JUNIFLAIR

mP20 / RRA

MICROPROCESSOR CO_NTROL FOR CriltLE.RS

INSTRUCTION MANUA.L

GB

1.CONTENTS

DIAGRAMS IN APPENDIX
- SCREEN FLOW CHART
- LAY-OUT OF BASIC CIRCUIT- STANDARD VERSION

2. IMPORTANT

⚠ Electronic components are sensitive to static disc.harges emitted by the human body. Touch an earth con–nection before handling any electronic compon◆nt.. ·

⚠ Take out the components (basic circuit, user terminal, EPROM) from their containers only when ready to assemble and avoid touching the electronic components.

⚠ Before undertaking any operation (connection, disconnection, external linking), always disconnect the unit from the power supply.

The control system consists of a Basic *Circuit* containing the microprocessor. a read-only memory (EPROM) which contains the regulation programme. a read/write memory (RAM) for operational variables, a permanent read/write memory (EEPROM) for the maintenance of the most important data and the pre-set parameters even in the case of power failure; the circuit also contains the terminals for el ctronic input and output connections and power supply.

The *User Terminal* is used for programming the control parameters (set points, differentials. alarm thresholds etc.) and the display of data and events (reading the set points and the controlled values. function events and/or alarms etc.). This is also controlled by a microprocessor equipped with an LCD display, a keypad, LEDs and alarm buzzer).

A single user terminal can be used to programme and display the parameters of more than one basic circuit; this can be done:
*   by linking where necessary the terminal to the appropriate unit, through the six-way telephone cable link with an easily removable connector

*   setting up a network link of the circuits and the terminal which can exchange data with the pre-selected circuit.

Once programmed. the basic circuit can function automatically following the pre-set data contained in the EEPROM memory .

The basic circuit can therefore be used. on its own: this solution. however - which does not provide any means of interface with the user for the setting of parameters and the display of data and events - is suggested for units for which the programming of the functions and/or functional parameters are expected to be modified very rarely - or never - as for example in unmanned installations.

To see the date and the time and to use the subroutines linked to time (time bands, memorising the time of alarm events) the basic circuit can be supplied with a *clock circuit.*

The control can be linked to a centralised supervision system; an optional *serial board* is available to this end , which makes possible the optoisolated interface to a RS422 network for data transmission.

4. CHARACTERISTICS

4.1. BASIC CIRCUIT

The basic circuit (see lay-out of the basic circuit in the appendix) in the electrical panel of the unit is connected to the user terminal with a two-wire half-duplex asynchronous cable with a six-way. telephone connector; the maximum cable length for remote fitting of the user terminal is 50 metres. For longer distances a T-junction must be used with 6-pole shielded cable (AWG24-type with twisted pair shielding and wires and resistance <80ohm/M) with maximum length 200m.

The inputs and outputs of the unit are summarised below *(see. electrical diagram).*

OPTOISOLATED DIGITAL INPUTS

011	Remote switch-on/switch-off inlet
012	Set-point commutation (with external potential-free contact)
013	Flow aauae. phase sequence control relay
014	External pump aroup alarm
015	Free-cooling pump thermal switch
016	-
017	Not used
018	Not used
019	Low pressure pressostat circuit 1
0110	Low pressure pressostat circuit 2
0111	HP I Compressor thermal switch / fan thermal switch 1
0112	HP i Compressor thermal switch / fan thermal switch 2

ANALOGUE INPUTS

AI1	Evaporator water inlet temperature sensor
AI2	Evaporator water outlet temperature sensor
AI3	Ext. air temp. (free cooling)
AI4	Not used
AI5	Sensor hiah pressure circuit 1
AI6	Sensor high pressure circuit 2
AI7	Sensor low pressure circuit 1
AI8	Sensor low pressure circuit 2

DIGITAL RELAY OUTPUTS

001	Compressor 1 (1st circuit)
002	Fans
003	Compressor 2 (1 st circuit)
004	Compressor 3 (2nd circuit)
005	Not used
006	Compressor 4 (2nd cirucit)
007	Liauid electrovalve 1
D08	Liauid electrovalve 2
009	Free-cooling pump

0010	Recirculation pump command
0011	General alarm
0012	Not used
0013	Not used

ANALOGUE OUTPUTS

YO	!Fan speed regulator
Y1	Not used

4.2. EPROM MEMORY

The regulatory programme of the control system is contained in the EPROM memory on the basic circuit and identified by an alphanumeric code.

CRA-E EN	Vers. 4.2	09/06/99

Product family
Software Version
Update
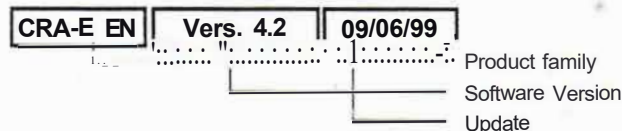
If the EPROM is replaced, observe the following procedures:
*   disconnect the system from the power supply (turning off mains power at the electrical panel) making sure that the yellow LED power indicator is *off;*
*   remove the EPROM from its socket using a suitable extractor, making sure that it is removed in a uniform manner, and taking special care not to touch the components mounted in the socket on the circuit;
    insert the new EPROM in the correct way putting the semicircular reference mark in the position indicated in the diagram of the circuit board: make sure that all the feet are aligned in their respective slots before pushing the EPROM gently into the socket as shown in fig.1.
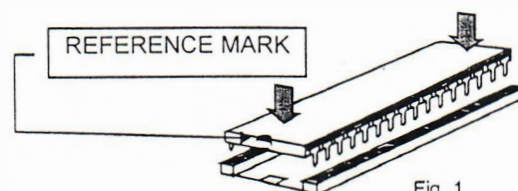

REFERENCE MARK

Fig. 1

Clearing the memory is necessary if the EPROM is changed (for example to up-date the program). See *10. 4. RESTORING FACTORY PRESETS.'*

&

Electronic components are sensitive to static discharges emitted by the human body.
Touch an earth connection before handling any electronic component and/or the basic circuit.
Remove the EPROM from its container only when ready to assemble. do not touch the metal feet.

4.3. OPTIONAL CIRCUITS

4.3.a SERIAL CIRCUIT FOR CONNECTION TO SUPERVISION/MAINTENANCE SYSTEMS

Network transmission of data is possible through the RS422 serial circuit (see fig 2a) which is inserted in the appropriate socket of the basic circuit (see lay-out of the basic circuit).
For more details on transmission, see the relevant technical guide.

4.3.b. CLOCK CIRCUIT

This allows the user to see the date and time and is indispensable for operating programmes linked to time (time bands and memorising of the time and date of the alarm event).
The clock circuit (see fig 2b) is equipped with a rechargeable battery which can run for more than one month without recharging.

4.3.c. LAN ADDRESS CIRCUIT

The LAN address circuit enables the microprocessor to be connected to a Local Area Network (see special LAN manual).
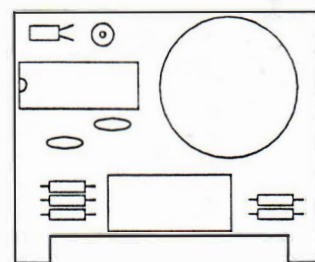
4.3.d. CLOCK CIRCUIT/LOCAL NETWORK

There is only one connector on the mP20 circuit for either the clock board or the LAN board. If both functions are needed then a single CLOCK+LAN board must be fitted.
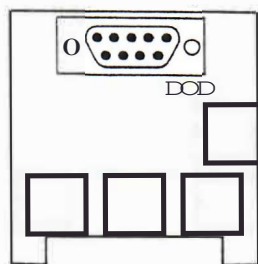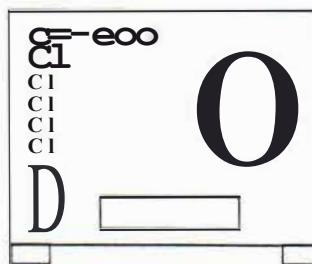
SERIAL CIRCUIT
Fig. 2a

CLOCK CIRCUIT
Fig. 2b

LAN ADDRESS CIRCUIT BOARD
Fig. 2c

4.4. USER TERMINAL

LCD ALPHANUMERIC DISPLAY

(*)

(*) PANEL OPENING CATCH

PROGRAMMING PANEL

ALARM LED

UNIT ON LED
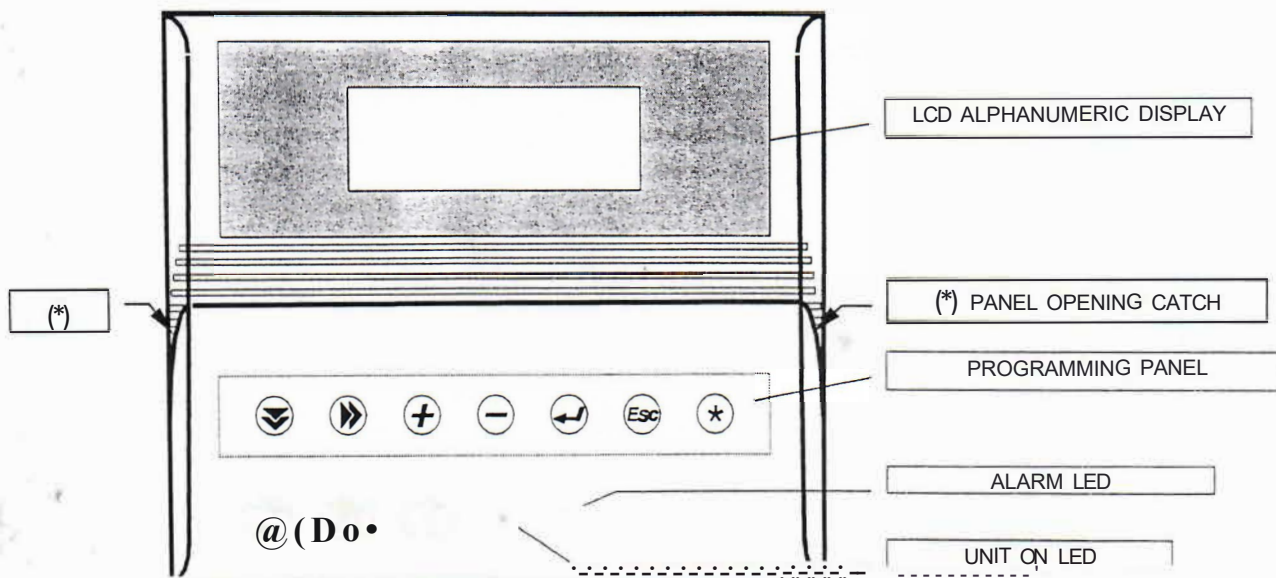
The user terminal is equipped with:

- LCD display with 4 lines, 20 alphanumeric characters for consultation and programming of the system;
- LED displays showing power on (green) and alarm (red);
- Alarm buzzer, which can be switched off with the appropriate key and if necessary disconnected completely with software;
- Command and programming keys.

The three buttons on the front of the panel have the following functions:

Turns the system on and off.
The setting is memorised in order to allow automatic intelligent resetting. If programmed (see 'AUTOMATIC RESTART AFTER POWER LOSS - screen 16) the machine assumes the same state (ON/OFF) that it had before the interruption of the power supply.

Switches the buzzer off and resetting the alarms.
If pressed once the alarm buzzer stops; if pressed twice the alarm memory is reset and the alarm event display is cancelled. A continuing alarm state causes the signal to continue even after the button has been pressed. The sequence of the last 30 alarms is maintained in the memory and can be accessed with the appropriate routine.

Reads parameters and events.
This displays unit status and the alarm sequence memory.

The seven membrane keys, which are accessible only when the protective door is opened using the catch. have the following functions:

scrolling key for subsequent screens and vertical movement of the cursor.

key to access the selected screens and horizontal movement of the cursor

key to increase setting values

key to decrease setting values

key to modify and accept values (Enter)

(Esc) escape key: return to original screen of the current read/write routine

(*) Full escape key: return to STATUS screen.

4.4.1. REMOTE TERMINAL

An optional wall mounting kit is available for remote installation of the user terminal, including a metal housing for the terminal.
The terminal is linked to the basic circuit via the cable equipped with connectors at both ends: insert the connector into socket A which is accessible from the back of the container (see fig 5).
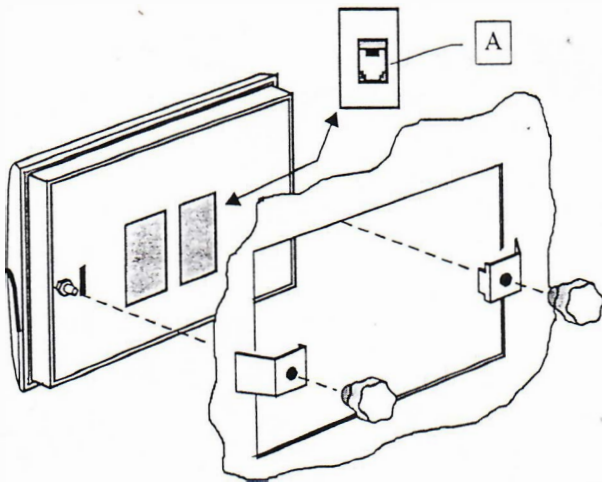
Fig. 5

Fig. 4
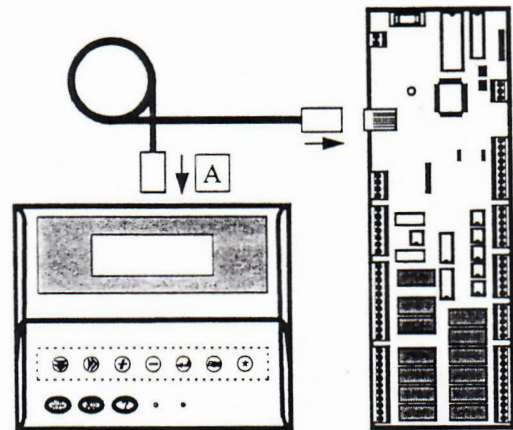
5. REMOTE CONTROLS

The unit can be turned off and on with an external remote control system. The unit 's resources are, however, controlled by the microprocessor.
The types of remote control provided for are the following:

REMOTE CONTROL: The unit is turned on by closing a potential-free remote N.O. contact linked to the base circuit (see electronic diagram of the circuit and lay-out of the base circuit).

SUPERVISION SYSTEM: a supervision system exchanges data via a serial cable with the basic circuit which has remote monitoring and control. For further details, see relevant report.

6. SWITCHING ON AND PROGRAMMING

The programming of the microprocessor and the INTERACTION (WRITING/READING of the functional parameters) is only possible through the user terminal equipped with a LCD display linked directly to the basic unit connected to the local network through a transmission line (see relevant technical guide).

Once the functional parameters have been set, the basic circuit can function independently without the user terminal, which can then be removed or used for the programming of other units and connected only in case of necessity (for the reading of events or to change the parameters).

In the absence of programming, the basic unit operates with the factory default settings. There follows a description of the use of the terminal for programming and reading the operating parameters of the basic unit (see factory settings - calibration fields).

6.1. CONNECTING THE USER TERMINAL AND POWER SUPPLY

Correctly insert the cable link (connectors) *(see '4.4. USER TERMINAL)* without forcing the connection and turn on the power supply. The control is activated as follows:
- the power supply LED on the base circuit comes on (see LAY-OUT OF THE BASIC UNIT);
- it emits a short acoustic signal;

- the display shows the following message for 10 seconds, before returning to unit *off* status (see paragraph below).

```
INITING
PLEASE WAIT ....
```

6.2. DISPLAY INFORMATION WITH UNIT OFF

When the unit is connected to the power supply but **not on**, 3 fields are active on the display (see fig. 0-1):
A. Room temperature and outside temperature or water intake and output temperature;

B. Indication of unit switched off by:
1. ON/OFF switch;
2. REMOTE CONTROL;
3. SUPERVISION system *(see '8. CALIBRATION AND SETTINGS'* - screen 22);
4. MANUAL OVERRIDE (see '8.2. MANUAL PROCEDURE).

6.3. SWITCHING THE UNIT ON AND OFF

According to the pre-set configuration, the control of the unit can be programmed:

LOCALLY: the unit is operated with the button @ ; one touch switches the unit on, two touches switches it off.
AUTOMATICALLY: the control is configured to enable switching the machine off and on to

occur automatically with:
1. a remote control command;
2. a SUPERVISION system (only in units with serial circuit);
3. timer (only in units with clock circuit)

NB. during automatic functioning, the button

$@$. is inactive, except when manual override is activated (see 'MANUAL PROCEDURE).

```
TMP. WATER IN      16.1'C
TMP. WATER OUT     13.2'C
UNIT OFF
```
(Screen 01)

```
ON
OFF
```

```
TMP. WATER IN      16.1'C
TMP. WATER OUT     13.2'C
UNIT ON
```
(Screen 01)

6.4. REGULATION OF SET POINT

| » | ALARM DISPLAY
SET POINT DISPLAY
_SE VICE MENU
(CLOCK FACILITY") | | SET POINT TEMP
OPERATIVE SETTINGS
MAINTENANCE | » | REGULATION SET POINTS
STD TEMP.   13.0°C
REGULATION SET POINT
DEHUMID. REO.   10 0'C |

The set point regulation screen modifies the operating point of the unit. There are two set points: the first is the default and is set at 13'C '.he second is activated only if input 012 is closed (see '4. 1 *BASE CIRCUIT)* and is needed mainly when there is an external humidifier. The set point is 10'C.

6.5. UNIT STATUS

Unit operation varies according to the type of function activated:

- on
- off
- manual.

For the unit to be turned on by the operator the following conditions must be met:
- the ON button must be pressed and the green LED must come on;
- if time daily or weekly bands have been set, these must allow the switching on of the control;
- if there is a remote input, digital input 011 must be in the closed contact position;
- if the unit is connected to a supervision system, this must also enable unit operation;
- the unit must not be set to manual;
- there must be no alarm conditions such as interlock, pump thermal switch or manual re-set flow gauge.

If these conditions are met, the green LED on the ON button is on.

If only one of these conditions is not satisfied the unit will be off.

One of the above conditions is enough to turn off the unit. The display and the ON/OFF LED inform the user of the status of the system. The last line of the Main screen gives the following information:

- **UNIT ON**
In this status all devices can be activated. The ON/OFF LED is on.

- **UNIT OFF**
No devices can be activated. The ON/OFF LED is off.

- **TURNED OFF BY REMOTE CONTROL**
The unit has been turned off by the dedicated digital input. No devices can be activated.

- **TURNED OFF BY SUPERVISOR**
The unit has been turned off by the supervisor and therefore no devices can be activated.
In this condition the ON/OFF LED flashes to show that the unit can be turned on by the supervision system or using the ON button on the panel.

The unit can only be turned on by the supervision system if the local button is enabled (i.e. if the ON LED is on).

If the unit is turned off locally no external or remote control can turn it on (for total safety during maintenance).

- **TURNED OFF BY TIME BAND**
The unit has been turned off by the time band setting. No devices can be activated.
The ON/OFF LED is on.
The unit will start as soon as the time band setting activates it.

- **MANUAL OPERATION**
Manual operation can be selected in the maintenance loop screens (password protected). If the unit is on, this overrides the current status and turns it off. It is then possible to control all the components of the unit directly, excluding the temperature control but allowing alarm signals. In this condition the ON button flashes.
Manual override procedure ends when all the devices selected are turned off or when the ON/OFF button is pressed.

6.6. THE STATUS SCREEN

When the unit is in operation, the STATUS screen appears on the display, with five active fields (see fig 0-2)·

A. Current operation: depending on function conditions: the following indications are provided:
  - TEMPERATURE WATER IN
  - TEMPERATURE WATER OUT

B. Function mode:
  - "MANUAL" in manual override operating mode (see MANUAL OVERRIDE)
  - "UNIT ON" when the unit is switched on from the panel on the terminal
  - "UNIT OFF" when the unit is switched off from the panel on the terminal.
  - "OFF SUPERV.' If the ON/OFF button is pressed when supervision is activated.

```
+-----------------------------+
|             C               |
|                             |
|             A               |
|                             |
| +---------+     +---------+ |
| |    B    |     |    D    | |
| +---------+     +---------+ |
+-----------------------------+

  +-----------+     +-----------+
  | UNIT ON   |     |  ALARM    |
  +-----------+     +-----------+
  | UNIT OFF  |     §NTIFREEZE
  +-----------+

  | MANUAL    |
D-2+-----------+
  | OFF SUPERV. |
  +-----------+
```
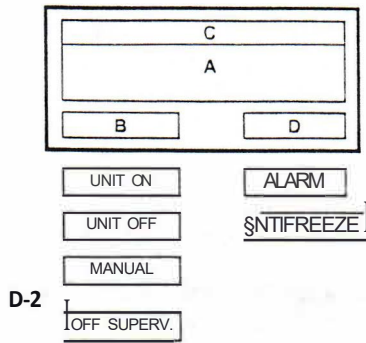
C. Date and time, if the optional clock circuit is fitted

D. Fault indication:
  - "ALARM" if there is an alarm.
  - "ANTIFREEZE" if the temperature at the evaporator output falls below the *'ANTIFREEZE ALARM SET POINT'* (see *B* 1 *SETTING SUBROUTINE'* - screen 19); the control shuts down the compressors immediately.

6.7. STATUS LOOP: DISPLAY OF OPERATING PARAMETERS

The unit's function parameters can be read in sequence by pressing the **CT)** button on the front panel. At the end of the loop the STATUS display returns.

Pressing the ![button] button, accessed by opening the terminal cover, returns to the STATUS display immediately.
The information shown on the display is illustrated under the STATUS panel in the SCREEN flow chart. Only information related to the pre-selected configuration is shown.

Hour and date are only shown if the clock circuit is fitted.

6.8. KEYPAD

The keypad, described in the section on the User Terminal, is divided into two parts:
A. External buttons used for current operations (switching on/off, reading parameters, silencing alarm buzzer, etc.);

B. Internal buttons, accessed by opening the protective cover, used for interacting with the system memory.

During consultation, calibration and programming, the display guides the user through the menu screen structure. A cursor shows the active field.

6.9. CONSULTATION AND PROGRAMMING MENU

(cf. Screen flow chart appendix)

Access to consultation and programming of control parameters is arranged in menus and is obtained from any of the visualisation loops for the function parameters by pressing the ⌐ horizontal scrolling button found under the cover of the user terminal.

SUBROUTINE OPERATIONS

The sequential passage between screens within each subroutine is performed by pressing the $@$ page down button; The sequence is circular and leads back to the first screen The **read-only subroutines** do not allow data modification and are freely accessible.

The **write** subroutines allow the variation of memorised data and require a password for access. The password is in a sealed envelope attached to this manual. addressed to the service manager.

VARIATION OF PARAMETERS

Calibration and/or configuration parameters in a subroutine are modified as follows:

- choose the screen which contains the required parameter using the $@$ button. The flashing cursor appears in the top left corner of the screen;

- press the g button to move the cursor to the parameter;

change the value of the parameter (whether numerical or yes/no) with the O and buttons (numerical values can be altered only within the limits of the pre-set calibration);

- press the g button to enter new values.

Pressing the CJ button moves the cursor to the next parameter, leaving any unmodified data unchanged in the memory.

IMPORTANT:

pressing the $@$ button takes the screen back to the start of the subroutine.

pressing the O button returns to the STATUS screen.

6.10. INTERACTIONS LEVELS

Attached is the *SCREEN FLOW CHART* for reading and programming the control.

The interaction of the user with the control is on 4 levels:

1. READING which, as well as the visualisation of parameters, consists of the reading of the following:
   - room conditions
   - values measured by sensors connected to the system;
   - alarm events.
   This level is freely accessible.

2. OPERATIONAL PARAMETER SETTING LEVEL which allows the modification of the setting values of:

- set points of function parameters;
- thresholds of programmable alarms;
- thresholds of cumulative run hours of individual components to indicate requests for maintenance.

This level is accessed with the *USER* password. In this level it is also possible to modify the *USER* password (cf. *8. CALIBRATION AND SETTING*).

3. SERVICE MENU which allows the manual starting of the various components of the unit, independently of room conditions.
   This level is accessed with the *MAINTENANCE* password. In this level it is also possible to modify the *MAINTENANCE* password (cf. *7. MAINTENANCE MENU*).

4. CONFIGURATION LEVEL in which the following are possible:
   - operations on the microprocessor memory.
   - OFFSET setting of the sensors.

This level is only accessible with the *MANUFACTURER* password contained in the sealed envelope attached to this manual and addressed to the Service manager.

N.8. The USER SETTING password default is, 0000. (see '13. FACTORY SETTINGS').

The mai◆tena'nce menu allows the activation of the various components of the unit individually (COMPRESSOR, PUMP, etc.), the display And re-setting of the unit run hour -counter and the setting of the sensors connected to the unit. The parameters of the various screens of the menu can either be displayed only (SET POINT DISPLAY). or modified (SERVICE MENU). The second of these requires a password for modifications.

@
```
ALARM DISPLAY
  SET POINT DISPLAY
- SERVICE MENU
  (CLOCK FACILITY•)
```
(Screen 01 a)

@
```
SET POINT TEMP.
OPERATIVE SETTINGS
_ MAINTENANCE
```
(Screen 01 b)

@
```
INSERT MAINTENANCE
PASSWORD
      0     0000
    f 2 (
```
(Screen .)

g @
```
MANUAL PROCEDURE
REMOTE GENERAL
ALARM SIGNALLING
DISABLE?          NO
```
(Screen 24a)

@
```
MANUAL PROCEDURE
PUMP              N
FREE COOLING      N
```
(Screen 24)

@
```
COMPRESSOR  11   N
COMPRESSOR  21   N
COMPRESSOR  12   N
COMPRESSOR  22   N
```
(Screen 25a)

@
```
FAN CONTACTOR     N
FAN SPEED      000%
```
(Screen 25)

@
```
SERVICE THRESHOLD
UNIt        20000 h
COMPRESSORS 10000 h
```
(Screen 26)

@
```
RUN HOUR RESET
UNIT             N
COMPRESSOR 1    N N
COMPRESSOR 2    N N
```
(Screen 27)

@
```
OFFSET ADJ.
   SENSOR(')
READ VALUE   °C 21.5
ADJUSTMENT   °C  0.0
```
(Screen 28-29)

n:
WATER INLET SENSOR
WATER OUTLET SENSOR
EXTERNAL AIR SENSOR

@
```
OFFSET ADJ.
   SENSOR(..)
READ VALUE   °C 27.5
ADJUSTMENT   °C  00
```
(Screen 30a-30b-30c-30d)

n:
CONOENS. TEMP. 1
CONDENS. TEMP. 2
EVAPOR. TEMP. 1
EVAPOR. TEMP. 2

@
```
SET NEW SERVICE
PASSWORD       1234
```
(Screen 31)

7.1. REMOTE ALARM *(screen 24a)*

Screen 24a enables the de-activation of remote alarm signalling. It should normally be set to "NO", allowing the remote signalling of alarms. Setting this screen to "YES" is useful when carrying out maintenance on the unit to prevent an alarm signal from being sent.

An alarm signal is displayed on the user terminal regardless of whether screen 24a is set to "YES" or "NO.

7.2. MANUAL OVERRIDE PROCEDURE *(screen 24, 25a, 25)*

Screens 24 and 25 manually activate the various components of the unit. The activation of the free-cooling pump depends on whether the unit has this function.

7.3. RUN HOUR COUNTER *(screen 26, 21;*

Screens 26 and 27 enable the setting of the service intervals of the unit's components by fixing a run hour limit. Screen 26 sets the threshold of the unit and compressors run hours while screen 27 re-. sets the current total.

7.4. SENSOR SETTINGS *(screen 28, 29, 30a, 30b, 30c, 30d)*

Screens 28, .. 30d correct the setting of the sensors if a difference is detected between the sensor reading and that taken with a precision measuring device. The READ VALUE is the corrected value; the correction (OFFSET) is the value to be added to or subtracted from the value transmitted by the sensor to give the true value.

7.5. CHANGING THE PASSWORD *rscreen31J*

La screen 31 enables the setting of a new password for the maintenance menu.

8. CALIBRATION AND SETTING

T'le password (aefault 0000) mi.;st be e_ntered in order to access the setting procedure:

```
AU.RM DIS?U\Y
 SET POINT DISPU.Y       »
 SERVICE MENU
(CLOCK FACILITY•)
  (Screen 01a)
```

```
SET POINT TEMP.
 OPERATIVE SETTINGS        @
-MAINTENANCE
   (Screen 01b)
```

```
INSERT USER PASSWORD
               0000       g
      (Screen .. )
```

```
INSERT USER PASSWORD
               0000
CORRECT PASSWORD
          »
```

```
WATER TEMPERATURE SET
POINT LIMIT
MIN              11.0°C
MAX              2oo·c
    @   (Screen 12)
```

```
TEMP. REGULATION
BAND             02.o·c

    @   (Screen 13)
```

```
TEMP. REGULATION
DEAD BAND        0.00·c
REGULATION SENSOR:
                 INLET
    @   (Screen 14)
```

```
AUTOMATIC RESTART
AFTER POWER LOSS   Y
REMOTE ON/OFF      N
BUZZER ENABLE      Y
    @   (Screen 16)
```

```
ENERGY SAVING TEMP.
TIME EXC.        05 min
DELTA E.S.       7.0°C
BAND             1.s·c
    @   (Screen 17)
```

```
!NATER INLET TEMP.
 LARM  THRESHOLDS
HIGH             18.0°C
LOW              08.0°C
    @   (Screen 18)
```

```
NTIFREEZE  ALARM
 SET POINT       os.o·c
 NTIFREEZE  FUNCTION:
 PUMP ACTIVATION    N
    @   (Screen 19)
```

```
!JVATER INLET
 HIGH/LOW TEMP.
 ALARM DELAY
                 030 min
    ⌄   (Screen 20)
```

```
INTERBLOCK ALARM
DELAY            000sec

    @   (Screen 21)
```

```
SUPERVISION NETWORK
UNIT ADDRESS.      01
BAUD RATE:       1200

        (Screen 22)
```

```
SET NEW USER
PASSWORD:        —
                 1234       ⌄

    (Screen 23)
```

8.1. SETTING SUBROUTINE

This subroutine enables the changing of the unit's setting parameters. All variables are pre-set in the factory to enable the control to function correctly.

SCREEN12

- WATER TEMPERATURE SET-POINT LIMIT: this screen sets the max. and min. limits for the water temperature set point.

SCREEN13

- TEMPERATURE REGULATION BAND: sets the regulation differential for unit function.

SCREEN14

- REGULATION DEAD ZONE: The temperature regulation dead zone creates an area around the set point where the control does not request the intervention of any of the unit's components.
- CONTROL SENSOR: it is possible to select the sensor on which to base the temperature control. The default is the water intake temperature sensor. It is strongly advised NOT to change this setting in order not to de-stabilise the whole system. Control using the water delivery temperature presumes an extremely accurate system.

SCREEN 16

- AUTOMATIC RE-START: selects the automatic re-start of the unit after a power failure if the unit had been on previously.
- REMOTE ON/OFF: enables the unit to be switched on and off from a remote contact.
- SIREN ENABLING: enables the de-activation of the alarm siren.

SCREEN17

- ENERGY SAVING CONTROL: controls the function parameters of the energy-saving control (only on units with this function).

SCREEN 18

- Selects the water intake temperature threshold.

SCREEN19

- ANTIFREEZE ALARM SET POINT: if the water temperature at the evaporator output falls below this value. ANTIFREEZE is shown on the display and the control shuts down the compressors immediately.; if the temperature remains below the antifreeze set point for at least 5 minutes. an alarm condition is activated. If the 'temperature returns above the set point by the differential value (2°C), the compressors start up when called by the water intake sensor.
- ANTIFREEZE FUNCTION: PUMP ACTIVATION: when the unit is off the control commands pump start-up if the air temperature falls below S'C;

SCREEN 20

- AL.ARM DELAY FOR HIGH/LOW WATER INTAKE TEMPERATURE: sets the delay on the alarm signal for water intake temperature.

SCREEN 21

- INTERLOCK ALARM DELAY: sets the interlock alarm delay.

SCREEN 22

- UNIT NETWORK ADDRESS : this screen is active only on units which are configured for supervision. It selects the identification number of the unit and the transmission speed.
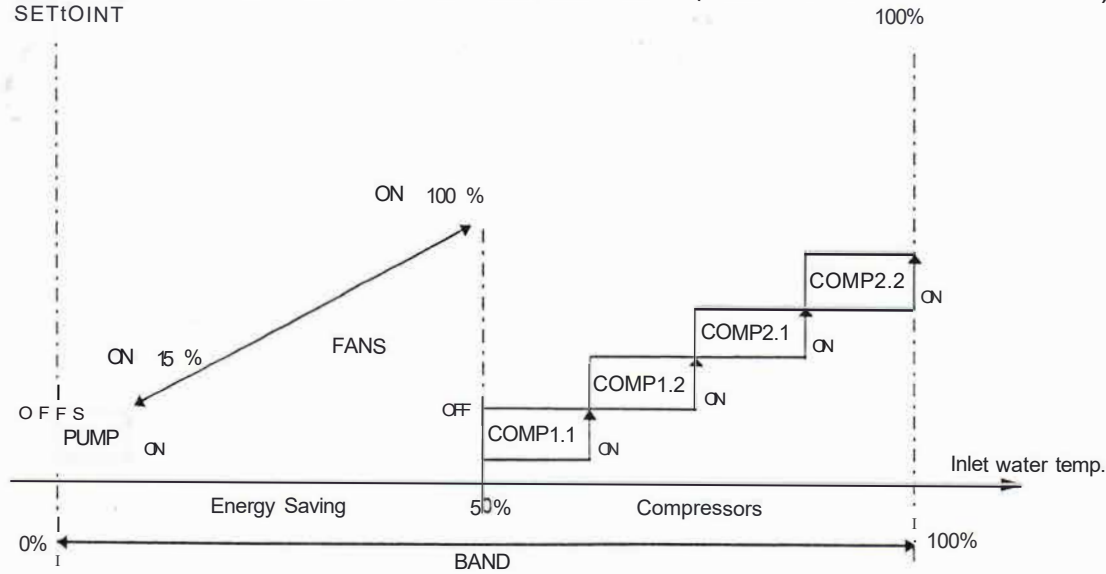
SCREEN 23

- SET NEW PASSWORD: sets a new USER password.

9. REGULATION DIAGRAMS

9.1. VI/ATER TEMPERATURE REGULATION (ENERGY SAVING OPTION)

The diagram shows the progress of the cooling steps as a function of their distance from the set point, within the proportional regulation band.

The first half of the regulation band is occupied by the pump control steps and fan stages and is used only when the Energy Saving function is active.

The second half is occupied by the two steps which manage the compressors. Each chiller has two independent cooling circuits; the number of compressors varies with unit capacity.

When compressor rotation is activated there is no direct correspondence between the step and the compressor (e.g. the first compressor step can call either of the two compressors on the circuit: COMP 1.1 or COMP2.1).

The rotation between the compressors is based on calls (i.e. if compressor COMP. 1 is off the next call will be directed to compressor COMP. 2).

N.B.: since this rotation system is not directly based on the run hours of each compressor it is possible that, in certain circumstances there may be noticeable differences in the run hours of each compressor; this difference will, however, disappear over time.

9.2. MANAGEMENT OF THE ENERGY SAVING FUNCTION
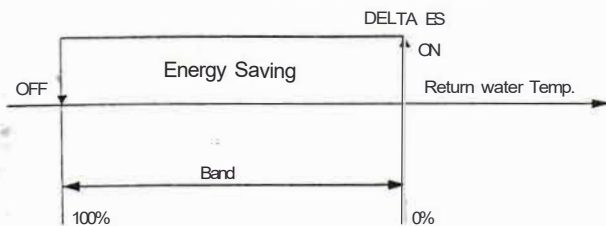
The possibility to work in Energy Saving decided by the control. comparing the water intake temperature with the outside air temperature. When the water entering the unit is warmer than the air by a value equal to "Delta ES" the Energy Saving function is activated . as shown in the diagram, right.

9.3. VI/ATER TEMPERATURE REGULATION (BASE VERSION)

The monitoring of the water temperature is either proportional (P) or proportional and integral (P+I), depending on the choice of the manufacturer.

PROPORTIONAL CONTROL: this defines an ideal function point (SET POINT), The action of the control to bring the system as near as possible to the ideal function point is proportional to the distance from that point. Having determined a proportional band of a defined value around the set point, the control produces the minimum actc,.1 necessary corresponding to the set point. As the distance measured increases the effectiveness of the control also increases until it is total when it reaches the limit of the regulation band.

PROPORTIONAL AND INTEGRAL CONTROL: in addition to the above. this type of control includes the concept of time. The characteristic feature is the time constant, expressed in seconds, which characterises the speed of response of P+I (short time = high speed). This is especially useful for overcoming stall situations (a large constant error) which are common with proportional-only controls. The normal time constant is 600 seconds.

9 4 SET POINT OF COMPRESSORS (BASE VERSION)

9.2 control nrs: selects the set-point arc re differential on which re control of water temperature is based it hen. based on the numoer If components available. uses them in the operational band in order to cover It comoletely.

Olagrar.1 1 shows the compressor activation sec;c;-:2 n units Nith 4 Scroll compressors in tandem

SET POINT

Temp. water IN

COMP2.1
COMP2.2
COMP1.1
COMP1.2

0%   (1/2 Temp. regulation band)   100%
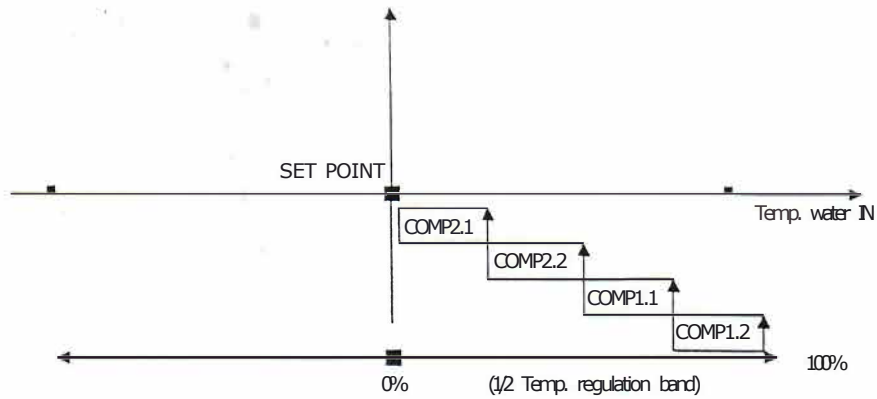
DIAG.1

9.5. DEAD ZONE MANAGEMENT

The control enables the setting of a dead zone around the set point, that is a zone in which all compressors remain off. To do this, the steps are moved to the right (after the set dead zone)

and are reduced as intervention fields. *It is important to check that the value of the set dead zone is smaller than the differential otherwise the components connected would never be activated.*

Oeac Band

COMP1   COMP2

SET POINT

Temp. water IN

Sensibility

9.6. FAN SPEED REGULATION

10V

MAX. SPEED
(DEFAULT 100%)

MIN. SPEED
(DEFAULT: 15%)

-:--BANDA PROP--.

0

T. COND

T. COND. (START)
(DEFAULT: 35.0°C)
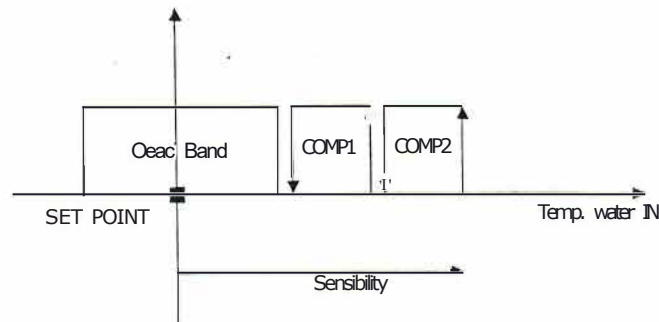
T. COND. (END)
(DEFAULT 58.0°C)
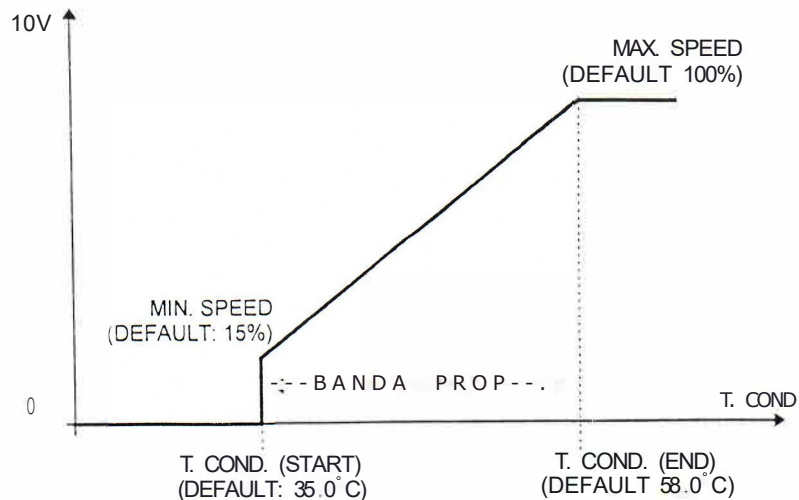
Fan speed control requires the presence of condensation pressure sensors. It enables the continuous control of fan speed in order to

maintain condensation temperature within the limits shown in the diagram (see *13. FACTORY PRE-SETS - CAL/BRA TION FI::!.DS).*

13

9.7. TIME BANOS (OPTIONAL)

Programmable time bands are useful since they enable the lowering of the set point of•the system, for example during the night, in order to save energy. They require the setting of the hour and minute of system activation and the associated set point. This set point is taken into consideration by the control when the current hour and minute coincide with those of the time band setting and remains in force until the next time band comes into effect.
For example, assuming time bans with the following values:

TIME	SET POINT	RESULT
06:00	2o·c	from 06:00 to 07:00 the set point will be 20°C
07:00	21·c	from 07:00 to 10:00 the set point will be 21°C
10:bO	1a·c	from 10:00 to 17:00 the set point will be 18°C
17:00	1s·c	from 17:00 to 06:00 the set point will be 15°C

The optional *clock circuit* is necessary for this function. 4 time bands can be set: f one of these is not needed, it must be set to the same values as the one before in order not to cause problems for the control.

The table below gives examples of right and wrong settings if only two time bands are needed.

WRONG		RIGHT	
HOUR/MINUTES	I SET POINT	HOUR/MINUTES	I SET POINT
07:30	1o·c	07:30	1o·c
00:00	0	17:00	15°C
00:00	0	17:00	15°C
17:00	1s·c	17:00	1s°c

The system allows the setting of 4 set points. (One per time band). As well as the daily time bands with change of set point, two other types of time band are available for turning the unit on and off, although these do not permit the fixing of a set-point.
1st type: daily, e.g. unit on at 9.00 and off at 16.30
2nd type: weekly, e.g. unit on Monday and off on Friday.

10. CONTROL CONFIGURATION

The microprocessor control must be configured, i.e. adapted to the unit in which it is to be installed.

This operation is normally performed when the control is installed in the unit, i.e. in the factory.

It may be necessary to make some adjustments if the unit is modified or if the EPROM is changed.

There is a specific part of the programme which accesses the CONFIGURATION subroutine and to the other operations which are normally performed by service technicians: the settings for this subroutine must not be modified.

To access the CONFIGURATION subroutine follow the instructions below until the display requests the MANUFACTURER password.

```
ALARM DISPLAY
SET POINT DISPLAY
SERVICE MENU
- (CLOCK FACILITY•)
```
(Screen 01a)

```
SET POINT TEMP.
OPERATIVE SETTINGS
MAINTENANCE
```
(Screen 01b)

Press the 𝑟𝑗 8 buttons together. \.::!:)

```
INSERT MANUFACTURER
PASSWORD
                  0000
```
(Screen _.) 8

Enter the MANUFACTURER password and change the values shown using the (±) and 8 buttons

```
INSERT MANUFACTURER
PASSWORD
                  _0121
```
g

```
INSERT MANUFACTURER
PASSWORD
                  0121
CORRECT  PASSWORD
```

```
UNIT CONFIGURATION
- COMPRESSORS
  GLOBAL PARAMETERS
  DEFAULT VALUES
```
(Screen 40)

From the CONFIGURATION MENU (screen 40) it is possible to access the subroutines described below, which allow the modification of unit configuration and the restoring of default settings.

10.1. UNIT CONFIGURATION

SCREEN 41

- CLOCK BOARD: this is selected when the optional clock board is fitted. The CLOCK FUNCTIONS subroutine for time band functions is automatically shown in screen 01 a
- SUPERVISOR: this is selected if the unit is connected to a serial supervision network. Screen 22 is automatically displayed for the setting of the serial address of the unit and the speed of serial data transmission.

SCREEN 43

- Defines the temperature sensors present.

SCREEN 44

- FREE COOLING: enables ENERGY SAVING function commands;
- TOTAL HEAT RECOVERY: enables command of total heat recovery (optional)

SCREEN 45

- Defines which pressure sensors are present

SCREEN 46

- Defines the type of refrigerant present (R22/R407C or R134a).

```
_ UNIT CONFIGURATION
  COMPRESSORS
  GLOBAL PARAMETERS
  DEFAULT VALUES
```
(Screen 40) @

```
CLOCK BOARD      N
SUPERVISOR       N
N COMPR.        2+4
```
(Screen 41) @

```
ENABLE FANS      y
```
(Screen 42) @

```
WATER INLET TEMP.
SENSOR PRESENT:    y
WATER OUTLET TEMP.
SENSOR PRESENT     y
```
(Screen 43) @

```
FREECOOLING:       y
TOTAL HEAT RECOV.: N
```
(Screen 44) @

```
HIGH PRESS. 1 PROBE  y
HIGH PRESS. 2 PROBE  Y
LOW PRESS. 1 PROBE   N
LOW PRESS. 2 PROBE   N
```
(Screen 45) @

```
TYPE OF REFRIGERANT
(R22 / R134A):   R22
```
(Screen 46) @

```
HIGH PRESSURE PROBE
RANGE PRESSURE
START      00.0 BAR
END        30.0 BAR
```
(Screen 47) @

Press the O key to exit the CONFIGRATION MENU.

10.2. COMPRESSORS

SCREEN 50

- COMPRESS. MIN. SWITCH-OFF TIME: sets the minimum time between the stopping of a compressor and its restarting.
- COMPRESS. MIN. RUNNING TIME: sets the minimum time between the starting of a compressor and its switching off.

SCREEN 51

- TIME BETWEEN STARTS SAME COMPR.: sets the minimum time between two successive start-ups of the same compressor to avoid on/off cycles which are too frequent.
- TIME BETWEEN STARTS DIFFR. COMPR.: sets the minimum time between the start-up of two different compressors to avoid the simultaneous starting of more than one compressor.

```
UNIT CONFIGURATION
_COMPRESSORS
 GLOBAL PARAMETERS
 DEFAULT VALUES
     (Screen 40)
```
>>
```
COMPRESS.MIN.SWITCH-
OFF TIME      0180 sec.
COMPRESS.MIN.RUNNING
TIME          0060 sec.
     (Screen 50)
```
@
```
TIME BETWEEN STARTS
SAME COMPR.  0360 sec.
TIME BETWEEN STARTS
DIFFR. COMPR. 0120 sec.
     (Screen 51)
```
Press the 0 **key to exit the CONFIGRATION MENU**

10.3. GLOBAL PARAMETERS

SCREEN 61

- PUMP SWITCH-OFF DELAY: this sets the time delay between switching off the compressor and the stopping of the pump.

SCREEN 62

- LOW PRESSURE ALARM DELAY: this sets the delay on the intervention of the LP pressostat on start-up to allow the unit to reach function conditions.

SCREEN 66

- CONDENSATION RAMP: this enables regulation of the temperature band in which speed control is active.

SCREEN 67

- FAN SPEED SETTING: this sets the minimum (**MIN.** SPEED) and maximum (MAX. SPEED) fan speed.

```
UNIT CONFIGURATION
 COMPRESSORS·
 GLOBAL PARAMETERS
- DEFAULT VALUES
     (Screen 40)
```
>>
```
TEMP. REGULATION
TYPE            P
INTEGRATION TIME
IN P+I REG.    600 sec.
     (Screen 60)
```
⤓
```
PUMP SWITCH-OFF
DELAY         020 sec.
     (Screen 61)
```
⤓
```
LOW PRESSURE ALARM
DELAY         090 sec.
     (Screen 62)
```
⤓

```
CONDENSATION RAMP
START AT:     35.0 °C
END AT:       58.0 °C
     (Screen 66)
```
⤓
```
FAN SPEED SETTING
MIN. SPEED:        015%
MAX. SPEED COND.   100%
MAX. SPEED FC.     100%
     (Screen 67)
```
Press the 0 **key to exit the CONFIGURATION MENU.**

10.4. RESTORING FACTORY PRE-SETS

Clearing the memory is necessary if the EPROM is changed (for example to up-date the program) or if the data (set-points, configuration choices, etc.) is disrupted.

- DEFAULT VALUES: automatically restores the factory defaults (see *13. FACTORY DEPAULTS - SETTING FIELDS)* when it is necessary to restore all parameters to default values with a single command.

After this operation **it is** necessary to re-**configure the control and re-adjust the set-points if the desired settings are different from the defaults.**

```
UNIT CONFIGURATION
-COMPRESSORS
 GLOBAL PARAMETERS
 DEFAULT VALUES
     (Screen 40)
```
⤓ ⤓ ⤓
```
UNIT CONFIGURATION
 COMPRESSORS
 GLOBAL PARAMETERS
_DEFAULT VALUES
     (Screen 40)
```
@
```
INSERT DEFAULT VALUES

PRESS ENTER KEY
     (Screen 70)
```
g

```
INSERT DEFAULT VALUES

PRESS ENTER KEY
OPERATION COMPLETE
     (Screen 70)
```
Press the 9 key to return to screen 40.

11.ALARMS

All alarm conditions are signalled:
1. acoustically, by the buzzer in the user terminal;
2. vi,sually, by the red LED on the front and by the word ALARM in field D of the, display (see SWITCHING TH UNIT ON AND OFF: THE STATUS SCREEN).

Press the (a) key to silence the buzzer (if active) and display the alarm description.

Press the (I:) key to read any other alarm events in sequence and to enter the STATUS LOOP.

The ALARM message is displayed until the cause of the alarm has been.eliminated.

11.1. DESCRIPTION OF ALARM EVENTS

All possible alarm messages which can be shown on the user terminal display are listed below.

It should be noted that some of these refer to specific unit configurations and will not appear unless the unit in question has the relevant feature.

To find the solution to any problems, please refer to the Troubleshooting section in this manual and to the instruction manual for the unit controlled by the microprocessor.

FAULTY REGULATION ALARMS

These alarms are related to unit components and are caused by the intervention of a protection device.

```
SERVICE NOTE
EEPROM FAILURE:
CONTROL BOARD NEED
TO BE REPLACED
```

Indicates an EEPROM write error, probably due to too many write/cancel cycles or the absence of the EEPROM chip.
The "EEPROM" has to be changed by the manufacturer: return the control to Uniflair for repair.

```
ALARM
n
SENSOR
FAILED/DISCONNECTED
```

This is detected by the check algorithm of the /"", sensor when normal threshold values are exceeded. This is probably caused by a short circuit in the sensor or the output signal.

(**) This alarm is connected to the following sensors:
• evaporator water intake temperature sensor;
• outside air temperature sensor;
• h_eat recovery water temperature sensor;
• evaporator water delivery temperature sensor (this alarm switches the unit OFF).

```
ALARM
CIRCUIT 1/2 CONDENS.
PRESSURE TRANSDUCER
FAILED
```

This is detected by the check algorithm of the circuit 1/2 pressure sensor, when normal threshold values are exceeded: probably caused by the sensor being faulty or disconnected.

```
ALARM
CLOCK BOARD
NON FITTED OR
NON PROPERLY WORKING
```

The clock circuit has been selected but it is not connected or is faulty. Check that the circuit is fitted near the telephone connection.

NON-FUNCTION ALARMS

```
HIGH PRESSOSTAT
COMPR. THERMAL SWITCH
FAN THERMAL SWITCH
CIRCUIT 1/2
```

This alarm can have a variety of causes, all of which act on the same digital input (IO11-circuit 1 / ID12-circuit 2). This input covers the HP pressostat. compressor and fan thermal switches and all components on circuit 1/2.

```
FLOW GAUGE ALARM
```

Detected by the flow gauge.

TEMPERATURE THRESHOLDS

```
ALARM EVAPORATOR
WATER INLET
HIGH TEMP. THRESHOLD
PASSED
```

Detected by the evaporator water intake sensor. This alarm is gen r-ated when the read value goes above the maximum temperatur';! Jhreshold (which can be set)..

```
ALARM EVAPORATOR
WATER OUTLET
HIGH TEMP. THRESHOLD
PASSED
```

Detected by the evaporator water intake sensor. This alarm is generated when the read value goes below the minimum temperature threshold (which can be set).

PRESSURE ALARMS

```
LOW PRESSURE-STAT
CIRCUIT 1/2
```

The LP pressostat on circuit 1 has intervened, causing compressor 1/2 to·switch off.

```
ALARM
HIGH PRESSURE
THRESHOLD PASSED
CIRCUIT 1/2
```

Detected by the pressure sensor on circuit 1/2 and indicates the exceeding of the high pressure threshold.

OTHER ALARMS

```
PUMP 1 OR 2
THERMAL SWITCH
ALARM
```

The pump 1-2 thermal switch alarm has intervened, causing all components and the unit to switch off.

```
FREECOOLING PUMP
THERMAL SWITCH
ALARM
```

The pump thermal switch alarm has intervened, causing all components and the unit to switch off.

```
ALARM
INTEBLOCK
```

The interlock alarm has intervened, causing all components and the unit to switch off.

```
ANTIFREEZE ALARM BY
EVAPORATOR WATER
OUTLET TEMP. SENSOR
```

The antifreeze alarm has intervened from the digital input or because the evaporator water delivery temperature has gone above the set antifreeze threshold. This has caused all components except the pump to switch off.
Before re-setting the alarm, wait for the temperature to go above the differential antifreeze threshold.

SERVICE ALARMS

SeNice alarm are not alarms in the true sense since they do not influence unit function. They are signals which indicate that one of the scheduled seNice operations is due.

EXCEEDING OF THE RUN HOUR COUNTER THRESHOLD

Alarms caused by the exceeding of the run hour threshold can only be cancelled if the counter involved is zeroed or the threshold is increased.

```
SERVICE NOTE
n
RUN HOURS THRESHOLD
PASSED
```

Detected by the specific counter for the threshold set in screen 26
(.) This alarm is connected to the following components:
* *unit;*
* *compressor 1;*
* *compressor 2*

Signal only.

IMPORTANT It is possible to use the *'General Alarm'* terminals (see layout of the circuit board attached to this manual) to transmit unit alarm signals to a remote location. This is possible only when the default setting NO is set on screen *24a* (see 7. 1. REMOTE ALARMS).

12. TROUBLESHOOTING

Many pr.oblems can be caused by loose terminal connections. In the event of an alarm, check that all wires are securely attached to the header.

In any case it is advisable to contact the naarst authorised UNI-FLAIR Service Centre, with at least a general indication of the nature of the problem.
To facilitate diagnosis of the problem it is helpful to have an electrical diagram of the unit in which the control is fitted.

PROBLEM	POSSIBLE CAUSE	CHECK/ CORRECTIVE ACTION
THE UNIT DOES NOT SWITCH ON (Mains LED on base circuit is off, display is off, other LEDs are off)	A) The unit's electrical panel is not powered	Check mains power. Check that the power switch 011 the electrical panel is closed
	B) The circuit of the control has no power supply	1) Check that auxiliary power switch is primed; 2) Check mains power at terminals G and GO on the cir- l 3) Check that the protection fuse for the circuit is intact; 4) Check the electrical connections (see unit electrical diagram).
AFTER SWITCHING ON, THE CON-rnOL 'IS NOT IN NORMAL CONDI-TION (alarm LED on; no LCD display or rado.11 display; buzzer active)	A) The EPROM is nor positioned cor-rectly	Disconnect the power supply, position the EPROM cor-rectly (see CHARACTERISTICS) and re-connect ttie power supply. **N.B.:** read the IMPORTANT WARNINGS on page 2 CAREFULLY
	B) Some of the EPROM pins were bent during installation	See above
	C) The microprocessor chip has been incorrectly handled	The control must be replaced: contact an authorised serv-ice centre
THE USER TERMINAL DOES NOT RESPOND TO THE BUTTONS BE-ING PRESSED	0) The user terminal is not connected	Disconnect the power supply, connect the terminal and re-connect the power supply. **N.B.:** read the IMPORTANT WARNINGS on page 2 CAREFULLY
	E) The EPROM is nor positioned cor-rectly	Disconnect the power supply, position the EPROM cor-rectly (see CHARACTERISTICS) and re-connect the power supply. **N.B.:** read the IMPORTANT WARNINGS on page 2 CAREFULLY
A NON-EXISTENT ALARM CONDI-TION APPEARS REPEATEDLY	F) The contact connected to the digital input is normally open instead of normally closed	Switch the contact over (see LAYOUT OF BASE CIR-CUIT)
	G) Defective contact on the relative digital input connections	Check the closure of the contact on the base circuit termi-nals
	H) Fault on the digital input circuit	The control must be replaced. Contact the Service Centre
ON THE DISPLAY APPEARS THE MESSAGE: *EEPROM DAMAGED - CHANGE CONTROL CIRCUIT*	The memory chip is damaged	Contact the Service Centre; change the base circuit

13. FACTORY PRE-SETS-CALIBRATION FIELDS

The_ m1croprpcessor function pa·rameters are pre-set in the factory at the most common f,unction .values (DEFAULT values).

Tl:iese values can be adapted to the demands of the installation. within the minimum and maximum limits given in the table below.

For convenience, next t0 the pararri ter is given the number of tE screM in whii;h that parameter can be modified.

PARAMETERS

CRA-E EN Vers. 4.2 H 09/0699

screen	SETTING VALUES		DEFAULT	MIN	MAX
	Regulation set points			MIN	MAX
31	Water intake temperature - STANDARD	·C	13.0	MIN	MAX
31	Water intake temperature - DEHUMID. REQ.	·C	10.0	MIN	MAX
	Water temperature set point limit				
12	MIN	·C	11.0	-50.0	50.0
12	MAX	·C	20.0	-50.0	50.0
13	Temperature requlation band·	·C	2.0	0.0	15.0
14	Temp. regulation dead band	·C	0.0	0.0	3.0
17	Time exc.	min	05	0	900
17	Delta E.S. (Energy Saving)	·C	7	2	9.9
17	Movement band (Energy Savinq)	·C	1.5	1	5
	Water inlet temperature alarm thresholds				
18	HIGH	·C	18	-99.9	99.9
18	LOW	·C	.8	-99.9	99.9
19	Antifreeze alarm set point	·C	5.0		
20	Alarm delay_ on high/low water intake temp.	min	30	0	999
21	Interlock alarm delay	sec	000	0	999
26	Unit run hours service threshold	ore	20000	1	32000
26	Compressor run hours service threshold	ore	10000	1	32000
	Condensation ramp				
66	START AT	·C	35.0	30.0	50.0
66	END AT	·C	58.0	40.0	60.0
	Fan speed setting				
67	Min speed	%	15	0	100
67	MaxSfl_eed	%	100	0	100
67	Max sgeed free coolinq	%	100	0	100
	Password				
	User	-	0000	-	-
	Maintenance	-	*	-	-
	Manufacturer	-	••	-	-

*Password contamed_m the sealed envelope attached to this manual
** Password contained in the sealed envelope attached to this manual