ADDI-DATA®
PARTNER FÜR PRÄZISION

TECHNICAL

DESCRIPTION

APCI-3003

Analog input board, optically isolated

DISCONTINUED

DIN EN ISO 9001:2008 certified

Edition: 02.03-05/2017

Product information

This manual contains the technical installation and important instructions for correct commissioning and usage, as well as production information according to the current state before printing.
The content of this manual and the technical product data may be changed without prior notice.
ADDI-DATA GmbH reserves the right to make changes to the technical data and the materials included herein.

Warranty and liability

The user is not authorised to make changes to the product beyond the intended use, or to interfere with the product in any other way.
ADDI-DATA shall not be liable for obvious printing and phrasing errors. In addition, ADDI DATA, if legally permissible, shall not be liable for personal injury or damage to materials caused by improper installation and/or commissioning of the product by the user or improper use, for example, if the product is operated despite faulty safety and protection devices, or if notes in the operating instructions regarding transport, storage, installation, commissioning, operation, thresholds, etc. are not taken into consideration. Liability is further excluded if the operator changes the product or the source code files without authorisation and/or if the operator is guilty of not monitoring the permanent operational capability of working parts and this has led to damage.

Copyright

ADDI-DATA software product licence

Please read this licence carefully before using the standard software. The customer is only granted the right to use this software if he/she agrees with the conditions of this licence.
The software may only be used to set up the ADDI-DATA products.
Reproduction of the software is forbidden (except for back-up and for exchange of faulty data carriers). Disassembly, decompilation, decryption and reverse engineering of the software are forbidden. This licence and the software may be transferred to a third party if this party has acquired a product by purchase, has agreed to all the conditions in this licence contract and the original owner does not keep any copies of the software.

Trademarks

- ADDI-DATA, APCI-1500, MSX-Box and MSX-E are registered trademarks of ADDI-DATA GmbH.
- Turbo Pascal, Delphi, Borland C, Borland C++ are registered trademarks of Borland Software Corporation.
- Microsoft .NET, Microsoft C, Visual C++, MS-DOS, Windows XP, Windows 7, Windows 8, Windows Server 2000, Windows Server 2003, Windows Embedded and Internet Explorer are registered trademarks of Microsoft Corporation.
- LabVIEW, LabWindows/CVI, DASYLab, DIAdem are registered trademarks of National Instruments Corporation.
- CompactPCI is a registered trademark of PCI Industrial Computer Manufacturers Group.
- VxWorks is a registered trademark of Wind River Systems, Inc.
- RTX is a registered trademark of IntervalZero.

Warning!

The following risks result from the improper implementation of the board and from use contrary to the regulations:

Personal injury

Damage to the board, the PC and peripherals

Pollution of the environment.

- Protect yourself, others and the environment!
- Read the safety precautions (yellow leaflet) carefully!

  If this leaflet is not enclosed with the documentation, please contact us and ask for it.
- Observe the instructions of this manual!

  Make sure that you do not forget or skip any step!
  We are not liable for damages resulting from the wrong use of the board.
- Pay attention to the following symbols:

NOTICE!
Designates hints and other useful information.

NOTICE!
Designates a possibly dangerous situation.
If the instructions are ignored, the board, the PC and/or peripherals may be **destroyed**.

WARNING!
Designates a possibly dangerous situation.
If the instructions are ignored, the board, the PC and/or peripherals may be **destroyed** and persons may be **endangered**.

Contents

Figures

Tables

Chapter overview

In this manual, you will find the following information:

Chapter	Content
1	Important information on the application, the user and on handling the board
2	Brief description of the board (features, block diagram)
3	Detailed information on the insertion of the board, connection of the accessories (including pin assignment) and driver installation **Tip:** Print out this chapter to have help at hand for inserting and installing the board.
4	Description of the individual functions of the board
5	Standard software: Information on the API software functions
6	Procedure for returning (repairing, etc.) or disposing of the board
7	List of technical data and limit values of the board
8	Appendix with glossary and index
9	Contact and support address

1 Definition of application, user, handling

1.1 Definition of application

1.1.1 Intended use

The board **APCI-3003** must be inserted in a PC with PCI slots which is used as electrical equipment for measurement, control and laboratory pursuant to the standard EN 61010-1 (IEC 61010-1).

The used personal computer (PC) must fulfil the requirements of IEC 60950-1 or EN 60950-1 and EN 55022 or IEC/CISPR 22 and EN 55024 or IEC/CISPR 24.

The use of the board **APCI-3003** in combination with external screw terminal panels requires correct installation according to the series IEC 61439 or EN 61439 (Low-voltage switchgear and controlgear assemblies).

1.1.2 Usage restrictions

The board **APCI-3003** must not be used as a safety-related part (SRP).

The board **APCI-3003** must not be used for safety-related functions, for example for emergency stop functions.

The board **APCI-3003** must not be used in potentially explosive atmospheres.

The board **APCI-3003** must not be used as electrical equipment according to the Low Voltage Directive 2014/35/EU.

1.1.3 Limits of use

All safety information and the instructions in the manual must be followed to ensure proper intended use.

Uses of the board beyond these specifications are considered as improper use. The manufacturer is not liable for damages resulting from improper use.

The board must remain in its anti-static packaging until it is installed.

Please do not delete the identification numbers of the board or the warranty claim will be invalid.

1.2 User

1.2.1 Qualification

Only persons trained in electronics are entitled to perform the following works:

- Installation
- Commissioning
- Use
- Maintenance.

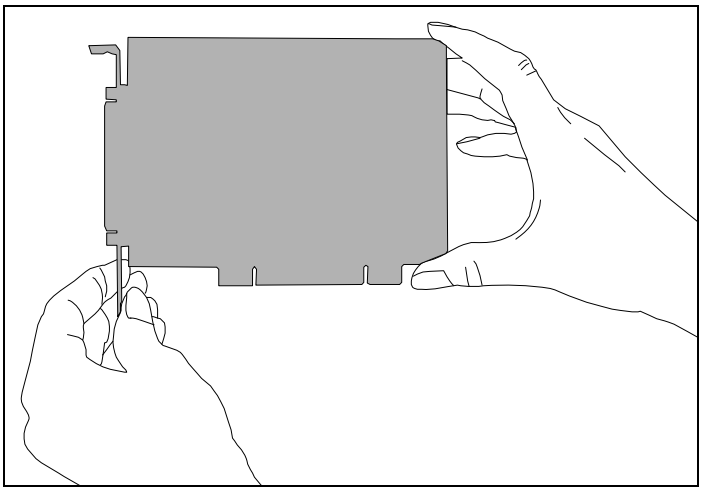
1.2.2 Country-specific regulations

Do observe the country-specific regulations regarding

- the prevention of accidents
- electrical and mechanical installations
- Electromagnetic compatibility (EMC).

1.3 Handling of the board

Fig. 1-1: APCI-3003: Correct handling



Hold the board cautiously at the outer end and at the slot bracket.
Do not touch the surface of the board!

1.4 Questions and updates

If you have any questions, do not hesitate to call us or to send us an e-mail:

Phone: +49 7229 1847-0
E-mail: info@addi-data.com

Manual and software download from the Internet

The latest versions of the technical manual and the standard software for the board **APCI-3003** can be downloaded for free at: www.addi-data.com.

NOTICE!
Before using the board and in case of malfunction during operation, check if there is an update (manual, driver) available. Current data can be found on our website or contact us directly.

2 Brief description

2.1 Technical features

Table 2-1: Technical features: Overview

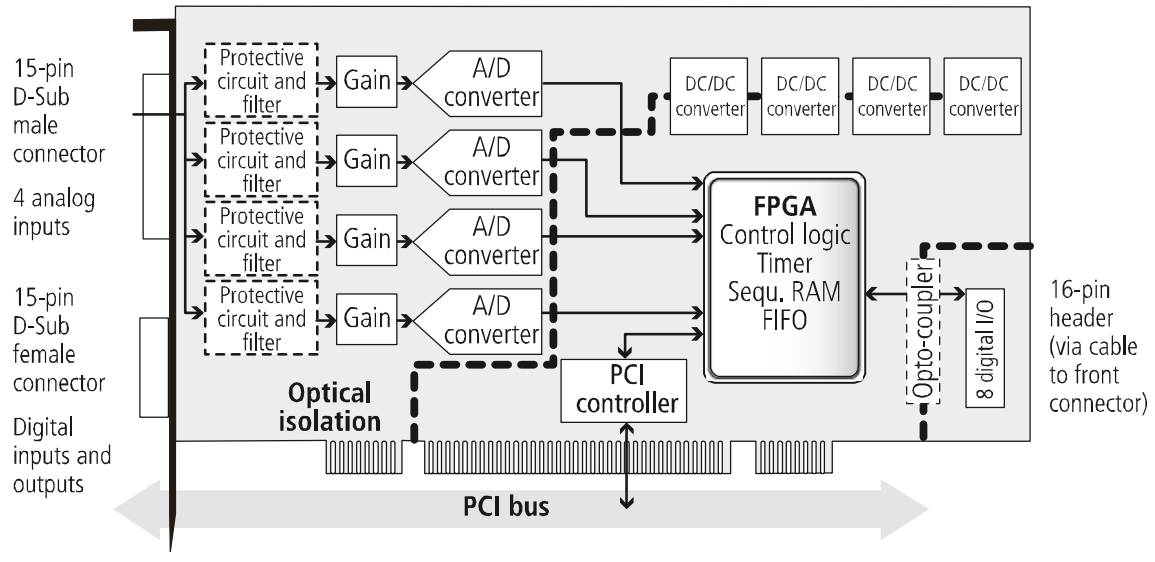
Technical features	APCI-3003
Analog inputs: differential	4
Resolution	16-bit
Throughput rate per input	400 kHz
Digital inputs/outputs: 24 V, optically isolated	4 inputs 4 outputs
Timer: 16-bit	1

Other features:

- Simultaneous acquisition of all channels
- Input range and gain can be programmed for each channel
- Various acquisition modes (with DMA function as well) and trigger settings
- Optical isolation between the channels: 1000 V
- Input filters
- Overvoltage protection
- Protection against high-frequency EMI

2.2 Block diagram

Fig. 2-1: APCI-3003: Block diagram



3 Insertion and installation of the board

3.1 Insertion of the APCI board

Risk of injury!
Please follow the safety precautions! An improper handling of the board may cause property damage and injury.

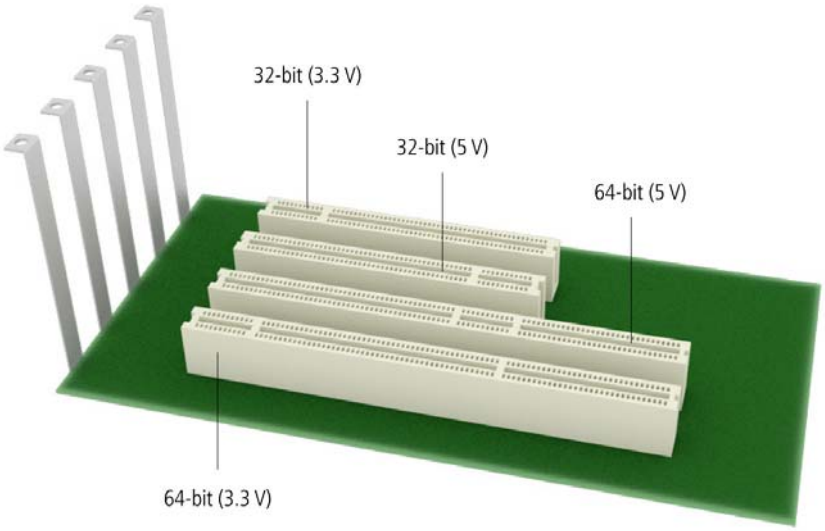
3.1.1 Opening the PC

- Switch off the PC and all the units connected to it.
- Pull the PC mains plug from the socket.
- Open the PC as described in the manual of the PC manufacturer.

3.1.2 Selecting a slot

- Select a free 32-/64-bit PCI slot (5 V or 3.3 V) for the board.

Fig. 3-1: PCI slot types

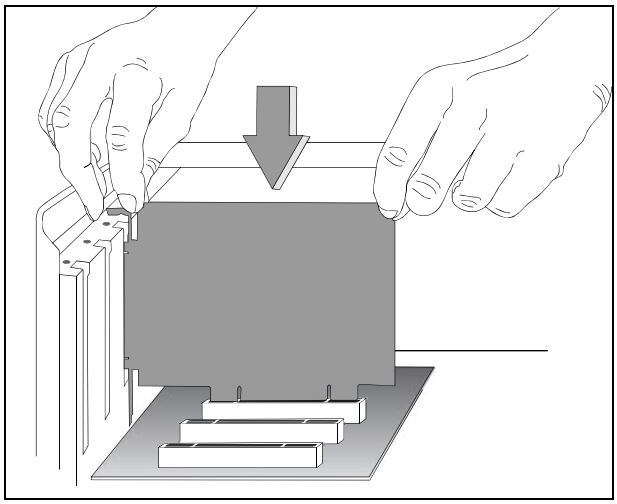


- Unscrew the back cover from the selected slot. For this, follow the operating instructions provided by the PC manufacturer!
  Keep the back cover in a safe place. You will need it if you remove the board.
- Provide for potential equalisation.
- Take the board out of its protective packaging.

3.1.3 Inserting the board

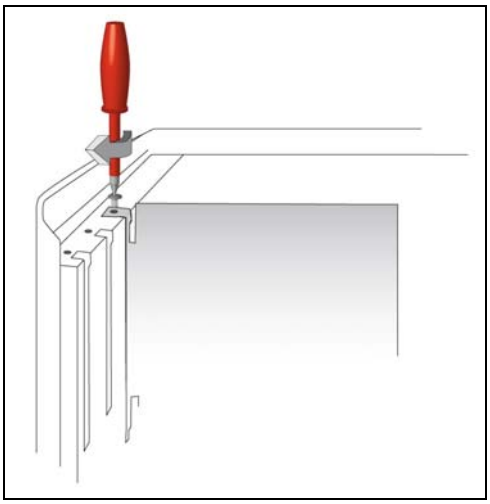
- Insert the board vertically from above into the selected slot.

Fig. 3-2: Slot: Insert the board



- Fasten the board to the rear of the PC housing using the screw which held the back cover in place.

Fig. 3-3: PC housing: Fasten the board



- Tighten all loose screws.

3.1.4 Closing the PC

- Close the PC as described in the manual of the PC manufacturer.

3.2 Connecting the accessories

3.2.1 Connection of the screw terminal panels

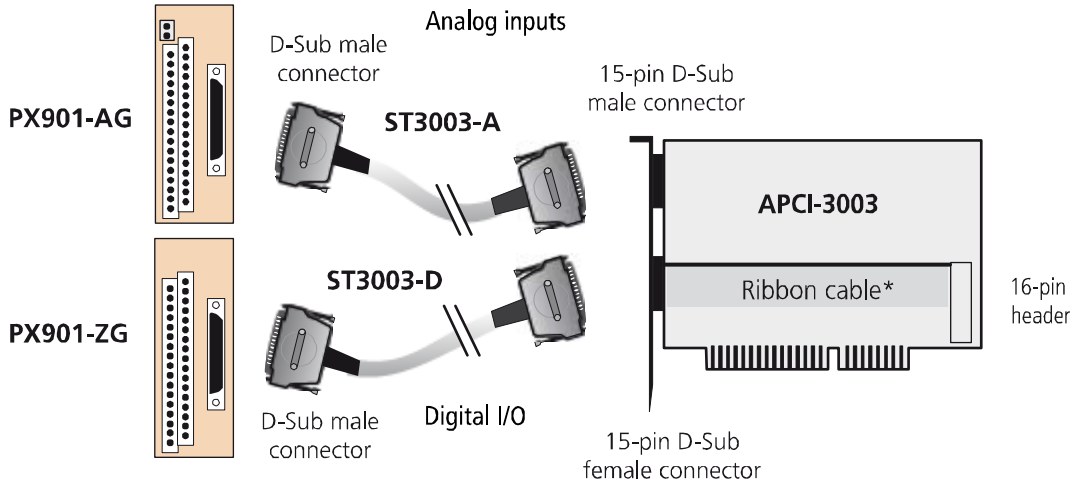
The **APCI-3003** board receives analog signals from the peripherals via the screw terminal panel **PX901-AG** und the cable **ST3003-A**, which needs to be connected to the 15-pin D-Sub male connector of the board.

Between the board and the peripherals, digital signals are exchanged via the screw terminal panel **PX901-ZG** and the cable **ST3003-D**, which needs to be connected to the 15-pin D-Sub female connector of the board.

In terms of electromagnetic compatibility (EMC), the cables have the following properties:

- Metallised connector housing
- Shielded cable
- Cable shield folded back over insulation and firmly screwed on both sides to the connector housing.

Fig. 3-4: APCI-3003: Connection of the screw terminal panels



* included in delivery

3.2.2 Pin assignment

1) Analog inputs

Fig. 3-5: 15-pin D-Sub male connector (analog inputs)

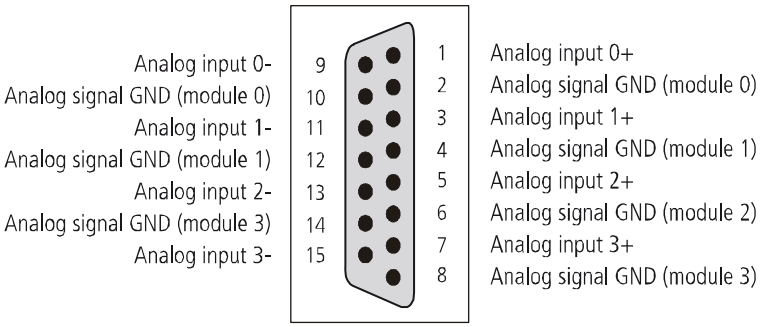
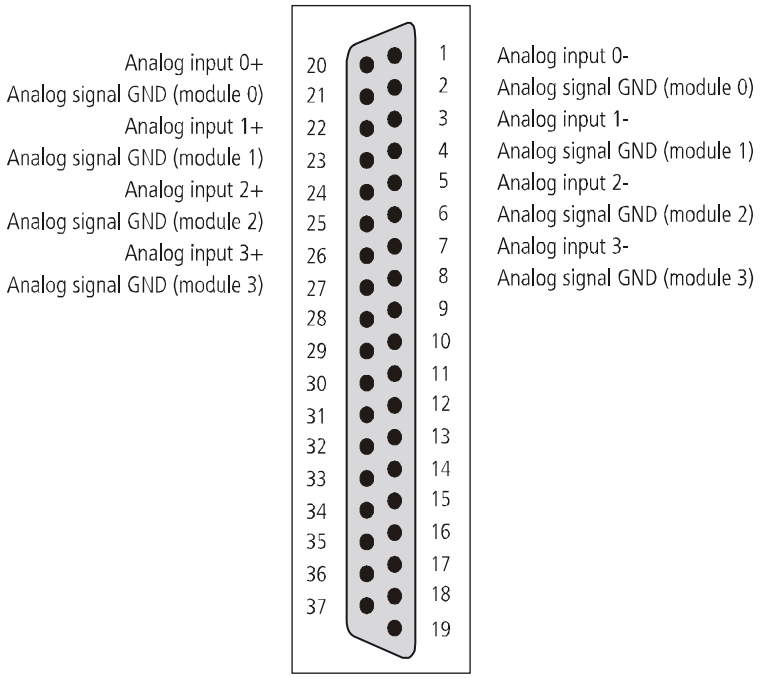


Fig. 3-6: ST3003-A cable: 37-pin D-Sub male connector (analog inputs)



2) Digital I/O

Fig. 3-7: 15-pin D-Sub female connector (digital I/O)

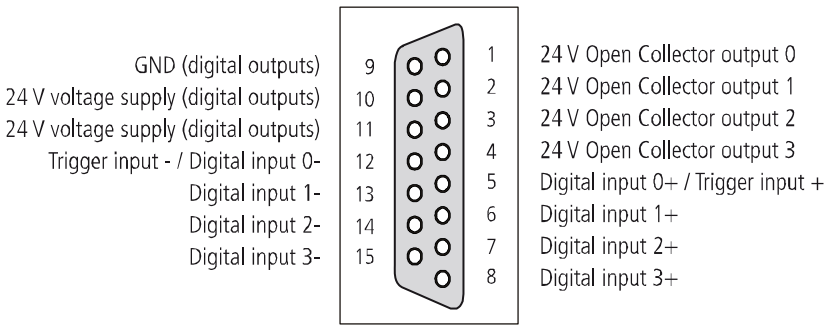
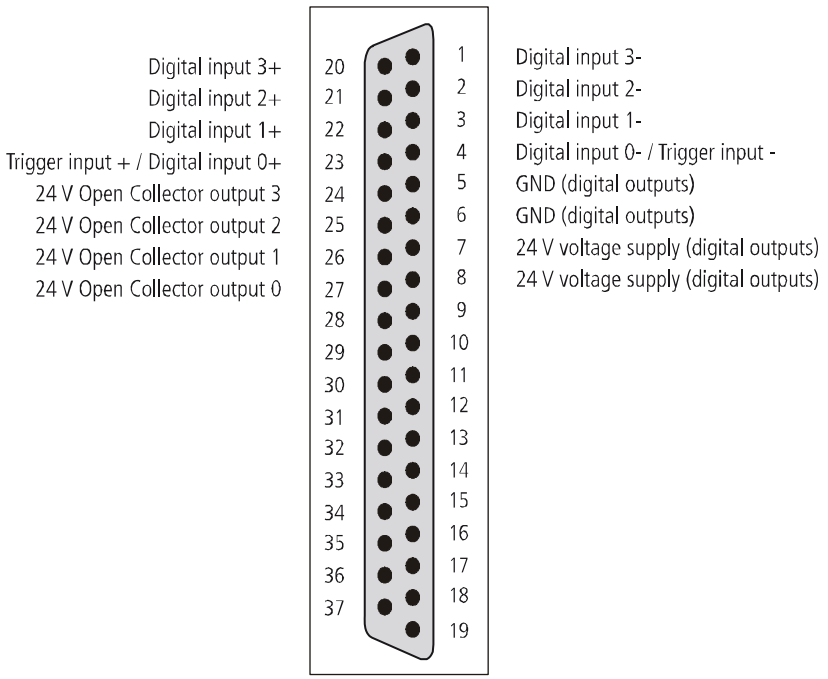
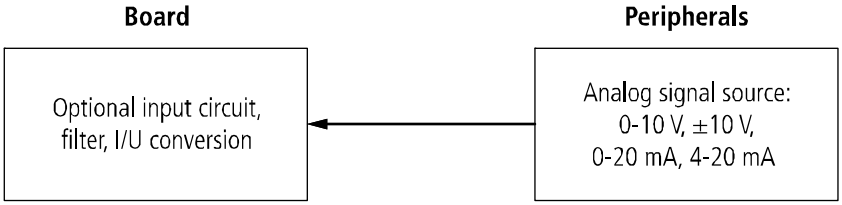


Fig. 3-8: ST3003-D cable: 37-pin D-Sub male connector (digital I/O)



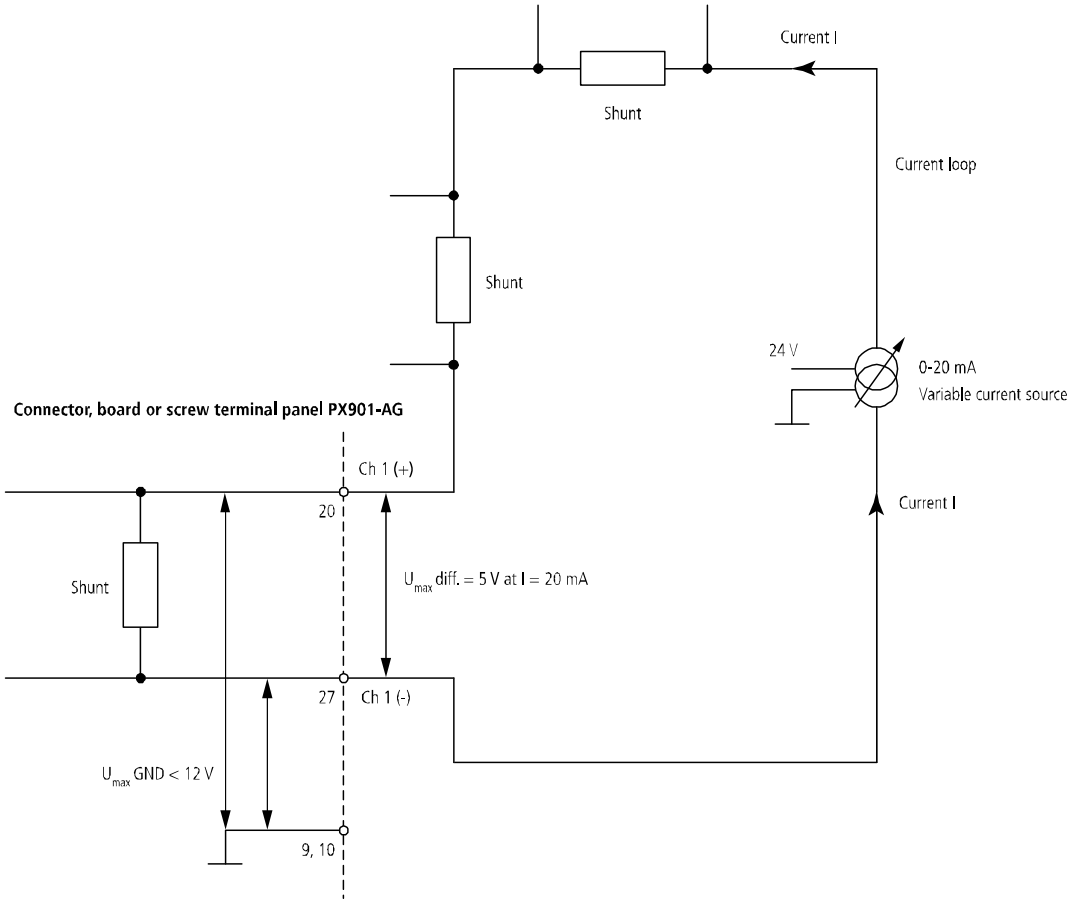
3.2.3 Connection principle

Fig. 3-9: Connection principle



With the **PC-Diff** option (see Chapter 7.4), the board has to be placed at the end of the current loop so that the voltage (U_{max} GND) at the differential input pin is 12 V max. relating to GND.

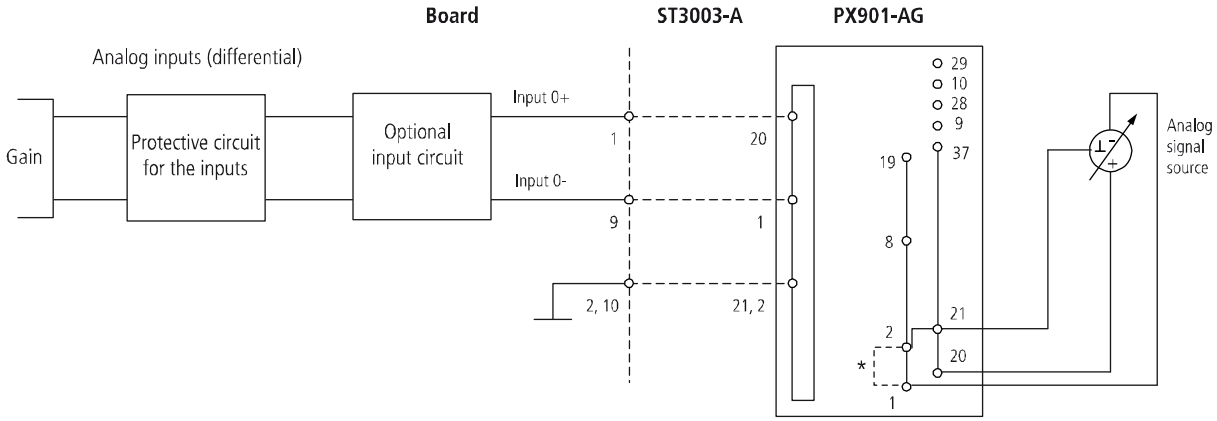
Fig. 3-10: Current loop for PC-Diff option



3.2.4 Connection examples

1) Analog inputs

Fig. 3-11: Connection example (differential inputs)



* Optional connection if there is no GND connection available at the signal source

NOTICE!

Due to the very high impedance of the analog inputs, the measurement result is undefined, i.e. variable at inputs that are not connected (open). To minimise interfering factors, all the inputs that are not required should be connected with "Analog signal GND" (see pin assignment).

2) Digital I/O (24 V)

Fig. 3-12: Connection example (digital inputs)

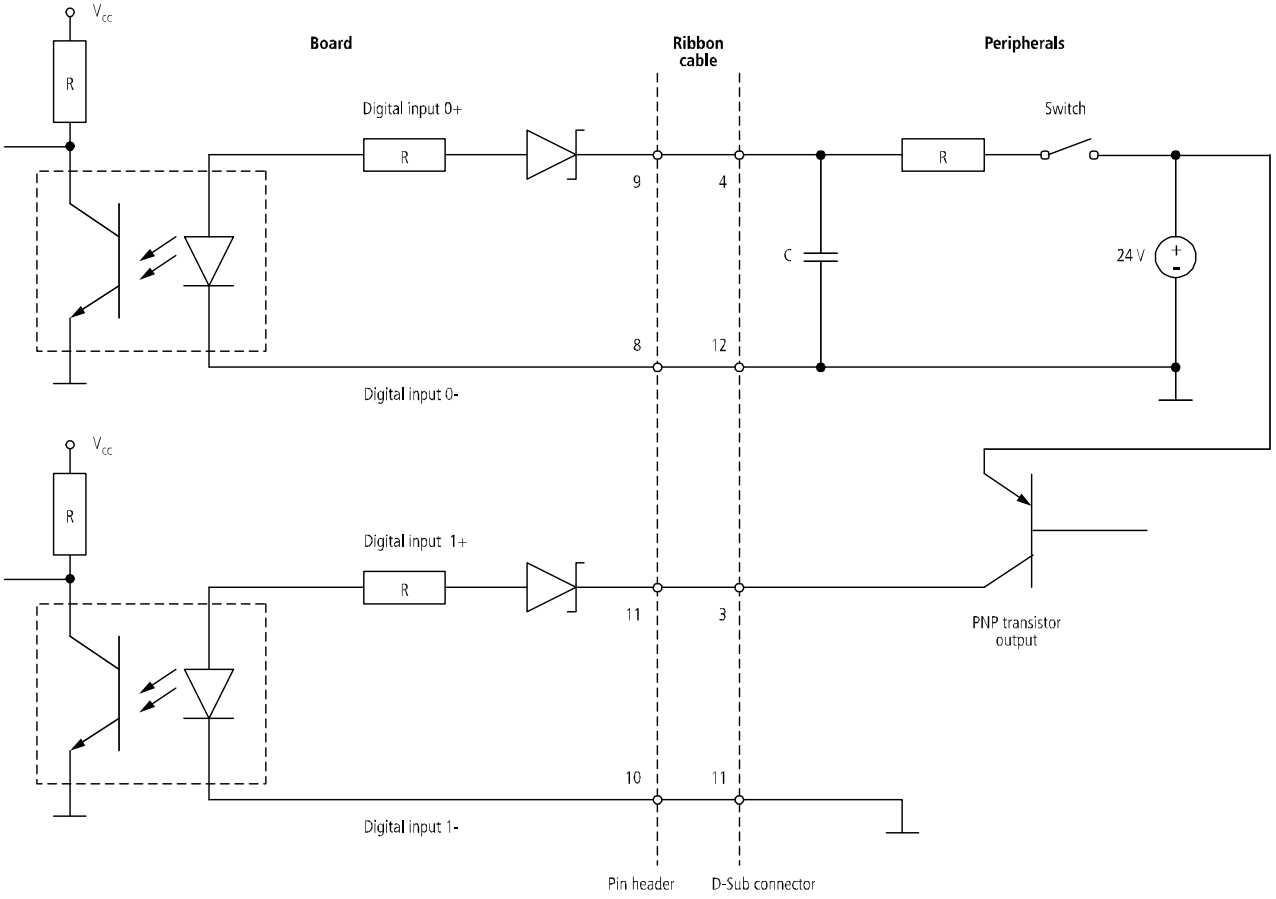
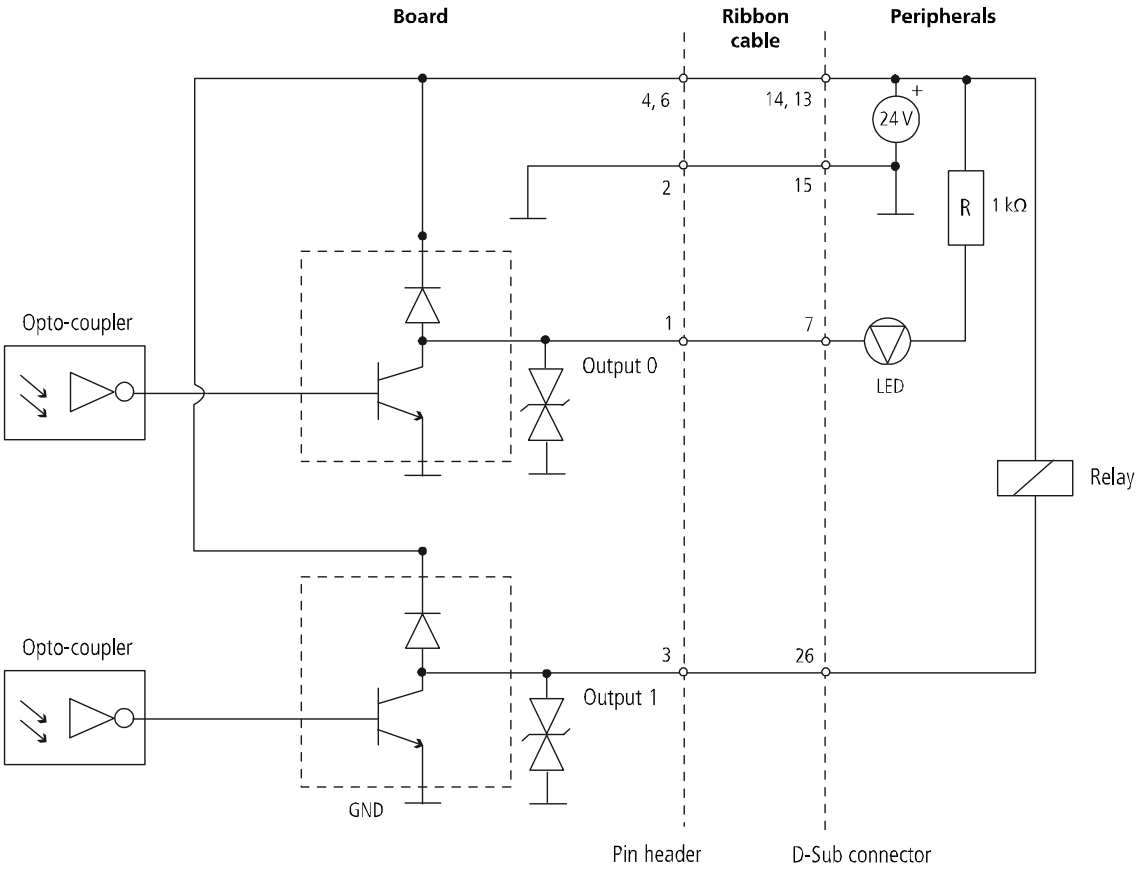


Fig. 3-13: Connection example (digital outputs)



NOTICE!
Please note that an external voltage source is required for the digital outputs (see Chapter 7.5.3).

3.3 Driver installation

Information on how to select and download the appropriate driver can be found in the document "Quick installation PC boards" (see PDF link).

The installation of drivers of the type "ADDI-DATA Multiarchitecture Device Drivers 32-/64-Bit for x86/AMD64" as well as the installation of the corresponding samples is described in the installation instructions (see PDF link).

4 Function description

4.1 Analog inputs

Up to 4 differential signals can be connected to the **APCI-3003** board.

Each channel has its own A/D converter. A high throughput rate (400 kHz per channel) can be reached by a simultaneous conversion of all four channels.
The four analog modules are always started simultaneously. Only the configured channels are written in the read registers provided for this purpose (FIFO, AUTOREFRESH RAM).

Besides the software trigger, the analog acquisition can also be started via the hardware trigger, i.e. by a signal change from 0 V to 24 V at the digital input 0 (see Chapter 4.1.3).

4.1.1 Voltage ranges

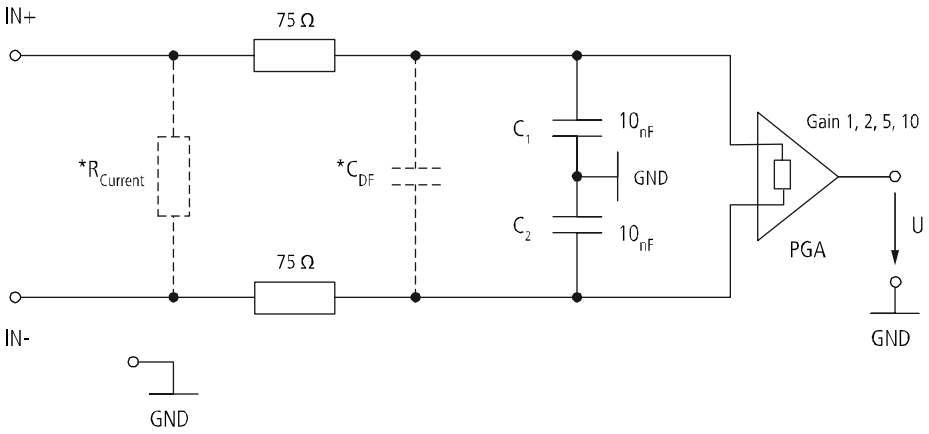
The analog input range (0-10 V, ± 10 V, 0-5 V, ±5 V, 0-2 V, ± 2 V, 0-1 V, ± 1 V or optional 0-20 mA) and the gain can be selected through software for each channel. This enables different voltages (or currents) with the channels so that the resolution of the A/D converter can be used to full capacity.

NOTICE!
Please note that a longer settling time of the measurement chain has to be reckoned with when switching the voltage range from unipolar to bipolar or vice versa.

4.1.2 Analog input circuit

The input impedance (10^{12} Ω || 5 nF) corresponds to the input resistance of the PGA (10^{12} Ω) and the capacities switched to it in parallel (C_1 and C_2).

Fig. 4-1: Analog input circuit (differential)



*$R_{Current}$ = optional equipment with current version
*C_{DF} = optional equipment with DF filter

Cut-off frequency $f_g = \frac{1}{2\pi \cdot (75\ \Omega + 75\ \Omega) \cdot [C_{DF} + (C_1 \parallel C_2)]}$ = 212.2 kHz (C_{DF} not fitted)

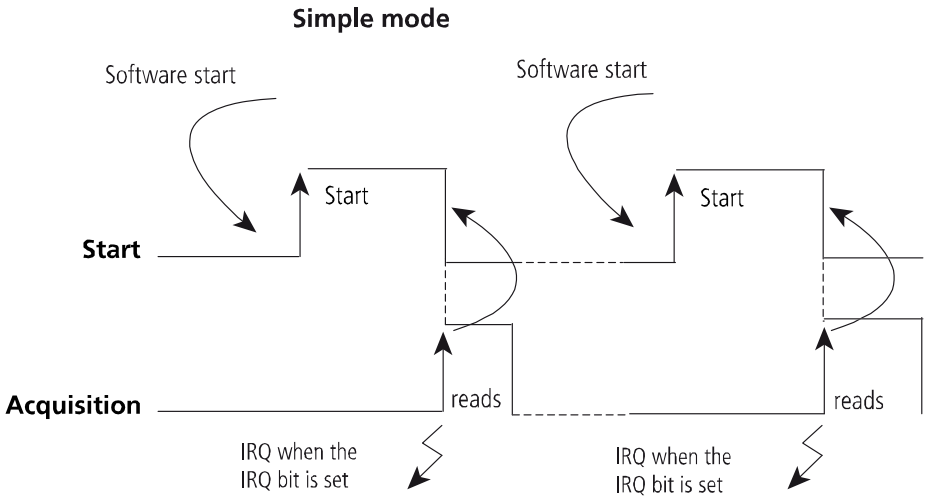
4.1.3 Input modes of the analog inputs

For analog input, four differential channels are available on the **APCI-3003** board. The acquisition can be carried out in the following modes:

1) Simple mode
2) Scan mode
3) Sequence mode (with DMA function)
4) Auto-refresh mode.

1) Simple mode

The software initialises and starts the A/D conversion. After that it reads in the digital value from one or more channels. This can be done either with or without interrupt.



2) Scan mode

There are 6 different scan modes:

a) Software-triggered single scan

b) Hardware-triggered single scan

c) Software-triggered continuous scan

d) Software-triggered continuous scan with timer delay

e) Hardware-triggered continuous scan

f) Hardware-triggered continuous scan with timer delay.

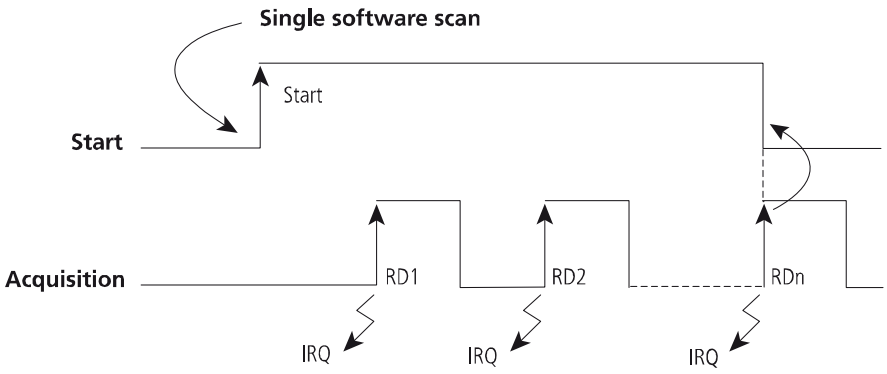
These scan modes are explained in more detail below.

a) Software-triggered single scan

The user interrupt routine is called up after the last IRQ (= ADDI-DATA driver).

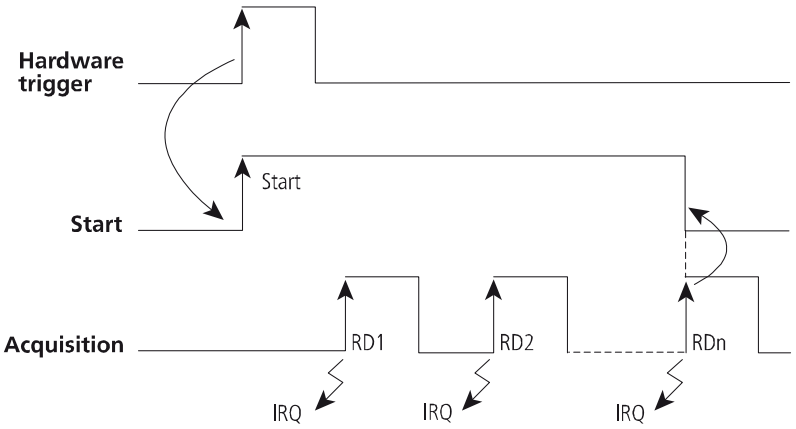
NOTICE!

Please note that the DMA function is not used in Scan mode.

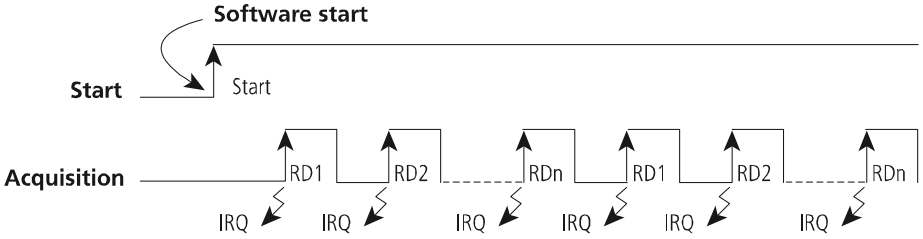


b) Hardware-triggered single scan

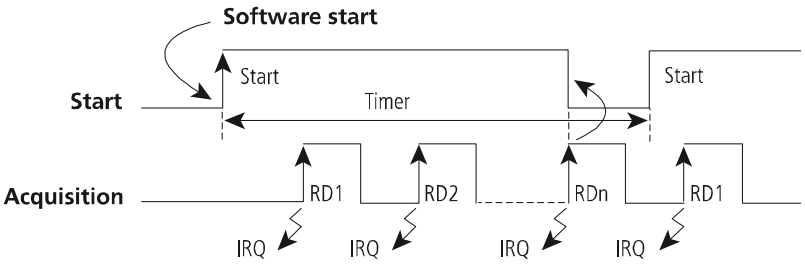
This scan can be triggered with a rising or falling edge (initialisation through software).



c) Software-triggered continuous scan

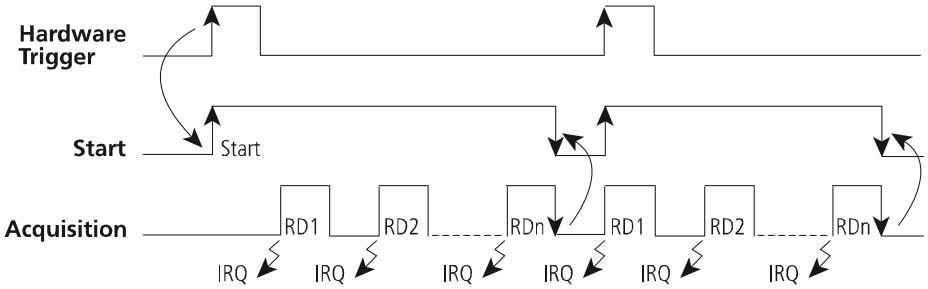


d) Software-triggered continuous scan with timer delay

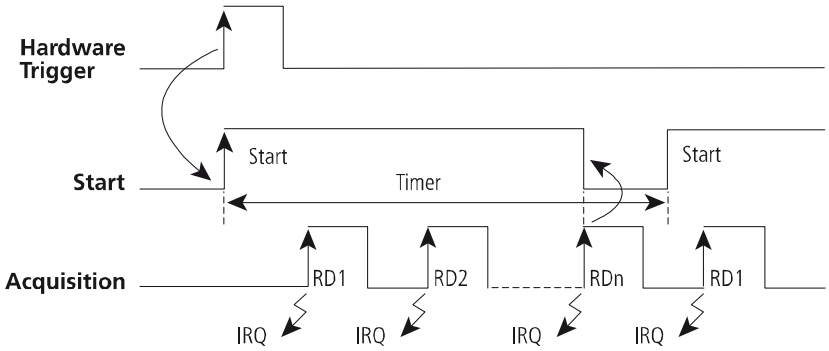


e) Hardware-triggered continuous scan

NOTICE!
Please note that in this scan mode, the external signal triggers only one scan at a time.



f) Hardware-triggered continuous scan with timer delay



3) Sequence mode (with DMA function)

Two sequence modes are available, which are described below with two examples each:

a) Simple sequence mode (examples 1 and 2)

b) Sequence mode with delay (examples 1 and 2)

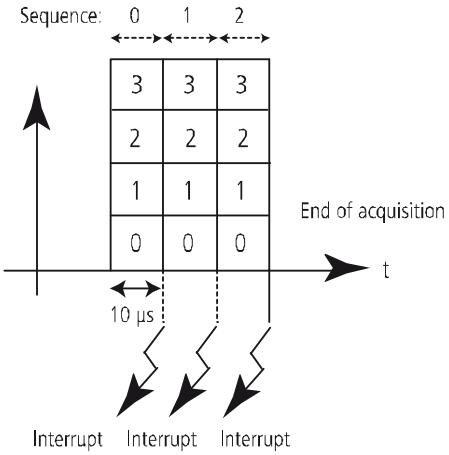
NOTICE!

Please note that the Sequence mode always uses the DMA function (Direct Memory Access).

a) Simple sequence mode

Simple sequence mode - example 1

In this example, the interrupt is released at the end of each sequence (after 5 acquisitions at a time). The whole acquisition is completed after 3 sequences.



b_ChannelCount = 4

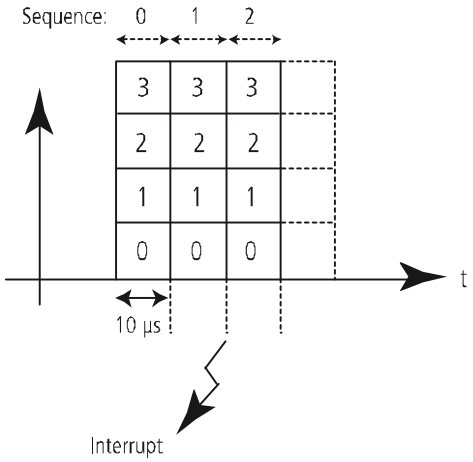
pb_Channel = 0, 1, 2, 3

dw_SequenceCount = 3

dw_SequenceBeforeInterrupt = 1

Simple sequence mode - example 2

Here, the interrupt is released after 2 sequences (10 acquisitions). The entire acquisition is completed via the following function: i_PCI3003_StopAnalogAcquisition



b_ChannelCount = 4

pb_Channel = 0, 1, 2, 3

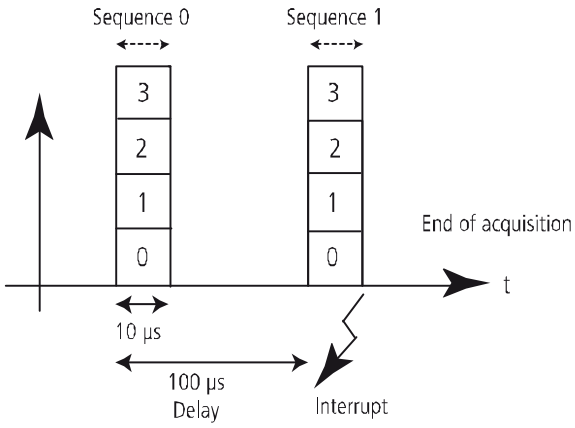
dw_SequenceCount = 0

dw_SequenceBeforeInterrupt = 2

b) Sequence mode with delay

Sequence mode with delay - example 1

The interrupt is released after 2 sequences (10 acquisitions). At the same time, the acquisition is completed. The delay between the starts of two sequences is 100 µs.



b_ChannelCount = 4

pb_Channel = 0, 1, 2, 3

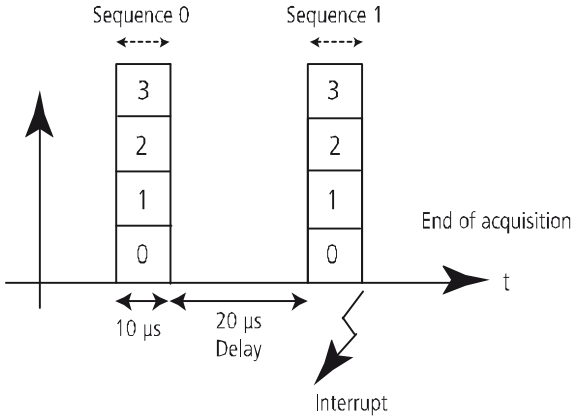
dw_DelayTime = 100

dw_SequenceCount = 2

dw_SequenceBeforeInterrupt = 2

Sequence mode with delay - example 2

In this example, the delay between the end of a sequence and the start of the next one is 20 µs.



b_ChannelCount = 4

pb_Channel = 0, 1, 2, 3

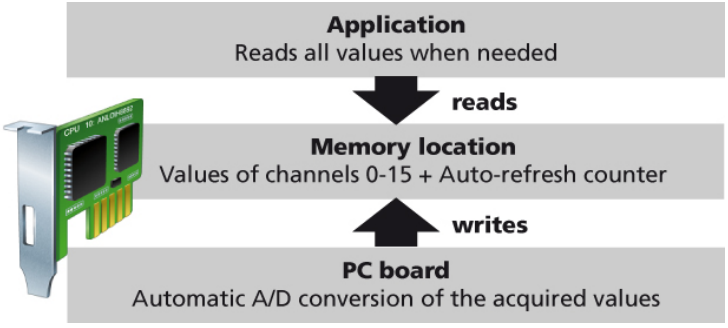
dw_DelayTime = 20

dw_SequenceCount = 2

dw_SequenceBeforeInterrupt = 2

4) Auto-refresh mode

The analog acquisition is initialised and the values of the channels are written in a fixed memory location on the board. The PC reads the data asynchronously to the acquisition.



4.2 Digital inputs

The digital inputs acquire external signal states. The input information is loaded as a numeric value in a memory cell of the system via the driver function. This numeric value represents the status of the input signals.

The inputs correspond to the 24 V industry standard (IEC1131-2):

- Logic "1" corresponds to an input voltage ≥ 19 V.
- Logic "0" corresponds to an input voltage ≤ 14 V.

The current demand for each input is 10.5 mA at nominal voltage. The maximum input voltage is 30 V.

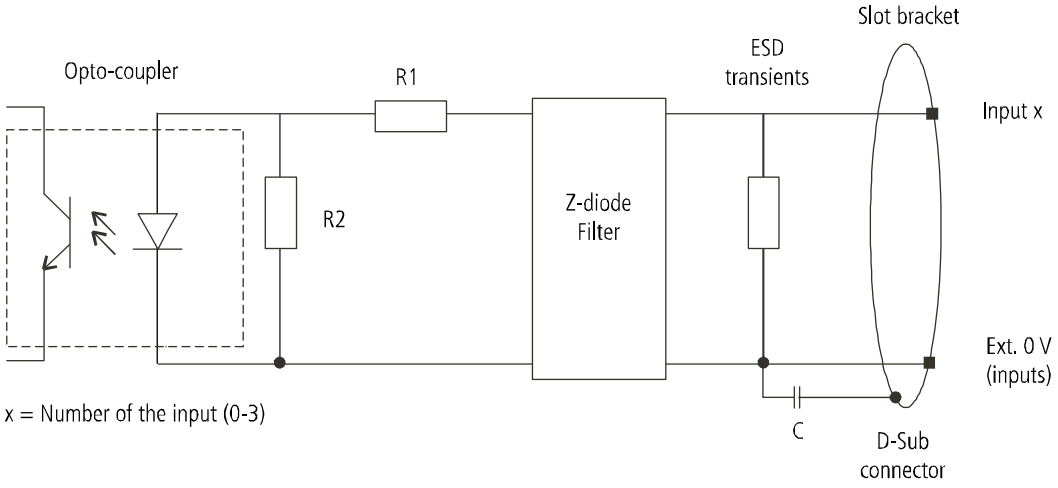
NOTICE!

The mains supply for the external power supply of the board must deliver at least the power that is required for your application.

The input signals are filtered by TVS diodes, Z-diodes, RC filters and opto-couplers. In this way, the effect of inductive and capacitive noise is reduced.

The board does not require initialisation to directly read the digital input information. The data is immediately available after "Power ON".

Fig. 4-2: Input circuit



4.3 Digital outputs

For the digital outputs, positive logic is used:

- Logic “1”: Set output through software
- Logic “0”: Reset output

The maximum supply voltage is 30 V. Each output can switch a current of 50 mA. The total current of all outputs is limited to 300 mA by a polyswitch fuse element.

NOTICE!
The mains supply for the external power supply of the board must deliver at least the power that is required for your application.

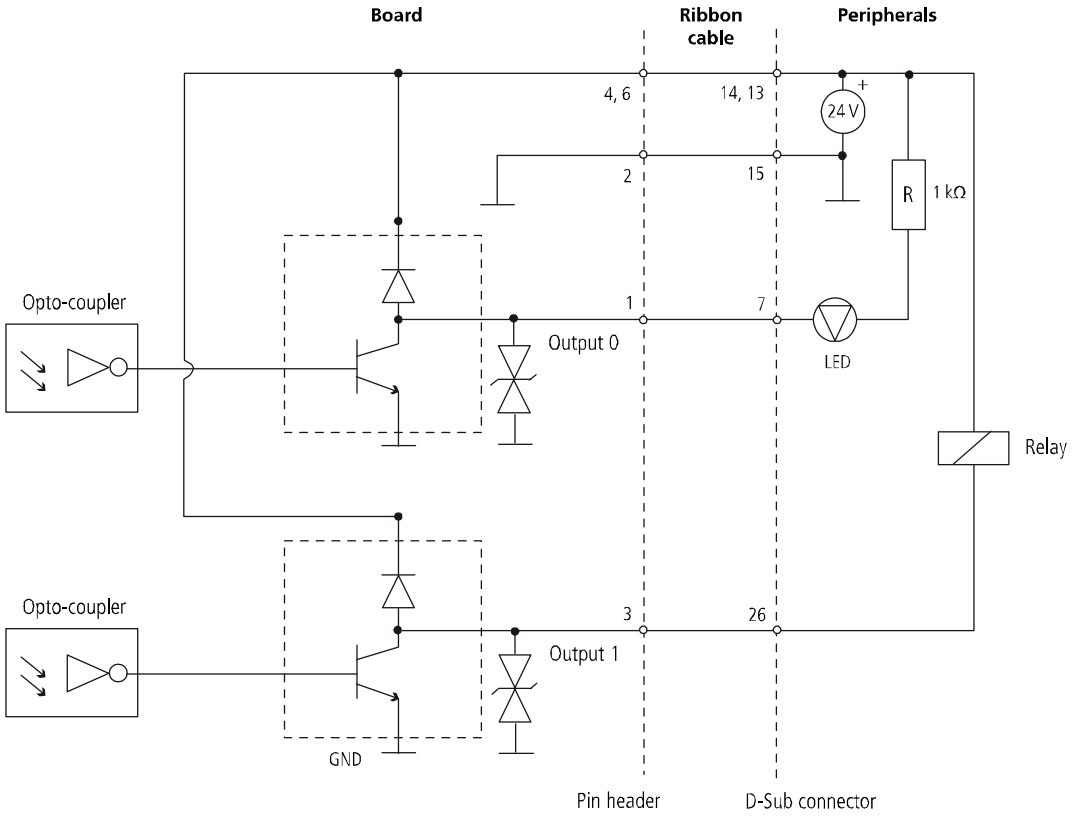
Characteristics of the 24 V outputs:

- Short-circuit protection relating to ground: The output is switched off.
- Protection against overtemperature: The output driver is switched off.

TVS diodes, C-filters and opto-couplers filter noise on the peripheral side. In this way, the effect of inductive and capacitive noise on the system bus side is reduced or eliminated.

The board does not require initialisation to output the digital information. The outputs are reset to “0” after “Power ON Reset” and can be immediately programmed.

Fig. 4-3: Output circuit (24 V)



4.4 Timer

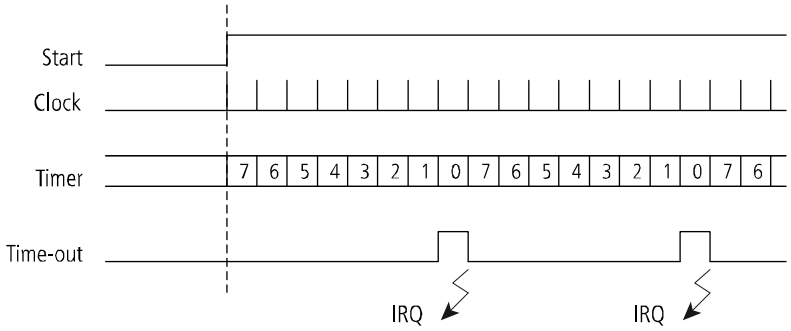
The **APCI-3003** board is fitted with a timer.
Independently from the PC clock, the timer provides a time base to synchronise operations, for example. The 16-bit timer is a downward counter which can release an interrupt after the programmed cycle time has elapsed (time-out).
The current timer value and the start value (reload value) as well as status and interrupt registers can be read back through software. The cycle time can be programmed in the range from 1 µs to 65535 s.

Example

Reload value = 7
Initialisation with a rising edge
Interrupt enabled

When the timer value is “0”, the reload value “7” will be reloaded with the next valid edge and an interrupt will be released.

Fig. 4-4: Timer (example)



5 Standard software

The API software functions supported by the board are listed in an HTML document. A description of how to access the respective file can be found in the document “Quick installation PC boards” (see PDF link), in the chapter “Standard software”.

6 Return or disposal

6.1 Return

If you need to return your board, you should read the following checklist before.

Checklist for returning the board:

- Specify the reason for returning your board (e.g. exchange, modification, repair), the serial number of the board, the contact person in your company including his/her telephone extension and e-mail address, as well as the mailing address for a potential new delivery. You do not have to indicate the RMA number.

Fig. 6-1: Serial number

- Note down the serial number of the board.
- Place the board in an ESD protective cover. Then pack it in a cardboard box so that it is well-protected for shipping. Send the packed board together with your details to:

  ADDI-DATA GmbH
  Airpark Business Center
  Airport Boulevard B210
  77836 Rheinmünster
  Germany

- If you have any questions, do not hesitate to contact us:

  Phone: +49 7229 1847-0
  E-mail: info@addi-data.com

6.2 Disposal of ADDI-DATA waste equipment

ADDI-DATA organises the disposal of ADDI-DATA products that were put on the German market after 13 August 2005.
If you want to return waste equipment, please e-mail your request to: rohs@addi-data.com.

Boards that were delivered after 13 August 2005 can be recognised by the following label:

Fig. 6-2: Disposal: Label

This symbol indicates the disposal of waste electrical and electronic equipment. It is valid in the European Union and in other European countries that have a separate collection system. Products carrying this symbol must not be treated as household waste.
For more detailed information on the recycling of these products, please contact your local citizens' office, your household waste collection service, the shop where you bought this product or the distributor you purchased this product from.

If you dispose of this product correctly, you will help to prevent damage that could be caused to the environment and to human health by inappropriate disposal. The recycling of materials will help to conserve our natural resources.

Disposal in other countries than Germany
Please dispose of the product according to the country-specific regulations.

7 Technical data and limit values

7.1 Electromagnetic compatibility (EMC)

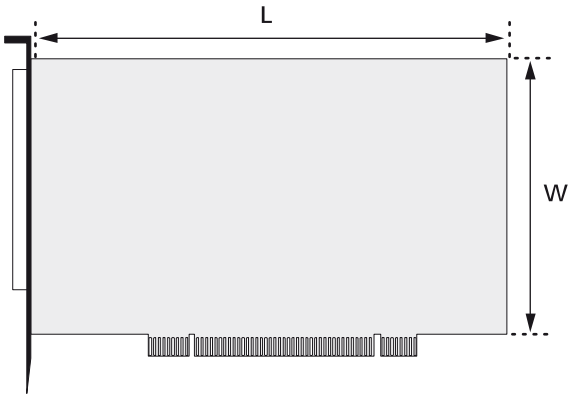
The board **APCI-3003** is suited for installation in personal computers (PCs) which comply with the European EMC directive.

The board **APCI-3003** complies with the European EMC directive. The tests were carried out by a certified EMC laboratory in accordance with the standard from the EN 61326 series (IEC 61326).
The limit values as set out by the European EMC directive for an industrial environment are complied with.

The respective EMC test report is available on request.

7.2 Mechanical structure

Fig. 7-1: APCI-3003: Dimensions



Dimensions (L x W):	175 x 99 mm	
Weight:	approx. 160 g	
Insertion into:	PCI slot	
Connection to peripherals:		
Front connector:	15-pin D-Sub male connector (analog inputs) 15-pin D-Sub female connector (digital I/O)	
Accessories: [1]	see Chapter 3.2	
for analog inputs:	Cable: Screw terminal panel:	**ST3003-A** **PX901-AG**
for digital I/O:	Cable: Screw terminal panel:	**ST3003-D** **PX901-ZG**

NOTICE!
The connection lines must be installed in such a way that they are protected against mechanical loads.

[1] Not included in standard delivery

7.3 Version

The specific version name can be found on the type label at the slot bracket of your board.

7.4 Options

Please specify the number of channels when ordering one of the following options for the **APCI-3003** board!

Table 7-1: Options

Option	Features
DF	Precision filter for 1 differential channel
PC-Diff	Current input 0-20 mA or 4-20 mA for 1 differential channel

Table 7-2: PC-Diff option: Resolution

Measurement range	Resolution (16-bit)
0-20 mA	0 to 65535
4-20 mA	13107 to 65535

7.5 Limit values

Height:	2000 m over NN
Operating temperature:	0-60 °C (with forced ventilation)
Storage temperature:	-25 °C to +70 °C
Relative air humidity at indoor installation:	50 % at +40 °C 80 % at +31 °C
Minimum PC requirements:	
System bus:	PCI 32-bit
Bus speed:	≤ 33 MHz
Required space:	analog inputs and digital I/O: 1 PCI slot
Operating system:	Windows 8, Windows 7, Windows XP, Linux
Energy demand:	
Operating voltage from the PC:	5 V ± 5 %
Current consumption (typ., without load)	1.55 A ± 10 %

7.5.1 Analog inputs

Number of inputs:	4 (differential)
Resolution:	15-bit (unipolar) 16-bit (bipolar)
Input range:	0-10 V (unipolar), 1 LSB = 153 µV ± 10 V (bipolar), 1 LSB = 305 µV 0-20 mA (optional): if unipolar, gain = 2
Throughput rate per input:	400 kHz
Optical isolation:	1000 V
Gain:	gain of 1, 2, 5 and 10
Linearity error of the ADC:	± 1.22 mV typ. ± 2.44 mV max.
Temperature drift:	10 ppm/K
Input impedance:	10^{12} Ω || 5 nF
Bandwidth (-3 dB):	212.2 kHz (limited with low pass filter)
Overvoltage protection:	± 40 V
Common-mode rejection ratio (CMRR):	DC up to 10 Hz 80 dB min. (gain = 1)
Digital coding:	linear (see Table 7-3)
Input calibration:	
Unipolar offset calibration value:	0.01 V (tolerance: ± 0.0017 V)
Bipolar offset calibration value:	-0.00061 V (tolerance: ± 0.0017 V)
Unipolar gain calibration value:	9.995 V (tolerance: ± 0.0017 V)
Bipolar gain calibration value:	9.995 V (tolerance: ± 0.0017 V)
Calibration channel:	0
Measuring method:	average value computation of 200 values

Table 7-3: Analog input: Digital coding

Analog input			
Unipolar	**Bipolar**	**Binary code**	**HEX code**
0 V	-10 V	0000000000000000	0000
5 V	0 V	1000000000000000	8000
10 V	+10 V	1111111111111111	FFFF

7.5.2 Digital inputs (24 V)

Number of inputs:	4
Nominal voltage:	24 V
Filter/protective circuit:	low pass/TVS diodes
Optical isolation:	1000 V (1 s tested)
Input voltage:	0-30 V
Input current (at nominal voltage):	10.5 mA typ.

Max. input frequency (at nominal voltage):	1 MHz
Logic input levels:	UH_{max}: 30 V UH_{min}: 19 V UL_{max}: 14 V UL_{min}: 0 V

7.5.3 Digital outputs (24 V)

Number of outputs:	4
Output type:	Open Collector (ULN2803A)
Nominal voltage:	24 V
Filter/protective circuit:	low pass/TVS diodes
Optical isolation:	1000 V (1 s tested)
Supply voltage:	5-30 V
Output current per output:	50 mA
Total current limit (PTC):	300 mA
Start-up time:	2 µs (load: 50 mA)
Shutdown time:	36 µs (load: 50 mA)

7.5.4 Timer (interruptible)

Number:	1
Resolution:	16-bit
Time base:	µs, ms, s (programmable)
Time value range:	1 to 65535
Output:	low/high (programmable)

8 Appendix

8.1 Glossary

A/D converter
An A/D converter is an electronic device, often an integrated circuit that produces a digital output directly proportional to an analog signal output.

Data bus
The data bus basically consists of several lines (or pins) through which the processor sends and receives data. The volume of data that can be transmitted simultaneously depends on the number of data lines. In other words: The more pins the bus has, the more efficient it is.

DMA
= Direct Memory Access

For direct memory access, i.e. direct data exchange with the PC memory, a DMA controller is used.

DNL
= Differential Nonlinearity

The differential non-linearity is a KPI of the A/D converter or D/A converter. This value shows the difference between the measured and the ideal 1 LSB step between two neighbouring digital values.

Driver
A driver is a series of software instructions written specifically to manage particular devices.

Edge
Edges can either be rising or falling.
Logic levels are defined for processing and displaying information. In binary switches, voltages are used for digital values. Here, the two voltage ranges “H” (high) und “L” (low) represent the information. The “H” range is closer to plus infinity; the “H” level corresponds to digital 1. “L” denotes the range closer to minus infinity; the “L” level corresponds to digital 0.

The rising edge is the transition from the status “0” to “1”; the falling edge is the opposite transition.

EMC
= Electromagnetic Compatibility

The definition of the VDE regulation 0870 states: Electromagnetic compatibility is the ability of an electrical installation to function satisfactorily within its electromagnetic environment without unduly affecting its environment and the equipment it contains.

ESD
= Electrostatic Discharge

On non-conductive surfaces, an electric charge is conducted away very slowly. If the dielectric strength is overcome, there is a fast potential equalisation between the surfaces involved. The often very sudden equalisation process is referred to as electrostatic discharge (ESD). Currents of up to 20 A may occur in this process.

FSR
= Full Scale Range

FSR is the usable measurement range.

Ground line
Ground lines should not be seen as potential-free return lines. Different ground points may have small potential differences. This is always true with large currents and may cause inaccuracy in high-resolution circuits.

INL
= Integral Nonlinearity

The integral non-linearity is a KPI of the A/D converter or D/A converter. This value describes the maximum variance from a straight line that runs through the end-points of the transfer function (highest and lowest digital value). Before the measurement of the INL, the offset and the area error have to be calibrated.

Calibration of the INL error alone is not possible.

Input impedance
The input impedance is the ratio between voltage and current at the input terminals when the output terminals are open.

Input level
The input level is the logarithmic ratio between two electrical values of the same type (voltage, current or power) at the signal input of any receiving unit. This unit is often configured as a logical level related to the input of the circuit. The input voltage corresponding to logic "0" is between 0 V and 15 V and the voltage corresponding to logic "1" is between 17 V and 30 V.

Interrupt
= IRQ

An external event indicating that the CPU should suspend its current task to service a designated activity.

Level
Logic levels are defined for processing and displaying information.
In binary switches, voltages are used for digital values. Here, the two voltage ranges "H" (high) und "L" (low) represent the information.

The "H" range is closer to plus infinity; the "H" level corresponds to digital 1. "L" denotes the range closer to minus infinity; the "L" level corresponds to digital 0.

Limit value
Exceeding the limit values, even for a short time, can easily result in the destruction of the component or the (temporary) loss of functionality.

LSB
= Least Significant Bit

LSB is the lowest order bit in a digital quantity.

Operating voltage
The operating voltage is the voltage to the device in sustained operation. It must not exceed the maximum sustained voltage, and all unfavourable operating conditions, such as possible mains power surges for over a minute when the device is switched on, must be taken into account.

Optical isolation
Optical isolation means that two networks are only connected through an optoelectric transmitter and receiver with no electrical continuity between the two networks.

PTC
= Positive Temperature Coefficient

The best-value resistance sensors are either specified as PTC or NTC thermistors. A PTC thermistor has a positive temperature coefficient, hence, "PTC".

Resolution
The resolution indicates how precisely a signal or value is held within the computer.

Short-circuit
A short-circuit is an electrical circuit in a device of lower resistance than that of a normal circuit, typically resulting from the unintended contact of components, and consequent accidental diversion of the current.

Short-circuit current
A short-circuit current is the current between two short-circuited terminals.

Timer
A timer is used for adjusting time-dependent program processes between the processor and peripheral devices. It contains counters that are mostly independent of each other and can be programmed like a programmable I/O module via a control word register for different operating types.

Trigger
A trigger is a pulse or signal for starting or stopping a special task. Triggers are often used for controlling data acquisition.

TVS
= Transient Voltage Suppression

8.2 Index

9 Contact and support

Do you have any questions? Write or call us:

Address: ADDI-DATA GmbH
Airpark Business Center
Airport Boulevard B210
77836 Rheinmünster

Phone: +49 7229 1847-0
Fax: +49 7229 1847-222

E-mail: info@addi-data.com

Manual and software download from the Internet:

www.addi-data.com