this port with vsmStudio use Server 1-4 fields in the “Application” section. This protocol is only available for RS422 ports with preconfigured serial settings. Every reboot will discard any changes for Baudrate, Data Bits, Parity, Stop Bits and Swap Rx/Tx fields.



Application	
1 - RS232	Probel-sw-p-08 - 8001 [38400-N-8-1]
2 - RS422	PESA-Proxy [38400-N-8-1]
Connections	0
Protocol - Name	PESA-Proxy
Protocol - TCP Port	vsmStudio(Server 1-4)
Protocol - Tx Idle Disconnect Time(sec.)	0
Serial - Baudrate	_38400
Serial - Data Bits	_8
Serial - Parity	None
Serial - Stop Bits	_1
Serial - Swap Rx/TX	False

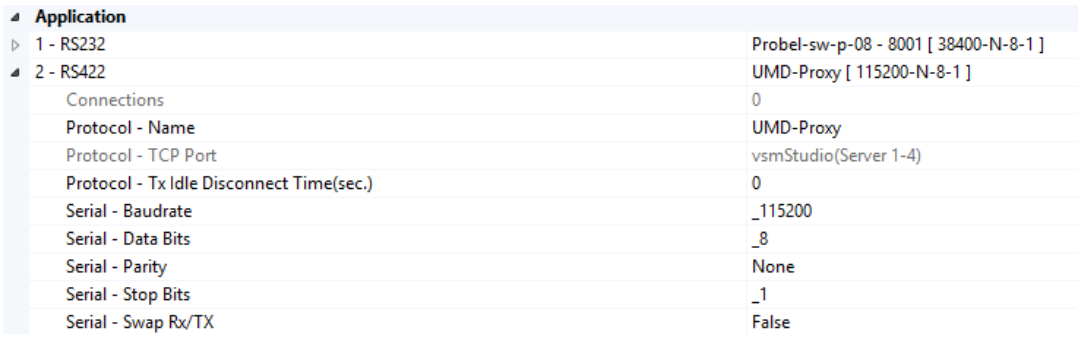
Verified and supported Pesa devices are:

- RCP-MLDT
- RCP-MP32
- RCP-CSD2
- RCP-48 Remote
- Panel Port Expander RCP Bus

Up to 32 panels per Port.

UMD-Proxy

Master bus to interface Lawo UMDs. To connect this port with vsmStudio use Server 1-4 fields in the “Application” section. This protocol is only available for RS422 ports with preconfigured serial settings. Every reboot will discard any changes for Baudrate, Data Bits, Parity, Stop Bits and Swap Rx/Tx fields.



Application	
1 - RS232	Probel-sw-p-08 - 8001 [38400-N-8-1]
2 - RS422	UMD-Proxy [115200-N-8-1]
Connections	0
Protocol - Name	UMD-Proxy
Protocol - TCP Port	vsmStudio(Server 1-4)
Protocol - Tx Idle Disconnect Time(sec.)	0
Serial - Baudrate	_115200
Serial - Data Bits	_8
Serial - Parity	None
Serial - Stop Bits	_1
Serial - Swap Rx/TX	False

MI3040

Simulates a MI3040 General Purpose/Tally Interface. To connect this port with vsmStudio use Server 1-4 fields in the “Application” section. This protocol is only available for RS422 ports with preconfigured serial settings. Every reboot will discard any changes for Baudrate, Data Bits, Parity, Stop Bits and Swap Rx/Tx fields.

Application	
1 - RS232	Probel-sw-p-08 - 8001 [38400-N-8-1]
2 - RS422	MI3040 [38400-E-8-1 Rx/Tx Sw]
Connections	0
Protocol - Name	MI3040
Protocol - TCP Port	vsmStudio(Server 1-4)
Protocol - Tx Idle Disconnect Time(sec.)	0
Serial - Baudrate	_38400
Serial - Data Bits	_8
Serial - Parity	Even
Serial - Stop Bits	_1
Serial - Swap Rx/TX	True

The Location and Comment fields in the “Misc” section can be set to reference the device in your environment.

Misc	
Comment	Tally/Umd
Location	Studio 1

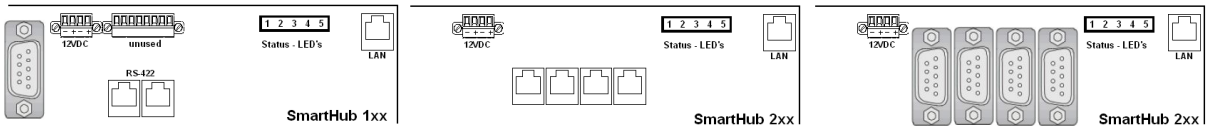
Supported Baudrates:

- 1.200 Baud
- 2.400 Baud
- 4.800 Baud
- 9.600 Baud
- 14.400 Baud
- 19.200 Baud
- 28.800 Baud
- 38.400 Baud
- 57.600 Baud
- 76.800 Baud
- 115.200 Baud
- 230.400 Baud

Data Bits can either be set to “5”, “6”, “7” or “8”, as well as Parity (Odd/Even/None) and Stop-Bits (1 or 2).

9. Technical Specifications

Rear-view



9.1 Rear Status LEDs

SmartHub 1xx

1 (R/G/B): Lights blue: internal serial I/O controller OK, green: serial TX, red: serial RX.

2 (R/G/B): Pulses red: no connection to the network.
Blinks fast red: device in bootloader-mode.
Pulses yellow: network connection established.
Pulses blue: connected to vsmStudio.

3 Green: Light, processor core-voltage OK.

4 Green: Light, internal I/O-voltage OK.

5 Orange: Blinks, physical LAN connection/TCP/IP-data-transfer.

SmartHub 2xx

1 (R/G/B): Alternates with R/G/B-LED 2 red: no connection to the network.
Alternates with R/G/B-LED 2 yellow: no connection to the network.
Alternates with R/G/B-LED 2 blue: connected to vsmStudio.

2 (R/G/B): Alternates with R/G/B-LED 1 red: no connection to the network.
Alternates with R/G/B-LED 1 yellow: no connection to the network.
Alternates with R/G/B-LED 1 blue: connected to vsmStudio.
Lights white: device in bootloader-mode.

3 Green: Light, processor core-voltage OK.

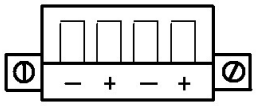
4 Green: Light, internal I/O-voltage OK.

5 Orange: Blinks, physical LAN connection/TCP/IP-data-transfer.

9.2 Connectors

9.2.1 Power

Connector for 12 V DC-supply: 4-Pin connector (MC 1,5/ 4-STF-3,81) locked with two screws.

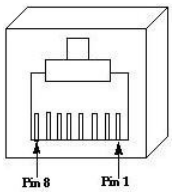


12 Volt
DC IN

It is understood that if NOT using the original Power-Supply-Unit, you need to make sure that there is only one single 12V DC-supply with a maximum tolerance of 3% within the 12V. It has to be taken care, that the external supply uses a circuit-breaker, fuse or another kind of short-circuit-protection to never allow a current >5A @12VDC per device. Do NOT connect the device at reverse polarity at any time.

9.2.2 Serial

RJ45 RS422 (Standard: EIA-422)



Pin	Signal description "SWAP RS422 Rx/Tx Pins = False"	Comments
1	NC	Internally not connected
2	NC	Internally not connected
3	Rx+	Receive Data input
4	Tx+	Transmit Data output
5	Tx-	Transmit Data output
6	Rx-	Receive Data input
7	NC	Internally not connected
8	NC	Internally not connected

Sub-D9 male RS232 (Standard: EIA RS232D 2.1.7)

Pin	Signal description	Comments
1	NC	Internally not connected
2	RxD	Receive Data input
3	TxD	Transmit Data output
4	NC	Internally not connected
5	GND	Ground (shield)
6	NC	Internally not connected
7	NC	Internally not connected
8	NC	Internally not connected
9	NC	Internally not connected

9.2.3 Restrictions on Serial Cabling

RS422

It is necessary that twisted pair is used for Tx as well as twisted pair for Rx.

To avoid potential difference between devices, shielded cable and shielded plugs with ground potential on both sides should be used. (Metalized plug-covers of RJ-45-plugs to touch ground-flange of RJ-45 connectors).

RS422 (RS485) does not need any signal-ground, but ground to avoid potential difference.

For RS422 (RS485)-traces it is best to use network cable category shielded CAT5 or higher standard (e.g. shielded CAT6/CAT7).

vsmGear-devices are built to be used with preconfigured standard shielded 1:1 network cable (CAT5 or higher standard).

If there are third party devices with other than one separated twisted pair for Tx and one for Rx, it is very important, to keep untwisted or wrong-twisted wiring as short as a possible. (Max. 1 inch/2,54 cm)

Incorrect wiring, use of cable type, use of twisted pair and non-shielded traces can lead to shorter working distances. This can also cause slow reaction of connected devices because of high retransmissions and may even lead to strange behavior of connected devices.

A bad connection on one of the core twisted pair traces may lead to a working device that initially works fine, but intermittently loses connection or shows strange behavior.

Always use a cable-tester before installing vsm-products to ensure there is no unsuspected trouble with connected devices after installation. Also check proper wiring of wire-shield-traces.

We suggest RS422 traces via shielded twisted pair cable should not exceed 100m (328 feet) in total length.

Up to 32 serial devices can be used in one chain. Using more than 32 devices in one chain may work with good cabling, but is not guaranteed and therefore not recommended.

RS232

RS232 is a single ended point-to-point signal transfer. There are only 3 traces necessary for serial data transfer, two for data (Rx and Tx), and one for signal ground.

Tx host must be connected to Rx device and Rx host must be connected to Tx device. Signal-ground-pin must always be connected for RS232 communication on both ends.

Because of single ended structure, the traces between host and device must be short depending on data rate used.

The following figure shows the maximum cable-length according to the data rate.

Data-rate vs. trace-length RS232

Max. baud	Max. length
2.400	900 m
4.800	300 m
9.600	152 m
19.200	15 m
57.600	5 m
115.200	<2 m

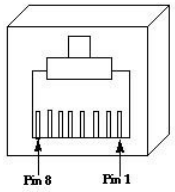
Pin @ Sub-D9	RS232 color standard: EIA-232
1	brown
2	red
3	orange
4	yellow
5	green
6	blue
7	violet
8	grey
9	black

9.2.4 Ethernet

Ethernet communication port to vsmStudio

It is understood that for proper operation each SmartHub is connected to an Ethernet-switch where the individual port of the switch is set to “Auto-Negotiation”.

RJ45 Ethernet



Pin	Signal	Color of a standard TIA-568A-shielded twisted pair patch cable (CAT5 or higher)
1	TX+	white/green
2	TX-	green
3	RX+	white/orange
4	NC	blue
5	NC	white/blue
6	RX-	orange
7	NC	white/brown
8	NC	brown

Notice for wiring:

NC: No connection; does not connect to any signal or supply.

Only use shielded CAT5 (or higher standard) -specified networkable. Refer to TIA-568A or TIA-568B for wiring.

Do not use cable-traces longer than 100m (328ft) between the device and network-switch for 100BASE-T communication.

Make sure to do standard wiring and use shielded RJ45-plugs for shielded cable on both ends of the line.

9.3 Reset Interface

Beside the possibility to “Reset” the SmartHub via vsmDiscover [soft-Reset], there is also the possibility to assert a “Reset” [hard-Reset] by the Reset-knob on the lower left side next to the SmartHub-display. The Reset-knob can easily be reached with a pin or pen if needed, but is recessed to prevent accidentally assertion during normal operation.

If the Reset-knob is manually asserted for a short time period, an internal reset-handler resets the main CPU, as well as the peripheral parts such as the network controller and the OLED-display-unit.

Please avoid using the Reset-knob as in most cases it is not necessary. Before intending to use the Reset-knob check if the serial cabling to third party device is correct and that the third party-device is in proper working condition. Also check the serial settings applied in vsmDiscover for specific port.

Make sure your network-connection to vsmStudio is established and in proper condition.

Caution

Never activate the Reset-knob while the device is in Firmware-update-mode. During firmware-update-mode, the red and blue LEDs located on the left and right within the display-unit start to flash very fast.

10. Cleaning the Display

To clean the front panel display use a soft cloth and smooth window-cleaner-fluid. Do not expose the window-cleaner directly to the unit, but to the cloth and then wipe slight pressure over the display area.

Do not use polish remover, oil, alcoholic- or gasoline based cleaner for the display area and the buttons as this will destroy the display-glass.