MiniPrep
Operator’s Guide

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About This Guide

Congratulations on your purchase of a TECAN MiniPrep Sample Processor (MiniPrep). As a compact, fully automated sample workstation, the MiniPrep provides maximum productivity in minimal space. Its modular construction makes customization for specific sample handling applications quick and easy. The MiniPrep incorporates proven robotic and pump modules for excellent performance and reliability. It has a small footprint and rugged, dependable design.

The MiniPrep family includes two models; the MiniPrep 60 and the MiniPrep 75. The MiniPrep 60 has one arm and utilizes up to 4 slots for liquid handling modules. The MiniPrep 75 has one or two arms and utilizes up to 8 slots for liquid handling modules. Aside from these differences, both models share the same capabilities.

This guide introduces you to the operation of the MiniPrep, provides liquid handling techniques, and recommends proper maintenance.

Audience

This guide is intended for lab technicians and researchers in the medical industry who use robotic equipment to perform assays. It assumes that you are familiar with the basic operation of robotic systems and with liquid handling.

In this Guide

This guide includes the following chapters and appendixes:

- Chapter 1, “Getting Started,” which describes how to verify the operation of your MiniPrep.
- Chapter 2, “Operation and Liquid Handling,” which introduces you to the MiniPrep’s flow of operation and provides tips for liquid handling.

- Chapter 3, “Normal Maintenance,” which describes the day to day maintenance of your MiniPrep and how to replace common components.
- Appendix A, “MiniPrep Specifications,” which provides the MiniPrep’s specifications.
- Appendix B, “Parts and Accessories,” which describes the MiniPrep’s parts and accessories.
- Appendix C, “Maintenance Log,” which provides the log sheets used to record the daily, weekly, semi-annual, and annual maintenance of your MiniPrep.
- Appendix D, “Liquid Handling Troubleshooting,” which provides solutions for liquid handling problems.
- Appendix E, “Electrostatic Discharge Information,” which provides information on preventing damage through electrostatic discharge.
- Appendix F, “Unpacking and Setup Instructions,” which points you to a separate unpacking and setup instructions.

Other Sources of Information

This guide provides information on the operation and maintenance of the MiniPrep.

To perform your assays using the MiniPrep, use the *Gemini for MiniPrep Software Manual* included with the Gemini software.

To unpack and setup your MiniPrep, use the *Unpacking and Setup Instructions for the MiniPrep* booklet included with the instrument.

Typographic Conventions

The following typographic conventions help you locate and identify information:

Italic text	Used for new terms, emphasis, and book titles; also identifies arguments in syntax descriptions
Bold text	Identifies keywords and punctuation in syntax descriptions

NOTE *Notes provide extra information, tips, and hints regarding the topic.*

CAUTION Cautions identify important information about actions that could result in damage to or loss of data or could cause the MiniPrep to behave in unexpected ways

MiniPrep is used when referring to both the MiniPrep 60 and MiniPrep 75.

Operational and Precautionary Information

Hazards

Mechanical Hazards

The MiniPrep is a robotic device that operates under computer control. As with most robotic devices there is a potential for injury and bodily harm from moving mechanical components whenever the instrument is in operation. The instrument is designed for automatic *hands-off* operation only. *Never* reach into the instrument workspace when the MiniPrep is in an operating mode.

Liquid Hazards

Potential hazards to personnel may exist from the liquids being handled by the MiniPrep. Infectious clinical samples, toxic or corrosive chemicals, or radioactive chemicals may be present. Although the *hands-off* operating feature of the MiniPrep minimizes exposure to these agents, the potential for hazardous exposure still exists. Hand, eye and clothing protection, as well as radioactive monitoring badges should always be worn, where appropriate.

Electrical Hazards

The same precautions must be considered when using any electrical equipment. Do not touch any switches or outlets with wet hands. Switch the instrument off before disconnecting the AC power cord. Unplug the instrument prior to cleaning up any major liquid spills and prior to servicing any of the electrical or internal components. Only qualified personnel should perform electrical servicing, such as servicing fuses and modular components, such as pumps. Replace all access covers before operating the instrument.

FCC Compliance

The MiniPrep generates, uses, and radiates radio frequency energy. If not installed and used properly, it may cause interference to radio communications. the MiniPrep has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of the MiniPrep in a residential area is likely to cause interference, in which case the user at his own expense must take whatever measures may be required to correct the interference.

ContactingTECAN

Contact information for all TECAN Dealers and Affiliates is available at the TECAN website: **www.tecan.com**.

1 Getting Started

This chapter provides instructions to verify that your TECAN MiniPrep Sample Processor (MiniPrep) can perform a few simple operations. Once the MiniPrep runs these operations successfully, you're ready to use it for your assays.

Setting Up the MiniPrep

Before performing the verification tests, be sure you have followed the *Unpacking and Setup Instructions for the MiniPrep* to:

1. Remove the MiniPrep from its packaging and situate it in its permanent location.
2. Verify the configuration of the MiniPrep.

The *Unpacking and Setup Instructions for the MiniPrep* was located on the top of the packaging when you opened the MiniPrep's shipping container.

Verify the MiniPrep's Operation

Now that you have setup your MiniPrep and have verified its configuration, install the Gemini software and verify the MiniPrep's performance. Referring to the *Gemini for MiniPrep Software Manual*, check the following:

- Tip configuration
- Communication port
- Worktable size

Congratulations, your MiniPrep is ready to use. The remainder of this guide introduces you to the MiniPrep's functionality and maintenance.

To perform your assays, see the *Gemini for MiniPrep Software Manual* included with the Gemini software.

2 Operation and Liquid Handling

This chapter introduces the MiniPrep and includes the following sections:

Overview

The MiniPrep utilizes the highest standards of liquid handling and a wide selection of modules to handle the most demanding assays. It has been designed to easily aspirate, dispense, mix, and, depending on your configuration, dispose of the pipette tip after each operation ensuring non-contamination.

Figure 2-1 illustrates the basic MiniPrep configuration and highlights the main components.

Customize your MiniPrep with any single or combination of pumps, options, and accessories. For a complete list of parts and accessories, see Appendix B, "Parts and Accessories."

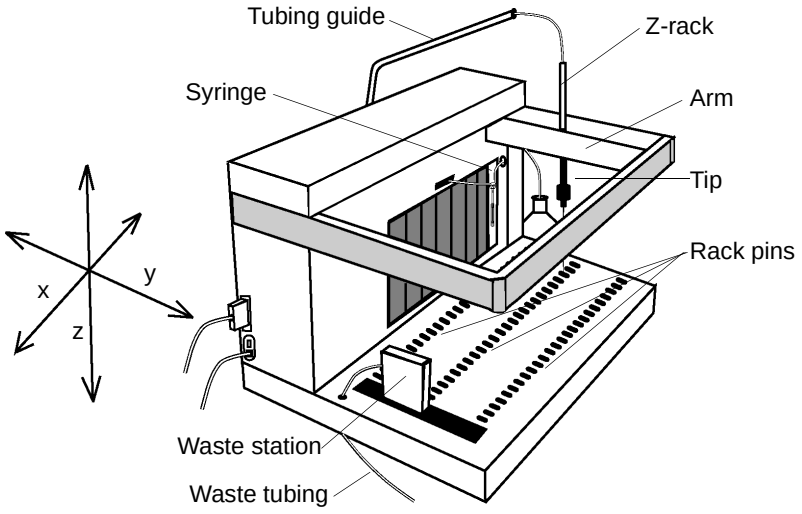


Figure 2-1 MiniPrep basic configuration and components

Basic Operation

Control the MiniPrep through Gemini, a software application installed on a dedicated computer running Windows NT®. Gemini's flexibility allows you to not only use system-defined tests and methods for your assays, but to develop your own tests and methods to fit your particular needs.

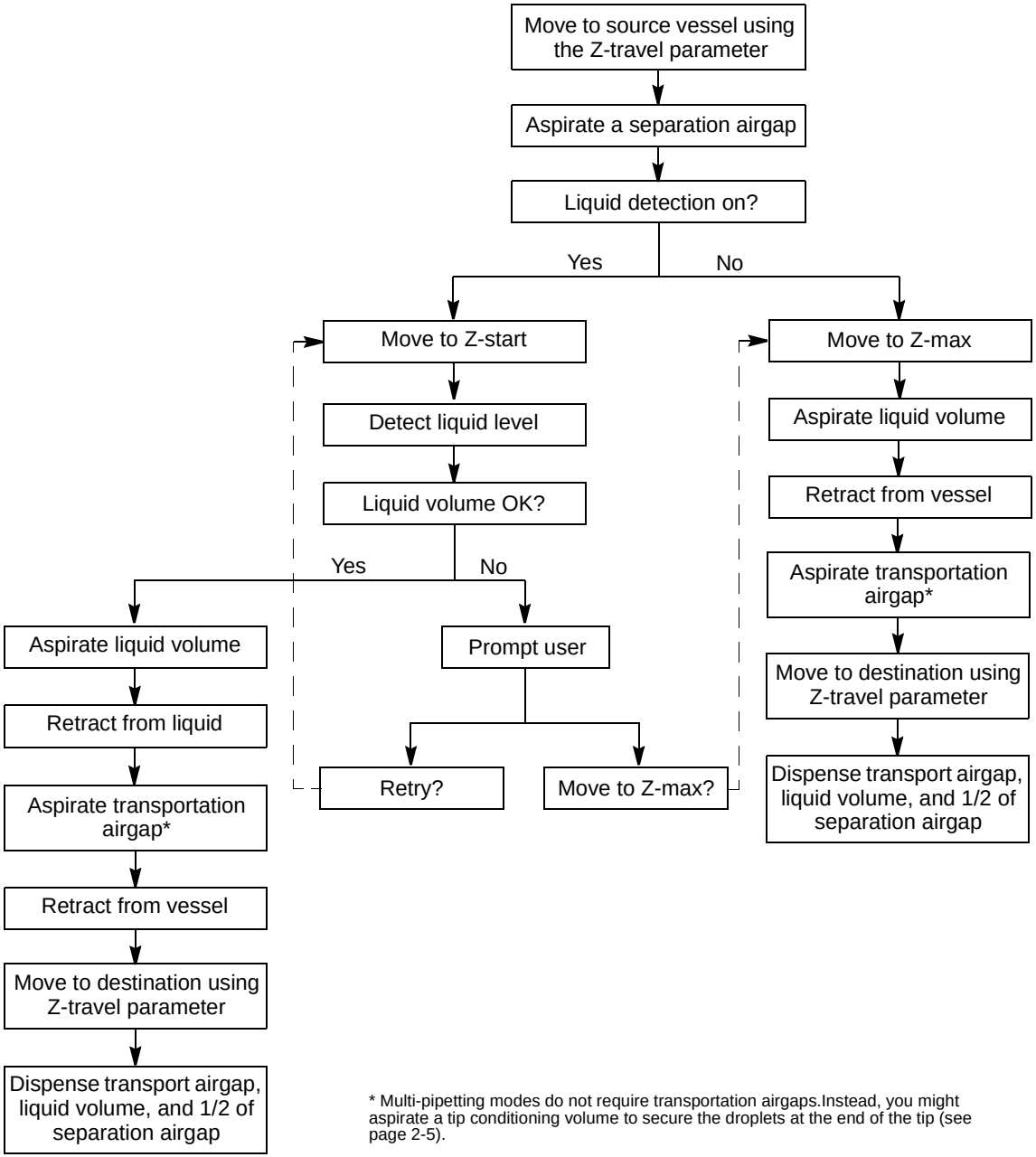
Using Gemini, you:

- Configure the MiniPrep's workstation parameters (arm, syringe, waste block, waste bin, racks and reagents)
- Generate and run tests that control the MiniPrep

The MiniPrep uses a simple physical coordinate system as shown in Figure 2-1. The X, Y, and Z axes describe the three dimensional work space. When setting up racks, specify their location through Gemini in terms of XYZ coordinates.

Example Overview

Figure 2-2 introduces the concepts of basic operation and liquid handling. Refer to this figure as you read the remainder of this chapter.



* Multi-pipetting modes do not require transportation airgaps.Instead, you might aspirate a tip conditioning volume to secure the droplets at the end of the tip (see page 2-5).

Figure 2-2 The process of operation and liquid handling

Through Gemini, you define the movement parameters, called *Z-values*, the aspirated *volume* and *airgaps*, the dispense *volume*, and the *speed* at which the MiniPrep aspirates and dispenses liquid. “Liquid Handling Concepts” below, covers each of the concepts introduced in Figure 2-2.

Liquid Handling Concepts

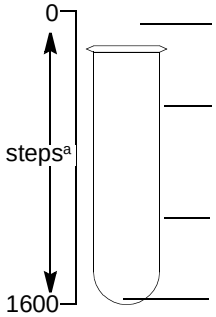
> **CAUTION** Potential hazards to personnel may exist from the liquids being handled by the MiniPrep. Infectious clinical samples, toxic or corrosive chemicals, or radioactive chemicals may be present. Although the hands-off operating feature of the MiniPrep minimizes exposure to these agents, the potential for hazardous exposure still exists. Hand, eye and clothing protection, as well as radioactive monitoring badges should always be worn, where appropriate.

Many factors come into play when aspirating and dispensing fluids including the pump mechanics, tubing, aspirate and dispense speeds, and airgaps. Each can affect accuracy and precision of your assays in different ways. This section provides fundamental concepts that will help you optimize your automated liquid handling applications.

Z-Values

Z-values represent the vertical heights set for the pipette tip as it moves, aspirates, and dispenses. Table 2-1 describes each Z-value.

Table 2-1 Z-values and recommended settings

Example	Z-Value	Definition	Setting
	**Z-travel**	the height at which the tip travels between positions within a rack	Set higher than any possible obstruction.
	Z-start	the height at which the MiniPrep activates Liquid Detection Operation	Set just inside the neck of the vessel and just above the liquid.
	Z-dispense	the height in the vessel at which the MiniPrep dispenses liquid	Set based on the needs of your assay.
	Z-max	the lowest height in the vessel in the Z-axis.	For routine operation, set Z-max to 10 steps[a] above vessel’s bottom.

a. One step equals 0.1 mm

Pipetting Modes

The MiniPrep uses three pipetting modes; *single-pipetting*, *dual-pipetting*, and *multi-pipetting*.

Single-pipetting

Using a single probe, the MiniPrep aspirates the liquid volume (one aliquot) at one source position and dispenses the entire volume at one destination position.

When pipetting two or more liquids together, consider the individual volumes when selecting the aspiration speed for each volume. When determining the dispense speed consider the total volume, including the airgaps. See "Aspiration and Dispense Speeds" on page 2-7.

Dual-pipetting

Using a dual probe, the MiniPrep aspirates and dispenses the liquid volume (one aliquot) through each barrel.

Multi-pipetting

Using a single or dual probe, the MiniPrep aspirates and dispenses multiple liquids (multiple aliquots) multiple times. In addition to the aspirate and dispense speeds, multi-pipetting includes the following parameters:

- Waste volume

  Each multi-pipetting volume requires a waste volume related to its size. The waste volume prevents dilution of the pipetted volume with the system liquid. The size is generally 10% to 20% of the total pipetted volume. For standard tubing, this total volume should not exceed 1800µl.

- Number of replicates

  The number of replicates is a function of the tubing length from the diluter (syringe drive) valve, the tip, and the size of the syringe. The total pipetted volume determines the number of replicates. For optimum liquid handling performance, limit the number of replicates to no more than six.

- Tip conditioning volume

  The tip conditioning volume, used when aspirating large volumes, is aspirated and then dispensed back into the source to secure droplets at the end of the tip, thus conditioning the tip.

> **NOTE** *When using multi-pipetting, aspirating a transportation airgap results in dispensing an incorrect volume into the first destination tube.*

- Maximum volume

  Maximum volume is the total volume allowed to be aspirated while multi-pipetting, and is equal to the sample volume + waste volume.

> **CAUTION** Do no specify a volume so large that it may reach the manifold at the sample processor's side. For standard tubing the absolute maximum is 1800µl.

Airgaps

Airgaps separate different liquids in the pipetting tips (*separation airgap*) and tubing and secure droplets from the end of the tip while the arm moves over the worktable (*transportation airgap*).

To avoid breaking apart the airgap, aspirate it slowly. The recommended airgap aspiration speed is 30 to 70µl / sec.

> **NOTE** *If your assay uses the DiTi option consult the Gemini software guide to determine if you need to specify airgaps; instead, you may need to specify the Disposable Tip Parameters.*

Separation Airgaps

Separation airgaps separate system liquid from the aspirated liquid. Larger liquid volumes require larger separation airgaps as shown in Table 2-2.

Table 2-2 Recommended separation airgaps

Liquid Volume	Separation Airgap Size
Up to 100µl	10µl
100 to 299µl	20µl
300µl	30µl

Separation airgaps should not exceed 30 microliters.

Transportation Airgaps

Transportation airgaps, taken after the last aspirated liquid volume, prevent droplet formation at the end of the tip. A transportation airgap of 10µl is sufficient for most applications.

> **NOTE** *When using multi-pipetting, aspirating a transportation airgap results in dispensing an incorrect volume into the first destination tube.*

Example of Liquid Volume and Airgaps

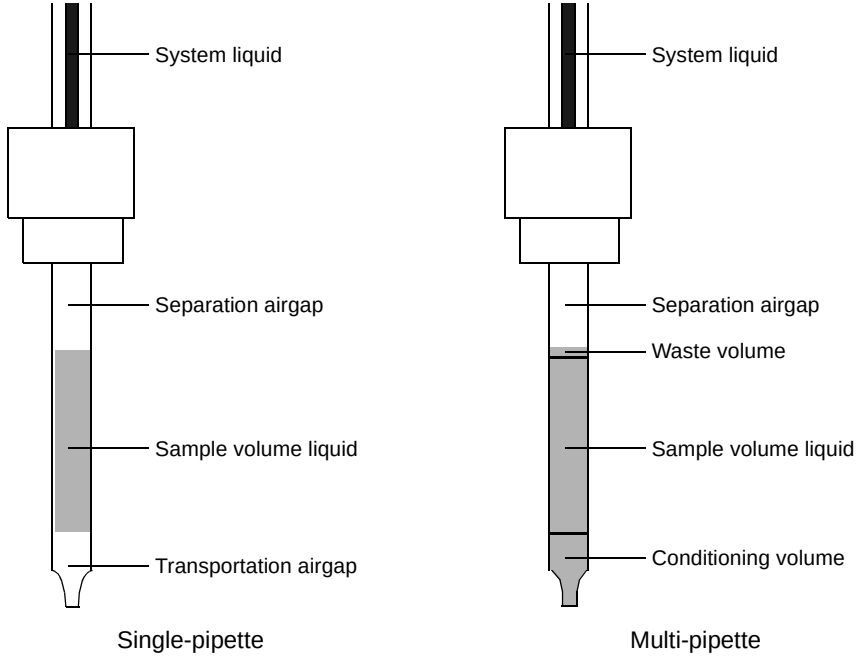


Figure 2-3 Single- and multi-pipette with liquid volume and airgaps

Aspiration and Dispense Speeds

The choice of aspiration and dispense speeds affects both accuracy and precision. As a general rule aspiration should be slow and dispense should be fast. Rapid aspiration speeds can cause the airgap to break up which results in a significant dilution effect, or, can introduce bubbles into the system. Faster dispense speeds generally result in better breakoff at the tip.

The MiniPrep has speeds ranging from 1.2 seconds per stroke to 20 minutes per stroke.

Aspiration Speed

The aspiration speed is the flow rate at the tip when aspirating the liquid volume.

When optimizing the aspiration speed, consider the *aspiration delay.* An aspiration delay is a pause in the syringe movement after aspirating the liquid volume. An aspiration delay is set in milliseconds. During liquid aspiration, a vacuum builds inside the system tubing. The faster the liquid is aspirated, the stronger this vacuum pulls. The aspiration delay gives the system time to return to equilibrium.

CAUTION Retracting the tip from the liquid too quickly can result in aspiration of air instead of liquid.

An aspiration delay of 100ms is sufficient for most applications.

Dispense Speed

The dispense speed is the flow rate at the tip when dispensing the liquid volume. The dispense speed is another important parameter when optimizing liquid handling. When optimizing the dispense speed consider the following:

- Calculation of the total volume to be dispensed.

  This total includes all volumes in a pipetting sequence including the airgaps.

- The type of liquid

  Different viscosities and compositions require different liquid handling parameters.

- Foaming and droplet formation

  Liquids such as detergents must be dispensed slowly to avoid foaming and droplet formation on the outside of the tip.

- Small volumes

  Relatively higher dispense speeds are required for volumes less than 20µl.

- Large volumes

Larger volumes lose accuracy when dispensed with high speeds due to dilution effects and breaking of airgaps. Larger volumes should be dispensed at relatively slower speeds.

Table 2-3 Recommended aspirate and dispense speeds

Pipetting Volume (µl)	Aspirate Speed (µl/sec)	Dispense Speed (µl/sec)
10 to 30	33 to 70	600 to 800
50 to 100	150 to 300	400 to 600
100 to 300	300 to 500	500 to 700
300 and over	70 to 150	150 to 200

Wash Procedures

Routine pipetting with steel tips requires both wash and flush steps to ensure proper cleaning of the tips between pipetted liquids.

Use flush before assay start as a means of priming and cleaning the system. During operation, wash the tips between pipetting steps.

When using a DiTi, you don't need to wash, but flush the system between use to ensure hydraulic operation.

When optimizing the assay,

- the wash volume must be sufficient to empty the clean station
- the wash speed must be set to create turbulence to clean the outside of the tip

Table 2-4 Suggested wash volumes

Pipetted volume (µl)	Suggested wash volume (µl)
10 to 30 (smaller)	1000
> 50	2500

In general use a larger wash volume whenever possible.

Miniwash Pump

As a high velocity membrane pump, the ‘Miniwash pushes liquid through the tip at the flow rate of approximately 180ml per minute, and provides fast and effective washing to enable faster processing times. When using the Miniwash, set the minimum wash volume to 5ml. This activates the pump for 1 to 2 seconds.

Additional Accuracy and Precision Tips

System Liquid

Always use deionized water as the system fluid.

CAUTION Using deionized water for diluting samples or reagents may interfere with liquid detection, due to minimization of active ions, which is critical to liquid detection.

Backlash

The MiniPrep’s digital pump uses a stepper motor to drive the plunger. A mechanical tolerance, called *backlash*, exists between the gears in the drive train. When the motor reverses direction, the carriage remains immobile until the backlash is compensated.

TECAN has built *backlash compensation* into the MiniPrep’s firmware. Backlash compensation means that, during aspiration, the plunger moves down a few additional steps further than required, reverses direction, and moves back up a few additional steps. This ensures the plunger moves to the correct position.

Backlash settings are fixed by the pump manufacturer and should not require resetting during the lifetime of the MiniPrep.

Submerge Steps

After detecting liquid, each tip submerges a set number of steps in the liquid. In normal liquid, set the submerge steps to 5. When foaming is present, increase the submerge steps between 10 and 25 steps.

Syringe Selection

Generally small syringes maximize accuracy and precision. However numerous other factors are involved in determining the appropriate syringe size. These factors include the smallest and largest volumes pipetted, accuracy requirement, speed, and breakoff.

If the application requires multiple aspirations or multiple dispenses, then a larger syringe will allow more aliquots.

NOTE *For the best precision and accuracy, the syringe size should not exceed 100 times the smallest sample volume. For example, a 10µl sample requires a 1000µl syringe or smaller.*

Tracking

Use tracking to avoid foaming while dispensing.

When aspirating, the tip automatically tracks down being controlled by the aspiration speed, liquid volume, and the tube diameter.

When dispensing, you control the tip's tracking through the Gemini software. You can set the tip to track up, a useful setting for larger volume (for example, tracking up can prevent heavy foaming when dispensing serum). When set to track up, the tip submerges into any liquid it detects in the tube and begins to dispense while moving up the tube. If the tip does not detect liquid, it moves to Z-max before beginning to dispense.

During operation, the tip moves up the tube at a constant rate.

NOTE *Dispensing with tracking overrules the Z-dispense setting.*

CAUTION In cases where tip contamination is a primary concern, TECAN recommends enabling tracking if the disposable tip option is used

Cutoff

The cutoff indicates the number of steps *not* performed at the end of the plunger strokes. You can set the cutoff from 0 to 24. Typically, set the cutoff to 10 (the default). Use a lower cutoff with smaller volumes and a higher cutoff with larger volumes.

You can improve pipetting accuracy and precision in some circumstances by setting a high cutoff value. However, changing the cutoff value alone will have little effect on the overall assay.

- With a cutoff of zero, the plunger drive motor ramps down to the start frequency (100Hz) at the end of any dilutor stroke.

- With a cutoff of 7, you can stop the plunger at approximately 500Hz. This setting may prevent droplets from forming at the probe tip.

Serial and Pre-Dilution

Serial dilutions are prepared in the destination trays. To ensure a constant volume of liquid for all dilution steps, including the one at the end of the sequence, insert a *waste line* at the end of the dilution series. The waste line aspirates the requested volume from the last tube and dispenses it to the waste position.

Pre-Dilution follows the same sequence as serial dilution, except that the dilution points are made in a separate (intermediate) tray.

- Maximum Mix Volume

  Specifying a maximum mix volume minimizes carryover. For mixing, a default 50% of the volume dispensed to a serial or pre-dilution well is re-aspirated and dispensed.

- Mix Cycles

  When specifying the number of mixing cycles to be performed while mixing a serial or pre-dilution keep in mind that in most cases one mixing cycle is the best choice.

NOTE *Enlarging the number of mixing cycles causes increased dilution effects resulting in bad precision.*

NOTE *To be detected by the liquid detector, serial and pre-dilution must have a minimum volume of 300µl. Ensure that at least 300µl are present or disable liquid detection.*

3 Normal Maintenance

This chapter details the normal maintenance required to help your MiniPrep retain its high dependability and performance. This chapter includes the following sections:

- “Maintenance Schedule” on page 3-1—provides an overview of daily, weekly, semi-annual, and annual maintenance required for specific devices
- “Maintenance Procedures” on page 3-4—provides instructions for the more detailed maintenance items
- “Customer Service” on page 3-13—provides addresses and phone numbers that you may need when your MiniPrep requires more than normal maintenance

Appendix C, “Maintenance Log,” provides a log where you record and track required maintenance tasks.

Maintenance Schedule

The following maintenance schedule indicates how often you should service specific devices on your MiniPrep.

CAUTION Table 3-1 provides for maintenance under normal conditions. If, at any time during operation of the MiniPrep, a part begins to malfunction, replace it immediately.

Table 3-1 The MiniPrep's maintenance schedule

Device	Daily	Weekly	Semi-Annually	Annually
Insulation block and alidum cable		Look for residue, liquid, and cracks at the connection. If found, replace the insulation block and alidum cable.	Replace (see page 3-4)	
Pump	Flush two to three times with distilled or deionized water	Flush with 10% solution of bleach, a weak detergent, or a weak acid and base. Follow this by flushing 10 times with distilled water.		
Pump valves		Look for leakage. If found, replace the pump valve.		Replace (see page 3-6)
Racks	Clean with detergent or antiseptic solution			
Safety shields		Clean with IPA[a] and lint-free cloth		
Sampling probe[b]	Clean with IPA and lint-free cloth	Check for straightness and integrity of the Teflon. If damaged, replace the sampling probe.	Replace (see page 3-6)	
Syringe	Clean with distilled water. Tighten and check for leaks	Check for leakage. If found, replace the syringe.		Replace (see page 3-8)
Syringe cap (seal)	Clean with distilled water. Check for cracks in Teflon coating		Replace (see page 3-8)	
Tubing				
• Probe tubing				Replace (see page 3-11)

Table 3-1 The MiniPrep's maintenance schedule

Device	Daily	Weekly	Semi-Annually	Annually
• Reagent tubing				Replace (see page 3-11)
• Waste tubing		Clean with detergent or antiseptic solution		Replace (see page 3-12)
Wash stations	Clean with detergent or antiseptic solution			
XYZ mechanism			Clean arm exterior with IPA and lint-free cloth	
Z-rack/arm		Clean with lint-free cloth		

a. Iso-propyl alcohol (IPA)
b. Cap piercing probes are consumable, designed for use with Vacutainer brand specimen collection tubes. They provide up to 5,000 pierces, and their wear is based on septa material.

CAUTION Do not use organic solvents

CAUTION Do not cycle the pumps without fluid. Doing so will greatly reduce syringe, cap, and valve life

Maintenance Procedures

CAUTION The same precautions must be considered when using any electrical equipment. Do not touch any switches or outlets with wet hands. Switch the instrument off before disconnecting the AC power cord. Unplug the instrument prior to cleaning up any major liquid spills and prior to servicing any of the electrical or internal components. Only qualified personnel should perform electrical servicing, such as servicing fuses and modular components, such as pumps. Replace all access covers before operating the instrument.

CAUTION Before removing or installing any part, turn off the power to the MiniPrep.

This section provides instructions for performing the more detailed maintenance requirements listed in Table 3-1.

Replacing the Insulation Block and Alidum Cable

Removing old insulation block and alidum cable

1. Turn off the power to the MiniPrep.
2. Remove retaining screws on the back of the top cover.
3. Remove the top cover by lifting both sides.
4. Remove the sampling probe following the procedure in “Replacing the Sampling Probe (Tip)” on page 3-6.
5. Remove the plastic cable strap underneath the arm that is holding the insulation block cable.

NOTE *Use a small wire cutter to remove the plastic cable binder. A new cable binder is included with each spare replacement insulation block.*

6. Push the insulation block cable through the back end of the arm until the gold connector is visible. (See Figure 3-1 to locate the alidum cable.)

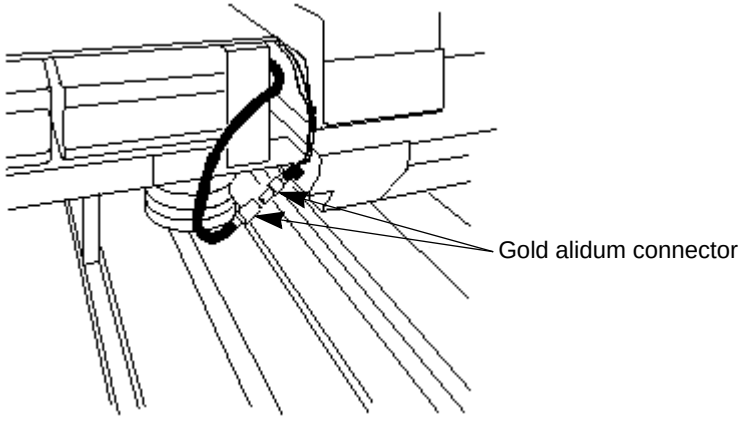


Figure 3-1 Disconnecting the insulation block cable

7. Disconnect the insulation block cable from the connector.
8. Carefully pull the insulation block cable back out through the back of the arm.

Installing new insulation block and alidum cable

1. Remove the new insulation block cable and the plastic cable strap from the packaging.
2. Feed the gold connector of the insulation block cable through the back of the arm.
3. Attach the gold connector to the matching connector on the alidum cable. Be sure that the connectors are firmly seated.
4. Adjust the alidum cable until all of the slack is removed from behind the arm.

CAUTION Ensure the insulation block cable is not twisted or kinked.

5. Fasten the insulation block cable to the arm using the new plastic cable binder.
6. Reinstall the sampling probe following the procedure in “Replacing the Sampling Probe (Tip)” on page 3-6.
7. Replace top cover and retaining screws.

Replacing the Pump Valves

Removing old pump valves

1. Remove all tubing and the syringe from the valve.
2. Loosen the two screws on the valve, and remove the valve.

Installing new pump valves

1. Align the “D” coupler on the valve stem with the “D” hole in the pump panel.
2. Rotate the valve body so that the Leur lock fitting is oriented toward the bottom of the pump.
3. Gently push the valve in place ensuring the locating pins on the frame side of the valve body fit in the holes on the pump panel.
4. Replace the screws.

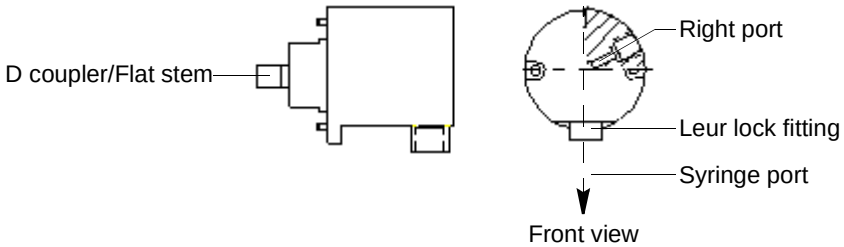


Figure 3-2 Pump valve

Replacing the Sampling Probe (Tip)

Removing old sampling probe

1. Loosen the insulation block set screw and remove the block from the Z-rack.
2. Carefully remove the probe from the probe tubing.
3. Loosen the sampling probe set screw and remove the probe from the block. See Figure 3-3.

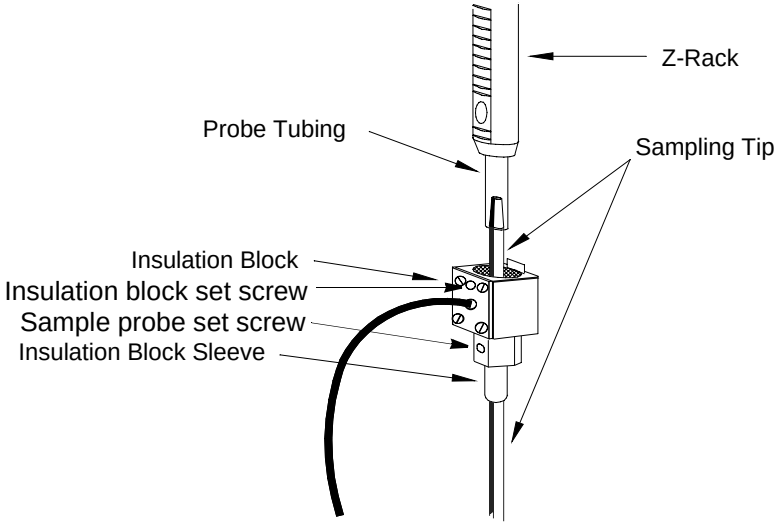


Figure 3-3 Replacing the sampling probe

Installing new pump valves

1. Remove the sampling probe from the accessory bag.
2. Insert the non-Teflon coated end of the probe through the sleeve in the insulation block until approximately 0.5 inches is visible through the top.

> **CAUTION** Electrostatic discharge to the sampling probe may cause damage to the alidum liquid level detector.

3. Attach the probe tubing to the non-Teflon coated end of the sample probe.
4. Install the insulation block on the Z-rack with the insulation block sleeve facing down and the insulation block (alidum) cable on the left side. Ensure that the insulation block cable is not twisted.
5. Push the insulation block onto the Z-rack until firmly seated.
6. With an allen wrench, tighten the insulation block set screw until it makes contact with the flat portion of the Z-rack. Do not overtighten the set screw.
7. Remove the sample tip screw (green head) from the accessory bag.
8. Insert the screw into the threaded hole in the sleeve at the bottom of the insulation block.

9. Gently adjust the position of the sample probe in the insulation block until the groove on the sampling tip is aligned with the bottom of the insulation block sleeve.
10. Gently tighten the sampling probe set screw.

Replacing the Syringe

Removing old syringe

1. Using the Gemini software, lower the syringe approximately 1500 steps. See the *Gemini for MiniPrep Software Manual* for the correct script.
2. Remove the plunger pin at the base of the syringe plunger.
3. Carefully unscrew the syringe barrel from the Leur lock fitting (about 1-1/2 turns) while pulling downward slightly.
4. Slide the syringe plunger from the plunger shaft.

Installing new syringe

1. Place the plunger over the plunger shaft.
2. Line up the barrel with the Leur lock fitting on the valve.
3. Screw the barrel onto the fitting while pushing upward slightly.

CAUTION Assist the Leur lock threads by pushing upward. Otherwise they may become stripped.

4. Replace the plunger screw at the base of the syringe plunger.

Replacing the Syringe Cap (Seal)

Replace the syringe cap approximately every six months. How often depends on the duty cycle of the pump, the type of fluids being run through the system, the size of the syringe, and how well you maintain the MiniPrep. If the syringe cap becomes worn and is not replaced, the following problems may occur:

- Poor precision and accuracy
- Variable or moving air gaps
- Fluid leaks from the bottom of the syringe
- The tip of the plunger breaks through the cap and scratches the inside of the syringe barrel. If this happens, replace the entire syringe.

Replacing 500µl, 1.0 ml and 2.5 ml caps

Removing old syringe cap

1. Remove the syringe from the pump following the procedure in “Replacing the Syringe” on page 3-8.
2. Remove the syringe plunger.
3. Using a single edged razor or precision knife, carefully slice the old cap lengthwise and remove it from the plunger. Care must be taken not to damage the plunger.

> **CAUTION** 500 µl, 1.0 ml and 2.5 ml syringes have "O"- rings beneath the cap. Do not cut the "O"-ring. Replace the "O"-ring if it is damaged.

Installing new syringe cap

1. Wet the "O"-ring (if present) and plunger tip with distilled or deionized water.
2. Place the cap on a flat surface with the open end facing up. Press the plunger tip firmly into the hole until it snaps into position.
3. Wet the cap and replace the plunger in the syringe.
4. Replace the syringe on the pump.

Replacing 5.0 ml and 10.0 ml caps

Removing old syringe cap

1. Remove the syringe from the pump following the procedure in “Replacing the Syringe” on page 3-8.
2. Remove the syringe plunger.
3. Remove the cap from the plunger tip using a pair of pliers and gripping the cap approximately one third of the way down.

> **CAUTION** 5.0 ml and 10.0 ml syringes have "O"-rings beneath the cap. Take care not to damage the "O"-ring. If you need to replace the "O"-ring, slip the new "O"-ring over the narrow lip on the plunger. You may need to use needle nose pliers to remove the "O"-ring from the 10.0 ml plunger.

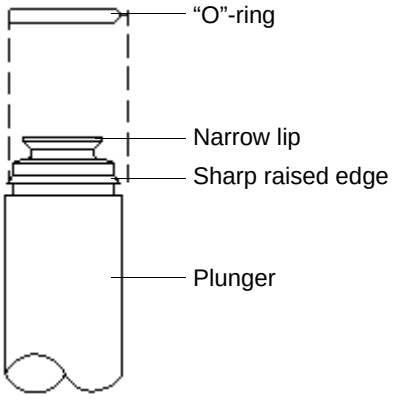


Figure 3-4 Removing cap from plunger

Installing new syringe cap

1. Wet the plunger tip and the "O"-ring with distilled or deionized water.
2. Place the cap on a flat surface with the open end facing up.
3. Press the plunger tip firmly into the hole until it snaps into position.
4. Lay the plunger on a flat table top.
5. Position the plunger so that the cap (from the "O"-ring up) hangs over the edge.

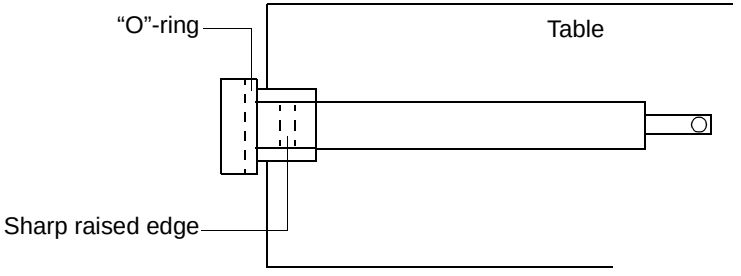


Figure 3-5 Installing the cap

6. Slowly roll the plunger along the table edge, pressing firmly on the portion of the cap below the "O"-ring. Rotate the plunger three complete turns. This is necessary for the sharp, raised edge of the plunger to bite into the cap for a secure fit.

Replacing the Reagent and Probe Tubing

Removing old reagent and probe tubing

1. Unscrew the connector from the right side of the valve (reagent tubing) and the left side of the valve (probe tubing).
2. Pull the tubing clear of the MiniPrep.

> **NOTE** *Take care when disconnecting the probe tubing from the pipetting tip.*

Installing new reagent and probe tubing

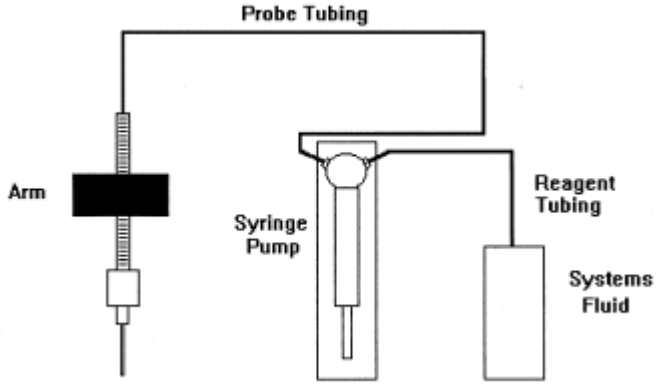


Figure 3-6 Installing the reagent and probe tubing

The MiniPrep has a slot above the pump panel (front, rear center of the work surface) that may be used to route tubing to the rear (then back and over the top to the probe via a support arm).

1. Install the reagent tubing.
   a. Route the end of the tubing with the fitting through the black grommet hole on the right panel.
   b. Install fitting on the right valve port of the digital syringe pump.
   c. Finger tighten the fitting.
2. Install the probe tubing.
   a. Install the end of the tubing with the fitting into the left valve port of the digital syringe pump.
   b. Route the other end of the tubing through the slot in the top, center of the pump panel (black panel at the back of the work surface that accepts accessory modules such as digital syringe pump).
   c. Pull the tubing through the slot and route it up and over the top of the MiniPrep via the support arm.

d. Remove the insulation block by loosening the allen screw that holds the block to the Z-bar.

e. Insert the tubing end through the Z-rack until it extends approximately one inch out from the lower end.

f. Attach the tubing to the non-Teflon coated end of the sampling probe (see “Replacing the Sampling Probe (Tip)” on page 3-6).

3. Install the insulation block on the Z-rack with the insulation block sleeve facing down and the insulation block (alidum) cable on the left side. Ensure that the insulation block cable is not twisted.
4. Push the insulation block onto the Z-rack until firmly seated.
5. With an allen wrench, tighten the insulation block set screw until it makes contact with the flat portion of the Z-rack. Do not overtighten the set screw.
6. Remove the sample tip screw (green head) from the accessory bag.
7. Insert the screw into the threaded hole in the sleeve at the bottom of the insulation block.
8. Gently adjust the position of the sample probe in the insulation block until the groove on the sampling tip is aligned with the bottom of the insulation block sleeve.
9. Gently tighten the sampling probe set screw.

Replacing the Waste Tubing

Removing old waste tubing

CAUTION Before removing the waste tubing, be sure the fluidic system/wash station is dry.

- Disconnect the waste tubing from the wash station and remove the tubing from the MiniPrep.

Installing new waste tubing

1. Insert the waste tubing into the hole on the left side of the instrument.
2. Tilt the instrument backwards with one hand and route the waste tubing into the small rectangular opening at the back of the work surface.
3. Remove the white rectangular wash station from the accessory box.

4. Attach the waste tubing to the black hose connector on the bottom of the wash station.

CAUTION Adjust the routing of the waste tubing so that it is not kinked.

Customer Service

For maintenance or repairs not covered in this section, contact your local TECAN dealer or go to **www.tecan.com** to find information for all TECAN Dealers and Affiliates.

A MiniPrep Specifications

This appendix provides specifications for the MiniPrep and includes the following sections:

- "General Specifications" on page A-1—provides the general specifications such as the footprint, travel range, and power requirements.
- "Setup Information" on page A-4—provides specifications for setting up the operation of the MiniPrep.
- "Liquid Handling Inaccuracy and Imprecisions" on page A-5—provides useful information for liquid handling.

General Specifications

Specification	MiniPrep 60	MiniPrep 75
Pipetting arms	1	1 or 2
Microplate capacity deck	6	12
Dimensions (approximate)		
• Footprint	W x D x H[a] 22" x 24.2" x 20.3" 559mm x 615mm x 515mm	W x D x H[a b] 32.1" x 23.6" x 20.3" 815mm x 600mm x 515mm
• Probe travel range	W x D x H 15.4" x 11.8" x 6.5" 390mm x 300mm x 165mm	W x D x H 25.3" x 11.8" x 6.5" 643mm x 300mm x 165mm
• Weight	~68 lbs / ~30 kg	~100 lbs / ~46 kg

Specification	MiniPrep 60	MiniPrep 75
Power requirements		
• Input voltages	Auto-selecting 110/230 VAC +/- 10%	Auto-selecting 110/230 VAC +/- 10%
• Frequency	47-63 Hz	47-63 Hz
• Maximum power	150 watts	250 watts
384 Well MTP support	Yes	Yes
Diluter 1, 4, 8 channel	Yes	Yes
Disposable tips	Yes	Yes
Cap piercing	Yes	Yes
LC injection	Yes	Yes
Liquid Handling		
• Volume range	2.0µl – 25.0ml	2.0µl – 25.0ml
• Syringe sizes	250µl – 25.0ml	250µl – 25.0ml
• Accuracy	< 1% full stroke with 1.0 ml syringe	< 1% full stroke with 1.0 ml syringe
• Precision	< 0.05 CV @ full stroke with 1.0 ml syringe	< 0.05 CV @ full stroke with 1.0 ml syringe
• Min. detectable volume	200µl with ionic fluid in round bottom microtiter plate	200µl with ionic fluid in round bottom microtiter plate
Control and programming		
• Standard software	Gemini for Windows NT	Gemini for Windows NT
• Additional software available	RUI	RUI

Specification	MiniPrep 60	MiniPrep 75
• Computer requirements	• Pentium® class (166MHz or better) with Windows NT® version 4.0, Service Pack 3 • Minimum 32 Mbytes RAM: 48 Mbytes strongly recommended • SVGA monitor with 800 x 600 pixel resolution • 100 Mbytes virtual memory • One available serial interface • One available parallel interface (optional printer support)	• Pentium class (166MHz or better) with Windows NT version 4.0, Service Pack 3 • Minimum 32 Mbytes RAM: 48 Mbytes strongly recommended • SVGA monitor with 800 x 600 pixel resolution • 100 Mbytes virtual memory • One available serial interface • One available parallel interface (optional printer support)
Environment		
• Storage temp.	32-122F / 0-50C	32-122F / 0-50C
• Operating temp.	59-104F / 15-40C	59-104F / 15-40C
• Humidity	30-85% RH (non-condensing)	30-85% RH (non-condensing)
General		
• Pollution	Degree 2	Degree 2
• Safety and regulatory	In compliance with applicable U.L., C.S.A. and CE standards	In compliance with applicable U.L., C.S.A. and CE standards
• Altitude	Up to 2,000 M	Up to 2,000 M

a. Height does not include Z-rack
b. See “Setup Information” on page -4

Setup Information

Item	X-Axis	Y-Axis	Z-Axis
Travel range: • MiniPrep 75/1 arm • MiniPrep 75/2 arm	 643 mm (25.31 in) 563 mm (22.17 in)	 300 mm (11.81 in) 300 mm (11.81 in)	 165 mm (6.57 in) 165 mm (6.57 in)
Travel range (steps) • MiniPrep 75/1 arm • MiniPrep 75/2 arm	 2,877 steps 2,533 steps	 2,109 steps 2,109 steps	 1,700 steps 1,700 steps (both 3,400 steps with 2:1 gear ratio)
Initialization offset	5 steps	5 steps	20 steps
Resolution per half step (1:1 pulleys)	0.2234 mm (0.009 in)	0.1422 mm (0.006 in)	0.0982 mm (0.004 in)
Accuracy over travel	± 0.20 mm (±0.008 in)	±0.20 mm (±0.008 in)	±0.40 mm (±0.016 in)
Reproducibility	±0.10 mm (±0.004 in)	±0.10 mm (±0.004 in)	±0.10 mm (±0.004 in)
Start Speed	50 steps/sec 11 mm/sec (0.43 in/sec)	200 steps/sec 28 mm/sec (1.1 in/sec)	400 steps/sec 39 mm/sec (1.54 in/sec)
End Speed	4,000 steps/sec 894 mm/sec (35.2 in/sec)	4,000 steps/sec 569 mm/sec (22.4 in/sec)	4,000 steps/sec 393 mm/sec (15.5 in/sec)
Acceleration[a]	10,000 steps/sec 2,235 mm/sec (87.9 in/sec)	20,000 steps/sec 2,845 mm/sec (112 in/sec)	30,000 steps/sec 2,945 mm/sec (116.0 in/sec)

a. Accuracy and precision were determined within run, and coordinates were measured independently.

A

Liquid Handling Inaccuracy and Imprecisions

Dispense Volume	Inaccuracy	Imprecision
Mechanical resolution is 1/3,000 of syringe volume. The smallest recommended volume is 24 steps or 2µl, whichever is the larger volume. Minimum detectable volume is 200µl (ionic fluids)		
250µl syringe		
250µl dispense	≤ 1.0%	≤ 0.05%
125µl dispense	≤ 1.0	≤ 0.25%
2µl dispense	≤ 5.0%	≤ 2.5%
1.0ml syringe		
1.0ml dispense	≤ 1.0%	≤ 0.05%
500µl dispense	≤ 1.0%	≤ 0.25%
10µl dispense	≤ 1.0%	≤ 1.0%
25.0ml syringe		
25.0ml dispense	≤ 1.0%	≤ 0.05%
12.5ml dispense	≤ 1.0%	≤ 0.05%
250 µl dispense	≤ 1.0%	≤ 0.25%

NOTE *No invitro diagnostic assays established the performance characteristics stated in the specifications. Each laboratory has the responsibility of verifying that the system works for its applications.*

A

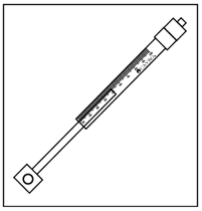
B Parts and Accessories

This appendix provides a description of the MiniPrep's parts and accessories and presents them in the following sections:

MiniPrep Consumables

TECAN considers the following items *consumables* and therefore, not covered under warranty. For instructions on replacing these items, see Chapter 3, "Normal Maintenance."

Syringes



- Standard syringe consists of a barrel made from borosilicate glass, a stainless steel plunger and a Teflon seal. These materials meet most application needs. See the attached chemical compatibility chart.
- If you see fluid below the seal of the syringe, replace the seal.
- If you see a cracked or scratched (inside) syringe barrel, replace the complete syringe assembly.

Replacement Syringes

Syringe availability changes depending on the XL 3000 Diluter used by the MiniPrep.

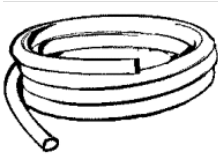
Part Number	Description	
C725030	500 µl	all available with XL 8-channel Diluter Kit, P/N C788242
C725040	1.0 ml	
C725050	2.5 ml	
C725060	5.0 ml	
C729882	10.0 ml	syringe with clamp
C728776	25.0 ml	syringe with clamp (only available with High Resolution XL Diluter used in kit, P/N C728774)

Replacement Syringe Caps (Seals)

Part Number	Description	
C722597	500 µl	6/pkg
C724272	1.0 ml	6/pkg
C724273	2.5 ml	6/pkg
C724274	5.0 ml	6/pkg
C6739	10.0 ml	1/pkg
C728764	25.0 ml	plunger/seal assembly (due to the syringe construction, customers must replace the plunger/seal assembly instead of just the seal)

For custom syringe requirements, please call your MiniPrep Product Manager. There is a 100 unit minimum order for custom syringes.

Tubing



- Waste Tubing—allows fluid to flow quickly out of the wash station to the waste
- Interconnect Tubing—connects Smart Valve or MiniWash modules to the Diluters in the system
- Reagent Tubing—brings reagent or system fluid from the reagent container to the Diluter
- Probe Tubing—connects the Diluter to the probe, and aspirates sample and dispenses sample and reagent
- If you see cracked, crimped, or dirty tubing, replace the tubing.

Standard MiniPrep Tubing

Part Number	Description
C726015	Waste tubing
C727723	Probe tubing, M6, 1780 mm (70”)
C728051	Interconnect tubing, M6, 205 mm (8”)
C727929	Reagent tubing, M6, 990 mm (39”)
C727925	MiniWash Inlet/Outlet tubing, M6, 990 mm (39”)
C727926	MiniWash Interconnect tubing, M6, 280 mm (11”)
C727958	Tubing Kit for XL 3008 (for MiniPrep 75 only)

If you need a tube other than the standard tubes listed above, contact the Mini-Prep Product Manager.

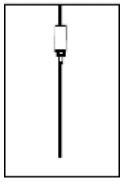
Tip Types

Tip	Part #	Description	#/Box
Standard	C722470	Stainless steel, Teflon coated. Probe narrows at the tip to enhance breakoff	1
Dual	C722953	Teflon coated. Used for enzyme immunoassay type applications that require washing.	1
Cap-piercing	C725877	Minimizes exposure of the operator to blood	1
Single replacement	C728027	For 8-channel manifold, Teflon coated. Used to dispense into microtiter plates.	1
Disposable		Used in applications that are extremely sensitive to contamination.	
	T612510	200µl	17280
	T612511	200µl with filter	17280
	T612512	1000µl	9600
	T612513	1000µl with filter	9600

Probes

If you plan to upgrade your MiniPrep, choose a probe kit from the following list.

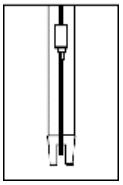
Standard Tip Kit



- Use with a Compliant arm.
- Use to aspirate and dispense liquid.
- Includes
  - Insulation block
  - One standard tip made of 304 stainless steel with a Teflon coating.
  - Liquid level sensing electronics via insulation block and level sensing electronics.
- Can accommodate a dual lumen tip.
- Part number: C722470

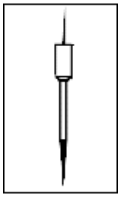
B

Cap Piercing Kit



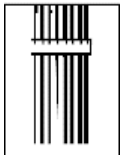
- Use with a Power arm and Vacutainer Brand vacuum tubes.
- Includes
  - Dynamic Tube Positioner (DTP—holds down tubes that tend to lift as the probe tip withdraws.
  - Insulation block
  - Cap piercing tip of stainless steel with Teflon coating. Provides up to 5,000 pierces. Wear based on septa material.
  - Liquid level sensing electronics via insulation block and level sensing electronics.
- Part number: C725877

DiTi Tip Kit



- Use with a Compliant arm
- Includes
  - Hardware to mount disposable tip probe
  - Fluidics tubing (not shown here)
  - Insulation block
  - Liquid level sensing electronics via insulation block
- Requires
  - Disposable tips and disposable tip carriers. 200µl and 1000µl disposable tips available with and without filters
  - Conductive tips for liquid level sensing
- Part number: C728307

8-Channel Kit



- Use with a Power arm
- Includes
  - Hardware to mount an 8-channel probe
  - Fluidics tubing (not shown here
  - Liquid level sensing electronics. Liquid sensing is connected to all 8 tips, the circuitry is triggered by the first tip that comes in contact with liquid.
  - 8 tips. Single tip inserts can be ordered as replacements
- Part number: C728087

Valves

Replacement Valves

Part Number	Description
C725908	3-Port Valve for XL 3000 Diluter, 120°, M6
C724754	4-Port Valve for XL 3000 Diluter, 90°, M6
C727517	Solenoid Valve for XL 3000x Diluter, M6
C726197	3-Port Valve for External Valve Enhancement Kit
C725549	6-Port Valve for External Valve Enhancement Kit

Rotary valves are found on the Single Channel Diluters and External Valve Modules. They consist of a Teflon plug that rotates inside the valve body to the input, output or bypass positions. If the valve is not properly maintained particulate from reagents can get inside the valve and lodge between the plug and body. When the plug turns, the plug or the valve body can be scratched causing leakage. When this occurs the valve needs to be replaced.

Diluter valves cannot be interchanged. If the customer has a XL 3000 Diluter with a 3-port 120^{o} rotary valve, then they must purchase the same style of valve for that pump. This is because the Diluter firmware and encoder are matched to that specific valve. Should your customer wish to change to a 4-port 90^{o} valve then they need to order the enhancement kit for that Diluter.

External Valve Modules use a universal encoder. This allows the customer to change from one type of valve head to another without replacing the complete module, i.e. change from a 3-port valve to a 6-port valve. However, when a valve head is changed the commands sent to the valve must also change. Therefore, customers will need to reprogram their system if a change such as this is made.

The XL 3000 Multi-Channel Pumps use solenoid valves. These valves use a diaphragm to switch between ports. If a particulate gets caught in the diaphragm it will not seal against the port resulting in leakage. It can also damage the diaphragm. Therefore keeping the valve clean is very important. Once the valve is damaged it needs to be replaced.

Arms

The MiniPrep 60 uses one arm and the MiniPrep 75 uses one or two arms.

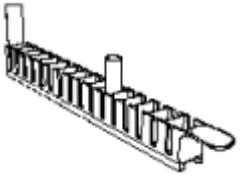
Compliant Arm	• Use for all probe options except cap-piercing and 8-channel.
Power Arm	• Use with cap-piercing and 8-channel probes. • With a 2:1 ratio, includes the additional torque need to cap piercing. • Can carry the additional weight of an 8-channel probe. • Z-axis speed is half the speed of a Compliant arm.

Carriers

Carriers fit onto the MiniPrep deck and hold racks that in turn hold tubes.

This section describes the most commonly used carriers. TECAN offers other types of carriers, and you can learn more about these through your local TECAN dealer.

Tube Carriers

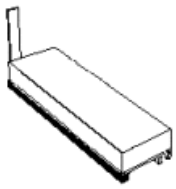


- Holds 16 sample tubes
- Width of 1 grid position (25mm)
- DiTi waste slide and bag holder collects discarded tips in waste bag.
- Part numbers:

  Each of the following tube carriers contains a set of 6 individual strips. Each strip is treated as separate from the others.
  - T613014: 10 mm, 16 position (set of 6)
  - T613002: 13 mm, 16 position (set of 6)
  - T613003: 16 mm, 16 position (set of 6)

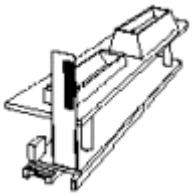
  Each of the following tube carriers contains a set of 6 bolted strips. All 6 strips are treated as one unit.
  - T613015: 10 mm, 96 position (1 block of 96)
  - T613004: 13 mm, 96 position (1 block of 96)
  - T613005: 16 mm, 96 position (1 block of 96)

Reagent Carriers



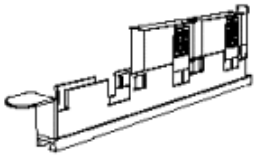
Solid block

- Drilled or milled to specific requirements
- Width of 3 grid positions (75mm)
- 3 carrier units
- Part number: T613010



2 Reagent troughs 60ml

- Width of 3 grid positions (75mm)
- 2 carrier units
- Part number: T613009



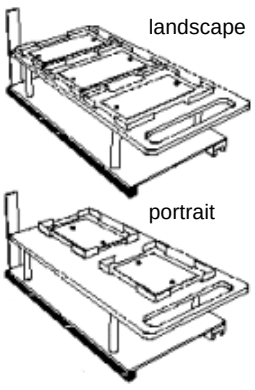
3 Reagent troughs 100ml

- Width of 1 grid position (25mm)
- 1 carrier unit
- Part number: T613020

Reagent carrier for 8 bottles/tubes

- Width of 8 grid positions
- Part number: C727954

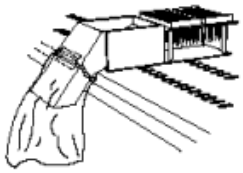
Microplate Carrier



- Width of 6 grid positions (150mm)
- Part numbers:
  - T613006: 3-position, landscape
  - T613007: 2-position, portrait
  - C729956: 6-position, landscape (For MiniPrep LC injection)

B

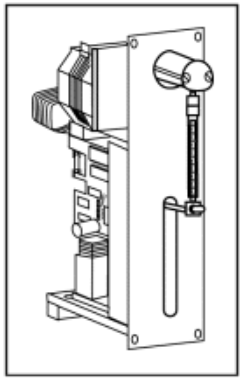
Disposable Tip Carriers



- Holds 2 frames with 96 200µl or 1000µl disposable tips each, with DiTi waste position
- Width of 6 grid positions (150mm)
- DiTi waste slide and bag holder collects discarded tips in waste bag.
- Part number: C728777

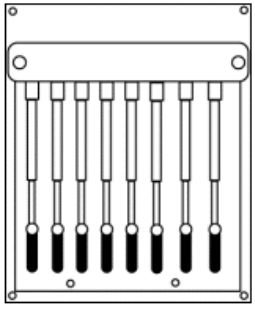
Modules

Single-Channel Diluter



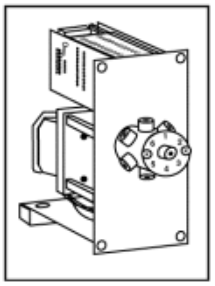
- A Cavro XL 3000 digital syringe pump
- Can be equipped with precision syringes ranging from 500µl, 1.0ml, 2.5ml, 5.0ml, 10ml, or 25ml
  - A full-height (10 inch) Module. Clamp required for 10.0 ml syringe or larger
- Available in standard and high resolution versions, each equipped with a 3-port or a 4-port valve
  - 3-port standard resolution pumps are used in most applications
  - 4-port standard resolution pumps are typically used for venting in a cap piercing application
  - High-resolution pumps are required when using a 25ml syringe

Multi-Channel Diluter



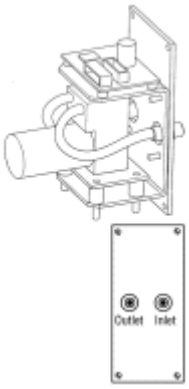
- Based on the mechanics of the XL 3000 dilutor
- Typically used for aspirating from and dispensing into microtiter plate column, or, for simultaneous washing of a whole microtiter plate column with a dual-lumen equipped multi-channel probe
- 4-channel version and 8-channel version
  - 4-channel diluter occupies 2 full-height slots
  - 8-channel version occupies 3 full-height slots
- Capable of driving multiple syringes simultaneously. All syringe plungers move in parallel.
- Can accommodate 500µl, 1 ml or 2.5 ml syringes

Multi-Port Valves



- Stand-alone 3 or 6 port fluid distribution valves
- Half-height modules

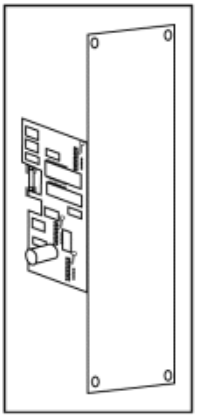
MiniWash



- A diaphragm pump that quickly moves air or liquid approximately 148 ml / min
- Typical applications include
  - Probe washing when a disposable tip is not desired but minimizing cross contamination is critical
  - Microtiter plate washing with a dual lumen tip
- Operates in the full-on or full-off mode. Flow rate is a function of inlet / outlet tubing and not variable.
- RS-485 interface, black faceplate, includes required cable
- Requires firmware revision 4.2 or above for MiniPrep 60
- A half-height device one filler panel wide
- Wettable parts made of Teflon (PTFE), PDVF, FFKM (Kalrez) and Polypropylene
- Do not use with acetaldehyde, acetone, DMF, MEK, and potassium or sodium hydroxide
- Compatible with DMSO

B

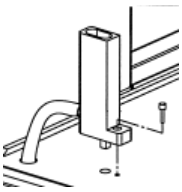
I/O Board



- A microprocessor driven PC board that allows the operation of a number of I/O ports from an external serial line. I
- Placed on the same RS-485 bus with other pumps and smart devices.
- I/O signal is CMOS (0-5 volts).
- I/O lines include 16 inputs, 16 outputs, and 4 analog inputs.
- Uses standard OEM communications protocol.
- Mounted on single filler panel and comes complete with cables and manual.
- A full-height module

Wash Stations

3-Position Wash Station



- Part number: C727853
- 3-well wash station and waste tubing.
- For shallow or deep washing of single standard tip, dual lumen, or cap piercing tips.
- Mounting systems vary per MiniPrep model.

8-Position Wash Station

Not illustrated

- Part number: C727989
- Eight-well wash station for washing and waste collection when using 4 or 8-channel tip probes.
- Mounting systems vary per MiniPrep model.

C Maintenance Log

On the next page, this appendix provides a log where you can record the normal maintenance work as you perform it. For details on the type of required maintenance, see Chapter 3, “Normal Maintenance.”

> NOTE ***Make a copy of the log and keep the copy near the MiniPrep for easy access and recording. Keep the original free from marks so that you can continue to make copies as needed.***

MiniPrep *Daily* Maintenance Log

Make a copy of this page, keep the copy near your MiniPrep, and date the copy as you perform each task.

Device	Task	Daily Completion Date									
Pump	Flush two to three times with distilled or deionized water										
Sampling probe	Clean with IPA and lint-free cloth										
Syringe	Clean with distilled water										
	Tighten syringe										
	Check for leaks										
Syringe cap (seal)	Clean with distilled water										
	Check for cracks in Teflon coating										
Wash stations	Clean with detergent or antiseptic solution										
Racks	Clean with detergent or antiseptic solution										

MiniPrep *Weekly* Maintenance Log

Make a copy of this page, keep the copy near your MiniPrep, and date the copy as you perform each task.

Device	Task	Weekly Completion Date							
Insulation block and aliquot cable	Look for residue, liquid, and cracks at the connection. If found, replace.								
Pump	Flush with 10% solution of bleach, a weak detergent, or a weak acid and base. Follow this by flushing 10 times with distilled water.								
Pump valves	Look for leakage. If found, replace.								
Sampling probe	Check for straightness and integrity of the Teflon. If damaged, replace.								
Z-rack/arm	Clean with lint-free cloth								
Safety shields	Clean with IPA and lint-free cloth								
Waste tubing	Clean with detergent or antiseptic solution								

MiniPrep *Semi-Annual* Maintenance Log

Make a copy of this page, keep the copy near your MiniPrep, and date the copy as you perform each task.

Device	Task	Semi-Annual Completion Date					
Insulation block and alidum cable	Replace						
Sampling probe	Replace						
Syringe cap (seal)	Replace						
XYZ mechanism	Clean arm exterior with IPA and lint-free cloth						

MiniPrep *Annual* Maintenance Log

Device	Task	Annual Completion Date		
Pump valves	Replace			
Syringe	Replace			
Probe tubing	Replace			
Reagent tubing	Replace			
Waste tubing	Replace			

D Liquid Handling Troubleshooting

Table D-1 summarizes hardware-related errors and symptoms of poor assay performance associated with *liquid detection process* problems and offers suggestions for corrective action.

In order for the Liquid Level Detection system to perform properly the following conditions are needed:

- Adequate electrical contact between the tubes or plates on the rack and the worktable.
- The Z-Start parameter is set above the maximum level of liquid
- The inner diameter of the tube of the bottle is correct. Use the outer diameter dimension in millimeters at the widest base minus 1.5 for standard laboratory glassware.

Table D-1 Common liquid level detection errors and symptoms

Problem	Possible Cause	Suggested Action
No Liquid Detected	Z-Start is set too deep within a well or tube. If so, a capacitance change may not occur since the tip is already submerged in the liquid before the liquid detection system is activated.	• Rest Z-start (see the *Gemini for MiniPrep Software Manual*) • Check the ionic strength of the liquid
Not Enough Liquid	Z-Max is set too high. The remaining liquid in the tube or well is not calculated in total volume and may result in an error message when the well or tube may actually have enough liquid for the aspiration step.	Re-calculate the total volume
Tip crashing into the bottom of the tube.	Z-Max is set too low.	Set the Z-Max higher

Table D-1 Common liquid level detection errors and symptoms

Problem	Possible Cause	Suggested Action
Liquid rising above the tip while dispensing, contaminating the transfer or clean station.	Z-Dispense is set too low in the tube or well.	Reset Z-dispense
Poor pipetting precision Long runtime of assay	Z-Travel is set too high above the tubes, especially for multi-pipetting or multi-dispensing modes.	Check all parameters
Poor detection of ionic solution	Inadequate electrical contact between the tubes or plates on the rack and the worktable	Ensure the correct placement of the tubes and carriers
Tip does not aspirate complete volume	• The inner diameter value of the tube of bottle is incorrect. • Incorrect submerge steps	• Recalculate the inner diameter value. Use the outer diameter dimension in millimeters at the widest base minus 1.5 for standard laboratory glassware. • Check submerge steps

E Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not be affected at all and can work perfectly throughout a normal cycle. Or it may function normally for a while, then degrade in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following proper packaging and ground precautions are necessary to prevent damage to electric components and accessories:

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.

- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

F Unpacking and Setup Instructions

See the separate *Unpacking and Setup instructions for the MiniPrep* booklet included in the MiniPrep packaging.

F

Glossary

absolute field The range of movement (*Z-values*) set through the software.

airgaps Air aspirated between liquids to prevent mixing (*separation airgaps*) and after the final aspirated liquid to secure droplets from the end of the tip while the arm moves over the worktable (*transportation airgaps*).

arm The component that is mounted to the X-slide and contains the Y- and Z-axis control mechanisms.

aspiration delay A pause, set in milliseconds, in the syringe movement after aspirating the liquid volume.

aspiration speed The speed at which the MiniPrep aspirates liquid and airgaps. As a general rule aspiration should be slow. Rapid aspiration speeds can cause the airgap to break up which results in a significant dilution effect, or, can introduce bubbles into the system.

backlash A mechanical tolerance that exists between the gears in the drive train. When the motor reverses direction, the carriage remains immobile until the backlash is compensated.

backlash compensation During aspiration, the plunger moves down a few additional steps further than required, reverses direction, and moves back up a few additional steps. This ensures the plunger moves to the correct position.

conditioning volume Extra volume aspirated from the source and dispensed back into the source to condition the tip.

coordinate Any number or set of numbers used to specify a point on one or more axes in steps.

dispense speed The speed at which the MiniPrep dispenses liquid and airgaps. As a general rule dispense should be fast resulting in better breakoff at the tip.

dual-pipetting mode Using a dual probe, the MiniPrep aspirates and dispenses the liquid volume (one aliquot) through each barrel.

firmware The software stored in a fixed form on the MiniPrep.

liquid detection process Monitors the change of capacitance as the tip enters the tube. During the process, the system compares the position where liquid is detected with the *Z-max* value in the tube to determine whether there is sufficient volume for aspiration. The system calculates the available liquid volume by multiplying the distance between Z-Max and the detection position by the inner diameter of the vessel.

multi-pipetting mode Using a single or dual probe, the MiniPrep aspirates and dispenses multiple liquids (multiple aliquots) multiple times.

separation airgaps Air aspirated between liquids to prevent mixing.

single-pipetting mode Using a single probe, the MiniPrep aspirates the liquid volume (one aliquot) at one source position and dispenses the entire volume at one destination position.

transportation airgaps Air aspirated after the final aspirated liquid to secure droplets from the end of the pipette tip while the arm moves over the worktable.

waste line Ensures a constant volume of liquid for all dilution steps, including the one at the end of the sequence. Inserted at the end of the dilution series, the waste line aspirates the requested volume from the last tube and dispenses it to the waste position.

waste volume Prevents dilution of the pipetted volume with the system liquid. The size is generally 10% to 20% of the total pipetted volume.

Z-dispense The height in the vessel at which the MiniPrep dispenses liquid.

Z-max The lowest height in the vessel in the Z-axis.

Z-start The height at which the MiniPrep activates Liquid Detection Operation

Z-travel The height at which the tip travels between positions within a rack

Z-values Represent the vertical heights set for the pipette tip as it moves, aspirates, and dispenses.

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