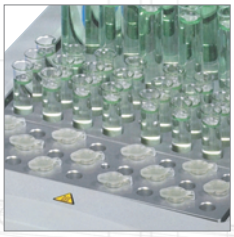
I.C.T, S.L.
INSTRUMENTACIÓN CIENTÍFICO TÉCNICA

Grant
SCIENTIFIC

Scientific Equipment

Catalogue 2010 – 2011

Precision temperature control, sample preparation and life sciences products for the world's laboratories



QUALITY DESIGN « » CONSISTENT PERFORMANCE « » SOUND INVESTMENT

Contents

= primarily for life sciences laboratories = primarily for a specific application

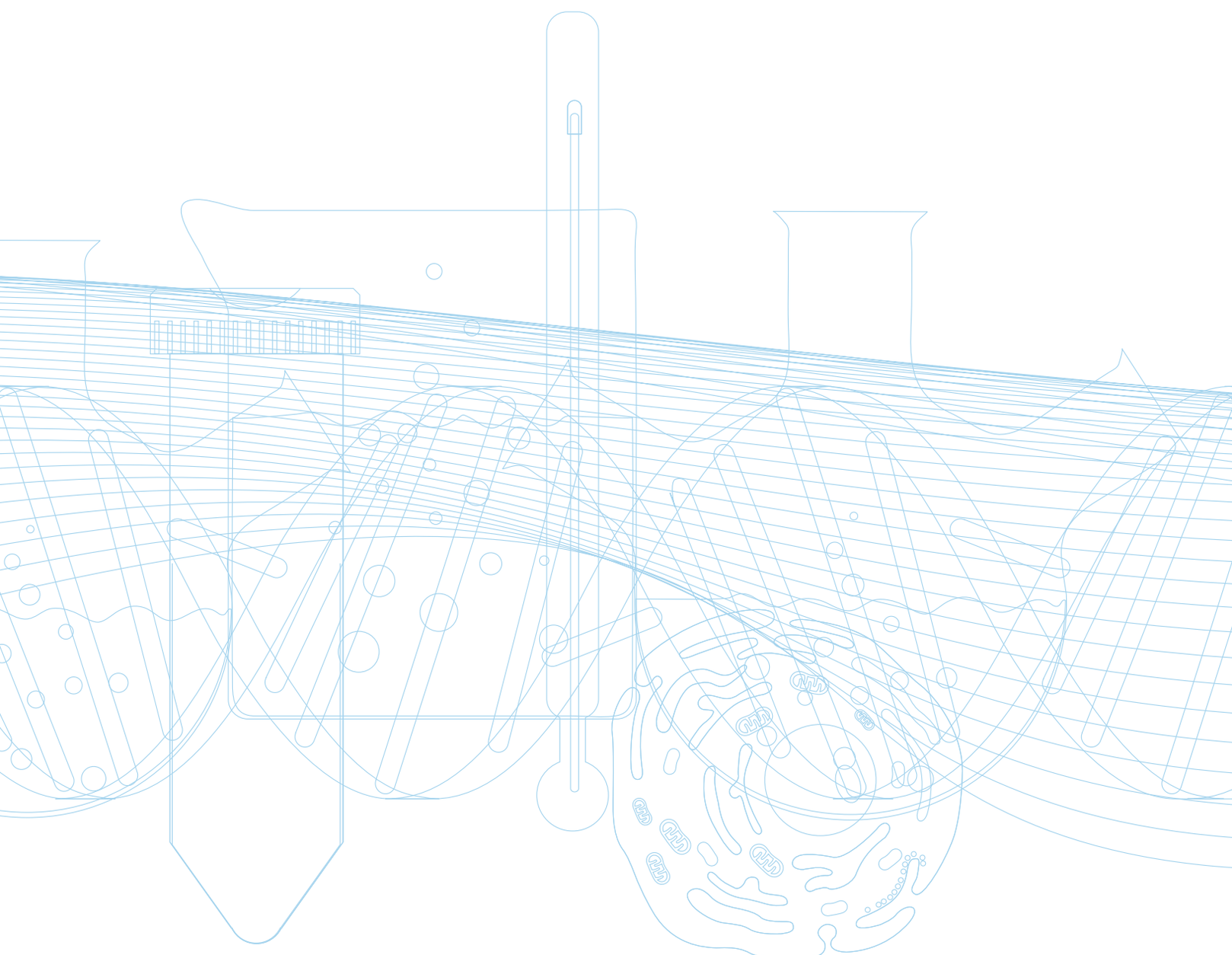
Part number 28981 Version 1.5 © Grant Instruments (Cambridge) Ltd

Contents »

= primarily for life sciences laboratories = primarily for a specific application

 © Grant Instruments (Cambridge) Ltd

1 Dry block heating systems



Dry block heating systems

QB and BT series

Market-leading dry block heating systems combining superb temperature control and uniformity with high quality design and great versatility. A premium product range at an affordable price.

- **Accurate, reproducible, rapid and safe heating of your samples** – due to advanced temperature control combined with high quality, precision-engineered blocks providing excellent thermal contact
- **Choice of models with interchangeable blocks or with fixed microtube blocks**
- **Versatile range of interchangeable heating blocks to fit any sample tube or plate** – from our standard range of blocks, or custom-made blocks to suit your application
- **Full range of models and options for basic through to more sophisticated applications**

Market-leading dry block heating systems with interchangeable precision blocks

Applications

Grant dry block heating systems provide a source of precision temperature control for general, routine applications and sensitive analytical procedures including enzyme digestions, enzyme activity studies and nucleic acid hybridisations.

For combined dry block heating and cooling systems, see p. 2.1.

 © Grant Instruments (Cambridge) Ltd

showcase – **mid range/general purpose** example

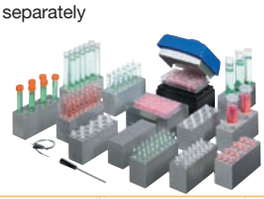
Model QBD2* stability and uniformity ± 0.1°C, range ambient + 5 to 130°C

A versatile general purpose system with two removable/interchangeable blocks and a comprehensive specification to suit most dry block heating applications in the laboratory.

- **Stability and uniformity ± 0.1°C**
- **Digital temperature control for optimum precision**
- **Heating range ambient + 5° to 130°C, with rapid heat-up time**
- **Range of convenient features including alarms, two-point and one-point calibration, programmed start/stop, 'offset' for known sample temperature variation and choice of external or internal probe**
- **External probe for accurate temperature control in a tube**

Microplate or microtube blocks for 0.2 ml tubes, strips and 96-well microtitre plates used in molecular biology and biotechnology applications

Wide range of interchangeable blocks – extraction tool supplied as standard for easy and safe removal of blocks. Order separately



Custom blocks – for virtually any tube or vessel

High power heater for fast heat-up – from 25° to 100°C in only 15 minutes

Overtemperature cut-out protects your samples and your workplace

Optional safety cover – protects samples from contamination and users from accidental contact with hot blocks

Convenient timer facility, with audible buzzer, for reaction timing and function timing, e.g. delayed heater switch-on/turn-off

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up

Compact footprint and sloping fascia optimise benchspace and ensure clear visibility during set-up and in use

High quality, robust construction in streamlined coolwall aluminium and chemical-resistant plastic – durable in demanding environments

* see summary table on pp. 1.5–1.6 for accessories and for other models in the range

© Grant Instruments (Cambridge) Ltd

showcase – dry block heater for microtubes

Model BTD* stability and uniformity ± 0.1°C, range ambient + 5 to 100°C

A compact and flexible fixed block system for rapid and precise heating of microtubes up to 100°C.

- **Stability ± 0.1°C**
- **Digital temperature control for optimum precision**
- **Heating range ambient + 5° to 100°C, with rapid heat-up time**
- **Capacity for up to 49 microtubes in a combination of four common sizes**
- **Integral timer**

Heating block holds combinations of four microtube sizes simultaneously – up to a total of 49 tubes:
- 24 x 1.5/2.0 ml
- 15 x 0.5 ml
- 10 x 0.2 ml

Powerful heater for rapid heat-up times
- 25° to 100°C in just 15 minutes
- 25° to 37°C in just 4 minutes

Sturdy, durable, easy-to-clean plastic outer case; compact design with small footprint

2-line display for simple and precise setting of temperature/time showing actual and preset values

Convenient integral timer for time-sensitive incubations

* see p. 1.7 for a detailed specification

 © Grant Instruments (Cambridge) Ltd

Dry block heating systems with interchangeable blocks – models

Temperature range
- ambient + 5 to 130°C
- ambient + 5 to 200°C
- ambient + 5 to 100°C

● = standard

	Precision digital			High performance digital	Economy analogue	
	QBD1	QBD2	QBD4	QBH2	QBA1	QBA2
	1-block system	2-block system	4-block system	2-block system	1-block system	2-block system
	 h: 100 mm d: 230 mm w: 200 mm	 h: 100 mm d: 280 mm w: 200 mm	 h: 100 mm d: 380 mm w: 200 mm	 h: 100 mm d: 280 mm w: 200 mm	 h: 100 mm d: 230 mm w: 200 mm	 h: 100 mm d: 280 mm w: 200 mm

Specification

Temperature range	°C	ambient + 5 to 130			ambient + 5 to 200	ambient + 5 to 100	
Temperature setting range	°C	15 to 130			15 to 200	0 to 100	
Setting resolution	°C	0.1			0.1	2	
Stability	@ 37°C, °C	± 0.1			± 0.1	± 1.0	
Uniformity							
within the block	@ 37°C, °C	± 0.1			± 0.1	± 1.0	
across similar blocks	@ 37°C, °C	± 0.2			± 0.2	± 1.0	
Temperature display, LED		●			●	–	
Display resolution	°C	0.1			0.1	–	
Heat up time	25° to 100°C mins	15			15	25	
Three programmable temperature/time segments plus end-of-program segments		–			●	–	
Reaction timer, with audible buzzer		1 to 999 mins			1 to 999 mins	–	
Function timer for delay of heater start-up/switch-off		up to 72 hours			up to 72 hours	–	
Off-set adjustment		●			●	–	
Two-point calibration of internal and external probes		●			●	–	
High/low temperature alarms, settable to within 0.5°C of set temperature		●			●	–	
Fault indication display		●			●	–	
Power	W	150	300	600	300	150	300
Supply voltage	V	120 or 230			120 or 230	120 or 230	
Safety	overtemperature cut-out	thermal fuse			thermal fuse; adjustable	thermal fuse	
Extraction tool for easy and safe block removal		●			●	●	

© Grant Instruments (Cambridge) Ltd

Options and accessories

x = not available ● = available

		QBD1	QBD2	QBD4	QBH2	QBA1	QBA2
Interchangeable blocks							
No. of blocks	140 x 50 x 63 mm	1	2	4	2	1	2
QB-0 Plain block without holes		●	●	●	●	●	●
QB-10 24 x 10 mm Ø holes, 50 mm hole depth		●	●	●	●	●	●
QB-12 24 x 12 mm Ø holes, 50mm hole depth		●	●	●	●	●	●
QB-13 12 x 13 mm Ø holes, 50 mm hole depth		●	●	●	●	●	●
QB-16 12 x 16 mm Ø holes, 50 mm hole depth		●	●	●	●	●	●
QB-18 12 x 18 mm Ø holes, 50 mm hole depth		●	●	●	●	●	●
QB-24 5 x 24 mm Ø holes and universal bottles, 50 mm hole depth		●	●	●	●	●	●
QB-50 4 x 50 ml centrifuge tubes, glass universals, 50 mm hole depth		●	●	●	●	●	●
QB-H 56 x 0.2 ml microtube, 14 mm hole depth		●	●	●	●	●	●
QB-E0 24 x 0.5 ml microtube, 30 mm hole depth		●	●	●	●	●	●
QB-E1 24 x 1.5 ml microtube, 35 mm hole depth		●	●	●	●	●	●
QB-E2 24 x 2.0 ml microtube, 35 mm hole depth		●	●	●	●	●	●
External Pt1000 temperature probe							
QBEP 	Standard probe. For in-sample or in-block temperature control; encased in stainless steel sheath, Ø 3 mm x 30 mm long, with 350 mm of cable	●	●	●	●	x	x
QBEP-WM 	Short-form probe. For in-sample or in-block temperature control; encased in stainless steel sheath, Ø 3 mm x 14 mm long, with 350 mm of cable	●	●	●	●	x	x
Microplate blocks for molecular biology and biotechnology applications Double-size blocks 140 x 100 x 75 mm supplied with additional extraction tool (see Section 10.4 for more information)							
QDP-H 	96 holes in microplate configuration for 0.2 ml microplates, strips or individual tubes Uniformity ± 0.3°C within tubes across the block; 6.2 mm Ø holes, 14 mm hole depth	x	●	x	●	x	●
QDP-FL 	Universal block for standard 96-well plates (u-well, v-well, flat bottom, high temperature) Uniformity ± 0.5°C between wells; supplied with hinged, double layer lid to create an insulated incubation chamber	x	●	x	●	x	●
Safety covers (not required with QDP-FL Microtiter blocks)							
	Made from tough clear acrylic for maximum visibility whilst preventing accidental touching of a hot block or contamination of samples from splashes Clearance height 85 mm	QBL1	QBL2	QBL4	QBL2	QBL1	QBL2

 © Grant Instruments (Cambridge) Ltd

Dry block heating systems with fixed microtube blocks – models and specifications

Temperature range

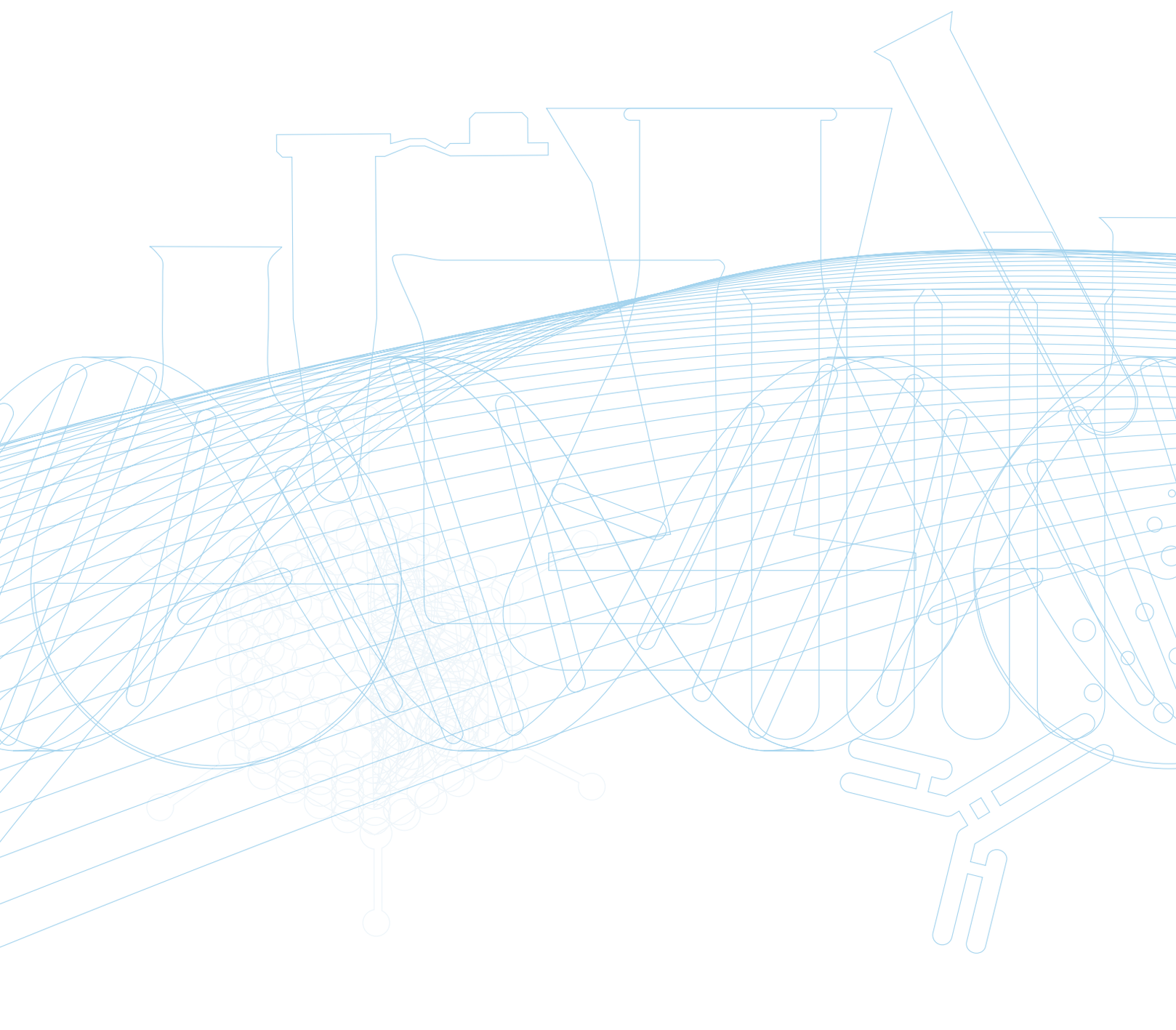
ambient + 5 to 100°C

● = standard

			Digital control
			BTD
			 h: 110 mm d: 230 mm w: 210 mm
Stability	@ 37°C, °C		± 0.1
Uniformity	°C		± 0.2
Block dimensions	mm		Ø 130 x 45
Temperature range	°C		ambient + 5 to 100
Temperature setting range	°C		25 to 100
Setting resolution	°C		0.1
Temperature display	2 line x 16 character LCD		●
Heat up time	25° to 100°C	mins	16
	25° to 37°C	mins	2.5
Timer			1 min to 96 hours
Power	W		200
Supply voltage	V		120 or 230
Safety	overtemperature cut-out		thermal fuse

© Grant Instruments (Cambridge) Ltd

2 Dry block heating/cooling systems



Dry block heating/cooling systems

PCH-1 and PCH-2

Compact, flexible, easy to use systems for rapid heating and cooling of microtubes; very effective tools for DNA/RNA sample preparation techniques.

- **Cooling/heating setting range from - 10° to 100°C, with very rapid cool down and heat-up times**
- **Stability ± 0.2°C, uniformity ± 0.5°C**
- **Choice of two models: capacity for up to 32 microtubes in a combination of two sizes (PCH-1) or up to 20 microtubes of one size (PCH-2)**
- **Convenient integral reaction timer with audible alarm**

Model PCH-1

Ingenious block construction, combined with powerful Peltier cooler, produces very rapid heating and cooling

Dry temperature control system maintains clean and aerosol-free environment

2-line LCD display clearly indicates both set and actual values for temperature and time

Simple push button combinations for easy set-up

Block holds a combination of two microtube sizes simultaneously – up to a total of 32 tubes: 12 x 1.5 ml plus 20 x 0.5 ml

Rapid DNA denaturation at 95ºC quickly achieved

DNA denaturation techniques further supported with an audible alarm for denaturation 'time-up'; samples can then be quickly cooled

Typical applications include: freezing restriction enzymes for storage, nick translations, ligation reactions, restriction digests, protein solubilisation for PAGE, warm incubation of microcentrifuge tubes for hybridisation, cooling blood samples prior to coagulation testing, enzyme reactions and deactivations.

© Grant Instruments (Cambridge) Ltd

Dry block heating/cooling systems – models and specifications

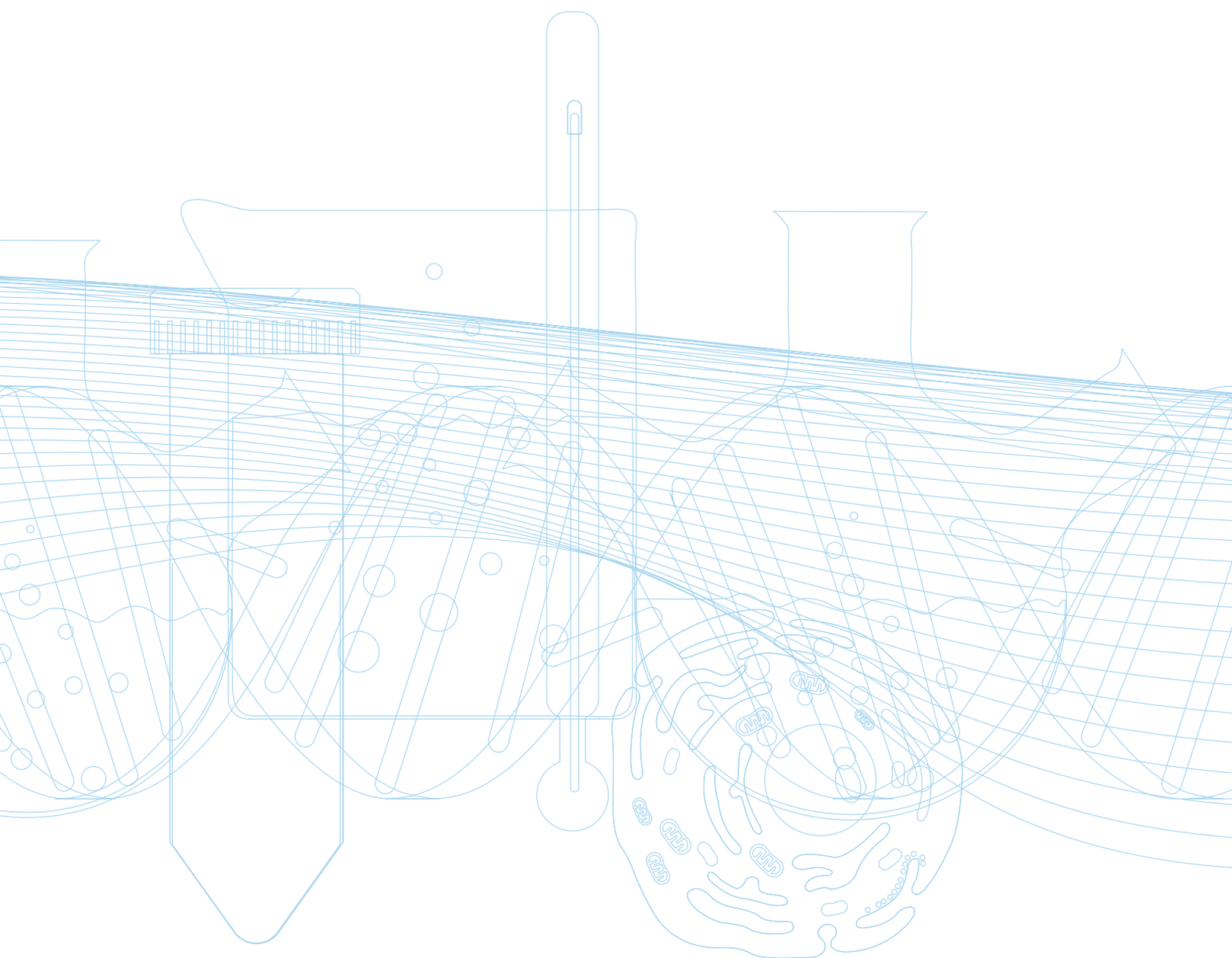
Temperature range

- 10 – 100°C

			PCH-1	PCH-2
			 h: 161 mm d: 195 mm w: 225 mm	 h: 161 mm d: 195 mm w: 225 mm
Block dimensions		mm	100 x 110	
Temperature setting range		°C	- 10 to 100	
Temperature control range		°C	30°C below ambient to 100°C	
Stability		°C	± 0.2	
Uniformity	@ 10°C	°C	± 0.5	
Setting resolution		°C	0.1	
Temperature display			2 line x 16 character LCD	
Heat up rate	room temperature to 100°C	°C/min	> 10	
Cool down rate	100°C to room temperature	°C/min	> 10	
	room temperature to - 10°C	°C/min	> 2	
Heat up time	room temperature to 100°C	min	< 10	
Cool down time	100°C to room temperature	min	< 12	
	room temperature to - 10°C	min	< 11	
Capacity		microtubes	12 x 1.5 ml plus 20 x 0.5 ml	20 x 1.5 ml
Timer			1 min to 96 hrs	
Input voltage		V dc	12 via 110/230 universal power adaptor	
Input current		A	5	

 © Grant Instruments (Cambridge) Ltd

3 Thermoshakers



Thermoshakers

A range of compact, efficient and highly versatile thermoshakers, with excellent temperature uniformity, ideal for applications requiring heating and shaking in microplates and microtubes and suitable for use in cold rooms and incubators (operating temperature range 4 to 40°C).

By combining the mixing operation with the incubation phase, reaction process times and operator workload are reduced and efficiency of many procedures is increased, resulting in a higher throughput.

- **Thermoshakers for microtubes**
- **Thermoshakers for microplates**

PHMT-PSC microtube thermoshaker

PHMP

PHMP- 4

thermoshakers for two and four microplates

 © Grant Instruments (Cambridge) Ltd

Thermoshaker PHMT for microtubes

Variable speed, variable temperature thermoshaker combining three instruments in one for maximum versatility and efficiency:

- a microtube thermoshaker
- a compact benchtop incubator without shaking
- a microtube shaker operating at ambient + 5˚C

- **Temperature range: ambient + 5 to 100°C**
- **Uniformity ± 0.1°C***
- **Shaking speed: 250 to 1400 rpm**
- **Rapid heat-up**
- **Continuous or timed operation, with alarm and automatic switch-off facility**
- **Capacity for up to 20 or up to 32 microtubes**

* 25 to 40°C

PHMT-PSC-20 microtube thermoshaker

2-line LCD display clearly indicates both set and actual values for temperature, shaking speed and time

Easy programming via simple push buttons and display

PSC-18 microtube block can accommodate two different microtube sizes:
• 20 x 0.5 ml plus
• 12 x 1.5/2.0 ml microtubes

Choice of three models available:
• PHMT-PSC-15
(20 x 1.5 ml microtubes)
• PHMT-PSC-18
(20 x 0.5 ml plus 12 x 1.5 ml microtubes)
• PHMT-PSC-20
(20 x 2.0 ml microtubes)

Convenient interchangeable block for 20 or 32 microtubes provides flexibility for an easy change in application

The powerful motor operates extremely smoothly, quietly and consistently. With ‘soft’ start function for delicate samples

Timer 1 min to 96 hours

Low voltage cord easily fits through incubator door gaskets

Compact and sturdy, with a low profile and small footprint – fits neatly into the workspace and provides years of reliable service

PSC-18 microtube block

© Grant Instruments (Cambridge) Ltd

Thermoshaker PHMP and PHMP-4 for microplates

Excellent temperature uniformity across the platform/microplate (due to the bi-directional heating system) combined with variable speed and variable temperature produces the ideal thermoshaker for microplate incubations.

Can be used with all types of standard depth microplates and offers three instruments in one for maximum versatility and efficiency:

- a microplate thermoshaker
- a compact benchtop incubator without shaking
- a microplate shaker operating at ambient + 5°C

- **Temperature range: ambient + 5 to 60°C**
- **Stability ± 0.1°C, uniformity ± 0.2°C due to the bi-directional heating system (platform and lid)**
- **Shaking speed: 250 to 1200 rpm**
- **Rapid heat-up**
- **Continuous or timed operation, with alarm buzzer and automatic switch-off facility**
- **Choice of two models with capacity for two or four microplates**

The heated lid completely covers the heating platform to provide bi-directional heating and a controlled micro-environment. This produces excellent temperature stability and uniformity, whilst preventing condensation

Display of both set and actual temperature and shaking speed

Very easy to operate, with simple set-up of temperature, shaking speed and time via push buttons and the 2-line LCD status display

Soft start/stop protects samples

Model shown PHMP thermoshaker for two microplates

The **PHMP-4** has the same functionality as the PHMP but can accommodate four microplates

The powerful, reliable motor and sturdy construction combine to provide years of consistent operation

Low voltage cord easily fits through incubator door gaskets

Suitable for applications in many fields including: immunochemistry, molecular diagnostics, ELISAs, molecular biology (for microbial cell cultivation and DNA analysis), cytochemistry (for *in situ* reactions), biochemistry (for enzyme and protein analysis) and molecular chemistry (for matrix analysis).

 © Grant Instruments (Cambridge) Ltd

Thermoshakers – models and specifications

● = option

	For microtubes			2-plate thermoshaker	4-plate thermoshaker
	PHMT-PSC15	PHMT-PSC18	PHMT-PSC20	PHMP	PHMP-4
	 h: 130 mm d: 230 mm w: 205 mm	 h: 130 mm d: 230 mm w: 205 mm	 h: 130 mm d: 230 mm w: 205 mm	 h: 125 mm d: 250 mm w: 265 mm	 h: 140 mm d: 390 mm w: 380 mm
Temperature setting range °C	+ 25 to 100	+ 25 to 100	+ 25 to 100	+ 25 to 60	+ 25 to 60
Temperature control range °C	+ 5°C above ambient to 100°C			+ 5°C above ambient to 60°C	
Uniformity °C	± 0.1†	± 0.1†	± 0.1†	± 0.2	± 0.2
Temperature display	2 line x 16 character LCD				
Heat up rate RT to 100°C °C/min	> 6	> 6	> 6	–	–
Heat up time RT to 37°C mins	–	–	–	15 to 20	15 to 20
Capacity microtubes	20	32	20	–	–
Capacity microplates	–	–	–	2	4
Shaking speed rpm	250 to 1400	250 to 1400	250 to 1400	250 to 1200	250 to 1200
Speed setting resolution rpm	10				
Orbit mm	2				
Timer (with auto-off and audible alarm)	1 min to 96 hours				
Timer resolution mins	1				
Input voltage V dc	12				
Input current A	5				
External power supply V	120 or 230				

Accessories

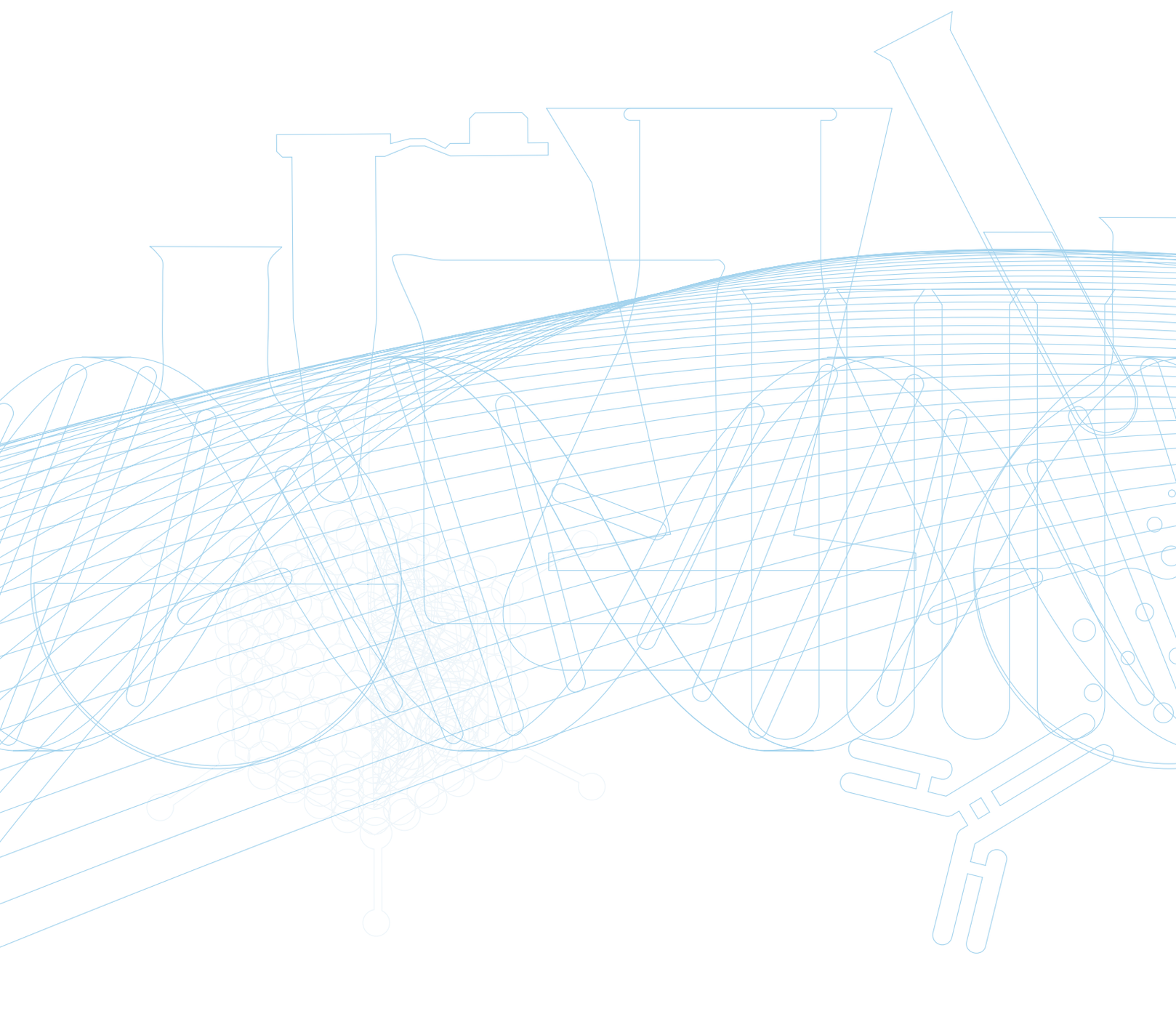
PSC-15 additional interchangeable block for 20 x 1.5 ml microtubes	●	●	●	–	–
PSC-18 additional interchangeable block for 20 x 0.5 ml microtubes plus 12 x 1.5 ml microtubes	●	●	●	–	–
PSC-20 additional interchangeable block for 20 x 2.0 ml microtubes	●	●	●	–	–

* depending on choice of block

† 25 to 40°C

© Grant Instruments (Cambridge) Ltd

4 Shaker-incubators



Shaker-incubators

ES-20

Versatile and programmable bench-top shaker-incubator for mixing and incubating biological cultures and samples in a variety of flasks and vessels.

- Digital control of time, temperature and shaking speed for accuracy and repeatability
- Variable speed: 50 to 250 rpm
- Temperature range: 25 to 42°C
- Load up to 2.5 kg
- Interchangeable platforms for shaking/incubating different vessels

ES-20 shaking incubator with PUP-12 universal platform

Temperature control by microprocessor plus forced heated air circulation ensure a constant and even temperature within the chamber

Designed for easy assembly/ disassembly – easy to move from one location to another. Comes flat packed, takes an hour to assemble

Equipped with direct drive shaking system for reliable, long-term operation

Simple to programme time, temperature and shaking speed using clear 2-line 16 character LCD

Robust, compact construction with clear 7mm thick Plexiglass panels

Option of four easily interchangeable platforms for a wide range of applications

Suitable for growing cell cultures in flasks, extracting tissue samples at physiological temperatures, and sample preparation processes.

Optional accessory platforms for ES-20*

P12-100 – Platform with clamps for 12 x 100 ml flasks/150 ml beakers
Dimensions: 250 x 190 mm

PP-4 – Flat platform with non-slip rubber mat for Petri dishes and culture flasks
Dimensions: 219 x 219 mm

P6-250 – Platform with clamps for 6 x 250 ml flasks/400 ml beakers
Dimensions: 250 x 190 mm

PUP-12 – Universal platform, with adjustable bars for different types of container
Dimensions: 285 x 220 mm

* a platform for accommodating 4 x 500ml flask is available as a special option

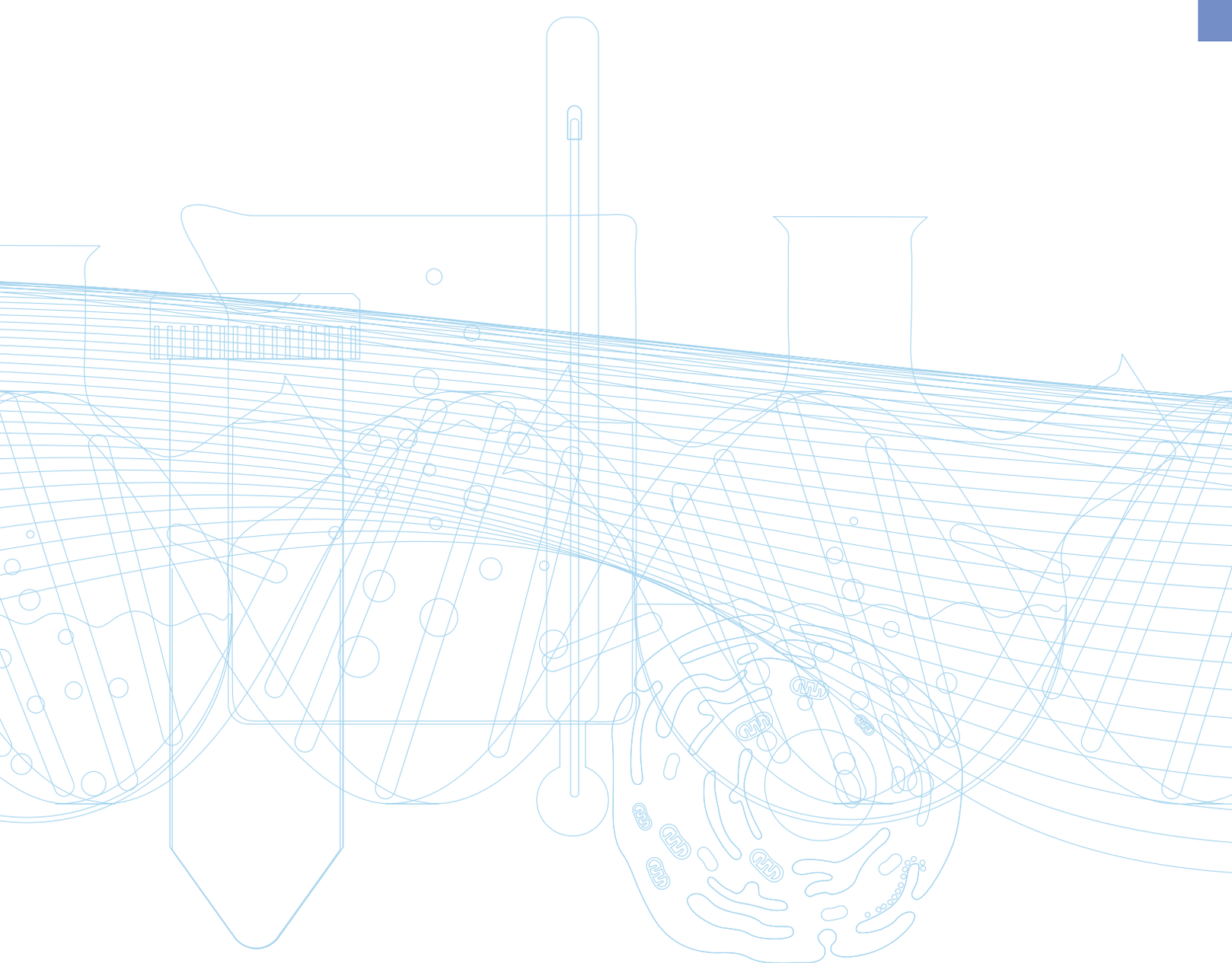
© Grant Instruments (Cambridge) Ltd

Shaking incubators – specification

		ES-20
		
Speed range	rpm	50 to 250
Orbit	mm	10
Temperature range	°C	25 to 42
Temperature setting resolution	°C	0.1
Timer		1 min to 96 hours
Load capacity	kg	2.5
Display		2 line 16 character LCD
Internal working height	mm	270
Power supply	V	230 (50-60 Hz)

 © Grant Instruments (Cambridge) Ltd

5 UV cabinets – DNA/RNA



UV cabinets – DNA/RNA

Range of advanced benchtop UV cabinets providing aseptic conditions for a variety of biomedical and biochemical procedures. The innovative built-in UV-air recirculator provides constant decontamination of the air volume within the cabinet, making it suitable for working with DNA/RNA, infectious and viral materials including prions.

- **General purpose UV cabinets with UV cleaner/recirculator**
- **Double PCR workstation with UV cleaner/recirculator**

UVC/T-AR – economy UV cabinet

UVC/T-M-AR – stainless steel UV cabinet

UVT-S-AR – double PCR workstation

 © Grant Instruments (Cambridge) Ltd

UVC/T-M-AR – stainless steel UV cabinet

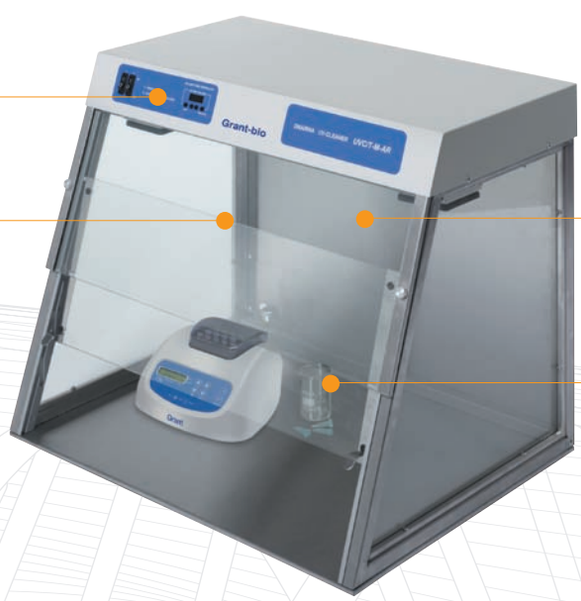
Robust general purpose stainless steel UV cabinet designed to provide a convenient workspace.

- **UV surface irradiation – via single 25 W 254 nm open UV lamp**
- **High intensity UV air cleaner – 25 m^3/hour cleaner-recirculator continuous air flow with 1 cm UV irradiation distance**
- **UV protection – UV-protective film on glass panels**
- **UV exposure control – 24 hour digital timer**

Convenient, easy to use digital timer for accurate control of UV exposure

White lamp provides local illumination of the workplace to optimise visual control during operations

Automatic switch off of irradiated UV light when door opened



Built-in UV cleaner-recirculator both increases the maximum density of UV light and generates 25 m^3/h air flow exchange – prevents unwanted contamination and protects the user from direct UV light during manipulation

Front opening with three adjustable positions for ease of access

© Grant Instruments (Cambridge) Ltd

UV cabinet UVC/T-AR – economy UV cabinet

General purpose UV cabinet with a lighter, more basic and economical design than UVC/T-M-AR.

- **UV surface irradiation – via single 25 W 254 nm open UV lamp**
- **High intensity UV air cleaner – 25 m^3/hour cleaner-recirculator continuous air flow with 1 cm UV irradiation distance**
- **UV exposure control – 24 hour digital timer**

Convenient, easy to use digital timer for accurate control of UV exposure

White lamp provides local illumination of the workplace to optimise visual control during operations

Automatic switch-off of irradiated UV light when door opened

Built-in UV cleaner-recirculator prevents unwanted contamination and protects the user from direct UV light during manipulation

 © Grant Instruments (Cambridge) Ltd

UVT-S-AR double PCR workstation – stainless steel

Large capacity stainless steel UV cabinet with additional space for equipment and accessories to allow for more comfortable and convenient working in PCR applications.

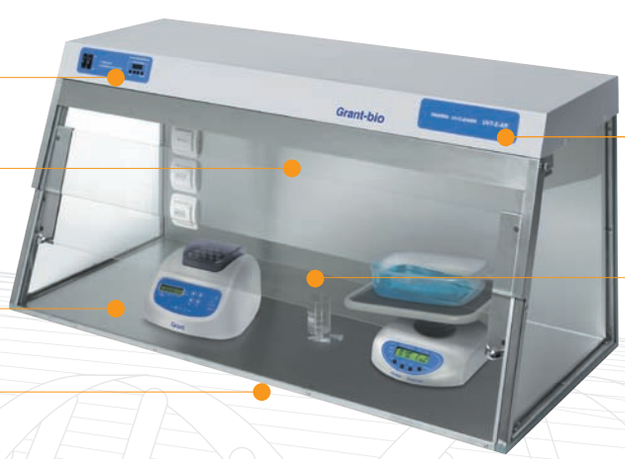
- **Robust construction with large, 1.2 m x 0.52 m working area**
- **UV surface irradiation – dual 30 W 254 nm UV lamp**
- **High intensity UV air cleaner – 25 m^3/hour cleaner-recirculator continuous air flow with 1 cm UV irradiation distance**
- **UV protection – UV-protective film on glass panels**
- **UV exposure control – 24 hour digital timer**

Convenient, easy to use digital timer for accurate control of UV exposure

White lamp provides local illumination of the workplace to optimise visual control during operations

Front opening with three adjustable positions for ease of access

Automatic switch off of irradiated UV light when door opened



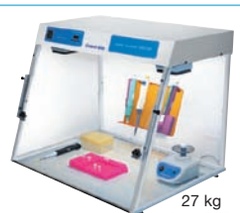
Built-in UV cleaner – recirculator both increases the maximum density of UV light and generates 25 m^3/h air flow exchange – prevents unwanted contamination and protects the user from direct UV light during manipulation

Ample additional space for equipment and comfortable working

© Grant Instruments (Cambridge) Ltd

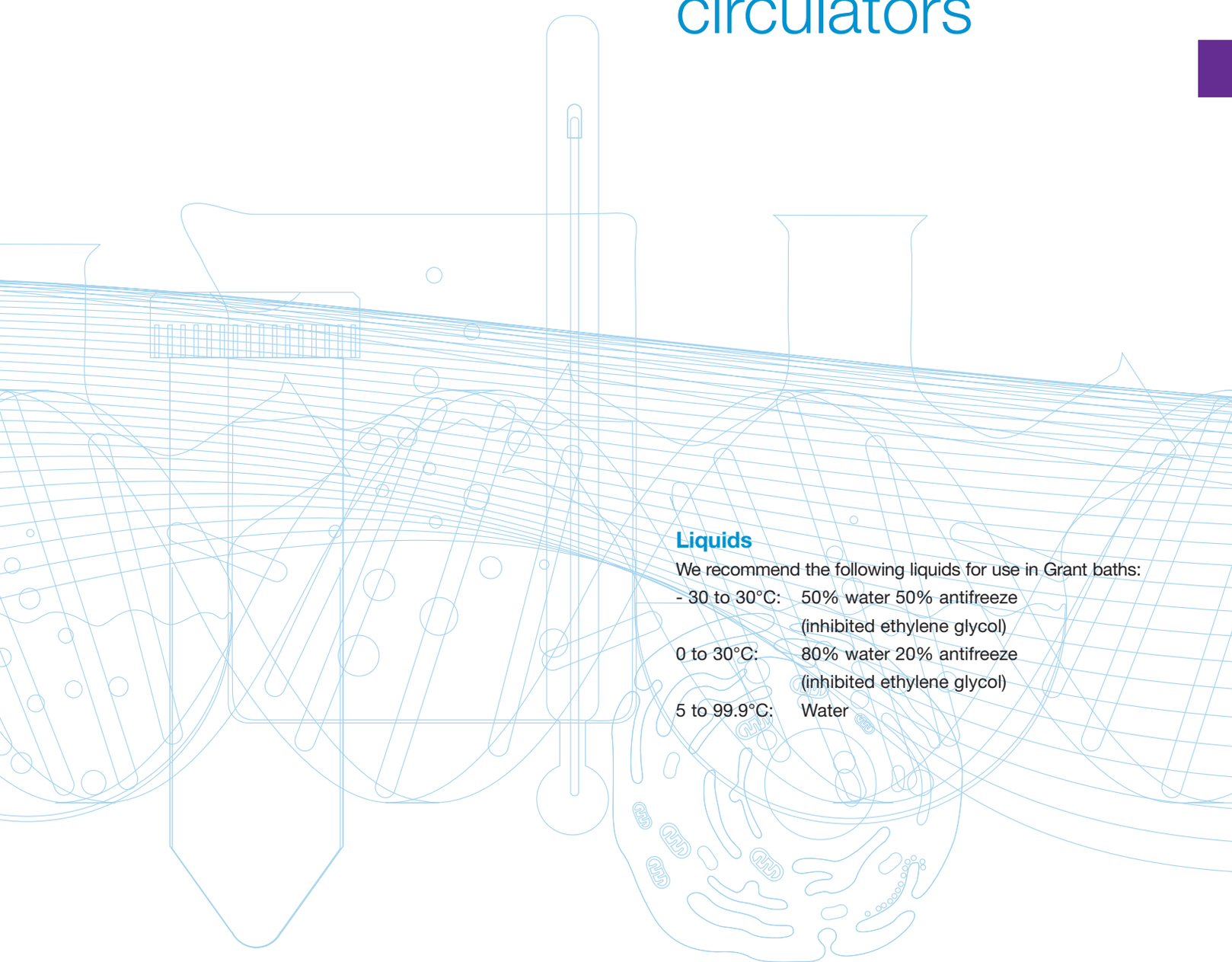
UV cabinets – models and specifications

● = standard

	General purpose	General purpose economy	PCR workstation
	UVC/T-M-AR	UVC/T-AR	UVT-S-AR
	 35 kg h: 555 mm d: 515 mm w: 690 mm	 27 kg h: 555 mm d: 515 mm w: 690 mm	 58 kg h: 585 mm d: 580 mm w: 1245 mm
Construction	stainless steel frame and working area	painted steel frame and working area	stainless steel frame and working area
Panels	glass with UV-protective film	Plexiglass	glass with UV-protective film
Front opening with three adjustable positions	●	–	●
Open UV lamp, 25 W bactericidal, 254 nm, ozone free	1	1	–
Open UV lamp, 30 W bactericidal, ozone free	–	–	2
Bactericidal air recirculator, 25 m^3/h air flow exchange	●	●	●
UV recirculator, 25W (efficiency >99% per 1 cycle)	1	1	–
UV recirculator, 30W (efficiency >99% per 1 cycle)	–	–	1
White lamp for workplace illumination 15 W	1	1	–
30 W	–	–	1
Digital timer 0 to 24 hours	●	●	●
Internal power outlets	–	–	3
Power supply	230 V		

 © Grant Instruments (Cambridge) Ltd

6 Stirred thermostatic baths and circulators



Liquids

We recommend the following liquids for use in Grant baths:

- 30 to 30°C:	50% water 50% antifreeze (inhibited ethylene glycol)
0 to 30°C:	80% water 20% antifreeze (inhibited ethylene glycol)
5 to 99.9°C:	Water

Stirred thermostatic baths and circulators

A cost-effective range of multi-purpose systems combining Grant's legendary quality and reliability. Precise temperature control for a wide range of laboratory applications.

- **Accurate and safe temperature control** – for samples and users
- **Intuitive programming and thoughtful design features** – makes working with Grant stirred baths and circulators easy
- **Robust, durable construction** – for longevity, reliability and long-term low cost of ownership
- **A complete range** – 32 models to cover basic through to sophisticated needs, each model represents excellent value for money

Applications

Grant stirred baths and circulators provide a source of precision heating and cooling for many routine and sensitive analytical procedures. All models from the GD120 upwards are suitable for use as both open and closed loop circulators (i.e. remote vessel open or closed).

For more powerful heating requirements, i.e. above 200°C, contact Grant for advice.

Model selection (operating temperature)

Any of the four Grant Optima™ digital thermostats can be combined with any of eight Grant tanks (five stainless steel and three plastic) to provide a choice of 32 models. The colour-coded summary table on p. 6.6 shows you the temperature range of each combination.

The following pages showcase examples of popular combinations for different requirements.

For more details of Grant Optima™ thermostats see, p. 6.6.

 © Grant Instruments (Cambridge) Ltd

showcase 1 – **entry level** example

Model GD100-S5* range 0 to 100°C, stability ± 0.02°C

Well specified entry-level model with digital thermostatic control unit and stainless steel tank for straightforward laboratory applications requiring high precision temperature control.

- **Optima™ digital thermostat (GD100) for precise temperature control**
- **Cooling/heating range 0 to 100°C****
- **Stability ± 0.02°C**
- **5 litre tank volume (other tank sizes available)**
- **Range of convenient programming features**
- **Four stored temperature presets**

Visual alarm – alerts you when your attention is required

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up

User calibration facility for optimum accuracy at the required operating temperature

Comprehensive range of options and accessories for a very wide range of applications

Robust construction, corrosion resistant materials, stainless steel tank – durable in demanding environments

Clear digital display – easy to read from a distance for instant reassurance

Operating setpoint plus **3 adjustable preset temperatures** for convenience

Dual-position bridge plate – ensures visibility/ accessibility of the thermostat whilst optimising bench space

Convenient recessed handholds for carrying/ repositioning the unit

Choice of **120 V and 230 V models**

* see summary table on pp. 6.6–6.7 for accessories and for other models utilising the GD100 thermostat
** operation below ambient temperature requires accessory cooling

© Grant Instruments (Cambridge) Ltd

showcase 2 – **mid range** example

Model GD120-S12* range 0 to 120°C, stability ± 0.02°C

Versatile mid-range model with digital thermostatic control unit and stainless steel tank and a comprehensive specification to suit most applications for high precision temperature control.

- **Optima™ digital thermostat (GD120) for precise temperature control**
- **Integral pump**
- **Cooling/heating range 0 to 120°C****
- **Stability ± 0.02°C**
- **12 litre tank volume (other tank sizes available)**
- **Range of convenient programming features**

Audible and visual alarms – alert you when your attention is required

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up

Convenient **timer function** for reaction timing

User calibration facility for optimum accuracy at the required operating temperature

Powerful integral pump – allows temperature-controlled fluid to be circulated to external devices

Dual-position bridge plate – ensures visibility/ accessibility of the thermostat whilst optimising bench space

Clear digital display – easy to read from a distance for instant reassurance

Operating setpoint plus **3 adjustable preset temperatures** for convenience

Optional removable hinged gabled lid with insulated handle – minimises evaporation of fluid and avoids contamination of samples

Robust construction, corrosion resistant materials, stainless steel tank – durable in demanding environments

Convenient recessed handholds for carrying/ repositioning the unit

Choice of **120 V and 230 V models**

* see summary table on pp. 6.6–6.7 for accessories and for other models utilising the GD120 thermostat
** operation below ambient temperature requires accessory cooling

 © Grant Instruments (Cambridge) Ltd

showcase 3 – **high specification** example

Model GP200-S26* range 0 to 200°C, stability ± 0.005°C

High specification model with high performance digital thermostat and stainless steel tank for sophisticated applications requiring complex programming and/or ultra precise temperature control.

- **Optima™ high performance digital thermostat (GP200) for ultra precise temperature control**
- **Stability ± 0.005°C**
- **Cooling/heating range 0 to 200°C****
- **26 litre tank volume (other tank sizes available)**
- **Comprehensive range of sophisticated and automated programming and control functions**

High performance GP200 digital thermostat

Memory capacity for 5 programs of 30 segments

Convenient heater timer for early morning start-ups/late evening shut-downs

Automatic adjustment of temperature range and heater power according to liquid type selected

Two programmable relays for control of refrigeration on/off or other ancillary equipment

High and low temperature alarm settings – can be configured to switch a relay

High power integral pump with multi-stage variable flow rate – programmable fluid circulation to external devices

Socket for optional external probe – allows remote temperature control

Fast and intuitive menu-driven programming through powerful front-panel interface

Option of Labwise™ PC software for program set-up, data-logging and real-time graphing

High power heater for faster heat-up

* see summary table on p. 6.6–6.7 for accessories and other models utilising the Grant high performance digital control units
** operation below ambient temperature requires accessory cooling

© Grant Instruments (Cambridge) Ltd

showcase 4 – **budget** example

Model GD100-P12* range ambient + 5 to 99°C, stability ± 0.02°C

Economy model with digital thermostatic control unit and plastic tank for straightforward applications requiring accurate temperature control.

- **Optima™ digital thermostat (GD100) for accurate temperature control**
- **Cooling/heating range ambient + 5 to 99°C**
- **Four temperature presets**
- **Stability ± 0.02°C**
- **12 litre tank volume**
- **Simple operation**

Choice of **120 V and 230 V models**

Visual alarm – alerts you when your attention is required

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up

Optional removable lid to minimise evaporation of fluid and avoid contamination of samples

Float switch – monitors water level and protects from drying out

Operating setpoint plus **3 adjustable preset temperatures** for convenience

Wide range of optional accessories for different applications

Robust plastic construction, double-walled for rigidity, easy to clean

Convenient recessed handholds for carrying/repositioning the unit

* see summary table on p. 6.6 for accessories and for other models utilising GD100 control units and/or plastic tanks

 © Grant Instruments (Cambridge) Ltd

Stirred thermostatic baths and circulators – models, options and accessories

Any of the four Grant Optima™ digital thermostats can be combined with any of the Grant stainless steel and plastic tanks. The colour-coded summary table shows you the temperature range of each combination. For more details of Grant Optima™ thermostats see, p. 6.8

Effective operating temperature range†
(tank + thermostat)

- ambient +15 to 99°C
- ambient + 5 to 99°C
- 0 to 100°C
- 0 to 120°C
- 0 to 150°C
- 0 to 200°C
- -15 to 120°C
- -15 to 150°C
- -15 to 200°C

† operation at or below ambient temperatures requires accessory cooling

Key to symbols

display, timer, pump, offset adjustment, program storage, relay, audible alarm, menu system, RS232, adjustable overtemperature cutout, visual alarm, 2 point recalibration, external probe, programmable

Thermostatic control units

	Digital		Digital High Performance	
	GD100	GD120	GR150	GP200
	 h: 315 mm d: 145 mm w: 115 mm	 h: 315 mm d: 145 mm w: 115 mm	 h: 315 mm d: 145 mm w: 115 mm	 h: 315 mm d: 145 mm w: 115 mm

Tanks

Capacity (L) Outer tank dimensions	• Working area (l x w) • Min/max liquid depths • Inner tank dimensions (l x w x h) • Overall dimensions incl. controller (l x w x h)	System designation (tank + control unit)			
S5 – 5 L stainless steel  h: 175 mm d: 325 mm w: 175 mm	• 150 x 150 mm • 80/140 mm • 300 x 150 x 150 mm • 325 x 175 x 355 mm	GD100–S5 (showcased on page 6.2)	GD120–S5	GR150–S5	GP200–S5
S12 – 12 L stainless steel  h: 175 mm d: 350 mm w: 325 mm	• 210 x 300 mm • 80/140 mm • 325 x 300 x 150 mm • 350 x 325 x 355 mm	GD100–S12	GD120–S12 (showcased on page 6.3)	GR150–S12	GP200–S12
S18 – 18 L stainless steel  h: 225 mm d: 530 mm w: 325 mm	• 390 x 300 mm • 70/30** mm • 505 x 300 x 150 mm • 530 x 325 x 405 mm	GD100–S18	GD120–S18	GR150–S18	GP200–S18
S26 – 26 L stainless steel  h: 225 mm d: 530 mm w: 325 mm	• 390 x 300 mm • 120/180** mm • 505 x 300 x 200 mm • 530 x 325 x 405 mm	GD100–S26	GD120–S26	GR150–S26	GP200–S26 (showcased on page 6.4)
S38 – 38 L stainless steel  h: 225 mm d: 730 mm w: 325 mm	• 580 x 300 mm • 120/180** mm • 690 x 300 x 200 mm • 720 x 325 x 405 mm	GD100–S38	GD120–S38	GR150–S38	GP200–S38
P5 – 5 L plastic  h: 180 mm d: 240 mm w: 330 mm	• 120 x 150 mm • 80/140 mm • 240 x 160 x 150 mm • 390 x 200 x 360 mm	GD100–P5	GD120–P5	GR150–P5	GP200–P5
P12 – 12 L plastic  h: 180 mm d: 415 mm w: 350 mm	• 210 x 280 mm • 80/140 mm • 325 x 280 x 150 mm • 415 x 350 x 360 mm	GD100-P12 (showcased on page 6.5)	GD120–P12	GR150–P12	GP200–P12
P18 – 18 L plastic  h: 180 mm d: 600 mm w: 365 mm	• 280 x 325 mm • 80/140 mm • 510 x 290 x 150 mm • 600 x 350 x 360 mm	GD100–P18	GD120–P18	GR150–P18	GP200–P18

Options and accessories

Labwise™ PC software (optional)					
Allows two-way communication for status display, programming and data capture (see p. 16.1 for more information)		–	–		
External probes (optional)					
for monitoring and controlling temperature of remote loads		–	–		
FF17 flexible nylon probe, 2 m cable	100 mm x Ø 4.5 mm				
LL17 stainless steel probe, 2 m cable	125 mm x Ø 5 mm	–	–		
Remote switching device (optional)					
For switching appliances on and off (up to max. 8 Amps)		–	–	1	2
Vertical turbine pumps (optional)*					
Low noise, compact design. Supplied with pipe connections and special lid for fitting to tank, pipe bore 12.7 mm			Required only where application demands a higher pressure than that delivered by the internal pump to maintain flow		
VTP 1					
max. pressure	1000 mbar				
max. flow	9 L/min				
VTP 2					
max. pressure	1650 mbar				
max. flow	12 L/min				

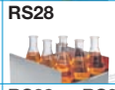
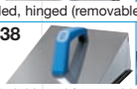
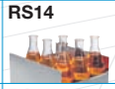
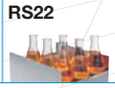
* when pump is fitted, available working area is reduced ** maximum depth can be increased by 10 mm, by removing the circulation tray in 18, 26, 38 litre baths, with slight loss of performance

© Grant Instruments (Cambridge) Ltd

Glossary (see also options and accessories section)

2 point calibration	Provides calibration across wide temperature range with high and low reference points, used to re-set calibration of instrument.
Offset adjustment	Allows accurate temperature control where the monitored temperature is different from the target temperature, often used in conjunction with an external probe
Pump	Enables fluid to be circulated externally instead of within the bath. Typically to provide temperature control to a remote instrument (tubing and connectors not supplied)

Accessories

Lids* to help reduce evaporation/heat loss and avoid sample contamination	**Polypropylene spheres*** (no. of packs required)	**Rack systems†** to optimise use of available bath capacity (no. of racks accommodated)	**Raised shelves** to allow shallow vessels to be accommodated	**Accessory cooling systems**** to allow systems to operate at or below room temperature by means of a cooling coil dipped into the bath; designed for minimal impact on working area		
				Refrigerated immersion coolers Consist of a cooling coil connected to a refrigeration unit by a flexible pipe. Extract heat continuously, with the bath control unit controlling temperature		**Heat exchange coil** Designed to be attached to a supply of cooling tap water or a refrigerated circulator
				C1G (0 to 40°C***)	**C2G** (- 15 to 40°C***)	**CW5** (2°C above coolant temperature)
FG5  flat stainless steel	**1 x PS20** 	**1 x QR** 	–		–	
LG12  gabled, hinged (removable) stainless steel	**1 x PS20** 	**2 x VR** 	**RS14** 		–	
LG26  gabled, hinged (removable) stainless steel	**2 x PS20** 	**4 x VR** 	**RS22** 		–	
LG26  gabled, hinged (removable) stainless steel	**2 x PS20** 	**4 x VR** 	**RS28** 			
LG38  gabled, hinged (removable) stainless steel	**3 x PS20** 	**6 x VR** 	**RS28** or **RS38** 			
PL5  flat, stainless steel	**1 x PS20** 	**1 x QR** 	–	–	–	–
PL12  curved plastic	**1 x PS20** 	**2 x VR** 	**RS14** 	–	–	–
PL18  curved plastic	**2 x PS20** 	**4 x VR** 	**RS22** 	–	–	–

* Between operating temperatures 60°C and 100°C and below room temperature a lid or layers of polypropylene spheres should be used. Above 100°C a lid must be used

** The cooling coil can be continuously immersed in liquids up to 100°C with the cooler switched off, and may be used to cool liquid down from 100°C, but it is not designed for continuous operation above 40°C.

*** Minimum operating temperature without accessory cooling is room temperature + 5°C (room temperature + 15°C for S5 tanks).

† Rack capacity (no. of test tubes per rack)

VR racks	Tube size	Capacity
VR-13	Ø 10-13 mm	65
VR-19	Ø 16-19 mm	36
VR-24	Ø 24 mm	23
VR-30	Ø 30 mm	14
VR-SE	0.5 ml	102
VR-LE	1.5 ml	75

QR racks	Tube size	Capacity
QR-13	Ø 10-13 mm	30
QR-19	Ø 16-19 mm	16
QR-24	Ø 24 mm	10
QR-30	Ø 30 mm	5
QR-SE	0.5 ml	44
QR-LE	1.5 ml	35

 © Grant Instruments (Cambridge) Ltd

Stirred thermostatic baths and circulators – technical specifications

Grant Optima™ thermostats

● = standard

			Digital		Digital High Performance	
			GD100	GD120	GR150	GP200
						
Stability (DIN 58966), stainless steel (S) tanks @ 37°C		°C	± 0.02	± 0.02	± 0.005	± 0.005
Uniformity (DIN 58966), stainless steel (S) tanks @ 37°C		°C	± 0.05	± 0.05	± 0.02	± 0.02
Setting resolution		°C	0.1	0.1	0.1 (0.01 with Labwise)	
Display			4 digit 13 mm LED		4 digit 13 mm LED 2 line 16 character LCD	
Display resolution		°C	0.1	0.1	0.01 (LCD)	0.01 (LCD)
Timer function			–	1 to 9999 mins	1 min to 99 hrs 59 mins	
No. stored temperature values			4	4	4	4
Two point re-calibration			●	●	●	●
Offset adjustment			–	–	●	●
Socket for external probe (Pt1000)			–	–	●	●
RS232 interface			–	–	●	●
Programmable			–	–	remote via PC	remote via PC/direct
No. stored programs			–	–	1 x 30 segment	5 x 30 segment
Relays			–	–	1	2
Safety	overtemperature		–	adjustable cut-out		
	fluid level – float switch		●	●	●	●
Alarms (can be configured to switch a relay)			–	high	high and low	high and low
Heater power	230 V	kW	1.4	1.4	2	2
	120 V	kW	1.3	1.3	1.3	1.3
Electrical power	230 V	kW	1.5 (50-60 Hz)	1.5 (50 Hz)	2.2 (50 Hz)	2.2 (50-60 Hz)
	120 V	kW	1.4 (50-60 Hz)	1.4 (60 Hz)	1.4 (60 Hz)	1.4 (50-60 Hz)
Height above tank rim		mm	180	180	180	180
Depth below tank rim		mm	135	135	135	135

Grant Optima™ thermostat pumps (integral)

Maximum pressure	water	mbar		310	310	530
Maximum flow	water	L/min		17	17	21 (adjusted flow rate)
Pipe bore	inlet/outlet	mm		6, 11	6, 11	6, 11

Grant immersion thermostats are suitable for use with Grant stainless steel and plastic tanks. With the addition of a clamp (K clamp) they can also be attached to any vertical sided tank with a maximum wall thickness of 35 mm for rectangular tanks, 30mm for circular tanks (300 mm diameter), and a capacity of up to 50 litres. Minimum and maximum temperatures achievable are dependent upon the tank insulation and minimum operating temperature depends on the accessory cooling device.

© Grant Instruments (Cambridge) Ltd

High pressure pumps (optional)

			VTP pumps	
			VTP1	VTP2
				
Maximum pressure	water	mbar	1000	1650
Maximum flow	water	L/min	9	12
Pipe bore	inlet/outlet	mm	12.7	12.7
Electrical connection			10 amp IEC	10 amp IEC
Power consumption		W	30	40
Power output to liquid @ 20°C		W	15*	22*
Safety			thermal fuse	thermal fuse

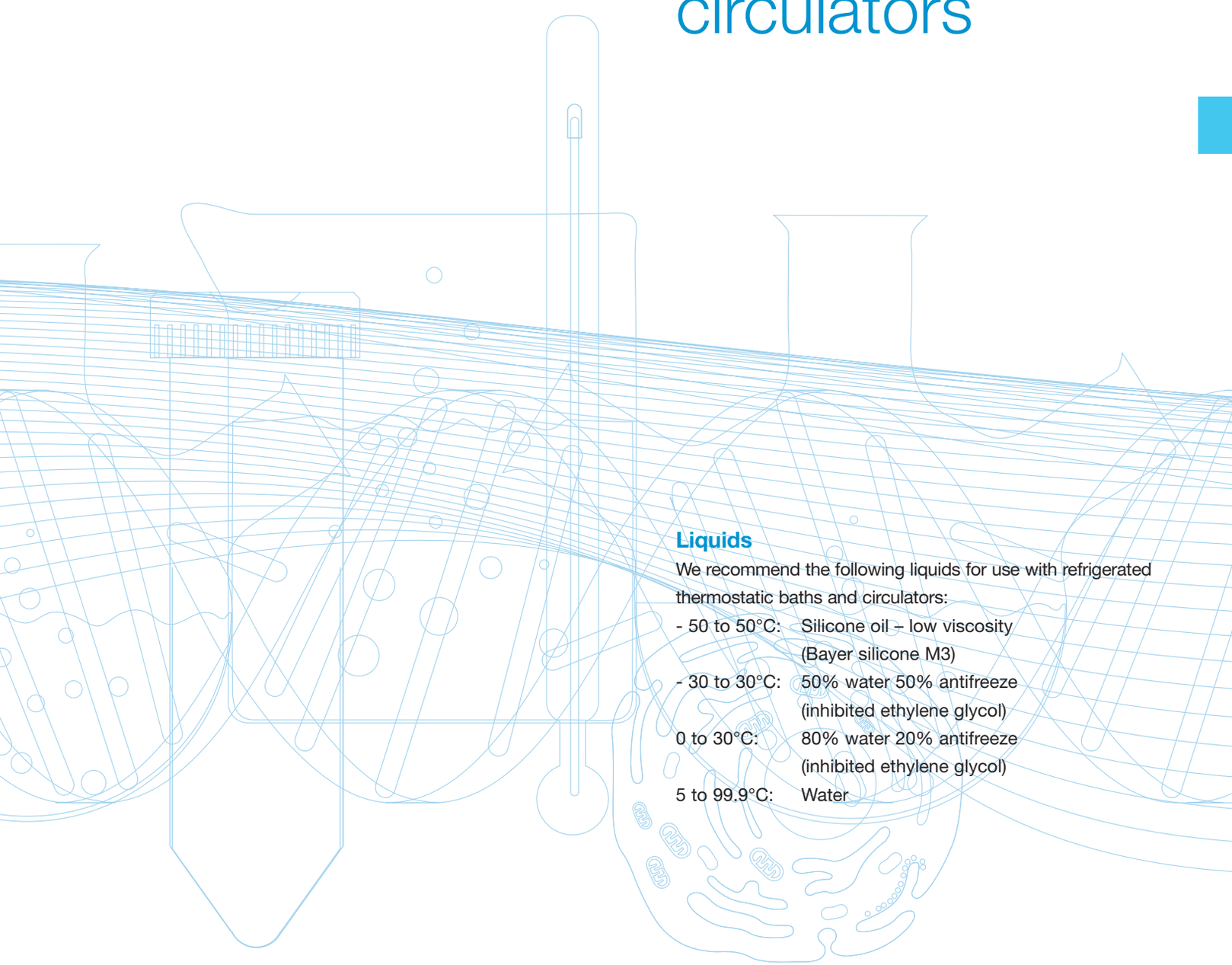
Grant accessory cooling systems

			Refrigerated immersion coolers		Heat exchange coil
			C1G	C2G	CW5
					
Cooling power	@ 20°C	W	350	400	–
	@ 0°C	W	110	320	–
	@ - 10°C	W	–	170	–
Overall consumption		VA	300	500	–
Dimensions	d/w/h	mm	460/305/225		–
Flexible pipe	I	mm	925	925	–
Coil	Ø /I	mm	77/55	77/55	77/55
Pipe bore inlet/outlet		mm	–	–	7
Electrical supply			120 V (60 Hz) or 230 V (50Hz)		–

* The VTP optional pumps will transfer additional heat to the baths, so the minimum temperature achievable with or without accessory cooling will be increased.
Note: when ordering a VTP pump, please specify which Grant tank it is to be used with.

 © Grant Instruments (Cambridge) Ltd

7 Refrigerated thermostatic baths and circulators



Liquids

We recommend the following liquids for use with refrigerated thermostatic baths and circulators:

- 50 to 50°C:	Silicone oil – low viscosity (Bayer silicone M3)
- 30 to 30°C:	50% water 50% antifreeze (inhibited ethylene glycol)
0 to 30°C:	80% water 20% antifreeze (inhibited ethylene glycol)
5 to 99.9°C:	Water

Refrigerated thermostatic baths and circulators

Cost-effective and efficient multi-purpose systems for low temperature applications.

- **Powerful precision cooling** whether used in open-loop or closed-loop format
- **Combining legendary quality, reliability and design for everyday usage** – useful features, straightforward maintenance, compact design
- **Robust, durable construction** for longevity, reliability and long-term low cost of ownership
- **A complete range** – 19 models to cover basic through to sophisticated needs
- All refrigeration products come with market-leading 3-year warranties

Applications

Grant low temperature circulators provide a source of precision cooling for many sensitive analytical procedures including spectrophotometry, viscometry, refractometry and electrophoresis. They are suitable for use in both open and closed loop circulation (i.e. remote vessel open or closed).

Alternatively, **Grant RC** series of recirculating chillers (closed circulators) can be used. These are generally needed for more powerful cooling requirements, e.g. the removal of mechanical or electrical heat produced in apparatus or machinery. Please contact Grant for advice.

Operating temperature

The four Grant Optima™ thermostats can be combined with the five Grant refrigeration units to provide a choice of 19 models. The colour-coded summary table on p. 7.4 shows you the temperature range of each combination.

The following page showcases our most popular model, the versatile mid-range GD120-R2.

 © Grant Instruments (Cambridge) Ltd

showcase – **mid range** example

Model GD120-R2* range - 20 to 100°C, stability ± 0.1°C

Our most popular model – a versatile system for the laboratory, with a comprehensive specification to suit most low temperature applications.

- **Optima™ digital thermostat (GD120) for precise temperature control**
- **Cooling/heating range - 20 to 100°C**
- **Stability ± 0.1°C**
- **Heat removal – typically 200 W at + 5°C (most common working temperature)**
- **5 litre tank volume (other tank sizes available)**
- **Range of convenient programming features**

LTC1 Kit

The GD120-R2 is available ready-assembled with the thermostat mounted on the refrigerator and supplied with insulated tubing and clips to form a system ready to use. Supported by an industry leading 4 year warranty emphasising Grant's confidence in the reliability of its refrigeration products.

Audible and visual alarms – alert you when your attention is required

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up

Powerful integral pump – allows temperature-controlled fluid to be circulated to external devices via tubing (tubing not supplied)

Easy access to coolant reservoir for local cooling of tubes, bottles etc

Easily accessible power switch

Powerful efficient cooling, ozone-friendly refrigerant

Removable grille – easy access to drain valve* and condenser for routine maintenance

*Drain valve not available on R1 systems

Choice of **120 V and 230 V models**

Operating setpoint plus 3 adjustable preset temperatures for convenience

Convenient timer function for reaction timing

Dual-position bridge plate – ensures visibility/ accessibility of the thermostat whilst optimising bench space

Convenient carrying handles front and rear for repositioning the unit

Designed for quiet operation for minimal impact on your working environment

Robust construction, corrosion resistant materials, stainless steel tank – durable in demanding environments

5°C thermostat on/off switch – stops tank freezing when operating with water

© Grant Instruments (Cambridge) Ltd

Factors to consider when choosing your system

- **Do you need to immerse samples within a tank?**

Consider the working area required. The table on p. 7.4 shows the dimensions of the top opening and the min/max liquid depths

- **Cooling power required at a given temperature**

For example, if your operating temperature is 0°C, and you need 500 W cooling power, you will need the R4 (or R5) refrigeration unit with any of the controllers. Alternatively to calculate the power required use the following formula:

$$W = \frac{V \times \varnothing T \times K}{60 \times t(\text{mins})}$$

W = average cooling power	Water	K = 4200
V = total system liquid volume L	50/50 water/glycol	K = 3800
∅T = temperature difference °C	Alcohol	K = 2100
K = liquid heat capacity (J/L/°C)	Silicone oil	K = 1800

- **Cool-down time required to reach that temperature**

Calculate the cool-down time required according to the following formula, and refer to the cool down curves for individual performance.

$$t(\text{mins}) = \frac{V \times \varnothing T \times K}{60 \times W}$$

- **Do you need to control the temperature of/remove the heat from an external device?**

1. Consider the pump requirement. Liquid flow rate is critical in order to maintain adequate exchange of heat within the external system. Flow rate is dependent on the restrictions within the system. Factors which cause a pressure drop are height, length, pipe bore and the number and angle of bends within the system. To maintain sufficient flow in a highly restricted system, a high pressure pump is required. The integral pumps in the Optima™ series thermostats are satisfactory for most laboratory applications; for more powerful pump requirements select either of the Grant accessory vertical turbine pumps (VTP).

2. Consider whether you need to control the temperature within the external apparatus. For external temperature control choose GR150 or GP200 controller and an external temperature probe.

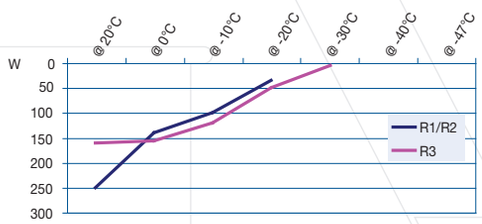
- **Do you require temperature ramping?**

If yes, choose GR150 or GP200 controller and Labwise accessory software. For refrigeration on/off control by programmable relay choose refrigeration units R2 to R5.

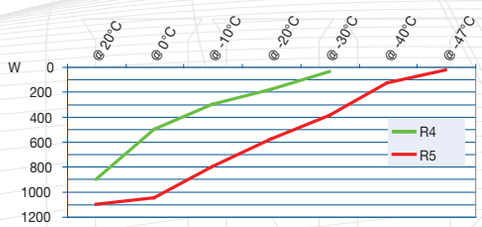
- **What other features do you require?**

Consider the numerous features offered by the four Optima™ series controllers, and select the controller that meets your needs.

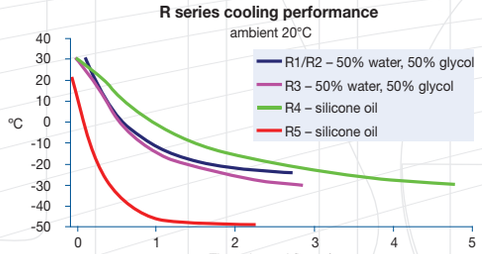
Available cooling power: general purpose models
ambient 20°C



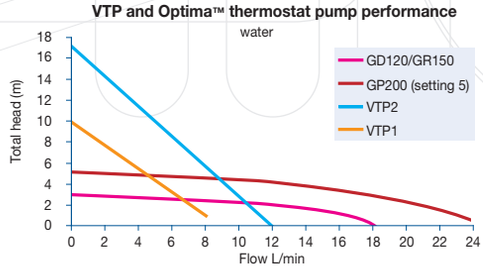
Available cooling power: high performance models
ambient 20°C



R series cooling performance
ambient 20°C



VTP and Optima™ thermostat pump performance
water



 © Grant Instruments (Cambridge) Ltd

Refrigerated baths and circulators – range of available models, options and accessories

Effective operating temperature range (refrigeration unit + thermostat)

- 0 to 100°C
- - 20 to 100°C
- - 30 to 100°C
- - 47 to 100°C

Key to symbols

- display
- timer
- pump
- offset adjustment
- drain
- program storage
- relay/ relay control
- audible alarm
- menu system
- RS232
- refrigeration high pressure switch
- adjustable overtemperature cutout
- visual alarm
- 2 point recalibration
- external probe socket
- programmable

Thermostatic control units

	Digital		Digital high performance	
	GD100	GD120	GR150	GP200
	h: 315 mm d: 145 mm w: 115 mm	h: 315 mm d: 145 mm w: 115 mm	h: 315 mm d: 145 mm w: 115 mm	h: 315 mm d: 145 mm w: 115 mm

Refrigeration units

Capacity (L) Outer tank dimensions	• Working area (l x w) • Min/max liquid depths • Weight				
R1 – 5 L stainless steel h: 410 mm d: 410 mm w: 230 mm	• 110 x 145 mm • 80/140 mm • 19.2 kg	GD100-R1	GD120-R1	GR150-R1	GP200-R1
R2 – 5 L stainless steel h: 410 mm d: 410 mm w: 230 mm	• 110 x 145 mm • 80/140 mm • 19.2 kg	GD100-R2	GD120-R2 (showcased on page 7.2)	GR150-R2	GP200-R2
R3 – 5 L stainless steel h: 410 mm d: 410 mm w: 230 mm	• 110 x 145 mm • 80/140 mm • 19.2 kg			GR150-R3	GP200-R3
R4 – 20 L stainless steel h: 530 mm d: 490 mm w: 390 mm	• 230 x 305 mm • 80/140 mm • 37.8 kg	GD100-R4	GD120-R4	GR150-R4	GP200-R4
R5 – 12 L stainless steel h: 585 mm d: 575 mm w: 415 mm	• 260 x 115 mm • 120/180 mm • 47 kg	GD100-R5	GD120-R5	GR150-R5	GP200-R5

Options and accessories

Labwise™ PC software (optional)				
Allows two-way communication for status display, programming and data capture (see p. 16.1 for more information)	–	–		
External probes (optional)				
for monitoring and controlling temperature of remote loads				
FF17 flexible nylon probe, 2 m cable 100 mm x Ø 4.5 mm	–	–		
LL17 stainless steel probe, 2 m cable 125 mm x Ø 5 mm	–	–		
Remote switching device (optional)				
For switching mains powered appliances on and off (up to max. 8 Amps)	–	–	1	2
Vertical turbine pumps (optional)*				
Low noise, compact design. Supplied with pipe connections and special lid for fitting to tank, pipe bore 12.7 mm				
VTP 1 max. pressure 1000 mbar max. flow 9 L/min		Required only where application demands a higher pressure than that delivered by the internal pump to maintain flow		
VTP 2 max. pressure 1650 mbar max. flow 12 L/min				

* when pump is fitted, available working area is reduced.

© Grant Instruments (Cambridge) Ltd

Glossary

2 point calibration	Provides calibration across wide temperature range with high and low reference points, used to re-set calibration of instrument.
Offset adjustment	Allows accurate temperature control where the monitored temperature is different from the target temperature, often used in conjunction with an external probe
Pump	Enables fluid to be circulated externally instead of within the bath. Typically to provide temperature control to a remote instrument (tubing and connectors not supplied)

Low temperature refrigerated baths and circulators – technical specification

Grant Optima™ thermostats

● = standard

			Digital		Digital High Performance	
			GD100	GD120	GR150	GP200
						
Stability (DIN 58966)	water @ 10°C	°C	± 0.1	± 0.1	± 0.1	± 0.1
	50% water, 50% glycol @ 10°C	°C	–	± 0.1	± 0.1	± 0.1
Uniformity (DIN 58966)	water @ 10°C	°C	± 0.1	± 0.1	± 0.1	± 0.1
	50% water, 50% glycol @ 10°C	°C	–	± 0.1	± 0.1	± 0.1
Setting resolution		°C	0.1	0.1	0.1 (0.01 with Labwise)	
Display			4 digit 13 mm LED		4 digit 13 mm LED 2 line 16 character LCD	
Display resolution		°C	0.1	0.1	0.01 (LCD)	0.01 (LCD)
Timer function			–	1 to 9999 mins	1 min to 99 hrs 59 mins	
No. stored temperature values			4	4	4	4
Two point re-calibration			●	●	●	●
Offset adjustment			–	–	●	●
Socket for external probe (PT1000)			–	–	●	●
RS232 interface			–	–	●	●
Programmable			–	–	remote via PC	remote via PC/direct
No. stored programs			–	–	1 x 30 segment	5 x 30 segment
Relays			–	–	1	2
Safety	overtemperature		–	adjustable cut-out		
	fluid level – float switch		●	●	●	●
Alarms (can be configured to switch a relay)			–	high	high and low	high and low
Heater power	240 V	kW	1.4	1.4	2	2
	115 V	kW	1.3	1.3	1.3	1.3
Electrical power*	230 V	kW	1.5 (50-60 Hz)	1.5 (50 Hz)	2.2 (50 Hz)	2.2 (50-60 Hz)
	120 V	kW	1.4 (50-60 Hz)	1.4 (60 Hz)	1.4 (60 Hz)	1.4 (50-60 Hz)
Height above tank rim		mm	180	180	180	180
Depth below tank rim		mm	135	135	135	135

Grant Optima™ thermostat pumps (integral)

Maximum pressure	water	mbar		310	310	530
Maximum flow	water	L/min		17	17	21 (adjusted flow rate)
Pipe bore	inlet/outlet	mm		6, 11	6, 11	6, 11

* Optima™ thermostats and accessory pumps can be powered from the back of the R1, R2 and R3 220-240V refrigeration units. Allow up to 2 kW of extra power from the electrical supply

 © Grant Instruments (Cambridge) Ltd

High pressure pumps (optional)

			VTP pumps	
			VTP1	VTP2
				
Maximum pressure	water	mbar	1000	1650
Maximum flow	water	L/min	9	12
Pipe bore	inlet/outlet	mm	12.7	12.7
Electrical connection			10 amp IEC	10 amp IEC
Power consumption		W	30	40
Power output to liquid @ 20°C		W	15**	22**
Safety			thermal fuse	thermal fuse

Grant R series refrigeration units – models and specifications

● = standard			R1	R2	R3	R4	R5
							
Relay control (refrigeration on/off)			–	●	●	●	●
Refrigerant			R134a	R134a	R134a	R134a	R404a
Drain			–	●	●	●	●
Overtemperature cut-out	100°C limit		●	●	●	●	●
Water freezing protection thermostat			●	●	●	●	●
Refrigeration high pressure switch	27 bar		–	–	–	●	●
Cooling power, ambient 20°C	@ 20°C	W	250	250	160	900	1100
	@ 0°C	W	140	140	156	500	1050
	@ - 10°C	W	100	100	120	300	800
	@ - 20°C	W	35	35	50	180	580
	@ - 30°C	W	–	–	5	40	370
	@ - 40°C	W	–	–	–	–	130
	@ - 47°C	W	–	–	–	–	25
Electrical power (maximum)	230 V	W	334 (50 Hz)*	334 (50 Hz)*	354 (50 Hz)*	850 (50 Hz)	1400 (50 Hz)
	120 V	W	328 (50-60 Hz)	328 (50-60 Hz)	370 (60 Hz)	780 (60 Hz)	–
EMC emissions		Class	B	B	B	B	B

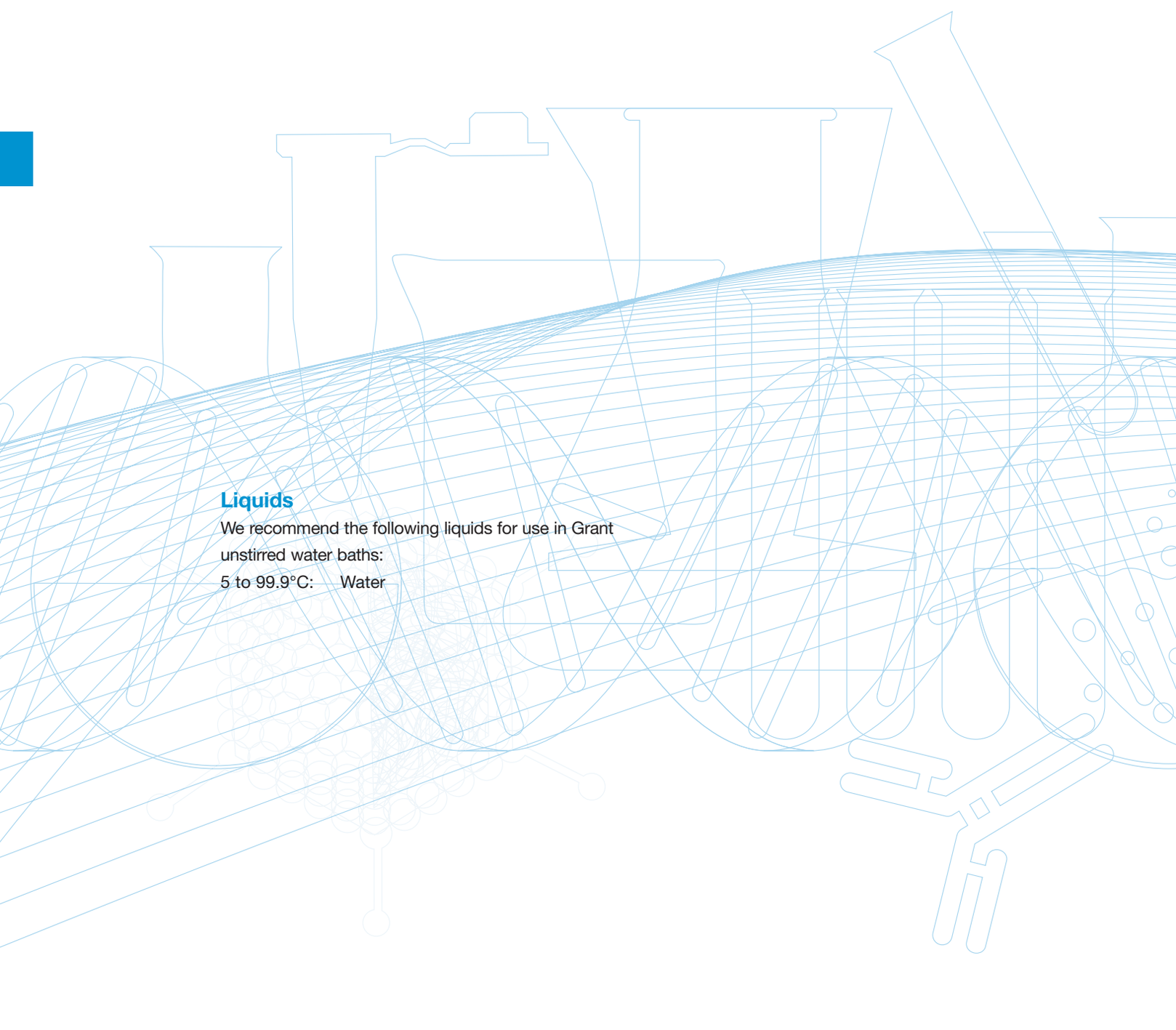
* Optima™ thermostats and accessory pumps can be powered from the back of the R1, R2 and R3 220-240 V refrigeration units. Allow up to 2 kW of extra power from the electrical supply

** The optional VTP pumps will transfer additional heat to the baths and reduce the net cooling power of the refrigeration unit. The above figures must be taken into consideration when choosing the refrigeration unit

Note: when ordering a VTP pump, please specify which refrigeration base unit it is to be used with

© Grant Instruments (Cambridge) Ltd

8 Shaking water baths



Liquids

We recommend the following liquids for use in Grant unstirred water baths:

5 to 99.9°C: Water

Shaking water baths

World-renowned shaking water baths from Grant: high precision temperature control combined with a robust, high quality, patented orbital and linear shaking mechanism that works smoothly and consistently even in demanding applications.

- **High quality, robust design with unique magnetically coupled shaking mechanism** for maximum reliability, consistency and quiet operation.
- **Flexible choice of combined orbital/linear shaking or linear-only shaking** for all techniques from optimised shaking through to everyday shaking requirements.
- **Wide range of accessories** to provide exactly the right solution for your application – from basic through to sophisticated needs, each model represents excellent value-for-money.

Combined orbital/linear shaking bath OLS200
for optimisation and flexibility of application

NEW RANGE

GLS Aqua 12 Plus and 18 Plus
for general and everyday requirements

© Grant Instruments (Cambridge) Ltd

showcase – **combined orbital/linear shaking bath**

Model OLS200 range 0 to 99°C, stability ± 0.1°C

Patented, combined orbital and linear shaking mechanism of the OLS200 allows optimisation of aeration, shear forces and degree of mixing for maximum and reproducible yields.

- **Precision digital temperature control**
- **Stability ± 0.1°C**
- **Easy changeover from linear to orbital shaking**
- **Adjustable shaking speed and stroke length**
- **0° to 99°C operating range***
- **3-year warranty**

Unique shaking mechanism allows orbital and linear shaking in one product – simply change the orientation of the shaking tray to change from one mode to the other

Powerful drive mechanism: – quiet operation; smooth consistent shaking over a wide speed range

Quality construction for years of reliable operation in the laboratory

Can be operated below ambient/ to 0°C with accessory cooling

Individual displays/controls for temperature and shaking speed

Heater and temperature sensor mounted under tank – large available working area; easy to clean/keep clean

* accessory cooling required for operation below ambient

 © Grant Instruments (Cambridge) Ltd

Linear shaking bath – GLS Aqua Plus series

Grant quality and design combined with the temperature stability and functions you need in a linear shaking bath for your laboratory. The baths now share the same stylish, modern looks associated with the Grant Aqua Plus range.

- **Ambient + 5˚C to 99˚C operation**
- **Digital PID control for quick heat-up and precision control throughout the temperature range**
- **Stability ± 0.1˚C**
- **Programmable temperature and shaking presets**
- **User-settable sample protection and fixed thermal cut-out**
- **Choice of two models – 12 and 18 litre**
- **Front panel lock-out**
- **3-year warranty**

GLS Aqua 12 Plus model shown

Stainless steel tank – high grade steel, with durable polished finish

Clean, painted steel case – maximum chemical and abrasion resistance

Robust magnetically coupled shaking mechanism – safe, reliable, durable, space saving

User-settable over-temperature sample protection – protects samples from overheating

Drain tap – allows convenient emptying

Raised feet – allows lifting whilst holding base of tank

Heater mat and sensor bonded to underside of tank – optimises temperature uniformity, workspace and is easy to clean

Two programmable temperature and shaking presets – allows commonly used temperatures and shaking speeds to be quickly selected

Front panel lock-out – disables front panel controls and prevents settings being accidentally changed

Grant non-drip polycarbonate lid, included as standard – improves performance, limits evaporation and conserves energy

Choice of three versatile trays – universal, test tube and plain tray. Tray is required, specify when ordering.

Digital PID temperature control circuitry – with sensitive PT1000 temperature control probe

Clear, wide-angle viewing LED display, with indication of heating state – 'heating-up', 'cooling down' or 'maintaining temperature'

Variable high temperature alarm setting plus convenient timer function with audible alert and shaker control

Fixed thermal cut-out protects the user if the bath is accidentally run without water, or in the very unlikely event of failure of both control systems

Countdown timer with audible buzzer – for accurate reaction timing

User-calibration – single or dual-point for optimum re-calibration of your working temperatures

© Grant Instruments (Cambridge) Ltd

Shaking water baths – summary of specifications

● = standard
x = not available

			Orbital/linear shaking bath	Linear shaking bath	
			OLS200	GLS Aqua12 Plus	GLS Aqua18 Plus
			 h: 300 mm d: 555 mm w: 325 mm	 h: 270 mm d: 390 mm w: 335 mm	 h: 270 mm d: 570 mm w: 335 mm
Minimum working volume			9 litres	5 litres	8 litres
Temperature range		°C	0 to 99*	ambient + 5 to 99	
Stability	@ 37°C	°C	± 0.1	± 0.1	
Uniformity	@ 37°C	°C	± 0.1	± 0.1	
Temperature setting/display		°C	digital/3-digit LED	digital/3-digit LED	
Temperature display resolution		°C	0.1	0.1	
Shaking speed range	orbital	rpm	20 to 200	–	
	linear	strokes/min	40 to 360**	40 to 400**	
Orbital shaking	radius	rpm	9	–	
Linear shaking	stroke length	mm	18, 28, 36	18	
Shaking speed setting/display			digital/3-digit LED	digital/3-digit LED	
Shaking speed display resolution		strokes/min	1	1	
Shaking tray area		mm	375 x 235	240 x 235	420 x 235
Flask immersion	min./max.	mm	0/90	0/60	
Overall power consumption		120V/230V kW	1.15/1.5	0.8/0.8	1.15/1.5
Supply voltage		V		120 or 230	
Safety	overtemperature/low liquid level			adjustable cut out	

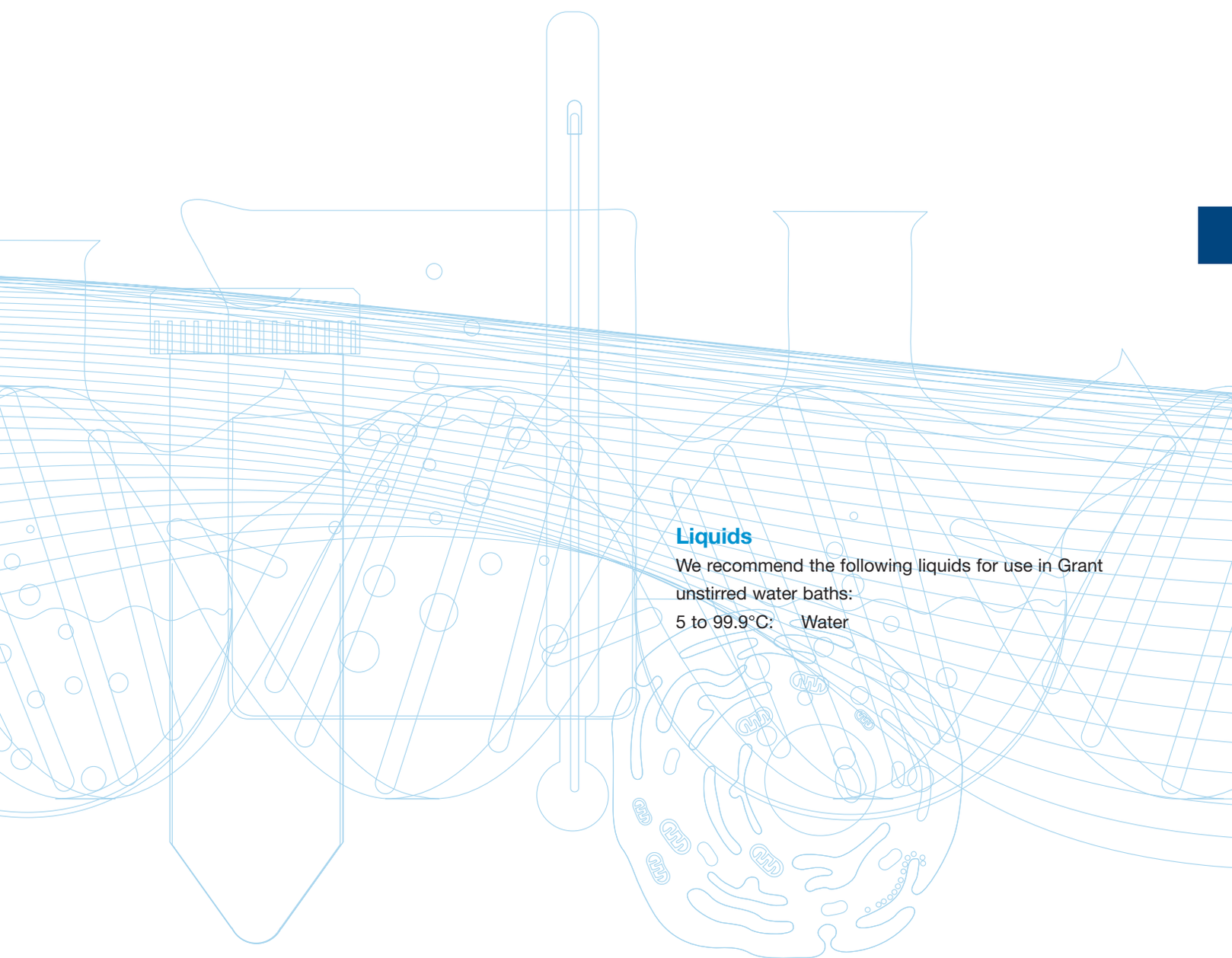
Options and accessories

		Polycarbonate lids, blue (optional)	Replacement Polycarbonate lids, blue	
		AQL26****	AQL12	AQL26
		**Stainless steel sloping lid** (optional)		
		LS200	LU14	LU28
	Designed for ultimate versatility as to the types and sizes of vessel which can be accommodated. Adjustable spring configuration for maximum flask capacity	**Universal tray – with springs**		
		UT200	UT12	UT18
	Will accommodate containers, bags and miscellaneous vessels	**Plain tray**		
		UTP	UTP12	UTP18
	Compatible with H1 Test tube racks	**Test tube tray**		
		TT200	TT12	TT18
	Choice of 7 variants to accommodate different tube diameters and microtubes	**Test tube racks**		
		H1*** (Holds up to 5 H1 racks)	H1*** (Holds up to 3 H1 racks)	H1*** (Holds up to 5 H1 racks)
		**Base trays**		
		x	SBT14	SBT28
	Accessory cooling is required for operation around or below room temperature	**Immersion cooler**		
		CS200G	x	x
Fits underneath the shaking tray and is designed to be attached to a supply of cooling tap water or a refrigerated circulator. Can be used down to 2°C above the temperature of the coolant. See page 6.9		**Heat exchange coil**		
		CW200	x	x

* accessory cooling required for operation around/below ambient temperature ** depending on load
*** H1 rack options H1-10 48 x 10 mm tubes Ø 10 mm H1-13 44 x 13 mm tubes Ø 13 mm H1-16 24 x 16 mm tubes Ø 16 mm H1-19 21 x 19 mm tubes Ø 19 mm
H1-25 12 x 25 mm tubes Ø 25 mm H1-30 10 x 30 mm tubes Ø 30 mm H1-LE 48 x 1.5 ml microtubes
**** AQL26 for OLS200 not suitable if using cooling coil/chiller

 © Grant Instruments (Cambridge) Ltd

9 Unstirred water baths



Liquids

We recommend the following liquids for use in Grant unstirred water baths:

5 to 99.9°C: Water

Unstirred water baths

The quality and reliability of Grant products have made Grant a world leading manufacturer of water baths for decades.

- **The new 'standard' for digital and analogue water baths.**
- **The world's best-selling range of water baths** – thousands sold and thousands of satisfied users.
- **Unbeatable for everyday use** – safe for your samples and safe for the user.
- **Durable and easy to use** – with Grant's legendary quality and reliability built in.
- **A complete range for all your needs** – offers the reliability, performance and value-for-money our customers have come to expect.

NEW RANGE

SUB Aqua Plus – the new digital water bath range. Wide choice of eight models, including shallow and dual models. Supplied with lid and base tray.

NEW RANGE

JB Aqua Plus – the analogue water bath range. Wide choice of seven models, including shallow and dual models. Supplied with lid and base tray.

NEW RANGE

SBB Aqua Plus boiling bath range – choice of four models. Supplied with polycarbonate lid and stainless steel base tray.

Transparent unstirred bath PB1 – one model with transparent 3.5 L polycarbonate tank and analogue control.

 © Grant Instruments (Cambridge) Ltd

The water bath 'standard' – SUB Aqua Plus

High quality and excellent temperature stability, in a value-for-money package designed to meet the needs of the world's researchers. The SUB Aqua Plus range has raised the standard with new usability features across the eight model range.

- **Ambient + 5°C to 99°C operation**
- **Digital PID control for quick heat-up and precision control throughout the temperature range**
- **Stability ± 0.2°C**
- **User-settable sample protection and fixed thermal cut-out**
- **Three programmable temperature presets**
- **Drain tap included on SUB Aqua 12 Plus, 18 Plus, 26 Plus and 34 Plus**
- **Front panel lock-out**
- **3-year warranty**

SUB Aqua 12 Plus model shown

Stainless steel tank – high grade steel, with durable polished finish

Clean, painted steel case – maximum chemical and abrasion resistance

Grant polycarbonate perforated base tray included – promotes heat convection and optimal temperature uniformity and allows any container to be placed directly in the bath

User-settable over-temperature sample protection – protects samples from overheating

Drain tap – allows convenient emptying on 12, 18, 26, 34 L baths

Raised feet – allows lifting whilst holding base of tank

Heater mat and sensor bonded to underside of tank – optimises temperature uniformity, workspace and is easy to clean

Three programmable temperature presets – allows commonly used temperatures to be quickly selected

User-calibration – single or dual-point for optimum re-calibration of your working temperatures

Grant non-drip polycarbonate lid, included as standard – improves performance, limits evaporation and conserves energy

Clear, wide-angle viewing LED display, with indication of heating state – 'heating-up', 'cooling down' or 'maintaining temperature'

Digital PID temperature control circuitry – with sensitive PT1000 temperature control probe

Simple and intuitive, programming – immediate temperature re-setting from + / - buttons

Fixed thermal cut-out protects the user if the bath is accidentally run without water, or in the very unlikely event of failure of both control systems

Countdown timer with audible buzzer – for accurate reaction timing

Front panel lock-out – disables front panel controls and prevents settings being accidentally changed

© Grant Instruments (Cambridge) Ltd

showcase – small volume, shallow digital water bath

SUB Aqua 2s Plus 2 litres, a life science 'microtube' water bath

The **SUB Aqua 2s Plus** is ideal when small tubes or vessels need to be maintained at a specific temperature and a limited water bath volume is sufficient. Energy is conserved, heating only the water needed and access to tubes is easy. The Grant polycarbonate lid ensures water lost to evaporation is minimised and any condensation does not drip back onto samples in the bath.

- **A microtube water bath – ideal for life science applications**
- **High surface to volume ratio – conserves energy by heating only as much water as is needed**
- **It is easy to see the tubes at all times**
- **Space saving – compact size is ideal for laboratories where space is at a premium**
- **Low height – ideal for use in fume cupboards**

Grant non-drip polycarbonate lid, included as standard – improves performance, limits evaporation and conserves energy

Clear, wide-angle viewing LED display, with indication of heating state – 'heating-up', 'cooling down' or 'maintaining temperature'

Three programmable temperature presets – allows commonly used temperatures to be quickly selected

Fixed thermal cut-out – protects the user if the bath is accidentally run without water, or in the very unlikely event of failure of both control systems

Countdown timer with audible buzzer – for accurate reaction timing

Front panel lock-out – disables front panel controls and prevents settings being accidentally changed

 © Grant Instruments (Cambridge) Ltd

showcase – dual, digital water bath

SUB Aqua Dual Plus 5 and 12 litres

When two temperatures are needed and space and value-for-money are primary concerns – the **SUB Aqua Dual Plus** is the answer. Popular 5 and 12 litre bath volumes are compatible with routine procedures and the bench space occupied is limited. Separate polycarbonate lids allow independent access to the baths and the use of two thermometers, if needed.

- **Excellent value-for-money – lower cost than two individual baths**
- **Dual controls – simple, separate set-ups and temperature displays for complete clarity**
- **Optimum use of space**
- **Dual lids provide separate access and reduce evaporation**
- **Single power lead**

Clear, wide-angle viewing LED display, with indication of heating state – 'heating-up', 'cooling down' or 'maintaining temperature'

Three programmable temperature presets – allows commonly used temperatures to be quickly selected

Fixed thermal cut-out – protects the user if the bath is accidentally run without water, or in the very unlikely event of failure of both control systems

Heater mat and sensor bonded to underside of tank – optimises temperature uniformity, workspace and is easy to clean

Front panel lock-out – disables front panel controls and prevents settings being accidentally changed

Countdown timer with audible buzzer – for accurate reaction timing

© Grant Instruments (Cambridge) Ltd

The economical, quality water bath – JB Aqua Plus

Quality meets value-for-money! The JB Aqua Plus range offers the simplicity of an analogue bath, with the quality and reliability expected in a Grant water bath. Blue transparent polycarbonate lid and polycarbonate base tray are included as standard to improve performance and limit energy wastage. The range consists of seven models including shallow and dual bath options.

- **Ambient + 5°C to 98°C**
- **User-settable sample protection and fixed thermal cut-out**
- **Polycarbonate lid and base tray – improve performance and reduce evaporation/energy loss**
- **Drain tap included on JB Aqua 12 Plus, 18 Plus and 26 Plus**
- **3-year warranty**

JB Aqua 18 Plus model shown

Stainless steel tank – high grade steel, with durable polished finish

Clean, painted steel case – maximum chemical and abrasion resistance

User-settable over temperature cut-out – when sample has critical maximum temperature

Fixed thermal cut-out – protects the user if the bath is accidentally run without water or in the very unlikely event of failure of both control systems

Drain tap – allows convenient emptying on 12, 18 and 26 L baths

Raised feet – allows lifting whilst holding base of tank

Grant non-drip polycarbonate lid, included as standard – improves performance, limits evaporation and conserves energy

Simple dial temperature setting – quick visual indication of temperature and ability to re-set dial position

Grant polycarbonate perforated base tray (included as standard) – promotes heat convection and optimal temperature uniformity, also allows any container to be placed directly in the bath

Heater mat and sensor bonded to underside of tank – optimises temperature uniformity and workspace

Removable knob – enables calibration

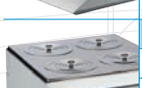
 © Grant Instruments (Cambridge) Ltd

SUB Aqua Plus unstirred water baths range – summary of specifications

ambient + 5 to 99°C

	'Standard' unstirred baths – SUB Aqua Plus							
	SUB Aqua 2 Plus	SUB Aqua 2s Plus	SUB Aqua 5 Plus	SUB Aqua 12 Plus	SUB Aqua 18 Plus	SUB Aqua 26 Plus	SUB Aqua 34 Plus	SUB Aqua Dual Plus
	 h: 215 mm d: 200 mm w: 190 mm	 h: 150 mm d: 210 mm w: 335 mm	 h: 270 mm d: 215 mm w: 335 mm	 h: 270 mm d: 390 mm w: 335 mm	 h: 270 mm d: 570 mm w: 335 mm	 h: 270 mm d: 570 mm w: 335 mm	 h: 270 mm d: 750 mm w: 340 mm	 h: 225 mm d: 360 mm w: 540 mm
Tank capacity	2 litres	2 litres	5 litres	12 litres	18 litres	26 litres	34 litres	5 & 12 litres
Temperature range °C	ambient + 5 to 99							
Temperature setting range °C	10 to 99 in 0.1 steps							
Stability (DIN 12876**) @ 37°C °C	±0.2							
Temperature setting/energy regulation	digital							
Temperature display	3 digit bright, wide-angle view LED							
Working volume l/w/d mm	125/140/115	145/290/30	145/290/115	315/290/115	495/290/115	495/290/165	630/290/160	145/290/115+ 315/290/115
Drain tap included	–	–	–	●	●	●	●	–
Power consumption 120V kW	0.13	0.375	0.375	0.77	1.2	1.2	1.4	1.2
230V kW	0.13	0.375	0.375	0.77	1.5	1.5	2.1	1.2
Supply voltage V	120 or 230							
Sample protection	adjustable cut-out							

Options and accessories

	 SUB Aqua 2 Plus	 SUB Aqua 2s Plus	 SUB Aqua 5 Plus	 SUB Aqua 12 Plus	 SUB Aqua 18 Plus	 SUB Aqua 26 Plus	 SUB Aqua 34 Plus	 SUB Aqua Dual Plus
	2 L	2 L	5 L	12 L	18 L	26 L	34 L	5 L and 12 L
 **Replacement polycarbonate transparent lids, blue**	**AQL2**	**AQL5**	**AQL5**	**AQL12**	**AQL26**	**AQL26**	–	**AQL5, AQL12**
Directs condensation away from immersed vessels, avoids contamination, reduces evaporation and saves energy								
 **Stainless steel sloping lids**	–	**LU6**	**LU6**	**LU14**	**LU28**	**LU28**	**LU36**	**LU6 & LU14**
 **Flat lids***	–	–	**LF6** (2 ring sets)	**LF14** (4 ring sets)	**LF28** (6 ring sets)	**LF28** (6 ring sets)	**LF36** (8 ring sets)	**LF6 / LF14**
With ring sets of variable hole diameter to accommodate tall vessels whilst reducing evaporation								
 **Polypropylene spheres*** (packs per bath)	1 x **PS20**	1 x **PS20**	1 x **PS20**	1 x **PS20**	2 x **PS20**	2 x **PS20**	3 x **PS20**	2 x **PS20**
Useful alternative to a lid, minimises evaporation and heat loss whilst allowing easy access to vessels in the bath; particularly useful for tall vessels								
 **Raised shelves** – reversible, allows two shelf depths. h = shelf height above tank base (mm)	–	–	–	**RS14H** (h 40 or 78) shelf covers half area of SUB Aqua 12 Plus	**RS18H** (h 40 or 135) shelf covers half area of SUB Aqua 18 Plus	**RS28H** (h 45 or 135) shelf covers half area of SUB Aqua 26 Plus	**RS36H** (h 45 or 135) shelf covers half area of SUB Aqua 34 Plus	**RS14H** (h 40 or 78) shelf covers half area of SUB Aqua Plus dual 12 tank
 **Racks** (no. per bath)			1 x **J2**	2 x **J2**	4 x **J2**	4 x **J2**	6 x **J2**	1 + 2 x **J2**
Choice of 8 variants to accommodate different tube diameters and microtubes (see page 9.10)								
 **Replacement base trays**	**AQBT2**	**AQBT5**	**AQBT5**	**AQBT12**	**AQBT26**	**AQBT26**	**SBT36**	**AQBT5 & AQBT12**
Required if flat-bottomed flasks are to be placed directly on the base of the bath and to promote thermal convection in the bath								

* lid or spheres must be used above 60°C **figures determined according to DIN 12876

© Grant Instruments (Cambridge) Ltd

JB Aqua Plus unstirred water baths range – summary of specifications

ambient + 5 to 98°C

	Analogue unstirred baths – JB Aqua Plus						
	JB Aqua 2 Plus	JB Aqua 2s Plus	JB Aqua 5 Plus	JB Aqua 12 Plus	JB Aqua 18 Plus	JB Aqua 26 Plus	JB Aqua Dual Plus
	 h: 215 mm d: 200 mm w: 190 mm	 h: 150 mm d: 210 mm w: 335 mm	 h: 270 mm d: 215 mm w: 335 mm	 h: 270 mm d: 390 mm w: 335 mm	 h: 270 mm d: 570 mm w: 335 mm	 h: 270 mm d: 570 mm w: 335 mm	 h: 225 mm d: 360 mm w: 540 mm
Tank capacity	2 litres	2 litres	5 litres	12 litres	18 litres	26 litres	5 & 12 litres
Temperature range °C	ambient + 5 to 98						
Temperature setting range °C	10 to 98 in 2.0 steps						
Stability (DIN 12876**) @ 37°C °C	±1.0						
Temperature setting/energy regulation	Analogue						
Working volume l/w/d mm	125/140/115	145/290/30	145/290/115	315/290/115	495/290/115	495/290/165	145/290/115+ 315/290/115
Drain tap included	–	–	–	●	●	●	–
Power consumption 120 V kW	0.13	0.375	0.375	0.77	1.2	1.2	1.2
230 V kW	0.13	0.375	0.375	0.77	1.5	1.5	1.2
Supply voltage V	120 or 230						
Sample protection	adjustable cut-out						
CSA approved	yes						

Options and accessories

	 JB Aqua 2 Plus	 JB Aqua 2s Plus	 JB Aqua 5 Plus	 JB Aqua 12 Plus	 JB Aqua 18 Plus	 JB Aqua 26 Plus	 JB Aqua Dual Plus
	2 L	2 L	5 L	12 L	18 L	26 L	5 L and 12 L
 **Replacement polycarbonate lids, blue**	**AQL2**	**AQL5**	**AQL5**	**AQL12**	**AQL26**	**AQL26**	**AQL5, AQL12**
Directs condensation away from immersed vessels, avoids contamination, reduces evaporation and saves energy							
 **Stainless steel sloping lids**	–	**LU6**	**LU6**	**LU14**	**LU28**	**LU28**	**LU6 & LU14**
 **Flat lids***	–	–	**LF6** (2 ring sets)	**LF14** (4 ring sets)	**LF28** (6 ring sets)	**LF28** (6 ring sets)	**LF6 / LF14**
With ring sets of variable hole diameter to accommodate tall vessels whilst reducing evaporation							
 **Polypropylene spheres*** (packs per bath)	1 x **PS20**	1 x **PS20**	1 x **PS20**	1 x **PS20**	2 x **PS20**	2 x **PS20**	2 x **PS20**
Useful alternative to a lid, minimises evaporation and heat loss whilst allowing easy access to vessels in the bath; particularly useful for tall vessels							
 **Raised shelves** – reversible, allows two shelf depths. h = shelf height above tank base (mm)	–	–	–	**RS14H** (h 40 or 78) shelf covers half area of JB Aqua 12 Plus	**RS18H** (h 40 or 135) shelf covers half area of JB Aqua 18 Plus	**RS28H** (h 45 or 135) shelf covers half area of JB Aqua 26 Plus	**RS14H** (h 40 or 78) shelf covers half area of JB Aqua dual 12 Plus
 **Racks** (no. per bath)			1 x **J2**	2 x **J2**	4 x **J2**	4 x **J2**	1 + 2 x **J2**
Choice of 8 variants to accommodate different tube diameters and microtubes (see page 9.10)							
 **Replacement base trays**	**AQBT2**	**AQBT5**	**AQBT5**	**AQBT12**	**AQBT26**	**AQBT26**	**AQBT5 & AQBT12**
Required if flat-bottomed flasks are to be placed directly on the base of the bath and to promote thermal convection in the bath							

* lid or spheres must be used above 60°C ** figures determined according to DIN 12876

 © Grant Instruments (Cambridge) Ltd

Boiling baths – SBB Aqua Plus series

The SBB Aqua Plus boiling baths are robust and reliable and provide continuous 100°C operation. The range consists of four models to suit a range of applications and any budget.

- **Adjustable energy regulator provides steady boiling**
- **Constant level device maintains liquid level**
- **Robust and reliable design to withstand everyday wear and tear**
- **Choice of sizes to suit individual applications**
- **Grant non-drip polycarbonate lid included as standard**
- **3-year warranty**

SBB Aqua 12 Plus model shown

Grant non-drip polycarbonate lid included – improves performance, limits evaporation and conserves energy

Large available working area in relation to footprint

Stainless steel tank in a robust outer case – tough and durable in demanding environments

Adjustable energy regulator provides steady boiling

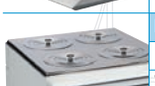
Range of tank sizes and options to suit different requirements

Constant level device maintains the required liquid level for optimal operation

Two over-temperature cut-outs protect users and the workplace if bath is accidentally run without liquid

Supplied with perforated tray to ensure uniform heat distribution

Options and accessories

	 SBB Aqua 5 Plus	 SBB Aqua 12 Plus	 SBB Aqua 18 Plus	 SBB Aqua 26 Plus
	**Replacement polycarbonate lids, blue**			
	AQL5	**AQL12**	**AQL18**	**AQL26**
	Directs condensation away from immersed vessels, avoids contamination, reduces evaporation and saves energy			
	**Stainless steel sloping lids**			
	LU6	**LU14**	**LU28**	**LU28**
	**Flat lids**			
	LF6 (2 ring sets)	**LF14** (4 ring sets)	**LF28** (6 rings sets)	**LF28** (6 rings sets)
	With ring sets of variable hole diameter to accommodate tall vessels whilst reducing evaporation			
	**Polypropylene spheres*** (packs per bath)			
	1 x **PS20**	1 x **PS20**	2 x **PS20**	2 x **PS20**
	Useful alternative to a lid, minimises evaporation and heat loss whilst allowing easy access to vessels in the bath; particularly useful for tall vessels			
	**Raised shelves** – reversible, allows two shelf depths. h = shelf height above tank base (mm)			
	–	**RS14H** (h 40 or 78) shelf covers half area of SBB Aqua 12 Plus	**RS18H** (h 40 or 135) shelf covers half area of SBB Aqua 18 Plus	**RS28H** (h 45 or 135) shelf covers half area of SBB Aqua 26 Plus
	**Racks** (no. per bath)			
	1 x **J2**	2 x **J2**	4 x **J2**	4 x **J2**
	Choice of 8 variants to accommodate different tube diameters and microtubes (see page 9.10)			
	**Replacement base trays**			
	SBT6	**SBT14**	**SBT28**	**SBT28**
	Required if flat-bottomed flasks are to be placed directly on the base of the bath and to promote thermal convection in the bath			

© Grant Instruments (Cambridge) Ltd

Transparent unstirred water baths – PB1

Ideal for educational purposes, routine laboratory purposes, procedures requiring visibility of reactions inside the vessels and as a ‘personal’ water bath for scientists needing only a small working area with a compact footprint.

- **20 to 60ºC operation**
- **Stability ± 0.3ºC**
- **Simple to use analogue control**

Optional gabled lid (LP1) to prevent evaporation of liquid* and avoid contamination of samples

Clear polycarbonate tank for easy visibility of reactions within the vessels

Perforated tray to mix the liquid by convection and enhance the performance

Removable control unit with simple to use analogue temperature setting dial

Choice of racks to accommodate tubes with 13, 16 and 19 mm diameter

* evaporation can also be minimised by using polypropylene spheres (1 x PS20)

 © Grant Instruments (Cambridge) Ltd

Unstirred water baths – summary of specifications

ambient + 5 to 60°C
100°C

			Boiling baths – SBB Aqua Plus series			
			SBB Aqua 5 Plus	SBB Aqua 12 Plus	SBB Aqua 18 Plus	SBB Aqua 26 Plus
			 h: 270 mm d: 215 mm w: 385 mm	 h: 270 mm d: 390 mm w: 385 mm	 h: 270 mm d: 570 mm w: 385 mm	 h: 300 mm d: 570 mm w: 385 mm
Tank capacity			5 litres	12 litres	18 litres	26 litres
Temperature range		°C	100 only			
Temperature setting/energy regulation			analogue			
Working volume	l/w/d	mm	145/290/105	315/290/105	495/290/105	495/290/155
Heater power/overall consumption,		120 V / 230 V	1.3/1.5 kW	1.35/1.5 kW	1.35/2.0 kW	1.35/2.0 kW
Supply voltage		V	120 or 230			
Safety		temperature	two fixed cut-outs			

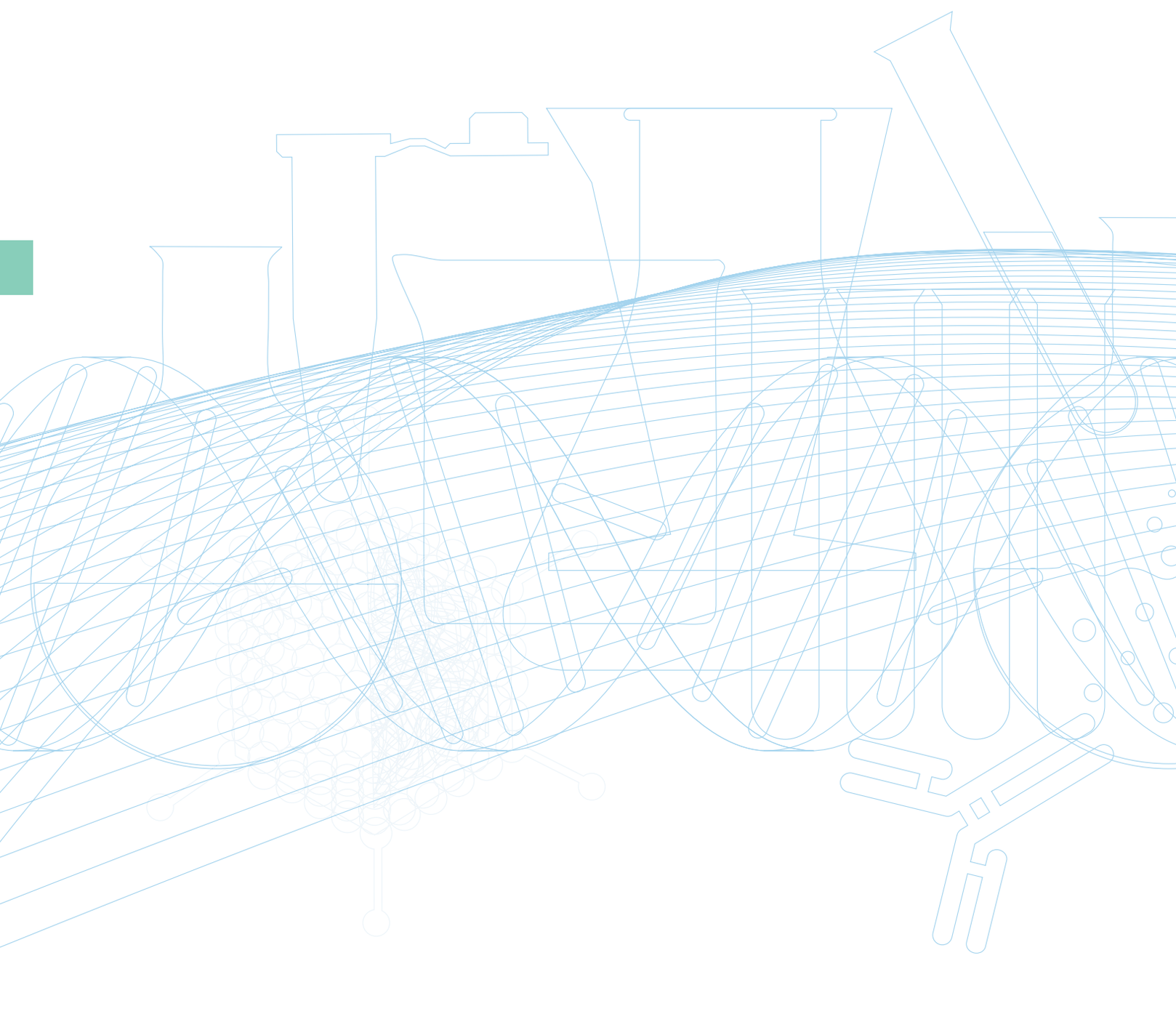
			Transparent unstirred bath
			PB1
			 h: 130 mm d: 160 mm w: 355 mm
Tank capacity			3.5 litres
Temperature range		°C	ambient + 5 to 60
Temperature setting range		°C	10 to 60
Stability (DIN 58966)		°C	@ 37°C ± 0.3
Temperature setting/energy regulation			analogue
Temperature display			–
Working volume	l/w/d	mm	225/120/80
Heater power/overall consumption,		120 V / 230 V	0.3 kW
Supply voltage		V	120 or 230
Safety		temperature	fixed cut-out

Unstirred Bath Racks

J2 Racks	Tube size Ø	Capacity	P1 Racks	Tube size Ø	Capacity
J2-10	10 mm	84	P1-13	13 mm	12
J2-13	13 mm	55	P1-16	16 mm	10
J2-16	16 mm	36	P1-19	19 mm	9
J2-19	19 mm	32			
J2-25	25 mm	18			
J2-30	30 mm	12			
J2-SE	0.5 ml	105			
J2-LE	1.5 ml	65			

© Grant Instruments (Cambridge) Ltd

10 Ultrasonic baths



Ultrasonic baths

The XUBA and XUB series of reliable, high-performance ultrasonic baths offer fast, safe and cost-effective consistent ultrasonics for various scientific and laboratory applications.

- Unique transducer technology provides outstanding performance and reliability.
- Gentle yet effective cleaning ensuring consistent results for rapid and complete removal of contaminants.
- Ultrasonic baths suitable for sophisticated applications in the scientific sector such as degassing, sonochemistry and fluid dissolution.
- Clean finish, high-quality and robust design for long-term reliability and durability.
- A choice of five digital and two analogue models.

The XUB and XUBA range of baths are ideal for cleaning of a wide range of laboratory instruments as well as in other healthcare, medical and industrial applications. The ultrasonic activity generated in the baths allows rapid and effective cleaning and processing of a wide range of instruments and components – a safer alternative to manual operations.

© Grant Instruments (Cambridge) Ltd

XUB Digital Ultrasonic Baths

XUB range of digitally controlled benchtop ultrasonic baths offer consistent and reliable performance in a variety of environments such as laboratory, scientific and healthcare. Incorporating Frequency LEAP technology to ensure uniform levels of ultrasonic activity throughout the fluid, these baths offer vastly improved performance giving a more accurate and precise ultrasonic process.

- **Frequency LEAP technology provides more homogeneous ultrasonic activity throughout the tank, reducing dead spots and standing waves**
- **Heated ambient + 5˚C to 70˚C**
- **SD card slot for digital validation allows the results of each cycle to be easily recorded and analysed**
- **LCD Display, menu driven control panel**
- **Accurate process control of time, temperature, ultrasonic activity, degas and power**
- **Modern, sleek design with stainless steel basket, ABS plastic lid and drain tap included as standard**
- **A choice of 5 sizes**

Example: **XUB12**

Stainless steel basket designed specifically to generate maximum ultrasonic activity, prevent items resting on the tank and prevent operators coming into contact with chemical solutions

Stainless steel basket, ergonomic lid, SD card and one bottle of M2 Ultrasonic solution included as standard

SD port allows easy validation tracking between XUB series and PC

Improved software memory logs cleaning parameters allowing easy cycle repeatability

Easy traceability of cycle number, time, temperature and sonics validation

Lid and basket forms a drip collection unit, minimising flow of contaminated liquid once cycle is finished

Ergonomic lid reduces noise volume and minimises potential of aerosol escape

Easy to use single touch LCD control panel with user-settable parameters to suit the individual requirements

Intelligent software remembers last cycle cleaning setting

Accurate fluid level sensors to ensure bath is not under-filled prior to or during the cycle

Drain valve for convenient emptying – located at the rear of the unit

 © Grant Instruments (Cambridge) Ltd

XUBA Analogue Ultrasonic Baths

Compact analogue controlled range of ultrasonic baths, providing a high standard of reliable and effective ultrasonic technology. Suitable for use in a wide range of applications from healthcare to laboratories, the choice of two baths come in a great value-for-money package, with stainless steel basket and ABS plastic lid included as standard.

- **Excellent entry level ultrasonic bath**
- **Fast, effective, efficient, easy and safe cleaning and processing of diverse instruments, components and solutions**
- **Supplied with stainless steel basket and ABS plastic lid as standard**
- **One bottle of M2 Ultrasonic solution included as standard**
- **Robust design offers outstanding durability and reliability**
- **Easy to operate control panel dials even when wearing gloves**
- **Time control from 0-15 minutes on both baths**
- **Ambient + 5˚C to 70˚C heating on the XUBA3**

Example: **XUBA3**

Ergonomic lid reduces noise volume and minimises potential of aerosol escape

Stainless steel basket, ABS plastic lid and one bottle of M2 solution included as standard

Simple dial analogue controls for accurate setting of cycle time and temperature (temperature control on XUBA3 only, XUBA1 unheated)

Stainless steel basket and ABS plastic lid forms a drip collection unit to collect excess liquid when the basket is removed from tank

Stainless steel basket designed specifically to generate maximum ultrasonic activity, prevent items resting on the tank and prevent operators coming into contact with chemical solutions

Heating function (XUBA3 only) to deliver reduced processing times

© Grant Instruments (Cambridge) Ltd

XUB and XUBA ultrasonic water baths range – models and specifications

Ambient +5 to 70ºC

● = standard

		Digital					Analogue	
		XUB5	XUB10	XUB12	XUB18	XUB25	XUBA1	XUBA3
		 h: 267 mm d: 200 mm w: 345 mm	 h: 267 mm d: 183 mm w: 550 mm	 h: 366 mm d: 288 mm w: 345 mm	 h: 366 mm d: 347 mm w: 374 mm	 h: 366 mm d: 347 mm w: 551 mm	 h: 190 mm d: 160 mm w: 180 mm	 h: 210 mm d: 170 mm w: 270 mm
Working capacity	L	4.5	9.5	12.5	17.5	25	1.5	2.5
Max capacity	L	5	10.5	14	18.5	28	1.75	2.75
Ultrasonic Power	W	100	200	200	300	400	35	35
	per Litre/W	22.2	21	16	17	16	23.3	14
Operating frequency	KHz	32-38					44	44
Frequency LEAP		●	●	●	●	●	–	–
Heated		●	●	●	●	●	–	●
Digital LCD controls		●	●	●	●	●	–	–
SD port with SD card		●	●	●	●	●	–	–
Maximum heating capacity	ºC	ambient + 5 to 70					N/A	ambient + 5 to 70
Heater power	W	150	250	250	450	500	N/A	150
Timer	mins	0-99					0-15	0-15
Drain outlet BSP valve		3/8"	1/2"				N/A	N/A
Supply voltage	V	230						

Options and accessories

Replacement ABS lid

Reduce operating noise and potential escape of aerosols (supplied as standard with the baths)

XAL5	XAL10	XAL12	XAL18	XAL25	XAL1	XAL3

Replacement baskets

Support the items to be processed and work with the lid as a drip collection unit (supplied as standard with the baths)

XAB5	XAB10	XAB12	XAB18	XAB25	XAB1	XAB3
273 x 125 x 90	460 x 110 x 90	265 x 215 x 140	285 x 260 x 140	470 x 270 x 140	120 x 96 x 55	220 x 125 x 40

Internal basket dimensions w/d/h mm

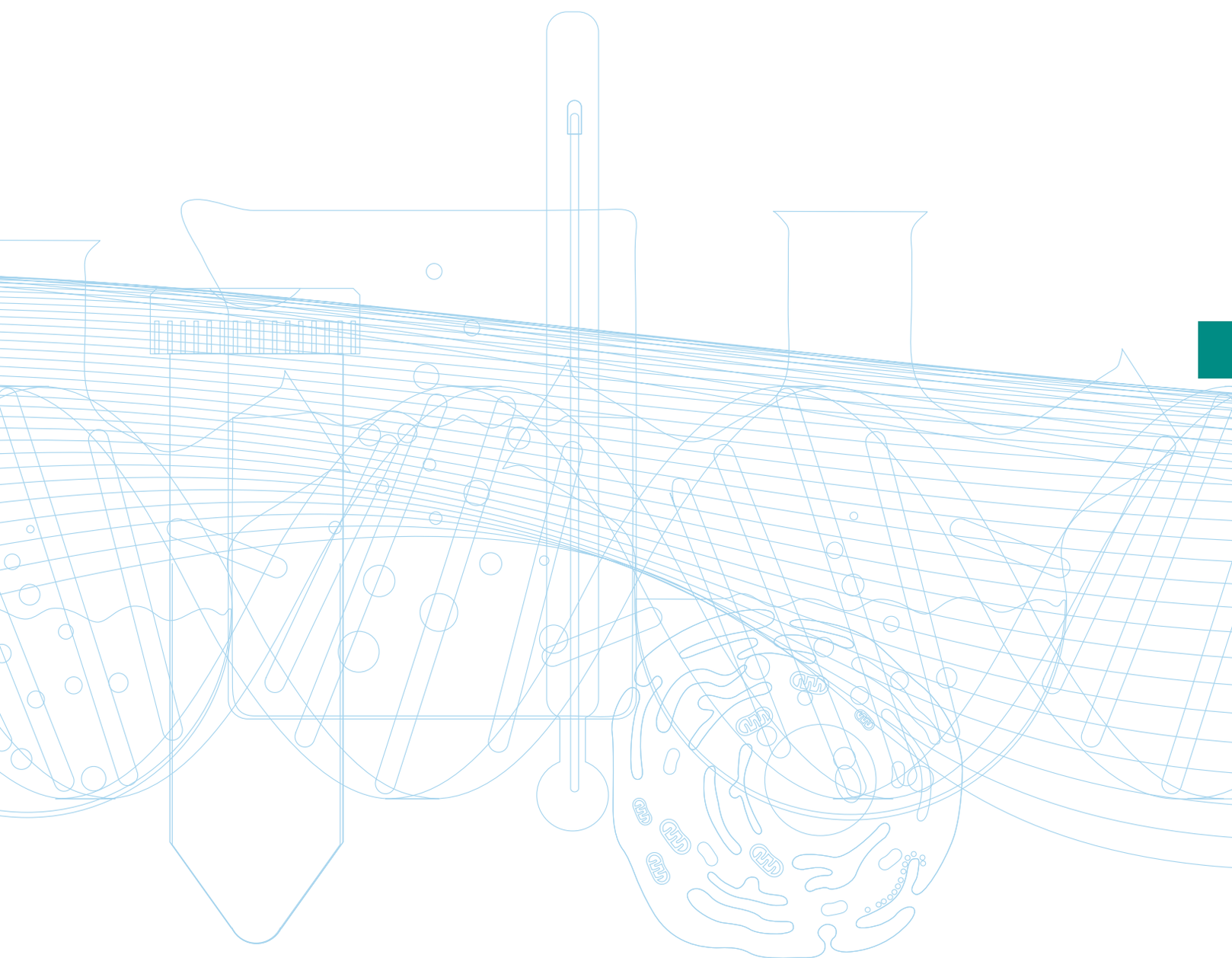
Ultrasonic solution

General purpose detergent for use with ultrasonic baths. Pack of 6 x 1L bottles

M2 Sol	M2 Sol	M2 Sol	M2 Sol	M2 Sol	M2 Sol	M2 Sol

 © Grant Instruments (Cambridge) Ltd

11 Microplate apparatus and equipment



Microplate apparatus and equipment

A focused range of compact and efficient equipment for the heating, mixing and replicating of microplates in biotechnology, biomedical, biochemical and other life science laboratories.

- **Microplate shakers**
- **Microplate thermoshakers**
- **Dry block heaters for microplates, strips and tubes**
- **Microplate replicators**

PHMP

PHMP- 4

PMS-1000

QBA2

* please discuss requirements for other temperature ranges with Grant

 © Grant Instruments (Cambridge) Ltd

(see also p. 13.4)

PMS–1000 microplate shaker

Compact and efficient variable speed, horizontal shaker for reliable, regulated shaking of two or four microplates.

- **Variable shaking speed: 150 to 1000 rpm**
- **Quick and easy screw fitting of any standard-depth multiwell plates**
- **Continuous or timed operation, with automatic switch off**
- **Holds two or four microplates**
- **Operating temperature ambient +5 to + 40°C**

PMS-1000 fitted with platform for two microplates

Platform for two microtitre plates supplied as standard. Platform for four plates (MPP-4) available as an option

Quick and easy to use screw fittings – keep the plates securely in position and allow fitting of any standard-depth well plates

Simple graduated dial to adjust the speed to suit the application: – gentle shaking to ensure that the well contents remain *in situ*, or more vigorous agitation for effective aeration across the surface area of each well

Easy-to-use integral electronic timer ensures accurate count-down and repeatability of time-sensitive incubations

Easy to read LED display clearly indicates time remaining on timed operations

Low voltage cord easily fits through incubator door gaskets

Suitable for mixing, incubation and cultivation of biological and chemical components in many life science disciplines including microbiology, cell and molecular biology, immunology and biotechnology. Specific applications include: immunoassays, coloration tests, binding of template DNA to silica-coated magnetic beads. PMS-1000 avoids low signal caused by inadequate re-suspension of purified PCR products, helps ensure the correct optical density in each of the wells and helps achieve maximum yield and quality in production of plasmid DNA.

© Grant Instruments (Cambridge) Ltd

(see also p. 3.3)

Thermoshakers PHMP and PHMP–4 for microplates

Highly versatile and efficient variable-speed, bi-directional heating microplate thermoshakers for use with all types of standard depth 96 and 384 well microplates. Combine three instruments in one for maximum versatility and efficiency:

- a microplate thermoshaker
- a compact benchtop incubator without shaking
- a microplate shaker without temperature control

- **Stability ± 0.1°C, uniformity ± 0.2°C**
- **Bi-directional heating – both platform and lid heat the plate producing a controlled microenvironment**
- **Shaking speed: 250 to 1200 rpm**
- **Temperature range: ambient + 5 to 60°C***
- **Rapid heat-up**
- **Continuous or timed operation, with alarm buzzer and automatic switch-off facility**
- **Choice of two models with capacity for two or four microplates**

The **PHMP-4** has the same functionality as the PHMP but can accommodate four microplates

PHMP thermoshaker for two microplates

The heated lid completely covers the flat heating platform to provide bi-directional heating and excellent temperature stability and uniformity, whilst preventing condensation

Combination of bi-directional heating and powerful orbital shaking capability produces the maximum yield from incubations

Very easy to operate, with simple set-up of temperature, shaking speed and time via push buttons and the 2-line LCD status display

The powerful, reliable motor and sturdy construction combine to provide years of consistent operation

Low voltage cord easily fits through incubator door gaskets

Suitable for applications in many fields including: molecular biology (for microbial cell cultivation and DNA analysis), cytochemistry (for *in situ* reactions), biochemistry (for enzyme and protein analysis), molecular chemistry (for matrix analysis), immunochemistry, molecular diagnostics and ELISAs.

* please discuss requirements for other temperature ranges with Grant

 © Grant Instruments (Cambridge) Ltd

(see also p. 1.3)

Dry block heaters for microplates, strips and tubes

Versatile dry block heating system with interchangeable microplate blocks for heating applications in molecular biology and biotechnology.

- **QBD2 digital controller**, temperature range ambient + 5 to 130°C
- **QBH2 programmable digital controller**, temperature range ambient + 5 to 200°C
- **QBA2 analogue controller**, temperature range ambient + 5 to 100°C

plus either

- **QDP-H block** for 0.2 ml microplates, strips or individual tubes **or**
- **QDP-FL universal undrilled block** with integral lid for standard/high temperature 96 well microtitre plates

- **Excellent stability and uniformity**
- **Rapid heat-up time**
- **Choice of easily removable/interchangeable microplate blocks for different applications***
- **Choice of one analogue and two digital control units with different temperature ranges**

Versatile **QDP-H block** accommodates 0.2 ml microplates, strips or tubes:
- 1 x 96-well microplate or
- 12 x 8-well strip or
- 8 x 12-well strip or
- up to 96 individual capped tubes

Excellent ± 0.3°C temperature uniformity between tubes across the block

Digital models come with a convenient timer facility, with audible buzzer, for reaction timing and function timing such as delayed start

Simple-to-use rotor plus two keys provide access to the interactive interface for fast, accurate set-up and use of the many standard features

QDP-FL undrilled block – of black anodised aluminium for efficient heat transfer – comes complete with a double layer hinged lid to create an insulated incubation chamber with very good uniformity: **± 0.5°C** between wells

Simple dial for selecting temperature on analogue models

High quality, robust construction in streamlined coolwall aluminium and chemical-resistant plastic – durable in everyday use and in demanding environments

Digital model QBD2 fitted here with **QDP-H** block for 0.2 ml microplates, strips or tubes. The QBD2 has a temperature range of ambient + 5 to 130°C, while similar model QBH2 offers a range up to 200°C plus three programmable time/temperature segments

Analogue model QBA2 fitted here with universal **QDP-FL** block for standard 96 well microtitre plates.
Temperature range ambient + 5 to 100°C

* see summary table on p. 11.6 for overview of options and accessories

© Grant Instruments (Cambridge) Ltd

Microplate shakers and thermoshakers – models and specifications

	Microplate shaker	2-plate thermoshaker	4-plate thermoshaker
	PMS-1000	PHMP	PHMP-4
	 h: 90 mm d: 185 mm w: 175 mm	 h: 125 mm d: 250 mm w: 265 mm	 h: 140 mm d: 390 mm w: 380 mm
Temperature range °C	–	ambient + 5 to 60	ambient + 5 to 60
Stability °C	–	± 0.1	
Uniformity °C	–	± 0.2	
Display	4 digit LED	2 line 16 character LCD	
Heat up time room temperature to 37°C mins	–	15 to 20	15 to 20
Capacity microplates	2 or 4	2	4
Shaking speed rpm	150 to 1000	250 to 1200	250 to 1200
Orbit mm	2		
Timer, with automatic switch-off	1 min to 24 hours	–	–
Timer, with automatic switch-off and alerting buzzer	–	1 min to 96 hours	
Ambient temperature range °C	4 to 40		
Input voltage V dc	12		
Input current A	0.5	5	
External power supply	12 V, 500 mA	12 V AC/DC, 4.16 A	12 V AC/DC, 4.16 A

 © Grant Instruments (Cambridge) Ltd

Dry block heaters for microplates – range of models, options and accessories

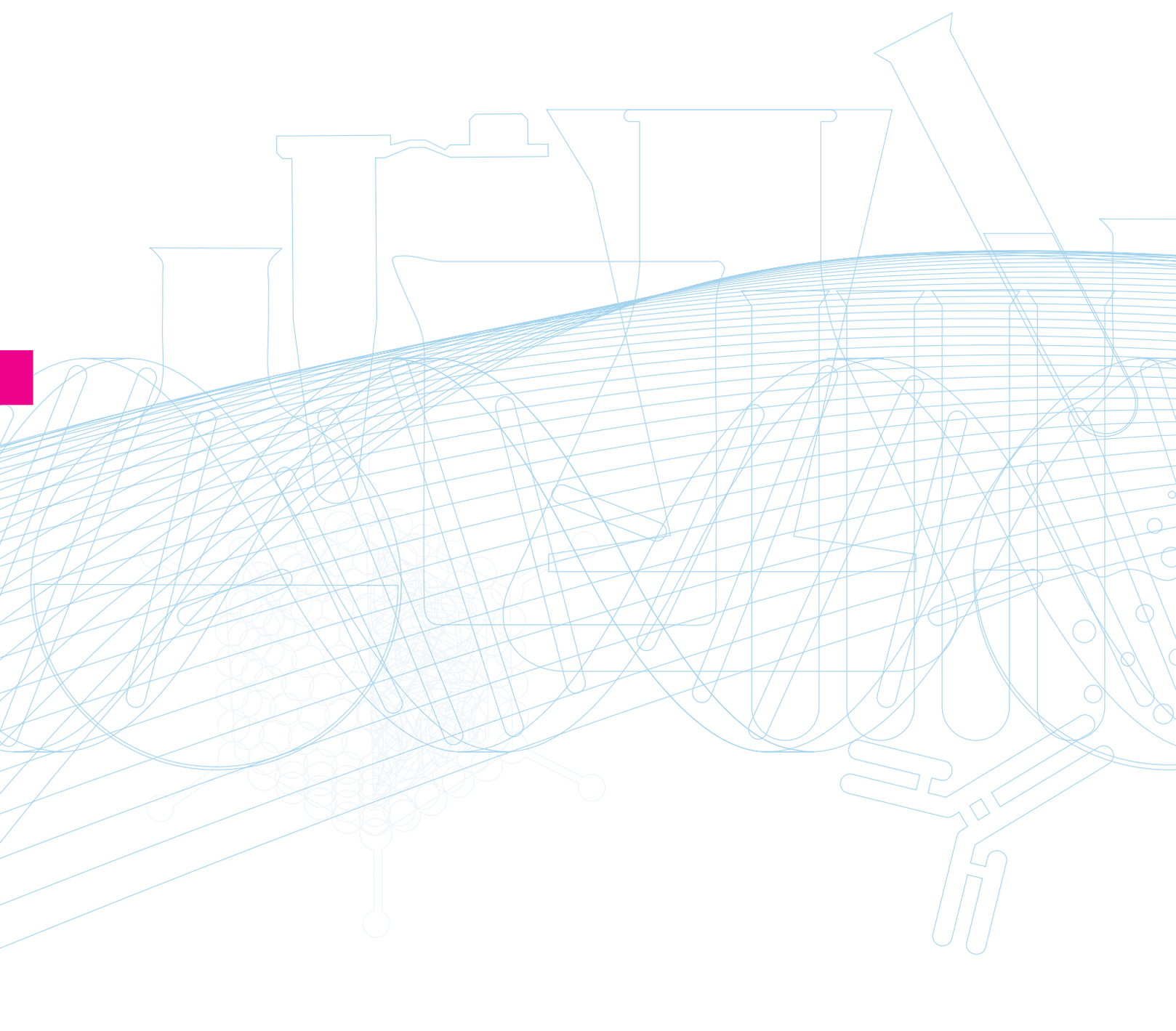
Temperature range ambient + 5 to 100°C ambient + 5 to 130°C ambient + 5 to 200°C ● = standard ● = available option x = option not available		Precision digital QBD2  h: 100 mm d: 280 mm w: 200 mm	High performance digital QBH2  h: 100 mm d: 280 mm w: 200 mm	Analogue QBA2  h: 100 mm d: 280 mm w: 200 mm
Temperature range	°C	ambient + 5 to 130	ambient + 5 to 200	ambient + 5 to 100
Temperature setting range	°C	15 to 130	15 to 200	0 to 100
Setting resolution	°C	0.1	0.1	2
Stability	@ 37°C, °C	± 0.1	± 0.1	± 1.0
Uniformity	within the block @ 37°C, °C	± 0.1	± 0.1	± 1.0
	across similar blocks @ 37°C, °C	± 0.2	± 0.2	± 1.0
Temperature display, LED		●	●	–
Display resolution	°C	0.1	0.1	–
Heat up time	25° to 100°C mins	15	15	25
Three programmable temperature/time segments plus end-of-program segments		–	●	–
Reaction timer, with audible buzzer		1 minute to 999 mins	1 minute to 999 mins	–
Function timer for delay of heater start-up/switch-off		up to 72 hours	up to 72 hours	–
Off-set adjustment		●	●	–
Two-point calibration of internal and external probes		●	●	–
High/low temperature alarms, settable to within 0.5°C of set temperature		●	●	–
Fault indication display		●	●	–
Power	W	300	300	300
Supply voltage	V	120 or 230	120 or 230	120 or 230
Safety	overtemperature cut-out	thermal fuse	thermal fuse; adjustable	thermal fuse
Extraction tool for easy and safe block removal		●	●	●

Options and accessories

Microtitre blocks for molecular biology and biotechnology applications				
Double-size blocks, 140 x 100 x 75 mm, supplied with extraction tool				
QDP-H 	96 holes in microplate configuration for 0.2 ml microplates, strips or individual tubes. Accommodates 1 x 96-well plate or 8 x 12-well or 12 x 8-well strips or up 96 individual capped tubes. Uniformity ± 0.3°C within tubes across the block; 6.2 mm Ø holes, 14 mm hole depth	●	●	●
QDP-FL 	Universal block, undrilled black anodised aluminium, for standard 96-well plates (u-well, v-well, flat bottom, high temperature). Uniformity ± 0.5°C between wells. Supplied with hinged, double layer lid	●	●	●
Safety cover				
QBL2* 	Made from tough clear polycarbonate for maximum visibility whilst preventing accidental touching of a hot block or contamination of samples from splashes *Not required with QDP-FL microtitre blocks	●	●	●
External Pt1000 temperature probes				
QBEP 	Standard probe for in-sample or in-block temperature control; encased in stainless steel sheath, Ø 3 mm x 30 mm long, with 350 mm of cable	●	●	x
QBEP-WM 	Short-form probe. For in-sample or in-block temperature control; encased in stainless steel sheath, Ø 3 mm x 14 mm long, with 350 mm of cable	●	●	x

© Grant Instruments (Cambridge) Ltd

12 Rockers and rotators



Rockers and rotators

A comprehensive range of efficient and sturdy rocking and rotating equipment for a wide range of mixing applications in life science, cell culture, chemistry, and other analytical/research laboratories.

Suitable for use in cold rooms and incubators.

- **Platform rockers**
  – fixed tilt, for light loads
- **3D platform rotators**
  – fixed tilt, for light loads
- **Multi-function rotators**
  – 3D and 360° vertical, for light loads and microtubes

PMR-30

PS-3D

PS-M3D

NEW MODEL
PTR-35

© Grant Instruments (Cambridge) Ltd

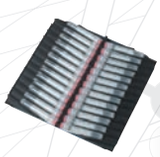
PMR-30 platform rocker – fixed tilt

Compact but highly functional fixed-angle platform rocker in the Grant bio range, providing a smooth side to side rocking motion for gentle sample agitation in tubes, culture flasks, dishes and boxes.

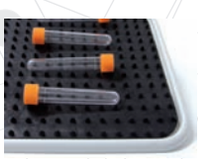
- **Variable speed: 7.5 to 30 rpm**
- **Fixed 7° tilt angle**
- **Load up to 0.5 kg**
- **Continuous or timed operation, with automatic switch-off**

Suitable for mixing applications in many different fields, with specific applications including: gel staining/destaining, washes, antibody staining, hybridisations, immuno precipitations, Southern blots, Western blots, *in situs*.

Accessory options for PMR-30



PTP-26 – Tube adaptor for 26 tubes up to 11 mm diameter



PDM – Dimpled mat prevents tubes from rolling around the platform

 © Grant Instruments (Cambridge) Ltd

PS-3D 3D platform rotator – fixed tilt

Variable speed, fixed-angle 3D rotator in the Grant bio range providing smooth orbital motion for mixing in commonly used vessels – culture flasks, dishes, boxes and tubes.

- **Variable speed: 15 to 30 rpm**
- **Fixed 7° tilt angle**
- **Loads up to 0.5 kg**

The gentle movement is ideal for staining gels without destroying the gel edges, or for keeping fragile tissue intact during incubations

Smooth, reliable, extremely quiet motor; low power consumption

Simple speed adjustment – 15 to 30 rpm

200 x 200 mm platform accommodates most commonly used vessels. Smooth, non-slip mat supplied as standard

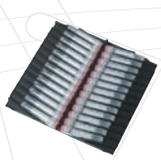
Compact, sturdy construction with a low profile and small footprint – fits neatly into the smallest workspace

Low voltage power supply provides for safe cold room operation and low energy consumption

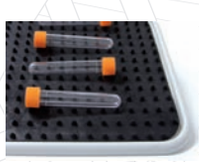
Low voltage cord easily fits through incubator door gaskets

Suitable for gentle mixing applications in many different fields, with specific applications including: gel staining and destaining, antibody staining, washes, hybridisations, immuno precipitations, Southern blots, Western blots, *in situs*. The 3D motion provides very effective sample coverage, for efficient mixing with a reduced quantity of solution.

Accessory options for PS-3D



PTP-26 – Tube adaptor for 26 tubes up to 11 mm diameter



PDM – Dimpled mat prevents tubes from rolling around the platform

© Grant Instruments (Cambridge) Ltd

PS-M3D multi-function 3D rotator

Variable speed, fixed-angle, multi-function 3D rotator providing all that is required – rotation, reciprocation and vibration – to fully optimise the mixing of different sized particles in flasks, dishes, petri dishes and boxes.

Function	action	best for mixing
Rotation	long wave motion	large particles
Reciprocation	long and medium wave motion	medium and large particles
Vibration	short wave motion	small particles

- **3D rotation, reciprocation and vibration functions all in one product**
- **3D rotation speed: 5 to 30 rpm**
- **Reciprocal 3D rotation: 1 to 360° turning angle**
- **Vibration: 1 to 6° turning angle, programmable in a burst of 1 to 5 seconds**
- **Fully programmable sequence of all functions**
- **Loads up to 1.0 kg**

Smooth, non-slip mat supplied as standard – prevents vessels from slipping

Compact, with a low profile and small footprint, and extremely quiet in operation – fits neatly and unobtrusively into the workspace

Very easy to operate, with simple set-up of multi-segment programs via push buttons and the 2-line LCD status display

Low voltage cord easily fits through incubator door gaskets

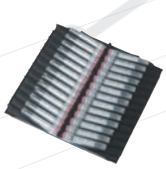
All actions – rotation, reciprocation and vibration – can be set for continuous or timed operation, or linked together in different combinations to ensure optimum mixing conditions for your application

Reliable stepper motor and sturdy construction will deliver years of consistent performance

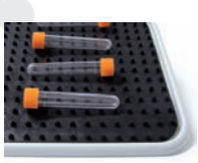
Ambient operating temperature range of 4 to 40°C allows use in cold room or incubator

Suitable for mixing applications in many different fields, with specific applications including: immuno precipitations and other affinity matrix applications, treatment of adherent tissue culture in small volumes, e.g. for trypsinisation, gel staining and destaining, antibody staining, washes, hybridisations, Southern blots, Western blots, *in situs*.

Accessory options for PS-M3D



PTP-26 – Tube adaptor for 26 tubes up to 11 mm diameter



PDM – Dimpled mat prevents tubes from rolling around the platform

 © Grant Instruments (Cambridge) Ltd

PTR-35 and PTR-60 360° vertical multi-function rotators

Compact and efficient variable-speed, variable-angle vertical rotators providing all the functionality – vertical rotation, reciprocation and vibration – for thorough mixing of microtubes and reproducible sample preparation. All mixing functions can be linked or used separately.

Function	action	best for mixing
360° vertical rotation	long wave motion	large particles
Reciprocation	long and medium wave motion	medium and large particles
Vibration	short wave motion	small particles

- **360°C vertical rotation, reciprocation and vibration functions all in one compact product**
- **Choice of two models with different tube capacities**
- **Vertical rotation speed: 10 to 100 rpm**
- **Reciprocal rotation: 1 to 90° turning angle**
- **Vibration: programmable in a burst of 1 to 5 seconds**
- **Fully programmable sequence of functions, including pause**

Very easy to operate, with simple set-up of multi-segment programs via push buttons and the 2-line LCD status display

Reliable and extremely quiet motor produces regulated and reproducible rotation throughout the speed range

Compact with a low profile and small footprint – fits neatly into the workspace

Low voltage cord easily fits through incubator door gaskets

PTR-35

All actions – rotation, reciprocation and vibration – can be set for continuous or timed operation, or linked together in different combinations to ensure optimum mixing conditions for your application

Supplied with platform accommodating up to 26 microtubes. Maximum rotating speed of up to 100 rpm

The **PTR-60** has the same functionality as the PTR-35 and is supplied with platform accommodating up to 48 microtubes

Suitable for 360° vertical mixing applications including immuno precipitations and other affinity matrix applications, prevention of blood coagulation, latex diagnostics.

Accessory options for PTR-35

- **PRSC-10** – for 10 tubes up to Ø 30 mm, tube volumes up to 50 ml
- **PRS-5/12** – combined platform for 5 tubes up to Ø 30 mm and 12 tubes up to Ø 15 mm, tube volumes 50 ml/1.5-15 ml
- **PRSC-22** – for 22 tubes up to Ø 15 mm, tube volumes up to 1.5 ml
- **PRS-10** – for 10 tubes up to Ø 30 mm, tube volumes up to 50 ml

Accessory options for PTR-60

- **PRS8-22** – platform for 8 tubes up to Ø 30 mm plus 22 tubes up to Ø 15 mm, tube volumes up to 50 ml/1.5-15 ml
- **PRS-14** – platform for 14 tubes up to Ø 30 mm, tube volumes up to 50 ml
- **PRS-48** – replacement platform for 48 tubes up to Ø 15 mm, tube volumes 1.5-15 ml

© Grant Instruments (Cambridge) Ltd

Grant-bio compact rockers and rotators – models and specifications

● = optional

		PMR-30	PS-3D
		Fixed tilt platform rocker	**Fixed tilt 3D platform rotator**
		 h: 110 mm d: 185 mm w: 175 mm	 h: 100 mm d: 150 mm w: 85 mm
Speed	rpm	7.5 to 30	10 to 30
Tilt angle	°	7	7
Timer, with automatic switch-off		1 min to 24 hours	–
Platform dimensions (working area)	mm	210 x 210	210 x 210
Maximum load	kg	0.5	0.5
Display		4 digit LED	–
Ambient temperature range	°C	4 to 40	4 to 40
Input voltage	V dc	12	12
Input current	A	0.5	0.5
Accessories			
PTP-26 tube adaptor for 26 tubes up to Ø 11mm		●	●
PDM – dimpled mat		●	●

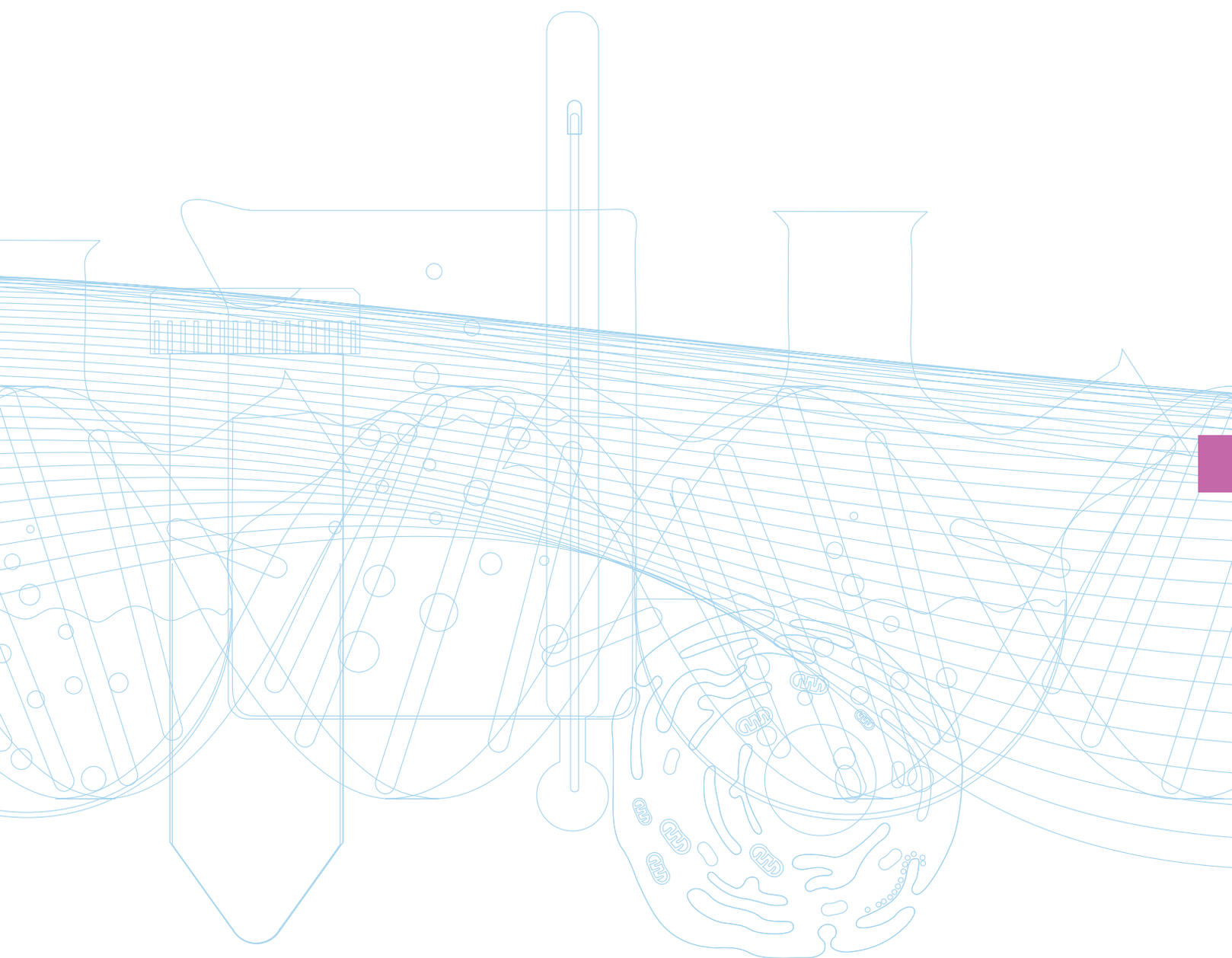
Grant bio multi-function rotators – models and specifications

● = optional

		PS-M3D	PTR-35	PTR-60
		Multi-function 3D rotator	**360° vertical multi-function rotators**	
		 h: 125 mm d: 170 mm w: 225 mm	 h: 195 mm d: 155 mm w: 365 mm	 h: 230 mm d: 230 mm w: 420 mm
Speed	rpm	5 to 30	10 to 100	
Turning angle (reciprocal mode)	°	1 to 360	15 to 90	15 to 90
Turning angle (vibration mode)	°	1 to 5	1 to 5	1 to 5
Tilt angle	°	7	–	–
Orbit diameter	mm	22	–	–
Timer, with automatic switch-off		–	1 min to 24 hours	1 min to 24 hours
Timer (orbital/360° vertical or reciprocal mode)	sec	1 to 250	1 to 250	1 to 250
Timer (vibration mode)	sec	1 to 5	1 to 5	1 to 5
Pause	sec	–	1 to 5	1 to 5
Number of cycles		1 to 125	–	–
Platform dimensions (working area)	mm	215 x 215	–	–
Microtube capacity	Ø 15mm max	–	26	48
Maximum load	kg	1.0	0.5	0.8
Display		2 x 16 character LCD	2 x 16 character LCD	2 x 16 character LCD
Ambient temperature range	°C	4 to 40	4 to 40	4 to 40
Input voltage	V dc	12	12	24
Input current	A	0.5	0.5	2.1
Accessories				
PTP-26 tube adaptor for 26 tubes up to Ø 11 mm		●	–	–
PRS8-22 platform for 8 tubes up to Ø 30 mm plus 22 tubes up to Ø 15 mm, tube volumes up to 50 mL/1.5-15 ml		–	–	●
PRS-14 platform for 14 tubes up to Ø 30 mm, tube volumes up to 50 ml		–	–	●
PRS-48 replacement platform for 48 tubes up to Ø 15 mm, tube volumes 1.5-15 ml		–	–	●
PDM – dimpled mat		●	–	–
PRSC-10 for 10 tubes up to Ø 30 mm, tube volumes up to 50 ml		–	●	–
PRS-5/12 combined platform for 5 tubes up to Ø 30 mm and 12 tubes up to Ø 15 mm, tube volumes 50 ml/1.5-15 ml		–	●	–
PRSC-22 for 22 tubes up to Ø 15 mm, tube volumes up to 1.5 ml		–	●	–
PRS-10 for 10 tubes up to Ø 30 mm, tube volumes up to 50 ml		–	●	–

 © Grant Instruments (Cambridge) Ltd

13 Shakers, mixers and stirrers



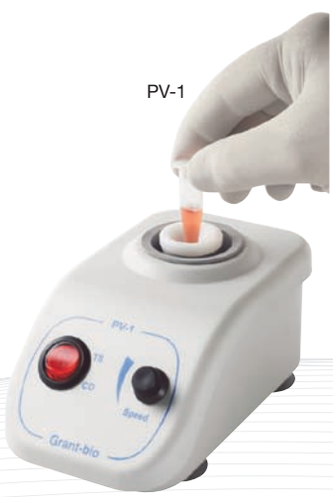
Shakers, mixers and stirrers

A range of compact, stylish and efficient equipment for many routine shaking, mixing and stirring applications in chemistry, life science and other analytical/research laboratories. Suitable for use in cold rooms and incubators (operating temperature range 5 to 40°C).

- **Orbital shaking platforms** – single and multi platform
- **Microplate shakers**
- **Vortex mixers**
- **Stirrers** – magnetic

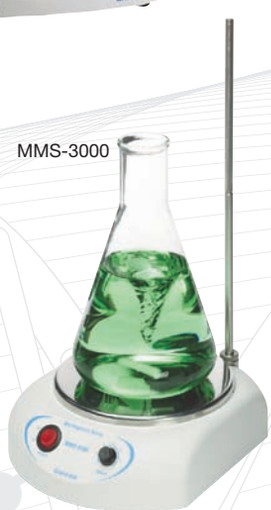
PSU10i

PV-1



PMS-1000

MMS-3000



V-32

PSU-20i

 © Grant Instruments (Cambridge) Ltd

PSU20-i orbital multi-platform shaker

Powerful and efficient microprocessor controlled, multi-functional orbital shaker providing all that is required to mix your samples – rotation, reciprocation and vibration. This enables optimisation of the mixing whether in flasks, beakers, Petri dishes or other laboratory vessels.

- **Orbital motion, reciprocation and vibration functions all in one product**
- **Reliable direct drive system**
- **Fully programmable sequence that can use one or all the functions**
- **Interchangeable platforms, including multi-level platform option**
- **Loads up to 8 kg**
- **Orbital and reciprocating speed: 20 to 250 rpm**
- **Reciprocal rotation: 30 to 360° turning angle**
- **Vibration: 0 to 5° turning angle, programmable in a burst of 0 to 5 seconds**

PSU-20i fitted with PUP-330

Universal detachable platform accommodates vessels of different shapes and sizes for maximum flexibility

All mixing functions – orbital motion, reciprocation and vibration – can be set for continuous or timed operation, or be linked together in different combinations to establish optimum mixing and ensure accurately repeatable conditions for your application

Low voltage cord easily fits through incubator door gaskets

Powerful, reliable and exceptionally quiet motor – combines an 8 kg loading capacity with consistent even motion and quiet operation

2-line LCD status display of actual and set parameters

Very easy to operate, with simple set-up of multi-segment programs via push buttons

Optional accessory platforms for PSU-20i

PUP-330 – Universal platform with adjustable bars and two fixing levels to accommodate high and low level vessels
Dimensions: 345 x 430 x 105 mm

PP-20 – Flat platform with non-slip rubber mat to accommodate low profile containers such as Petri dishes
Dimensions: 480 x 380 mm

PP-20-(2/3/4 level) – Flat platform with non-slip rubber mat
Dimensions: 480 x 380 mm
Height between levels: 140 mm

P30-100 – Platform with clamps for 30 x 100 ml flasks

P16-250 – Platform with clamps for 16 x 250 ml flasks

P9-500 – Platform with clamps for 9 x 500 ml flasks

P6-1000 – Platform with clamps for 6 x 1000 ml flasks

© Grant Instruments (Cambridge) Ltd

PSU-10i orbital shaking platform

Microprocessor controlled shaking platform providing smooth and quiet horizontal orbital motion for mixing in bottles, flasks and beakers.

- **Variable shaking speed: 50 to 450 rpm**
- **Reliable direct drive system**
- **Automatic load balancing system**
- **Continuous or timed operation with automatic switch-off**
- **Interchangeable platforms for use with a variety of vessels**
- **Simple to set up and easy to operate**
- **Loads up to 3.0 kg**

PSU-10i fitted with PUP-12 universal platform

Soft start feature ensures a smooth ramp-up – avoids potential damage to vessel content

Exceptionally quiet motor – consistent and even shaking

2-line LCD display clearly indicates both set and actual shaking speed, plus set and elapsed time.

Works in combination with simple push buttons for easy set-up

Choice of 4 interchangeable platforms (optional accessories) to suit different types of vessels – maximum flexibility

Low voltage power supply provides for safe cold room operation and low energy consumption. Ambient operating temperature range of 5 to 40°C allows use in cold room or incubator

Integral electronic timer with audible alarm and automatic switch-off – accurate repeatability of time sensitive incubations

Low voltage cord easily fits through incubator door gaskets

Optional accessory platforms for PSU-10i

Enable a wide range of vessels to be accommodated – bottles, flasks, beakers, dishes, boxes and Petri dishes

P12-100 – Platform with clamps for 12 x 100ml flasks/150 ml beakers
Dimensions: 250 x 190 mm

Bio PP-4 – Flat platform with non-slip rubber mat
Dimensions: 230 x 230 mm

P6-250 – Platform with clamps for 6 x 250 ml flasks/400 ml beakers
Dimensions: 250 x 190 mm

PUP-12 – Universal platform, with adjustable bars
Dimensions: 270 x 195 mm

 © Grant Instruments (Cambridge) Ltd

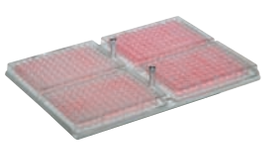
PMS-1000 microplate shaker

Compact and efficient variable speed, horizontal shaker for reliable, regulated shaking of two or four microplates.

- **Variable shaking speed: 150 to 1000 rpm**
- **Quick and easy screw fitting of any standard-depth multiwell plates**
- **Continuous or timed operation, with automatic switch off**
- **Holds two or four microplates**
- **Operating temperature 5°C to 40°C**

PMS-1000 fitted with platform for two microplates

Platform for two microtitre plates supplied as standard. Platform for four plates (MPP-4) available as an option



Easy-to-use integral electronic timer ensures accurate count-down and repeatability of time-sensitive incubations

Low voltage cord easily fits through incubator door gaskets

Quick and easy to use screw fittings – keep the plates securely in position and allow fitting of any standard-depth well plates

Simple graduated dial to adjust the speed to suit the application: – gentle shaking to ensure that the well contents remain *in situ*, or more vigorous agitation for effective aeration across the surface area of each well

Easy to read LED display clearly indicates time remaining on timed operations

Suitable for mixing, incubation and cultivation of biological and chemical components in many life science disciplines including microbiology, cell and molecular biology, immunology and biotechnology. Specific applications include: immunoassays, colouration tests, binding of template DNA to silica-coated magnetic beads. PMS-1000 avoids low signal caused by inadequate re-suspension of purified PCR products, helps ensure the correct optical density in each of the wells and helps achieve maximum yield and quality in production of plasmid DNA.

© Grant Instruments (Cambridge) Ltd

V-32 multi vortex mixer

Versatile multi vortex mixer for vigorous re-suspension of cell or chemical pellets in tubes up to 1.5 ml, with the facility to mix individual tubes up to 15 ml.

- **Adjustable speed control: 500 to 3000 rpm**
- **'Continuous' or 'touch' operation**
- **Handles up to 32 tubes in three different sizes/combinations**

Compact rugged design plus powerful motor delivering consistent performance and quiet operation – fits neatly and unobtrusively into the workspace

Easy operation – select 'continuous' or 'touch' operation and set speed knob from 500 rpm to 3000 rpm

The 32-socket universal platform for three tubes sizes (16 x 1.5 ml, 8 x 0.5 ml, 8 x 0.2 ml) and a tip for mixing individual tubes up to 15 ml provide maximum flexibility for different applications

Low voltage cord easily fits through incubator door gaskets

Rubber suction pads hold tight to the work surface and prevent the unit from 'walking' – they also absorb vibration and prevent its transmission to the workbench

Typical applications include vigorous stirring and re-suspension of bacterial and yeast cells and pellets, metabolite and enzyme extraction and various DNA operations such as deproteinisation of DNA/protein complexes and purification of low molecular weight DNA/RNA fragments in PCR diagnostics.

Optional accessory platforms for V-32

- **VP-8/15** – Universal 6-socket platform for 10 ml tubes (maximum tube diameter 15 mm)

 © Grant Instruments (Cambridge) Ltd

PV-1 personal vortex mixer

Extremely compact personal vortex mixer with a low profile and small footprint for gentle mixing to vigorous re-suspension of cell or chemical pellets in 0.5 ml, 1.5 ml and 15 ml tubes.

- **Adjustable speed control: 750 to 3000 rpm**
- **'Continuous' or 'touch' operation**
- **For tubes up to 20 mm diameter**

Pressure sensitive cup accommodates tubes up to 20 mm diameter

Reliable and extremely quiet motor produces regulated and reproducible agitation throughout the speed range

Extremely easy to operate – select either 'continuous' or 'touch' operation and turn the knob to adjust the speed from 750 rpm to 3000 rpm

Low voltage cord easily fits through incubator door gaskets

In 'touch' mode, agitation starts in response to pressure on the pressure sensitive cup

Exceptionally compact with a low profile and small footprint – fits into almost any location

Rubber suction pads hold tight to the work surface and prevent the unit from 'walking' – they also absorb vibration and prevent its transmission to the workbench

© Grant Instruments (Cambridge) Ltd

MMS-3000 mini magnetic stirrer

Compact magnetic stirrer for handling small volumes in routine laboratory procedures such as pH metering, extraction and dialysing.

- **Adjustable speed control: 0 to 3000 rpm**
- **Stirring volume: 2 litres**

Handles volumes up to 2 litres

Rugged stainless steel plate provides a working surface of 160 mm

Quiet operation, small size – fits neatly into the workspace

MMS-3000 is equipped with a detachable stand that allows inserting different sensors (temperature, pH etc.) inside the liquid.

Magnetic cylinder-shape stirring bar (6 x 25 mm) supplied as standard

Easy to use graduated dial for quick and convenient selection of mixing speed

 © Grant Instruments (Cambridge) Ltd

Shakers – models and specifications

● = standard
● = optional

(all heights excl. platform)

		Multi platform shaker	Shaking platform	Microplate shaker
		PSU-20i	PSU-10i	PMS-1000
		 h: 130 mm d: 410 mm w: 410 mm	 h: 90 mm d: 205 mm w: 220 mm	 h: 90 mm d: 185 mm w: 175 mm
Speed	rpm	20 to 250**	50 to 450**	150 to 1000
Orbit	mm	20	10	2
Maximum load	kg	8	3	–
Capacity	2 microplates	–	–	●
	4 microplates (with optional platform MPP-4)	–	–	●
Timer, with automatic switch-off		1 min to 96 hours	1 min to 96 hours	1 min to 23 h 59 min
Motion timer (orbital/reciprocal modes)	sec	0 to 250	–	–
Motion timer (vibration mode)	sec	0 to 5	–	–
Display		2-line 16 character LCD	2-line 16 character LCD	4 digit LED
Angle (reciprocal mode)	°	0 to 360	–	–
Angle (vibration mode)	°	0 to 5	–	–
Input voltage	V dc	12	12	12
Input current	A	4.16	1	0.5
Ambient temperature range	°C	5 to 40		

Vortex mixers – models and specifications

● = standard
(all heights excl. platform)

		Personal vortex mixer	Multi vortex mixer
		PV-1	V-32
		 h: 75 mm d: 145 mm w: 82 mm	 h: 100 mm d: 180 mm w: 120 mm
Speed	rpm	750 to 3000	500 to 3000
Acceleration time	sec	–	3
Orbit	mm	2	2
Maximum tube diameter	mm	20*	16
Capacity	16 x 1.5 + 8 x 0.5 + 8 x 0.2 ml tubes, Eppendorf type	–	●
Input voltage	V dc	12	12
Input current	A	0.5	0.5
Ambient temperature range	°C	5 to 40	

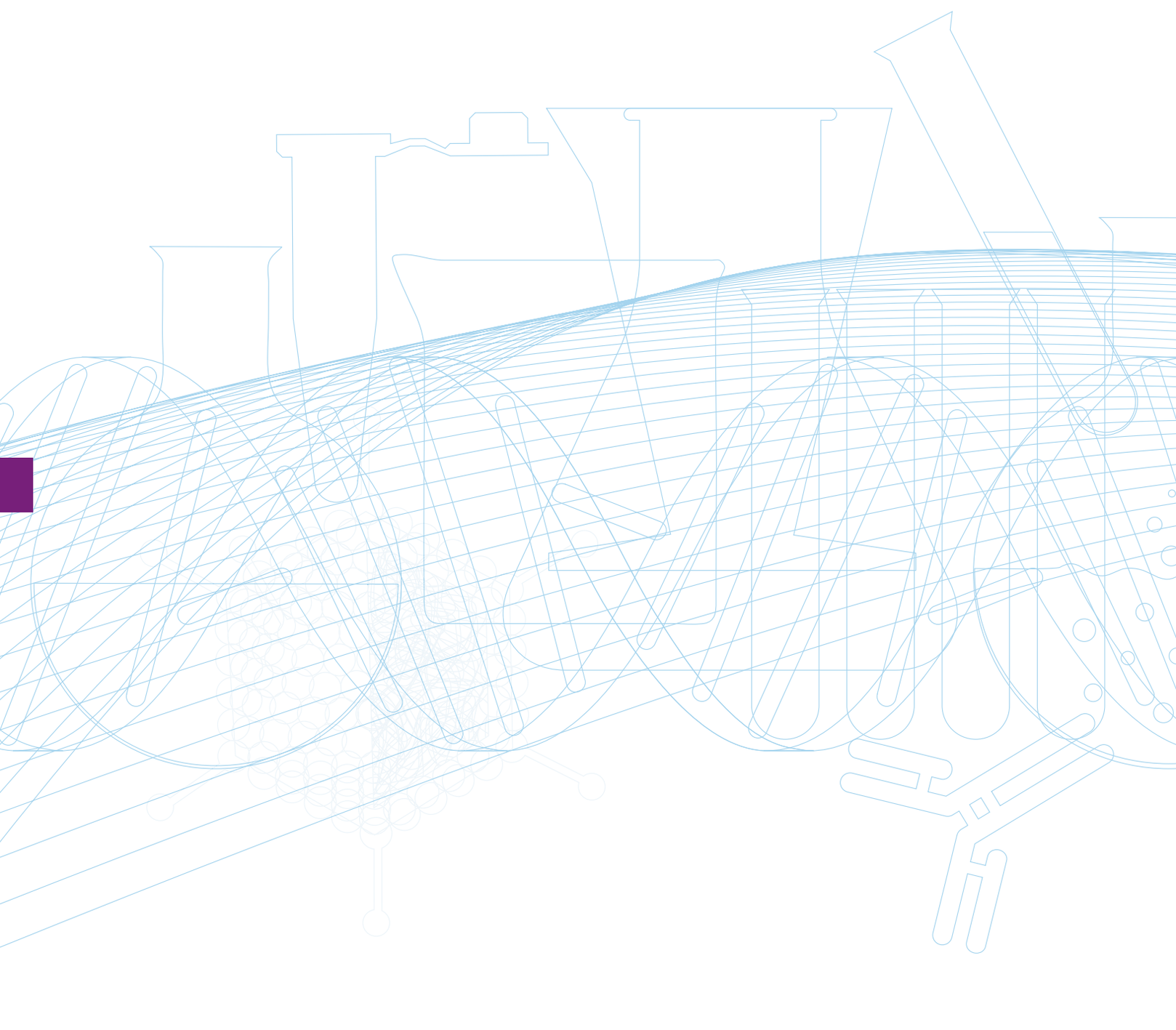
Stirrers – models and specifications

		Magnetic stirrer
		MMS-3000
		Mini stirrer
		 h: 75 mm d: 230 mm w: 185 mm
Speed	rpm	0 to 3000
Stirring volume	L	2
Plate dimensions	mm	160
Input voltage	V dc	12
Input current	A	0.3

* PV-1 takes conical tubes up to 28.5 mm in diameter ** Maximum speed is dependant on loading

© Grant Instruments (Cambridge) Ltd

14 Centrifuges



Centrifuges

A focused range of compact, modern benchtop centrifuges for a variety of biomedical, biochemical and life science applications requiring centrifuging or a combination of centrifuging and mixing for microtubes and microplates.

- **General purpose low speed centrifuges**
- **Combined centrifuges/vortex mixers**

LMC-3000

© Grant Instruments (Cambridge) Ltd

LMC-3000 general purpose centrifuge for scientific applications

Low speed benchtop centrifuge with interchangeable rotors for accommodating centrifuge tubes (10 to 15 ml or 50 ml) or microplates.

- **Spin speed: up to 3000 rpm for tubes, up to 2000 rpm for microtitre plates**
- **Timed operation (1 to 30 minutes), with automatic switch-off**
- **'Soft-start' and 'run-down' functions**
- **Choice of interchangeable rotors for up to 12 centrifuge tubes or 2 microplates**

LMC-3000 general purpose centrifuge fitted with R-2 rotor

Sturdy metal housing and lid, automatic imbalance switch-off and lid lock when centrifuge is running providing safe operation in your workplace

Convenient interchangeable rotor for 6 or 12 tubes or 2 microplates (standard and deep well). Specify when ordering

The powerful and extremely quiet motor has a 'soft' start-up and run-down function to avoid jolting of samples

Compact design with small footprint – fits neatly into the workspace

Easy set-up of speed and time via 2-line LCD display and simple push buttons

Suitable for a wide range of analytical applications including biomedical, bio-organic and immunoenzyme analysis.

Accessory rotors for LMC-3000

R-2 – interchangeable centrifuge rotor for 2 microplates (standard and deep well)

R-6 – interchangeable centrifuge rotor for 6 x 50 ml tubes with caps and conical ends

R-12-10 – interchangeable centrifuge rotor for 12 x 10 to 15 ml tubes, rounded ends, no caps

R-12-15 – interchangeable centrifuge rotor for 12 x 15 ml tubes with caps and conical ends

 © Grant Instruments (Cambridge) Ltd

PCV-3000 Multi-spin™ combined centrifuge/vortex mixer

Highly versatile and efficient variable-speed combined centrifuge/vortex mixer. Programmed centrifugation and mix operations or independent centrifuging and vortex-mixing of multiple microtubes and 0.2 ml strips.

With tubes positioned in the rotor throughout the operation, Multi-spin™ can complete programmed spin-mix-spin sequences in significantly less time compared to individual instruments, typically 4 minutes for 100 tubes compared to 35 minutes with individual instruments – a dramatic time and cost saving. In addition, spinning samples before and after mixing allows lower reagent volumes to be used. Because of its powerful G force and accurate control of spin and mix parameters, the Multi-spin™ can be used with volumes as low as 5 µL.

- **Centrifugation speed: up to 3500 rpm**
- **Timed spin operation: 1 second to 99 minutes, with automatic switch-off**
- **Timed vortex mixing: 1 to 20 seconds, with automatic switch-off**
- **Three adjustable vortex intensities**
- **Choice of interchangeable rotors for different microtube sizes/combinations and for 0.2 ml strips**

Multi-spin™ PCV-3000 fitted with optional PR2-05-02 rotor

A safety interlock stops the rotor when the lid is opened to ensure you and your workplace remain safe

Multi-spin™ enables consecutive spin and mix phases of multiple tubes – tubes are loaded into the rotor for spinning and remain in position for vortex mixing, saving time and labor. In addition, lower reagent volumes can be used, providing a further saving

Simple push-buttons and a clear 2-line LCD status display enable accurate and repeatable setting of spin and mix levels and times. Spin and mix phases can be linked in sequences which can be repeated up to 999 times

Low voltage cord easily fits through incubator door gaskets

The Multi-spin™ is supplied as standard with two interchangeable rotors for 12 x 1.5 ml and 12 x 0.5 ml + 12 x 0.2 ml microtubes

Optional accessory rotors – for 16 and 18 microtubes and for two 8 well 0.2 ml strips – allow for quick and easy changes of application

Compact design and extremely quiet in operation – fits neatly and unobtrusively into the workspace

Suitable for spin-mix-spin applications in many fields, including clinical and hospital PCR laboratories, biochemical clinical laboratories and immunology departments. Multi-spin aids the sample preparation process for many procedures including PCR, gel electrophoresis and enzyme reactions, and is ideal for laboratories processing multiple tubes. Other specific applications include immunoprecipitations; cell permeabilization by chelating or hydrophobic agents for reaction *in situ*; low solubility drug testing; cell washing from culture media after fermentation.

© Grant Instruments (Cambridge) Ltd

PCV-2400 Combi-spin™ combined centrifuge/vortex mixer

Cost-effective fixed-speed combined centrifuge/vortex mixer for combined or independent centrifuge and mixing applications of microtubes and 0.2 ml microtube strips in low volume applications.

Tubes are loaded into the rotor for simultaneous spinning, then removed for individual mixing in the vortex cup located at the top of the central shaft. In spin-mix-spin applications, the Combi-spin™ can be used with reagent volumes down to approximately 50 µL, representing an overall saving in time, labor and material.

- **Centrifugation speed: fixed at 2800 rpm**
- **Continuous operation or short spin**
- **Choice of interchangeable rotors for different microtube sizes/combinations and for 0.2 ml strips**

PCV-2400 Combi-spin™

A safety interlock stops the rotor when the lid is opened to ensure you and your workplace remain safe

The vortex cup emerges through an opening in the closed lid, enabling individual tubes to be mixed while a full load of tubes is spinning

The Combi-spin™ is supplied as standard with two interchangeable rotors for 12 x 1.5 ml and 12 x 0.5 ml + 12 x 0.2 ml microtubes

Optional accessory rotors – for 16 and 18 microtubes and for two 8 well 0.2ml strips – allow for quick and easy changes of application

Very simple to operate – use the left-hand button to select continuous or short spin

Combi-spin™ aids the sample preparation process for many procedures including PCR, gel electrophoresis and enzyme reactions, and is particularly suitable for low volume applications. Other specific applications include immunoprecipitations; cell permeabilization by chelating or hydrophobic agents for reaction *in situ*; low solubility drug testing; cell washing from culture media after fermentation.

Accessory rotors for Multi-spin™ PCV-3000 and Combi-spin™ PCV-2400

PR2-05 – interchangeable centrifuge rotor for 8 x 1.5/2.0 ml plus 8 x 0.5 ml microtubes

PR2-05-02 – interchangeable centrifuge rotor for 6 x 1.5/2.0 ml plus 6 x 0.5 ml plus 6 x 0.2 ml microtubes

PSR-16 – interchangeable centrifuge rotor for 2 x 8 well 0.2 ml microtube strips

 © Grant Instruments (Cambridge) Ltd

Centrifuges – models and specifications

● = standard
● = optional

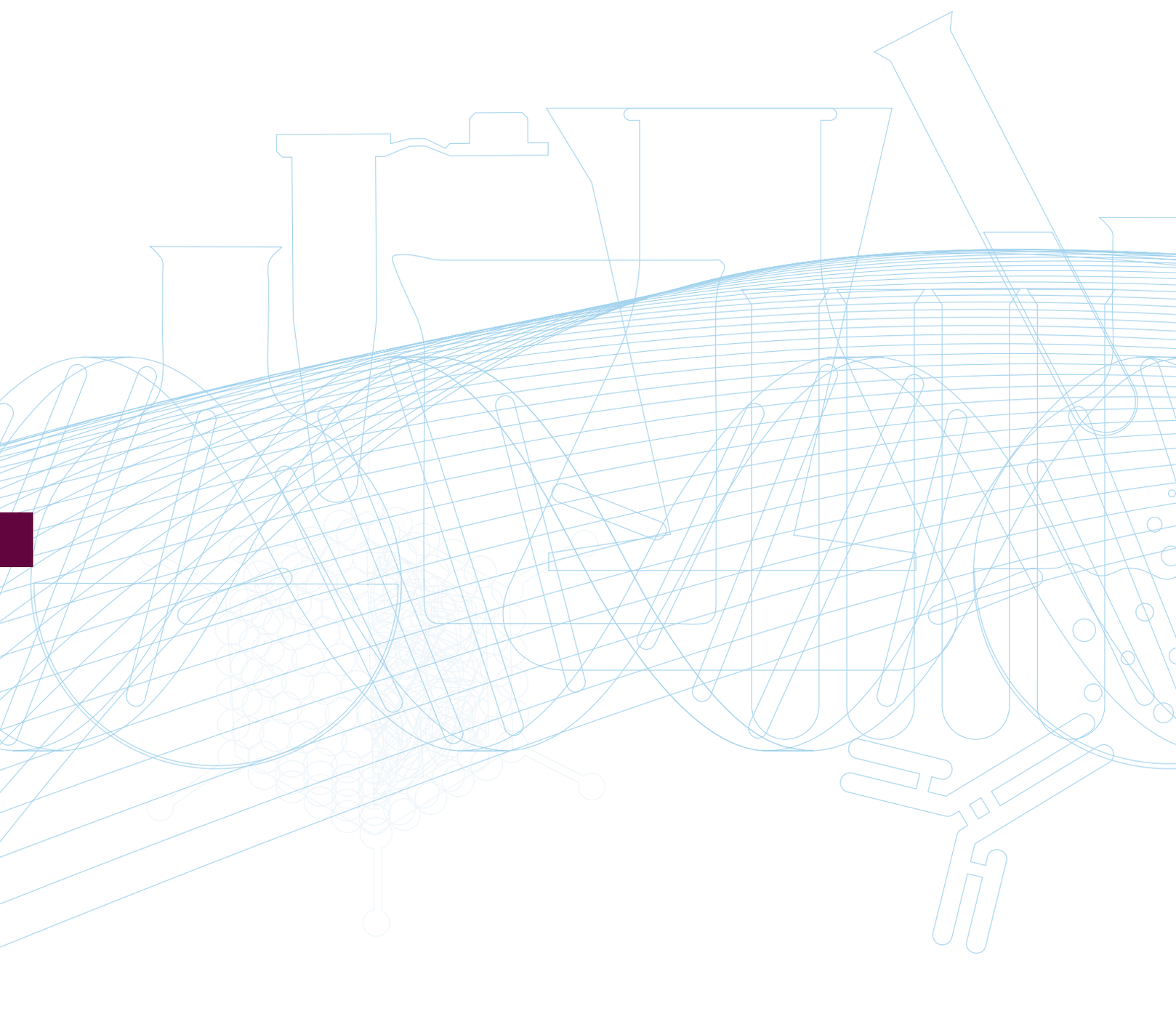
			General purpose	Combined centrifuge/vortex mixer	
			LMC-3000	PCV-2400	PCV-3000
			low speed	combi-spin, fixed speed	multi-spin, variable speed
			 h: 235 mm d: 400 mm w: 470 mm	 h: 115 mm d: 180 mm w: 225 mm	 h: 115 mm d: 180 mm w: 225 mm
Max RCF (bottom of tube) g-force		g	–	700	800
Speed (centrifuge tubes)		rpm	100 to 3000	2800	1000 to 3500
Speed (microtiter plates)		rpm	100 to 2000	–	–
Operation			continuous or timed	continuous up to 60 mins or short spins	continuous or timed
Spin timer, with automatic switch-off			1 to 90 mins	–	1 sec to 99 mins
Mix timer, with automatic switch-off			–	–	1 to 20
Vortex mixing intensity	3-stage adjustment		–	–	soft, medium, hard
Cycle regulation			–	–	1 to 999
Capacity	12 x 1.5/2.0 ml microtubes		–	●	●
	12 x 0.5 ml plus 12 x 0.2 ml microtubes		–	●	●
	2 x microtiter plates		●	–	–
Display			2 line x 16 character LCD	–	2 line x 16 character LCD
Input voltage		V dc	–	–	12
		V ac	120 or 230 (50-60 Hz)	120 or 230 (50-60 Hz)	–
External power supply			–	–	●
Ambient temperature range		°C	4 to 40		

Accessories

	RCF from the middle/bottom of the centrifuge tube			
R-6 interchangeable centrifuge rotor for 6 x 50 ml tubes, with cap, conical end	1100 x g / 1700 x g	●	–	–
R-12-10 interchangeable centrifuge rotor for 12 x 10 to 15 ml tubes, rounded ends, no caps	1200 x g / 1700 x g	●	–	–
R-12-15 interchangeable centrifuge rotor for 12 x 15 ml tubes, with cap, conical end	1150 x g /1700 x g	●	–	–
R-2 interchangeable centrifuge rotor for 2 microtitre plates	560 x g	●	–	–
PR2-05 interchangeable centrifuge rotor for 8 x 1.5/ 2.0 ml plus 8 x 0.5 ml microtubes		–	●	●
PR2-05-02 interchangeable centrifuge rotor for 6 x 1.5/ 2.0 ml plus 6 x 0.5 ml plus 6 x 0.2 ml microtubes		–	●	●
PSR-16 interchangeable centrifuge rotor for 2 x 8-well 0.2 ml microtube strips		–	●	●

© Grant Instruments (Cambridge) Ltd

15 Densitometers



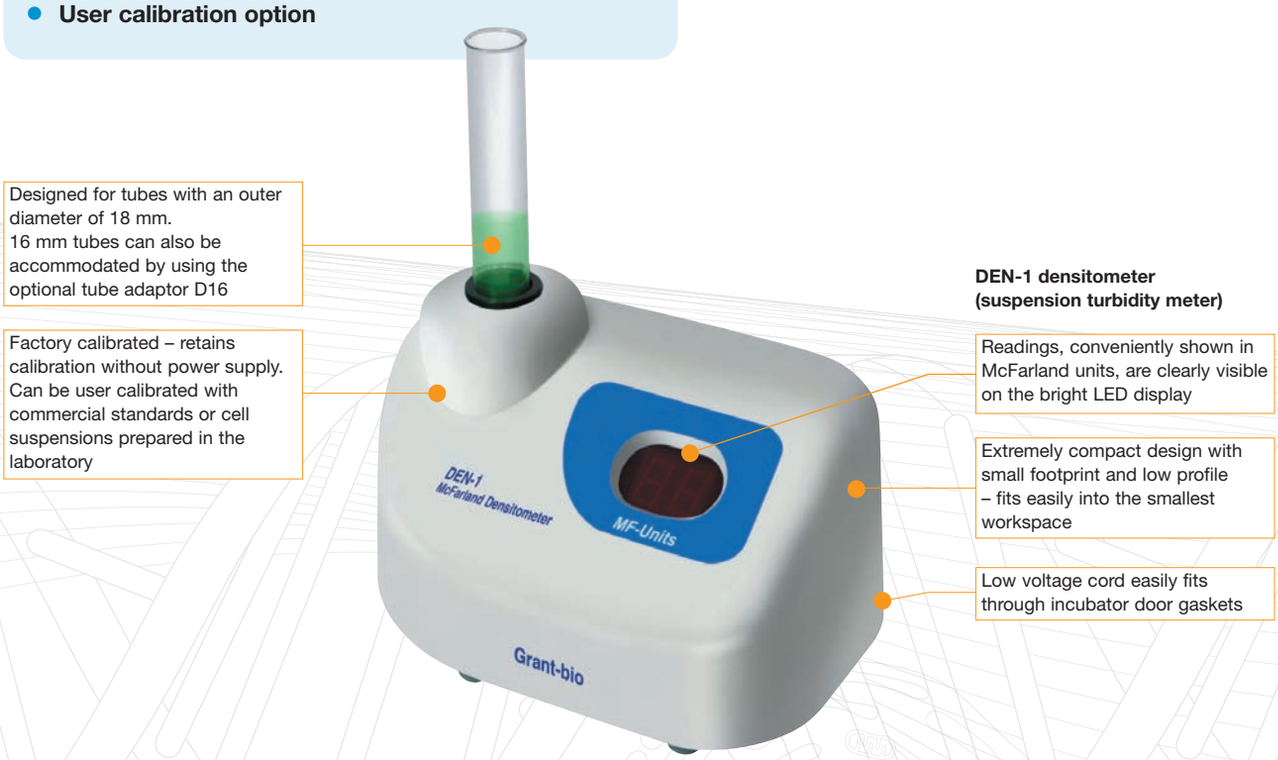
Densitometers

DEN-1

A compact and efficient benchtop densitometer for measuring turbidity of cell suspensions in a variety of life science applications.

The DEN-1 is designed and factory calibrated to measure turbidity in the range of 0.3 to 5.0 McFarland units with a small standard deviation. If required, it can deliver a wider measurement range (up to 15.0 McFarland units), but with a greater standard deviation.

- **Measurement range: 0.3 to 15.0 McFarland units**
- **Measurement time : 1 second**
- **Precision: ± 3%**
- **Standard deviation at 3.0 McF units: 3.0 ± 0.1**
- **User calibration option**



Typical applications include determining concentration of cells (bacterial and yeast cells) in the fermentation process, detecting the susceptibility of micro-organisms to antibiotics, identifying micro-organisms with various test systems, and measuring optical density at fixed wavelength.

Accessories for DEN-1

- **D16** – tube adaptor for tubes with 16mm outer diameter
- **DEN MCF STDS** – set of latex particle suspension McFarland standards (0.5/1.0/2.0/3.0/4.0) require D16 for use

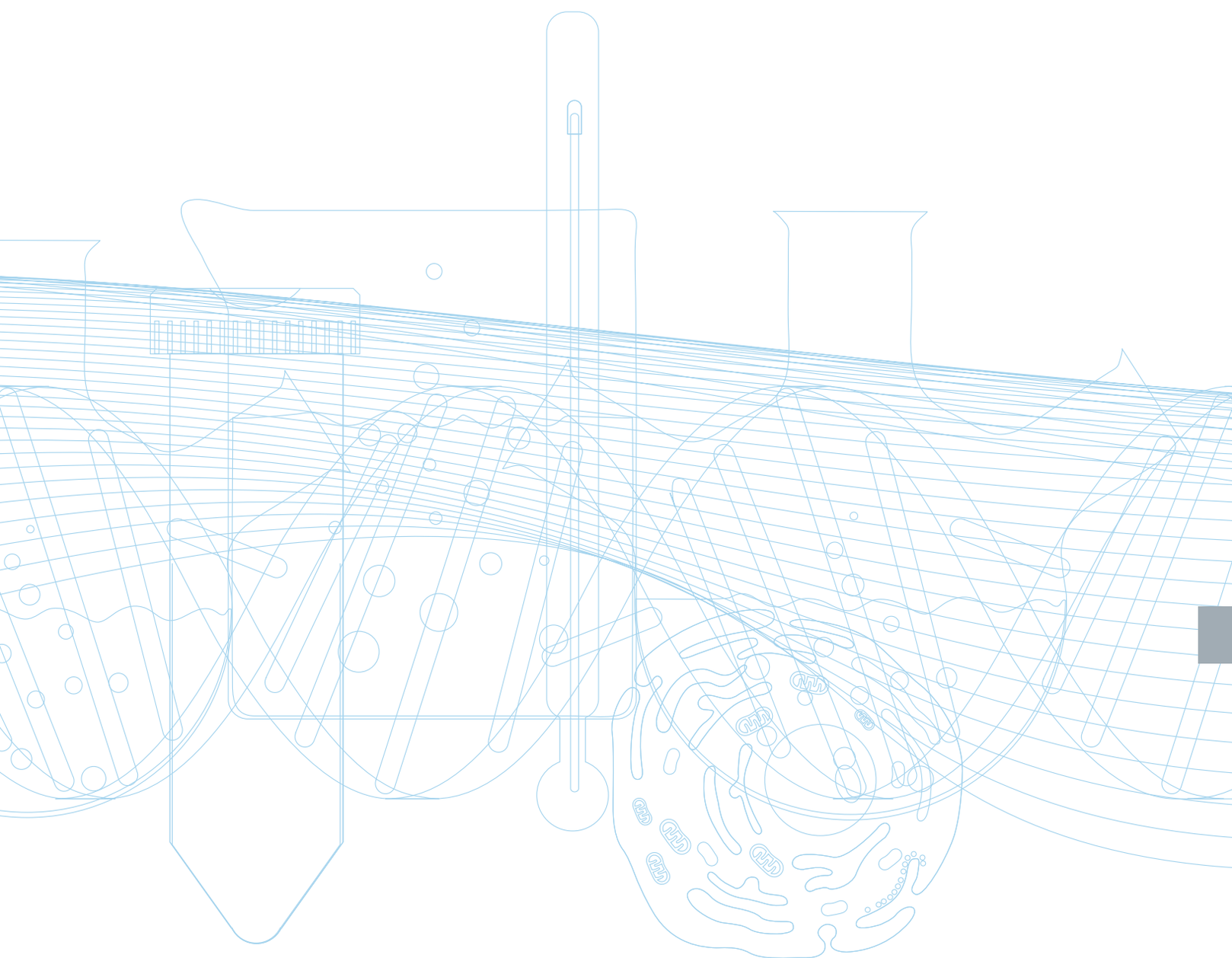
© Grant Instruments (Cambridge) Ltd

Densitometers – specification

		Densitometer
		DEN-1
		 h: 75 mm d: 115 mm w: 165 mm
Light source		light diode
Wavelength, λ	nm	565 ± 15
Range	McFarland units	0.3 to 15.0
McFarland unit standard deviation	0.5 McF	0.5 ± 0.1
	3.0 McF	3.0 ± 0.1
	6.0 McF	6.0 ± 0.2
	≥ 7.5 McF	7.5 ± 0.2
Precision		± 3%
Measurement time	sec	1
Tube diameter, external diameter	mm	18
with D16 adaptor	mm	16
Sample volume	ml	⩾ 2
Display		2 digit LED
External power supply		12V, 300 mA
Ambient temperature range	°C	5 to 40
Dimensions	mm	165 x 115 x 75
Weight	kg	0.9

 © Grant Instruments (Cambridge) Ltd

16 Control and analysis software for the laboratory



Labwise™ control and analysis software for the laboratory

Labwise™ is a powerful and convenient LabVIEW™ software package for programming, controlling and recording key parameters of high performance baths and circulators in the Grant Optima™ range via a PC.

- **Full control of set-up, multi-segment programming and data logging for heating and cooling**
- **Real-time status windows with graphic display including zooming and scaling**
- **Operates in combination with Grant Optima™ GR150 and GP200 series baths and controllers**
- **Enables easy control of relays and remote switching devices including in multiple segments**

Labwise™ set-up features

- set temperature
- set high and low alarms; alarms can be configured to switch a relay
- set reaction timer
- set delayed start and stop time
- control of output relays for refrigeration on/off control and operating ancillary equipment
- control of pump speed for GP200

Labwise™ programming features

- set cool or heat time to target
- program values may be set graphically or numerically
- up to 30 segments per program
- set number of loops, 1 to 254 or infinite looping between selected way points
- programmed control of output relays for each segment, for operating ancillary equipment
- control of pump speed for GP200

Labwise™ display and logging features

- display of temperature/time profile on screen in real time
- real time zoom and scaling of graphical display
- logging of temperature profiles to disk for storage and subsequent analysis
- store programs to disk

 © Grant Instruments (Cambridge) Ltd

Remote switching device

When used in combination with a remote switching device (RDS), the GR150 and GP200 controllers can control, by switching on and off, any mains powered appliance (up to a maximum of 8 Amps). This function can be programmed with Labwise™ software or alternatively directly on the GR150 and GP200 controllers.

Note: The GR150 can control one relay and the GP200 can control two. A separate RDS is required for each relay on the GP200.

Real time temperature monitoring showing high/low alarms and 'zoom-in' facility

Multi-segment program with cycled segment (simple 'drag and drop' operation to change all parameters)

© Grant Instruments (Cambridge) Ltd

17 Custom solutions and products for special applications

Custom solutions and products for special applications

Custom solutions

Grant Instruments has a facility that offers design and manufacture of customised products for individual applications based around our core competencies in:

- **Thermal control: heating and cooling**
- **Data acquisition, analysis and communication**
- **Equipment and instrument design and development**

Block heater for oil testing

We manufacture bespoke items for many industries including Scientific, Motor, Medical, Catering and Semiconductor. Projects range from simple customisation of Grant products to complete white-paper design; from small one off items to large OEM contracts.

Probe calibration bath

Our dedicated team of engineers and technicians ensure prompt, cost effective solutions as well as after sales service. The benefits to our clients are:

- one company approach for any temperature control solution
- economic solutions to individual applications

We have a long list of interesting and unique products that have been made specifically for one application. These include:

- One of the world's most accurate baths used in standards testing at the National Physical Laboratory.
- Large and highly uniform high-temperature block heaters for oil testing at Rolls Royce.
- Highly stable refrigerated bath assemblies to cool highly sensitive lithographic semiconductor equipment at Vistec Lithography.

Occasionally, we work with clients to create a new product that is so successful that it progresses to mainstream production and sold worldwide. Examples are:

The Grant inspissator
This is a temperature controlled system designed to produce large batches of uniform tuberculosis culture medium. It was designed in conjunction with the Post Graduate Medical School at London University and is used in most tuberculosis laboratories assisted by the World Health Organisation. It is a vital tool contributing to the worldwide fight against resurgent tuberculosis.

Temperature Gradient Plate.
This is a bi-directional temperature gradient system that is a tool to investigate responses of seeds to temperature and light, small plants and animals and micro-organisms. It creates, in effect, 196 miniature incubators that can provide comprehensive data on a sample in a single run. These units are supplied worldwide to end users such as those involved in the Millennium Seed Bank Project, food crop research and bio-fuel research.

© Grant Instruments (Cambridge) Ltd

Recent Customer Specific systems

Engineering and Aerospace

- Thawing specialist aircraft glues
  – **BAE**
- Oil ageing test equipment for aero engines
  – **Rolls Royce**
- Engine thermostat testing
  – **Western Thompson**
- Engine testing cooling systems
  – **Cosworth**
- Radiator valve testing
  – **Siebe Climate Control**

Electronics and Optics

- Temperature control in wafer lithography
  – **Vistec**
- Organo metallic (MOCVD) bubbler control for opto-electronics
  – **EMF**
- Sub-atomic research in a synchrotron monochromator
  – **Diamond Light Source**
- Fibre optic manufacture
  – **Kobe, Fibrecore**
- Head-up display manufacture
  – **Qioptiq**

Environmental Science

- Marine studies
  – **Schleicher and Schuell**
- Water test equipment
  – **pHox (GLI), Palintest**
- Potentiometric microplate reading system
  – **Universal Sensors**
- Seed germination gradient plate
  – **Kew Gardens Millennium Seed Bank**
- Soil analysis sample preparation
  – **Alcontrol**

Medical and Life Sciences

- Milk pasteurisation
  – **Great Ormond Street, Alder Hey**
- IVF cryopreservation system
  – **Asymptote**

Manufacturing Industries

- Inkjet printing head temperature control
  – **Xennia, Xaar and Inca**
- Pharmaceutical manufacturing and packaging
  – **Ross**
- Chill filtration for whisky distillers
  – **Bowmore**
- Fermentor jacket temperature control
  – **New Brunswick Scientific**

Standards and Materials Testing

- Sorption systems
  – **Hiden Isochema**
- Oil petrochemical testing equipment
  – **Stanhope Seta**
- Micro calorimetry
  – **Thermometric**
- Standards baths
  – **National Physics Laboratory**
- Refractive index cell temperature control
  – **Index, Bellingham and Stanley**

 © Grant Instruments (Cambridge) Ltd

Customisation of existing Grant equipment

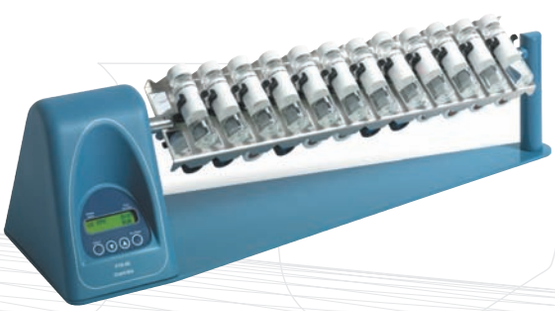
Grant laboratory equipment can often be adapted for specific applications, for example:

- **non-standard tanks** that can hold up to 100 litres or more and/or accommodate vessels of different sizes and shapes
- **temperature control optimised for a specific application** – e.g. high power thermostats and thermostats optimised for extremes of control accuracy or for higher or lower temperature ranges
- **extra safety features**, e.g. for working with volatile or dangerous chemicals
- **additional control mechanisms** such as remote control in closed or open loop circulation systems and extra control lines in integrated systems
- **inter-device communication**, e.g. adapting products for networking (Canbus, Profibus and Devicenet) – absolutely critical for certain applications.

Examples of customised products include:

- Deep tanks and optimised controllers for calibration baths
- Glass sided tanks for viscometers
- Shallow tanks for optics manufacture
- Baby breast milk and formula feed pasteurisation baths
- Flow heaters and pumps for adhesive manufacture
- Plasma thawing baths with specialist racks to take bags
- Re-circulating chillers for cement cure applications and testing
- Deep block heaters for recovery analysis
- Special block heaters and shakers systems for diagnostics and water testing

More information about Grant Technologies' services can be found on the Grant website **www.grant.co.uk** and in a separate brochure entitled 'Bespoke Scientific Systems for Industry'.



© Grant Instruments (Cambridge) Ltd

Products for special applications

Grant Technologies also designs and manufactures a range of special products for high and low temperature applications and for specific applications in the medical, diagnostics and research fields. This range of products includes:

BT5D

TRANS INC

GRD1

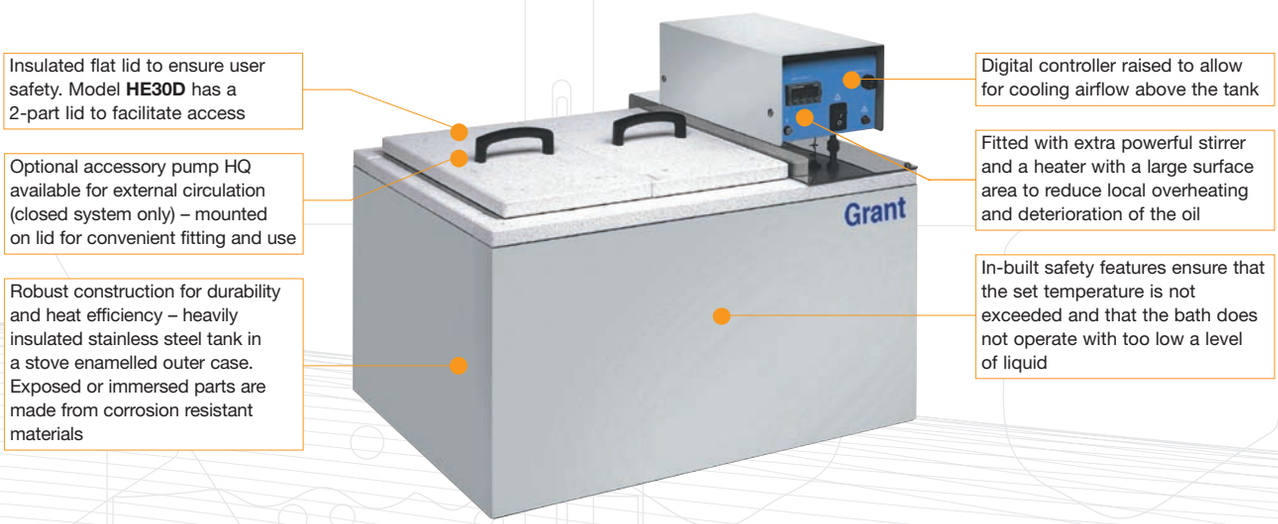
HE30D

 © Grant Instruments (Cambridge) Ltd

High temperature baths/circulators – HED series

Series of robust baths/circulators for high temperature applications combining electronic control with Grant's proven circulation system to provide long-term stable, uniform temperature control. Designed for use with high temperature liquids.

- **Temperature range 50 to 260ºC**
- **Stability ± 0.25 ºC, uniformity ± 0.2ºC**
- **Timed or continuous operation**
- **Choice of two tank sizes – 10 litres (HE10D) and 30 litres (HE30D)**



Accessory pump for external circulation (closed systems only)

- **HQ10** – for 10 litre bath HE10D
- **HQ30** – for 30 litre bath HE30D

© Grant Instruments (Cambridge) Ltd

High temperature dry block heater – BT5D

Convenient digitally controlled dry block heating system for high temperature applications. Provides temperature control without the need for fluids and reduces the risk of contamination.

- **Temperature range ambient + 10 to 400ºC**
- **Stability ± 0.5ºC, uniformity 1%**
- **Timed or continuous operation**
- **Choice of two models with different block capacities**

BT5D-16 high temperature block heater

Choice of two models:
BT5D-16 for 38 x Ø16 mm tubes
BT5D-26 for 22 x Ø26 mm tubes
Other sizes available

An adjustable overtemperature cut-out protects users, valuable samples and the workplace

Robust construction for long term durability and reliability

Digital controller for accurate and reproducible time and temperature setting

 © Grant Instruments (Cambridge) Ltd

Flow heater – FH16D

Compact closed circulator with digital control for applications where an open tank is unsuitable or inconvenient. Widely used in conjunction with corrosion resistant heat exchange coils for controlling the temperature of tanks containing corrosive liquid. Suitable for circulation through open and closed systems.

- **Temperature range ambient + 5 to 80ºC**
- **Stability ± 0.004ºC**

FH16-D flow heater
with LL17 stainless steel remote temperature probe

Robust construction, using corrosion resistant materials – long term durability and reliability in demanding applications

Digital controller for accurate and reproducible temperature setting

Accessory remote probe – stainless steel (**LL17**) or nylon fast-response (**FF17**) for monitoring temperature in remote devices

Convenient filler/de-aerator and bypass system (**BS15**) available as an optional accessory to simplify filling and de-aerating of closed systems

BS15

Compact design with powerful pump – takes up the minimum of space on or beneath the bench

© Grant Instruments (Cambridge) Ltd

Recirculating chillers – RC series

Comprehensive range of robust recirculating chillers delivering a constant flow of temperature-controlled liquid to provide powerful, regulated cooling down to -10ºC for many types of industrial machinery and scientific apparatus. Suitable for circulation through open and closed systems.

- **Temperature range -10 to 60ºC or -5 to 60ºC (model dependent)**
- **Stability ± 0.25ºC or ± 0.5ºC (model dependent)**
- **Choice of models with different cooling power – from 350 to 3000 W**
- **Efficient, reliable and cost-effective alternative to cooling with mains water**

RC350G recirculating chiller

Choice of four models – three acting as recirculating chillers/heaters, one as a powerful dedicated recirculating chiller (**RC3000G**)

Digital controller for accurate and reproducible temperature setting. User-selectable high and low temperature alarms

Robust construction, using corrosion resistant materials – long term durability and reliability in demanding applications

In-built safety features protect the user, equipment and application from overtemperature, undertemperature and flow failure

A useful TUNE facility enables automatic optimisation of the chiller's closed-loop temperature control parameters to meet specific user requirements

Lockable wheels allow RC units to be moved easily from location to location and ensure that they stay put once in position

Accessories for RC series

- **RC BYP** – bypass to overcome flow restrictions (flow < 1 L/min), e.g. in narrow tubes or small cells
- **RC PR** – pressure gauge to assist with setting up cooling systems and monitoring performance
- **PRES** – priming reservoir to simplify priming in a closed loop system which has no filling port available on the RC inlet (not required for RC3000G)
- **External probe** – Pt1000 probe for remote sensing temperature control. On request only, requires modification to chiller
- **RC HF9, RC HF12, RC HF17** – Rear connecting fittings (pair) for 9, 12 and 17 mm internal diameter hose sizes respectively

 © Grant Instruments (Cambridge) Ltd

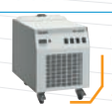
Products for special high temperature applications – models and specifications

			High temperature baths/circulators digital control		High temperature block heater, digital control	Flow heater digital control
			HE10D	HE30D	BT5D	FH16-D
			 h: 400 mm 10 litres h: 265 mm d: 320 mm w: 415 mm	 h: 455 mm 30 litres h: 320 mm d: 415 mm w: 565 mm	 h: 150 mm d: 410 mm w: 205 mm	 h: 140 mm d: 340 mm w: 205 mm
Temperature range		°C	50 to 260		ambient + 10 to 400	ambient + 5 to 80
Stability (DIN 58966)		°C	± 0.25 (at 150°C)*		± 0.5 (up to 300°C)	± 0.004
Uniformity		°C	± 0.2 (at 150°C)*		1%	–
Display			LED		LED	LCD
Display resolution		°C	1		1	0.1
Timer		mins	1 to 9999		1 to 9999	–
Alarms			high/low		high/low	–
Heater power 220/240 V		kW	1.1	2.2	–	0.75
Overall consumption 220/240 V		kW	1.2	2.3	–	0.85
Liquid flow rate, maximum		L/min	6*#		–	19
Pump head pressure @ 0 L/min		m	1.6*#		–	2.2
Pipe bore		mm	7.5#		–	–
Heat up time ambient to maximum		mins	–		100	–
Working area/tank opening		mm	190 x 210	350 x 305	–	–
Tank dimensions	l/w/h	mm	305 x 210 x 185	455 x 305 x 240	–	–
Liquid depth	min/max	mm	100/140	145/190	–	–
Heating block	l/w/d	mm	–		190 x 140 x 75	–
Capacity	BT5D-16		–		38 x Ø 16 x d60 mm tube	–
	BT5D-26		–		22 x Ø 26 x d60 mm tube	–
Safety	overtemperature protection		adjustable cut-out		adjustable cut-out	adjustable cut-out
	liquid level		float switch		–	–
Electrical supply		V	–		–	220-240 (50-60 Hz)
Electrical power	220-240 V 50/60 Hz	kW	1.2	1.3	0.75	–
	110-120 V 50/60 Hz	kW	1.2	1.6	0.75	–
EMC emissions			Class A		–	–

* using silicon oil # using accessory pump

Products for special low temperature applications – models and specifications

● = standard

			Recirculating chillers – digital control			
			RC350G	RC400G	RC1400G	RC3000G**
			 42 kg h: 510 mm d: 600 mm w: 370 mm	 42 kg h: 510 mm d: 600 mm w: 370 mm	 53 kg h: 590 mm d: 630 mm w: 380 mm	 88 kg h: 640 mm d: 840 mm w: 490 mm
Temperature range	ambient 20°C	°C	-5 to 60	-10 to 60	-10 to 60	-10 to 60
Stability (DIN 58966)	@ 20°C using water	°C	± 0.25*	± 0.25*	± 0.25*	± 0.5#
Display			LED	LED	LED	LED
Display resolution		°C	1.0	1.0	1.0	1.0
Typical cooling power, ambient 20°C	@ 20°C	W	350	400	1300	3000
	@ 0°C	W	120	150	600	1500
	@ -10°C	W	–	20	150	575
Heater power		kW	0.75	0.75	1.5	–**
Overall consumption	220/240 V	W	1.5	1.5	3.0	2.0
Liquid flow rate, maximum		L/min	15	12	15	15
Pump head pressure @ 1 L/min		bar	1.6	0.62	1.6	1.6
Pipe connection, inlet/outlet	3/8" BSP male		●	●	●	●
Reservoir capacity		L	1.7	1.7	2.5	1.1
Safety: – temperature	switchable undertemperature thermostat		●	●	●	●
– temperature	fixed overtemperature cut-out		●	●	●	–
– level	flow-fail device		●	●	●	●
Electrical supply		V	220-240 (50 Hz)	220-240 (50 Hz)	220-240 (50 Hz)	220-240 (50 Hz)
EMC emissions		Class	B	B	A	B

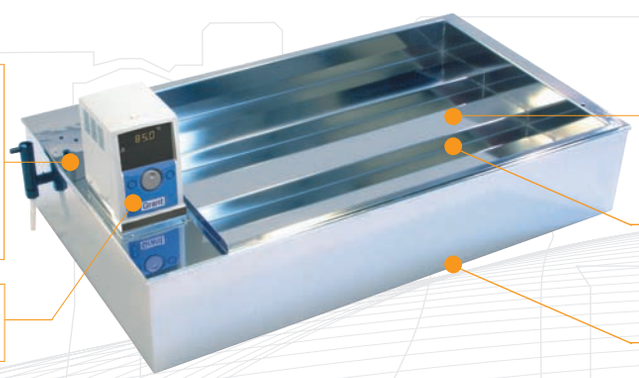
* with 10 litres of water in the system # with 25 litres of water in the system *# improved performance is achieved in applications with a large load
** RC3000G has no heater so can only control against a heat load

© Grant Instruments (Cambridge) Ltd

Inspissator for the production of tuberculosis culture medium

Convenient and effective system designed to produce large batches of uniform tuberculosis culture medium four to six times per day. Vessels containing culture medium are incubated on a shallow tray which is in contact with water held at a constant temperature of 85ºC within a tank, so ensuring that the temperature of the vessels is constant. Inspissation takes 50 minutes at 85ºC.

- **Robust durable design, with digital temperature control**
- **Standard temperature: 85ºC; operating temperature range ambient + 5 to 90ºC**
- **Capacity for up to 156 test tubes (16 mm diameter x 150 mm long) or 162 universal containers**



Grant Inspissator TB-GD100IN

Water temperature under the tray is controlled by a digital immersion thermostat for accuracy and reproducibility of set temperature. All moving parts are incorporated in the control unit which is easily removed for servicing.

Digital controller for accurate and reproducible time and temperature setting

An insect resistant blanket and quilt are placed over the containers to provide thermal insulation and exclude draughts

An adjustable overtemperature cut-out protects users, valuable samples and the workplace

Robust and durable construction – the tray, tank and robust outer case are made of polished stainless steel

Developed in conjunction with Professor Mitchison of the Royal Postgraduate Medical School of London University and used in a number of tuberculosis laboratories which are assisted by the World Health Organisation.

According to the statistics of the WHO, TB kills more young people and adults than any other infectious disease in the world. It causes more deaths than AIDS and Malaria combined. Although the use of penicillin and antibiotics have caused the decline of this disease in some countries, hot spots of this illness still exist in eastern Europe, south east Asia and sub-Saharan Africa. Numbers that were seemingly beginning to decrease began to rise in the 1980's with the emergence of Aids. Scientists now say that the number of people with TB around the world has reached a ten year high. The very cost effective Grant Inspissator means that it is used extensively in these areas and assists in the diagnosis of this serious disease.

 © Grant Instruments (Cambridge) Ltd

Transportable incubator

Convenient battery-powered transportable incubator, based on a dry block heating system, for transporting biological samples at 37°C. Ideal for applications requiring portable temperature control within the range of ambient + 5 to 45°C.

- **Temperature range ambient + 5 to 45°C**
- **Stability within the tube ± 0.1°C, uniformity ± 0.2°C**
- **Digital setting and display for accuracy and reproducibility of set temperature**
- **Capacity for up to 18 x 16 mm Falcon tubes – other options available**
- **Internal battery – charged from mains or vehicle 12v dc (lighter) socket (leads supplied)**
- **Robust and reliable in operation**
- **Convenient carrying case**

TRANS INC transportable incubator

Extremely easy to use – simply plug into the mains, set the required temperature and allow the unit to heat up. Once the set temperature is reached and the unit is disconnected, the fully charged internal battery will maintain the temperature for 4 to 5 hours and, if necessary, can be recharged by plugging into a vehicle 12v dc (lighter) socket

Dry block heating system ensures a clean environment with less chance of contamination

Blocks are interchangeable to provide flexibility. The standard block supplied holds up to 18 x 16 mm Falcon tubes. Alternatively you can specify your own

Small, rugged, easy-to-clean carrying case with a comfortable carrying handle and a latching lid to keep contents safe

The bright LED display constantly displays actual temperature for at-a-glance reassurance

An overtemperature cut-out keeps the products safe from overheating

© Grant Instruments (Cambridge) Ltd

Gerber bath

Robust, high precision temperature-controlled stirred bath specifically designed for use in dairy laboratories, with sufficient depth to allow immersion of Gerber butyrometers. Also suitable for general laboratory applications where a deeper tank is required.

- **Temperature range ambient + 5 to 100°C**
- **Stability ± 0.05°C**
- **Electronic temperature control, with stirred circulation**
- **Capacity for up to 36 Gerber butyrometers**

GD100-MS20 Gerber bath

Removable control unit for easy cleaning and servicing. All immersed parts – the heater, float, stirrer and temperature sensor – are made of materials that will resist occasional contamination of the water by spilt Gerber acid

Space for three purpose-designed racks (H1-25M), each with the capacity to hold 12 butyrometers

Robust stainless steel inner tank and outer case with a hinged lid plus handle for convenient access

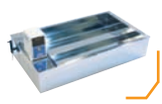
The bright LED display constantly displays actual temperature for at-a-glance reassurance

Sophisticated digital control unit provides adaptive intelligent PID temperature control

In-built safety features ensure that the set temperature is not exceeded and that the bath does not operate with too low a level of liquid

 © Grant Instruments (Cambridge) Ltd

Products for special warming applications – models and specifications

			Inspissator	Transportable incubator	Gerber bath
			TB-GD100IN	TRANS INC	GD100-MS20
			 h: 380 mm d: 600 mm w: 1040 mm	 9 kg h: 280 mm d: 235 mm w: 304 mm	 h: 480 mm h: 290 mm d: 232 mm w: 412 mm
Standard temperature		°C	85	–	–
Temperature range		°C	ambient + 5 to 100	ambient + 5 to 45	ambient + 5 to 90
Stability (DIN 58966)		°C	–	± 0.1 (tube)	± 0.05
Uniformity		°C	± 0.7 (tray)	± 0.2	–
Display			LED	3-digit LED	4-digit LED
Display resolution		°C	0.1	1	0.1
Heater power	220/240 V	W	1400	25	1400
	110/120 V	W	–	–	1300
Heat up time	20 to 85°C	hrs	3.5	–	–
	ambient to 37°C	mins	–	60	–
Heat retention, ambient 20°C internal battery power, 37°C		hrs	–	>5	–
Working area/tank opening		mm	820 x 594	–	240 x 210
Tubes	*Falcon tubes*		–	18	–
Tank capacity (nominal)		L	45	–	20
Liquid depth	min/max	mm	–	–	185/225
Heating block	l/w/h	mm	–	140 x 65 x 75	–
Safety	overtemperature protection		fixed cut out	–	–
Electrical power	220-240 V 50/60 Hz	W	1500	48	1500
	110-120 V 50/60 Hz	W	–	–	1400
Vehicle battery supply 12 V DC		W	–	24	–
Internal battery supply 12 V		AH	–	6.5	–
Ambient temperature		°C	–	10 to 30	–

© Grant Instruments (Cambridge) Ltd

Temperature gradient plate

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. The design is based on the fact that a temperature gradient results if one edge of a square aluminium plate is heated and the opposite edge is cooled.

In the Grant system, the gradient runs in one direction for part of the 24 hour cycle and can be then automatically switched to run at a right angle to its original direction for the remainder of the cycle, to provide all possible combinations of minimum and maximum temperature.

- **Temperature range (cold edges): 0 to 30°C**
- **Temperature range (hot edges): ambient + 5 to 50°C**
- **Perspex grid divides working area into 196 mini-incubators**
- **Multi-channel Squirrel data logger for recording time and temperature**

GRD1 temperature gradient plate shown with optional lid and integrated Squirrel data logger

Removable Perspex grid effectively divides the working area into 196 miniature incubators, each with a different temperature regime – allows many samples to be tested without the need for separate controlled environment chambers

Robust, fully integrated system. Fitted with castors to assist with locating the unit

A 24 hour adjustable timer controls the length of the two phases within the 24 hour cycle, and the switching the gradient direction

Multi-channel Squirrel data logger for recording time and temperature from five probes positioned underneath the plate – one in each corner and one in the centre – for later analysis by PC

Developed from a design originating from Dr A. J. Murdoch and Professor E. H. Roberts of Reading University, Department of Agriculture.

Typical applications include seed testing, germplasm screening, research in seed and plant physiology, microbiology, entomology and biotechnology, and component testing.

 © Grant Instruments (Cambridge) Ltd

Applications of the GRD1

Based on studies carried out at the University of Reading, UK

Overcoming seed dormancy

Dormant seeds often require moist storage (stratification) to help break their dormancy. The GRD1 can help to quantify temperature effects in seeds during warm stratification as carried out by Kebreab & Murdoch, (1999a).

Seed germination at constant temperatures

The GRD1 allows germination tests to be carried out over a very wide range of temperatures for both dormant and non-dormant seeds. Interaction with other factors such as water stress and chemicals can also be studied and modelled as was done by Kebreab & Murdoch (2000).

Seed germination at alternating temperatures

The GRD1 will operate with the temperature gradient for part of the day in one direction and then at right angles to that direction for the rest of the day. Thus the GRD1 can provide 196 different thermal environments. The effects of constant and alternating temperatures at two thermoperiods were quantified in several species by Kebreab & Murdoch (1999b).

With many plants, particularly small-seeded species, the GRD1 provides an extremely powerful tool (Murdoch *et al.*, 1989). Optimum temperatures are easily identified and sufficient data is available to understand and model the responses to temperature. Interactions with dormancy-relieving factors may also be investigated.

Germination rates

The GRD1 has been invaluable in such studies as the evaluation of thermal time required for germination. Examples include Ellis & Barrett (1994) and Kebreab & Murdoch (1999C).

Other applications

Apart from the size constrains (the GRD1 is suitable for samples up to 30mm in diameter); uses are only limited by imagination. For example, parasitism of insects by nematodes has been tested by Ratnasinghe and Hague (1998).

Our GRD1 and GRD1 LH are in use worldwide as critical tools in various fields, namely:

Seed Preservation	Kew Gardens and other establishments worldwide (particularly Australia and China) within the Millennium Seed Project Partnership.
Biofuel Research	Ceres, California USA
Food Crop research	Scottish Crop Research, International Rice Research Institute (IRRI), Philippines.
Plant Pest Diagnostics	California Department of Food & Agriculture (CFDA).

© Grant Instruments (Cambridge) Ltd

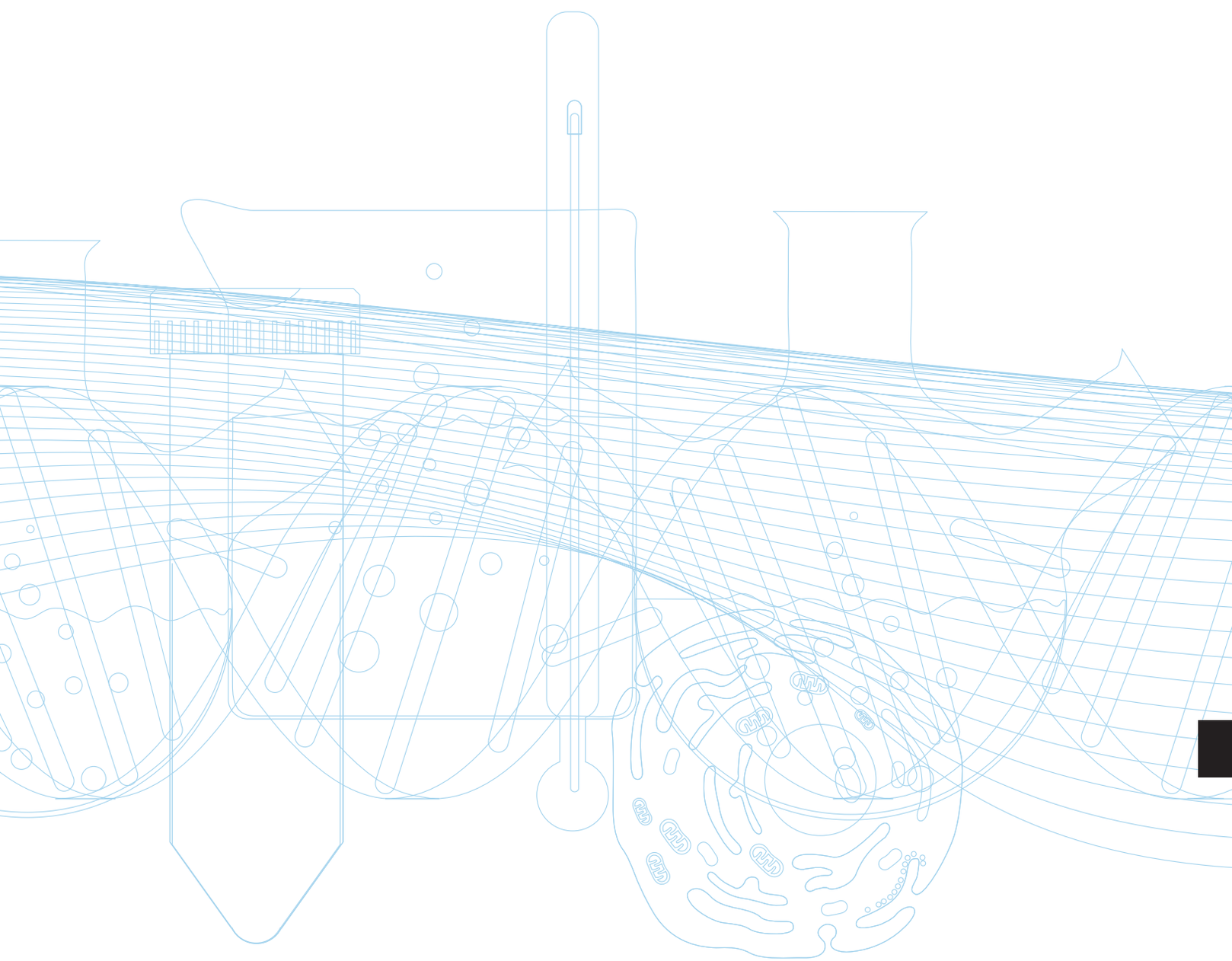
Products for other special applications – models and specifications

● = standard		Temperature gradient plate
		GRD1
		 229 kg h: 1040 mm d: 1020 mm w: 1020 mm
Temperature range cold edges	°C	0 to 25
hot edges	°C	ambient + 5 to 50
Stability (DIN 58966)	°C	± 1
Display		digital
Time/temperature recording via optional Squirrel data logger		●
Working area	mm	760 x 760
Electrical power 220-240 V 50/60 Hz	W	2050
EMC (emissions)		Class A

* dimensions including FS60 frame – available as an accessory option

 © Grant Instruments (Cambridge) Ltd

18 Cryopreservation



Grant Asymptote EF600M

Liquid nitrogen free and cryogen free controlled rate freezer for the cryopreservation of a wide range of material including: embryos, stem cells, mammalian cells, spermatozoa, antibodies, tissue sections and rodent organs. **The EF600M brings accuracy, precision and reproducibility to biological cryopreservation.**

Unlike conventional liquid Nitrogen based controlled rate cooling equipment used in IVF laboratories, the EF600M poses no contamination risk and can be used in cleanrooms and barrier facilities. The EF600M fits neatly and quietly on a bench-top and its performance in terms of cell viability after freezing is comparable or better than standard liquid nitrogen freezers. As alcohol is not used, there is also no potential fire risk. The EF600M will cool down to –100°C with straws.

The cooling rate of the EF600M is precisely controlled, ensuring accuracy and reproducibility throughout the freezing profile especially for the important nucleation/seeding phase. This ensures optimal recovery of cells upon thawing. Operation is simple and can be carried out with or without a PC; data can be logged via PC software and cooling profiles are directly displayed. Different cooling profiles are available from a drop down menu and customised profiles can be written. Published trials[1] have demonstrated successful freezing and recovery of embryos, sperm and embryonic stem cells.

[1]RBM Online 13, 421-426, 2006; Cryoletters 27(3), 179-184 (2006)

 © Grant Instruments (Cambridge) Ltd

Main applications

The EF600M is highly versatile and can be used for the cryopreservation of a wide range of samples in cryovials, straws, bags, microplates and Matrix-96-well block plates including:

- Human and veterinary IVF
- Transgenic embryos
- Stem cells
- Clinical and research samples, e.g. lymphocytes and tissue cells lines in conventional cryovials
- Various mammalian cells including cardiomyocytes, adipose, liver and muscle
- Cord blood derived stem cells in typical cryocyte bags
- Adherent cells and stem cells in microplates plates
- Cell suspensions in numbered/barcoded arrays for archiving and storage
- Robotic integration – the EF600M has also successfully been integrated into robotic systems, supporting biorepository and biobank applications

Key benefits/features

- Accurate and reproducible control of cooling rates and sample temperatures
- Easy to use and samples can be nucleated/seeded *in-situ*
- Linear and non-linear cooling profiles
- Low running costs: estimated at 1% of liquid nitrogen controlled rate freezing
- Temperature remains at -100°C at the end of cycle for straw applications until freezer is switched off
- Uninterruptible Power Supply (UPS): complete cycle run if power fails (supplied as an optional accessory)
- CE marked
- Servicing and calibration available
- 3 year warranty

© Grant Instruments (Cambridge) Ltd

Product range

The range includes various models each providing optimum performance for a specific and common vessel, or vessels for the combined heads including:

EF600M 100	Plate for 16 x 0.5 ml CBS high security straws
EF600M 101	Plate for 18 x 0.3 ml IMV straws
EF600M 102	Plate for 55 x 1.8 ml cryovials (0.5 ml max fill)
EF600M 103	Flat plate for various items/vessels
EF600M 104	Plate for cryocyte bag (available as a “Special” only)
EF600M 105	Plate for 1 x SBS microplate
EF600M 106	Plate for 55 x 1.8 ml cryovials (1.0ml max fill)
EF600M 107	Plate for 10 x 0.5 ml CBS high security straws & 12 x 1.8 ml cryovials (0.5 ml max fill)
EF600M 108	Plate for 12 x 0.3 ml IMV straws & 12 x 1.8 ml cryovials (0.5 ml max fill)

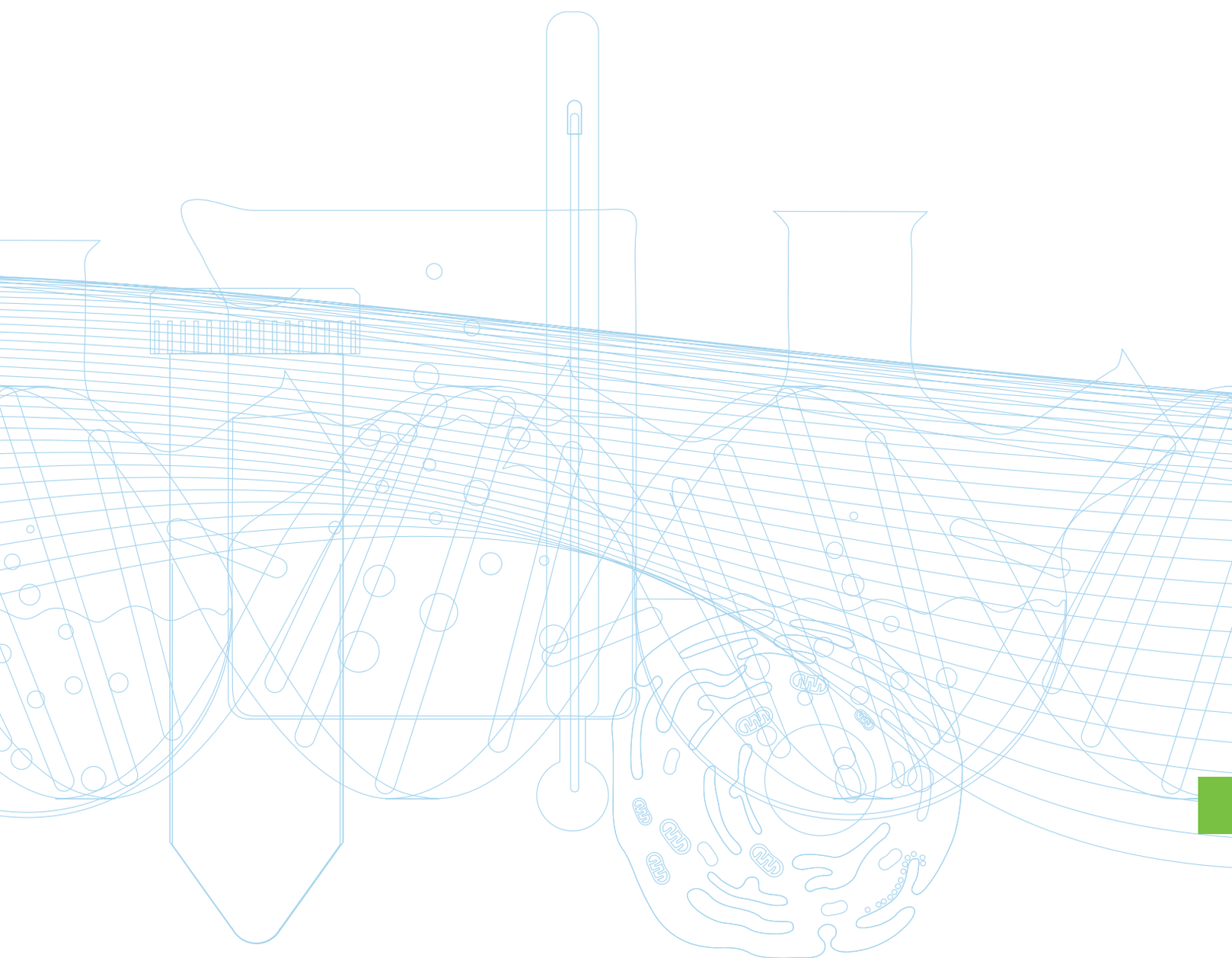
Accessories

- **Cryopen ice nucleating tool:**
  A small nitrous oxide cryosurgical device which uses the rapid expansion of sterile N_2O to induce ice nucleation (“seeding”) in the samples. The gas does not compromise the sterility of the operating environment.
- **Backup electrical supply:**
  Uninterruptible Power System (UPS) capable of running the freezer for a 3 hour cycle in the event of an electrical power failure

Grant are developing a number of additional accessories to compliment the EF600M. For further information please contact Grant technical support. Contact details are provided at the front of this catalogue.

 © Grant Instruments (Cambridge) Ltd

19 Grant data loggers



Grant data loggers

Grant designs and manufactures the world renowned range of Squirrel data loggers – small, portable, battery operated loggers for metering and recording a wide variety of physical parameters in scientific and research laboratories.

Grant's range of Squirrel data loggers includes:

- **High-precision universal data loggers** for recording a wide range of physical parameters including temperature (thermistor; K, J, T thermocouple; Pt100/Pt1000 platinum resistance), humidity, voltage, current and resistance
- **Dedicated temperature loggers** for recording temperature from K or T thermocouple sensors

High-precision universal data loggers

Squirrel 2010 – 4 to 8 analogue channels

Small versatile portable data logger with 4 to 8 analogue input channels to measure current, voltage, resistance and temperature, plus 8 digital channels to record events or automatically trigger or stop logging. Suitable for bench based and fixed installations.

- 4 to 8 universal analogue inputs plus 8 digital inputs
- Up to 16 derived/calculated channels
- 0.1% accuracy
- 2 alarm outputs
- 2 pulse counter inputs (1 at 64 kHz, 1 at 100 Hz)
- Up to 14 million readings
- USB connectivity to PC

Squirrel SQ2020 series – 8 to 16 analogue channels

A range of hand held high-performance universal data loggers. Up to 16 universal analogue channels and a choice of communications methods, including Wi-Fi. Suitable as stand-alone loggers or as PC-linked data acquisition systems in industrial and scientific research and quality assurance applications.

- 8 to 16 universal analogue inputs plus 8 digital inputs
- Up to 16 derived/calculated channels
- High precision (0.05%)
- High speed option (up to 100 Hz)
- Integral Wi-Fi Ethernet networking option
- 4 pulse/counter inputs(2 at 64kHz, 2 at 100Hz)
- 4 alarm outputs
- Advanced data management and communications (MMC, USB, Ethernet, RS232)
- Remote connection via dial up modem or inbuilt Ethernet
- Up to 14 million readings

 © Grant Instruments (Cambridge) Ltd

Squirrel SQ2040 series – 16 to 32 analogue channels

Offering the same powerful features as the Squirrel SQ2040 series but with twice as many universal input channels plus the option of high speed logging on up to four channels.

- 16 to 32 universal analogue plus 8 digital inputs
- High speed option (up to 100 Hz on 4 channels)

Squirrel OQ610-S temperature logger

Small battery-operated temperature logger for general purpose temperature monitoring applications in research, industry and development.

- 6 channels for type K or T thermocouples
- USB connectivity for direct data print-out
- up to 8 samples/second
- up to 260,000 readings of secure data

SquirrelView and SquirrelView Plus software

Included with every new Grant Squirrel data logger, SquirrelView software allows quick set-up of Squirrel loggers for any application, speedy download of data and direct export to Excel. SquirrelView Plus, available at extra cost, has the additional benefits of graphically analysing your historical and on-line data and providing advanced reporting.

Grant temperature probes

Grant manufactures a comprehensive range of robust, high quality temperature probes with a choice of sensor and in a variety of physical styles for use with Squirrel data loggers and Grant laboratory equipment.

- Choice of thermistor, thermocouple and platinum resistance sensors
- High quality robust construction for long life
- Test and calibration traceable to national standards

© Grant Instruments (Cambridge) Ltd

Squirrel data loggers – summary of specifications

x = not available
● = standard

	Entry level	Standard	High speed	High performance	Extended high performance	Temperature only
	SQ2010	SQ2020-1F8	SQ2020-2F8	SQ2040-2F16	SQ2040-4F16	OQ610-S
Analogue input channels	4 to 8	8 to 16	8 to 16	16 to 32	16 to 32	6
High voltage channels	x	2	2	2	2	x
Digital channels	8	8	8	8	8	x
Counter channels	2	4	4	4	4	x
Input types:						x
– current	4	8	8	16	16	x
– voltage	4 to 8	8 to 16	8 to 16	16 to 32	16 to 32	x
– resistance	2-wire	2-wire	2-, 3- or 4-wire	2-wire	2-, 3- or 4-wire	x
– 3- or 4-wire Pt100/Pt1000	x	x	4	x	8	x
– temperature Thermocouple / Thermistor	4 to 8	8 to 16	8 to 16	16 to 32	16 to 32	6 x K or T thermocouple
Max no. readings per second	10 (on 1 channel)	20 (on 1 channel)	100 (on 2 channels)	100 (on 2 channels)	100 (on 4 channels)	8
Accuracy	0.10%	0.05%	0.05%	0.05%	0.05%	0.5°C
Display	128 x 64 dot matrix LCD	2 x 20 character LCD	2 x 20 character LCD	2 x 20 character LCD	2 x 20 character LCD	2 x 16 character LCD
Memory capacity	14 million readings					0.25 million readings
External memory (MMC/SD card)	x	●	●	●	●	x
RS232 communications	●	●	●	●	●	x
USB communications	●	●	●	●	●	●
Ethernet	x*	x*	●	●	●	x
Wi-Fi option	x	x	●	●	●	x
Alarm outputs	2	4	4	4	4	x
Sensor power output	5 VDC at 50 mA and supply volts @ 100 mA	5 VDC at 50 mA and supply volts @ 100 mA	5 VDC at 50mA and supply volts @ 100 mA	5 VDC at 50 mA and supply volts @ 100 mA	5 VDC at 50 mA and supply volts @ 100 mA	x
Set-up/analysis software	SquirrelView/SquirrelView Plus					
Environment	- 30 to 65°C RH up to 95% (non-condensing)					

* can supply separate RS232 to Ethernet, converter part SQ20A 801 ** in place of Ethernet

Other data loggers from the Grant group of companies

Eltek telemetry based data logging systems

Grant affiliate Eltek, part owned by Grant Instruments and UK based, specialises in the design and manufacture of wireless data logging systems based on the Squirrel data logger.

Visit **www.eltekdataloggers.co.uk** for more information.

 © Grant Instruments (Cambridge) Ltd

20 General information

Safety

All Grant laboratory equipment meets the requirements of International Standard IEC 61010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use and IEC 61010-2-010, Particular requirements for laboratory equipment for the heating of materials.

The above international standards are also published as European (EN 61010) and British (BS EN 61010).

All plastics used in Grant laboratory equipment are resistant to acids and to common laboratory solvents, and meet classification FVO or FV1 of IEC 707 (equivalent to V-0 or V-1 of UL94).

Electrical supplies

All standard Grant laboratory equipment is available for voltages within the range 220-240 V, 50 or 60 Hz, apart from RC recirculating chillers which may only be used on 50 Hz supplies. Most standard equipment is available for voltages within the range 110-120 V, 50 or 60 Hz. See individual specifications for details.

Environmental conditions

Grant laboratory equipment is designed for indoor use in laboratory conditions, with room temperature between 5°C and 40°C, and 80% relative humidity up to 31°C unless stated otherwise.

CE mark

All Grant laboratory equipment bears a CE mark to indicate that it meets the requirements of all applicable European Directives.

Compliance with the Low Voltage Directive is demonstrated by meeting EN 61010 (see paragraph above on safety) and the EMC Directive by meeting EN 61326-1: EMC requirements for electrical equipment for measurement, control and laboratory use.

Where appropriate Grant laboratory equipment conforms to IEC 61326-1 (EN 61326-1) Class B except where indicated.

Class B equipment is for use in domestic establishments, and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

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.

Quality

The Grant Quality Management System complies with the requirements of BS EN ISO 9001:2008. It is Grant's policy to supply customers with products which are fit for their intended purpose, safe in use, perform reliably to published specification and are backed by a fast and efficient customer service.

After sales service

In the United Kingdom, repairs are normally carried out within three to five working days of arrival at our factory, or receipt of authorisation to repair. Refrigeration systems may take a few days longer, as they require more prolonged testing after repair. Alternatively, spare parts and service manuals can normally be despatched within two working days.

Most distributors of Grant equipment outside the UK hold stocks of spare parts, have their own service engineers and operate a similarly prompt repair service.

Guarantee

Grant equipment is robust and reliable, designed and built to provide years of trouble-free service.

All standard Grant laboratory equipment is guaranteed for three years against faulty materials and workmanship. Grant bio equipment is guaranteed for two years, and application-specific equipment for one year. If repairs are carried out under guarantee, no charge is made for labour or materials, and within the United Kingdom we make no charge for carriage.

Performance figures

Except for refrigerated products, performance figures quoted apply to equipment used in ambient temperature between 10°C and 35°C. See individual specifications for details.

Stability figures quoted for baths/circulators are derived from tests made in accordance with DIN 58966 or DIN 12876. Both DIN standards require measurements to be taken as follows:

- at one point in the middle of the bath
- at one temperature
- during '100 fluctuations'
- without any test tubes or flasks in the baths
- stable ambient temperature
- stable supply voltage

Stability figures calculated using DIN 58966 discount the worst 25% of all temperature fluctuations.

The measurement procedure for stability of block heaters is similar, with measurements taken in the centre of a block.

Uniformity is measured at 37°C, using water in a bath, unless stated otherwise. Uniformity is defined as half the maximum temperature difference between any two points in the working space of a bath, or between any two tubes in a block heater.

Liquids

We recommend the following liquids for use in Grant baths:

- 50 to 50°C:	Silicone fluid: Bayer Baysilone fluid M3
- 30 to 30°C:	50% water 50% antifreeze (inhibited ethylene glycol)
0 to 30°C:	80% water 20% antifreeze (inhibited ethylene glycol)
5 to 99.9°C:	Water
50 to 150°C:	Dow Corning silicone fluid DC200/20
150 to 260°C:	Dow Corning silicone fluid DC210H/100

World wide availability and support for Grant laboratory equipment

Grant laboratory equipment and specialist technical support is available world-wide. Please visit **www.grant.co.uk** for further product information and to locate your locally appointed distributor and support centre.

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

I.C.T, S.L. - INSTRUMENTACION CIENTIFICA TÉCNICA, S.L.
Avda. de Juan Carlos I, 24 · 26140 Lardero (La Rioja) · España
Tel: (+34) 902 193 170 · Fax: (+34) 902 193 167
Http://www.ictsl.net · E-mail: información@ictsl.net

 © Grant Instruments (Cambridge) Ltd