

vsm GPIO Box

User Manual

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Revision History

Version	Edition	Changes	Firmware Version
1	2014-05-19	Initial draft	2.33
2	2014-06-13	Initial Release	2.33
3	2014-10-29	Ember+ added	2.35
4.0/1	2017-03-31	New Overview graphics & template	2.40

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1. Welcome

About this Manual

This document describes how to install and setup the **vsm GPIO Box** 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 *a/ways* 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 GPIO Box 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 GPIO Box** is the interface between Ethernet and a specific number of digital or analog general purpose ports. The number of inputs and/or outputs as well as the type (analog or digital) depends on the type of the box in use. This guide provides you with all the information that is required in order to integrate a GPIO Box into a vsmStudio.

4. Overview

GPI 64



Number of ports	64 galvanically isolated TTL-compatible inputs
Communication port	1xEthernet
Dimensions	483mm x 43,7mm x 127,3mm (WxHxD): 1RU
Weight	approx. 1,9KG
Power Consumption	< 7,5W @12VDC/0,62A max
Working Environment	0°C-60°C non condensing humidity

GPO 64



Number of serial ports	64 dry relay-outputs, up to 60VDC/35VAC/7A
Communication port	1xEthernet
Dimensions	483mm x 43,7mm x 127,3mm (WxHxD): 1RU
Weight	approx. 2,3KG
Power Consumption	< 22,7W @12VDC/1,89A max
Working Environment	0°C-60°C non condensing humidity

GPIO 32



Number of serial ports	32 galvanically isolated TTL-compatible inputs 32 dry relay-outputs
Communication port	1xEthernet
Dimensions	483mm x 43,7mm x 127,3mm (WxHxD): 1RU
Weight	approx. 2,1KG
Power Consumption	< 15,1W @12VDC/1,26A max
Working Environment	0°C-60°C non condensing humidity

GPO 64 analog



Number of serial ports	64 analog voltage outputs, 0-10 VDC
Communication port	1xEthernet
Dimensions	483mm x 43,7mm x 127,3mm (WxHxD): 1RU
Weight	approx. 1,9KG
Power Consumption	< 19W @12VDC/1,58A max
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. Preparing for Operation

If all GPI-connectors are connected, the total depth of the General Purpose Interface will increase up to 140mm.

Each General Purpose Interface comes enclosed with a cable-lacing bar which can be mounted to the front cover for cable management of in- and output cables. If the bracket is mounted, the complete depth of the GPI-unit will be increased by another 61mm.

All Lawo devices will be shipped with DHCP enabled network configuration. If you don't have a DHCP network ask your administrator for 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	192.168.17.109
IP Mask	255.255.248.0
Mac Address	00-13-16-01-26-38
Mode	100MBit-Full Duplex
Network Name	GP-I/O-Box

Press the "Apply" button if you are sure you have entered the settings correctly. The device will automatically perform a reboot to apply the network configuration.

To connect a device to vsmStudio enter the IP Address of Server 1 – 4 (depending on how many vsmStudio servers are configured) in the "Application" section. This connection will also be used for any future firmware updates.

Application	
GP-I/O Mode	32In/32Out
Server 1	192.168.17.38
Server 2	192.168.17.39
Server 3	192.168.17.40
Server 4	192.168.17.41

The Location and Comment fields in the "Misc" section are to set to easily locate the device in your environment.

Misc	
Comment	Red Tally
Location	Studio 1

Additional read-only status and device information from vsmDiscover:

Status	
Current Primary	192.168.17.41
Current Secondary	0.0.0.0
Detection State	Online

Device	
Controls	256
Hardware ID	1
Hardware Revision	3
ID	0
Moniker	GP-I/O-Box
Options	FFFF
Software ID	4
Software Version	234
Software Version CPLD	4

Execute “regedit.exe” as Administrator on your vsmStudio server to configure the device and find the vsmStudio registry key: “HKEY_...\\...\\VirtualStudioManager\\vsmStudio\\Registered Devices”. Allocate the MAC Address of the device in the “Registered Devices” list and use the Application Key (MAC Address with [001]) to enter your inputs-/outputs-offset of the GPIO's in the “Base-Inputs/-Outputs” key and reboot the device.

Registered Devices			
{CDA328F5-8654-4A29-A64E-88F578A873}			
00-13-16-01-1b-ae			
00-13-16-01-1b-ae [001]			
00-13-16-01-1b-ae [002]			
00-13-16-01-1b-b5			
00-13-16-01-1b-b5 [001]			
00-13-16-01-1b-b5 [002]			
00-13-16-01-26-38			
00-13-16-01-26-38 [001]			
00-13-16-01-26-67			
00-13-16-01-26-67 [001]			
00-13-16-01-26-67 [002]			
00-13-16-01-27-01			
00-13-16-01-27-01 [001]			

Name	Typ	Daten
(Standard)	REG_SZ	(Wert nicht festgelegt)
Base-Inputs	REG_DWORD	0x00000001 (1)
Base-Outputs	REG_DWORD	0x00000001 (1)
ID	REG_DWORD	0x00000001 (1)
Identifier	REG_DWORD	0x00000579 (1401)
Inputs	REG_DWORD	0x00000020 (32)
Name	REG_SZ	GP-I/O-Box
Outputs	REG_DWORD	0x00000020 (32)
Port	REG_SZ	192.168.017.109:08000-Client
Status GPI	REG_DWORD	0xffffffff (4294967295)
Temperature Maximum	REG_SZ	37.69°C - 2014-05-09 15:34:54
Temperature Minimum	REG_SZ	20.00°C - 2014-05-13 09:54:09
Version	REG_DWORD	0x00000233 (563)

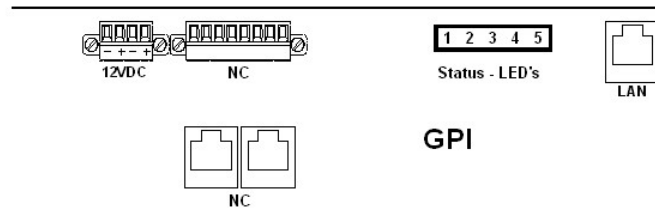
6.1 Ember+ Interface



Firmware version 2.35 or higher is required to use the provided Ember+ Interface for digital GPIO's. As long as the device has a valid connection to a vsmStudio, the Ember+ Interface is read only. The ports are represented as a One-To-N Matrix , where the matrix outputs are used as the device GPIO ports and the matrix input is the connect/disconnect signal. Use TCP Port 9000 for the Ember+ connection.

7. Technical Specifications

7.1 Status LEDs



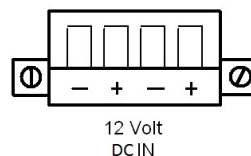
Rear-view

- 1 (R/G/B): Lights blue: internal serial I/O controller OK
- 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

7.2 Connectors

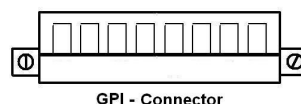
7.2.1 Power

Connector for 12 V DC-supply: 4-Pin connector (MC 1,5/ 4-STF-3,81) locked with two screws.
(Mounted on power-supply delivered with each GPIO-Box)



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.

7.2.2 GPI-Interface



Connectors for frontally GPI-interface:

8-Pin connector locked with two screws (MC 1,5/ 8-STF-3,81)

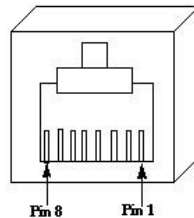
Delivered connectors: 16 pieces for one complete device. See [Connector Pin-outs](#) for wiring details.

7.2.3 Ethernet

Ethernet communication port to vsmStudio

It is understood that for proper operation each GPIO Interface 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.

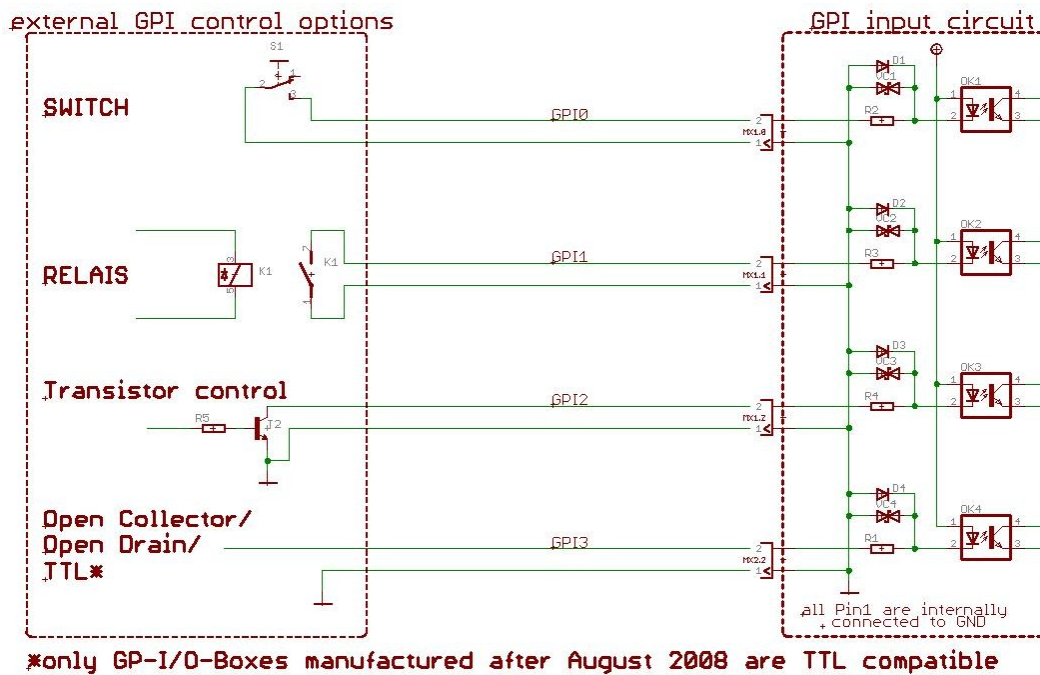
7.3 Signals

GPI

Grounding the input pin will 'set' the device. Supplying a DC voltage, it needs to be lower than 2.6 V DC to 'set' the device. Make sure not to supply any same ground external DC-voltage exceeding 14V.

The open-circuit-voltage of the inputs is approximately 3,6V. The external current for short-circuiting the input is limited down to max 8mA.

All inputs are galvanically isolated but share the same signal ground potential. Make sure not to supply any positive voltage to the ground potential.



GPO

The relay outputs are primarily designed for low level voltage (up to 48 V) that meet the small signal safety rules following DIN VDE 0100, Part 410. Nevertheless, the relay outputs are designed for a voltage of up to 60V DC/ 35 V AC, are rated 7 Amps constant current and 1750 VA breaking capacity with non-inductive load. For safety reasons while using "higher current" make sure the current does not exceed the maximum current permitted for each relay (maximum 7 A per relay).

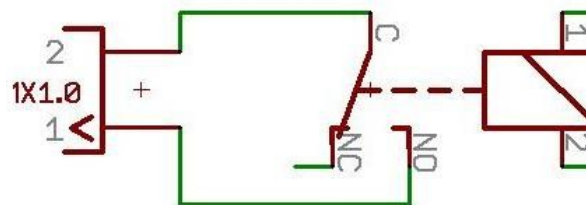
High level signals and low level signals should not be run together on the same GPIO.

We advise that if using signals with up to 60VDC/35VAC not to power the GPO's dry relay output contacts with more than 1 A per relay.

Professional broadcast equipment mostly uses 5 V up to 24 V DC with a maximum current of 500 mA.

Important: Due to physical properties the usage of higher voltage and higher current causes more abrasion within the relays. This may result higher transient resistance between the switching contacts.

When once used with more than 48 V with more than 1 A per relay, the GPO output should not be used later on in another application with small signal voltage because this might lead to interpreting some switching conditions not correctly.



GPO-Analog

The analog outputs are self-powered by the external PSU of the GPO 64 analog device for an output-voltage of 0VDC up to 10VDC @ 20mA max. each.

Each output is driven separately with common ground for all outputs.

Every output is capable of driving a maximum load of 20mA. Exceeding 20mA will enable the internal short-circuit-protection. We recommend the source-current not to be higher than 3-5mA for each single output.

Each output amplifier is capable of driving a load of 2K-Ohms in parallel with 4000pF related to ground. The slew rate is 3,5V/μs with full-scale settling time of 10μs.

Avoid any external supplied voltage to the outputs. Do not supply any externally supplied voltage to the ground-potential.

The analog outputs are primarily designed for the communication with TAC Xenta I/O-modules or for certified LonMark-devices. The safety rules must follow DIN VDE 0100, Part 410 small signal safety rules.

The maximum operating temperature-range is between 0°C and 60°C. Over- or undershooting these ranges may lead to nonlinearity in output-voltage.

Be careful with cable-length between analog output and communication-module.

A DC voltage-drop -related to maximum cable-length and cable-diameter- may occur. Avoid cable-traces over 10m and use a diameter for at least 1.5 mm².

Make sure to keep analog signal cable away from noisy electric environment to avoid any crosstalk.

8. Connector Pin-outs

