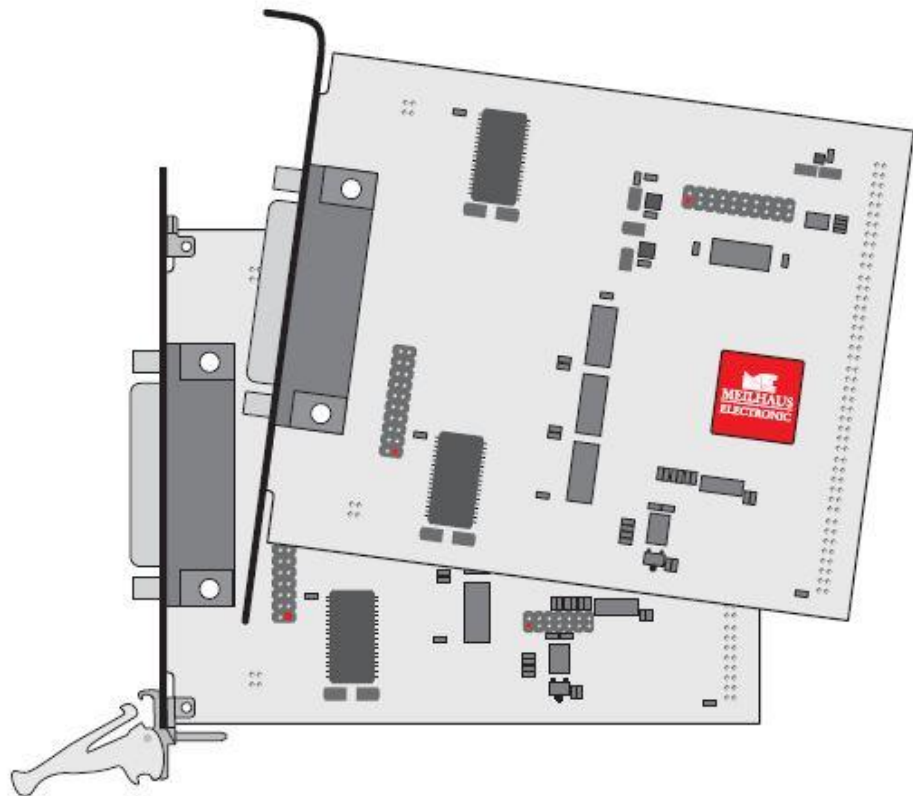


# Meilhaus Electronic Manual

## ME-5001 3.0E



Plug-on Board for ME-5000 Series

with up to 48 Digital I/Os

(alternatively: Frequency Measurement and Pulse Generator)

# Imprint

Manual ME-5001

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# 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.

## 1.1 Important Notes

### 1.1.1 Use in Accordance with the Requirements

The plug-on boards of the ME-5000 series require a base board of the ME-5000 series and will be plugged onto these and extend the functionality of the base boards. Depending on the PC platform the plug-on board additionally needs:

- a free PCI-Express slot (PCIe) or
- a free CompactPCI slot (cPCI)

however, without using the PCI slot connector.

Please follow the instructions of chapter 2.3 on page 9 of this document and the manual of your computer for the procedure when fitting additional hardware components.

**Please** follow the notes and the specifications starting on page 23:

- Ensure sufficient heat dissipation for the board within the PC housing.
- All unused inputs should be connected to the ground reference of the appropriate functional section. This avoids cross talk between the input lines.
- When using the configuration „pulse generator“ (FO) unused output pins should not be connected.

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

### **1.1.2 Improper Application**

PC plug-in boards for the PCI-, PCI-Express- or CompactPCI-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 Unforeseeable 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.

## **1.2 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:

- 48-bit digital-I/O board used as a plug-on board for the base boards of the ME-5000 series.
- Manual in PDF format on CD/DVD.
- Driver software on CD/DVD.
- 25-pin D-Sub mating connector.

**Note:** For connecting the digital I/Os of subdevice 2 up to 5 one resp. two optional mounting brackets are necessary. Use type ME-AK-D25F/S for PCI-Express slots resp. ME-AK-D25F/S (cPCI) for Compact.

## 1.3 Features

The plug-on board of type ME-5001 is a 48-bit digital-I/O board with bit-pattern detection for the base boards of the ME-5000 series. You can configure individual subdevices alternatively for frequency measurement resp. pulse generator on demand (see chapter 4 from page 16).

### Overview:

Model	DIO	FIO*	3,3 V/5 V	Termination
<b>ME-5001</b>				
(-device 0/1)	2 x 8-bit DIO	8 FI channels/ 8 FO channels	4 x 8-bit	4 x 8-bit
(Subdevice 2/3)	2 x 8-bit DIO	-	4 x 8-bit	4 x 8-bit
(Subdevice 4/5)	2 x 8-bit DIO	-	-	-

Table 1: Overview ME—5001

\*Alternative configuration can be activated via ME-iDC.

- **Digital-I/O ports:** The ME-5001 has totally 48-bit-directional I/Os. The direction can be defined for each of the six 8-bit ports (subdevice 0..5) by software. After powering up, all the ports are configured as inputs.
- **Frequency counter:** The concept of the “configurable subdevices” allows subdevice 0 to be employed as a frequency counter. Eight independent channels are available for measuring the frequency and duty cycle of rectangular signals (max. 5.5 MHz).
- **Pulse generator:** The concept of the “configurable subdevices” allows subdevice 1 to be employed as a rectangular wave generator. Eight independent channels are available for the output of a periodic, rectangular signal at up to 5.5 MHz with a variable duty cycle.
- **Signal level 3.3/5 V:** The signal level of all the digital inputs/outputs and of the control lines can be switched together between

3.3 V and 5 V depending on the external circuitry. The changeover is made for all the ports of the plug-on board at once using software.

- For **optimum signal matching**, you are able to activate, via software, an active 110  $\Omega$  termination at the digital inputs/outputs of the subdevices 0...3.
- **Bit pattern detection:** The bit-pattern at the digital inputs can be monitored if required. Depending on the configuration, an interrupt can be triggered in response to a change in the bit-pattern.

The ME-5001 divides the bandwidth for transferring the data from and to the PC with the respective base card. The actual transfer rate depends on the activity of the base card and the configuration of your computer.

Depending on requirements, you can select from the following operating modes:

- **Single:** In this operating mode, a single value can be read or written under software control (see chapter 4.1.1 on page 18).
- **Interrupt:** For interrupt handling in the "bit-pattern change" modes (see chapter 4.2 on page 21).

## 1.4 System Requirements

The ME-5000 series may be installed into any PC with a free standard PCI-, PCI-Express resp. CompactPCI-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 2000/XP/Vista and 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 note the corresponding 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

- Installation under Windows

The following basic procedure should be used:

If you have received the driver software as an archive file please unpack 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.

### 2.3 Fitting the Plug-on Boards



The boards should be handled with care in order to make sure that the device is not damaged by electrostatic discharge (ESD), mechanical stress or unsuitable current surges. Precautions should also be taken to avoid an electric shock. Ensure that standard ESD safety precautions are taken. At least one hand should be grounded in order to dissipate any static charge.

**Observe** the following procedure:

1. If the base board is installed, you must first remove it in order to be able to insert the plug-on board. Here you should observe the procedure as described in the manual for your PC system.

2. Make sure that electrostatic discharges cannot take place through the plug-on board or the base board as you plug it in. Follow the standard ESD safety precautions.
3. Push the plug-on board carefully, and with only a little force, on to the male connector provided for it (see Diagram 1, items 1, 2 and 3). Check that the board is fully plugged in.
4. Choose two adjacent slots for the installation. If necessary, remove an additional mounting bracket for the slot of the plug-on board.
5. Carefully plug the combination of the base and plug-on board into the computer.
6. Screw the two slot brackets down firmly.
7. Close the PC system again.

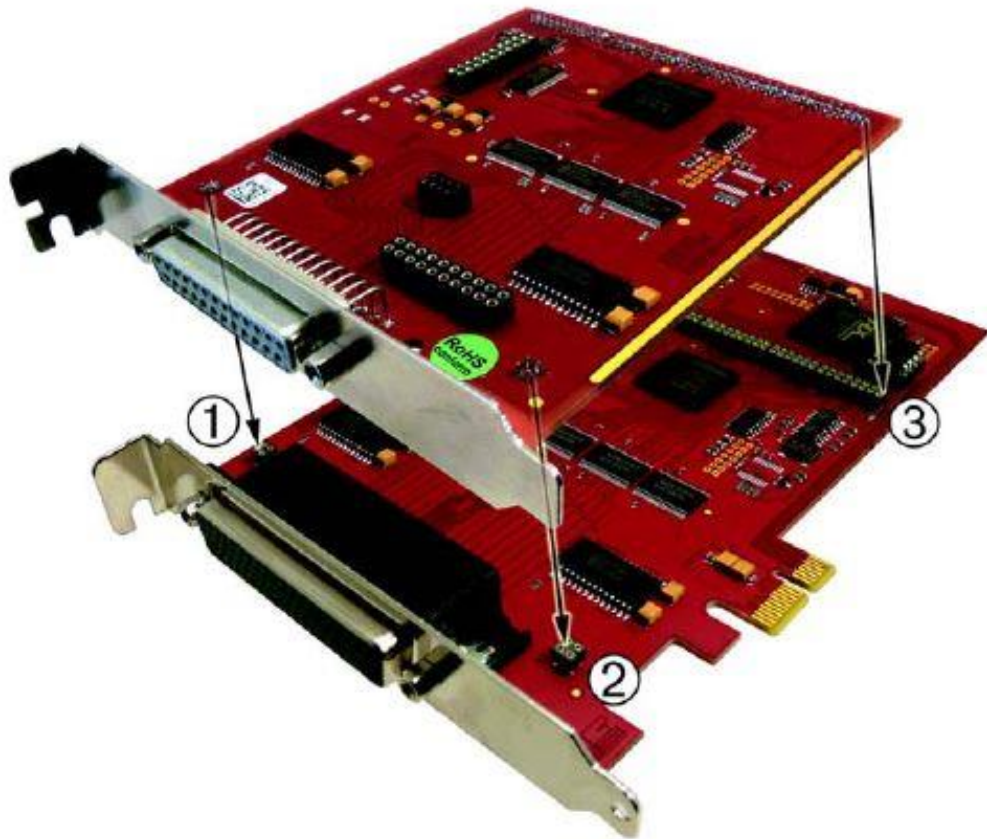


Diagram 1: Fitting the plug-on boards

## 3 Hardware

### 3.1 Block Diagram

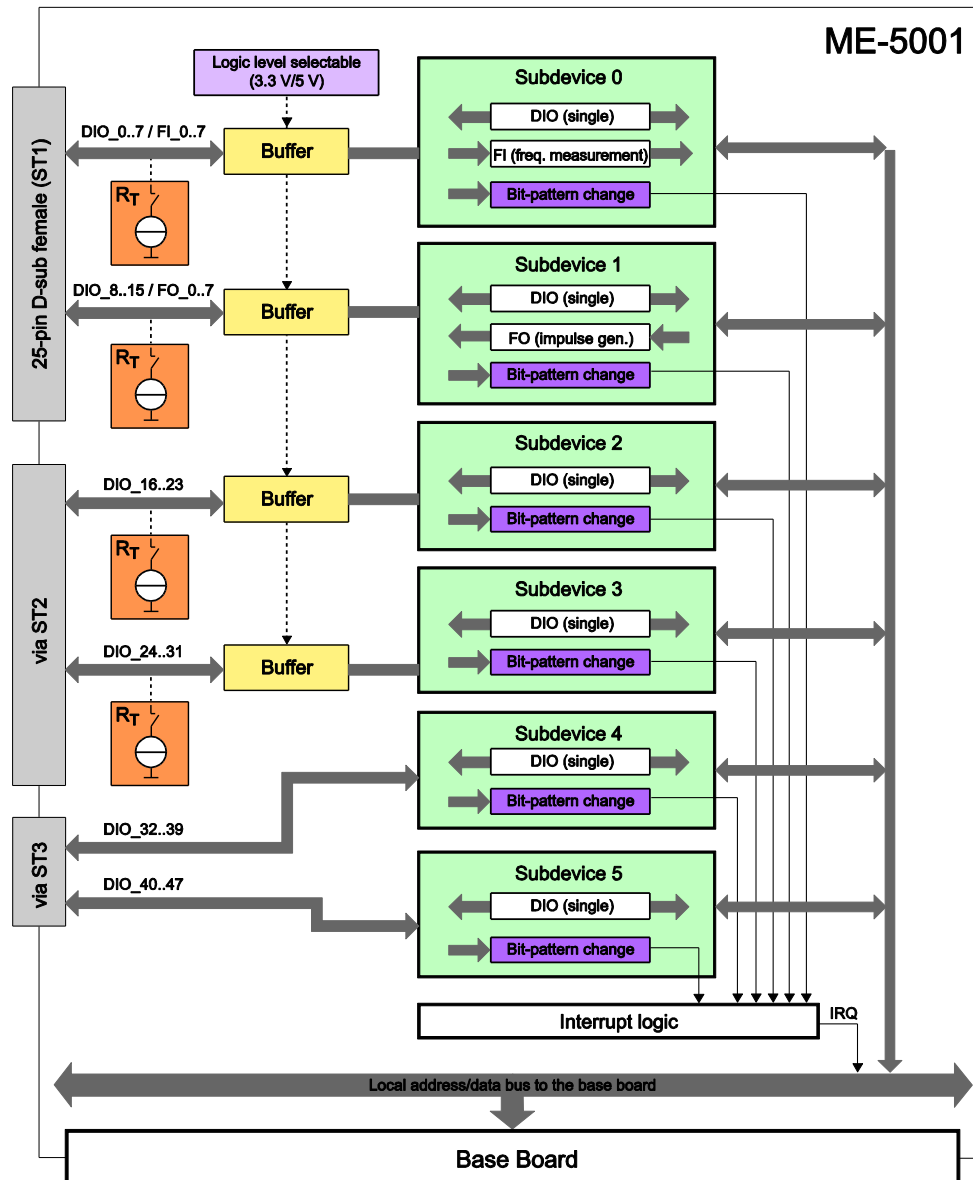


Diagram 2: Block diagram of ME-5001

The pin assignment of the connectors can be found in the appendix (see "Pinout" on page 26).

In the following chapters you will learn more about the external wiring of the individual subdevices. Chapter 4 from page 16 describes the operation modes and the programming.

## 3.2 ME-5001 cPCI/PCIe

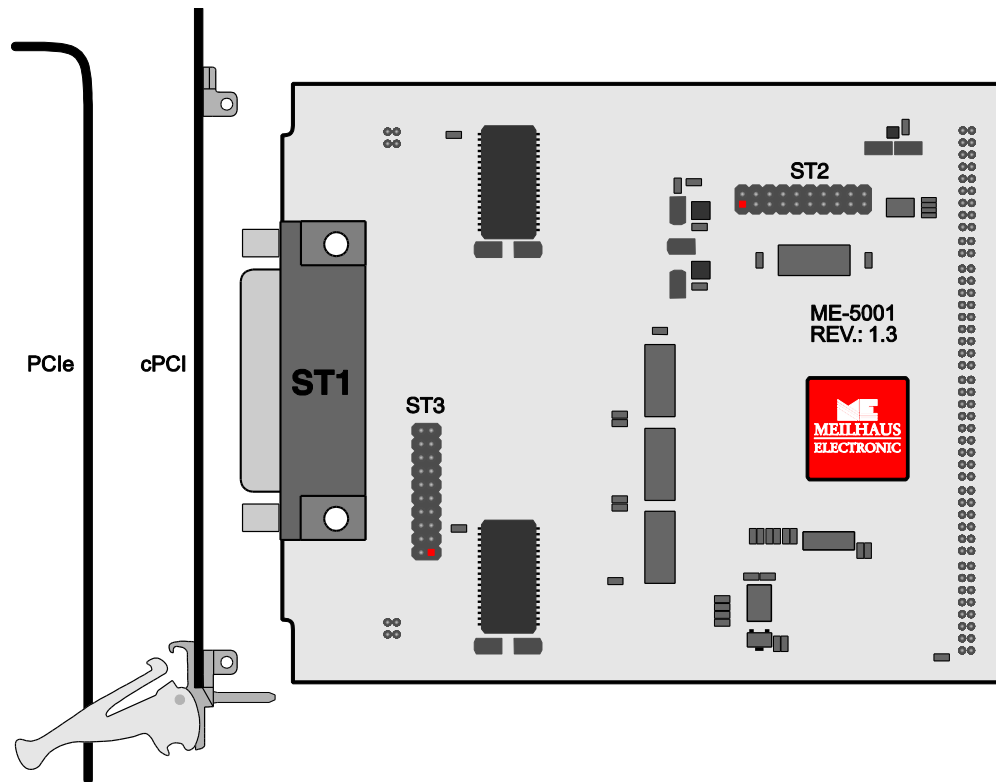


Diagram 3: ME-5001 cPCI/PCIe

## 3.3 Digital Input/Output

The ME-5001 has a total of six 8-bit digital-I/O ports (subdevice 0..5). In single operation mode, the subdevices can be configured independently of one another, as input or outputs.

The direction of the ports is defined by software. After powering up, all the ports are configured as inputs.

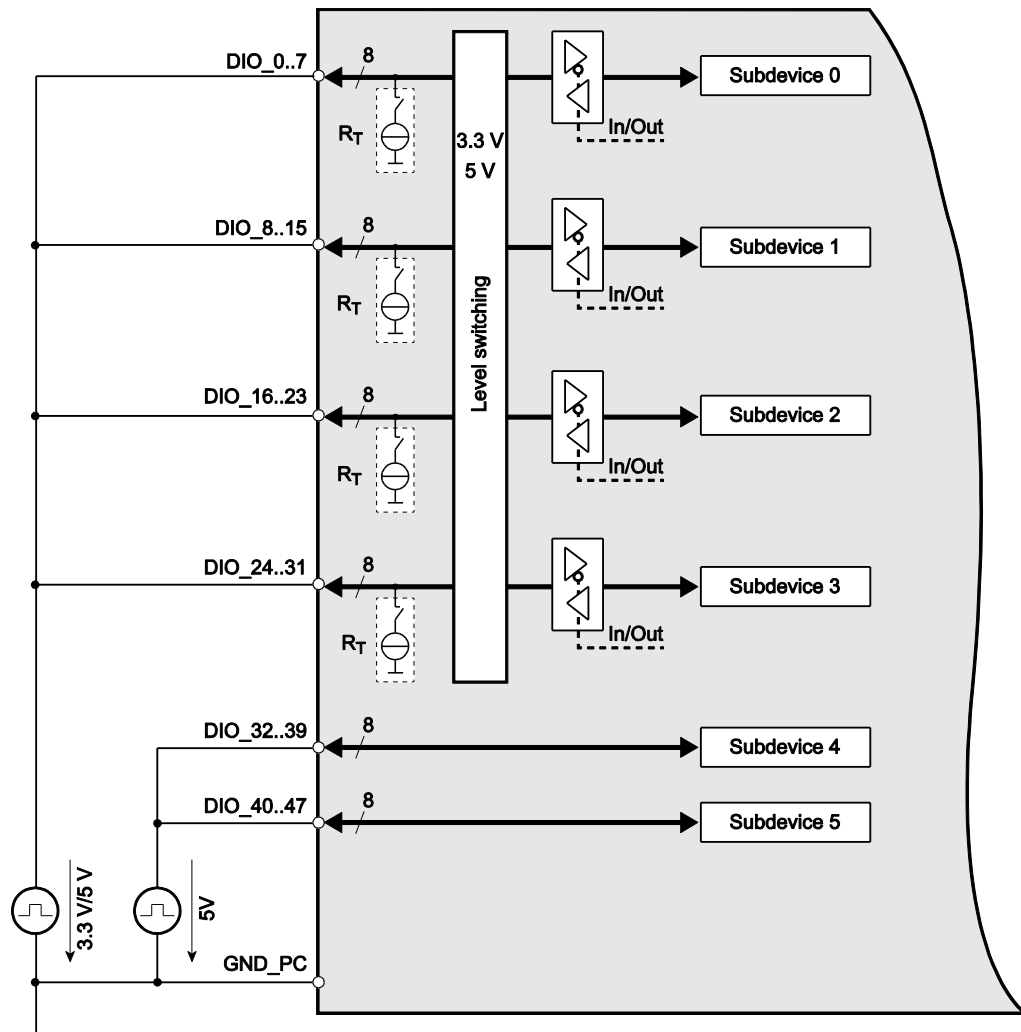


Diagram 4: Wiring of digital input/outputs

Please read chapter 4.1.1 from page 18 for programming the different operating modes.

### 3.3.1 Digital Inputs

When wiring the inputs, note that the voltage level must be observed (see the specifications on page 23) and that a reference to the PC ground (GND\_PC) must be established (see diagram 4).

### 3.3.2 Digital Outputs

When wiring the outputs, note that the voltage level must be observed (see the specifications on page 23) and that a reference to the PC ground (GND\_PC) must be established (see diagram 4).

$$I_{out} = I_{OL} = I_{OH} = 24 \text{ mA per pin.}$$

### 3.3.3 External Trigger

On the ME-5001 no external trigger inputs are available. However you can monitor the bit-pattern of a digital input port. As soon as the specified event occurs, an interrupt can be issued and passed directly to the PC. See chapter 4.2 on page 21.

## 3.4 Frequency Input/Output

The concept of the “configurable subdevices” of the ME-5000 series gives you the option of using individual subdevices with an alternative functionality. The associated configuration is carried out with the ME-iDC configuration tool before your application is called.

The following channels are available:

- Frequency measurement (FI=“Frequency Input”):  
8 independent inputs for measuring the frequency and duty cycle of rectangular signals (max. 5.5 MHz).
- Pulse generator (FO=“Frequency Output”):  
8 independent outputs for a periodic rectangular signal at up to 5.5 MHz with a variable duty cycle.

The associated pins are identified as FI\_0..7 and FO\_0..7 in the terminal assignment on page 27. After powering up, the pins FO\_0..7 are configured as inputs i.e. in high-impedance state. Not until the driver has been loaded driver become conductive.

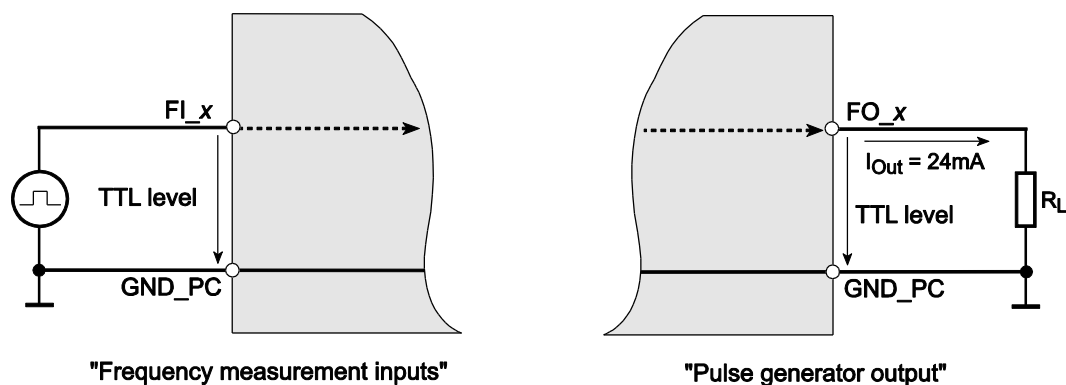


Diagram 5: Wiring the frequency inputs/outputs

The specifications for the digital-I/O ports apply to the wiring of the FI/FO lines. A reference to the PC ground (PC\_GND) must always be established. The maximum output current is  $I_{Out} = I_{OL} = I_{OH} = 24 \text{ mA}$ .

The frequency counters and pulse generators are configured by software. Please read chapter 4.2 on page 21 for programming the frequency input/output.

## 3.5 External Interrupt

If required, you can also monitor the bit-pattern of a digital input port. The “bit-pattern change” mode is available on the ME-5100. As soon as the specified event occurs, an interrupt is issued and passed directly to the PC.

The digital inputs/outputs are programmed in the single operating mode. The interrupt handling is carried out with the *meIOIrq...func*-tions; see also chapter 4.2 on page 21.

## 3.6. Additional Functions

You can make the following settings for adapting to your application regardless of the operating mode.

### 3.6.1 Termination

For optimum signal matching, you can enable via software, an active 110 Ω termination at the digital inputs/outputs of each port.

The termination circuits are effectively protected against overload by the combination of current limiting and thermal shutdown (with automatic return to service).

### 3.6.2 Logic Level Matching

The signal level of subdevices 0..3 can be switched together between 3.3 V and 5 V, depending on the external circuitry. The changeover for the pins DIO\_0...31 is made in common by software.

## 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 2000 and higher 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: [www.meilhaus.de/download/ME-iDS](http://www.meilhaus.de/download/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.

The plug-on board of type ME-5001 is a discrete device with six "subdevices", beginning with the index "0". The functionality of the subdevices can be specified by the user through selecting a pre-defined configuration. The desired configuration is loaded into the board by the ME-iDC configuration tool before your application starts. Using the standard configuration, (ID 0), the board is ready to operate immediately. You will find an overview of the currently available configurations in the following table:

### Subdevice Configurations ME-5001

Subdevice Type...	...Subtype	I/Os	ID of the Configuration
Subdevice 0 (DIO, FI)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*
<b>Frequency input (FI)</b>	single	8 channels	1
Subdevice 1 (DIO, FO)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*
<b>Frequency output (FO)</b>	single	8 channels	1



Subdevice 2 (DIO)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*
Subdevice 3 (DIO)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*
Subdevice 4 (DIO)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*
Subdevice 5 DIO)			
<b>Digital input/output (DIO)</b>	single	8-bit bidirectional	0*

Table 2: Subdevice configuration ME-5001

\*Standard configuration at shipment. The most recently selected configuration in the ME-iDC is stored in a non-volatile memory on the board, and is automatically loaded after a restart.

Depending on requirements, you can select from the following operation modes:

- **Single:** Individual values can be read or written in this operating mode.
- **Interrupt:** For the interrupt handling in the bit-pattern change mode (see chapter 4.2.1 starting on page 21).

Operation Mode	Speed	Trigger
<b>Single</b>	single value	input/output via software
<b>Interrupt (Bit-pattern detection)</b>	$f_{IRQmax.} = 10 \text{ kHz}$	ext. trigger signal at a digital input/output port

Table 3: Operation modes summary

## 4.1 Single Operation Mode

Individual values can be read or written in this operating mode.

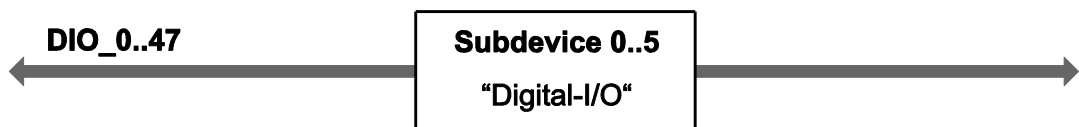
### Notes:

- In the single operating mode, the subdevices of the ME-5001 can be used bidirectional.
- After powering up, the bidirectional ports are configured as inputs.
- A port that is configured as an output can also be read back!

### 4.1.1 Digital Input/Output

<b>ME-5001</b>
✓

The input/output of individual digital values is carried out in the single operating mode. All subdevices are of type ME-TYPE\_DIO, subtype ME\_SUBTYPE\_SINGLE. The configuration is done separately for each subdevice.



*Diagram 6: Digital input/output in single operating mode*

Please observe the ME-iDS manual and the ME-iDS help file (\*.chm) for the procedure. You can open both these documents through the "ME-iDS Control Center" or through the Windows Start menu.

Please read chapter 3.3 on page 14 for wiring of the digital I/Os.

### 4.1.2 Frequency Input/Output

<b>ME-5001</b>
✓

Before you can use the “Frequency measurement” or “Pulse generator” modes, it is necessary, before opening your application, to run the ME-iDC configuration tool in order to specify the configuration for the corresponding subdevice (see also table 2 on page 17).

The programming of the frequency measurement and the pulse generator is always done in the single operating mode. The subtype of the subdevices is always ME-SUBTYPE\_SINGLE.



Diagram 7: Frequency input/output in single operation mode

Please read the ME-iDS manual and the ME-iDS help file (\*.chm) carefully prior to programming. You can open both of these documents through the “ME-iDS Control Center” or through the Windows Start menu.

Two variables are introduced to describe the rectangular signal, and apply equally to input and output. One value indicates the period  $T$ , while the other value provides the duration of the pulse of the first phase of the period  $t_{1p}$ . For frequency measurement, the measurement starts with the first rising edge, and finishes with the next rising edge. The falling edge that lies between them defines the end of the first phase. In pulse generator mode, output normally starts with a high level, changing to the low level when the first phase has elapsed.

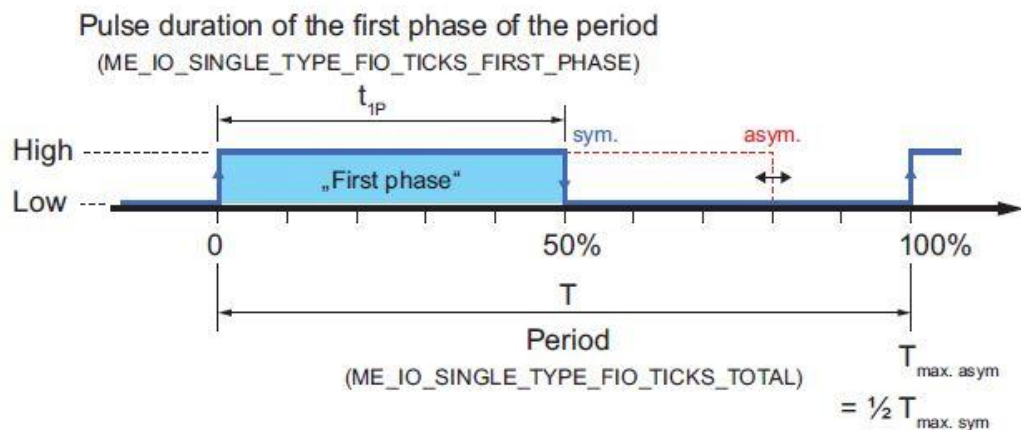


Diagram 8: Signal definition

The time reference is provided by a 66 MHz counter. It is configured using the `meIOSingleConfig()` function. A period of 15.15 ns follows from this, and is defined as the smallest unit of time. It is referred to below as “1 tick”. The resolution for T and  $t_{1P}$  is therefore 1 tick (see also the specifications on page 23).

**Note** that the value of the maximum period  $T_{max}$  depends on the duty cycle. A distinction is drawn between rectangular signals with an asymmetrical duty cycle  $T_{max, asym}$  and a symmetrical duty cycle  $T_{max, sym}$ . The figures for the ME-5100 are:

$$T_{max, asym} = 32.5 \text{ s (0.03 Hz)}; T_{max, sym} = 65 \text{ s (0.015 Hz)}$$

The wiring of the frequency inputs/outputs can be found in chapter 3.5 on page 15.

#### 4.1.2.1 Frequency Measurement

With the frequency measurement operating mode (FI=“Frequency Input”) you can determine the period or frequency, and the duty cycle of rectangular signals up to about 5.5 MHz. The resolution is 1 tick = 15.15 ns. The measurement always starts at a rising edge. On the ME-5100, all 8 frequency measuring channels (FI\_0...7) are addressed as subdevices of type ME\_TYPE\_FI, sub-type ME\_SUBTYPE\_SINGLE. Each channel can be programmed independently.

**Note:** If the frequency and duty cycle are the magnitudes you want, these can easily be calculated from the values returned for `<pdTime>`. The formula is:

$$\text{Frequency [Hz]} = 1/\text{period [s]}$$

$$\text{Duty cycle [\%]} = (\text{„duration of the first phase of the period“ [s]}/\text{period [s]}) \times 100.$$

#### 4.1.2.2 Pulse Generator

In the pulse generator operating mode (FO = “Frequency Output”) you can output rectangular signals with a variable duty cycle at frequencies of up to 5.5 MHz and with a resolution of 1 tick. On the ME-5100, all 8 pulse generator channels (FO\_0...7) are addressed as a subdevices of type ME\_TYPE\_FO, sub-type ME\_SUBTYPE\_SINGLE. Each channel can be programmed independently.

The first phase of the rectangular signal is “high” by default. By setting the ME\_IO\_SINGLE\_TYPE\_FO\_START\_LOW flag it is also possible to start the output with a “low” level.

**Note:** An output channel can also be read back!

## 4.2 Interrupt Operation

<b>ME-5001</b>
✓

On the ME-5001 you can monitor the bit-pattern of a subdevice configured as an input for changes in one or more masked bits. As soon as the first edge that meets the trigger condition arrives, an interrupt is generated and passed directly to the PC.

The programming the digital input/output is carried out in the single operation mode. The subdevice must be of type ME\_TYPE\_DIO. the interrupt handling is done by the *meDIrq...* functions.

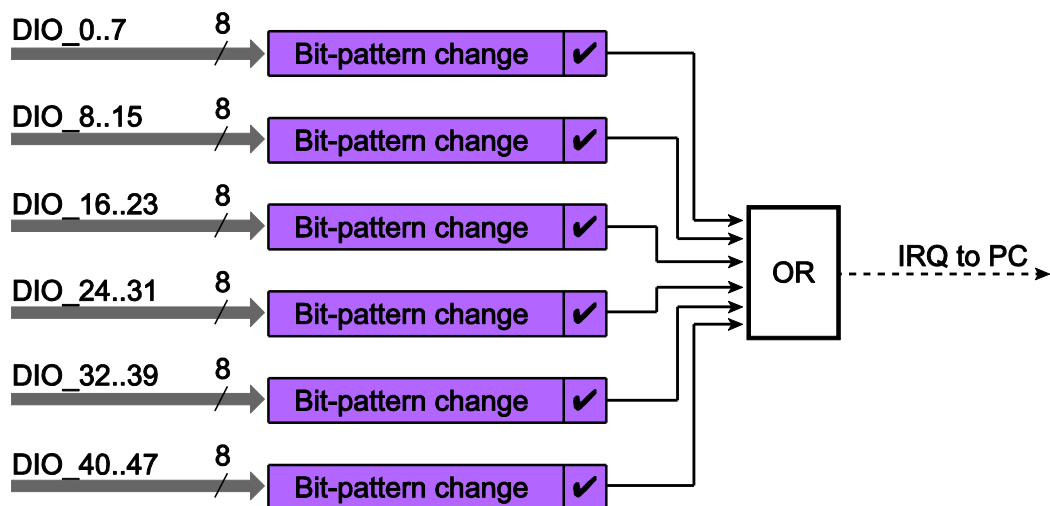


Diagram 9: Interrupt options

Please observe the ME-iDS manual and the ME-iDS help file (\*.chm) for the **procedure**. You can open both of these documents through the “ME-iDS Control Center” or through the Windows Start menu.

### 4.2.1 Bit-Pattern Change

In the bit-pattern change mode, one or more bits that are to be monitored for a change of state can be defined (masked). A 32-bit-wide argument per subdevice contains the mask. For each input pin both one bit for rising edge and one bit for falling edge is available. If the state of at least one bit masked with a “1” changes (0 → 1 or 1 → 0), an interrupt is issued (see diagram 10 on page 22).

In what is known as the “extended format” of interrupt handling (see the ME-iDS manual), two bits are available for the interrupt status of each pin. One is for the rising edge, and one for the falling edge. The bits for the falling edges are assigned to the bit b7...0, while the bits for the rising edges are assigned to the bits b23...16.

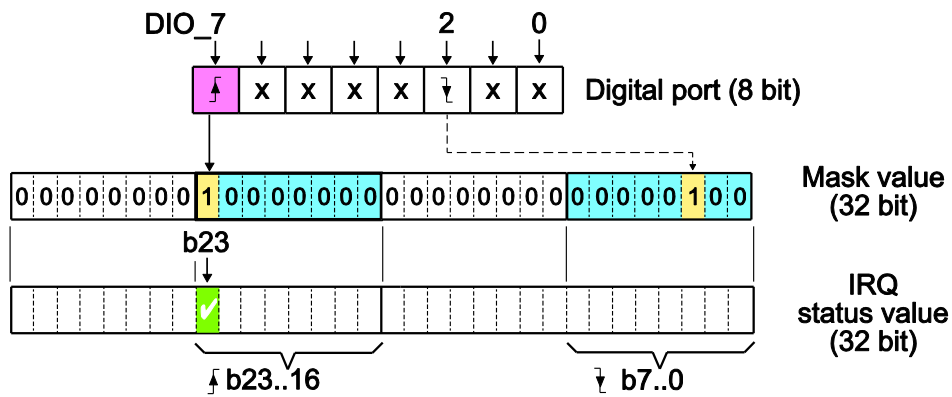


Diagram 10: Bit-pattern change

#### Example (see diagram 10):

By writing the value 00800004 Hex as a mask value (see parameter `<iIrqArg>` of the function `meIOIrqStart()`, bit 2 is monitored for a falling edge, and bit 7 for a rising edge. A rising edge now is to arrive at bit 7, so that an interrupt is issued and in the interrupt status value bit b23 returns “1”. Any edges that might arrive at pins labelled with an “X” are ignored. Only the change in state of a pin whose edge is set to “1” in the parameter `<iIrqArg>` can issue an interrupt.

The interrupt event is evaluated with the function `meIOIrqWait()`. We recommend using what is known as the “extended format” to obtain detailed information about the triggering edge.

# 5 Appendix

## A Specification

### PC Interface

PCI-Express bus	32 bit, 33 MHz, 3.3 V, PCI-Express x 1 specification version 2.0
CompactPCI bus	32 bit, 33 MHz, 5 V, PICMG 2.0 R3.0
Plug&Play	is fully supported

### Digital Input/Output

Measured Quantity/Criterion	Condition/Explanation	Value
Number Ports	subdevice 0...5	48 bits (6 x 8-bit bidirectional)
Operation modes	single	software-triggered reading/writing
	interrupt	monitoring the digital ports for a change in the bit-pattern
External trigger inputs		DIO_0..47
External trigger edges		rising, falling, any
Output level: $U_{OL}$	at $I_{OUT} = 24 \text{ mA}$	max. 0.5 V
$U_{OH 3,3V}$	at $I_{OUT} = -24 \text{ mA}$	min. 2.4 V
$U_{OH 5V}$	at $I_{OUT} = -24 \text{ mA}$	min. 2.4 V
Input level: $U_{IL}$	at $V_{CC} = 3.3 \text{ V}$ or $5 \text{ V}$	max. 0.8 V
$U_{IH 3,3V}$	at $V_{CC} = 3.3 \text{ V}$	min. 2 V
$U_{IH 5V}$	at $V_{CC} = 5 \text{ V}$	min. 2 V
Input current:	$I_{IN}$	$\pm 1 \mu\text{A}$
Output current: $I_{OUT}$	per pin	max. 24 mA
Reference ground		PC ground (GND_PC)

### Frequency Input/Output

Availability	alternative subdevice configuration via ME-iDC
Signal form	rectangular

**Frequency Measuring Channels**

Measured Quantity/Criterion	Condition/Explanation	Value
Reference ground		PC ground (GND_PC)
Number of channels	(FI_0...7)	8 inputs (TTL)
Input level		see digital I/O
Input current		see digital I/O
Period (T)	$T_{min.} = T_{min.asym.} = T_{min.sym.}$  $T_{max.asym}$ $T_{max.sym}$	181.81 ns (5.5 MHz) 32.5 s (0.03 Hz) 65 s (0.015 Hz)
Duty cycle	variable, depending on T	measurable in steps of 1 tick
Resolution	1 tick	15.15 ns
Accuracy		$\pm 15.15$ ns
Operating modes		single

**Pulse Generator Channels**

Measured Quantity/Criterion	Condition/Explanation	Value
Reference ground		PC ground (GND_PC)
Number of channels	(FO_0..7))	8 outputs (TTL)
Output level		see digital I/O
Period (T)	$T_{min.} = T_{min.asym.} = T_{min.sym.}$  $T_{max.asym}$ $T_{max.sym}$	181.81 ns (5.5 MHz) 32.5 s (0.03 Hz) 65 s (0.015 Hz)
Duty cycle	variable, depending on T	adjustable in steps of 1 tick
Resolution	1 tick	15.15 ns
Accuracy		$\pm 15.15$ ns
Operating modes		single

**Interrupt**

Measured Quantity/Criterion	Condition/Explanation	Value
Interrupt sources	passed directly to the PC	bit-pattern change



**General Data**

<b>Measured Quantity/Criterion</b>	<b>Condition/Explanation</b>	<b>Value</b>
Power supply	via base board	3.3 V/5 V
Current consumption	additional to base board	0.5...0.9 A (full load)
Board dimensions (without mounting bracket and connector)	base board requires its own slot	120 mm x 100 mm
Connections	ST1	25-pin D-Sub female socket
	ST2	20-pin IDC socket (opt. 25-pin D-Sub, see accessories)
	ST3	20-pin IDC socket (opt. 25-pin D-Sub, see accessories)
Operating temperature		0...70 °C
Storage temperature		-40...100 °C
Air humidity		20...55 % (non-condensing)

Certification	CE
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## B Pinout

### Legend for pinouts:

<b>Pin-name</b>	<b>Function</b>
DIO_0...7	digital input/output (subdevice 0)
DIO_8...15	digital input/output (subdevice 1)
DIO_16...23	digital input/output (subdevice 2)
DIO_24...31	digital input/output (subdevice 3)
DIO_32...39	digital input/output (subdevice 4)
DIO_40...47	digital input/output (subdevice 5)
FI_0...7	frequency measuring inputs (alternative configuration)
FO_0...7	pulse generator outputs (alternative configuration)
VCC_OUT	V <sub>CC</sub> output (+5 V from PC)
GND_PC	common ground (=PC ground)
n.c.	pin reserved for extensions

## B1 25-pin D-Sub (ST1)

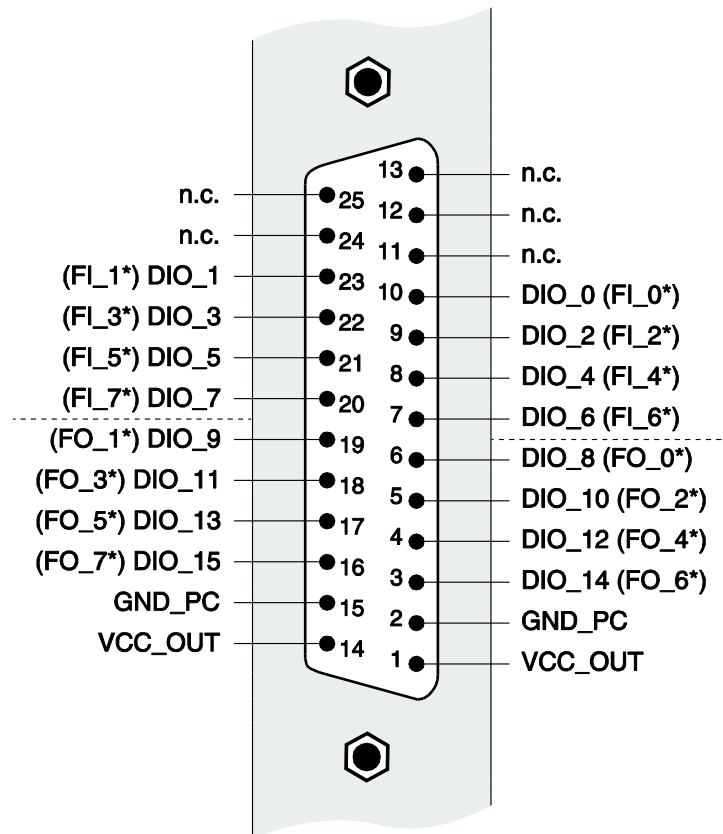


Diagram 11: 25-pin D-sub socket ME-5001 (ST1)

The digital I/Os of ST1 are assigned to subdevice 0 and 1.

\*Use as a frequency measuring input (FI\_x) or pulse generator output (FO\_x) is only possible after appropriate configuration using ME-iDC. The other pins of the relevant digital subdevice can then no longer be used for digital input/output.

## B2 Additional Sockets (ST2/ST3)

For adaption from ST2 (DIO\_16...31) resp. ST3 (DIO\_32..47) to a 25-pin D-Sub female connector one resp. two optional mounting brackets are required. Use type ME-AK-D25F/S for PCI-Express slots resp. ME-AK-D25F/S (cPCI) for CompactPCI slots.

Please note: When plugging on the flat ribbon cable, make sure that pin 1 of the flat ribbon cable (red marked line) is connected on to the IDC-socket ST2 resp. ST3 as shown in diagram 12.

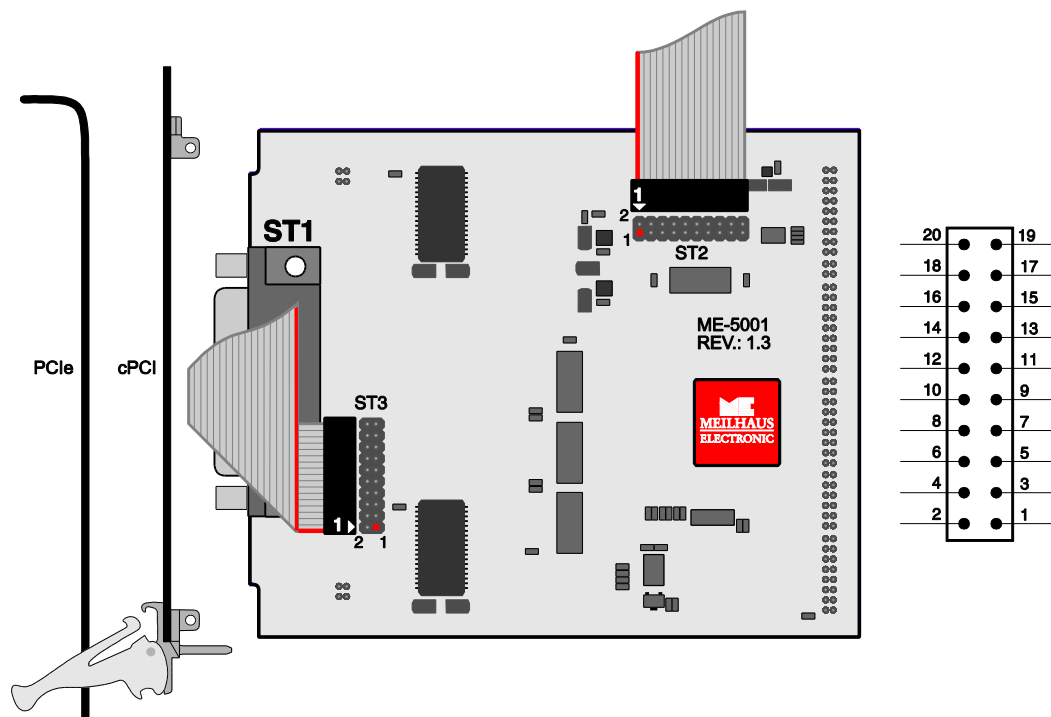


Diagram 12: Connecting the additional sockets ST2/ST3

### 20-pin IDC socket for ST2 and ST3

Pin	Labeling (ST2/3)	Pin	Labeling (ST2/3)
20	DIO_17/33	19	DIO_16/32
18	DIO_19/35	17	DIO_18/34
16	DIO_21/37	15	DIO_20/36
14	DIO_23/39	13	DIO_22/38
12	DIO_25/41	11	DIO_24/40
10	DIO_27/43	9	DIO_26/42
8	DIO_29/45	7	DIO_28/44

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6	DIO_31/47	5	DIO_30/46
4	GND_PC	3	GND_PC
2	VCC_OUT	1	VCC_OUT

## **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:

[www.meilhaus.de/en/pc-boards/accessories/](http://www.meilhaus.de/en/pc-boards/accessories/)

## D Technical Questions

### D1 Hotline

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

**Meilhaus Electronic GmbH**

Repair & Service  
Am Sonnenlicht 2  
D-82239 Alling

**Sales:**

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Fax: (08141) 52 71 – 129

eMail: [sales@meilhaus.de](mailto:sales@meilhaus.de)

**Support:**

Tel.: (08141) 52 71 – 188  
Fax: (08141) 52 71 – 169

eMail: [support@meilhaus.de](mailto:support@meilhaus.de)

**Download-Server and Driver Update:**

To download current driver versions for Meilhaus Electronic devices as well as manuals in PDF format, please go to:

[www.meilhaus.org/driver](http://www.meilhaus.org/driver)

**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:

[www.meilhaus.de/en/infos/service/rma.htm](http://www.meilhaus.de/en/infos/service/rma.htm).

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