



Block heater

QBA, QBD, QBH

Operating Manual

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1. Safety

1.1. Symbols used in these instructions:



Caution! Read these operating instructions fully before use and pay particular attention to sections containing this symbol.



Caution! Surfaces can become hot during use.

1.2. Always observe the following safety precautions



Caution! Do not check the temperature by touch. Use a thermometer.



Caution! Do not touch surfaces which become hot during high temperature operation.



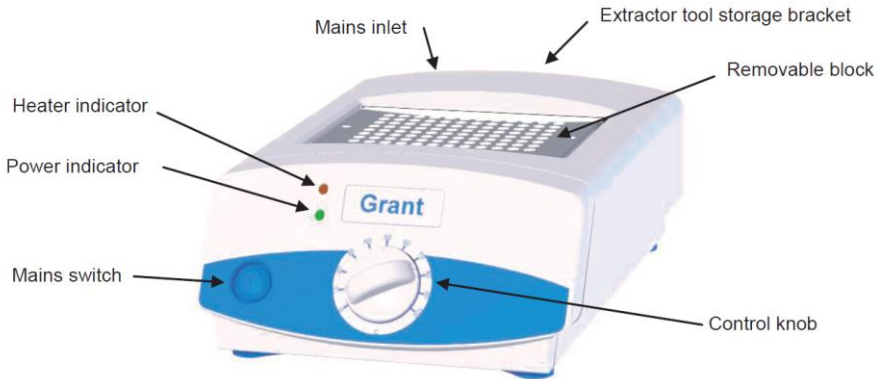
Caution! Use only as specified by the operating instructions, or the intrinsic protection may be impaired.



Caution! To reduce the risk of eye injury during high temperature operation, use safety goggles or spectacles.

- After transport or storage in humid conditions, dry out the unit before connecting it to the supply voltage. During drying out the intrinsic protection may be impaired.
- Connect only to a power supply with a voltage corresponding to that on the serial number label at the rear of the unit.
- Ensure that the mains switch and power plug are easily accessible during use.
- Connect only to a power supply which provides a safety earth (ground) terminal.
- Before moving, allow to cool and disconnect at the power supply socket.
- If liquid is spilt inside the unit, disconnect it from the power supply and have it checked by a competent person.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.
- Clean the unit only with a damp cloth. Do not use chemical cleaning agents.
- Before using any cleaning or decontamination method except those recommended in this manual, users should check with Grant Instruments that the proposed method will not damage the equipment.
- The unit must be placed on a level, non-flammable surface away from flammable materials and ensuring that all ventilation slots in the base are clear from obstructions.
- Disconnect the mains before removing the outer cover. Note there are no user serviceable parts inside in the unit.
- Use appropriate vessels / tubes for temperature required.
- The unit is for indoor use only. Check that the environmental conditions of the laboratory are within the limits given in Section 5.
- Do not use in fume cupboards containing corrosive atmospheres.

2. Operation of QBA



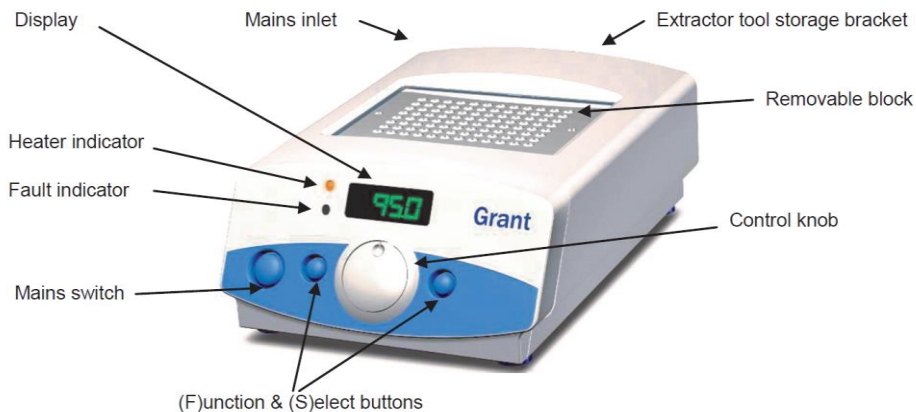
- 2.1. Unpack the unit carefully and retain packaging for future shipment or storage.
- 2.2. The pack includes: Block heater, Mains cable, Operating instructions, Extractor tool.
- 2.3. Plug the mains cable into the socket at the rear of the unit and position to allow easy access to the power switch and connector.
- 2.4. Fit the desired block(s) into the heater well. Ensure that the heater bed and the bottom of the blocks are clean in order to ensure good thermal contact between heater and blocks resulting in optimal temperature control performance.
- 2.5. Turn the unit on by pressing the mains switch on the front of the unit. The power light will illuminate.
- 2.6. Turn the control knob to the desired temperature.
- 2.7. The block heater will now begin to heat the blocks. The heater light will illuminate continuously during the heating phase but will begin to flash when the set temperature is approached.
- 2.8. Allow the block(s) to stabilise at the set temperature before use.
- 2.9. If a more accurate temperature setting is required, use a calibrated thermometer. Place in the thermometer hole in the block and adjust the set temperature accordingly. N.B. Allow time for block to stabilise between each adjustment.
- 2.10. To turn the unit off press the mains switch on the front. Allow the unit to cool before completing any maintenance.
- 2.11. **Extractor tool.** The extractor tool enables the user to remove blocks safely and easily. The tool can be stored on the rear of the unit in the mounting bracket provided. The tool should be screwed tightly into the threaded hole/holes in the block and then the block lifted out.



Note.

One tool is provided with the unit for use with single blocks. A second tool is provided with the double size blocks which require the use of two tools.

3. Operation of QBD, QBH



3.1. Unpack the unit carefully and retain packaging for future shipment or storage.

3.2. The pack includes: Block heater, Mains cable, Operating instructions, Extractor tool.

3.3. Plug the mains cable into the socket at the rear of the unit and position to allow easy access to the power switch and connector.

3.4. Fit the desired block(s) into the heater well. Ensure that the heater bed and the bottom of the blocks are clean in order to ensure good thermal contact between heater and blocks resulting in optimal temperature control performance.

3.5. Turn the unit on by pressing the mains switch on the front of the unit. The display will illuminate showing the current temperature of the block.

3.6. Press the 'S' button and adjust the set temperature using the knob. Press 'S' to select the temperature or press 'F' to exit without changing the value.

3.7. The block heater will now begin to heat the blocks. The heater light will illuminate continuously during the heating phase but will begin to flash when the set temperature is approached.

3.8. Allow the block(s) to stabilise at the set temperature before use.

3.9. To turn unit off, press the mains switch on the front. The set temperature will be stored in memory. Allow unit to cool before completing any maintenance.

3.10. **Extractor tool.** The extractor tool enables the user to remove blocks safely and easily. The tool can be stored on the rear of the unit in the mounting bracket provided. The tool should be screwed tightly into the threaded hole/holes in the block and then the block lifted out.



Note.

One tool is provided with the unit for use with single blocks. A second tool is provided with the double size blocks which require the use of two tools.

3.11. **Heating Error Detection (QBD\QBH).** If the processor detects an error in heating the fault light will illuminate, the buzzer will beep and the display will flash -oE-. To reset this fault; switch the unit off and on. If the fault reoccurs contact your local service agent or Grant Instruments: contact details can be found towards the rear of this manual.

4. User features – QBD, QBH

4.1. The digital range of products also contain the following user features:

- Timer
- Alarm
- Offset
- Probe selection
- Delay Start and Stop
- Calibration
- Programming (QBH only)

4.2. Timer.

The timer is used to count down a time period in the range of 1 to 999 minutes. A buzzer signifies time up, but the heater control is not affected.

4.2.1. Press F to enter main menu.

4.2.2. Rotate control knob until display shows $\square L \square \square$.

4.2.3. Press S to select timer control.

4.2.4. Display will show $\square n$ or $\square FF$. Rotate knob to desired state and press S to select state.

4.2.5. If $\square n$ is selected the display will flash and show number of minutes. Rotate the control knob until the desired value is displayed and press S to select. If $\square FF$ is selected the display will return to the actual temperature.

4.2.6. If the timer is set the display will alternate between actual temperature and time left on the timer.

4.2.7. Once the timer has counted down to zero the buzzer will sound and the display will alternate between $E n d$ and actual temperature.



Note. The heater control is not affected by the timer, normal operation continues.

4.2.8. To cancel the buzzer press either F or S key. The buzzer will cancel automatically after 5 minutes.

4.2.9. If the main power to the unit fails the timer will revert to $\square FF$.



Note. The timer value will be retained in memory after the main power has been turned off

4.3. Alarm.

The alarm is a deviation alarm, settable from 0.5 to 10 °C. If the actual temperature deviates from the set point by more than the value selected the alarm will sound and the fault lamp illuminates. It is only activated once the actual value has been within ± 0.2 °C of the set value for 2 minutes. It does not affect the normal operation of the unit.

4.3.1. Press F to enter main menu.

4.3.2. Rotate control knob until display shows $R L R r$.

4.3.3. Press S to select timer control.

4.3.4. Display will show $\square n$ or $\square FF$. Rotate knob to desired state and press S to select state.

4.3.5. If $\square n$ is selected the display will flash and show the current set value. Rotate control knob until desired value is shown. (The alarm limit is ± 0.5 °C to ± 10.0 °C). If $\square FF$ is selected the display will return to the actual temperature.

4.3.6. Press S to set alarm state once the desired value has been selected.

4.3.7. The display will return to actual temperature. No indication is given that the alarm is set.

4.3.8. If the temperature is outside the limit set for more than 10 seconds, the buzzer will sound and the display will alternate between actual temperature and $-R L -$.

4.3.9. To reset the alarm press either F or S key. If the alarm conditions still exist the alarm will re-activate after 10 seconds.

4.3.10. To disable the alarm feature select `OFF` at point 4.3.4 above.



Note. The alarm value and set state condition are retained in memory.

4.4. Offset.

The offset feature allows the user to change the temperature from +3°C to -7 °C in order to allow single point calibration.

4.4.1. Press F to enter main menu.

4.4.2. Rotate control knob until display shows `OFF`.

4.4.3. Press S to select offset control.

4.4.4. The display will flash and show current value. Rotate the control knob until de-sired value is shown.

4.4.5. Press S to confirm the offset value.

4.4.6. To cancel the offset, set the value to `0.0`.

4.5. Probe Selection.

By using the optional external probe, it is possible to control the temperature of a sample, a dummy sample or the block directly. Ensure the probe is maintained in contact with either a sample or the block during the course of the experiment. Failure to maintain this contact could result in the probe monitoring an air temperature or, another non-specific temperature. This could result in the temperature exceeding the set point and an error condition occurring (see “Errors” below). Grant has provided this function to protect accidental operation when the external probe has been ‘selected’ but is not used. When selected the external probe may be calibrated by the procedure described in 7.7.

4.5.1. To select the external probe, complete the following procedure:

- Press F to enter main menu.
- Rotate control knob until display shows `Pr 0b`.
- Press S to select probe selection.
- The display will show which probe type is currently selected. `int` for internal and `ext` for external.
- Rotate the control knob until the desired probe is shown.
- Press S to select the desired probe.

4.5.2. Errors:

- `Err2`: The external probe should be plugged in before it is selected. If the probe is not connected to the unit or disconnected the message `Err2` will be displayed.
- `Err3`: If a difference of 40°C or more is detected between the internal and external probe then `Err3` will be displayed.
 - This condition might occur if the external probe is not in direct contact with a sample, a dummy sample or the block.
 - This error can also occur if the external probe is placed in a cool sample which is then placed in a pre-warmed block.

To remove an error 3, ensure the external probe is indeed in direct contact with the chosen target and there is not a difference of more than 40°C between the block (measured by the internal probe) and the external probe.

As the sample heats-up, the heater will switch on again as the difference becomes less than 40°C. Therefore the user can wait and `err3` will clear.



Note. Should experimental conditions require a difference of 40°C or more between the block and the external probe, please contact Grant to discuss other options.

4.6. Delay Start and Stop.

The delay start and stop provides a means of turning the heater control on or off after a specified period of time.

4.6.1. Press F to enter main menu.

4.6.2. Rotate control knob until display shows dEL .

4.6.3. Press S to select delay control.

4.6.4. Display will show On or OFF , rotate knob to desired state. Press S to select state.

4.6.5. If On is selected the display will show either $Start$ (delayed start) or $Stop$ (delayed stop). Using the control knob select which type of delay is required.

4.6.6. Press S to select.

4.6.7. The display will flash and show the number of minutes delayed. Rotate the control knob until the desired value is displayed and press S to select.



Note.

During delayed start the display will alternate between $Start$ and the actual temperature.



Note.

During delayed stop the unit will continue to respond as normal. Once the delayed period has expired the temperature control will be turned off and the display will alternate between $Stop$ and the actual temperature. To return to normal operation press either the S or F keys.

4.7. Calibration.

The calibration procedure allows the user to calibrate the unit over a wide temperature range. Note that the probe used will be the probe selected as described in 4.5.

A calibrated thermometer will be required to measure the temperature of the block. The adjusted readings entered must be within $\pm 5^{\circ}\text{C}$ of the original reading.

4.7.1. Set the temperature of the unit to 35°C in the normal manner and allow the unit to stabilise.

4.7.2. Press F to enter main menu.

4.7.3. Rotate control knob until display shows CRL . Press S to select.

4.7.4. The display will show $PRSS$ for one second then 000 !. Rotate to a value of 0004 and press S to select.

4.7.5. Rotate the control knob until the display shows $LCRL$. Press S to select.

4.7.6. The display will show the current temperature value. Using the control knob change the value to match that of the calibrated thermometer.

4.7.7. Press S to select the new value. The display will revert to the non-adjusted actual temperature.

4.7.8. Set the temperature of the unit to 75°C and allow the unit to stabilise.

4.7.9. Press F to enter main menu.

4.7.10. Rotate control knob until display shows CRL . Press S to select.

4.7.11. The display will show $PRSS$ for one second then 000 !. Rotate to a value of 0004 and press S to select.

4.7.12. Rotate the control knob until the display shows $HCRL$. Press S to select.

4.7.13. The display will show the current temperature value. Using the control knob change the value to match that of the calibrated thermometer.



Note.

If the reading is over 3 degrees out the unit will continue to flash the display. In this case turn the unit off and allow to cool. Then remove the blocks and clean the heater bed and bottom of the blocks and start the procedure again.

4.7.14. Press S to select the new value. The display will revert to the non-adjusted actual temperature.

4.7.15. Press F to enter main menu.

4.7.16. Rotate control knob until display shows CRL . Press S to select .

4.7.17. The display will show $PRSS$ for one second then 000 !. Rotate to a value of 0004 and press S to select.

4.7.18. Rotate the control knob until the display shows SEt . Press S to select.

4.7.19. The display will now display the actual adjusted temperature using the calibration values entered.

4.7.20. To **return to factory settings** complete the following:

- Press F to enter main menu.
- Rotate control knob until display shows CAL. Press S to select.
- The display will show PASS for one second then 0001. Rotate to a value of 0004 and press S to select.
- Rotate the control knob until the display shows rFd. Press S to select.

4.8. Programming (QBH with external probe only).

The QBH is capable of running a simple program consisting of three temperature and time segments and an end phase. All the temperature/time segments must be set even if only 2 steps are required. An external probe must be fitted to edit or run a program.

4.8.1. Press F to enter main menu.

4.8.2. Rotate control knob until display shows Prd. Press S to select.

4.8.3. Rotate the control knob to show On, Off or Ed t. Press S to select state. (On or Off will return the display to actual temperature. On runs the program, Off returns to normal operation).

4.8.4. If Edit is selected the display will show S i (section 1) then SEtP (set point).

4.8.5. Press S to select.

4.8.6. The display will flash and show the current set value. Rotate the control knob until the desired value is displayed and press S to select.

4.8.7. The display will show t (time). Press S to select.

4.8.8. The display will flash and show the time in minutes. Rotate the control knob until the desired value is displayed and press S to select.

4.8.9. The display will show S2 (section 2).

4.8.10. Repeat steps 4.8.6 to 10 above for sections 2 and 3 (S3).

4.8.11. The display will show S4 (section 4), press S to select.

4.8.12. The display will show bEEP (buzzer) press S to select.

4.8.13. By rotating the control knob the display will show On or OFF. Press S to select state of buzzer when the program finishes (it will sound for 1 minute).

4.8.14. The display will show HEt (heater control). Press S to select.

4.8.15. By rotating the control knob the display will show On or OFF. Press S to select state of heater control when the program finishes. If Off is selected the heater is switched off after the last step and there is no temperature control. If On is selected the unit will return to normal operation.

4.8.16. The unit is now programmed; to run the program:

4.8.17. Press F to enter main menu.

4.8.18. Rotate control knob until display shows Prd. Press S to select.

4.8.19. By rotating the control knob the display will show On, Off or Ed t. Select On and press S. (If external probe is not selected ErrH will be displayed).

4.8.20. To cancel the program complete 4.8.18 to 21 but select Off.



Note.

When running a program the display will alternate as follows: When heating up the display will alternate between SEtP and the actual temperature. When temperature has been achieved the display will alternate between time left, step number and actual temperature.

The time count down for each step is only started once the actual temperature is within 1 °C of the set temperature.

5. Maintenance

5.1. All products covered in this manual are designed to comply with IEC61010-1 and can be flash tested. Some are fitted with radio frequency interference suppressers. Therefore it is recommended that only a D.C. test be performed. No other routine service is required.

5.2. **Cleaning.** The case can be cleaned with a damp cloth after disconnection. Do not use solvents. Before using any decontamination or cleaning method except that recommended, check with our Service Department that the proposed method will not damage the equipment.

5.3. **Replacement of fuses.** Disconnect from the power supply socket. Remove the IEC power plug from the rear of the unit. Pull out the fuse drawer, replace the fuse with the correct type, and replace the fuse holder. Below is the table of fuse ratings, depending on the model and the mains.

	QBA1	QBA2	QBD1	QBD2	QBD4	QBH2
230 V~	2	2	2	2	3.15	2
120 V~	2	3.15	2	3.15	5	3.15

5.4. **Routine safety tests.** If routine tests are to be made, we recommend a test of the integrity of the protective earth conductor and an insulation test at 500 V~. Routine flash tests are not recommended for any electrical equipment, because repeated high voltage tests degrade insulation materials.

6. Guarantee and service

6.1. **Guarantee.** When used in laboratory conditions and according to this Operating Manual, this product is guaranteed for THREE YEARS against faulty materials or workmanship.

6.1.1. Extended warranty for years four and five can be purchased by contacting our sales department at labsales@grantinstruments.com

6.2. **Service.**

6.2.1. There are no user-serviceable parts inside the unit. For service return for repair to our Service Department in the UK or in other countries to our distributor.



Note. Please do not return the blocks.

6.2.2. Service e-mail: labservice@grantinstruments.com

6.2.3. At Grant we are continuously trying to improve the performance we offer our customers. If you have any feedback on Grant's products or services we would like to hear from you. Please send all feed back to our contact address or to feedback@grantinstruments.com.

6.2.4. Contact address:

Grant Instruments (Cambridge) Ltd

Evolution House, Unit 2, Durham Way

Royston Gateway

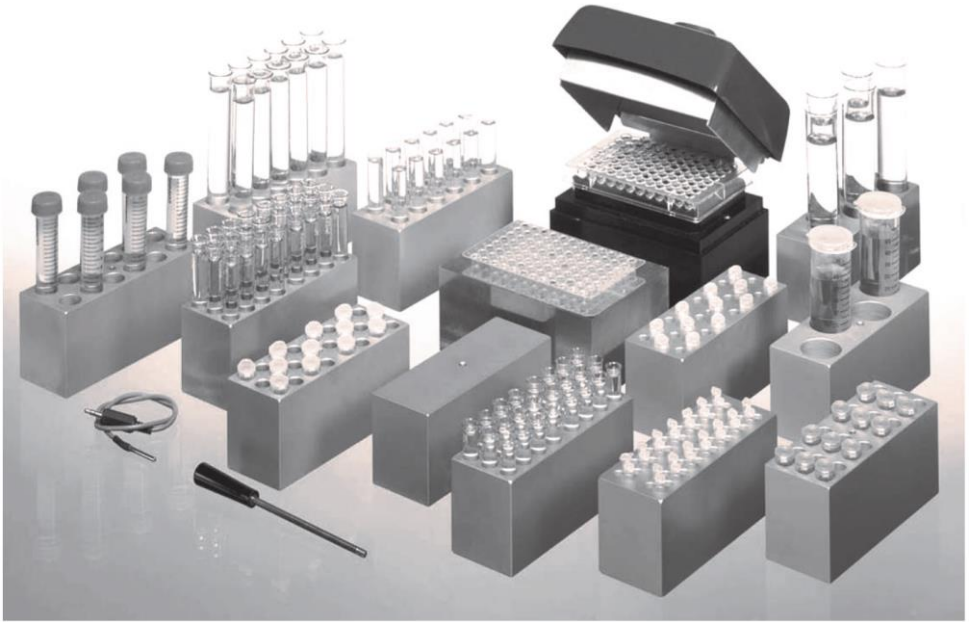
Royston

SG8 5GX

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7.1. Only use genuine Grant products with your block heater. The following accessories are available from Grant Instruments, or our local distributor.

7.2. Single blocks

- QB-0 Plain
- QB-10 10mm holes
- QB-12 12mm holes
- QB-13 13mm holes
- QB-16 16mm holes
- QB-17H 17mm holes
- QB-18 18mm holes
- QB-24 24mm holes
- QB-50 50mm holes
- QB-H 0.2ml micro tube
- QB-E0 0.5ml micro tube
- QB-E1 1.5ml micro tube
- QB-E2 2.0ml micro tube
- QB-E5 5.0ml micro tube

7.3. Double size blocks (QBA2, QBD2, QBD4, QBH2)

- QDP-H 0.2ml
- QDP-FL 96-well plate

7.4. Polycarbonate safety covers

- QBL1 Cover for QBA1, QBD1
- QBL2 Cover for QBA2, QBD2, QBH2
- QBL4 Cover for QBD4

7.5. External probe

- QBEP External Pt1000 sensor

8. Specification

8.1. Supply specifications

Model	Voltage and frequency	Power
QBA1	230 V~ ±10%, 50–60 Hz	200 VA
QBA2		350 VA
QBD1		200 VA
QBD2		350 VA
QBD4		700 VA
QBH2		350 VA

Model	Voltage and frequency	Power
QBA1L	120 V~ ±10%, 50–60 Hz	150 VA
QBA2L		300 VA
QBD1L		150 VA
QBD2L		300 VA
QBD4L		550 VA
QBH2L		300 VA

8.2. General specifications

Model variations	QBA, QBAL	QBD, QBDL	QBH, QBHL
Minimum setting temperature, °C	0	15	15
Maximum temperature, °C	100	130	200
Stability @37°C within block, °C	±1.0	±0.1	±0.1
Uniformity @37°C within block, °C	±1.0	±0.1	±0.1
Number of blocks	1 & 2	1, 2 & 4	2
Setting resolution, °C	2	0.1	0.1
Display resolution, °C	2	0.1	0.1
Heatup time from 25 to 100 °C, minutes	25	20	20
External probe socket	no	yes	yes
Width x height, mm	200 x 100	200 x 100	200 x 100

Block variations	1 block	2 blocks	4 blocks
Length, mm	230	280	380
Heater power, W (230/120 V~)	150/100	300/200	600/400



Note. All block heaters are fitted with a thermal fuse which operates at a temperature of 230°C.

8.3. Workroom requirements

Operating Temperature	5 to 40°C
Maximum relative humidity	80 % r.h. in room temperatures up to 31°C decreasing linearly to 50 % r.h. at 40°C
Altitude	Up to 6,500 feet (2,000 m) above sea level

UK Declaration of Conformity

All the products covered by this Manual comply with the requirements of UK statutory requirements verified using the following standards.

Electrical Equipment (Safety) Regulations 2016	BS EN 61010 Part 1 BS EN 61010 Part 2-010
Electromagnetic Compatibility Regulations 2016	BS EN 61326-1
The Restriction of the Use of Certain Substances in Electrical and Electronic equipment Regulations 2012	BS EN 50581

Waste Electrical and Electronic Equipment (WEEE)



All the products covered by this Manual are marked with the crossed-out wheeled bin symbol indicating they must not be disposed of with unsorted waste. Safe recycling of WEEE helps conserve natural resources and protect human health.

Grant Instruments complies fully with the UK Waste Electrical & Electronic Equipment (WEEE) regulations 2013. We are a member of the B2B compliance scheme (Scheme Approval Number WEE/MP3338PT/SCH), which handle our WEEE obligations on our behalf. Grant Instruments have been issued with a unique registration number by the Environmental Agency, this reference number is WEE/GA0048TZ.

For information regarding WEEE collections in the UK please contact our B2B Compliance Scheme directly on 01691 676 124 or www.b2bcompliance.org.uk

In the EU, Grant Instruments complies with WEEE Directive 2012/19/EU. Contact your local equipment supplier for WEEE collections.

REACH Regulations

This product does not contain any Substances of Very High Concern (SVHCs) at greater than 0.1% that have to be identified in accordance with Regulation (EC) No 1907/2006 and therefore does not have an entry in the SCIP database.



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