

MCN for Neonatology

West of Scotland

Neonatal Guideline



Cooling - Tecotherm Neo Instructions

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Getting started:

Mattress filling

1. Check that mattress is filled with coolant (visual inspection/feel for "plumpness") *N.B. where disposable mattresses are used filling will always be required*

If clearly under filled, attach the mattress to the filling bottle (using both ports) directly and allow the cooling fluid (*Sterile Water for Irrigation is suitable for disposable mattresses*) to drain into the mattress. Further filling via the machine will be required later to plump up the mattress but this stage speeds that process up:

2. Switch on:

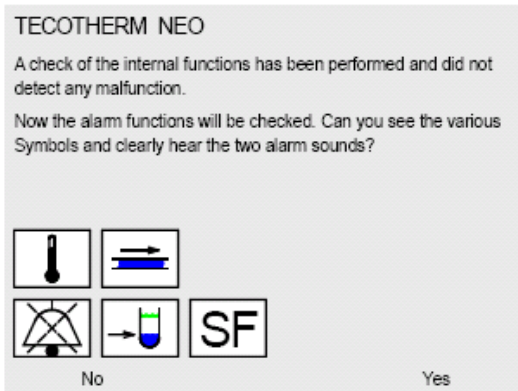


Press this button



3. Confirm self test:

The machine will undertake a series of self tests; this will involve audible and visual alarms being displayed. The screen will display the following:



If you have heard two different alarms, seen five symbols on screen and three warning lights press the button below the "Yes":



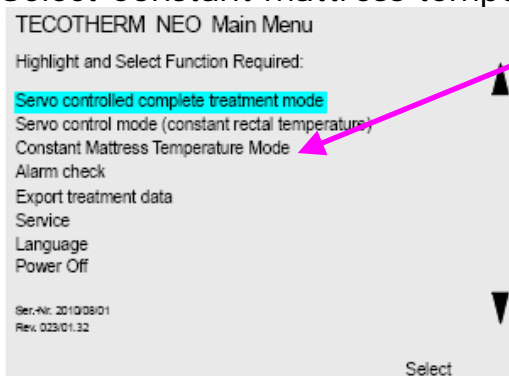
4. Top up the machine and mattress with coolant

Connect the mattress to the unit via the hose:



Place the mattress in an unheated incubator, ensuring that the connecting hoses are not kinked or trapped. Cover the mattress with a thin protective sheet.

Select Constant mattress temperature mode:



Then press "start"

Fill the coolant filling bottle (With sterile water for Irrigation for disposable mattresses) then attach the **green** connector to the right hand filling port:



Wait until the fluid level stops dropping/bubbles no longer rise

5. De-air the internal reservoir/mattress.

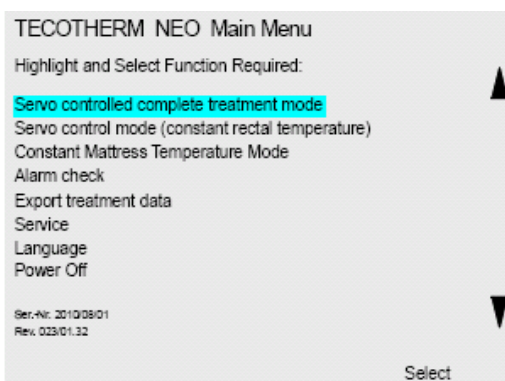
Attach the other arm of the filling bottle, and wait until bubbles stop rising. At this point, look for bubbles in the mattress and “chase them” round- remember bubbles will rise to the highest point of the mattress. If the bubbles are troublesome try reversing the connections to the mattress, or agitating the mattress to get them out.

Once this has been done the mattress should be well filled- plump to feel and curling up at the edges. If that is not the case then repeat steps 4 and 5 again.

The mattress is now filled and ready for use. You should now exit the “constant mattress temperature” mode, as follows: select “Option”, then “End treatment and save data

Starting treatment

1. Select Servo controlled complete treatment mode:

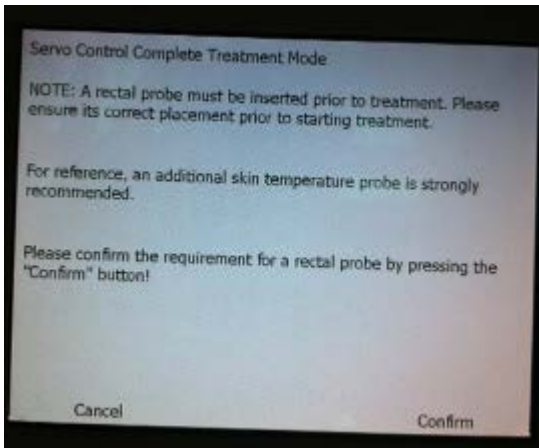


Use the arrows to scroll up down, then the button “Select”



arrows and press below

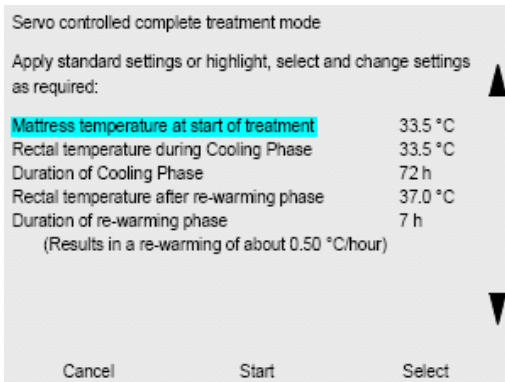
2. You will see the following screen:



Press confirm again

3. Select starting temperature and start cooling of mattress

You will now see the following screen:



To change any of these options use the arrow keys to scroll down, press select then use the arrow keys again to alter the parameters up or down, and confirm.

This will particularly be required for babies coming from outside who have already been cooled for, where the "Duration of Cooling Phase" should be reduced by the number of hours that the baby has been at target temperature.

4. Insertion of rectal probe and commencement of cooling of baby.

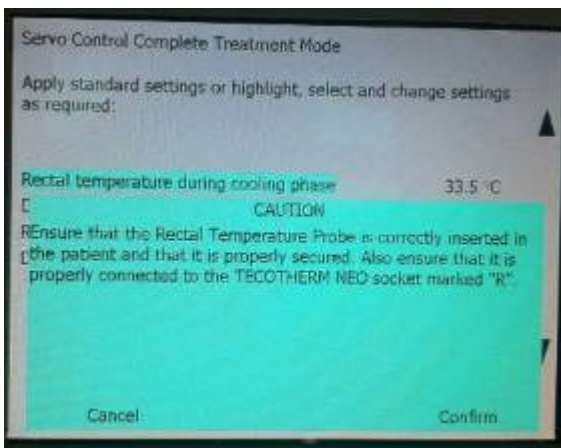
Measure 7cm from the end of the rectal temperature probes and mark with a piece of tape. Insert the tecotherm rectal probe *and* the probe for the multi-parameter monitor to 6cm (the tape marker should be one centimetre from the anus). Secure with tape to the inner thigh.

Connect the tecotherm rectal probe to the machine using the socket marked **R** (note we now use the disposable probe and adaptor as pictured on the right):



The skin probe should be applied to the abdomen (on an area of skin not covered by the mattress) and inserted into the socket marked **S**.

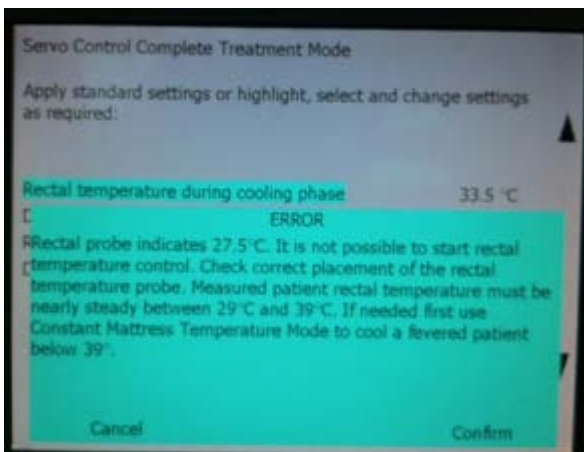
Once probes are in place and connected press the button below "Start" on the screen. You will then see the following screen:



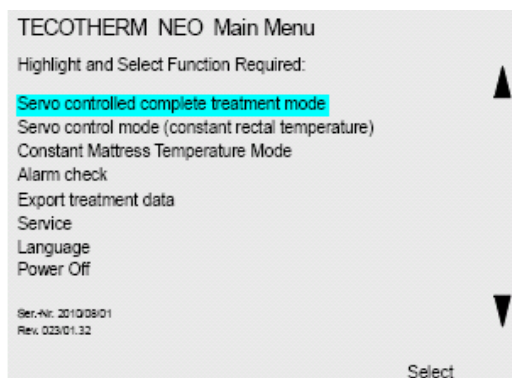
Select Confirm.

Cooling to a target rectal temperature of 33.5°C will now commence. This will be maintained over 72 hours before rewarming at 0.5 °C per hour, as in the TOBY protocol:

If the baby's temperature is outwith 29-39 °C you will see the following screen:



If this is the case select cancel, cancel again, then end the treatment save the data. From the original menu select "Constant Mattress Temperature Probe", and rewarm or cool the baby to 29-39 °C , setting the mattress temperature manually and monitoring this with the multiparameter monitor.



Once within that range go back to the start menu and select "Servo control complete treatment mode and start again.

In use/troubleshooting:

1. Monitoring:

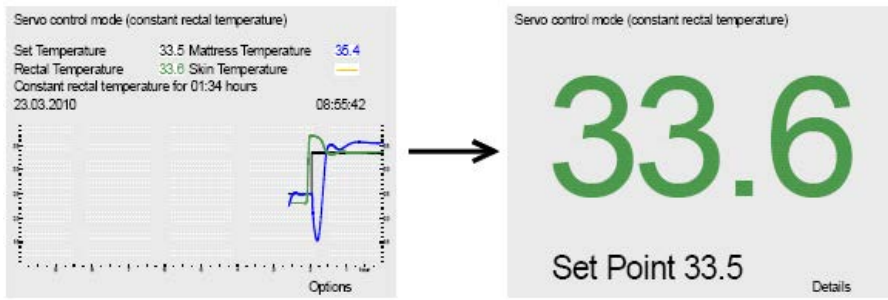
Ensure that the rectal temperature alarm limits are set at 33-34 °C on the multiparameter monitor.

2. Visual checks

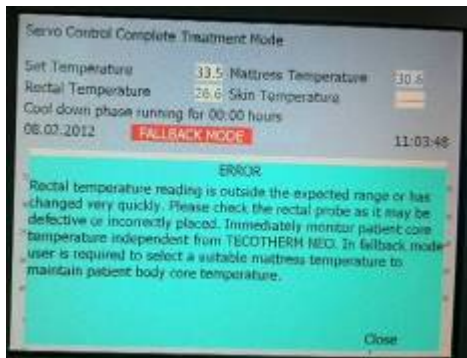
The rectal probes must be checked hourly to ensure that they remain in place. The 7cm tape marker acts as a reference- this should be 1cm from the anus at all times. If the probes are expelled (e.g. when the baby passes stool) they should be replaced immediately as the tecotherm will warm the baby rapidly if this happens.

3. Tecotherm display

The tecotherm will initially show the set, rectal, skin and mattress temperatures (see left). After 60 seconds this will change to the display on the right with the current rectal temperature displayed in a large coloured number. If this is within 0.5 °C of the target temperature this will be green, however it will display red if it deviates outwith this.



If a sudden change in temperature is experienced by the machine the following will be displayed:



Select close, and look for the cause of this sudden change:

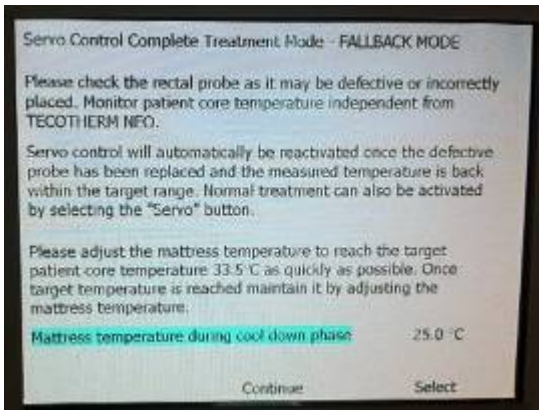
- Check for probe displacement by looking at the 7cm marker on the probe
- Check all probe connections
- Check that the mattress is well filled with coolant and there are not too many bubbles see points 4 and 5 below.
- Consider changing the probe (do not do this automatically on seeing this message, often this is not required, change at this stage for example if the rectal measured by the tecotherm is very different to that on the multiparameter monitor despite both probes being well placed).

Often the machine will revert back to normal operation as the change in temperature settles. It will signal that by displaying the screen below:

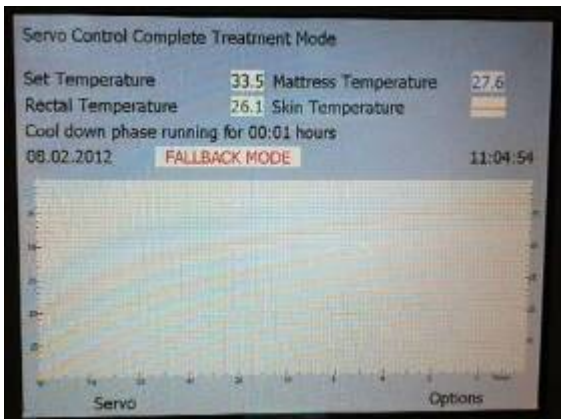


Select close and ensure that the parameters are in order.

If this does not happen the following screen will be displayed:




Select continue to stay with the current mattress temperature and troubleshoot as described above. Press "Select" to alter the mattress temperature manually using the arrow keys, press "apply", then continue and you will see the following screen:



Once the rectal temperature measurement settles down, press Servo and the machine will revert to the servo control mode if it is happy with the measurements it is making.

If again the machine reverts back to fallback mode, change the rectal probe (if this has not already been done). If this still does not resolve the problem, revert to constant mattress temperature mode and manually adjust the mattress to maintain the temperature (as with the original tecotherm), using the temperature readout on the multiparameter monitor). Inform the attending/on call consultant of this, and contact medical physics at the first opportunity (immediately during normal working hours).

4. Topping up with coolant (*Sterile water for Irrigation for disposable mattresses*)

During use top-up the Tecotherm 6 hourly or whenever the  icon is displayed on the screen:

Fill the filling bottle with coolant then attach **both** connectors to the filling ports of the Tecotherm (**green** connector to the right hand port):



Hold the filling bottle upside-down above the machine and wait for any bubbles to stop rising in the left hand connection (de-airing the internal reservoir).

Plump-up the mattress by disconnecting from the left hand port leaving the green connector attached to the right hand port. Wait for a minute, or until bubbles stop entering the un-attached connector then disconnect the filling bottle completely.

5. Dealing with air in the mattress

If air is seen in the mattress during use it may be “milked” around the mattress to the outlet hose without disturbing the baby. If however the air is nearest the inlet hose then de-airing may be achieved by reversing the flow through the mattress by simply switching the positions of the hoses at the Tecotherm Neo connecting ports (L to R and R to L).

6. Power failure

If a power failure occurs the system will shut down. It will retain your settings and patient data in order to offer the opportunity to continue or start again completely when the power returns. If the system needs to be moved during treatment rather than end treatment, power down and restart simply switch off at the wall socket move and then on powering up the option to continue will be available with treatment protocols and patient data preserved

7. Downloading patient data

On completion of treatment save the data to a memory stick (non-encrypted) via the USB connection on the rear of the device. This will enable data transfer to a PC.

Other Modes

- Servo Control – Constant Rectal Temperature

The device uses servo-control for the initial cooling and maintenance phases but the user must make manual mattress temperature adjustments during re-warming. This is not generally used but may be considered, e.g. where seizures have been seen during rewarming that the rate of rewarming is to be slowed.

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Document Name

WoS_CoolingMattress_Neonates

Implementation Date

Implementation – 01/12/15 Reviewed – 09/09/20 Next review 01/09/23