

DuaLogR Manual

Standard operating procedure for temperature data logging in the field

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Purpose:

During every case, we should collect data. Temperatures are particularly vital, so that we can evaluate the success of our cooling procedures. If we don't have data, we have little hope of making improvements in the future.

The DuaLogR is a handheld battery-powered device that receives and stores temperature readings from probes that have been placed in the patient. Subsequently the temperatures can be uploaded to a desktop computer.

Caution

Many times, when DuaLogRs have accompanied patients back to Alcor, we have found that they contain no data, or virtually no data, or unusable data (e.g. a thousand temperatures recorded at intervals of 1 second). Two recurring problems have caused these frustrating events:

- 1. The DuaLogR has been allowed to rattle around in transit, allowing one or more of the keys to be pressed. A single accidental hit on the LOG key will stop the temperature logging process.*
- 2. Users have made programming errors.*

We have fabricated a keypad shield which should prevent accidental hits on the keys. Please use the shield. As for programming errors: You can avoid them with the help of this manual.

Quick Overview of Parts and Functions

Thermocouple probe: A flexible white plastic tube about one-quarter inch in diameter, round at one end with an electrical connector at the other end.

Thermocouple wire: A wire (usually gray) that connects a thermocouple probe with the DuaLogR.

DuaLogR Keypad: There are twelve buttons. See page 12.

DuaLogR Display: See page 13.

Keypad Shield: Always clip it over the keys of the DuaLogR when you are not actually entering data. Be careful not to push a key accidentally with the edge of the shield when you are clipping it in place.

General Use

1. Plug In the Probes.

Connect thermocouple probes to the DuaLogR by using thermocouple wires. Each wire plugs into a port in the top edge of the unit. Each plug consists of two metal tabs of different widths, so that you can only insert the plug one way around. Do not try to insert it the wrong way around. If you are using only one thermocouple probe, plug it into the port marked T1 (as shown in the photo).



2. Insert the Probe(s) into the Patient.

Usually, insert one probe into each nostril and continue sliding the probes in until they nudge the back of the throat. Do not force them any deeper.

3. Switch On.

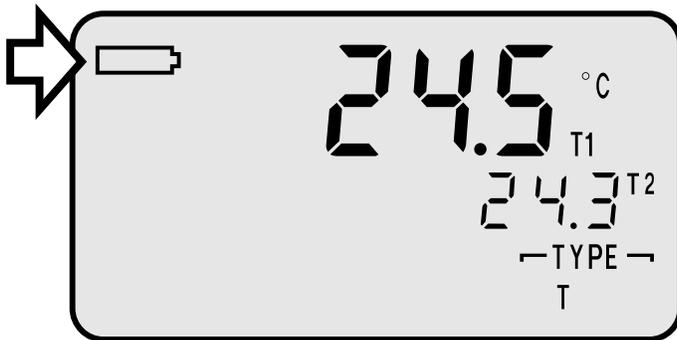
Press the ON/OFF button. All elements in the display should be visible for a couple of seconds, as in the figure on page 12. A moment later, you should see two temperature readings at the right-hand side of the screen, one large and one small (or only one reading if you are only using only one probe). Underneath the word TYPE at bottom-right of the display you should find the letter T. See below.

Sample LCD display. The large numerals indicate that probe T1 is measuring a typical room temperature. OPEN indicates that a second probe is not being used; its port is open. If a second probe were connected, its temperature would be displayed instead of the word OPEN.



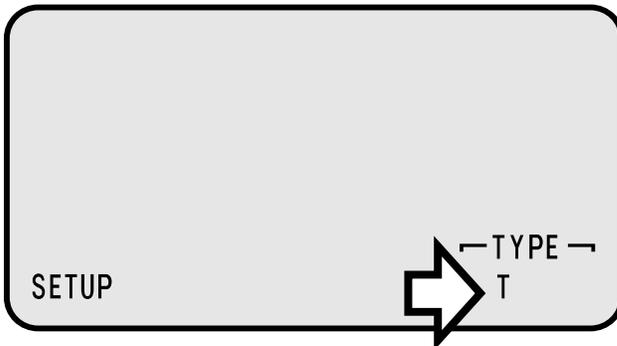


This display shows that both ports are open, and no thermocouple probes have been connected. If you see this, check the connections.



4. Battery Check.

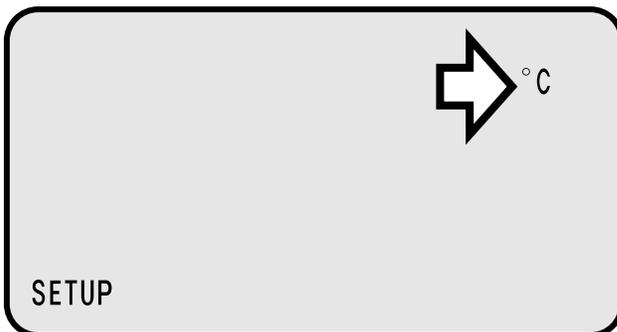
If the battery symbol flashes in the top left corner of the display, turn the DuaLogR over, remove the battery cover with a small Phillips screwdriver, replace the batteries, and replace the cover. Press ON/OFF again to switch the unit on.



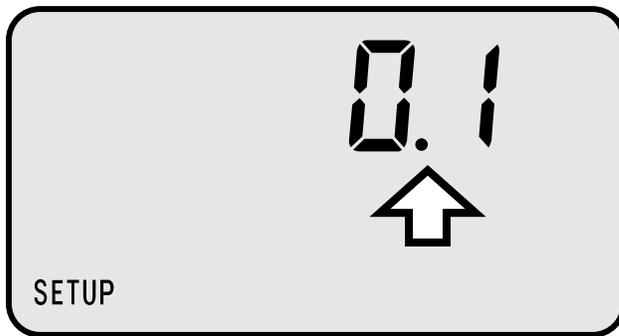
5. General Setup.

Press the SETUP button to check that the unit has been set up correctly, as follows:

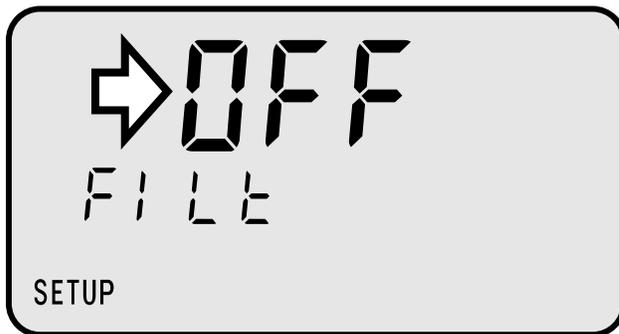
a) Letter T should be flashing. If you see a different letter flashing, press the MAX or MIN arrow keys till you see T. This insures that the DuaLogRR understands you are using type T thermocouple probes. Press HOLD to continue.



b) Degrees C should be flashing. If you see a different letter flashing, press the MAX or MIN arrow keys till you see C. This insures that the DuaLogR will record temperatures in Celsius/ Centigrade. Press HOLD to continue.



c) 0.1 should be flashing. If you see only a numeral 1, press MAX to switch to 0.1. This insures that the DuaLogR will record temperatures in tenths of a degree. Press HOLD to continue.



d) The letters FILT should appear, and OFF should be flashing. If you see On flashing, press MAX till you see OFF flashing. This insures that the DuaLogR will not filter (smooth) the temperature readings. Press HOLD to continue.

e) The current time should be displayed, in 24-hour format, with the minutes flashing. If the minutes value is not correct, press MAX to increase it or MIN to decrease it. If you hold down either key, the minutes value will count gradually faster. Press HOLD to continue.

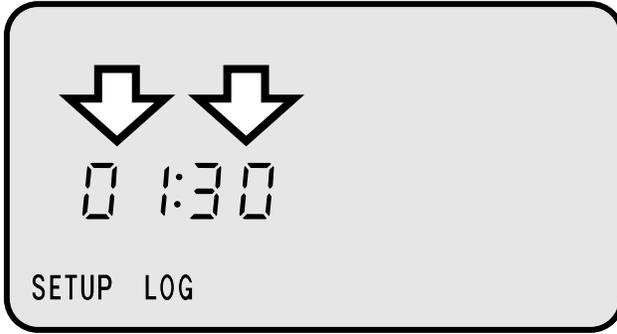
f) The hours should be flashing. Press MIN or MAX if you need to change the value. Press HOLD to continue.

g) The number of the current month should be flashing. Press MIN or MAX if you need to change the value. Press HOLD to continue.

h) The number of the day in the current month should be flashing. Press MIN or MAX if you need to change the value. Press HOLD to continue.

i) The year should be flashing. Press MIN or MAX if you need to change the value. Press HOLD to continue, and you will return to the main temperature-display screen.

If the display does not match these instructions at any time, press the ON/OFF button to switch off the DuaLogR, press ON/OFF again to switch on, wait for the display to show temperature numbers, then press SETUP again to start over at 5 a) above.



6. Check the Data Logging Time Interval.

a) Press SETUP and then press LOG. You should see the words SETUP and LOG in the bottom left corner of the display. If you don't, switch off the DuaLogR, switch it back on, wait for the temperatures to be displayed, and then press SETUP followed by LOG again.

b) The log interval is displayed in minutes:seconds format. The seconds should be flashing. We will set the log interval for 01:30 for a typical transport which is not expected to exceed 25 hours (see table below for other values). If the number 30 is not displayed, press MAX or MIN until 30 is flashing. Press HOLD to store the 30-second value and continue.

c) The number of minutes should be flashing. If it is not 01 minutes, press MAX or MIN until 01 appears. Press HOLD to store this value and return to the normal temperature display.

You have set the logging interval to 1 minute 30 seconds. Since the DuaLogR's memory has room for 1,000 temperature samples (from each probe), this logging interval will enable temperature readings for 25 hours. After 25 hours the DuaLogR will stop recording data.

WARNING: If your expected transport time exceeds 25 hours, you must set a longer logging interval. Use the following formula or the table below. When in doubt, use a longer log interval! It's better to sample data at longer intervals than to run out of memory because your transport took longer than expected.

Logging interval (in minutes) = maximum transport hours x 0.06

When your maximum expected transport is	Set your logging interval to
15 hours	01 minutes 00 seconds
20 hours	01 minutes 15 seconds
25 hours	01 minutes 30 seconds
30 hours	02 minutes 00 seconds
35 hours	02 minutes 15 seconds
40 hours	02 minutes 30 seconds
45 hours	02 minutes 45 seconds
50 hours	03 minutes 00 seconds

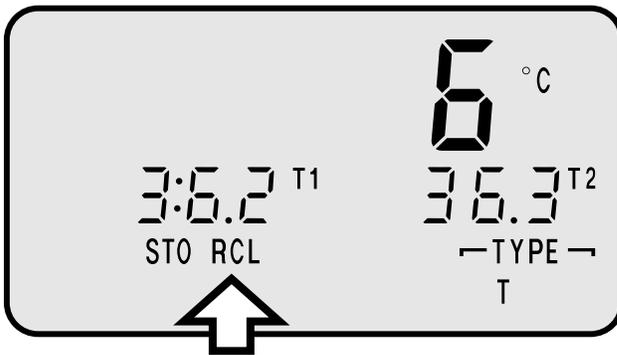
Logging intervals have been rounded up to the nearest 15 seconds in the table above, to provide some margin for error.



7. Test the Logging Function.

a) While the display is showing temperature reading(s) from your probe(s), press the LOG button. The word LOG should show at the bottom of the display. This is your indication that the DuaLogR is logging data. The word STO also appears, to show that data have been stored in memory.

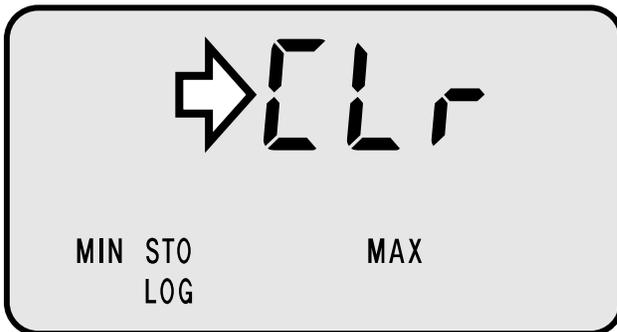
b) After waiting at least 10 seconds, press LOG again. The word LOG should disappear from the bottom of the display to indicate that you are not logging data anymore. The word STO should still be displayed, showing data has been stored in memory.



c) Press RECALL. The word RCL appears, and a number should start flashing. This is the number of data readings that were logged.

d) Press the MIN key to step down through the data readings. You will see the temperature that was logged each time.

e) Press CLEAR to get back to the normal temperature display. (The first time you press CLEAR, it does not clear memory.)



f) To clear memory, press CLEAR a second time. The big letters CLR should appear.

g) Now press LOG. The normal temperature display should return. The word STO disappears, telling you there is no data stored in memory anymore, because you have erased it.

h) To check that data has been erased, press RECALL. A big 0 (zero) should appear, telling you that there are zero data readings. After a moment it will disappear and the normal temperature display will return.

8. Quick Check.

a) Press SETUP and press LOG. Press HOLD twice to accept the logging interval in seconds and minutes.

b) Press SETUP. Press HOLD nine times to accept the thermocouple type (T), the temperature scale (C), the temperature accuracy (0.1 degrees), the filter mode (OFF), the time in minutes, the time in hours, the month, the day, and the year.

When you have verified that your DualLogR is set correctly, press ON/OFF to switch it off, or press LOG to start logging. If you switch it off, it will remember your settings.

Points to Remember

After you start logging data, check that the word LOG is on the screen. If it isn't displayed, you are not logging data.

While you are logging, and after you have finished logging, the word STO shows that data is stored in memory.

Be careful not to press the LOG key by accident! The unit will stop logging with virtually no indication that anything has happened (the word LOG simply disappears from the display).

Unused Functions

The STORE button stores a data sample manually. You can ignore it.

The T1/T2 button varies the temperature display. Ignore it.

The PRINT button is used only to get data out of the DualLogR. Ignore it.

The CAL button is used only during calibration.

Calibrating the Thermocouple Probes

If you have time, you should calibrate your probes to make sure that they are properly matched with the DuaLogR. If you don't have time, or if you aren't confident that you can follow the calibration procedure, you can ignore it. The probes can be calibrated after the DuaLogR arrives at Alcor.

Warning

Calibration can take up to ten minutes, or longer if you don't follow the instructions precisely and you have to start over. Don't attempt to calibrate unless you are sure you have sufficient time. You do not want to stop in the middle of calibration.

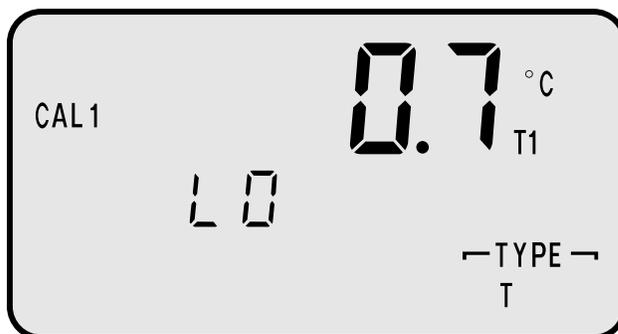
Calibration requires a container such as a styrofoam cup containing small-cube or crushed ice with a little water. If it will be a hassle to obtain this, skip the calibration procedure.

If you perform the calibration procedure incorrectly, it can cause the DuaLogR to crash with an "Err" message. The only way to restart is by switching the unit off and then on again. Do not attempt to calibrate the unit unless you feel reasonably confident that you can follow the instructions.

Calibration Sequence

1. Place Thermocouple Probes in Icewater.

Put the tip of each thermocouple probe at least an inch under the surface in the center of a small amount of water in a styrofoam cup of small-cube or crushed ice. (For better results, use a larger container than a cup if one is available.) Try to avoid touching the tips of the probes against the container. Try to avoid moving the probes.



2. Go Into Calibration Mode.

Press the CAL key. The word LO will be visible, telling you that you are going to measure the low end of the temperature scale.

3. Observe Current Temperature from Probe 1.

CAL 1 will appear at the left of the screen, with CAL flashing. (If you don't see this, and you are using only a single probe, check that your probe is plugged into port T1, not into port T2.) The temperature currently being measured by probe 1 will appear in big numerals.

4. Wait for the Readout to Stabilize.

You may have to wait for a couple of minutes for the ice to cool the water to freezing point, and for the water to cool the probes.

5. Adjust Displayed Temperature.

Press MIN or MAX to decrease or increase the temperature that is displayed, until the reading is 0 degrees (assuming you are measuring temperature in degrees Celsius).

Important: You have to press MIN or MAX at least once!

6. Record the Calibration.

Press HOLD when you see 0 degrees displayed after you have pressed MIN and/or MAX. If you are using only a single thermocouple probe plugged into port T1, skip to step 11 on the next page.

7. Observe Current Temperature from Probe 2.

CAL 2 appears in the display, with CAL flashing. The temperature currently being measured by probe 2 will appear in big numerals.

8. Wait for the Readout to Stabilize.

9. Adjust Displayed Temperature.

Press MIN or MAX to decrease or increase the temperature that is displayed, until the reading is 0 degrees (assuming you are measuring temperature in degrees Celsius).

Important: You have to press MIN or MAX at least once!

10. Record the Calibration.

Press HOLD when you see 0 degrees displayed after you have pressed MIN and/or MAX.

11. Skip High-Temperature Calibration.

The word HI appears in the display, asking you to calibrate the first probe using a high temperature. Press CAL to skip the HI calibration for the first probe.

If you are using two probes, press CAL again to skip HI calibration for the second probe.

12. Exit from Calibration Mode.

Press STORE to return to the normal temperature display.

13. Check the Temperature Display.

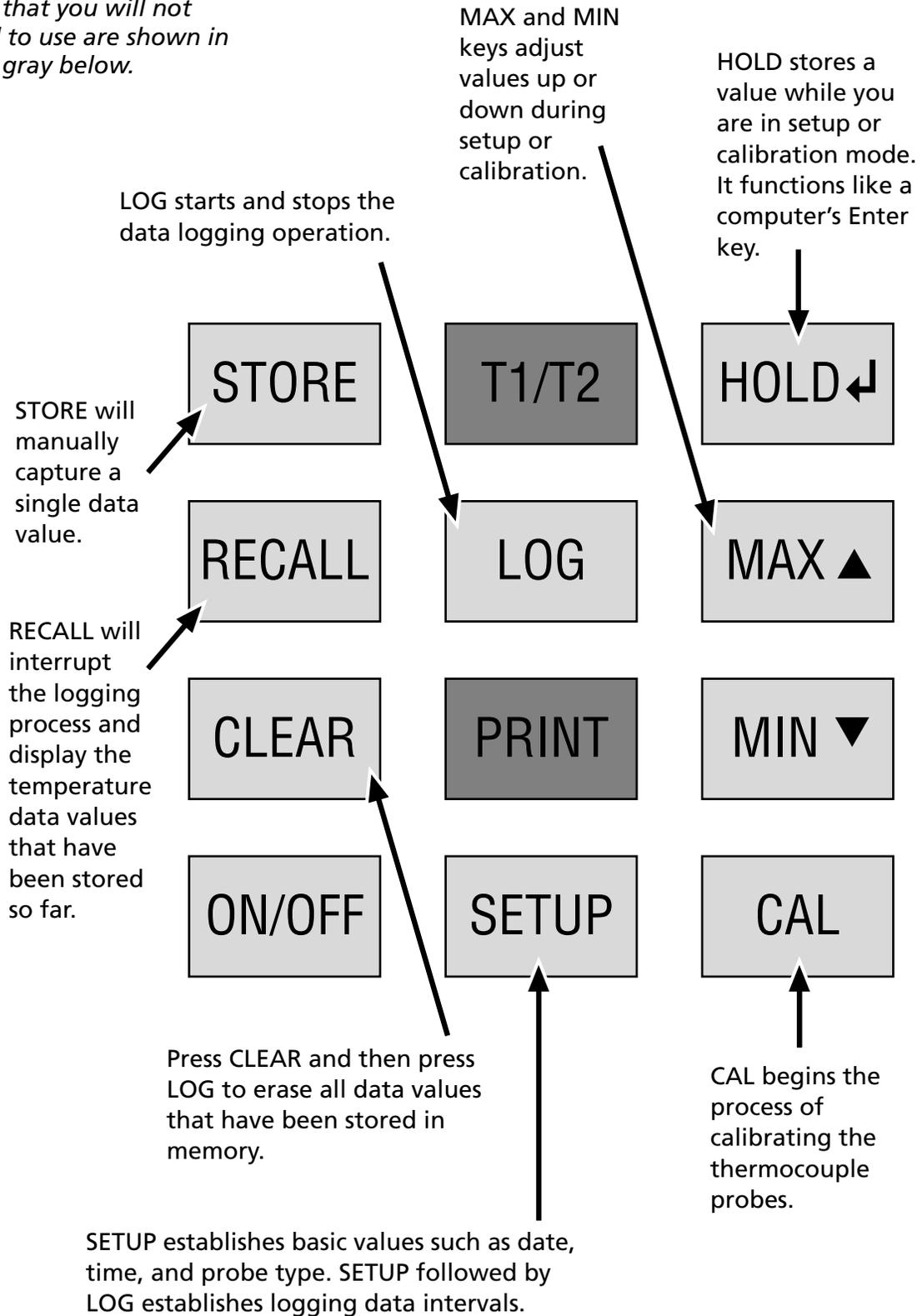
If you are using two probes, you should see CAL12 at the left side of the display. If you are using only one probe, you should see only CAL 1. If the display does not match these instructions, your calibration attempt was unsuccessful, and you will have to go back to step 1 to repeat the process.

14. Clear Calibration if Desired.

If you want to erase the calibration that you have done, press CLEAR and then press the CAL key. The CAL1 or CAL12 memo at the left side of the screen will disappear. Note that if you merely switch off the DuaLogR and then switch it on again, it will remember your previous calibration value.

DuaLogR Keypad

Keys that you will not need to use are shown in dark gray below.



DuaLogR Liquid Crystal Display (LCD)

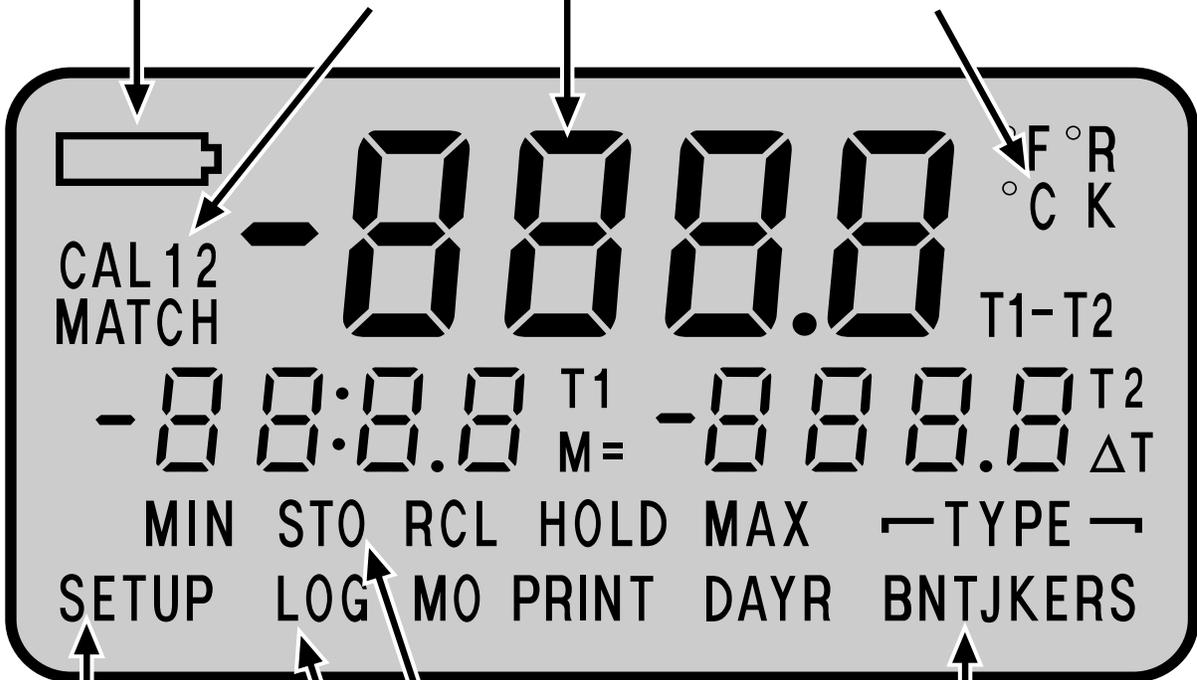
All elements in the LCD will be visible, as in the figure below, for a couple of seconds when you switch on the DuaLogR.

Battery symbol will flash when batteries need to be replaced. Symbol will not be visible normally.

CAL indicator shows that probe 1 or 2 has been calibrated.

Main temperature display (usually from the probe connected with the T1 port)

Celsius indicator should be visible during use of DuaLogR.



SETUP indicator tells you when you are in setup mode instead of normal temperature logging.

When the DuaLogR is recording data, LOG is displayed. This is your only indication that temperatures are being logged.

When STO is displayed, the DuaLogR contains temperature data stored in its memory.

Letter T should be visible while you are using the DuaLogR. It shows that the unit is adjusted for Type T thermocouple probes.