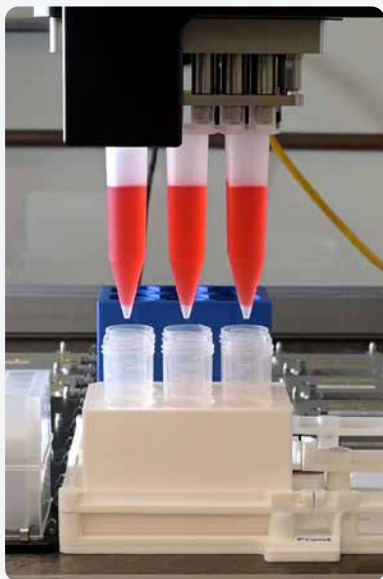


Single stroke Pipetting from 50mL conical tubes with the Mammoth™ 30mL Automation Tip

Contribution by AstraZeneca



Abstract

The Thomson Mammoth 30mL Automation Tips for the Dynamic Devices Lynx Robotic Liquid Handler enables fast, reliable single-tip large-volume aspiration and dispensing from 50mL conical tubes. It shortens run times, improves uniformity and reduces plastic waste. Engineered for compatibility with 50mL conical tubes, mini-bioreactors and similar, the tips streamline method design and improve throughput.

Introduction

Automation engineers often face inefficiencies when transferring 5–30mL volumes from 50 mL conical tubes, as standard 1–5 mL tips require multiple aspiration and dispense cycles that increase protocol time, error risk, method complexity, and allow for cell settling. The Mammoth 30mL Automation tips enable single-stroke handling of large volumes, improving consistency while reducing cycle count, deck complexity, and plastic waste. This application note provides guidance on labware offsets and highlights workflows where the Mammoth 30mL Automation tips improves speed and robustness.

Product Features

1. Designed for large volumes on the Dynamic Devices Lynx LM-series automated liquid handling systems
2. Designed for compatibility with standard 50 mL conical tubes
3. Aspirate/Dispense range 1.5 mL – 20 mL (30mL nominal tip volume)
4. Sterile, Filtered tip with 5 mL increment graduation marks
5. Large-bore tip supporting gentle, high-speed mixing of cells

Materials

- Dynamic Devices Lynx Liquid Handler LM-Series with a 24-channel MCPA or ST
- pipetting arm with Super Stroke
- Thomson Mammoth 30mL Automation Tips (9453030)
- Thomson 30mL Deck Plate Adapter (PROTOTYPE1-1212630-399)
- Automation-friendly 50 mL Conical Tube Rack
- Thomson 24-Well Plate (931565-G-1X; 931568; 931569-G-1X; 931571)
- Standard reagent reservoirs
- Water, PBS, or media



Figure 1- Workflow of the Mammoth 30mL Automation tip and 50mL tube labware and offset definitions.

Labware Definitions for 30mL Automation Tips

1. Open Method Manager 4 (MM4) software, initialize and connect.
2. Select “Labware Category” from the Workspace section (Figure 2).
3. Click on the “Tipbox” button (Figure 2) and select new (or copy a previous file template).
4. To define the Mammoth 30mL Automation Tip, in the General Tab, enter the labware name as “Thomson-30mL_Tip” with 6 columns and 4 rows (Table 1).
5. Enter labware values: tip length, width, and Z-clear parameters, as shown in Figure 3 and Table 1.
6. In the Tip Box Layout tab, select the Tip Type as “LXB-24-5000” with a total tip height of 118.0mm. The offset values are displayed in Figure 3-Lower and Table 3 for the 24-channel MCPA or ST pipetting arm.
7. Save these parameters.

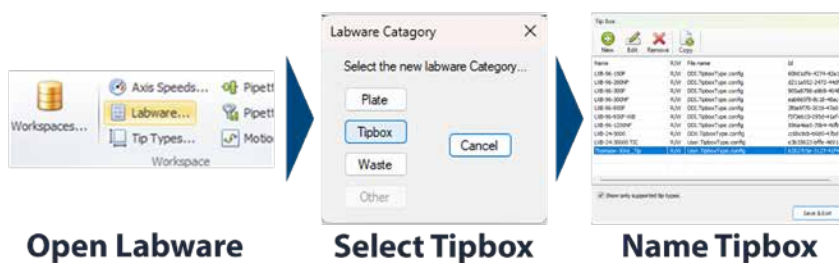


Figure 2 – Method Manager 4 software setup for Mammoth 30mL Automation Tips. Opening Labware for definitions; Selection of Tip Box; Defining Name of Tip Box “Thomson-30mL_Tip”.

| Labware | Columns | Rows | Length (mm) | Width (mm) | Z Clear (mm) |
|------------------------------|---------|------|-------------|------------|--------------|
| Mammoth 30mL Automation Tips | 6 | 4 | 127.8 | 85.5 | 10.0 |

Table 1 – Reference labware values for the “Thomson-30mL_Tip” definition

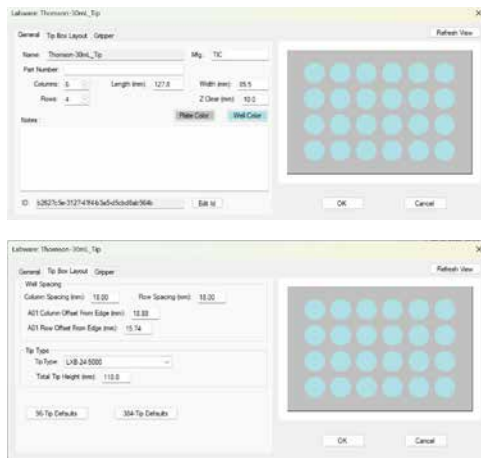


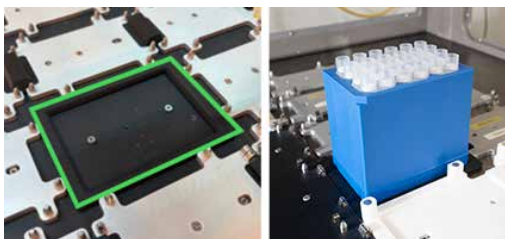
Figure 3 - Mammoth 30mL Automation Tip General Parameters; Upper. Definitions of labware values for “Thomson-30mL_Tip” using dimension parameters for 24-well layout; **Lower.** Tip Box Layout - Definitions of offset for 30 ml tip to ensure proper channel loading and Tip Type “LXB-24-5000”

Define deck position and offset for the Mammoth 30mL Deck Plate Adapter

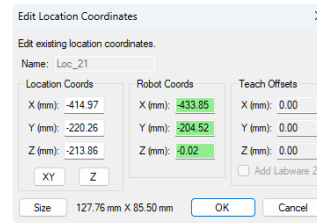
To ensure that the Mammoth 30mL Automation Tip may be retrieved from the tip box on the deck, an adapter (PROTOTYPE1-1212630-399) will have to be fitted to the deck and Z-axis values re-taught at the chosen location.

Note: If Lynx instrument has MCPA and Super Stroke, there is no need to adjust for the tray height (Z-coordinates). Please skip to the next section.

1. In the Devices tab, enter the Gantry Robot Utility View and on the worktable, select the location where you will place your Thomson 30mL Deck Plate Adapter (Figure 4)
2. Right click “Edit Location” and select “Yes”
3. From the Tip type drop-down, select “Thomson-30mL_Tip”, then select “OK”
4. Teach this location by subtracting the height of the Lynx deck plate (6.5mm) from the Z parameter under the “Location Coords” (Figure 4, “Offset-Corrected” example) and select OK
5. Select save and “Yes” for these parameters
6. Remove the existing Lynx deck plate at the position corresponding to where the Deck Plate Adapter will go (for example, Location 21 in Figure 4)
7. Position the Mammoth 30mL Deck Plate Adapter into the corresponding location as in Figure 4 (Upper Left)
8. Place the Mammoth 30mL Tip Box into the Deck Plate Adapter on the deck (Figure 4)
9. This can be repeated for other positions on the deck where tips are to be used.



Default



Offset-Corrected

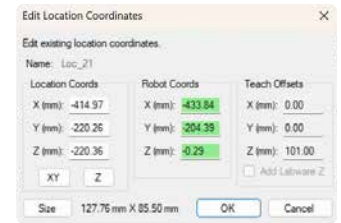
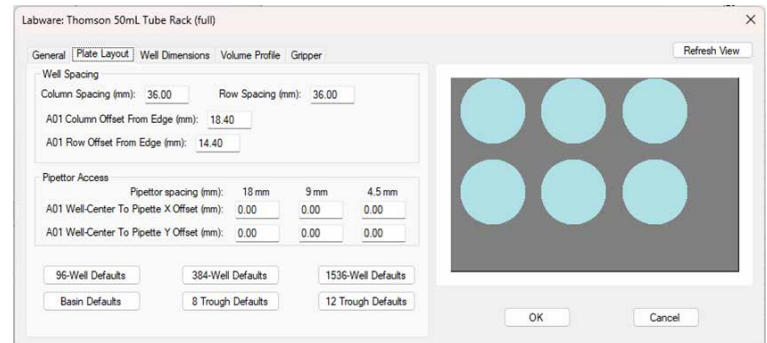
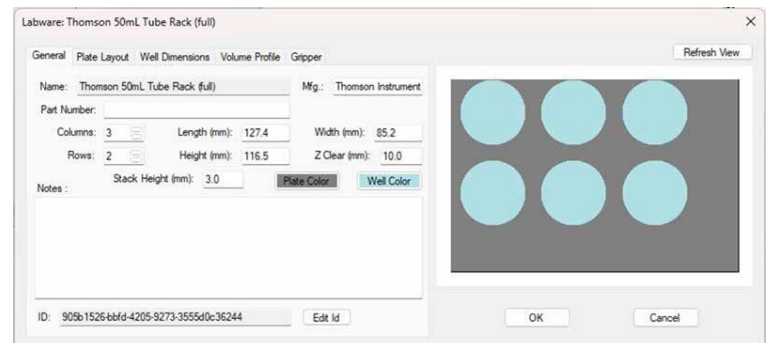


Figure 4 – Mammoth 30mL Tip Tray Adapter definitions and offset corrections; Upper: images of deck plate adapter and tip box engaged into adapter; **Lower:** Parameters to define offset for the change in Z-axis for the Tip box. “Default” = original parameters for the Lynx deck plate; “Offset-Corrected” = changed Z-axis parameters to account for removal of the Lynx deck plate (6.5mm height).

Defining Labware and Offset values for the 50mL Conical Tube Rack

1. Select “Labware Category” from the Workspace section (Figure 5).
2. Click on the “Plate” button (Figure 5) and select new (or copy a previous file template).
3. In the General tab, enter the labware name as “Thomson 50mL Tube Rack (full)” with 3 columns and 2 rows (Table 1).
4. Enter labware values: length, width, height, Z-clear parameters, and stack height, as shown in Figure 6 and Table 1.
5. In the Plate Layout tab, enter the labware values: Column Spacing, Row Spacing, A01 Column Offset and A01 Row Offset, as shown in Figure 6 and Table 1.
6. In the Well Dimensions tab, enter the values for the well depth, top diameter, change the Bottom Taper to “TaperedBottom” and tapered Height as shown in Figure 6 and Table 1.
7. Save these parameters.



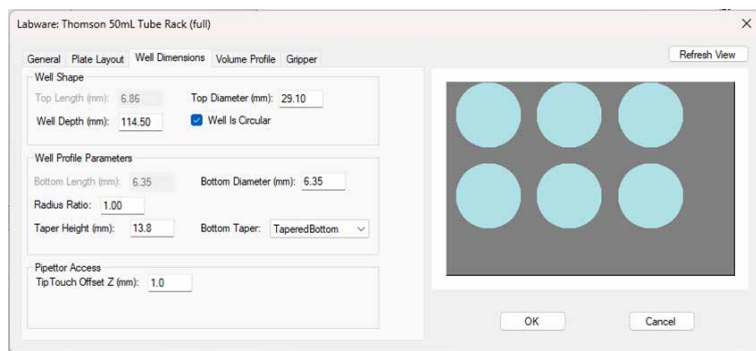


Figure 5 - Labware Definitions for Conical Tube Rack containing tubes. **Upper** – General Layout values. **Middle** – Plate Layout values; **Bottom** – Well Dimension values.

Defining volumetric aspiration for Mammoth 30mL Automation Tips

Each Mammoth 30mL Automation Tip is connected to 4 adjacent channels on the 24-channel head (Figure 6). Every channel aspirates & dispenses 25% of the volume of one 30mL Automation tip.

1. Open the Aspirate window, enter the appropriate volume from Table 2 (Column 2) into the Pipetting Command section (Figure 7) to have each channel aspirate 25% of total volume desired (Table 2, Column 3). For example, if a volume of 3800µL is entered with a Leading Air Gap of 75µL and a Post Air Gap of 25µL into the pipetting command (Figure 6), a total of 15200µL will be aspirated (3800µL x 4 channels = 15200µL per Mammoth Tip). (Figure 7)
2. Save these parameters



Figure 6 – Left: View of channels highlighting that one tip will engage with 4 adjacent channels on the 24-channel MCPA or ST pipetting arm; Right: Images of Mammoth 30mL Automation Tips engaged to channels.

| Percentage of 30mL tip | Volume (µL) Entered into MM4 | Volume Pipetted (µL) |
|------------------------|------------------------------|----------------------|
| 55% | 4100 | 16400 |
| 60% | 4500 | 18000 |
| 65% | 4900 | 19600 |
| 66% | 4950 | 19800 |
| 67% | 5000 | 20000 |

Table 2 – Reference for volumetric definitions to enter (Column 2) into pipette command to achieve total volume (Column 3).

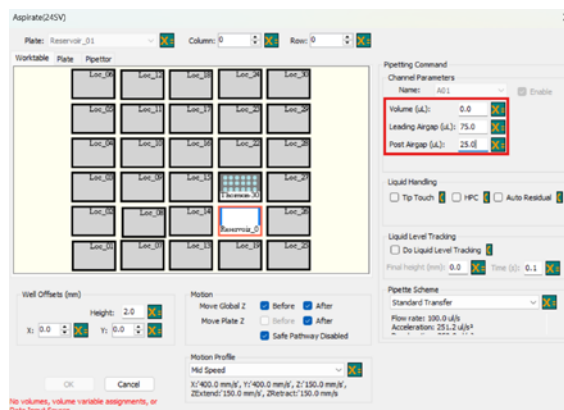


Figure 7 – Aspiration volume entered in Pipetting Command: “Channel Parameters” with a Leading Air Gap of 75µL and a Post Air Gap of 25µL. Volume (µL) entered will be ¼ of total volume to be aspirated.

Defining the offset for Mammoth 30mL Automation Tips for pipetting from 50 mL conical tubes

To ensure the Mammoth 30mL Automation Tips are positioned accurately relative to the 50mL Conical tubes and rack, the offset must be adjusted (Figure 8) to the center of the four adjacent channels (which will be connected to a single 30mL tip).

1. In the Well Offset section, enter the correct offset values for 50 mL conical tubes and rack. Starting reference values (X axis -8.5 mm, Y axis -8.5 mm) are also summarized in Figure 9 & Table 3 .
Note: the offsets from the edges are adjusted to the appropriate distance relative to the A01 reference position.
2. Save these parameters.

| Percentage of 30mL tip | Volume (µL) Entered into MM4 | Volume Pipetted (µL) |
|------------------------|------------------------------|----------------------|
| 5% | 375 | 1500 |
| 10% | 750 | 3000 |
| 20% | 1500 | 6000 |
| 30% | 2250 | 9000 |
| 40% | 3000 | 12000 |
| 45% | 3400 | 13600 |
| 50% | 3750 | 15000 |
| 51% | 3800 | 15200 |

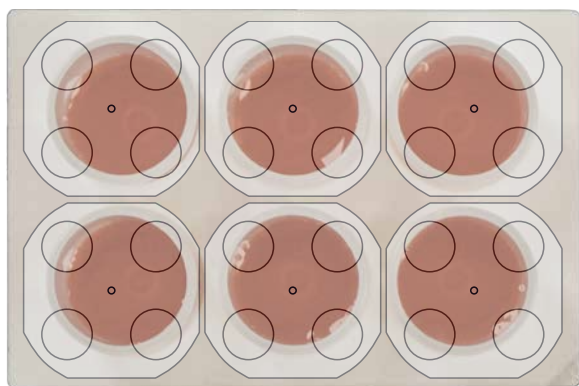


Figure 8 - Top-down view of Mammoth 30mL Automation Tip depicting -8.5mm X/Y offset as it appears for standard 50 mL Conical Tubes.

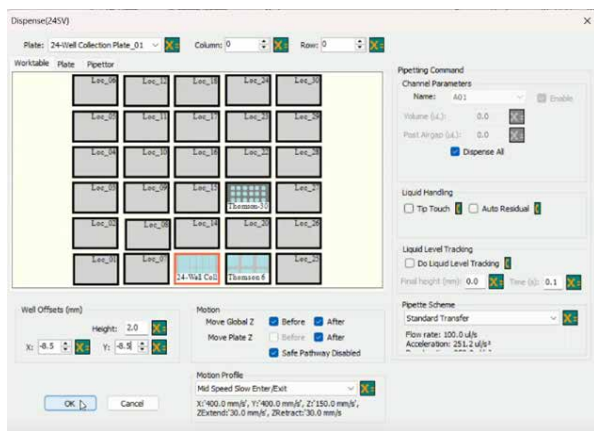


Figure 9 – Well offset values for aspiration from 50 mL Conical Tube.



Figure 10 - Workflow of aspiration and dispensing into a Thomson 24-well plate

Aspiration, Dispensing and mixing using the Mammoth 30mL Automation Tips with 50mL conical tubes

For the 50mL tubes we recommend testing colored water or PBS to ensure the tips aspirate and dispense to the proper positions.

Loading Labware

1. Open MM4 worktable, add “Thomson 30mL_Tip” to worktable in desired position (Figure 10)
2. Ensure the “Motion Profile” as “Mid Speed” or “Mid Speed Slow Enter/Exit” (Figure 9)
3. Fill 50 ml conical tubes with colored water, and into the rack
4. Place conical tube rack and 24-well plate into desired positions on deck and load labware on worktable in the appropriate positions.

| Labware | Column Spacing (mm) | Row Spacing (mm) | A01 Column Offset from Edge (mm) | A01 Row Offset from Edge (mm) |
|---|---------------------|------------------|----------------------------------|-------------------------------|
|  Mammoth 30mL Automation Tips | 18.00 | 18.00 | 18.88 | 15.74 |
|  Tube Rack | 36 | 36 | 18.40 | 14.40 |

Table 3 - Reference spacing and offset values for the Mammoth 30 mL Automation Tips and 50 mL Conical Tubes in a Tube rack.

Aspiration and Dispensing

1. Aspirate desired volume of liquid from 50 mL Tubes as defined in the pipetting command
2. Dispense liquid into Thomson 24-well plate (up to 10 ml per well)

Parameters for Tube Mixing Cycle

1. Place 50mL Tube Rack with tubes onto desired deck position
2. Mix at 3000µL/s for three mix cycles (bottom-to-top offset of 3mm from well base).
Note: Aspirate at least ½ of working volume for optimal mixing performance.

Discussion

Single-stroke handling (1.5–20 mL) reduces run time and improves reproducibility from 50mL conical tubes

Fewer aspiration cycles for volumes above 5 mL reduce cell settling and improve consistency during deck operations

Reduced plastic waste by replacing up to 24 standard tips with 6 high-capacity tips

Easy Lynx integration with compatible accessories, intuitive software setup, and minimal user training

Conclusion

The Mammoth 30 L Automation Tips enable reliable, single-stroke handling of large liquid volumes from 50 mL conical tubes on the Dynamic Devices Lynx platform. This large volume tip eliminates multi-aspiration cycles that slow high-volume workflows when using 1 mL or 5 mL tips. With proper labware offsets and volumetric settings, users achieve effective mixing of liquids in 50 mL conical tubes, and efficient dispensing into 50 mL conical tubes or 6- and 24-well plates, reducing plastic consumption and simplifying method development. The tip is well suited for reagent additions, buffer exchanges, dilutions, and plate filling where volumes exceed standard tip capacity but do not require bulk dispensers, helping teams improve throughput and streamline automated bioprocessing and cell-culture workflows

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