



HT200H
USER MANUAL
Version 1.0

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Chapter

1

TECHNICAL SPECIFICATIONS**1.1 Technical Specifications****DIMENSIONS**

Height	620 mm
Width	400 mm
Length	420 mm

Weight

With tray	11.5 kg
-----------	---------

Electrical

Voltage	230/115V
Frequency	50/60 Hz
Power	160 VA

Operating conditions

Ambient Temperature	15°C - 35°C
Humidity	5% - 85%

OPERATING SPECIFICATIONS**Sample conditioning**

Oven Temperature	40°C - 150°C
Incubation time	0:00-24:00 hr
Progressive heating time	0:00-9:59 hr
Oven Shaking time	Variable

Sample withdrawal

Syringe Temperature	40-150°C
Sample Volume	Steps of 0.01 ml
Flushing flow rate	0.1-99.9 ml/min
Sample Homogenisation	Up to 15 strokes
Syringe Size	2.5 or 5 ml

Injection

Injection speed	0.1- 99 ml/min
Pre/Post injection dwell time	0-99sec
Post injection syringe flush time	0- 9.9 min

Chapter

2

INSTRUMENT DESCRIPTION

2.1 Parts Definition

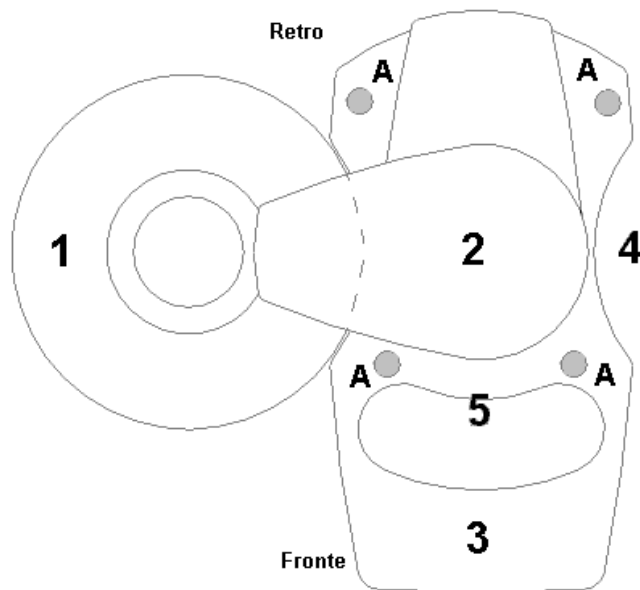


Table 1
Standard Version with 40 vial tray

- 1 **TRAY:** vial plate (40 positions)
 - 2 **TOWER:** (Contains the syringe)
 - 3 **CONTROL PANEL**
 - 4 **INJECTION PORT LOCATION OF GC**
 - 5 **OVEN/SHAKER**
- A Fixing holes to secure the sampler to the GC (Bracket).

2.1.1 KEY BOARD

The control panel of the unit is laid out as follows.

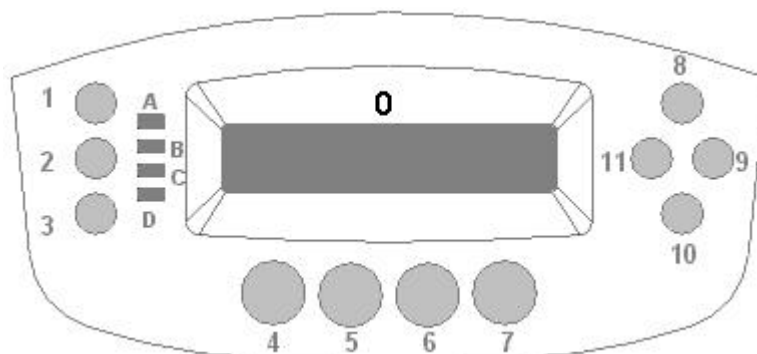


Table 2 – KEY BOARD

0 Display 20 characters/2 lines.

Keys:

- 1 **SET:** enters Set Up mode (this can only be done from the initial boot up screen).
- 2 **MET:** Enter Method mode.
- 3 **SEQ:** Enter Sequence mode.
- 4 **STOP:** Stops the unit when running
- 5 **START:** Starts a run once a single injection or Automatic run has been selected
- 6 **EXIT:** Exits current screen – also used like a “back” key
- 7 **ENTER:** Confirmation of command
- 8 : directional key
- 9 : directional key
- 10 : directional key
- 11 : directional key

Led:

- A **ST-BY:** status indicator
- B **RUN:** status indicator
- C **A-INJ:** status indicator
- D **B-INJ:** status indicator

2.1.2 CONNECTIONS

The connection panel is on the rear of the instrument.

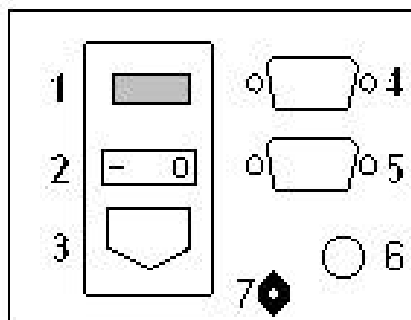


Table 3 –CONNECTION PANEL

- 1 Power setting (115/230 Vac)
- 2 I/O: Power switch

Connectors:

- 3 Power cable socket
- 4 **RS232C**: serial port
- 5 **GC**: Analyser connection (GC, elemental analyser...)
- 6 Ground.
- 7 Gas connection for washing syringe

2.1.3 OVEN/SHAKER

Above the keypad there are 6 injection holes.

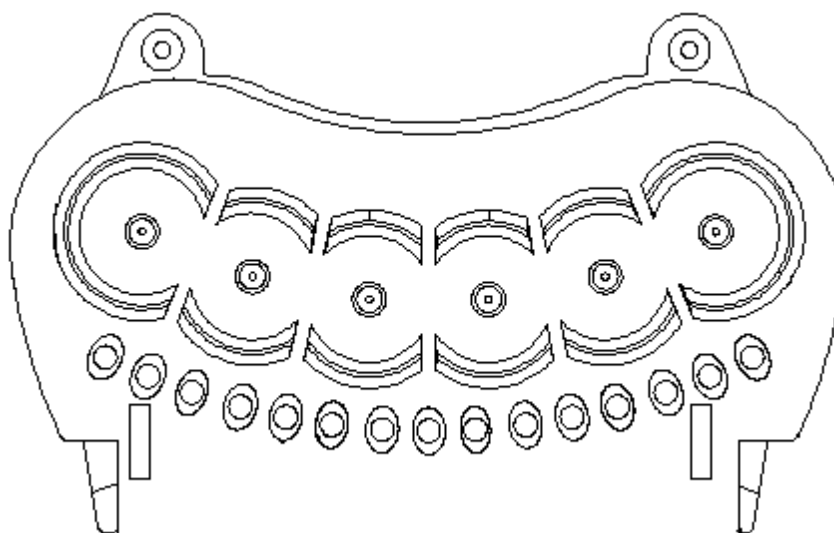
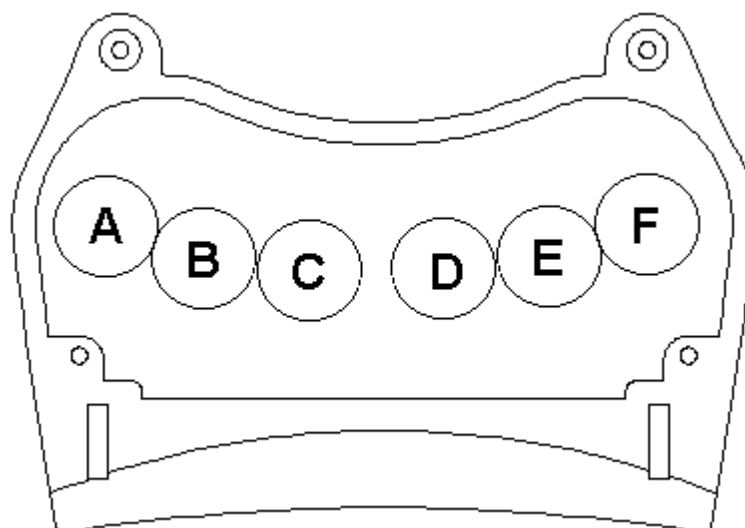


Table 4. Cover of oven



View inside the oven. There are six positions for the vials.

2.1.4 INSTRUMENT BASE

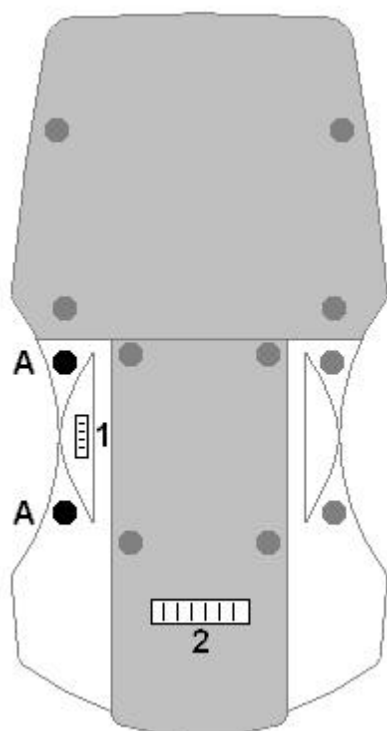


Table 5A
INSTRUMENT BASE
with tray on the left hand side

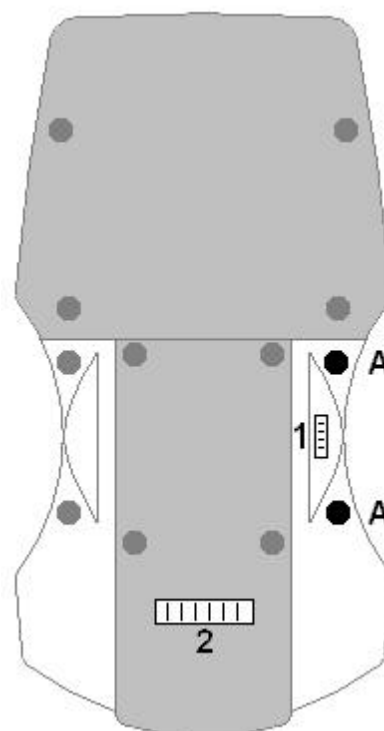


Table 5B
INSTRUMENT BASE
with tray on the right hand side

A Two screws used for fixing the support for the tray.

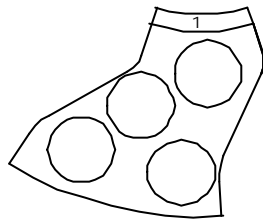
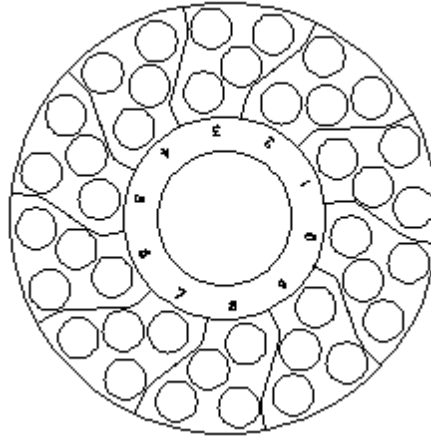
Connectors:

- 1 **Connector for the tray support.**
- 2 **Aux Connector:** For connecting either an integrator or two autosamplers together.

The sampler can be configured with the tray on either the right or left hand side. This configuration is not user changeable – therefore please check that you have the correct format before proceeding.

2.1.5 VIAL RACK

The sampler is supplied with a 40vial rotating tray. This tray can accommodate either 10ml or 20ml vials



Vials on the rotating plates, are organised in sectors.

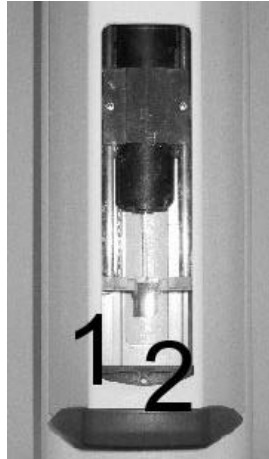
Each vial is identified with a two digit number as follows

1	3
Number identifying the sector	Number identifying the Position

The **Sector number**, (0 – 9), is written on the central part of plate. The **Position number** is written close to vial. This number can be 0,1,2 or 3

2.1.6 SYRINGE LOCATION

The syringe is located inside the tower. To access to the syringe remove the screw and open the protective lid.



Protective lid down



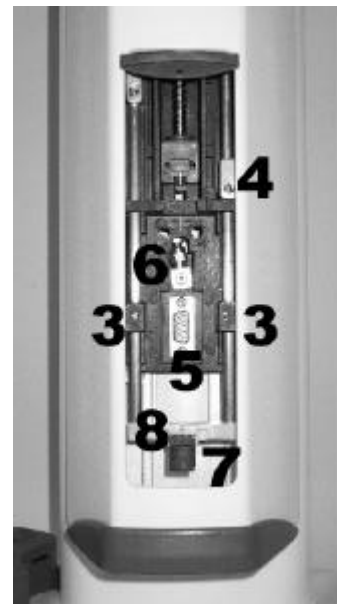
Protective lid up

- 1 Protective lid
- 2 Locking screw

The Syringe holder is made from the following parts:

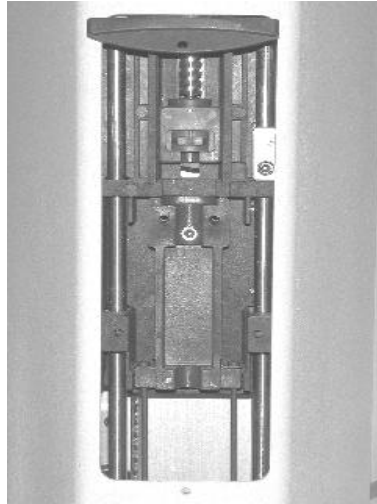


With Syringe

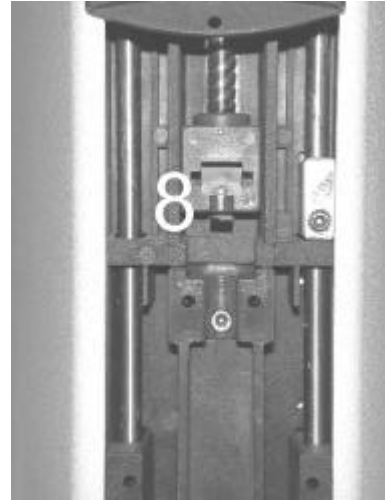


Without Syringe

- 1 Needle guide
- 2 Intermediate Needle guide
- 3 Syringe location
- 4 Safety lock
- 5 Piston locker
- 6 Syringe locker
- 7 Syringe pointer
- 8 Piston location

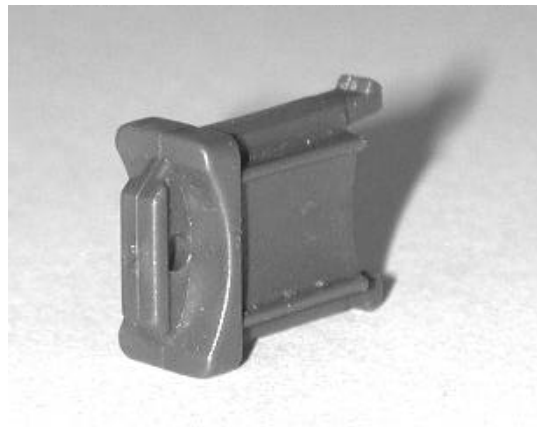


SYRINGE LOCATION

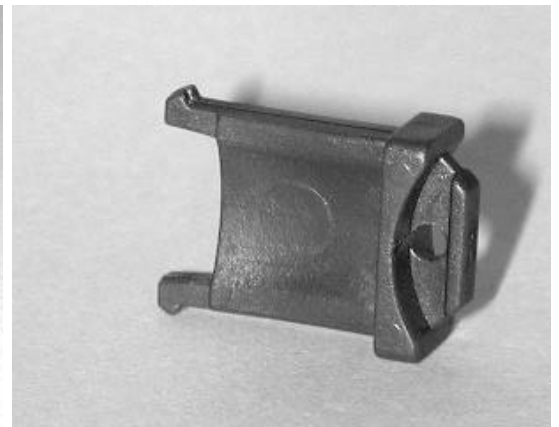


SYRINGE LOCATION
(piston locker removed)

The Piston Locker has two different faces to accommodate different pistons. These faces will be indicated as "S side" and "B side".



"S" SIDE



"B" SIDE

2.2 Moving Parts

There are four moving parts: the rotating plate **Tray, (TRY)**, the tower (also called **Turret, TUR**), the needle location (**NDL**) and the piston (or **Plunger, PLG**).

The **Tray**, can rotate about 355°.

The Tower can rotate of 160° from the central position in either direction.

The **Syringe** can move vertically up to a maximum of 210mm.

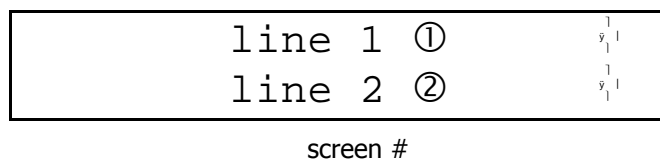
The Piston can move up to 64mm inside the syringe.

Warning


It is possible to move each part by hand but **only with the instrument switched off**. Move the parts slowly and carefully. Rapid movements or movements with the instrument switched on can damage the autosampler.

2.3 Typographic Notes

For simplification each screen will be shown as follows



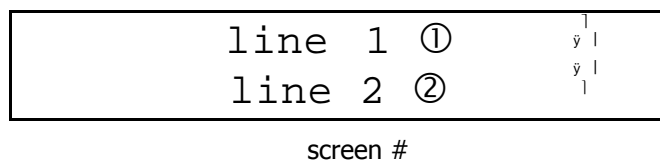
The symbols ①, ②. . . indicate the presence of a field that can have different values. These can be modified when necessary.

The symbols  indicate the direction keys 8, 9, 10, 11 that are located in the front of the instrument (see. table 2).



The symbols SET MET SEQ STOP START EXIT and ENTER indicate the keys that are located in the front of the instrument.



2.4 Command Keys Description





2.4.1 DIRECTIONAL KEYS



The instrument display has two lines. The active line will have a blinking cursor.

To move from one line to another use the   keys. These also move from one screen to another.

The   keys modify values indicated on a specific line and also move to secondary menus.

The directional keys (   ) are not active in all screens – the icon in the right hand of the screen indicates which keys are active.

2.4.2 STOP, START, EXIT AND ENTER KEYS

The **EXIT** key is important for moving inside menus. In order to move back from a screen to a previous one, and also to exit from a secondary menu to the main menu it is necessary to use **EXIT**.

STOP is used to stop the instrument when it is moving. This key stops the run and changes the status to STAND BY.

START is used to activate preparation/injection.

ENTER confirms an instruction to the instrument.

2.4.3 SET, MET AND SEQ KEYS

SET accesses to the configuration menu of the autosampler. To get into this mode the screen must have the initial display (this can be accessed by pressing **EXIT**)

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MET accesses the method setup – this controls the injection parameters. Finally, **SEQ** accesses the injection sequence mode which is used to program a set of automatic injections.

When the unit is in the SET/MET/SEQ modes the respective key will be lit. To exit the mode the key will need to be pressed again.

2.4.4 STATUS INDICATORS

On the command panel there are four lights: **ST-BY**, **RUN**, **A-INJ** and **B-INJ**.

B-INJ and **A-INJ** indicate that the sampler is in the phase before (**Before-INJ**ection) or after (**After-INJ**ection) injection.

RUN indicates that HT200H received the command to do one of the following actions:

- **SINGLE INJECTION;**
- **AUTOMATIC RUN.**

ST-BY (**STAND-BY**) indicates that the unit is ready to receive a command (it will heat the oven and needle to the standby temperatures).

During an automatic injection cycle **ST-BY, on together with B-INJ or A-INJ**, indicates that the unit is waiting for confirmation to stop the run (press EXIT to confirm)

3.1 Installation

Please follow these instructions carefully.

1. Check that voltage value is correct (see paragraph 3.2 “Check and modify voltage”).
2. Assemble the autosampler (see paragraph 3.3 “Autosampler Assembly”).
3. Install bracket and autosampler on to the analyser (see paragraph 3.4 “Installation on analyser”).
4. Connect cables (see paragraph 3.5 “Cable Connection”).
5. Install the sample tray following points 1, 2, 3 & 4 shown on paragraph 3.6 “Tray Installation”.
6. Switch on the instrument (see paragraph 3.7 “Start Up”).
7. Put at least one vial on the plate in position 1.
8. Input correct parameters for “Vial Size” and “Vial Depth” in the menu “Vial/Syringe Set up” (see paragraph 4.5).
9. Install syringe (see paragraph 4.6.1 “Before installation”).
10. Align the injector. (see par. 4.4).

3.2 Check and Modify Voltage

Check that HT200H is not connected to the main power.

The input Voltage of the unit is displayed above the power socket at the rear of the unit and is normally set to 230V.

To modify voltage proceed as follows:



Table 8 A



Table 8 B

1. Open the fuse compartment with a screwdriver, as shown in table 8A.
2. Extract the fuse holder as shown in table 8B.
3. Substitute the two fuses with the ones suited for your power supply as indicated in the table below.

Power voltage	Fuse (EN 60127)
115v	0,8A T
230v	0,5A T

Table 1

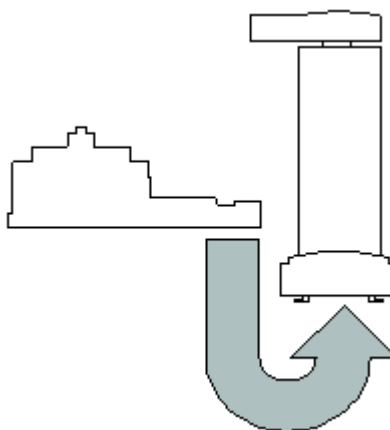
4. Insert the fuse holder displaying the correct voltage at the top.
5. Close the compartment by pushing gently.

3.3 Autosampler Assembly

Ensure that the unit is not plugged into the power.

Unpack the instrument carefully. Remove the belt from around the tower that is used to protect the instrument during transportation.

- Check from the product specifications if the instrument has the tray on the left or on the right hand side.
- Remove the two screws used to fix the plate on the base (See 2.1.4).
- Fix the tray support using these two screws.



Location of the tray support

- Connect the cable from the tray support to the socket underneath the base.
- Put the instrument upright on a suitable flat bench.

3.4 Installing the unit onto the analyser

Warning

Follow these instructions **with the instrument switched off**.

Please follow these instructions in order:

1. Check the sampler is configured correctly, with the tray on the right hand side or on the left hand side.
2. Fix the bracket onto the analyser. For the correct installation see the instructions with the bracket; each analyser has a specific bracket and installation instructions.
3. Place the sampler onto the bracket ensuring that the four holes identified with "A" in table 1A correspond with the bracket holes.
4. Secure the auto sampler to the bracket using the four screws provided in the mounting kit
5. Open the **Syringe Compartment**, remove the safety screw with the Allen key and open the protective lid (see table 7A & 7B).
6. Rotate the tower manually and gently position over the injector. (Move it by pushing the upper part of the tower.)
7. Move the **Needle Guide** down over the injector by pushing on the **Syringe Locker**.
8. Ensure the **Needle Guide** is perfectly centered on the injector
9. Lock the auto sampler in that position using the four screws.
10. Push the **Needle Guide** back to the original position.
11. Move the tower to the original position and close the **Syringe Compartment**.

3.5.1 Cable Connections

1. Check that the power is switched off.
2. Check that the voltage is correct (see paragraph 3.2).
3. Connect the analyser to the 9 pin port of unit with one of the two cables provided with the instrument (see. table 3).
4. If remote control is required, connect the second cable from the RS232C port (see table 3) to the serial port of the PC.
5. If an integrator or second auto sampler needs to be connected the port is located under the auto sampler base (see par. 2.1.4 "Under base area")
6. Plug the power cable into the sampler.

3.5.2 Gas Connection

In order to flush the syringe, a suitable gas source (e.g. Nitrogen) must be connected to the inlet at the rear of the unit. The gas line must be regulated so that the inlet pressure does not exceed 100 kPa (1Bar/15 PSI).

3.6 Tray Installation

1. Put the plate on the support as shown;

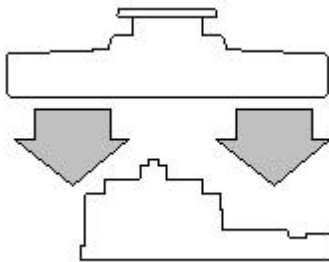


Table 9 A
Before installation

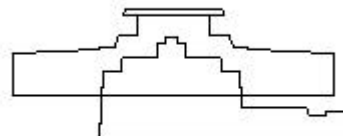


Table 9 B
After installation

2. Rotate it clockwise until it fits into the locking position.
3. Switch the unit on and allow the unit to complete its tray identification procedure (see 3.7).
4. If the vial size is changed (10ml or 20ml), it will be necessary to modify the Set Up parameters. See chapter 4, paragraph "Vial/Syringe Set Up". It will also be necessary to modify "Vial Size" and "Vial Depth" and perform the positioning procedure "Touch & Plunger Zero".

3.7 Start Up

As soon as the instrument is switched on the following screen will appear:

(① represents the software version installed in the instrument.)

HT200H Series
Software rel. ①

NOTE. It is possible to come back to this screen by pressing **EXIT** from the main menu.

After 5 seconds the unit will begin its setup procedure. It will move the tower in the hold position and will proceed to recognize the type of tray

TRAY IDENTIFYNG
PLEASE WAIT

It is possible that this operation will take a few minutes. Pressing **EXIT** will interrupt this procedure and the unit will assume that it was the same tray as previously set.

NOTE. If the unit is being used for the first time **DO NOT** interrupt this procedure.

From this point the unit will enter the main menu (**Run Time Menu**).

3.8 Switching off

Before switching off the instrument verify that:

- **The unit is in the main menu (Run Time Menu)**
- **The instrument is on hold status (STAND-BY)**

If the instrument is sampling interrupt it by pressing STOP then EXIT. If you are in a menu different from Run Time Menu, you have to go back to it, before proceeding to switch off the instrument.

In an emergency you can switch off the instrument from any position (main menu / secondary menu).

Chapter

4

START UP

4.0 Introduction

To configure the instrument for use with different vials, syringes and analysers it is necessary to use the **SET UP Mode**.

Warning

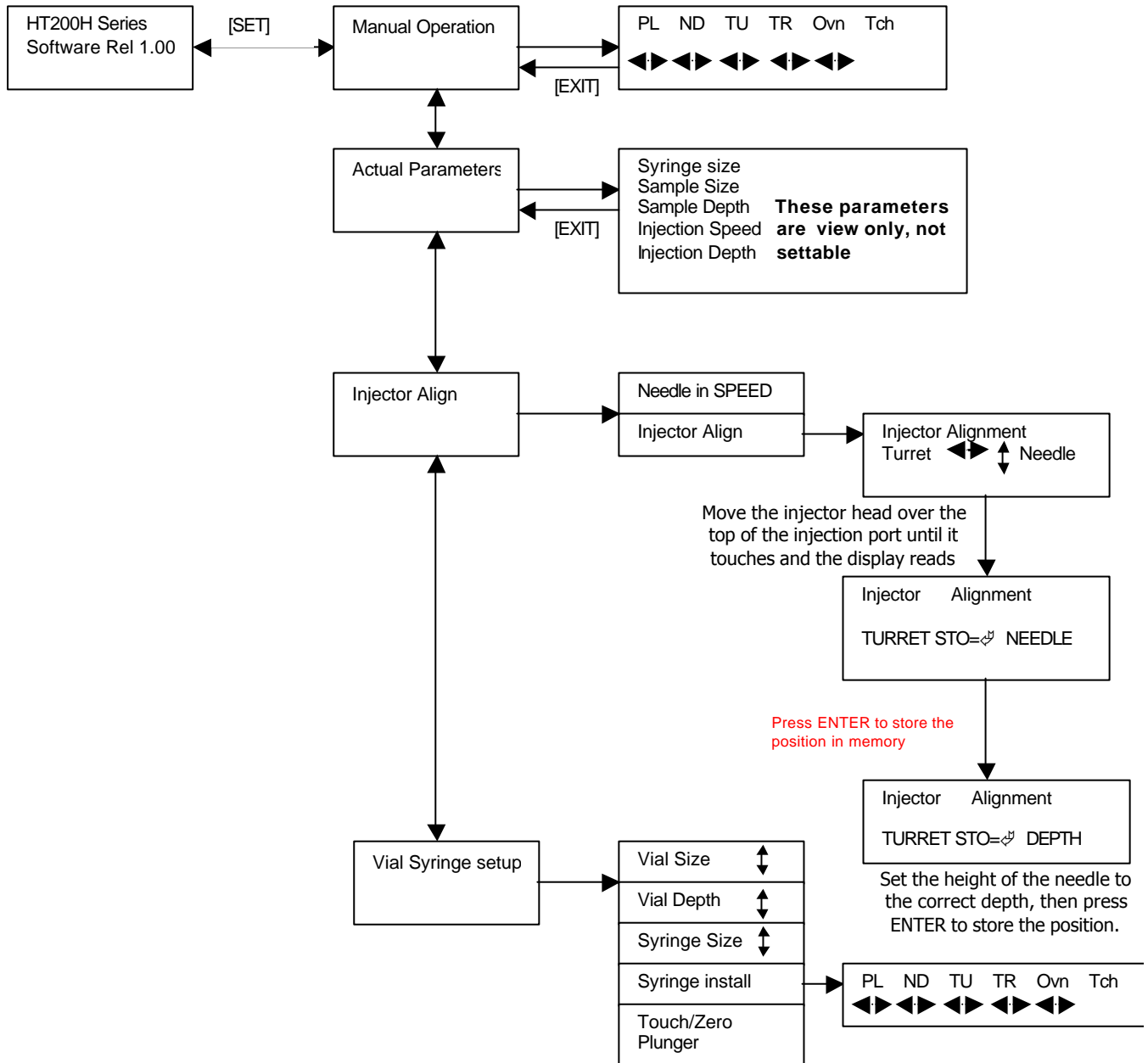
The **Set Up** must be done carefully by trained, qualified personnel. Incorrect setup may damage the syringe or even the instrument.

If you don't input values in each field of the Set Up menu, the **SET** light will remain on even after you exit the Set Up menu.

4.1 Set Up Mode

To access to the Set Up menu it is necessary to be in the initial screen. This can be accessed by pressing exit from any screen in the run menu.

The setup mode is laid out as in the following flow diagram.





Flow Diagram of the SETUP mode

4.2 Manual Operations

The “**Manual Operation**” is used to move manually the syringe, syringe piston, tower and the vial tray. This function is used when











- You want to install, substitute or remove the syringe.
- The sampler makes a movement error in one of its functions. This will cause an error message to appear on the screen followed by the control screen below

PLG	NDL	TUR	TRY	OVN	TCH
					①



Using the  and  keys it is possible to select one of the five “**PLG**”, “**NDL**”, “**TUR**”, “**TRY**” and “**OVN**”. Where

- “**PLG**”: is the syringe piston;
- “**NDL**”: is the syringe holder;
- “**TUR**”: is the tower;
- “**TRY**”: is the vial tray.
- “**OVN**” is the oven

The  and  keys will then move the parts in the following way:

- lift () or lower () the syringe piston;
- lift () or lower () the syringe holder;
- rotates tower to the right () or left ();
- rotates the tray to the right () or left ().
- Open () or close () the oven.

The symbol under the word “**TCH**” indicates the injection sensor status, to warn the operator that the needle guide has touched a surface.

	The needle guide is touching a surface
	The needle guide is not touching a surface.

4.3 Actual Parameters

In this mode it is possible to view the set-up parameters as they are currently installed.

The following parameters can be viewed

- Syringe size
- Sample Size
- Sample Depth
- Injection Speed
- Injection depth

These values can not be set from this screen they can only be viewed. For the injection speed, the following table can be used to convert the set value to a speed in mm/sec

Set Value	Corresponding Speed	Set Value	Corresponding Speed
0	2 mm/s	5	64 mm/s
1	4 mm/s	6	128 mm/s
2	8 mm/s	7	256 mm/s
3	16 mm/s	8	512 mm/s
4	32 mm/s		

4.4 Injector Align

Attention

It is necessary to have the syringe installed (following all the relative procedures) **before** proceeding.

The display shows

```

Needle in SPEED ①  |
                    |
Injector Align      |
  
```

“Needle in SPEED” allows descent speed of the needle to be set. This speed is indicated by a value between 0 and 8 (see previous page).

Press the right arrow to select injector align and the following screen appears

```

Injectors Alignment
TURRET          | NEEDLE
  
```

The tower will move to the location stored in memory. Use the \rightarrow and \leftarrow keys to align the tower over the injector, then use \updownarrow keys to lower the syringe on to the injector. This point is defined as “touch point”.

As soon as the needle touches the injector, the following screen appears.

```

Injectors Alignment
TURRET STO=↙      NEEDLE
  
```

Screen 59A

Push the **ENTER** key to confirm the position and store it in memory (Pushing the **EXIT** key will exit without saving)

The following screen then appears

```

Injectors Alignment
STO=↙ mm DEPTH: - ①
  
```

Move the syringe holder using the **⬅** and **➡** keys to insert the needle into the injector at the required depth. The actual depth will be displayed on the screen. This value is negative as it is calculated with respect to the touch point.

Push the **ENTER** key to confirm the position and store it in memory (Pushing the **EXIT** key will exit without saving).

The alignment is now complete and the screen reverts to the menu.

Attention

Be careful in aligning the needle as it is possible to damage the syringe. In particular, ensure:

- To carefully place the needle guide on the injector;
- The needle guide fits properly to the injector;
- The needle has to enter without impediment into the injector, penetrating the diaphragm without an excessive bending: if it does then check injector septum, type of syringe used and needle tip;

4.5 Vial/Syringe Set Up

Selecting Vial/Syringe set up from the main menu enters the following screen

Vial Size ml ①
Vial Depth mm ②

Vial Size

The unit is capable of using two sizes of vials, either 10 or 20ml. Select the appropriate vial size using either the **➡** or **⬅** keys.

Vial depth

The vial depth is the position that the needle has to reach inside the sample vial. This field may have values between 0mm and 25mm. Use **➡** and **⬅** to increase (**➡**) or decrease (**⬅**) this value in steps of 1 mm.

NOTE. Ensure that the depth set-up is appropriate for the contents of the vial. In particular, please be sure that there is nothing to reduce the available depth (such as a limited volume insert).

NOTE. Perform the Touch/Zero plunger routine after changing the vial size or the vial depth.

When performing the Touch/Zero plunger routine after the vial size has been changed a message will appear on the screen to remind the user to either install or remove the spacers in the oven (these are used to raise the height of a 10ml vial to that of a 20ml vial)

Syringe Size

The syringe size can be either 2.5ml or 5.0ml. Select the appropriate size using the left/right arrow keys.

Syringe install

The syringe installation procedure is the same as the manual control screen of the unit. Use the control panel to move the tower/plunger/needle into the correct place and then insert the new needle according to the installation instructions on the following page.




Touch & Plunger Zero

After installing a new needle or changing the vial dimensions, it is necessary to zero the touch point of the plunger. The unit will do this automatically once the function has been selected. Ensure there is a vial in position 0.1 of the tray as the unit will touch this position. If the vial size has been changed the oven will open and a message will appear to either "Install Spacers" (if changing from 20ml to 10ml) or "Remove Spacers" (changing from 10ml to 20ml). Follow the onscreen instructions, and then press "start"

4.6 Syringe Installation

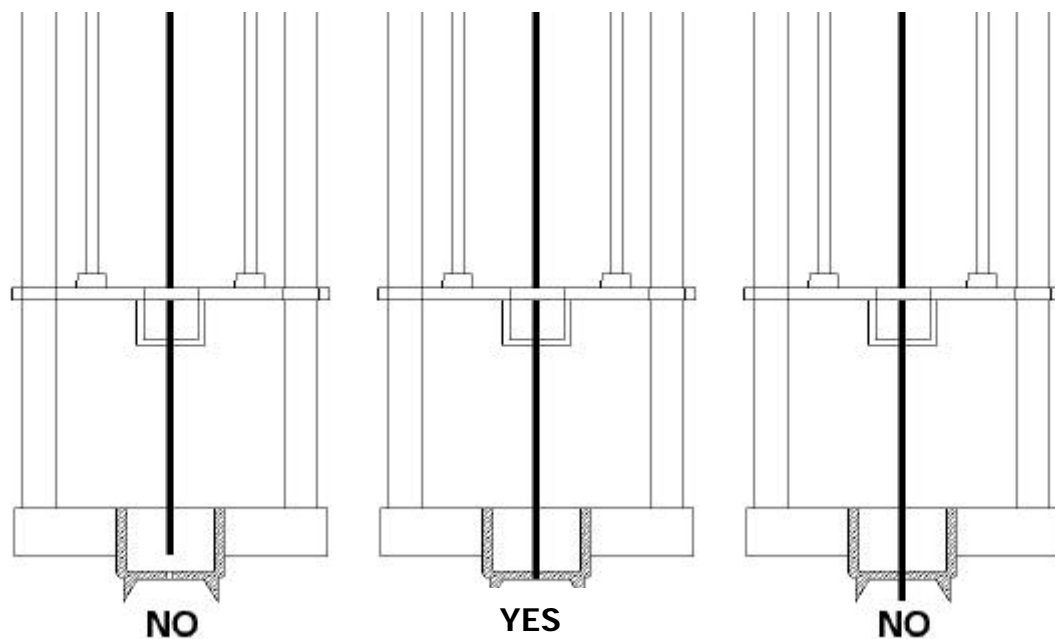
In order to avoid damaging the syringe or the sampler please follow the instructions carefully and in order :

4.6.1 INSTALLATION

1. Check that unit is in standby status
2. Ensure the tower is in the central position
3. Open the Syringe Compartment, removing the safety screw with the Allen key supplied with the instrument and raising the protective lid
4. Enter the SET UP Mode (refer to 4.1); using , select "Vial/Syringe Setup".
5. Ensure the "Syringe Size" is set to the correct value
6. Using  and  enter the syringe installation mode.
7. Lower the plunger (**PLG**) into to the lowest position possible
8. Lower syringe holder (**NDL**) about 5cm down from its highest position.
9. Loosen the safety block, allowing it to slide easily.
10. Remove the piston block by carefully pulling with 2 fingers.
11. Remove the syringe block using the Allen key supplied.
12. Raise the syringe holder (**NDL**) back to its highest possible position.
13. **Ensure the appropriate syringe holder is used for the syringe**

There are two different syringe holders, suitable for various syringes. Before mounting the syringe, check that the appropriate syringe holder is installed. If the syringe holder is wrong, it will either be impossible to insert the syringe, or will not allow the syringe to sit safely inside it.

14. Insert the needle into the intermediate needle guide and then into the needle guide; insert the syringe body into the holder; lastly position the plunger into its lodging.
15. Fix the syringe block. Shut carefully and tighten the two screws.
16. Lock the safety block. **This operation ensures that the needle point remains perfectly aligned with the needle guide and that the needle doesn't protrude out of needle guide. This will ensure the safety of the needle.**
17. Raise the plunger (**PLG**) to insert the piston block. Insert the piston block taking care to orientate it the right way. The correct face should point down
18. Check that the syringe needle is correctly aligned, as per the following illustration:






Push to return to the menu, then select "Touch&Plunger Zero".
Push to start the procedure.

19. Close the **Syringe Lodging**, lowering the lid and locking with the safety screw using the Allen key supplied (cfr. tables 7A and 7B).
20. At the end of the procedure, exit from Set Up Mode by pressing the key.

4.6.2 REMOVAL AND REPLACEMENT

Removal

1. Ensure that unit is in standby mode
2. Position the tower in central position (this is so that it is over the oven).
3. Open the **Syringe Lodging**, remove the protective screw and raise the shutter.
4. Enter Set Up Mode (see chapter 4); select by pressing  on the "Vial/Syringe Setup" line.
5. Using  and  enter Syringe Installation Mode.
6. Lower the syringe plunger (**PLG**) to its lowest point.
7. Lower the syringe lodging (**NDL**) about 2 cm.
8. Remove the piston block using two fingers.
9. Remove the syringe block using the supplied Allen key.
10. Extract the syringe carefully

Replacing the syringe

Replace the syringe according to the "syringe set up" above. Ensure that the correct volume is entered and stored in the memory of the sampler.

Chapter

5

SEQUENCE MODE

5.1 Method sequences

If the sampler is required to process more than one sample at a time a method sequence must be used. A sequence is a collection of individual methods. The unit can store up to 16 methods in a sequence.

Making a sequence

From the main runtime menu, press the sequence button on the front panel – this will enter the sequence mode. A flow diagram of the sequence mode is shown on page 35.

5.2.1 Sequence step

The sequence step is the individual step of the sequence that you are editing. You can only edit a step that has previously been created – so when you create your first method the sequence step will be 1 and the left/right keys will be inactive. When another step has been added to the method you will be able to edit 1 or 2 .

5.2.2 Method Number

Select the method number that you wish to use for this particular step of the sequence. The individual methods have to be defined in the method mode which is explained in the next chapter. The instrument can store 10 methods.

5.2.3 First Sample

Choose the first sample to be injected in this step of the sequence. This can be anywhere on the rack, independent of where previous steps may have started or finished.

5.2.4 Last Sample

Select the last sample to be analysed using this step. This number must be equal to or higher than the first sample number. If it is equal to the first sample number then only one sample will be analysed.

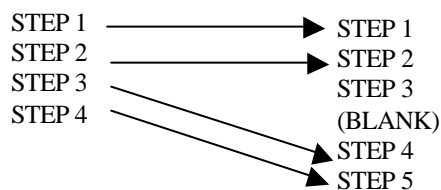
5.2.5 Sequence step

This command is used to move on to the Next step (NXT) insert (INS) or delete a step from the sequence.

To select a command, highlight the cursor on the desired step and confirm by pressing the ENTER key.

NXT will move on to the next step in the sequence. If the last step of a sequence is being edited it will create a new blank set and add it to the end of the current sequence. For example if the sequence has four steps it will add a new 5th step.

INS inserts a new step into the sequence below the one which is being edited. For example if step 3 of a 5 step sequence is being edited and INS is selected, there will be a new step 3. The steps above 3 will all increase by 1



The Effect of pressing INS when step 3 is being edited.

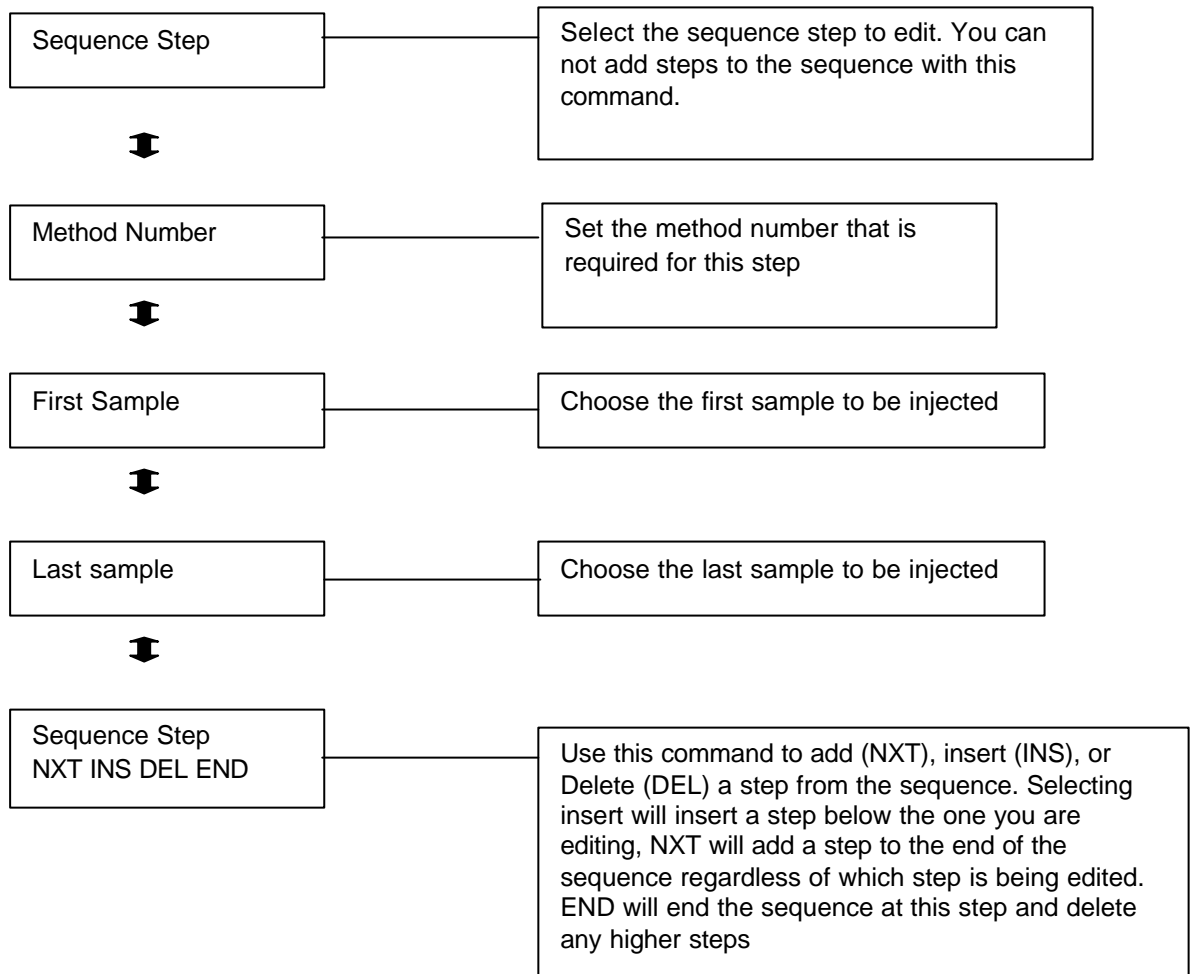
DEL

Pressing DEL will delete the step that is being edited. Any steps that are above the deleted steps will then decrease by one. This is the opposite of INS.

END

Pressing END finishes the sequence and deletes any step in the sequence after the current step.

Press EXIT return to the RunTime Menu



Flow Diagram of the Sequence Mode

Examples

To run 10 samples using the same method. We will assume this to be method 3

- 1) From the main menu press SEQ to enter the sequence mode.
- 2) Select sequence step 1, then press the down key to change the method number.
- 3) Use the left/right arrow keys to select method 3.
- 4) Press the down key to set the First sample. Select position 0.0
- 5) Press the down key to the last sample. Select 3.1 (each row contains 4 vials, starting at 0. So the sequence will run 0.0, 0.1, 0.2, 0.3, 1.0 ...)
- 6) Press SEQ to get back to the runtime menu.
- 7) From the runtime menu press the down key until the Automatic Injection screen is reached. Select this method by pressing the right arrow.
- 8) At the prompt, select sequence step 1 as the first sequence step. Ensure that the last sequence step is also 1.
- 9) Press START. The unit will now run all 10 samples in order, unless the STOP command is used.

Example 2

Run 10 samples using method 3, followed by 5 samples using method 6.

- 1) Follow steps 1-5 as the above method.
- 2) Select NXT and press ENTER. The display will now show "Sequence Step 2"
- 3) Change the method number to 6, then press the down arrow
- 4) Set the first sample to 3.2, and the last Sample to 4.2, then press the down key.
- 5) Select SEQ to return to the runtime menu.
- 6) From the runtime menu press the down key until the Automatic Injection screen is reached. Select this method by pressing the right arrow.
- 10) At the prompt, select sequence step 1 as the first sequence step and step 2 as the last sequence step.
- 11) Press START. The unit will now run all 15 samples in order.

Chapter

6

METHOD MODE

6.1 Programming a method

The method mode can be accessed from the Runtime menu by pressing the MET key on the keypad.

The method mode allows the definition of a particular preparation and injection for a sample. The flow diagram of the method mode is shown on the following page. By using the directional keys the following parameters can be set.

6.2.1 Method Number

The unit can store up to 10 individual methods in memory. The method number can be set from 0-9.

6.2.2 Method Type

There are two method types **Constant (C)** or **Progressive (P)**. In the constant mode the vials are kept in the incubator for a constant period of time and this is the same for all the samples. In the progressive mode the length of time the samples are incubated is increased.

For example if the Progressive mode is selected and the progressive time is set to 10minutes, the second sample will be incubated for 10minutes longer than the first. The third sample will be incubated for 10 minutes longer than the second (and 20 minutes longer than the first). In constant mode, all the vials will be incubated for the same time.

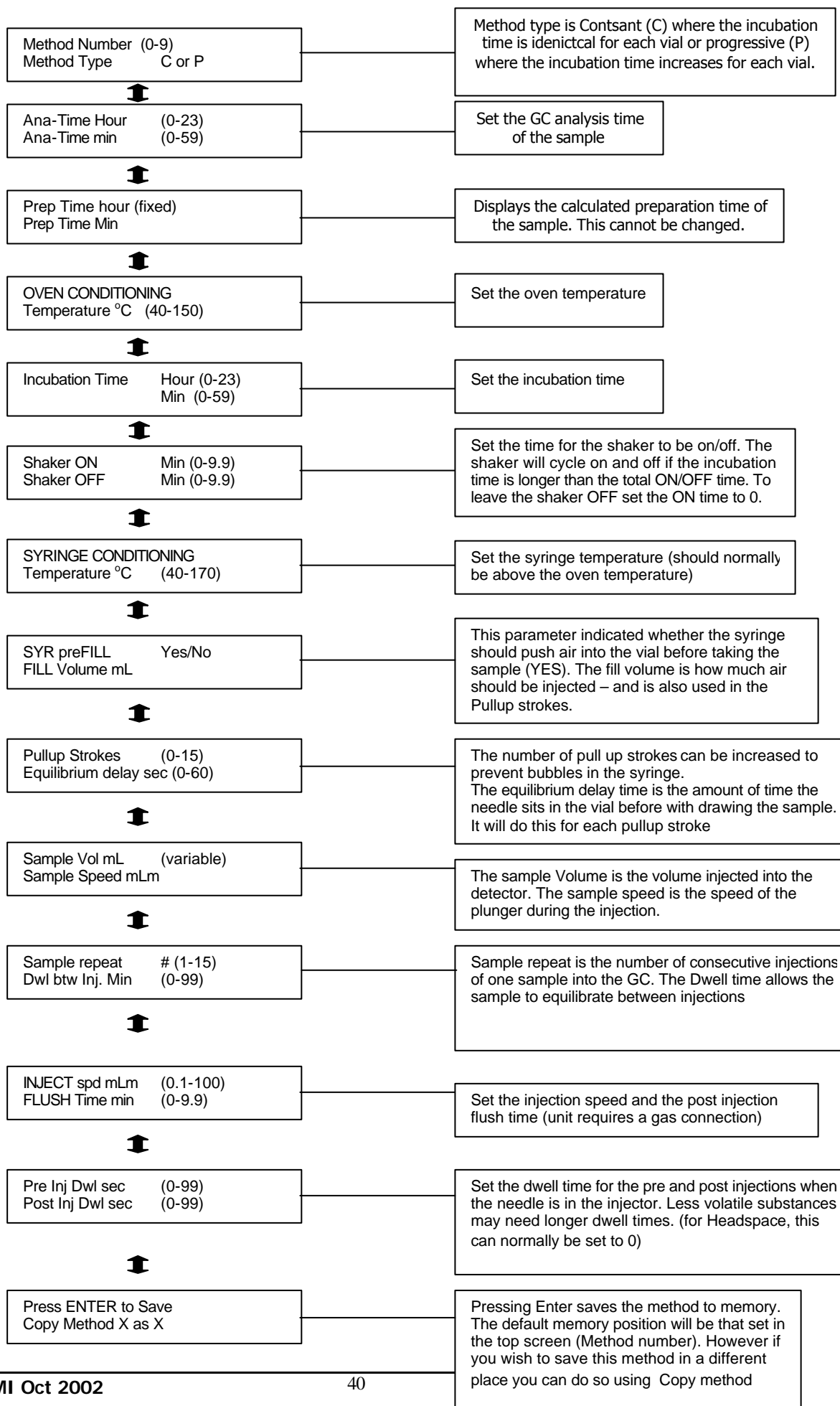
To set the increase in time, scroll down the menu until the Progressive parameter appears (it is between Incubation Time & Shaker parameters).

Note: This screen does not appear if the constant mode is selected.

6.2.3

<p>Ana Time Hour Ana Time Min</p>

This screen prompts the user to enter the length of time for the GC analysis in hours and minutes. This value is used to calculate the optimum timing for preparing the samples in the oven before injection.



Prep Time Hour
Prep Time Min

6.2.4 This screen displays the calculated time taken to inject a sample. It is the combination of the movement of the syringe and plunger with their associated dwell times. It does not include the incubation time of the sample.

When this screen is accessed it will appear only for a few seconds before changing to the next parameter.

Oven conditioning
Temperature °C

6.2.5 This is the first screen of the oven conditioning parameters. The temperature of the oven can be set between 40-150°C. When the injection run is started the oven will heat to this temperature from its stand by temperature. Therefore if high temperatures are to be used then it is recommended to have a high standby temperature to save time.

Incubation Time Hour
Min

6.2.6 The incubation time is the time the sample spends in the oven before it is analysed. This time can be set from 0-23hrs and 0-59mins.

Shaker ON
Shaker OFF

6.2.7 This allows the shaker to be switched on or off during the incubation time of the sample. Each can be set from 0-9.9minutes. The unit will shake the sample vial for the ON period and leave it to settle in the OFF period. It will then start again until the sample has finished its incubation. If the shaker is required to be permanently ON, then the Shaker ON value should be set to a non-zero time and the shaker OFF value set to zero. If the shaker needs to be switched OFF then the Shaker ON time should be set to zero.

**Syringe conditioning
Temperature °C**

6.2.8 This screen marks the beginning of the syringe conditioning parameters. Set the syringe temperature to the required temperature for the injection. The syringe temperature is normally higher than the oven temperature. The value can be set from 40-170°C.

**SYR preFILL
FILL Volume**

6.2.9 This parameter determines whether the piston is raised or lowered before the needle enters the vial. If the Syringe preFill is set to YES then the piston will be up and the FILL volume will be injected into the vial before the sample is withdrawn. If the preFILL is set to NO, then piston will be down and the unit will not inject any air into the sample. Sometimes injecting air into the vial increases the homogenisation of the sample.

The FILL volume is also used for the pullup strokes which are defined below.

**Pullup Strokes
Equilibrium Delay**

6.2.10 The pullup strokes are the strokes made by the plunger prior to taking the sample. In this way it is possible to remove air bubbles from liquid samples and also to ensure that the syringe has been completely filled with sample rather than air. The number of strokes can be set to between 0-15. The volume of the stroke is defined in the previous screen "FILL volume" (see above).

The equilibrium delay is the time the plunger waits at the top of its stroke. This allows viscose samples to rise through the needle. The equilibrium delay will apply to the pullup strokes as well as to the sample withdrawal. The delay can be between 0-60secs. For normal headspace analysis this value is set to 0.

**Sample Volume
Sample speed**

6.2.11 The sample volume is the volume of sample that is withdrawn from the vial and injected into the GC. The maximum sample volume will vary according to the size of the syringe. The sample speed is the speed the plunger moves in the syringe. This can be set from 0-100ml/min. For speeds less than 10ml/min the value can be set in units of 0.1ml/min, after 10ml it can be set in units of 1ml.

**Sample Repeat
Dwl btw Inj. Min**

6.2.12 The sample repeat function allows the unit to make multiple injections into the GC. The sample repeat value can be set from 1 (single injection) to 15. When an injection is repeated, the number of Pullup strokes and the syringe preFILL will be the same as for the initial injection.

The "Dwl btw Inj" is the dwell time between the consecutive injections. This allows the equilibrium between the vapour and liquid in the vial to stabilise and also can prevent cavitation if large volumes are withdrawn from the vial.

**INJECT spd mlm
FLUSH Time**

6.2.13 The injection speed is the speed at which the sample is injected into the GC. This can have value between 0.1-100ml/min. From 0-10ml the speed can be set in units of 0.1ml/min. From 10-100ml/min the speed is settable in units of 1ml/min.

The flush time is the length of time the syringe is flushed after the injection. The gas line at the rear of the unit has to be connected in order for this to work.

Pre Inj Dwl sec
Post Inj Dwl sec

6.2.14 This screen is used to set the Pre and Post injection dwell times. The preinjection dwell time is the time when the needle is in the injector before the plunger is lowered. The Post Injection Dwell time is the time the needle is in the injector after the plunger is lowered. This allows time for less volatile components to evaporate from the syringe. Each value can be set for a time between 0-99 seconds. For headspace gas analysis these values can normally be set to 0.

Press ENTER to Save
Copy Method X as Y

6.2.15 This screen asks for confirmation that any changes to a method be saved into memory. Pressing ENTER whilst in this screen will save the current method being edited (X) into position (Y) in memory.

Note: The unit will automatically overwrite any previous method without asking for confirmation.

Once the method has been stored in memory, press MET to return to the runtime menu.

To exit from the Method without saving the modifications, press the EXIT key twice, then press MET. This works from any screen in the Method menu.

Chapter

7

RUN-TIME MENU

7.1 The run time mode is the main mode from which the injections can be made. After the unit has been powered up and the test sequences completed, the unit will automatically enter the Run Time Mode.

A flow diagram of this mode is displayed on the following page, with each parameter being accessible using the direction keys in the normal way.

VIAL SIZE

7.2.1 This displays the vial size that the unit has been configured for, either 10ml or 20ml. If a different vial size is required to the one shown, the size must be changed in the SETUP mode.

TURRET ON

7.2.2 This shows the current position of the Turret (tower). It can be moved using the left/right keys to one of three positions to allow easy access to samples or to allow maintenance of the GC.

Tray - over the vial tray

Oven - This is also known as the central position

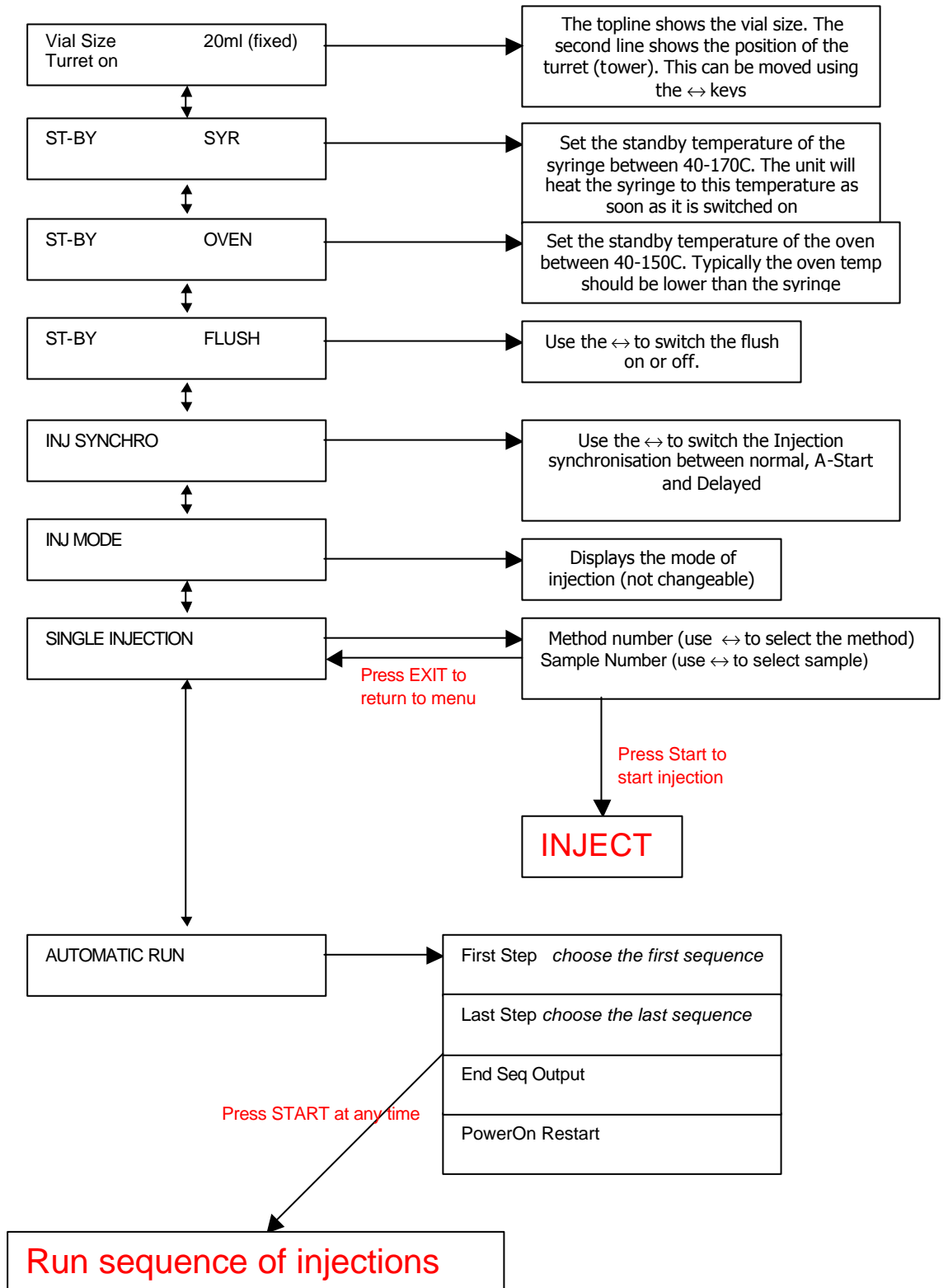
Injector – This can be used to check the alignment of the injector port

**ST-BY SYR.
ST-BY OVEN**

7.2.3 This screen allows the standby temperature of the syringe and oven to be set. The unit will heat the respective parts to their standby temperatures when the unit is switched on. The temperature of the syringe can be set to between 40-170°C, the temperature of the oven 40-150°C.

ST-BY FLUSH

7.2.4 This screen allows the syringe flush function to be switched on or off when the unit is in standby. Switching the flush ON will mean that the gas line will continually flush the syringe unless the unit is performing part of an injection sequence.



INJ.SYNCHRO INJ.MODE

7.2.5 The Injection synchronisation describes the timing of signal that the unit sends to the analyser so that the retention times can accurately be measured. The following choices are available.

Type of synchronisation	Timing of output to analyser
Normal	At the beginning of the syringe plunger movement.
A-start	In the moment it touches the injector.
Delayed	At the end of the plunger movement.

The unit requires a ready signal from the GC to start the injection (this can be triggered manually by grounding pin 6 on the GC connector)

7.2.6 INJ MODE

The injection mode is fixed to normal for this injector (some GC units are equipped to inject into 2 different injection ports).

7.3 Single injections

Select "Single Injection" from the run time menu by using the down and right direction keys (see page 45 for the flow diagram of the RunTime Menu). The screen should now show

Method Number	XX
Sample Number	YY

Use the \rightarrow \leftarrow keys to select the method number for the injection that you wish to use and the sample position that needs to be injected and press START. (If a single injection is not required press EXIT to return to the main Run Time menu)

The following screen will then appear

Sng	Met	Smp
Status		

Sng indicates that a single injection is running (in automatic mode this shows the step of the sequence). **Met** is the method number, **SMP** is the **Sample** that is being analysed and **Status** shows the current status of the unit. This may be one of the following

HEAT	The unit is heating the oven/syringe up to the temperature required by the method. This can be monitored by pressing the right arrow key when the unit is in this mode. The display will then show. Syringe °C (Target Temp) (Actual Temp) Oven °C (Target Temp) (Actual Temp)
LOAD	The unit is transporting the sample from the tray to the oven.
UNLOAD	The unit is transporting the sample from the oven to the tray.
COND>	The sample is being conditioned, according to the instructions in the method. The remaining conditioning time can be seen by pressing the right arrow.
FILL	The syringe is being filled with sample.
INJECT	The unit is in the injection process.
WAITGC	The unit is waiting for the ready signal from the GC.
ABORT	The unit is aborting the run after user intervention.

Once an injection run has started there should be no need for user intervention unless an error occurs (see the error list at the back of this manual). To break an injection sequence mid run press the "STOP" key. The unit will then require confirmation (press EXIT to confirm, or START to continue).

On confirmation of the abort the unit will stop the sample preparation and return the vial from the oven to the rack.

7.4 Automatic Run

In order to perform an automatic run a sequence must be programmed into the unit (see chapter 5). The automatic Run is selected by pressing the (>) Key on the Automatic run line of the Run Time menu

7.4.1 SET UP

The first screen that appears is

First Step ①	y
Last Step ②	y

This asks for the steps in the sequence that you want to run. The unit will only run consecutive steps, and will only allow the selection of steps that are in the sequence. For instance if there are 10 steps in the sequence the first step can have a value of 1-10. The last step must have a value that is at least equal to the first step and be 10 or less.

Pressing **⏏** again gives the following screen.

End seq. Output ①	y
PowerOn Restart # ②	y

7.4.2 End Sequence output

The End sequence output will send a signal to the GC at the end of the complete sequence. This signal is sent through the Auxiliary contact. The signal will be sent if YES is selected.

7.4.3 PowerON restart

The powerON restart function allows the unit to continue the sequence run from where it left off in case of the main power supply failing. If this function is set to YES, then in the event of a power failure the unit will continue where it left on when the power is restored. If it is on NO, then the unit will not perform any more steps when the power is restored, and will move the samples from the oven to the vial tray (as if the unit was rebooted).

7.5 Running the Injection

To start the sequence of injection press the START key from either the above two screens. The unit will then begin the sample preparation and will run through all the samples without any further user requirement.

The unit will display the following

Stp Met Smp Status

Stp is the current step of the sequence

Met is the current method being used for the sample

SMP is the sample

Status is the current status of the sampler which can be

HEAT	The unit is heating the oven/syringe up to the temperature required by the method. This can be monitored by pressing the right arrow key when the unit is in this mode. The display will then show. Syringe °C (Target Temp) (Actual Temp) Oven °C (Target Temp) (Actual Temp)
LOAD	The unit is transporting the sample from the tray to the oven.
UNLOAD	The unit is transporting the sample from the oven to the tray.
COND>	The sample is being conditioned, according to the instructions in the method. The remaining conditioning time can be seen by pressing the right arrow.
FILL	The syringe is being filled with sample.
INJECT	The unit is in the injection process.
WAITGC	The unit is waiting for the ready signal from the GC.
ABORT	The unit is aborting the run after user intervention.

Once the sequence of injections has finished the unit will display the following message

End Sequence Total Injections XX

where XX is the total number of injections completed.

Pressing the EXIT button here returns the unit to the main runtime menu.

7.6 INTERRUPTION PROCEDURE

The automatic injection sequence can be interrupted at any time by pressing either the STOP or START keys.

Pressing STOP will stop the sampler immediately and produce the message

**CONTINUE AUTORUN START
EXIT ABORT AUTORUN ENTER OVEN EXHAUST**

Pressing EXIT will abort the run and the sampler will unload the vials from the oven back to the vial tray. Pressing START will resume the injection sequence.

Pressing START during an injection will give the following choice

EXIT → CONTINUE
START → INJECT VIAL
STOP → UNLOAD VIAL

In this way an injection can be made instantly, or an incorrect sample can be removed from the oven.

7.7 MONITORING THE INJECTION SEQUENCE

It is possible to access information on the state of the unit during an injection sequence by pressing the (>) key.

When in WAIT mode this will show the residual time left for the incubation of the sample (pressing the (<)) returns to the previous screen).

Whilst in WAIT mode pressing the (>) will show the remaining analysis time of the sample currently in the analyser.

In HEAT mode the (>) key will show the set and current temperatures of the needle and oven respectively.

Chapter

8

TROUBLE SHOOTING

In case of unexplained errors, please contact your local dealer. In all cases the serial number of the unit will be required. Before contacting your dealer please ensure that;

All cables are connected and haven't worked loose
The instructions in the manual have been followed correctly
The needle has not been bent and is aligned properly
The sensor is working correctly.

In most cases if a vial falls during transport the problem is due to an incorrectly crimped cap. To reduce this problem the crimpers should be regularly checked to ensure that the cap can not turn once it is crimped and that the under edge of the cap is flush with the vial lip. Also check that the tower is not hindered by any obstacles and that the grabbers on the end of the arm are clean.

Error Messages

<p style="text-align: center;">*WARNING* <i>Touch Sensor does not work properly. .</i></p>

Cause

- The injection sensor is not working correctly. This could be due to mechanical problems.

Possible solution:

- Press EXIT. The machine will revert to the initial position. Press EXIT again so that the initial boot up screen appears then press the SET key and select manual operation. From here it is possible to move the instrument manually to try and find the blockage.

TRAY 40 Removed
Waiting Tray

Cause

- The Vial tray has been knocked off center or is damaged or missing.

Solution:

- Ensure that the tray is properly secured. Press EXIT to get the instrument to go to its initial page and allow it to run through the start up procedure (do not press EXIT when it is running the vial tray identification).

WARNING

Obstacle found, press "Exit then remove"

Cause:

- The unit has found an obstacle over the oven, injector or over a vial

Solution:

- Remove the cause of the obstruction then press "START". The unit will carry on from where it left off.

WARNING

Cover jammed, press "Exit then fixup"

Cause:

- The cover of the oven can not open or close correctly due to a blockage.

Solution:

- Remove any object that may be blocking the oven then press EXIT to resume operations.

Cause:

- The cover is opening or closing correctly but does not give a correct signal.
- Possible break in the transmission strap
- The motor does not move or turn the pulley.

Solution: Consult your local dealer.

```
Vial size mismatch
-Check vial on tray, then "START"
```

Cause:

- Vial size not set correctly
- Mixed vial sizes used

Solution:

- Ensure correct vial size is installed in the software (see SETUP)

Programming errors

The following errors can happen during single injections or an Automatic Run.

These errors are different to the previous kind as they do not involve physical problems with the unit. In each case the error message is accompanied by another line of text which indicates the position of the error in the program

```
Sample volume> max
Met: ①      Stp: ②
NXT
```

```
Filling volume> max
Met: ①      Stp: ②
NXT
```

```
Fill speed too high
Met: ①      Stp:
NXT
```

Typical causes of these errors include

- The sample volume is larger than the syringe
- Filling volume is larger than the syringe
- Filling speed higher than available.