



USB/ basicCON 4112 4:1 LVDS Multiplexer

User Manual

(Translation of Original docu)

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1 Installation

1.1 Hardware Installation



We recommend to install the device driver software before connecting the device to the PC/ Laptop (see [Driver Installation](#)).

USB 4112:

The USB 4112 board can only be operated when it is installed in one of the GOPEL electronics USB Racks USB 1004, USB 1008 or USB 1016.



Please make absolutely certain that all of the hardware installation procedures described below are carried out with your system switched off.

Select an empty slot of your USB Rack. First remove the slot sheet covering the slot (if mounted). To do that, loose the two screws.

Insert the board carefully via the guides into the prepared slot. Push it finally into the slot till to the arrester by applying a little pressure.

Then, tighten the two outer screws at the front panel to fix the board.



When installing the board, touch it at its edges only. Never touch the surface of the board, because otherwise it may be destroyed by electrostatic discharge.

To remove the board from the USB Rack (if necessary), unscrew the two outer screws. By the lever at the front panel the board can be dissolved from the slot and then be unplugged.

basicCON 4112:

basicCON 4112 can be directly connected to the PC or Laptop.

Connect the USB female at the device's rear side to the PC/ laptop using the supplied USB cable.

If necessary, see chapter [Power Supply](#), connect the supplied power supply unit or an own voltage source to the corresponding ext. Power Supply connections at the device's rear side.



Please refer to chapter [Addressing](#) regarding the addressing of several USB 4112 boards.



Please refer to chapter [Connector Pinout](#) regarding the connections at the device's front side.

1.2 Driver Installation

Windows Device Driver

For proper installation of the GOEPEL electronics USB drivers on your system, we recommend to execute the GUSB driver setup. To do that, start the *GUSB-Setup-*.exe* setup program (of the supplied CD, to be find under *USB4112-basicCON4112\Driver*, the asterisk "*" stands for the version number) and follow the instructions.



At present, the available device driver supports Windows® XP as well as Windows® 7/ 32 Bit and Windows® 7/ 64 Bit systems.



The USB interface uses the high-speed data rate according to the USB2.0 specification (if possible, otherwise full-speed).

Due to the plug-and-play ability of Windows®, the device will be automatically recognized by the operating system.

On completion of the installation process, Windows® will request you to reboot your computer.

For safe and reliable operation this step is strongly recommended.

After driver installation/ hardware installation, you can check by the Device Manager whether the devices are properly embedded by the system.

The following figure shows the successful embedding of a USB 4112 board or basicCON 4112 device:



Figure 1-1:
Device Manager Display



Please note that the Device Manager shows all USB controllers.

2 Hardware

2.1 Definition

The USB 4112 LVDS Multiplexer board with USB 2.0 Interface of GOEPEL electronic GmbH is used to distribute LVDS signals (ANSI TIA/EIA-644).

The board is a 4 to 1 multiplexer for LVDS signals with a bandwidth up to 3.125 GBit/s at maximum.

Additionally, the board is used as signal repeater.

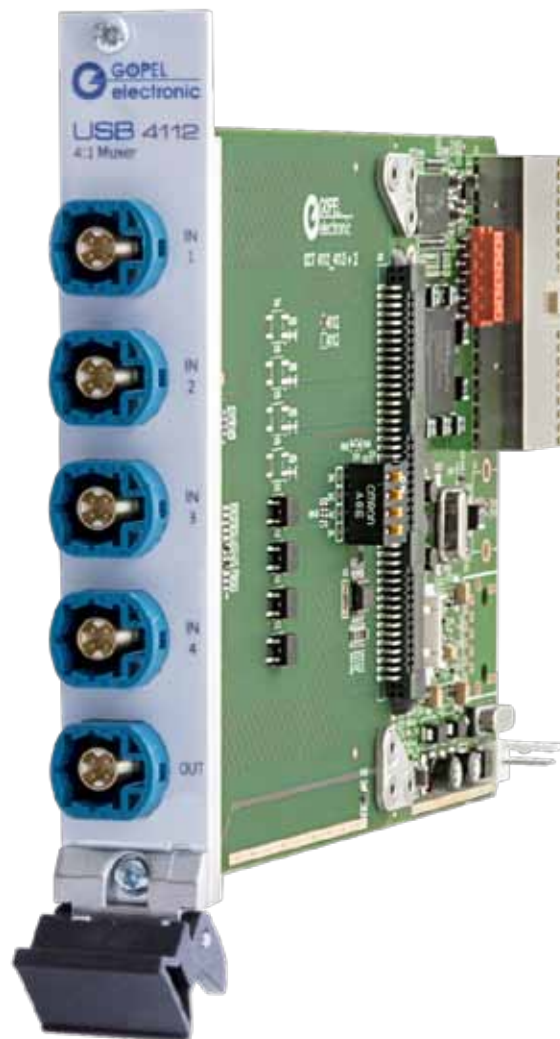


Figure 2-1:
USB 4112



USB 4112 boards can only be operated in one of the GOEPEL electronics USB Racks USB 1004, USB 1008 or USB 1016 covering up to 16 GOEPEL electronics USB boards. Power supply comes from the USB Rack.

basicCON 4112 is a GOPEL electronic GmbH stand-alone device based on a USB 4112 board to be connected directly to a PC or Laptop. It has been developed for the independent operation out of complex test systems.

basicCON 4112 can be supplied via the USB interface or via the ext. Power Supply connections (see [Power Supply](#)).



Figure 2-2:
basicCON 4112

At the device's rear side, there are the following connections:



Figure 2-3:
basicCON 4112 – rear side

- USB-B female for the USB 2.0 interface with USB standard assignment
- DC female for the AC adaptor plug (part of delivery)
- Banana females for power supply



Warning

Please use for external power supply either the banana females OR the DC female for the AC adaptor plug.



Additionally, please refer also to the corresponding chapter regarding [Power Supply](#).

2.2 Technical Data

2.2.1 Dimensions (W x H x D):

- USB 4112: 4 HP x 100 mm x 160 mm
- basicCON 4112: 130 mm x 55 mm x 200 mm



The dimensions given for USB 4112 (without front panel and connectors) correspond to standard dimensions in a GOEPEL electronics USB-Rack.

2.2.2 Properties The USB 4112 board has the following characteristics:

Symbol	Characteristic Value	Min.	Typ.	Max.	Unit	Remarks
Power Supply						
U _{SS}	Supply voltage		5		V	Supply via USB possible (basicCON 4112)
I _{SS}	Supply current		200	400	mA	
U _{SEXT}	External Power supply	7	12	25	V	I _{Max} = 170mA at 12V Optionally for basicCON 4112
LVDS						
U _{ID}	Differential LVDS input voltage			1	V	
I _{ID}	Differential input current		±1	±10	µA	
R _{IN}	Input resistance		100		Ω	
C _{IN}	Input capacity		1.7		pF	
U _{OD}	Differential LVDS output voltage	250	350	450	mV	
I _{OS}	Output short-circuit current			±55	mA	
R _{OUT}	Output resistance		100		Ω	
C _{OUT}	Output capacity		1.2		pF	
Control channel						
U _{CTRL}	Voltage of the Control channel			40	V	
I _{CTRL}	Current of the Control channel			250	mA	



Please use the supplied USB cable to connect the devices to the PC's/ laptop's USB interface.
Other cables may be inapplicable.

2.3 Construction and Function

2.3.1 General

The USB 4112 multiplexer board (also used for basicCON 4112) switches the signal of one of the four LVDS inputs (ANSI TIA/EIA-644) to the output.

Moreover, the signal is regenerated by the repeaters on the board.

Additionally, a control signal (for example LIN) is multiplexed.

By cascading resp. interconnecting several USB 4112 devices with each other it is possible to create a 64 to 1 multiplexer.

But we advise not to chain more than three multiplexers in series.

(As otherwise too much jitters would be on the LVDS signal.

Then no error-free transmission can be ensured.)

The board can be controlled via USB or (limited) via switches located on the board.

All boards have five HF connections at the frontal panel to connect the LVDS cables.

At the rear side of the USB 4112 board there is a 132 poles backplane connector for connecting the board in a GOPEL electronics USB Rack.

The basicCON 4112 has a USB-B connector and connections for external power supply.

2.3.2 Hardware Initialization

If required, a Hardware Initialization can be carried out by means of the Switches on the board.

In Figure 2-4 you can see that there is a belonging switch 1..4 for each of the LVDS In1..LVDS In4 input channels.

After switching on, when the Host Mode has not been activated, yet, the device conducts at most one of the channels to the output as follows:

If all switches are switched OFF, the LVDS output is also switched OFF. If one switch is switched ON, the signal of the belonging input is conducted to the output.

In the case several switches are switched ON, always the switch with the lowest number has priority. That means, the belonging signal is conducted to the output.

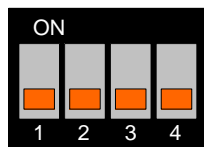


Figure 2-4:
Switches for Initialization

After the activation of the Host Mode, the switches are not active and control is effected via USB. In the delivery state, all switches are switched OFF. If required, the switches should be set as needed before the installation process.



Activate the Host Mode by G-API command
`G_Lvds_Multiplexer_HostControlMode_Set`.

Please refer to the G-API User Manual regarding this command and further G-API commands for the control of your USB 4112/ basicCON 4112 module.

2.3.3 Addressing

Addressing individual USB 4112 boards in the GOPEL electronics USB Rack or basicCON 4112 devices takes place exclusively according to the serial numbers: The device with the least serial number is always the device with the number 1 (but counting by considering all other GOPEL electronics USB devices in the same system).



To improve clarity, we recommend to arrange several USB 4112 boards (if applicable) in the order of ascending serial numbers in a GOPEL electronics USB Rack.

2.3.4 Power Supply

The USB 4112 board is supplied via the USB Rack in that it has been installed.

Power supply for basicCON 4112 can be effected via the USB interface (as far as it is configured for the required current of about 500 mA).

For operating the basicCON 4112 at passive USB hubs or laptops with lower power supply, use the two banana females for ext. Power Supply (red = plus/ blue = minus)

for supplying the device with a voltage of 7-25 VDC.

Alternatively, you may use the female for the delivered AC adaptor plug with coaxial power plug (2.1 x 5.5mm/ plus polarity inside), see also Figure 2-3.

2.3.5 Connector Pinout

Used connector:
Rosenberger D4S20A-40ML5-Z

Connector for connecting cable (recommended):
Rosenberger D4K10A-1D5A5-Z

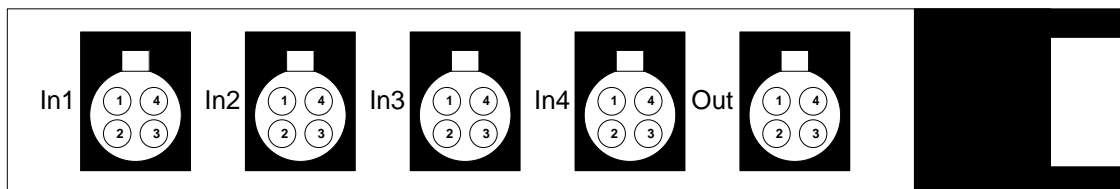


Figure 2-5: Front panel USB 4112

The following table shows the pinout of the LVDS females:

Connection	Pin	Signal	Connection	Pin	Signal
In 1..4	1	GND	Out	1	LVDS-
	2	LVDS+		2	Control
	3	Control		3	LVDS+
	4	LVDS-		4	GND

2.4 Accessories

The following accessories can be delivered
for USB 4112/ basicCON 4112 devices:

- LVDS HF connecting cable
(when ordering, please state the required length
and the connector type of the transmitting side)

3 G-API Programming

The G-API (GOEPEL-API) is the C-programming user interface for GOEPEL electronics hardware under Windows®.

It provides a wide hardware independent command set for CAN, LIN, K-Line, MOST, FlexRay, LVDS, ADIO and Diagnostic services.

No matter whether a PXI/ PCI, USB and Ethernet device is used, the commands remain the same.

The hardware abstraction introduced with the G-API gives the test application parallel access to the hardware, allowing one application to access multiple hardware interfaces. As well as multiple applications can access the same hardware interfaces in parallel.

Another feature introduced by the G-API is the asynchronous hardware access. This means no blocking execution for pending firmware commands. The command acknowledgement is provided via callback mechanism.

Therefore no polling is required from the application.

With the HardwareExplorer GOEPEL electronics provides a hardware configuration and management tool. Offering users an easy way to manage their hardware configurations and identifying specific hardware interfaces by logical names. Using logical interface names in the application saves from rebuilding the application when porting it to another interface or controller board, as the interface can be easily reassigned in the HardwareExplorer.

Furthermore the HardwareExplorer provides a simple means of testing the interaction between hardware and software by executing the integrated self-tests.



Please consult the G-API documentation for further information. This documentation and the installation software are located in the *G-API* folder on the supplied Product CD.

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