Sirius Digital Analog I/O Peripheral

Revision: 1.41

July 24, 2014

version	date	author	description	fw version
1.4	25/05/2014	Marco Trentarossi	first delivery	IOB0-00_07
1.41	23/07/2014	Francesco Trentarossi	FCC / Industrial Canada statements	IOB0-00_07

Table 1: revision history

Contents

Chapter 1

General information

1.1 Introduction

I/O resources solution:

- ACH-A I/O board
- Specialized firmware
- Winloader - Application updater
- Oscilloscope - Setup and diagnostic software

ACH-A is based on DSP MICROCHIP 33JF128MC804.

The structure is optocoupled from the microprocessor outwards and separately via CAN.

1.2 Operational description

Sirius ACH is an industrial peripheral powered at 24Vdc.

ACH I/Os communicate with via CANOpen with an industrial computer board or other devices in a can network, and it can operate multiple I/Os.

ACH features 4 digital inputs, 4 digital outputs, 8 switchable digital inputs or outputs, 4 high speed digital inputs, 1 PT1000 analog input, 2 analog inputs and 1 encoder input.

Chapter 2

Hardware

2.1 Product images

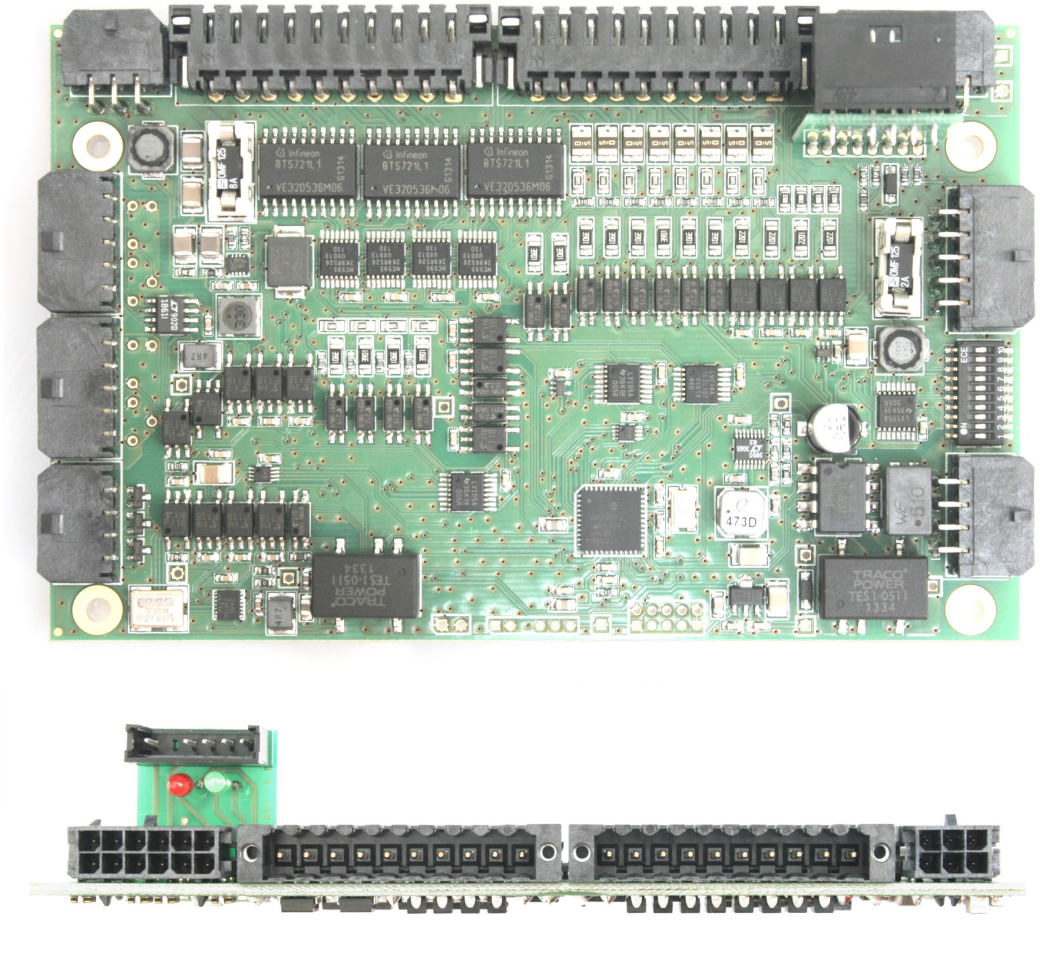

Figure 2.1: Foto dispositivo ACH-A

2.2 Configuration

	Quantity	*Description*
DIGITAL INPUT	4	General purpose digital inputs
DIGITAL OUTPUT	4	General purpose digital outputs
ADVANCED DIGITAL I/Os	8	Configurable digital inputs / outputs
FAST DIGITAL INPUT	4	High speed digital inputs
PT1000 INPUT	1	PT1000 analog input
ANALOG INPUT	2	4/20mA or 0-10V analog inputs
ENCODER INPUT	1	5V TTL encoder input

2.3 Specifications

2.3.1 Input Power

	ACH-A	*U.M.*
Input Voltage min-max	16-34	V
logic current	0.060	A
Max current*	19	A

*with all inputs/outputs active

2.3.2 Command InputsDigital input connector

	ACH-A
CANopen	digital outputs / analog parameters
Serial TTL	digital outputs / analog parameters

2.3.3 Digital Inputs

	ACH-A
Number, type	up to 16,
All inputs	operating from 24V or 5V, software programmable, with RC filter
Logic levels	Vin-LO < 5.6V, Vin-HI > 13V @24V Vin-LO < 1.6V, Vin-HI > 3.5V @5V
GP (IN0..11)	up to 12 General Purpose inputs with 4.7us RC
HS (IN12..15)	4 High Speed input with 3.3us RC and interrupt capability
Current rating	10mA @ 24/5V

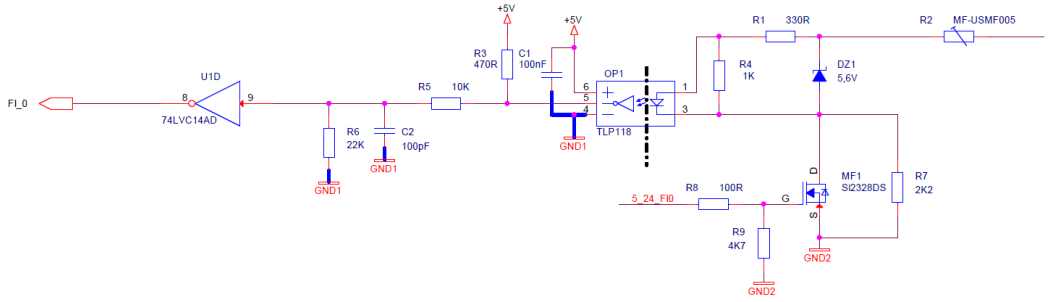

Figure 2.2: HS Inputs

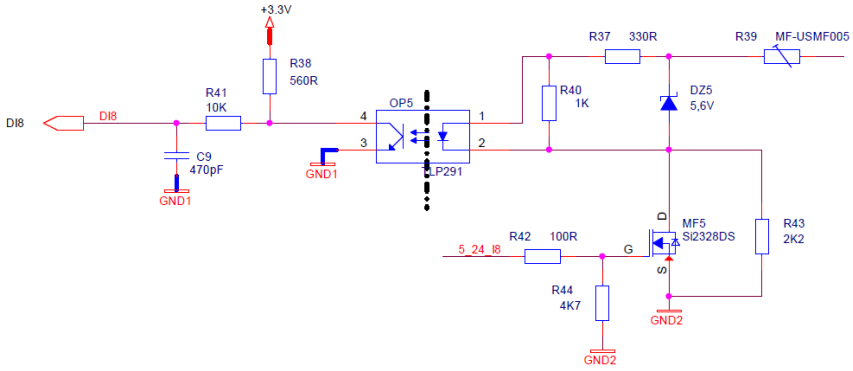

Figure 2.3: GP Inputs

2.3.4 Analog Inputs

	ACH-A
Number, type	2, insulated
All inputs	operating from 0 to 10V or 4 to 20mA
AN (IN0,1)	2 x 12 bits (LTC1861) /16 bits (LTC18lt does not detect the lack o65) analog inputs

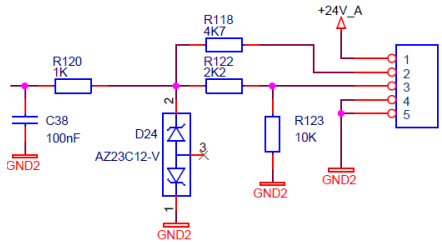

Figure 2.4: 12/16 bits Analog Inputs

2.3.5 PT1000 Input

	ACH-A
Number, type	1, insulated
All inputs	operating at 1000 ohm
AN (IN2)	1 x 16 bits analog inputs

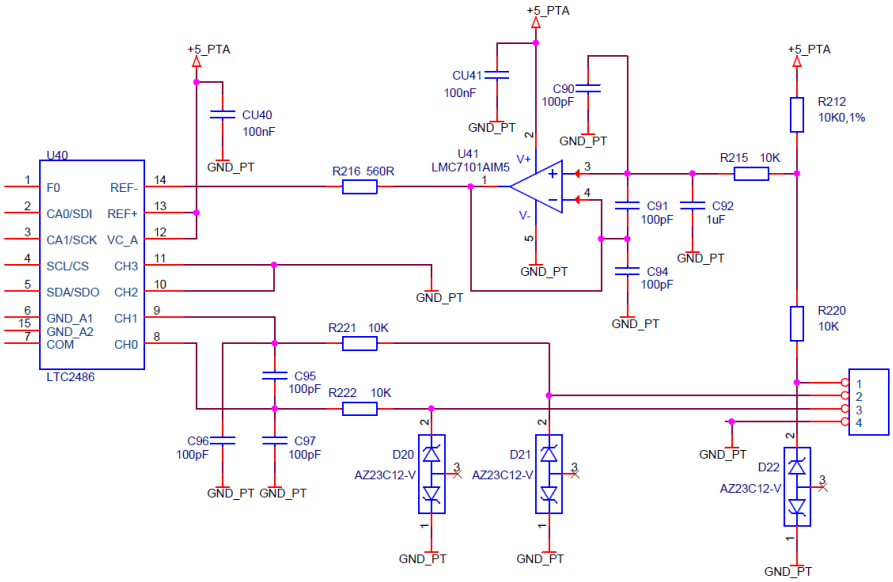

Figure 2.5: 16 bits Analog Input

2.3.6 Digital Outputs

	ACH-A
Number, type	12, insulated
(OUT0..11)	Current-sourcing MOSFET at 24V (PNP)
	1 parallel, 2 parallel, 4 parallel
Nominal Load Current	2.9A, 4.3A, 6.3A
ESD protection	yes

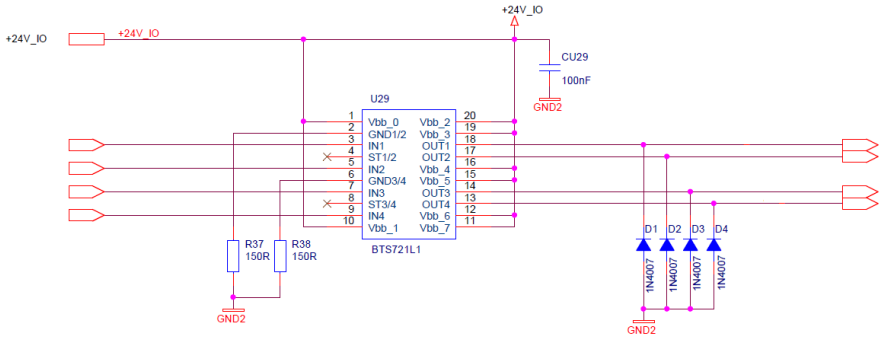

Figure 2.6: Output

2.3.7 UART Port

	ACH-A
Signals	RX, TX, GND
Mode	full-duplex, serial communication port for setup and control, 115200 - 1250000 baud rate
Protocol	Binary

2.3.8 CAN Port

	ACH-A
Signals	CANH, CANL, GND
Isolation	CAN interface circuit and +5 Vdc supply for CAN is optically insulated from drive circuits
Format	CAN V2.0b physical layer for high-speed connection compliant
Data	in according CANopen CIA DS301
Address selection	determined by dip-switch
Stub	121 ohm selectable

2.3.9 Encoder Port

	ACH-A
Signals	A, B, X
Levels	5V
Frequency	4MHz (post quadrature)
Power supply	5V @ 400mA

2.3.10 Status Indicators

	ACH-A
CAN status	green and red leds, in according with CAN indicator specification DR303-3

2.3.11 Protections

	ACH-A
Current limitation	8A (digital output)
Reverse polarity	logic circuit, serie diode power circuit, serie diode
Short circuit	logic circuit, 500mA fuse

2.3.12 Mechanical & Environmental

	ACH-A
Size (L x W)	129,5 x 83 mm
Height	24 mm
Weight	77 g
Ambient temperature	0 to +45 ºC operating, -40 to +85 ºC storage
Humidity	0 to 95%, non condensing

2.3.13 Agency Conformance

	ACH-A
CE	CE compliant
61000_6_4	Generic standards - Emission Standard for industrial environments
61000_6_2	Generic standards - Immunity for industrial environments
ROHS	ROHS Compliant

2.4 Connections

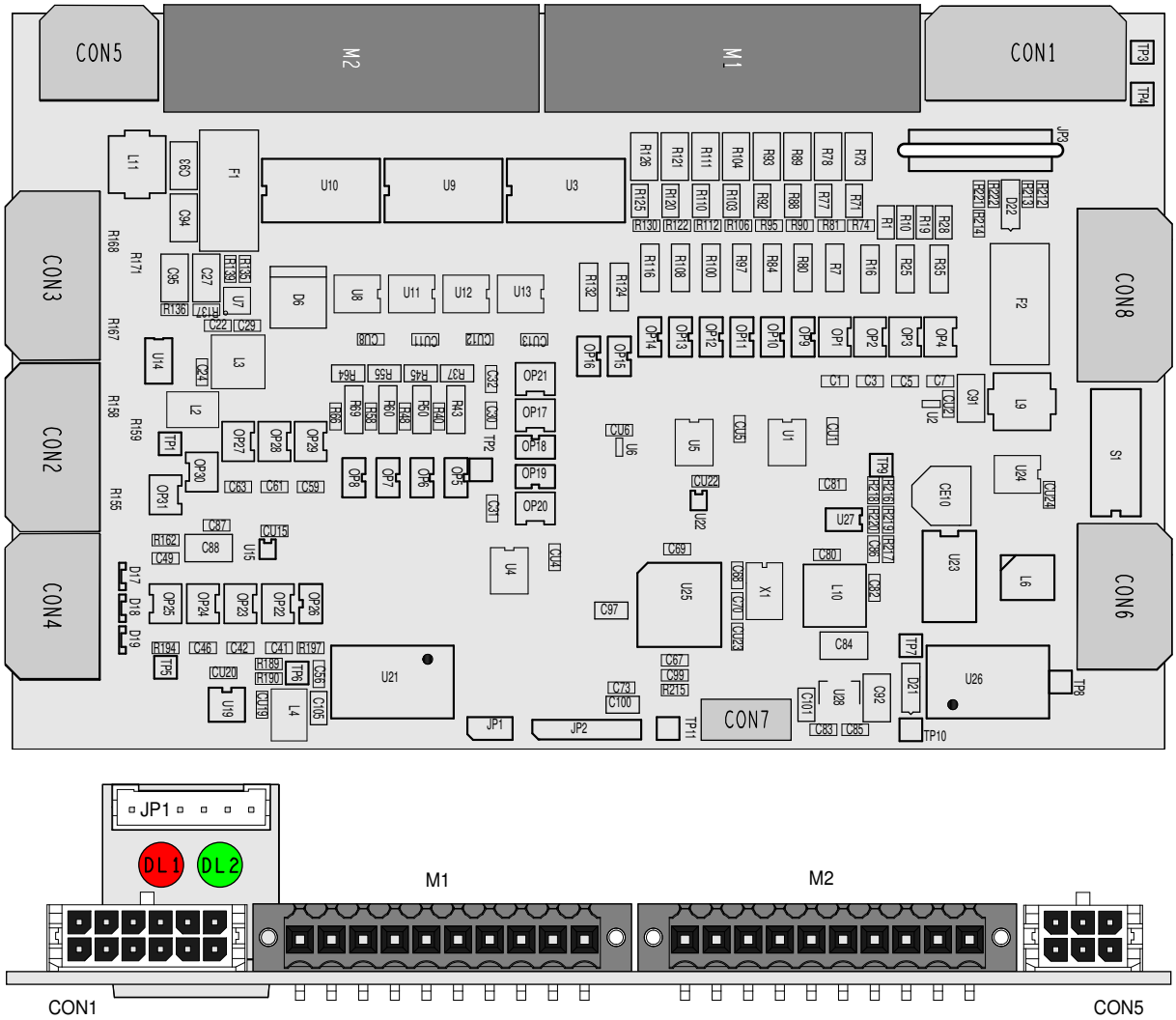

Figure 2.7: Onboard connectors

2.4.1 Board Power supply

The card reads as feedback only the voltage of the PT1000 side galvanically insulated.

It does not detect the lack of power supply circuits for input / output, so you need to power through terminals M1 or M2, galvanically insulated side from the micro.

2.4.2 CON1 - High Speed digital inputs

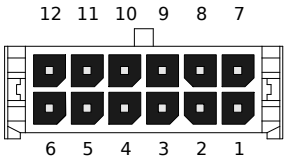

Figure 2.8: MICROFIT 3.0 430451200

pin	*name*	*type*	*description*
1	FI_0	IN	HS digital input 0 - EI1.SA
2	+24V_IO	OUT	inputs power supply
3	FI_1	IN	HS digital input 1 - EI1.SB
4	FI_2	IN	HS digital input 2- EI2.SA
5	+24V_IO	OUT	inputs power supply
6	FI_3	IN	HS digital input 3- EI2.SB
7	GND2	-	Inputs reference
8	+24V_IO	OUT	inputs power supply
9	GND2	-	Inputs reference
10	GND2	-	Inputs reference
11	+24V_IO	OUT	inputs power supply
12	GND2	-	Inputs reference

2.4.3 CON2 - Analog input 0

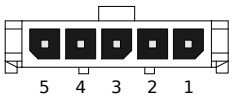

Figure 2.9: MICROFIT 3.0 436500500

pin	*name*	*type*	*description*
1	+24V_A	OUT	Input power supply
2	0-10V	IN	Analog Input 0, 0-10V input
3	4-20mA	IN	Analog Input 0, 4-20mA input
4	GND2	-	Input reference
5	GND2	-	Input reference

2.4.4 CON3 - Analog input 1

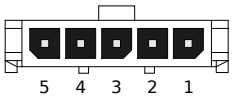

Figure 2.10: MICROFIT 3.0 436500500

pin	*name*	*type*	*description*
1	24V	OUT	Input power supply
2	0-10V	IN	Analog Input 1, 0-10V input
3	4-20mA	IN	Analog Input 1, 4-20mA input
4	0V	-	Input reference
5	Ground	-	Input reference

2.4.5 CON4 - PT1000 analog input

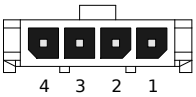

Figure 2.11: MICROFIT 3.0 436500400

pin	*name*	*type*	*description*
1	H1	OUT	source power supply
2	H2	IN	high side PT1000
3	L1	IN	low side PT1000
4	L2	OUT	drain power supply

2.4.6 CON5 - Encoder

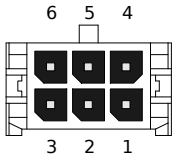

Figure 2.12: MICROFIT 3.0 430450600

pin	*name*	*type*	*description*
1	5V	OUT	5V encoder power supply
2	reference	-	0V encoder reference
3	reference	-	0V encoder reference
4	SA	IN	A signal
5	SB	IN	B signal
6	SC	IN	C signal (index)

2.4.7 CON6 - CANopen

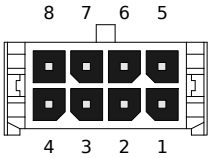

Figure 2.13: MICROFIT 3.0 430450800

pin	*name*	*type*	*description*
1-5	CH+	IN	CAN high
2-6	CH-	IN	CAN low
3-7	CAN reference	IN	0V CAN reference
4-8	CAN reference	IN	0V CAN reference

2.4.8 CON7 - Reserved for future use

CON7 supplies 5V, 3.3V and 6 signals to the CPU for piggy back expansions.

2.4.9 CON8 - Logical power supply

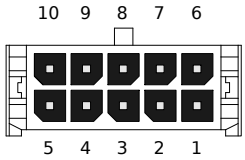

Figure 2.14: MICROFIT 3.0 430451000

pin	*name*	*type*	*description*
1-6	comune	IN	0V power supply reference
2-7	24V	IN	24V power supply
3-8	Ground	IN	ground
4-9	NC	-	-
5-10	NC	-	-

2.4.10 M1 - Upper GP I/Os terminal block

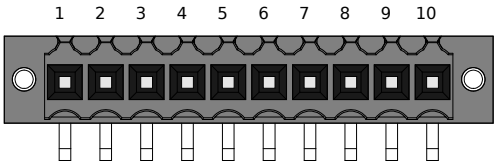

Figure 2.15: WEIDMULLER 1607120000

pin	*name*	*type*	*description*
1	24V	IN	24V power supply
2	DI_0	IN	GP 0 - EI3.SA digital input
3	DI_1	IN	GP 1 - EI3.SB digital input
4	DI_2	IN	GP 2 - EI4.SA digital input
5	DI_3	IN	GP 3 - EI4.SB digital input
6	DI_4/DO_8	IN/OUT	GP 4 digital input/8 digital output
7	DI_5/DO_9	IN/OUT	GP 5 digital input/9 digital output
8	DI_6/DO_10	IN/OUT	GP 6 digital input/10 digital output
9	DI_7/DO_11	IN/OUT	GP 7 digital input/11 digital output
10	0V	-	reference

For wiring, use WEIDMULLER SOCKET BLOCKS BL-I/O 3.5/30F

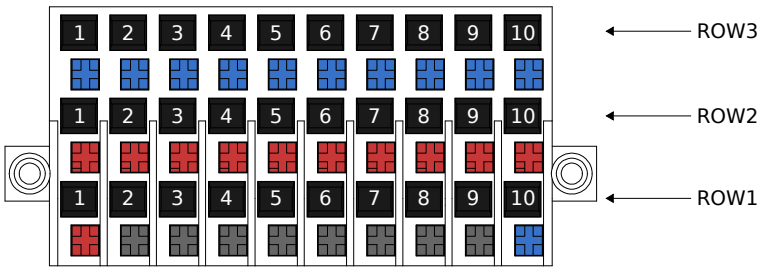

Figure 2.16: WEIDMULLER 1779920000

BL-I/O 3.5/30F terminal block adds two reference rows, 24V and 0V, that must be connected externally to blocks 1 and 10.

2.4.11 M2 - Upper GP I/Os terminal block

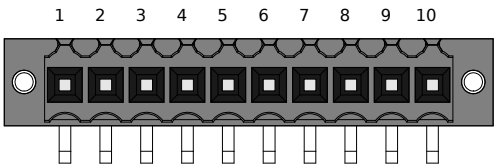

Figure 2.17: WEIDMULLER 1607120000

pin	*name*	*type*	*description*
1	24V	IN	24V power supply
2	DO_0	OUT	GP 0 - EI3.SA digital output
3	DO_1	OUT	GP 1 - EI3.SB digital output
4	DO_2	OUT	GP 2 - EI4.SA digital output
5	DO_3	OUT	GP 3 - EI4.SB digital output
6	DO_4/DI_8	OUT/IN	GP 4 digital output/8 digital input
7	DO_5/DI_9	OUT/IN	GP 5 digital output/9 digital input
8	DO_6/DI_10	OUT/IN	GP 6 digital output/10 digital input
9	DO_7/DI_11	OUT/IN	GP 7 digital output/11 digital input
10	0V	-	reference

FOR WIRING, USE WEIDMULLER SOCKET BLOCKS BL-I/O 3.5/30F

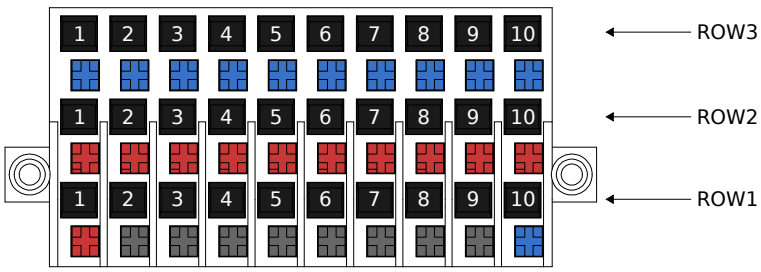

Figure 2.18: Connettore tipo WEIDMULLER 1779920000

BL-I/O 3.5/30F terminal block adds two reference rows, 24V and 0V, that must be connected externally to blocks 1 and 10.

2.5 Dip-switch

S dip-siwtch is located as in figure

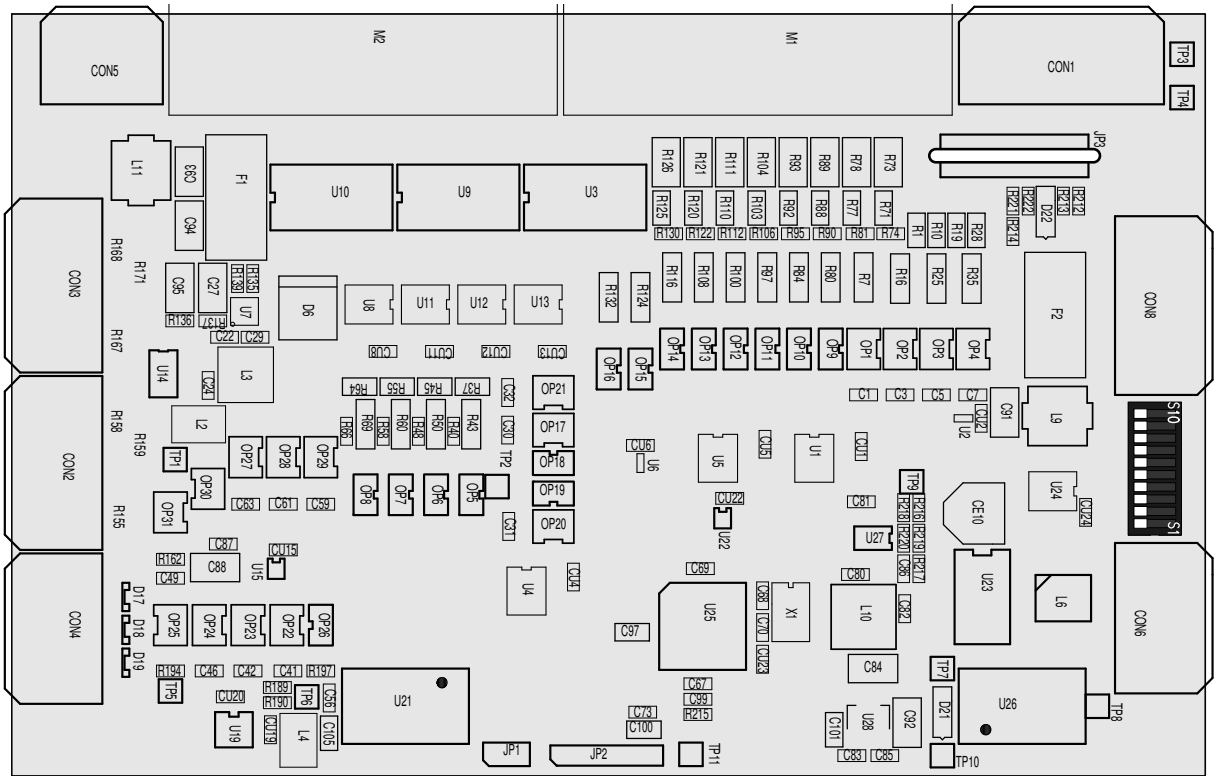

Figure 2.19: dip-switch position

2.5.1 Address selection

Using S1 selector it is possible to change the CAN address of the device.

Assigned address is stored in variable CobId.

Address can be a number from 0 to 127. Every CAN node must have an unique address.

Follows bit weight:

Switch	*Peso*
S2 ON	1
S3 ON	2
S4 ON	4
S5 ON	8
S6 ON	16
S7 ON	32
S8 ON	64

Table 2.1: dip-switch weight

2.5.2 Communication speed selection

Using S1 selector it is possible to change the communication speed of the device.

Assigned speed is stored in variable CobBR.

Speed can be 125, 250, 500 or 1000 kbps.

S10	***S9***	***Baud rate kbps***
OFF	OFF	125
OFF	ON	250
ON	OFF	500
ON	ON	1000

Table 2.2: baud rate selection

FCC Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. *this device may not cause interference, and*
2. *this device must accept any interference, including interference that may cause undesired operation of the device.*

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. *l'appareil ne doit pas produire de brouillage, et*
2. *l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

CAN ICES-3 (A)/NMB-3(A)