

Lumineq® Bus Adapter

Field Operations Manual

Table of contents:

1	Overview	3
1.1	Features	3
2	Installation and handling.....	3
3	Specifications	3
3.1	Connectors.....	4
3.1.1	12Vdc connector.....	4
3.1.2	CAN – interface.....	4
3.1.3	RS485 – interface.....	5
3.1.4	Aux 1 connector	6
3.1.5	ELT40S – SPI connectors.....	6
3.2	Self-test.....	7
3.3	Component board mechanical dimensions	7
3.4	DC input requirements.....	8
4	Features & Capabilities	9
4.1	Firmware	9
4.2	Aux 1 control board.....	9
5	LBA documents.....	10
6	Document version history.....	10

Display specific appendices:

APPENDIX 1. ELT78S-HUD	11
APPENDIX 2. ELT40S AND EL40S	12
APPENDIX 3. ELT120S-MULTIGAUGE.....	13

1 Overview

Lumineq® Bus Adapter (LBA) is a multi-purpose interface card including excess amount of connections / ports that may or may not be utilized in different assemblies. The nature of the card in current physical outline is highly towards demo/prototyping/easy access rather than being highly integrated end production device.

1.1 Features

Features of the Lumineq Bus Adapter heavily depend on the uploaded firmware. The LBA electronics can support for example the following features:

- ISO 11898-1 compliant, CAN 2.0A/B protocol, 11bit & 29bit addressing and 1Mb/s supporting CAN interface
- RS-485 interface
- SPI / I2C interface(s)
- Integrated 4-40Vdc input DCDC step-up/-down, 2x12VDC @ 1A output
- Demo specific scripting
- Aux 1 board for controls.

2 Installation and handling

It is advisable to unpack, assemble, examine and handle Bus Adapter in ESD-controlled area only.

3 Specifications

The listed performance characteristics, unless otherwise noted, are guaranteed at a temperature of 25 °C and with the rated input voltage. The minimum and maximum specifications in this manual should be acknowledged and respected without exception, in order to ensure long-term reliability of the device at hand. Beneq does not recommend operation of the device beyond these specifications.

CAUTION: *Absolute maximum ratings are those values beyond which damage to the device may occur.*

3.1 Connectors

There are multiple connectors in Bus Adapter card, and only few are described here.

3.1.1 12Vdc connector

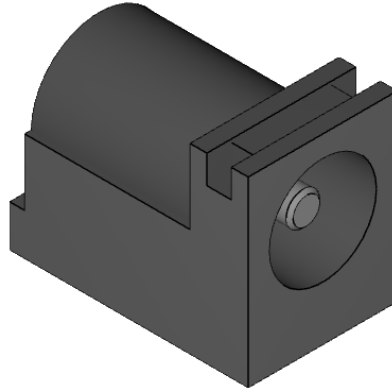


Figure 1. 12Vdc power connector. CUI PJ-202AH

Table 1. PJ-202AH power connector pin assignments.

PIN	Symbol	Functional Description
1	+12 VDC	Power supply
2	GND	Power ground
3	GND	Power ground

When powering the Bus Adapter board via 12VDC connector, make sure jumpers J10 & J11 are **positioned "DC_JACK"** instead of "DCDC1 / DCDC2".

3.1.2 CAN – interface

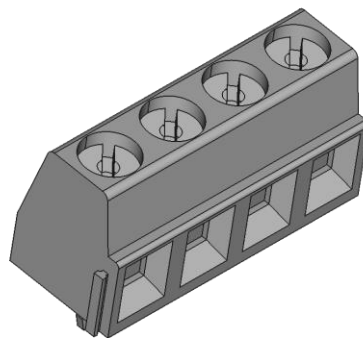


Figure 2. CAN interface. Phoenix Contact 1729034

Table 2. 1729034 data & power connector pin assignments.

PIN	Symbol	Functional Description
1	CAN_HI	CANBus, high level signal
2	CAN_LO	CANBus, low level signal
3	4-40V	Power supply
4	GND	Signal/Power ground

When powering the Bus Adapter board via CAN-interface connector, even without actual CANBus signal input, make sure jumpers J10 & J11 are **positioned "DCDC1 & DCDC2"** instead of "DC_JACK". Additionally, pins on **J5 "PWR_SW"** must be shorted. This jumper may be used as main power switch when powering via CAN-interface connector.

CANBus IC has 6kV ESD protection on CAN_HI & CAN_LO pins, 4kV on all other pins. Absolute maximum V_{dc} at CAN_HI & CAN_LO -42V to +42V.

3.1.3 RS485 – interface

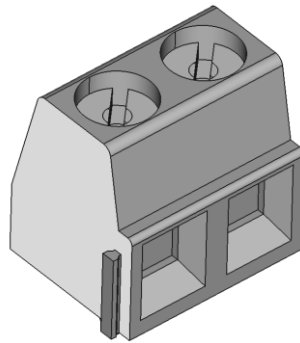


Figure 3. RS485 interface. Phoenix Contact 1729018

Table 3. 1729018 data & power connector pin assignments.

PIN	Symbol	Functional Description
1	B/Z	inverting input/output
2	A/Y	noninverting input/output

RS485 IC has $\pm 15kV$ ESD protection on I/O pins and $>9kV$ protection on other pins. Differential V_{out} 2.8V into 54 Ω . Up to 40Mbps data rate, -7V to +12V common-mode input voltage range. Absolute maximum at A/Y & B/Z -9V to +13V. **NOTE that if Bus Adapter is used to control ELT240S, it requires its own 24Vdc supply.**

3.1.4 Aux 1 connector

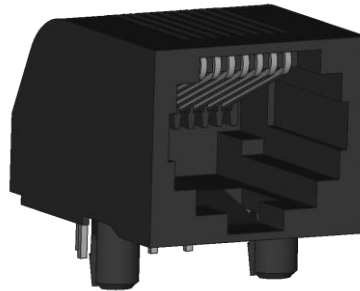


Figure 4. Aux 1 connector J17. Würth Elektronik 615008143721

Connector J17 is a standard 8-way RJ45 Female Jack, which is purely dedicated for Aux 1 control board. **It is not electrically compatible with LAN usage**, although standard cabling (e.g. Amphenol MP-54RJ45UNNE-002) can be used.

3.1.5 ELT40S – SPI connectors

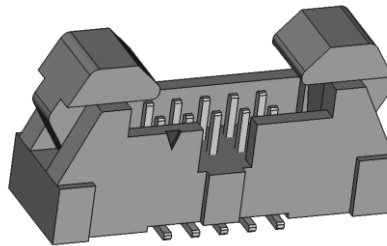


Figure 5. ELT40S SPI interface. Samtec EHT-105-01-L-D-SM

Table 4. 1729018 data & power connector pin assignments.

PIN	Symbol	Functional Description
1	+12Vdc	Power supply
2	GND	Signal/Power ground
3	SCLK	SPI clock
4	GND	Signal/Power ground
5	MOSI	SPI Master Output
6	GND	Signal/Power ground
7	SS	SPI slave select
8	GND	Signal/Power ground
9	ST	Display Selftest
10	Reserved	(MISO) do not connect.

ELT40S SPI connectors are dedicated for controlling ELT40S display driving electronics. Power and ground are hard wired, 12Vdc has SW-controllable **ENABLE**-signal to enable/disable power supply.

3.2 Self-test

When controlling display(s) over SPI connectors (see 3.1.5), proper SW control must be given for

- enabling data signal level shifter(s)
- enabling +12Vdc power

after these requirements are fulfilled, it is possible to test the ELT40S Self-test functionality by shorting **J12** "SelfTest" jumper.

3.3 Component board mechanical dimensions

Table 5. Bus Adapter dimensions.

Width:	100mm
Length:	150mm
Height:	<23mm (depending on assembly)

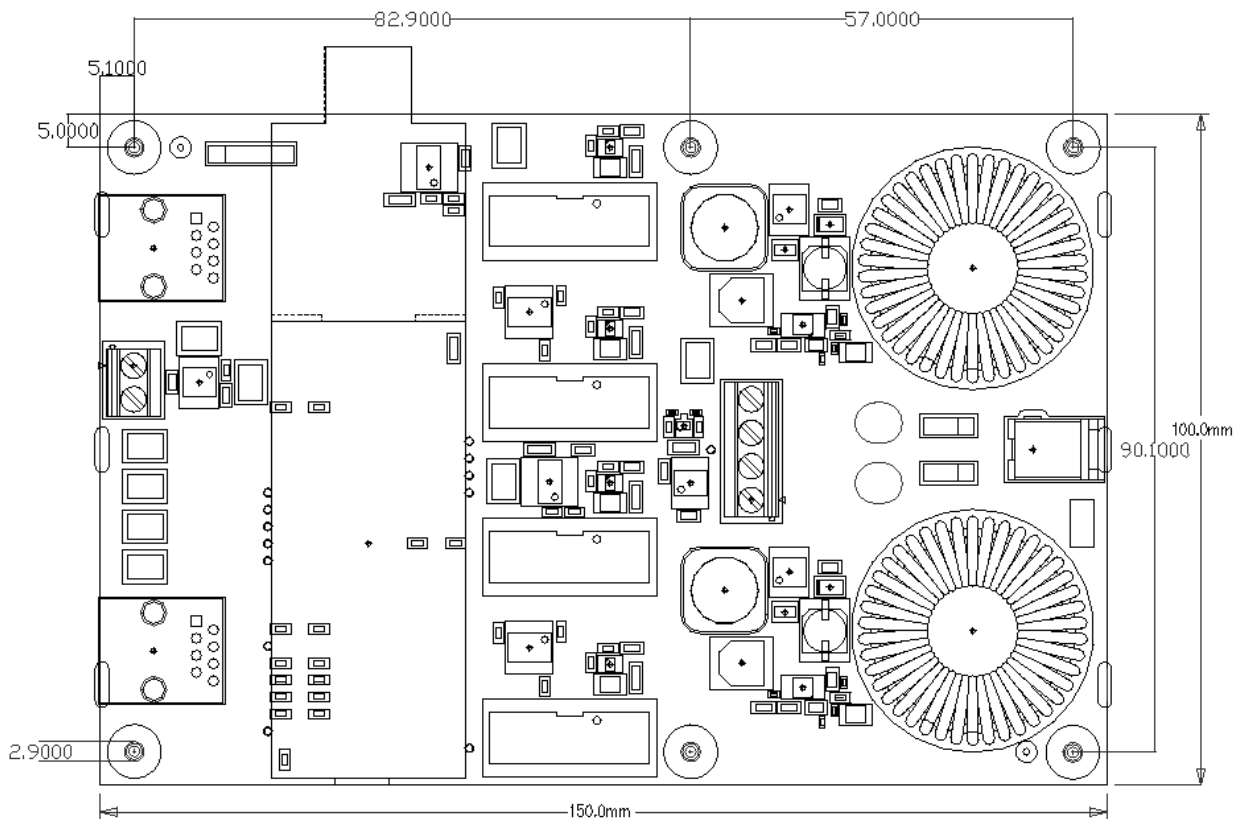


Figure 6. Board dimensions and fixing locations.

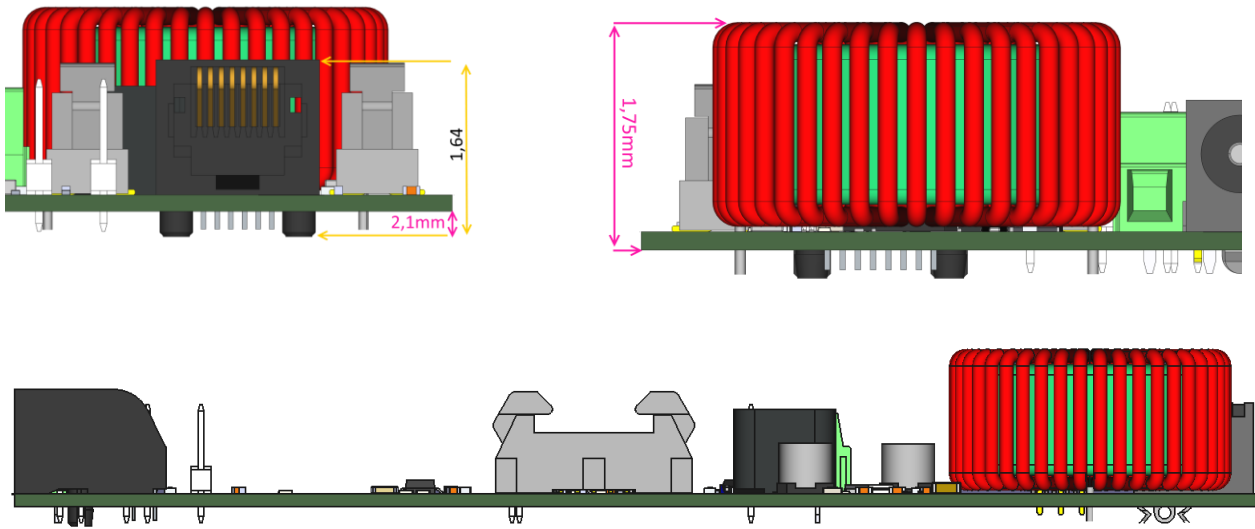


Figure 7. Space reservation requirements for large components

Due to through hole components used in assembly, especially large coils and RJ45 connectors, 3mm spacers should be used at the b-side (underneath) of the board when mounting with screws. **NOTE.** Mandatory microcontroller PCB add-on is shown only as space reservation in these figures due to different assembly options which reflect directly to required X/Y/Z area.

3.4 DC input requirements

Bus Adapter can generate all internal voltages from single input. If 12Vdc supply (see 3.1.1) is used, all 4 SPI connected displays can be powered directly from Bus Adapter. For CAN-interface input (see 3.1.2), the input voltage range is wider: 4-40V_{dc}, but the limitation is that only two SPI connected displays (ports A & B correspondingly) can be driven. Built-in DCDC converters regulate 12V_{dc} from input 4-40Vdc for SPI-displays.

Table 6. Absolute maximum input voltage ratings.

Description	Min.	Nominal	Max.	Unit
CAN-interface supply voltage	4	~	40	V
12Vdc input, no SPI displays connected	6	12	20	V
12Vdc input, SPI display connected	11.4	12	16	V

4 Features & Capabilities

4.1 Firmware

Behavior of the Bus Adapter is heavily relying on uploaded firmware. Depending of target system LBA may be programmed with one of the following firmware applications:

- LBA Script (*EL00080100*)
- LBA CAN (*EL00090700*)
- LBA demo specific software.

4.2 Aux 1 control board

Aux 1 is a general-purpose control board including one rotary encoder with push button feature. Additionally, there are four (4) non-assembled locations, electrically weakly pulled-up, when connected to J17 (see 3.1.4). These empty slots can be populated with e.g. extra push buttons for additional controls. Rotary encoder could be used for example to control the brightness of the connected display or change the state of the graphics. All the functions of Aux 1 are purely determined by included firmware.

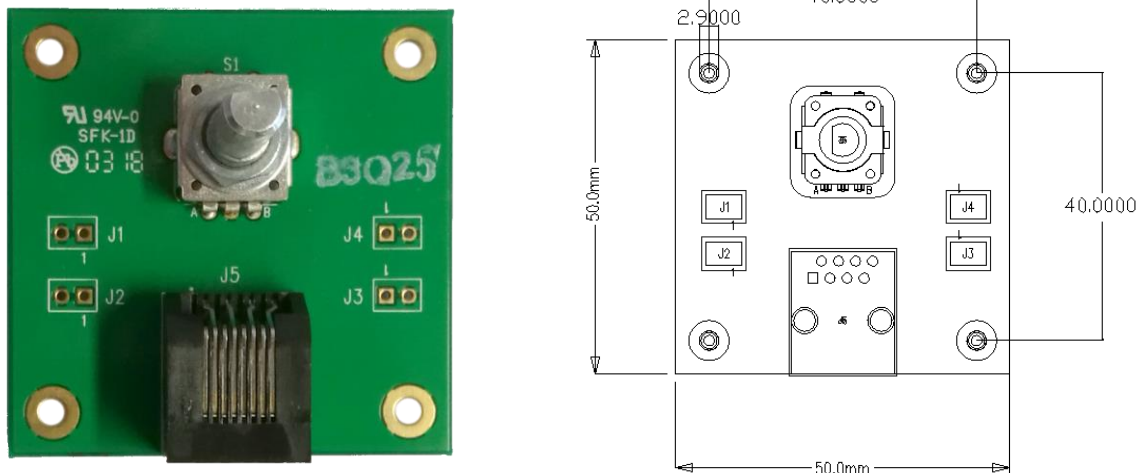


Figure 8. Aux 1 control board.

5 LBA documents

Following documents contain detailed information about the usage and functionality of Lumineq Bus Adapter.

Number	Name
ED001498	LBA Firmware Upgrade Guide
ED001499	LBA Script Manual
ED001497	LBA Controller Area Network Interface

6 Document version history

Version	Date	Change list
1.0	1.10.2019	Released

APPENDIX 1. ELT78S-HUD

Related products

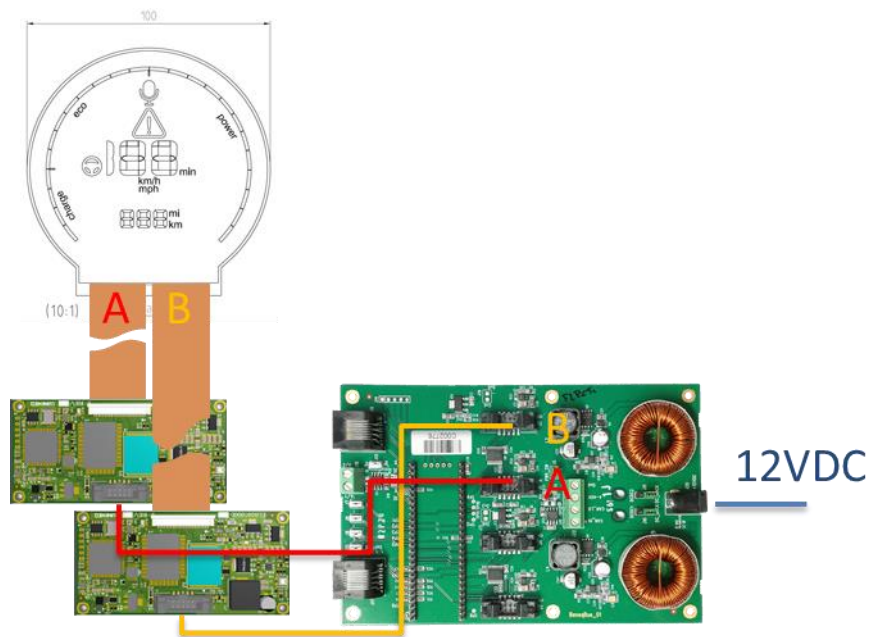
Product	Number
ELT78S-HUD-LBA	EL00056620
LIP ELT78S-HUD-LBA-07	EL00081800

Technical specifications

Description	Min.	Typical	Max.	Unit
Luminance *	~900	~900	~900	Cd/m ²
Power *	2.4	6	12	W

* Based on latest software driving parameter values.

Components and wiring diagram



APPENDIX 2. ELT40S and EL40S

Related products

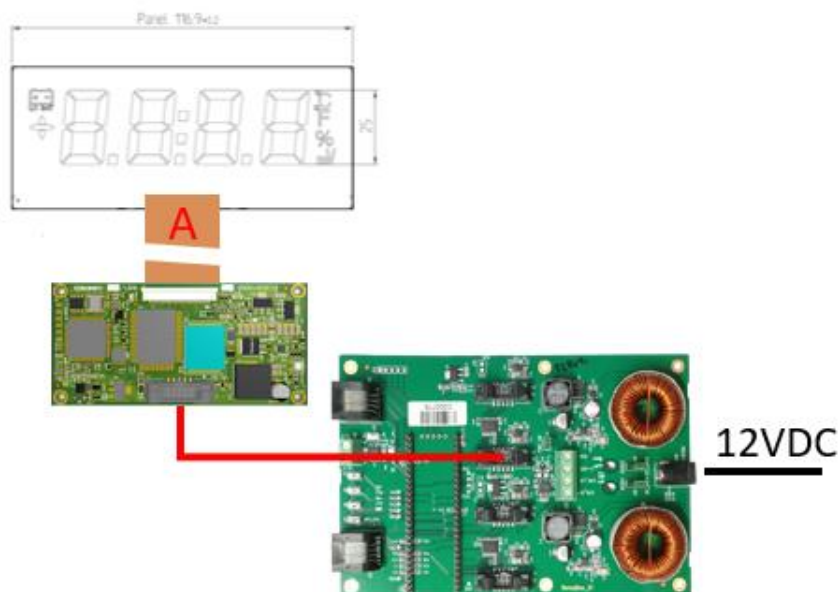
Product	Number
LIP ELT40S-CAN-J1939-07	EL00035710
LIP ELT40S-CAN-NMEA2000-07	EL00035720
TIP ELT40S-CAN-J1939	EL00037010
TIP ELT40S-CAN-NMEA2000	EL00037020

Technical specifications

Description	Min.	Typical	Max.	Unit
Luminance *	~200	-	~1000	Cd/m ²
Power *	2.5	3.5	12	W

* Based on latest software driving parameter values.

Components and wiring diagram



APPENDIX 3. ELT120S-MultiGauge

Related products

Product	Number
LIP ELT120S-MultiGauge-LBA-11NC	EL00043510
TIP ELT120S-MultiGauge-LBA	EL00043540
TIP ELT120S-MultiGauge-CAN-J1939	EL00043550
LIP ELT120S-MultiGauge-CAN-J1939-11	EL00043570

Technical specifications

Description	Min.	Typical	Max.	Unit
Luminance *	~150	-	~950	Cd/m ²
Power *	4	7.5	30	W

* Based on latest software driving parameter values.

Components and wiring diagram

