RBXM MODULE

AS5037.001 - "INC.AXI. – 4ch" - 4-channel INCREMENTAL READ OUT BOARD

Jumpers

A two-position jumper is installed: RESET and HOLD.
If the jumper is on RESET position, in case of system misbehaviour (WATCH DOG NOT-OK) all the outputs are set to their start condition (outputs disabled = 0 Volt).
If the jumper is on HOLD position, or it is not installed, in case of system mishebaviour (WATCH DOG NOT-OK) all the outputs are left in their current state.

Input / Output Words.

The Input/Output word address for each board (CPU excluded) depends on its position inside the rack. Addresses are here referred to as "BASE" + a number representing the board internal offset. To find the value of "BASE" refer to the RHW.CFG configuration file generated by the operating system during the autoconfiguration session and stored in the flash card. This file contains the address of the I/O words for each board installed in your rack. The value of "BASE" is the value of the first Input or Output word in the board.

Number of Input Words: 12

Numerb of Output Words: 8

"Bit 0" is the least significant bit in the word, "Bit 15" is the most significant bit in the word.

Input Word ("BASE" + 0):   Counter 1 real position (16 Bits)

Input Word ("BASE" + 1):   Counter 2 real position (16 Bits)

Input Word ("BASE" + 2):   Counter 3 real position (16 Bits)

Input Word ("BASE" + 3):   Counter 4 real position (16 Bits)

Input Word ("BASE" + 4):   Zero position for counter 1 (16 Bits) (significant only when a zero cycle has been successfully terminated)

Input Word ("BASE" + 5):   Zero position for counter 2 (16 Bits) (significant only when a zero cycle has been successfully terminated)

Input Word ("BASE" + 6):   Zero position for counter 3 (16 Bits) (significant only when a zero cycle has been successfully terminated)

Input Word ("BASE" + 7):   Zero position for counter 4 (16 Bits) (significant only when a zero cycle has been successfully terminated)

Input Word ("BASE" + 8): Counter 1 state

        Bit 0: 1 = zero micro in High State
                0 = zero micro in Low State

        Bit 1: 1 = zero cycle running

        Bit 2: 1 = zero cycle successfully terminated

        Bit 3: 1 = zero cycle alarm (state of the zero micro non consistent with the required 0 cycle)

        Bit 4: 0 = encoder alarm

        Bit 5: 0 = short circuit alarm on encoder supply

        Bit 6: state of channel A

        Bit 7: state of channel B

        Bit 8: state of zer channel

        Bit 9..15: non significant

N.B.: After reading this address, the existing alarms are reset, provided that the alarm condition has been eliminated.

Input Word ("BASE" + 9): State of counter 2

        for the bit meaning, see the previous input word.

Input Word ("BASE" + 10): State of counter 3

        for the bit meaning, see the previous input word.

Input Word ("BASE" + 11): State of counter 4

        for the bit meaning, see the previous input word.

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Output Word ("BASE" + 0):   Analog output 1

Output Word ("BASE" + 1):   Analog output 2

Output Word ("BASE" + 2):   Analog output 3

Output Word ("BASE" + 3):   Analog output 4

At the system reset all the analog channels are set to 0 corresponding to a 0 Volt DC

The correspondence between the decimal value written in the Output Words and their analog value is as follows:

-2048 -->	-10 Volt DC
0 -->	0 Volt DC
2047 -->	+10 Volt DC

Output Word ("BASE" + 4): Request for zero cycle for encoder channel 1

Data =   0 Hex --> no request for zero cycle

Data =   8 Hex --> request for zero cycle on zero channel

Data =   A Hex --> request of zero cycle on the zero channel, after the zero micro transition from close to open

Data =   B Hex --> request of zero cycle on the zero channel, after the zero micro transition from open to close

Data =   C Hex --> request for 0 cycle on the transition of the zero micro from closed to open

Data =   D Hex --> request for 0 cycle on the transition of the zero micro from open to closed

To terminate the procedure relevant to the zero cycle for channel 1, the user will write "0" in this Output Word.
This can be done also if the zero cycle is still running.

Output Word ("BASE" + 5): Request for Zero cycle for Encoder channel 2

Meaning as the previous Output Word

Output Word ("BASE" + 6): Request for Zero cycle for Encoder channel 3

Meaning as the previous Output Word

Output Word ("BASE" + 7): Request for Zero cycle for Encoder channel 4
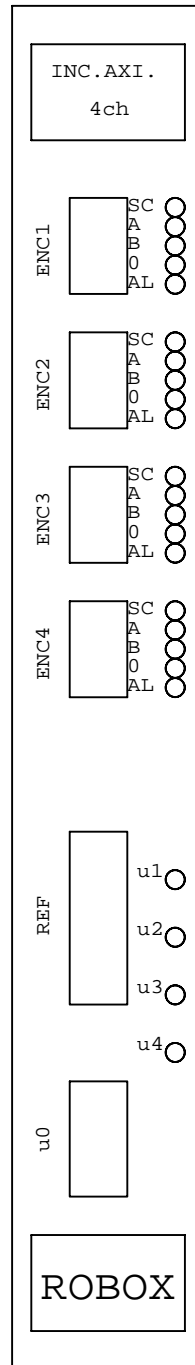
Meaning as the previous Output Word

At the system reset output words 5, 6, 7 and 8 are set to value 0 Hex

Enclosure: IU5037.001

FRONT PANEL

BOARD
"INC.AXI."
4ch

FRONT VIEW

INC.AXI.

4ch

ENC1
SC
A
B
0
AL

ENC2
SC
A
B
0
AL

ENC3
SC
A
B
0
AL

ENC4
SC
A
B
0
AL

REF
u1
u2
u3
u4

u0

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LED MEANING (WHEN ON)

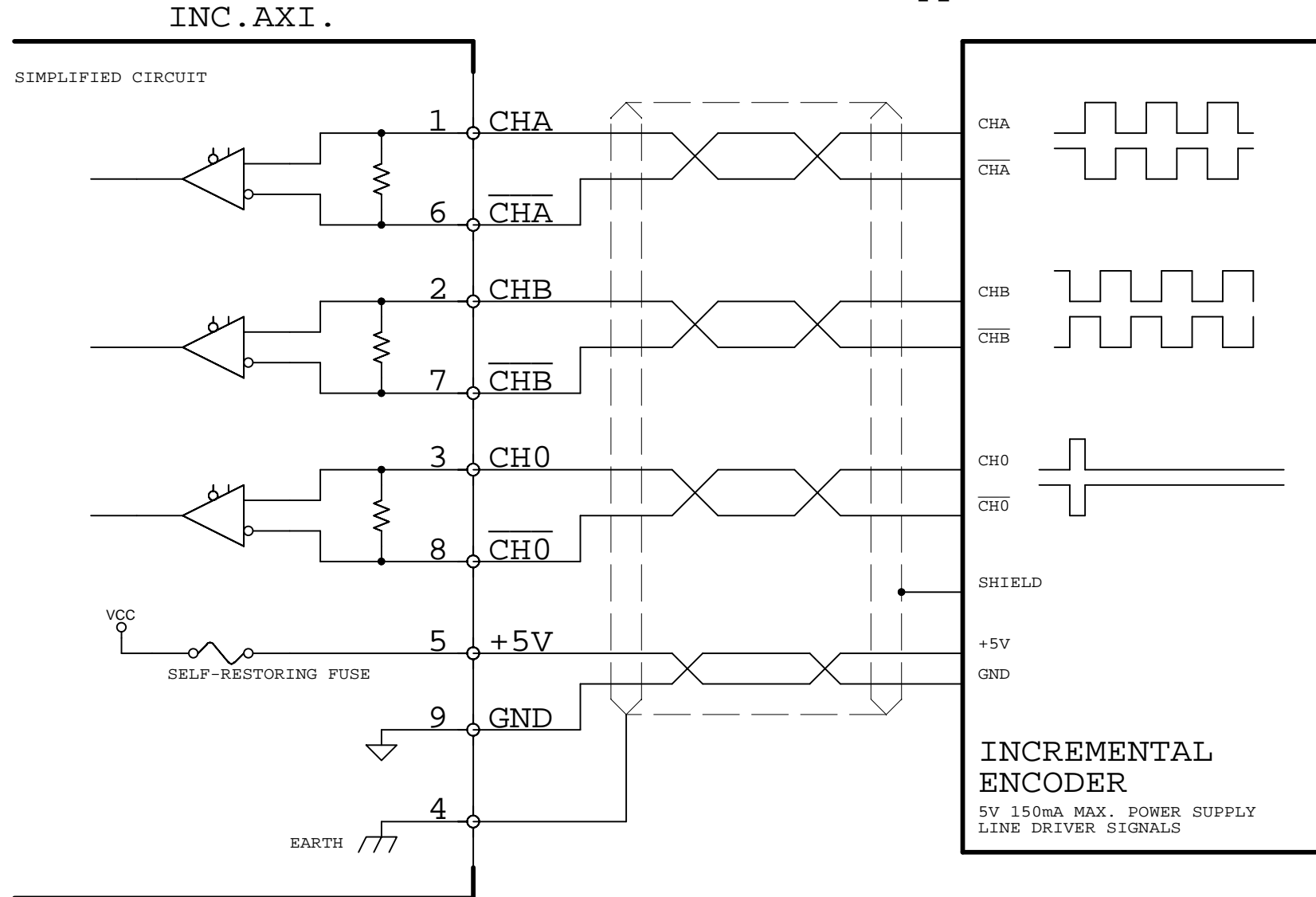| NAME	COLOR	MEANING
SC	RED	ENCODER POWER SUPPLY FAILURE (SHORT-CIRCUIT)
A	GREEN	ENCODER CHANNEL A IN LOGIC STATE "1"
B	GREEN	ENCODER CHANNEL B IN LOGIC STATE "1"
0	GREEN	ENCODER CHANNEL 0 IN LOGIC STATE "1"
AL	RED	ENCODER ALARM: THE ENCODER IS NOT CORRECTLY CONNECTED
u1	GREEN	CHANNEL 5 MICRO ZERO ACTIVE (=24V)
u2	GREEN	CHANNEL 6 MICRO ZERO ACTIVE (=24V)
u3	GREEN	CHANNEL 7 MICRO ZERO ACTIVE (=24V)
u4	GREEN	CHANNEL 8 MICRO ZERO ACTIVE (=24V)

SPECIFICATION

BOARD SPECIFICATION

Backplane Current (5 V)	150 mA Maximum
Backplane Current (5 V AUX)	170 mA Maximum (without Encoder)
Backplane Current (+15 V)	50 mA Maximun
Backplane Current (-15 V)	50 mA Maximum
Power Dissipation	5 W Maximum

Environmental Conditions:

Temperature	from 0 to 50 degrees C
Humidity	85% Maximum (without condensation)

ENCx
Female D-Type Connector - 9 Pins

INC.AXI.

SIMPLIFIED CIRCUIT

1 CHA
6 $\overline{CHA}$

2 CHB
7 $\overline{CHB}$

3 CH0
8 $\overline{CH0}$

VCC
SELF-RESTORING FUSE
5 +5V
9 GND

4
EARTH

CHA
$\overline{CHA}$

CHB
$\overline{CHB}$

CH0
$\overline{CH0}$

SHIELD

+5V
GND

INCREMENTAL ENCODER

5V 150mA MAX. POWER SUPPLY
LINE DRIVER SIGNALS

Encoder cable Length

The maximum encoder cable length depends
on the encoder supply current and cable impedance.

A useful data can be obtained by the formula:

$$Ve = V - (Ri + R) * I$$

where Ve is the Encoder Supply Voltage;
V is the Voltage on the board connector (in Volt);
Ri is the board output impedance (0.6 Ohm);
R is the cable impedance (in Ohm);
I is the Encoder Supply Current (in Ampere).

Cable Impedance R can be obtained by the formula:

$$R = ro * (2 * l) / S$$

where ro is the conductor resistivity (in Ohm * m)
(for copper 0,02 Ohm m);
l is the cable length (in meters);
S is the cable section (in mm2).

The encoder works properly if the voltage on it
is in the correct range.

For example, if the encoder supply current
is 150 mA at 5V, the cable section is 0.22 mm2,
the voltage on the encoder is reported on the
following table (depending on the cable length):

l (meters)	Ve (Volt)	l (meters)	Ve (Volt)
2	4.86	18	4.42
4	4.80	20	4.36
6	4.75	22	4.31
8	4.69	24	4.26
10	4.64	26	4.20
12	4.58	28	4.15
14	4.53	30	4.09
16	4.47		

CABLES:

USE TWISTED/SHIELDED CABLE 4x2x0.22 mm2

TWISTING PITCH: 40 mm MAXIMUM
SHIELDING: HIGHER THEN 90%

REMARK:

If the encoder power supply (+5V) is not used
(for example if an encoder simulation
is connected), the 'Grounds' (GND)
must be connected, to ensure
an equipotential reference.

SPECIFICATION

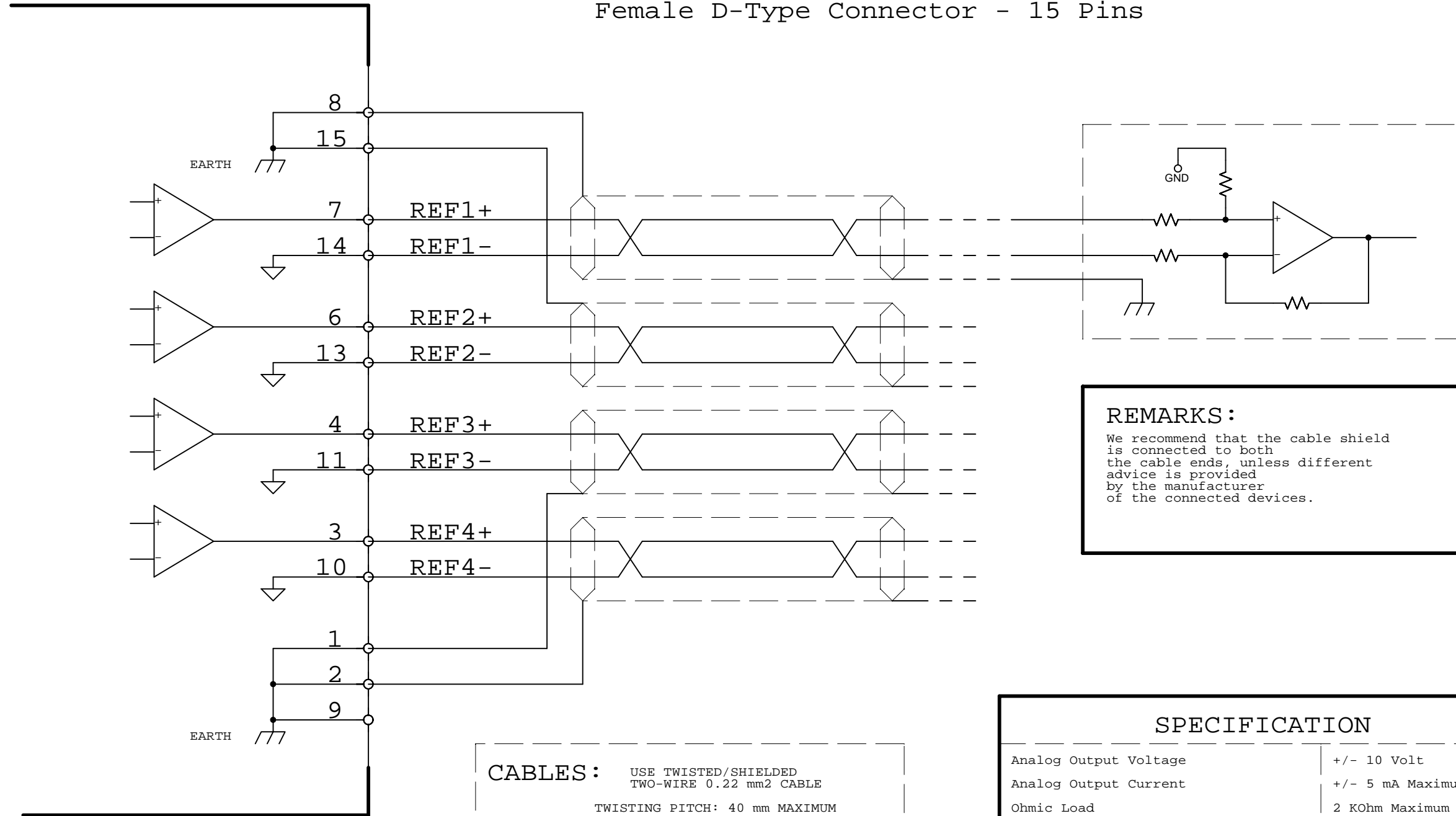|	
Encoder Current Power Supply (each Encoder)	150 mA (at +5V) MAXIMUM
Encoder Signals Electr. Levels	Following RS422 Specs
Encoder Signals Frequency (aech channel)	350 KHz MAXIMUM

REF
Female D-Type Connector - 15 Pins

INC.AXI.

EARTH

Pin	Signal
8	
15	
7	REF1+
14	REF1-
6	REF2+
13	REF2-
4	REF3+
11	REF3-
3	REF4+
10	REF4-
1	
2	
9	

EARTH

GND

REMARKS:

We recommend that the cable shield
is connected to both
the cable ends, unless different
advice is provided
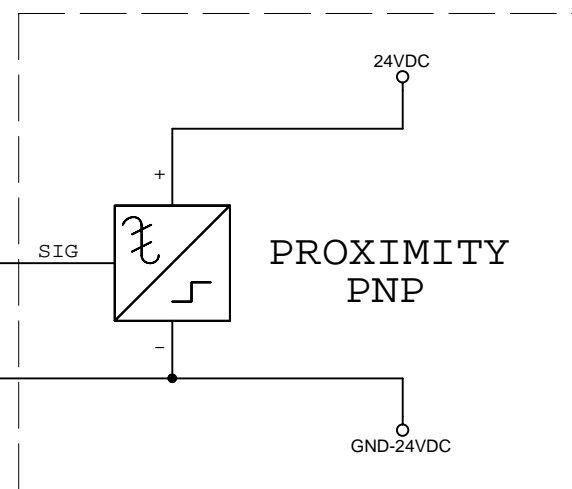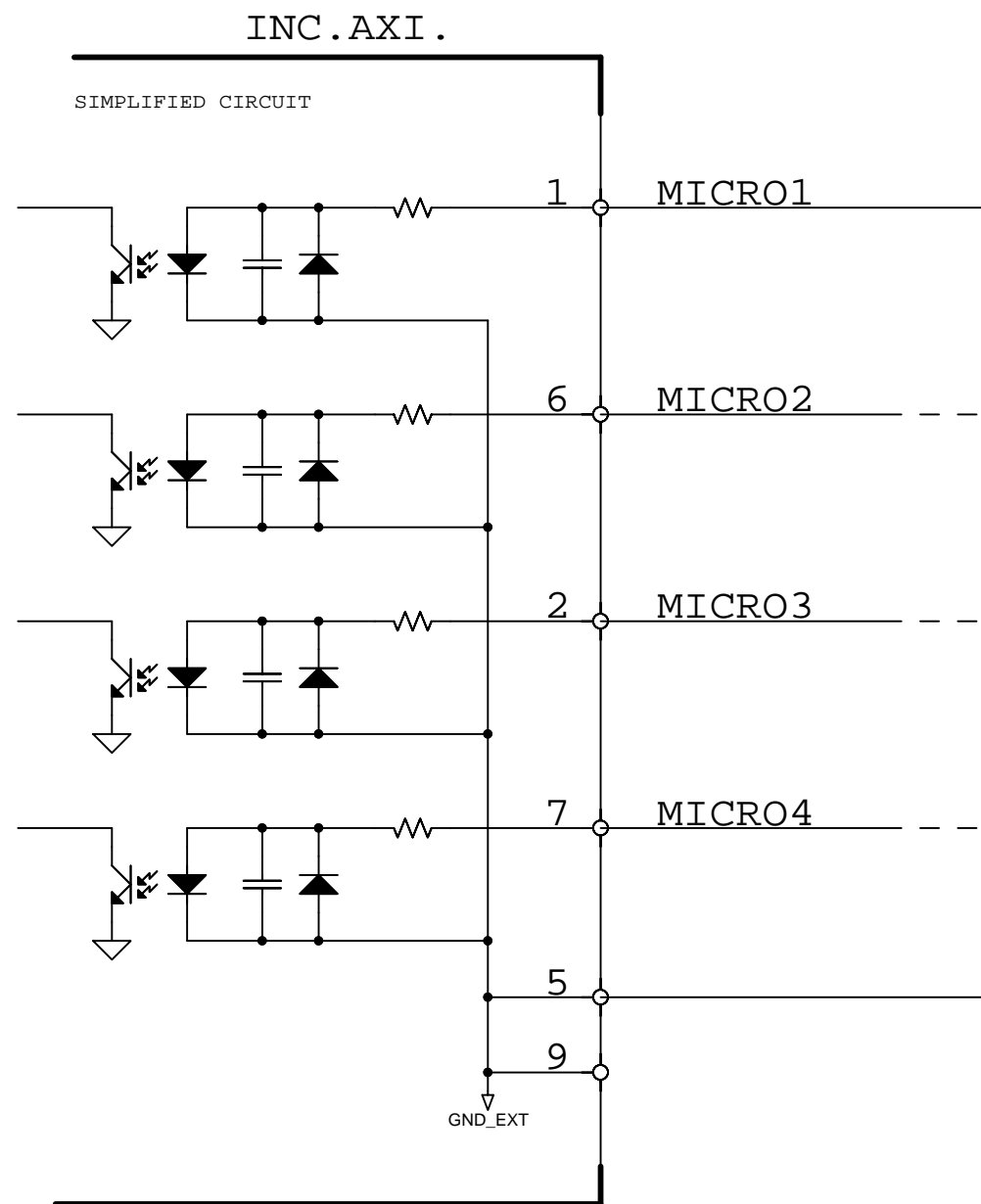by the manufacturer
of the connected devices.

CABLES:

USE TWISTED/SHIELDED
TWO-WIRE 0.22 mm2 CABLE

TWISTING PITCH: 40 mm MAXIMUM

SHIELDING: HIGHER THAN 90%

SPECIFICATION

Analog Output Voltage	+/- 10 Volt
Analog Output Current	+/- 5 mA Maximum
Ohmic Load	2 KOhm Maximum
Resolution	12 Bit (+/- 11 Bit)

u0
Male D-Type Connector - 9 Pins

INC.AXI.

SIMPLIFIED CIRCUIT

1 — MICRO1

6 — MICRO2

2 — MICRO3

7 — MICRO4

5

9

GND_EXT

24VDC

SIG

PROXIMITY
PNP

GND-24VDC

REMARKS:

If a mechanical micro is used, the contact
must connect the 24VDS Power Supply
to the relevant MICROx input.

SPECIFICATION

Input Voltage Range	from -30 V to +30 V
Off-State Voltage	5 V Maximum
Off-State Current	1 mA Maximum
On-State Voltage	15 V Minimum
On-State Current	5 mA Minimum
Input Impedance	3.8 KOhm Typical
Input Current	7 mA
Propagation Delay	400 us Typical
Isolation	1500 V AC rms

ROBOX®	Rev.N.	Descr.	Dis.	Disegno	INC.AXI. 4 ch BOARD for RBXM USER'S INSTRUCTION	Dis.	R.COLOMBO	D.N.	IU5037.001
ROBOX SpA ITALY Via Sempione 82 Castelletto T. 28053 (NO)	Data		Ver.	Foglio	"u0" ZERO MICRO WIRING	Ver.	D.D.MONACHE	Data	14/01/2009
			App.			App.	A.TERUGGI	FN 4	Di 4