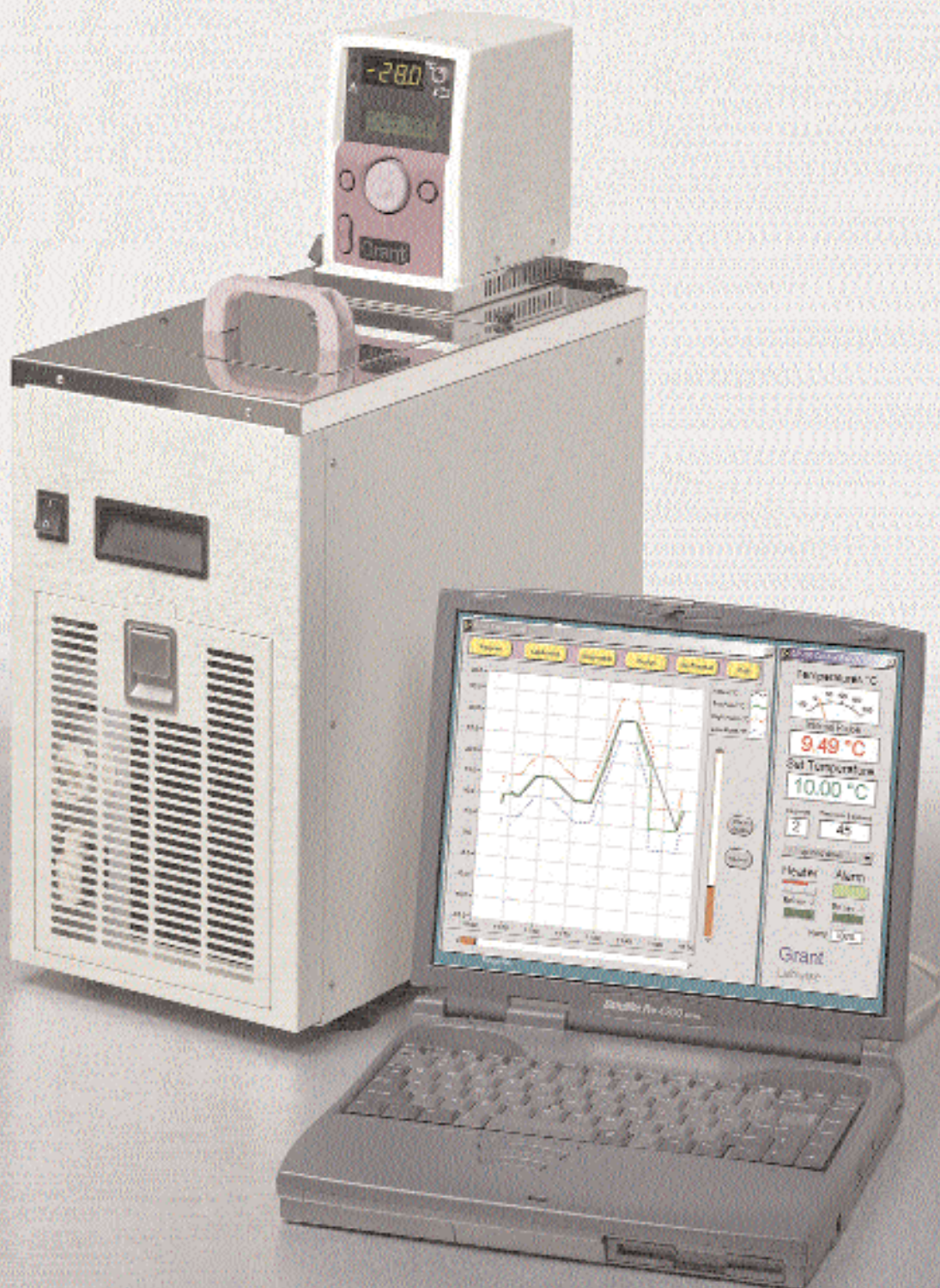


Optima Series

Low temperature refrigerated circulators and baths

Grant
IN THE LABORATORY



Unrivalled system flexibility

Widest choice of refrigeration units

Interchangeable Optima controllers

Powerful pumps

Labwise control software



Grant's flexible approach to controlled low temperature applications

With over seventy configurations to choose from, Grant's exciting new range of powerful and efficient low temperature circulators and baths offers unrivalled system flexibility by allowing the user to combine one of the five new refrigeration base units with any of the popular Optima™ series thermostats. Combined with a wide range of accessories, Grant can offer a complete solution for virtually any controlled low temperature application.

Just follow the three easy steps...

With over seventy configurations to choose from...

1

Select the thermostat



There are five thermostats available ranging from the simple efficiency of the analogue GA100 to the sophistication of the powerful, programmable GP200. All the digital models offer the unique navigator and interactive display which allows for fast, accurate set-up and intuitive movement from one menu selection to another. And, for ultimate performance, the optional Labwise™ PC software package allows two-way communication for status display, programming and data capture.

2

Select the refrigeration unit



Quality is the keynote in the development of this range of powerful and efficient refrigeration units from Grant. Choose between five units in three popular sizes with minimum operating temperatures from as low as -47 °C. Quiet in operation, robust and corrosion resistant they offer long service life. All models are supplied with a bridge plate for mounting the thermostat unit, a removable lid and a detachable front grille for easy cleaning of the condenser. A host of other features are available, including fitted drain valves and refrigeration on/off control during a heating and cooling program.

3

Select the add-on accessories



A comprehensive range of accessories is available, enabling the user to configure the system to suit any specific requirements. Choose from the full range of Grant accessories including:

- powerful pumps for external circulation
- Labwise software for control, programming and data logging
- external probes for monitoring and controlling the temperature of remote loads



There are many factors to consider when choosing your system. A simple selection guide along with full specification tables are shown on pages six and seven to help you through this process. Grant's technical support team is also on hand should you require further assistance.

Thermostats

Analogue control for simple, effective performance, model GA100



GA100-R1

- 0 to 100°C
- setting dial with analogue scale, resolution better than 1°C (20 to 80°C)
- a reference thermometer is required (not supplied) for accurate temperature setting
- dual-position fitting on refrigeration units for convenient access
- stirred circulation within the tank for good temperature stability and uniformity
- low liquid protection by float switch
- visual alarm

Microprocessor controlled digital units

Features common to all digital models:

- Intelligent Control Optimisation™, (ICO), for adaptive intelligent PID temperature control. Optimum control of below-ambient temperatures is achieved by finely tuned heater control balanced against continuously running refrigeration; the ICO of the Optima series thermostats is ideal for this purpose
- digital display and uncomplicated user interface
- easy interactive user interface, based on a novel, sensitive rotor plus two keys
- operating setpoint, plus three adjustable preset temperature values
- user recalibration facility, for optimum accuracy at the required operating temperature
- dual-position fitting on refrigeration units for convenient access
- stirred circulation within the tank for good temperature stability and uniformity
- low liquid protection by float switch
- fault indication display
- visual alarm

General purpose digital models GD100, GD120

Features common to both models:

- digital display: 4 character bright LED

GD100

- 0 to 100°C

GD120

- -20 to 120°C
- powerful pump for external circulation, maximum flow rate 17 L/min, maximum pressure 310 mbar
- two pump connector plates supplied as standard, choice of pipe bore: 6mm and 11mm
- timer function for reaction timing, 1 to 9999 minutes
- variable high temperature alarm setting
- user-adjustable overtemperature cut-out
- liquid selection safety feature for restriction of temperature range or heater power
- audible alarm



Easy, interactive user interface

High performance models GR150, GP200

Features common to both models:

- novel soft-touch rotor for fast, intuitive navigation through the powerful, layered menu system
- dual display: 4 character bright LED, plus two line 16 character LCD

- twin heaters, for compliance with Flicker standard EN61000-3-3
- heater power 2kW, for fast heat up
- timer function for reaction timing, 99 hours, 59 minutes, with audible alert and heater control
- two pump connector plates supplied as standard, choice of pipe bore: 6mm and 11mm
- fault indication display
- external Pt1000 temperature probe socket
- two-point user recalibration of internal and external probes
- off-set adjustment for optimal isothermal performance
- the GR150 and GP200 thermostats can be programmed to switch the refrigeration on and off during a heating and cooling program
- liquid selection safety feature adjusts for temperature range or heater power
- variable high and low temperature alarm settings, choice of fixed temperature or deviation modes
- alarms can be configured to switch a relay
- choice of language: English, French, German, Spanish and Italian
- RS232 interface
- optional Labwise PC software for program set-up, data-logging and real-time graphing
- adjustable over-temperature cut-out
- audible alarm

GR150

- -50 to 150°C
- powerful pump for external circulation, maximum flow 17 L/min, maximum pressure 310 mbar
- memory capacity for one program of up to 30 segments

GP200

- -50 to 200°C
- powerful pump for external circulation, multi-stage variable flow rate, max. flow 21 L/min, max. pressure 530 mbar
- additional programmable relay for control of ancillary equipment during program execution
- storage for five programs of up to 30 segments
- front-panel programming interface, featuring:
 - set target temperature
 - set heating or cooling time to target temperature
 - up to 30 segments per program
 - switching cooling on and off

GD120-R2



Refrigeration units



The five refrigeration units offer:

- minimum operating temperatures: -20°C, -30°C, -47°C
- tank volumes: 5, 12, 20 litres
- powerful and efficient cooling: 250, 900 and 1100 W extraction @ 20°C
- ozone friendly refrigerant
- rapid cool down
- quiet operation
- choice of 230V and 115V models

PLUS a host of features:

- constructed throughout from corrosion resistant materials with a stainless steel internal tank
- removable front grille allows easy access to the condenser and the liquid drain valve for convenient routine cleaning and liquid changes
- all units are supplied with a bridge plate for mounting the thermostat and a removable lid with fitted handle
- liquid drain valve supplied on R2, R3, R4 and R5 models
- 5°C thermostat on/off switch to stop the tank freezing when operating with water
- dual-position fitting of thermostat for convenient access
- high-pressure switch supplied on R4 and R5 models
- R2 to R5 models: the refrigeration can be switched on and off by the GR150 and GP200 thermostats during a heating and cooling program

Note: The refrigeration unit can be switched off independently of the thermostat, to allow heating only applications. All the refrigeration base units can be used up to a maximum temperature of 100°C.



Accessory pumps

The Optima series integral pumps are satisfactory for most laboratory applications; only if your system demands a higher pressure pump to maintain adequate flow, will you need an accessory vertical turbine pump.

Features

- the unique design produces high pressure with low heat input to the liquid
- the motor is protected from ingress of liquid for long life and reliability
- compact design and low noise
- VTP pumps are supplied with a special lid to enable fitting onto the tank, with half inch pump connections

removable front grille for easy cleaning

Software

The high performance GR150 and GP200 thermostatic controllers together with the dedicated Grant Labwise software form a powerful combination, which makes set-up, monitoring and data logging straightforward. Labwise also features real-time status windows, a graphic display of the controller's performance as a program is run, and allows data to be logged for future recall and analysis.

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

The Labwise software runs on a PC (Pentium II with Windows 95 or higher) and is suitable for use with the GR150 and GP200 controllers.

External probes

For use with the GR150 and GP200 Optima thermostats, for monitoring and controlling the temperature of remote loads. FF17 flexible nylon probe has a very fast response; 100mm long, 4.5mm dia. LL17 robust stainless steel probe, slower response; 125mm long, 5mm dia. Fitted with two metres of cable. Other special probes can be supplied.



Labwise control software

Factors to consider when choosing your system...

Operating temperature required

Combine any Optima thermostat with any refrigeration unit; consider the temperature range of the combination
e.g. GA100 + R5 temperature range is 0 to 100°C.

Cooling power required at that temperature

E.g. if your operating temperature is 0°C, and you need 500W 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:

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

W = average cooling power

V = total system liquid volume L

ΔT = temperature difference °C

K = liquid heat capacity (J/L°C)

Water K = 4200

50/50 water/glycol K = 3800

Alcohol K = 2100

Silicone oil K = 1800

Cool-down time required to reach that temperature

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

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

Do you need to immerse samples within a tank?

Consider the working area required.

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

- 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 accessory vertical turbine pumps.

- 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 R2 to R5.

What other features do you require?

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

Specification comparison table – thermostats

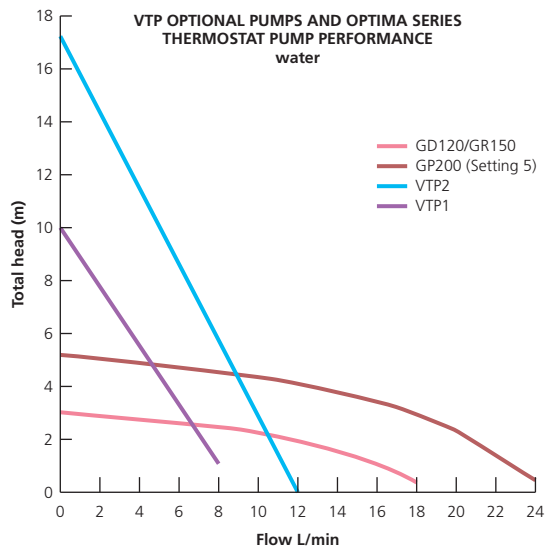
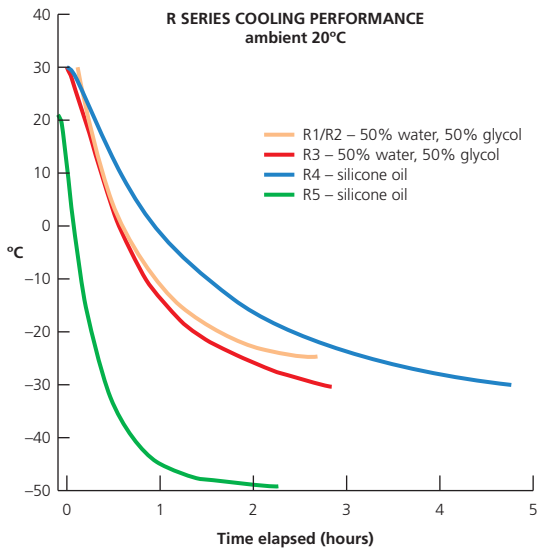
			GA100	GD100	GD120	GR150	GP200
Control temperature range*	°C		0 to 100	0 to 100	-20 to 120	-50 to 150	-50 to 200
Stability (Din 58966)	water@10°C	°C	±0.1	±0.1	±0.1	±0.1	±0.1
	50 %water, 50% glycol@-10°C	°C	–	–	±0.1	±0.1	±0.1
Uniformity (Din 58966)	water@10°C	°C	±0.1	±0.1	±0.1	±0.1	±0.1
	50 %water, 50% glycol@-10°C	°C	–	–	±0.1	±0.1	±0.1
Setting resolution		°C	better than 1	0.1	0.1	0.1 (0.01 using Labwise)	0.1 (0.01 using Labwise)
Display			none	4 digit 13mm LED	4 digit 13mm LED	4 digit 13mm LED 2 line 16 character LCD	4 digit 13mm LED 2 line 16 character LCD
Display resolution		°C	–	0.1	0.1	0.01 (LCD)	0.01 (LCD)
No. stored temperature values			1	4	4	4	4
Two point re-calibration			–	yes	yes	yes	yes
Offset adjustment			no	no	no	yes	yes
External probe			none	none	none	PT1000	PT1000
RS232			no	no	no	yes	yes
Programmable			no	no	no	remote via PC	remote via PC/direct
No. stored programs			none	none	none	1 x 30 segment	5 x 30 segment
Relays			none	none	none	1	2
Heater power	240V	kW	1.4	1.4	1.4	2	2
	115V	kW	1.3	1.3	1.3	1.3	1.3
Pump			no	no	yes	yes	yes
Safety	overtemperature		no	no	adjustable cut-out	adjustable cut-out	adjustable cut-out
	level - float switch		yes	yes	yes	yes	yes
Alarms			no	no	high	high and low	high and low
Electrical power	220-240V	kW	1.5 (50-60Hz)	1.5 (50-60Hz)	1.5 (50Hz)	2.2 (50Hz)	2.2 (50-60Hz)
	110-120V	kW	1.4 (50-60Hz)	1.4 (50-60Hz)	1.4 (60Hz)	1.4 (60Hz)	1.4 (50-60Hz)
Overall dims. excl. clamp	w/d/h	mm	115/145/315	115/145/315	115/145/315	115/145/315	115/145/315
Height above tank rim		mm	180	180	180	180	180
Depth below tank rim		mm	135	135	135	135	135

*The temperature range depends on the refrigeration unit selected, see page seven for details

Specification comparison table – refrigeration units

			R1	R2	R3	R4	R5
Temperature range	ambient 20°C	°C	-20 to 100	-20 to 100	-30 to 100	-30 to 100	-47 to 100
Relay control for refrigeration on/off			–	yes	yes	yes	yes
Cooling power	@20°C	W	250	250	160	900	1100
ambient 20°C	@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	390
	@-40°C	W	–	–	–	–	130
	@-47°C	W	–	–	–	–	25
Refrigerant			R134a	R134a	R134a	R134a	R404a
Weight		Kg	19.2	19.2	19.2	37.8	47
Overall dimensions	w/d/h	mm	230/410/410	230/410/410	230/410/410	390/490/530	415/575/585
Tank capacity		L	5	5	5	20	12
Top opening		mm	110/145	110/145	110/145	230/305	260/115
Liquid depth	min/max	mm	80/140	80/140	80/140	80/140	120/180
Drain			no	yes	yes	yes	yes
Overtemperature cut-out 100°C limit			yes	yes	yes	yes	yes
Water freezing protection thermostat			yes	yes	yes	yes	yes
Refrigeration high pressure switch			–	–	–	27bar	27bar
Electrical power max	220-240V	W	334 (50Hz)*	334 (50Hz)*	354 (50Hz)*	684 (50Hz)	1305 (50Hz)
	110-120V	W	328 (50-60Hz)	328 (50-60Hz)	370 (60Hz)	684 (60Hz)	n/a
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 220-240V refrigeration units.
Allow up to 2kw of extra power from the mains supply



Specification comparison table – VTP optional pumps and Optima series thermostat pumps

			VTP1	VTP2	GD120	GR150	GP200
Max. pressure	water	mbar	1000	1650	310	310	530
Max. flow	water	L/min	9	12	17	17	21 adj. flow rate
Pipe bore	inlet/outlet	mm	12.7	12.7	6, 11	6, 11	6, 11
Mains power 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	–	–	–

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

Note: The refrigeration base unit selected must be specified when ordering the required VTP optional pump

Open and closed loop circulation

Optima low temperature circulators, which have an open tank, are suitable for use in both closed and open systems. An open tank is highly convenient for use with a closed load (remote vessel closed), since there is no need to prime the circulator. For operation with an open system (remote vessel open), position the circulator at a level lower than the remote vessel in order to ease priming. Alternatively choose one of the Grant RC series recirculating chillers, which are closed circulators.

Applications

Optima low temperature circulators provide a source of cooling for many sensitive analytical procedures. Applications requiring the precision temperature control of samples include spectrophotometry, viscometry, refractometry and electrophoresis. Grant's range of more powerful chillers are ideally suited for applications requiring the removal of the mechanical or electrical heat produced in apparatus or machinery, combined with a higher pressure flow for faster heat removal within restricted systems. Please contact Grant for further information.

Equipment safety

Grant's low temperature Optima series products

- meet the requirements of IEC61010 parts 1 and 2
- all the 230V products are CE marked to show conformity with the Low Voltage and EMC Directive (IEC 61326-1 Class B)
- all the 115V products are designed to meet cCSAus and ETL standards

After sales service

Repairs are normally carried out within three to five working days of arrival at our factory or receipt of authorisation to repair. Alternatively, spare parts and service manuals can be despatched within two working days. Most overseas distributors offer a rapid and effective after-sales service, with spare parts held in stock.

Three year guarantee

Grant's low temperature Optima series products are guaranteed for three years against faulty materials and workmanship. For repairs carried out under guarantee, no charge is made for labour or materials.

We are committed to a continuous programme of improvement and specifications may be changed without notice.



Trademarks

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Acknowledgements

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