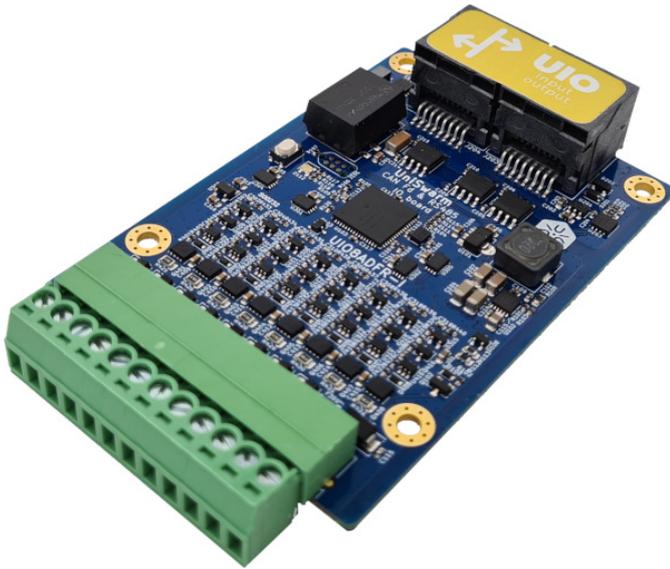


## HARDWARE DATASHEET

# Analog inputs / outputs with CAN Fd and RS485

### Description

UIO8AD product line is an industrial inputs/outputs module with RS485 and/or CAN Fd communication. It contains 8 inputs that can be reconfigured as outputs.



### Features

- Analog inputs and digital outputs
- Fast communication to read and write IOs
- Full compatibility with CANOpen protocol, DS401

### Interfaces

- CAN Fd bus up to 8 Mbds

- RS485 / RS422 interface (up to 16 Mbds) for protocols like Modbus, Profibus or DMX512...
- 1 kV isolation between power-side and interface-side

### Inputs / outputs

- Each channel can be configured as output or input
- analog inputs, 0 - 12 V, 12 bits ADC resolution ( $\approx 3$  mV sensibility)
- outputs configurable as open drain (NPN), open source (PNP) or push-pull
- outputs can drive up to 55V / 0.5A, relay directly driven, PWM control

### Application examples

- Small DC motor
- RGB LED
- Relays
- Pneumatic solenoid valve
- Ultrasonic / analog sensors
- etc...

### MCU

- High performance safety MCU
- For firmware manual, please refer to UFM4001 document : [https://uniswarm.eu/boards/uio/doc/uio\\_firmware\\_ufm4001B.pdf](https://uniswarm.eu/boards/uio/doc/uio_firmware_ufm4001B.pdf)

Reference	Inputs	Outputs	RS485	CAN Fd	Isolated
UIO8ADF	up to 8	up to 8	-	1	-
UIO8ADF-I			-	1	500 V
UIO8ADR			1	-	-
UIO8ADR-I			1	-	500 V
UIO8ADFR			1	1	-
<b>UIO8ADFR-I</b>			1	1	500 V

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# Chapter 1

## Specifications

### 1.1 Technical data

<b>Power supply</b>	
Nominal power supply voltage (Vin)	6.5 - 55 V
ESD protection	30 kV
<b>Analog Inputs</b>	
Voltage	0 - 12 V
Resolution	≈ 3 mV (12 bits) 16 bits over-sampled
Sampling	500 kHz
Analog bandwidth	50 kHz
<b>Digital Inputs</b>	
Voltage	0 - 12 V
Logic low voltage	configurable
Logic high voltage	configurable
Maximum frequency	500 kHz
<b>Digital Output</b>	
Voltage	5 V or Vin
Output current	max 500 mA
Logic low voltage	0 V
Logic high voltage	5 V or Vin
<b>Interfaces</b>	
CAN Fd	max 8 Mbit/s
RS-485	max 16 Mbit/s
Isolation	1 kV
<b>Physical</b>	
Operating temperature	0°C...+85°C
Dimensions (L x W )	80 mm x 55 mm
Mounting	4 mounting holes for M3 screws

## 1.2 Connectors

UIO8AD have 3 connectors.

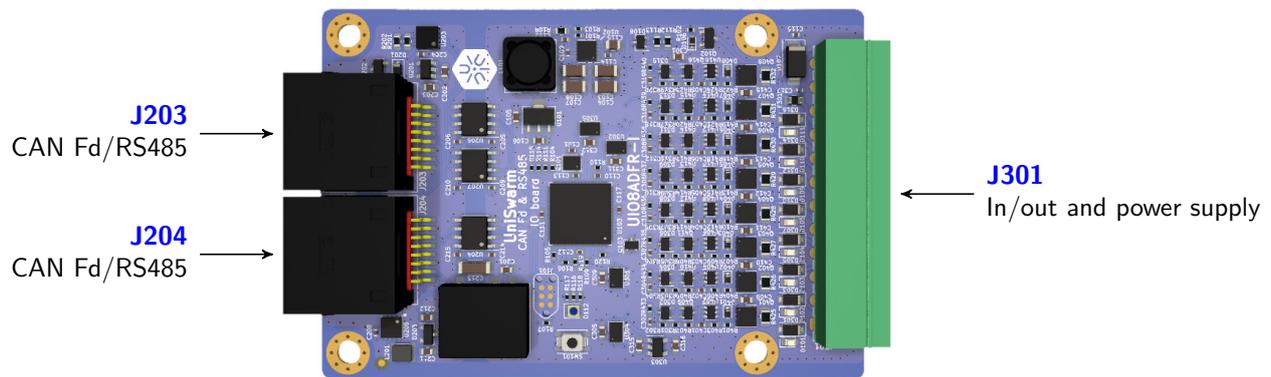


Figure 1.1: UIO8AD connectors

## 1.3 Electrical

### 1.3.1 Buses

Both buses (RS485 and CAN Fd) have 30 kV ElectroStatic Discharge (ESD) protection and high quality filters for noisy environment.

A full 1kV isolation is present between BUS-side and power-side to prevent damage and avoid noise to propagate through the bus.

Dual RJ45 socket (J203 / J204), both ports are connected together, to daisy chain the bus without external Y cable or adapter.

The speed of both buses can be set by software. The board does not include a bus terminator, you need to add one to each side of the bus.

#### Connectors J203-J204, CAN Fd / RS485

Pins	Name	Description
1	CAN H	CAN Fd dominant
2	CAN L	CAN Fd recessive
3	GND	Ground, connected to 7
4	RS485 B	RS485 B side
5	RS485 A	RS485 A side
6	-	Unused, but pins 6 of two connectors are connected together
7	GND	Ground, connected to 3
8	-	Unused, but pins 8 of two connectors are connected together

Figure 1.2: J203/J204 pins

### 1.3.2 Inputs, outputs and power supply

Inputs and output uses the same connector. Each way can be programmed by software as an input or as an output. Inputs are protected against over-voltage and negative voltage.

#### Inputs

- The input can be used in analog mode. UIO can measure analog tension up to 12V with a 3mV resolution with a maximal frequency of 500 kHz.

Analog inputs	
Voltage	0 - 12 V
Resolution	3 mV (12 bits)
Maximum Frequency	50 kHz

- Digital mode UIO can be used to determine the logic level of the input. The low and high logic level can be set by software depending of the application.

Digital inputs	
Voltage range	0 - 12 V
Resolution	3 mV (12 bits)

### Outputs

- Outputs can be used in digital mode. There is different functions for digital mode:
  - Push pull with 5V or Vcc voltage with a maximal current of 500 mA
  - Open drain with a maximal current of 500 mA and voltage of 55 V

Push Pull	
Voltage	5 V or VCC
Current	500 mA
Open drain	
Voltage	0 - 55 V
Current	max 500 mA
Open source	
Voltage	0 - 55 V
Current	max 500 mA

### Connector J301, inputs / outputs - power supply

12 ways connector (J301). 8 inputs/outputs, a 5V power output and a ground + power supply. UIO requires a single 6.5 V to 55 V power supply with reverse polarity protection.

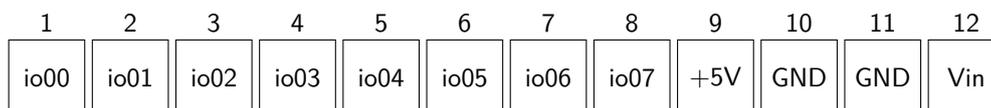
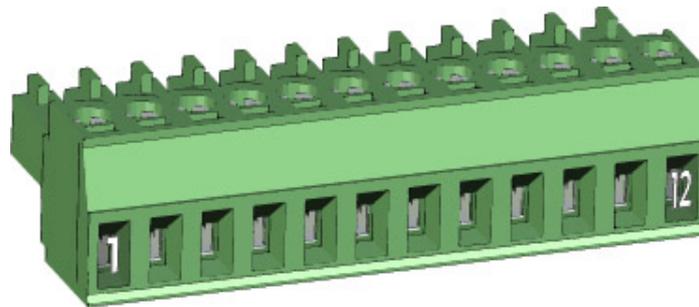


Figure 1.3: J301 pins, 12 pins, inputs / outputs - power supply

Pins	Name	Description
1	io00	Input / output 0
2	io01	Input / output 1
3	io02	Input / output 2
4	io03	Input / output 3
5	io04	Input / output 4
6	io05	Input / output 5
7	io06	Input / output 6
8	io07	Input / output 7
9	+5V out	+5V output (500mA max.)
10	GND	Ground
11	GND	Ground, power in -
12	+V	Power in +

Figure 1.4: J301 pins

**Recommended connector references**

Screw connection :

- Phoenix : MC 1,5/12-ST-3,5

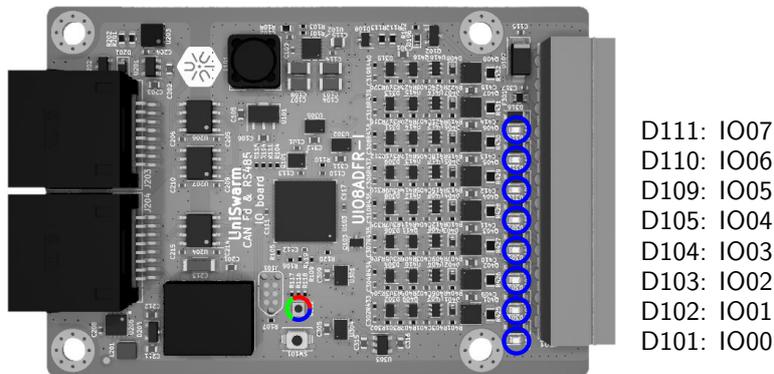
Push-in spring connection :

- Phoenix : FK-MCP 1,5/12-ST-3,5

**1.3.3 Leds**

There are 9 leds on the board :

- The first one is a RGB leds that give the status of the board.
- The 8 others leds are blue and each one correspond to a channel. If the led is turned on, it means that the channel is active.



D112: Communication status

Figure 1.5: UIO8AD leds

## 1.4 Application examples

UIO8AD board can be used to drive different elements if they **don't exceed 500 mA**.

The following list shows the most common examples but is not exhaustive and specific applications can also be adapted.

**Please refer to the datasheet of the element before using it.**

### 1.4.1 DC motors

Board can be used to drive DC motors up to 55 V and 500 mA, there is two ways to drive a DC motor (speed can be modulated using PWM) :

- If one-way operation is used a single output can be used in open drain mode
- If both directions is used 2 outputs need to be used

Mode	Motor	UIO
One way	+	Vin
	-	Output 1
Two ways	+	Output 1
	-	Output 2

Figure 1.6: DC motor connection example

### 1.4.2 RGB LED

Board can be used to drive RGB LEDs, each color needs to be linked to an output so 3 outputs are used to drive a single RGB LED (brightness can be modulated using PWM).

LED	UIO
R	Output 1
G	Output 2
B	Output 3
GND	GND

Figure 1.7: RGB LED connection example

### 1.4.3 Relay

Board can be used to drive an external relay coils up to 55 V and 500 mA. Relay coil needs to be connected between an output and a power supply.

Relay	UIO
+	Vin
-	Output 1

Figure 1.8: Relay connection example

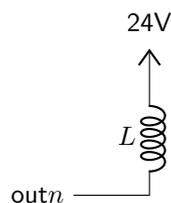


Figure 1.9: Relay schematics example

### 1.4.4 Pneumatic solenoid valve

Board can drive a solenoid valve up to 55 V and 500 mA. Solenoid valve needs to be connected to an output and a power supply.

Solenoid valve	UIO
+	Vin
-	Output 1

Figure 1.10: Solenoid valve connection example

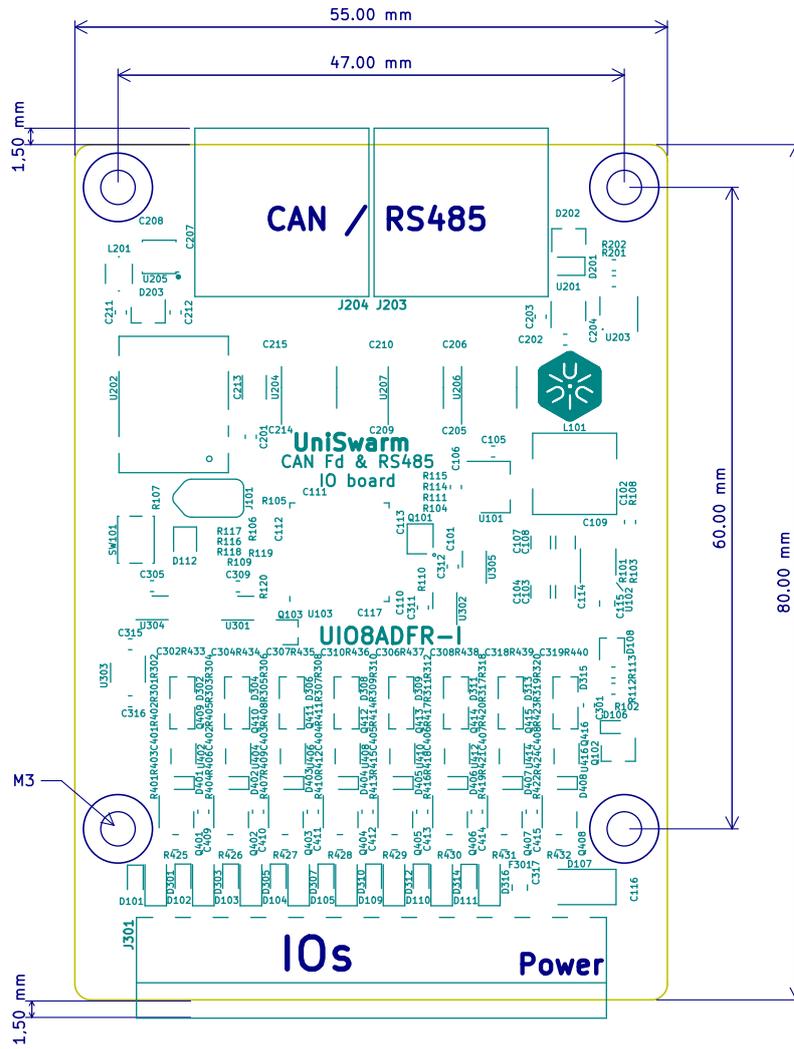
### 1.4.5 Ultrasonic sensor

Board can control an ultrasonic sensor.

Ultrasonic sensor	UIO
Vcc	Output 1
Trig	Output 2
Echo	Input 3
GND	GND

Figure 1.11: Ultrasonic sensor connection example

# 1.5 Drawings



Maximum height : 18.00 mm

## Appendix A

# Hardware revision history

Version	Date	Change
1.0.1	2020/09/01	Initial public version
1.0.2	2021/05/05	Changed connectors 10 + 2 to 12 pins Improved outputs power dissipation Improved EMC on switching supply Added a restore button

## Appendix B

# Datasheet revision history

Revision	Date	Change
A	2020/09/07	Initial public revision
B	2021/05/18	Added board revision 1.0.2
C	2021/10/21	Added 3D connectors view