
## Thermo Scientific

# Versette

## User's Manual

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Part of Thermo Fisher Scientific

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Release history:
21 December 2010, Rev. 1.9 Initial release.
6 January 2011, Rev. 2.0
17 January 2011, Rev. 2.1 - Added Cert. of Compliance. Updated SMC Calibration.
21 January 2011, Rev. 2.2 - Update to SMC Calibration.
28 March 2011, Rev. 2.3 - Update to Calibration sequences, and install of 2-stage system.

**For Research Use Only. Not for use in diagnostic procedures.**

**PATENT PENDING**

# Declaration of Conformity

| | |
|---|---|
| Legal Identity: | Thermo Fisher Scientific<br>81 Wyman Street<br>Waltham, MA 02454 |
| Authorized Representative: | Thermo Fisher Scientific<br>22 Friars Drive<br>Hudson, NH 03051 |
| | **Equipment Identification** |
| Type of Equipment: | Laboratory - Versette Automated Liquid Handler<br>650-01-BS, BASE TOWER<br>Serial Numbers 1010 to 1500 |

*We, Thermo Fisher Scientific, hereby declare that the devices mentioned above comply with the European Low Voltage Directive 2006/95/EC & 2004/108/EEC EMC Directive*

| | |
|---|---|
| Common Technical Specifications used for demonstration of compliance: | EN55011 (2007)<br>EN61326-1 (2006)<br>EN61000-3-2 (2000) + A2 (2005)<br>EN61000-3-3 (1995) + A2 (2005)<br>EN61010-1 (2001, 2nd ED.) |
| Date of Validity: | November 17, 2010 |
| Name of Authorized Signatory:<br>Position Held in Company<br>Location @ Signing | Michael Morrison<br>Operations Manager<br>Hudson, NH |
| Signature: | |

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# 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:

Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. Contact Thermo for further information on Thermo Fisher Scientific's compliance with these Directives and the recyclers in your country.

# WEEE Konformität

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# Conformité DEEE

Ce produit doit être conforme à la directive européenne (2002/96/EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant:

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## EMC Directive 89/336/EEC

EMC compliance has been evaluated by TUV SUD America Inc.

| | |
|---|---|
| EN55011 | Radiated & Conducted Emissions, Industrial, scientific, and medical (ISM) products and applications, Class B, Group 1 |
| FCC Part 15 Class B | Radiated and Conducted emissions, incluidng ICES-003, AS/NZA, and CISPR22, and EN55022. |
| EN61000-3-2 & 3-3 | Harmonics and Flicker |
| EN61326-1 | Including<br>EN61000-4-2 - ESD<br>EN61000-4-3 - Radiated Immunity<br>EN61000-4-4 - EFT/Burst<br>EN61000-4-5 - Surge<br>EN61000-4-6 - Conducted Susceptibility<br>EN61000-4-8 - Magnetics<br>EN61000-4-11 - Dips/Dropouts |
| IEC 60068-2-1 | Cold Test |
| IEC 60068-2-2 | Dry Heat Test |
| IEC 60068-2-3 | Humidity Static |
| EN61010-1 (sub) | Safety Requirements |

## Low Voltage Safety Compliance

This device complies with Low Voltage Directive 73/23/EEC and harmonized standard EN 61010-1:2001.

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# FCC Compliance Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

**CAUTION** Read and understand the various precautionary notes, signs, and symbols contained inside this manual pertaining to the safe use and operation of this product before using the device.

# Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument ***requires a team effort*** to lift and/or move the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

# Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: Use of this instrument in a manner not specified by Thermo Fisher Scientific could impair any protection provided by the instrument.

# Notice on the Susceptibility to Electromagnetic Transmissions

Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

For manufacturing location, see the label on the instrument.

# Contents

# Figures

# About this User Manual

The ***Thermo Scientific Versette*** is a versatile automated microplate and tube pipetting system designed to meet the demands of life science/research liquid manipulation at all stages and rates of production. This guide describes the installation setup, operation, and routine maintenance of the system.

## Intended users

This user manual is written for the end user, for example, research scientist or laboratory technician, and provides information on the Thermo Scientific Versette, including the installation and operating instructions. The ***Versette*** system is intended for use by persons who have been trained on standard laboratory and equipment safety and use.

Read the manual in its entirety before operating the instrument.

## How to use this user's manual

This user manual is designed to give you the information to:

- Review safety precautions
- Set up the ***Versette*** system
- Use the ***Versette*** on board user interface software
- Perform dispensing procedures
- Perform basic cleaning and maintenance procedures
- Optimize the instrument performance

This user manual also describes all the features and specifications of the ***Versette*** system.

# Related Documentation

In addition to this guide, Thermo Scientific provides the following documents for the ***Versette*** system:

- *Versette ControlMate® User's Manual*

The ControlMate software also includes embedded Help files to assist the user in operation of the software.

# Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need.

### ❖ To contact Technical Support

| | |
|---|---|
| Phone | 800-345-0206 or 603-595-0505 |
| Fax | 603-595-0106 |
| E-mail | ushud-technicalservices@thermofisher.com |
| Website | www.thermoscientific.com for any phone and/or contact update information |

Find software updates and utilities to download at ____________________.

### ❖ To contact Customer Service for ordering information

| | |
|---|---|
| Phone | 800-345-0206 or 603-595-0505 |
| Fax | 603-595-0106 |
| E-mail | matrix.orders@thermofisher.com |
| Web site | www.thermoscientific.com for any phone and/or contact update information |

### ❖ To contact Applications Support

| | |
|---|---|
| Phone | 800-345-0206 or 603-595-0505 |
| E-mail | applications.alhd@thermofisher.com |

# Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:

**CAUTION** Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

ATTENTION
Souligne des dangers aux humains, la propriété, ou l'environnement. Chaque notification de ATTENTION est accompagnée d'un symbole de ATTENTION approprié.

**IMPORTANT** Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

**Note** Highlights information of general interest.

**Tip** Highlights helpful information that can make a task easier.

# Safety symbols and markings

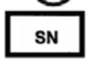
These symbols are intended to draw your attention to particularly important information and alert you to the presence of hazards as indicated.

## Safety symbols and markings used on the Versette

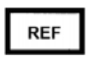
The following symbols and markings appear on the type label and the instrument itself.


**Power ON** ▲


**Power OFF** ▲



**Serial number** ▲



**Catalog number** ▲

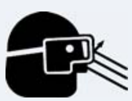

**Date of manufacture** ▲


**Consult instructions for use** ▲

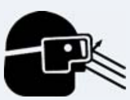

**WEEE symbol** This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. ▲

## Warning and other markings used in the documentation

Symbols and markings appear in this user manual are described on the following pages.

| CAUTION Symbol | CAUTION | VORSICHT | ATTENTION | PRECAUCION | AVVERTENZA |
|---|---|---|---|---|---|
|  | **Electric Shock:** This instrument uses high voltages that can cause personal injury. Before servicing, shut down the instrument and disconnect the instrument from line power. Keep the top cover on while operating the instrument. Do not remove protective covers from PCBs. | **Elektroschock:** In diesem Gerät werden Hochspannungen verwendet, die Verletzungen verursachen können. Vor Wartungsarbeiten muß das Gerät abgeschaltet und vom Netz getrennt werden. Betreiben Sie Wartungsarbeiten nicht mit abgenommenem Deckel. Nehmen Sie die Schutzabdeckung von Leiterplatten nicht ab. | **Choc électrique:** L'instrument utilise des tensions capables d'infliger des blessures corporelles. L'instrument doit être arrêté et débranché de la source de courant avant tout intervention. Ne pas utiliser l'instrument sans son couvercle. Ne pas enlever les étuis protecteurs des cartes de circuits imprimés. | **Descarga eléctrica:** Este instrumento utiliza altas tensiones, capaces de producir lesiones personales. Antes de dar servicio de mantenimiento al instrumento, éste debera apagarse y desconectarse de la línea de alimentacion eléctrica. No opere el instrumento sin sus cubiertas exteriores quitadas. No remueva las cubiertas protectoras de las tarjetas de circuito impreso. | **Shock da folgorazione.** L'apparecchio è alimentato da corrente ad alta tensione che puo provocare lesioni fisiche. Prima di effettuare qualsiasi intervento di manutenzione occorre spegnere ed isolare l'apparecchio dalla linea elettrica. Non attivare lo strumento senza lo schermo superiore. Non togliere i coperchi a protezione dalle schede di circuito stampato (PCB). |
|  | **Chemical:** This instrument might contain hazardous chemicals. Wear gloves when handling toxic, carcinogenic, mutagenic, or corrosive or irritant chemicals. Use approved containers and proper procedures to dispose waste oil. | **Chemikalien:** Dieses Gerät kann gefährliche Chemikalien enthalten. Tragen Sie Schutzhandschuhe beim Umgang mit toxischen, karzinogenen, mutagenen oder ätzenden/reizenden Chemikalien. Entsorgen Sie verbrauchtes Öl entsprechend den Vorschriften in den vorgeschriebenen Behältern. | **Chimique:** Des produits chimiques dangereux peuvent se trouver dans l'instrument. Portez des gants pour manipuler tous produits chimiques toxiques, cancérigènes, mutagènes, ou corrosifs/irritants. Utiliser des récipients et des procédures homologuées pour se débarrasser des déchets d'huile. | **Química:** El instrumento puede contener productos quimicos peligrosos. Utilice guantes al manejar productos quimicos tóxicos, carcinogenos, mutagenos o corrosivos/irritantes. Utilice recipientes y procedimientos aprobados para deshacerse del aceite usado. | **Prodotti chimici.** Possibile presenza di sostanze chimiche pericolose nell'apparecchio. Indossare dei guanti per maneggiare prodotti chimici tossici, cancerogeni, mutageni, o corrosivi/irritanti. Utilizzare contenitori aprovo e seguire la procedura indicata per lo smaltimento dei residui di olio. |
|  | **Heat:** Before servicing the instrument, allow any heated components to cool. | **Hitze:** Warten Sie erhitzte Komponenten erst nachdem diese sich abgekühlt haben. | **Haute Temperature:** Permettre aux composants chauffés de refroidir avant tout intervention. | **Altas temperaturas:** Permita que lop componentes se enfríen, ante de efectuar servicio de mantenimiento. | **Calore.** Attendere che i componenti riscaldati si raffreddino prima di effetturare l'intervento di manutenzione. |
|  | **Fire:** Use care when operating the system in the presence of flammable gases. | **Feuer:** Beachten Sie die einschlägigen VorsichtsmaBnahmen, wenn Sie das System in Gegenwart von entzündbaren Gasen betreiben. | **Incendie:** Agir avec précaution lors de l'utilisation du système en présence de gaz inflammables. | **Fuego:** Tenga cuidado al operar el sistema en presencia de gases inflamables. | **Incendio.** Adottare le dovute precauzioni quando si usa il sistema in presenza di gas infiammabili. |
|  | **Eye Hazard:** Eye damage could occur from splattered chemicals or flying particles. Wear safety glasses when handling chemicals or servicing the instrument. | **Verletzungsgefahr der Augen:** Verspritzte Chemikalien oder kleine Partikel können Augenverletzungen verursachen. Tragen Sie beim Umgang mit Chemikalien oder bei der Wartung des Gerätes eine Schutzbrille. | **Danger pour les yeux:** Des projections chimiques, liquides, ou solides peuvent être dangereuses pour les yeux. Porter des lunettes de protection lors de toute manipulation de produit chimique ou pour toute intervention sur l'instrument. | **Peligro par los ojos:** Las salicaduras de productos químicos o particulas que salten bruscamente pueden causar lesiones en los ojos. Utilice anteojos protectores al mnipular productos químicos o al darle servicio de mantenimiento al instrumento. | **Pericolo per la vista.** Gli schizzi di prodotti chimici o delle particelle presenti nell'aria potrebbero causare danni alla vista. Indossare occhiali protettivi quando si maneggiano prodotti chimici o si effettuano interventi di manutenzione sull'apparecchio. |
|  | **General Hazard:** A hazard is present that is not included in the above categories. Also, this symbol appears on the instrument to refer the user to instructions in this manual. | **Allgemeine Gefahr:** Es besteht eine weitere Gefahr, die nicht in den vorstehenden Kategorien beschrieben ist. Dieses Symbol wird im Handbuch auBerdem dazu verwendet, um den Benutzer auf Anweisungen hinzuweisen. | **Danger général:** Indique la présence d'un risque n'appartenant pas aux catégories citées plus haut. Ce symbole figure également sur l'instrument pour renvoyer l'utilisateur aux instructions du présent manuel. | **Peligro general:** Significa que existe un peligro no incluido en las categorias anteriores. Este simbolo también se utiliza en el instrumento par referir al usuario a las instrucciones contenidas en este manual. | **Pericolo generico.** Pericolo non compreso tra le precedenti categorie. Questo simbolo è utilizzato inoltre sull'apparecchio per segnalare all'utente di consultare le istruzioni descritte nel presente manuale. |
|  | **Pinch Hazard:** Moving parts can damage hands and/or other body parts. Use extreme care. Do not reach into an operating system. Always keep covers in place. Lift objects with care. | **Kneifen Sie Gefahr:** Bewegenteile können Hände bzw. andere Körperteile beschädigen. Benutzen Sie äußerste Sorge. Greifen Sie kein Betriebssystem hinein. Behalten Sie immer Decken an der richtigen Stelle. Aufzug wendet gegen vorsichtig ein. | **Pincer le Danger :** Les parties en mouvement peuvent endommager des mains et/ou les autres parties de corps. Utiliser le soin extrême. Ne pas atteindre dans un système d'exploitation. Toujours garder des couvertures à sa place. L'ascenseur s'oppose avec soin. | **Pellizque Peligro:** Las piezas móviles pueden dañar manos y/o otras partes de cuerpo. Utilice cuidado extremo. No alcance en un sistema operativo. Siempre mantenga coberturas en el lugar. El ascensor se opone con cuidado. | |

| CAUTION Symbol | CAUTION | VORSICHT | ATTENTION | PRECAUCION | AVVERTENZA |
|---|---|---|---|---|---|
| | When the safety of a procedure is questionable, contact your local Technical Support organization for Thermo Scientific Products. | Wenn Sie sich über die Sicherheit eines Verfahrens im unklaren sind, setzen Sie sich, bevor Sie fortfahren, mit Ihrer lokalen technischen Unterstützungsorganisation für Thermo Scientific Produkte in Verbindung. | Si la sûreté d’une procédure est incertaine, avant de continuer, contacter le plus proche Service Clientèle pour les produits de Thermo Scientific San Jose. | Cuando la certidumbre acerca de un procedimiento sea dudosa, antes de proseguir, pongase en contacto con la Oficina de Asistencia Tecnica local para los productos de Thermo Scientific San Jose. | Quando e in dubbio la misura di sicurezza per una procedura, prima di continuare, si prega di mettersi in contatto con il Servizio di Assistenza Tecnica locale per i prodotti di Thermo Scientific San Jose. |

| CAUTION Symbol | CAUTION | 危険警告 | 危險警告 |
|---|---|---|---|
|  | **Electric Shock:** This instrument uses high voltages that can cause personal injury. Before servicing, shut down the instrument and disconnect the instrument from line power. Keep the top cover on while operating the instrument. Do not remove protective covers from PCBs. | 電撃：この計測器は高電圧を使用し、人体に危害を与える可能性があります。保守・修理は、必ず操業を停止し、電源を切ってから実施して下さい。上部カバーを外したままで 計測器を使用しないで下さい。プリント配線板の保護カバーは外さないで下さい。 | 電擊：儀器設備使用會造成人身傷害的高伏電壓。在維修之前，必須先關儀器設備並切除電源。務必要在頂蓋蓋上的情況下操作儀器。請勿拆除PCB保護蓋。 |
|  | **Chemical:** This instrument might contain hazardous chemicals. Wear gloves when handling toxic, carcinogenic, mutagenic, or corrosive or irritant chemicals. Use approved containers and proper procedures to dispose waste oil. | 化学物質：危険な化学物質が計測器中に存在している可能性があります。毒性、発がん性、突然変異性、腐食・刺激性などのある薬品を取り扱う際は、手袋を着用して下さい。廃油の処分には、規定の容器と手順を使用して下さい。 | 化學品：儀器設備中可能存在有危險性的化學物品。接觸毒性致癌、誘變或腐蝕／刺激性化學品時，請配帶手套。處置廢油時，請使用經過許可 的容器和程序。 |
|  | **Heat:** Before servicing the instrument, allow any heated components to cool. | 熱：熱くなった部品は冷えるのを待ってから保守・修理を行って下さい。 | 高溫：請先等高溫零件冷卻之後再進行維修。 |
|  | **Fire:** Use care when operating the system in the presence of flammable gases. | 火災：可燃性のガスが存在する場所でシステムを操作する場合は、充分な注意を払って下さい。 | 火災：在有易燃氣體的場地操作該系統時，請務必小心謹慎。 |
|  | **Eye Hazard:** Eye damage could occur from splattered chemicals or flying particles. Wear safety glasses when handling chemicals or servicing the instrument. | 眼に対する危険：化学物質や微粒子が飛散して眼を傷つける危険性があります。化学物質の取り扱い、あるいは計測器の保守・修理に際しては防護眼鏡を着用して下さい。 | 眼睛傷害危險：飛濺的化學品或顆粒可能造成眼睛傷害。處理化學品或維修儀器設備時請佩戴安全眼鏡。 |
|  | **General Hazard:** A hazard is present that is not included in the above categories. Also, this symbol appears on the instrument to refer the user to instructions in this manual. | 一般的な危険：この標識は上記以外のタイプの危険が存在することを示します。また、計測器にこの標識がついている場合は、本マニュアル中の指示を参照して下さい。 | 一般性危險：說明未包括在上述類別中的其他危險。此外，儀器設備上使用這個標誌，以指示用戶本使用手冊中的說明。 |
| NOTE: | When the safety of a procedure is questionable, contact your local Technical Support organization for Thermo Scientific Products. | 安全を確保する手順がよくわからない時は、作業を一時中止し、お近くのサーモエレクトロンサンローゼプロダクトのテクニカールサポートセンターごご連絡ください。 | 如对安全程序有疑问，请在操作之前与当地的菲尼根技术服务中心联系。 |

1

# Introduction

This section provides a brief overview of the system features and provides safety information for proper use.

**Contents**

# System Features

The ***Versette*** system provides a flexible workstation that can be easily configured to match your process/production needs. The system can be configured to handle various deep or shallow well plates, a variety of interchangeable pipette heads, and multiple system accessories. The ***Versette*** system provides a base unit with expendability to meet future production needs.


Figure 1. Thermo Scientific Versette System, 2-stage and 6-stage configurations

System features include:

- 19 interchangeable pipette head options to provide a optimal performance and flexibility for all multi-channel pipetting applications. Pipette heads can be easily replaced as needed depending on the plate format or volume range requirements.
- Automatic loading/unloading of single-, 8-, and 12-channel pipette heads and tips
- Rapid swapout 96- and 384-channel user interchangeable pipette heads
- High-resolution linear plate movement allows accurate microplate positioning of 24, 48, 96, 384, 864, and 1536 well plates
- Precise, accurate, and fast pipetting action

## Efficient pipette tip replacement

Compatible with 19 interchangeable, RFID-tagged pipette heads, the ***Versette*** system provides versatile pipetting options for a broad range of applications that require single- to 384-channel automated pipetting. The ***Versette*** system is compatible with both disposable and fixed-tip pipette heads, with a total volume ranging from 0.1 to 1250 µl.

### Use of ClipTips

To further optimize performance, the single-, 8-, and 12-channel pipette heads utilize the Thermo Scientific ClipTips, which securely seal to the pipette head. The unique clip design requires minimal insertion and ejection force, decreasing wear and tear and increasing the life of the instrument and pipette heads.

### Use of D.A.R.Ts

The 96- and 384-channel pipette heads use the Thermo Scientific D.A.R.T.s tips, which use a surface seal to ensure accurate and precise pipetting across all channels.

## Serial dilution feature

The ***Versette*** system also supports easy-to-program single, 8-, or 12-channel serial dilution applications. This is accomplished by using a dedicated single, 8-, or 12-channel tip magazine and advanced system software. The instrument's discrete x/y advancement design allows for incremental plate movement needed to accomplish row-by-row or column by column dilutions directly on the ***Versette*** system.

## Volumetric calibration

***Versette*** systems are factory calibrated for typical fluid type/viscosities. Calibration settings can be stored in memory and applied when needed. In cases where liquids of varying specific gravity are used, the instrument can be recalibrated in-situ for most fluids.

# Principle of Operation

The ***Versette*** system can be:

- used as a standalone instrument with onboard software using the integrated touch panel
- programmed and controlled by advanced ControlMate PC software through RS-232 (or a USB serial port connection if enabled and available for your system)
- used as part of an automation system.

## Dispensing applications

The ***Versette*** system is ideal for precise, repeatable, high-speed, low-volume dispensing applications, including:

- 24 or 48 well plate to/from 96/384 well plate reformat
- Addition of buffers, dilutents, enzymes, substrates, ligands etc.
- Addition of labeled compounds, including fluorophores, radio labeled compounds
- Addition of microbeads for assays such as LOCI or loading combichem plates
- Addition of viscous solutions such as scintillation fluid or glycerol/sucrose solutions
- Antibody microarrays for multianalyte ELISAs
- Any 96- or 384-channel low-volume positive displacement pipetting procedure
- Assay miniaturization
- Automatic serial dilutions
- Cell-based assays
- Intra/inter-plate serial dilutions
- ELISA assays
- Filter-plate vacuum extraction assays
- Fluorescence assays
- Full 96/384 plate sample transfers
- Full plate dilutions
- Full plate reformatting (96 to 384 or 384 to 1536 well plates)
- Full plate sample transfers
- IC50 Assays Luminescence assays
- PCR setup
- Plate-to-plate transfers

# Advantages of using the Versette system

The ***Versette*** system offers:

- Flexibility with 19 standard pipette head options
- Pipetting volumes as low as 0.1 µl
- Multiple dispensing heights for each plate or tube type
- Ultra-precise dispense volume throughout the entire dispense range
- Easy-to-use, wizard-based touchscreen programming guides user through all operation steps
- PC software for increased flexibility
- Flexible platform provides basic functions with simple upgrade to plug-and-play accessories
- Excellent robot compatibility

# Safety

There are no known hazards associated with the ***Versette*** system when it is operated in accordance with the instructions in this manual. However, you should be aware of situations that can result in serious injury.

**Note** Do not perform troubleshooting procedures on the internal components unless instructed by Thermo Scientific service personnel.▲

## Warnings

The following warnings describe conditions or situations that can cause personal injury. Throughout the manual, warnings will be marked with a Warning icon in the left margin.

**WARNING** Highlights hazards to humans, property, or the environment. Each WARNING notice is accompanied by an appropriate WARNING symbol. ▲

- This equipment is to be used only as offered, for the purposes described in this manual, in accordance with standard industry safety practices, and common safety usage. This equipment is not intended for any other usage other than that described. Use of this equipment in any other application or manner, without the direct written consent of Thermo Scientific may constitute an unsafe practice, and will void all warranty on the part of the manufacturer.

- Do not modify the equipment, the safety shields, the components, nor any accessory, nor use, store, ship, or otherwise handle or cause to be handled this equipment in any manner other than that which is expressly offered for sale. Inappropriate use of this equipment, and unauthorized modifications of the equipment and any action of use of the equipment, storage of the equipment, shipping, or other handling of the equipment, in a manner not expressly authorized by Thermo Scientific will void any and all warranties and liabilities of the manufacturer, whether expressed or implied.
- Ensure that the power plug is connected to a power receptacle that provides voltage and current specified for the device. Use of incompatible line power can cause shock and fire hazard.
- Never use a two-prong adapter or connect the device into a two-prong receptacle. Use of a two-prong receptacle disables the electrical grounding and creates a severe shock hazard. Always plug the device directly into a three-prong receptacle with a functional ground.
- Do not use a power cord that is frayed or cut. Do not kink or strain the power cord. Use of a damaged power cord can cause shock and fire hazard.
- Never plug, unplug, or otherwise touch the power cord when your hands are wet. Contact with the cord can cause severe shock hazard.
- If you notice smoke or unusual odor or noise coming from the instrument, turn it off immediately, and then unplug the power cord. Do not use the instrument until it has been serviced and inspected by Thermo Scientific or authorized service representative.
- Always turn off the power switch and unplug the power cord when servicing the device. Contact with internal components or other components connected to the line power can cause severe shock hazard. Perform only service procedures that are described in the manual or authorized by Thermo Fisher Scientific service personnel.
- Do not allow tools, objects or liquids to enter the instrument through ventilation slots or other openings. Contact with electrical or other internal components can cause severe shock hazard, fire hazard, or instrument malfunction. If a hazardous condition occurs, disconnect the instrument from the line power immediately.
- Keep hands away from moving parts (e.g., tips magazine mechanism, moving stages, and any peristaltic pump). Personal injury may result. Warning symbols on the device indicate areas of potential personal injury.
- Always ensure that the local supply voltage in the laboratory conforms to that specified on rating label on the power-connector on the instrument.
- Do not smoke, eat or drink while using the ***Versette*** system.
- Use protective gloves and eyewear and always wash your hands thoroughly after handling test fluids and/or touching potentially soiled areas/components.
- Observe normal laboratory procedures for handling potentially dangerous samples.

- Wear proper protection clothing, such as protective gloves, eyewear, and laboratory coats and/or other personal protection equipment, according to good laboratory practice and your facility requirements.
- Ensure that the working area is properly ventilated.

## Cautions

**CAUTION** The following cautions describe conditions or situations that can cause damage to the instrument.▲

- Do not install or operate unit in extreme environmental conditions (for example, direct sunlight, extreme temperature or humidity, or restricted ventilation). Refer to installation instructions for proper environmental conditions.
- When unpacking or transporting the system, always support the base to prevent damage to the instrument.
- The system is designed for use on a bench top. Set up the instrument on a sturdy bench or table that is capable of holding its weight and remains stable during its operation.
- Always turn off the power and unplug the system before cleaning the instrument.
- When disconnecting the power plug from the power receptacle, grip the plug itself, not the cord. Pulling on the cord can damage the cord, exposing the electrical wires, and cause a shock hazard.
- Use replacement fuses that conform to the current rating and specification. Use of improper fuses or short-circuting the fuse holders can cause fire hazard or damage the instrument.
- Do not restrict movement of the plate stages and the dispense head.
- Use only accessories and replacement parts provided by, or recommended by Thermo Scientific. Use of improper accessories and parts can damage the instrument.
- Do not clean the instrument with abrasive cleansers, flammable or caustic solutions, or solvents (such as paint thinners or acetone). Use of such cleansers will damage the instrument housing, keyboard, and display.
- The following components of the system, syringes, and/or accessories may contact liquid directly; therefore, use only liquids that are compatible with these components:
  - Stainless steel
  - Nickel Titanium
  - Glass
  - Polypropylene tips

- PMMA or PTFE vessels
- Silicone
- UHMW UPE

**Note** Failure to observe these cautions may invalidate your warranty. If you have questions about any aspect of operating the system safely, please contact Thermo Scientific.▲

## Instrument safety and guidelines for use

This instrument is designed to provide full user protection. When correctly installed, operated and maintained, the instrument will present no hazards to the user. The following recommendations are provided to assist you and your safety personnel in enacting appropriate user safety protocols.

- Never modify the equipment or its components or accessories. Unauthorized modifications will void all warranties and negate any claims of recourse, including physical, personal, and financial, for the use, storage, shipment, or other handling of this equipment.
- Always follow basic safety precautions when using the ***Versette*** to reduce the risk of injury, biohazardous contamination, fire, or electric shock.
- Read this user manual in its entirety prior to operating the instrument. Failure to read, understand, and follow the instructions in the manual may result in damage to the instrument, injury to laboratory and operating personnel or poor instrument performance.
- Observe all “Warning”, “Caution”, and “Note” statements as well as safety symbols and markings on the instrument and in the documentation.
- The ***Versette*** is intended for laboratory research use only. Observe proper laboratory safety precautions, such as wearing protective clothing and following approved laboratory safety procedures.
- Use of the ***Versette*** system in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to the property. Avoid unintended use of the equipment, for example, using incompatible materials, making unauthorized modifications, using incompatible or damaged parts, using unapproved auxiliary equipment or accessories, or operating equipment in excess of maximum ratings.
- Preventative maintenance instructions should be followed closely to keep the instrument in the best condition for maximum reliability. A poorly maintained instrument will not give the best results.

## Recommended Safety and Personal Protective Equipment

All safety equipment should be clearly marked, easily accessible, and located in the immediate vicinity of the equipment. Recommended equipment includes spill cleanup kits, safety goggles, gloves and chemical-protecting clothing for the chemicals in use. All equipment should be used in accordance with safety equipment manufacturer's instructions, and your site-specific safety requirements, and any local, national, and/or international standard safety practices and codes.

## Mechanical Hazards

System components can cause crush or pinch hazards. These locations include: system door, moveable shields, stages, and motors. Pipetting modules and pipette heads can be heavy and awkward and can also result in personal injury if improperly handled.

Safety motion interlocks are provided on the system door to prevent motion while the door is open.

**CAUTION** **CRUSH HAZARD!** Never attempt to defeat a system interlock or operate the system with the covers and safety shields not properly installed and operating.▲

Never reach into the work space while the instrument is performing any motion operation. If it is necessary to stop the operation of the equipment, turn the system off.

ECRASER DANGER ! Jamais la tentative pour battre un système s'enclenche ou fonctionne le système avec les protections de couvertures et sécurité n'a pas installé convenablement et l'opérant.s Jamais portée dans l'espace de travail pendant que

l'instrument exécute de l'opération de mouvement. Si c'est nécessaire d'arrêter l'opération de l'équipement, tourner le système loin.

## Electrical Hazards

The system is designed to be powered by 100 – 240 VAC. Input location is by removable pronged power cord. Power connection is located on the right side of the system.

**CAUTION** Follow standard safety practices: never remove panels or covers from the unit to access system electronics wiring.▲

Suivre les pratiques standard de sécurité : ne jamais enlever de panneau ou des couvertures de l'unité pour accéder à l'installation électrique d'électronique de système.

Ensure that the power cable supplied with the unit is always used. The power cord plug should only be inserted into a socket outlet provided with a protective ground contact.

**WARNING** There are no user-replaceable parts inside the instrument. The user should not remove fixed covers from the ***Versette*** system.▲

Il n'y a pas de parties utilisateur-remplaçables dans l'instrument. L'utilisateur ne devrait pas enlever des couvertures fixes du système de Versette.

The same precautions applicable when using any electrical equipment should be observed with this instrument. Do not touch switches or electrical outlets with wet hands. Switch the instrument off before disconnecting it from the mains supply.

## Chemical and Environmental Hazards

No chemicals are shipped with the system. The system is designed for use with a variety of chemicals, as supplied by the end user. Material Safety Data Sheets (M.S.D.S.) for every chemical used with the system should be available in close proximity to the unit at all times.

**CAUTION** Ensure that the system is kept in a clean condition at all times and free of any chemical residues. Follow all steps to properly clean and disinfect the system, as provided in the maintenance section of this manual. Consult your own safety professionals or Thermo Scientific representative with any questions.▲

Garantir que le système est gardé dans une condition propre et libère à tout instant de résidus chimiques. Suivre toutes les étapes convenablement pour nettoyer et désinfecter le système, comme fourni dans la section d'entretien de ce manuel. Consulter vos propres gens de métier de sécurité ou le représentant de Scientifique de Pêcheur Thermique avec n'importe quelles questions.

Infectious samples and corrosive fluids are commonly used with this equipment. The “hands-off” nature of the system allows the user to dispense into the reaction wells without getting into direct contact with these fluids. However, the wells that have been in contact with potentially hazardous fluids must be handled with utmost care. Always wear hand and eye protections as well as corrosive resistant laboratory coats.

**CAUTION** Observe normal laboratory procedures for handling potentially hazardous samples.▲

Observer que les procédures normales de laboratoire pour contrôlant échantillons potentiellement des hasardeux.

## Defects and abnormal stresses

Whenever it is likely that the protection against safety hazards has been impaired, make the instrument inoperative and secure against any unintended operation.

The protection is likely to be impaired if, for example, the instrument:

- Shows visible damage.
- Fails to perform the intended functions.
- Has been subjected to prolonged storage under unfavorable conditions.
- Has been subjected to severe transport stresses.

# System Overview

**Contents**



## General Description

The *Versette* system is a versatile automated microplate and tube pipetting system designed to meet the demands of life science/research fluid manipulation at all stages and rates of production. The system delivers accurate, precise, consistent and reliable performance for plate stamping, plate reformatting, tube to plate reformatting, serial dilution, inter-plate transfers, assay setup and development, and other applications.

The base system allows easy point-of-entry for manual as well as automated production demands. Multiple system options provide a cost-effective pathway to advanced high-volume integration and production. The system features 19 available standard interchangeable pipette head options: self interchangeable single-, 8-, and 12-channel pipette heads and tips, and advanced 96- and 384-channel user interchangeable pipette heads. The system can work as a standalone (in hood) benchtop device or may be fully integrated into an automated robotic liquid handling workflow solution.

The *Versette* system combines precision stepper-motor controlled stage motion with an automated pipette head platform, enabling reliable tip access into all standard labware (96 - 1536 wells). The system is also designed to perform serial dilutions in both portrait and landscape layouts (96 and 384 well plates).

## Typical Applications

The ***Thermo Scientific Versette*** system can be configured for use in a variety of applications, including:

- plate stamping
- plate reformatting
- tube to plate reformatting
- serial dilution
- inter-plate transfers
- assay setup and development
- other applications
- PCR prep
- Kingfisher prep
- 96-channel low or medium-throughput plate stamping
- 384-channel medium throughput plate stamping
- matrix dilution

# System Configuration

## Base Model Features

All models share the following list of standard features:

- full color touch screen for system programming and control
- stepper motors for plate positioning (supports 24, 48, 96, 384, 864, and 1536 well plates; also supports deep or shallow wells)
- the system can be configured for 2 or 6 position stages
- stages are enclosed for user safety and process purity
- stages can accommodate microplates or tubes in adapter holder
- high-resolution linear microplate movement
- 2 fluid line inputs (wash and reagent addition)
- 1 fluid drain outlet
- fast pipetting speeds

- integrated reagent non-contact liquid level detection
- software includes pre-programmed general sequences and liquid classes to aid in rapid system programming/setup
- universal operating voltage (100 – 240VAC)
- USB and RS-232 interfaces for connection to PC systems and/or ControlMate® Windows®-based PC interface software for advanced programming
- compatible with standard automation and accessories, including RapidStak®, Orbitor®, and Catalyst Express®
- program creation and editing, plus OLE option for robotic integrations

# Accessory Options

**Table 1.** Accessories

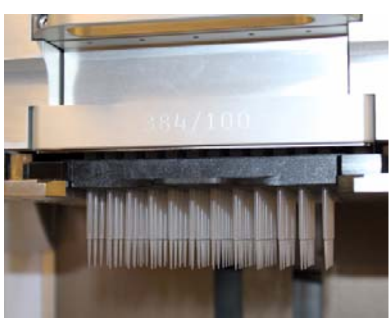
| Item | Description |
|---|---|
|   | 19 standard available interchangeable pipette head options (12-tip head shown) |
|   | Rapid-connect 96- and 384-channel user interchangeable pipette heads |

Table 1. Accessories

| Item | Description |
|---|---|
|  | ClipTips - Pre-boxed, ready-fit tips which securely seal to the pipette head. The unique clip design requires minimal insertion and ejection force, decreasing wear and tear and increasing the life of the instrument and pipette heads. |
|  | Disposable Tips (D.A.R.T.s), provide rapid loading of 96 or 384 tips into the ***Versette*** system. |
|  | Tip Wash Station - Used for washing both the interior and exterior walls of disposable or fixed pipette tips, The wash station can be mounted on a microplate stage and connected to the buffer and waste lines. A liquid level sensor prevents overflow. Tip wash stations are available in 96 and 384 formats. |

Table 1. Accessories

| Item | Description |
|---|---|
|  | Tube adapters - Multiple tube adapter plates are available to properly hold tubes and vessels on the Versette stages. |
|  | Sealed Storage Piercing Manifold - An optional deck accessory that allows for the simultaneous piercing of 96 sealed storage tubes. The piercing manifold is compatible with 1.4mL, 0.7mL, and 0.5mL tubes. Separate piercing head is required for sealed storage tube piercing applications. |
|  | External Pump Module - An optional three-pump module that contains three peristaltic liquid pumps which can be used for wash, reagent addition, and drain. |

Table 1. Accessories

| Item | Description |
|---|---|
|  | Reagent reservoir: Reagent vessel for dispensing limited volume of reagent. Automatic fill reservoir can be mounted on a microplate stage. A separate fill line connects to an external peristaltic pump and reagent source. The reservoir provides on-demand supply of reagent. A non-contact liquid level sensor prevents overflow. |
|  | Barcode Reader - Optional component that can be mounted to the system and reads the barcode label a microplate when it is moved into position for pipetting. The barcode reader supports the following barcode types: Code39, ITF, Industrial 2 and 5, Coda bar, EAN/UPC (A.E.), CDOE 128, COOP 2 of 5, Read Error, and CODE93. |
|  | Vacuum Manifold - An optional vacuum manifold can be used to perform filtration procedures. The manifold accessory kit includes plate lifters to accommodate for any height restrictions when using short 96 or 384 format D.A.R.T.s. The manifold is compatible with 96 and 384 filtration labware. |

Additional accessories and options are available from Thermo Scientific.

# Instrument layout

This section provides an overview of the main system components.

## 6-stage systems

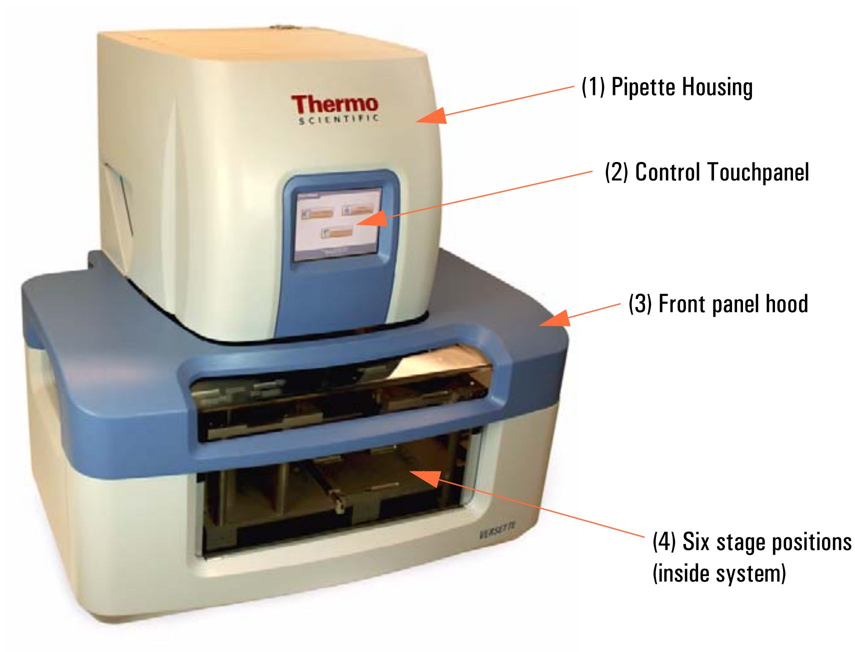
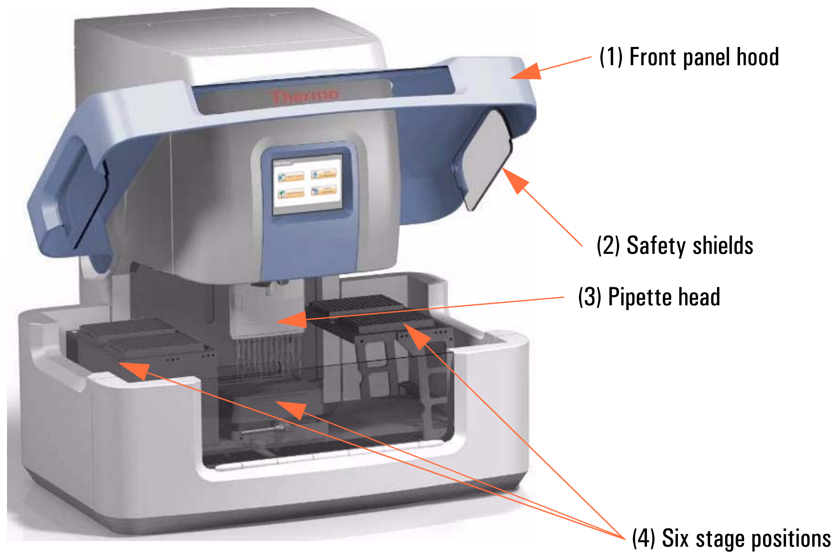



Figure 2. Versette Components, 6-Stage System- Front View

Table 2. System Components

| I.D. | Item | Description |
|---|---|---|
| 1 | Pipette Housing | Houses pipette head and tips. |
| 2 | Control Touchpanel | Allows on-board system programming through wizard-based touchscreen prompts |
| 3 | Front panel hood | The hinged hood can be raised to allow access to the internal components. |
| 4 | Stages | Configurable stage platforms for microplates, tubes, and vessels. |




| | | |
|---|---|---|
| 3 | 1 | 5 |
| 4 | 2 | 6 |

Stage Positions

**Figure 3.** Versette, 6-Stage System- Inside View

**Table 3.** 6-Stage System Components

| I.D. | Item | Description |
|---|---|---|
| 1 | Front panel hood | The hinged hood can be raised to allow access to the internal components. |
| 2 | Safety shields | Plastic covers on both sides of the instrument provide safety to the operator and reduce possible contamination of the work area. |
| 3 | Pipette head | Pipettes aspirate and dispense fluids. Heads are user changeable. 19 options are currently available. |
| 4 | Stages | Configurable stage platforms for microplates, tubes, and vessels. |

## 2-stage systems

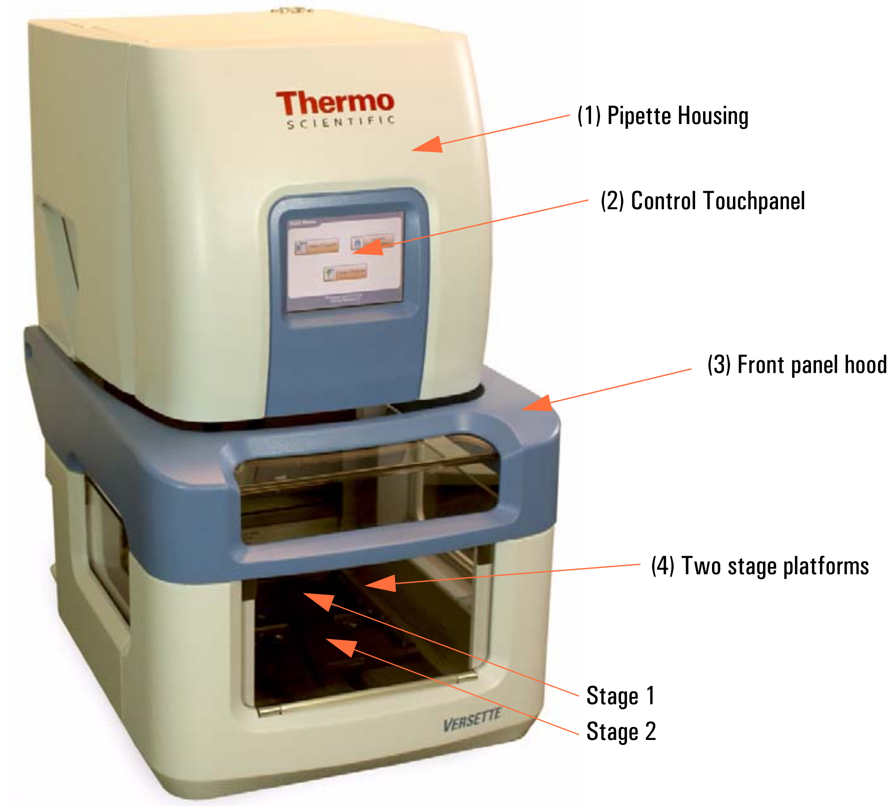



Figure 4. Thermo Scientific Versette Components 2-Stage System- Front View

Table 4. 2-Stage System Components

| I.D. | Item | Description |
|---|---|---|
| 1 | Pipette Housing | Houses pipette head and tips magazine. |
| 2 | Control Touchpanel | Allows on-board system programming through wizard-based touchscreen prompts. |
| 3 | Front panel hood | The hinged hood can be raised to allow access to the internal components. |
| 4 | Stages | Stage platforms for microplates, tubes, and vessels. |

## Stage Usage

The following tables detail the various configurable uses of the 6-stage and 2-stage systems. Consult Thermo for additional options to meet your specific needs.

Table 5. 6-Stage System, Stage Usage

| Stage | Usage | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Microplate | Deep Well Block | Tube Rack | Auto-Fill Reagent Reservoir | Manually Filled Reservoir | Tip Wash Station | Vacuum Manifold | Sealed Storage Tube Piercing Manifold |
| 1 | Yes | Yes | Yes | Yes | Yes | Yes | | Yes |
| 2 | Yes | Yes | Yes | | Yes | Yes | Yes | Yes |
| 3 | Yes | Note A | Note A | | Note B | | | |
| 4 | Yes | Yes | Yes | | Yes | | | |
| 5 | Yes | Yes | Yes | | Yes | | | |
| 6 | Yes | Yes | Yes | | Yes | | | |

**Note A:** Not for use with SMC head.
**Note B:** Usage with SMC limited to reservoirs < 18 mm in height.

Table 6. 2-Stage System, Stage Usage

| Stage | Usage | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Microplate | Deep Well Block | Tube Rack | Auto-Fill Reagent Reservoir | Manually Filled Reservoir | Tip Wash Station | Vacuum Manifold | Sealed Storage Tube Piercing Manifold |
| 1 | Yes | Yes | Yes | Yes | Yes | Yes | | Yes |
| 2 | Yes | Yes | Yes | | Yes | Yes | Yes | Yes |

## Fluid Connections

Fluid connections are provided on the left side of the system:


**Figure 5.** Versette, Fluid Connections, Left Side of Unit

**Table 7.** Fluid Connections

| I.D. | Item | Description |
|---|---|---|
| 1 | WASH | Connect wash fluid pump to the WASH inlet when using an optional wash station. |
| 2 | N/C FILL | Connect dispense fluid pump to the Non-Contact FILL inlet when using the optional non-contact fill sensor. |
| 3 | DRAIN | Connect DRAIN pump to the DRAIN connection when using an optional wash station. |

# Power/Communication Connections


**Figure 6.** Versette, Power/Communications Connections, Right Side of Unit

**Table 8.** Power/Communications Connections

| I.D. | Item | Description |
|---|---|---|
| 1 | PC | USB port for connection to PC for programming with ControlMate Software or other computer communication and/or software loading and updates (not currently enabled on most systems) |
| 2 | FLASH | Flash drive port for uploading new firmware to ***Versette*** instrument. |
| 3 | RS-232 | USB port for connection to PC for programming with ControlMate Software or other computer communication and/or software loading and updates. |
| 5 | WASH | Connects to optional wash module, for automated control |
| 4 | FUSE, ON/OFF, Plug | Power Module:<br>Power connection, on/off switch, integrated fuse holder |

Table 8. Power/Communications Connections

| I.D. | Item | Description |
|---|---|---|
| 5 | 120/240 VAC Connector | Standard power connection for system. |
| 6 | I/O Power Switch | Turns system on or off. |

## Touchpanel

The system touchpanel provides a menu-based, wizard-based programming and operation prompts to allow rapid programming, configuration, calibration, and control of the system.

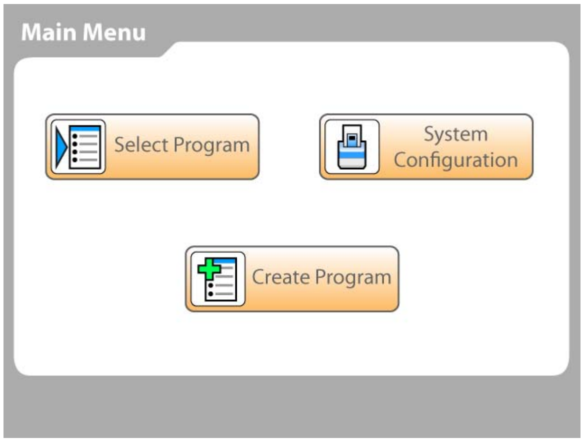



Figure 7. Touchscreen Main Menu Display

## Other System Components

### Pipette heads

There are 19 standard pipette head options available. Air and positive displacement interchangeable pipette heads that can be easily inserted into or removed from the base unit. Air displacement pipette heads contain a silicone gasket that forms an airtight seal with tips in the tips magazine. Disposable Automated Research Tips (D.A.R.T.S.) are also available. Available head types:

- Single channel pipette heads
- Multichannel (8/12 channel) pipette heads
- 96-Channel pipette heads
- 384-Channel pipette heads

All Pipette heads include RFID tag for self recognition and will capture service information.

Table 9. Pipette Heads

| Head Size/Type | Dispense Type | Volume Range | Part Number |
|---|---|---|---|
| Single Channel | Air Displacement | 0.5-12.5 µl | 650-07-S12 |
| | | 2-30 µl | 650-07-S30 |
| | | 10-125 µl | 650-07-S125 |
| | | 20-300 µl | 650-07-S300 |
| | | 100-1250 µl | 650-07-S1250 |
| 8-Channel | Air Displacement | 0.5-12.5 µl | 650-07-M812 |
| | | 2-30 µl | 650-07-M830 |
| | | 20-300 µl | 650-07-M8300 |
| 12-Channel | Air Displacement | 0.5-12.5 µl | 650-07-M1212 |
| | | 2-30 µl | 650-07-M1230 |
| | | 20-300 µl | 650-07-M12300 |
| 96-Channel | Air Displacement | 0.5-30 µl | 650-06-9630 |
| | | 5-300 µl | 650-06-96300 |
| | Positive Displacement, Piercing | 0.2-50 µl | 650-06-9650PC |
| | Positive Displacement, DF | 0.1-50 µl | 650-06-9650DF |
| 384-Channel | Air Displacement | 0.5-30 µl | 650-06-38430 |
| | | 1.0-100 µl | 650-06-384100 |
| | Positive Displacement, SS | 0.1-50 µl | 650-06-38450SS |
| | Positive Displacement, DF | 0.1-50 µl | 650-06-38450DF |

*SS = stainless steel, DF = Duraflex®

## Tips magazine

The tips magazine is a plastic frame that holds 96 or 384 pipette tips. Disposable tips magazines (D.A.R.Ts) can be used with the *Versette* system.

D.A.R.T.s (Disposable Automated Research Tips) tips are compatible with the ***Versette*** system's 96 and 384-channel pipette heads. Tips held in the D.A.R.T.s magazine are placed on the device and seal directly against a silicone pad. This forms a definitive seal without the use of conventional tip fittings or o-rings. In addition to providing a cleaner seal that presents less opportunity for contamination, this method provides the added benefit of ensuring uniform tip height across all 96/384 pipette tips, which facilitates consistent drop delivery onto microplate surfaces. Filter tip options are available for disposable tips.

## ControlMate Software

ControlMate software is provided with all *Versette* systems to allow advanced PC-based sequence and advanced program creation, and OLE options for robotic integration. Programming consists of point and click options and easy sequence/step additions and changes to allow rapid, flexible development of custom dispense programs.

# Installation

**Contents**



## Site requirements

### Installation environment

The *Versette* system is designed for operation in a clean, vibration-free environment. Please refer to the following installation site requirements:

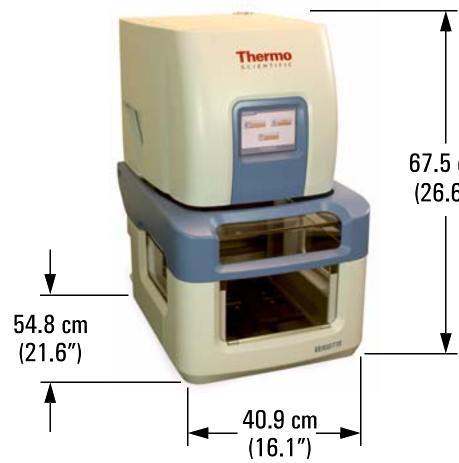
- Avoid excess moisture, dust, vibration
- Avoid direct sunlight or unnecessary UV light
- Avoid strong magnetic fields
- Make sure relative humidity is between 10% and 80% (non-condensing).
- Avoid large temperature fluctuations. The ambient temperature range should be between +10°C (50°F) and +40°C (104°F).

- Make sure the ambient air is clean and free of corrosive vapors, smoke and dust.
- The work area should be level, clean, and vibration-proof and leave additional room for accessories, cables, and reagent bottles.
- The instrument operates at the following voltages:
  - U.S. Voltage Standard: 110 - 124 VAC, 60 Hz
  - European Standard: 240 VAC, 50 Hz

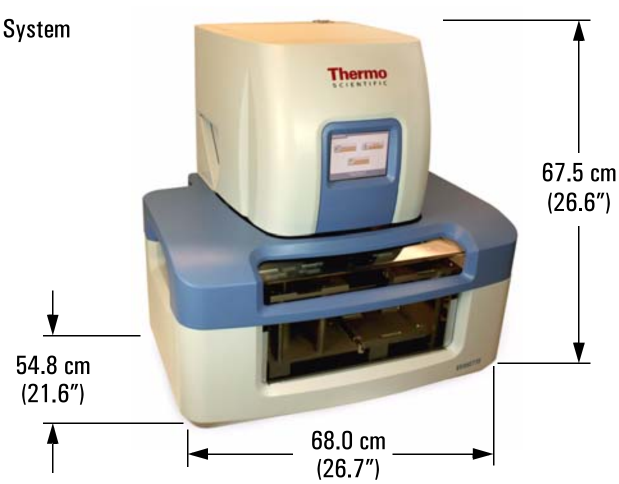
## Required space and clearance

Leave sufficient space (at least 20 cm) on each sides of the system and at the rear of the system to allow adequate air circulation and connection of cables and tubes. Sufficient space above the system is required for proper ventilation. A heat exhaust fan is located on the top rear cover of the system. Additional space for connection of power and communication cables on the right side of the system, and fluid connections on the left side of the system, is typically required. Minimum system dimensions are shown below.

2-Stage System




6-Stage System




Not shown to scale.

Figure 8. System minimum dimensions (not including required space for ventilation and connections)

# Delivery Check

This section covers the relevant procedures to be carried out on receipt of the instrument.

## Checking delivery

1. Check the enclosed packing list against order. Contact your local Thermo Scientific representative with any questions.
2. Visually inspect the transport package, the instrument and the accessories for any possible transport damage.
3. If the carton has been damaged in transit, it is particularly important that you retain it for inspection by the carrier in case there has also been damage to the instrument.
4. Neither the manufacturer nor its agents can be held responsible for any damage incurred in transit, but the manufacturer will make every effort to help obtain restitution from the carrier. Upon receipt of the carrier's inspection report, arrangements will be made for repair or replacement. If any parts are damaged, contact your local Thermo Scientific representative.

## Unpacking

1. Move the packed instrument to its site of operation. To prevent condensation, the instrument should be left in its protective, anti-static plastic wrapping until ambient temperature has been reached, typically 1 hour.
2. Unpack the instrument and accessories carefully. Remove the instrument from the package using a two-person lift and place it on a level surface. The following notes and instructions are typically sent with the instrument and are immediately available when you open the package:
   - Unpacking instructions (if applicable)
   - Warranty Certificate card
   - Packing instructions/Packing list
   - Transportation discrepancy report
   - additional documentation (varies per shipment)

# Requirements

When you set up your *Versette* system, avoid sites of operation with excess dust, vibrations, strong magnetic fields, direct sunlight or UV light, draft, excessive moisture or large temperature fluctuations.

- Make sure the working area is flat, dry, clean and vibration-proof and leave additional room for accessories, cables, and reagent bottles.
- Make sure the ambient air is clean and free of corrosive vapors, smoke and dust.
- Make sure the ambient temperature range is between +10°C (50°F) and +40°C (104°F).
- Make sure relative humidity is between 10% and 80% (noncondensing).

Leave sufficient space (at least 10 cm) on both sides and at the back of the unit to allow adequate air circulation.

The Versette does not produce operating noise at a level that would be harmful. No sound level measurements are required after installation.

Place the instrument on a sturdy, level surface, for example on laboratory bench or under an exhaust hood that is properly rated for the type of chemicals in use. The base system (without pipetting module, pipette heads, and stage assembly) weighs approximately 36 kilograms (80 pounds). Stages, heads, and additional components can add 4.5 to 27 kilograms (10 to 60 pounds) additional weight.

The instrument operates at voltages of 100 – 240 VAC and a frequency range of 50/60 Hz.

## Precautions and limitations

Refer to the system safety cautions. See "Safety" on page 15.

- Always ensure that the local supply voltage in the laboratory conforms to that specified on the power input panel.
- Wear proper protection clothing, such as protective gloves, eyewear, and laboratory coats and/or other personal protection equipment, according to your standard laboratory practice and your facility requirements and any safety regulations for the area you are working in and the chemicals in use.
- Ensure that the working area is properly ventilated for the chemicals in use and that it meets or exceeds all user safety requirements and regulations, as directed by your safety officers. Consult Thermo with any questions.
- Never spill fluids in or on the equipment.

# System installation procedure

## Required tools/equipment

- Precision level (bull's eye level or similar level recommended)
- 4 mm, 3 mm,2.5 mm, and 2 mm Allen wrenches
- Phillips screwdrivers

## Installation steps

Installation consists of positioning the system in a proper work environment, installing any stages and covers, then connecting power, fluid, and any communication cables.

### Step 1: Position the system

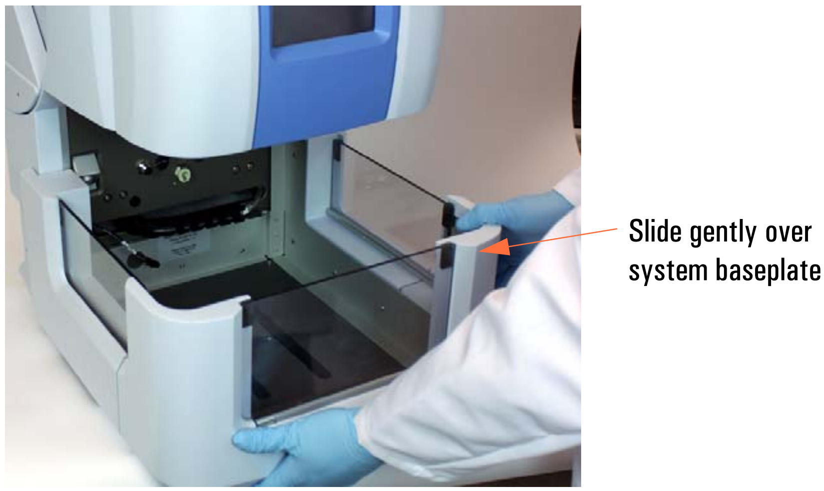
Position the system on a stable, vibration-free work platform, away from magnetic fields. Refer to the "Site requirements" on page 39 for details. Use a precision level to ensure the installation work surface is level.

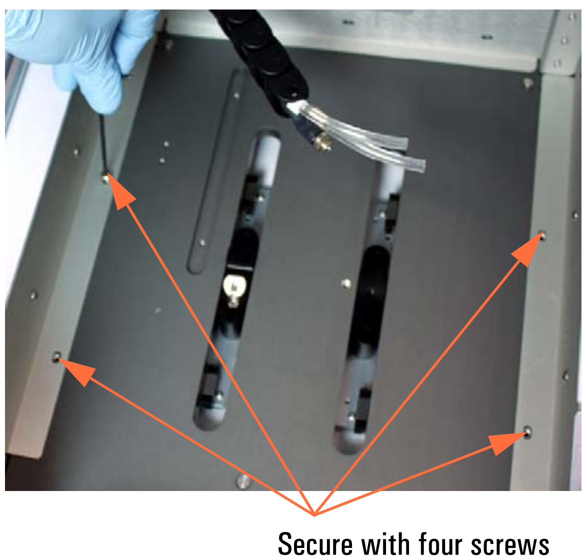
**IMPORTANT** The system must be installed in a very precise, level manner to ensure proper precision dispense quality and accuracy. Take care to place a precision level on multiple locations (front and back, left and right), on the system baseplate to ensure proper level of the system. If you have any questions, contact Thermo.▲

## Step 2: For a 2-stage system:

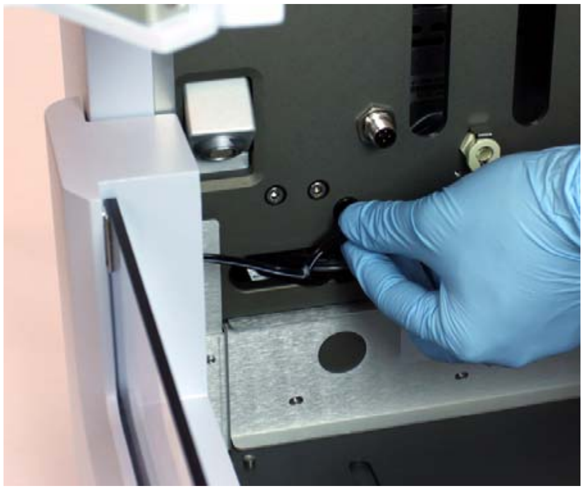
Read this entire procedure before performing the tasks. You may change the order of certain tasks as desired (for example, you can install the optional wash station or install the bumpers prior to installing the shields, if desired). Be sure to secure all hardware firmly as directed.

1. Remove any packing materials and transport locks from the stage components.
2. Carefully slide the base shield assembly onto the system platform and attach with four supplied M3 x 8mm button head screws using a 2mm Allen wrench.

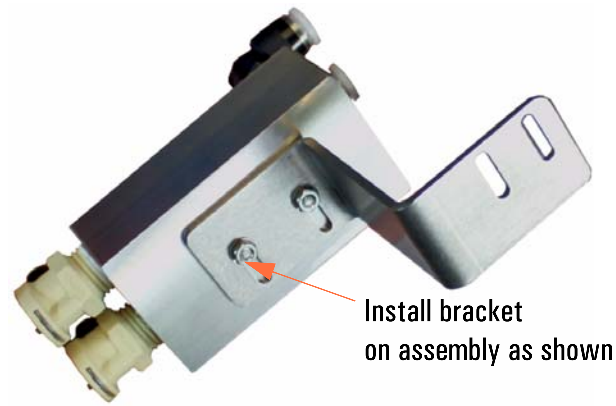


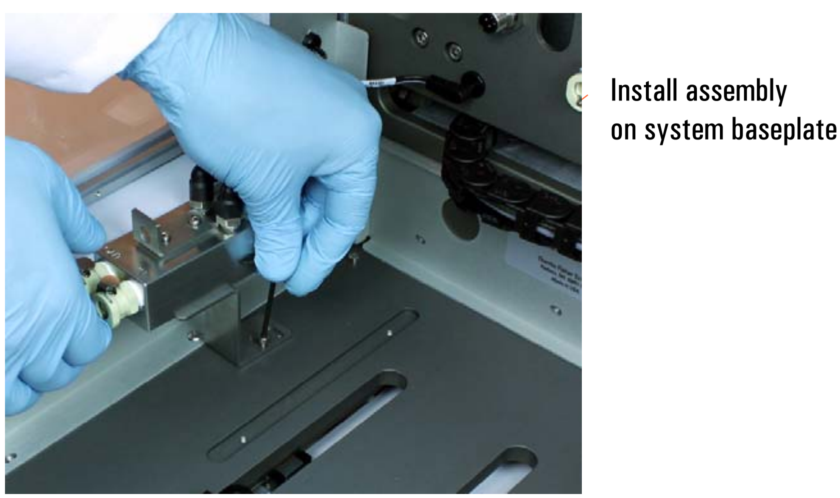



3. Connect shield sensor cable to the connector port on the backplane of the system, as shown.



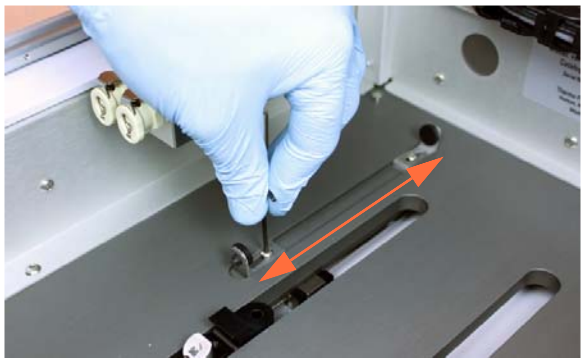
4. If using a wash station, install the wash station bracket assembly on the system baseplate, as shown. Use two supplied M3 button head screws and a 2.5 mm Allen wrench.



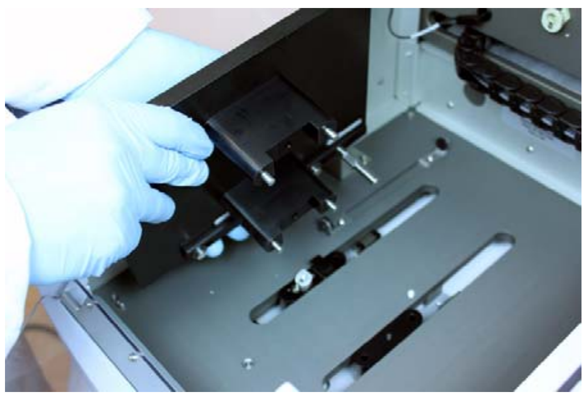



5. Install the 2-stage bumpers on the base place with provided hardware, as shown. Place bumpers facing each other, as shown. Tighten at mid-point or near extreme ends of slots in bumper brackets.

   Note: The bumpers actuate the stage “plate lock” mechanism to either secure a plate on a stage or to unlock a plate to allow remove from a stage. Typical setup allows this locking/unlocking to occur without further adjustment. In the rare instance that you encoutner any issue with locking/unlocking (if the system fails to move the white locking lever forward or back), simply remove the stage and move the rear (lock), or front (unlock) lever forward or back to ensure proper operation.



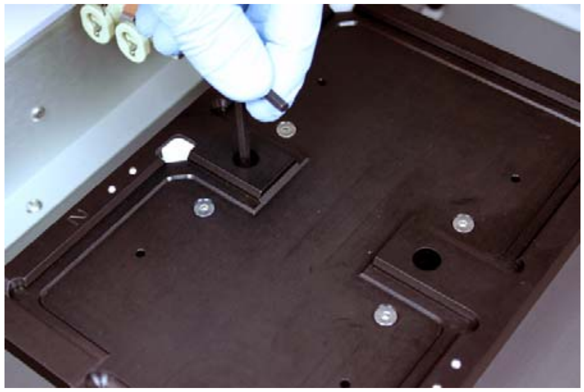
Slide bumpers to extreme ends of track, as shown



Place stage in system with long guidepost at left-rear to slide between bumpers on stage base

Seat 4 corner guideposts firmly on stage platform

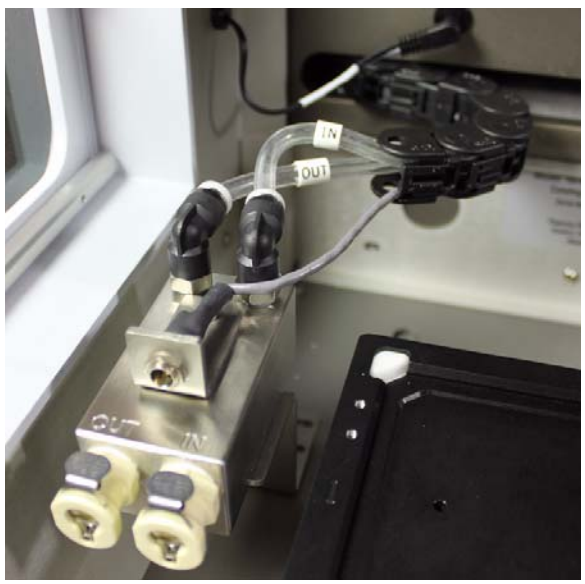
6. Secure stage on base with 2 M5x30mm SHCS using a 4mm Allen wrench.



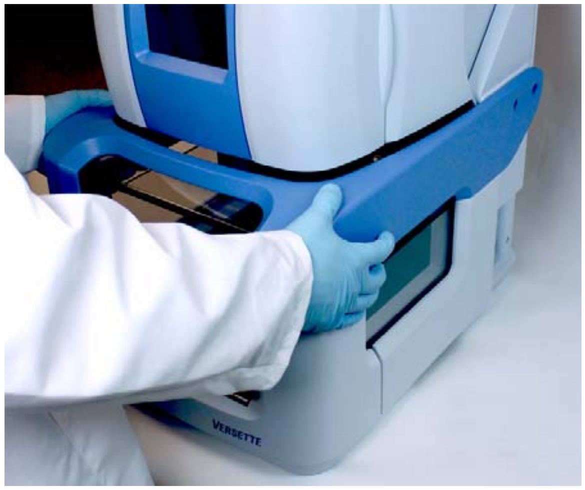
Secure with 2
M5 x 40mm SHCS
(socket head cap screws)
with a 4mm Allen wrench

7. If using a wash module, connect fluid lines and sensors. Each line is labeled with it's mating connector, OUT or IN.

   Push the fluid lines into the fluid connections.
   Plug the sensor cable into the sensor connection bracket and secure with provided nut.



8. Slide the shield cover over the stage assembly and connect to the shield hinges using four supplied M5 x 5mm shoulder screws using a 3mm Allen wrench.

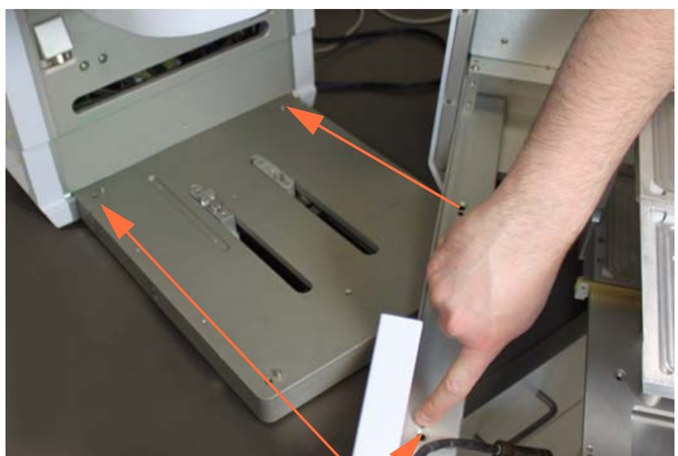



## Step 3: For a 6-stage system:

1. Remove the 6-stage system from its packing container. Leave one end foam piece in place or install foam inserts, as necessary, to prevent the stages from sliding back and forth when you lift it, during the installation process.

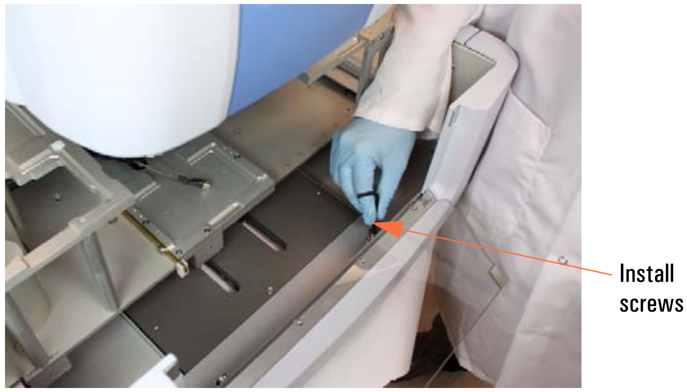

2. Verify that the power is off.
3. Manually move the stage locking pin to the rear of the base platform.

4. Carefully place the stage assembly onto the base platform and align to the four corner pins as shown.

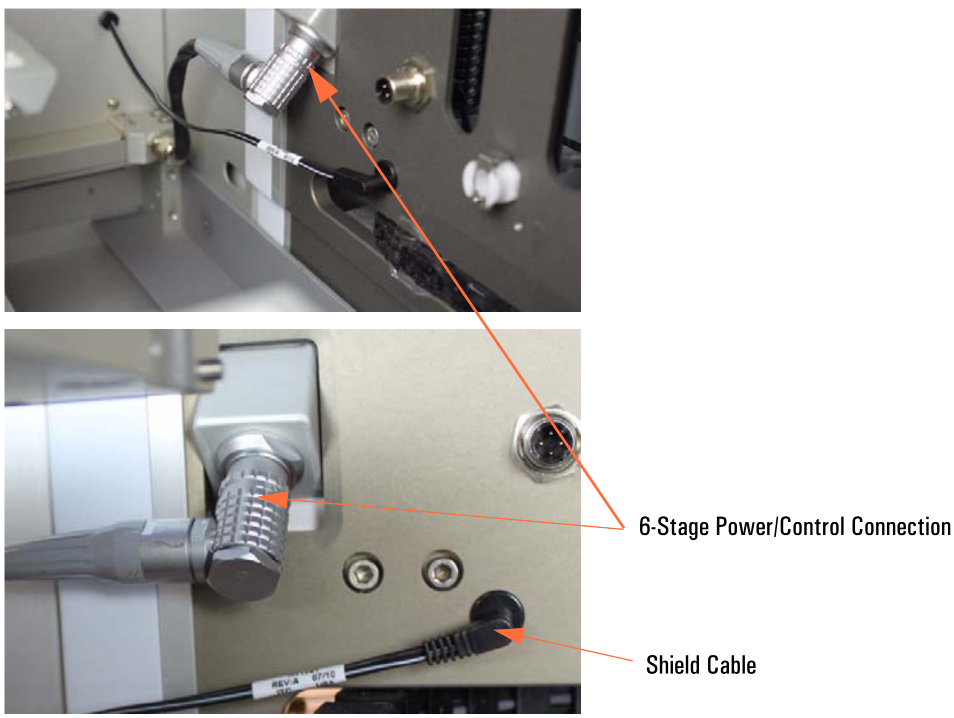


Align 4 corner holes and alignment posts

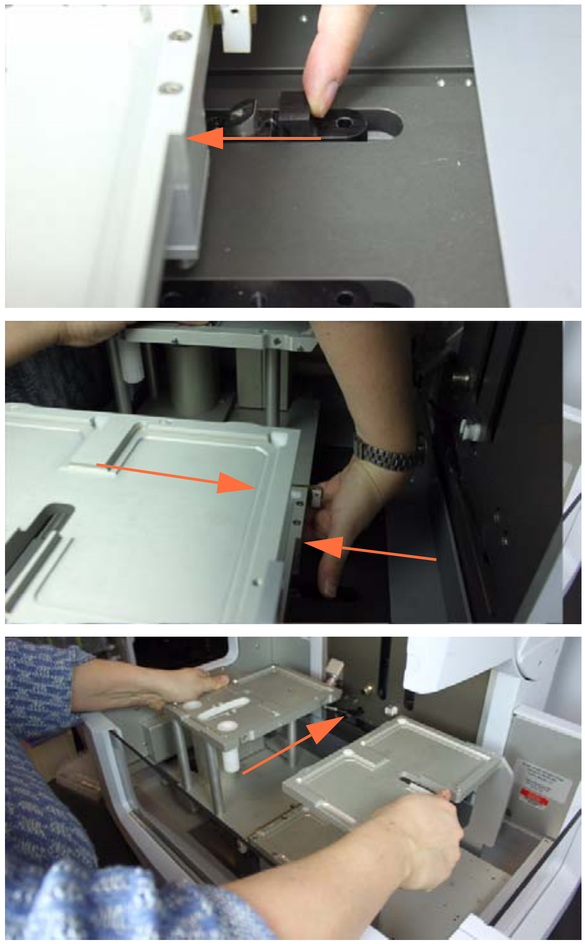
5. Connect the stage assembly onto the system platform with M6 x 12mm flat head cap screws us a 4mm Allen wrench.



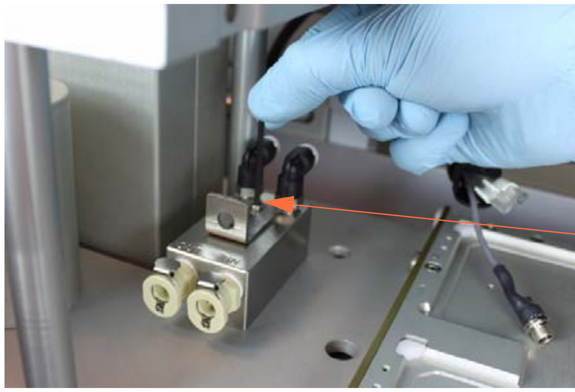

6. Attach the shield cable to the backplane and attach the stage control electronics connection to the system, as shown.
   The connector is “keyed” to match the pins, and must be pushed into place.



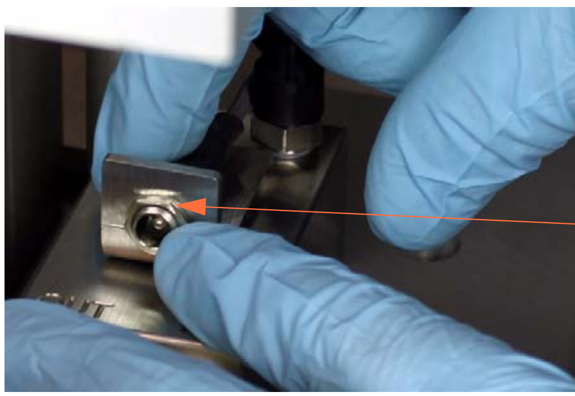
7. With one hand, reach over the stages and push the locking pin forwards towards you as you gently push the stage assembly towards the rear of the system.
   Be sure to slide the locking pin forward and hold firmly while pushing the stages to the rear. The stage assembly should now engage the base pin and belt and slide with firm pressure, in and out.
   Do not slam or rattle the stage assembly. Simply press firmly.



8. OPTIONAL: Attach the wash station block (without bottom bracket) using M3 screws and a 2.5mm Allen wrench as shown, then connect water IN and OUT lines to the block, and attached the sensor to the block using the supplied nut.



Connect to base of stage
with 2 M3 screws, supplied



Connect tubes as labeled, then
connect cable with nut, supplied

9. Slide the blue safety shield assembly onto the system and attach with four supplied M5 x 10mm shoulder screws using a 3mm Allen wrench.


## Step 6: OPTIONAL - External fluid and drain connections:

Three fittings are provided on the left side of the system:

- Wash station fill
- Non-Contact (N/C) Fill
- Drain

1. Position peristaltic pumps near the system.
   The optional Thermo 3-pump unit is equipped with a forward/reverse switch for each pump to direct the flow of liquid, in or out of the system. One touch of the switch reverses the pump direction.
2. Make connects to the left side of the system using supplied quick-disconnect tubing adapters. See following photos:


Figure 9. Optional pump unit with fluid connections to Versette

3. Rotate pump clamp to the left side then insert the tubing.

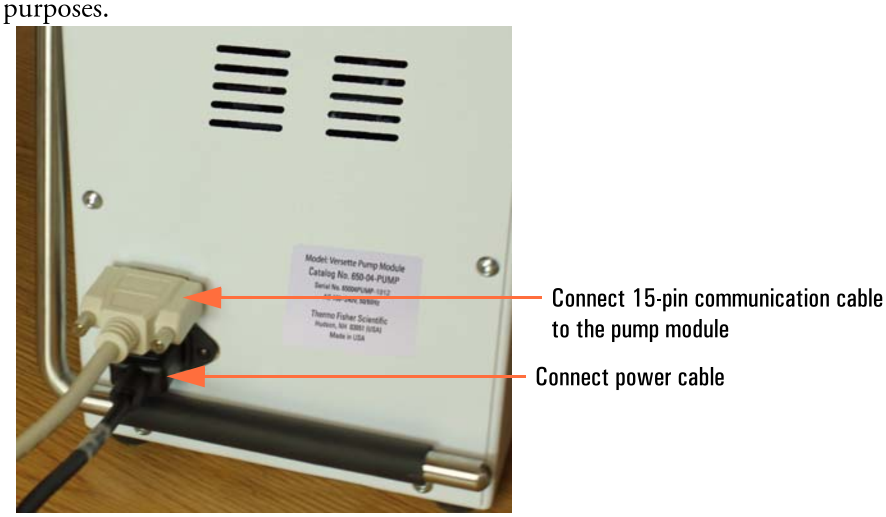
4. Push tubing all the way into the system. Be sure to push the tubing all the way into the clips on each side, as shown.


5. Rotate clamp lever to right to lock tubing in place.


6. Connect fluid lines to left side of Versette system using supplied quick-disconnect fittings.


7. Connect pump module electrical cable:
   a. Connect the supplied communication cable to the pump module and to the Wash Module input on the ***Versette*** system.
   b. Connect the power cable to the pump module.

**CAUTION** Do not run pumps continuously for more than 10-15 minutes. In normal operation, the pumps will typically run for a few minutes at a time. Do not use the pumps for other purposes.



## Step 7: Make electrical connections

All power connections to the *Versette* system are made on the right side of the system.

1. OPTIONAL: Connect the external pump to the WASH connector.

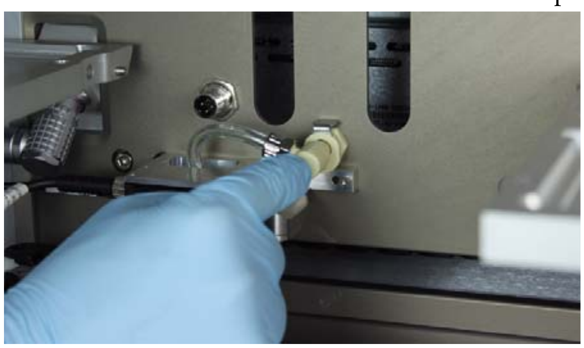

2. Connect supplied power cable to the system and to a correctly installed line power outlet which has a protective conductor, also called earth or ground.

# Use of a Reservoir with the Non-Contact Fill Option

A reservoir can be installed on stage 1 of a 2-stage or 6-stage system for automatic filling with the use of the non-contact fill option.

1. Attach the non-contact fill option onto the backplane, as shown using 2 screws provided and a 2 mm Allen wrench.

2. Connect fill tube to N/C fill connection on backplane.



3. Connect sensor power cable.

4. Connect the source fluid to the N/C fill position on the side of the system. See “Fluid Connections” on page 33 and “Step 6: OPTIONAL - External fluid and drain connections:” on page 56.

5. Place reservoir plate on stage 1 then press and hold the fluid level sensor until the reservoir is filled to the desired level. Let go of the sensor to stop liquid flow and automatically set the re-fill height.

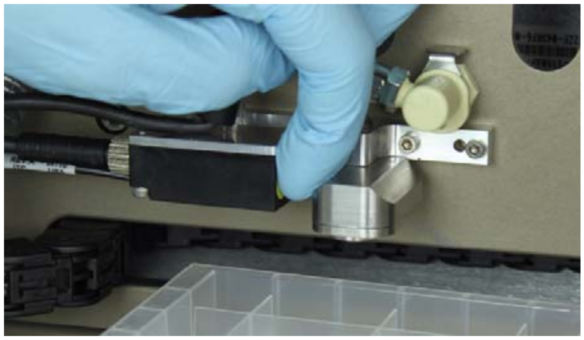


Table 10. Reagent reservoirs

| Item | Catalog No. |
|---|---|
| 96-channel, 125mL, Non-Sterile, Polypropylene | 1064-05-8 |
| 96-channel, 125mL, Sterile, Polypropylene | 1064-15-8 |
| 96-channel, 200mL, Non-Sterile, Polypropylene | 1064-05-6 |
| 96-channel, 200mL, Sterile, Polypropylene | 1064-15-6 |
| 384-channel, 65mL, Non-Sterile, Polypropylene | 1064-05-7 |
| 384-channel, 65mL, Sterile, Polypropylene | 1064-15-7 |

6. See "Reservoir and non-contact fill - Sequence Summary" on page 115 for software usage.

# Using a Tip Wash Station

A Tip Wash Station washes both the interior and exterior walls of D.A.R.T. tips, positive displacement pipette heads, and stainless steel probes. Cleaning solution is connected to the wash station and a waste line is used to remove waste fluid. You can specify the number of wash cycles and related parameters through the onboard system software or through ControlMate software.

Tip Wash Stations are available for 96-channel and 384-channel pipette heads. All tip wash stations are made of PTFE with Stainless Steel “Chimneys”. Wash fluid flows up through the “chimneys” to wash the inside and outside of the tips, and the excess flow is pulled out of the wash station through the “OUT” line, connected to a drain pump. An integrated fluid liquid level sensor serves as a safety fluid inlet shutoff in case the drain pump stops.

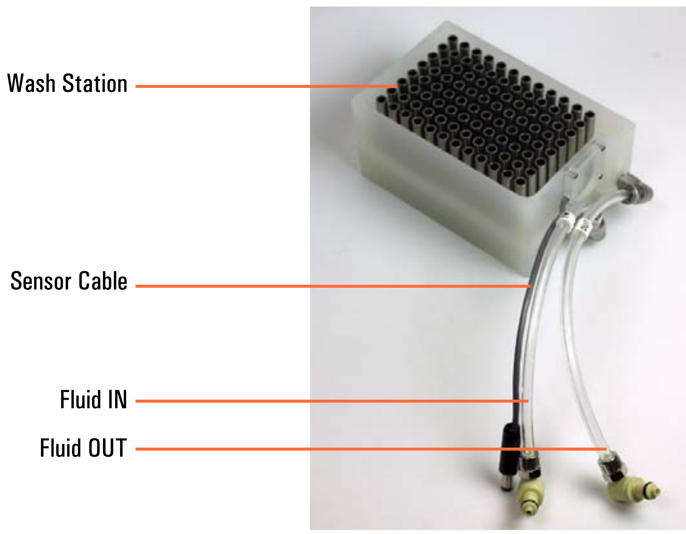
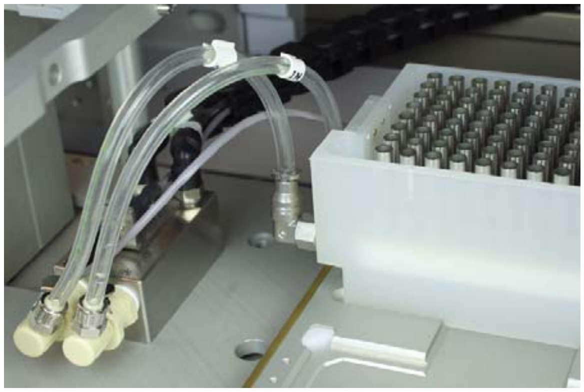



Table 11. Tip Wash Stations

| Item | Catalog No. |
| --- | --- |
| 96-channel, Tall Height | |
| 384-channel, Tall Height | |

1. Place the Tip Wash Station on stage 1 or stage 2, with the connections on the left side, as shown below.

2. Connect the sensor cable and connect the fluid IN and fluid OUT connectors to the mating IN/OUT connectors.



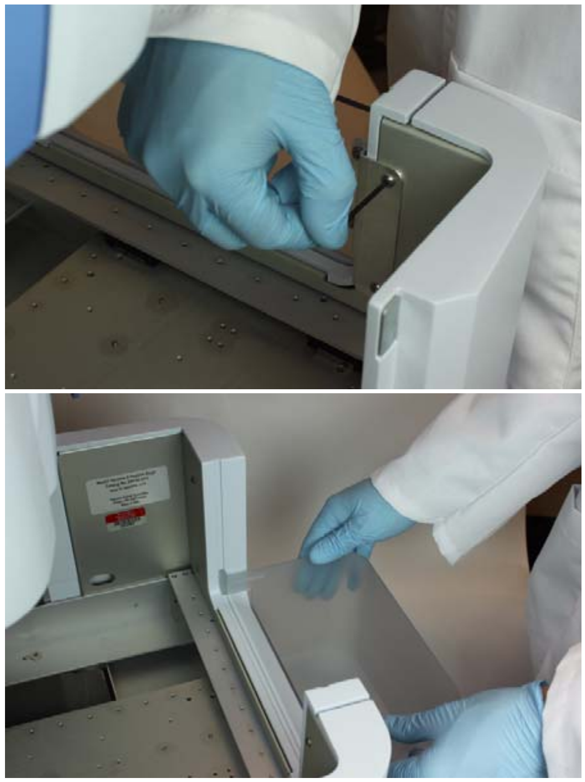
3. Connect fill and drain pumps to the system. See “System installation procedure” on page 44.

4. Refer to the ControlMate software or on-board system software to program a Move command (to move the stage below the pipettes), and to set wash station parameters including tip position (vertically and horizontally), number of cycles, pump speed, etc. See “Using a Tip Wash Station” on page 62.

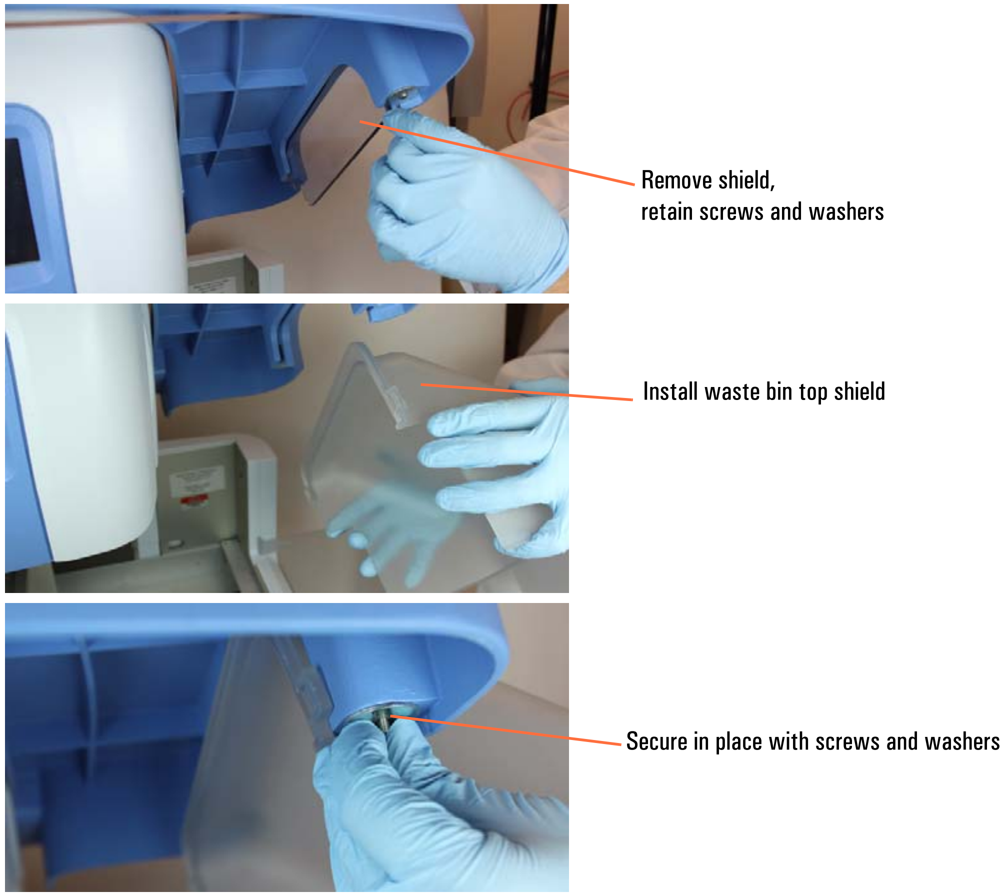
# Using a Pipette Tip Waste System

An optional pipette tip waste bin can be attached to a 6-position stage system for automatic discharge of used pipette tips.

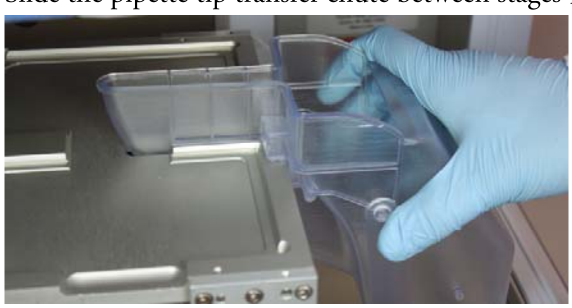
1. Remove right side shield the slide lower tip waste bin in place as shown.



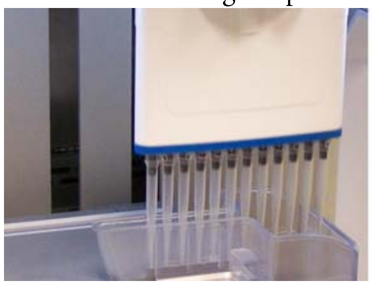
2. Remove top shield and install top of waste bin shielding.



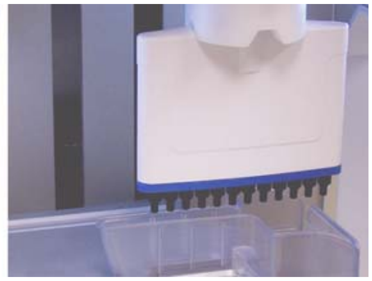

3. Slide the pipette tip transfer chute between stages 5 & 6 on 6-position stage systems.



4. During operation, the pipette tips are automatically ejected into the transfer chute. The chute is then automatically driven to the right side of the system where a bracket tips and unloads the discharged tips.



1) Head moves over and into tip transfer chute



2) Tips are ejected and fall into the transfer chute

3) Stage drives to right where chute is emptied to waste bin

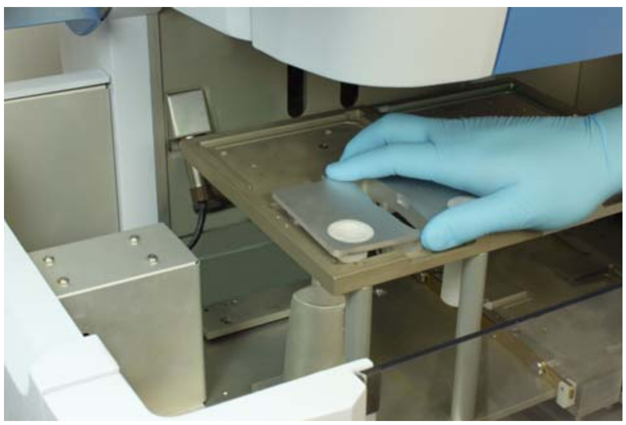
# Using Pipette Head Nests

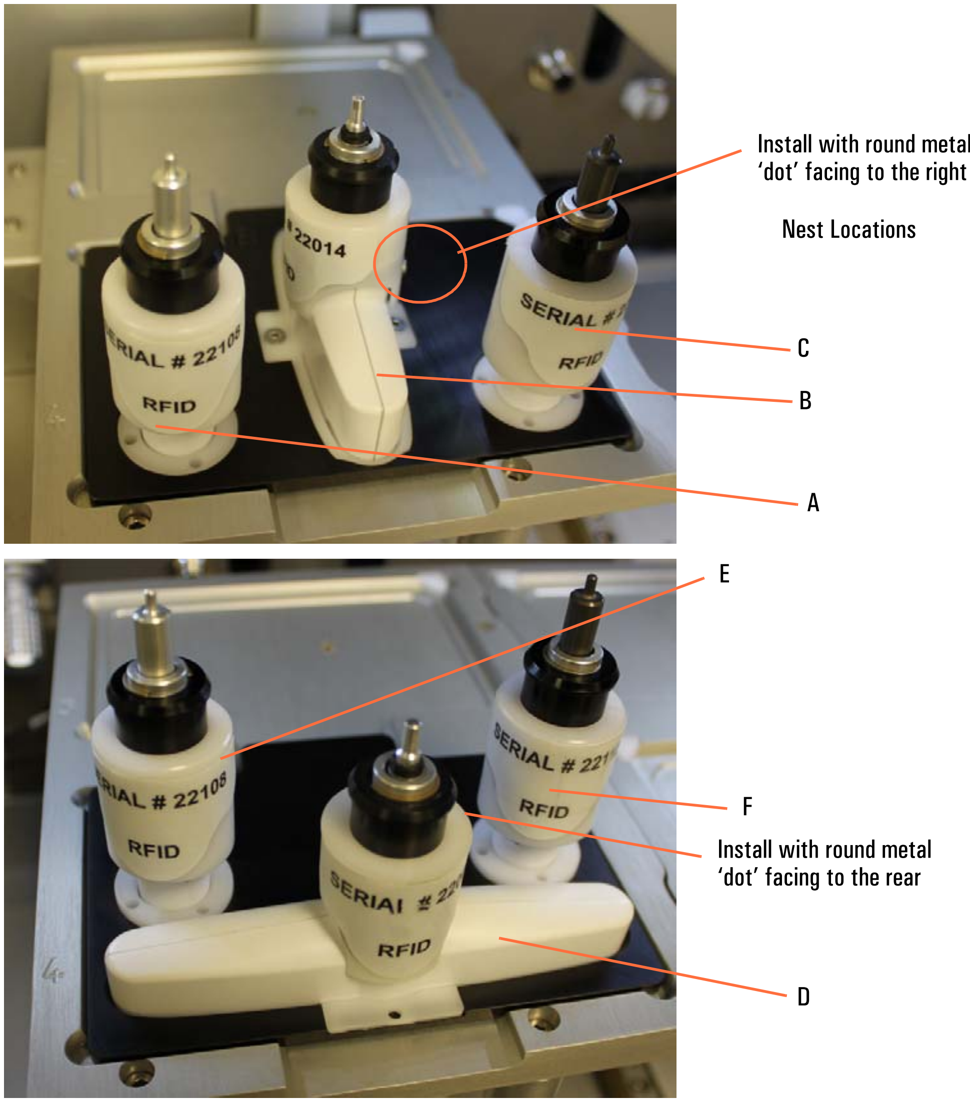
Pipette head “nests” can be installed in the system to hold pipette heads for automatic loading/unloading of the pipette head by the system.

Pipette head holders can be inserted into the opening of stage 4 on six-stage systems, or can be inserted into a nest holder on a two-stage system.

Two types of nests are available: 8-tip nest and 12-tip nest. Each nest can hold up to three pipette heads: two single heads (of different volume capacities) and one multi-tip head (8 or 12).

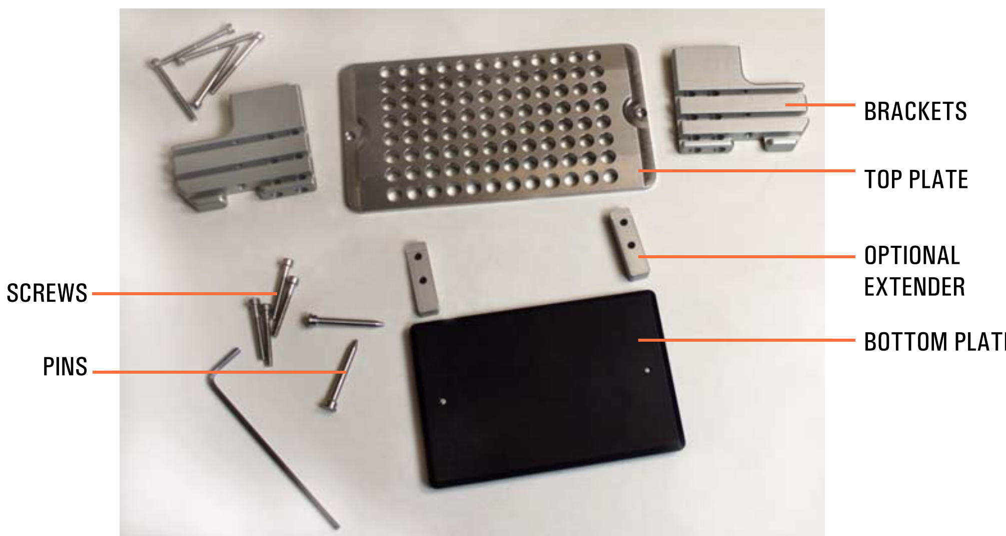
The bracket will typically hold up to three pipette heads for automatic loading and unloading of the heads. See “Creating an aspirate/dispense program (sequence)” on page 94 for operation instructions. Pipette head nests simply snap into place on a a stage, as shown.



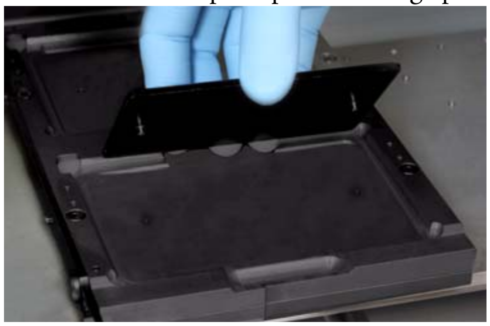

Install with round metal
'dot' facing to the right
Nest Locations
C
B
A
E
F
Install with round metal
'dot' facing to the rear
D

# Using a Sealed Storage Tube Piercing Manifold

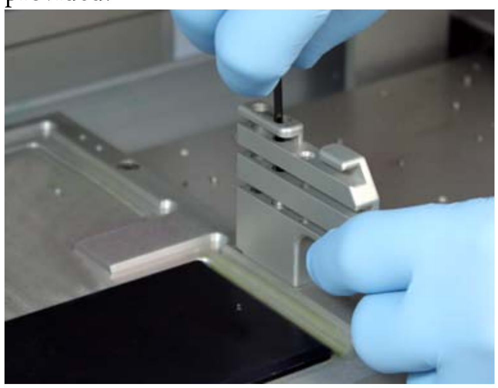
The piercing manifold allows for the simultaneous piercing of 96 SepraSeal® or DuraSeal® storage tubes. The piercing manifold is compatible with 1.4mL, 0.7mL, and 0.5mL tubes. A piercing head is required for sealed storage tube piercing applications.

1. Insert the bottom plate pins into stage position 2.



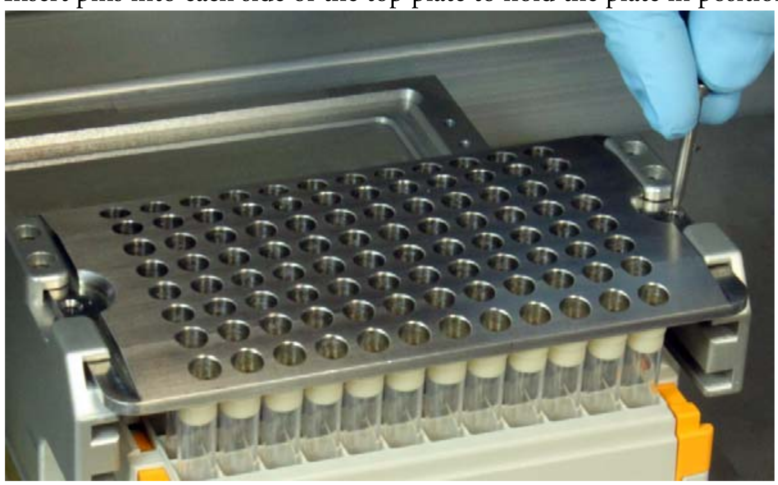
2. Attach side brackets to stage position. Optional extenders with longer screws are provided.



3. Slide the sealed storage tubes into the piercing assembly.

4. Slide the top plate over the tubes. The brackets have multiple slots for short and long tubes.


5. Insert pins into each side of the top plate to hold the plate in position.



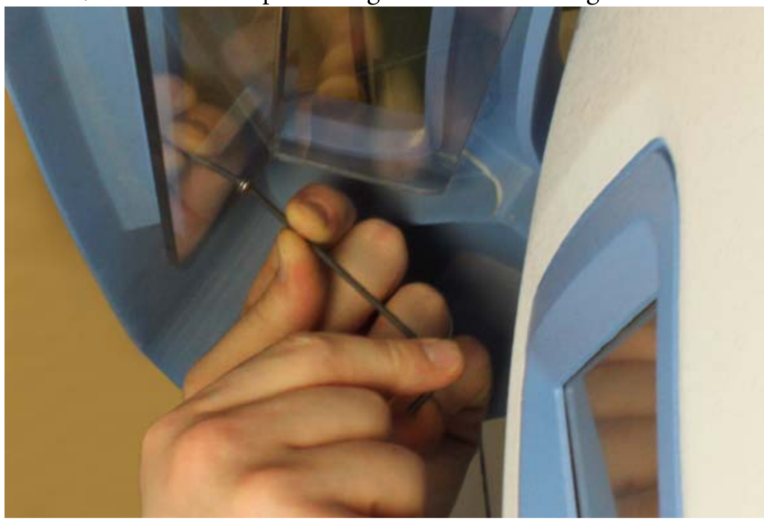
6. Install an appropriate piercing head, and use the onboard or ControlMate software to program operation.

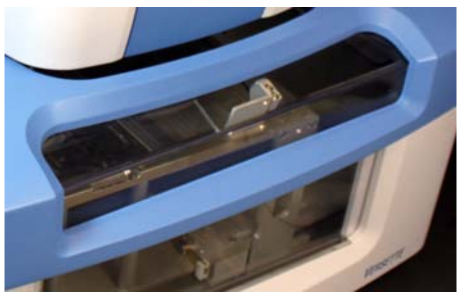
# Using a Barcode Reader

The barcode reader can be mounted to the front, left or right side safety shield to read the barcode label on a microplate when it is moved in position for pipetting. The barcode reader supports the following barcode types:

- Code 39
- Code 93
- Code 128
- ITF
- Industrial 2 of 5
- Coda bar
- EAN/UPC (A.E) standard 2 of 5
- COOP 2 of 5
- NW-7 Coda bar
- GS1-128 (EAN-128)
- UPC/EAN
- GS1 Databar (RSS)

1. Replace the front or side shield with the custom shield with barcode reader mounting bracket, or install the optional right-shield mounting bracket.





Front shield mounting

2. Mount the barcode reader on the bracket with two cap screws. Move bracket slide as necessary to tighten screws.

3. Adhere wire clips to the underside of the shield (if needed) and feed the wire out the rear of the system, as shown.

4. Connect the barcode reader cables, per instructions provided with the barcode reader.

5. Install the barcode reader software, as instructed then energize the barcode reader to align the scanning beam.

6. Adjust the mounting bracket angle (move the mounting bracket then tighten the screws), as necessary to center the barcode reader laser on the center of the barcode, as shown.

# Using a Vacuum Manifold

The vacuum manifold can be installed on stage 2 to perform filtration procedures. The manifold kit provides a complete solution. The kit includes the manifold, a vacuum pump, a vacuum flask, regulators, tubing, connections, and complete instructions for setup and use. The kit is compatible with 96 and 384 filtration labware.

1. Unpack and assemble the vacuum manifold per the provided instructions. Location of the manifold on stage 2 or stage 6 (shown below) is recommended.
2. Place the manifold on a stage. Connect the waste tubing to the manifold and feed the tubing through out the rear of the system and to the vacuum flask which asks as a ‘trap’ to protect the vacuum pump during operation. Refer to the installation instructions provided with the vacuum manifold kit. A plate riser can be used to allow use of a stage position where the tubing is directed, as shown:

# Operational check

Complete the following procedure to confirm the correct functioning of the system prior to normal use.

1. Verify that the safety shields are in place and closed.
2. Verify that the power cable is connected to an appropriate power supply.
3. Switch the instrument on using the power switch.
   - If the instrument starts properly:
     - The display lights up.
     - The plate carrier moves to the home position and the dispense mechanisms lifts to the up position.

# Operation

The ***Versette*** system is designed for easy operation via an on-board wizard-based touchscreen menu system. You can also control the ***Versette*** through ControlMate PC-based software.

**Contents**

# Theory of operation

The ***Versette*** system executes a series of commands (called a *program* or *protocol*) to aspirate (pick up with one or more pipettes) fluid from labware, and dispense this fluid into its source labware, or to labware located on one of multiple stages in the system.

A simplified operation process is listed below:

1. Create a program to run a series of aspiration, movement, and dispense commands.
2. Install the desired pipette device, with supporting equipment, if applicable.
3. Connect a fluid source, or install fluid, as appropriate.
4. Install labware into the system
5. Run the program.

As the ***Versette*** is a flexible system, actual operation will vary to meet the specific needs of the end user.

# Precautions and limitations

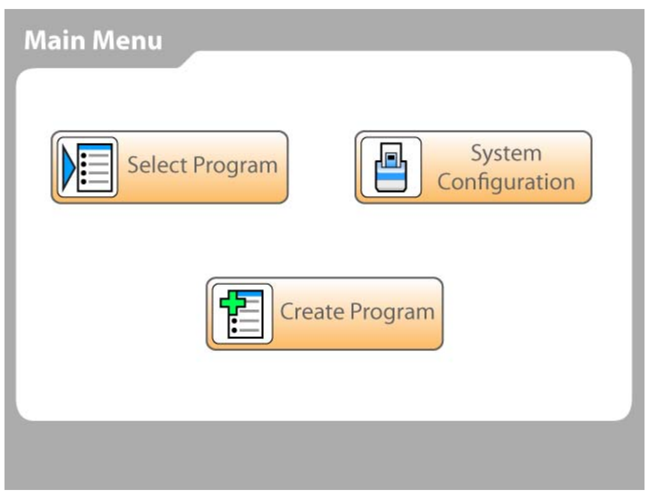
Refer to the safety section of this manual for detailed system safety cautions.

- Always follow your facilities safety and health instructions for all operation. Wear proper protection clothing, such as disposable gloves and laboratory coats, according to good laboratory practice.
- Ensure that the working area is properly ventilated for the chemicals in use, and that the ***Versette*** system is installed in an environment which is safe for the chemicals in use. Always follow your facility's safety guidelines and local, national, and international safety codes and procedures for the chemicals in use.
- Do not attempt to install or use the equipment if you are not properly trained for the tasks described.
- Always ensure that the supply voltage meets the specifications printed on the ***Versette*** system and detailed in this manual. The voltage supply should be checked by a a certified electrician to verify proper voltage. If there are any questions, consult with Thermo support.
- Do not run the optional Thermo pumps continuously for more than 10-15 minutes. In normal operation, the pumps will typically run for a few minutes at a time. Do not use the pumps for other purposes.

# Initial system startup

1. Refer to Chapter 3, “Installation,” for system setup information.
2. Verify that the system safety shields are closed.
3. Turn the system on (power switch on the right side) and wait for the touchscreen to initialize, and display the main menu.


System Initializing Screen




Main Menu

Figure 10. System Power-on Screen Display Sequence

4. Calibrate the system. Refer to the calibration sections of this manual.

# Operation overview

Operation consists of the following tasks (not all tasks are needed, depending on system setup and use):

1. Install optional equipment. For example, reagent reservoir, tip wash station, etc.
2. Turn the system on.
3. Create a program.
4. Run the program.
   - Follow system prompts to install a pipetting module ("Installing a Pipetting Module" on page 117).
   - Install a pipette head ("Manual Installation of a Pipette Head" on page 122).

The following section details the use of the onboard software. Refer to the *ControlMate User's Manual* for additional and alternative operation and calibration instructions. All procedures assume that the system has been calibrated. Refer to the calibration sections of this manual for details.

# Programs

A pipetting program consists of multiple sequences (move, aspirate, move, dispense, wash, etc.) that are combined to accomplish a task. Each sequence consists of one or more "steps". A very basic program typically consists of at least four major steps: move, then aspirate, then move, then dispense. For example:

1. Move to position and aspirate (pick up fluid)
2. Move to position and dispense (dispense fluid into plate or tube)

An example of a basic program and its components is shown below:

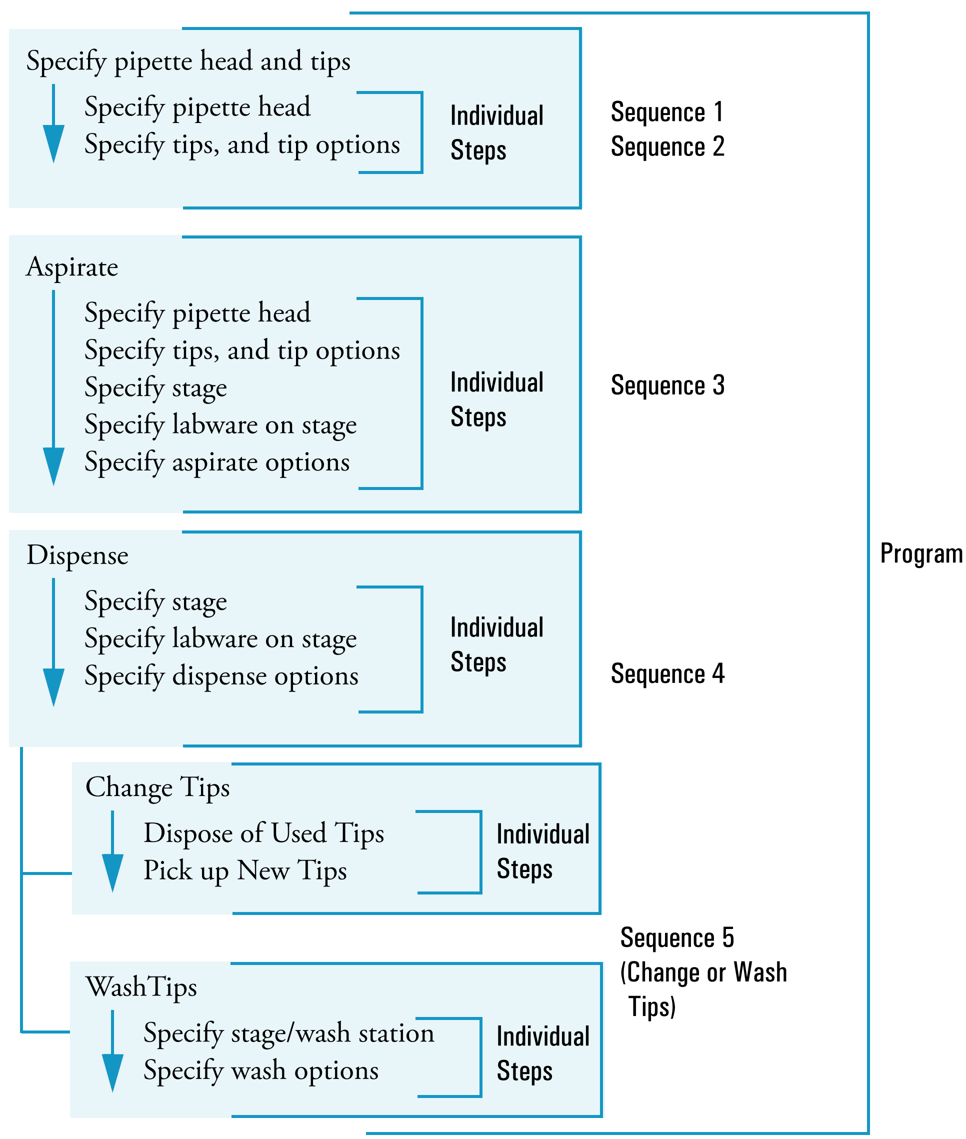



**Figure 11.** Sample basic program components

Typically, a pipette will aspirate sufficient fluid to move to and dispense to a large number of wells in a microplate. Multiple move commands as well as multiple dispense commands will follow in sequence. Additional program steps may include washing the pipette tips in an automated wash reservoir, and may include various speed adjustments for stage movements, dispense speed, etc. to ensure accurate dispense. Other commands may include mixing (a series of aspirations and/or dispenses in the same well or tube to mix the fluid in that well or tube or to equalize pressure in a pipette), and basic pause and position commands.

Programs can be created for serial dilutions, plate-to-plate transfers, and simple dispensing operations. Once created and saved, programs and sequences can be recalled and combined to create a variety of programs.

The system software includes a number of program examples which can help you design your own programs.

# Touchscreen operation

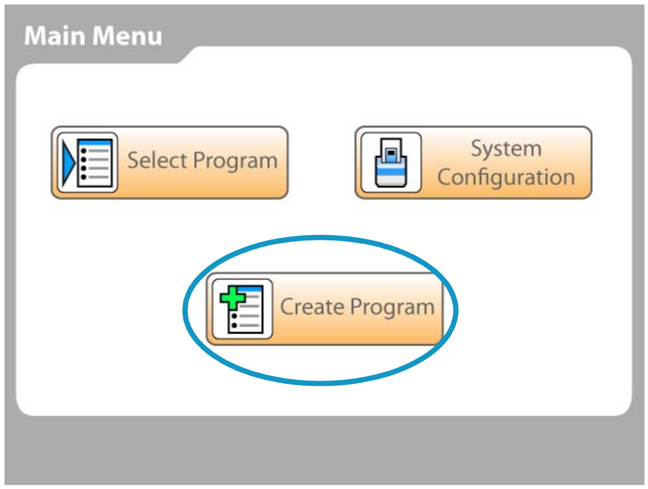
The system can be operated locally via the touchscreen, or remotely via a remote computer with ControlMate control software, or other OEM software. Most operations can be performed locally. This section details basic program creation and operation actions through the onboard touchscreen. Please refer to the following sample operations:


- "Serial Dilution - Sequence Summary" on page 85
- "Creating an aspirate/dispense program (sequence)" on page 94
- "Installing a Pipetting Module" on page 117
- "Wash - Sequence Summary" on page 112
- "Manual Installation of a Pipette Head" on page 122
- "Change Tips - Sequence Summary" on page 124
- "Delay - Sequence Summary" on page 127
- "Selecting a Program" on page 129
- "Using Tube Adapters" on page 133

## Serial Dilution - Sequence Summary

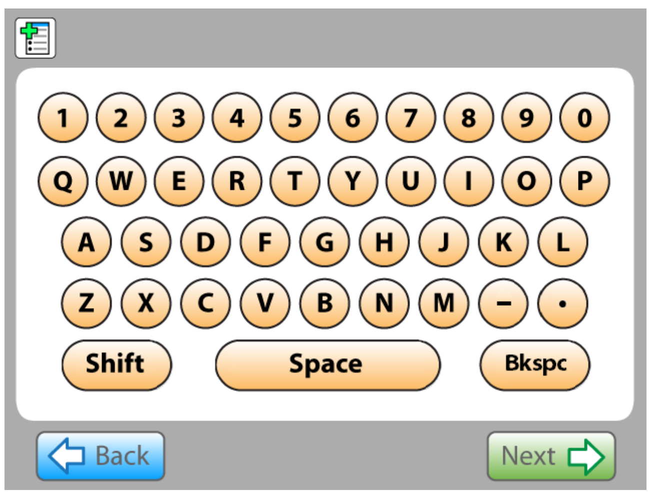
An example of creating a serial dilute sequence is shown below. Each version of software can vary from that shown, but the fundamental process of selecting and editing steps, creating sequences and programs is consistent across all software versions.

1. Select “Create Program” from the Main Menu.




2. Use the keypad to enter a name for the program then press 

.




Upper and lower-case keypads are available using the Shift key to toggle between keypads.

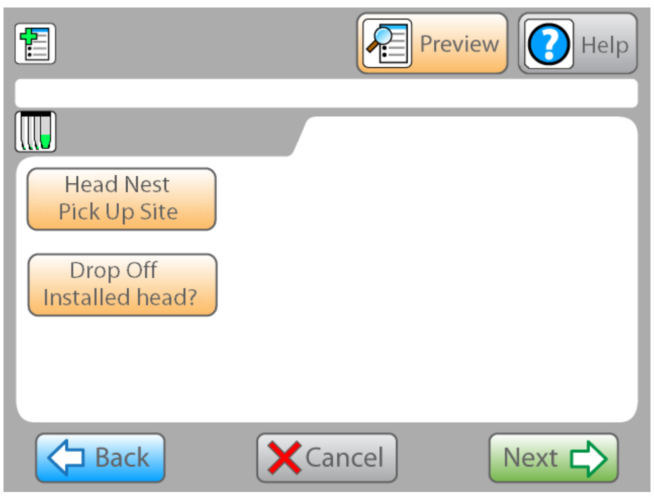
3. Highlight the pipette head from the list then press .


Use arrows to scroll to multiple pages

List will vary from that shown.

4. For 1-channel, 8-channel, or 12-channel heads, select the Head Substation Pick-up Site and Drop-off Site, or select “Installed” if the head is currently installed, then press

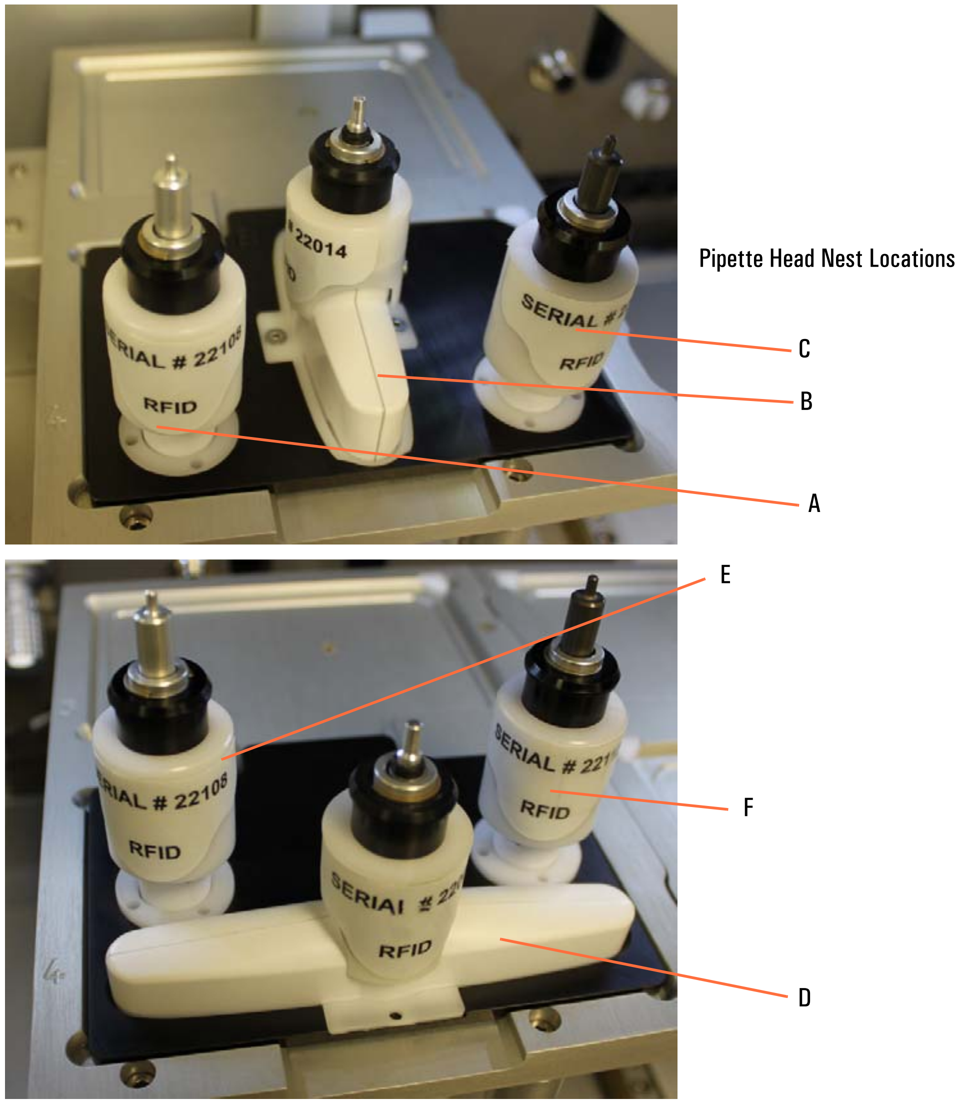
. See “Using Pipette Head Nests” on page 67 for details.



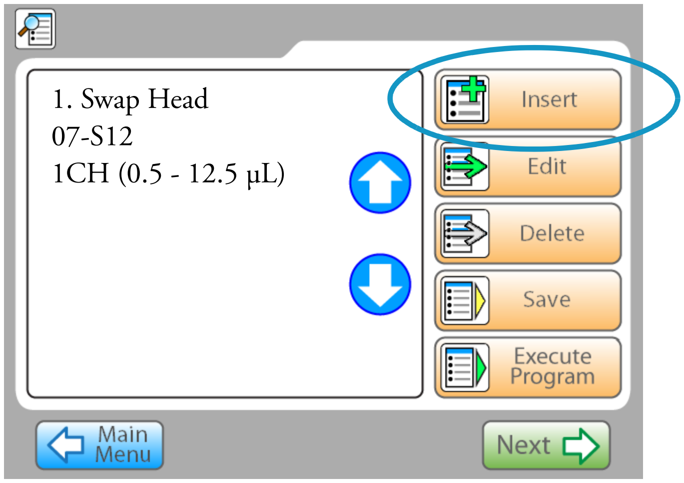

Head substation options include:
Installed - used head installed
Station A, B, C, D, E, or F

5. Station selection will vary based on head type and installed head next. Possible on-board head substation locations are shown below:

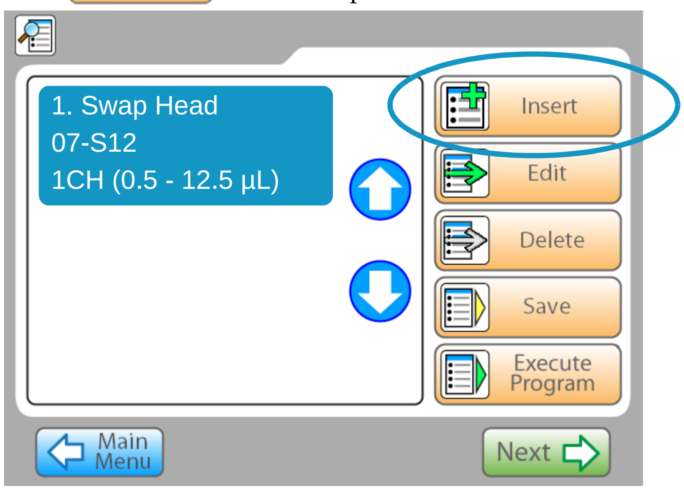
Figure 12. Pipette Head Nest Locations



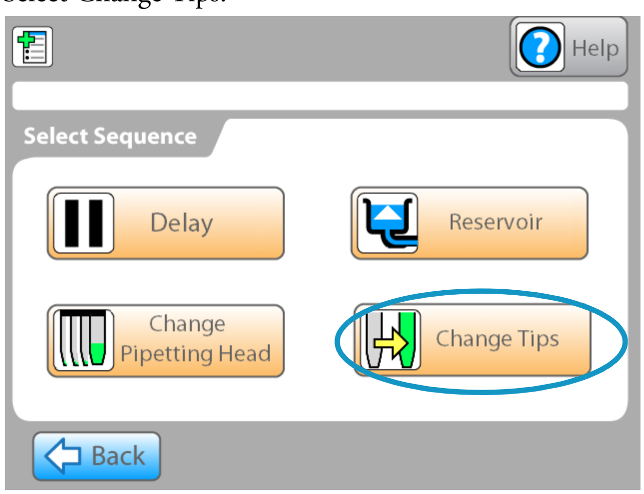
6. Press   to add a step.



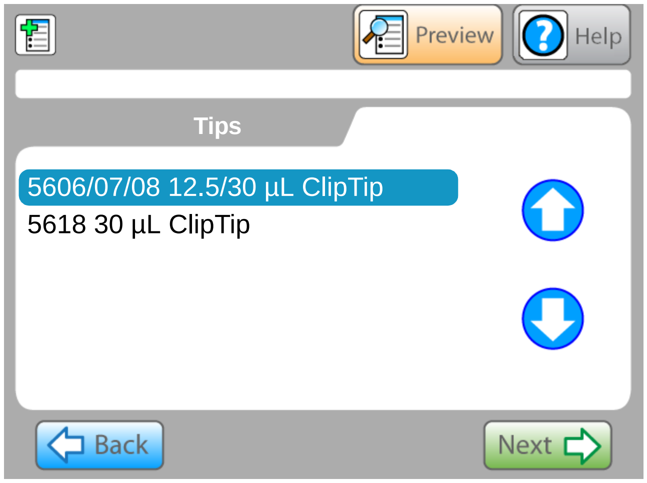

7. Press   to add a step.



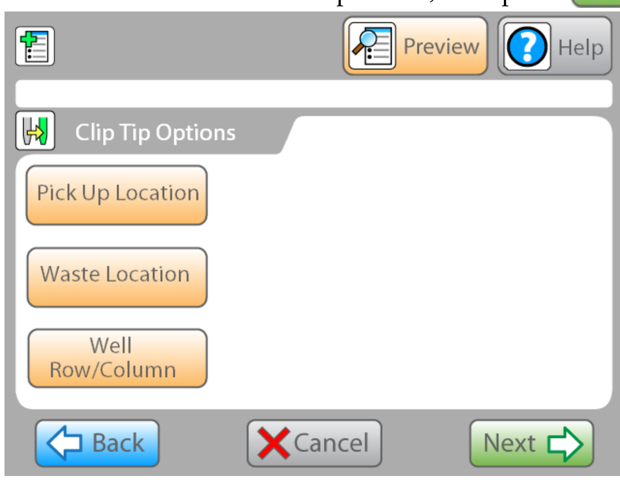

8. Select Change Tips.



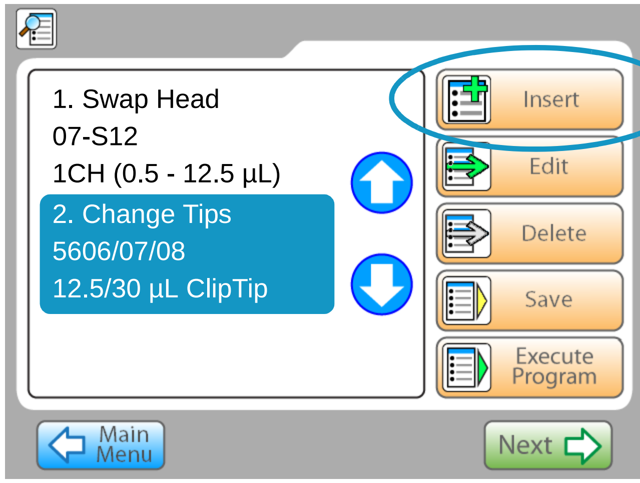
9. Use the arrows to highlight the clip type from the listing, then press .



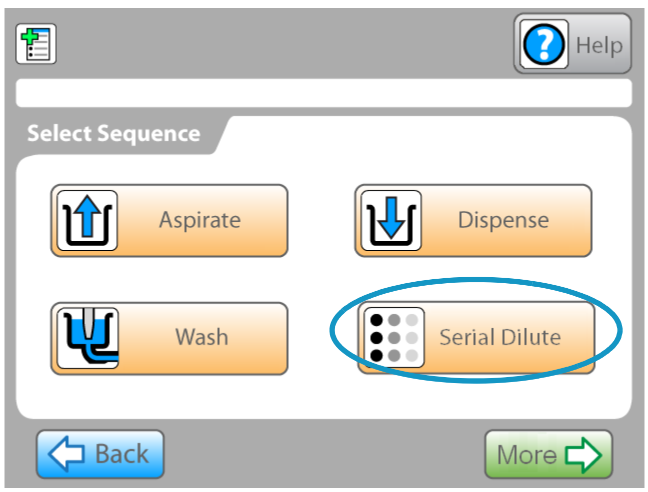

10. If prompted, select the ClipTip options including PickUp Location, Waste Location, and Well Row/Column start position, then press .



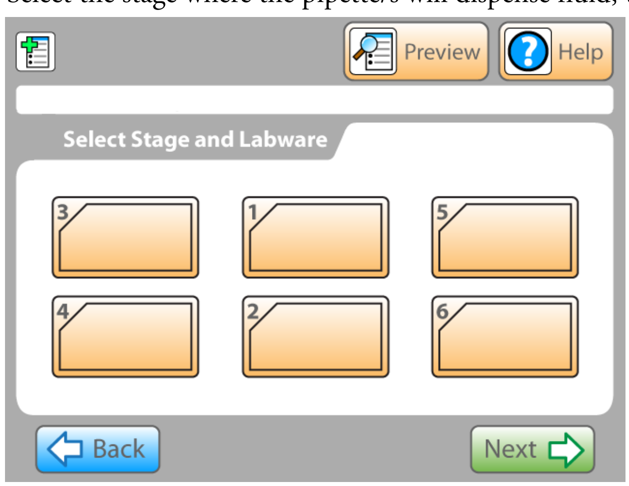
11. Press   to add a step.



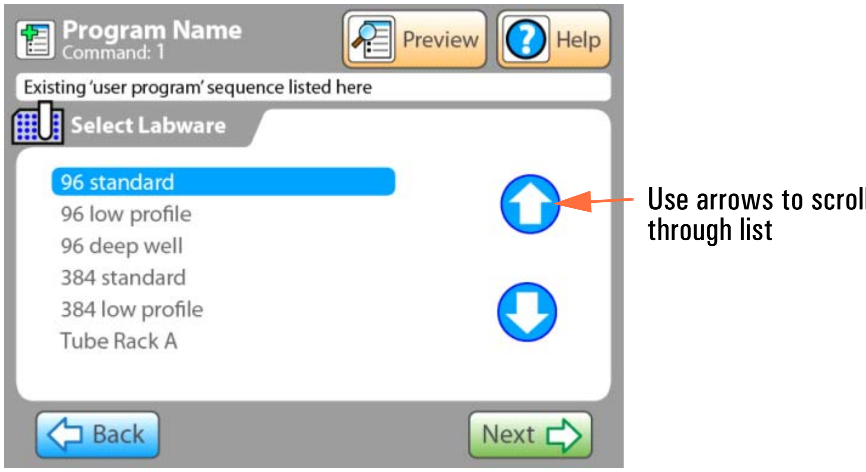

12. Select “Serial Dilute”.




13. Select the stage where the pipette/s will dispense fluid, then press  .



14. Highlight the labware that will be on the dispense stage, then press Next.




15. Make any changes to the settings, then press Next.
Refer to the following table for setting details.

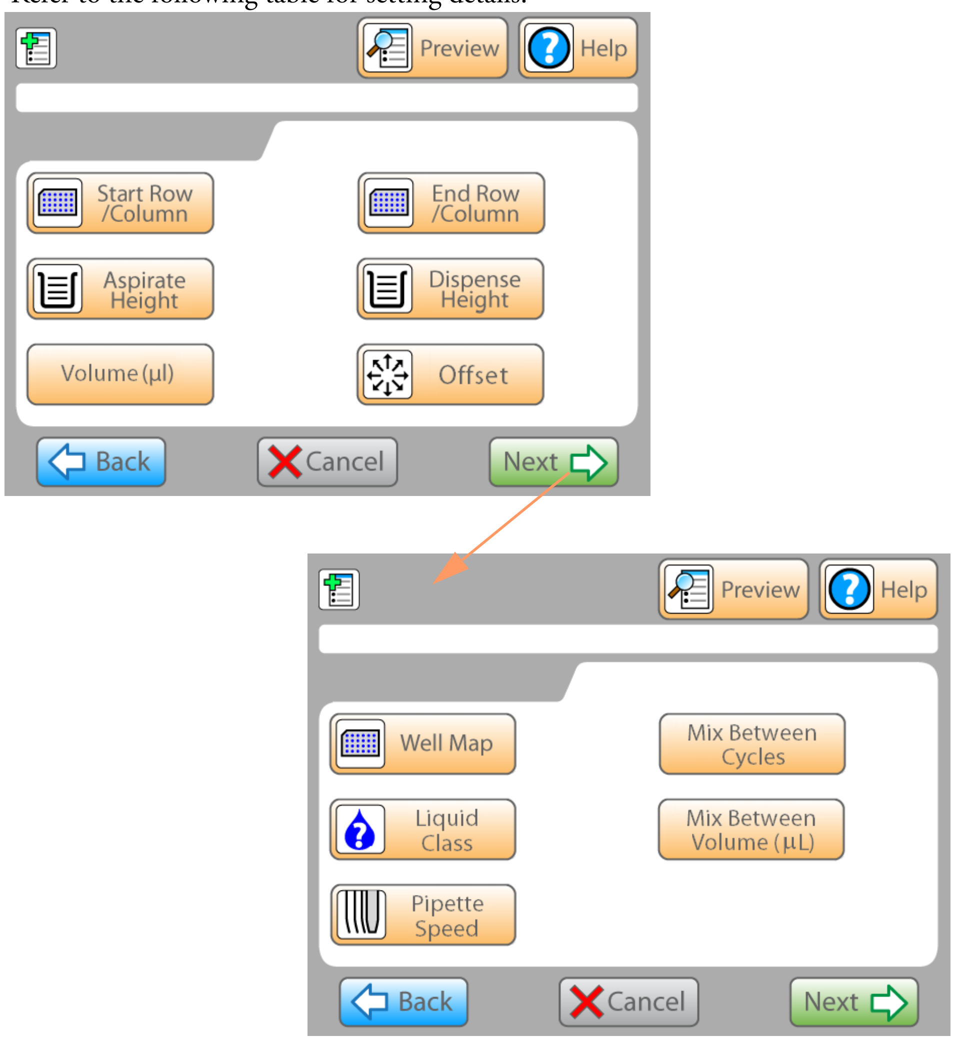
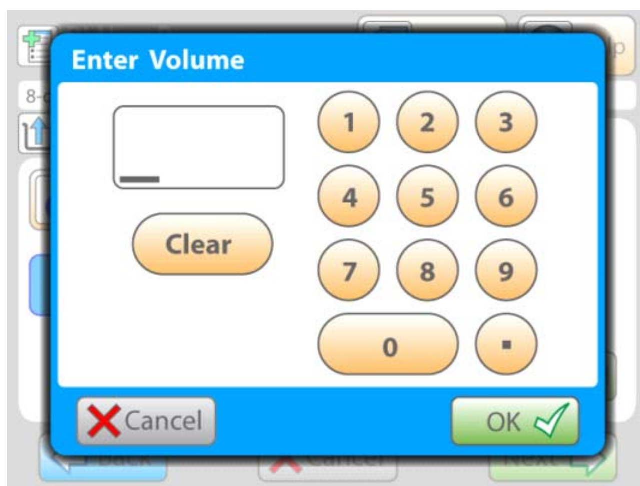


Table 12. Serial Dilute Settings

| Selection | Description | Default Setting |
|---|---|---|
| Start Row /Column | The starting row or column where you will begin the dispense action. Also select the increment value (next row or column to be dispensed into). | A1<br>(Column A, Row 1) |
| End Row /Column | The ending row or column where you will end the dispense action. | The last row and column on the plate. |
| Aspirate Height | Low, Medium, Medium-High, or High. Fixed height from the bottom of the well. The exact position (in mm) is set by the system based on the plate type. | Low |
| Dispense Height | Low, Medium, Medium-High, or High. Fixed height from the bottom of the well. The exact position (in mm) is set by the system based on the plate type. | High |
| Volume (µl) | Enter the volume to dispense.<br> | |
| Offset | Tip/well offset: It may be necessary to position the tips away from the center of each well. For example, when using ultra low volumes it may provide more accuracy by positioning the tips in one of the well corners. | Off (Center)<br>Options:<br>- Back Left Corner<br>- Back<br>- Back Right Corner<br>- Right Side<br>- Front Right Corner<br>- Front<br>- Front Left Corner<br>- Left Side |

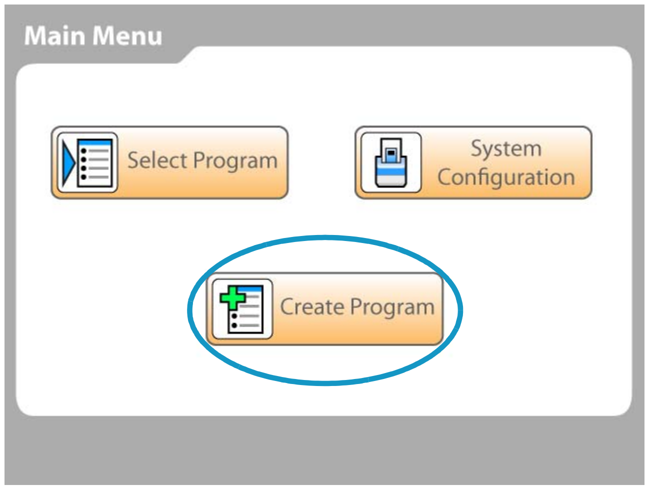
| Selection | Description | Default Setting |
|---|---|---|
| Well Map | Individually select the well locations.<br>The well map displays green colored wells for the start of the dispense, followed by blue colored wells, and ending in red colored wells. | |
| Liquid Class | Select the type of liquid. This will enter corresponding settings for the pipette speed, motions, and internal settings to ensure accurate liquid aspiration (and dispense).<br><br>Typical options include: Water, 1% BSA, Glycerine 30%, DMSO, and Ethanol.<br><br>The liquid class settings make small changes to increase or decrease the number of stepper motor counts required to achieve an extremely accurate volume movement based on liquid type and operating temperature. The settings are generated using a standard volumetric correction factor for the specific liquid type at the temperature range required. | Water |
| Pipette Speed | Select a pipette speed of 1 (slowest), 2,3,4, or 5 (fastest).<br><br>Increase speed to increase throughput. Decrease speed to ensure proper aspiration of more viscous fluid. Consult Thermo applications for recommendations for any changes from the default setting. | A medium speed of 3 is the default setting. |
| Mix Between | "Mix between" consists of dispensing then aspirating and then dispensing again from the same well to mix the fluid in that well. | OFF |
| Mix Between Volume (µL) | Sets the volume of liquid to aspirate and dispense during a mix cycle. | OFF |

16. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See "Creating an aspirate/dispense program (sequence)" on page 94.

## Creating an aspirate/dispense program (sequence)

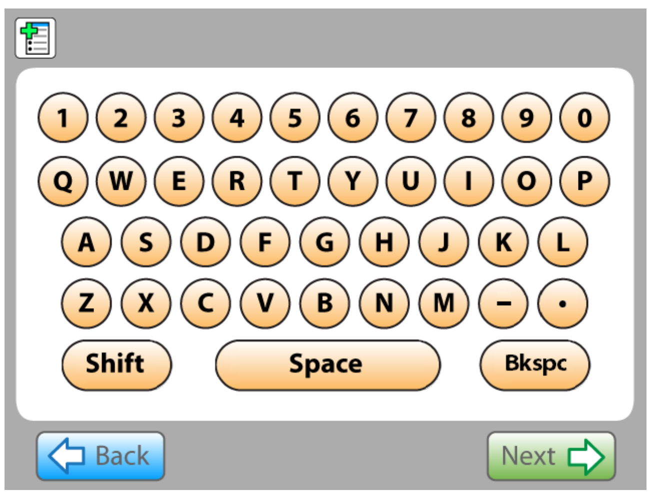
The following example shows a typical on-screen process of creating a program. Each version of software can vary from that shown, but the fundamental process of selecting and editing steps, creating sequences and programs is consistent across all software versions.

1. Select “Create Program” from the Main Menu.




2. Use the keypad to enter a name for the program then press 

.



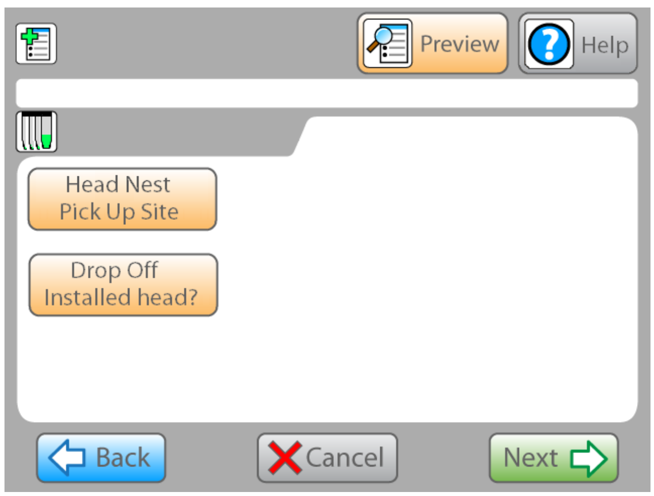

Upper and lower-case keypads are available using the Shift key to toggle between keypads.

3. Highlight the pipette head from the list then press Next.


Use arrows to scroll to multiple pages

List will vary from that shown.

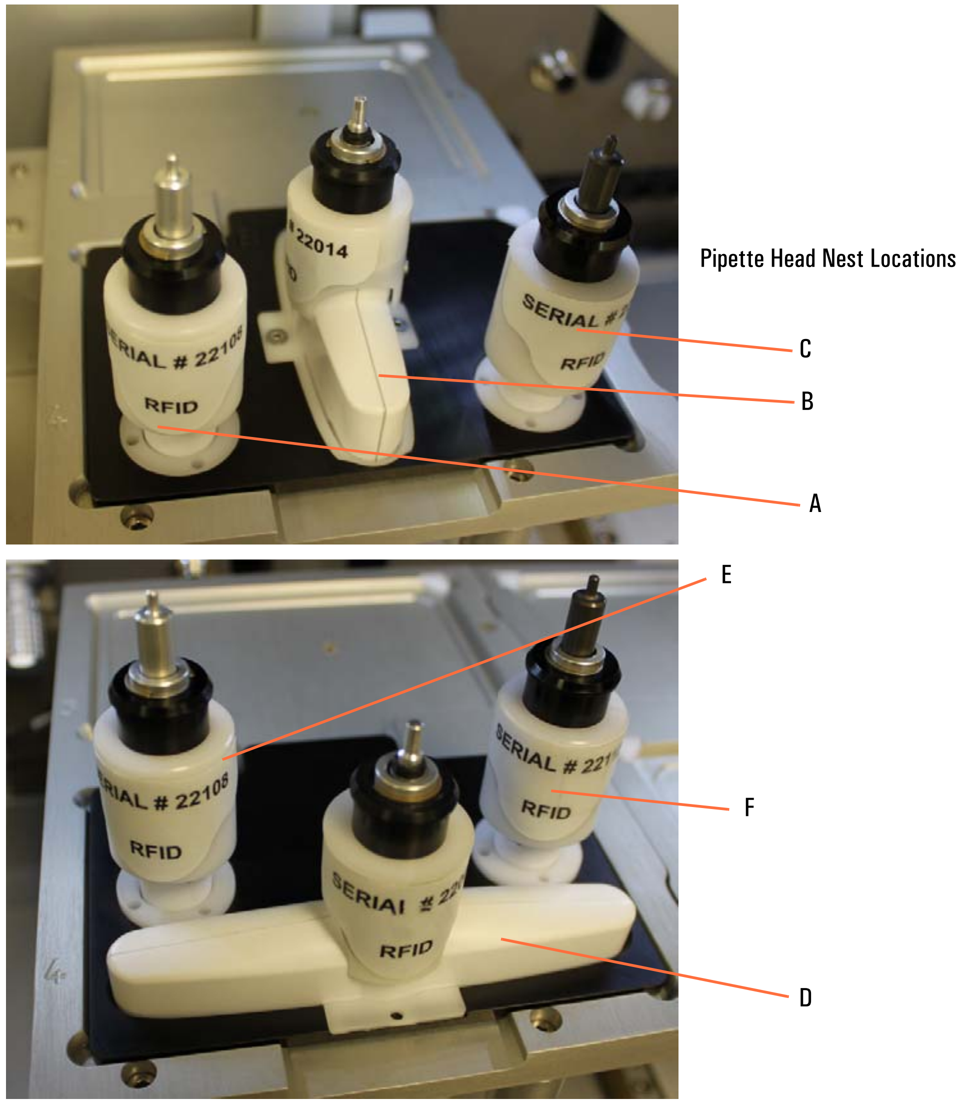
4. For 1-channel, 8-channel, or 12-channel heads, select the Head Substation Pick-up Site and Drop-off Site, or select “Installed” if the head is currently installed, then press Next. See “Using Pipette Head Nests” on page 67 for details.



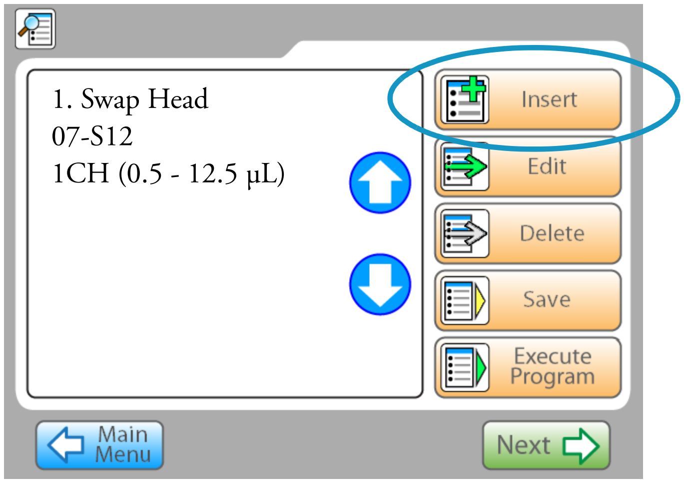

Head substation options include:
Installed - used head installed
Station A, B, C, D, E, or F

5. Station selection will vary based on head type and installed head next. Possible on-board head substation locations are shown below:

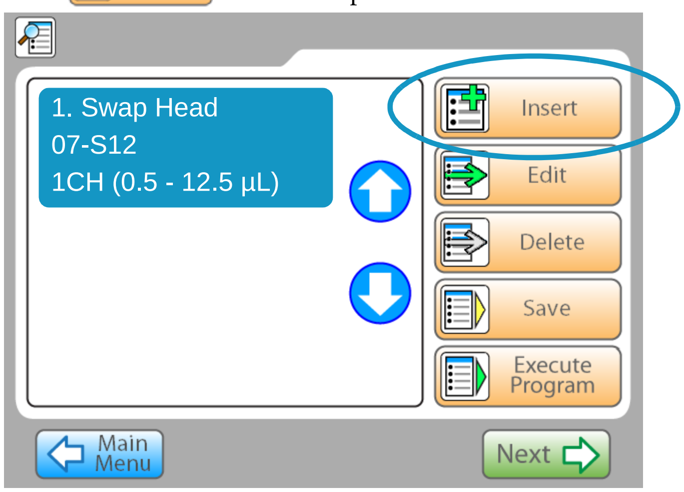
Figure 13. Pipette Head Nest Locations



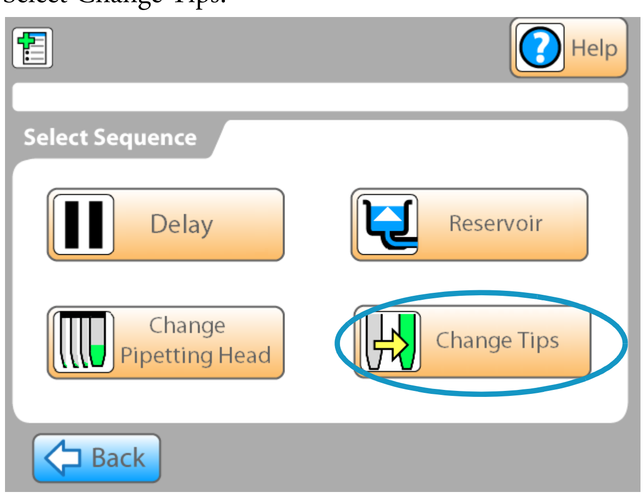
6. Press  to add a step.




7. Press  to add a step.

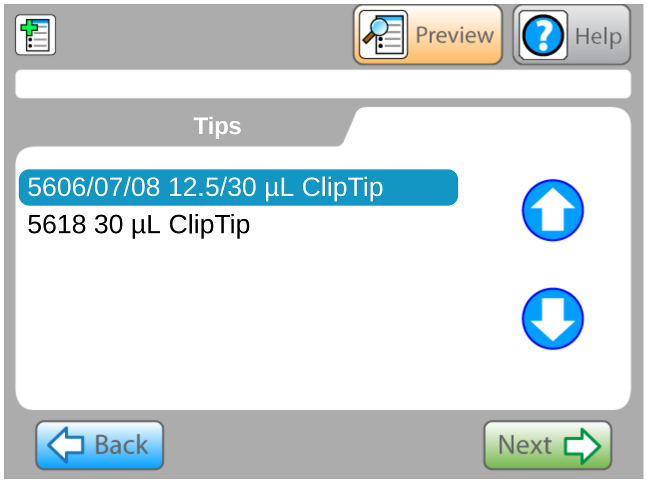



8. Select Change Tips.



9. Use the arrows to highlight the pipetting tip type from the listing, then press 

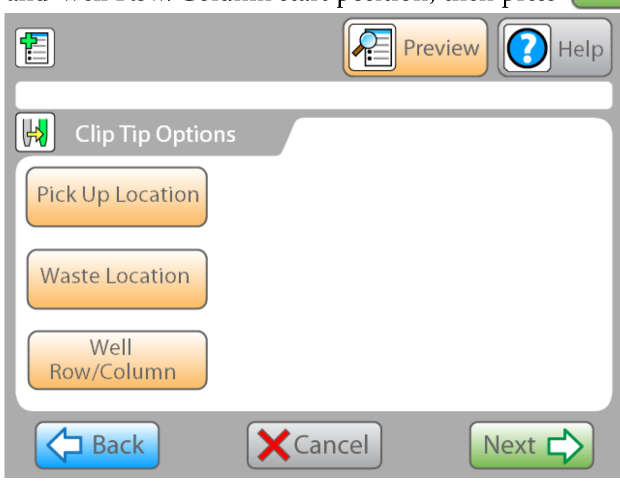
.



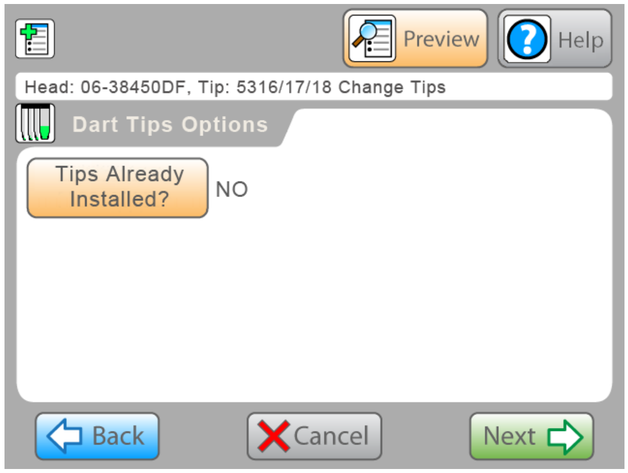

10. The screen display will vary for the type of pipette head previously selected:

If prompted, select the ClipTip options including PickUp Location, Waste Location, and Well Row/Column start position, then press 

.

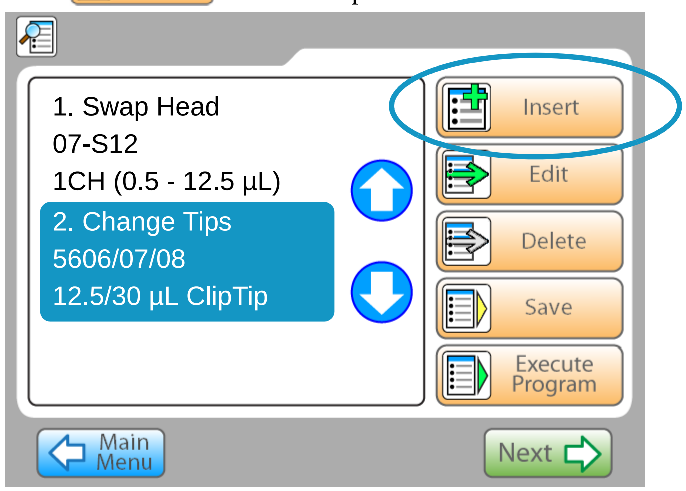


If prompted, tell the system if D.A.R.T tips are already installed in the system (toggle YES or NO), then press 
.



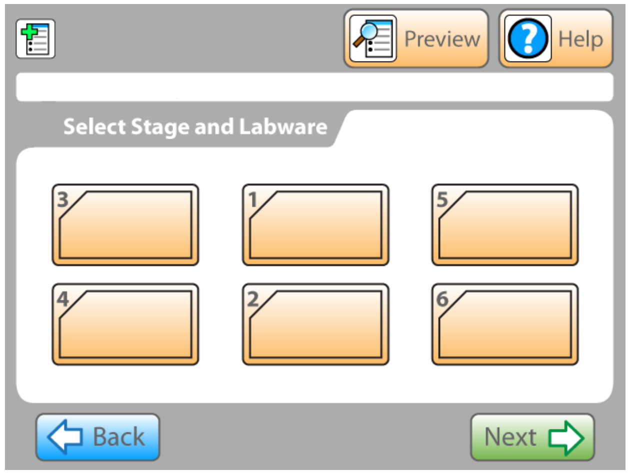

11. Press 

to add a step.

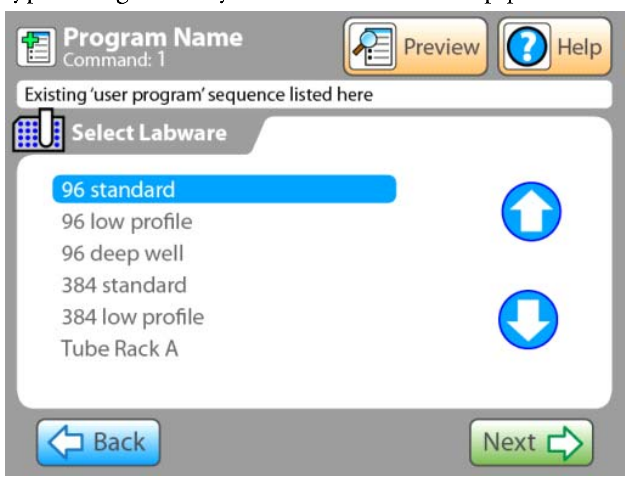



12. Press 
.

13. Select the stage where the pipette/s will aspirate, then press Next.

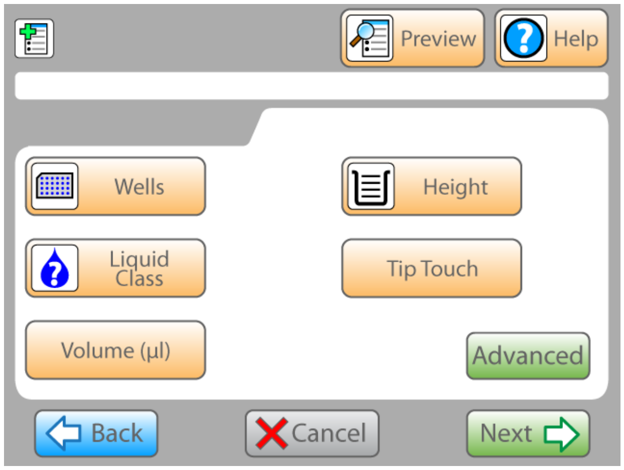


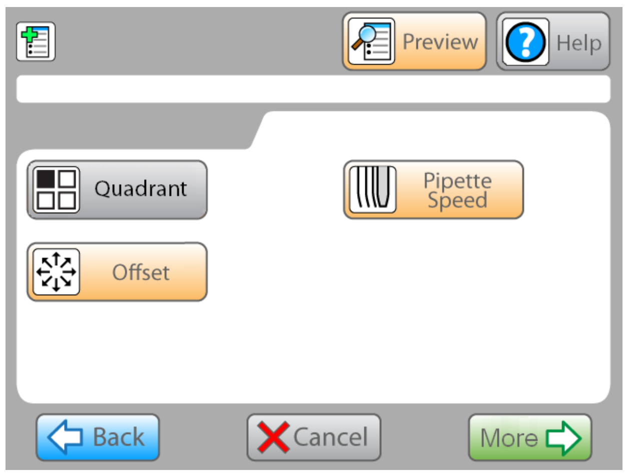

14. Highlight the labware that will be used for aspiration then press Next.The labware type listing will vary based on the selected pipette head.



15. Enter all applicable aspiration variable settings. Select “Advanced” to set advanced settings.
When done, press 

.



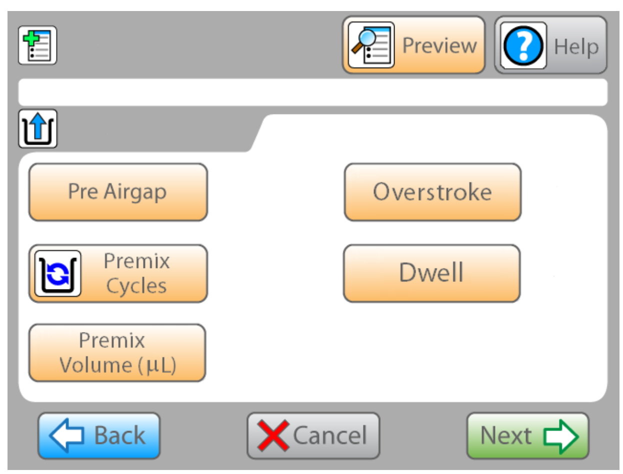
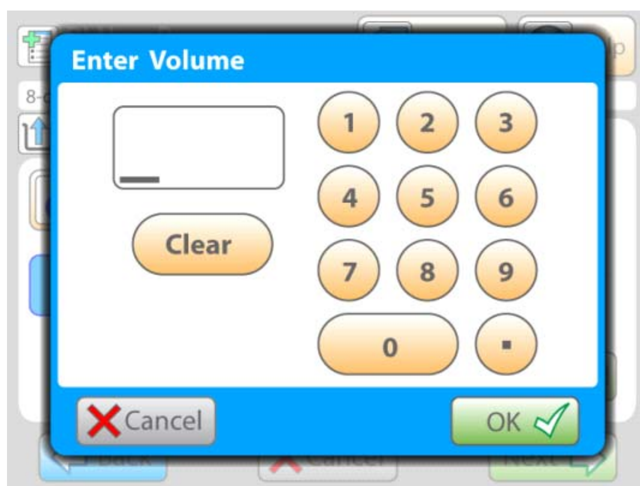
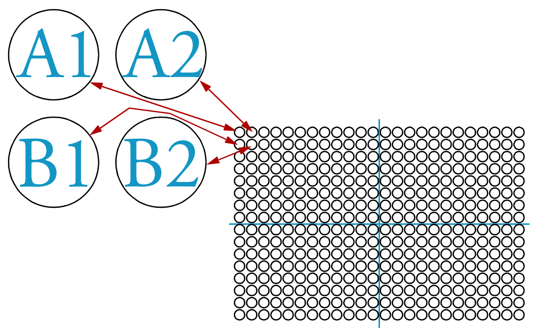
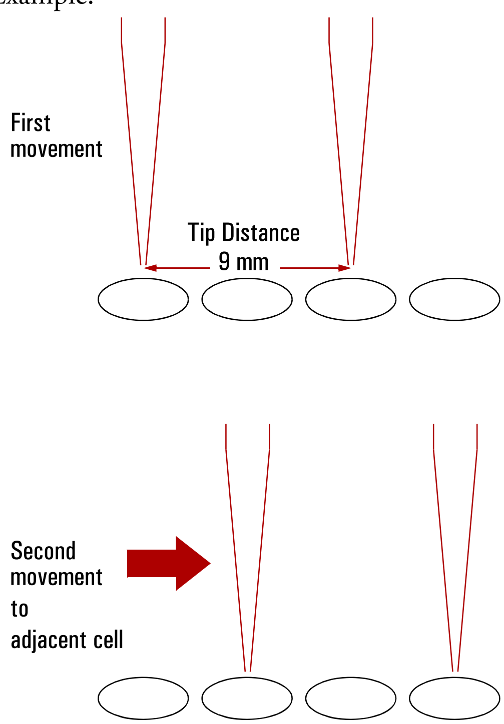
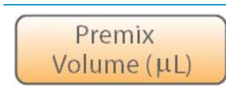
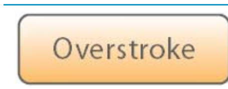



Table 13. Aspirate/Dispense Settings

| Selection | Description | Default Setting |
|---|---|---|
|  | The physical number of wells contained within the vessel. | Defaults to well count for previously selected labware. |
|  | Select the type of liquid. This will enter corresponding settings for the pipette speed, motions, and internal settings to ensure accurate liquid aspiration (and dispense).<br><br>Typical options include: Water, 1% BSA, Glycerine 30%, DMSO, and Ethanol.<br><br>The liquid class settings make small changes to increase or decrease the number of stepper motor counts required to achieve an extremely accurate volume movement based on liquid type and operating temperature. The settings are generated using a standard volumetric correction factor for the specific liquid type at the temperature range required. | Water |
|  | Enter the volume.<br> | |

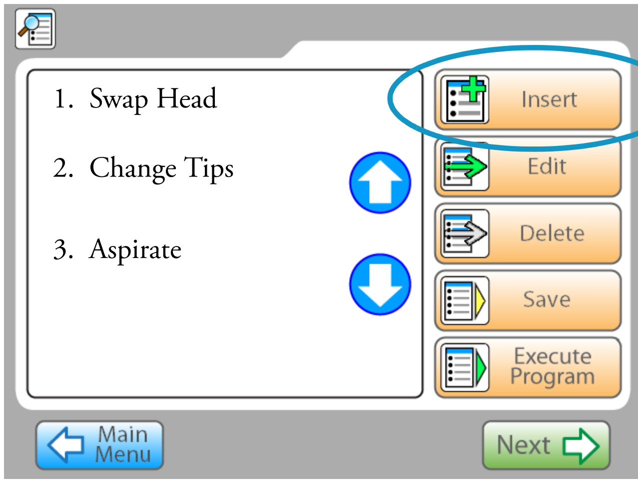
| Selection | Description | Default Setting |
|---|---|---|
|  | The physical height of the vessel. This is measured from the bottom of the plate or tube to the top of the plate or tube. The height is critical for calculating the exact pipette head vertical position for the tips and also for tip touch positioning.<br><br>*You can dispense without warning to the maximum dispensing volume, but once the maximum is exceeded, a warning appears and you have to press **OK** to continue dispensing.<br><br>** The default dispensing height is 1 mm above the selected plate. | Defaults to the physical height of the previously selected labware. |
|  | Use this field to set a value which will be used when positioning the vessel for tip touch off. The value is used to determine how near to the top of the well the tips are positioned, for example a value of 200 1/100mm will position the vessel so that the tips are approximately 2 mm inside the top of the well. | Off |

| Selection | Description | Default Setting |
|---|---|---|
|  | A fixed distance of 9 mm exists between each dispense tip on a 96 multi-tip head. Because of this gap, adjacent tips on the head cannot aspirate from nor dispense to adjacent wells on plates with wells that are located closer than 9 mm apart (most standard plates). To compensate for this, the Versette drives the multi-tip head in what is called “quadrants”, stepping through a plate as shown below.<br><br>Select the starting location--upper left corner to place the pipette tip. Options are A1, A2, B1, or B2.<br><br>*384 well plate*<br><br>Example:<br> | A1 |

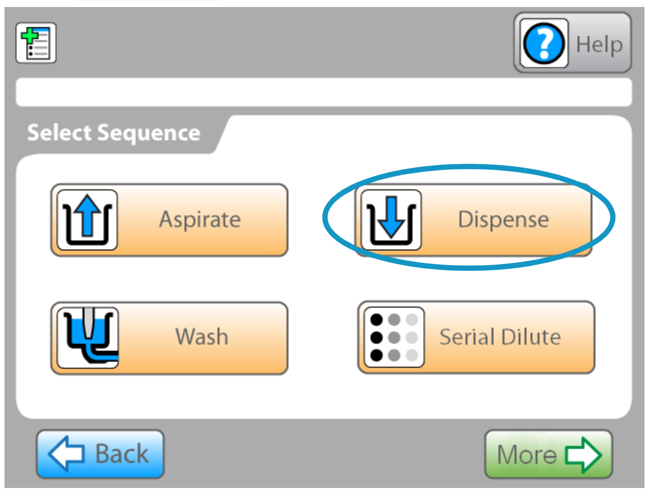
| Selection | Description | Default Setting |
|---|---|---|
|  | Tip/well offset: It may be necessary to position the tips away from the center of each well. For example, when using ultra low volumes it may provide more accuracy by positioning the tips in one of the well corners. | Off (Center)<br>Options:<br>- Back Left Corner<br>- Back<br>- Back Right Corner<br>- Right Side<br>- Front Right Corner<br>- Front<br>- Front Left Corner<br>- Left Side |
|  | Select a pipette speed of 1 (slowest),2,3,4, or 5 (fastest).<br><br>Increase speed to increase throughput. Decrease speed to ensure proper aspiration of more viscous fluid. Consult Thermo applications for recommendations for any changes from the default setting. | A medium speed of 3 is the default setting. |
|  | An air gap can be used to separate fluid in a column (pick up one fluid, then an air gap, then pick up another fluid), or for other advanced uses. Consult applications support. | Off |
|  | Number of cycles to premix. Options are 1 through 10. | Off |
|  | Volume of liquid to aspirate during a premix. | Off |
|  | Select overstroke if this is the first aspirate prior to multiple dispenses. The overstroke sequence will aspirate additional fluid, then return a portion of this liquid to the source. This will ensure that the piston motor is primed and improves volumetric accuracy throughout all subsequent dispense allotments. | Off |

| Selection | Description | Default Setting |
|---|---|---|
| Dwell | Imposes a slight dwell time within the fluid source to allow time for the fluid to saturate the tip, or dwell after dispense to allow time for a full dispense. This can ensure accurate aspiration or dispense. | Off |
| Blowout | Blowout is the command used to move the pipetting head pistons past the “zero volume” dispense point, pushing a small amount of air after the liquid. This command in conjunction with the air gap will aid in pushing any remaining liquid in or on the outer orifice of the tip or needle into the destination labware to completely dispense the liquid. Blowout can be used to overcome capillary action to ensure the complete dispense of all fluid in a pipette. To use the blowout command, aspirate a small volume of air before aspirating the desired quantity of liquid. Dispense as normal, then actuate the blowout to drive the aspirated air, and any remaining fluid, out of the pipette. The extra air volume should be great enough to overcome any capillary action in the small tip orifice. The air volume should be sufficient to assist the separation of the droplet from the tip to the well bottom, but not so great that air bubbles become a problem. Air blowout is often optimized by trial and error. | Off |
| Postmix Cycles | Number of cycles to mix. Options are 1 through 10. | Off |
| Postmix Volume (µL) | Volume of liquid to dispense during a postmix. | Off |

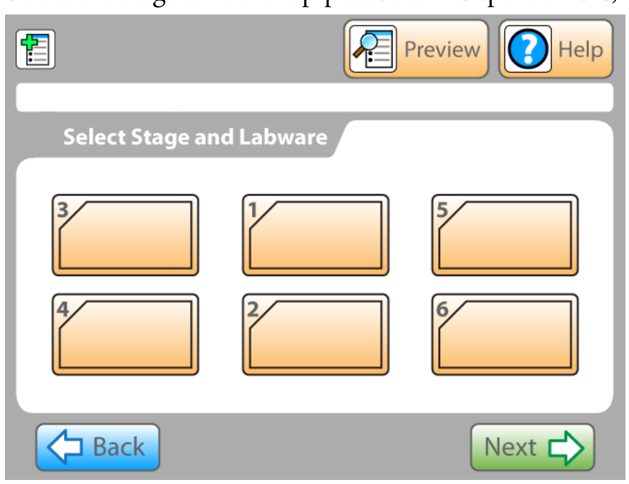
16. Press Insert to add a step.




17. Press Dispense.

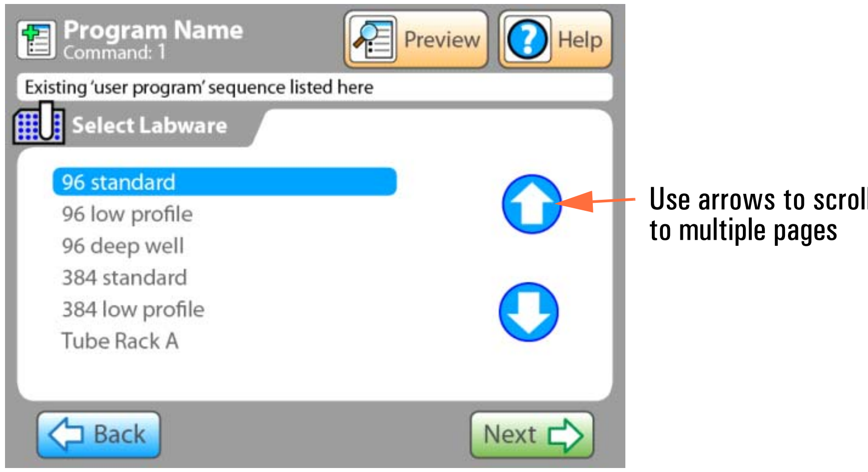



18. Select the stage where the pipette/s will dispense fluid, then press Next.

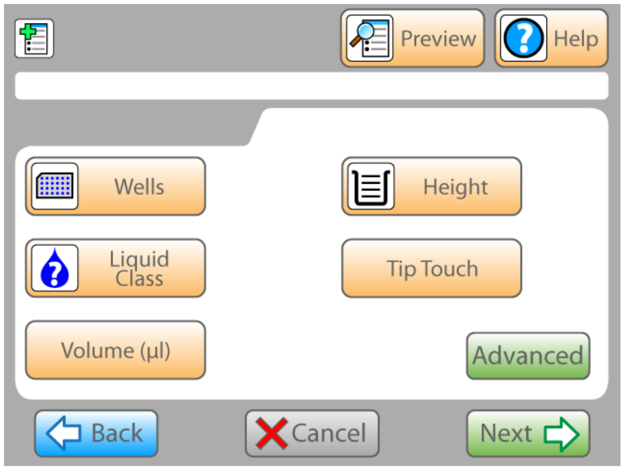


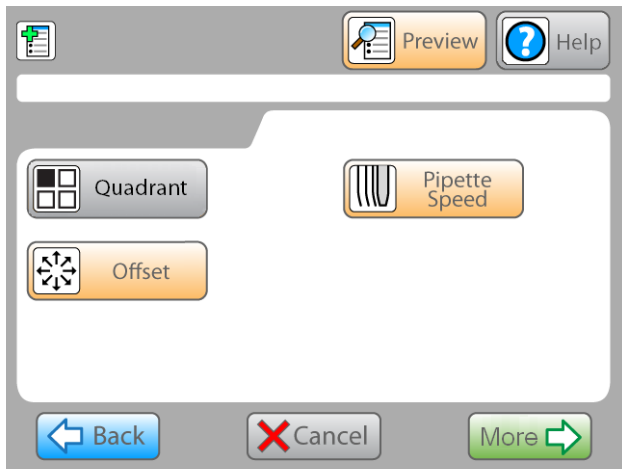
19. Highlight the labware that will be on the dispense stage, then press .

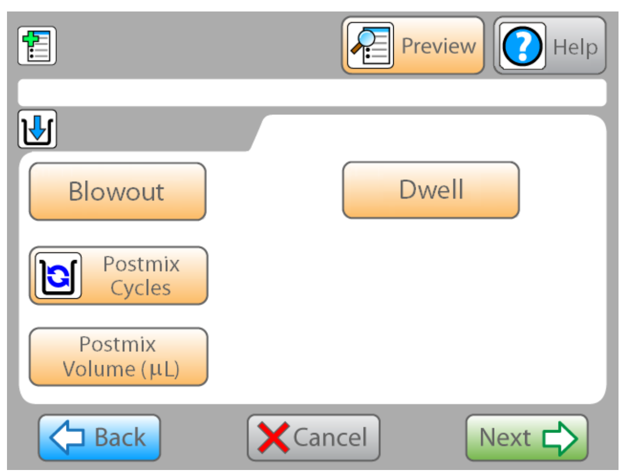




20. Enter all applicable dispense variable settings.
Select “Advanced” to set advanced settings. When done, press .

21. Continue to follow the system prompts to enter any variables. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program.

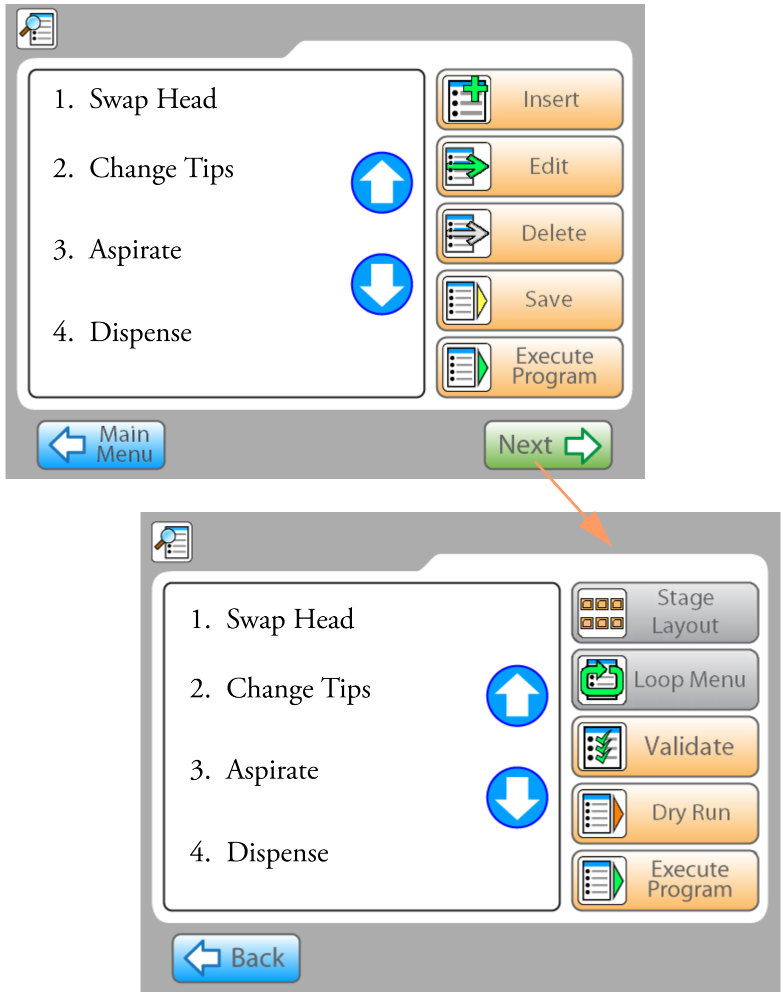



Table 14. Sequence Review Screen

| Selection | Description |
|---|---|
| Insert | Insert a new sequence. |
| Edit | Use the up/down arrows to highlight a step then select Edit Step to make changes to a step or to insert a new step at a given location, or to change the order of the sequences. |
| Delete | Delete the selected sequence. |
| Save | Save the displayed sequence. |

| Selection | Description |
|---|---|
| Execute Program | Begin program operations. |
| Stage Layout | Displays summary of labware for each stage location. |
| Loop Menu | If enabled, allows looping (repeating) of multiple sequences. For example:<br>1. Aspirate<br>2. Dispense<br>3. Delay (to allow changeout of microplate)<br>4. Loop (repeat above steps) 5 times, and optionally incrementing the aspirate and dispense locations. |
| Validate | If enabled, checks program to verify all parameters are applicable. |
| Dry Run | Runs the program in a test mode, without actually aspirating or dispensing any fluid. |
| Back | Return to previous screen. |
| Run Time | If enabled, approximate time to complete the Command List. |

*Note: Not all options are enabled/available on all systems. Consult Thermo for details.

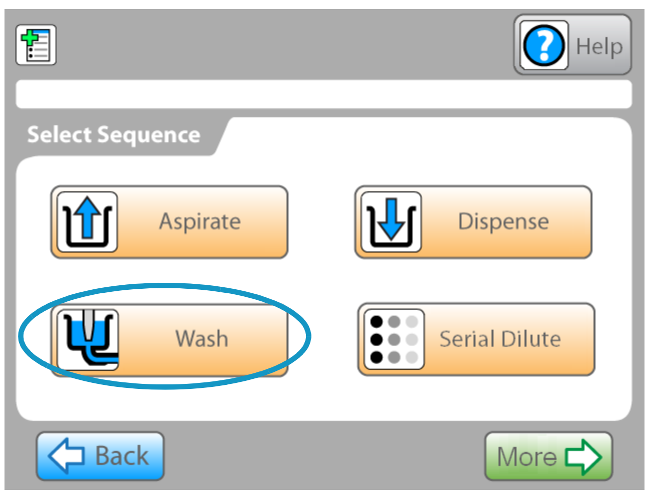
## Wash - Sequence Summary

Washing the tips can remove persistent air bubbles and remove any potential contaminating fluids from the pipette tips. During operation of a wash cycle, the system moves the tip wash station inline with the pipette tip/s. A typical wash sequence is:

1. Blowout all fluid from the tip.
2. Aspirate fresh cleaning solution from the "chimneys".
3. Dispense the wash fluid back into the chimney, or into the waste overflow area.
4. Repeat aspirations and dispenses, as desired.
5. Perform a final blowout of all fluid in the tip/s.

Although tip washing significantly reduces sample carryover by rinsing both the internal and external walls of the D.A.R.T.s tips, carryover is never completely eliminated. To ensure zero carryover it is recommended that D.A.R.T. tips be replaced between sample transfers. See "Change Tips - Sequence Summary" on page 124.

1. Please refer to "Creating an aspirate/dispense program (sequence)" on page 94 for complete details, then from the Select Sequence screen, select "Wash".




2. If prompted, select the wash station from the displayed list. For example, Wash Station 96 or Wash Station 394.

3. Make any changes to the Wash settings, then select the “Next” button when done. Refer to the table below for setting details.

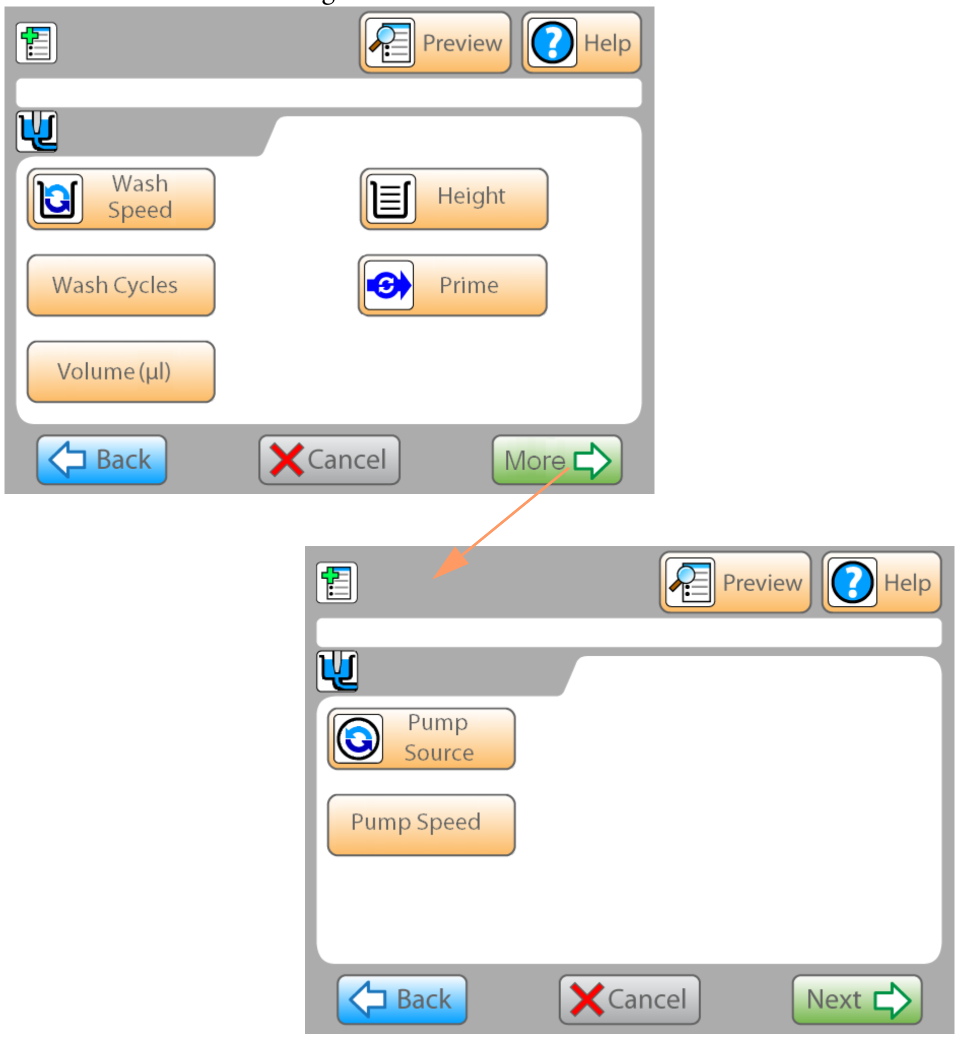
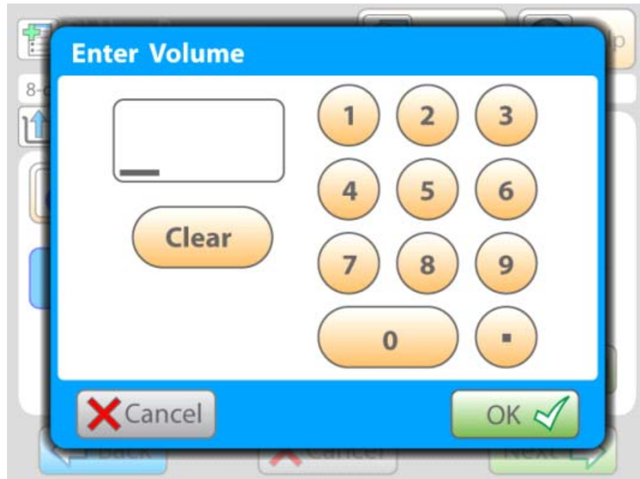



Table 15. Wash Settings

| Selection | Description | Default Setting |
|---|---|---|
| Wash Speed | The optimal wash speed for different liquids are factory set. For example, the optimal speed for water is 3. If a higher density solution is used, it requires a greater speed to move the corresponding volume. You can decrease the speed, for example, to reduce foaming. | 3 |
| Wash Cycles | The number of wash cycles (aspirate then dispense into the wash well or tube). | 3 |

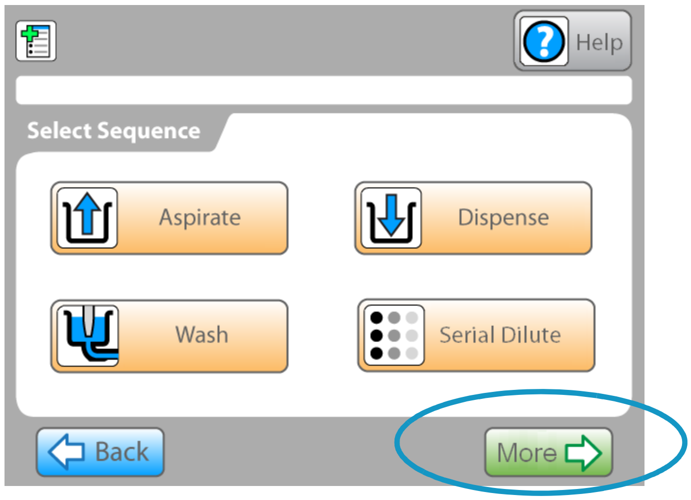
| Selection | Description | Default Setting |
|---|---|---|
| Volume (µl) | Enter the volume of fluid which will be aspirated into the pipette tip and then dispensed back out of the tip.   | |
| Height | Low, medium, or high.<br>The height above the base of the plate well or tube base at which the tip of the pipette will be located during the wash cycle.<br><br>The system determines the position of the tips in the wash station based on the station default measurements. | Medium |
| Prime | | |
| Pump Source | Select the pump that supplies fluid to the wash station. | 1 |
| Pump Speed | Select a pump speed of 1 (slowest), 2,3,4, or 5 (fastest). Increase speed to increase pump speed/speed of operation. Decrease speed to prevent frothing. | A medium speed of 3 is the default setting. |

4. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See "Creating an aspirate/dispense program (sequence)" on page 94. To install and use a wash station, see

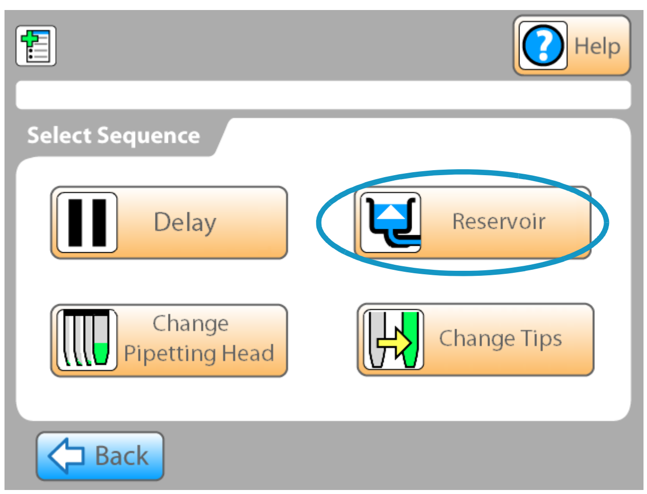
## Reservoir and non-contact fill - Sequence Summary

1. A reservoir can be installed on stage 1 of a 2-stage or 6-stage system. "Use of a Reservoir with the Non-Contact Fill Option" on page 60 for non-contact fill and reservoir setup instructions.

2. Please refer to "Creating an aspirate/dispense program (sequence)" on page 94 for complete details, then from the Select Sequence screen, select "More".




3. Select "Reservoir".



4. Use the reservoir screen system prompts to set reservoir settings (fill and usage.)

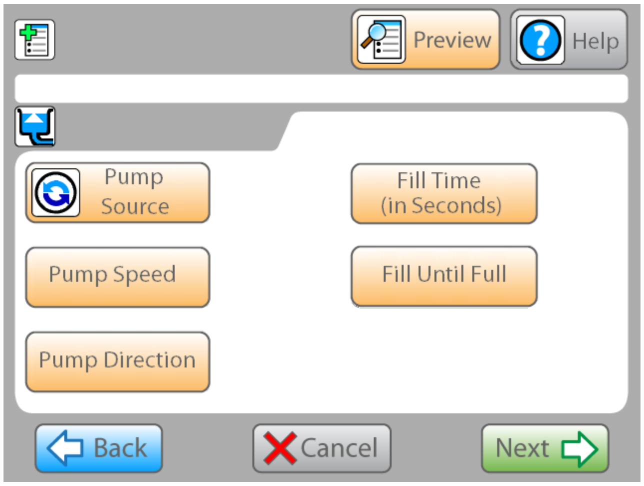



Table 16. Wash Settings

| Selection | Description | Default Setting |
|---|---|---|
| Pump Source | Select the pump that supplies fluid to the reservoir station. Options are pump 1 or pump 2. | 1 |
| Pump Speed | Select a pump speed of 1 (slowest), 2,3,4, or 5 (fastest). Increase speed to increase pump speed/speed of operation. Decrease speed to prevent splashing. | A medium speed of 3 is the default setting. |
| Pump Direction | Set to FILL or DRAIN. | FILL |
| Fill Time (in Seconds) | The fill time can be used to set a defined fill time in seconds.<br><br>Enter a Zero value to turn OFF. This indicates “Fill to Sensor”. | |
| Fill Until Full | When enabled, the reservoir will fill until the sensor detects that the reservoir is full, then shuts off the pump. | |

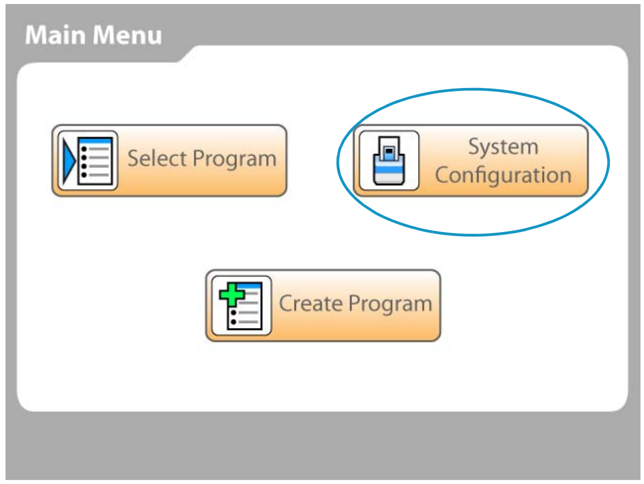
5. Continue to follow the on-screen menus to select any options for the reservoir pumping, location, and/or stage location.

6. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See “Creating an aspirate/dispense program (sequence)” on page 94.

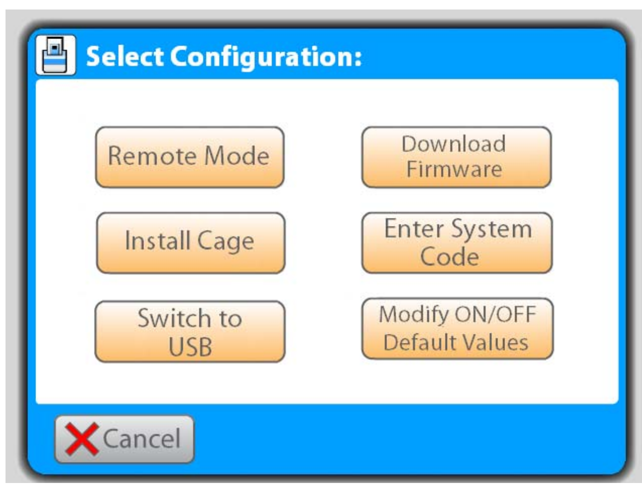
## Installing a Pipetting Module

A pipetting module contains a precision stepper motor and supporting equipment to position a pipette block and/or a pipette head to perform the liquid aspiration and dispense actions.

1. Select "System Configuration" from the Main Menu.

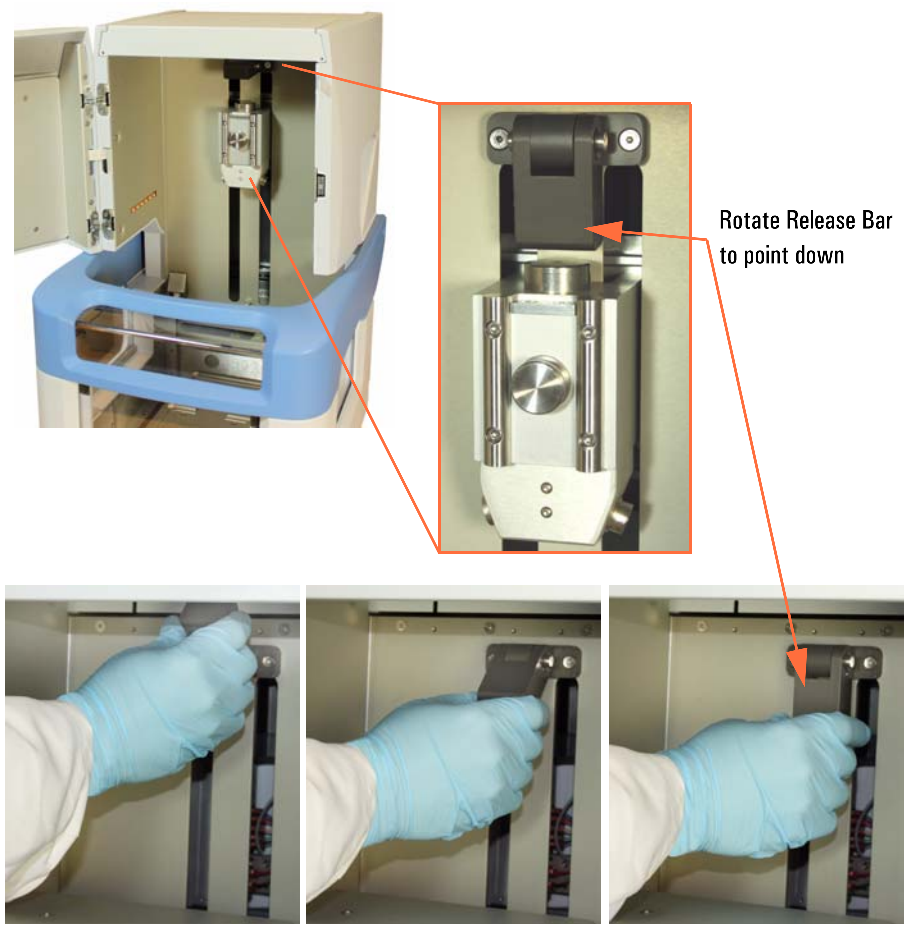



2. Select **"Install Cage"**.



3. Wait for the pipetting module to reach the pre-load position, then open the front door when prompted.


4. Rotate the pipetting module release block to the down position, then close the door and press “Next.” Note: The door interlock prevents motion with the door open.

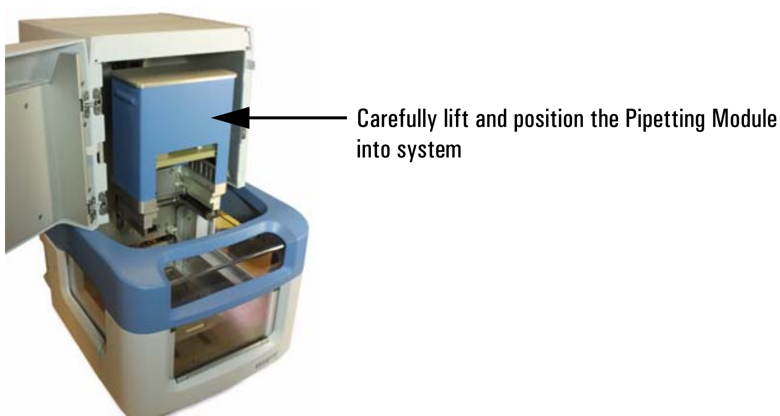



Rotate Release Bar to DOWN position.

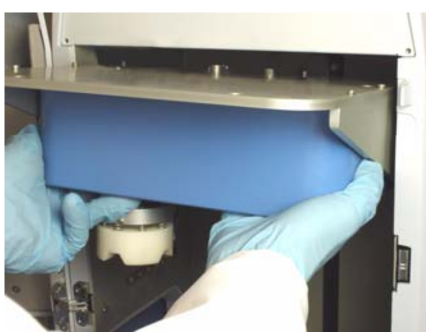
5. Wait for the system to prompt you to open the door again and load the pipetting module.


6. Open the door and install the pipetting module in the system.

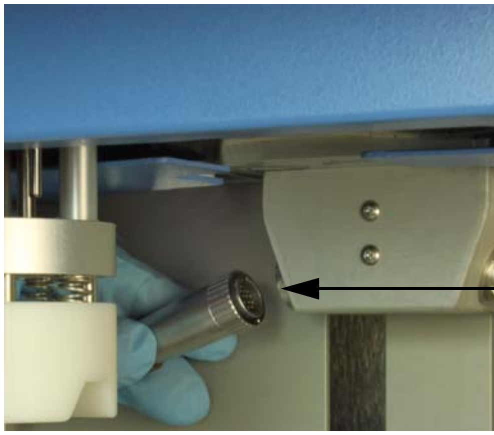
**CAUTION** Use care in lifting the pipetting module as they are heavy (Multi: 22 lbs., Serial: 11 lbs. approx.).▲



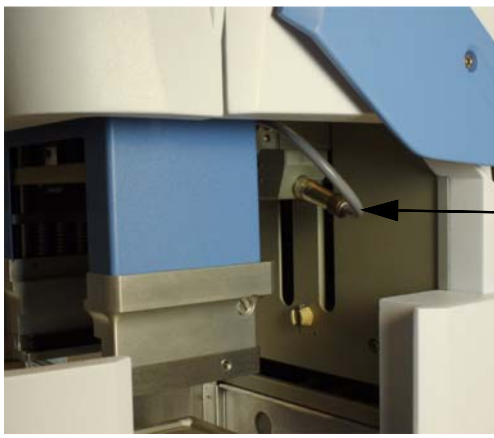

NTC Pipetting Module installation



SMC Pipetting Module installation



SMC pipetting module
Use left-side connector only.

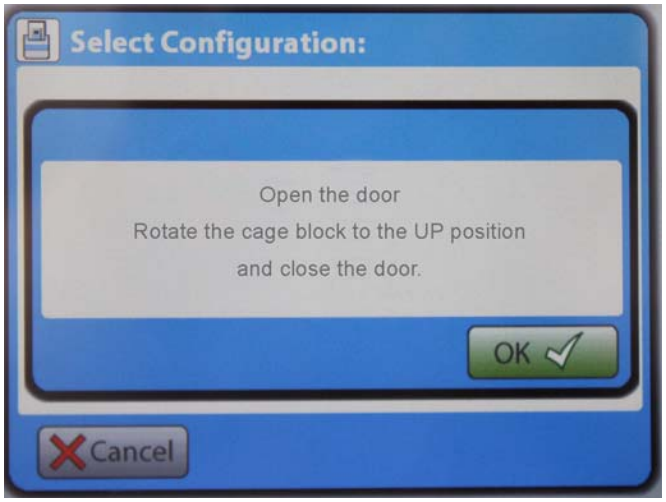


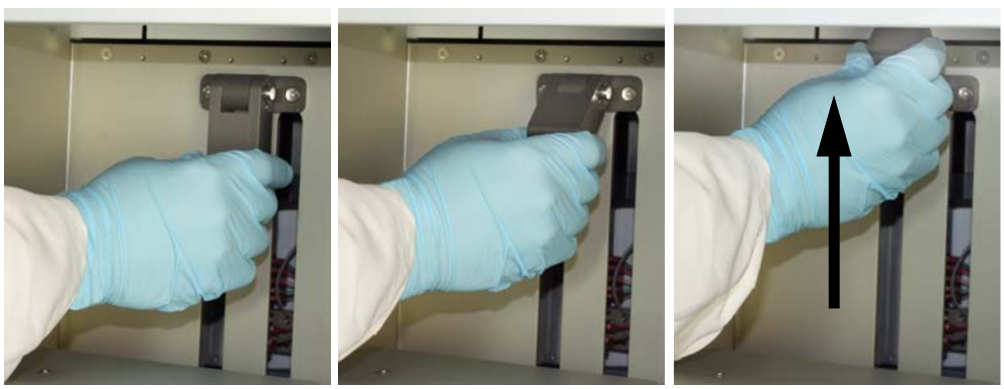
NTC pipetting module:
Use right-side connector only.

Note: connection type may vary per pipetting module type.
Be sure to align any cable "key" to connect the cable and push to lock.

7. Close the door and press "Next."

8. Wait for the pipetting module to move down to the release position, then open the door as instructed, and rotate the release bar to the UP position, as shown. Remove restraining bolt if applicable (serial pipetting module only).



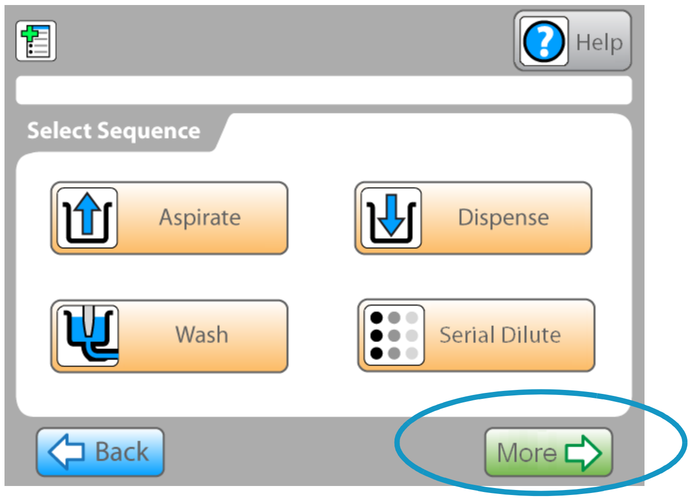
Rotate block to UP position.

## Manual Installation of a Pipette Head

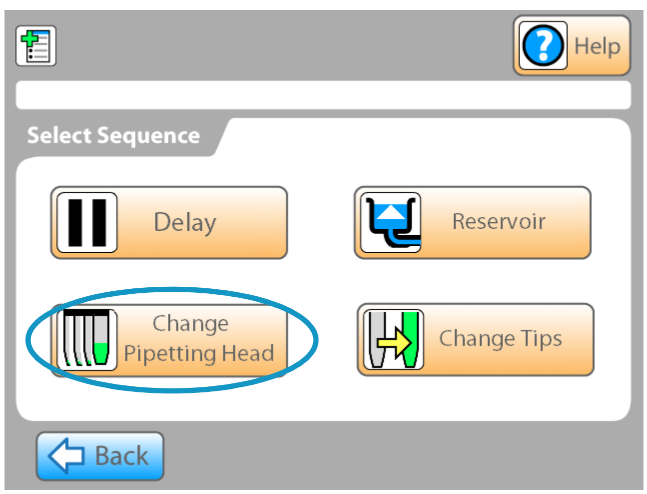
The following steps detail installing a pipette head. See also "Change Tips - Sequence Summary" on page 124.

1. Verify that the pipetting module is properly installed. Refer to "Installing a Pipetting Module" on page 117 for instructions.

2. Please refer to "Creating an aspirate/dispense program (sequence)" on page 94 for complete details, then from the Select Sequence screen, select "More".




3. Select "**Change Pipetting Head.**"

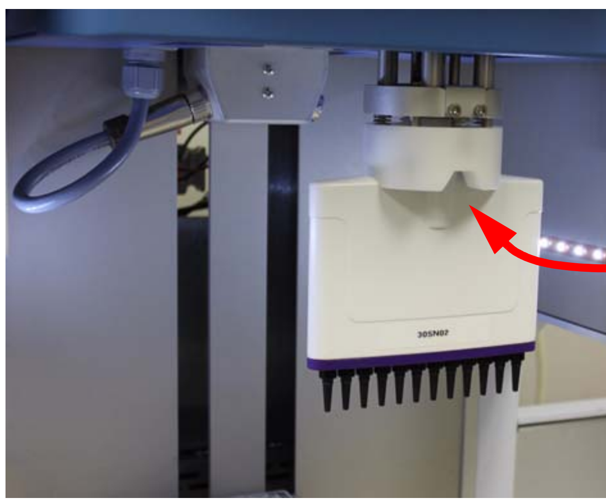


4. Follow the system prompts. Wait for the pipetting module to move to the head loading position, then install a pipette head into the pipetting module. Press the head in until it snaps in place.

**Pipette head loading into NTC Pipetting Module**

**1.** Carefully align pipette head to slide in. **2.** Slide pipette head into pipetting module. **3.** Press into pipetting module until it clicks in place.

**12 - Pipette head loading onto SMC Pipetting Module**




5. Typically, a 1, 8, or 12 tip head can be installed into the system for automatic loading from a head next on 6-stage system. Refer to "Using Pipette Head Nests" on page 67 and follow any system prompts for head and tip options.

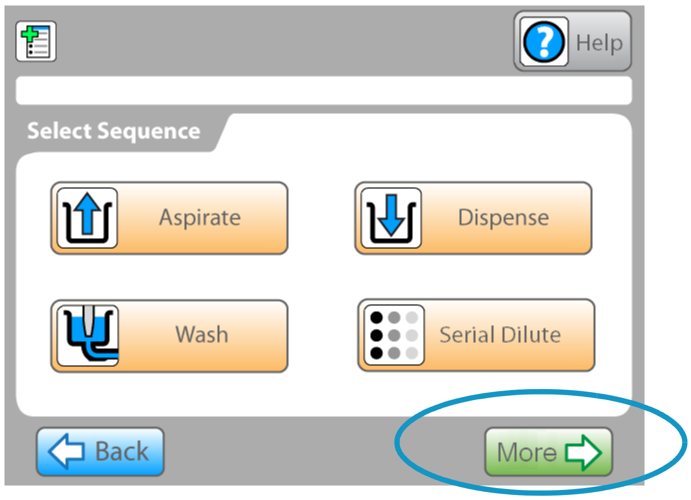
6. When you change heads, the system may prompt you to enter tip details. Complete these items by following the screen prompts, if applicable.

7. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See "Creating an aspirate/dispense program (sequence)" on page 94.

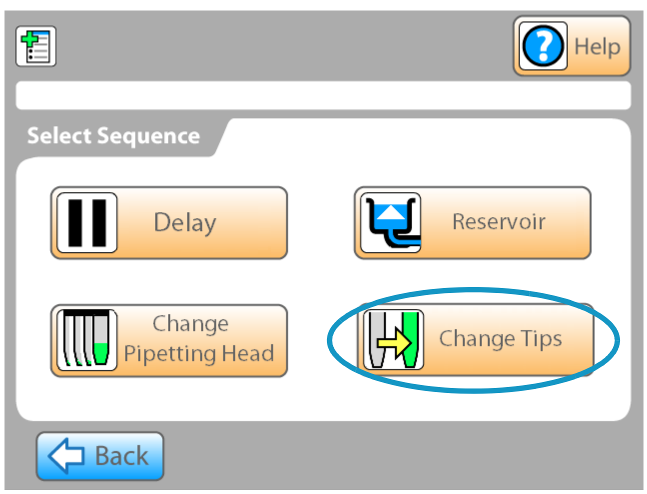
## Change Tips - Sequence Summary

Pipette tips can be replaced quickly and easily in the Versette system. Tips can be changed before a run or during a run. To add the "Change Tips" sequence to a program:

1. Please refer to "Creating an aspirate/dispense program (sequence)" on page 94 for complete details, then from the Select Sequence screen, select "More".



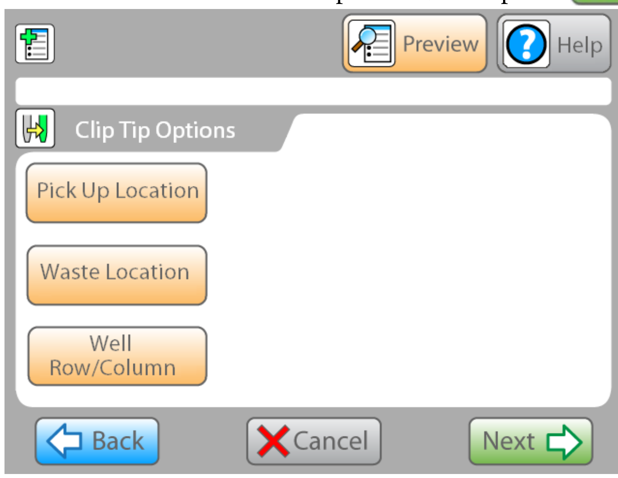

2. Select "More" then select "Change Tips."



3. Follow system prompts which will vary to match the type of head installed in the system. The screen display will vary for the type of pipette head previously selected.
   Tips can be discharged to stage 1 or stage 2 in the system, or tips can be discharged off-stage, through use of an optional tip disposal station. See "Using a Pipette Tip Waste System" on page 64.

   If prompted, select the ClipTip options including PickUp Location, Waste Location, and Well Row/Column start position, then press 

.




   If prompted, tell the system if D.A.R.T tips are already installed in the system (toggle YES or NO), then press 

.

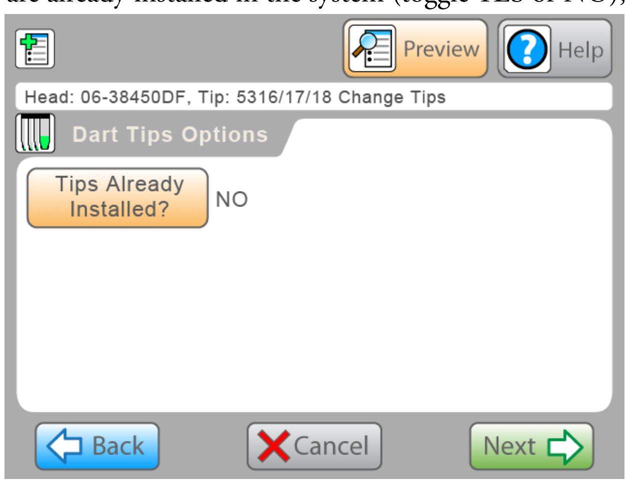


Table 17. Tip Change Settings

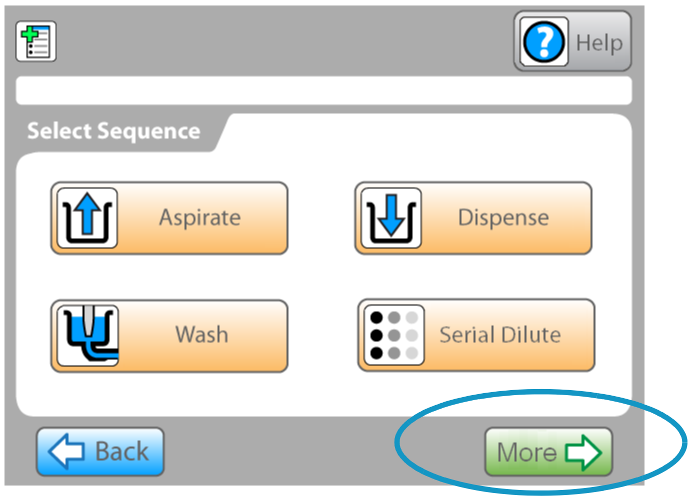
| Selection | Description | Default Setting |
|---|---|---|
| Pick Up Location | Pickup location can be stage 1 or stage 2. | Stage 1 |
| Waste Location | Waste location can be stage 1, stage 2, or offstage, for use with an automatic tip ejector. See “Using Tube Adapters” on page 133. | Stage 2 |
| Start Well Row/Column | Select the location to begin pickup one or more tips. Use the arrows to highlight the row or column, depending on head type. | COL 1 |

4. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See “Creating an aspirate/dispense program (sequence)” on page 94.

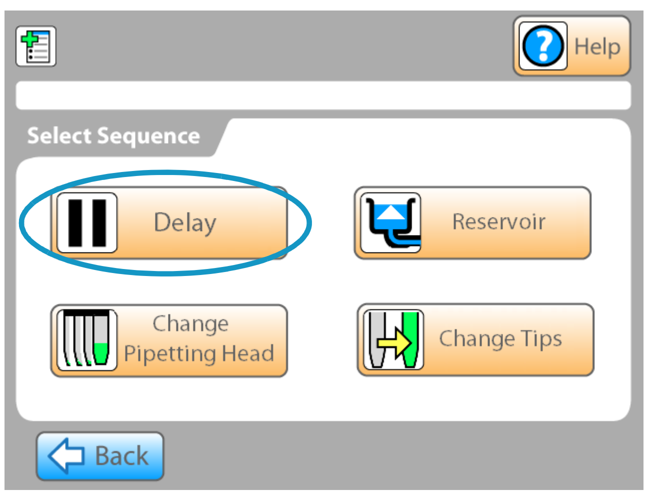
## Delay - Sequence Summary

A delay sequence allows a programmed automatic timed delay, or prompts the operator to perform to take an action. To add the "Delay sequence to a program:

1. Please refer to "Creating an aspirate/dispense program (sequence)" on page 94 for complete details, then from the Select Sequence screen, select "More".




2. Select "Delay".



3. Enter a delay in seconds, or select "Wait for User" then enter a custom message if desired. Refer to table below.

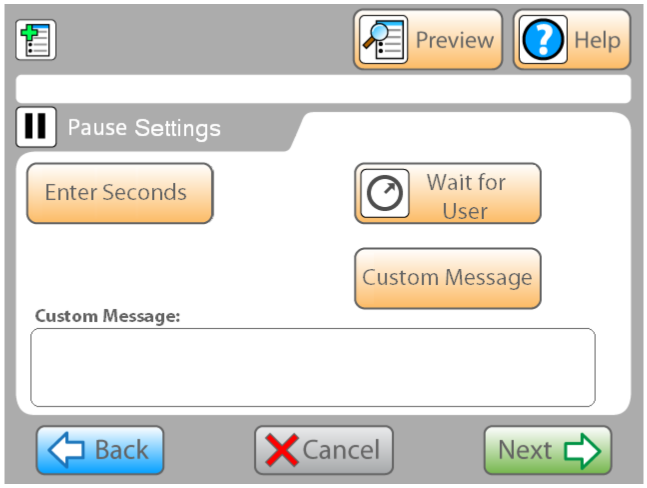



Table 18. Delay Settings

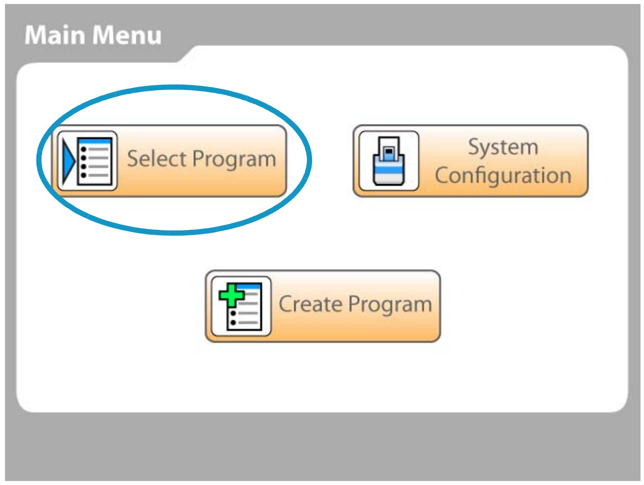
| Selection | Description | Default |
|---|---|---|
| Enter Seconds | Enter the number of seconds to wait before proceeding to the next step. | 0 |
| Wait for User | Select to delay until the user responds to a system prompt. | No |
| Custom Message | Select to enter a custom message to the user. This message will be displayed during the delay cycle. | Off |
| Custom Message display | Displays custom message. | Select "OK" to resume Versette Operation |

4. When all parameters are set, the Command List screen will display. From this screen, you can scroll through your program and test each step or execute the full program. See "Creating an aspirate/dispense program (sequence)" on page 94.

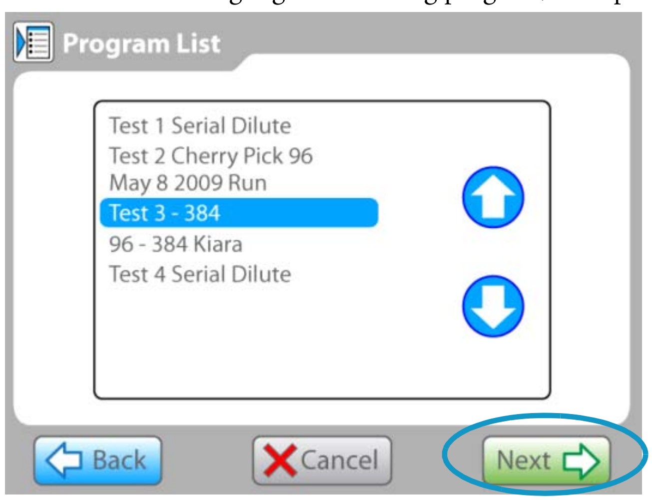
## Selecting a Program

To select and run an existing program:

1. Choose “Select Program” from the Main Menu.




2. Use the arrows to highlight an existing program, then press the Next button.




3. Use the up/down arrows to highlight a program then press the Next button. The recipe will be displayed. Changes can be made on the displayed screen or the recipe can be run.

## System Configuration

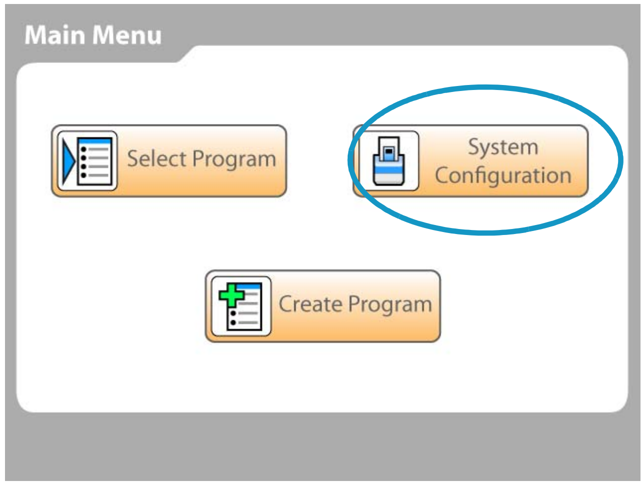
The System Configuration screens provide access to advanced functions, summarized below. Refer to the on-board software for any updates.

Table 19. System Configuration Options

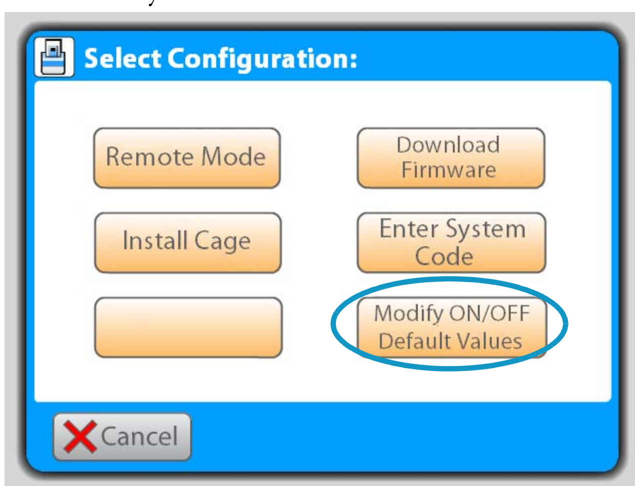
| Selection | Description | Default |
|---|---|---|
| Remote Mode | Selects Remote Mode operation to allow use of the system by a remote computer, for example, a laptop running ControlMate software. | Local |
| Install Pipetting Module | Follow prompts to install pipetting module. See "Installing a Pipetting Module" on page 117, and "Manual Installation of a Pipette Head" on page 122. | |
| Download Firmware | Download firmware updates as directed by Thermo. | |
| Enter System Code | Allows the user to enter service commands (service and advanced troubleshooting codes), if applicable for the system. | |
| Modify ON/OFF Default Values | Set default values for speed, cycles, volumes, and other actions as provided in the particular software release. Refer to example instructions below. | |

Various default speeds, cycles, volumes and other actions can be configured by the user, as provided via the on-board software screen programming. Examples are shown below. Please refer to the on-board software installed on a particular system for any updates, limitations, and/or changes.

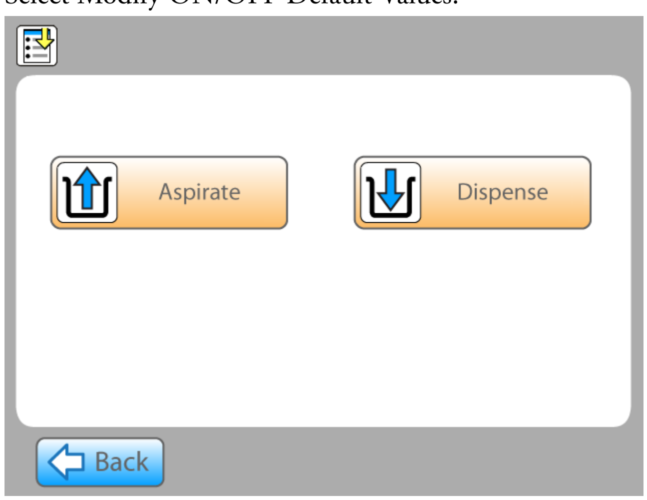
1. Choose “Select Program” from the Main Menu.




2. Select Modify ON/OFF Default Values.




3. Select Modify ON/OFF Default Values.



4. Select an item then enter a default value.

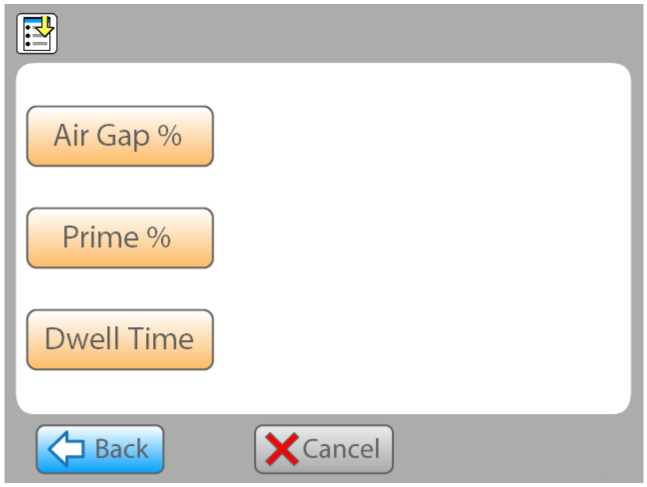



Table 20. System Default Options

| Selection | Description | Default |
|---|---|---|
| Air Gap % | A percentage of the programmed aspiration volume which is used to create additional movement of the aspirate/dispense piston(s). The air gap can then be used to fully push the entire desired volume out of the pipette during dispense. See system optimization section of this manual. | 1% |
| Prime % or Overstroke % | A percentage of the programmed aspiration which is then used to move the piston head to add additional fluid to the aspiration. | 1% |
| Dwell Time | A value of 0.5 to 5.0 seconds.<br>During aspiration, the tip will stay in the liquid source for the dwell time entered.<br>During dispense, the tip will wait for the dwell time entered, before moving to its next commanded location. | |

# Using Tube Adapters

Tube adapters are available for placement of various tubes in the system. A variety of styles are available. Contact Thermo for ordering information.

# System Shutdown

## Emergency Interrupt

In case there is any abnormal situation during operation, such as fluids spilling inside the instrument, follow the steps below:

1. Switch OFF the instrument.
2. Unplug the instrument immediately from the power supply.
3. Carry out appropriate corrective measures. However, do not disassemble the instrument.
4. If the corrective measures taken do not help, contact authorized technical service or your local Thermo Scientific representative.

## Normal Shutdown

Normal system shutdown may include removal of fluid vessels from the stages, removal of pipette tips, flushing/cleaning of all tubing, and powering off the system.

1. Remove used tips from the system.
2. Remove source fluids from the system.

3. Flush all tubing (connect inlets to cleaning solution) with appropriate fluid to clean any reagents or other fluids from the tubing lines. Use caution to select a cleaning fluid that is compatible with the source fluid you are using.
4. Perform a final flush of all tubing with distilled water.

   **IMPORTANT** The flush time will vary for the cleaning solution you have used. It is essential that all cleaning solutions are removed from the inlet tubing to prevent future cross-contamination.▲
5. Remove all plates, tubes, reservoirs and related accessories from the system and properly clean and dry the items.

   **CAUTION** Typically, all vessels are properly cleaned per individual laboratory requirements. Follow your facility's instructions and all local and national regulations for proper cleaning and/or disposal.▲
6. Turn off the system power switch.

# ControlMate Software

**ControlMate** is a Windows®-based application that provides a graphical user interface for creating and running pipetting programs. From this application you can create and run a variety of pipetting operations, from repetitive liquid transfers to complex pipetting sequences.

Because the **ControlMate** software is tightly integrated with the ***Versette*** instrumentation, you can control all ***Versette*** functions from the software, such as: changing tips and pipette heads, or fine-tuning plate movements to handle delicate pipetting operations (e.g., transferring or mixing liquids in 1536 micro wells).

This section covers software installation and setup. Refer to the ***ControlMate User's Guide*** for use instructions.

## Minimum System Requirements

### Computer minimum requirements:

- Computer running Microsoft® Windows 95/98/NT/XP/Vista®/Windows® 7*
- CD-ROM drive for installation

*Download and installation of the WinHlp32.exe file may be required to display ControlMate software Help files that have the ".hlp" file name extension on Vista and Windows 7 systems. Downloads are available at www.microsoft.com/downloads.

### Computer interface requirements:

RS-232 Serial connector (or USB connection on systems with USB connector enabled)

Serial connector details

- Serial RS-232C
- 115,200 bps
- 8 data bits
- 1 stop bits
- Parity: none

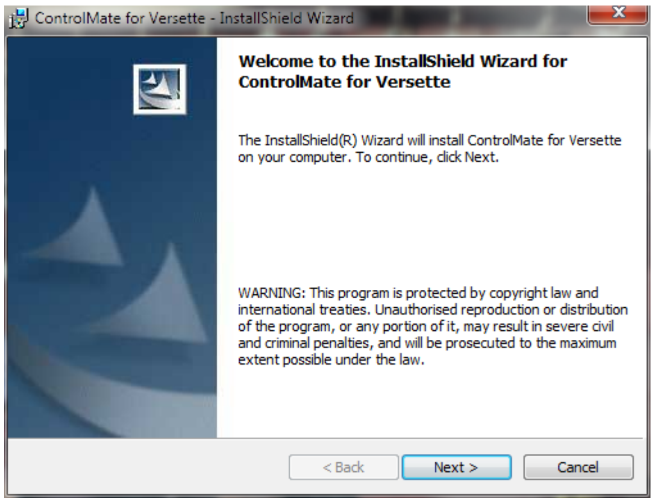
# Installing ControlMate

The ControlMate software can be used from a CD, a flash drive, or installed from a common directory or server. The software can be download from http://controlmate.net/.

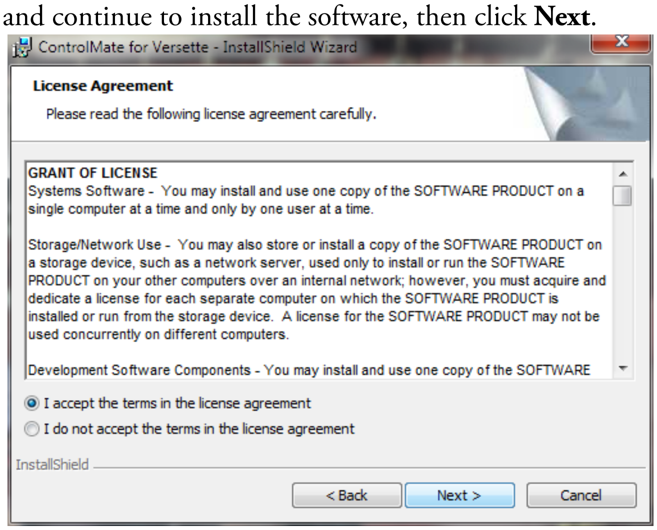
1. Start Windows and locate the **Versette.exe** file on your hard drive, flash drive, common drive, network, or CD.

2. Double-click on the **Versette.exe** file to launch the installation program.

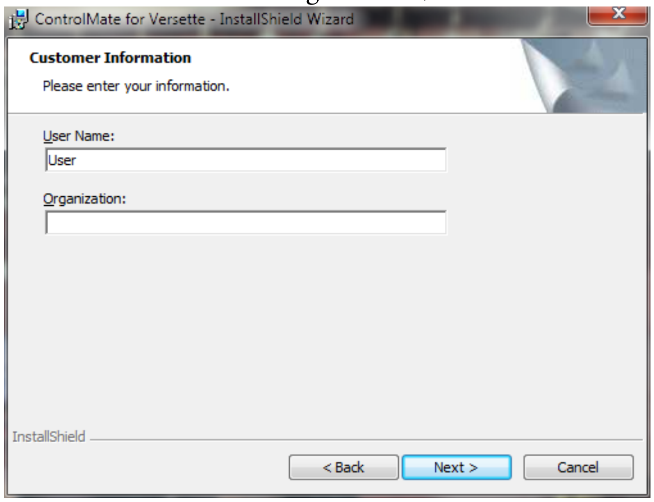
3. At the InstallShield Wizard, click **Next**.



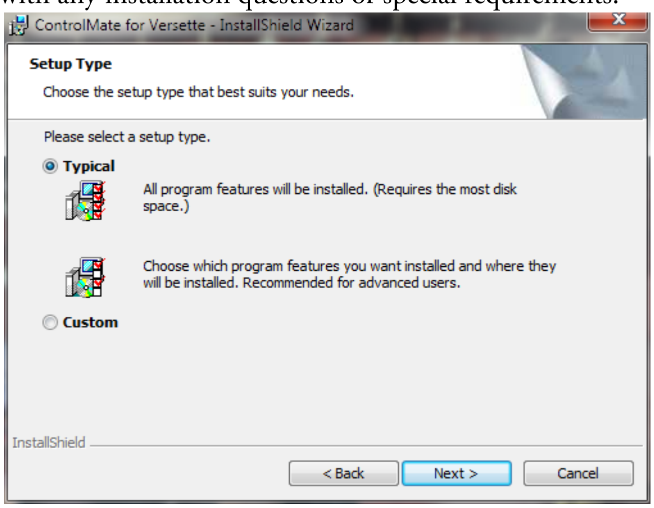

4. Read the License Agreement, select “I accept the terms in the license agreement” to agree and continue to install the software, then click **Next**.



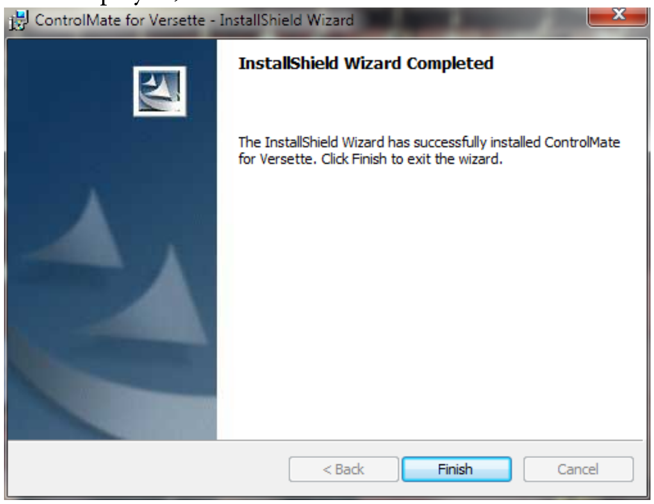
5. Enter a User Name and Organization, then click **Next**.




6. At the Setup Type screen, click **Next** to select "Typical" installation, or select "Custom" then click **Next** to enter a custom directory or other options. Consult Thermo Scientific with any installation questions or special requirements.



7. Wait for the ControlMate files to copy to your installation directory, then click the **Finish** when displayed, to exit the wizard.




8. Refer to the ***ControlMate User's Guide*** for use instructions.

# Frequently Asked Questions

## Q&As

What liquid is recommended for washing fluid lines?

Distilled and filtered laboratory grade water and/or a detergent solution, for example, filtered 1% Micro-90, followed by distilled and filtered laboratory-grade water.

What should you do if the liquid foams during dispensing?

Some liquids foam more easily than others. One option is to reduce the dispense speed. There are five dispensing speeds available: 1 to 5 with 1 being the slowest speed.

Do you need specific plate adapters for the Versette?

No, the Versette has a fixed plate adapter and does not use any external plate adapters except for use with accessories (for example, tube adapters).

Where can you see the Versette internal software version number?

The software version number is displayed on the System Configuration menu or select Help “About” if available. The software version is alway available on the main menu with certain software releases.

# Calibration for SMC Pipetting Modules Only

Follow this procedure to calibrate the coordinates for a system that uses an SMC pipetting module only.

Refer to "Calibration for NTC Pipetting Modules Only" on page 189 for use of an NTC pipetting module only.

Refer to "Calibration for SMC and NTC Pipetting Modules" on page 219 for use of an SMC and an NTC pipetting module in the same system.

**Contents**

# Calibrating the System Coordinates

## Purpose/summary

All systems are calibrated at the time of manufacture. Due to the precise nature of the equipment's motions, the "coordinate calibration" needs to be verified, and minor adjustments are typically required, upon installation. Calibration consists of placing "teach tools" in the system and moving the system stages and pipetting module to pre-defined coordinates. Minor adjustments to the precise calibration locations help to ensure precise aspiration and dispense.

## When to calibrate the system

The system's coordinate system should be calibrated upon installation and whenever the system is moved. The coordinate system can also be verified and/or adjusted at periodic intervals as determined by the usage and end-user. Calibration can take several hours to properly complete for a 6-stage system with multiple pipette options and accessories.

## Coordinate system

The coordinates used on the ***Versette*** system are standard geometric coordinates, with an added "S-axis" (syringe axis), listed below:

- X-axis: left-to-right position
- Y-axis: front-to-back position
- Z-axis: up and down (height) position
- S-axis: 'Syringe" axis, a special height coordinate for use with the SMC pipetting module only, to properly calculate coordinates for head pickup and drop-off heights for use with optional head-nests, and for pickup and drop-off heights for disposable tips, etc.

## Skill level

Coordinate calibration is typically performed by a trained professional but can be performed by most technicians who understand how to use the ControlMate software, are familiar and comfortable with working on precision equipment and with working with Windows software, and who understand basic X-axis (left-to-right), Y-axis (forward-to-back), and Z-axis (vertical) coordinate systems. The coordinate system is referenced from the front of the machine where the operator stands.

The following procedures use ControlMate software to calibrate the coordinate system. Modify as necessary for a 2-stage or 6-stage systems. Refer to the *ControlMate User's Guide* for additional information on the use of ControlMate software.

## Versette system calibration flowchart

The calibration process varies for the type of pipetting module in use with the system. All calibration steps require the use of the Calibration Plate. The methods are shown below:


Figure 14. Versette Calibration Master Flowchart

# Required Equipment

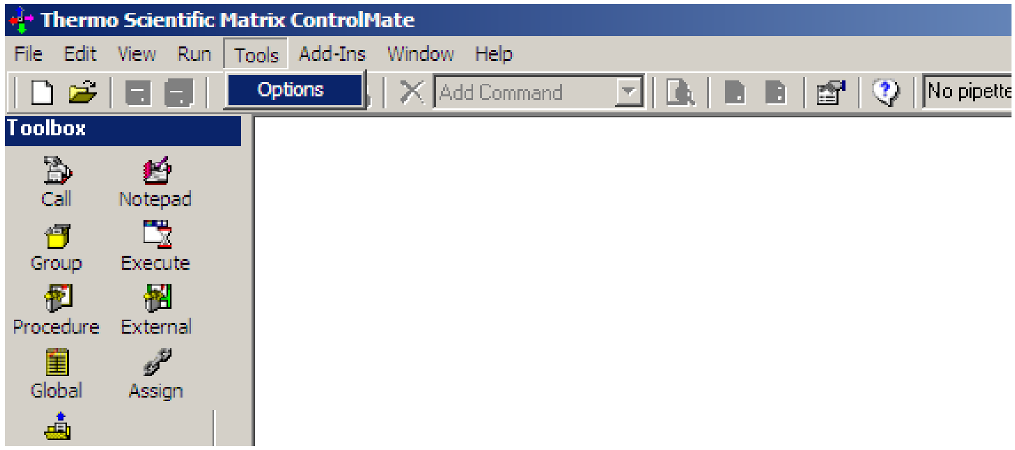
- ***Versette*** system with 2-stage or 6-stage assembly
- ControlMate software, installed on computer or laptop with communications cable
- Calibration Plate
- SMC Teach Tool

# BEFORE CALIBRATION

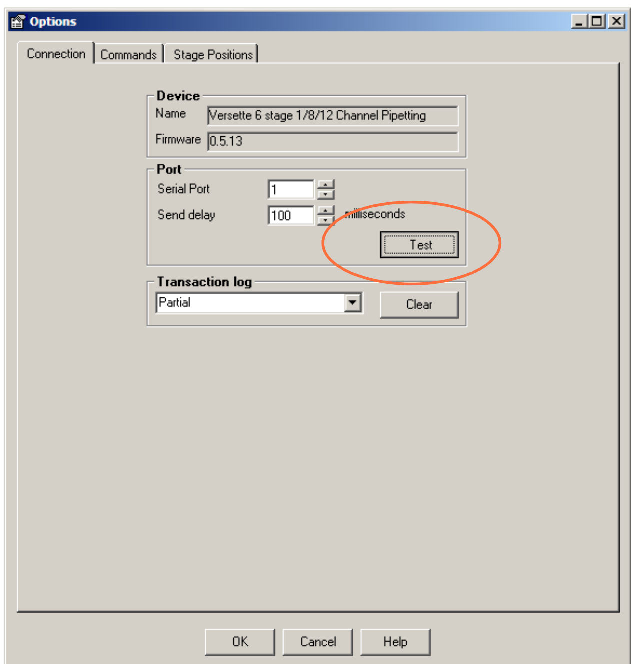
## 1: Verify Communications with the Versette System

1. Verify that the stage unit has been installed properly in the system.
   See Installation section of the Versette manual.
2. Connect the ***Versette*** to a computer running ControlMate software.
3. Verify that the ***Versette*** is operating in Remote mode. The "On Board" button will display on the main screen. If not in Remote mode, from the Main Menu select **Configuration** then **Remote Mode** to switch to remote mode.

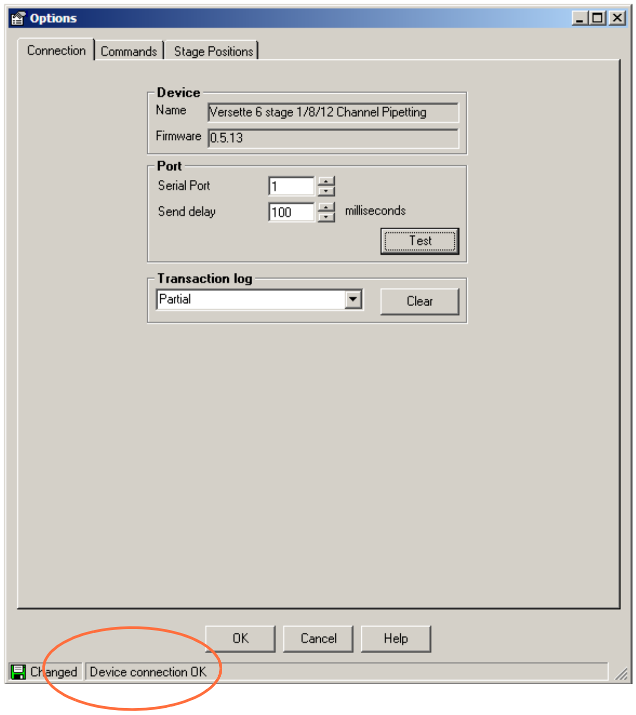
4. From the Tools menu, select Options.



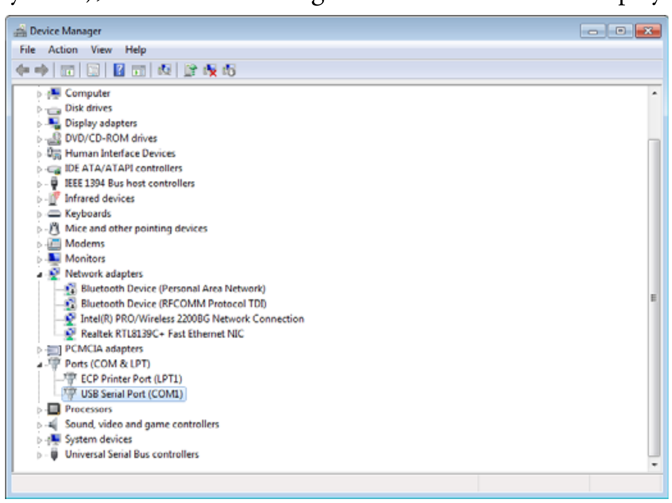

5. Click the Test button.



6. Verify that the Device Connection is OK and verify that the correct RS232 or RS232 Virtual Serial Communication port number has been entered. If not, check the connection cable.

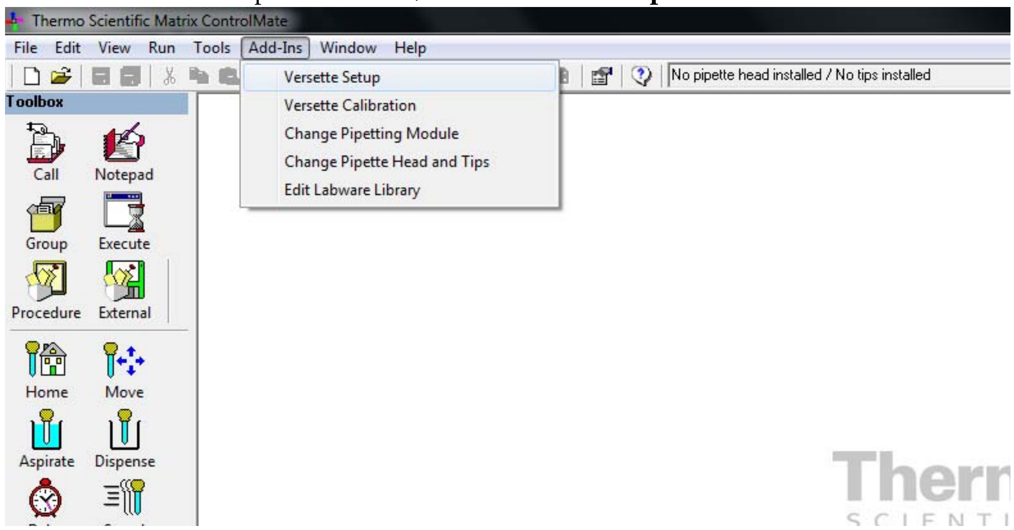



If you are unable to connect, verify that your computer is recognizing the port that the communication cable is attached to on your computer. You do this through Device Manager. In Windows, select Start then Control Panel, then Hardware and Sound (on Windows 7 systems), then DeviceManager.   The screen should display the port as shown below:



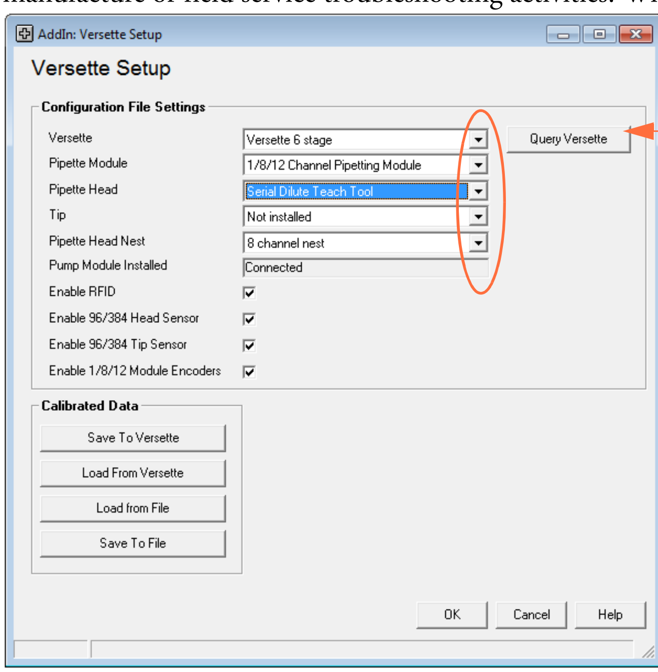
## 2: Verify Versette System Setup

1. From the **Add-ins** drop-down menu, select **Versette Setup**.




2. Click the Query Versette button to confirm machine and ControlMate are properly communicating. Drop-down fields will automatically prefill with the appropriate information.

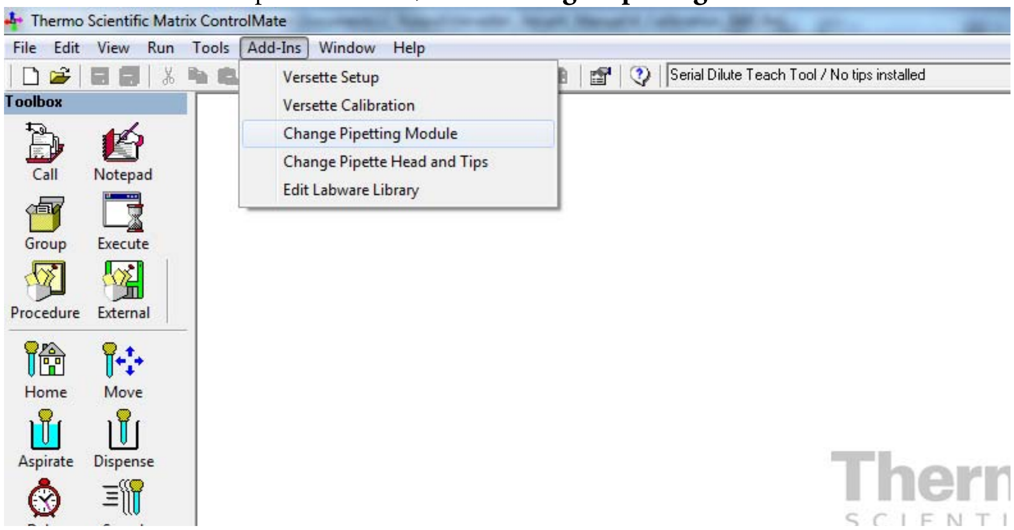
   You can also make any changes to the Configuration File Settings by selecting the correct system configurations from the drop-down menus. Check marks should be placed next to all optional equipment as shown below (even if not installed, as it will not affect performance). A check mark should be placed next to the RFID at all times during calibration and normal system operation. This feature is only turned off during manufacture or field service troubleshooting activities. When finished, click **OK**.




Click to populate fields with info from Versette system.

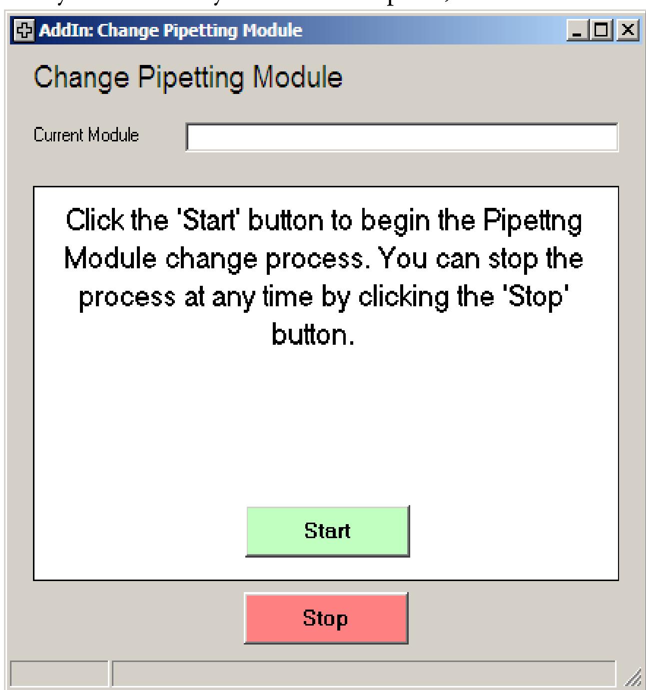
# STEP 1: Install the SMC Pipetting Module and SMC Teach Tool

1. From the **Add-ins** drop-down menu, select **Change Pipetting Module**.

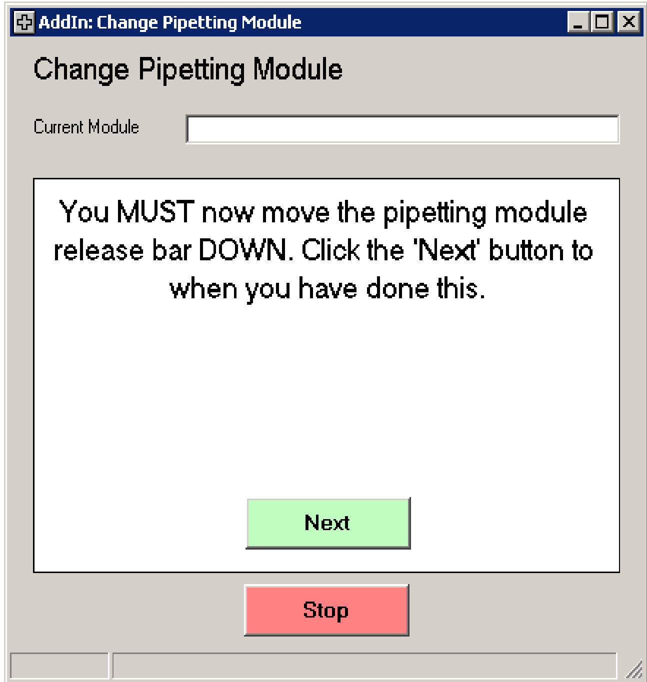


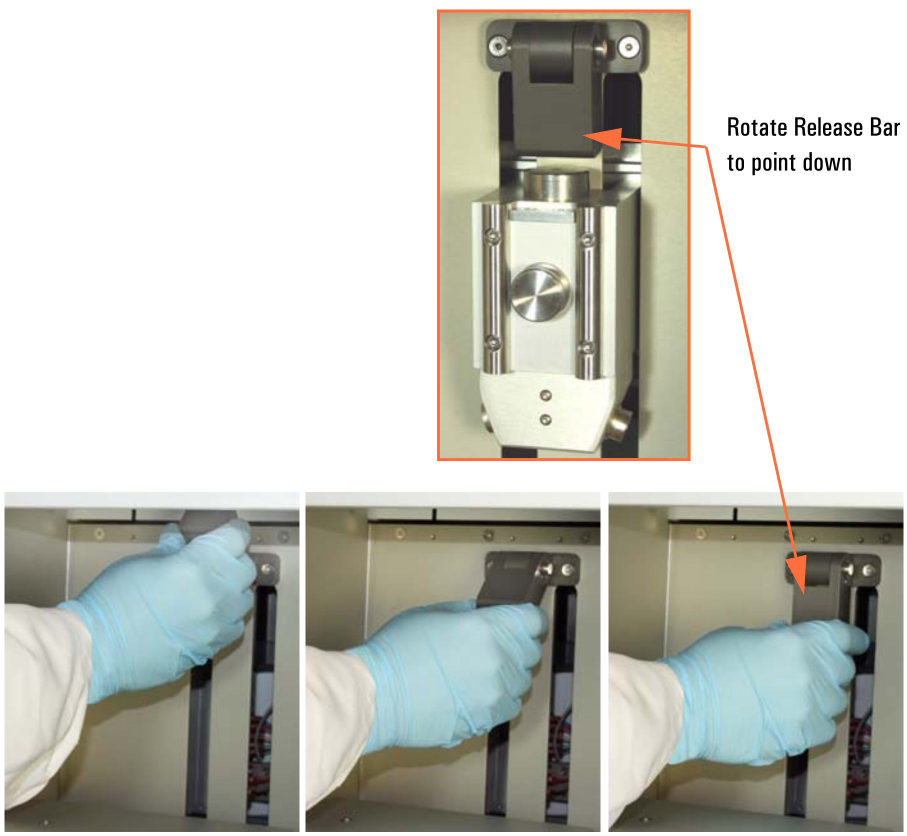

2. Follow the screen prompts to install an SMC pipetting module:

   a. Verify that all safety shields are in place, then click the **Start** button.



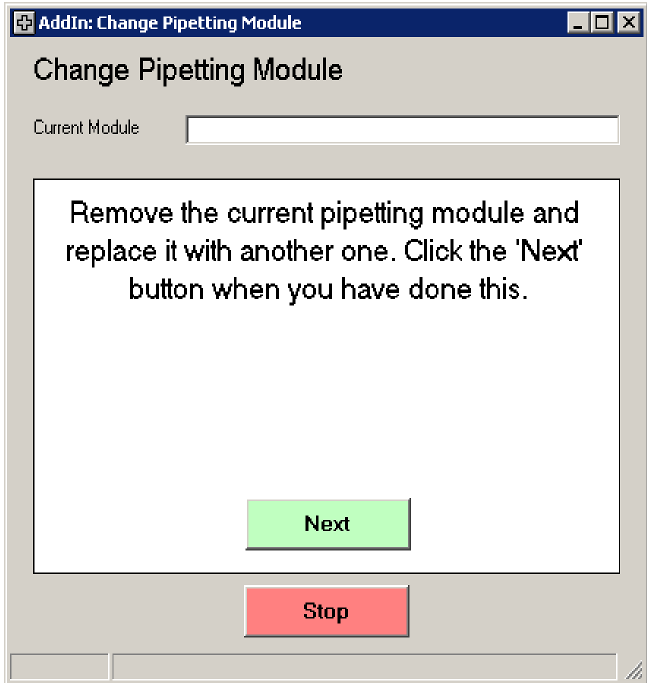
b. Move the release bar DOWN then click **Next**.

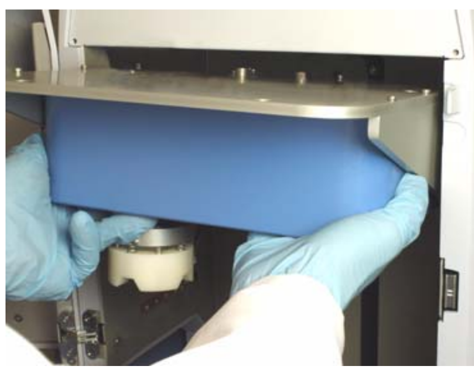


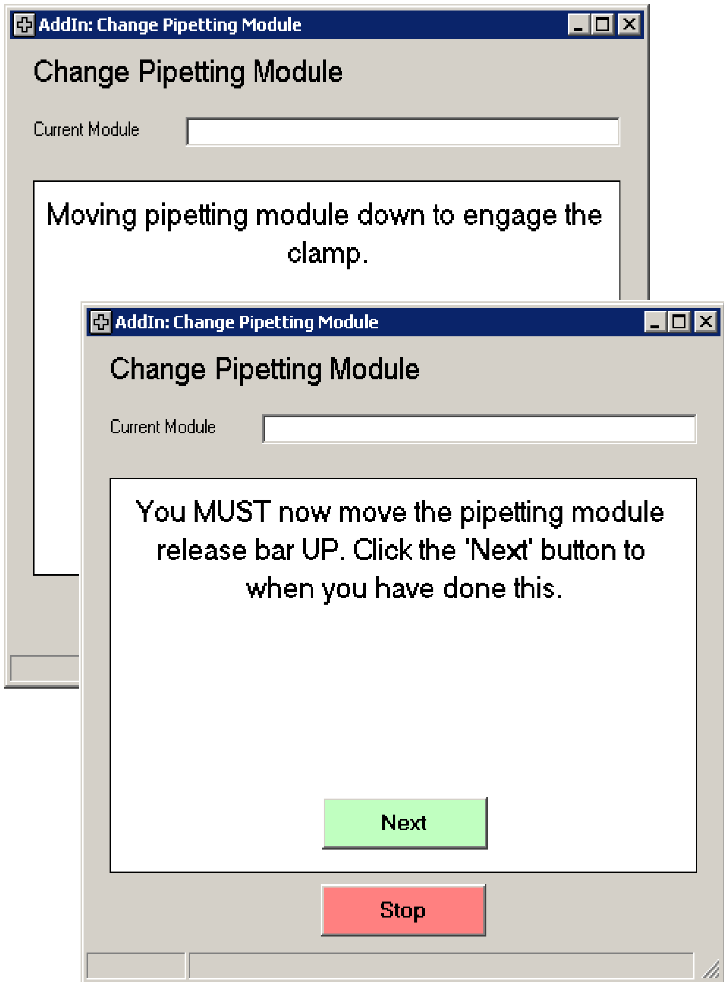

Rotate Release Bar to DOWN position.

c. Carefully lift and position the SMC pipetting module into the system, then click **Next**.



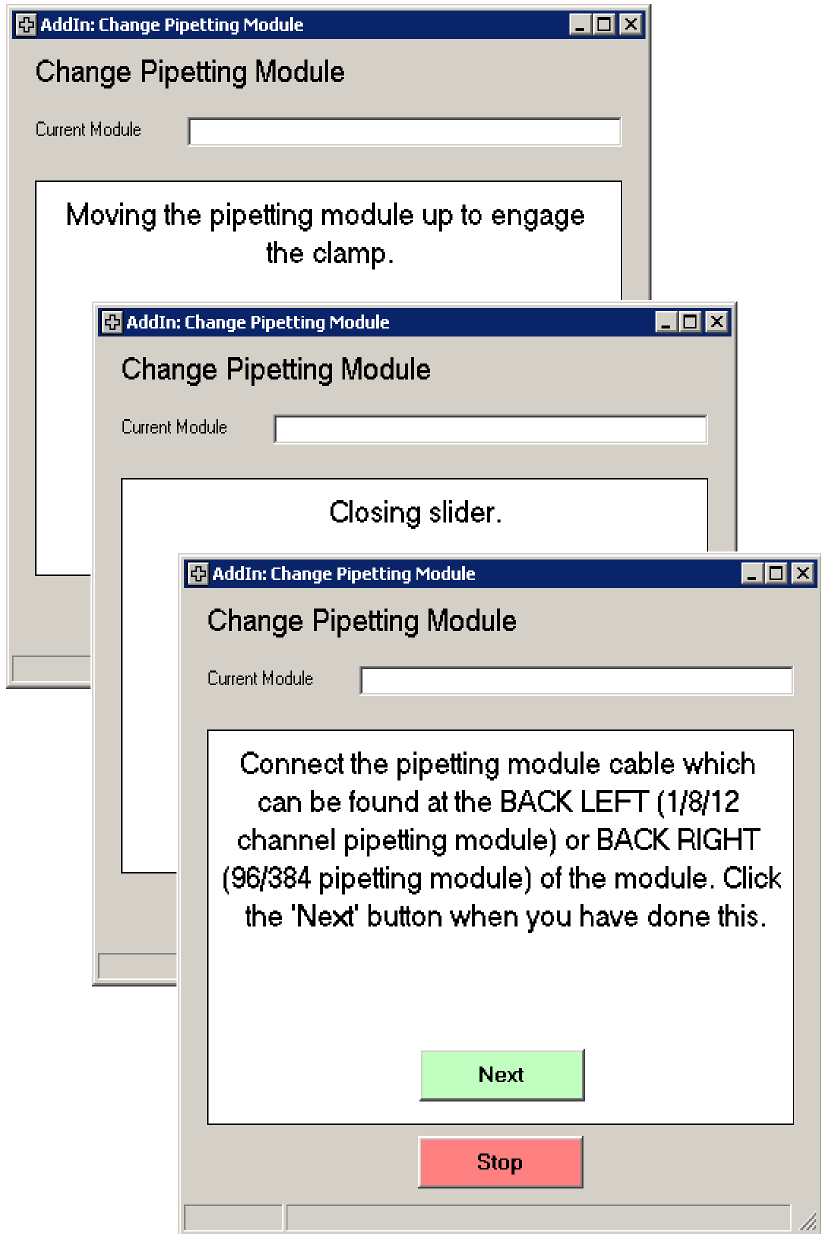



d. Wait for the system prompt, then move the release bar UP, then click **Next**.



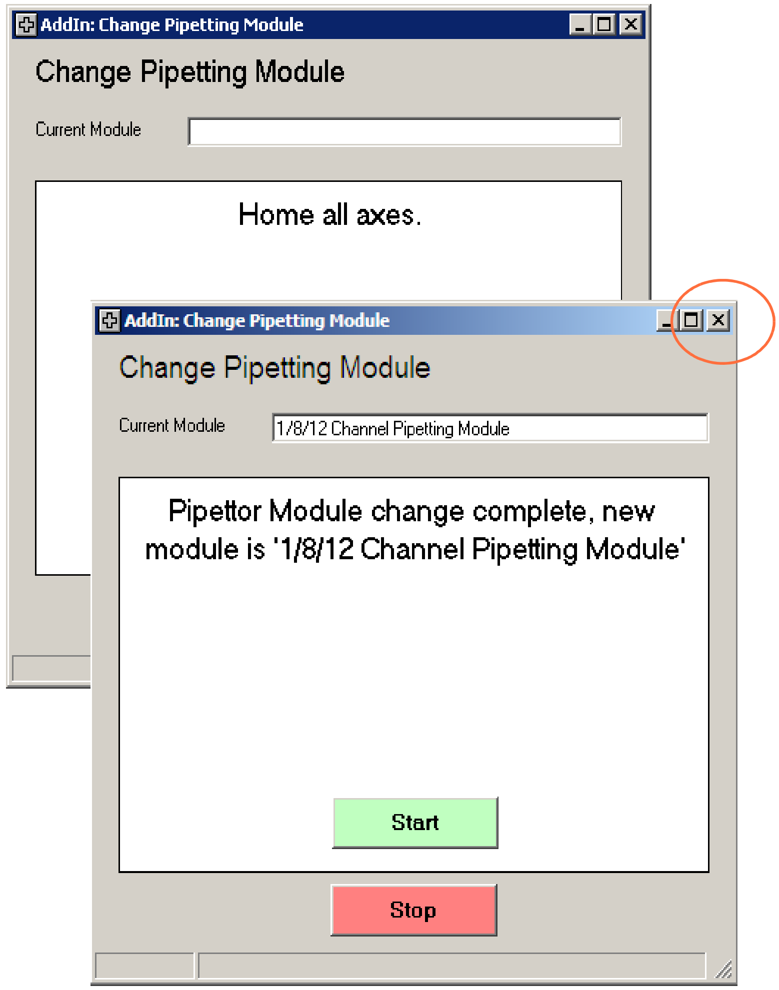

Rotate Release Bar to UP position.

e. Wait for the system prompt then connect the pipetting module cable, then click **Next**.



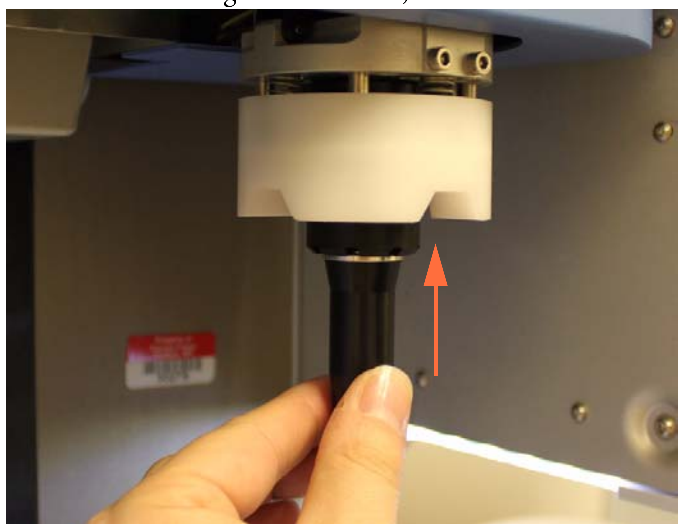

The cable connector may have red dots which align to the system connector. The dots are difficult to see due to their location. Follow the screen messages carefully and press in firmly to ensure proper connection.

f. Wait for the system movements to complete, then click the window's corner X to close the window.



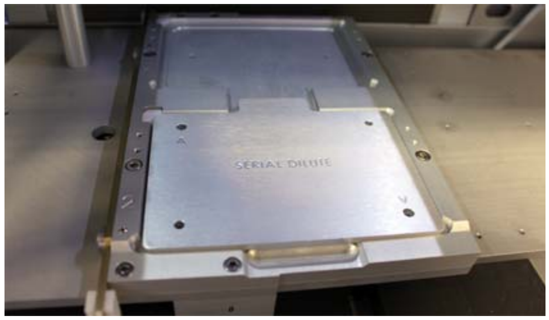
3. Manually insert the teach tool into the SMC pipetting module by pushing the tool straight up into the white “chuck” holder. Push straight up only.

   If you accidently move the chuck you may have to power cycle the unit on/off. (Make sure it returns to Remote Mode on the touch panel screen, or select Remote Mode through the touchscreen’s Configuration screen.)

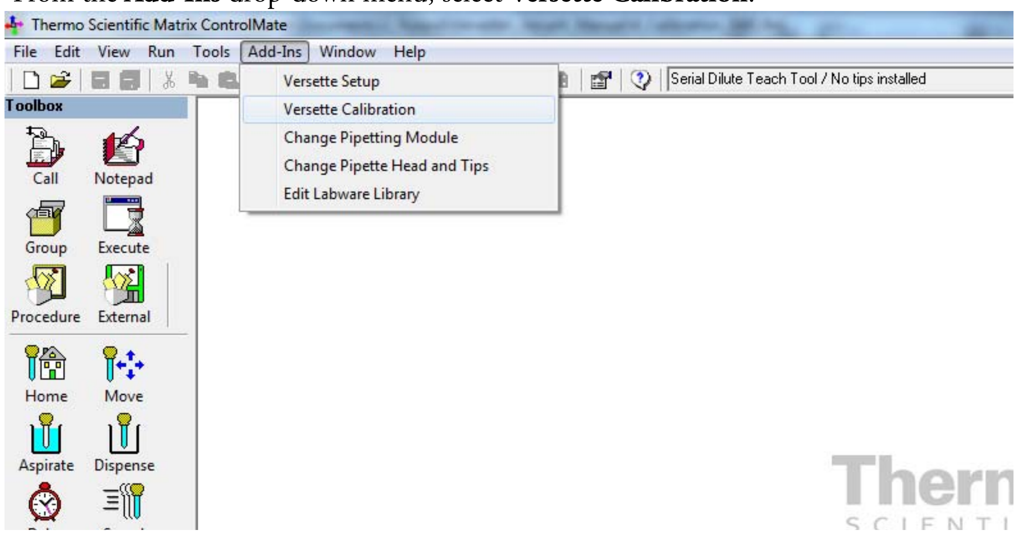


# STEP 2: Calibrate Stage XY

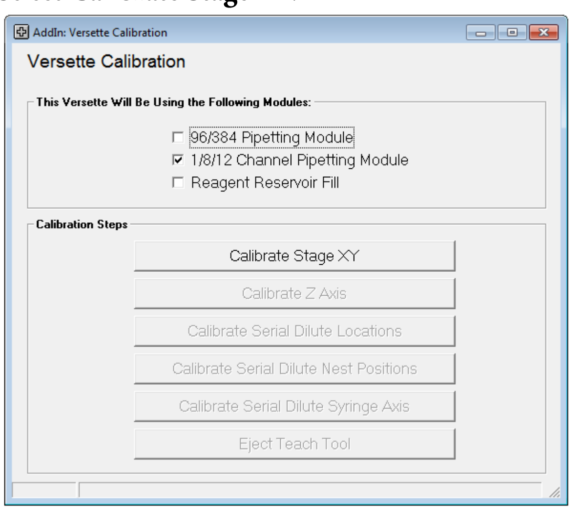
1. Place the Teach Tool Plate with the words “SERIAL DILUTE” facing up, on stage 2. Press the plate firmly down in place to ensure that it is absolutely flat, firmly positioned in the stage.



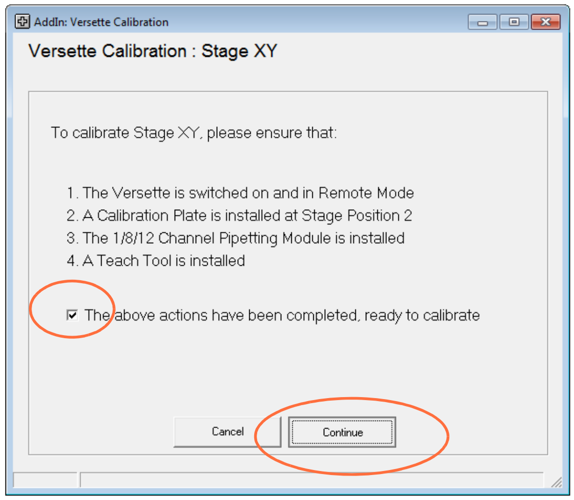
2. From the **Add-Ins** drop-down menu, select **Versette Calibration**.



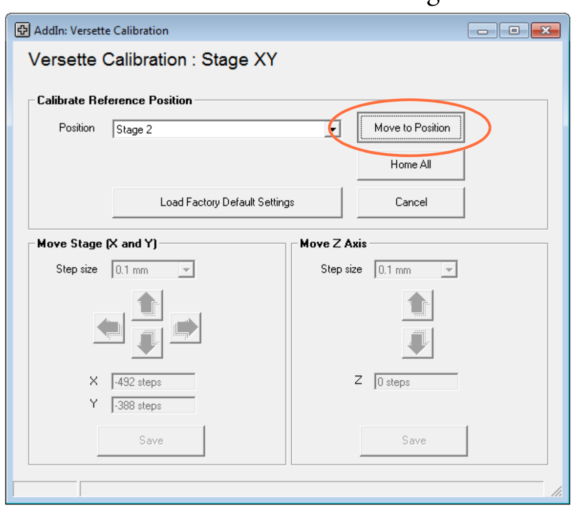

3. Select **Calibrate Stage XY**.



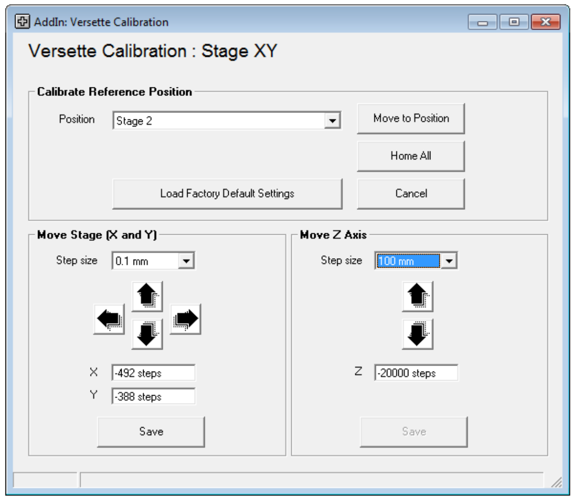
4. Read the instructions and verify that all items have been completed, then select the check box to continue, then click “**Continue**” to begin the calibration process.

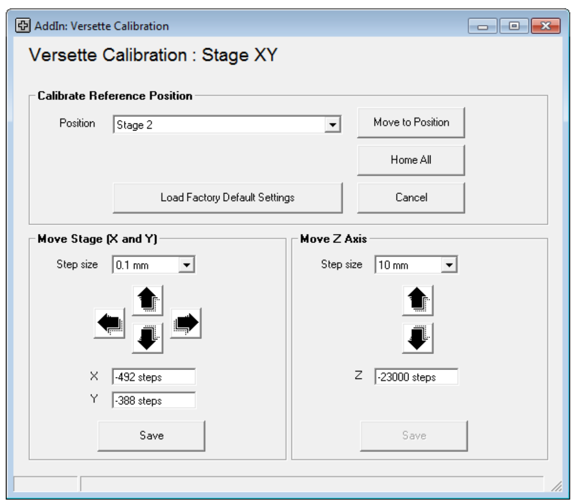


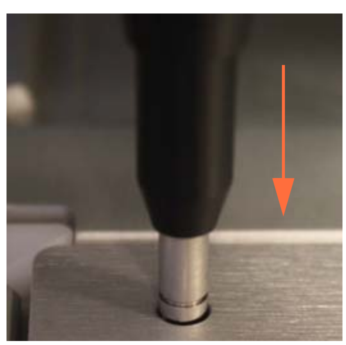

5. The Stage XY is calibrated from Stage 2. Verify that Stage 2 is displayed in the position box, then press “**Move to Position**.” The head and stages will move to position the Teach Tool over the Calibration Plate on Stage 2.



6. Set the **Step size**, then use the arrows to move the teach tool down until it is close to the the Calibration Plate, as shown below.
   Typically, start with 100mm, once or twice, then switch to 10mm for 2-3 moves, then 1 mm, then 0.1 mm. Always use the smallest, practical move.

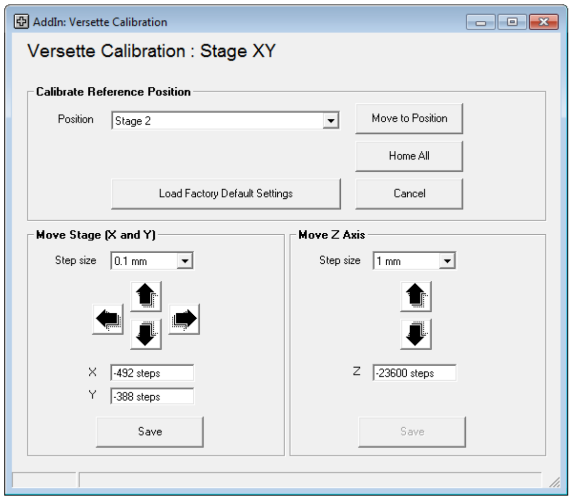


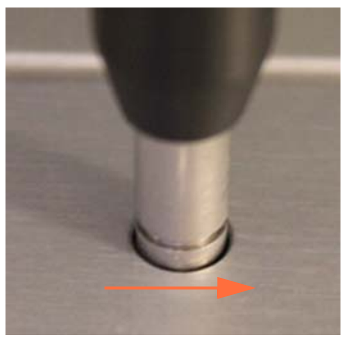



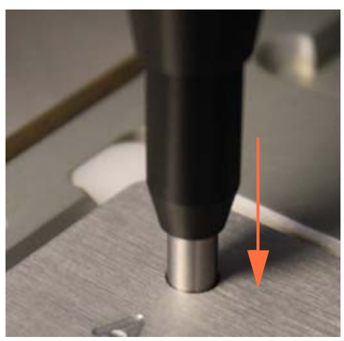
slowly lower teach tool very close to plate

7. Make very precise, minor movements at 0.1mm to center the teach tool in the hole marked “A”. Use both the “Move Stage” commands and the “Move Axis” commands to precisely position the Teach Tool in the hole.



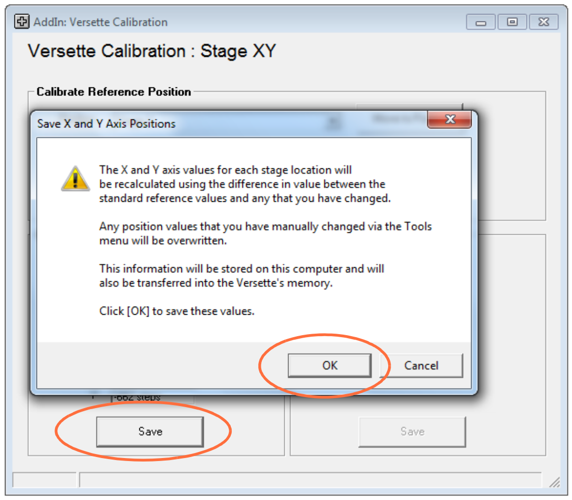



raise the teach tool up,
move the stage slightly to the left
then re-lower the teach tool in the hole

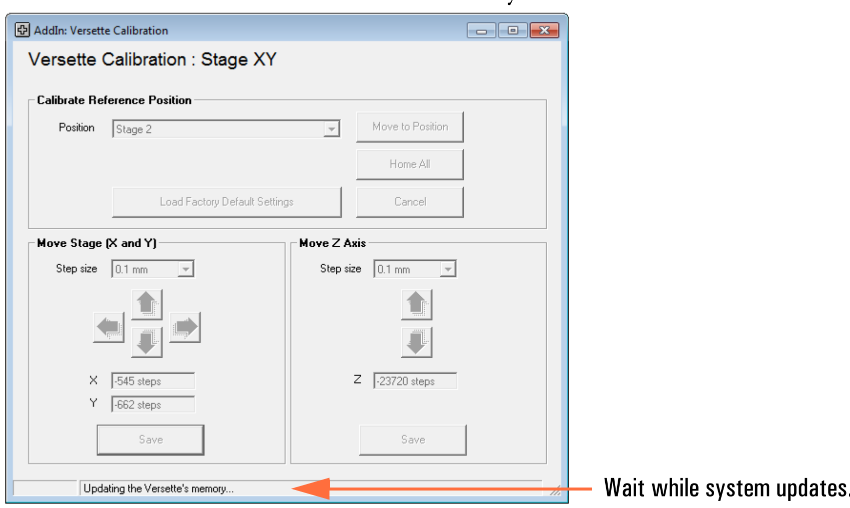


once the teach tool is very precisely lined up,
lower the teach tool carefully into the hole
to verify the left/right, front/back alignment

8. Click "**Save**" to save the new calibration coordinates, then click **OK** on the pop-up window.

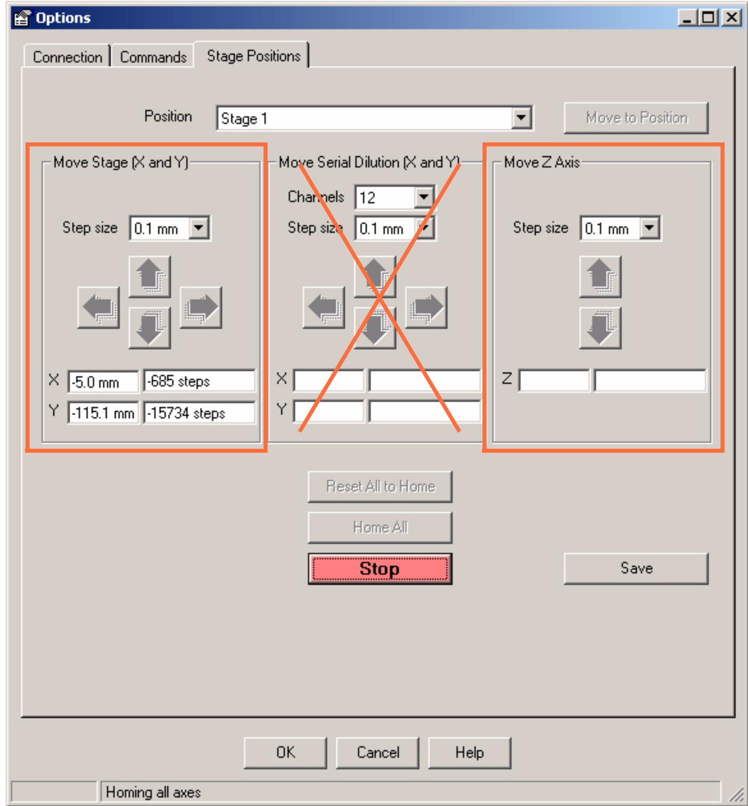



9. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.



10. OPTIONAL: Verify the accuracy of calibration at each remaining stage location, as detailed below. If no changes are made on a specific stage, there is no need to click save, just move to the next location and continue to check each stage position.

    a. From the Tools menu, select **Options**, then select the **Stage Positions** tab.




Use Stage and Z-Axis controls only

    b. Place a Calibration Plate with the 986/384 printing facing up on the stage where you will check the coordinate alignments (typically start at Stage 1).

    c. Use the dropdown box to select the stage where the Calibration Plate is installed, then click "**Move to Position**". The unit will go through a homing cycle, then move to the selected stage position.

    d. After the selected stage has moved in position under the teach tool, use the "Move Z Axis" commands to lower the teach tool down within 1mm of the Calibration Plate. - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down button to move the head down.

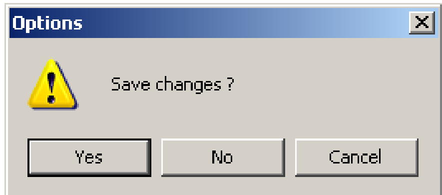
    **CAUTION** Use care when moving the pipetting module down to avoid hitting the stage. Select the smallest reasonable **Step size**.

    e. Verify alignment of the teach tool pins with the Calibration Plate. If necessary, use the **Step size** and arrows to center the alignment pins as shown.

    f. If you made any changes, click **Save** and wait approximately 15 seconds for the system to save the changes.

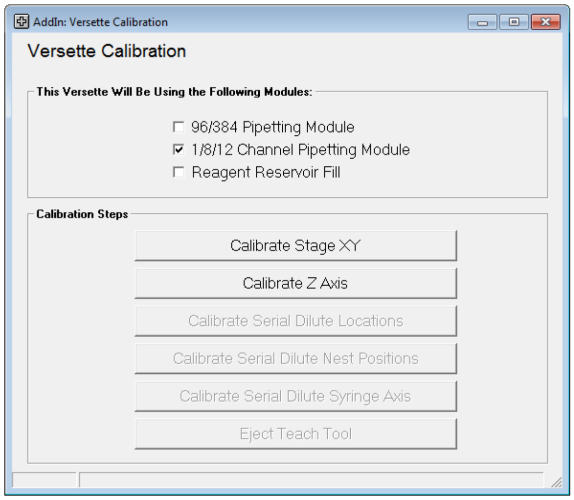
g. For 6-stage systems, repeat steps b through f above for each of the remaining stage positions (3, 4, 5, and 6).

h. Click the X in the upper right corner of the calibration window to close the window. If prompted, click "**Yes**" to save changes.

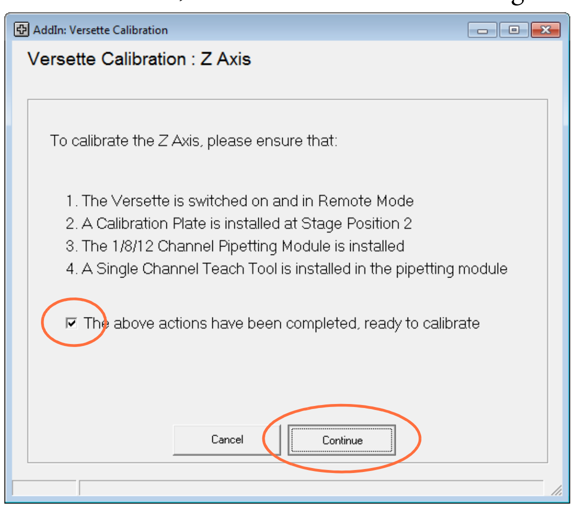


# STEP 3: Calibrate the Z-axis

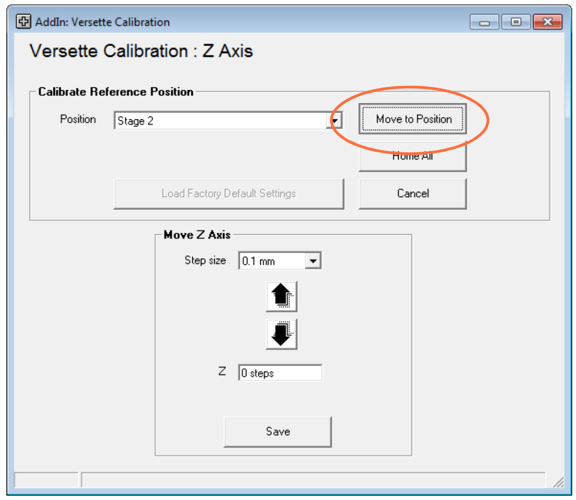
1. Select the 1/8/12 Channel Pipetting Module then click **Calibrate Z Axis**.



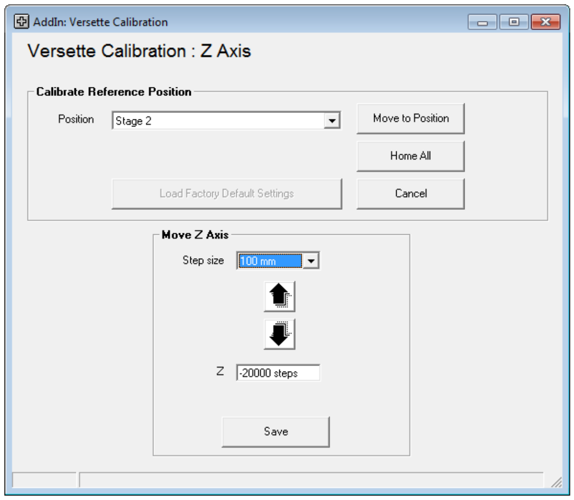

2. Read the instructions and verify that all items have been completed, then select the check box to continue, then click "**Continue**" to begin the calibration process.

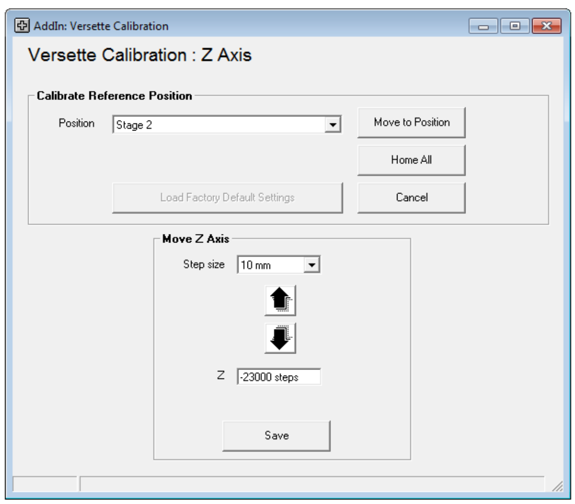


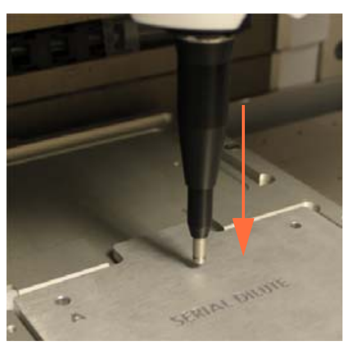
3. The Z-Axis is calibrated from Stage 2. Verify that Stage 2 is displayed in the position box, then press "**Move to Position**." The head and stages will move to position the Teach Tool over the Calibration Plate on Stage 2.



4. Set the **Step size**, then use the arrows to move the teach tool down until it is close to the the Calibration Plate, as shown below.
   Typically, start with 100mm, once or twice, then switch to 10mm for 2-3 moves, then 1 mm, then 0.1 mm. See next step to place a piece of paper over the plate.
   It is CRITICAL that you do not hit the calibration plate. Always use the smallest, practical move.

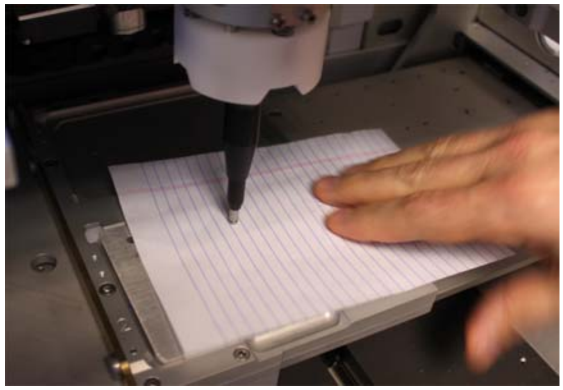


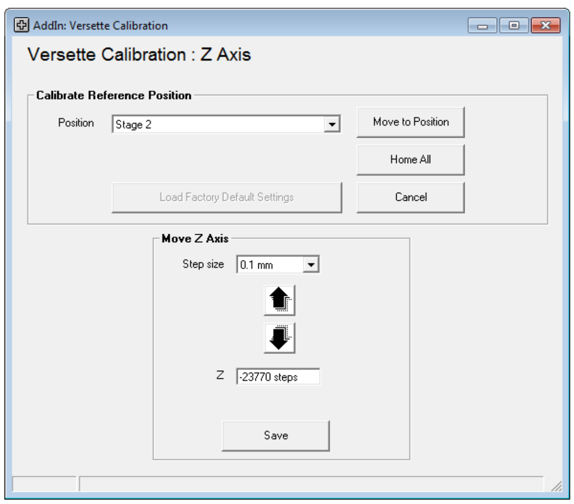




slowly lower teach tool

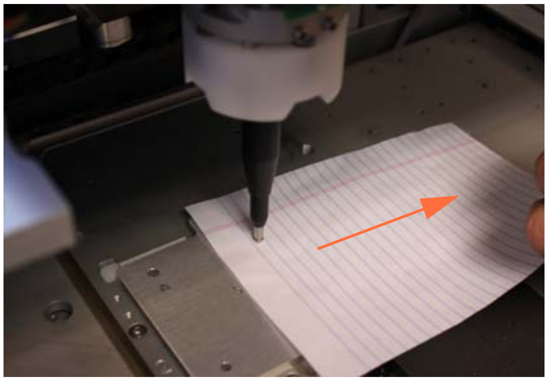
5. Slide a piece of paper under the Teach Tool's tip, as shown. Do this before you lower the tool too far down. If you went too far down, just raise it up with the up arrow, slide the paper under the tool, then move the tool back down.



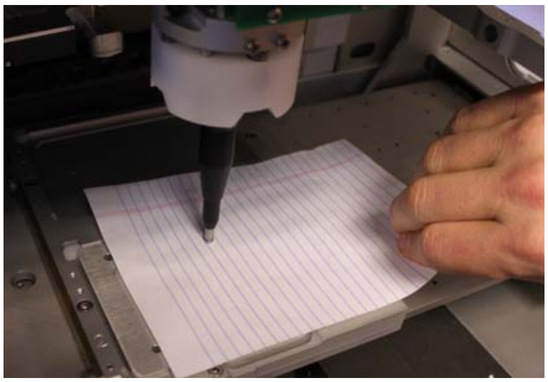
6. Verify that the step size is set to 0.1 mm and then continue to press the Down arrow until you touch the paper.



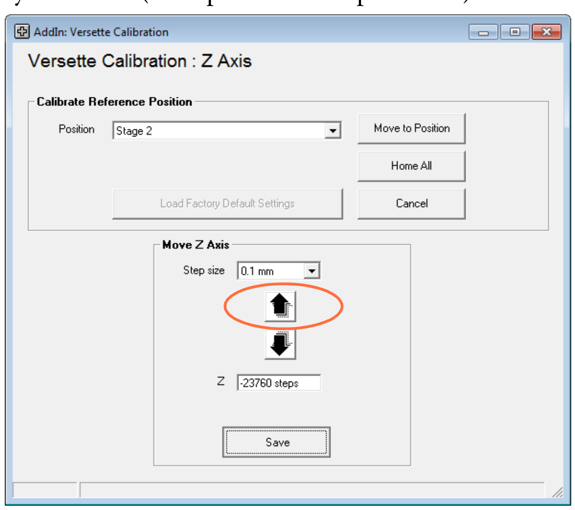
7. Try to gently pull the paper out from under the Teach Tool. If you can move the paper, lower the teach tool again by 0.1 mm then check again. Continue this until you cannot pull the paper out from under the Teach Tool.



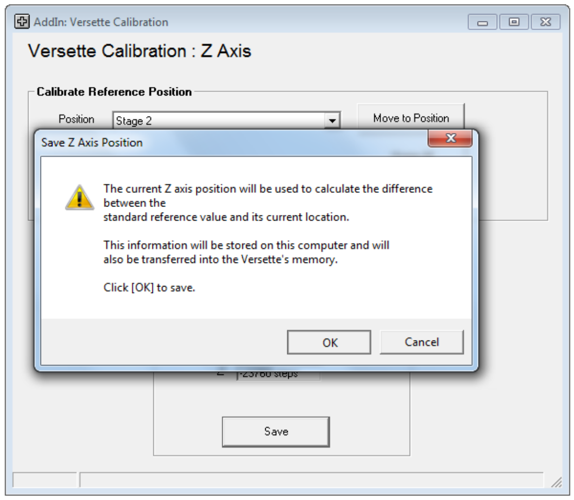
if paper moves,
lower teach tool 0.1 mm
try again



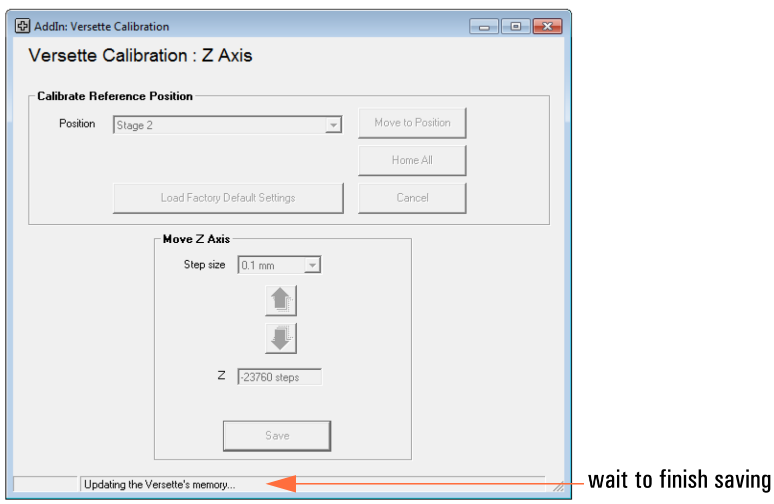
8. When you cannot move the paper out from under the Teach Tool, RAISE the Teach Tool by 0.1 mm. (One press of the up button.)



9. Click **Save** to save the Z-axis position, read the message, then click **OK**.

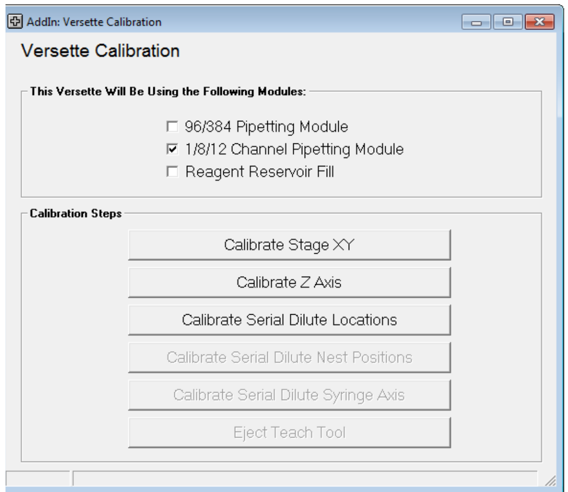



10. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.

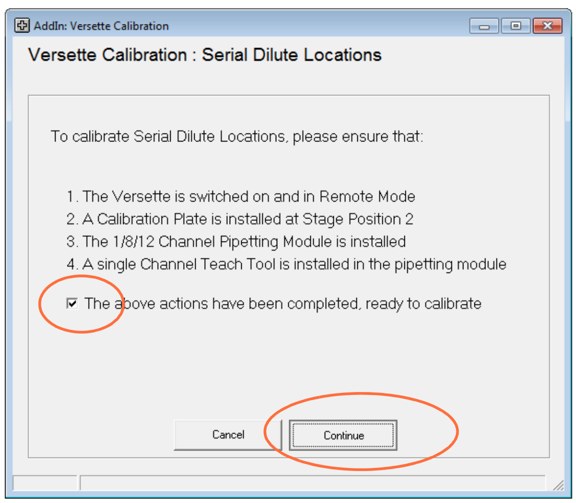


# STEP 4: Calibrate the Serial Dilute coordinates

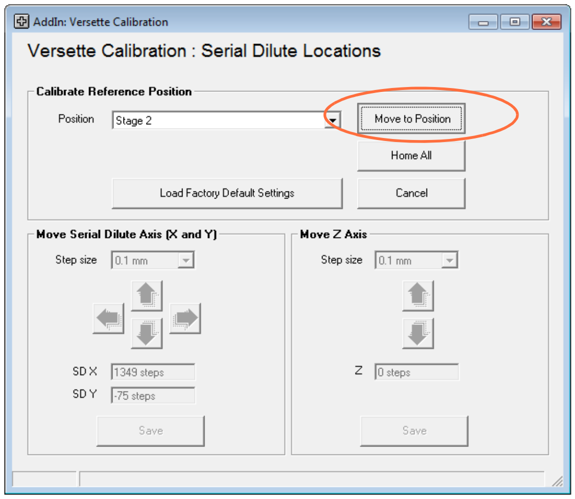
1. Select **Calibrate Serial Dilute Locations**.



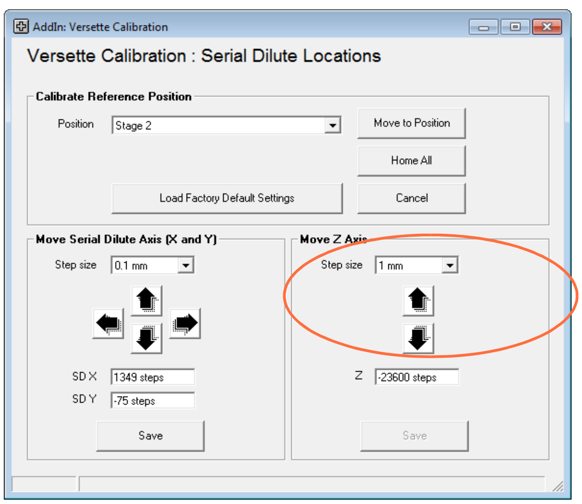

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.



3. The Serial Dilute coordinates are calibrated from Stage 2. Select Stage 2 from the drop-down menu, then click “**Move to Position**”.



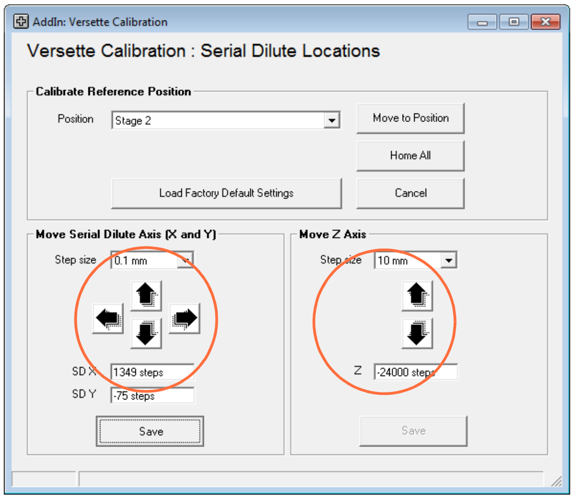

4. After the system has stopped moving, use “Move Z Axis” to lower the head down to approximately 1 mm above the Calibration Plate.
   - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down arrow to move the pipetting module.  Typical movements down are: 100mm two times, then 10mm three times, then1 mm, six times, then move at 01.mm increments.

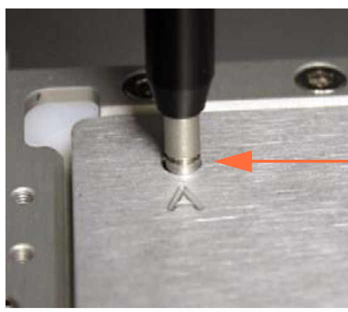



Lower teach tool close to calibration plate

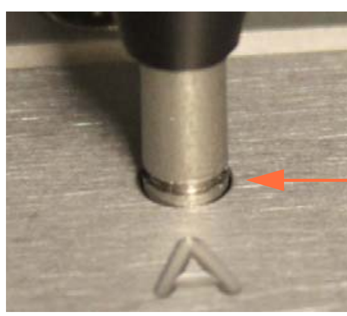
5. Check the alignment location. The teach tool should be positioned in the exact center of the Calibration Plate left rear hole marked “A”.

   If necessary, use the arrows to achieve perfect alignment. **Take great care to be as precise as possible.**

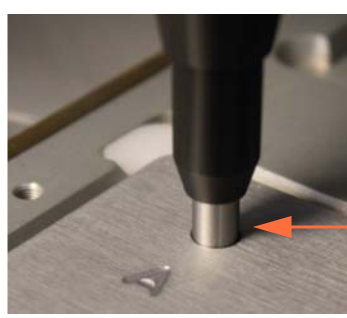


lower to hole
check alignment left/right, up/down
verify that alignment is absolutely perfect

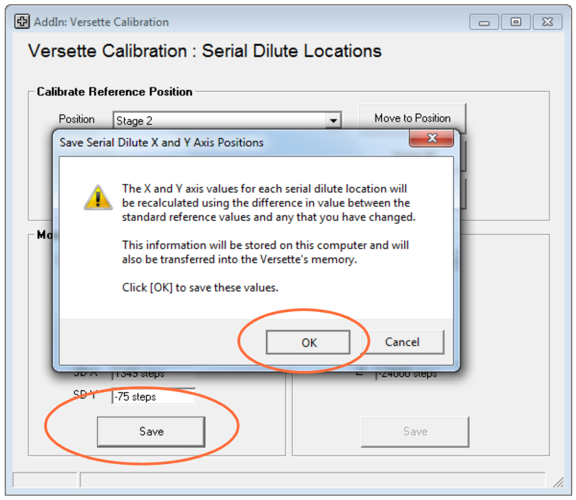


lower into hole,
centered in hole

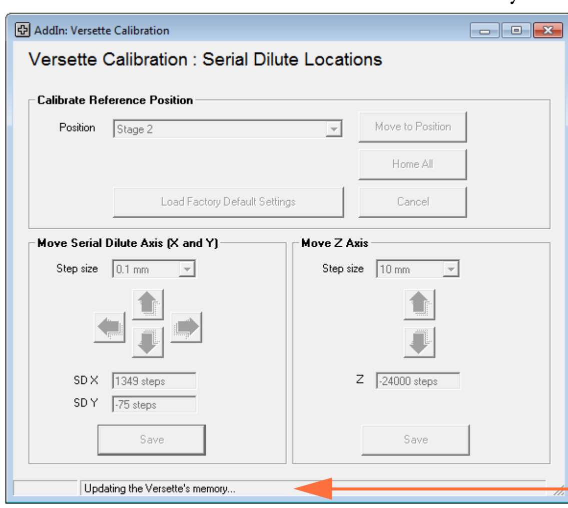


lowered further into hole
to fully verify XY positions

6. Click "**Save**" to save the new calibration coordinates, then click **OK** on the pop-up window.

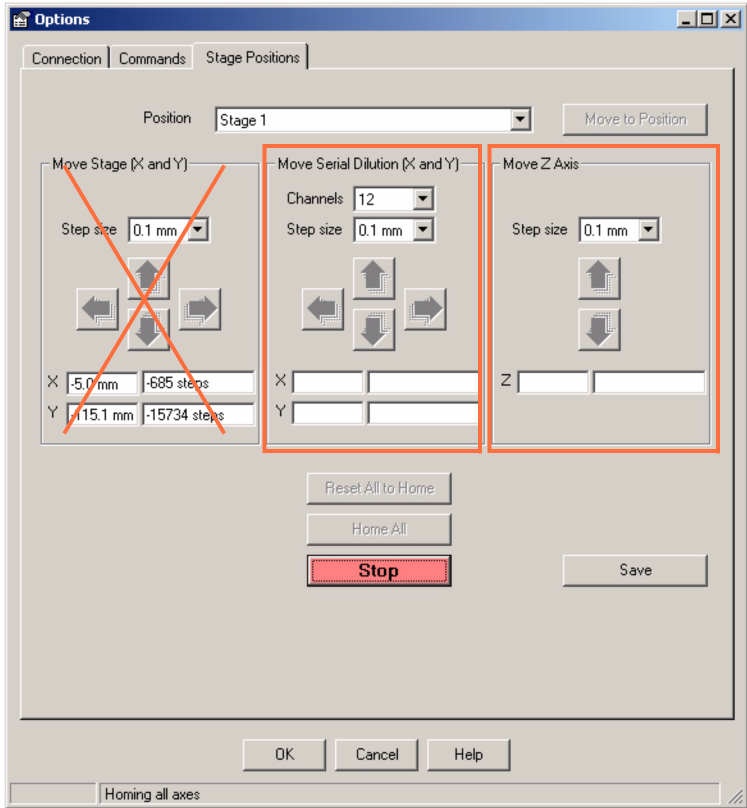



7. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu



8. OPTIONAL: Verify the accuracy of calibration at each remaining stage location, as detailed below. If no changes are made on a specific stage, there is no need to click save, just move to the next location and continue to check each stage position.

   a. From the Tools menu, select **Options**, then select the **Stage Positions** tab.

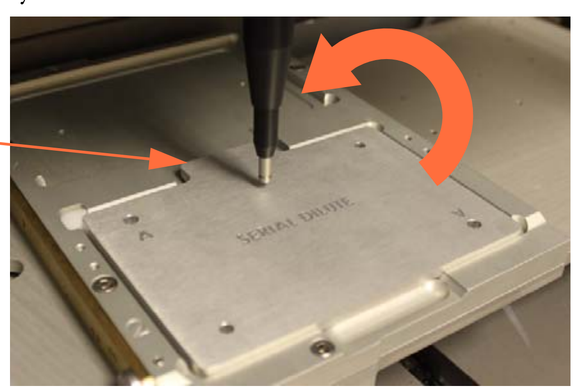



Use Serial Dilution and Z-Axis controls only

   b. Place a Calibration Plate with the “SERIAL DILUTE” printing facing up on the stage where you will check the coordinate alignments. You need to rotate the plate to fit onto different stage positions. Typically start at Stage 1 and work through the stage positions sequentially.

Calibration Plate Tab

Picture shows Calibration Plate position for stages 2, 4, and 6



Rotate calibration plate to place on stage 1, 3 and 5.

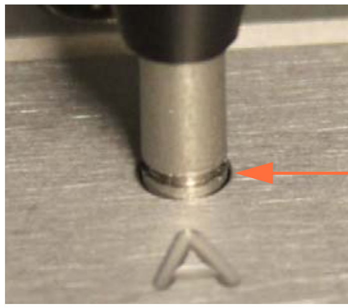
Tab will face front of machine.

   c. Use the dropdown box to select the stage where the Calibration Plate is installed, then click “**Move to Position**”. The unit will go through a homing cycle, then move to the selected stage position.

d. After the selected stage has moved in position under the teach tool, use the **Step size** and move arrows to check the alignment at each stage position.

**CAUTION** Use care when moving the head down to avoid hitting the stage. Select the smallest reasonable **Step size**.

e. Verify alignment of the teach tool with the Calibration Plate. If necessary, use the **Step size** and arrows to center the alignment as shown.



Adjustment complete, centered in hole

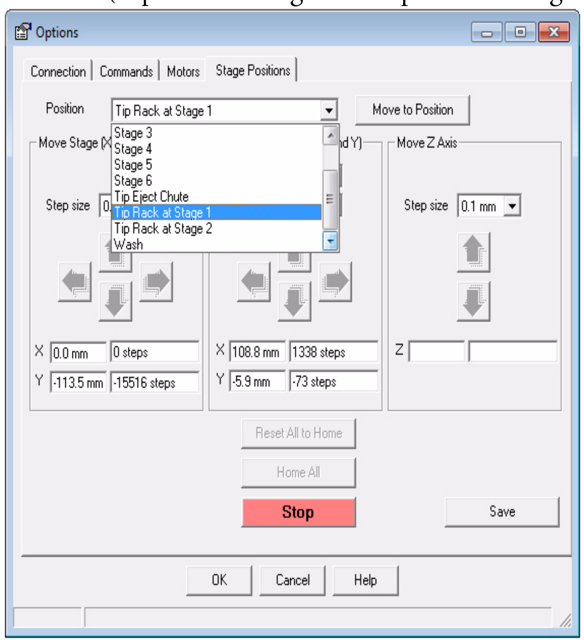
f. If you made any X or Y changes, click **Save** and wait approximately 15 seconds for the system to save the changes.

g. For 6-stage systems, repeat steps b through f above for each of the remaining stage positions (3, 4, 5, and 6).

9. Verify the tip rack at stage 1 and stage 2 locations:

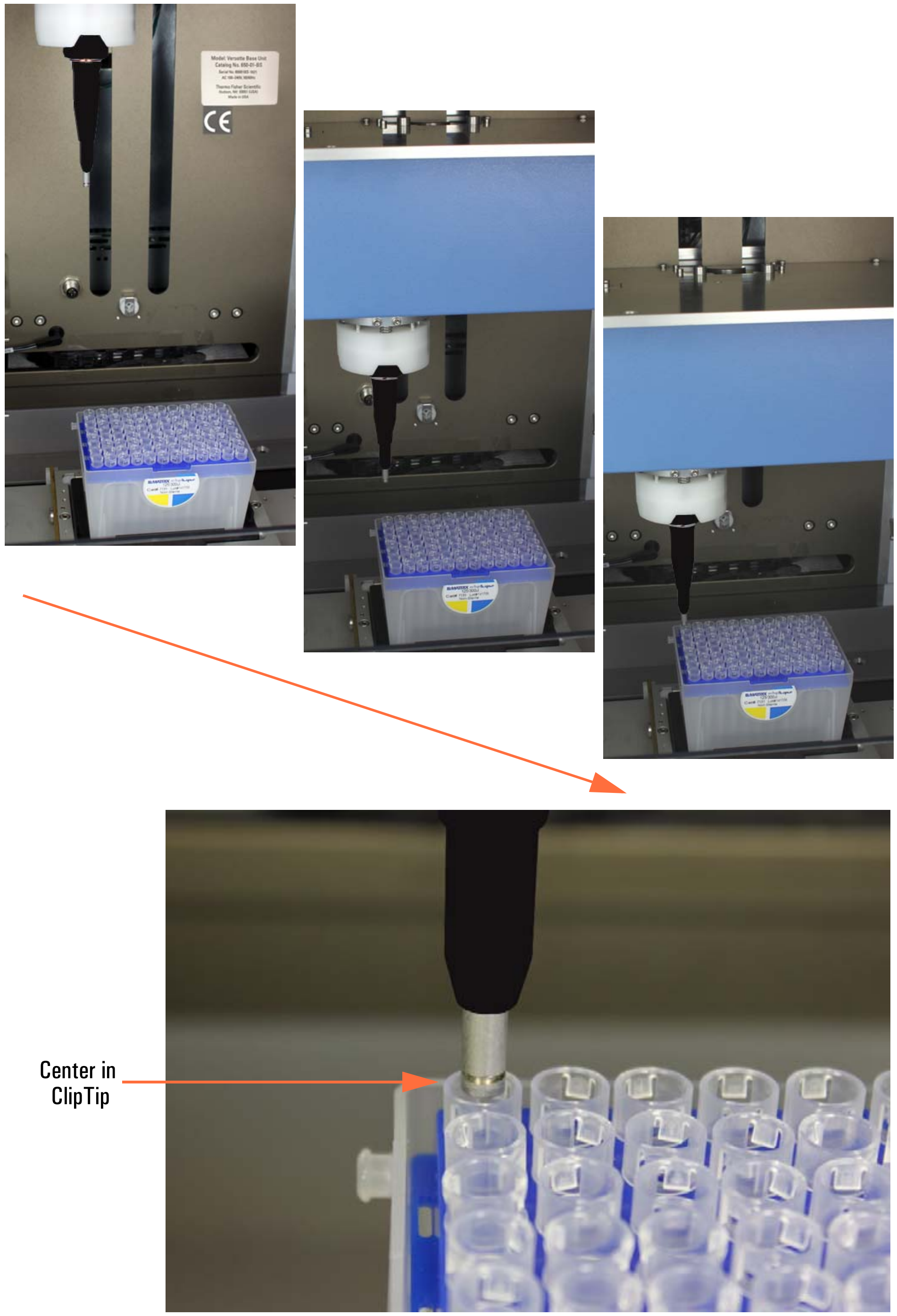
   a. Insert a Tip Rack adapter onto Stage 1 or Stage 2, then insert a ClipTip Rack. If there is any play (back/forth motion) in the rack while seated in the adapter, place the rack of tips towards the back, left position.

   b. From the Tools menu, select **Options**, select **Stage Positions** tab, select the rack location (Tip Rack at Stage 1 or Tip Rack at Stage 2), then click “Move to Postion”.




   c. Use the Z axis command to move the tip down to just above the tip rack. Verify that the teach tool is exactly centered in the tip in the A1 position in the ClipTip rack. If any changes are required to the X and Y axis (front/back, left/right) use the Move Serial Dilution (X and Y) to exactly position the teach tool in the A1 position in the tip rack, then select Save. See photos on next page.

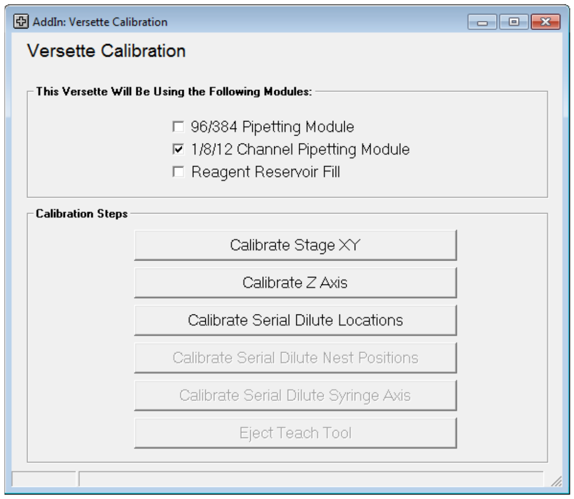
   DO NOT ATTEMPT to pick up a tip with the Teach Tool!



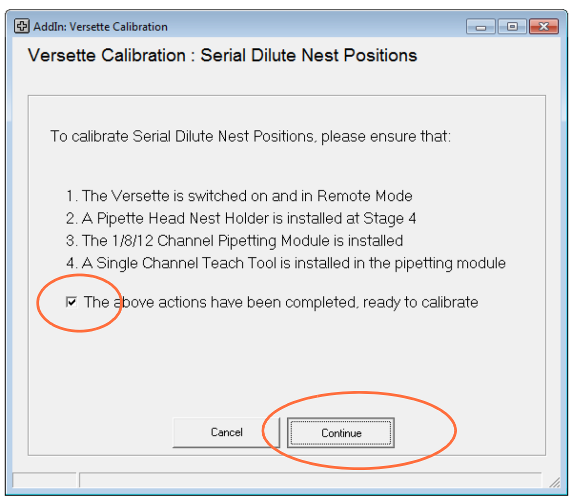

10. If any changes were made, select Save, wait for the values to be saved, then click OK to close the dialogue box.

# STEP 5: Calibrate the Serial Dilute Nest Positions

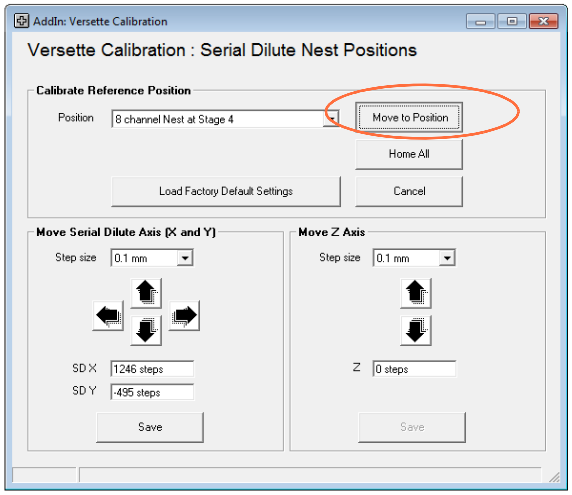
1. Select **Calibrate Serial Dilute Nest Positions**.



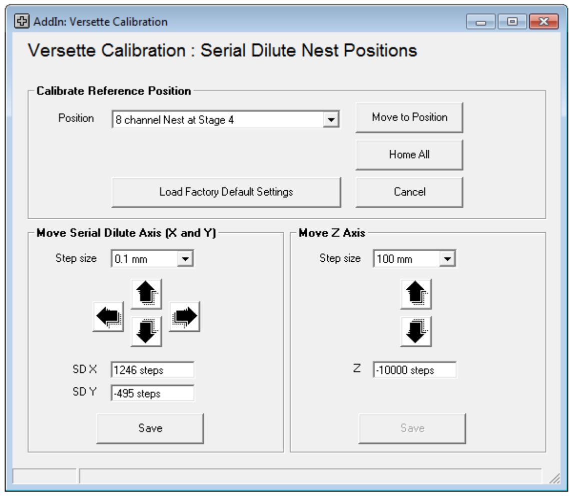

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.



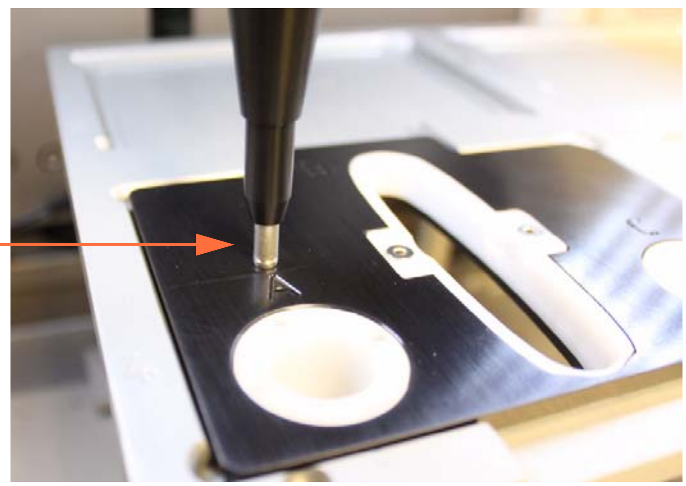
3. Select the nest type (8-channel or 12-channel) that is installed, then click "**Move to Position**".



4. Carefully evaluate the position of the Teach Tool alignment. If necessary, select the **Step size** (0.1mm, 1mm, 10mm, etc.), then use the arrows to precisely align the teach tool in the alignment hole, as shown.

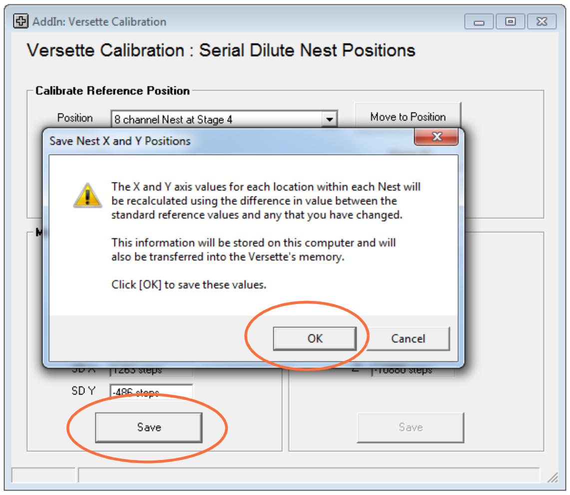



precisely align in hole marked “A”

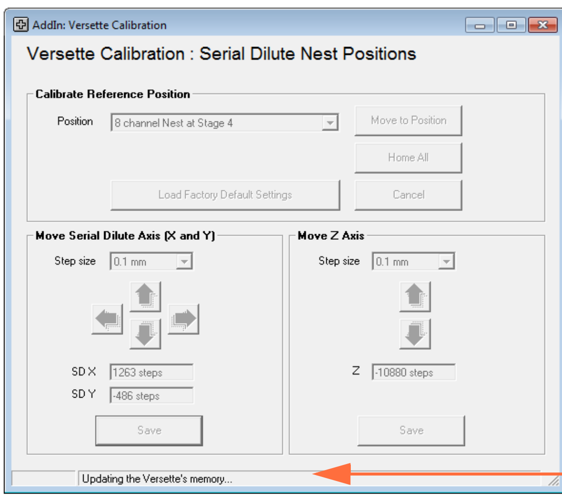


8-channel nest shown

5. Click **Save** then click **OK** to save the coordinates.



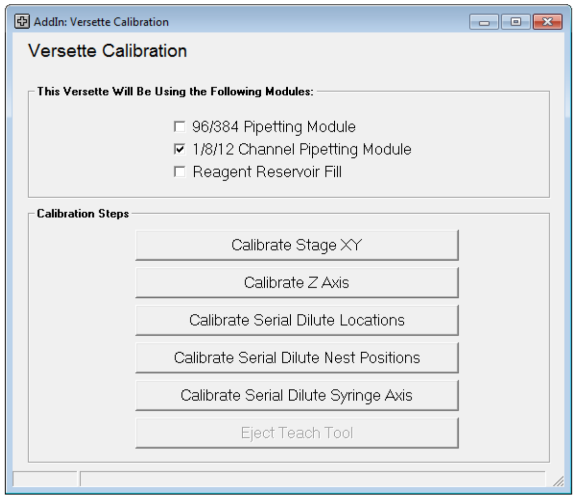

6. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.



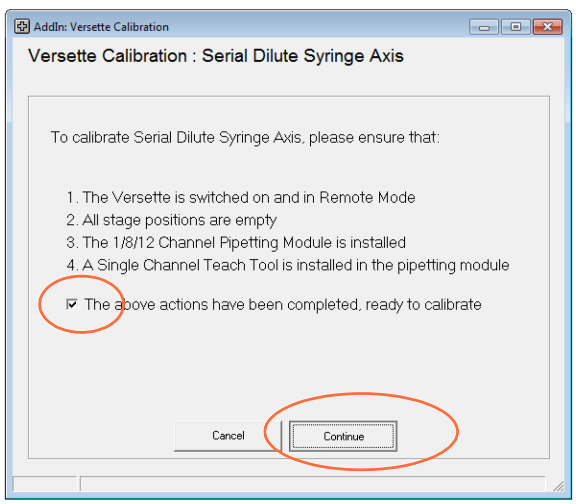
# STEP 6: Calibrate Serial Dilute Syringe Axis ("S-Axis")

The "S-axis" or "Syringe Axis" position is used to pickup and release pipette heads and tips.

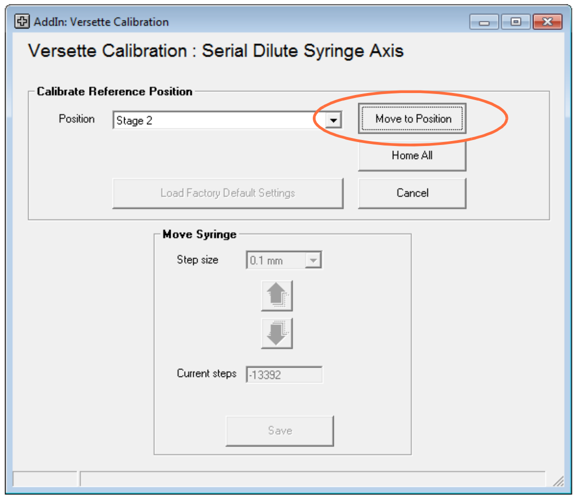
1. Select **Calibrate Serial Dilute Syringe Axis**.



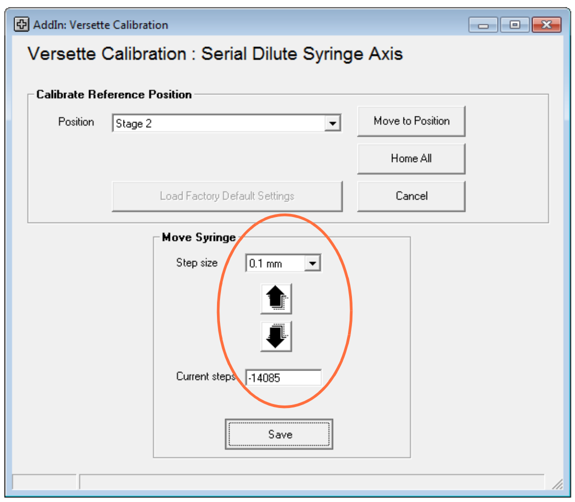

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.

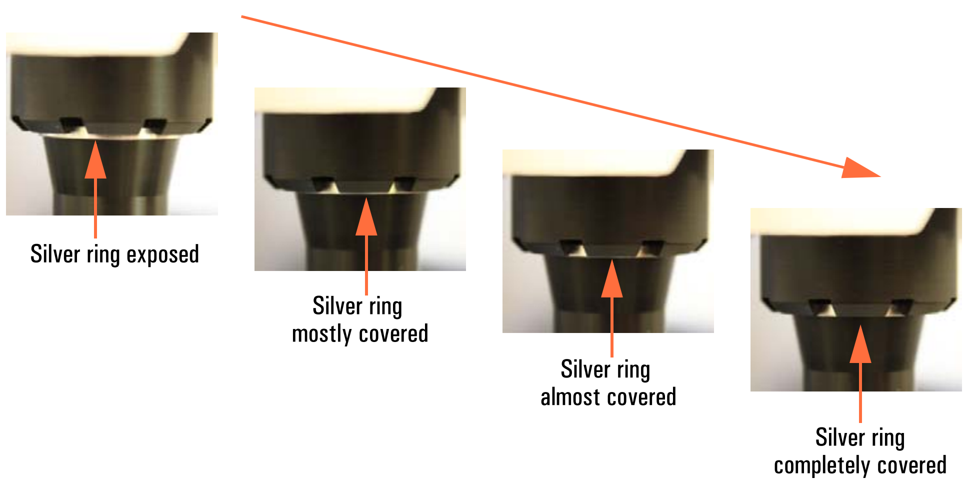


3. Click **Move to Position**.

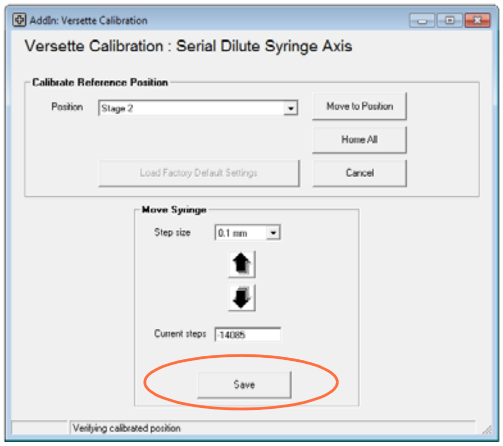



4. Use the **Step size** and arrows to move the teach tool until the silver ring is positioned as shown in the final alignment photograph below.

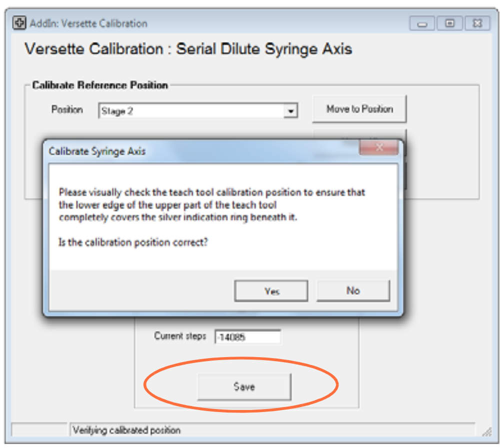


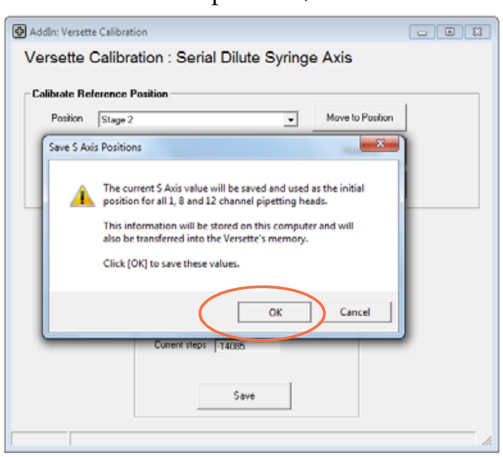
5. When precisely positioned, click **Save**. The system will verify the calibration position. Wait for the screen prompts.



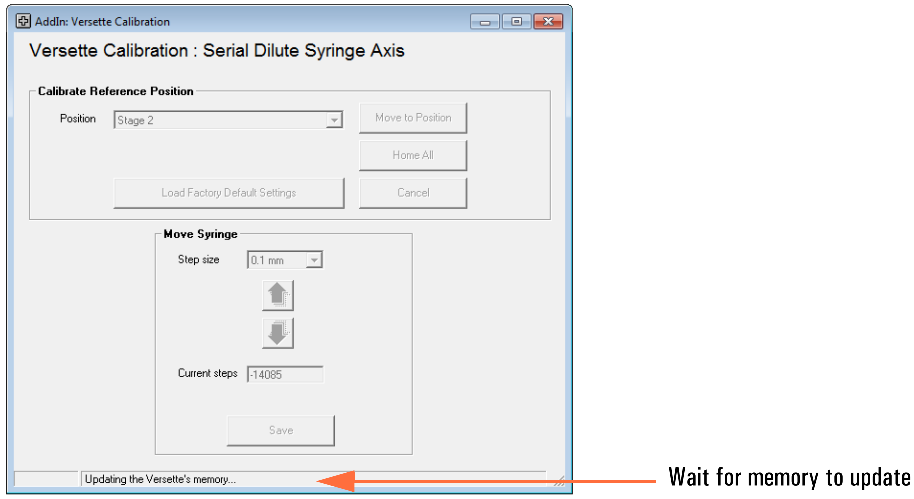

6. Read the dialogue box text, and check the precise placement of the teach tool, as directed., then click **Yes** to continue, or No to re-adjust the axis position.




7. To save the S-Axis position, click **OK**.

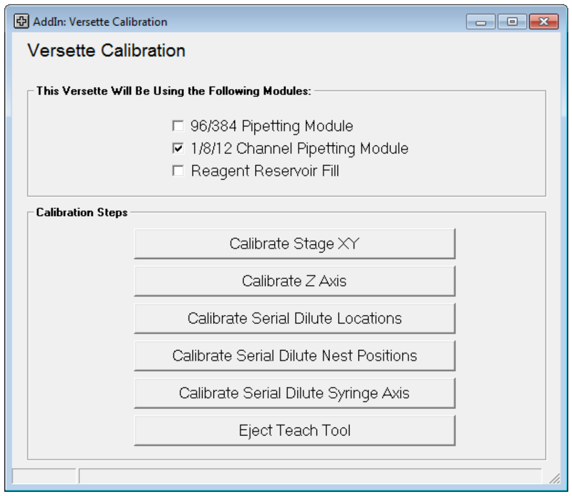


8. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.

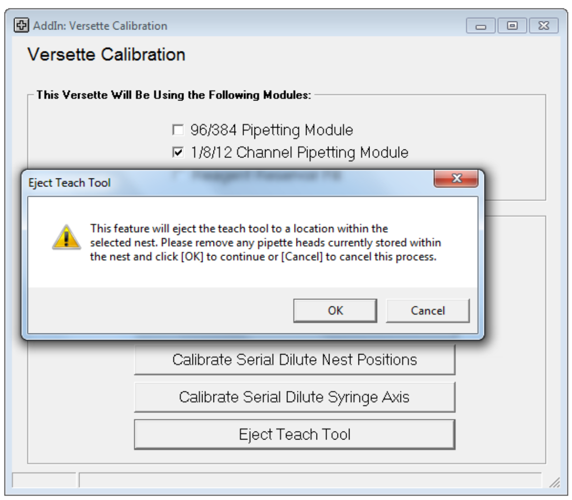


# STEP 7: Eject Teach Tool and Verify Head and Tip Pickup

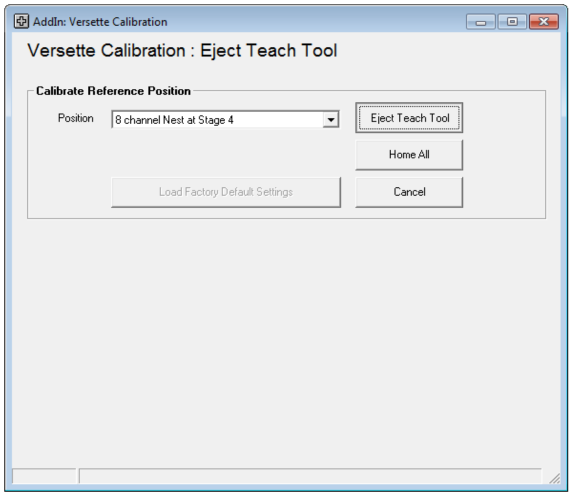
1. Click **Eject Teach Tool** to eject the teach tool. Follow the on-screen prompts to complete the procedure.




2. Read the popup warning. Be sure all next positions are empty, then click **OK**.



3. Select the release position, then click **Eject Teach Tool**.





8-channel nest

Teach tool will eject to left position in nest. Ensure the nest position is empty.

This is the same location where only the 1250 µl head is installed.

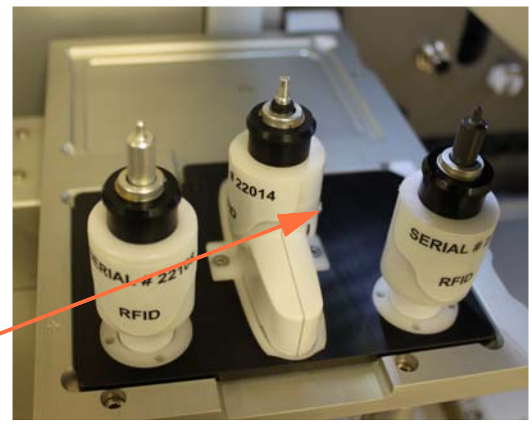

12-channel nest

4. The following steps will verify that the pipetting heads and tips will pickup and eject properly when running your protocols.

   Install a single, 8-channel, or 12-channel head into the nest.

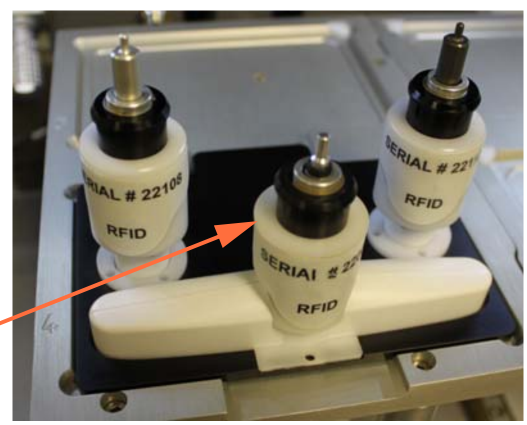
   8-channel heads must be installed with the stainless ‘button’ facing to the right, as shown. 12-channel heads must be installed with the stainless facing to the rear, as shown. There is a small “1” printed on a corner of 8-channel and 12-channel heads near the tip pickup location. This ‘1’ will line up with the tip rack located in Tip Rack position A1.

8-channel: stainless “button” faces to right




8-channel nest

12-channel: stainless “button” faces rear of machine



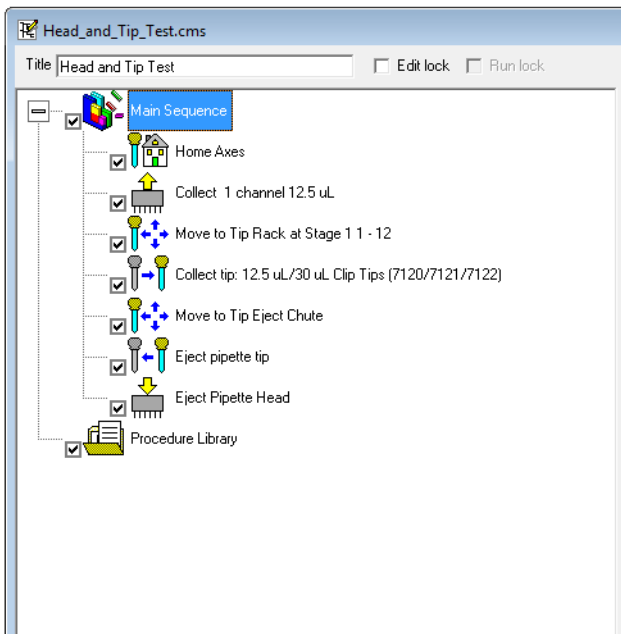

12-channel nest

5. Position a ClipTip rack in a rack adapter on stage 1 or stage 2.

6. Create and run a protocol (sequence) in ControlMate (shown below) as follows:

    1. Home Axes
    2. Collect head
    2. Move to Tip Rack at Stage 1 or Tip Rack at Stage 2
    3. Collect tips
    4. Move to Tip Eject Chute
    5. Eject pipette tip
    6. Eject Pipette Head

    Be sure to select all options, heads, tip types, and locations that match the equipment installed on your system. For example, if you do not have a Tip Eject Chute, simply change the procedure to match the equipment you have (for example, return the tips to their source or to some waste location.



7

# Calibration for NTC Pipetting Modules Only

Follow this procedure to calibrate the coordinates for a system that uses an NTC pipetting module only.

Refer to "Calibration for SMC Pipetting Modules Only" on page 141 for use of an SMC pipetting module only.

Refer to "Calibration for SMC and NTC Pipetting Modules" on page 219 for use of an SMC and an NTC pipetting module in the same system.

**Contents**

# Calibrating the system coordinates

## Purpose/summary

All systems are calibrated at the time of manufacture. Due to the precise nature of the equipment's motions, the "coordinate calibration" needs to be verified, and minor adjustments are typically required, upon installation. Calibration consists of placing "teach tools" in the system and moving the system stages and pipetting module to pre-defined coordinates. Minor adjustments to the precise calibration locations help to ensure precise aspiration and dispense.

## When to calibrate the system

The system's coordinate system should be calibrated upon installation and whenever the system is moved. The coordinate system can also be verified and/or adjusted at periodic intervals as determined by the usage and end-user. Calibration can take several hours to properly complete for a 6-stage system with multiple pipette options and accessories.

## Coordinate system

The coordinates used on the ***Versette*** system are standard geometric coordinates, with an added "S-axis" (syringe axis), listed below:

- X-axis: left-to-right position
- Y-axis: front-to-back position
- Z-axis: up and down (height) position
- S-axis: 'Syringe" axis, a special height coordinate for use with the SMC pipetting module only, to properly calculate coordinates for head pickup and drop-off heights for use with optional head-nests, and for pickup and drop-off heights for disposable tips, etc.

## Skill level

Coordinate calibration is typically performed by a trained professional but can be performed by most technicians who understand how to use the ControlMate software, are familiar and comfortable with working on precision equipment and with working with Windows software, and who understand basic X-axis (left-to-right), Y-axis (forward-to-back), and Z-axis (vertical) coordinate systems. The coordinate system is referenced from the front of the machine where the operator stands.

The following procedures use ControlMate software to calibrate the coordinate system. Modify as necessary for a 2-stage or 6-stage systems. Refer to the *ControlMate User's Guide* for additional information on the use of ControlMate software.

## Versette calibration flowchart

The calibration process varies for the type of pipetting module in use with the system. All calibration steps require the use of the Calibration Plate. The methods are shown below:


Figure 15. Versette Calibration Master Flowchart

# Required Equipment

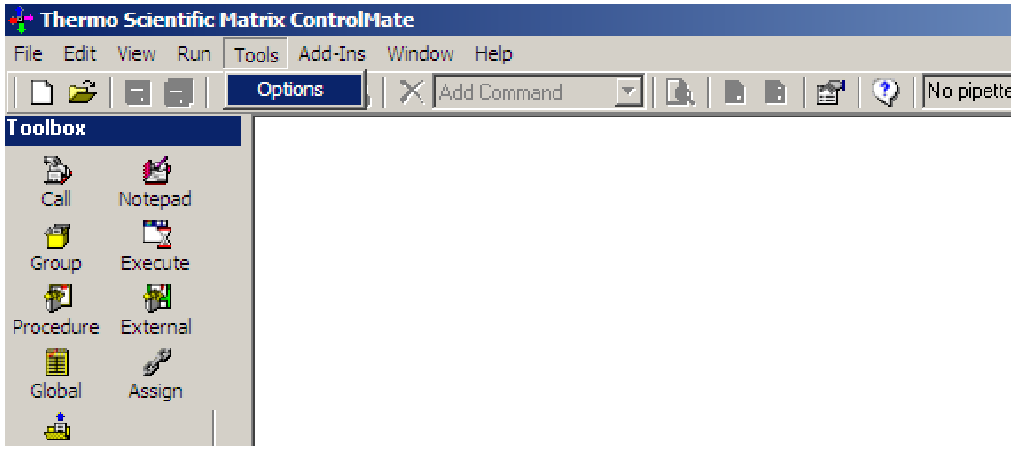
- ***Versette*** system with 2-stage or 6-stage assembly
- ControlMate software, installed on computer or laptop with communications cable
- Calibration Plate
- NTC Teach Tool

# BEFORE CALIBRATION

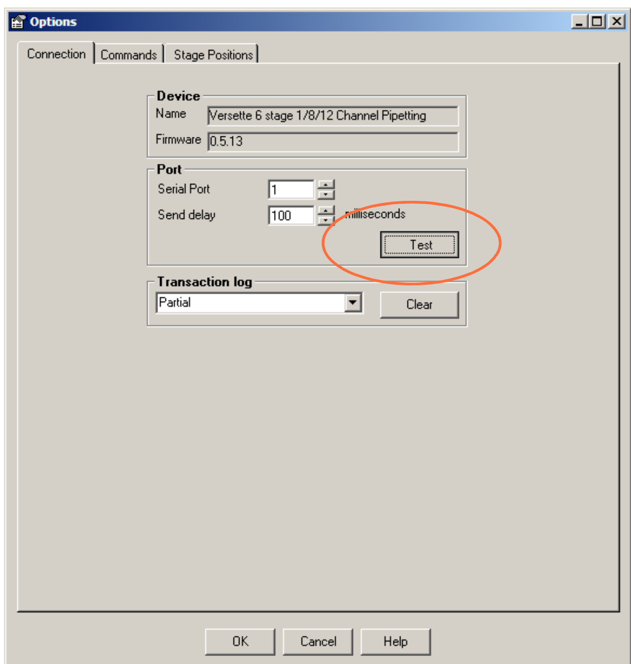
## 1: Verify Communications with the Versette System

1. Verify that the stage unit has been installed properly in the system.
   See Installation section of the Versette manual.
2. Connect the ***Versette*** to a computer running ControlMate software.
3. Verify that the ***Versette*** is operating in Remote mode. The "On Board" button will display on the main screen. If not in Remote mode, from the Main Menu select **Configuration** then **Remote Mode** to switch to remote mode.

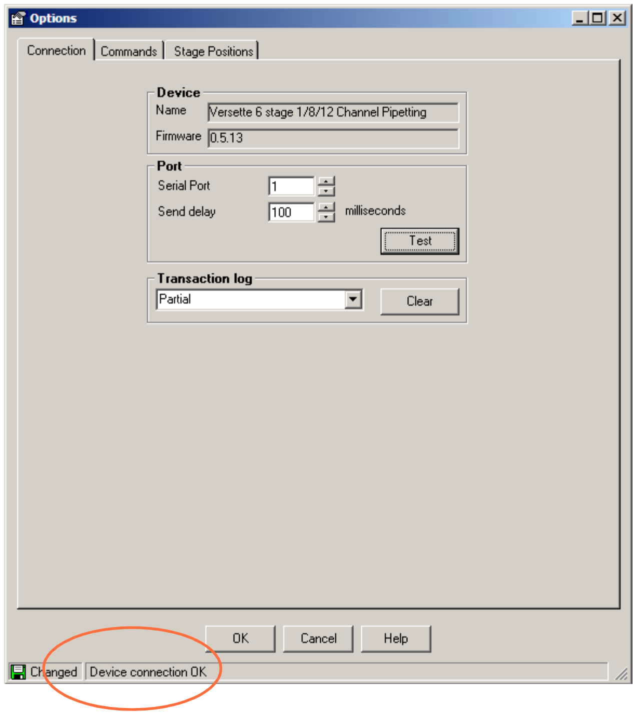
4. From the Tools menu, select Options.



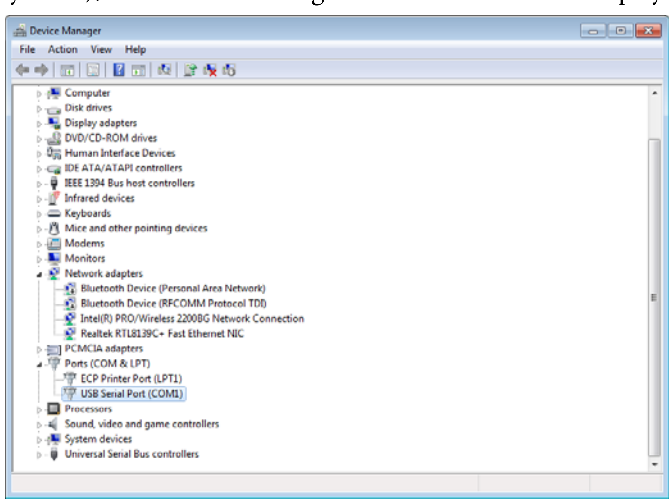

5. Click the Test button.



6. Verify that the Device Connection is OK and verify that the correct RS232 or RS232 Virtual Serial Communication port number has been entered. If not, check the connection cable.

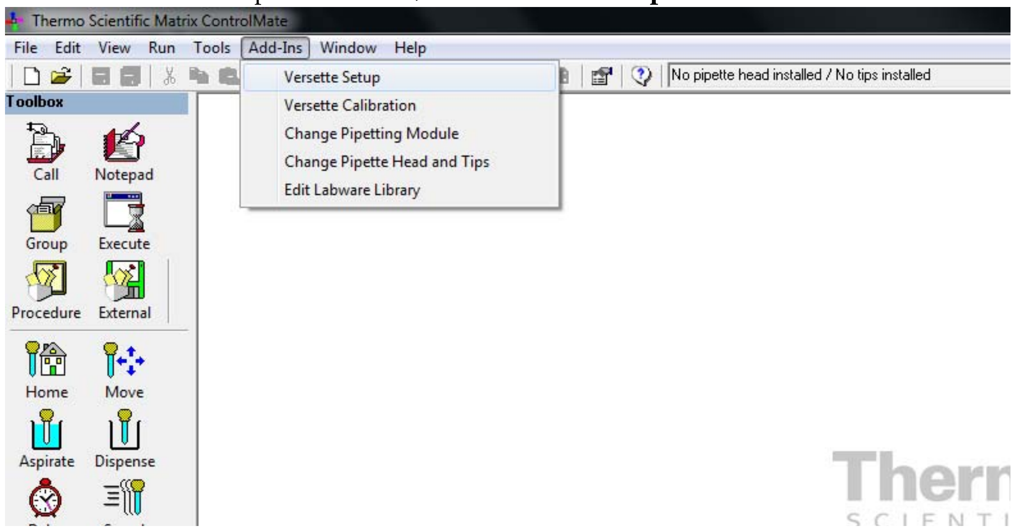



If you are unable to connect, verify that your computer is recognizing the port that the communication cable is attached to on your computer. You do this through Device Manager. In Windows, select Start then Control Panel, then Hardware and Sound (on Windows 7 systems), then DeviceManager. The screen should display the port as shown below:



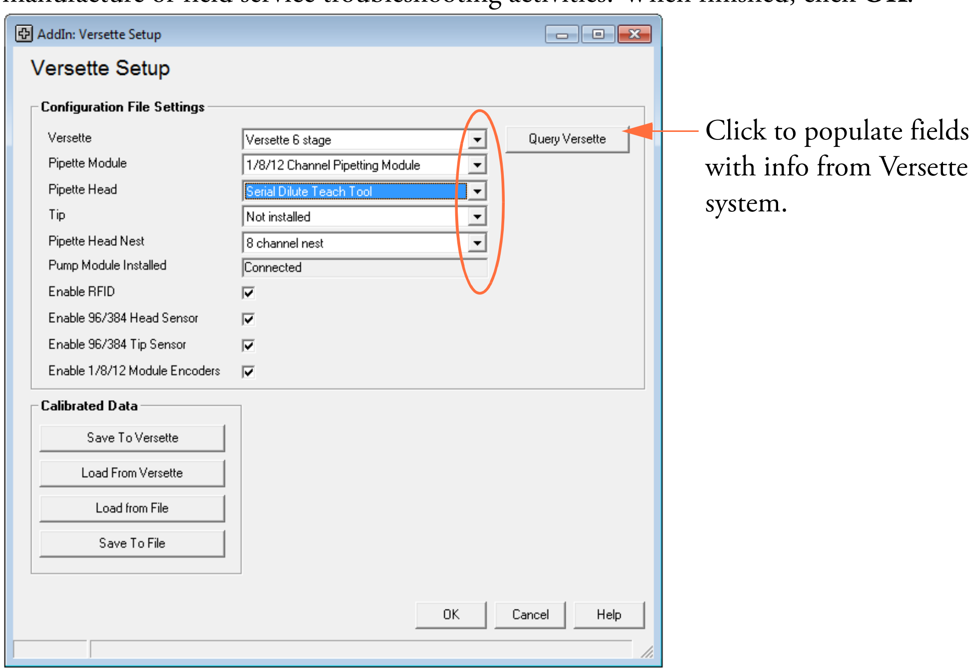
## 2: Verify Versette System Setup

1. From the **Add-ins** drop-down menu, select **Versette Setup**.




2. Click the Query Versette button to confirm machine and ControlMate are properly communicating. Drop-down fields will automatically prefill with the appropriate information.

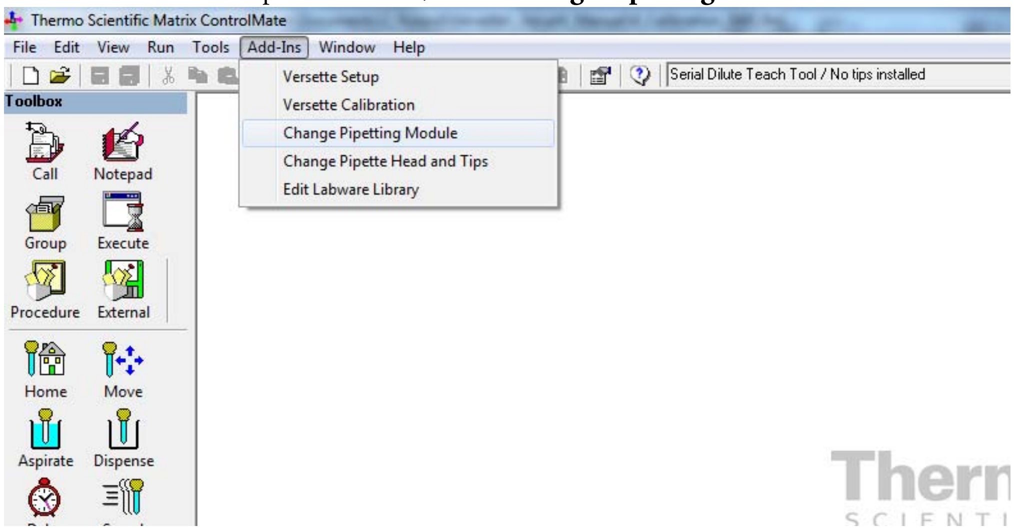
   You can also make any changes to the Configuration File Settings by selecting the correct system configurations from the drop-down menus. Check marks should be placed next to all optional equipment as shown below (even if not installed, as it will not affect performance). A check mark should be placed next to the RFID at all times during calibration and normal system operation. This feature is only turned off during manufacture or field service troubleshooting activities. When finished, click **OK**.



# STEP 1: Install the NTC Pipetting Module and NTC Teach Tool

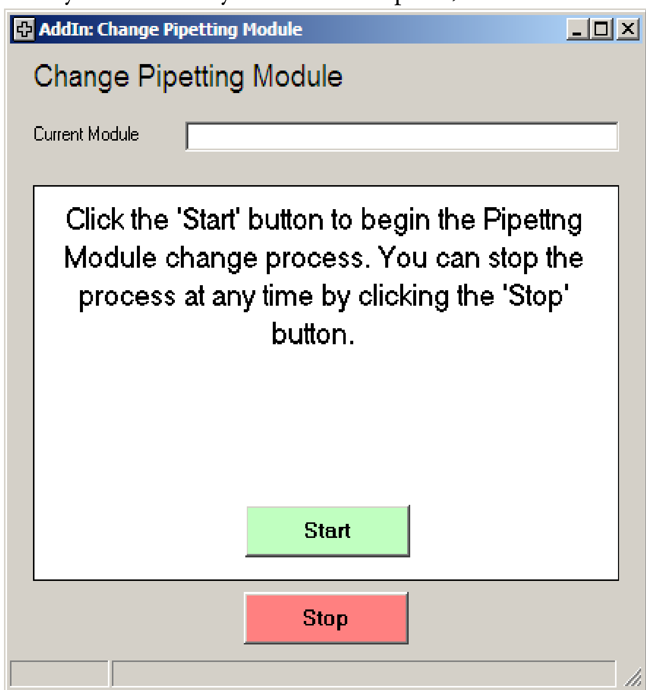
1. If not installed, install an NTC Pipetting Module as follows:

1. From the **Add-ins** drop-down menu, select **Change Pipetting Module**.

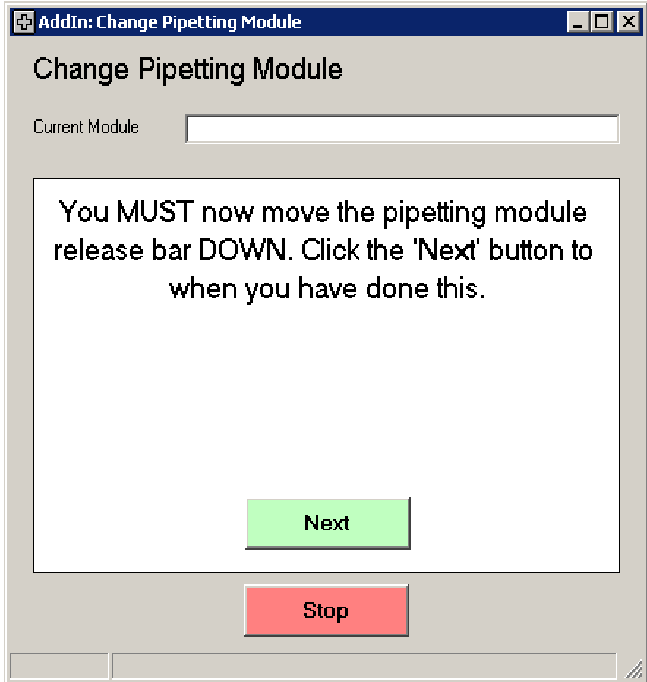


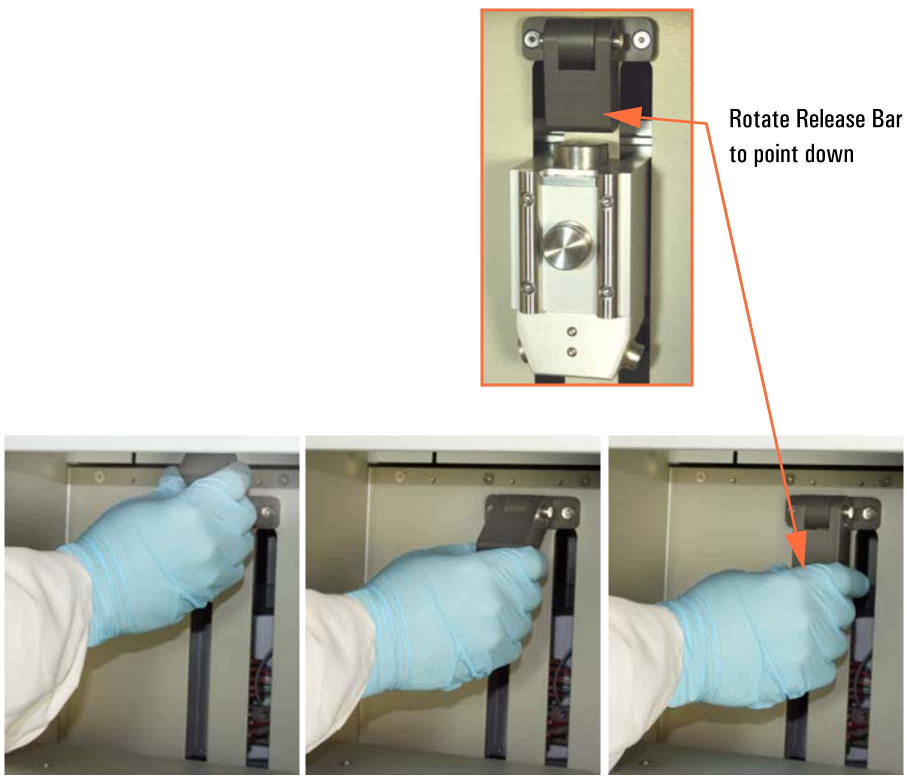

2. Follow the screen prompts to install an NTC pipetting module:

   a. Verify that all safety shields are in place, then click the **Start** button.



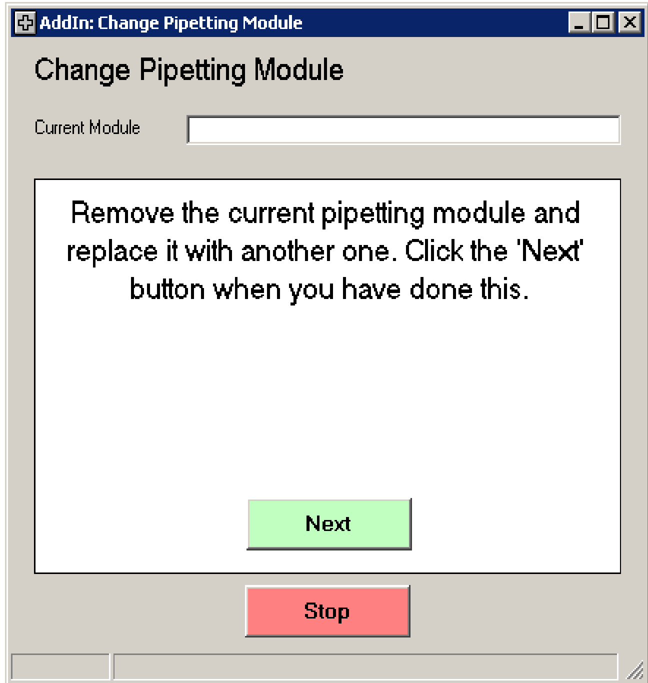
b. Move the release bar DOWN then click **Next**.

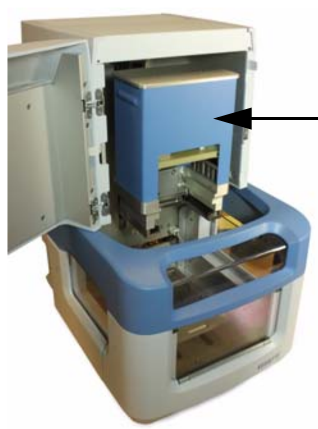



Rotate Release Bar to DOWN position.

c. Carefully lift and position the pipetting module onto the pipetting module holder then click **Next**.

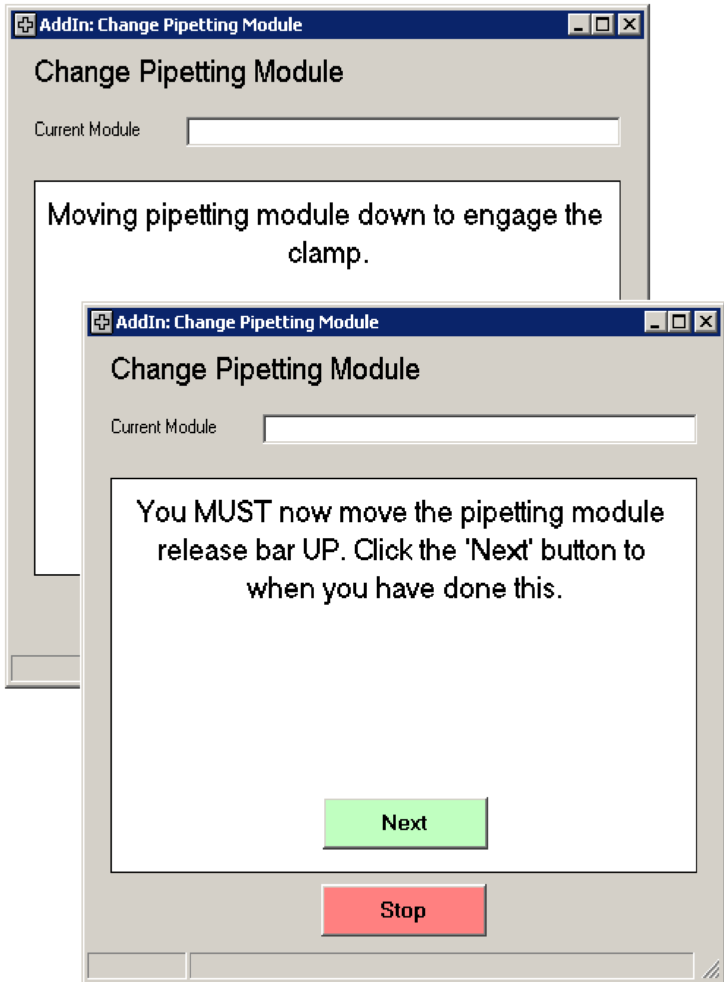


Carefully lift and position the pipetting module into the system

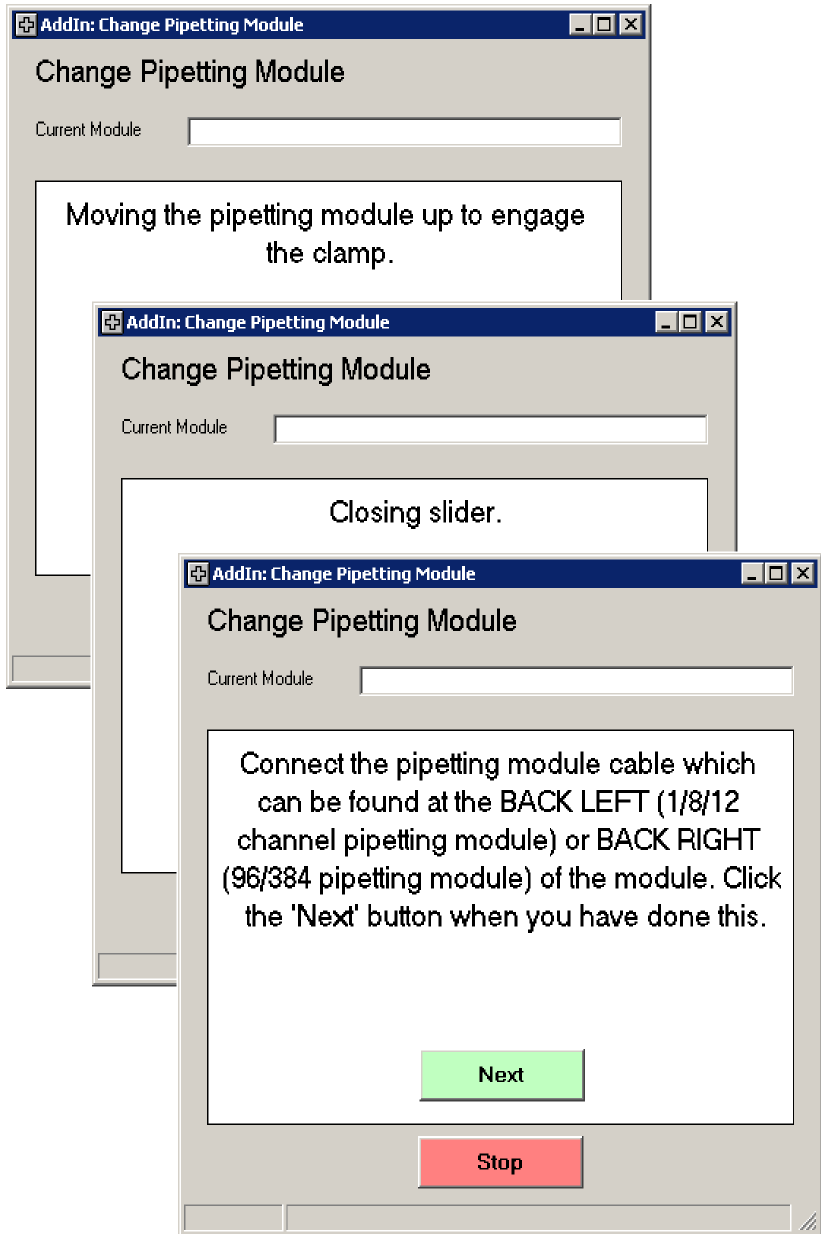
(2-stage system shown)

d. Wait for the system prompt, then move the release bar UP, then click **Next**.




Rotate Release Bar to UP position.

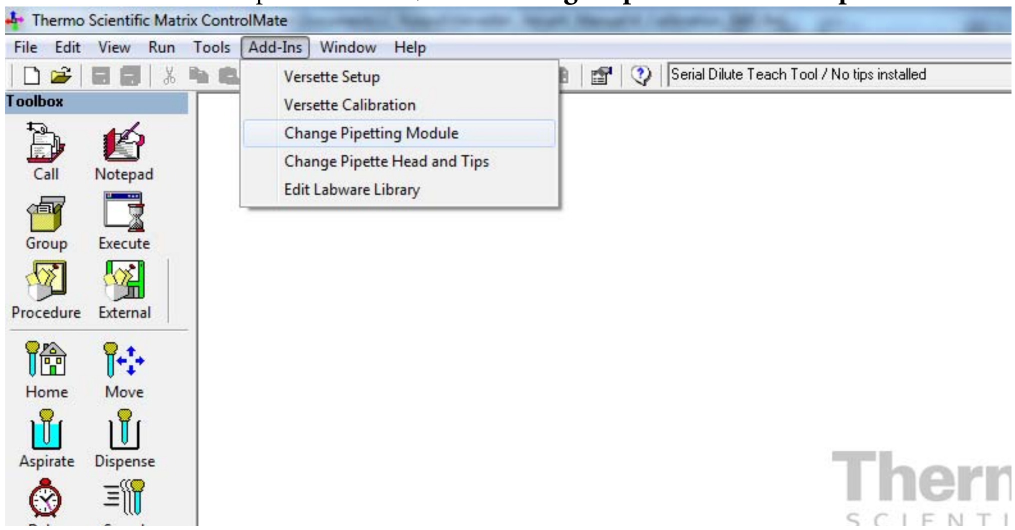
e. Wait for the system prompt then connect the pipetting module cable, then click **Next**.



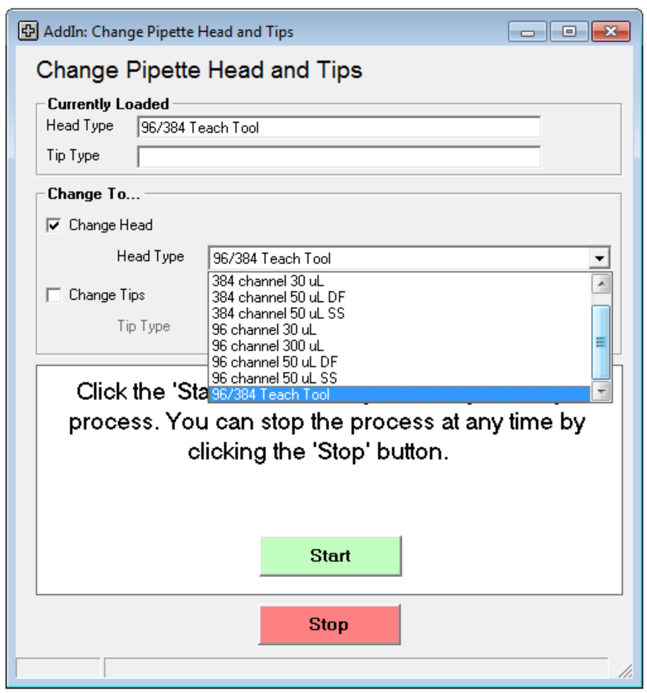

The cable connector may have red dots which align to the system connector. The dots are difficult to see due to their location. Follow the screen messages carefully and press in firmly to ensure proper connection.

f. Wait for the system to complete the load sequence and home all axes. Various messages will be displayed. When complete, the system will display “Change Complete...”. Close the window by clicking the X in the upper right-corner.

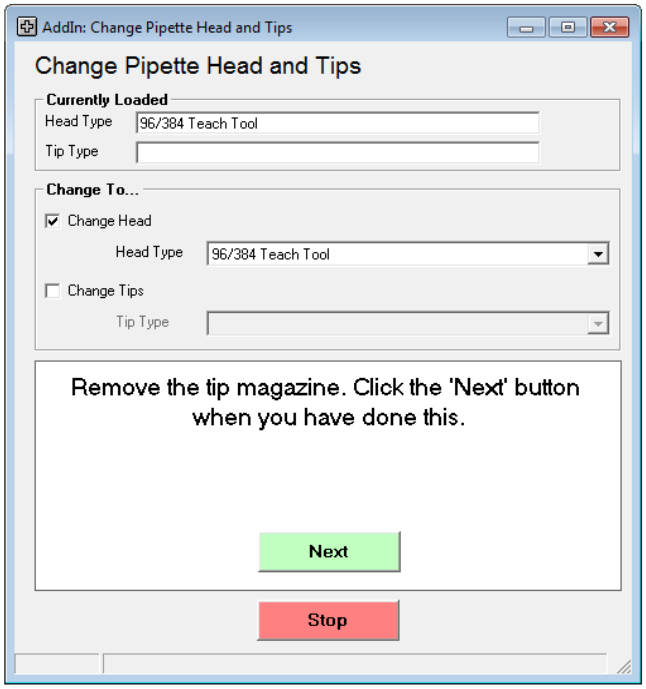
3. From the **Add-ins** drop-down menu, select **Change Pipette Head and Tips**.



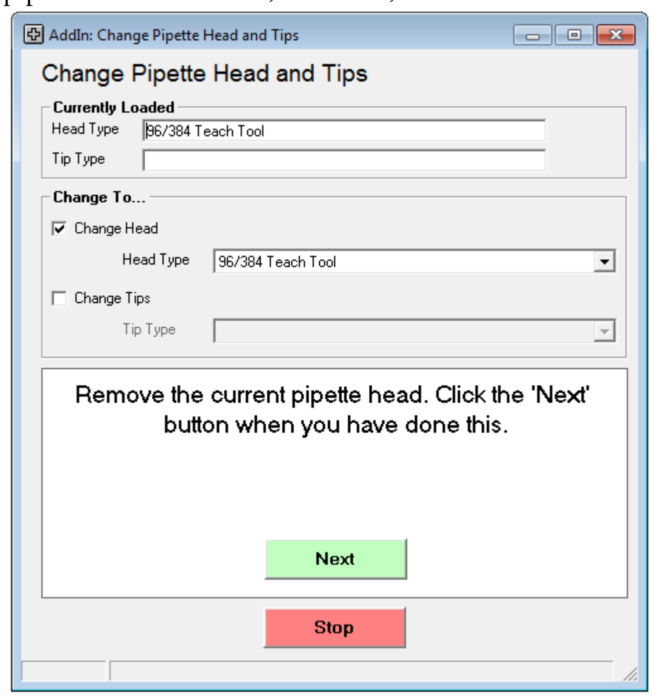

4. Place a checkmark in “**Change Head**” then use the scroll-down field to select “**96/384 Teach Tool**”.



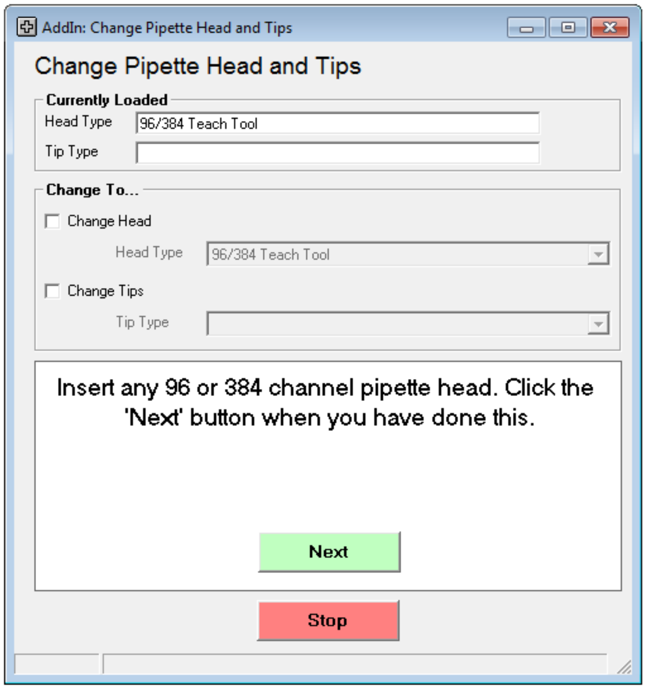
5. If a tip magazine is in the system, remove it, then press the **Next** button to continue.

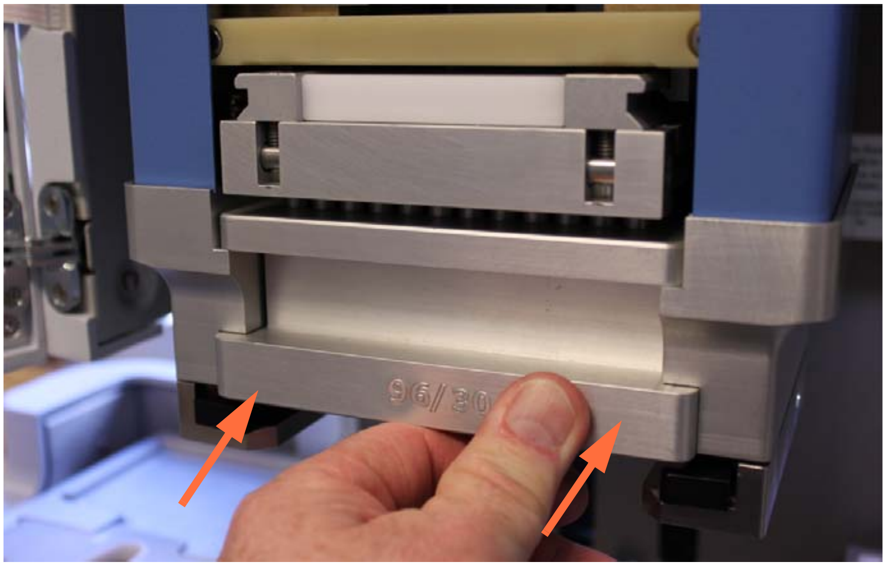



6. If a pipette head is installed, remove it, then click **Next** to continue.



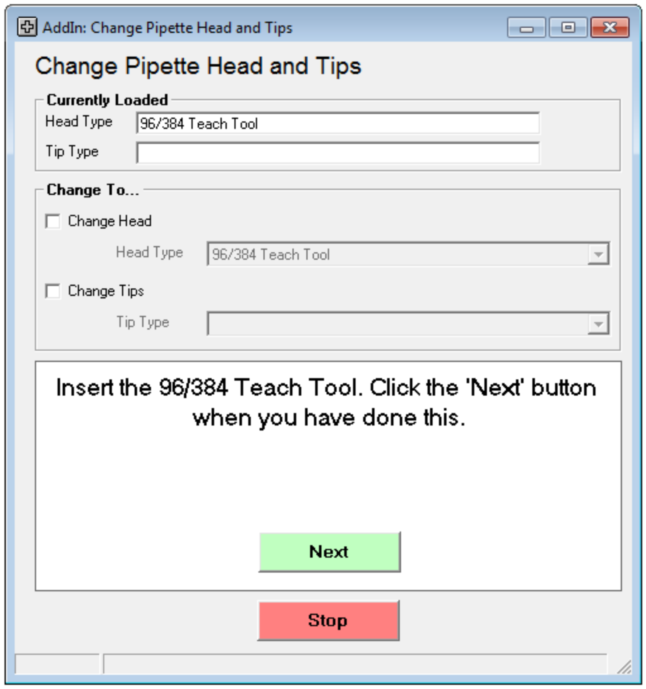
7. Insert any 96 or 384 channel pipette head, then click the **Next** button to continue.



Press firmly in until it clicks in place.

8. Insert the 96/384 Teach Tool, then click **Next** to continue.



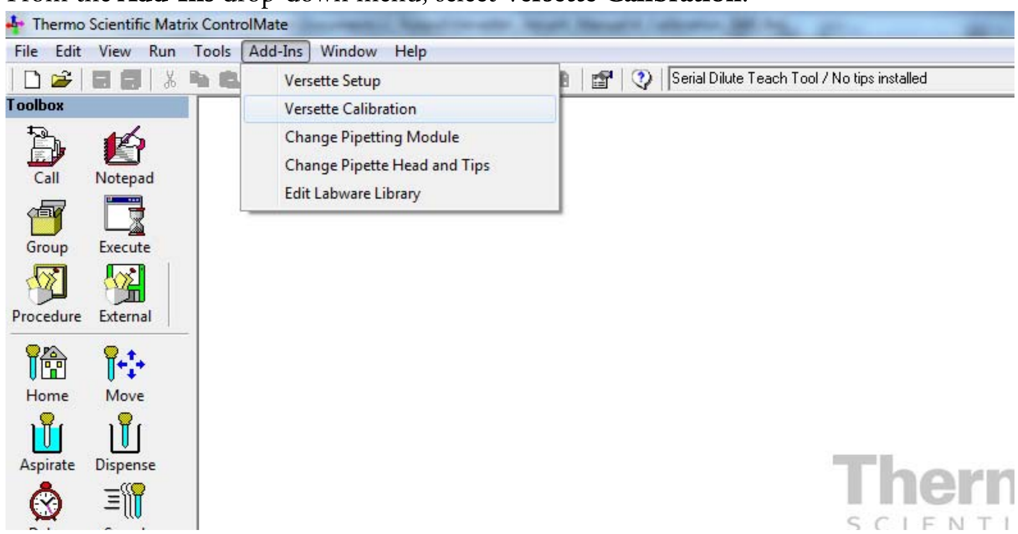


Press firmly in until it clicks in place.

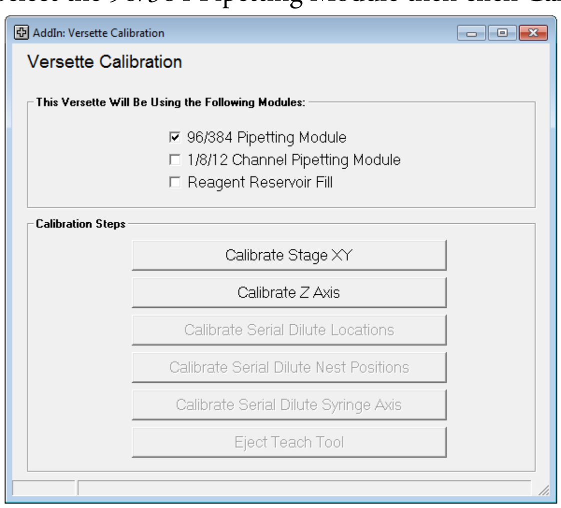
# STEP 2: Calibrate Stage XY Coordinates

1. Place the Calibration Plate flat in position on Stage 2 with the "96/384 PIPETTING HEAD" side facing up.

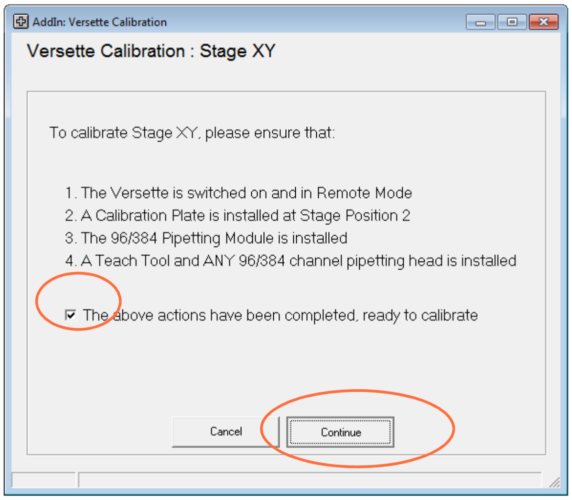

2. From the **Add-Ins** drop-down menu, select **Versette Calibration**.



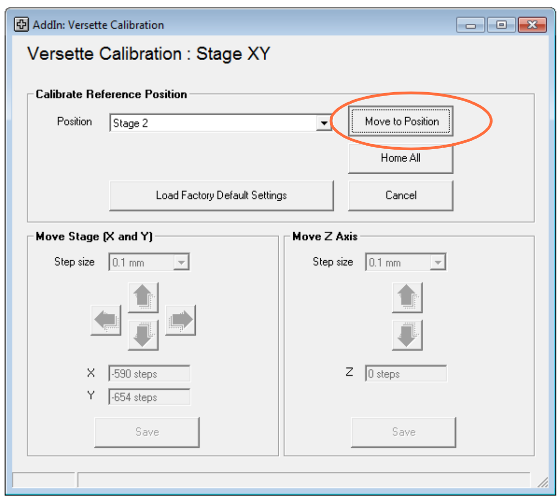

3. Select the 96/384 Pipetting Module then click **Calibrate Stage XY**.



4. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.

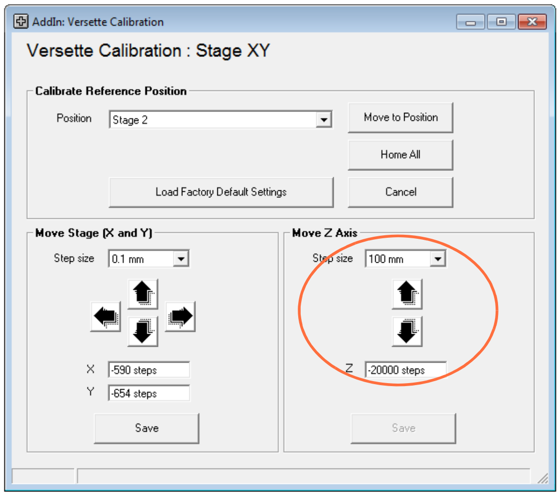



5. Select Stage 2 from the drop-down menu then click "**Move to Position**".

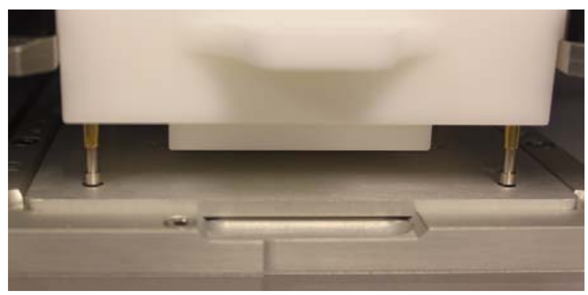


6. After Stage 2 has moved in position under the teach tool, use “Move Z Axis” to lower the teach tool to approximately 1 mm above the Calibration Plate.
   - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down arrow to move the pipetting module.

   **CAUTION** Use care when moving the pipetting module to avoid hitting the stage. Select the smallest reasonable **Step size**.

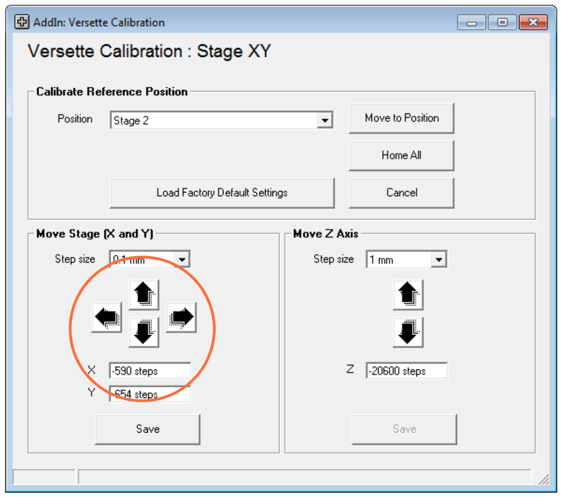


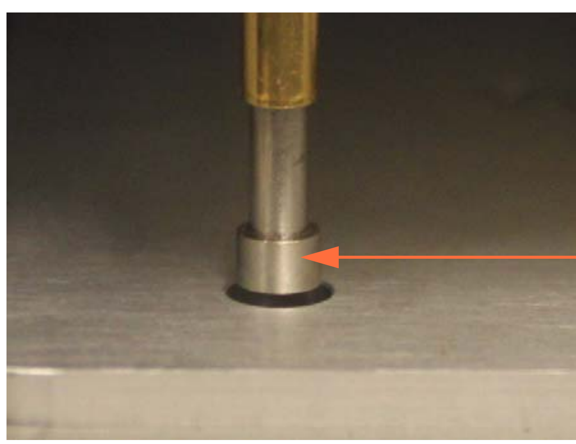

Lower NTC
teach tool close
to Calibration Plate



7. Check the alignment location. The teach tool posts should be positioned in the exact center of the Calibration Plate holes. Alignment of the holes marked "A" (left rear, and right front) is critical.

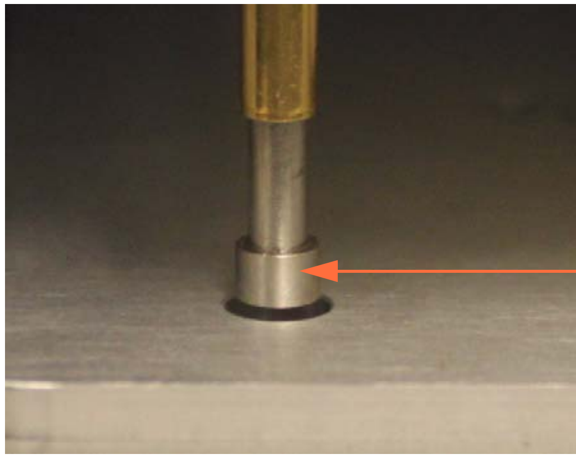
   If necessary, use the Move Stage (X and Y) commands to enter a **Step size** (typically 0.1 mm) then use the arrows to move the stage left or right, forward or back to achieve perfect alignment. Take great care to be as precise as possible. It is recommended to view the alignment from as many angles as practical.



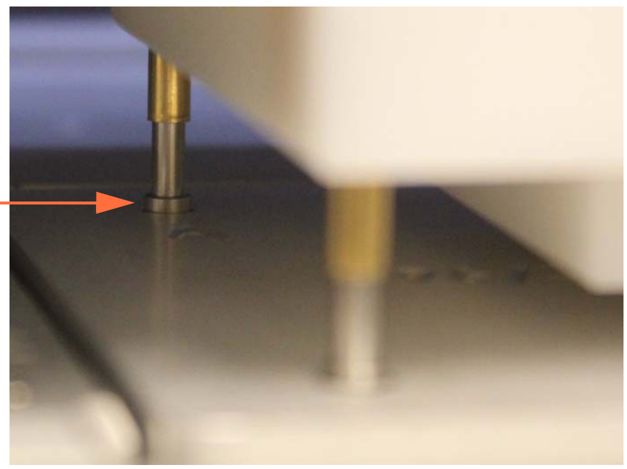



Center above hole in "A" location

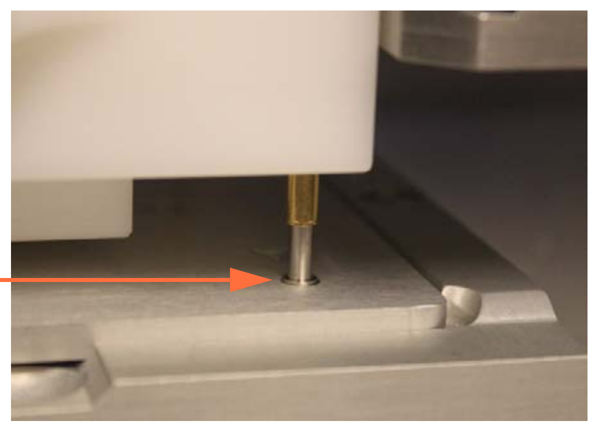
8. Lower the pipetting module slightly to verify that the X-axis and Y-axis alignments are properly set. Take care to check the left rear hole and the right front hole marked as “A” locations on the Calibration Plate.



Center above hole

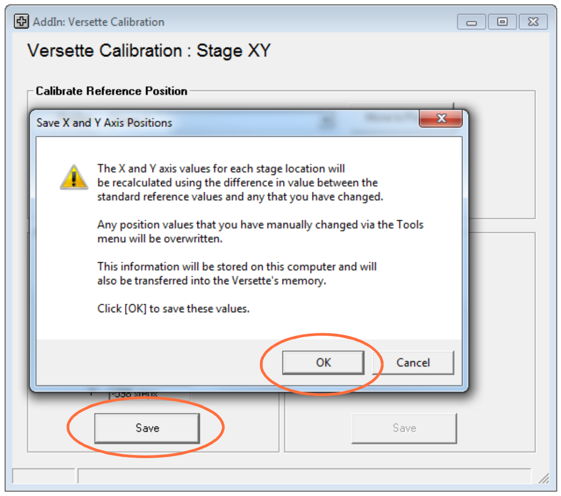


LEFT REAR
lower teach tool
into hole
marked “A”

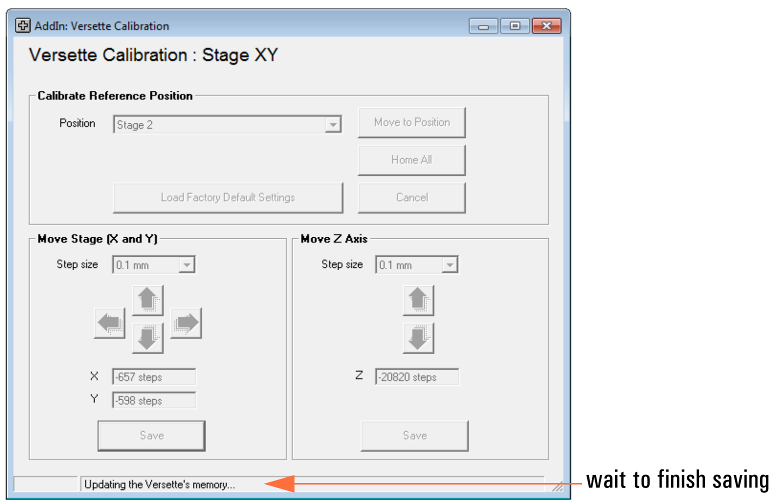


RIGHT FRONT
lower teach tool
into hole
marked “A”

9. Click “**Save**” to save the new calibration coordinates, read the message, then click **OK**.

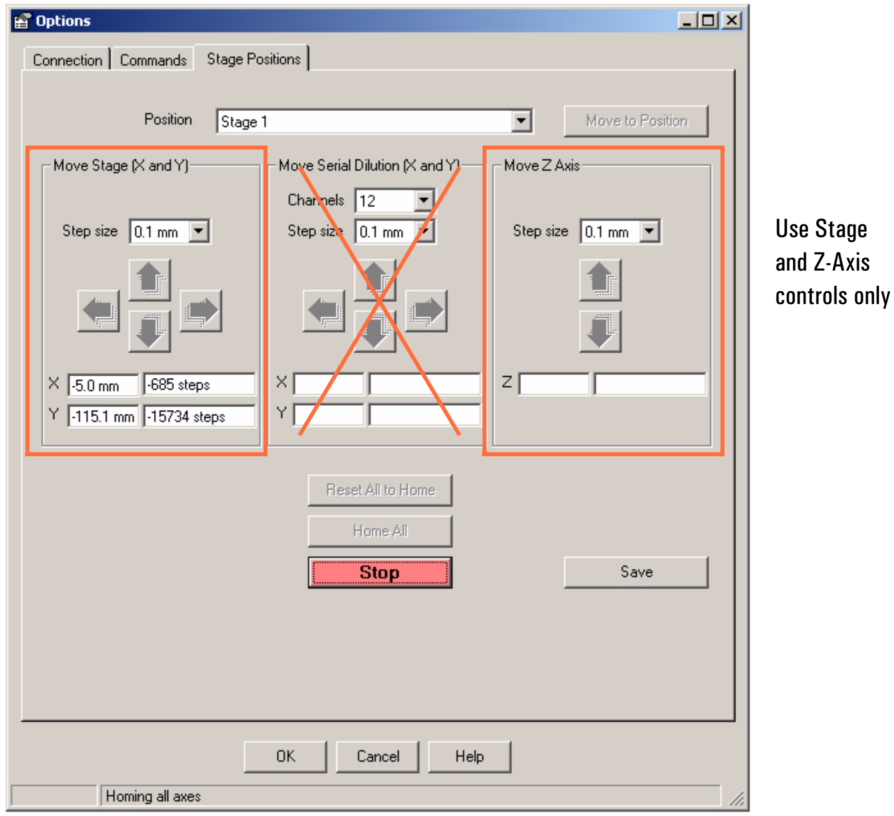



10. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.



11. OPTIONAL: Verify the accuracy of calibration at each remaining stage location, as detailed below. If no changes are made on a specific stage, there is no need to click save, just move to the next location and continue to check each stage position.

    a. From the Tools menu, select **Options**, then select the **Stage Positions** tab.



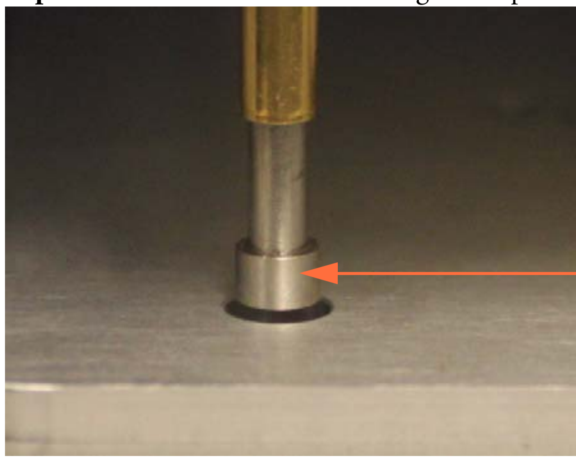

    b. Place a Calibration Plate with the 986/384 printing facing up on the stage where you will check the coordinate alignments (typically start at Stage 1).

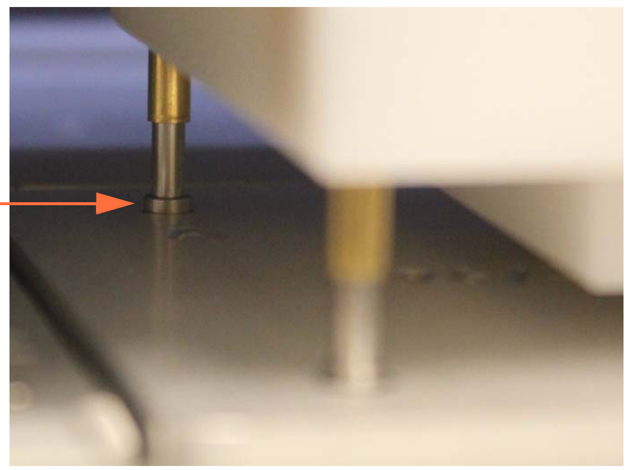
    c. Use the dropdown box to select the stage where the Calibration Plate is installed, then click "**Move to Position**". The unit will go through a homing cycle, then move to the selected stage position.

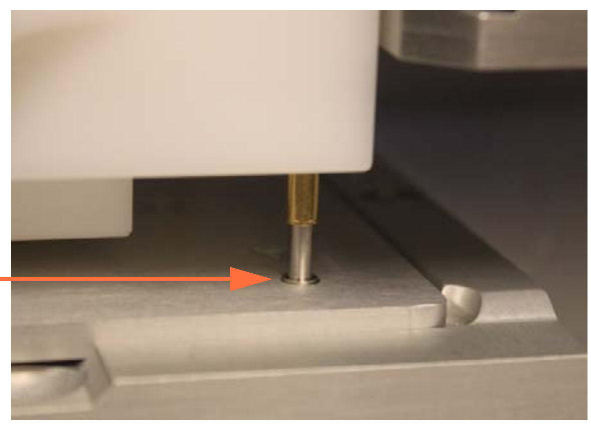
    d. After the selected stage has moved in position under the teach tool, use the "Move Z Axis" commands to lower the teach tool down within 1mm of the Calibration Plate. - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down button to move the head down.

    **CAUTION** Use care when moving the pipetting module down to avoid hitting the stage. Select the smallest reasonable **Step size**.

e. Verify alignment of the teach tool pins with the Calibration Plate. If necessary, use the **Step size** and arrows to center the alignment pins as shown.



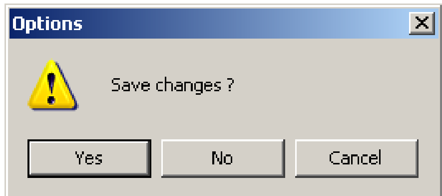



f. If you made any changes, click **Save** and wait approximately 15 seconds for the system to save the changes.

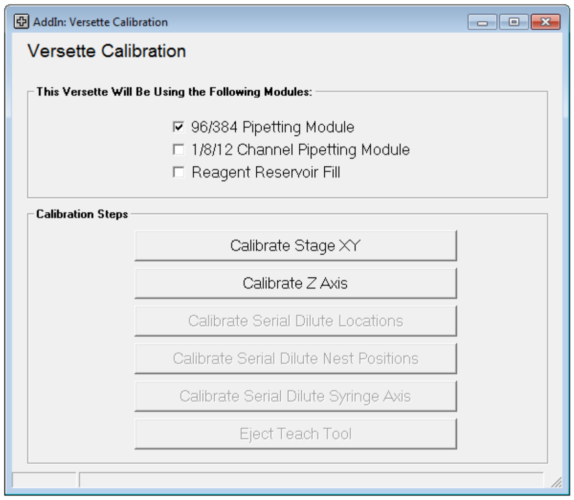
g. For 6-stage systems, repeat steps b through f above for each of the remaining stage positions (3, 4, 5, and 6).

h. Click the X in the upper right corner of the calibration window to close the window. If prompted, click “**Yes**” to save changes.

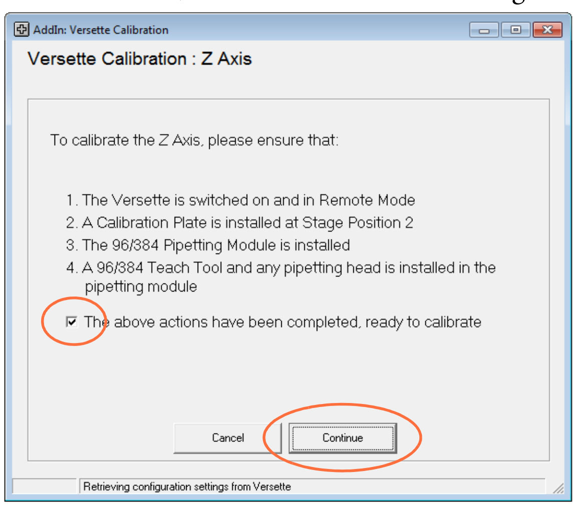


# STEP 3: Calibrate the Z-axis

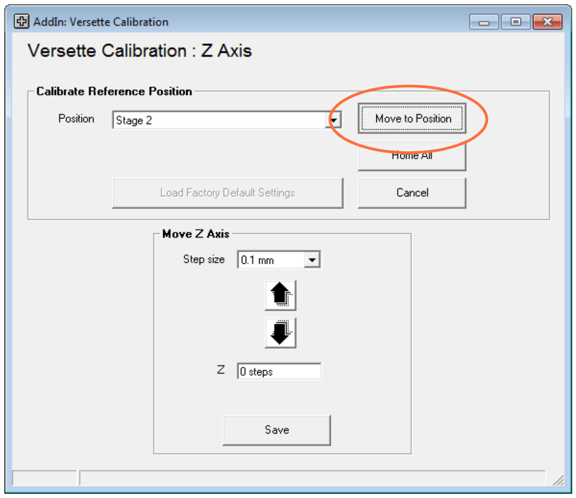
1. Select **Calibrate Z-axis**.



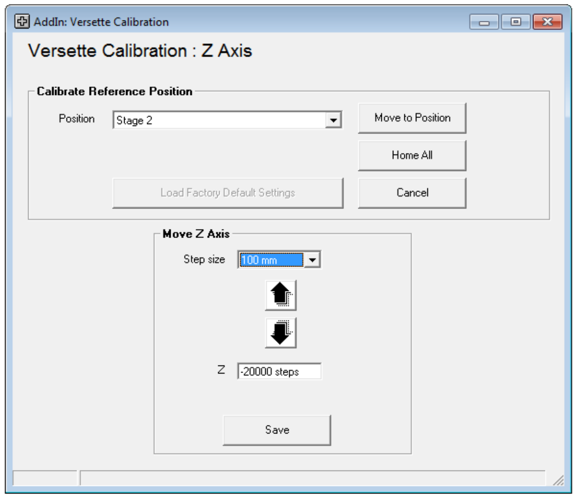

2. Read the instructions and verify that all items have been completed, then select the check box to continue, then click "**Continue**" to begin the calibration process.

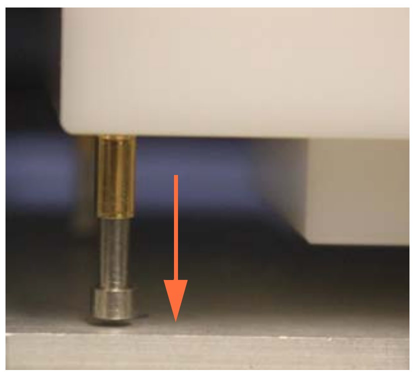


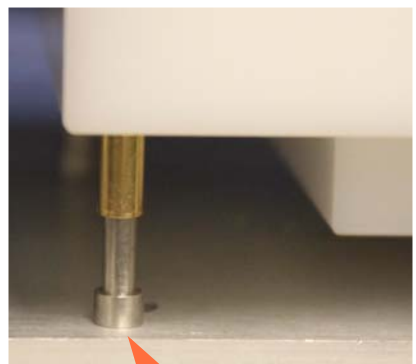
3. The Z-Axis is calibrated from Stage 2. Verify that Stage 2 is displayed in the position box, then press "**Move to Position**." The head and stages will move to position the Teach Tool over the Calibration Plate on Stage 2.



4. Set the **Step size**, then use the arrows to move the teach tool down until it is just barely touching the Calibration Plate, as shown. Keep adjusting the step size, as necessary. Use care and move very slowly into position.



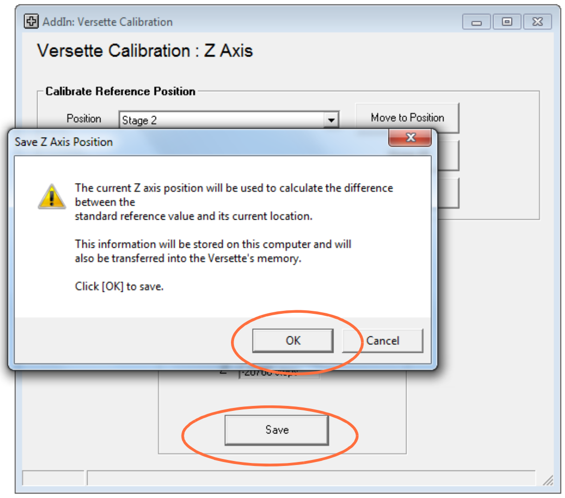


slowly lower teach tool

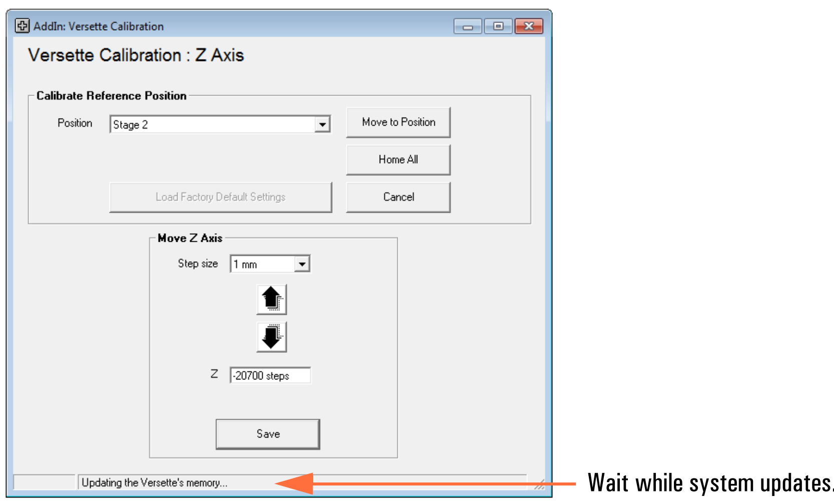
teach tool just touches
Calibration Plate

Front pins on Calibration Plate
(It is not necessary for the rear pins on the teach tool to touch the Calibration Plate as the Z-axis calibration is calculated from the front pins.)
DO NOT ALLOW THE PINS TO COMPRESS. IF THEY DO, RAISE THE TEACH TOOL AND THEN RE-TRY.

5. Click “**Save**” to save the new calibration coordinates, then click **OK** on the pop-up window.




6. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu



8

# Calibration for SMC and NTC Pipetting Modules

Follow this procedure to calibrate the coordinates for a system that will use both the SMC pipetting module and the NTC pipetting module.

Refer to "Calibration for NTC Pipetting Modules Only" on page 189 for use of an NTC pipetting module only.

Refer to "Calibration for SMC Pipetting Modules Only" on page 141 for use of an SMC pipetting module only.

**Contents**

# Calibrating the system coordinates

## Purpose/summary

All systems are calibrated at the time of manufacture. Due to the precise nature of the equipment's motions, the "coordinate calibration" needs to be verified, and minor adjustments are typically required, upon installation. Calibration consists of placing "teach tools" in the system and moving the system stages and pipetting module to pre-defined coordinates. Minor adjustments to the precise calibration locations help to ensure precise aspiration and dispense.

## When to calibrate the system

The system's coordinate system should be calibrated upon installation and whenever the system is moved. The coordinate system can also be verified and/or adjusted at periodic intervals as determined by the usage and end-user. Calibration can take several hours to properly complete for a 6-stage system with multiple pipette options and accessories.

## Coordinate system

The coordinates used on the ***Versette*** system are standard geometric coordinates, with an added "S-axis" (syringe axis), listed below:

- X-axis: left-to-right position
- Y-axis: front-to-back position
- Z-axis: up and down (height) position
- S-axis: 'Syringe" axis, a special height coordinate for use with the SMC pipetting module to properly calculate coordinates for head pickup and drop-off heights for use with optional head-nests, and for pickup and drop-off heights for disposable tips, etc.

## Skill level

Coordinate calibration is typically performed by a trained professional but can be performed by most technicians who understand how to use the ControlMate software, are familiar and comfortable with working on precision equipment and with working with Windows software, and who understand basic X-axis (left-to-right), Y-axis (forward-to-back), and Z-axis (vertical) coordinate systems. The coordinate system is referenced from the front of the machine where the operator stands.

The following procedures use ControlMate software to calibrate the coordinate system. Modify as necessary for a 2-stage or 6-stage systems. Refer to the *ControlMate User's Guide* for additional information on the use of ControlMate software.

## Versette calibration flowchart

The calibration process varies for the type of pipetting module in use with the system. All calibration steps require the use of the Calibration Plate. The methods are shown below:


Figure 16. Versette Calibration Master Flowchart

# Required Equipment

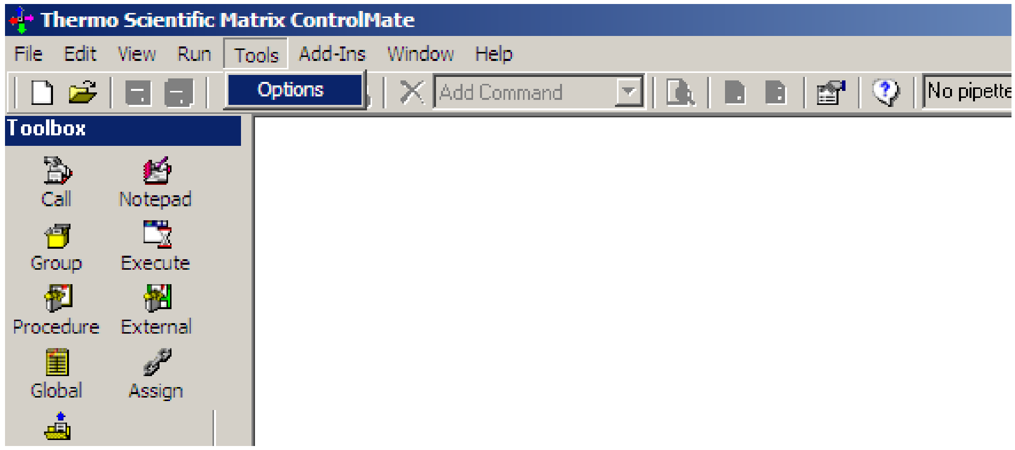
- ***Versette*** system with 2-stage or 6-stage assembly
- ControlMate software, installed on computer or laptop with communications cable
- Calibration Plate
- NTC Teach Tool
- SMC Teach Tool

# BEFORE CALIBRATION

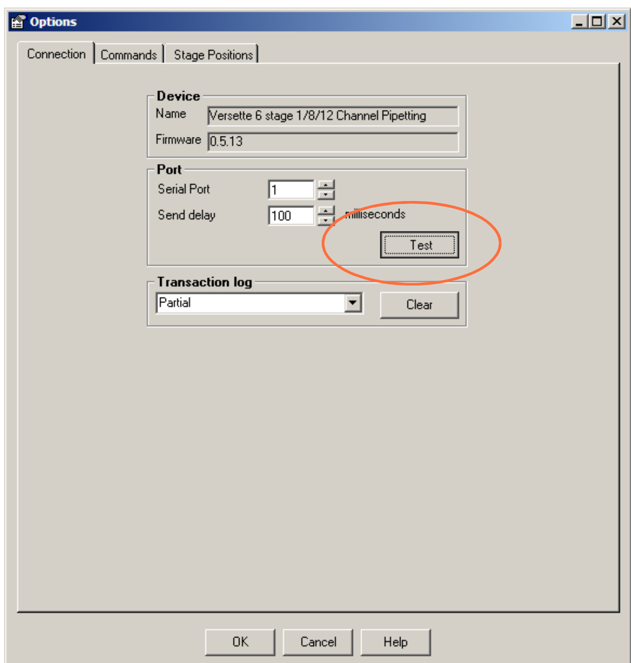
## 1: Verify Communications with the Versette System

1. Verify that the stage unit has been installed properly in the system. See Installation section of the Versette manual.
2. Connect the ***Versette*** to a computer running ControlMate software.
3. Verify that the ***Versette*** is operating in Remote mode. The "On Board" button will display on the main screen. If not in Remote mode, from the Main Menu select **Configuration** then **Remote Mode** to switch to remote mode.

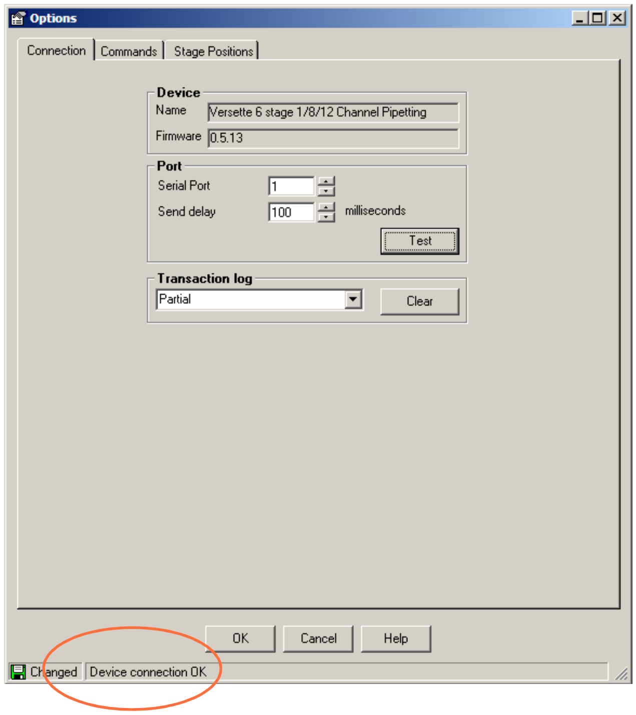
4. From the Tools menu, select Options.



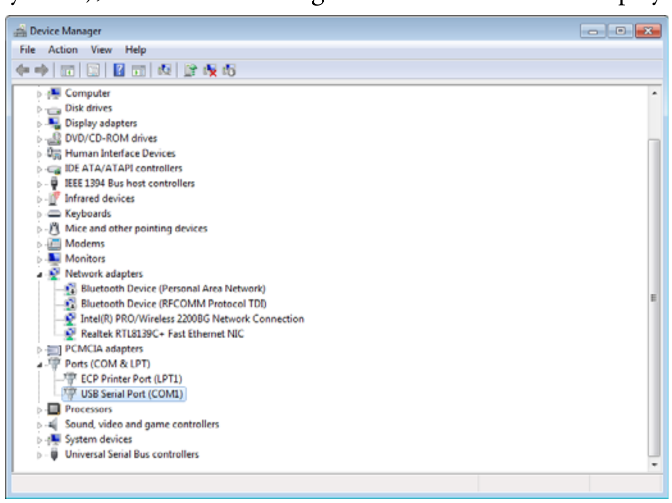

5. Click the Test button.



6. Verify that the Device Connection is OK and verify that the correct RS232 or RS232 Virtual Serial Communication port number has been entered. If not, check the connection cable.

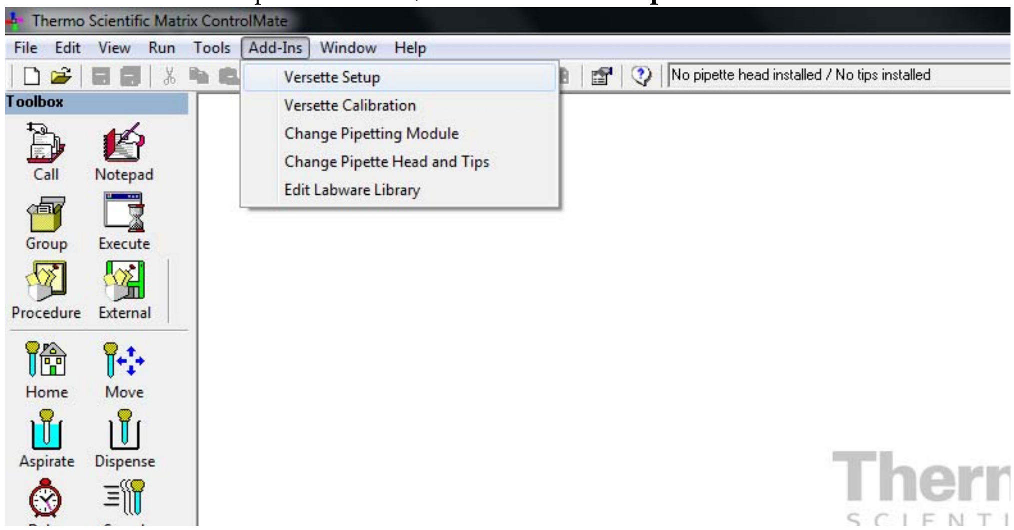



If you are unable to connect, verify that your computer is recognizing the port that the communication cable is attached to on your computer. You do this through Device Manager. In Windows, select Start then Control Panel, then Hardware and Sound (on Windows 7 systems), then DeviceManager. The screen should display the port as shown below:



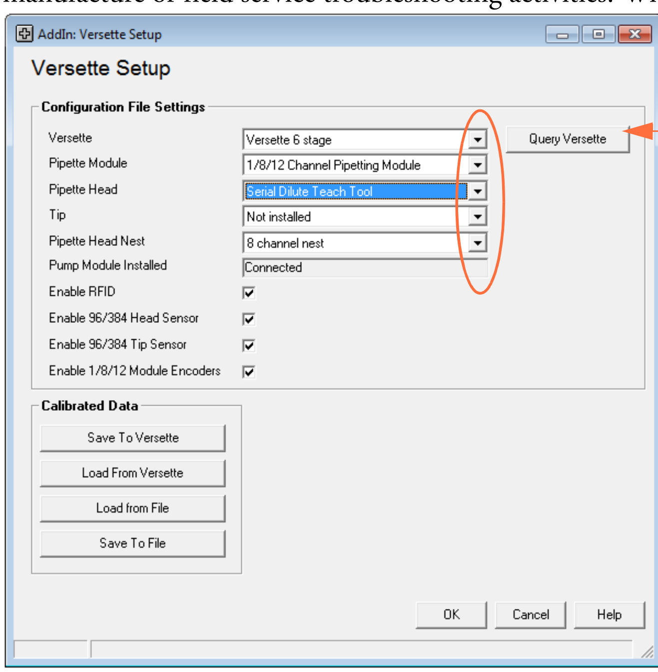
## 2: Verify Versette System Setup

1. From the **Add-ins** drop-down menu, select **Versette Setup**.




2. Click the Query Versette button to confirm machine and ControlMate are properly communicating. Drop-down fields will automatically prefill with the appropriate information.

   You can also make any changes to the Configuration File Settings by selecting the correct system configurations from the drop-down menus. Check marks should be placed next to all optional equipment as shown below (even if not installed, as it will not affect performance). A check mark should be placed next to the RFID at all times during calibration and normal system operation. This feature is only turned off during manufacture or field service troubleshooting activities. When finished, click **OK**.

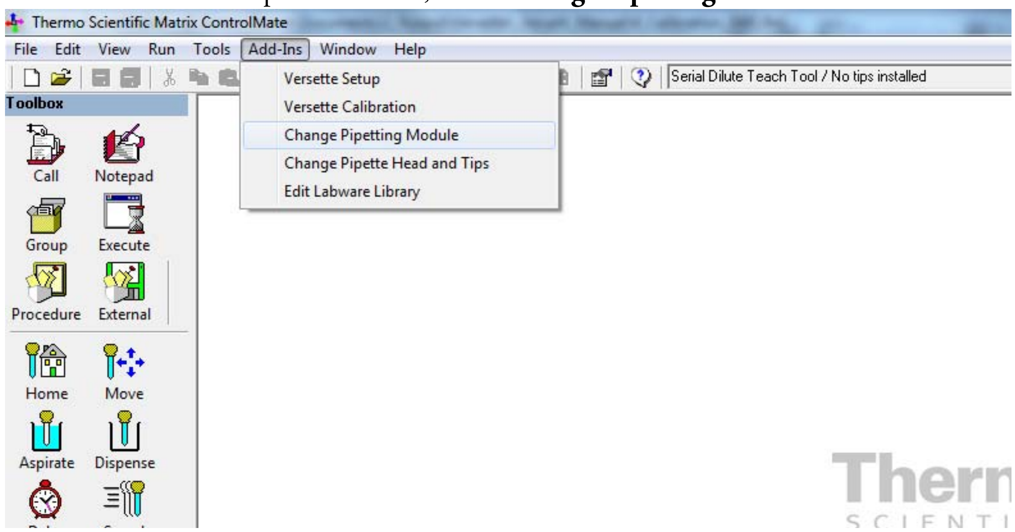



Click to populate fields with info from Versette system.

# STEP 1: Install the NTC Pipetting Module and NTC Teach Tool

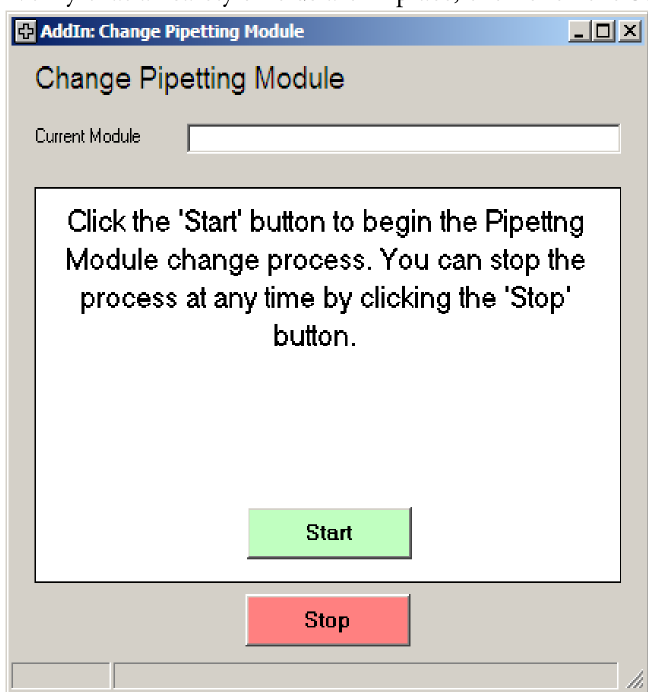
1. If not installed, install an NTC Pipetting Module as follows:

1. From the **Add-ins** drop-down menu, select **Change Pipetting Module**.

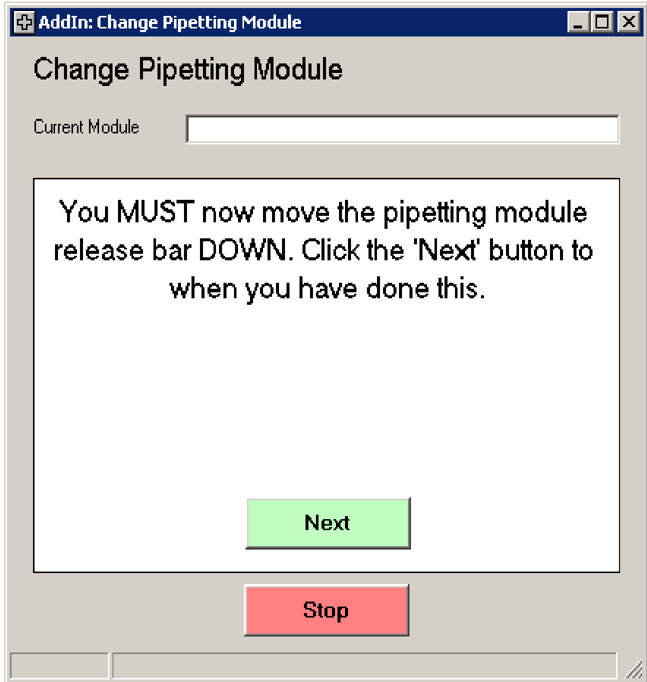


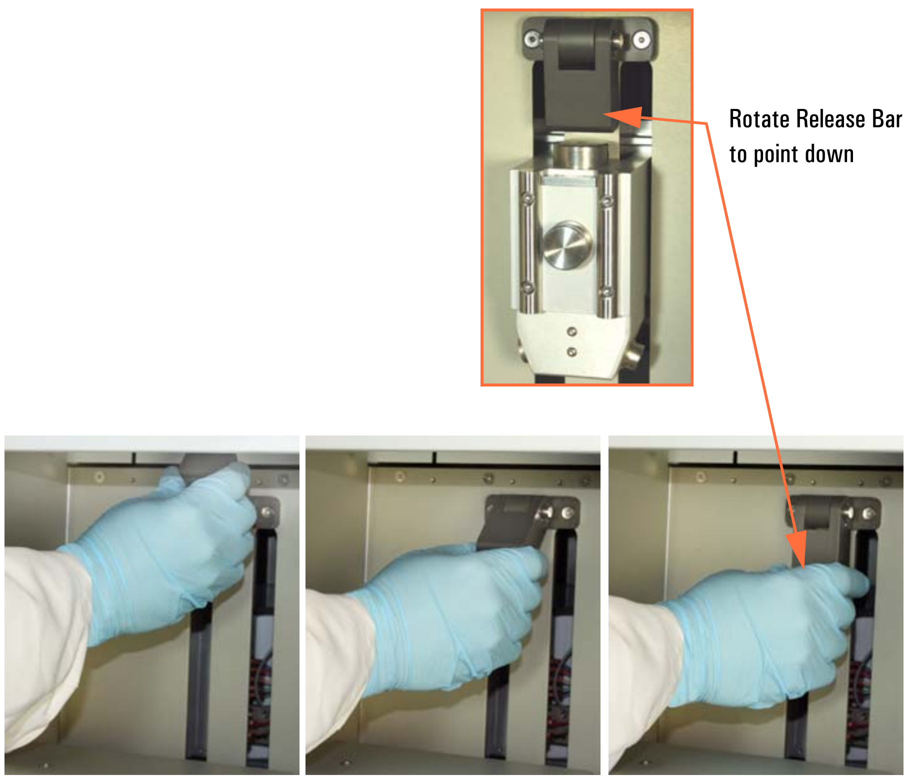

2. Follow the screen prompts to install an NTC pipetting module:

   a. Verify that all safety shields are in place, then click the **Start** button.



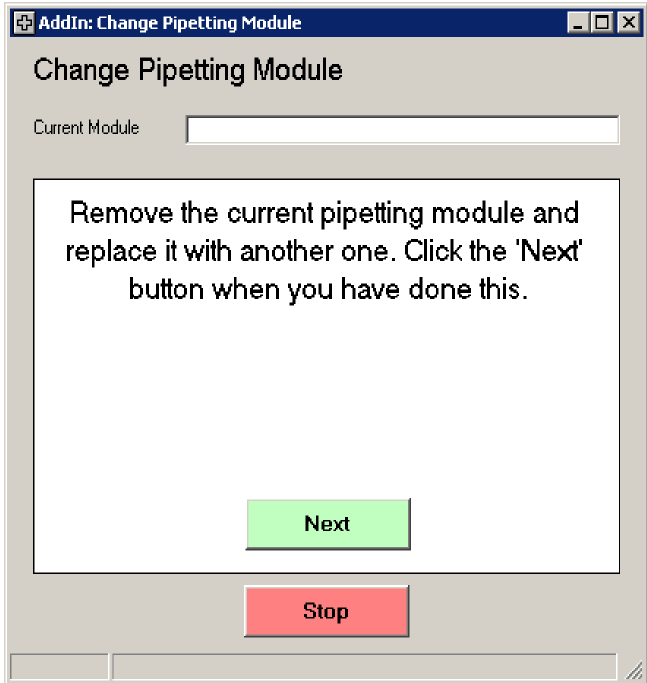
b. Move the release bar DOWN then click **Next**.

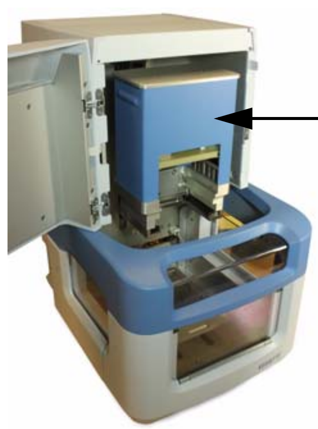



Rotate Release Bar to DOWN position.

c. Carefully lift and position the pipetting module onto the pipetting module holder then click **Next**.

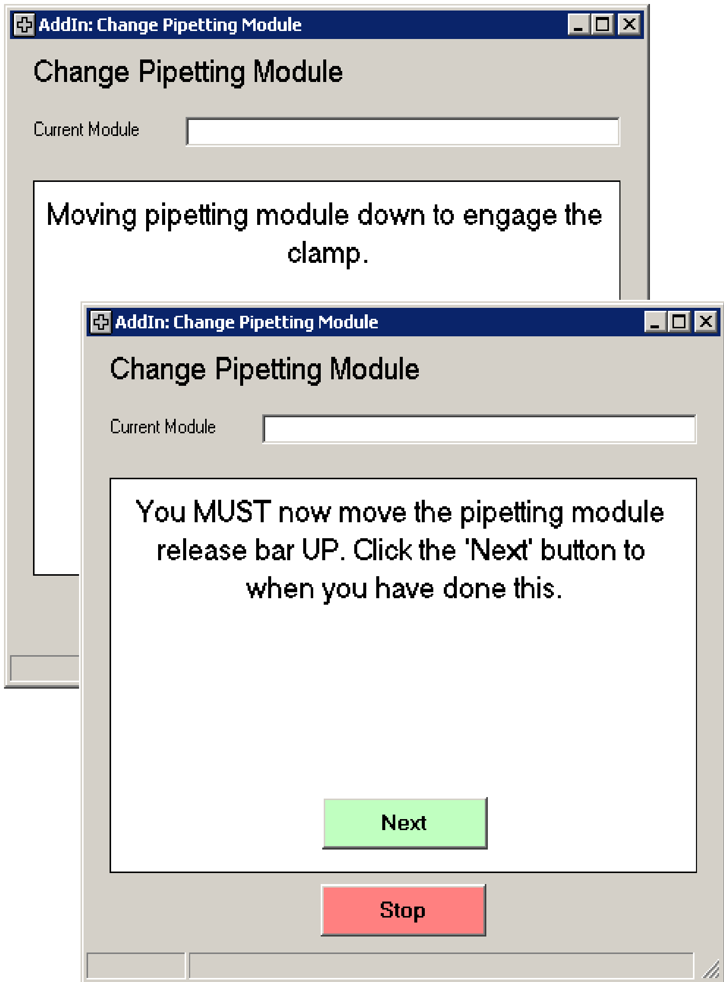


Carefully lift and position the pipetting module into the system

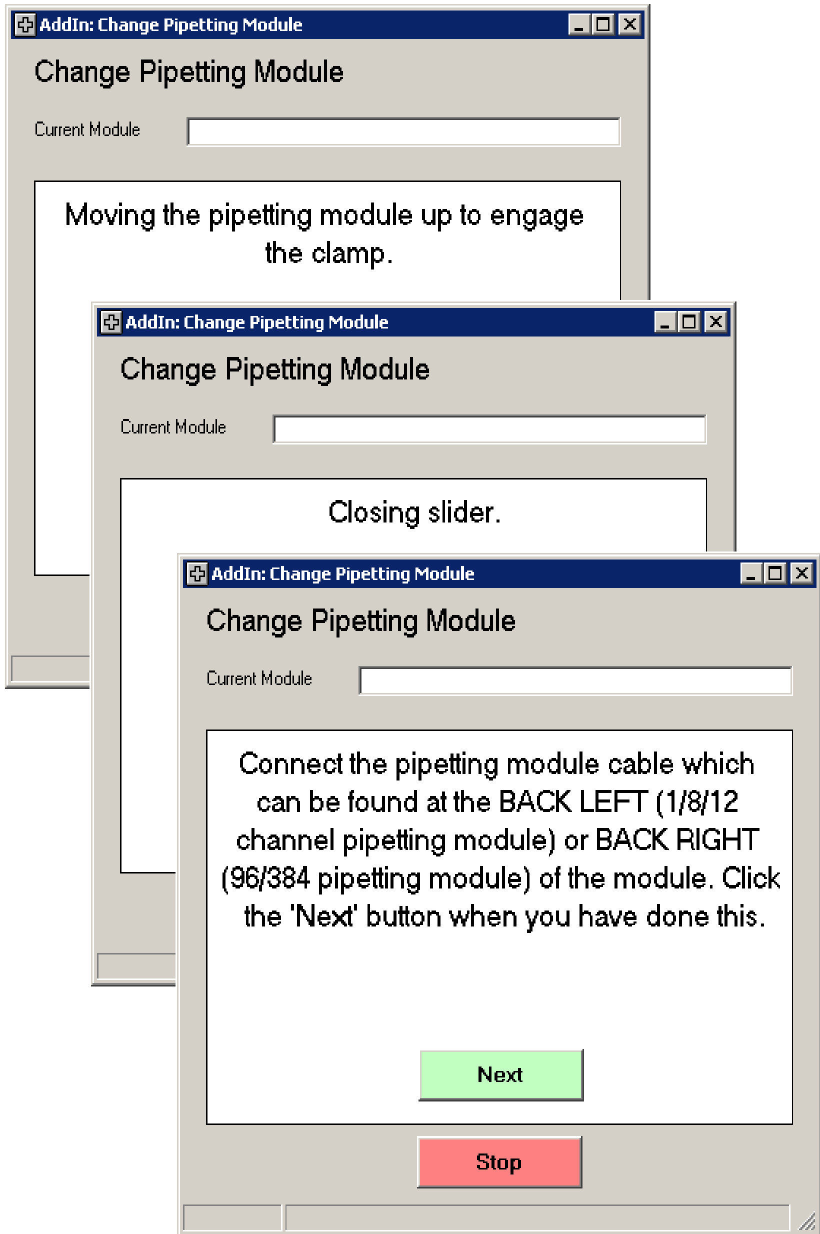
(2-stage system shown)

d. Wait for the system prompt, then move the release bar UP, then click **Next**.




Rotate Release Bar to UP position.

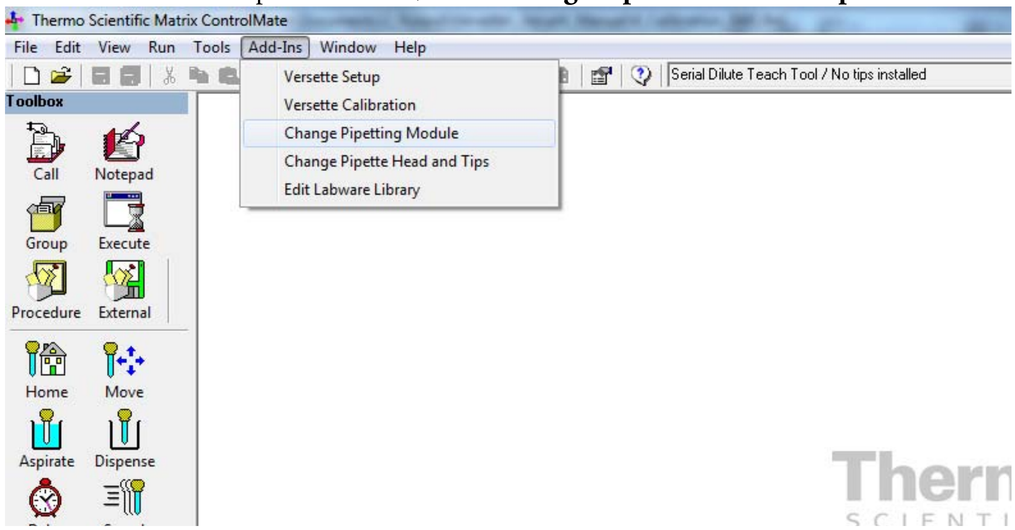
e. Wait for the system prompt then connect the pipetting module cable, then click **Next**.



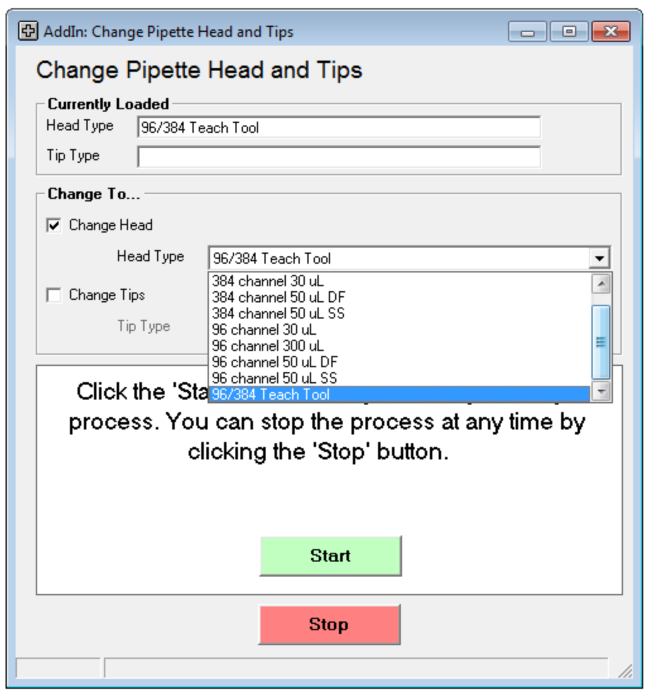

The cable connector may have red dots which align to the system connector. The dots are difficult to see due to their location. Follow the screen messages carefully and press in firmly to ensure proper connection.

f. Wait for the system to complete the load sequence and home all axes. Various messages will be displayed. When complete, the system will display "Change Complete...". Close the window by clicking the X in the upper right-corner.

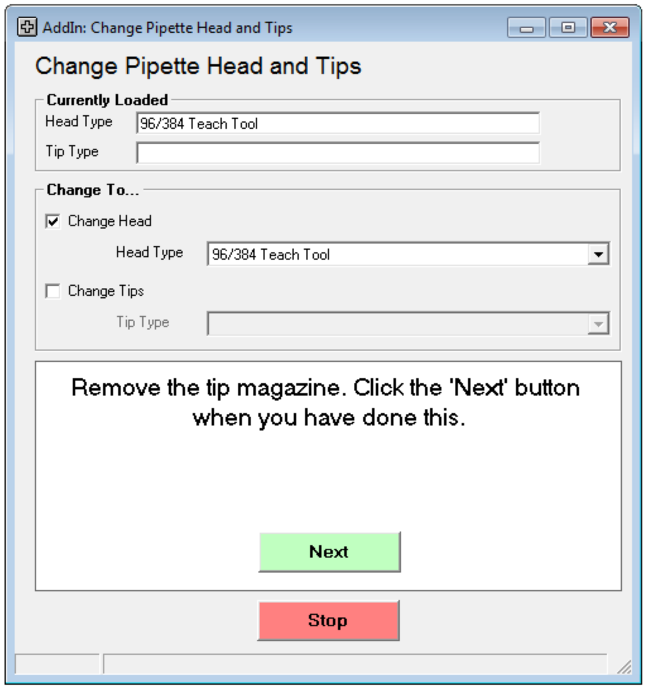
3. From the **Add-ins** drop-down menu, select **Change Pipette Head and Tips**.



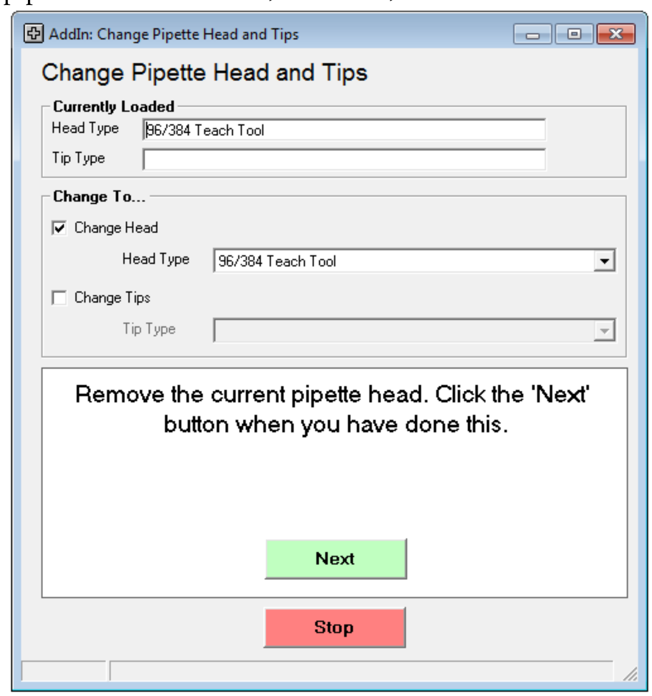

4. Place a checkmark in “**Change Head**” then use the scroll-down field to select “**96/384 Teach Tool”**.



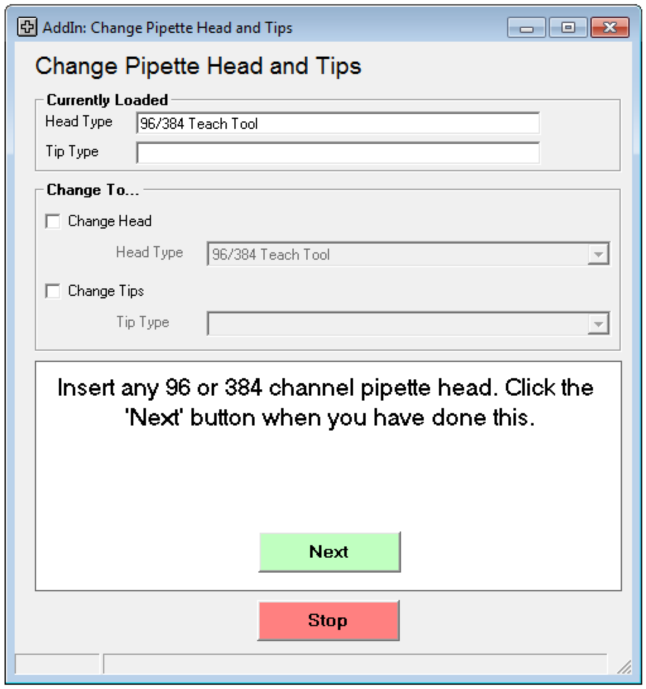
5. If a tip magazine is in the system, remove it, then press the **Next** button to continue.

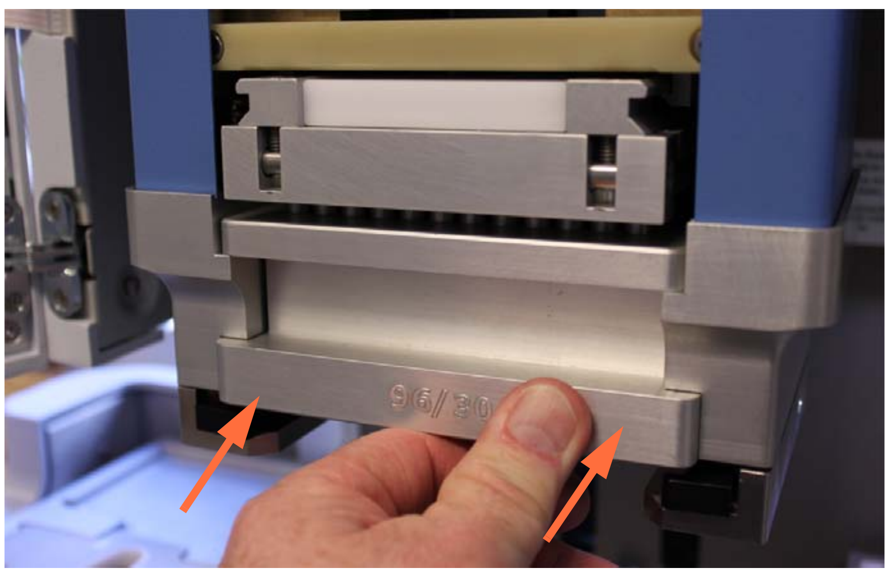



6. If a pipette head is installed, remove it, then click **Next** to continue.



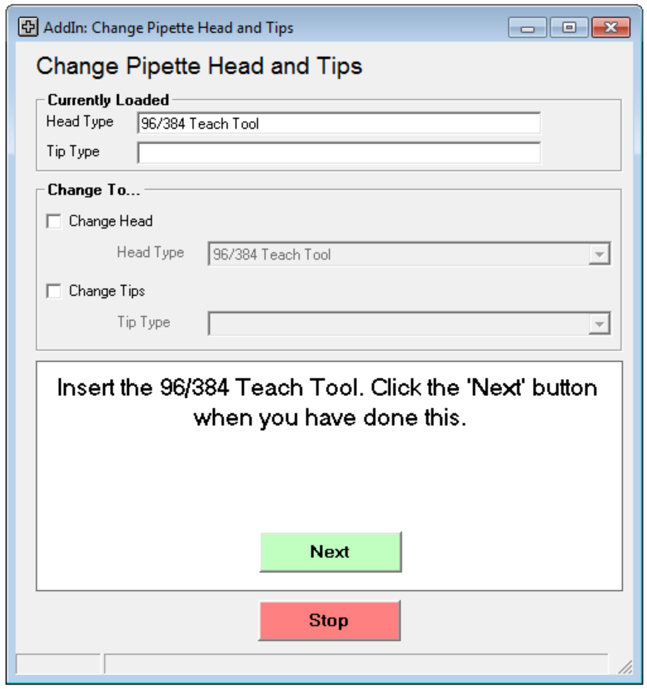
7. Insert any 96 or 384 channel pipette head, then click the **Next** button to continue.



Press firmly in until it clicks in place.

8. Insert the 96/384 Teach Tool, then click **Next** to continue.



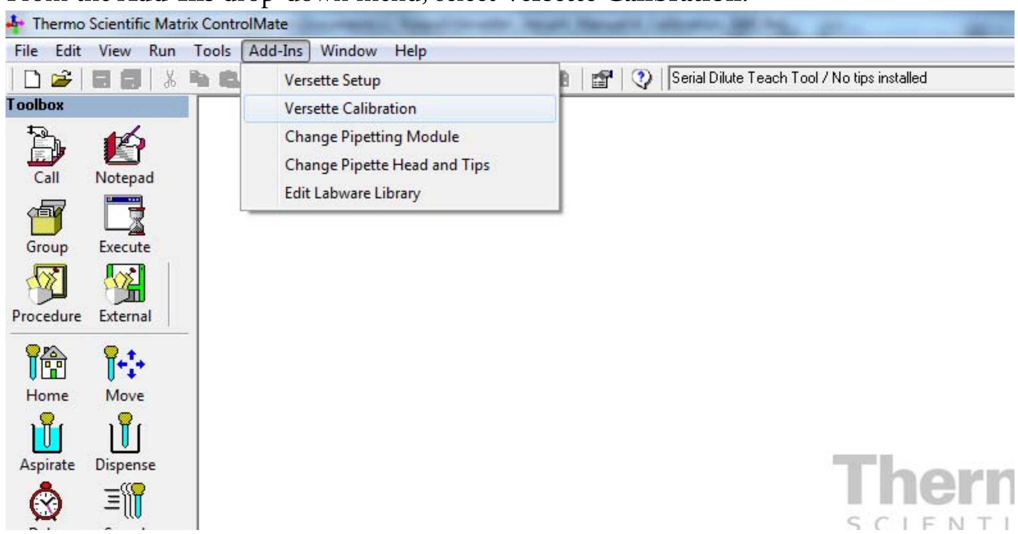


Press firmly in until it clicks in place.

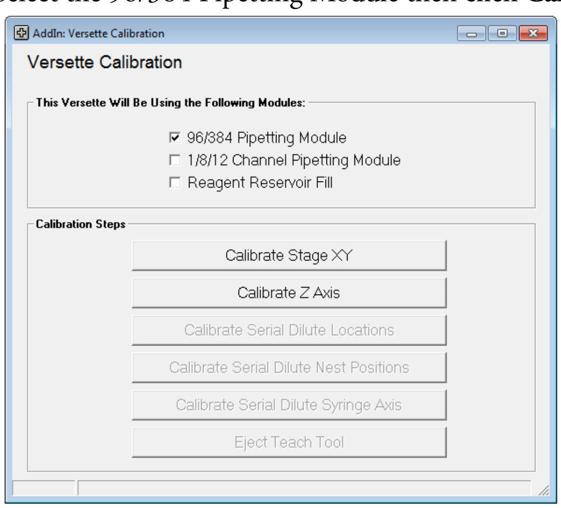
# STEP 2: Calibrate Stage XY Coordinates

1. Place the Calibration Plate flat in position on Stage 2 with the “96/384 PIPETTING HEAD” side facing up. Press the plate firmly down in place to ensure that it is absolutely flat, firmly positioned in the stage.

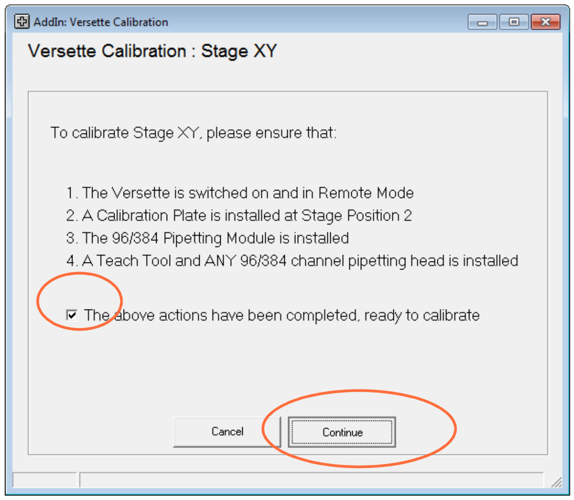

2. From the **Add-Ins** drop-down menu, select **Versette Calibration**.



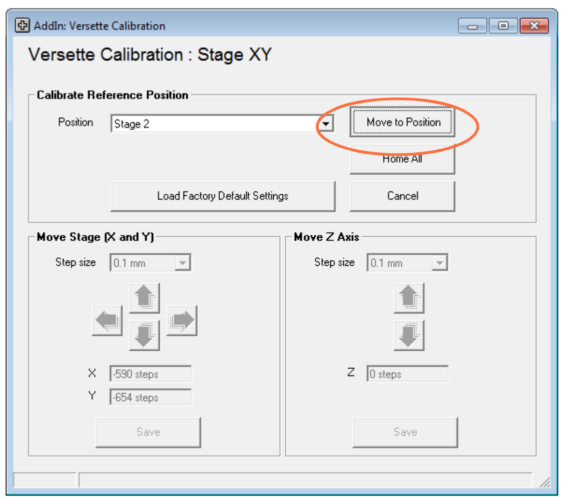

3. Select the 96/384 Pipetting Module then click **Calibrate Stage XY**.



4. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.

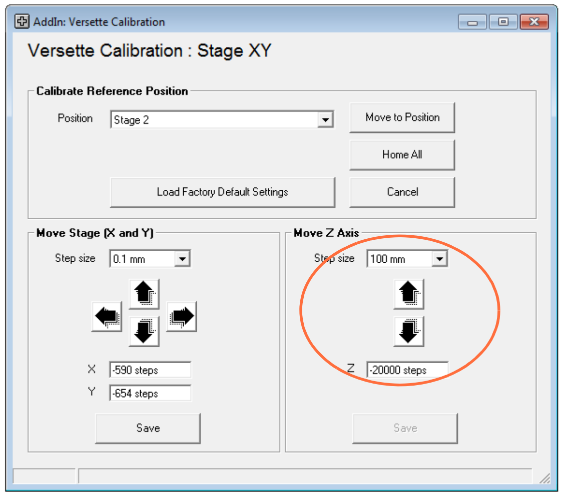



5. Select Stage 2 from the drop-down menu then click “**Move to Position**”.

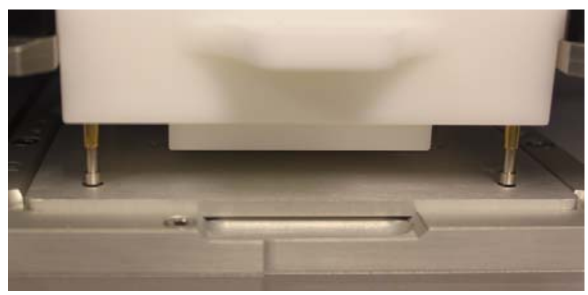


6. After Stage 2 has moved in position under the teach tool, use "Move Z Axis" to lower the teach tool to approximately 1 mm above the Calibration Plate.
   - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down arrow to move the pipetting module.

   **CAUTION** Use care when moving the pipetting module to avoid hitting the stage. Select the smallest reasonable **Step size**.

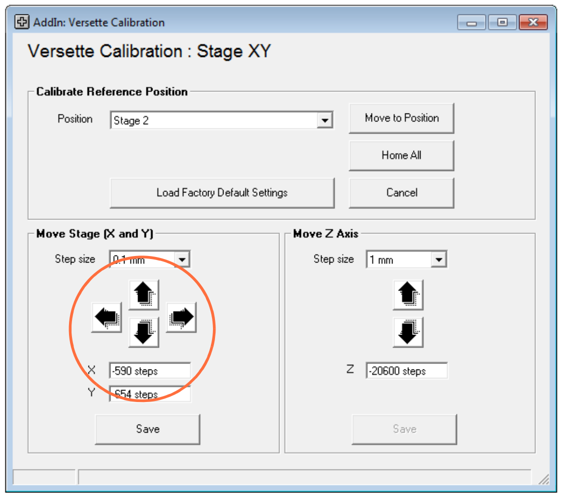


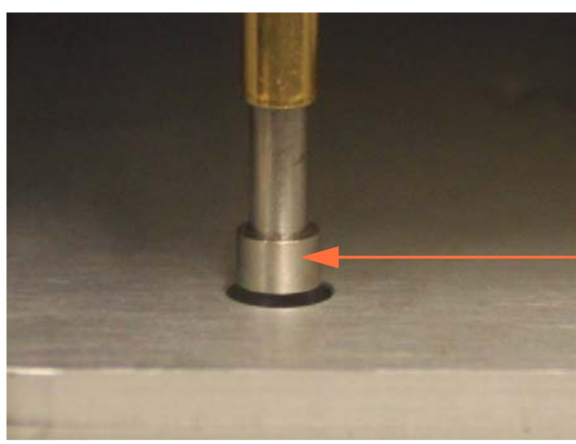

Lower NTC teach tool close to Calibration Plate



7. Check the alignment location. The teach tool posts should be positioned in the exact center of the Calibration Plate holes. Alignment of the holes marked “A” (left rear, and right front) is critical.

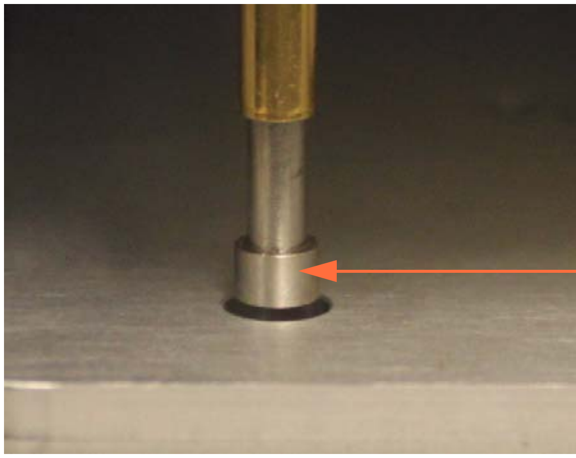
   If necessary, use the Move Stage (X and Y) commands to enter a **Step size** (typically 0.1 mm) then use the arrows to move the stage left or right, forward or back to achieve perfect alignment. Take great care to be as precise as possible. It is recommended to view the alignment from as many angles as practical.



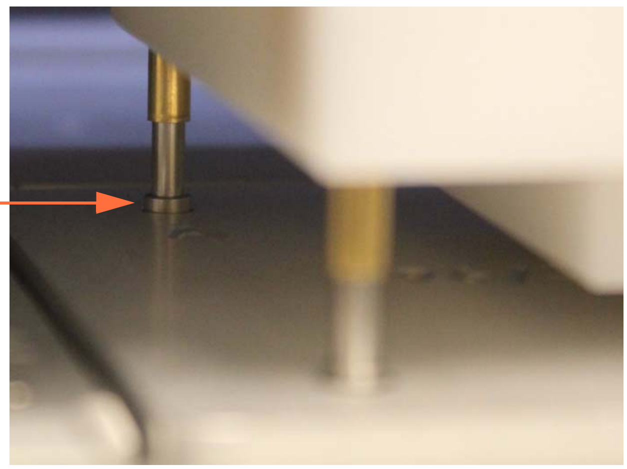
Center above hole in “A” location

8. Lower the pipetting module slightly to verify that the X-axis and Y-axis alignments are properly set. Take care to check the left rear hole and the right front hole marked as "A" locations on the Calibration Plate.

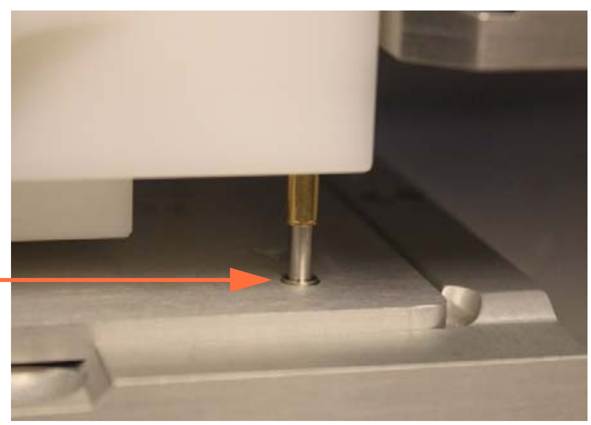


Center above hole

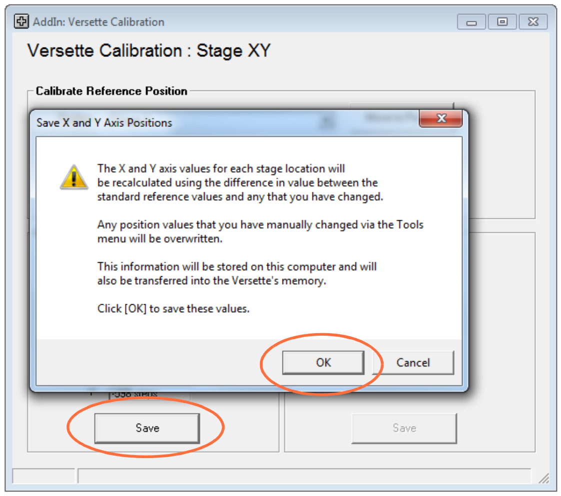
LEFT REAR
lower teach tool
into hole
marked "A"



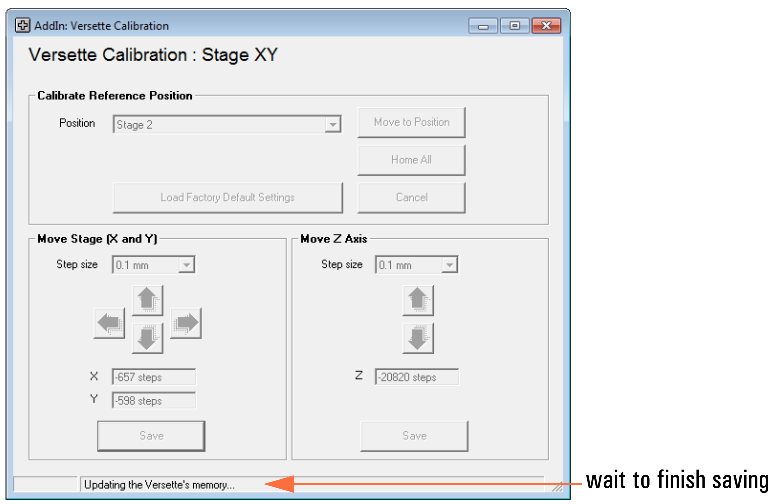
RIGHT FRONT
lower teach tool
into hole
marked "A"



9. Click “**Save**” to save the new calibration coordinates, read the message, then click **OK**.

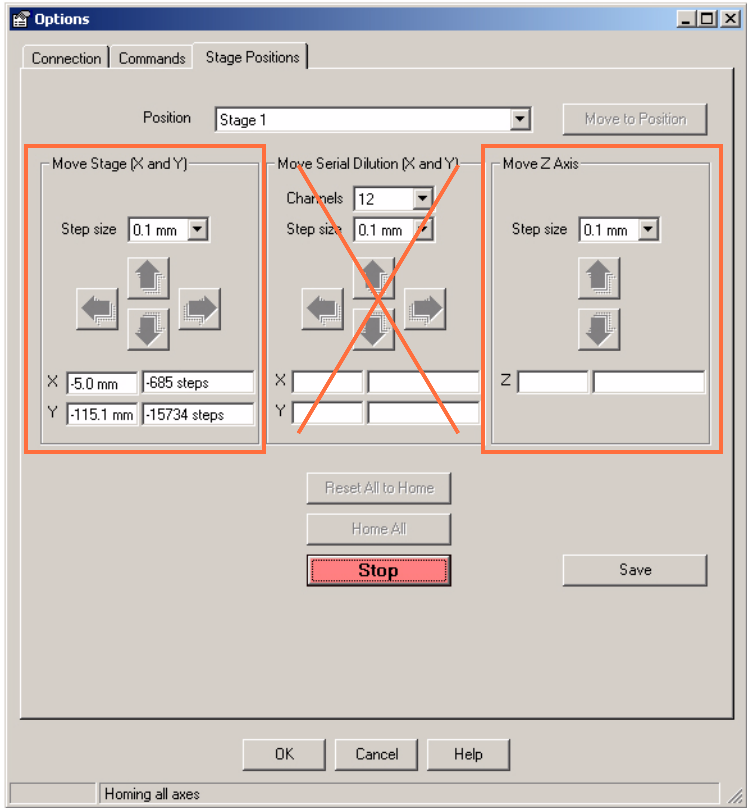



10. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.



11. OPTIONAL: Verify the accuracy of calibration at each remaining stage location, as detailed below. If no changes are made on a specific stage, there is no need to click save, just move to the next location and continue to check each stage position.

   a. From the Tools menu, select **Options**, then select the **Stage Positions** tab.



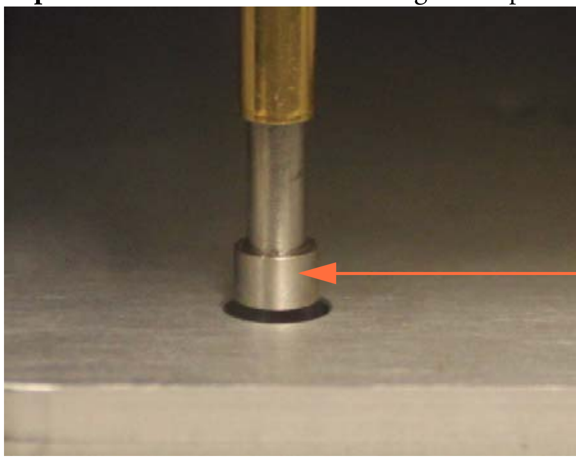

   b. Place a Calibration Plate with the 986/384 printing facing up on the stage where you will check the coordinate alignments (typically start at Stage 1).

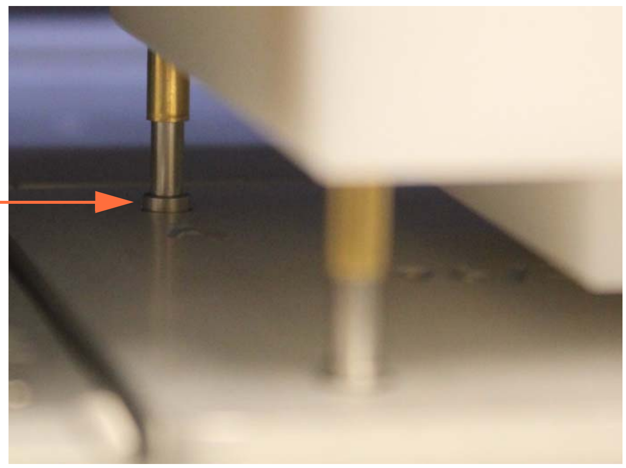
   c. Use the dropdown box to select the stage where the Calibration Plate is installed, then click "**Move to Position**". The unit will go through a homing cycle, then move to the selected stage position.

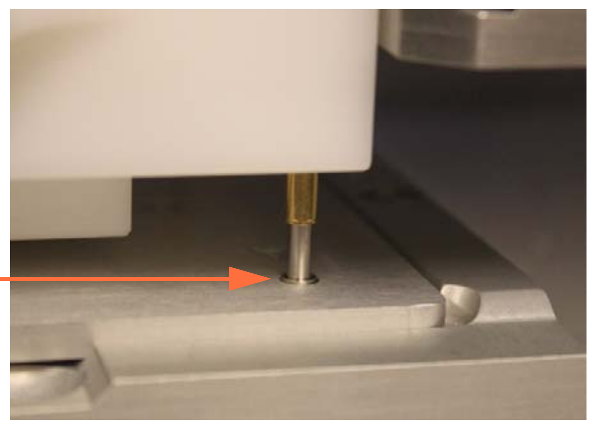
   d. After the selected stage has moved in position under the teach tool, use the "Move Z Axis" commands to lower the teach tool down within 1mm of the Calibration Plate. - Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down button to move the head down.

   **CAUTION** Use care when moving the pipetting module down to avoid hitting the stage. Select the smallest reasonable **Step size**.

e. Verify alignment of the teach tool pins with the Calibration Plate. If necessary, use the **Step size** and arrows to center the alignment pins as shown.



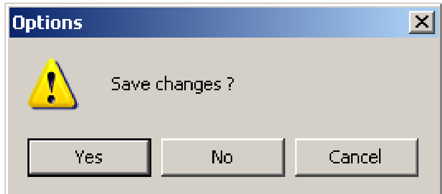



f. If you made any changes, click **Save** and wait approximately 15 seconds for the system to save the changes.

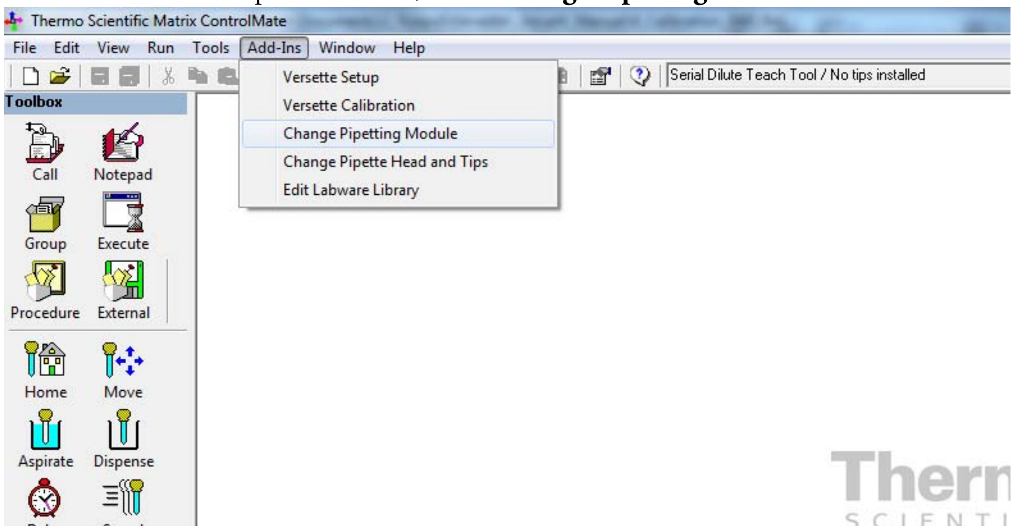
g. For 6-stage systems, repeat steps b through f above for each of the remaining stage positions (3, 4, 5, and 6).

h. Click the X in the upper right corner of the calibration window to close the window. If prompted, click "**Yes**" to save changes.

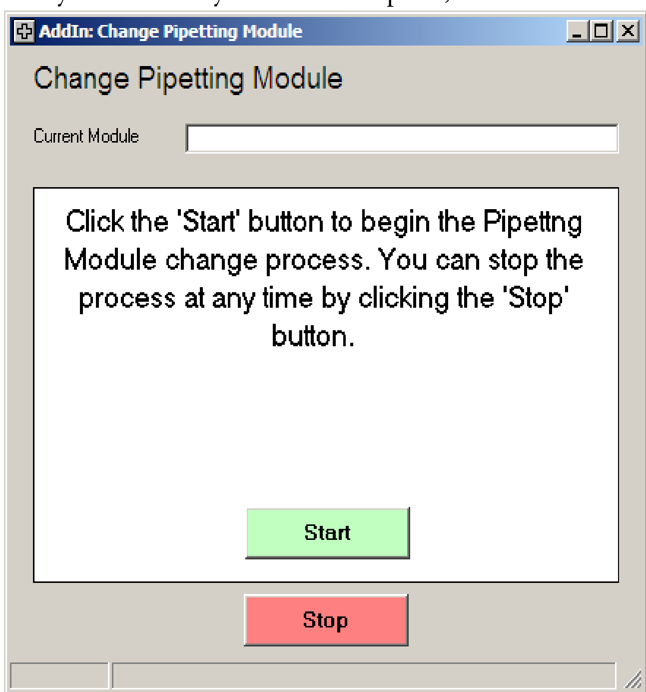


# STEP 3: Install the SMC Pipetting Module and SMC Teach Tool

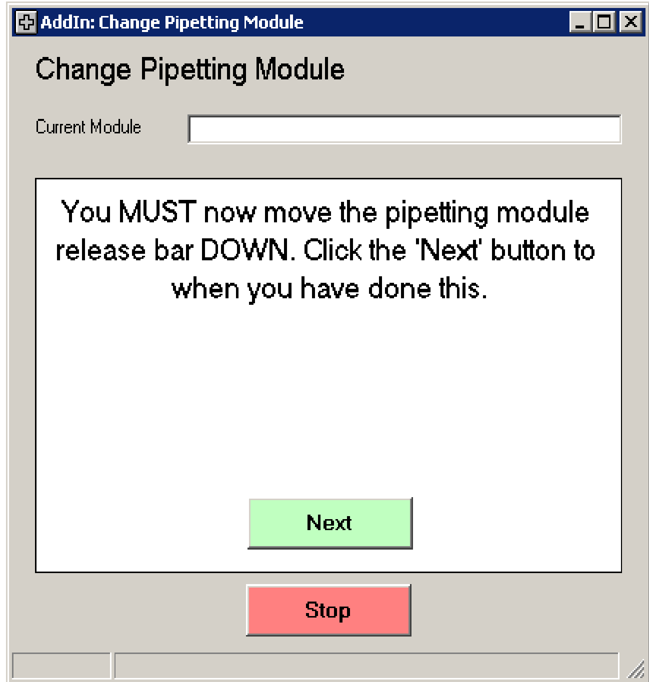
1. From the **Add-ins** drop-down menu, select **Change Pipetting Module**.

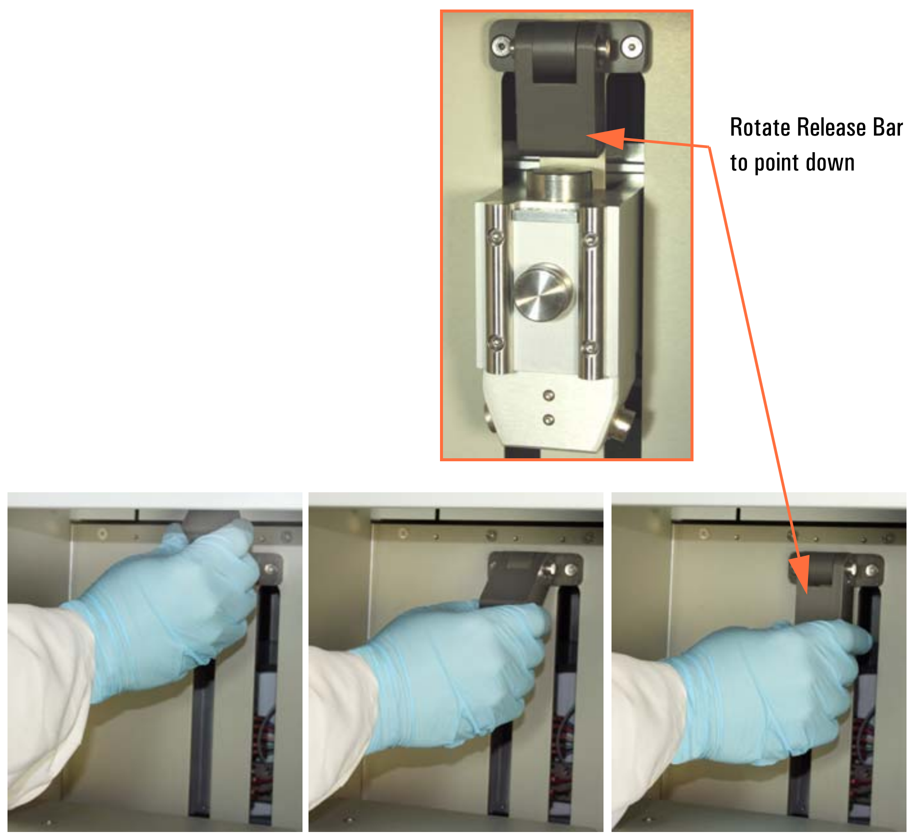



2. Follow the screen prompts to install an SMC pipetting module:
   a. Read the screen prompts, and follow directions. Click "Continue" if prompted.
   b. Verify that all safety shields are in place, then click the **Start** button.



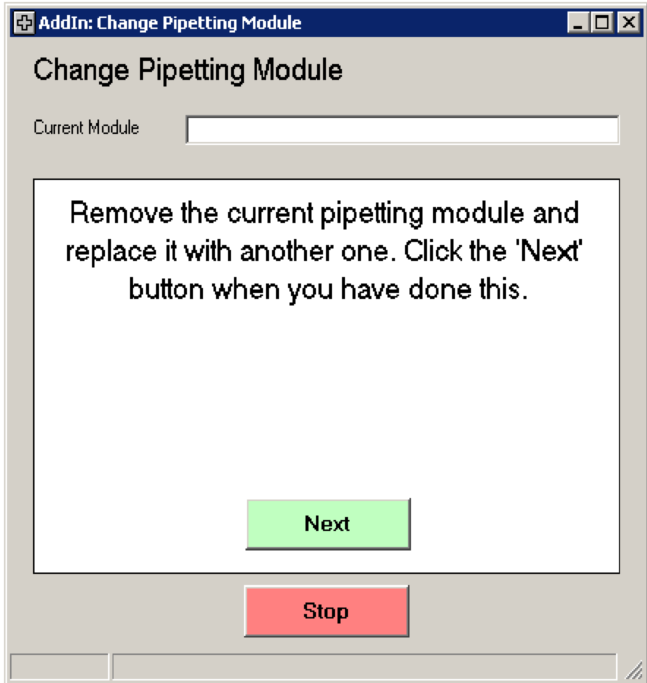
c. Move the release bar DOWN then click **Next**.

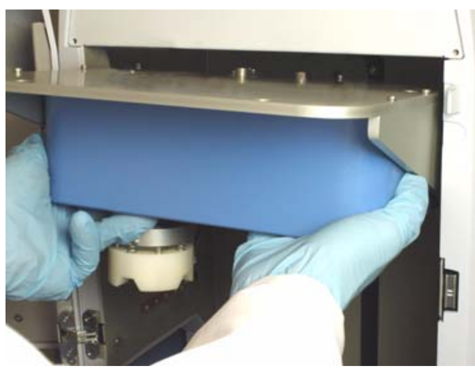


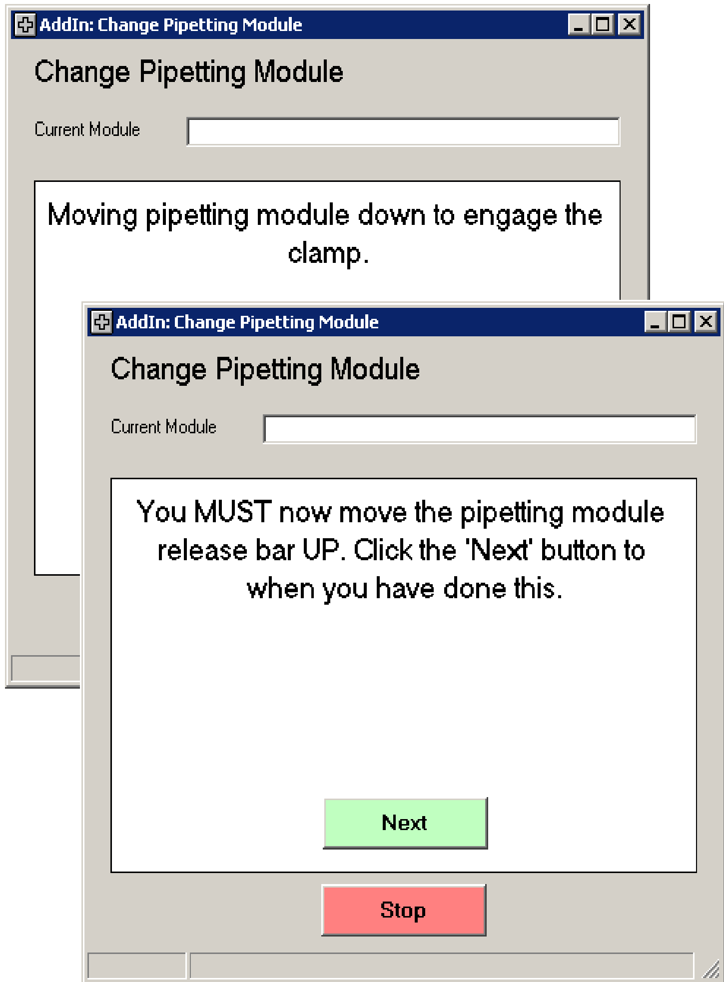

Rotate Release Bar to DOWN position.

d. Carefully lift and position the SMC pipetting module into the system, then click **Next**.



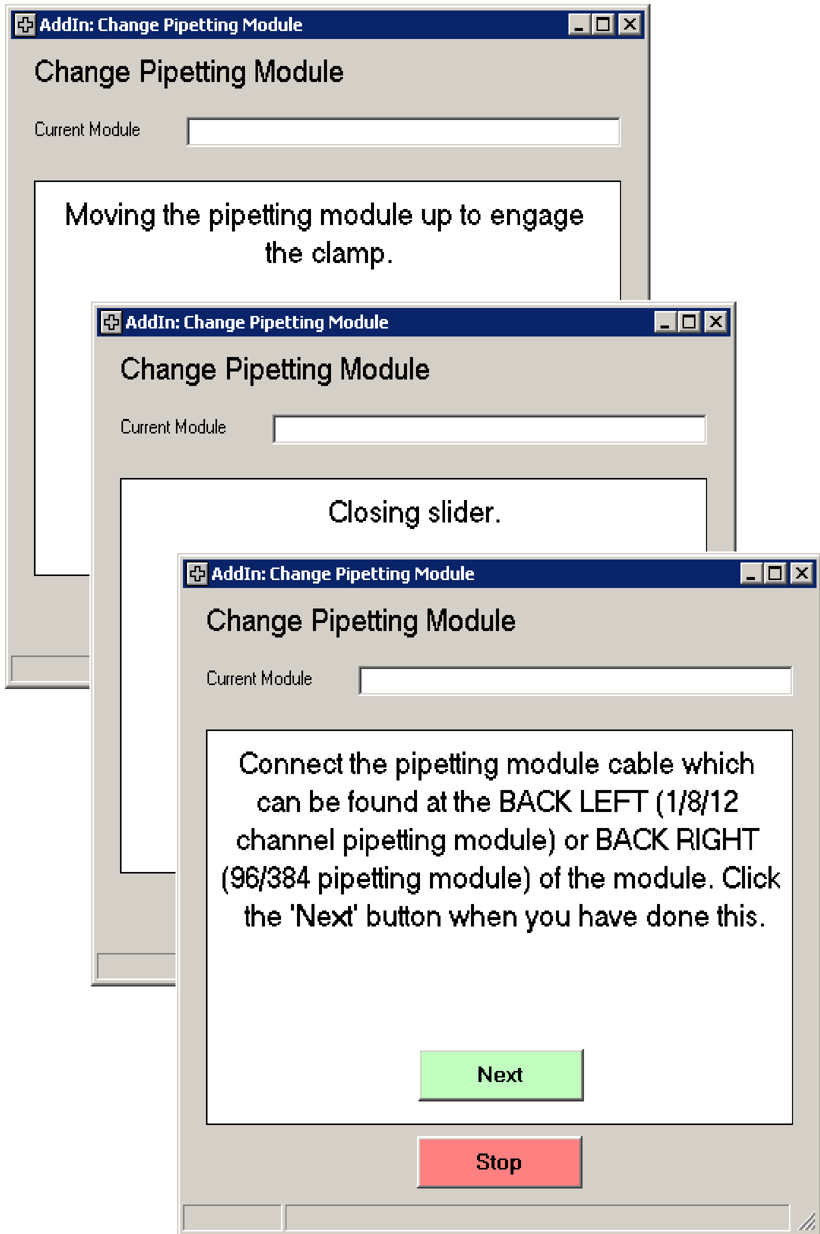



e. Wait for the system prompt, then move the release bar UP, then click **Next**.



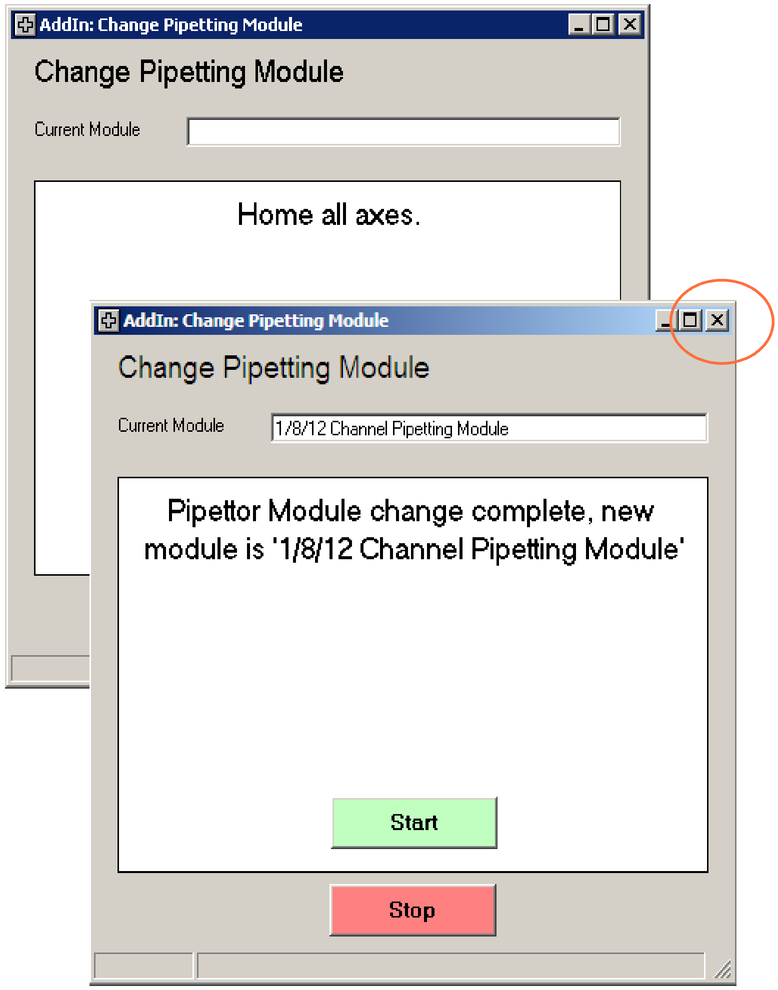

Rotate Release Bar to UP position.

f. Wait for the system prompt then connect the pipetting module cable, then click **Next**.



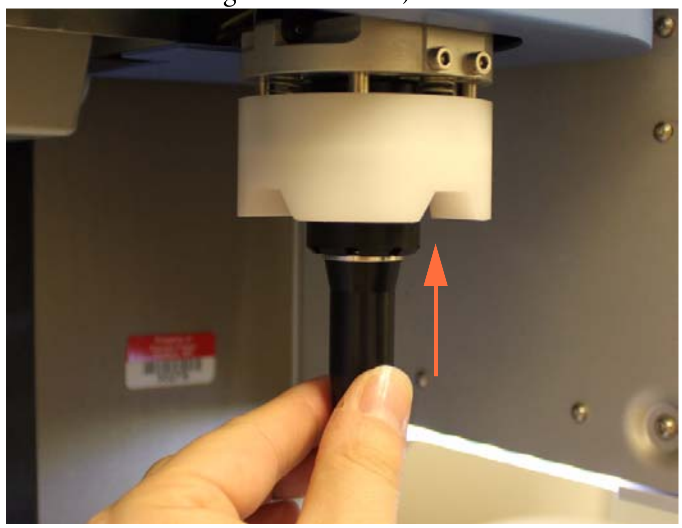

The cable connector may have red dots which align to the system connector. The dots are difficult to see due to their location. Follow the screen messages carefully and press in firmly to ensure proper connection.

g. Wait for the system movements to complete, then click the window's corner X to close the window.

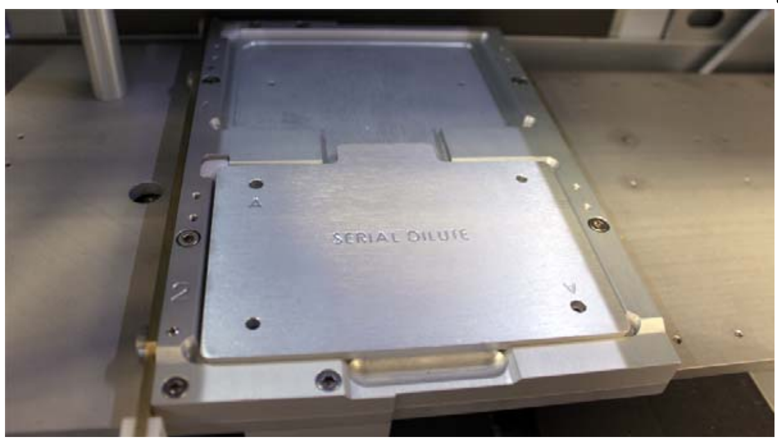


3. Manually insert the teach tool into the SMC pipetting module by pushing the tool straight up into the white "chuck" holder. Push straight up only.

   If you accidently move the chuck you may have to power cycle the unit on/off. (Make sure it returns to Remote Mode on the touch panel screen, or select Remote Mode through the touchscreen's Configuration screen.)



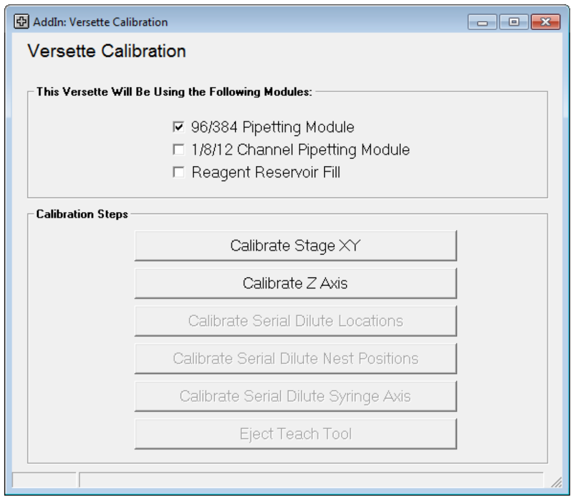
4. Place the Teach Tool Plate with the words "SERIAL DILUTE" facing up, on stage 2.



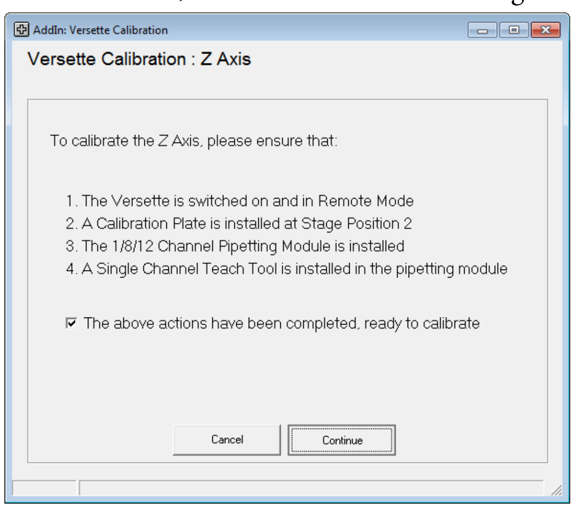

   Press the plate firmly down in place to ensure that it is absolutely flat, firmly positioned in the stage.

# STEP 4: Calibrate the Z-axis

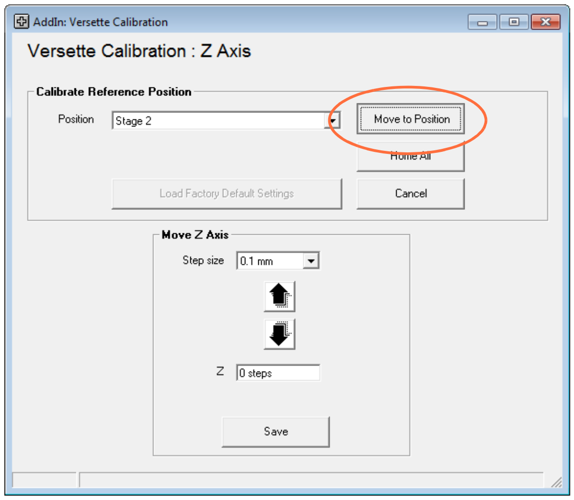
1. Select the 1/8/12 Channel Pipetting Module then click **Calibrate Z Axis**.



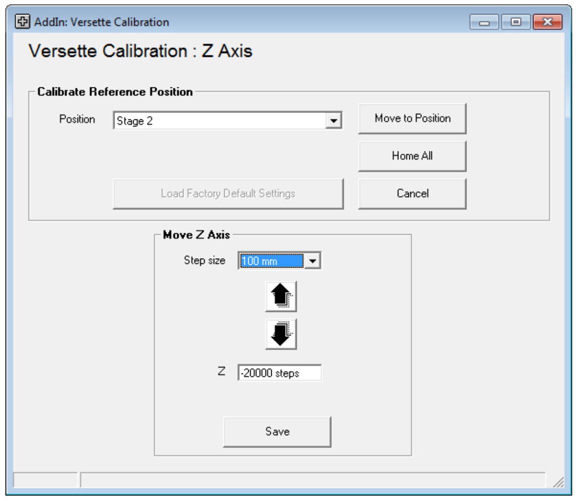

2. Read the instructions and verify that all items have been completed, then select the check box to continue, then click "**Continue**" to begin the calibration process.

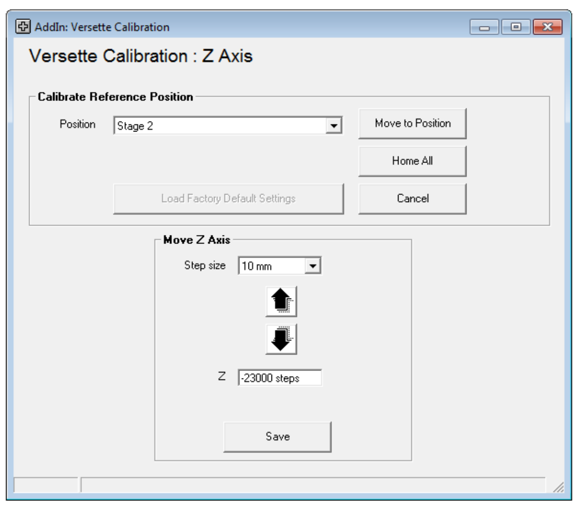


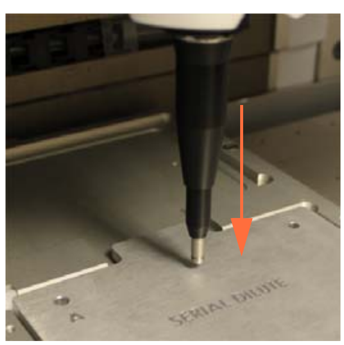
3. The Z-Axis is calibrated from Stage 2. Verify that Stage 2 is displayed in the position box, then press "**Move to Position**." The head and stages will move to position the Teach Tool over the Calibration Plate on Stage 2.



4. Set the **Step size**, then use the arrows to move the teach tool down until it is close to the the Calibration Plate, as shown below.
   Typically, start with 100mm, once or twice, then switch to 10mm for 2-3 moves, then 1 mm, then 0.1 mm. See next step to place a piece of paper over the plate.
   It is CRITICAL that you do not hit the calibration plate. Always use the smallest, practical move.

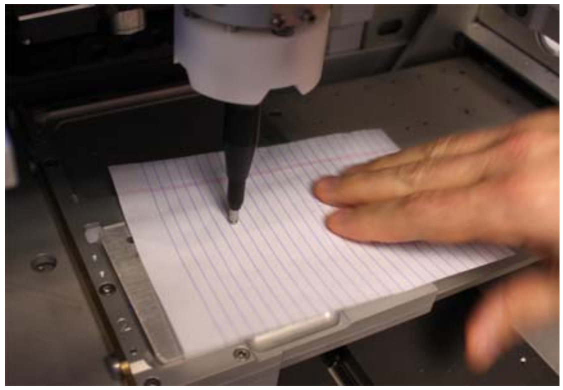


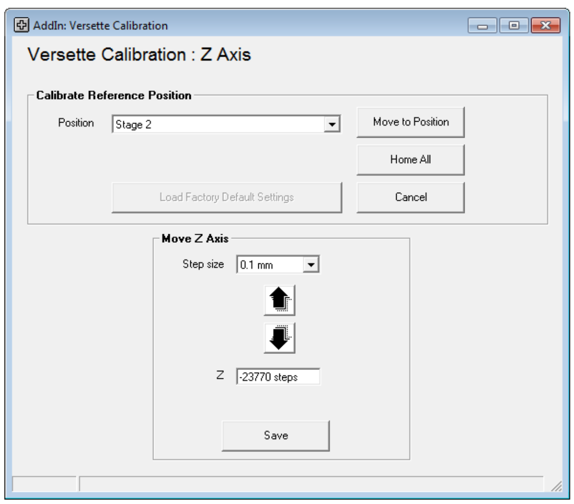



slowly lower teach tool

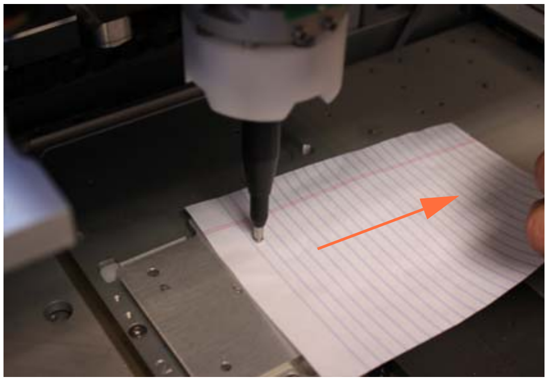
5. Slide a piece of paper under the Teach Tool's tip, as shown. Do this before you lower the tool too far down. If you went too far down, just raise it up with the up arrow, slide the paper under the tool, then move the tool back down.



6. Verify that the step size is set to 0.1 mm and then continue to press the Down arrow until you touch the paper.

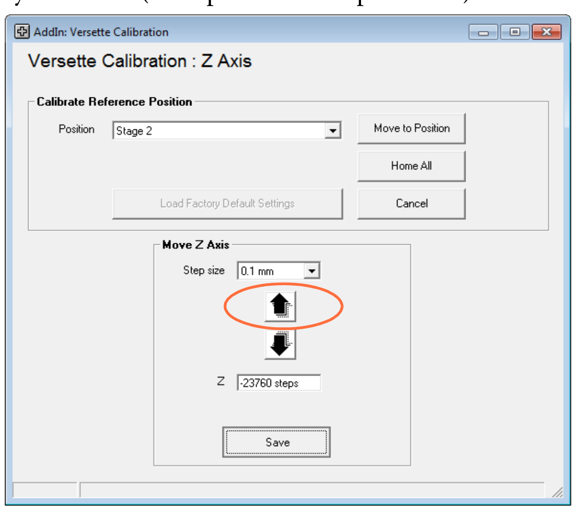


7. Try to gently pull the paper out from under the Teach Tool. If you can move the paper, lower the teach tool again by 0.1 mm then check again. Continue this until you cannot pull the paper out from under the Teach Tool.

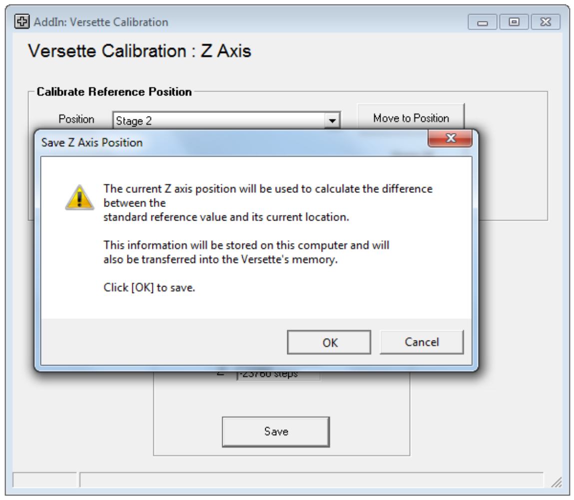


if paper moves,
lower teach tool 0.1 mm
try again

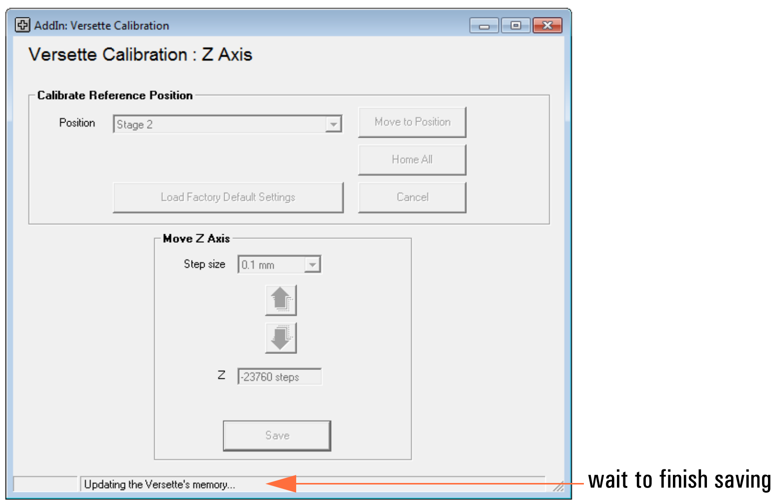
8. When you cannot move the paper out from under the Teach Tool, RAISE the Teach Tool by 0.1 mm. (One press of the up button.)



9. Click **Save** to save the Z-axis position, read the message, then click **OK**.

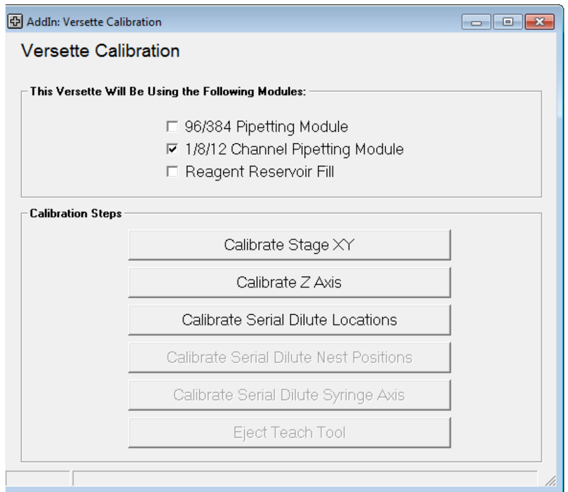



10. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.

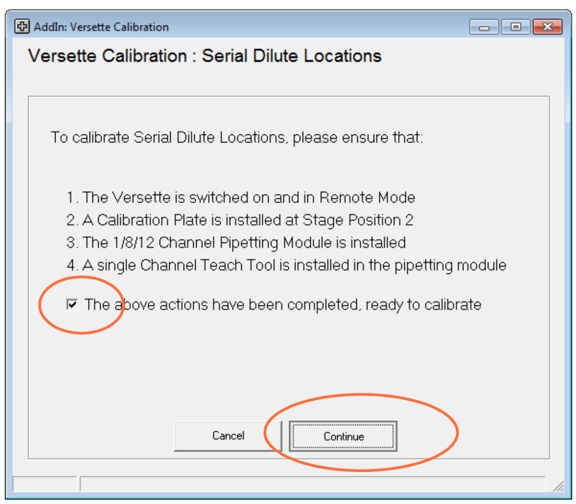


# STEP 5: Calibrate the Serial Dilute coordinates

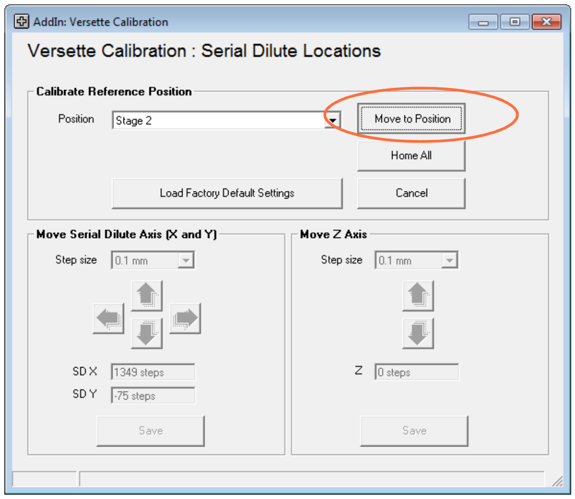
1. Select **Calibrate Serial Dilute Locations**.



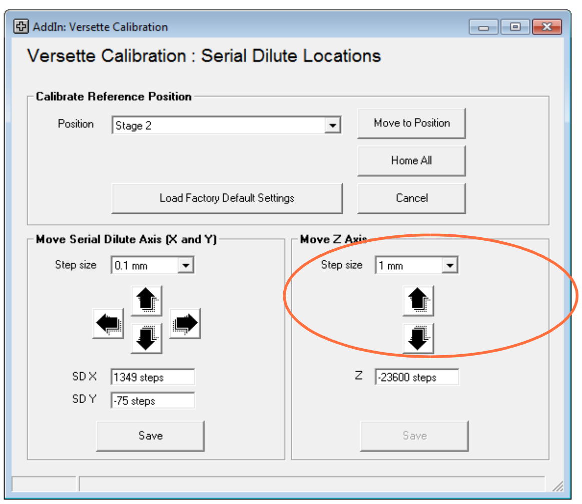

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.



3. The Serial Dilute coordinates are calibrated from Stage 2. Select Stage 2 from the drop-down menu, then click "**Move to Position**".



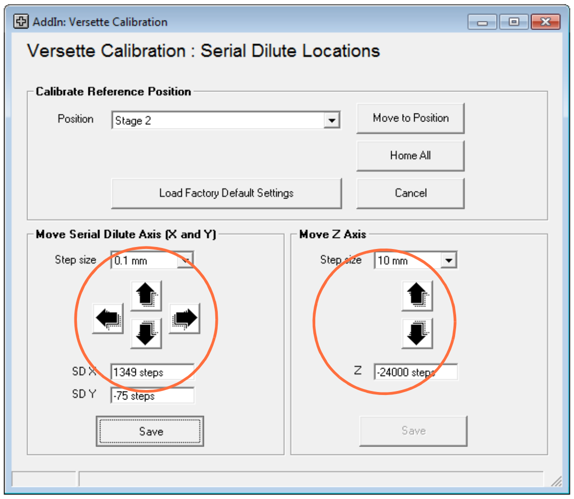

4. After the system has stopped moving, use "Move Z Axis" to lower the head down to approximately 1 mm above the Calibration Plate.
- Select the **Step size** (0.1mm, 1mm, 10mm, etc.), then click the Down arrow to move the pipetting module. Typical movements down are: 100mm two times, then 10mm three times, then1 mm, six times, then move at 01.mm increments.

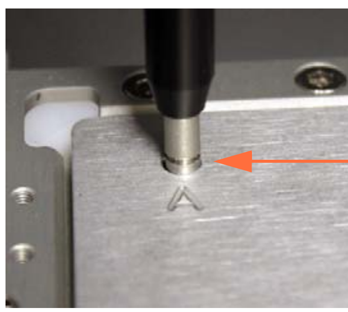



Lower teach tool close to calibration plate

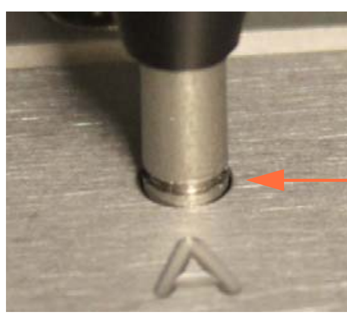
5. Check the alignment location. The teach tool should be positioned in the exact center of the Calibration Plate left rear hole marked “A”.

   If necessary, use the arrows to achieve perfect alignment. **Take great care to be as precise as possible.**

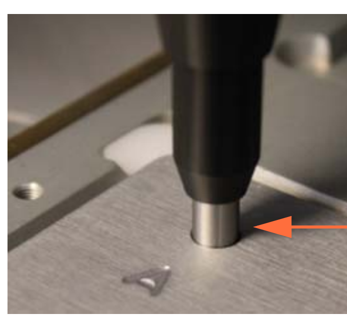


lower to hole
check alignment left/right, up/down
verify that alignment is absolutely perfect

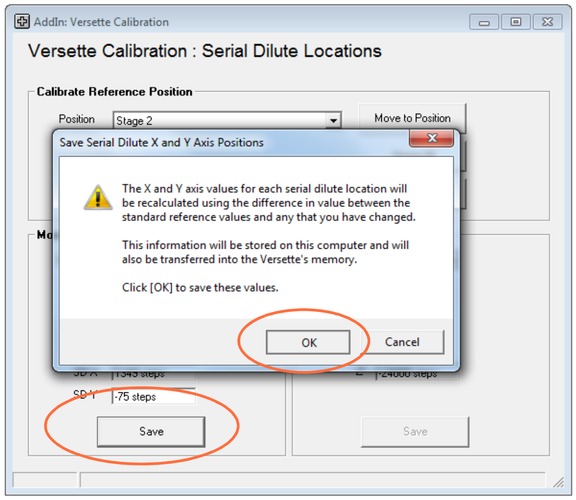


lower into hole,
centered in hole

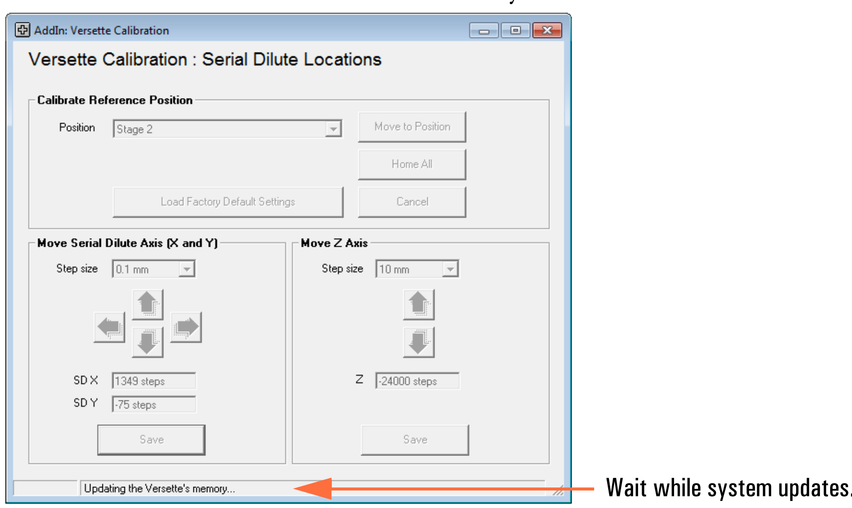


lowered further into hole
to fully verify XY positions

6. Click "**Save**" to save the new calibration coordinates, then click **OK** on the pop-up window.

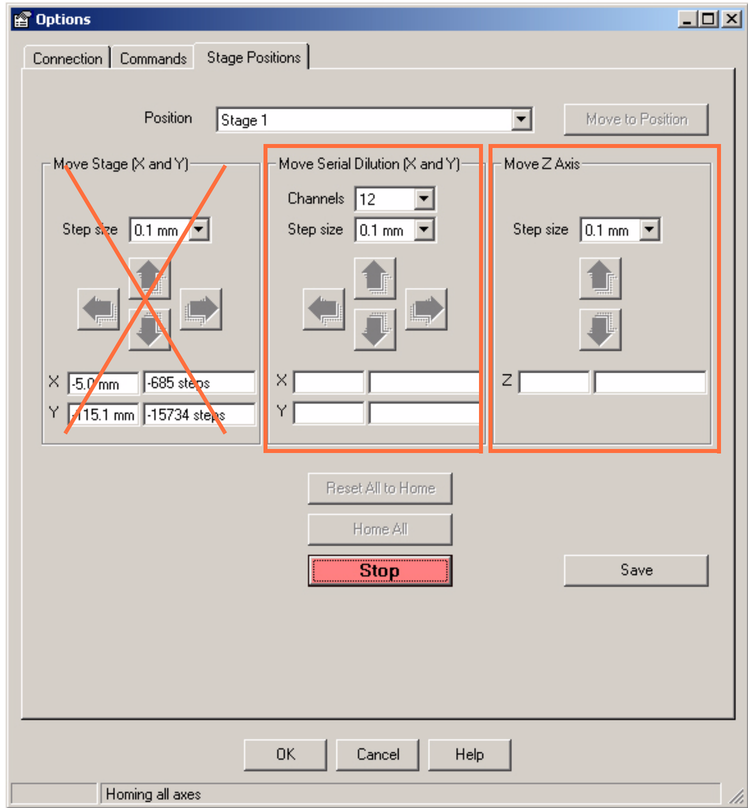



7. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu



8. OPTIONAL: Verify the accuracy of calibration at each remaining stage location, as detailed below. If no changes are made on a specific stage, there is no need to click save, just move to the next location and continue to check each stage position.

   a. From the Tools menu, select **Options**, then select the **Stage Positions** tab.

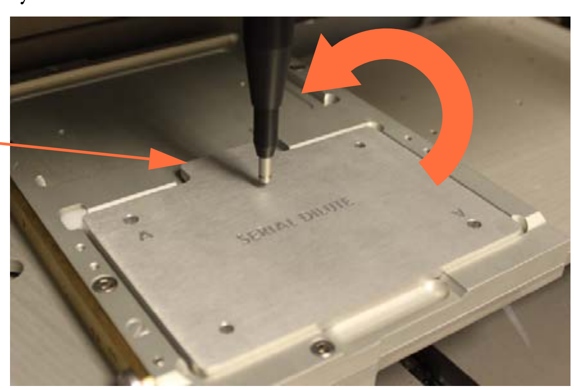



Use Serial Dilution and Z-Axis controls only

   b. Place a Calibration Plate with the “SERIAL DILUTE” printing facing up on the stage where you will check the coordinate alignments. You need to rotate the plate to fit onto different stage positions. Typically start at Stage 1 and work through the stage positions sequentially.

Calibration Plate Tab

Picture shows Calibration Plate position for stages 2, 4, and 6




Rotate calibration plate to place on stage 1, 3 and 5.

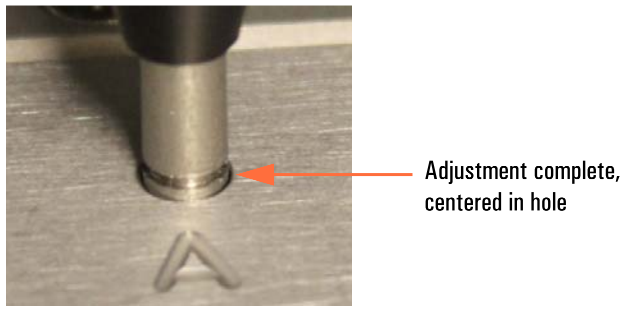
Tab will face front of machine.

   c. Use the dropdown box to select the stage where the Calibration Plate is installed, then click “**Move to Position**”. The unit will go through a homing cycle, then move to the selected stage position.

d. After the selected stage has moved in position under the teach tool, use the **Step size** and move arrows to check the alignment at each stage position.

**CAUTION** Use care when moving the head down to avoid hitting the stage. Select the smallest reasonable **Step size**.

e. Verify alignment of the teach tool with the Calibration Plate. If necessary, use the **Step size** and arrows to center the alignment as shown.



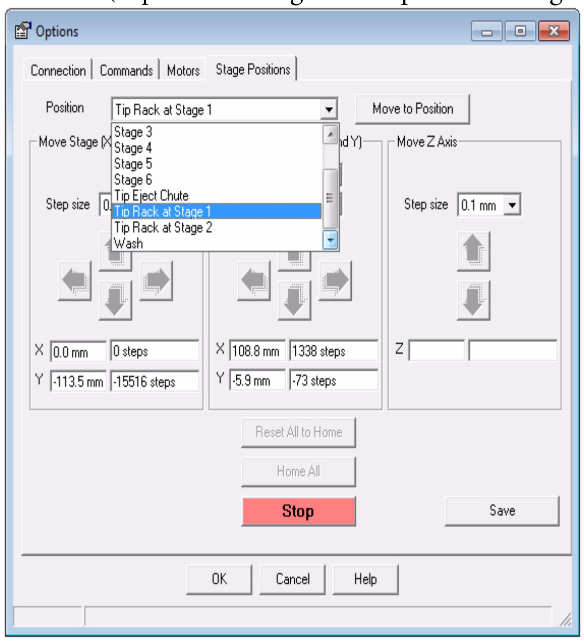

f. If you made any X or Y changes, click **Save** and wait approximately 15 seconds for the system to save the changes.

g. For 6-stage systems, repeat steps b through f above for each of the remaining stage positions (3, 4, 5, and 6).

9. Verify the tip rack at stage 1 and stage 2 locations:

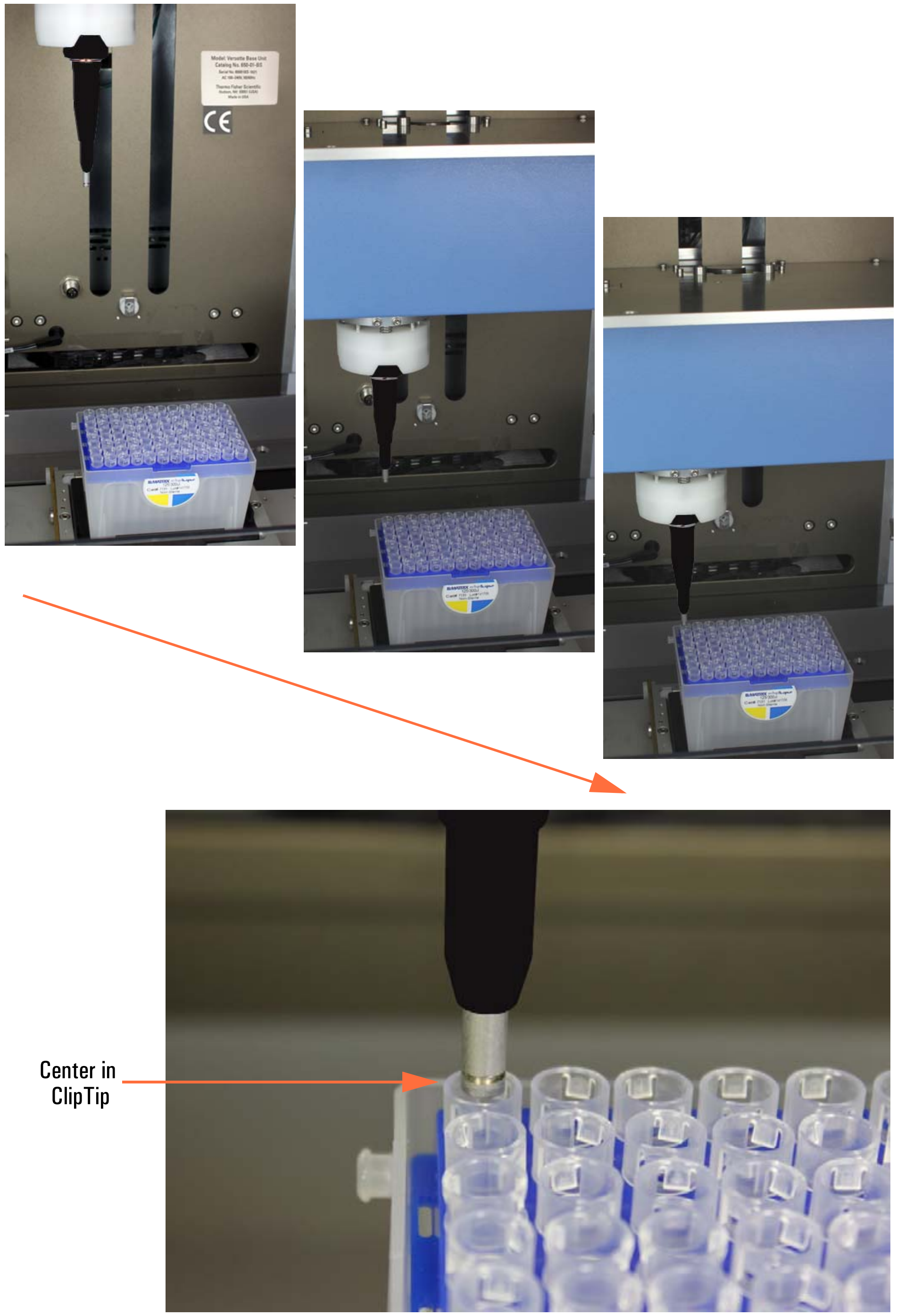
   a. Insert a Tip Rack adapter onto Stage 1 or Stage 2, then insert a ClipTip Rack. If there is any play (back/forth motion) in the rack while seated in the adapter, place the rack of tips towards the back, left position.

   b. From the Tools menu, select **Options**, select **Stage Positions** tab, select the rack location (Tip Rack at Stage 1 or Tip Rack at Stage 2), then click "Move to Postion".




   c. Use the Z axis command to move the tip down to just above the tip rack. Verify that the teach tool is exactly centered in the tip in the A1 position in the ClipTip rack. If any changes are required to the X and Y axis (front/back, left/right) use the Move Serial Dilution (X and Y) to exactly position the teach tool in the A1 position in the tip rack, then select Save. See photos on next page.

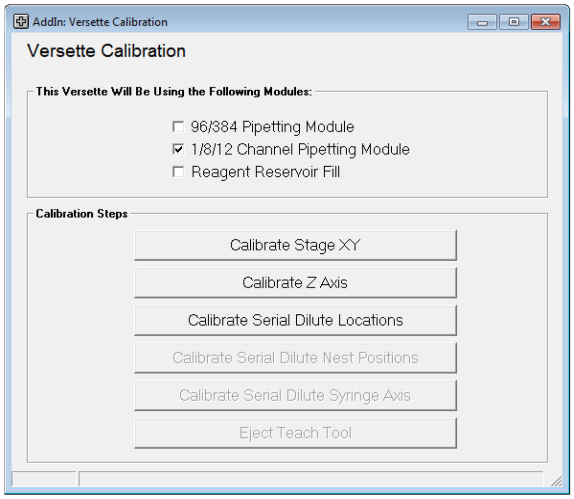
   DO NOT ATTEMPT to pick up a tip with the Teach Tool!



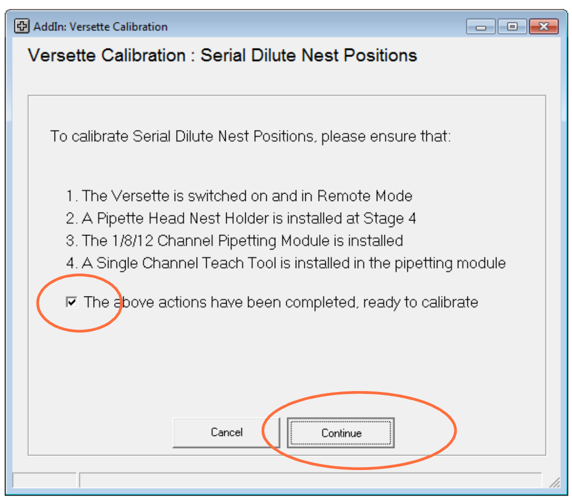

10. If any changes were made, select Save, wait for the values to be saved, then click OK to close the dialogue box.

# STEP 6: Calibrate the Serial Dilute Nest Positions

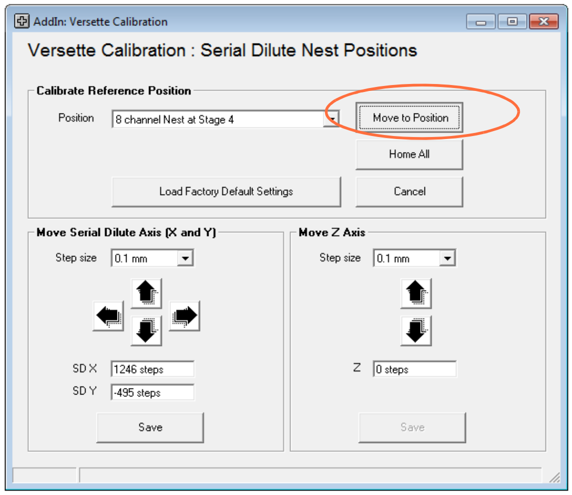
1. Select **Calibrate Serial Dilute Nest Positions**.



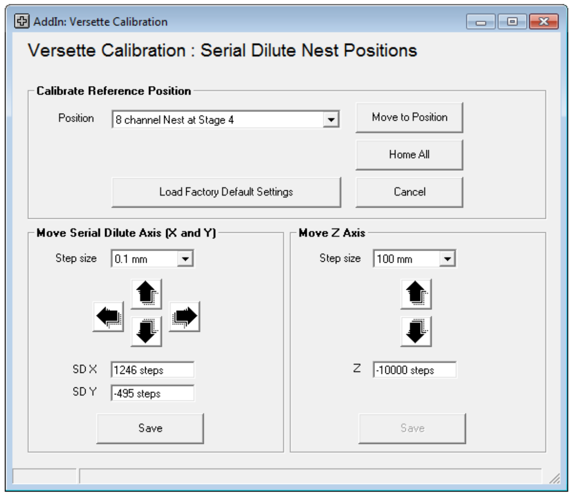

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.

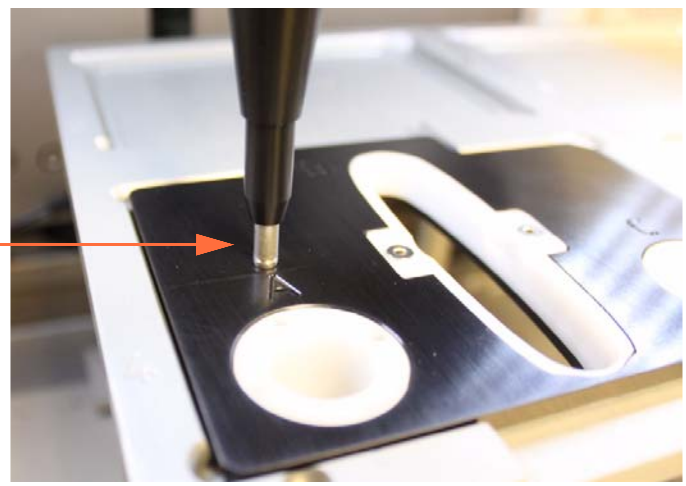


3. Select the nest type (8-channel or 12-channel) that is installed, then click "**Move to Position**".



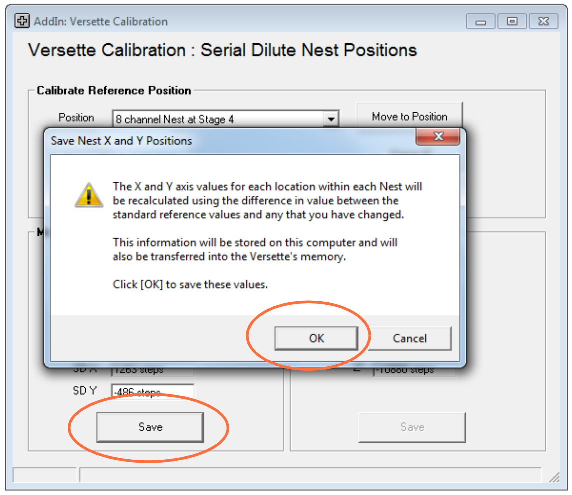
4. Carefully evaluate the position of the Teach Tool alignment. If necessary, select the **Step size** (0.1mm, 1mm, 10mm, etc.), then use the arrows to precisely align the teach tool in the alignment hole, as shown.



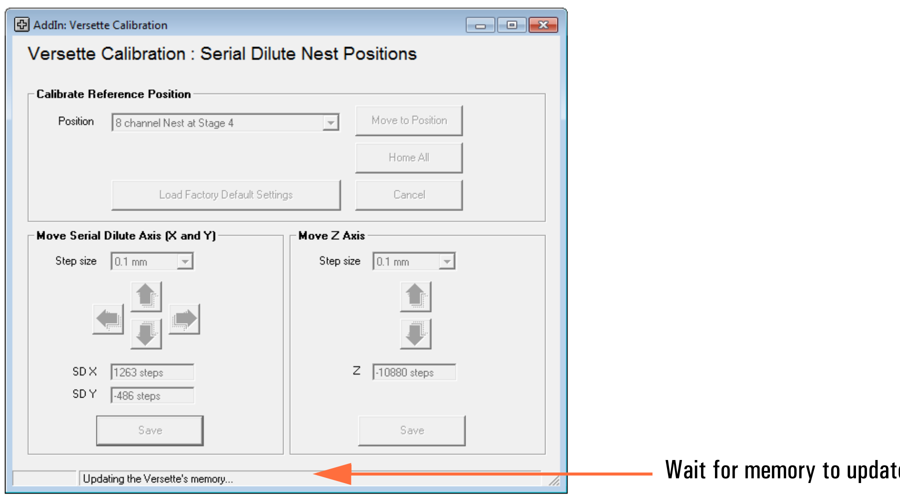




8-channel nest shown

5. Click **Save** then click **OK** to save the coordinates.



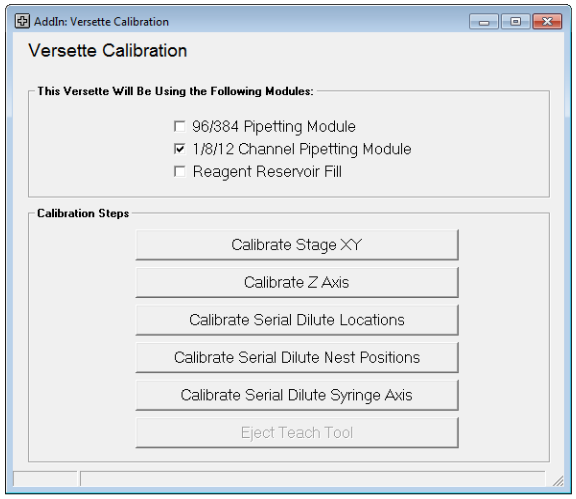

6. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.



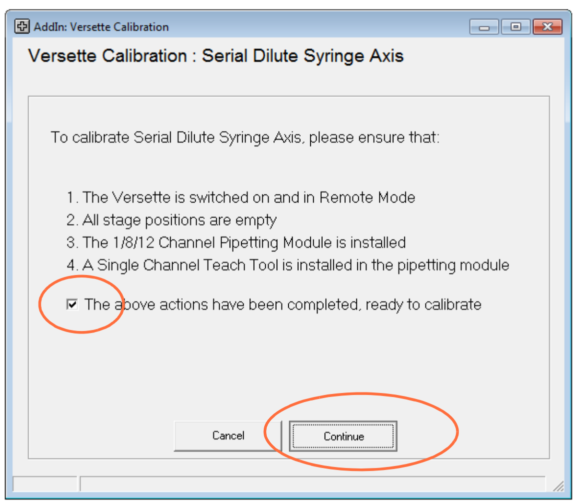
# STEP 7: Calibrate Serial Dilute Syringe Axis (“S-Axis”)

The “S-axis” or “Syringe Axis” position is used to pickup and release pipette heads and tips.

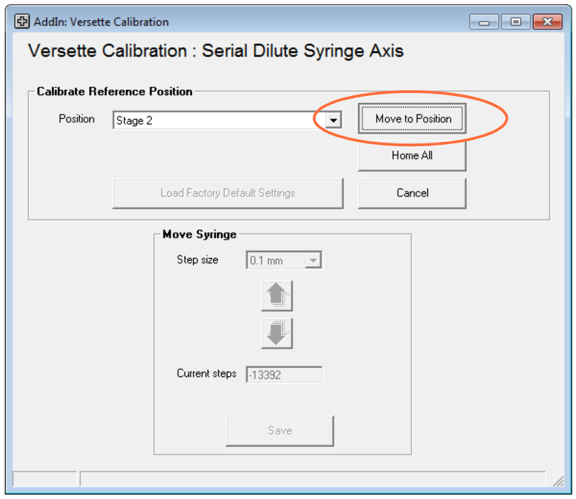
1. Select **Calibrate Serial Dilute Syringe Axis**.



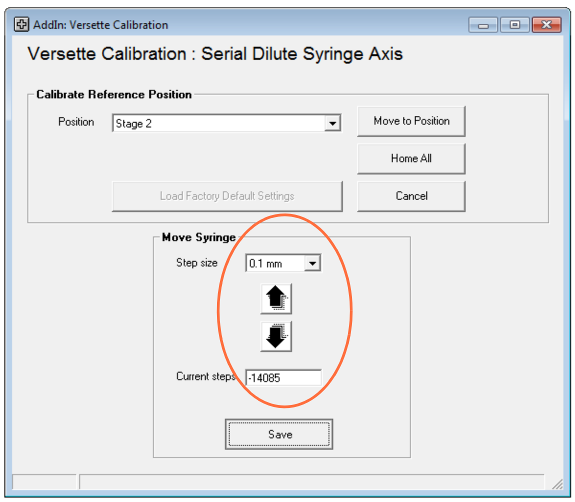

2. Read and comply with any instructions. Place a check mark as noted below when all conditions are met, then click **Continue**.

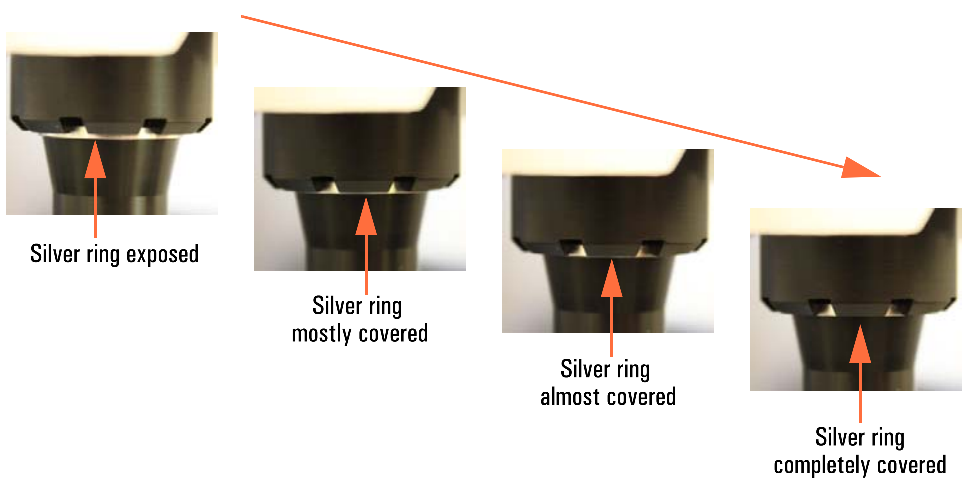


3. Click **Move to Position**.

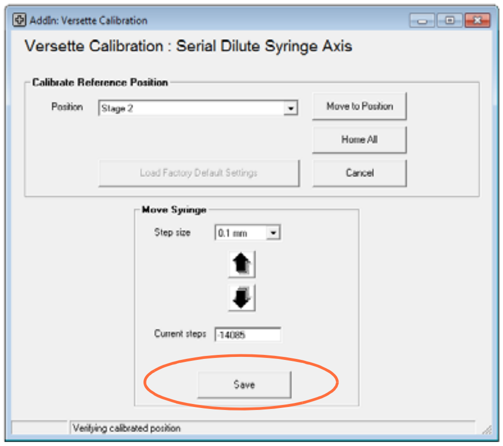



4. Use the **Step size** and arrows to move the teach tool until the silver ring is positioned as shown in the final alignment photograph below.

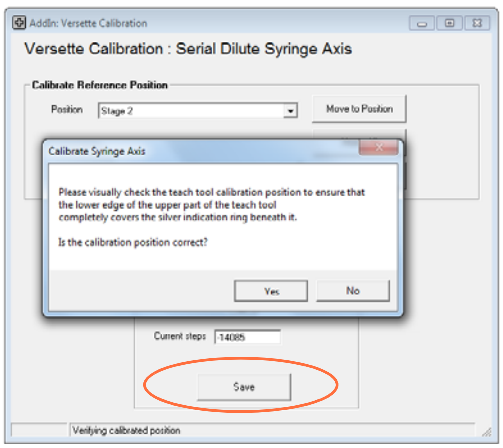


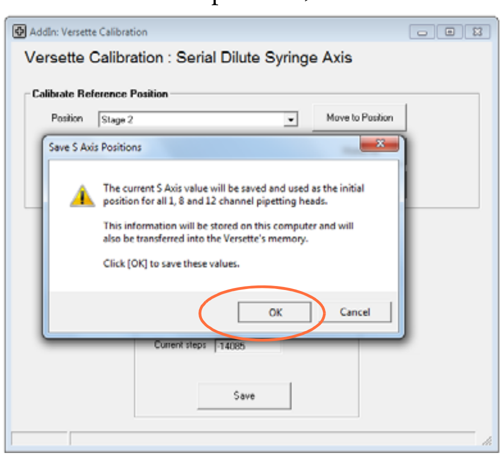
5. When precisely positioned, click **Save**. The system will verify the calibration position. Wait for the screen prompts.



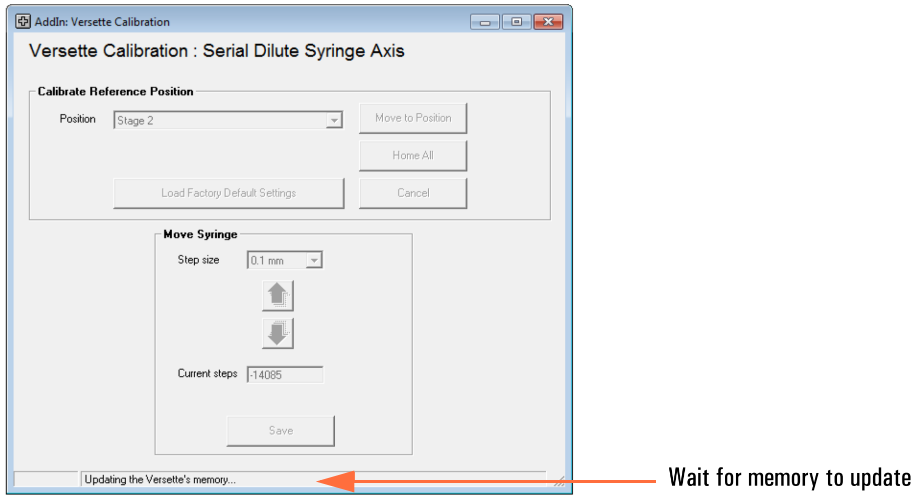

6. Read the dialogue box text, and check the precise placement of the teach tool, as directed., then click **Yes** to continue, or No to re-adjust the axis position.




7. To save the S-Axis position, click **OK**.

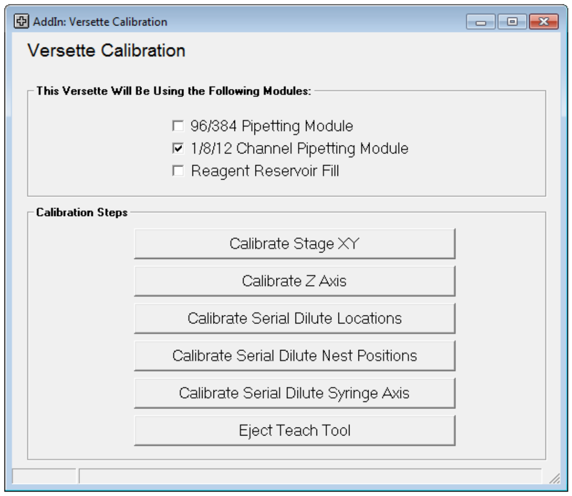


8. Wait approximately 15 seconds for the system to save the changes. Do NOT close the window! The window will close automatically and return to the Calibration Menu.

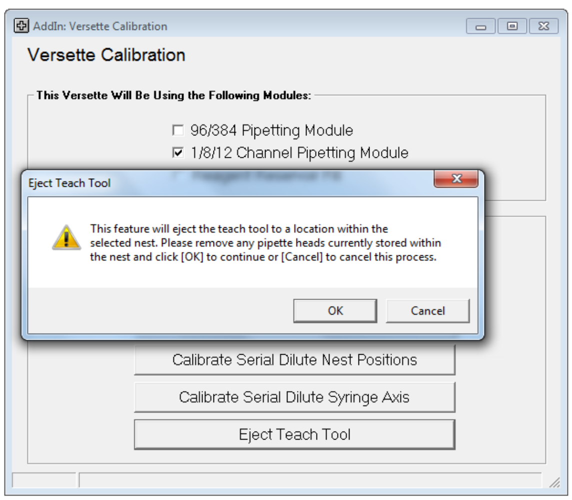


# STEP 8: Eject Teach Tool and Verify Head and Tip Pickup

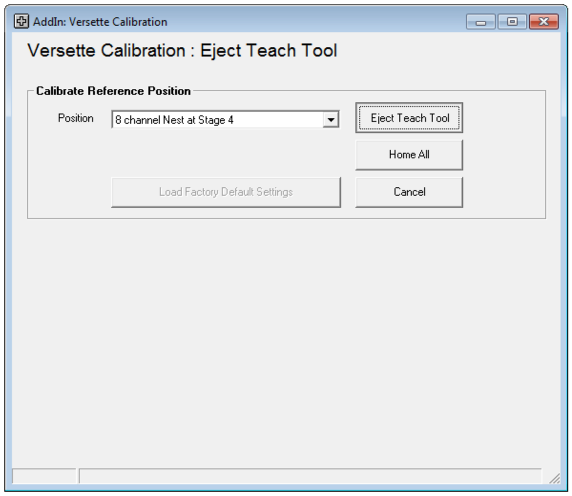
1. Click **Eject Teach Tool** to eject the teach tool. Follow the on-screen prompts to complete the procedure.




2. Read the popup warning. Be sure all next positions are empty, then click **OK**.



3. Select the release position, then click **Eject Teach Tool**.




8-channel nest

Teach tool will eject to left position in nest. Ensure the nest position is empty.

This is the same location where only the 1250 µl head is installed.

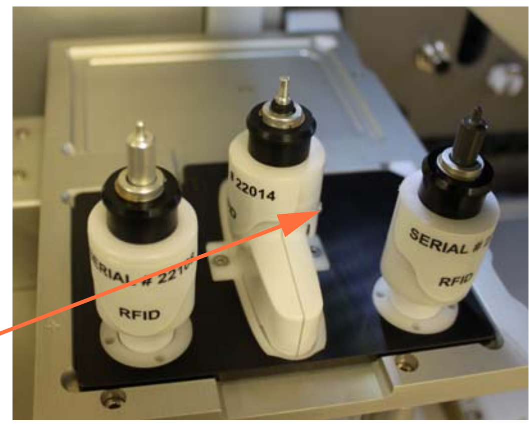
12-channel nest

4. The following steps will verify that the pipetting heads and tips will pickup and eject properly when running your protocols.

   Install a single, 8-channel, or 12-channel head into the nest.

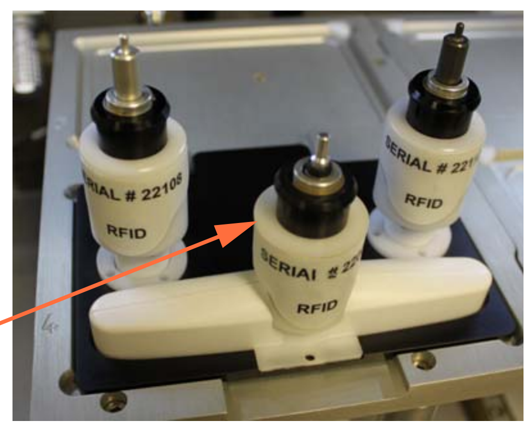
   8-channel heads must be installed with the stainless 'button' facing to the right, as shown. 12-channel heads must be installed with the stainless facing to the rear, as shown. There is a small "1" printed on a corner of 8-channel and 12-channel heads near the tip pickup location. This '1' will line up with the tip rack located in Tip Rack position A1.

8-channel: stainless "button" faces to right




8-channel nest

12-channel: stainless "button" faces rear of machine



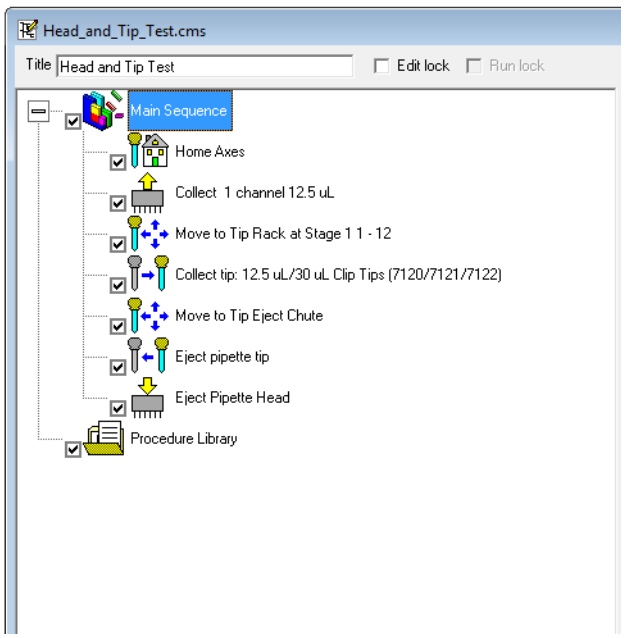

12-channel nest

5. Position a ClipTip rack in a rack adapter on stage 1 or stage 2.

6. Create and run a protocol (sequence) in ControlMate (shown below) as follows:

   1. Home Axes
   2. Collect head
   2. Move to Tip Rack at Stage 1 or Tip Rack at Stage 2
   3. Collect tips
   4. Move to Tip Eject Chute
   5. Eject pipette tip
   6. Eject Pipette Head

   Be sure to select all options, heads, tip types, and locations that match the equipment installed on your system. For example, if you do not have a Tip Eject Chute, simply change the procedure to match the equipment you have (for example, return the tips to their source or to some waste location.



# Pipetting Techniques

Precision and accuracy can be difficult to obtain when pipetting low volumes. This section describes the dispense procedure that was used to test the ***Versette*** for small volumes and discusses the critical parameters that affect pipetting performance.

**Contents**



Liquid handling operations, regardless of throughput, demand precision and accuracy to minimize experimental variation. Broadly, most applications include handling chemical buffers with varying properties and/or biological macromolecules. Modifying several minor parameters in automated liquid handling procedures can result in better performance and improved downstream results. Users can choose suitable parameters for appropriate reagents and introduce features in the software to achieve better performance for their respective liquid handling procedures.

Thermo Scientific ControlMate software interface offers several features to efficiently control the instrument. Optimization of these features will help achieve better liquid handling results. In addition to optimizing the operational parameters, the type of dispense mechanism also plays an important role in liquid handling. Two pipetting mechanisms are generally used on automated liquid handling platforms; positive displacement (syringe based) and air displacement (tip based). The compatibility of these liquid handling mechanisms varies with experimental requirements.

Positive displacement pipetting can result in greater accuracy when used with non-aqueous liquids and solutions at volumes below 0.5µl. In contrast air displacement pipetting is compatible with most aqueous solutions at volumes above 0.5µl and offers disposable tips which eliminate risk of liquid carryover and cross contamination. The choice to utilize either pipetting mechanism should be considered in conjunction with the desired transfer volume range, throughput, and other application requirements.

# Pipetting Techniques for Small Volumes

Critical parameters affecting performance include:

## Air gap

Air gap is a volume of air aspirated before any reagents. An air gap combined with a blowout will allow complete dispense of the liquid into the destination plate. Compare this to dispensing to a purge point using a manual pipetting technique.

## Blowout

Blowout is the command used to move the pipetting head pistons past the “zero volume” dispense point, pushing a small amount of air after the liquid. This command in conjunction with the air gap will aid in pushing any remaining liquid in or on the outer orifice of the tip or needle into the destination labware to completely dispense the liquid. Blowout can be used to overcome capillary action to ensure the complete dispense of all fluid in a pipette. To use the blowout command, aspirate a small volume of air before aspirating the desired quantity of liquid. Dispense as normal, then actuate the blowout to drive the aspirated air, and any remaining fluid, out of the pipette. The extra air volume should be great enough to overcome any capillary action in the small tip orifice. The air volume should be sufficient to assist the separation of the droplet from the tip to the well bottom, but not so great that air bubbles become a problem. Air blowout is often optimized by trial and error.

## Aspiration and Dispense Speeds

The speed of aspiration and dispense will affect liquid handling results. In general, thick, viscous liquids require slower aspiration and dispense. The common occurrence of wicking (liquid adhering to the side of the tip or needle after dispense), hanging droplets (liquid not fully dispensing from the tip or needle), or full dispense of viscous liquids can be achieved by slowing the aspirate and/ or dispense speeds. Slow pipetting speeds are best for smaller volumes as they prevent droplets that form at the end of the tips from contacting the sides or top of the wells

## Dwell Times

Dwell time is the amount of time the tips or needles remain in the aspirate or dispense location after moving liquid. This command allows time for pressure to equalize in all pistons and allows viscous liquids to completely aspirate or dispense. During the dispense step for a small volume it is important to use a Dwell Time to allow the volume droplet to form on the end of the pipet tip. As a general rule dwell times are dependant on the dispense volume and liquid type. Smaller dispense volumes require longer dwell times. (e.g., 0.5 – 1.0 µL dwell times should be 1.5-2.0 seconds).

## Neat vs. Incremental Dispense

Neat dispense is the process of aspirating from a source and dispensing directly to the destination labware. The incremental pre-dispense cycle involves aspiration with a dispense prior to dispensing the desired volume in the destination labware. Incremental dispensing involves aspirating from the source and dispensing a portion of the aspirated volume to a multitude of destination plates.

## Overstroke

An overstroke includes the aspiration of excess reagent and immediate dispensing of this fluid back to the source labware.  A percentage of the programmed aspiration which is then used to move the piston head to add additional fluid to the aspiration.

## Tip Heights

Tip height and placement in the labware well is an important factor in achieving optimal automated liquid handling performance.

Tip Height for dispense should be 0.1 to 0.3 mm above the well bottom to ensure that droplets make contact with the well bottom and are removed from the tip during the dispense step. Tip height requires some trial and error to determine the optimal distance from the well bottom. A height that places the tips too deep in the wells will seal the tip to the well bottom and not allow the liquid to leave the tip. If the tips are not deep enough, the dispensed droplet will not make contact with the well bottom and will not remove the droplet from the tip.

Tip height for aspirate should be optimized from the top of the source liquid to minimize carryover to the destination plate.

## Tip Touch

Tip touch is the "touch off" on the side wall or bottom of a microplate well that removes droplets adhering to the pipetting head tip or needle after an aspirate or dispense. This command allows droplets to fall into the well rather than be carried away with the tips or needles.

## Volume Correction

The ability to adjust pipette head piston movements and timing for viscosity and specific gravity of solutions used in liquid handling aspirate and dispense procedures.

# Calibrating for different liquids to improve pipetting accuracy

***Versette*** is factory calibrated with multiple fluid types:

- 1% Bovine Serum Albumin
- 70% Ethanol
- 90% DMSO
- 30% Glycerol
- Deionized Water

You can add calibration values to improve pipetting accuracy of liquids with specific gravity that is significantly different from those installed on the system.

The calibration feature defines the number of steps that the piston motor uses to raise or lower the pipetting pistons during a pipetting cycle. A liquid type with high viscosity requires more time to move through the pipet tip. By increasing or decreasing the number of motor steps, the pistons aspirate and dispense more or less liquid dependent on that liquid's characteristics (specific gravity). Liquids exhibiting higher specific gravity than water require more motor steps and liquids exhibiting lower specific gravity than that of water will require less motor steps.

Through the ControlMate software, you can define and save calibration values for a library of liquid types. These settings will be available as choices when you insert an aspirate or dispense command. The calibration procedure is performed by obtaining five volumetric weights using ControlMate to run a dispense program. The weights, as well as the liquid's conversion factor, are entered in the ControlMate Volumetric Calculation program. ControlMate converts the weights to volume, averages the results, and calculates the motor steps factor. This feature is also useful to determine if you need to define calibration values for a specific liquid. After obtaining the volumetric weights, you can compare the weights to the Versette accuracy specifications. If the results are outside of the accuracy specification, then continue with the rest of the procedure to calculate the motor steps factor.

10

# Maintenance and Service

**Contents**

# Preventative maintenance schedule

Maintenance steps are summarized in the table below. Please refer to each procedure's instructions on the following pages or in the Service Manual for complete details.

**Table 21.** Maintenance/Check Schedule

| Frequency | Item | Action |
|---|---|---|
| Monthly | Inspect Tubing and Power Cord | Verify that all tubing is secure and clean and in good condition. Verify power cord is in good condition and shows no signs of cracks or wear. |
| | Check non-contact liquid level sensor | Check for cleanliness and any damage. |
| | Inspect wash station | Check sensors, wiring, and tubing to ensure each item is clean and shows no signs of cracks or wear. |
| | Inspect external pumps | Verify that pumps and tubing are in good working order, clean, and with no signs of wear. |
| Yearly | Yearly service should be performed by trained maintenance technicians. Please consult the Thermo for details. | |

# Cleaning the Plate Stages

Clean the plate stage surfaces if needed using a soft cloth or tissue paper soaked in a mild detergent solution (e.g. dishwashing liquid), or 70% ethanol. Wipe up spills immediately. Do not use formaldehyde or strong alkaline solutions.

If you have spilled infectious agents on the plate carrier, see "Decontamination procedure" on page 283 for instructions to clean and decontaminate the system.

## Cleaning a Reagent Reservoir

A reagent reservoir should be cleaned after use and when you change the reagent.

1. Verify the system is off and all pumps are turned off.
2. Remove the reagent reservoir from the system.
3. Rinse or wash the reagent reservoir with water or detergent when necessary.
4. Rinse with distilled and filtered laboratory-grade water.
5. Dry the reagent reservoir before use.

## Disposal of materials

Follow laboratory and country-specific procedures for the disposal of biohazardous or radioactive waste. Refer to local regulations for the disposal of infectious material.

**WARNING** The samples can be potentially infectious. Dispose of all used plates, strips, syringes, disposable tips, etc., as biohazardous waste following your facility's instructions and all local and national standards and codes for the materials you are using.▲

Les échantillons peuvent être potentiellement contagieux. Liquider toutes les plaques utilisées, les bandes, les seringues, les pointes à jeter, etc., comme le gaspillage de biohazardous qui suit les instructions de votre facilités et toutes normes et les codes locales et nationales pour les matériels que vous utilisez.

## Decontamination procedure

Decontamination should be performed in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

A decontamination procedure is only recommended when infectious substances have been in direct contact with any part(s) of the instrument.

If there is a risk of contamination with biohazardous material, the procedure recommended below or some other corresponding decontamination procedure must be performed.

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another or before sending it to service.

Example of decontaminants:

- Ethanol 70%
- 5% Bleach and water solution

- Virkon solution 1 – 3%
- Glutaraldehyde solution 4%
- Chloramine T
- Microcide SQ 1:64

**CAUTION** If local or laboratory regulations prescribe regular decontamination, it is not advisable to use formaldehyde, since even small traces of formaldehyde negatively affect the enzyme being used in EIA tests resulting in bad test results.▲

**WARNING** The decontamination procedure should be performed by authorized trained personnel wearing disposable gloves, protective glasses and clothing in a well-ventilated room.▲

La procédure de décontamination devrait être exécutée par le personnel entraîné autorisé qui porte des gants à jeter, les lunettes protectives et vêtant dans une pièce bien ventilée.

1. Prepare the decontaminant: for example, 70% Ethanol or 5% bleach (or another agent recommended by your safety officer).
2. Empty the reagent reservoir. Ensure that you are wearing disposable gloves.
3. Switch OFF the power and disconnect the power supply cable.
4. Disinfect the outside of the instrument using a cloth dampened with 70% ethanol.
5. Clean the instrument using a mild detergent (e.g. dishwashing liquid).
6. Remove any stains using 70% ethanol.
7. Disinfect the liquid path of the instrument with isopropanol, 10% bleach (for example, sodium hypochlorite), or 70% ethanol.
8. Flush with distilled and filtered laboratory-grade water.
9. Clean and disinfect all components, tubings, accessories, as appropriate according to your standard laboratory procedures for the type of fluids and chemicals used in the system.

# Packing for Service

To pack for service, follow the guidelines presented below.

**CAUTION** It is important that the instrument is thoroughly decontaminated before it is removed from the laboratory or any servicing is performed on it.▲

C'est important que l'instrument décontamine à fond avant qu'il est ait enlevé du laboratoire ou n'importe quel entretenir est dessus exécuté.

When you ship the instrument for service:

1. Removal all accessories and loose components and connections from the system.
2. Switch the power OFF and disconnect the power supply cable.
3. Decontaminate the instrument. See“Decontamination procedure” on page 283.
4. Install packing equipment (foam) as necessary to lock the stages in place, and prevent motion during shipment, or remove the stages and ship them separately.
5. Follow standard packing practices to place the unit into a well padded, sturdy carton or crate suitable for shipping. Consult your local professional packer for support if necessary. It is critical that all components are properly protected during shipment..
6. Place the accessories box into a separate carton.
7. Inform about the use of hazardous materials. Enclose a dated and signed Certificate of Decontamination (see Appendix A: “Certificate of Decontamination”) both inside and attached to the outside of the package, in which you return your instrument (or other items).
8. Enclose the instrument serial number as well as the return authorization number (RGA) given by your local Thermo Fisher Scientific representative.
9. Seal the box carefully and securely. Make sure all required information is clearly indicated on the outside of the carton and enclosed as instructed.

   Refer to “General Specifications” for details on storage and transportation temperatures.

# Touchpanel software upgrades

Upgrades to the touchpanel software can be installed via a USB memory stick or through laptop or network computer as required. Follow the instructions provided with the software upgrade kit.

# Service Contracts

It is recommended to maintain and service the instrument regularly every 12 months on a contract basis by the manufacturer's trained service engineers. This ensures that the product is properly maintained and gives trouble-free service. Contact the Thermo Scientific technical service department for more details.

# Disposal of the instrument

If the Versette has to be disposed of, follow the guidelines below.

**WARNING** Decontaminate the instrument before disposal. Refer to "Decontamination procedure" on page 283 and "Appendix A - Certificate of Decontamination" on page 301.

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.

Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The procedures vary by country.

- Pollution degree:
  2 (see "Safety specifications")
- Method of disposal:
  Electronic waste
  Contaminated waste
  (Infectious waste)

## WEEE symbol

Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State (European Country), and this product should be disposed of or recycled through them. Further information on Thermo Scientific's compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available from Thermo.

Regarding the original packaging and packing materials, use the recycling operators known to you. For more information, contact your local Thermo Scientific representative.

11

# Technical Specifications

**Contents**



## General Specifications

Thermo Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program. The general specifications are presented in Table 22General Specifications:

**Table 22.** General Specifications

| Item | Specification |
|---|---|
| Mechanical | |
| Height | 67.5cm (26.5 in.) |
| Depth | 54.8mm (21.6 in.) |
| Width | with 2 stage base: 40.8cm (16.1 in.)<br>with 6 stage base: 68.0cm (26.8 in.) |
| Weight | Base system (without pipetting module and pipette heads):<br><br>Single-head module: 5 kilograms (11 pounds)<br>Multi-head module: 10.2 kilograms (22.5 pounds) |
| Electrical | |
| Power requirements | AC 100~240V, 50/60Hz. 2 amp max draw |
| Fuse | Refer to system label. |
| Environmental Requirements | |
| Operational environment | Indoor use only |

**Table 22.** General Specifications

| Item | Specification | |
|---|---|---|
| Operating temperature | 15 to 40°C | |
| Transportation conditions | -25°C to +50°C, packed in transport packaging | |
| Relative humidity | <85% at 30°C | |
| Altitude | Up to 2,000 meters | |
| Supply voltage fluctuations | AC 100 ~ 240 V ±10% | |
| Installation category | II | |
| Pollution degree | 2 | |
| Performance | | |
| Dispensing accuracy | Refer to system pipette head specifications sheet for details. | |
| Dispensing precision | | |
| Speed | Plate to plate transfer: | |
| | Serial dilution: | 2:30 minutes (10µl volume aspirate and dispense with 3x mixing between); measured across 8- columns of a 96-well microplate |
| | Tip wash: | 2:00 minutes (includes fill/empty and 10µl mix) |
| | Mixing: | 0:20 minute per 10µl cycle (3x=1:00) |
| Pipetting Resolution | 96- and 384- channel pipette heads | Increments of 0.1µl |
| | Single and multichannel pipette heads (0.5-30µl, 10-125µl volume range); 1.0µl for 20-300µl and 100-1250µl volume ranges | Increments of 0.5µl |

**Table 22.** General Specifications

| Item | Specification | |
|---|---|---|
| Plate and Tubes Compatibility | Plates: | all standard SBS conforming low, standard and deep well 6-, 12-, 24-, 48, 96-, 384-, 1536-well formats |
| | Storage Tubes: | 0.5, 0.75, 1.4ml TrakMate® tubes, as well as comparable volume Abgene and Nunc storage tubes. |
| Wash Station | Available for single, 8, 12, 96, and 384 -channel pipette heads. 96- and 384- channel fixed and disposable tip pipetting options | |
| System Control | | |
| Touchpanel control | 5x7 inch touch-sensitive input panel with proprietary “wizard-based” (menu-driven) software | |
| PC control | Compatible with standard Windows platform PCs meeting requirements of ControlMate Software version 2.0 or later | |
| I/O switch | input/output switch for external devices, 24 VDC, 0.4 amps/switch (0.7 amp total) | |
| Robotic compatibility | Easily integrated into automated systems and stackers, e.g. Thermo Scientific RapidStak, Orbitor, Catalyst Express. The robotic arm has a convenient access both from right and left side of the instrument to the plate in the carrier and can grip the plate in landscape or portrait orientation. | |

# Safety specifications

This section describes the safety specifications for the Versette instrument.

## Live parts

The instrument is safe to operate with the covers fitted and they must not be removed during operation. The covers protect the user from live parts (motors, power supplies, etc.) and they should only be removed after switching the instrument off and disconnecting the mains supply cable, and only by suitably qualified maintenance and repair personnel.

**WARNING** The instrument uses voltages dangerous for human beings. Before removing any covers, disconnect the instrument from the power supply.▲

L'instrument utilise des tensions dangereuses pour les êtres humains. Avant d'enlever n'importe quelles couvertures, débrancher l'instrument de l'alimentation.

## In conformity with the requirements

| The Versette bears the following markings: |
|---|
| Type 838 |
| 100 – 240 Vac, 50/60 Hz, 100 VA |
| CE |

| The Versette conforms to the following requirements: |
|---|
| 2006/95/EC (Low Voltage Directive) |
| 89/336/EEC (Electromagnetic Compatibility Directive EMC) |
| FCC Part 15, Subpart B/Class B (July 2004) |
| 2002/96/EC (Waste of Electrical and Electronic Equipment) |

| Safety performance: |
|---|
| EN 61010-1:2001 (Ed. 2)<br>taking into account US and CA National differences |

| The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions: | |
|---|---|
| Altitude | up to 2000 m |
| up to 2000 m | +5°C to +40°C |
| Humidity | maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C |
| Power supply fluctuations | ± 10% from nominal |

| EMC performance: | |
|---|---|
| EN 61000-6-3:2001 | Generic standards –<br>Emission standard for residential, commercial and light industrial environments |
| EN 61000-6-1:2001 | Generic standards –<br>Immunity standard for residential, commercial and light industrial environments |
| EN 61326-1:1997<br>+ A1:1998 + A2:2001<br>+ A3:2003 | Product family standard |

| Test standards | Performance limits |
|---|---|
| EN 55022:1998 + A1:2000 + A2:2003 | Class B, 150 kHz – 1 GHz |
| EN 61000-3-2:2000 | Class A |
| EN 61000-3-3:1995 + A1:2001 | |
| ANSI C63.4:2003 | Class B, 150 kHz – 30 MHz;<br>30 MHz – 1 GHz |
| EN 61000-4-2:1995 + A1:1998 + A2:2001 | 4 kV CD, 8 kV AD, Criteria B |
| EN 61000-4-3:2002 + A1:2002 | 3 V/m, 80 MHz – 2 GHz, Criteria A |
| EN 61000-4-4:2004 | 1 kV, Criteria B |

| Test standards | Performance limits |
|---|---|
| EN 61000-4-5:1995 + A1:2001 | 2 kV line to ground, 1 kV line to line, Criteria B |
| EN 61000-4-6:1996 + A1:2001 | 3 $V_{rms}$, 150 kHz – 80 MHz, Criteria A |
| EN 61000-4-8:1993 + A1:2001 | 30 A/m, Criteria A |
| EN 61000-4-11:1994 + A1:2001 | 30%/10 ms, Criteria B<br>60%/100 ms, Criteria B<br>100%/10 ms, Criteria B<br>100%/5 s, Criteria C |

# Troubleshooting

## Mechanical

Table 23. Troubleshooting, Mechanical

| Problem | Cause | Action Required |
| --- | --- | --- |
| Overfill - tip wash station | Fill sensor not properly set | Check fill sensor. |
| Tubing in peristaltic pump slips | • Tubing improperly installed | • See installation section for proper installation of tubing. |
| | • Tubing wrong size | • Use only the tubing size shown on the pump. |
| | • Tubing worn | • Replace worn tubing. |
| Z-Axis Crash/Recovery | • Item on stage is improperly placed | • Keep pipette head door closed during auto-recovery process. Follow all on-screen prompts. |
| | • Calibration error | • Re-calibrate Z-axis per calibration instructions |
| | • General fault, unknown | • Contact Thermo support. |

Table 23. Troubleshooting, Mechanical

| Problem | Cause | Action Required |
|---|---|---|
| Tips crash into microplate | • Mismatch of tips to plate type.<br>• Mismatch of D.A.R.T. tips to pipetting head<br>• X, Y, or Z motions need to be calibrated | • Change tips or plate type.<br>• Check and replace with proper tips.<br>• Use ControlMate Software and manual to perform calibrations. |
| No power | • Power cable loose or disconnected<br>• Blown fuse | • Re-connect power cable<br>• Check power inlet source then replace fuse. |

# Error Messages

Table 24. Troubleshooting, Error Messages

| Problem | Cause | Action Required |
|---|---|---|
| X axis error, Y axis error | Platform stage movement blocked | • Check for obstructions to vessels on platform stages.<br>• Check for obstruction to platform stage tracks.<br>• Check X, Y, and Z calibrations using ControlMate software. |
| Stage "__" Z axis error | • Pipette head movement blocked<br>• Pipette tips crash into vessel | • Check for obstructions to pipette head or vertical track.<br>• Check for the correct combination of pipette head, tips, and vessel type.<br>• Check Z calibration using ControlMate software. |

Table 24. Troubleshooting, Error Messages

| Problem | Cause | Action Required |
|---|---|---|
| Syringe motor error | Pistons in pipette head blocked or moved out of their physical range of motion. | • Check for obstructions in piston shafts.<br>• Check piston settings. |
| Command transmission error | • Device receives command it does not recognize.<br>• Command timeout is set too low. | • Check for faulty data cable.<br>• increase command timeout setting. |
| ACK timeout | • Instrument does not respond to ***ControlMate*** commands. | • Check that the cables are correctly connected and that the power is switched on and available.<br>• Restart system. |

# Service Request Protocol

If the Versette requires service, contact your local Thermo Fisher Scientific representative or the Thermo Scientific technical service department. Do not under any circumstances send the instrument in for service without any prior contact. It is imperative to indicate the fault and nature of the required service. This will ensure a faster return of the instrument to the customer.

Your local Thermo Scientific representative or distributor will take care of sending a detailed service request form (that is, a Warranty Claim Technical Sheet) to the Thermo Scientific technical service department. The Warranty Claim Technical Sheet contains a more detailed description of the fault, symptom or condition. Give all the necessary information to the distributor or representative, who will fill out and forward the Warranty Claim Technical Sheet to the Thermo Scientific technical service department along with any additional information which will speed the processing of your repair.

Thermo makes available special packing materials for the system. Contact Thermo before packing the system and its components and accessories.

Check that any necessary decontamination procedure has been carried out before packing. Refer to “Decontamination procedure” on page 283 and “Certificate of Decontamination” on page 296. Ensure that the Certificate of Decontamination (see Appendix A: “Certificate of Decontamination”) as well as the return authorization number (RGA) are sent with the instrument.

The Thermo Scientific technical service department will keep you up to date with the progress of service and provide you with any further details you might need, for example, on maintenance, serviceability, troubleshooting and replacement.

## Certificate of Decontamination

The decontamination procedure is required before shipping the instrument to Thermo Scientific, for example, for repair. If, for any reason, the instrument is shipped back to Thermo Fisher Scientific, it must be accompanied by a dated and signed Certificate of Decontamination, which must be attached to the outside of the package containing the instrument. Refer to “Decontamination procedure” on page 283 and “Certificate of Decontamination” on page 296. Failure to confirm decontamination will incur additional labor charges or at worst the items will be returned for proper cleaning. Before returning any instrument(s) or item(s), ensure that they are fully decontaminated. Confirm A or B status. Refer to Appendix A:“Certificate of Decontamination”.

# Ordering Information

## Versette Base Units and Modules

| System | Cat. Number |
|---|---|
| Versette Base Unit<br>Requires pipetting module, pipette head, and stage, accessories sold separately | 650-01-BS |
| Single- and Multi- Head (SMC) pipetting module assembly for use with single-, 8-, 12- channel pipette heads | 650-02-SMC |
| 96- and 384- Head (NTC) pipetting module assembly for use with 96- and 384- channel pipette heads | 650-02-NTC |
| Two position stage, guarding included | 650-03-TPS |
| Two position robotic friendly stage | 650-03-TPSR |
| Six position stage, guarding included | 650-03-SPS |
| Pump Module | 650-04-PUMP |

## Versette Pipette Heads

| Head Size/Type | Dispense Type | Volume Range | Cat. Number |
|---|---|---|---|
| Single-Channel | Air Displacement | 0.5-12.5 µl | 650-07-S12 |
| | | 2-30 µl | 650-07-S30 |
| | | 10-125 µl | 650-07-S125 |
| | | 20-300 µl | 650-07-S300 |
| | | 100-1250 µl | 650-07-S1250 |
| 8-Channel | Air Displacement | 0.5-12.5 µl | 650-07-M812 |
| | | 2-30 µl | 650-07-M830 |
| | | 20-300 µl | 650-07-M8300 |

| Head Size/Type | Dispense Type | Volume Range | Cat. Number |
|---|---|---|---|
| 12-Channel | Air Displacement | 0.5-12.5 µl | 650-07-M1212 |
| | | 2-30 µl | 650-07-M1230 |
| | | 20-300 µl | 650-07-M12300 |
| 96-Channel | Air Displacement | 0.5-30 µl | 650-06-9630 |
| | | 5-300 µl | 650-06-96300 |
| | Positive Dispense, Pierce | 0.2-50 µl | 650-06-9650PC |
| | Positive Dispense, DF | 0.1-50 µl | 650-06-9650DF |
| 384-Channel | Air Displacement | 0.5-30 µl | 650-06-38430 |
| | | 1.0-100 µl | 650-06-384100 |
| | Positive Dispense, SS | 0.1-50 µl | 650-06-38450SS |
| | Positive Dispense, DF | 0.1-50 µl | 650-06-38450DF |
| 384-Channel | Air Dispense | 0.5-30µl | 650-06-38430 |
| | | 1.0-100µl | 650-06-384100 |
| | Positive Dispense, SS | 0.1-50µl | 650-06-38450SS |
| | Positive Dispense, DF | 0.1-50µl | 650-06-38450DF |

*SS = stainless steel, DF = Duraflex®

# Versette Accessories

| Item | Cat. Number |
|---|---|
| 96/384 Head teach tool | |
| Serial Dilute Head teach tool | |
| 8-channel Pipette Head Nest | |
| 12-channel Pipette Head Nest | |
| 96 Channel Tip Wash Station, Tall Height | 650-05-96TTW |
| 384 Channel Tip Wash Station, Tall Height | 650-05-384TTW |
| Vacuum Manifold Kit, 100V, Includes plate risers | 650-08-VMNA |
| Vacuum Manifold Kit, 220V, Includes plate risers | 650-08-VMEU |
| Piercing Manifold Kit, for use with 96 format sample storage tubes | 650-08-PRC |
| 1.5 ml Tube and Vial Adapter, accommodates lidded tubes and vials | 650-08-1.5ML-L |
| 2 ml Tube and Vial Adapter | 650-08-2ML |
| 8 ml Tube and Vial Adapter | 650-08-8ML |
| Linear Barcode Reader with Guards | 650-08-BCR |

# Replacement items

| Item | Part Number |
|---|---|
| Fuse, 6A, 250 VAC (2 required per system) | |
| Tubing, Inlet and Outlet | |
| Tip Base Replacement Packs | |
| Packaging, for Shipment | |
| RS232 Communications Cable | |
| Power cord | |

# Consumable spare parts

No chemicals and no consumable parts are supplied with this equipment.

# Appendix A - Certificate of Decontamination

THIS FORM MUST ACCOMPANY ALL SHIPMENTS

PHOTOCOPIABLE

Name: ______________________________

Company: ______________________________

Address: ______________________________

______________________________

Tel./Fax: ______________________________

E-Mail: ______________________________

Item: ____________________ Serial No. ____________________

☐ **I confirm that the returned items have not been contaminated by body fluids, toxic, cacinogentic or radioactive materials or any other hazardous materials.**

☐ **I confirm that the returned items have been decontaminated and can be handled without exposing personnel to health hazards.**

**Materials used in this unit:**

Chemicals ______________________________

Biological ______________________________

Radioactive______________________________

Decontamination procedure and solution/s used:

______________________________

______________________________

______________________________

Date and place: ______________________________

Signature: ______________________________

Name (block letters): ______________________________

The signature of a Radiation Safety Officer is also required when the unit has been used with radioactive materials. This unit is certified by the undersigned to be free of radioactive contamination.

Date and place: ______________________________

Signature: ______________________________

Name (block letters): ______________________________

# WARRANTY

Seller warrants that the Products will operate or perform substantially in conformance with Seller's published specifications and be free from defects in material and workmanship, when subjected to normal, proper and intended usage by properly trained personnel, for the period of time set forth in the product documentation, published specifications or package inserts. If a period of time is not specified in Seller's product documentation, published specifications or package inserts, the warranty period shall be one (1) year from the date of shipment to Buyer for equipment and ninety (90) days for all other products (the "Warranty Period"). Seller agrees during the Warranty Period, to repair or replace, at Seller's option, defective Products so as to cause the same to operate in substantial conformance with said published specifications; provided that Buyer shall (a) promptly notify Seller in writing upon the discovery of any defect, which notice shall include the product model and serial number (if applicable) and details of the warranty claim; and (b) after Seller's review, Seller will provide Buyer with service data and/or a Return Material Authorization ("RMA"), which may include biohazard decontamination procedures and other product-specific handling instructions, then, if applicable, Buyer may return the defective Products to Seller with all costs prepaid by Buyer. Replacement parts may be new or refurbished, at the election of Seller. All replaced parts shall become the property of Seller. Shipment to Buyer of repaired or replacement Products shall be made in accordance with the Delivery provisions of the Seller's Terms and Conditions of Sale. Consumables are expressly excluded from this warranty.

Notwithstanding the foregoing, Products supplied by Seller that are obtained by Seller from an original manufacturer or third party supplier are not warranted by Seller, but Seller agrees to assign to Buyer any warranty rights in such Product that Seller may have from the original manufacturer or third party supplier, to the extent such assignment is allowed by such original manufacturer or third party supplier.

In no event shall Seller have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Buyer, (iv) use of the Products in a manner for which they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage and handling of the Products or (vii) use of the Products in combination with equipment or software not supplied by Seller. If Seller determines that Products for which Buyer has requested warranty services are not covered by the warranty hereunder, Buyer shall pay or reimburse Seller for all costs of investigating and responding to such request at Seller's then prevailing time and materials rates. If Seller provides repair services or replacement parts that are not covered by this warranty, Buyer shall pay Seller therefor at Seller's then prevailing time and materials rates. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITHOUT SELLER'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS.

THE OBLIGATIONS CREATED BY THIS WARRANTY STATEMENT TO REPAIR OR REPLACE A DEFECTIVE PRODUCT SHALL BE THE SOLE REMEDY OF BUYER IN THE EVENT OF A DEFECTIVE PRODUCT. EXCEPT AS EXPRESSLY PROVIDED IN THIS WARRANTY STATEMENT, SELLER DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN,

WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

# Glossary

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

## A

**Aspirate** To remove fluid from a well, tube, reservoir, or other vessel via one or more pipettes.

**Aspirate height** The distance down into the well that the pipette tip is positioned to extract fluid from the well. This field is used to represent a pre-set height, available within the aspirate command. This height is useful for setting a default height at which liquid is aspirated.

## B

**Blowout** Blowout is the command used to move the pipetting head pistons past the “zero volume” dispense point, pushing a small amount of air after the liquid. This command in conjunction with the air gap will aid in pushing any remaining liquid in or on the outer orifice of the tip or needle into the destination labware to completely dispense of the liquid. Blowout can be used to overcome capillary action to ensure the complete dispense of all fluid in a pipette. To use the blowout command, aspirate a small volume of air before aspirating the desired quantity of liquid. Dispense as normal, then actuate the blowout to drive the aspirated air, and any remaining fluid, out of the pipette. The extra air volume should be great enough to overcome any capillary action in the small tip orifice. The air volume should be sufficient to assist the separation of the droplet from the tip to the well bottom, but not so great that air bubbles become a problem. Air blowout is often optimized by trial and error.

## C

**CE Marking** "Conformité Européene" = European Conformity. CE Marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislations, the product may be legally placed on the market and thus the CE Marking ensures the free movement of the product within EU.

## D

**Decontamination** Removal or neutralization of radiologic, bacteriological, chemical or other contamination.

**Dispense** To place fluid into a well, tube, reservoir, or other vessel via one or more pipettes.

**Dispense depth** The distance down into the well that the pipette tip is positioned to dispense fluid into the well (or tube, reservoir, or other vessel) via pipette. This is similar to the Aspirate Depth with the exception that it is used for determining a pre-set height for dispensing liquids.

**Dispensing height** The valve position on top of the microplate. The distance between the bottom surface of the plate carrier to the tip of the dispense pipette tip.

**Dry Tips** A dry tip is simply that: a tip which has not yet been exposed to fluid. During the first aspiration into a dry tip, a very small amount of fluid will saturate the dry air in the tip with moisture, while the vapor pressure increases above the liquid inside the tip. This loss of fluid to the vapor inside the tip can affect the very small dispenses. To ensure proper dispense, the use of a “dwell time”, an “overstroke” or implementing a “mix sequence” can compensate for any loss of fluid to the air within the tip. With an overstroke, extra fluid is drawn into the tip. With a mix sequence, fluid is aspirated then dispensed back to its source, then aspirated again. This process, with appropriate delays, will allow time for the dry air to saturate with fluid, and enable accurate dispenses with accurate fluid levels in the tips.

**Dwell Time** The dwell time is used to specify a period of time over which to leave the tips in the sample immediately after aspirate or dispense. This allows for equalizing air pressure and liquid movement inside the tips.

## M

**Mix Command** The mix command performs an aspiration followed by a dispense, into the same source location. This can be useful to pre-treat a dry pipette tip to ensure accuracy. See “Dry Tips”.

The Mix command should also be used to aspirate/ dispense liquid in a vessel to re-suspend material in the vessel so that a homogenous solution can be created prior to aspiration.

## N

**NTC** The NTC (Nintety-six and Three-eighty-four-Channel) pipetting module houses the 96 and 384 well pipette heads, and the NTC teach tool.

## O

**Overstroke** Select overstroke if this is the first aspirate prior to multiple dispenses. The overstroke sequence will aspirate additional fluid, then return a portion of this liquid to the source. This will ensure that the piston motor is primed and improves volumetric accuracy throughout all subsequent dispense allotments.

Overstroke is the process of driving the pipette head piston during aspiration to pickup more volume that will be required for the subsequent dispense. For example, if the dispense or series of dispenses will require a total volume of 10 µl, if the piston is driven to aspirate 12 µl, the overstroke of the piston is said to aspirate an additional 2 µl. Aspirating with overstroke on the first volume aspiration is useful at lower volumes and works to ensure consistency and accuracy throughout a series of incremental dispense steps. See also Dry Tips.

## P

**Pipetting module** A mechanism that holds pipette heads. Two types of pipetting modules are available: SMC and NTC.

The SMC houses the Single, 8-channel, and 12-channel pipette heads, and the SMC teach tool.

The NTC houses the 96 and 384 well pipette heads, and the NTC teach tool.

**Post Air Gap** This introduces an air gap following a aspiration to ensure that the liquid in the pipette tip does not leak during instrument movements or pauses.

**Pre Air Gap** This introduces an air gap in the pipette before aspirating liquid. This gap above the liquid is then used during a dispense operation to push the liquid column fully and completely out of the pipette to ensure complete, accurate dispense.

## S

**S-Axis** Also called 'Syringe" axis, a special height coordinate for use with the SMC pipetting module to properly calculate coordinates for head pickup and drop-off heights for use with optional head-nests, and for pickup and drop-off heights for disposable tips, etc.

**Shape** This represents the physical top shape of the well and can either be Square or Round.

**SMC** The SMC (Single/Multi-Channel) pippeting module houses the Single, 8-channel, and 12-channel pipette heads, and the SMC teach tool.

**Speed Control** The speed of the pipette pistons, as well as other system motions can be controlled to improve accuracy and precision for varying fluids. For example, the pipetting speed should be reduced when dispensing small volumes or when handling high viscosity liquids.

## T

**Tip Touch** This action causes the pipette tips to touch against a top side of a well after aspiration to remove fluid which may have adhered to the side or bottom of the tips. Tip Touch is essential for extremely low volume dispenses where accuracy is essential.

**Tip/Well Offset** Typical dispense takes place at the center of a well. Selecting a tip/well offset sets the tip position either to a corner of the well, or to a specific X and Y axis offset value. This is typically used with low volume dispenses; positioning the tips in the corner of a well provides additional surface area for the liquid to adhere.

## V

**Viscosity** Viscosity describes a fluid's internal resistance to flow and can be thought of as a measure of fluid friction. Thus, water is "thin", having a lower viscosity, while glycerol is "thick", having a higher viscosity.

## W

**Well count** The physical number of wells contained within the vessel. The value can be one of 96, 384 or 1536. The field is used for determining positional parameters for quadrants (division of the wells into blocks) etc.

**Well depth** The well depth value is used to define a preset height which defines the bottom of the well. The value entered must be measured from the well to top to the well bottom at the well geometric center.

**Width** The well width is especially important for determining well centers and quadrant offsets and tip touching. The field value represents the physical width of the well measured at the top of the well.

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