

WHY SHOULD I BUY A QUADRA?



You the user are entitled to that answer in very specific terms. You are entitled to full value in return for the expenditure of your funds. Following are the specific reasons that our Quadra design excels over competitive pipettor workstations. We offer a broad product line to fit you individual needs. Here are our design elements and how they benefit you.

COMPACT DESIGN SAVES BENCH SPACE

The Quadra 3 requires only 30 inches of bench top length. Compare that to competitive models with equivalent functionality. Within that space, it has two sets of infeed/outfeed stacker cassettes. One set can bring in the test variable or source plate, such as the compound plate. The other set can bring in the empty destination or output plates. The complete liquid handling steps of the protocol may be accomplished on the Quadra.

CASSETTE TYPE RECIRCULATING STACKERS

Instead of handling individual plates, they may be handled as stacks of 25. The Quadra stackers can restack from one to the other to provide first in first out (FIFO), for the next operation. If room temperature incubation is used, that next operation can occur in situ on the same Quadra.

CHOICE OF PIPETTOR HEADS

There are four (4) pipetting heads to choose from. There are two small volume heads, one is 96 well the other is 384. These are positive displacement pipettors that can aspirate and dispense 0.5 μ L with a C_v of 2-3%. The maximum volume per tip is 60 μ L. A head of this design has 200 μ L tip capacity in the 384 well format. They use a Teflon[®] coated (inside and outside) stainless steel needle. An ultrasonic tip washing station is provided to eliminate carryover. The hydrophobic nature of Teflon[®] permits touching off small volumes of liquid, in a dry plate. All of these heads can accommodate nanoliter pin tools in the 96, 384, or 1536 format, in lieu of the removable tip sets.

A 450 μ L head in the 96 well format is also available. It uses a special polypropylene tip that can be washed or changed as desired. The special narrow design of this tip will reach the bottom of 96 deep well plates. It also facilitates pipeline pipetting of multiple reagents. This pipettor head may operate in the air displacement mode or it may be backfilled to operate in the positive displacement mode. This provides additional precision in the less than 10 μ L range.

A choice of four heads may be easily installed by the user, on the Quadra 3. The front panel swings open. Four bolts and one connector completes the change over.

TOMTEC

MULTIPLE STATIONS ON THE QUADRA SHUTTLE

The Quadra design has always been set apart from competitive designs by virtue of its moving plate shuttle. The shuttle simplifies automation of the pipetting operation. A flat bed pipettor, such as the Tecan, BioMek, or MultiProbe, requires an external device, such as a robotic arm or conveyor, to put plates on and off of the pipettor bed. On the Quadra shuttle additional stations are available for tip washing and reagent reservoirs.

The six station shuttle provides exceptional flexibility in running complete unattended protocols. One station serves to handle the test variable. It can take a compound plate from the infeed cassette to the pipettor and then return it to the outfeed cassette. Another station on the opposite side does the same for the destination or assay plate. A third station may be devoted to an ultrasonic tip washing station. This leaves three stations to handle the reagents for the rest of the protocol. One station can provide the diluent or buffer. Another can provide the ligand or label. The third can provide the input of the standards and controls into the assay protocol.

PRECISION IN PIPETTING

The Quadra small volume pipettors in the 96 or 384 well format can provide a C_v of 2-3% when pipetting 0.5 μ L of compound in DMSO. This allows the 100:1 dilution to be made from the 100% DMSO of the compound to the 1% DMSO of the assay. Some compounds are not soluble in less than 100% DMSO. If a predilution is made a high percentage of the compound may be left in the dilution plate. If more than a 100:1 dilution is required, due to the molarity of the mother plate, that initial dilution may be made in DMSO.

PRECISE TIP TO PLATE CONTROL

The relationship of the tip location in the well is under full control of the operator. This height relationship can be set in 0.002 inch (0.005mm) increments. When dispensing 0.5 μ L dry into a well it is essential the tips touch off on the bottom of the well. If the tips touch too lightly, wells will be missed. The drop is not touched off of the tip. If the tips touch too tightly some orifices will be sealed and not dispense properly. Tests have shown there is a 0.010 inch (0.025mm) dimensional tolerance for 100% touch off in 384 wells. That is the thickness of two sheets of copy paper. The precision of the Quadra stage can easily handle this requirement.

PROGRAMMING

The Quadra may be programmed different ways. The Quadra Command Windows Program option is available, for all except the small three station models. The standard method is an intuitive single line method that can easily meet the requirements of any complex protocol. This can be done from a remote computer and downloaded to the Quadra, or it can be done directly on the Quadra without other means. The Quadra 3 has its' own LCD multiple line display, to facilitate local programming. The Quadra-Plus™ has a full screen and runs under Windows.

PIPELINE PIPETTING

The Quadra design facilitates pipeline pipetting. This means aspirating all of the required reagent aliquots within the tip and separating each with an air gap. This provides several distinct advantages. First, of course, is speed of throughput. Better precision is obtained by having the higher volume reagents, such as buffer, wash out the smaller volumes of compound. All wells in the plate receive all of their reagents simultaneously. Therefore, all reactions start together. Most plate readers complete the reading very quickly providing a uniform reaction time for all wells.

SPECIAL RESERVOIRS FOR STANDARDS & CONTROLS

For a nominal charge, Tomtec will machine custom polypropylene reservoirs to match your standards & controls format. These reservoirs facilitate putting your standards & controls into the pipetting protocol. Using pipeline pipetting, in one pass of the shuttle, you may aspirate buffer, ligand, standards & controls and compound. The Quadra will then dispense everything into the assay plate, mix the well contents thoroughly (without creating air bubbles) then wash the tips. The Quadra will then put away the assay plate and compound plate, prior to repeating the same sequence for the next plate. All of this can occur on a 2 to 3 minute cycle automatically.

MIXING REAGENTS WITHIN THE WELL

To assure a uniform start of all reagents in the well it is desirable to mix the reagents. Simple aspirating and dispensing is not effective. The Quadra programming allows the mix function to aspirate from the bottom of the well and dispense at the top of the well. This effectively turns the reagents over providing excellent mixing. Serial dilution testing can demonstrate the cumulative effect of improper mixing.

The precision of many readers, particularly photometric, are affected by air bubbles. The Quadra stage control programming permits blowing out any air gaps or final blow out air above the liquid level in the well. Then the tip may be touched off in the well to remove any clinging liquid. This is particularly important when working with the small volumes in the 384 well format. Air bubbles in the 384 well are almost impossible to remove.

REFORMATTING FROM 96 TO OTHER FORMATS

Both the Quadra 3 and the Quadra-Plus™ have full indexing stages. Not only can they reformat to other matrixes, they can also do serial dilution. By placing a single row of tips in either the 8 or 12 direction on the 450µL Quadra head, a full plate, serial dilution sequence can be made. The indexing stage moves the plate row by row under the fixed column of tips.

There are preset programs that translate from 96 to 384 or to 1536. In addition the operator can create other matrixes. An example may be spotting cultures on an agar surface in a unique format, or microarrays for genomic work. The Quadra Model 325 and 345 both have reformatting stages. This facilitates reformatting from 96 to 384 well or vice versa, on these models.

TIP REPLACEMENT

The entire tip and seal assembly, on the small volume Quadra's, is easily removed by the operator. Should a tip assembly become excessively clogged, it may be removed from the Quadra for more rigorous cleaning off line. Spare tip and seal assemblies are available as replacement parts.

A pin tool for nanoliter dispensing may be substituted for the tip assembly. Software then disables the pistons. A 384 or 1536 pin tool may be placed on a 96SV head assembly.

The Teflon[®] coated stainless steel tips on the small volume Quadra's are far more robust than competitive models. The safety switch on the stage assembly prevents excessive force on the tips, if a plate becomes jammed. There is the theoretical possibility of damaging a tip under some unforeseen circumstances. Any damaged tips may be replaced by the user.

Should seal replacement be necessary, over a period of time, they may be replaced by the user or returned to Tomtec for repair. A tip seal replacement kit may include the same fixture used by Tomtec to replace and align seals.

OPERATOR SAFETY

All stages, on all Quadra's, are spring loaded for operators' safety. When the stage sees more than approximately 10-15 pounds of force, the springs collapse and trip the safety switch. The stage direction immediately reverses and awaits operator correction. This protects the users' hands and it also protects the equipment. Should a stage height be set improperly, or a plate not be positioned correctly damage is unlikely.

On the 450 μ L Quadra head, it takes considerably more than 10 pounds to load the rack of tips. This is accomplished by the use of a small magnet on the tip jig and a magnetic sensing reed switch on the head. After the tips are closed on the tip pins, the magnetic switch bypasses the safety switch and the stage goes to full power. You will hear the change in the stepper motor. It requires about 120 pounds of force to properly seat the tips. A tip position switch confirms that they are properly seated. It prevents operation of partially seated tips that would not aspirate and dispense properly.

BOTTOM LINE

Tomtec needs and wants your business. We have over 100 employees, whose lively hood is dependent upon satisfying your wants and needs, with quality equipment and service. We all are waiting for your call to be of help to you in your work.

TYPICAL PROTOCOLS

a. *Compound Mother Plates to Daughter Plates*

Reformat from 96 deep well to 96 or 384 microplates. Concurrently make dilutions in DMSO, if required. Dispense 0.5 μ L into a dry plate or dispense the assay buffer of choice. Make one 384 mother plate from four 96 deep well plates then replicate 384 well plates.

b. *Run 384 Well Assay from 96 Well Compound Plates*

Add buffer, ligand, standards & controls, and compound into each of the four quadrants, of the 384 - all automatically. This combines the compound reformatting with the completion of the rest of the assay.

c. *Run Complete 96 Well Assay in One Pass Automatically*

Add buffer, ligand or label, standards & controls plus compound, mix, wash tips, log barcodes, and repeat.

d. *Run Heterogeneous Assays with Room Temperature Incubation, (followed with other reagent additions)*

All reagent additions may be made as above and the plates stacked in the outfeed cassette (LIFO). After room temperature incubation restack to first in first out (FIFO) and add the next set of reagents. Repeat as required for additional incubation steps.

e. *Some DNA protocols require pooling of reagents from 96 to 384 well or vice versa.*

The 384 well plates may be fed in from one stacker and the 96 well plate from the other side. The Quadra 96SV head can then pool from four 96 well plates into one 384 or vice versa depending on the protocol.