

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

MDE-3

2.160-2.180-2.200-2.220-2.250-

2.280-2.300-2.320-2.340-2.360-2.390-2.420-2.450-

2.480-3.480-3.500-3.520-3.540-3.570-3.600-3.630

CONTROL

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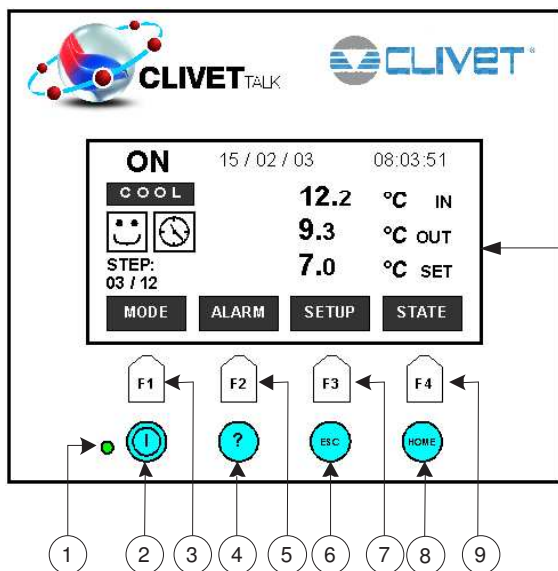
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


CIRCULATING PUMP MANAGEMENT

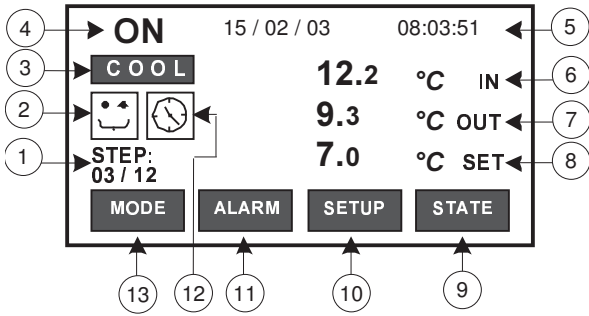
CONNECTING THE UNIT TO SUPERVISORY SYSTEMS










OPTIONS

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 = 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



| | | |
|-----|--|---|
| 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: |  | 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: |  | STATUS: allows access to unit status menu |
| 10: |  | SETUP: allow access to the menu used for setting parameters, changing the clock setting and setting time bands. |
| 11: |  | ALARM: allow access to the alarms menu |
| 12: |   | Time bands disabled Time bands enabled |
| 13: |  | 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 reserve 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 reserve 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 Condensing pressure probe | Circuit lockout 1 "UNIT-1" | Automatic |
| U1/CMP2 | E102 Condensing 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" alm. 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:

Example:

U2-CMP2 (Unit-2 alarm/ Compressor 2 module)

E105 High pressure alarm

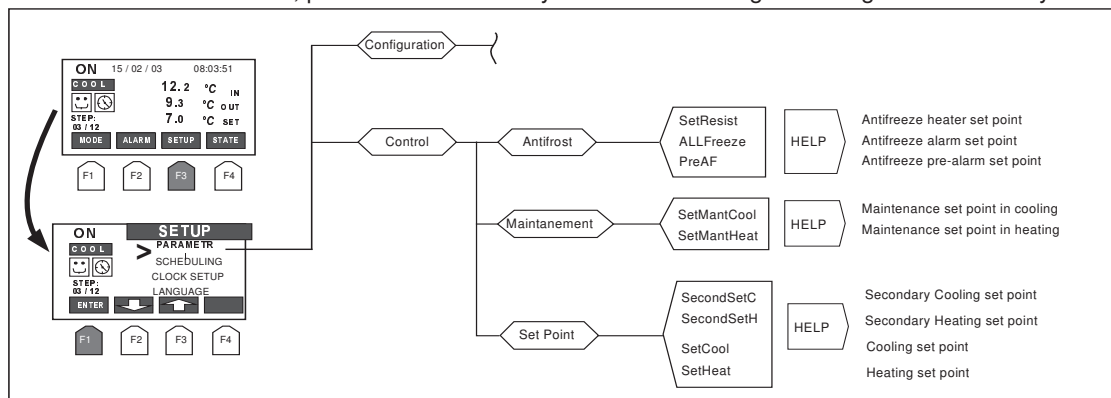
indicates that the alarm condition is active on the compressor module 2 of Unit 2

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:

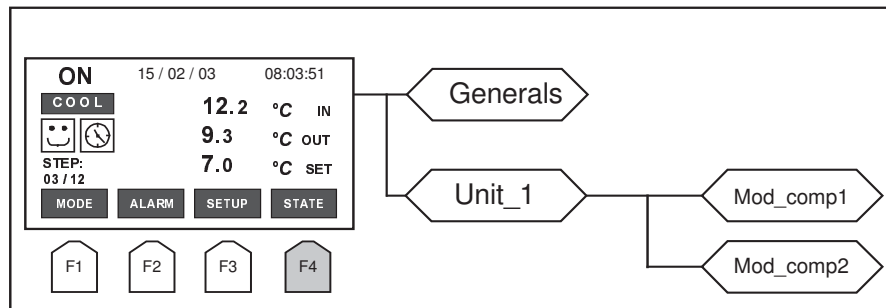
- select SetCool
- use the "ENTER" and "up arrow" / "down arrow" keys to change the value
- press "ESC" to confirm the change.

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 on 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 tempaure (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 | |

| 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.