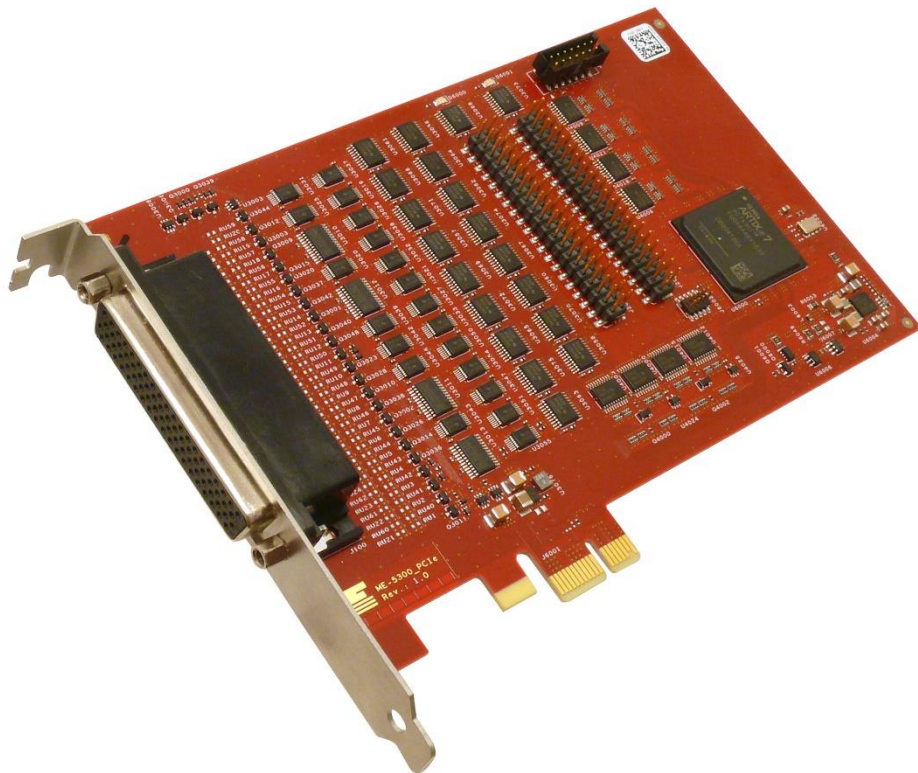Meilhaus Electronic Manual

ME-5310 Series 1.0E

(PCIe- and PXIe-Versions)

64-/128-Channel TTL Digital-I/O Board

Imprint

Manual ME-5310 Series

Revision 1.0E

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Content

1 Introduction

Valued customer,

Thank you for purchasing this device from Meilhaus Electronic. You have chosen an innovative high-technology product that left our premises in a fully functional and new condition.

Please take the time to carefully examine the contents of the package for any loss or damage that may have occurred during shipping. If there are any items missing or if an item is damaged, please contact us immediately.

Before installing the board in your computer, we recommend you read this manual carefully, especially the chapter describing board installation.

The descriptions in this manual concern PCI- and CompactPCI-versions of the ME-5310 series if not otherwise noted.

1.1 Important Notes

1.1.1 Use in Accordance with the Requirements

The PC boards of the ME series are designed for input and output of digital signals with a PC. Depending on type install the models of the ME-5310 series into:

> a free PCIe slot (PCIe versions) or

> a free PXIe slot (PXIe versions)

For installing a plug-in board please read the manual of your PC. Please follow the notes and the specifications from page 14 on.

- Please ensure sufficient heat dissipation for the board within the PC housing.
- If you connect the ME-63Xtend series to the ME-5310 always use the special connection cable ME AK-D78/1000 instead of the standard connection cable ME AK-D78. Otherwise the board will be **irreversibly damaged**.
- Note that the computer must be powered up, prior connecting signals by the external wiring of the board.
- As a basic principle, all connections to the board should only be made or removed in a powered-down state of all components.
- Ensure that no static discharge occurs when handling the board or when connecting/disconnecting the external cable.

Ensure that the connection cable is properly connected. It must be seated firmly on the D-Sub connector and must be tightened with both screws, otherwise proper operation of the board cannot be guaranteed!

1.1.2   Improper Application

PC plug-in boards for the PCIe- or PXIe-bus may not be taken into operation outside of the PC. Never connect the devices with voltage-carrying parts, especially not with mains voltage. As power supply for the USB models only an authorized power adaptor may be used.

Make sure that no contact with voltage-carrying parts can happen by the external wiring of the device. As a basic principle, all connections should only be made or removed in a powered-down state.

1.1.3   Unforseeable Misapplications

The device is not suitable to be used as a children's toy, in the household or under unfavourable environmental conditions (e.g. in the open). Appropriate precautions to avoid any unforeseeable misapplication must be taken by the user.

1.1.4   Warning

The device was developed and produced in accordance to the EMC low-voltage directive 73/23/EWG. When putting the device into operation, especially with voltages greater than 42 V, please follow the appropriate standards, installation instructions and national safety standards. Meilhaus Electronic GmbH assumes no responsibility for damage in case of faulty installation, operation or handling.

1.2   Package Contents

We take great care to ensure your delivery is complete. Nonetheless, please check the list enclosed to verify the contents of your delivery. You should find included:

- 64 resp. 128 channel TTL digital-I/O board for PCIe- or PXIe-bus (depending on version).
- Manual in PDF format on CD-ROM (optional as printed version).
- Driver software on CD-ROM.
- 78-pin D-Sub male connector.

- 128 channel version: Extender board ME-1001 with 78-pin D-Sub female connector, 78-pin D-Sub male connector and 2 flat ribbon cables.

1.3   Features

Model Overview

Model	Bus	TTL Digital I/Os
ME-5310 PCIe	Standard-PCIe	2 x 32-bit ports, independently configurable as input or output port (outputs can be read)
ME-5310 PXIe	PXIe	
ME-1001	Extender board for ME-5310 PCIe	2 x 32-bit ports, independently configurable as input or output port (outputs can be read).
ME-1001C	Extender board for ME-5310 PXIe	

Table 1: Model overview ME-5310 family

The ME-5310 is a highly integrated digital-I/O board designed for PCIe- resp. PXIe-bus.

The **ME-5310** has two 32-bit ports which can be independently configured as input or output. A port configured as output can also be read back.

The ME-5310 can be expanded to be a 128-channel-version at any time by using the **ME-1001** extender board.

1.4   System Requirements

The ME-series may be installed into any PC (Intel® Pentium® processor) with a free standard PCIe- resp. PXIe-slot (32 bit, 33 MHz, 5 V). The board is supported by the Meilhaus Electronic Intelligent Driver System (ME-iDS).

1.5   Software Support

The ME-series is supported by the Meilhaus Electronic Intelligent Driver System (ME-iDS). The ME-iDS is a unique driver system covering different devices and operating systems. It supports Windows 7, 8.1, 10 and contains a universal function library (API) for all common programming languages.

A detailed description of the functions can be found in the ME-iDS manual on the CD/DVD enclosed.

Please also read the notes in the appropriate README-files.

2   Starting up

Please read your computer's instruction manual on how to install new hardware components **before installing the board**.

2.1   Software Installation

The following basic procedure should be used:

If you have received the driver software as an archive file please un-pack the software **before installing the board**. First choose a directory on your computer (e.g. C:\Temp\Meilhaus\ME-iDS).

Use the Meilhaus Electronic Intelligent Driver System (ME-iDS) for programming your new data acquisition hardware. For installation and operation of the driver system, please follow the documentation in electronic form included with the software package.

2.2   Test Program

For simple testing of the board use the corresponding test program provided with the ME-iDS.

3   Hardware

3.1   Block Diagram
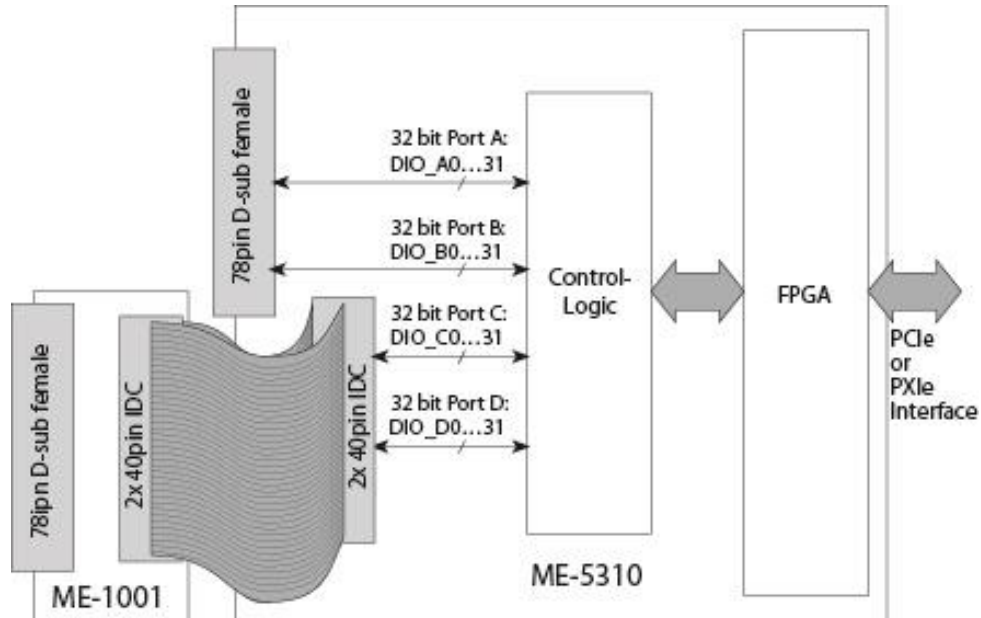
Picture 1: Block diagram of ME-5310

3.2   Digital I/O

3.2.1   Bidirectional TTL Ports

Depending on the version, the ME-5310 provides 64 or 128 I/O lines. These are organized in 2 or 4 ports each 32-bit-wide. The 32-bit ports can be configured independently as input or output by software. On power-up, all ports are set to input, therefore all lines are in a high-impedance state (see "Pull-up/Pull-down-resistors" on page 10).

For programming refer to chapter 4.1 on page 12.

The ports of the ME-5310 are assigned as follows:

- **ME-5310**: Port A (DIO_A0…31) and port B (DIO_B0…31) are available at the D-Sub 78-pin connector.
- Additionally for **ME-5310 + ME-1001**: Port C (DIO_C0…31) and port D (DIO_D0…31) are available at the D-Sub 78-pin connector of the ME-1001 extender board.

At the pins 19, 20, 38, 39, 58, 59, 77 and 78 a signal of + 5 V from the PC is available. The total load of these 8 pins should not exceed 500 mA.

The pin configuration of the 78-pin female D-Sub connector(s) can be found in appendix B (see page 15).
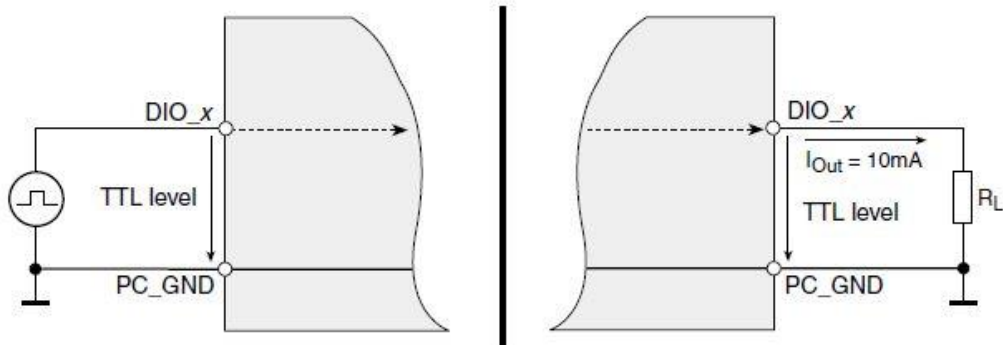
Picture 2: Wiring of the ME-5310

It is important that the voltage levels of the digital input/output wiring is within the TTL level-limits and that a reference to PC ground (PC_GND) is made.

The current load of the board (without airflow) including the possibly used pull-up resistors can be approximated using the following formula:

$T_J \geq T_u + (14 \,°C/W \times P_G)$

T_J = max. specified operation temperature of the component of 70 °C

P_G = total load of the outputs used

T_u = surrounding temperature (without convection)

The maximum output current of a single output is:

$I_{out} = I_{OL}$ = max. 20 mA bzw. $I_{out} = I_{OH}$ = max. 4 mA

3.2.2   Pull-Up/Pull-Down Resistors

On power-up, all ports are set as input and are in a high-impedance state (without an external switching). Depending on the application, it may be necessary to set the I/O lines in a defined state on power-up by using pull-up or pull-down resistors. The design of the ME-5310 allows these to be placed directly on the base board for all 64 lines as required. This is done port by port with 4.7 kΩ resistors. Note that when pull-up resistors are used, the current output of the lines is decreased (e.g. if R_{up} = 4.7 kΩ I_{max} = 3,1 mA).

Modell	Port A	Port B	Port C	Port D
ME-5310	n.c.	n.c.	n.c.	n.c.
ME-5310-1	pull up	pull up	n.c.	n.c.
ME-5310-2	pull down	pull down	n.c.	n.c.
ME-5310-3	pull down	pull up	n.c.	n.c.

Table 2: Model overview with pull-up/pull-down resistors

4   Programming

For programming the device please use the Meilhaus Electronic Intelligent Driver System (ME-iDS) included in your package. The ME-iDS is a unique driver system covering different devices and operating systems. It supports Windows 7, 8.1, 10 and contains a universal function library (API) for all common programming languages (the extent of the current software support can be found in the README-files of the ME-iDS).

A detailed description of the functions can be found in the ME-iDS manual (see CD/DVD enclosed or online:

https://www.meilhaus.de/en/products/pc-boards/me-ids/

Further details regarding the assignment of the subdevices and device specific arguments can be found in the help file (help file format under Windows, *.chm) which can be accessed via the „ME-iDS Control Center" in the info area of the task bar (as a rule in the lower right corner of the screen) or via the Windows start menu.

4.1   Digital-I/O Section

Each digital port of the ME-5310 boards is considered to be an independent functional group (subdevice) in the Meilhaus Intelligent Driver System (ME-iDS). The ME-5310 provides 2 bidirectional 32-bit TTL ports and the ME-5310 + ME-1001 provides 4 bidirectional 32-bit TTL ports. Each port can be independently configured as input or output port. On power-up, all ports are set to input. The following table shows the assignment of subdevices:

Port	Port width	ME-5310	ME-5310 + ME-1001
DIO_A	32 bit	subdevice 0 (ME_TYPE_DIO)	subdevice 0 (ME_TYPE_DIO)
DIO_B	32 bit	subdevice 1 (ME_TYPE_DIO)	subdevice 1 (ME_TYPE_DIO)
DIO_C	32 bit	-	subdevice 2 (ME_TYPE_DIO)
DIO_D	32 bit	-	subdevice 3 (ME_TYPE_DIO)

Table 3: Assignment port to subdevice

For wiring the digital-I/O ports refer to chapter 3.2 on page 9.

4.2   Input/Output

The input/output of single digital values is done in operation mode „**Single**". Each digital port is accessed as a unique subdevice of type ME_TYPE_DIO, subtype ME_SUBTYPE_SINGLE. Note the order of operation as described in the ME-iDS manual. The following parameters can be configured by the functions *meIOSingleConfig* and *meIOSingle:*

- Subdevice: see table 3.
- Port direction: input or output.
- Port width: bit, byte (8 bit), word (16 bit) or longword (32 bit).

Note: Ports defined as output can still be read back!

5 Appendix

A Specifications

PC Interface

PCI-Express Bus	PCI-Express x1, Version 2.0
PXI-Express Bus	PCI-Express x1, Version 2.0, PICMG 2.0 R3
Plug&Play	is fully supported

Digital Input/Output

Number	ME-5310: 2 x 32-bit I/O ports (output ports can be read back) ME-5310 + ME-1001: 4 x 32-bit I/O ports (output ports can be read back)
Input level	low: 0 V…+0,8 V ($I_{IL\ max.} = \pm 10\ \mu A$ high: + 2,0 V…+5,5 V ($I_{IH\ max.} = \pm 10\ \mu A$)
Output level	low: 0 V…+0,8 V ($I_{OL\ max.} = +20$ mA high: min.+ 2,4 V ($I_{OH} = -4$ mA)
Output current per channel	$I_{OL\ max.} = 20$ mA; $I_{OH\ max.} = 4$ mA
Attention	Total power consumption must not be exceeded (see calculation on page 10).

General Information

Max. load of the +5 V pins (19, 20, 38, 39, 58, 59, 77, 78): max. 500 mA at +5 V	
Power consumption at +5 V	typ. 1.2 A (without ext. load)
Physical size (without mounting bracket and connector)	ME-5310 PCIe: 165 mm x 107 mm ME-5310 PXIe: 3U CompactPCI board ME-1001 : 55 x 100 mm (LxH)
Connectors	all models: 78-pin D-Sub female connector; additional for ME-5310 + ME-1001: further 78-pin D-Sub female connector on ME-1001 extender board
Operating temperature	0…70 °C
Storage temperature	-40…100 °C
Relative humidity	20…55 % (non-condensing)
Certification	CE

B Pinout

B1 ME-5310 and ME-1001

The pin configuration of the ME-5310 is identical to the pin configuration of the ME-1001 extension board. On the diagram shown below, ports A and B on the ME-5310 correspond to ports C and D on the ME-1001:

Picture 3: Pinout of the 78-pin female D-Sub connector on the ME-5310 and ME-1001

C   Accessories

We recommend to use high-quality connector cables with single-shielded lines per channel.

For further accessories please refer to the current Meilhaus Electronic catalog and the internet:
https://www.meilhaus.de/en/Infos/me

D Technical Questions

D1 Hotline

Should you have questions or inquiries concerning your Meilhaus device, please contact us:

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D-82239 Alling

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Tel.:	(08141) 52 71 – 0	Tel.:	(08141) 52 71 – 188
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Service Department with RMA Process:
In case you need to return a board for repair purposes, we strongly ask you attach a detailed description of the error as well as information regarding your computer/system and the software used. Please register online using our RMA process:
https://www.meilhaus.de/en/about/rma-support/

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