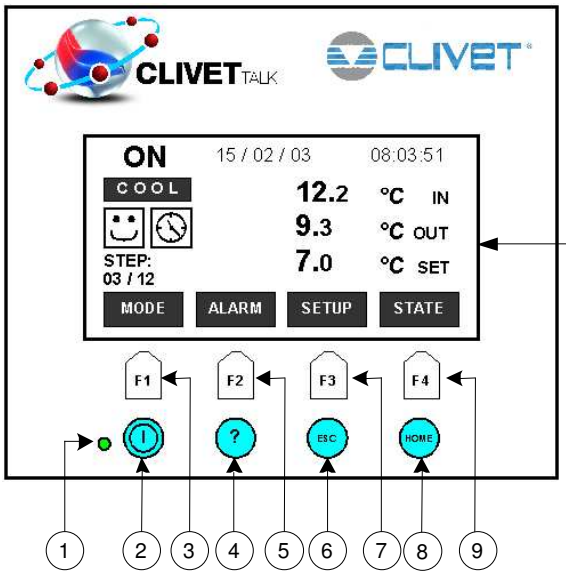
WATER CHILLER CONDENSERLESS
IT CAN BE COUPLED WITH REMOTE CONDENSER CLIVET SERIES CEM

MSE-2 2.200-2.230-2.260-2.280-2.300-2.360-2.400-2.440-3.450-3.540-3.580-3.620-3.660

CONTROL

CONTENTS:

MAIN CONTROL MODULE KEYPAD



1:	● ○	Led = alight when unit is 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	**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	**F2** = assumes the function associated with the operation displayed
6:	ESC	"**ESC**" key: when navigating the menus, this key can be used to go back to the previous screen.
7:	F3	**F3** = assumes the function associated with the operation displayed
8:	HOME	"**HOME**" key: when navigating the menus, this can be used to return to the main menu directly, whatever the screen currently displayed.
9:	F4	**F4** = assumes the function associated with the operation displayed.
10:		Display

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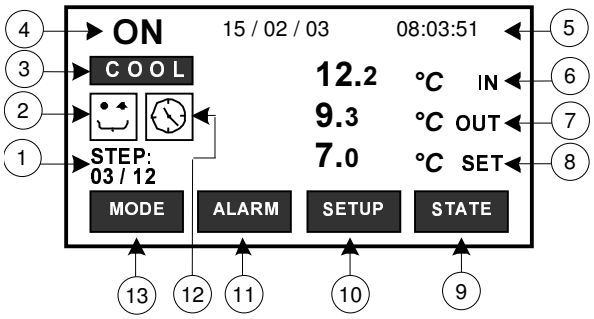
MAIN PAGE



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:	COOL	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:	STATE	STATUS: allows access to unit status menu
10:	SETUP	SETUP: allow access to the menu used for setting parameters, changing the clock setting and setting time bands.
11:	ALARM	ALARM: allow access to the alarms menu
12:		Time bands disabled Time bands enabled
13:	MODE	MODE: not 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			
MODULE	**ALARM**	**ACTION**	**RESET**
CEN	E001 CENTRE module inlet probe	Disables load compensation and free-cooling	Automatic
CEN	E002 CENTRE module outlet 1 probe	General lockout – Pump active	Automatic
CEN	E003 External probe	Disables associated functions (free-cooling - comp. Set point - defrost time count)	Automatic
CEN	E004 Water reset input	Disables Water reset compensation	Automatic
CEN	E005 External RH% probe	Disables associated functions	Automatic
CEN	E006 CENTRE module pump 1 thermal overload relay	Unit with 1 on bard/ external pump: General lockout Unit with 2 on board pumps: activates the riserve pump, if this is also affected by General lockout alarm	With one inboard/external pump: Manual With two inboard pumps: Automatic
CEN	E007 CENTRE module pump 2 thermal overload relay	Activates the riserve pump if this is also affected by alarm General lockout	Automatic
CEN	E008 CENTRE module pump flowswitch	General lockout	With one inboard/external pump: Manual With two inboard pumps: Automatic
CEN	E009 System load	General lockout	Manuale
CEN	E010 Phase monitor	General lockout – Deactivates pump after a suitable interval	Automatic
CEN	E011 CENTRE module antifreeze alarm	General lockout – Pump active	Manual
CEN	E012 CENTRE module antifreeze pre-alarm	Disables steps	Automatic
CEN	E013 CENTRE module pump change	Indication	Automatic
CEN	E014 Unit configuration alarm	Indication	Automatic
CEN	E015 Demand Limit inlet fault	Indication	Automatic
CEN	E016 CENTRE module disconnection from can net	Indication	Automatic

COMPRESSOR MODULE ALARM			
MODULE	**ALARM**	**ACTION**	**RESET**
U1/CMP1	E101 Coil probe	Cooling: indication only. Heating: circuit lockout 1 "UNIT-1"	Automatic
U1/CMP2	E101 Coil probe	Cooling: indication only. Heating: circuit lockout 2 "UNIT-1"	Automatic
U1/CMP1	E102 Condnesing pressure probe	Circuit lockout 1 "UNIT-1"	Automatic
U1/CMP2	E102 Condnesing pressure probe	Circuit lockout 2 "UNIT-1"	Automatic
U1/CMP1	E103 Evaporating pressure probe	Circuit lockout 1 "UNIT-1" "	Automatic
U1/CMP2	E103 Evaporating pressure probe	Circuit lockout 2 "UNIT-1"	Automatic
U1/CMP1	E105 High pressure alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP1	E106 Low pressure alarm	Circuit lockout 1 "UNIT-1"	Automatic
U1/CMP1	E107 Fan thermal alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP1	E108 Compressor 1 thermic alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP1	E109 Compressor 2 thermic alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP1	E110 Compressor 3 thermic alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP2	E105 High pressure alarm	Circuit lockout 2 "UNIT-1"	Manual
U1/CMP2	E106 Low pressure alarm	Circuit lockout 2 "UNIT-1"	Automatic
U1/CMP2	E107 Fan thermal alarm	Circuit lockout 2 "UNIT-1"	Manual
U1/CMP2	E108 Compressor 1 thermic alarm	Circuit lockout 2 "UNIT-1"	Manual
U1/CMP2	E109 Compressor 2 thermic alarm	Circuit lockout 2 "UNIT-1"	Manual
U1/CMP2	E110 Compressor 3 thermic alarm	Circuit lockout 2 "UNIT-1"	Manual
U1/CMP1	E112 High pressure prealarm1	Disables 1 compressor of circuit 1 "UNIT-1"	Automatic
U1/CMP2	E112 High pressure prealarm1	Disables 1 compressor of circuit 2 "UNIT-1"	Automatic
U1/CMP1	E113 High pressure prealarm2	Disables 1 compressor of circuit 1 "UNIT-1"	Automatic
U1/CMP2	E113 High pressure prealarm2	Disables 1 compressor of circuit 2 "UNIT-1"	Automatic
U1/CMP1	E114 Low pressure prealarm	Disables 1 compressor of circuit 1 "UNIT-1"	Automatic - Manual after 5 int. in 1h
U1/CMP2	E114 Low pressure prealarm	Disables 1 compressor of circuit 2 "UNIT-1"	Automatic - Manual after 5 int. in 1h
U1/CMP1	E115 Forced defrost alarm	Circuit 1 "UNIT-1" alarm. Indication only	Automatic
U1/CMP2	E115 Forced defrost alarm	Circuit 2 "UNIT-1" alarm. Indication only	Automatic
U2/CMP1	E115 Forced defrost alarm	Circuit 1 "UNIT-2" alrm. Indication only. Indication only	Automatic
U1/CMP1	E116 MaxDeltaPressure alarm	Circuit lockout 1 "UNIT-1"	Manual
U1/CMP2	E116 MaxDeltaPressure alarm	Circuit lockout 2 "UNIT-1"	Manual
	E213 Disconnected module alarm	General lockout	Manual

PUMP MODULE ALARM (IF PRESENT)			
MODULE	**ALARM**	**ACTION**	**RESET**
PMP	E502 Pump module Pump 1 termic alarm	Pump lockout 1	MANUAL
PMP	E503 Pump module Pump 2 termic alarm	Pump lockout 2	MANUAL
PMP	E504 Pump module Pump 3 ermic alarm	Pump lockout 2	MANUAL
PMP	E505 Pump module max flow rate indication	Force at max flow rate	Automatic - Manual after 5 int. in 1h

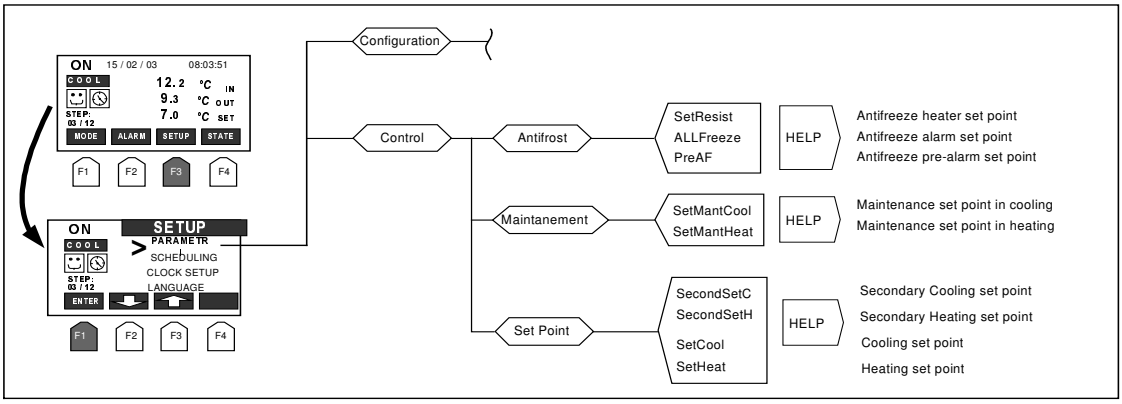
ALARM RESET
Alarms can be reset once the conditions that caused them to trip have been removed. Certain alarms are reset automatically, whereas others must be reset manually. To reset manual alarms:
- go to the “view alarms” screen
- press the RESET key.

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.

System composition
The control unit changes depending on how many compressors form the unit.
2-compressor unit: 1 central module, 2 compressor modules (compressor modules 1 and 2 on Unit-1),
3-compressor unit: 1 central module, 3 compressor modules (compressor modules 1 and 2 on Unit-1, compressor module 3 on Unit-2)
NOTE
The compressor module alarms feature the same identification on each compressor module forming the system. To correctly identify on which module the failure has occurred, carefully read the associated code:
Exemple:
U2-CMP2 (Unit-2 alarm/ Compressor 2 module)
E105 High pressure alarm
indicates that the alarm condition is active on the compressor module 2 of Unit 2

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.



ANTIFREEZE HEATER SET POINT (SetResist)
The SetResist parameter is factory-set by the manufacturer. To change the setting:
- select the SetResist parameter
- use the “ENTER” and “up arrow” / ”down arrow” keys to change the value
- press “ESC” to confirm the change.

FREEZE ALARM SET POINT (ALLFreeze)
The ALLFreeze parameter is factory-set by the manufacturer. To change the setting:
- select the ALLFreeze parameter
- use the “ENTER” and “up arrow” / ”down arrow” keys to change the value
- press “ESC” to confirm the change.

FREEZE PRE-ALARM SET POINT (PreAF)
The PreAF parameter is factory-set by the manufacturer. To change the setting:
- select the PreAF parameter
- use the “ENTER” and “up arrow” / ”down arrow” keys to change the value
- press “ESC” to confirm the change.

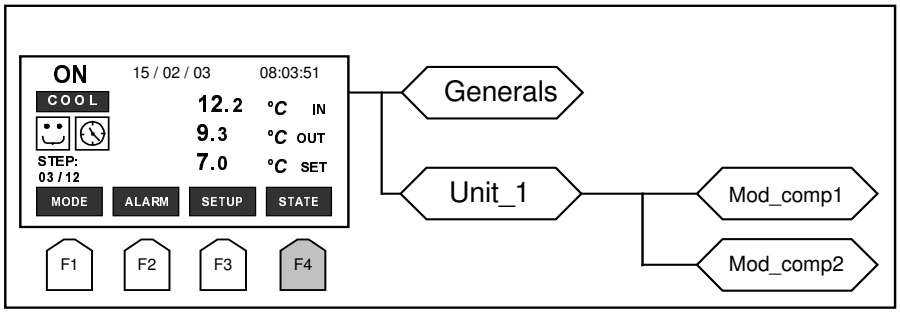
SET POINT MANTENIMENTO (SetMantCool)
The facility exists of enabling a hold SET POINT. If not included, the function can be activated by an authorized service centre. To set the function, if enabled:
- select the SetMantCool parameter
- use the “ENTER” and “up arrow” / ”down arrow” keys to change the 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 SECONDARY SET POINTS (SecondSetC)
A second SET POINT can be enabled, using a digital input. If not included, the function can be activated by an authorized service centre. To set the function, if enabled:
- select SecondSetC
- 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 SET POINT (SetCool)
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.
SetCool parameter are factory-set by the manufacturer. To change the setting:
- select SetCool
- 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.

OPERATING STATUS MENU

All statuses relative to the control module can be monitored.
Use the function keys F1-F2-F3-F4 to navigate. The “Mod_comp1” menu relates to the module controlling the compressors of circuit 1, “Mod_comp2” relates to the module controlling the compressors of circuit 2.



OPERATING STATUS: “GENERALS”

Parameter displayed	Description	UM
Machine status	Status of unit: ON o OFF	
Machine mode	Operating mode of machine: COOL o HEAT	
Current setpoint	Value of operating Set Point currently active	°C
Inlet temperature	Value of temperature at machine inlet	°C
Outlet temperature	Value of temperature at machine outlet	°C
Number of steps activated	Number of capacity control steps currently active	
Current step value	The value, calculated by the thermoregulator on the basis of the various compensation factors currently active, which when added (or added in HEAT mode) to the value of the current Set Point, will establish the temperature threshold ond which a further control step can be added.	°C
Step activation timer	Scan time controlling the activation of capacity steps. The thermoregulator can active a step only when TimeScan isters the value idicated here.	
Step activation dynamic TimeScan	Value of increment used in the count determining the activation of steps.	
CompExt	Value of Set Point compensation, calculated on the basis of outside air temperaure (or enthalpy).	°C
CompWR	Value of Set Point compensation, calculated on the basis of a Water Reset signal provided by an external device.	°C
CompCar	Load compensation calculated by the thermoregulator on the basis of Delta Temp. IN-OUT (compensation value is added to the Step value).	°C
CompStarts	Load compensation calculated by the thermoregulator on the basis of certain parameters defining optimum operation of the compressors (compensation value is added to the Step value).	°C
CompDuty	Load compensation calculated by the thermoregulator on the basis of certain parameters defining the optimum work cycle of the compressors (compensation value is added to the Step value).	°C
External temperature	Temperature of the outside air	°C
External humidity	Relative humidity of the outside air	%
Free Cooling valve percentage	The percentage distance to which the free cooling valve is open (unit with free cooling only)	%
Free Cooling flow percentage	Percentage quantity of air delivered by the dry cooler, if any, connected to the machine and operating as a free cooling appliance (unit with free cooling only).	%
Free Cooling valve control	Status of free cooling On-Off valve (unit with free cooling only).	
Pump 1 status	Status of pump n° 1	
Pump 2 status	Status of pump n° 2	
Water Reset	Percentage value of Water Reset signal applied to input.	%
Demand Limit	Percentage value of Demand Limit signal applied to input	%
Evaporator PMP water flow analogical out	Percentage value of analogical signal for utility side pump management	%
PMP pump 1 hours	Pump 1 utility side operating hours	
PMP pump 2 hours	Pump 2 utility side operating hours	
PMP pump 3 hours	Pump 3 utility side operating hours	

OPERATING STATUS: “Mod_comp1” e “Mod_comp2”

Parameter displayed	Description	UM
Compressor 1 status	Current status of compressor 1	
Compressor 2 status	Current status of compressor 2	
Compressor 3 status	Current status of compressor 3	
Cp 1 timer status	Status of safety timeouts for compressor 1	
Cp 2 timer status	Status of safety timeouts for compressor 2	
Cp 3 timer status	Status of safety timeouts for compressor 3	
Valve 1 c1 status	Status of valve (not significant)	
Valve 2 c1 status	Status of valve (not significant)	
Valve 3 c1 status	Status of valve (not significant)	
Valve 1 c2 status	Status of valve (not significant)	
Valve 2 c2 status	Status of valve (not significant)	
Valve 3 c2 status	Status of valve (not significant)	
Valve 1 c3 status	Status of valve (not significant)	
Valve 2 c3 status	Status of valve (not significant)	
Valve 3 c3 status	Status of valve (not significant)	
Liquid solenoid	Status of solenoid valve	
Coil temperature	Value of temperature measured at the coil	*°C*
Recovery temperature	Valore of water temperature measured at the inlet of the recovery (if installed))	*°C*
Condensing pressure	Value of condensation pressure	*Bar*
Evaporatine pressure	Value of evaporation pressure	*Bar*
Fan status	Percentage value of flow rate generated by the fans	*%*
Defrost status	Current status of defrost function (not significant)	
Defrost count time	Value registering on defrost delay timer (not significant)	*Sec*
Compressor 1 operating time	Total hours operation clocked by compressor 1	
Compressor 1 OFF-ON cycles	Total number of starts completed by compressor 1	
Compressor 2 operating time	Total hours operation clocked by compressor 2	
Compressor 2 OFF-ON cycles	Total number of starts completed by compressor 2	
Compressor 3 operating time	Total hours operation clocked by compressor 3	
Compressor 3 OFF-ON cycles	Total number of starts completed by compressor 3	

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.

DATA 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

When the unit is switched on, or when ON is selected from a remote device, the circulating pump is started up first, and only after the scan time has elapsed will operation of the compressors be enabled. For the first 20 seconds after the pump has started, the flow alarms input is ignored. In this way the pump has time to establish full flow of the circulated fluid, avoiding any problem posed by the formation of bubbles. In the event of the unit being switch off from the remote device, the compressor and fans will stop whilst the circulating pump continues to operate for 120 seconds.

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 optimising 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.