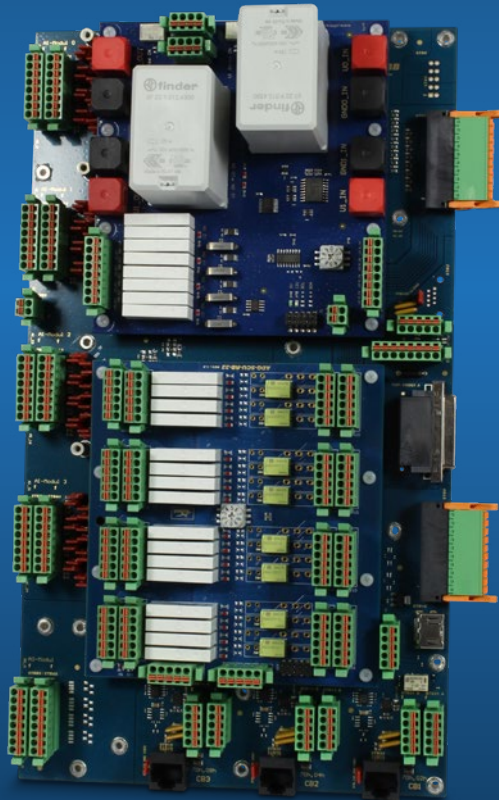




# ADQ-SCU-LC 1.0 Manual

Rev. 1.0 EN



**ALLDAQ signal conditioning unit baseboard,  
optional powerboard and relayboard**



# Imprint

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Rev. 1.0 EN  
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# 1. Introduction

Please check the packaging and contents for damage and completeness before commissioning. Should any defects occur, please inform us immediately.

- Does anything on the packaging indicate that anything was damaged during transport?
- Are there any signs of use on the device?

Under no circumstances may you operate the device if it is damaged. If in doubt, contact our technical service department.

**Please read - before installing and programming the device - this manual carefully!**

## 1.1 Scope of delivery

- ALLDAQ Baseboard ADQ-SCU-LC-BB for signal conditioning unit
- 2 x 68-pin VHDCI cable (male-male), double shielded, cables twisted in pairs, length: 1.8 m (ADQ-CR-VHDCI-68M/68M-1.8m), part no.: 146813 (2 x)
- HDMI cable, length: 2 m (ADQ-CR-HDMI-MM-2m), item no.: 127015

Optional:

- 2 x 68-pin VHDCI cable (male-male), double shielded, cables twisted in pairs, length: 1.2 m (ADQ-CR-VHDCI-68M/68M-1.2m), part no.: 150597 (2 x)
- Plug-on board ALLDAQ Powerboard ADQ-SCU-PB
- Plug-on board ALLDAQ relay board ADQ-SCU-RB

## 1.2 Safety Instructions



**Be sure to observe the following instructions:**

- Avoid touching cables and connectors
- Never expose the device to direct sunlight during operation.
- Never operate the device near heat sources.
- Protect the device from moisture, dust, liquids and vapours.
- Do not use the device in damp rooms and under no circumstances in potentially explosive areas.
- Repairs may only be carried out by trained, authorised personnel.
- When commissioning the instrument, please observe the installation regulations and all relevant standards (including VDE standards), especially when operating with voltages higher than 42 V.
- We recommend to always connect unused inputs to the corresponding reference ground to avoid crosstalk between the input channels.

- Always disconnect the field wiring of the analog and digital inputs/outputs from the signal conditioning unit (ADQ-SCU-LC incl. plug-in boards) as well as the connection to the ADQ-344 before connecting or disconnecting the power supply of the signal conditioning unit.
- Make sure that no static discharge can occur through the device when handling the card. Follow standard ESD protection measures.
- Never connect the devices to live parts, especially not to mains voltage.
- Precautions to avoid unpredictable misuse must be taken by the user.

ALLNET® GmbH Computersysteme is not liable for improper use and resulting damage.

## 1.3 Installation and assembly site

The signal conditioning unit (ADQ-SCU-LC incl. plug-in boards) is intended for installation in measuring and test systems by qualified personnel. The relevant installation regulations and standards must be observed.

The ADQ-SCU-LC may only be used in dry rooms. Ensure sufficient heat dissipation. Ensure that the connecting cables are securely attached. The installation must be carried out in such a way that the cables are not under tension, otherwise they may become loose.



## 1.4 Brief description

The ALLDAQ ADQ-SCU-LC signal conditioning unit was developed to optimally adapt a large number of analog and digital inputs/outputs to the requirements of a complex, automated measurement and test system. The acquisition and generation of the signals is performed synchronously via the multifunctional ALLDAQ ADQ-344 measurement and control card, which simultaneously controls the ADQ-SCU-LC via I2C bus.

### Important features:

- Analysis of audio signals of different levels
- Input coupling (AC/DC), by jumper
- Measurement and mathematical evaluation of relevant parameters
- Generation of standard and arbitrary signals for stimulation.
- Optionally switch supply voltages via relay with ADQ-Relay Board
- Switch currents up to 50 A (100 VDC) via relay, optional: ADQ-SCU-Power Board e.g. connect the supply voltage to the DUT
- Simple control via ALLDAQ driver system
- API for easy integration into your application
- Optimized for operation with the isolated ADQ-344 measurement and control card

# 2. Overview of the system

## 2.1 Block diagram

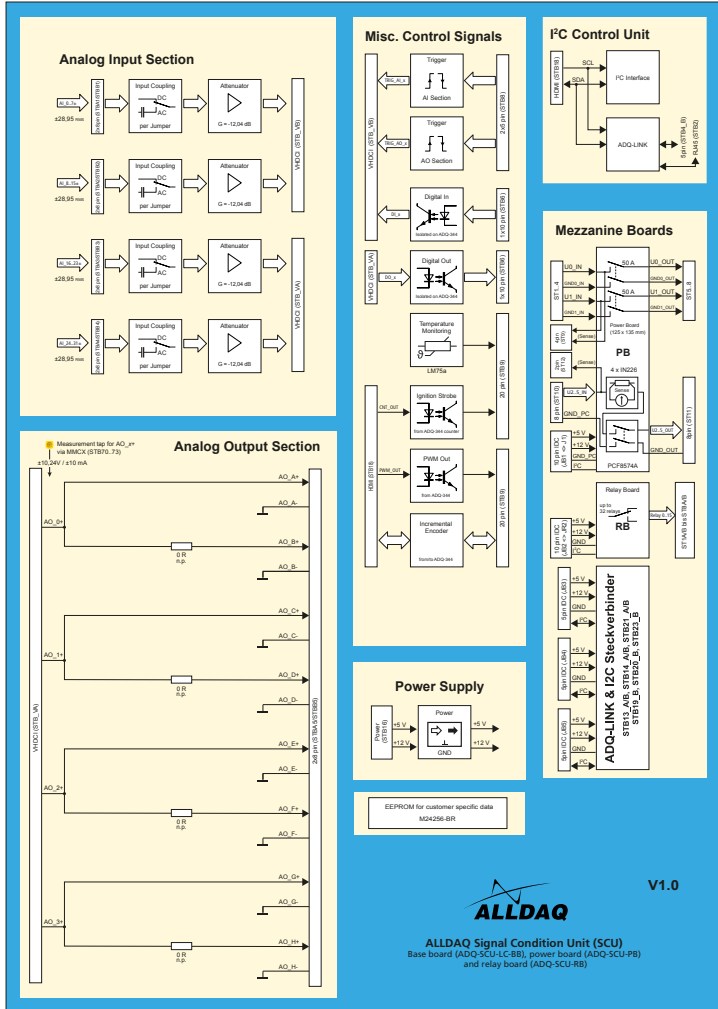


Fig. 1: Block diagram ADQ-SCU-LC

## 2.2 Baseboard ADQ-SCU-LC-BB

Baseboard for Signal Condition Unit (SCU) for connection to ADQ-344.

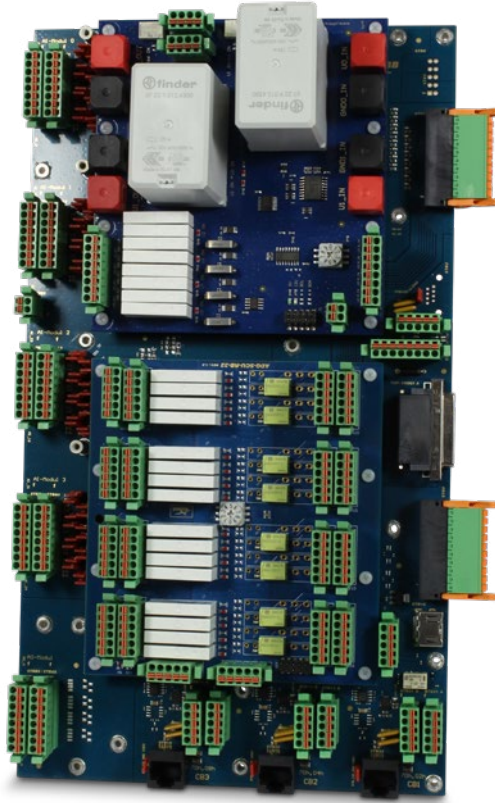


Fig. 2: Baseboard ADQ-SCU-LC-BB

### A/D section

- 32 analog inputs, input range per channel up to  $\pm 28.95$  Vrms
- AC/DC coupling per channel configurable by jumper
- 4 digital trigger inputs

### D/A section

- 4/8 analog outputs, output range  $\pm 10.24$  Vp / Iout =  $\pm 10$  mA
- 4 digital trigger inputs

### Other features

- Baseboard temperature monitoring with threshold value setting and opto-decoupled alarm output
- PWM output (opto-decoupled)
- 1 x 32 bit counter up to 66 MHz (inputs: enable, ext. trigger, ext. clock, output: strobe)
- 8 isolated digital inputs (High: 15..35 V)
- 8 isolated digital outputs up to 35V/600 mA
- Complete control via I2C bus

## 2.3 Power Board ADQ-SCU-PB-50

Powerboard for Signal Condition Unit (SCU) for plugging onto ADQ-SCU-LC-BB.

The board can be attached to the SCU with M3 screws with a torque of 0.5 Nm.

**Caution:** Higher torques can cause the fastening bolt on the SCU to shear.

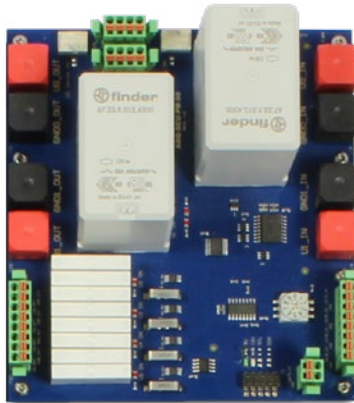


Fig. 3: Powerboard ADQ-SCU-LC-PB-50

- Power plug-in board (I2C controlled)
- 2 x high current relays up to max. 100 VDC/50 A per relay (sense line at relay input)
- 4 x supply (U2..5) switchable via relay max. 36 VDC/5 A per relay (sense line at relay input)
- 4-channel power measurement for U2..5
- Adjustable I2C addresses (eight possibilities)

## 2.4 Relay Board ADQ-SCU-RB

Relayboard for Signal Condition Unit (SCU) for plugging onto ADQ-SCU-LC-BB.

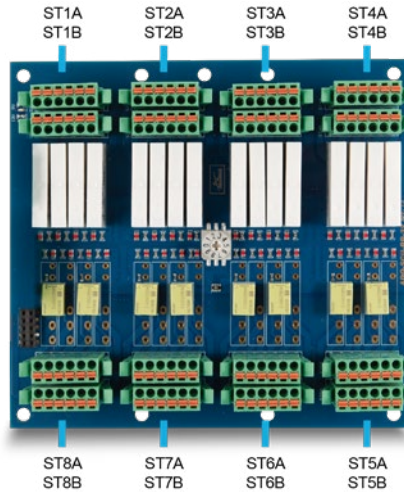


Fig. 4: Relayboard ADQ-SCU-LC-RB-16/8

- Other relay equipment possible
- Relay plug-in board (I2C controlled)
- 16 changeover relays (DPDT, type C), max. 30 VDC/6 A
- 8 small signal change-over relay (SPDT, type C), max. switching power 62.5VA/30W DC
- Contact resistance 1 A/6VDC max. 75mΩ at 1 A/6VDC

Other relay configurations possible.

The board can be attached to the SCU with M3 screws with a torque of 0.5 Nm.

**Caution:** Higher torques can cause the mounting bolt on the SCU to shear.

## 2.5 Multifunction Board ADQ-344

The ADQ-SCU-LC has been developed for connection to the multifunctional ALLDAQ ADQ-344 measurement and control board, which simultaneously controls the ADQ-SCU-LC via I2C bus. The connection is made via two 68-pin VHDCI cables and one HDMI cable for various special functions such as the I2C bus for controlling the ADQ-SCU-LC.

The ADQ-344 provides the following basic functionality:

- 32 pseudo-differential 18 bit voltage inputs up to 800 kS/s
- Input ranges:  $\pm 10.24$  Vp,  $\pm 5.12$  Vp, 0-10.24 Vp, 0-5.12 Vp
- Insulation voltage A/D section: 1500 VDC (60 s)
- Four 16 bit voltage outputs ( $\pm 10.24$  Vp) up to 500 kS/s
- Insulation voltage D/A section: 1500 VDC (60 s)
- 16 TTL-DIOs (3.3 V/5 V), max. 20 mA per output
- 8 isolated digital inputs (High: 15..35 V)
- 8 isolated digital outputs up to 600 mA/output
- Isolation voltage DI and DO part: 500 VAC
- Special functions via HDMI connector: 32 bit counter, I2C bus port, incremental encoder port, frequency measurement, PWM output

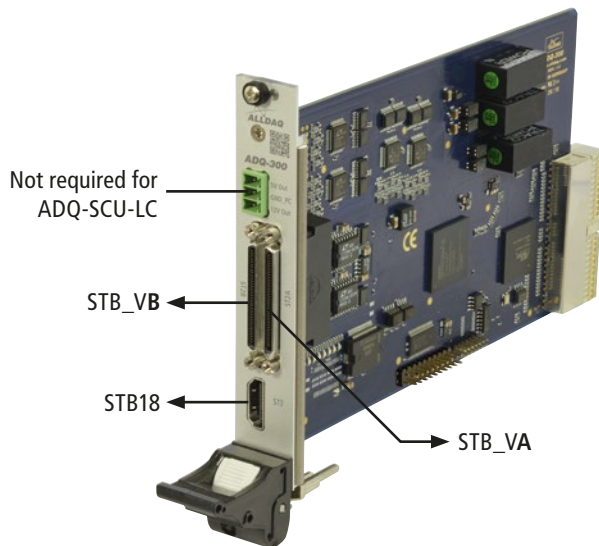


Fig. 5: Multifunction card ADQ-344

## 2.6 Example system configuration

Typical configuration of an ADQ-Express measurement system, equipped with 2 pcs. of the ADQ-344 multifunction boards to control one signal conditioning unit ADQ-SCU-LC each. In addition, one current measurement channel of the ADQ-412 is connected to one ADQ-SCU-LC-PB-50 power board per DUT.

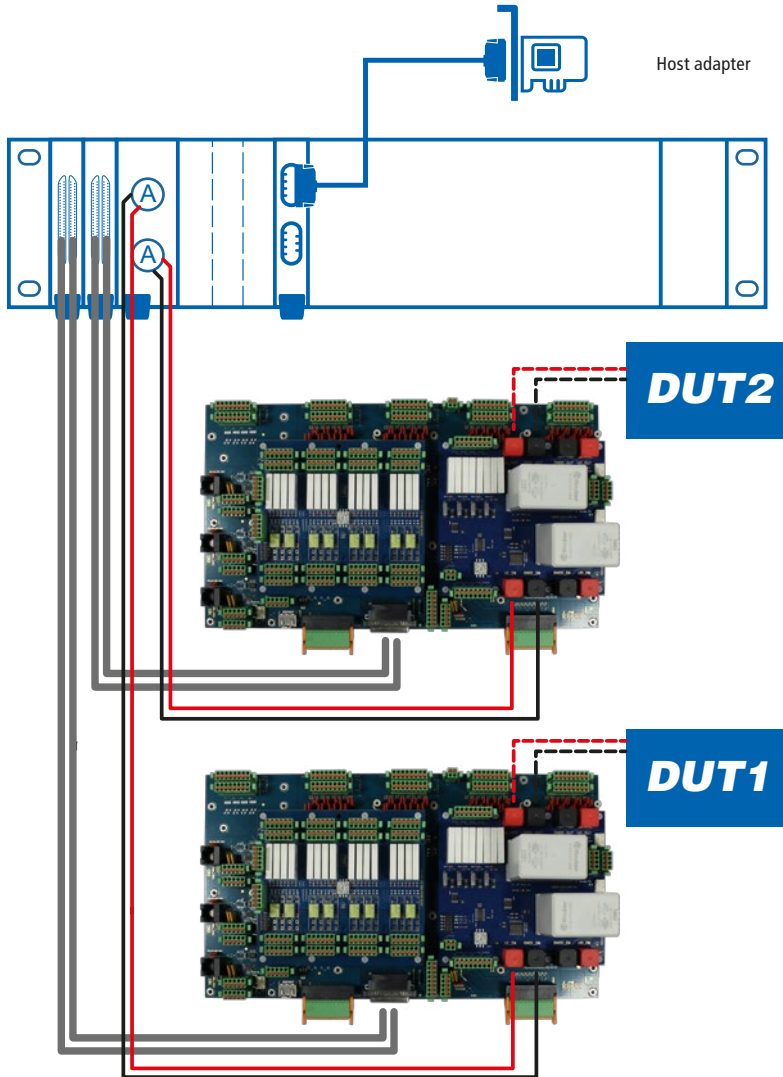


Fig. 6: Example system configuration

## 3. Pin Assignments

### 3.1 Position of the connectors

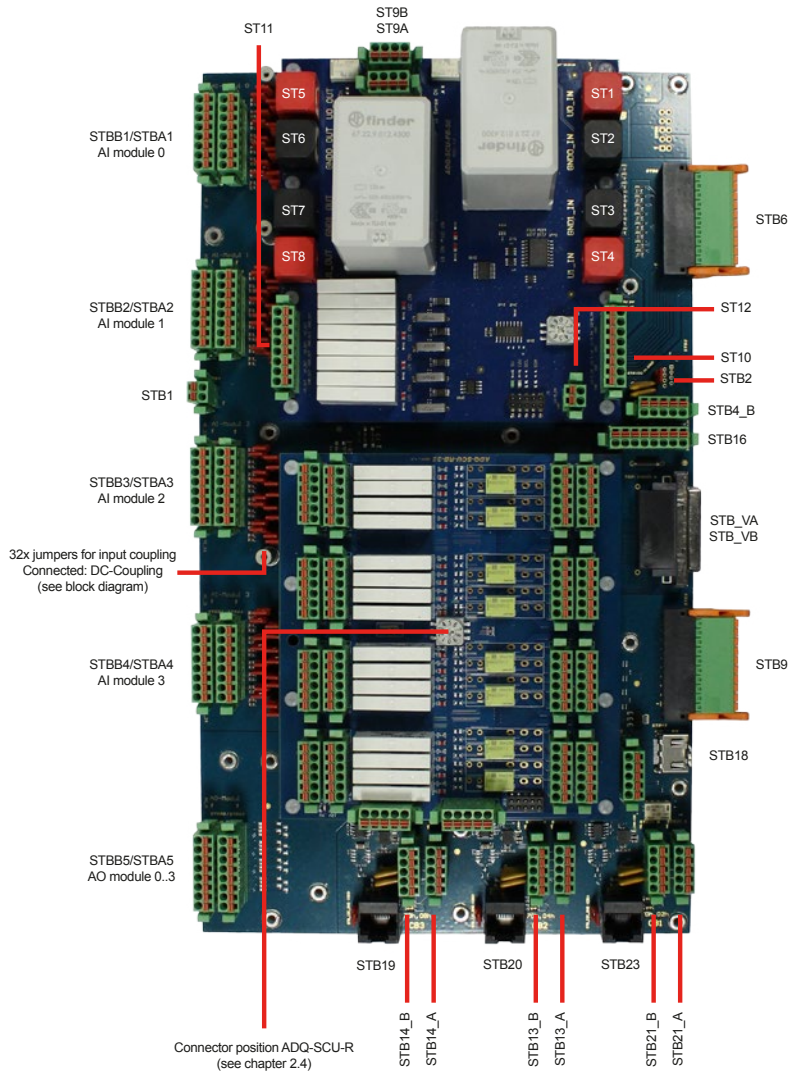


Fig. 7: Connector positioning



## 3.2 Prefixes of the connector designations

STB: Connector on the baseboard (ADQ-SCU-LC-BB)

ST: Connectors on the power board (ADQ-SCU-PB-50)

STR: Connector on the relay board (ADQ-SCU-RB)

Jx: Pin connector for connection from baseboard to plug-in boards

## 3.3 Overview of connector types

### 3.3.1 Type Würth

Numerous connectors of the Würth 69130513... series with different numbers of poles are used.

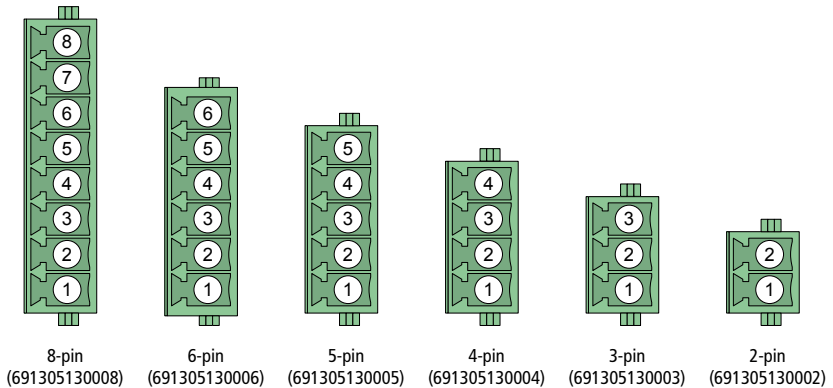
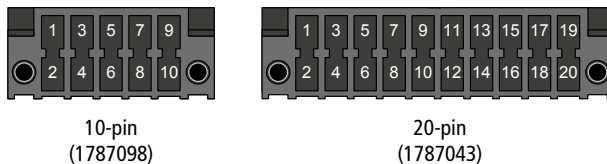


Fig. 8: Würth baseboard (top view)

### 3.3.2 Type Phoenix Contact



### 3.3.3 Type Pin plug

For the connection between baseboard and plug-on modules, 10- and 5-pole male connectors are used (grid dimension: 2.54 mm).

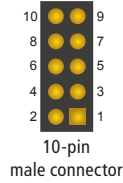


Fig. 9: Male connector (top view)

### 3.3.4 Type Würth

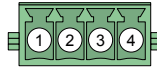


Fig. 10: 4-pin headphone connector (top view)

Connector type: 4-pin base strip, Würth (691305130004)

### 3.3.5 Mating connector for Würth connectors

We recommend the mating connector housing series 69130413-xy with UL 94V-2 approval.

Number of poles	Connector type on ADQ-SCU-LC	Mating connector housing
2-pin	691305130002	691304130002
3-pin	691305130003	691304130003
4-pin	691305130004	691304130004
5-pin	691305130005	691304130005
8-pin	691305130008	691304130008

Table 1: Overview mating connectors

### 3.3.6 Mating connector for Phoenix connectors

Number of poles	Connector type on ADQ-SCU-LC	Mating connector housing
10-pin	1787098	1790564
20-pin	1787043	1790519

Table 2: Overview mating connectors

## 3.4 Baseboard (ADQ-SCU-LC-BB)

### 3.4.1 Analog input section (STBA1..4/STBB1..4)

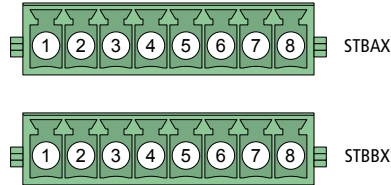


Figure 11: 8-pin Würth connector

The corresponding MMCX connectors (STB30..61) are given in brackets. They can be used as measuring taps for the analog input signals to the ADQ-344.

Pin	STBA1/STBB1 (module 0)	STBA2/STBB2 (module 1)	STBA3/STBB3 (module 2)	STBA4/STBB4 (module 3)
8	+AI0_M0 (STBA1)	+AI0_M1 (STBA2)	+AI0_M2 (STBA3)	+AI0_M3 (STBA4)
7	+AI1_M0 (STBA1)	+AI1_M1 (STBA2)	+AI1_M2 (STBA3)	+AI1_M3 (STBA4)
6	+AI2_M0 (STBA1)	+AI2_M1 (STBA2)	+AI2_M2 (STBA3)	+AI2_M3 (STBA4)
5	+AI3_M0 (STBA1)	+AI3_M1 (STBA2)	+AI3_M2 (STBA3)	+AI3_M3 (STBA4)
4	+AI4_M0 (STBA1)	+AI4_M1 (STBA2)	+AI4_M2 (STBA3)	+AI4_M3 (STBA4)
3	+AI5_M0 (STBA1)	+AI5_M1 (STBA2)	+AI5_M2 (STBA3)	+AI5_M3 (STBA4)
2	+AI6_M0 (STBA1)	+AI6_M1 (STBA2)	+AI6_M2 (STBA3)	+AI6_M3 (STBA4)
1	+AI7_M0 (STBA1)	+AI7_M1 (STBA2)	+AI7_M2 (STBA3)	+AI7_M3 (STBA4)
8	-AI0_M0 (STBB1)	-AI0_M1 (STBB2)	-AI0_M2 (STBB3)	-AI0_M3 (STBB4)
7	-AI1_M0 (STBB1)	-AI1_M1 (STBB2)	-AI1_M2 (STBB3)	-AI1_M3 (STBB4)
6	-AI2_M0 (STBB1)	-AI2_M1 (STBB2)	-AI2_M2 (STBB3)	-AI2_M3 (STBB4)
5	-AI3_M0 (STBB1)	-AI3_M1 (STBB2)	-AI3_M2 (STBB3)	-AI3_M3 (STBB4)
4	-AI4_M0 (STBB1)	-AI4_M1 (STBB2)	-AI4_M2 (STBB3)	-AI4_M3 (STBB4)
3	-AI5_M0 (STBB1)	-AI5_M1 (STBB2)	-AI5_M2 (STBB3)	-AI5_M3 (STBB4)
2	-AI6_M0 (STBB1)	-AI6_M1 (STBB2)	-AI6_M2 (STBB3)	-AI6_M3 (STBB4)
1	-AI7_M0 (STBB1)	-AI7_M1 (STBB2)	-AI7_M2 (STBB3)	-AI7_M3 (STBB4)

Table 3: Pin assignment STBA1-4/STBB1-4

### 3.4.2 Analog output section (STBA5/STBB5)

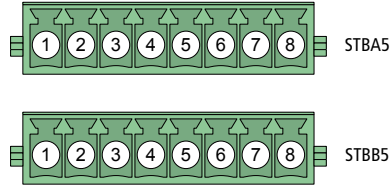


Fig. 12: 8-pin Würth connector

Pin	STBA5/STBB5	Note
8	AO_A+ (STBA5)	Corresponding output signal from AO_0+
7	AO_B+ (STBA5)	Corresponding output signal from AO_0+
6	AO_C+ (STBA5)	Corresponding output signal from AO_1+
5	AO_D+ (STBA5)	Corresponding output signal from AO_1+
4	AO_E+ (STBA5)	Corresponding output signal from AO_2+
3	AO_F+ (STBA5)	Corresponding output signal from AO_2+
2	AO_G+ (STBA5)	Corresponding output signal from AO_3+
1	AO_H+ (STBA5)	Corresponding output signal from AO_3+
8	AO_A- (STBB5)	Alternatively in phase with AO_A+ or reference to GND_AO
7	AO_B- (STBB5)	Alternatively in phase with AO_B+ or reference to GND_AO
6	AO_C- (STBB5)	Alternatively in phase with AO_C+ or reference to GND_AO
5	AO_D- (STBB5)	Alternatively in phase with AO_D+ or reference to GND_AO
4	AO_E- (STBB5)	Alternatively in phase with AO_E+ or reference to GND_AO
3	AO_F- (STBB5)	Alternatively in phase with AO_F+ or reference to GND_AO
2	AO_G- (STBB5)	Alternatively in phase with AO_G+ or reference to GND_AO
1	AO_H- (STBB5)	Alternatively in phase with AO_H+ or reference to GND_AO

Table 4: Pin assignment STBA5/STBB5

### 3.4.3 Digital I/O section (STB6)

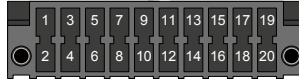


Fig. 13: 20-pin Phoenix connector

Pin	STB6 (DO)	Pin	STB6 (DI)
1	V_EXT_DO	11	GND_DI
2	GND_DO	12	V_EXT_DI
3	DO_0	13	DI_0
4	DO_1	14	DI_1
5	DO_2	15	DI_2
6	DO_3	16	DI_3
7	DO_4	17	DI_4
8	DO_5	18	DI_5
9	DO_6	19	DI_6
10	DO_7	20	DI_7

Table 5: Pin assignment STB6

### 3.4.4 External trigger inputs for AI/AO section (STB8)



Figure 14: 10-pin Phoenix connector

Pin	STB8	Note
1	TRIG_AO_1	Trigger input for analog output AO_1 of ADQ-344 (= AO_C/D)
2	TRIG_AO_0	Trigger input for analog output AO_0 of ADQ-344 (= AO_A/B)
3	TRIG_AO_3	Trigger input for analog output AO_3 of ADQ-344 (= AO_G/H)
4	TRIG_AO_2	Trigger input for analog output AO_2 of ADQ-344 (= AO_E/F)
5	TRIG_AO_GND	Reference ground for triggering the analog outputs
6	TRIG_AI_GND	Reference ground for triggering the analog outputs
7	TRIG_AI_2	Trigger input for analog input module AI_2 of ADQ-344 (= AI_16..23)
8	TRIG_AI_3	Trigger input for analog input module AI_3 of ADQ-344 (= AI_24..31)
9	TRIG_AI_0	Trigger input for analog input module AI_0 of ADQ-344 (= AI_0..7)
10	TRIG_AI_1	Trigger input for analog input module 1 of ADQ-344 (= AI_8..15)

Table 6: Pin assignment STB8

### 3.4.5 Counter & temperature alarm (STB9)



Fig. 15: 20-pin Phoenix connector

Pin	STB9	Note
1	TEMP_OUT	Open collector output of temperature monitoring on the baseboard ( $V_{CE} = 50V / I_{max.} = 250mA$ )
2	VCC_PC	+5 V from PC
3	PWM_OUT	Opto-decoupled output for square wave signal with variable duty cycle
4	GND_PC	PC ground
5	32 bit counter	Output: Strobe (see ADQ-344 documentation)
6	GND_PC	PC ground
7	FRQ_IN	Input for frequency measurement
8	GND_PC	PC ground
9	INC_A	Incremental encoder input (channel A)
10	GND_PC	PC ground
11	INC_B	Incremental encoder input (channel B)
12	GND_PC	PC ground
13	INC_EXT_RST	Incremental encoder reset input
14	GND_PC	PC ground
15	PWM_EN	Enable input for PWM output
16	GND_PC	PC ground
17	CNT_EN	Enable input for counter
18	GND_PC	PC ground
19	CNT_TRIG	External trigger input for counter
20	CNT_EXT_CLK	External clock input for counter

Table 7: Pin assignment STB9

### 3.4.6 Pin assignment (STB4\_A)

The TTL I2C bus (5V level) is connected to this connector.

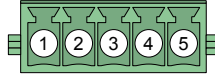


Fig. 16: 5-pin Würth connector

Pin	STB4_A	Note
1	SCL	SCL
2	GND_PC	PC ground
3	+5V_PC	
4	SDA	SDA
5	+12V_PC	

Table 8: Pin assignment STB4\_A

### 3.4.7 Special functions (STB4\_B)

The ADQ-SCU-LC can be remotely controlled via these connectors. More information from the ALLDAQ support.

ADQ-LINK (point to point):

- Overvoltage protection of the cables up to  $\pm 60$  V / ADQ-SCU-LC can be placed up to 20 m (twisted cable)
- IEC Level 4 ESD  $\pm 8$  kV and EFT  $\pm 5$  kV
- Status LED (yellow), if connection to a remote device is available

Pin	STB4_B	Note
1	+ADQ-LINK	Differential BUS
2	GND_PC	PC ground
3	+5V_PC	Secured by Polyfuse 16R 500g (littlefuse)
4	-ADQ-LINK	Differential BUS
5	+12V_PC	Secured by Polyfuse 16R 500g (littlefuse)

**Note:** Route ADQ Link via simple **twisted pair cable**.

## RJ-45 Pin assignment

The ADQ-SCU-LC can be remotely controlled via these connectors.

ADQ-LINK (point to point):

- Overvoltage protection of the cables up to  $\pm 60$  V / ADQ-SCU-LC can be placed up to 20 m (twisted cable)
- IEC Level 4 ESD  $\pm 8$  kV and EFT  $\pm 5$  kV
- Status LED (yellow), if connection to a remote device is available

Pin	STB2	Note
1	NC	not connected
2	NC	not connected
3	NC	not connected
4	NC	not connected
5	GND_PC	PC ground pluggable via jumper
6	GND_PC	PC ground pluggable via jumper
7	-ADQ-LINK	Differential BUS
8	+ADQ-LINK	Differential BUS

### (STB13\_A / STB14\_A / STB21\_A)

I2C TTL level (5V level).

Pin	STB13_A	STB14_A	STB21_A	Note
1	SCL	SCL	SCL	SCL
2	GND_PC	GND_PC	GND_PC	PC ground
3	+5V_PC	+5V_PC	+5V_PC	Protected by Polyfuse 16R 400g (littlefuse)
4	SDA	SDA	SDA	SDA
5	+12V_PC	+12V_PC	+12V_PC	Protected by Polyfuse 16R 400g (littlefuse)



### 3.4.8 (STB13\_B / STB14\_B / STB21\_B)

ADQ devices (e.g. ADQ-31, ADQ-48) can be connected via these connectors.

ADQ-LINK (point to point):

- Overvoltage protection of the cables up to  $\pm 60$  V / ADQ devices (e.g. ADQ-48) can be placed up to 100 m (twisted cable)
- IEC Level 4 ESD  $\pm 8$  kV and EFT  $\pm 5$  kV
- Status LED (yellow), if connection to a remote device is available

Pin	STB13_B	STB14_B	STB21_B	Note
1	+ADQ-LINK	+ADQ-LINK	+ADQ-LINK	Differential BUS
2	GND_PC	GND_PC	GND_PC	PC ground
3	+5V_PC	+5V_PC	+5V_PC	Protected by Polyfuse 16R 500g (littlefuse)
4	-ADQ-LINK	-ADQ-LINK	-ADQ-LINK	Differential BUS
5	+12V_PC	+12V_PC	+12V_PC	Protected by Polyfuse 16R 500g (littlefuse)

**Note:** Route ADQ Link via simple **twisted pair cable**.

### RJ-45 Pin assignment

ADQ devices (e.g. ADQ-31, ADQ-48) can be connected via these connectors.

Pin	STB19_B	STB20_B	STB23_B	Note
1	+5V_PC	+5V_PC	+5V_PC	Secured by Polyfuse MF-USML175/12
2	+5V_PC	+5V_PC	+5V_PC	Secured by Polyfuse MF-USML175/12
3	+12V_PC	+12V_PC	+12V_PC	Secured by Polyfuse MF-USML175/12
4	+12V_PC	+12V_PC	+12V_PC	Secured by Polyfuse MF-USML175/12
5	GND_PC	GND_PC	GND_PC	PC ground pluggable via jumper
6	GND_PC	GND_PC	GND_PC	PC ground pluggable via jumper
7	-ADQ-LINK	-ADQ-LINK	-ADQ-LINK	Differential BUS
8	+ADQ-LINK	+ADQ-LINK	+ADQ-LINK	Differential BUS

### 3.4.9 Supply for Baseboard (STB16)

Power supply from PC power supply unit via a Würth connector (STB16) for power supply baseboard, powerboard and relay board with  $\pm 5\text{ V}$ ,  $\pm 15\text{ V}$  and  $\pm 24\text{ V}$

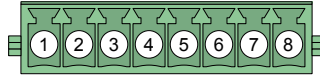


Fig. 17: 8-pin Würth connector (STB16)

Pin	STB16
1	12V_IN (+12V PC)
2	12V_IN (+12V PC)
3	GND_PC
4	GND_PC
5	GND_PC
6	GND_PC
7	5V_IN (+5V PC)
8	5V_IN (+5V PC)

Table 9: Pin assignment STB16

### 3.4.10 HDMI connector for special functions (STB18)

HDMI connector for connecting the following special functions of the ADQ-344 (ST3) to the baseboard:

- 32 bit counter (prefix: CNT...)
- I2C bus port (prefix: I2C..)
- Incremental encoder port (prefix: INC...)
- Frequency measurement input (prefix: FRQ...)
- PWM output (prefix: PWM...)

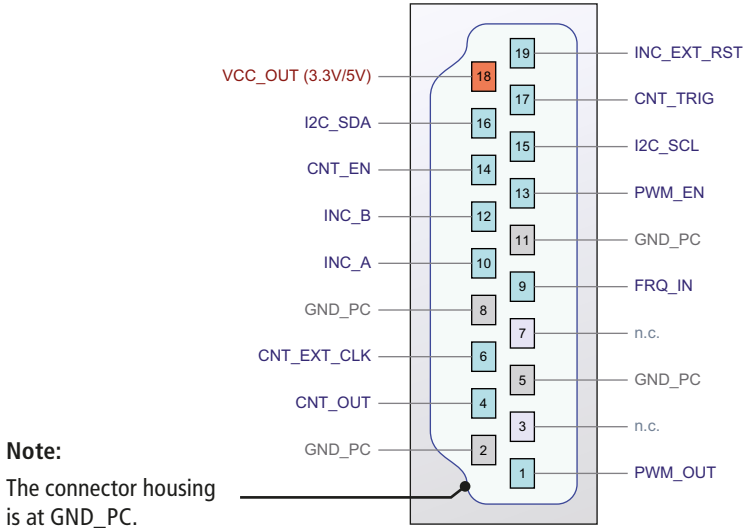


Fig. 18: HDMI connectors (STB18)

Pin	STB18	Note
1	PWM_OUT	Input for PWM output of ADQ-344
2	GND_PC	PC ground
3	n.c.	reserved
4	CNT_OUT	Input for strobe output of ADQ-344 counter
5	GND_PC	PC ground
6	CNT_EXT_CLK	Output to external clock input for ADQ-344 counter
7	n.c.	reserved
8	GND_PC	PC ground
9	FRQ_IN	Output to frequency measurement input of ADQ-344
10	INC_A	Output to incremental encoder input (channel A) of ADQ-344
11	GND_PC	PC ground
12	INC_B	Output to incremental encoder input (channel B) of ADQ-344
13	PWM_EN	Output to enable input for PWM output of the ADQ-344
14	CNT_EN	Output to enable input for ADQ-344 counter
15	I2C_SCL	Clock input for I2C bus from the ADQ-344
16	I2C_SDA	Data input for I2C bus from the ADQ-344
17	CNT_TRIG	Output to external trigger input for ADQ-344 counter
18	VCC_IN_344	3.3 V/5 V supply voltage from ADQ-344
19	INC_EXT_RST	Output to incremental encoder Reset input of ADQ-344

Table 10: Pin assignment STB18

### 3.4.11 Analog AI-GND (AGND) STB1



Fig. 19: 1 x 2-pole Würth plug connector

Pin	STB1	Note
1	AGND	AI_GND (AI0..3 module)
2	AGND	AI_GND (AI0..3 module)

### 3.4.12 68-pin VHDCI sockets from/to ADQ-34x (STB\_VA/B)

The following pin assignment refers to the VHDCI sockets on the ADQ-344, i.e. the direction of the signals on the baseboard side is inverted.

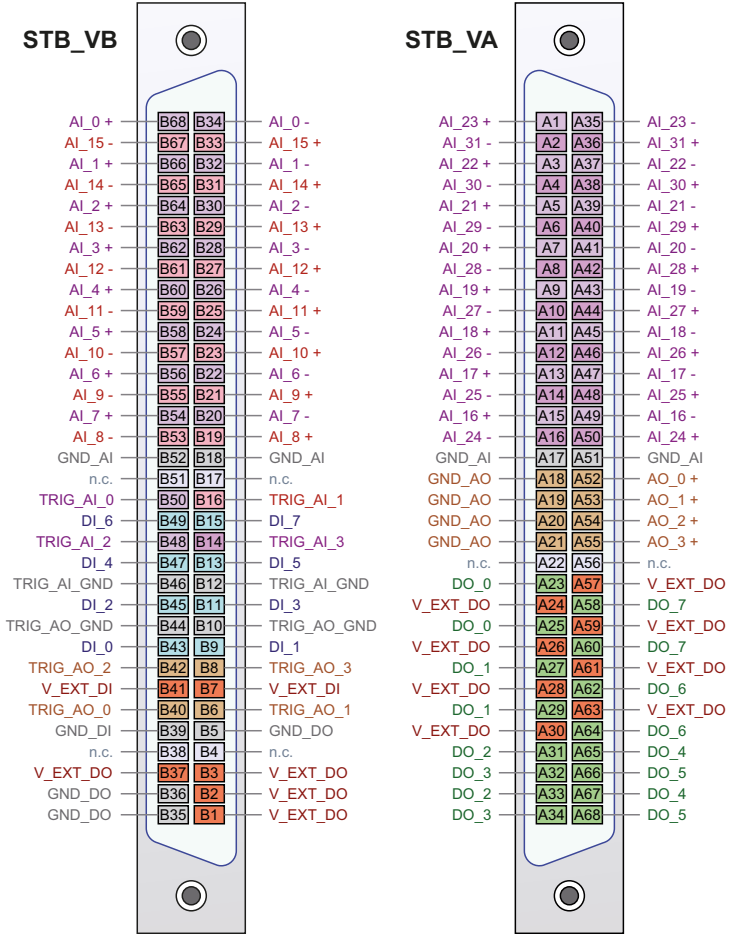


Fig. 20: Pin assignment STB\_VA and STB\_VB

## 3.5 Powerboard (ADQ-SCU-LC-PB)

### 3.5.1 Pin header JB1 -> J1

The powerboard is connected to the baseboard via the two-row pin header JB1 -> J1.

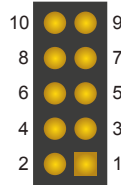


Fig. 21: 10-pin male connector strip (JB1 / J1)

Pin	Note	Pin	Note
1	GND_PC	2	GND_PC
3	SCL_BASE	4	SDA_BASE
5	GND_PC	6	GND_PC
7	+12V PC	8	+12V PC
9	+5V PC	10	+5V PC

Table 11: Pin assignment JB1/J1

### 3.5.2 High current supply switchable (ST1..8)

Via ST1..8 two power supplies up to max. 50 A/100 VDC per channel can be switched via relay. The switching status is indicated by an LED.

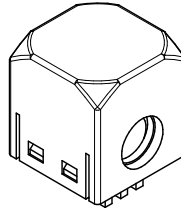


Fig. 22: 8 x single pole high current connectors of the type: Würth Electronic REDCUBE Direct Plug Terminal WP-PLUG.

ST..		Note
ST1	U0_IN	Input U0 <sub>IN</sub>
ST2	GND0_IN	Input GND0 <sub>IN</sub>
ST3	GND1_IN	Input GND1 <sub>IN</sub>
ST4	U1_IN	Input U1 <sub>IN</sub>
ST5	U0_OUT	Relay output U0 <sub>OUT</sub>
ST6	GND0_OUT	Relay output GND0 <sub>OUT</sub>
ST7	GND1_OUT	Relay output GND1 <sub>OUT</sub>
ST8	U1_OUT	Relay output U1 <sub>OUT</sub>

Table 12: Pin assignment ST1..8

### 3.5.3 Sense connection (ST9)

Sense connection to monitor the voltage at the inputs U0<sub>IN</sub> and U1<sub>IN</sub>.

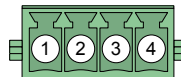


Fig. 23: 4-pole Würth plug connector

Pin	ST9	Note
1	GND0_SENSE	Sense connection for GND0 <sub>IN</sub> (coming from ST2)
2	U0_IN_SENSE	Sense connection for U0 <sub>IN</sub> (coming from ST1)
3	GND1_SENSE	Sense connection for GND1 <sub>IN</sub> (coming from ST3)
4	U1_IN_SENSE	Sense connection for U1 <sub>IN</sub> (coming from ST4)

Table 13: Pin assignment ST9

### 3.5.4 Supply switchable (ST10, ST11)

Via ST10 and ST11 four power supplies (max. 36 V/5 A per channel) can be switched via relay. The switching status is indicated by an LED. Voltage and current can be measured per channel (via 20 mΩ shunt). With the I2C power monitor type INA226, the power can be called up directly in addition to voltage (up to 36 VDC) and current (up to 5 A).

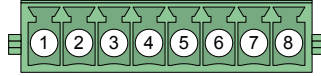


Fig. 24: 8-pin Würth connector (ST10, ST11)

Pin	ST10	ST11	Note
1	GND_PC	GND_OUT	PC ground
2	U2..5_IN	U2_OUT	Relay switches U2..5_IN to U2_OUT
3	GND_PC	GND_OUT	PC ground
4	U2..5_IN	U3_OUT	Relay switches U2..5_IN to U3_OUT
5	GND_PC	GND_OUT	PC ground
6	U2..5_IN	U4_OUT	Relay switches U2..5_IN to U4_OUT
7	GND_PC	GND_OUT	PC ground
8	U2..5_IN	U5_OUT	Relay switches U2..5_IN to U5_OUT

Table 14: Anschlussbelegung ST10, ST11

### 3.5.5 Sense connection (ST12)

Sense connection to monitor the voltage U\_IN (see ST10)

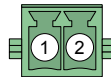


Fig. 25: 2-pole Würth plug connector

Pin	ST12	Note
1	GND_PC	PC ground
2	U2..5_IN	Sense connection for U2..5_IN (coming from ST10)

Table 15: Pin assignment ST12



## 3.6 Relay board (ADQ-SCU-LC-RB)

### 3.6.1 Pin header JB2 -> JR2

The relay board is connected to the baseboard via the two-row pin header JB2 -> JR2. 24 TTL I/O channels (DIO\_0..23) and 16 single-pole changeover relays (SPDT, type C) are available.

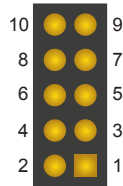


Fig. 26: 10-pin male connector strip (JB2 / JR2)

Pin	Note	Pin	Note
1	GND_PC	2	GND_PC
3	SCL_BASE	4	SDA_BASE
5	GND_PC	6	GND_PC
7	+12V_PC	8	+12V_PC
9	+5V_PC	10	+5V_PC

Table 16: Pin assignment JB2/JR2

### 3.6.2 Changeover Relay (ST1A/ST1B..ST8A/ST8B)

Connections of the 16 changeover contact relays. All switching contacts (NO/NC/COM) are connected to the connectors ST1A/ST1B..ST8A/ST8B. Load capacity per relay (max. 30 VDC/6 A).

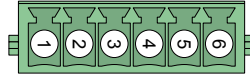


Fig. 27: 6-pin Würth plug connector

Pin	ST1A	ST1B	ST2A	ST2B	ST3A	ST3B	ST4A	ST4B
1	NO0	NO1	NO4	NO5	NO8	NO9	NO12	NO13
2	COM0	COM1	COM4	COM5	COM8	COM9	COM12	COM13
3	NC0	NC1	NC4	NC5	NC8	NC9	NC12	NC13
4	NO3	NO2	NO7	NO6	NO11	NO10	NO15	NO14
5	COM3	COM2	COM7	COM6	COM11	COM10	COM15	COM14
6	NC3	NC2	NC7	NC6	NC11	NC10	NC15	NC14

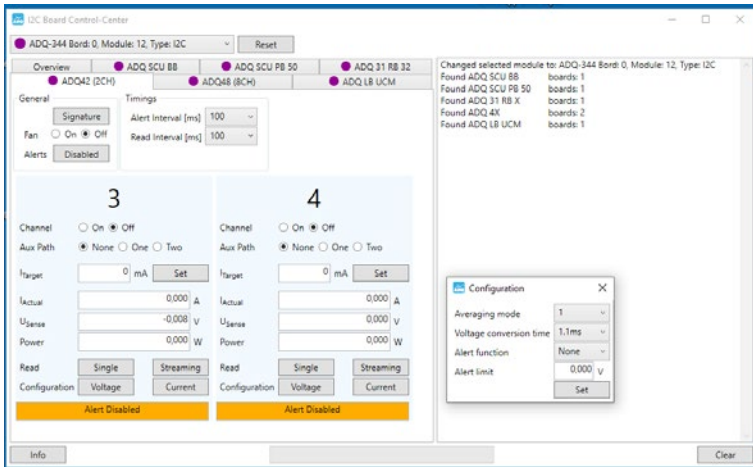
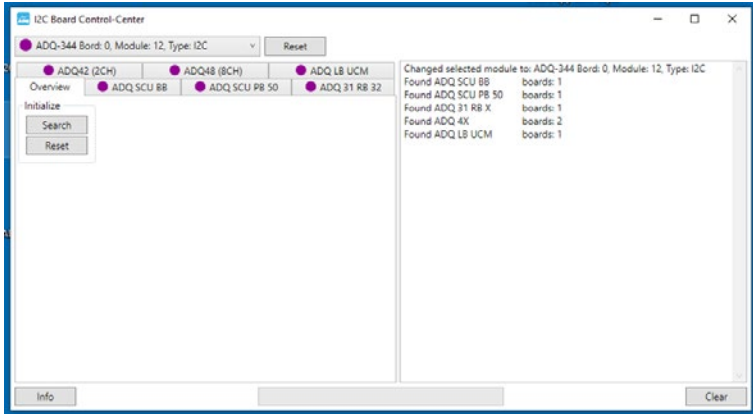
Pin	ST5A	ST5B	ST6A	ST6B	ST7A	ST7B	ST8A	ST8B
1	NO16	NO17	NO20	NO21	NO24	NO25	NO28	NO29
2	COM16	COM17	COM20	COM21	COM24	COM25	COM28	COM29
3	NC16	NC17	NC20	NC21	NC24	NC25	NC28	NC29
4	NO19	NO18	NO23	NO22	NO27	NO26	NO31	NO30
5	COM19	COM18	COM23	COM22	COM27	COM26	COM31	COM30
6	NC19	NC18	NC23	NC22	NC27	NC26	NC31	NC30

Table 17: (ST1A/ST1B..ST8A/ST8B)

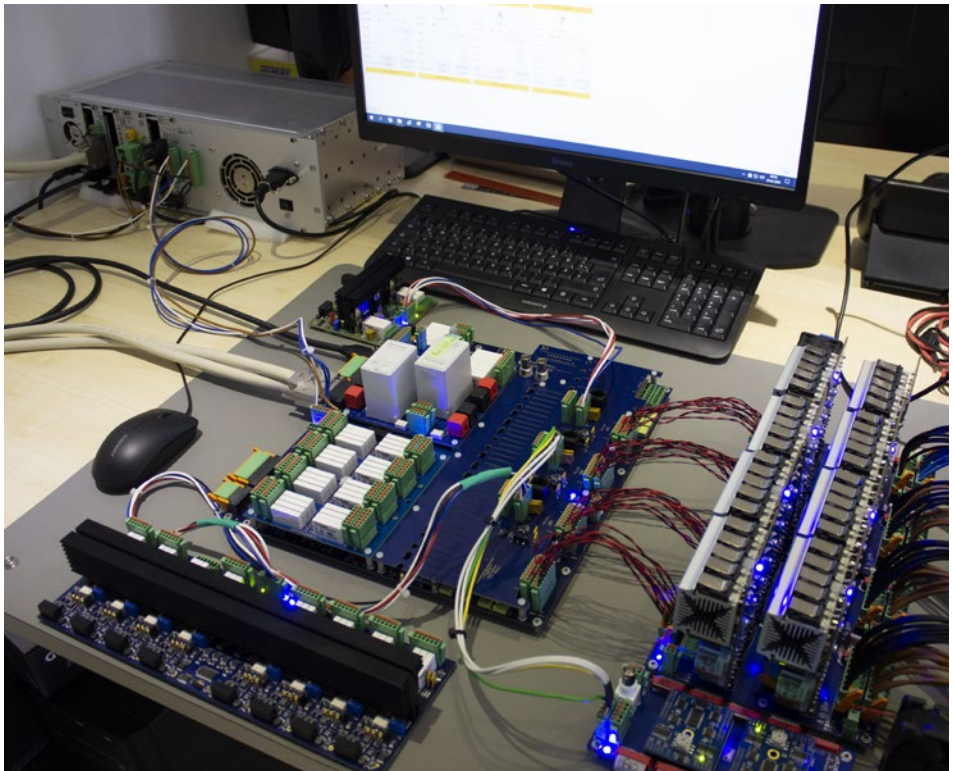
**Note:** Corresponding with the software, the index of the relays starts at "0".

## 4. ADQ-SCU-LC 1.0 BB App

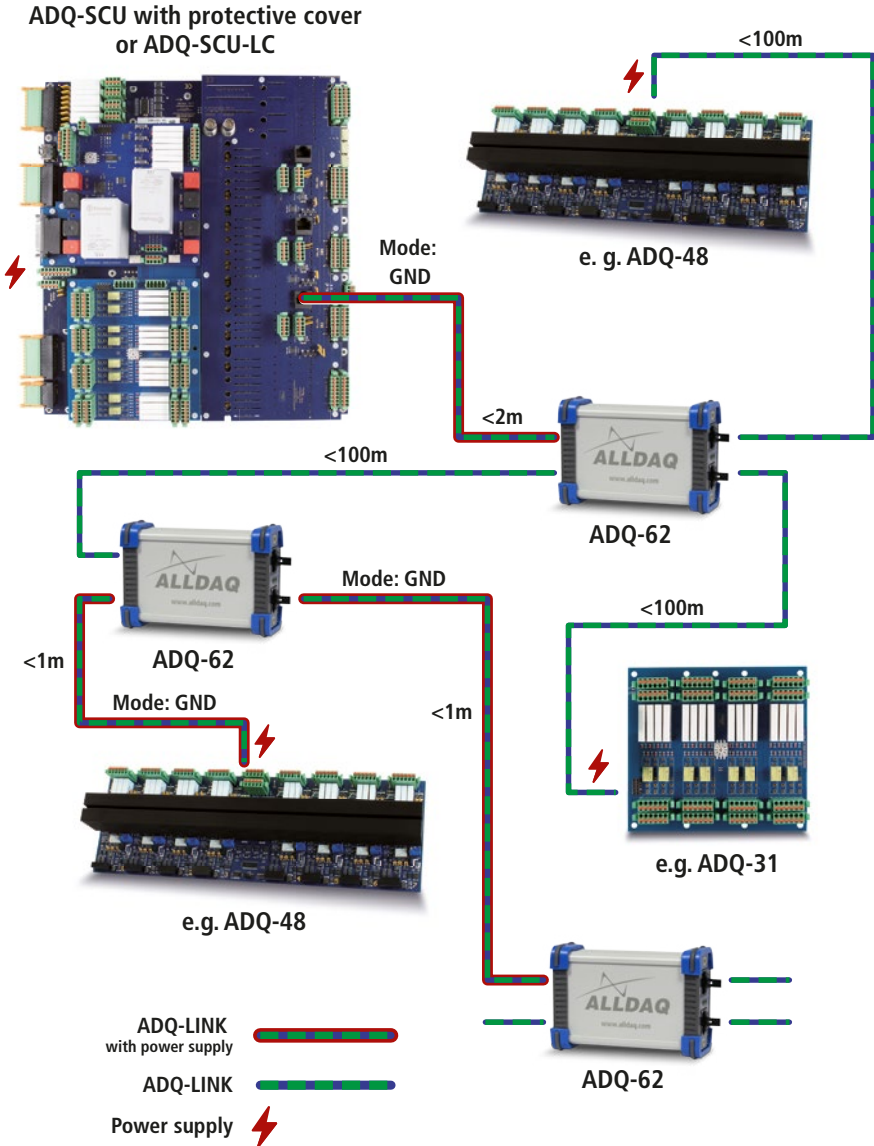
To learn how to operate the SCU, there is an 'App' I2C Board Control Center in the ALLDAQ Launcher under 'Tools'.



Pin	Signal	Module	Level	Source	Destination	Level	Source	Destination
0	DC-R-AC	Low-R	High	High	Low	SD08	Module	18
1	DC-R-AC	Low-R	High	High	Low	SD08	Module	17
2	DC-R-AC	Low-R	High	High	Low	SD08	Module	16
3	DC-R-AC	Low-R	High	High	Low	SD08	Module	15
4	DC-R-AC	Low-R	High	High	Low	SD08	Module	14
5	DC-R-AC	Low-R	High	High	Low	SD08	Module	13
6	DC-R-AC	Low-R	High	High	Low	SD08	Module	12
7	DC-R-AC	Low-R	High	High	Low	SD08	Module	11
8	DC-R-AC	Low-R	High	High	Low	SD08	Module	10
9	DC-R-AC	Low-R	High	High	Low	SD08	Module	9
10	DC-R-AC	Low-R	High	High	Low	SD08	Module	8
11	DC-R-AC	Low-R	High	High	Low	SD08	Module	7
12	DC-R-AC	Low-R	High	High	Low	SD08	Module	6
13	DC-R-AC	Low-R	High	High	Low	SD08	Module	5
14	DC-R-AC	Low-R	High	High	Low	SD08	Module	4
15	DC-R-AC	Low-R	High	High	Low	SD08	Module	3
16	DC-R-AC	Low-R	High	High	Low	SD08	Module	2
17	DC-R-AC	Low-R	High	High	Low	SD08	Module	1
18	DC-R-AC	Low-R	High	High	Low	SD08	Module	0



# 5. Example application using (ADQ-LINK)





## 6. Specifications

Conditions:  $T_A = 25^\circ\text{C}$  unless otherwise stated; warm-up time: 30 minutes.

### General

Element	Condition	Specification
Control and signal processing	Recommended	ADQ-344 for analog and digital input/output, and control via I <sup>2</sup> C-Bus
Supply	STB16	+5 V / +12 V supply via Würth connector from PC power supply unit for power supply of ADQ-SCU-LC-BB/PB-50/RB with $\pm 5\text{ V}$ , $\pm 15\text{ V}$ , $\pm 24\text{ V}$ , $\pm 10$
Quiescent current consumption	ADQ-SCU-LC-BB/ PB/RB no relay energised	+5V: max. 140 mA +12V: max. 20 mA
Power consumption	ADQ-SCU-LC-BB all relays energized	+5V: max. 170 mA +12V: max. 1100 mA
	ADQ-SCU-LC-PB-50 all relays energized	+5V: max. 150 mA +12V: max. 500 mA
	ADQ-SCU-LC-RB all relays energized	+5V: max. 160 mA +12V: max. 650 mA
Temperature range	Operation	0..60 °C (standard)
Humidity	Operation	20%..55% (non-condensing)
Dimensions (W x D x H)	ADQ-SCU-LC-BB	330 x 187 x 50 mm
	ADQ-SCU-LC-PB	135 x 125 x 65 mm
	ADQ-SCU-LC-RB	135 x 125 x 19 mm
	Total amount	80 mm
Manufacturer warranty		36 months

Element	Condition	Specification
Connections	STBA1..STBA4 STBB1..STBB4 STBA5/STBB5	8-pin Würth plug: 691305130008 Mating connector: 691304130008
	STB6/STB9/STB15	(2x10p.) 20-pin Phoenix connector: 1787043 Mating connector: 1790519
	STB16	8-pin Würth plug: 691305130008 Mating connector for power supply: 691304130008
	STB8	(2x5p.) 10-pin Phoenix connector (Trigger ADQ-344): 1787098; Mating connector: 1790564
	STB18	HDMI connectors, type HEC
	STB4	5-pin Würth plug (buffered I2C): 691305130005 Mating connector: 691304130005
	STB_VA, STB_VB	Two 68-pin VHDCI sockets
	STR1..4*	12-pin Würth plug: 43045-1226 Mating connector: 43025-1210
	STR5..7*	10-pin Würth plug: 43045-1026 Mating connector: 43025-1010
	ST1..8	Single pole high current connectors of the type: Würth Electronic REDCUBE Direct Plug Terminal WP-PLUG (4 x black, 4 x red)
	STB11..STB14	4-pin Würth plug (auxiliary voltage): 691305130004 Mating connector: 691304130004
	ST9 ST9A/ST9B	4-pin Würth plug: 691305130004 Mating connector: 691304130004
	ST12	2-pin Würth plug (AGND): 691305130002 Mating connector: 691304130002
	ST10, ST11	8-pin Würth plug: 691305130008 Mating connector: 691304130008
JB1..2, JR2_S	10-pin male connector strip (double row)	

\*See also section "3.3 Overview of connector types".



**Analog inputs ADQ-SCU-LC-BB**

Unless otherwise specified here, the specifications of ADQ-344 apply.

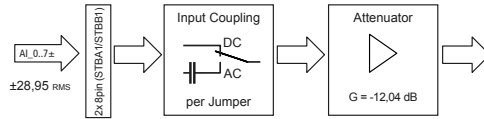
Basically, an adjustment with field wiring connected should be carried out in conjunction with the ADQ-344.

Element	Condition	Specifications
Channels		32 single-ended analog inputs (4 AI modules)
Resolution		18 bit A/D converter resolution, the output level to the ADQ-344 is normalized to $\pm 5.12$ V
Input impedance	With damping	100K 6k $\Omega$    220pF
	With damping	100K 1M $\Omega$    220pF
Input coupling		AC/DC (jumper-insertable)
Input voltage range		$\pm$ max.: 40.96 Vp
Small Signal Relay	See separate table for details	Type: FTR-B3CA()Z
Trigger inputs		4 external trigger inputs via STB8 (one per AI module)
Ground reference	Analog inputs	GND_AI
	AI Trigger Inputs	TRIG_AI_GND

**Accuracy of the overall setup of ADQ-SCU-LC signal conditioning unit and ADQ-344 multifunction measurement and control card:**

Before starting the adjustment of the AI and AO part, the measuring system should warm up for at least 30 minutes. The following measuring equipment was used for the measurements:

- Reference voltage source: Kink J152
- 6½ digit multimeter: Siglent SDM3065
- ADQ-344 with the following settings: Sampling rate: 200 kHz, 5,000,000 values per channel, input range: ±5.12 V. The ADQ-344 is calibrated.



Input voltage.	DC/AC	Damping	Adjustment	Error typically
±10mVp	DC	- 12.04 dB	G = 0.25	±0.14%
±100mVp	DC	- 12.04 dB	G = 0.25	±0.15%
±1Vp	DC	- 12.04 dB	G = 0.25	±0.12%
±10Vp	DC	- 12.04 dB	G = 0.25	±0.08%

### Analog outputs ADQ-SCU-LC-BB

Unless otherwise specified here, the specifications of ADQ-344 apply.

In principle, an adjustment should be carried out in conjunction with the ADQ-344 with the field wiring connected.

Element	Condition	Specifications
Number of channels	AO_A..G±	4/8 single-ended/diff. Voltage outputs (depending on equipment) ; 2 channels each (AO_x/y±) are fed from the same D/A channel of the ADQ-344
Output voltage range		± 10.24 V (+10.24 V - 1 LSB)
Resolution		16 bit (1 LSB = 625 µV)
Offset error	Not aligned	Max. 1.25 mV
Output current		Max. ±10 mA per channel
Capacitive load		Max. 1 nF
Total harmonic distortion (THD)		At 10 Vpp f = 100 kHz (sine): - 96 dB
Cut-off frequency		1 MHz (-3 dB)
Ausgaberate		Max. 500kS/s (synchron)
Sample time area		2 µs - 65 s
Timer resolution		In steps of 15.15 ns
Rise time		(to do)
Settling time		0.9 µs
Output impedance		
Total accuracy		2 LSB = 1.25 mV
Temperature drift		20 ppm / °C
Isolation voltage	ADQ-344	1500 VDC (60s), D/A - part to PC ground
Trigger inputs		4 external trigger inputs via STB8 (one per channel pair)
Ground reference	Analogue outputs	GND_AO
	AO trigger inputs	TRIG_AO_GND

\* The actual achievable output rate depends strongly on the performance of your computer, the number of cards installed and the number of channels used. See the ADQ-344 manual for more information.

### Isolated digital inputs via ADQ-SCU-LC-BB

Unless otherwise specified here, the specifications of ADQ-344 apply.

Element	Condition	Specifications
Quantity	To ADQ-344	1 x 8 bit digital input ports via STB6
Type		Isolated digital inputs (unidirectional) with Schmitt trigger characteristic according to IEC 61131-2 (type 1)
External supply	V_EXT_DI	15..35 VDC, typ. 24 VDC for control technology
Ground reference		GND_DI

### Isolated digital outputs via ADQ-SCU-LC-BB

Unless otherwise specified here, the specifications of ADQ-344 apply.

Element	Condition	Specifications
Quantity	To ADQ-344	1 x 8 bit digital output ports via STB7
Type		Isolated digital outputs (unidirectional) according to IEC 61131-2 (type 1)
External supply	V_EXT_DO	11..35 VDC; typ. 24 VDC for control technology
Ground reference		GND_DO

### Relayboard ADQ-SCU-LC-RB-16/8 und ADQ-31

Element	Condition	Specifications
Relay	Quantity/Type	16 changeover contact relay (SPDT), type: Finder series 34
	Contact material	Silver/nickel
	Switching time	Response time max. 5 ms
		Release time max. 3 ms
	Switching cycles	Min. 10.000.000 (mechanical)
	Switching current DC1	Max. 6 A at 30 VDC
	Min. switching load	500mW (12V/10mA) must not be fallen below, whereby at 24V a minimum current of 21mA or at 10mA a minimum voltage of 50V should be given
	Connection	All relay contacts (NO/NC/COM) are connected to the plugs ST1A/ST1B..ST8A/ST8B guided
Status display	32 LEDs	

Element	Condition	Specifications
Relay small signal FTR	Quantity/Type	8 changeover contact relay (DPDT), type FTR
	Contact material	Gold/Silver/Nickel
	Switching time	Response time max. 3 ms
		Release time max. 3 ms
	Switching cycles	Min. 100 x 10 <sup>3</sup> (mechanical)
	Switching current DC1	Max. 30VDC 1A, 125VAC, 0.3A
	Contact resistance	Max. 75mΩ at 1A, 6 VDC
	Min. switching load	0.01mA, 10mVDC
	Connection	All relay contacts (NO/NC/COM) are connected to the plugs ST1A/ST1B..ST8A/ST8B guided
Status display	32 LEDs	

### Powerboard ADQ-SCU-LC-PB-50

Element	Condition	Specifications
High Current Relays	Quantity/Type	2 normally open relays (DPST), type: Finder series 67 (power relay)
	Contact material	AgSnO <sub>2</sub>
	Switching time	Response time max. 25 ms
		Release time max. 5 ms
	Switching cycles	Min. 1.000.000 (mechanical)
	Switching current DC1	2 closing contacts per relay, switching in parallel: max. 2 x 50 A/ 100 VDC
	Connection	Single pole high current connectors of the type: Würth Electronic REDCUBE Direct Plug Terminal WP-PLUG
	Relay 1 Switching path	ST1 to ST5 / ST2 to ST6
	Relay 2 Switching path	ST4 to ST8 / ST3 to ST7
	Sense cables	Signal at relay input (U1_IN/U2_IN) can be measured via ST9
Status display	2 red LEDs	

Element	Condition	Specifications
Standard relay	Quantity/Type	8 normally open relays (SPDT), type: Finder series 34
	Contact material	Silver/nickel
	Switching time	Response time max. 5 ms
		Release time max. 3 ms
	Switching cycles	Min. 10.000.000 (mechanical)
	Switching current DC1	Max. 6 A / 36 VDC, here max. 4 A due to maximum current of power measurement via INA226
	Min. switching load	500mW (12V/10mA) must not be fallen below, whereby at 24V a minimum current of 21mA or at 10mA a minimum voltage of 50V should be given
	Connection	Input (U_IN) via ST10, outputs (U2..5_OUT) via ST11
	Sense line	Signal at relay input (U_IN) can be measured via ST12
Status display	4 red LEDs	
Performance measurement	Channels	4 channels U2..5
	Current measurement	20 mΩ Shunt per relay input, measuring range 0..5 A
	Voltage measurement	At relay input (U_IN), measuring range 0..30 VDC
Control system	Relay	I <sup>2</sup> C-controlled via PCF8574
	Powermeter	I <sup>2</sup> C-controlled, 4 x INA226
Ground reference		GND_PC

## I<sup>2</sup>C-Bus

Unless otherwise specified here, the specifications of ADQ-344 apply.

Element	Condition	Specifications
Modes		Standard Mode (Sm): 100 KHz
Bus participant		Max. 128 devices addressable; ADQ-SCU-LC is always a node!
Bus signals	Via HDMI (STB18)	Clock line "Serial Clock" (I2C_SCL), data line "Serial Data" (I2C_SDA)
Address format		7-bit address + read/write bit as LSB
Data format		Multi-byte capable (up to 16 data bytes per cycle)
Insulation	Via optocoupler (Type: ISO1541)	For bus devices on baseboard (incl. temperature sensor and EEPROM), powerboard and relay board

## Zähler

Unless otherwise specified here, the specifications of ADQ-344 apply.

Element	Condition	Specifications
Zählertyp		32 bit Abwärtszähler
Preset		32 bit Startwert ladbar

Element	Condition	Specifications
Mode		Counting once to zero (retriggerable) or continuously with automatic reloading of the start value
Threshold value	Threshold value < Preset	Programmable threshold value that can trigger interrupts when the current counter value matches the current counter value
Strobe	Strobe < Preset	Pulse duration adjustable in steps of 15.15 ns
Interrupt		At zero crossing or reaching the threshold value
Inputs	Via HDMI (STB18)	Enable Input (CNT_EN), External Trigger Input (CNT_TRIG), External Clock Input (CNT_EXT_CLK)
Output	Via HDMI (STB18)	Strobe output (CNT_OUT)

**Incremental encoder port (in preparation)**

Unless otherwise specified here, the specifications of ADQ-344 apply.

Element	Condition	Specification
Meter type		16 bit up/down counter + direction of movement
Quadrature signal		A/B channel with 90° phase shift
Coding		Gray code
Resolution		4 times per signal period ( every edge counts)
Error correction		Suppression of invalid states on hardware level
Pulse frequency Sensor		Max. 33 MHz
Reset Input		Asynchronous reset, sets counter to 0000 Hex
Interrupt		One interrupt per direction when exceeding the count range
Inputs	Via STB10	Sensor input "Channel A" (INC_A), Sensor input "Channel B" (INC_B), External reset input (INC_EXT_RST)

**Frequenzmessung**

Sofern hier nicht anderweitig spezifiziert gelten die Spezifikationen der ADQ-344.

Element	Condition	Specification
Measuring range	Frequency (period)	$f_{IN} = 0.0153 \text{ Hz } (T_{IN} = 65 \text{ s})$ to $f_{IN} = 660 \text{ kHz } (T_{IN} = 1.5 \mu\text{s})$ .
	Resolution	$T_{ON}$ in steps of 15.15 ns
Resolution	Period & Pulse	15.15 ns
Accuracy	Due to the system	$\pm 15.15 \text{ ns}$
Entrance	Via HDMI (STB18)	Frequency measurement input (FRQ_IN)

**PWM-Ausgabe**

Die Spezifikation gilt bei Ansteuerung mit der ADQ-344.

Element	Condition	Specification
Square wave signal output	Frequency (period)	$f_{OUT} = 0.0153 \text{ Hz } (T_{OUT} = 65 \text{ s})$ to $f_{OUT} = 660 \text{ kHz } (T_{OUT} = 1.5 \mu\text{s})$ .
	Duty cycle	$T_{ON}$ in steps of 15.15 ns; $T_{ONmax} = T_{OUT} - 15.15 \text{ ns}$
Duty cycle	Period duration/ pulse duration	Min. 1% steps or finer (slow frequencies can be resolved more finely than high frequencies).
Resolution	Period & Pulse	15.15 ns
Entrance	Via HDMI (STB18)	Enable-Input (PWM_EN)
Output	Via HDMI (STB18)	PWM output (PWM_OUT), invertible by software



## 7. Annex

### 7.1 Accessories

#### 7.1.1 Cables

- **ADQ-CR-VHDCI-68M/68M-1.2m** (Art.-Nr. 150597)  
round cable double shielded from 68pin VHDCI male to 68pin VHDCI male, cables twisted in pairs, length: approx. 1.2 m
- **ADQ-CR-VHDCI-68M/68M-1.8m** (Art.-Nr. 146813)  
round cable double shielded from 68pin VHDCI male to 68pin VHDCI male, cables twisted in pairs, length: approx. 1.8 m
- **ADQ-CR-HDMI-MM-1m** (Art.-Nr. 127015)  
HDMI cable to connect the digital I/Os and trigger signals with the special connector block, length: 1 m
- **ADQ-SCU-PB-50** Powerboard (Art.-Nr. 150555)
- **ADQ-RB-32/0** Relayboard 32 x SPDT (Art.-Nr. 181065)
- **ADQ-RB-16/8** Relayboard 16 x SPDT & 8 x DPDT (Art.-Nr. 178675)
- **ADQ-62 / ADQ-LINK-STAR** (Art.-Nr. 185077)  
Distribution box to connect further ALLDAQ peripherals

### 7.2 Manufacturer and support

ALLNET® is a registered trademark of ALLNET® GmbH Computersysteme. For questions, problems and for product information of all kinds please contact the manufacturer directly:

**ALLNET® GmbH Computersysteme**

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## 7.3 Important notes

### 7.3.1 Packaging ordinance

"Both manufacturers and distributors are basically obliged to ensure that sales packaging is taken back from the final consumer after use and is reused or recycled. (according to § 4 sentence 1 of the Packaging Ordinance). If you as a customer have problems disposing of the packaging and shipping materials, please write an e-mail to [info@allnet.de](mailto:info@allnet.de).

### 7.3.2 Recycling advice and RoHS conformity



Please note that parts of the products of ALLNET® GmbH should be handed in at recycling centres or may not be disposed of with household waste (printed circuit boards, power supply unit, etc.).



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

### 7.3.3 CE identification

The ADQ-SCU-LC bears the CE marking.



This device complies with the requirements of the EU Directive 2004/108/EC, Directive on Electromagnetic Compatibility and Mutual Recognition of Conformity. Conformity with the above directive is confirmed by the CE mark on the device.

### 7.3.4 Warranty

Within the warranty period, we will eliminate manufacturing and material defects free of charge. You will find the warranty conditions valid for your country on the homepage of your distributor. If you have any questions or problems concerning the application, you can reach us during our normal opening hours at the following telephone number +49 (0)89 894 222 - 474 or by e-mail to: [support@allda.com](mailto:support@allda.com)





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