

Voltage Requirements

Introduction

Internationally, power supplied via national grids varies in characteristics quite significantly. It is important for any international manufacturer that products perform as expected in all geographies. This compliance is demonstrated here with the Prime range of thermal cyclers.

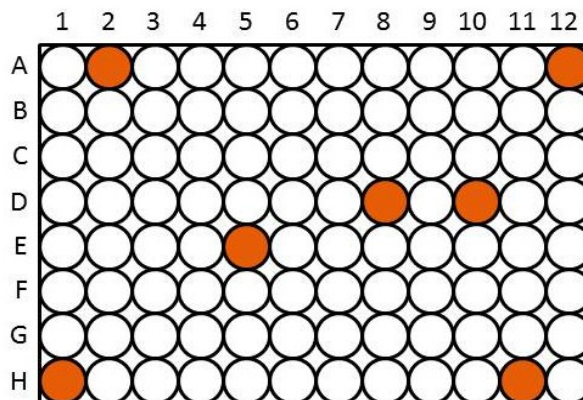
Methods

A sample of 5 thermal cyclers in the final inspection stage of production underwent Thermal Validation, both at 230V and 90V. Thermal Validation consists of testing the unit using 6 thermal probes placed across the block (Figure 1). The unit was then set to run the program shown in Table 1.

Table 1 Thermal Test Program

1 minute @ 95°C
1 minute @ 4°C
1 minute @ 95°C
1 minute @ 30°C
1 minute @ 95°C
1 minute @ 55°C
1 minute @ 72°C
30 seconds @ 95°C
30 seconds @ 4°C

Figure 1 Layout of temperature probes during thermal testing. Orange wells indicate position of probe.



The results gained from the run were collected using the Quanta Temperature Acquisition System (QTAS, Quanta Biotech, Surrey) and analysed using the software supplied with this system.

Results

All 5 units showed consistency between runs at 230V and 90V as demonstrated by the accuracy and uniformity figures shown in Table 2. Furthermore, the overall time to run the program was used as a measure of thermal cycling efficiency, as this encompasses the ability of the unit to ramp up, ramp down and stabilise at hold temperatures. The results of this analysis are shown in Table 2.

Table 2 Results of test program, showing Accuracy, average temperature of probes, and Uniformity, difference between highest and lowest probe.

230V				90V			
Unit	Accuracy @ 55°C	Uniformity @ 55°C	Time to complete program	Unit	Accuracy @ 55°C	Uniformity @ 55°C	Time to complete program
120A	55.08	0.49	18:25	90A	55.15	0.41	18:30
120B	55.10	0.30	18:27	90B	55.04	0.41	18:25
120C	54.95	0.48	18:15	90C	55.00	0.38	18:29
120D	55.11	0.44	18:24	90D	55.01	0.36	18:23
120E	55.12	0.30	18:35	90E	54.96	0.35	18:20

A paired samples t-test showed there was no significant difference between Accuracy ($p=0.414$) or Uniformity ($p=0.659$).

Conclusion

This study demonstrates no significant difference in performance between Prime thermal cycler units run at 90V or 230V. Therefore we recommend these units for use in countries that have power supplies of $100V\pm 10\%$, such as Canada, the United States, Japan and Taiwan, as well as countries using $230V\pm 10\%$.