

# ELECTRATECH

## Key Pad Controller

The key pad comprises 20 keys, 12 of which are numbered 1 to 12 corresponding to the Economy 7/24 hour circuits and 3 keys marked with legends of the hot water cylinder. 3 keys are dedicated to setting up the system and clock including a code button to prevent tampering of the controls by children etc. A HELP key provides rolling script on the LCD which will assist the user to programme the system at any given time. The script can be frozen by pressing any key.

The key pad controller is in two parts a wall mounting plate with cable access to the side and rear and the front cover which houses the key pad LCD, pcb and terminal block. This is a snap fit, and is removed by a twist of a screw driver.

Each circuit is addressable by means of a menu written within the programme. This will be of the form, room - eg lounge, hall, kitchen etc and circuit type eg storage heater, panel heater, wall heater, security lighting, washer etc. Each of keys must be addressed if no circuit exists then the key must be programmed as spare.

All circuits except storage heaters and bottom hot rods can be set for operation as 3 variable, timed periods. An override facility is available to circuits programmed as 24 hr ie pressing of these keys will switch the circuit 'on' until pressed again, or the next programmed 'off'.

Pressing of a key whose circuit has been programmed as a storage heater will receive no action by the system until the ECON 7 period commences. A second press of these keys will switch off the storage heater. The key must be pressed once more to switch the heater back on. A light emitting diode (LED) shows through a translucent window in the top right corner of each of the 12 circuit keys. **This LED shows the status of that circuit - flashing when manually overridden, extinguished for not programmed, and illuminated steady whilst under program control.**

Keys are of the touch sensitive type and issue a sound to confirm operation.

Switching facilities are provided for winter and summer holidays via the MODE key.

During the summer holiday all circuits are switched off with the exception of security lighting and water heating boost but details of switching of other circuits are retained within the memory.

During a winter holiday the system automatically switches panel heaters and storage heater on for a 2 hour period 2 hours after the commencement of the E7 period. Security lighting circuits switch in accordance with previously set programmes whilst all other circuits except water heating boost are switched off for the period of the holiday.

During any stage of programming if the user is in any doubt or if the user forgets how to operate the system information on the LCD can be obtained by pressing the HELP key. Information in

the form of rolling script, which can be frozen by pressing any key is provided to advise the user what is required. A second press of the HELP key exits the user from this routine. To find out what is connected to a particular circuit, press the key, full details will be displayed on the LCD. This feature makes Electratech very user friendly, and avoids the user having to refer to a manual and circuit card.

The key pad controller transmits its serial signals to the slave unit via a 4c security type cable. The cable will in most cases be stapled to the wall surface and in some instances eg tiled surfaces be enclosed in a 16 x 16mm minitrunking.

Note!

- (1) The circuit length (a) keypad - slave unit, 30 metres max. (b) keypad - thermistor is not critical however
- (2) The above circuits should be kept away from fluorescent fittings thereby avoiding corruption of signals.
- (3) The keypad controller must be located in a position away from (i) sources of heat ie above storage heaters etc, as this could effect the "on board" microprocessor and (ii) direct sunlight etc, as this could effect the reading of the LCD.

## **Servicing**

The impulse relays can be manually switched by means of the grey lever protruding from the top of the unit.

As the distribution has a 24hr busbar, manual switching of the relay controlling a storage heater would allow testing of the heater and circuit.

It should be noted however that every 10 minutes ET interrogates the system and switches off any relays which are switched on that shouldn't be, this prevents wasted energy. It also switches on any circuits that have been switched off at the lever.

It is not intended to carry out repairs on the keypad and slave unit pcb, these should be replaced and returned to Central Appliance Repair Workshop to be examined.

If it is necessary, during the course of rectifying faults on the system to switch off the supply then the following must be checked before leaving the premises.

- (i) The 100A DP isolator is switched on
- (ii) The 1A MCB - ET system is switched on
- (iii) The clock on the keypad controller indicates the correct time
- (iv) That keypad controller is set to the MODE required

## **Section 4 - HELP!**

At any time, if the user is unsure of what to do the HELP! Key may be pressed. This results in a scrolling message that moves from right to left of the display which explains what to do. The HELP! Function is context-sensitive, that is, the message displayed is one relevant to what you are trying to do. For instance, the HELP! Message seen for the circuit programming would be:-

Circuits may be set for 3 on/off periods per day. Timers operate in 10 minute steps, so only three numbers are required. To enter an ON or OFF time press keys 1 to 10. To enter a 0 press key 10. To cancel a timer period, set the ON time to 00:00 eg, for 1 period only, set the second ON time to 00:00.

The message motion may be frozen by holding down any key except HELP which exits from the scrolling and returns you to where you left off.

## **Section 5 - Timer Setting**

All of the programmable circuits may be programmed with up to three on/off times for weekdays and the same for weekends. For example, you may want a panel heater in a bedroom to run for an hour before you get up (say 7 am until 8 am), in the early evening (say 6pm until 10.30pm) during the week.

Circuits may be set for 3 on/off times per day. The timers operate in ten minute steps .. so only three numbers are required. To enter the ON and OFF times press keys 1 to 10. To enter a zero press 10 ... to cancel a timer, set the ON time to midnight eg, for only one period, set the second ON time to 00:00.

To achieve this, select the timer function by pressing the CLOCK key. The unit will respond by asking:-

Select key, SET key cancels.

Exit the timer function by pressing SET, allowing the 5 second time-out to expire or select which circuit to program by pressing the relevant key, say key 6. The display changes to:-

Press 1 = weekday, 2 = weekend.

To program for a weekday, the user will press key 1. Once a choice has been made the display will change to:-

SET to enter "choice"

If the user has made an error then pressing the CLOCK key will cause the display to revert to the previous menu and await another selection. If the user is happy with the choice, pressing the SET key will enter the data into the system.

Note - a zero is entered by pressing key 10. After two valid keys have been pressed, the display changes to:-

Set to enter  
"Chosen Month" xx

Where xx is the chosen date

Pressing the clock key will reset the display to await a new date, pressing set will enter the date into the system.

The final item before the clock setting routine is entered is that of the day. The day is required in order that the system can differentiate between a weekday and a weekend for circuit timers. The display will show the following:-

Enter the DAY  
1 = Mon, 2 = Tue, etc

The user will enter the chosen day by pressing the relevant key (1 to 7). Once a selection has been made, the system will move to the next menu:-

SET to enter "chosen day"

Pressing the SET key will enter the data and move to the next menu, pressing the CLOCK key will return to the previous display.

The user will enter the clock setting part of the programme and be presented with the following menu:-

CLOCK - Time 00:00

The user then enters the time using the keys (1 to 10). As each digit is entered, the cursor will move beneath the next digit provided that a valid digit was entered previously. When four digits have been entered, the display changes to:-

SET to enter  
Time AB:CD

When ABCD is the current time

When four digits have been entered, the user presses SET to enter the time. Should the user make an error at any time prior to the final entry, pressing the CLOCK key will reset the time to 00:00.

Note - a zero is entered by pressing key 10.

If manual boost has been selected, the display shows boost xx, where xx is the number of minutes remaining of the boost period. Programmed boost will display Boost on. If continuous is selected, "Continuous" is shown. The final section of the display (bottom right) shows whether the Economy 7 period is active by displaying E7.

### **Section 3 - Clock and Date Setting**

To alter the clock, the user presses the SET key. This results in a message:-

"Current day"  
"Current month" xx

Where xx is the current date.

After 3 seconds the display changes to press SET now to alter clock date.

This gives the user the option of escaping if the initial press was accidental by pressing any key except SET (or HELP, see later). The user must press SET again within 5 seconds if they wish to continue, otherwise the display returns to normal. The second press of the SET key results in the display:-

Press a key 1 = Jan ... 12 = Dec

The user enters the month first in order that the software can check the syntax of the date entry. If June 31st was entered, it could easily be detected but to enter 31st June would cause an error on the month setting caused by the date setting and confuse the user.

The user will use keys (1 to 12) to enter the month, pressing the CLOCK key will return the display to the above. Once the user makes a choice the menu shows:-

SET to enter "chosen month"

Pressing the SET key will cause the system to accept the data and move to the next menu:-

Enter the date "chosen month" 00

The user will use keys (1 to 10) to enter the date. Pressing a correct channel key will automatically move the cursor beneath the next digit. Pressing the CLOCK key will reset the display to the above.

# Electratech Commissioning

## Commissioning Procedure

On installation of the Electratech system, the following checks should be carried out.

- 1) Open all the circuit breakers to take power off all circuits. Move all the relays to the off position. Power up the unit - if function appears normal (LCD display on, unit responds to key presses etc) proceed, otherwise check 12VD supply is present before changing key pad or slave PCB.
- 2) Short out the TEST pins located next to the connection terminals on the rear of the master controller with a suitable object (coin, screwdriver etc). While the pins are shorted, press any key. The unit should clear the memory and enter the configuration routine (see Part B Electratech II System Manual Section 10).
- 3) Set all circuits as storage heaters (the room type does not matter). Disconnect the Teleswitch connections and replace with a wire link. Leave this link open for the moment. Manual switch ON heater circuits 1 to 12 (LED's in the corner keys all illuminated).
- 4) Note that the display does not show E7 in the bottom right corner. All the relays should still be switched off.
- 5) Press and hold the Continuous button until the double bleep is heard to switch ON both water heater circuits. Check that relays 13 and 14 come ON. Switch off again when satisfied.
- 6) Make the Teleswitch link. Wait for the minutes to change on the display. All relays should switch on in sequence starting with number 12 and moving down to number 1 (channel 1) because the Economy 7 period has begun and all circuits are storage heaters. The display should show E7 in the bottom right. If not, the Teleswitch sense is suspect. If the relays do not switch correctly, check wiring to the relays, between lay pad and slave unit and 12V supply to relays.
- 7) Open the teleswitch link. Wait for the minutes to change. Heater channels 1 to 12 should switch off in sequence, again starting at channel 12.
- 8) Check that the manual BOOST cycle terminates when the water is hot by shorting out the pair of wires at the thermistor. The master control unit will show WATER HOT.

The above sequence fully exercises the slave unit and master control unit. When complete, the configuration routine may again be executed to set the customer requirements. (Part B Electratech II System Manual Section 10).

If keypad or slave PCB are suspected of being faulty they should be returned to Appliance Repair Workshop for examination.

Once a selection is entered, the display changes to:-

First on time?,  
Time - 00:00

The time setting procedure is exactly the same as for the clock with the exception that the timers work on 10 minute intervals, so there are only three digits to enter. After three valid numbers have been entered, the display changes to SET to enter time - AB:CD where ABC are the three numbers entered.

A press of the SET key enters this time into the system and moves to the next menu:-

First off time?,  
Time - 00:00

and so on for the second and third on/off times.

To cancel a timer, set the first on time to 00:00 (just keep pressing the 10 key followed by SET!). To correct an error at any stage, press the CLOCK key and the particular display will revert to 00:00.

Note that it is not possible to programme a circuit that has been assigned as a storage heater or as the main (economy) water heater. Storage heater circuits will be active when the Economy 7 switches on for the full E7 duration, the main (economy) water heater switches on two hours after the E7 switches on and remains on while E7 is active.

Note - see comment in SPECIAL CONDITIONS.

## **Section 6 - Manual Operation**

Each circuit key has two functions, switching of the circuits and display of timer settings. To display the timer settings for a circuit, press and release the circuit key. This results in a single 'bleep' and the display shows:-

Weekday on	xx:xx
1 off	xx:xx

which is the weekday first on and off times for that circuit. The display will then cycle through the other two weekday on and off times followed by the weekend on and off times at 5 second intervals.

If no times are set, the display shows:-

No Time Set

A storage heater channel or main/economy water heater channel would show “Economy 7”.

Pressing the mode key displays the holiday mode, month and start date followed 5 seconds later by the month and stop date. eg:

S’mer start date  
“Chosen Month” xx

Where xx is the chosen date.

If no holiday has been programmed the display will show:-

“No mode set”

To actually switch a circuit, the key is held down. This results in a double bleep and a display showing:-

‘Room Name’ xx  
‘Circuit Type’ On  
Off

On the initial operation of a circuit key, the circuit is switched on. A second operation switches the channel off. The display confirms which circuit you have operated (xx), also the room name and the heater type momentarily.

Each programmable circuit may be manually switched on or off at any time, however the system will override this manual operation at the next programmed opposite signal. This does mean that if no timers are set for a particular circuit then if it is manually switched on, it will remain on till manually switched off. The exception is Boost which will be turned off when the water is sensed to be hot or after 60 minutes whichever occurs first.

A storage heater circuit or the Economy water heater can be manually switched but it must be noted that this is not overridden because there are no timers for these circuits. This permit’s the customer to override these Economy 7 circuits.

The LED in the corner of each circuit key shows the status of that circuit. If the circuit is off, the LED is extinguished. If the circuit is manually switched on, the LED flashes to draw the users attention to it, avoiding circuits being left on unintentionally. If a circuit is under timer control or is an Economy Seven circuit (storage heater or Economy water heater), the LED glows steadily, unless these circuits are manually switched off.

Electratech II System Manual

## **Section 7 - Water Heating**

Four ways of heating the water are provided by the 3 dedicated water heating keys in accordance with:-

### **Section 7.1 - Boost Key**

The BOOST key functions differently from the other circuits. A press of the BOOST key results in the upper water heater being switched on for 1 hour or until the temperature sensor on the tank detects that the water is hot. By implication, this means that a manual press of the BOOST key does not operate if the water is already hot. During the manual boost cycle, the display shows Boost xx where xx is the number of minutes of boost remaining and the LED on the key flashes.

If Boost is switched on during a timed period, then the display shows Boost on. If this is subsequently over-ridden, the display becomes Boost xx as before. A further key press (double beep) will turn the circuit off and the display would show Boost Req'd?

This circuit may still have time settings, but in this mode of operation temperature control is via the heater's own thermostat and the LED glows steadily.

### **Section 7.2 - Economy**

The ECONOMY water heater operates in a similar manner to the storage heater channels, but will not switch on until 2 hours after the start of the Economy 7 period. The ECONOMY function is overridden during CONTINUOUS mode - see below.

### **Section 7.3 - Continuous Key**

The CONTINUOUS key overrides the operation of the BOOST and ECONOMY circuits and brings both heaters on for rapid heating of the whole tank of water. LED's for the BOOST and ECONOMY circuits are extinguished until CONTINUOUS is cancelled.

## **Section 8 - Holiday Modes**

The unit has two 'holiday' modes for use when the premises are likely to be vacant for a while.

Pressing the clock key followed by the MODE key gives the following display:-

Press 1 = Program  
2 = Cancel

To program a holiday mode or to enter a new mode press 1. To cancel holiday mode press 2. Making a valid selection will cause the display to change to:-

Set to enter  
"Choice"

Pressing SET will enter the data into the system, clock will revert to previous display.

If cancel was chosen, the display reverts to the standard but if a mode is to be programmed the display moves to

Press 1 = Summer  
2 = Winter

Pressing 1 or 2 selects the mode and changes the display to

SET to enter  
"Chosen Mode"

Pressing SET enters the data, pressing clock reverts to the previous display.

In Summer mode only manual boost and security lights are active. In Winter modes, in addition to these, all manually selected storage heaters will operate for two hours beginning two hours after the beginning of the E7 period. In addition Panel heaters will operate the same provided that a weekday or a weekend programme has been set. This does not mean that the user has to programme for this special 2 hours, that is done automatically, merely the fact that the user requires his Panel heaters on a regular basis tells the system that these should be run during Winter holiday mode.

Having chosen the mode, the display changes to

SUMMER start mth (or Winter)  
1 = Jan .... 12 = Dec

Keys 1 to 12 are used to select the month. After a valid key has been pressed the display moves to

SET to enter  
"Chosen Month"

Pressing clock reverts the display to the previous menu, pressing SET changes the display to

S'mer start date  
"Chosen month" 00

Using keys 1 to 10 (pressing 10 gives a zero) the user enters the date on which h/she wishes the

holiday to begin. Having entered a valid date (2 digits) the display becomes

SET 6 enter  
"Chosen month" xx

Where xx is the date

Pressing clocks reverts to the previous menu to await a new date, pressing SET runs through stop date sequence using exactly the same sequence as the start date.

The holiday mode and the dates are kept in battery supported RAM so that in the event of power failure the unit will carry on where it left off following power restoration.

The holiday mode will commence at midnight on the evening of the start date in order to provide heating etc, on the day of departure and will recommence at midnight of the evening prior to arrival in order to take advantage of Economy 7 to heat the home prior to the home coming.

## **Section 9 - Security Code**

To prevent infants or unauthorised personnel tampering with the unit, there is a security code function. This has the effect of 'locking out' all the keys by requesting that the code be entered before any functions may be accessed. To set the code, press the CODE key. The display responds by asking for a second press to confirm:-

Press CODE to confirm

Once code is pressed the menu reverts to enter CODE. The unit then requires three keys to be pressed, these may be ANY three keys. Asterisks appear in the display to confirm the key presses. Once set, any keys pressed on the unit will cause a request for the code, except when it is less than two minutes since you last gave the code. Do not forget this code, it cannot be overridden.

To clear the code, press any key. The unit will, as usual, request the code to be given, enter this code. The unit will return to the system display. Press CODE again, the system will prompt with:-

Press CODE to confirm

when the CODE key should be pressed once more, the code will then be cleared. If a bad code is given, the display shows:-

**BAD CODE !**

After a short delay, the display returns to normal.

Note: There is an engineers entry code which is always valid, for use on set up or when the customer has lost his code. 3 Presses of the mode key gives access.

## **Section 10 - Circuit Configuration**

On initial power-up, the system recognises that it has not been programmed and enters an engineers configuration routine. The display shows:-

Room 01

Spare

The CLOCK key then moves you through a list of room names. When the name appears, pressing the SET key selects that option and the display changes to:-

Circuit type?

Again, the CLOCK key moves through a list of heaters and other appliances that may be attached, for instance, it is possible to have a washer in the garage. These selections appear in the display whenever a channel is manually altered. Circuits for which there are no definitions in the list can be left as circuit.

### **Section 10.1 - Engineers Reset**

If a system requires re-configuring (perhaps more circuits have been added etc.) then the above mode may be entered by using any metallic object (a coin perhaps) to short together the two pins protruding from the rear of the keypad control unit PCB adjacent to the terminal blocks and pressing any key.

This will permit the engineer to edit the circuit configuration or to clear the unit (except for the clock data) and re-program totally. The display will show:-

Press 1 = Edit

2 = Re-Programme

Pressing 2 followed by SET will cause a re-initialisation of all circuits as described in section 10 above. Pressing 1 will change the menu to:-

Set to enter

EDIT

Pressing clock will cause the display to revert to the previous menu to permit a different selection. Pressing SET will cause the display to change to:-

Press required  
circuit to edit

## **Section 11 - Special Conditions**

To avoid confusion over some aspects of the units operation, the following conditions should be noted concerning circuit switching.

Storage heater Economy 7 circuits will ONLY switch on inside the Economy 7 period. Outside this period the key LED will illuminate but no switching will take place until Economy 7 begins. Main hot water key LED operates the same as storage heaters but it can operate outside the E7 period (see below).

Manually switched on circuits will be overridden by the Timers at the next programmed off time and manually switched off circuits will be overridden at the next programmed on time.

Storage heater circuits and the main (economy) water operate differently to the above. When one of these is manually switched off it remains off, when it is manually switched on it runs when the Economy 7 is active (see earlier description section 5). Main (economy) water can be overridden by the continuous mode to be active outside the Economy 7 period (see below).

The CONTINUOUS function is really the boost heater and the main heater being operated together (circuits 3 and 14). Because of this, conflicts of operation arise between the water function keys.

The CONT key has priority and will switch off channel 13 & 14 LED's (if you are switching CONT on). If BOOST or ECONOMY are selected while Continuous is running, a message is displayed:-

Not during Continuous!!

## **Section 12 - Hardware Description**

The main control unit uses an 8 bit micro-controller with the following interfaces:-

- 1) 16 character by 2 line intelligent alpha-numeric LCD display with contrast adjustment.
- 2) 20 key (5\*4 matrix) keypad interface with static discharge protection.
- 3) Thermistor temperature sensor (5 kilohms characteristic impedance) interface with calibrating potentiometer and software-driven noise filtering, plus high voltage and surge protection.
- 4) Real time clock circuitry (100 hours minimum clock back-up).