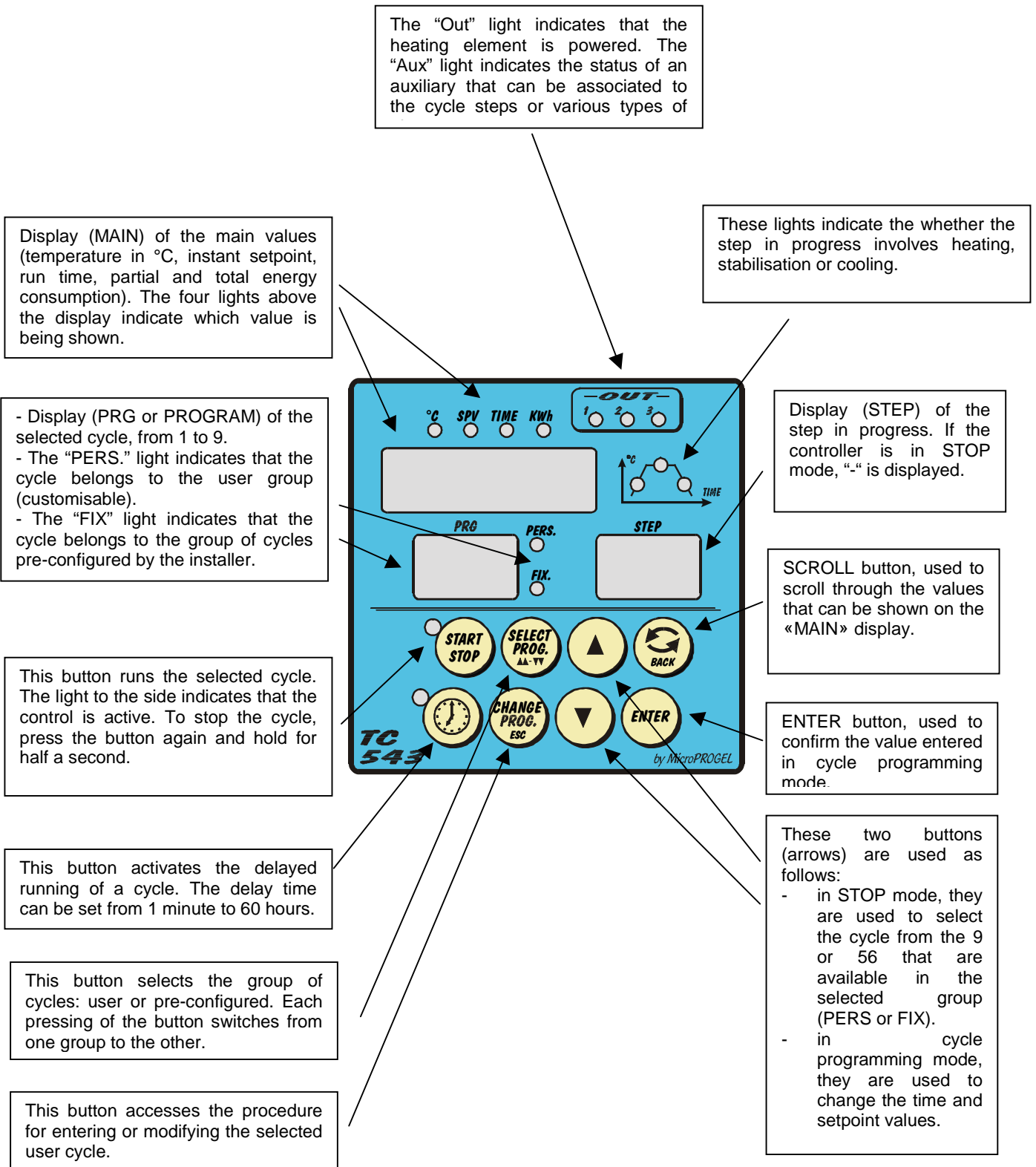


Operating instructions, TC543 controller.

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SUMMARY

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Sect. 1) Description of the controller operating modes


The controller features various different operating modes:

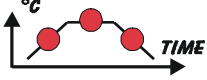
- *controller in STOP mode*

the controller is in STOP mode when no cycle is being run. The lights next to the  and  buttons are both off. The controller simply measures the temperature of the kiln and shows this on the "MAIN" display. This mode allows the following to be performed




- select the cycle (see section 3)
- display the total time and energy consumed in the last cycle (see section 2)
- immediately run the selected cycle or set the start time, by modifying the delay time as required (see sections 5, 6, 7)

- *controller in RUN mode*


the controller is in RUN mode when a firing cycle is in progress, that is, when the controller is controlling the temperature of the kiln according to the data set in the cycle. In this mode, the light next to the  button is on. The PRG and STEP

displays indicate the cycle and step in progress. The group of lights  indicate whether, in the current step, the temperature is increasing (heating), stabilising or decreasing (cooling).

The energy consumed and the time elapsed since the start of the RUN can be checked in this mode, including any pauses if the kiln cannot follow the required temperatures. The cycle can be moved forwards or backwards to a desired point.

Each pressing of the  button moves forward one minute. Each pressing of the  button moves back one minute. When the cycle is finished, the controller shows the message "END" on the "MAIN" display. To return to STOP mode, simply press the  button.

- *controller in RECOVERY mode*

the controller goes into RECOVERY mode when a cycle is interrupted by a blackout. When mains power returns, the controller performs an extra step at a fixed gradient (defined by the installer) to return to the setpoint prior to the blackout, and then continues the affected cycle. This condition is signalled by the blinking of the  light, and the message "r" on the "STEP" display.

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- *controller in TIMER mode*

the controller is in TIMER mode when a delayed cycle has been activated. The delay time is counted down on the "MAIN" display. The lights to the sides of the




and buttons both blink. The TIME light located above to MAIN display is on.

Sect. 2) Displaying the various values (temperature, step time etc..)

Different values can be displayed, depending on the status of the controller.

In STOP mode:


Normally the controller displays the temperature of the kiln in °C on the "MAIN" display, and the "°C" light is on

Pressing the  button repeatedly scrolls through the following values, always shown on the "MAIN" display:

- the total time in the last cycle run (e.g. 04.22 for 4 hours and 22 minutes); the TIME light is on
- the energy consumed in the running of the last cycle (e.g. 12.36 per 12.36 kWh); the kWh light blinks
- the total energy consumed (since the last time the counter was reset by the user); the kWh light is on


In START mode:

Normally the controller displays the temperature of the kiln in °C on the "MAIN" display, and the "°C" light is on



Pressing the  button repeatedly scrolls through the following values, always shown on the "MAIN" display:

- the setpoint value reached (e.g. 400 indicates 400°C; the SPV light is on).
- the running time of the cycle in progress (e.g. 01.33 for 1 hour and 33 minutes); the TIME light is on.
- the partial kWh counter, that is, the energy consumed in the running of the current cycle (e.g. 12.36 for 12.36 kWh); the kWh light blinks
- the total kWh counter, that is, the total energy consumed in all the cycles (this can be reset by the user); the kWh light is on

NOTE




- It is not necessary to press the  button repeatedly to return to the display of the temperature, as the controller will automatically do this after a few seconds.

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- To set the total energy counter to zero, press the  button until the corresponding value is displayed, and then press and hold the  button for at least one second.

Sect. 3) Selecting the cycle from the 56 user (PERS) and 9 pre-configured (FIX) cycles

The controller features 56 custom cycles, called user cycles, and 9 pre-configured cycles, called fixed cycles.


Press the  button until the PERS light turns on, if the desired cycle is in the user group. Press the same button until the FIX light turns on, if the cycle is in the pre-configured group. Then use the  and  buttons to select the cycle from the 9 or 56 available possibilities (the number of the cycle is shown on the “PRG” display).




Example:




To select cycle number 4 in the user group.

Make sure the “PERS” light is on, if not press . Then, press the  button until the number 4 appears on the “PRG” display.

Sect. 4) Entering or modifying the selected cycle

Press the  button for at least half a second. An audible signal will indicate that the modify cycle procedure has been activated, and the main display will show the time of the first step, flashing. If the cycle is empty (that is, has not yet been entered), the time shown will be 00.00, otherwise the previously set time in hours:minutes will be displayed (e.g. 02.25 indicates a time of 2 hours and 25 minutes).

Use the  and  buttons to modify the value, if required, or press  to move to the next entry, that is, the setpoint. If the cycle is empty, the display will show a minimum setpoint equal to the ambient temperature (e.g. 25, that is, 25°C), otherwise it will show the previous setpoint.

Again use the  and  buttons to modify the value, if required, or press  again to move to the time/setpoint pair for the following step.

The display (STEP) will show which step is being displayed and/or modified. By setting a time equal to 00.00, the cycle will end at the step in question. To end the modify cycle

procedure without scrolling the entire cycle, press the  button again.

NOTE

- During this procedure, the time or setpoint values displayed will flash on the display (MAIN).

















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- The new cycles entered or the modifications made to the previously entered cycles in the user cycle group are stored permanently, even when the controller is off.
- The modify cycle procedure can also be accessed when the controller is in START mode.
- The pre-configured cycles can also be modified, using the same procedure, however the changes are lost when another cycle is selected.
- The controller will in any case limit the number of time/setpoint pairs (steps) that can be set per cycle to a maximum of 31






Example

To program a cycle with the following pairs of time/setpoint values:





01:00 600°C, 00:30 600°C, 00:45 700°C


- ✓ press  for half a second
- ✓ the controller prompts the time for the first time/setpoint pair (STEP no. 1)
- ✓ press  to increase the value displayed or  to decrease it, until the time displayed is 01:00 (that is, 1h), flashing
- ✓ press 
- ✓ the controller prompts the setpoint for the first time/setpoint pair (STEP no. 1);
- ✓ press  to increase the value displayed or  to decrease it, until the temperature displayed is 600°C, flashing
- ✓ press 
- ✓ the controller prompts the time for the second time/setpoint pair (STEP no. 2)
- ✓ press  to increase the value displayed or  to decrease it, until the time displayed is 00:30 (that is, 30 minutes), flashing
- ✓ press 
- ✓ the controller prompts the setpoint for the second time/setpoint pair (STEP no. 2)
- ✓ press  to increase the value displayed or  to decrease it, until the temperature displayed is 600°C, flashing
- ✓ press 
- ✓ the controller prompts the time for the third time/setpoint pair (STEP no. 3)
- ✓ press  to increase the value displayed or  to decrease it, until the time displayed is 00:45, flashing
- ✓ press 
- ✓ the controller prompts the setpoint for the third time/setpoint pair (STEP no. 3)

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- ✓ press  to increase the value displayed or  to decrease it, until the temperature displayed is 700°C, flashing
 - ✓ press 
 - ✓ the controller prompts the time for the fourth time/setpoint pair (STEP no. 3)
 - ✓ press  until the time displayed is 00:00, flashing
 - ✓ press  to end the cycle; the controller will exit the modify cycle procedure.
-

Sect. 5) Running a cycle


Select the cycle to be modified: use the  button and the  and  buttons (see Sect. 3). The controller is in STOP mode (see the description of the modes). Press the  button. The controller will emit a brief audible signal, the light next to the button will turn on and the controller will start controlling the temperature of the kiln using the values

set in the cycle. In this phase, the  button can be pressed to display the following values, in sequence:

- Operating setpoint
- Time elapsed since the “start”
- Partial energy consumed, since the last “start”
- Total energy consumed (this value can be reset; see the corresponding section)


At the end of the cycle, the controller will go into “END” mode, displaying the message “END” on the display (MAIN). To return to STOP mode, press the  button.

NOTE



- **IMPORTANT:** If attempting to run an empty cycle (not programmed, or with the time in the first step set to 00.00), the controller will display an error code, “ER26”. The error is reset using the  button.
- The controller returns to display the temperature of the kiln if no button is pressed for a few seconds.


Sect. 6) Activating the timer for the delayed running of the cycle

Select the group and the desired cycle, see section 3.




Press the  button: the controller, after having emitted a brief audible signal, will start a countdown, with the remaining time (in hours:minutes) shown on the “MAIN” display. At

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this point, the “TIME” light turns on, the decimal between the hour and minute digits will flash, and the lights to the sides of the  and  button will blink. When the time has elapsed, the controller will automatically start the selected cycle, by going into “START” mode.

To stop the countdown and return to STOP mode, press  again.

NOTE:

- START mode can be accessed at any moment, without waiting for the end of the delay time, by pressing the  button.
- The time displayed can be increased or decreased using the  and  buttons. **WARNING:** changes made in this way to the start delay time are not saved, and are only valid for the timer in progress.

Sect. 7) Setting the timer for the delayed running of the cycle

To permanently change the delay time for all successive timer operations, press and hold the  button for at least one second. Once the value displayed on the MAIN display starts to flash, change the time value by entering the new time, and confirm using the  button.

Sect. 8) Troubleshooting

When running a cycle the controller may signal one of the errors listed in the table below.

ERROR CODE DISPLAYED	CAUSE	SOLUTION
ER21	Hardware fault	Contact the installer.
ER22	Reserved	Contact the installer.
ER23	Reserved.	Contact the installer.
ER24	Reserved.	Contact the installer..
ER25	Cycle in the memory with incorrect data.	Program the cycle.
ER26	Attempted running of a cycle without any steps being programmed.	Program the cycle.
ER27	Alarm configured by digital input	Check the fault that caused the activation
ER28	Reserved.	Contact the installer.
ER31	Hardware fault.	Contact the installer.
ER41, ER42	Thermocouple continuity failure, not connected or connected incorrectly.	Check the thermocouple and connections.
ER43	Cold junction temperature sensor broken or continuity failure.	Contact the installer.
EREC	Interrupted cycle recovery not initiated (kiln temperature outside of set limit).	Run the cycle again.
EAFS	Cycle stopped due to maximum end step wait time (if programmed).	Check the heating elements or reduce the kiln charge.
ALL1	Temperature signal outside of maximum set limit. (See alarm relay).	Check the heating elements.
ALL2	Activation of alarm configured by installer	Contact the installer.