**DIN EN ISO 9001:2000**
**certified**

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**Technical description**

**APCI-035**

**Watchdog board, optically isolated**

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# WARNING

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

♦ **Personal injury**

♦ **Damage to the board, PC and peripherals**

♦ **Pollution of the environment**

♦ **Protect yourself, the others and the environment!**

♦ **Read carefully the safety precautions (yellow leaflet).**

If this leaflet is not with the documentation, please contact us and ask for it.

♦ **Observe the instructions of the manual.**

Make sure that you do not forget or skip any step. We are not liable for damages resulting from a wrong use of the board.

♦ **Used symbols:**

**i** **IMPORTANT!**
designates hints and other useful information.

**WARNING!**
It designates a possibly dangerous situation.
If the instructions are ignored the board, PC and/or peripheral may be destroyed.

## Figures

## Tables

# 1    APPLICATION

## 1.1   Intended use

The board **APCI-035** is the interface between an industrial process and a personal computer (PC).

The board **APCI-035** must be inserted in a PC with PCI 5V/32-bit slots, which is used as electrical equipment for measurement, control and laboratory use as definedn in the norm IEC 61010-1.

The PC is to comply with the norm IEC61326 for measurement, control and laboratory use and with the specifications for EMC protection.

Products complying with these specifications bear the CE mark.

The **APCI-035** board is intended for the supervision of the software running in a personal computer (PC) for the temperature monitoring of critical PC components.

After booting the board is automatically recognised by the BIOS and is allocated the free resources. It can then be set for the monitoring of program processes or of internal temperature.

The boards **APCI-035** operates as a watchdog which sets alarm when the expected event did not occur within the defined time interval.

**WARNING!**
2 screw terminals are mounted on the board so that the board itself can generate a hardware reset in case of alarm.

The screw terminals are to be connected to the reset circuitry of the PC according to the intended purpose of the board. Please read the corresponding chapter in the PC manufacturer manual.

All drivers functions have been developed for using a software program adapted to the intended purpose of the **APCI-035**. Please use the driver suiting your operating system for implementing the watchdogs and select the language in which you want to program. The condition for it is that the driver functions are correctly implemented in the program to be monitored.

The board is to be used according to its intended purpose as follows:

**Watchdogs:**
4 watchdogs are available on the board. They control the software in time steps of µs, ms, s and mn through 2 independent programmable alarm levels. The 2-level alarm principle allows to inform the operating system with an interrupt generation before a reset occurs. There is thus enough time to complete the running task.

**Digital input:**
The digital input can be used as a watchdog trigger or as a timer gate.

**2 change-over relays:**
2 outputs are available as change-over contacts. The first output is used as a warning relay and switches off when the watchdog has run down. The second output is a used as a reset relay and switches off after a pre-programmed time interval (alarm level 2).

Please only use the board:
- in conditions providing absolute security
- in a closed housing which is adequately protected against environmental
  influences
- **with the accessories** we recommend

The use of the board according to its intended purpose includes observing all advice given in this manual and the safety leaflet. Uses beyond these specifications are not allowed.

The manufacturer is not liable for any damages which would result from the non-observance of this clause.

## 1.2    Limits of use

**The APCI-035 board is not to be used as safety related part for securing emergency stop functions.**

The emergency stop functions are to be secured separately.
This securing must not be influenced by the board or the PC.

**WARNING!**
The EMC tests have been carried out in a specific appliance configuration. We guarantee these limit values **only** in this configuration

The tested appliance configuration is at your disposal on request.

The use of the board in a PC could change the PC features regarding noise emission and immunity. Increased noise emission or decreased noise immunity could result in the system not being conform anymore.

**The installation of the board APCI-035 in sites lying under risk of explosion is excluded.**

 The board is not to be used as electrical equipment as defined by the low-voltage directive 73/23/EEC.

Make sure that the board remains in its protective blister pack **until it is used**.

Do not remove or alter the identification numbers of the board.
If you do, the guarantee expires.

# 2    USER

## 2.1    Qualification

Only persons trained in electronics are entitled to perform the following works:
- installation
- use,
- maintenance.

## 2.2    Personal protection

Consider the country-specific regulations about:
- the prevention of accidents
- electrical and mechanical installations
- radio interference suppression.

# 3    HANDLING OF THE BOARD

**Fig. 3-1: Correct handling**
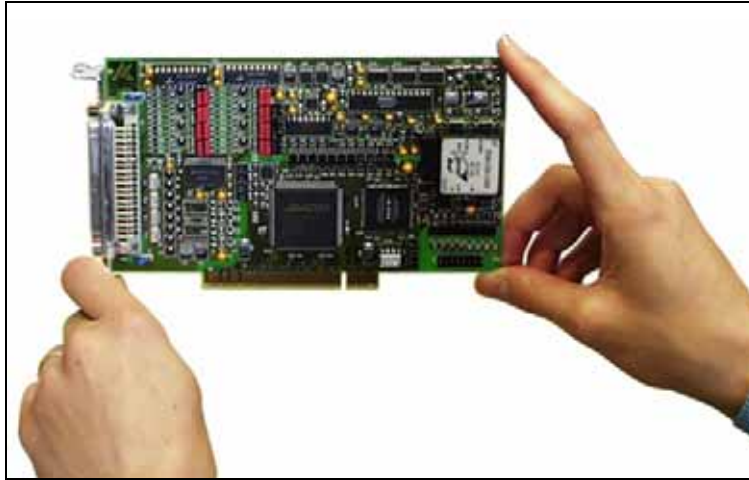
# 4    TECHNICAL DATA

## 4.1    Electromagnetic compatibility (EMC)

The board has been subjected to EMC tests in an accredited laboratory. The board complies with the limit values set by the norms IEC61326 as follows:

|                                              | True value | Set value |
|----------------------------------------------|------------|-----------|
| ESD (Discharge by contact/air) ................. | 4/8 kV     | 4/8 kV    |
| Fields ........................................... | 10 V/m     | 10 V/m    |
| Burst ........................................... | 4 kV       | 2 kV      |
| Conducted radio interferences ................... | 10 V       | 10 V      |

## 4.2    Physical set-up of the board

The board is assembled on a 4-layer printed circuit card.

**Dimensions:**
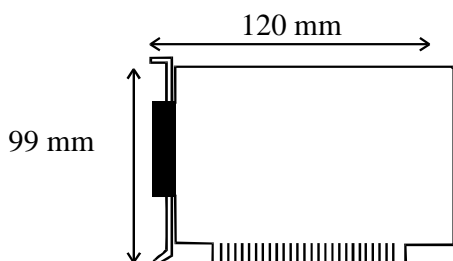


| | |
|---|---|
| Weight: .................................................... | approx. 100 g |
| Installation in: .......................................... | 32/64-bit PCI slot 5 V |
| Connection to the peripheral: ................... | 9-pin SUB-D male connector |

## 4.3    Limit values

Max. altitude: ........................................... 2000 m
Operating temperature: ............................ 0 to 60°C
Storage temperature: ................................ -25 to 70°C
Relative humidity: ................................... 30% to 99% non condensing

**Minimum PC requirements:**
**PCI BIOS from Version 1.0**
Bus speed: ................................................ < 33 MHz
Operating system: .................................... Windows NT, 98, 2000, XP

**Energy requirements:**
- Operating voltage of the PC: ................. 5 V $\pm$ 5%
- Current consumption (without load): ..... typ. 310 mA $\pm$ 10%

**Watchdog:**
Watchdog depth: ...................................... 8 bits
Number: ................................................... 4
                                                                  (1 x hardware/software trigger
                                                                   3 x software trigger)
Switching time of the reset relays: .......... 2 s
Monitoring time: ...................................... 1-255 µs, ms, s, min

**Timer**
Number: ................................................... 4
                                                                  (1 x hardware/software gate
                                                                   3 x software gate)
Timer depth: ............................................ 8 bits
Time base : .............................................. µs, ms, s, min

**Change-over contacts:**
Max. switching voltage: ........................... 60 VDC, 48 VAC
Max. switching current: ............................ 1 A
Max. switching capacity: .......................... 62.5 VA, 30 W
Min. permissible load: .............................. 1 mA 5 VDC
Nominal voltage: ...................................... 24 VDC
Nominal load: .......................................... 1 A 24 VDC
Contact resistance: ................................... < 100 $\Omega$
Contact material: ..................................... Ag + AU-plated
Responding time: ..................................... max. 5 ms, typ. 2.5 ms
Release time: ........................................... max. 5 ms, typ. 0.9 ms
Mechanical life: ....................................... 5 x $10^6$ operations
Electrical life at nominal load: ................. $10^5$ operations

**Trigger/gate input channel:**
Nominal voltage: ...................................... 24 V
Input current at nominal load: ................... 6 mA
Logic levels of the input:
"1": ..........................................................fed signal voltage > 17 V
"0": ..........................................................fed signal voltage < 15 V
Watchdog trigger: ................................... rising and/or falling edge
Timer gate: ............................................. rising and/or falling edge

**Temperature monitoring:**
Resolution: ............................................. 8 bits
Precision: ............................................... ± 2°C
Temperature measurement range:
(temperature sensor): ...............................-45°C / +135 °C
Real range of application
(PC operation range): ............................... 0-60°C

**Safety:**
Optical isolation of the inputs and outputs:   up to 500 V

## 4.4    Component scheme

**Fig. 4-1: Component scheme**
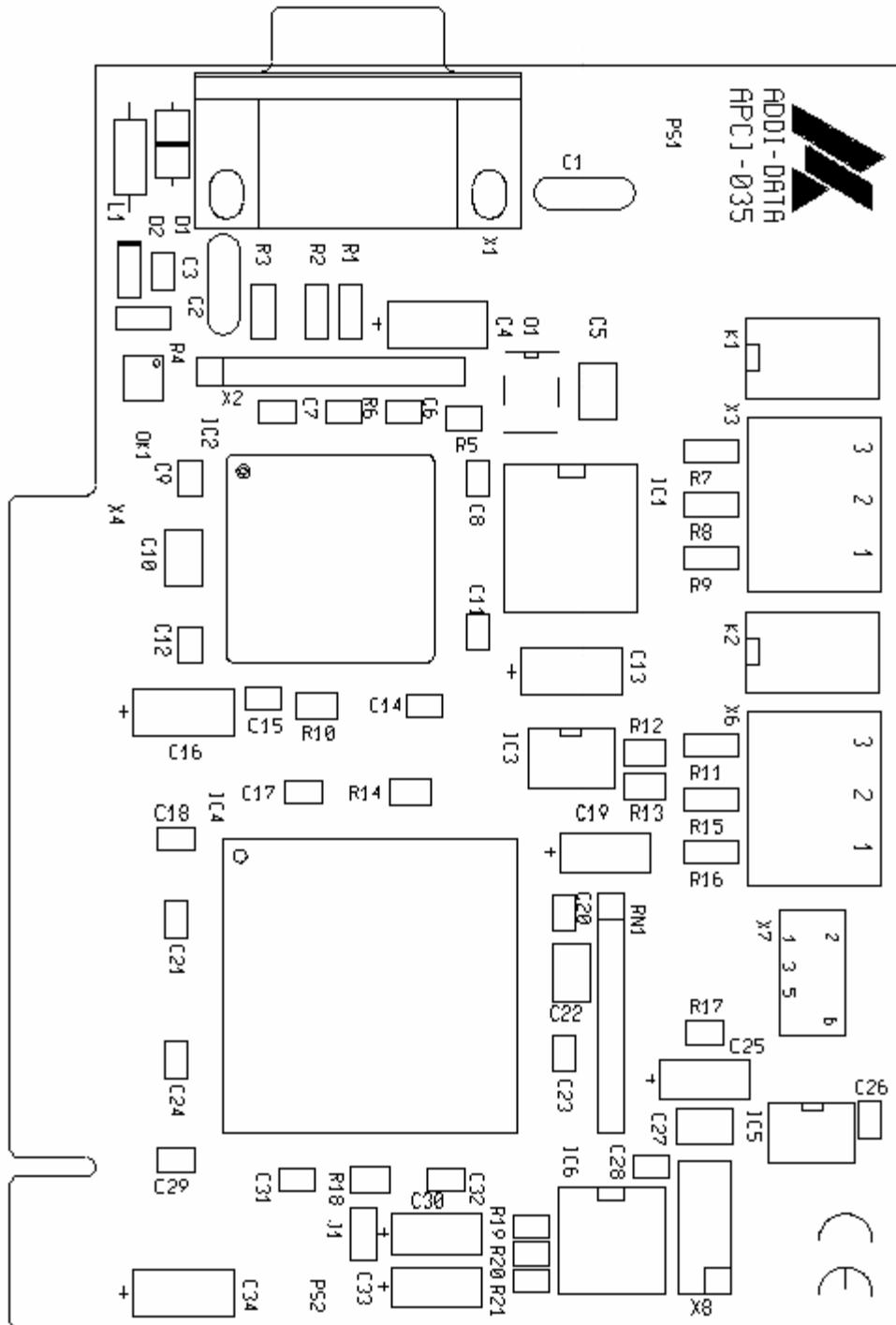
# 5    INSTALLATION OF THE BOARD

## i    **IMPORTANT!**
Do observe the safety precautions (yellow leaflet)!

## 5.1    Opening the PC

♦ **Switch off your PC and all the units connected to the PC.**

♦ **Pull the PC mains plug from the socket.**

♦ **Open your PC as described in the manual of the PC manufacturer.**

## 5.2    Selecting a free slot

Insert the board in a free PCI-5V slot (32-bit).

### Fig. 5-1: PCI-5V slot (32-bit)

**32 bits**

**Remove the back cover of the selected slot** according to the instructions of the PC manufacturer. Keep the back cover. You will need it if you remove the board

**Discharge yourself from electrostatic charges.**

**Take the board out of its protective pack.**

## 5.3    Plugging the board into the slot

♦ Insert the board **vertically into the chosen slot.**

**Fig. 5-2: Inserting the board**
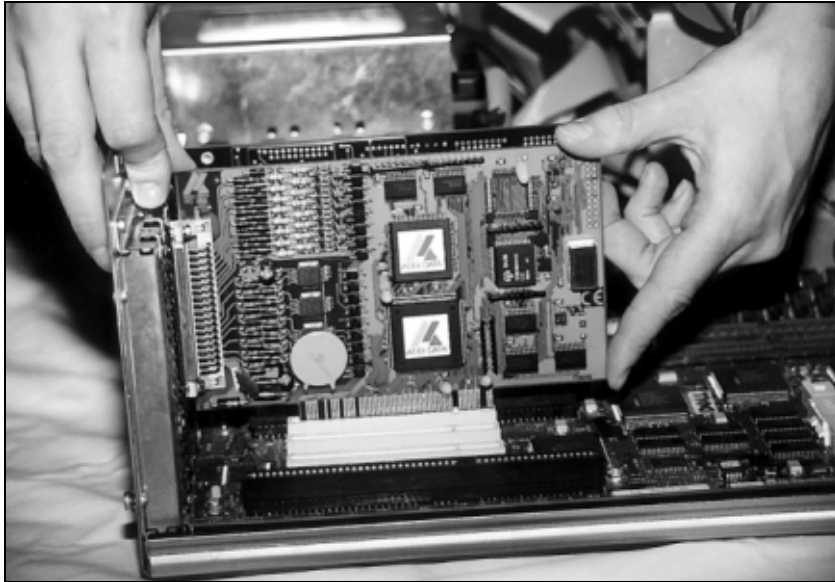


♦ Fasten the board **to the rear of the PC housing with the screw which was fixed on the back cover.**

**Fig. 5-3: Fastening the board at the back cover**
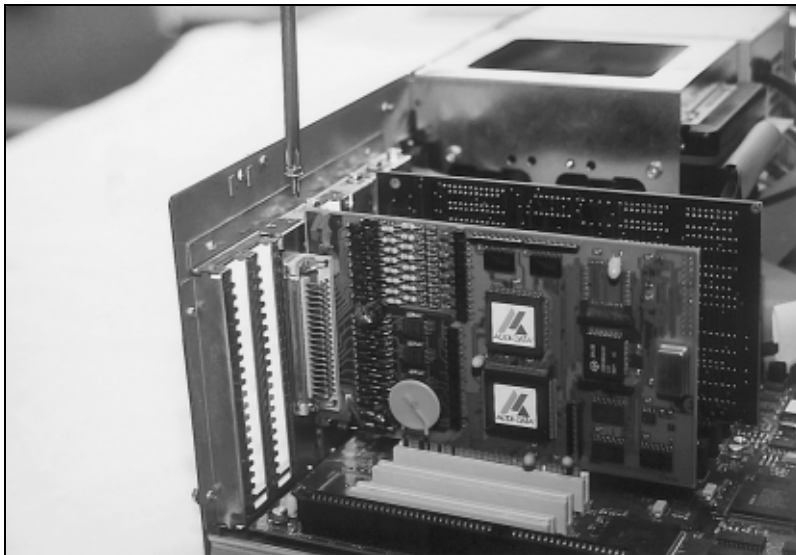


♦ **Tighten all the loosen screws.**

## 5.4    Closing the PC

♦ **Close your PC as described in the manual of the PC manufacturer.**

# 6    SOFTWARE

In this chapter you will find a description of the delivered software and its possible applications.

**i**    **IMPORTANT!**
Further information for installing and uninstalling the different drivers is to be found in the delivered description
**"Installations instructions for the PCI and ISA bus".**

A link to the corresponding PDF file is available in the navigation panel (Bookmarks) of Acrobat Reader.

**i**    **IMPORTANT!**
The supported software functions for the APCI-035 are listed in chapter 9.

The board is supplied with a CD-ROM containing the ADDIPACK software package for Windows NT 4.0 and Windows XP/2000/98.

**ADDIPACK** is composed of following programs:
- **ADDIREG:** The ADDIREG registration program is a 32-bit program for Windows NT 4.0 and Windows XP/2000/98. The user can register all hardware information necessary to operate the ADDI-DATA PC boards.

- **ADDIDRIVER** contains API functions to operate the ADDI-DATA boards in 32 bits.

- **ADDevice Manager** configures the resources of the ADDI-DATA virtual board (See below).

- **ADDI-DATA virtual board:**
  ADDI-DATA software is based on the principle of a **virtual board:** it transposes the different functions (e.g. digital inputs, analog outputs, timer, ...) of all inserted ADDI-DATA boards as the functions of a single (virtual) board. The virtual board features a pool of functions, the functionality of which can be called up without calling a specific board.

- **ADDEVICE MAPPER** was specifically developed for the ADDIPACK boards to facilitate the management of the virtual board. With this program you can optimally adapt the virtual board to your application requirements.

  **IMPORTANT!**
  For some functions of the **ADDEVICE MAPPER** program the browser Internet Explorer 6 or higher has to be installed on your PC.

# 6.1    Board registration

When starting the set-up of ADDIREG, the APCI-035 is automatically recognised and registered.

## 6.1.1  Installation of a new board

If a new board is recognised, the following windows is displayed:

**Fig. 6-1: New inserted board**
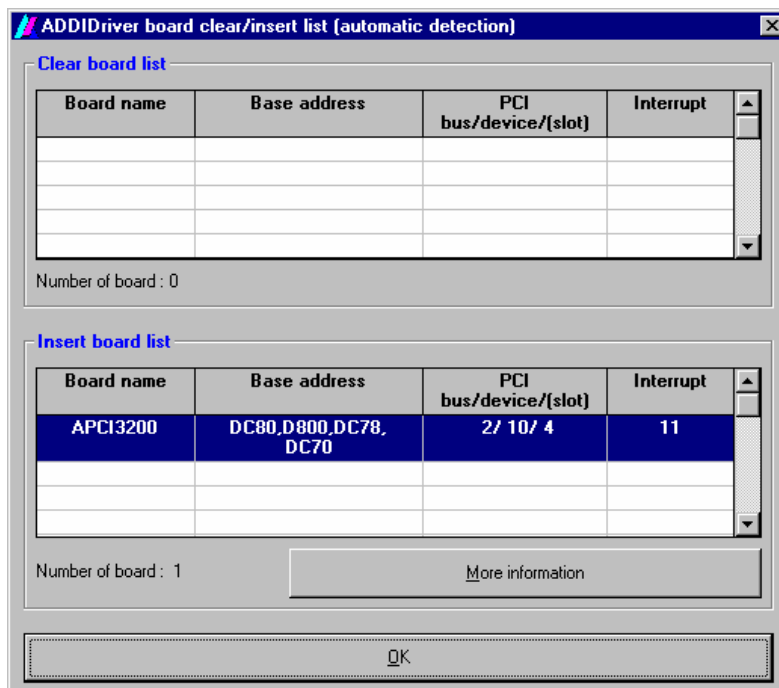


The boards which have been removed from the PC since the last ADDIREG start are listed in the upper table

The new inserted boards are listed in the lower table.

In case further information is required for the operation of the board, click on "More Information". ADDevice Manager is started.

### ADDevice Manager

**Fig. 6-2: ADDevice Manager**
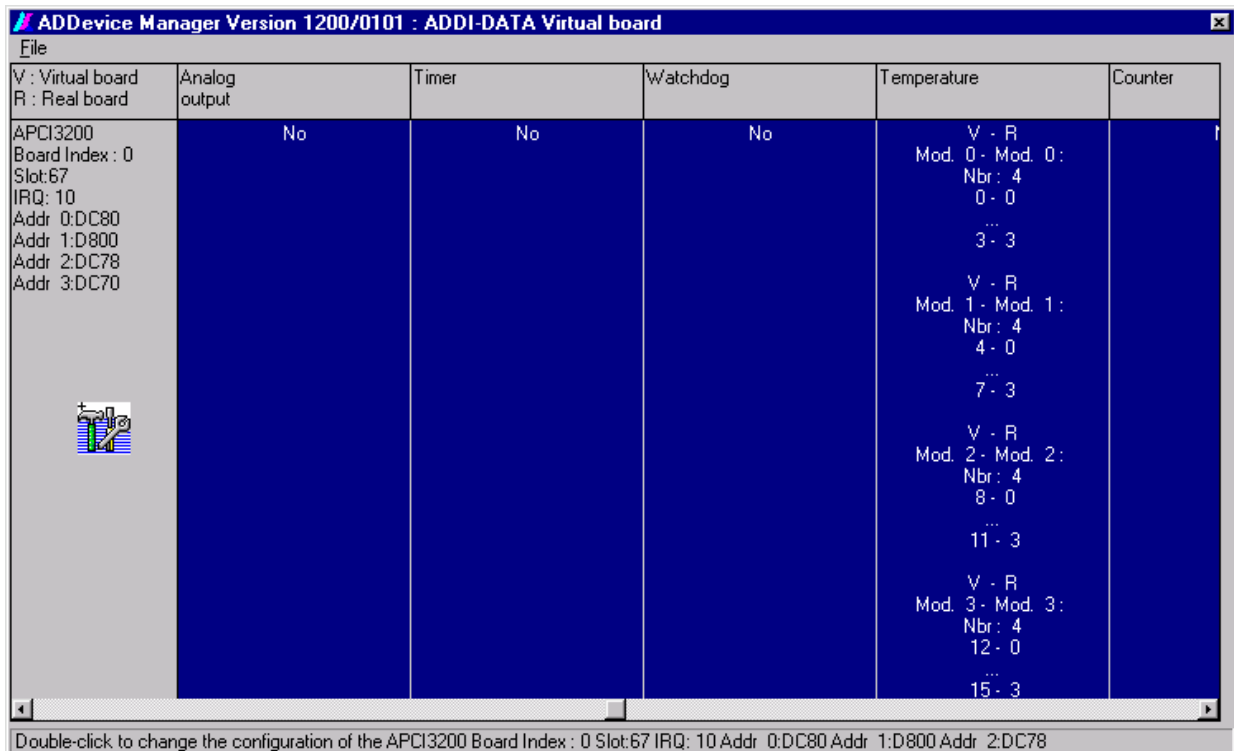


The following parameters are displayed for every inserted board:

**First column:**
- Board name
- Board index: Number allocated to the board when it is registered in ADDIREG.
- Slot number
- IRQ line
- Different addresses which are automatically allocated to the board by the BIOS.

**Other columns:**

The program distinguishes between the resources (Analog/digital input/output, watchdog, ...) of the virtual board (**V,** software) and the real board (**R,** board).

The following parameters are listed
- Module number,
- Number of resources
- Index: The first index line represents the number of the first resource (left: virtual resource - right: real board) The second index line represents the number of the last resource (left: virtual resource - right: real board).
- Type (24 V/5 V, voltage/current, HS/OC - High-Side/Open collector).
- IRQ: if the input channels are interruptible, the program displays the number of the first and of the last input channel

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By clicking twice within a column, the connection principle and the technical data of the resource are displayed. This function is only possible if a question mark appears with the cursor.

You can export the set configuration as a text file. Click on "file" and save the configuration as a .txt file with "Export information to file...". You can then print the configuration or use it for other boards.

Once you have controlled the registration, you can quit the window of ADDevice Manager. The board is ready to operate.

## 6.1.2  Changing the registration of a board

You can change the current board configuration with ADDIREG

### Description of the ADDIREG program

The program is automatically installed with ADDIPACK.
Start ADDIREG under Start/Programme/ADDIPACK/ADDIREG.

**i**     **IMPORTANT!**
First quit all the applications (programs) which use the board
before starting the ADDIREG program.

In the main window of ADDIREG the fields "Insert" and "Clear" are not available for the board.

**Fig. 6-3: ADDIREG registration program (example)**
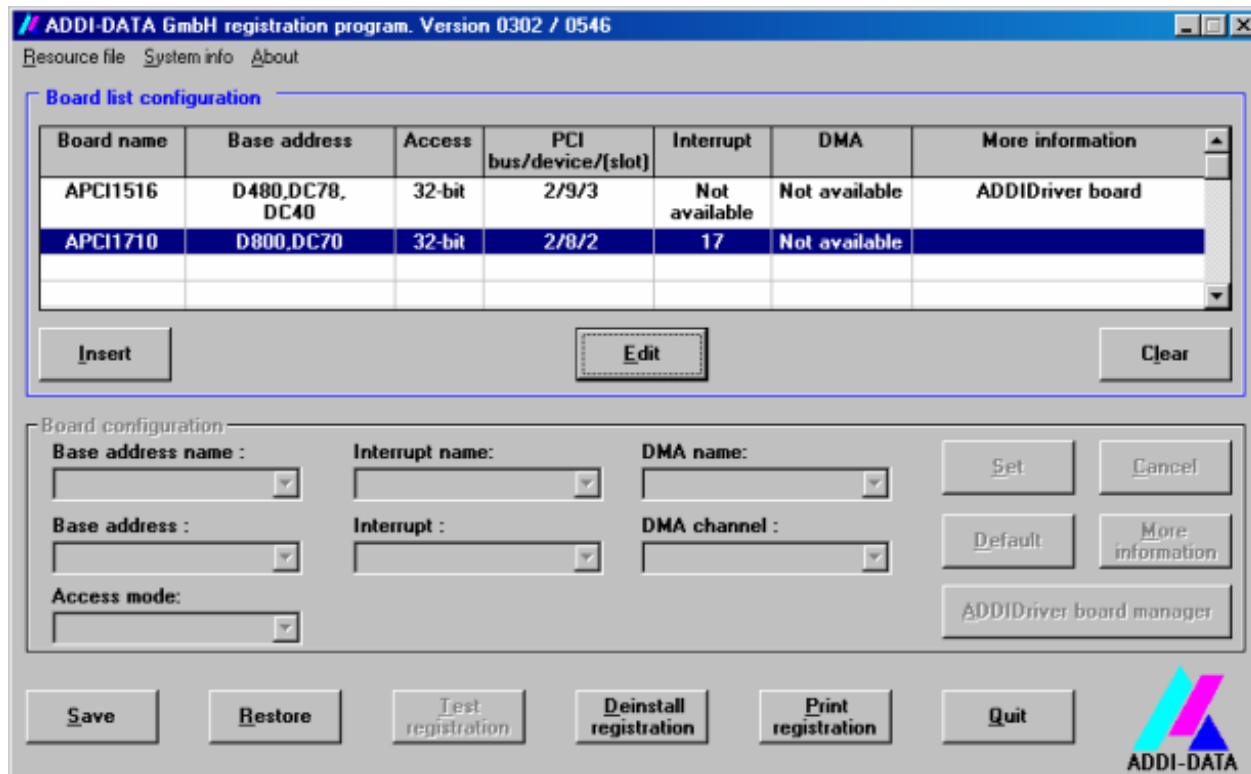
## Table:

**Board name:**
Names of the different registered boards (e.g.: APCI-3200).

**Base address:**
Selected base address of the board. For PCI boards the base address is allocated through BIOS.

**Access:**
Selection of the access mode for the ADDI-DATA digital boards.
Access in 8-bit or 16-bit or 32-bit mode.

**PCI bus/device/(slot):**
Number of the used PCI bus, slot, and device. If the board is no PCI board, the message "NO" is displayed.

**Interrupt:**
Used interrupt of the board. If the board supports no interrupt, the message "Not available" is displayed. **For PCI boards the interrupt is allocated through BIOS.**

**DMA (ISA boards only):**
Indicates the selected DMA channel or "Not available" if the board uses no DMA or if the board is no ISA board.

**More information:**
Additional information like the identifier string or the installed COM interfaces. It also displays whether the board is programmed with ADDIDRIVER or if a **PCI DMA** memory is allocated to the board.

## Text boxes:

**Base address name:**
Description of the used base addresses for the board. Select a name through the pull-down menu. The corresponding address range is displayed in the field below (Base address).

**Interrupt name:**
Description of the used IRQ lines for the board. Select a name through the pull-down menu. The corresponding interrupt line is displayed in the field below (Interrupt).

**DMA name (for ISA boards only):**
When the board supports 2 DMA channels, you can select which DMA channel is to be changed.

**DMA channel (for ISA boards only):**
Selection of the used DMA channel.

# Buttons:

### Edit:
Selection of the highlighted board with the different parameters set in the text boxes.

### Set:
Sets the parametered board configuration. The configuration should be set before you save it.

### Cancel:
Reactivates the former parameters of the saved configuration.

### Default:
Sets the standard parameters of the board.

### More information (not available for the boards with ADDIPACK)
You can change the board specific parameters like the identifier string, the COM number, the operating mode of a communication board, etc...
If your board does not support these information, you cannot activate this button.

### ADDIDriver Board Manager:
Under Edit/ADDIDriver Board Manager you can check or change the current settings of the board set through the ADDEVICE Manager.
ADDevice Manager starts and displays a list of all resources available for the virtual board.

### Test registration:
Controls if there is a conflict between the board and other devices installed in the PC. A message indicates the parameter which has generated the conflict. If no conflict has occurred, "Test of device registration OK" is displayed.

### Deinstall registration:
Deinstalls the registrations of all boards listed in the table and deletes the entries of the boards in the Windows Registry.

### Print registration:
Prints the registration parameter on your standard printer.

### Quit:

## Registration test

Under "Test registration" you can test if the registration is "OK".
This test controls if the registration is right and if the board is present. If the test has been successfully completed you can quit the ADDIREG program. The board is initialised with the set parameters and can now be operated.

In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

## 6.2    Questions and software downloads on the web

Do not hesitate to e-mail us your questions.
per e-mail:     info@addi-data.de     or
                      hotline@addi-data.de

**Free downloads of standard software**

You can download the latest version of the software for the board **APCI-035.**


**http://www.addi-data.com**


**i**    **IMPORTANT!**
Before using the board or in case of malfunction during
operation, check if there is an update of the product (technical
description, driver). The current version can be found on the
internet or contact us directly.

# 7      CONNECTING THE PERIPHERAL

## 7.1     Connector pin assignment

### Fig. 7-1: 9-pin SUB-D male connector

User designation                                                                                                 User designation

GND trigger input   | 6        1 |   OC - Reset relay 1
–   | 7        2 |   CO - Reset relay 1
CC - Reset relay 1   | 8        3 |   CC - Warning relay 0
Trigger input   | 9        4 |   OC - Warning relay 0
| 5 |   CO - Warning relay 0

OC: opening contact (NO)
CO: change-over contact (COM)
CC: closing contact (NC)
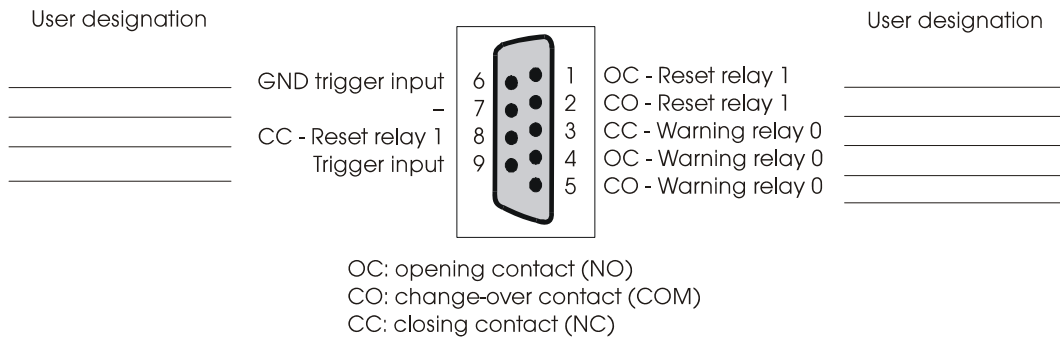
# 8    FUNCTIONS OF THE BOARD

## 8.1    Block diagram

**Fig. 8-1: Block diagram of the APCI-035**
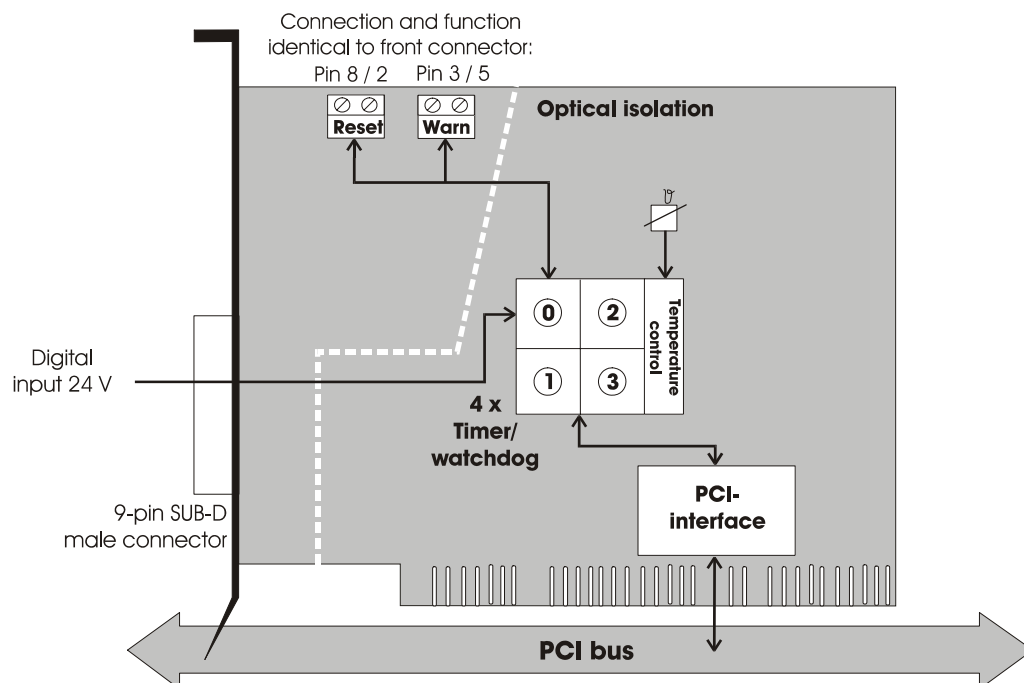


## 8.2    Principle of the alarm system

The **APCI-035** board is fitted with a two-level alarm system: it immediately warns the software and hardware before the PC automatically reboots in case of error.

There is then enough time to close the active tasks and run down the operating system. In this way the PC can be rebooted without difficulty even after a reset.

The board is equipped with a warning relay for the alarm level 1 and a reset relay for the alarm level 2. Whereas the PC can be rebooted at alarm level 2 (depending on the running application), the alarm level 1 starts the emergency program, which provides diagnostics. According to the alarm cause, this program clears the imminent danger or prepares the operating system, the application and if necessary the external devices to the emergency situation (reset or power down).

**Fig. 8-2: Alarm principle of the APCI-035**
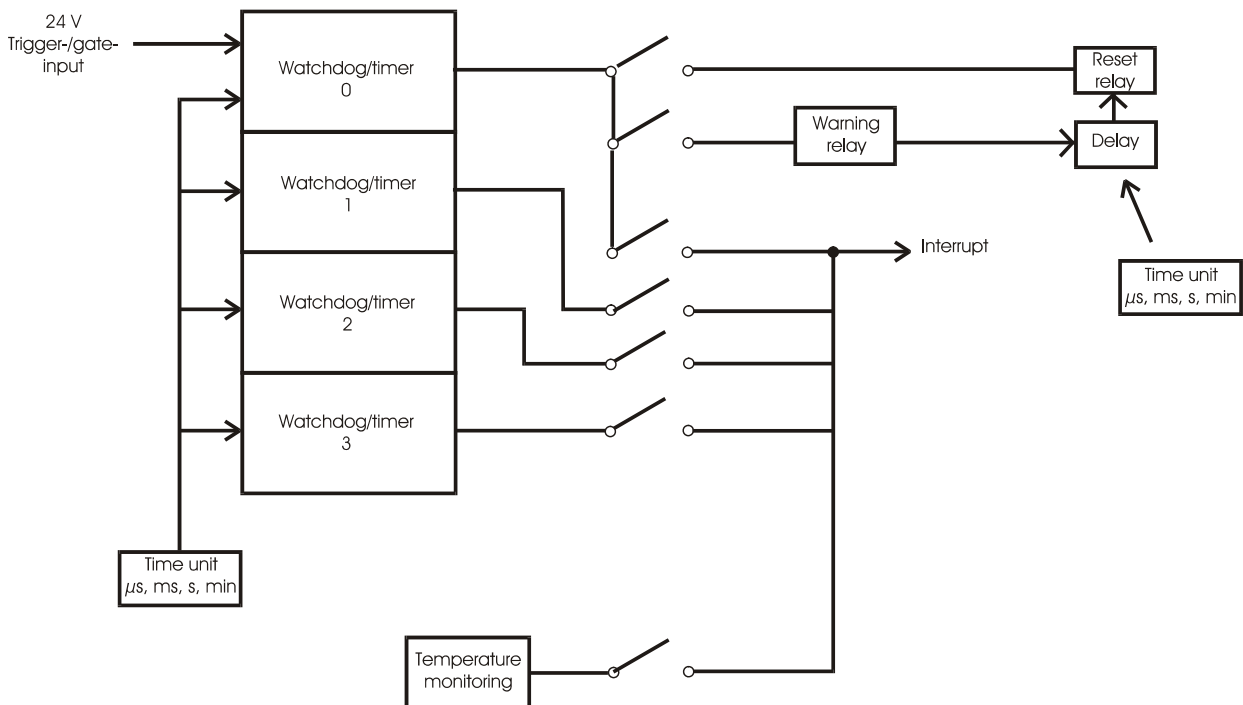


Alarm level 1 → interrupt / warning relay on
Alarm level 2 → reset relay activated / reset via the reset switch of the PC system

## 8.2.1  Warning relay

The function of the warning relay is parametered through software (API function). The warning relay is set once the watchdog 0 has run down. The current circuit between the change-over contact and the closing contact is closed.

## 8.2.2  Reset relay

The function of the reset relay is parametered through software (API function). The reset relay can have 2 different states after the watchdog 0 has run down.

**1.** The reset relay is set when the watchdog 0 runs down. The circuit between the change-over contact and the closing contact is closed. It keeps its status during 2 s.

**2.** The reset relay is set after the watchdog function is initialised. The circuit between the change-over contact and the closing contact is closed. The reset relay is reset after the running down of the wachtdog 0. The circuit between the change-over contact and the closing contact is opened. It keeps its status during 2 s.

## 8.3   Timer/watchdog

### 8.3.1  Timer

The timer function comprises 4 programmable 8-bit timers. The 4 timers can be programmed independently from each other. The time when the timers are enabled and the selection of the cycle time depend on the execution speed of the PC and on the time features of the program to be controlled.

**Timer gate**

Once the counter value of the timer has been programmed, the timer is started by setting the gate on. For the timer 1 it is realised through software or via the 24 V trigger/gate input. For the timers 2 to 4 the gate is monitored by software.

### 8.3.2  Watchdog

Once the watchdog has been enabled, it decrements from the pre-initialised counter value to 0. The watchdog is reset to the initial counter value by retrigger so that the running down of the watchdog is avoided.

In case the watchdog runs down, the alarm status is indicated according to the configuration (warning relay, reset relay and interrupt).

**"Retrigger"**

Retrigger  is to be called up in the program loop for the piece of program to be controlled at cyclic intervals (software tasks). If the program crashes, the retrigger command does not occur any more and the watchdog runs down.

The watchdog is to be enabled once before the piece of program to be supervised is called up.

The watchdog is started by the first software retrigger command. The watchdog 0 can be started either through software or through the 24 V trigger input.

**Diagnostic**

The status of the 4 watchdogs/timers and of the temperature monitoring can be read back through software in the status register.

## 8.4   Temperature

Temperature is measured over an on-board temperature sensor. The integrated A/D converter enables the control of small temperature variations.

The switching threshold is software programmable. If this value is exceeded, an interrupt can be generated.

# 8.5   24 V trigger/gate input

| Trigger/gate-level | Meaning |
|:---:|---|
| **1** | Supply voltage > 17V |
| **0** | Supply voltage < 15V |

**Function**

| Function selection | Action | Edge selection |
|---|---|---|
| Watchdog retrigger | Retrigger of Watchdog 1 | ↑ and/or ↓ |
| Timer gate | Starts or stops the Timer 1 | ↑ and/or ↓ |

# 9    STANDARD SOFTWARE

## 9.1    Supported software functions

The ADDIDRIVER supports the following function for the **APCI-035.**

### Table 9-1: Supported software functions

| Functionality | Function name |
|---|---|
| **Common functions** | i_ADDIDATA_OpenWin32_Driver |
| | i_ADDIDATA_GetDriverVersion |
| | b_ADDIDATA_CloseWin32_Driver |
| **Interrupt** | b_ADDIDATA_SetFunctionalityIntRoutineWin32 |
| | b_ADDIDATA_TestInterrupt |
| | b_ADDIDATA_ResetFunctionalityIntRoutine |
| **Error** | i_ADDIDATA_GetLastError |
| | i_ADDIDATA_GetLastErrorAndSource |
| | b_ADDIDATA_EnableErrorMessage |
| | b_ADDIDATA_DisableErrorMessage |
| | b_ADDIDATA_FormatErrorMessage |
| **Timer** | b_ADDIDATA_GetNumberOfTimers |
| | b_ADDIDATA_GetTimerInformation |
| | b_ADDIDATA_InitTimer<br>*b_TimerMode               2*<br>*b_TimerTimeUnit          1 to 3*<br>*dw_ReloadValue           1 to 255* |
| | b_ADDIDATA_EnableDisableTimerInterrupt |
| | b_ADDIDATA_StartTimer |
| | b_ADDIDATA_StartAllTimers |
| | b_ADDIDATA_TriggerTimer |
| | b_ADDIDATA_TriggerAllTimers |
| | b_ADDIDATA_StopTimer |
| | b_ADDIDATA_StopAllTimers |
| | b_ADDIDATA_ReadTimerValue |
| | b_ADDIDATA_ReadTimerStatus |
| | b_ADDIDATA_EnableDisableTimerHardwareGate<br>**Concerns only the first timer** |
| | b_ADDIDATA_GetTimerHardwareGateStatus |
| | b_ADDIDATA_ReleaseTimer |

| Functionality | Function name |
|---|---|
| **Watchdog** | b_ADDIDATA_GetNumberOfWatchdogs |
| | b_ADDIDATA_GetWatchdogInformation |
| | b_ADDIDATA_GetWatchdogInformationEx |
| | b_ADDIDATA_InitWatchdog<br>*b_DelayTimeUnit*                        1 to 3<br>*dw_DelayValue*                        *1 to 255* |
| | b_ADDIDATA_EnableDisableWatchdogInterrupt |
| | b_ADDIDATA_StartWatchdog |
| | b_ADDIDATA_StartAllWatchdogs |
| | b_ADDIDATA_TriggerWatchdog |
| | b_ADDIDATA_TriggerAllWatchdogs |
| | b_ADDIDATA_StopWatchdog |
| | b_ADDIDATA_StopAllWatchdogs |
| | b_ADDIDATA_ReadWatchdogStatus |
| | b_ADDIDATA_EnableDisableWatchdogHardwareTrigger<br>**Concerns only the first watchdog** |
| | b_ADDIDATA_GetWatchdogHardwareTriggerStatus |
| | b_ADDIDATA_GetWarningDelayInformation<br>**Concerns only the first watchdog** |
| | b_ADDIDATA_InitWarningDelay<br>**Concerns only the first watchdog** |
| | b_ADDIDATA_EnableDisableWatchdogWarningRelay<br>**Concerns only the first watchdog** |
| | b_ADDIDATA_EnableDisableWatchdogResetRelay<br>**Concerns only the first watchdog** |
| | b_ADDIDATA_ReleaseWatchdog |
| | b_ADDIDATA_SetWatchdogResetRelayMode |
| **Temperature** | b_ADDIDATA_Read1TemperatureChannel |
| | b_ADDIDATA_ConvertDigitalToRealTemperatureValue |
| | b_ADDIDATA_InitTemperatureWarning<br>w_Offset                                  not significant |
| | b_ADDIDATA_EnableDisableTemperatureWarningChannel |
| | b_ADDIDATA_StartAllTemperatureWarnings |
| | b_ADDIDATA_StopAllTemperatureWarnings |
| | b_ADDIDATA_ReleaseTemperatureWarning |
| | b_ADDIDATA_ReleaseTemperatureChannel |

## 9.2   Supported samples

**Table 9-2: Supported samples**

| Functionality | Sample number | Description |
|---|---|---|
| **Timer** | SAMPLE01 | Initialise 1 timer in mode 2 without interrupt. Start timer starten. Read/write timer value. |
| | SAMPLE02 | Initialise 1 timer in mode 2 with interrupt. Start timer starten. Read timer value.1 When an interrupt is generated, stop the timer and quit the program. |
| **Watchdog** | SAMPLE01 | Initialise and release software-trigger at key stroke. Start 1 watchdog. Read status, once the watchdog has run down. Reset the watchdog and quit the program. |
| | SAMPLE02 | Initialise and release software-trigger at key stroke. Start 1 watchdog with interrupt. Wait for interrupt. Reset the watchdog and quit the program. |
| | SAMPLE03 | Initialise and start all watchdogs. Read the status, once all have run down, reset them all and exit the program. The hardware gate and trigger aren't used. The warning and reset relays aren't used. |
| | SAMPLE04 | Initialise and start all watchdogs with interrupt. Wait for all interrupts. Reset all watchdogs and exit the program. The hardware gate and trigger aren't used. The warning and reset relays aren't used. |
| | SAMPLE05 | b_ADDIDATA_GetWatchdogInformationEx() is used. Initialise and release software trigger at key stroke. Start 1 watchdog. Read status once the watchdog has run down. Reset the watchdog and quit the program. |
| | SAMPLE06 | b_ADDIDATA_GetWatchdogInformationEx() is used. Initialise and release software trigger at key stroke. Start 1 watchdog with interrupt. Wait for interrupt. Reset the watchdog and quit the program. |
| **Temperature** | SAMPLE00 | Display information about 1 temperature channel |
| | SAMPLE01 | Read 1 temperature channel without interrupt. |
| | SAMPLE02 | Read 1 temperature channel with interrupt. |
| | SAMPLE05 | Test warning of 1 temperature channel with interrupt. |

# 10   GLOSSARY

## Table  10-1: Glossary

| Term | Description |
|------|-------------|
| A/D converter | = *ADC*<br>An electronic device that produces a digital output directly proportional to an analog signal output. |
| Acquisition | The process by which data is gathered by the computer for analysis or storage. |
| Analog | Continuous real time phenomena |
| Bus | The group of conductors that interconnect individual circuitry in a computer. Typically, a bus is the expansion vehicle to which I/O or other devices are connected. Examples of PC buses are PCI, PC Card (PCMCIA), ISA (AT), and EISA bus. |
| D/A converter | = *DAC*<br>A device that converts digital information into a corresponding analog voltage or current. |
| Data acquisition | Gathering information from sources such as sensors and transducers in an accurate, timely and organized manner. Modern systems convert this information to digital data which can be stored and processed by a computer. |
| DC voltage | = *Direct current voltage*<br>DC voltage means that the voltage is constant respecting the time. It will always fluctuate slightly. Especially at switching on and switching off the transition behaviour is of high significance. |
| Digital signal | A signal which has distinct states. Digital computers process data as binary information having either 1 or 0 states. |
| Disturb signal | Interferences that occur during the transfer caused by reduced bandwidth, attenuation, gain, noise, delay time etc. |
| Driver | A part of the software that is used to control a specific hardware device such as a data acquisition board or a printer. |
| Ground | A common reference point for an electrical system. |
| Inductive loads | The voltage over the inductor is U=L.(dI/dt), whereas L is the inductivity and I is the current. If the current is switched on fast, the voltage over the load can become very highly for a short time. |
| Input impedance | The measured resistance and capacitance between the high and low inputs of a circuit. |
| Interrupt | A signal to the CPU indicating that the board detected the occurrence of a specified condition or event. |
| Limit value | Exceeding the limit values, even for just a short time, can lead to the destruction or to a loss of functionality. |
| Noise immunity | Noise immunity is the ability of a device to work during an electromagnetic interference without reduced functions. |
| Noise suppression | The suppression of undesirable electrical interferences to a signal. Sources of noise include the ac power line, motors, generators, transformers, fluorescent lights, CRT displays, computers, electrical storms, welders, radio transmitters, and others. |
| Operating voltage | The operating voltage is the voltage that occurs during the continuous operation of the device. It may not exceed the |

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|---|---|
| | continuous limit voltage. Furthermore, any negative operation situations, such as net overvoltages over one minute at switching on the device must be taken in consideration. |
| Optical isolation | The technique of using an optoelectric transmitter and receiver to transfer data without electrical continuity, to eliminate high-potential differences and transients. |
| Output voltage | The nominal voltage output reading when shaft is rotated to full range, expressed in volts DC /Vo DC) |
| Parameter | The parameters of a control comprise all fort he control process required numeric values, e.g. for   limit values and technological number. |
| PCI bus | PCI bus is a fast local bus with a clock rate up to 33 MHz. This bus is used for processing a great number of data. The PCI bus is not limited like the ISA and EISA systems. |
| PLD | = *Programmable Logic Device* Prorammable logic circuitry |
| Protective circuitry | A protective circuitry of the active part is done in order to protect the control electronic. The simplest protective circuitry is the parallel switching of a resistance. |
| Sensor | A device that responds to physical stimuli (heat, light, sound, pressure, motion, etc.) and produces a corresponding electrical output. |
| Short circuit | A short circuit of two clamps of an electric switch is when the concerning clamp voltage is zero. |
| Timer | The timer allows the adaptation of program processes between processor and peripheral devices. It usually contains from each other independent counters and can be programmed for several operation types over a control word register. |
| Diagnostic program | A utility program used to isolate hardware malfunctions on-board, or software malfunctions in the program. |

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