MITSUBISHI ELECTRIC HYDRONICS & IT COOLING SYSTEMS S.p.A.

INTERFACE MANUAL

Translation of the original instructions

MANAGER 3000+

Version 02



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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.

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SYMBOLS:

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



CAUTION:

Information on the occurrence of situations/operations which, if ignored or not duly acted upon, could put not only the Unit but also the functions of the Software and the various electronic parts at risk



OBLIGATION:

Indicates the need to take appropriate precautions/perform specific operations to avoid compromising protection of the points of access reserved for authorised operators and/or operators who guarantee the proper operation of the Unit



INFORMATION:

Indicates technical/functional information of particular importance which should not be overlooked

1 INSTALLING THE SERIAL BOARD

There are various types of communication protocols. A serial board connected to the controller on board of the unit must be used for each one of them.

Even if the serial board 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 board is already on board the unit.



INFORMATION:

The boards must not be powered during these operations

1. Identify the electronic controller on board the unit. The images refer to the board with the largest number of terminals, but the procedure is the same even for smaller boards



Figure 1.1: board display



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

Figure 1.2: demonstration for removing the cover



Figure 1.3: demonstration for inserting the board

3. Push the interface board 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 board

Figure 1.4: demonstration for removing the perforated plastic



5. Put back the cover making sure to match the hole in the cover with the engaged serial board connector

connector to pass through

Figure 1.5: demonstration for inserting the cover

For units fitted with the +2P module, a dual serial board is required, one for the main control and the other for the remote control of the +2P module. The interface database is identical for both controls.

Different ID's must be allocated to the two controls in order to prevent conflicts in the BMS network.



INFORMATION:

The connection to the FWS3000, FWS3 and Manager3000 system is unavailable on this type of unit

2 MODBUS INTERFACE

2.1 **Components required**

Interface board

MODBUS RTU (for RS485 serial line transmission) or MODBUS TCP/IP (for Ethernet cable transmission)



Figure 2.1: Interface board



Gateway inside the Manager3000+ control panel if requested by the customer

Figure 2.2: gateway

2.2 Installing the serial interface board

Follow the points in paragraph 1 "Installing the serial board" to insert the MODBUS serial board into the controller.

2.3 Setting supervisor parameters

2.3.1 MODBUS RTU

The communication with the BMS requires the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the E key and select the "Device Configuration" page) as described below:

NETWORK SETTINGS			SUPERVISOR SETTINGS
Host Name Use IPv6 Domain IPv4 Gateway DHSv4 Servers(comma separated) IPv6 Gateway	[scalhost № ♥] [172.21.51.197		PROTOCOL Set Modbus Over IP / Modbus RTU / BACnet MSTP / BACnet
DHSv6 Servers(comma separated)	ID Description Physical Address Adapter Enabled DHCPv4 IPv4 Address	en0 Onboard Ethenet Adapter en0 44:EA/DE/E3/AE/F9 Exabled V Desbled V 172:21:51:44	ADDRESS 11 Set
	IPv4 Subnet Hask DHCPv4 Server DHCPv4 Lease Granted DHCPv4 Lease Expres IPv6 Support IPv6 Enabled Obtain IPv6 Settings Automatically	255.255.0 Yes Tooble€ ♥ Too ♥	BAUDRATE 19200 baud Set

Figure 2.3: "Device Settings" screen

In the SUPERVISOR SETTINGS section set

PROTOCOL	Modbus Over IP/Modbus RTU/ BACnet MSTP/BACnet
ADDRESS	Address to assign to MANAGER3000+ in the modbus network
BAUD RATE	Select the communication protocol speed

Other non-changeable settings for communication with the supervisor:

Protocol	Configuration
Modbus	Data Bit: 8
	Parity: none
	Stop bits: 2
	Start Address: 1

2.3.2 MODBUS Over IP

The communication with the BMS requires the setting of dedicated parameters through the Web interface or the touchscreen

access the menu using the	key and select the	"Device Configuration"	page) as described below:
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NETWORK SETTINGS		SUPERVISOR SETTINGS
Host Name Use IPv6	localhost	PROTOCOL
Domain IPv4 Gateway DNSv4 Servers(comma separated) IPv6 Gateway		Set Modbus Over IP / Modbus RTU / BACnet MSTP / BACnet
Figure 2.4: "Supervisor settings" disp	lay	

In the SUPERVISOR SETTINGS section set:

PROTOCOL Modbus Over IP/ Modbus RTU/ BACnet MSTP/ BACnet		
	PROTOCOL	Modbus Over IP/ Modbus RTU/ BACnet MSTP/ BACnet

2.4 Setting up the supervisor network

The supervisor network must be set up as shown below:



Summary diagram showing a possible BMS supervision network layout

Special attention must be paid in the realisation of the serial line. 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.

For the serial line, use a twisted and shielded AWG 20/22 cable. The serial connection is made with a single cable running from the BMS to the gateway. The serial cable must be kept separate from the power cables.

Connect the shield of the connecting cable to earth in just one point.

2.5 Interface database

R 001 A OUT Unit 1 evaporator inlet temperature R 002 A OUT Unit 2 evaporator inlet temperature R 003 A OUT Unit 3 evaporator inlet temperature R 004 A OUT Unit 3 evaporator inlet temperature R 006 A OUT Unit 3 evaporator inlet temperature R 006 A OUT Unit 7 evaporator inlet temperature R 006 A OUT Unit 7 evaporator inlet temperature R 007 A OUT Unit 7 evaporator outlet temperature R 017 A OUT Unit 2 evaporator outlet temperature R 018 A OUT Unit 3 evaporator outlet temperature R 019 A OUT Unit 4 evaporator outlet temperature R 020 A OUT Unit 4 evaporator outlet temperature R 021 A OUT Unit 4 evaporator outlet temperature R 023 A	
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R 054 A OUT Unit 6 recovery outlet temperature	
R 055 A OUT Unit 7 recovery outlet temperature	
R 056 A OUT Unit 8 recovery outlet temperature	
R 065 A OUT Unit 1 condenser inlet temperature	
R 066 A OUT Unit 2 condenser inlet temperature	
R 067 A OUT Unit 3 condenser inlet temperature	
R 068 A OUT Unit 4 condenser inlet temperature	
R 069 A OUT Unit 5 condenser inlet temperature	
R 070 A OUT Unit 6 condenser inlet temperature	
R 071 A OUT Unit 7 condenser inlet temperature	
R 072 A OUT Unit 8 condenser inlet temperature	
R 090 A OUT Cold/hot circuit inlet temperature	
R 091 A OUT Cold/hot circuit outlet temperature	
R 092 A OUT Recovery circuit inlet temperature	
R 093 A OUT Recovery outlet circuit temperature	
R 094 A IN / OUT Cold temperature setpoint	
R 095 A IN / OUT Cold temperature adjustment band	
R 096 A IN / OUT Hot temperature setpoint	
R 097 A IN / OUT Hot temperature adjustment band	
R 098 A IN/OUT Recovery temperature setopint	
R 099 A IN / OUT Recovery temperature adjustment band	
R 100 A OUT Cold/hot active temperature setopint	
R 101 A OUT Recovery temperature active setnoint	
R 102 A OUT External air temperature	
R 103 A OUT Linit 1 condenser outlet temperature	
R 104 A OUT Unit 2 condenser outlet temperature	
R 105 A OUT Unit 2 condenser outlet temperature	

R: register C: coil	Address	Туре	Flow	Description
R	106	Α	OUT	Unit 4 condenser outlet temperature
R	107	Α	OUT	Unit 5 condenser outlet temperature
R	108	Α	OUT	Unit 6 condenser outlet temperature
R	109	Α	OUT	Unit 7 condenser outlet temperature
R	110	Α	OUT	Unit 8 condenser outlet temperature
С	001	В	OUT	Offline unit 1 (0: unit online – 1: unit offline)
С	002	В	OUT	Offline unit 2 (0: unit online – 1: unit offline)
С	003	В	OUT	Offline unit 3 (0: unit online – 1: unit offline)
С	004	В	OUT	Offline unit 4 (0: unit online – 1: unit offline)
С	005	В	OUT	Offline unit 5 (0: unit online – 1: unit offline)
С	006	В	OUT	Offline unit 6 (0: unit online – 1: unit offline)
C	007	В	OUT	Offline unit 7 (0: unit online – 1: unit offline)
C	008	В	OUT	Offline unit 8 (0: unit online – 1: unit offline)
C	017	В	IN / OUT	Enable unit 1 (0: unit disabled – 1: unit enabled)
C	018	В	IN / OUT	Enable unit 2 (0: unit disabled – 1: unit enabled)
C	019	В	IN / OUT	Enable unit 3 (0: unit disabled – 1: unit enabled)
C	020	В		Enable unit 4 (0: unit disabled – 1: unit enabled)
C	021	В	IN / OUT	Enable unit 5 (0: unit disabled – 1: unit enabled)
C	022	В	IN / OUT	Enable unit 6 (0: unit disabled – 1: unit enabled)
C	023	В		Enable unit 7 (0: unit disabled – 1: unit enabled)
C	024	В	IN/OUT	Enable unit 8 (0: unit disabled – 1: unit enabled)
C	033	В		Cold/hot circuit single pump status (0:Off - 1:On)
C	034	В		Recovery circuit single pump status (0:0ff - 1:0n)
C	090	В		System on/off command (0: system off – 1: system on)
	091	В		Demand Limit command from supervision (0: command not active – 1: command active)
U U	092	В	IN / 001	Unit manual rotation command (U: command not active – 1: command active)
D	120		OUT	Linit 1 and that domand parameters
R	129	1		Unit 1 cold/hot demand percentage
P	130	, ,		Unit 2 cold/hot demand percentage
R	132	, ,		Unit 3 cold/hot demand percentage
R	132	· ·		Unit 4 cold/hot demand percentage
R	134	· ·		Unit 5 cold/hot demand percentage
R	135		OUT	
R	136	i	OUT	
R	145	i	OUT	I Init 1 cold/hot active percentage
R	146	i	OUT	Unit 2 cold/hot active percentage
R	147	Ι	OUT	Unit 3 cold/hot active percentage
R	148	Ι	OUT	Unit 4 cold/hot active percentage
R	149	I	OUT	Unit 5 cold/hot active percentage
R	150	I	OUT	Unit 6 cold/hot active percentage
R	151		OUT	Unit 7 cold/hot active percentage
R	152	Ι	OUT	Unit 8 cold/hot active percentage
R	161	Ι	OUT	Unit 1 status (see unit 1 status)
R	162	- 1	OUT	Unit 2 status (see unit 1 status)
R	163	- 1	OUT	Unit 3 status (see unit 1 status)
R	164	1	OUT	Unit 4 status (see unit 1 status)
R	165	- 1	OUT	Unit 5 status (see unit 1 status)
R	166	- 1	OUT	Unit 6 status (see unit 1 status)
R	167		OUT	Unit 7 status (see unit 1 status)
R	168		OUT	Unit 8 status (see unit 1 status)
R	169		OUT	Unit 1 alarm code active
R	170	I	OUT	Unit 2 alarm code active
R	171		OUT	Unit 3 alarm code active
R	172		OUT	Unit 4 alarm code active
R	173		OUT	Unit 5 alarm code active
R	174		OUT	Unit 6 alarm code active
R	175		OUT	Unit 7 alarm code active

R: register C: coil	Address	Туре	Flow	Description	
R	176		OUT	Unit 8 alarm code active	
R	193	1	OUT	Unit 1 recovery demand percentage	
R	194		OUT	Unit 2 recovery demand percentage	
R	195	1	OUT	Unit 3 recovery demand percentage	
R	196	1	OUT	Unit 4 recovery demand percentage	
R	197	1	OUT	Unit 5 recovery demand percentage	
R	198	I	OUT	Unit 6 recovery demand percentage	
R	199	1	OUT	Unit 7 recovery demand percentage	
R	200	I	OUT	Unit 8 recovery demand percentage	
R	209	I	OUT	Unit 1 recovery active percentage	
R	210	I	OUT	Unit 2 recovery active percentage	
R	211	I	OUT	Unit 3 recovery active percentage	
R	212	1	OUT	Unit 4 recovery active percentage	
R	213	I	OUT	Unit 5 recovery active percentage	
R	214	I	OUT	Unit 6 recovery active percentage	
R	215	1	OUT	Unit 7 recovery active percentage	
R	216	I	OUT	Unit 8 recovery active percentage	
R	228	1	OUT	System status (0: system ON - 4: system OFF from alarm - 7: system OFF from contact - 8: system OFF	
R	229	I	OUT	System alarm code active	
R	231	I	OUT	Cold/hot circuit demand percentage	
R	232	I	OUT	Cold/hot circuit active percentage	
R	233	I	OUT	Recovery circuit demand percentage	
R	234	I	OUT	Recovery circuit active percentage	
R	235	- 1	IN / OUT	System operating mode (1: cold only - 2: cold+recovery - 3: recovery only - 4: hot - 5: hot+recovery)	
R	236	I	IN / OUT	Cold capacity limit percentage	
R	237	I	IN / OUT	Hot capacity limit percentage	
R	238	1	IN / OUT	Recovery capacity limit percentage	
R	239	I	OUT	Pump speed percentage with unit 1 cold/hot circuit inverter	
R	240	I	OUT	Pump speed percentage with unit 2 cold/hot circuit inverter	
R	241	1	OUT	Pump speed percentage with unit 3 cold/hot circuit inverter	
R	242	I	OUT	Pump speed percentage with unit 4 cold/hot circuit inverter	
R	243	1	OUT	Pump speed percentage with unit 5 cold/hot circuit inverter	
R	244	I	OUT	Pump speed percentage with unit 6 cold/hot circuit inverter	
R	245	I	OUT	Pump speed percentage with unit 7 cold/hot circuit inverter	
R	255	1	OUT	Unit 1 cold/hot available percentage	
R	256	I	OUT	Unit 2 cold/hot available percentage	
R	257	I	OUT	Unit 3 cold/hot available percentage	
R	258	1	OUT	Unit 4 cold/hot available percentage	
R	259	1	OUT	Unit 5 cold/hot available percentage	
R	260	1	OUT	Unit 6 cold/hot available percentage	
R	261	1	OUT	Unit 7 cold/hot available percentage	
R	271	I	OUT	Unit 1 recovery available percentage	
R	272	1	OUT	Unit 2 recovery available percentage	
R	273	I	OUT	Unit 3 recovery available percentage	
R	274	I	OUT	Unit 4 recovery available percentage	
R	275	I	OUT	Unit 5 recovery available percentage	
R	276	I	OUT	Unit 6 recovery available percentage	
R	277	1	OUT	Unit 7 recovery available percentage	
R	278	Ι	OUT	Unit 8 recovery available percentage	
R	287	Ι	OUT	Pump speed percentage with unit 1 recovery circuit inverter	
R	288	I	OUT	Pump speed percentage with unit 2 recovery circuit inverter	
R	289	I	OUT	Pump speed percentage with unit 3 recovery circuit inverter	
R	290	Ι	OUT	Pump speed percentage with unit 4 recovery circuit inverter	
R	291	I	OUT	Pump speed percentage with unit 5 recovery circuit inverter	
R	292	I	OUT	Pump speed percentage with unit 6 recovery circuit inverter	
R	293	1	OUT	Pump speed percentage with unit 7 recovery circuit inverter	
R	294	Ι	OUT	Pump speed percentage with unit 8 recovery circuit inverter	
п	20.2			System status (0:system ON - 1:system ON from contact - 20:system OFF from alarm - 27:system OFF from	
к	303		001	contact - 28:system OFF)	

R: register C: coil	Address	Туре	Flow	Description	
R	304	Ι	OUT	Cold/hot circuit single pump % value (value/10)	
R	305	I	OUT	Recovery circuit single pump % value (value/10)	

Table 2-1: Interface database

GATEWAY Address:

This is the ID of Manager3000 within the BMS network. The value can be set from 1 to 200.

Variable address:

This is the supervision variable address in the electronic control unit.

Type:

B: Boolean variable (Coil for the Modbus protocol)

I: Whole variable (Register for the Modbus protocol) A: Analogue variable (Register for the Modbus protocol)

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

Analogue variables are expressed with a decimal number (e.g.: 12.0 bar -> 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.

Analogue, whole and digital variables with address 0 are considered as incorrect and throw the "ILLEGAL DATA ADDRESS" error code. All the addresses not indicated in the database must not be used.

3. BACNET INTERFACE

3.1 Components required

The components required to interface the system managed by the Manager30000+ electronic controller to the BACNET system are described below.

+



Figure 3.2: internal board display

3.2 Installing the BACNET system serial interface board

Follow the points in paragraph 1 "Installing the serial board" to insert the MODBUS serial board into the controller.

3.3 Setting supervisor parameters

3.3.1 BACNET MS/TP

The communication with the BMS requires the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the key and select the "Device Configuration" page) as described below:

NETWORK SETTINGS			SUPERVISOR SETTINGS
Host Name Use IPv6 Domain IPv4 Gateway DNSv4 Servers(comma separated)	localhost		PROTOCOL Set Modbus Over IP / Modbus RTU / BACnet MSTP / BACnet
IPv6 (ateway DNSv6 Servers(comma separated)	ID Description Physical Address Adopter Enabled DHCPv4 HV4 Address	en0 Orboard Ethenet Adapter en0 44:EACBACEAGF9 Texbildet V Disabled V 17:21:51:14	ADDRESS 11 Set
	IPv4 Subnet Hask DHCPv4 Server DHCPv4 Lease Granted DHCPv4 Lease Expres IPv6 Support IPv6 Support Obtain IPv6 Settings Automatically	Yes [0:salief ♥] [10: v]	BAUDRATE 19200 baud Set

Figure 3.3: "Device settings" screen display

In the SUPERVISOR SETTINGS section set:

PROTOCOL	Modbus Over IP/ Modbus RTU/ BACnet MSTP/ BACnet
ADDRESS	Address to assign to MANAGER3000+ in the bacnet network

3.3.2 BACNET Over IP

The communication with the BMS requires the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the key and select the "Device Configuration" page) as described below:

NETWORK SETTINGS		SUPERVISOR SETTINGS
Host Name Use IPv6	localhost	PROTOCOL
Domain IPv4 Gateway DNSv4 Servers(comma separated) IPv6 Gateway	[172.21.51.197 [Set Modbus Over IP / Modbus RTU / BACnet MSTP / BACnet
Figure 3.4: "Supervisor settings" disp	lay	

In the SUPERVISOR SETTINGS section set:

PROTOCOL Modbus Over IP/ Modbus RTU/ BACnet MSTP/BACnet

3.4 Setting up the supervisor network

The PICS (Protocol Implementation Conformance Statement) file for configuring the board must be requested from MEHITS by the technicians setting up the network.

The board is programmed by the technician in charge of the integration.

The supervision network is set up by the technicians developing the BACNET interface. For the connection of the BACNET TCP/IP board to the Ethernet network use a category 5e or better S/FTP type cable.

3.5 Interface database

Address	Туре	Flow	Conv. factor	Description
001	А	OUT	valuex1	Unit 1 evaporator inlet temperature
002	А	OUT	valuex1	Unit 2 evaporator inlet temperature
003	Α	OUT	valuex1	Unit 3 evaporator inlet temperature
004	Α	OUT	valuex1	Unit 4 evaporator inlet temperature
005	Α	OUT	valuex1	Unit 5 evaporator inlet temperature
006	А	OUT	valuex1	Unit 6 evaporator inlet temperature
007	Α	OUT	valuex1	Unit 7 evaporator inlet temperature
008	Α	OUT	valuex1	Unit 8 evaporator inlet temperature
017	Α	OUT	valuex1	Unit 1 evaporator outlet temperature
018	Α	OUT	valuex1	Unit 2 evaporator outlet temperature
019	Α	OUT	valuex1	Unit 3 evaporator outlet temperature
020	Α	OUT	valuex1	Unit 4 evaporator outlet temperature
021	Α	OUT	valuex1	Unit 5 evaporator outlet temperature
022	Α	OUT	valuex1	Unit 6 evaporator outlet temperature
023	Α	OUT	valuex1	Unit 7 evaporator outlet temperature
024	Α	OUT	valuex1	Unit 8 evaporator outlet temperature
033	Α	OUT	valuex1	Unit 1 recovery inlet temperature
034	Α	OUT	valuex1	Unit 2 recovery inlet temperature
035	Α	OUT	valuex1	Unit 3 recovery inlet temperature
036	Α	OUT	valuex1	Unit 4 recovery inlet temperature
037	Α	OUT	valuex1	Unit 5 recovery inlet temperature
038	Α	OUT	valuex1	Unit 6 recovery inlet temperature
039	Α	OUT	valuex1	Unit 7 recovery inlet temperature
040	Α	OUT	valuex1	Unit 8 recovery inlet temperature
049	Α	OUT	valuex1	Unit 1 recovery outlet temperature
050	Α	OUT	valuex1	Unit 2 recovery outlet temperature
051	Α	OUT	valuex1	Unit 3 recovery outlet temperature
052	Α	OUT	valuex1	Unit 4 recovery outlet temperature
053	Α	OUT	valuex1	Unit 5 recovery outlet temperature
054	А	OUT	valuex1	Unit 6 recovery outlet temperature

Address	Туре	Flow	Conv. factor	Description
055	Α	OUT	valuex1	Unit 7 recovery outlet temperature
056	Α	OUT	valuex1	Unit 8 recovery outlet temperature
065	Α	OUT	valuex1	Unit 1 condenser inlet temperature
066	Α	OUT	valuex1	Unit 2 condenser inlet temperature
067	Α	OUT	valuex1	Unit 3 condenser inlet temperature
068	Α	OUT	valuex1	Unit 4 condenser inlet temperature
069	Α	OUT	valuex1	I Init 5 condenser inlet temperature
070	A	OUT	valuex1	
071	Δ		valuex1	
072	Δ		valuex1	
002	^		valuex1	
090	A		valuex1	
091	A		valuex1	
092	A	001	valuex1	
093	A	001	valuex I	Recovery outlet circuit temperature
094	A	IN / OUT	valuex1	Cold temperature setpoint
095	A	IN / OUT	valuex1	Cold temperature adjustment band
096	A	IN / OUT	valuex1	Hot temperature setpoint
097	Α	IN / OUT	valuex1	Hot temperature adjustment band
098	Α	IN / OUT	valuex1	Recovery temperature setpoint
099	Α	IN / OUT	valuex1	Recovery temperature adjustment band
100	Α	OUT	valuex1	Cold/hot active temperature setpoint
101	Α	OUT	valuex1	Recovery temperature active setpoint
102	Α	OUT	valuex1	External air temperature
103	Α	OUT	valuex1	Unit 1 condenser outlet temperature
104	Α	OUT	valuex1	I Init 2 condenser outlet temperature
105	Α	OUT	valuex1	Linit 3 condenser outlet temperature
106	Δ		valuex1	Unit d condensor outlet temporature
100	Δ		valuex1	Unit 4 condenser outlet temperature
107	^		valuex1	
100	A		valuex1	
109	A		valuex1	Unit / condenser outlet temperature
110	A	001	Valuex I	Unit 8 condenser outlet temperature
		0117		
001	В	001	valuex I	Offline unit 1 (0: unit online – 1: unit offline)
002	В	001	valuex1	Offline unit 2 (0: unit online – 1: unit offline)
003	В	OUT	valuex1	Offline unit 3 (0: unit online – 1: unit offline)
004	В	OUT	valuex1	Offline unit 4 (0: unit online – 1: unit offline)
005	В	OUT	valuex1	Offline unit 5 (0: unit online – 1: unit offline)
006	В	OUT	valuex1	Offline unit 6 (0: unit online – 1: unit offline)
007	В	OUT	valuex1	Offline unit 7 (0: unit online – 1: unit offline)
008	В	OUT	valuex1	Offline unit 8 (0: unit online – 1: unit offline)
017	В	IN / OUT	valuex1	Enable unit 1 (0: unit disabled – 1: unit enabled)
018	В	IN / OUT	valuex1	Enable unit 2 (0: unit disabled – 1: unit enabled)
019	В	IN / OUT	valuex1	Enable unit 3 (0: unit disabled – 1: unit enabled)
020	В	IN / OUT	valuex1	Enable unit 4 (0: unit disabled – 1: unit enabled)
021	В	IN / OUT	valuex1	Enable unit 5 (0: unit disabled – 1: unit enabled)
022	В	IN / OUT	valuex1	Enable unit 6 (0: unit disabled – 1: unit enabled)
023	B		valuex1	Enable unit 7 (0: unit disabled - 1: unit enabled)
024	B		valuex1	Enable unit 8 (0: unit disabled = 1: unit enabled)
024			valuex1	Cold/bet aircuit cincle nume status (0:0ff 1:0n)
000			valuev1	
004			valuex1	recovery circuit single pump status (0.011 - 1.00)
090	В		valuex I	System on/oπ command (U: system oπ – 1: system on)
091	В		valuex I	Demand Limit command from supervision (U: command not active – 1: command active)
092	В	IN / OUT	valuex1	Unit manual rotation command (U: command not active – 1: command active)
129		OUT	valuex10	Unit 1 cold/hot demand percentage
130		OUT	valuex10	Unit 2 cold/hot demand percentage
131		OUT	valuex10	Unit 3 cold/hot demand percentage
132		OUT	valuex10	Unit 4 cold/hot demand percentage
133	Ι	OUT	valuex10	Unit 5 cold/hot demand percentage

Address	Туре	Flow	Conv. factor	Description	
134	1	OUT	valuex10	Unit 6 cold/hot demand percentage	
135	- 1	OUT	valuex10	Unit 7 cold/hot demand percentage	
136		OUT	valuex10	Unit 8 cold/hot demand percentage	
145	1	OUT	valuex10	Linit 1 cold/hot active percentage	
146	·		valuex10		
140			valuex10	Unit 2 cold/hot active percentage	
147	1		valuex10		
140			valuex10		
149		001	valuex 10	Unit 5 cold/hot active percentage	
150		001	valuex10	Unit 6 cold/hot active percentage	
151		OUT	valuex10	Unit 7 cold/hot active percentage	
152	I	OUT	valuex10	Unit 8 cold/hot active percentage	
161	- 1	OUT	valuex10	Unit 1 status (see unit 1 status)	
162	1	OUT	valuex10	Unit 2 status (see unit 1 status)	
163	- 1	OUT	valuex10	Unit 3 status (see unit 1 status)	
164		OUT	valuex10	Unit 4 status (see unit 1 status)	
165	1	OUT	valuex10	l Init 5 status (see unit 1 status)	
166		OUT	valuex10	l Init 6 status (see unit 1 status)	
167			valuex10	Unit 7 status (see unit 1 status)	
169			valuex10	Unit / Status (see unit 1 status)	
100			valuex10	Unit 8 status (see unit 1 status)	
169	1	001	valuex 10	Unit 1 alarm code active	
170		OUT	valuex10	Unit 2 alarm code active	
171	I	OUT	valuex10	Unit 3 alarm code active	
172		OUT	valuex10	Unit 4 alarm code active	
173	- 1	OUT	valuex10	Unit 5 alarm code active	
174	1	OUT	valuex10	Unit 6 alarm code active	
175	- 1	OUT	valuex10	Unit 7 alarm code active	
176		OUT	valuex10	Jnit 8 alarm code active	
193	1	OUT	valuex10	Juit 1 recovery demand percentage	
194	1	OUT	valuex10	Juit 2 recovery demand percentage	
195			valuex10	Init 3 recovery demand percentage	
106			valuex10	Init 4 recovery demand percentage	
190	1		valuex10		
197	-	001	valuex10		
198		001	Valuex 10	Unit 6 recovery demand percentage	
199		001	Valuex10	Unit 7 recovery demand percentage	
200		OUT	valuex10	Unit 8 recovery demand percentage	
209	Ι	OUT	valuex10	Unit 1 recovery active percentage	
210		OUT	valuex10	Unit 2 recovery active percentage	
211	- 1	OUT	valuex10	Unit 3 recovery active percentage	
212	I	OUT	valuex10	Unit 4 recovery active percentage	
213	- 1	OUT	valuex10	Unit 5 recovery active percentage	
214	I	OUT	valuex10	Unit 6 recovery active percentage	
215		OUT	valuex10	Unit 7 recovery active percentage	
216	1	OUT	valuex10	Linit 8 recovery active percentage	
228	1	OUT	valuex10	System status (0: system ON - 4: system OFF from alarm - 7: system OFF from contact - 8: system OFF	
229			valuex10	System slattas (c. system on - 4. system on - inom alarm - 7. system on - inom contact - c. system on -	
223			valuex10	Cold/bat aircuit domand paraphage	
201	-		valuex10		
232		001	valuex10		
233		001	valuex 10		
234		001	Valuex10	Recovery circuit active percentage	
235		IN / OUT	valuex10	System operating mode (1: cold only - 2: cold+recovery - 3: recovery only - 4: hot - 5: hot+recovery)	
236	Ι	IN / OUT	valuex10	Cold capacity limit percentage	
237	Ι	IN / OUT	valuex10	Hot capacity limit percentage	
238	Ι	IN / OUT	valuex10	Recovery capacity limit percentage	
239	Ι	OUT	valuex10	Pump speed percentage with unit 1 cold/hot circuit inverter	
240		OUT	valuex10	Pump speed percentage with unit 2 cold/hot circuit inverter	
241		OUT	valuex10	Pump speed percentage with unit 3 cold/hot circuit inverter	
242		OUT	valuex10	Pump speed percentage with unit 4 cold/hot circuit inverter	
242			valuex10	Pump speed percentage with unit 5 cold/hot aircuit involtor	
240			valuev10	r ump speeu percentage with unit 5 cold/hot circuit inverter	
244		001	Valuex IU	Purip speed percentage with unit 6 cold/not circuit inverter	

Address	Туре	Flow	Conv. factor	Description
245	1	OUT	valuex10	Pump speed percentage with unit 7 cold/hot circuit inverter
255		OUT	valuex10	Unit 1 cold/hot available percentage
256		OUT	valuex10	Unit 2 cold/hot available percentage
257		OUT	valuex10	Unit 3 cold/hot available percentage
258		OUT	valuex10	Unit 4 cold/hot available percentage
259	Ι	OUT	valuex10	Unit 5 cold/hot available percentage
260	Ι	OUT	valuex10	Unit 6 cold/hot available percentage
261	Ι	OUT	valuex10	Unit 7 cold/hot available percentage
271	Ι	OUT	valuex10	Unit 1 recovery available percentage
272	1	OUT	valuex10	Unit 2 recovery available percentage
273	1	OUT	valuex10	Unit 3 recovery available percentage
274	1	OUT	valuex10	Unit 4 recovery available percentage
275	1	OUT	valuex10	Unit 5 recovery available percentage
276	1	OUT	valuex10	Unit 6 recovery available percentage
277	1	OUT	valuex10	Unit 7 recovery available percentage
278	1	OUT	valuex10	Unit 8 recovery available percentage
287	Ι	OUT	valuex10	Pump speed percentage with unit 1 recovery circuit inverter
288	1	OUT	valuex10	Pump speed percentage with unit 2 recovery circuit inverter
289	1	OUT	valuex10	Pump speed percentage with unit 3 recovery circuit inverter
290	1	OUT	valuex10	Pump speed percentage with unit 4 recovery circuit inverter
291	1	OUT	valuex10	Pump speed percentage with unit 5 recovery circuit inverter
292	1	OUT	valuex10	Pump speed percentage with unit 6 recovery circuit inverter
293	1	OUT	valuex10	Pump speed percentage with unit 7 recovery circuit inverter
294	1	OUT	valuex10	Pump speed percentage with unit 8 recovery circuit inverter
303	I	OUT	valuex10	System status (0:system ON - 1:system ON from contact - 20:system OFF from alarm - 27:system OFF from contact - 28:system OFF)
304	1	OUT	valuex10	Cold/hot circuit single pump % value
305		OUT	valuex1	Recovery circuit single pump % value

Table 3-1: Interface database

Type:

B: Boolean variable

I: Whole variable

A: Analogue variable

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

All the addresses not indicated in the database must not be used.

3.6 Meaning of variables

Analogue variables 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.

3.7 Instructions on configuration of the BACNET TCP/IP board on the PC

Before a PC can communicate with the BACNET TCP/IP board, the settings of both devices must be correctly aligned. As the factory settings of the BACNET TCP/IP board can only be changed after establishing the connection with the PC, when making access for the first time, the Personal Computer will have to be adapted to the factory settings of the BACNET TCP/IP board.

3.7.1 PC settings

Disconnect the Personal Computer from any networks and connect it directly to the BACNET TCP/IP board using the cable (crossed).



Figure 3.5: demonstration of cable connection to BACNET TCP/IP board

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

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



7.

INFORMATION:

Before changing the settings, take note of all the existing settings as these will be have to be restored afterwards in order to allow the PC to communicate with the data network it was previously connected to

- 6. Click "Use the following IP address" and set the following parameters:
 - IP address: 172.16.0.2
 - Subnet mask: 255.255.0.0
 - Click on "OK" to close all the windows

	Connetti tramite:	È possibile ottenere l'assegnazione automatica delle impostazioni IP se la		
	Broadcom Net%treme 57xx Gigabit Cc Configura	rete supporta tale caratteristica. In caso contrario, sarà recessario richiedere all'amministratore di rete le impostazioni IP corrette.		
	La connessione utilizza i componenti seguenti			
Connessione alla rete locale	🗹 🗾 Client per reti Microsoft	Utilizza il seguente indirizzo IP.		
Cavo di rete scollegato, con fi	Condivisione file e stampanti per reti Microsoft	Indirizzo IP: 172 . 16 . 0 . 2		
	Protocollo Internet (TCP/IP)	Subnet mask: 255 . 255 . 0 . 0		
	Links Durants Durants	Gateway predefinito:		
	Descrizione	O Ottieni indirizzo servel DNS automaticamente O Utilizza i seguenti indirizzi server DNS:		
	TCP/IP. Protocollo predefinito per le WAN che permette la			
	comunicazione tra diverse reti interconnesse.	Server DNS preferito:		
	Mostra unicona sull'area di notifica guando connesso	Server DNS alternativo:		
	Votifica in caso di connettività limitata o assente	Avanzate		

Figure 3.6: demonstration of connection mode

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 Windows "Control Panel"
- 2. Double click "Internet Options"

- 3. Click "Connections". Another window appears
- 4. Click "LAN settings"
- 5. Disable the proxy server
- 6. Press Ok to close the windows



Figure 3.7: demonstration of elimination of "proxy" network device

3.7.2 Starting the BACNET TCP/IP board with the factory settings

- 1. Switch on the W3000 + controller
- 2. Make sure that both the LEDs of the BACNET TCP/IP board connector light up within a few seconds



Figure 3.8: display of leds presents on the connector



INFORMATION:

The choice as to whether to activate factory settings or user settings can only be made when starting the BACNET TCP/IP board. The BACNET TCP/IP board restarts whenever it is turned on

3. As soon as the Status LED turns on GREEN immediately after restart, hold down the button to activate the factory settings

4. If the button is held down, after about 20 seconds the Status LED will turn RED, flashing slowly three times.

Release the button during these 3 flashes

5. After the 3 red flashes, the Status LED turns GREEN and, if the procedure has been performed correctly, the Status LED will confirm the button has been pressed and released by rapidly flashing RED 3 times and will then turn steady GREEN for about 1 minute (completion of the start phase). Once the start phase is complete, the Status LED will start flashing: the BACNET TCP/IP board will be effectively running

In this way, the BACNET TCP/IP board will not use the "User" set communication configuration parameter values, but rather the following factory values:

- IP address: 172.16.0.1
- Subnet mask: 255.255.0.0



INFORMATION:

These values will remain active until the BACNET TCP/IP BOARD IS RESTARTED. After restart, the BACNET TCP/IP board will return to the "User" configuration values. It is recommended that the network communication parameters are configured immediately

3.7.3 Access the BACNET TCP/IP board via the PC

To allow the board to communicate with the data network it will be installed to, certain network communication parameters must be set.

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Ť.	
н.	

INFORMATION: The network administrator must establish whether the BACNET TCP/IP board can be connected and must communicate essential system data

Start the Internet Explorer application on the PC. Write the following	🖉 Google - Windows Internet Explorer
number including dots in the address field: 172.16.0.1 and press ENTER	File Modifica Visualizza Preferiti Strumenti ?
	(3) → 172.16.0.1
	Eigure 2.0: aptoring the ID address
The main page of the BACNET TCP/IP board "index html" appears	Image: Solution of the second control of the seco
Click "Go to Administrator Area"	The matrix match match match i
	Televini (Englishi Li
	They is the default index.html autoentically generated by Card SpA. They file register registering are any time and PR, on developing AutoBiodensichterp.
	The unemarks to access the to "https://ore.initial/username.to access the configuration http:/pages.til/adopt/ Administratory utilities
	🗇 🗰 cio te Administrator Area
	Magnifications 122.46.0.1 Magnifications 00.04.56110/22an Personal Columns 4.0.04.56110/22an Personal Columns 4.1.3.4.6.1.2.5
	Figure 3.10: BACNET TCP/IP board page display
At the login and password request enter the factory values: • Username: admin	Connetti a 172.16.0.1
Password: fadmin	- The second sec
	Il server 172.16.0.1 all'indirizzo config richiede un nome utente e una password.
	Avviso: il server ha richiesto che il nome utente e la password siano inviati senza protezione, ovvero mediante
	autendicazione a base senza i uso di una connessione protetta.
	Nome utente: 2 Amin Password: fadmin
	Memorizza password
	Figure 3 11: Details entry screen
At the login and password request enter the factory values:	Information General Network pCO Com
• Username: admin	Configuration 🔐 Serial communication
Password: fadmin	Clock & Logger Clock & Logger
	Events Detween pCOWeb and pCO controller. Refer to the manual of the pCO application for further information on how to a communication protocols in the pCO. Modify very carefully.
The BACNET TCP/IP board is set at the factory with Carel protocol.	Protocol Modbus Extended ~ Tests Baud rate 19200 ~ default 19200
Switch the protocol to Modbus Extended	Customer Site Modbus slave address 1 1 to 247 Dinital variables* 2048 1 to 248
All the settings will be enabled the next time the BACNET	Info & Contact Analog variables* 5000 1 to 5000 Integer variables* 5000 1 to 5000 1 to 5000
TCP/IP board is started	System is using: Factory parameters Submit
	Firmware Release: Figure 3.12: Login display page

The BACNET TCP/IP board is set at the factory for the reading of maximum 207 digital, analogue and whole variables. In the BACnet menu change the values in the pCO Mapping Parameters fields from 207 to 2048 All the settings will be enabled the next time the BACNET TCP/IP board is started	Information General Natured and Comments Concisionaria Device configuration Device configuration Concis Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Forms Device configuration Device configuration Device configuration Device configuration Formation configuration Device configuration Device configuration Device configuration Device configuration Formation configuration Device configuration Device configuration Device configuration Device configuration Formation configuration Device configuration Device configuration Device
If the details entered during the previous access stage are correct, the following page appears: Update the variable data by clicking the "Information" button	Information Enformation Page Configuration Configuration Clock & Logger Image: Clock & Logger Vestis 500 1500 2000 2046 Tests 1<
	Figure 3.13: information page
As the BACNET TCP/IP board in its factory configuration is set with DHCP addressing (automatic addressing), it will already be operational and no further action will be required.	Information Configuration Clock and Logger General Network pCO Com System Information
To set the user network parameters, click on "Configuration", then on the "Network" board and set the following basic network parameters: • IP address • NetMask	Events Image: View used/free disk space Tests View factory bootswitch parame Customer Site View network configuration Info & Contact View network configuration Figure 3.14: "configuration" page display
The set values will only be used from the next time the BACNET TCP/IP board is restarted	Centeral Network professor build professor buil

3.7.4 Configuring the board for the BACNET protocol

The BACNET TCP/IP board can recognise queries sent by a supervisor using either of the following two versions of the BACnet	General Network pC0 Co	SNMP	BACNet Plugins Users Firmware
(Building Automation Control Networks) protocol:	BACnet LAN Type	● BAChetiP ● B	BACinet Ethenset
• BACnet/IP (Addenda A/Anney I)	BAChetIP UDP	BACO	hexadecimal
	pCOWeb Device Inst	77000	(0 to +194303)
BACnet Ethernet ISO8802-2 over 8802-3	Description	Carel BACnet Gatev	N2
	Location	Unknown	
The configuration of the parameters for the BACnet protocol is	APDU Timeout	5000	miliseconds
	APDU Retries	3	
available on the corresponding page of the "Configuration" menu.	Password for Restart	1234	
All the pattings will be enabled the part time the DACNET TOD/D	Alarm Parameters		
All the settings will be enabled the next time the BAGNET TOP/IP	Alarming Enabled	O Yesi O No	
board is started	Broadcast Alarms	O Yes O No	
	Alarm Destination Device Inst	0	(0 to #194303)
	Alarm Process 1d	0	
	Figure 3.16: BACnet protocol p	arameters configu	uration display



INFORMATION:

The professional system integrator who sets the various parameters, checks the network communication, and starts the supervision system, must be familiar with BACNET

4. MITSUBISHI ELECTRIC SYSTEM INTERFACE

Below is the table showing the compatibility of the Mitsubishi Electric system remote controllers with MANAGER3000+:

	AE-200E (Ver.7.68 or later) AE-50E (Ver.7.68 or later) *AE-200E is required on same system		
MITSUBISHI ELECTRIC SYSTEMS R/C	EW-50E (Ver.7.68 or later) *AE-200E is required on same system		
MEHITS	2-pipe systems consisting of chiller unit and heat pump	MANAGER3000+ (HG06 versions or later)	
	ADAPTER MEHITS (version 1.00)		



INFORMATION:

This supervising system cannot be used for 4-pipe systems with energy raisers
 The temperature values that can be set have the restriction that they must only be values greater than or equal to zero

4.1 Components required



MEHITS Adapter



INFORMATION: The use of the ADAPTER requires a central controller

Serial interface board



Figure 4.2: serial interface board



Figure 4.3: internal board

Board inside the Manager3000+ panel

4.2 Installing the serial board

Follow the points in paragraph 1 "Installing the serial board" to insert the MODBUS serial board into the controller.

4.3 Manager3000+ - setting the serial line parameters

The communication with the BMS requires the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the setting of dedicated parameters through the Web interface or the touchscreen (access the menu using the setting of dedicated parameters through the setting of dedicated parameters the se

NETWORK SETTINGS			SUPERVISOR SETTINGS	
Host Name Use IPv6 Domain	localhost		PROTOCOL	
IPv4 Gateway DNSv4 Servers(comma separated) IPv6 Gateway DNSv6 Servers(comma separated)	172.21.51.197		Modbus Over IP / Modbus RTU / BACnet MSTP / BACnet	
	ID Description Physical Address Adapter Enabled DHCPv4	en0 Onboard Ethernet. Adapter en0 ++E&D:B:CB:A6:F9 Ensitied V Disabled V	ADDRESS 11 Set	
	IPv4 Address IPv4 Subnet Hask DHCPv4 Server DHCPv4 Lease Granted DHCPv4 Lease Expires IPv6 Support	172.21.51.44 255.255.255.0	BAUDRATE 19200 baud Set	
	IPv6 Enabled Obtain IPv6 Settings Automatically	Disabled V No V		

Figure 4.4: "Device configuration" screen

In the SUPERVISOR SETTINGS section set:

PROTOCOL	Modbus Over IP/ Modbus RTU/ BACnet MSTP/BACnet
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4.4 Setting up the supervisor network

M-NET Transmission Cable and Modbus cable wiring*

W3000-NET





INFORMATION:

* Refer to MEHITS Adapter manual for details about connection. The serial cable must be kept separate from the power cables. The shield of the connection cable must be earthed in just one point

5. Annexes

5.1 AWG (American Wire Gauge) conversion table

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

AWG n°	Diam. mm	Area mm ²	AWG n°	Diam. mm	Area mm ²
1	7,350	42,400	16	1,290	1,310
2	6,540	33,600	17	1,150	1,040
3	5,830	26,700	18	1,024	0,823
4	5,190	21,200	19	0,912	0,653
5	4,620	16,800	20	0,812	0,519
6	4,110	13,300	21	0,723	0,412
7	3,670	10,600	22	0,644	0,325
8	3,260	8,350	23	0,573	0,259
9	2,910	6,620	24	0,511	0,205
10	2,590	5,270	25	0,455	0,163
11	2,300	4,150	26	0,405	0,128
12	2,050	3,310	27	0,361	0,102
13	1,830	2,630	28	0,321	0,080
14	1,630	2,080	29	0,286	0,065
15	1,450	1,650	30	0,255	0,050

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