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User Manual

QF112

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Introduction

Genetix QFill2

The **QFill2** is an automated **QPlate** (384 well plate) dispenser. It is the ideal choice for filling the Genetix range of 384 or 96 **WellPlates**. With this equipment you eliminate the laborious task of manual well filling.

The **QFill2** is ideal for microbial and cell culture applications or for aliquoting solutions in multi-well plate assays such as plasmid mini-preps or clean up procedures.

The **QFill2** can fill 96, 384 and 96 deep wells in less than 20 seconds.

Before using the **QFill2**, it is **very important** that you carefully read this manual and take notice of any safety instructions. The **QFill2** set up procedure *must* be adhered to. This procedure ensures that the few adjustable parts on the **QFill2** are correctly situated in their datum positions.

Failure to comply with this procedure can damage the Genetix **QFill2**.

Note - The Genetix QFill2 is strictly for research use only and is not intended or recommended for the diagnosis of disease in humans or animals.

Technical Specifications

QFill2

Manufactured by Genetix Ltd (UK)

Dimensions

Total assembled:

Size: 30cm x 30cm x 20cm

Weight: 5Kg

Operating Environment

Temperature: 10°C to 35°C

Humidity: 20 to 80% non-condensing

Electrical Supply

Voltage is fixed at either 110vac or 240vac depending upon geographical market. Make sure your **QFill2** is set for the correct supply voltage before attempting to connect to a power supply.

European

Voltage: AC210-250V 45-65 Hz single phase

Max. Current: 250mA

Power: 50W

Connections: IEC inlet.

USA/Japan:

Voltage: AC 90-120V 45-65 Hz single phase

Max. Current: 500mA

Power: 50W

Connections: IEC inlet

Health & Safety

Note

Before using the **QFill2** please make sure that you have read the manual and comply with the following safety directions.

Prior to using the **QFill2** please make sure that you have been through the **QFill2** Pre-Power-Up checklist to ensure that the **QFill2** is set up correctly.

Safety Features

Isolator Switch:

Located at the back of the machine – this turns the power on or off. The LCD panel indicates whether or not the power is on.

Start/Stop:

Located on the keypad – pressing this during operation will interrupt a fill routine.

Warning Labels

The machine is marked with hazard warning labels. All warning labels must be observed.

Non-Return Filter Valve

The Whatman Filter valve is fitted on the rear port of the machine and will prevent fluid entering the machine in the event that the tubes are fitted the wrong way round.

If the Whatman Filter valve becomes wet or damaged it must be replaced.

Electrical safety

The **QFill2** must be connected to a properly earthed power outlet to protect users from the risk of electric shock. The main chassis of the machine is earthed together with all associated electrical components.

Do not remove any of the fixed covers, as there are no user serviceable parts inside. All internal work should be referred to Genetix approved service personnel.

The **QFill2** has a Warranty seal and is marked with tamper evident sealant; if any of the covers are removed the guarantee is rendered null and void.

In the event of a liquid spillage into the base cavity of the QFill2, the power supply should be disconnected at the mains before any attempt is made to clean up the spillage.

Drive Safety

The **QFill2** incorporates a moving plate tray. Keep objects and fingers clear from this mechanism when the robot is in operation.

The Pre-Power-Up Checklist on page 7 should be followed before every routine in order to prevent serious damage to the **QFill2** or any of its constituent parts.

Cleaning Machine

The machine should be cleaned after use.

After operation flush the system through with clean water and drain the dispensing bottle of any remaining liquid. Replace the cap on to the bottle and purge the system with air only. This is to remove any residual liquid from the tubing and the manifold.

Failure to carry out this operation may result in blocked tubes on the manifold.

Lastly, switch the unit off and remove the silicone tubing from the pinch valve. The bottle and cap, silicone tubing, manifolds, and purge tank are autoclavable.

To clean the manifold more thoroughly use the special screw supplied to pull off the manifold plugs at either end of the large tube. They seal the tube with an o-ring and may be simply pressed back into place once cleaning is complete.

Service and Maintenance

We would strongly recommend that maintenance be carried out regularly and by a Genetix-approved service engineer.

If you move the system, repack it in the packaging material and boxes.

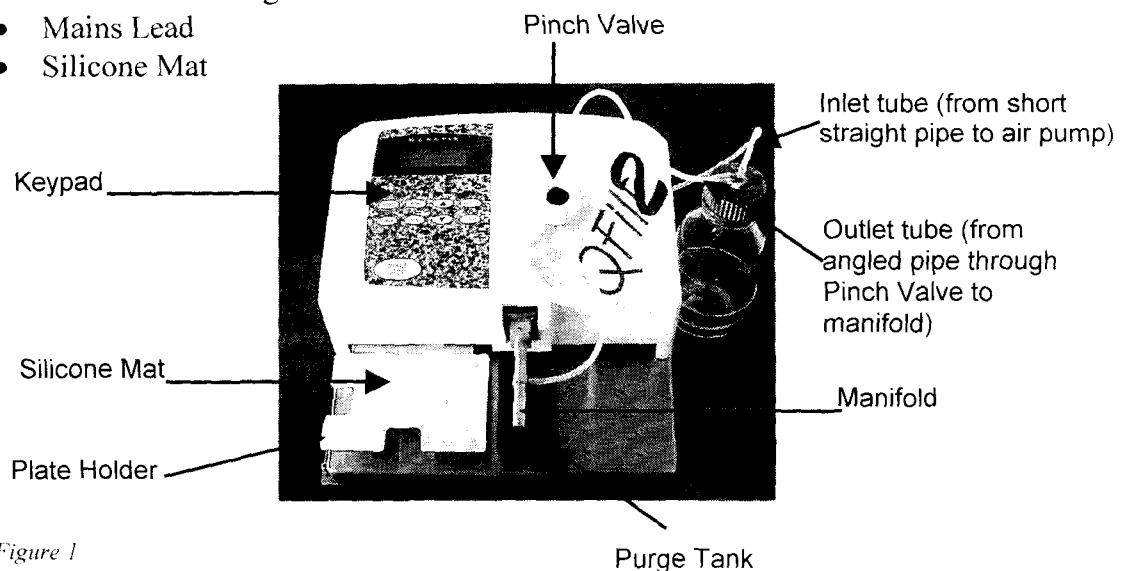
If the QFill2 needs to be returned to Genetix under warranty, the machine must be returned in its original box to protect it during transit. Please ensure that the Decontamination Certificate (located in Appendix A) is completed and that reasons for return are clearly stated. The Product Return and Decontamination Certificate (parts I and II) must be returned with the machine.

Initial Operation

System Features

The Genetix **QFill2** consists of the following:

- Base machine of approximately 30 centimetres square in size
- Pump running at approximately 3.5 psi
- Pinch valve which controls the working volume of medium (in user defined quantities) dispensed by the machine
- Motorised table which holds a 384 or 96 well microtitre plate
- Purge tank
- Manifolds - 16 way suitable for 384 well microtitre plates and 8 way manifold suitable for 96 well microtitre plates.
- Pressurised dispensing bottle with silicone tubing
- Manual
- Bottle holder ring
- Manifold cleaning screw
- Mains Lead
- Silicone Mat



Capacities

The **QFill2** is normally configured and calibrated at the factory to work with 0.5 litre and 1.0 litre bottles. If re-calibration is necessary, refer to Appendix B.

Note – please ensure that the serial number recorded in the manual matches the serial number of the machine because each machine is calibrated individually to ensure optimum performance.

Pre-Power-Up Checklist

- Check that the master switch on the back panel of the **QFill2** is in the OFF position and plug the power cable into the back of the unit.
- Check that the tubing is not fatigued
- Make sure that the sealing washer on the bottle cap is not perished
- Check the o-rings on each manifold plug to make sure that they are not perished
- Fasten the bottle-retaining clip onto the side of the unit, using a flat-bladed screwdriver to tighten as necessary. Place the dispensing bottle inside this clip.
- Inspect the bottle for evidence of cracks, scratches or any other damage.
- Fit the purge tank onto the front of the **QFill2**. Always make sure that it is properly seated down. The purge tank is designed to catch any spillage from the dispensing nozzles.
- **In the event of a liquid spillage into the base cavity of the QFill2, the power supply should be disconnected at the mains before any attempt is made to clean up the spillage.**
- Connect the power cable for the **QFill2** to your power source.

Fitting the manifold

The **QFill2** uses a stainless steel manifold with either 8 or 16 nozzles to dispense liquid evenly into wells. 8-way manifolds are used for 96 WellPlates and 16-way manifolds are used for 384 WellPlates.

Standard manifolds are designed for Genetix plates, but custom types are available for deeper well plates.

To fit the manifold; insert the tapered end of the manifold back-plate (see Figure 2 on page 8) into the black slot in the centre of the **QFill2** unit.

The machine will automatically detect whether an 8 or 16-way manifold is fitted by the hole in the back-plate. An 8-way manifold has the hole on the left (see Figure 2) and the hole is on the right-hand side of the back-plate of a 16-way manifold.

Tapered end of manifold back-plate

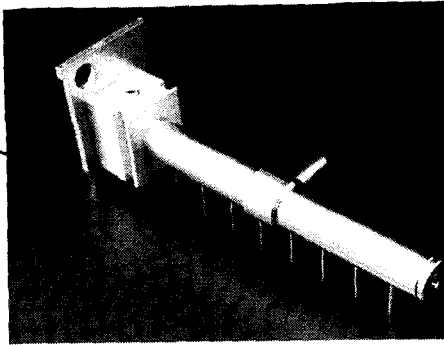


Figure 2 8-way Manifold - hole in back-plate on left-hand side

For accurate filling, the manifold must be purged of air first. See the section on purging (page 12)

Connecting the dispensing bottle



Important – Please make sure that you follow these instructions correctly. Connecting the tubes wrongly will render your warranty null and void.

- Place the dispensing bottle to the side of the QFill2.
- Screw the dispensing bottle lid onto the bottle, **ensuring a close, airtight fit.**
- Identify the stainless steel pipes on the top of the bottle. The long, angled pipe is the liquid outlet, the short, straight pipe is the air pressure inlet.

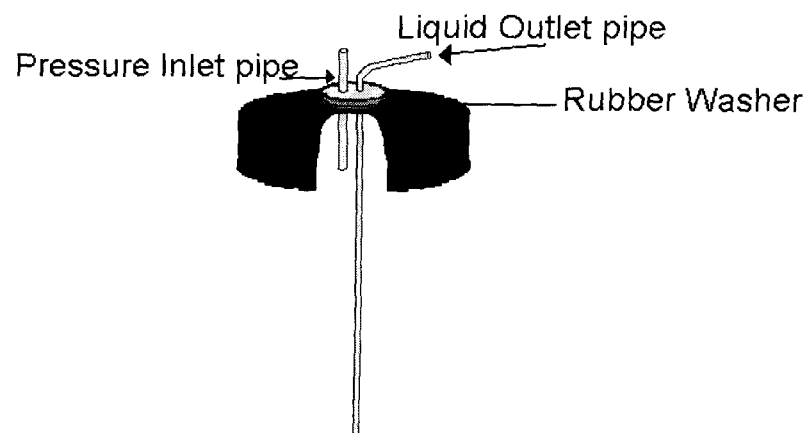


Figure 3 Bottle cap showing Inlet and Outlet pipes

- You need two silicone tubes which are supplied with the **QFill2**.
- Connect the first silicone tube to the Whatman Non-Return filter which in turn is connected to the short, air pump outlet pipe at the back of the **QFill2**.

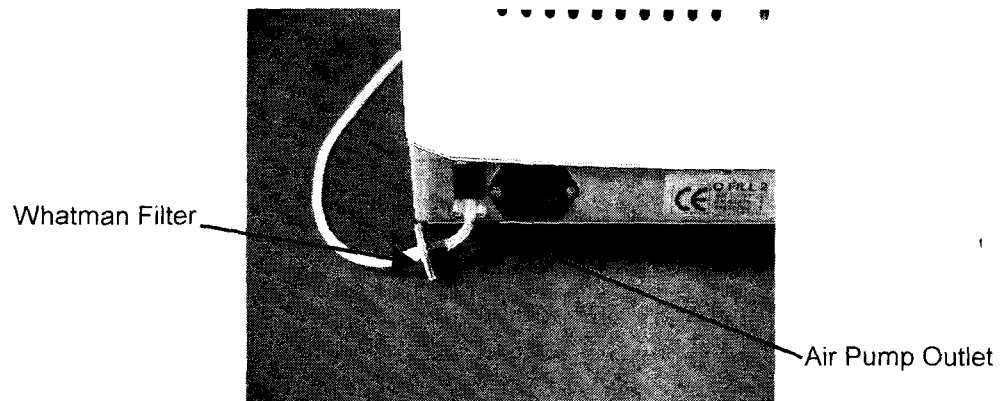


Figure 4 Rear view of QFill2

- Connect the first silicone tube to the **QFill2** manifold (the steel tube with either 8 or 16 nozzles) and then to the long, angled stainless steel pipe on the dispensing bottle.
- Insert the first silicone tube into the pinch valve. This is done by depressing the black button of the pinch valve and sliding the silicone tube into the slot making sure that it is fully home.
- Connect the second silicone tube to the air pressure inlet pipe on the dispensing bottle lid. This tube will pressurise the bottle, so it must be airtight.



Important – Double check that the tubing runs through the centre of the pinch valve. Failure to do so may result in a spillage and will render your warranty null and void.

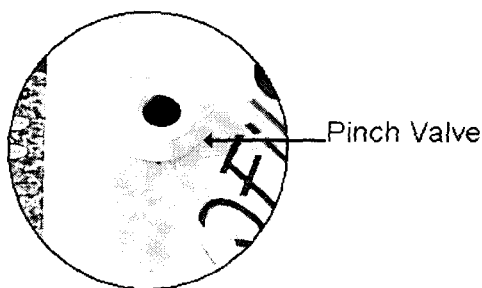


Figure 5

Filling the dispensing bottle

If you have just connected the bottle according to the instructions above, unscrew the bottle now, but leave all the tubes connected. The easiest way to do this is to hold the top still, while rotating the glass bottle.

Fill up the dispensing bottle with the required media (never more than three-quarters full). It is advisable that the first time you set up the **QFill2** it is done with water.

Power-Up Procedures

- Switch on the machine. The power switch is on the back panel.
- Press **RESET** on the keypad to pressurise **QFill2**.
- Allow the machine to run for approximately thirty seconds in order to build up pressure in the dispensing bottle.
- Press the **PURGE** key. The option to **PURGE** will be displayed. Purging the system allows any air in the tubing to be displaced. Press the **PURGE** key and hold it down until all the air has been removed. Press the **STOP** key to return to the previous screen.
- Empty the purge tank and replace it on the machine.

Running a Filling Routine

Initialising the machine

The **QFill2** features an easy to use menu interface on its integral LCD display. Once the unit has been set up and the dispensing bottle filled, it is a simple process to fill large numbers of plates with a precisely measured volume of liquid.

After powering up the **QFill2**, the LCD display will show the following message:

```
GENETIX
Ready to RESET
Software
Version:
```

After the **QFill2** is switched on, press the **RESET** key. This will initialise the drive system and start the pressurisation cycle. The bottle **must** be connected and airtight at this point. You should briefly see this display:

```
GENETIX
Wait for vessel
To pressurise
```

If you do not see the following display within about 30 seconds, check that all the tubes are connected and the bottle top is screwed on tightly.

```
GENETIX
READY
Volume: 0050
Plate:
```

The dispensing volume and plate type (96 or 384) will be displayed. The volume displayed is always the last volume used.

Setting the Dispensing volume

- Press the **VOL** key to view the volume options.

```
* 1 0050
   2 0060
   3 0070
   4 0080
```

- Scroll through the volume options using the ▲ ▼ keys.
- When the asterisk is next to the desired volume, press the **ENTER** key. The screen will now display the chosen volume.
- To return to the previous screen at any time, press the **CLEAR** key.

Purging the system

The system must be purged of air for accurate filling. From the following screen...

```
GENETIX
READY
Volume: 0050
Plate: type 96
```

...press the **PURGE** key to see the following screen...

```
Press <purge>
      or
<stop> to end
```

At this point, press and hold the **PURGE** key to run liquid through the tubing and manifold and expel any air in the system. This function may also be used to flush water through the system for cleaning purposes.

When finished, press the **STOP** key and empty the purge tank.

Preparation

Fit the Silicone Mat

- The silicone mat (included in the packaging) has moulded pegs on its underside.
- Place the mat so that it aligns with the edges of the moving Plate Holder.
- Make sure that the pegs are pushed firmly into the holes of the Plate Holder.

Set up the dispensing bottle and the manifold.

- Three-quarter fill the dispensing bottle with the required media for the run.
- Fit the correct manifold for the type of plate you are using, 8-way for 96-well plates, 16-way for 384-well plates.
- Purge the system (see page 12).

Automatic Filling

Place the first plate in the plate carrier; making sure it is properly seated on the silicone mat.

- Ensure that you have keyed in the required volume.
- Press the **START** key and the carrier will automatically advance, the wells will be filled and the plate will then return to its start position.

To abort the operation at any stage, press the STOP key. Dispensing will pause and the display will prompt you to press STOP to end or any other key to continue.

From time to time the carrier may pause and the message ‘waiting for vessel to pressurise’ will be displayed. This is normal. Once the vessel has re-pressurised the plate will advance and continue to fill.

Cleaning after use

The **QFill2** should be cleaned after each use, refer to **Cleaning Machine** in the **General Maintenance** section (page 20)

Menu Options

To access the menu options press the **MENU** key.

There are 4 available options:

CHANGE VOLUMES

This allows you to edit the 16 pre-set volumes. Use the **▲ ▼** keys to move to the memory position you wish to change. To edit a certain volume press the **ENTER** key and then adjust the 4-digit value using the **▲ ▼** keys. The editor works in a similar way to a combination lock. Each digit may be 'rolled' up or down by one unit. The **ENTER** key advances to the next digit. Once you have modified the volume press **ENTER**.

Press **menu** to return to the menu screen and **menu** again to return to the opening screen. To confirm the volume change press the **VOL** key, scroll to the volume you have just altered and press **ENTER**.

The QFill2 always displays the last volume used.

SET POSITIONS

Warning – changing these settings may affect your Warranty

This option allows the pre-determined plate and well co-ordinates to be altered and is not required for normal filling operations. The values are pre-set by Genetix personnel and should only be changed by Genetix engineers for troubleshooting purposes.

MANUAL FILL

Having selected the required volume this menu will allow you to step the plate manually one row at a time. Scroll to **manual fill** and press **ENTER**.

Place a plate in the plate holder and (having selected the desired volume) Press the **▼** key to dispense the liquid and the **▲** key to move to the next row. Press **STOP** twice at any time to abort the fill.

SET DEFAULTS

Warning – changing these settings may affect your Warranty

This option also refers to plate and well co-ordinates, which do not require adjusting for normal operation. It should only be used by Genetix engineers for troubleshooting purposes.

QStacker

Assembly instructions

Note – Steps 1–3 only apply if you have purchased the QStacker independently.

1. Screw the base plate onto the **QFill2** carriage (Figure 6).
2. Remove the three screws from the left hand side of the base of the **QFill2**.
3. Align the holes in the connector plate with the holes in the base of the **QFill2** and replace the screws so that the connector plate is attached to the **QFill2** with the pillars pointing up (Figure 6).
4. Place the **QStacker** next to the **QFill2** so that the slots on the side plate fit over the pillars on the connector plate (Figure 7).
5. Push the **QFill2** carriage across to the left and adjust the position of the **QStacker** so that the extension fits into the recess of the carriage. Tighten the front pillar on the connector plate.
6. The height adjuster screw is located on the side plate. Set this so that the extension is slightly below the base plate. Place a WellPlate on the base plate and ensure that it can slide smoothly over the extension.
7. Connect the power output lead from the **QStacker** to the power socket on the **QFill2**.
8. Connect the serial cable on the **QStacker** to the serial port on the **QFill2**.
9. Connect the mains power to the **QStacker**.
10. Switch on the **QFill2** *then* the **QStacker**. Press the **RESET** key on the **QFill2** to make it home.
11. The END position for the **QFill2** carriage should be preset by Genetix so that it aligns with the manifold. The START position is preset by Genetix so that the gap between the base plate and the **QStacker** extension is about 3 mm (Figure 8).
12. As the carriage moves to the left to pick up a WellPlate, the pin on the base plate strikes the clamp activator bolt on the **QStacker** (Figure 7), causing the plate retaining clamp to open. Adjust the clamp activator bolt so that the plate retaining clamp opens sufficiently to allow plates to move onto the base plate from the stacker.

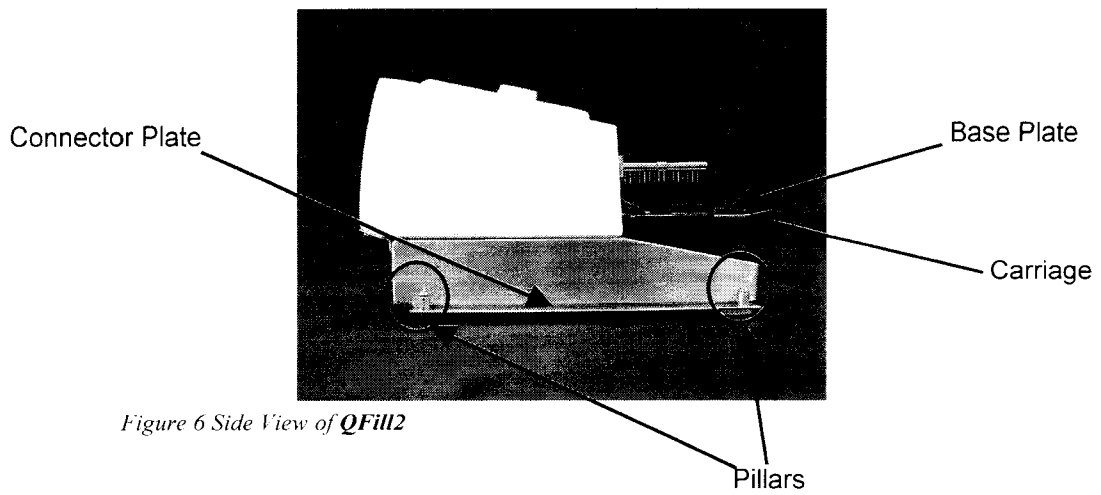


Figure 6 Side View of *QFill2*

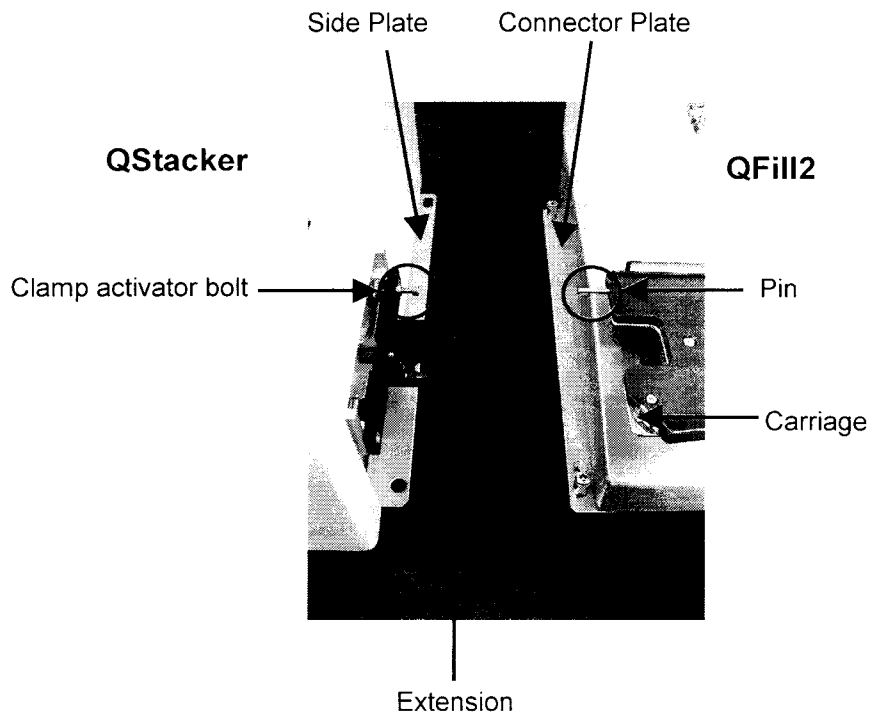


Figure 7 Top view of *QStacker* and *QFill2* prior to connection.

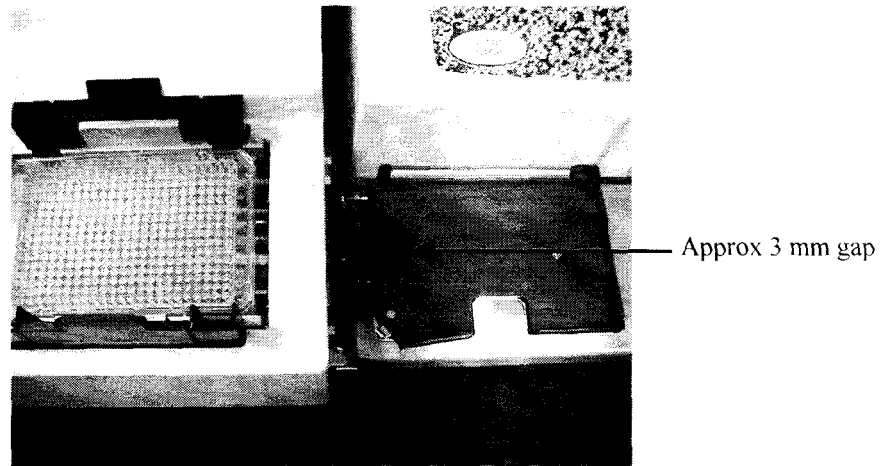


Figure 8 Alignment of extension to carriage/base plate

Operating instructions

1. Switch on both the **QStacker** and the **QFill2**.
2. Press the **RESET** key on the **QFill2**.
3. Set the required volume to be dispensed.
4. Load the WellPlates **to be filled** into a cassette and fit the cassette into the **left** hand position of the stacker.

Note – Plates must be loaded with **lids on**.

Alternatively, plates can be loaded into the cassette after it has been fitted to the machine. The cassette will hold a maximum of 40 Genetix WellPlates. For ease of application it is better to load all WellPlates in the same direction.

5. Fit an empty cassette into the **right** hand position of the stacker. Ensure that the cassette engages with the clamps.
6. Press the **START** key on the **QStacker** and the machine will take plates from the left-hand cassette to the **QFill2**, dispense liquid into the plate and return it to the right-hand cassette.
7. Once all the plates in the left-hand cassette have been filled, the machine will stop. The right-hand cassette containing the filled plates can then be removed by squeezing the levers on each side of the base of the cassette and lifting it out of the machine.
8. If the **STOP** key on the **QStacker** is pressed during a run, the machine will finish filling the current plate, then stop. The run can be restarted by pressing **START** on the **QStacker**.
9. If the **STOP** key on the **QFill2** is pressed during a run, the machine will pause until either **STOP** is pressed or any other key is pressed to continue.

Troubleshooting

Common Problems

Problem	Possible Cause/Solution
Air bubbles blow through the dispensing bottle liquid	<ul style="list-style-type: none"> • Check that silicone tubing is connected to the correct tubes on the cap
Leakage from manifold	<ul style="list-style-type: none"> • Check that tube is fitted in pinch valve correctly • Check for leak(s) in silicone tube
Low manifold nozzle pressure	<ul style="list-style-type: none"> • Tighten bottle cap • Check that silicone tube is not blocked
Not all tubes dispensing	<ul style="list-style-type: none"> • Tube in manifold may be blocked
Manifold not dispensing	<ul style="list-style-type: none"> • Tubing has been left in pinch valve after a previous run and now has deformed.
Fluid continually flows from manifold	<ul style="list-style-type: none"> • Make sure silicone tube is fully inserted into pinch valve
Will not pressurise	<ul style="list-style-type: none"> • Check top of media bottle is secured. • Tubing is not connected to rear of QFill2. • o-ring(s) perished • Tubing fatigued • Bottle washer perished
WellPlate lids jam during operation	<ul style="list-style-type: none"> • Switch machine off, push down lever then remove lids. Switch machine on and RESET
Stacker fails to stop at end of test	<ul style="list-style-type: none"> • Check that small metal lever in cassette hole has returned to its up position
Plate(s) jammed in stacker	<ul style="list-style-type: none"> • Switch off machine. Do not try to pull cassettes (stacks) out of machine. Push down lifter and remove cassette. Clear jammed plates, replace cassette and Switch machine back on. RESET QFill2
Plates(s) jammed in stacker on entry or exit from QFill2	<ul style="list-style-type: none"> • Check that stacker height is 2mm lower than QFill2

Pusher in stacker misses plates	<ul style="list-style-type: none"> • Damaged well plates • Pusher bent • Damaged cassette preventing plates from dropping down
Stacker stops for no apparent reason	<ul style="list-style-type: none"> • Press START button • Plates may be stuck in cassette • Flag jammed in UP position
Plates not moving freely up and down in Stacker cassette	<ul style="list-style-type: none"> • Cassette feet may be bent
Media "splashes" out of wells when filling	<ul style="list-style-type: none"> • Angle the manifold slightly to avoid an air pocket forming at the bottom of the well.

General Maintenance

Note

Always switch the machine off and remove the plug from the electricity supply before attempting any maintenance task.

There is very little in the way of routine maintenance that The Genetix **QFill2** requires. The components have all been designed with very long mean time between failures, and it is not anticipated that regular replacement of mechanical or electrical parts will be required for many years.

Cleaning the Machine

After operation flush the system through with clean water and drain the dispensing bottle of any remaining liquid. Replace the cap on to the bottle and purge the system with air only. This is to remove any residual liquid from the tubing and the manifold.

Failure to carry out this operation may result in blocked tubes on the manifold.

Lastly, switch the unit off and remove the silicone tubing from the pinch valve. The bottle and cap, silicone tubing, manifolds, and purge tank are autoclavable.

To clean the manifold more thoroughly use the special screw supplied to pull off the manifold plugs at either end of the large tube. They seal the tube with an o-ring and may be simply pressed back into place once cleaning is complete.

Cleaning QFill2 Components

It is important that after a filling session has been completed, the medium handling elements of the **QFill2** are thoroughly cleaned with 70% ethanol (manifold, tubing, dispensing bottle and plate carrier). Failure to attend to this will lead to blocking of the manifold needles resulting in erratic and inaccurate dispensing of medium. If this occurs the components are best cleaned in an ultrasonic bath filled with ethanol, and the manifold needles cleaned with fine stainless steel wire.

Note – If the manifold is dismantled, check the condition of the o-rings because they may perish after cleaning.

Recommended Spare Parts

Spare Parts List for QFill2

<u>Code</u>	<u>Description</u>
X3172	8 Way Manifold
X3173	16 Way Manifold
X3174	500ml Bottle & Cap
X3175	Silicone Tubing - per metre
X3176	Purge Tank
X3177	1 Litre Bottle & Cap
X3178	2 Litre Bottle & Cap
X3182	Deep 8 Way Manifold
X3183	Deep 16 Way Manifold

Appendix B

Calibration Information

Q-FILL 2		SERIAL No. 646			
VALUE	Settings	Adjustment	DEFAULT	CALIBRATION	
				½ litre	1 litre
17	384 plates	Coarse	0016	16	16
18		Fine	0200	250	265
19		Solenoid	0180	509	509
20	96 plates	Coarse	0011	11	11
21		Fine	0200	260	270
22		Solenoid	0128	164	164

The table shows a record of the calibration settings *specifically* for the QFill2 whose Serial Number appears in the box above.

If you find it necessary to modify or change these settings please contact Genetix Ltd for instructions.

Please Note – changing these settings without supervision by Genetix personnel could affect your warranty.

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