

DESCRIPTION

MACON_C2 is a control device for chiller units / heat pumps with 2 circuits. The second circuit (**MACON_C2B**) has a plastic box for rail mounting and it is connected with the main device via three cables.

MACON_C2W (1st circuit) has the following specifications:

3 analog inputs for measuring temperature with range $-50 \div -150\text{ }^{\circ}\text{C}$

SEN 1. Water input circuit 1. Operation thermostat HEATING - COOLING

SEN 2. Water output. Safety thermostat No1. Resistance No1

SEN 3. Defrost control C1 (Compressor 1st)

6 digital inputs:

1st input → Terminal block 11. ON-OFF device from a remote switch

2nd input → Terminal block 12 HEAT-COOL from a remote switch

3rd input → Terminal block 13 HP1. High pressure 1st circuit

4th input → Terminal block 14 LP1. Low pressure 1st circuit

5th input → Terminal block 15 C1. Thermal of 1st circuit compressor

6th input → Terminal block 16 FLOW SWITCH

6 relay outputs 250 VAC 5 Amp: pump relay, compressor **C1**, valve **V1**, resistance **R1**, fan **FAN 1**, alarm.

1 Analog output 0-10 Volt → Terminal block 22, 23.

MACON_C2B (2nd circuit) has the following specifications:

2 inputs for measuring temperature with range $-50 \div -150\text{ }^{\circ}\text{C}$

SEN 4. Water output 2nd circuit Safety thermostat No2. Resistance No2

SEN 5. Defrost C2 control (2nd compressor)

3 digital outputs:

7th Input → Terminal block 17 HP2. High pressure 2nd circuit

8th Input → Terminal block 16 LP2. Low pressure 2nd circuit

9th Input → Terminal block 15 C2. Thermal of 2nd circuit compressor

4 relay outputs 250 VAC 5 Amp: compressor **C2**, valve **V2**, resistance **R2** and fan **FAN 2**

CONNECT TO NETWORK

The device can be connected through its serial port in the following options:

- Connection to external device monitoring network using Modbus protocol. It is possible for the monitoring network to read all temperatures, analog signal, alarms and relays status of the device. In addition, the MACON_C2 model has the possibility of recording Sco and SHT parameters. Ask, for the mapping of the device in order to read and write the above.
- Connect to a PC: CAMIN software can monitor all temperatures, compressors relays, alarm, parameters, while sending SMS and emails in case of an alarm. More than 250 devices can connect to this network.
- Connect to a Remote Control device: it displays on screen whatever is displayed on the main device and it has full access from the keyboard to the main device. It can be installed up to 500 meters away from the main device.

PARAMETERS

Parameters are separated in two groups: 67 main parameters and 8 secondary parameters (A1-A8). Two of the main and eight of the secondary parameters are easy accessible. The rest require an access code. Check relevant parameters table (page 2).

TECHNICAL SPECIFICATIONS

Power supply: 24 VAC/DC 50/60 Hz 5W

Connection with terminal blocks 28-16 AWG 1.5 mm²

6 relays 250 VAC 5A Resistive Load στο MACON_C2W

4 relays 250 VAC 5A Resistive Load στο MACON_C2B

Operation temperature: $-10 - +50\text{ }^{\circ}\text{C}$

Storage temperature: $-20 - +80\text{ }^{\circ}\text{C}$

MACON_C2 is mounted on a panel / Dimensions 28x70x75mm

MACON_C2B is mounted on a Ω rail / Dimensions 70x90x65mm

It is suggested using a safety switch 1A (not included)

Maximum consumption for each device 5 Watt

ON/OFF DEVICE

Press  for 4 seconds to toggle the device between **ON/ OFF** state if the parameter is set to **Grc=0**.

If the input 11 ON/OFF is activated or the parameters are being programmed, this operation is cancelled.

HEATING – COOLING OPERATION

Press  for 4 seconds to toggle the operation between heating and cooling mode if parameter is set to **GrH=0**.

If the input 10 Heating-Cooling is activated or the parameters are being programmed, this operation is cancelled.

RESET ALARMS

Press  to reset the alarms: this feature is active even during programming the parameters.

PROGRAMMING PARAMETERS

Press  to enter or exit the parameters menu.

The first parameter “**SCo**” is displayed and with the ,  we scroll into the parameters menu.

Press **SET** to display the parameters value and adjust it with the , .

Press  to confirm the new value and display the parameters name.

Press **SET** to cancel the new value and revert to the parameters name.

NOTE: for safety reasons all parameters as presented to the parameters table are not displayed. We must enter parameter Cod=22 to access full parameters menu.

DISPLAY AND RESET OPERATION HOUR OF COMPRESSORS

Press  to display the first parameter **SCo**. Press  to display parameter **H 2** which refers to operation hours of compressor 2. By pressing again  the next parameter is displayed **H 1** which refers to operation hours of compressor 1. By pressing once more parameters **H P** is displayed which refers to pump hours operation.

Press **SET** to display the operation hours and press simultaneously ,  to reset the timer. By pressing  we confirm the reset.

DISPLAY OF THE TEMPERATURE SENSORS

After we reach parameter **HP**, by pressing ▲, the following parameters are displayed: t5, t4, ... up to t1. Press **SET** to display the temperature of the corresponding sensor (5, 4, 3, 2, 1).

LED OPERATION

ON	The system is activated.
C1	ON when the compressor C1 operates. When it starts blinking then the compressor is set to ON but a timer is active and waits to elapsed.
C2	ON when the compressor C2 operates. When it starts blinking then the compressor is set to ON but a timer is active and waits to elapsed.
C	Cool – system operates in cooling mode.
H	Heat – system operated in heating mode.
△	Blinks if an alarm is active.
x100	ON when the operation hours are x100.

RESET TO FACTORY DEFAULT SETTINGS

Enter the parameter **Cod = 31** and press twice the enter button ◀ in order to enter the factory values of the parameters (see in the following table the column default values).

TABLE 1

No	PARAMETERS – DESCRIPTION		min	max	DEFAULT	U.O.M.
A1	t1	Temperature sensor N 1 (Input)	-	-	-	°C
A2	t2	Temperature sensor N 2 (Water output 1)	-	-	-	°C
A3	t3	Temperature sensor N 3 (deFrost C1)	-	-	-	°C
A4	t4	Temperature sensor N 4 (Water output 2)	-	-	-	°C
A5	t5	Temperature sensor N 5 (deFrost 2)	-	-	-	°C
A6	HP	Pump operation hours	- - - - - To reset the timer, press simultaneously ▲ + ▼ and then ◀.	-	-	hours
A7	H1	Compressor 1 operation hours		-	-	hours
A8	H2	Compressor 2 operation hours		-	-	hours
1	SCo	SET POINT of compressor in Cooling mode	LCL	LCH	10	°C
2	SHT	SET POINT of compressor in Heating mode	LHL	LHH	20	°C
3	Cod	Access code: with Cod=22 we access all the following parameters	0	255	0	-
4	diS	Adjust which sensor is displayed on screen, where 1 = sensor 1, etc.	1	5	1	-
5	LCL	minimum temperature limit of SCo in Cooling mode	-50	150	-10	°C
6	LCH	maximum temperature limit of SCo in Cooling mode	-50	150	40	°C
7	LHL	minimum temperature limit of SHT in Heating mode	-50	150	10	°C
8	LHH	maximum temperature limit of SHT in Heating mode	-50	150	60	°C
9	FoP	Fan operation 0 = Fans are always OFF 1 = Fans are ON when the device is ON. 2 = Fan is ON when the corresponding compressor is ON 3 = Fans are ON based on their heating FSH and cooling FSC set points and when the defrost sensor reaches a temperature for the fan to turn ON (in normal operation – not in defrost mode)	0	3	1	-
10	FSC	SET POINT of fan in Cooling mode. Operates when parameter FoP=3 .	-50	150	15.7	°C
11	FSH	SET POINT of fan in Heating mode. Operates when parameter FoP=3 .	-50	150	15.7	°C
12	doP	Defrost operation 0 = defrost operation is deactivated 1 = defrost operation is activated 2 = defrost operation is activated. During defrosting, the compressor is not stopped by the thermostat, either its own or the WM_RC's. If the compressor does not stop after the defrost, the repeat time will count from the end of the defrost. If the compressor stops before the repeat time then the repeat time will count from the time the compressor started.	0	2	1	-
13	dto	0 = defrost ends based only on parameter timer dt3 1 = defrost ends when the temperature reaches temperature end deFrost. In the meantime, if timer dt3 elapses, defrost ends and an indication dF appears on screen for a few minutes.	0	1	1	-
14	dbE	Temperature starting defrost When temperature is below dbE for a period of time greater than dt1 with the compressor ON, the defrost starts.	-50	150	3.6	°C
15	dEn	Temperature ending defrost When parameter dto = 1 defrost ends when it reaches dEn temperature in time smaller than the maximum defrost duration.	-50	150	15.6	°C
16	dFA	Over this temperature, the fan is ON during defrost	-50	150	16.4	°C
17	dt1	Time frame in which all defrost requirements must occur in order to start defrost	1	200	1	min
18	dt2	Minimum time defrost duration, where 1 unit = 10 sec	1	200	1	10sec
19	dt3	Maximum time defrost duration	1	200	1	min
20	dt4	Minimum time between two successive defrosts of the same circuit	1	200	1	min
21	dt5	Minimum time between two successive defrost of the two circuits	0	200	0	min
22	ASP	Antifreeze ALARM SET POINT, Safety thermostat	-50	60	4	°C
23	ArE	Antifreeze heater SET POINT, Resistance	-50	60	3.6	°C
24	Adi	Differential of safety thermostat	0.1	20.0	1.5	°C
25	Adr	Differential of resistance thermostat	0.1	20.0	1	°C
26	SE2	Sensor operation No 2, where 0 = sensor deactivated, 1 = sensor activated	0	1	1	-
27	SE3	Sensor operation No 3, where 0 = sensor deactivated, 1 = sensor activated	0	1	1	-
28	SE4	Sensor operation No 4, where 0 = sensor deactivated, 1 = sensor activated	0	1	1	-
29	SE5	Sensor operation No 5, where 0 = sensor deactivated, 1 = sensor activated	0	1	1	-
30	AJ1	Sensor 1 offset	-9	15	0	°C

31	AJ2	Sensor 2 offset	-9	15	0	°C
32	AJ3	Sensor 3 offset	-9	15	0	°C
33	AJ4	Sensor 4 offset	-9	15	0	°C
34	AJ5	Sensor 5 offset	-9	15	0	°C
35	rCo	Differential of SET POINT in Cooling mode	0.1	25	1	°C
36	rHt	Differential of SET POINT in Heating mode	0.1	25	1	°C
No	PARAMETERS – DESCRIPTION		min	max	DEFAULT	U.O.M.
37	rS2	Differential of the second SET POINT When parameter GSP=1 the second compressor operates as follows: cooling mode: SET POINT of 2nd compressor = set point SCo + rS2 parameter heating mode: SET POINT of second compressor = set point SHt – rS2 parameter	0.1	25	2	°C
38	tPC	Timer Pump - Compressor : when this timer elapses, the compressor starts after the pump	0	200	3	sec
39	tCP	Timer Compressor - Pump : timer for the deactivation of the pump, after the deactivation of the compressor	0	200	0	min
40	tF1	Bypass timer of FLOW SWITCH during pump start-up	0	200	5	sec
41	tF2	Bypass timer of FLOW SWITCH during operation	0	200	5	sec
42	too	Timer from ON to ON of the same compressor, where 1 unit = 10 sec	0	200	1	10sec
43	tFo	Timer from OFF to ON of the same compressor, where 1 unit = 10 sec	0	200	1	10sec
44	tdC	Timer from ON to ON between the two compressors	0	200	5	sec
45	tFC	Timer from OFF to OFF between the two compressors	0	200	2	sec
46	Ton	Compressor minimum time ON	0	200	2	sec
47	tLP	Bypass timer for the low pressure of the compressor (LP1) during start-up	0	200	3	sec
48	tAF	Bypass timer of safety thermostat during start-up	0	200	2	sec
49	Gnc	Number of compressors: where 1 = one compressor, 2 = two compressors	1	2	2	-
50	Grc	Remote Control ON-OFF of the system: where 0 = OFF, 1 = ON	0	1	1	-
51	GrH	Remote Control for heating/cooling operation of the system, where 0=OFF, 1=ON	0	1	1	-
52	GSP	Compressors operation with one SET POINT or two SET POINTs 0 = one SET POINT 1 = two SET POINTs	0	1	1	-
53	GAL	Alarm operation 0 = manual alarm reset of the following alarms: HP1, LP1, Safety thermostat 1, FLOW SWITCH, HP2, LP2, Safety thermostat 2 1 = automatic alarm reset	0	1	1	-
54	GSu	Reverse Pumps 0 = in cooling mode pumps are OFF and in heating mode pumps are ON 1 = in heating mode pumps are OFF and in cooling mode pumps are ON	0	1	0	-
55	GFr	Pumps operation 0 = pump always ON 1 = pump starts and stops with the compressors based on timers tPC and tCP. 2 = When compressors are OFF, the pump is 10 minutes OFF and 20 seconds ON.	0	2	0	-
56	GLE	out of order	-	-	-	-
57	GPO	Starting-up timer of the compressors during Power-Up	0	200	0	-
58	GLC	Compressors sequence 0= compressor with the minimum operation hours precedes 1= compressor 1 precedes 2= compressor 2 precedes	0	2	0	-
59	GFP	Pump operation with Safety thermostat alarm during OFF status of the machine 0 = Pump is OFF and the Safety thermostat relay is activated 1 = Pump is ON and the Safety thermostat relay is activated	0	1	1	-
60	trE	Time response of the device on network	30	100	30	-
61	Add	0 = network is deactivated. 1= Remote Control operation is activated. Address of the device on network from 1 – 255	0	255	1	-
62	nCo	0 = ON SLAVE: PC operation 1 = MASTER: operate with REMOTE CONTROL and parameter Add = 1 In Version V4.2A and later also, we can connect the WM_RC to the 2nd serial input and it works alone or with the MACON_C2B and the other serial works in a modBus network or with Wi-Fi. And the nCo parameter must have a value of 2 or 3. With a value of =2, both devices (MACON_C2b and WM_RC) work together. With value=3, WM_RC works by itself	0	1(3)	0	-
63	LLo	Minimum voltage level of the analog output The analog output has a range between HLo – LLo for a temperature range adjusted by the parameters ArH or ArC. For example, if HLo – LLo = 7 and ArH =3 and SHt = 45 °C, the voltage changes from 3-10 Volt for 42÷45 °C	0	5	3	Volt
64	HLo	Maximum voltage level of the analog output	6	10	10	Volt
65	ArH	Temperature range for the analog output voltage in heating mode	1.0	25.0	3.0	Volt
66	ArC	Temperature range for the analog output voltage in cooling mode	1.0	25.0	3.0	Volt
67	IAO	Reverse analog output signal	0	1	0	Units
68	dEr	Increasing the value reduces the 0-10 Volt signal change speed	1	40	1	Units
69	VtO	When device is OFF. Value = -1 : Valve ON. Value = 0-20 min. → OFF the valve after the minutes defined by the parameter	-1	20	-1	min
70	rOF	Value =0 → resistances OFF with whole system OFF. - frost conditions - .	0	1	1	Μovάδες
71	tYP	Product number – not programmable	-	-	110	-
72	baU	Baud rate: 0 = 2400 / 1 = 4800 / 2 = 9600 / 3 = 19200 Enter the new value, exit the parameters menu by pressing  and toggle power supply of the device.	0	3	3	-
73	Ert	Activation of Remote Control thermostat intervention. 0 = disabled. 1 = enabled.	0	1	0	units

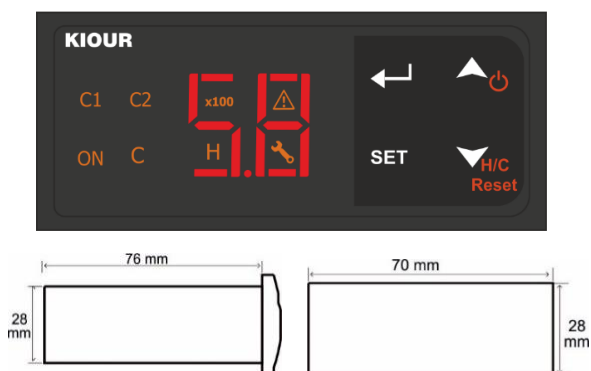
ALARM TABLE

1	HP1	ALARM HIGH PRESSURE C1: Stops the operation of compressor C1. By adjusting GAL = 0, alarm reset is manual.
2	LP1	ALARM COMPRESSOR C1: Stops the operation of compressor C1. Alarm is only automatically deactivated when the cause of the alarm disappears.
3	C1	ALARM COMPRESSOR C1: Stops the operation of compressor C1. Alarm is only automatically deactivated when the cause of the alarm disappears.
4	FLS	ALARM FLOW SWITCH: ALARM from the FLOW SWITCH. By adjusting GAL = 0, alarm reset is manual.
5	HP2	ALARM HIGH PRESSURE C2: Stops the operation of compressor C2. By adjusting GAL = 0, alarm reset is manual.
6	LP2	ALARM LOW PRESSURE C2: Stops the operation of compressor C2. By adjusting GAL = 0, alarm reset is manual.
7	C2	ALARM COMPRESSOR C2: Stops the operation of compressor C1. Alarm is only automatically deactivated when the cause of the alarm disappears.
8	Ar1	ALARM SENSOR 1: ALARM analog input No 1. Safety thermostat. (Water input). Sensor malfunction. Alarm is only automatically deactivated when the cause of the alarm disappears.
9	Ar2	ALARM SENSOR 2: ALARM analog input No 2. Safety thermostat. (Water output). Circuit 1. Sensor malfunction. Alarm is only automatically deactivated when the cause of the alarm disappears.
10	Ar3	ALARM SENSOR 3: ALARM analog input No 3. Defrost Sensor malfunction. Alarm is only automatically deactivated when the cause of the alarm disappears.
11	Ar4	ALARM SENSOR 4: ALARM analog input No 4. Safety thermostat. (Water output). Circuit 2. Sensor malfunction. Alarm is only automatically deactivated when the cause of the alarm disappears.
12	Ar5	ALARM SENSOR 5: ALARM analog input No 5. Defrost. Sensor malfunction. Alarm is only automatically deactivated when the cause of the alarm disappears.
13	At1	ALARM FROST: ALARM from the Safety Thermostat Circuit 1. At compressor's start-up, the thermostat is deactivated based on parameter timer tAF. By adjusting GAL = 0, alarm reset is manual.
14	At2	ALARM FROST: ALARM from the Safety Thermostat Circuit 2. At compressor's start-up, the thermostat is deactivated based on parameter timer tAF. By adjusting GAL = 0, alarm reset is manual.

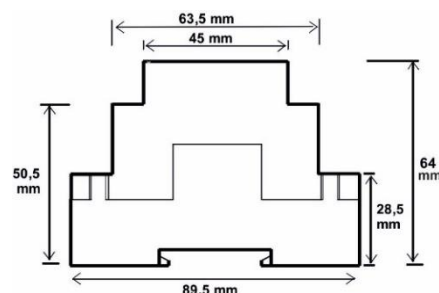
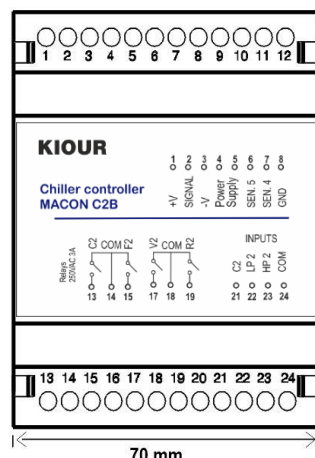
The alarms are automatically deactivated when the cause of the alarm disappears.

DIMENSIONS

MACON_C2



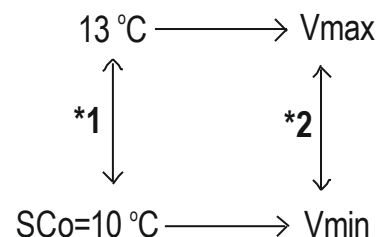
MACON_C2B



Secondary device model **MACON_C2B** has two LEDs with the following operations:

- when the LED on **terminal block No. 2** starts blinking, the secondary device is in communication with the main device
- when the LED on **terminal block No.11** is ON, then the secondary device is under power supply.

ANALOG OUTPUT OPERATION AND ADJUSTMENTS IN COOLING MODE



Parameter **IAO = 0**: 10°C correspond to Vmin, while 13°C correspond to Vmax

Parameter **IAO =1**: the analog output signal is reversed as follows:
10°C correspond to Vmax, while 13°C correspond to Vmin

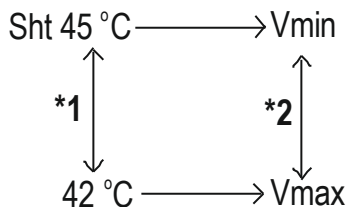
Note 1. The range is set from the parameter **ArC = 3°C**

Note 2. Analog output voltage (**terminal blocks 22, 23, Analog Out**) which corresponds to **10 ÷ 13°C**

Vmin. Minimum level of analog output voltage to 10°C, **0 ÷ 5 Volt**, which is set from parameter **LLo**.

Vmax. Maximum level of analog output voltage to 13°C, **(6 ÷ 10 Volt)**, which is set from parameter **HLo**.

ANALOG OUTPUT OPERATION AND ADJUSTMENTS IN HEATING MODE



Parameter **IAO = 0**: 45°C corresponds to Vmin, while 42°C corresponds to Vmax

Parameter **IAO = 1**: the analog output signal is reversed as follows:
45 °C correspond to Vmax, while 42 °C correspond to Vmin

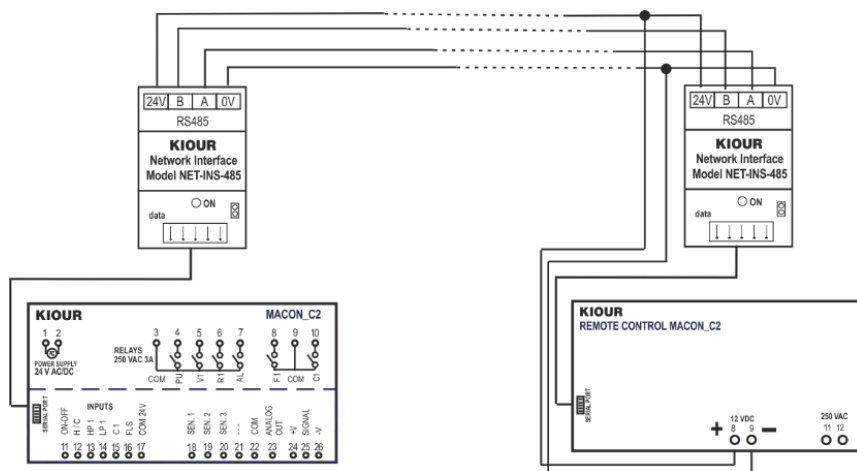
Note 1. The range is set from the parameter **ArH = 3°C**

Note 2. Analog output voltage (**terminal blocks 22, 23, Analog Out**) which corresponds to **45 ÷ 42°C**

Vmin. Minimum level of analog output voltage to **45°C, 0 ÷ 4 Volt**, which is set from parameter **LLO**.

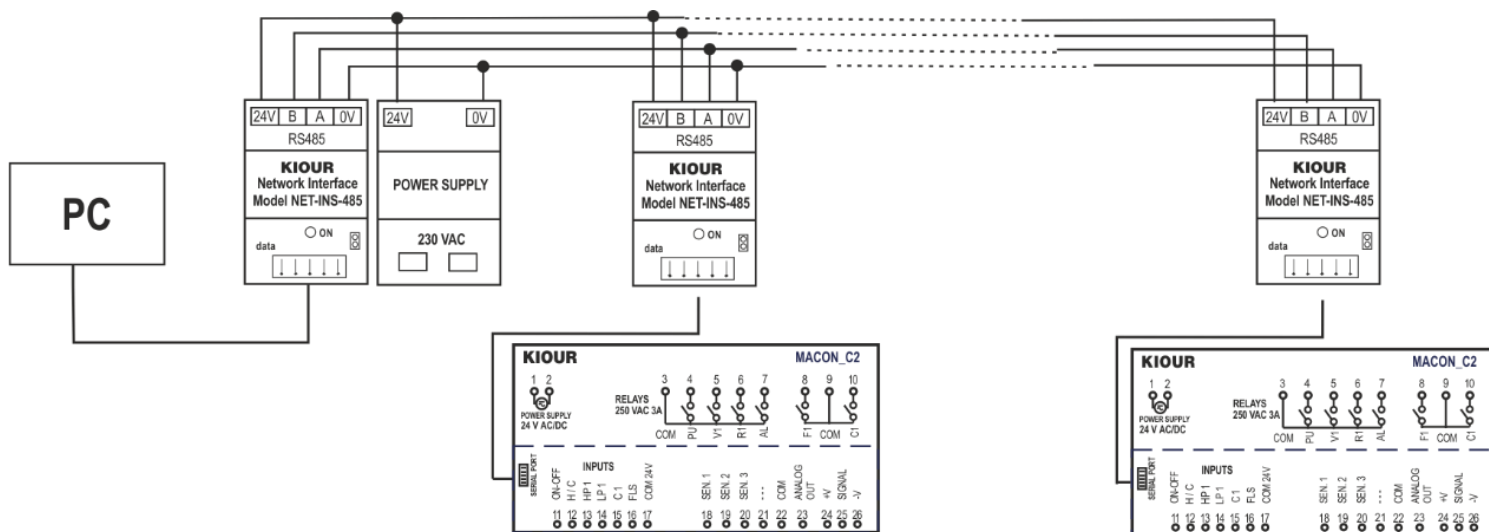
Vmax. Maximum level of analog output voltage to **42°C, (6 ÷ 10 Volt)**, which is set from parameter **HLO**.

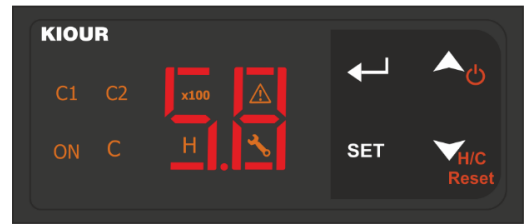
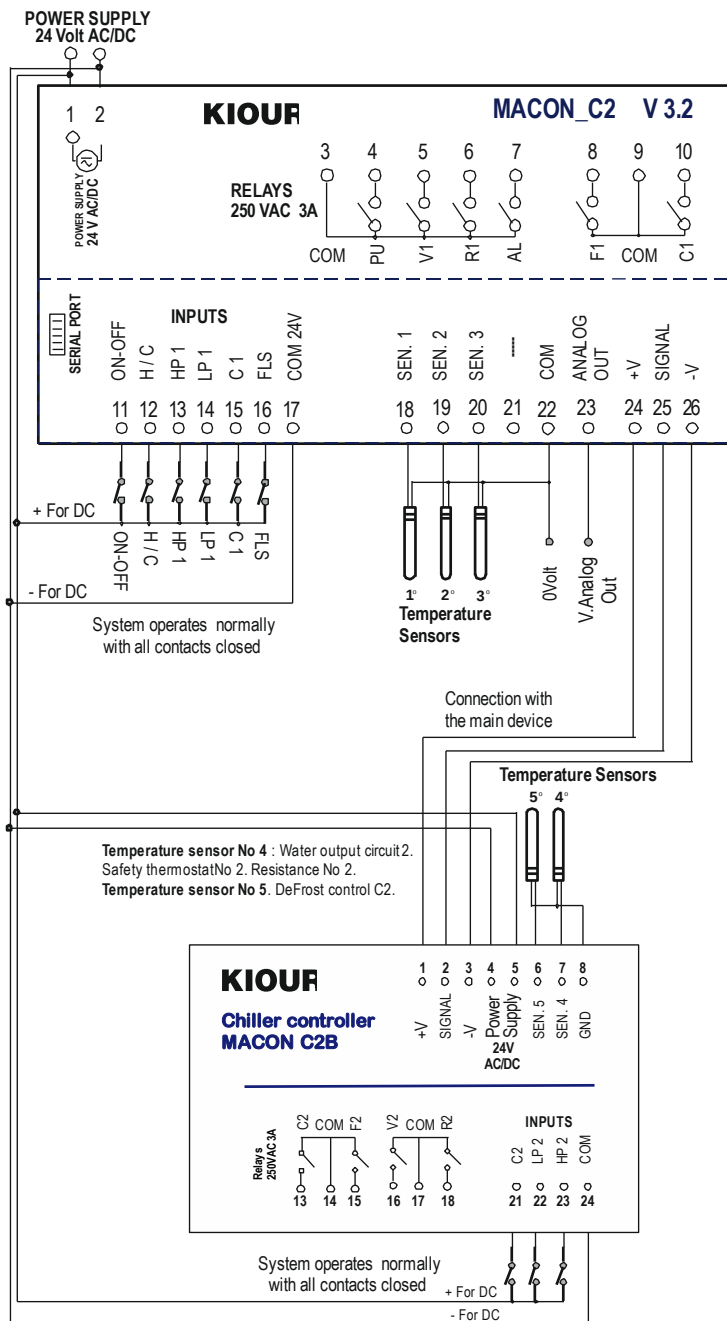
CONNECTING TO THE REMOTE CONTROL



Network power supply: +12-24VDC

CONNECTION TO A PC





Temperature Sensor No 1. Water input circuit 1.
Operation thermostat HEATING-COOLING.
Temperature Sensor No 2. Water output.
Safety thermostat No 1. Resistance No 1.
Temperature Sensor No 3. DeFrost control.

Version V4.3. 21-2-23. An option is added in parameter **A/A 55, Grf.** Option 2= When compressors are OFF the pump is 10 minutes OFF and 20 seconds ON.

Version V4.2. 20-1-23. An option is added in parameter **A/A 12, doP.** Option 2= defrost operation is activated. During defrosting, the compressor is not stopped by the thermostat, either its own or the WM_RC's. If the compressor does not stop after the defrost, the repeat time will count from the end of the defrost. If the compressor stops before the repeat time then the repeat time will count from the time the compressor started.

Version V4.1 12-7-22 1st. Added parameter with **A/A 73, Ert.** (Enable remote thermostat). With value =0, it does not affect MACON operation. With value =1 it affects the operation of MACON. When the Remote Control thermostat is OFF, the operation of the compressors is OFF. When the RC thermostat is ON the compressors are controlled (ON-OFF) by the MACON.

2nd. ON-OFF and H/C status of thermostat and MACON are the same. If for any reason they are not the same, the WM_RC state is changed in order to match. When we change the state on one instrument, it automatically changes on the other. In MACON the H/C status changes when the compressors are OFF. If the H/C status is changed from RC, it will also change to MACON when the compressors are OFF. To change H/C and ON-OFF from keyboards parameters GrC, GrH =0.

3rd. In **Version V4.1A.** we can connect the **WM_RC** to the 2nd serial input and it works alone or with the MACON_C2B and the other serial input works in a modBus network or with Wi-Fi. Also, the nCo parameter must have a value of 2 or 3. With value=2, both devices work together. With value=3, WM_RC works by itself.



Made in Greece.

RoHS



ATTENTION: according to safety standards, the device must be properly positioned and protected from any contact with electrical parts. The device must be fastened in such a way that it cannot be removed without the use of tools. Disconnect the main safety switch of the installation before proceeding to any maintenance. Disconnect the power supply of the device before proceeding to any maintenance. Do not place the device near heat sources, equipment containing strong magnets, in areas affected by direct sunlight or rain. Prevent electrostatic discharges and sharp objects from been inserted to the device. Separate signal cables from power supply cables to prevent electromagnetic disorders. Signal cables must never be in the same pipe with the power supply cables.

The device is under two year's guarantee. The guarantee is valid only if the manual instructions have been applied. The control and service of the device must be done by an authorized technician. The guarantee covers only the replacement or the service of the device. KIOUR preserves the right to adjust its products without further notice.