

**MODULAR PLAT-FORM
IEC61163-3 PLC
C EMBEDDED COMPUTER**

LT160-LT200

INSTALLATION MANUAL



FOREWORD

This manual contains all the necessary information for the installation, cabling and powering up of the LT.

The equipment implementation includes a description for assembly, dimensions, connections and equipment specifications.

The main difference between the LT160 and the LT200 is the CPU. Input/Output blocks are the same.

As processors and operating system are different , the software workbenchs are different :

	LT160	LT200
CPU	LUC33xx and LUC35xx	LUC4001
OS	Proprietary	Linux 2.6.12
I/O blocks	All blocks	
OPAL software	OPAL32	
IEC611316-3 software	Isagraf V3	Isagraf V5
C language	no	Linux Software DevelopmentKit

TECHNICAL SUPPORT

Tel : 33.(0)5.62.24.05.46 Fax : 33.(0)5.62.24.05.55
e-mail : support@leroy-autom.com

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Leroy Automation

35 Boulevard du Libre échange

F-31650 Saint Orens

Tél : +33.(0)5.62.24.05.50

Fax : +33.(0)5.62.24.05.55

www.leroy-automation.com .fr ou .eu

TABLE OF CONTENTS

PRESENTATION.....	10
HARDWARE ARCHITECTURE - TERMINOLOGY	10
CATALOGUE.....	12
ATTACHMENT – DIMENSIONS	17
ATTACHMENT TO A PLATE OR GRID : SHORT BRACKETS.....	17
ATTACHMENT TO AN ASYMMETRIC G DIN RAIL	17
ATTACHMENT TO A 19" BAY : LONG BRACKETS	18
COMPONENT WEIGHTS.....	18
CONNECTIONS.....	19
GROUNDING – SHIELDS - WATCHDOG	19
LT160 CPU WIRING.....	20
Communication module List.....	20
Ethernet channel	20
RS485.....	21
RS232 (simple)	22
PRG Bridge :	22
RS232 (Complete).....	22
LT200 CPU BLOCK : LUC4001.....	23
Serial links of CPU610 module (on the same SubD 9 pins connector)	23
COM630 Module	23
I/O TERMINAL MODULE WIRING.....	25
Wiring diagram table.....	25
DIAGRAM A : DI310 / 16i.24b - 16i48b, DI410 / 16ix24b - 16ix48b, DIO210 / 16i.24b	27
DIAGRAM B : DO310 / 16o24b.....	28
DIAGRAM C : DO310 / 8om3Ab, DIO210 / 8om3Ab	29
DIAGRAM D : AI110 or AI210 / 8i.c1b or 8i.v1b or 8i.v2b.....	30
AIO320 / 8i.c1b - 8i.v1b.....	30
DIAGRAM E : AO121 / 8o.c1b	31
DIAGRAM F : AO121 / 8o.v1b	32
DIAGRAM G : DI312 / 16is24b	33
DIAGRAM M : DO310 / 8om3As, DIO210 / 8om3As	35
DIAGRAM N : DI310 / 16i.24s - 16i.48s; DIO210 / 16i.24s	36
DIAGRAM O : AI110 - AI210 / 8i.c1s - 8i.v1s AO121 / 8o.v1s	37
DIAGRAM P : DO310 / 16o.24s	38
DIAGRAM Q : AIO320 / 4o.c1b.....	39
DIAGRAM R : AIO320 / 4o.v1b.....	40
DIAGRAM S : AIO320 / 8i.p1b.....	41
DIAGRAM T : DI410 / 32ix24s.....	42
DIAGRAM U : DI130 / 8i.120b-1/8i.120b-2.....	43
DIAGRAM V : DIO130 / 8io.120b-1/8io.120b-2	44
ROBUSTNESS	46
ELECTROMAGNETIC COMPATIBILITY.....	46
EMISSION	46
IMMUNITY	46
CLIMATIC ENVIRONMENT	47
Working and storage temperatures.....	47
SHOCK/VIBRATION STRESS	47
Shocks	47
Random vibrations.....	47
Sinusoidal vibrations.....	47
TECHNICAL SPECIFICATIONS	48
POWER SUPPLY	48
LT160 : CPU AND COMMUNICATION TERMINALS.....	49

CPU display (LED).....	50
RS232 / RS485 ports	50
Port de communication Ethernet.....	51
LT200 : LUC4001 CPU	52
LUC4001 composition.....	52
CPU610 central unit module.....	52
Serial link on CPU610 module	52
Wiring : RS232 RS422.....	52
CPU610 module diagnosis lights	53
Going to the Program Restart Mode (PRM).....	53
COM630 communication module.....	53
DIGITAL INPUTS : DI310 - DI410 MODULES	56
SAFETY DIGITAL INPUTS (WIRING CONTROL) : DI312.....	57
STATIC DIGITAL OUTPUTS : DO310 MODULE	58
RELAY DIGITAL OUTPUTS : DO310 / 80M3A.....	59
DIGITAL I/O : DIO210.....	60
NON ISOLATED ANALOG CURRENT INPUTS : AI110 - AI210	61
ENTREES ANALOGIQUES TENSION NON ISOLEES : AI110 - AI210	62
ANALOG 4-20MA CURRENT OUTPUTS : AO121.....	63
ANALOG VOLTAGE OUTPUTS : AO121	64
ANALOG CURRENT AND VOLTAGE I/O : AIO320	65
PT100 SENSOR INPUTS : AIO320	67
SECURED DIGITAL INPUTS : DI130.....	68
SECURED DIGITAL INPUTS / OUTPUTS : DIO130.....	69

Presentation

Hardware architecture - terminology

The LT is a modular plat-form. It comprises a **base** on which the **blocks** are fixed. **The base** is a metallic section which supports a **bus rack**. The section extremities are fitted with 2 **brackets** which enable it to be screwed to a cabinet. The section may also be fitted, on option, with 2 **flanges** which enable the fixation to an asymmetric DIN rail.

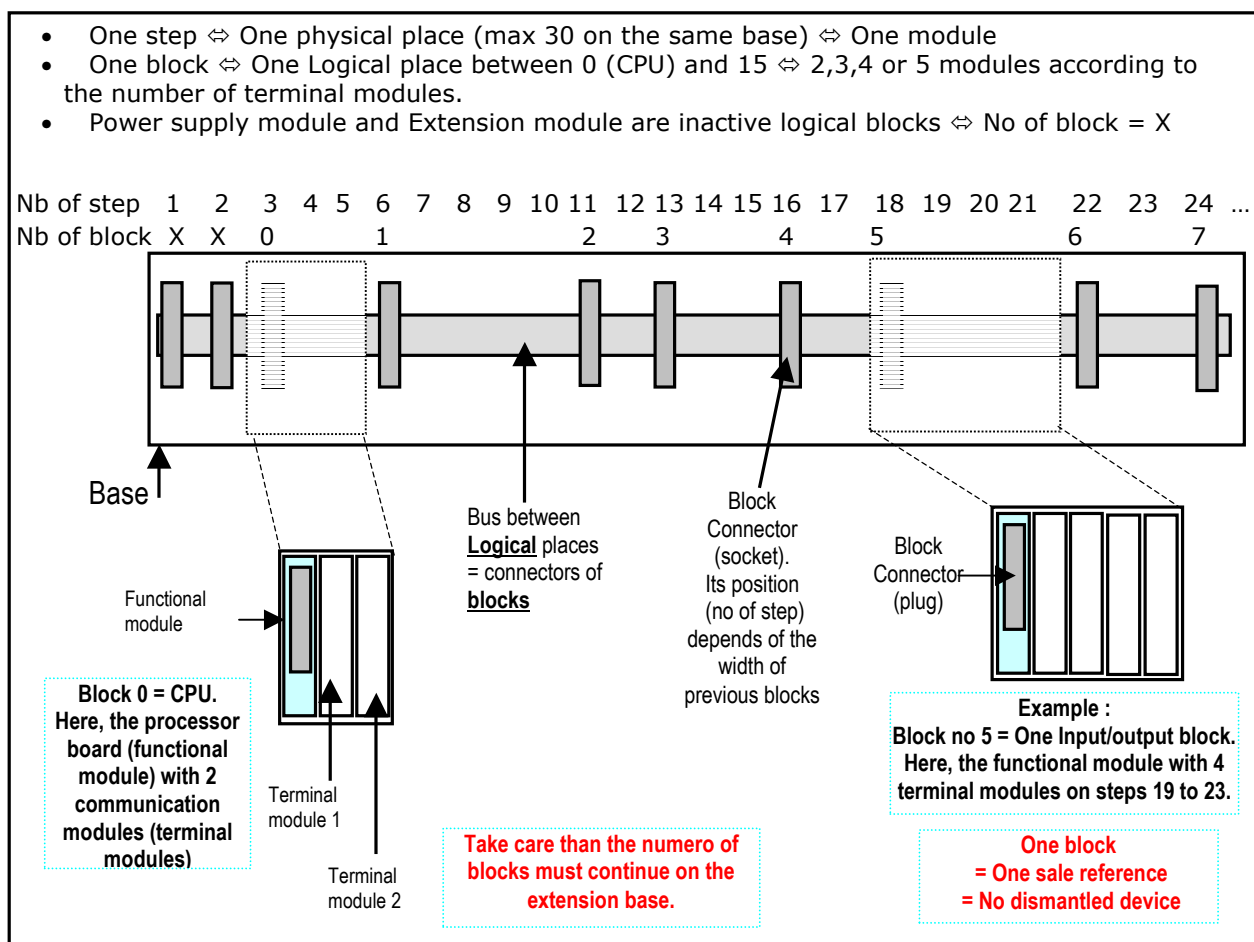
A **block** consists of a **functional module** (for instance DI310 Digital inputs, AO121 analog outputs CPU332 central processor ...) associated with **terminal modules** (for instance, 16i.24b for 16 24V digital inputs on a screw terminal , 8o.c1b for 8 ANA current outputs on a screw terminal , ...). All modules on the same block are solidary and screwed together on a plate.

BLOCK	Functional module Connected on the bus	Terminal modules
Power block	1	No
CPU block	1	1 to 4 modules : communication links
I/O block	1	1 to 4 modules : I/O channels
Extension block	1	No

Each module need a **2.5 cm step** on the base which has a **modular length of n steps**. The minimum length of a base is 4 steps and the maximum length is **30 steps**. The distance between the CPU and the most distant block should not (including the extension cable) exceed **1 meter**.

One CPU block can manage up to 15 I/O blocks coded from 1 to F in the connector on the bus rack.

The base consists of a metallic rack and a flexible bus with HE10 connectors. The connectors which receive a input/output block have a code between 1 anf F (hexadecimal base) . The code of the connector which receive a CPU block is 0.



CAUTION :

The width of blocks varies between 1 and 5 depending of the number of terminal modules. So, the distance between HE10 block connector sockets varies between 1 and 5 slots / steps. So you can't always invert blocks if their width are different.

The build of the base is made on demand in factory in accordance with the customer configuration on the purchase order.

Extension bases

The LT accepts up to 2 extension bases. The width can be different. Bases are linked by extension cable and extension module preferably in slot 1.

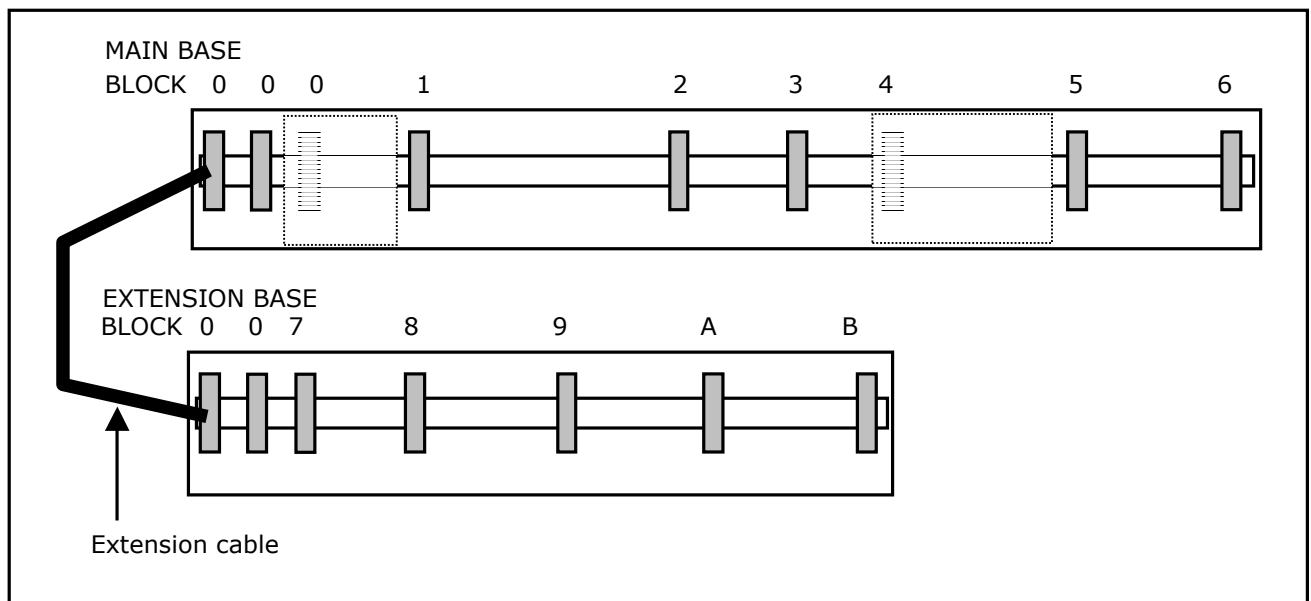
So, on main base, there are :

- One extension module (1 module)
- Power supply block (1 module)
- CPU block and I/O blocks.

On extension base :

- One extension module
- Additional power supply module (if necessary),
- Other I/O blocks

The I/O block numbering continues over the extension base. (see diagram below)



Catalogue

Description	Sale reference	Functional module	steps
Power supply			
24V-48V	LPSD331	PSD331	1
120V	LPSD342	PSD342	1
Extension blocks			
Extension 100	LEXT100	EXT100	1
Extension 101 (needs an additional power supply on the extension base)	LEXT101	EXT101	1
Extension cables			
simple, length 22cm	PCABEXT22		
simple, length 45cm	PCABEXT45		
double, length 22cm (Y cable for 3 embases)	PCABEXTY22		
double, length 45cm (Y cable for 3 embases)	PCABEXTY45		
Screw terminals connectors			
frontal (female removable)	LCBVF18	5.08mm apart	
Lateral (female removable)	LCBVL18	5.08mm apart	
Spring cage (female removable)	LCBCR18	5.08mm apart	
lateral for PT100 blocks	LCVBL12	3.5mm apart	
bases			
from 4 to 30 slots	From LEMB004 to LEMB030		4 to 30
Base attachment			
With short brackets	LFIX000		
With "flanges" on Din rail	LFIX001		
With long brackets	LFIX003		
Reserve			
(1 reserve = 1 HE10 connector on the flexible bus)			
1 slot for future insertion of a 1 slot block.	LRES1		1
2 slot for future insertion of a 2 slot block.	LRES2		2
3 slot for future insertion of a 3 slot block.	LRES3		3
4 slot for future insertion of a 4 slot block.	LRES4		4
5 slot for future insertion of a 5 slot block.	LRES5		5
Cache			
(1 cache = NOT HE10 connector on the flexible bus → no insertion of future bloc			
1 slot.	LRESC		1

LT200 CPU block (only one for the moment)

Sale Block reference	modules	Description	Steps
LUC4001	CPU610 COM630	CPU : RS232 and USB connectors Ethernet 10-100 base T and 3 x RS232/RS422 /RS485	2

NO Ethernet LT160 CPU blocks : LUC330x

(*) The same 9 pins D-sub connector contains the two RS232 and RS485 interfaces which may be used exclusively according to the wiring.

Sale block reference	Module composition	Description	Steps
LUC3300	CPU332 COM301	CPU RS232/Prg + RS232/485 (*)	2
LUC3301	CPU332 COM301 COM311	CPU RS232/Prg + RS232/485 (*) RS232C + RS232 C	3
LUC3302	CPU332 COM301 COM312	CPU RS232/Prg + RS232/485 (*) RS232/485 + RS232/485	3
LUC3303	CPU334 COM301 COM311 COM312	CPU RS232/Prg + RS232/485 (*) RS232C + RS232 C RS232/485 + RS232/485	4
LUC3304	CPU334 COM301 COM312 COM312	CPU RS232/Prg + RS232/485 (*) RS232/485 + RS232/485 RS232/485 + RS232/485	4
LUC3305	CPU334 COM301 COM311 COM312 COM312	CPU RS232/Prg + RS232/485 (*) RS232C + RS232 C RS232/485 + RS232/485 RS232/485 + RS232/485	5
LUC3306	CPU334 COM301 COM312 COM312 COM312	CPU RS232/Prg + RS232/485 (*) RS232/485 + RS232/485 RS232/485 + RS232/485 RS232/485 + RS232/485	5

Ethernet LT160 CPU blocks : LUC350x

Sale block reference	Module composition	Description	Steps
LUC3500	CPU354 COM303	Ethernet CPU RS232/Prg + 10Base-T RJ45	2
LUC3501	CPU354 COM303 COM311	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232C + RS232 C	3
LUC3502	CPU354 COM303 COM312	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232/485 + RS232/485	3
LUC3503	CPU354 COM303 COM311 COM312	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232C + RS232 C RS232/485 + RS232/485	4
LUC3504	CPU354 COM303 COM312 COM312	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232/485 + RS232/485 RS232/485 + RS232/485	4
LUC3505	CPU354 COM303 COM311 COM312 COM312	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232C + RS232 C RS232/485 + RS232/485 RS232/485 + RS232/485	5
LUC3506	CPU354 COM303 COM312 COM312 COM312	Ethernet CPU RS232/Prg + 10Base-T RJ45 RS232/485 + RS232/485 RS232/485 + RS232/485 RS232/485 + RS232/485	5

Description	Sale block reference	Composition : Functional module / terminal modules	steps
Digital inputs			
24V (filtered inputs)			
16 channels			
Screw terminals	LID14241	DI310 /1×16i.24b	2
25 pin SubD connector	LID14641	DI310 /1×16i.24s	2
32 channels			
Screw terminals	LID16241	DI310 /2×16i.24b	3
25 pin SubD connector	LID16641	DI310 /2×16i.24s	3
24V (no filtered inputs)			
48 channels			
Screw terminals	LID18241	DI410 /3×16ix24b	4
64 channels			
Screw terminals	LID19241	DI410 /4×16ix24b	5
37 pin SubD connector	LID19641	DI410 /2×32ix24s	3
48V (filtered inputs)			
16 channels			
Screw terminals	LID34242	DI310 /1×16i48b	2
25 pin SubD connector	LID34642	DI310 /1×16i48s	2
32 channels			
Screw terminals	LID36242	DI310 /2×16i48b	3
25 pin SubD connector	LID36642	DI310 /2×16i48s	3
48V (no filtered inputs)			
48 channels			
Screw terminals	LID38241	DI410 /3×16ix48b	4
64 channels			
Screw terminals	LID39241	DI410 /4×16ix48b	5

* 1psl./x voies : 1 power supply for x channels

Description	Sale block reference	Composition : Functional module / terminal modules	steps
Digital inputs with wiring control (for anti intrusion or secured systems)			
16 channels			
Screw terminals	LID44241	DI312 / 1 ×16is24b	2
32 channels			
Screw terminals	LID46241	DI312 / 2 ×16is24b	3
Secured digital inputs			
24V/48V/120V			
16 channels			
Screw terminals	LID64202	DI130/8i120b-1/8i120b-2	3

Description	Sale block reference	Composition : Functional module / terminal modules	steps
Static output (24V 100mA)			
16 channels			
Screw terminals	LOD14240	DO310 / 16o.24b	2
25 pin SubD connector	LOD14640	DO310 / 16o.24s	2
32 channels			
Screw terminals	LOD16240	DO310 / 2 x 16o.24b	3
25 pin SubD connector	LOD16640	DO310 / 2 x 16o.24s	3
Relay outputs			
8 channels			
Screw terminals	LOD52200	DO310 / 8om3Ab	2
25 pin SubD connector	LOD52600	DO310 / 8om3As	2
16 channels			
Screw terminals	LOD54200	DO310 / 2 x 8om3Ab	3
25 pin SubD connector	LOD54600	DO310 / 2 x 8om3As	3
24 channels			
Screw terminals	LOD55200	DO310 / 3 x 8om3Ab	4
25 pin SubD connector	LOD55600	DO310 / 3 x 8om3As	4
32 channels			
Screw terminals	LOD56200	DO310 / 4 x 8om3Ab	5
25 pin SubD connector	LOD56600	DO310 / 4 x 8om3As	5

Mixte digital input/output blocks			
16 inputs (24V) + 8 relay outputs			
Screw terminals	LIO15200	DIO210 / 6i.24b / 8om3Ab	3
25 pin SubD connector	LIO15600	DIO210 / 16i.24s /8om3As	3
8three voltage inputs (24V/48V/120V) + 8 relays outputs with redundant commands (for sub station energy management)	LIO64202	DIO130 / 2 x 8io120b	3

Description	Sale block reference	Composition : Functional module / terminal modules	steps
Analog inputs			
-20 mA/ +20 mA			
8 channels			
Screw terminals	LIA12210	AI110 / 8i.c1b	2
SubD 25 points	LIA12610	AI110 / 8i.c1s	2
16 channels			
Screw terminals	LIA14210	AI210 / 2 x 8i.c1b	3
SubD 25 points	LIA14610	AI210 / 2 x 8i.c1s	3
-10 V/ +10V			
8 channels			
Screw terminals	LIA32210	AI110 / 8i.v1b	2
SubD 25 points	LIA32610	AI110 / 8i.v1s	2
16 channels			
Screw terminals	LIA34210	AI210 / 2 x 8i.v1b	3
SubD 25 points	LIA34610	AI210 / 2 x 8i.v1s	3
-5 V/ +5V			
8 channels Screw terminals	LIA52210	AI110 / 1x 8i.v2b	2
16 channels Screw terminals	LIA54210	AI210 / 2 x 8i.v2b	3
Analog outputs			
4 / 20mA			
8 channels Screw terminals	LOA12211	AO121 / 8o.c1b	2
-10V / +10V			
8 channels			
Screw terminals	LOA32211	AO121 / 8o.v1b	2
SubD 25 points	LOA32611	AO121 / 8o.v1s	2

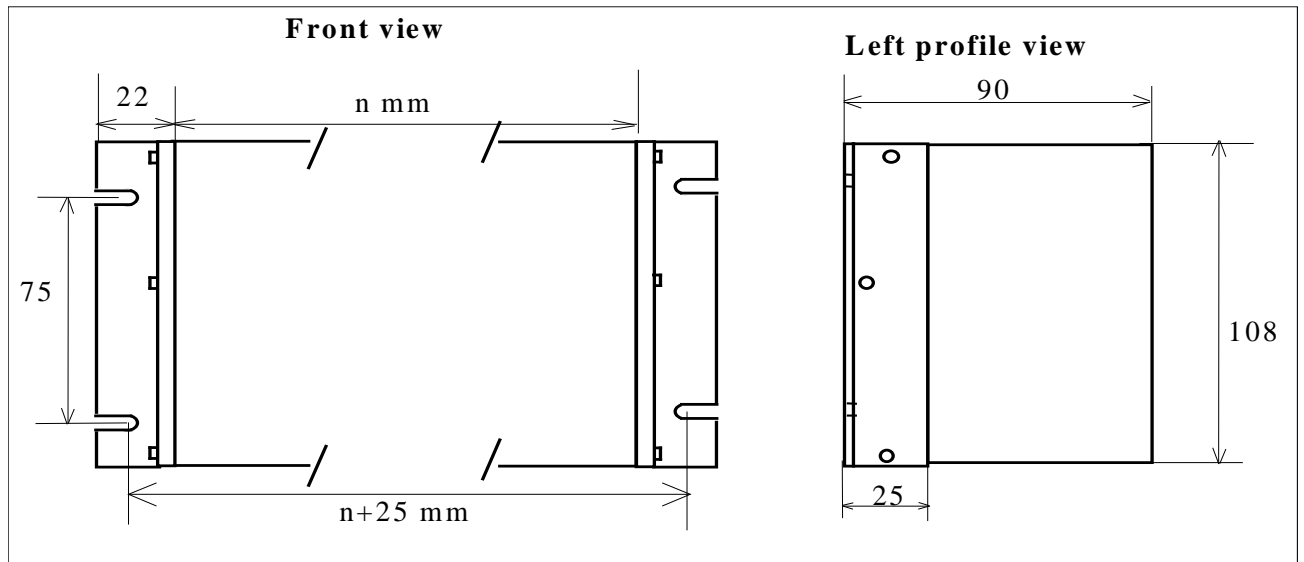
Mixte analog input / output blocks		(Screw terminals)	
8 inputs -20/+20mA 4 outputs 4-20mA	LIO33200	AIO320 8i.c1b 4o.c1b	3
8 inputs -10/+10V 4 outputs -10V/+10V	LIO43200	AIO320 8i.v1b 4o.v1b	3
8 inputs PT100 (-200/+350°C)	LIO52200	AIO320 8i.p1b	2
8 inputs PT100 (-200/+350°C) 4 outputs 4-20mA	LIO53203	AIO320 8i.p1b 4o.c1b	3
8 inputs PT100 (-200/+350°C) 4 outputs -10V/+10V	LIO53204	AIO320 8i.p1b 4o.v1b	3

* 8ip1b screw terminals have 12 pins.

Attachment – Dimensions

Attachment to a plate or grid : short brackets

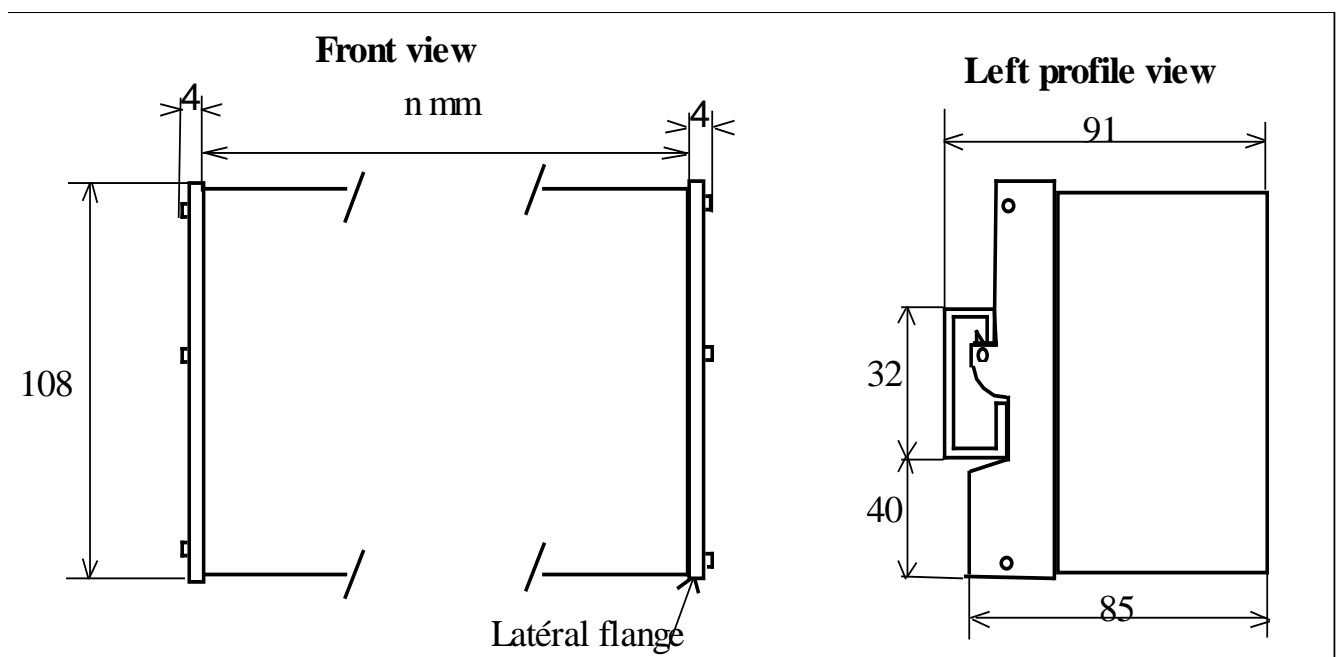
The base consists of a rack (modular : n slots \times 250mm) and at each side a bracket for screwing (M6) to a grid or plate.



LT dimensions with short brackets screw attachment

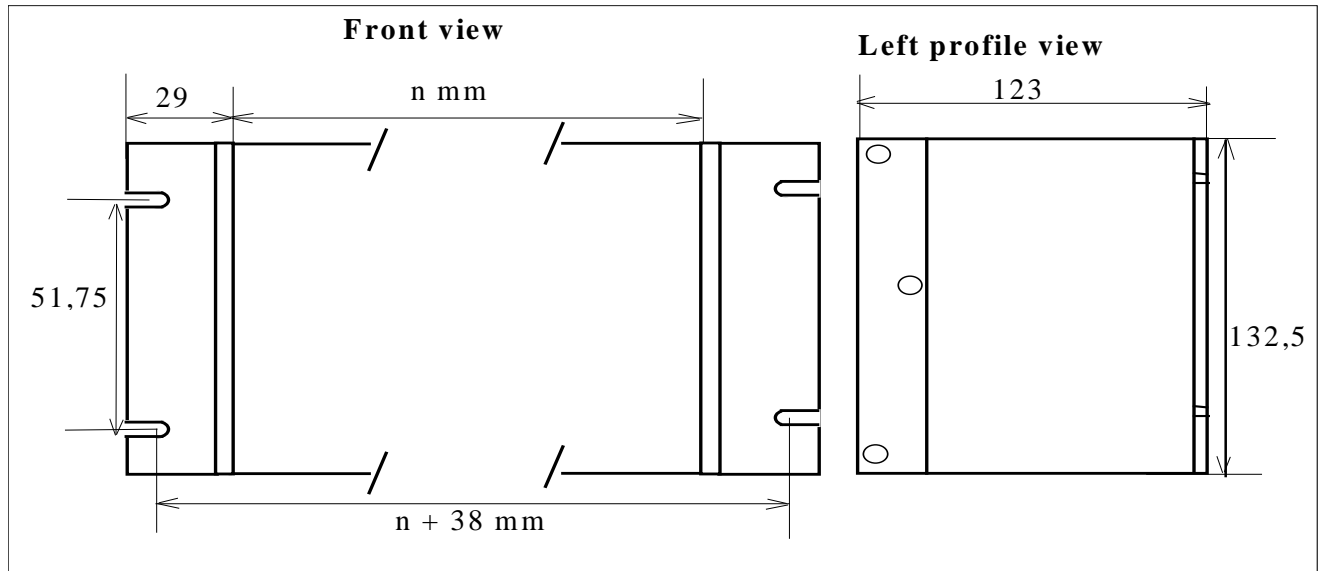
Attachment to an asymmetric G DIN rail

The base consists of a **rack** (n slots \times 250mm) and at each side a lateral protection flange fixed with 3 screws. The rail is situated 40 mm below the flange bottom and exceeds the LT depth by 6 mm. 7 cms free space should be envisaged above the **DIN Rail** to enable the LT pivoting during its rail insertion or removal.



Attachment to a 19" bay : long brackets

The base consists of a rack (n slots x 250mm) and a bracket on either side for screwing to a 19" mounting bay with M6 screws.



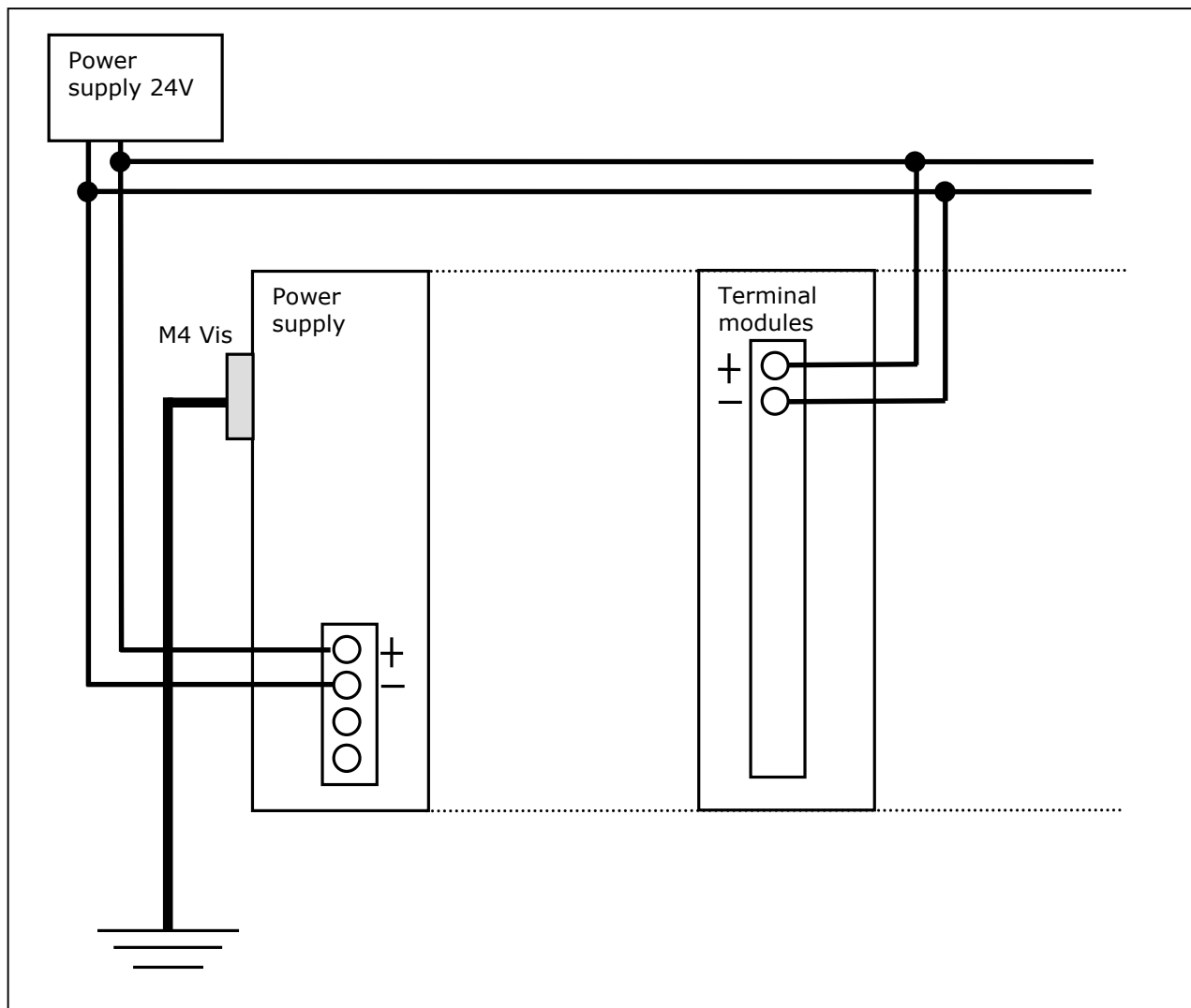
LT dimensions with long brackets screw attachments

Component weights

equipment	Nb slots	weight (grams)
base (short brackets)	6	210
	17 (19 pouces)	600
	30	1100
Power supply block	1	100
CPU blocks	2	270
	3	370
	4	470
	5	570
I/O blocks	2	240
	3	360
	4	470
	5	580

Connections

Grounding – Shields - Watchdog



General wiring diagram

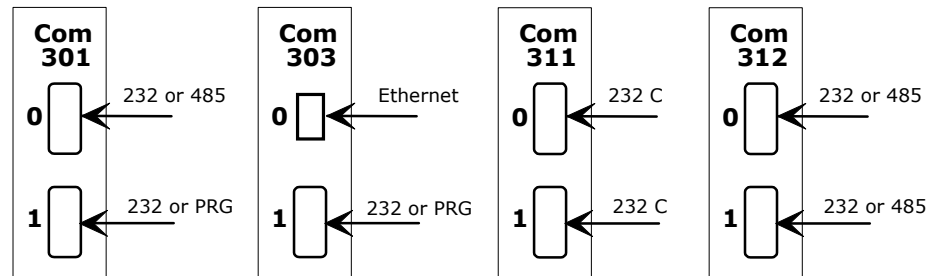
Rules to respect :

- Connect the LT chassis to the ground through the M4 screw on the left flange of the base.
- Use shielded cables to transport analog and communication signals.
- Connect the cable shielding to an grounding bar close to the LT which is also connected to the ground.
- The terminal module wiring : verify that the wiring diagrams of each board to see if a fuse needs to be placed in the power supply circuit. (Note : some terminal modules are passive and do not require a power supply).
- Shielding of the Digital I/O cables is recommended for disturbed environments..

LT160 CPU wiring

Communication module List

The LT160 CPU supports 1 to 4 communication terminal modules. Each terminal module supports **2 communication ports** fitted with 9 pins D-sub. The upper D-Sub is called com0 and the lower com1. The different terminal modules available on the LT are



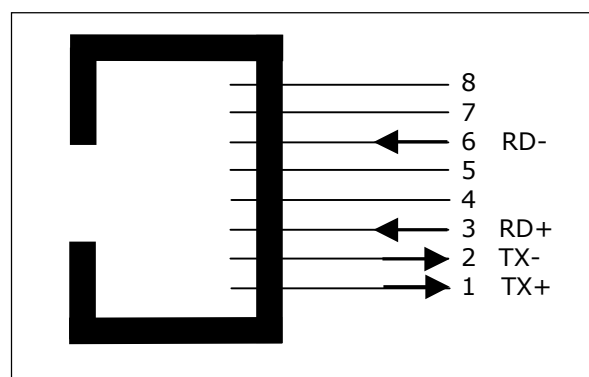
	Com301	Com303	Com311	Com312
Upper connector : Com0	RS232/RS485	Ethernet 10 base T	RS232C	RS232/485
Lower connector : Com1	RS232/Prg (*)	RS232/Prg (*)	RS232C	RS232/485

(*) A bridge between no 1 and no 6 pins allows to switch to a special Mode to upload a new Operating System. CAUTION !!

Ethernet channel

Available on the com0 of the Com303.

Speed	10 Mbits base T
Connector	Shielded RJ-45
Médium	Failed twisted-pair cable (FTP 100Ω)
Lenght	100 m max between the LT and the switch
Topology	Star. point to point



RS485

Available on the com0 of the Com301 and on the com0 and com1 of the Com312.

The RS485 signal is the voltage difference between 2 terminals, A and B. The RS485 is said to be mono-pair: the same pair is used to transmit and receive.

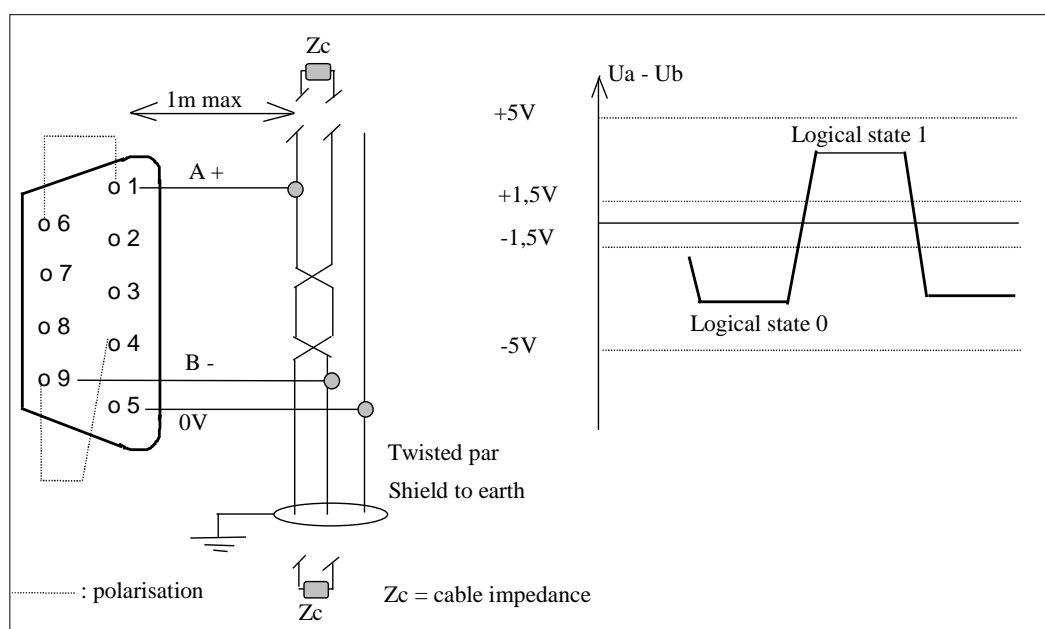
On transmission :

- The 0 bit is characterized by a voltage differential $-5V < U_a - U_b < -1.5V$, in practice approximately $-2.5V$
- The 1 bit is characterized by a voltage differential $+1.5V < U_a - U_b < +5V$, in practice approximately $+2.5V$

On reception :

- If $-5V < U_a - U_b < -1.5V$, then the received signal is interpreted as a 0 bit
- If $+1.5V < U_a - U_b < +5V$, then the received signal is interpreted as a 1bit

Idle : $U_a - U_b$ is equal to approximately $+250mV$ under the condition that the line is **adapted** and **polarized**.



Reminder : an RS232 or RS485 is used on a com but never simultaneously (however, the transmission may be simultaneous but not the reception) .

2 operations are necessary for the normalization of your RS485 network : **polarize and adapt** the line.

Line Polarization: The A+ and B- terminals are pre-polarized ($150k\Omega$) internally. These suggested default values enable the LT station polarization when not connected to a RS485 network. In order to customize your installation you must polarize your line at 470Ω . **Polarization should be undertaken at a single unique point on the line.** On the LT, it is sufficient if you bridge the pins 1 and 6 and then 9 and 4. The 470Ω resistances are available internally (refer to IV.3.2 "Technical data").

Line adaptation : Wire an adaptation resistance to each extremity of the network. The value of this resistance should be equal to the impedance characteristic of the transmission wire which is normally 120Ω . This is required if the line is longer than 100 meters. The resistance should be added between the pins 1 and 9.

RS232 (simple)

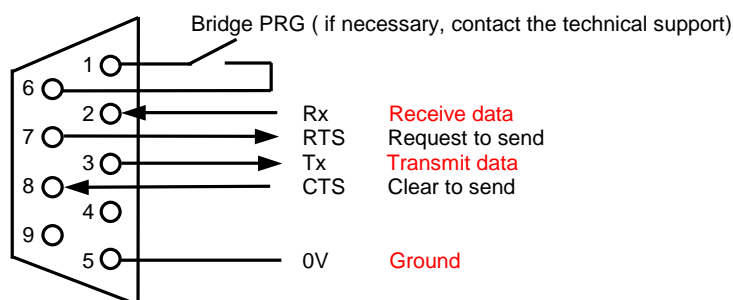
Available on the com0 of the Com301 and on the com0 and com1 of the Com312.

Warning : the RS232 and RS485 are present on the same D-Sub. Connect the pins 2, 3, 5 and if required the 7 and 8 (RTS and CTS) to use the RS232.

Also, under the Jbus/Modbus protocol the RTS output is activated (electrically between 5 and 12 volts) when the LT sends. This can be used to pilot a converter.

PRG Bridge :

On the com1 of the Com301 and Com303, Pins 1 and 6 enable the launching of the LT in programming mode (Prg). The programming mode is used to release the operating system (Technical support only).

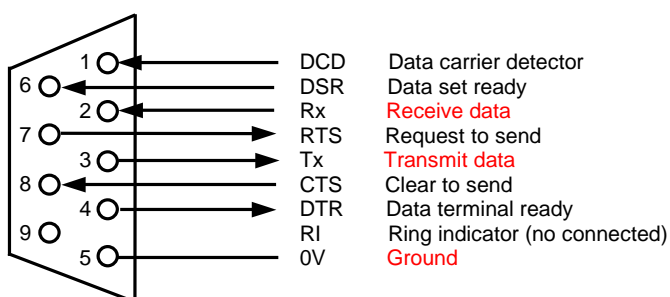


RS232 (Complete)

Available on com0 and com1 of the Com311.

The RTS output (pin 7), on the Jbus/Modbus protocol, is activated (electrically between +5 et +12 volts) when the LT transmits. It can be used for piloting a converter.

The DTR and RTS signals may be piloted by the application software. The DCD, DSR and CTS may be read..

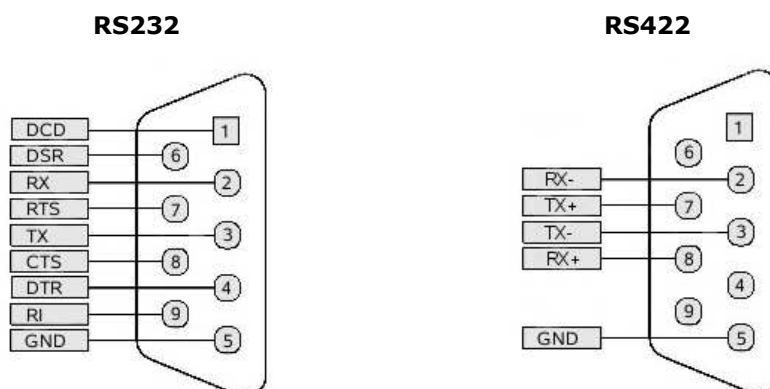


LT200 CPU block : LUC4001

The LUC4001 block consists of

- A CPU module CPU610 with RS232/RS422 link and USB maintenance link.
- A communication module COM630 with Ethernet and 3 serial links.

Serial links of CPU610 module (on the same SubD 9 pins connector)



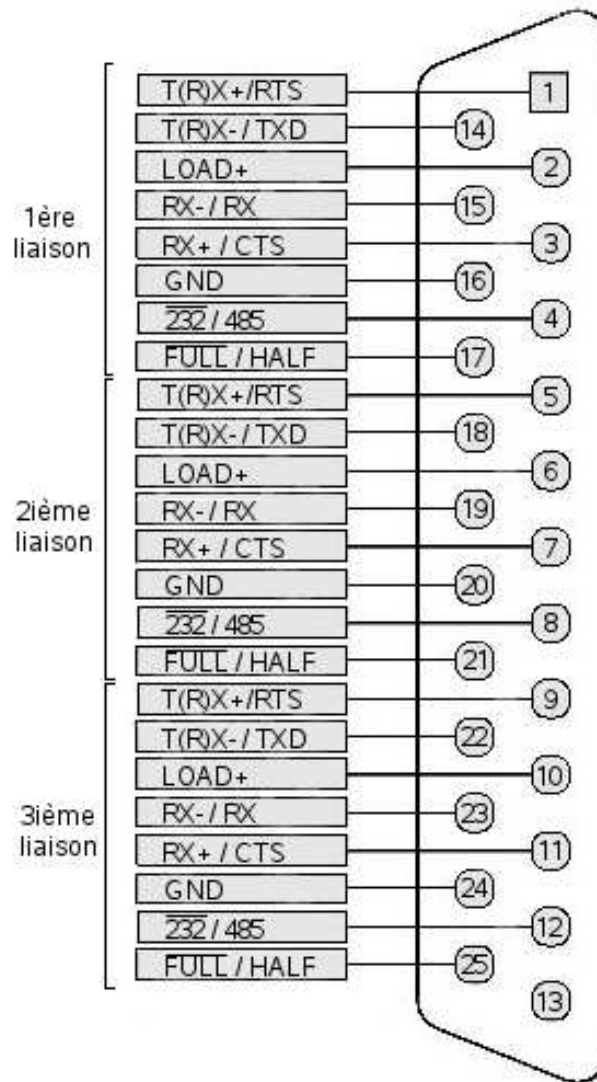
NOTA : The RS485 is not possible. It would use a bridge between 7 and 8 pins. But this bridge is tested on power ON to switch in Program Restart Mode (PRM). If you need RS485 link, use the COM630 links.

COM630 Module

Ethernet channel

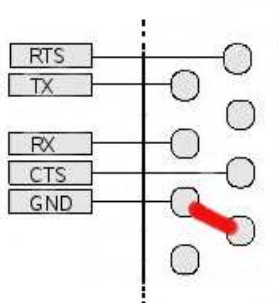
Pin	Description
1	Out +
2	Out -
3	In +
4	Common
5	Common
6	In -
7	Common
8	Common

Serial links

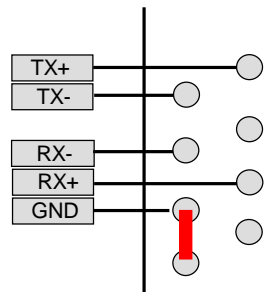


Choice of RS type

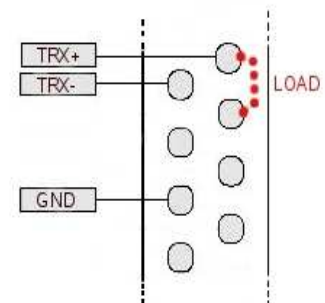
RS232



RS422



RS485



About RS485 :

TRX+ and TRX- lines are internally polarized with 150 k Ω resistor.

There is a 120 Ω adaptation resistor between TRX+ and TRX-. To use it , bridge the TRX+ and LOAD pins.

I/O terminal module wiring

Reminder : An input output module consists of

- a functional module
- 1 to 4 terminal modules

The convention is to name **terminal module n°1 the closest to the function board**. In the following wiring plans the channel numbers are given for terminal module 1. The channel numbers of the other terminal modules, if present, follow respectively.

In order to find the wiring which corresponds to your board :

Read the print on the function module and then the terminal module.

Deduce **the reference for the wiring plan** and go to the following pages.

Important : some blocks have to be powered. Generally the power supply is situated on the first two wiring points.

Except precision within wiring, only one terminal module requires a power supply in order power all terminal modules of the block.

In complement of the protection of the terminal module against over voltage, it is recommended to protect their supply circuit by a 0.5A fuse.

If necessary (After Sales Service), the blocks should be dismantled with a Pozidriv n°1 cruciform screwdriver. The torque force is 1Nm.

Wiring diagram table

Digital inputs	Power supply	Connector	Diagram
DI310 / 16i.24b	24V	Screw terminal	A
DI310 / 16i.24s	24V	SubD 25 pins	N
DI310 / 16i48b	48V	Screw terminal	A
DI310 / 16i48s	48V	SubD 25 pins	N
DI312 / 16is24b	24V	Screw terminal	G
DI410 / 16ix24b	24V	Screw terminal	A
DI410 / 16ix48b	48V	Screw terminal	A
DI410 / 32ix24s	24V	SubD 37 pins	T
DIO210 / 16i.24b	24V	Screw terminal	A
DIO210 / 16i.24s	24V	SubD 25 pins	N
DI130/8i.120b-1/8i.120b-2	24V/48V/120V	Screw terminal	U
DIO130/8io.120b-1/8io.120b-2	24V/48V/120V	Screw terminal	V
Digital outputs	Signal		
DO310 / 16o.24b	Sorties statiques 24V	Screw terminal	B
DO310 / 8om3Ab	Sorties relais	Screw terminal	C
DO310 / 8om3As	Sorties relais	SubD 25 pins	M
DO310 / 16o.24s	Sorties statiques 24V	SubD 25 pins	P
DIO210 / 8om3Ab	Sorties relais	Screw terminal	C
DIO210 / 8om3As	Sorties relais	SubD 25 pins	M
DIO130/8io.120b-1/8io.120b-2	Sorties relais	Screw terminal	V

Analog inputs	Signal		
AI110 / 8i.c1b	-20 / +20mA	Screw terminal	D
AI110 / 8i.v1b	-10 / +10V	Screw terminal	D
AI110 / 8i.v2b	-5 / +5V	Screw terminal	D
AI110 / 8i.c1s	-20 / +20mA	SubD 25 pins	O
AI110 / 8i.v1s	-10 / +10V	SubD 25 pins	O
AI110 / 4iyv1s	0 / 10V	SubD 9 pins	Q
AI110 / 4iyc1s	0 / 20mA	SubD 9 pins	Q
AI210 / 8i.c1b	-20 / +20mA	Screw terminal	D
AI210 / 8i.v1b	-10 / +10V	Screw terminal	D
AI210 / 8i.v2b	-5 / +5V	Screw terminal	D
AI210 / 8i.c1s	-20 / +20mA	SubD 25 pins	O
AI210 / 8i.v1s	-10 / +10V	SubD 25 pins	O
AI210 / 4iyv1s	0 / 10V	SubD 9 pins	Q
AI210 / 4iyc1s	0 / 20mA	SubD 9 pins	Q
AIO320 / 8i.c1b	-20 / +20mA	Screw terminal	D
AIO320 / 8i.v1b	-10 / +10V	Screw terminal	D
AIO320 / 8i.p1b	-50°C / +350°C	Screw terminal	S
Analog outputs	Signal		
AO121 / 8o.c1b	4 / 20mA	Screw terminal	E
AO121 / 8o.v1b	-10 / +10V	Screw terminal	F
AO121 / 8o.v1s	-10 / +10V	SubD 25 pins	O
AIO320 / 4o.c1b	4 / 20mA	Screw terminal	R
AIO320 / 4o.v1b	-10 / +10V	Screw terminal	S

DIAGRAM A : DI310 / 16i.24b - 16i48b, DI410 / 16ix24b - 16ix48b, DIO210 / 16i.24b

Digital inputs , **type P** , screw terminal 18 pins, 1 power supply .

The input is ON when the sensor switch to V+.

Channel numbers : terminal module 1 : 0 to F; terminal module 2 : 10 to 1F.

Terminal module	Functional module	V+	Advice
16i24b	DI310	24V	
16i24b	DIO210	24V	no need to wire the +V
16i48b	DI310	48V	Supply all the terminal modules
16ix24b	DI410	24V	
16ix48b	DI410	48V	Supply only one terminal module if several terminal modules are present.

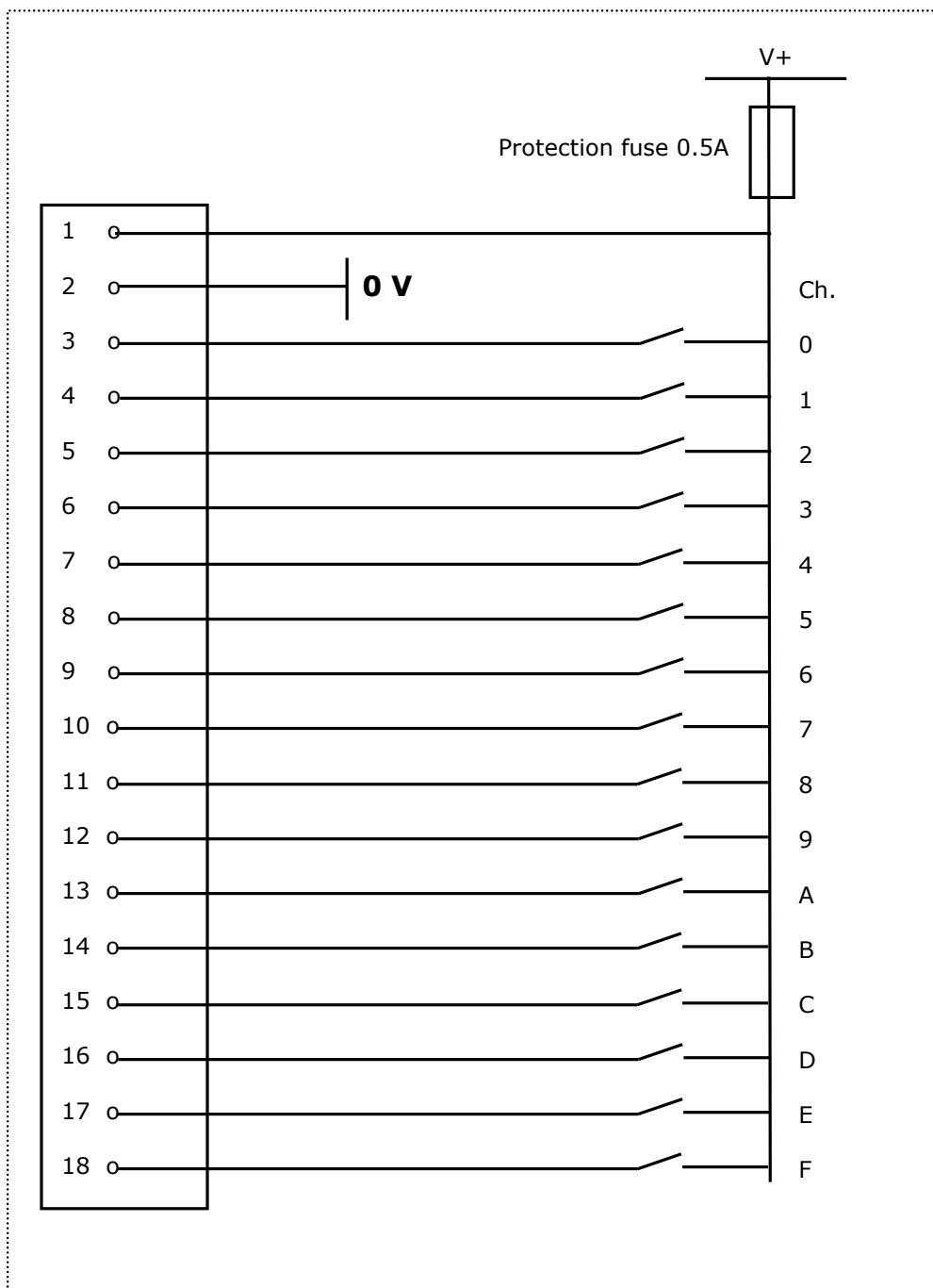


DIAGRAM B : DO310 / 16o24b

16o24b terminal module : 16 digital outputs , **24Vcc**, **screw terminal** , type P, 1 supply for 16 channels.

The output switches the load at + V. The unplugged loads have to be connected to 0V.

Channel numbers : terminal module 1 : 0 to F; terminal module 2 : 10 to 1F

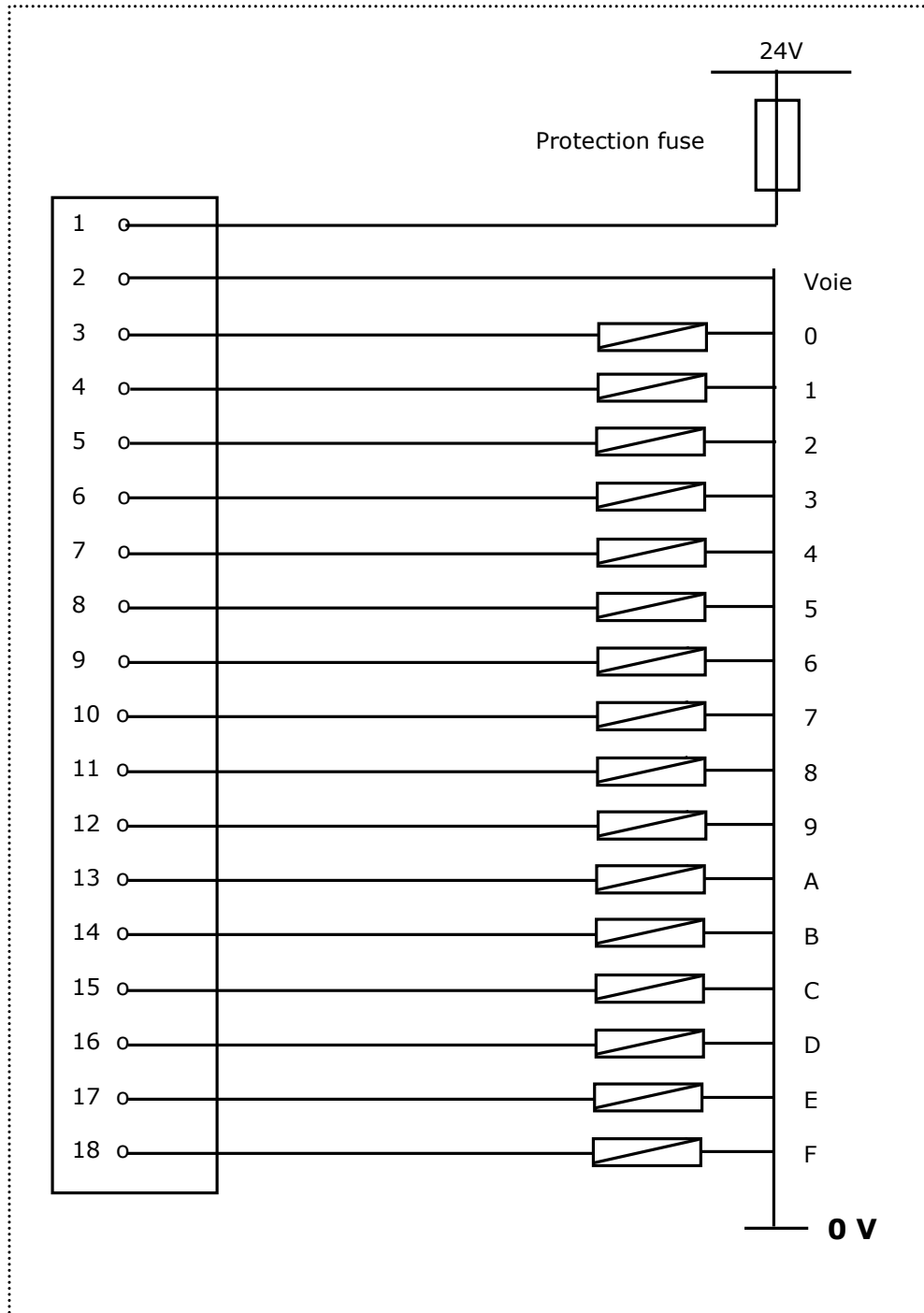


DIAGRAM C : D0310 / 8om3Ab, DIO210 / 8om3Ab

8 **relay** Digital Outputs (1T : the contact operates without potential) on 18 pins screw terminal .
A common 24V power supply for the coils of the 8 relay.channels.

Channel numbers : terminal module 1 : 0 to 7; terminal module 2 : 8 to F; terminal module 3 : 10 to 17; terminal module 4 : 18 to 1F.

Perminal module	Functional module	Advice
8om3Ab	D0310	Necessary to supply the terminal module (24V for relay coils)
8om3Ab	DIO210	NOT necessary to supply the terminal module (pin 1 and 2)

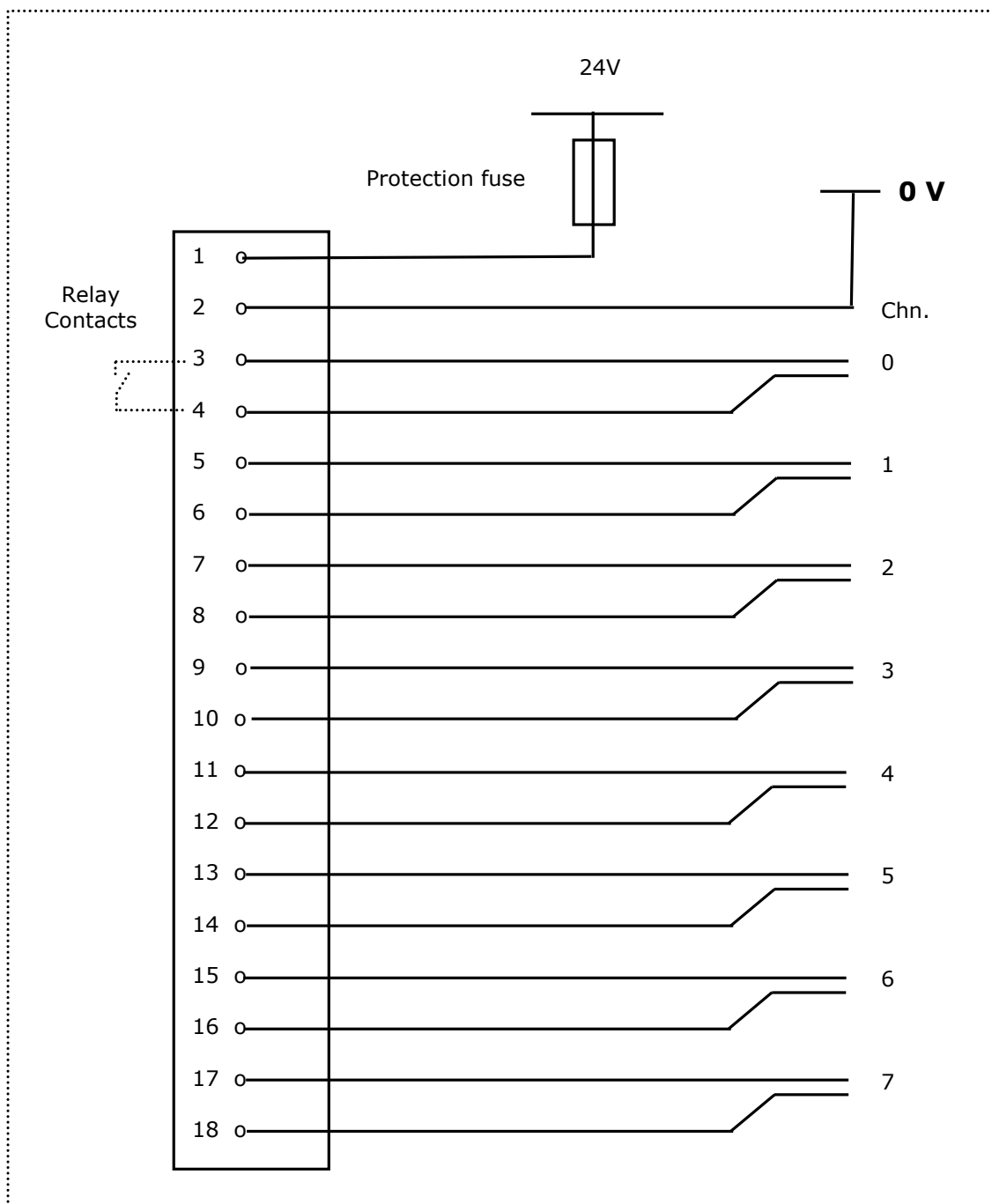


DIAGRAM E : AO121 / 8o.c1b

8oC1b module : 8 analog outputs **4-20mA** . Screw terminal 18 pins.

1 power supply entry for 8 channels.

Channel numbers : terminal 1 : 0 to 7.

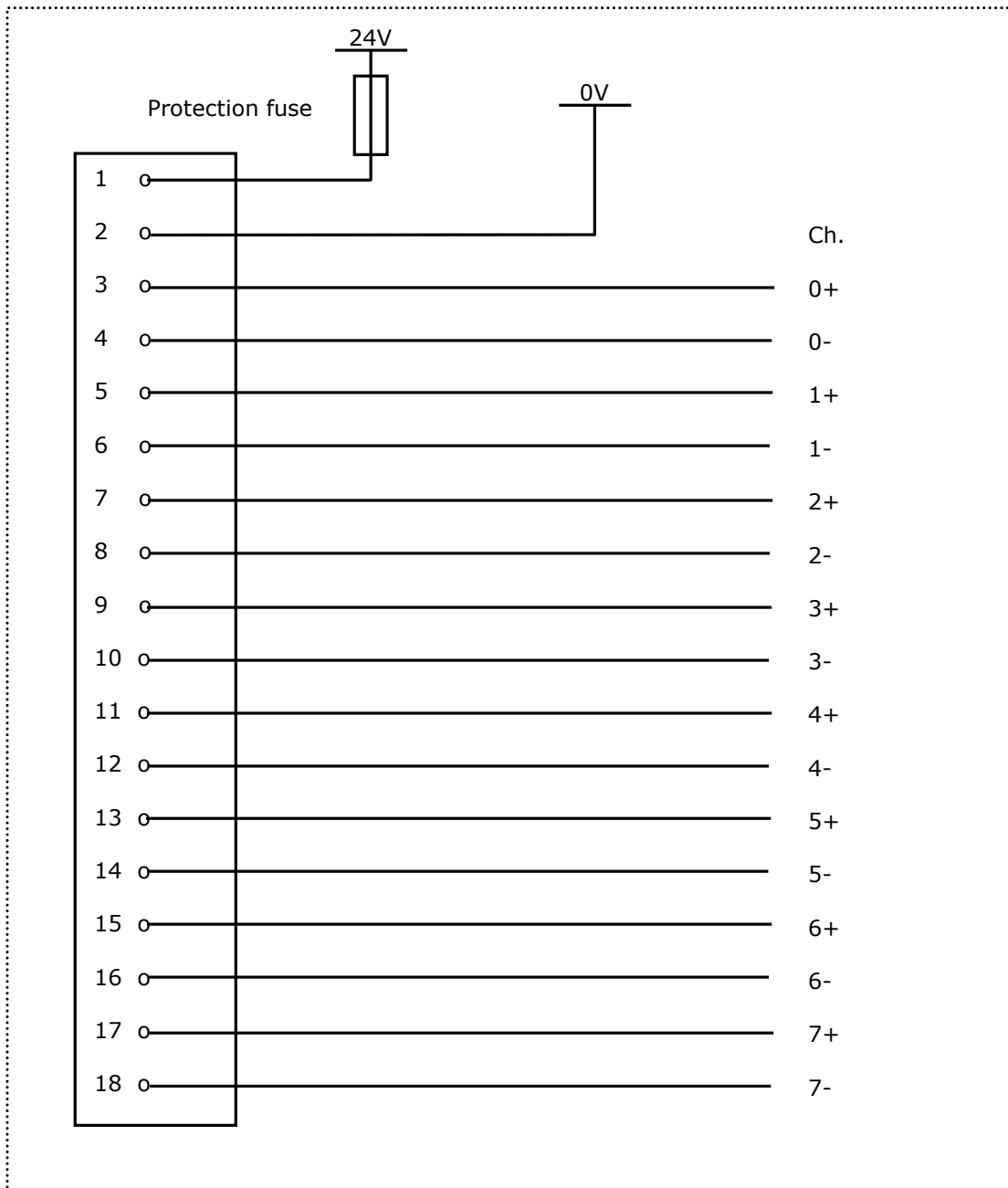


DIAGRAM F : AO121 / 8o.v1b

8oV1b : 18 pins screw terminal - 8 analog outputs **-10/+10V** ..

The pin 2 is linked internally to the negative outputs pins.

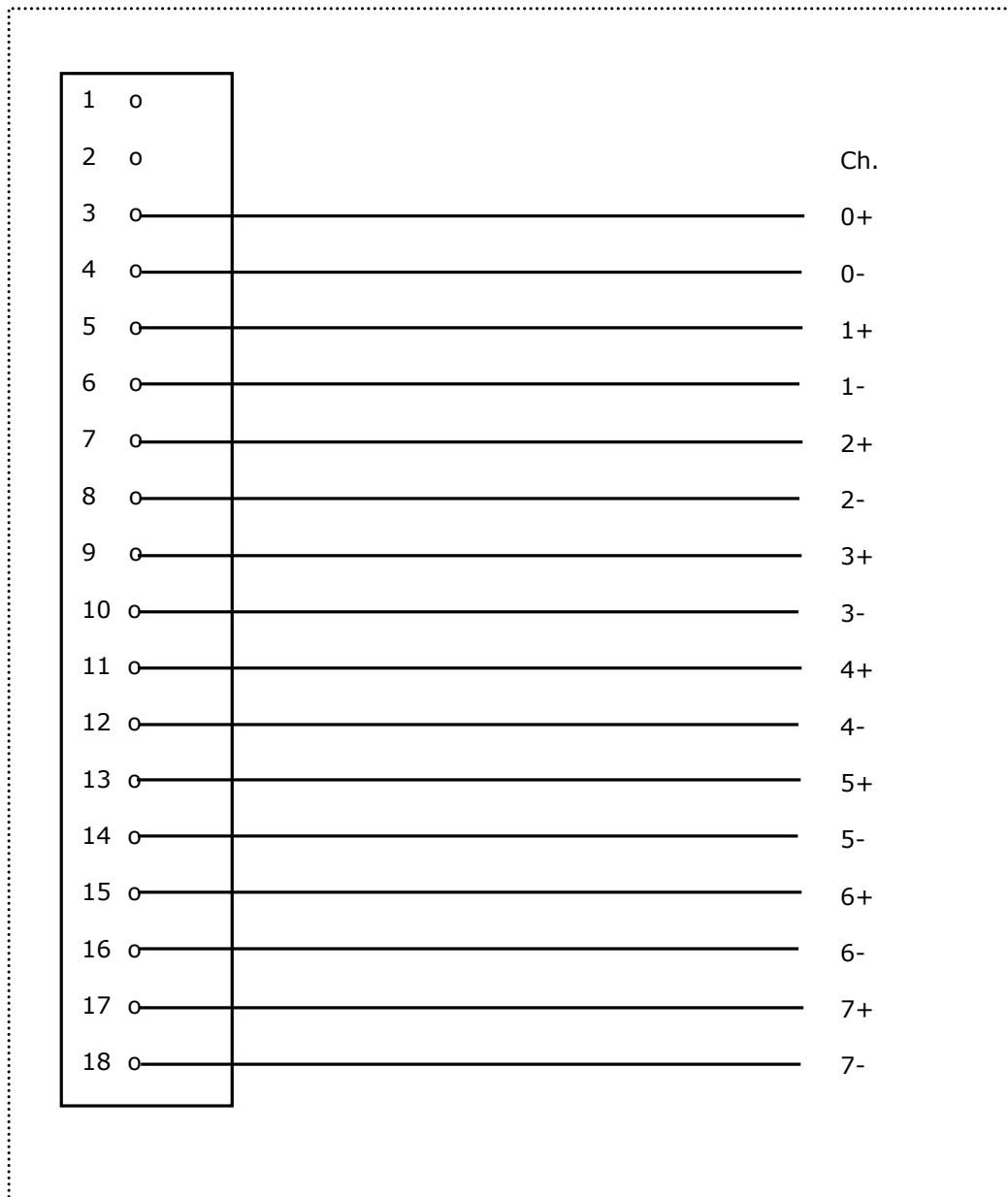


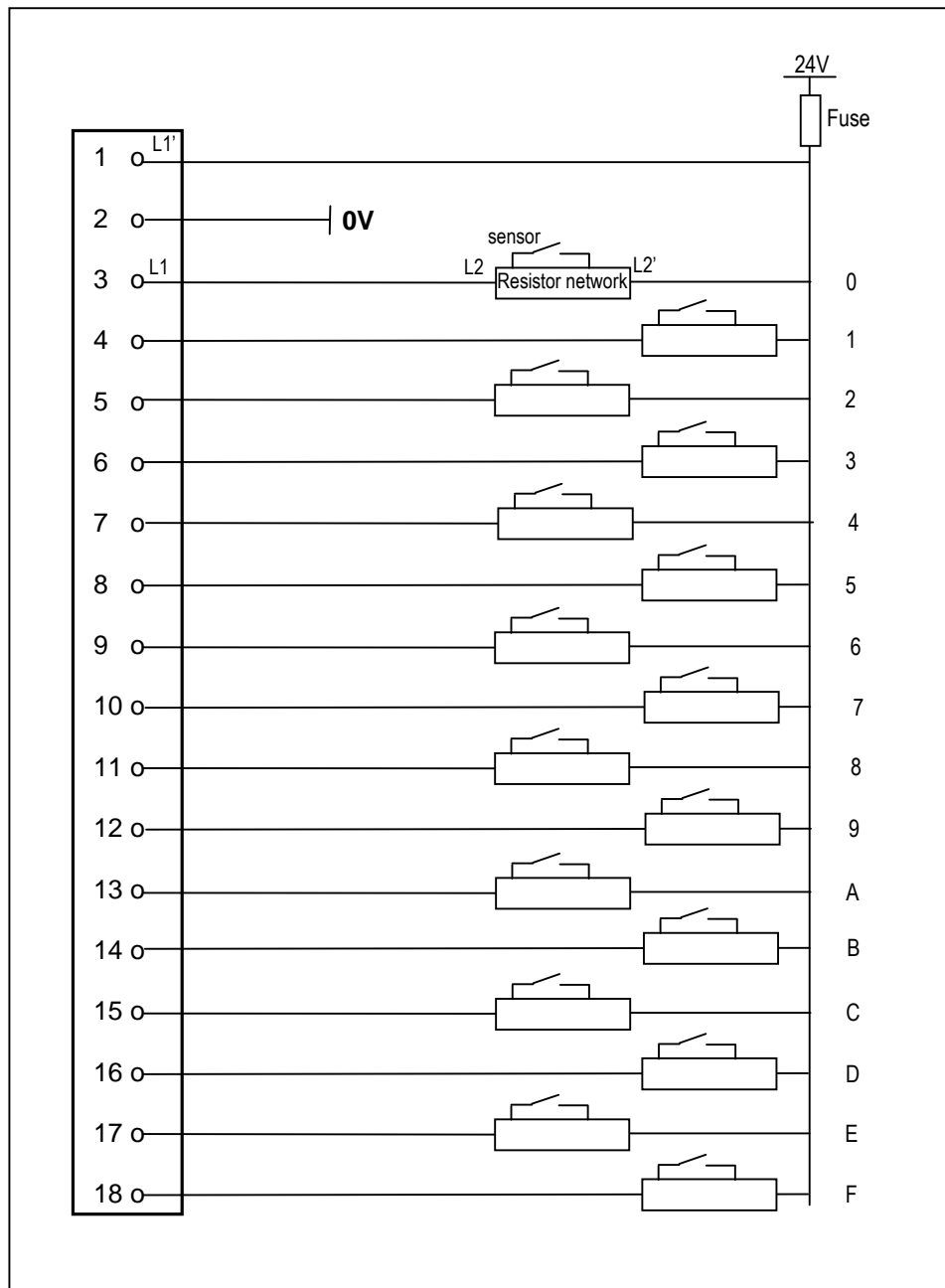
DIAGRAM G : DI312 / 16is24b

16is24b screw 18 pins terminal : 16 secured logic inputs

The input is active when the sensor switches to +V. The unplugged loads have to be connected to the power +V connector.

Channel numbers : terminal module 1 : 0 to F; terminal module 2 : 10 to 1F.

Note the name of the points L1, L1', L2, L2' to understand the next page.

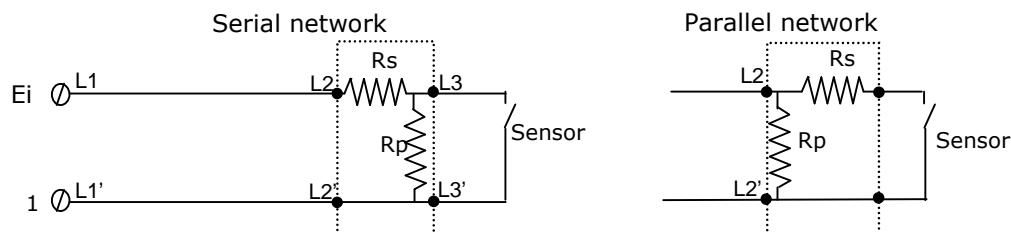


DI312 / 16is24b : Set up of monitoring line (see diagram below)

The DI312 module can detect

- if the sensor is normally opened (NO),
 - if the sensor is normally closed (NC),
 - if the line between the PLC input « L1 » and the Sensor L2 is failed,
 - if the line between the PLC input « L1' » and the Sensor L2' is failed.
- « Failed » means Open circuit or Short circuit.

To detect the 4 states, it is necessary to place 2 resistors R_s and R_p near the sensor. Two networks are possible (see below).



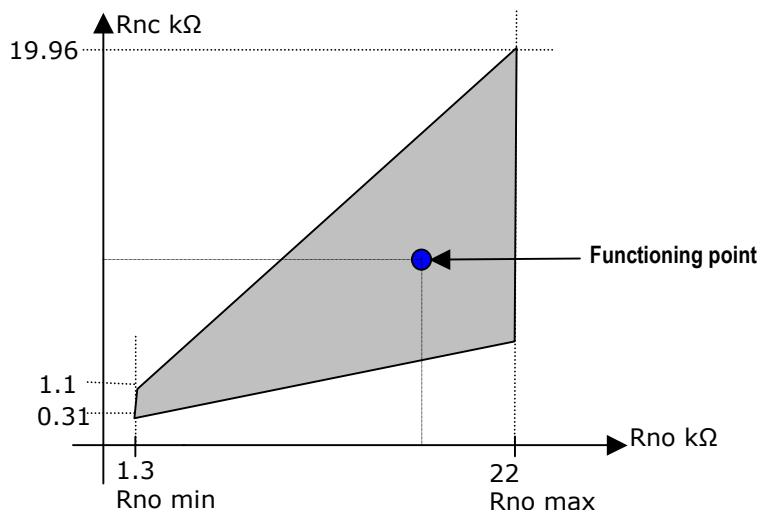
Sensor	Equivalent resistor	Serial network	Parallel network
opened	$R_{no} =$	$R_s + R_p$	R_p
closed	$R_{nc} =$	R_s	$(R_s \times R_p) / (R_s + R_p)$

CAUTION : the values to capture in OPAL software or Isagraf Software are R_{no} and R_{nc} (NOT R_s and R_p). They must be identical for all channels of the same DI312 board.

R_s and R_p values

R_s and R_p must be selected so that the point (R_{no}, R_{nc}) is included in the below grey polygon.

CAUTION : Line resistance = resistance between L1 and L2 + resistance between L1' and L2'.



Current in the sensor = I (mA) = $22 / (1 + R_{no})$ with R_{no} in $k\Omega$

Example

We want $I = 3\text{mA}$ (reasonable value)

- ⇒ $R_{no} = (22/I) - 1 = (22/3) - 1 = 6.333k\Omega$
- ⇒ R_{nc} can be between $1k$ and $5.6k$.
- ⇒ We choose the serial network, $R_s = R_{nc} = 3.3k$ (standard value)
- ⇒ $R_p = R_{no} - R_s = 6.3 - 3.3 = 3k$.
- ⇒ We select $R_p = 3.3k$ (standard value) so $I = 22/(1+6.6) = 2.9\text{ mA}$

DIAGRAM M : DO310 / 8om3As, DIO210 / 8om3As

8om3As : SubD 25 pins terminal

8 relay outputs (1 working contact).

A 24V power supply for the 8 channels and relay coils.

Channel numbers : terminal module 1: 0 to 7; terminal module 2: 8 to F; terminal module 3: 10 to 17; terminal module 4: 18 to 1F.

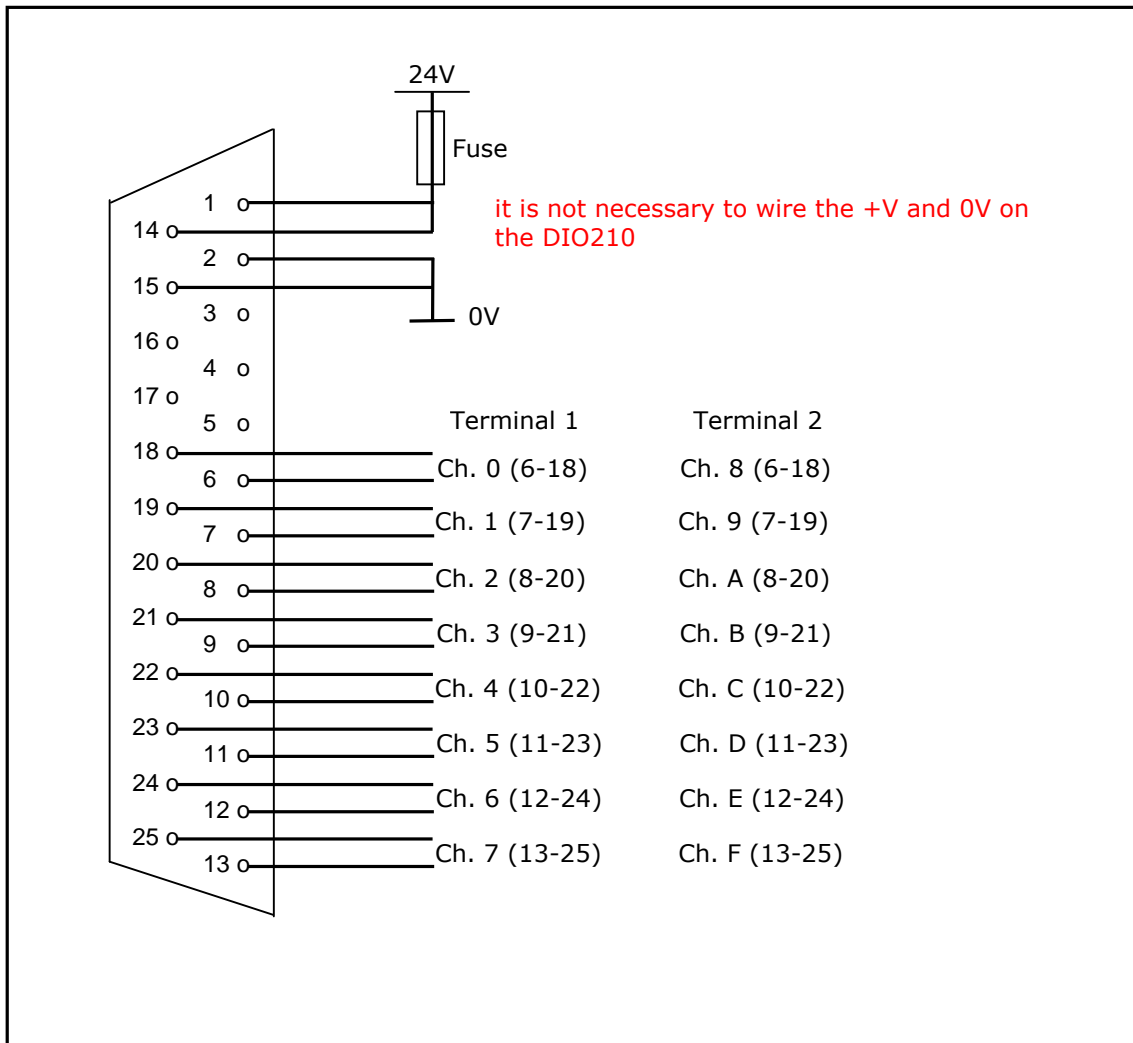


DIAGRAM N : DI310 / 16i.24s - 16i.48s; DIO210 / 16i.24s

PNP type 24V or 48V Digital inputs on a 25 pins D-Sub connector : 1 power supply for 16 channels.

The input is active when the sensor switches to +V.

Channel numbers : terminal module 1 : 0 to F ; terminal module 2 : 10 to 1F

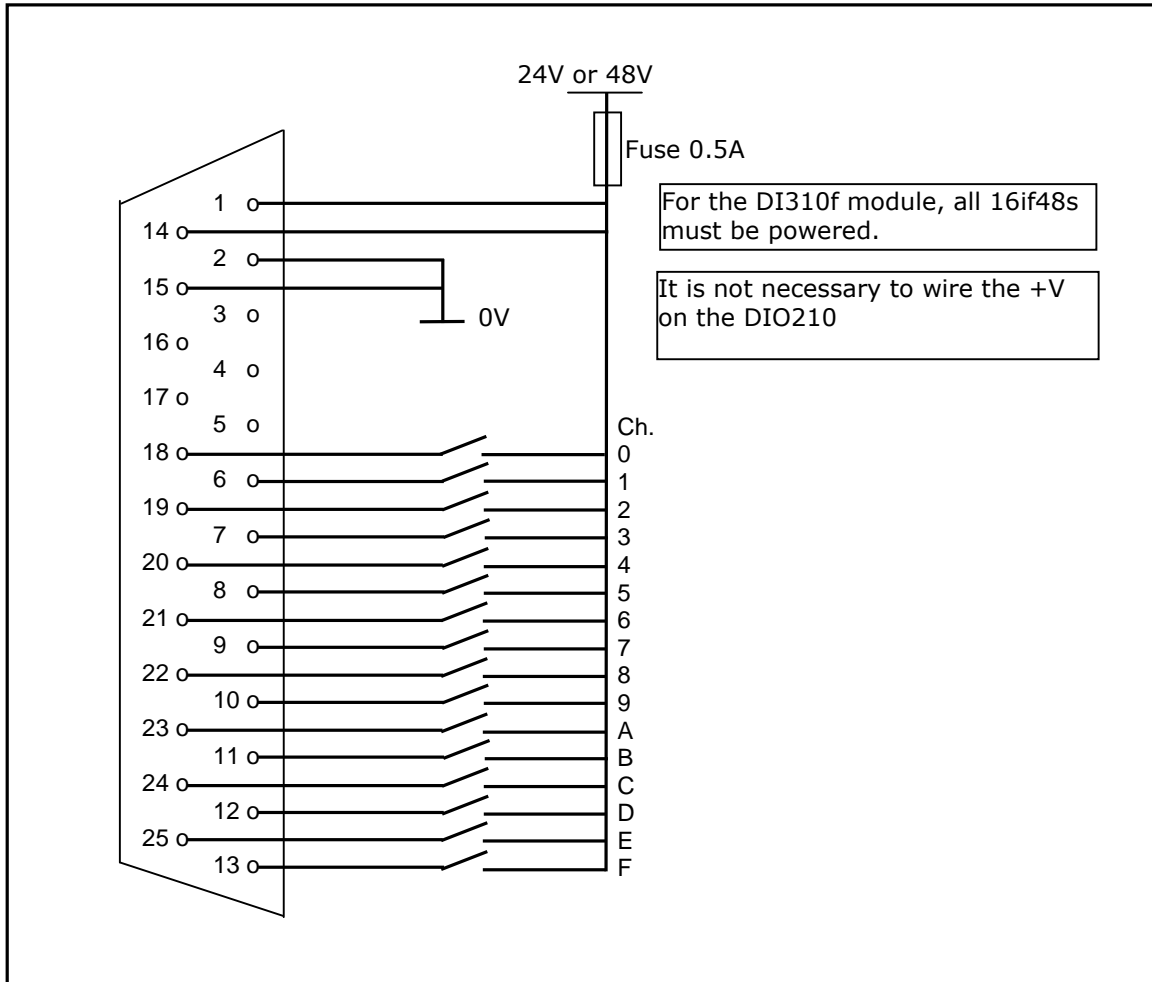


DIAGRAM O : AI110 - AI210 / 8i.c1s - 8i.v1s AO121 / 8o.v1s

8 analog inputs, **current -20/+20mA, (8i.c1s)** on 25 pins D-Sub.

8 analog inputs, **voltage -10V/+ 10V (8i.v1s)** on 25 pins. D-Sub

8 analog outpus, **voltage -10V/+10V (8o.v1s)** on 25 pins D-Sub

Channel numbers : terminal module 1: 0 to 7; terminal module 2: 8 to F.

For indication purposes, please refer to chapter IV "Technical Specifications", depending on the type of sensor (1 or 2 outputs).

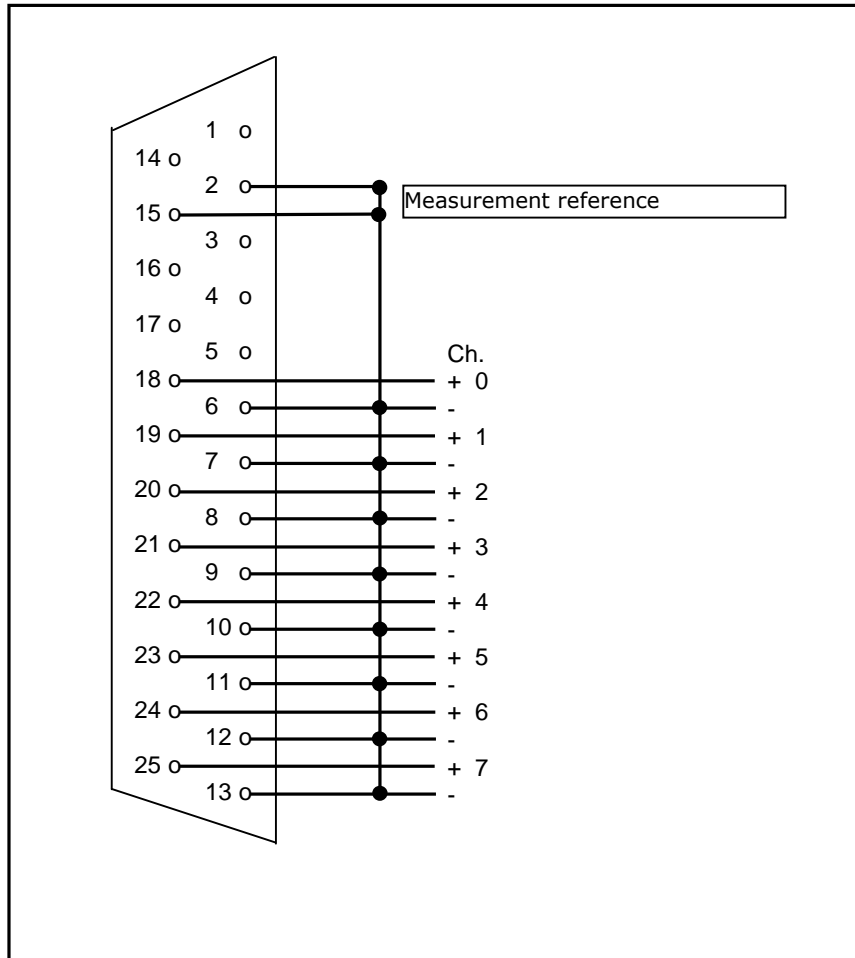


DIAGRAM P : DO310 / 16o.24s

PNP type 24V outputs on 25 pins D-Sub connectors.

The output switches the load to + V. The unplugged loads have to be connected to the 0V.

Channel numbers : terminal module 1 : 0 to F ; terminal module 2 : 10 to 1F.

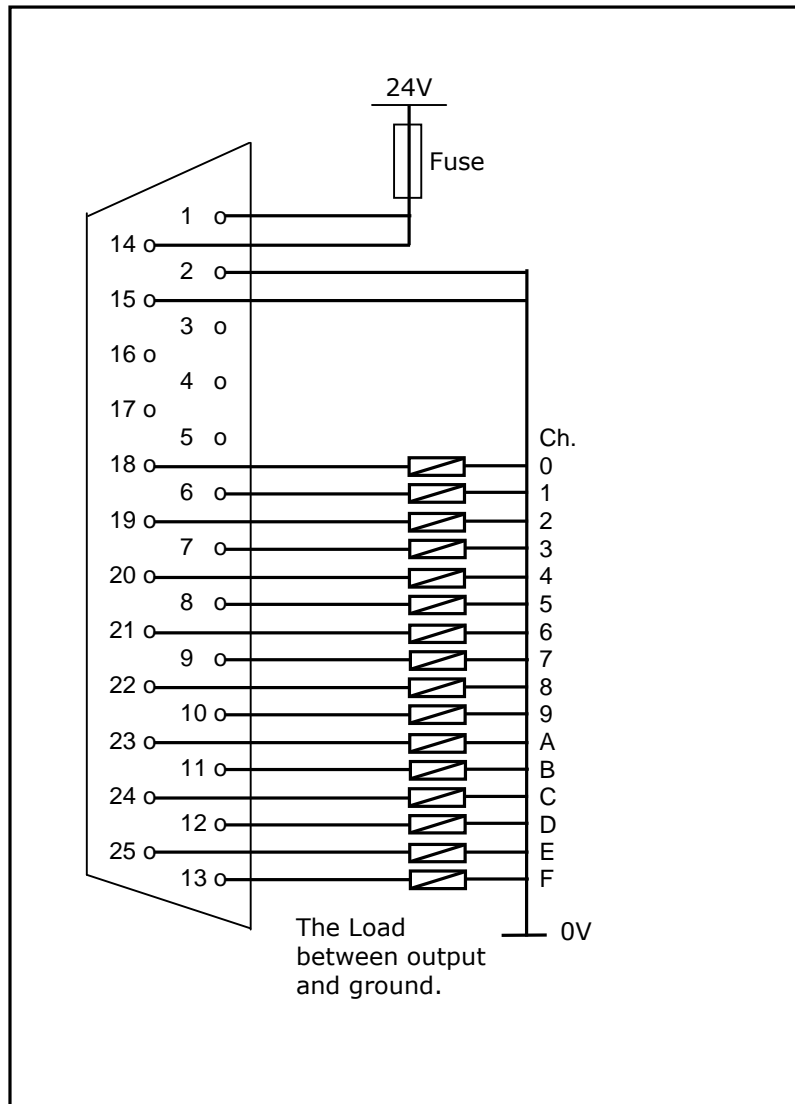


DIAGRAM Q : AIO320 / 4o.c1b

4 analog outputs, **current 4/20mA**, on 18 pins screw terminal s: 1 power supply for 4 channels.
 Idem diagram E : only 4 channels.

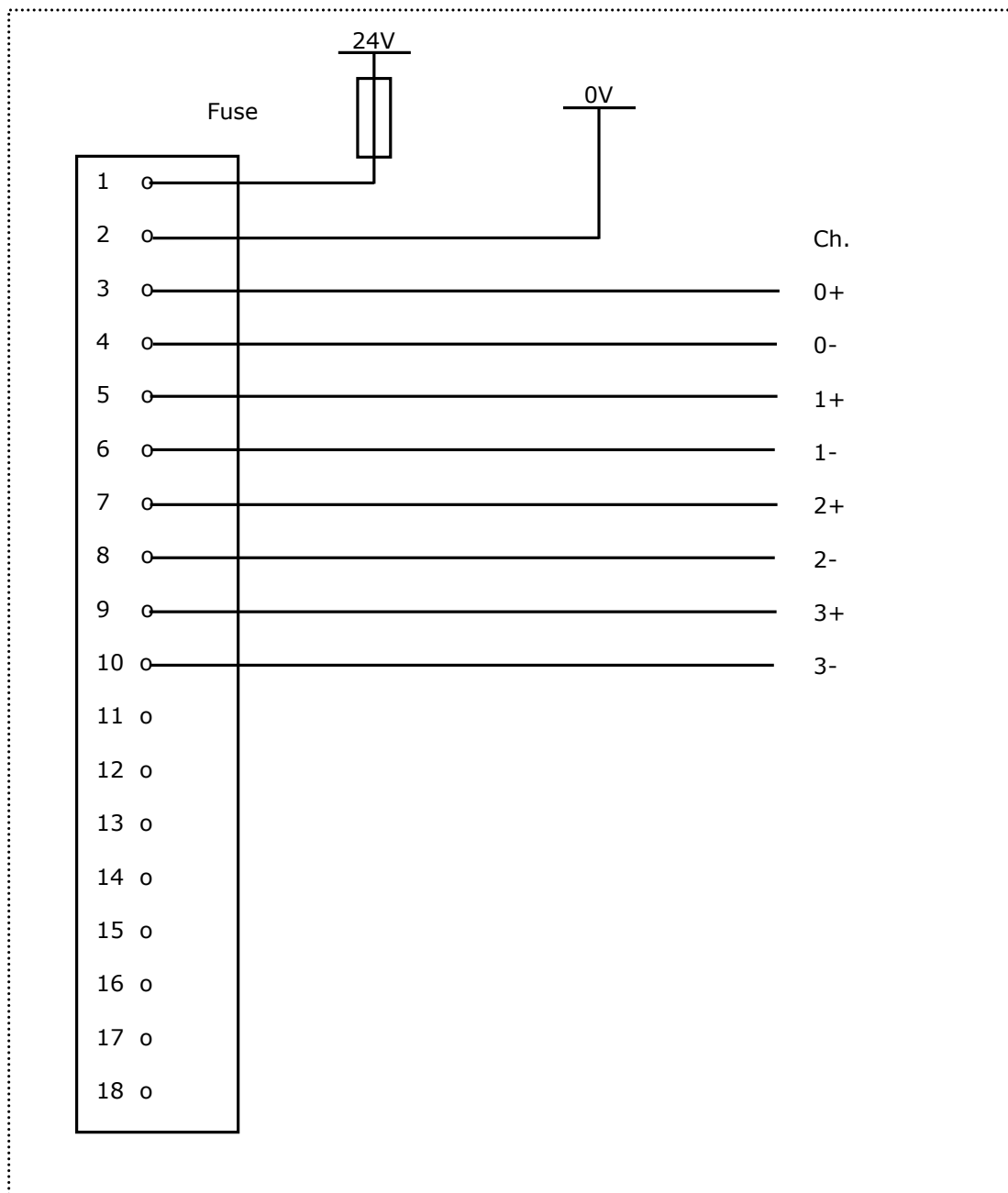


DIAGRAM R : AIO320 / 4o.v1b

4 analog outputs **-10/+10V**, on 18 pins screw terminal

Pin number 2 is linked internally to the negative outputs pins.

Idem diagram F : only 4 channels.

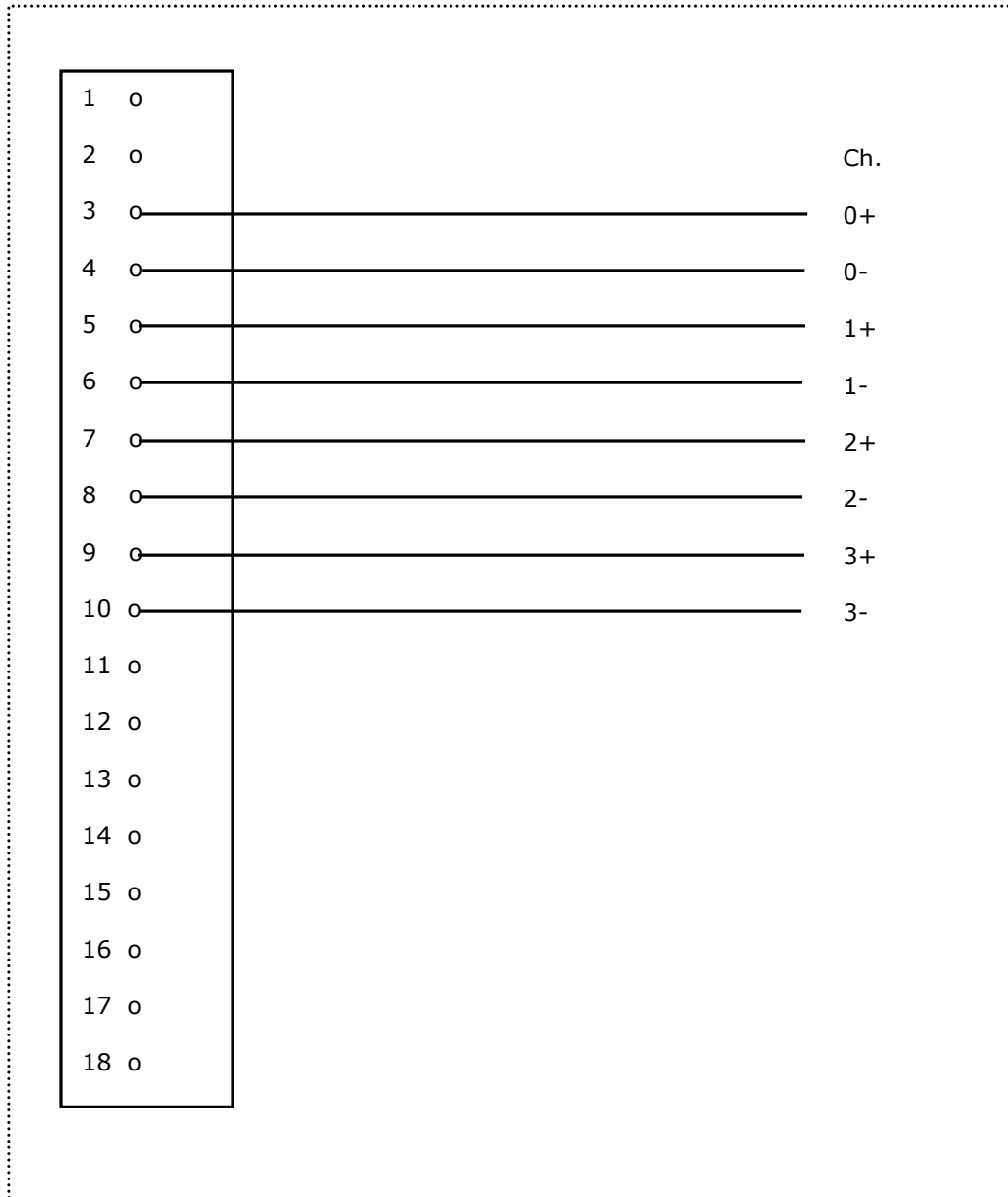


DIAGRAM S : AIO320 / 8i.p1b

8 inputs for **PT100 sensor** on 12 points terminal screw (see catalogue).

For 2 wire PT100 sensor, bridge pin Xm and pin X-

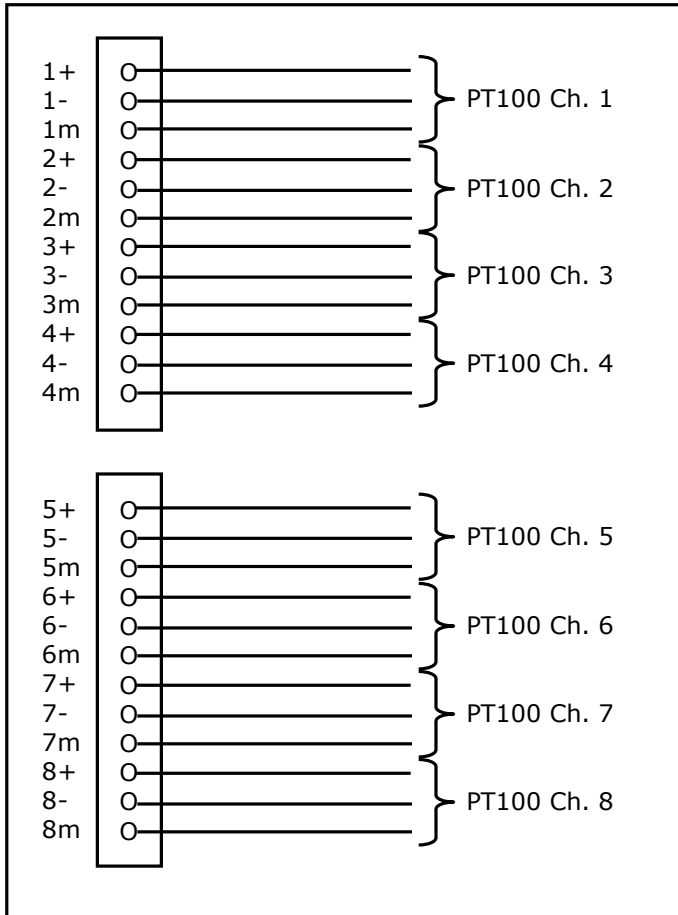


DIAGRAM T : DI410 / 32ix24s

24V PNP type Digital inputs on Dsub 37 points : 1 common power supply for 32 channels.

The input is activated when the sensor switches to +V.

Channel numbers : terminal module 1 : 0 to 1F; terminal module 2 : 20 to 3F.

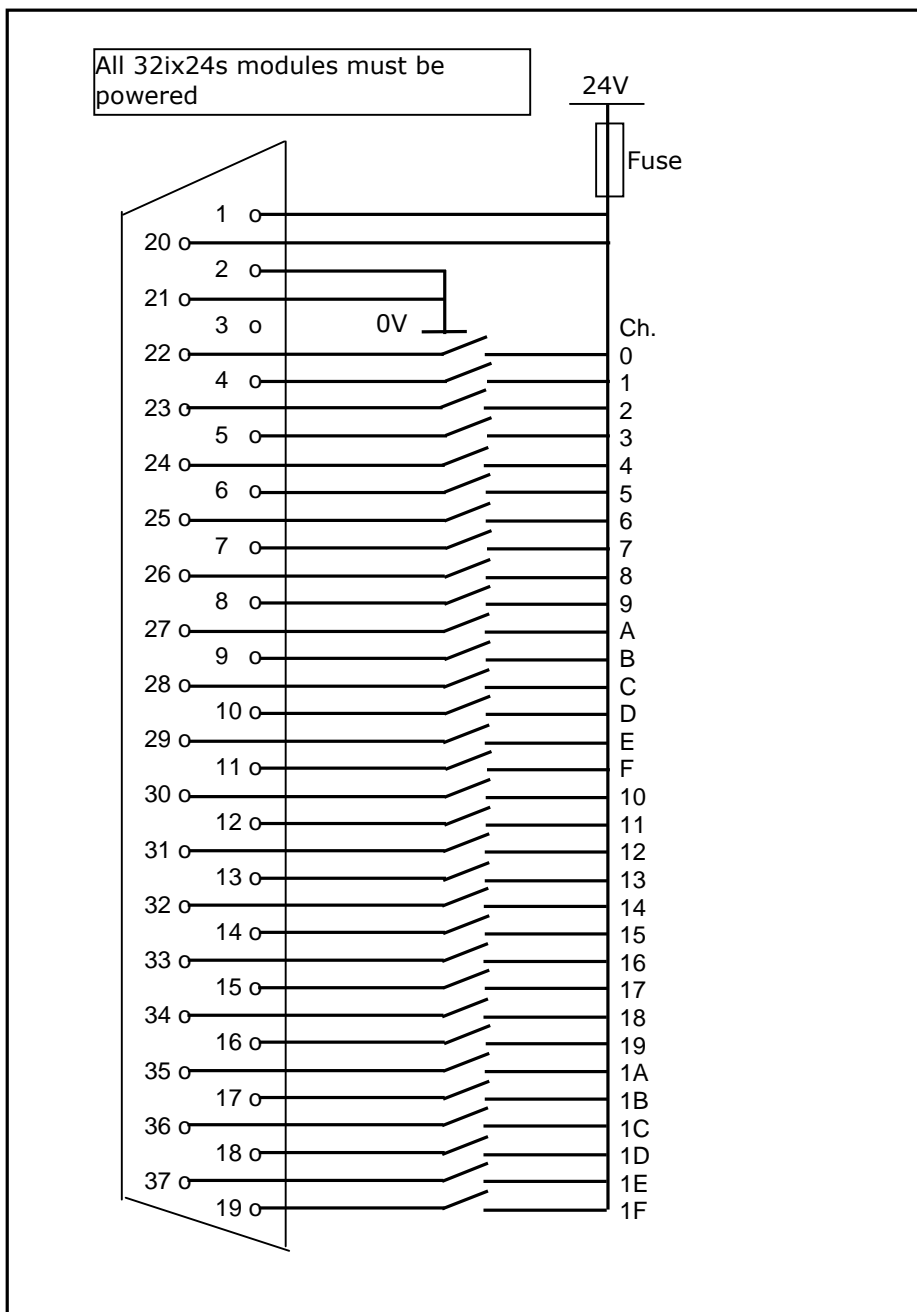


DIAGRAM U : DI130 / 8i.120b-1/8i.120b-2

8 digital inputs **24Vcc, 48Vcc or 120Vcc PNP type** on four screw connectors (4 pins) :

- 1 power supply for 2 channels.
- The input is active when the sensor switches to +V : the 24V, 48V, 120V pins must be connected to the common of power supply
- Channel numbers : terminal module 1 : I1 to I8 ; terminal module 2 : I9 to I16.

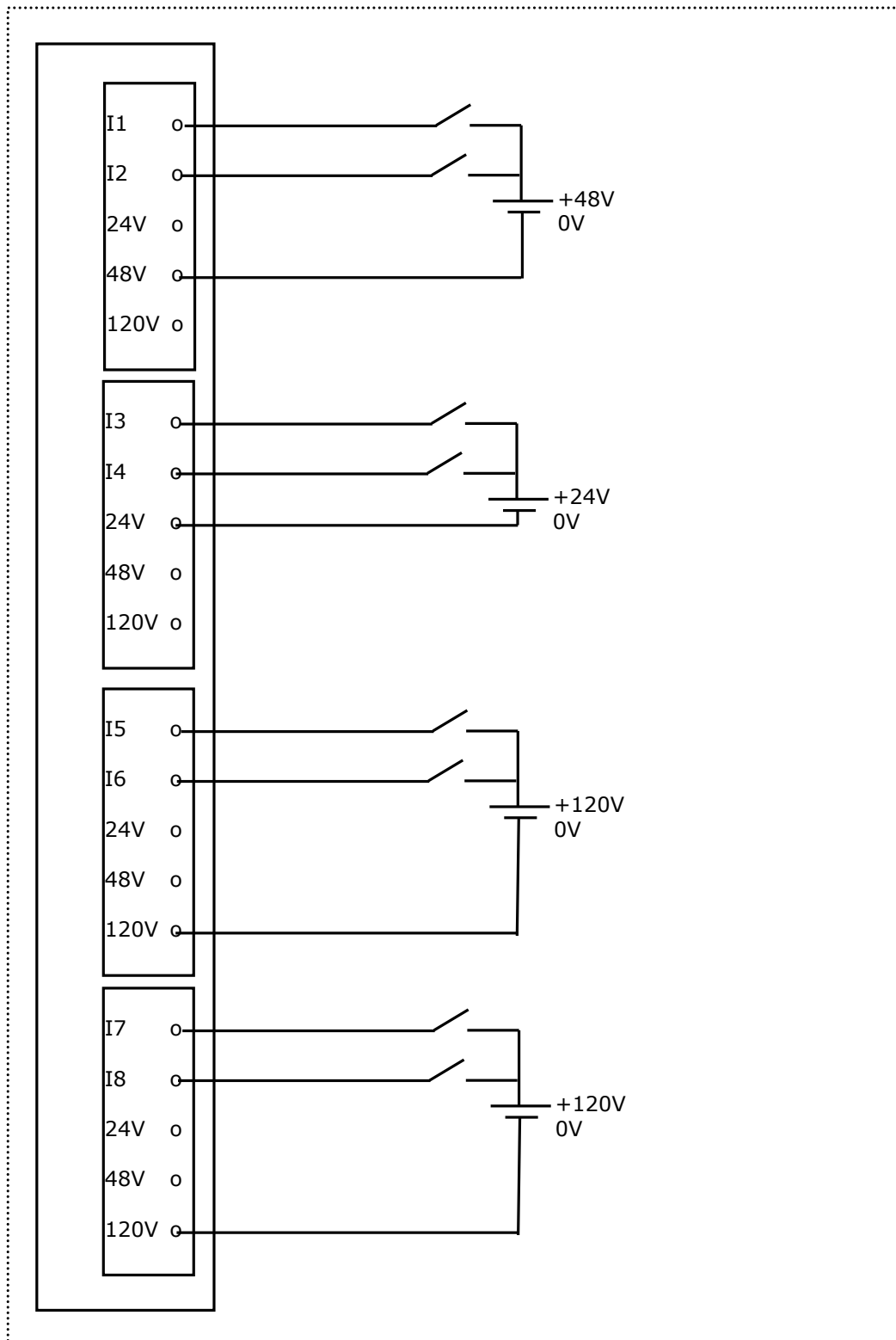
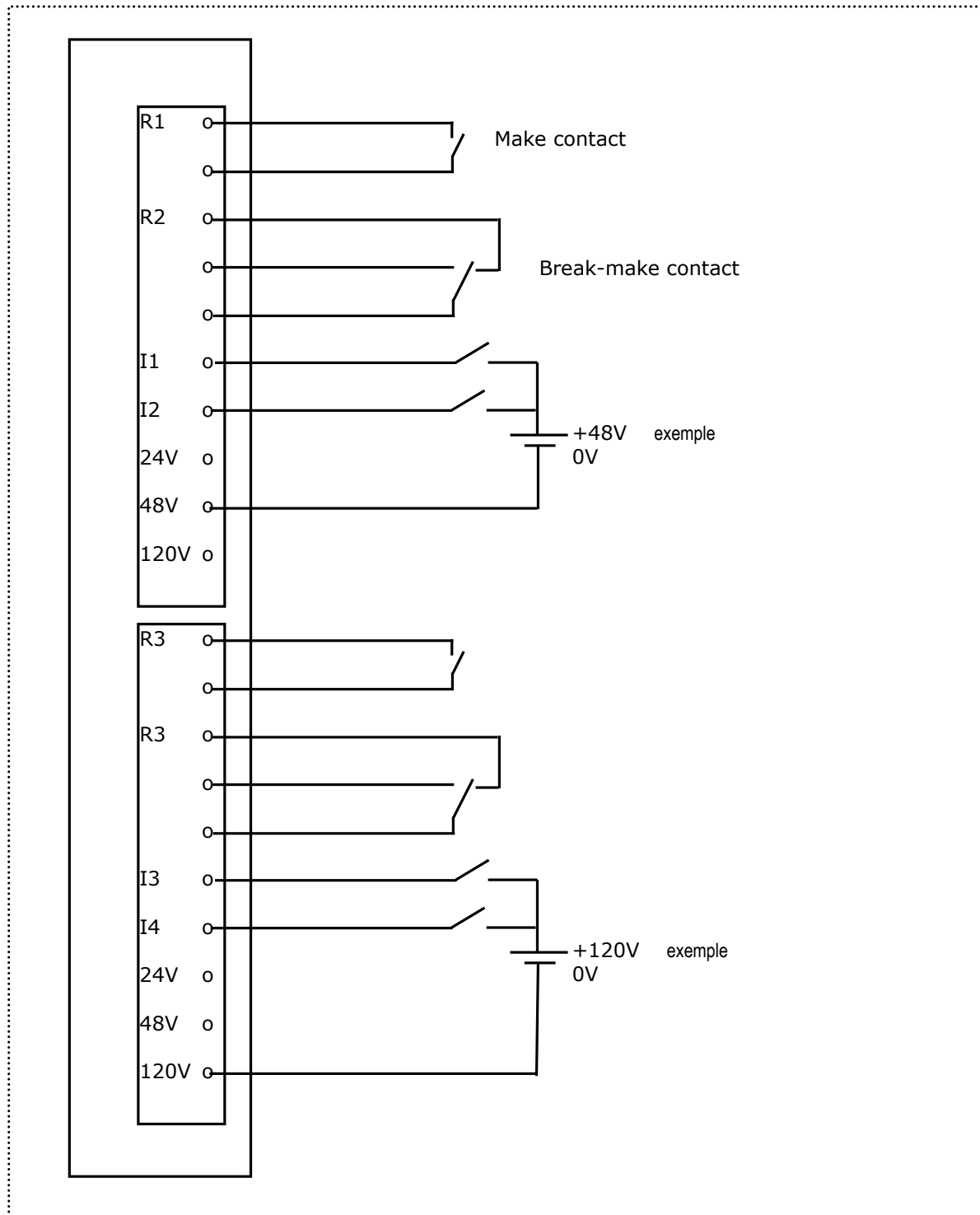


DIAGRAM V : DIO130 / 8io.120b-1/8io.120b-2

4 digital inputs **24Vcc, 48Vcc or 120Vcc PNP type** and 4 relay outputs on 2 screw connectors (10 pins) :

- 1 power supply for 2 channels
 - The input is active when the sensor switches to +V : the 24V, 48V, 120V pins must be connected to the common of power supply
 - Channel numbers :
 - terminal module 1 : 4 relays output R1 to R4 and 4 digital input I1 to I4
 - terminal module 2 : 4 relays output R5 to R8 and 4 digital input I5 to I8



ROBUSTNESS

Electromagnetic compatibility

EMISSION

Norms : EN61000-6-3 / CISPR 22

Conducted emission (low frequencies)

Between 150 kHz and 500 kHz : emission < 68 dB μ V < limit = 84 dB μ V

Between 500 kHz and 30 MHz : emission < 64 dB μ V < limit = 74 dB μ V

Radiated emission (high frequencies)

Between 30 Mhz and 230 Mhz : emission < 25 dB (μ V/m) < limit = 30 dB (μ V/m) à 10 m

Between 230 Mhz and 1Ghz : emission < 15 dB (μ V/m) < limit = 37 dB (μ V/m) à 10 m

IMMUNITY

Norms : NF EN 61 131-2 (1994) and additional clause A11 (1996) and Additionnal clause PrA12 (1999)

Immunity to electrostatic discharges : NF EN 61000-4-2

Immunity criterion B

- against contact direct discharges ± 4 kV on conducting surfaces
- against air discharges ± 8 kV , all surfaces.

Discharge applications : 10 points of impact with 2 polarities

Immunity to radiated electromagnetic fields : NF EN 61000-4-3

Immunity criterion A

- Severity class 3 : **10 V/m** , 80Mhz to 2GHz, sinusoidal amplitude modulation 80% at 1kHz.

Immunity to electrical fast transient/burst : NF EN 61000-4-4

Stress : 200 burst trains. Repetition : 5 kHz. Wave form 5ns/50ns

Immunity criterion A (EN 61000-6-1)

- capacitive coupling on Bus and signal ports : ± 0.5 kV / 1mn
- Direct coupling on power ports : ± 0.5 kV / 1mn

Surge immunity : EN61000-4-5

Stress : Waveform 1.2uS/50uS open circuit Class 1. 5 impacts by polarity.

Immunity criterion A

- Differential mode and common mode on power and signal ports : ± 0.5 kV

Immunity to conducted disturbances, inducted by radio frequency fields : EN61000-4-6

Stress : frequencies of electromagnetic field between 150kHz and 80 MHz. sinusoidal amplitude modulation 80% at 1kHz

Immunity criterion A with field strenght = 3V/m

Immunity criterion A with field strenght = 10V/m except for analog inputs (incorrect values)

Climatic environment

Working and storage temperatures

LT160 CPU : working	-20°C à +70°C
LUC4001 LT200 CPU : working Cold start up at -40°C (IEC 68-2-1:1990 test Ad)	-40°C à + 70°C
Digital I/O blocks : working	-40°C à + 70°C
Analog I/O blocks working	-30°C à + 70°C
Storage (EN60068-2-1)	-40°C à + 85°C
Damp heat (EN60068-2-30 test Db) 2 days with varnished boards	55°C 95% without condensation

Shock/Vibration stress

Shocks

Norm : EN 60068-2-27 test Ea : « equipment fasten to road vehicle, railway vehicle or transport aircraft»

Stress : semi sinusoidal impulse, Acceleration = 30g , Impulse duration = 18 ms.
3 shocks x 2 directions x 3 axis.

Random vibrations

Norm : EN 60048-2-27

Stress : white noise random vibrations with spectrum density between 0.20 g²/Hz and 0.01 g²/Hz , frequencies between 5Hz and 500 Hz
Stress duration : 2 h , each axis

Sinusoidal vibrations

Norm : EN 60048-2-27 test Fc

Stress :

Stress duration : 2 hours by axis

Equipment working

Sweeping between 0 and 200Hz

Cross-over frequency COF = 10Hz

- Below the COF, the vibration amplitude is specified as constant displacement : 5mm
- Above the COF, the vibration amplitude is specified as constant acceleration :
 - From 10 to 15 hz : 20 m/s²
 - From 15 to 200hz : 10 m/s²

Technical specifications

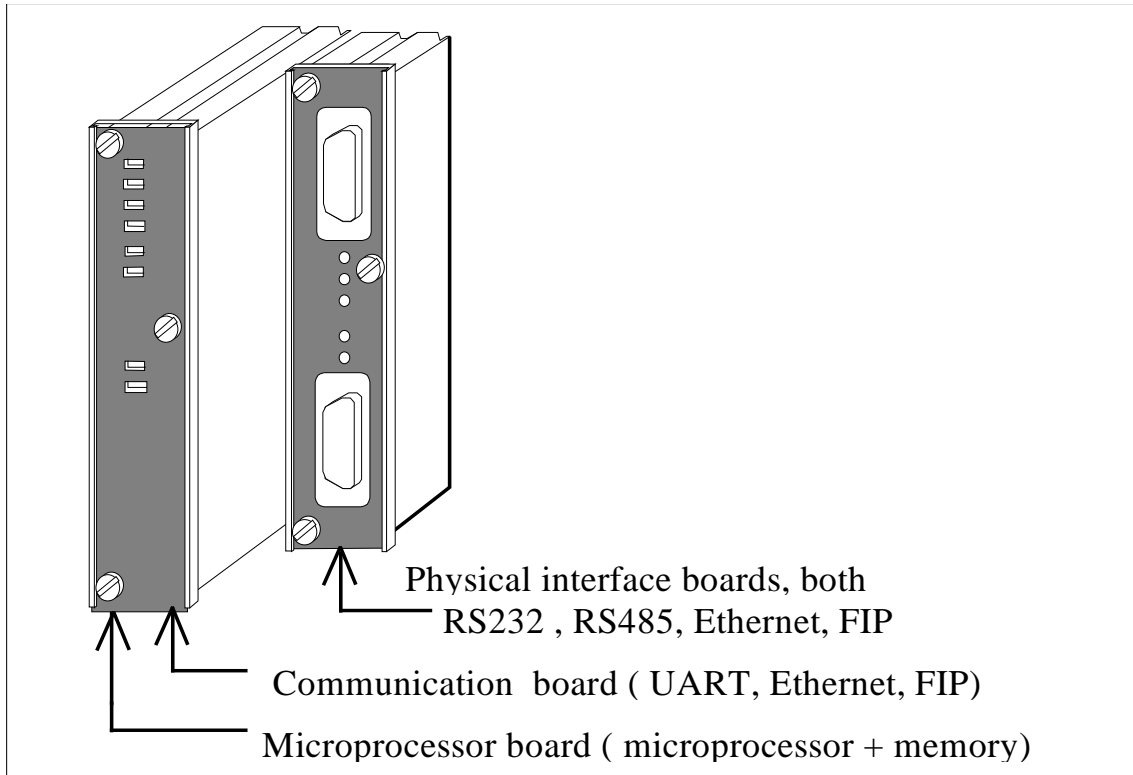
Power supply

	Unité	PSD331 (24-48Vcc)	PSD342 (120Vcc)
Voltage			
Nominal value	Vcc	24 / 48	120
Permitted range	Vcc	20 - 60	84 - 150
Max absorbed power	W	20	20
Startup current		5A while 5ms	3A while 10ms
Fuse (soldered to board)	A	7	
Power available	W	15	
Display		1 green LED : ON if power supply OK	
Voltage isolation			
Input ⇄ internal logic	Veff	1500	
Input ⇄ ground	Veff	1500	
Alarm output (relay) - release - relay - braek power - max voltage - contact	W Vcc	CPU,WDG or power failure Dry contact (no protected) 60 (2A - 30V dc) 220 OPENED : LT unpowered or faulty CLOSED : nominal operation	

LT160 : CPU and communication terminals

The CPU has a processor board and a communication board within the same casing. The physical connection interfaces of the communication board are displaced on the annexed casings better known as the terminal modules..

REMARK : 1 Asynchronous RS232 is required in order to connect the OPAL setup tool or the ISaGRAF workbench..



Processor board	
Microprocessor	INTEL 386 Ex - 50 MHz
FLASH memory	512 Ko
RAM memory	256 Ko
FRAM Backup memory	2 Ko
I/O capacity	Max 15 blocks
Consumption	2 W
RTC	Rechargeable battery backed clock with an unlimited life span, autonomy : 147 hours at 25°C Year-Month-Day-Hour-Minute-Second. Quartz clock; precision $\pm 5.10E-5$ at 25°C, reset possible from software

CPU display (LED)

LED	Color	meaning
RUN	green	Isagraf V3 or OPAL : slow flashing (1s) = correct application execution Isagraf V3 or OPAL : fast flashing (1/10s) = Program Restart Mode selected
TEST	red	ON = Flash program defective OR one I/O board faulty
I/O	Red	ON = I/O block faulty (code, status, power...)
PRM	Green	ON = Program Restart Mode selected. OFF after reboot if PRM not selected
PRG	Green	ON if PRG mode selected (bridge between pins 5 and 6 of COM1) . OFF after reboot without bridge.
WDG	Red	ON = start up OR fatal fault. See also software manual.
COMx	green	ON = correct protocol on this port

RS232 / RS485 ports

Speed Frame Display Protocols Signaux DCD, DSR, DTR, RTS, CTS (only complete RS232)	75 to 115200 bits/s 8 data bits , Parity : Odd Even None 2 green leds TX and RX + 1 led TEN (Transmit ENable) for RS485 Modbus/Jbus RTU master and slave Null protocol : simple Emit/receive frame gérés par le logiciel applicatif
Physical layer connector isolation - Communication Channel ⇔ channel - Communication channel ⇔ I/O blocks - Communication Channel ⇔ ground	SubD 9 pins By transformer and optocoupler 1500V 1000V 1000V

The choice between channel 232 or 485 is done by external wiring.

Remark : The LT pre-polarizes the RS485 with the Rp1=Rp2=150 kΩ resistances. Rp3 and Rp4 are available on the terminal module to polarize the line. Their value is 470Ω.

Port de communication Ethernet

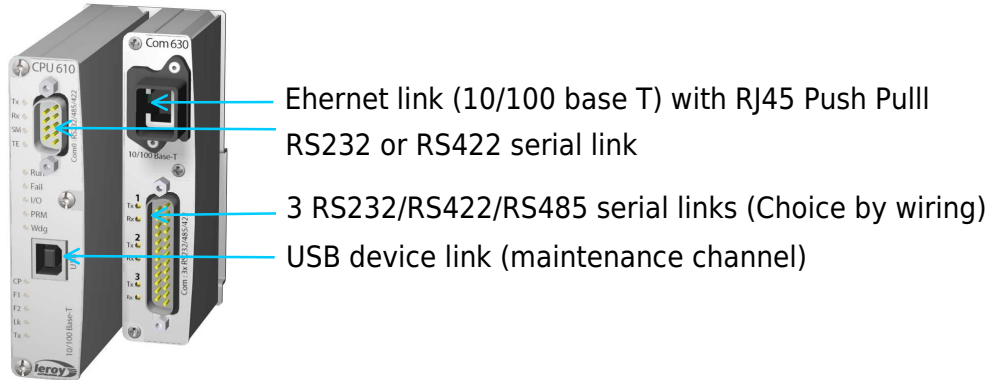
Transmission	
connector	Shielded RJ45
code	Manchester
Speed	10 base T
Display	
1 green led Tx	lit while sending frames
1 red led Col	lit on collision detection by the LT
1 green led Lnk	lit if the port is correctly wired
Protocols	
	IP, ARP, ICMP, UDP, TCP Modbus TCP, SNMP, SMTP, telnet sont proposés selon les logiciels applicatifs. Consulter le manuel utilisateur correspondant au noyau logiciel embarqué

LT200 : LUC4001 CPU

LUC4001 composition

Le bloc LUC4001 est composé

- d'un module unité centrale CPU610 avec 1 liaison RS232 (modem) ou RS422.
- d'un module de communication COM630 : Ethernet + 3 liaisons série.



CPU610 central unit module

Microprocessor	Intel PXA 255	300 Mhz
Coprocessor for Inputs/Outputs management	FPGA Spartan III	100 Mhz
Working memory	SRAM	32 Mo
Storage memory	FLASH ROM	16 Mo including 4 Mo for user
Permanent memory	FRAM	8 Ko including 4 Ko for user
Real Time Clock / calendar		Quartz stability : +/- 50 10 ⁻⁶ Life : 96h à 25°C (Backup by capacitor)

Serial link on CPU610 module

RS232 or RS422 : choice by wiring (see below)

Connector : SudD 9 plug

Insulations of signals by photocouplers. Insulation of power supply by transformer.

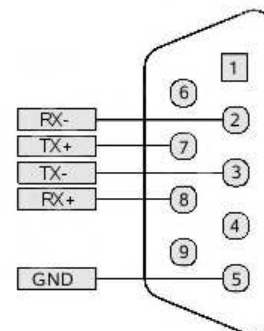
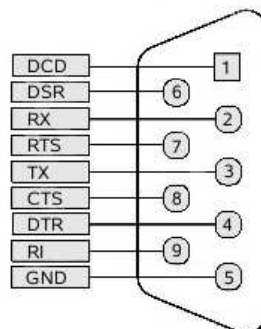
Speeds : 50, 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bits/s

Frame : 7 or 8 bits of data ; even, odd or no parity; 1 or 1.5 stop bits.

Wiring :

RS232

RS422



NOTA : RS485 is not possible. RS485 would require a bridge between 7 and 8 pins, but this bridge is tested at the power on in order to go into the Program Restart Mode (PRM). Use RS485 channels on COM630 module.

CPU610 module diagnosis lights

Serial link

Marking	Meaning	LED	Behavior
Tx	Transmit	Green	On or flickering if the Com0 channel emits
Rx	Receive	Green	On or flickering if the Com0 channel receives
SM	Serial Mode	Green	OFF : Com0=RS485 ; ON : Com0=RS232
TE	Transmit Enable	Green	if Com0=RS232, ON = RTS active if Com0=RS485, ON = Transmit Enable active

Ethernet link

Marking	Meaning	LED	Behavior
Lk	Link	Green	ON = Ethernet link OK
Tx	Transmit	Green	Flickering = emission

Central unit

Marking	Meaning	LED	Behavior
RUN		Green	Its behavior depends on the applicative software (*).
Fail		orange	Its behavior depends on the applicative software (*).
I/O	Inputs / Outputs	Green	Its behavior depends on the applicative software (*).
PRM	Program Restart Mode	Green	ON= Program Restart Mode active. To move into the PRM, see after.
WDG	Watch Dog	Red	ON during the initialisation or after a fatal hardware failure or after a stop of the Linux kernel.
CP	CoProcessor	Green	ON = the inputs/outputs manager is OK
F1		Green	Reserved
F2		Green	Reserved

(*) The applicative software is the software of the user. It can be an OPAL application, an Isagraf program or an user application in C/C++ language. See the appropriate user manual.

Behavior of the lights after the power on

Sequence time	Sequence	Behavior
25 s	Start and running of the boot Installation and running of the Linux kernel	RUN and I/O lights are flickering in turn
15 s	Installation and running of services	All lights are ON
Then ...	Start and running of the user applicative software : - C/C++ application - Isagraf - OPAL	Depends of the application. See the appropriate user manual.

Going to the Program Restart Mode (PRM)

Power off the product. Put a bridge between 7 and 8 pins of the SubD9 connector.

Power on the product. Wait 3s then the PRM Led is ON : the PRM is running.

To understand the usefulness of the Program Restart Mode, see the user manual of the appropriate applicative software.

COM630 communication module

This module consists of an Ethernet link (RJ45) and 3 serial links (subD 25p).

Ethernet link

Features

RJ45 socket with push pull system.

Speeds : 10 or 100 base T

Ethernet cable

- You can get a supply of the cable from
 - Leroy Automation
 - HARTING reference 09 45 701 11 xx. (xx depends of the length and the opposite connector)

- You can make the cable with the RJ45 pushpull connector set from chez HARTING ref 09 45 145 1100 (4 data contacts) .

Ethernet connector pin assignment

Nota : The Cat5 4 poles cable has the threads no 1,2,3,6 only.

Pin	Meaning
1	Out +
2	Out -
3	In +
4	Common
5	Common
6	In -
7	Common
8	Common

Ethernet lights

The Ethernet lights are on the CPU610 module (see above).

Serial links

Features

SudD 25 plug connector

RS232 or RS422 or RS485 : choice by wiring (see below)

Insulations of signals by photocouplers. Insulation of power supply by transformer

Speeds :

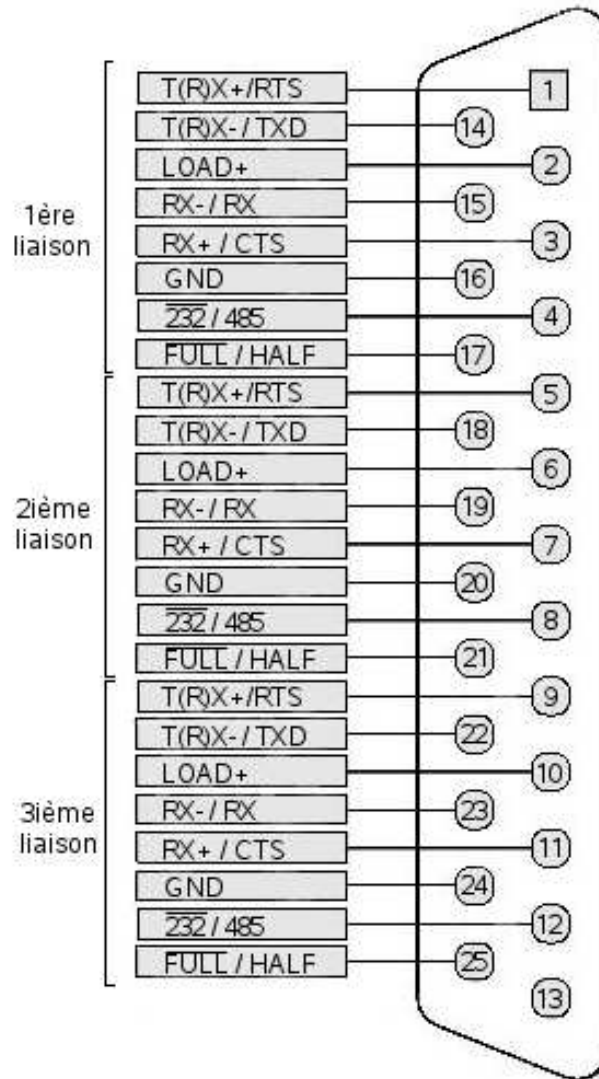
50, 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bits/s

Frame : 7 or 8 bits of data ; even, odd or no parity; 1 or 1.5 stop bits.

Lights (for each link)

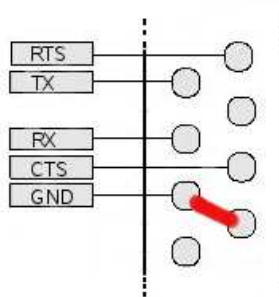
LED	Marking	Meaning
Green	Rx	ON= The channel receives
Green	Tx	ON= The channel emits

SubD 25p connector pin assignment

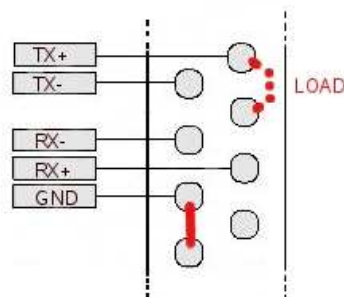


Wiring

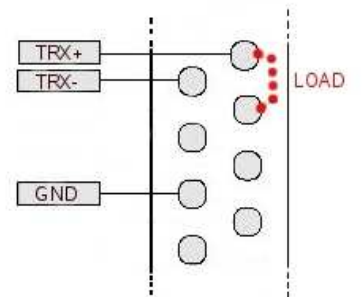
RS232



RS422/RS485 4 wires full duplex



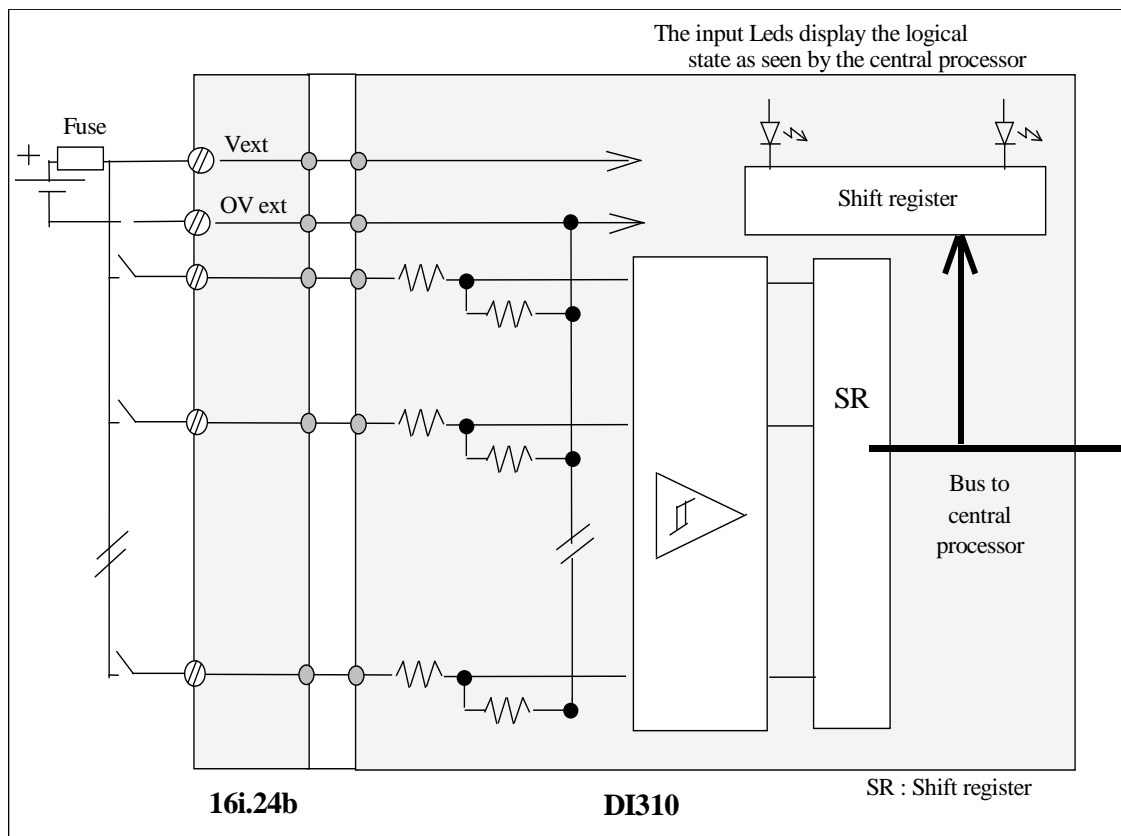
RS485



Bias resistors : Lines TRX+ et TRX- are inside pre-loaded with R=150 kΩ.
 Adaptation resistor : the COM630 module has a inside resistor (120Ω) between TRX+ and TRX-.
 You can use it by connecting TRX+ and LOAD pins.

Digital inputs : DI310 - DI410 modules

Input specifications	Unit	
Nominal voltage	Vdc	24 with terminal module 16()24() 48 with terminal module 16()48()
Range	Vdc	12 to 30 with terminal module 16()24() 40 to 60 with terminal module 16()48()
Input type		type P; IEC I1131 standard : type 1 resistive
Input impedance	kΩ	5,5
Nominal current at nominal voltage	mA	5 mA for 24V ; 3 mA for 48V
High level	%	55% of the power voltage
Low level	%	25% of the power voltage
Common to input sensors		To the + of the power supply
Over-voltage protection		With transient voltage suppressors in parallel to the terminal module inputs. 0.5A fuse recommended on the terminal module power supply.
Input response times	ms	<1ms for DI310/410/312 2 ms (RC filter) for DI310
Logic		Positive
Consumption		
on internal voltage	mW	DI310 : 180 + 10 per lit led, attaining 500 max. DI410 : 560 + 10 per lit led, attaining 1200 max.
On the terminal module power voltage	mA	<5xn where n = number of channels in a high state
Channel display		1 green LED per channel
General display		1 red lit LED if board fault
Dielectric rigidity		
Input/ground	Veff	1500 on screw terminal
Input/ground	Veff	1000 on D-Sub and RJ45



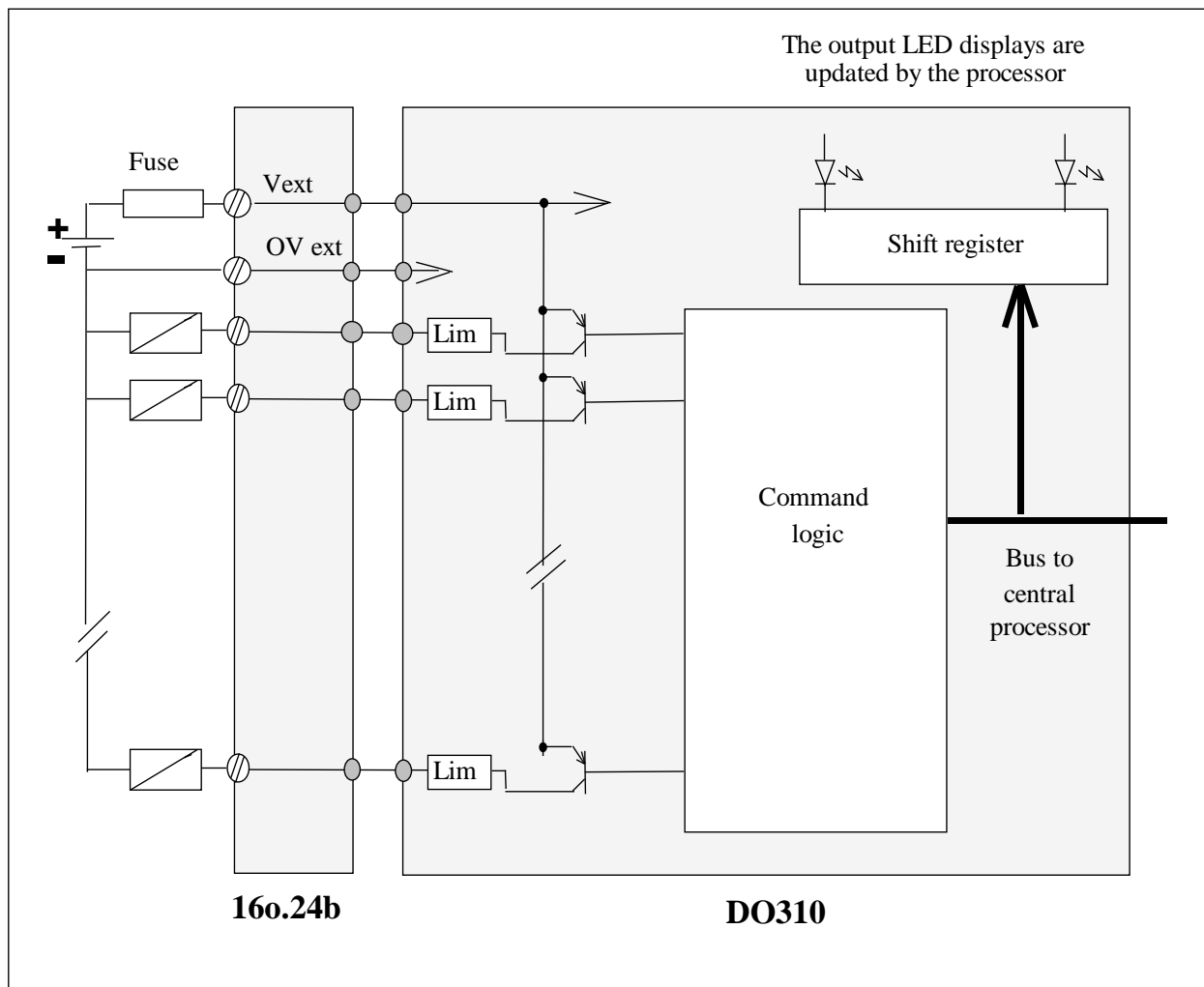
Safety digital inputs (wiring control) : DI312

Input specifications	Unit	
Nominal voltage Resistance ranges Common for input sensors Over-voltage protection Logic Consumption - internal - on the voltage of the terminal module power Channel display General display	Vdc mW mA	24 with 16is24b terminal module See below To the power supply + pin With transient voltage suppressors in parallel to the terminal module inputs. 0.5A fuse recommended on the terminal module power supply. positive 280 + 10 per led lit attaining 920 max. 1 to 10 depending on the resistance values 1 green and 1 red LED 1 red FLT LED lit if board fault
Industrial tolerance Dielectric rigidity Input / ground Input / ground	Veff Veff	1500 with screw terminal 1000 with D-Sub and RJ45

See diagram G.

Static digital outputs : DO310 module

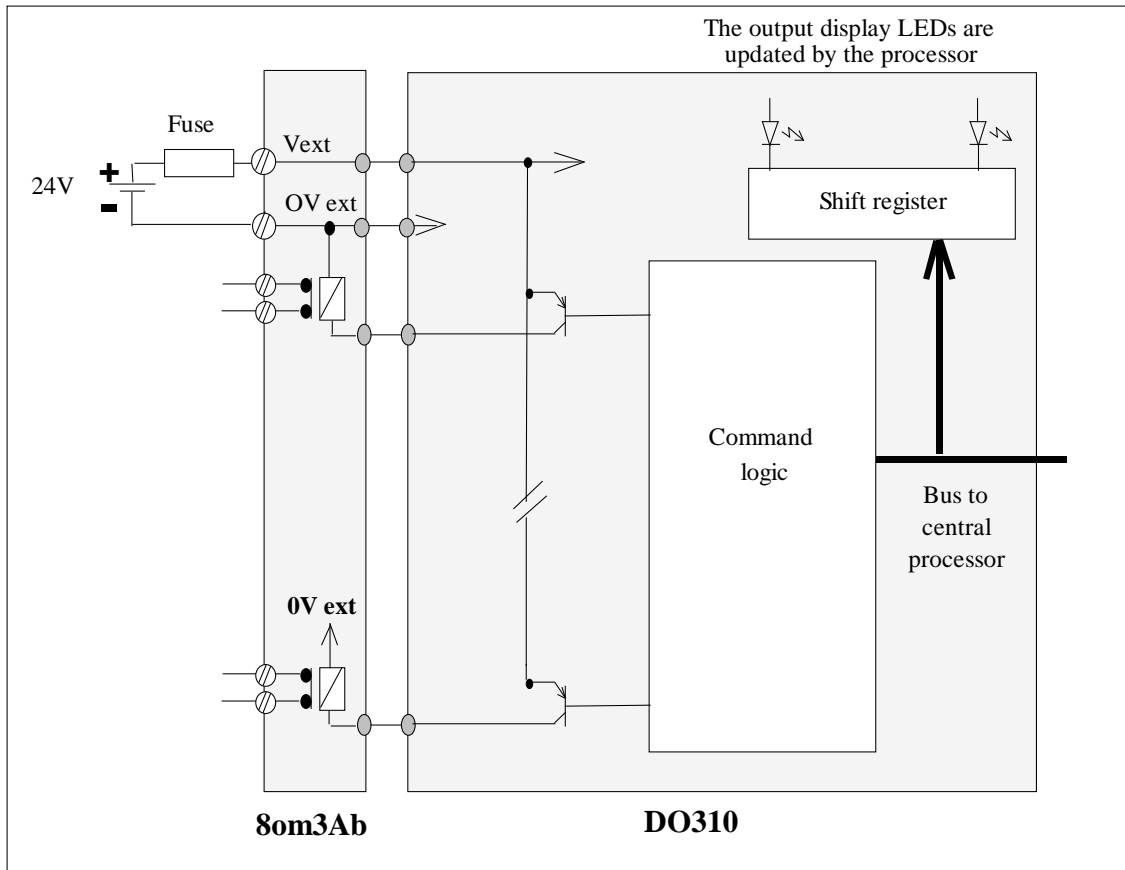
Output specifications	Unit	
Nominal voltage	Vdc	24
Maximum nominal current per channel	mA	350 per 8 channel group [0..7][8..F][10..17][18..1F]
Current leakage at low level	mA	<0.5
Waste voltage at state 1 with maximum nominal current	V	<1.8
Over-voltage protection		1,5A fuse recommended on the terminal module power supply.
Common to loads		at 0V of the power supply
Response time (logic + output)	ms	<1
Logic		positive : status 1= output busy
Internal bus consumption	mW	580 + 10 per led lit with a max 900.
External voltage consumption (excluding load current)	mA	<5
Channel display		1 orange LED per channel
General display		1 board fault LED . The outputs at low level if fault
Industrial tolerance		
Dielectric rigidity		
Output/ground	Veff	1500 with screw terminal
Output/ground	Veff	1000 with D-Sub and RJ45



Simplified diagram of a DO310 output

Relay digital outputs : D0310 / 8om3A.

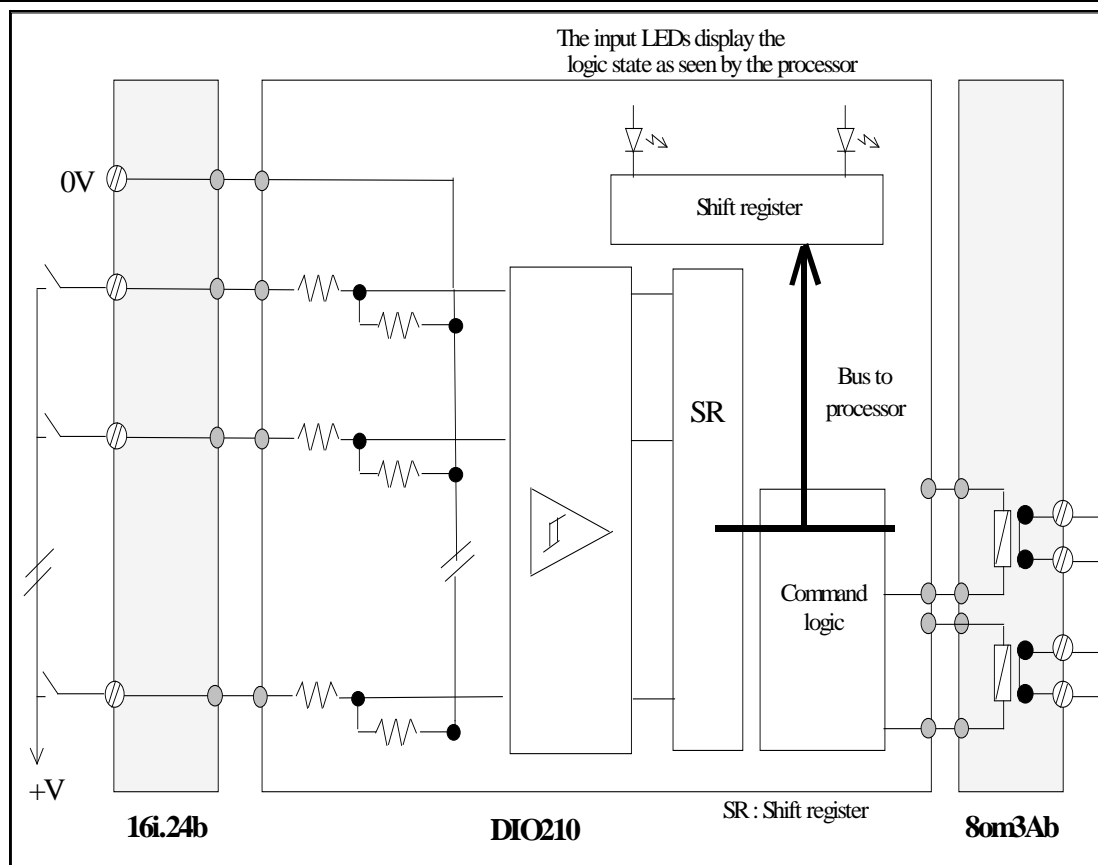
Output specifications	Unit	
Coil nominal voltage	V	24 V
Contact type		contact 1 T, potential free
Max current per channel	A	3 A on resistive load (30V=) 2A inductive load (230V~)
Current leakage at 0 state	mA	<0.5
Over-voltage protection		By transient voltage suppressors in parallel to the outputs on the terminal modules. 0.5A fuse recommended on the terminal module power supply.
Response time (logic + output)	ms	<10
Logic		positive : high level= output busy
Internal bus consumption	mW	580 + 10 by lit led, attaining 900 max.
External voltage consumption (excluding current load)	mA	10mA per relay coil
Channel display		1 orange LED per channel
General display		1 board fault LED . The outputs at low level if fault
Expected life		> 30.10 ⁶ mechanical switches
Breakage point		
load : 30VCC/6A, resistive		500.000 switches
load : 50VCC/0.3A, L/R=40ms		3.10 ⁶ switches
load : 250VCA/6A		100.000 switches
Industrial tolerance		
Dielectric rigidity between outputs	Veff	1500 for screw terminal
between outputs and ground	Veff	1500for screw terminal
between outputs	Veff	1000 for D-Sub
between outputs and ground	Veff	1000 for D-Sub



Simplified diagram of a D0310 relay output

Digital I/O : DIO210

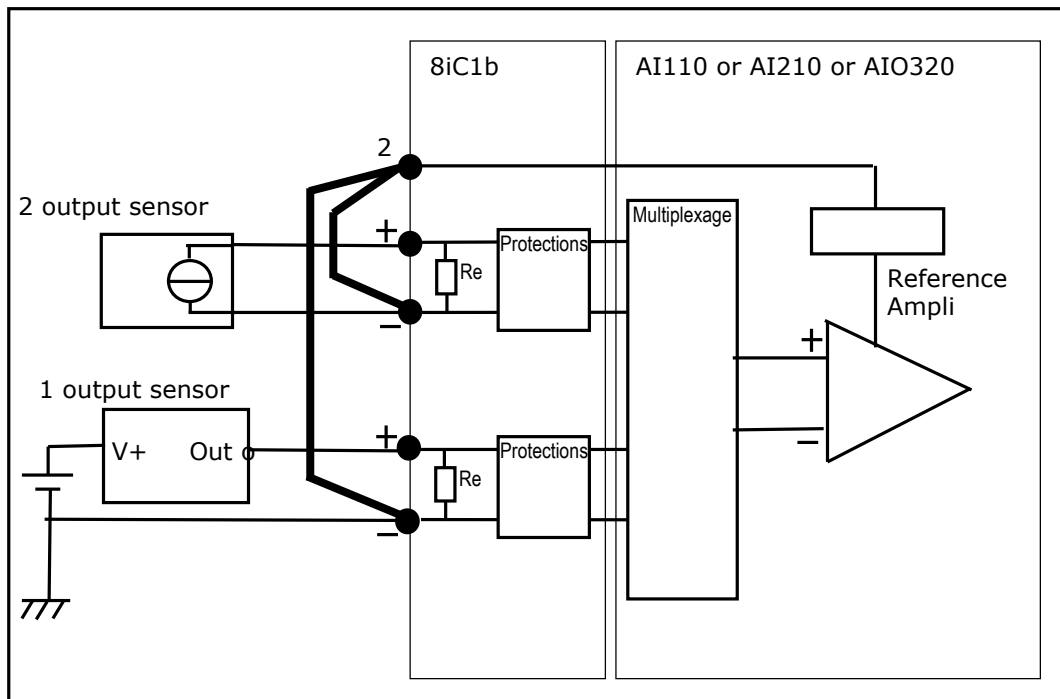
Common specifications	Unit	
Internal voltage consumption General display	mW	600 + 200 per relay + 10 per lit led attaining 2500 max. 1 red LED lit if board fault
Input specifications	Unit	
Nominal voltage	Vdc	24 with 16i.24() terminal module
Range	Vdc	12 to 30 with 16i.24() terminal module
Input type		type P IEC1131 standard : type 1 resistive
Input impedance	k Ω	5.5
Nominal current at nominal voltage	mA	5 mA for 24V
Input hysteresis	Vdc	$\pm 1.5V$ around 10.3V
Common to input sensors		at +V
Over-voltage protection		By transient voltage suppressors in parallel to the terminal module inputs.
Input response time	ms	2 ms (RC filter)
Logic		positive
Channel display		1 green LED per channel
Output specifications	Unit	
Coil nominal voltage	V	24 V
Contact type		contact 1 T, potential free
Max current per channel	A	3 A on resistive load (30V=) 2A on inductive load (230V~)
Current leakage at 0 state	mA	<0.5
Response time (logic+output)	ms	<10
Logic		positive : high level= output busy
Channel display		1 orange LED per channel
Dielectric rigidity		
Input / ground	Veff	1500 for screw terminal
Input / ground	Veff	1000 for D-Sub



Simplified DIO210 block screw terminal diagram

Non isolated analog current inputs : AI110 - AI210

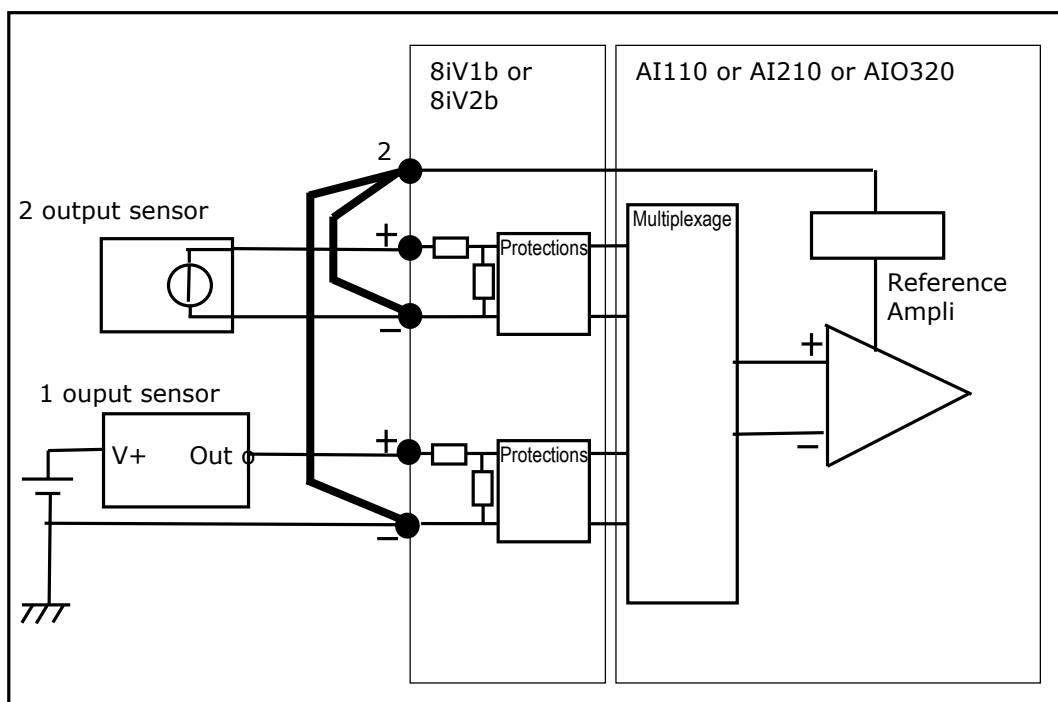
Input specification	Unit	
input signals	mA	-21.1 / +21.1
Digital resolution	Bits	13 + sign : ± 8192 points
Software correspondence value		$\pm 21.1\text{mA} \Rightarrow \pm 32767\text{points}$
Galvanic separation		
Between input and ground		yes
Between inputs		no
Input impedance	Ω	240
Conversion time	μs	<10
Maximum error at 25°C	%FS	± 0.2 (that is ± 60 points at 25°C with OPAL software)
Temperature coefficient	%FS	$\pm 0.005/^{\circ}\text{K}$
Maximum error over the complete temperature range	%FS	± 0.5
Maximum permanent current in differential mode without destruction	mA	40
Internal bus consumption	mW	580+ 10 per lit Led attaining 900 max.
Channel display		1 green LED + 1red LED per channel
General display		1 lit red LED if board fault
Dielectric rigidity		
Input / ground	Veff	1500 for screw terminal
Input / ground	Veff	1000 for D-Sub and RJ45



The inputs are symmetrical : a current entering through the + pin and exiting through the - pin supplies a positive digital value and inversely.

Entrées analogiques tension non isolées : AI110 - AI210

Input specifications	Unit	8iv1b module	8iv2b module
Input voltage And converted numeric value		-10.25V = -32767 pts +10.25V = +32767 pts	-5V = -32767 pts +5V = -32767 pts
Input impedance	kΩ	200	
Galvanic separation			
Between input and ground		yes	
Between inputs		no	
Conversion time		<10	
Digital resolution	Bits	13 + sign : ± 8192points	
Max. error at 25°C	%	±0.2 (full scale)	
Temperature coefficient	%	±0.005/°K (full scale)	
Maximum error across the full temperature range	%	±0.5 (sull scale)	
Channel display		1 green LED + 1red LED per channel	
General display		1 red lit LED if board fault	
Internal bus consumption	mW	580 + 10 per lit led attaining 900 max.	
Dielectric rigidity			
Input/ground	Veff	1500 with screw terminal	
Input/ground	Veff	1000 with D-Sub and RJ45	



The voltage difference between pin - of sensors and the reference of ampli (Pin **2**) don't must exceed :

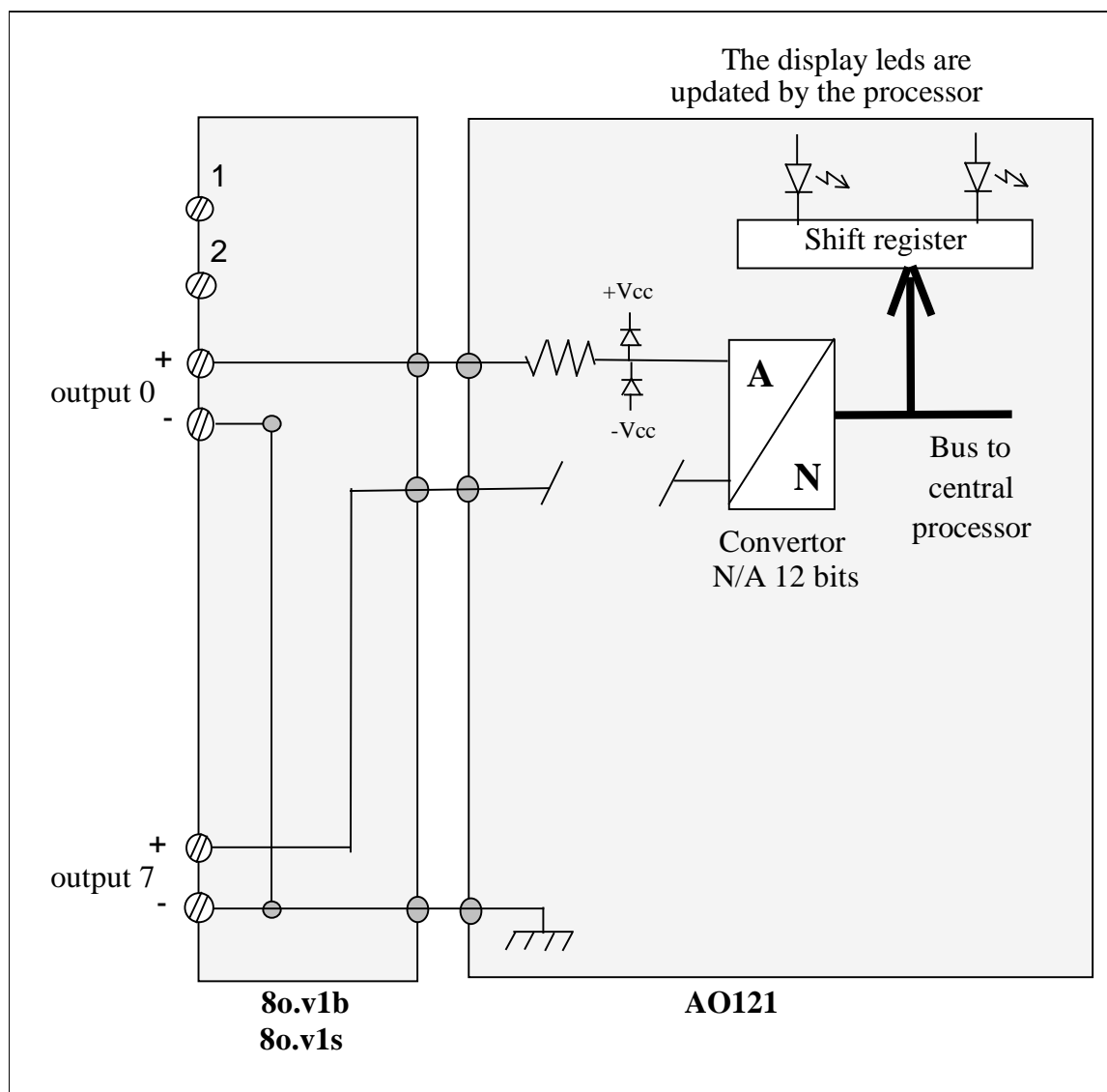
- 8i.v2b module (5v input) : ±10.5V
- 8i.v1b module (10V input) : ± 21V

If this is not the case it will be necessary to reference by wiring to avoid saturation.

The inputs are symmetrical : a voltage applied to the + pin greater than the voltage applied to the - pin supplies a positive numeric value and inversely.

Analog voltage outputs : AO121

Output specification	Unit	
Output voltage and Correspondence value	V	-10 V → -32767 pts +10 V → +32767 pts
Digital resolution	Bits	11 + sign : ± 2048 points
Common point between channels		YES
Load impedance	Ω	>2000
Conversion time outside of refresh cycle	μs	50
LSB value		4.88mV
Maximum error over the complete temperature range	%	±0.2 (full scale)
Incorporated over-voltage protection		yes
Internal bus consumption	mW	1180 + 10 per lit led + 50 per output attaining 1660 max.
Channel display		1 green LED per channel
General display		1 red LED if board fault
Dielectric rigidity		
Between outputs and ground	Veff	1500 with screw terminal
Between outputs and ground	Veff	1000 with D-Sub and RJ45



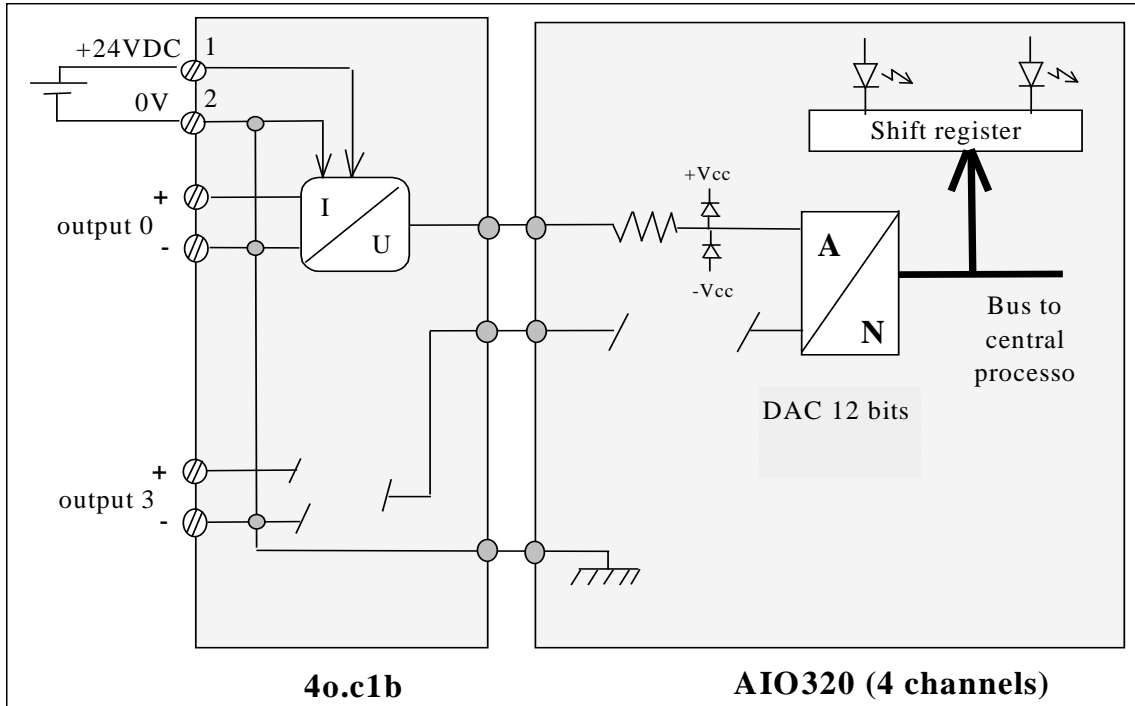
Simplified diagram of an ANA voltage output (80.v1b – 80.v1s)

Analog current and voltage I/O : AIO320

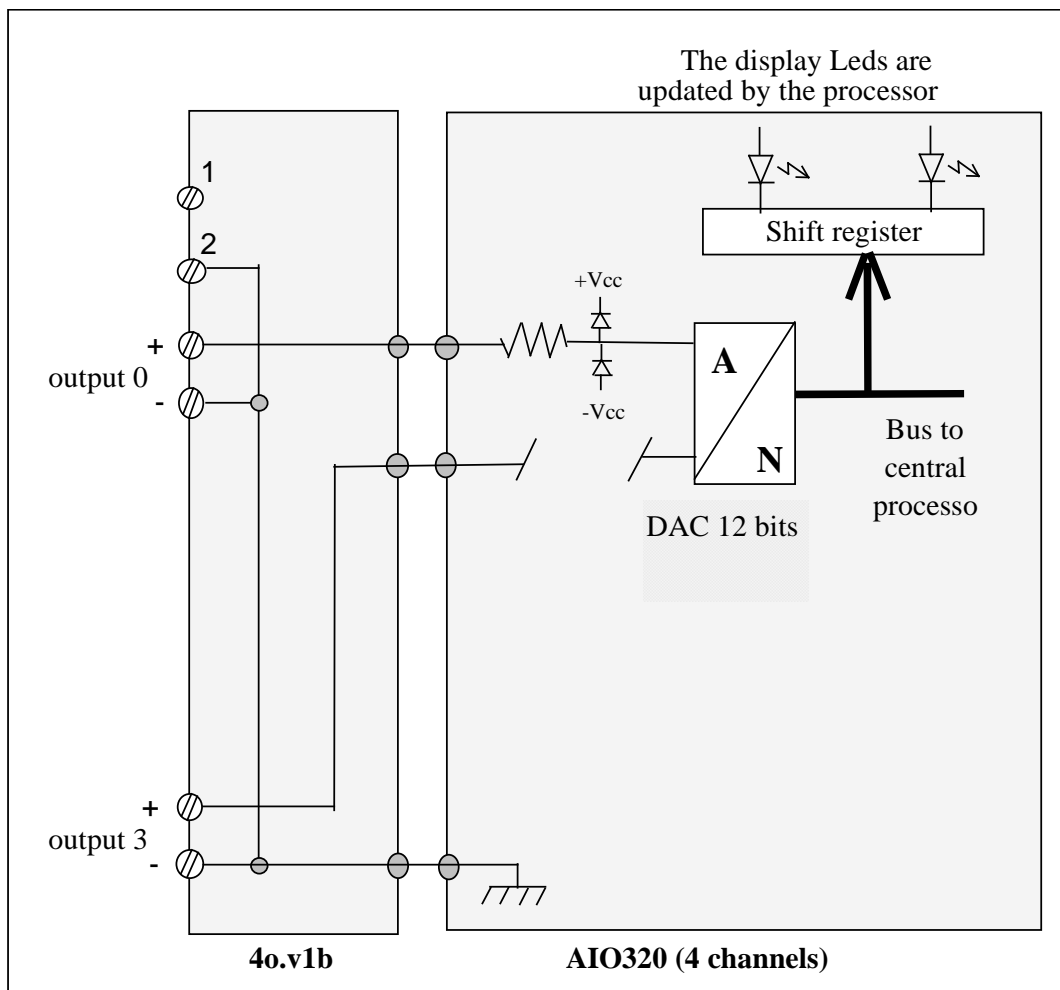
ANALOG INPUTS		
Current input specification	Unit	
Max input currents and software value	mA	-20 mA → -32767 pts +20 mA → +32767 pts
Input impedance	Ω	240
Voltage input specifications		
Max input voltages and software values	V	-10 V → -32767 pts +10 V → +32767 pts
Input impedance	Ω	200k
Common specifications		
Résolution numérique overflow	Bits	15 + signe Signaled by led + overflow bit
Analog to Digital conversion time	μs	<25
Error (full scale) : at 25°C / at 60°C	%	±0.1 / ±0.2
Permanent current in differential mode without destruction	mA	40
Channel display		1 orange LED per channel

ANALOG OUTPUTS		
Current output specifications		
Output currents and software values	mA	0 pt → 4mA + 32767points → 20 mA
Load impedance	Ω	770 max (power = 24V), 650 max (power = 24V -10%)
Current output supply		24V external
Voltage output specifications		
Output voltages and software values	V	-32767 pts → -10V +32767pts → +10V
Load impedance	Ω	>1000
Common output specifications		Unit
Digital resolution	Bits	11 + sign : ± 2048 points
Common point between channels		yes
DAC conversion time	μs	70
Maximum error at 25°C / +60°C	%	±0.2 / ±0.3
protection		against over-voltage and short circuits
Maximum consumption of the 4o.c1b terminal module on an external 24V power supply	mA	100
Channel display		none

Common I/O specifications		Unit
Internal bus consumption	W	1.5W outputs at low level or unloaded and 2.1W with 4 outputs at a maximum load (1kΩ)
General display		1 red LED lit on board fault
Industrial tolerance		
Dielectric rigidity input/ground	Veff	1500 with screw terminal
Dielectric rigidity output/ground	Veff	1500 with screw terminal
Dielectric rigidity input-output/internal bus	Veff	1000



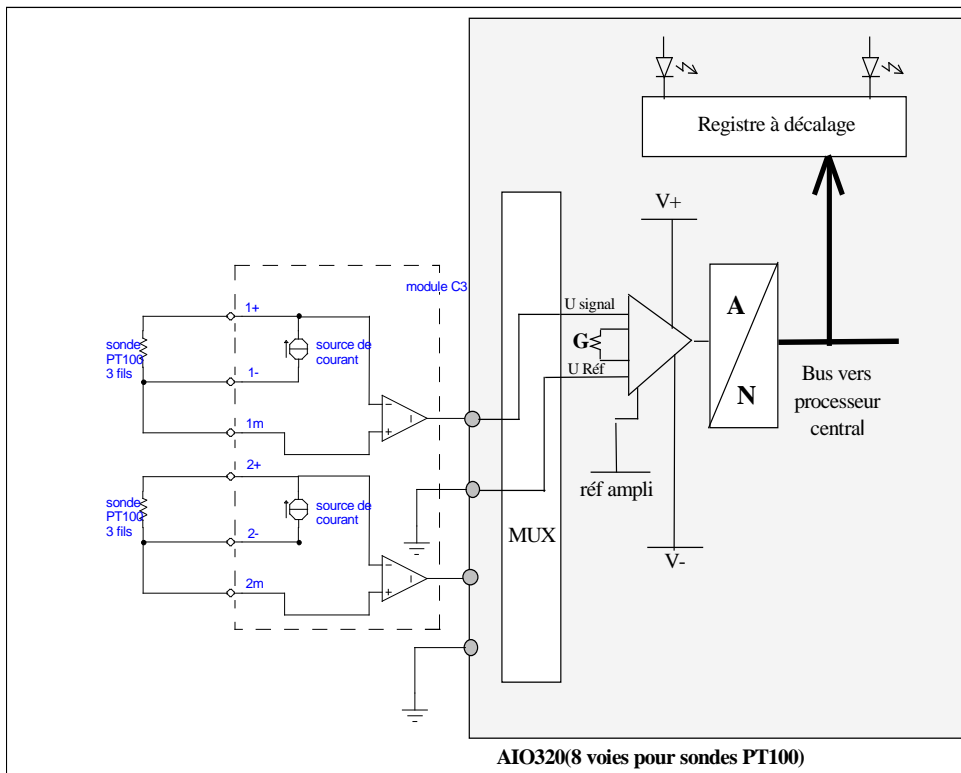
Simplified diagram of an ANA current output (4o.c1b)



Simplified diagram of an ANA voltage output (4o.v1b)

PT100 sensor inputs : AIO320

PT100 input specifications	Unit	
Number of inputs		8
Type		PT100 2 and 3 wires (according to CEI751)
Min/max Temperatures and software value		-50°C => -50 points +350°C => +350 points
Measure precision with à LT at +25°C	°C	0.5 with software gain correction and offset
PT100 wires lenght compensation		yes (if wires have the same resistance)
Cut wires detection		yes
Detection of temperature range overflow		yes (by software)
Internal bus consumption	W	2.7W (without analog outputs)
Channel display		1 orange LED per channel for range overflow or threshold set by OPAL software

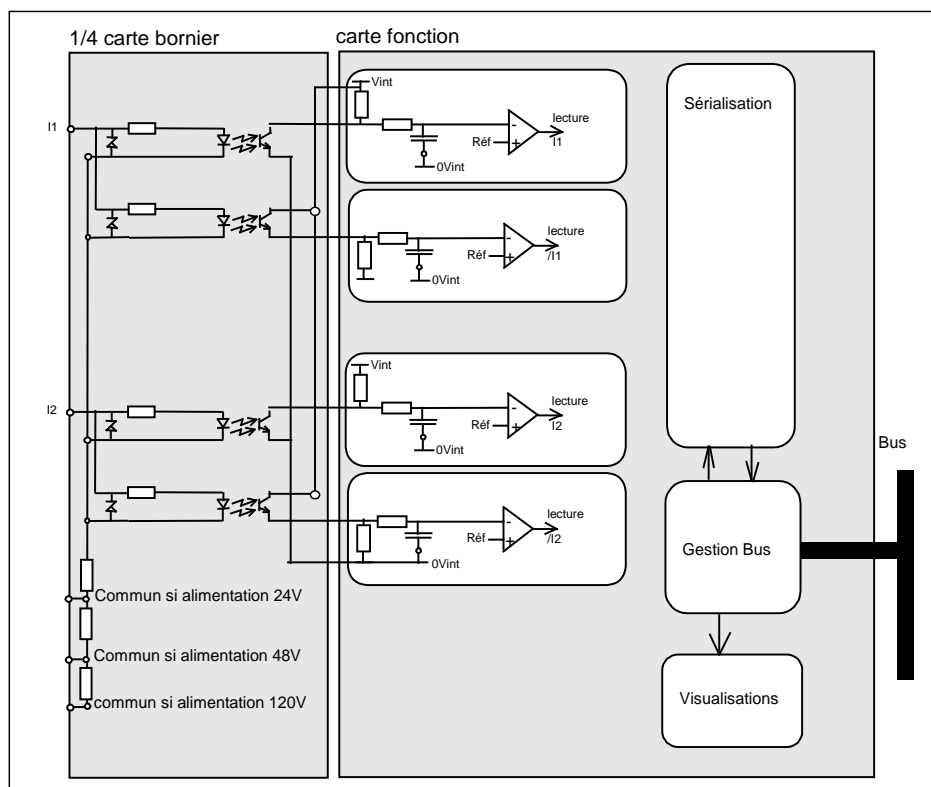


Secured digital inputs : DI130

Interest of this module :

- every input is redounded to generate two complementary bits
- 16 double digital input in a three pas length module
- 3 possible choice for the input power supply
- good CEM immunity

Input specifications	Unit	
Nominal voltage	Vdc	1 common 24V 1 common 48V 1 common 120V
Range	Vdc	-20% to +15% of the nominal voltage
Input type		type P; IEC I1131 standard : type 1 resistive
Input current	mA	20 for 24V ; 15 for 48V ; 7.5 for 120V
Switch on/off	%	High level =55% of the power voltage Low level =25% of the power voltage
Common to input sensors		To the + of the power supply
Over-voltage protection		With transient voltage suppressors in parallel to the terminal module inputs.
Input response times	ms	15 ms (RC filter)
Logic		positive
Consumption on internal voltage	W	1
Channel display		1 green LED per channel
General display		1 red lit LED if board fault
Dielectric rigidity : Input/ground	Veff	1500 on screw terminal
Local temperature limitation	°C	45 max.



Secured digital inputs / outputs : DIO130

Interest of this module :

- every input is redounded to generate two complementary bits
- Higher modularity : 4 inputs and 4 outputs by card terminal
- Secured of the open command of relays : double command line
- Internal check up of the double command of each relays and activation of a local WDG
- good CEM immunity

Input specifications	Unit	
Nominal voltage	Vdc	24/48/120 -20% à +15%
Input current	mA	20 for 24V, 15 for 48V, and 10 for 120V
Switch on/off	%	High level =55% of the power voltage Low level =25% of the power voltage
Input response times	ms	15
Channel display	mA	1 green LED per channel
Output specifications		
Relays : type		1RT : ST1 / DC12V from Matsushita : 1 contact T et 1 contact RT
Contact - Break power	W	30 on inductive load L/R = 40ms(200 mA ,137V ,10.000 mechanical switches)
Coil - nominal voltage - nominal curent	V mA	12 (via internal power supply of 15V) 20
Relays : R2, R4, R6, R8		1 work/break contact
Relays : R1, R3, R5, R7		1 work contact
Signalisations		
Relays R2, R4, R6, R8		4 green LED
Relays R1, R3, R5, R7		4 red LED
Sa, Sb, Sc, Sd	orange	4 LED managed by program
Wdl	Red	Local Watch Dog : ON if - the monostable duration (200ms) is out without any CPU activity - the CPU switched on the internal signal Wdg

