Manual

Rev. 0.9 EN

ADQ-250 cPCI/PCIe

Isolated 8 channel voltage measurement board

Imprint

Manual ADQ-250 series
Rev. 0.9
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Manufacturer and Support

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ALLNET® GmbH Computersysteme
Division ALLDAQ
Maistrasse 2
D-82110 Germering

Support
Email: support@alldaq.com
Phone: +49 (0)89 894 222 – 74
Fax: +49 (0)89 894 222 – 33
Internet: www.alldaq.com/support

Table of Content

1.   Introduction

Please check the box and the content for damages and completeness before taking the device into operation. If any fault should be detected please inform us immediately.

- Shows the packing some evidence to damaging during transport?

- Any traces of use to be recognized at the device?

The device may not be taken into operation if it is damaged. In case of doubt please contact our technical service department.

Please read – before installing the device – this manual watchfully!

1.1   Scope of delivery

- ALLDAQ board of ADQ-250 series for CompactPCI (4 HP) or PCI Express

- Data medium with driver software and documentation

Optional as bundle including:

- Special terminal block for ADQ-250 series (ADQ-TB-ADQ-250-HUT)

- 8 coaxial cables from MMCX male connector to MMCX male connector, length: 1 m (ADQ-CR-MMCXM-MMCXM-8x-1m)

HDMI cable, length: 1 m (ADQ-HDMI-MM-1m)

1.2   Safety instructions

Necessarily note the following advices:

- Necessarily avoid touching of cables and connectors inside the PC with the board.

- Ensure sufficient air circulation in the CompactPCI rack.

- Never expose the device to direct solar radiation during operation.

- Never run the device near heat sources.

- Protect the device before humidity, dust, liquids and fumes.

- Don´t use the device in damp rooms and never in explosive areas.

- A repair may only be done by trained and authorized persons.

- Please note before initial operation of the device especially when using voltages greater 42 V the installation rules and all relevant standards (including VDE standards).

- We recommend to tie all unused inputs basically to the corresponding reference ground to avoid cross talk between the input lines.

- Before connecting or removing cables with your board always disconnect your field wiring from the power supply.

- Ensure that no static discharge can occur passing the board when handling it. Follow the standard ESD safety precautions (see also chapter 2.1 on page 9).

- Never connect devices with voltage-carrying parts, especially not with mains voltage.

- The user must take appropriate precautions to avoid unforseeable misuse.

For damages caused by improper use and subsequent damages any liability by ALLNET® GmbH Computersysteme is excluded.

1.3   Location of installation and mounting

The CompactPCI resp. PCI-Express boards of the ADQ-250 series are voltage measurement boards for industrial use. Depending on the version the models of the ADQ-250 series are…

… for installation into a free PCI Express slot (ADQ-255/256/258-PCIe), or

… for installation into a free CompactPCI slot (ADQ-255/256/258-cPCI).

PC boards may not be taken into operation outside of appropriate PC systems. For the order of operation on installing the devices please read the chapter „Initial operation" in this manual and the documentation of your PC.

The ADQ-250 series may only be used in dry rooms. PC boards are not for use with tough environment conditions (e.g. outside). Ensure a very good ventilation. Take care for proper fitting of the connection cables. Installation has to be done in a way that the cables (PC connection and field wiring) are not in tension else they could release itself.

1.4   Short description

The measurement boards of the **ALLDAQ ADQ-250 series** are CompactPCI or PCI-Express boards for high precision voltage measurements in industry and laboratory with a bandwidth of up to 280 kHz. By the potential-free voltage inputs and the full differential sampling parasitic effects like ground loops and common mode errors can be largely rejected. The input voltage range is from -10.24 V to +10.24 V for full ±10 V peak to peak. Optional an input voltage range of ±102.4 V is possible. The 8 analog input channels are electrically isolated up to 700 V_{RMS} between each other and against PC ground.

Depending on the application you can choose between 3 models: the ADQ-255 with 8 x 16 bit A/D converters and 250 kS/s sample rate, the ADQ-256 with 8 x 16 bit A/D converters and 2 MS/s sample rate and the ADQ-258 with 8 high-precision 18 bit A/D converters sampling with 1.6 MS/s. All channels are always sampled synchronously. The values can be acquired as single values or timer-controlled. On demand the measurement can be started or stopped by two external trigger inputs, which are isolated against PC ground and to the analog inputs.

	ADQ-255	**ADQ-256**	**ADQ-258**
PC interface	CompactPCI or PCI Express		
Analog inputs	8 differential	8 differential	8 differential
Resolution	16 bit	16 bit	18 bit
Sampling rate	250 kS/s	2 MS/s	1.6 MS/s
Bandwidth	50 kHz (0 dB)	280 kHz (-3 dB)	280 kHz (-3 dB)

Table 1: Overview ADQ-250 series

The **8 bit TTL digital I/O port** can be attached by the HDMI connector at the front panel. If the digital port is configured as input the inputs can be monitored on bit-change and can generate an interrupt.

1.5   System requirements

1.5.1   Hardware

- PC system with a current Intel® or compatible processor based on the x86(-64) architecture
- A free PCI Express x1 resp. CompactPCI slot (4 HP)

1.5.2   Software

System Driver

- Windows Vista (SP2) (32 and 64 bit)
- Windows 7 (32 and 64 bit)
- Windows 8/8.1 (32 and 64 bit)
- Linux on request

ALLDAQ-Manager

By the ALLDAQ-Manager you have central access to the software developer kit (SDK), several utility programs and help files. The ALLDAQ-Manager can be found in the info area of the taskbar (usually at the bottom right corner of the desktop) or by the Windows Start menu. See also chapter 2.4 on page 11.

Software Developer Kit (SDK)

A function library (API) with example code for high-level language programming is included Please note the corresponding help file included with the SDK.

LabVIEW Support

A library with virtual instruments (VIs) for easy access to the ALLDAQ hardware is included with the ALLDAQ SDK.

MATLAB Support

An adapted MATLAB® interface for the ALLDAQ hardware with examples and a help file is included with the ALLDAQ SDK.

2.   Initial operation

2.1   Installing the board

Please read the manual of your computer prior installing the board regarding the installation of additional hardware components.

Handling the board should be done with care to ensure that the device will not be damaged by electrostatic discharge (ESD), mechanical stress or current surges. Ensure to take all safety precautions to avoid an electric shock and follow the standard ESD safety precautions.

Follow this order of operation:

• Unplug the mains plug of your PC system.

• Open the housing as described in the manual of your PC system.

• Make sure that electrostatic discharge cannot occur via the board when you plug it in. At least one hand should be grounded in order to dissipate any static charge.

• Only for PCI Express models: for the +5 V supply of the board an additional supply by the PC power supply is neccessary (current consumption without load 300 mA typ.). Connect a free power connector of your PC (e. g. as used for powering drives) with the appropriate „MOLEX" male connector of your PCIe board (see the following diagram). On demand adapter (cables), e. g. from 13-pin SATA power supply male connector to 4-pin MOLEX female connector are available in specialized shops.
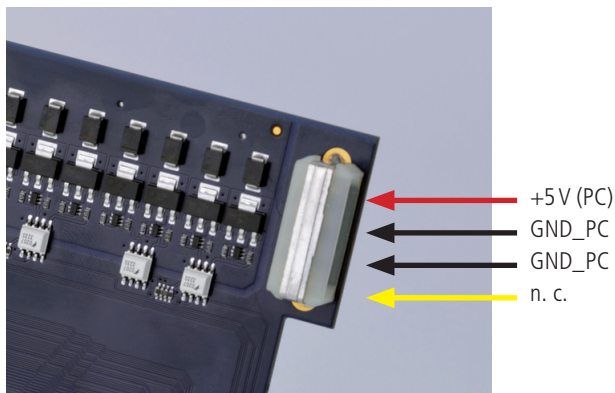

+5 V (PC)
GND_PC
GND_PC
n. c.

Figure 1: 5 V supply for PCI Express models

Attention: If you take the board into operation without connecting the +5 V supply the board can be irreverseable damaged!

- Push the plug-in board carefully and with only a little force into the appropriate slot. Check that the board is not cant and fully plugged in.

- If you want to use the additional mounting bracket for the TTL digital I/Os choose two slots side by side for installation. Remove (if neccessary) an additional blind bracket for the slot.

- Screw all mounting brackets.

- Close the housing as described in the manual of your PC system

2.2 Software installation

2.2.1 Installation under Windows

Basically use the following procedure:

Download the driver package and run the installation program on your computer before installing the board.

After installing the board (see chapter „2.1 Installing the board" on page 9) Windows recognizes the new hardware and starts the driver installation automatically. The installation is Windows compliant – but the procedure can differ depending on your Windows version.

Additional to the driver a software package is included with your board which you can install on your computer. Run the file *ALLDAQDriverSetup32.exe* for 32 bit systems resp. *ALLDAQ-DriverSetup64.exe* for 64 bit systems from the included data medium or in the target directory of your download. After successful installation the ALLDAQ-Manager can be found in the info area of the taskbar (usually at the bottom right corner) or by the Windows Start menu. By the ALLDAQ-Manager you have access to the software developer kit (SDK), several utility programs and help files.

2.3 Test programm

Simple test programs can be found in the ALLDAQ-SDK. For each programming language a sub-directory „Applications" can be found with test programs for your ALLDAQ hardware.

With the ALLDAQ-Manager you can retrieve several information of the installed ADQ hardware.

2.4 ALLDAQ Manager

The ALLDAQ-Manager under Windows gives you a quick overview of the parameters of the ALLDAQ driver system and offers a central access to software tools and help files. You can find the ALLDAQ-Manager in the info area of the taskbar (as a rule at the bottom right) or via the Windows start menue.

ALLDAQ-Manager in overview:

• Information on the installed ALLDAQ hardware in overview

• XML export of the driver configuration for archiving and support

• Tool for interactive illustration of the pin-assignment with the possibility to generate a PDF

• Tool for user balancing

• Convenient access to the software developer kit (SDK) for high-level language programming with examples and simple test programs

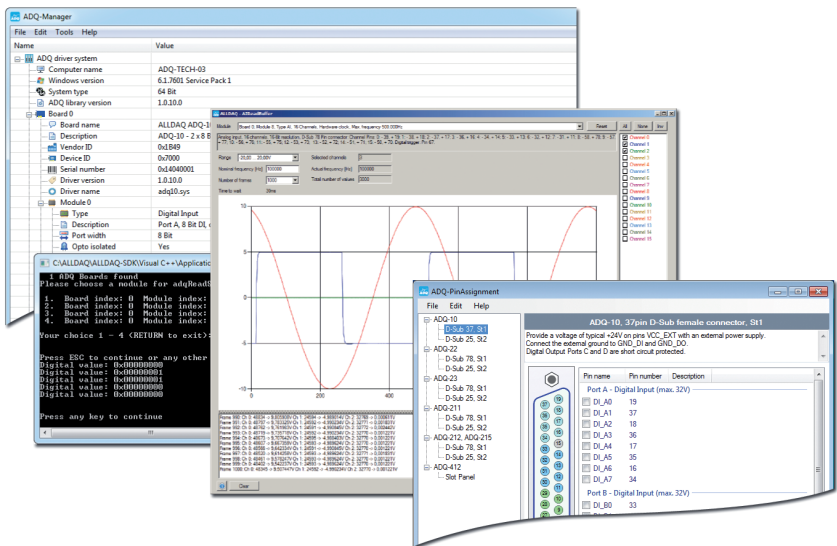• Quick access to the help files

Figure 2: ALLDAQ-Manager and SDK programs

2.5   Balancing/Calibration

By the ALLDAQ-Manager you can select which balancing data record (factory or user balancing) should be activated when booting the computer. You can change the setting via the ALLDAQ-Manager.

2.5.1   Factory balancing

The ADQ-250 series will be balanced before delivery. The balancing data will be stored into an EEPROM. If a re-balancing should be neccessary please contact our service department. For contact details see chapter 4.4 on page 33.

2.5.2   User balancing

For a precise voltage measurement considering multiple error factors, e. g. caused by the field wiring you can balance the analog inputs by yourself. After balancing the application-specific balancing data can be stored beside the factory balancing data into an EEPROM.

Please follow the procedure below:

1. Power-on the system with the ADQ-250 series.

2. Connect the part of the field wiring you want to include into the balancing.

3. Apply a constant voltage and monitor the voltage by a high-precision voltmeter (e. g. multimeter). Make sure, that the voltmeter has a higher accuracy than the respective board of the ADQ-250 series.

4. Run the balancing tool in the ALLDAQ-Manager and follow the procedure in the appropriate help file. See also chapter 2.4 on page 11.

Note: Repeat the balancing for each channel separately.

TIP: To achieve the best accuracy, we recommend to set that sample rate in the balancing tool which one you want to use in your measurement later.
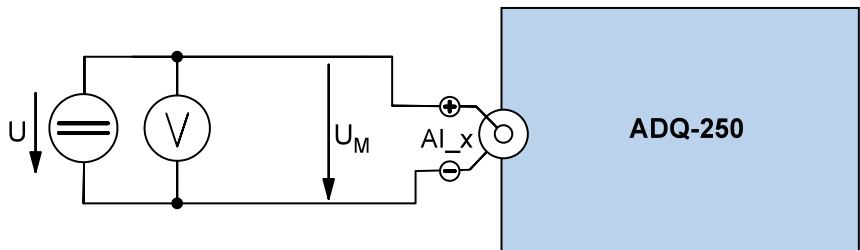

Figure 3: Wiring for balancing

2.5.3   DAkkS calibration

We collaborate with independent test laboratories accredited by the Deutsche Akkreditierungs-stelle GmbH (DAkkS). On-demand please contact our service department. For contact details see chapter 4.4 on page 33.

3. Functional groups
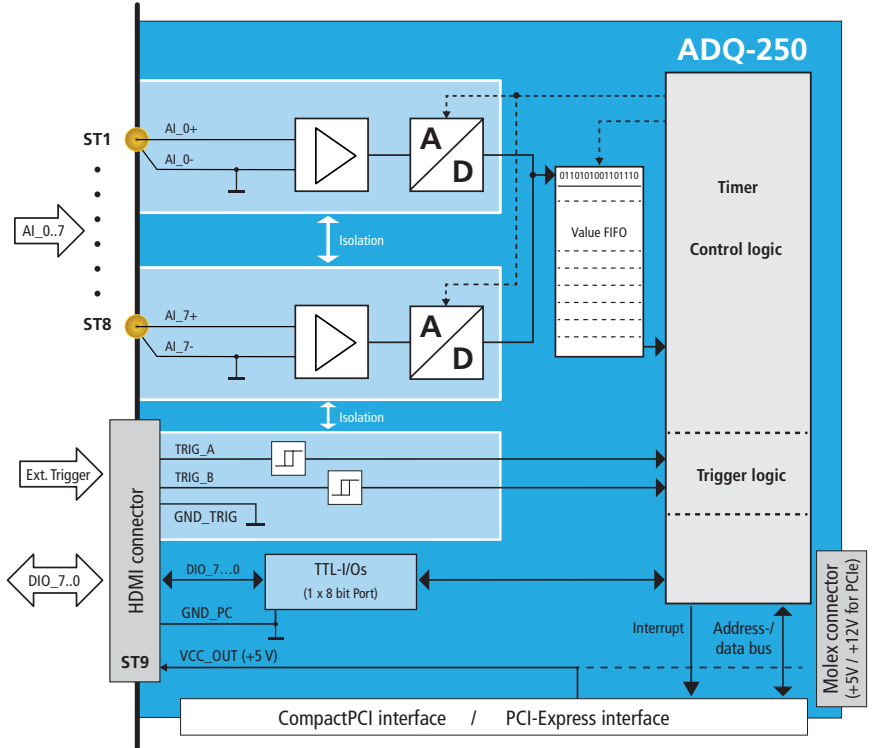
3.1 Block diagram

Figure 4: Block diagram ADQ-250 series

- 8 isolated voltage measurement channels
- 2 isolated external digital trigger inputs
- 8 bi-directional TTL digital I/Os

## 3.2	Analog acquisition

Nyquist´s sampling theorem (Oversampling)

Nyquist´s sampling theorem tells us, that the sample rate for a periodic signal, whose maximum frequency component should be f_{Pmax}, must be at least twice as high, i. e. $2 \bullet f_{Pmax}$ or higher. In practice we recommend to choose a sampling rate by the factor 5 or 10 higher than f_{Pmax} to replicate the signal form truely. This issue is also called "oversampling".

Example:

The max. frequency component $f_{Pmax.}$ ($1/t_P$) of the signal frequency should be 10 kHz. The sample rate f_S ($1/t_S$) should be at least $5 \bullet 10\,kHz = 50\,kHz$.
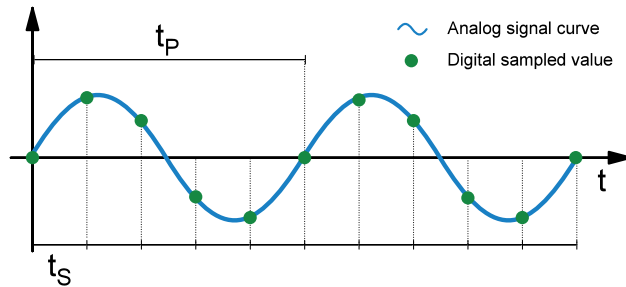
Figure 5: Nyquist-Shannon sampling theorem

### 3.2.1	Voltage inputs

The ADQ-250 series provides 8 voltage inputs with electrical isolation of up to $700\,V_{RMS}$ between each other and towards PC ground. Each of the 8 channels is assembled with a 16 bit or 18 bit ADC and can sample with up to 2.0 MS/s synchronously (depending on model).

The differential input channels are optimized for signal bandwidth of 280 kHz (-3 dB). Because of the lower sample rate of the ADQ-255 you can acquire signals with a bandwidth of about 50 kHz without an appreciable decrease of the amplitude (0 dB) with this model. By the potential-free voltage inputs and the full differential sampling parasitic effects like ground loops and common mode errors can be largely rejected. The input voltage range is standard from -10,24 V to +10,24 V for signals with a full swing of ±10 V. Optional an input voltage range of ±102,4 V is possible. The high A/D converter resolution of 16 bit resp. 18 bit (depending on model) enables a very precise measurements without the need of switching between different measurement ranges.

All channels are always sampled synchronously. The values can be acquired as single values or timer-controlled. On demand the measurement can be started or stopped by two external trigger inputs, which are isolated towards PC ground and to the analog channels.

	ADQ-255	ADQ-256	ADQ-258
PC interface	CompactPCI or PCI Express		
Analog inputs	8 differential	8 differential	8 differential
Resolution	16 bit	16 bit	18 bit
Sampling rate	250 kS/s	2 MS/s	1.6 MS/s
Bandwidth	50 kHz (0 dB)	280 kHz (-3 dB)	280 kHz (-3 dB)
Signal noise ratio	91.7 dB$_{FS, RMS}$	91.7 dB$_{FS, RMS}$	102.3 dB$_{FS, RMS}$
Input voltage range	±10.24 V	±10.24 V	±10.24 V
Input inpedance	$R_i > 100\,M\Omega$, typ. $240\,M\Omega$, $C_i = 4\,pF$		

Table 2: Overview analog inputs

3.2.1.1 Wiring

For proper signed measuring connect the line with the positive potential to the inner conductor AI_*x*+ and the line with the negative potential to the outer conductor AI_*x*−.

We recommend to use high-quality coaxial cables alternativly from MMCX male connector to MMCX male connector (Art. No. 122585) or from MMCX male connector to BNC male connector (Art. No. 122586) in combination with the special terminal block for the ADQ-250 series (Art. No. 122584).
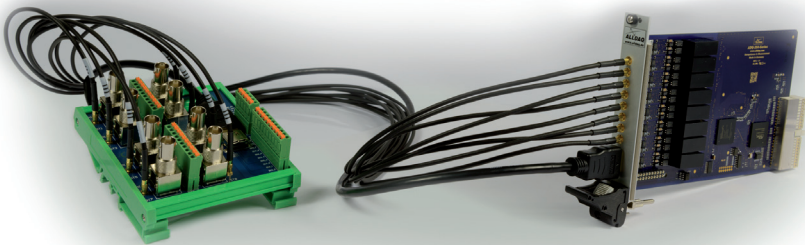

Figure 6: Wiring example with MMCX coaxial cable and special terminal block

On the special terminal block for the ADQ-250 series the analog inputs can be either connected via BNC female connectors or Phoenix type clamps, digital I/Os via a 10-pin Phoenix type clamp and the trigger inputs as well as +5 V and ground via a 5-pin Phoenix type clamp.

3.2.1.1.1 Standard measurement range

The standard input voltage range is ±10.24 V. Each channel is decoupled by a high-impedance input stage with a typical R_i of 240 MΩ and a parallel C_i = typ. 4 pF.
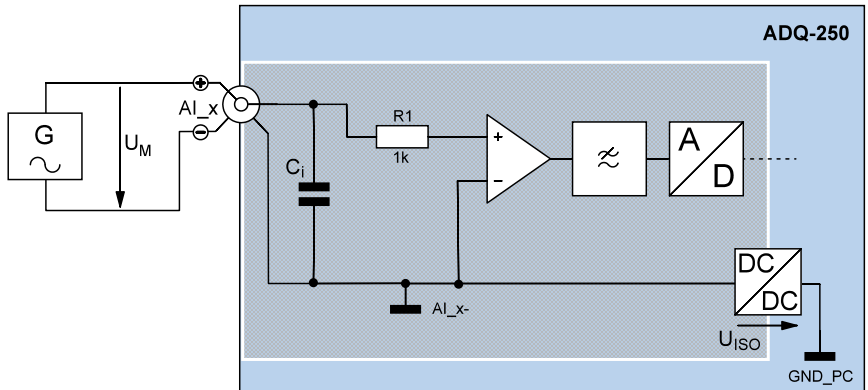

Figure 7: Input stage for ±10.24 V range

3.2.1.1.2 Extended measurement range

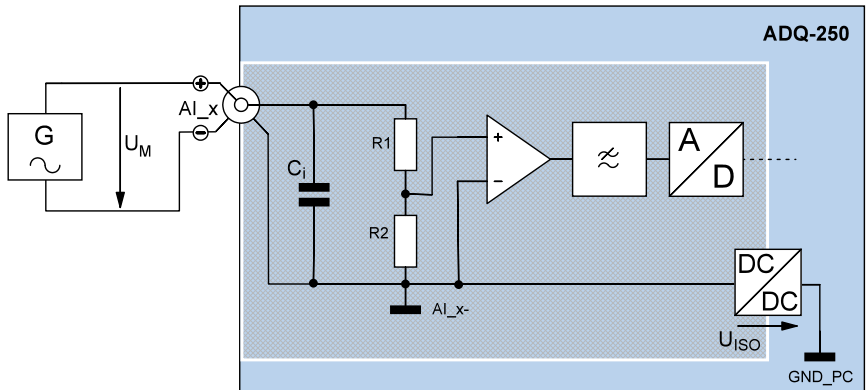As an option an extended input voltage range of ±102.4 V is available. The input impedance can be adapted to your needs.

Figure 8: Input stage for ±102.4 V range

3.2.1.1.3 Isolation voltage

Note, that the maximum voltage potential U_B between the negative analog input AI_x- and earth may not exceed the isolation voltage of $U_{ISO} = 700\,V_{RMS}$. Else the board can be be damaged irreversible. See also the following example:

Example:

The cells of a high voltage battery (e. g. 600 V) in the area of electric mobility should be measured. By the earth a reference between battery ground and PC ground is established. For example if you are measuring the "upper battery" cells you must observe the relatively high voltage potential U_B which may not exceed U_{ISO}. Independently of this the measurement voltage U_M may not exceed the specified range of ±10.24 V (standard) resp. ±102.4 V (E versions).
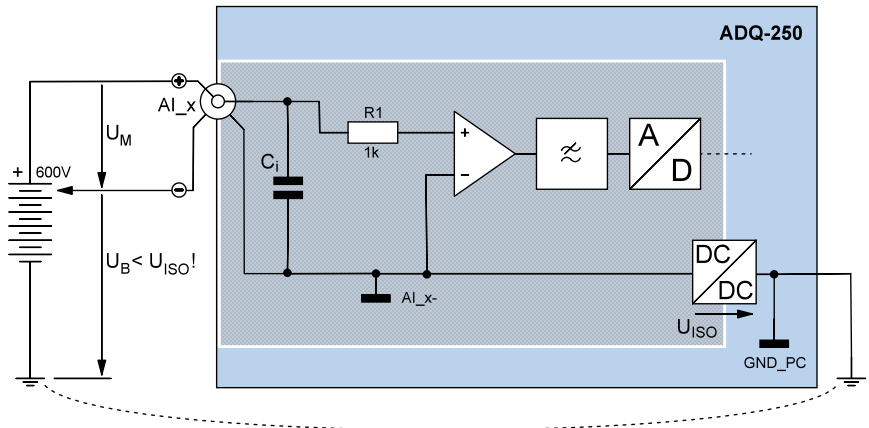
Figure 9: Isolation voltage

3.2.1.2 External trigger A/D section

The ADQ-250 series provides two external digital trigger inputs which are isolated from PC ground and against the analog inputs. You can control the common control logic of all channels by these two independent trigger sources. Depending on configuration the acquisition can be started or stopped by a rising, a falling or any of both edges.

The digital trigger inputs (TRIG_A and TRIG_B) are designed for a TTL high-level of +5V. They use GND_TRIG as common ground reference.

The trigger inputs can be attached by the HDMI connector ST9 at the front panel. A suitable terminal block is available as an option (see chapter 4.2.4 on page 32).
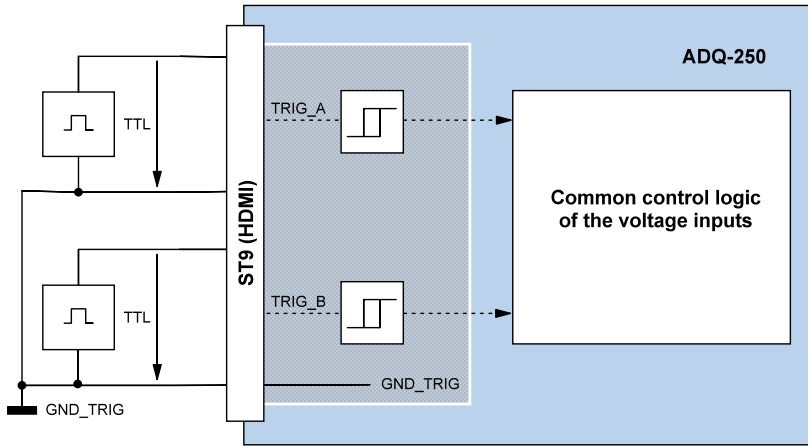
Figure 10: Wiring of the external trigger inputs

3.2.2 Programming

For programming the analog acquisition there is a differentiation between the so-called "Single value acquisition" and the "Timer-controlled acquisition". On demand the measurement can be started or stopped by two external TTL trigger inputs.

3.2.2.1 Single value acquisition

This operation mode is for acquiring single values without fixed time reference.

Depending on configuration the conversion can be started by software or by a rising and/or falling edge at the two external trigger inputs (TRIG_x).

Please note the order of operation as described in the online help.

3.2.2.2 Timer-controlled acquisition

With the timer-controlled acquisition you can sample signals in defined time intervals and acquire them continuously. You can acquire a pre-defined number of frames or continuously. The so-called A/D value FIFO is a fast buffer memory which enables a continuous data transfer of all channels at maximum speed to the PC.
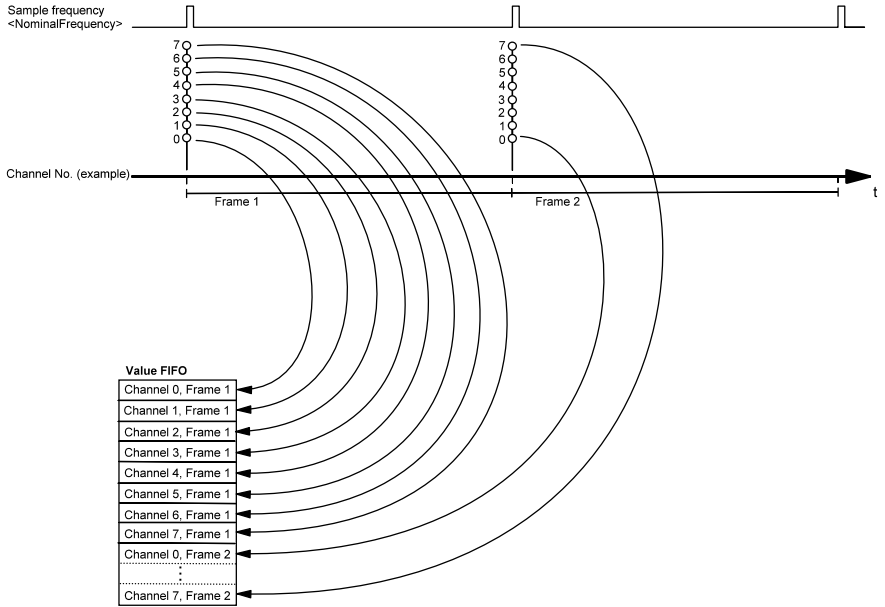
Figure 11: Timer-controlled acquisition

Please note the order of operation as described in the online help.

3.3   Bi-directional digital I/Os

The ADQ-250 series provides one bi-directional 8 bit wide digital I/O port (DIO_7..0). If the digital port is configured as input the pins can be monitored on bit-change and can generate an interrupt event.

The port can be attached by the HDMI connector ST9 at the front panel. A suitable terminal block is available as an option (see chapter 4.2.4 on page 32).

Note: After power-up all ports are configured as input.

3.3.1   Wiring

When wiring digital I/Os take care that the TTL level is met (see specifications on page 27) and that a reference to PC ground (GND_PC at ST9) must be established. The max. output current is $I_0 = 24\,mA$.
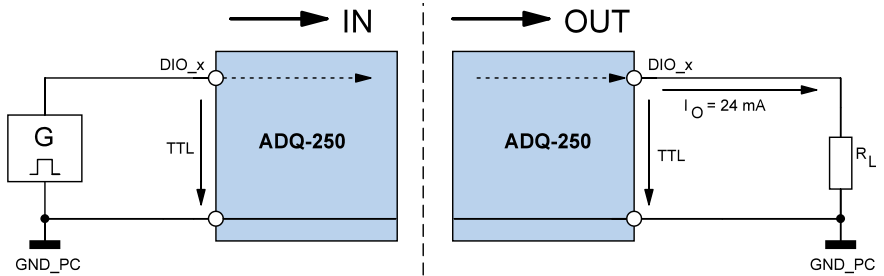
Figure 12: Wiring of the digital I/Os

3.3.2 Programming

The bi-directional 8 bit digital I/O port (DIO_x) can be programmed by port as input or output. After power-up the port is configured as input.

3.3.2.1 Single value input/output

In this operation mode one digital value can be read resp. output port-wise. The port direction is defined by software.

Note: A port configured as output can be read back also!

Follow the order of operation as described in the online help.

3.3.2.2 Streaming Operation

Depending on the port direction the software-controlled streaming operation enables a continuous reading of digital inputs resp. the output of a bit pattern stream with up to 1 kS/s.

Follow the order of operation as described in the online help.

3.3.2.3 Interrupt modes

On demand the digital I/O port configured as input can be monitored on bit change and can be evaluated as an interrupt event. Programming is done in the operation mode „interrupt".

3.3.2.3.1 Bit change

In the operation mode „bit change" one or more input bits which should be monitored for toggling can be masked. For each rising and falling edge, a bit mask defines which bit and which edge should generate an interrupt. As soon as an appropriate edge at minimum one bit masked with „1" occurs, an interrupt is triggerd (see figure).
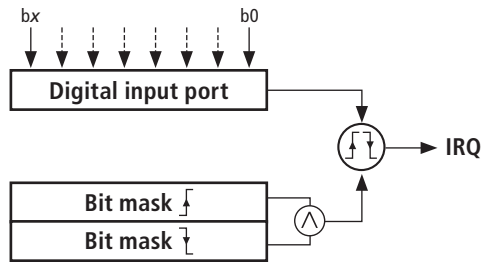
Figure 13: Bit change

Example for bit change:

- When passing the value FFHex in parameter `uiPortBitChangeRisingEdge` of the structure `SADQIRQEnable` in function `adqEnableIRQ()` all bits of a port are monitored on a rising edge for example. If only single bits should be monitored (e. g. monitoring of bit b2 on rising edge), the corresponding bit of the bit mask must be set to „1" (e. g. `uiPortBitChangeRisingEdge` = 04Hex).

- An interrupt is triggered as soon as a rising edge at bit b2 is detected.

- For evaluation of the interrupt event use the parameters `uiPortBitChangeRising-Edge` resp. `uiPortBitChangeFallingEdge` of the structure `SADQIRQStatus` in the function `adqWaitIRQ()`. You get the information which bit with which edge (rising/falling) triggered the interrupt.

4.   Appendix

4.1   Specifications

Conditions: $T_A = 23°C$ if not otherwise specified; warm-up time: 30 minutes.
In line with continuous tests we monitor the long-term stability of the specifications regularly.

Analog inputs

Element	Condition	Specification
Channels		8 full differential voltage inputs
Sample rate max.	ADQ-255	250 kS/s (synchronous)
	ADQ-256	2 MS/s (synchronous)
	ADQ-258	1.6 MS/s (synchronous)
Resolution	ADQ-255	16 bit (1 LSB = 0.3125 mV)
	ADQ-256	16 bit (1 LSB = 0.3125 mV)
	ADQ-258	18 bit (1 LSB = 0.0781 mV)
Bandwidth	ADQ-255	50 kHz (-0 dB)
	ADQ-256	280 kHz (-3 dB)
	ADQ-258	280 kHz (-3 dB)
Input filter bandwidth	0,1 dB flatness	1.6 MHz
Signal noise ratio (SNR)	ADQ-255	tbd.
	ADQ-256	91.7 dB$_{FS, RMS}$
	ADQ-258	102.3 dB$_{FS, RMS}$
Data transfer rate in streaming operation	Board -> PC	max. 25 MHz (cPCI) resp. 30 MHz (PCIe) system dependent*
Sample time range	ADQ-255 (250 kS/s)	4 µs up to ~65 s
	ADQ-256 (2 MS/s)	500 ns up to ~65 s
	ADQ-258 (1,6 MS/s)	625 ns up to ~65 s
Timer resolution	programmable	in steps of 15.$\overline{15}$ ns
Trigger modes	Start	Software, digital trigger inputs (TRIG_A, TRIG_B)
	Stop	Software, digital trigger inputs (TRIG_A, TRIG_B)
Ext. trigger	via HDMI	see chapter trigger inputs
Input voltage range	Standard	-10.24 V.. (+10.24 V - 1 LSB)
	Extended	-102.4 V.. (+102.4 V - 1 LSB)
Input voltage max.	Standard	±12.5 V
	Extended	±125 V
Input current	Standard	10 nA
	Extended	500 mA
Couple capacity		2.2 nF

Element	Condition	Specification
Input impedance	Standard	$R_i > 100\,M\Omega$, typ. $240\,M\Omega$, $C_i = 4\,pF$
	Extended	tbd.
Isolation voltage	Channel to PC ground	$700\,VDC$ / $700\,VAC_{RMS}$ ($60\,Hz$)
	Channel to channel	$700\,VDC$ / $700\,VAC_{RMS}$ ($60\,Hz$)
Accurracy		see separate table
Temperature drift		$20\,ppm/°C$
Value FIFO		8192 values for all channels
Channel list	Channel selection	8 entries
Ground reference		fully differential channels

* The effective transfer rate depends largely on the performance of your computer, the number of installed boards and the number of channels used.

Accurracy of the analog inputs ADQ-255
Conditions: 100 values sampled with 100 kHz and subsequent average calculation

Measuring range	Data point	Expanded measurement uncertainty[1] (coverage factor $k = 2$)
±10.24 V range (1 LSB = 0.3125 mV)	10 V	±0.332 mV (0.003%)
	5 V	±0.302 mV (0.006%)
	1 V	±0.260 mV (0.026%)
±102.4 V range (1 LSB = 3.125 mV)	100 V	tbd.
	50 V	tbd.
	10 V	tbd.

Accurracy of the analog inputs ADQ-256
Conditions: 100 values sampled with 100 kHz and subsequent average calculation

Measuring range	Data point	Expanded measurement uncertainty[1] (coverage factor $k = 2$)
±10.24 V range (1 LSB = 0.3125 mV)	10 V	±0.376 mV (0.004%)
	5 V	±0.357 mV (0.007%)
	1 V	±0.289 mV (0.029%)
±102.4 V range (1 LSB = 3.125 mV)	100 V	tbd.
	50 V	tbd.
	10 V	tbd.

Accurracy of the analog inputs ADQ-258

Conditions: 100 values sampled with 100 kHz and subsequent average calculation

Measuring range	Data point	Expanded measurement uncertainty[1] (coverage factor k = 2)
±10.24 V range (1 LSB = 0.0781 mV)	10 V	±0.353 mV (0.004%)
	5 V	±0.271 mV (0.005%)
	1 V	±0.184 mV (0.018%)
±102.4 V range (1 LSB = 0.781 mV)	100 V	tbd.
	50 V	tbd.
	10 V	tbd.

[1] The expanded measurement uncertainty with the coverage factor k = 2 corresponds with a confidence interval of 95%. With it the demanding requirements of industrial measurement are met.

Trigger inputs isolated for analog inputs

Element		Condition	Specification
Number		via HDMI	2 externe Trigger-Eingänge isoliert
Level max.			-0,5..+5.5 V (different input level on request)
Input level	U_{IH}	VCC = 5V	min. 2.2 V
	U_{IL}	VCC = 5V	max. 0.8 V
Input current	I_F		typ. ±1.6 mA
Trigger clock		Rectangular symmetrical	max. sample rate of the board
Trigger edges			rising, falling, any
Delay time			max. 30.30 ns
Isolation voltage		Signal to PC ground	max. 500 V
Ground reference			GND_TRIG

Bi-directional digital I/Os (TTL)

Conditions: $T_A = 25°C$

Element		Condition	Specification
Number		via HDMI	1 x 8 bit port bi-directional
Type			TTL (bi-directional, direction configurable per port)
Input level	U_{IH}	VCC = 5V	min. 2.0 V
	U_{IL}	VCC = 5V	max. 0.8 V
Input current	I_I		typ. ±1 µA
Output level	U_{OH}	I_O = -24 mA	min. 2.4 V
	U_{OL}	I_O = 24 mA	max. 0.5 V
Output current	I_O	each Pin	±24 mA

Element	Condition	Specification
Operation modes	Single	Read/write of single values
	Streaming	max. 1 kHz (via software timer)
	Interrupt	Monitoring the digital port for bit-change
Ground reference		PC ground (GND_PC)

General

Element	Condition	Specification
PC interface	cPCI models	CompactPCI (32 bit, 33 MHz) Rev. 2.2
	PCIe models	PCI-Express x1 Rev. 1.0
Auxiliary power supply	only for PCI-Express	+5 V/+12 V supply via MOLEX connector to connect with the PC power supply
Power consumption cPCI models	8 AI 1 MS/s, 8 DIO	+3.3 V: max 150 mA +5 V: max. 220 mA; +12 V: max. 1.5 A
Power consumption PCIe models	8 AI 1 MS/s, 8 DIO	+3.3 V: max 150 mA +5 V: max. 220 mA; +12 V: max. 1.5 A
Temperature range	Operation	0..70 °C (standard)
	Storage	-40..100 °C
Humidity	Operation	20%..55% (not condensing)
	Storage	5%..90% (not condensing)
Physical size (without mounting bracket and connectors)	cPCI models	3 HE CompactPCI board, 4 HP width
	PCIe models	158 mm x 111.15 mm (B x H)
Connectors	ST1..8	8 MMCX coaxial female connectors
	ST9	HDMI connector, type HEC
	ST10	20-pin IDC female connector
Certifications		EMC directive 2004/108/EG, Emission EN 55022, Noise immunity EN 50082-2, RoHS
Manufacturer warranty		36 months

4.2   Pinouts

4.2.1   MMCX connectors (analog inputs)
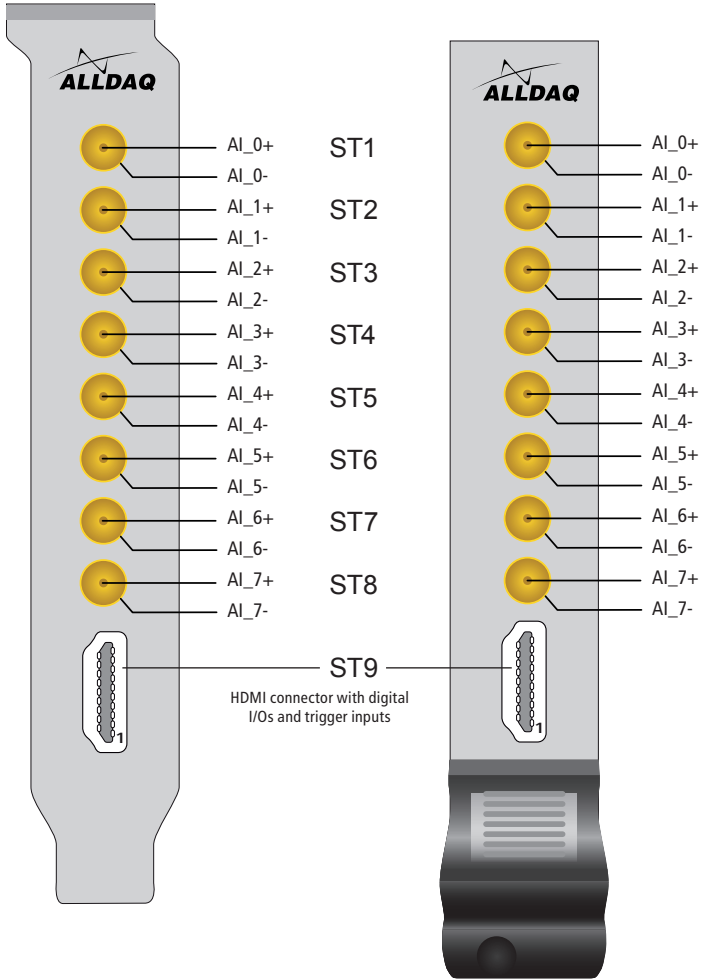
Figure 14: Connectors of the ADQ-250 series

ST1..ST8 are MMCX coax female connectors.

4.2.2   HDMI connector (ST9)

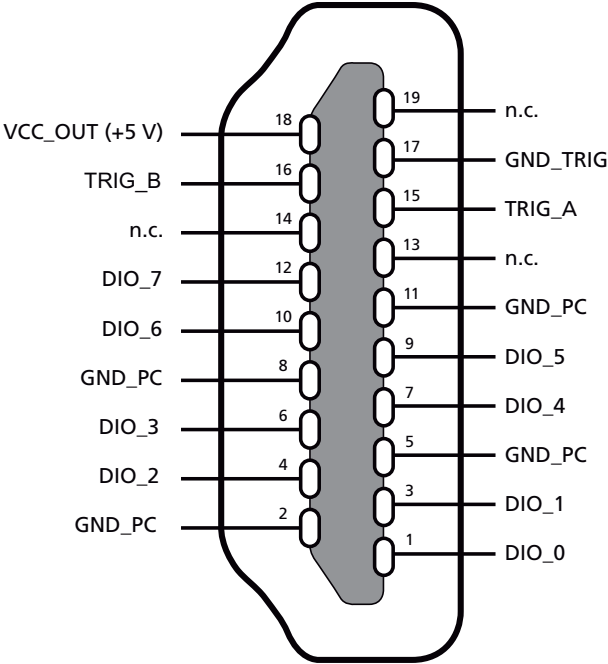HDMI connector type HEC for digital I/Os and trigger inputs.

Figure 15: HDMI connector for digital I/Os and trigger inputs

4.2.3   Auxiliary connector (ST10)

IDC connector ST10 provides the digital I/Os DIO_7..0 and the PC power supplies (3.3 V / 5 V / 12 V).

Note: The pins DIO_7..0 of ST10 are directly connected to the corresponding pins of ST9. You may not use these signals via ST9 and ST10 at the same time. Else the board can be be damaged irreversible.
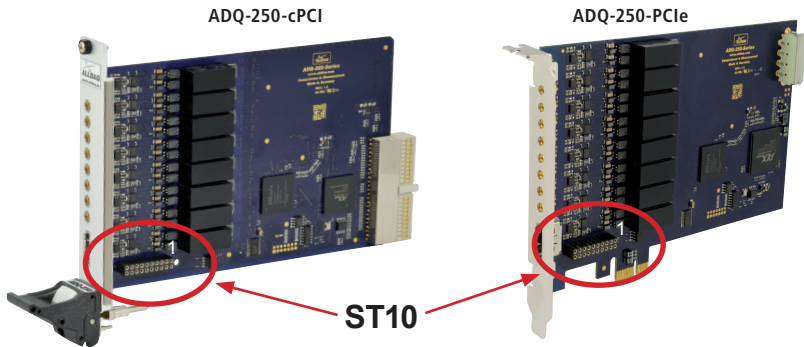
Figure 16: 20-pin auxiliary connector ST10

Pin ST10	Description	Pin ST10	Description
1	VCC_OUT (+5 V)	11	n.c.
2	VCC_OUT (+5 V)	12	n.c.
3	GND_PC	13	DIO_6
4	GND_PC	14	DIO_7
5	GND_PC	15	DIO_4
6	GND_PC	16	DIO_5
7	VCC_PC_3.3V (+3.3 V from PC)	17	DIO_2
8	VCC_PC_12V (+12 V from PC)	18	DIO_3
9	VCC_OUT (+5 V)	19	DIO_0
10	n.c.	20	DIO_1

Table 3: Pinout ST10

4.2.4   Terminal block for ADQ-250

Special terminal block for the ADQ-250 series. The analog inputs can either be connected via the BNC female connectors, the MMCX female connectors or the Phoenix type clamps (ST1_4 and ST5_8), the digital I/Os via the 10-pin Phoenix type clamp ST9B and the trigger inputs as well as +5 V and ground via a 5-pin Phoenix type clamp ST9A.
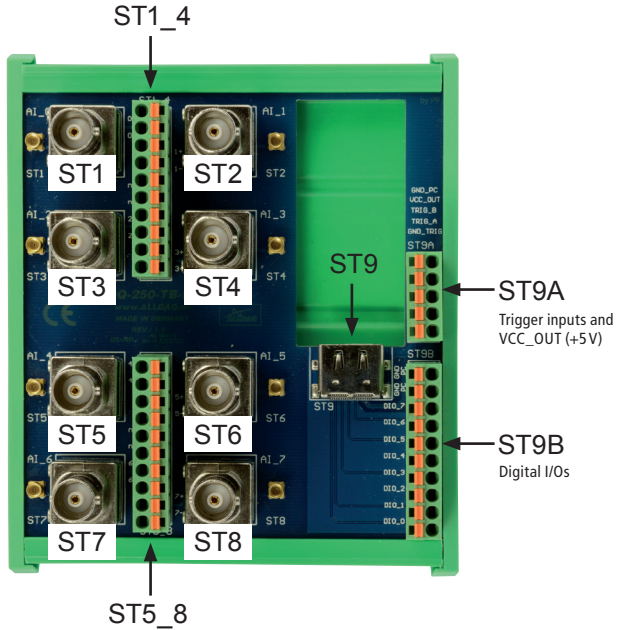
Figure 17: Terminal block for ADQ-250 series

4.3 Accessories

ADQ-TB-ADQ-250-HUT (Art. No. 122584)

Special terminal block for ADQ-250 series, including cable set.

ADQ-CR-MMCXM-MMCXM-8x-1m (Art. Nr. 122585)

8 x Coaxial cable from MMCX male connector to MMCX male connector (1 m)

ADQ-CR-MMCXM-BNCM-8x-1m (Art. No. 122586)

8 x Coaxial cable from MMCX male connector to BNC male connector (1 m)

ADQ-HDMI-MM-1m (Art. No. tbd.)

HDMI cable to connect the digital-I/Os and trigger signals with the terminal block (1 m)

4.4 Manufacturer and support

ALLNET® and ALLDAQ® are registered trademarks of the ALLNET® GmbH Computersysteme. For questions, problems and product information please contact the manufacturer directly:

ALLNET® GmbH Computersysteme
Division ALLDAQ
Maistrasse 2
D-82110 Germering
E-Mail: support@alldaq.com
Phone: +49 (0)89 894 222 74
Fax: +49 (0)89 894 222 33
Internet: www.alldaq.com

4.5   Important notes

4.5.1   Packaging ordinance

Basically manufacturer and distributors are committed to take care, that sales packaging are withdrawn after use from the end user and applied to a new disposal or to a material recycling as a matter of principle (translated according to § 4 sentence 1 of VerpackVO). If you have problems as customer on disposal of packaging and shipping material please write an email to info@allnet.de.

4.5.2   Recycling note and RoHS compliance

Please note, that parts of products of ALLNET® GmbH should be disposed in recycling centers resp. may not be disposed via the household waste (printed circuit boards, power adapters and so on).

ALLNET® products are manufactured in accordance with RoHS (RoHS = Restriction of the use of certain hazardous substances).

4.5.3   CE certification

The ADQ-250 series is CE certified.

This device is compliant to the EU directive: 2004/108/EG regarding the electromagnetic compatibility (EMC) and the cross approval of their conformity. The conformity with the directive as stated above is confirmed by the CE sign on the device.

4.5.4   Warranty

Within the warranty time we eliminate manufacturing and material defects free of charge. The warranty terms valid for your country can be found on the homepage of your distributor. If you have questions or problems applying the warranty you can contact us during our normal opening hours under the following phone number +49 (0)89 894 222 – 74 or by email: support@alldaq.com.

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