Autura 1000
Automatic Microplate Washer
User Manual

mikura
technology for science

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Contents:

1 Unpacking the unit

1.A Unpacking

Place the shipping carton on the floor, open the carton and remove the washer and its components.

☝Note: Lift the main unit out of the box by putting your hands underneath the main body of the washer. It will lift out of the box with its foam packing blocks on each end.
Following the unpacking, make sure that you have all the following components.
Please contact your supplier immediately if you notice any of the components missing or damaged.

☝Note: Do not attempt to assemble a unit using damaged components.

A.	Autura washer	Cat. No. 1000
B.	Mains cable with -	
	European mains plug	Cat. No.5520
	British mains plug	Cat. No.5521
	American mains plug	Cat. No.5522
C.	Power supply unit	Cat. No.6004
D.	Wash reservoir (blue cap) with level control	Cat. No.1000.316
E.	Waste reservoir (red cap) with level control	Cat. No.1000.315
F.	User manual	Cat. No.1000.6000

Retain the packaging for any future shipping needs.

The remote power supply unit is a Switch Mode Power Supply and automatically adjusts to the main supply characteristics and will work with any voltage from 110V to 250V and 50/60Hz.

1.B Positioning

Autura requires an operation environment of between 10 ºC – 40 ºC

The fully assembled Autura 1000 occupies a work surface area of 40cm width and 55cm depth; clear this area on your bench and position it to the left of this space. Autura is fitted with levelling feet on each corner; adjust them so the unit is horizontal and level.

The wash and waste bottles are then positioned to the right of the washer unit.

Conveniently place the remote power supply so the lead can easily be attached to the washer, insure that it is not covered and has access to a free flow of air over it.

2 The socket panel

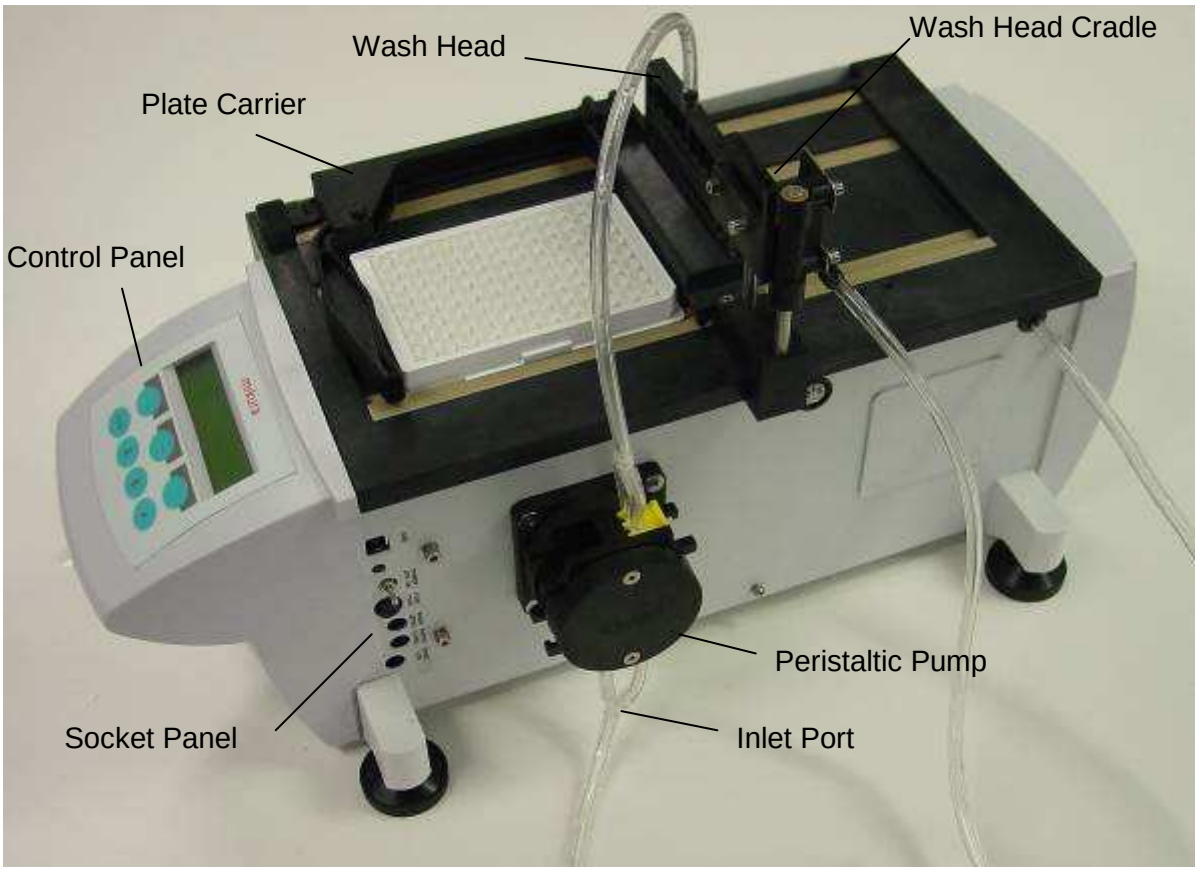
The socket panel is located on the right hand side of Autura and contains the following:

1. USB socket for software upgrades.
2. ‘Power On’ green LED which illuminates whenever the unit is switched on.
3. Power On/Off switch.
4. Fuse Holder containing a F4A fuse.
5. Mini stereo socket for liquid level sensing from the wash bottle
6. Mini stereo socket for liquid level sensing from the waste bottle
7. A 5.0mm power socket that connects to the remote power supply.

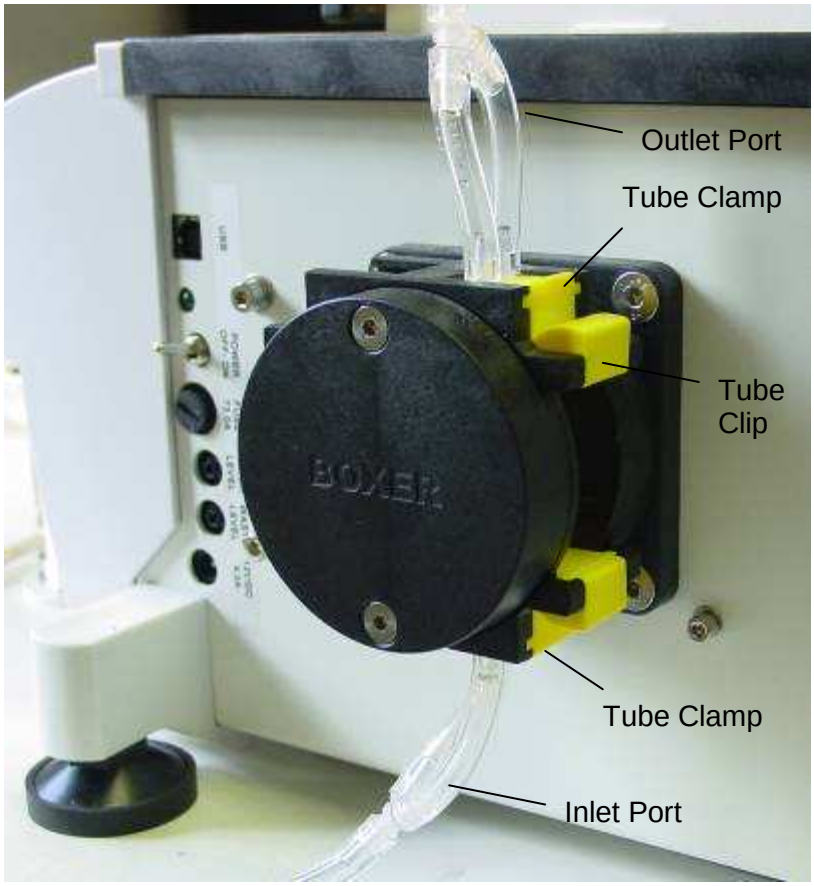
3 Assembly

3.A General assembly

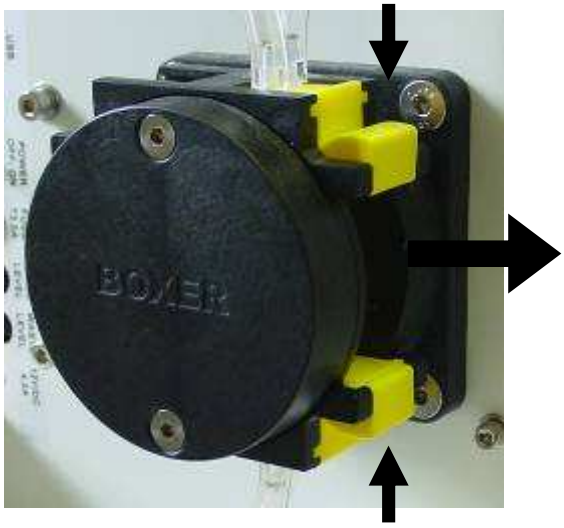
1. Remove all packing material from the head and plate carrier area.
2. Plug the power supply cable into the socket on Autura's sockets panel.
3. Plug the mains cable into the remote power supply unit and the mains plug into your main supply. Note that a green LED illuminates on the remote power supply unit, indicating the correct operation of this component. Do not switch on the unit at this time.
4. Fill the wash bottle with the chosen wash reagent and tighten bottle cap. Connect the clear Tygon tubing from the longer outlet spigot on the bottle cap to the inlet (bottom) tube on the peristaltic pump.
5. Tighten the cap on the waste container and connect the clear Tygon tubing, which exits the back of Autura onto the shorter spigot.
6. Insert the plug from the wash reservoir into its respective socket.
7. Insert the plug from the waste reservoir into its respective socket.
8. Connect the clear Tygon tubing, which leads from the outlet (top) port of the peristaltic pump onto the top spigot on the wash head.
9. Connect the clear Tygon tubing from the top of your waste bottle cap onto the side spigot on the wash head going through tube support bracket.
10. Power up the unit using the toggle switch on the socket panel. The back illuminated LCD will display the message 'Autura 1000 Welcome'.



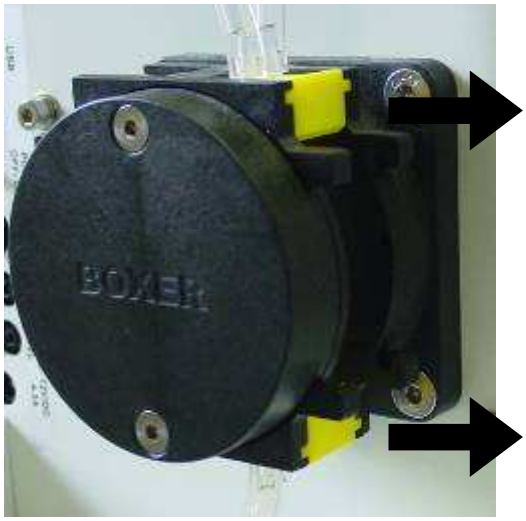
3.B The peristaltic pump



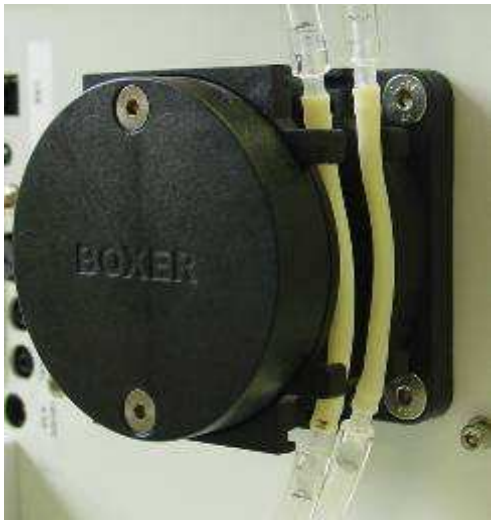
3.C Changing the peristaltic pump tubing



1. Turn off the unit. Press top and bottom of the tube clip together and slide out.



2. Slide out the tube clamps on top and bottom of the pump



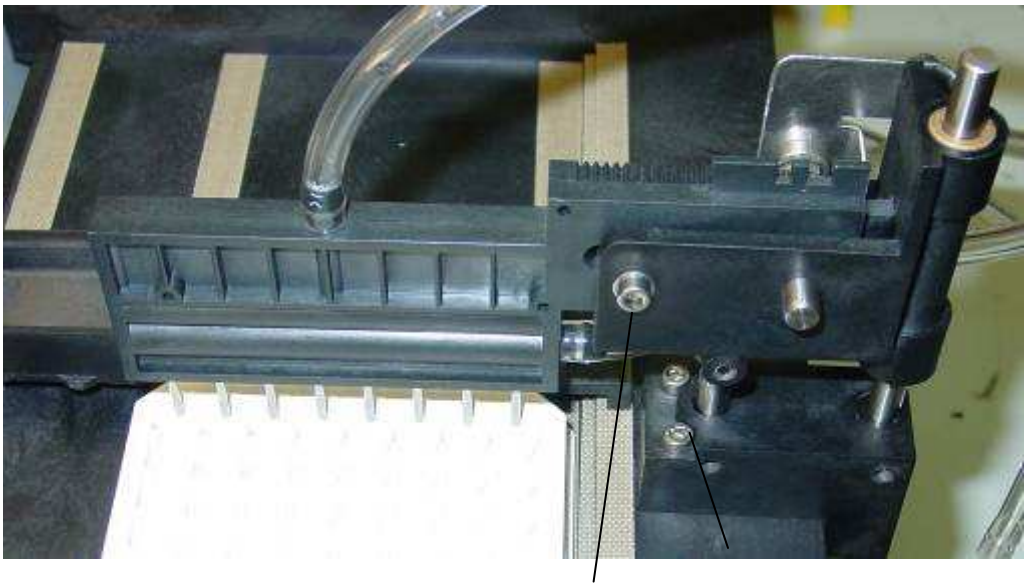
3. Unclip tube connectors from the clamps. Refit new tube and reassemble in reverse order.

3.D Wash Head assembly and alignment

To give the best wash results Autura's wash head is adjusted to the correct position prior to shipping. However the size variations between plate manufacturers may necessitate the user fine-tuning this position for the type of plates most commonly used. Adjustment to the heads front to back position is achieved via the software. Head alignment within the wells is however achieved through the hardware.

There are three adjustments to the heads, which you can carry out. All hardware alignment procedures should be done with the plate you most commonly use in the plate carrier and the machine switched off.

1. Auxiliary head alignment
Move the plate with the plate carrier until its front edge is just below the first row of wash tips. Gently lower the head by pushing it down until the tips are just below the top level of the plate. Without forcing the plate against the tips, check whether all the tips touch the edge of the plate. To remedy any misalignment, using the appropriate Allen key, loosen the 2 off M3 socket head screws on the top of the head block, align the head to the edge of the plate, and retighten the screws.



M3 socket head screw for level adjustment

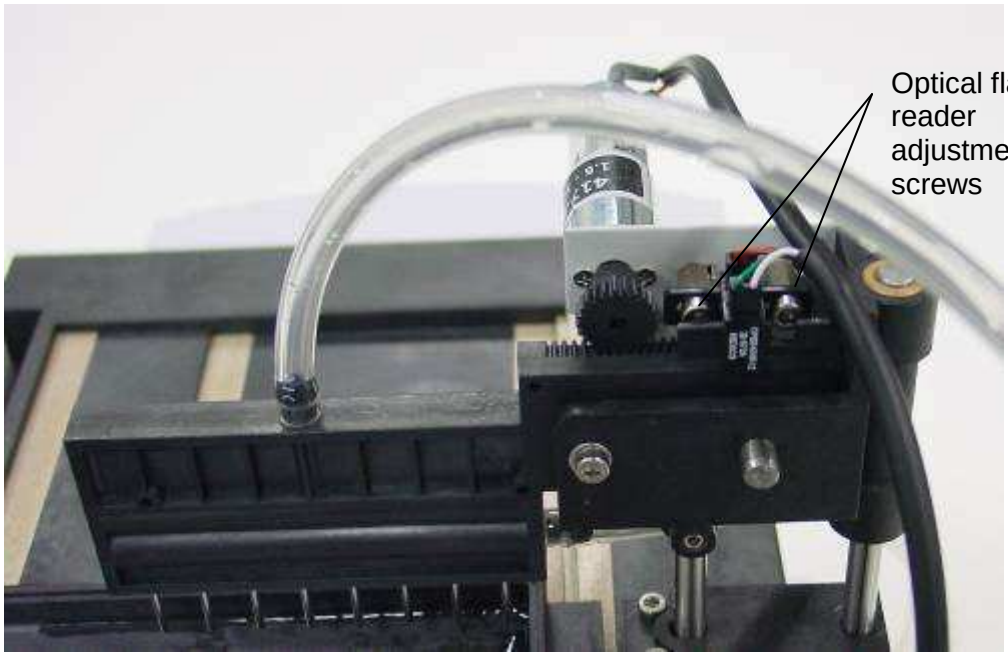
M3 socket head screws for auxiliary head alignment

2. Left to right alignment
Move the plate with the plate carrier under the head until the tips are aligned at the edge of the first row of wells. Gently lower the head by pushing it down until the tips are level with the plate. The head requires a realignment of its left to right axis if the tips do not align with the centres of the wells.
To remedy any misalignment, using the appropriate Allen key, loosen the two M3 socket head screws on the metal head locating bracket, move the wash head left or right for alignment, retighten the screws.

3. Level alignment

Level alignment denotes the level of the head to the horizontal plane. Move the plate with the plate carrier under the wash head and lower the head until the tips nearly touch the flat portion of the plate.

To remedy any misalignment, loosen the M3 socket head screw on the front of the wash head cradle and rotate the cam from behind using a small slotted screwdriver until the head is level. When it is level retighten the M3 socket head screw on the front.



4. Left to right alignment with head motor

Move the plate with the plate carrier under the head until the tips are aligned at the edge of the first row of wells. Gently lower the head by pushing it down until the tips are level with the plate. The head requires a realignment of its left to right axis if the tips do not align with the centres of the wells.

To remedy any misalignment, lift head motor, using the appropriate Allen key, loosen the two M3 socket head screws on the optical flag reader, move the optical flag reader left or right by the same amount the head is out of alignment, retighten the screws. The Autura will need to be switched on for the motor to adjust to the new position.

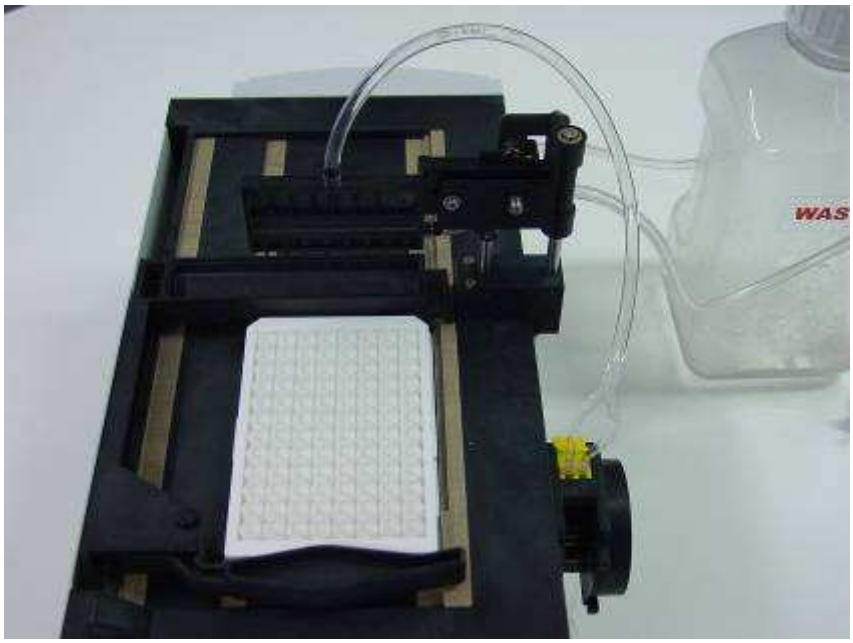
3.E Changing from 8 way head to 12 way head

The plate clamping arm needs to be turned around.

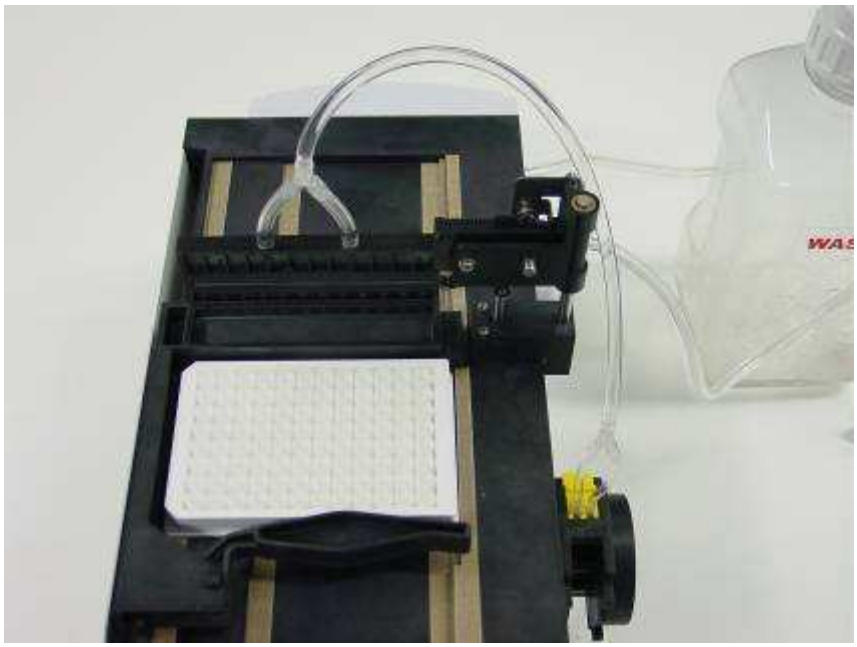
1. Remove plate from carriage.
2. Support arm with one hand and pull the pivot pin out with the other.
3. Slide arm out of carriage.
4. Take care not to drop the spring.
5. Turn the arm over and locate the spring on the other side.
6. Slide arm into carriage.
7. Make sure the arm stop is located behind the carriage stop and replace the pivot pin.

The head needs to be changed.

1. Disconnect tubing from head.
2. Slide 8 way head out of head cradle.
3. Slide 12 way head into head cradle.
4. Connect 12 way tubing to head.



8 way set up



12 way set up

The software needs to be changed.
Go into the engineering menu (Chapter 7.B) and change the head size to 12 way. The plate offset, the dispense height, the well depth and pump calibration will need to be adjusted to suit the new plate orientation.

4 Familiarising yourself with Autura

4.A – General

Your Autura is the most versatile strip washer currently available. Using separate exchangeable upgrade components, you can adapt your basic Autura to wash any 96 or 384 well plates with 'V', 'U' or flat bottomed wells , deep well plates (factory configured) of any possible well depth, introduce soak times between wash stages and dispense up to three different wash reagents of any volume. Autura is available with a single or double row wash heads.

Being a strip washer by definition means that the Autura washes in a strip format and not as a full plate washer. You can choose to wash any number of strips, as long as they are arranged as adjacent rows. I.e. using a double row 8 way head, you cannot choose to process rows 1/2 and 5/6 whilst skipping row 3/4.

The washer is designed as an open frame transparent unit in order to facilitate maintenance and upgrades as well as allowing easy integration with existing robotic systems**.**

4.B Familiarising yourself with Autura – system hardware components

For added safety Autura washers are fitted with a remote 12v/4.3A power supply. Therefore there is no mains voltage apparent within the unit. The remote power supply plugs into your mains supply socket and should be kept away from the unit and dry at all times.

The Autura system operates by moving the microplate under the wash head.

The wash head then moves into the wells to aspirate any liquid within them and dispense the wash solution from a controlled height.
The wash head is located in a cradle and is magnetically connected to allow free floating up and down, this is to avoid damaging the wells coating and the tips whenever the tips come into contact with an obstacle or when resting on the bottom of the wells.

The fluid pathways on Autura are very simple. All tubes are exposed to allow you to pin point any air bubbles that may be apparent in the tubes and to easily maintain the system.

The wash liquid is pumped from the wash reservoir via a peristaltic pump. This type of pump is used for this function so that you can optimise the delivery volume and pressure of the wash solution by adjusting the speed and rotor revolutions through the software. Peristaltic pumps pulse the liquid with every revolution of the rotor and knowingly provide a very efficient washing system.

Each tip is constructed from concentric Stainless Steel tubes. The liquid is pumped into the wells through the internal tube, and aspirated via the external tube.

A pump is housed within the unit and produces a vacuum within the waste bottle. The pump runs all the time the unit is carrying out a wash cycle to avoid the possibility of well-to-well overflow and reduce cross contamination. The wash head height is set such that its top position will not allow overflow of liquid in the dispense position and leaves positive meniscus in the wells, any danger of overfill is therefore eliminated. Over dispensing has been found to be a very effective way of washing a plate , i.e. dispensing an amount of liquid into the well, which is larger than the well's capacity.

After plate washing Autura positions the wash head into the soak trough and dispenses a small amount of wash solution into the soak trough.

4.C Familiarising yourself with Autura – system software interface components

Autura stores up to 30 wash protocols in its memory. According to the machine's specification, the machine is either delivered with pre-programmed wash protocols or with a default sample protocol. In both cases you can edit the protocols with ones of choice.

The control panel is equipped with a total of seven keys.

'**soft keys'**: 'Soft keys' are keys that are assigned to carry out a certain function. These three keys are located adjacent to the bottom line of the display and its function is indicated on the display. For the purpose of clarification, soft key functions will be accompanied with *SK* in this manual.

'ENTER' key: The 'enter' key saves, in some cases, your selection from the screen into Autura's memory.

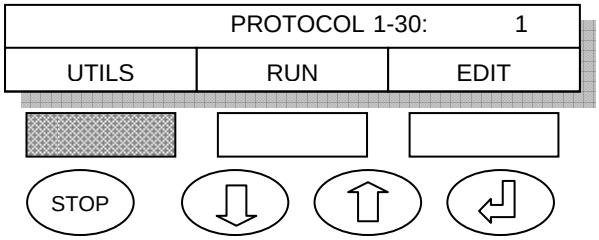
'UP' & 'DOWN' keys: These keys will either increment or decrement the values on your setting or toggle between various setting options.

'STOP' key: The 'STOP' key allows you to terminate any protocol at any time.

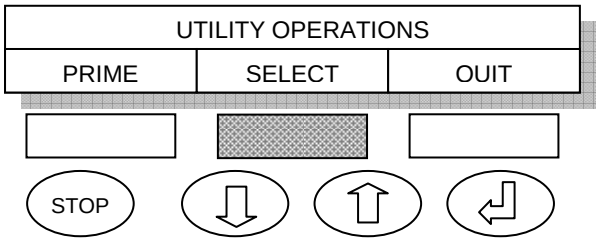
5 Utilities

5.A Priming the washer

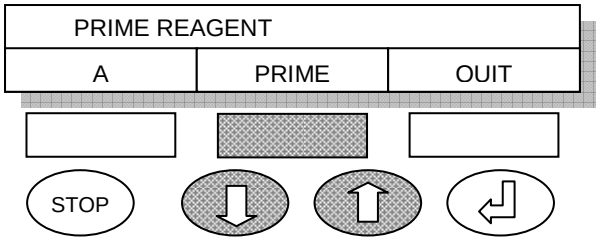
Before you start to use the washer, you should ensure that the wash solution delivery tubes that lead from the wash bottles, through the peristaltic pump, to the wash head, are primed, i.e. full with wash reagent and no air bubbles can be seen in the delivery tubes. For this purpose Autura has a dedicated priming utility.
The following chart will run you through all the necessary steps to prime the tubes.
You can quit the protocol editing process at any stage by pressing the 'QUIT' *SK* button.



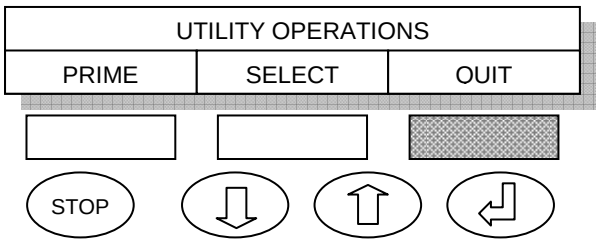
Press UTILS *SK* in order to access the utilities menu.



Press SELECT *SK* in order to access the prime menu.



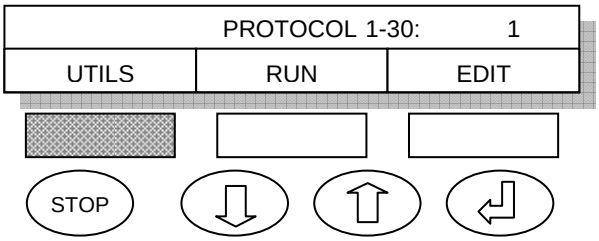
Press SELECT *SK* to dispense a pre set volume through the tubes. Press the same key as many times as is required to clear all air bubbles from the delivery tubes.
If the washer is fitted with multiple peristaltic pumps, use the up/down keys to select the desired pump to prime.



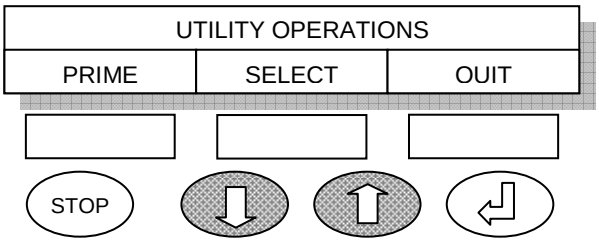
Press QUIT *SK* to return to the main menu.

5.B Plate aspirate

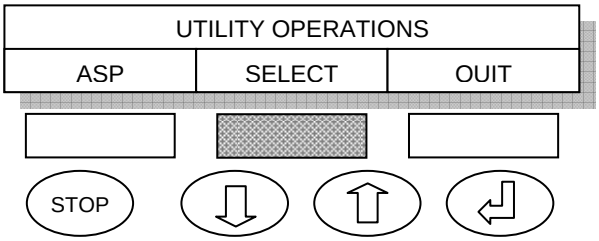
This utility allows you to aspirate a plate's contents into the waste container. This utility does not allow you to select the number of rows i.e. only aspirates a complete plate



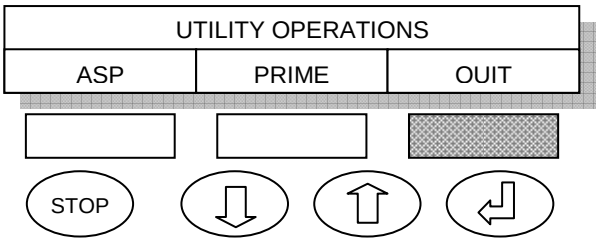
Press UTILS *SK* in order to access the utilities menu.



Select the Asp function by scrolling through using the up/down keys



Press SELECT *SK.* Following the aspiration of all rows Autura will then return to the Utility Operations menu.



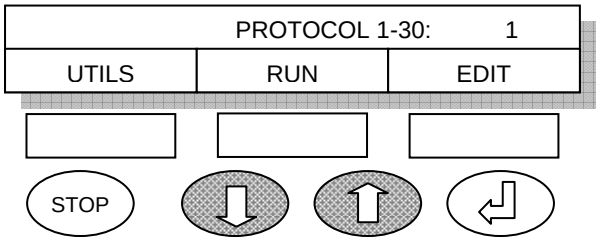
Press QUIT *SK* to return to the main menu.

6 Quick Start

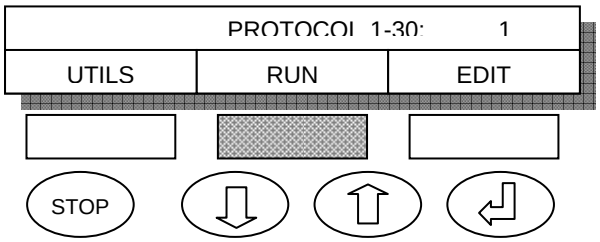
6.A Running a wash protocol

Subject to the machines specification, Autura is supplied with either a set of pre-programmed protocols, or with a single default protocol in all 30 positions.

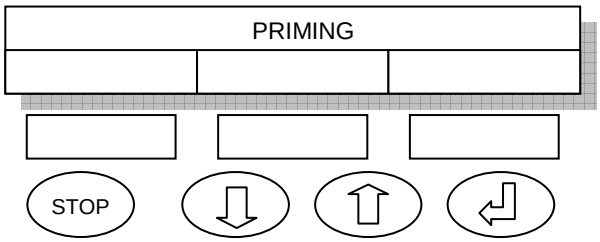
The following chart will run you through all the necessary steps to run a protocol.
You can quit the running of a protocol at any time by pressing the STOP button.



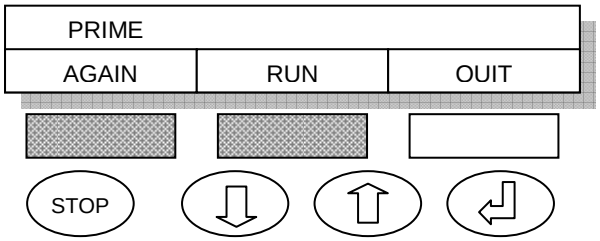
You have to determine which of the 30 protocols you would like to run. Select the desired protocol by scrolling through using the up/down keys.



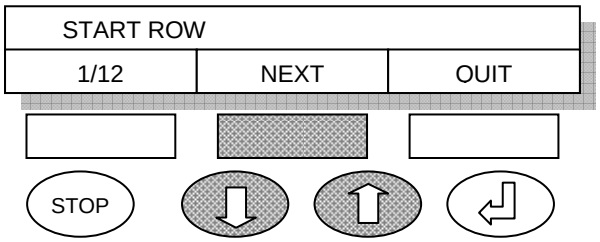
Press RUN *SK* to run a protocol.



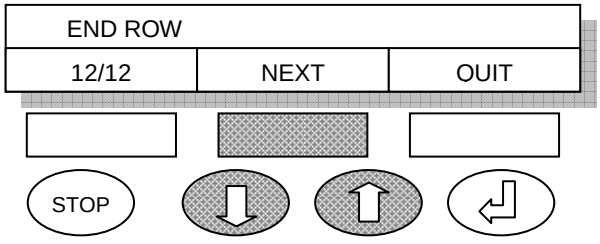
Autura starts the vacuum pump in order to build up the required vacuum in the waste bottle. First time it will initiate a self-priming cycle before it runs.



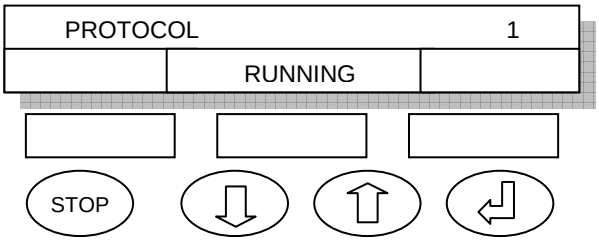
If you can still see air bubbles in the delivery tube, you can prime again by pressing the PRIME AGAIN *SK*, or press RUN *SK*.



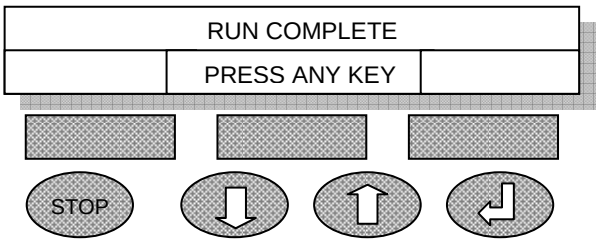
Choose the row you want to start from by scrolling through using the up/down keys. Then press NEXT *SK*.



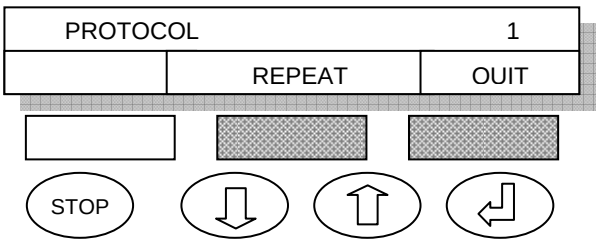
Choose the row you want to end on by scrolling through using the up/down keys. Then press NEXT *SK*.



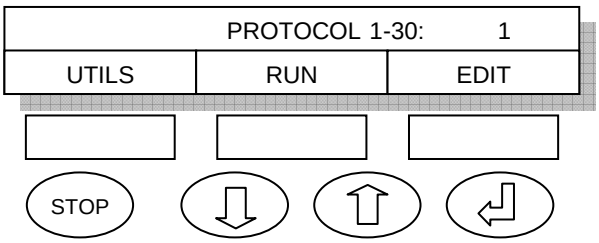
Autura runs the selected wash protocol for the number of rows you have selected. You can stop the process by pressing the STOP button on the control panel.



Autura confirms that the wash cycle is complete. This message is to assure you that the cycle was not terminated prematurely.
Press any key to confirm.



Press REPEAT *SK* to repeat protocol or QUIT *SK* to return to main menu.



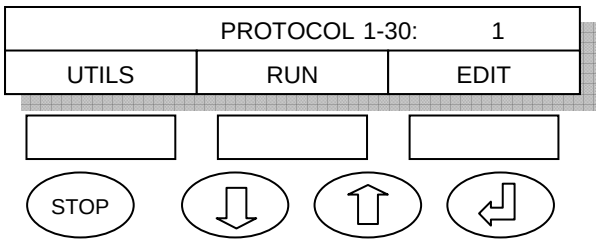
When you press QUIT *SK* Autura moves the priming trough under the wash head, dispenses a pre set amount of wash solution into it and rests the head into the trough.

7 Navigating through the control panel

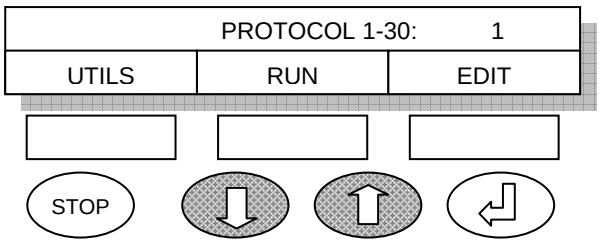
7.A Editing wash protocols

The following chart will run you through all the necessary steps to edit a protocol.
You can quit the protocol editing process at any stage by pressing the 'QUIT' *SK* button. Always press the 'STORE' *SK* button to enter your selection into Autura's memory and move to the next screen. Press 'STORE' *SK* in order to move to the next screen even if you do not change any values. Use the edit function to review the settings of any protocol stored.

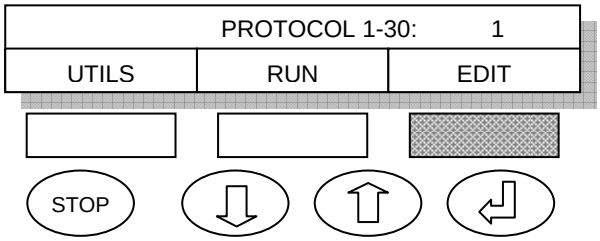
NOTE: If you quit a screen at any stage of the editing, none of the changes you have made will be saved. In order to save any of your changes to a protocol, you must scroll to the last screen that asks you to overwrite or change the protocol position you want to change.



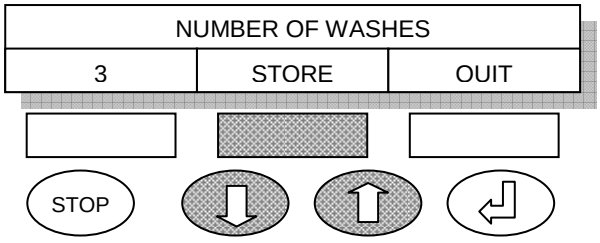
The 'EDIT' *SK* will allow you to edit any one of 30 protocols. You assign the position of the edited protocol when you overwrite it. The following chart will run you through all the necessary steps.



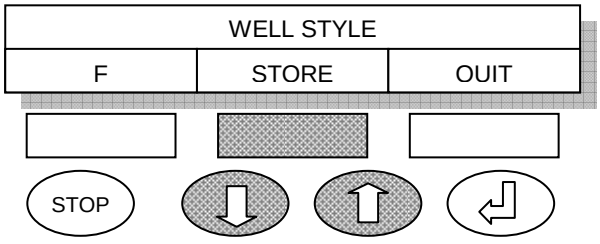
Choose a protocol to edit by scrolling through using the up/down keys.



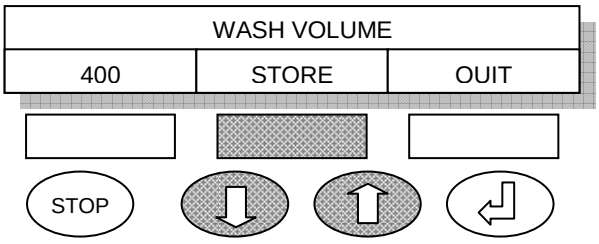
Press EDIT *SK*.



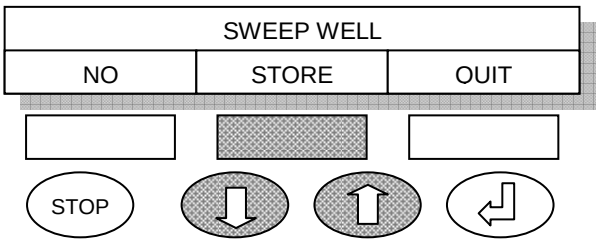
Use the up/down keys, enter the number of wash cycles. A wash cycle is defined as the number of times that the wash head will fill and aspirate the row of wells. Press STORE *SK* to scroll through to the next menu.



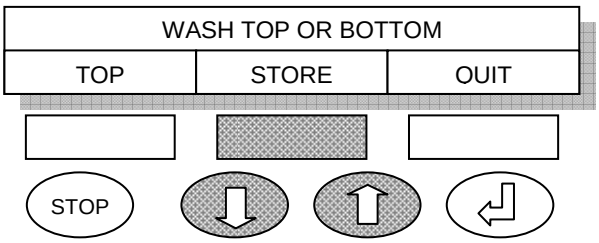
Use the up/down keys, select the type of wells in you plate –'F' flat bottom, 'V' shaped or 'U' shaped. Press STORE *SK* to scroll through to the next menu.



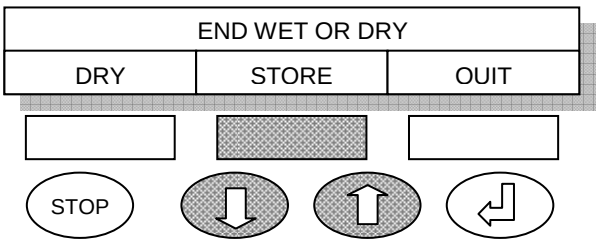
Use the up/down keys, select the desired wash volume per well. The volume is expressed in micro litres per well. For 96 plates you can enter any volume between 25 to 1500 in steps of 25. For 384 plates you can enter any volume between 5 to 125 in steps of 5. Press STORE *SK* to scroll through to the next menu.



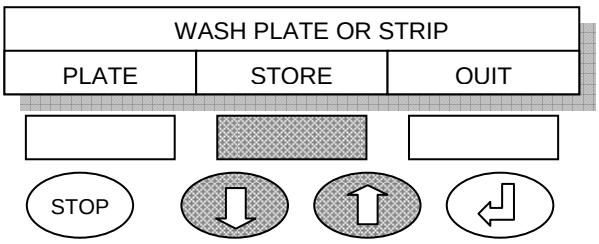
Use the up/down keys to toggle between 'YES' & 'NO' for sweep action. A sweep is achieved by moving the plate a predefined distance along the X axis when the wash head is in its lowest position in the well. This sweeping action will obtain very low residual volumes in the wells thus reducing any chance of cross well contamination. Press STORE *SK* to scroll through to the next menu.



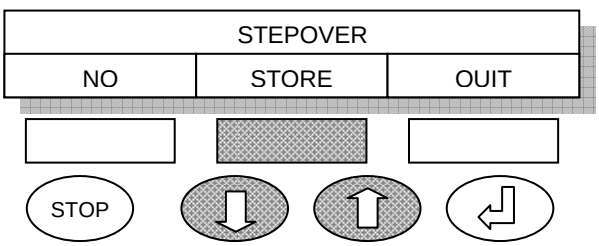
Use the up/down keys to toggle between the options to dispense the wash reagent whilst the head is in its top position above the wells or in its bottom position inside the wells. Press STORE *SK* to scroll through to the next menu.



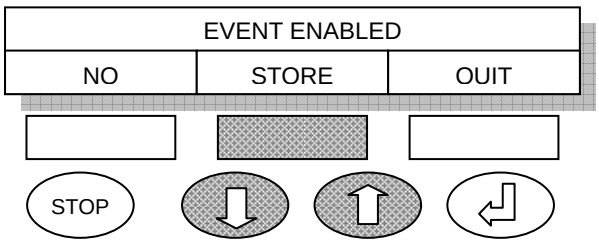
Use the up/down keys to toggle between the options to leave the plate full with wash solution at the end of a wash cycle or dry. The option to leave the plate wet after a wash cycle is of particular use for protocols that require an extended soak or incubation period. Press STORE *SK* to scroll through to the next menu.



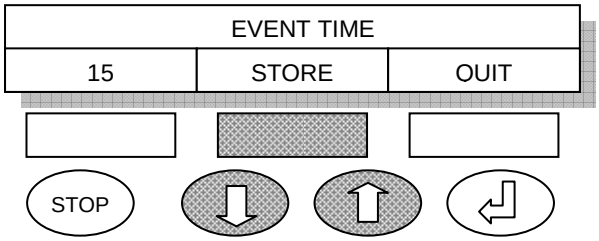
Use the up/down keys to toggle between the options. In strip format the wash head will process the strip(s) to the set number of wash cycles that you determined previously, before moving on to the next strip(s). In plate format, Autura will allow the head to process a strip once, move to process the next rows and return to process the previous strip again. Press STORE *SK* to scroll through to the next menu.



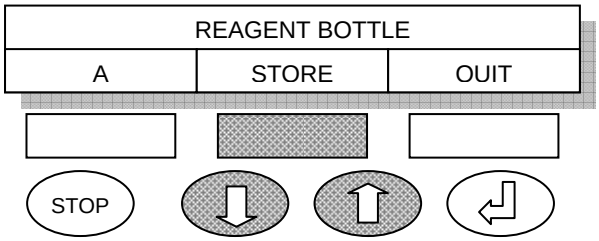
Use the up/down keys to toggle between 'YES' & 'NO'. The step over function will determine whether Autura will process the plate as if all rows are washed regardless of the number of rows to be washed. This function is of particular importance whenever the soak time between wash cycles has to remain constant. Press STORE *SK* to scroll through to the next menu.



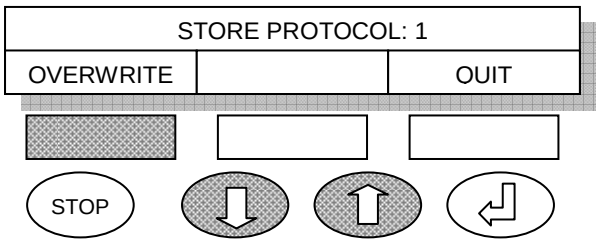
Use the up/down keys to toggle between 'YES' & 'NO'. The event enable function allows for a plate soak time after each wash. Only one event can be assigned for any particular protocol. Press STORE *SK* to scroll through to the next menu.



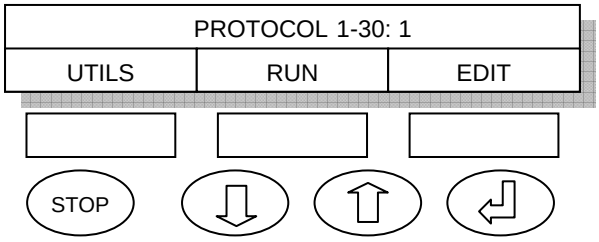
This menu will not appear if you chose N0 in the previous menu, i.e. no event. In this menu you can assign the duration of the event.
Using the up/down keys, the event duration will increment from 15 to max 900 seconds in steps of 15 seconds.
For example if you choose 120 this means a soak time of 2 minutes. If you previously chose three washes, the washer will fill the rows with wash solution and move the plate to the designated event position after each cycle for a period of 2 minutes, before moving it back under the wash head for the next wash cycle.
Press STORE *SK* to scroll through to the next menu.



Use the up/down keys to toggle between the options. Here you can choose which reagent you wish to use for this wash protocol. This function is of use for those washers that have been configured with more than one peristaltic pump. Choose between A, B or C for any of up to three reagents. Press STORE *SK* to scroll through to the next menu.



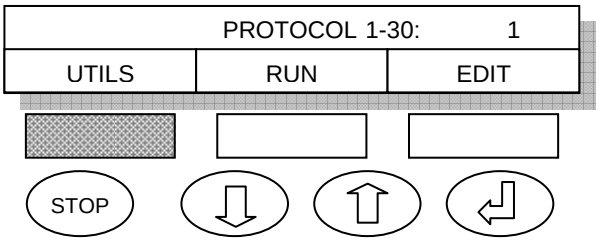
Store the protocol that you have just edited in any of the 30 positions. The up/down keys will step you from position to position. The OVERWRITE *SK* will store the new protocol.
NOTE: Storing a protocol in a particular position overwrites the protocol, which was previously in that position.



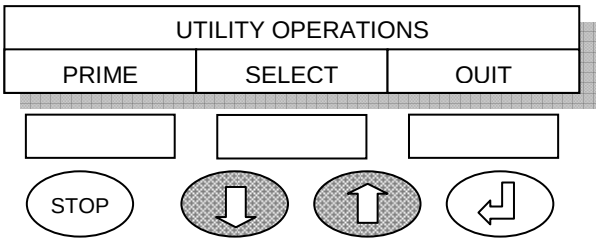
Following the storage of a protocol, Autura will return to display the main menu.

7.B Chaining protocols

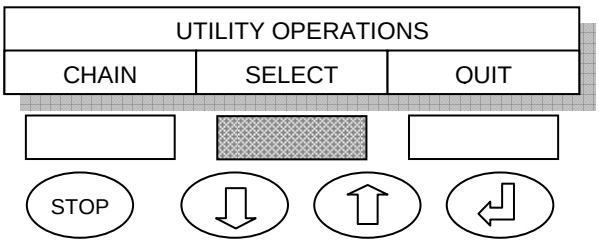
A simple way to achieve complex wash sequences is to chain together various protocols. If chaining is enabled you can chain together up to four protocols. Autura will run each chain as a single protocol characterised by your setting for each of the individual protocols according to any sequence you desire. You can create up to 5 different chains.



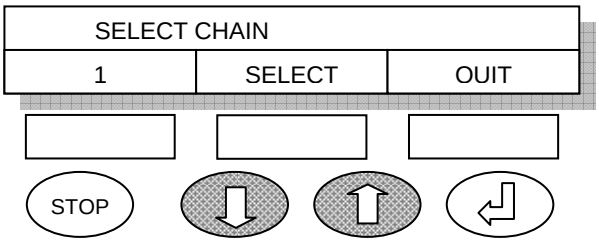
Press UTILS *SK* in order to access the utilities menu.



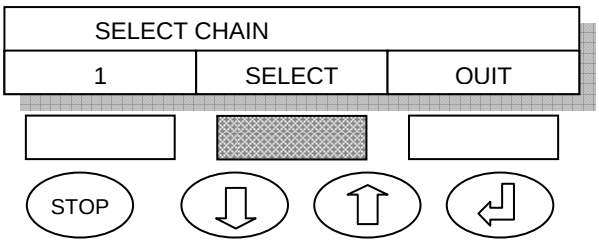
Select the Chain function by scrolling through using the up/down keys



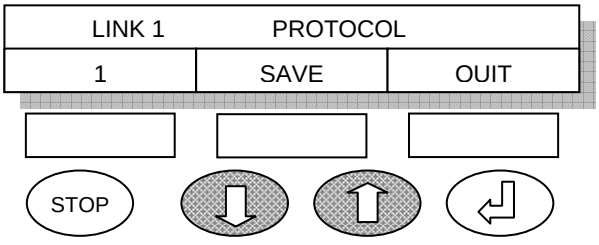
Press SELECT *SK.* In order to access the chaining menu.



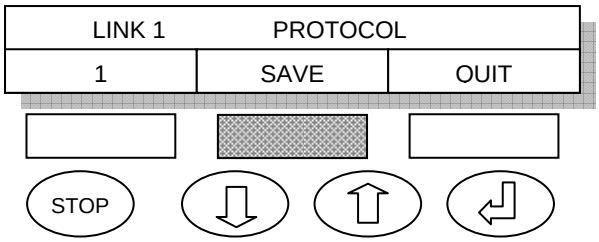
Select the Chain to be edited by scrolling through using the up/down keys



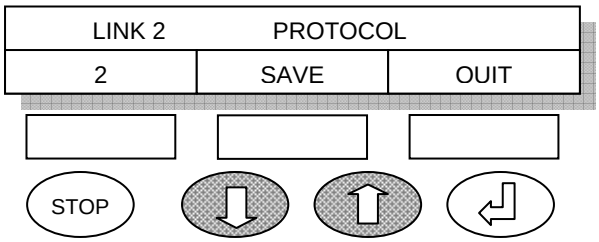
Press SELECT *SK.* In order to access the chain editing menu.



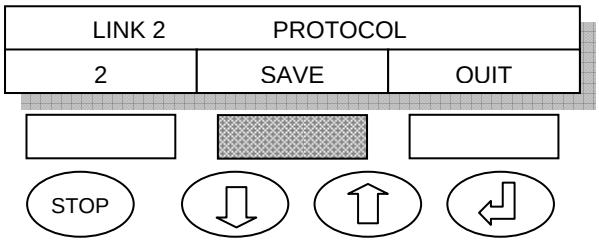
Select the first Protocol to be chained by scrolling through using the up/down keys



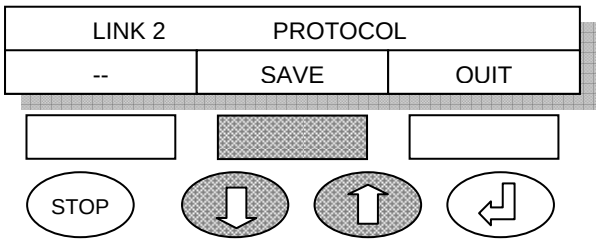
Press SAVE SK. To move to the next link menu



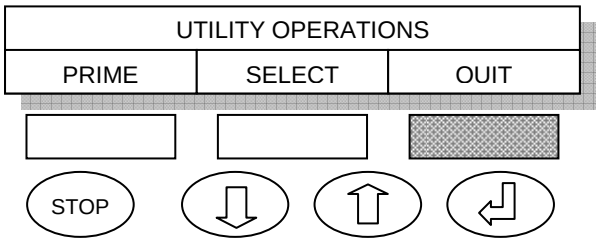
Select the second Protocol to be chained by scrolling through using the up/down keys



Press SAVE SK. To move to the next link menu

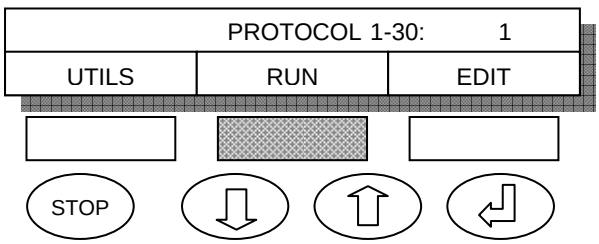


Repeat the above steps to chain more Protocols. If you don't want to chain anymore Protocols use the up/down keys to select --. Press SAVE SK. To move to the next link menu
When all 4 links are saved it will return to the utilities menu.

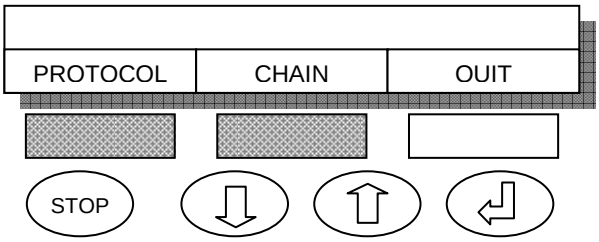


Press QUIT *SK* to return to the main menu.

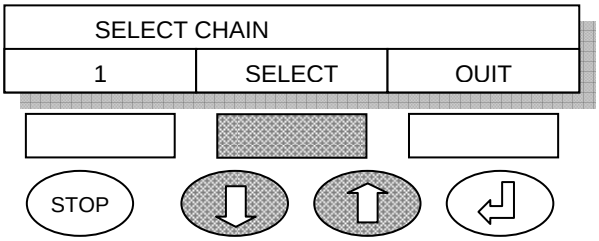
When chaining is enabled the run menu will change.
The following chart will run you through all the necessary steps to run a chain or a protocol.
You can quit the running of a chain or a protocol at any time by pressing the STOP button.



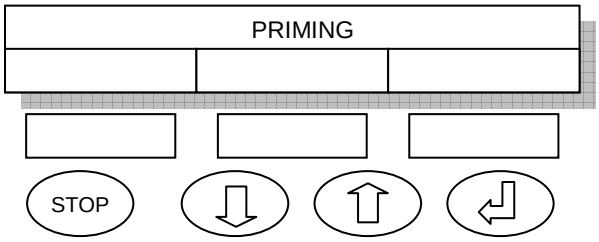
Press RUN *SK* to run a chain or a protocol.



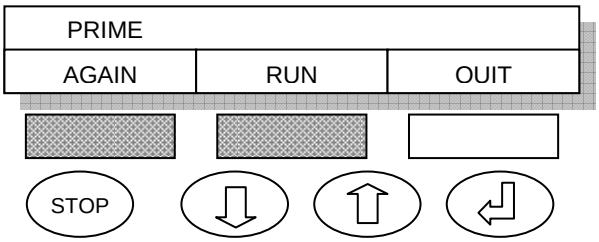
Press PROTOCOL *SK* to run the current protocol as normal or press CHAIN *SK* to select a chain to run.



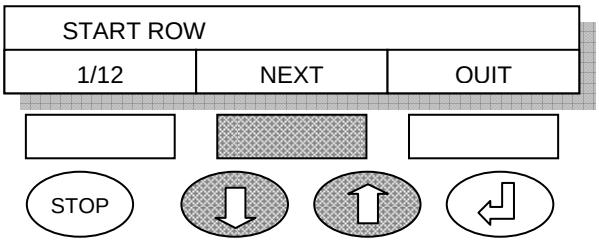
If you selected chain this menu will appear. Select the chain you want to run by using the up/down keys. Press SELECT *SK.* To run the chain.



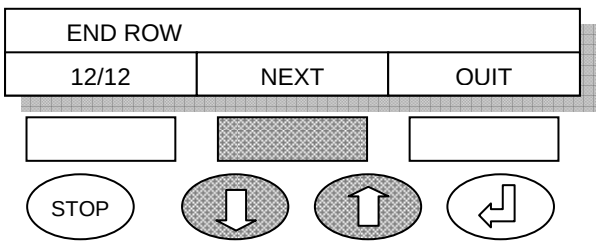
Autura starts the vacuum pump in order to build up the required vacuum in the waste bottle. First time it will initiate a self-priming cycle before it runs.



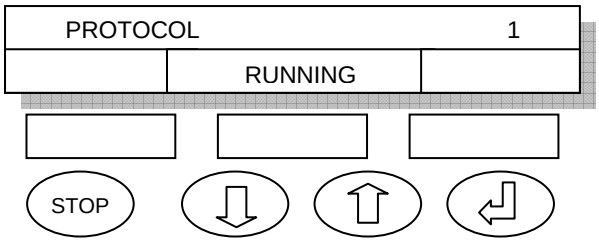
If you can still see air bubbles in the delivery tube, you can prime again by pressing the PRIME AGAIN *SK*, or press RUN *SK*.



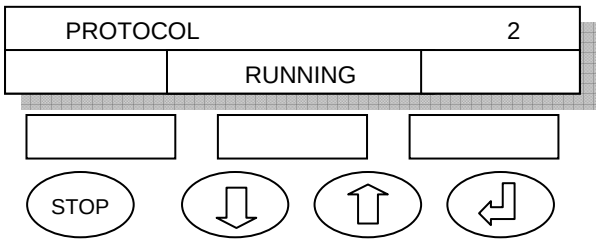
Choose the row you want to start from by scrolling through using the up/down keys. Then press NEXT *SK*.



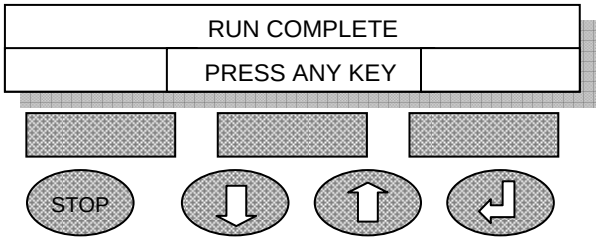
Choose the row you want to end on by scrolling through using the up/down keys. Then press NEXT *SK*.



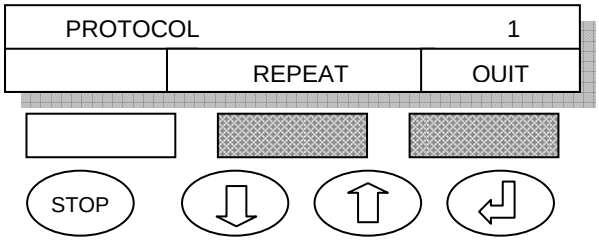
Autura runs the selected wash protocol for the number of rows you have selected. You can stop the process by pressing the STOP button on the control panel.



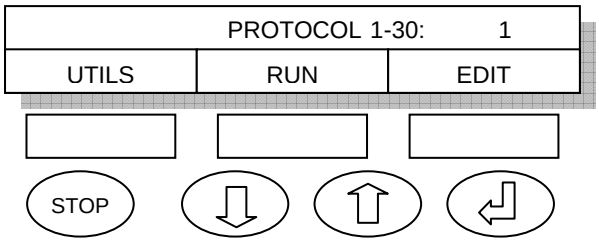
If you selected chain it will automatically move onto the next protocol in the chain.



Autura confirms that the wash cycle is complete. This message is to assure you that the cycle was not terminated prematurely.
Press any key to confirm.



Press REPEAT *SK* to repeat protocol or chain.
Press QUIT *SK* to return to main menu.

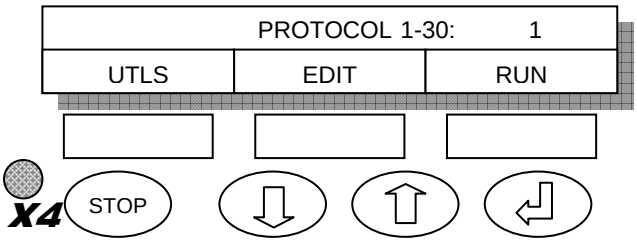


When you press QUIT *SK* Autura moves the priming trough under the wash head, dispenses a pre set amount of wash solution into it and rests the head into the trough.

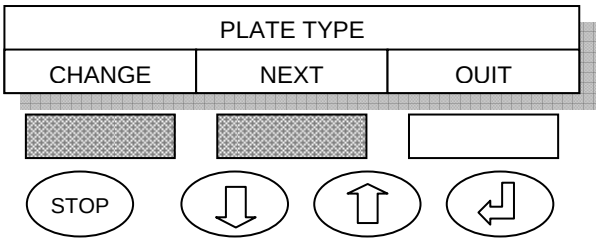
7.C Engineering menu

This menu should only be used by the principle laboratory operator and is dedicated to changing various software configurations such as changing the machine from 8 to 12 way wash head use and the fine positional of the plate – head geometry. You can scroll through the menus by pressing the NEXT *SK* button. Changes made to any of the menus will be automatically entered into the machines memory. You can quit at any point.

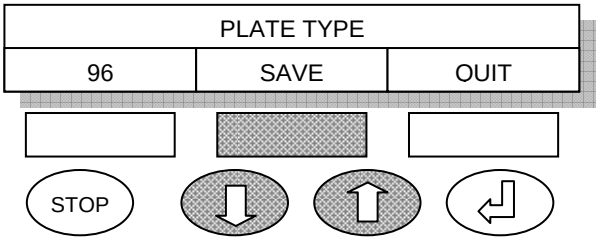
In order to inhibit unauthorised personnel from making changes to the settings, the access to this set of menus is via a hidden key.



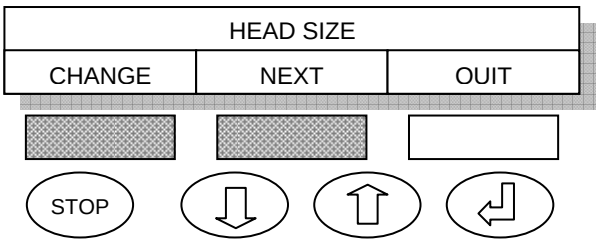
The hidden key is positioned to the left of the keypad between the two rows of keys. Press the hidden key four times to access the engineering menu.



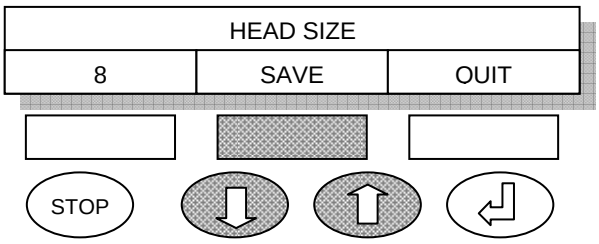
This menu will only appear if the head motor has been enabled (factory option).Press CHANGE *SK* to enter this procedure or NEXT *SK* to scroll through to the next menu.



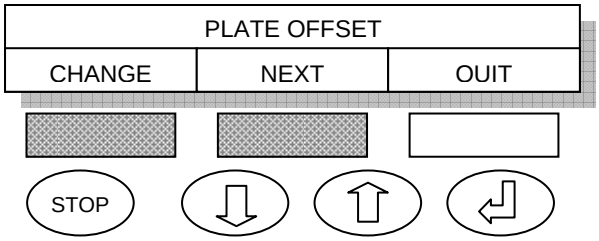
Use the up/down keys to toggle between 96 and 384.Press SAVE *SK* to scroll through to the next menu.



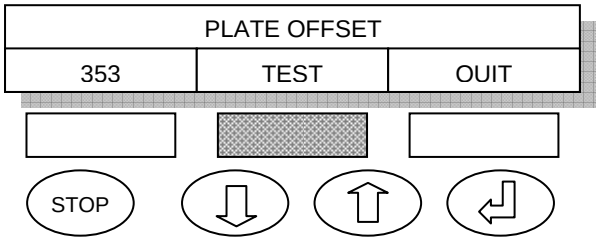
Press CHANGE *SK* to enter this procedure or NEXT *SK* to scroll through to the next menu.



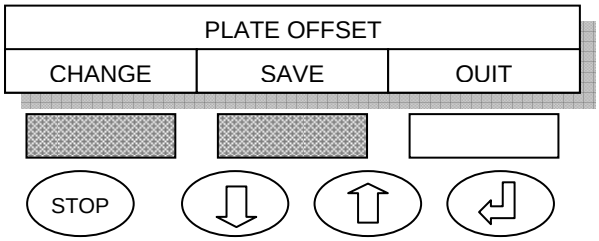
Use the up/down keys to toggle between 8, 12, 8 X 2 and 12 x 2.Press SAVE *SK* to scroll through to the next menu.



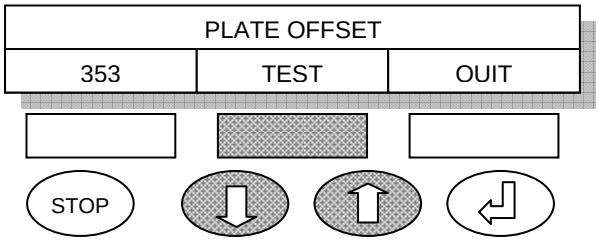
This menu is designed to allow the front to back alignment of the wash tips in the wells. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



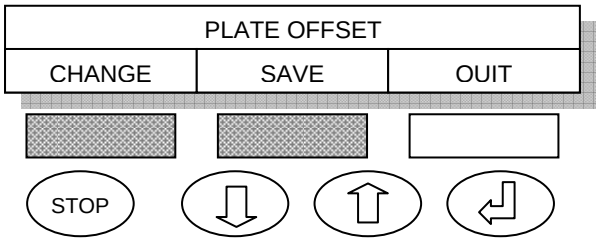
Press TEST *SK* the plate will move under the head. Check whether the head alignment is centralised over the first row of wells.



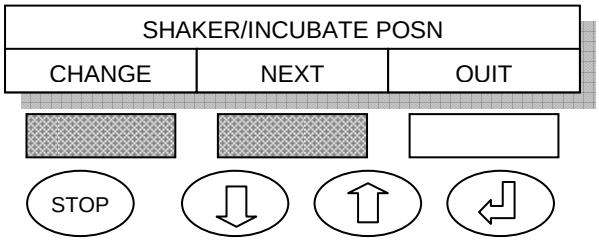
If head is aligned central over the first row of wells press SAVE *SK* to scroll through to the next menu. If the head is not aligned press CHANGE *SK*.



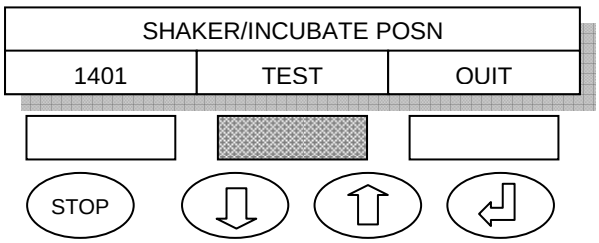
Use the up/down keys to step the plate under the wash head. Press TEST *SK* to check whether the head alignment is centralised over the first row of wells.
Note: The numbers refer to steps approx 22 steps per 1mm. The position 0 is to the front of the washer. Increment the number in order to move the plate backwards. Decrement the number if you wish the plate to move towards you.



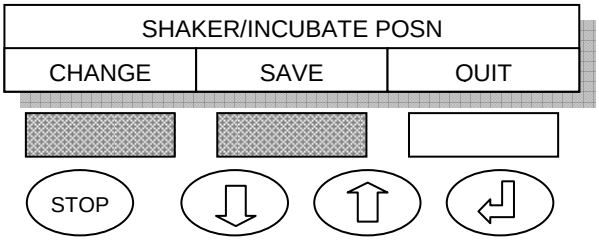
If head is aligned central over the first row of wells press SAVE *SK* to scroll through to the next menu. If the head is not aligned press CHANGE *SK* and repeat above steps.



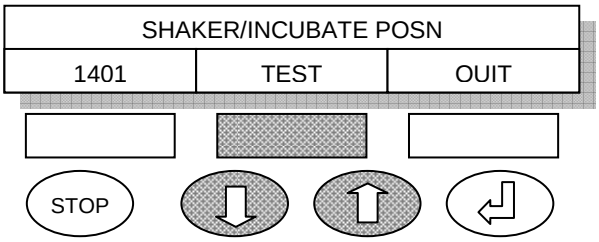
This menu is designed to allow the front to back alignment of the plate in the shaker or incubate position. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



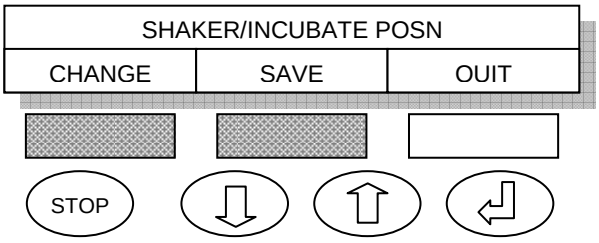
Press TEST *SK* the plate will move into position. Check whether the plate alignment is centralised over the shaker or incubate position.



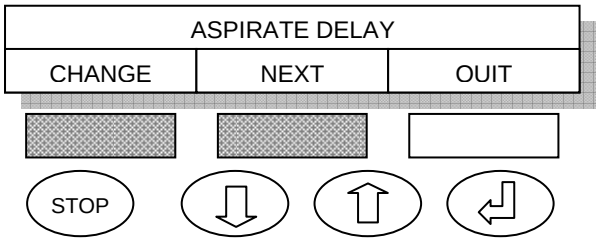
If plate is aligned central over the shaker or incubate position press SAVE *SK* to scroll through to the next menu. If the plate is not aligned press CHANGE *SK*.



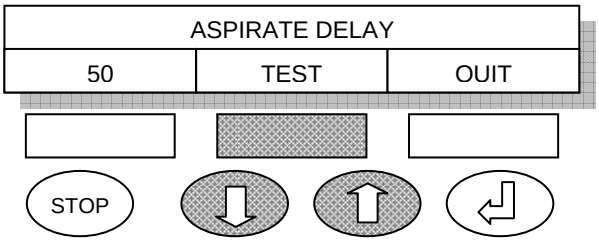
Use the up/down keys to step the plate over the shaker or incubate position. Press TEST *SK* to check whether the plate alignment is centralised over the shaker or incubate position.
Note: The numbers refer to steps approx 22 steps per 1mm. The position 0 is to the front of the washer. Increment the number in order to move the plate backwards. Decrement the number if you wish the plate to move towards you.



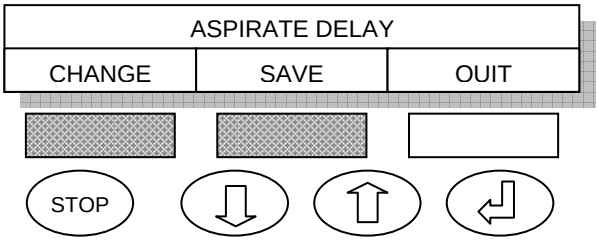
If the plate is aligned press SAVE *SK* to scroll through to the next menu. If the head is not aligned press CHANGE *SK* and repeat above steps.



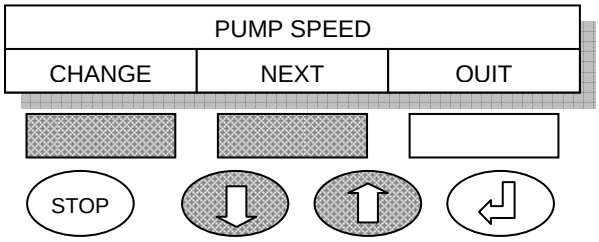
This sets the length of time the head rests at the bottom of the wells. In most cases, the longer the head rests at bottom, the drier the well will be left. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



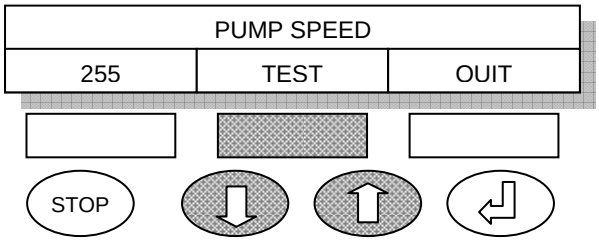
Use the up/down keys to change the time. The number is incremented in steps of 100th of a second. You can choose from a minimum of 1, this equates to 100th of a second to a maximum of 255, this equates to 2.55 seconds. Press TEST *SK*



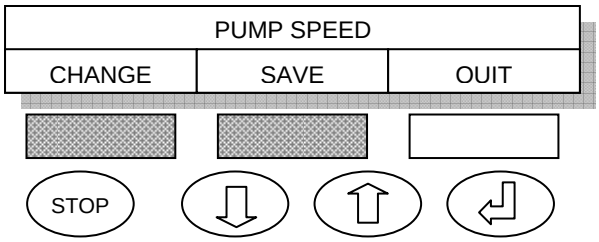
If the delay is correct press SAVE *SK* to scroll through to the next menu. If the delay is not correct press CHANGE *SK* and repeat above steps.



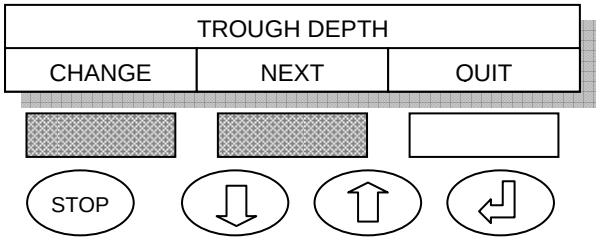
This sets the speed of the peristaltic pump. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



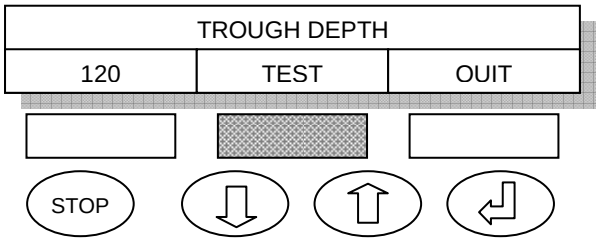
Use the up/down keys to change the speed. Each key action increments the speed by a factor of 1, 255 is the maximum speed. Press TEST *SK*



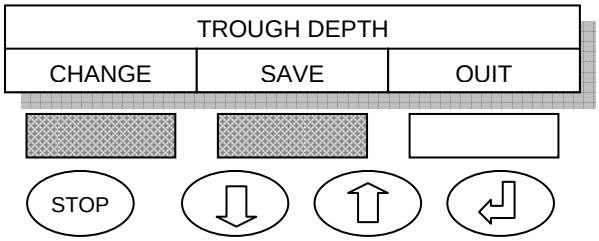
If the pump speed is correct press SAVE *SK* to scroll through to the next menu. If the pump speed is not correct press CHANGE *SK* and repeat above steps.



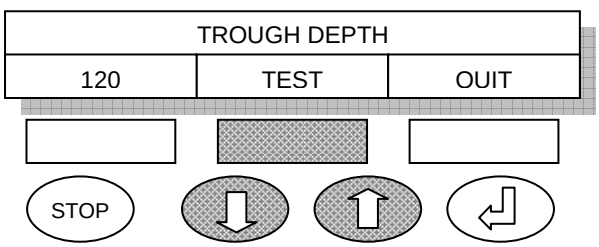
This menu is designed to allow the adjustment of the wash tips in the prime trough. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



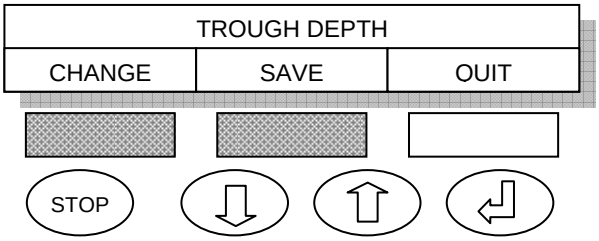
Press TEST *SK* the head will lower into the prime trough. Check whether the head tips are about 0.5mm above the bottom of the prime trough.



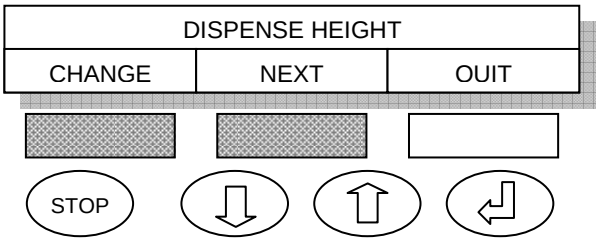
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK*.



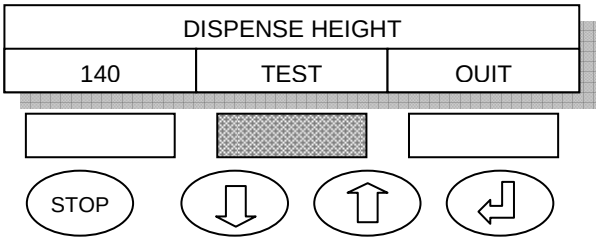
Use the up/down keys to step the head up and down. Press TEST *SK* to check whether the head tips are correct.
Note: The numbers refer to steps approx 22 steps per 1mm. The position 0 is to the top of the washer. Increment the number in order to move the head downwards. Decrement the number if you wish the head to move upwards.



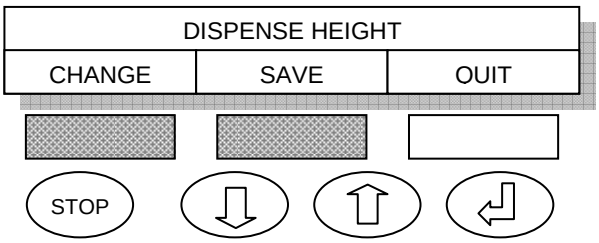
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK* and repeat above steps.



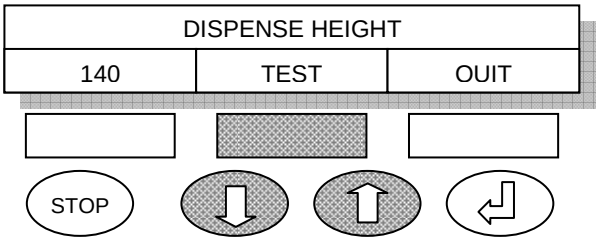
DISPENSE HEIGHT is the height that the head dispenses wash reagent into the plate. The head must be adjusted so that there is a small positive meniscus on each well, setting the head to about 1.0mm above the top of the plate should achieve this. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



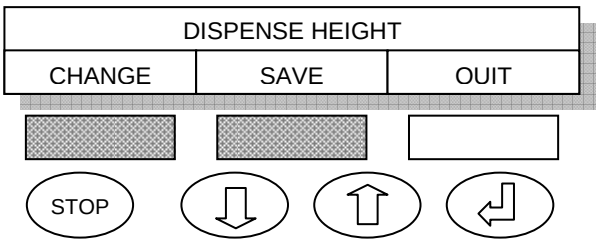
Press TEST *SK* the head will position itself above the first row. Check whether the head tips are about 1.0mm above the top of the wells.



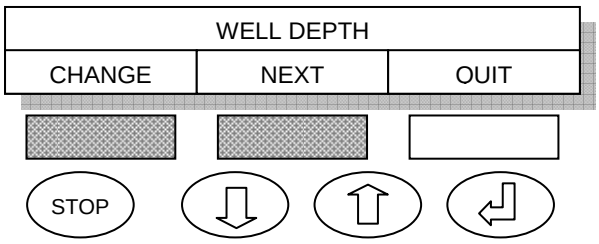
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK*.



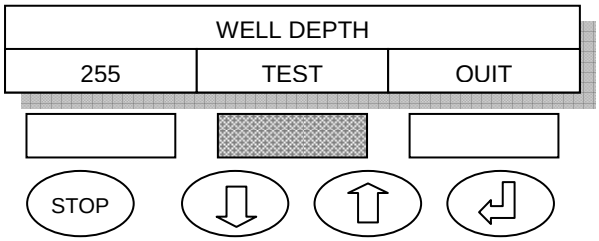
Use the up/down keys to step the head up and down. Press TEST *SK* to check whether the head tips are correct.
Note: The numbers refer to steps approx 22 steps per 1mm. The position 0 is to the top of the washer. Increment the number in order to move the head downwards. Decrement the number if you wish the head to move upwards.



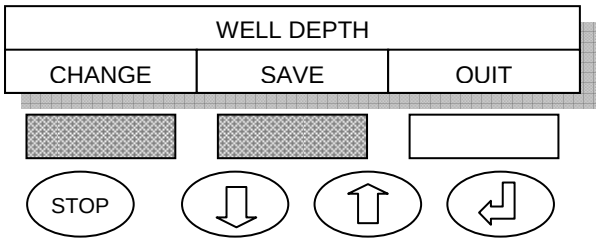
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK* and repeat above steps.



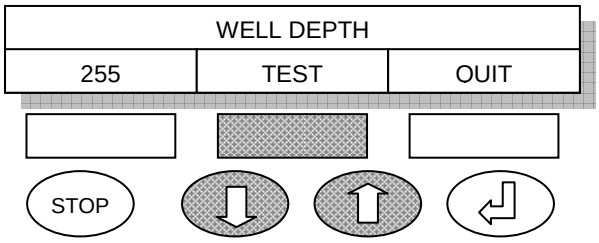
WELL DEPTH is the height that the head aspirates wash reagent from the plate. In most cases it is advisable to set this position to below the bottom of the wells. Such setting will allow the head to rest on the bottom surface of the wells for best aspirate results. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



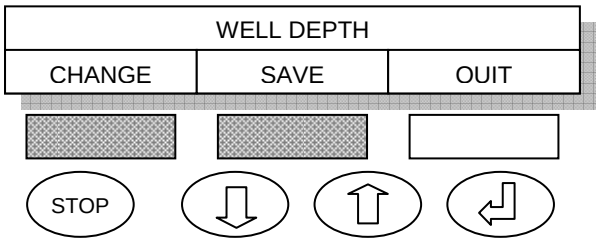
Press TEST *SK* the head will position itself at the bottom of the first row. Check whether the head tips are touching the bottom of the wells.



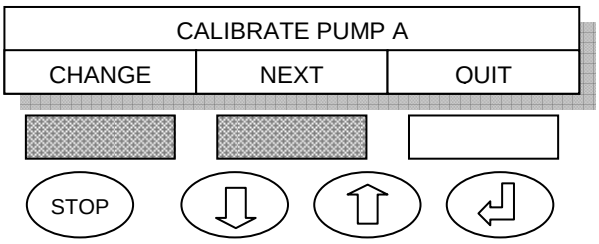
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK*.



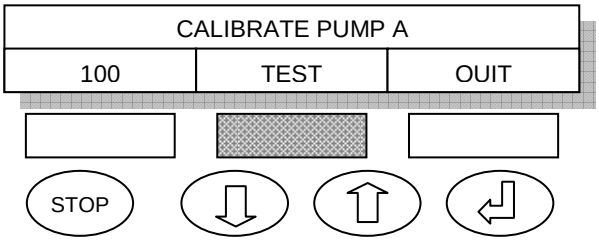
Use the up/down keys to step the head up and down. Press TEST *SK* to check whether the head tips are correct.
Note: The numbers refer to steps approx 22 steps per 1mm. The position 0 is to the top of the washer. Increment the number in order to move the head downwards. Decrement the number if you wish the head to move upwards.



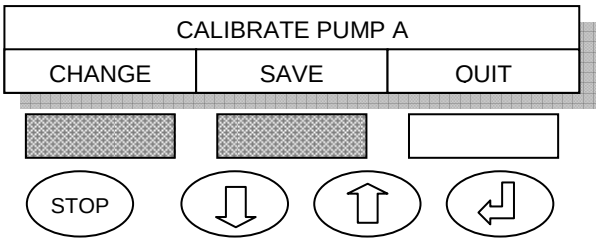
If head tips are correct press SAVE *SK* to scroll through to the next menu. If the head tips are not correct press CHANGE *SK* and repeat above steps.



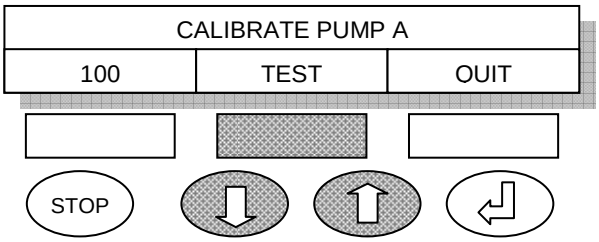
CALIBRATE PUMP A is the calibration of the peristaltic pump. To run this function the wash bottle needs to be filled with distilled water and the wash and waste bottles must be connected to the Autura. The head will need to be primed in the UTILS menu. You will also need a clean dry plate. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



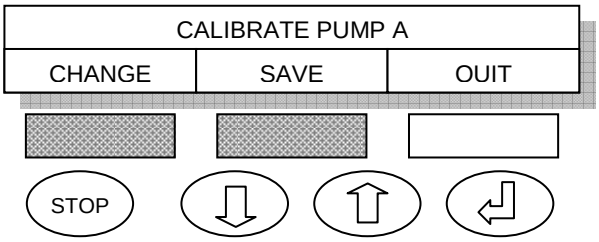
Weigh the new plate and zero the balance, place the plate into the plate carrier. Press TEST *SK* Autura will dispense a quantity of water into each well, if the Autura is set to run 96 well plates it should dispense 300µl per well. If the Autura is set to run 384 well plates it should dispense 60µl per well.



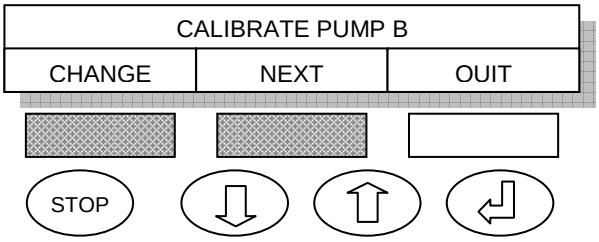
Weigh plate if plate weighs 28.8g (300µl x 96 wells) or 23.0g (60µl x 384 wells) calibration is correct, press SAVE *SK* to scroll through to the next menu. If the plate weight is different press CHANGE *SK*.



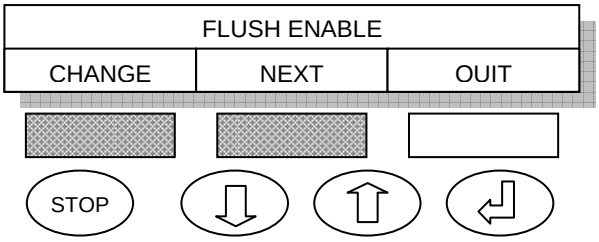
Use the up/down keys to change the calibration value. Empty and dry plate, re-weigh the plate and zero the balance, place the plate into the plate carrier. Press TEST *SK* to repeat the dispense routine.



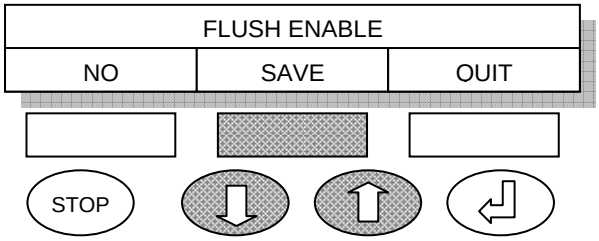
Weigh plate if plate weighs 28.8g (300µl x 96 wells) or 23.0g (60µl x 384 wells) calibration is correct, press SAVE *SK* to scroll through to the next menu. If the plate weight is different press CHANGE *SK* and repeat above steps.



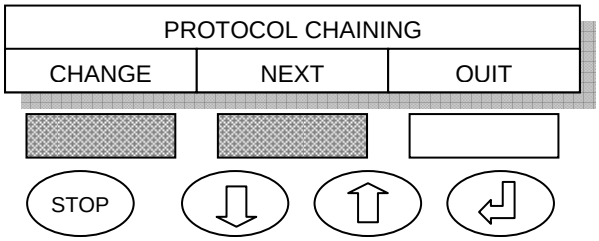
Note: This menu will only appear if a second peristaltic pump is fitted.
CALIBRATE PUMP B is the calibration of the second peristaltic pump. Repeat above steps for pump A to calibrate this pump. Press NEXT *SK* to scroll through to the next menu



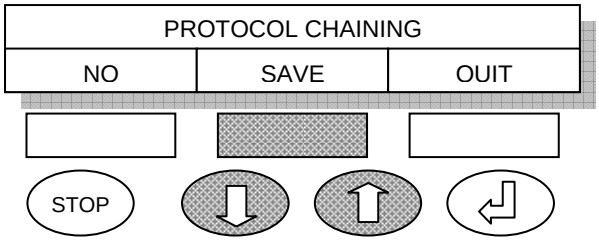
Press CHANGE *SK* to enable flushing or NEXT *SK* to scroll through to the next menu.
Note: Flushing can only be done if a second peristaltic pump is fitted.



Use the up/down keys to toggle between ‘YES’ or ‘NO’. Press SAVE *SK* to scroll through to the next menu.



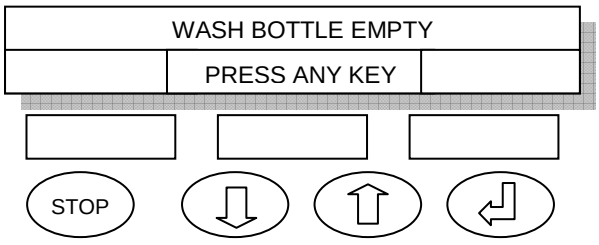
Press CHANGE *SK* to enable protocol chaining or NEXT *SK* to scroll through to the next menu.



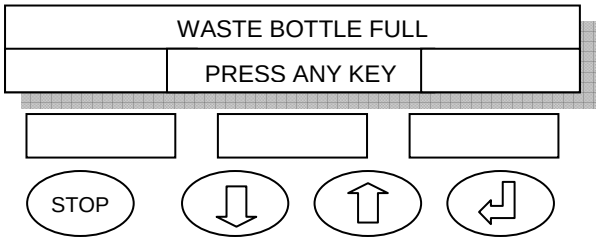
Use the up/down keys to toggle between ‘No’ or ‘Yes’. Press SAVE *SK* to scroll through to the next menu.

8 Error messages

The error messages are there to inform you if a situation occurs that is detrimental to the smooth operation of the unit. Take the necessary steps before attempting to continue the work.



To fill the wash bottle or to empty the waste bottle first unscrew the caps and lift the sensing floats vertically from the bottles and lay on a tissue paper to drain. Empty or fill the bottles.



9 Maintenance routine

These instructions are intended as a daily routine that will help you to keep the equipment fit for a long operational life.

 Safety first: Always wear disposable gloves, safety goggles and a laboratory coat before performing any maintenance.

9.A At the end of a working day:

10.1. Do not leave the wash head to dry out between wash runs. The salts in your wash buffers will crystallise in the tubes and block them. Between runs make sure that the dispense tubes of the wash head are left soaking in the prime trough.

10.2. Fill the wash bottle with distilled water and flush all the delivery tubes and the head thoroughly by priming the system until the distilled water is dispensed through the wash head.

10.3. Empty the waste reservoir and rinse them thoroughly with distilled water. Saline solution that might crystallise on the level detection float will stop the system from working properly. Remove the level detection rods from both bottles and let them dry on a tissue paper.

10.4. Any dispense tubes that become blocked can be cleaned using the cleaning probe supplied as part of the accessory kit.

10.5. It is advised that the pressure is removed from the peristaltic pump tubes, to do this remove the tube clamp on the pumps.

10.6. Dry out any liquid residues from the wash trough with tissue paper.

9.B At the beginning of a working day:

10.7. Check that the wash head is in perfect condition and none of the tubes are bent, damaged or blocked.

10.8. Check that the floats move freely on the level detection rods and reassemble the level detection system onto the waste & wash bottles.

10.9. Reassemble the peristaltic tubes into the pumps. A ‘click’ is heard when the tube clamp is properly inserted into position on both sides of the pump.

10.10. Fill the wash reservoir and prime wash solution into the prime trough so that the tips are immersed.

10.11. It is advised to prime the delivery system into an empty plate making sure that all head needles, both dispense and suction, are clear from obstruction, if not use the supplied cleaning probe needle to clear any dispense tubes which are clogged.

10.12. Flushing the complete system with warm clean water can clear any blocked aspirate tubes. Note this may take several priming cycles to completely clear the probes.

10 Trouble shooting

The following guide is aimed to help you to address operational problems of the equipment. Please contact our qualified service engineer if the fault continues to exist after you have completed these checks.

Problem	Possible Cause	Possible Remedy
1. LED on remote Power Supply is not illuminated	▪ Blown fuse in plug ▪ Faulty Power Supply Unit	▪ Replace fuse in mains plug ▪ Replace power supply
2. Display & Power LED do not illuminate	▪ No power to the unit	▪ Replace the fuse and check power connection is well inserted into the socket. Check the LED is illuminated on remote power supply.
3. 'Waste Bottle Full'/'Reagent Bottle Empty' message although OK	▪ Level detection DIN plug not properly plugged into sockets ▪ Floats on level sensing rods not moving freely	▪ Check level detection connectors ▪ Clean level sensing rods
4. Dripping dispense tubes	▪ Pump speed too low ▪ Blocked dispense tubes ▪ Pump tubes not properly inserted in peristaltic pump	▪ Increase pump speed ▪ Unblock tubes with unclogging needle ▪ Open pump clip and reassemble tubes
5. Wash reagent spilling over	▪ Vacuum malfunction ▪ Blocked aspirate tubes ▪ Aspirate tubes too high over well's edge	▪ Check air lines and connectors between waste bottle and wash head ▪ Unblock aspirate tubes using syringe ▪ Lower head height in engineering menu
6. Waste bottle collapses	▪ Aspirate tubes are clogged ▪ Vacuum tube between wash head and waste bottle is kinked	▪ Unblock aspirate tubes using syringe ▪ Un-kink tube, check for damage
7. Plates remain wet after wash	▪ Software programmed to leave wells wet after cycle ▪ Wash head does not move feely on its shaft ▪ Low vacuum	▪ Check that the protocol calls for the wells to be left dry ▪ Apply a small drop of oil to the shaft ▪ Check vacuum efficiency
8. Grinding noise when head moves up or down	▪ Y axis speed is set too low	▪ Increase speed through engineering menu

11 Sending back for maintenance or repair

Please do not send the equipment back for repair or maintenance until you have agreed the procedure with Mikura Ltd. or your distributor. You will receive a Return Authorisation Number (RAN) once you have agreed that the instrument must be returned.

Units will only be accepted for repair if accompanied with a fully completed and signed Return & Decontamination Certificate. A copy of the certificate is attached to this manual. Units, which are not accompanied with the certificate, will not be accepted into the factory and returned at your expense.

 Note: The equipment can be returned only after the following decontamination procedure has been completed.

 Safety first: Always wear disposable gloves, safety goggles and a laboratory coat before performing any decontamination routine.

1. Empty the waste bottle completely
2. Fill the wash bottle with at least 200ml 10% Chlorine bleach solution and prime the system thoroughly.
3. Disassemble wash head and immerse in 10% bleach solution for 2 hours.
4. Flush waste and wash bottles with 10% bleach solution
5. Wet a cleaning pad with bleach solution and clean all outside surfaces of the equipment and bottles
6. Pack the unit in its original packaging. Mikura Ltd. is not liable for any damage incurred in transport if the original packaging is not used.

Return & Decontamination Certificate

Mikura Limited
Spinningwood Farm
Burnthouse Lane
Lower Beeding
W Sussex
RH13 6NN
United Kingdom
☎ 44 (0) 1403 891875
🖷 44 (0) 1403 892651
info@mikura.co.uk

RAN number ☐☐☐☐☐☐☐
Serial Number ☐☐☐☐☐☐☐

Name

_____

Laboratory name

_____

Full address:
Street

_____

Town

_____

ZIP

_____

Tel. No.

_____

Fax No.

_____

Email

_____

Laboratory supervisor

Describe nature of fault:

Is the equipment's surface or components damaged in any other way?

The equipment has been in contact through use or otherwise with the following media:

- ☐ Body fluids
- ☐ Toxic media
- ☐ Carcinogenic media
- ☐ Radioactive media
- ☐ Other hazardous materials
  Please specify:
  _____

I hereby certify that the enclosed equipment has been fully decontaminated as per the instruction in the Autura Manual.

To the best of my knowledge, service personnel can handle the equipment without exposing them to health hazards.

Signed _____

Print name _____

Date _____

12 Materials compatibility chart

Component	Material	Acetone	Ethanol (EthylAlcohol)	Dimethylformamide (DMF)
Delivery tubes	Tygon	X	L	X
Peristaltic pump tubes	Santoprene	R	R	R
Level sensing tubes/Tube fittings	PP	R	R	R
	Acetal (Polyoxymethylene) Delrin Du-Pont	R	R	R
Reagent bottles	PC	X	R	X
Bottle tops	ABS (Acrylonitrile Butadiene Styrene)	X	R/L	X
Dispense tubes/Head lifting rods/Screws	Stainless Steel	R	R	R
Dispense head	PPS Ryton (polyphenylene sulfide)	R	R	R
	Nylon	R	R	R
Plate carrier/Top plate	PPS Ryton (polyphenylene sulfide)	R	R	R
Front and back mouldings	ABS (Acrylonitrile Butadiene Styrene)	X	R/L	X

X = Not Recommended
L = Limited
R = Recommended

13 General Specification

Dimensions - main unit:	230mm(W) X 485mm(D) X 275mm(H)
Weight – complete system:	6.5Kg
Operating voltage:	100-240Vac 50/60Hz
Power consumption:	51.6VA
Power Supply	12V 4.3A DC Switch Mode, centre +
Environmental operating temperature:	10 ºC – 40 ºC
Environmental storage temperature:	4 ºC – 40 ºC
Precision @ 350µl	CV =± 3%@300µl
Dispensing volume	25 -1500µl in 25µl increments
Residual volume	3µl per well typical action 1µl per well with sweep

Protocols:	
Max number of protocols	30
Max number of washes	10
Min wash volume	5µl
Max wash volume	1500µl
Min soak time	1 seconds
Max soak time	15 minutes
Min aspirate delay	0.01 second
Max aspirate delay	2.55 seconds

CE

The CE sign certifies that the instrument meets the requirement of the EEC directive and has been tested according to the specified test methods.

WEEE COMPLIANCE

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Mikura Ltd has contracted with one or more recycling/disposal companies and this product should be disposed of or recycled through them. Further information on Mikura Ltd's compliance with these Directives, the recyclers, and information on Mikura Ltd products which may assist the detection of substances subject tothe RoHS Directive are available on request.

Produced by

Mikura Ltd.
Spinningwood Farm
Burnthouse Lane
Lower Beeding
W Sussex
RH13 6NN
England

It is the stated philosophy of Mikura Ltd to preserve the environment wherever possible.

Mikura will only use materials and production techniques that cause least environmental damage.

List of Protocols

No.	Number of washes	Well style	Wash volume	Sweep well	Wash top or bottom	End wet or dry	Wash plate or strip	Stepover	Event enabled	Event type	Event time	Reagent bottle
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
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16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

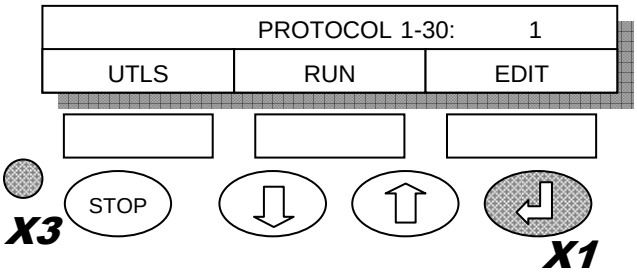
List of Chains

Chain	Protocol	Protocol	Protocol	Protocol
1				
2				
3				
4				
5				

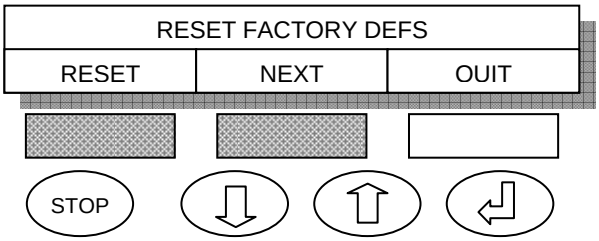
14 Appendix A - Service Engineer Menus

This appendix is for routines that are intended for the service engineer only. Most menus are identical to user engineering menu. There are however some additional menus that allow fine adjustment and return to factory default settings.

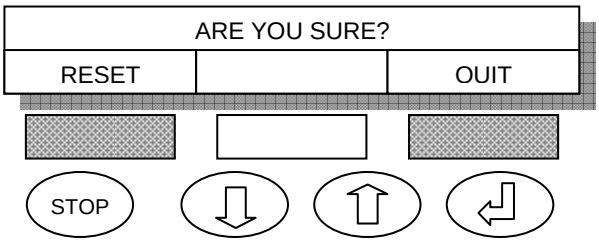
The following instructions focus on the menus that are in addition to the normal user engineering menus.



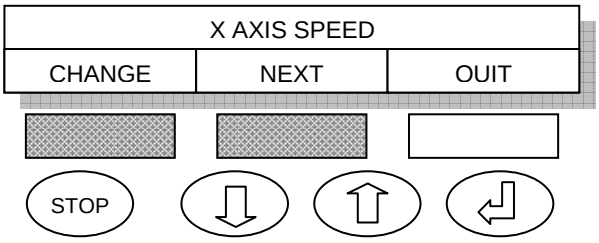
To access the service engineer menu, press the hidden key three times and than the ↵ key once.



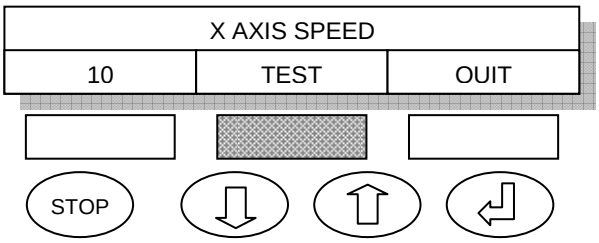
RESET FACTORY DEFS command sets all the protocols and engineering settings to the factory's default settings. The user will loose all the custom written protocols.
Press RESET *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



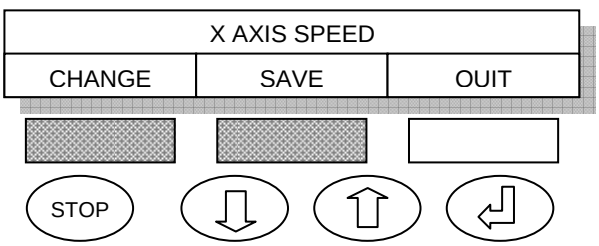
DO NOT PRESS RESET UNLESS YOU ARE ABSOLUTLY SURE
Press QUIT *SK* to scroll through to the next menu.



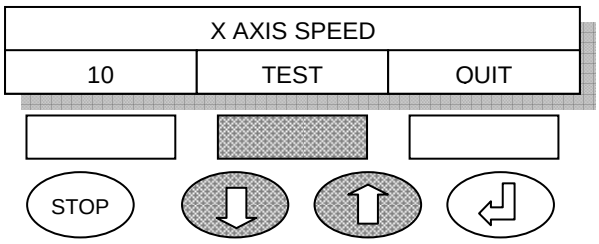
X AXIS SPEED is the speed in which the plate carrier moves along the front to back axis. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



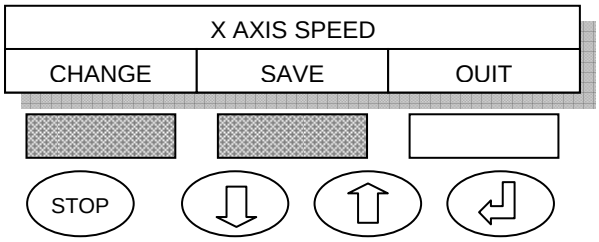
Press TEST *SK* the plate carrier will move back and forwards. Check whether the speed is correct.



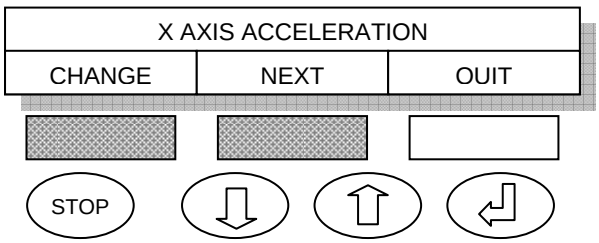
If plate speed is correct press SAVE *SK* to scroll through to the next menu. If the plate speed is not correct press CHANGE *SK*.



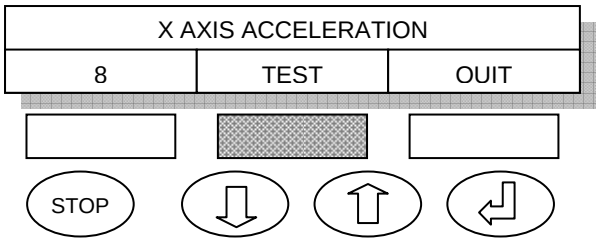
Use the up/down keys to change the speed. Press TEST *SK* to check whether the plate speed is correct.



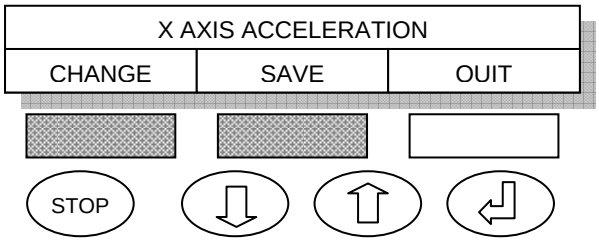
If plate speed is correct press SAVE *SK* to scroll through to the next menu. If the plate speed is not correct press CHANGE *SK* and repeat above steps.



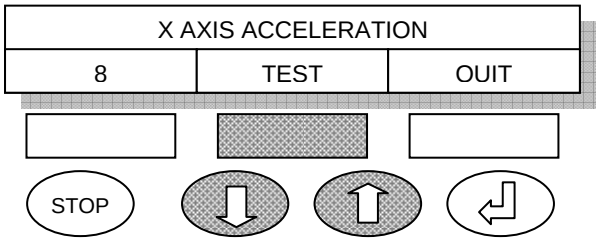
X AXIS ACCELERATION is the acceleration in which the plate carrier moves along the front to back axis. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



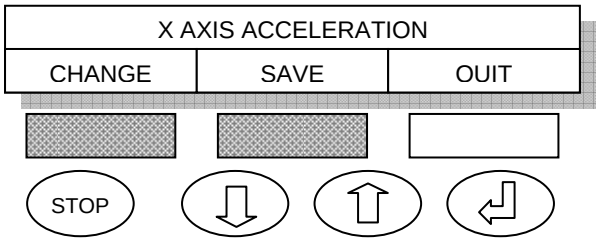
Press TEST *SK* the plate carrier will move back and forwards. Check whether the acceleration is correct.



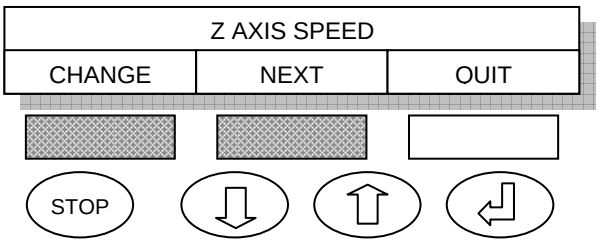
If plate acceleration is correct press SAVE *SK* to scroll through to the next menu. If the plate acceleration is not correct press CHANGE *SK*.



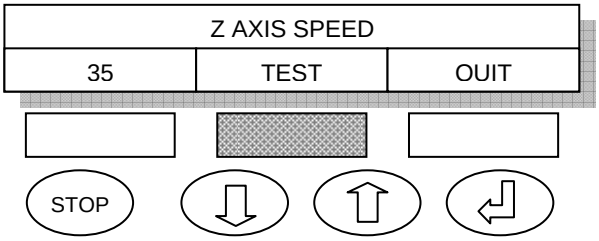
Use the up/down keys to change the acceleration. Press TEST *SK* to check whether the plate acceleration is correct.



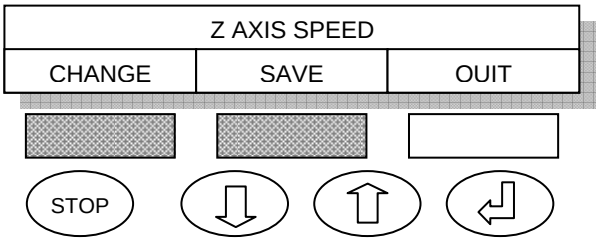
If plate acceleration is correct press SAVE *SK* to scroll through to the next menu. If the plate acceleration is not correct press CHANGE *SK* and repeat above steps.



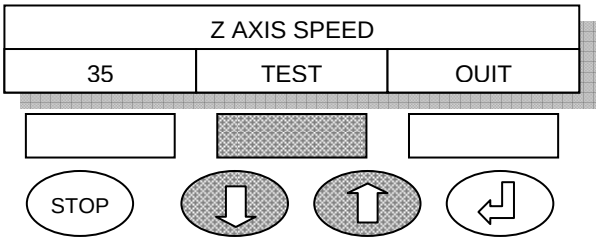
Z AXIS SPEED is the speed in which the head moves along the up and down axis. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



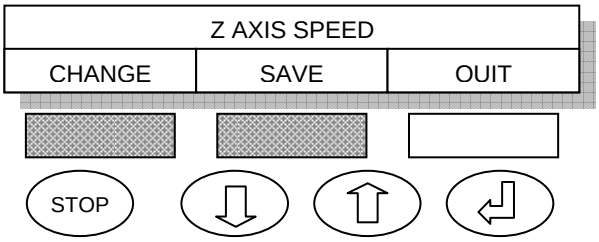
Press TEST *SK* the head will move up and down. Check whether the speed is correct.



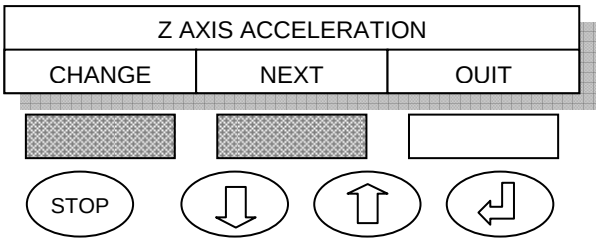
If head speed is correct press SAVE *SK* to scroll through to the next menu. If the head speed is not correct press CHANGE *SK*.



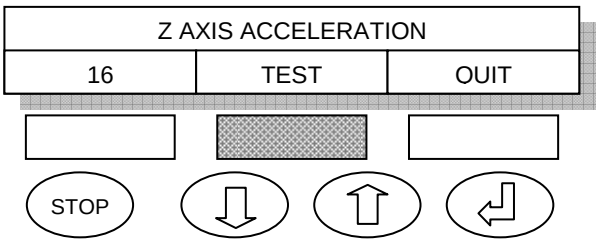
Use the up/down keys to change the speed. Press TEST *SK* to check whether the head speed is correct.



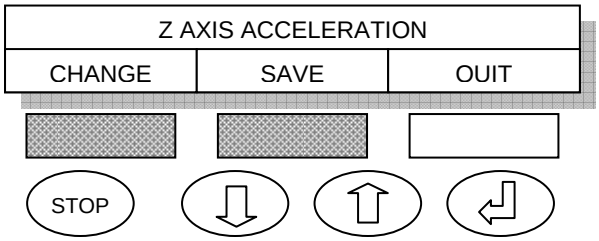
If head speed is correct press SAVE *SK* to scroll through to the next menu. If the head speed is not correct press CHANGE *SK* and repeat above steps.



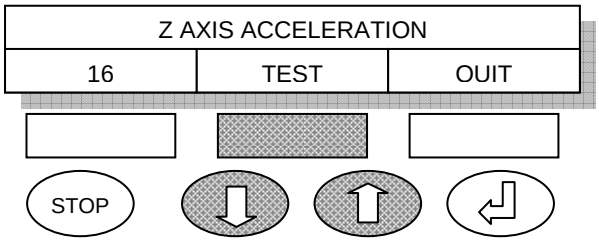
Z AXIS ACCELERATION is the acceleration in which the head moves along the up and down axis. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



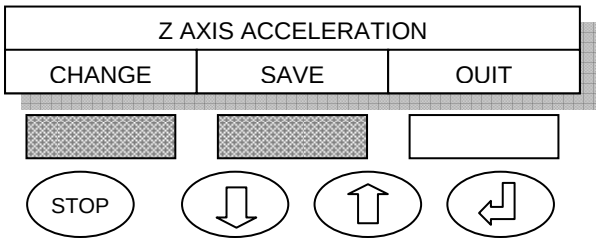
Press TEST *SK* the head will move back and forwards. Check whether the acceleration is correct.



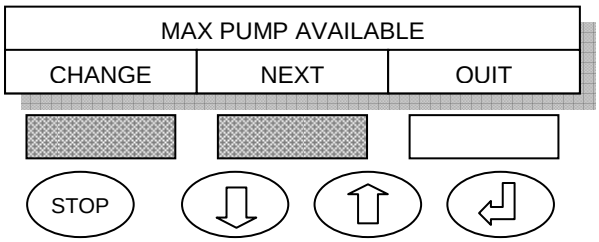
If head acceleration is correct press SAVE *SK* to scroll through to the next menu. If the head acceleration is not correct press CHANGE *SK*.



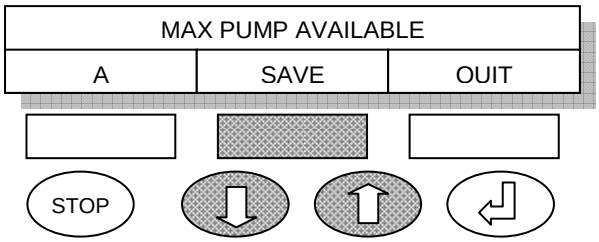
Use the up/down keys to change the acceleration. Press TEST *SK* to check whether the head acceleration is correct.



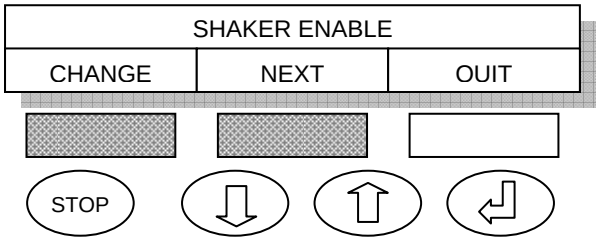
If head acceleration is correct press SAVE *SK* to scroll through to the next menu. If the head acceleration is not correct press CHANGE *SK* and repeat above steps.



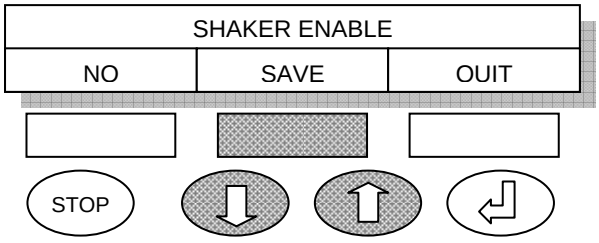
Press CHANGE *SK* to change the number of pumps or NEXT *SK* to scroll through to the next menu.



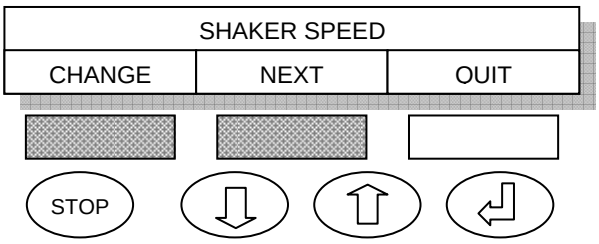
Use the up/down keys to toggle between A, B or C.Press SAVE *SK* to scroll through to the next menu.



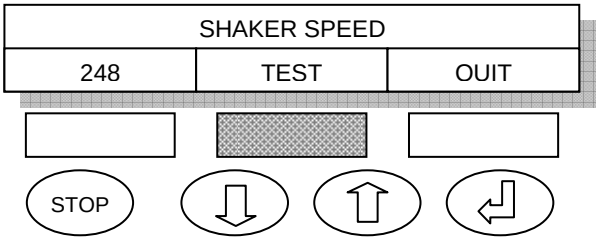
Press CHANGE *SK* to enable the shaker or NEXT *SK* to scroll through to the next menu.



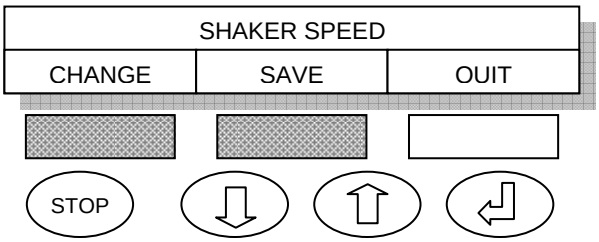
Use the up/down keys to toggle between ‘YES’ or ‘NO’.Press SAVE *SK* to scroll through to the next menu.



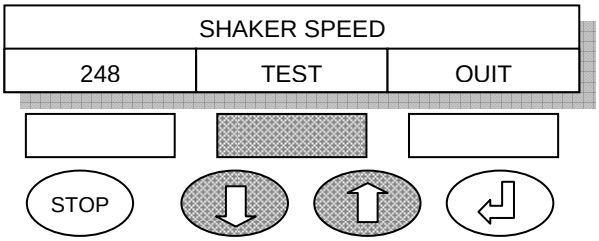
This menu will not appear if you chose N0 in the previous menu, i.e. no shaker. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



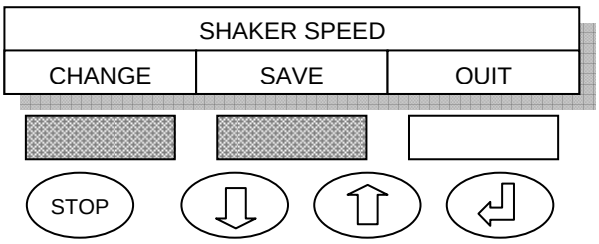
Press TEST *SK* the plate will move into the shaker position and shake. Check whether the speed is correct.



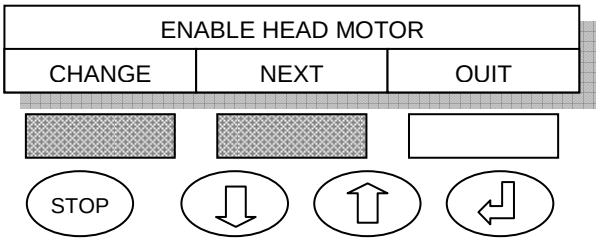
If shaker speed is correct press SAVE *SK* to scroll through to the next menu. If the shaker speed is not correct press CHANGE *SK*.



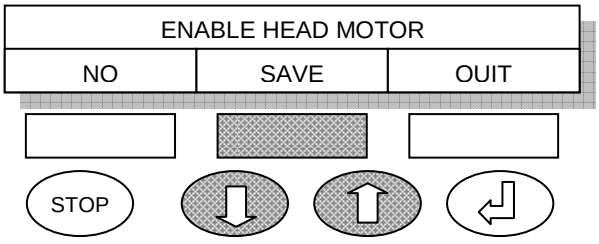
Use the up/down keys to change the speed. Press TEST *SK* to check whether the shaker speed is correct.



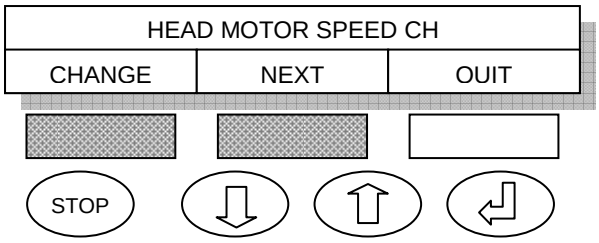
If shaker speed is correct press SAVE *SK* to scroll through to the next menu. If the shaker speed is not correct press CHANGE *SK* and repeat above steps.



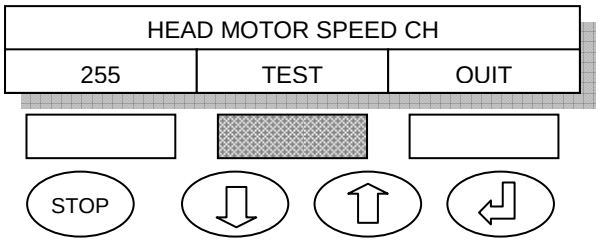
Press CHANGE *SK* to enable the head motor or NEXT *SK* to scroll through to the next menu.



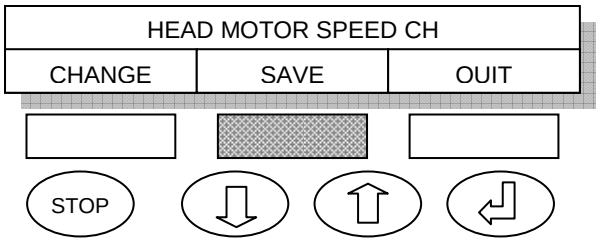
Use the up/down keys to toggle between ‘YES’ or ‘NO’.Press SAVE *SK* to scroll through to the next menu.



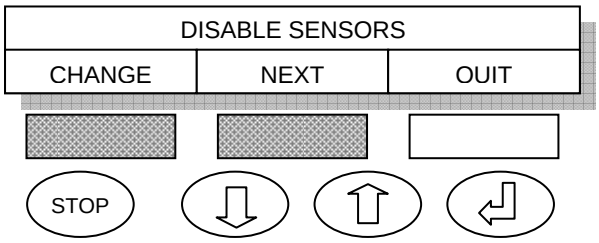
This menu will not appear if you chose N0 in the previous menu, i.e. no head motor. Press CHANGE *SK* to enter this procedure. Press NEXT *SK* to scroll through to the next menu.



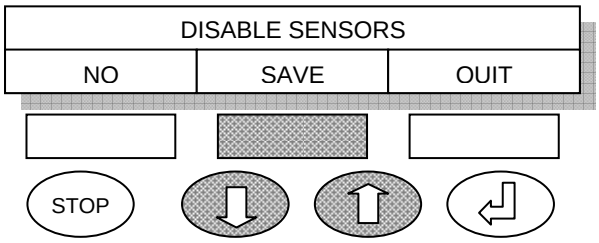
Press TEST *SK* the head motor wont turn.



Press SAVE *SK* to scroll through to the next menu.



Press CHANGE *SK* to disable the level sensors or NEXT *SK* to scroll through to the next menu.



Use the up/down keys to toggle between ‘YES’ or ‘NO’.Press SAVE *SK* to scroll through to the next menu.

15 Appendix B - Hardware information for the Service Engineer

Autura has a microprocessor of type Winbond W78E516B40PL. This is located on the PCB behind the front cover. It is programmable via the USB socket.

The PCB also contains an eeprom that is rewritten with new hardware settings through the engineering menus. This eeprom is not replaceable.

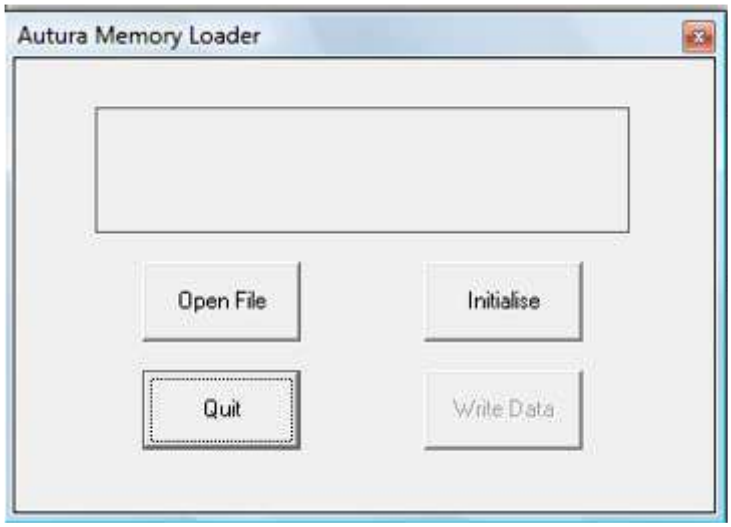
16 Appendix C - Upgrading software via USB socket

The USB Interface CD contains all the software required for uploading new software versions to the Autura 1000 washer from a PC running all versions of Windows 9X to Windows Vista.

To install the software, copy the folder called PC Software from the CD to your local HD. Quit all other applications. Open the folder and create a shortcut for Autura memory loader to your desktop.

The Autura is equipped with a USB type B socket. Connect your Autura Washer 1000 to your PC using an USB type A to type B cable (i.e. printer cable). Connect USB cable to Autura first then to the computer.

Switch on your Autura and launch the Autura memory loader software application from your desktop.



Click the ‘Initialise’ button to start communication with your Autura. The Autura display will read Memory Loader Mode and the software will display Initialisation success.

Click the ‘Open File’ button and select the new XXX.hex file to upload. After sending the data the software will display:
File opened Ok
End of data:

Click the ‘Write Data’ button. The new software will be uploaded to the Autura. After the data has been sent and verified the software will be display Programming Successful. The Autura will return to the main menu.

Click the ‘Quit’ button to close the program.

Switch off your Autura and unplug the USB cable.