AcNet Pro 4x4

Actec Ltd.
Access Control Solutions
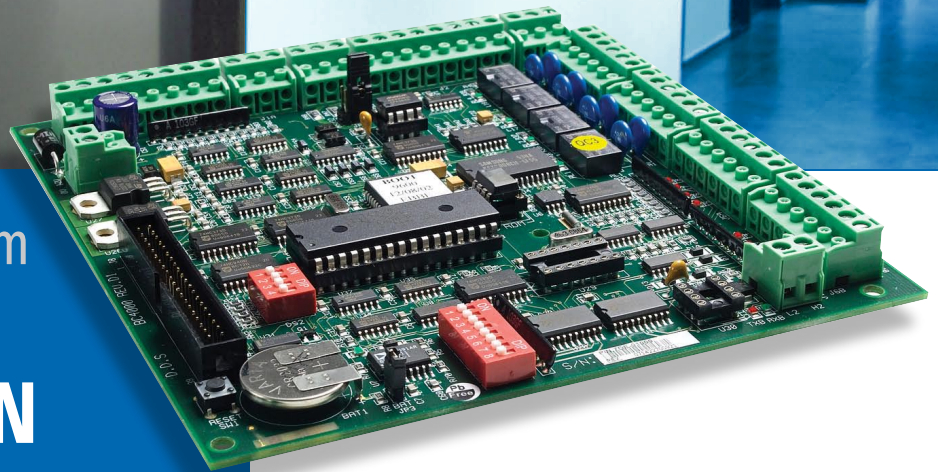
Access Control System
controller

INSTALLATION

MANUAL

CROW
Electronic Engineering Ltd

IMPORTANT NOTICE

P/N 7102004   Rev.A.   September 2008

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1. INTRODUCTION.

AcNet series, are all based on microprocessors. They are installed in order to operate 24 hours a day. In addition, since they must often control a given environment, AcNet series may be connected to various types of exterior elements such as card readers, electrical door opener, alarm detection device, printer, mainframe computer and so forth.

Under such circumstances, this kind of system is subjected to some extremely difficult constraints directly related to :

1. Electro Magnetic Interferences (EMI) along the lines connecting the terminal to any exterior elements. Undesired voltage may reach thousands of volts in case of lightnings.

2. The exterior elements themselves. In most cases, they are not supplied by CROW but are chosen in response to the constraints of the particular installation site (local distributors, national operating standards, etc.).

All AcNet series is provided with internal protection devices against all such interference. (These devices include varistances, protection diodes, etc.). However, since AcNet series may be installed in a variety of operating environments, there are a certain number of basic rules of thumb that should be followed in order to provide extra protection.

It is absolutely imperative that, from the moment a AcNet series is installed, the individual responsible for the installation rigorously adhere to all the directives listed below. Should any of these directives not be rigorously adhered to, CROW will not assume responsibility for any problems or malfunctions that might be encountered as a result of such non-compliance.

1. The control unit (housing the microprocessor) must never be installed inside a high voltage electrical power box and must never be placed in close proximity to large transformers or high voltage/current source devices. Since the controller may require maintenance, it is important to consider the accessibility of the unit.

2. The board must be separately grounded. Therefore, one must verify in advance whether the installation site provides adequate grounding facilities. Verification can be carried out by measuring the 220/110 volts between the phase and the ground.

3. The cover or case that contains the control unit housing the microprocessor must be tightly screwed down or locked in place.

4. It is essential to plug the AcNetPro terminal's 220/110 volt sector cable into a "clean" line (i.e., a line not being used other pieces of heavy equipment) or into an independant line, which has been specifically allocated to the terminal, with a good earth ground.

5. Never use the system cables guide to pass wires from another system, like loud bells, electric door openers, etc ...

6. Four categories of cable go to, or from, the terminal:

    –   The 220/110 volt sector cable

    –   The cables connecting badge-readers, alarm entries and push-buttons

    –   The communication cable

    –   The cable connecting the electrical door opener or an exterior release device

These categories must be installed as far as possible one from the other.

2. THE ELECTRONIC BOARD AND THE PCB JUMPERS
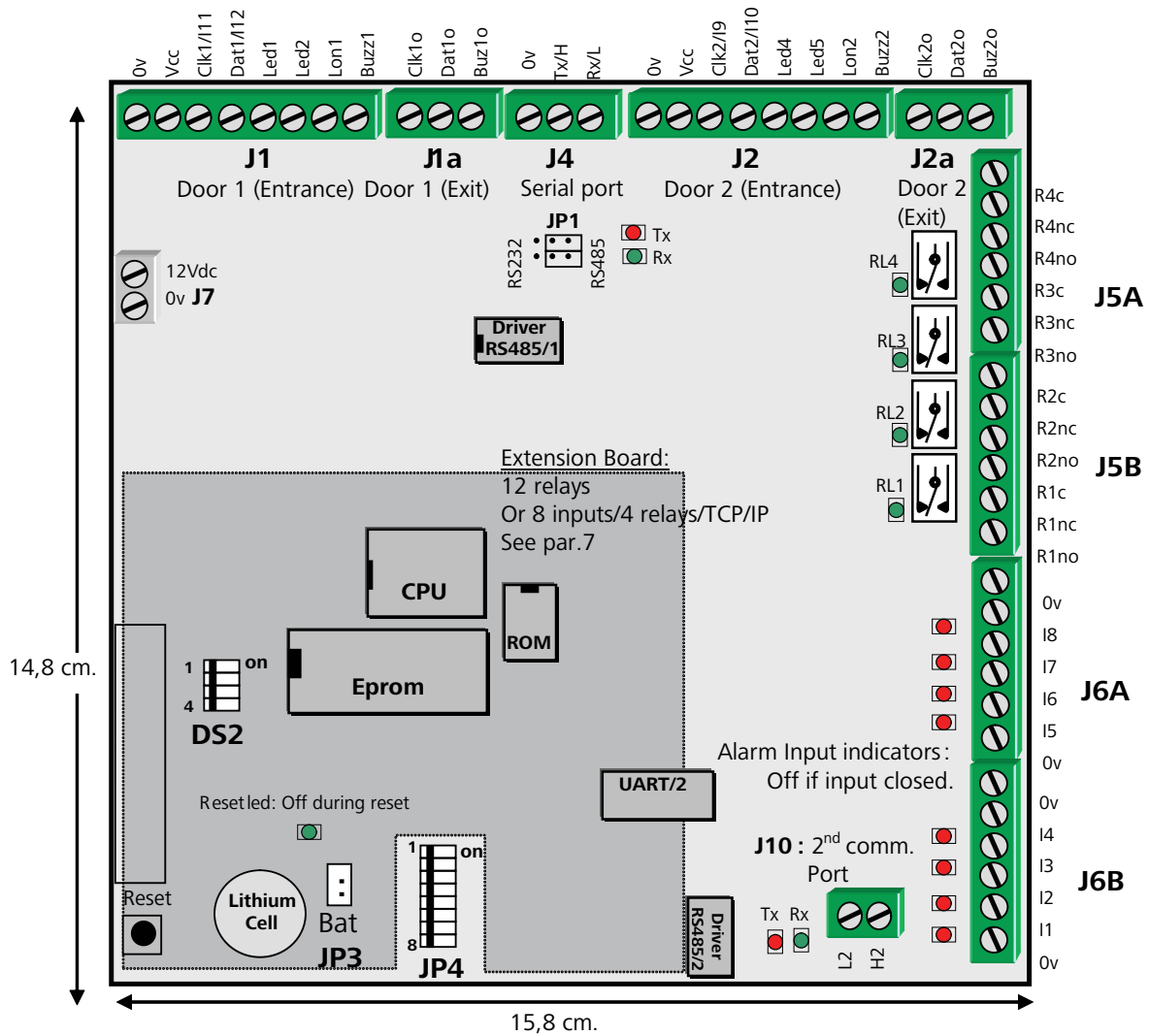
Fig. 1: The AcNetPro 4x4 Electronic board

	SWITCHES DS2:	

J1/J1a: Readers
Entrance/Exit Door 1
	DS2/1: Reserved
	DS2/2: off: Led1/Led2 for green/red Leds of Readers 1 and 1a
	  Led4/Led5 for green/red Leds of Readers 2 and 2a
	  On: Led1/Led2/Led4/Led5 for green leds of readers
	  1/1a/2/2a.	

J1/J1a: Readers Entrance/Exit Door 2	**DS2/3:** Not used **DS2/4 on:** Readers with Wiegand Interface	**JP3: Lithium Cell on/off** Do not remove
J4 : Serial Port RS232 or RS485	**SWITCHES JP4:**	
J5A, J5B : 4 Relays 24v / 1A	AcNetPro: JP4/1-5 : Controller Address (see par. 8.4) JP4/6,7,8 : Readers Technology :	
J6A, J6B : 8 Alarme inputs	6 on: Wiegand (Up to 50 bits) with parity check (set also DS2/4 to 'on') 7 on: Wiegand (Up to 50 bits) without parity check (set also DS2/4 to 'on')	**JP1: Selection** **RS232/RS485:**
J7 : Power 10Vdc to 13Vdc/0,5A	8 on: not in use Note 1: For the Wiegand Interface only : Set switch DS2/4 ON.	6 5 4 6 5 4 1 2 3 1 2 3
J10: Second serial port (Driver RS485/2 and UART/2 must be installed)	Note 2 : reader type PR use blue Led (not Red Led)	**RS232 RS485**

3. POWER SOURCES AND BOARD CONSUMPTION

The board must be powered by 12Vdc. Nude, without any card reader, the board consumption is 100 mA max.

The maximum consumption authorised through the Vcc of the board is 300 mA.

NOTES: 1- Card readers consuming more than 250mA CANNOT be powered by the AcNetPro Vcc output.

 2- A safety approved 12V battery pack has to be used, according to the local standards.
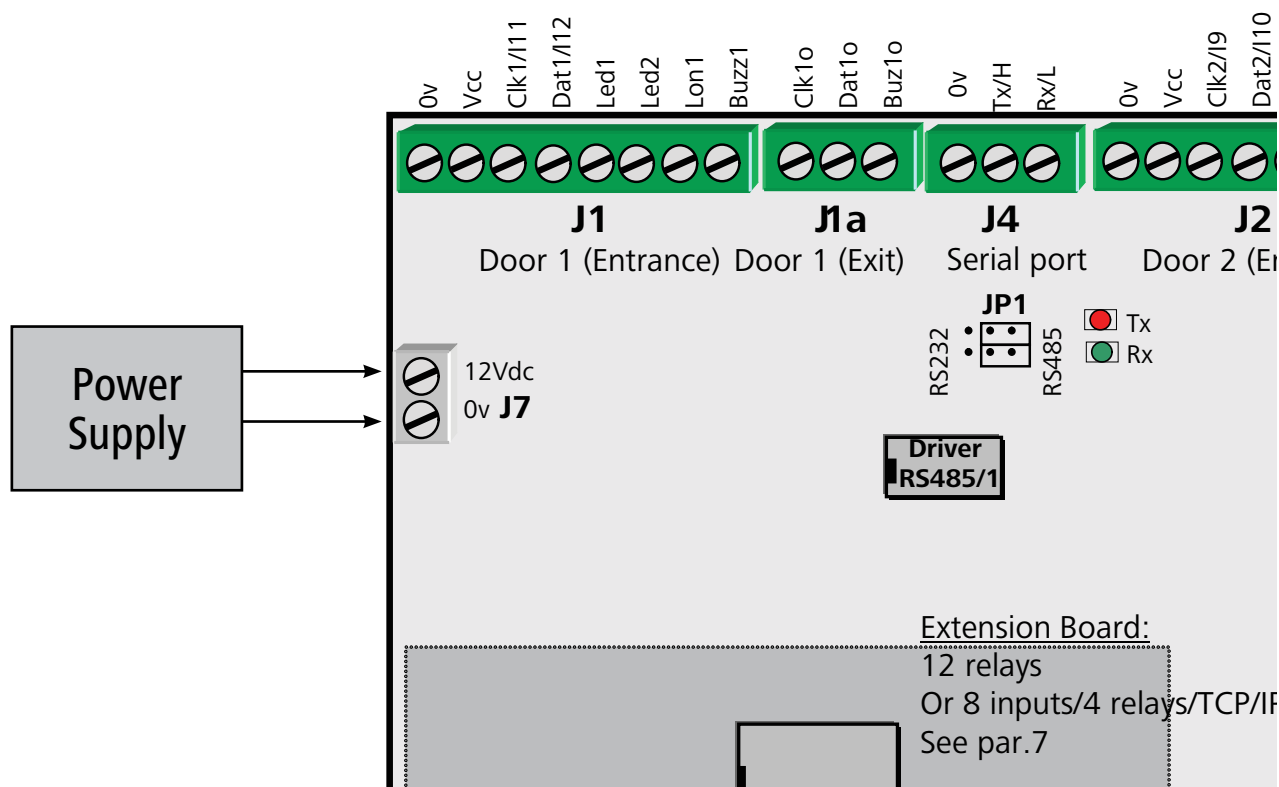
REMINDER! DON'T CONNECT THE READER'S RED WIRE TO VCC OF THE PCB CONTROLLER.

4. CARD READERS TYPES AND CONNECTION

The AcNetPro controller may recognise many kind of reader technologies, selected by jumpers JP4/6,7,8. Hereunder the connection for the most popular one (magnetic and proximity). For other technologies, refer to the relevant manual.

4.1 Connecting the Proximity Reader Range

It is adviced to use the ACTEC proximity reader range.
PR 103/104 – a 125 KHz models or smart reader – a 13,56 MHz model

PR 104 Anti Vandal	**PR 103** Prox	**PR 106** Prox Pincode	**SW - 7** Fingerprint (refer to the relevant Manual)

Type of cable: 8 shielded wires, 22 AWG. Maximum length: 100m.

Interface: ISO2 (clock/data) or Wiegand (data0/data1)

NOTE : Connection readers table on next page

4.1.1 Card readers type and connection

PR TYPE READERS - CABLE CONNECTION		
Reader / ISO2 Interface (Proxpoint, etc…)	**Reader / Wiegand Interface** (PR 03/04/06, etc..)	**ACNET 200 PCB** Reader 1/2
+DC	+DC Red	12Vdc
GROUND	GROUND Black	0v
CLOCK	DATA 0 Green	CLK1/CLK2
DATA	DATA 1 White	DAT1/DAT2
DATA RTN (If exists)	DATA RTN	
GREEN LED (If exists)	BLUE LED Brown	0v
RED LED (If exists)	GREEN LED Orange	LED1/LED4
BEEPER (If exists)	BEEPER Yellow	BUZ1/BUZ2

Fig 3. connection readers table

NOTE 2 : Refer to the reader manufacturer instruction manual for reader operation detail

AcNetPro Dip switches DS1		
ISO 2 INTERFACE (Clock/Data) :	**WIEGAND INTERFACE (See also note 1 below) :**	
 6 7 8 off on **DS1** Any Wiegand card up to 50 bits with parity checking based on ISO2 format.	 6 7 8 off on **DS1** Any Wiegand card up to 50 bits with parity checking based on format: PE …. Data bits ….PO	 6 7 8 off on **DS1** Any Wiegand card up to 50 bits without parity checking

Fig 3. setup of DS1 switch

NOTE!   Bfore connecting the PR 106 – make sure to reprogram it to Motorola output signal.
         Read PR 106 instruction for details.

4.2   Connecting four readers without extension board:

AcNetPro 4x4 allows to control four card readers. The readers connection and the Leds functionning may be selected between the two following modes:
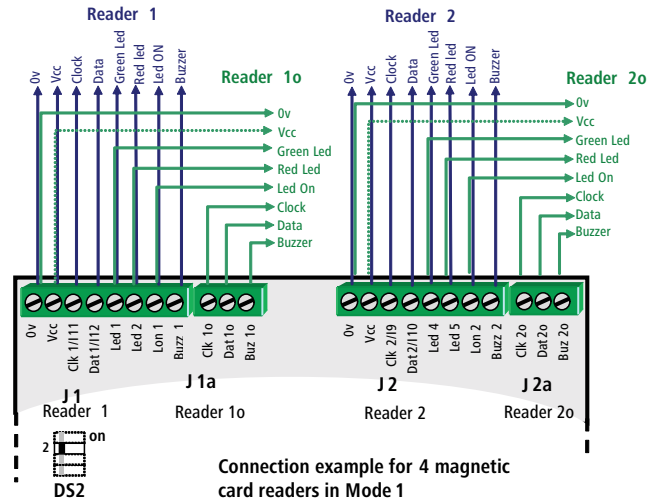
Mode 1 (DS2/2 'off'):

The red and green leds of readers 1 and 1o (and 2 and 2o) are common.

Connection:

'Led1' for green leds of reader 1 and 1o.

'Led2' for red leds of reader 1 and 1o.

'Led4' for green leds of reader 2 and 2o.

'Led5' for red leds of reader 2 and 2o.

Note: The leds of Readers 1o and 2o may be controlled separately by using an extension board (See par.4.3).

Mode 2 (DS2/2 'on'):

Each reader green led is independantly controlled. The reader red leds are not used.

Connection:

'Led1' for reader 1 green led.

'Led2' for reader 1o green led.

'Led4' for reader 2 green led.

'Led5' for reader 2o green led.

Note: Readers type PR use blue led (not red led).

Connection example for 4 magnetic card readers in Mode 1

Connection example for 4 magnetic card readers in Mode 2
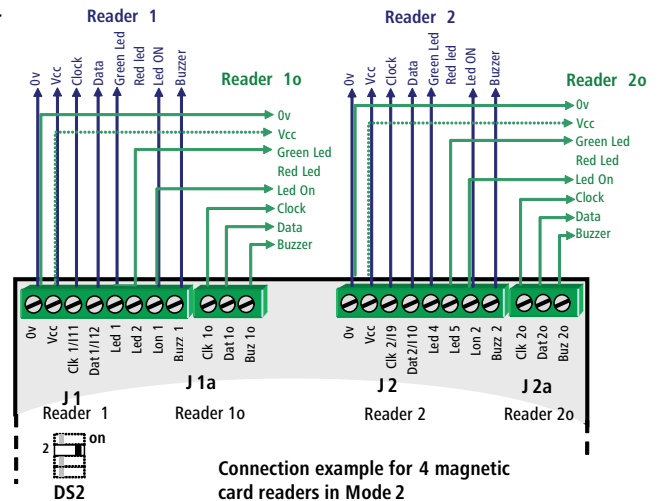
4.3   Connecting four readers with an extension board EXT-84 or EXT-TCPT84:

Using an extension board allows to control the green and Red leds of each reader.

Connection:

'Led1'/'Led2' for reader 1 green/red led.

'Led6'/'Led7' for reader 1o green/red led.

'Led4'/'Led5' for reader 2 green/red led.

'Led8'/'Led9' for reader 2o green/red led.

(DS2/2 must be set to 'off')

5. DOOR CONTACTS AND INPUTS DEVICES

A magnetic contact, passive infra-red unit, request to exit switch or any other form of dry contact can be monitored via the AcNetPro controller through 8 inputs I1 to I8.

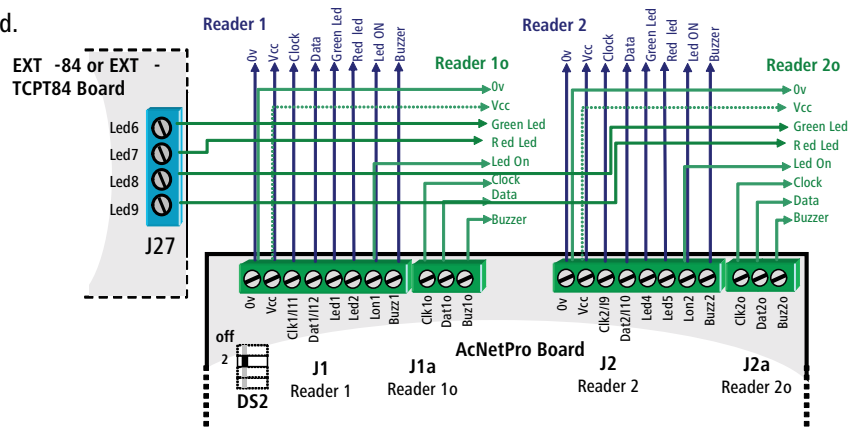Inputs I1 to I4 are supervised inputs: they control the contact itself (Open or close) and also the line (line short or cut). For this purpose, Two resistors must be installed as shown on the diagram.

Inputs I5 to I8 are 2 states only. (contact close or open)

Protection against RFI interferences:

The following must be rigidly adhered to, in order to prevent malfunctions or interruptions :

– If the distance between the alarm detector, push-button, etc., and the   electronic board is greater than 10 meters, use a shielded cable and connect   the shields to the ground point of the control unit.

– Always ensure that a distance of at least 50 cm, separates the connecting cables from both high-tension cables and electrical door opener cable.

Example of a Normally Open or Normally Closed switch connected to input I1.

– Inputs I1 to I4 may be supervised (use 2x4,7KOhms resistors as shown).

– Inputs I5 to I8 are 2 states only.

– Use a 2 conductors wire 22 AWG. Maximum lenght: 100 meters
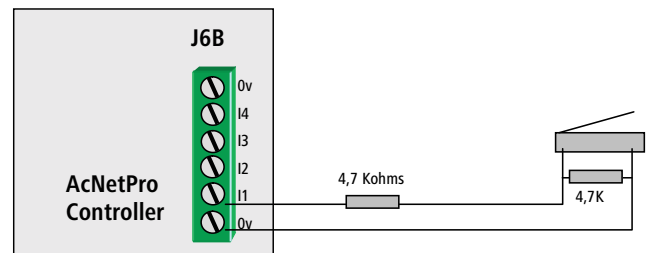
WARNING! - Do not apply voltage higher than 30VAC/DC
to alarm inputs.

6. LOCK DEVICE - RELAY OUTPUTS CONNECTION

The Four relays on the controller can support a maximum of 24V @ 1 Amp. Do not try to switch higher voltage than this as it may damage the controller. See figure below, for details of wiring an electronic release. The function of each relay is user definable in the software.
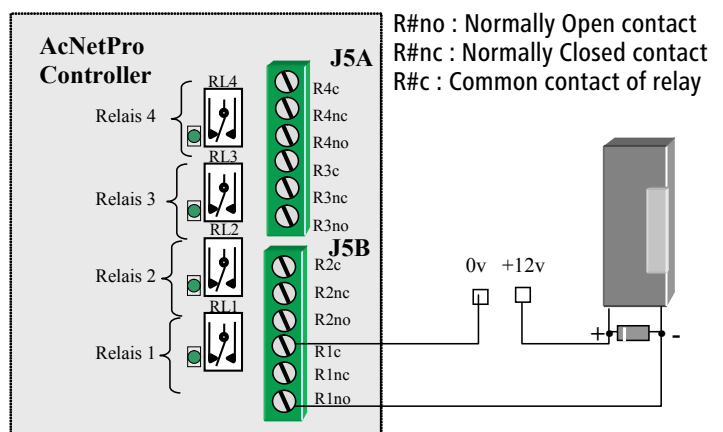
Example of wiring an electronic release on relay No.1
Use a 2 conductors wire 18 AWG.
Standard length : 10 meters.
For more than 10m, depends on wire resistance and load current consumption.

> **Always fit a Diode across a DC electronic lock, to be fitted at the lock end.**

R#no : Normally Open contact
R#nc : Normally Closed contact
R#c : Common contact of relay

Important notes:

1. If the release mechanism has a charge that exceeds the authorised limit or has a strong inductive charge (as in the case, for example, of revolving doors or turnstiles), it will be necessary to use an intermediate relay between the system and the charge. THE CHARGE MUST BE POWERED WITH A SEPARATE POWER SUPPLY. The intermediate relay and the electronic board may be powered with the same power supply, the one of the board for example.

2. The cable connecting the release mechanism to the control unit (or to the intermediate relay) must be isolated, and there must therefore be a distance of at least 50 cm, between this cable and all the other cables.

7. EXTENSION BOARDS

Different kinds of extension boards may be installed on the AcNetPro:

– The 'EXT-RLY' board which is a 12 relays board. Each relay has a 'Co' and a 'No' contact which must be connected as described in par.6.

– The 'EXT-84' board which has 8 supervised inputs (which must be connected as described in par.5), 4 output relays (which must be connected as described in par.6), and 4 supplementary leds (Led6 to led9) to control independantly the green and Red leds of readers 1o and 2o (see par. 4.3).

– The 'EXT-TCPT' board which has a TCP/IP interface.

– The 'EXT-TCPT84' board which is similar to the EXT-84 with, in addition, a TCP/IP interface. Fig.7.1 shows such a board and its connection.

RJ45 (10BaseT)
For TCP/IP network

J27: 4 leds Led6 to Led9
for readers 1o and 2o (See par. 4. 3)

Led6: Rdr. 1o Green ('Pass') led
Led7: Rdr. 1o Red ('Fail') led
Led8: Rdr. 2o Green ('Pass') led
Led9: Rdr. 2o Red ('Fail') led

J28: RS485 port from TCP/IP network.
When TCP/IP is used, the AcNetPro on-board RS485 port **is not available**.

This ext. board RS485 port may be used to connect other controllers (through their RS485 port).

Refer to par. 8.3 for line protection.

J25: 8 supervised Inputs I9 to I16.
(See Par. 5 for connection)

SW2, SR, SG, ER and EG are used by the TCP/IP module and described in the Module User Manual.

J26: 4 relays RL5 to RL8   (See Par. 6 for connection).

Fig. 7.1 - 'EXT-TCPT84' Board (9,90 x 12,1 cm)

8. RS232 / RS485 SERIAL PORT CONNECTION.

If the controller has to be connected to a PC at less than 30 meters, its RS232 port may be used.

If the distance is bigger than 30 meters or if several controllers must be connected together to a PC, the RS485 port must be used as follows.

The characteristics of the serial transmission is : asynchronous serial transmission, 4800 bauds, 8 data bits, no parity, 1 stop bits.

With an on-board firmware version from 1/4/2002, the baud rate may be programmable from 4800 to 38400 baud.

8.1 RS232 port. Jumpers JP1:

The three signals 0v, Rx andTx (3 shielded wire 22 or 24 AWG. Maximum distance: 30m) are connected to the PC (or the printer) as follows: AcNetPro-JP4/0v to D25/Pin 7 or D9/pin 5, AcNetPro -JP4/Rx to D25/Pin 2 or D9/pin 3, AcNetPro -JP4/Tx to D25/Pin 3 or D9/pin 2.

8.2 RS485 port. Jumpers JP1 :

Connect the controllers as follows:
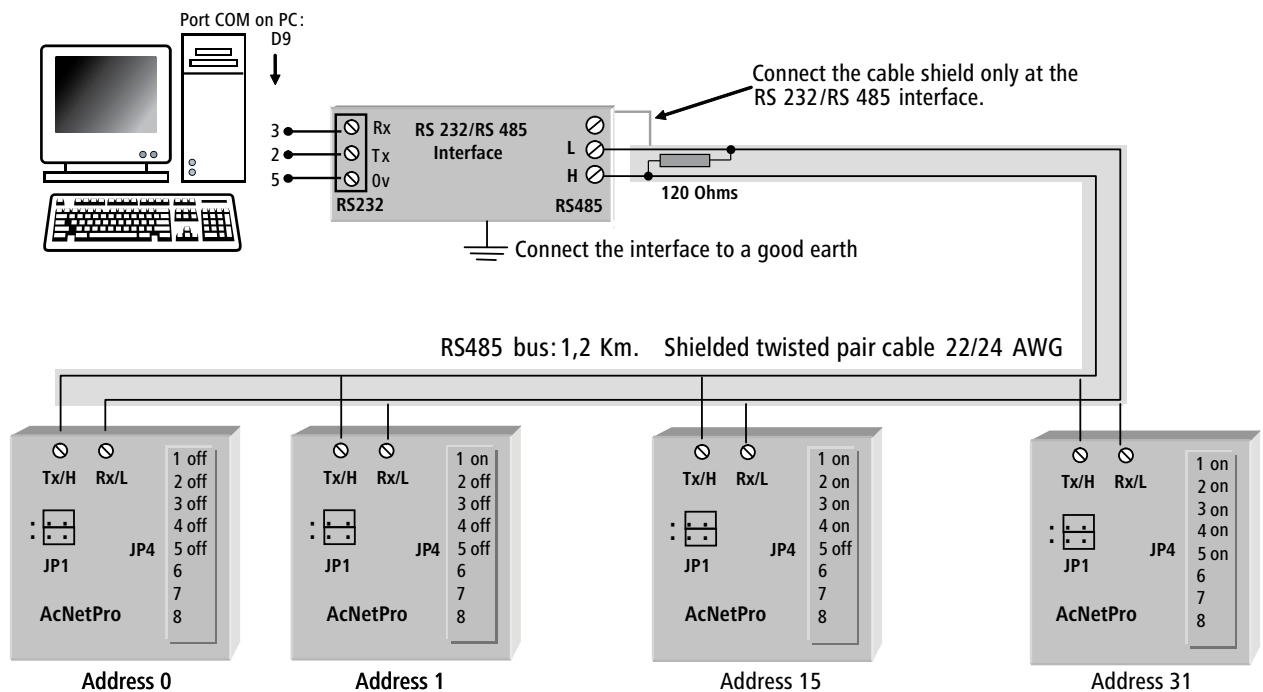
Notes:

1-Do not connect the communication cable screen at any point other than at the RS232/RS485 interface end.

2- It is imperative that the interface has a good earth ground through the mains. The importance of a good earth ground cannot be overemphasized. Performance of the protection is directly related to the efficiency of the grounding system.

3- When one RS485 bus is used as shown in the schema, two end of line resistors (120 ohms) must be installed, one at the RS232/RS485 interface and one at the last controller of the bus.

4- Each AcNetPro board must have its own address selected by jumpers JP4/1-5, as shown below.

8.3   Protection against RFI interferences:

Most of the interference will come by induction to the cable shield, on which high and very high voltage may appear because of RFI interferences or lightning bolts.

To prevent perturbations, the following rules must then be respected:

1. Use a shielded 22AWG triple-wire cable ("Receive"/"Transmit"/0v) for the RS232 connection and use a shielded 22 AWG twisted pair cable for the RS485 connection.

2. A good quality cable shield must be used and the shield must be connected to a strong earth. The shield should be from copper rather than aluminium, since the latter provides only partial attenuation.

3. All communication cable shieldings should be connected to only one extremity (and not both), in order to avoid the problem of "ground loops". Whereas the connection for the RS485 wire shield should be carried out at the level of the concentrator and the connection for the RS232 wire shield should be carried out at the level of the terminal.

4. A distance of at least 50 cm must separate all such connecting cables from high-tension cables, from cables connected to an electrical power box controlled by the system, or from any cables capable of generating strong interference (such as cables connected to high-power motors, generators, wireless telephone, etc.). Since it is often located besides a variety of cables, the external telephone line can also be a source of strong interference.

5. Extremely high tension produced by lightning bolts can enter the terminals through these above lines. Such tension can reach the level of hundreds of thousands of volts. It is therefore advised to use the CROW SP200 protection unit at the AcNetPro level. (This protection is included in the RS232/RS485 interface)

8.4 Setting the controller address.

In order to programme the system, each controller has to have a unique address which is defined with jumpers JP4:

AcNetPro is addressed from 00 to 31 through jumpers JP4/1 to JP4/5.

AcNetPro address:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
JP4/1	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
JP4/2	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
JP4/3	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
JP4/4	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On
JP4/5	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

AcNetPro address:	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JP4/1	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
JP4/2	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
JP4/3	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
JP4/4	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On
JP4/5	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On

Fig. 8.4 Setting the controller address through jumpers JP4/1 to JP4/5.

9.   Alarm Inputs

According to the model, a controller gets between 4 to 16 alarm inputs to which any kind of detectors may be connected (magnetic contact, passive infra-red, etc.).

The mode of each input (Normally Open or Normally Close) and its time zone are programmable. (Refer to the system Programming Manual for details)

Inputs may be programmed to operate in the following modes:

– **General alarm inputs**
   During the time zone it is armed (defined by its Event Weekly Programme), as soon as an alarm input switches from its normal state to its active state, a 'start alarm' transaction is recorded in the transaction buffer. When the input switches back to its normal state, an "end of alarm" transaction is recorded.

– **Door contact for door alarm**
   A door contact connected to door input will raise an alarm in the 2 following cases:

   - The door is forced, i.e. opened with no valid card.

   - The door is opened with a valid card but left open more than a pre-defined delay.

– **Request to open button**
   The door may be opened via a button connected to the "door remote" input.

In a AcNetPro, the alarm consists of a message sent to the central computer, which in turn may activate relays or trigger pre-defined actions.

9.1   Output Relays

According to the model, a controller gets between 4 to 16 relays.

The function of each relay (door or alarm control, automatisms, etc.) and the way it is activated are programmable. (Refer to the system Programming Manual for details)
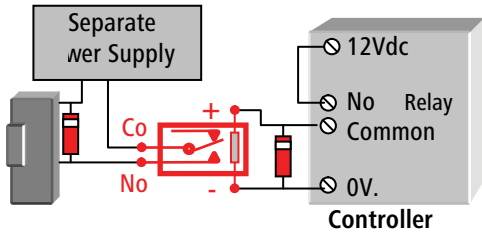
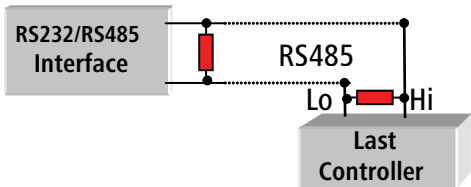# APPENDIX A : THE 10 COMMANDMENTS OF THE INSTALLER.
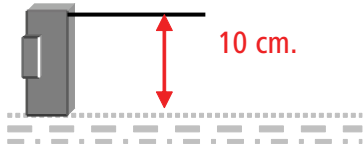
10 cm.

1. Never pass the door opener cable near the other cables: it must be at least 10cm from all other cables.
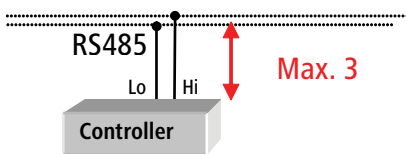
**DC +** **|-**
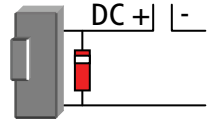
2. Use always a diode if the door opener is DC powered

Separate
wer Supply

12Vdc

No   Relay
Common

0V.

Controller

Co

No

3. If the door opener consumption is more than 24V/1A, use an intermediate relay.

RS232/RS485 Interface

RS485

Lo   Hi

Last Controller

4. Always install a 120 ohms terminator resistor at both ends of the RS485 line.

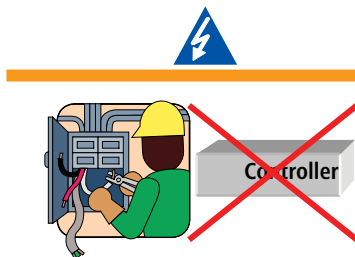RS485

Lo   Hi

Max. 3

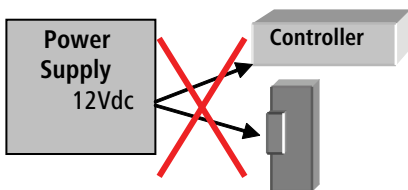**Controller**

5. Never connect a controller to the RS485 bus farther than 3 meters.
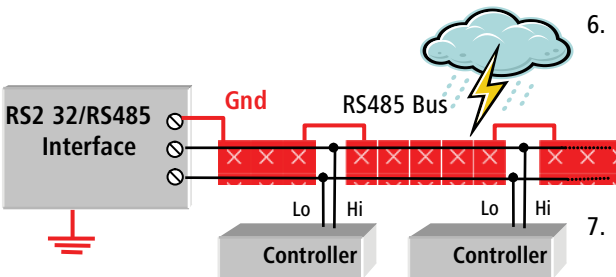
6. Link all the RS485 wire shields together and connect it at the RS232/ RS485 interface end and NOT at the controllers end.

RS2 32/RS485 Interface

Gnd   RS485 Bus

Lo   Hi   Lo   Hi

Controller   **Controller**

7. Use a very good earth at the interface.

Controller

8. Use a surge protection if the region is inclined to lightning. (like the SP200 unit)

Power Supply 12Vdc

Controller

9. Never install a controller or its cables near a high voltage line or a heavy duty electric devices (Motors, transformers, high voltage sources, etc…)

10. Never use the same power supply for the controller AND the door opener

CROW ELECTRONIC ENGINEERING LTD. (Crow) WARRANTY POLICY CERTIFICATE

This Warranty Certificate is given in favor of the purchaser (hereunder the "Purchaser") purchasing the products directly from Crow or from its authorized distributor.

Crow warrants these products to be free from defects in materials and workmanship under normal use and service for a period of 24 months from the last day of the week and year whose numbers are printed on the printed circuit board inside these products (hereunder the "Warranty Period").

Subject to the provisions of this Warranty Certificate, during the Warranty Period, Crow undertakes, at its sole discretion and subject to Crow's procedures, as such procedures are form time to time, to repair or replace, free of charge for materials and/or labor, products proved to be defective in materials or workmanship under normal use and service. Repaired products shall be warranted for the remainder of the original Warranty Period.

All transportation costs and in-transit risk of loss or damage related, directly or indirectly, to products returned to Crow for repair or replacement shall be borne solely by the Purchaser.

Crow's warranty under this Warranty Certificate does not cover products that is defective (or shall become defective) due to: (a) alteration of the products (or any part thereof) by anyone other than Crow; (b) accident, abuse, negligence, or improper maintenance; (c) failure caused by a product which Crow did not provide; (d) failure caused by software or hardware which Crow did not provide; (e) use or storage other than in accordance with Crow's specified operating and storage instructions.

There are no warranties, expressed or implied, of merchantability or fitness of the products for a particular purpose or otherwise, which extend beyond the description on the face hereof.

This limited Warranty Certificate is the Purchaser's sole and exclusive remedy against Crow and Crow's sole and exclusive liability toward the Purchaser in connection with the products, including without limitation - for defects or malfunctions of the products. This Warranty Certificate replaces all other warranties and liabilities, whether oral, written, (non-mandatory) statutory, contractual, in tort or otherwise.

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Purchaser understands that a properly installed and maintained product may in some cases reduce the risk of burglary, fire, robbery or other events occurring without providing an alarm, but it is not insurance or a guarantee that such will not occur or that there will be no personal injury or property loss or damage as a result.

Consequently, Crow shall have no liability for any personal injury; property damage or any other loss based on claim that these products failed to give any warning.

If Crow is held liable, whether directly or indirectly, for any loss or damage with regards to these products, regardless of cause or origin, Crow's maximum liability shall not in any case exceed the purchase price of these products, which shall be the complete and exclusive remedy against Crow.