



**WATER-COOLED  
WATER CHILLERS  
WITH SCREW  
COMPRESSORS**

**WSH-2**

**2.200-2.230-2.260-2.280-**

**2.300-2.360-2.400-2.440-**

**WATER-WATER  
HEAT PUMPS  
WITH SCREW  
COMPRESSORS**

**WSHH-2**

**3.450-3.540-3.580-3.620-3.660**

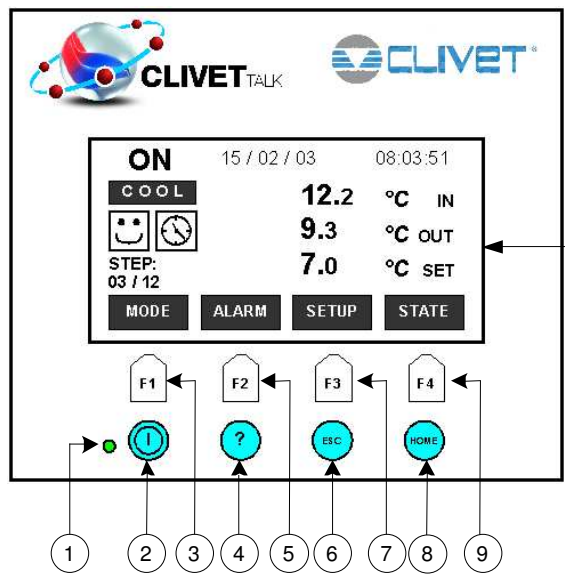
**CONTROL**

**CONTENTS:**

- WITH SCREW COMPRESSORS**
- MAIN CONTROL MODULE KEYPAD**
- MAIN PAGE**
- UNIT ON/OFF**
- ALARMS**
  - CENTRAL MODULE ALARM
  - COMPRESSOR MODULE ALARM
  - EVAPORATOR MODULE ALARMS
  - ALARM RESET
  - VIEWING THE ALARMS HISTORY
- MENU STRUCTURE**
  - ANTIFREEZE HEATER SET POINT

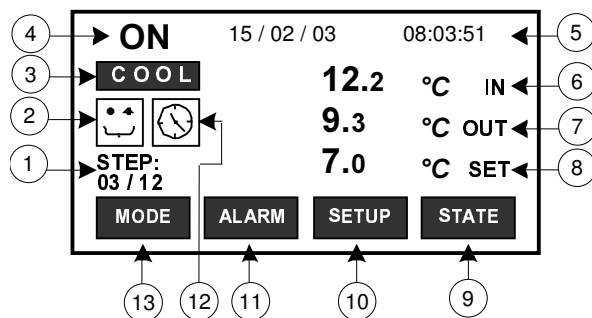
- ANTIFREEZE ALARM SET POINT
- ANTIFREEZE PRE-ALARM SET POINT
- HOLD SET POINT (SETMANTCOOL - SETMANTCOOL)
- COOL/HEAT SECONDARY SET POINT (SECONDDSETC - SECONDDSETH)
- COOL – HEAT SET POINT (SETCOOL - SETHEAT)
- SETTING THE CLOCK**
- DATE SETTING**
- CONTROL OF UNIT BY TIME BANDS**
- CIRCULATING PUMP MANAGEMENT**
- CONNECTING THE UNIT TO SUPERVISORY SYSTEMS**
- OPTIONS**





**MAIN CONTROL MODULE KEYPAD**



- 1: Led = a light when unit is in ON  
 Led = extinguished when unit is OFF
- 2: "ON/OFF" key: when pressed and held for at least 3 seconds, switches the unit on or off
- 3: F1 = assumes the function associated with the operation displayed
- 4: "HELP" key: depending on the menu selected, pressing this key will display brief explanations of parameters, status variables and alarms, for the benefit of the user.
- 5: F2 = assumes the function associated with the operation displayed
- 6: "ESC" key: when navigating the menus, this key can be used to go back to the previous screen
- 7: F3 = assumes the function associated with the operation displayed
- 8: "HOME" key: when navigating the menus, this can be used to return to the main menu directly, whatever the screen currently displayed.
- 9: F4 = assumes the function associated with the operation displayed
- 10: Display

## MAIN PAGE



1:	STEP: 00/00	N° of capacity control steps activated in relation to n° of steps available
2:		No alarm active
		Indication of active alarms
3:	<b>COOL</b>	Unit operating in cool mode
4:	ON OFF	Unit on Unit off
5:	15/02/03 08:03:51	Display the actual date and hour
6:	00.0 °C IN	Inlet temperature
7:	00.0 °C OUT	Outlet temperature
8:	00.0 °C SET	Actual Set-point
9:	<b>STATE</b>	STATUS: allows access to the unit status menu
10:	<b>SETUP</b>	SETUP: allows access to the menu used for setting parameters, changing the clock setting and setting time bands
11:	<b>ALARM</b>	ALARM: allows access to the alarms menu
12:		Time bands disabled
		Time bands enabled
13:	<b>MODE</b>	MODE: non significant

## UNIT ON/OFF

Press the ON/OFF key and hold for a few seconds to switch the unit on or off. When powered up, the word "ON" appears in the display; when shut down, the word "OFF" will appear.

The ON/OFF status can be monitored by way of a remote device (see electrical diagram to identify the relative terminals).  
N.B. The different menus can also be accessed with the unit "OFF".

## ALARMS

The presence of one or more alarms is indicated by the “Current alarms” icon, which will blink, and, according to the type of alarm, by activation of the cumulative trip relay. To see the list of active alarms:

- press the ALARM key once
- select the “VIEW ALARM” key
- press the ENTER key.

### CENTRAL MODULE ALARM

<b>Display code</b>	<b>Reset</b>	<b>Description</b>
<b>E001</b> Temp. probe fault H2O IN central	Automatic	Disables load compensation and free-cooling
<b>E002</b> Temp. probe fault H2O OUT central	Automatic	General lockout – pump active
<b>E003</b> External air temperature probe fault	Automatic	Disables associated functions (free-cooling – setpoint compensation – defrost time count)
<b>E004</b> Water Reset inlet fault	Automatic	Disables WR compensation
<b>E005</b> External RH% probe fault	Automatic	Disables associated functions
<b>E006</b> Pump 1 central thermic alarm	Automatic	See pump management
<b>E007</b> Pump 2 central thermic alarm	Automatic	See pump management
<b>E008</b> Central flowswitch alarm	See pump management	General lockout - See pump management
<b>E009</b> System pressure alarm	Manual	General lockout - See pump management
<b>E010</b> Phase monitor alarm	Automatic	General lockout - Pump Off after a suitable interval
<b>E011</b> Central antifreeze alarm	Manual	General lockout – Active pump
<b>E012</b> Antifreeze central PREAlarm	Automatic	Disables steps
<b>E013</b> CENTRAL Pump change	Automatic	Indication
<b>E014</b> Unit configuration alarm	Automatic	Indication
<b>E015</b> Demand Limit inlet fault	Automatic	Indication
<b>E016</b> Can net disconnectedness on control module	Automatic	General lockout

### COMPRESSOR MODULE ALARM

<b>Display code</b>	<b>Reset</b>	<b>Description</b>
<b>E101</b> Cond./ Evap. Temp. probe fault	Automatic	TypeCE=0; Cooling: only signal Heating: interested circuit lockout
<b>E102</b> Condensing pressure probe fault	Automatic	Interested circuit lockout
<b>E103</b> Evaporating pressure probe fault	Automatic	Interested circuit lockout
<b>E104</b> Recovery temp. probe fault	Automatic	Disables "compressor module 4-ways valve" outlet (disables recovery).
<b>E105</b> High pressure alarm	Manual	Interested circuit lockout
<b>E106</b> Low pressure alarm	Automatic	Interested circuit lockout
<b>E107</b> Fan thermic alarm	Manual	Interested circuit lockout. If the ventilation is in common block "UNIT-I"
<b>E111</b> H2O cond. / Evap. flow alarm	Automatic	TypeCE=1; Interested circuit lockout
<b>E112</b> High pressure Prealarm 1	Automatic	HP1Enabled=0: alarm not managed HP1Enabled=1: active max interested fan speed
<b>E113</b> Low pressure Prealarm 2	Automatic	LP1Enabled=0: alarm not managed LP1Enabled=1 disables an interested circuit compressor
<b>E114</b> Low Pressure Prealarm	Automatic - Manual dopo NPRELP1 hour	LP1Enabled=0: alarm not managed LP1Enabled=1 disables an interested circuit compressor
<b>E115</b> Defrosting forcing alarm	Automatic	Only signal
<b>E116</b> MaxDeltaPressure alarm	Manual	Interested circuit lockout
<b>E117</b> H2O recovery flow alarm	Automatic	Interested circuit lockout
<b>E118</b> Recovery HP prealarm	Automatic - Manual after NPREHPHour	Disables recovery on the interested circuit
<b>E108</b> Compressor 1 thermic alarm	Manual	Interested circuit lockout
<b>E109</b> Compressor 2 thermic alarm	Manual	Interested circuit lockout
<b>E110</b> Compressor 3 thermic alarm	Manual	Interested circuit lockout
<b>E213</b> Disconnected module	Automatic	General lockout

## System composition

Control system changes according to the number of compressors that compose the unit.

Unit with 2 compressors: 1 central module, 2 compressor modules (Compressor module 1 and 2 on Unit-1),

Unit with 3 compressors: 1 central module, 3 compressors module, (Compressor module 1 and 2 on Unit-1, Compressor module 3 on Unit-2)

## NOTE

The compressor module alarms have the same symbol on each compressor module that composes the system. To correctly identify on which module is occurred the fault, pay attention on the associated code:

Exemple:

**U2-CMP2** (Alarm Unit-2 / Compressor Module 2)

**E105 High pressure alarm**

Indicates that the alarm is active on the Unit 2 Compressor 2 Module

## EVAPORATOR MODULE ALARMS

(present only for units with at least two evaporators)

<b>Display code</b>	<b>Reset</b>	<b>Description</b>
<b>E201</b> Evaporator inlet probe fault	Automatic	Disable load compensation and free-cooling
<b>E202</b> Evaporator outlet probe 1 fault	Automatic	Lockout "UNIT-i" – active pump
<b>E202</b> Evaporator outlet probe 2 fault	Automatic	Lockout "UNIT-i" – active pump
<b>E203</b> Programmable evaporator input alarm	Automatic	To define according to the associated functions
<b>E204</b> Thermal alarm evaporator pump 1	Manual	Lockout "UNIT-i" – See pump management
<b>E205</b> Thermal alarm evaporator pump 2	Manual	Lockout "UNIT-i" – See pump management
<b>E206</b> Evaporator flow switch alarm	Manual	Lockout "UNIT-i" – See pump management
<b>E207</b> Evaporator system fill alarm	Manual	MACHINE lockout – See pump management
<b>E208</b> Change pumps on evaporator	Automatic	See pump management
<b>E209</b> Antifreeze alarm on evaporator	Manual	Lockout "UNIT-i" – active pump
<b>E210</b> Tout 1, antifreeze pre-alarm on evaporator	Automatic	Disables steps on UNIT-i (see example)
<b>E211</b> Tout 2, antifreeze pre-alarm on evaporator	Automatic	Disables steps on UNIT-i (see example)
<b>E212</b> System pump lockout	Manual	General lockout
<b>E214</b> Module not connected	Automatic	General lockout

## ALARM RESET

Alarms can be reset once the conditions that caused them to trip have been removed. Certain alarms are reset automatically, whereas others must be reset manually. To reset manual alarms:

- go to the "view alarms" screen
- press the RESET key

## VIEWING THE ALARMS HISTORY

To display the list of alarm events recorded by the control system:

- press the ALARM key once
- select the "VIEW STORE" menu
- press the ENTER key.

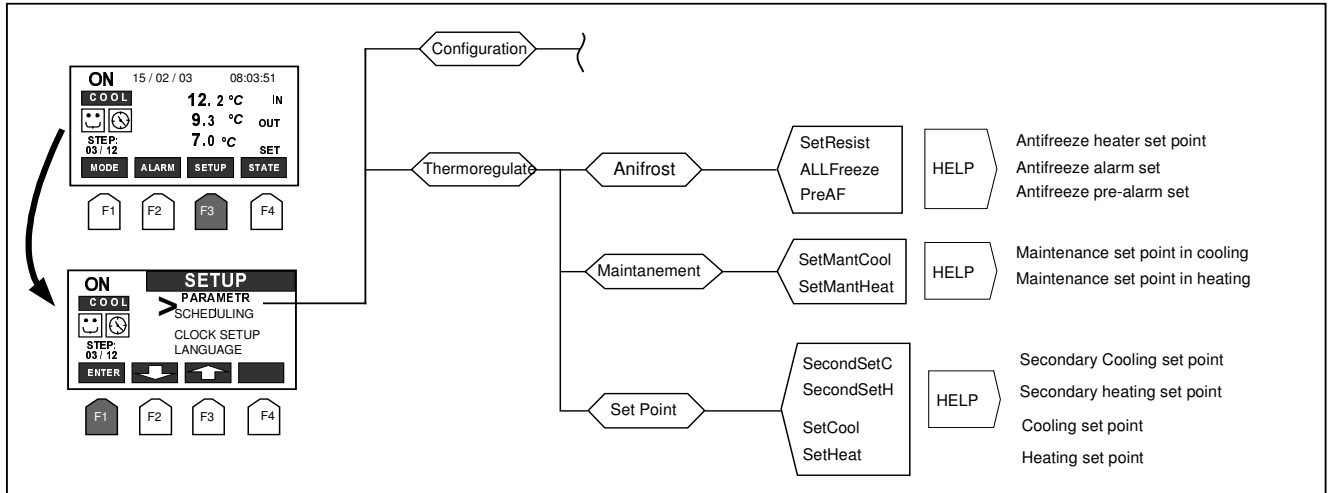
## MENU STRUCTURE

Electronic parameters are managed by way of various submenus. The menus are navigated using keys F1-F2-F3-F4, of which the function will be that associated with the operation displayed at any given moment.

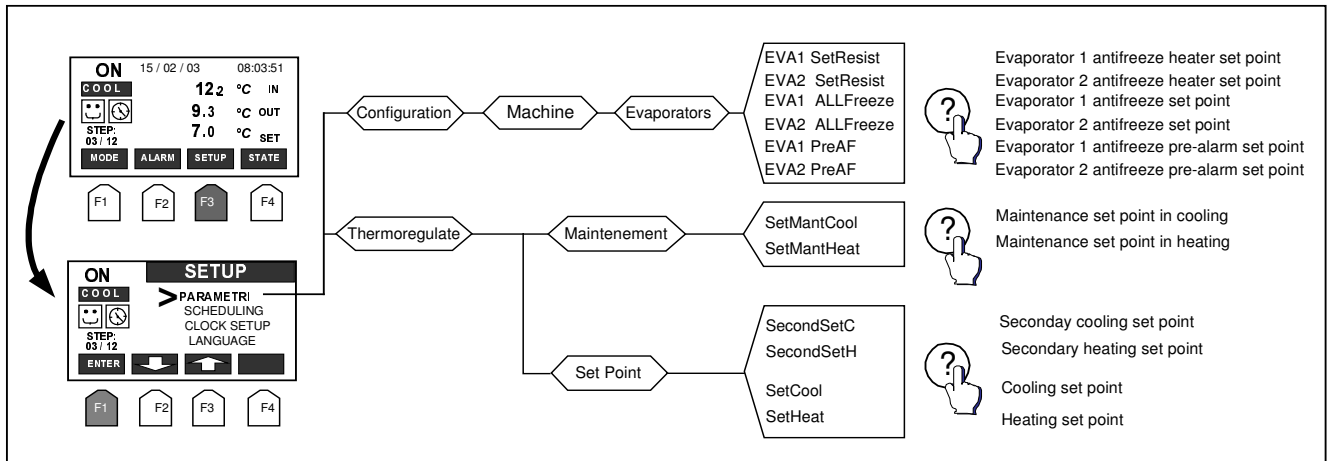
## PARAMETERS MENU

To access the PARAMETERS menu, press the "SETUP" key. The menu is navigated using the function keys F1-F2-F3-F4.

Unit with one internal exchanger.



Unit with two internal exchangers.



### ANTIFREEZE HEATER SET POINT

(SetResist-EVA1 SetResist – EVA2 SetResist)

The parameter is pre-set by the manufacturer. To change these settings:

- access the parameter to be modified
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change.

### ANTIFREEZE ALARM SET POINT

(ALLFreeze – EVA1 ALLFreeze – EVA2 ALLFreeze)

The parameter is pre-set by the manufacturer. To change these settings:

- access the parameter to be modified
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change.

### ANTIFREEZE PRE-ALARM SET POINT

(PreAF – EVA1 PreAF – EVA2 PreAF)

The parameter is pre-set by the manufacturer. To change these settings:

- access the parameter to be modified
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change

---

#### **HOLD SET POINT (SETMANTCOOL - SETMANTCOOL)**

The facility exists of enabling a hold SET POINT. If not included, the function can be activated by an authorized service centre. To set the function, if enabled:

- select the parameter SetMantCool/SetMantCool
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change.

When switched to OFF, the unit remains in standby. In this condition, the water circulating pump will cut in at predetermined intervals (for a programmable duration), so that the temperature of the chilled fluid can be sensed. If the temperature registers near the operating limits of the unit, the system will restart and remain in operation until the temperature is brought comfortably within these limits.

It is also possible to select the maximum number of compressors enabled to operate during the hold phase.

#### **COOL/HEAT SECONDARY SET POINT (SECONDSETC - SECONDSETH)**

A second SET POINT can be enabled from a digital inlet. If not included, the function can be activated by an authorized service centre. To set the function, if enabled:

- select SecondSetC – SecondSetH.
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change.

When the remote contact is closed, the system switches from the normal operating set point to the selected Second Set Point.

#### **COOL – HEAT SET POINT (SETCOOL - SETHEAT)**

The function of the thermoregulator is that of maintaining the temperature of the fluid at the plate exchanger outlet as near as possible to the selected COOL SET POINT.

The current Set point is determined by the value selected for the SetCool or the SecondSetC parameter, plus any compensating factors (if active). The actual operating Set point value for the unit is displayed on the main screen against the value indicated by "°C Set". The thermoregulator can activate only one step at a time, and only after the set scan time has elapsed. At any other time, no activation of steps is possible. The activation scan time is not fixed, but will vary according to the difference between the outlet water temperature and the current Set point value. The greater the difference (whether positive or negative), the shorter the interval between scan points will be.

The SetCool parameter is factory-set by the manufacturer. To change the setting:

- select SetCool-SetHeat
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change

The thermoregulator deactivates capacity control steps when the outlet water temperature drops toward the value selected for the SetCool parameter. Steps are activated when the outlet temperature rises above the value given by SetCool plus a correction, computed by the thermoregulator, which ensures optimization of the compressors operating cycle according to the effective load demand on the unit.

#### **SETTING THE CLOCK**

The control circuit board is equipped as standard with a clock function. To change the settings, select the SETUP menu, then -> CLOCK SETUP -> TIME. Proceed to enter the required hours, minutes and seconds by pressing the "+" key. The value entered can only be increased, not decreased. Once the maximum numerical value has been reached (e.g.: 23H for the hours), the scroll restarts from 0.

To store the values entered, the "ENTER" key must be pressed and held for a number of seconds.

#### **DATE SETTING**

To change the settings, select the SETUP menu, then -> CLOCK SETUP -> DATE. Proceed to enter the required day of the month (0...31), the month (0...12) and the year by pressing the "+" key. The value entered can only be increased, not decreased. Once the maximum numerical value has been reached (e.g. 31 for the day of the month), the scroll restarts from 1.

To store the values entered, the "ENTER" key must be pressed and held for a number of seconds.

---

### **CONTROL OF UNIT BY TIME BANDS**

The microprocessor allows management of ON/OFF events and change of Set point utilizing the time band function. To enable this function, if required, contact an authorized service centre.

### **CIRCULATING PUMP MANAGEMENT**

The circulation pumps of the source and use circuit are controlled by the control module, connecting their control circuit as indicated in the wiring diagram supplied with the unit. The pumps are thus automatically operated at the machine switching-on, delaying the compressor start for a certain time so that the system can reach its standard operating conditions; then, they are switched off with a set delay after the unit switching-off.

### **CONNECTING THE UNIT TO SUPERVISORY SYSTEMS**

A control module is available (as an accessory), which allows communication with the outside world by way of a CAN TO MODBUS serial port. If use of this accessory is contemplated, contact an authorized service centre.

### **OPTIONS**

Equipped with the appropriate options, the control module is able to recalibrate the current set point automatically, thereby optimizing operation and efficiency.

The following options can be activated:

- temperature of fluid supplied to system compensated with variation in ambient temperature.
- temperature of fluid supplied to system compensated with variation in ambient enthalpy.
- temperature of fluid supplied to system compensated in response to signal from an external device.

Activation and setting of these functions must be entrusted to an authorized service centre.

The unit is delivered with a standard configuration that will ensure smooth operation in all applications. Nonetheless, the configuration of specific parameters can be refined to suit particular types of use, for example:

- unit providing chilled water for industrial processes
- unit providing chilled water for air conditioning systems

If it is considered that parameters need adjusting, contact an authorized service centre.