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**APPENDIX A - SYMBOL KEY**

**APPENDIX B - LIST OF REFERENCES**

**APPENDIX C - EC DECLARATION OF CONFORMITY**
1. INTRODUCTION:

Electrothermal’s IA9000 Series of Digital Melting Point Equipments are designed for general purpose laboratory use, in which samples submitted for analysis are enclosed in glass capillary tubes and brought to a melt condition under strictly controlled parameters of time and temperature.

All instruments operate in a similar manner, with microprocessor assisted operation of oven temperature and readout, and an on-board memory for control and storage of results. Melt temperatures can be recorded by simple key depression, transferring the display temperature into memory and enabling different phases of melt, or critical melt temperatures of alternate samples, to be recorded. After recording the melt point, the oven temperature reverts to the ‘Set Point’, allowing consecutive samples to be analysed using identical control parameters.

The IA9200 and IA9300 have additional sophisticated features to permit computer assisted data analysis.

Start ramp temperature and ramp rate can be keyboard selected for different test standards.

The operating system permits batch serial numbers to be allocated from the keyboard.

An RS232-C interface enables the information to be transferred directly to a computer.

An optional serial/parallel printer enables hard copy of temperatures, date, time, batch number, to be recorded, in association with the built-in real-time clock.

Warnings (**) given in these Operating Instructions identify conditions and actions that pose hazards to the user.

It is therefore recommended that the Responsible Body for the equipment reads these Operating Instructions and Safety Information and that the User(s) are suitably trained before using the apparatus.

2. SAFETY INFORMATION

This product has been designed for safe operation when in normal use and operated in accordance with manufacturers instructions.

** This equipment is classified as Class O (IEC519: Part 2) with regard to overtemperature protection and should be used accordingly.

WARNING

** Always follow good laboratory practice when using the equipment and give due recognition to your company’s safety procedures and the applicable health and safety and associated legislation applicable to your areas of operation. Check laboratory procedures for substance being heated to ensure that any hazards (e.g. explosion, implosion or the release of toxic or flammable gases) that might arise, have been suitably addressed before proceeding.

** When heating certain substances, the liberation of hazardous gases may require the use of a fume cupboard or other extraction system.

** Ensure equipment is used on clean, dry non-combustible work surface with suitable clearance from other equipment.

** Do not lean or stretch over equipment, glass capillary tubes protruding from top could be broken or cause injury.

** The equipment is not spark or explosion proof and has not been designed for use in hazardous areas in terms of BS5345. Keep flammable, low flash point substances away from the apparatus.

** Do not spill substances onto the equipment. If spillage does occur, disconnect unit from mains supply and follow instructions detailed at Equipment Maintenance.

** Place used capillary tubes into suitable container and dispose of in the appropriate manner.

continued ...
NOTE: If this product is not used in accordance with manufacturer’s Operating Instructions then the basic safety protection afforded by the equipment may not be preserved and also the guarantee invalidated.

3. INSTALLATION INSTRUCTIONS

The equipment is Installation Category (Over Voltage Category) Class II with regard to protection against electric shock (IEC 664 Sub Clause 5.6).

Upon receipt of the equipment proceed consecutively as follows:

Environmental operation conditions: indoor use only; temperatures 5°C to 40°C, 80% RH maximum; mains supply voltage fluctuations not to exceed ± 10%.

This equipment must be connected to a fixed earthed mains socket outlet. See Technical Specification section for recommended fuse rating.

- Green/Yellow or Green = Protective Earth (Ground)
- Blue or White = Neutral
- Brown or Black = Line (Live)

Ensure that the correct equipment fuse and mains lead fuse are fitted for the supply used. Check the voltage rating on the product data label, ensure the rating conforms to the local supply. For equipment with a voltage selector, ensure the selector is set for the correct voltage.

It is recommended that for normal use the equipment should be connected to a mains supply via a Residual Current Device (RCD). The RCD, which may be an in-line adapter or a panel mounted, interrupts power to the equipment immediately it detects an earth leakage fault (ie: fluid spillage on the power supply shorting down to the earth).

** DO NOT ATTEMPT TO MOVE ADJUSTABLE ARM BEFORE RELEASING CLAMP SCREWS (See Figure 2).

After releasing the clamp screws, adjust the angle and extension of the arm, and rotate the oven head if necessary, in order to establish the most comfortable viewing position; re-tighten screws.

** Do not over-tighten arm clamp screws.
3.1.3.1 Connections IA9100

a) Insert power supply output connector to the equipment supply socket.

b) Connect the power supply to the mains socket of the local supply, but do not switch the power ON (I - setting) at this time.

Connections IA9200 and IA9300

a) If a line printer is to be used it should now be connected to the equipment using an approved cable. For the PR2000 use the cable supplied with it. For a parallel (Epson compatible) printer use an AZ6732 and for a serial printer use an AZ6731.

** It is essential that mains power is disconnected (unplug the power supply from the mains supply), when connecting or disconnecting the printer from the equipment. Failure to do so may result in damage to the equipment electronics.

** If an unapproved cable is used damage could result.

b) Insert power supply output connector to the equipment supply socket.

c) Connect the power supply to the mains socket of the local supply, but do not switch the power on at this time.
3.1.4 Start-Up
Switch the power ON (I - setting).

Observe that all the indicator lights flash momentarily and then the display rolls from 9999 to 0000 and settles at the oven ambient temperature.

**NOTE:** In order to attain maximum accuracy from the unit it is important to allow all components to stabilise at their working temperature. It is recommended therefore that the unit is switched on for 30 minutes before use.

Alternatively the unit may be switched on overnight at ambient temperature. The bulb will supply sufficient heat to maintain stability.

The insulation material of the oven may absorb small amounts of moisture if left unpowered for any length of time (dependent upon ambient conditions). It is suggested that the oven is heated up to a temperature of 300 deg.C before use as described in sections 4.2.1 and 4.2.2 for IA9100 and sections 4.3.2 and 4.3.3 for IA9200 and IA9300, with the lens removed, and then allowed to cool, switching the oven off as in section 4.2.8 for IA9100 and section 4.3.9 for IA9200 and IA9300 before replacing the lens.

3.1.5 Prepare a Sample
Up to three samples may be accommodated in the tube guide. To prepare a sample proceed as follows:-

Break a new capillary tube in half and insert the powdered sample in the tube. The quantity should be such that the height does not exceed 1mm.

Locate the sample(s) in the tube guide. It is recommended that three tubes are inserted even if each tube does not contain a sample.

3.1.6 CALIBRATION

It is advised calibration must be carried out annually, or whenever the performance of the equipment is suspect, e.g. when similar successive tests produce markedly divergent results.

The apparatus must either be returned to the dealer for calibration, or calibration must be carried out in the following manner, using Calibration Kit AZ6730 and the standard chemicals 4-Nitrotoluene (AZ9062) and Carbazole (AZ9118).

To check if the unit is still in calibration proceed as follows:-

a) Switch the unit on and ensure that the equipment components are in the stable condition as described in sections 3.1.4.

b) Perform a melt with each standard chemical and note the reading.

c) Compare the results obtained with the melting points shown on the certificates supplied with each chemical and ascertain whether the unit performs within acceptable limits.

d) If it is decided that re-calibration is required proceed as follows:-

1. Switch off (O - setting) the unit and allow to cool.

2. Disconnect power supply from rear of unit.

3. Invert the unit and remove the three screws securing the base plate to the body.

4. Place the unit on the bench the correct way up taking care not to let the base fall from the unit. Lift the body from the base plate.

5. Turn the body on its side and place it on the bench to the right of the base plate.

6. Remove the two pin connector from PL12A on the printed circuit board.

7. Plus the Calibration Box into PL12A.
8. Switch the selector switch to the LO position.

9. Insert the power plug on the equipment and switch on (I - setting).

10. Allow the equipment to re-stabilise. It should not be necessary to go through the 'Set Point' procedure again at this stage. 2 to 3 minutes should suffice to ensure stabilisation.

11. Adjust the LO knob until the display shows the actual melting point obtained in b) above for the standard sample of 4-Nitrotoluene.

12. Switch the selector switch to the HI position.

13. Adjust the HI knob until the display shows the actual melting point obtained in b) above for the standard sample of Carbazole.

14. Adjust the VR1 on the P.C.B. with the trimtool provided until the display reads the melting point of Carbazole as quoted on the Calibration Certificate provided with the sample.

15. Switch the selector switch to LO.

16. Adjust VR3 on the P.C.B. with the trimtool until the display reads the melting point of 4-Nitrotoluene as quoted on the Calibration Certificate provided with the sample.

17. Repeat steps 12 to 16 until no further adjustment to VR1 and VR3 are required when switch is changed from HI to LO.

18. The unit is now calibrated.

19. Unplug the Calibration Box from PL12A and replace connector removed in 6.

20. Switch off (O - setting), remove the power supply plug and replace the base. Check the calibration again using Standard Chemicals as in b) and c) overleaf and repeat the procedure if necessary.

(Figure 9)

Environmental Protection

It is Electrothermal policy to give consideration to environmental issues in design and manufacturing without compromising end product performance and value to customers.
- Packaging materials have been selected such that they may be sorted for recycling.
- For other recycling, see Technical Section for Main Case Materials etc.
4. OPERATING INSTRUCTIONS

4.1. PRINCIPLES OF OPERATION

During operation the various parameters of the sample analysis are shown on the liquid crystal display, and all stages of the process are status indicated by L.E.D. illumination and/or audible warning. The principles of operation are as follows:-

- Guided by knowledge of the expected melting temperatures of the sample, a ‘Set Point’ is established and its value keyed in (see Figure 1).
- The oven temperature is driven to meet this ‘Set Point’ at maximum rate.
- After a short delay for the oven temperature to stabilise at the ‘Set Point’, the ramp rate is established and selected.
- The temperature now increases linearly at the much slower ramp rate, during which time melt analysis takes place.
- The melting of the sample(s) is observed and the temperature registered in the memory at the appropriate time.
- The temperatures (and for the IA9200 also the measuring parameters) are now available for review on the display (and for the IA9200 a hard copy record to be printed).
- The oven temperature may now be directed to a new ‘Set Point’ if required for the next analysis.

(Figure 1)

In recording melting points, the user may wish to observe four distinct phases:-

a) First signs of change (darkening, shrivelling, sintering etc.). These changes may be due to loss of solvent or crystallisation. Occasionally one can see the solvent condensing again on the cooler portions of the tube.

b) First signs of liquid formation.

c) Formation of meniscus.

d) Formation of a completely clear liquid...
Not all compounds will behave in this manner, however. With many, especially where the material is in a high state of purity, no change may be seen before the liquid appears. Some materials will be seen to sublime, rather than melt above 300 deg.C.

Pure compounds will be expected to pass through the 3 stages b), c) and d) within a range of 1 deg.C.

It is generally accepted that the formation of a meniscus should be regarded as the figure to be recorded for a single temperature melting point.

4.2 IA9100 OPERATION

4.2.1 Enter the ‘Set Point’

(This should be 2 to 5 deg.C below expected melt point).

Proceed as follows (a figure of 107 deg.C is given as an example):-

Press arrowed UP key eleven times (value 10 deg.C per keystroke) to set a temperature of 110 deg.C.

Then press the arrowed DOWN key three times (value -1 deg.C per keystroke) to reduce the ‘Set Point’ to 107 deg.C.

If an error is made, press the CLEAR key and start again.

4.2.2. GOTO ‘Set Point’

Press GOTO key.

The four bar L.E.D. will illuminate consecutively as the temperature rises.

To review ‘Set Point’ press UP arrowed key and ‘Set Point’ will be displayed for approximately 1 second.

When the ‘Set Point’ temperature is reached the left hand L.E.D. on the GOTO key will illuminate and three audible bleeps will sound to indicate that the temperature has stabilised.

4.2.3. Initiate Ramp

Press GOTO to initiate the temperature ramp of 1.0 deg.C per minute.

The four bar L.E.D.’s and the left hand L.E.D. on the GOTO will go out.

The right hand L.E.D. will illuminate.

After a brief delay the oven temperature will commence to rise at 1.0 deg.C per minute.

4.2.3a Fast Ramp Selection - See Appendix B. (P27)

4.2.4 Analysis and Storage of Melt Points

The four basic stages of melting should be anticipated as described in Principles of Operation, section 4.1. Proceed as follows:-

Adjust the object lens by rotation until a sharp focus on the sample is obtained.

When the desired stage of melt is observed press the GOTO key to store the temperature in the memory. Up to four values can be stored. An additional L.E.D. above the GOTO key will illuminate as each value is stored. After the fourth value is stored
the oven temperature will return to the 'Set Point'.

NB: If less than four melt points are required to be stored, press the CLEAR key once only after the last required temperature has been stored, and the oven temperature will return to 'Set Point'.

4.2.5 Recall of information
To review the melt points:

The display will show the temperature of each successive melt point held in the memory with each subsequent depression of the GOTO key. An L.E.D. above the GOTO will indicate which of the stored temperatures is being displayed.
If less than four temperatures have been recorded then unused memory will be displayed by 0000.

NB: Temperatures must be recorded on paper at this point.

4.2.6 To carry out a further Melt
a) Press CLEAR once only, The current 'Set Point' will be displayed. If this is the value desired, press GOTO key as in section 4.2.2.

b) If a new 'Set Point' is desired press the UP/DOWN keys as in section 4.2.1. Press GOTO key as in section 4.2.2. Do not insert new samples until temperature has stabilised at the new 'Set Point' (as indicated in section 4.2.2.). After insertion allow 2 minutes for tubes and samples to stabilise at the 'Set Point' before initiating ramp as in section 4.2.3.

NB: Faster cooling where required can be achieved by the insertion of a Cold Finger (Accessory AZ9001).

**WARNING:- The capillary tube guide could be HOT and care should be taken when removing.

4.2.7 CLEAR Key
The CLEAR key may be operated at any time and will, depending upon the current stage, function as follows:-

1. If at section 4.2.1, operation of the CLEAR key will reset display to 0000.

2. If at section 4.2.2, by pressing CLEAR key the display will show oven temperature and heater will control to 'Set Point'.

2a. Press CLEAR again and display shows 0000. Enter new 'Set Point' as in section 4.2.1.

3. If at section 4.2.3, pressing CLEAR once will prevent further entry into memory of melt points, and oven will revert to 'Set Point'.

3a. Pressing CLEAR again will display current 'Set Point' - proceed to section 4.2.1.

4.2.8 Oven Off
Pressing CLEAR key four times during any stage will turn off the heating to the oven.
4.3 IA9200 OPERATION

4.3.1 Initial Set-Up
When the equipment is first received the following procedure should be followed in order to set the clock and print parameters:-

Press the batch key and maintain depressed whilst mains power is switched on. The key must be kept depressed until a second bleep is heard. Observe that all the indicator lights flash momentarily during this procedure and display rolls from 9999 to 0000.

**NOTE:** The unit comes equipped with a rechargeable battery. A fully charged battery will keep the records stored for up to one month even if it is switched off. During normal usage the battery will remain charged. If the unit has been switched off for more than one month, leave it on for at least 24 hours to recharge the battery for normal operation after setting the clock and print parameters as on sections 4.3.1a and 4.3.1b.

If the memory back-up battery is flat (quite possible in a new equipment prior to charging) operation of the BATCH key during initial start-up is unnecessary. When the instrument is switched on without depressing the BATCH key it will default to initial set-up mode and will indicate this by a colon (:) in the display. Any figures associated with the colon should be disregarded.

a) **Setting Clock Parameters**
Enter the Year; Month; Date and Time in order as follows: (The figures January 22 1996 at 09.56 are given as an example).

Press CLEAR

Press 8; 9; then press GOTO

Press in turn 1; 2; 2; GOTO

Press in turn 0; 9; 5; 6; GOTO

b) **Setting Print Parameters**
After following the above procedure the display will show current print parameters.
Default is 0000 for PR2000.

If PR2000 or no printer is to be used ensure display is 000.0.

Press GOTO and proceed to section 3.1.4.

If EPSON compatible parallel printer is to be used, set display to 001.0. Press GOTO and proceed to section 3.1.4.

If Serial RS232-C printer is to be used set display to 002.0 and press GOTO.

**RS232-C parameters now need to be set: See Appendix A.**
4.3.2  **Enter the ‘Set Point’**

Proceed as follows:

(A figure of 207 deg.C is given as an example)

Press ENTER - the display will change to register the previous ‘Set Point’ if one exists. Press CLEAR. Key in the figures 2; 0; 7; 0 and the display will show 207.0 as a ‘Set Point’.

If an incorrect ‘Set Point’ value is keyed in, press CLEAR and key in the correct value. Do not key in a value above 400 deg.C.

4.3.3  **GOTO ‘Set Point’**

Press GOTO key, (if long audible bleep is heard and display does not change then the ‘Set Point’ is outside allowable parameters; key in the correct ‘Set Point’). The four bar L.E.D.’s will illuminate consecutively as the temperature rises. To review ‘Set Point’ press RECALL and display will show ‘Set Point’ for approximately one second. When the ‘Set Point’ temperature is reached the left hand L.E.D. on the GOTO key will illuminate and three audible bleeps will sound to indicate that the temperature has stabilised.

4.3.4  **Select Ramp Rate**

This may be done by one of two methods:-

Method 1 - selected if a present ramp rate is suitable.

Method 2 - selected is an intermediate ramp value is required. Any ramp rate may be selected between 0.2 deg.C per minute and 10.0 deg.C per minute on 0.1 deg.C steps.

Proceed as follows:-

Method 1
Select one of the five pre-set ramp rate values - 1.0; 0.2; 0.5; 2.0; or 3.0. Press the selected key.

Method 2
A ramp rate value of 2.5 deg.C per minute is given as an example:-

Press in turn ENTER; 2; 5; GOTO.

**Note:** The entered value in Method 2 must not exceed 10 deg.C per minute. If too high a value is entered, an audible warning is given and the instrument will wait in a stalled condition. Press CLEAR and enter an acceptable value.

With the ramp rate entered, the four bar L.E.D.’s and the left hand L.E.D. on GOTO will go OFF and the right hand L.E.D. will illuminate.

4.3.4a  **Fast Ramp Selection - see Appendix B.**

4.3.5  **Analysis and Storage of Melt Points**

The four basic stages of melting should be anticipated as described in Principles of Operation, section 4.1. Proceed as follows:-

Adjust the object lens by rotation until a sharp focus on the sample is obtained. When the desired stage of melt is observed
press the GOTO key to store that temperature in the memory. Up to four values can be stored. An additional L.E.D. above the GOTO key will illuminate as each value is stored. After the fourth value is stored the oven temperature will return to the ‘Set Point’.

**NB:** If less than four melt points are required to be stored, press the CLEAR key once only after the last required temperature has been stored. (Oven temperature will return to ‘Set Point’).

### 4.3.6. Recall and Processing of Information

Four operations for information processing are available as follows:-

a) **Review of the current melt batch**

This is obtainable by successive depressions of the GOTO key. Repeated operations of the GOTO key will display the batch parameters in the following sequence:-

Melt point 1; Melt point 2; Melt point 3; Melt point 4; ‘Set Point’; Ramp rate; Year; Month and Date; Hour and Minute.

The display will show the temperature of each successive melt point and an L.E.D. above the GOTO will indicate which is the stored temperatures is being displayed. If less than four melt points have been stored unused memory will be displayed as 0000.

**NOTE:** The CLEAR key may be operated at any time to cancel the review sequence.

b) **Store**

To store the current values in the batch memory:-

Press BATCH, key in Batch Number between 000 and 999, for example, 123 and press GOTO. Previously stored values having the same Batch Number will be overwritten.

c) **Recall**

To recall values previously stored against a Batch Number, press RECALL then key in the desired Batch Number and press GOTO. The stored batch melt parameters will be available for review (see paragraph a) and may be printed out if required.

d) **Print**

If a line printer is suitably connected:-

Press PRINT, the current or recalled batch melt parameters will be printed out in hard copy.

### 4.3.7 To carry out a further melt.
To initiate analysis of a further batch; Press ENTER. The display will indicate the current ‘Set Point’ which can be updated if necessary to commence the next analysis. Proceed as from section 4.3.2. Do not insert samples until oven temperature has stabilised at ‘Set Point’ as indicated in section 4.3.3. After insertion of samples allow at least 2 minutes to elapse for samples to stabilise at ‘Set Point’ before initiating ramp.

4.3.8 CLEAR Key
Pressing CLEAR at any point (except at the value entry stage when CLEAR is used to cancel an incorrect entry) will clear the current stage of the melt and return the equipment to the condition prior to the ‘Set Point’ entry state.

4.3.9 Oven Off
Pressing CLEAR key twice at any stage (except at value entry stage when you must press GOTO first) will switch oven off and display current temperature.

4.4. IA9300 OPERATION

The IA9300 provides the same range of facilities as the IA9200 with the following exceptions:

- Only one pre-programmed Ramp Rate is available, i.e. 1.0 deg.C/min
- Six melting points may be stored in the resident memory per batch.
- Three additional L.E.D. indicators are installed in the head to facilitate ease of assignment of recorded melt point to particular capillaries.
- The number of batches that can be recorded in memory is reduced to 500.

4.4.1 Mode of Operation
All sections of the Operating Instructions pertaining to the IA9200 can be applied to the IA9300 with some exceptions. Upon receipt of the equipment follow installation instructions (section 3) then start from section 4.3 taking care to substitute the following changes:

Section 4.3.4, Select Ramp Rate
Method 1. Only the 1.0 deg.C/min ramp is pre-selectable. All other ramps must be keyed in as per Method 2.

Section 4.3.5. Analysis and Storage of Melt Points
Melt points are stored in memory by selecting the appropriate capillary with the TS (Tube Select) key until the L.E.D. corresponding to the selected tube is illuminated and then recording the temperature in memory by operation of the (insert symbol) key. Two values of melt point per capillary may be recorded and these will be indicated by the two L.E.D.’s associated with the TS key.

Section 4.3.6. Recall and Processing of Information
a) Review of current melt batch.
This is obtainable by successive operations of the (insert symbol) key. Repeated operation of this key will display the batch parameters in the following sequence:

Melt points 1 and 2 - Capillary 1
Melt points 3 and 4 - Capillary 2
Melt points 5 and 6 - Capillary 3
Set point
Ramp rate
Year
Month and Day
Hours and Minutes.
The display will show the temperatures of each successive melt point and the L.E.D. associated with each capillary and the TS key will show which of the stored temperatures is being displayed.

Store, Recall and Print instructions remain unchanged.

5. **TECHNICAL SPECIFICATION**

The specified data for each instrument is shown in Table 2. The accessories available are shown in section 8.

**Table 1. General Features.**

<table>
<thead>
<tr>
<th>Feature</th>
<th>IA9100</th>
<th>IA9200</th>
<th>IA9300</th>
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<tbody>
<tr>
<td>8-bit Processor</td>
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<tr>
<td>3 Capillary Tubes, 2mm OD</td>
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<td>•</td>
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<tr>
<td>(Storage for pack of 100)</td>
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<tr>
<td>Tube Guide for removal for cleaning</td>
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<tr>
<td>and use of Cold Finger</td>
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<tr>
<td>40mm dia. lens</td>
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<tr>
<td>(magnification x 8)</td>
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<tr>
<td>removable and with adjustable focus</td>
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<td></td>
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<tr>
<td>4-key membrane keypad</td>
<td>•</td>
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<tr>
<td>3-key membrane keypad</td>
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<tr>
<td>16-key membrane keypad</td>
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<tr>
<td>Fixed ramp of 1.0 deg.C</td>
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<tr>
<td>Ramp rates selectable from the keyboard</td>
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<tr>
<td>range 0.2 to 10 deg.C per minute</td>
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<td>Fast ramp of 10 deg.C per minute</td>
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<td>Nicad battery for memory, clock and back-up</td>
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<tr>
<td>4 x 1 Melt memory capacity</td>
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<tr>
<td>3 x 2 Melt memory capacity</td>
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<tr>
<td>Batch memory capacity of 500</td>
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<td>Batch memory capacity of 1000</td>
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<tr>
<td>Parallel/Serial (RS232-C) Port for Printer</td>
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<tr>
<td>Included with each instrument</td>
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<tr>
<td>Pack of 100 Tubes</td>
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<tr>
<td>Spare Bulb</td>
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<td>Spare Input Fuse</td>
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<td>Spare Output Fuse</td>
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<tr>
<td>Power Supply</td>
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<td>Power Cable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Specification**

**Electrical**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oven Wattage</td>
<td>17W</td>
</tr>
<tr>
<td>Total Power</td>
<td>45W (including PR2000 printer)</td>
</tr>
</tbody>
</table>
Oven Control
Closed Loop P.I.D. Zero crossing burst fire

Oven Illumination
12V 2.2W Bulb M.E.S. (AZ9005)

Oven Temperature Range
Ambient to 400 deg.C

**Power Supply**
Conforms to BSI, CSA and VDE requirements.

AZ9003

Input Voltage Selectable
100V/120V or 220V/250V

Output Voltage
Approx. 15V DC

Input Fuse
T1 amp Antisurge 5mm dia x 20mm LG

Output Fuse
F3.15 amp Quickblow 5mm dia x 20mm LG

**Digital Thermometer**

Range
0 deg.C to 400 deg.C

Resolution
0.1 deg.C

Accuracy
+/- 0.5 deg.C @ 20 deg.C (+/- 1 digit)

Display
12mm high 4 digit liquid crystal

Sensor
Platinum Resistance Probe (PT100) to BS1904

**APPENDIX A**

**Baud Rate**
Default is 096.0 = 9600 baud; i.e. Set display to 003.0 for 300.
See Table below for appropriate baud rate settings.

<table>
<thead>
<tr>
<th>Display</th>
<th>Baud Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>003.0</td>
<td>300</td>
</tr>
<tr>
<td>006.0</td>
<td>600</td>
</tr>
<tr>
<td>012.0</td>
<td>1200</td>
</tr>
<tr>
<td>024.0</td>
<td>2400</td>
</tr>
<tr>
<td>048.0</td>
<td>4800</td>
</tr>
<tr>
<td>096.0</td>
<td>9600</td>
</tr>
<tr>
<td>192.0</td>
<td>19200</td>
</tr>
</tbody>
</table>

Press GOTO

**Parity:** Default is 000.0 = None
Set display as indicated in Table below.

<table>
<thead>
<tr>
<th>Display</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>000.0</td>
<td>None</td>
</tr>
<tr>
<td>001.0</td>
<td>Odd</td>
</tr>
<tr>
<td>002.0</td>
<td>Even</td>
</tr>
</tbody>
</table>

Press GOTO

**Data Bits:** Default is 008.0, i.e. 8 Data Bits
Set display as indicated in Table below.

<table>
<thead>
<tr>
<th>Display</th>
<th>Data Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>007.0</td>
<td>7</td>
</tr>
<tr>
<td>008.0</td>
<td>8</td>
</tr>
</tbody>
</table>

Press GOTO
Stop Bits:-  Default is 001.0, i.e. 1 Stop Bit

<table>
<thead>
<tr>
<th>Display</th>
<th>Stop Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>001.0</td>
<td>1</td>
</tr>
<tr>
<td>002.0</td>
<td>2</td>
</tr>
</tbody>
</table>

Press GOTO

Now proceed to section 3.1.4.

APPENDIX B

(Applicable only to Serial Nos. 1100 and above)

Fast Ramp Selection

In order to facilitate the determination of unknown melt points, a fast ramp of 10 deg.C per minute may be reached with or without the pre-selection of a set point temperature. This may be achieved as follows:-

**IA9100**

Press CLEAR 4 times (or once if at set point)

Press arrowed UP key. The display will show 010.0

Press GOTO. The display will show 10:10 to indicate that ‘fast ramp’ has been selected.
Press GOTO to initiate fast ramp or CLEAR to cancel if required.
The right hand L.E.D. on the GOTO key will be illuminated and the oven temperature will now rise at 10 deg.C per minute to a maximum temperature of 400 deg.C.

Four melt temperatures may be stored and recalled in the normal manner.

**IA9200/9300**

Press CLEAR twice

Press in turn ENTER, 1; 0; 0; to enter 10.0

The display will show 010.0

Press GOTO. The display will show 10:10 to indicate that ‘fast ramp’ has been selected.

Press GOTO to indicate that fast ramp or CLEAR to cancel if required.

The right hand L.E.D. on the GOTO key will be illuminated and the oven temperature will now rise at 10 deg.C per minute to a maximum temperature of 400 deg.C.

Four melt temperatures may be stored and recalled in the normal manner.

6. MAINTENANCE

This equipment is classified as Class II (Ref. IEC 536) with respect to protection against electric shock.

WARNING

** Unplug equipment from mains supply before undertaking any maintenance tasks.

** Maintenance should only be carried out by a competent Electrician under the direction of the Responsible Body.
With proper care and operation the equipment should give a reliable service. Contamination, or general misuse will however reduce the effective life of the product and may cause a hazard.

Maintenance for the equipment should include:
- periodic electrical safety testing (an annual test is recommended as a minimum requirement).
- regular inspection for damage with particular reference to the mains lead and plug/socket.

Little maintenance is required, expect for ensuring a general standard of cleanliness by periodically wiping the equipment clean with a dry, lint-free cloth.

Preventive maintenance for the equipment should include keeping the unit clean and protecting it from spillage, contamination or corrosive elements.

**DO NOT USE SOLVENTS FOR CLEANING ANY PART OF THE EQUIPMENT.**

If the equipment has been exposed to spillage or contamination, then the Responsible Body is responsible for carrying out appropriate decontamination if hazardous material has been spilt on or inside the equipment. Decontamination should only be undertaken under the control of the Responsible Body with due recognition of possible hazards that may ensue. Before using any cleaning or decontamination method, except that recommended above, the Responsible Body should check with the manufacturer that the proposed method will not damage the equipment.

**Capillary Tubes**

These must not be re-used. Discard used tubes immediately after analysis. If tubes break inside the oven, remove by raising the arm to a vertical position, observing the need to loosen the clamp screws first. Then remove the white tubes guide by pulling gently. Rotate the head upwards and backwards so that the broken parts fall out. A gentle tap may be necessary to ensure complete removal. Return to the correct viewing position and re-insert the white tube guide.

**Object Lens**

When necessary, remove the object lens and wipe with a clean, dry, lint-free cloth.

**Bulb (see Figure 6)**

In the event of a bulb failure, proceed as follows:-

- Ensure unit is switched off (O - setting) and oven cool.
- Remove the semi-circular end cover to the right of the object lens by pulling gently.
- Using a No. 1 Phillips screwdriver, remove the one screw retaining the bulb bracket.
- Withdraw the bracket taking care not to strain the connecting leads.
- Unscrew the defective bulb and replace with a new bulb ((Part No. AZ9005).
- Reassemble the bulb bracket using the screw and replace the end cover.
**Fuse Replacement (Power Supply)**

Refer to the product label on the base of the Power Supply unit for the correct value of fuse.

- Mains input T1A Antisurge 20mm
- A/C output F3.15A Quickblow 20mm

Both of these are located in the power supply unit AZ9003.

**The Mains Input Fuse (See Figure 7)**

Ensure the equipment is switched off (O - setting) and the mains plug disconnected. The fuse located within the mains input socket of the power supply. Access is obtained by removing the mains input lead and withdrawing the drawer beneath the socket to expose the fuse. Remove the fuse by prising it from its plastic clip and replacing it by one of the correct type. (See above). Provision for storage of a spare fuse is provided in the front compartment of the drawer.

**The Input Fuse**

Ensure the unit is switched off (O - setting) and the mains plug disconnected. Remove mains plug from input socket. The fuse drawer will now slide out. Note the first fuse is a spare fuse. With the drawer fully out replace the fuse at the back.

**The Output Fuse**

Depending upon the type of power supply unit supplied, the Output Fuse may be located internally or externally.

**Externally Located Fuse (see Figure 7)**
Ensure the unit is switched off (O - setting) and the mains plug disconnected. This is located on the back panel and is removed by unscrewing the carrier from its fitting. AFTER FIRST REMOVING THE MAINS OUTPUT LEAD FROM ITS SOCKET.

**Internally Located Fuse (see Figure 8)**

Ensure the unit is switched off (O - setting) and the mains plug disconnected. Access to the internally mounted fuse is achieved by removing the four screws that secure the Power Supply cover to the base AFTER ENSURING THAT THE MAINS INPUT LEAD HAS BEEN REMOVED FROM ITS SOCKET. remove the fuse by prising it from its metal clip and replace with one of the correct type. See below.

---

7. **SERVICE INFORMATION**

For Service or Technical Assistance contact the local distributor where the unit was purchased (see back page). Any unit returned for service/maintenance should be accompanied by a completed Decontamination Certificate prior to any work being undertaken. Copies of the Certificate are available from Distributor/Manufacturer.

8. **SPARE PARTS LISTING**

Table 3. Accessories

<table>
<thead>
<tr>
<th>Part No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ9001</td>
<td>Cold Finger</td>
</tr>
<tr>
<td>AZ9002</td>
<td>Dust Cover</td>
</tr>
<tr>
<td>AZ9003</td>
<td>Power Supply 100-120V/220-250V</td>
</tr>
<tr>
<td>AZ9005</td>
<td>Bulb 12V 2.2W M.E.S.</td>
</tr>
<tr>
<td>AZ9006</td>
<td>Fuse T1A Antisurge (pack of 10)</td>
</tr>
<tr>
<td>AZ6717</td>
<td>Benzil</td>
</tr>
<tr>
<td>AZ6719</td>
<td>Anthraquinone</td>
</tr>
<tr>
<td>AZ9027</td>
<td>Fuse F3.15A Quickblow (pack of 10)</td>
</tr>
<tr>
<td>Item Code</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>AZ6730</td>
<td>Calibration Kit</td>
</tr>
<tr>
<td>AZ6731</td>
<td>Interface Cable for alternative Serial Drive Printers</td>
</tr>
<tr>
<td>AZ6732</td>
<td>Interface Cable for alternative Parallel Drive Printers</td>
</tr>
<tr>
<td>AZ6733</td>
<td>Interface Cable for Printer (PR2000)</td>
</tr>
<tr>
<td>AZ9124</td>
<td>RCD Safety Adapter 230V 50Hz 13A Max. 3KW</td>
</tr>
<tr>
<td>AT4042</td>
<td>Capillary Tubes 1.5mm (10 x 100 pack)</td>
</tr>
<tr>
<td>AT4043</td>
<td>Capillary Tubes 2.0mm (10 x 100 pack)</td>
</tr>
<tr>
<td>PR2000</td>
<td>Printer (with connecting ribbon cable)</td>
</tr>
<tr>
<td>AT4044</td>
<td>Paper Roll (2) and ribbon for printer</td>
</tr>
<tr>
<td>M6332</td>
<td>Power Cable with European Plug (220V)</td>
</tr>
<tr>
<td>M6054</td>
<td>Power Cable (plain end)</td>
</tr>
<tr>
<td>M6288</td>
<td>Power Cable with North American plug (110V)</td>
</tr>
</tbody>
</table>
LIST OF REFERENCES

1. IEC519: Safety in electroheat installations - Part 2: Particular requirements for resistance heating equipment.

2. BS5345 Codes of Practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres.

3. IEC664 Guide to insulation co-ordination within low voltage systems including clearances and creepage distances for equipment.


5. BS7687: Section 2.10:1993 Specification for laboratory equipment for the heating of materials.


8. CAN/CSA - C22.2 No. 1010.2.010-94 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 2-010: Particular requirements for laboratory equipment for the heating of materials.

9. EN55014 Specification for limits and methods of measurement for radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus.


11. FCC15 Class B - ANSI C63.4 Electromagnetic interference Part 15 low powered emitters of radio frequency energy between 9KHz and 40GHz. US and Canada.
EC DECLARATION OF CONFORMITY:

The IA9000 series products defined within this document conform to the following regulations/standards:

- EMC Directive (89/336/EEC)
- Low Voltage Equipment Directive (73/23/EE)
  In particular:
  - BS EN 61010-1: 1993 Pt 1
  - BS7687: Section 2.10: 1993
  - IEC1010-2-010: 1992
  - CAN/CSA-C22.2 No. 1010.1.010-94
  - CAN/CSA-C22.2 No. 1010.2.010-94
  - EN55014
  - EN50082-1
  - FCC 15 Class B - ANSI C63.4

CE94

Signed: ________________________________________________
M.J. King/Engineering Manager
Electrothermal Engineering Ltd

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