

# Temperature Gradient Plate

*The GRD1 Temperature Gradient Plate is a highly efficient, bi-directional temperature gradient system for investigating responses to temperature of seeds, small plants and animals, micro-organisms or any small component or material.*

Analysis of results is straightforward and optimum or harmful temperatures, whether constant or alternating, are easily identified. More detailed investigation of responses to mean temperature, different amplitudes of temperature fluctuation, and so on, can then be carried out.

The design of the GRD1 is based on the fact that a temperature gradient results if one edge of a square aluminium plate is heated and the opposite edge cooled. In the Grant Temperature Gradient Plate, the gradient runs in one direction for the first part of the 24 hour cycle and is then automatically switched, after a pre-set time has elapsed, to run at a right angle to its original direction for the remainder of the period. In this way, all possible combinations of minimum and maximum temperatures, within the limits of the temperature gradient, are generated at the two chosen thermoperiods.

A removable perspex grid effectively divides the working area into 196 miniature incubators, each of which has a different temperature regime. Thus, many samples can be tested simultaneously under different conditions, without the need to use a large number of separate controlled environment chambers. As the two halves of the plate are mirror images in temperature, the effect of different thermoperiods can clearly be seen.

An integral chart recorder provides a time/temperature plot from five temperature sensors located on the underside of the plate (one in each corner and one in the centre).

An accessory data logger can be used as an alternative to the chart recorder. The five probes can be switched to provide Pt100 outputs for a data logger. Grant manufactures a wide range of data logging systems, please contact us for further details.

## Applications

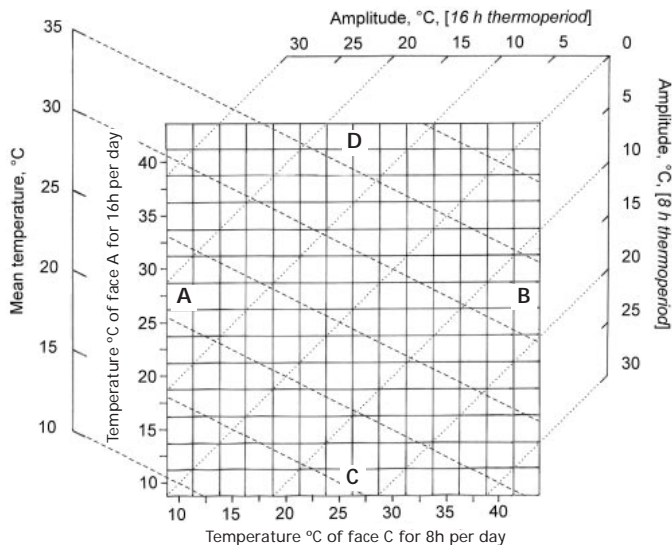
- seed testing
- seed physiology
- germplasm screening
- plant physiology
- microbiology
- entomology
- biotechnology
- component testing



The Grant Temperature Gradient Plate has been developed from a design originating from Dr. A. J. Murdoch and Professor E. H. Roberts of Reading University, Department of Agriculture.

## Specification

|                            |                   |    |                                      |
|----------------------------|-------------------|----|--------------------------------------|
| Temperature range          | cold edges        | °C | 0 to 30                              |
|                            | hot edges         | °C | Ambient +5 to 50                     |
| Temperature display        |                   |    | digital                              |
| Time/Temperature recording |                   |    | Integral five channel chart recorder |
|                            |                   |    | Output socket for data logger        |
| Stability                  |                   | °C | ±1                                   |
| Working area dimensions    |                   | mm | 760/760                              |
| Overall dimensions         | l/w/d             | mm | 1020/1020/1040                       |
| Weight                     |                   | kg | 229                                  |
| Electrical power           | 220-240V 50/60 Hz | W  | 2050                                 |
| EMC (emissions)            |                   |    | Class A*                             |



# Grant

**Grant Instruments  
(Cambridge) Ltd**

Shepreth  
Cambridgeshire  
SG8 6GB

Tel: +44 (0)1763 260811

www.grant.co.uk

Email: labsales@grant.co.uk

Fax: +44 (0)1763 262410

Diagram illustrating the nominal temperature treatments on the temperature gradient plate using, in this example, a 13 x13 matrix of cells.

The example shown is for 10-40°C gradients applied in alternate directions, face A to face B for 8 hours then face C to face D for 16 hours. The daily minimum and maximum temperatures of each cell can be read off from the temperature scales. Mean temperature can be calculated from these values after allowing for the time spent at these temperatures. The daily amplitude of temperature alternation in the centre of each cell is simply given by the difference between these two temperatures. Note that along the 0°C-amplitude diagonal, there is a gradient of nominally constant temperatures. Cells above and below this diagonal have 16h and 8h thermoperiods, respectively, defining thermoperiod as the time per day spent at the upper temperature. In this way all possible combinations of minimum and maximum temperature, within the limits of the temperature gradient, are generated for the two selected thermoperiods.

The Grant plate accommodates a 14 x14 matrix of cells divided up by the removable Perspex grid supplied with the plate. Because the temperature gradients are continuous, there are theoretical gradients of temperature and amplitude across each cell. Users may wish to put small Petri dishes or boxes (not supplied) within the cells of the Perspex grid to contain and isolate the samples being tested.

## Equipment safety

The Temperature Gradient Plate meets the requirements of IEC61010 and IEC61326 (Class A).

\*Class A equipment is suitable for use in establishments other than domestic and those directly connected to a low voltage power supply network, which supplies buildings used for domestic purposes.

## CE mark

The Temperature Gradient Plate bears a CE mark to indicate that it meets the requirements of the Low Voltage and EMC Directives.

## After sales service

In the United Kingdom, repairs are normally carried out within two to five working days of arrival at our factory, or receipt of authorisation to repair. Alternatively, spare parts and service manuals can be despatched within two working days.

## One year guarantee

Grant equipment is robust and reliable, designed and built to provide years of trouble-free service. The Grant Temperature Gradient Plate is guaranteed for one year against faulty materials and workmanship.

As Grant Instruments is committed to a continuous programme of improvement, specifications may be changed without notice.