

18 GDS Helpsheet



World Leaders in Computer Controlled Testing
Systems for Geotechnical Engineers and Geologists

Hardware

STD & ADV Controller

Hot Motors

1. Introduction

The Mark III GDS digital controller has a stepper motor which is driven by a current limited "bipolar chopper" power supply. This means that the majority of heat dissipation occurs in the motor itself and not within the motor drive circuit. This design is beneficial because excess heat is produced externally and not within the controller case.

The motor in the Mark III controllers does get much hotter than the Mark I and II controllers and this is normal. The motor in the Mark III controller runs between 20 and 30 degrees Celsius above ambient and so you can expect a motor operating temperature normally between 40 and 60 degrees Celsius. At 60 degrees Celsius the motor is not hot enough to burn you but it will be uncomfortable to leave your hand on it for more than two or three seconds.

It should also be noted that after either a Power On or a controller keyboard reset (RESET, 9.) the stepper motor will be forced into a 'Strong step' mode. In this state the motor temperature will increase by between 5 to 10 degrees from its usual operating temperature. This again is quite normal. When a controller is in operation during a test it is in 'Soft step' mode and the temperature will return to the normal operating temperature.

It has been suggested by a number of GDS Users that the heat transmission from the motor into the water in the controller cylinder could have adverse effects on the measurement of volume change. Our measurements indicate that once the controller has come into thermal equilibrium the water in the controller cylinder remains at one degree Celsius above ambient.

The thermal coefficient of cubical expansion of water is 0.02% per degree Celsius. This means that you can expect the volume of water in your digital controller, in the connecting tubing, in the test cell, and (last but not least!) in the soil test specimen itself, to change by 0.02% for each degree change in ambient temperature.

This means it is the ambient temperature which needs to be controlled. This is especially the case for long term testing and applies to all soil testing whether or not GDS apparatus is used.