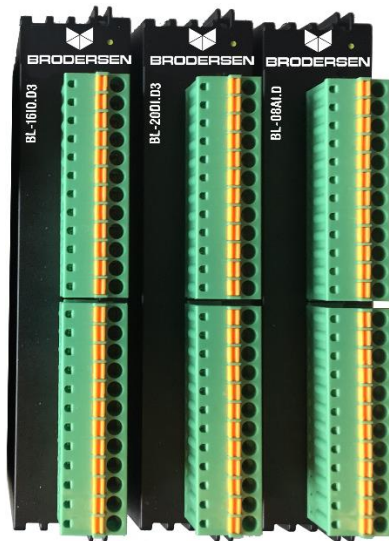


# AI08A

## LB2 I/O Series Intelligent 8 Channel AI Module

### Data Sheet

Doc: 40a407 v1.01 / December 17<sup>th</sup>, 2018





## Contents

INTRODUCTION to LB2 I/O series .....	3
IO MODULE BACKPLANE PART.....	3
VERSIONS / ORDERING CODES .....	3
Order code: AI08A .....	3
I/O Interface .....	3
Connectors Analog Input: .....	3
Input terminals layout: .....	3
Connector Top section A: .....	3
Connector Bottom section B:.....	3
Electrical .....	4
Module power supply.....	4
Analog Input. ....	4
Ambient temperature range:.....	4
Module status LED flashing codes. ....	5
Table 5 Module LED pattern .....	5
Table 6 Yellow I/O module LED Codes:.....	5
Table 7: RED I/O module LED Codes:.....	5



## INTRODUCTION TO LB2 I/O SERIES

Before use of LB2 Modules see LB2 User manual document nr. 40430. Link to document

The Brodersen LB2 modules can be used with RTU32N & RTU32M series. The I/O modules are in two parts, bottom part containing the backplane bus, and top part containing the I/O board and logic. All LB2 modules are hot plug. LB2 modules are all equipped with 200 MHz processor to process I/O, handle filtering, SOE, debounce, module clock and general module logic.

Firmware update is handled from RTU level in Brodersen worksuite. Use only genuine Brodersen bus cables for connection to Brodersen RTUs and extension of I/O module blocks. The connection cables for LB2 is special made to handle the power requirements and shielding to run communication. The maximum overall length of complete system is 5m. Each I/O module & Power supply module is calculated as 2 cm. The cables are as the length indicates, e.g. UCC-610/1 count as 100 cm.

Maximum possible system configuration is 250 I/O modules on one LB2 Bus.

### Cable ordering codes.

UCC-610/1	100cm LB2 Cable
UCC-610/2	200cm LB2 Cable
UCC-610/25	25cm LB2 Cable
UCC-610/50	50cm LB2 Cable

## IO MODULE BACKPLANE PART

Description	Part nr.
<b>BUS module for I/Os, Start</b>	<b>BB21A</b>
<b>BUS module for I/Os, Middle</b>	<b>BB21B</b>
<b>BUS module for I/Os, Expansion</b>	<b>BB21C</b>
<b>BUS module for power supply, Start</b>	<b>BB41A</b>
<b>BUS module for power supply, Middle</b>	<b>BB41B</b>
<b>BUS module for main CPU, Start</b>	<b>BB61A</b>
<b>BUS module for main CPU, Middle</b>	<b>BB61B</b>
<b>BUS module for redundant CPU (Middle)</b>	<b>BB61R</b>
<b>BUS module for system I/Os, Start</b>	<b>BB81A</b>
<b>BUS module for system I/Os, Middle</b>	<b>BB81B</b>

## VERSIONS / ORDERING CODES

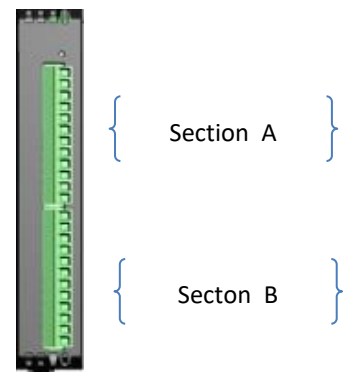
Hardware basic version

Order code: AI08A

## I/O INTERFACE

### Connectors Analog Input:

2x 12 way 3.5mm p luggable spring clamp connector Conductor Area CSA: 1.5mm<sup>2</sup>



### Input terminals layout:

#### Connector Top section A:

Pin 1:	CH0 V+
Pin 2:	CH0 I
Pin 3:	CH0 V-
Pin 4:	CH1 V+
Pin 5:	CH1 I
Pin 6:	CH1 V-
Pin 7:	CH2 V+
Pin 8:	CH2 I
Pin 9:	CH2 V-
Pin 10:	CH3 V+
Pin 11:	CH3 I
Pin 12:	CH3 V-

#### Connector Bottom section B:

Pin 1:	CH4 V+
Pin 2:	CH4 I
Pin 3:	CH4 V-
Pin 4:	CH5 V+
Pin 5:	CH5 I
Pin 6:	CH5 V-



Pin 7:	CH6 V+
Pin 8:	CH6 I
Pin 9:	CH6 V-
Pin 10:	CH7 V+
Pin 11:	CH7 I
Pin 12:	CH7 V-

## ELECTRICAL

### Module power supply.

Supply voltage: 12 VDC +- 20 %

Power consumption: 80mA @ 12V (typ.)

## ANALOG INPUT.

8 channels differential configurable analog inputs, with 16 bit resolution is provided. Each channel can be measured voltage or current. There is isolation between outputs and digitals and also between channels.

### Input ranges:

Each input channel can be configured to operate in one of the following ranges:

- Voltage mode: 0 to 10V, 0 to 5V, -5V to +5V, -10V to +10V
- Current mode: 0 to 20mA, -20mA to +20mA, 4mA to 20mA

### Input impedance:

- Voltage mode:  
More than 1M $\Omega$
- Current mode:  
125 Ohm  $\pm$ 0.1%

<b>Effective resolution:</b>	16 bit
<b>ADC resolution:</b>	24 bit
<b>Update time:</b>	30ms (for all 8 channels)
<b>Accuracy (at 25°C):</b>	$\pm$ 0.1%
<b>Nonlinearity:</b>	$\pm$ 0.001%
<b>Temperature drift:</b>	$\pm$ 25ppm/°C
<b>Common mode voltage:</b>	Max. $\pm$ 80V DC
<b>CMRR:</b>	Min. 80dB

### Isolation:

- Input to digital: At least 1KV
- Channel to channel: At least 350V

### Power Frequency noise rejection:

- Default: 50Hz
- Option: 60Hz (set by manufacturer)

**Digital Low-pass filter:** User configurable

### AMBIENT TEMPERATURE RANGE:

-40°C to +70°C

### Absolute maximum ratings\*:

- Voltage:  $\pm$ 40V DC
- Current:  $\pm$ 40mA

\* Note: Input signals exceeding the absolute maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.



Error! Reference source not found. **Yellow I/O module LED Codes:**

Yellow LED	Pattern Description
Off	No module power
on	Module is <b>Operational</b> mode.
Blinking:	Module is in Operational Timeout, caused by missing RTU heartbeat "timeout from CPU to I/O module". Outputs will be managed according to failsafe configuration (Last state, forced On, forced Off)
Flickering:	NA
Single Flash:	No valid node ID. Normal after power up.
Double Flash:	Module is assigned a valid node ID, and is <b>Stopped</b> .
Triple Flash:	NA
Quadruple Flash:	Module is in firmware update mode.

Table 2

Error! Reference source not found.: **RED I/O module LED Codes:**

Red LED	Pattern Description
Off	No warnings or errors.
on	Module LB2 communication error. A number of LB2 communication errors has occurred, which has caused the LB2 error counters to reach the error level. The module will automatically stop any transmission on the bus, to prevent LB2 bus corruption for other modules (nodes). The module will still listen for NMT commands, and a communication reset command will reconfigure module configuration / communication, if the error was temporary.
Blinking:	NA
Flickering:	Corrupted module information / calibration data in eeprom. Fatal error
Single Flash:	Module communication error warning. A number of LB2 communication errors has occurred, which has caused the LB2 error counters to reach the warning level. A number of successful communications will automatically reset this warning.
Double Flash:	NA
Triple Flash:	NA
Quadruple Flash:	NA

Table 3

**Module status LED flashing codes.**

A two color (red/yellow) LED is provided on the module. This indicates the module status with different blinking patterns. The yellow is indicating module mode (run, stop). The red indicate module error or warnings. Each pattern / color will operate in 2 sec duty cycles. When the red LED is inactive (off), only the 2 sec yellow duty cycle will operate ( yellow is always active ). When the red LED is active, a switch between 2 sec yellow, and 2 sec red patterns will occur. The patterns in **Error! Reference source not found.** are possible:

Error! Reference source not found. **Module LED pattern**

LED	Pattern
Off	LED is constantly off
on	LED is constantly on
Blinking:	LED is flashing, 200 ms on, 200 ms off
Flickering:	LED is flashing, 50 ms on, 50 ms off
Single Flash:	LED pattern is, 200 ms on, 1800 ms off
Double Flash:	LED pattern is, 200 ms on, 200 ms off, 200 ms on, 1400 ms off
Triple Flash:	LED pattern is, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 1000 ms off
Quadruple Flash:	LED pattern is, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 600 ms off

Table 1