



ENERGY XT

Hardware Installation User Manual



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1 USE OF MANUAL

To facilitate use of the manual, customers may find the following useful:

Call-outs

Callout column:

Callouts on the topics described are placed to the left of the text to allow the user to find the desired information quickly.

Cross references

Cross references:

All the words in *italics* are listed in the index with a reference to the page where they are described in more detail; the text below serves as an example:

"activation of the alarm stops the compressors"

The italics indicate that under Compressors in the index there is a reference to the page where compressors are described in more detail.

If the online Help on the PC is used, the words in italics become proper hyperlinks (automatic links activated with a click of the mouse) that connect the different sections in the manual and allow you to navigate through the document.

Highlighted icons

Some parts of the text are highlighted in the callout column using icons that have the following meanings:



Note: draws attention to a specific topic that users should take into account.



Tip: highlights a suggestion that helps users to understand and use the information on the topic described.



Warning! : highlights information that may damage the system or place persons, equipment, data, etc at risk if not known. These sections must always be read prior to use.

2 INTRODUCTION

Energy XT is an instrument used to control medium and large sized chillers and/or heat pumps. With its series of expandable models, it can cover all types of application with ad hoc use of electronics. The controller can control machines with up to 32 power steps distributed on a maximum of 8 compressors with 8 circuits.

2.1 Main characteristics

The functions currently available on the Energy XT are:

- Time-Proportional control;
- Proportional control or PI of thermoregulation;
- Proportional control of boilers or electric resistors integrating heat;
- Proportional control of the condensation for each circuit through modulation of the speed of the fans. The function may work on an analogue output (to control an inverter or a phase cut) or on the relays by means of a step control;
- Pump-down management both during circuit power-on and power-off;
- The circuits belonging to an evaporator may be activated on the basis of saturation or balancing logic.
- Rotation of the compressors and circuits according to the hours of operation or related to numbers of compressor's *start-up*;
- Management of two pumps for the water integrated with the flowmeter diagnostics;
- Management of the real time clock with the possibility of setting up to 4 time zones per day of the week
- Energy-saving functions such as free-cooling and heat recovery,

2.2 Configuration Tools

2.2.1 Wizard

Energy XT's easy to use, *WIZARD*-driven software allows control algorithms to be easily customised. Applications range from basic heating and cooling, energy-saving functions such as free-cooling and heat recovery, through to a wide-ranging unit diagnostics system. Applications can be downloaded and upgraded locally or via a PSTN or GSM modem.

This software drives the developer to build the unit through a path which helps the configuration of the application and shows any possible conflict or discrepancy.

Starting with the physical description of the plant (type of plant, number of circuits, number and kind of compressors,...), then it defines the regulator algorithms (thermoregulator, fans, pumps, freecooling,...) to end with the diagnostic (antifreeze, pressure alarms, thermics) ensuring the "consistency" of the selected algorithms and ensuring the validity of the built plant.

2.2.2 Apploader

Apploader download the application files created by *Wizard* and *MenuMaker* to the EXTM.

Besides it is possible to

- manually configure the layout and the features of the *INPUTS/OUTPUTS* in order to standardize the electrical panels
- set digital INPUT/ digital OUTPUT polarity.

2.2.3 MenuMaker

Energy XT includes a software tool which automatically generates programme files to enable the structure and text of the *user interface* to be easily and intuitively personalised. In addition, *MenuMaker* means different languages can be accommodated, with the option to import and export text files and automatically generate user manuals.

MenuMaker allows to modify or to create a customised *user interface* both in terms of structure and labels, it provides also the possibility to manage a standard mask library for a quicker customisation. Moreover, it is possible to import and export text files for a simple languages management beside an automatic creation of applicative files and user manual. Furthermore it is possible to determine the functions related to the 4 keyboard configurable *buttons*.

2.2.4 Param Manager

The steady software used for the parameters configuration of the Energy family, can be also used to modify the whole range of Energy XT parameters, by the management of the files for the different parameters lists. The programming table allows to modify all the functional parameters and set point cooling and heating, in a simple and rapid way.

2.3 Models available

The models in the XT series include the *base* modules (with the letters XTM), the expansion modules (XTE) and the keyboards (XTK).

Models /R
Models /H

The letter /R indicates the presence of the *analogue outputs*, the RS232 connection and CAN-BUS1 .
The letter /H indicates the bases and expansions with the most *inputs* and *outputs* (see Tab. 1 below).

Memory

All bases have 128KB+M flash *memory* and 6+512KB RAM *memory*

Half of the analogue *inputs* on the XTM *base* and all the analogue *inputs* on the XTE1 expansion can be software configured and adapted to NTC, extended NTC sensor, 4÷20 mA *inputs*. (some solutions require specific semi-finished products)

Inputs/Outputs

Tab. 1 *Inputs/Outputs*

	Instrument	Digital Inputs	Analogue Inputs	Analogue Outputs	Relay Outputs	Serials
Bases	XTM <i>base</i>	14	8	-	12	COM1,2
	XTM/R <i>base</i>	14	8	4	12	COM1,2
	XTM/H <i>base</i>	22	16	-	20	COM1,2
	XTM/HR <i>base</i>	22	16	4	20	COM1,2
Expansions	EXTE1 expansion	4	4	-	9	-
	EXTE1/H expansion	8	4	2	15	-
Keyboard	EXTK <i>keyboard</i>	-	-	-	-	-

Modem
MODBUS



management is integrated in the instrument. The protocols available are the standard protocol and TELEVIS for parameter programming.

2.4 Possible Configurations

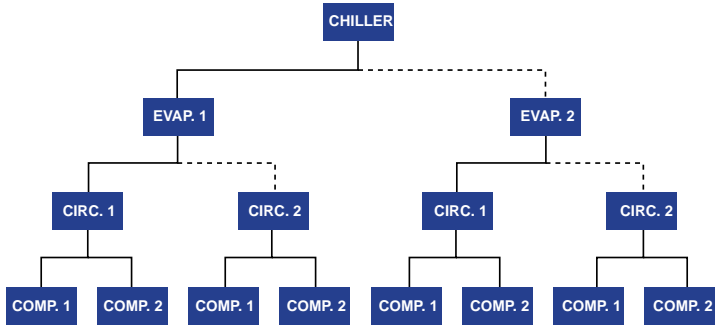
Energy XT helps designers to describe their machines in a straightforward uncomplicated way. It represents the Chiller with a particularly effective tree diagram in which the evaporators are the main branches made up of circuits that are in turn made up of compressors.

Possible configurations can be seen in Table 2.

Configurations

Tab. 2 Configurations

Number of evaporators	Number of circuits per evaporator	Number of circuits	Number of compressors per circuit	Number of compressors	Number of capacity steps per compressor
1	1	1	1- 4	1...4	0÷3
1	2	2	1- 4	2 x 1...4	0÷3
1	3	3	1- 2	3 x 1...2	0÷3
1	4	4	1- 2	4 x 1...2	0÷3
2	1	2	1- 4	2 x 1...4	0÷3
2	2	4	1- 2	4 x 1...4	0÷3
2	3	6	1	6	0÷3
2	4	8	1	8	0÷3
3	1	3	1- 2	3 x 1...2	0÷3
3	2	6	1	6	0÷3
4	1	4	1- 2	4 x 1...2	0÷3
4	2	8	1	8	0÷3



Diagram

2.5 User Interface

The user interacts with the machine using a keyboard with a large backlit graphic LCD display; it has three LEDs and two multifunctional [buttons](#) (5 positions) for controlling and programming the instrument.

The easily accessible information provided by the keyboard allows you to check machine status at any time and change the settings if necessary.

The keyboard can be panel-mounted or wall-mounted by drilling a hole; in this case, it offers a high level of protection from water.

2.6 Components

2.6.1 EXTM base (+internal expansion*)

The *base* module is an open electronic card containing the I/O resources and the CPU that has to be connected as specified in the *MECHANICAL ASSEMBLY* chapter.

Base Components

See *MECHANICAL ASSEMBLY* chapter

Base Configuration

Four configuration of EXTM are available with different number of *inputs/outputs* and two *communication* layers to offer the best solution to the various application requirements.

EXTM - EXTM/R Bases

- EXTM (I/O)
 - 8 Analogue *inputs*: 4 temperature + 4 configurable
 - 14 Digital *inputs*: 10 Low Voltage + 4 (High or Low Voltage)
 - 12 Digital output: 9 SPST + 3 SPDT
 - *COM1: RS-485*
 - COM2: CAN-BUS 0 for connection to
 - keyboard EXTK
 - exp. EXTE1(/H)
- EXTM/R (I/O)
 - 8 Analogue *inputs*: 4 temperature + 4 configurable
 - 14 *Digital inputs*: 10 Low Voltage + 4 (High or Low Voltage)
 - 12 Digital output: 9 SPST + 3 SPDT
 - 4 *Analogue outputs*: single configurable (4-20mA, 0-10V)
 - *COM1: RS-485*
 - COM2: CAN-BUS 0 for connection to
 - keyboard EXTK
 - exp. EXTE1(/H)
 - *COM3: RS-232*
 - COM4: CAN-BUS 1 for connection to remote keyboard

*EXTM *base* +internal expansion (/H models)

EXTM/H- EXTM/HR Bases

- EXTM/H (I/O)
 - 16 Analogue *inputs*: 8 temperature + 8 configurable
 - 22 *Digital inputs*: 14 Low Voltage + 8 (High or Low Voltage)
 - 20 *Digital outputs*: 17 SPST + 3 SPDT
 - *COM1: RS-485*
 - COM2: CAN-BUS 0 for connection to
 - Keyboard EXTK
 - exp. EXTE1(/H)
- EXTM/HR (I/O)
 - 16 Analogue *inputs*: 8 temperature + 8 configurable
 - 22 *Digital inputs*: 14 Low Voltage + 8 (High or Low Voltage)
 - 20 *Digital outputs*: 17 SPST + 3 SPDT
 - *Analogue outputs*: single configurable (4-20mA, 0-10V)
 - *COM1: RS-485*
 - COM2: CAN-BUS 0 for connection to
 - keyboard EXTK
 - exp. EXTE1(/H)
 - *COM3: RS-232*
 - COM4: CAN-BUS 1 for connection to remote keyboard

--> for more details see *Technical data* chapter

*-->PLEASE NOTE: DO NOT mistake internal expansion with EXTE expansion:

the internal expansion is an EXTM/H *base* component where /H indicates the internal expansion presence

2.6.2 EXTE expansion**

If Energy XT requires more *inputs* and *outputs* it can be fitted with an XTE expansion; versions are available:

- EXTE1 Expansion
 - 4 Configurable analogue *inputs*
 - 4 *Digital inputs*: 4 Low Voltage
 - 9 Digital output: 7 SPST + 2 SPDT
- EXTE1/H Expansion
 - 4 Configurable Analogue *inputs*
 - 8 *Digital inputs*: 4 Low Voltage + 4 (High or Low Voltage)
 - 15 Digital output: 11 SPST + 4 SPDT
 - 2 *Analogue outputs*: single configurable (4-20mA, 0-10V)

--> for more details see [Technical data chapter](#)

-->** in this case we mean EXTE expansion or EXTERNAL expansion

2.6.3 EXTK keyboard

One keyboard is available. It can be mounted in two different ways:

- Standard *wall-mounted keyboard*
- Standard *panel-mounted keyboard* (using brackets *and seal*, see [Keyboard Components](#) paragraph)



If requested, a "Naked" version of the keyboard can be supplied that is mounted on an aluminium panel by the customer.

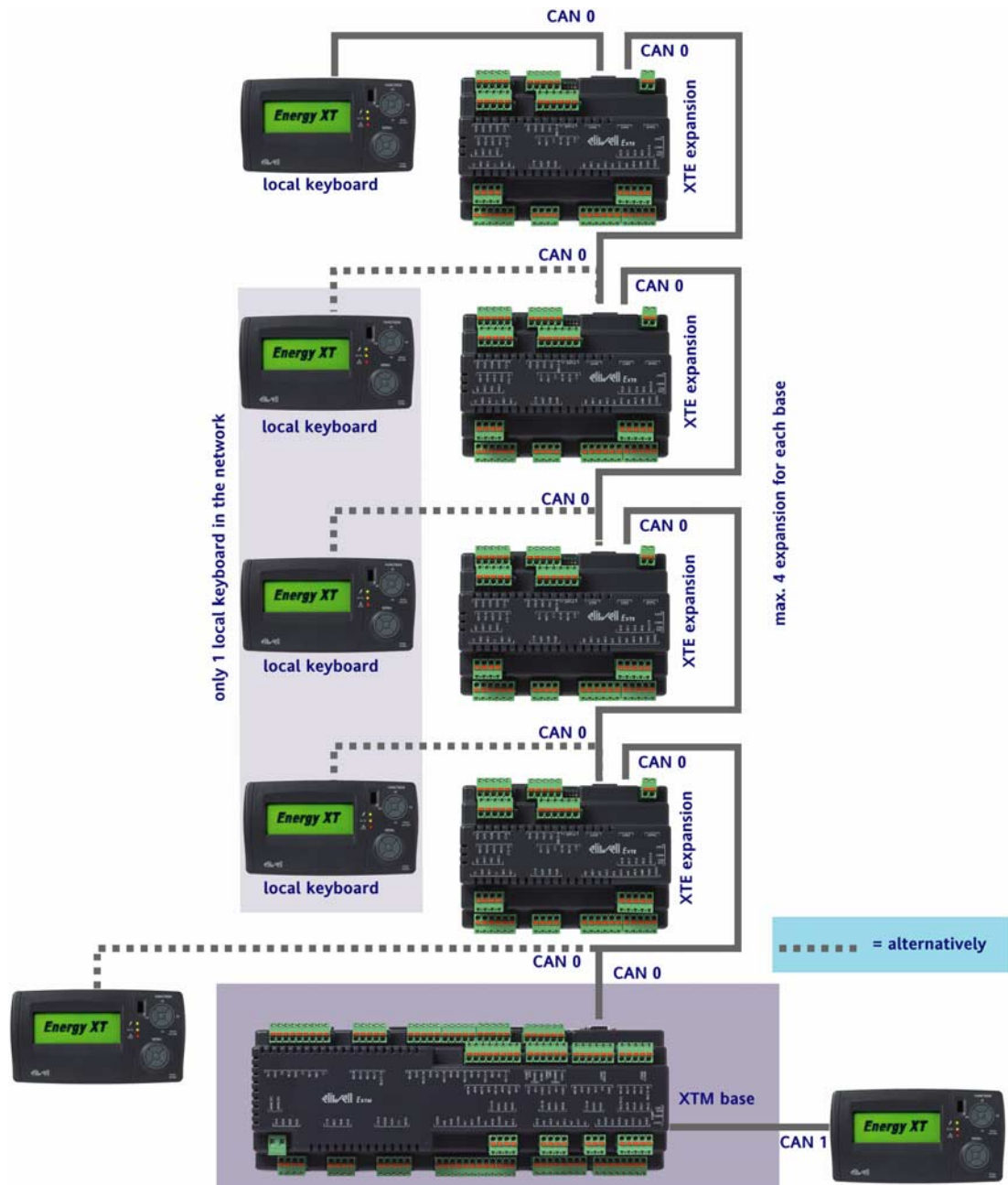
- 1 "FRONT KEYPAD" in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) that houses the printed board with the control circuitry and multifunctional *buttons*
- 1 "*BASE*" in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) for anchoring the terminal blocks for connection of electrical cables.
- 1 EPDM "SEAL" between front keypad and panel (IP 54)
- 2 *METAL BRACKETS* (and screws) for panel-mounting of device .

NB: Make sure that you have all the above *components*



Keyboard Components

2.6.4 Connections between Base, Expansions, Keyboards



Example of connection between base, expansions and keyboards

Example of connection

PLEASE NOTE

Maximum 4 expansions for each base

Only one local keyboard for each network

- COM2: CAN-BUS 0 for connection to
 - Keyboard EXTK or alternatively to
 - exp. XTE1(/H)
- COM4: CAN-BUS 1 for connection to
 - Keyboard EXTK

2.7 Serial Interface

Used to connect the controller to a Personal Computer



The PC must be connected to the device when each of the units is disconnected from the *power supply* and must be connected in accordance with the safety *standards* in force. Electrostatic shocks must also be avoided especially on the metal surfaces of each unit. Special measures must therefore be taken to ensure that electrostatic currents are discharged to earth.

3 USER INTERFACE

3.1 User Interface

Energy XT Keyboard



The interface, i.e. the device keyboard, allows to perform all the functions related to the device and particularly:

- To set the operation mode
- To manage the alarm cases
- To assess the resources status

KEYBOARD HAS IP65 PROTECTION GRADE



Keyboard: front view



The unit can also be operated without use of a keyboard

3.2 Buttons

The two **buttons** on the keyboard are multi-function **buttons** with 5 position options. By operating on the four external positions (up-down-right-left) or in the middle it is possible to access the menus, scroll down the display or confirm commands.

3.2.1 “FUNCTION” function keys

“FUNCTION” function keys

From the four external positions (F1:up; F3: down; F2:right; F4:left)

- by a single pressure: access to the Functions menu
- by pushing for some seconds: direct access to the Fn (n=1,..., 4) menu

By pushing the central button (PUSH): enable an user function (programmable)

3.2.2 “MENU” Menu keys

“MENU” Menu keys

From the four external positions (UP: up; DOWN: down; RIGHT:right; LEFT(ESC):left) by a single pressure menus scrolling down

Particularly:

- UP position: menu items scrolling up
- DOWN position: menu items scrolling down
- LEFT (ESC) position: back to the previous menu
- RIGHT position: possible modification and/or confirmation of the set value (it operates as the ENTER button (see reference)).

By pushing the central button (PUSH:ENTER) the command is confirmed, or it is possible to enter the required menu.

When pushing a multi-function button, an acoustic signal (bip*) is emitted.

3.3 Displays

Display: graphical LCD 122x32 mm.

When pushing any button, the display light turns on for 10 seconds.

If no button is used for 10 seconds, the display lighting automatically stops.

At the device startup the “ENERGY XT” welcome is displayed.

The standard display (main display with default menu) shows the menu "menu" that permits to:

- show I/O;
- insert the password;
- enter Configuration Mode.

The default set language is ENGLISH.

3.4 Led

3.4.1 Led 1 (first on top) GREEN

It indicates *power supply* is present.

- ON if the device is on or in standby (*power supply* present)
- OFF if the device is NOT supplied

3.4.2 Led 2 (the second one) YELLOW

It indicates the presence of a *base* - keyboard connection

- ON if a connection is established
- OFF in case of no connection (NO-LINK)

Note: the absence of *communication* has a timeout of 10 seconds: YELLOW *led* will then turn on blinking and "ENERGY XT" message is displayed.

When the *communication* link is restored, YELLOW *led* will then turn on again and previous page is displayed.

3.4.3 Led 3 (the third one) RED

It indicates presence of alarms / programmable by user

- ON if at least one alarm is on / defined by user
- OFF if there are no alarms / defined by user
- BLINK if there were ONLY manual reset OFF alarms, waiting for a manual reset / defined by user

3.5 Parameters programming - Menu levels

The device parameters can be modified via a Personal Computer (provided with the adequate software, the interface key and the proper cables) or via the keyboard.

3.5.1 Sub-menu and parameters visibility

With the support of a personal computer, the proper cables and the "Menu Maker" software, it is possible to limit parameters and sub-menus displaying and modifications. For further information please refer to the "Menu Maker" User Manual.



3.6 Keyboard Mounting and Keyboard-Base Connection

The keyboard is designed to be wall or panel-mounted.
Make sure that you have a 2 m long 8-way telephone cable for the [Base-Keyboard connection](#).
For panel-mounting, make sure that you have 2 rails and the special seal



3.6.1 Wall-mounted keyboard

[Wall-mounted keyboard](#)



For information of mounting the keyboard, see the [MECHANICAL ASSEMBLY](#) chapter



3.6.2 Panel-mounted keyboard

[Panel-mounted keyboard](#)



For information of mounting the keyboard, see the [MECHANICAL ASSEMBLY](#) chapter

4 MECHANICAL ASSEMBLY

4.1 General Recommendations



WARNING!

Always switch OFF machine before working on electrical connections. All operations must be performed by qualified personnel only.

Do not assemble the instruments in excessively dirty and/or dirty locations: they are designed to be used in places with normal contamination levels.

Always make sure that the area near the cooling slits is adequately ventilated.

The ambient temperature range for correct operating is between -5 and 60 °C;

4.2 Energy XT Base

The *Energy XT base* is designed to be mounted on a RAIL EN CEI 60715 guide

4.2.1 Base Components

The electronic device consists of:

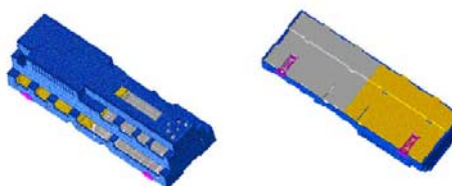
- 2 "SEMI-BASES" in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) , intercoupled where the printed control boards are housed
- 1 "PLATE" in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) that protects the upper part of the electronic device
- 4 "spring-loaded latching devices" on 2 SEMI-BASES for anchoring to RAIL EN CEI 60715 guide



NB: Make sure that you have all the above *components* (Figure 1)

Base

Fig. 1 *Base components*



To mount the *BASE* on RAIL EN CEI 60715 guide do the follow:

Put the four "spring-loaded latching devices" in a rest position (using a screwdriver as a lever on the special spaces as in figure).

Mounting of Base

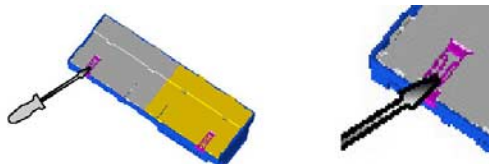


Fig. 2 *Mounting of Base*

Mount the "*BASE*" on RAIL EN CEI 60715 guide and press the spring-loaded latching devices" to close them.



NB:

When the "*BASE*" is mounted on RAIL EN CEI 60715 guide the "spring-loaded latching devices" must point downwards.

Mounting of expansion

The same procedure applies to mounting the XTE expansion.

4.3 Energy XT Keyboard

4.3.1 Keyboard Components

The “KEYBOARD” electronic device consists of:

- 1 “FRONT KEYPAD” in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) that houses the printed board with the control circuitry and multifunctional [buttons](#).
- 1 “[BASE](#)” in self-extinguishing thermoplastic (PC+ABS) (UL94V0 rated) for anchoring the terminal blocks for connection of electrical cables.
- 2 [METAL BRACKETS](#) (and screws) for panel-mounting of device.
- 1 EPDM “SEAL” between front keypad and panel

Front Keypad and Base

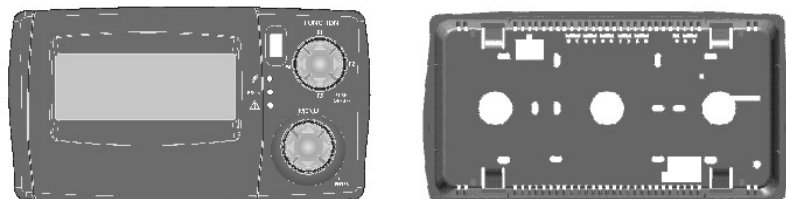


Fig. 3a Front keypad and Fig. 3b [Base](#)

Metal Brackets and Seal



Fig. 4 [Metal Brackets and Seal](#)



NB: Make sure that you have all the above [components](#).

4.3.2 Mounting of Keyboard

The keyboard is designed to be mounted in two ways:

- wall-mounted (see figure 5).
- panel-mounted (see figure 10).

Wall-mounting

Fig. 5 [Wall-mounted keyboard](#)



For [wall-mounting](#), do the follow:

Separate the “FRONT KEYPAD” from the “[BASE](#)” (by pressing down with a screwdriver on the four snap-on joints around the edge (Figure 6).

Separating the
Front Keypad-Base
of Keyboard

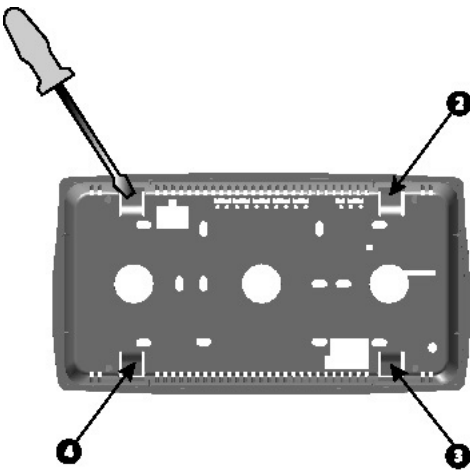


Fig. 6 *Separating the Front Keypad-Base of Keyboard*

Once you have threaded the electrical cables through one of the three large circular holes on the “*BASE*” (Figure 7a), screw the *BASE* to the wall using its many slots (Figure 7b).

Cables and Fixing
to Wall

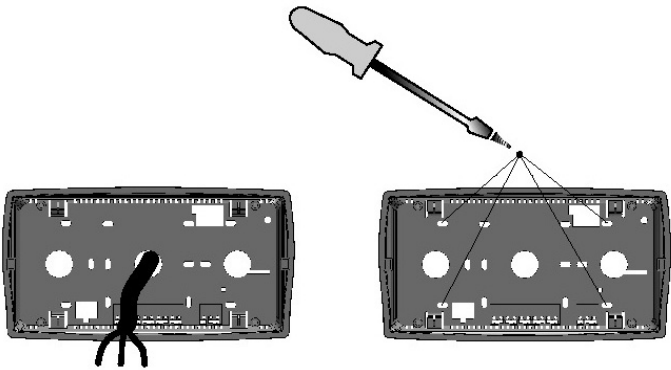


Fig. 7a *Base* holes and Fig. 7b *Base* slots

NB: The “*BASE*” must be mounted on the wall with the terminal blocks pointing downwards.



Dimensions



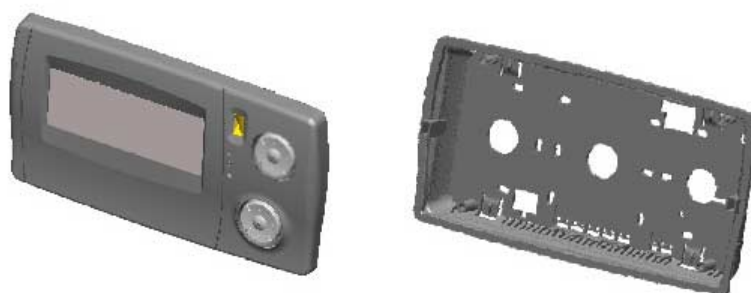
Fig. 8 Fixing to wall

Connect the electrical cables to the “*BASE*” terminal block

Assemble the “FRONT KEYPAD” on the “*BASE*” making sure that you press down evenly on the surface of the moving part until the four snap-on joints slot into place.

Assembling the Front Keypad-Base

Fig. 9 *Assembling the Front Keypad-Base*



Warning!

If a flat RJ 45 connector is used, a special hole must be made in the wall to house the male Ethernet connector.

Panel mounting

Fig. 10 *Panel-mounted keyboard*



For panel-mounting, do the follow:

- (1) Separate the "FRONT KEYPAD" from the "**BASE**" (by pressing down with a screwdriver on the four snap-on joints around the edge (Figure 11).

Separating the Front Keypad-Base of Keyboard

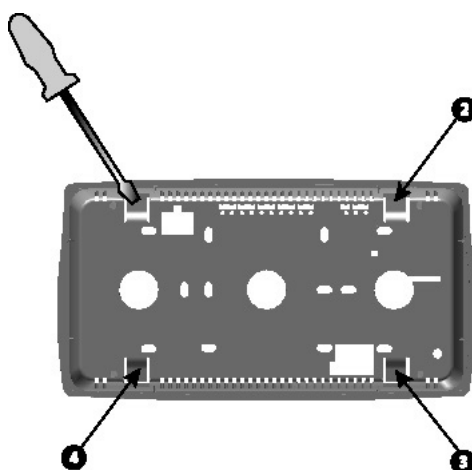


Fig. 11 *Separating the Front Keypad-Base of Keyboard*

- (2) Thread the electrical cables through the *panel cut-out* and then through one of the three large circular holes on the "**BASE**" (Figure 11).

Passing through Cables

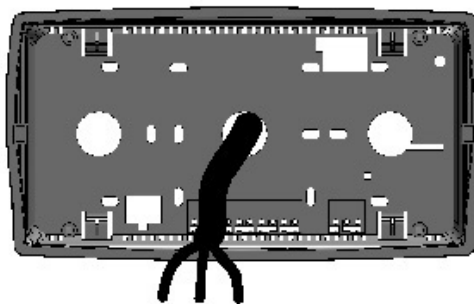


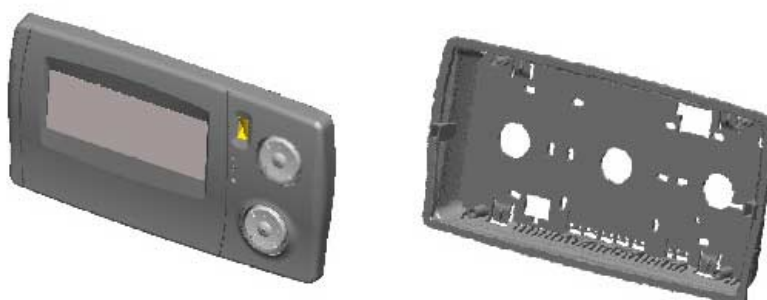
Fig. 12 *Base* holes

Connect the electrical cables to the “*BASE*” terminal block.

Assemble the “FRONT KEYPAD” on the “*BASE*” making sure that you press down evenly on the surface of the moving part until the four snap-on joints slot into place (Figure 13).

Assembling the Front Keypad-Base

Fig. 13 *Assembling the Front Keypad-Base*



Attach the perimetral seal (see Figure 14).

Attaching seal to keyboard

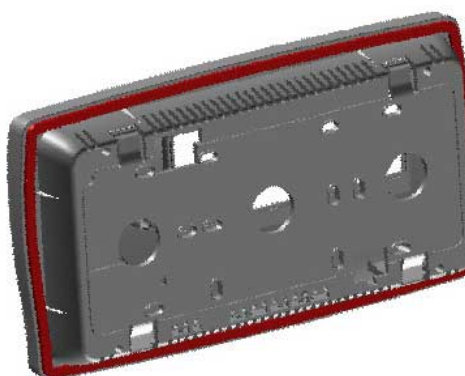


Fig. 14 *Attaching seal to keyboard*

Place the assembled device in the special *panel cut-out* (Figure 15).

Panel cut-out



Fig. 15 *Panel cut-out*

Use the special *metal brackets* (screws supplied) on the back of the panel to fix the device to the panel (Figure 16).

Mounted panel

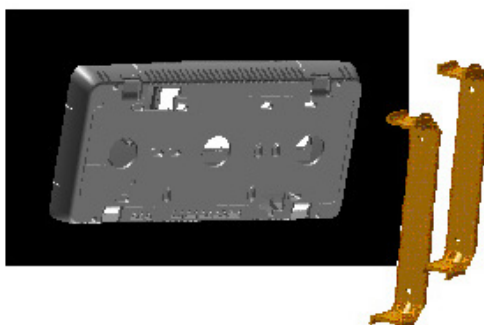


Fig. 16 Back view of panel



NB:

The device must be mounted on the panel with the terminal blocks pointing downwards.

4.4 Base-Keyboard connection and position of cables

To connect the [base](#) to the keyboard, a 2 metre long flat RJ 45 cable is supplied with two 8-way flat RJ 45 plugs at the ends (Figure 16a-16b).

Fig. 16a Connection to Keyboard

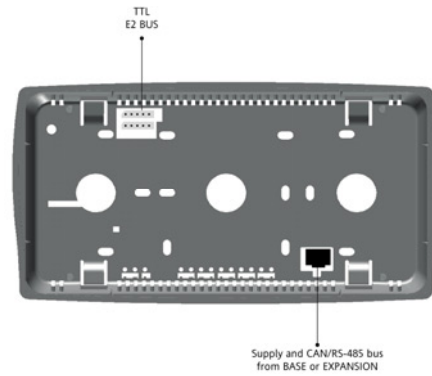
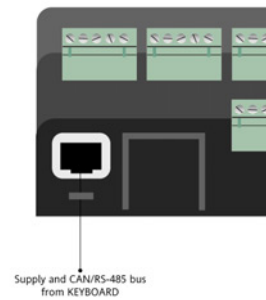


Fig.16b Connection to [Base](#)

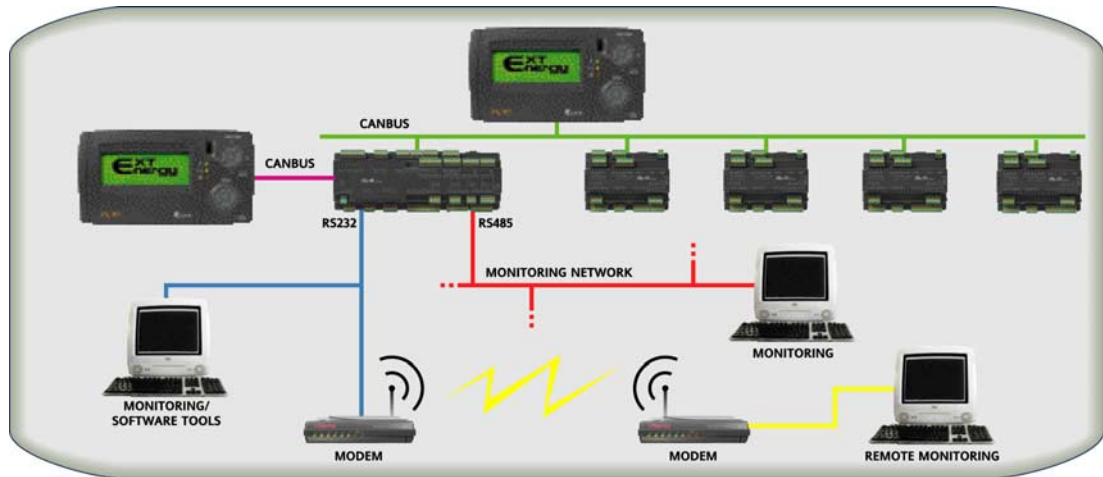


The flat RJ 45 cable must be wired separately from the power cables

5 CONNECTIVITY

Communication

With two [serial ports](#) (RS485 and RS232), Energy XT can be directly connected to a supervisory system using the MODBUS [communication](#) protocol enabling both local and remote monitoring via a PSTN or GSM modem.



5.1.1 Serial Ports

The diagram shows the following [Serial Ports](#):

- **COM1/RS485**: in RS485 network you can connect one or more XTM. Through a supervisory system you can monitor one or more XTM using a MASTER MODBUS and using the XTM as slave MODBUS each with their own network address;
- **COM2/RS232**: for local monitoring via PC/PLC or remote monitoring via modem;
- **COM2/CANBUS** (highlighted in green) to connect 1 or more EXTM / 1 or more expansions (4 each [base](#) max.) EXTE and connecting to a remote keyboard EXTK (1 in the network max.);
- **COM4/CANBUS** (highlighted in red magenta) to connect the EXTM [base](#) / EXTK remote keyboard

→ For more information please refer [Communication Protocol User Manual](#)

6 ELECTRICAL WIRING

6.1 General Recommendations

WARNING!

Always switch off machine before working on electrical connections.

All operations must be performed by qualified personnel only.

To connect correctly, please comply with the following recommendations:

- A *power supply* with characteristics that are different from those specified may seriously damage the system.
- Use cables with the correct diameter for the terminals used.
- **For screw terminal blocks:** Unscrew each screw on the terminal block, insert the end and tighten screws again. When the operation is completed, gently pull the cables to check that they are fastened.
- **For spring terminal blocks:** Insert the end of the cable in the terminal block and check that the spring springs back. When the operation is completed, gently pull the cables to check that they are fastened. To remove, press the switch under the terminal block so that the spring is released.
- Keep the probe and input cables apart from the inductive loads and power connections as far as possible to prevent electromagnetic interference. Make sure that the probe cables are not placed near other electrical equipment (circuit breakers, meters, etc.)
- Reduce the length of the connections as far as possible and avoid winding them around the electrically connected parts.
It is recommended to use Shielded cables for probe connections.
- Avoid touching the electronic *components* on the cards so that electrostatic discharges are not generated.

- **collegamento CAN0 EXTm base – EXTE expansion connection**

WARNING : ALWAYS USE the Eliwell standard cable RJ45 provided with XT.

For more details please contact Eliwell Technical Support

Base Electrical connections (+internal expansion)

PLEASE NOTE: When we refer to “Expansion” in chp. 6.2-6.5 we always mean the internal one. Connections for external expansion are not listed

Power supply

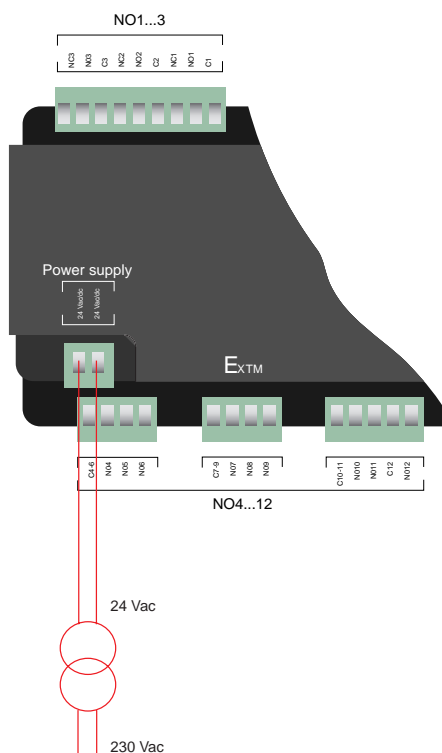
6.2 Power supply and High Voltage Inputs (Relays)

Power supply: 24Vac $\pm 10\%$

The instrument has screw or spring plug-in terminal blocks for connecting cables with maximum cross-sectional area of 2.5 mm² (only one conductor per terminal block for power connections).

The relay contacts are voltage free. Do not exceed the maximum current allowed. For higher loads, use an appropriate contactor.

Make sure that the power voltage complies with the device voltage.



Optional transformer

The unit must be powered by an adequate transformer with the following characteristics:

- Primary voltage: 230V $\sim \pm 10\%$; (also 115V $\sim \pm 10\%$ on request)
- Secondary voltage: 24V \sim
- Supply frequency: 50Hz; 60Hz
- Power: 25VA;

6.3 Inputs

6.3.1 Base Analogue inputs

The **base** has 8 analogue **inputs** of which 4 can be configured in pairs using software:

INPUT NUMBER	CHARACTERISTICS
1	NTC
2	NTC
3	NTC
4	NTC
5	Configurable from parameter***
6	Configurable from parameter***
7	Configurable from parameter***
8	Configurable from parameter***

***see ENERGY XT –Controllers manual Parameters chapter

There are four (4) configuration options based on the factory setting (**in bold type**):

- Analogue **inputs** parameter-configurable in groups of two
 - **With NTC* probe**, extended NTC, **4–20mA****
- Analogue **inputs** parameter-configurable in groups of two
 - **With PTC* probe**, **4–20mA****
- Analogue **inputs** parameter-configurable in groups of two
 - **With NTC* probe**, 0–1V, 0–5V, 0–10V, **0–100mA****
- Analogue **inputs** parameter-configurable in groups of two
 - **With PTC* probe**, 0–1V, 0–5V, 0–10V, **0–100mA****

NOTE 1 : * factory-set probe type

NOTE 2 : ** factory-set current input type

6.3.2 Internal Expansion Analogue inputs

The expansion has 8 analogue **inputs** of which 4 can be configured in pairs using software:

INPUT NUMBER	CHARACTERISTICS
9	Configurable from parameter***
10	Configurable from parameter***
11	Configurable from parameter***
12	Configurable from parameter***
13	NTC
14	NTC
15	NTC
16	NTC

***see ENERGY XT –Controllers manual Parameters chapter

There are four (4) configuration options based on the factory setting (**see above, Base Analogue Inputs**):

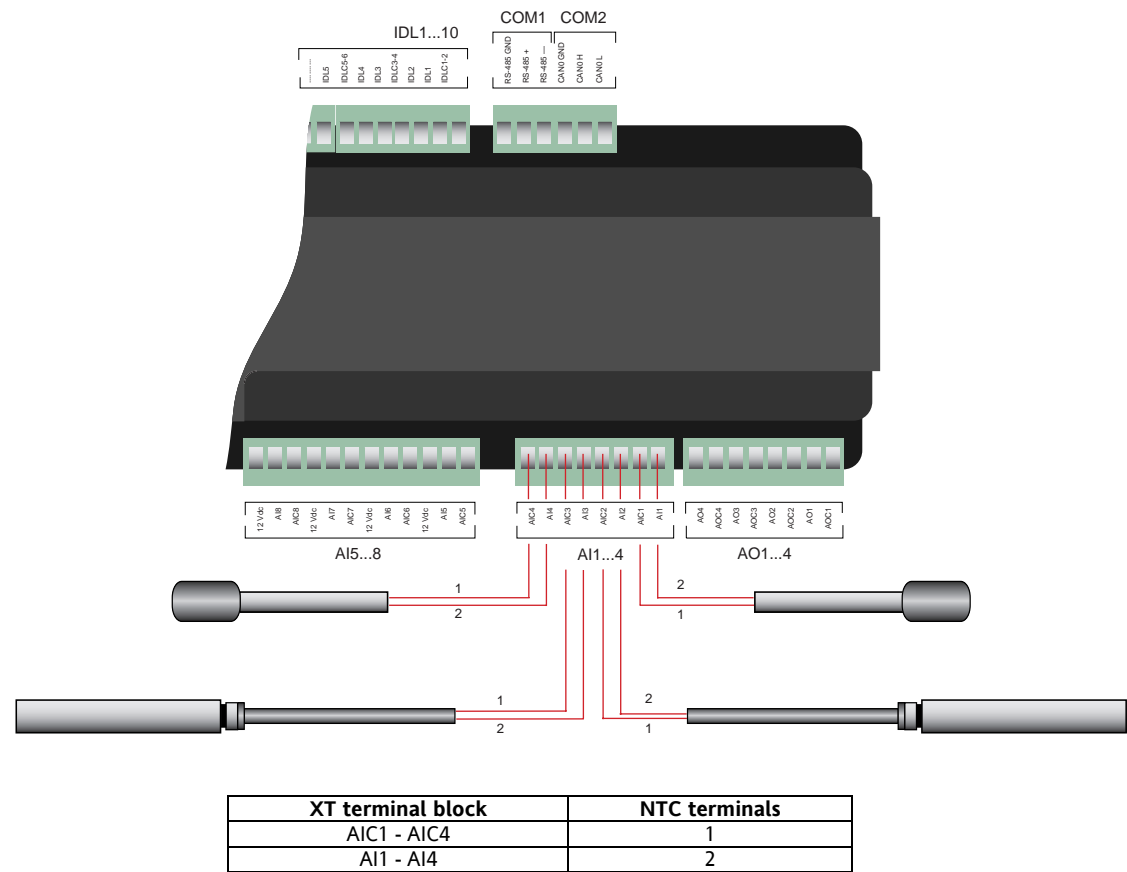
- PTC or NTC **temperature probes**. NTC probes with internal resistance from 10KΩ a 25° are preferred
Resolution: 0.1°C/°F, range –40°C to +110°C
Accuracy: 0.5 % end of scale
Slew rate max 3°C/sec

Temperature probes have no connection polarity and can be extended using an ordinary bipolar cable (note that if probes are extended this affects the electromagnetic compatibility (EMC) of the instrument: wiring operations must be performed very carefully).

Temperature
probes

**Connection with
NTC probe to base**

Example of probe connections to **base** on AI1–AI4 non-configurable **inputs**



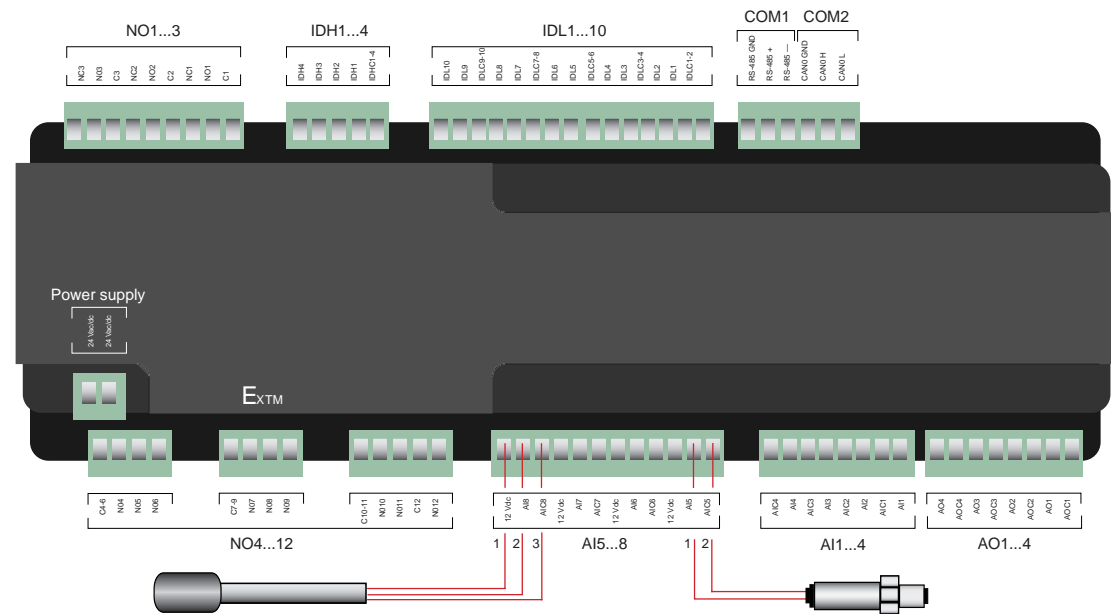
Pressure probes

- Pressure transducers: 4–20mA, scale set with software
Accuracy: 0.1bar, range 0bar-30bar
Accuracy: 0.1bar, range 0bar-7bar
Slew rate max: 1bar/sec



Warning!
The **pressure probes** have specific connection polarity that must be observed.

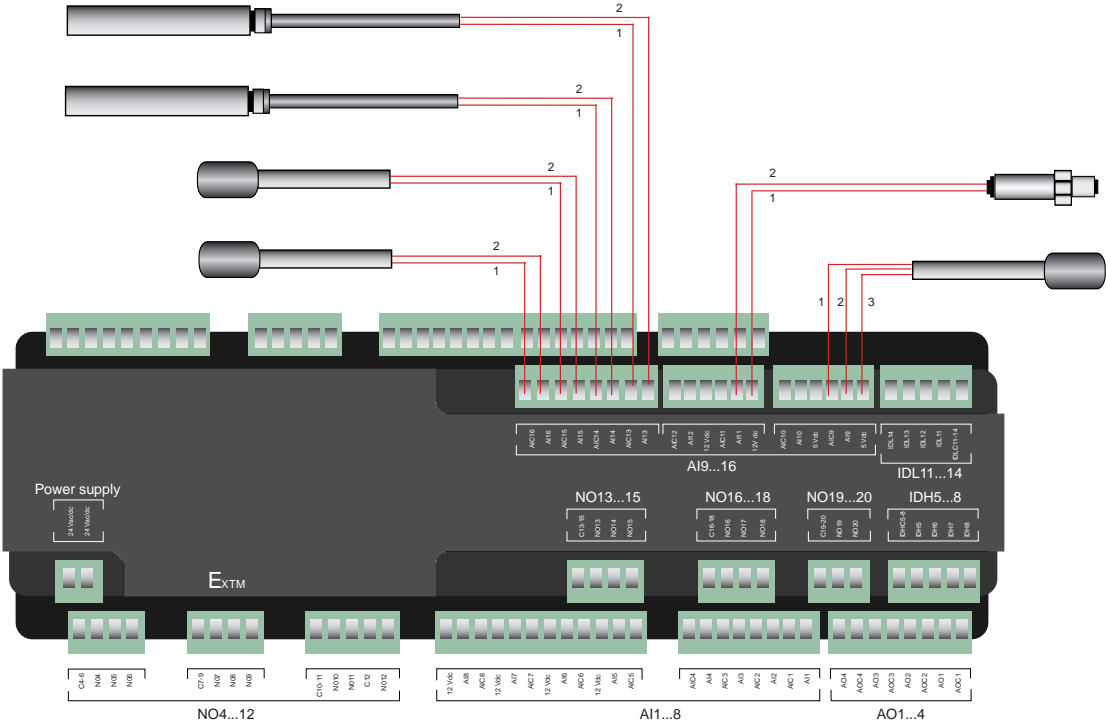
The signal cables (temperature/**pressure probes**, **digital inputs**, **RS-485**/RS 232/CAN-BUS serials and electronics **power supply**) must be wired separately from the power cables.



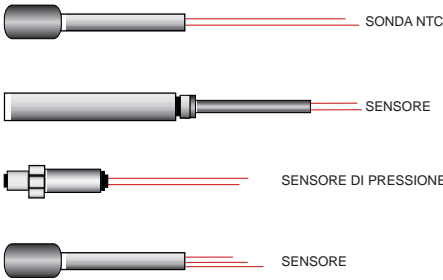
Connection on internal expansion

Example of configuration for connections of probes and transducers to the expansion on non-configurable and configurable *inputs*

INPUT TERMINAL BLOCK	CHARACTERISTICS
AI5 – AI8	Signal
AIC5 – AIC8	Common
12Vdc	12Vdc output



INPUT TERMINAL BLOCK	CHARACTERISTICS
AI9 – AI10	1
AIC9 – AIC10	2
5Vdc	5Vdc output
AI11 – AI12	1
AIC11 – AIC12	2
12Vdc	12Vdc output
AI13 – AI16	1
AIC13 – AIC16	2



6.3.3 Digital inputs

The *Energy XT base* has 10 optoisolated *digital inputs* with 24Vac/dc voltage and 4 optoisolated *digital inputs* that depending on the semi-finished product selected can have a voltage of 24Vac/dc or 115/230Vac

INPUT TERMINAL BLOCK	CHARACTERISTICS
IDL1 – IDL10	24Vac/dc
IDH1 – IDH4	24Vac/dc* - 115/230Vac

The expansion has 4 optoisolated *digital inputs* with 24Vac/dc voltage and 4 optoisolated *digital inputs* that depending on the semi-finished product selected can have a voltage of 24Vac/dc or 115/230Vac

INPUT TERMINAL BLOCK	CHARACTERISTICS
IDL11 – IDL14	24Vac/dc
IDH5 – IDH8	24Vac/dc* - 115/230Vac

*default configuration.

Sensitivity of *digital inputs* IDH high voltage:

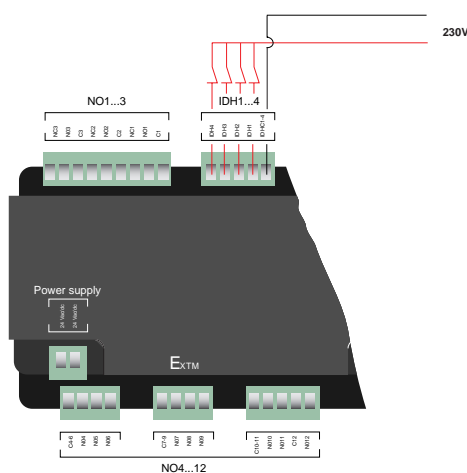
- maximum voltage at which reading of open input is guaranteed: 20V
- minimum voltage for guaranteed reading of input: 180Vac

Sensitivity of *digital inputs* IDL low voltage:

- maximum voltage at which reading of open input is guaranteed: 4.7V
- minimum voltage for guaranteed reading of input: 22Vac

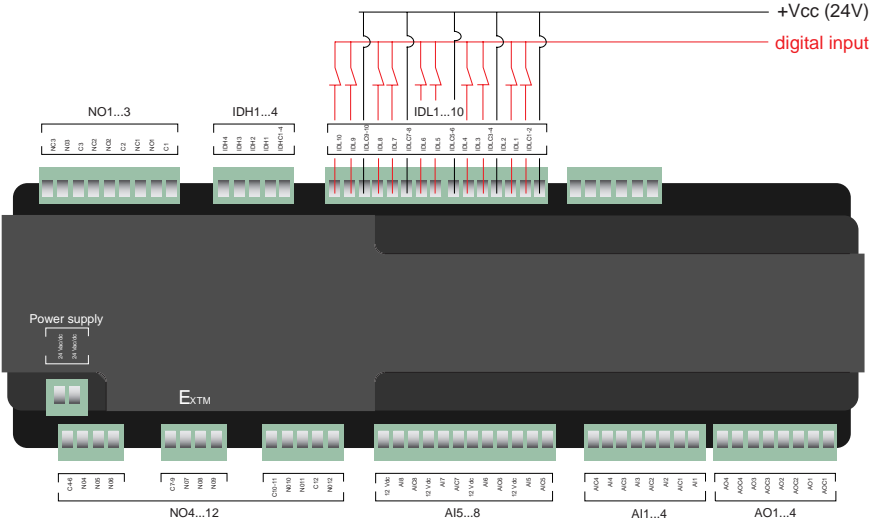
Diameter of cables 2mm²

Example of high voltage digital input connection to *base*



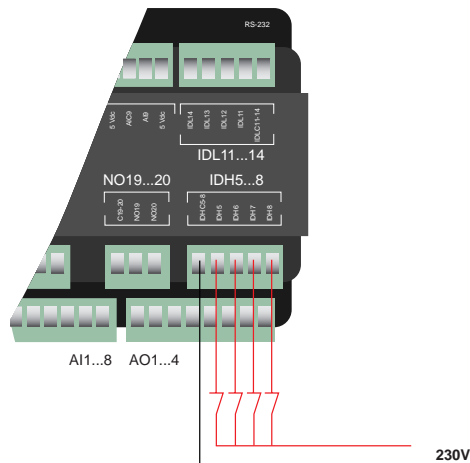
INPUT TERMINAL BLOCK	CHARACTERISTICS
IDH1 – IDH4	
IDHC1–4	Common

Example of low voltage digital input connection to *base*



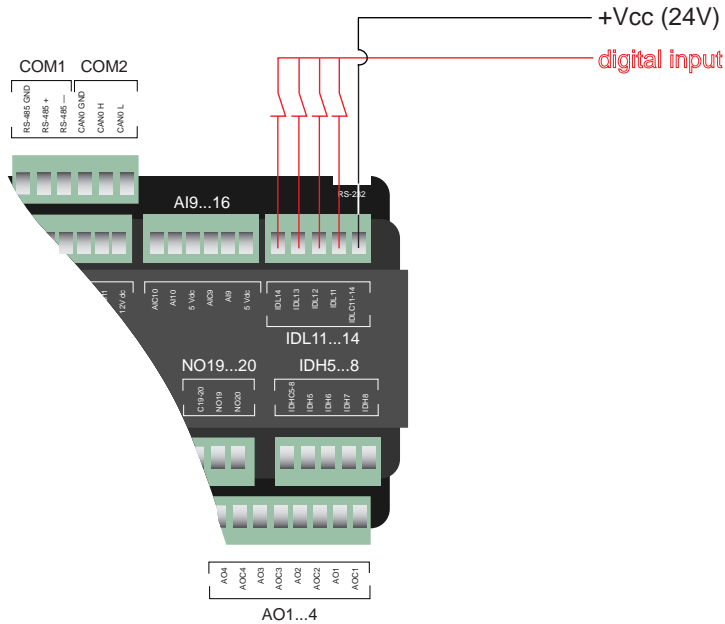
INPUT TERMINAL BLOCK	CHARACTERISTICS
IDL1 – IDL10	+Vcc (24V)
IDLC1–2 IDLC3–4 IDLC5–6 IDLC7–8 IDLC9–10	Digital input

Example of high voltage digital input connection to expansion



INPUT TERMINAL BLOCK	CHARACTERISTICS
IDH5 – IDH8	
IDHC5–8	Common

Example of low voltage digital input connection to expansion



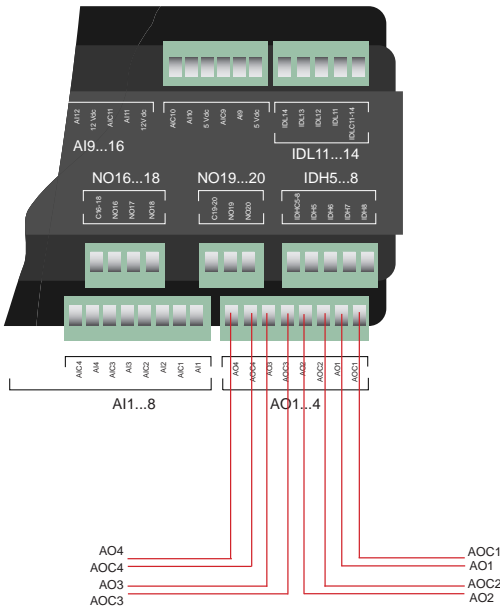
INPUT TERMINAL BLOCK	CHARACTERISTICS
IDL11 – IDL14	+Vcc (24V)
IDLC11– 14	Digital input

6.4 Outputs

6.4.1 Analogue outputs

Analogue outputs are only available on the *base*. The expansion does not have *analogue outputs*

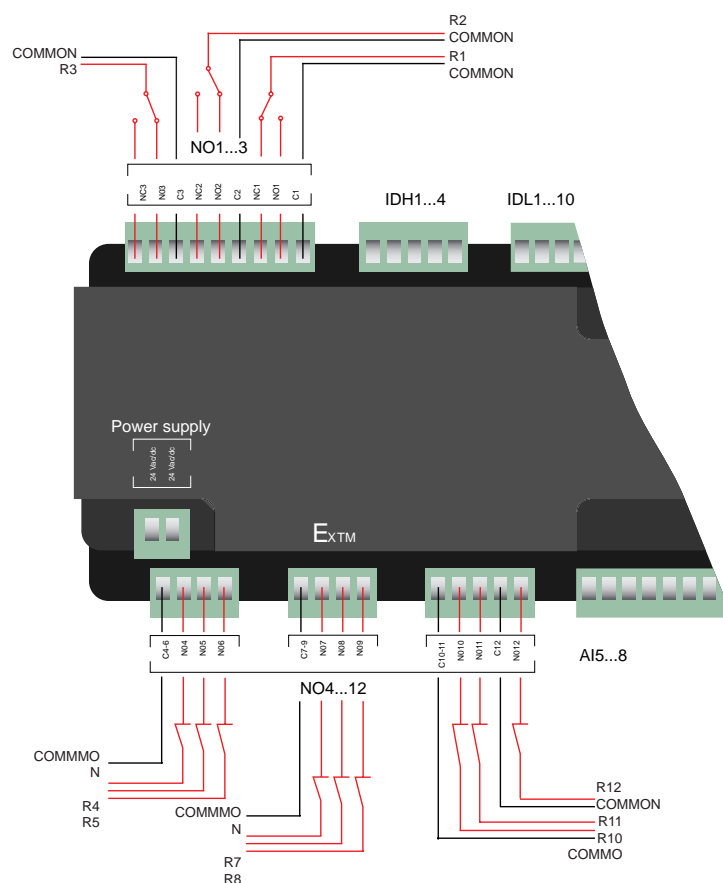
OUTPUT TERMINAL BLOCK	CHARACTERISTICS
AO1 – AO4	0÷10V o 4÷20mA on different semi-finished products
AOC1 – AOC4	Common



6.4.2 Digital outputs

The *base* has four terminal blocks for *digital outputs* with three *outputs* for change-over relays and nine for contact relays

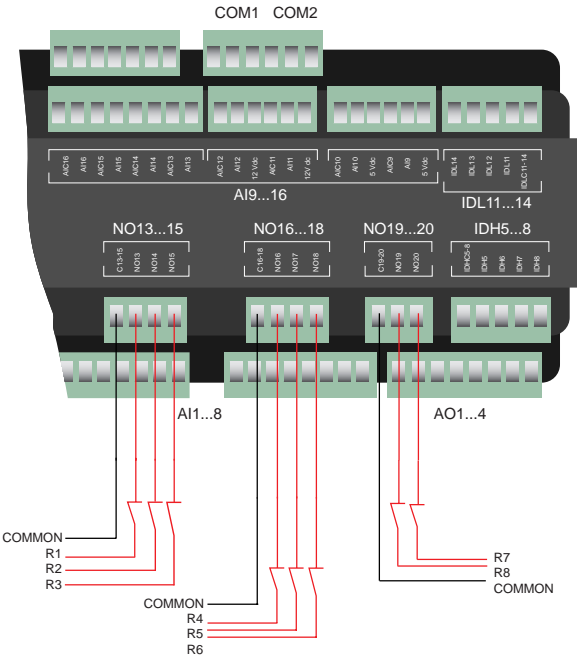
OUTPUT NUMBERS	CHARACTERISTICS
1 – 3	3 8A/250V~ change-over relays
4 – 6	3 8A/250V~ contact relays
7 – 9	3 8A/250V~ contact relays
10 – 12	3 8A/250V~ contact relays



INPUT TERMINAL BLOCK	CHARACTERISTICS
NO1 – NO3	Normally open
NC1 – NC3	Normally closed
C1 – C3	Common
NO4 – NO6 NO7 – NO9 NO10 – NO12	Normally open
C4-6 C7-9 C10-11 C12	Common

The internal expansion has eight N.O. (normally open) contact relay *outputs*

OUTPUT TERMINAL BLOCK	CHARACTERISTICS
NO13 – NO15	3 8A/250V~ contact relays
NO16 –NO18	3 8A/250V~ contact relays
NO19 – NO20	3 8A/250V~ contact relays

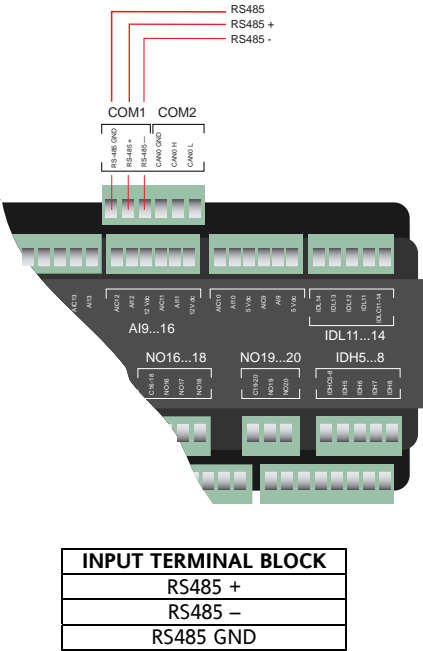


COM1

6.5 Serial connections

6.5.1 COM1

RS485 serial with RS485+, RS485-, RS485GND signals



6.5.1.1 COM1 and RS485 network

Several [Energy XT bases](#) can be connected together -via RS485 - using

- ModBUS protocol for local monitoring.

(-->See [Connectivity](#) Chapter)

COM2

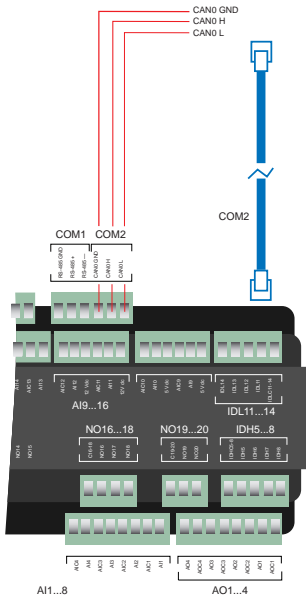
6.5.2 COM2 (<--> CAN0)

CAN BUS serial with CANH, CANL, CAN GND signals

PLEASE NOTE: COM2 is related to CAN0

COM2 is available with:

- Screw connectors (see diagram, connections highlighted in red)
- RJ45 flat cable (see diagram, connections highlighted in blue)



INPUT TERMINAL BLOCK
CAN0 H
CAN0 L
CAN GND

6.5.3 CAN0 EXTM base – EXTK keyboard connection

CAN0-COM2 is available with:

- Screw connectors (see diagram, connections highlighted in red)
- RJ45 flat cable (see diagram, connections highlighted in blue)

In figure A it is shown the connection between EXTK local keyboard and EXTM *base* through screw connectors (highlighted in red). In this case it is **MANDATORY** to supply the EXTK keyboard.

Alternatively it is possible to connect EXTK local keyboard and EXTM *base* through RJ45 flat cable (highlighted in blue).

In this case the distance between EXTK and EXTM is **1 m maximum (RJ45 cable length)**

When you connect EXTK local keyboard to EXTM *base* through RJ45 flat cable, the keyboard is supplied directly from EXTM *base*. (figure B)

Figure A.

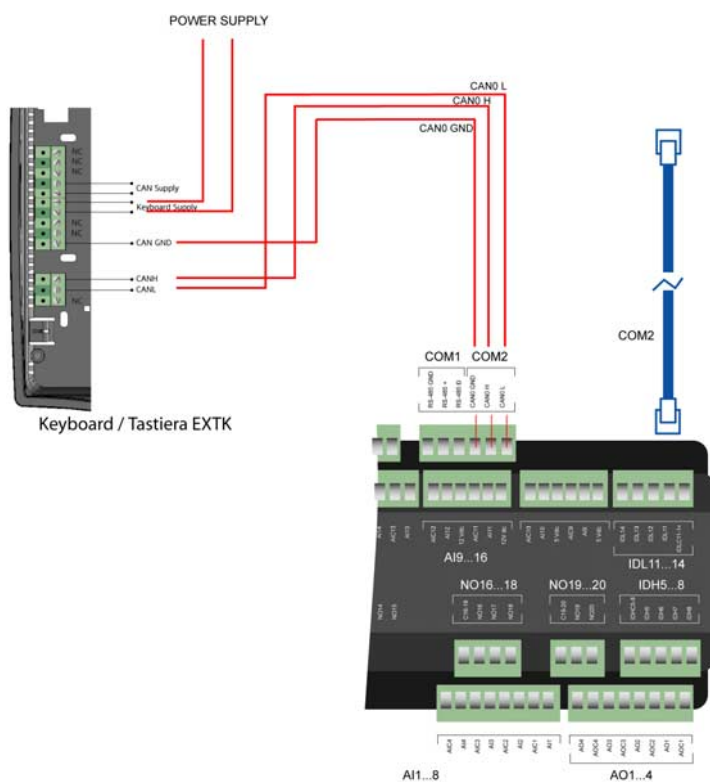
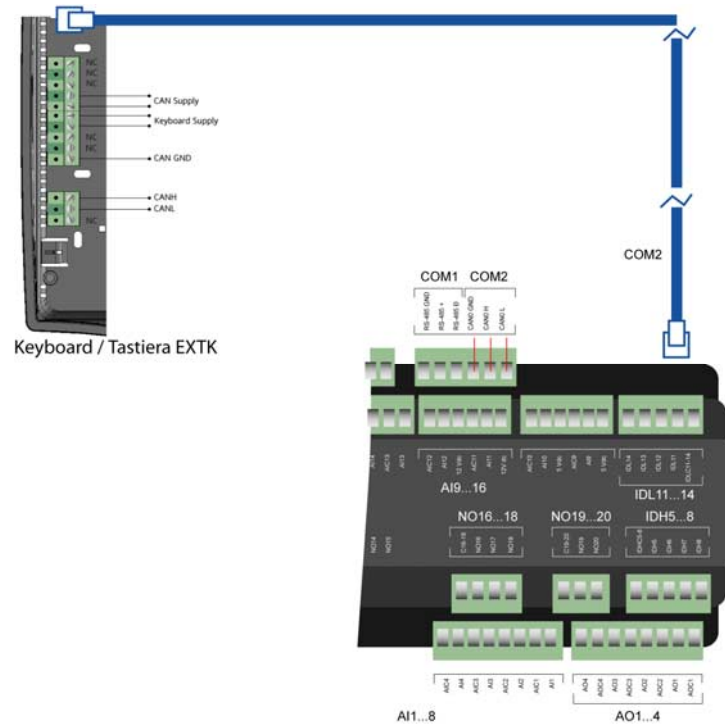


Figure B



6.5.3.2 CAN0 EXT M base – EXT K expansion connection

Through CAN0/COM2 it is possible to connect EXT M [base](#) to EXTE (external) expansion.

Connections for external expansion are not listed as they are very similar (§) to connections between EXT M [base](#) and EXT K keyboard



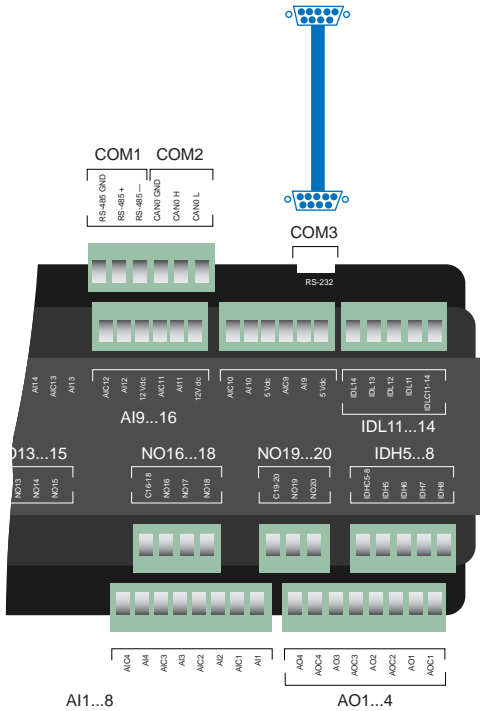
(§) In this case, EXTE (external) expansion should be supplied directly from mains.

6.5.4 COM3

RS232 serial with signals RX, TX, CTS not controlled, RTS, and DTR fixed
COM3 is available with:

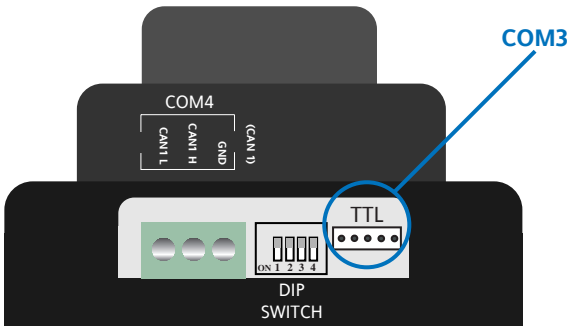
- RS232 (see **COM3** diagram 1, connections highlighted in blue)
- A 2 metre long DB9 nullmodem cable is used for the connection
- **TTL** (see **COM3** diagram 2, connections highlighted in blue)

COM3 diagram 1



INPUT TERMINAL BLOCK	
	RX
	TX
	CTS not controlled
	RTS
	fixed DTR

COM3 diagram 2



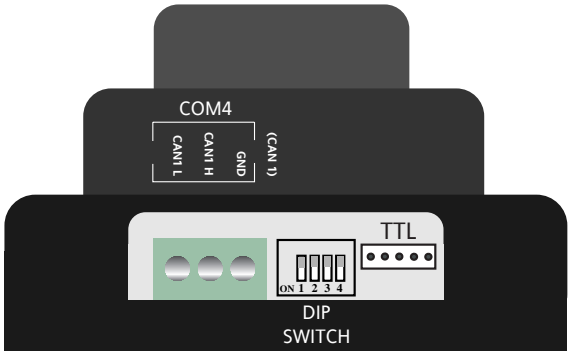
6.5.4.3 COM3 EXTM base – MODEM/FAX/GSM connection

With RS232 serial port EXTM **base** can be directly connected to a supervisory system using the MODBUS **communication** protocol enabling remote monitoring or,
 If EXTM is a 'Master' **base** in a Master-Slave network, via 232, to ModBUS/Televis Systems enabling both local or remote monitoring via RS232/RS485 converter. (--->See **Connectivity** Chapter)

6.5.5 COM4: (<-->CAN1) CAN BUS and side view

PLEASE NOTE: COM4 is related to CAN1

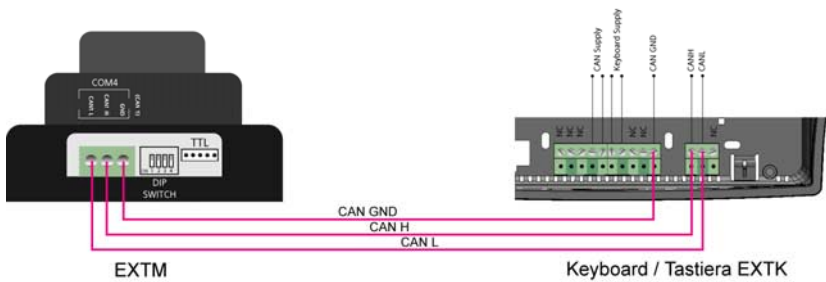
- CAN BUS serial with CANH, CANL, CANGND and *TTL* signals
- Side view: Dip Switch and *TTL**



INPUT TERMINAL BLOCK	Dip Switch	<i>TTL</i> *
CAN H	See <i>Dip Switch configuration</i>	GND
CAN L		EN
GND		TX
		RX
		NC
		*PLEASE NOTE: <i>TTL</i> port is in vertical position

6.5.5.4 CAN1 EXTM base – EXTK keyboard connection

- CAN BUS serial with CANH, CANL, CANGND and *TTL* signals
- EXTK keyboard can be a Remote Keyboard in a supervisory system

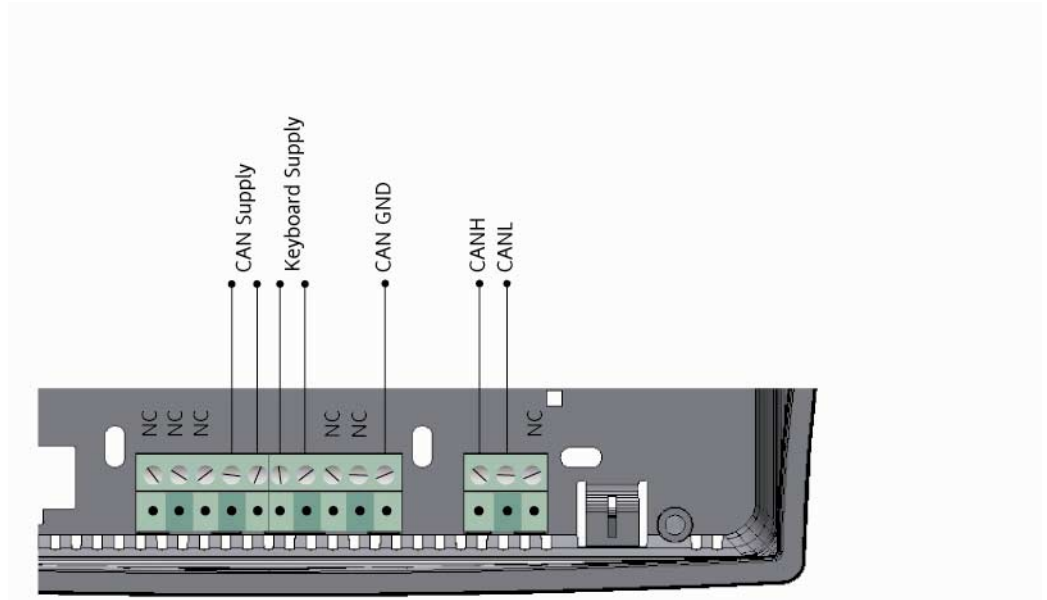


- (--->See *Connectivity* Chapter)

6.6 Base-keyboard connection and position of cables

To connect the [base](#) to the keyboard, a 2 metre long RJ45 flat cable is supplied with two 8-way RJ45 plugs at the ends (see [MECHANICAL ASSEMBLY](#) chapter)

6.6.1 EXTK keyboard wiring

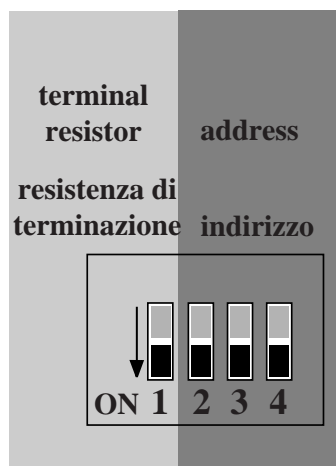


6.7 Base-keyboard connection via COM0 and COM2

See par.

- CAN0 EXTM [base](#) – EXTK keyboard connection
- CAN1 EXTM [base](#) – EXTK keyboard connection

6.8 Dip Switch Configuration



6.8.1 Dip switches Setting for EXTM (/H/HR)

Dip switches have to be set in order to:

- Enable or DISABLE the [CANBUS](#) network final resistor
- Specify the LSB network ([RS-485](#)) address of XT

The address of the EXTM is unique for both serial lines ([COM1](#) and [COM3](#)).

The address is a byte formed by 2 parts:

- Device family (nibble MSB “upper part”): EEPROM parameter called FAA_ADDRESS
- Device address (nibble LSB “low part”): selectable by means of dip switches 2-3-4

Dip switch # 1

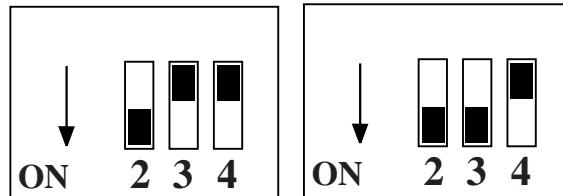
- ON: terminal resistor enabled
- OFF: terminal resistor DISABLED

Dip switch # 2-3-4

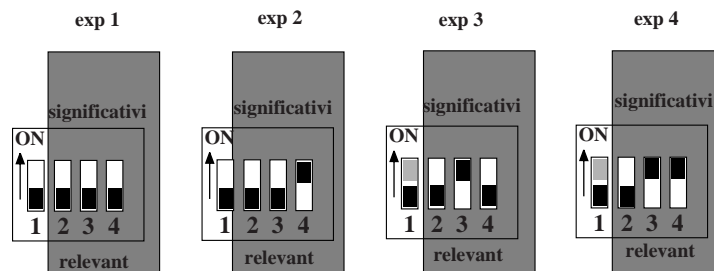
- ON: value =1
- OFF: value =0

Examples

- If dip 2 ON, dip 3 OFF, dip 4 OFF, then LSB=1 (the binary number is 001 if read from right to left)
- If dip 2 ON, dip 3 ON, dip 4 OFF, then LSB=3 (the binary number is 011 if read from right to left)

**6.8.2 Dip switches Setting for Espansion EXTE1 (/H)**

exp	dip2	dip3	dip4
1	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON



Dip switches have to be set to indicate the expansion number to be connected to the XT *base* board

expansion #1

- dip switch 2-3-4 OFF

expansion #2

- dip switch 2-3 OFF
- dip switch 4 ON

expansion #3

- dip switch 2-4 OFF
- dip switch 3 ON

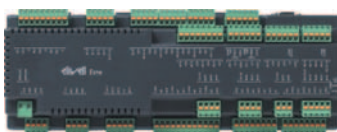
expansion #4

- dip switch 2 OFF
- dip switch 3-4 ON

OTHER SETTINGS

NOT RELEVANT

6.9 LEGEND



Base Terminal
Block

ENERGY XT <i>BASE</i> <i>TERMINAL BLOCK</i>	CHARACTERISTICS
24 Vac/dc	<i>Power supply</i> input
24 Vac/dc	<i>Power supply</i> input
AI1	NTC
AIC1	NTC
AI2	NTC
AIC2	NTC
AI3	NTC
AIC3	NTC
AI4	NTC
AIC4	NTC
AIC5	Analogue input configurable from parameter***
AI5	Analogue input configurable from parameter***
12Vdc	12Vdc <i>power supply</i>
AIC6	Analogue input configurable from parameter***
AI6	Analogue input configurable from parameter***
12Vdc	12Vdc <i>power supply</i>
AIC7	Analogue input configurable from parameter***
AI7	Analogue input configurable from parameter***
12Vdc	12Vdc <i>power supply</i>
AIC8	Analogue input configurable from parameter***
AI8	Analogue input configurable from parameter***
12Vdc	12Vdc <i>power supply</i>
IDLC1–2	24V ac/dc common digital input
IDL1	24V ac/dc digital input
IDL2	24V ac/dc digital input
IDLC3–4	24V ac/dc common digital input
IDL3	24V ac/dc digital input
IDL4	24V ac/dc digital input
IDLC5–6	24V ac/dc common digital input
IDL5	24V ac/dc digital input
IDL6	24V ac/dc digital input
IDLC7–8	24V ac/dc common digital input
IDL7	24V ac/dc digital input
IDL8	24V ac/dc digital input
IDLC9–10	24V ac/dc common digital input
IDL9	24V ac/dc digital input
IDL10	24V ac/dc digital input

ENERGY XT BASE TERMINAL BLOCK	CHARACTERISTICS
IDHC1-4	24V ac/dc - 230V ac/dc common digital input****
IDH1	24V ac/dc - 230V ac/dc digital input****
IDH2	24V ac/dc - 230V ac/dc digital input****
IDH3	24V ac/dc - 230V ac/dc digital input****
IDH4	24V ac/dc - 230V ac/dc digital input****
AOC1	Analogue output
AO1	Analogue output
AOC2	Analogue output
AO2	Analogue output
AOC3	Analogue output
AO3	Analogue output
AOC4	Analogue output
AO4	Analogue output
C1	Common digital output
NO1	8A/250Vac change-over relay digital output
NC1	8A/250Vac change-over relay digital output
C2	Common digital output
NO2	8A/250Vac change-over relay digital output
NC2	8A/250Vac change-over relay digital output
C3	Common digital output
NO3	8A/250Vac change-over relay digital output
NC3	8A/250Vac change-over relay digital output
C4-6	Common digital output
NO4	8A/250Vac contact relay digital output
NO5	8A/250Vac contact relay digital output
NO6	8A/250Vac contact relay digital output
C7-9	Common digital output
NO7	8A/250Vac contact relay digital output
NO8	8A/250Vac contact relay digital output
NO9	8A/250Vac contact relay digital output
C10-11	Common digital output
NO10	8A/250Vac contact relay digital output
NO11	8A/250Vac contact relay digital output
C12	Common digital output
NO12	8A/250Vac contact relay digital output
RS485 +	COM1
RS485 -	COM1
RS485 GND	COM1
CAN0 L	COM2
CAN0 H	COM2
CAN0 GND	COM2
RX	COM3
TX	COM3
CTS	COM3
RTS	COM3
DTR	COM3
CAN1 H	COM4
CAN1 C	COM4
GND	COM4
TTL	COM4

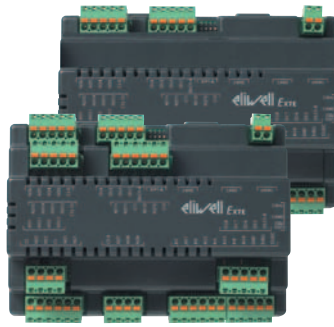
Internal Expansion
Terminal Block

ENERGY XT EXPANSION TERMINAL BLOCK	CHARACTERISTICS
5Vdc	5Vdc power supply
AI9	Analogue input configurable from parameter***
AIC9	Analogue input configurable from parameter***
5Vdc	5Vdc power supply
AI10	Analogue input configurable from parameter***
AIC10	Analogue input configurable from parameter***
12Vdc	12Vdc power supply
AI11	Analogue input configurable from parameter***
AIC11	Analogue input configurable from parameter***
12Vdc	12Vdc power supply
AI12	Analogue input configurable from parameter***
AIC12	Analogue input configurable from parameter***
AI13	NTC
AIC13	NTC
AI14	NTC
AIC14	NTC
AI15	NTC
AIC15	NTC
AI16	NTC
AIC16	NTC
IDLC11-14	24V ac/dc common digital input
IDL11	24V ac/dc digital input
IDL12	24V ac/dc digital input
IDL13	24V ac/dc digital input
IDL14	24V ac/dc digital input
IDHC5-8	24V ac/dc - 230V ac/dc common digital input****
IDH5	24V ac/dc - 230V ac/dc digital input****
IDH6	24V ac/dc - 230V ac/dc digital input****
IDH7	24V ac/dc - 230V ac/dc digital input****
IDH8	24V ac/dc - 230V ac/dc digital input****
C13-15	Common digital output
NO13	8A/250Vac contact relay digital output
NO14	8A/250Vac contact relay digital output
NO15	8A/250Vac contact relay digital output
C16-18	Common digital output
NO16	8A/250Vac contact relay digital output
NO17	8A/250Vac contact relay digital output
NO18	8A/250Vac contact relay digital output
C19-20	Common digital output
NO19	8A/250Vac contact relay digital output
NO20	8A/250Vac contact relay digital output

***see ENERGY XT –Controllers manual Parameters chapter

****Selectable using semi-finished product

6.9.1 EXTE1 (H) wiring



EXTE1 (/H) Terminals

POWER SUPPLY

24VAC
24 Vac/dc $\pm 15\%$ 15VA max.

ANALOG *INPUTS*

- AI1...AI4: N.O. NTC probe/ configurable through parameter;
- AIC1...AIC4: N.C. NTC probe/ configurable through parameter.

DIGITAL *INPUTS*

- IDL1...IDL4: 24 Vac/dc
(IDLC1...IDLC4: common D.I.)

(only /H model)

- IDL5...IDL8: 24 Va/c
(under voltage 230Vac)
(IDLC5...IDLC8: common D.I.)

DIP SWITCH

- DIP1-4: see DIP SWITCHES CONFIGURATION

DIGITAL *OUTPUTS*

- NO1...NO2: changeover relay 8A/250Vac
(C1...C2: common,
NO1... NO2: normally open,
NC1...,NC2: normally close).
- NO3...NO6: N.O. relay 8A/250Vac
- C3-6: N.C. relay 8A/250Vac
- NO7...NO9: N.O. relay 8A/250Vac
- C7-9: N.C. relay 8A/250Vac

(only /H model)

- N10...N11: changeover relay 8A/250Vac
(C11...C12: common,
NO11... NO12: normally open,
NC11...,NC12: normally close).
- N12...N15: N.O. relay 8A/250Vac
- C12-15: N.C. relay 8A/250Vac

ANALOG *OUTPUTS*

(only /H model)

AO1...AO2: 0-10 Vcc
(AOC1...AOC2: common)

SERIAL *INPUTS*

CAN0 (2 connectors): CAN-BUS 0 for connection to :

- XTM *base*
- XTE1 (/H) expansion

7 WIRING RECOMMENDATIONS

7.1 General Recommendations

WARNING!

Always switch off machine before working on electrical connections.
All operations must be performed by qualified personnel only.

7.2 Power supply-High Voltage Inputs (Relays)

The instrument has terminal blocks for connecting cables with maximum cross-sectional area of 2.5 mm² (only one conductor per terminal block for power connections).

The relay contacts are voltage free. Do not exceed the maximum current allowed. For higher loads, use an appropriate contactor.

Make sure that the power voltage complies with the device voltage.

7.3 Analogue Inputs-Probes

Temperature probes have no connection polarity and can be extended using an ordinary bipolar cable (note that if probes are extended this affects the electromagnetic compatibility (EMC) of the instrument: wiring operations must be performed very carefully).

Warning!

The *pressure probes* have specific connection polarity that must be observed.

The signal cables (temperature/*pressure probes*, *digital inputs*, RS-485/RS 232/CAN-BUS serials and electronics *power supply*, *TTL*) must be wired separately from the power cables.

7.3.1 Relay contacts-Digital inputs

The relay contacts and *digital inputs* with dangerous voltages have stronger insulation than the rest of the circuit. For this reason, the circuitry related to the probes and signal processing part (micro processor) are in a SELV (SAFETY EXTRA LOW VOLTAGE) area.

7.4 Serial connections

7.4.1 1. RS-485 serial connections

NOTE 1

- The modules must be connected to the system units using a cable with conductors with a cross section of 0.5 mm².
- **The distance between the first and last module in the network must not exceed 1,000 m.**
- When laying the cable, the following *standards* must be observed. Shielded cable is recommended (such as Belden cable model 8762 with PVC sheath, 2 conductors plus earth braid, 20 AWG, nominal capacity between conductors 89 pF, nominal capacity between one conductor and other conductors connected to the shielding 161 pF).

NOTE 2

Two types of terminal blocks can be used:

- single with 2 conductors: only use "+" and "-" conductors, maintain "gnd" conductor continuity.
- single or double with 3 conductors: use all 3 conductors ("+", "-", and "gnd").

7.4.2 2. RS-232 serial connections

A nullmodem DB9-DB9 cable is required.

NOTE 1

- **The distance between the two parts (PC-base/keyboard) must not exceed 2 m.**

Warning!

The PC must be connected to the interface module and the interface module to the unit when each of the units is disconnected from the *power supply* and must be connected in accordance with the safety *standards* in force. Electrostatic shocks must also be avoided especially on the metal surfaces of each unit. Special measures must therefore be taken to ensure that electrostatic currents are discharged to earth.

CANBUS

7.4.3 3. CAN-BUS connection

NOTE 1

- The modules must be connected to the system units using a cable with conductors with a cross section of 0.5 mm².
 - The distance between the first and last module in the network must not exceed 100 m and a Belden cable model 8762 must be used.
 - When laying the cable, the following [standards](#) must be observed. Shielded cable is recommended.
- Onboard ([base](#)) termination resistance is available between the “+” and “–” terminals of 330 Ω that can be inserted using jumper 1 (see pg. 30).

NOTE 2

Single terminal block with 3 conductors: use all 3 conductors (“+”, “–” and “gnd”).

7.4.4 4. TTL connection

TTL

Use 5-wire [TTL](#) cable with maximum length of 30 cm



8 START-UP

8.1 Notes on Start-Up*

CRC EEPROM Error

Downloading EEPROM parameters with [AppLoader](#) causes the deletion of all previous [configurations](#) (stored in the EEPROM [memory](#)). If the system detects, after [start-up](#), that the configuration of parameters is not congruent with the existing one, it warns the user thereof by generating a resettable [CRC EEPROM error](#). To reset this alarm, it is sufficient to open the configuration menu (after entering the necessary password), enable and disable the configuration mode and exit from the menu.

External expansion modules

After the [AppLoader](#) result has been successfully downloaded to the Energy XT [memory](#), it is necessary to verify whether the expansion modules are internal or external (XTH, XTE1 or XTE1/H). Expansion modules must in fact be provided with configuration data on the "types of probes" (NTC or 4-20mA pressure transducers), the bottom scales of the probes and the unit of measurement of temperature (°C or °F) used. After making sure that all the expansion modules are powered, correctly linked by means of the related dip switches (the address of each expansion module must be unique) and connected to Energy XT by means of the CAN connection, it is necessary to perform one of the following two operations:

- Establish a serial connection with tool ParamManager 3.0 or higher, force the writing of parameters after reading them, then switch Energy XT and all the connected expansion modules on and off.
- Use the keyboard to confirm all the probe, bottom scale and temperature unit parameters, being careful NOT to select the configuration mode. After entering the correct password, enable and disable the configuration mode. Then, wait approximately fifteen seconds before turning the whole system off and on.

Replacing an expansion module

To replace a faulty expansion module, disable the regulation function (by holding key ON/OFF down for at least two seconds), then switch Energy XT off by disconnecting it from the [power supply](#), after checking that all the safety timings have been met. Replace the faulty expansion module with a new one and reconnect the whole system to the [power supply](#), after carefully verifying that all the electric connections are correct. At this point, it is necessary to transmit to the new expansion module the correct I/O configuration. This can be done by following the instructions given above or, in other words, by confirming all the configuration parameters of the replaced expansion module through the keyboard or re-writing the system parameters with [Param Manager](#) (provided that these are enabled to perform this operation and that the parameter reading/writing password is available).

Disconnect the replaced card from the [power supply](#) and reconnect it after approximately ten seconds.

Restart the regulation function by pressing holding key ON/OFF down for approximately two seconds on the keyboard.

* →please refer to User Manual Energy XT software ([Apploader](#)+[Textloader](#))

9 TECHNICAL DATA

9.1 MECHANICAL CHARACTERISTICS

Model	Length	Width	Height
EXTM <i>base</i>	316	114	80
EXTM /R <i>base</i>	316	114	80
EXTM /H <i>base</i>	316	114	80
EXTM /HR <i>base</i>	316	114	80
EXTE1 expansion	159	114	80
EXTE1 /H expansion	159	114	80
EXTK keyboard EXTK keyboard (overall <i>dimensions</i>)	219	119	32
EXTK keyboard EXTK keyboard (cut out)	200	103	-



Please Note: *Dimensions* expressed in mm

9.2 Characteristics shared by Bases and Expansions

Plastic casing: PC+ABS plastic resin body UL94 V-0

GREY ref. BAYER 765

Mounting: see *MECHANICAL ASSEMBLY* chapter

Insulation class: 2 (instrument under normal conditions shall not be accessible);

Operating temperature: -5...60 °C

Storage temperature: -30...85 °C

Operating ambient humidity: 10...90% R.H. (non-condensing)

Storage ambient humidity: 10...90% R.H. (non-condensing)

Terminals and connectors plug-in, pitch 5.08, vertical insertion

Data retention: on non-volatile EEPROM

Resolution: 0.1 °C.

Accuracy: better than 1% of bottom scale.

Power supply: 24 V~/~ 50/60 Hz.

Power: 25VA



9.2.1 Keyboard Characteristics

Protection grade: IP 65 on front

Plastic casing: PC+ABS thermoplastic resin UL94 V-0

GREY ref. BAYER 765

Display: Graphic LCD 122x32 mm.

Insulation class: 2

Operating temperature: -5...60 °C

Storage temperature: -30...85 °C

Operating ambient humidity: 10...90% R.H. (non-condensing)

Storage ambient humidity: 10...90% R.H. (non-condensing)

Terminals and connectors: spring or screw

Buttons

Display range: 3 digits + sign (-999...+999)

Power supply: 12 V~/~ 50/60 Hz.

9.2.2 ELECTRICAL CONNECTIONS see INSTALLATION chapter

9.2.3 MECHANICAL ASSEMBLY see MECHANICAL ASSEMBLY chapter

9.3 Technical Data EXTM

9.3.1 Technical Data EXTM and EXTM/R Base

- *Digital inputs:*
 - 14 *inputs* 24V~/=
 - or, on demand, 10 *inputs* 24V~/= + 4 *inputs* 230V~
 - Analog *inputs:*
 - 4 NTC *inputs*, range -35 to 150°C + 4 *inputs* configurable to 4-20mA, NTC range -35 to 150°C
 - (°) *Digital outputs:*
 - 3 relays SPDT, 250V~ 8A;
 - 9 relays SPST N.O., 250V~ 8A
- (°) SSR MODELS: NO10, NO11 & NO12 SSR type 100-240V~ 600mA max.

(only /R model)

- *Analogue outputs:*
 - 4 *outputs* 0-10Vc up to 1% of resolution (or 4...20mA on demand)

9.3.2 Technical Data XTM/H and XTM/HR Base

- *Digital inputs:*
 - 22 *inputs* 24V~/=
 - or, on demand, 14 *inputs* 24V~/= + 8 *inputs* 230V~
 - Analog *inputs:*
 - 8 NTC *inputs*, range -35 to 150°C + 8 *inputs* configurable to 4-20mA, NTC range -35 to 150°C
 - (°) *Digital outputs:*
 - 3 relays SPDT, 250Va 8A;
 - 17 relays SPST N.O., 250V~ 8A
- (°) SSR MODELS: NO10, NO11 & NO12 SSR type 100-240V~ 600mA max.

(only /R model)

- *Analogue outputs:*
 - 4 *outputs* 0-10Vc up to 1% of resolution (or 4...20mA on demand)

9.3.3 Serial Connections on EXTM

- *COM1: RS-485* serial connection
- COM2: CAN-BUS serial connection
- *COM3: RS-232* serial connection (only /R model)
- COM4: CAN-BUS serial connection (only /R model)

9.4 Technical data EXTE

- Plastic housing: resin plastic body PC+ABS UL94 V-0
- Operating temperature: -5...60 °C.
- Storage temperature: -30...85 °C.
- Operating humidity: 10...90 % R.H. (non condensing)
- Storage environment humidity: 10...90% R.H. (non-condensing)
- Terminals and connectors: screw or spring removable connectors,
- vertical insertion
- Data storage: on non-volatile EEPROM *memory*.
- *Power supply*: 24 V~/~ 50/60 Hz

9.4.1 EXTE1 Expansion Technical Data

- *Digital inputs*: 4 *inputs* 24 V~/~
- Analogue *inputs*: 4 *inputs* configurable to 4-20mA, NTC, extended NTC
- *Digital outputs*:
 - 2 relays SPDT 250 Va 8A
 - + 7 relays SPST N.O. 250 Va 8A

9.4.2 EXTE1/H Expansion Technical Data

- *Digital inputs*: • 8 *inputs* 24 V~/~ or 4 *inputs* 24V~/~
+ 4 *inputs* 230V~ (on demand)
- Analogue *inputs*: 4 *inputs* configurable to 4-20mA, NTC, extended NTC
- *Digital outputs*: 4 relays SPDT + 11 relays SPST N.O. 250 V~ 8A
- *Analogue outputs*: 2 *outputs* 0-10 V~ or 2 *outputs* 4...20mA
(on demand), with 1% of resolution max.

9.4.3 Serial Connections on EXTE expansion

- COM: CAN-BUS serial connection

10 STANDARDS

10.1 Standards

The product complies with the following European Union Directives:

- EU Directive 73/23/EEC and subsequent amendments
- EU Directive 89/336/EEC and subsequent amendments

and is compliant with the following harmonized *standards*

- LOW VOLTAGE: EN60335-1, where applicable
- LOW VOLTAGE: EN60335-1 per quanto applicabile
- EMC EMISSION: EN61000-6-3
- EMC IMMUNITY: EN61000-6-1

11 USE OF DEVICE

11.1 Permitted Use

This unit is used to control small, medium and large sized chillers with 1 to 8 compressors and circuits.

For safety purposes, the control device must be installed and used in accordance with the instructions supplied. Users must not be able to access parts with dangerous voltage levels under normal operating conditions. The unit must be resistant to water and dust, depending on the specific application, and be accessible only by using special tools. This unit can be fitted on domestic appliances and/or similar units used for air conditioning.

In accordance with the reference *standards*, this unit is classified:

- as an automatic electronic control device to be installed in a standalone configuration or on other units with regard to manufacturing;
- As a Type 1 control unit in relation to its manufacturing tolerances and derivatives with regard to its automatic operating characteristics;
- As a Class 2 device with regard to protection against electric shocks (referring to the parts that can be accessed during normal use: front keypad);
- As a Class A device with regard to software class and structure

11.2 Unpermitted Use

The use of the unit for applications other than those described is forbidden.

Please note that the relay contacts supplied are functional and may be subject to failure (since the electronics controlling them may short circuit these relays or leave them open). For this reason, any protection devices needed to comply with product requirements or dictated by common sense due to obvious safety reasons should be installed externally.

12 RESPONSIBILITIES AND RESIDUAL RISKS

Eliwell & Controlli s.r.l. shall not be liable for any damages deriving from:

- installation/use other than that prescribed which does not comply with the safety *standards* specified in the regulations and/or herein;
- use on equipment that does not guarantee adequate protection against electric shock, water or dust when assembled.
- use on equipment that allows dangerous parts to be accessed without the use of tools;
- Installation/use on equipment that is not compliant with the *standards* and regulations in force.

13 DISCLAIMER

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