MITSUBISHI ELECTRIC

COMPUTER ROOM AIR CONDITIONER
MODEL

s-MEXT 006-044

INTERFACE MANUAL
TRANSLATION OF THE ORIGINAL INSTRUCTION

For software version ME18-relC

EN

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Before carrying out any operation on the machine,

you must carefully read this manual

and make sure you understand all the instructions and

information given

Keep this manual in a known and easily accessible place

to refer to as necessary

during the entire life-span of the unit.

SM_s-MEXT_ME18relC_01_11_18_EN

CONTENTS

Description of the symbols

A number of symbols are used to highlight some parts of the text that are of particular importance. These are described below.

	ATTENTION **Indicates situations of grave danger which, if ignored, can seriously endanger the health and safety of people.**
	OBLIGATION Indicates that it is necessary to act in an appropriate manner in order not to put at risk the health and safety of people and not cause financial damage.
	INFORMATION *Indicates technical information of particular importance which should not be neglected.*

1   USE

<table>
<tr><td>

ATTENTION
The EVOLUTION+ controller software is protected by a digital signature.
This means that it can only work on boards supplied by MEHITS and not on boards purchased from other dealers.

In addition, plastics and screen-printed hardware are MEHITS exclusive.

</td></tr>
</table>

This document **may only be used** for the units managed by the EVOLUTION + electronic controller running on **ME18r01-reIC software**.
Information on the revision of the electronic controller is shown in the "**Unit" menu** which can be accessed as shown below.

Press the **"PRG"** key to access the main menu.

Main Factory Unit Setpoint	Access mask in the Main menu Press the "Up" or "Down" keys to scroll the other screens Press "Enter" to access the selected menu.
↑ Unit ← ↓	Access mask in the User menu Press the "Up" or "Down" keys to scroll the other screens. Press "Esc" to return to the submenu.
Evolution+ Cod. ME 18.01 EN □ Man. C01002387H HW pCO5+M NAND 50MB Flash 2MB + 7MB + 4MB Ram 2048KB Boot 05.01 Bios06.31	This mask shows the reference information of the application (in the example version ME18r01)

The electronic controller may only be installed and programmed by adequately trained technical staff.

The images in the various chapters refer to the larger controller, but the procedure remains the same for smaller controllers.

2   INSTALLING SERIAL CARD

There are various types of communication protocols. For each of them, a serial card connected to the controller on board the unit must be used.

Even if the serial cards differ according to the supervisor to connect, the installation procedure on the controller is the same and comprises the following steps to be performed in order.

This procedure is not necessary if the serial card is already on board the unit.

ATTENTION
The cards must not be powered during these operations.

1.   Identify the electronic controller on board the unit.

2.   Remove the "BMS Card" cover from the controller using a screwdriver.

3.   Push the interface card into its dedicated slot making sure it correctly engages the dedicated comb connector mounted in the controller.
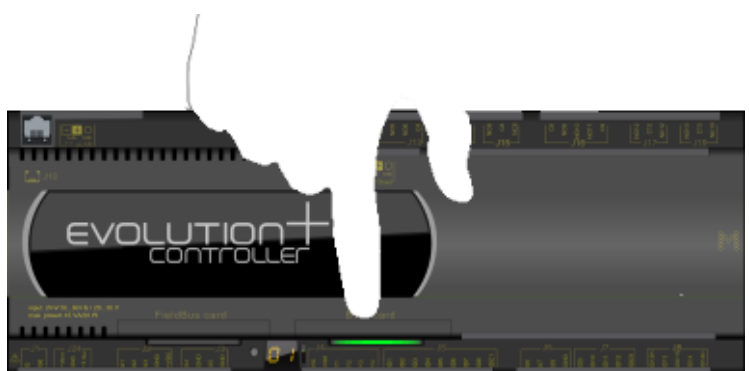
4. If necessary, remove the perforated plastic element with a pair of nippers to allow the serial card connector to pass through.
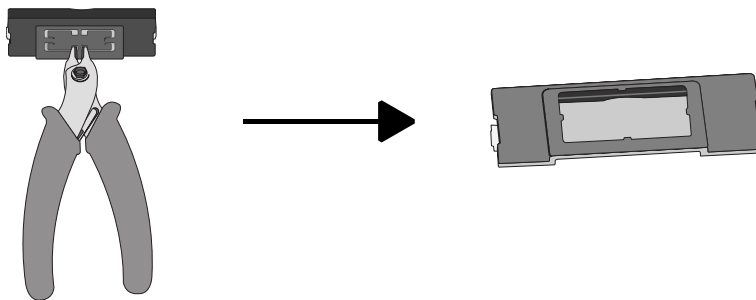
5. Put back the cover making sure to match the hole in the cover with the engaged serial card connector.
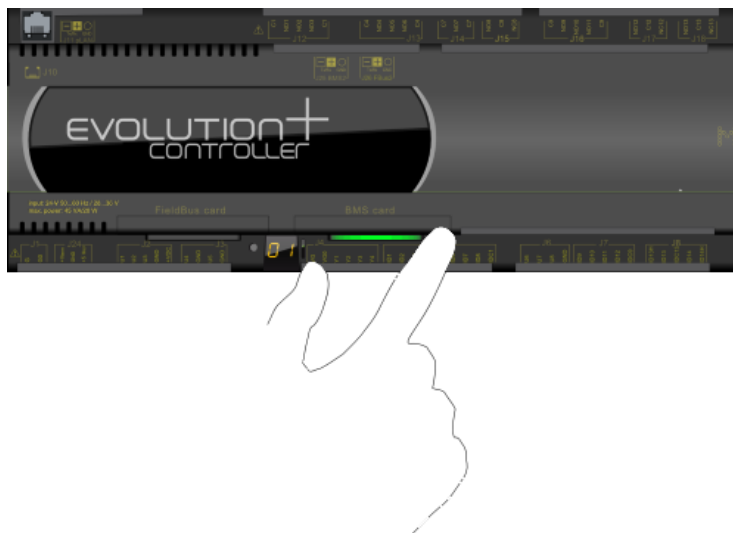
3 INTERFACING TO THE MODBUS SYSTEM

3.1 COMPONENTS REQUIRED

- Modbus Serial interface card

- Electronic control card.
  (Already fitted to the unit)

3.2 INSTALLING THE SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the Modbus serial card into the controller.

3.3 SUPERVISION PARAMETERS SETTING

P To communicate with BMS, set the parameters as shown below.

You must enter the user menu and, after having given the **User password**, scroll to the masks described below.

Mask of the terminal	Description	N. Par.
🖥️ Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu.	
-------------- P30.01 Enable supervision: Y	Communication with the supervision system must be enabled.	30.01
-------------- P30.02 BMS Address: 001 -------------- P30.03 BMS protocol config.: Modbus	Parameters for configuring the BMS address and BMS protocol (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) It is necessary to set the connection parameters with the supervisor as follows: • Control type: **Modbus** • Unit identification number: from **001 to 200** (default 01, …)	30.02 30.03
-------------- P30.04 BMS baud rate config.: 19200	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) It is necessary to set the connection parameters with the supervisor as follows: • Baud rate: **19200 baud**	30.04

Mask of the terminal	Description	N. Par.

`--------------- P30.05`
`ON/OFF by BMS status:`
`Y`
	Parameters to configure ON/OFF from BMS (N:disabled - Y:enabled)
	
	It is necessary to set the connection parameters with the supervisor as follows:
	• on/off enabling: **Yes**
		30.05
		30.06

`--------------- P30.11`
`Enable FC STOP by`
`supervisor:        N`
	Enable stop Freecooling from BMS
	
	Visible only on unit with Direct Freecooling
		30.11

3.4   SETTING THE SUPERVISOR NETWORK

The supervisor network must be set up as shown below.
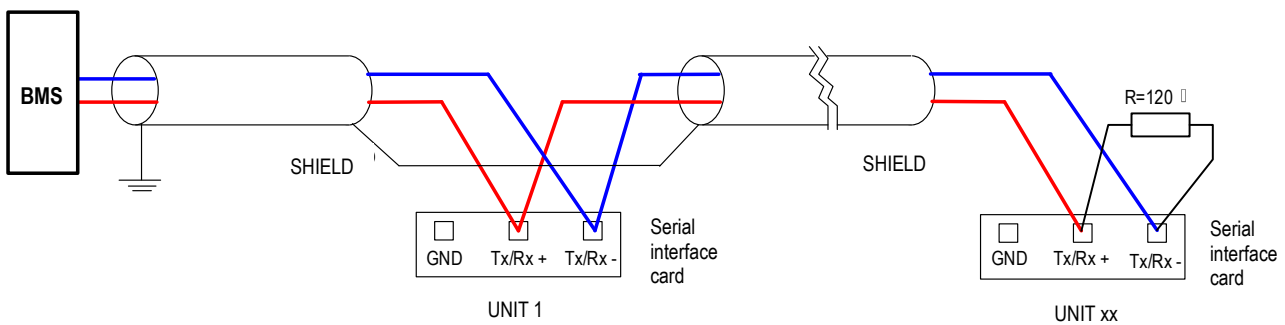
Take great care when connecting the serial line to the units. This is an RS485 serial line, based on a balanced differential communication line with a characteristic impedance of 120 ohm.

The maximum length of the connection depends on the Baud-rate, background electrical noise, and the type and quality of the cable. Operation is generally guaranteed up to 1000 m.
Use a shielded and twisted 3 x AWG 22/7 cable for the network.

Use the third wire when the reference signal must be equalised.

The serial connection is made with a single cable running from the BMS to the first (nearest) unit, from the first to the second (in order of distance), and so on).
The serial cable must be kept separate from the power cables.
The shield of each connection cable must be connected to the shield of the previous derivation. The ground connection must be made in just one point.

A maximum of 200 units can be connected to the network; the polling time of the entire system is proportional to the number of units supervised by the BMS.

3.5 MODBUS CHARACTERISTICS

Modicon Modbus protocol implemented as described in the document:

> **Modicon Modbus protocol reference guide**
> **March 1992, PI Modbus-300 rev D.**

As regards serial communication with the Modbus protocol, the communication data are:

- Speed: may be selected by software (see user menu, usually from 1200 to 19200 baud)
- Data bits: 8 (not modifiable)
- Stop bits: 2 (not modifiable)
- Parity: None (not modifiable)
- Flow Control: Establishes how the PC and the converter interact, no influence on the controller
- Start address: this is 1 and not 0.

Address

This is the supervision variable address in the electronic control unit.
When using the addresses with the Modbus protocol, add 128 for whole variables.
(e.g.: Software address 3 -> Modbus address 131 [128+3])

Type

- B: Boolean variable (Coil for the Modbus protocol).
- A and I: Whole variable (Register for the Modbus protocol).

Flow

- OUT: Read-only variable for the BMS.
- IN: Read/write variable for the BMS.

Scale factor

It concerns the value read (OUT) or written (IN) from the BMS:

- Value x1: It is the true value, no conversion factor is required.
- Value x10: Value must be multiplied by 10 after being read or before being written.
- Value x100: Value must be multiplied by 100 after being read or before being written.
- Value /10: Value must be divided by 10 after being read or before being written.
- Value /100: Value must be divided by 100 after being read or before being written.

E.g.: Writing and readingthe chiller temperature setpoint

- Writing:

40002	001	A	IN	Value x10	°C	Cold temperature setpoint

> If the "Chiller temperature setpoint" variable must be written (IN) at 21.3 °C
> The BMS must multiply the value to send to the controller by 10 (21.3x10 = 213)

- Reading:

40002	001	A	OUT	Value/10	°C	Cold temperature setpoint

> If the "Cold temperature setpoint" variable must be read (OUT)
> The BMS must divide the value received from the controller by 10 (213/10 = 21.3 °C)

If a probe is in an alarm condition a value equal to -999 is sent, that is -99.9
If a probe or a parameter is not configured a value equal to -888 is sent, that is -88.8

Unit of measurement

This is the data unit of measurement after conversion with the scale factor

E.g.: Reading from the control of a value of 221

- Reading:

40013	012	A	OUT	Value/10	bar	High pressure

> With the scale factor, the true value is 22.1 which involves reading 22.1 bar in the unit of measurement column.

Function code

The read and write commands (function codes) for the available coils and registers are shown in the following table.

Type of data	Type of command	Function Codes
Coils (boolean)	Read	1
	Variable write	5
	Multiple variable write	15
Registers (analogue and whole)	Read	4
	Variable write	6
	Multiple variable write	16

Coil Modbus addresses: Boolean variables:

Register/Coil Modbus protocol	Protocol addresses: Standard | Trend | Bacnet	Type	
Booleane			
001	000	B	**Not managed**
002	001	B	Boolean 001
003	002	B	Boolean 002
004	003	B	Boolean 003
…	…	B	…
182	181	B	Boolean 181
183	182	B	Boolean 182
184	183	B	Boolean 183

Register Modbus addresses: Analogue and Whole variables:

Register/Coil protocollo Modbus	Protocol addresses: Standard | Trend | Bacnet	Type	
Analogue			
40001	000	A	**Not managed**
40002	001	A	Analogue 001
40003	002	A	Analogue 002
40004	003	A	Analogue 003
…	…	…	…
40127	126	A	Analogue 126
40128	127	A	Analogue 127
40129	128	A	Analogue 128
Whole			
40129	000	I	**Not managed**
40130	001	I	Whole 001
40131	002	I	Whole 002
40132	003	I	Whole 003
…	…	…	…
40255	126	I	Whole 126
40256	127	I	Whole 127
40257	128	I	Whole 128

3.6   INTERFACE DATABASE

Reference database for systems using Modbus networks. The addresses not indicated in the database **must not be used**.

Register/Coil Modbus protocol	Protocol addresses: Standard | Trend | Bacnet	Type	Flow	Conversion factor	Unit of measurement	Description
Boolean						
001	000	B				**Not managed**
002	001	B	OUT	-	-	Unit status (0: Off - 1: On)
003	002	B	OUT	-	-	Alarm presence (0: Unit OK – 1: Alarm)
009	008	B	IN	-	-	On/Off command by supervisor (0:Off - 1:On)
			OUT	-		
016	015	B	OUT	-	-	Status step 1 heating elements
017	016	B	OUT	-	-	Status step 2 heating elements
038	037	B	IN	-	-	Stop FC by BMS 0: FC normal operation;1: FC disabled)
			OUT	-		
Analogue						
40001	000	A				**Not managed**
40002	001	A	IN	Value x10	°C	Cold setpoint temperature
			OUT	Value/10		
40003	002	A	IN	Value x10	°C	Hot setpoint temperature
			OUT	Value/10		
40005	004	A	OUT	Value/10	°C	Cold temperature setpoint enabled
40006	005	A	OUT	Value/10	°C	Hot temperature setpoint enabled
40007	006	A	OUT	Value/10	°C	Room temperature
40008	007	A	OUT	Value/10	°C	Delivery temperature
40009	008	A	OUT	Value/10	°C	Adjustment temperature
40017	016	A	OUT	Value/10	bar	Low pressure
40018	017	A	OUT	Value/10	bar	Low pressure circuit 2
40021	020	A	OUT	Value/10	°C	External air temperature
40022	021	A	OUT	Value/10	%	Ambient humidity
40024	023	A	OUT	Value/10	°C	Address 129 auxiliary probe temperature
40025	024	A	OUT	Value/10	%	Address 129 auxiliary probe humidity
40041	040	A	OUT	Value/10	%	Fan speed
40054	053	A	OUT	Value/10	%	Free cooling damper position
40055	054	A	OUT	Value/10	%	Humidifier request
Whole						
40129	000	I				**Not managed**
40132	003	I	OUT	Value x1	-	Software release
40133	004	I	OUT	Value x1	-	Software release (revision)
40139	010	I	OUT	Value x1	-	Flow control type (0=adjustable head / 1=constant flow / 2=constant head)
40140	011	I	OUT	Value x1	-	Probe used for adjustment (0= ambient air probe / 1= delivery air probe)
40141	012	I	OUT	Value x1	-	Unit status (0:ON by keyboard, 1:ON by digital input, 2:ON by PLAN, 3:ON by time bands, 4:ON by supervisor, 5:OFF by alarm, 6:OFF by supervisor, 7:OFF by time bands, 8:OFF by Plan, 9:OFF by digital input, 10:OFF by keyboard, 11:OFF by deselected ventilation, 12:Switch off)
40143	014	I	OUT	Value x1	-	Unit operating mode (0: Unit OFF, 1: Ventilation only, 2: Cooling, 3: Free cooling, 4: Cooling+Free cooling, 5: Dehumidification, 6: Dehumidification+Post heating, 7: Humidification, 8:Cooling+Humidification, 9:Heating, 10:Heating+Humidification)
40154	025	I	OUT	Value x1	-	Year
40155	026	I	OUT	Value x1	-	Month
40156	027	I	OUT	Value x1	-	Day
40157	028	I	OUT	Value x1	h	Hours
40158	029	I	OUT	Value x1	m	Minutes

Register/Coil Modbus protocol	Protocol addresses: Standard | Trend | Bacnet	Type	Flow	Conversion factor	Unit of measurement	Description
40161	032	I	OUT	Value x1	-	Active alarm code (with greater priority)
40163	034	I	OUT	Value/10	%	Cold thermoregulator request (%)
40166	037	I	OUT	Value/10	%	Heat request (%)
40169	040	I	OUT	Value/10	%	Post-heating request (%)
40175	046	I	IN	Value x1	%	Dehumidification setpoint (%)
			OUT	Value x1		
40176	047	I	IN	Value x1	%	Humidification setpoint (%)
			OUT	Value x1		
40177	048	I	OUT	Value x1	h	Unit operating hours (thousands)
40178	049	I	OUT	Value x1	h	Unit operating hours (units)
40191	062	I	OUT	Value x1	h	Heating element 1 operating hours (thousands)
40192	063	I	OUT	Value x1	h	Heating element 1 operating hours (units)
40193	064	I	OUT	Value x1	h	Heating element 2 operating hours (thousands)
40194	065	I	OUT	Value x1	h	Heating element 2 operating hours (units)
40195	066	I	OUT	Value x1	h	Humidifier operating hours (thousands)
40196	067	I	OUT	Value x1	h	Humidifier operating hours (units)
40197	068	I	IN	Value x1	°C	High ambient temperature set point
			OUT	Valore x1		
40198	069	I	IN	Valore x1	°C	Low ambient temperature set point
			OUT	Valore x1		
40199	070	I	IN	Valore x1	%	Ambient humidity high set point
			OUT	Valore x1		
40200	071	I	IN	Valore x1	%	Ambient humidity high set point
			OUT	Valore x1		
40209	080	I	OUT	Valore x1	V	Voltage measured between L1 and N
40210	081	I	OUT	Valore x1	V	Voltage measured between L2 and N
40211	082	I	OUT	Valore x1	V	Voltage measured between L3 and N
40212	083	I	OUT	Valore x1	V	Voltage measured between L1 and L2
40213	084	I	OUT	Valore x1	V	Voltage measured between L2 and L3
40214	085	I	OUT	Valore x1	V	Voltage measured between L3 and L1
40215	086	I	OUT	Valore x1	A	Maximum current at L1
40216	087	I	OUT	Valore x1	A	Maximum current at L2
40217	088	I	OUT	Valore x1	A	Maximum current at L3
40218	089	I	OUT	Valore x1	A	Maximum current at N
40219	090	I	OUT	Valore x1	W	L1 power
40220	091	I	OUT	Valore x1	W	L2 power
40221	092	I	OUT	Valore x1	W	L3 power
40222	093	I	OUT	Valore x1	W	Total Power
40223	094	I	OUT	Valore x1	kWh	Energy
40232	103	I	OUT	Valore x1	Pa	Average differential pressure for DeltaP control with APL
40233	104	I	OUT	Valore x1	Pa	Differential pressure for DeltaP control

4 INTERFACING TO THE LONWORKS SYSTEM

4.1 COMPONENTS REQUIRED

- LonWorks interface card

- Electronic control card.
  Already fitted to the unit)

4.2 INSTALLING SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the LonWorks serial card into the controller.

4.3 SETTING SUPERVISION PARAMETERS

To communicate with the LonWorks system, set the parameters as shown below.

You must enter the user menu and, after having given the password, scroll to the masks described below.

Mask of the terminal	Description	N. Par.
🖥️ Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu.	
-------------- P30.01 Enable supervision: Y	Communication with the supervision system must be enabled.	30.01
-------------- P30.02 BMS Address: 001 -------------- P30.03 BMS protocol config.: LON	Parameters for configuring the BMS address and protocol (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) It is necessary to set the connection parameters with the supervisor as follows: - Protocol type: **LON** (LonWorks) - Unit identification number: from **001 to 200** (default 01, …)	30.02 30.03
-------------- P30.04 BMS baud rate config.: 4800	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) It is necessary to set the connection parameters with the supervisor as follows: - Baud rate: **4800 baud*** *Speed of communication between pCO and interfacing board.* *The communication speed between the interfacing card and external BMS is always 78 kbps.*	30.04

Mask of the terminal	Description	N. Par.

`--------------- P30.05`
`ON/OFF by BMS status:`
`Y`
	Parameters to configure ON/OFF from BMS (N:disabled - Y:enabled)
	
	It is necessary to set the connection parameters with the supervisor as follows:
	• on/off enabling: Yes
		30.05
		30.06

`--------------- P30.11`
`Enable FC STOP by`
`supervisor:       N`
	Enable stop Freecooling from BMS
	
	Visible only on unit with Direct Freecooling
		30.11

4.4   REALIZATION OF THE SUPERVISION NETWORK

The supervision network is created by LonWorks technicians.
Note: MEHITS will provide serial cards and some files needed by LonWorks technicians for network configuration.
Specifically, a .NXE file and an .XIF file will be provided. The programming of the card is by those who carry out the integration.

4.5 MEANING OF VARIABLES

The **analogue** variables (ie type A) are expressed with a decimal number (For example: 12.0bar → 120; 33.8°C → 338).
If a probe is in alarm, a value equal to -999 is sent from the control, ie -99.9.
If a probe or parameter is not configured, a value of -888 is sent from the control, ie -88.8.

4.6 INTERFACE DATABASE

Reference database for systems using LonWorks networks. The addresses not indicated in the database must not be used

Address	Type	Type NV	Flow	Copnversion factor	Unit of measurement	Description
Boolean						
0	B					**Not managed**
1	B	95	OUT	-	-	Unit status (0:Off - 1:On)
2	B	95	OUT	-	-	Presence of Alarm (0: Unit OK – 1:Alarm)
8	B	95	IN	-	-	On/Off command by supervisor (0:Off - 1:On)
			OUT	-		
Analogue						
0	A					**Not managed**
1	A	105	IN	Value x10	°C	cold temperature setpoint
			OUT	Value /10		
2	A	105	IN	Value x10	°C	hot temperature setpoint
			OUT	Value /10		
6	A	105	OUT	Value /10	°C	Room temperature
7	A	105	OUT	Value /10	°C	Delivery temperature
16	A	30	OUT	Value /10	bar	Low pressure
17	A	30	OUT	Value /10	bar	Low Pressure circuit 2
20	A	105	OUT	Value /10	°C	External air temperature
21	A	81	OUT	Value /10	%	Ambient humidity
40	A	81	OUT	Value /10	%	Fan speed
Whole						
0	I					**Not managed**
12	I	0	OUT	Value x1	-	Unit status (0:ON by keyboard, 1:ON by digital input, 2:ON by PLAN, 3:ON by time bands, 4:ON by supervisor, 5:OFF by alarm, 6:OFF by supervisor, 7:OFF by time bands, 8:OFF by Plan, 9:OFF by digital input, 10:OFF by keyboard, 11:OFF by deselected ventilation, 12:Switch off)
14	I	0	OUT	Value x1	-	Unit operating mode (0: Unit OFF, 1: Ventilation only, 2: Cooling, 3: Free cooling, 4: Cooling+Free cooling, 5: Dehumidification, 6: Dehumidification+Post heating, 7: Humidification, 8:Cooling+Humidification, 9:Heating, 10:Heating+Humidification)
32	I	0	OUT	Value x1	-	Active alarm code (with greater priority)
34	I	81	OUT	Value /10	%	Cold thermoregulator request (%)
37	I	81	OUT	Value /10	%	Heat request (%)
46	I	81	IN	Value x1	%	Dehumidification setpoint
			OUT	Value x1		
47	I	81	IN	Value x1	%	Humidification setpoint
			OUT	Value x1		
68	I	105	IN	Value x1	°C	High ambient temperature set point
			OUT	Value x1		
69	I	105	IN	Value x1	°C	Low ambient temperature set point
			OUT	Value x1		
70	I	81	IN	Value x1	%	High ambient humidity set point
			OUT	Value x1		
71	I	81	IN	Value x1	%	Low ambient temperature set point
			OUT	Value x1		

5   INTERFACING TO THE BACNET SYSTEM

5.1   COMPONENTS REQUIRED

- BACnet Serial interface card

As well as the BACnet MS/TP card (for RS485 network), the BACnet TCP/IP serial card is also available

- Electronic control card.
  Already fitted to the unit

5.2   INSTALLING THE SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the BACNET serial card into the controller.

5.3   SETTING SUPERVISION PARAMETERS

To communicate with the BACnet system, set the parameters as shown below.

Enter the user menu and, after having given the password, scroll to the masks described below.

Mask of the terminal	Description	N. Par.
🖥️ Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu	
-------------- P30.01 Enable supervision: Y	Communication towards the supervisor system must be enabled.	30.01
-------------- P30.02 BMS Address: 001 -------------- P30.03 BMS protocol config.: Standard	BMS address and protocol configuration parameters (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) The supervisor connection parameters must be set as shown below: • Protocol: **Bacnet** • Unit ID: from **001** to **200** (default 01, …)	30.02 30.03
-------------- P30.04 BMS baud rate config.: 19200	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) The supervisor connection parameters must be set as shown below: • Baud rate: **19200 baud*** *Speed of communication between pCO and interfacing board.* *The communication speed between the interfacing card and external BMS is 9600-19200-36400-76800.*	30.04

Mask of the terminal	Description	N. Par.
``` --------------- P30.05 ON/OFF by BMS status: Y ```	Parameters to configure ON/OFF from BMS (N:disabled - Y:enabled) It is necessary to set the connection parameters with the supervisor as follows: • on/off enabling: Yes	30.05 30.06
``` --------------- P30.11 Enable FC STOP by supervisor: N ```	Enable stop Freecooling from BMS Visible only on unit with Direct Freecooling	30.11

5.4 REALIZATION OF THE SUPERVISION NETWORK

The supervision network is created by BACnet technicians.
The Modbus protocol database is used for interfacing.

5.5 SIGNIFICATO DELLE VARIABILI

Analogue variables (type A) are expressed with a decimal number (e.g.: 12.0bar → 120; 33.8°C → 338).
the scale factor of the analogue variables must be multiplied by 10 before being applied to the read or written value of the variable.
If a probe is in an alarm condition a value equal to -999 is sent, that is -99.9.
If a probe or a parameter is not configured a value equal to -888 is sent, that is -88.8.

6 INTERFACING TO THE SNMP SYSTEM

6.1 COMPONENTS REQUIRED

- The BACnet TCP/IP serial board is required

The Ethernet board is used for connection to the SNMP v1, v2c, v3 networks

- Electronic control board.
  Already fitted on the machine

6.2 INSTALLING THE SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the BACnet TCP/IP serial card into the controller.

6.3 SETTING SUPERVISOR PARAMETERS

To communicate with the SNMP system, set the parameters as shown below.

Enter the **User menu**, type in the User **password** and scroll down to the following masks.

Mask of the terminal	Description	N. Par.
🖥️ Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu.	
-------------- P30.01 Enable supervision: Y	Communication towards the supervisor system must be enabled.	30.01
-------------- P30.02 BMS Address: 001 -------------- P30.03 BMS protocol config.: Standard	BMS address and protocol configuration parameters (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) The supervisor connection parameters must be set as shown below: • Protocol: **Standard** • Unit ID: from **001** to **200** (default 01, …)	30.02 30.03
-------------- P30.04 BMS baud rate config.: 19200	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) The supervisor connection parameters must be set as shown below: • Baud rate: **19200 baud** (*) ** Speed of communication between pCO and interfacing board.* *The communication speed between the interfacing card and external BMS is 9600-19200-36400-76800.*	30.04

Mask of the terminal	Description	N. Par.

``--------------- P30.05``
``ON/OFF by BMS status:``
``Y``
	Parameters to configure ON/OFF from BMS (N:disabled - Y:enabled)
	
	It is necessary to set the connection parameters with the supervisor as follows:
	• on/off enabling: Yes
		30.05
		30.06

``--------------- P30.11``
``Enable FC STOP by``
``supervisor:      N``
	Enable stop Freecooling from BMS
	
	Visible only on unit with Direct Freecooling
		30.11

6.4   REALIZATION OF THE SUPERVISION NETWORK

The supervision network is created by SNMP technicians.
The interface database is the one for the Modbus protocol
Note: MEHITS will provide serial cards and some files needed by SNMP technicians for network configuration.
Specifically, a .MIB file will be provided. The programming of the card is by those who carry out the integration.

6.5   MEANING OF VARIABLES

Analogue variables (type A) are expressed with a decimal number (e.g.: 12.0bar → 120; 33.8°C → 338)
If a probe is in an alarm condition a value equal to -99.9 is sent
If a probe or a parameter is not configured a value equal to -88.8 is sent

7   SERIAL INTERFACE RS232 – MODEM GSM

The RS232-Modem serial card is an option that allows direct interfacing of the unit with a GSM system.
The connection of the GSM modem allows to send SMS messages on the GSM phone in case of alarms.

7.1   COMPONENTS REQUIRED

• RS232 serial interface card

• Modem GSM (external)

• Electronic control card.
  (Already fitted to the unit)

7.2   INSTALLING THE SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the RS232 serial card into the controller.

7.3   SETTING SUPERVISOR PARAMETERS

To communicate with the SNMP system, set the parameters as shown below.

Enter the **User menu**, type in the **User password** and scroll down to the following masks.

Mask of the terminal	Description	N. Par.
🖳 Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu.	
--------------- P30.01 Enable supervision: Y	Communication towards the supervisor system must be enabled.	30.01
--------------- P30.02 BMS Address: 001 --------------- P30.03 BMS protocol config.: GSM Modem	BMS address and protocol configuration parameters (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) The supervisor connection parameters must be set as shown below: • Protocol: **GSM Modem** • Unit ID: from **001** to **200** (default 01, …)	30.02 30.03
--------------- P30.04 BMS baud rate config.: 9600	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) The supervisor connection parameters must be set as shown below: • Communication speed: **9600 baud *** ** Speed of communication between pCO and interfacing board.* *The communication speed between the interfacing card and external BMS is 9600-19200-36400-76800.*	30.04

8   INTERFACING TO THE KONNEX SYSTEM

8.1   KONNEX COMMUNICATION

The EVOLUTION+ controller is compatible with program ETS3 or ETS4.

INFORMATION
The controller is currently NOT compatible with program ETS5.

The mode supported by the EVOLUTION+ controller for the Konnex network is TP1 9.6 kbits/s System mode, with cyclical transmission at fixed intervals (2 sec).
Data is sent as soon as any values change, and cyclically, at intervals of 2 sec. Complete re-transmission of all the variables takes about N+2 sec, where N indicates the number of output variables.

ATTENTION
The operation of a Konnex network requires a specific bus power supply that supplies the bus 29 volts DC (NOT PROVIDED BY MEHITS).

The network is configured using a personal computer with installed the ETS3 or ETS4 program and a connection device between the USB port and the Konnex bus (NOT PROVIDED BY MEHITS).

8.2   COMPONENTS REQUIRED

- Konnex interface card

- Electronic control board.
  Already fitted on the machine)

8.3   INSTALLING THE SERIAL INTERFACE CARD

Follow the points in paragraph "Installing the serial card" to insert the Konnex serial card into the controller.

8.4   SETTING SUPERVISOR PARAMETERS

To communicate with the Konnex system, set the parameters as shown below.

Enter the **User menu** and, after having given the **password**, scroll to the masks described below.

Mask of the terminal	Description	N. Par.
⌨️ Serial ← ↓	Access mask to BMS management submenu. Press "Up" or "Down" to scroll the other masks Press "Esc" to return to the submenu.	
--------------- P30.01 Enable supervision: Y	Communication towards the supervisor system must be enabled.	30.01
--------------- P30.02 BMS Address: 001 --------------- P30.03 BMS protocol config.: LON	Parameters for configuring the BMS address and protocol (0:Standard - 1:Modbus - 2:GSM Modem - 3:LON - 4:Bacnet - 5:TCP/IP - 6:WinLoad) The supervisor connection parameters must be set as follows: • Protocol: **LON** (Lonworks) • Unit ID: from **001** to **200** (default 01, …)	30.02 30.03
--------------- P30.04 BMS baud rate config.: 4800	BMS baud rate configuration parameter (0:1200 - 1:2400 - 2:4800 - 3:9600 - 4:19200) The supervisor connection parameters must be set as follows: • Communication speed: **4800 baud** (*) ** Speed of communication between pCO and interfacing board* *The communication speed between the interfacing card and external BMS is always 78 kbps.*	30.04
--------------- P30.05 ON/OFF by BMS status: Y	Parameters to configure ON/OFF from BMS (N:disabled - Y:enabled) It is necessary to set the connection parameters with the supervisor as follows: • on/off enabling: Yes	30.05 30.06
--------------- P30.11 Enable FC STOP by supervisor: N	Enable stop Freecooling from BMS Visible only on unit with Direct Freecooling	30.11

8.5   SETTING SUPERVISOR NETWORK

The supervisor network is set up by Konnex staff.
Note: MEHITS will supply the serial files and some files necessary to configure the network.
The following is provided:
- an .XML file containing the variables database;
- Controller plug-in for ETS3 program
- Controller plug-in for ETS4 program
- K-Set program for configuration of the variables database in relation to the BMS
- KONNEX card manual.

Programming of the card and adapting of the variables database to the BMS system in use is to be carried out by the technician responsible for integration.

⚠️ **ATTENTION**
The groups assigned to each Konnex datapoint of the XML file are purely indicative and must be adapted to the supervision system in use. The groups are adapted by the technician responsible for integration.

The diagram below shows the phases of the Configuration process carried out by the technician responsible for integration.
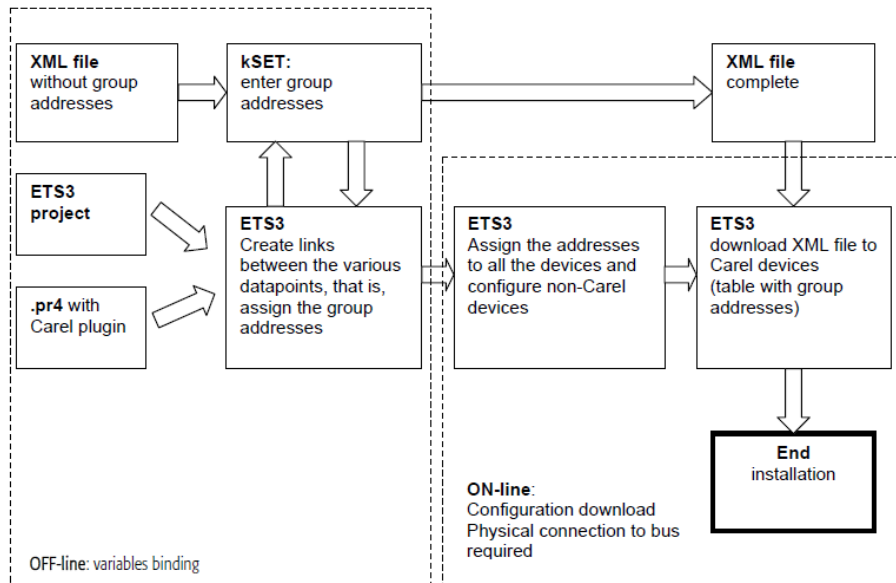
In order to assign the address to the card and download the XML file created with the K-Set program, the ETS3 or ETS4 data archive must be loaded with a specific description of the EVOLUTION+ controller. A plugin is distributed in the form of a "project database". The manual of the KONNEX card explains how to import the database in the program and how to use the K-Set program.

For the assignment of group addresses to the EVOLUTION + controller it is necessary to use both the K-Set program, supplied by MEHITS, and ETS3 or ETS4. With K-Set you create the configuration of the Konnex card, while with ETS3 or ETS4 you assign the physical address of the card and download the configuration table.

8.6 MEANING OF VARIABLES

Analogue variables (type A) are expressed with a decimal number (e.g.: 12.0bar → 120; 33.8°C → 338)
If a probe is in an alarm condition a value equal to -99.9 is sent, that is -99.9
If a probe or a parameter is not configured a value equal to -88.8 is sent, that is -88.8

8.7 INTERFACE DATABASE

Reference database for systems using Konnex networks. The addresses not indicated in the database must not be used

Address	Type	Type NV	Flow	Conversion factor	Unit of measurement	Description
Boolean						
0	B					**Not Managed**
1	B	95	OUT	-	-	Unit status (0:Off - 1:On)
8	B	95	IN	-	-	On/Off command by supervisor (0:Off - 1:On)
			OUT	-		
Analogue						
0	A					**Not Managed**
1	A	105	IN	Value x10	°C	cold temperature setpoint
			OUT	Value /10		
2	A	105	IN	Value x10	°C	hot temperature setpoint
			OUT	Value /10		
6	A	105	OUT	Value /10	°C	Room temperature
7	A	105	OUT	Value /10	°C	Delivery temperature
16	A	30	OUT	Value /10	bar	Low pressure
17	A	30	OUT	Value /10	bar	Circuit 2 low pressure
20	A	105	OUT	Value /10	°C	External air temperature
21	A	81	OUT	Value /10	%	Ambient humidity
40	A	81	OUT	Value /10	%	Fan speed

Address	Type	Type NV	Flow	Conversion factor	Unit of measurement	Description
Whole						
0	I					**Not Managed**
12	I	0	OUT	Value x1	-	Unit status (0:ON from keypad, 1:ON from digital input, 2:ON from PLAN, 3: ON from time bands, 4:ON from supervision, 5: OFF from alarm, 6: OFF from supervision, 7:OFF from time bands, 8: OFF from Plan, 9: OFF from digital input 10: OFF from keypad, 11:OFF from deselected ventilation, 12:disconnection))
14	I	0	OUT	Value x1	-	Unit operating mode (0: Unit OFF, 1: Ventilation only, 2: Cooling, 3: free cooling, 4: cooling+free cooling, 5: Dehumidification, 6: Dehumidification+Post heating, 7: Humidification, 8:Cooling+Humidification, 9:Heating, 10: Heating+Humidification)
32	I	0	OUT	Value x1	-	Active alarm code (with greater priority)
34	I	81	OUT	Value /10	%	Cold thermoregulator request (%)
37	I	81	OUT	Value /10	%	Heat request (%)
46	I	81	IN	Value x1	%	Dehumidification setpoint
			OUT	Value x1		
47	I	81	IN	Value x1	%	Humidification setpoint
			OUT	Value x1		
68	I	105	IN	Value x1	°C	High ambient temperature set point
			OUT	Value x1		
69	I	105	IN	Value x1	°C	Low ambient temperature set point
			OUT	Value x1		
70	I	81	IN	Value x1	%	High ambient humidity set point
			OUT	Value x1		
71	I	81	IN	Value x1	%	Low ambient temperature set point
			OUT	Value x1		

8.8   RESTRICTION

Each line can reach 1,000 m, including all the branches; multiple lines can be connected together using a "Line coupler".
Two EVOLUTION+ controllers can be installed a maximum distance of 700 m apart, while each device must not be more than 350 m from the line power supply.

A maximum of 64 devices can be connected to each segment in the line. Multiple segments can be connected using the couplers to reach the maximum of 255 devices in each line. Each line can have a maximum of 3 couplers.

Use the YCYM 1x2x0.8 cable in accordance with the EIB specifications.

9   ATTACHMENTS

9.1   AWG CONVERSION TABLE (AMERICAN WIRE GAUGE)

Conversion: AWG number – diameter in mm – area in mm²

N° AWG	Diameter mm	Area mm²
1	7.350	42.400
2	6.540	33.600
3	5.830	26.700
4	5.190	21.200
5	4.620	16.800
6	4.110	13.300
7	3.670	10.600
8	3.260	8.350
9	2.910	6.620
10	2.590	5.270
11	2.300	4.150
12	2.050	3.310
13	1.830	2.630
14	1.630	2.080
15	1.450	1.650
16	1.290	1.310
17	1.150	1.040
18	1.024	0.823
19	0.912	0.653
20	0.812	0.519
21	0.723	0.412
22	0.644	0.325
23	0.573	0.259
24	0.511	0.205
25	0.455	0.163
26	0.405	0.128
27	0.361	0.102
28	0.321	0.080
29	0.286	0.065
30	0.255	0.050

9.2 ETHERNET SERIAL INTERFACE: INTERFACING WITH THE BACNET OR SNMP SYSTEM

9.2.1 USE

The ETHERNET board acts as a "gateway", in other words, a translator between the propriety protocol and the BACnet and SNMP protocols which are the emerging protocols in the world of HVAC and based on the Ethernet standard. The board has an extensive memory (8MB flash, 4MB of which available to the user) and calculation capacity (ARM7 74MHz processor with LINUX operating system).

The ETHERNET board is used to connect to the following networks:
- LAN or the Internet: Thanks to its web-server capability, users can download, via FTP, the HTML pages relative to their application and then use a browser such as Internet Explorer to view/edit the variables sent to the supervisor;
- SNMP v1, v2c, v3 networks;
- BACnet Ethernet ISO8802-2 over 8802-3 networks;
- BACnet/IP networks.

The network parameters can also be configured automatically if there is a DHCP server.

By connecting the ETHERNET board to an Ethernet network, the following functions can be used:
- WEB Server:
  Checks or changes the operating status of the EVOLUTION+ controller using a remote computer with, for example, Internet Explorer™ or Mozilla Firefox. Dynamic web pages realised by the user can be inserted; supports CGI technology; supports web page access protection.
- Logger:
  The ETHERNET board can save the values of some EVOLUTION+ controller variables to a non-volatile memory file; this file can be downloaded to a PC via Internet Explorer ™.
- Charts:
  The trends of the data recorded using the Logger function can be consulted in chart form.
- E-mail:
  The ETHERNET board can send e-mails if events programmed by the EVOLUTION+ programmer take place (tripped alarms, exceeded thresholds) or at pre-set intervals of time. An XML file containing the values of variables can be attached.
- FTP Push:
  The ETHERNET board can send a XML file containing values of variables to a suitably configured computer. Transmission can be programmed according to the same methods used for sending e-mails (events or at intervals of time). The file is sent using the FTP protocol.
- SNMP v1 & v2:
  To access the ETHERNET board from a computer using supervision software based on the SNMP protocol. The ETHERNET board can send programmable "enterprise" TRAP or INFORM to notify alarms.
- BACnet Ethernet ISO8802-2 over 8802-3:
  To access the EVOLUTION controller using supervision software based on the BACnet Ethernet protocol.
- BACnet/IP (Addenda A/Annex J):
  For access using supervision software based on the BACnet/IP protocol.
- FTP Server:
  Used to copy data files or web pages from/to the ETHERNET board in a simple way using programmes based on dragging symbols from one window to another.
- DHCP:
  Used to connect the ETHERNET board to a local network which automatically attributes address from the central server rather than static addresses set in the single devices
- Plugin:
  used to enter additional applications realised by the user in script or compiled format.
- Firmware update:
  the ETHERNET board firmware can be updated via computer.

The possibility for a PC to communicate with the Ethernet card depends on the correct alignment of the settings of both.
Since the factory settings of the Ethernet card can only be changed once the connection to the PC is established, at the first access it is necessary to set the Personal Computer to adapt to the factory settings of the Ethernet card.

The following paragraphs describe the configuration procedures.

9.2.2 **PC setting**

Disconnect the Personal Computer from any data networks and connect it directly to the ETHERNET board using the cable (crossed).
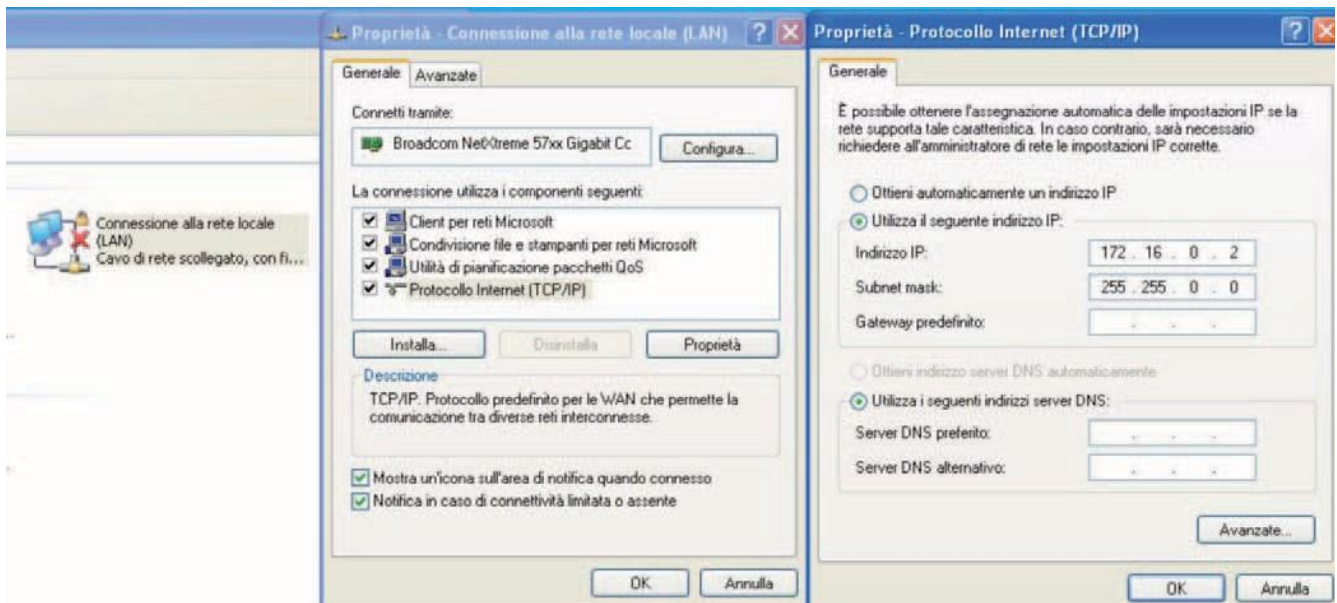

Set the Personal Computer so that it does not used the DHCP, but the IP address: 172.16.0.2, through the following steps.
Also specify the Subnet mask field; it is not necessary to specify the Gateway.

1. From "Control Panel"
2. Double click on "Network Connections"
3. Double click on "Connection to local network (LAN)"
4. Click on "Properties"
5. Double click on "Internet Protocol (TCP/IP)".

Before changing the settings, take note of all existing settings: they will be needed to reset them after work so that the PC is once again able to communicate with the data network it was previously connected.

1. Cli Click on "Use the following IP address".
2. Set the following parameters:
   - IP address = 172.16.0.2
   - Subnet mask = 255.255.0.0
3. Press OK to close all the windows.

The Personal Computer is set so that it does not use the "proxy" network device as a communication channel.
In fact, the PC is not networked and if the use of "proxy" were not disabled, communication would become impossible..

1. Open the "Control Panel" application.
2. Double click on "Internet Options"
3. Click on "Connections". Another window appears
4. Click on "LAN settings"
5. Disable the use of the proxy server.
6. Press OK to close the windows
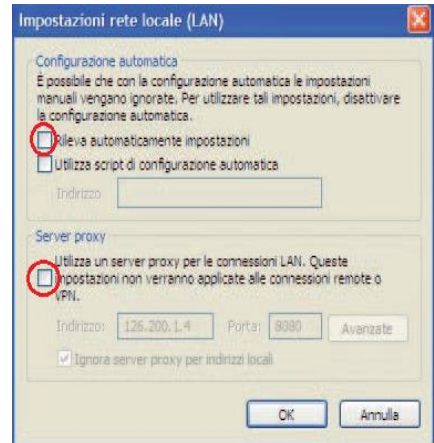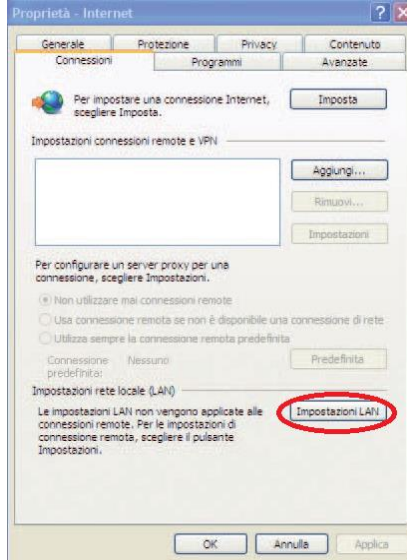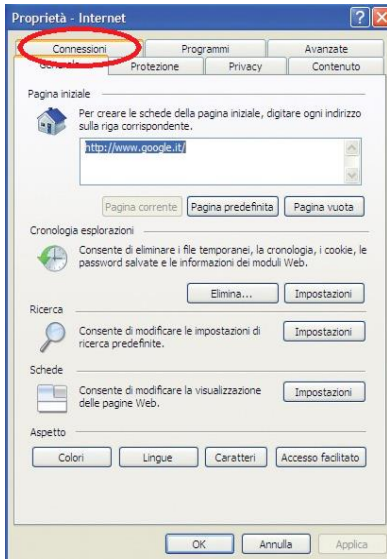
9.2.3 Starting the Ethernet board with factory set

1. Switch on the EVOLUTION+ controller
2. Make sure that both the indicator lamps on the ETHERNET board connector light up within a few seconds

⚠️ **ATTENTION**
It is only possible to choose between activating factory settings and activating user settings while switching on the ETHERNET board. The ETHERNET board restarts whenever it is switched on.

3. As soon as the Status LED shines GREEN immediately after restarting, hold down the button to enable the factory settings.
4. by holding down the button for approximately 20 seconds, the Status LED slowly flashes RED 3 times; release the button during these 3 flashes.
5. After the red flashes, the Status LED turns GREEN and, if the procedure has been performed correctly, the Status LED confirms the button has been pressed and released by slowly flashing RED 3 times, then it turns GREEN for approximately one minute (completion of the start phase).
6. After completing the start phase, the Status LED starts flashing: the ETHERNET board will now be definitively started.

In this way, the ETHERNET board will not use the "User" parameter values of the communication configuration, but the following factory values:
- IP address: 172.16.0.1
- Subnet mask: 255.255.0.0

Note: These values will remain active **until the ethernet board is restarted**.
When it is next started, the ETHERNET board will return to use the "User" values of the configuration.

The network communication parameters should be configured immediately.

9.2.4   **Accessing the ETHERNET board from the PC**

To ensure that the board can communicate with the data network it will be installed to, some network communication parameters must be set correctly.

ATTENTIOPN
The network administrator must establish whether the ETHERNET board can be connected and must provide essential system data.

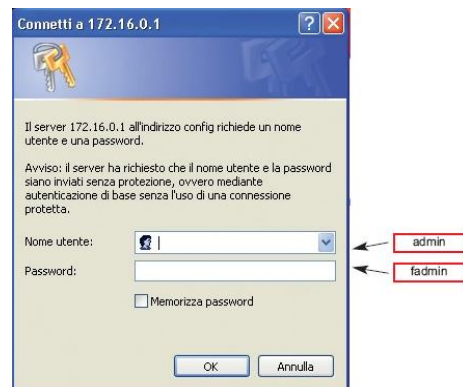1. Run a web browser on the PC, type 172.16.0.1 and press ENTER.

2. The main page of the ETHERNET board "index.html" appears. Click on "Go to Administrator Area".
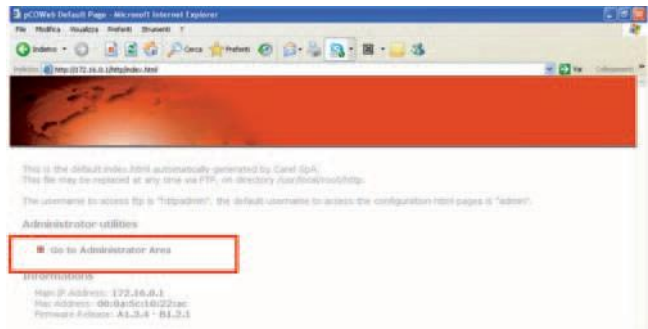
3. When the login and password is requested, enter the factory settings:
   - Username: **admin**
   - Password: **fadmin**

4. If the information is correct, the following page appears.
   Update the variables data by clicking on the Information button.
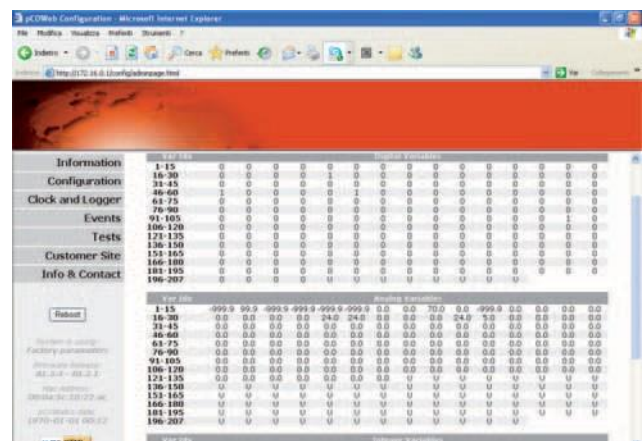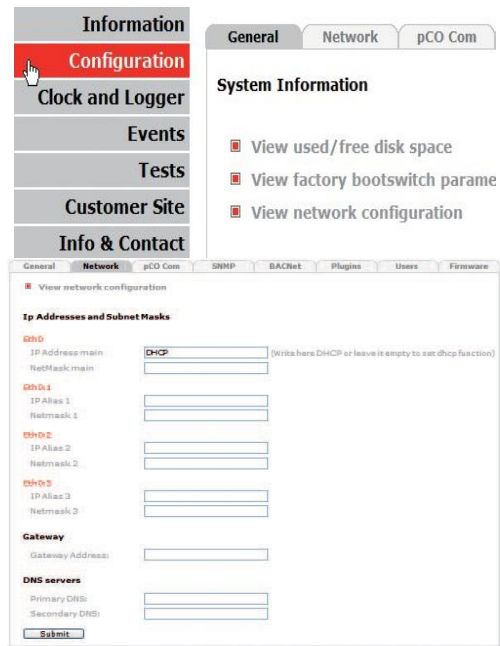
In its factory configuration, the ETHERNET board is set with the DHCP address (automatic addressing) and it will therefore be ready already and no operations will be required.

5. To set the User network parameters, click on "Configuration", then on the "Network" board and set the following main network parameters:
   - IP Address
   - NetMask

The set values will only be used starting from the next time the ETHERNET board is started.

9.2.5 Configuring the board for the BACnet or SNMP protocol

The Ethernet board can recognise queries sent by a supervisor using the following two versions of the BACnet (Building Automation Control Networks) protocol:
- BACnet/IP (Addenda A/Annex J)
- BACnet Ethernet ISO8802-2 over 8802-3
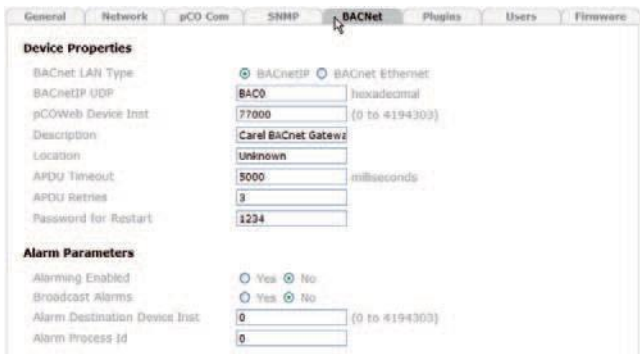
The configuration of the parameters for the BACnet protocol is available on the relative page of the "Configuration" menu".
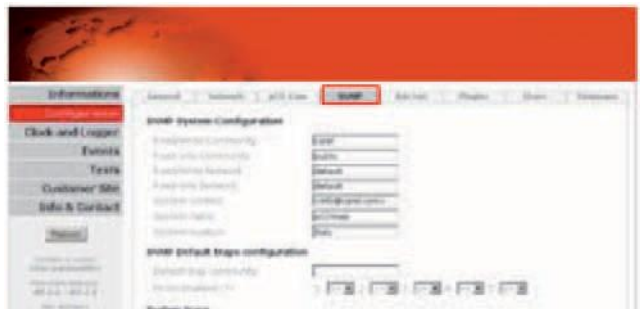
The configuration of the parameters for the SNMP protocol is available on the relative page of the "Configuration" menu".

All the settings will be enabled the next time the Ethernet board is started.

⚠️ **ATTENTION**
The professional system integrator who sets the various parameters, verifies the network communication and starts the supervision system must be familiar with SNMP or BACnet.

9.2.6 Notification evets

The transmission of notification messages when events occur can be programmed. The following types of notification messages can be used:
- E-mail, the body of which can contain personalised text or a web page with the EVOLUTION+ controller variables values at the moment of transmission; a personalisable XML file containing the variables values can be attached;

- XML file, identical to the one that can be transmitted via e-mail, but sent via FTP (FTP PUSH function);
- TRAP or INFORM SNMP, to which a selection of up to 5 variables values can be attached.
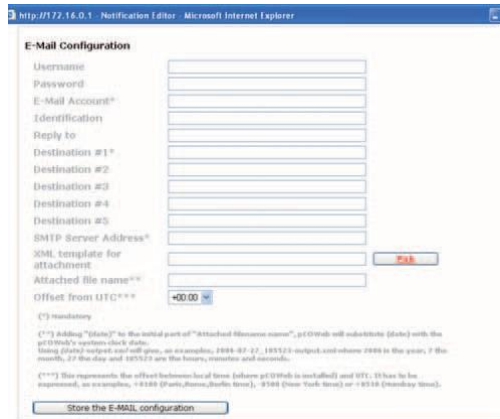
Setting up recipients

1. On the main page of the ETHERNET board, open the "Events" page".
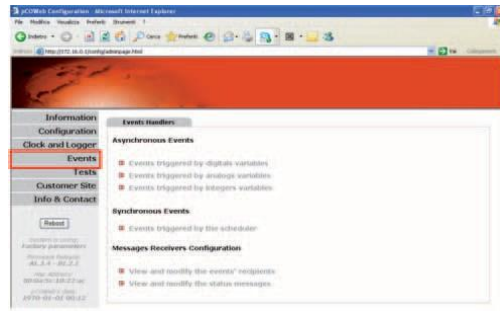
2. Open the recipients settings window and the attachable "View and modify the events recipients" files for e-email configuration (these must be supplied by the system administrator).

The settings of this window will be common to all generated events.

Transmission of notifications on variables variation

1. Click one of the following:
   - Click "Events triggered by digital variables"
   - Click "Events triggered by analogue variables"
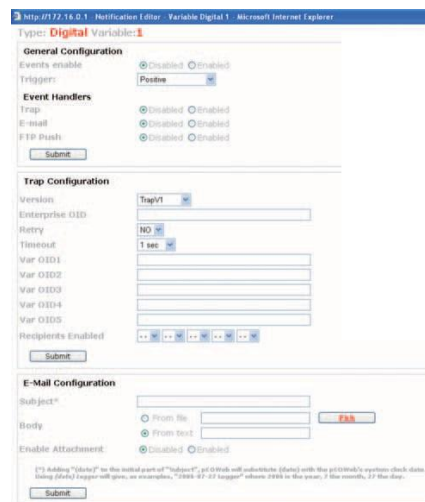   - Click "Events triggered by integer variables"

Example of a digital variable setting.
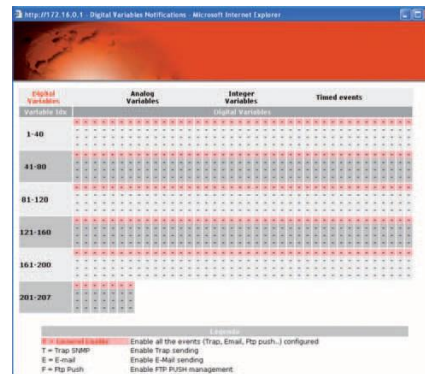
2. Click on the check box of the variable
   (the example shows digital variable 1)
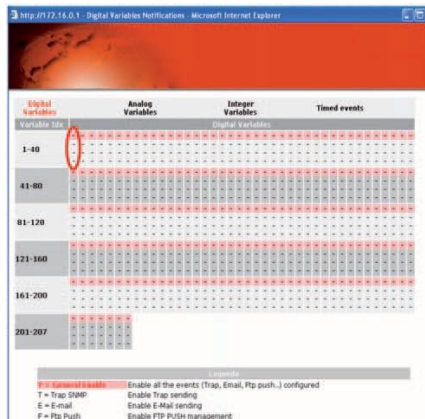
3. Personalise the parameters.

For all the functions and details of the individual menus, consult the complete manual of the ETHERNET board.

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