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Board description

The system consists of a main board and keyboard. An expansion board (slave) may also be present, depending on the type of unit. The keyboard may be one of two types:

- Keyboard for units with 1 to 4 compressors;
- Keyboard for units with over 4 compressors.

The main board communicates with the keyboard through a serial current-loop and with the expansion board through a RS485 serial port.

A board (logic board) with the microprocessor used to control all the electronic system is mounted on the main board. The electronic system management program is memorised in the EPROM. Parameters, adjustments and history data of the various unit models managed by this controller are memorised in the EEPROM. The parameters are set through the keyboard.

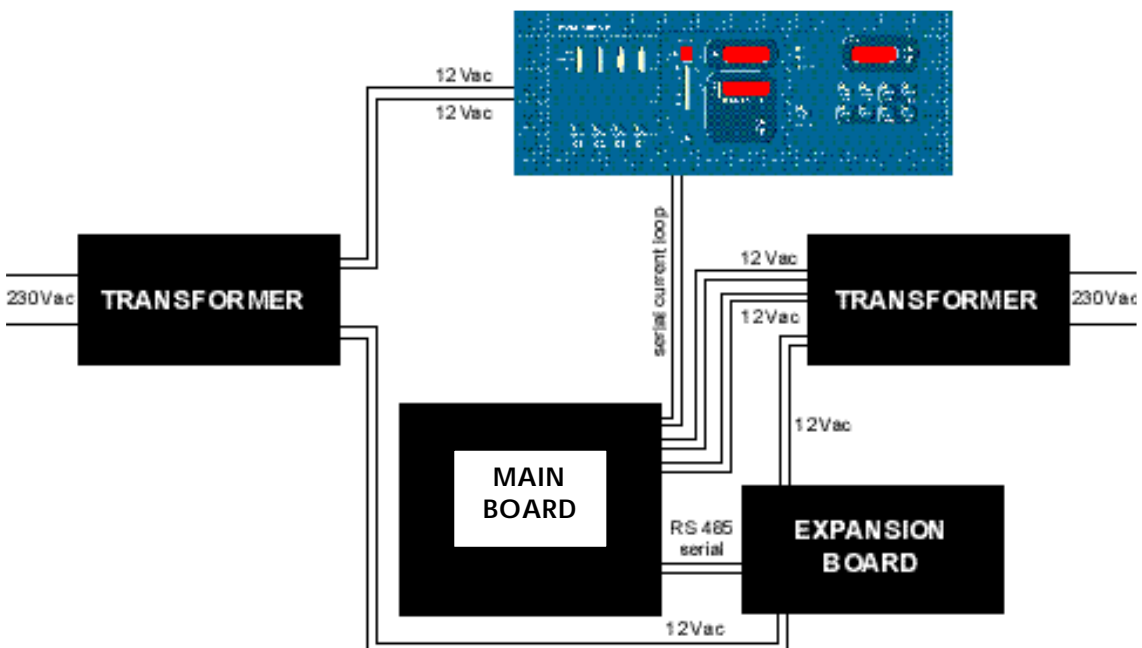


Figure 1-0 ELECTRONIC SYSTEM

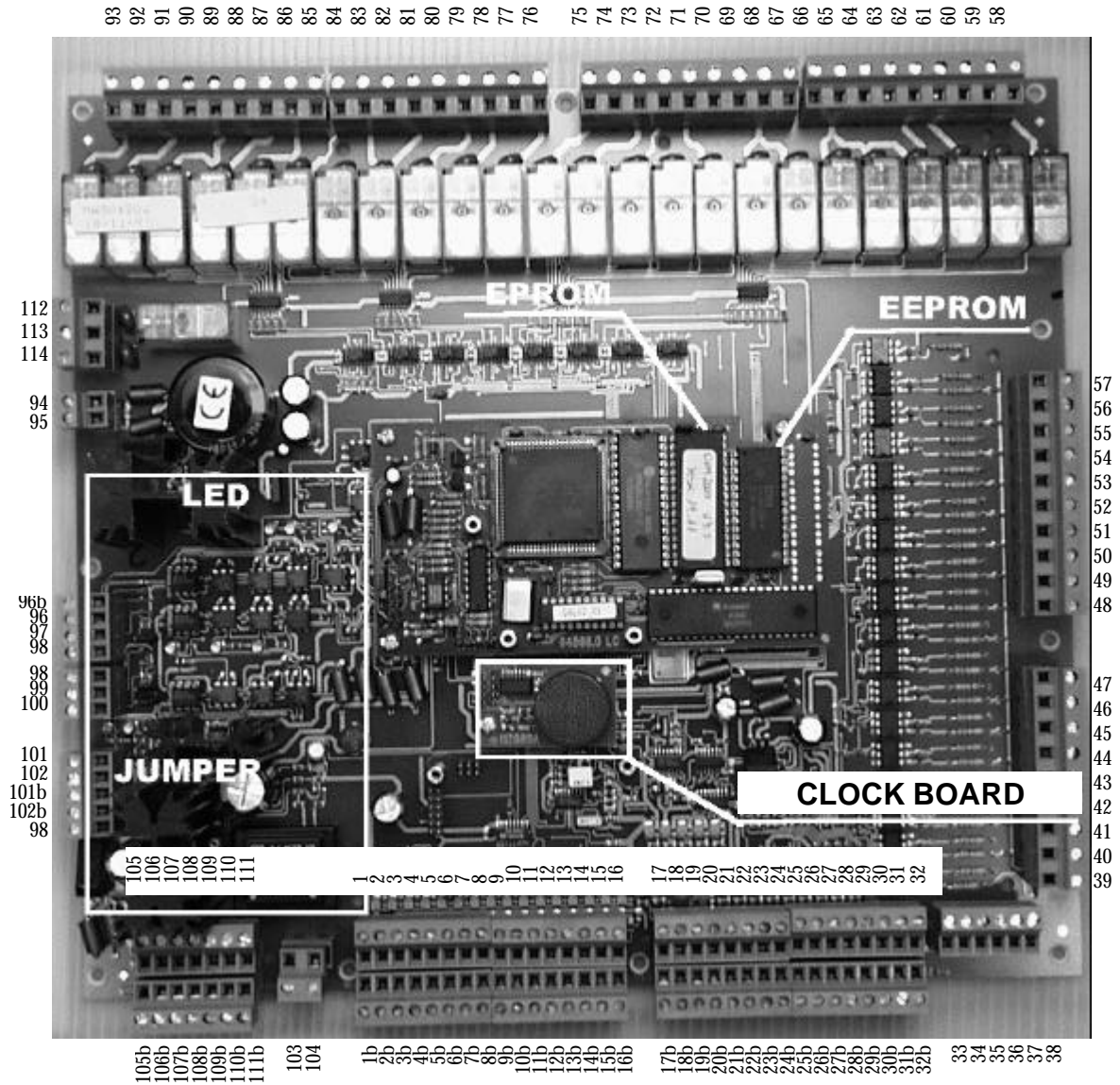


Figure 1-1 MAIN BOARD

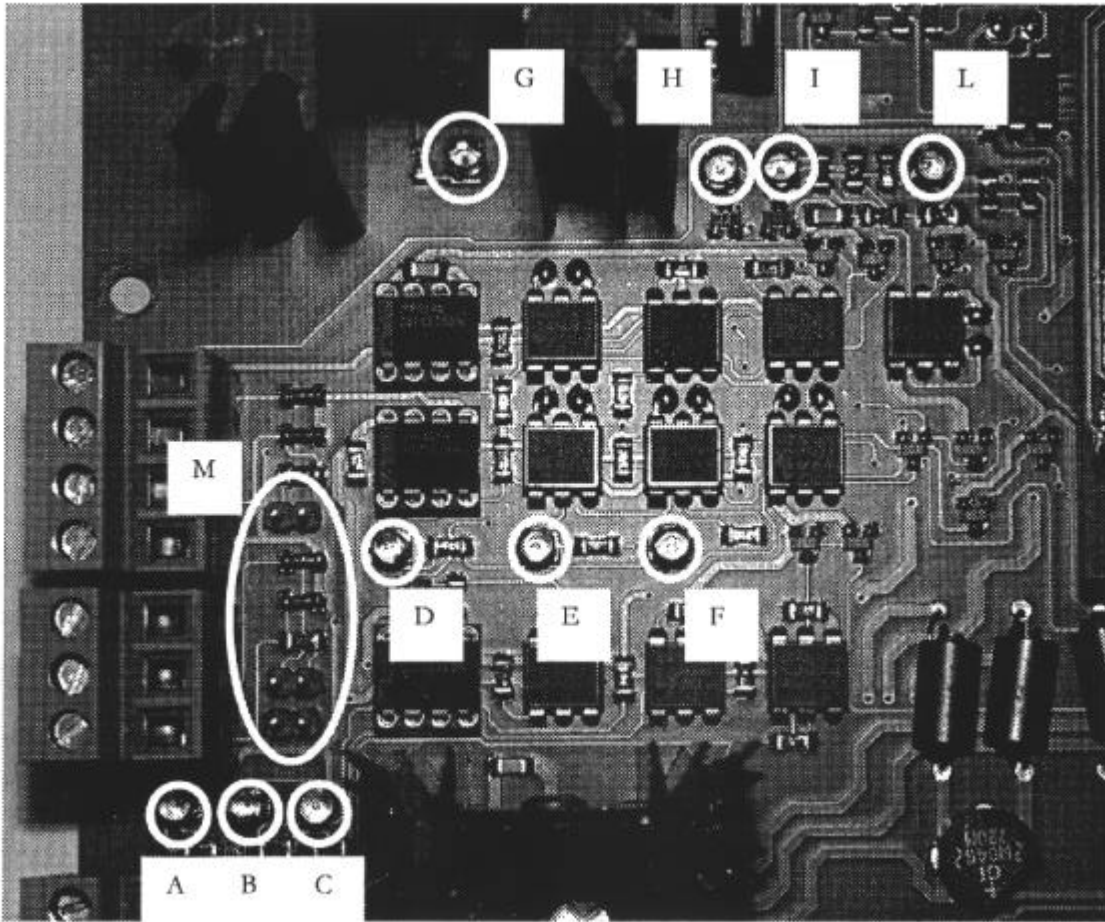


Figure 1-2 MAIN BOARD DETAIL

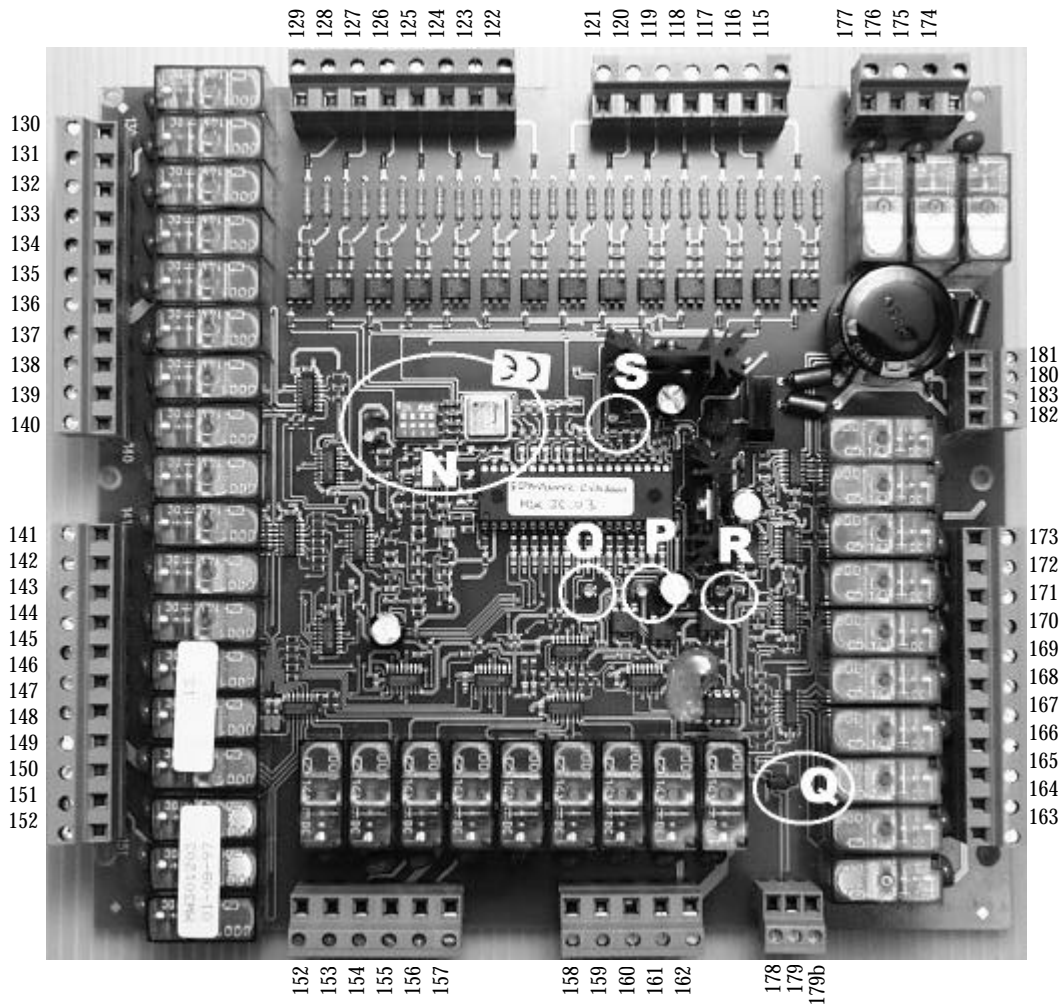


Figure 1-3 EXPANSION MODULE

Notes for proper installation:

1	Remove the jumpers shown in: Figure 1-2 MAIN BOARD DETAIL ; Figure 1-3 EXPANSION MODULE
2	Set all the dip switches to ON; Figure 1-3 EXPANSION MODULE

Meaning of the LED's:

A	Power supply to the terminals (logic board power supply): terminals 105-106
B	COM 2 serial port Rx signal: <i>expansion module <-> main board (terminals 101bis/102bis/98)</i>
C	COM 2 serial port Tx signal, alternately for: <i>logic <-> main board</i> <i>expansion module <-> main board (terminals 101bis/102bis/98)</i>
D	COM 3 serial port Rx signal: <i>(terminals 98/99/100)</i>
E	COM 3 serial port DTR signal
F	COM 3 serial port Tx signal <i>(terminals 98/99/100)</i>
G	Supply to terminals (main board power supply): 94-95
H	COM 4 serial port Rx signal <i>(terminals 96/97/98/96bis)</i>
I	COM 4 serial port DTR signal <i>(terminals 96/97/98/96bis)</i>
L	COM 4 serial port Tx signal <i>(terminals 96/97/98/96bis)</i>
O	COM 2 serial port Rx signal <i>expansion module <-> main board (terminals 178/179/179 bis)</i>
P	COM 2 serial port Tx signal <i>expansion module <-> main board (terminals 178/179/179 bis)</i>
R	Supply to terminals (serials): 180-181
S	Supply to terminals (relays): 182-183

1 Connections

1.1 Temperature probes

The 16 PTC-type temperature probes have a different meaning depending on the software configuration given to the machine's configuration parameters.

Terminals 1 to 16: temperature probe inlets.

Terminals 1-bis to 16-bis: temperature probe references.

Temperature [°C]	-55	-50	-40	-30	-20
Resistance [Ω]	485	510	562	617	677

Temperature [°C]	-10	0	10	20	25
Resistance [Ω]	740	807	877	951	990

Temperature [°C]	30	40	50	60	70
Resistance [Ω]	1029	1111	1196	1286	1378

Temperature [°C]	80	90	100	110	120
Resistance [Ω]	1475	1575	1679	1796	1896

Temperature probes verification procedure:

- disconnect the power supply to the unit;
- disconnect the probe from the microprocessor's terminals;
- using a digital Ohmmeter, measure the probe's resistance value;
- measure the temperature near the probe cap;
- compare the measured resistance value with the one shown in the table: the corresponding temperature should be approximately the same as the measured one.

1.2 Pressure probes

The 16 42 mA type pressure transducers have a different meaning depending on the software configuration given to the machine's configuration parameters.

Number 16 pressure probes 4-20 mA 0-30 bar.

Terminals 17 to 32: signal inputs 4-20 mA.

Terminals 17-bis to 32-bis probe power supply 12 Vdc.

	STANDARD UNITS AND HEAT PUMPS WITH TOTAL RECOVERY	UNITS WITH SCREW COMPRESSORS
Terminals 17 18 19 20	High pressure per circuit	High pressure per circuit
Terminals 21-22-23-24	High pressure per circuit	High pressure per circuit
Terminals 25 26 27 28 29 30 31 32	Compressor oil pressures	Low pressure per circuit

Pressure [Bar]	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Current [mA]	4.00	4.27	4.54	4.80	5.07	5.34	5.61	5.87

Pressure [Bar]	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
Current [mA]	6.14	6.41	6.68	6.94	7.21	7.48	7.75	8.01

Pressure [Bar]	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
Current [mA]	8.28	8.55	8.82	9.08	9.35	9.62	9.89	10.15

Pressure [Bar]	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5
Current [mA]	11.43	10.69	10.96	11.23	11.49	11.76	12.03	12.30

Pressure [Bar]	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5
Current [mA]	12.56	12.83	13.10	13.37	13.63	13.90	14.17	14.44

Pressure [Bar]	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5
Current [mA]	14.70	14.97	15.24	15.51	15.77	16.04	16.31	16.58

Pressure [Bar]	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5
Current [mA]	16.84	17.11	17.38	17.65	17.92	18.18	18.45	18.72

Transducer checking procedure:

- disable the compressors and leave the unit with only the "ON/OFF switch" ON;
- disconnect the cable from the "bis" terminal;
- place a tester between the "bis" terminal and the disconnected cable and read the current value using a milliammeter (20mA bottom of scale);
- read the pressure with a gauge placed near the pressure transducer;
- compare the readings with the values shown in the table.

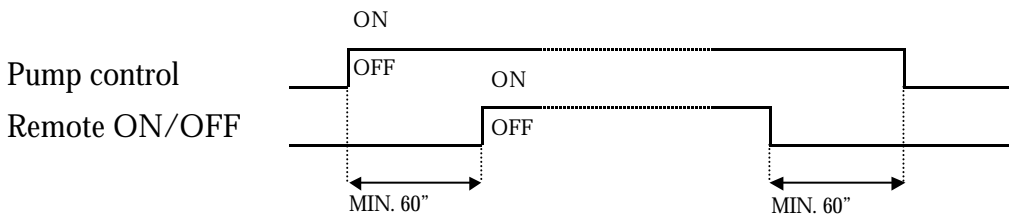
1.3 Low voltage digital inputs

The inputs described below (BT) are low voltage inputs and must consist of voltage-free contacts.

	STANDARD UNITS AND HEAT PUMPS WITH TOTAL RECOVERY	UNITS WITH SCREW COMPRESSORS
Terminal 33	Common to all low voltage inputs	Common to all low voltage inputs
Terminals 34 35 36 37	Fan thermal protection signal contact for circuit (closed contact = correct operation)	Fan thermal protection signal contact for circuit pair (closed contact = correct operation)
Terminal 38	Unit remote ON/OFF (closed contact = unit on)	Unit remote ON/OFF (closed contact = unit on)

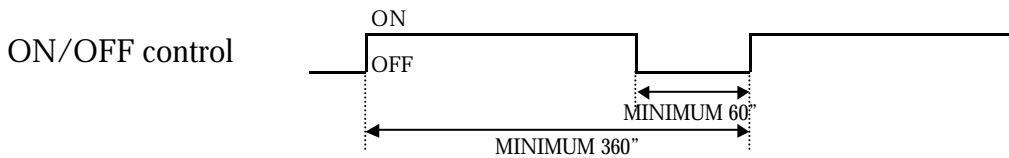
Using the REMOTE ON/OFF control:

For proper use of the unit's remote on/off control, the following delay time must be set between the unit's on/off control and the water pump control:



This is very important, because during the pump-down procedure (at compressor stop) the water pump must be on in order to carry it out correctly, otherwise if the flow switch intervenes, this could cause damage to the compressors. In this case Climaveneta will not cover warranty.

Moreover, if the remote ON/OFF control is used (from an external contact or through protocol control) the following minimum time delays must be observed:



Electrical panel connection of the remote ON/OFF contact:



1.4 Live digital inputs

39 Reference signal for all live inputs, where the neutral conductor must be connected (N). The signal contacts must interrupt the other phase (R) and, if the contact is closed, they must let the phase (R) reach the terminal of the corresponding contact.

40 41 42 43 44 45 46 47 Compressor maximum safety high pressure switch signal input;

48 49 50 51 52 53 54 55 Compressor thermal overload protection signal input;

56 Primary circuit flow switch signal input;

57 Secondary circuit flow switch signal input.

(*) A flow switch at the evaporator's outlet is mandatory to avoid the invalidation of the warranty.

Connection to the electrical panel:



1.5 Relay outputs

Main board:

RELAY	N.A.	N.C.	COM.
RL1 Cumulative alarm	114	112	113
RL2 Primary circuit antifreeze		93	92
RL3 Secondary circuit antifreeze		91	90
RL4	88		89
RL5	87		
RL6	85		86
RL7	84		
RL8	82		83
RL9	81		
RL10	79		80
RL11	78		
RL12	76		77
RL13	75		
RL14	73		74
RL15	72		
RL16	70		71
RL17	69		
RL18	67		68
RL19	66		
RL20	64		65
RL21	63		58
RL22	62		
RL23	61		
RL24	60		
RL25	59		

Expansion board:

RELAY	N.A.	COM.
RL26	130	132
RL27	131	136
RL28	133	144
RL29	134	148
RL30	135	
RL31	137	
RL32	138	
RL33	139	
RL34	140	
RL35	141	
RL36	142	
RL37	143	
RL38	145	
RL38	146	
RL40	147	
RL41	149	
RL42	150	
RL43	151	

RELAY	N.A.	COM.	
RL44	152	155	
RL45	153	162	
RL46	154		
RL47	156		
RL48	157		
RL49	158		
RL50	159		
RL51	160		
RL52	161		
RL53	163		167
RL54	164		
RL55	165		
RL56	166		
RL57	168		
RL58	169		
RL59	170		
RL60	171		
RL61	172		
RL62	173		
RL63	174	177	
RL64	175		
RL65	176		

2 Voltage/frequency input

The main board has an input for monitoring the voltage and frequency value.

103 - 104 Input for voltage to be monitored (range 0 -260 Vac).

Verification of the voltage value read by the board:

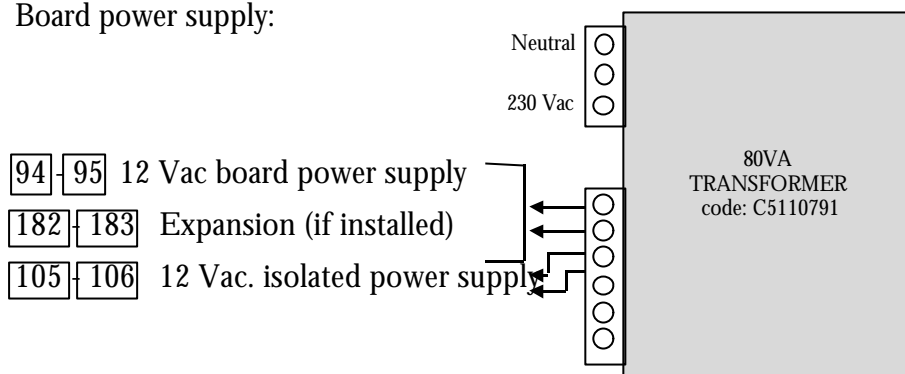
- read the voltage to terminals 103 and 104 using a tester:
- visualise the value of parameter 93.

If the two values do not correspond, make the necessary calibration using the trimmer shown in Figure 1-1 MAIN BOARD.

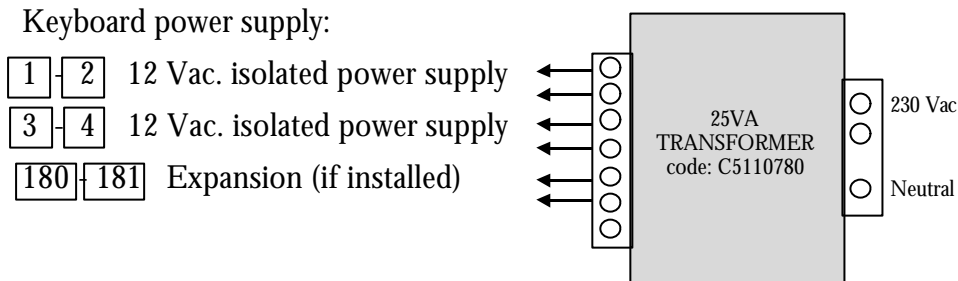
N.B.: the value of parameter 93, indicated on display B5, is not updated dynamically. Update the displayed value using the B6 keys.

3 Power supply

Board power supply:



Keyboard power supply:

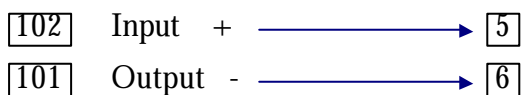


4 Serial connections

COM1: 0-20mA half duplex serial interface for connection with the display board.

MAIN BOARD

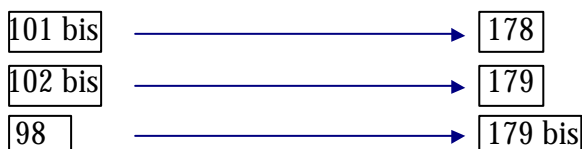
KEYBOARD



COM2: 0-20mA half duplex serial interface for connection between logic and main board. With a suitable circuit the current loop is also converted into an RS 485 serial port for communication to the expansion modules:

MAIN BOARD

EXPANSION BOARD

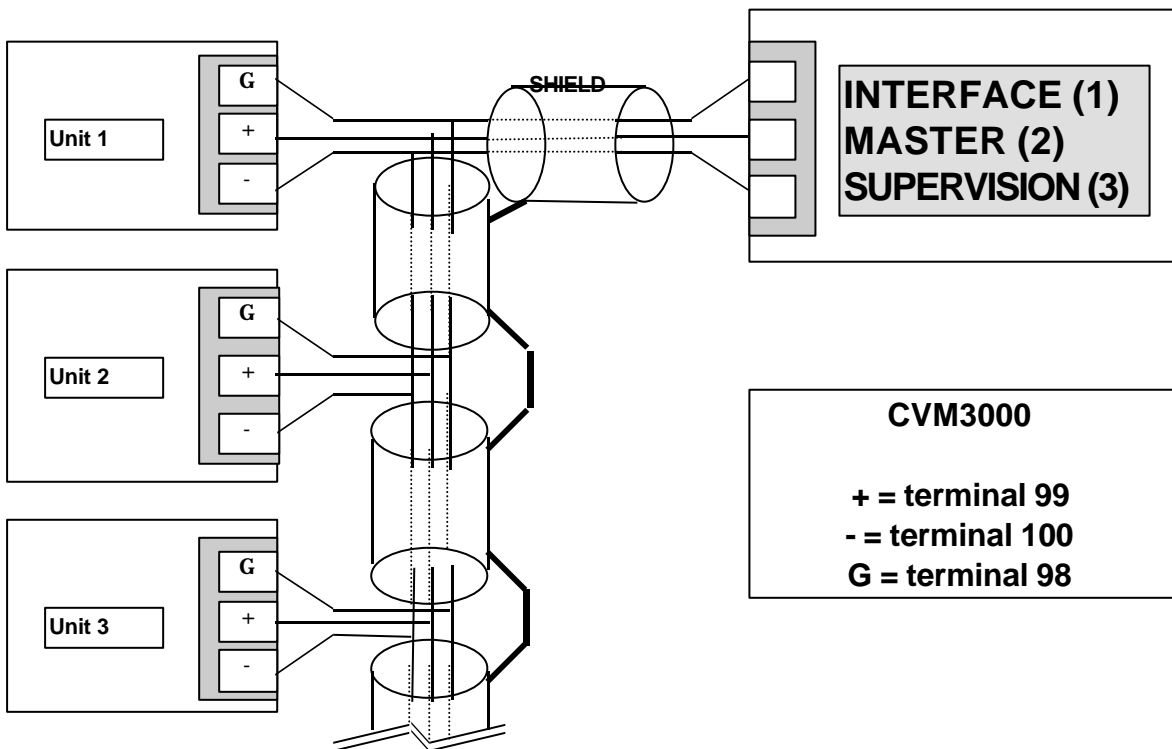


Note: the expansion dip-switches must all be set to ON (Figure 1-3 EXPANSION MODULE, point N).

COM3: half duplex RS485 serial interface for connection to printer, supervision systems, Interface, Master:

- 99 RS485 +
- 100 RS485 -
- 98 reference

The cable used for the connections must be shielded and must have at least 1 sq. mm wires for distances of less than 300 meters and 1.5 sq. mm wires for longer distances. The maximum distance of the cable that connects the CVM Master, the Interface, the supervision software to the farthest unit must not exceed 1000 meters. As shown in the figure, the single shield sections must be connected to each other but not to the terminal boards:



NB: maximum number of connected units = 8

NB: as indicated in the figure, a SINGLE serial cable must leave the CVM Master, the Interface, or the Supervision software to connect the first unit, then proceed to connect the other units successively.

COM4: RS485 half duplex serial interface with DTR for remote connection by modem:

- 96 bis DTR
- 96 RS485 +
- 97 RS485 -
- 98 reference

- (1) Refer to manual
- (2) Refer to manual
- (3) Refer to manual

for description and use.
for description and use.
for description and use.

Software

5 Description of user interface

The CVM_3000 keyboards are shown in figures 1, 2, 3, 4, 5, 6 of the enclosures, respectively:


- Fig. 1: CVM_3000 C Chiller version
- Fig. 2: CVM_3000 R Chiller with heat recovery version
- Fig. 3: CVM_3000 N Heat Pump version
- Fig. 4: CVM_3000 FC Free-Cooling version
- Fig. 5: CVM_3000 Q Multipurpose Unit version
- Fig. 6: CVM_3000 NR Heat Pump with heat recovery version

If the **(C1) POWER** LED is on, it means that the electronic control is supplied with power.


Before you switch on the unit, make sure that it has been supplied with power for at least 8 hours (in order to enable the heating of the oil and to avoid presence of refrigerant gas inside the compressor oil pan).

When the power supply is connected, the controller carries out a 10 second lamp test automatically.


5.1 Unit start-up

 Press the **T1** key:
The LED on the key will light up.

5.2 Unit shutdown

 Press the **T1** key:
The LED on the key will go off.

5.3 Enabling a compressor

 Press the **A1** key corresponding to the compressor to be enabled;
The LED on the key will light up.

The start-up of the enabled compressor may be delayed due to:

- the delays set in the parameters
- the water inlet temperature is under the cold water set point
- alarm.

5.4 Disabling a compressor











Press the **A1** key corresponding to the compressor to be disabled;
The LED on the key will go off.

Use this function only for emergency stops, since the pump-down procedure is not carried out and the compressor may suffer damage not covered by the warranty.

5.5 Meaning of the compressor status LED's (A2)

LED REQUEST	LED OPERATION	
Off	Off	Compressor off
On	Off	Compressor requested but delayed
On	On	Compressor operating
Off	On	Shutdown with pump down procedure

5.6 Reading the operating conditions

-  Using the **B3** key, select the compressor for which you wish to visualise the information (the number will appear on the **B2** display and the corresponding LED on the **A1** key will simultaneously start flashing);
-  the condensing pressure appears on the **B4** display;
-  other values may be visualised on the **B5** display, selected through the **B6** “arrow down” key. The values that may be visualised are:
 -  low pressure (default);
 -  compressor differential oil pressure;
 -  discharge temperature;
 -  compressor operating hours;
 -  air temperature near condenser coil fins (only on N and Q versions; in this case all the LED's on the left of the B5 display will flash).

The LED on the side of the display (**B5**) lights up to indicate which value is visualised; simultaneously, one of the LED's below the display indicates the unit of measurement.

5.7 Temperature display

5.7.1 Version C (Chiller)

Evaporator inlet temperature:



press the **T4** key. The LED on the key will light up;



read the value on the **C2** display.

Evaporator outlet temperature:



press the **T5** key. The LED on the key will light up;



read the value on the **C2** display.

5.7.2 R/N/Q versions: Chiller with recovery; Heat Pumps; Multipurpose Units

Evaporator inlet temperature:



press the **T4** key (CHILLED WATER). The LED on the key will light up;



read the value on the **C2** display.

Evaporator outlet temperature:



press the **T5** key (CHILLED WATER). The LED on the key will light up;



read the value on the **C2** display.

Condenser inlet temperature:



press the **T4** key (HOT WATER). The LED on the key will light up;



read the value on the **C2** display.

Condenser outlet temperature:





press the **T5** key (HOT WATER). The LED on the key will light up;





read the value on the **C2** display.

5.7.3 FC version (Chiller with free-cooling)



Free-cooling coil inlet temperature:

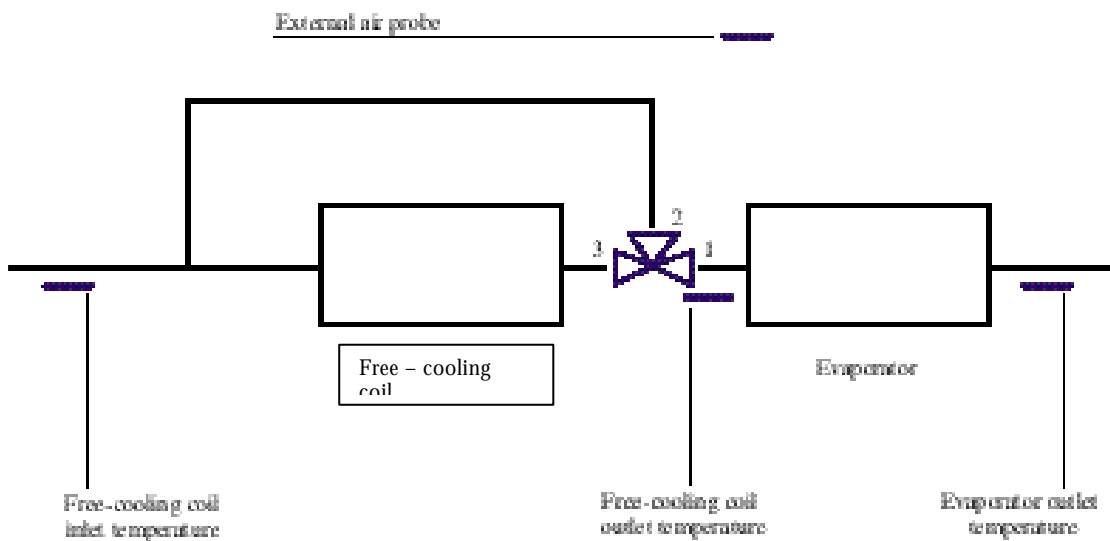
-  press the **T17** key. The LED on the key will light up;
-  read the value on the **C2** display.

Free-cooling coil outlet temperature (evaporator inlet):

-  press the **T18** key. The LED on the key will light up;
-  read the value on the **C2** display.

Evaporator outlet temperature:

-  press the **T19** key - The LED on the key will light up;
-  read the value on the **C2** display.



5.8 Operating mode selection

5.8.1 R version

Selection of recovery operating mode

To select the recovery operating mode:



press the **T12** key - The LED on the key will light up

To deselect the recovery operating mode:



press the **T12** key - The LED on the key will go off

5.8.2 N version

Selection of chiller operating mode

To select the chiller operating mode:



press the **T11** key - The LED on the key will light up

Selection of heat pump operating mode

To select the heat pump operating mode:



press the **T11** key - The LED on the key will go off

5.8.3 FC version

Selection of free-cooling operating mode

To select the free-cooling operating mode:



press the **T15** key - The LED on the key will light up

To deselect the free-cooling operating mode:



press the **T15** key - The LED on the key will go off

5.8.4 Q version

Selection of automatic operation

With the automatic operating mode the unit satisfies the demands for thermal and/or refrigerating energy coming from the system. To select the automatic operating mode:

 press the **T20** key. The LED on the key will light up.

When the automatic operating mode has been selected, both the cold and hot circuit pumps must be in operation.

Selection of chiller operating mode

 press the **T21** key. The LED on the key will light up.

Selection of chiller with recovery operating mode

 press the **T12** key. The LED on the key will light up.

Selection of heat pump operating mode

 press the **T22** key. The LED on the key will light up.

5.9 Signals

ConF This message flashes during the writing phase of an EEPROM.

Att This message flashes during the alarm list erasing.

5.10 ALARMS

NB: if microprocessor's data logger is enabled when a manual reset alarm appears (except for E003, E004, E020, E211, E203 and E213 which have automatic reset) keyboard response will slow down for about a minute, which is the time required to store in the memory the status of the last 10 minutes of unit operation. During this phase it is important:

1. **DO NOT** to access the programming menus.
2. **DO NOT** to disconnect the power supply to the unit.


At the conclusion of this phase the keyboard will resume normal operating speed.


There are two types of alarm: the circuit/compressor and the general alarms.

5.10.1 Circuit and/or compressor alarms


Display of circuit and compressor alarms

The circuit alarms are signalled by the lighting up of the **FAULT (A2)** LED corresponding to the compressor for which the alarm has activated. To visualise the alarm:

 press the **B3** key – The number of the selected compressor will appear on the **B2** display; to pass to the next compressor press the **B3** key again, then select the compressor in alarm status; once the compressor has been selected, one of the **B1** LED's will light up to indicate the type of alarm.


 Press the "arrow up" **B6** key – the alarm code will appear on the **B5** display.

Alarm reset:


 press the **A1** key corresponding to the compressor in alarm status; if the event that caused the alarm has been removed (fault LED flashing), the alarm will be reset.

5.10.2 General alarms

Display of general alarms

 press the **T7** key – On the **C2** display the alarm code will appear. The corresponding **C1** LED will light up simultaneously in case of a flow switch or antifreeze alarm. In case of a voltage alarm, the **POWER** LED will flash.

Alarm reset:


















 press the **T8** key; if the event that caused the alarm has been removed (code on C2 display flashing) the alarm will be reset.

















5.11 FLASHING LED's













The flashing of the keyboard LED's may signal status or alarm conditions:

A1 key LED's	Compressor selected on the B2 display
A2 LED: DEFROST	Defrost time counting phase Stand-by phase at the end of defrosting
A2 LED: RECOVERY	Condensation pressure too high in recovery operating mode: forced time in chiller operating mode
A2 LED: FAULT	End of an alarm condition: the alarm can be reset
B1 LED: lp	The maximum number of low pressure, automatic reset alarms has been reached and therefore the alarm must be reset manually
B1 LED: hp	End of high pressure alarm: manual reset is possible
B1 LED: op	End of compressor oil pressure alarm: manual reset is possible
C1 LED: ICE	End of antifreeze alarm: manual reset is possible
C1 LED: Power	Mains voltage and/or frequency alarm
T1 ON/OFF LED	Forcing in OFF from serial connected remote control but not from remote ON/OFF contact
T7 key LED	Printing of parameters in progress
T10 key LED	Printing of variables in progress
T6 key LED	Printing of alarm history in progress
T23 key LED	During hour band programming

6 Alarm signals

CODE	ALARM	Type of reset	Possible causes
E000	Antifreeze	M	<ul style="list-style-type: none">  Not correct water flow rate to the evaporator  Water pump off  Incorrect setting of set point and Δt  Incorrect setting of antifreeze set point
E001	Mains voltage	A	<ul style="list-style-type: none">  Voltage values exceed limits set in parameters 3 and 4
E002	Mains frequency	A	<ul style="list-style-type: none">  Frequency values exceed limits set in parameters 5 and 6
E003	Chilled water circuit flow switch	A	<ul style="list-style-type: none">  Not correct water flow rate to the evaporator  Air bubbles in water circuit  Flow switch malfunction
E004	Hot water circuit flow switch	A	<ul style="list-style-type: none">  Not correct water flow rate to the condenser  Air bubbles in water circuit  Flow switch malfunction
E005	Low inlet temperature	Only on alarm list/A	<ul style="list-style-type: none">  This alarm is detected only for heat pump unit, after a chiller/heat pump switchover
E006	High inlet temperature	Only on alarm list/A	<ul style="list-style-type: none">  This alarm is detected only for heat pump unit, after a heat pump/chiller switchover
E020	Incorrect configuration	A	<ul style="list-style-type: none">  Error in the programming of the configuration parameters
E028	Incorrect probe calibration	M	<ul style="list-style-type: none">  Unit start-up with Eeprom not yet programmed  Unit start-up with Eeprom already programmed but with problematic reading of the probe calibration data

E029	Compressor data error	M	 The alarm will be reset by entering into the programming mode. In this mode, the compressors are deselected and the operating hours are set to zero.
E030	Parameter read error	M	 The alarm will be reset by entering into the programming mode. The programmed parameters must be checked to make sure they are correctly set.
E031	Set-point read error	M	 The alarm will be reset by entering into the programming mode. The programmed set points must be checked to make sure they are correctly set.
E035	Master disconnected	A	 No serial communication with the Master
E036	Keyboard disconnected	Only on alarm list/A	 No communication with the keyboard (the COLL message appears on the C2 display and the alarm code is recorded in the alarm history)
E037	Expansion board disconnected	A	 No serial communication with the expansion board
E038	Disconnection between the logic and the main board	A	 No serial communication between logic and main board  No power supply to the logic board
E101	Oil differential pressure	M	 Low compressor oil pressure
E102	Discharge temperature	M	 High temperature on compressor's discharge
E103	Compressor thermal overload protection	M	 Compressor motor overheating
E106	Oil pressure probe error	M	 Oil pressure transducer malfunction
E107	Discharge temperature probe error	M	 Malfunction of the compressor discharge temperature probe
E116	Maximum safety high pressure switch	M	 High condensing pressure
E201	High pressure	M	 High condensing pressure
E202	Fan thermal overload protection	M	 Fan motor overheating

E203	Pump down pressure	A	 The circuit has not reached the pump-down pressure set
E206	Low pressure probe error	M	 Pressure transducer malfunction
E207	High pressure probe error	M	 Pressure transducer malfunction
E208	Defrost temperature probe error	A	 Failure of temperature probe placed near coils fins
E211	Maximum defrost time	Only on alarm list	 Event recorded only in alarm history
E213	Low pressure	A/M	 Not correct water flow rate to the evaporator  Dirty evaporator  Insufficient refrigerant gas charge
E214	Modem disconnected	M	 Modem off  No power to converter  Defective connection
E4XX	Temperature probe error	A	 Malfunction in one of the temperature probes

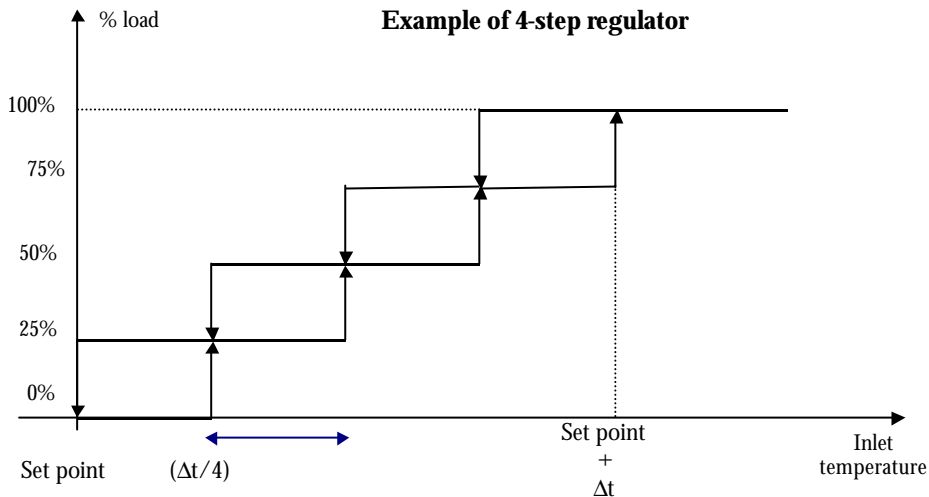
M = manual reset alarm









A = manual reset alarm

A/M = automatic reset alarm for a programmable number of events/hour

7 Regulation

7.1 Chilled water regulation



-  press the **T2** key. The LED of the key will light up;
-  the value of the set point will appear on the **C2** display;
-  modify the set point using the **C3** keys:
 - arrow up to raise,
 - arrow down to lower,
-  press the **T2** key to confirm. The LED on the key will go off;
-  press the **T3** key. The LED on the key will light up;
-  the value of the Δt setting will appear on the **C2** display;
-  modify the value of the Δt using the **C3** keys:
 - arrow up to raise,
 - arrow down to lower,
-  press the **T3** key to confirm. The LED on the key will go off.

7.1.1 Default set point settings

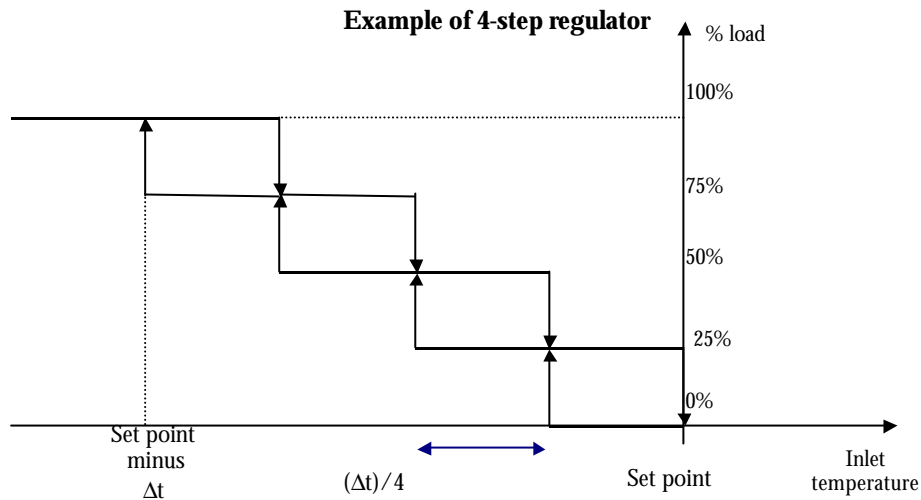
The following table shows, based on the number of steps, the commonly used set point and Δt values.









The theoretical minimum and maximum values indicated in the table for the outlet temperature refer to nominal flow rate operation, and therefore with a 5° C evaporator thermal head.

No. of steps	Set point [°C]	Δt [°C]	Theoret. min out temp.	Theoret. max out temp.
1	11	1	6	12
2	9.5	2.5	5.7	10.8
3	8	4	5.6	9.4
≥ 4	7	5	≤ 5.7	≤ 8.3

Warning: the regulation is made based on the temperature reading at the evaporator's inlet.

7.2 Hot water regulation



-  press the **T9** key – The LED on the key will light up;
-  the value of the set point will appear on the **C2** display;
-  modify the set point using the **C3** keys:
 - arrow up to increase,
 - arrow down to decrease,
-  press the **T9** key to confirm. The LED on the key will go off;
-  press the **T10** key. The LED on the key will light up;
-  the value of the Δt setting will appear on the **C2** display;
-  modify the value of the Δt using the **C3** keys:
 - arrow up to increase,
 - arrow down to decrease,
-  press the **T10** key to confirm. The LED on the key will light up.

7.2.1 Default set point settings

The following table shows, based on the number of steps, the commonly used set point and Δt values.

The theoretical minimum and maximum values indicated in the table for the outlet temperature refer to nominal flow rate operation, and therefore with a 5° C evaporator thermal head.

No. of steps	Set point [°C]	Δt [°C]	Theoret. min out temp.	Theoret. max out temp.
1	41	1	40	46
2	42.5	2.5	41.2	46.3
3	44	4	42.6	46.4
≥ 4	45	5	≤ 43.7	≤ 46.3

Warning: the regulation is made based on the temperature reading at the condenser's inlet.

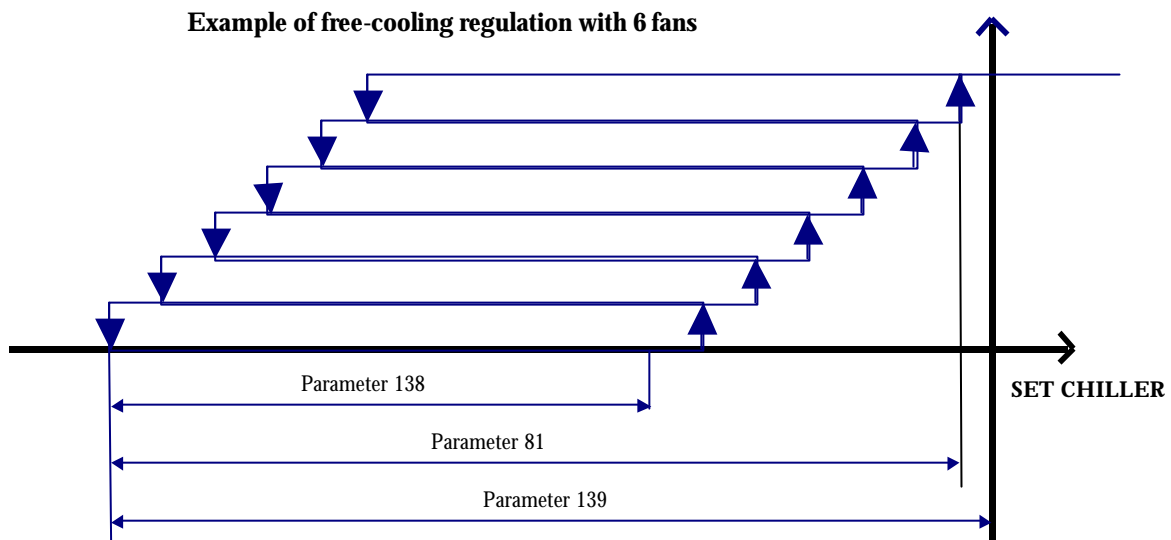
7.3 Free-cooling regulation (only FC version):

The regulation is made using the **T15** key.

Key **T13** allows you to visualise the set point variation compared to the value set with the **T2** key (the set point variation is enabled through parameter 97).

Key **T14** allows you to visualise the actual thermal head between the unit's inlet and outlet temperatures.

These visualisations appear on the **C2** display.



7.3.1 Default set point settings

NB: refer to the figure above.

N.	MACHINE PARAMETERS	RANGE	DEFAULT
81	PROPORTIONAL BAND FOR FAN REGULATION IN FREE COOLING OPERATING MODE	0 ↔ 500	2 °C
85	PRIMARY CIRCUIT INTEGRAL TIME	0 ↔ 600	0 sec
87	SECONDARY CIRCUIT INTEGRAL TIME	0 ↔ 600	0 sec
98	MINIMUM DIFFERENCE BETWEEN INLET WATER TEMPERATURE AND EXTERNAL AIR TEMPERATURE FOR THE STARTING OF FREE COOLING OPERATION	0 ↔ 50	1 °C
99	MAXIMUM DIFFERENCE BETWEEN EXTERNAL AIR TEMPERATURE AND INLET WATER TEMPERATURE FOR THE END OF FREE COOLING OPERATION	0 ↔ 50	1 °C
138	FAN ACTIVATION HYSTERESIS IN FREE-COOLING MODE	-10 ↔ 10	1 °C
139	FAN ACTIVATION OFFSET IN FREE-COOLING MODE	-10 ↔ 10	2 °C
140	FAN SHUTDOWN DELAY IN FREE-COOLING MODE	0 ↔ 500	20 sec
141	FAN STARTUP DELAY IN FREE-COOLING MODE	0 ↔ 500	20 sec

8 Enable printing

The data are accessible through the RS485 serial port on the main board, to which a serial printer can be connected for delivering the contents of the files (DPU printer – 114, paragraph 11.5).

During the printout, the enable printing key flashes. If the print command is repeated while printing is in progress, the operation will be interrupted.

NB: to enable printing, the value of parameter 1 must be set to 0. For printing you can use the printer and converter supplied by Climaveneta, or the Service software.

8.1 Parameter printing

NASCOSTO 1 *+ T 7

Each line of print has the following structure:

1. parameter number;
2. parameter value;
3. unit of measurement.

For the printing of pressure values, the unit of measurement and the position of the decimal point must be compatible with the value of parameter 2.

8.2 Compressor variables and status printing

NASCOSTO 1 *+ T 10

The lines with the probe values have the following structure:

- 1: probe number;
- 2: measurement value;
- 3: unit of measurement.

If the probe has not been configured, “- - - -” appears instead of the value, if the probe is faulty, “Error” appears.

The lines with the compressor status have the following structure:

- 1: compressor number;
- 2: status: Alarm, Deselected, On, Off;
- 3: compressor working hours.

(*) For information on these keys, contact the Climaveneta Customer Service Dept.

8.3 Alarm history printing

NASCOSTO 1+ T 6

The record printout has 7 columns and is structured as follows:

	DESCRIPTION	LIMITS
1	Progressive print number	001-200
2	Hour of event	00-24
2b	Dd/mm/yy of event	
3	Alarm code	000-299
4	Number of events in the indicated hour	1-32
5	Compressor or circuit number	1-8
6	29-character alphanumeric string for alarm description and associated compressor and/or circuit number to which the alarm refers	

Example:

```

** ALARM HISTORY **

PROG HR   DATE   FREQ/  CIRC COD.  DESCR.
.         .     .     .     .     .
          HR   ALM. ALM.
34 13 07/10/97 01   4   201 MAXIMUM PRESSURE
33 13 07/10/97 04   4   116 MAXIMUM PRESSURE
32 13 07/10/97 02   3   116 MAXIMUM PRESSURE
31 13 07/10/97 03   2   116 MAXIMUM PRESSURE
30 13 07/10/97 01   2   201 MAXIMUM PRESSURE
29 13 07/10/97 01   1   116 MAXIMUM PRESSURE
28 13 07/10/97 01   1   201 MAXIMUM PRESSURE
27 13 07/10/97 01   3   103 THERMAL PROTECTION
26 13 07/10/97 01   4   103 THERMAL PROTECTION
25 13 07/10/97 01   2   103 THERMAL PROTECTION
24 13 07/10/97 01   1   103 THERMAL PROTECTION
23 13 07/10/97 01           000 ANTIFREEZE
22 10 07/10/97 02           402 TEMPERATURE PROBE ERROR
21 10 07/10/97 02           401 TEMPERATURE PROBE ERROR
20 16 06/10/97 01           000 ANTIFREEZE
19 14 06/10/97 01   4   101 OIL DIFFERENTIAL
18 14 06/10/97 03   3   213 MINIMUM PRESSURE
17 13 06/10/97 03   3   213 MINIMUM PRESSURE
16 13 06/10/97 03   2   213 MINIMUM PRESSURE
15 13 06/10/97 02   1   213 MINIMUM PRESSURE
14 12 06/10/97 01   1   203 PUMP-DOWN PRESSURE
13 12 06/10/97 03   4   203 PUMP-DOWN PRESSURE
12 12 06/10/97 05   3   203 PUMP-DOWN PRESSURE
11 12 06/10/97 03   2   203 PUMP-DOWN PRESSURE
10 12 06/10/97 01   1   101 OIL DIFFERENTIAL
9 11 06/10/97 01   1   203 PUMP-DOWN PRESSURE
8 11 06/10/97 03   4   203 PUMP-DOWN PRESSURE
7 11 06/10/97 04   4   101 OIL DIFFERENTIAL
6 11 06/10/97 01   3   101 OIL DIFFERENTIAL
5 11 06/10/97 02   2   101 OIL DIFFERENTIAL
4 11 06/10/97 04   1   101 OIL DIFFERENTIAL
3 13 15/08/92 01           000 ANTIFREEZE
2 10 04/07/92 01           000 ANTIFREEZE
1 10 04/07/92 02           003 COLD FLOW SWITCH INLET

```

8.4 Lamp test

NASCOSTO 1* + T 8



Procedure for lighting up all the front panel LED's and displays in order to verify the proper keyboard and display operation.

When the unit is switched on a 10 second lamp test is carried out automatically.

(*)For information on these keys, contact the Climaveneta Customer Service Dept.

8.5 Printer characteristics for connection to CVM 3000

To check the setting of the DPU-414 printer:

-  press the printer's ON LINE (for at least 2 SECONDS) and POWER ON keys simultaneously. The configuration of the software dip-switches will be printed.
-  Press the FEED key to exit from the programming.

The setting is correct if the print corresponds to the following list:

Dip SW-1

- 1 (OFF): Input = Serial
- 2 (ON): Printing Speed = High
- 3 (OFF): Auto Loading = OFF
- 4 (OFF): Auto LF = OFF
- 5 (ON): Setting Command = Enable
- 6 (OFF): Printing
- 7 (ON): Density
- 8 (ON): =100 %

Dip SW-2

- 1 (OFF): Printing Columns = 80
- 2 (ON): User Font Back-up = ON
- 3 (ON): Character Select = Normal
- 4 (ON): Zero = Normal
- 5 (ON): International
- 6 (ON): Character
- 7 (OFF): Set
- 8 (OFF): = England

Dip SW-3

- 1 (ON): Data Length = 8bits
- 2 (ON): Parity Setting = NO
- 3 (OFF): Parity Condition = Even
- 4 (OFF): Busy Control = XON/XOFF
- 5 (OFF): Baud
- 6 (ON): Rate
- 7 (ON): Select
- 8 (ON): = 9600 bps

If the configuration of the dip-switches differs from the one shown above, consult the printer operating manual or contact CLIMAVENETA.

9 Hour band programming

9.1 Keys

T23 - ON-OFF for hour band program execution. It can be used if the controller is not in the hour band configuration or programming phase.

NASCOSTO 1 +T23- To access or exit the hour band programming phase.

Access to programming is possible only when all the displays are off (as in programming mode) and the compressors are off.

NB: in order to operate with the hour bands, parameter 37 must be set to 1.

9.2 Led's

T23 KEY LED – it is on when the hour band operating mode is active, it flashes during programming.

9.3 The display during programming

B2 day;

B4 band;

B5 starting time;

C2 value selected based on the set keys and proportional band.

The B6 keys are used to modify the value visualised on the B2, B4, B5 display.

The B3 key is used to select the parameter to be modified (day/band/starting time): during the selection the corresponding display (B2/B4/B5) flashes.

The following keys are enabled: T2, T3, T9, T10, *i.e.* the set keys and proportional band that can be set for each exchanger.

The desired operating mode for each circuit and each band can also be selected.

The A1 keys are used to select the active compressors within the programmed hour band.

9.4 Hour band execution

When hour band execution has been enabled the following parameters cannot be modified:

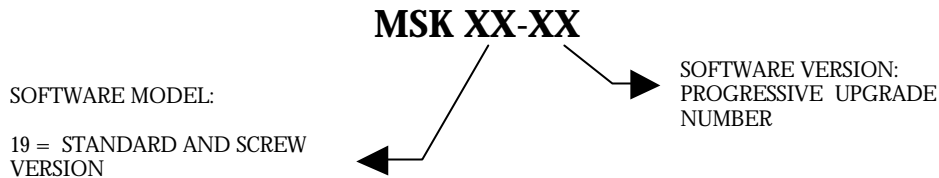
- operating mode;
- setting;
- proportional band.

However, compressor selection can temporarily be modified in case of an emergency.

When hour band execution is disabled, regulation continues with the latest settings utilised and manual modification is possible.

10 Upgrading Eprom

The software version is identified by the following code, shown above the EPROM:



If you need to upgrade the software of a board from an MSK19_16 version or older to an MSK 19_17 version or higher, contact CLIMAVENETA.

If you need to upgrade the board from an MSK 19_17 version to an improved version, follow this procedure:

1. disable the compressors (see chap.8.4);
2. the displays must be off;
3. print the parameters (see chap.11);
4. disconnect the power supply to the unit;
5. remove the EPROM (Figure 1-1 MAIN BOARD) from its base;
6. install the new EPROM; be careful not to touch the pins with your fingers;;
7. install the self-calibration kit in the appropriate board terminals;
8. reconnect the power supply;
9. to access the programming menu, press the NASCOSTO 2*+C3 keys “arrow up”. A dot should start flashing on the C2 display;
10. scroll through the parameter list using the C3 keys, until the “PASS” message appears on the C2 display;
11. enter the password visualised on the B5 display using the B6 keys;
12. scroll through the parameter list using the C3 keys, visualise parameter 120 on the C2 display;
13. press the NASCOSTO 1*+C3 key “arrow up”. The LED on the T7 key will light up. Wait until the LED on the T7 keys goes off;
14. scroll through the parameter list using the C3 keys, visualise parameter 121 on the C2 display;

(*) For information on these keys, contact the Climaveneta Customer Service Dept.

repeat point 13 until the value that appears on the B4 display, regarding parameters 120, 121, 152, 153, corresponds to the one shown in the table:

PARAMETER	VALUE
120	50.0 + parameter offset value
121	-20.0 + parameter offset value
152	25.0 + parameter offset value
153	05.0 + parameter offset value

16. exit from the programming menu, press the NASCOSTO 2* + C3 keys, “arrow up”;
17. disconnect the power supply to the unit;
18. remove the self-calibration kit;
19. reconnect the power supply to the unit;
20. enter the programming menu (see point 9);
21. re-program the unit (check the value of the parameters by printing them, and set the value of any new parameters). Scroll through the parameter list using the C3 keys. The value of the parameter is visualised on the B5 display;
22. exit from the programming menu (see point 16);
23. disconnect the power supply to the unit;
24. reconnect the power supply to the unit;
25. enable the compressors (see chap.8.3).

(*)For information on these keys, contact the Climaveneta customer service dept.

11 Self-calibration

1. disable the compressors (see chap.8.4);
2. the displays must be off;
3. disconnect the power supply to the unit;
4. install the self-calibration kit** in the appropriate board terminals;
5. re-connect the power supply to the unit;
6. press the NASCOSTO 2*+C3 keys, “arrow up”. A dot should start flashing on the C2 display;
7. scroll through the parameter list using the C3 keys and visualise parameter 120 on the C2 display;
8. press the NASCOSTO 1*+C3 key “ arrow up ”. The T7 key LED will light up. Wait until it goes off;
9. scroll through the parameter list using the C3 keys and visualise parameter 121 on the C2 display;
10. repeat step 8 so that the value of parameters 120, 121, 152, 153 on the B4 display is, respectively:

PARAMETER	VALUE
120	50.0 + offset value shown on the B5 display
121	-20.0 + offset value shown on the B5 display
152	2.50 + offset value shown on the B5 display
153	0.50 + offset value shown on the B5 display

11. to exit from parameter programming press the NASCOSTO 2* + C3 keys, “arrow up”;
12. disconnect the power supply to the unit;
13. remove the self-calibration kit;
14. re-connect the power supply to the unit;
15. enable the compressors (see chap.8.3).

(*) For information on these keys, contact the Climaveneta customer service dept.

(**) Refer to manual for description and use.

Setup

12 Access to the programming menu

To access the USER menu:

1. disable all the compressors (see chap 8.4);
2. the displays must be off;
3. press the NASCOSTO 2* + C3 keys “arrow up”. A dot should start flashing on the C2 display if the procedure was done properly;
4. scroll through the parameter list using the C3 keys, and modify the value of the parameter visualised on the B5 display using the B6 keys;
5. to exit from parameter programming, press the NASCOSTO 2* + C3 keys, “arrow up”;
6. enable the compressors (see chap.8.3).

To access the FACTORY menu:

1. disable the compressors (see chap.8.4);
2. the displays must be off;
3. press the NASCOSTO 2* + C3 keys “arrow up”. A dot should start flashing on the C2 display;
4. scroll through the parameter list using the C3 keys until the “PASS” message appears on the C2 display. Enter the password on the B5 display using the B6 keys;
5. scroll through the parameter list using the C3 keys, and modify the value of the parameter visualised on the B5 display using the B6 keys;
6. to exit from parameter programming, press the NASCOSTO 2* + C3 keys, “arrow up”;
7. enable the compressors (see chap.8.3).

(*) For information on these keys, contact the Climaveneta customer service dept.

13 PARAMETERS

= USER PARAMETERS
M = MACHINE PARAMETERS
CI = CIRCUIT PARAMETERS
CO = COMPRESSOR PARAMETERS

N.	TYPE	MACHINE PARAMETERS	RANGE	DEFAULT
0	CI	LOW PRESSURE ALARM DELAY	0 ↔ 500	120 sec
1	M	ALLOWS YOU TO SELECT THE DEVICE TO BE CONNECTED TO THE COM3 SERIAL PORT	0: PRINTER 1: CVM MASTER 2: SUPERVISION 3: ----- 4: INTERFACE	-----
2	CI	PRESSURE UNIT OF MEASUREMENT	0: BAR 1: MEGAPASCAL	1 flag
3	M	MAXIMUM VOLTAGE CONTROL SETTING	0 ↔ 500	242 Volt
4	M	MINIMUM VOLTAGE CONTROL SETTING	0 ↔ 500	198 Volt
5	M	MAINS FREQUENCY	38 ↔ 62	50 Hz
6	M	MAINS FREQUENCY DELTA	1 ↔ 10	2 Hz
7	M	VOLTAGE/FREQUENCY ALARM DELAY	0 ↔ 10	5 sec
8	M	ANTIFREEZE ALARM DIFFERENTIAL	0 ↔ 20	4 °C
9	CO	MINIMUM TIME BETWEEN COMPRESSOR SHUTDOWN AND STARTUP	0 ↔ 500	60 sec
10	M	MINIMUM STARTUP DELAY TIME BETWEEN COMPRESSORS (ANTIPEAK)	0 ↔ 500	10 sec
11	M	DELAY TIME BETWEEN STEPS SWITCHING ON	0 ↔ 500	0 sec
12	M	DELAY TIME BETWEEN STEPS SWITCHING OFF	0 ↔ 500	0 sec
13	M	COLD WATER FLOW SWITCH ALARM RESET DELAY	0 ↔ 500	10 sec
14	M	HOT WATER FLOW SWITCH ALARM RESET DELAY	0 ↔ 500	10 sec
15	M	START FREE-COOLING OPERATION DELAY TIME	0 ↔ 200	10 sec
16	M	STOP FREE-COOLING OPERATION DELAY TIME	0 ↔ 200	10 sec
17	M	COMPRESSOR TYPE SELECTION (see paragraph 13.1)	0: ALTERNATIVE COMPRESSORS 2: SCREW COMPRESSORS	-----
18	CO	COMPRESSOR OIL DIFFERENTIAL PRESSURE ALARM DELAY	0 ↔ 500	Tab. 13-3
19	M	UNIT IDENTIFICATION CODE FOR CVM MASTER, INTERFACE, SOFTWARE, SUPERVISION	11 ↔ 18	11-18

20	CI	CONFIGURATION OF CIRCUIT N° 1	1-12	Tab. 13-1
21	CI	CONFIGURATION OF CIRCUIT N° 2	0-12	Tab. 13-1
22	CI	CONFIGURATION OF CIRCUIT N° 3	0-12	Tab. 13-1
23	CI	CONFIGURATION OF CIRCUIT N° 4	0-12	Tab. 13-1
24	CI	CONFIGURATION OF CIRCUIT N° 5	0-12	Tab. 13-1
25	CI	CONFIGURATION OF CIRCUIT N° 6	0-12	Tab. 13-1
26	CI	CONFIGURATION OF CIRCUIT N° 7	0-12	Tab. 13-1
27	CI	CONFIGURATION OF CIRCUIT N° 8	0-12	Tab. 13-1

PARAMETER VALUE	No. OF CAPACITY STEPS PER COMPRESSOR:	No. OF COMPRESSORS PER CIRCUIT:
0	0	0
1	0	1
2	0	2
3	0	3
4	1	1
5	1	2
6	1	3
7	2	1
8	2	2
9	2	3
10	3	1
11	3	2
12	3	3

Table 13-1 CIRCUIT CONFIGURATION

28	CI	LOW PRESSURE ALARM SET	-1.0 ↔ 7.0	Tab. 13-2
29	CI	LOW PRESSURE ALARM DIFFERENTIAL	0.0 ↔ 10.0	Tab. 13-2

R22 (Bar) R407C		R134A (Bar)		
PAR. 28	PAR. 29	PAR. 28	PAR. 29	
2.8	1.4	1.0	0.7	WATER COOLED UNITS
1.6	0.9	0.6	0.7	AIR COOLED UNITS
1.6	0.9	0.6	0.7	FOR LOW OUTLET WATER TEMPERATURE (> -5°C) AND FOR EXTERNAL AIR LOW TEMPERATURE DEVICE
1.0	0.7			FOR LOW WATER TEMPERATURES (LOWER THAN OR EQUAL TO -5°C)

Table 13-2 LOW PRESSURE ALARM SET

30	CO	COMPRESSOR OIL DIFFERENTIAL PRESSURE ALARM SET	0.0 ↔ 5.0	Tab. 13-2
----	----	--	-----------	-----------

TYPE OF COMPRESSOR	PARAMETER 30	PARAMETER 18
COPELAND FINO A 60 Hp	0.7	120
COPELAND OLTRE 60 Hp	1.2	45
REFCOMP SERIE "F" E "M"	1.8	60

Table 13-3 COMPRESSOR OIL DIFFERENTIAL PRESSURE ALARM SET

31	CI	HIGH PRESSURE ALARM SET	10.0 ↔ 28.0	Tab. 13-4
32	CI	HIGH PRESSURE ALARM DIFFERENTIAL	0.0 ↔ 10.0	Tab. 13-4

SAFETY VALVE CALIBRATION	MAXIMUM SAFETY PRESSURE SWITCH SET		HIGH PRESSURE ALARM SET	
	SET	RESET	PAR. 31	PAR. 32
23.3	21.8	16.3	20.8	5.3
24.5	23	17.5	22 (22.8*)	5.5 (6.3*)
27	25.5	19.5	24.5	6
27.6	26.1	20.1	25.1	6
28	26.5	20.5	25.5	6

(*)ON HEAT PUMP UNIT WITH ISPEL SHELL AND TUBE HEAT EXCHANGERS
Table 13-4 HIGH PRESSURE ALARM SET

33	CO	COMPRESSOR DISCHARGE TEMPERATURE ALARM SET	40.0 ↔ 140.0	125.0 °C
34	CO	COMPRESSOR DISCHARGE TEMPERATURE ALARM DIFFERENTIAL	0.0 ↔ 30.0	30.0 °C
35	M	MINIMUM TIME BETWEEN TWO SUCCESSIVE COMPRESSOR STARTUPS	0 ↔ 600	360 sec
36	CI	PRESSURE SET FOR FORCED VENTILATION DURING DEFROSTING	10.0 ↔ 28.0	23.5 Bar
37	M	HOUR BAND ENABLE	0: NOT ENABLED 1: ENABLED	0-1 Flag
38	C	MAXIMUM NUMBER OF LOW PRESSURE ALARMS PER HOUR	0 ↔ 30	3 Num
39	M	COMPRESSOR STARTUP/SHUTDOWN MODE BY THE THERMOREGULATOR MUST BE SET TO 0 FOR UNITS WITH MORE THAN 1 EVAPORATOR.	0= ENABLE CAPACITY STEPS OF ALL THE COMPRESSORS BEFORE SHUTDOWN 1= ENABLE CAPACITY STEPS AND SHUTS DOWN EACH SINGLE COMPRESSOR	1 Num

40	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 1	0 ↔ 2	Tab. 13-5
41	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 2	0 ↔ 2	Tab. 13-5
42	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 3	0 ↔ 2	Tab. 13-5
43	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 4	0 ↔ 2	Tab. 13-5
44	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 5	0 ↔ 2	Tab. 13-5
45	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 6	0 ↔ 2	Tab. 13-5
46	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 7	0 ↔ 2	Tab. 13-5
47	CI	PUMP-DOWN CONFIGURATION CIRCUIT N° 8	0 ↔ 2	Tab. 13-5

PARAMETER VALUE	DESCRIPTION
0	SHUTDOWN WITHOUT PUMP DOWN
1	SHUTDOWN WITH PUMP DOWN
2	SHUTDOWN WITH PUMP DOWN IN CHILLER MODE ONLY

Table 13-5 CIRCUIT PUMP DOWN CONFIGURATION

48	CI	PUMP-DOWN PRESSURE SET	-0.5 ↔ 5.0	Tab. 13-6
49	CI	PUMP-DOWN PRESSURE DIFFERENTIAL	0.0 ↔ 5.0	Tab. 13-6

WORK CONDITIONS	PARAMETER 48	PARAMETER 49
STANDARD	2.5	1
FOR WATER TEMPERATURES BELOW 0°C	1.6	1

Table 13-6 PUMP DOWN PRESSURE SET

50	CI	PRESSURE SET FOR START STAND-BY TIME COUNTING, BEFORE STARTING OF DEFROST CYCLE (PAR. 51)	-0.5 ↔ 7.0	3.6 Bar
51	CI	STAND-BY TIME TO BEGIN DEFROST CYCLE	0 ↔ 3600	1800 sec
52	CI	TEMPERATURE SET TO BEGIN DEFROST CYCLE AFTER TIME COUNTING AS PER PARAMETER 51	-10 ↔ 100	3.0 °C
53	CI	TEMPERATURE SET FOR END OF DEFROST PROCEDURE	0 ↔ 30	10.0 °C
54	CI	MAXIMUM TIME FOR END OF DEFROST CYCLE	0 ↔ 600	300 sec
55	CI	PRESSURE SET FOR FORCING IN CHILLER MODE UNITS WITH RECOVERY	10.0 ↔ 28.0	23.5 Bar
56	CI	PRESSURE DIFFERENTIAL FOR END OF FORCING IN CHILLER MODE UNITS WITH RECOVERY	0 ↔ 10	5.0 Bar
57	CI	MINIMUM TIME OF CHILLER MODE OPERATION AFTER FORCING, IN UNITS WITH RECOVERY	0 ↔ 500	120 sec
58	M	ANTIFREEZE SET LOWER LIMIT	-50 ↔ 20	3 °C
59	M	TYPE OF DEFROSTING IN AIR/WATER HEAT PUMPS.	0=NORMAL 1=SIMULT.	0
60	CI	COMPRESSOR STARTUP STAND-BY TIME AFTER DEFROSTING PROCEDURE	0 ↔ 500	120 sec
61	M	ANTIFREEZE SET UPPER LIMIT	-20 ↔ 20	10.0 °C
62	CI	MAXIMUM TIME OF OPERATION IN PUMP-DOWN MODE	0 ↔ 100	30 sec
63	M	ANTIFREEZE OFFSET ON HOT WATER CIRCUIT COMPARED TO COLD WATER ANTIFREEZE SET	-50 ↔ 50	0.0 °C

64	M	UNIT CONFIGURATION	0 ↔ 6	Tab. 13-7
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PARAMETER VALUE	DESCRIPTION
0	CHILLER
1	AIR/WATER HEAT PUMP
2	HEAT PUMP WITHOUT DEFROSTING
3	CHILLER WITH TOTAL RECOVERY
4	MULTIPURPOSE UNITS
5	CHILLER WITH FREE-COOLING
6	TOTAL RECOVERY HEAT PUMP

Table 13-7 UNIT CONFIGURATION

65	M	ALARM LIST ERASING	1: ERASE ALARMS	0
66		-----	-----	0

67	CI	DELAY TIME BEFORE PASSING FROM HEAT PUMP TO ANOTHER STATUS (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 500	120 sec
68	CI	STAND-BY TIME BEFORE VALVE RE-CONFIGURATION (FOR MULTIPURPOSE UNITS ONLY)	0 ↔ 500	120 sec
69	CO	OPERATING HOURS COMPRESSOR N° 1	0 set operating hours to zero n>1: n is the number of operating hours	----- hrs
70	CO	OPERATING HOURS COMPRESSOR N° 2		----- hrs
71	CO	OPERATING HOURS COMPRESSOR N° 3		----- hrs
72	CO	OPERATING HOURS COMPRESSOR N° 4		----- hrs
73	CO	OPERATING HOURS COMPRESSOR N° 5		----- hrs
74	CO	OPERATING HOURS COMPRESSOR N° 6		----- hrs
75	CO	OPERATING HOURS COMPRESSOR N° 7		----- hrs
76	CO	OPERATING HOURS COMPRESSOR N° 8		----- hrs
77	M	POLARITY OF WATER FLOW SWITCH INPUT ON PRIMARY CIRCUIT	0= FLOW ALARM WITH CLOSE CONTACT 1= FLOW ALARM WITH OPEN CONTACT	1 flag
78	M	POLARITY OF WATER FLOW SWITCH INPUT ON SECONDARY CIRCUIT	0= FLOW ALARM WITH CLOSE CONTACT 1= FLOW ALARM WITH OPEN CONTACT	0 flag
79	M	PRIMARY CIRCUIT FLOW SWITCH ALARM DELAY TIME WITH UNITS IN OPERATION	0 ↔ 500	1 sec
80	M	SECONDARY CIRCUIT FLOW SWITCH ALARM DELAY TIME WITH UNITS IN OPERATION	0 ↔ 500	1 sec
81	M	Δt FOR FAN SPEED REGULATION IN FREE COOLING OPERATION	0 ↔ 500	2 °C
82	M	TYPE OF INTEGRAL REGULATION	0= MEAN INTEGRAL 1=ABSOLUTE INTEGRAL	1 flag
83	M	MINIMUM TIME BETWEEN TWO LOAD VARIATIONS DURING THE CONTROLLED STARTUP PROCEDURE	0 ↔ 600	0 sec
84	M	MAXIMUM LOAD VARIATION DURING THE CONTROLLED STARTUP PROCEDURE	0 ↔ 100	100%
85	M	PRIMARY CIRCUIT INTEGRAL TIME	0 ↔ 600	0 sec
86	M	MAX CORRECTION VALUE APPLIED TO THE PRIMARY CIRCUIT THROUGH THE INTEGRAL REGULATION	0 ↔ 10	0 °C
87	M	SECONDARY CIRCUIT INTEGRAL TIME	0 ↔ 600	0 sec
88	M	MAX CORRECTION VALUE APPLIED TO THE SECONDARY CIRCUIT THROUGH THE INTEGRAL REGULATION	0 ↔ 10	0 °C

89	M	REFERENCE PROBE FOR INTEGRAL REGULATION ON PRIMARY CIRCUIT	0=SONDA INGRESSO 1=SONDA USCITA	0 flag
90	M	REFERENCE PROBE FOR INTEGRAL REGULATION ON SECONDARY CIRCUIT	0= INLET PROBE 1= OUTLET PROBE	0 flag
91	M	MODE IN WHICH THE THERMOREGULATOR ACTIVATES UNIT'S CAPACITY STEPS MUST BE SET TO 1 FOR UNITS WITH MORE THAN ONE EVAPORATOR.	0= COMPLETE ACTIVATION OF A CIRCUIT BEFORE PASSING TO THE NEXT ONE 1= DISTRIBUTION OF STEPS BETWEEN CIRCUITS	0
92	M	MAINS FREQUENCY VISUALISATION	-----	Hz
93	M	MAINS VOLTAGE VISUALISATION	-----	V
94	C	LOW PRESSURE ALARM DELAY IN DEFROST MODE	0 ↔500	300 sec
95	M	SET VARIATION STARTING PERCENTAGE IN FREE-COOLING MODE	0 ↔100	80%
96	M	SET VARIATION END PERCENTAGE IN FREE-COOLING MODE	0 ↔100	20%
97	M	MAXIMUM SET VARIATION IN FREE-COOLING MODE	0 ↔50	0 °C
98	M	MINIMUM DIFFERENCE BETWEEN INLET WATER TEMPERATURE AND AMBIENT AIR TEMPERATURE TO START FREE-COOLING OPERATION	0 ↔50	1 °C
99	M	MAXIMUM DIFFERENCE BETWEEN AMBIENT AIR TEMPERATURE AND INLET WATER TEMPERATURE TO END FREE-COOLING OPERATION	0 ↔50	1 °C

100	CO	TYPE OF COMPRESSOR STARTUP:	0=DIRECT 1=PART-WINDING	1 flag
101	M	TOTAL NUMBER OF COMPRESSOR UNITS	1 ↔ 8	1-8 num
102	CO	NUMBER OF CAPACITY STEPS PER COMPRESSOR	0 ↔ 3	0-3 num
103	C	NUMBER OF SOLENOID VALVES PER CIRCUIT	0 ↔ 2	1-2 num
104	C	NUMBER OF VENTILATION CONTROL STEPS PER CIRCUIT	0 ↔ 4	0-4 num
105	C	NUMBER OF 4-WAY VALVES PER CIRCUIT (WRAN)	0 ↔ 1	0-1 num
106	C	NUMBER OF AUXILIARY VALVES PER CIRCUIT (WRAQ)	0 ↔ 10	0-7 num
107	M	NUMBER OF ANTIFREEZE REALYS	1 ↔ 2	1-2 num
108	M	NUMBER OF RELAYS FOR FREE COOLING	0 ↔ 1	0-1 num
109	M	PRESENCE OF PROBES IN HOT WATER CIRCUIT	0 ↔ 1	0-1 flag
110	M	NUMBER OF PROBES AT COLD WATER OUTLET	1 ↔ 9	1-3 num
111	M	NUMBER OF PROBES AT HOT WATER OUTLET	0 ↔ 9	0-3 num
112	M	TOTAL NUMBER OF DEFROST PROBES	0 ↔ 8	0-4 num
113	M	NUMBER OF TEMPERATURE PROBES FOR TOTAL COMPRESSOR DELIVERY OUTLETS	0 ↔ 8	1-8 num
114	M	NUMBER OF TEMPERATURE PROBES FOR FREE COOLING	0 ↔ 2	0-2 num
115	C	NUMBER OF RECOVERY RELAYS PER CIRCUIT	0 ↔ 1	0-1 num
116	C	ENABLING OF PUMP DOWN DURING UNIT'S START (WORKS ONLY IF PUMP DOWN UNIT'S STOP IS ENABLED) IT MUST BE 0 FOR UNITS WITH SCREW COMPRESSORS	0=NOT ENABLED 1=ENABLED	0 flag
117	M	VOLTAGE ALARM ENABLING/DISABLING	0=DISABLED 1=ENABLED	1
118	M	FREQUENCY ALARM ENABLING/DISABLING	0= DISABLED 1= ENABLED	1
119	M	EXPANSION MODULE CONFIGURATION	0= DISABLED 1= ENABLED	0

120	M	ST1 temperature probe offset	-10 ↔ 10	0.0 °C
121	M	ST2 temperature probe offset	-10 ↔ 10	0.0 °C
122	M	ST3 temperature probe offset	-10 ↔ 10	0.0 °C
123	M	ST4 temperature probe offset	-10 ↔ 10	0.0 °C
124	M	ST5 temperature probe offset	-10 ↔ 10	0.0 °C
125	M	ST6 temperature probe offset	-10 ↔ 10	0.0 °C
126	M	ST7 temperature probe offset	-10 ↔ 10	0.0 °C
127	M	ST8 temperature probe offset	-10 ↔ 10	0.0 °C
128	M	ST9 temperature probe offset	-10 ↔ 10	0.0 °C
129	M	ST10 temperature probe offset	-10 ↔ 10	0.0 °C
130	M	ST11 temperature probe offset	-10 ↔ 10	0.0 °C
131	M	ST12 temperature probe offset	-10 ↔ 10	0.0 °C
132	M	ST13 temperature probe offset	-10 ↔ 10	0.0 °C
133	M	ST14 temperature probe offset	-10 ↔ 10	0.0 °C
134	M	ST15 temperature probe offset	-10 ↔ 10	0.0 °C
135	M	ST16 temperature probe offset	-10 ↔ 10	0.0 °C

136	M	HYSTERESIS TO ENABLE PROPORTIONAL REGULATION AT PRIMARY CIRCUIT OUTLET	-10 ↔10	°C
137	M	HYSTERESIS TO ENABLE PROPORTIONAL REGULATION AT SECONDARY CIRCUIT OUTLET	-10 ↔10	°C
138	M	FAN ACTIVATION HYSTERESIS IN FREE-COOLING MODE	-10 ↔10	1 °C
139	M	OFFSET FOR FAN ACTIVATION IN FREE-COOLING MODE	-10 ↔10	2 °C
140	M	FAN SHUTDOWN DELAY IN FREE-COOLING MODE	0 ↔500	20 sec
141	M	FAN STARTUP DELAY IN FREE-COOLING MODE	0 ↔500	20 sec

142	M	ENABLING CONDENSING PRESSURE RELAY	0 ↔2	0 num
143	CI	RELAY 1 SET POINT	0 ↔30	10.0 Bar
144	CI	RELAY 1 DIFFERENTIAL	0 ↔10	5.0 Bar
145	CI	RELAY 2 SET POINT	0 ↔30	9.5 Bar
146	CI	RELAY 2 DIFFERENTIAL	0 ↔10	0.5 Bar

152	M	SP1 HP pressure probe offset CIRCUIT N°1	-10 ↔10	0.0 Bar
153	M	SP2 HP pressure probe offset CIRCUIT N°2	-10 ↔10	0.0 Bar
154	M	SP3 HP pressure probe offset CIRCUIT N°3	-10 ↔10	0.0 Bar
155	M	SP4 HP pressure probe offset CIRCUIT N°4	-10 ↔10	0.0 Bar
156	M	SP5 LP pressure probe offset CIRCUIT N°1	-10 ↔10	0.0 Bar
157	M	SP6 LP pressure probe offset CIRCUIT N°2	-10 ↔10	0.0 Bar
158	M	SP7 LP pressure probe offset CIRCUIT N°3	-10 ↔10	0.0 Bar
159	M	SP8 LP pressure probe offset CIRCUIT N°4	-10 ↔10	0.0 Bar
160	M	SP9 0P pressure probe offset COMP. N°1	-10 ↔10	0.0 Bar
161	M	SP10 0P pressure probe offset COMP. N°2	-10 ↔10	0.0 Bar
162	M	SP11 0P pressure probe offset COMP. N°3	-10 ↔10	0.0 Bar
163	M	SP12 0P pressure probe offset COMP. N°4	-10 ↔10	0.0 Bar
164	M	SP13 0P pressure probe offset COMP. N°5	-10 ↔10	0.0 Bar
165	M	SP14 0P pressure probe offset COMP. N°6	-10 ↔10	0.0 Bar
166	M	SP15 0P pressure probe offset COMP. N°7	-10 ↔10	0.0 Bar
167	M	SP16 0P pressure probe offset COMP. N°8	-10 ↔10	0.0 Bar

170	M	ENABLING SUMMER/WINTER SWITCH-OVER IN HEAT PUMPS	0 ↔1	0 flag
171	M	AT27 INPUT POLARITY	0 ↔1	1 flag
172	M	COMPRESSOR FORCING TIME IN OFF AFTER SWITCH-OVER	10 ↔3600	10 sec
173	M	INLET TEMPERATURE SET BEYOND WHICH NO ALARM IS TRIGGERED IN THE CHILLER/HEAT PUMP SWITCH-OVER	0 ↔50	30 °C
174	M	INLET TEMPERATURE SET BELOW WHICH NO ALARM IS TRIGGERED IN THE CHILLER/HEAT PUMP SWITCH-OVER	0 ↔50	20 °C

184	M	YEAR	1992 ↔2091	1998 num
185	M	MONTH	1 ↔12	0 num
186	M	DAY	1 ↔31	0 num
187	M	HOUR	0 ↔23	0 num
188	M	MINUTES	0 ↔59	0 num
189	M	DAY OF THE WEEK	1 ↔7	0 num

190	M	relay status S0 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	000 hex
191	M	relay time S0 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 100	0 sec
192	M	relay status S1 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	022 hex
193	M	relay time S1 (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 100	0 sec
194	M	relay status S2 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	061 hex
195	M	relay time S2 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 100	0 sec
196	M	relay status S3 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	002 hex
197	M	relay time S3 (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 100	0 sec
198	M	relay status S4 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	001 hex
199	M	relay time S4 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 100	0 sec
200	M	relay status S5 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	00D hex
201	M	relay time S5 (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 100	0 sec
202	M	relay status S6 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	018 hex
203	M	relay time S6 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 100	0 sec
204	M	relay status S7 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	009 hex
205	M	relay time S7 (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 100	0 sec
206	M	relay status S8 (FOR WRQ/WRAQ UNITS ONLY)	000 ↔ 3FF	009 hex
207	M	relay time S8 (FOR WRQ/WRAQ UNITS ONLY)	0 ↔ 100	0 sec
210	M	first step HP set	0 ↔ 30	14 Bar
211	M	first step differential	0 ↔ 10.5	2.0 Bar
212	M	second step HP set	0 ↔ 30	15.5 Bar
213	M	second step HP differential	0 ↔ 10.5	2.0 Bar
214	M	third step HP set	0 ↔ 30	17.0 Bar
215	M	third step HP differential	0 ↔ 10.5	2.0 Bar
216	M	fourth step HP set	0 ↔ 30	18.0 Bar
217	M	fourth step HP differential	0 ↔ 10.5	2.0 Bar
218	M	first step LP set	0 ↔ 30	5.0 Bar
219	M	first step LP differential	0 ↔ 10.5	1.4 Bar
220	M	second step LP set	0 ↔ 30	5.0 Bar
221	M	second step LP differential	0 ↔ 10.5	1.4 Bar
222	M	third step LP set	0 ↔ 30	8.0 Bar
223	M	third step LP differential	0 ↔ 10.5	1.0 Bar
224	M	fourth step LP set	0 ↔ 30	8.0 Bar
225	M	fourth step LP differential	0 ↔ 10.5	1.0 Bar
226	M	Activation of HP and LP steps	0=continuous activation (step regulation) 1= activation with switch-over to fan feed from auto-transformer (continuous step regulation)	0
227	M	FORCED VENTILATION TIME DURING STANDBY TIME AFTER DEFROSTING (FOR WRQ UNITS ONLY)	0 ↔ 60	0 sec
229	M	CUMULATIVE COMPRESSOR ALARM	0 ↔ 1	0 flag

230	M	HOT WATER SET HIGHER LIMIT	-20 ↔ 100	50 °C
231	M	HOT WATER SET LOWER LIMIT	-20 ↔ 100	30 °C
232	M	COLD WATER SET HIGHER LIMIT	-20 ↔ 100	18 °C
233	M	COLD WATER SET LOWER LIMIT	-50 ↔ 100	5 °C
234	M	HOT WATER Δt HIGHER LIMIT	1 ↔ 50	5 °C
235	M	HOT WATER Δt LOWER LIMIT	1 ↔ 50	1 °C
236	M	COLD WATER Δt HIGHER LIMIT	1 ↔ 50	5 °C
237	M	COLD WATER Δt LOWER LIMIT	1 ↔ 50	1 °C

240	CI	TIME REMAINING TO CIRCUIT 1 END OF DEFROST CYCLE	-----	min
241	CI	TIME REMAINING TO CIRCUIT 2 END OF DEFROST CYCLE	-----	min
242	CI	TIME REMAINING TO CIRCUIT 3 END OF DEFROST CYCLE	-----	min
243	CI	TIME REMAINING TO CIRCUIT 4 END OF DEFROST CYCLE	-----	min
244	CI	TIME REMAINING TO CIRCUIT 5 END OF DEFROST CYCLE	-----	min
245	CI	TIME REMAINING TO CIRCUIT 6 END OF DEFROST CYCLE	-----	min
246	CI	TIME REMAINING TO CIRCUIT 7 END OF DEFROST CYCLE	-----	min
247	CI	TIME REMAINING TO CIRCUIT 8 END OF DEFROST CYCLE	-----	min

250	M	ENABLE SUBCOOLING	0 ↔ 1	0 flag
251	M	DELAY TIME TO START REGULATION	0 ↔ 120	60 sec
252	M	DELAY TIME TO ACTIVATION OF RELAY	0 ↔ 120	30 sec
253	M	SUBCOOLING SET POINT	0 ↔ 100	5.0 °C
254	M	SUBCOOLING PROPORTIONAL BAND	0 ↔ 10	1.0 °C
255	M	TYPE OF REFRIGERANT GAS USED	1 ↔ 3	Tab. 13-8

PARAMETER VALUE	DESCRIPTION
1	R 22
2	R 134a
3	R 407c
4	R 404a

Table 13-8 TYPE OF REFRIGERANT GAS

260	M	0: MODEM DISABLED 1: Enables unit to answer calls by modem 2: Enables the unit to answer and call by modem	0 ↔ 2	0 Num
261	M	Mask for machine alarms which activate the call	0 ↔ 0xFFF	0 Mask
262	M	Mask for circuit alarms which activate the call	0 ↔ 3F	0 Mask
263	M	Mask for compressor alarms which activate the call	0 ↔ 0F	0 Mask
264	M	Type of serial port listening prior to the transmission of the initialisation command	0 ↔ 120	4 sec
265	M	Type of serial port listening prior to the transmission of the connection command	0 ↔ 120	60 sec
266	M	Maximum number of call attempts to the same number	0 ↔ 5	2 Num
267	M	Delay time between two successive attempts to call the same number	0 ↔ 600	10 sec
268	M	Maximum wait time for reply after the initialisation command	0 ↔ 120	2 sec
269	M	Maximum wait time for reply after the connection command	0 ↔ 120	45 sec
270	M	ENABLE DATA LOGGER (see note in chapter 8.10)	0 ↔ 1	1 flag

280	M	MAXIMUM OPERATING TIME ALLOWED WITH CAPACITY STEPS ON	0 ↔300	0 min
281	M	FORCING TIME IN "FULL" OPERATION	0 ↔300	0 sec
282	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 1	0 ↔300	----- min
283	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 1	0 ↔300	----- sec
284	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 2	0 ↔300	----- min
285	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 2	0 ↔300	----- sec
286	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 3	0 ↔300	----- min
287	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 3	0 ↔300	----- sec
288	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 4	0 ↔300	----- min
289	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 4	0 ↔300	----- sec
290	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 5	0 ↔300	----- min
291	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 5	0 ↔300	----- sec
292	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 6	0 ↔300	----- min
293	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 6	0 ↔300	----- sec
294	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 7	0 ↔300	----- min
295	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 7	0 ↔300	----- sec
296	CO	RESIDUAL TIME ALLOWED WITH CAPACITY STEPS ON; COMPRESSOR 8	0 ↔300	----- min
297	CO	RESIDUAL TIME IN FULL OPERATION OF COMPRESSOR 8	0 ↔300	----- sec

13.1 PARAMETER LIST FOR UNITS WITH SCREW COMPRESSORS (PARAMETER 17=2)

The following tables show the parameters which have a different meaning when a unit with screw compressors is configured:

17	M	UNIT WITH SCREW COMPRESSORS BUT WITHOUT OIL TRANSDUCER	0--2	2 num
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152	M	SP1 HP pressure probe offset CIRCUIT N°1	-10 ↔10	0.0 Bar
153	M	SP2 HP pressure probe offset CIRCUIT N°2	-10 ↔10	0.0 Bar
154	M	SP3 HP pressure probe offset CIRCUIT N°3	-10 ↔10	0.0 Bar
155	M	SP4 HP pressure probe offset CIRCUIT N°4	-10 ↔10	0.0 Bar
156	M	SP5 HP pressure probe offset CIRCUIT N°5	-10 ↔10	0.0 Bar
157	M	SP6 HP pressure probe offset CIRCUIT N°6	-10 ↔10	0.0 Bar
158	M	SP7 HP pressure probe offset CIRCUIT N°7	-10 ↔10	0.0 Bar
159	M	SP8 HP pressure probe offset CIRCUIT N°8	-10 ↔10	0.0 Bar
160	M	SP9 L. pressure probe offset COMP. N°1	-10 ↔10	0.0 Bar
161	M	SP10 LP pressure probe offset COMP. N°2	-10 ↔10	0.0 Bar
162	M	SP11 LP pressure probe offset COMP. N°3	-10 ↔10	0.0 Bar
163	M	SP12 LP pressure probe offset COMP. N°4	-10 ↔10	0.0 Bar
164	M	SP13 LP pressure probe offset COMP. N°5	-10 ↔10	0.0 Bar
165	M	SP14 LP pressure probe offset COMP. N°6	-10 ↔10	0.0 Bar
166	M	SP15 LP pressure probe offset COMP. N°7	-10 ↔10	0.0 Bar
167	M	SP16 LP pressure probe offset COMP. N°8	-10 ↔10	0.0 Bar

