Dimension® RxL Max® clinical chemistry system
Operator’s Guide

SIEMENS

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The material in this manual is believed adequate for the intended use of the Dimension® RxL Max® clinical chemistry system. If this instrument system acquires a Reagent Management System (RMS) module, an RMS Operator's Guide will be shipped with the RMS and should be placed behind the RMS tab in this manual. If the system or its individual components are used for purposes other than those specified herein, confirmation of their validity and suitability must be obtained; otherwise, Siemens does not guarantee results and assumes no obligation or liability. Siemens warrants that the material itself does not infringe any United States patents. No further warranty is expressed or implied.

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The device described in this manual bears a CE mark which confirms the observance of essential requirements of the following European directives:

• If the device has a serial number on the type plate greater than or equal to 220570-AX, it corresponds to the following directive: 98/79/EC (In Vitro Diagnostics Directive).

• If the device has a serial number on the type plate less than 220570-AX, it corresponds to the following directive: 89/336/EEC (EMC Directive).
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*Only trained operators should perform these procedures.*

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Use this page for NOTES
About This Manual

Intended Use
The Dimension® RxL Max® clinical chemistry system is a discrete, random-access, microprocessor-controlled, integrated instrument/chemistry system that measures a variety of analytes, including enzyme activities, in body fluids. It can also process high-sensitivity chromium-based heterogeneous immunoassays with its HM module.

Use of this Manual
This guide can be used to supplement your laboratory’s procedure manual. The College of American Pathologists (CAP) has approved the use of a manufacturer’s procedure manual as a component of the overall departmental procedures if it complies with Clinical and Laboratory Standards Institute (CLSI/NCCLS) GP2-A3 guidelines.

Any modification to or deviation from the manufacturer’s procedure must be clearly documented. This manual has been written to comply with CLSI/NCCLS GP2-A3 guidelines.

Information that is specific to the structure and operation of each laboratory should be added. The manual should be reviewed and signed by laboratory supervision at required intervals. A “Manual Reviews Documentation” log sheet is provided at the end of this section to assist in your documentation.

Only trained operators should operate the instrument and perform the maintenance procedures in this manual. Each procedure has been written as a separate stand-alone procedure. However, it is very likely that an entire portion of maintenance (e.g., monthly maintenance) will be performed at the same time.

If you perform all your maintenance procedures at the same time, you can wait and perform one System Check (or pump prime routine, etc.) after all procedures are completed.

CLSI/NCCLS reference...
How this Manual is Organized
This manual is divided into seven modules. These modules or chapters include the following information:

<table>
<thead>
<tr>
<th>Module</th>
<th>Contains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Introducing</td>
<td>Information about features available, safety labeling, proper ways for removing and restoring instrument power, and how to use the instrument keyboard and understand the components of the screen that appear on the instrument monitor. Information for installing the instrument, such as electrical, water, room environment, and space requirements. Although the instrument is installed by a qualified representative of Dade Behring Inc., this information is useful should the instrument need to be relocated.</td>
</tr>
<tr>
<td>2: Using</td>
<td>Procedures for operating the instrument. This module contains three sets of procedures: for processing samples, for loading the instrument with consumables, and for calibrating/verifying methods.</td>
</tr>
<tr>
<td>3: Maintaining</td>
<td>Procedures for performing typical operator maintenance, including daily and monthly maintenance, and procedures for replacing parts that are in the Accessory Spare Parts kit.</td>
</tr>
<tr>
<td>4: Aligning</td>
<td>Procedures for performing alignments of various parts on the instrument.</td>
</tr>
<tr>
<td>5: Troubleshooting</td>
<td>Procedures for resolving problems with various system reports and components, such as report slips, system check results, calibrations, and error messages.</td>
</tr>
<tr>
<td>6: Customizing</td>
<td>Procedures for customizing the instrument to your specific laboratory parameters and operations and information on how to correlate results between the Dimension® RxL Max® system and other analyzers.</td>
</tr>
</tbody>
</table>

Using this Manual with other Dimension® Modules
Various screens, function keys, and procedures in this manual may differ slightly from what is shown in this manual when other modules, such as the Reagent Management System (RMS), are attached to the Dimension® system. When these instances occur, a sidebar reference is made which directs the user to the Operator’s Guide for those modules attached to the Dimension® system for the specifics on using that screen, function keys, or procedure.
Components of a Typical Procedure in this Manual

The pages in this manual are designed with a left and right side. The right side of a page contains information for performing the particular procedure. The procedures are presented in a step-by-step manner. Follow the steps to ensure the proper performance of the procedure.

The left side of a page contains sidebars and provides areas for you to make notes. The sidebars contain information about additional screen features or reminders to help you in performing a typical operation on the instrument.

A sample sidebar appears at the left.

The illustrations used in this manual are a combination of photographs and line art. The photographs are provided for locating the specific area of the instrument. Line art gives more details where needed to perform the procedure or replacement.

Illustrations of actual screens that appear on the monitor are also provided as necessary. An example of one of these screen is shown below. The small boxes in the background at the top of the screen depict the sequence of function keys to press and the title of the screen where those function keys are located.

For Additional Help

If you want additional help in operating or understanding procedures or information in this manual, call the Technical Assistance Center.

- For help with instrument problems, call: 1-800-441-9250.
- For help with chemistry problems, call: 1-800-435-7222.
Use this page for Notes
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<th>Revised Date</th>
<th>Title of Reviewer</th>
<th>Reviewer Signature</th>
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Use the Notes column to document all revisions made to a method and/or any method revision levels sent by manufacturer.
Manuals must be reviewed by supervisor/lab manager at a minimum frequency of once per year per CLSI/NCCLS GP2-A guidelines.
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Manuals must be reviewed by supervisor/lab manager at a minimum frequency of once per year per CLSI/NCCLS GP2-A guidelines.
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Use the Notes column to document all revisions made to a method and/or any method revision levels sent by manufacturer.
Manuscripts must be reviewed by supervisor/lab manager at a minimum frequency of once per year per CLSI/NCCLS GP2-A guidelines.
This package of Maintenance Log Masters contains 12 logs:
- Log 1 - Daily Maintenance (Indirect IMT)
- Log 2 - Daily System Check (Indirect IMT)
- Log 3 - Monthly Maintenance (Indirect IMT)
- Log 4 - Daily Maintenance (RMS)
- Log 5 - Daily System Check (RMS)
- Log 6 - Daily Maintenance (HM)
- Log 7 - Daily System Check (HM)
- Log 8 - Weekly/Monthly Maintenance (HM)
- Log 9 - Daily Maintenance (HM and RMS)
- Log 10 - Daily System Check (HM and RMS)
- Log 11 - Electrolyte Results
- Log 12 - Instrument Log

You will not use all of these logs. Only five logs are needed per instrument. The instrument configuration determines which of the 12 log sheets will be used. Refer to the following table:

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Logs to Use</th>
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<tbody>
<tr>
<td>Dimension® RxL Max® - (no HM, no RMS)</td>
<td>1, 2, 3, 11, 12</td>
</tr>
<tr>
<td>Dimension® RxL Max® with RMS (no HM)</td>
<td>4, 5, 3, 11, 12</td>
</tr>
<tr>
<td>Dimension® RxL Max® with HM (no RMS)</td>
<td>6, 7, 8, 11, 12</td>
</tr>
<tr>
<td>Dimension® RxL Max® with HM and RMS</td>
<td>9, 10, 8, 11, 12</td>
</tr>
</tbody>
</table>

- Record maintenance information in the appropriate columns of these maintenance logs as you perform these procedures.
- Use the Instrument Log (Log 12) to record any maintenance you perform that is not part of scheduled maintenance, e.g.- Replacing the Source Lamp.
- Procedures for the scheduled maintenance listed in these logs are detailed in your Operator’s Guide. Refer to these procedures as necessary.
- Complete documentation of maintenance procedures is beneficial in instrument and chemistry troubleshooting.

The Dimension® clinical chemistry system is designed to process clinical laboratory specimens, some of which may be a potential biohazard. It is important to follow standard laboratory practice for protection from biohazards when you place specimens on the instrument and when you perform maintenance and troubleshooting procedures.
### Dimension® RxL Max® clinical chemistry system
#### Daily Maintenance (with Indirect IMT)

**Instrument Serial No.** ____________________________  **Month & Year** __________

<table>
<thead>
<tr>
<th>Date</th>
<th>Record Cuvette Temp</th>
<th>Record Reagent Temp</th>
<th>Empty Cuvette</th>
<th>Waste</th>
<th>Run System Check</th>
<th>Operator Initials</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>31</td>
<td>36.8 to 37.2 °C</td>
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Log 1  
Dade Behring Inc. • Newark, DE 19714 • USA  
2006/12
### Dimension® RxL Max® clinical chemistry system

**Daily System Check (with Indirect IMT)**

**Instrument Serial No.** ____________________ **Month & Year** __________

<table>
<thead>
<tr>
<th>Are all wavelengths OK?</th>
<th>Reagent 1</th>
<th>Reagent 2</th>
<th>Sampler</th>
<th>IMT Sampler</th>
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<tr>
<td></td>
<td>Mean</td>
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<td>293 filter:</td>
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<tr>
<td>− 2.5 to +2.5</td>
<td>ABS Carton value ± 12</td>
<td>≤ 3.8</td>
<td>ABS Carton value ± 12</td>
<td>≤ 3.8</td>
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<tr>
<td>all other filters:</td>
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<td>− 1.5 to +1.5</td>
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ABS lot  | Oper Init.

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Log 2  
Dade Behring Inc. • Newark, DE 19714 • USA

2006/12
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<th>Date</th>
<th>Monthly Maintenance</th>
<th>Operator Initials</th>
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<td>Replace/clean air filters</td>
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*If you run more than 100 IMT samples daily, bleach the IMT system and port every 15 days.
### Daily Maintenance

**Instrument Serial No. ___________________________**

**Month & Year ___________**

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<thead>
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<th>Date</th>
<th>Cuvette</th>
<th>Reagent</th>
<th>RMS Hydration</th>
<th>RMS Reagent</th>
<th>Empty Cuvette Waste</th>
<th>Run System Check</th>
<th>Operator initials</th>
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### Dimension® RxL Max® clinical chemistry system with RMS Module
### Daily System Check

**Instrument Serial No.** _________________  **Month & Year** ____________

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<tr>
<th>Are all wavelengths OK?</th>
<th>Reagent 1</th>
<th>Reagent 2</th>
<th>Sampler</th>
<th>IMT Sampler</th>
<th>RMS</th>
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</table>

- **Reagent 1**
  - 293 filter: 
    - 2.5 to +2.5: ABS Carton value ±12 ≤ 3.8
  - All other filters: 
    - 1.5 to +1.5: ABS Carton value ±12 ≤ 3.8

- **Reagent 2**
  - 10% of ABS Carton value ±2 ≤ 0.8

- **Sampler**
  - 10% of ABS Carton value ±2 ≤ 1.4

- **IMT Sampler**
  - ABS Carton value ±12 ≤ 3.8

- **RMS**
  - ABS Carton value ±12 ≤ 3.8

<table>
<thead>
<tr>
<th>ABS lot</th>
<th>Oper Init.</th>
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**Log 5**

Dade Behring Inc. • Newark, DE 19714 • USA

2006/12
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<th>Record Cuvette Temp</th>
<th>Record Reagent Temp</th>
<th>Record Temp</th>
<th>HM Temp</th>
<th>Empty Cuvette</th>
<th>Run System Check</th>
<th>Operator Initials</th>
<th>Comments</th>
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## Dimension® Rxl Max® system with HM Module
### Daily System Check

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**Are all wavelengths OK?**

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<tr>
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<th>Sampler</th>
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293 filter: -2.5 to +2.5
all other filters: -1.5 to +1.5

| 293 filter: -2.5 to +2.5 | ABS Carton value ±12 | ≤ 3.8 | ABS Carton value ±12 | ≤ 3.8 | 10% of ABS Carton value ±2 | ≤ 0.8 | 10% of ABS Carton value ±4 | ≤ 1.6 |

ABS lot | Oper Init. |

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Log 7 | Dade Behring Inc. • Newark, DE 19714 • USA

2006/12
### Weekly Maintenance

<table>
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<th>Date</th>
<th>Clean outside of R2 and HM wash probes</th>
<th>Weekly Maintenance QuikLYTE® Integrated Multisensor</th>
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<td>Clean IMT System*</td>
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*If more than 100 IMT samples run daily, bleach IMT system port every 15 days.*
## Dimension® RxL Max® with HM and RMS Modules
### Daily Maintenance

**Instrument Serial No.** ______________________  **Month & Year** ____________

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<th>RMS Reagent</th>
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Log 9  Dade Behring Inc. • Newark, DE 19714 • USA  2006/12
### Dimension® RxL Max® system with HM and RMS Modules
#### Daily System Check

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<thead>
<tr>
<th>Instrument Serial No.</th>
<th>Month &amp; Year</th>
<th>Are all wavelengths OK?</th>
<th>293 filter: − 2.5 to +2.5</th>
<th>all other filters: − 1.5 to +1.5</th>
<th>Reagent 1 Mean SD</th>
<th>Reagent 2 Mean SD</th>
<th>Sampler Mean SD</th>
<th>HM Mean SD</th>
<th>RMS Mean SD</th>
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Dade Behring Inc. • Newark, DE 19714 • USA

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## Dimension® RxL Max® clinical chemistry system Training Checklist

**Laboratory Name:** _______________________________  
**Name of Trainer:** ____________________________  
**Date:** _______________________  
**Name of Trainee:** _________________________

### Topic: Brief Component Overview

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review RMS components</td>
<td>RMS Operator’s Guide</td>
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</tbody>
</table>

### Topic: Sample Processing

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>Process patient sample using sample cup, primary tube (include barcoded tube if used)</td>
<td>Operator’s Guide, <em>Using</em></td>
</tr>
<tr>
<td>Process multiple fluid types, including urine assays</td>
<td>Operator’s Guide, <em>Using</em></td>
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<tr>
<td>Enter manual dilution factor</td>
<td>Operator’s Guide, <em>Using</em></td>
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<tr>
<td>Respond to system need; use ALT N to review needs screen</td>
<td>Operator’s Guide, <em>Using</em></td>
</tr>
<tr>
<td>Add and remove reagent cartridges</td>
<td>Operator’s Guide, <em>Using</em></td>
</tr>
<tr>
<td>Use ALT S to determine segment status and to delete segments</td>
<td>Operator’s Guide, <em>Using</em></td>
</tr>
</tbody>
</table>
| Process short sample:  
  • use ALT L to respond to Insufficient Sample message  
  • use SSC  
  • or sample cup  
  • use tube fill guide | Operator’s Guide, *Using* |
| Edit samples, including adding and deleting tests, rerunning tests and deleting samples | Operator’s Guide, *Using* |
| Perform manual query, if used | Operator’s Guide, *Using* |
| Review use of these keys:  
  Pause  Exit/Shift Exit  
  Reset  Backspace/Backslash  
  Run  Up Arrow/Down Arrow  
  Alarm  Pg Up/Pg Down  
  CTL  Stop | Operator’s Guide, *Introducing* |
| (RMS only) Using Load Tray, add reagent cartridges and pause loading to add additional cartridges | RMS Operator’s Guide, *Using* |
| Review how to handle HOLD lots if they are:  
  - 3rd lot or mismatch | Operator’s Guide, *Using*, *Troubleshooting* |
# Dimension® RxL Max® clinical chemistry system Training Checklist

**Laboratory Name:** _______________________________  **Name of Trainer:** _______________________

**Date:** _______________________  **Name of Trainee:** _______________________

## Operators

### Topic: Calibration and Quality Control

<table>
<thead>
<tr>
<th>Activity</th>
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<tbody>
<tr>
<td>Calibrate linear methods</td>
<td>Operator’s Guide, <em>Using</em></td>
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<td>Verify enzyme methods</td>
<td>Operator’s Guide, <em>Using</em></td>
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<td>Calibrate urine drugs of abuse methods</td>
<td>Operator’s Guide, <em>Using</em></td>
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<tr>
<td>Calibration alerts configure</td>
<td>Operator’s Guide, <em>Customizing</em></td>
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<td>Respond to calibration alerts</td>
<td>Operator’s Guide, <em>Using</em></td>
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<tr>
<td>Define calibration panels</td>
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<td>Configure QC alerts</td>
<td>Operator’s Guide, <em>Customizing</em></td>
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<td>Define QC products</td>
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<tr>
<td>Define QC panels</td>
<td>Operator’s Guide, <em>Customizing</em></td>
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<table>
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<tr>
<td>Store calibrations</td>
<td>Operator’s Guide, <em>Customizing</em></td>
</tr>
<tr>
<td>Store QC results</td>
<td>Operator’s Guide, <em>Customizing</em></td>
</tr>
</tbody>
</table>
**Dimension® RxL Max® clinical chemistry system Training Checklist**

**Laboratory Name:** _______________________________  **Name of Trainer:** _______________________

**Date:** _______________________  **Name of Trainee:** _______________________

<table>
<thead>
<tr>
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</tr>
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</table>

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Do these procedures using the Maintenance Log

<table>
<thead>
<tr>
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<td>Do Weekly Maintenance procedures (HM only)</td>
<td>Operator’s Guide, <em>Maintaining</em></td>
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<td>Do these Periodic Maintenance procedures:</td>
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<td>Controlled power down</td>
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<tr>
<td>Perform selected alignments</td>
<td>Operator’s Guide, <em>Aligning</em></td>
</tr>
<tr>
<td>Review changing the aliquot wheel (non-HM only)</td>
<td>Operator’s Guide, <em>Maintaining</em></td>
</tr>
<tr>
<td>Review controlled power down procedure for RxL Max™ system and RMS</td>
<td>RMS Operator’s Guide, <em>Introducing</em></td>
</tr>
<tr>
<td>Review controlled power down procedure for RMS only</td>
<td>RMS Operator’s Guide, <em>Introducing</em></td>
</tr>
</tbody>
</table>

☑️ Required  
☒ Optional
Dimension® RxL Max® clinical chemistry system Training Checklist

Laboratory Name: _______________________________ Name of Trainer: _______________________

Date: _______________________ Name of Trainee: _______________________

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</table>
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<table>
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<td>Operator’s Guide, <em>Appendix</em></td>
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<td>Review troubleshooting a failed RMS on a system check</td>
<td>RMS Operator’s Guide, <em>Troubleshooting</em></td>
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<tr>
<td>Review responding to and clearing error messages (RMS only)</td>
<td>RMS Operator’s Guide, <em>Troubleshooting</em></td>
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## Dimension® RxL Max® clinical chemistry system Training Checklist

Laboratory Name: _______________________________ Name of Trainer: _______________________

Date: _______________________ Name of Trainee: _______________________

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☐ Required
☐ Optional
1: Introducing the Dimension® RxL Max® clinical chemistry system

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Overview of the Dimension® RxL Max® clinical chemistry system

The Dimension® RxL Max® clinical chemistry system is a discrete, random-access, microprocessor-controlled, integrated instrument/chemistry system that measures a variety of analytes, including enzyme activities, in body fluids.

For in vitro diagnostic use.

It uses the Dade Behring Inc. Flex® multiple-test reagent cartridges, disposable reaction cuvettes, integrated multisensor technology (IMT) with the Dade Behring Inc. QuikLYTE® integrated multisensor to provide rapid, accurate, and precise test results, and the heterogeneous immunoassay (HM) module for processing of high-sensitivity chromium-based heterogeneous immunoassays.
Features

- Performs tests in random order.
- Uses the Dade Behring Inc. low-cost-per-test Flex® reagent cartridge and onboard cuvette manufacturing system.
- Uses the Dade Behring Inc. exclusive QuikLYTE® integrated multisensor for Na, K, Cl testing.
- Performs up to 500 photometric chemistry tests and 300 Na, K, Cl tests per hour on serum, plasma, urine, or cerebrospinal fluid samples.
- Performs up to 167 heterogeneous immunoassays per hour.
- Performs automatic reflex testing.
- Performs automatic panic reruns.
- Uses various sizes of primary sample tubes.
- Uses 1.5-mL Dade Behring Inc. sample cups.
- Uses 1-mL Dade Behring Inc. SSC containers on top of barcoded tubes for short volume samples.
- Holds up to 44 Flex® reagent cartridges in a non-CFC refrigeration system and up to 88 Flex® reagent cartridges in a non-CFC refrigerated system when the Reagent Management System (RMS) module is installed.
- Performs automatic reagent preparation.
- Has an easy-to-use computer.
- Has ten user-programmable panel keys.
- Has the ability to link with other Dade Behring Inc. analyzers through the Dade Behring Inc. DataFusion® system integrator (either with or without bar code generation capability) or with an Laboratory Information System (LIS).
- Uses a 17-inch touchscreen monitor with visual/audio alerts.
- Uses the HIL feature to help determine usability of sample.
- Has the ability to produce calculated results.
- Has automatic rerun capability.
- Has automatic dilution for overrange samples.
- Performs an automatic dilution on urine patient and urine QC samples.
- Has capability to process user-defined methods.
- Has the ability to automatically remove reagent cartridges when these cartridges are empty or their on-board life has expired.
- Provides for automatic calibration acceptance, and storage and retrieval of calibration results.
- Provides for off-instrument storage (diskette) of test results and calibration and QC records.
- Provides for barcoded QC panel processing.
Major Components

1. Touchscreen monitor
2. IMT peristaltic pump
3. QuikLYTE® sensor holder
4. Monopump
5. IMT probe
6. HM reaction vessel feeder
7. Segmented sample area
8. Photometric sample probe
9. HM incubate and wash wheels
10. HM wash probes
11. R1 reagent arm
12. R2 reagent arm
13. Reagent cartridge tray
14. Cuvette manufacturing area
15. Cuvette waste container
16. HM vessel waste container
17. Cuvette film cartridge
18. Sample, reagent, HM pumps
19. HM probe cleaner pumps
20. Automatic Flex® loader
21. Interlock override switch
22. Main power switch
23. Computer hard drive
24. System control boards
25. UPS
26. DC fuse panel
27. IMT standards and flush bags (located under cover)
28. Keyboard
29. System printer

The optional hand-held barcode reader (not shown) is located to the left of the keyboard.
Major Components of the HM Module

1. Top of vessel feeder track
2. Vessel holder
3. Vacuum sensor WP2
4. Vacuum sensor WP1
5. Wash probe #2
6. Wash probe #1
7. Wash pump head #2
8. Wash pump head #1
9. Vessel mixer #2
10. Vessel mixer #1
11. Wash wheel
12. Incubate wheel
13. Thermal ring (inside incubate wheel)
14. Vessel gate solenoid
15. Vessel shuttle
16. Vessel shuttle guide solenoid

No tubing is shown in the illustration.
Safety

General Safety
Personnel operating the instrument must be proficient in its operation, maintenance, and alignment procedures. To ensure safety, follow basic precautions.

- Observe all warnings and cautions in the manual.
- Remove safety guards only if specifically instructed in the procedures. Replace all guards after completing the procedures.
- Stow cables and tubing properly to eliminate tripping hazards.
- Use only specified cleaners on the Dimension® RxL Max® clinical chemistry system. Using other than the specified cleaners will cause imprecision in some methods.
- Review the Flex® reagent cartridge method insert sheets for specific chemicals and safety information about the reagents in each method cartridge.

WARNING: This is a “Class A” product. In a domestic environment this product may cause radio interference, in which case, the user may be required to take adequate measures.

Biohazard and Probe Safety
The Dimension® RxL Max® system is designed to process clinical laboratory specimens, some of which may be a potential biohazard. It is important to follow standard laboratory practice for protection from biohazards when placing specimens on the instrument and when performing maintenance and troubleshooting procedures.

- Observe all warnings and cautions stated in the manual.
- Always perform every step in a procedure and perform them in sequence as written, including pressing the Pause key or raising instrument lids to prevent probes from moving while performing a procedure.
- All materials that come in contact with patient samples should be considered potential biohazards and treated according to local biohazard handling and disposal procedures.

Instrument Removal
Please contact a Dade Behring Inc. service representative for any instrument removal for repair or disposal.
Safety Notes
Warnings and cautions are included throughout this manual to emphasize important and critical instructions. Where appropriate, an icon is also provided as part of the warning block to visually indicate the concern of the warning.

WARNING: An operating procedure, step, or practice that, if not followed correctly, could result in personal injury, affect the operator's health, contaminate the environment, or cause erroneous and misleading results.

CAUTION! An operating procedure, step, or practice that, if not observed strictly, could result in damage to equipment.

Safety Labels
The following labels are affixed to the instrument to alert you to safety considerations.

Attention
When used alone, the attention label indicates specific instruction affecting safety in this guide involving the marked areas of the instrument.

When used with another symbol, the attention label points out another instrument warning label defined in this guide. You should understand that warning before going into the labeled area of the instrument.

Potential Biohazard
Indicates an area of the instrument that could have been in contact with biohazardous materials. Do not handle the contents or touch the area unless you are properly protected. Refer to your applicable laboratory procedures and to the guidelines set forth by the Department Of Labor (OSHA) 29CFR Part 1910.1030, Occupational Exposure to Blood Borne Pathogens: Final Rule.

Pinch Hazard
Indicates an area of the instrument where you can be exposed to moving parts. Be careful around these parts when performing diagnostic and maintenance operations with safety shield removed.

Puncture Hazard
Indicates an area of the instrument where you can be exposed to a sharp tip that could puncture the skin. In particular, do not extend fingers under the guard over the sample area during operation.
Burn Hazard
Indicates a heated area of the instrument that could burn you. Be sure to power off the instrument and let these areas cool before touching them or performing diagnostic and maintenance operations around them.

Electrostatic Discharge
Indicates potential damage to electronic boards from electrostatic discharge. Attach the grounding wrist strap to your wrist prior to handling any electronic board as instructed in the replacement procedure.

Protective Earth Terminal
Indicates the terminal that connects the power supply line external earth (ground) to the primary instrument.

Protective Earth Terminal
Indicates the terminal that connects the power supply line external earth (ground) to secondary instrument systems.

Open Lid
Indicates an area of the instrument where you can be exposed to a closing lid. Be careful around these parts when performing diagnostic and maintenance operations.

Crush Hazard
Indicates an area of the instrument where you can be exposed to moving parts. Be careful around these parts when performing diagnostic and maintenance operations.

Link Symbol
Indicates that the instrument is being operated from a remote location.

Laser Label
Indicates an area of the instrument where you can be exposed to direct laser emissions. Do not look directly into the aperture of the emitted laser beam. The maximum radiant power at the aperture of the laser barcode reader is 1.0 milliwatt.
Performing Power Shutdowns and Start-Ups

Types of Shutdowns
The Dimension® RxL Max® clinical chemistry system allows you to remove power from the entire instrument or from specific areas of the instrument when a complete removal of power is not needed for the maintenance work to be performed. The maintenance procedure will specify the type of shutdown needed.

The power shutdown procedures in this manual are for a Dimension® RxL Max® system with a Heterogeneous Immunoassay (HM) module. If other modules are installed on the instrument, such as the Reagent Management System (RMS), refer to the Operator’s Guide for those modules when power must be removed from instrument.

<table>
<thead>
<tr>
<th>Shutdown</th>
<th>Removes power from</th>
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<tbody>
<tr>
<td>Emergency</td>
<td>The entire instrument. An emergency shutdown requires two steps: turning off the UPS power switch and removing the instrument power cord from the wall outlet. These two steps can be performed in any order.</td>
</tr>
<tr>
<td>Controlled</td>
<td>All areas of the instrument except for the compressor. A Controlled Shutdown is used to perform most maintenance procedures.</td>
</tr>
<tr>
<td>Safety</td>
<td>The entire instrument. A safety shutdown is a combination of a Controlled Shutdown and an Emergency Shutdown. It involves first using the software to prepare the instrument for a power shutdown as is done in a Controlled Shutdown, and then turning off the UPS power switch and removing the instrument power cord from the wall outlet as is done in an Emergency Shutdown. Some maintenance procedures require a Safety Shutdown.</td>
</tr>
</tbody>
</table>

WARNING: If the UPS OFF button is not pressed, full power will still be provided to the instrument by a fully charged UPS for approximately 21 minutes, even if the instrument power cord is unplugged from the wall outlet.
Performing an Emergency Shutdown

If the Dimension® RxL Max® system must be shut down in an emergency situation where you do not have the time to perform a safety shutdown, follow the steps below.

1. Turn off the UPS by pressing its OFF button. When the UPS power is off, all LEDs on the UPS will go out.

   **WARNING:** If the UPS OFF button is not pressed, full power will still be provided to the instrument by a fully charged UPS for approximately 21 minutes, even if the instrument power cord is unplugged from the wall.

2. Unplug the instrument power cord from its wall receptacle.

To restore power and return to operating conditions after an emergency power shutdown:

1. Plug the instrument power cord into its wall outlet.
2. Press the UPS ON/Test button.
3. Push the instrument main power switch to its up (↑) position.
4. When the Operating Menu appears, run a System Check and your laboratory’s daily QC to ensure that all instrument systems are operating properly.
5. The following may also need to be done for your laboratory operations.
   - For Hydration Setup users only – Go to the Inventory/Hydration screen and reload the number of test to hydrate for each method. See Module 6: Customizing, “Hydrating Using the Inventory/Hydration Screen.”
   - For Timed Hydration users only – Go to the Inventory/Hydration screen, reenter your timed hydration times, and reactivate the timer. See Module 6: Customizing, “Hydrating Using a Preprogrammed Setup List.”

Getting to the Inventory/Hydration screen...

From the Operating Menu, press:

- F4: System Prep
- F2: Reagent Prep
- F6: Reagent Setup
Performing a Controlled Power Shutdown

1. With the instrument in Standby, from the Operating Menu press the **Exit** key and follow the messages as they appear on the screen.

2. Wait for the Console Menu screen to appear (about 30 seconds).

<table>
<thead>
<tr>
<th>CONSOLE MENU</th>
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<tbody>
<tr>
<td>1 - Restart the Dimension(R) Application Software</td>
</tr>
<tr>
<td>2 - Install or Update software</td>
</tr>
<tr>
<td>3 - Prepare to turn off the instrument</td>
</tr>
</tbody>
</table>

Type a number to select an option then press Enter:

3. Select option 3: type **3** and press the **Enter** key.

4. When the message “**You may now turn off the instrument**” appears, open the left cabinet door and push the main power switch to its down (O) position.
To restore power and return to operating conditions after a controlled power shutdown:

1. Push the instrument main power switch to its up (|) position.

2. When the Operating Menu appears, run a System Check and your laboratory’s daily QC to ensure that all instrument systems are operating properly.

3. The following may also need to be done for your laboratory operations.
   - For Hydration Setup users only – Go to the Inventory/Hydration screen and reload the number of test to hydrate for each method. See Module 6: Customizing, “Hydrating Using the Inventory/Hydration Screen.”
   - For Timed Hydration users only – Go to the Inventory/Hydration screen, reenter your timed hydration times, and reactivate the timer. See Module 6: Customizing, “Hydrating Using a Preprogrammed Setup List.”
Performing a Safety Power Shutdown

1. With the instrument in Standby, from the Operating Menu press the Exit key and follow the messages as they appear on the screen.

2. Wait for the Console Menu screen to appear (about 30 seconds).

   CONSOLE MENU

   1 - Restart the Dimension(R) Application Software
   2 - Install or Update software
   3 - Prepare to turn off the instrument

   Type a number to select an option then press Enter:

3. Select option 3: type 3 and press the Enter key.

4. When the message “You may now turn off the instrument” appears, open the left cabinet door and push the main power switch to its down (O) position.

   WARNING: You must continue with steps 5 and 6 on the next page to remove power from all areas of the instrument!

(Continue with steps 5 and 6 on the next page)
5  Turn off the UPS by pressing its OFF button. When the UPS power is off, all LEDs on the UPS will go out.

**WARNING:** If the UPS OFF button is not pressed, full power will still be provided to the instrument by a fully charged UPS for approximately 21 minutes, even if the instrument power cord is unplugged from the wall.

6  Unplug the instrument power cord from its wall receptacle.

**To restore power and return to operating conditions after a safety power shutdown:**

1  Plug the instrument power cord into its wall outlet.
2  Press the UPS ON/Test button.
3  Push the instrument main power switch to its up (|) position.
4  When the Operating Menu appears, run a System Check and your laboratory’s daily QC to ensure that all instrument systems are operating properly.
5  The following may also need to be done for your laboratory operations.
   • For Hydration Setup users only – Go to the Inventory/Hydration screen and reload the number of test to hydrate for each method. See Module 6: **Customizing**, “Hydrating Using the Inventory/Hydration Screen.”
   • For Timed Hydration users only – Go to the Inventory/Hydration screen, reenter your timed hydration times, and reactivate the timer. See Module 6: **Customizing**, “Hydrating Using a Preprogrammed Setup List.”
Using the Keyboard

Overview
The Dimension® RxL Max® system keyboard has six areas:

- Test keys
- Action keys
- Function keys
- Keypad keys
- Cursor movement keys
- Keyboard keys

The use of the keys in each area is described on the following pages. Some of these keys can be used in combination. These are referred to as keystroke combinations, which are also described on the following pages.
Test Keys

Use the test keys to select tests and panels of tests. The test keys that contain labels P1 through P10 are the panel keys. By programming groups of frequently used tests to these ten panel keys, you can request a panel of up to 20 tests with a single keystroke. (See “Panel Keys” in Module 6: Customizing.) You can also customize which tests are on a test key. (See “Test Keys” in Module 6: Customizing.)

Keyboard Overlays

Additional tests may be shown on overlays at the top or the bottom of the keyboard. To select these tests, press the Alt key and the key indicated by the overlay. For example, the TSH test is on an overlay above the test keys:

- Press Control and the Test Key to select the UCFP test
- Press Shift and the Test Key to select the ACP test
- Press the Test Key to select the ALB test

- Press Alt and the Test Key to select the TSH test
**Action Keys**

<table>
<thead>
<tr>
<th>Key</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stop</strong></td>
<td>The <strong>Stop</strong> key can be used only with the <strong>Control</strong> key. This key combination will stop all instrument operations in progress in a manner that will not damage the instrument. All tests in progress will be aborted; however, all scheduled tests will be retained in instrument memory.&lt;br&gt;To resume operations, press the <strong>Reset</strong> key.</td>
</tr>
<tr>
<td><strong>Pause</strong></td>
<td>This key turns all the sampler systems off. It prevents the photometric sample arm and the IMT sample arm from moving. Press the <strong>Pause</strong> key again to restart the sampler systems.</td>
</tr>
<tr>
<td><strong>Reset</strong></td>
<td>This key is used to clear error messages on the screen. It initializes any modules that are not being used and causes the instrument to resume processing. This key is also used to resume operations after you use the <strong>Control/Stop</strong> key combination to halt processing.</td>
</tr>
<tr>
<td><strong>Run</strong></td>
<td>This key instructs the instrument to look for and process any new samples. It is equivalent to the <strong>F4: Run</strong> key on the Load List screen.</td>
</tr>
</tbody>
</table>

**Function Keys**

The Function keys, labeled F1–F8, can be used as alternative to the touch keys on the touchscreen. Function keys perform various tasks, depending on which screen is displayed. The tasks are defined in the touch keys at the bottom of the screen. The use of these function keys is self-explanatory or is explained where needed in applicable procedures.
Keypad Keys

Key Use
Delete When entering information in a field, hold down the Shift key and press Delete to delete all characters to the right of the cursor in a field.
Exit Press the Exit key to leave the screen that is currently on the display; the system will return to the previous screen.
Help Press the Help key at any time to get information about the screen that is on the display or the functions of various keys on the keyboard that are used with that screen. Use the PgUp and PgDn keys to move through the help screen information. Press the Exit key to return to the instrument screen. The operation of the Help key in combination with other keys is explained in “Help Keys” in the Appendix.
Alarm Off When there is a problem with the system, the system sounds an alarm. Press the Alarm Off key to turn off this alarm. Once the alarm has been turned off, you must press Alarm Off again to enable the alarm.
PgUp Displays the previous full screen, if any.
PgDn Displays the next full screen, if any.
Enter Press the Enter key after entering data using the keyboard keys to store what you entered in the current field or to activate a command.
Numbers Use to enter numerical data. Numerical data can also be entered using the Keyboard keys.

Other keys that also delete...
Refer to the Keyboard Keys discussion in this section for how the Backspace key and the slash key delete items.

Cursor Movement Keys

These keys, commonly referred to as arrow keys, move the cursor on the screen up, down, right, and left.
The left and right arrow keys move the cursor from data field to data field on the display. When these keys are pressed with the Shift key, the cursor moves one space to the right or left within that data field.
### Keyboard Keys

The keyboard keys function like keys on a standard computer keyboard. Keys that have special functions when used in a data field are described below.

<table>
<thead>
<tr>
<th>Key</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backspace</td>
<td>To delete the character immediately to the left of the cursor when entering/editing data in a field.</td>
</tr>
<tr>
<td>Enter</td>
<td>To store what you entered in the current field or to activate a command.</td>
</tr>
<tr>
<td>Tab</td>
<td>This has no function or use on the keyboard</td>
</tr>
<tr>
<td>\ (backward slash)</td>
<td>Use the backward slash key to delete the entire entry in a data field if you return to a field to make corrections.</td>
</tr>
<tr>
<td>Alt</td>
<td>This key is used in combination with other keys to move directly to other screens or to do other routine functions such as advance the printer paper. See &quot;Keystroke Combinations&quot; in the Appendix for a listing of all the key combinations and what they do.</td>
</tr>
</tbody>
</table>

### Handheld Barcode Reader

The optional barcode reader, located to the left of the keyboard, can be used to scan barcoded information from insert sheets for calibrators and QC products.
Using the Touchscreen

The Dimension® RxL Max® system display has several distinct areas in which a specific type of information always appears. These areas are:

- Instrument Status
- Segment Status
- Operating Conditions Status
- Error Message
- Applications
- Message
- Function Keys
- Alert Keys

This section describes these areas and the information they provide.
**Instrument Status Area**

At the top of the screen is a row of five boxes. The first three boxes indicate the processing status of the instrument and its systems. The information that can appear in each box and its meaning are listed below.

<table>
<thead>
<tr>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>The system is ready for processing.</td>
</tr>
<tr>
<td>Initializing</td>
<td>The system is starting up. You cannot process sample or access the sample wheel until the system has finished initializing. The sampler/wheel will move during initialization.</td>
</tr>
<tr>
<td>Processing</td>
<td>The system is either processing samples, the IMT system is being calibrated, or photometric calibrations or reagent hydrations are being performed.</td>
</tr>
<tr>
<td>System Prep</td>
<td>Instrument is in system preparation mode.</td>
</tr>
<tr>
<td>Can't Process</td>
<td>The system is unable to process samples.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Diagnostic software is being used. You cannot process samples when this box displays &quot;Diagnostics.&quot; The instrument must be in &quot;Standby&quot; to access the Diagnostic software.</td>
</tr>
</tbody>
</table>

**Photometric Sampler Status Box**

<table>
<thead>
<tr>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampler Idle</td>
<td>You may remove or add samples.</td>
</tr>
<tr>
<td>Sampler Busy</td>
<td>The system is using one or both of the sample handlers or the sample wheel.</td>
</tr>
<tr>
<td>Waiting...</td>
<td>The Pause key was pressed while samples were processing. The system is waiting for an appropriate place and time to stop the photometric and IMT sampler systems.</td>
</tr>
<tr>
<td>Waiting...60</td>
<td>The instrument is 60 seconds from pausing. This will count down the number of seconds until the instrument is paused (&quot;Waiting...59,&quot; &quot;Waiting...58,&quot; etc.).</td>
</tr>
<tr>
<td>Samplers Off</td>
<td>Appears when the Pause key has been pressed. The system has stopped the photometric and IMT sampler systems. These systems will not move until the Pause key is pressed again.</td>
</tr>
<tr>
<td>Moving Wheel...</td>
<td>The instrument is within five seconds of accessing samples in the sample area. You must not add samples to the sample area when the box displays &quot;Moving Wheel...&quot;. A red light on the instrument frame in front of the sample area also lights when this status appears.</td>
</tr>
</tbody>
</table>
**IMT System Status Box**

<table>
<thead>
<tr>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMT OK</td>
<td>The integrated multisensor technology (IMT) system is turned on and is calibrated. You can process IMT tests.</td>
</tr>
<tr>
<td>IMT Paused</td>
<td>All activity in the IMT system has been paused. The IMT system will not move, prime, or calibrate unless the operator exits the screen or presses a function key on the screen.</td>
</tr>
<tr>
<td>IMT Calibrating</td>
<td>The IMT system is running a calibration. IMT tests can be scheduled and will be run when this changes to &quot;IMT OK.&quot;</td>
</tr>
<tr>
<td>Na, K, Cl</td>
<td>One or more of the individual sensors failed calibration. The color indicates the status of each (see sidebar at the left).</td>
</tr>
<tr>
<td>IMT Not Calib</td>
<td>The IMT system is not calibrated. You cannot process any IMT tests until the IMT system is calibrated.</td>
</tr>
<tr>
<td>IMT Not Config</td>
<td>The IMT system has not been configured. You cannot process IMT tests.</td>
</tr>
</tbody>
</table>

**Date and Time Box**

<table>
<thead>
<tr>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>When Flashing “Remote Access”</td>
<td>Instrument is in remote access mode and is being controlled by Technical Assistance Center personnel. See safety precautions in the remote access portion of &quot;When You Call Us&quot; in &quot;Troubleshooting Overview&quot; in Module 5: Troubleshooting.</td>
</tr>
</tbody>
</table>

**WARNING:** Remote access may cause unexpected movement of instrument components.

**Operating Conditions Status Area Icons**

These boxes contain icons that indicate the operating conditions status of various systems and consumables on the instrument. These icons will only appear when their systems or consumables are not within normal operating levels or will require replacement shortly. When these icons appear, you can press the **Control/Help** key combination to find out what the icon means. See “Operating Conditions Status Area Icons” in the Appendix for more information on these icons.
Segment Status Area
These six boxes indicate the status of each of the six segment positions of the sample wheel. They show which segments were in each position of the sample wheel the last time the system scanned the sample wheel.

<table>
<thead>
<tr>
<th>Segment Box Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>A segment box with a letter in it indicates that the instrument has scanned the sample wheel and identified that lettered segment in that segment position. In the segment box at the left, segment position one has the “A” segment in it.</td>
</tr>
<tr>
<td><strong>GREEN</strong> background color:</td>
</tr>
<tr>
<td>All work has been completed or no work is required for this segment.</td>
</tr>
<tr>
<td>It can be removed and replaced with another segment.</td>
</tr>
<tr>
<td><strong>RED</strong> background color:</td>
</tr>
<tr>
<td>Instrument is processing work on this segment.</td>
</tr>
<tr>
<td>• Do not remove the segment or reposition it to another segment location on the sample wheel.</td>
</tr>
<tr>
<td>• Do not remove any sample container in this segment or reposition it to another position in the segment.</td>
</tr>
<tr>
<td>• Do not remove sample fluid from any sample container in this segment.</td>
</tr>
<tr>
<td><strong>WARNING:</strong> When the background color is red, failure to follow the above items will affect reported results and may damage the instrument.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment Box Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>–</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>A segment box with a dash in it indicates that the instrument has scanned the sample wheel and did not identify a lettered segment in that segment position.</td>
</tr>
</tbody>
</table>

Error Message Area
Below the segment status area and the operating conditions status area are lines of the screen that are used to display error messages. If system malfunctions occur, an appropriate error message will appear here in red. Press the **Alt/M** key combination to see if there is help on how to resolve the error message.

When an error message appears in this area of the screen, you must press the **Reset** key to clear the error message from the screen before any system processing will continue.
**Applications Area**

Below the error message area is the applications area, the area of the screen where you enter and review data.

The title of the screen always appears in capital letters on the first line. Below the title are various text and data fields.

**Message Area**

Below the applications area on the screen is the message area. This area can contain the following kinds of messages:

<table>
<thead>
<tr>
<th>Message Type</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prompt</td>
<td>When the system needs additional information about a certain task it is performing, it will display a message and wait for your response. Example: “Please enter your password, then press Enter.”</td>
</tr>
<tr>
<td>Question</td>
<td>The system will display query messages when there is something that requires your action or if you have forgotten to press a required keystroke or perform a certain task. Example: “Press Enter to enter data?”</td>
</tr>
<tr>
<td>Information</td>
<td>The system informs you what it is currently doing. Example: “Loading film…”</td>
</tr>
</tbody>
</table>

**Function Keys**

The eight function keys are displayed at the bottom of the screen. The text in the box describes the task pressing the key will perform. You can activate a task by pressing the key on the screen or by pressing the corresponding key (F1 through F8) on the keyboard.

Use of these keys is explained in applicable procedures. For example, if you display Operating Menu screen and want to enter sample data, you would press the F1 function key, which corresponds to the **F1: Enter Data** box on the Operating Menu screen.

The text in function key boxes changes for each displayed screen.
Alert Keys
Five alert keys are displayed vertically on the left side of the screen. These keys are normally gray but change color to alert you of a situation needing your attention. Press the key to find out the reason for the alert.

<table>
<thead>
<tr>
<th>Key</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT Status</td>
<td>Displays the STAT Samples screen. Shows the STAT requests that are in process and the time until the result will be available, as well as completed STATs and STATs requested but not yet begun.</td>
</tr>
<tr>
<td>Sample Alert</td>
<td>Displays the Sample Alert screen. Shows rerun status of sample requests which encountered exceptions while processing (autodilute, reflex, etc.)</td>
</tr>
<tr>
<td>Supplies</td>
<td>Displays the Reagent Cartridge Alerts screen. Shows Flex® reagent cartridge lots which are nearing an operator-defined depletion threshold. Warns you that it is time to load cartridges for specific methods.</td>
</tr>
<tr>
<td>QC Alert</td>
<td>Displays the QC Tests Out of Range screen. Shows the method, QC level and high or low status of QC tests.</td>
</tr>
<tr>
<td>Calib Alert</td>
<td>Displays the Calibration Alert screen. Shows onboard methods/lots and the amount of time left to calibration expiration. Shows onboard lots which have triggered configurable calibration alert criteria.</td>
</tr>
</tbody>
</table>

Additional Touchscreen Keys
You can navigate the software screens with these keys:

<table>
<thead>
<tr>
<th>Key</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help</td>
<td>Shows instructions about the screen/fields displayed in the Applications Area. It is equivalent to the Help key on the keyboard.</td>
</tr>
<tr>
<td>Run</td>
<td>When you press this key, the instrument looks for and processes new samples. It is equivalent to the Run key on the keyboard or the F4: Run key on the Load List screen.</td>
</tr>
<tr>
<td>Home</td>
<td>Closes the currently displayed screen and returns to the Operating Menu (Home) screen. It is equivalent to pressing the Shift/Exit keystroke combination on the keyboard.</td>
</tr>
<tr>
<td>Enter</td>
<td>Performs the same functions as the Enter key on the keyboard.</td>
</tr>
<tr>
<td>Exit</td>
<td>Closes the currently displayed screen and returns to the previously displayed screen. It is equivalent to the Exit key on the keyboard.</td>
</tr>
<tr>
<td>Arrow Keys</td>
<td>Move the cursor from field to field on the screen displayed in the Applications Area. They are equivalent to the arrow keys on the keyboard.</td>
</tr>
</tbody>
</table>
Installation Specifications

The Dimension® RxL Max® clinical chemistry system will be installed by a qualified Dade Behring Inc. representative. The installation of the system will include a full checkout to ensure that the equipment is fully operational.

Space Requirements

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Weight, lbs. (kgs.)</th>
<th>Dimensions, in. (cm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxL Max®</td>
<td>805 (366)</td>
<td>62.5 (159) 67 (170) 32 (81)</td>
</tr>
<tr>
<td>RxL Max® with HM</td>
<td>880 (400)</td>
<td>62.5 (159) 67 (170) 32 (81)</td>
</tr>
<tr>
<td>RxL Max® with HM and RMS</td>
<td>1205 (548)</td>
<td>88.5 (225) 67 (170) 32 (81)</td>
</tr>
</tbody>
</table>

1 Add 7.7 (20) to the length if the UPS is positioned to the left of the instrument.
2 Required for raising instrument lids.
3 Add 11 (28) to the depth if the UPS is positioned in the rear of the instrument.

The instrument keyboard can be raised to reduce the depth from 32 to 30.5 inches for moving the instrument through doorways.

Minimum Clearances, in. (cm)

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Overhead</th>
<th>Left Side</th>
<th>Right Side</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxL Max®</td>
<td>19 (48)</td>
<td>16 (41)</td>
<td>3 (8)</td>
<td>9 (23)</td>
</tr>
<tr>
<td>RxL Max® with HM</td>
<td>19 (48)</td>
<td>16 (41)</td>
<td>3 (8)</td>
<td>9 (23)</td>
</tr>
<tr>
<td>RxL Max® with HM and RMS</td>
<td>19 (48)</td>
<td>16 (41)</td>
<td>2 (5)</td>
<td>9 (23)</td>
</tr>
</tbody>
</table>

No leveling is required. However, a reasonably level floor is required for proper operation. The two front casters of the instrument should be in their locked position during operation.
### Power Requirements

#### Instrument Power Specifications

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Normal Line Voltage</th>
<th>Voltage Range</th>
<th>Nominal Line Frequency</th>
<th>Maximum Continuous Current</th>
<th>Maximum Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxL Max® (HM or non-HM)</td>
<td>115V</td>
<td>103 to 127V</td>
<td>47 to 63 Hz</td>
<td>~ 13A</td>
<td>1900 Watts</td>
</tr>
<tr>
<td></td>
<td>230V</td>
<td>207 to 253V</td>
<td>47 to 63 Hz</td>
<td>~ 8A</td>
<td>1900 Watts</td>
</tr>
<tr>
<td>RxL Max®w/RMS (HM or non-HM)</td>
<td>115V</td>
<td>103 to 127V</td>
<td>47 to 63 Hz</td>
<td>~ 17A</td>
<td>2350 Watts</td>
</tr>
<tr>
<td></td>
<td>230V</td>
<td>207 to 253V</td>
<td>47 to 63 Hz</td>
<td>~ 11A</td>
<td>2350 Watts</td>
</tr>
</tbody>
</table>

The following items are common to all Dimension® RxL Max™ instruments:

- **Service**: 115V AC, 60 Hz, Single Phase, 20A
  - 230V AC, 50 Hz, Single Phase, 16A
- **Transient Overvoltage**: Installation category II (branch circuit)
- **Circuit and Ground**: A separate dedicated line with grounded 3-wire distribution to the receptacle is required. The third (green) ground wire should initiate at the distribution panel and be continuous to the receptacle in accordance with the NEC paragraph 250-74, exception 4, unless local codes prohibit. The ground wire should not be tied to grounds from other loads.
- **Shield**: Not required.
- **Wire Size**: Number 10 AWG minimum (North America only).
- **Receptacle**: Hospital grade receptacle must be installed by the hospital electrician. The receptacle must be accessible to the 9 foot (2.74 meter) power cord furnished with the instrument.

#### Leakage Current

<table>
<thead>
<tr>
<th>Supply Voltage and Frequency</th>
<th>115VAC/60 Hz</th>
<th>230VAC/50 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Supply Connections</td>
<td>Under 10 µA</td>
<td>Under 100 µA</td>
</tr>
<tr>
<td>Ground Disconnected</td>
<td>Under 70 µA</td>
<td>Under 150 µA</td>
</tr>
</tbody>
</table>

Leakage current complies with the requirements of: CSA-C22.2 No. 1010.1B/UL61010A-1, and TUVPS Certification for EN61010-1 safety standards for laboratory equipment in non-patient vicinity areas.
Water Requirements

The Dimension® RxL Max® clinical chemistry system requires an external source of CLSI Clinical Laboratory Reagent Water.¹ The system that provides this deionized water must be connected to the water inlet connector in the rear of the instrument. Maximum rate of water consumption and maximum rate of liquid waste output is 0.85 gal. (3.2 L)/hr.

The purified water supply systems for the Dimension® RxL Max® system must produce water to the specifications shown below. These specifications meet the definition of CLSI Clinical Laboratory Reagent Water. Water supply maximum valve pressure is <55 psi.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ionic Purity</td>
<td>megohm-cm, 25°C</td>
<td>≥ 10</td>
</tr>
<tr>
<td>Microbiological Impurities</td>
<td>Colony Forming Units/mL</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Organic Impurities</td>
<td>ng/gas</td>
<td>&lt; 500</td>
</tr>
<tr>
<td>Particulate Content</td>
<td>µm</td>
<td>&lt; 0.22</td>
</tr>
<tr>
<td>Dissolved Oxygen²</td>
<td>ppm</td>
<td>5 to 8</td>
</tr>
</tbody>
</table>

¹ Clinical Laboratory Standards Institute; C3-A4, Vol. 25, No.13.
² Not applicable to CLSI Clinical Laboratory Reagent Water (CLRW), but required for proper instrument performance.

Room Temperature Requirements

Normal indoor environment is acceptable. Pollution degree 2: non-conductive pollution with occasional condensation.

Room temperature must be between 65°F (17°C) and 85°F (30°C), with a maximum fluctuation of 5°F (2.8°C) per hour.

Relative humidity must be maintained at ≥ 20% and ≤ 80%.

Average thermal output of the instrument (Btu/hr.):

- RxL Max®: 4778
- RxL Max® w/HM: 4778
- RxL Max® w/HM w/RMS: 6318 (1540 RMS only)

The system requires 120 minutes (maximum) to warm up to operating temperature from a cold start.
External Uninterruptible Power Source (UPS)
The Dimension® RxL Max® system comes with an external UPS which will maintain power to the instrument for up to approximately 21 minutes if power is interrupted or lost at the wall outlet. The UPS provides clean power and protects the instrument during power problems such as blackouts, brownouts, sags, swells, EMI/RFI noise, and surges. The UPS provides network-grade battery backup during power interruptions.

When locating the UPS, it:
- must be installed in the same room as the Dimension® RxL Max® system.
- should be installed on the left side of the instrument (when viewing the instrument from the front); if you need to install the UPS behind the Dimension® RxL Max® system, allow for 11 in. (28 cm) of clearance between the UPS and any wall.

For further information, refer to the UPS manufacturer’s manual that was shipped with the UPS.

Additional Requirements

Phone Line
Only a dedicated, direct phone line should be connected to the Dimension® RxL Max® clinical chemistry system. This means that only the Dimension® RxL Max® system must use this phone line. Also, this phone line must not be connected through a switchboard.

Specifications for this phone line are:
- Full Duplex – capable of two-way transmission.
- Standard phone jack connection – RJ11C or RJ11W (not new digital)
- For DBNet® Workstation installations – a dedicated dial-out analog phone line (Bell 202 modem compatible).

Host Interfacing
For host interfacing, a 25-pin female connector is required for hookup to the male connector on the Dimension® RxL Max® system host communications port.
2: Using the Dimension® RxL Max® clinical chemistry system

Sample Setup ......................................................................................................... 2-3
  Sample Preparation .............................................................................................. 2-3
  Types of Containers ............................................................................................ 2-3
  Using Sample Cups .............................................................................................. 2-4
  Using Primary Sample Tubes .............................................................................. 2-5
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Sample Setup

Sample Preparation
Whichever type of sample container you use, ensure that the sample quality is acceptable for processing before you load it into a segment. The sample should be free of clots, fibrin strands, and other impurities that may affect metering fluids through the instrument. There should be no air bubbles in the sample container.

While the Dimension® HIL feature can alert you to undesirable hemolysis, icterus, and lipemia in a serum or plasma sample, proper preparation is very important. Be sure to follow the sample container manufacturer’s instructions and specifications on proper tube storage and handling techniques for mixing, timing, and centrifugation.

Types of Containers
You may use the following types of sample containers on the Dimension® RxL Max® clinical chemistry system:

- sample cup with lid
- small sample container (SSC) supplied by Dade Behring Inc.
- unstoppered 5-mL, 7-mL, and 10-mL primary sample tube
- pediatric tubes of various sizes and capacities

All sample containers, except the 10-mL primary sample tube, require an adapter to load them into the sample wheel segments.

When loading a 5-mL or 7-mL primary sample tube, use only the adapters that were shipped with the Dimension® RxL Max® system. Dimension® adapters are easy to recognize: the 5-mL adapter is teal (blue-green); the 7-mL adapter is beige.

There are three colors of segments (black, yellow, and orange) available from Dade Behring Inc. for use in loading sample containers onto the sample wheel. All of these segments are identical except for their color. You may find it useful to use the yellow and orange colored segments to:

- designate SSC segments
- differentiate sample cup and tube segments
- identify STAT segments
- identify segments with calibrators and verifiers
- identify instruments by segment colors (in multi-instrument laboratories)
- separate work from satellite or other labs

Additional orange and yellow segments can be ordered in packages of three.
Using Sample Cups
The Dade Behring Inc. sample cup will hold a maximum of 1.5 mL of sample. The dead volume in a Dade Behring Inc. sample cup is 50 µL.

WARNING: You must ensure that, prior to processing a sample cup, sufficient sample is present in the cup to allow for any possible automatic rerun of tests from that cup. If any of the following instrument options is turned on,

- autorerun
- autodilute
- automatic reflex
- automatic panic rerun
- HIL feature

insufficient sample in a sample cup could cause incorrect results.

When using sample cups:

- Press the lid on the sample cup down securely so it does not interfere with the sample probe.

- Sample cups must be placed into an adapter supplied by Dade Behring Inc. to load them into a segment. Push the sample cup completely down onto the adapter.
Using Primary Sample Tubes

Before using primary sample tubes, you must perform the sample probe maximum depth alignment using the primary tube and, if applicable, adapter combination that sits the highest in a segment. See “Sample Probe Maximum Depth Alignment” in Module 4: Aligning. This alignment relates only to mechanical movement of the the probe and does not prevent the probe from aspirating separator gel or blood cells when serum/plasma volume is insufficient. It is the operator's responsibility to ensure that there is sufficient sample for the requested tests.

When using primary sample tubes:

- Follow the manufacturer's recommendations for factors such as tube storage temperature and orientation, clotting time, spin time, and RPMs (g force).

**WARNING:** Failure to follow manufacturer's recommendations for primary sample tube handling could result in erroneous results or damage to the instrument.

- Always inspect the tube after centrifugation to ensure there is sufficient sample for the requested tests.
- Remove the stopper and use an appropriate adapter, if necessary, to load the tube into a segment.
- Use tubes with dimensions as listed below.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Adapter* Size</th>
<th>Adapter Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 mm</td>
<td>75.0 mm*</td>
<td>5-mL</td>
</tr>
<tr>
<td>13.0 mm</td>
<td>100.0 mm*</td>
<td>7-mL</td>
</tr>
<tr>
<td>16.0 mm</td>
<td>100.0 mm</td>
<td>none</td>
</tr>
</tbody>
</table>

* requires a Dade Behring Inc. adapter
Using Pediatric Tubes

Dade Behring Inc. does not recommend a specific pediatric blood collection tube for use on the instrument. However, the tube must be cylindrical at the point where sample is aspirated. Any pediatric tube may be used if a proper adapter is available. Adapters for pediatric tubes are not available from Dade Behring Inc. **SSCs and sample cups are not designed for use in the "PED tube" mode.**

To configure your instrument to use pediatric tubes, you must:

- Supply an adapter that holds the pediatric tube securely and at a consistent height to allow the sample probe maximum depth alignment procedure to be performed properly.
- Go to the Sample ID/Computer Menu screen and then:
  - enter the inner diameter (I. D.) of the pediatric tube.
  - if desired, designate PED segments. See "Entering Sample ID Information" in Module 6: Customizing.
- Perform the sample probe maximum depth alignment using the pediatric tube and adapter combination that sits the highest in a segment. See “Sample Probe Maximum Depth Alignment” in Module 4: Aligning. This alignment relates only to mechanical movement of the probe and does not prevent the probe from aspirating separator gel or blood cells when serum/plasma volume is insufficient. It is the operator's responsibility to ensure that there is sufficient sample for the requested tests.
- Always test your pediatric tube configuration before using actual patient samples in the pediatric tubes.

When using pediatric sample tubes:

- Follow the manufacturer’s recommendations for factors such as tube storage temperature and orientation, clotting time, spin time, and RPMs (g force).

**WARNING: Failure to follow manufacturer’s recommendations for pediatric sample tube handling could result in erroneous results or damage to the instrument.**

- Always inspect the tube after centrifugation to ensure there is sufficient sample for the requested tests. Make sure the probe will not penetrate unusable sample material (blood cells, separator gel, etc.) and that the probe will not go below the cylindrical area of the tube.
- Remove the stopper.
- Use the appropriate adapter to load the pediatric tube into a segment.
**Using SSC (Small Sample Containers)**

SSCs are intended to be used when the probe cannot reach the sample, or when a whole blood test is requested. In these situations, using an SSC allows for efficient sample processing by retaining the use of the bar code information on a primary tube.

**To configure your instrument to use SSCs, you must:**

- Go to the Sample ID/Computer Menu screen and then:
  - enter the inside diameter of the Dade Behring Inc. SSC (8 mm).
  - designate SSC segments to enable automatic processing of whole blood tests from barcoded tubes.
- Perform the sample probe maximum depth alignment using the SSC and tube (and, if necessary, adapter) combination that places the SSC highest in a segment. See “Sample Probe Maximum Depth Alignment” for SSC in Module 4: **Aligning**.

**WARNING:** Do not place an SSC on a sample tube that presents the SSC at a higher position than the tube that was used to perform the maximum depth alignment for the SSC. Failure to follow these instructions can result in operator injury, exposure to biohazardous samples, or damage to the instrument.

**To process SERUM or PLASMA samples from SSCs:**

- Fill the SSC with a maximum of 1.0 mL of sample. (The dead volume in a Dade Behring Inc. SSC is 50 µL only when placed in the same size sample tube that was used to perform the sample probe maximum depth alignment and the alignment is performed properly.)

**WARNING:** Prior to processing an SSC, you must ensure that sufficient sample is present to allow for any automatic test rerun from that SSC. If any of the following options is turned on, insufficient sample in the SSC could cause incorrect results:

- autorerun
- autodilute
- automatic reflex
- automatic panic rerun
- HIL feature

---

**Are any of these options turned on?**

Check it on the System Configuration Menu screen.

From the Operating Menu, press F6: **Sys Config**.
• Place the SSC on a sample tube that presents the SSC at the same height used in the sample probe maximum depth alignment for SSCs. Tubes that present the SSC at a lower position may be used, but the SSC must be filled with 1.0 mL of sample. It is the operator's responsibility to ensure that sufficient sample is present for the requested tests.

**To process WHOLE BLOOD samples from SSCs:**

• Before pipetting whole blood into the SSC, ensure that the sample is well-mixed as described in the appropriate method insert sheet.

• Pipette the volume of whole blood specified for the sample cup (see the appropriate method insert sheet) into the SSC.

  **WARNING:** Due to whole blood mixing requirements in the SSC, do not place more or less than the specified volume of sample in the SSC.

• Place the SSC on a sample tube that presents the SSC at the **same** height used in the sample probe maximum depth alignment for SSCs. To avoid the potential for erroneous results, tubes that present the SSC at a **lower position must not** be used for whole blood samples.
Placing Bar Code Labels on Sample Tubes

Apply the label to the tube according to the position your laboratory chose when the instrument was installed. There are two possible positions to select from: top bar code position and bottom bar code position.

Place the bar code label on the tube so that:

- it is oriented along the length of the tube. Do not wrap the label horizontally around the tube.
- it does not overlap the top or bottom of the tube
- there is no (or a minimum) slant to the label
- it meets the specifications for the position selected

Top bar code position: the entire bar code symbol must appear between the top of the tube down to 2.75 in. (0–70 mm).

Bottom bar code position: the bar code symbol must be 0.70 in. (18 mm) from the top of the tube. The bar code symbol placement also depends on the size of the tube for the bottom bar code position.

5-mL: between 0.70–2.75 in. (18–70 mm)
7- or 10-mL: between 0.70–3.46 in. (18–88 mm)

Barcode Labels
There should be at least .25-inch (6.4 mm) of blank space before and after the barcode.
Checking for Adequate Sample Volume for Processing

Before loading a sample tube into a segment, you should use the sample tube fill guide as a quick check for adequate sample volume in the sample tube. Hold the sample tube up to the proper side of the guide for that size tube. If the sample is within the indicated sufficient sample height area, there is adequate sample volume to run that sample. (The illustration shown below is not to scale.)

When the sample tube fill guide indicates that the sample is out of reach:

- If the sample tube does not have a bar code on it or there is less than 1 mL of sample available, pipette the fluid into a sample cup before processing.
- If you are using a bar code on the sample tube and there is at least 1 mL of sample available, pipette the fluid into an SSC and place the SSC on that same bar coded sample tube. Place this SSC/tube combination onto a segment that has been designated for SSC containers.
**Entering Sample Data**

Use this screen to enter data about a sample. Some shortcuts when using this screen are:

- **Manual Query.** If your LIS download capability uses the Send ID/Receive option, use the Manual Query feature to enter sample information. Type an asterisk (*) in front of the sample number and the rest of the Enter Sample Data screen will be filled in automatically.

- **QC Recall.** Enter a unique QC identifier in the Patient Name field beginning with the letters QC (such as QCmtr4) for each QC sample. Entering that unique name will retrieve all sample information from the last time that QC sample was processed. You won’t have to reenter this QC sample information. **However, if a QC panel is rerun for selected overrange/underrange results, only the tests that were rerun will be retrieved the next time QC recall is used.**

- **Default Data.** If you primarily use one mode and/or one fluid type, you can set defaults for these fields so that when a blank Enter Sample Data screen appears, those defaults will appear in those fields. See “Entering Sample ID Information” in Module 6: Customizing.

Using the Enter Sample Data screen, enter information in the following operator-assigned fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Enter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position</strong></td>
<td>Segment letter and position number of the sample.</td>
</tr>
<tr>
<td><strong>Patient Name</strong></td>
<td>Information must be entered in one of these two fields.</td>
</tr>
<tr>
<td>(and/or <strong>Sample Number</strong>)</td>
<td></td>
</tr>
<tr>
<td><strong>Patient ID</strong></td>
<td>Appears only if External Printer mode = Test Results Only and the LIS Communications mode = OFF.</td>
</tr>
<tr>
<td><strong>Tests</strong></td>
<td>Use the test keys or panel keys P1–P10.</td>
</tr>
</tbody>
</table>
2 Check the information in the following fields. If necessary, change the information as shown below.

<table>
<thead>
<tr>
<th>To change field</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>F7: Next Mode</td>
</tr>
<tr>
<td>Priority</td>
<td>F4: Next Priority</td>
</tr>
<tr>
<td>Fluid</td>
<td>F8: Next Fluid</td>
</tr>
<tr>
<td>Dilution (if used)</td>
<td>Use the arrow keys to move the cursor down to the Location field and then over to the Dilution field.</td>
</tr>
<tr>
<td>Location (if used)</td>
<td>Use the arrow keys to move the cursor to this field.</td>
</tr>
</tbody>
</table>

3 Press **F1: New Sample** to store the sample information.
A new Enter Sample Data screen will appear with the Position field automatically updated to the next available position (if one exists) in that segment.

4 Repeat steps 1 through 3 to enter more samples.

**Enter Sample Data Screen Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Where the sample container should be placed in the sample area.</td>
</tr>
<tr>
<td>Mode</td>
<td>To select a different mode, press F7: Next Mode. The type of sample container used with the sample. Possible modes are: • Primary tube • Bar code tube • Sample cup • Limited cup - no level sense • SSC - if configured • PED tube - if configured</td>
</tr>
<tr>
<td>Fluid</td>
<td>To select a different sample fluid, press F8: Next Fluid. You have nine sample fluid types to choose from: 4 sample fluids and 5 QC fluids. Sample Fluids QC Fluids • Serum • SerumQC1 • Urine • SerumQC2 • Plasma • SerumQC3 • CSF/Blood • UrineQC1 • UrineQC2 When a QC fluid is selected, the Priority field must be QC or XQC. When a urine drugs of abuse test is selected, the fluid field must be set to Urine.</td>
</tr>
</tbody>
</table>

Position entries are indicating none are available?
Press Alt/S to go to the Segment Status screen and then press F1: See All to see the status of positions in each segment.
To delete/clear segments and make their positions available for samples, press F3: Delete Seg and answer the prompts as they appear on the screen.
To delete:
• a segment, enter its letter
• all on-board segments, enter an asterisk (*)
• all segments, enter an exclamation point (!)
**Enter Sample Data Screen Fields** (continued)

<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
</table>
| Priority  | The system automatically sets the priority to Routine. To select a different priority, press **F4: Next Priority**. You have five priorities to choose from:  
  • Routine  
  • ASAP  
  • STAT  
  • QC  
  • XQC (crossover QC)  
  When QC or XQC priority is selected, the sample fluid must be set to SerumQC1, SerumQC2, SerumQC3, UrineQC1, or UrineQC2. If there are two Flex® reagent lots of the method on board and they have been calibrated, QC will be performed on both lots. |
| Volume    | This should be used for reference only; it shows how many μL of sample are needed to run the tests requested. It does not include the dead volume of the sample container.  
  *Do not use the volume field to determine the amount of sample needed for processing!!!* |
| Dilution  | Enter a dilution factor in this field if you manually made a dilution of the sample. Enter your manually made dilution factor as a whole number. Remember! Check the Method Insert Sheet for the proper diluent to use for that method.  
  For example, to make a times-10 dilution, you would dilute one part of sample with nine parts of diluent. The dilution factor would be: \((1 + 9) / 1 = 10\)  
  You would enter 10 in the Dilution field.  
  Dilution limit is 1:99.  
  When a dilution factor is entered, that sample will not be autodiluted by the instrument, except in certain circumstances (see Module 6: Customizing). To move the cursor to the Dilution field, first move the cursor to the Location field and then press the right arrow key. |
| Location  | This is a six-character optional field. It might be used to indicate the location of the patient in the hospital (wing 2 or rm 214) or to indicate some other type of helpful sample identification information for your laboratory. |
| Tests     | Select tests by pressing a test key or a predefined panel key. Up to twenty tests can be ordered for a sample. |
Entering and Running Batch Samples

To run batch samples, you must configure the system so that the Enter Batch Sample Data screen appears. See “Selecting Instrument Options” in Module 6: Customizing.

**All remaining sample positions for the batch are assigned automatically!**

The software will assign all remaining samples in the batch to on-board segments alphabetically and numerically beginning with the segment position you entered in the Position field.

1. Using the Enter Batch Sample Data screen, enter information in the following operator-assigned fields:
   - Position—Segment letter and position number where you will place the first sample of the batch.
   - Batch ID—The unique identification number for the batch.
   - Number of Samples to process—The number of samples in the batch.
   - Tests—Use the test keys or panel keys P1–P10.

2. Check the information in the following fields. If necessary, change the information as shown below.

   **To change**  
   **Use**  
   Mode  
   Fluid  
   F6: Next Mode  
   F8: Next Fluid

3. Press **F1: Assign Pos**.
4. Repeat steps 1 through 3 to enter more batch samples.
5. Press **F3: Load List** and use the Load List to load the samples in their assigned segment positions.
6. Make a separate handwritten listing of which patient sample is in which position on the segment wheel.
7. Press **F4: Run** or the Run key.

An example of entering a batch sample is on the next page.
Batch Example
Let's say you want to run a batch of 25 serum samples in sample cups. You might decide to give this batch a Batch ID of 025AX.

You would fill in the Enter Batch Sample Data screen as described below.

Field Fill in with:

Position Enter the position where the first sample cup of this batch will be placed. The instrument will then automatically assign all of the remaining 24 samples in the batch to available empty segment positions on the segment wheel.

Batch ID Enter the batch ID, 025AX.

Mode Press F6: Next Mode until this field displays Sample Cup.

Sample Fluid Press F8: Next Fluid until this field displays Serum.

Tests Enter the tests using the test method keys and/or any panel keys.

OPERATING MENU Press F1: ENTER DATA
F1: ASSIGN POS F3: LOAD LIST F5: DELETE TEST
F2: ENTER DATA F6: NEXT MODE F7: DELETE BATCH
F4: ENTER DATA

Press F1: Assign Pos to assign positions for all 25 samples in the batch.

Press F3: Load List and use the Load List screen to:

- load the samples in their assigned segment positions
- make a handwritten list that identifies which patient sample is in which segment position. This list will allow you to match each patient sample to the test report printout.

After loading the samples and making the handwritten list, press F4: Run or the Run key.

The test report for this batch would show sample numbers of 025AXC09, 025AXC10, 025AXD01, etc., and results. (Note that the sample’s segment position is shown by the last three characters of the sample number.) To determine which patient corresponds to the segment position shown on the report slip, you would use your handwritten list.

It is OK to be creative when naming batch IDs...
Here the Batch ID contains the number of samples in the batch. This will help this operator remember how many samples to check on the test result printout.

Batch reminder!
- All batch samples are run with a Routine priority.

When F1: Assign Pos is pressed...here's how batch positions are assigned.
If the on-board segments in the segment status area of the screen are A, X, L, M, N, and Z, and you enter the starting position for this 25 sample batch as X4, the positions for the remaining 24 samples in the batch would be automatically assigned to the next available positions in segment X, then L, M, N, Z, and A.
Loading Samples

1. For samples without bar code labels, use the Load List screen to see the segment position you assigned to each sample. The words “New Samples” should be within the brackets in the upper right-hand corner of the Load List screen. If they are not, press F2: Next Status.

<table>
<thead>
<tr>
<th>POSITION</th>
<th>VOLUME</th>
<th>STATUS</th>
<th>NEW SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Ensure that any lids on sample cups are pressed down completely and that all stoppers have been removed from sample tubes.

**WARNING:** Failure to remove stoppers can result in operator injury, exposure to biohazardous samples, or damage to the instrument.

3. Completely seat the correct sample container in its correct segment position. Remember to use the proper adapter for each sample container as necessary.

**WARNING:** Do not load samples/segments into the sample area if:

- that segment’s status box is red
- the instrument is initializing or processing
- the moving wheel light is lit
- the message “Moving Wheel . . .” is in the photometric sampler status box

Do not place your hands in the sample wheel area while the system is initializing or processing. You could injure yourself, be exposed to biohazards or damage the instrument.

**WARNING:** Incorrect results could occur if a primary sample tube is not completely seated in its segment position.

Placing a sample container in an incorrect position in the segment could affect results or damage the instrument.
4 Position bar code labels so that the bar code is visible in the opening of the segment. They can then be read by the bar code scanners.

5 Completely seat the segment in its segment position on the sample wheel.  
**WARNING:** Incorrect results could occur if a segment is not completely seated in its segment position.
Sample Processing

Processing Samples
When the sample information is available (either through the use of the Enter Sample Data screen, a bar code on a sample tube, or downloaded from an LIS) and segments have been loaded into the sample wheel, begin processing by selecting the appropriate option. There are three ways to begin processing samples:

• Processing samples from Standby status
• Adding samples while the system is in Processing status
• Processing samples downloaded from an LIS

Select the option that is appropriate for your current workload. These three options are discussed on the pages that follow.

Processing Samples from Standby Status
1 Ensure that all instrument lids are closed and all instrument doors and panels are closed.
2 Process your samples using one of the three options shown below:
   • Press the Run key on the keyboard.
   • If you are processing a single sample from the Enter Sample Data screen, press F2: Process Single.

What if the short sample icon appears and the instrument alarm sounds after processing begins?
Just press the Alt/L key combination for a list of the short samples.
• If you are processing a group of samples from the Load List screen, press **F4: Run**.

<table>
<thead>
<tr>
<th>LOAD LIST</th>
<th>STATUS: NEW SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITION</td>
<td>VOLUME REQUIRED</td>
</tr>
<tr>
<td>A 1</td>
<td>c</td>
</tr>
<tr>
<td>A 2</td>
<td>c</td>
</tr>
<tr>
<td>A 3</td>
<td>t</td>
</tr>
<tr>
<td>A 4</td>
<td>t</td>
</tr>
<tr>
<td>A 5</td>
<td>t</td>
</tr>
<tr>
<td>A 6</td>
<td>t</td>
</tr>
<tr>
<td>A 7</td>
<td>t</td>
</tr>
<tr>
<td>F 1</td>
<td>l</td>
</tr>
<tr>
<td>F 2</td>
<td>x</td>
</tr>
<tr>
<td>F 3</td>
<td>x</td>
</tr>
</tbody>
</table>

---

### Adding Samples While the System Is in Processing Status

1. Before adding samples while the system is in processing status, check the segment position in the segment status area of the screen.
   - If there is no segment letter in that position, you can load a new segment into that position.
   - If the segment letter has a *green* background color, you can add new samples to empty or unassigned positions of the segment or remove and replace the segment.
   - If the segment letter has a *red* background color, you can add new samples to empty or unassigned positions of the segment but **DO NOT** remove the segment or reposition the segment to another position on the sample wheel and **DO NOT** remove any sample container from the segment or reposition any sample container to another position in the segment.

   **WARNING**: If the background color is red, do not remove the segment, move the segment to another position of the sample wheel, or reposition any sample containers on the segment. Doing so will affect reported results and may damage the instrument.

2. Be sure that the sample data information for the sample is available to the instrument. Sample data information is available if:
   - you entered it using the Enter Sample Data screen
   - the sample tube is bar coded and its information has been downloaded to the instrument
   - the sample tube is bar coded and its information is available from an LIS
3 Load the samples/segments into their correct positions.

**WARNING:** Do not load samples/segments into the sample area if:

- that segment’s status box is red
- the instrument is initializing or processing
- the moving wheel light is lit
- the message “Moving Wheel . . .” is in the photometric sampler status box

Do not place your hands in the sample wheel area while the system is initializing or processing. You could injure yourself, be exposed to biohazards or damage the instrument.

4 Press the **Run** key on the keyboard.
Processing Samples Downloaded from an LIS

Samples that have had their sample information downloaded to the Dimension® RxL Max® system from an LIS will be run:

- for bar code sample tubes when the instrument reads the bar code during its scan of the sample segments
- for non-bar code sample tubes after the operator assigns a position for those samples

Configuring the System to Process Downloaded Samples from an LIS

To run samples downloaded from an LIS, two screens, Communications Set Up and Sample ID/Computer Menu, should have their fields filled out as shown in the table below. With the screens and fields filled in as shown below, the operator can assign segment positions for any downloaded samples that are not bar coded using the Sample Status screen.

Reminder!

If your laboratory has an LIS, the system configurations have already been set to meet the requirements of your laboratory during instrument installation.

Do not change an instrument option or configuration setting without approval from your laboratory supervisor.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Field</th>
<th>Set field to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Set Up</td>
<td>Mode</td>
<td>Send ID / Receive (or Send/Receive)</td>
</tr>
<tr>
<td>Sample ID / Computer Menu</td>
<td>Sample Edit</td>
<td>Sample Cup (or to the type of sample container you use most frequently)</td>
</tr>
</tbody>
</table>

**Screen Diagram**

```
[Diagram showing the screens and fields to be configured]
```

**Table Data**

<table>
<thead>
<tr>
<th>Field</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument ID:</td>
<td>Mode: Send ID / Receive</td>
</tr>
<tr>
<td>Result Sequence:</td>
<td></td>
</tr>
<tr>
<td>Screen</td>
<td>Field</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>SAMPLE ID / COMPUTER MENU</td>
<td>SEGMENTED WHEEL SETUP</td>
</tr>
<tr>
<td></td>
<td>Default Fluid Type: SERUM</td>
</tr>
<tr>
<td></td>
<td>Sample Edit: Sample Cup</td>
</tr>
<tr>
<td></td>
<td>Pediatric Tube Segments: Ped Tube I.D. (mm): 0</td>
</tr>
<tr>
<td></td>
<td>SSC: SSC I.D. (mm): 0</td>
</tr>
<tr>
<td></td>
<td>BAR CODE CONFIGURATION: Default Test Panel: 7</td>
</tr>
<tr>
<td></td>
<td>download Pretreats: NO</td>
</tr>
<tr>
<td></td>
<td>Bar Code Label Format: auto-discriminate - no check digits</td>
</tr>
</tbody>
</table>

Reminder!

If your laboratory has an LIS, the system configurations have already been set to meet the requirements of your laboratory during instrument installation.

Do not change an instrument option or configuration setting without approval from your laboratory supervisor.
Processing Non-Barcoded Samples Downloaded from an LIS

This procedure assumes that the instrument has been configured using the typical settings discussed earlier.

All downloaded samples appear at the top of the Sample Status screen with double asterisks (**) in the Position field.

1. From the Sample Status screen, use **F2: Next Status** to change the status in the upper right-hand corner of the screen to Entered.

2. Move the cursor to any asterisked (**) sample. The cursor will change into a box. If you want to see what tests were requested for that sample, press **F1: Show Tests**.

3. Enter a segment position for the sample.

4. Press the **Enter** key.

5. Load the proper sample container into the segment position that you assigned for it.

   **WARNING:** Failure to use the proper sample container can result in operator injury, exposure to biohazardous samples, or damage to the instrument.

6. Repeat steps 2–5 until you have assigned positions and loaded all asterisked (**) samples that you want to run at this time.

7. Press the **Run** key on the keyboard to begin processing.
System Needs

System needs include:

- adding:
  - reagent cartridges
  - IMT consumables
  - IMT probe cleaner
  - cuvette film cartridge
  - aliquot wheel (non-HM instruments only)

- performing:
  - calibration/verification on photometric methods and the IMT system
  - quality control

Before the system begins processing samples, it checks to see if it needs any reagents or supplies or if any process control functions need to be performed (calibration or quality control). However, tests that are ordered through the automatic test ordering features of autodilute, autoreflex, and panic values will not generate a system need and will not be processed if reagents, supplies, or control functions are required.

When you press **F2: Process Single** from the Enter Sample Data screen, **F4: Run** from the Load List screen, or the Run key, the system will check its needs (the yellow Needs Check icon appears) for processing the requested tests.

- If no system needs are required, the system will begin processing.
- If system needs are required, the red Check Needs icon appears. You will need to satisfy the system needs listed or choose to ignore these needs. If you choose to ignore system needs, tests that require those needs WILL NOT be processed. Tests will still be processed and reported if you ignore QC needs.

The System Needs screen:

- Shows which system needs must be satisfied to process all the samples on the Load List. Samples that have no system needs will be scheduled for processing.
- Shows function keys only for those categories of supplies and procedures that are needed.
Responding to System Needs

1. When the red Check Needs icon appears, press the Alt/N key combination to go to the System Needs screen to see what is needed to process all the samples on the Load List. Samples that have no system needs will be scheduled for processing.

<table>
<thead>
<tr>
<th>SYSTEM NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>To process the current workload, you need to:</td>
</tr>
<tr>
<td>ADD</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CALIBRATE</td>
</tr>
<tr>
<td>START QC ON</td>
</tr>
</tbody>
</table>

2. Decide whether you want to fill all or just some needs. Use the table on the next page to help you make your decisions.

3. To fill a specific system need, press its function key to see a list of what is needed. Function keys only appear for those system needs that must be filled to run the Load List. For example, in the screen above, to see which reagent cartridge needs to be added, press F1: Reagents and follow the appropriate procedure as indicated in the table below to fill the need.

<table>
<thead>
<tr>
<th>Function Key</th>
<th>Press the function key and follow this procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Reagents</td>
<td>“Adding Reagent Cartridges” in this module</td>
</tr>
<tr>
<td>F2: QC</td>
<td>Run your laboratory QC for the lots indicated.</td>
</tr>
<tr>
<td>F3: Cal/Ver</td>
<td>“Calibrating (or Verifying) Photometric Methods” as applicable in this module.</td>
</tr>
<tr>
<td>F4: IMT Consums</td>
<td>“Replacing IMT Consumables” (“Replacing IMT Fluids”, “Replacing the QuikLYTE® Integrated Multisensor”) in this module.</td>
</tr>
<tr>
<td>F5: Ignore Needs</td>
<td>See the “Understanding System Needs” table on next page.</td>
</tr>
<tr>
<td>F7: Sys Counters</td>
<td>To replace the cuvette film cartridge, press F3: Film Load and follow “Replacing the Cuvette Film Cartridge” or to replace the IMT probe cleaner bottle, press F6: HM Counters and follow “Replacing HM Fluids.” Both procedures are in Module 3: Maintaining.</td>
</tr>
<tr>
<td>F8: IMT</td>
<td>“Calibrating the IMT System” in this module.</td>
</tr>
<tr>
<td>Aliquot Positions</td>
<td>(non-HM) “Replacing the Aliquot Wheel” in Module 3: Maintaining.</td>
</tr>
</tbody>
</table>

4. If you fill a need and other system needs are still required, the System Needs screen will reappear and allow you to press another function key and fill another need. If no additional system needs are required, the system will begin processing your samples.
### Understanding System Needs

<table>
<thead>
<tr>
<th>Need</th>
<th>Occurred because:</th>
<th>If I press F5: Ignore Needs, what happens?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartridges</td>
<td>There is not enough reagent available to run all the tests.</td>
<td>As many tests as possible are run for the method.</td>
</tr>
<tr>
<td>Cuvette Cartridge</td>
<td>There is not enough film in the cuvette film cartridge to make all the necessary cuvettes.</td>
<td>As many tests as possible are run.</td>
</tr>
<tr>
<td>IMT Consumable</td>
<td>The QuikLYTE® sensor or a required IMT fluid does not have enough assays remaining to run the tests. OR The time remaining for the QuikLYTE® sensor or a required IMT fluid has expired.</td>
<td>As many electrolyte tests as possible are run. Na, K, Cl tests are run.</td>
</tr>
<tr>
<td>IMT Probe Cleaner</td>
<td>The IMT probe cleaner bottle does not have enough fluid in it to run all tests or has expired.</td>
<td>IMT Probe Cleaner is used with the HCG test. As many HCG tests as possible are run.</td>
</tr>
<tr>
<td>IMT System</td>
<td>The IMT system is not calibrated.</td>
<td>An IMT calibration is scheduled. If it fails, no electrolyte tests are run.</td>
</tr>
<tr>
<td>QC</td>
<td>QC for these lots has not been run within the time period set by the operator.</td>
<td>All tests are run.</td>
</tr>
<tr>
<td>Photo Methods</td>
<td>Calibration status is &quot;Expired&quot; for these reagent cartridges. OR Calibration status is &quot;Never Calibrated&quot; for these reagent cartridges.</td>
<td>All tests are run, but a test report message will appear on the report slip. Tests are not run and a test report message will appear on the report slip.</td>
</tr>
<tr>
<td>Aliquot Positions (non-HM)</td>
<td>The aliquot wheel does not have enough positions remaining on it to run all the tests.</td>
<td>As many tests as possible are run.</td>
</tr>
</tbody>
</table>
**Resolving a Short Sample Detected**

When the short sample icon appears, the instrument will also sound its alarm. This indicates that there is not enough sample in the sample container to perform all the tests requested. You have two options:

- Reduce the number of tests on the sample using **F8: Edit Sample**.
- Transfer the sample into a different sample container using the procedures below.

1. Press the **Alt/L** key combination to the Load List screen and view a list of the samples that do not have enough fluid to perform the requested tests.

   ![Load List Screen](image)

   **OPERATING  MENU**

   **Press F8: LOAD SAMPLES**

   **LOAD LIST**

<table>
<thead>
<tr>
<th>POSITION</th>
<th>VOLUME REQUIRED</th>
<th>SAMPLE NO.</th>
<th>DIL.</th>
<th>PATIENT NAME</th>
<th>FLUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1 c</td>
<td>short</td>
<td>55 ul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 5 c</td>
<td>short</td>
<td>55 ul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 9 t</td>
<td>short</td>
<td>116 ul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G 6 t</td>
<td>short</td>
<td>160 ul</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G 7 t</td>
<td>short</td>
<td>160 ul</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   **SAMPLE NO.**

   | 81465    | 21345           | 32235      | 44467 | 51356        |

   **FLUID**

   | SERUM    | SERUM           | SERUM      | SERUM  | SERUM         |

2. Use the appropriate procedure below for the sample container type with the short sample. In the screen above, position G6 has a “t” after it, indicating that sample is currently in a tube. Sample container letter designations on the Load List screen are:

   - **t** = sample tube
   - **c** = sample cup
   - **x** = SSC
   - **p** = pediatric tube
   - **l** = limited cup-no level sense

<table>
<thead>
<tr>
<th>Sample Container</th>
<th>Follow procedure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube (with bar code)</td>
<td>Short Sample – Primary Tube with a Bar Code</td>
</tr>
<tr>
<td>Tube (no bar code)</td>
<td>Short Sample – Primary Tube without a Bar Code</td>
</tr>
<tr>
<td>Sample Cup</td>
<td>Short Sample – Sample Cup</td>
</tr>
<tr>
<td>SSC</td>
<td>Short Sample – SSC</td>
</tr>
<tr>
<td>Pediatric Tube</td>
<td>Short Sample – Primary Tube without a Bar Code</td>
</tr>
</tbody>
</table>
Short Sample – Primary Tube with a Barcode

When a short sample occurs in a primary tube with a bar code label, you can transfer the sample into an SSC or a sample cup depending on the amount of sample available.

The dead volume in a Dade Behring Inc. SSC is 50 µL only in the sample tube that was used to perform the sample probe maximum depth alignment for an SSC. Tubes that present the SSC at a lower position may be used but must be filled with 1.0 mL of sample.

1  Press the Pause key. When the Sampler status box turns blue, open the sample area lid.

2  Remove the bar coded tube from its segment position and then use a pipette to transfer the sample into an SSC.

3  Place the SSC on top of the same bar coded tube and place it in the same segment position on the same sample segment.

   WARNING: Failure to place the SSC/bar coded sample tube combination into the same segment position as the original sample will cause erroneous patient identification and erroneous results.

4  Close the sample area lid and press the Pause key.

5  Using the Load List short sample screen, move the cursor to this short sample, press F6: Change to SSC, and answer the prompt that appears by typing a “y”.


Short Sample – Primary Tube without a Barcode
When a short sample occurs in a primary tube without a bar code label, you can transfer the sample into a sample cup or an SSC depending on the amount of sample available.

1. Press the Pause key. When the Sampler status box turns blue, open the sample area lid.
2. Remove the sample tube from its segment position and then use a pipette to transfer the sample into a sample cup.
3. Place the sample cup directly on top of the adaptor in the same segment position on the sample segment. (If a 10-mL sample tube was in this position, you will need to add an adaptor into this position to hold the sample cup. Do not place the sample cup directly on top of the 10-mL sample tube.)

WARNING: Failure to place the sample cup into the same segment position that the sample tube was in will cause erroneous patient identification and erroneous results.

4. Close the sample area lid and press the Pause key.
5. From the Load List short sample screen, move the cursor to this short sample and press F8: Edit Sample to go to that sample’s Enter Sample Data screen. Then press F7: Next Mode until the Mode field changes to “sample cup.”

Short Sample – SSC
When a short sample occurs in an SSC, you can pour the sample into a sample cup.

1. Press the Pause key. When the Sampler status box turns blue, open the sample area lid.
2. Remove the sample tube from its segment position and then use a pipette to transfer the sample into a sample cup.
3. Place the sample cup directly on top of the adaptor in the same segment position on the sample segment. (If a 10-mL sample tube was in this position, you will need to add an adaptor into this position to hold the sample cup. Do not place the sample cup directly on top of the 10-mL sample tube.)

WARNING: Failure to place the sample cup into the same segment position that the sample tube was in will cause erroneous patient identification and erroneous results.

4. Close the sample area lid and press the Pause key.
5. From the Load List short sample screen, move the cursor to this short sample and press F8: Edit Sample to go to that sample’s Enter Sample Data screen. Then press F7: Next Mode until the Mode field changes to “sample cup.”
**Short Sample – Sample Cup**

When a short sample occurs in a sample cup, you can change the sample container type for the sample to a limited cup. A limited cup is a Dade Behring Inc. sample cup that is processed without a level sense or fluid check being performed on it.

The operator must determine that some sample remains in the sample cup after the sample is run.

1. From the Load List short sample screen, move the cursor to this short sample, press F7: No Level / Cup, and answer the prompt that appears by typing a “y.”

2. After this sample has been run, there must be some sample fluid remaining in the sample cup. If the sample cup is empty, the test results should be reviewed for possible erroneous results.

**WARNING:** If there is no sample in the sample cup AFTER processing is complete, the operator must carefully review test results and decide which are reportable. To do this, determine which tests were sampled first. Results for tests that were sampled (and therefore processed) first are more likely to be reportable; however, at the point where there was no sample fluid in the sample cup, the results reflect values based on no sample fluid and should not be reported. Determine at which test that occurred and do not report any results for that test or for tests sampled/processed after that test. There may or may not be a test report message associated with an erroneous result.

**Suggestion when running the Limited Cup - No Level Sense mode:**

Run one test per sample request and check the volume of sample in the cup after each test. It will take longer to run all the tests on that sample, but the results will be reportable because you are checking the fluid level in the cup after each test.

**To determine which tests were sampled (processed) first, view the test results in their sampled order sequence....**

Go to the Test Results screen for that sample and press F7: Smp Ord On/Off until a message appears that indicates that the order of the tests on the screen is the sampled order. Tests at the top of this screen were processed first.
Sample Status

Determining the Status of Samples
The Sample Status program enables you to check the progress of samples through the instrument. There are several ways to determine the status of your samples and their segments:

- Sample Status screen
- STAT Status alert key
- Sample Alert key
- Segment Status – On Board Segments screen
- Segment Status – All Segments screen

Viewing Sample Status

Sample Status Screen
The Sample Status screen can contain the last 500 sample requests entered into instrument memory. A sample appears on this screen as soon as its sample data has been entered. It will remain on this screen until it is automatically discarded when the 500-sample or 5000-test result limit is exceeded, whichever occurs first. When the list is full, samples are discarded on a first-in, first-out basis.

Since this screen can contain up to 500 samples, a search function (see “Searching for a Sample” later in this module) is available from this screen to help you to find specific samples quickly.

More than one page of samples?
- Use the up and down arrow keys to move through the list.
- Use F5 or F6 to move to the first or last page of the list.
- Use PgUp and PgDn keys on the keyboard to move forward or back in the list one screen at a time.

What are the test results for a sample?
1. Move the cursor to that sample.
2. Press F8: Test Results.

Asterisks (*) to the left of the Status column?
This means that at least one test on this sample had a test report message on its printout.

What tests were run on a sample?
1. Move the cursor to that sample.
A list of the tests will appear in the message area. If this list ends with a series of dots, you will need to press F8: Test Results to see all tests for the sample.

From the Sample Status screen, check that the sample status category you want to view appears in the brackets in the upper right-hand corner of the screen. If this is not the status category you want to view, press F2: Next Status until the status category you want appears.
**Status** | **Meaning**
---|---
Entered | This sample’s data has been entered into a Load List, but you have not requested the system to run this sample yet. This sample’s data can still be edited before processing.
Ready | This sample’s data has been entered into a Load List, the sample has been loaded into the sample area, and you have requested the system to run this sample. This sample’s data can still be edited before processing.
Begun | The system has begun to process tests for the sample; some test results may be available. You can see any completed tests by moving the cursor to the sample and pressing **F8: Test Results**. Additional tests can be added to this sample even though processing has already begun.
Done | All tests for the sample have been processed; all test results are available. You can see these results by moving the cursor to the samples and pressing **F8: Test Results**. This sample can be edited and rerun.
Printed | All tests for the sample have been processed; all test results have been sent to the printer. This sample can be edited and rerun.
Report | All tests for the sample have been processed; all test results have been sent to an external host computer. This sample can be edited and rerun.
All | This is a comprehensive list of all samples currently in instrument memory.

**STAT Status Alert Key**
The STAT Status alert key can be configured to change to red or yellow to alert to a specific situation (see Module 6: Customizing). When you press the key on the touchscreen, the STAT Samples screen is displayed.

<table>
<thead>
<tr>
<th>STAT SAMPLES</th>
<th>Display Mode: SHOW ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name</td>
<td>Sample ID</td>
</tr>
<tr>
<td>James Smith</td>
<td>02030405</td>
</tr>
<tr>
<td>A. Harris</td>
<td>21232529</td>
</tr>
<tr>
<td>Fran Day</td>
<td>22332288</td>
</tr>
</tbody>
</table>

The information is displayed in the “When Available” field depends on the status of the sample:

<table>
<thead>
<tr>
<th>Status of Sample</th>
<th>When Available field displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing is completed</td>
<td>Now</td>
</tr>
<tr>
<td>Currently processing</td>
<td>Time to completion</td>
</tr>
<tr>
<td>Entered but not yet processing</td>
<td>Not Started (if alert is active)</td>
</tr>
<tr>
<td>Entered but not yet processing</td>
<td>Entered (if alert is not active)</td>
</tr>
</tbody>
</table>
There are four display modes for the STAT Samples screen, depending on your configuration (see “STAT Sample Alert Setup” in Module 6: Customizing). To change the display, press **F3: Next Display**.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show All</td>
<td>Displays all STAT samples, regardless of status.</td>
</tr>
<tr>
<td>Show Completed</td>
<td>Displays all completed STAT samples.</td>
</tr>
<tr>
<td>Show Processing</td>
<td>Displays all STAT samples currently processing. The When Available field is updated every five seconds. When a sample is completed, it is removed from this list.</td>
</tr>
<tr>
<td>STATS Not Started</td>
<td>Displays STAT samples entered but not started within a specified time period.</td>
</tr>
</tbody>
</table>

Additional function keys on the STAT Samples screen can save time by directly displaying screens to help you research and resolve errors. To use the following function keys, you must first move the cursor to an individual sample.

<table>
<thead>
<tr>
<th>Function Key</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Test Results</td>
<td>Displays the Test Results screen. For additional information, see &quot;Displaying Test Results&quot; later in this section.</td>
</tr>
<tr>
<td>F2: Edit/Rerun</td>
<td>Displays the Enter Sample Data screen. For more information, see &quot;Editing and Rerunning a Sample&quot; later in this section.</td>
</tr>
<tr>
<td>F5: Clear Alert</td>
<td>Removes the alert status from the selected sample. A better way to remove the alert is to resolve the problem that caused the alert status.</td>
</tr>
<tr>
<td>F8: Complete Alert</td>
<td>Available only when the STAT complete alert is configured for Selectable. Highlight a sample which is processing or not started. Press F8: Complete Alert. When processing is complete for the highlighted sample, the alert is activated.</td>
</tr>
</tbody>
</table>
Sample Alert Key

The Sample Alert key on the touchscreen changes color to yellow when a test is being reprocessed for any of these reasons:

- autodilute
- reflex test
- panic repeat
- process error

Press the Sample Alert key to display the Sample Alert screen:

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Sample ID</th>
<th>Pos</th>
<th>Reason for Rerunning</th>
<th>Meth</th>
<th>Samp Available In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ainsley, Keith</td>
<td>02030403</td>
<td>C1</td>
<td>Auto Dilute</td>
<td>ALB</td>
<td>2 mins 11 secs</td>
</tr>
<tr>
<td>Sanders, Jose</td>
<td>43548901</td>
<td>C3</td>
<td>Reflex</td>
<td>GLU</td>
<td>4 mins 21 secs</td>
</tr>
<tr>
<td>Inskip, Mary</td>
<td>22332222</td>
<td>C4</td>
<td>Reflex</td>
<td>BUN</td>
<td>READY</td>
</tr>
</tbody>
</table>

Samples appear on the screen at the time the initial test is completed and are removed after the rerun is completed. The display is refreshed every 10 seconds.

While the sample is displayed, you can select it with the cursor and press **F1: Test Results** to see the detail (see "Displaying Test Results" later in this section).

**Field**  | **Information**
---|---
Patient Name | Name of patient associated with the sample.
Sample ID | ID from barcode label or Enter Sample Data screen.
Position | Segment position of the sample.
Reason for Rerunning | Possibilities are:
- Auto Dilute
- Reflex
- Panic Repeat
- Process Error
Meth | The test method that is being rerun or reflexed for the sample.
Samp Available In | Time remaining until sample is finished processing. Expressed in minutes and seconds or as READY.
Segment Status – On Board Segments
You can view the position assignments status of segments appearing in the Segment Status area of the screen by pressing the Alt/S key combination at any time.

The On Board Segments screen shows each segment position and the sample ID of the sample that is assigned to that position. The segment ID uses the information in the sample number field from the sample’s Enter Sample Data screen.

Segment Status – All Segments
You can view the processing status of segment positions for all segments at any time by pressing the Alt/S key combination and then pressing F1: See All.

Viewing Segment Status
Using the Segment Status - On Board Segments screen shown below, you can view the position assignments status of the segments appearing in the Segment Status area of the screen. Press the Alt/S key combination at any time to see this screen.

The On Board Segments screen shows each segment position and the sample ID of the sample that is assigned to that position. The segment ID column uses the information in the sample number field from the sample’s Enter Sample Data screen.

Press Alt / S key combination on the keyboard.

<table>
<thead>
<tr>
<th>SEGMENT STATUS - ON BOARD SEGMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment - A</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>1 4355476</td>
</tr>
<tr>
<td>2 4355477</td>
</tr>
<tr>
<td>3 4355478</td>
</tr>
<tr>
<td>4 12</td>
</tr>
<tr>
<td>5 13</td>
</tr>
<tr>
<td>6 14</td>
</tr>
<tr>
<td>7 15</td>
</tr>
<tr>
<td>8 361763</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

F1: SEE ALL    F2:    F3: DELETE SEG    F4: DELETE SAMPLE
F5:    F6:    F7: DELETE ENTERED    F8: DEL RECORDS

Letters and colors used for sample status...
N - no data (red)
E - entered (white)
R - ready (green)
B - begun (yellow)
D - done (light red)
P - printed (blue)
r - reported (light blue)
Using the Segment Status - All Segments screen shown below, you can view the **processing status** of segment positions for all segments. From the Segment Status - On Board Segments screen above, press **F1: See All** to see this screen.

---

**Here's a way to put the All Segments screen to use...**

Use it when pre-entering samples into segments that are not currently on the instrument and when you don't remember the availability of the segment positions.
HM Reaction Vessel Status

The status of each of the 45 slots in the HM incubate wheel is available from the Process Control Menu. To see the status of each slot in the incubate wheel:


2. Now press Exit to go back to the Process Control Menu screen. The status of the slots in the incubate wheel is now shown whenever this screen appears.

The letters indicate the status of the 45 positions on the incubate wheel.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>Unloaded</td>
<td>no vessel is loaded or slot empty</td>
</tr>
<tr>
<td>L</td>
<td>Loaded</td>
<td>vessel has been successfully loaded</td>
</tr>
<tr>
<td>A</td>
<td>Allocated</td>
<td>vessel has been allocated by system for use</td>
</tr>
<tr>
<td>i</td>
<td>incubating</td>
<td>vessel contains sample/reagent and is incubating</td>
</tr>
<tr>
<td>w</td>
<td>washing</td>
<td>vessel is on the wash wheel</td>
</tr>
<tr>
<td>W</td>
<td>Washed</td>
<td>vessel has returned from wash wheel to incubate wheel</td>
</tr>
<tr>
<td>P</td>
<td>Processed</td>
<td>assay complete, vessel has been used and will be discarded</td>
</tr>
</tbody>
</table>
The dot on the screen above status position 1 and the line above position 23 correspond to the white alignment dot and the white alignment mark on the incubate wheel itself. If there is a vessel listed on this screen that you need to locate, use these two known reference points and refer to the illustration below. Position/slot 1 is always the first slot counterclockwise from the white alignment dot; all other positions/slots are numbered clockwise starting from position/slot 1.
Understanding Test Reports

You can report a test result if it appears without a message on its line of the printed test report. If a message appears, see the information below.

Test Results with Test Report Messages
A test result may appear with a test report message next to the result in the Reference Range column. Depending on the specific test report message, the test result may or may not be reportable.

WARNING: Do not report a test result that appears on the printed test report with a test report message whose meaning indicates that it is NON-REPORTABLE, even though a result may appear on the printed report slip.

A test result line on the test report can only display one test report message. If more than one test report message has affected the result, the instrument prints the highest priority message. See “Test Report Message Priorities” in the Appendix.

Test Results with Reference Range Indicators
A test result may contain a reference range indicator next to the result. There are four reference range indicators: HI, LO, hp, and lp. Test results that appear with only a reference range indicator are reportable.

WARNING: Do not report a test result that appears on the printed test report with a reference range indicator if it also appears with a test report message whose meaning indicates that it is NON-REPORTABLE.

These reference range indicators appear next to a result according to the ranges the operator has programmed for that method in the Method Parameters screen. See “Entering Method Parameters” in Module 6: Customizing. Remember to follow your laboratory procedures for lp and hp indicators.

HIL Index
The HIL index can alert you to potential interference from hemolysis, icterus, and lipemia in a sample, where:

- H = hemoglobin resulting from lysis of red blood cells
- I = icterus resulting from endogenous bilirubin
- L = lipemia or turbidity caused by insoluble lipids

When the HIL feature has been programmed (see Module 6: Customizing), the instrument automatically pipets 20 µL of sample into an empty cuvette along with system water. Spectral absorbance measurements are used to generate a sample-specific HIL index. The HIL index appears on the report slip as a three-digit value where:

1st digit = H index
2nd digit = I index
3rd digit = L index

Meanings of Test Report Messages and Reference Range Indicators...
See “Test Report Messages and Reference Range Indicators” in the Appendix for an alphabetical listing of test report messages along with the appropriate action that should be taken by the operator.
Each index value correlates to an approximate concentration for each of the potential interferents, as specified in this table:

<table>
<thead>
<tr>
<th>Index</th>
<th>H (mg/dL)</th>
<th>I (mg/dL)</th>
<th>L (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H ≤ 25</td>
<td>I ≤ 2</td>
<td>L ≤ 25</td>
</tr>
<tr>
<td>2</td>
<td>25 &lt; H ≤ 50</td>
<td>2 &lt; I ≤ 5</td>
<td>25 &lt; L ≤ 50</td>
</tr>
<tr>
<td>3</td>
<td>50 &lt; H ≤ 200</td>
<td>5 &lt; I ≤ 20</td>
<td>50 &lt; L ≤ 200</td>
</tr>
<tr>
<td>4</td>
<td>200 &lt; H ≤ 300</td>
<td>20 &lt; I ≤ 40</td>
<td>200 &lt; L ≤ 600</td>
</tr>
<tr>
<td>5</td>
<td>300 &lt; H ≤ 500</td>
<td>40 &lt; I ≤ 60</td>
<td>600 &lt; L ≤ 1000</td>
</tr>
<tr>
<td>6</td>
<td>500 &lt; H ≤ 1000</td>
<td>60 &lt; I ≤ 80</td>
<td>1000 &lt; L ≤ 3000</td>
</tr>
</tbody>
</table>

If the following conditions are met, the test report will display the “HIL interf” message next to the affected test result:

- the HIL Operating Mode has been set to an “AUTO-ON” mode
- a method with entered Alert Index values between 2 and 6 has been processed on the sample
- any of the measured HIL index values (H, I or L) is greater than or equal to the corresponding Alert Index value entered for that method

If the “HIL Interf” message is displayed, follow your laboratory’s procedure for reporting results when the sample is hemolyzed, icteric and/or lipemic.

If the maximum number of tests (36) has been ordered for a sample, HIL is not processed.
Using Dimension® RxL Max® clinical chemistry system

**Printed Test Report**

The printed test report is automatically output by the instrument’s printer when all the requested tests on a sample have been processed. If an instrument problem occurs during the processing of a test, the test report will contain an appropriate test report message for each test that was affected. A typical test report is shown and explained on the next page.

If two or more of the same tests are requested or performed on a sample, the mean, sd, and cv for these tests will appear at the bottom of the test report. The following formulas are used to calculate the standard deviation and the coefficient of variation for these tests:

\[
SD = \sqrt{\frac{\sum(x - \bar{X})^2}{N - 1}}
\]

\[
CV = \frac{SD}{\bar{X}} \times 100
\]

**Understanding a Printed Test Report**

The header of the instrument printer’s test report can be customized with your laboratory's name. (See “Configuring the Printer” in Module 6: Customizing).
<table>
<thead>
<tr>
<th>Test Report</th>
<th>Why it appears/What it means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient information</td>
<td>Comes from the Enter Sample Data screen (or the LIS).</td>
</tr>
<tr>
<td>Test Results</td>
<td></td>
</tr>
<tr>
<td>HIL</td>
<td>Indicates the three indexes for HIL measurement in the sample. Used to determine if the sample condition should be evaluated before results are reported.</td>
</tr>
<tr>
<td>CA</td>
<td>This indicates that two CA tests were requested and run on this sample.</td>
</tr>
<tr>
<td>crea</td>
<td>These lowercase letters indicate that this method’s standard sample volume was changed on the Method Parameters screen or the method has been correlated. See Module 6: Customizing.</td>
</tr>
<tr>
<td>MG</td>
<td>The result exceeded the assay range of the method. Although a result appears with a HI test report message, it cannot be reported because of the “assay range” non-reportable test report message.</td>
</tr>
<tr>
<td>VANC</td>
<td>The result was above the assay range of the method and could not be calculated. No result is reported with the “above assay range” non-reportable test report message.</td>
</tr>
<tr>
<td>CA</td>
<td>The last line was automatically calculated by the instrument because more than one CA test was run on the sample.</td>
</tr>
</tbody>
</table>

See “Test Report Messages and Reference Range Indicators” in the Appendix for an alphabetical listing of all the test report messages, their meaning, and what action should be taken by the operator when they appear.
Displaying Test Results

**Reminder:**
This display is instantly updated with results as tests are completed.

**Can't remember the exact name?**
Try using the asterisk (*) as a wild card when using F6: Search. For details, see "Searching for a Sample" on the next page.

**To see which segment position was assigned to this sample...**

**To set up a customized order for viewing and printing test results...**
See "Test Result Order" in Module 6: Customizing.

**Reprinted Report Title:**
A reprinted report contains the words “Print Results” on it; the original report has “Test Report” on it.

1. From the Test Results screen, type the patient name or sample number and press Enter. The most recently processed sample with that patient name or sample number appears.

2. To see if there are any more samples with test results for the same patient name or sample number, press F1: Search Back to search chronologically for a sample processed prior to this sample or F2: Search Forward to search for one processed after this sample.

You can view/print the results out in either the order in which they were processed (referred to as “sampled order”) or in your customized order (referred to as selected order) if you have one set up. Press F7: Smp Ord On/Off and answer the prompt to see the difference between a sample order sequence and a processed order sequence for these test results. Note that whichever order you leave this screen in will be used by the instrument for all future reporting; typically the order is not changed after it is set up during your instrument installation.

**Reprinting Results from the Test Results Screen**
You can reprint these results by pressing F5: Print Results.

If these results have already been sent to a host computer, the message “Do you want to re-transmit to Host Computer (y/n)” appears. Before using the retransmit feature, ensure that the host computer is capable of receiving multiple reports for the same sample without confusing them. If you are not sure, check with your local host computer consultant.

Press “n” to print out the results; press “y” to retransmit to your host computer.
Searching for a Sample

1 Using the Sample Status screen, check that the sample status category you want to search through is in the brackets in the upper right-hand corner of the screen. If this is not the status category you want to search, press F2: Next Status until the status category you want to search appears.

2 Press F3: Search.

3 Type the desired search pattern for the patient name or sample number of the sample. You don’t have to type the entire patient name or sample number; just type enough of it to make it unique, followed or preceded by an asterisk (*). See “Search Examples” on the following page for how the asterisk is used.

4 Press the Enter key. The Test Results screen for the most recently processed sample with that search pattern will appear.

5 Press F1: Search Back to see if any more matches were found for the search pattern you entered.

Another way to search for a sample:
From the Operating Menu, press:
F3: Test Results
F6: Search
and follow this procedure from step 3.
Using an asterisk (*) in the search pattern to search for samples.

The * is a match for anything.
- In the example "Smith", anything can precede the word Smith.
- In the example Smith*, anything can follow the word Smith.
- In the example "Smith*", anything can precede or follow Smith.

This “sounds” like a nice feature!

The search function will also find sound-alike patterns when searching for names.
- For example, if you type "Reta Smith" and the search does not find an exact match, it might advise you that it could not find that exact name and then suggest possible “sound-alike” matches that it did find (which in this case would include Rita Smith)!

<table>
<thead>
<tr>
<th>If you type</th>
<th>The system will find</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>Samples that match <strong>John Smith</strong> exactly. It <strong>would not</strong> find: John-Smith-123, A-John Smith.</td>
</tr>
<tr>
<td>Smith-Jackson</td>
<td>Samples that match <strong>Smith</strong> exactly. Punctuation marks are not recognized.</td>
</tr>
<tr>
<td>*Smith</td>
<td>Samples that end with <strong>Smith</strong>. It would find: John-Smith, 123-Smith. It <strong>would not</strong> find: John-Smith-123, Smith-Jones.</td>
</tr>
<tr>
<td>Smith*</td>
<td>Samples that begin with <strong>Smith</strong>. It would find: Smith-Jones-Smith, Smith-123-A. It <strong>would not</strong> find: John-Smith-123, 123-Smith.</td>
</tr>
<tr>
<td><em>Smith</em></td>
<td>All samples that have the word <strong>Smith</strong> in it. It would find: John-Smith-123, ICU Smith-A, John-Smith, Smith-Jones.</td>
</tr>
<tr>
<td>123*</td>
<td>All sample ID numbers that begin with <strong>123</strong>. It would find: 123456, 123333, 123999, 123957.</td>
</tr>
<tr>
<td>123**9</td>
<td>Numbers that begin with <strong>123</strong>, end with <strong>9</strong>, and have two characters between the 3 and 9. It would find: 123649, 123AZ9, 123GB9, 1235W9.</td>
</tr>
</tbody>
</table>
Editing and Rerunning a Sample

1. Find the sample’s Enter Sample Data screen in instrument memory using one of the three screens listed below:

<table>
<thead>
<tr>
<th>At this screen</th>
<th>Do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load List</td>
<td>If the sample is still on the Load List, move the cursor to the sample and press F8: Edit Sample.</td>
</tr>
</tbody>
</table>
| Sample Status  | 1 Press F2: Next Status until the status category in the upper right-hand corner of the display changes to the status category of the sample, if known, or All.  
2. Find the sample in this list by either moving the cursor to the sample using the arrow keys or by pressing F3: Search and entering the desired search pattern. |
| Test Results   | 1 Enter the desired search pattern.  
2. Once the sample has been located, press F4: Edit/Rerun. |

Sample Status Screen Reminder:
An asterisk (*) next to the sample on the Sample Status screen means that the sample had one (or more) failed tests.

If the status of the sample to be edited is Begun...
The Add Tests screen appears. You can only add tests to that sample or change its priority. You cannot change this sample’s container until it finished processing.

Helpful messages also appear!
When the sample’s Enter Sample Data screen appears, a message will give you some information about the sample to help you with rerunning.

2. The Enter Sample Data screen or the Add Tests screen will appear. Change or add any information as you do when filling out the Enter Sample Data screen. (If the Add Tests screen appears, you can only add tests to that sample or change its priority.)

3. After you have edited the information:
   - Press F2: Process Single or the Run key to begin processing this sample.
   - Press F3: Load List to enter the sample into the Load List. Then press F4: Run or the Run key if you want to begin processing all samples shown in this Load List.

From the Enter Sample Data screen, you can also press F1: New Sample to enter a new sample.
Rerunning Tests Using Load Errors

1. Do not remove any segments or sample containers from their original positions and do not delete any segments using the software.

2. Review the Test Report slip for that sample and correct any instrument problems that might have caused the test report message(s).

3. From the Load List screen, press **F6: Load Errors**.

4. Answer the message that appears to designate the segment(s) that have samples with errors to be loaded into the Load List.

<table>
<thead>
<tr>
<th><strong>Selection</strong></th>
<th><strong>Selects</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment letter</td>
<td>Any samples with errors on that segment.</td>
</tr>
<tr>
<td>*</td>
<td>Any segment currently appearing in the segment status box that has samples with errors on it.</td>
</tr>
<tr>
<td>!</td>
<td>All segments on the Load List</td>
</tr>
</tbody>
</table>

5. Answer the message that appears by typing a “y.”

6. Select what you want to do next:
   - To rerun these tests now, press **F4: Run**.
   - To enter new samples, go to the Enter Sample Data screen.

What if you answer with an “n”?
You will see how many tests there are in the selected area but you cannot load them at this time.
System Needs

Supplies Alert
When the Supplies alert key changes to yellow, press the key on the touchscreen to display the Reagent Cartridge Alerts screen.

<table>
<thead>
<tr>
<th>REAGENT CARTRIDGE ALERTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>REAGENT CARTRIDGE</td>
</tr>
<tr>
<td>ACP</td>
</tr>
<tr>
<td>ALB</td>
</tr>
<tr>
<td>CHOL</td>
</tr>
<tr>
<td>CHOL</td>
</tr>
</tbody>
</table>

The screen sample above demonstrates three different scenarios for a reagent cartridge alert:

ACP - a single ACP Flex® cartridge is on board and has only five tests remaining, five fewer than the designated alert threshold of 10.

ALB - multiple ALB Flex® cartridges are on board, all with the same lot number. The “Tests Left” field shows the cumulative number of tests from all ALB reagent cartridges.

CHOL - multiple CHOL Flex® cartridges from two different lots are on board. The threshold of 161 is compared to the cumulative number of “Tests Left” from all CHOL reagent cartridges.

When a method appears on the Reagent Cartridge Alerts screen, you can do one of the following:

- Load enough reagent cartridges to exceed the “Alert At” threshold for the method (see “Adding Reagent Cartridges” later in this section).
- Change the “Alert At” threshold to a number lower than the number of available tests (see “Setting Alert Thresholds” in Module 6: Customizing).
- Change the “Alert At” threshold to 0 (zero) to disable the alert function for the method (see “Setting Alert Thresholds” in Module 6: Customizing).
### Reviewing the Reagent Cartridge Inventory

The reagent cartridge inventory contains all the information for each Flex® reagent cartridge currently in the reagent tray. From the Reagent Cartridge Inventory screen, press a test key on the keyboard to move directly to that method in the listing. The information on this screen is discussed in the table below.

#### Field Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Method name abbreviation.</td>
</tr>
<tr>
<td>Lot Number</td>
<td>The six-character (two letters and four numbers) manufacturing lot number for the cartridge.</td>
</tr>
<tr>
<td>Sequence Number</td>
<td>The unique eight-digit number for each cartridge.</td>
</tr>
<tr>
<td>Tests Left</td>
<td>The number of test equivalents of reagent remaining in the cartridge.</td>
</tr>
<tr>
<td>Calib Exp Date</td>
<td>The date that the calibration for that lot expires.</td>
</tr>
<tr>
<td>System Exp Date</td>
<td>The date after which the cartridge will not be used by the system and must be discarded.</td>
</tr>
<tr>
<td>In Use</td>
<td>YES (white) The cartridge is currently being hydrated or is being used by the system to process a Load List or a System Check. NO (white) The cartridge is not being used.</td>
</tr>
</tbody>
</table>

#### Function Key references

Procedures for using these function keys are in this module on the pages that follow.

<table>
<thead>
<tr>
<th>Function Key</th>
<th>How to use it</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Show Holds</td>
<td>See “Using Third Lots of Reagent Cartridges” procedure.</td>
</tr>
<tr>
<td>F3: Remove Reag</td>
<td>See “Removing Reagent Cartridges” procedure.</td>
</tr>
<tr>
<td>F5: Print</td>
<td>Press to print out entire reagent cartridge inventory.</td>
</tr>
<tr>
<td>F6: Fix Inventory</td>
<td>See “Removing Reagent Cartridges” procedure.</td>
</tr>
<tr>
<td>F7: Remove Zero'd</td>
<td>See “Removing Reagent Cartridges” procedure.</td>
</tr>
<tr>
<td>F8: Remove All</td>
<td>See “Removing Reagent Cartridges” procedure.</td>
</tr>
</tbody>
</table>
Adding Reagent Cartridges
Reagent cartridges are placed into the instrument using the automatic loader. All you need to do is place the reagent cartridge in the loader. The Dimension® RxL Max® system will read the information on the barcode label and then move the cartridge into the reagent tray.

Automatic Addition of Reagent Cartridges
Place the reagent cartridge into the automatic loader so that its narrow end goes into the instrument first and its bar code label is on the right side of the cartridge.

WARNING: Do not add any reagent cartridge that:
• has been used in any other Dimension® instrument
• has exceeded its on-system expiration period (check the insert sheet)
• has exceeded its shelf life date (check the wrapper)
• is empty

If the automatic loader will not insert the cartridge into the instrument...
The loader light will begin blinking and a blinking reagent manager icon will appear on the screen.
1. Remove the cartridge from the loader.
2. Press the Alt/R key combination to see why this reagent cartridge could not be loaded.

If the cause was:
• The reagent tray is full:
  Remove a reagent cartridge from the instrument to make room for this cartridge.
  Follow “Removing Reagent Cartridges” in this module.
• The reagent cartridge bar code could not be read:
  Follow the “Manually Entering a Reagent Cartridge Bar Code” procedure on the next page.

WARNING: Do not place anything except a reagent cartridge or the reagent tray alignment gauge into the automatic loader slot. Doing so could cause operator injury or damage to the instrument.
Manually Entering a Reagent Cartridge Barcode

You need to use this procedure only when the barcode reader cannot read the barcode on the reagent cartridge.

1. Record the following information from the reagent cartridge label on a piece of paper:
   - method name abbreviation (e.g., CREA)
   - lot number (e.g., GB0301)
   - sequence number (e.g., 25131096)

2. Go to the Reagent Cartridge Control screen.

   WARNING: Do not add any reagent cartridge that:
   - was used in any other Dimension® instrument
   - exceeds its on-system expiration period (see insert sheet)
   - exceeds its shelf life date (check reagent cartridge wrapper)
   - is empty

3. Put the reagent cartridge into the automatic loader so that its narrow end goes into the instrument first and its bar code label is on the right side of the cartridge.

4. When the bar code reader fails to read the bar code this time, use the keyboard to enter the information recorded in step 1 onto the screen.
   a) Type the method name abbreviation (e.g., CREA) and then press Enter.
   b) Type the lot number (e.g., GB0301) and then press Enter.
   c) Type the first five numbers of the sequence number (e.g., 25131) and then press Enter.
   d) Type the last three numbers of the sequence number (e.g., 096) and then press Enter.

5. Press F1: Accept Data to confirm the addition of the reagent cartridge. The automatic loader will then place the reagent cartridge into the instrument.
Removing Reagent Cartridges

Let the system remove empty or expired reagent cartridges automatically...

From the Operating Menu, press F6: Sys Config and set the Automatic Cartridge Removal field to "ON." You will need your password to change this field.

A yellow "NO" in the In Use field...

Indicates that an automatic reagent cartridge removal of this cartridge was unsuccessful. This cartridge must be removed manually. See "To remove a specific reagent cartridge" on this page.

If the reagent cartridge barcode cannot be read when it is removed from the instrument, the reagent manager icon will appear.

To remove this cartridge from the inventory:
1. Remove the reagent cartridge from the loader.
2. Check the barcode on the cartridge to be sure it is the one you wanted to remove.
3. Press F6: Fix Inventory on the Reagent Cartridge Inventory screen.
4. Move the cursor to that reagent cartridge and press F3: Verify Slot.
5. When prompted, press F2: Remove Data.

Use F1: Verify All to verify the entire inventory.

Using the Reagent Cartridge Inventory screen, decide whether you want to remove a specific cartridge, all empty cartridges, or all reagent cartridges from the instrument and then follow the instructions below.

**WARNING:** Wait until the red loader light is blinking before placing your hands or fingers into the loader to remove a reagent cartridge.

**To remove a specific reagent cartridge:**
1. Move the cursor to the cartridge and then press F3: Remove Reag.
2. When the red loader light begins blinking, remove the reagent cartridge from the loader.
3. Press F1: Confirm Remove.

**To remove all empty reagent cartridges:**
1. Press F7: Remove Zero’d.
2. Remove the reagent cartridges from the loader as they are removed from the reagent tray.

**To remove all reagent cartridges:**
1. Press F8: Remove All.
2. Remove the reagent cartridges from the loader as they are removed from the reagent tray.
Using Third Lots of Reagent Cartridges

There may be times when a third lot of reagent cartridge for a method is loaded onto the system. When a third lot is loaded, a blinking reagent manager icon appears. Pressing the Alt/R key combination will show the following message: “A reagent cartridge has been added which would force calibration of a 3rd lot. It has been stored as method ‘HOLD.’ Please go into the inventory 3rd lots screen to replace a currently calibrated lot or remove it from inventory.”

A reagent cartridge with a HOLD designation is not used by the Dimension® system until you confirm that this third lot should be used.

You should periodically check to see if any third lots of reagent cartridges are on the instrument by going to the Reagent Cartridge Hold Inventory screen and pressing F1: Show 3rd Lot.

1. Go to the Reagent Cartridge 3rd Lot Inventory screen.

2. Move the cursor to the reagent cartridge that you want to begin using on the Dimension® system and then press F1: Replace Lot.

3. Since this action will permanently remove a previous lot ID from instrument memory, the system will display the message: “New lot would replace calibrated lot (Lot ID that will be replaced). Do you approve? (y/n).”

4. Press “y” to confirm removal of this lot’s calibration from instrument memory. If you are not ready to replace this lot (e.g., there are still unexpired Flex® reagent cartridges remaining in your laboratory for this lot, or you loaded this third lot by mistake), press “n.”

If you have loaded a third lot by mistake...

To remove a third lot from the instrument:

1. Move the cursor to the reagent cartridge.
2. Press F3: Remove Reag.

The cartridge will be moved to the autoloader for you to remove.
**Replacing HM Consumables**

The HM module requires periodic replacement of the four fluids listed below and the addition of reaction vessels:

- IMT probe cleaner
- chemistry wash
- reagent probe cleaner
- sample probe cleaner

The IMT probe cleaner must be replaced when it appears on the System Needs screen before processing tests. It appears if its 30-day expiration period has expired or if there is 0% left in the bottle as indicated in the Fill Level Est field on the Heterogeneous Module System Counters screen.

The volume of chemistry wash, reagent probe cleaner, and sample probe cleaner is monitored by a low level sensor in each of their bottles.

**WARNING: DO NOT pool the Chemistry Wash solution. To prevent contamination of these solutions, wear gloves when handling the dip tube assemblies and do not allow them to touch the instrument or the floor.**

Replace these fluids when there is less than 5% remaining in the bottle as indicated on the Daily Maintenance Routines screen (F3: Chk HM Counts) or when an error message appears indicating that the bottle is empty.

**Replacing HM Fluids**

1. With the system in Standby, go to the Heterogeneous Module System Counters screen.

---

**Tools and supplies:**
- paper towels
- disposable gloves

---

**Getting to the HM System Counters screen...**

From the Daily Maintenance Routines screen, press:

- F3: Chk HM Counts

From the System Needs screen, press:

- F7: Sys Counters
- F6: HM Counters

or to get there on your own, from the Operating Menu, press:

- F4: System Prep
- F6: Sys Counters
- F6: HM Counters
2. To replace the chemistry wash, reagent probe cleaner, or sample probe cleaner, open the middle instrument door, press the pump assembly release button to open the pump assembly, and locate the bottle to be replaced.

To replace the IMT probe cleaner, raise the sample lid and locate the IMT probe cleaner bottle between the IMT port and the sample wheel.
3 Replace the bottle(s).

**WARNING:** Wear gloves to avoid contaminating the pump assemblies and new bottles of solutions. When removing a dip tube assembly from its bottle, only touch the bottle cap; *do not touch* the dip tube assembly itself or allow it to contact the instrument or floor. If necessary, lay the dip tube assembly on a clean paper towel.

---

**All fluid priming is done automatically!**

After you replace any of these fluids, the instrument will schedule and perform any priming necessary.

<table>
<thead>
<tr>
<th>Bottle</th>
<th>To Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Wash,</td>
<td>1 Unscrew the bottle cap/dip tube assembly and remove it from the bottle.</td>
</tr>
<tr>
<td>Reagent Probe Cleaner</td>
<td><em>(If necessary, place the dip tube assembly on a clean paper towel.)</em></td>
</tr>
<tr>
<td>or Sample Probe Cleaner</td>
<td></td>
</tr>
<tr>
<td>IMT probe cleaner</td>
<td>2 Screw the bottle cap/dip tube assembly onto the new bottle and place back in the instrument.</td>
</tr>
</tbody>
</table>

4 Use the arrow keys to move the cursor box to each bottle that was replaced and press the **Enter** key.

5 Press **F1: Store Changes**.
Adding HM Reaction Vessels

1. Raise the reaction vessel cover in the sample area lid.
2. Pour reaction vessels up to the red line on the reaction vessel holder.
3. Open the right cabinet door. Slide the HM waste container out of its holder and remove the waste container liner. Peel the liner tape, seal the liner and discard.

**WARNING:** The used reaction vessels and waste container liner are biohazards; use your laboratory’s safe biohazard waste disposal procedures when discarding.

4. Place a new waste container liner (supplied in HM reaction vessel bags) in the HM waste container. Make sure the liner is fully open and conforms to the inside walls and bottom of the container. Slide the lined waste container into its holder.

**WARNING:** Failure to insert the HM waste container liner properly may result in vessel jams in the vessel chute.

5. Display the HM System Counters screen. From the Operating Menu, press:
   - F4: System Prep
   - F6: Sys Counters
   - F6: HM Counters

6. Move the cursor to the Vessels in Waste field, and press the Enter key to change this field to YES. Then press F1: Store Changes.
Replacing IMT Consumables

**Time Left fields ...**
The Time Left fields count down in days. The countdown changes to hours when less than one day remains for the consumable.

Using the Change IMT Consumables screen, determine which IMT consumables are empty or have no time left, or those that you want to replace.

- Replace any IMT fluid (Standard A, Standard B, Flush, Salt Bridge Solution, or Diluent) that does not have enough assays (reagent) remaining to run your tests.
- Replace any IMT fluid (Standard A, Standard B, Diluent) that has no time left for its on-board life.
- Replace the QuikLYTE® integrated multisensor if it does not have enough assays or time left to run your tests.
Replacing IMT Fluids

1. Go to the Change IMT Consumables screen to replace Standard A, Standard B, Flush, Salt Bridge Solution, or Diluent.

   **IMT Fluid** | **To Replace**
   --- | ---
   Diluent or Salt Bridge Solution | Unscrew the cap and replace the used bottle. **WARNING:** Never pour the remnants of a Salt Bridge Solution bottle or Diluent bottle into a new bottle. If you replace the Salt Bridge Solution and Diluent bottles at the same time, do not let the dip tubes touch each other. This will cause contamination of the fluids in the new bottles when the dip tubes are placed into them.
   Standard A, Standard B, or Flush | Lift the keyboard, remove the tubing connector from the used bag and push the tubing connector onto a new bag. Place the new bag in its tray so that the label on the bag faces you (you should be able to read the label).

   **Maximum on-board time:**
   - Standard A = 21 days
   - Standard B = 21 days
   - Diluent = 21 days

2. Press the appropriate function key for each fluid replaced. The screen will update with the maximum assays and, if applicable, time left for that fluid.

3. Press **F8: Store Changes**. After you replace fluids, the system will automatically:
   - prime any fluids that were replaced.
   - schedule an IMT calibration if you replaced Standard A or B or when you exit from this screen.
Replacing the QuikLYTE® Integrated Multisensor

1. Go to the Change IMT Consumables screen.

   Check to determine if you should also perform a cleaning of the IMT system before replacing the QuikLYTE® sensor. If the bleach/conditioning soak interval is zero (0), clean the IMT system by following the “Cleaning the IMT System” procedure in Module 3: Maintaining before replacing the QuikLYTE® sensor.

2. Press down on the rear of the sensor holder and pull the holder forward.

3. Slide the used QuikLYTE® sensor out of the holder, insert the new QuikLYTE® sensor, and close the sensor holder.

4. Press F7: Change Sensor. The screen will update with the maximum assays and time for the new QuikLYTE® sensor.

5. Press F8: Store Changes. The system will automatically prime the Salt Bridge Solution and the IMT Condition and Dilution Check screen appears.

   (Continue with step 7 in “Running a Dilution Check” on the next page.)
Running a Dilution Check

Running a Dilution Check checks the accuracy of the 1:10 sample dilution ratio made by the monopump on the IMT system. Dilution check fluid has a known concentration of Na and K. Five replicates of dilution check solution are processed. The recovered Na and K results are compared to the expected bottle value and a % bias is calculated. A bias within ±1% is acceptable.

ONLY

Run a dilution check as part of the replacement procedure for the QuikLYTE® sensor, the monopump valve seal and piston lip seal.

ALWAYS

• Refrigerate bottles of Dilution Check solution.
• Use the same bottle of Dilution Check solution when checking performance across multiple instruments.

NEVER

• Run a dilution check on a sensor that has already been used to run samples.
• Use Dilution Check solution from a bottle that has less than one inch of fluid remaining in it.
• Rerun a dilution check using the same sample cup. Always pour a fresh cup.

7 At the IMT Condition and Dilution Check screen, type the segment position for the conditioning sample in the Start at Position field and press Enter.

8 Press F4: Cond & Dilchk. The screen will update with assigned positions for the conditioning and dilution check fluids.

9 Fill a sample cup with conditioning sample (plasma or serum) and load it into its assigned position as shown on the screen.

10 Remove the cap from the Dilution Solution bottle and fill a sample cup by pouring directly from the bottle. Load this sample cup into its assigned position as shown on the screen.

11 Press F5: Start. An IMT calibration will be scheduled automatically with the dilution check.
12 Check the printout for the IMT dilution check to see if it passed or failed. There will be no dilution check printout if the IMT calibration fails.
   • If the dilution check passed, continue with step 13 below.
   • If the dilution check failed, follow the “Resolving a Failed Dilution Check” procedure on the next page. When the dilution check does pass, you do not need to rerun the IMT calibration.
   • If the IMT calibration fails, follow the “IMT Troubleshooting” procedures in Module 5: Troubleshooting to resolve why the IMT calibration failed.

13 Record the dilution check results from the printout on the Electrolyte Results log sheet.

14 Run QC for electrolytes.
Resolving a Failed Dilution Check

A dilution check that is not acceptable generates a printout with the status of FAIL in reverse print. A dilution check will fail if:

- the bias is greater than \( \pm 1\% \)
- the standard deviation (SD) for Na is > 1.4 or for K is > 0.04.
- the dilution check did not completely process (or did not process properly)

If both the bias and SD are unacceptable, resolve the SD problem first. Follow the appropriate procedure below to correct a failed dilution check

If the Bias Is Greater than \( \pm 1\% \)

1. Go to the IMT Dilution Calibration screen. A message similar to that shown on the screen below will appear.

2. Press F1: Correct Bias. At the prompt, “Do you want the dilution calibration factor to be corrected? (y/n),” type a “y” for yes.

   - If the Bias field corrects to 0%, record both the FAILED and the PASSED dilution check results from their printouts on the Electrolyte Results log sheet and then run QC for electrolytes.
   - If the Bias field does not correct, continue with step 3. When the bias does not correct, a message similar to that shown on the screen below will appear.
3 If the Bias field does not correct to 0%, do the following:
   a) Replace the bottle of QuikLYTE® Sample Diluent.
   b) Use a new bottle of Dilution Check solution to rerun the dilution check.

4 Press F4: Run Dilchk to go to the IMT Condition and Dilution Check screen.

5 Press F2: Dilchk and then pour fresh Dilution Check solution into a new sample cup and place it in the assigned position indicated on the screen.

6 Press F5: Start.

7 After running the dilution check:
   • If the dilution check passes, record the results from the printout on the Electrolyte Results log sheet and then run QC for electrolytes.
   • If the dilution check does not pass, refer to the appropriate discussion in this section to resolve why the dilution check did not pass.
   • If the bias still fails and pressing F1: Correct Bias does not correct it, call the Technical Assistance Center.

If the Na and/or K Standard Deviation (SD) is Unacceptable

1 Go to the Fluids Prime / Pump Alignment screen and check the IMT pumping rate field. If the IMT pumping rate is less than 68, replace the X tubing inside the IMT pump.

2 Perform all IMT probe alignments according to "IMT Probe Alignments" procedures in Module 4: Aligning.

3 Perform another dilution check using fresh Dilution Check solution in a new sample cup. (For the procedure, start at step 7 of "Running a Dilution Check" earlier in this module.)

4 After running the dilution check:
   • If the dilution check passes, record the results from the printout on the Electrolyte Results log sheet and then run QC for electrolytes.
   • If the SDs are now acceptable but the bias fails, refer to “If the Bias is Greater than ±1%” discussion in this section.
   • If the SDs are still unacceptable, call the Technical Assistance Center.
If the Dilution Check Did Not Process Completely

A screen similar to that below will appear with the message shown in the message area.

<table>
<thead>
<tr>
<th>IMT DILUTION CALIBRATION</th>
<th>Corrected Dilution Check Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Dilution Check Results</td>
<td>Na</td>
</tr>
<tr>
<td>139.6</td>
<td>3.97</td>
</tr>
<tr>
<td>138.7</td>
<td>3.96</td>
</tr>
<tr>
<td>138.4</td>
<td>3.97</td>
</tr>
<tr>
<td>mean:</td>
<td>138.90</td>
</tr>
<tr>
<td>sd:</td>
<td>0.624</td>
</tr>
<tr>
<td>Bottle:</td>
<td>140.00</td>
</tr>
<tr>
<td>Bias:</td>
<td>-0.61%</td>
</tr>
</tbody>
</table>

1 Press **F4: Run Dilchk** to go to the IMT Condition and Dilution Check screen.

2 Press **F2: Dilchk** and then pour *fresh* Dilution Check solution into a *new* sample cup and place it in the assigned position indicated on the screen.

3 Press **F5: Start**.

4 After running the dilution check:
   - If the dilution check passes, record the results from the printout on the Electrolyte Results log sheet and then run QC for electrolytes.
   - If the dilution check does not pass but all the results are complete, refer to the appropriate troubleshooting steps listed earlier in this section.
   - If the dilution check still does not process completely, call the Technical Assistance Center.
Calibration and Verification

Overview
Calibration/verification is performed to maintain the accuracy of the measurement processes for methods used on the instrument.

You calibrate nonenzyme methods and verify enzyme methods (except for Lipase). All methods on the instrument are referred to as photometric methods except Na, K, and Cl, which are processed on the IMT system and therefore require the IMT system to be calibrated before they can be processed. Calibrating the IMT system involves calibrating the QuikLYTE® integrated multisensor.

The Dimension® RxL Max® clinical chemistry system uses the following equations to convert an absorbance reading into concentration of analyte:

For logit methods: \( \text{Conc} = C_3 \left( \frac{C_1}{\Delta \text{Abs} - C_0} - 1 \right) \frac{1}{C_2} - C_4 \)

For linear and verify methods: \( \text{Conc} = (C_1 \times \Delta \text{Abs}) + C_0 \)

Calibrating the IMT System
The IMT system automatically performs a two-point calibration every two hours, after a condition cycle and after priming Standards A and B.

However, you can calibrate the IMT system on demand. (See “Calibrating the IMT System” later in this section.)

Calibrating Urine Drugs of Abuse Methods
To calibrate urine drugs of abuse methods in either qualitative or semiquantitative mode, refer to the “Calibrating Urine Drugs of Abuse Methods” procedure in the Urine Drugs of Abuse Manual Supplement.

In the semiquantitative report mode, the methods have a multilevel logit-type calibration procedure; in the qualitative report mode, the software reserves SerumQC3 fluid for calibration and stores a cutoff.

Calibrating HA1C
To calibrate the HA1C method, refer to the “Calibrating Hemoglobin A1c (HA1C) Assay” procedure in the Hemoglobin A1c (HA1C) Kit Supplement.

When to Calibrate or Verify Photometric Methods
Perform calibration/verification for a method when you change reagent lots, when the calibration time interval has expired, or when a new method is added. You can configure calibration alerts for these conditions. In addition, you must calibrate the light-dependent methods C3, C4, CCRP, CRBM, CRP, GENT, HA1C, IGA, IGG, IGM, LIDO, MALB, MPA, NAPA, PALB, PHNO, PROC, PTN, RCRP, THEO, TOBR, TRNF, VALP and VANC when the source lamp is replaced. Refer to the method insert sheet (IFU) for specific information. Calibration/verification may also be performed as specified by your laboratory procedures.
The system will process samples using reagent lots that have an expired calibration/verification status, but it will print and display a “Calib Expired” processing message with the results. The system will not use a reagent lot if it has not been calibrated/verified on the instrument or if its calibration has been rejected by the operator.

**Calibration Alert**

The **Calib Alert** key changes color when a calibrated lot approaches or reaches its expiration date. The threshold used (0 to 240 hours before expiration) is operator-assigned and is the same for each method. See “Configuring Calibration Alerts” in Module 6: *Customizing*.

When the Calib Alert key is yellow, press it to display the Calibration Alert screen:

```
METHOD | LOT | ALERT or WILL EXPIRE IN | CAL PRODUCT
------- | ---- | ------------------------ | --------------
CA XX4215 | CAL REQUIRED
CHOL XX4365 | 9 hrs 49 mins | CHOL Cal
CKMB XX5215 | CAL REQUIRED
PBNP XX4365 | EXPIRED

**Field Information**

**Method**
The method related to the alert.

**Lot**
Reagent lot number of the method.

**Alert or Will Expire In**
Provides these messages:
- Expiration time, e.g., 9 hrs 49 mins
- EXPIRED, if calibration time has elapsed or time to expiration is less than 48 hrs
- CAL REQUIRED, if a reagent cartridge is in inventory and not calibrated
- AUTO ACCEPT FAILURE, if automatic calibration acceptance failed
From the Calibration Alert screen, you can perform several tasks by pressing the appropriate function key:

<table>
<thead>
<tr>
<th>Key</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Set Up and Run</td>
<td>Highlight a method and press this key to display the Calibration Setup screen (see “Setting up and Running a Calibration” later in this chapter).</td>
</tr>
<tr>
<td>F2: Calib Review</td>
<td>Press this key to display the Calibration Review screen.</td>
</tr>
<tr>
<td>F3: Group Cals</td>
<td>Press this key to display methods with calibrator alerts grouped by Calibration Product.</td>
</tr>
<tr>
<td>F4: Config Alerts</td>
<td>Press this key to toggle between displaying alerts or not displaying alerts on the screen.</td>
</tr>
<tr>
<td>F5: Def Cal Product</td>
<td>Highlight a method showing no product in the Cal Product field. Press this key to enter the calibration product.</td>
</tr>
</tbody>
</table>

**Group Calibration Alerts/Run Calibration Group**

Use this screen to group all methods with alerts by their defined calibration products. This allows you to calibrate a group of methods with minimal setup, and to process multiple methods from a single set of cups defined on the screen.

1. Press the **Calib Alert** key on the touchscreen to display the Calibration Alert screen.
2. Press **F3: Group Cals** on the Calibration Alert screen to display the Group Cal Alerts screen.

3. Highlight the group. Press **F2: Setup Group**.
4. If more than one calibrator lot is available, the Select Calibration Product screen appears. If it does not appear, skip to step 5. Otherwise, do the following:
   a. Highlight the calibrator lot to be used.
   b. Type **Y** in response to the prompt *Is the selected lot the same as the one on the calibrator insert sheet?*
5 Enter your initials in the Operator field.

6 If needed, use the **F1: Delete Method** key to remove highlighted methods from the group. You may need to do this when the Volume Exceeded field reads Yes.

7 Press **F8: QC Yes/No** to toggle the Run QC field between Yes and No. If you choose Yes, at least two levels of QC must be run with the calibration for the AutoAccept option to apply.

8 Press **F3: Print** to print a pick list for the calibration group.

9 Press **F4: Assign Cups** to assign calibrator cups and, if Run QC is Yes, QC cups. After successful cup assignment, each of the methods in the group is assigned In Process calibration status.

10 Press **F7: Load/Run** to display the load list and begin calibration processing.

**Additional Functions**

<table>
<thead>
<tr>
<th>Function Key</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>F5: Def QC Product</td>
<td>Displays the Define QC Product screen. See Chapter 6 for the procedure to define QC products.</td>
</tr>
<tr>
<td>F6: View QC Cups</td>
<td>This function key is available when Run QC is Yes and after cups have been assigned.</td>
</tr>
</tbody>
</table>
If EQCC functions are set up on your system, you can initiate calibrations by responding to Calibration Alerts and manually entering method reagent lot and calibrator information. EQCC functions automate input of calibrator values and allow for auto-acceptance of calibrations according to predefined acceptance criteria. In addition the EQCC Group Calibration Alert function minimizes setup steps by calibrating multiple methods from a single set of calibration cups.

**Setting Up and Running a Calibration**

The calibration must be reviewed and either accepted or rejected (by performing steps 9–13 in this procedure) before a calibration for this lot can be set up.

1. From the Calibration Set Up screen, select the method to be calibrated by pressing its test key.

2. Check the information on the screen and make any changes to the fields listed in the table below.

<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot</td>
<td>If this is not the correct lot number, press F1: Other Lot.</td>
</tr>
<tr>
<td>Status</td>
<td>The calibration status of this lot for the method. A calibration for this lot cannot be set up if its status is &quot;Not Accepted.&quot;</td>
</tr>
<tr>
<td>Operator</td>
<td>Enter your name.</td>
</tr>
<tr>
<td>Calibrator Product</td>
<td>EQCC: Calibrator product name is automatically entered from previously defined products. If multiple products are available, select one from the list. Manual: Enter the calibrator product name and calibrator lot number.</td>
</tr>
<tr>
<td>Lot</td>
<td>EQCC: Lot number is automatically entered from previously defined calibrator products. Manual: The system will use the same calibrator cup for those methods for which you type the exact same entry in the Calibrator Product/Lot field. You will need to place calibrator in only one set of cups instead of multiple sets of cups for each calibration setup.</td>
</tr>
</tbody>
</table>
Start at Position Enter the segment position where you will place the first cup. Do not use SSC segments for calibrations.

Bottle Values EQCC: Bottle values are automatically entered from previously defined calibrator products.
Manual: Enter the bottle values from the calibrator product insert sheet in ascending order (lowest to highest).

3 Press F8: QC Yes/No to change the QC Levels fields to Yes.
4 Press F4: Assign Cups.
5 Repeat steps 1 through 4 to set up more methods for calibration.
6 Press F7: Load/Run to go to the Load List screen and view a summary of all the calibrations you have set up.
7 Load the samples as indicated on the Load List.
8 Press F4: Run or the Run key. The Status field changes to “In Progress”. When the calibration is finished, the Status field changes to “Not Accepted”.

Reviewing and Accepting Calibration Results
When the calibration is complete, a report slip is printed out.
If your instrument uses the Auto Acceptance option and the calibration passes all acceptance criteria, you may skip steps 9 through 13. If the calibration fails the auto-acceptance limits, continue with step 9.
Continue with step 9 even if any of the informational messages listed below appear on the report slip (or on the Calibration Review screen):
• Arithmetic
• above assay range
• high ‘A’ error – especially with the UCFP method
• nan – nan designates “not a number”
• assay range
9 Go to the Calibration Review screen and select the method by pressing its test key. If the correct Lot number is not displayed, press F1: Other Lot.

Number of Replicates per level ...
HM methods have a different number of replicates per level of calibrator depending on the specific HM method calibrated.
10 Press F7: Calculate. Continue with step 11 even if the “Curve Fit Not Finalized” message appears after pressing F7: Calculate.

<table>
<thead>
<tr>
<th>CALIBRATION REVIEW</th>
<th>METHOD: BUN</th>
<th>LOT: HB5214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units: mg/dL</td>
<td>Calculation: LINEAR</td>
<td>Status: NOT ACCEPTED</td>
</tr>
<tr>
<td>LEVELS</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>BOTTLE</td>
<td>0</td>
<td>85</td>
</tr>
<tr>
<td>MEAN</td>
<td>0</td>
<td>86</td>
</tr>
<tr>
<td>SD</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>RESULT 1</td>
<td>0</td>
<td>86</td>
</tr>
<tr>
<td>RESULT 2</td>
<td>0</td>
<td>87</td>
</tr>
<tr>
<td>RESULT 3</td>
<td>0</td>
<td>86</td>
</tr>
</tbody>
</table>

**If you inadvertently delete a result...**
You must press Exit and begin the reviewing and accepting of calibration results again.

11 Review the individual calibration results for precision. If there are no obvious outliers, continue with step 12.

If there are obvious outliers:

- For linear methods: You may delete up to three obvious outliers; however, you must retain at least one result in each calibration level. If there are more than three obvious outliers, you must press F8: Reject Data. Refer to “Troubleshooting Precision of Calibration Results” in this section to resolve the problem.

  To delete a result, move the cursor to the result and press F3: Delete Result. After deleting all obvious outliers, you must press F7: Un-calculate and then press F7: Calculate to generate NEW calibration statistics before continuing with step 12.

- For logit methods: Outliers cannot be deleted. You must press F8: Reject Data if there are any obvious outliers for a logit method calibration. Refer to “Troubleshooting Precision of Calibration Results” in this section to resolve the problem.

12 Review the calibration statistics m, b, and r that appear on the bottom of the screen and decide if these values are acceptable.

- If the calibration statistics are acceptable, press F2: Accept Data (the Status field on the screen will change to “Calibrated”) and continue with step 13.

- If the calibration statistics are not acceptable, you must reject this calibration by pressing F8: Reject Data. Refer to “Troubleshooting Calibration Statistics” at the end of this procedure to resolve the problem and then rerun the calibration.

**Acceptable Criteria for Linear Method Calibrations**

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Intercept (b)</th>
<th>Correlation Coefficient (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.97–1.03</td>
<td>0.0 or clinically insignificant</td>
<td>0.990–1.000</td>
</tr>
</tbody>
</table>

To print a plot of the calibration results ...
Press F4: Plot / Print and type a "y" for yes.
Acceptable Criteria for Logit Method Calibrations

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Intercept (b)</th>
<th>Correlation Coefficient (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.95–1.05</td>
<td>0.0 or clinically insignificant</td>
<td>0.990–1.000</td>
</tr>
</tbody>
</table>

13 Review the QC results.

Press **F6: See QC** and decide if the results that appear in the message area of the screen are within the acceptable established QC ranges.

- If the QC is within acceptable range, you are finished. Remember to save the printouts for your calibration and documentation records.
- If the QC is not acceptable, refer to the "Troubleshooting Quality Control" at the end of this procedure to resolve the problem and then rerun the QC.

Cancelling a Calibration

You can cancel a calibration only if it has been scheduled (F7: Assign Cups has been pressed but you have not pressed F4: Run or the Run key). After cancelling a calibration, the Calibration Set Up screen Status field changes to “Rejected” for that lot. Since the system will not use a reagent lot that has been rejected by the operator, you will need to recalibrate this lot.

1 From the Calibration Set Up screen, press **F4: Cancel Calib**.

2 Press the **Exit** key.

3 Press **F3: Review Data**.

4 Press the method test key for the method you just cancelled (be sure to check the Lot number).

5 Press **F8: Reject Data** and answer the message prompt by pressing “y.”
Viewing Calibration History

Use the Calibration History screen to view and print information about completed calibrations. This screen is password-protected.

When you access the screen and select a method, the most recent calibration is displayed. Use the function keys to find the calibration information you need.

<table>
<thead>
<tr>
<th>Key Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: &lt;==Prev Cal</td>
<td>Displays the previous calibration.</td>
</tr>
<tr>
<td>F2: Next Cal==&gt;</td>
<td>Displays the next newest calibration.</td>
</tr>
<tr>
<td>F3: Search by Lot</td>
<td>Searches for a specific lot number.</td>
</tr>
<tr>
<td>F4: Plot Print</td>
<td>Presents the information in a plot format and lets you print a hard copy.</td>
</tr>
<tr>
<td>F6: See QC/Show HB</td>
<td>Toggle key. SHOW HB is available only for HA1C calibrations.</td>
</tr>
<tr>
<td>F7: Search Calib</td>
<td>Displays calibration history for a Calibration ID that you specify.</td>
</tr>
</tbody>
</table>
**Calibration Troubleshooting**

This section contains information on troubleshooting a calibration that has unacceptable:

- Precision
- Calibration Statistics
- Quality Control

**Troubleshooting Precision of Calibration Results**

- Review calibrator preparation, storage conditions, and expiration date on the package insert sheet of the calibrator product. For lyophilized products, the preparation steps *must be followed precisely*.
- Review the instrument maintenance logs and the System Counters screen for any maintenance that may be overdue. Check the cycle count for the sample probe tip, especially if the problem is on a method with a low sample volume.
- Check that all temperatures are within range on the Daily Maintenance screen. Check the temperatures with a calibrated thermometer according to the “Calibrating Cuvette System Temperature,” “Calibrating Reagent System Temperature,” and “Calibrating HM Module Temperature” procedures in Module 3: *Maintaining*.
- If any data points are missing due to a process error:
  - For logit methods, you must reject the calibration.
  - For linear methods, up to three data points can be missing as long as there is at least one data point for each level. If the calibration meets the criteria, it can be accepted.

**Troubleshooting Calibration Statistics**

- Ensure that you are using the insert sheet from the correct calibrator lot that you are calibrating.
- Review calibrator preparation, storage conditions, and expiration date on the package insert sheet of the calibrator product. For lyophilized products, the preparation steps *must be followed precisely*.
- Check that the sample cups were loaded into the segment in the proper order. If they were not, you must press F8: Reject Data and rerun the calibration.
- Review the instrument maintenance logs and the System Counters screen for any maintenance that may be overdue. Check the cycle count for the sample probe tip, especially if the problem is on a method with a low sample volume.
- Check that all temperatures are within range on the Daily Maintenance screen. Check the temperatures with a calibrated thermometer according to the “Calibrating Cuvette System Temperature,” “Calibrating Reagent System Temperature,” and “Calibrating HM Module Temperature” procedures in Module 3: *Maintaining*.
- Compare the C4 term on the Calibration Review Data screen to the C4 value on the method insert sheet. If it is not the same, call the Technical Assistance Center. Only logit methods have a C4 term.
**Troubleshooting Quality Control**

These suggestions for addressing QC shifts assume optimal instrument conditions and that the calibration has met precision and accuracy guidelines.

- Make sure there is enough QC material in the sample cup and repeat the QC using the same sample cup.
- Make sure you are using the correct control product/lot number.
- Rerun the QC using a fresh vial of QC material.
- Run an alternate control product or a different lot number of the same product.
- Compare established QC ranges to peer group.
- Run previously reported patient sample for which you have acceptable performance values.
- Run patient crossovers (split patient samples).
Verifying Photometric Methods

If EQCC functions are set up on your system, you can initiate verifications by responding to Calibration Alerts or by manually entering method reagent lot and verifier information. EQCC functions automate input of verifier values and allow for auto-acceptance of verifications according to predefined acceptance criteria. In addition the EQCC Group Calibration Alert function minimizes setup steps by verifying multiple methods from a single set of calibration cups.

Setting Up and Running a Verification

You cannot set up a verification for a method if its Status field is “Not Accepted.” This verification must be reviewed by the operator and either accepted or rejected (by performing steps 9–12 in this procedure) before a verification for this lot can be set up.

Calibrator/verifier information...

Check the method insert sheet for which calibrator/verifier product to use. Use the calibrator product insert sheet for the following information:
- product name
- product lot number
- bottle values

Status field for a method lot can be...
- Never Calibrated
- In Progress
- Not Accepted
- Calibrated
- Expired
You cannot set up a verification for a method if its Status is Not Accepted. Accept or Reject the verification before proceeding.

1. From the Calibration Set Up screen, select the method to be calibrated by pressing its test key.
2. Check the information on the screen and make any changes to the fields listed in the table below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot</td>
<td>If this is not the correct lot number, press F1: Other Lot.</td>
</tr>
<tr>
<td>Status</td>
<td>The calibration status of this lot for the method. A calibration for this lot cannot be set up if its status is “Not Accepted.”</td>
</tr>
<tr>
<td>Operator</td>
<td>Enter your name.</td>
</tr>
<tr>
<td>Calibrator Product</td>
<td><strong>EQCC</strong>: Calibrator product name is automatically entered from previously defined products. If multiple products are available, select one from the list. Manual: Enter the calibrator product name and calibrator lot number.</td>
</tr>
<tr>
<td>Calibrator Lot</td>
<td><strong>EQCC</strong>: Lot number is automatically entered from previously defined calibrator products. Manual: The system will use the same calibrator cup for those methods for which you type the exact same entry in the Calibrator Product/Lot field. You will need to place calibrator in only one set of cups instead of multiple sets of cups for each calibration setup.</td>
</tr>
</tbody>
</table>
Start at Position: Enter the segment position where you will place the first cup. Do not use SSC segments for calibrations.

Bottle Values:
- EQCC: Bottle values are automatically entered from previously defined calibrator products.
- Manual: Enter the bottle values from the calibrator product insert sheet in ascending order (lowest to highest).

3. Press F8: QC Yes/No to change the QC Levels fields to Yes.
5. Repeat steps 1 through 4 to set up more methods for verification.
6. Press F7: Load/Run to go to the Load List screen and view a summary of all the calibrations you have set up.
7. Load the samples as indicated on the Load List.
8. Press F4: Run or the Run key. The Status field changes to “In Progress”. When the verification is finished, the Status field changes to “Not Accepted”.

**Reviewing and Accepting Verification Results**

When the verification is complete, a report slip is printed.

If your instrument uses the Auto Acceptance option and the verification passes all acceptance criteria, you may skip steps 9 through 13. If the verification fails the auto-acceptance limits, continue with step 9.

Continue with step 9 even if the “above assay range” message appears on the report slip (or on the Calibration Review screen):
- above assay range

9. Go to the Calibration Review screen and select the method by pressing its test key. If the correct Lot number is not displayed, press F1: Other Lot.
10 Review the individual verification results for precision. If there are no obvious outliers, continue with step 11.

If there are obvious outliers:

- You may delete up to three obvious outliers, however you must retain at least one result in each level. If there are more than three obvious outliers, you must press F8: Reject Data. Refer to “Troubleshooting Precision of Verification Results” in this section to resolve the problem.

To delete a result, move the cursor to the result and press F3: Delete Result.

11 Review the verification statistics $m$, $b$, and $r$ that appear on the bottom of the screen and decide if these values are acceptable.

- If the verification statistics are acceptable, press F2: Accept Data (the Status field on the screen will change to “Calibrated”) and continue with step 12.

Acceptable Criteria Method for Verifications

<table>
<thead>
<tr>
<th>Slope ($m$)</th>
<th>Intercept ($b$)</th>
<th>Correlation Coefficient ($r$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.90–1.10</td>
<td>0.0 or clinically insignificant</td>
<td>0.990–1.000</td>
</tr>
</tbody>
</table>

- If the verification statistics are not acceptable, you must reject this verification by pressing F8: Reject Data. Refer to “Troubleshooting Verification Statistics” at the end of this procedure to resolve the problem and then rerun the verification.

NOTE: DO NOT press F7: Calculate; the only exception is for the CKMB method. For CKMB, if Level I is not between –3 to +3, you must press F7: Calculate. After pressing F7: Calculate, the Level I result should be between –3 to +3. Review your results to see if they are now acceptable. If they are acceptable, press F2: Accept Data and continue with step 12. If they are still unacceptable, you must press F8: Reject Data and rerun the verification.

12 Review the QC results.

Press F6: See QC and decide if the results that appear in the message area of the screen are within the acceptable established QC ranges.

- If the QC is within acceptable range, you are finished. Remember to save the printouts for your verification and documentation records.
- If the QC is not acceptable, refer to the "Troubleshooting Quality Control" at the end of this procedure to resolve the problem and then rerun the QC.
Cancelling a Verification
You can cancel a verification only if it has been scheduled (F7: Assign Cups has been pressed but you have not pressed F4: Run or the Run key). After cancelling a calibration, the Calibration Set Up screen Status field changes to “Rejected” for that lot. Since the system will not use a reagent lot that has been rejected by the operator, you will need to recalibrate this lot.

1. From the Calibration Set Up screen, press **F4: Cancel Calib**.
2. Press the **Exit** key.
3. Press **F3: Review Data**.
4. Press the method test key for the method you just cancelled (be sure to check the Lot number).
5. Press **F8: Reject Data** and answer the message prompt by pressing “y.”

Verification Troubleshooting
This section contains information on troubleshooting a verification that has unacceptable:

- Precision
- Verification Statistics
- Quality Control

Troubleshooting Precision of Verification Results

- Review verifier preparation, storage conditions, and expiration date on the package insert sheet of the verifier product. For lyophilized products, the preparation steps must be followed precisely.

- Review the instrument maintenance logs and the System Counters screen for any maintenance that may be overdue. Check the cycle count for the sample probe tip, especially if the problem is on a method with a low sample volume.

- Check that all temperatures are within range on the Daily Maintenance screen. Check the temperatures with a calibrated thermometer according to the “Calibrating Cuvette System Temperature” and “Calibrating Reagent System Temperature” procedures in Module 3: Maintaining.

- If any data points are missing due to a process error: up to three data points can be missing as long as there is at least one data point for each level. If the verification meets the criteria, it can be accepted.
Troubleshooting Verification Statistics

- Ensure that you are using the insert sheet from the correct verifier lot that you are verifying.
- Review calibrator preparation, storage conditions, and expiration date on the package insert sheet of the calibrator product. For lyophilized products, the preparation steps *must be followed precisely*.
- Check that the sample cups were loaded into the segment in the proper order. If they were not, you must press F8: Reject Data and rerun the verification.
- Review the instrument maintenance logs and the System Counters screen for any maintenance that may be overdue. Check the cycle count for the sample probe tip, especially if the problem is on a method with a low sample volume.
- Check that all temperatures are within range on the Daily Maintenance screen. Check the temperatures with a calibrated thermometer according to the “Calibrating Cuvette System Temperature” and “Calibrating Reagent System Temperature” procedures in Module 3: Maintaining.
- The F7: Calculate function key is not used in verification. If you should press it, be sure to press F7: Un-Calculate before accepting the verification. If you have already pressed F2: Accept, call the Technical Assistance Center.

Troubleshooting Quality Control

These suggestions for addressing QC shifts assume optimal instrument conditions and that the verification has met precision and accuracy guidelines.

- Make sure there is enough QC material in the sample cup and repeat the QC using the same sample cup.
- Make sure you are using the correct control product/lot number.
- Rerun the QC using a fresh vial of QC material.
- Run an alternate control product or a different lot number of the same product.
- Compare established QC ranges to peer group.
- Run previously reported patient sample for which you have acceptable performance values.
- Run patient crossovers (split patient samples).
Calibrating the IMT System

1. From the IMT Calibration screen, press **F1: Calibrate**.

2. After the calibration is completed:
   - If all three methods (Na, K, Cl) passed calibration, the system displays an “IMT OK” message in the IMT status box.
   - If one or more methods did not pass calibration, the following occurs:
     - the system will display the uncalibrated methods in red in the IMT status box.
     - the IMT calibration report printout will not contain the slope, but will have asterisks in the slope field for the uncalibrated method.
     - the IMT Calibration screen will contain the slope reading with asterisks to the left of the reading.

3. You can elect to override the specific IMT method or troubleshoot the IMT to resolve a failed IMT calibration. See “IMT Troubleshooting” in Module 5: Troubleshooting.

**Electrolyte Coefficients**

For the QuikLYTE® system results to compare to other existing indirect “diluted” electrolyte systems, the following recommended C0 and C1 terms are the default settings in the software.

<table>
<thead>
<tr>
<th>Indirect (diluted)</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na⁺</td>
<td>1.5 1.01</td>
</tr>
<tr>
<td>K⁺</td>
<td>-0.2 1.05</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>-10.0 1.09</td>
</tr>
</tbody>
</table>

**Overriding IMT method(s):**

You may elect to override a specific IMT method.

To do this, use the up/down arrow keys to move the cursor box in the Override column to the method that you want to override and then press the Enter key. The field will change to YES.

**Reminder:**

If you override the K method, the Na method will also be overridden because the K method is required for accurate Na results.

**C0 and C1 coefficients when URINE is selected as the fluid type:**

The following are the default coefficients used by the software when urine is selected as the fluid type:

<table>
<thead>
<tr>
<th>C0</th>
<th>C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na⁺</td>
<td>0  1.0</td>
</tr>
<tr>
<td>K⁺</td>
<td>0  1.0</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>0  1.06</td>
</tr>
</tbody>
</table>

Over the URINE fluid type...
Using Calibration Status Lists

The Calibration Status List screen can be used to:

- create a list of methods for calibration.
- remind you of calibration intervals that are due to expire within a specific time period.
- permanently remove reagent cartridges from instrument memory that have expired or when your laboratory’s supply is completely used up.

Press **F2: Offboard Lots** and follow the procedure on the next page.

Create a List of Methods for Calibration

1. From any Calibration Status List screen (Recommended Lots, Same Product, or All Lots), move the cursor to the method and press **F3: Select**. Do this for each method that you want to calibrate.

To see a list of all the methods you have selected, press **F7: Selected Lots**.

Press function key **F7** to view four other groupings of this information as described in the table below.

<table>
<thead>
<tr>
<th>List</th>
<th>What it contains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Lots</td>
<td>Shows a list of reagent lots that are within X hours of their expiration date. You can set X using <strong>F4: Exp Period</strong>.</td>
</tr>
<tr>
<td>Same Product</td>
<td>Shows all reagent lots that use the same calibrator/verifier product.</td>
</tr>
<tr>
<td>All Lots</td>
<td>Shows all reagent lots that are in system memory.</td>
</tr>
<tr>
<td>Selected Lots</td>
<td>Shows all reagent lots you have selected to be calibrated/verified from the three status list screens listed above.</td>
</tr>
</tbody>
</table>

2. Go to the Calibration Set Up screen by pressing the **Exit** key and then **F2: Set-Up & Run**.

3. Press **F5: Next Method** to display each method in the Selected Lots list you just created.

To delete a calibration you selected:
1. Press **F7** until the “Selected Lots” grouping of the Calibration Status List screen appears.
2. Move the cursor to the method.
3. Press **F3: Delete**.
Create a Reminder List for Expiring Calibrations
While at the Calibration Status List screen, you can see how many reagent calibrations will expire within a specific number of hours. You may want to know what reagent calibrations will expire in the next four hours, during your shift, or even during the week.

After you enter the number of hours in the “expires in” field, the screen will automatically be updated to show a list of those reagent cartridge calibrations that will expire within that number of hours. The instrument will also automatically print out this list. This printout will also be automatically printed as part of your Daily Maintenance printouts.
To enter a value in the “expires in” field:
2. Type the number of hours.
3. Press the Enter key. The screen updates to show all calibrations that will expire in the next 24 hours.

For example, to see how many reagent calibrations will expire in the next 24 hours, use the steps above to enter “24” in the “expires in” field on the screen.

Remove Reagent Lot Calibrations from Instrument Memory
If there are many reagent cartridge lots appearing on the Calibration Status List screen (or the automatic printout from Daily Maintenance) that are no longer available in your laboratory, follow the steps below to permanently remove them from instrument memory.
1. From any Calibration Status List screen (Recommended Lots, Same Product, or All Lots), press F2: Offboard Lots to see a listing of all the method lots that are in instrument memory.
2. Move the cursor to the method lot you want to delete from instrument memory.
4. Repeat steps 2 and 3 for each method lot that you want to permanently delete the calibration.

Double-check the method lot number on the screen before you delete it!!!
Since you are going to permanently delete the lot number from instrument memory, if you should find and use another reagent cartridge with this lot number on it, you will need to recalibrate the lot. This is not a problem...but why cause yourself any extra work?
Use this page for NOTES
3: Maintaining the Dimension® RxL Max® clinical chemistry system

Only trained operators should perform these procedures.

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Use this page for NOTES
General Instrument Care and Cleaning

The instrument and areas around it should be kept clean based on guidelines set forth by the Department of Labor (OSHA) 29 CFR 1910.1030, Occupational Exposure to Blood Borne Pathogens: Final Rule.

Clean up spills immediately.

Routinely clean the outside surfaces of the entire Dimension® RxL Max™ clinical chemistry system using a cloth dampened with warm, soapy water.

Opening the Reagent Lid

Opening the reagent lid requires tool access. To open the lid, lift it slightly and insert a strong slender tool into the gap just below the small round indentation. Press forward firmly against the latch and lift the lid.

Cleaning the Touchscreen

Turn OFF power to the monitor. Wipe the touchscreen with a lint-free cloth which has been lightly moistened with deionized water, a 10% bleach solution, or bactericidal disinfectant.
Materials for Cleaning

Undiluted Bleach
All references to “undiluted bleach” in this manual refer to a product that meets the following criteria:

- 5.25% sodium hypochlorite
- No additives
- No detergents
- No surfactants
- No fragrances
- Minimal impurities

Bleach Solutions
All references to a bleach solution, e.g.– “10% bleach solution,” refer to a solution that is made by diluting an undiluted bleach product that meets the criteria listed above with water (e.g.- to create a 10% bleach solution, add 10 mls of undiluted bleach to 90 mls of water to create 100 mls of 10% bleach solution).

All bleach solutions should be prepared fresh prior to use.

Sodium Hydroxide Solutions
When 0.1N sodium hydroxide solution is required, you can use a dedicated bottle (which should not to be used on the instrument once opened and used for cleaning) of Reagent Probe Cleaner (Cat. No. RD 702) or you can prepare your own solution if desired.
Daily Maintenance

The Daily Maintenance procedure contains four simple tasks.

- Cleaning the sample area and emptying cuvette waste
- Checking for other maintenance
- Running a System Check
- Recording the daily maintenance results

Cleaning the Sample Area and Emptying Cuvette Waste

1. With the instrument in Standby, press **Pause** to stop the sampler systems from moving.
2. Raise the sample and reagent lids and remove all segments from the sample area.
3. Clean the inside of the sample area with a damp cloth.
4. Put the segments back into the instrument and close the sample and reagent lids.
5. Press **Pause** to restart the sampler systems.
6. Open the right cabinet door and cut the cuvette string about 12 inches down from the instrument. Be sure to cut the between two cuvettes to prevent spilling fluids from a sealed cuvette. Empty the accumulated cuvette waste.

**WARNING:** The cuvettes and the contents of the cuvettes may present a biohazard or chemical hazard. Follow standard laboratory procedures for protection from biohazards and chemicals when performing maintenance and troubleshooting procedures.

Continue with “Checking for Other Maintenance” on the next page.

**Tools and supplies:**
- Cleaning the sample area
  - damp cloth
  - scissors
- Running a System Check
  - ABS reagent cartridge on instrument
  - fresh ABS solution from the same lot of ABS as the ABS reagent cartridge that is in the instrument
- Running a System Check
  - ABS reagent cartridge on instrument
  - fresh ABS solution from the same lot of ABS as the ABS reagent cartridge that is in the instrument

[Image of the instrument]
Checking for Other Maintenance

Additional maintenance items appear in red. Follow the appropriate replacement procedure in this manual.

Maintenance requirements for other modules...

If your instrument has other modules installed on it, such as the Reagent Management System (RMS) module, etc., refer to the operator's manual that came with the module and perform its daily maintenance procedure also.

2. If F2: Check Counts appears as a function key, press this key to see the System Counters screen and what additional maintenance is required. (Refer to “Understanding the Dimension® System Counters Screen” at the end of this procedure.)
3. If F3: Chk HM Counts appears as a function key, press this key to see what additional HM maintenance is required. (Refer to “Understanding the HM System Counters Screen” at the end of this procedure.)

Continue with “Running a System Check” below.

Running a System Check

1. Fill a sample cup with fresh ABS solution.
2. Using the Daily Maintenance Routines screen, enter a segment position for this sample cup and then place the cup in that position.
3. Close all instrument lids.
4. Press F1: Start.

Continue with “Recording Daily Maintenance Results” on the next page.
Recording Daily Maintenance Results

When the System Check results are printed out, record the following information in the Maintenance Log:

- temperature from the Daily Maintenance Log printout. Acceptable temperature ranges are shown below.
- photometer filter wavelength values are all OK,
- the mean and SD results for the R1 and R2 reagent arms, sampler, and IMT sampler from the System Check printout. Acceptable ranges are listed below.

Unacceptable System Check results appear on the printout in white letters on a black background. An asterisk on the report indicates that the cuvette had processing problems (typically, foaming occurred in the cuvette). If the System Check printout indicates that any of your results are not acceptable, refer to “System Check Troubleshooting” in Module 5: Troubleshooting.

System Temperature Specifications

<table>
<thead>
<tr>
<th>System</th>
<th>Temperature Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuvette System</td>
<td>36.8°C – 37.2°C</td>
</tr>
<tr>
<td>Reagent System</td>
<td>2°C – 8°C</td>
</tr>
<tr>
<td>HM System</td>
<td>42°C – 44°C</td>
</tr>
</tbody>
</table>

System Check Specifications

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Photometer      | -2.5 to +2.5 mAU for the 293-nm filter only  
|                 | -1.5 to +1.5 mAU for all other filters  |
| Reagent #1      | Assay value listed on the end flap of the ABS carton ±12 mAU  
| (R1 Reagent Arm)| ≤ 3.8                               |
| Reagent #2      | Assay value listed on the end flap of the ABS carton ±12 mAU  
| (R2 Reagent Arm)| ≤ 3.8                               |
| Sampler         | 10% of the assay value listed on the end flap of the ABS carton ±2 mAU  
|                 | ≤ 0.8                               |
| HM Wash         | 10% of the assay value listed on the end flap of the ABS carton ±4 mAU  
|                 | ≤ 1.6                               |
| IMT Dil         | 10% of the assay value listed on the end flap of the ABS carton ±2 mAU  
| (non-HM only)   | ≤ 1.4                               |

Failing ALL your System Checks?...Did you recently change ABS lots?
Remember, you must enter the carton value on the ABS carton end flap on the Daily Maintenance routines screen every time you start using a new ABS lot.
To get to the Daily Maintenance routines screen, from the Operating Menu, press: F8: System Prep
F8: Daily Maint.

If a mean or standard deviation IS NOT reported...
System Check tests were aborted for the reagent systems or sampler system.
Go to the Error Log screen and resolve any error messages and rerun the System Check.
To go to the Error Log screen, from the Operating Menu, press:
F5: Process Ctrl
F6: Error Log
Understanding System Counters

Dimension® System Counters Screen

<table>
<thead>
<tr>
<th>Item</th>
<th>Cycles</th>
<th>Clean at</th>
<th>Last Cleaned</th>
<th>Replace at</th>
<th>Last Replaced</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Probe</td>
<td>319</td>
<td>20000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Cuvette Cartridge</td>
<td>582</td>
<td>12000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>582</td>
<td>12000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>Sample Probe Tip</td>
<td>319</td>
<td>48000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>R1 Probe Tip</td>
<td>249</td>
<td>48000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>R2 Probe Tip</td>
<td>0</td>
<td>48000</td>
<td>1-SEP-2000</td>
<td>1-SEP-2000</td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

Items where the Cycles field exceeds the Clean At or Replace At field appear in red. Those items should be cleaned or replaced now or at your earliest opportunity. Follow the appropriate cleaning or replacement procedure for the item.

Contact your Field Service Representative to customize the R1 and R2 probe tip replacement cycle.

If function keys F6 or F7 have titles in them...

Additional modules that require maintenance are installed on your instrument. Press these keys to see other maintenance needed for that module. Refer to the Operator’s Guide for that module for how to perform that maintenance.
HM System Counters Screen

The HM System Counters screen shows the status of the consumable items for the HM module. Any items appearing in red or whose Fill Level Est field is 5% or less or have 0 days left must be replaced before running any HM tests with one exception; if your laboratory does not run HCG tests, you can ignore IMT probe cleaner fluid requirements because it is only used for HCG tests.

Use the appropriate procedures on the pages that follow to perform these replacements.

**Why wait...**

Check all the fields to see if there are other HM consumable fields that will probably need attention later today or tomorrow.

If you have the time now, why not replace these also.

**Another way to get to this screen...**

You can view this screen anytime! From the Operating Menu, press:

F4: System Prep
F6: Sys Counters
F6: HM Counters

**For more information...**

Refer to the "Adding HM Reaction Vessels" procedure in 2: Using.

The number of reaction vessels in the waste container is continually monitored. When the count reaches 250, a “Check Reaction Vessel Waste - Reset Counter” error message appears and unloading of additional vessels is prohibited. The user must empty this waste container and reset this counter to continue unloading reaction vessels. This avoids overflowing the vessel waste.
Managing Offboard Reagent Lots

The Daily Maintenance printout can contain a list of the reagent cartridge lot calibrations that either have expired or are about to expire within a set time period (if the operator has configured it on the Calibration Status List screen). This list can be extremely long because it includes the status of ALL lots in the instrument’s memory.

You should only be concerned with those lots that you are currently using or for which you still have supplies remaining in your laboratory’s refrigerator. Follow this procedure to eliminate unnecessary lots from continually appearing on this printout. This procedure will permanently remove these lots and their calibrations from instrument memory, which should significantly reduce the length of this printout.


2. Press F5: Offboard Lots. Enter the password and press the Enter key.

3. Decide which lot you want to remove permanently from instrument memory.

4. Move the cursor to the lot and press F3: Delete.

5. Repeat step 4 for each lot you want to remove permanently from instrument memory.

What is an "unnecessary lot?"

A reagent cartridge lot for which there are no more reagent cartridges available in the laboratory.

For methods to appear on this list...

The operator must enter the time duration for displaying methods on the Calibration Status List. See "Using Calibration Status Lists" in Module 2: Using.

Before deleting...

Double-check the method lot number on the screen!

Since you are going to delete the lot number permanently from instrument memory, if you should find and use another reagent cartridge with this lot number on it, you will need to recalculate the lot.

This is not a problem...but why cause yourself any extra work?
Weekly Maintenance

Tools and supplies:
- cotton swabs
- 0.1N sodium hydroxide
- water

Why go to the HM Pump Prime screen? SAFETY!
By going to the HM Pump Prime screen, you will be preventing any automatic priming of the HM wash probes that may occur.

You will also be at the correct screen to prime the probes at the end of the procedure.

To get to the HM Pump Prime screen from the Operating Menu, press:
- F4: System Prep
- F7: Pump Prime
- F6: HM . . .

Only trained operators should perform this procedure.
Weekly maintenance is required only if your instrument is equipped with HM operation.

Cleaning HM Wash Probes and the R2 Reagent Probe
Both the HM wash station probes and the R2 reagent arm probe must be cleaned weekly to remove any residue.

1. With the system in Standby, go to the HM Pump Prime screen.

2. Raise the sample and reagent lids.

3. Dip a clean cotton swab in water and, beginning at the top of the probe, wipe down the outside of both wash station probes.
4 Turn the splined shaft on the R2 reagent arm until the R2 probe comes up out of the R2 reagent drain. Then move the arm until you can easily access the R2 probe.

5 Dip a clean cotton swab in \textit{0.1N sodium hydroxide} and scrub the nut at the top of the probe tube. Then, beginning at the top, wipe down the outside of the R2 reagent probe.

\textit{0.1N sodium hydroxide...}

The reagent probe cleaner bottle contains 0.1N sodium hydroxide. If you use a bottle of reagent probe cleaner for your 0.1N sodium hydroxide, DO NOT use that bottle on the instrument. Use that particular bottle ONLY for your weekly cleaning of the R2 probe.

6 Press \textbf{F1: HM Wash Pump} to prime the HM wash pump.

7 Document the cleaning on the Weekly Log sheet.
Monthly Maintenance

Only trained operators should perform these procedures.

The monthly maintenance procedures are:
- Replacing IMT Pump Tubing
- Replacing the Monopump Valve Seal
- Cleaning the IMT System
- Replacing Instrument Air Filters

If your instrument is equipped with the HM module, two additional procedures are required:
- Replacing HM Pump Head
- Styletting HM Wash Probes

The replacement procedures use tools and commonly replaced parts that are provided in your Accessory Spare Parts kit. After you use a spare part from this kit, be sure to order a new one from Dade Behring Inc.
Replacing IMT Pump Tubing

CAUTION! Do not interchange IMT tubing with other Dimension® models. The Dimension® RxL Max® tubing kit package is labeled appropriately.

1. With the instrument in Standby, press Pause to stop the sampling system. Raise the IMT lid.
2. Go to the Fluids Prime/Pump Alignment screen.
3. Use the fluidics label on the instrument to locate IMT pump tubing X around the IMT peristaltic pump.

   - Pressure Plates
   - Foot Bar
   - Pressure Plates
   - Tubing X2
   - Tubing X

4. Turn and remove the pressure plates foot bar.
5. Open the pressure plates.
6. Remove and replace tubing X which is located around the top of the pump. Pull to fit the end of the tubing in place.

   WARNING: IMT pump tubing X is a biohazard. Use your laboratory’s safe biohazard waste disposal procedures when discarding this tubing.

7. Close the pressure plates.
8. Reinsert the pressure plates foot bar and turn it to lock in the pressure plates.
10. Prime with Salt Bridge solution until the solution exits the IMT sensor and is visible in the X2 tubing.
11. Hold down the Shift key and press Exit to return to the Operating Menu. The system will automatically perform an IMT pump alignment and IMT calibration.
Replacing the Monopump Valve Seal

1. With the instrument in Standby, press Pause to stop the IMT sampling system.

2. Raise the sample and IMT lids.

3. Loosen the large thumbscrew on top of the retaining lever and slide the retaining lever backward.

   **CAUTION!** Do not pinch tubing when moving the retaining lever back.
4. Lift the valve motor off the valve body, turn it over, and remove the valve seal from the valve seal holder on the encoder assembly.

5. Clean the inside of the valve body with a gauze pad lightly moistened with water.

6. Lubricate the new valve seal with Krytox® grease. Place a pinhead-sized drop of grease on your gloved forefinger. Gently rub your gloved forefinger and thumb together, then rub both sides of the seal between your thumb and forefinger.

7. Install the new valve seal with the flat side against the valve seal holder on the valve motor assembly. The “X” and the slot on the seal should be visible.

8. Press down firmly on the encoder assembly and ensure that it springs back with a click sound. If it doesn’t, call the Technical Assistance Center to order a new motor.

9. Reinstall the valve motor onto the valve body ensuring that the wires are toward the rear of the instrument. Be sure the motor is seated firmly on the valve body.

10. Slide the retaining lever on the pump forward and tighten the large thumbscrew on top of the pump assembly. **CAUTION!** Do not pinch tubing when moving the retaining lever forward.

    After tightening the thumbscrew, check that you can turn the valve motor with slight resistance. If you cannot turn the motor, the thumbscrew is too tight; if there is no resistance, the thumbscrew is too loose.

11. Press **Pause** to restart the IMT sampling system.
From the Pump Prime Menu screen, prime the monopump by moving the cursor to the Cycles field, typing 3 for the number of prime cycles to be performed, and pressing Enter. Then press F5: IMT Mono Pump.

For non-HM instruments, run a System Check.

Replace the QuikLYTE® sensor by following the entire procedure (steps 1–14) in Module 2: Using, “Replacing the QuikLYTE® Integrated Multisensor.”

CAUTION! You MUST replace the QuikLYTE® sensor after replacing the monopump valve seal.

Document this replacement on the Instrument Log sheet.
Cleaning the IMT System (Monthly)

1 With the instrument in Standby, go to the IMT System Clean screen.

   1. Bleach port: Press F3: OPEN PORT. Dispense 1 ml of undiluted bleach 10 times into IMT port, followed by 1 ml of water 10 times to rinse. Press F3: CLOSE PORT
   2. Bleach Tubing: Fill port with undiluted bleach. Press F8: START SOAK
   3. Condition Tubing: Fill port with serum or plasma. Press F8: START SOAK.

2 Press F3: Open Port.

3 Fill a disposable pipette with undiluted bleach and dispense approximately 1 mL of the bleach into the IMT port 10 times. Allow the port to empty itself before each subsequent addition of bleach.

4 Fill another disposable pipette with water and dispense approximately 1 mL of water in the IMT port 10 times. Allow the port to empty itself before each subsequent addition of water.

5 Press F3: Close Port.

Tools and supplies:
- undiluted bleach
- disposable pipettes
- serum or plasma
- water
- QuikLYTE® Integrated Multisensor

If you run more than 100 IMT samples daily...
Bleach the IMT system and port every 15 days.
6 Using a disposable pipette, fill the port with undiluted bleach. Press *F8: Start Soak*. The IMT probe moves to the port and is bleached by the system. Make sure the fluid is flowing through the tubing.

**WARNING:** Do not place your hands near the port while the probe is being cleaned with bleach. You could injure yourself, be exposed to biohazards, or damage the instrument.

7 The fluid sits in the tubing for two minutes. When the soak is complete, the system primes Standard A.

8 Using a disposable pipette, fill the port with serum or plasma.

9 Press *F8: Start Soak*. Make sure the fluid is flowing through the tubing.

10 The fluid sits in the tubing for two minutes. When the soak is complete, the system primes Standard A.

11 Press *F7: Change Sensor*.

**CAUTION!** You MUST replace the QuikLYTE® sensor after bleaching the IMT system.

12 Replace the QuikLYTE® Integrated Multisensor (see the procedure in the topic "Replacing IMT Consumables" in Module 2: *Using*).

13 Document the cleaning on the Monthly Log sheet.
Replacing Instrument Air Filters
There are five filters that need to be replaced monthly.

1. With the instrument in Standby, use the table below and on the next page to locate and replace each filter.

   **CAUTION!** When installing these filters, make sure that the air flow arrows on the frame of each filter are pointing as indicated in the table below.

<table>
<thead>
<tr>
<th>Filter</th>
<th>To replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet (non-RMS only)</td>
<td>This filter is located on the rear of the instrument. Slide the filter up out of its holder. The air flow arrow on the new filter should point <strong>IN</strong> toward the instrument.</td>
</tr>
</tbody>
</table>

---

**Tools and supplies:**
- Phillips screwdriver
- disposable thermal chamber filters
<table>
<thead>
<tr>
<th>Filter</th>
<th>To replace</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Supply</strong></td>
<td>Open the left instrument door and remove the thumbscrew that holds the frame for the two power supply air filters. The air flow arrow on the new filters should point <strong>IN</strong> toward the instrument.</td>
</tr>
<tr>
<td><strong>Cuvette Ring (non-RMS only)</strong></td>
<td>Remove the right instrument cabinet panel and slide the filter up out of its holder. The air flow arrow on the new filter should point <strong>IN</strong> toward the instrument.</td>
</tr>
</tbody>
</table>
Maintaining Dimension® RxL Max® clinical chemistry system

Filter To replace
Thermal Chamber Pull the filter cover and filter off of their plastic frame. This filter does not have any air flow arrows; it cannot be installed backwards.

Cabinet and Cuvette Ring
(RMS only) These two filters are located on the rear of the instrument. Use the tab on the filter to slide each filter up out of its holder. The air flow arrow on the new filter should point IN toward the instrument.

2 Remove all dust from the used filter (except the thermal chamber filter pictured above, which must be replaced) by washing with water and air drying or by using a vacuum cleaner. You can reuse these filters next month.

3 Document these replacements on the Monthly log sheet.
**Tools and supplies:**
- paper towels

**Why go to the HM Pump Prime screen? SAFETY!**

By going to the HM Pump Prime screen, you will be preventing any automatic priming of the HM wash probes that may occur.

You will also be at the correct screen to prime the probes at the end of the procedure.

To get to the HM Pump Prime screen from the Operating Menu, press:

F4: System Prep  
F7: Pump Prime  
F6: HM . . .

1. With the system in Standby, go to the HM Pump Prime screen.

   ![](image1.png)

   **HM Pump Prime**

   Please select an option using the function keys:

   - Cycles: 3
   - HM Wash: 0
   - Reagent Cleaner: 0
   - Sampler Cleaner: 0

   F1: HM Wash Pump  
   F2: Reag Cleaner  
   F3: Samp Cleaner  
   F4:  
   F5:  
   F6:  
   F7:  
   F8:  

2. Access the pump head to be replaced. There are two sets of pump heads: one set is on the frame of the wash station and the other is on the pump panel inside the instrument cabinet.

   **Pump Heads**  
   **To Access**

   Wash Station  
   Raise the sample and reagent lids. The aspirate and dispense pump heads are located on the wash station frame.
**Pump Heads To Access**

| Probe Cleaner | Open the middle cabinet door and the pump panel assembly. The probe cleaner pump heads are located on the lower left side of the pump panel assembly. |

3 Disconnect the tubing from the pump head at its connectors.

4 Using your fingers, squeeze the two tabs on the edge of the pump head and pull the pump head off of the pump base and discard it.

**WARNING:** The pump head is a biohazard; use your laboratory’s safe biohazard waste disposal procedures when discarding.
5 Install the new pump head to the motor.
   a. Insert the shipping plug (or “T”) that came with the pump head
      completely into the front of the pump head.
   b. Slide the pump head onto the shaft of the motor. Remove and discard
      the shipping plug from the new pump head.
   c. Reattach the tubing to the pump head.

6 Prime the pump of the pump head that was replaced.
   • If you replaced a wash station pump head, prime the chemistry wash.
   • If you replaced the bottom pump head on the pump panel, prime the
     reagent cleaner.
   • If you replaced the top pump head on the pump panel, prime the
     sample cleaner.

7 Perform a System Check.

8 Make an entry on the Monthly Log sheet.
Tools and supplies:
- screwdriver
- IMT stylet
- paper towels

Why go to the HM Pump Prime screen? SAFETY!
By going to the HM Pump Prime screen, you will be preventing any automatic priming of the HM wash probes that may occur. You will also be at the correct screen to prime the probes at the end of the procedure.

To get to the HM Pump Prime screen from the Operating Menu, press:
F4: System Prep
F7: Pump Prime
F6: HM . . .

1 With the system in Standby, go to the HM Pump Prime screen.

2 Raise the sample and reagent lids.
3 Disconnect the aspirate tubing from the wash probes.

<table>
<thead>
<tr>
<th>Tubing Color / Number</th>
<th>Detach from</th>
</tr>
</thead>
<tbody>
<tr>
<td>green 4</td>
<td>Wash Probe 1 aspirate (bent top) probe</td>
</tr>
<tr>
<td>blue 2</td>
<td>Wash Probe 2 aspirate (bent top) probe</td>
</tr>
</tbody>
</table>

To remove the bottom plastic guard from the wash station...
You only need to loosen, not remove, the two screws on the side facing you until you can slide the guard out from under these screws.
4 Using a screwdriver, remove the bottom plastic guard from the wash station.

5 Pass an IMT stylet completely through the aspirate probe of each wash station probe to dislodge any obstructions/accumulations. Pass the stylet down through the probe and pull the stylet out through the bottom of the probe.

**WARNING:** The beveled wash station probes are a biohazard and a puncture hazard; use your laboratory’s safe biohazard procedures for contact with these probes.

6 Dispose of the IMT stylet.

**WARNING:** This IMT stylet is now a biohazard; use your laboratory’s safe biohazard procedures for contact with and disposal of this stylet.

7 Reconnect the tubing to the probes.

<table>
<thead>
<tr>
<th><strong>Tubing Color / Number</strong></th>
<th><strong>Detach from</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>green 4</td>
<td>Wash Probe 1 aspirate (bent top) probe</td>
</tr>
<tr>
<td>blue 2</td>
<td>Wash Probe 2 aspirate (bent top) probe</td>
</tr>
</tbody>
</table>

8 Reinstall the bottom plastic guard onto the wash station.

9 Press **F1: HM Wash Pump** to prime the HM wash pump.

10 Perform a System Check.

11 Make an entry on the Monthly Log sheet.
Other Maintenance

*Only trained operators should perform these procedures.*

The procedures described in this section are for maintenance that is required periodically or for troubleshooting.

**Accessory Spare Parts Kit**

The replacement procedures use tools and commonly replaced parts that are provided in your Accessory Spare Parts kit. After you use a spare part from this kit, be sure to order a new one from Dade Behring Inc.
Lowering and Raising the Thermal Chamber

Occasionally you will be asked to lower and raise the thermal chamber for troubleshooting. It is very important that you do this correctly. If the thermal chamber is not completely closed, it can affect patient results.

Lowering the Thermal Chamber

1. With the instrument in Standby, open the right instrument door and remove the cuvette waste container.
2. Pull the knob on the cuvette film cartridge bracket and swing the film cartridge down out of the way.
3. Place a screwdriver into the hole of the thermal chamber release bracket and push the screwdriver down on the internal release plate. **Do not use a prying motion.** Continue pushing the screwdriver until the thermal chamber drops down completely.

Tools and supplies:
- screwdriver
Raising the Thermal Chamber

**CAUTION!** Do not raise the thermal chamber by lifting up on the plastic components where the air hose connects to the thermal chamber.

1. Grab the ledge of the metal frame at the top of the long bar that holds the release bracket and pull up on this metal frame until the thermal chamber seats completely against the baseplate.

2. Look at the tape indicators to ensure the chamber is closed completely.

3. Adjust the tension in the cuvette file. From the Film Loading/Tension screen, press **F2: Tension**. When the tensioning is complete, press **F2: Tension** again if the film is not taut.

*For a better view of this ledge...*

The photo to the right shows the thermal chamber in its raised position.

*Getting to the Film Loading/Tension screen...

From the Operating Menu, press:
- **F4: System Prep**
- **F6: Sys Counters**
- **F3: Film Load**

![Ledge Image]
Calibrating Cuvette System Temperature

Tools and supplies:
• digital thermometer

About F8: Temp Diag...
Use this function key to see if all system temperature monitoring items are OK. Status possibilities are OK, Open, and Short. This may help you determine the problem area and will be of use if you have to call the Technical Assistance Center.

If Functions key F7 has a title in it...
The Reagent Management System module is installed on your instrument. Refer to the Operator’s Guide for that module for how to use this key.

Warmup time...
The instrument must be on for more than two hours before a proper temperature calibration can be performed.

1 From the Cuvette/Reagent Temperature Monitor and Calibration screen, press F1: Check Cuvette and answer the message that appears. Then wait for the message to place the temperature probe in position before continuing.

2 Slide the plastic probe positioning sleeve completely onto the digital thermometer temperature probe. Make sure that the side labeled “RxL/ARx THIS SIDE UP” faces up.
3 Raise the reagent and sample lids and place the digital thermometer probe in the cuvette hole at the sample access position.

Use the location mark to find the sample probe cuvette access hole. There is an indentation in the baseplate at the sample probe cuvette access location.

4 Close the reagent and sample lids and ensure that all instrument doors and panels are closed.

The temperature appears...
In the message area of the screen as you enter it, not at the bottom of the Cuvette column on the screen as you might expect.
5 Wait until the cuvette Thermal Signal Acquisition Interval field counts down to 0 and changes to YES. If all other cuvette fields are also YES, read the temperature on the digital thermometer.

If the temperature is outside the 32°C to 42°C range, do not enter the temperature. Call the Technical Assistance Center.

If the cuvette temperature on the thermometer is between 32°C to 42°C, continue with step 6.

6 Remove the digital thermometer probe and sleeve from the cuvette access hole and close the instrument lids. Then press the space bar on the keyboard, and again wait until all the cuvette fields are YES.

7 Press F2: Calib Cuvette, enter the temperature from the digital thermometer, and press Enter. You are finished. The instrument will now make cuvette thermal adjustments automatically.
Calibrating Reagent System Temperature

**Tools and supplies**
- digital thermometer

<table>
<thead>
<tr>
<th>Temperature Monitor Status</th>
<th>Cuvette</th>
<th>Reagent</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Calibrated</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Thermal Signal Acquisition Interval</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Monitoring Circuitry Functional</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Control System Functional</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Primary Sensor In Range</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Secondary Sensor In Range</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Sample and Reagent Lids Closed</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Photometer Lamp On</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.1 °C</td>
<td>1 °C</td>
</tr>
</tbody>
</table>

From the Cuvette/Reagent Temperature Monitor and Calibration screen, wait until the reagent Thermal Signal Acquisition Interval field contains a YES.

Press **F5: Check Reagent** and answer the message that appears. Then wait for the message to place the temperature probe in position before continuing.

Raise the reagent lid and place the digital thermometer probe in the reagent tray temperature measurement hole.

The temperature appears...
In the message area of the screen as you enter it, not at the bottom of the Reagent column on the screen as you might expect.

Warm-up time...
The instrument must be on for more than two hours before a proper temperature calibration can be performed.
4 Close the reagent lid and ensure that all instrument doors and panels are closed.

5 Wait until the temperature on the digital thermometer equilibrates (approximately 30 seconds). If all the reagent fields are also YES, read the temperature on the digital thermometer.
   • If the reagent tray temperature on the thermometer is between –2° to +10°C, continue with step 6.
   • If it is outside this temperature range, call the Technical Assistance Center.

6 Remove the digital thermometer probe from the reagent tray temperature measurement hole, close the reagent lid, and then press the space bar on the keyboard.

7 Press **F6: Calib Reagent**, enter the temperature from the digital thermometer, and press **Enter**. You are finished. The instrument will now make reagent thermal adjustments automatically!

   If the message “**The value entered is outside the allowed calibration range**” appears in the message area of the screen after pressing **Enter**, it is because the temperature you tried to enter is not within the –2° to +10°C temperature range. Perform this reagent system temperature calibration procedure again. If the temperature on the digital thermometer is still not within –2° to +10°C, call the Technical Assistance Center.
Calibrating HM Module Temperature

**Tools and supplies:**
- digital thermometer

**Operating menu**

| SYSTEM PREPARATION MENU | SYSTEM PREP | TEMP MONITOR |

**Cuvette/Reagent Temperature Monitor and Calibration**

<table>
<thead>
<tr>
<th>Temperature Monitor Status</th>
<th>Cuvette</th>
<th>Reagent</th>
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<tr>
<td>System Calibrated</td>
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<td>Control System Functional</td>
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<td>YES</td>
</tr>
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<td>YES</td>
</tr>
<tr>
<td>Secondary Sensor In Range</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Sample and Reagent Lids Closed</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Photometer Lamp On</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

| Cuvette Temperature                  | 37.1 °C |
| Reagent Temperature                  | 1 °C    |

**Warm-up time...**
The instrument must be on for more than two hours before a proper temperature calibration can be performed.

**Locating the temperature monitoring hole...**
After you respond to the instrument warm-up prompt with a 'y', the HM thermal ring will move slightly, uncovering the small temperature monitoring hole. The hole is located at approximately the 6 o'clock position of the HM thermal ring.

1. From the Cuvette/Reagent Temperature Monitor and Calibration screen, press **F3: Check HM Incu** and answer the message that appears.
2. When the message to place the temperature probe appears, raise the reagent and sample lids and place the digital thermometer probe in the temperature monitoring hole of the HM thermal ring. This small hole is in the inside rim of the heater ring.
3. Wait three minutes for the temperature to equilibrate and then read the temperature on the digital thermometer. If the temperature is between 40°C to 46°C, continue with step 4. If the temperature is outside this range, call the Technical Assistance Center.
4. Remove the digital thermometer probe.
5. Press **F4: Calib HM Incu**, enter the temperature from the digital thermometer, and press **Enter**.
**Cleaning Cuvette Windows**

There are two procedures for cleaning cuvette windows

- cleaning all cuvette windows
- cleaning only the bad (or dirty) cuvette windows

Decide which type of cleaning you want to perform and then follow the appropriate steps from the procedure below.

Before performing either of these cleaning procedures, with the instrument in Standby, raise the reagent area lid and go to the Window Check screen.

**Tools and supplies:**

- needlenose pliers or cuvette window extractor tool
- lens paper
- water
Cleaning All Windows

1. Set the Access field at the top of the Window Check screen to **Access All**.

2. Press **F1: Start Clean**.

3. When the message “**Clean and replace window, then press any key to continue**” appears, remove the window that is in the window access position on the cuvette ring. There are two ways to remove a cuvette window: using needlenose pliers or using the cuvette window extractor tool. See “Removing and Installing Cuvette Windows” at the end of this procedure.

4. Clean the window with lens tissue (and **WATER**, if necessary) and reinstall it. If you cannot clean the window (or it is scratched or damaged), discard the cuvette window and install a new window from your Accessory Spare Parts kit.

5. Press any key to go to the next window and when the message “**Clean and replace window, then press any key to continue**” appears, remove, clean, and reinstall the window and then press any key. Repeat this step until you have cleaned all the windows.

6. When you have cleaned all the windows, and they have been determined to be clean by the instrument, the message “**All windows have successfully passed QC**” will appear and window QC ranges will be printed out.

7. Close the reagent area lid.

8. Press **Shift/Exit** to return to the Operating Menu and then press the **Reset** key to initialize the instrument.


*A window MUST be in each position on the cuvette ring!*

You MUST put a window back in each position. Use a spare window from your accessory spare parts kit or, if you are out of replacement windows, put the damaged window back in the instrument. Do not leave an empty hole in the cuvette ring!
Cleaning Bad Windows

1. Set the Access field at the top of the Window Check screen to Access Bad by pressing F2: Access Mode.

2. Press F1: Start Clean.

3. When the message “Clean and replace window, then press any key to continue” appears, remove the window that is in the window access position on the cuvette ring. There are two ways to remove a cuvette window: using needlenose pliers or using the cuvette window extractor tool. See “Removing and Installing Cuvette Windows” at the end of this procedure.

4. Clean the window with lens tissue (and WATER, if necessary) and reinstall it. If you cannot clean the window (or it is scratched or damaged), discard the cuvette window and install a new window from your Accessory Spare Parts kit.

5. Press any key to go to the next window and when the message appears remove the window and replace it.

6. After you clean these first two windows, the instrument will automatically check all the remaining windows and alert you when to clean a window that needs cleaning. If you determine that any of these windows is damaged, discard it and replace it with one from your accessory spare parts kit.

7. When you have cleaned all the dirty windows and all the windows are determined to be clean by the instrument, the message “All windows have successfully passed QC” will appear and window QC ranges will be printed out.

8. Close the reagent area lid.

9. Press the Exit key twice to return to the Operating Menu and then press the Reset key to initialize the instrument.

Removing and Installing Cuvette Windows

Removing Cuvette Windows

Removing cuvette windows using needle nose pliers:

How to use the needle nose pliers:
Grasp the top of the cuvette window with the pliers and pull the window straight up out of the cuvette wheel. Use this same technique to insert a cleaned or new cuvette window.

Removing cuvette windows using the cuvette window extractor tool:

Removing a cuvette window using the extractor tool:
With the flat side of the extractor facing the cuvette ring, insert the extractor straight down until it touches the top of the window. Tilt the handle toward you to grip the window and hold it in place. Pull the extractor up to remove the window.
**Installing Cuvette Windows**

Install the cuvette window with its top curved area facing you (as shown in the diagram below) and press it completely into position.

**CAUTION!** Instrument processing problems could occur if you replace it incorrectly.

*Inserting a cuvette window using the extractor tool:*

With the flat side of the extractor facing the cuvette ring, and the extractor tilted toward you, insert the window into the access position and press down. Raise the handle of the extractor to release the window.
Cleaning the IMT Waste Tubing

1. Raise the IMT lid and disconnect the waste tubing.

   **WARNING:** The waste tubing is a biohazard.

2. Fill a sample cup with 1.5 mL of undiluted bleach.
3. Place the waste tubing into the sample cup. The bleach should be drawn out of the cup within 3–4 seconds. If it is not, repeat this step with additional cups of bleach until it does.

4. Fill a sample cup with water and place the waste tubing in the cup to flush any residual bleach from the waste line.
5. Connect the waste tubing.
6. Calibrate the IMT.

**Tools and supplies:**
- undiluted bleach
- sample cup
**Cleaning Reagent Drains R1 and R2**

1. Turn off vacuum to the instrument. From the Operating Menu, press F7: Diagnostics
   F1: Electromechanical
   F6: Waterworks
2. Press F4: Vacuum On/Off until the message "Vacuum control signal is now off."
3. Raise the instrument lids.
4. Clamp the drain lines directly at the R1 and R2 drains, as shown here:

4. Fill a disposable pipette with 100% bleach or sample probe cleaner.
5. Wrap a paper towel around the drain. Insert the pipette tip into the R1 drain near the bottom and dispense the bleach until the drain starts to overflow.
6. Continue to dispense the solution as you remove the pipette from the drain. Ensure that the drain is filled completely with solution.
7. Repeat steps 3 through 5 for the R2 drain.
8. After the solution has been in the drains for five minutes, unclamp the drain lines.
9. Press F4: Vacuum On/Off to display the message "Vacuum control signal is now on."
10. Exit to the Operating Menu. Press:
    F4: System Prep
    F7: Pump Prime
11. Enter 10 in the Cycles field and press F1: Prime Water.
12. Close the instrument lids.
Cleaning the Sample Probe and Drain

Cleaning the Sample Probe

1. Go to the System Counters screen.

2. Press F4: Clean Probe.

3. In the Pos: field of the Sample Probe line (where the cursor is blinking inside the backlit box), enter the segment position where you will place the 1.5-mL sample cup of undiluted bleach.

4. Place the 1.5-mL sample cup of undiluted bleach in an adaptor in that segment position.

5. Press F4: Clean Probe to begin the probe cleaning.

6. When the probe cleaning is finished, follow the prompt to remove the sample cup from the segment.

7. The message "Manually clean sample probe drain" appears. Clean the sample probe drain by following the "Cleaning the Sample Probe Drain" portion of this procedure on the next page.

(Continue with “Cleaning the Sample Probe Drain” on the next page.)
Cleaning the Sample Probe Drain

8 Raise the sample and reagent lids.

9 Manually lift and move the sample arm away from the sample drain.

10 Dip the drain brush into a 10% bleach solution.

11 Note that the sample drain on your instrument has two holes. Insert the drain brush into the hole that is closest to the reagent tray. Scrub down inside the drain.

WARNING: The drain brush is a biohazard; use your laboratory’s safe biohazard waste disposa procedures when discarding this brush.

12 Repeat steps 9 and 10 three times. When you are finished, leave the probe out of the drain.

13 Close the instrument lids and then press the Reset key.
Cleaning the Water Bottle
This procedure is included for those customers who periodically change their water bottle and must then clean the used bottle.

1. Fill the used water bottle with a 10% bleach solution.
2. Let the solution stand in the bottle one hour.
3. *Thoroughly* rinse the bottle out and then allow it to air dry.
4. Cover the top of the bottle and store the bottle until you decide to replace it again.

**Tools and supplies:**
- 10% bleach solution
- spare water bottle
Lubricating a Pump Lead Screw

1. With the instrument in Standby, go to the Pump Prime Menu screen to turn off the sampling system.
2. Open the middle instrument door, press the pump assembly release button, and pull the pump assembly toward you.
3. Locate the pump lead screw to be lubricated and remove its plastic shield on the rear of the pump assembly by loosening the captive screw near the top of the shield.
4. Check the condition of the lubricant on the lead screw. If it appears to be dry or dirty, follow steps 5–8. If not, skip to step 9.

Tools and supplies:
- grease, PN 270921, in Accessory Spare Parts Kit
- talc-free disposable gloves
- lint-free dry cloth

Getting to the Pump Prime Menu screen...
From the Operating Menu, press:
F4: System Prep
F7: Pump Prime

Synonyms used for these pumps:
The 100 uL and 500 uL pumps are also referred to as metering or small pumps.
The 2500 uL pumps are also referred to as flush or large pumps.
5 While wearing a talc-free disposable glove, apply grease (PN 270921 in your Accessory Spare Parts Kit) to fill the exposed grooves in the lead screw.

6 Prime the pump using 10 pump cycles.

   From the Pump Prime Menu screen, move the cursor to the Cycles field, type **10** for the number of prime cycles to be performed, and press **Enter**. Then press the appropriate function key to prime the pump lead screw that was lubricated.

7 After priming, wipe as much lubricant as possible from the lead screw and the top of the black moving block using a lint-free dry cloth.

8 Change the Cycles field on the Pump Prime Menu screen back to **3** and continue with step 9 to apply another application of grease.

9 Apply grease (PN 270921 in your Accessory Spare Parts Kit) to fill the exposed grooves in the lead screw and add a few dabs of grease to the guide rod.

10 From the Pump Prime Menu screen, prime the pump using 3 pump cycles by moving the cursor to the Cycles field, typing **3** for the number of prime cycles to be performed, and pressing **Enter**. Then press the appropriate function key to prime the pump lead screw that was lubricated.

11 After priming, wipe off any excess grease from the top of the black moving block (especially any accumulation on the top of the block) and the **bottom two threads only** of the lead screw.

12 Replace the plastic shield on the rear of the pump assembly and close the assembly.

13 Perform a System Check.
Replacing the Aliquot Wheel (non-HM)

1. With the instrument in Standby, go to the System Counters screen and press F5: Aliq Change.
2. Raise the sample lid and the aliquot wheel lid.
3. Place a plastic lid on the used aliquot wheel.

**WARNING:** The used aliquot wheel and its contents are a biohazard. Follow your laboratory’s safe handling procedures for handling and disposal of this wheel.

4. Lift the covered, used aliquot wheel off the instrument and discard it.

5. Place a new aliquot wheel in the instrument.
6. Close the aliquot wheel lid and the sample lid.
7. Answer the message on the screen and any other messages that may appear.

---

**Tools and supplies:**

- aliquot wheel

**Getting to the System Counters screen:**

From the Operating Menu, press:

- F4: System Prep
- F6: Sys Counters

**How many sample positions are available on an aliquot wheel?**

122 positions are available.

---

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Replacing the Aliquot Wheel Home Sensor (non-HM)

1. With the instrument in Standby, press the Pause key to stop the IMT sampling system, and then raise the sample and aliquot wheel lids.

2. Remove the aliquot wheel.

   **WARNING:** A used aliquot wheel and its contents are a biohazard. Follow your laboratory’s safe handling procedures when removing this wheel.

3. Using a large screwdriver, remove three screws that hold the aliquot wheel assembly in the instrument. Hold this assembly up by its center shaft as you remove the last screw, and lower it down inside the instrument.

4. Remove the left rear cabinet panel (the larger panel). Then locate and disconnect P/J 31C, P/J 31E, and P/J 31F and remove the aliquot wheel assembly through the rear of the instrument.

5. Using a 5/64” Allen wrench, remove two screws from the sensor bracket and remove the sensor from the aliquot wheel assembly.
Service tip:
When fitting the aliquot wheel assembly back into the instrument, position the cutout window and sensor at approximately 11 o’clock.

6 Properly install the new sensor onto the aliquot wheel assembly and reinstall the assembly into the instrument by reversing the previous steps. Be careful not to install this sensor backwards! See the illustration below for proper orientation of the sensor.

7 Install the same aliquot wheel removed in step 2 back on the instrument.

8 Close the sample and aliquot wheel lids and press the Pause key to restart the IMT sampling system.

9 Document this replacement on the Instrument Log sheet.
Replacing the Aliquot Wheel Lid Open Sensor (non-HM)

1. With the instrument in Standby, press the **Pause** key to stop the IMT sampling system, and then raise the sample and aliquot wheel lids.

2. Disconnect the aliquot wheel lid open sensor connector, P/J 31L.

3. Use the 3/32” Allen wrench to remove the sensor bracket mounting screw and remove the sensor.

4. Install the new sensor by reversing the previous steps.

5. Close the sample and aliquot wheel lids and press the **Pause** key to restart the IMT sampling system.


---

**Tools and supplies:**
- 3/32” Allen wrench

**You might want to remove the aliquot wheel to do this replacement...**
If you do, you must place this same aliquot wheel back on the instrument at the end of this procedure.
Replacing the Cuvette Diaphragm

1. With the instrument in Standby, raise the reagent lid.
2. Go to the System Counters screen and press **F2: Diaph Change**.
3. Open the cutout in the top of the faceplate and locate the cuvette diaphragm.

4. Raise the bar code reader out of the way, unscrew the alignment bar thumbscrew and raise the alignment bar out of the way.

**WARNING:** When working in the cuvette manufacturing area, be very careful not to touch the U-seal solenoid—it can be extremely HOT! If components are hot, wait about five minutes for them to cool before continuing with this procedure.
5 Unlock the U-seal solenoid assembly by pulling its curved locking bar to the right; then move this assembly to the left and out of the way.

6 Pull the cuvette formation assembly away from the cuvette ring.
7 Remove the used cuvette diaphragm by lifting an edge and pulling it up off the heat torch.

CAUTION! Do not pull the soft tip out of position while replacing the diaphragm.
8 Install the new cuvette diaphragm. The circular hole should be toward the bottom of the heat torch. The U-shaped notch should face toward you. Be sure the diaphragm is pushed down completely.

9 Push the cuvette formation assembly back into position next to the cuvette ring.

10 Put the U-seal solenoid assembly in its original position and lock it in place with the curved bar.

11 Position the alignment bar and tighten its screw.

12 Lower the barcode reader.

13 Press any key. When the prompt “Do you want to store the NEW system information? (y/n)” appears, type y to update the System Counters screen.

14 Close the reagent lid.

15 Document this replacement on the Instrument Log sheet.
Replacing the Cuvette Film Cartridge

1. With the system in Standby, go to the Film Loading/Tension screen.

   - Press F4: SYSTEM PREP
   - Press F6: SYS COUNTS
   - Press F3: FILM LOAD

   **FILM LOADING / TENSION**
   
   TO LOAD:
   1. CUT THE OLD FILM AND REMOVE THE CARTRIDGE
   2. TAPE THE NEW FILM TO THE OLD FILM
   3. PRESS F1 TO START FILM LOADING

   TO TAKE UP SLACK:
   1. PRESS F2 TO TAKE UP SLACK IN FILM

   CUVETTE FILM COUNT = 500

2. Open the right instrument door. Use scissors to cut the right and left film strips on the used cuvette cartridge between the cartridge and the baseplate. Leave at least six inches of film hanging from the instrument.

3. Slide the used cartridge off the film holder and discard it.

4. Pull up on the red plastic key in the center of the new cartridge to remove the plastic ring.

**Tools and supplies:**
- scissors
- transparent tape

**Cuvette diaphragms are also shipped with the cuvette film cartridge:**
Place these cuvette diaphragms in your Accessory Spare Parts Kit.
5 Slide the new cartridge onto the film holder and raise it until the release knob locks in place.

6 Pull the left film strip out of the cartridge. Overlap it about one-half inch over the left strip of old film hanging from the instrument and align the sides of these two film strips. Then use the red tape from the new cartridge to tape these strips together. Repeat the overlapping, aligning and taping with the right strip of film.

7 Press F1: Load Film. Wait for the counter to reset to 12000 and motion to stop.

8 After film loading is complete, check to see that there is no slack in the film coming out of the cuvette film cartridge. If there is, press F1: Load Film again.
Reverting the Cuvette Ring Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.
2. Open the right front instrument door and remove the cuvette waste container.
3. Locate the cuvette ring sensor.
4. Grip the sensor firmly and pull it straight down off its spring clip and post and then disconnect P/J 32B.
5. Install the new cuvette ring sensor.
6. Restore power as indicated in the “Controlled Power Shutdown” procedure.
7. Perform the “Cuvette Ring Alignment” and the alignment portion of the “Photometer Alignment” procedure in Module 4: Aligning.
8. Perform a System Check.
Replacing the Flex® Loader Home Sensor

1. With the instrument in Standby, press the Pause key to stop the sampling system, and then raise the sample and reagent lids.

2. Using a screwdriver, remove the small hand shield that covers the sensor.

3. Remove the front faceplate of the instrument and locate the sensor.

4. Disconnect sensor connector P/J 22B. Then use the 5/64" Allen wrench to remove the screw that secures the sensor to the instrument.

5. Install the new home sensor by reversing the previous steps.

6. Close the sample and reagent lids and press the Pause key to restart the sampling system.


Tools and supplies:
- screwdriver
- 5/64-in. Allen wrench

To remove the front faceplate...
The two 1/8-in. Allen screws to remove the front faceplate are located at either end of the faceplate.

After removing these screws, lift the faceplate slightly and disconnect two electrical connectors, P/J 13A and P/J 22E, on the underside of the faceplate.

Be sure to reconnect these connectors when reinstalling the faceplate.
Replacing the Flex® Presence Sensor

1  With the instrument in Standby, press the **Pause** key to stop the sampling system, and then raise the sample and reagent lids.
2  Using a screwdriver, remove the small hand shield that covers the sensor.
3  Using the 1/4" open-end wrench, remove the hexagonal standoff.
4  Disconnect the Flex® presence sensor connector, P/J 22C.
5  Using the 3/32" Allen wrench, remove the screw from the sensor board and remove the sensor. Be careful not to lose the small plastic spacer between the sensor and the instrument frame.
6  Install the new sensor by reversing the previous steps. Make sure to install the hexagonal standoff and to install the small plastic spacer between the sensor and the instrument frame.

7  Close the sample and reagent lids and press the **Pause** key to restart the sampling system.
8  Document this replacement on the Instrument Log sheet.

**Tools and supplies:**
- 3/32" Allen wrench
- 1/4" open-end wrench
- screwdriver

**Easier to access if the front faceplate is removed? To remove the front faceplate...**

The two 1/8" Allen screws to remove the front faceplate are located at either end of the faceplate. After removing these screws, lift the faceplate slightly and disconnect two electrical connectors, P/J 13A and P/J22E, on the underside of the faceplate.

Be sure to reconnect these connectors when reinstalling the faceplate.
Tools and supplies:
- screwdriver

Replacing Fuses in the Card Cage Area

Replacing AC Fuses
1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Using a screwdriver, turn the fuse holder to the left (counterclockwise) to release the fuse from the instrument.

3. Replace the fuse with a fuse of the same voltage/amperage rating. The amperage is printed on the instrument cabinet above the fuse holder.

4. Restore power as indicated in the “Controlled Power Shutdown” procedure.

Replacing DC Fuses
1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Using a screwdriver, turn the fuse holder to the left (counterclockwise) to release the fuse from the instrument.

3. Replace the fuse with a fuse of the same voltage/amperage rating. The voltage is printed on the left of the fuse holder; the amperage is printed on the right of the fuse holder.

4. Restore power as indicated in the “Controlled Power Shutdown” procedure.
Replacing the Heat Torch Assembly

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Raise the reagent lid.

3. Open the cutout in the top of the faceplate, raise the bar code reader out of the way, unscrew the alignment bar thumbscrew and raise the alignment bar out of the way.

**WARNING:** When working in the cuvette manufacturing area, be very careful not to touch the U-seal solenoid—it can be extremely HOT! Wait about five minutes for all components in this area to cool before continuing with this procedure.

4. Unlock the U-seal solenoid assembly by pulling its curved locking bar to the right; then move this assembly to the left and out of the way.

5. Pull the cuvette formation assembly away from the cuvette ring.

**Tools and supplies:**
- 3/32” Allen wrench
- screwdriver
6 Locate and disconnect P/J 13K.

7 Remove the cuvette diaphragm.

8 Use the 3/32" Allen wrench to remove the air manifold screw and pull the compressed air manifold out of the heat torch.

9 Remove the screw that holds the heat torch assembly and remove the heat torch assembly from the instrument.

Reminder: To install the cuvette diaphragm properly...
The circular hole should be toward the bottom of the cuvette diaphragm; the U-shaped notches should face toward you. Be sure the diaphragm is pushed down completely.

10 Install the new heat torch assembly by reversing the previous steps.

11 Restore power as indicated in the “Controlled Power Shutdown” procedure.

12 Perform a System Check.

Tools and supplies:
- screwdriver
- 9/64" T-handle Allen wrench

To remove the bottom plastic guard from the wash station...
You only need to loosen, not remove, the two screws on the side facing you until you can slide the guard out from under these screws.

Replacing the HM Incubate Wheel or Wash Wheel Home Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.
2. Raise the sample and reagent area lids.
3. Using a screwdriver, remove the bottom plastic guard from the wash station.
4. Remove and discard all reaction vessels from the wash and incubate wheels.
   WARNING: All reaction vessels removed from the wash wheel and incubate wheel are biohazards. Dispose of them according to your laboratory’s safe biohazard disposal procedures.
5. Unscrew the wash wheel locking knob and then use the knob to lift the wash wheel out of the instrument.

6. Lift the incubate wheel out of the instrument.
7 Using a 9/64" T-handle Allen wrench, remove the three screws that hold the magnet ring in the instrument and lift the magnet ring out of the instrument.

8 Using a screwdriver, remove the sensor bracket screw.

9 Lift the sensor up until you can disconnect its electrical connector (P/J 41B for the incubate wheel home sensor; P/J 42B for the wash wheel home sensor). Remove the sensor and bracket from the instrument.

10 Using a screwdriver, remove one screw to remove the sensor from the bracket.

11 Install the new sensor.
   a. Install the new sensor onto the bracket.
   b. Connect the sensor electrical connector and reinsert and tighten the sensor bracket screw.
   c. Install the magnet ring in the instrument.
   d. Place any of the three alignment cutouts in the incubate wheel onto the incubate wheel alignment pin.
   e. Place any of the three alignment holes in the wash wheel onto the wash wheel alignment pin and push the wash wheel onto the instrument.
   f. Tighten the wash wheel locking knob.
   g. Reinstall the bottom plastic guard onto the wash station.

12 Restore power as indicated in the “Controlled Power Shutdown” procedure.

13 Perform all the alignment procedures in “HM Module Alignments” in Module 4: Aligning.

14 Perform a System Check.

15 Document this replacement on the Instrument Log sheet.
Tools and supplies:  
- screwdriver  
- 9/64" T-handle Allen wrench

Replacing the HM Mixer Assembly PC Board

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing.*
2. Raise the sample and reagent area lids.
3. Using a screwdriver, remove the bottom plastic guard from the wash station.
4. Remove and discard all reaction vessels from the wash and incubate wheels.
   
   **WARNING:** All reaction vessels removed from the wash wheel and incubate wheel are biohazards. Dispose of them according to your laboratory’s safe biohazard disposal procedures.

5. Unscrew the wash wheel locking knob and use the knob to lift the wash wheel out of the instrument.

6. Lift the incubate wheel out of the instrument.
7 Using a 9/64” T-handle Allen wrench, remove the three screws that hold the magnet ring in the instrument. Lift the magnet ring out of the instrument.

8 Using a screwdriver, remove the two screws that hold the mixer assembly sensor board to the mixer assembly.
9 Lift the sensor board up until you can disconnect electrical connector P/J44B and remove the sensor board from the instrument. Discard the old sensor. Using the Allen wrench, remove the two screws that hold the mixer assembly in place.

To perform a mixer calibration...
1 Go to the HM Module Alignments screen. From the Operating Menu, press:
   F7: Diagnostics
   F3: Alignments
   F6: HM Module
2 Press F5: Mixer Calib.
The instrument will perform the mixer calibration and prompt you when it is finished.

10 Install the new mixer assembly sensor board.
   a. Connect P/J 44B. Position the new board to the left of the twin mixers and install using the same screws that hold the mixer assembly in place. Tighten the screws with the T-handle Allen wrench.

   b. Position the magnet ring in the instrument. Reinsert and tighten the three screws.
   c. Place one of the three alignment cutouts in the incubate wheel onto the incubate wheel alignment pin.
   d. Position one of the three alignment holes in the wash wheel onto the wash wheel alignment pin and push the wash wheel onto the instrument.
   e. Tighten the wash wheel locking knob.
   f. Reinstall the bottom plastic guard onto the wash station.
11 Restore power as indicated in the “Controlled Power Shutdown” procedure.
12 Perform a mixer calibration.
13 Perform a System Check.
14 Document this replacement on the Instrument Log sheet.
Replacing an HM Pump and Motor Assembly

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Access the pump and motor to be replaced. There are four HM pump and motor assemblies: two are mounted on the frame of the wash station and two are mounted on the pump panel inside the instrument cabinet.

**Tools and supplies:**
- 3/32” Allen wrench
- Screwdriver

**Pump Head/Motor To Access**

- **Wash Station**: Raise the sample and reagent lids.

- **Pump Panel**: Open the middle cabinet door and the pump panel assembly.

---

300178A-010

300178A-011
3 Disconnect the top and bottom tubing from the pump head at its connectors.

<table>
<thead>
<tr>
<th>Pump Head/Motor</th>
<th>Connector</th>
<th>Tubing Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash Station Pump Head #1</td>
<td>Top</td>
<td>Tubing 4 (green) to wash probe #1</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td>To Chemistry Waste container</td>
</tr>
<tr>
<td>Wash Station Pump Head #2</td>
<td>Top</td>
<td>Tubing 2 (blue) to wash probe #2</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td>To Chemistry Waste container</td>
</tr>
<tr>
<td>Pump Panel (Top Pump)</td>
<td>Top</td>
<td>To Sample Drain</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td>To Sample Probe Cleaner bottle</td>
</tr>
<tr>
<td>Pump Panel (Bottom Pump)</td>
<td>Top</td>
<td>To R2 Drain</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td>To Probe Cleaner bottle (reagent)</td>
</tr>
</tbody>
</table>

4 Disconnect the motor electrical connector.

5 Using a 3/32" Allen wrench for an assembly on the wash station or a screwdriver for an assembly on the pump panel, remove two screws that hold the pump and motor assembly to the HM pump panel or wash station.

**WARNING:** The pump head is a biohazard; use your laboratory’s safe biohazard waste disposal procedures when discarding.

*Photo at the right shows...*

The location of the screws to remove the top or bottom pump and motor assembly on the pump panel.
Screws to remove a wash station pump and motor assembly are in a similar location on the wash station.

![Photo of pump head and motor assembly](Max200209_06)
Use the shipping plug...
The shipping plug (or "T") must be inserted into the pump head BEFORE installing onto the motor to prevent damage to the pump rollers as the pump head is pushed onto the motor shaft.

Quick primer for priming...
1. Go to the HM Pump Prime screen.
   From the Operating Menu, press:
   - F4: System Prep
   - F7: Pump Prime
   - F6: HM . . .
2. Type the number 3 in the Cycles field.
3. Press Enter.
4. Prime the pump and motor assembly that was replaced by pressing one of the following:
   - F1: HM Wash Pump (chemistry wash),
   - F2: Reag Cleaner (reagent cleaner),
   - F3: Samp Cleaner (sample cleaner).

6. Attach the new pump head to the new motor.
   a. Insert the shipping plug (or “T”) that came with the pump head completely into the front of the pump head.
   b. Slide the pump head onto the shaft of the motor.
   c. Reattach the tubing to the pump head.

7. Install the new HM pump and motor assembly.
   a. Insert and tighten two screws.
   b. Connect the motor electrical connector.
   c. Connect the tubing to the pump head.

8. Restore power as indicated in the “Controlled Power Shutdown” procedure.

9. Prime the pump on the assembly that was replaced.
   - If you replaced either wash station pump and motor assembly, prime the chemistry wash.
   - If you replaced the bottom pump and motor assembly on the pump panel, prime the reagent cleaner.
   - If you replaced the top pump and motor assembly on the pump panel, prime the sample cleaner.

10. Perform a System Check.

**Tools and supplies:**
- screwdriver

**Sensor is located...**
The shuttle home sensor is mounted on the vessel shuttle guide motor block.

---

**Replacing the HM Shuttle Home Sensor**

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing.*
2. Using a screwdriver, remove the screw that holds the shuttle home sensor to the instrument.

3. Unplug electrical connector P/J 48E from the Vessel Transfer PC board and remove the shuttle home sensor from the instrument.
4. Install the new shuttle home sensor and reconnect P/J 48E.
5. Restore power as indicated in the “Controlled Power Shutdown” procedure.
6. Perform a System Check.
Tools and supplies:
- 5/64" Allen wrench
- 9/64" Allen wrench

Replacing the HM Vessel Detect Switch

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.
2. Using a 5/64" Allen wrench, remove two screws that hold the vessel detect switch to the instrument.
3. Using a 9/64" Allen wrench, remove the screw that holds the cable clamp that contains the electrical cable for the switch.
4. Unplug electrical connector P/J 48C from the Vessel Transfer PC board and remove the vessel detect switch from the instrument.
5. Install the new vessel detect switch and reconnect P/J 48C.
6. Restore power as indicated in the “Controlled Power Shutdown” procedure.
7. Perform a System Check.
Tools and supplies:

- paper towels

Why go to the HM Pump Prime screen? SAFETY!

By going to the HM Pump Prime screen, you will be preventing any automatic priming of the HM wash probes that may occur. You will also be at the correct screen to prime the probes at the end of the procedure.

Tools and supplies:

- paper towels

To get to the HM Pump Prime screen from the Operating Menu, press:

- F4: System Prep
- F7: Pump Prime
- F6: HM...

1. With the system in Standby, go to the HM Pump Prime screen.

2. Raise the sample and reagent lids.

3. Disconnect the tubing from the wash probe.
4. Loosen the probe thumbscrew until you can lift the probe up and out of the wash station. Discard the probe.

**WARNING:** These beveled wash station probes are a biohazard and a puncture hazard. Use your laboratory’s safe biohazard waste disposal procedures for contact with and disposal of these probes in a sharps container.

5. Position the new wash probe in the wash station so that its dispense probe is toward the front edge of the wash station. Gently push the probe all the way down until its lip contacts the probe holder.

6. Tighten the probe thumbscrew and connect the tubing to the new probe.

<table>
<thead>
<tr>
<th><strong>Tubing Color</strong></th>
<th><strong>Number</strong></th>
<th><strong>Attaches to</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>3</td>
<td>Wash Probe 1 dispense (straight top) probe</td>
</tr>
<tr>
<td>green</td>
<td>4</td>
<td>Wash Probe 1 aspirate (bent top) probe</td>
</tr>
<tr>
<td>yellow</td>
<td>1</td>
<td>Wash Probe 2 dispense (straight top) probe</td>
</tr>
<tr>
<td>blue</td>
<td>2</td>
<td>Wash Probe 2 aspirate (bent top) probe</td>
</tr>
</tbody>
</table>

7. Press **F1: HM Wash Pump** to prime the HM wash station pump.

8. Align the wash probe to the wash wheel.
   a. Go to the HM Module Alignments screen.
   b. Move the cursor to the Wash Probes to Wash Wheel field.
   c. Press **F7: Check Align**. If you need more information on how to perform this alignment, refer to the “HM Module Alignments” procedure in Module 4: **Aligning**.

9. Perform a System Check.

Replacing the HM Wash Probe Home Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.
2. Raise the sample and reagent lids.
3. Manually push the wash probe platform down until you can access the wash probe home sensor.

4. Using a 5/64” Allen wrench, remove the screw that holds the wash probe home sensor in the instrument.
5. Disconnect electrical connector P/J 45B and remove the sensor from the instrument.
6. Install the new wash probe home sensor and reconnect P/J 45B.
7. Restore power as indicated in the “Controlled Power Shutdown” procedure.
8. Align the wash probes to the wash wheel.
   a. Go to the HM Module Alignments screen.
   b. Move the cursor to the Wash Probes to Wash Wheel field.
   c. Press F7: Check Align. If you need more information on performing this alignment, refer to the “HM Module Alignments” procedure Module 4: Aligning.
9. Perform a System Check.

Tools and supplies:
• 5/64” Allen wrench

Getting to the HM Module Alignments screen…
From the Operating Menu, press:
F7: Diagnostics
F3: Alignments
F6: HM Module
Replacing HM Wash Probe Tubing

1. With the system in Standby, go to the HM Pump Prime screen.

   - Raise the sample and reagent lids.
   - Disconnect and discard the following pieces of tubing:
     - **WARNING:** These pieces of tubing are biohazards; use your laboratory's safe biohazard waste disposal procedures when discarding.

     | Tubing Wrap | Color | Number | Attaches to                                      |
     |-------------|-------|--------|-------------------------------------------------|
     |             | yellow| 1      | Wash Probe 2 dispense (straight top) probe       |
     |             | blue  | 2 (long)| WP 2 vacuum sensor and wash pump 2 (top pump)   |
     |             | blue  | 2 (short)| Wash Probe 2 aspirate (bent top) probe and vacuum sensor |
     |             | red   | 3      | Wash Probe 1 dispense (straight top) probe      |
     |             | green | 4 (long)| WP 1 vacuum sensor and wash pump 1 (bottom pump) |
     |             | green | 4 (short)| Wash Probe 1 aspirate (bent top) probe and vacuum sensor |

Why go to the HM Pump Prime screen? SAFETY!
By going to the HM Pump Prime screen, you will be preventing any automatic priming of the HM wash probes that may occur. You will also be at the correct screen to prime the probes at the end of the procedure.

To get to the HM Pump Prime screen from the Operating Menu, press:
- F4: System Prep
- F7: Pump Prime
- F6: HM . . .
4 Install the new tubing. (Refer to the table on the previous page.)

Keep this tubing neat...
The tubing holder on the top of the wash station has a color-coded label indicating where (top or bottom position) the tubing should be positioned inside the holder. It also indicates which tubing attaches to which part of the probe.

Quick primer for priming...
1 Type the number 3 in the Cycles field.
2 Press Enter.
3 Press F1: HM Wash Pump.

5 Press F1: HM Wash Pump to prime the HM wash pump.
6 Perform a System Check.
7 Make an entry on the Instrument Log sheet.
**Replacing the HM Wash Wheel**

1. With the system in Standby, press the **Pause** key and raise the sample and reagent area lids.

2. Using a screwdriver, remove the lower plastic guard from the wash station.

3. Remove and discard all reaction vessels from the wash and incubate wheels.
   **WARNING:** All reaction vessels removed from the wash wheel and incubate wheel are biohazards. Dispose of them according to your laboratory’s safe biohazard disposal procedures.

4. Unscrew the wash wheel locking knob and then use the knob to lift the wash wheel out of the instrument.

5. Install the new wash wheel.
   a. Place any of the three alignment holes in the wash wheel onto the wash wheel alignment pin and push the wash wheel onto the instrument.
   b. Tighten the wash wheel locking knob.
   c. Reinstall the lower guard onto the wash station.

6. Press **Pause** to restart sampling system.

7. Perform the three incubate and wash wheel alignments located in the top half of the HM Module Alignments screen. See the “HM Module Alignments” procedure in Module 4: **Aligning**.

8. Perform a System Check.


---

**Tools and supplies:**
- screwdriver

**To remove the bottom plastic guard of the wash station...**
You only need to loosen, not remove, the two screws on the side facing you until you can slide the guard out from under these screws.

---

**Getting to the HM Module Alignments screen...**
From the Operating Menu, press:
- F7: Diagnostics
- F3: Alignments
- F6: HM Module
Replacing IMT Miscellaneous Tubing

CAUTION! Do not interchange IMT tubing with other Dimension® models. The Dimension® RxL Max® tubing kit package is labeled appropriately.

1. With the instrument in Standby, press the Pause key to stop the IMT sampling system, and then raise the IMT lid.
2. Go to the Fluids Prime/Pump Alignment screen.
3. Pull the IMT sensor cartridge interface forward.

4. Refer to the illustration on the next page to identify where the IMT miscellaneous tubing is located within the IMT system. Then refer to the pages that follow the illustration for how to replace each piece of tubing. The IMT miscellaneous tubing to be replaced is labeled: D1, D2, F1, F2, R1, X2, W2, and W.

WARNING: The X2, W2, and W tubing are biohazards. Follow your laboratory’s safe biohazard waste disposal procedures to discard this tubing.

5. After replacing all the tubing, return the IMT sensor cartridge interface to its locked, upright position.
6. Press the Pause key to restart the IMT sampling system and then prime the IMT system with Salt Bridge solution.
7. Run a condition/soak cycle (see Conditioning the IMT System earlier in this section).
8. Calibrate the IMT.

Tools and supplies: • 3/32” Allen wrench

Getting to the Fluids Prime/Pump Alignment screen...
From the Operating Menu, press:
F4: System Prep
F3: IMT
F3: Align/Prime

Max20209_07
Tubing W2 is connected to the IMT Sample Port under the instrument baseplate.
### Tubing To replace...

<table>
<thead>
<tr>
<th>Tubing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Disconnect and replace this tubing and bottle cap combination. Ensure that the new tubing is placed completely into the pinch valve on the back of the sensor cartridge interface.</td>
</tr>
<tr>
<td>D1 and D2</td>
<td>Disconnect and replace this tubing.</td>
</tr>
<tr>
<td>F1 and F2</td>
<td>Disconnect and replace this tubing.</td>
</tr>
<tr>
<td>W2</td>
<td>Disconnect and replace this tubing.</td>
</tr>
<tr>
<td>X2</td>
<td>Disconnect and replace this tubing. X2 connects the QuikLYTE® integrated multisensor with the IMT Pump.</td>
</tr>
<tr>
<td>Waste</td>
<td>Disconnect and replace this tubing. The waste tubing connects to the waste bottle inside the instrument cabinet.</td>
</tr>
</tbody>
</table>

---

**For a neater IMT tubing appearance...**

When routing tubing, place the tubing in plastic tubing guides wherever possible.

**Here’s a good tubing replacement tip from Service...**

Remove and replace one tubing at a time. This makes it easier to see where the tubing should be connected!

**Routing the X2 tubing:**

Route this tubing through the holes in the sides of the sensor cartridge interface. This will prevent pinching these lines when the interface is closed.

---

**WARNING:** The W2 tubing is a biohazard; follow your laboratory’s safe biohazard waste disposal procedures to discard this tubing.

**WARNING:** The X2 tubing is a biohazard; follow your laboratory’s safe biohazard waste disposal procedures to discard this tubing.

**WARNING:** The waste tubing is a biohazard; follow your laboratory’s safe biohazard waste disposal procedures to discard this tubing.
Replacing the IMT Probe

1. With the instrument in Standby, press **Pause** to stop the IMT sampling system and then raise the sample lid.

2. Disconnect the IMT probe tubing from the top of the probe.

3. Unscrew and remove the black probe locking guide and remove the electrical connector. Then pull the used probe out of the IMT arm.

   **WARNING:** This beveled probe is a biohazard and a puncture hazard. Follow your laboratory’s safe handling procedures for contact with and disposal of this probe in a sharps container.

4. Slide the new probe into the IMT arm and then slide the round electrical connector onto the top of the probe.

5. Reinstall the black probe locking guide and push the IMT probe tubing onto the new probe.

6. Close the sample lid and press the **Pause** key to restart the IMT sampling system.

7. Perform all the IMT probe alignments in the “IMT Probe Alignments” procedure in Module 4: *Aligning*.

8. If you have an HM module on your instrument, only run QC for electrolytes. For non-HM instruments, run a System Check and QC for electrolytes.

9. If the QC is out, replace the QuikLYTE® sensor by following the entire procedure (steps 1–14) in Module 2: *Using*, “Replacing the QuikLYTE® Integrated Multisensor.”

Repeating the IMT Probe Tubing

1. With the instrument in Standby, press Pause to stop the IMT sampling system and then raise the sample lid.

2. Disconnect the IMT probe tubing from the top of the IMT probe and from its connection on port #1 of the monopump.

3. Pull the IMT probe tubing out of the instrument and discard it.

   **WARNING:** The IMT probe and tubing are biohazards; use your laboratory’s safe biohazard waste disposal procedure when discarding this tubing.

4. Connect the new IMT probe tubing onto the IMT probe and then route it into the tubing guide at the rear of the IMT arm until it comes out of the hole in the baseplate. This tubing connects to port #1 of the monopump.

5. Close the sample lid and press the Pause key to restart the IMT sampling system.

6. If you have an HM module on your instrument, only run QC for electrolytes. For non-HM instruments, run a System Check and QC for electrolytes.

7. If the QC is out, replace the QuikLYTE® sensor by following the entire procedure in Module 2: Using, “Replacing the QuikLYTE® Integrated Multisensor.”


**Tools and supplies:**
- IMT probe tubing
Replacing the IMT Rotary Valve Seal

1. Raise the keyboard and disconnect the tubing from the Standard A and Standard B bags.

2. Go to the Fluids Prime/Pump Alignment screen and prime both Standard A and Standard B two times to remove fluid from the A and B tubing.

3. Raise the sample lid and the small IMT access door and locate the IMT Rotary Valve.

Tools and supplies:
- Krytox® lubricant
- 3/32" Allen wrench
- paper towels
- disposable gloves
- gauze
- needlenose pliers

Getting to the Fluids Prime/Pump Alignment screen...
From the Operating Menu, press:
- F4: System Prep
- F3: IMT
- F3: Align/Prime
4 Using needlenose pliers, remove four screws or posts at each corner in the top of the IMT Rotary Valve and then lift the rotary valve motor off the valve body, turn it over, and remove the rotary valve seal from the valve seal holder on the encoder assembly.

Service Tip...
Do not apply too much Krytox® grease to the valve seal. The grease can clog the slot opening in the seal.

5 Press down firmly on the encoder assembly and ensure that it springs back with a click sound. If it doesn’t, call the Technical Assistance Center to order a new motor.

6 Clean the inside of the valve body with a gauze pad lightly moistened with water.

7 Lubricate the new rotary valve seal with Krytox® grease. Place a pinhead-sized drop of grease on your gloved forefinger. Gently rub your gloved forefinger and thumb together, then rub both sides of the seal between your thumb and forefinger.

8 Install the new rotary valve seal with the flat side against the valve seal holder on the valve motor assembly. The “X” and the slot on the seal should be visible.

9 Reinstall the motor assembly into the valve body using the four screws or posts. Completely tighten these four screws using the needlenose pliers.

10 Reconnect the tubing to the Standard A and Standard B bags and close the keyboard.


12 Calibrate the IMT.

Replacing the IMT Rotary Valve Sensor

1. Raise the keyboard and disconnect the tubing from the Standard A and Standard B bags.

2. Raise the sample lid and the small IMT access door and locate the IMT Rotary Valve.

Tools and supplies:
- 3/32" Allen wrench
- needlenose pliers

Getting to the Fluids Prime/Pump Alignment screen..
From the Operating Menu, press:
- F4: System Prep
- F3: IMT
- F3: Align/Prime
3 Using needle-nose pliers, remove four screws or four posts at each corner in the top of the IMT Rotary Valve and then lift the rotary valve motor off the valve body.

4 Using the 3/32" Allen wrench, remove two screws that secure the sensor to the IMT Rotary Valve body.

5 Disconnect electrical connector P184/J184 and remove the sensor from the valve body.

6 Install the new sensor on the valve body.

7 Reinstall the motor assembly into the valve body using the four screws or posts. Completely tighten these four screws using the needle-nose pliers.

8 Reconnect the tubing to the Standard A and Standard B bags and close the keyboard.


10 Calibrate the IMT.

Replacing the IMT Rotary Valve Tubing

1. With the instrument in Standby, press **Pause** to stop the IMT sampling system, and then raise the sample lid.

2. Go to the Fluids Prime/Pump Alignment screen.

3. Raise the keyboard and open the small IMT access door.

4. Disconnect the A and B tubing by removing the plastic tubing connector from the Standard A and Standard B bags and at the fittings of the IMT rotary valve.

5. Disconnect the X1 tubing from the QuikLYTE® integrated multisensor and the X0 tubing from the IMT sample port.

**WARNING:** The X0 and X1 tubing are biohazards. Use your laboratory’s safe biohazard waste disposal procedures when discarding this tubing.

**Tools and supplies:**
- Screwdriver

**Getting to the Fluids Prime/Pump Alignment screen...**
From the Operating Menu, press:
- F4: System Prep
- F3: IMT
- F3: Align/Prime

**Here’s a good tubing replacement tip from Service . . .**
Remove and replace one tubing at a time. This makes it easier to see where the tubing should be connected!
6 Connect new tubing A, B, X0, and X1.
7 Lower the keyboard and small IMT access door.
8 Press the Pause key to restart the IMT sampling system.
9 Run 2 or 3 IMT condition cycles.
10 Calibrate the IMT.

To run an IMT condition cycle...
From the Fluids Prime/Pump Alignment screen:
1 Press the Exit key to go to the IMT Setup Menu screen.
2 Press F4: Cond/Dilchk
3 Enter the segment position where you will place the conditioning fluid and then press the Enter key.
4 Insert your sample cup of conditioning fluid in the position indicated on the screen.
5 Press F1: Condition.
Replacing the IMT Sampler Handler Sensors

This procedure is normally performed by trained Field Service Engineers. However, an experienced operator could also perform this procedure in conjunction with the Technical Assistance Center.

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Open the middle instrument door and open the pump panel assembly.

3. Locate the IMT sampler handler and remove its plastic cover. This cover is held on by two reusable plastic clips.

4. Disconnect the appropriate sensor cable connector: P/J 50E for the probe vertical sensor; P/J 50D for the probe rotational sensor.

5. Using the 7/64" Allen wrench, remove the sensor mounting screw and remove the sensor.

6. Install the new sensor:
   a. Place the new sensor on its locator pin.
   b. Tighten the sensor mounting screw.
   c. Reconnect the cable connector.
   d. Replace the plastic cover.

7. Restore power as indicated in the “Controlled Power Shutdown” procedure.

8. Perform an IMT probe alignment. Refer to the “IMT Probe Alignments” procedure in Module 4: Aligning as necessary.


Tools and supplies:
- 7/64" Allen wrench
Tools and supplies:
- Phillips screwdriver

Reminder:
Here’s where to connect the monopump tubing when you reinstall it.
Port 1 - tubing wrapped with blue tape and labeled “Monopump #1.”
Port 2 - tubing that has no blue tape on it.
Port 3 - tubing wrapped with blue tape and labeled “Monopump #3.”

Replacing the Monopump Piston Home Sensor

1. With the instrument in Standby, press Pause to stop the IMT sampling system.

2. Raise the sample and IMT lids and remove the cover at the rear of the IMT area.

3. Disconnect all tubing from the monopump and electrical connectors (P/J 81, 82, 83, and 84).

4. Remove the monopump from the instrument by gently pressing down on the latch on the front of the monopump and lifting the pump out of the instrument.

5. Using a Phillips screwdriver, remove the black pump base mounting screw.
6 Carefully pull the plastic center tab on the monopump forward while slowly opening the top portion of the pump, exposing the piston home sensor located on the underside of this top portion.

7 Remove the piston sensor mounting screw. To access this screw, turn the orange piston drive belt and move the sensor’s home flag out of the way.

8 Remove and replace the sensor.

9 Reassemble the monopump and install it in the instrument. Remember to reconnect all electrical connectors (P/J 81, 82, 83, and 84) and to connect all tubing to the correct port on the monopump.

10 Press Pause to restart the IMT sampling system.

11 Continue with “Adjusting the Piston Home Sensor” on the next page.
Adjusting the Monopump Piston Home Sensor

1. With the instrument in Standby, go to the Pump Prime Menu screen.
2. On the right side of the monopump, place your finger on the orange belt and move it clockwise (toward you) until the belt cannot be moved any further.

3. Use a Phillips screwdriver to turn the silver-colored adjustment screw clockwise until you feel resistance.
4. Open the left cabinet door and locate LED CR6A near the bottom of motor control board #3. It should be off.
5. Turn the adjustment screw counterclockwise until LED CR6A just turns on.
6. Turn the adjustment screw an additional 3/4 turn counterclockwise.
7. Move the orange belt approximately one revolution counterclockwise (away from you).
8. From the Pump Prime Menu screen, prime the monopump:
   a. Move the cursor to the Cycles field and type 3 for the number of prime cycles to be performed.
   b. Press Enter.
   c. Press F5: IMT Mono Pump.
9. If you have an HM module on your instrument, only run QC for electrolytes. For non-HM instruments, run a System Check and QC for electrolytes.
10. If the QC is out, replace the QuikLYTE® sensor by following the entire procedure in Module 2: Using, “Replacing the QuikLYTE® Integrated Multisensor.”
Replacing the Monopump Piston Lip Seal

1. With the instrument in Standby, press Pause to stop the IMT sampling system.

2. Raise the sample and IMT lids.

3. Loosen the large thumbscrew on top of the retaining lever and slide the retaining lever backward.

   **CAUTION!** Do not pinch tubing when moving the retaining lever back.

---

**Tools and supplies:**
- Krytox® grease
- disposable gloves
- gauze
4  Lift the valve motor off the valve body and set it aside.

5  Gently pull the white valve body straight up and off the pump to expose the lip seal.

6  With a glove or paper towel, unscrew the lip seal and washer from the top of the pump piston and discard them.

7  Place the new washer onto the top threads of the piston and then screw on the new lip seal. Hand-tighten completely.

8  Clean the inside of the valve body with a gauze pad lightly moistened with water or a lint-free towel.
9 Lubricate the outside rim of the lip seal with Krytox® grease. Place two pinhead-sized drops of grease on your gloved forefinger. Gently rub a light coating around the outer edge of the lip seal. Do not apply it to the entire surface. Using the same gloved finger, lubricate the inside surface of the valve body.

10 Reinstall the white valve body by pushing it straight down on the piston.

11 Press down firmly on the encoder assembly and ensure that it springs back with a click sound. If it doesn’t, call the Technical Assistance Center to order a new motor.

12 Reinstall the valve motor onto the valve body, ensuring that the wires are toward the rear of the instrument. Be sure the motor is seated firmly on the valve body.

13 Slide the retaining lever on the pump forward over the assembly.

   **CAUTION!** Do not pinch tubing when moving the retaining lever forward.

14 Tighten the large thumbscrew on top of the pump assembly. Check that you can turn the valve motor with slight resistance. If you cannot turn the motor, the thumbscrew is too tight; if there is no resistance, the thumbscrew is too loose.

15 Press **Pause** to restart the IMT sampling system.

16 From the Pump Prime Menu screen, prime the monopump by moving the cursor to the Cycles field, typing 3 for the number of prime cycles to be performed, and pressing **Enter**. Then press **F5: IMT Mono Pump**.

17 For non-HM instruments, run a System Check.

18 Replace the QuikLYTE® sensor by following the entire procedure in Module 2: *Using, “Replacing the QuikLYTE® Integrated Multisensor.”*

   **CAUTION!** You MUST replace the QuikLYTE® sensor after replacing the monopump piston lip seal.

Replacing the Monopump Position Sensor

1. With the instrument in Standby, press **Pause** to stop the IMT sampling system.

2. Raise the sample and IMT lids and remove the cover at the rear of the IMT area.

3. Loosen the large thumbscrew on top of the retaining lever, slide the retaining lever backwards, and lift the valve motor off the valve body.

   **CAUTION!** Do not pinch tubing when moving the retaining lever back.

---

**Tools and supplies:**
- 3/32" Allen wrench
4 Using a 3/32" Allen wrench, remove two screws and slide the sensor and its bracket out of the assembly.

5 Disconnect the sensor’s electrical connector, P/J 84.
6 Install the new sensor/sensor bracket into the monopump.
7 Reinstall the valve motor onto the valve body.
8 Slide the retaining lever on the pump forward and tighten the large thumbscrew on top of the pump assembly.

CAUTION! Do not pinch tubing when moving the retaining lever forward.

9 Press Pause to restart the IMT sampling system.
10 From the Pump Prime Menu screen, prime the monopump by moving the cursor to the Cycles field, typing 3 for the number of prime cycles to be performed, and pressing Enter. Then press F5: IMT Mono Pump.

11 If you have an HM module on your instrument, only run QC for electrolytes. For non-HM instruments, run a System Check and QC for electrolytes.

12 If the QC is out, replace the QuikLYTE® sensor by following the entire procedure in Module 2: Using, “Replacing the QuikLYTE® Integrated Multisensor.”


---

**Service Tip - Don’t screw the large thumbscrew down too tight!**

Tighten this screw until the motor housing contacts the valve body, then continue to tighten another 1/8th turn.
If this screw is tightened too much, you may get Lost Steps error messages.

**Getting to the Pump Prime Menu screen...**
From the Operating Menu, press:
F4: System Prep
F7: Pump Prime
Replacing/Cleaning Optical Filters

1 Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2 Raise the reagent area lid and turn the bottom splined shaft on the R2 reagent arm to raise the reagent probe out of the reagent drain.

3 Using the screwdriver, loosen the three captive screws that secure the R2 reagent arm to the instrument. Manually move the R2 arm counterclockwise to access and loosen captive screw number 3. Carefully lift the R2 reagent arm and lay it aside. You do not need to disconnect any tubing or electrical connectors.

**Tools and supplies:**
- screwdriver
- lens paper
4 Locate the optical filter to be cleaned/replaced.

5 Carefully lift the edge of the filter and remove it from the wheel. Holding the filter by its sides, clean both surfaces with lens paper. If necessary, use water to clean the filter.

**CAUTION!** Do not use paper towels to clean optical filters; they will damage the filters by scratching them.

6 Reinsert the filter into its correct position in the filter wheel. The arrow on the side of the filter should point up. Then wipe the top surface of the optical filter with lens paper. Also wipe the top of any other filters you may have inadvertently touched while inserting the filter.

**WARNING:** Make sure that the filter is replaced with the arrow pointing up or it will not function properly.

7 Position the R2 reagent arm alignment slot over the alignment pin in the instrument baseplate. Tighten the captive screws.

8 Restore power as indicated in the “Controlled Power Shutdown” procedure.
When reinstalling the R2 reagent arm...remember to use the alignment pin!
Position the alignment pin on the baseplate in the alignment slot in the base of the R2 reagent arm. The captive screws should now be aligned over their holes!

9 Perform the “R2 Reagent Probe Alignments” procedure in Module 4: Aligning.

10 Perform a System Check.


You may want to confirm method performance by processing QC samples for those methods that use as a primary or blanking wavelength the filter(s) replaced/cleaned. See the chart below for methods that are used by each filter.

<table>
<thead>
<tr>
<th>Filter #</th>
<th>Wavelength</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>340 nm</td>
<td>ALC, ALT, AMON, AMPH, AST, BARB, BENZ, BUN, C3, C4, CK, CKMB, COC, CRBM, CRP, EXTC, GENT, GLU, GLUC, HA1C, IGA, IGG, IGM, LA, LDH, LIDO, MALB, METH, MPA, NAPA, OPI, PCP, PHNO, PHOS, PROC, PTN, RCRP, T4, THC, THEO, TOBR, TRIG, TRNF, TU, VALP, VANC</td>
</tr>
<tr>
<td>2</td>
<td>383 nm</td>
<td>ALC, AMON, BUN, GLU, GLUC, LA, LDH, PALB, T4, TRIG, TU</td>
</tr>
<tr>
<td>3</td>
<td>405 nm</td>
<td>ABS, ALP, AMY, CCRP, CK, CKMB, ECO2, GGT, HA1C</td>
</tr>
<tr>
<td>4</td>
<td>452 nm</td>
<td>CHOL, HDL</td>
</tr>
<tr>
<td>5</td>
<td>510 nm</td>
<td>ABS, ALP, CCRP, CREA, CTNI*, FT4*, LPBN*, LTNI*, MG, PBNP*, SAL, TGL, TSH*</td>
</tr>
<tr>
<td>6</td>
<td>540 nm</td>
<td>ALB, ALDL, CA, CHOL, DBI, DBIL, HDL, LI, TBI, TBIL, TP</td>
</tr>
<tr>
<td>7</td>
<td>577 nm</td>
<td>AMY, CA, CSA*, CSAE*, DGNA, DGTX, FERR*, FPSA*, HA1C, HCG*, LHCG*, LIP, LMMB*, MMB*, MYO*, PSA*, TACR*, TPSA*</td>
</tr>
<tr>
<td>8</td>
<td>600 nm</td>
<td>ACP, ACTM, AHDL, ALC, CREA, EXTC, GGT, IBCT, IRN, IRON, MG, PCHE, THC, TIBC, UCFP</td>
</tr>
<tr>
<td>10</td>
<td>293 nm</td>
<td>URCA</td>
</tr>
</tbody>
</table>

* – HM methods.
**Tools and supplies:**
- screwdriver

**Replacing the Photometer Filter Wheel Dual Sensor**

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Raise the reagent area lid.

3. Turn the bottom splined shaft on the R2 reagent arm to raise the reagent probe out of the drain.

4. Using the screwdriver, loosen the three captive screws that secure the R2 reagent arm to the instrument. Manually move the R2 arm counterclockwise to access and loosen captive screw number 3. Carefully lift the R2 reagent arm and lay it aside. You do not need to disconnect any tubing or electrical connectors.
5 Unplug P/J 34C. Remove the screw in the center of the S1 sensor and remove the sensor from the instrument.

**CAUTION!** Be careful not to touch, scratch, or damage any of the optical filters during this procedure.

6 Install the new dual sensor by reversing the previous steps.

7 Position the alignment slot in the R2 reagent arm over the alignment pin in the instrument baseplate. Tighten the captive screws. Reinstall the R2 reagent arm.

8 Restore power as indicated in the “Controlled Power Shutdown” procedure.

9 Perform the “R2 Reagent Probe Alignments” in Module 4: Aligning.

10 Perform a System Check and Daily QC.

Replacing the Photometer Home Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Raise the sample and reagent lids. Then remove the small hand shield from the instrument.

3. Raise the reagent area lid and turn the bottom splined shaft on the R1 reagent arm to raise the reagent probe out of the reagent drain.

4. Using a screwdriver, remove the three captive screws that secure the R1 arm to the instrument and then move the R1 reagent arm out of the way.

5. Use the 5/64” Allen wrench to remove the screw that secures the sensor to the baseplate. Then pull sensor connector P/J 13D up through the hole in the baseplate and disconnect it.

6. Install the new photometer home sensor by reversing the previous steps.

7. Restore power as indicated in the “Controlled Power Shutdown” procedure.

8. Perform steps 1 through 6 of the “Photometer Alignment” procedure in Module 4: *Aligning*.

9. Perform a System Check and your Daily QC.


**Tools and supplies:**
- 5/64” Allen wrench
- screwdriver
Replacing the Printer Paper

1. Raise the printer cover.

2. Tilt the printer toward the rear of the instrument and remove any remaining paper from the used roll. Push the locking pins on each side of the bar down and toward the sides of the printer and remove the used roll of paper.

3. Position the new roll of paper in the printer so that the paper feeds off the front (or top) of the roll.

4. Lock the new roll of paper in place by pushing the locking pins on both sides of the bar toward the paper and then up toward the printer.

5. Slide the paper up into the printer until it catches and automatically feeds itself through the printer.

6. Tilt the printer forward and close the printer cover.

7. Press the Select button on the printer to place the printer back on line.

8. Press the Alt/O key combination to advance the paper out of the printer.

Tools and supplies:
- scissors

If there is still some paper remaining on the roll:
1. Cut or tear the paper.
2. Press the Alt/O key combination a few times until the remaining paper exits the printer.

If the printer ran out of paper while test reports were printing:
The test results will automatically print when the paper is replaced.

If there is still some paper remaining on the roll:
1. Cut or tear the paper.
2. Press the Alt/O key combination a few times until the remaining paper exits the printer.
Replacing a Pump Limit Sensor or Switch

The replacement part for this procedure is an optical sensor. In this procedure, you will install the sensor in place of either a lever-type switch or another optical sensor.

Tools and supplies:
- screwdriver
- 3/32" Allen wrench
- 11/32" wrench

Getting to the Pump Prime Menu screen...
From the Operating Menu, press:
F4: System Prep
F7: Pump Prime

Synonyms used for these pumps:
The 100 uL and 500 uL pumps are also referred to as metering or small pumps.
The 2500 uL pumps are also referred to as flush or large pumps.

1. With the system in Standby, go to the Pump Prime Menu screen to turn off the sampling system.
2. Open both front instrument doors, press the pump assembly release button, and pull the pump assembly toward you.
3 Remove the plastic shield on the rear of the pump assembly by loosening the captive screw at the top of the shield.
4 Locate the limit switch or sensor to be replaced and disconnect its connector. If a limit switch has a small wedge which is used to tighten the limit switch into its connector, remove the wedge using your fingers.

5 If removing a limit switch:
   a. Use the 3/32" Allen wrench to remove the two screws and lockwashers. Save the lockwashers for later use. Discard the limit switch.
   b. Remove the 11/32 locking nut from the top of the adjustment screw. Lower the screw so that about 1/4-inch shows at the top. Install the locking nut on the lower part of the adjustment screw as shown below:
   c. Position the optical sensor bracket in the area where the switch was located. Install the bracket using the hex screws and lockwashers.

If removing an optical sensor:
   a. Use the 5/64 hex wrench to remove the hex screw holding the sensor to its bracket. Remove and discard the sensor.
b. Install the optical sensor on the bracket using the 2-56 x .25 hex screw. **Do not overtighten the screw - you could damage the sensor.** Do not replace the plastic shield yet.

c. Plug the optical sensor into the connector.

6 Check the syringe gap between the bottom of the syringe and the top of the metal plunger using a folded piece (equal to four thicknesses) of printer paper. This will set a gap of 0.005–0.010 inches. If the gap setting is correct, you should be able to just barely slide this paper between the bottom of the syringe and the top of the metal plunger (see illustration). If the setting is correct, skip to step 15.

If the setting needs adjustment, continue with step 9.

7 Manually turn the pump lead screw in the direction shown in the illustration below until it cannot be turned any further.
8 Using the 11/32" wrench, loosen the locking nut.

9 Turn the adjustment screw until the syringe indicator light (LED) on the front panel of the appropriate Motor Control Board in the card cage just lights.

<table>
<thead>
<tr>
<th>Syringe</th>
<th>Motor Control Board Slot</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 2500 µL</td>
<td>Slot 3</td>
<td>CR2A</td>
</tr>
<tr>
<td>Sample 100 µL</td>
<td>Slot 3</td>
<td>CR2C</td>
</tr>
<tr>
<td>R2 2500 µL</td>
<td>Slot 3</td>
<td>CR3A</td>
</tr>
<tr>
<td>R2 500 µL</td>
<td>Slot 3</td>
<td>CR3C</td>
</tr>
<tr>
<td>R1 2500 µL</td>
<td>Slot 3</td>
<td>CR5A</td>
</tr>
<tr>
<td>R1 500 µL</td>
<td>Slot 3</td>
<td>CR5C</td>
</tr>
<tr>
<td>Diluent</td>
<td>Slot 4</td>
<td>CR6C</td>
</tr>
<tr>
<td>HM Wash</td>
<td>Slot 5</td>
<td>CR5C</td>
</tr>
</tbody>
</table>

10 Prime the appropriate pump.

11 After priming the pump, again check the gap setting.
   If the gap setting is correct, skip to step 16.
   If further adjustment is required, use the 3/32" Allen wrench to turn the adjustment screw as needed and then press Reset and recheck the gap.

12 Using the 3/32" Allen wrench to keep the adjustment screw from turning, tighten the locking nut using the 11/32" wrench.
   After tightening this nut, perform another prime and then make a final check of the gap to ensure that it did not move while you tightened the locking nut.
   Then continue with step 16.

13 Replace the plastic shield on the rear of the pump assembly and close the assembly.

14 Prime the pump.

15 Perform a System Check and Daily QC.

16 Document this replacement on the Instrument Log sheet.
Replacing a Pump Solenoid Valve

1. With the system in Standby, go to the Pump Prime Menu screen to turn off the sampling system.

2. Open the middle instrument door, press the pump assembly release button, and pull the pump assembly toward you.

3. Locate the solenoid valve to be replaced and disconnect its connector. Follow the yellow wires from the solenoid valve to locate the solenoid connectors in the rear of the pump panel.

**Tools and supplies:**
- 3/32" allen wrench

**Getting to the Pump Prime Menu screen...**
From the Operating Menu, press:
   - F4: System Prep
   - F7: Pump Prime
4 Remove the tubing from the old solenoid valve.
5 Using the 3/32" Allen wrench, loosen two screws on the top of the old solenoid valve to remove it from its support bracket and replace it with the new valve. Attach the tubing to the new valve.

CAUTION! If you are replacing solenoid valve B, E or F, refer to the illustration below to ensure that the circular label on the valve faces toward you. If replacing solenoid valve A, C, or D, ensure that the circular label faces away from you.

6 Using the Pump Prime Menu screen, prime the appropriate pump. While priming, check for any tubing leaks. Continue priming the pump until all the air is out of its tubing.
7 Perform a System Check and your Daily QC.
8 Document this replacement on the Instrument Log sheet.
Tools and supplies:
- 7/64" Allen wrench
- needlenose pliers
- 3/32" Allen wrench
- 11/32" wrench
- 3/16" Allen wrench
- screwdriver

Getting to the Pump Prime Menu screen...
From the Operating Menu, press:
F4: System Prep
F7: Pump Prime

Replacing a Pump Syringe
1. With the system in Standby, go to the Pump Prime Menu screen to turn off the sampling system.
2. Open both front instrument doors and locate the syringe to be replaced.
3. Remove the thumbscrew from the bottom bracket of the syringe. Use the needlenose pliers to keep the syringe plunger from turning as you unscrew this thumbscrew.
   CAUTION! Use the needlenose pliers on the metal portion of the syringe plunger. Do not use pliers on the glass portion of the syringe.
4. Press the pump assembly release button and pull the pump assembly toward you.
5. Remove the plastic shield on the rear of the pump assembly by loosening the captive screw at the top of the shield.
6 Manually turn the syringe’s pump lead screw in the direction shown in the illustration below until it cannot be turned any further.

7 Using the 7/64" Allen wrench, remove the screw from the top bracket of the syringe.

8 Fit the new syringe into the upper bracket and loosely tighten the 7/64" Allen screw in the upper bracket.

9 Pull the plunger down until it is snug in the bottom syringe bracket, then completely tighten the thumbscrew. Use needlenose pliers to keep the syringe plunger from turning as you tighten the thumbscrew with your fingers.

   **CAUTION!** Use the pliers on the metal portion of the syringe plunger.
   Do not use pliers on the glass portion of the syringe.

10 Completely tighten the 7/64" Allen screw at the top of the syringe bracket.

11 On the Pump Prime screen, move the cursor to the Cycles field and type 6.

12 Press the appropriate function key to begin priming the pump for the syringe that was replaced.
13 Check the syringe gap between the bottom of the syringe and the top of the metal plunger using a folded piece (equal to four thicknesses) of printer paper. This will set a gap of 0.005–0.010". If the gap setting is correct, you should be able to just barely slide this paper between the bottom of the syringe and the top of the metal plunger (see illustration).

If the gap setting is correct, skip to step 21.

If a gap adjustment is required, continue with step 14.

14 Manually turn the pump lead screw in the direction shown in the illustration below until it cannot be turned any further.
15 Using the 11/32" wrench, loosen the locking nut on the black moving block.

16 Place the 3/32" Allen wrench in the bottom of the adjustment screw and lower this screw until it no longer touches the actuator arm of the pump syringe. Then turn the adjustment screw in the opposite direction until the syringe indicator light (LED) on the front panel of the appropriate Motor Control Board in the card cage just lights.

<table>
<thead>
<tr>
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<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 2500 μL</td>
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<td>CR2A</td>
</tr>
<tr>
<td>Sample 500 μL</td>
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<td>R2 2500 μL</td>
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</tr>
<tr>
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<td>Slot 3</td>
<td>CR3C</td>
</tr>
<tr>
<td>R1 2500 μL</td>
<td>Slot 3</td>
<td>CR5A</td>
</tr>
<tr>
<td>R1 500 μL</td>
<td>Slot 3</td>
<td>CR5C</td>
</tr>
<tr>
<td>HM Wash</td>
<td>Slot 5</td>
<td>CR5C</td>
</tr>
</tbody>
</table>

17 When the LED for the syringe just lights, raise the adjustment screw further by turning it an additional 1/2 to 3/4 turn.

18 Prime the appropriate pump.

19 After priming the pump, check the gap setting again.
   If the gap setting is correct, skip to step 21.
   If further adjustment is required, use the 3/32" Allen wrench to turn the adjustment screw as needed and then press Reset and recheck the gap.

20 Using the 3/32" Allen wrench to keep the adjustment screw from turning, tighten the locking nut using the 11/32" wrench.
   After tightening this nut, perform another prime and then make a final check of the gap to ensure that it did not move while you tightened the locking nut. Then continue with step 21.
21 Replace the plastic shield on the rear of the pump assembly and close the assembly.
22 Prime the pump.
23 Perform a System Check and your Daily QC.
Replacing a Reagent Arm Radial Home Sensor

The reagent arm radial home sensor is located midway along the reagent arm.

1. With the instrument in Standby, press the Pause key to stop the sampling system and then raise the reagent lid.

2. Turn the bottom splined shaft on the reagent arm to raise the reagent probe out of the reagent drain.

**WARNING:** The R2 probe is a biohazard.

3. Move the probe away from its reagent drain (by turning the top shaft of the R1 reagent arm or manually moving the R2 reagent arm counterclockwise) until you can easily access the sensor.

4. Disconnect P/J 20C for R1 (or P/J 80D for R2).

5. Using a screwdriver, remove the screw that holds the radial home sensor to the reagent arm and remove the sensor.

6. Install the new sensor by reversing the previous steps. Position the R1 sensor with the yellow and black wires at the top.

7. Close the reagent lid and press the Pause key to restart the sampling system.

8. Perform all the reagent arm alignments for the probe on which the sensor was replaced. Refer to the “R1 (or R2) Reagent Probe Alignments” procedure in Module 4: Aligning as necessary.

9. Perform a System Check.


---

**Tools and supplies:**
- screwdriver
- 3/32” Allen wrench

**An easy way to find the sensors on a reagent arm...**
Follow the yellow and black wires. They end up at the sensor.
Replacing a Reagent Arm Vertical Home Sensor

The reagent arm vertical home sensor is located at the probe end of the reagent arm.

1. With the instrument in Standby, press the **Pause** key to stop the sampling system and then raise the reagent lid.

2. Turn the bottom splined shaft on the reagent arm to raise the reagent probe out of the reagent drain.

   **WARNING:** The R2 probe is a biohazard.

3. Move the probe away from its reagent drain (by turning the top shaft of the R1 reagent arm or manually moving the R2 reagent arm counterclockwise) until you can easily access the sensor.


5. Using a screwdriver, remove the screw that holds the vertical sensor to the sensor housing bracket and remove the sensor from the reagent arm.

6. Install the new sensor by reversing the previous steps. Make sure the sensor cable is placed into its cable holder.

7. Close the reagent lid and press the **Pause** key to restart the sampling system.

8. Perform all the reagent arm alignments for the probe on which the sensor was replaced. Refer to the “R1 (or R2) Reagent Probe Alignments” procedure in Module 4: **Aligning** as necessary.

9. Perform a System Check.

Replacing the R2 Reagent Arm Rotational Home Sensor

The R2 reagent arm rotational home sensor is located at the R2 reagent drain.

1. With the instrument in Standby, press the Pause key to stop the sampling system and then raise the reagent lid.

2. Turn the bottom splined shaft on the reagent arm to raise the reagent probe out of the reagent drain.

**WARNING:** The R2 probe is a biohazard.

3. Move the probe away from its reagent drain (by turning the top shaft of the R1 reagent arm or manually moving the R2 reagent arm counterclockwise) until you can easily access the sensor.

4. Disconnect P/J 32D.

5. Using a screwdriver, remove the screw that holds the sensor to its bracket and remove the sensor from the instrument.

6. Separate the metal clip from the old sensor and place it on the new sensor.
7 Install the sensor by reversing the previous steps.

8 Close the reagent lid and press the Pause key to restart the sampling system.

9 Perform all the reagent arm alignments for the probe on which the sensor was replaced. Refer to the “R1 (or R2) Reagent Probe Alignments” procedure in Module 4: Aligning as necessary.

10 Perform a System Check.

Replacing a Reagent Probe Tip

1. With the instrument in Standby, press the **Pause** key and then raise the reagent area lid.

2. Turn the bottom splined shaft on the reagent arm to raise the reagent probe out of the reagent drain.

   **WARNING:** The R2 probe is a biohazard. Follow your laboratory’s safe handling procedures for contact with and disposal of this probe.

3. Move the probe away from its reagent drain (by turning the top shaft of the R1 reagent arm or manually moving the R2 reagent arm counterclockwise) until you can easily access its reagent probe tip.

4. Place a paper towel under the probe to prevent anything from falling into a reagent cartridge while you are removing the probe tip.

---

**Tools and supplies:**

Use one of the following sets of tools:
- 5/16” wrench
- 1/4” wrench

OR

(The following two wrenches are not in all tool kits.)
- offset wrench
- ratchet wrench
5 Remove the probe tip and nut.

The probe tip and nut can be removed by using the 5/16" wrench with either the offset wrench or the ratchet wrench.

**Using the 5/16" wrench and the offset wrench:**

Place the 5/16" wrench on the reagent probe body to keep it from turning. Then slide the 1/4" end of the offset wrench up the reagent probe and onto the probe tip nut. Turn the offset wrench clockwise to loosen the probe tip nut. Once the probe tip nut is loose, unscrew it with your fingers to remove the probe tip and nut.

**Using the 5/16" open-end wrench and the ratchet wrench:**

Place the 5/16" wrench on the reagent probe body to keep it from turning. With the “ON” marking on the ratchet wrench facing UP (so you can read it), slide the 1/4" opening of the ratchet wrench up the reagent probe and onto the probe tip nut. Then turn the ratchet wrench clockwise to loosen the probe tip nut. Once the probe tip nut is loose, unscrew it with your fingers to remove the probe tip and nut.
6 Insert a new reagent probe tip into a new probe tip nut and then screw the new reagent probe tip onto the reagent probe body finger-tight.

7 Completely tighten the new reagent probe tip using either the 5/16" open-end wrench and offset wrench or the 5/16" open-end wrench and ratchet wrench.

Using the ratchet wrench to tighten the probe tip:
Place the 5/16" wrench on the reagent probe body to keep it from turning. With the “OFF” marking on the ratchet wrench facing UP (so you can read it), slide the 1/4" opening of the ratchet wrench up the reagent probe and onto the probe tip nut. Turn the ratchet wrench counterclockwise completely to tighten the probe tip and nut to the probe body.

8 Align the reagent probe. See Module 4: Aligning.

9 Close the reagent lid and press Pause to restart the sampling system.

10 Go to the System Counters screen, move the cursor box to the appropriate reagent probe tip field, and press Enter to change the field from NO to YES. Then press F1: Store Changes.

11 Prime the reagent pump.

12 Perform your Daily QC.

Replacing the Reagent Tray Home Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Raise the reagent area lid.

3. Disconnect the two reagent tray drive motor connectors, P/J 50G and P/J 3C, and remove all tubing clamps from the reagent tray drive bracket.

4. Using the 9/64" Allen wrench, loosen the four screws that secure the drive motor to its bracket and slide the drive motor toward the front of the instrument to disengage its gears.

**Tools and supplies:**
- screwdriver
- 9/64" Allen wrench
- 5/32" Allen wrench
5 Use a screwdriver to remove the three screws (A, B, and C in illustration) that secure the reagent tray drive assembly to the instrument baseplate. Remove the assembly by carefully lifting it up and out of the instrument.

6 Gently pull the spring bar toward you until you can push the reagent tray home sensor out of its hole in the spring bar, remove one cable clamp, and then disconnect P/J 50H.

To reinstall the reagent tray drive assembly:
1 Slide the drive motor to the rear of its bracket, then place it in the instrument and tighten the three screws that secure its bracket to the instrument baseplate.
2 Slide the drive motor all the way toward the center of the instrument to engage its gears and then, holding it in this position, tighten the four screws that secure the drive motor to the bracket.

Tip from Service:
If the gears don’t engage, remove the reagent tray cover and manually turn the reagent tray until you can get the gears to fit properly.

7 Install the new reagent tray home sensor.
8 Install the reagent tray drive assembly.
9 Restore power as indicated in the “Controlled Power Shutdown” procedure.
10 Align the Reagent Tray. See “Reagent Tray Alignment” in Module 4: Aligning.
11 Perform a System Check.
12 Document this replacement on the Instrument Log sheet.
Replacing Reagent Tubing

1. With the instrument in Standby, press the Pause key to stop the sampling system and then raise the sample and reagent area lids.

2. Perform this step ONLY if you are replacing the R2 reagent tubing; otherwise, continue with step 3.

Turn the bottom splined shaft on reagent arm R2 to raise its reagent probe out of the reagent drain and then manually move reagent arm R2 counterclockwise toward the front of the instrument until you can easily access its tubing.
3 Open the middle instrument door and remove the reagent tubing from the left port of the reagent arm 500-µL syringe by pulling on the knurled fitting. Then unscrew the knurled fitting from the tubing. Save this knurled fitting because you will be installing it on the new tubing later in this procedure.
4 Disconnect the reagent tubing from the reagent probe by pulling on the probe knurled fitting. Then unscrew the knurled fitting from the tubing and pull the tubing through the spring guide. Save this knurled fitting because you will be installing it on the new tubing later in this procedure.

The knurled fittings in steps 3 and 4 are NOT the same...
The knurled fitting at the pump end of the sample tubing is larger (has a larger collar) than the knurled fitting at the probe end. Be sure that you place the correct knurled fitting onto the proper end of the tubing. The procedure will remind you of this in later steps.

5 Remove the tubing from any other tubing clamps or guides as necessary and pull the tubing up through the instrument. Discard the tubing.
6 Start from the reagent probe and thread the new tubing through the instrument down to the reagent pump. Thread through any tubing clamps and guides as necessary.

When routing the new tubing...

Position the black wrappings (or stamped markings) on the reagent tubing as shown in the illustration.
7 Attach the knurled fitting removed from the old tubing in step 3 to the pump end of the new tubing by screwing the fitting on by hand until approximately 1/16" of the tubing extends past the fitting. Then press the tubing onto the 500-µL reagent syringe fitting.

![Diagram of tubing attachment](image)

8 Install the new reagent tubing through the spring guide and onto the reagent probe. Position the reagent tubing through the spring guide as shown in the illustrations below.

To install the reagent tubing through the spring guide:

a Pull the tubing through the spring guide to position the black wrapping (or stamped marking) as shown below.

![Diagram of spring guide installation](image)

b Attach the knurled fitting removed in step 4 to the reagent probe end of the tubing as described in step 7 above. Then press the tubing completely onto the metal fitting on the reagent probe.

9 Close the instrument doors, close the sample and reagent area lids, and press the Pause key to restart the sampling system.

10 From the Pump Prime Menu screen, prime the reagent pump by moving the cursor to the Cycles field, typing 3 for the number of prime cycles to be performed, and pressing the Enter key. Then press the function key for the reagent pump that had its tubing replaced.

Check the reagent tubing for leaks while the system is priming.

11 Perform a System Check.

12 Document this replacement on the Instrument Log sheet.
**Reseating a Control Board in the Card Cage**

1. Perform the “Controlled Power Shutdown” procedure in Module 1: *Introducing*.

2. Open the left cabinet door and attach the grounding wrist strap to your wrist.

3. Using a screwdriver, loosen the two captive screws (one at the very top and one at the very bottom of the board faceplate). **DO NOT** remove or loosen any other screws on the board faceplate.

4. Use the square handles on the board faceplate to pull the board halfway out of its slot and then firmly reseat it. You will detect a click or pop when the board seats completely into its connector.

5. Tighten the two captive screws.

6. Restore power as indicated in the “Controlled Power Shutdown” procedure.

---

**Tools and supplies:**
- screwdriver

**Use the grounding wrist strap...**
This will eliminate possible electrostatic damage to the board while performing this procedure.

**What is a captive screw?**
A captive screw cannot be completely removed from the board; it can only be completely loosened.

**Another way to determine whether the board is completely seated...**
The faceplate of the board should be flush with all the other boards.
Replacing the Sample Probe Tip

1. With the instrument in Standby, press the Pause key, and then raise the sample and reagent lids.

2. Manually lift and move the sample probe out of and away from the sample drain.

**WARNING:** The sample probe is a biohazard. Follow your laboratory’s safe handling procedures for contact with and disposal of this probe.

**Tools and supplies:**
Use one of the following sets of tools:
- disposable gloves
- 1/4" wrench
- 5/16" wrench

OR
(The following two wrenches are not in all tool kits.)
- offset wrench
- ratchet wrench
3 Remove the probe tip and nut.

The probe tip and nut can be removed by using the 5/16" wrench with either the offset wrench or the ratchet wrench.

**Using the 5/16" open-end wrench and the offset wrench:**

Place the 5/16" wrench on the sample probe body to keep it from turning. Then slide the 1/4" end of the offset wrench up the sample probe and onto the probe tip nut. Turn the offset wrench clockwise to loosen the probe tip nut. Once the probe tip nut is loose, unscrew it with your fingers to remove the probe tip and nut.

**Using the 5/16" open-end wrench and the ratchet wrench:**

Place the 5/16" wrench on the sample probe body to keep it from turning. With the “ON” marking on the ratchet wrench is facing up (so you can read it), and slide the 1/4" opening of the ratchet wrench up the sample probe and onto the probe tip nut. Then turn the ratchet wrench clockwise to loosen the probe tip nut. Once the probe tip nut is loose, unscrew it with your fingers to remove the probe tip and nut.
4 Insert a new sample probe tip into a new probe tip nut and screw it onto the sample probe body finger-tight.

5 Completely tighten the new sample probe tip using either the 5/16" open-end wrench and offset wrench or the 5/16" open-end wrench and ratchet wrench.

   **To use the ratchet wrench to tighten the probe tip:**
   Place the 5/16" wrench on the sample probe body to keep it from turning. With the “OFF” marking on the ratchet wrench facing UP (so you can read it), slide the 1/4" opening of the ratchet wrench up the reagent probe and onto the probe tip nut. Turn the ratchet wrench counterclockwise completely to tighten the probe tip and nut to the probe body.

6 Close the sample and reagent lids and press the **Pause** key to restart the sampling system.

7 Go to the System Counters screen, move the cursor box to the Sample Probe Tip field, and press **Enter** to change the field from NO to YES. Then press **F1: Store Changes**.

8 Prime the sample pump.

9 Perform the "Sample Probe Alignments" procedures in Module 4: **Aligning**.

10 Perform your Daily QC.


---

Getting to the System Counters screen...
From the Operating Menu, press:
- **F4: System Prep**
- **F6: Sys Counters**

**Priming the sample pump:**
1 From the Operating Menu, press:
   - **F4: System Prep**
   - **F7: Pump Prime**
2 Move the cursor to the Cycles field and type 3 for the number of cycles to be performed.
3 Press **F2: Sampler** to begin priming the sample pump.
Replacing Sample Tubing

WARNING: All used sample tubing is a biohazard.

1. With the instrument in Standby, press the **Pause** key to stop the sampling system, and then raise the sample and reagent area lids.

2. Open the middle instrument door and pull the sample tubing off the left port of the 100-µL syringe.

3. Remove the plastic fitting from the end of this tubing. It will need to be placed onto the new sample tubing later in this procedure.
4 Remove the sample tubing from the instrument by pulling it off its sample probe connection and pulling this tubing up through the instrument.

5 Press the black sheathed end of the new sample tubing onto its sample probe connection.

6 Route the other end of the sample tubing under the ultrasonic cable cover and down through the corrugated black plastic conduit until it comes out the opening above the 100-µL syringe.

7 Attach the plastic fitting onto the sample tubing and press the tubing onto the left port of the 100-µL syringe.

8 Close the sample and reagent lids and press the Pause key to turn on the sampling system.

9 From the Pump Prime Menu screen, prime the sample pump by moving the cursor to the Cycles field, typing 3 for the number of prime cycles to be performed, and pressing Enter. Then press F2: Sampler.

Check the sample tubing for leaks while the system is priming.

10 Perform a System Check and your Daily QC.

Replacing the Sample Wheel Home Sensor

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Open the middle instrument door and open the pump panel assembly.

3. Disconnect sample wheel home sensor connector P/J 32C.

4. Manually unscrew the sensor assembly and remove it from the instrument.

5. Using the 5/64” Allen wrench, remove the screw that holds the sensor to the bracket.

6. Install the new sample wheel home sensor onto the bracket.

7. Install the sample wheel home sensor and bracket in the instrument.

8. Restore power as indicated in the “Controlled Power Shutdown” procedure.


WARNING: Failure to perform the “Bar Code Scanner Alignment” procedure could result in misidentification of bar code sample tubes.

10. Perform the IMT Probe to Segment Outer and Segment Inner Alignments (inner and outer) of the “IMT Probe Alignments” procedure in Module 4: Aligning.

11. Perform the Sample Probe to Cup Alignment of the “Sample Probe Alignments” procedure in Module 4: Aligning.


Tools and supplies:
- 5/64" Allen wrench
Replacing the Sampler Handler Sensors

This procedure is normally performed by trained Field Service Engineers. However, an experienced operator could also perform this procedure in conjunction with the Technical Assistance Center.

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Open the middle instrument door and open the pump panel assembly.

3. Locate the photometric sampler handler and remove its plastic cover. This cover is held on by two reusable plastic clips.

4. Disconnect the appropriate sensor cable connector. P/J 50E for the probe vertical sensor; P/J 50D for the probe rotational sensor.

5. Using the 7/64" Allen wrench, remove the sensor mounting screw and remove the sensor.

6. Install the new sensor:
   - Place the new sensor on its locator pin
   - Tighten the sensor mounting screw
   - Reconnect the cable connector
   - Replace the plastic cover

7. Restore power as indicated in the “Controlled Power Shutdown” procedure.

8. Perform a sample probe alignment. Refer to the “Sample Probe Alignments” procedure in Module 4: Aligning as necessary.


Note: The views below show the IMT sampler handler. This is the same handler that is used for the photometric sampler handler. These sensors are located in the same areas on the photometric sampler handler.
Replacing the Source Lamp

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

   WARNING: Wait about five minutes after turning off the instrument power for the source lamp assembly to cool before continuing with this procedure.

2. Lower the cuvette thermal chamber. See “Lowering and Raising the Thermal Chamber” in this module.

3. Unplug source lamp connector P/J 72B located inside the cuvette thermal chamber.

   WARNING: Source lamp assembly may be hot.

4. Loosen the two captive thumbscrews that hold the source lamp assembly in place and remove the source lamp assembly.

5. Install the new source lamp assembly, by reversing steps 2–4.

   CAUTION! Do not raise the thermal chamber by lifting up on the plastic components where the air hose connects to the thermal chamber.

6. Restore power as indicated in the “Controlled Power Shutdown” procedure.

   CAUTION! If the photometer fails to initialize (indicated by an error message on the screen), perform the “Photometer Lamp Calibration” on the next page before continuing with step 7.

7. Adjust the tension in the cuvette film. From the Film Loading/Tension screen, press F2: Tension. The system will begin forming cuvettes.

   When the cuvette film is taut, press the Shift/Exit key combination to return to the Operating Menu screen.

8. Perform the “Photometer Alignment” procedure in Module 4: Aligning.

9. Perform a System Check and your Daily QC.

When raising the thermal chamber...
DO NOT LIFT UP on any plastic components. Use the metal ledge. Refer to “Raising the Thermal Chamber” portion of the “Lowering and Raising the Thermal Chamber” procedure in this section.

Getting to the Film Loading/ Tension screen...
From the Operating Menu, press:
F4: System Prep
F6: Sys Counters
F3: Load Film

Tools and supplies:
• screwdriver
10 Recalibrate the following methods: C3, C4, CCRP, CRBM, CRP, GENT, HAI1C, IGA, IGG, IGM, LIDO, MALB, MPA, NAPA, PALB, PHNO, PROC, PTN, RCRP, THEO, TOBR, TRNF, VALP, VANC. Their performance can be affected by a new source lamp.

**WARNING:** If you do not recalibrate these methods, you could obtain erroneous results.


**Photometer Lamp Calibration**

No operator adjustments are required for this calibration.

1 Ensure that all instrument doors and lids are closed.

2 From the Photometer Alignment and Calibration screen, press **F1: Dark Calib**.

3 If the instrument has been on for more than 30 minutes and the cuvette temperature icon is not appearing at the top the screen, answer the message with a Y. The dark calibration takes approximately 30 seconds.

4 When the dark calibration is complete, press **F2: Lamp Calib**.

5 When the Time on HIGH field on the screen is ≥ 30 minutes, answer the message with a Y. The lamp calibration takes approximately 30 seconds.

6 Press Exit.

7 Complete any remaining steps in the “Replacing the Source Lamp” procedure.
Replacing the Top Seal Element

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Open the right instrument door.

3. Locate the top seal element and, from underneath the baseplate, unplug its connector P/J 33B.

4. Using a screwdriver, remove the mounting screws located under the baseplate that hold the top seal element to the top seal assembly. Remove the element.

   WARNING: Treat the top seal element as a potential biohazard because it may have come in contact with sample fluid.

5. Install the new top seal element but do not completely tighten the two mounting screws, and reconnect P/J 33B.


7. Restore power as indicated in the “Controlled Power Shutdown” procedure.

8. Continue with the “Aligning the Top Seal Element” procedure on the next page.

Tools and supplies:
- screwdriver
- 9/64 hex key
Aligning the Top Seal Element

1. Use the 9/64 hex key to loosen the two pivot arm mounting screws.

2. Finger-tighten the solenoid adjustment screw to completely close and hold the gap on the solenoid. You may need to adjust the locking nut.

3. Slide the pivot arm assembly toward the capstan until the curved part of the top seal element is aligned perfectly with the curved part of the capstan silicone ring. The parts should be touching with very slight compression of the silicone ring.

4. Keep the element aligned while using a 9/64 hex key to tighten the pivot arm mounting screws.

5. Loosen the solenoid adjustment screw until the solenoid opens completely. Lock it into position with the nut to ensure free movement of the assembly.

6. Tie-wrap the excess heater wire past the cable clamp, ensuring an adequate service loop for element operation.
7 Wrap the cuvettes around the capstan and push the nip roller lever into place.

**WARNING:** Do not place your fingers near the toothed gear of the capstan drive during this step. This is a potential pinch point area. Wait until the cuvettes are away from the capstan.

8 Check for proper sealing by checking only air-filled cuvettes as they come off the capstan.
   b  Press F1: Cycle, enter 30, press Enter.

**WARNING:** DO NOT check any cuvettes that contain liquid! If there are no air-filled cuvettes to test, repeat step 9b until air-filled cuvettes are coming off the capstan. Treat all the cuvettes that come off the capstan as a potential biohazard.

   c  Gently squeeze the air-filled cuvettes. Properly sealed cuvettes will retain their shape; improperly sealed cuvettes will allow air to leak out.
Tools and supplies:
- screwdriver
- tie wrap
- needlenose pliers

Getting to the Cuvette Diagnostics screen...
From the Operating Menu, press:
F7: Diagnostics
F1: Electro/Mech
F4: Cuvette

You can hear and see the U-seal solenoid de-energize!
Notice that the large, flat, round plate on the end of this solenoid valve has now moved away (or de-energized) from the rounded portion of the valve.
You may have also heard the release of air as it de-energized.

Replacing the U-Seal Element
1. With the instrument in Standby, raise the reagent lid.
2. De-energize the U-seal solenoid by going to the Cuvette Diagnostics screen and pressing F4: U-Seal Solenoid.
3. Open the cutout in the top of the faceplate, raise the bar code reader, unscrew the alignment bar thumbscrew and raise the alignment bar out of the way.

WARNING: When working in the cuvette manufacturing area, be very careful not to touch the U-seal solenoid—it can be extremely HOT!

4. Unlock the U-seal solenoid assembly by pulling its curved locking bar to the right; then move this assembly to the left away from the cuvette ring.
5 Unplug the U-Seal element connector, P/J 13L.

6 Observe how the cable is looped around the tie wrap. With needlenose pliers, break the tie wrap and remove it.

7 Using the screwdriver, gently pry the U-seal element off its metal frame.

8 Snap the new U-seal element onto the metal frame.
9 Bend the end of a new tie wrap as shown here:

10 Insert the tie wrap through the tie mount on the cuvette arm.

11 Pass the P/J 13L cable through the tie wrap loop and wrap it around once. Connect P/J13L. Tighten the tie wrap around the cable enough to hold but not pinch it. Cut off the excess tie wrap.

12 Reposition the U-seal solenoid near the cuvette ring and push the curved locking bar into place.

13 Position the alignment bar and tighten its thumbscrew.

14 Lower the bar code reader.

15 Close the instrument lids.

16 Document this replacement on the Instrument Log sheet.
Replacing the Vacuum Pump Muffler Filter
1. With the instrument in Standby, open the middle instrument door and then open the pump assembly by pressing its release button.
2. Remove the waste and water bottles from the instrument to access the vacuum pump muffler.
3. Unscrew the black plastic cover from the vacuum pump muffler by turning it toward the rear of the instrument.
4. Remove the old felt filter off of the vacuum pump fitting and replace it.

Tools and supplies:
None

You don't have to disconnect any of the tubing...
Just move these bottles out of the instrument. There is enough tubing so that you don't have to disconnect anything!
Replacing the Vacuum Switch or Pressure Switch

1. Perform the “Controlled Power Shutdown” procedure in Module 1: Introducing.

2. Open the right instrument door and locate the switch.

3. Use the needlenose pliers to remove two connectors from the switch.

   CAUTION! It is important to replace the connectors correctly on the new switch. Refer to the illustration below.

---

**Tools and supplies:**
- 5/64" Allen wrench
- needlenose pliers

**If your switches are digital...**

Follow the in-the-box replacement procedure that comes with the switch.

---

**Electrical connector designations...**

The vacuum switch uses the J30C connectors.
The pressure switch uses the J30B connectors.
4 Use the needle-nose pliers to open the tubing clamp behind the switch by squeezing the prongs of this clamp and pulling the tubing from the rear of the switch.

5 Use the 5/64" Allen wrench to remove four screws and remove the switch.

**To determine proper switch operation ...**

After restoring instrument power:
The vacuum switch LED should be lit whenever the vacuum is >3 in. Hg.
The pressure switch LED should be lit whenever the pressure gauge reading is 15 psi.

6 Install the new switch by reversing steps 2–5.
7 Restore power as indicated in the “Controlled Power Shutdown” procedure.
8 Document this replacement on the Instrument Log sheet.
Replacing the Water Bottle

1. With the system in Standby, open the middle cabinet door and then open the pump panel assembly by pressing its release button.

2. Remove the water bottle from the instrument.

3. Disconnect connector P/J 1A. Follow the cable that comes out of the hole labeled “LEVEL” to locate P/J 1A.

4. Loosen the collar ring on the cap of the water bottle (the collar ring turns without moving the cap), remove the dip tube assembly, and place it in the spare water bottle.

5. Reconnect P/J 1A, place the water bottle back in the instrument. The water bottle should begin filling with water.

6. Wait until the water bottle is filled, then prime all the system pumps.


8. Clean the used water bottle. See “Cleaning the Water Bottle” earlier in this module.

Tools and supplies:
- paper towels

Disconnect P/J 1A!
Disconnecting P/J 1A prevents the automatic water supply valve on the instrument from opening when the dip tube assembly is removed from the water bottle.

Priming all the system pumps:
1. From the Operating Menu, press:
   F4: System Prep
   F7: Pump Prime
2. Move the cursor to the Cycles field and type 3.
3. Press Enter.
4. Press F1: Prime Water to begin priming.
Running a System Check

Tools and supplies:
- ABS reagent cartridge in the instrument
- fresh ABS solution from the same lot of ABS as the ABS reagent cartridge that is in the instrument.

Failing ALL your System Checks?...Did you recently change ABS lots?
Remember, you must enter the carton value on the ABS carton end flap on the Daily Maintenance screen every time you start using a new ABS lot.

If you want to delete this System Check...
1. Press the Alt-S key combination to go to the Segment Status screen.
2. Press F1: On Board.
3. Press F4: Delete Sample and follow the message prompts as they appear.

If a mean or standard deviation IS NOT reported...
System Check tests were aborted for the reagent systems or sampler system. Go to the Error Log screen and resolve any error messages and rerun the System Check. To go to the Error Log screen, from the Operating Menu, press:
F5: Process Ctrl
F6: Error Log

1. With the instrument in Standby, go to the System Check Load List screen.

<table>
<thead>
<tr>
<th>POSITION</th>
<th>SAMPLE ID</th>
<th>SAMPLE FLUID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAMPLER CHECK</td>
<td>ABS</td>
</tr>
</tbody>
</table>

Enter a segment (A - Z), and a location (1 - 10) (e.g. A5) in the POSITION field for the SAMPLER CHECK.

2. Fill a sample cup with fresh ABS solution.
3. Using the System Check Load List screen, enter a segment position for this sample cup and then place the cup in that position.
4. Close all instrument lids.
5. Press F1: Start.
6. Acceptable ranges for the system check results are listed below. If the System Check printout indicates that any of your results are not acceptable, refer to “System Check Troubleshooting” in Module 5: Troubleshooting.

System Check Specifications

- **Photometer**
  - –2.5 to +2.5 mAU for the 293-nm filter only
  - –1.5 to +1.5 mAU for all other filters

- **Reagent #1**
  - Mean = Assay value listed on the end flap of the ABS carton ± 12 mAU
  - SD ≤ 3.8

- **Reagent #2**
  - Mean = Assay value listed on the end flap of the ABS carton ± 12 mAU
  - SD ≤ 3.8

- **Sampler**
  - Mean = 10% of the assay value listed on the end flap of the ABS carton ± 2 mAU
  - SD ≤ 0.8

- **HM Wash**
  - Mean = 10% of the assay value listed on the end flap of the ABS carton ± 4 mAU
  - SD ≤ 1.6

- **IMT Dil**
  - Mean = 10% of the assay value listed on the end flap of the ABS carton ± 2 mAU
  - SD ≤ 1.4

Tools and supplies:
- ABS reagent cartridge in the instrument
- fresh ABS solution from the same lot of ABS as the ABS reagent cartridge that is in the instrument.
Decontamination Procedure

Perform this procedure only if your instrument is equipped with the Heterogeneous Module (HM) and you are advised by a Dade Behring Inc. representative. It takes about 50 minutes to complete these steps.

1 Disable the water system supply:
   a. Go to the Operating Menu and press F6: System Config
   b. Use the arrow keys to move the cursor down to “Water In”
   c. Press Enter twice to change from “plumbed” to “manual.”

2 Prepare decontamination solution:
   a. Refer to the following table to determine the amount of bleach to add:

<table>
<thead>
<tr>
<th>Bleach Product</th>
<th>% of Sodium Hypochlorite (bleach)</th>
<th>THEN ADD:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clorox For Institutional Use</td>
<td>5.25</td>
<td>500 mL</td>
</tr>
<tr>
<td>Ultra Clorox</td>
<td>6.00</td>
<td>438 mL</td>
</tr>
<tr>
<td>Other</td>
<td>8.00</td>
<td>328 mL</td>
</tr>
<tr>
<td>Other</td>
<td>10.00</td>
<td>263 mL</td>
</tr>
<tr>
<td>Other</td>
<td>12.00</td>
<td>219 mL</td>
</tr>
<tr>
<td>Other</td>
<td>15.00</td>
<td>175 mL</td>
</tr>
</tbody>
</table>

NOTE: The bleach product must contain a minimum of 5.25% sodium hypochlorite. It must have NO additives, detergents, surfactants or fragrances and be 99.9% free of impurities.

   b. Fill a water bottle with deionized water, and then add the required volume of bleach. Cover, then agitate the bottle to mix the solution.
   c. Fill an empty chemistry wash bottle with the solution and pour half of the remaining solution in another water bottle.

3 Decontaminate the water and chemistry wash system:
   a. Install a water bottle containing the bleach solution, then agitate gently to wash the inside of the bottle, the bottom of the lid, and the water bottle float switch assembly.
   b. Install the chemistry wash bottle containing the bleach solution. Gently agitate the bottle to clean the bottom of the lid, and the bottle float switch assembly.
   c. Display the Operating Menu screen and press F4: System Prep, then F7: Pump Prime.
   d. Set CYCLES: to 10.
   e. Press F1: Prime Water to pump bleach solution through the system.
   f. Press F6: HM
   g. Set CYCLES: to 10.
   h. Press F1: HM Wash Pump to pump bleach solution through the chemistry wash system. **DO THIS STEP 3 TIMES.**
4 Allow the bleach solution to remain in the lines for at least 30 minutes.

5 Rinse the water and chemistry wash systems:
   a. Remove the water and chemistry wash bottle lids and float switch assemblies and set them into spare bottles (or on a clean paper towel if a bottle is not available).
   b. Discard each bottle's contents and rinse each bottle 3 times with deionized water.
   c. Fill the bottles with deionized water and install the lid assemblies.
   d. Agitate each bottle gently to rinse the bottom of the lids and the float switch assemblies.
   e. Cycle water through the system as described in step 3, e, f and h.
   f. Remove the bottles again as described in step (a) and (b) above and discard the contents.
   g. Rinse the water bottle one more time with deionized water.

6 Reassemble the water and chemistry wash systems:
   a. Install the water bottle and lid assembly on the instrument.
   b. Change the “Water In” back to “plumbed.”
      1) Go to the Operating Menu and press F6: System Config
      2) Use the arrow keys to move the cursor down to “Water In”
      3) Press Enter to change from “manual” to “plumbed.”
   c. Allow the system to fill the water bottle.
   d. Install a new Chemistry Wash bottle and update the count.
   e. Perform another system prime as described in Step 3, e, f and h. (Set each prime cycle back to the original number.)

7 From the System Counters screen, select the Clean Probe routine. Condition the photometric sample probe by using a normal serum sample for the fluid.

8 Run your Daily QC.
4: Aligning the Dimension® RxL Max® clinical chemistry system

Only trained operators should perform these procedures

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Use this page for NOTES
General Alignment Information

All alignments on the Dimension® RxL Max® clinical chemistry system are performed with the help of system software. This section contains procedures for aligning the following instrument components:

- Bar Code Scanners
- Cuvette Ring
- HM Module
- IMT Probe
- IMT Pump
- Photometer
- R1 Reagent Probe
- R2 Reagent Probe
- Reagent Tray
- Sample Probe

Alignment Offsets

Each component is set during manufacture to a specific position. To compensate for slight manufacturing variations each component, your system’s components are corrected to manufacturing specifications using “offset” values determined during your alignment of the component. This offset value can be positive, negative, or zero.

Printing and Viewing Alignment Offsets

The current alignment offsets are automatically printed out on the system printer each time instrument power is turned on.

On various screens in the alignment software, you will see a Function key called Align File or Offset File. Pressing that key displays the Alignment File screen, which contains the current alignment offsets for each component.

The alignment file is longer than one screen...

Use the PgDn and PgUp keys on the keyboard to see more of this file.

Make a printout...its easy and it could save unnecessary realignments!

Press F4: Pnt Align File.
You should make a printout of the alignment file after performing any alignment. You will then have a record of the current alignment data available for reference or troubleshooting.

<table>
<thead>
<tr>
<th>ALIGNMENT POINT</th>
<th>OFFSET</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2 reagent arm</td>
<td>0</td>
</tr>
<tr>
<td>R2 reagent probe to plate</td>
<td>-15</td>
</tr>
<tr>
<td>R2 reagent probe to cartridge</td>
<td>-35</td>
</tr>
<tr>
<td>R2 reagent carriage to cartridge</td>
<td>24</td>
</tr>
<tr>
<td>R2 reagent carriage</td>
<td>-15</td>
</tr>
<tr>
<td>R2 reagent arm phase</td>
<td>0</td>
</tr>
<tr>
<td>R1 reagent probe to plate</td>
<td>-12</td>
</tr>
<tr>
<td>R1 reagent probe to cartridge</td>
<td>-29</td>
</tr>
<tr>
<td>R1 reagent carriage to cartridge</td>
<td>19</td>
</tr>
<tr>
<td>R1 reagent carriage to drain</td>
<td>0</td>
</tr>
</tbody>
</table>

Press F4: PRINT ALGN FILE

F1: F2: F3: F4: PRINT ALGN FILE

Press F5: F6: F7: F8: ACCEPT

255105A-304
Barcode Scanner Alignment (for barcoded tube users only)

Tools and supplies:
- sample tubes with barcode labels
- 9/64" Allen wrench (needed only if the alignment fails)

WARNING: Sample wheel bar code alignment must be completed after removal and installation of the following components: sample wheel home sensor, either the inner or outer barcode reader, segment wheel, or the motor/encoder. Failure to do so could result in misidentification of barcoded sample tubes.

1 (You only need to perform this alignment if you are using barcode labeled tubes.) With the instrument in Standby, from the Sample Probe Max Depth screen, press F5: Bar Code Align.

2 Place barcode labeled tubes in positions #5 and #6 of an empty segment and place this segment in position 1 of the sample wheel. Make sure the barcode labels are good quality, properly positioned on the tube, and centered in the slot of the segment.

3 Press Enter. The system will automatically scan the barcode labels and determine the alignment values. The outer segment is scanned first, then the inner. This takes about two minutes to complete. If the following message is displayed: “mechanical align inner barcode reader clockwise,” disregard and continue with step 4.

4 The new alignment values will be displayed on the lower portion of the display screen as shown on the screen on the previous page.

5 Compare the values on the screen to the alignment limits in 5a and 5b:
   a) Calculate the SUM of the [outer] and [inner] values on the screen:
      \[(\text{Outer}) + (\text{Inner}) = ____\] include the + and - signs,
      e.g., \((1) + (-26) = -25\)
      This SUM must be equal to or more positive than -30.
      (e.g., -30, -29, -28 ... = Pass, while -31, -32, -33 ... = Fail)
b) The Interval value (from the lower right corner of the display screen) must be equal to or more positive than \(-15\).
(e.g., -15, -14, -13 ... = Pass, while -16, -17, -18 ... = Fail)

e) If both alignments pass, skip to step 6.

If either of the above alignment limits fails...

d) Check for proper bar code label placement on the tubes, ensure that the label is visible through the slot in the segment, and then press F5: Bar Code Align to rerun the alignment. Compare the new alignment values with the alignment limits noted in steps 5a and 5b above.
- If both alignments pass, skip to step 6.
- If either alignment fails, continue with steps 5e, 5f, and 5g.

e) Loosen the two screws that attach the inner barcode scanner bracket to the baseplate and rotate the scanner bracket fully clockwise.

f) Retighten the screws and then press F5: Bar Code Align to rerun the alignment.

g) Compare the new alignment values with the alignment limits noted in steps 5a and 5b above.
- If both alignments Pass, continue with step 6.
- If the alignment fails, call the Technical Assistance Center.

6 Press Exit and follow the messages to remove the bar code labeled sample tubes in segment #1, positions #5 and #6.
Cuvette Ring Alignment

Tools and supplies:
- 5/64" Allen wrench

1 With the instrument in Standby, raise the reagent lid.

2 From the Cuvette Alignment screen, press **F1: Start**.

3 Visually check the alignment position of the cuvette ring.
   - If the cuvette ring is properly aligned, the center of the plunger on the heat torch will be aligned with the center of a notch in the cuvette ring.
     - If an adjustment is needed, continue with step 4.
     - If the cuvette ring is properly aligned, press **Exit**. (You are finished; do not continue with the remainder of this procedure).
4 Check that the cuvette ring sensor is fully seated by pushing up on the sensor.

5 Press F1: Start.

6 Visually check the alignment position of the cuvette ring.
   If the center of the plunger on the heat torch still does not align with the center of a notch in the cuvette ring, adjust the cuvette ring sensor using a 5/64" Allen wrench:
   • to move the ring to the left, turn the wrench clockwise.
   • to move the ring to the right, turn the wrench counterclockwise.

7 Verify the alignment by pressing F1: Start and visually checking the position of the cuvette ring. Repeat step 6 if necessary. When the cuvette ring is aligned, press Exit.

8 Close the reagent lid.

9 Perform the “Photometer Alignment” portion of the “Photometer Alignment and Calibration” procedure in this module.
HM Module Alignments

This procedure includes alignments of parts on the HM module. To completely align the HM module, you will also need to perform the following three alignments:

- IMT probe to IMT probe cleaner bottle
- Sample arm to incubate wheel
- R2 reagent arm to incubate wheel

The above three alignments align other parts of the Dimension® RxL Max™ clinical chemistry system to the HM module. See their alignment procedures later in this module.

The HM module component alignments consist of the following:

- Incubate and Wash Wheel Alignments:
  - incubate wheel to transfer opening
  - wash wheel to incubate wheel
  - wash probes to wash wheel, and
- Vessel Transfer Shuttle Alignments:
  - vessel transfer shuttle to incubate wheel
  - vessel transfer shuttle to wash wheel
  - vessel transfer shuttle to load

The three incubate and wash wheel alignments must be performed in the order that they are listed on the screen.

All six alignments listed above must be checked/performed to align the HM module components. Use message prompts as they appear to help you with each alignment.

1. With the instrument in Standby, raise the sample and reagent lids.
2. Go to the HM Module Alignments screen.

**F5: Calib Mixers?**
This is not part of aligning the HM module. It is used when checking/replacing the HM mixers.
3 Aligning the incubate wheel to the transfer opening.

With the cursor at the Incubate Wheel to Transfer Opening field, press F7: Check Align. The edges of the transfer station and the incubate wheel reaction vessel slots should be aligned with each other so that there is an unobstructed path into the incubate wheel.

If the alignment is correct, move the cursor down to the Wash Wheel to Incubate Wheel field and continue with the next step.

If an adjustment is needed, use F1 and F2 to visually align the incubate wheel slot to the vessel transfer slot. When this alignment is complete, press F8: Accept and continue with the next step.

Good alignment practice:
After visually performing an alignment, press F7: Check Align and ensure that the component moves and returns to the new alignment position.

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Correct Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubate Wheel to Transfer Opening</td>
<td>The edges of the transfer station and the incubate wheel slots are aligned with each other so that there is an unobstructed path into the incubate wheel.</td>
</tr>
</tbody>
</table>
4 Aligning the wash wheel to the incubate wheel.

With the cursor at the Wash Wheel to Incubate Wheel field, press **F7: Check Align**. The white alignment marks on the wash wheel and the incubate wheel should be aligned with each other.

If the alignment is correct, move the cursor down to the Wash Probes to Wash Wheel field and continue with the next step.

If an adjustment is needed, use F1 and F2 to visually align the wash wheel mark to the incubate wheel mark. When this alignment is complete, press **F8: Accept** and continue with the next step.

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Correct Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash Wheel to Incubate Wheel</td>
<td>The white alignment mark on the wash wheel is aligned to the white alignment mark on the incubate wheel.</td>
</tr>
</tbody>
</table>
5 Aligning the wash probes to the wash wheel.

With the cursor at the Wash Probes to Wash Wheel field, press F7: Check Align. This alignment involves checking two alignment positions: probe position and probe height.

**Probe position**
Both wash probe tips should be centered over the white alignment dots in the wash wheel. If a probe is not centered over its dot, perform a visual alignment using the procedure in the sidebar at the left.

**Probe height**
Each probe tip should be just above (you should be able to just fit a piece of printer paper between the probe tip and the incubate wheel) the white alignment dots on the wash wheel. If an adjustment is needed, use F1 and F2 to visually align the height of the wash probes above the white alignment dots.

When this alignment is complete, press F8: Accept and continue with the next step.

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Correct Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash Probes to Wash Wheel</td>
<td>The wash probe tips are centered over and just above the white alignment dots on the wash wheel.</td>
</tr>
</tbody>
</table>
6 Aligning the vessel transfer shuttle to the incubate wheel.

With the cursor at the Vessel Transfer Shuttle to Incubate Wheel field, press **F7: Check Align** and follow the message to place a reaction vessel *in the slot of the incubate wheel* directly across from the transfer slot.

Depress the vessel shuttle guide solenoid valve plunger to manually lower the shuttle guide to the reaction vessel and then visually determine if the guides are centered around the reaction vessel.

If the alignment is correct, move the cursor down to the Vessel Transfer Shuttle to Wash Wheel field and continue with the next step.

If an adjustment is needed, use F3 and F4 to visually align the vessel transfer shuttle guides around the reaction vessel. When this alignment is complete, press **F8: Accept** and continue with the next step. Do not remove the reaction vessel from the incubate wheel; it will be used in the next step.

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Correct Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Transfer Shuttle to Incubate Wheel</td>
<td>The edges of the vessel guide on the end of the vessel transfer shuttle are centered around the top of the vessel in the incubate wheel.</td>
</tr>
</tbody>
</table>

**Valve plunger location...**
See the photo at the bottom of page 4-14.

**Good alignment practice:**
After visually performing an alignment, press **F7: Check Align** and ensure that the component moves and returns to the new alignment position.
7 Aligning the vessel transfer shuttle to the wash wheel.

With the cursor at the Vessel Transfer Shuttle to Wash Wheel field, press **F7: Check Align** and follow the message to push the reaction vessel **all the way into the wash wheel**.

Depress the vessel shuttle guide solenoid valve plunger to manually lower the shuttle guide to the reaction vessel and then visually determine if the **left edge** of the shuttle guide is just touching the reaction vessel.

If the alignment is correct, move the cursor down to the Vessel Transfer Shuttle to Load field and continue with the next step.

If an adjustment is needed, use F3 and F4 to visually align the left edge of the shuttle guide until it just touches the reaction vessel. When this alignment is complete, press **F8: Accept** and continue with the next step.

**Alignment** | **Correct Alignment Position**
--- | ---
Vessel Transfer Shuttle to Wash Wheel | The left edge of the shuttle vessel guide on the end of the vessel transfer shuttle is just touching the vessel in the wash wheel.

*Valve plunger location...*  
See the photo at the bottom of page 4-14.

*Good alignment practice:*  
After visually performing an alignment, press **F7: Check Align** and ensure that the component moves and returns to the new alignment position.
8 Aligning the vessel transfer shuttle to Load.

With the cursor at the Vessel Transfer Shuttle to Load field, press F7: Check Align. The reaction vessel used in step 7 is moved into the transfer station.

Depress the vessel gate solenoid valve plunger to manually move its guide around the reaction vessel. This ensures that the reaction vessel is in the proper location to align the vessel shuttle.

While keeping the vessel gate solenoid valve plunger depressed, also depress the vessel shuttle guide solenoid valve plunger to manually lower the shuttle guide over the reaction vessel and then visually determine if the vessel shuttle guides are centered around the reaction vessel.

(Step 8 continues on the next page.)
8 Aligning the vessel transfer shuttle to Load (continued).

If the alignment is correct, continue with the next step.

If an adjustment is needed, use F3 and F4 to visually center the vessel transfer shuttle guides around the top of the reaction vessel. When this alignment is complete, press F8: Accept and continue with the next step.

<table>
<thead>
<tr>
<th>Alignment</th>
<th>Correct Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Transfer Shuttle to Load</td>
<td>The vessel guide on the end of the vessel transfer shuttle is</td>
</tr>
<tr>
<td></td>
<td>centered over the top of the vessel in the transfer station.</td>
</tr>
</tbody>
</table>

You have completed aligning the HM module components. Press Exit, and follow the message to remove any reaction vessels placed on the wheel during the alignment procedure.
IMT Probe Alignments

Tools and supplies:
Alignment gauges:
- IMT Drain/Port
- Segment
- Aliquot (only on non-HM instruments)
  This is the orange-colored aliquot wheel!

These are the alignments possible for the IMT probe:
- drain
- port
- segment outer
- segment inner
- IMT probe cleaner bottle
- aliquot inner - only on non-HM instruments
- aliquot outer - only on non-HM instruments

When aligning the IMT probe, perform all alignments that pertain to your instrument configuration.
Depending on why you are performing the alignment (e.g., part replacement, troubleshooting), you may need to do one, several, or all of these alignments.

1. With the instrument in Standby, open the left cabinet door and turn the service key to the right (“Interlock Override” position).
2. Raise the sample lid.
3. Go to the IMT Arm Alignments screen.

4. Use the right and left arrow keys to move the box on the screen to the target to which you want to align the IMT probe.
5. Press F7: Check Align and follow any messages as they appear on the screen to place the appropriate alignment gauge in position. Remember that the segment alignment gauge must be placed on either a 5- or 7-mL adaptor.

WARNING: The IMT probe is a biohazard and a puncture hazard. Follow your laboratory’s safe handling procedures for contact with and disposal of this probe in a sharps container.
6 Visually check for correct alignment using the photographs on the pages that follow. If an adjustment is needed, visually align the probe using the function keys on the screen.

7 When the probe is aligned, press **F8: Accept**.

8 To align to another target, follow steps 4–7 again.

9 When you are finished aligning the IMT probe, press **Exit** and follow any messages that appear on the screen to ensure that all alignment gauges have been removed and, if your instrument has an aliquot wheel, that the original aliquot wheel has been placed back on the instrument.

10 Close the sample lid and turn the service key back to its vertical ("Normal") position.

11 Run quality control for Na, K, Cl.
**Good alignment practice:**
After aligning to a target, press F7: **Check Align** and ensure that the system moves and returns to the new alignment position.

<table>
<thead>
<tr>
<th>Target</th>
<th><strong>The IMT probe should be</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain</td>
<td>Centered over the hole in the drain itself.</td>
</tr>
</tbody>
</table>

**What does “just above the target circle on the alignment gauge” mean?**
A piece of printer paper should just fit between the probe tip and the gauge.

<table>
<thead>
<tr>
<th>Target</th>
<th><strong>The IMT probe should be</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>Centered over and just above the target circle on the IMT drain/port gauge.</td>
</tr>
</tbody>
</table>
**Good alignment practice:**
After aligning to a target, press F7: Check Align and ensure that the system moves and returns to the new alignment position.

<table>
<thead>
<tr>
<th>Target</th>
<th>The IMT probe should be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Outer</td>
<td>Centered over and just above the target circle on the segment alignment gauge. Remember that the segment alignment gauge must be placed on either a 5- or 7-mL adapter.</td>
</tr>
<tr>
<td>Segment Inner</td>
<td>Centered over the target circle on the segment alignment gauge. Remember that the segment alignment gauge must be placed on either a 5-mL or 7-mL adapter.</td>
</tr>
</tbody>
</table>

**Target**  
**The IMT probe should be**

| IMT Probe Cleaner Bottle | Centered over and just above the rubber septum in the bottle top. |
Good alignment practice:
After aligning to a target, press F7: Check Align and ensure that the system moves and returns to the new alignment position.

Only on non-HM Instruments

**WARNING:** The aliquot wheel may contain biohazardous materials. Follow your laboratory’s safe biohazard handling procedures.

<table>
<thead>
<tr>
<th>Target</th>
<th>The IMT probe should be</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aliquot Inner</td>
<td>Centered over and just above the target circle on the orange aliquot alignment gauge.</td>
<td></td>
</tr>
<tr>
<td>Aliquot Outer</td>
<td>Centered over the target circle on the orange aliquot alignment gauge.</td>
<td></td>
</tr>
</tbody>
</table>

**Probe Centered Over Hole**
IMT Pump Alignment

1. With the system in Standby, go to the Fluids Prime/Pump Alignment screen.
2. Press F3: Align Pump. The alignment is complete when the message "Aligning IMT pump ... Automatically" disappears from the message area.

An IMT calibration will be scheduled.
After you perform this alignment, an IMT calibration will automatically be scheduled for you when you exit from this screen.
Photometer Alignment

**Nice feature of this alignment!**
You do not have to do any adjustments with this alignment procedure. It is performed completely by software.

1. Ensure that all instrument doors and lids are closed.
2. Display the Photometer Alignment and Calibration screen.

4. Press F1: Start. Do not touch any other keyboard keys until this alignment has been completed.
5. When the message “New alignment is: (old value: ) Do you want to store? (y/n)” appears, the alignment is complete.

6. The alignment is acceptable if the new alignment value is between –2 and –10 and the screen shows a U-shape with a straight, flat line along the bottom of the U (no spikes or peaks; a good U-shape is shown above). If the alignment is acceptable, press Y. If either the new alignment value or shape of the curve is not correct, press N and call the Technical Assistance Center.

7. Press F4: mAU Offset Cal.
8. When the Time on HIGH field on the screen is ≥ 30 minutes, answer the message with a Y. The mAU offset calibration takes approximately 60 seconds.
Three alignments need to be done to align the R1 reagent probe.
- R1 reagent arm to drain
- R1 reagent arm to target (cuvette)
- R1 reagent arm to reagent tray

These alignments should be done in the sequence listed above (the order in which they are presented in this procedure).

1. With the instrument in Standby, raise the reagent lid.
2. Go to the Reagent Arm Alignments screen. Each of the R1 reagent probe alignments begins from this screen.

(Continue with the R1 reagent arm to drain alignment on the next page.)
R1 Reagent Arm to Drain Alignment

1 Press F6: Align R1 Drain.

2 If the probe is aligned correctly, the tip of the probe will be centered above the hole in the cover of the drain.
   If an adjustment is needed, continue with step 3; if the probe is aligned correctly, skip to step 4.

3 Visually align the probe using the function keys described on the screen.

4 When the probe is aligned, press F8: Accept.

(Continue with the R1 reagent arm to target alignment.)
R1 Reagent Arm to Target (Cuvette) Alignment

1. Press F7: Align R1 Target.
3. Place the reagent probe alignment gauge into the R1 cuvette access hole and then press Enter.

What does “just above the gauge” mean?
You should just be able to fit a piece of printer paper between the probe tip and the gauge.

Good alignment practice:
After aligning, press F7: Check Align and ensure that the system moves and returns to the new alignment position.

4. If the probe is aligned correctly, the probe should be within the flat circled tip in the center of the alignment gauge and just above the gauge. If an adjustment is needed, continue with step 5; if the probe is aligned correctly, skip to step 6.

5. Visually align the probe using the function keys described on the screen.

CAUTION! Perform the Up/Down alignment first to avoid possible damage to the probe.

6. When the probe is aligned, press F8: Accept and follow the instructions as they appear in the message area of the screen to remove the reagent probe alignment gauge.

(Continue with the R1 reagent arm to reagent tray alignment on the next page.)
R1 Reagent Arm to Reagent Tray Alignment

1 Press F2: Align Cartridge.
2 Use the right arrow key to move the box on the screen to “R1 arm.”
3 Press F5: Insert Gauge and follow the messages as they appear on the screen to insert the reagent tray alignment gauge into the instrument. If you are prompted to remove a reagent cartridge, this same cartridge must be placed into the instrument at the end of this procedure.
4 If the probe is aligned correctly, the probe should be centered within the target circle on the gauge and just above the gauge.
   If an adjustment is needed, continue with step 5; if the probe is aligned correctly, skip to step 6.
5 Visually align the probe using the function keys described on the screen.
6 When the probe is aligned, press F8: Accept.
7 Press Exit and follow the messages as they appear to remove the reagent tray alignment gauge and return the reagent cartridge (if one was removed) to its original slot in the reagent tray.
   WARNING: If you removed a reagent cartridge, you must place that SAME cartridge in the reagent tray slot from which you removed it!
8 Close the reagent lid.
R2 Reagent Probe Alignments

Tools and supplies:
• screwdriver
• 9/64" Allen wrench
• Reagent probe gauge
• Reagent tray gauge
• Sample probe gauge

Four alignments need to be done to align the R2 reagent probe:
• R2 reagent arm to drain
• R2 reagent arm to target (cuvette)
• R2 reagent arm to reagent tray
• R2 reagent arm to incubate wheel

These alignments should be done in the sequence listed above (the order in which they are presented in this procedure).

1 With the instrument in Standby, raise the reagent lid.
2 Go to the Reagent Arm Alignments screen. Each of the R2 reagent probe alignments begins from this screen.

(Continue with the R2 reagent arm to drain alignment on the next page.)
R2 Reagent Arm to Drain Alignment

1  Press F1: Align R2 Drain.

2  Press F7: Check Align. If any part of the R2 probe is directly above the hole in the cover of the drain, type n to answer the prompt on the screen and continue with step 3; otherwise type y and first perform the “Coarse Adjustment” procedure on this page.

3  If the probe is aligned correctly, the tip of the probe will be centered above the hole in the cover of the drain. If a fine adjustment is needed, visually align the probe using the function keys described on the screen.

4  When the probe is aligned, press F8: Accept.

Coarse Adjustment

1  Use a screwdriver to loosen (do not remove) the two alignment bracket screws.

2  Use the 9/64” Allen wrench to turn the adjustment screw on the bracket in the same direction (clockwise or counterclockwise) that the reagent probe needs to be moved. One turn of the adjustment screw will move the probe approximately one-half of the probe width.

3  Press F7: Check Align. When any part of the probe is above the hole in the cover of the drain, tighten the two alignment bracket screws.

4  Return to step 3 in the “R2 Reagent Arm to Drain Alignment” procedure above.

(Continue with the R2 reagent arm to target alignment on the next page.)
R2 Reagent Arm to Target (Cuvette) Alignment

1. Press F3: Align R2 Target.
3. Place the REAGENT probe alignment gauge into the eighteenth hole from the cuvette access hole of the cuvette ring and then press Enter.

4. If the probe is aligned correctly, the probe should be within the flat circled tip in the center of the alignment gauge and just above the gauge. If an adjustment is needed, continue with step 5; if the probe is aligned correctly, skip to step 6.

5. Visually align the probe using the function keys described on the screen.

**CAUTION!** Perform the Up/Down alignment first to avoid possible damage to the probe.

6. When the probe is aligned, press F8: Accept.

7. Answer the prompt “Additional reagent arm to cuvette alignments should be checked. Check? (y/n)” by pressing y and following the prompts as they appear on the screen.

**CAUTION!** It is very important to use the proper alignment gauge indicated in each prompt. The SAMPLE probe gauge has a white plastic top; the REAGENT probe gauge has a stainless steel top.

Align the probe using the PROPER alignment gauge indicated in the prompt and following steps 4–6 above.

*(Continue with the R2 reagent arm to reagent tray alignment on the next page.)*
R2 Reagent Arm to Reagent Tray Alignment

1. Press F2: Align Cartridge.
2. Use the right arrow key to move the box on the screen to “R2 arm.”
3. Press F5: Insert Gauge and follow the messages as they appear on the screen to insert the reagent tray alignment gauge into the instrument. If you are prompted to remove a reagent cartridge, this same cartridge must be placed into the instrument at the end of this procedure.
4. If the probe is aligned correctly, the probe should be centered within the target circle on the gauge and just above the gauge.
   If an adjustment is needed, continue with step 5; if the probe is aligned correctly, skip to step 6.
5. Visually align the probe using the function keys described on the screen.
6. When the probe is aligned, press F8: Accept.

(Continue with the R2 reagent arm to incubate wheel alignment on the next page.)
R2 Reagent Arm to Incubate Wheel Alignment

1 Press F4: Align R2 Vessel.
2 If the R2 arm is aligned correctly to the incubate wheel, the R2 probe will be centered and just above the white alignment dot on the incubate wheel. If an adjustment is needed, continue with step 3; if the probe is aligned correctly, skip to step 4.

3 Visually align the probe using the Function keys on the screen.
   • F1 and F2 move the incubate wheel clockwise and counterclockwise.
   • F3 and F4 move the R2 probe in and out.
   • F5 and F6 move the R2 probe up and down.
4 When the R2 probe is aligned, press F8: Accept.
5 Press Exit and follow the messages as they appear to remove the reagent tray alignment gauge and return the reagent cartridge (if one was removed during these alignments) to its original slot in the reagent tray.
   WARNING: If you removed a reagent cartridge, you must place that SAME cartridge in the reagent tray slot from which you removed it!
6 Close the reagent lid.
Reagent Tray Alignment

Tools and supplies:
- reagent tray alignment gauge

There are four alignments required to complete a reagent tray alignment. They are identified in the Mode field line on the Reagent Tray Offsets screen. Perform these alignments in the left-to-right order that they appear on the screen.

1. With the instrument in Standby, raise the reagent lid.

2. From the Reagent Tray Offsets screen, press **F7: Check Align**.

3. Check the Insert alignment by sighting along the automatic loader channel and visually determine whether the reagent cartridge in the reagent tray is centered in the automatic loader channel. If an adjustment is required, use the function keys described on the screen to move the reagent tray clockwise (cw) or counterclockwise (ccw) as needed and then press **F8: Accept**.
4 Use the right arrow key to move the cursor box to the Auto Loader mode.
5 Press F5: Insert Gauge and follow the messages as they appear on the screen to insert the reagent tray alignment gauge into the instrument. If you are prompted to remove a reagent cartridge, this same cartridge must be placed into the instrument at the end of this procedure.
6 The alignment positions are described and shown below.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Alignment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Loader</td>
<td>Press F6: Calib Loader. There is no alignment position to check. When the automatic Flex® loader stops all movement, the alignment is complete.</td>
</tr>
<tr>
<td>R1 Arm</td>
<td>Press F1: Pos Gauge. The R1 probe should be just above and centered within the target circle on the gauge. Use the function keys described on the screen to align to the alignment position.</td>
</tr>
<tr>
<td>R2 Arm</td>
<td>Press F1: Pos Gauge. The R2 probe should be just above and centered within the target circle on the gauge. Use the function keys described on the screen to align to the alignment position.</td>
</tr>
</tbody>
</table>

7 Use the right arrow key to move to the next mode and repeat step 6.
8 When you are finished with your alignments, press F8: Accept.
9 Press Exit and follow the messages as they appear to remove the reagent tray alignment gauge and return the reagent cartridge (if one was removed) to its original slot in the reagent tray.

WARNING: If you removed a reagent cartridge, you must place that SAME cartridge in the reagent tray slot from which you removed it!

What does “just above the gauge” mean?
You should just be able to fit a piece of printer paper between the probe tip and the gauge.

Good alignment practice:
After aligning, press F7: Check Align and ensure that the system moves and returns to the new alignment position.

What does “just above the gauge” mean?
You should just be able to fit a piece of printer paper between the probe tip and the gauge.

R1 Arm — Alignment Position

R2 Arm — Alignment Position

WARNING: If you removed a reagent cartridge, you must place that SAME cartridge in the reagent tray slot from which you removed it!
Sample Probe Alignments

Tools and supplies:
- Cup alignment gauge
- Sample probe gauge
- Aliquot wheel (non-HM)
  The alignment gauge for the aliquot wheel is the orange-colored aliquot wheel.

Five alignments need to be done to align the sample probe:
- Sample probe to cuvette
- Sample probe to cup
- Sample probe to drain
- Sample probe to HM incubate wheel
- Sample probe maximum depth
- Sample probe to aliquot wheel (non-HM instruments only)

Perform these alignments in the order listed above (the order in which they appear on the Sampler Arm Alignment screen and are presented in this procedure).

Depending on the reason why you are performing the alignment (e.g., part replacement, troubleshooting, etc.), you may need to do one, several, or all of these alignments.

1. With the instrument in Standby, open the left cabinet door and turn the service key to the right (“Interlock Override” position).
2. Raise the sample and reagent lids.
3. Go to the Sampler Arm Alignment screen. Each sample probe alignment begins from this screen.

(Continue with sample probe to cuvette alignment on the next page.)
Sample Probe to Cuvette Alignment

1. Press F1: Cuvt Align.
3. Place the sample probe alignment gauge into the sample probe cuvette access hole of the cuvette ring and then press Enter.

4. If the probe is aligned correctly, it should be positioned just above the gauge and within the small flat circled tip in the center of the alignment gauge.
   
   If an adjustment is needed, continue with step 5; If the probe is aligned correctly, skip to step 6.

5. Visually align the probe using the function keys described on the screen.
   
   CAUTION! Perform the Up/Down alignment first to avoid possible damage to the probe.

6. When the probe is aligned, press F8: Accept and follow the instructions as they appear in the message area of the screen to remove the sample probe alignment gauge.

(Continue with sample probe to cup alignment on the next page.)
Sample Probe to Cup Alignment

1. Press F2: Cup Align.

2. Press F7: Check Align and follow the messages as they appear on the screen to place the cup alignment gauge in the top of an adaptor in segment #1, position #1.

3. If the probe is aligned correctly, it should be positioned just above the gauge and within the target circle of the gauge.
   If an adjustment is needed, continue with step 4; if the probe is aligned correctly, skip to step 5.

4. Visually align the probe using the function keys described on the screen.

CAUTION! Perform the Up/Down alignment first to avoid possible damage to the probe.

5. When the probe is aligned, press F8: Accept.

6. Use the right arrow key to move the box on the screen to Segment Inner.

7. Press F7: Check Align and follow the messages as they appear on the screen to move the cup alignment gauge into the top of an adaptor in segment #1, position #2.

8. If the probe is aligned correctly, it should be positioned within the target circle in the outer hole of the gauge.
   If an adjustment is needed, continue with step 9. If the probe is aligned correctly, skip to step 10.

9. Visually align the probe using the function keys described on the screen.

10. When the probe is aligned, press F8: Accept.

11. Press Exit and follow the messages as they appear on the screen to remove the cup alignment gauge.

(Continue with sample probe to drain alignment on the next page.)
Sample Probe to Drain Alignment

1  Press F3: Drain Align.

2  If the probe is aligned correctly, the probe should be centered above the drain hole. If your instrument has the newer style drain with two holes in it, align to the hole that is closest to the reagent tray. If you have an older style drain, there is only one hole in the drain.

   If an adjustment is needed, continue with step 3. If the probe is aligned correctly, skip to step 4.

3  Visually align the probe using the F1 and F2 function keys.

4  When the probe is aligned, press F8: Accept.

(For non-HM instrument, skip the sample probe to HM incubate wheel alignment on the next page and continue with the sample probe maximum depth alignment.)
Sample Probe to HM Incubate Wheel Alignment

1 Press **F4: Vessel Align**

2 If the sample arm is aligned correctly to the HM incubate wheel, the sample probe will be centered and just above the white alignment dot on the incubate wheel.

   If an adjustment is needed, continue with step 3; if the probe is aligned correctly, skip to step 4.

3 Visually align the probe using the Function keys on the screen.
   - F1 and F2 move the *sample probe* clockwise and counterclockwise.
   - F3 and F4 move the *sample probe* up and down.
   - F5 and F6 move the *incubate wheel* clockwise and counterclockwise.

4 When the probe is aligned, press **F8: Accept**.

*(Continue with sample probe maximum depth alignment on the next page.)*
Sample Probe Maximum Depth Alignment

**CAUTION!** Ensure that the sample probe to cup alignment has been performed before performing this alignment.

1. **Press F8: Probe/Bar Code.**

   - Max Depth in: **PRIMARY TUBE** **PED TUBE** **SSC**
   - Move the probe until the nut is at the top of the tube.
   - **UP / DOWN 1000** sample probe max depth
   - **Sample Wheel Target:** 100
   - **Bar Code Alignment:** 1 [outer] – 26 [inner] – 27 [interval]

2. **Move the box in the Max Depth in: field to the appropriate sample container.**

3. **Press F7: Check Probe** and follow any messages as they appear on the screen to place the appropriate container into the proper segment position. Any tube/sample you must remove from segment #1 to insert the container for this alignment will be placed back in its position later in this procedure.

**PED or SSC sample probe depth alignments...**
Only need to be done if you use these tubes or containers!

**Which is segment #1?**
It is marked on the inside of the sample area.
4 Set the correct probe depth using the F3 and F4 function keys.

<table>
<thead>
<tr>
<th>Container</th>
<th>For correct probe depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Tube</td>
<td>Align to the primary tube that sits the highest in the segment. The bottom edge of the nut on the sample probe should be even with the top of the primary tube. See illustration below.</td>
</tr>
<tr>
<td>PED</td>
<td>Align to the pediatric (PED) tube that sits the highest in the segment. The sample probe tip should be just above the bottom of the pediatric (PED) tube.</td>
</tr>
<tr>
<td>SSC</td>
<td>Align to the primary tube/SSC combination that sits the highest in the segments. The sample probe tip should be just above the bottom of the SSC. The size of the sample tube used during this SSC alignment should now be used with all SSC samples.</td>
</tr>
</tbody>
</table>
  * For processing whole blood samples, ALWAYS place the SSC in the same size tube used for the SSC sample probe maximum depth alignment. Refer to the method insert sheet for sample handling details. |
  * For processing serum and plasma, primary tube/SSC combinations that present the SSC at a lower height may be used only if the SSC is filled with a maximum of 1.0 mL sample. |

What does "just above the bottom" mean?
Move the probe down until it contacts the bottom of the PED tube or SSC container. Then raise the probe up two steps to set the correct probe depth.

Adding a new tube size (5, 7, 10, or PED) or tube type (glass or plastic)?
Before using a new tube size or type in your laboratory, all maximum depth alignments should be checked.

5 When the probe depth is correct, press F8: Accept.
6 To do another sample container depth setting, follow steps 2–5.
7 Press Exit. Then follow the instructions as they appear in the message area of the screen to remove the containers you inserted into segment #1 and reinset any tubes/samples removed in Step 3.
8 Close the sample and reagent lids and turn the service key back to its vertical (“Normal”) position.

(For an HM instrument, sample probe alignments are now complete. For a non-HM instrument, continue with the sample probe to aliquot wheel alignment on the next page.)
Sample Probe to Aliquot Wheel Alignment (non-HM)

1. Press F5: Aliquot Align.
2. Press F7: Check Align and follow the messages as they appear on the screen to remove the aliquot wheel and place the aliquot wheel alignment gauge on the instrument.

**WARNING:** The aliquot wheel may contain biohazardous materials. Follow your laboratory’s safe biohazard handling procedures.

3. If the probe is aligned correctly, it should be positioned just above the gauge and within the target circle in the inner hole of the gauge. If an adjustment is needed, continue with step 4. If the probe is aligned correctly, skip to step 5.
4. Visually align the probe using the function keys described on the screen.
   **CAUTION!** Perform the Up/Down alignment first to avoid possible damage to the probe.
5. When the probe is aligned, press F8: Accept.
6. Use the right arrow key to move the box on the screen to Aliquot Outer.
7. Press F7: Check Align.
8. If the probe is aligned correctly, it should be positioned within the target circle in the outer hole of the gauge. If an adjustment is needed, continue with step 9. If the probe is aligned correctly, skip to step 10.
9. Visually align the probe using the function keys described on the screen.
10. When the probe is aligned, press F8: Accept.
11. Press Exit and follow the messages as they appear on the screen to remove the aliquot wheel alignment gauge and reinstall the original aliquot wheel.
12. Close the sample and reagent lids and turn the service key back to its vertical (“Normal”) position.

**Aliquot wheel gauge**
This is the orange-colored aliquot wheel.

**Reminder:**
Leave the aliquot wheel lid open while performing this alignment.

**What does “just above the gauge” mean?**
You should just be able to fit a piece of printer paper between the probe tip and the gauge.

**Good alignment practice:**
After aligning, press F7: Check Align and ensure that the system moves and returns to the new alignment position.
5: Troubleshooting the Dimension® RxL Max® clinical chemistry system

Only trained operators should perform these procedures

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Troubleshooting Overview

This Troubleshooting module contains information to help you resolve problems on the Dimension® Rxl Max® clinical chemistry system. There are two main components to troubleshooting a problem:

- specifying the problem by obtaining all information related to it.
- solving the problem.

Specifying the Problem

Most problems can be specified by systematically reviewing the four major aspects of instrument problems:

1. What are the indicators of the problem?
   - alarm
   - error messages
   - inaccuracy—when system results are not correct or as expected
   - imprecision—when system results are not reproducible

2. With what frequency does the problem occur?
   - Check the printed test reports for test report messages or HI/LO results.
   - Check QC results using your laboratory’s quality control guidelines.
   - Display (and print, if desired) the instrument’s error log.

3. What major changes have occurred recently with the system?
   - Has the lab started to use any new methods or manufacturing lot numbers of existing methods?
   - Has anyone replaced or adjusted major system parts?
   - What type of maintenance (daily, monthly, other) was last performed on the instrument?

4. What common characteristics do all the problems share?
   - Is the problem specific to one method or several? If several, do they have something (such as wavelength) in common?

Solving the Problem

Once you have specified the problem, solving the problem usually involves one or more of the following actions:

- performing an alignment
- replacing tubing
- eliminating expired supplies (e.g., control materials or calibrators)
- recalibrating any affected methods
- performing some type of maintenance
- replacing a mechanical component
When You Call Us

If you have followed the previous recommendations and have not resolved the problem, you should call the Technical Assistance Center.

The staff at the Technical Assistance Center will ask for some or all of the information listed below. Have it ready when you call.

- serial number of your instrument
- software revision currently in use
- description of the problem
- method or methods affected (if any)
- reagent lot or lots affected and their expiration dates
- calibrator/verifier product lot or lots used and their expiration dates
- any data obtained from troubleshooting
- recent QC data (upper and lower QC limits, group mean and standard deviation)
- instrument maintenance log data, including system check data, instrument maintenance, and troubleshooting history
- the modem number of your instrument for remote access (see below)

Remote Access

The Technical Assistance Center (TAC) may ask permission to remotely access your instrument using the instrument modem. There are two modes of access: monitor and control. In monitor mode, the TAC specialist can look at files in the instrument’s computer memory and/or see your screens. In control mode, the TAC specialist can perform the same keyboard functions as the operator standing at the instrument. The TAC specialist will give you specific directions over the telephone to establish the remote link between your instrument and the TAC.

WARNING: Remote access in the control mode may cause unexpected movement of instrument components. The Technical Assistance Center will ask for permission before entering the control mode. Before giving permission, the operator must ensure that the safety precautions listed below and any additional precautions as directed by the Technical Assistance Center are followed.

- All instrument lids and doors should be closed.
- All instrument cabinet panels should be in place.
- All interlocks should be returned to their operating position, i.e.—do not bypass any interlocks.
- The remote access warning sign, located on the underside of the spare storage cover lid at the left of the keyboard, should be conspicuously placed on the instrument to warn other personnel that the instrument is in the remote access mode.
Chemistry Troubleshooting

Instrument problems are evident when the system displays an error message. Chemistry problems, however, may not display an error message and may become evident only when test results are reviewed.

The following tips will help prevent chemistry problems:

- Perform scheduled maintenance to avoid problems.
- Calibrate or verify a new lot of Flex® reagent cartridges before you run out of the current lot.
- Check the expiration date of the calibrator/verifier in use.
- Use fresh quality control materials and check their expiration dates.
- Be sure that QC values are within the assay range identified for each method.
- Check for interfering substances that may affect test results (refer to test methodology insert sheet).
- Assure proper handling and preparation of samples (pretreatment, preservative, etc.).

When to Troubleshoot Chemistry Problems

Situations that may call for chemistry troubleshooting include:

- Calibration and verification results do not meet specific method performance guidelines.
- QC results fall outside established limits.
- Several test results are inconsistent with each other.
- A test result is inconsistent with patient history.

How to Troubleshoot Chemistry Problems

To solve a chemistry problem, you will need information concerning the test involved. Refer to the Quality Control or Specific Performance Characteristics sections on the method insert sheet packaged inside each reagent cartridge box for specific chemistry information.

Procedures for troubleshooting three common chemistry problem areas are on the following pages. These problem areas are:

- One or more QC results are out of range.
- Inaccuracy—result obtained is not consistent with patient history.
- Imprecision—test results are not reproducible.

Stop at any point in the procedure when the problem is resolved. If you cannot resolve the problem, call the Technical Assistance Center for assistance (refer to “When You Call Us” earlier in this module).
One or more QC results are out of range.

1. Check sample cup for sufficient sample volume.
2. Fill a fresh sample cup and repeat the QC test in question.
3. Make fresh QC material. Repeat QC test using an alternate well in the same cartridge. This is done by first removing the cartridge, then adding it back into the instrument.
4. Repeat the test using another reagent cartridge from the same lot. This is like step 3 except that, instead of reinserting the same cartridge, you insert a new cartridge from the same lot.
5. Run calibrators/verifiers to check the calibration/verification.
6. Repeat QC tests.
7. Repeat steps 4, 5, and 6 using a different reagent cartridge lot.
8. Examine the QC charts for trends, a slow drift of results in one direction, random outliers, or a sudden shift in results.
9. Repeat System Check.
10. Check the alignment of the sample arm, reagent probes, and photometer.
11. Check the Instrument Log sheets for recent instrument problems.

Inaccuracy—result obtained is inconsistent with patient history.

1. Check sample cup for sufficient sample volume.
2. Repeat QC tests for the affected method.
3. Make fresh QC material. Repeat QC test using an alternate well in the same cartridge. This is done by first removing the cartridge, then adding it back into the instrument.
4. Repeat the test using another reagent cartridge from the same lot. This is like step 3 except that, instead of reinserting the same cartridge, you insert a new cartridge from the same lot.
5. Repeat the test using another cartridge of the same lot.
6. Repeat System Check.
7. Obtain a list of the patient’s medications and check the method insert sheet for known interfering substances.
8. Check for proper sample handling (e.g., pretreatment, storage, or preservative).
9. Check recent test results for that sample to see if other methods also had suspicious results.
10. Check for proper sample arm and reagent probe alignments.
11. Repeat the test on fresh sample.
Imprecision—test results are not reproducible.
1 Check sample cup for sufficient sample volume.
2 Run five of the same tests on the same sample at the appropriate level according to the Method Insert sheet to check precision.
3 Refer to the method insert sheet for method-specific precision limits for each level. The mean, standard deviation, and coefficient of variation for these tests are already calculated for you on the printed test report.
4 Repeat System Check.
5 Check for proper storage of reagents (i.e., temperature, humidity).
6 Check the Instrument Log sheets for any relevant system problems.
7 Check for proper sample arm and reagent probe alignments.
8 Repeat the test on fresh sample.

How to Print Filter Data for a Test Result
1 Turn on the “DATA” password.
   a) From the Operating Menu screen, press F6: System Config.
   b) Press F7: Password.
   c) Type the word DATA (must be in capital letters) and press Enter.
2 Select the test result for which you want filter data.
   a) From the Operating Menu screen, press F2: Sample Status.
   b) Move the cursor to the sample ID and press F8: Test Results.
   c) Move the cursor to the test result you want filter data for and press F8: Filter Data. To print out this data, press F4: Print Data. If the message “Search found Nothing” appears, the filter data for this result has been deleted from the instrument to make room for more current results.
3 When you are finished, turn off the “DATA” password.
   a) From the Operating Menu screen, press F6: System Config.
   b) Press F7: Password.
   c) Type the word DATA (must be in capital letters) and press Enter.
System Check Troubleshooting

When the system check results do not meet specifications, rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check. The possible causes are listed beginning with the easiest for the operator to do. However, with your knowledge/experience with the problem, you may begin anywhere in the list.

If this does not resolve the problem, contact the Technical Assistance Center.

Resolving Miscellaneous System Check Error Conditions

Asterisks Appear Next to a System Check Result
This indicates that foaming occurred in one or more of the cuvettes during the system check.

Rerun the System Check. If the asterisk still appears, follow the appropriate troubleshooting in this section for the system (reagent arm, sampler, HM wash, or IMT) that has the asterisks.

Asterisks Appear instead of Max Diff, Mean, and SD Calculations
This indicates that an error condition occurred during the system check that caused the instrument to abort the system check. Go to the Error Log screen and resolve the error condition before running the system check.

Probe Cleaner Not Detected Error Message (either sample or reagent)
This message indicates that there was either insufficient Sample Probe Cleaner or Reagent Probe Cleaner present in the appropriate drain.

Note: Ensure that all other system check results are acceptable BEFORE troubleshooting this problem using the items listed below.

• Prime the appropriate probe cleaner from the Pump Prime screen.
• Check the tightness of the probe cleaner tubing connections to the pump and drain.
• Check that the probe drain and fittings are not leaking.
• Check that the probe cleaner tubing is completely inserted into and reaches the bottom of the bottle.
• Check that the correct cleaner solution is in place.

No System Check Printout
If you do not receive a system check printout:

• Check the sample status to see if the system check is still processing.
• Check that you pressed F1: Start to start the system check.
• Check that there is not a system need for an ABS Flex® reagent cartridge.
• Check the short sample load list for a possible short sample in the cup that contains the ABS solution.
Unacceptable Photometer Ranges
Rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check.

The acceptable photometer ranges are:
- 2.5 to +2.5 mAU for the 293-nm filter
- 1.5 to +1.5 mAU for all other filters

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stray light entering</td>
<td>The reagent lid must be closed and all instrument side instrument panels and doors must be closed when a system check is processing.</td>
</tr>
<tr>
<td>Photometer is misaligned</td>
<td>Realign the photometer. See “Photometer Alignment” in Module 4: Aligning.</td>
</tr>
<tr>
<td>Dirty cuvette windows</td>
<td>Clean cuvette windows. See “Cleaning Cuvette Windows” in Module 3: Maintaining.</td>
</tr>
<tr>
<td>Source lamp was installed incorrectly</td>
<td>This will be the cause only if you have just installed a new source lamp. Remove and reinstall the source lamp. See “Replacing the Source Lamp” in Module 3: Maintaining.</td>
</tr>
<tr>
<td>Optical filter is dirty or has become delaminated</td>
<td>Remove the specific optical filter that is failing, inspect it, and either clean or replace it. See “Cleaning/Replacing Optical Filters” in Module 3: Maintaining.</td>
</tr>
</tbody>
</table>
**Unacceptable Mean or SD for a Reagent Arm (R1, R2)**

Rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check.

The acceptable mean and SD for a reagent arm are:

Mean = the assay value listed on the end flap of the ABS carton ±12 mAU

SD ≤ 3.8

**Possible Cause** | **To resolve**
---|---
Using a new lot of ABS and failing to enter ABS carton flap value into the software. | Go to the Daily Maintenance screen for ABS and enter the value from the ABS carton flap into the Carton Value field for the ABS lot.

Loose tubing on the reagent syringes. | Check the tightness of all tubing connections on the R1 or R2 reagent pump panel.

Reagent probe is misaligned. | Realign the reagent probe. See “R1 (or R2) Reagent Probe Alignments” in Module 4: Aligning.

Crimped or pinched reagent tubing. | Check if the reagent tubing is crimped (bent) or pinched. Replace any tubing that appears to be damaged.

Reagent probe tip is not functioning properly. | Replace the probe tip. See “Replacing a Reagent Probe Tip” in Module 3: Maintaining.

Reagent syringe plunger tips are not functioning properly. | Replace both the 500-µL and the 2500-µL reagent syringes on the reagent pump panel for the appropriate pump. See “Replacing a Pump Syringe” in Module 3: Maintaining.

---

**To enter a new ABS carton value, use the Daily Maintenance screen.**

1. From the Operating Menu, press:
   - F4: System Prep
   - F8: Daily Maint.
2. Enter the ABS Carton Value and press the Enter key.

---

Troubleshooting Dimension® RxL Max® clinical chemistry system
Unacceptable Mean or SD for the Sampler

Rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check.

The acceptable mean and SD for the photometric sampler are:

\[
\text{Mean} = 10\% \text{ of the assay value listed on the end flap of the ABS carton} \\
\pm 2 \text{ mAU} \\
\text{SD} \leq 0.8
\]

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not filling the sample cup with ABS from the same lot that the instrument used for the System Check.</td>
<td>Look at the System Check printout and see what ABS Flex® Lot number was used for the System Check by the instrument. Ensure that you filled the sample cup with fresh ABS from this same lot number.</td>
</tr>
<tr>
<td>Using an old ABS sample</td>
<td>ABS sample older than one hour should be discarded and replaced with a fresh ABS sample.</td>
</tr>
<tr>
<td>Using a new lot of ABS and failing to enter ABS carton flap value into the software.</td>
<td>Go to the Daily Maintenance screen and enter the value from the ABS carton flap into the Carton Value field.</td>
</tr>
<tr>
<td>Loose tubing on the syringe.</td>
<td>Check the tightness of all tubing connections on the sampler pump panel.</td>
</tr>
<tr>
<td>Plugged sample probe or dirty sample drain</td>
<td>Clean the sample probe and drain. See “Cleaning the Sample Probe and Drain” in Module 3: Maintaining.</td>
</tr>
<tr>
<td>Sample probe is misaligned.</td>
<td>Realign the sample probe. See “Sample Probe Alignments” in Module 4: Aligning.</td>
</tr>
<tr>
<td>Loss of water to the sample drain.</td>
<td>This can be caused by crimped or pinched tubing, loose or disconnected water tubing, or a broken fitting on the bottom of the sample drain. Replace any tubing that appears to be damaged; tighten (or replace) any loose tubing. If the sample drain fitting is broken, call the Technical Assistance Center.</td>
</tr>
<tr>
<td>Sample syringe plunger tips are not functioning properly.</td>
<td>Replace both the 100-µL and the 2500-µL sample syringes on the sample pump panel. See “Replacing a Pump Syringe” in Module 3: Maintaining.</td>
</tr>
</tbody>
</table>
Unacceptable Mean or SD for the HM Wash System

Only troubleshoot the HM wash portion of a system check after all of the R1, R2, and sampler system check values are acceptable. On the HM wash portion of a system check printout, the first and second results (W1) are for wash probe #1; the remaining three results (W2) are for wash probe #2.

<table>
<thead>
<tr>
<th>+ HM WASH RESULTS +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean: 38.16</td>
</tr>
<tr>
<td>SD: 0.51</td>
</tr>
<tr>
<td>1st: 39.05  W1</td>
</tr>
<tr>
<td>2nd: 38.10 W1</td>
</tr>
<tr>
<td>3rd: 37.89 W2</td>
</tr>
<tr>
<td>4th: 38.01 W2</td>
</tr>
<tr>
<td>5th: 37.75 W2</td>
</tr>
</tbody>
</table>

Rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check.

The acceptable mean and SD for the HM wash system are:

- Mean = 10% of the assay value listed on the end flap of the ABS carton ± 4 mAU
- SD ≤ 1.6

Low Mean for Wash Probe 1 OR 2:

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash probe blocked</td>
<td>Stylet or replace probe.</td>
</tr>
<tr>
<td>Vacuum sensor tubing pinched</td>
<td>Check that this tubing is not pinched.</td>
</tr>
<tr>
<td>Wash station pump failure</td>
<td>Ensure that the pump on the wash station for the probe is working.</td>
</tr>
</tbody>
</table>

High Mean for Wash Probe 1 OR 2:

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry wash tubing pinched</td>
<td>Check that this tubing is not pinched or cut.</td>
</tr>
</tbody>
</table>

High Mean for Wash Probe 1 AND 2:

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash probe tubing disconnected</td>
<td>Check that the wash probe tubing is connected to the proper vacuum sensor.</td>
</tr>
</tbody>
</table>

SD > 1.6

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misaligned R2 probe</td>
<td>Check the R2 probe to vessel alignment.</td>
</tr>
<tr>
<td>Partially blocked wash probe</td>
<td>Stylet or replace the wash probe.</td>
</tr>
</tbody>
</table>

Wash probe tubing connections...

Tubing number 4 should be attached to sensor WP1; tubing number 2 to sensor WP2.
**Unacceptable Mean or SD for the IMT Sampler (non-HM)**

Rerun the system check. If the system check continues to fail, follow the troubleshooting items listed below as appropriate and then rerun the system check.

The acceptable mean and SD for the IMT sampler are:

- **Mean** = 10% of the assay value listed on the end flap of the ABS carton
  ±2 mAU
- **SD** ≤ 1.4

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>To resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General:</strong></td>
<td></td>
</tr>
<tr>
<td>Not filling the sample cup with ABS from the same lot that the instrument used for the System Check.</td>
<td>Look at the System Check printout and see what ABS Flex® Lot number was used for the System Check by the instrument. Ensure that you filled the sample cup with ABS from this same lot number.</td>
</tr>
<tr>
<td>Using a new lot of ABS and failing to enter ABS carton flap value into the software.</td>
<td>Go to the Daily Maintenance screen and enter the value from the ABS carton flap into the Carton Value field.</td>
</tr>
<tr>
<td><strong>Low Mean:</strong></td>
<td></td>
</tr>
<tr>
<td>Loose, crimped, damaged, or partially plugged IMT probe tubing.</td>
<td>Check the tightness of tubing connections at the IMT probe and at the monopump; check the probe tubing for damage; Remove the tubing and force water through it to see if it is plugged.</td>
</tr>
<tr>
<td>IMT probe is misaligned.</td>
<td>Realign the IMT probe. See “IMT Probe Alignment” in Module 4: Aligning.</td>
</tr>
<tr>
<td>Plugged IMT probe.</td>
<td>Run an IMT stylet through the IMT probe to unplug it.</td>
</tr>
<tr>
<td><strong>High Mean:</strong></td>
<td></td>
</tr>
<tr>
<td>Check the same possible causes as for Low Mean, plus:</td>
<td></td>
</tr>
<tr>
<td>Using an old ABS sample.</td>
<td>ABS sample older than one hour should be discarded and replaced with a fresh ABS sample.</td>
</tr>
<tr>
<td>Aliquot wheel not properly seated.</td>
<td>Ensure that the aliquot wheel is seated completely on its shaft.</td>
</tr>
<tr>
<td>Sample probe is misaligned to the aliquot wheel.</td>
<td>Realign the sample probe to the aliquot wheel. See “Sample Probe Alignments” in Module 4: Aligning.</td>
</tr>
<tr>
<td><strong>SD &gt; 1.4</strong></td>
<td></td>
</tr>
<tr>
<td>Loose, crimped, damaged supply tubing.</td>
<td>Check the tightness of the water supply tubing connections water on port #2 of the monopump; check for any damage to this tubing such as crimps or kinks. To replace this tubing, see “Replacing the IMT Probe Tubing” in Module 3: Maintaining.</td>
</tr>
</tbody>
</table>
Error Messages

The Dimension® RxL Max™ clinical chemistry system display has a line near the top of the screen that is only used to display error messages. In addition, the system software has two screens, Active System Errors and Error Log, that enable you to review errors that have occurred.

When the system detects an error condition, it displays an error message in the error message area, and the alarm sounds.

The system can display only one error message at a time. If more than one error condition occurs at the same time, the system uses a priority ranking to determine which one to display.

Some error messages will stop system processing; others will not. If system processing stops, you will need to reset the instrument by pressing the Reset key to clear the error message and/or resume processing.

An error message may have one or more ‘minor’ error messages associated with it. These minor error messages provide more specific information about why the error occurred. It is these ‘minor’ errors that you will troubleshoot.

**Active System Errors Screen**

The Active System Errors screen shows all the error messages that have occurred since the last time the Reset key was pressed. Pressing Reset deletes the Active System Errors screen list.

This screen shows the priority of the error message, the major error message itself, and a code that identifies the minor error message that caused the error.

These error log screens could contain a long list...
Use the cursor, PgDn, or PgUp keys to move through this list.

To see the minor error that corresponds to the code...
Press F3: See Minor.
Error Log Screen

The Error Log screen shows the error message, code, time each error message occurred, and the method (if any) associated with the error.

<table>
<thead>
<tr>
<th>ERROR MESSAGE</th>
<th>CODE</th>
<th>TIME</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Probe Lost Steps</td>
<td>(005)</td>
<td>Tue Jan 12 16:00</td>
<td>—</td>
</tr>
<tr>
<td>Insufficient IMT Consumables</td>
<td>(383)</td>
<td>Mon Jan 4 10:30</td>
<td>—</td>
</tr>
<tr>
<td>Photometer Communication Error</td>
<td>(165)</td>
<td>Sun Jan 3 08:30</td>
<td>—</td>
</tr>
</tbody>
</table>

Sample probe lost steps moving from home

Software Error Troubleshooting Help

Software help on how to troubleshoot an error message is available from the Error Log screen. To see this software help:

1. Move the cursor to the error message and then press either the Alt/M key combination or F5: More Info. The troubleshooting help information in the software appears.

From the Error Log screen:
Move the cursor to the error and press F5: More Info

OR
For information on ANY error code, press F6: Error Code and enter that error code

[383] IMT Consumable Required

One or more IMT consumable(s) (Standard A, B, or Flush Salt Solution, Diluent, or the IMT sensor) does not have enough tests remaining to do the work required.

1. Go to the Change IMT Consumables screen to replace the consumable(s).
   (Op Menu > F4: System Prep > F3: IMT > F1: Change IMT Consumables)


2. Press the space bar to remove the help message from the screen.
IMT Troubleshooting

IMT Results Troubleshooting

If the IMT results are questionable and there is no error message indicated by the instrument or test report slip, for example, any of the following situations could have occurred:

- QC is out
- failed delta check on the LIS
- results are inconsistent for the patient’s clinical picture
- abnormal Anion gap

Follow the steps below to troubleshoot these situations.

1. Check for insufficient sample in the sample container.
2. Rerun the sample. If the results are still questionable, do the basic troubleshooting steps below for Na, K, Cl results.

For Na, K, or Cl results:

1. Roll up the Standard A, Standard B, and Flush fluid bags and check for sufficient volume of fluid and that the bag fitting is in the down (toward the tray) position. Also check the tubing from each bag to ensure there are no air bubbles in this tubing. If necessary, replace the bags.
2. Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT
5. Bleach the IMT system. See “Cleaning the IMT System” in Module 3: Maintaining.
6. Clean the IMT port. See “Cleaning the IMT Port” in Module 3: Maintaining.

For identifying tubing in the IMT system...
Refer to the IMT tubing diagram later in this section.
**IMT Error Message Troubleshooting**

Before troubleshooting any patient/QC results or IMT error messages, rerun the sample or IMT calibration. If rerunning the sample or calibration is successful, you will not need to do any troubleshooting!

**“IMT Fails to Calibrate” [384]**

An IMT calibration will fail if there is an unacceptable slope for one or more of the sensors in the QuikLYTE® integrated multisensor or if there is an unacceptable Standard A or Standard B Air or Liquid value.

Using the IMT Calibration screen or the calibration printout, determine which values are unacceptable and then follow the appropriate steps on the following pages to resolve that problem.

---

**Acceptable IMT values:**

**Sensor slopes:**
- Na: 53–65
- K: 53–65
- Cl: –40 to –55

**Standard A Liquid value:**
Any value ≤ 0.6

**Standard A Air value:**
Any value ≥ 0.8 (Air value must be ≥ 2 times the Liquid value.)

---

A failed calibration on the IMT Calibration screen is shown at the right. The asterisks *** to the left of the Na and Cl slope values indicate that these sensors failed calibration. (These two sensors would also appear in red in the IMT sample status box at the top of the screen.) If the calibration failed for an unacceptable air or liquid value, there would be asterisks next to each sensor Slope field even if the sensor value is acceptable.

---

If a sensor (Na\(^+\), K\(^+\), Cl\(^−\)) slope is unacceptable

1. Check that the IMT cartridge interface (tower) is completely closed and that no tubing is being pinched by the tower.

2. Roll up the Standard A, Standard B, and Flush fluid bags and check for sufficient volume of fluid and that the bag fitting is in the down (toward the tray) position. Also check the tubing from each bag to ensure there are no air bubbles in this tubing. If necessary, replace the bags.

3. Prime with Salt Bridge Solution and verify that it is flowing through the R1 tubing and into the X2 tubing.


5. Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT

6. Replace the QuikLYTE® sensor. See “Replacing the QuikLYTE® Integrated Multisensor” in Module 2: Using.
“IMT Sample Fluid Detect Failure” [311]
1 Check for sufficient volume of sample in the sample container and that the sample container is in its assigned position on the segment.
2 Check that the IMT cartridge interface (tower) is completely closed and that no tubing is pinched by the tower.
3 Prime with Standard A. During the priming, ensure that there are no air bubbles or crimps in any tubing.
4 Check the IMT probe alignment to the port, drain, and segment. See “IMT Probe Alignments” in Module 4: Aligning.
5 Go to the Fluids Prime / Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT

“IMT Standard Fluid Detect Failure” [312]
1 Check that the IMT cartridge interface (tower) is completely closed and that no tubing is being pinched by the tower.
2 Roll up the Standard A and Standard B fluid bags and check for sufficient volume of fluid and that the bag fitting is in the down (toward the tray) position. If necessary, replace the bags.
3 Prime with Standard A. During the priming, ensure that there are no air bubbles or crimps in any tubing.
4 If you have just replaced the QuikLYTE® sensor, run another condition cycle and recalibrate.
5 Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT
6 Bleach the IMT Waste tubing. See “Cleaning the IMT Waste Tubing” in Module 3: Maintaining.
7 Replace the QuikLYTE® sensor. See “Replacing the QuikLYTE® Integrated Multisensor” in Module 2: Using.

To run an IMT condition cycle...
1 Go to the IMT Setup Menu screen. From the Operating Menu press:
   F4: System Prep
   F3: IMT
   F4: Cond/Dilchk
2 Enter the segment starting position where you will insert the conditioning fluid and then press the Enter key.
3 Insert your sample cup of conditioning fluid in the position indicated on the screen.
4 Press F1: Condition
“IMT Sample Air Detect Failure” [313]

1. Check the IMT port for any clogs.
   To do this, prime with Flush fluid and watch how the IMT port drains. If it is draining slowly or not at all, a clog probably exists in the IMT port or in the IMT port solenoid valve. Clean the IMT port. See “Cleaning the IMT Port” in Module 3: Maintaining.

2. Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT

3. Prime with Standard A. During the priming, ensure that there are no air bubbles or crimps in any tubing.


“IMT Standard Air Detect Failure” [314]

1. Check that the IMT cartridge interface (tower) is completely closed and that no tubing is being pinched by the tower.

2. Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT

3. Clean any salt buildup around the IMT cartridge interface and the pogo pin connectors.


5. Clean the IMT system. See “Cleaning the IMT System” in Module 3: Maintaining.

“IMT Measurement Error” [303]

1. Prime with Salt Bridge Solution and verify that it is flowing through the R1 tubing and into the X2 tubing.

2. Clean any salt buildup from around the sensor interface and pogo pins.

3. Calibrate the IMT and rerun your sample.

4. Replace the QuikLYTE® sensor. See “Replacing the QuikLYTE® Integrated Multisensor” in Module 2: Using.
“Replace IMT Fluids or Cartridge” [383]
Check IMT consumables inventory on the IMT Change Consumables screen and replenish consumables as required.

“IMT A to D Drifting” [500] or “IMT Invalid Test Frequency” [501]
1 Make sure the cable is connected securely to the IMT sensor board.
2 Check fuse 24-6B.
3 Reseat the auxiliary board. See "Reseating a Control Board in the Card Cage" procedure in Module 3: Maintaining.

“IMT Calibration not Valid” [509] or “IMT in Error for Test” [510]
1 Press Reset to resume operation.
2 Check the Error Log for an error that occurred at the same time as this error, e.g., a “Module Not Ready” error, and troubleshoot that error.
“IMT Failed to Detect Flush Fluid” [545]

1 Roll up the Flush fluid bag and check for sufficient volume of Flush fluid and that the bag fitting is in the down (toward the tray) position. If necessary, replace the bag.

2 Verify that the Flush fluid can be primed. To do this, go to the Align/Prime screen and press F7: Prime Flush. You should see Flush fluid being pumped into the IMT port.

3 Check that the following tubing connections are tight and that there are no pinches, crimps, leaks, or obstructions in the tubing:
   - F1: from the Flush bag to the Flush pump
   - F2: from the Flush pump to the IMT port
   - X0: from the IMT port to the IMT rotary valve
   - X1: from the IMT rotary valve to the QuikLYTE® sensor.

   Replace the tubing as necessary.

4 Check that the Flush pump is operating properly and that it is dispensing the proper amount of Flush fluid.

   **Flush pump is operating properly:**
   a) Go to the IMT Advanced Diagnostic screen.
   b) Move the cursor to the Flush: field.
   c) Press the Enter key twice.

   If the pump is operating properly, you should hear the pump ‘click’ on and off and see Flush fluid being pumped into the IMT port. If this does not occur, replace the Flush pump.

   **Flush pump is dispensing the proper amount of Flush fluid:**
   Refer to the table below for how much Flush fluid should appear in the IMT port. If the Flush pump is not dispensing the proper volume of fluid, replace it.

<table>
<thead>
<tr>
<th>Press Enter Key</th>
<th>Proper Fluid Level in IMT Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 times</td>
<td>Just under the tapered section of the IMT port.</td>
</tr>
<tr>
<td>8 times</td>
<td>Just under the injection ports for Flush and Diluent.</td>
</tr>
<tr>
<td>16 times</td>
<td>Full to the top of the IMT port.</td>
</tr>
</tbody>
</table>

Fluid level arrows are approximate.
5 Bleach the IMT Waste tubing. See “Cleaning the IMT Waste Tubing” in Module 3: Maintaining.

6 Clean the IMT port. See “Cleaning the IMT Port” in Module 3: Maintaining.

7 Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT
“Insufficient/Excess IMT Diluent in the Port” [546], [672]

The amount of Diluent in the IMT port was not sufficient or excessive for performing the sample dilution. A [672] error code appears when three consecutive [546] error occur (because you tried to clear the error and it returned). The [672] error will stop all instrument processing. Troubleshoot a [672] using this procedure.

1  Check for sufficient volume of Diluent in its bottle. Replace if necessary.
2  Clean the IMT port. See “Cleaning the IMT Port” in Module 3: Maintaining.
3  Check that the following tubing connections are tight and that there are no pinches, crimps, leaks, or obstructions in the following tubing:
   D1: from the Diluent bottle to the Diluent pump.
   D2: from the Diluent pump to the IMT port.

Replace the tubing as necessary.
4  Check that the Flush pump is operating properly and that it is dispensing the proper amount of Flush fluid.

**Flush pump is operating properly:**
   a) Go to the IMT Advanced Diagnostic screen.
   b) Move the cursor to the Flush: field.
   c) Press the **Enter** key twice.

If the pump is operating properly, you should hear the pump ‘click’ on and off and see Flush fluid being pumped into the IMT port. If this does not occur, replace the Flush pump.

**Flush pump is dispensing the proper amount of Flush fluid:**
Refer to the table below for how much Flush fluid should appear in the IMT port. If the Flush pump is not dispensing the proper volume of fluid, replace it.

<table>
<thead>
<tr>
<th>Press Enter Key</th>
<th>Proper Fluid Level in IMT Port</th>
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</thead>
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<tr>
<td>4 times</td>
<td>Just under the tapered section of the IMT port.</td>
</tr>
<tr>
<td>8 times</td>
<td>Just under the injection ports for Flush and Diluent.</td>
</tr>
<tr>
<td>16 times</td>
<td>Full to the top of the IMT port.</td>
</tr>
</tbody>
</table>

5  Clean the IMT port. See “Cleaning the IMT Port” in Module 3: Maintaining.
"AutoAlign Failed to Sense Standard A Alignment Fluid" [547]

1. Check that the IMT cartridge interface (tower) is completely closed and that no tubing is being pinched by the tower.

2. Roll up the Standard A, Standard B, and Flush fluid bags and check for sufficient volume of fluid and that the bag fitting is in the down (toward the tray) position. Also check the tubing from each bag to ensure there are no air bubbles in this tubing. If necessary, replace the bags.

3. Prime with Standard A. During the priming, ensure that there are no air bubbles or crimps in any tubing.

4. Prime with Salt Bridge Solution. Verify that it is flowing through the R1 tubing and into the X2 tubing. If there is no flow, check the R1 tubing inside the Salt Bridge pinch valve for crimps. Reposition the R1 tubing to change where the valve pinches it, or replace the tubing if necessary.

5. Go to the Fluids Prime/Pump Alignment screen and check the IMT pump alignment. If the IMT pumping rate field is less than 68:
   a) replace the X tubing inside the IMT pump
   b) prime with Salt Bridge solution
   c) calibrate the IMT


7. Replace the QuikLYTE® sensor. See “Replacing the QuikLYTE® Integrated Multisensor” in Module 2: Using.
IMT Tubing Diagram

### Dimension® RxL Max™ Fluidics for QuikLYTE® IMT System

- **IMT Pump**
- **Salt Bridge Solution**
- **Diluent Pump**
- **IMT Sample Port**
- **IMT Rotary Valve**
- **Air**
- **Diluent**
- **Waste**
- **Standard A**
- **Standard B**
- **Flush**

PN 752007.001 Rev. A
## Tubing Chart

<table>
<thead>
<tr>
<th>Tubing</th>
<th>Connects</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Standard A bag to IMT rotary valve</td>
</tr>
<tr>
<td>B</td>
<td>Standard B bag to IMT rotary valve</td>
</tr>
<tr>
<td>D1</td>
<td>Diluent bottle to Diluent pump</td>
</tr>
<tr>
<td>D2</td>
<td>Diluent pump to IMT port</td>
</tr>
<tr>
<td>F1</td>
<td>Flush bag to Flush pump</td>
</tr>
<tr>
<td>F2</td>
<td>Flush pump to IMT port</td>
</tr>
<tr>
<td>R1</td>
<td>Salt Bridge Solution bottle to QuikLYTE® sensor</td>
</tr>
<tr>
<td>X</td>
<td>Sample tubing inside IMT pump</td>
</tr>
<tr>
<td>X0</td>
<td>IMT port to IMT rotary valve</td>
</tr>
<tr>
<td>X1</td>
<td>IMT rotary valve to QuikLYTE® sensor</td>
</tr>
<tr>
<td>X2</td>
<td>QuikLYTE® sensor to IMT pump</td>
</tr>
<tr>
<td>W2</td>
<td>IMT port to solenoid (located under the baseplate)</td>
</tr>
<tr>
<td>Waste</td>
<td>To Chemistry Waste bottle</td>
</tr>
</tbody>
</table>

### Tubing Kit

<table>
<thead>
<tr>
<th>Contains tubing</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMT Pump</td>
</tr>
<tr>
<td>IMT Rotary Valve</td>
</tr>
<tr>
<td>IMT Miscellaneous</td>
</tr>
</tbody>
</table>
Resolving Error Messages

How To Use This Section
All error messages possible on the Dimension® RxL Max® clinical chemistry system are not covered in this section. The troubleshooting procedure for each of the following ‘generic-type’ error messages listed below is contained in this section.

- Cannot Find Home
- Lost Steps
- Reagent Preparation
- Block Time Missed
- Critical Time Missed
- Illegal Error
- Board Test Failed
- Communication Error
- Timeout on IOC Read
- System Problem

The information in these procedures is also available in the help system of the software.

Accessing help procedures in the software for these error messages...
If the error is in the error message line of the screen, press the Alt/M key combination.

From the Error Log screen, move the cursor to the message and press F5: More Info, OR to access any error code in the system, press F6: Error Code and enter the number of the error message you want to see help on.
“Cannot Find Home” Message
For example: [074] R2 probe cannot find home (cfh)

What Happened
The control system did not detect movement of the component.

Solution
1. Press Reset. If the error reappears, continue troubleshooting.
2. Open the left cabinet door and turn the service key to the right (“Interlock Override” position). When you are finished troubleshooting, return this key to its vertical “Normal” position. Open the instrument lids or cabinet doors as necessary so you can observe the movement of the component.
3. Press Reset again and observe the movement of the component. Depending on what you observe, follow the appropriate action below.

If the component moves through its complete cycle without stopping:
1. Go to the Electro/Mechanical Diagnostics screen and press the appropriate Function keys for the error number as shown in the table on the next page.
2. Move the cursor to the appropriate field in the Motors portion of the screen, then press the appropriate Function key as shown in the table and watch this field.
   - If the field changes to PASS, call the Technical Assistance Center. If the field DOES NOT change, the sensor has probably failed. Replace it, but first check to see if its P/J connector is loose or unplugged. (See how to replace the particular sensor in Module 3: Maintaining.)

If the component DID NOT MOVE through its complete cycle:
1. Check to see if anything is interfering with the component, e.g., tubing or cabling is restricting movement.
2. Press Reset.
   - If the error reappears, call the Technical Assistance Center.

If the component DID NOT MOVE AT ALL:
1. Check the fuse LED on the appropriate fuse board inside the card cage. The LED should be lit. If it is not lit, replace the fuse with one of the same amperage.
2. Press Reset.
   - If the error reappears, call the Technical Assistance Center.
<table>
<thead>
<tr>
<th>Error Number</th>
<th>Press this key(s) from Electro/Mech screen*</th>
<th>Move the Cursor to this field</th>
<th>then press</th>
<th>Specific Sensor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>001, 002, 004</td>
<td>F2: Sample System &gt; F2: Sampler Vertical Probe</td>
<td>F2: Test Mtr Only</td>
<td>P/J 50E B 24-5A</td>
<td>Sample probe vertical home sensor</td>
</tr>
<tr>
<td>013, 014, 016</td>
<td>F2: Sample System &gt; F2: Sampler Small Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 15C A 24-3A</td>
<td>Sample 100-uL pump limit switch</td>
</tr>
<tr>
<td>019, 020, 022</td>
<td>F1: Reagent &gt; F2: Reagent 2 Small Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 16D A 24-3B</td>
<td>R2 500-uL pump limit switch</td>
</tr>
<tr>
<td>025, 026, 028</td>
<td>F2: Sample System &gt; F2: Sampler Rotate Arm</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 50D B 24-5A</td>
<td>Sample probe rotational home sensor</td>
</tr>
<tr>
<td>031, 032, 034</td>
<td>F5: Photometer</td>
<td>—</td>
<td>Fuse 13D B 24-5A</td>
<td>Photometer home sensor</td>
</tr>
<tr>
<td>037, 038, 040</td>
<td>F2: Sample System &gt; F2: Sampler Large Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 15C A 24-3A</td>
<td>Sample 2.5-mL pump limit switch</td>
</tr>
<tr>
<td>043, 044, 046</td>
<td>F1: Reagent &gt; F2: Reagent 2 Large Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 16C A 24-3B</td>
<td>R2 2.5-mL pump limit switch</td>
</tr>
<tr>
<td>049, 050, 052</td>
<td>F1: Reagent &gt; F2: Reagent 2 Rotation</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 32D A 24-3B</td>
<td>R2 arm rotational home sensor</td>
</tr>
<tr>
<td>055, 056, 058</td>
<td>F2: Sample System &gt; F3: Samp Wheel [home]</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 32C A 24-3D</td>
<td>Sample wheel home sensor</td>
</tr>
<tr>
<td>073, 074, 076</td>
<td>F1: Reagent &gt; F2: Reagent 2 Vertical Probe</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 80B B 24-4C</td>
<td>R2 arm vertical home sensor</td>
</tr>
<tr>
<td>079, 080, 082</td>
<td>F1: Reagent &gt; F2: Reagent 2 Radial In/Out</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 80D B 24-4D</td>
<td>R2 arm radial home sensor</td>
</tr>
<tr>
<td>085, 086, 088</td>
<td>F2: Sample System &gt; F4: Aliquot wheel</td>
<td>Home</td>
<td>Fuse 32C A 24-3D</td>
<td>Aliquot wheel home sensor</td>
</tr>
<tr>
<td>097, 098, 100</td>
<td>F2: Sample System &gt; F1: IMT Sampler Rotate Arm</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 50D B 24-5C</td>
<td>IMT probe rotational home sensor</td>
</tr>
<tr>
<td>103, 104, 106</td>
<td>F2: Sample System &gt; F1: IMT Sampler Vertical Probe</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 50E B 24-5C</td>
<td>IMT probe vertical home sensor</td>
</tr>
<tr>
<td>109, 110, 112</td>
<td>F1: Reagent &gt; F1: Reagent 1 Large Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 16C A 24-3C</td>
<td>R1 2.5-mL pump limit switch</td>
</tr>
<tr>
<td>115, 116, 118</td>
<td>F1: Reagent &gt; F1: Reagent 1 Radial In/Out</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 20C B 24-4D</td>
<td>R1 arm radial home sensor</td>
</tr>
<tr>
<td>121, 122, 124</td>
<td>F1: Reagent &gt; F6: Reagent Tray [observe Home]</td>
<td>F1: Cycle</td>
<td>—</td>
<td>B 24-4A</td>
</tr>
<tr>
<td>133, 134, 136</td>
<td>F1: Reagent &gt; F1: Reagent 1 Small Pump</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 16D A 24-3C</td>
<td>R1 500-uL pump limit switch</td>
</tr>
<tr>
<td>139, 140, 142</td>
<td>F1: Reagent &gt; F1: Reagent 1 Vertical Probe</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 20D B 24-4B</td>
<td>R1 arm vertical home sensor</td>
</tr>
<tr>
<td>425, 426, 428</td>
<td>F2: Sample System &gt; F1: IMT Sampler Mono Piston</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 83D B 24-5D</td>
<td>Monopump piston home sensor</td>
</tr>
<tr>
<td>431, 432, 434</td>
<td>F2: Sample System &gt; F1: IMT Sampler Mono Valve</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 84 B 24-5D</td>
<td>Monopump rotary valve piston sensor</td>
</tr>
<tr>
<td>539, 540, 542</td>
<td>F3: IMT IMT Rotary Valve</td>
<td>F2: Test Mtr Only</td>
<td>Fuse 84 B 24-5B</td>
<td>IMT rotary valve home sensor</td>
</tr>
<tr>
<td>590, 591, 593</td>
<td></td>
<td></td>
<td>Fuse 48B C 24-10A</td>
<td>Vessel transfer home sensor</td>
</tr>
<tr>
<td>596, 597, 599</td>
<td></td>
<td></td>
<td>Fuse 45A C 24-10C</td>
<td>Wash probe home sensor</td>
</tr>
<tr>
<td>602, 603, 605</td>
<td></td>
<td></td>
<td>Fuse 42A C 24-3C</td>
<td>Wash wheel home sensor</td>
</tr>
<tr>
<td>614, 615, 617</td>
<td></td>
<td></td>
<td>Fuse 41A C 24-10A</td>
<td>Incubate wheel home sensor</td>
</tr>
<tr>
<td>620, 621, 623</td>
<td></td>
<td></td>
<td>Fuse 82 C 24-10B</td>
<td>Wash pump home sensor</td>
</tr>
</tbody>
</table>

1 Also occurs if the sample lid is up and the service key is in its Normal position. Close the sample lid and press Reset.
2 Sometimes occurs if the knob on the top of the monopump is too tight. Try slightly loosening this knob and press Reset.

You cannot check the HM sensors and motors individually. Typically these HM errors indicate a failed sensor. You will only be able to verify/check the fuse for that HM component.
“Lost Steps” Message
For example: [078] R2 probe lost steps (mth)

What Happened
The component did not move the proper distance.

Solution
1. Press Reset. If the error reappears, continue troubleshooting.
2. If the component is a rotary valve (Monopump or IMT), replace the rotary valve seal. If this does not resolve the problem, continue with step 9 below.
   - If the component is not a rotary valve, continue with step 3.
3. Open the instrument lids and cabinet doors to see the component.
4. Check to see if anything is interfering with the component, e.g., tubing or cabling is restricting movement.
5. Align the component (see Module 4: Aligning).
6. Lubricate the component. Refer to the table below.
7. Replace the R1, R2, IMT, or sample probe as appropriate.
8. Replace the R1, R2, IMT, or sample tubing as appropriate.
9. If the component is either a rotary valve or a syringe pump, check the operation of its sensor.
   a) From the Electro/Mechanical Diagnostics screen, press the function keys for the error number indicated in the table on the next page.
   b) Move the cursor to the appropriate field in the Motors portion of the screen, and press the Function key indicated in the table on the next page and watch this field on the screen.
      - If the field changes to PASS, call the Technical Assistance Center.
      - If the field DOES NOT change, the sensor has probably failed. Replace it, but first check to see if its P/J connector is loose or unplugged. (See Module 3: Maintaining to replace the sensor.)

If the error reappears after performing the above troubleshooting solution, call the Technical Assistance Center.
<table>
<thead>
<tr>
<th>Error Number</th>
<th>Press this key(s) from Electro/Mech screen*</th>
<th>Move the Cursor to this field then press</th>
<th>Specific Sensor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>005, 006, 249</td>
<td>F2: Sample System &gt; F2: Sampler</td>
<td>Vertical Probe</td>
<td>50E Sample probe vertical home sensor</td>
</tr>
<tr>
<td>029, 030, 250</td>
<td>F2: Sample System &gt; F2: Sampler</td>
<td>Rotate Arm</td>
<td>50D Sample probe rotational home sensor</td>
</tr>
<tr>
<td>035, 036, 248</td>
<td>F5: Photometer</td>
<td>(observe Home)</td>
<td>13D Photometer home sensor</td>
</tr>
<tr>
<td>053, 054, 246</td>
<td>F1: Reagent &gt; F2: Reagent 2</td>
<td>Rotation</td>
<td>32D R2 arm rotational home sensor</td>
</tr>
<tr>
<td>059, 060</td>
<td>F2: Sample System &gt; F3: Samp Wheel</td>
<td>[home]</td>
<td>32C Sample wheel home sensor</td>
</tr>
<tr>
<td>078, 079, 245</td>
<td>F1: Reagent &gt; F2: Reagent 2</td>
<td>Vertical Probe</td>
<td>80B R2 arm vertical home sensor</td>
</tr>
<tr>
<td>083, 084, 247</td>
<td>F1: Reagent &gt; F2: Reagent 2</td>
<td>Radial In/Out</td>
<td>80D R2 arm radial home sensor</td>
</tr>
<tr>
<td>089, 090</td>
<td>F2: Sample System &gt; F4: Aliquot wheel</td>
<td>Home</td>
<td>32C Aliquot wheel home sensor</td>
</tr>
<tr>
<td>101, 102, 256</td>
<td>F2: Sample System &gt; F1: IMT Sampler</td>
<td>Rotate Arm</td>
<td>50D IMT probe rotational home sensor</td>
</tr>
<tr>
<td>107, 108, 255</td>
<td>F2: Sample System &gt; F1: IMT Sampler</td>
<td>Vertical Probe</td>
<td>50E IMT probe vertical home sensor</td>
</tr>
<tr>
<td>119, 120</td>
<td>F1: Reagent &gt; F1: Reagent 1</td>
<td>Radial In/Out</td>
<td>20C R1 arm radial home sensor</td>
</tr>
<tr>
<td>143, 144</td>
<td>F1: Reagent &gt; F1: Reagent 1</td>
<td>Vertical Probe</td>
<td>20D R1 arm vertical home sensor</td>
</tr>
<tr>
<td>429, 430</td>
<td>F2: Sample System &gt; F1: IMT Sampler</td>
<td>Mono Piston</td>
<td>83D Monopump piston home sensor</td>
</tr>
<tr>
<td>435, 436</td>
<td>F2: Sample System &gt; F1: IMT Sampler</td>
<td>Mono Valve</td>
<td>84 Monopump rotary valve piston sensor</td>
</tr>
<tr>
<td>543, 544</td>
<td>F3: IMT</td>
<td>IMT Rotary Valve</td>
<td>84 IMT rotary valve home sensor</td>
</tr>
<tr>
<td>579, 580</td>
<td></td>
<td></td>
<td>48E HM shuttle home sensor</td>
</tr>
<tr>
<td>594, 595</td>
<td></td>
<td></td>
<td>48E HM shuttle home sensor</td>
</tr>
<tr>
<td>600, 601</td>
<td></td>
<td></td>
<td>45B HM wash probe home sensor</td>
</tr>
<tr>
<td>606, 607</td>
<td></td>
<td></td>
<td>42B HM wash wheel home sensor</td>
</tr>
<tr>
<td>618, 619</td>
<td></td>
<td></td>
<td>41B HM incubate wheel home sensor</td>
</tr>
<tr>
<td>624, 625</td>
<td></td>
<td></td>
<td>HM pump limit switch</td>
</tr>
</tbody>
</table>

* To get to the Electro/Mechanical Diagnostics screen: From the Operating Menu press F7: Diagnostics > F1: Electro/Mech.

1 Before pressing F2: Test Mtr Only, rotate the orange belt manually counterclockwise for one complete turn.

You cannot check the HM sensors individually. Typically these HM errors indicate a failed sensor.
“Reagent Preparation Error” Message
For example:  
[381] Process error during preparation
[382] Prepared reagent failed quality assurance

What Happened
A process error occurred during the preparation of a reagent or the prepared reagent failed quality assurance.

Solution
When a Reagent Preparation Error appears, go to the Error Log screen, move the cursor to the Reagent Preparation Error, and press F3: See Minor. Perform the troubleshooting steps below for the minor error message that appears.

[381] Process Error During Preparation
Troubleshoot the error code on the Error Log that occurred at the exact same time (typically the error code immediately below this error code). One of the common errors that appears at the same time as this error is “Ultrasonics unable to mix.” It's troubleshooting steps are shown below.

Ultrasonics Unable to Mix (R2 or R3)
1 Go to the Ultrasonics Diagnostic screen and press F1: Select Probe until the appropriate reagent probe (R2 or R3) is displayed in the Probe field.
2 Press F2: Enable On/Off.
   • If the Lock Status field is 100%, press Shift/Exit and then press Reset and continue processing.
   • If the Lock Status field IS NOT 100%, call the Technical Assistance Center.

[382] Prepared Reagent Failed Quality Assurance
1 Replace the R2 probe and nut. Ensure that the new nut is completely tightened. See “Replacing a Reagent Probe Tip” in Module 3: Maintaining.
2 Perform all R2 reagent probe alignments. See “R2 Reagent Probe Alignments” in Module 4: Aligning.
3 Prime the R2 reagent pump. While priming, check that there are no leaks and that there are no air bubbles inside the pump syringe.
4 Perform a system check.
   • If the system check passes, continue processing.
   • If the system check fails, perform system check troubleshooting for R2.

   See “Unacceptable Mean or SD for a Reagent Arm” in this Module.
5 If the error reappears, call the Technical Assistance Center.
“Block Time Missed” Message
“Critical Time Missed” Message
“Illegal Error” Message
For example: [075] R2 probe illegal error
            [329] Sample critical time missed
            [328] IMT block time missed

What Happened
Additional timing errors occurred because of a previous error.

Solution
1  Press Reset. If the error reappears, continue troubleshooting.
2  Go to the Error Log screen.
   OPERATING MENU
      PROCESS CONTROL MENU
         Press F5: PROCESS CTRL
         Press F6: ERROR LOG

   ERROR LOG
   ERROR MESSAGE    CODE   TIME          METHOD    LOC
   R2 Probe Illegal Error  (075)  Tue Apr 16 16:02   —
   R2 Arm Lost Steps       (053)  Tue Apr 16 16:02   —

3  Troubleshoot the error code(s) that occurred at the exact same time or the error code immediately below this error code.
   In the example screen above, you would troubleshoot the “R2 Arm Lost Steps” error message because it occurred at the same time as the “R2 probe illegal error” message.

   For information on troubleshooting that error code:
   a) Move the cursor to the error and press F5: More Info.
   b) Refer to the appropriate message in this troubleshooting section.
“Board Test Failed” Message
“Communication Error” Message
“Timeout on IOC Read” Message

For example:
[657] Incubation wheel timeout on IOC read
[174] Reagent 2 large pump board test failed
[197] Reagent 2 carriage communication error

What Happened
An error occurred with the component which is not related to any existing error code.

Solution
1 Press Reset. If the error reappears, continue troubleshooting.
2 Perform a “Controlled Power Shutdown” (see Module 1: Introducing).
3 Refer to the table below and reseat the appropriate board in the card cage that controls this component (see “Reseating a Control Board in the Card Cage” in Module 3: Maintaining).

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<thead>
<tr>
<th>For Error Numbers</th>
<th>Reseat this Board</th>
</tr>
</thead>
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<td>177, 178, 180, 193, 194, 196, 197, 198, 200, 221, 222, 224, 225, 226, 228, 237, 238, 240.</td>
<td>Motor Control Board (in slot 4)</td>
</tr>
<tr>
<td>145, 146, 148, 161, 162, 164, 209, 210, 212, 213, 214, 216.</td>
<td>Motor Control Board (in slot 5)</td>
</tr>
<tr>
<td>165, 166, 168.</td>
<td>Photometer Board</td>
</tr>
<tr>
<td>185, 186, 188, 204, 208.</td>
<td>Cuvette Board</td>
</tr>
<tr>
<td>646, 657, 660</td>
<td>Motor Control Board (in slot 10)</td>
</tr>
</tbody>
</table>

4 Restore power as indicated in the “Controlled Power Shutdown” procedure.
5 If the error reappears, call the Technical Assistance Center.
“System Problem” Message
For example: [227] Reagent carousel system problem

What Happened
An error was detected that does not belong to any established category.

Solution
1 Press Reset. If the error reappears, continue troubleshooting.
2 Go to the Console Menu.

From the Operating Menu
press: the EXIT key, then
press the EXIT key again, then
press ‘y’

CONSOLE MENU
1 - Restart the Dimension(R) Application Software
2 - Install or Update software
3 - Prepare to turn off the instrument

Type a number to select an option then press Enter:

3 Type the number 1 and then press Enter.
4 If the error reappears, call the Technical Assistance Center.
Use this page for NOTES
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Use this page for NOTES
Overview of the Customizing Module

The Customizing segment contains procedures that allow you to configure systems and reports of the Dimension® RxL Max® clinical chemistry system to meet the specific requirements of your laboratory. Typically, these configurations are set at the time of installation (e.g., “Selecting Instrument Options”) and may not need to be changed again. However, you may want to set up configurations and do other customizing (e.g., “Performing Reagent Hydrations”) to meet day-to-day changes in workload and laboratory operation.

Selecting Instrument Options

To Select/Change an Instrument Option

**WARNING:** The system configuration selections have been set to meet the requirements of your laboratory during instrument installation. Do not change an instrument option without approval from your laboratory supervisor.

At the System Configuration Menu screen, use the arrow keys to move the cursor to the desired field and press the Enter key to change the information for the field. If requested by the software, type the system password and press Enter to confirm the change.

Each of the fields and function keys that appear on this screen are described on pages that follow.
## System Configuration Menu Screen Field Descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Changing these fields requires entering your password.</td>
<td></td>
</tr>
<tr>
<td>Enter Sample Data Mode</td>
<td>Indicates which type of Enter Sample Data screen, NORMAL (single samples) or BATCH (batch samples), appears for entering patient sample information.</td>
</tr>
<tr>
<td>*Automatic Cartridge Removal</td>
<td>ON indicates that empty or expired reagent cartridges will be removed automatically from the instrument.</td>
</tr>
<tr>
<td>*Automatic Rerun</td>
<td>ON indicates that the instrument will rerun a test if there were instrument errors during the initial test processing that were resolved by the instrument. The test will be rescheduled without any operator intervention. This field must be set to ON to use the Automatic Dilution, Automatic Repeat for Panics and Automatic Reflex Testing.</td>
</tr>
<tr>
<td>*Automatic Dilution</td>
<td>ON indicates that the system will rerun the test using a smaller sample volume when autodilution conditions are met.</td>
</tr>
<tr>
<td>*Water In</td>
<td>PLUMBED indicates that the instrument is connected to an external water purification system. MANUAL indicates that purified water is being added manually to the instrument's water bottle.</td>
</tr>
<tr>
<td>*Waste Out</td>
<td>PLUMBED indicates that system chemistry wastes are automatically pumped to an external waste collection system. MANUAL indicates that these wastes are collected in the instrument waste bottle and must be emptied by the operator.</td>
</tr>
<tr>
<td>*Automatic Repeat for Panics</td>
<td>ON indicates that an automatic rerun of a test will be run if the test result is outside the panic values entered by the operator for that method. See &quot;Automatic Panic Rerun&quot; in this module.</td>
</tr>
<tr>
<td>*Automatic Reflex Testing</td>
<td>ON indicates that an automatic reflex test will be run if the test result is outside the reflex limits entered by the operator for that method. See &quot;Automatic Reflex Testing&quot; in this module.</td>
</tr>
<tr>
<td>Reminder!</td>
<td>Both HM fields MUST be set to ON.</td>
</tr>
<tr>
<td>*HM Module Configured</td>
<td>YES indicates that the HM module is available for use.</td>
</tr>
<tr>
<td>*Automatic HM Vessel Load</td>
<td>YES indicates that HM reaction vessels will be loaded automatically by the system.</td>
</tr>
</tbody>
</table>
System Configuration Menu Screen Function Key Descriptions
You can set additional configurations using the function keys on the System Configuration Menu screen. The use of these function keys is discussed in the table below.

<table>
<thead>
<tr>
<th>Function Key</th>
<th>Use to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Method Param</td>
<td>Enter/view method-specific information for each method you run on the Dimension® system. See “Entering Method Parameters” later in this module.</td>
</tr>
<tr>
<td>F2: Define Panels</td>
<td>Create ten panels with up to 20 tests on each panel. All 20 tests can then be requested with a single keystroke. See “Creating Panel Keys” later in this module.</td>
</tr>
<tr>
<td>F3: Date/Time</td>
<td>Change the date and time. To change the date and time:</td>
</tr>
<tr>
<td></td>
<td>1 Press F3: Date/Time.</td>
</tr>
<tr>
<td></td>
<td>2 In the Date field, type the day. Press F2: Next Month to select the month. Then type the year (e.g., 18-JUL-1998).</td>
</tr>
<tr>
<td></td>
<td>3 Move the cursor to the Hour and Minute fields and enter the time. Use the 24-hour time convention for the hour (e.g., 2:00 p.m. is 1400).</td>
</tr>
<tr>
<td></td>
<td>4 If you want to display the date/time as MM-DD-YY rather than DD-MM-YY as in step 2 above, just press the Enter key.</td>
</tr>
<tr>
<td></td>
<td>5 Press F1: Store Change before exiting from this screen. Verify that the entered date and time are correct.</td>
</tr>
<tr>
<td>F4: Computer</td>
<td>Set up the Dimension® system for your laboratory computer operations. See “Entering Sample ID Information” later in this module.</td>
</tr>
<tr>
<td></td>
<td>To establish communication with an LIS:</td>
</tr>
<tr>
<td></td>
<td>1 Press F4: Computer, then press F4: Communications.</td>
</tr>
<tr>
<td></td>
<td>2 Move the cursor to each field on the screen and use the Enter key to change its setting to the appropriate information for your laboratory.</td>
</tr>
<tr>
<td></td>
<td>3 Press F2: Store Changes to store changes before leaving this screen.</td>
</tr>
<tr>
<td>F5: IMT On / Off</td>
<td>Configure the IMT system. Press this function key and the IMT status box at the top of the screen will change appropriately.</td>
</tr>
<tr>
<td></td>
<td>If the box indicates “IMT Not Config,” this means that the IMT is off; any other wording in this box indicates that the IMT is configured.</td>
</tr>
<tr>
<td>F6: Select Printer</td>
<td>Configure the printer(s), creating the header and setting paper specifications for your printed test reports, and, if applicable, creating a custom format for an external printer. See “Configuring the Printer” and “Customizing an External Printer Report” later in this module.</td>
</tr>
<tr>
<td>F7: Password</td>
<td>Change your system password. To change the password, press this function key and follow the messages as they appear on the screen.</td>
</tr>
<tr>
<td>F8: Temperature</td>
<td>Override any reagent or cuvette operating temperatures that are out of range.</td>
</tr>
</tbody>
</table>
Automatic Reflex Testing

When a method’s test result is outside the reflex limits for a method, as determined by the laboratory, you can set reflex testing to automatically run another test method.

If a test result is outside the reflex limit, the instrument will automatically reflex the test method that was entered in the Reflex If < and or > field on the Method Parameters screen for that method. Only one reflex test can be run per result; however, if the reflexed test’s result is outside of its reflex limits, it can trigger its own reflex test.

Reflex testing improves the timeliness of results because the instrument automatically performs the next test needed without having to wait for the physician to see the initial result and ask for the next test. Some common examples of reflex testing include thyroid function testing and cardiac enzyme testing.

When a reflex test begins processing, it triggers the Sample Alert key on the touchscreen to turn yellow. Pressing the alert key lets you observe the progress of the test.

Since reflex testing is performed automatically once it is activated, the hospital’s medical staff and laboratory pathologists should agree that the laboratory will follow a path of reflex test selection that depends on the results of the initial test choices.

The following general conditions are required for a reflex test to run:

• Sample fluid type must be undiluted serum or plasma.
• No error conditions or non-reportable results due to test report messages must appear on the test report with the original test result.
• A reflex test will not be run if it is already in the test list for that sample.
• A reflex test will not be run if a calibration or QC is needed for that method.
• Sufficient reagent cartridge inventory must be on board the instrument to perform the reflex test.
• For a Lytes reflex test to run, the IMT system must indicate “IMT OK” in its status box.
• If an LIS is being used, it must be capable of accepting test results for tests that were not requested originally.

**WARNING:** As with any sample run on the Dimension® system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.

See the next page for how to set up an automatic reflex for a method.
Setting Up an Automatic Reflex Test

The instrument will perform automatic reflex tests only if this feature is activated on the System Configuration Menu screen.

1. With the Automatic Reflex Testing field configured to ON on the System Configuration Menu screen, go to the Method Parameters screen.

2. Press the method test key for which you want to enter reflex values and a reflex test.

3. Move the cursor box to the Reflex fields and enter the less than (<) and greater than (>) limits that you want to trigger the reflex test. You can enter any limits, even those that are within the “normal” results for the method. You can have one-sided limits by entering only one of these fields.

4. With the cursor box now positioned to the right of the Run field, press the test method key for the method you want to automatically reflex if the test result is outside the reflex limits you entered in step 3. Only one reflex test is permitted per method.

   **If you set** The reflex test is automatically rerun when:

   - Low and high limits The result is outside this range, either above or below it.
   - Low single-sided limit The result is lower than this limit.
   - High single-sided limit The result is higher than this limit.

5. Press F4: Store Param’s.

   **WARNING:** As with any sample run on the Dimension® clinical chemistry system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.

6. If you want to set up a reflex test for another test method, press any arrow key to move the cursor out of the Run field, and then press the test method key for the next method.

---

To deactivate reflex testing for a specific method:

1. Enter a 0 (zero) in both the upper and lower reflex limits.
2. Press F4: Store Param’s.

   The RUN field test will remain on the screen, but it will not be reflexed because the upper and lower reflex limits are set to zero.
**Automatic Panic Rerun**

An automatic rerun of a test can be performed when the test result is outside the method’s panic values as entered by the laboratory.

**Setting Up an Automatic Panic Rerun**

The instrument will only perform automatic panic reruns if this feature has been activated on the System Configuration Menu screen. When a panic rerun test begins processing, it triggers the Sample Alert key on the touchscreen to turn yellow. Pressing the alert key lets you observe the progress of the test.

1. With the Automatic Repeat for Panics field configured to ON on the System Configuration Menu screen, go to the Method Parameters screen.

   ![Method Parameters Screen](image)

   **Operating Menu**
   - Press F1: METHOD PARAM
   - Press F6: SYSTEM CONFIG

   **System Configuration Menu**
   - Press F1: METHOD PARAM

   **Method Parameters**
   - Test Name:
   - Decimal Places:
   - Result Units:
   - Calculation: LINEAR
   - Standard Vol: ul
   - AUTO Dilute Vols: serum / plasma: ul urine: ul
   - INTERVALS: SERUM / PLASMA CSF / BLOOD URINE
   - REFERENCE:
   - ASSAY:
   - PANIC:
   - REFLEX IF < OR > RUN

   Press NEXT METHOD or any method key.

2. Press the method test key for which you want to enter panic values.

3. Move the cursor box to the Panic row in the Serum/Plasma column and enter the low and high panic values for that method. You do not have to set both a low and a high value; you can set a single-sided panic value limit.

   **If you set**
   - Low and high limits: The test is automatically rerun when:
     - Low single-sided limit: The result is lower than this limit.
     - High single-sided limit: The result is higher than this limit.

4. Press F4: Store Param’s.

   **WARNING:** As with any sample run on the Dimension® system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.

**Important information for LIS users!**

Before activating this feature, check with your LIS administrator to ensure that your LIS can accept two results for the same test, since two results will be sent to the LIS when an automatic rerun is performed.

**Report slip indications of results with high or low panic values.**

A result with a high panic value on the test report slip has the letters “hp” after it (or “lp” for a low panic value). Since there will be two results shown because of the automatic panic rerun, a mean, SD, and CV for these results will also appear on the test report. All results will be sent to the host computer.
Automatic Reflex Testing and Panic Rerun Report Slips

When both the automatic reflex and panic rerun features are activated for a method, you may see test results on the printed test report that were not ordered directly by the operator or downloaded from an LIS.

For example, suppose the automatic panic and reflex features have both been configured to ON and that the Method Parameters screen for CA, PHOS, and MG have been set up as follows:

- **CA** has been set up with a single-sided high panic range of 12 and a reflex range of < 6 and > 9.5 with a reflex test of PHOS.
- **PHOS** has been set up with a reflex range of < 2 and > 5 and with a reflex test of MG but has no panic range.
- **MG** has no reflex range or panic range specified.

Here are the report slip and a table of what the instrument would do because a CA test result exceeded both its panic and reflex limits.

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>REF. INTERVAL</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - CA</td>
<td>13.1 hp</td>
<td>8.8 - 10.5 mg/dL</td>
<td></td>
</tr>
<tr>
<td>2 - CA</td>
<td>13.2 hp</td>
<td>8.8 - 10.5 mg/dL</td>
<td></td>
</tr>
<tr>
<td>3 - PHOS</td>
<td>1.2 LO</td>
<td>2.5 - 4.9 mg/dL</td>
<td></td>
</tr>
<tr>
<td>4 - MG</td>
<td>3.6 HI</td>
<td>1.8 - 2.4 mg/dL</td>
<td></td>
</tr>
<tr>
<td>5 - CA</td>
<td>mean: 13.15</td>
<td>sd: 0.071</td>
<td>cv: 0.54</td>
</tr>
</tbody>
</table>

**Why was test run? Test Result**

1 - CA Original test 13.1 exceeds both the panic and reflex limits for CA.

2 - CA hp rerun from 1-CA This test was run because the 1-CA result exceeded the panic limits for CA.

3 - PHOS reflex test from 1-CA This test was run because the 1-CA exceeded the reflex limits for CA.

4 - MG reflex test from 3-PHOS This test was run because the 3-PHOS 1.2 result exceeds reflex limits for PHOS. No additional reflex testing will be done for 4-MG because in this example the MG method did not have a reflex test specified.

5 - CA statistics Printed because more than one CA test was reported.

For LIS users: All results are sent back to the LIS. All of these test results, including those that were not directly ordered by the operator or downloaded from an LIS, will also be sent to the LIS.
Using Calculated Results

If the Dimension® system is connected to an LIS, ensure that the LIS is capable of receiving calculated test results before turning on any calculated result. Also ensure that it can receive results for tests it did not request originally. Check with your local LIS consultant.

Calculated results will only be transmitted if the Mode field on the Communication Set Up screen has been set to Send Only, Send ID/Receive, or Send/Receive. See F4: Computer under “Other System Configuration Options” earlier in this module.

A list of the equations used in the calculated results software program is in the table on the next page.

To set up your calculated results:

1. Go to the Calculated Results Setup screen.

   Operating Menu
   Press F6: SYSTEM CONFIG
   System Configuration Menu
   Press F6: SELECT PRINTER
   Printer Setup
   Press F8: CALCULATED RES
   Calculated Results Setup

<table>
<thead>
<tr>
<th>RESULT NAME</th>
<th>INTERVAL</th>
<th>ON / OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anion GAP (AGAP)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Anion GAP (AGAP)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Calculated Osmolality (OSMO)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>BUN / Creatinine Ratio (BN/CR)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Globulin (GLOB)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Albumin / Globulin Ratio (A/G)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Free Thyroxine Index (FTI)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>Indirect Bilirubin (IBIL)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>(A/HDL Risk Factor (RISK)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
<tr>
<td>LDL - Cholesterol (LDL)</td>
<td>*** - ***</td>
<td>OFF</td>
</tr>
</tbody>
</table>

2. Use the arrow keys to move the cursor to the Interval field for a calculated result.

3. Enter the reference interval.

4. Press F3: On/Off to turn on that calculated result.

5. Press F8: Store. Only those calculated results that are turned on will have their changes stored.

Information about using calculated results:
- Calculated results are only available for serum or plasma samples.
- Calculated results will not be reported for QC samples or samples that include multiple test requests of the same method.
- All test results used in the equation for a calculated result must be error-free for the calculated result to appear.

Want to see the equation used in calculating the result?
Press F4: Show Calc’n.

Is your calculated result always appearing with a Hi or Lo error message?
Check your Interval field entry for that result!

If a calculated result is turned on but no interval is entered, all reporting of that calculated result will contain a Hi (or Lo) error because the system will use 0.0 – 0.0 as the interval.
### Calculated Results Equations and k Values

<table>
<thead>
<tr>
<th>Result</th>
<th>Equation</th>
</tr>
</thead>
</table>
| AGAP   | Anion GAP (1) \((\text{Na} + \text{K}) – (\text{Cl} + \text{CO}_2)\)  
Anion GAP (2) \(\text{Na} – (\text{Cl} + \text{CO}_2)\) |
| A/G    | \(\text{ALB} / (\text{TP} – \text{ALB})\) |
| BN/CR  | \((\text{BUN} (k) / \text{CREA})\) where:  
k = 1 if both results are reported in mg/dL  
k = 1000 if BUN is reported in mmol/L and CREA in µmol/L |
| FTI    | \((\text{TU}) (T4) / 100.0\) |
| GLOB   | \(\text{TP} – \text{ALB}\) |
| IBIL   | \(\text{TBIL} – \text{DBIL}\) or \(\text{TBI} – \text{DBI}\) |
| LDL    | \(\text{CHOL} – \text{AHDL} – [k_1(\text{TRIG})]\) where:  
k_1 = 0.20 when TRIG is reported in mg/dL  
k_1 = 0.46 when TRIG is reported in mmol/L |
| MA/CR  | \(\text{(MALB/CREA)} \times 100\) |
| MBRI   | \((\text{MMB/CK}) \times 100\) |
| %FPSA  | \((\text{FPSA/TPSA}) \times 100\) |
| %MB    | \((\text{CKMB/CK}) \times 100\) |
| %ISAT  | \((\text{IRON} \times 100) / \text{IBCT}\) |
| OSMO   | \((k_1)(\text{Na} + k_j) (\text{GLUC}) + (k_j) (\text{BUN}) + 9\) where:  
k_1 = 1.86 \(k_1\) is the slope of the linear regression of Na to the calculated osmolality,  
k_j = 0.056 \(k_j\) converts GLUC results reported in mg/dL to millimolar concentration. If GLUC is reported in mmol/L, then \(k_j = 1.0\)  
k_j = 0.36 \(k_j\) converts BUN results reported in mg/dL to millimolar concentration. If BUN is reported in mmol/L, then \(k_j = 1.0\)  
9 The number 9 is a constant to account for all other osmotically active solutes present in the solution. |
| RISK   | \(\text{CHOL} / \text{AHDL}\) |
| UIBC   | \(\text{IBCT} – \text{IRON}\) or \(\text{IBCT} – \text{IRN}\) |

Note: The AGAP equations: two to choose from! However, only one AGAP can be used at a time.
Customizing Dimension® RxL Max® clinical chemistry system

Calibration Configuration

**Define Calibration Product**
You can store 150 calibrator products on the instrument.
To display this screen, press the Calib Alert key on the touchscreen, then press **F5: Define Calibration Product**.

Another way to display this screen...
From the Operating Menu:
• Press F5: Process Ctrl
• Enter password
• Press F1: Calibration
• Press F5: Def Cal Product

To enter data on this screen, you can either scan the calibration product barcode or enter data manually.

**Scanning Barcode Data**
1 Use the barcode reader to scan the barcode on the calibration product insert sheet. This fills all fields on the screen.
2 Press **F7: Store**.

**Entering Data Manually**
1 Press **Enter**.
2 Type the calibration product name. Press **Enter**.
3 Type the product lot number. Press **Enter**.
4 Type the lot expiration date. Press **Enter**.
5 Use the test keys to enter methods associated with the product. Units for each test are automatically supplied.
6 Enter the appropriate bottle values in the Level fields.
7 Press **F7: Store**.

To enter additional levels of the product, change the Level and Fluid fields and press **F7: Store**.

Bottle value units are not converted automatically to the instrument units when data is entered manually. Use the appropriate units when entering values.
Edit Calibration Product

1. Display the Edit Calibration Products screen.

   OPERATING MENU
   PROCESS CONTROL MENU
   CALIBRATION
   EDIT CALIBRATION PRODUCTS
   CAL PRODUCT CAL LOT PRODUCT EXPIRATION
   CHEM1 5JD020 9/1/2006
   CHEM II 2AF192 8/1/2006
   CHOL CAL 4FD058 9/5/2006

   1. Press F1: CALIBRATION (enter password)
   2. Press F5: PROCESS CTRL
   3. Press F6: EDIT CAL PRODUCT

   F1: EDIT PRODUCT F2: DELETE PRODUCT F3: SORT BY LOT F8: PRINT

2. Highlight the product you want to edit. Press F1: Edit Product to display the Define Calibration Products screen.

   DEFINE CALIBRATION PRODUCTS
   CAL PRODUCT CAL LOT PRODUCT EXPIRATION
   CHEM CAL1 5JD020 9/1/06
   METHOD UNITS LEVEL 1 LEVEL 2 LEVEL 3 LEVEL 4 LEVEL 5 LEVEL 6 LEVEL 7
   CA mg/dL 7.50 10.40 13.30
   CREA mg/dL 0.00 1.10 2.20
   GLU mg/dL 0.00 270.00 540.00
   GLUC mg/dL 0.00 270.00 540.00
   LA mol/L 0.00 0.20 16.30
   BUN mg/dL 0.00 8.40 164.00

   F1: NEW PRODUCT F2: DELETE METHOD F3: CHG PROD NAME F4: CHG PROD LOT
   F5: CHG PROD EXP F6: DELETE LEVEL F7: STORE F8: PRINT

3. Use the appropriate function keys to make changes.

   Key | Function
   --- | ---
   F1: New Product | Use to clear the screen and enter additional products.
   F2: Delete Method | Use to remove the highlighted method from the list.
   F3: Chg Prod Name | Use to enter a different name in the Cal Product field.
   F4: Chg Prod Lot | Use to enter a different lot number in the Cal Lot field.
   F5: Chg Prod Exp | Use to enter a different date in the Product Expiration field.
   F6: Delete Level | Use to delete a calibration level.
   F7: Store | Stores the edited data.
   F8: Print | Prints the information on the screen.

4. To add tests to the product, use the test keys, then enter the bottle values in the appropriate Level fields.

5. Press F7: Store.
Define Calibration Auto Acceptance Parameters

Use this procedure to specify that a method calibration or verification will or will not be accepted automatically. By defining automatic acceptance criteria for a calibration, you can eliminate the step in calibration processing where an operator must accept the calibration results.

Dade Behring Inc. has determined default values for slope, intercept and correlation coefficient \(r\), as well as standard deviation and maximum negative and positive bias at each calibrator level. Default parameters are based on the total error of multiple reagent lots and acceptable instrument variance. Wider acceptance limits increase the total error of accepted calibration, while narrower limits may reject calibrations which are in the normal variation of the method and instrument.

**CAUTION!** Because these values are integral to determining if a calibration is accurate, it is important to be cautious about changing them.

This table describes the auto acceptance parameters as displayed on the system:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope Low</td>
<td>Lowest acceptable slope value.</td>
</tr>
<tr>
<td>Slope High</td>
<td>Highest acceptable slope value.</td>
</tr>
<tr>
<td>Intercept</td>
<td>Close to zero or clinically insignificant.</td>
</tr>
<tr>
<td>Correlation Coefficient (r)</td>
<td>Lowest acceptable r value.</td>
</tr>
<tr>
<td>SD Mean</td>
<td>Maximum allowable standard deviation of replicates for each calibrated level.</td>
</tr>
<tr>
<td>Max Neg Bias</td>
<td>Maximum allowable negative bias (residual) for each calibrated level.</td>
</tr>
<tr>
<td>Max Pos Bias</td>
<td>Maximum allowable positive bias (residual) for each calibrated level.</td>
</tr>
</tbody>
</table>

This procedure requires a password.

1. Display the Calibration Auto Acceptance Parameters (CAAP) screen.

**Missing Function Keys?**

If methods are shown on the screen, **F6: Print Active** appears.

If no methods are shown on the screen, **F8: Show Active** appears.
2 Press the test key for the method you want to define.

3 Press **F4: CAAP On**. This key toggles between on and off.

4 Review the automatic acceptance parameters. To change, highlight the parameter and type the new value.

   You can restore the default parameters by pressing **F2: Default CAAP**.

5 Press **F7: Store**.

6 If you want to print the information on the screen, press **F5: Print**. To print a report of all active (ON) methods, press **F6: Print Active**.

   To display all active (ON) methods, press **F8: Show Active**. When you select F8: Show Active, these print options are displayed:

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6: Print AllParms</td>
<td>Prints all parameters for all methods listed on the screen in alphabetical order.</td>
</tr>
<tr>
<td>F7: Print Sel</td>
<td>Prints parameters for the highlighted method.</td>
</tr>
<tr>
<td>F8: Print Act List</td>
<td>Prints the list displayed on the screen.</td>
</tr>
</tbody>
</table>
Correlations

Some situations may require that your Dimension® system and an alternate system or method provide comparable results. It is suggested that the alternate method be correlated to provide the same results as the Dimension® system. If, however, you find it necessary to correlate your Dimension® system to the alternate method, the Correlation feature provides a way for you to adjust results by applying slope and intercept values derived from a correlation between the two methods.

The correlation feature uses simple linear regression to calculate the correlation curve $y = mx + b$ where $x$ is the expected result and $y$ is the observed result. When you store the correlation curve, the applied slope ($m_A$) and intercept ($b_A$) are calculated as $m_A = 1/m$ and $b_A = -b/m$. The applied slope and intercept, stored in the Correlation Entry screen, are used to calculate a correlated result using the following equation:

$$\text{correlated result} = (m_A)(\text{uncorrelated result}) + b_A$$

When the correlation is performed offline, the applied slope and intercept values (as calculated above) are entered in the Correlation Entry screen.

Correlation is applied only to patient samples and QC. Correlation is not applied to calibration; therefore, do not adjust calibrator bottle values when you calibrate a correlated method.

Correlation of the Dimension® System with Other Methods

To correlate the Dimension® system with another method, follow one of the procedures described on the following pages.

Remember that adjusting the Dimension® system to correlate with another method means that your laboratory results will no longer be the same as those of other laboratories using the Dimension® system. In laboratory surveys, these modified results should NOT be reported as “results for the Dimension® system.”

Before correlation, it is important that you properly calibrate or verify the method on the Dimension® system and the alternate method to ensure that the systems are currently performing acceptably.

Correlation Study

A split sample correlation study should be run using at least 20 patient samples spread throughout the assay range of the method. Do not use quality control material or calibrators as the sample. You will use the observed results from the study to calculate slope and intercept values for the method.

WARNING: Run correlation samples simultaneously on both instruments to minimize error. Do not use control or calibrator samples. Use only patient samples.
Result Reporting for Correlated Methods

When a test report includes results for a correlated method, the method mnemonic is shown in lowercase letters. See the following example.

```
+ TEST REPORT +
+ Patient: J Smith +
+ Sample No.: 001 +
+ Location: +
+ Sample: SERUM +
+ Priority: ROUTINE +
+ Entered: 11:03 Sep 4 2002 +
+ Position: 2 +
+ Segment: A +
+ 
+ TEST RESULT REF. INTERVAL UNITS +
+ ca 12.0 HI 0.5 - 10.1 mg/dL +
+
```

Using the Correlation Feature

There are two ways to use the correlation feature.

- **System Calculation.** Enter the results from the correlation study using the Correlation screen and let the Dimension® system calculate the applied slope and intercept values. (See “Entering Observed Results for System Calculation” later in this section.)

- **Manual (Offline) Calculation.** Using the slope and intercept from the offline correlation study, calculate applied slope and intercept values. Enter these new values onto the Dimension® system using the Correlation Entry screen. (See “Entering Slope and Intercept Calculated Offline” later in this section.)

After you have stored the applied slope and intercept, be sure to establish new QC ranges for the method.

*Remember!*

When you correlate a method, the reference interval, panic values, reflex values, and quality control ranges may change.
Entering Observed Results for System Calculation

1 Display the Correlation screen.

<table>
<thead>
<tr>
<th>OPERATING MENU</th>
<th>PROCESS CONTROL MENU</th>
<th>CORRELATION ENTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press F5: PROCESS CONTROL</td>
<td>Press F2: CORRELATION (enter password)</td>
<td>Press F1: CORRELATE</td>
</tr>
<tr>
<td>OPERATING MENU</td>
<td>PROCESS CONTROL MENU</td>
<td>CORRELATION ENTRY</td>
</tr>
<tr>
<td>Press F5: PROCESS CONTROL</td>
<td>Press F2: CORRELATION (enter password)</td>
<td>Press F1: CORRELATE</td>
</tr>
</tbody>
</table>

### Correlation Table

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>EXPECTED</th>
<th>OBSERVED</th>
<th>Slope</th>
<th>Intercept</th>
<th>( r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>2</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>3</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>4</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>5</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>6</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>7</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>8</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>9</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>10</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

- Press NEXT METHOD or any method key.

2 Press the test key for the method that you want to correlate.

3 Enter the following data for each set of samples processed.

<table>
<thead>
<tr>
<th>Field</th>
<th>Enter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>Sample ID</td>
</tr>
<tr>
<td>Expected</td>
<td>Result obtained using comparison method or system</td>
</tr>
<tr>
<td>Observed</td>
<td>Result obtained using the Dimension® RxL Max™ system</td>
</tr>
</tbody>
</table>

As you enter these results, the slope, intercept, and \( r \) (correlation coefficient) fields are updated automatically and a plot of the data appears on the screen.

4 After entering all the sample results, press F7: Show Correl’d.

The screen now shows the expected and correlated data (calculated using the observed data and the regression statistics), and a linear regression plot for the correlated data.

5 Review the information on this screen.

- expected and correlated values should now be nearly identical.
- statistics should be close to the following:
  - slope = 1.000
  - intercept = 0.000
  - \( r \) = 1.000

6 Decide if the information on this screen is acceptable for your laboratory operations.

- If the information is acceptable, skip to step 8.
- If the information is not acceptable, continue with step 7.
7 Look for possible discrepant result pairs. Delete discrepant result pairs as you determine necessary.

To delete a discrepant result pair:

a Press **F7: Show Observed**.

b Move the cursor to the result pair line.

c Press **F3: Delete Line**.

d Press **F7: Show Correl’d**.

e Return to step 5.

8 Press **F6: Correlated to** and enter the name of the method or instrument to which you are correlating the Dimension® system.

9 Press **F7: Show Observed**, then **F8: Print** to produce a report of the data you entered. You will not be able to view this data after you store the correlation.

10 Press **F7: Show Correl'd**. Press **F8: Print** to produce a report of the correlated data.

11 Press **F3: Accept Corr** to store the information for the method.

12 Press **Exit** to view the Correlation Entry screen. The system-calculated slope and intercept for the method will now appear on this list, along with the Correlated To name.

If you press **F5: Show Cor Date**, the “Correlated To” column changes to “Date Correlated”.

13 Confirm that the assay range from the Dade Behring Inc. method insert sheet is entered in the Method Parameters screen.

14 Establish and enter new reference interval, panic values, and reflex limits for the correlated method.

15 Establish new QC ranges for the correlated method.

The slope and intercept from the correlation will now be applied to all samples, including QC, in order to maintain the “Correlated To” status.
Entering Slope and Intercept Calculated Offline

1 Use the correlation slope and intercept from your offline correlation to calculate applied slope and intercept values as follows:
   
   Applied slope = 1/correlation slope
   Applied intercept = (-1)(intercept)/correlation slope

   For example:
   Correlation slope from offline correlation = 1.021
   Intercept from offline correlation = 1.434
   Applied slope = 1/1.021 = 0.979
   Applied intercept = (-1)(1.434)/1.021 = -1.405

   Reminder: Be sure to include the negative sign if the intercept is a negative number.

2 From the Operating Menu, press F5: Process Ctrl, then F2: Correlation to display the Correlation Entry screen.

3 Type your password and press Enter.

4 Move the cursor to the method you want to correlate, or press the test key for the method.

5 Enter the slope value you calculated in step 1. Press Enter.

6 Enter the Intercept value you calculated in step 1. Press Enter.

7 Type the name of the method or instrument to which you are correlating the Dimension® system. Press Enter.

8 Press F2: Store.

9 Confirm that the assay range from the Dade Behring Inc. method insert sheet is entered in the Method Parameters screen.

10 Establish and enter new reference interval, panic values, and reflex limits for the correlated method.

11 Establish new QC ranges for the correlated method.
Removing a Correlation
If you no longer want to use the correlation data for a method, simply change the slope and intercept values to 0 (zero):

1. Display the Correlation Entry screen.
2. Type your password and press Enter.
3. Move the cursor to the method, or press the test key for the method.
4. Enter 0 for the slope value. Press Enter.
5. Enter 0 for the Intercept value. Press Enter.
7. Confirm that the assay range from the Dade Behring Inc. method insert sheet is entered in the Method Parameters screen.
8. Establish and enter new reference interval, panic value and reflex limits for the method.
9. Establish new QC values.
Printing a List of Correlated Methods

To print a list of methods, with Slope, Intercept and Correlated To data:

1. Display the Correlation Entry screen.

   **OPERATING MENU**
   Press F5: PROCESS CONTROL

   **PROCESS CONTROL MENU**
   Press F2: CORRELATION

   **CORRELATION ENTRY**

   Corr Result = (m)x + b

<table>
<thead>
<tr>
<th>Method</th>
<th>Slp(m)</th>
<th>Intr(b)</th>
<th>Correlated To</th>
<th>Method</th>
<th>Slp(m)</th>
<th>Intr(b)</th>
<th>Correlated To</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKMB</td>
<td>0.9867</td>
<td>2.5460</td>
<td>Instrument X</td>
<td>ECO2</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>COC</td>
<td>***</td>
<td>***</td>
<td>FERR</td>
<td>FPSA</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>CRBM</td>
<td>***</td>
<td>***</td>
<td>FT4</td>
<td>GENT</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>CREA</td>
<td>***</td>
<td>***</td>
<td>GGT</td>
<td>GLU</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>CRP</td>
<td>***</td>
<td>***</td>
<td>GGT</td>
<td>HCG</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>CSA</td>
<td>***</td>
<td>***</td>
<td>HDL</td>
<td>IBCT</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>CTNI</td>
<td>***</td>
<td>***</td>
<td>HDL</td>
<td>IBCT</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>DGNA</td>
<td>***</td>
<td>***</td>
<td>HDL</td>
<td>IBCT</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

   Please enter your password, then press ENTER.

2. Type your password and press **Enter**.

3. Press **F4: Print**. When the prompt “Print all Methods? (y/n)” appears:
   - if you want to print only correlated methods, type **n**
   - if you want to print both correlated and non-correlated methods, type **y**

**Correlation Date**

The F5 function key on the Correlation Entry screen toggles the display between “Correlated To” and “Date Correlated”. If you press **F5: Show Cor Date**, the screen shows the correlation date where applicable:
Performing Reagent Hydrations

The Dimension® RxL Max® clinical chemistry system is designed to automatically hydrate reagent cartridge wells for you when they are needed. However, you can select a specific reagent cartridge to be hydrated, and you can also create your own specific hydration setup lists, which can be stored in the instrument and run at your command.

Preprogrammed setup lists and panel keys allow you to easily fill out the Inventory/Hydration screen and to schedule and manage peak workload hydration requirements.

There are three ways of hydrating reagents:

• The system will hydrate reagents as needed to satisfy the test requests. This is the easiest for operators. If there is calibrated reagent for the method on board, the instrument will hydrate wells in the reagent cartridge as needed.

• The operator can create a list of methods to be hydrated using the Inventory/Hydration screen. This allows the operator to control the instrument hydrations.

The Inventory/Hydration screen enables the operator to:

– create preprogrammed setup lists that contain the number of test equivalents of each specific reagent to be hydrated, then enter the entire setup list by pressing one key.

– select a specific panel of tests to be hydrated using preprogrammed panel keys, P1–P10, from the keyboard.

– hydrate the selected methods on the Inventory/Hydration screen now or at a preprogrammed time by setting up a timed hydration schedule. You can set a timed hydration to be performed whenever you want it to be...even while you are on your way to work! See “Setting a Timed Hydration Schedule” in this section.

• The operator can select specific reagent cartridge lots and hydrate a specific number of test equivalents in those cartridge lots.
Hydrating a Specific Cartridge Lot

The Hydration By Lot screen shows the number of available test equivalents of reagent that are hydrated, unhydrated, and to be hydrated for each reagent cartridge lot on the instrument.

1. Use the test keys on the keyboard or the cursor keys to move the cursor to the desired method lot to be hydrated.
2. Enter the number of tests you want to hydrate for that method lot.
3. Press Enter.
4. Repeat steps 1–3 until you have entered all your hydrations.
5. Press F4: Hydrate to begin hydration.

Cancelling a Reagent Hydration

You can cancel a hydration request after pressing F4: Hydrate Now if you find that you don’t want to perform these hydrations (maybe you don’t have the time required to perform the hydrations).

1. From the Inventory/Hydration screen, press F7: Request By Lot.
2. Press F5: Delete.
3. Press Y to answer the message prompt. Hydrations not yet begun will be deleted.
**Hydrating Using the Inventory/Hydration Screen**

The Inventory/Hydration screen shows the number of tests available in the reagent cartridges on the instrument in the first column in blue. The second column will have all zeroes in it until you request hydrations.

---

**Does a method name appear in red? Here’s why!**

This means that there is insufficient inventory on the instrument to perform the requested hydrations.

You’ll need to add another reagent cartridge for that method.

You can print out a list of all these red methods. See the sidebar below!

---

**1** Enter the number of tests you want to hydrate for each method using any or all of the methods listed below.

**Using** | **How to use it**
---|---
Cursor Keys | Move the cursor to the method you want to hydrate and then enter the number of tests you want to hydrate.
Test Keys | Press the test key for the method you want to hydrate and then enter the number of tests you want to hydrate.
Panel Keys | Press a predefined panel key, P1–P10, and then enter how many times you want this panel to be hydrated.
Preprogrammed Setup Lists | Press F1: Load Setup 1 or F2: Load Setup 2 for your preprogrammed setup list.

**2** Press Enter.

**3** Repeat steps 1 and 2 until you have entered all your hydrations.

**4** To begin hydrating, press **F4: Hydrate Now**.

---

To print out your listing...

Press F6: Print.

Answer the prompt with a **Y** to print the entire reagent inventory on the display.

Asterisks to the left of the method names on this printout indicate which reagent cartridges need to be added to the system to accomplish the requested hydrations.

Answer the prompt with an **N** to print out only those methods that need reagent cartridges added.

---

MaxP-6_19/20
Setting a Timed Hydration Schedule

1. Move the cursor to the Day field and use the Enter key to select the start day; move the cursor to the right and use the Enter key to select the stop day.

2. Move the cursor to the right, to the hour and minute fields, and enter the time you want the hydration to begin. Remember to use the 24-hr clock convention for the hours.

3. Move the cursor to the right and use the Enter key to select WEEKLY or ONLY. See the table below for how this field works with the Day field.

4. Move the cursor to the Activated field and press the Enter key. The Activated field will change to On and the Timer Countdown field now indicates the time remaining until this hydration begins.

<table>
<thead>
<tr>
<th>Set Day to</th>
<th>Select</th>
<th>When hydrations will be performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon to Mon</td>
<td>ONLY</td>
<td>The hydrations will only be performed on the next Monday. After that Monday you will need to return to the Inventory/Hydration screen and reactivate the hydration period.</td>
</tr>
<tr>
<td></td>
<td>WEEKLY</td>
<td>The hydrations will be performed on all future Mondays.</td>
</tr>
<tr>
<td>Mon to Fri</td>
<td>ONLY</td>
<td>The hydrations will only be performed on each day through the next Friday. After that Friday, you will need to return to the Inventory/Hydration screen and reactivate the hydration period.</td>
</tr>
<tr>
<td></td>
<td>WEEKLY</td>
<td>The hydrations will be performed Monday through Friday of each week until you change the hydration period.</td>
</tr>
<tr>
<td>Mon to Sun</td>
<td>ONLY</td>
<td>The hydrations will only be performed on each day through the next Sunday. After that Sunday, you will need to return to the Inventory/Hydration screen and reactivate the hydration period.</td>
</tr>
<tr>
<td></td>
<td>WEEKLY</td>
<td>The hydrations will be performed on each and every day until you to change the hydration period.</td>
</tr>
</tbody>
</table>
Hydrating Using a Preprogrammed Setup List

To hydrate using a preprogrammed setup list, you must first define your setup list. You use the Define Inventory/Hydration Setups screen to set up a preprogrammed hydration list. You can define two setup lists.

OPERATING MENU
Press F4: SYSTEM PREP

SYSTEM PREPARATION MENU
Press F2: REAGENT PREP

HYDRATION BY LOT
Press F6: REAGENT SETUP

INVENTORY/HYDRATION
Press F5: DEFINE SETUPS

Define Inventory / Hydration Setups

<table>
<thead>
<tr>
<th>Test</th>
<th>No. Tests to Hydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>0</td>
</tr>
<tr>
<td>CA</td>
<td>0</td>
</tr>
<tr>
<td>CHOL</td>
<td>0</td>
</tr>
<tr>
<td>CK</td>
<td>0</td>
</tr>
<tr>
<td>CKMB</td>
<td>0</td>
</tr>
<tr>
<td>CRBK</td>
<td>0</td>
</tr>
<tr>
<td>CREA</td>
<td>0</td>
</tr>
<tr>
<td>CRP</td>
<td>0</td>
</tr>
<tr>
<td>CRP</td>
<td>0</td>
</tr>
<tr>
<td>DBIL</td>
<td>0</td>
</tr>
<tr>
<td>DGNA</td>
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</tr>
<tr>
<td>GGT</td>
<td>0</td>
</tr>
<tr>
<td>GLU</td>
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</tr>
<tr>
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<td>LA</td>
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<tr>
<td>LDH</td>
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</tr>
<tr>
<td>LIP</td>
<td>0</td>
</tr>
<tr>
<td>MG</td>
<td>0</td>
</tr>
<tr>
<td>PCH</td>
<td>0</td>
</tr>
<tr>
<td>PCRE</td>
<td>0</td>
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<tr>
<td>PHNO</td>
<td>0</td>
</tr>
<tr>
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<tr>
<td>PHOS</td>
<td>0</td>
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<tr>
<td>PTN</td>
<td>0</td>
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<tr>
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</tr>
<tr>
<td>SALT</td>
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</tr>
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</tr>
<tr>
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</tr>
<tr>
<td>T4</td>
<td>0</td>
</tr>
<tr>
<td>TCRB</td>
<td>0</td>
</tr>
<tr>
<td>TBIL</td>
<td>0</td>
</tr>
<tr>
<td>THEO</td>
<td>0</td>
</tr>
<tr>
<td>TIBC</td>
<td>0</td>
</tr>
<tr>
<td>TOBR</td>
<td>0</td>
</tr>
<tr>
<td>TP</td>
<td>0</td>
</tr>
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<td>TRIG</td>
<td>0</td>
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<td>TU</td>
<td>0</td>
</tr>
<tr>
<td>UCFP</td>
<td>0</td>
</tr>
<tr>
<td>URIC</td>
<td>0</td>
</tr>
</tbody>
</table>

F: NEXT SETUP  F2: PRINT  F3: STORE SETUP  F4: CLEAR ALL
F5: NEXT PAGE  F6:  F7:  F8:

1 Use the test keys on the keyboard or the cursor keys to move the cursor to the desired method to be hydrated.
2 Enter the number of tests you want to hydrate for that method.
3 Press Enter.
4 Repeat steps 1–3 until you have entered all your hydrations.
5 Press F3: Store Setup.

Here’s an example of using a preprogrammed hydration setup list:
Suppose your daily sample routine typically requires 50 GLU and 80 BUN tests. You don’t want to enter this data on the Inventory/Hydration screen every day.

You would define one of your setup lists, say setup list 1, using the procedure above for 50 GLU and 80 BUN tests.

Then from the Inventory/Hydration screen:
1 Press F1: Load Setup 1.
2 Press Enter.

The 50 GLU and 80 BUN tests appear on the Inventory/Hydration screen.
IMT Configuration

There are two items related to IMT processing which you can customize to your laboratory's needs:

- Include ECO2 in Lytes test method key
- Specify the time interval for IMT bleach/condition soak

**ECO2 Test Method**

To include the ECO2 test method when you press the Lytes test key, do the following:

1. Display the IMT Configuration Menu:

2. Move the cursor to the "Select ECO2 with Lytes" field.

3. Press the **Enter** key to change the field to **ON**.

4. Press **F8: Store Params**.

---

**IMT Configuration Menu**

- IMT CARTRIDGE USE LIFE: 5 days
- SLOPE CUTOFF
  - Na: 53.0
  - K: 53.0
- Urine Chloride Coefficients: C0: 0.000, C1: 1.0600
- Cl Buffer Selectivity Factor: 0.035
- IMT bleach/conditioning soak interval: 30 days

**System Setup Menu**

- Press F4: SYSTEM PREP
- Press F3: IMT
- Press F7: IMT Config.
Bleach/Condition Soak Interval
The bleach/condition soak interval is used to remind you that it is time to clean the IMT system and replace the QuikLYTE® integrated multisensor. You can select a number of days (0 - 30) to elapse between cleanings. The recommended interval is 30 days. After the time has passed, a message reminding you to run IMT System Clean appears. It is a reminder only and does not impede processing in any way.

You should select the number of days based on your test volume. The higher your volume, the shorter the interval between cleanings should be.

To specify this bleach/condition soak interval:

1. Display the IMT Configuration Menu:

2. With the cursor in the IMT bleach/condition soak interval days field, type the number of days you want to elapse between IMT system cleanings.

3. Press the Enter key.

4. Press F8: Store Params.
**Entering Method Parameters**

*Remember:*  
ALWAYS refer to product insert sheets for method-specific information.  
If you change "Result Units", the method must be recalibrated/reverified.

1. From the Method Parameters screen, select a test method by pressing **F1: Next Method** or pressing a test key on the keyboard.  
   To select the ABS method: when the Method Parameters screen first appears, press **F1: Next Method**.
2. Move the cursor to the appropriate fields and enter your data. Refer to the tables on the pages that follow for information on these fields.
3. Press **F4: Store Param's**.

**Printing Method Parameters**  
After you press **F6: Print All**, you have the option to print only methods that have ever been calibrated on your system.  
You can abort the F6: Print All printout at any time.
Field | To enter information in the field
--- | ---
Result Units | Press F3: Next Unit.
**WARNING:** To ensure accurate results after you change Result Units, always recalibrate/reverify the method before you run patient samples.
Calculation | Press F8: Next Calc’n.
Standard Vol (or Selected Vol) | This field name can be either Standard Vol or Selected Vol.
When Standard Vol appears, the volume on the screen is the recommended standard volume of sample for that method as indicated in the Method Insert sheet.
When Selected Vol appears, this indicates that the standard volume has been changed (decreased) by the laboratory.
Selected Vol appears if you enter a volume different from the recommended standard volume on the Method Insert sheet. This volume could be either:
- a Dade Behring Inc. approved reduced sample volume for the method
or
- a decreased volume (not approved by Dade Behring Inc.) that is used by your laboratory. When such volume is used, you must perform method validation in your laboratory for CLIA compliance.
**WARNING:** To ensure accurate results if a new sample volume is selected, the method must be recalibrated/reverified using that new sample volume before you run patient samples.
Dade Behring Inc. does not recommend using any method parameters other than those published in our product literature. Product performance is optimized for each method’s recommended sample volume.
Dade Behring Inc. assumes no responsibility for performance if method parameters have been modified.
A recalibration/reverification of the method is required whenever a Standard or Selected Vol is entered or changed by the operator.
Calibration Vol | This field cannot be changed. It appears under the Standard Vol field only for those methods (e.g., C3, C4, IGA, IGG, IGM) that must use this volume for their calibrations.
Auto Dilute Vols | Use the keyboard or keypad to enter values for both serum/plasma and urine samples. Refer to the tables on the pages that follow for the recommended autodilute AD sample volumes for each autodilute method.

**Standard Vol vs. Selected Vol on the printed Test Report ...**
The system printer prints the method abbreviation on the test report in UPPERCASE for a method that is using the standard volume; in lowercase for a method that is using a selected volume.

**Standard Vol cannot be changed when ...**
the Calibration Vol field appears beneath it for a method. These methods require these two volumes to remain locked to ensure that the relationships between the sample and the calibrator volumes remain constant.
### Why is there a reference interval for CSF/Blood on the BUN method?

An unused Reference Interval fluid field, such as CSF/Blood for the BUN method, may contain the reference interval for a calculated result.

<table>
<thead>
<tr>
<th>Method</th>
<th>Fluid</th>
<th>Calc Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALB</td>
<td>CSF/Blood</td>
<td>A/G</td>
</tr>
<tr>
<td>AHDL</td>
<td>CSF/Blood</td>
<td>RISK</td>
</tr>
<tr>
<td>BUN</td>
<td>CSF/Blood</td>
<td>OSMO</td>
</tr>
<tr>
<td>CHOL</td>
<td>CSF/Blood</td>
<td>LDL</td>
</tr>
<tr>
<td>CKMB</td>
<td>CSF/Blood</td>
<td>%MB</td>
</tr>
<tr>
<td>CO₂</td>
<td>Urine</td>
<td>AGAP</td>
</tr>
<tr>
<td>CREA</td>
<td>CSF/Blood</td>
<td>BN/CR</td>
</tr>
<tr>
<td>DBIL</td>
<td>CSF/Blood</td>
<td>IBIL</td>
</tr>
<tr>
<td>ECO₂</td>
<td>Urine</td>
<td>AGAP</td>
</tr>
<tr>
<td>FPSA</td>
<td>CSF/Blood</td>
<td>%FPSA</td>
</tr>
<tr>
<td>HDL</td>
<td>CSF/Blood</td>
<td>RISK</td>
</tr>
<tr>
<td>IBCT</td>
<td>CSF/Blood</td>
<td>%ISAT</td>
</tr>
<tr>
<td>IRN</td>
<td>CSF/Blood</td>
<td>UIBC</td>
</tr>
<tr>
<td>LMMB</td>
<td>CSF/Blood</td>
<td>MBRI</td>
</tr>
<tr>
<td>MALB</td>
<td>CSF/Blood</td>
<td>MA/CRI</td>
</tr>
<tr>
<td>MMB</td>
<td>CSF/Blood</td>
<td>MBRI</td>
</tr>
<tr>
<td>TIBC</td>
<td>CSF/Blood</td>
<td>%ISAT</td>
</tr>
<tr>
<td>TP</td>
<td>CSF/Blood</td>
<td>GLOB</td>
</tr>
<tr>
<td>TPSA</td>
<td>CSF/Blood</td>
<td>TPSA range in which %FPSA is calculated</td>
</tr>
<tr>
<td>TU</td>
<td>CSF/Blood</td>
<td>FTI</td>
</tr>
</tbody>
</table>

### Field

<table>
<thead>
<tr>
<th>Field</th>
<th>To enter information in the field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervals</td>
<td>Use the keyboard or keypad to enter upper and lower limits for the reference, assay range, and panic intervals for a fluid.</td>
</tr>
<tr>
<td>Reference intervals</td>
<td>May be adjusted according to your laboratory's normal population.</td>
</tr>
<tr>
<td>Assay intervals</td>
<td>Are set by Dade Behring Inc. Use only the assay intervals published in each method's Method Insert Sheet.</td>
</tr>
<tr>
<td>Panic interval values</td>
<td>Can be set using upper and lower limits or can be set single-sided.</td>
</tr>
<tr>
<td>• Enter a lower limit to automatically rerun test results that are lower than this limit.</td>
<td></td>
</tr>
<tr>
<td>• Enter a higher limit to automatically rerun test results that are higher than this limit.</td>
<td></td>
</tr>
<tr>
<td>Reflex If &lt; or &gt;</td>
<td>Use the keyboard or keypad to enter a less than value and/or a greater than value which, if exceeded, will trigger the automatic reflex test entered in the Run field.</td>
</tr>
<tr>
<td>To deactivate Reflex for a method, enter a 0 (zero) in both the upper and lower reflex limits and then press F4: Store Param's. The Run field method remains on the screen, but it will not be reflexed because the upper and lower limits have been set to zero.</td>
<td></td>
</tr>
<tr>
<td>Run</td>
<td>Use the test keys to enter the method you want to be automatically reflexed if the test result for this method is outside the reflex limits entered in the Reflex If field. Only one method can be entered in this Run field.</td>
</tr>
<tr>
<td>Lot ID and (C0 – C4)</td>
<td>The lot ID and calibration coefficients (C0 – C4) are entered automatically in these fields by the software following the calibration/verification of the lot. The instrument can hold a maximum of two lot numbers per method in system memory.</td>
</tr>
</tbody>
</table>
**Automatic Dilutions**

The instrument can perform two types of automatic dilutions:

- **Automated Urine Dilutions (AUD)** – for BUN, CREA, PHOS, and URCA
- **Autodilute (AD)** – user programmable for urine and serum/plasma samples

**Automated Urine Dilutions (AUD)**

Whenever urine is selected as the sample fluid on the Enter Sample Data screen and BUN, CREA, PHOS, or URCA tests are requested, the sample is automatically diluted with water by the instrument to make a times-10 dilution. Test results for these four tests on urine samples are then automatically calculated and printed out using the times-10 dilution. If this AUD test result is outside the urine assay range for the method, the operator must prepare a manual dilution. For example, if you manually prepare a times-3 dilution of the sample and enter a dilution factor of 3 on the Enter Sample Data screen, the instrument will then make a times-30 dilution (times-3 * times-10 = times-30) of the sample. Test results are then automatically calculated and printed out using this times-30 dilution.

**Autodilute (AD)**

Once the autodilute Method Parameters are input and the system is configured to autorerun and autodilute, the Dimension® system automatically performs sample dilutions whenever the calculated result is above the assay range, or the absorbance of the sample and reagent exceeds the upper absorbance limit for the method. To perform the automatic dilution, the Dimension® system aspirates a reduced sample volume (similar to the way you would make a manual dilution). The dilution ratios are based on incremental sample volume adjustments.

The Dimension® system does not perform dilutions based on the Dilution field on the Enter Sample Data screen – this field is used for your convenience when you want the instrument to calculate the results of your manual dilutions. If a number is entered in the Dilution field, the Dimension® system will not autodilute the sample. For HCG only, entering a number in the Dilution field does not disable Automatic Dilution.

To configure the Dimension® system autodilute feature, you must first activate both the autodilute and autorerun features on the System Configuration screen. If either the Automatic Rerun or Automatic Dilution fields are off, use the arrow keys to move the cursor to the field and then press Enter to change the setting to on. When both fields are on, press F1: Method Parameters. You will be prompted to type your password and then press Enter. Press the method test key of the first method you want to edit and use the arrow keys to highlight the first autodilute volume field. Use the tables on the pages that follow to input the proper autodilute volume for each sample type. Press F4: Store Param’s or F5: Store & Print before exiting or choosing the next method.

When an Autodilute test begins processing, it triggers the Sample Alert key on the touchscreen to turn yellow. Pressing the alert key lets you observe the progress of the test.

---

**To use the autodilute (AD) feature...**

The Autorerun and Autodilute fields on the System Configuration Menu screen must both be set to ON.

**How do I know if a sample was automatically diluted by the instrument?**

If the Dimension® system automatically dilutes a sample, the word “Diluted” will appear next to the diluted method on the printout. If the sample was diluted and the result is still above the assay range for the method, the message “assy rng/dilu” will appear next to the method. (In this case a manual dilution should be performed to determine the correct result.)
### Recommended Autodilute (AD) for Urine Samples

To use the autodilute feature for urine samples, you must enter the Recommended AD Sample Volume from the table below in the *urine* portion of the Auto Dilute Vols field on that method’s Method Parameters screen.

#### Recommended Autodilute (AD) Sample Volumes for Urine Samples

<table>
<thead>
<tr>
<th>Method</th>
<th>Standard Sample Volume (µL)</th>
<th>Recommended AD Sample Volume (µL)</th>
<th>Dilution Factor</th>
<th>Other Qualified AD Sample Volumes (µL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>5</td>
<td>2</td>
<td>2.5</td>
<td>3, 4</td>
</tr>
<tr>
<td>GLU</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>GLUC</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>MALB</td>
<td>17</td>
<td>2</td>
<td>8.5</td>
<td>—</td>
</tr>
<tr>
<td>UCFP</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>AMPH 300</td>
<td>6</td>
<td>2</td>
<td>3.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>AMPH 500</td>
<td>6</td>
<td>2</td>
<td>3.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>AMPH 1000</td>
<td>3</td>
<td>2</td>
<td>1.7</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>BARB</td>
<td>10</td>
<td>2</td>
<td>5.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>BENZ</td>
<td>10</td>
<td>2</td>
<td>5.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>COC 150</td>
<td>12</td>
<td>2</td>
<td>6.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>COC 300</td>
<td>12</td>
<td>2</td>
<td>6.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>EXTC 300</td>
<td>13</td>
<td>2</td>
<td>6.5</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>EXTC 500</td>
<td>8</td>
<td>2</td>
<td>4.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>METH</td>
<td>6</td>
<td>2</td>
<td>3.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>OPI 300</td>
<td>12</td>
<td>6</td>
<td>2.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>OPI 300</td>
<td>12</td>
<td>3</td>
<td>4.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>OPI 2000</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>PCP</td>
<td>14</td>
<td>2</td>
<td>7.0</td>
<td>semi-quantitative only</td>
</tr>
<tr>
<td>THC</td>
<td>13</td>
<td>3</td>
<td>4.3</td>
<td>semi-quantitative only</td>
</tr>
</tbody>
</table>

\[
\text{Dilution Factor} = \frac{\text{(Standard Sample Volume)}}{\text{(Recommended AD Sample Volume)}}
\]
Recommended Autodilute (AD) for Serum/Plasma Samples

To use the autodilute feature for serum/plasma samples, you must enter the Recommended AD Sample Volume from the table below in the serum/plasma portion of the Auto Dilute Vols field on the method’s Method Parameters screen.

Recommended Autodilute (AD) Sample Volumes for Serum/Plasma Samples

<table>
<thead>
<tr>
<th>Method</th>
<th>Standard Sample Volume (µL)</th>
<th>Recommended AD Sample Volume (µL)</th>
<th>Dilution Factor</th>
<th>Other Qualified AD Sample Volumes (µL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACP</td>
<td>24/cuvette</td>
<td>5</td>
<td>4.8</td>
<td>2, 4</td>
</tr>
<tr>
<td>ACTM</td>
<td>4/cuvette</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>AHDL</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>ALB</td>
<td>5</td>
<td>2</td>
<td>2.5</td>
<td>3, 4</td>
</tr>
<tr>
<td>ALC</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>ALDL</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>ALP</td>
<td>7</td>
<td>3</td>
<td>2.3</td>
<td>2, 4</td>
</tr>
<tr>
<td>ALT</td>
<td>35</td>
<td>10</td>
<td>3.5</td>
<td>2, 5, 7, 8, 12, 15</td>
</tr>
<tr>
<td>AMON</td>
<td>53</td>
<td>26</td>
<td>2.0</td>
<td>10, 13, 31, 40</td>
</tr>
<tr>
<td>AMY</td>
<td>14</td>
<td>7</td>
<td>2</td>
<td>12</td>
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<tr>
<td>AST</td>
<td>40</td>
<td>20</td>
<td>2</td>
<td>2, 5, 10</td>
</tr>
<tr>
<td>BUN</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>5</td>
<td>3</td>
<td>1.7</td>
<td>2, 4</td>
</tr>
<tr>
<td>CCRP</td>
<td>12</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>CHOL</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>CK</td>
<td>14</td>
<td>7</td>
<td>2</td>
<td>2, 3, 4, 9</td>
</tr>
<tr>
<td>CRBM</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>CREA</td>
<td>20</td>
<td>10</td>
<td>2</td>
<td>5, 8, 15</td>
</tr>
<tr>
<td>CRP</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>CTNI</td>
<td>50</td>
<td>20</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>DBI</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>DBIL</td>
<td>31</td>
<td>10</td>
<td>3.1</td>
<td>5, 15</td>
</tr>
<tr>
<td>FERR</td>
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<td>20</td>
<td></td>
</tr>
<tr>
<td>FPSA</td>
<td>60</td>
<td>6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>GENT</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>GGT</td>
<td>32</td>
<td>16</td>
<td>2</td>
<td>4, 8, 14, 18, 20</td>
</tr>
<tr>
<td>GLU</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>GLUC</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>HCG</td>
<td>40</td>
<td>2</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>IBCT</td>
<td>25</td>
<td>12</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>IGA</td>
<td>10</td>
<td>2</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>IGG</td>
<td>10</td>
<td>2</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

If an autodilution is not performed for results on these methods... Here are some possible reasons why:
1. No reagent from the last calibrated reagent lot for that method is on board.
2. No calibrated reagent for that method is on board.
3. The Flex® reagent cartridge needs to be hydrated.
4. No test report message occurred with the result to activate the autodilution (e.g., abnormal reaction).
5. A "reagent prep" error message occurred.
6. Autorun was not turned on.
7. Autodilute was not turned on.
8. Autodilute volume was not entered.

The autodilute (AD) feature was not tested on serum/plasma samples for the following methods:
MG, NAPA, PALB, PCHE, PROC, RCRP, VANC because the normal sample size is 2 µL.
CKMB, IRN due to lack of samples above our assay range.

(Table continued on next page)
### Recommended Autodilute (AD) Sample Volumes for Serum/Plasma Samples

<table>
<thead>
<tr>
<th>Method</th>
<th>Standard Sample Volume (µL)</th>
<th>Recommended AD Sample Volume (µL)</th>
<th>Dilution Factor</th>
<th>Other Qualified AD Sample Volumes (µL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGM</td>
<td>10</td>
<td>2</td>
<td>5.0</td>
<td>—</td>
</tr>
<tr>
<td>IIRON</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>LA</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>LDH</td>
<td>14</td>
<td>7</td>
<td>2</td>
<td>2, 3, 4, 8, 9, 10</td>
</tr>
<tr>
<td>LHCG\textsuperscript{a,b,c}</td>
<td>40</td>
<td>2</td>
<td>200\textsuperscript{c}</td>
<td></td>
</tr>
<tr>
<td>LIDO</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td>LIP</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>LMMBa</td>
<td>60</td>
<td>30</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>LTNBa</td>
<td>50</td>
<td>20</td>
<td>2.5</td>
<td>—</td>
</tr>
<tr>
<td>MMBa</td>
<td>60</td>
<td>30</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>MYO\textsuperscript{a}</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>PHNO</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PHOS</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>PTN</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SAL</td>
<td>15</td>
<td>5</td>
<td>3</td>
<td>8, 10</td>
</tr>
<tr>
<td>T4</td>
<td>16</td>
<td>4</td>
<td>4</td>
<td>3, 5, 7, 10</td>
</tr>
<tr>
<td>TBI</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>TBIL</td>
<td>28</td>
<td>14</td>
<td>2</td>
<td>4, 7, 20</td>
</tr>
<tr>
<td>TGL</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>THEO</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>TOBR</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>TP</td>
<td>15</td>
<td>8</td>
<td>1.9</td>
<td>5, 7, 10</td>
</tr>
<tr>
<td>TPSA\textsuperscript{a}</td>
<td>40</td>
<td>2</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>TRIG</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>TSH\textsuperscript{a}</td>
<td>60</td>
<td>30</td>
<td>2</td>
<td>3, 4</td>
</tr>
<tr>
<td>UCFP</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>URCA</td>
<td>17</td>
<td>5</td>
<td>3.4</td>
<td>—</td>
</tr>
<tr>
<td>VALP</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>—</td>
</tr>
</tbody>
</table>

\textsuperscript{a} - HM methods.

\textsuperscript{b} - The HCG and LHCG methods use an additional 10-fold dilution prior to taking the autodilute sample. Therefore, a 2-µL autodilute sample for HCG or LHCG is equivalent to a 1:200 dilution. The instrument automatically does the calculations for you.

\textsuperscript{c} - For autodiluted HCG and LHCG results >200,00 mIU/mL [IU/L], prepare a manual dilution and enter the appropriate dilution factor on the Enter Sample Data screen. The instrument does the calculations automatically for you.

**WARNING:** As with any sample run on the Dimension\textsuperscript{®} clinical chemistry system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.
Recommended Autodilute (AD) Sample Volumes for Reduced Sample Volumes of Serum/Plasma Samples

If you want to use a Dade Behring Inc. approved reduced sample volume for any of the following methods, you must enter the Recommended AD Sample Volume from the table below in the serum/plasma portion of the Auto Dilute Vols field on the method’s Method Parameters screen.

<table>
<thead>
<tr>
<th>Method</th>
<th>Reduced Sample Volume (µL)</th>
<th>Recommended AD Sample Volume (µL)</th>
<th>Dilution Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>20</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>AMY</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>AST</td>
<td>20</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>CREA</td>
<td>15</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>DBIL</td>
<td>13</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>GGT</td>
<td>15</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>IRN</td>
<td>25</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>TBIL</td>
<td>12</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>TP</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>URCA</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

WARNING: As with any sample run on the Dimension® clinical chemistry system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.
Method Review of QC and Patient Results

**Standard Vol vs. Selected Vol on the printed Test Report**

The system printer prints the method abbreviation on the test report in UPPERCASE for a method that is using the standard volume; in lowercase for a method that is using a selected volume.

**Crossover QC results can also be selected for review!**

To view crossover QC results:
1. Press F1: Set Period/Lot.
2. Type an asterisk (*) followed by the letters XQC.
3. Press Enter.

To return to viewing non-crossover QC results:
1. Press F1: Set Period/Lot.
2. Type an asterisk (*).
3. Press Enter.

1. From the Method Review screen, press a test key on the keyboard to display results for a method.

2. Check the time period and specific lot shown on the first line of this screen. Change these entries to view the specific results set that you want.

   **Field** | **To change the information in the field**
   --- | ---
   **Fluid** | Press F5: QC/Patient for patient results or QC results (as indicated by the type of fluid that appears in the Fluid field). After selecting patient or QC results, press F6: Next Fluid to see another fluid type.
   **[Time Period]** | Press F1: Set Period/Lot.
   - To see results for a specific month: Type the first 3 letters of the month, e.g., “JAN,” and press Enter.
   - To see results for a specific time period in days, type the number of the days, e.g., “14,” and press Enter.
   - To see results for a specific time period in hours, type the percent symbol and the number of hours, e.g., “%16” and press Enter.
   **(Specific Lot)** | Press F1: Set Period/Lot and type an asterisk (*) followed by the lot ID number and press Enter. To return to viewing results for all lots of the method, press F1: Set Period/Lot, type an asterisk (*) and press Enter.

3. Press F3 to select the view of this information you want to see. Three views are available: a Result listing, a Histogram plot, and a Levey-Jennings–type plot. Continue pressing F3 to move from one view to another.

For more information on using the Method Review screen, refer to the three views of the data and discussions of fields and function keys on the pages that follow.
Print out all QC data from a single keystroke!

Press F8: Print from the Results Listing view of the Method Review screen and answer the messages that appear. See the discussion at the bottom of this page "Using F8: Print."

This list is typically longer than one screen.

Use the Pg Dn and Pg Up keys on the keypad to see more of this list. The Tests field shows how many results the list contains.

*, >, and < may appear on this screen.

When appropriate, these signs will appear at the left side of the screen. Asterisks (*) indicate that the data point has been deleted by the operator and is not used in the information at the top of the screen.

When a patient fluid is selected, > and < signs indicate that the data point is greater than (>) or less than (<) the limits shown in the interval field.

When a QC fluid is selected, the > and < signs indicate that the data point exceeds the rule (>) or is lower than the rule (<) shown in the Rule field.

Using F8: Print

You will be prompted to answer two messages after you press F8: Print:

Message 1 - “Do you want to print just a summary? (y/n)”

Message 2 - “Do you want to print ALL Methods/Levels? (y/n)”

If Fluid Type is To Print Answer Message

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>To Print</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>The summary information (the top half of the screen).</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>QC</td>
<td>The summary information and supporting data for each level of QC for the method.</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>QC</td>
<td>The summary information and supporting data for the method and fluid combination.</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>QC</td>
<td>All QC information for all levels and methods.</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
**Histogram Plot View**

To create a histogram plot, five results are required for the method/fluid combination. Each result must fall within the time period and the specific reagent cartridge lot that appear on the top line of the screen.

From the Results Listing view, press **F3: See Histogram**.

The X-axis shows the test result.

The Y-axis shows the number of tests having that test result. For example, in the screen shown above, 12 Glucose tests had a result of 84–85 mg/dL; two had a result of 74–75 mg/dL.

For better viewing, use the left and right arrow keys on the keyboard to change the scale of the X-axis as appropriate. The left arrow key expands the range of the X-axis; the right arrow key compresses the range of the X-axis.

**Printing Histogram Plot Information**

To print only the data listed at the top of the view, press **F8: Print**.

To print the entire screen, hold down the Control key and press the letter P.

Both of these printouts can only be printed by the system printer; they will not print to an external printer.
Levey-Jennings Plot Views

The Levey-Jennings–like plot view screens can be displayed for either patient results or QC results.

To create a Levey-Jennings plot, five results are required for the method/fluid combination. Each result must fall within the time period and the specific reagent cartridge lot that appear on the top line of the screen.

Levey-Jennings Patient Results Plot

1. From the Histogram Plot view, press **F3: See L-J Plot**.

2. Press **F5: QC/Patient** until a patient fluid appears in the Fluid field.
   - A green + is a result that is within the values in the Interval field.
   - A red x is a result that is outside the values in the Interval field.
   - A blue * is a result that has been deleted by the user.

3. To see the result value and date for a specific point, press the right or left arrow key to move a marker onto the point. The data for that point will appear in the Marker field. A greater-than or less-than sign after the date in this field indicates that the point exceeds (>) or is lower than (<) the limits shown in the Interval field.

Printing L-J Patient Information

To print the L-J plot (only the last 31 data points can be printed for this screen), press **F8: Print**.

To print the entire screen (all data points will be printed), hold down the Control key and press the letter P.

Both of these printouts only use the system printer; they will not print to an external printer.
Levey-Jennings QC Results Plot

**Actual mean and SD or Expected mean and SD?**

QC plots are created using the ACTUAL mean and SD values unless EXPECTED mean and SD values have been entered by the operator, in which case the expected values are used to create the plots.

**Changing the SD on the screen:**

To reposition the dashed SD line to ±1, ±2, or ±3 SD, press the up or down arrow key. The dashed SD line is repositioned; however, the SD values at the top of the screen will not change.

To change SD:
1. Press F4: Set Interval.
2. At the prompt, enter an SD level between 1.0 and 4.0. (You can select a decimal SD by entering the letters SD after the decimal, e.g., 2.5 SD.)
3. Press Enter.

The Interval, In, and Out field values at the top of the screen and the colored data points will change to reflect this new SD. **However, the dashed SD lines on the screen remain at ±2 SD.**

1. From the Histogram Plot view, press F3: See L-J Plot (or from the L-J Patients Results view, press F5: QC/Patient until a QC fluid appears in the Fluid field).

2. Press F5: QC/Patient until a QC fluid appears in the Fluid field.
   - A green + is a result that does not violate the rule in the Rule field.
   - A red x is a result that violates the rule in the Rule field.
   - A blue asterisk * is a result that has been deleted by the user.

The mean for the data appears as a solid line in the center of the plot and its value is listed on the scale at the left side of the plot. The dashed lines above and below the mean are lines of standard deviation (either ±1 SD, ±2 SD, or ±3 SD).

The values shown on the scale at the left side of the plot are ±1, ±2, and ±3 SD based on the value shown in the SD field at the top of the screen. For example, the mean shown in the screen above is 81.3 and the SD is 6.39; therefore the scale has ±1 SD or 87.7 (81.3 + 6.39) and 74.9 (81.3 – 6.39) respectively as its next values.

3. To see the result value and date for a specific point, press the right or left arrow key to move a marker onto the point. The data for that point will appear in the Marker field. A greater-than or less-than sign after the date in this field indicates that the point exceeds (> or is lower than (<) the limits shown in the Interval field.

**Printing L-J QC Information**

To print the 2SD plot, press F8: Print.

To print other SD plots that you have created on the screen, hold down the Control key and press the letter P.

Any deleted results on these printouts will appear as either an up or down arrow, depending on whether the deleted result was above or below 2 SD.

Both of these printouts only use the system printer; they will not print to an external printer.
Method Review Screen — Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluid</strong></td>
<td>The fluid for the patient or QC results shown on the screen. Use F5: QC/Patient to go from patient to QC results and vice versa. Use F6: Next Fluid to display results for another fluid. Only patient fluids that have been assigned ranges on the Method Parameters screen will appear. Only QC fluids that have been assigned ranges on the Quality Control Ranges screen will appear.</td>
</tr>
<tr>
<td>[dates]</td>
<td>Time period brackets. If there is nothing entered in the brackets, all results in the test result buffer for the method and fluid combination appear on the screen. If the brackets contain a time period, only the results for that time period are shown on the screen. If a time period is entered, all screens (patient and QC) will display only results that fall within this time period. This time period will remain in use on all Method Review screens until you delete it or change it. Use F1: Set Period/Lot as discussed under “Method Review Screen—Function Keys” later in this module to enter a time period in this field.</td>
</tr>
<tr>
<td>(lot ID)</td>
<td>Lot ID or crossover QC parentheses. If there is nothing entered in the parentheses, all results for all reagent cartridge lots in the test result buffer for the method and fluid combination appear. If the parentheses contain a reagent cartridge lot ID, only results that used that lot ID appear. If the parentheses contain the letters XQC, only crossover QC results appear. If a reagent cartridge lot ID or crossover QC is entered, all screens (patient and QC) will display only those results that use the specific lot ID or are crossover QC results. Use F1: Set Period/Lot as discussed under “Method Review Screen—Function Keys” to enter a reagent cartridge lot ID or crossover QC in this field.</td>
</tr>
<tr>
<td><strong>Tests</strong></td>
<td>The total number of results in the test result buffer that match the method and fluid on the screen (and, if specified, are within the specific time frame or are for the specific reagent cartridge lot ID or crossover QC).</td>
</tr>
<tr>
<td>(Tests) In</td>
<td>The number and percentage of results in the Tests field that are within the Interval field shown on the screen.</td>
</tr>
<tr>
<td>(Tests) Out</td>
<td>The number and percentage of results in the Tests field that are outside the Interval field shown on the screen.</td>
</tr>
</tbody>
</table>
**Field** | **Meaning**
--- | ---
**Interval** | The interval to which results are compared to determine the numbers and percentages shown in the In and Out fields.

When a patient fluid is selected, the interval from the Method Parameters screen for that method and fluid appears. When a QC fluid is selected, the interval from the Quality Control Ranges screen for that method and fluid appears.

This interval field can be changed using **F4: Set Interval** as discussed under “Method Review Screen—Function Keys” later in this module.

**Units** | Results units. These units are taken from the Method Parameters screen for the method.

**Expected Mean** | Value only appears when QC results are selected. The value that appears (if any) was entered by the operator on the Quality Control Ranges screen. The expected mean is typically based on historical laboratory studies conducted on that method. See “Entering QC Ranges” later in this module.

**Expected SD** | Value only appears when QC results are selected. The value that appears (if any) was entered by the operator on the Quality Control Ranges screen. The expected SD is typically based on historical laboratory studies conducted on that method. See “Entering QC Ranges” later in this module.

**Actual Mean** | The actual mean is calculated using all the Tests field results. *(It is not calculated using only the In field results.)*

**Actual SD** | The actual standard deviation is calculated using all the Tests field results. *(It is not calculated using only the In field results.)*

**CV %** | The coefficient of variation percentage is calculated using all the Tests field results. *(It is not calculated using only the In field results.)*

**Rule** | The rule or constraint against which the results are compared. Each result is compared to the Interval field to determine whether it exceeds or is below the interval. This field is always “High/Low Interval” for patient results. For QC results, in addition to High/Low Interval, one of six “Shewhart Rules” can be selected. See a list of these rules and their meanings in “Rules Field Definitions” later in this module.

**Marker: ( )** | This field contains the result and the date of the result corresponding to the position of the marker on Levey-Jennings–like plots. See the “Levey-Jennings Plots” discussion earlier in this module.
Method Review Screen — Function Keys

The operation of the function keys on Method Review screens varies depending upon whether patient results or QC results are being viewed.

Each function key is described below for patient and QC result screens.

F1: Set Period/Lot

<table>
<thead>
<tr>
<th>Patient Results</th>
<th>Used to enter a specific time period in the brackets [ ] and a specific reagent cartridge lot ID in the parentheses ( ) fields in the upper right-hand corner of the screen. For more information, see “Method Review Screen—Fields” earlier in this module.</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC Results</td>
<td>Same as patient results. Also allows crossover QC data to be selectively displayed inside the parentheses ( ).</td>
</tr>
</tbody>
</table>

When is F2: Delete; when is it Un-Delete?

Function key F2 is always Delete unless the cursor or marker is positioned on a data point that has been deleted.

F2: Delete Result (or F2: Un-Delete)

<table>
<thead>
<tr>
<th>Patient Results</th>
<th>Patient results cannot be deleted. This function key is disabled whenever patient results are displayed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC Results</td>
<td>Used to delete a QC result. Deletes the QC result where the cursor is positioned on the Data screen or where the marker is positioned on the Levey-Jennings–like QC plot. For more information on deleting and undeleting results using this function key, see “Reviewing QC Results” later in this module.</td>
</tr>
</tbody>
</table>

F3: See Data (or F3: See Histogram or F3: See L-J Plot)

<table>
<thead>
<tr>
<th>Patient Results</th>
<th>Used to display the results as either a list, a histogram, or a Levey-Jennings–like plot. You must go through these views in sequence (i.e., you cannot go from the Data screen to the L-J plot without going through the histogram view).</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC Results</td>
<td>Same as patient results.</td>
</tr>
</tbody>
</table>

F4: Set Interval

<table>
<thead>
<tr>
<th>Patient Results</th>
<th>Used to select results within a specific interval entered by the operator. To enter a new range in the Interval field, press F4: Set Interval and at the prompt enter the low range for the new interval and then the high range. Press Enter after each entry. The In and Out fields will automatically be updated based on this new range.</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC Results</td>
<td>Same as patient results. Also allows a decimal SD to be entered. See “QC Plots” in the Levey-Jennings plots discussion earlier in this module.</td>
</tr>
</tbody>
</table>
**F5: QC/Patient**

- **Patient Results**: Used to change displayed results from patient to QC and vice versa.
- **QC Results**: Same as patient results.

**F6: Next Fluid**

- **Patient Results**: Used to display results for the next patient fluid type.
- **QC Results**: Used to display results for the next QC fluid type.

**F7: Show mAU or Show Conc**

- **Patient Results**: Used to toggle result units between mAUs and concentration units. When mAUs are selected, the Interval field will always be 0.0 – 9999.9. (The mAU information is typically used for troubleshooting.)
- **QC Results**: Does not appear on the QC display.

**F7: Next Rule**

- **Patient Results**: Does not appear on the patient results display.
- **QC Results**: Used to change the Rule field selection. There are seven possible rule selections, six of which are Shewhart Rules. For a definition of these rules, see “Rules Field Definitions” on the next page.

**F8: Print**

- **Patient Results**: Used to print out the results information appearing at the top of the screen using the system printer. (This will not print to an external printer.)
  1. Press **F8: Print**.
  2. Answer the prompt with a **Y** to print out only the information listed at the top of the screen, or with an **N** to print out a report that contains all the individual results in that method’s test results buffer on this instrument.
  3. Press **Enter**.
- **QC Results**: Same as patient results.
Rules Field Definitions

All but the first field definition listed below are “Shewhart Rules,” by which the results are examined in several ways to determine if the overall system is in control. (Refer to: “A Multi-Rule Shewhart Chart for Quality Control in Clinical Chemistry,” J.O. Westgard et al., Clinical Chemistry, March, 1981.)

When a new rule is selected, the Interval, In, and Out fields (and individual result points on the L-J plot) will automatically be updated to reflect the new rule selected.

<table>
<thead>
<tr>
<th>Rule field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Low Interval</td>
<td>Any result that falls outside the range listed on the Quality Control Ranges screen for that fluid.</td>
</tr>
<tr>
<td>any point &gt; 2 sd</td>
<td>Any result that falls outside ± 2 standard deviations from the mean. This is termed a “warning” rule and requires further evaluation to judge whether the data presents a problem.</td>
</tr>
<tr>
<td>any point &gt; 3 sd</td>
<td>Any result that falls outside ± 3 standard deviations from the mean. A violation of this rule suggests systematic error.</td>
</tr>
<tr>
<td>two consecutive &gt; 2 sd</td>
<td>Two consecutive results that fall outside ± 2 standard deviations from the mean. A violation of this rule suggests systematic error.</td>
</tr>
<tr>
<td>four consecutive &gt; 1 sd</td>
<td>Four consecutive results that fall outside ± 1 standard deviation from the mean. A violation of this rule suggests systematic error.</td>
</tr>
<tr>
<td>two consecutive &gt; 4 sd</td>
<td>The absolute difference between two consecutive results is greater than or equal to 4 standard deviations. A violation of this rule suggests random error.</td>
</tr>
<tr>
<td>ten consecutive above/below mean</td>
<td>Ten consecutive results above or below the mean. A violation of this rule suggests systematic error.</td>
</tr>
</tbody>
</table>

Using these rules:

These rules use the EXPECTED mean and SD values unless the ACTUAL mean and SD values have been entered by the operator, in which case the ACTUAL values are used to create the plots.

These rules only consider results “within” a given material and not “across” materials. If you want to review results “across” materials, print out a plot of both levels and then visually examine them.
Reviewing QC Results

When reviewing QC results, you may want to view the data without including all of the data points. You can delete specific QC results.

Any deleted results are not included in or used to calculate the values in the fields at the top of a Method Review QC screen. These results are not permanently deleted from the QC test result buffer, so they can be undeleted.

Delete a result using the Results Listing screen:

1. Move the cursor to the result and then press F2: Delete Result. An asterisk (*) on the screen to indicate that the result is now deleted.

2. To undelete a deleted result, move the cursor to the result and press F2: Un-Delete.

Delete a result using the L-J plot:

1. Use the left or right arrow keys to move the marker onto the result and then press F2: Delete Result. A yellow asterisk (*) will appear on the screen to indicate that the result is now deleted.

2. To undelete a deleted result, move the cursor to the result and press F2: Un-Delete.

When a result is undeleted, it is compared against the current rule in the Rule field and will become a red x or a green + accordingly.
HIL Feature

If the Dimension® system is connected to an LIS, ensure that the LIS is able to receive results for tests it did not request originally. Check with your local LIS consultant.

The HIL feature, which is based on the spectral characteristics of a serum or plasma sample, provides an index that can alert you to potential interference from hemolysis, icterus, and lipemia in the sample, where:

- H = hemoglobin resulting from lysis of red blood cells
- I = icterus resulting from endogenous bilirubin
- L = lipemia or turbidity caused by insoluble lipids

The HIL feature can be programmed to run automatically in an Operating Mode that best suits the needs of your laboratory, or by request on individual samples. Once programmed, the instrument automatically pipets 20 µL of sample into an empty cuvette along with system water. Spectral absorbance measurements, taken at 405nm (hemoglobin), 452nm (bilirubin), and 700nm (turbidity), are used to generate a sample-specific HIL Index. The HIL Index appears on the report slip as a three-digit value where:

1st digit = H index
2nd digit = I index
3rd digit = L index

Each index value correlates to an approximate concentration range in mg/dL for each of the potential interferents, as specified in the table below:

<table>
<thead>
<tr>
<th>Index</th>
<th>H = Hemoglobin (mg/dL)</th>
<th>I = Bilirubin (mg/dL)</th>
<th>L = Intralipid™ (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≤ 25</td>
<td>≤ 2</td>
<td>≤ 25</td>
</tr>
<tr>
<td>2</td>
<td>25 &lt; H ≤ 50</td>
<td>2 &lt; I ≤ 5</td>
<td>25 &lt; L ≤ 50</td>
</tr>
<tr>
<td>3</td>
<td>50 &lt; H ≤ 200</td>
<td>5 &lt; I ≤ 20</td>
<td>50 &lt; L ≤ 200</td>
</tr>
<tr>
<td>4</td>
<td>200 &lt; H ≤ 300</td>
<td>20 &lt; I ≤ 40</td>
<td>200 &lt; L ≤ 600</td>
</tr>
<tr>
<td>5</td>
<td>300 &lt; H ≤ 500</td>
<td>40 &lt; I ≤ 60</td>
<td>600 &lt; L ≤ 1000</td>
</tr>
<tr>
<td>6</td>
<td>500 &lt; H ≤ 1000</td>
<td>60 &lt; I ≤ 80</td>
<td>1000 &lt; L ≤ 3000</td>
</tr>
</tbody>
</table>

The following general conditions are required for HIL to be run automatically:

- sample must be serum or plasma
- sample must be undiluted (dilution does not eliminate spectral interference)
- operating mode must be set to ON or AUTO-ON
- if the operating mode is AUTO-ON, Alert Index values between 2 and 6 must be entered in the HIL Setup screen
- Sample Mode must be primary tube, bar code tube, sample cup or SSC (as specified in the selected operating mode)
- HIL will not run automatically in the "limited cup - no level sense" and "PED tube" mode (sample volume may be limited)
**HIL Alert Index Values**

HIL Alert Index values are used to specify the concentration range at which interference may be observed. You can customize these values to meet the needs of your laboratory, using interference information from the Dade Behring Inc. method insert sheet, your laboratory testing, or other sources to guide you in selecting HIL Alert Index values. You should consider the following before selecting values and implementing the HIL feature:

- The maximum effect of a potential interferent may vary based on the method and the amount of analyte present.
- Your laboratory's individual patient population should be considered when you determine if a potential interferent is clinically significant.

The test report displays the "HIL Interf" message if any of the measured HIL index values (H, I, or L) is greater than or equal to the corresponding Alert Index value entered for the method (see "HIL Setup"). If the "HIL Interf" message is displayed, follow your laboratory's procedure for reporting results when the sample is hemolyzed, icteric and/or lipemic.

**WARNING:** Do not use the results of this feature to report hemoglobin, bilirubin or triglyceride concentrations.

**HIL Setup**

To set up the HIL feature, you must select an Operating Mode. Your choices for Operating Mode are explained below. If the mode is "AUTO-ON -Tubes, Cups, SSC's" or "AUTO-ON -Tubes, Cups", you must also enter HIL Alert Index values.

**WARNING:** As with any sample run on the Dimension® clinical chemistry system, the operator must ensure that there is enough sample in the sample container to run not only the requested tests but also any subsequent reflex tests that may be automatically run.

To specify parameters for HIL setup:

1. With the instrument in Standby, display the HIL Setup screen. A password is required.
2 Press **F1: Next Mode** to display the Operating Mode that best suits your laboratory's needs, then press **F2: Store**.

### Operating Modes

**AUTO-ON - Tubes, Cups, SSC's**

HIL is run automatically when a method with an alert index between 2 and 6 is requested and the sample mode is primary tube, bar code tube, sample cup or SSC. The test report will display the "HIL Interf" message for an affected method if any of the measured HIL index values is greater than or equal to the corresponding Alert Index for that method.

**AUTO-ON Tubes, Cups**

HIL is run automatically when a method with an alert index between 2 and 6 is requested and the sample mode is primary tube, bar code tube or sample cup. The test report will display the "HIL Interf" message for an affected method if any of the measured HIL index values is greater than or equal to the corresponding Alert Index for that method.

**ON**

HIL is run automatically and reported for all serum and plasma samples when the sample mode is primary tube, bar code tube, sample cup or SSC. The test report will NOT display the "HIL Interf" message for an affected method.

**OFF**

HIL is not run automatically for any sample. However, you can request HIL by including it in the list of tests requested by LIS or by pressing the HIL test key when ordering tests manually. The test report will display the HIL index, but will NOT display the "HIL Interf" message for an affected method.

3 If the Operating Mode is AUTO-ON, enter HIL Alert Index values:

- Press the method key for which you want to enter values or position the cursor on the row for the method to be configured.
- Enter values (2 through 6) for H, I, and L to specify the concentration range at which interference may be observed.
- To indicate that no interference was observed at an approximate concentration of 1000 mg/dL (H), 80 mg/dL (I), or 3000 mg/dL (L), enter zero (0) for the Alert Index value.
- To discontinue using a specific Alert Index, enter zero (0) in the appropriate index field for that method.
- To deactivate the HIL feature for a method, enter zero (0) in all the Alert Index fields for that method.
- To prevent inappropriate flagging of samples which are not hemolyzed, icteric or lipemic, the system does not accept an Alert Index value of 1.
4 When you have entered all desired HIL Alert Index values, press **F2: Store**.

To view a list of methods and HIL Alert Index values:
- press **F5: Show All** to display all HIL eligible methods
- press **F5: Show Active** to display only methods with stored alert indexes

To print a list of methods and HIL Alert Index values, press **F4: Print**.
Configuring Touchscreen Alert Keys

The five Alert Keys on the touchscreen can change color to warn you of operating conditions requiring a quick response. In some cases, an alarm will sound, attracting an operator's attention with both visual and audible cues. Before you can use this feature, you must enter specific settings for these four keys:

- STAT Status
- Supplies
- Calib Alert
- QC Alert

The Sample Alert key uses automated test rerun features which are configured individually.

Configuring the STAT Status Alert Key

There are three conditions which can trigger a STAT Status alert. The alerts can be configured to trigger the audio alarm in addition to the alert key color change. These conditions are:

- **STAT sample is complete, but no result.** In this situation, the alert key turns red. The sample information appears in red on the Show All and Show Completed display modes on the STAT Samples screen.

- **STAT sample not run.** In this situation, the alert key turns red. The sample information appears in red on the Show All and Stats Not Started display modes on the STAT Samples screen.

- **STAT sample completed.** In this situation, the alert key turns yellow. The sample information appears in blue on the STAT Samples screen.

You can configure the STAT Status feature to alert you to any or all of these conditions. To configure the alerts:

1. Press the **STAT Status** alert key to display the STAT Samples screen.
2 Press F4: Config Alerts.

![Config Alerts Screen]

2 Press F4: Config Alerts.

3 Move the cursor to the desired field. Press the Enter key until your choice is displayed or type the required number for time fields, then press Enter. When finished, press Exit.

<table>
<thead>
<tr>
<th>Field</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound audio alarm when any STAT alert is triggered</td>
<td>OFF alarm will never sound</td>
</tr>
<tr>
<td>Alert when a STAT sample is available</td>
<td>ON alarm will sound for all configured alerts</td>
</tr>
<tr>
<td>Alert when a STAT sample is available but has an error with no result</td>
<td>OFF alert key will not turn yellow when sample processing is finished.</td>
</tr>
<tr>
<td>Alert when a STAT sample has been entered but not run in a specified time</td>
<td>ALWAYS alert key will turn yellow when any STAT sample is finished processing.</td>
</tr>
<tr>
<td>Time from STAT entry to alert - in minutes (1 - 60)</td>
<td>1</td>
</tr>
<tr>
<td>Time for STAT alerts to be displayed - in minutes (1-120)</td>
<td>120</td>
</tr>
</tbody>
</table>

- **Selectables** allows you to select a specific sample and press the F8: Complete Alert key:
  - If the sample line is white (alert OFF) when you press F8, it turns yellow while processing and blue when finished.
  - If the sample line is yellow when you press F8, it turns white (alert OFF).

- **Not Started** alarm key turns red if a sample does not start processing within the specified time period.

- Can be used only if the previous entry is ON. Enter the number of minutes (1 - 60) a STAT request can wait before the Not Started alert is triggered.

- Enter the number of minutes (1 - 120) that an alert will be displayed on the STAT Samples screen. After the time has elapsed, the information is removed from the display.
Configuring the Supplies Alert Key
Pressing the Supplies alert key displays the Reagent Cartridge Alerts screen.

This screen shows the number of tests available for each configured test method, in addition to the "Alert At" number. When the number of tests available is equal to or less than the Alert At number, the Supplies alert key changes color to yellow.

To configure a test method for the Supplies alert:
1. From the Reagent Cartridge Alerts screen, press **F1: Config Alerts**.

2. Move the cursor to the "Alrt At" field for the test method you want to configure. Type the number of tests. Press the Enter key.
   If the "Alrt At" number is zero, the Supplies alert will not apply to the method.

3. When you are finished configuring methods, press **F1: Store Alerts**.
**Configuring Calibration Alerts**

1. Press the Calib Alert key. On the screen that appears, press **F4: config Alerts**.

   ![Configure Calibration Alerts](image)

2. For each parameter, type ON or OFF.

**Configuring QC Alerts**

1. Press the QC Alert key. On the screen that appears, press **F4: config Alerts**.

   ![Configure QC Alerts](image)

2. For each parameter, type ON or OFF.
Creating Panel Keys

You can define ten panel keys.

1. From the Defining Profile Panel Keys screen, press **F1: Edit Next** until the number of the panel to be created/edited appears on the Edit Panel line. Changes can only be made to the panel that is in the Edit Panel line.

2. Use the test keys to add tests to the panel. A maximum of 20 tests can be assigned per panel key.

3. Press **F3: Store Changes**.

To remove a test from the panel:

1. Move the cursor to the test.
2. Press **F4: Delete Test**.
Configuring the Printer

Try this combination if you are using an external printer as well as the system printer...
Set the system printer to ON LINE - NO TEST REPORTS and the external printer to ON LINE - TEST RESULTS ONLY.

All test reports will be printed at the external printer; all other printouts will be done by the system printer.

Want all of your test reports to be the same length? Use Minimum number of lines!
Enter the maximum number of tests that you typically run on a sample. Now, even if only one test was requested on a sample, the paper length of your test report will be the same as if you ran your maximum number of tests.

1 Use the Printer Set Up screen to create a report title, set system printer report printout specifications, and configure the printer(s).

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Title</td>
<td>This creates the header that appears on your printed test report. Enter a title for your report (up to 30 characters).</td>
</tr>
<tr>
<td>System Printer</td>
<td>Indicates the status of the system printer. Press F1: Sys Printer to select another status.</td>
</tr>
<tr>
<td>Spacing between reports</td>
<td>Enter the number of centimeters of blank paper you want between printed test reports.</td>
</tr>
<tr>
<td>Minimum number of lines</td>
<td>Enter how many test result lines will appear in all test reports.</td>
</tr>
<tr>
<td>External Printer</td>
<td>Indicates the status of the external printer. Press F2: Ext Printer to select another status.</td>
</tr>
<tr>
<td>Mode</td>
<td>May be set to Serial or Parallel depending on the type of external printer that is used.</td>
</tr>
</tbody>
</table>

2 Press F3: Store Changes.
Customizing an External Printer Report

The system software has a default report layout with preset column and line values to create a suitable report. This default layout is designed based on an 80-column format. Try this layout with your external printer and see if it meets your needs. To select this default report layout, press F1: Default Setup and then F8: Store Changes.

Customize Your External Printer Report

1 Using the Print Test Results—Format screen, use the arrow keys to scroll down through four sections of fields and type/edit the information as desired. All information that appears in white can be edited.

The Line and Column fields allow you to indicate the line and column (based on an 80-column format) where you want a particular field to begin.

2 Press F8: Store Changes.

See an example on the following pages.

An example of a customized external printer setup and its output appears on the following pages.
Customizing Dimension® RxL Max® clinical chemistry system

Creating an External Printer Report

Below are some additional points about customizing the four sections of an external printer report:

I. Report Title & Banner

The date and time the report was printed are placed on the last line of the label.

<table>
<thead>
<tr>
<th>LABEL</th>
<th>LINE</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ Hospital ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Address ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Day, Date, Time of Report ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. Patient Header Information

The Label section fields can be chosen from any information on the Enter Sample Data screen.

<table>
<thead>
<tr>
<th>LABEL</th>
<th>LINE</th>
<th>COLUMN</th>
<th>DATA: LENGTH</th>
<th>LINE</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ Patient Name: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Patient ID: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Sample Number: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Location: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Sample Fluid: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Priority: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Entered: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Segment: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Position: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Dilution: ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. Test Result Line – Header

This section consists of only two lines; both use the same Line and Column positioning data. This section sets the headers for the data.

<table>
<thead>
<tr>
<th>LABEL</th>
<th>LINE</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ Test Name ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Result ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Ref. Interval ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ Units ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. Test Result Line – Data

The Data Item column contains results information that can be selected for the report.

<table>
<thead>
<tr>
<th>DATA ITEM</th>
<th>(LENGTH)</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;CHEMISTRY&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>&quot;TEST&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>&quot;RESULT&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>&quot;HI/LO&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>&quot;REF. INTERVAL&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>&quot;UNITS&quot;</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

The field “Chemistry” means that the full name of the method (i.e., Triglyceride) will be printed on the report; the field “Test” means that the method abbreviation (e.g., TRIG) will appear on the report.

The remaining fields are self-explanatory.
**Example of an External Printer Format on a Report Slip**

<table>
<thead>
<tr>
<th>PRINT TEST RESULTS - FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. REPORT TITLE &amp; BANNER</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LABEL</th>
<th>LINE</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Address</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Day, Date, Time of Report</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. PATIENT HEADER INFORMATION:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LABEL</th>
<th>LINE</th>
<th>COLUMN</th>
<th>DATA: LENGTH</th>
<th>LINE</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name:</td>
<td>7</td>
<td>3</td>
<td>27</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Patient ID:</td>
<td>7</td>
<td>45</td>
<td>12</td>
<td>7</td>
<td>57</td>
</tr>
<tr>
<td>Sample Number:</td>
<td>8</td>
<td>3</td>
<td>12</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Location:</td>
<td>8</td>
<td>45</td>
<td>6</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Sample Fluid:</td>
<td>9</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Priority:</td>
<td>9</td>
<td>45</td>
<td>10</td>
<td>9</td>
<td>57</td>
</tr>
<tr>
<td>Entered:</td>
<td>10</td>
<td>3</td>
<td>17</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Segment:</td>
<td>10</td>
<td>45</td>
<td>1</td>
<td>10</td>
<td>57</td>
</tr>
<tr>
<td>Position:</td>
<td>11</td>
<td>-1</td>
<td>2</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Dilution:</td>
<td>11</td>
<td>45</td>
<td>3</td>
<td>11</td>
<td>57</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III. TEST RESULT LINE - HEADER</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Result</th>
<th>Ref. Interval</th>
<th>Units</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DATA ITEM</th>
<th>(LENGTH)</th>
<th>COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;CHEMISTRY&quot;</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>&quot;TEST&quot;</td>
<td>4</td>
<td>-1</td>
</tr>
<tr>
<td>&quot;RESULT&quot;</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>&quot;HILO&quot;</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>&quot;REF. INTERVAL&quot;</td>
<td>13</td>
<td>47</td>
</tr>
<tr>
<td>&quot;UNITS&quot;</td>
<td>6</td>
<td>66</td>
</tr>
</tbody>
</table>

The above settings should produce the output shown below.

<table>
<thead>
<tr>
<th>Columns</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>45</td>
</tr>
<tr>
<td>57</td>
</tr>
<tr>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hospital Address</th>
<th>Tue Jan 12 06:49:20 1999</th>
</tr>
</thead>
</table>

- Patient Name: 100
- Patient ID: 0305010
- Location: SERUM
- Priority: ROUTINE
- Entered: 06:44 Jan 12, 1999
- Wheel: Dilution:

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Result</th>
<th>Ref. Interval</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>85.00</td>
<td>70.00 - 110.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>7</td>
<td>7.18</td>
<td>mg/dL</td>
</tr>
</tbody>
</table>
Quality Control

Quality control (QC) is a system of checks to ensure that the instrument and all of the associated materials meet with your laboratory’s acceptable standards of performance. At Dade Behring Inc., quality control is carried out through all phases of reagent and instrument production and assembly. This ensures product quality and performance.

Your laboratory is responsible for the proper functioning of the Dimension® RxL Max® clinical chemistry system after installation. Dade Behring Inc. representatives assist in setting up the instrument and ensure that the methods to be used initially are calibrated and verified.

Quality Control Program

A good quality control program should monitor all methods and show changes in the system that may affect patient results. It will also take into account those sources of nonanalytical errors, such as specimen collection, handling, and transport, which also may affect results.

Routine quality control procedures involve checking known samples for reproducibility and accuracy on the Dimension® system. The method insert sheets describe typical performance characteristics for each method, which can be used for comparison with your laboratory’s data. Refer to product insert sheets for method-specific information.

A summary of the recommended quality control practices includes the following:

- Perform System Check at least once per day.
- Process two levels of quality control material at least once every 24 hours per method used.
- Perform calibration/verification whenever you change the reagent lots for a method and at the calibration/verification intervals specified in the associated method insert sheet. Calibration/verification may also be performed as specified by your laboratory procedures.

The Dimension® RxL Max® system contains software programming to allow the operator to maintain information necessary for a good quality control program.

The software also allows:

- storage of at least 100,800 QC results, allocating up to 540 points for each method. This means that depending on how many levels of QC you run for a method, the instrument can store from 108 to 270 days of results.
- the operator to display these results as a histogram or as a Levey-Jennings–like plot.
- the operator to display QC results for a specific period of time from one hour to 365 days, to display lines from one to four standard deviations (including values such as 1.5 SD) on the Levey-Jennings-like plot, and to remove specific QC results from being used in the creation of these plots (however, the operator cannot delete the results from QC memory).
Daily QC
You should check the Dimension® system daily for proper performance by general procedures such as the System Check procedure and by performing routine maintenance as scheduled and described in Module 3: Maintaining. Each day you should also run two levels of quality control material of known activity or concentration for each method you will run during that day. Record the results of all control samples. If the results are outside your laboratory’s acceptable limits, the cause should be investigated immediately.

QC Materials
The quality control material used should not be the same material that was used to calibrate or verify a method. This could cause an undetected error and lead to inaccurate results.

Carefully follow the procedures provided by the manufacturer of the quality control material for handling and reconstitution.

It is best to use a quality control material with a concentration (or activity) at a clinical decision-making level (as used by your laboratory).

New Reagent and Control Lots
Dade Behring Inc. recommends that you compare new lots of reagent and control products with lots that have given acceptable performance. For example, try not to use up all of the present method lot before calibrating/verifying and checking QC on a new method lot.

Each new quality control product or new lot of quality control material introduced should be evaluated in conjunction with the old lot during a trial period. This allows the newly established mean (\( \bar{X} \)) and standard deviation (SD) to be compared to the values of the old material.
Using the QC Alert Key

The QC Alert key changes color to yellow when the most recent (less than 48 hours old) QC result for a method meets any of the following conditions:

- out of range. For this alert condition, QC ranges must be configured.
- has an error message and no result
- expired. The alert uses the QC expiration period.
- result is greater than 2SD.

When the QC Alert key is yellow, press it to display the QC Tests Out of Range screen:

<table>
<thead>
<tr>
<th>METHOD</th>
<th>RESULT</th>
<th>REAG LOT</th>
<th>QC LEVEL</th>
<th>PRODUCT NAME</th>
<th>QC LOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOL</td>
<td>LOW</td>
<td>XX6365</td>
<td>SerumQC3</td>
<td>BioRad Lipochond</td>
<td>BLK9237</td>
</tr>
</tbody>
</table>

**Error Explanation**

- **Expired** The information about an expired QC remains on the screen up to 48 hours after the time the QC reported results.
- **Error** If an error occurs during QC processing which suppresses the result, the method is flagged on this screen.
- **High** The QC result is above the upper limit of the stored QC range.
- **Low** The QC result is below the lower limit of the stored QC range.
- **>2SD** Indicates result is greater than two Standard Deviations
This table explains the tasks you can perform with the QC Alert function keys:

<table>
<thead>
<tr>
<th>Key</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Test Results</td>
<td>To view QC result, highlight the method and press this key. (See &quot;Displaying Test Results&quot; in Module 2: Using.)</td>
</tr>
<tr>
<td>F2: Edit/Rerun</td>
<td>To rerun the QC, highlight the method and press this key. (See &quot;Editing and Rerunning a Sample&quot; in Module 2: Using.)</td>
</tr>
<tr>
<td>F3: Clear Alert</td>
<td>To clear an alert without rerunning the QC, highlight the method and press this key.</td>
</tr>
<tr>
<td>F4: Config Alert</td>
<td>To set parameters for QC alerts, press this key. (See &quot;Configuring QC Alerts&quot; earlier in this chapter.)</td>
</tr>
<tr>
<td>F5: Define QC Product</td>
<td>To display the Define QC Product screen, press this key. (See &quot;Defining QC Products&quot; later in this chapter.)</td>
</tr>
<tr>
<td>F6: Group Alerts</td>
<td>To group alerts with the same product definition, press this key. (See &quot;Grouping QC Alerts&quot; later in this chapter.)</td>
</tr>
<tr>
<td>F7: Method Review</td>
<td>To review the QC levels and applicable Westgard rule, highlight the method and press this key. (See “Reviewing QC Results” earlier in this chapter.)</td>
</tr>
<tr>
<td>F8: Print</td>
<td>To print the information on the screen, press this key.</td>
</tr>
</tbody>
</table>
Defining QC Products

To display this screen, press the **QC Alert** key on the touchscreen, then press **F5: Define QC Product**.

1. If a barcode label for the product is available, scan it, then use the function keys to change the default values as appropriate. Press **F7: Store**.
   
   If no barcode label is available, skip to step 2.

2. Type the QC product name and press **Enter**.

3. Type the product level and press **Enter**.

4. Type the QC Lot number. Press **Enter**.

5. Use **F3: Next QC Fld Lev** to select a QC Level.

6. Use **F4: Next Fluid** to select the fluid appropriate for the product.

7. Change the Active QC and Cal fields if this product will be active for daily QC and current calibrations. Press **Enter**.

8. Use the test keys to enter methods associated with the product.

9. Press **F7: Store**.

To enter additional levels of the product, change the Level and Fluid fields and press **F7: Store**.

---

**Another way to display this screen...**

From the Operating Menu, press

- **F5: Process Ctrl**
- **F3: QC Status**
- **F1: Define QC Product**
Editing QC Products

1. Display the Edit QC Products screen.

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Edit Product</td>
<td>Displays the information to be edited.</td>
</tr>
<tr>
<td>F2: Delete Product</td>
<td>Removes the highlighted product from the list.</td>
</tr>
<tr>
<td>F3: Sort by Prod/QC Fld/Fluid</td>
<td>Toggles among choices for sorting the QC products list by product name, QC fluid level, and fluid.</td>
</tr>
<tr>
<td>F4: Search</td>
<td>Displays all products related to a specific test method.</td>
</tr>
<tr>
<td>F6: Set QC Active/Set QC Inactv</td>
<td>Toggles between activating and deactivating QC.</td>
</tr>
<tr>
<td>F7: Set Cal Active/Set Cal Inactv</td>
<td>Toggles between activating and deactivating calibration.</td>
</tr>
<tr>
<td>F8: Print</td>
<td>Prints the information on the screen.</td>
</tr>
</tbody>
</table>

2. Highlight the product you want to edit and use the appropriate function keys to make changes.
Grouping QC Alerts

Use the QC Groups screen to combine methods with the same assigned QC product and active QC alert into one sample ID and cup. Using this feature lets you run QC on a maximum number of methods in a minimum number of cups.

1. Press the **QC Alert** key.
2. Press **F6: Group Alerts**.

<table>
<thead>
<tr>
<th>SAMP ID</th>
<th>QC LEVEL</th>
<th>QC FLUID</th>
<th>VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>SerumQC1</td>
<td>SERUM</td>
<td>40 µL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QC PRODUCT</th>
<th>METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample LYTE product</td>
<td>LYTE</td>
</tr>
<tr>
<td>Sample CREA GLU pro</td>
<td>GLU CREA</td>
</tr>
</tbody>
</table>

3. Move the cursor to a product.
4. Press **F1: Assign Sample ID**. Enter the ID by scanning the barcode or by typing it. Press **Enter**.
5. Repeat steps 3 and 4 for additional products.
6. To remove methods you do not want to process, highlight the method and press **F2: Delete Method**.
7. Press **F5: Load One** to select a sample for processing, or press **F6: Load All** to process all samples listed.
8. Press **F8: Print** to create a report of the QC group.
Quality Control Review
You can determine if your system is processing samples precisely and accurately by performing QC on your instrument. The instrument’s computer keeps track of the QC status of each method on the instrument.
To perform QC, process QC samples that have a known value and compare the measured results to that known value. There are a variety of QC rules for evaluating precision and accuracy. Check your laboratory guidelines for interpreting QC results.

Processing QC Samples
When you process a QC sample for a method, the system will run a test using each Flex® reagent cartridge lot that is on the system for that method. All QC samples, whether serum or urine, are automatically diluted just like patient samples.
When your test results are complete, the QC status for that method becomes valid, and the QC expiration time period begins. If you don’t process another QC sample before the QC expiration time period is up, the QC status for that method expires.
Using the Quality Control Status List screen, you can define the QC expiration time period. For example, if you set the QC expiration time period for CKMB to 24 hours, the QC status of each lot of CKMB on the system will expire every 24 hours unless another CKMB QC sample is processed. An expired QC causes the QC Alert key on the touchscreen to change to yellow.

Crossover QC
Before using a new lot of QC material, you will want to perform crossover QC tests on it. If you give a sample of the new lot of QC material a crossover QC priority (XQC) on the Enter Sample Data screen, the system will give you results for the sample that you can use to calculate your new QC ranges for the new lot. However, since the system does not compare these crossover QC results to the QC ranges of the current lot number of QC material, these results will not affect the QC status of the method. Crossover QC results are stored in the Method Review files.

QC for Urine Drugs of Abuse Methods
For QC of Urine Drugs of Abuse methods (AMPH, BARB, BENZ, COC, METH, OPI, PCP, THC) refer to the procedure “Processing Quality Control Tests” in the Urine Drugs of Abuse Supplement in the Method Insert Sheets binder. Follow this procedure exactly and be sure not to not use the SerumQC3 fluid for any QC sample. The SerumQC3 fluid is specifically reserved for calibration of these methods.

WARNING: For Urine Drugs of Abuse methods, negative and positive quality control samples must be run using the fluid types SerumQC1, SerumQC2, UrineQC1, or UrineQC2.

Processing QC samples as SerumQC3 will override the current calibration and could result in an erroneous calibration of these methods.
Entering QC Ranges

Use this screen to enter or modify the applicable QC ranges for a method.

Can I change the units?
Yes—but not using this screen. Go to the Method Parameters screen for that method, change the Result Units field there, and recalibrate/reverify the method before you run patient samples.

To delete a QC level for a method:
1. Move the cursor to the QC level to be deleted.
2. Press F4: Delete Level.

For a printout of all QC information:
Press F5: Print All.
This printout contains the QC ranges, expected mean, and expected SD for all methods in system memory.

1. From the Quality Control Ranges screen, press the test key for the method you want to edit.
   When you press the Lytes or Na/K test key, the Na method appears. Press F1: Next Method to see the K and Cl methods.

2. For each QC level, enter the QC range (low and high), expected mean, or expected SD as appropriate.
   The number of QC levels that you use determines how many days of QC data can be stored in the software for a method.

<table>
<thead>
<tr>
<th>QC levels set for each method</th>
<th>Days of QC results stored for each method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>270 days</td>
</tr>
<tr>
<td>3</td>
<td>180 days</td>
</tr>
<tr>
<td>4</td>
<td>135 days</td>
</tr>
<tr>
<td>5</td>
<td>108 days</td>
</tr>
</tbody>
</table>

Setting a QC Expiration Period and Checking QC Status

When a QC expiration period is exceeded, the QC Alert key on the touchscreen changes color to yellow. Use the Quality Control Status List screen to view and change expiration information.

Setting a QC Expiration Period

1. Using the Quality Control Status List screen, move the cursor to the Period (hrs) column of the desired method.
2. Enter the new expiration period in hours. QC expiration periods must be ≥4 hours and ≤24 hours and must be entered in one-hour units (e.g., 5, 8, 12, 24).
   
The system will change the expiration period for all lots of that method in system memory.

Checking QC Status

An asterisk (*) to the left of the QC Expires column (see the ALB method on the screen above) indicates that the QC for that reagent lot has expired.

To set the same expiration period for ALL methods:

1. Move the cursor to the Period (hrs) field for any method that already has that expiration time.
2. Press F4: Set All Same.

If no method has the expiration time you want to set:

1. Move the cursor to the Period (hrs) field for any method.
2. Enter the expiration period in hours.
3. Press F4: Set All Same.
Defining QC Panels

Use this screen to create up to 50 different QC panel definitions. Each definition is associated with a specific sample number, levels, fluids and methods. Panels are designed to run in short sample cups (SSC) placed on barcoded tubes. Only SSCs can be placed in tubes. Cups are not supported.

When an SSC with a panel ID is processed, the system:

- queries the LIS, if configured for the ID
- searches the QC panel database for a match

To define QC panels, display the Define QC Panels screen.

To complete this screen, you can either scan a barcode label or enter data manually.

Using Previously Defined QC Product

1  Press F6: Load from Prod to display the Select QC Product screen.

2  Highlight the product and press F1: Select Product.

3  Enter the appropriate values on the Define QC Product screen.

4  Press F5: Assign Sample ID. Enter a unique reusable number for the QC panel.

5  Review the displayed tests. To delete a test, highlight it and press F2: Delete Test.

6  Press F7: Store.
**Entering Data Manually**

2. Type the QC Product name and press Enter.
3. Move the cursor to the QC Lot and enter the value. Press Enter.
4. Use F3: Next QC Fld Lev to select the QC level.
5. Use to select the priority.
6. Press the test keys for up to 36 methods to be included in the panel. Volume is calculated automatically. A red volume field indicates too many tests for the SSC (950 µL maximum). Use F2: Delete Tests to remove tests until the volume field turns green.
7. Press F5: Assign Sample ID. Enter a specific reusable sample number for the panel.
8. Press F7: Store.
**Editing QC Panels**

1. Display the Edit QC Panel screen.

   ![Diagram of Edit QC Panel screen]

   - Sample ID
   - QC Product Name
   - QC Lot
   - QC Fluid
   - Level
   - Priority
   - Vol (µL)

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>QC Product Name</th>
<th>QC Lot</th>
<th>QC Fluid</th>
<th>Level</th>
<th>Priority</th>
<th>Vol (µL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1234</td>
<td>Bio Rad</td>
<td>A101</td>
<td>SerumQC3</td>
<td>QC</td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>44555</td>
<td>Bio Rad</td>
<td>A101</td>
<td>SerumQC1</td>
<td>QC</td>
<td>393</td>
<td></td>
</tr>
<tr>
<td>767676</td>
<td>Bio Rad</td>
<td>A101</td>
<td>SerumQC3</td>
<td>QC</td>
<td>257</td>
<td></td>
</tr>
</tbody>
</table>

2. Highlight the panel you want to edit and use the appropriate function keys to make changes.

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1:</td>
<td>Edit Panel Displays the information to be edited.</td>
</tr>
<tr>
<td>F2:</td>
<td>Delete Panel Removes the highlighted panel from the list.</td>
</tr>
<tr>
<td>F3:</td>
<td>Sort by Product Lists QC panels by product name, sample ID or level.</td>
</tr>
<tr>
<td>F4:</td>
<td>Search Displays all products related to a specific test method.</td>
</tr>
<tr>
<td>F8:</td>
<td>Print Prints the information on the screen.</td>
</tr>
</tbody>
</table>
Editing QC Panel Definitions
You can use the Edit QC Panel screen to edit panel definitions.

1. Move the cursor to the Sample ID to be edited.
2. Press **F1: Edit Panel** to display the Define QC Panels screen.

```
Define QC Panels

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>QC Product Name</th>
<th>QC Lot</th>
<th>QC Fluid Level</th>
<th>Priority</th>
<th>Vol (µL)</th>
</tr>
</thead>
</table>

Tests:
```

3. Move the cursor to field to be changed.
4. Type in the new QC product name or QC lot.
5. Use test keys to add tests and **F2: Delete Test** to remove tests.
6. Use the function keys to change Sample ID, QC Fluid Level and Priority.
7. Press **F7: Store**.
Using the Result Monitor Feature

Each Dimension® RxL Max® clinical chemistry system can collect its absorbance readings by method and lot of reagent, and then use this data to establish instrument-specific limits for that method. Any test result that exceeds these limits on this particular Dimension® instrument will generate an “abnormal assay” (abnl assay) flag on the test results printout. If this occurs, the result should not be reported and the sample should be rerun. Currently, this feature is not available for all methods.

The Result Monitor screen is divided into two sections. The left side (Limits) is used to activate a method and to enter/change method-specific limits. Periodically, as a result of internal testing, Dade Behring Inc. may communicate revisions to the Result Monitor limits. The right side (Accumulated Results) will be filled in by the instrument for each method that has been activated.

**Limits Side**

Includes an A column and a B column, depending on whether the methods used one or two monitoring checks. The fields in each column define the limit using either percentage or SD limits. Above Mean Factor numbers are given as a percentage factor of the mean absorbance result. For example, an upper limit of 1.20 indicates that the flag will be set if an individual results monitor is greater than 120% of the mean. A lower limit of 0.75 indicates a limit set at 75% of the mean. For the Mean Plus/Minus SD fields, the number entered is the factor times the SD to define the limit around the mean. For example, a Mean Plus/Minus SD factor of 6 indicates that the limits are 6 SDs above and below the mean absorbance value.
Accumulated Results Side
The Reagent Lot ID field displays the lots active on the instrument. To view accumulated results for a second reagent lot, use the F2 key to switch lots. The Status field shows whether the feature is actively checking results or collecting initial baseline data. The monitor columns display the mean, SD, lower and upper limits around the mean, and a count of the number of results checked and flagged. The results count does not begin until the baseline data are accumulated and the status is active.

To activate or deactivate a method, refer to the following procedure.

Activate or Deactivate a Method

1. From the Result Monitor screen, select one of the methods that can be used with this feature by pressing its method key or F1: Next Method.
2. Press F7: Method On/Off to turn the result monitor feature ON or OFF. The Result Monitoring in Effect field will indicate the on or off status.
3. Press F8: Store Params.
4. Repeat steps 1–3 for each method that you want to activate or deactivate.

F4: Zero Data Function Key
Do not press F4: Zero Data without first checking with your lab supervision or the Technical Assistance Center. This function key deletes (or zeroes) all data in the Accumulated Results portion of the screen and changes the Status field for the method to “Setting Baseline.”
<table>
<thead>
<tr>
<th>Method</th>
<th>Above Mean Factor</th>
<th>Below Mean Factor</th>
<th>Mean ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>ACP</td>
<td>1.25</td>
<td>1.25</td>
<td>0.80</td>
</tr>
<tr>
<td>ALDL</td>
<td>1.30</td>
<td>0.00</td>
<td>0.70</td>
</tr>
<tr>
<td>ALP</td>
<td>1.80</td>
<td>0.00</td>
<td>0.60</td>
</tr>
<tr>
<td>ALT</td>
<td>1.30</td>
<td>0.00</td>
<td>0.75</td>
</tr>
<tr>
<td>AMON</td>
<td>1.15</td>
<td>0.00</td>
<td>0.75</td>
</tr>
<tr>
<td>AST</td>
<td>1.20</td>
<td>0.00</td>
<td>0.75</td>
</tr>
<tr>
<td>BUN</td>
<td>1.08</td>
<td>0.00</td>
<td>0.80</td>
</tr>
<tr>
<td>CA</td>
<td>0.00</td>
<td>0.07</td>
<td>0.00</td>
</tr>
<tr>
<td>CCRP</td>
<td>1.25</td>
<td>1.10</td>
<td>0.65</td>
</tr>
<tr>
<td>CREA</td>
<td>2.00</td>
<td>1.00</td>
<td>0.80</td>
</tr>
<tr>
<td>CSA*</td>
<td>1.20</td>
<td>1.30</td>
<td>0.90</td>
</tr>
<tr>
<td>CSAE</td>
<td>1.20</td>
<td>1.10</td>
<td>0.90</td>
</tr>
<tr>
<td>CTNI*</td>
<td>1.19</td>
<td>0.00</td>
<td>0.83</td>
</tr>
<tr>
<td>DBIL</td>
<td>1.10</td>
<td>3.00</td>
<td>0.80</td>
</tr>
<tr>
<td>ECO2</td>
<td>1.12</td>
<td>2.00</td>
<td>0.88</td>
</tr>
<tr>
<td>FT4*</td>
<td>1.13</td>
<td>0.00</td>
<td>0.87</td>
</tr>
<tr>
<td>GGT</td>
<td>3.50</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>GLU</td>
<td>1.20</td>
<td>1.02</td>
<td>0.85</td>
</tr>
<tr>
<td>GLUC</td>
<td>1.20</td>
<td>1.02</td>
<td>0.85</td>
</tr>
<tr>
<td>HA1C</td>
<td>1.50</td>
<td>1.15</td>
<td>0.85</td>
</tr>
<tr>
<td>HIL</td>
<td>2.50</td>
<td>0.00</td>
<td>0.60</td>
</tr>
<tr>
<td>LI</td>
<td>1.18</td>
<td>0.00</td>
<td>0.82</td>
</tr>
<tr>
<td>LIDO</td>
<td>1.50</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>L/PBNP</td>
<td>1.40</td>
<td>40.00</td>
<td>0.80</td>
</tr>
<tr>
<td>MALB</td>
<td>4.00</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>MG</td>
<td>0.00</td>
<td>2.00</td>
<td>0.00</td>
</tr>
<tr>
<td>MYO*</td>
<td>1.20</td>
<td>0.00</td>
<td>0.80</td>
</tr>
<tr>
<td>NAPA</td>
<td>1.50</td>
<td>1.50</td>
<td>0.50</td>
</tr>
<tr>
<td>PALB</td>
<td>1.05</td>
<td>0.00</td>
<td>0.95</td>
</tr>
<tr>
<td>PBNP*</td>
<td>1.40</td>
<td>1.50</td>
<td>0.80</td>
</tr>
<tr>
<td>PHOS</td>
<td>1.20</td>
<td>0.00</td>
<td>0.75</td>
</tr>
<tr>
<td>PROC</td>
<td>1.50</td>
<td>1.50</td>
<td>0.50</td>
</tr>
<tr>
<td>PTN</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>RCRP</td>
<td>1.20</td>
<td>1.20</td>
<td>0.80</td>
</tr>
<tr>
<td>TACR*</td>
<td>1.20</td>
<td>1.20</td>
<td>0.80</td>
</tr>
<tr>
<td>TGL</td>
<td>1.50</td>
<td>0.00</td>
<td>0.80</td>
</tr>
<tr>
<td>TP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>TRIG</td>
<td>1.40</td>
<td>0.00</td>
<td>0.70</td>
</tr>
<tr>
<td>TSH</td>
<td>1.19</td>
<td>40.0</td>
<td>0.83</td>
</tr>
</tbody>
</table>

* HM method.
Entering Sample ID Information

Use the Sample ID/Computer Menu screen to configure the Dimension® RxL Max® system to the needs and operations of your laboratory as discussed below and on the following pages. After making changes, press F7: Store before exiting this screen.

There are four distinct portions of the Sample ID/Computer Menu screen:

- Segmented Wheel Setup
- Pediatric tube and SSC sample container configuration
- Bar Code Configuration
- Test Scheduling and Reporting

The Segmented Wheel Setup portion is used to indicate what information will appear automatically on the Enter Sample Data screen.

The PED/SSC sample container configuration portion is used to indicate the inside diameter of the PED tube or of the SSC container and, if desired, to designate those segments that will primarily be used with each type. The inside diameter must be entered before you can assign these segments.

The Bar Code Configuration portion is used to read and interpret the bar code system used by your laboratory and to set certain instrument actions when the bar code is read.

The Test Scheduling and Reporting portion is used to define information about test priority scheduling and test reporting on the instrument.

Reminder!
The system configurations have already been set to meet the requirements of your laboratory during instrument installation. Do not change an instrument option without approval from your laboratory supervisor.

About designating PED and SSC segments...
- The instrument will interpret any bar coded tube that it finds in a PED or SSC designated segment to be a PED tube or SSC container as appropriate.
- Whenever a PED or SSC designated segment letter is entered in the Position field on the Enter Sample Data screen, the Mode field will automatically change to PED or SSC, respectively. However, if you want to use another container for that position, you can do so by changing the Mode using F7: Next Mode.

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- The instrument will interpret any bar coded tube that it finds in a PED or SSC designated segment to be a PED tube or SSC container as appropriate.
- Whenever a PED or SSC designated segment letter is entered in the Position field on the Enter Sample Data screen, the Mode field will automatically change to PED or SSC, respectively. However, if you want to use another container for that position, you can do so by changing the Mode using F7: Next Mode.

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<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segmented Wheel Setup</td>
<td></td>
</tr>
<tr>
<td>Default Mode</td>
<td>The Mode field on blank Enter Sample Data screens will default to this. Use <strong>F8: Next Setting</strong> to select other modes.</td>
</tr>
<tr>
<td>Default Fluid</td>
<td>The Fluid field on blank Enter Sample Data screens will default to this entry. Use <strong>F8: Next Setting</strong> to select other fluids.</td>
</tr>
<tr>
<td>Sample Edit</td>
<td>Indicates the type of sample container that will be assigned to all downloaded samples that are assigned segment positions by the operator from the Sample Status screen. Use <strong>F8: Next Setting</strong> to select a sample container type.</td>
</tr>
<tr>
<td></td>
<td>If this field is set to No Default, sample positions cannot be assigned for downloaded samples using the Sample Status screen.</td>
</tr>
</tbody>
</table>

### Pediatric Tube and SSC Containers

**Pediatric Tube Segments**

Indicates those segments that have been configured for Pediatric tubes. Move the cursor to this field, press **F5: Add Segs**, enter the segment letters and press **Enter**, then press **F7: Store**. The Mode field on the Enter Sample Data screen defaults to PED Tube when positions in these segments are entered.

**PED Tube I.D. (mm)**

The inside diameter in millimeters of the PED tube used by your laboratory.

**SSC**

Indicates those segments that have been configured for SSC containers. Move the cursor to this field, press **F5: Add Segs**, enter the segment letters and press **Enter**, then press **F7: Store**. The Mode field on the Enter Sample Data screen defaults to SSC when positions in these segments are entered.

**SSC I.D. (mm)**

The inside diameter in millimeters of the SSC container. The inside diameter of the SSC container is 8 mm.

*If you configure PED and SSC segments...*

The same segment cannot be configured as both a PED and an SSC segment.
### Field | Explanation
--- | ---
**Test Scheduling/Reporting**

**Schedule Tests**

- **STAT tests are always run first...**
  
  Using either of the two “optimize” selections for the Schedule Test field does not alter the scheduling of STAT tests. STAT tests are always run first!

- **Priority Panels:**
  
  Decide how to define these two fields depending on your specific needs.

  The Priority Panel (schedule) and Priority Panel (report) fields do not need to have the same information in them. You could define different panels for use in each of these fields. For example, you could define a priority panel (schedule) of ACP so it would be scheduled first, and define the priority panel (report) to be GLU and LYTES so that these two results print out as soon as they are available.

- **Priority Panel (schedule)**

  Allows specific tests within samples to be given a higher scheduling priority than the sample itself. This enables critical tests to be processed in a STAT-like manner while the remainder of the tests for the sample are processed with the priority given that sample on the Enter Sample Data screen (or downloaded through a host computer). When a priority panel schedule is requested on a sample, the system will raise the priority of the tests in the designated panel one level above the other tests requested on that sample.

  - **NOTE:** The priority scheduling option is not active for QC samples, or samples that include multiple test requests of the same method, or samples that include pretreated tests. All tests in the priority panel must be ordered for sampling to occur.

  Enter the number of the panel key that you have defined to contain your priority scheduled tests. Then select “STAT only” or “All samples.”

  • If “STAT only” is selected, the priority panel will be performed only on samples that were entered as STAT.
  
  • If “All samples” is selected, the priority panel will be performed on all samples, regardless of their priority.

  **Priority Panel (report)**

  Enables the system to print a test report for a sample as soon as all the tests in the indicated panel are completed.

  **Before enabling priority panel reporting, you must ensure that the host computer is capable of receiving two reports for the same sample. If you are not sure of this, check with your local host computer consultant.**

  In addition, when the remaining tests of the sample are completed, another report is prepared that will include all tests (including the priority panel tests) requested on the sample. The priority of the priority panel report printout is STAT, so that it can be distinguished from the final sample report.

  - **NOTE:** The priority scheduling option is not active for QC samples, or samples that include multiple test requests of the same method, or samples that include pretreated tests. All tests in the priority panel must be ordered for sampling to occur.

  Enter the number of the panel key that you have defined to contain your priority report tests. Then select “STAT only” or “All samples” as discussed above for Priority Panel (schedule).
<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Code Configuration</td>
<td>Indicates the test panel that will be run on a bar coded sample if the system cannot find any patient data for that sample. Use the keyboard to enter a panel number. If you don’t want to select a default panel, enter a zero in this field.</td>
</tr>
<tr>
<td></td>
<td><strong>Processing Whole Blood Samples</strong>: Do not configure a default panel if you process whole blood samples. If you have configured a default panel, it is strongly recommended that you deconfigure the option to avoid the potential for inappropriately processing the default panel tests from a whole blood sample.</td>
</tr>
<tr>
<td>Default Test Panel</td>
<td>Indicates the test panel that will be run on a bar coded sample if the system cannot find any patient data for that sample. Use the keyboard to enter a panel number. If you don’t want to select a default panel, enter a zero in this field.</td>
</tr>
<tr>
<td>Download Pretreats</td>
<td>Indicates whether samples with pretreatment tests can be downloaded from your laboratory LIS. Use <strong>F2: Pretreats</strong> to select from <strong>YES</strong> or <strong>NO</strong>.</td>
</tr>
<tr>
<td>Bar Code Label Format</td>
<td>Indicates the format of the bar code used by your laboratory. Use <strong>F8: Next Setting</strong> for other formats recognized by the system.</td>
</tr>
<tr>
<td>Label Length</td>
<td>Indicates the field length of the bar codes used by your laboratory. This field can be zero or a number from 3 to 12.</td>
</tr>
<tr>
<td>Leading Zeros</td>
<td>Indicates whether the system will recognize zeros that precede a bar code. If <strong>YES</strong> is selected, you must enter all the zeros that precede the bar code when entering a Sample No. on the Enter Sample Data screen. Use <strong>F3: Zero’s Yes/No</strong> to make your selection.</td>
</tr>
<tr>
<td>Translate TCO2 to ECO2</td>
<td>If turned ON, lets the system interpret an LIS request for test method TCO2 as a request for test method ECO2.</td>
</tr>
<tr>
<td>Translate Low Volume Test Method Names</td>
<td>If turned ON, lets the system interpret LIS requests for test methods HCG, MMB and CTNI as requests for LHCG, LMMB, and LTNI when you use reduced test Flex® reagent cartridges for those methods.</td>
</tr>
</tbody>
</table>
Using Test Counters

The Test Counters program keeps track of how many tests of each method have been run on the instrument. Only tests that consumed reagent are included in this count.

Fields that appear on this display are explained below:

<table>
<thead>
<tr>
<th>Fields</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Results</td>
<td>Includes all patient tests that produced a reportable result. Test results that contained an “aborted test,” “no reagent,” or “not calibrated” processing message are not counted because they did not consume reagent.</td>
</tr>
<tr>
<td>Conditional Results</td>
<td>Includes all patient tests that produced a reportable result and included an error code with the result (any processing messages except for those listed above in Total Results). The Conditional Results count is included in the Total Results count.</td>
</tr>
<tr>
<td>QC/Calib</td>
<td>Includes all QC and Calibration tests that produced a printed result and consumed reagent. The QC/Calib count is not included in the Total Results count.</td>
</tr>
<tr>
<td>Last Saved</td>
<td>The count that was in the Total Results column when F8: Save Counts was last pressed.</td>
</tr>
<tr>
<td>Tests Since Last Save</td>
<td>The difference between the Total Results column and the Last Saved column.</td>
</tr>
</tbody>
</table>

Pressing F8: Save Counts will copy the Total Results count into the Last Saved column and reset the Tests Since Last Save field to 0 (zero). Since you are requesting the instrument to overwrite the Last Saved count, you will be prompted with a message asking whether you want to continue.
Storing Laboratory Data

With the Store Laboratory Data feature, you can store QC records, patient test results, and calibrations on preformatted DOS diskettes or, if enabled, a USB storage device.

**CAUTION!** You must always use **new** disks for this procedure. Reusing a disk may result in incorrect data.

The format of the stored files is compatible with the Microsoft® Excel spreadsheet program so you can use the data on another computer to produce customized reports.

The data retrieved using this feature cannot be restored to the Dimension® system and should not be considered a means of emergency backup for test results and QC records. Always follow your lab’s specific procedures for the proper storage and retention of patient test results, quality control records and instrument printouts.

Based on your instrument's volume, you may want to establish a routine time interval for storing data via this feature.

Perform this procedure for *only one* data type at a time. To store data:

1. With the instrument in Standby, display the Store Laboratory Data screen:

2. Press one of the following keys:
   - **F5: QC On/Off** to store QC results (changes field to **ON**).
   - **F6: Tst Rst On/Off** to store Test Results (changes field to **ON**).
   - **F7: Calib On/Off** to store Calibrations (changes field to **ON**).

3. If the USB storage option is not enabled, skip to step 4. If the option is enabled, but you want to use diskettes instead, press **F4: Select Floppy** and go to step 4.

   If you are using the USB option, connect the storage device to the instrument computer and press **F1: Store Data**. When finished, disconnect the device and label appropriately. You can skip the remaining steps in this procedure.

---

Why can't I store Calibrations?

Your system must use the optional EQCC feature in order to store calibration data.

Contact Dade Behring Inc. for more information.
4 If you are using diskettes for storage, the system calculates the size of the file to determine whether one or multiple preformatted DOS disks will be needed.

- If the function key **F1: Store Data** appears, you need only one disk to store the selected data. Continue with step 5.
- If the function key **F3: Str Mult Disks** appears, you need more than one disk to store the selected data. Skip to step 8.

5 Press **F1: Store Data** and follow the prompts to remove the Dimension® RxL Max® system backup disk and insert a new preformatted DOS disk. Then press the **Enter** key.

6 After the disk drive light goes out, remove the preformatted DOS disk and reinsert the Dimension® system backup disk.

7 Be sure to label the disk holding the results file.

8 If you don’t want to use multiple disks, press **F2: Chg Date Range**. Enter new dates to reduce the number of days covered. This should reduce the file size to fit on one disk. Then perform steps 5 through 7. Otherwise, continue with step 9.

9 To use multiple disks, press **F3: Str Mult Disks** and follow the prompts to remove the Dimension® RxL Max® system backup disk and insert a new preformatted DOS disk.

10 Press the **Enter** key. Prompts on the screen tell you when to insert new preformatted DOS disks and when to reinsert the backup disk.

   **Be sure that the disk drive light is out before you remove a disk.**

11 Label the disks holding the results files.

**How the Data is Stored**

The data is stored in fields in a tab delimited text file. The extension .xls lets you open it on your computer using the Microsoft® Excel spreadsheet program. When you open the file using the Excel application, the text appears with commas and tabs separating the fields. Use the Excel text import wizrd to format the fields into columns and rows.

The examples on the next page show Microsoft® Excel spreadsheets resulting from a qcdat.xls, rsdat.xls files and cldat.xls. The column headings shown are not in the file downloaded from the Dimension® RxL Max® system. You must supply your own column headings when creating the Excel file.

---

**Files Names for Labels**

- Qc results: qcdat.xls
- Test results: rsdat.xls
- Calibrations: cldat.xls

Multiple files are numbered, e.g., qcdat1.xls, qcdat2.xls, etc.
### Example of Quality Control Results (qcdat.xls) File

<table>
<thead>
<tr>
<th>Method</th>
<th>QC level</th>
<th>Result</th>
<th>HI/LO</th>
<th>QC Lo</th>
<th>QC Hi</th>
<th>Error</th>
<th>Units</th>
<th>Prod Name</th>
<th>QC Lot #</th>
<th>Flex Lot #</th>
<th>Inst Type</th>
<th>Inst ID</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Serum QC2</td>
<td>142</td>
<td>137</td>
<td>146</td>
<td>mmol/L</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Serum QC2</td>
<td>6.1</td>
<td>5.8</td>
<td>6.2</td>
<td>mmol/L</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>Serum QC2</td>
<td>101</td>
<td>96</td>
<td>104</td>
<td>mmol/L</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECO2</td>
<td>Serum QC2</td>
<td>26</td>
<td>22</td>
<td>27</td>
<td>mmol/L</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CREA</td>
<td>Serum QC2</td>
<td>6.2</td>
<td>6.1</td>
<td>6.4</td>
<td>mg/dL</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>ABI234</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUN</td>
<td>Serum QC2</td>
<td>55</td>
<td>50</td>
<td>54</td>
<td>abnl assay</td>
<td>mg/dL</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>CD4567</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
</tr>
<tr>
<td>GLU</td>
<td>Serum QC2</td>
<td>270</td>
<td>265</td>
<td>276</td>
<td>mg/dL</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>EF3345</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>Serum QC2</td>
<td>8.9</td>
<td>9.2</td>
<td>9.4</td>
<td>mg/dL</td>
<td>QC PROD 2</td>
<td>ABC 12345</td>
<td>GH3355</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>8:45AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Example of Test Results (rsdat.xls) File

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Sample No.</th>
<th>Method</th>
<th>Result</th>
<th>HI/LO</th>
<th>hp/lp</th>
<th>R Lo</th>
<th>R Hi</th>
<th>Error</th>
<th>Units</th>
<th>Fluid</th>
<th>Flex Lot #</th>
<th>Inst Type</th>
<th>Inst ID</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>2003051234</td>
<td>NA</td>
<td>140</td>
<td>136</td>
<td>145</td>
<td>mmol/L</td>
<td>Serum</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:45AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 1</td>
<td>2003051234</td>
<td>K</td>
<td>4.2</td>
<td>3.5</td>
<td>5.1</td>
<td>mmol/L</td>
<td>Serum</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:45AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 1</td>
<td>2003051234</td>
<td>CL</td>
<td>98</td>
<td>98</td>
<td>107</td>
<td>mmol/L</td>
<td>Serum</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:45AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 1</td>
<td>2003051234</td>
<td>ECO2</td>
<td>26</td>
<td>21</td>
<td>32</td>
<td>mmol/L</td>
<td>Serum</td>
<td>LYTEs</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:45AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 2</td>
<td>2003051256</td>
<td>CREA</td>
<td>3.8</td>
<td>0.6</td>
<td>1.3</td>
<td>mg/dL</td>
<td>Serum</td>
<td>AB1234</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:47AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 2</td>
<td>2003051256</td>
<td>BUN</td>
<td>55</td>
<td>7</td>
<td>18</td>
<td>abnl assay</td>
<td>mg/dL</td>
<td>Serum</td>
<td>CD4567</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:47AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 2</td>
<td>2003051256</td>
<td>GLU</td>
<td>356</td>
<td>70</td>
<td>110</td>
<td>mg/dL</td>
<td>Serum</td>
<td>EF3345</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:47AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 2</td>
<td>2003051256</td>
<td>CA</td>
<td>8.1</td>
<td>8.5</td>
<td>10.1</td>
<td>mg/dL</td>
<td>Serum</td>
<td>GH3355</td>
<td>DIMMAX</td>
<td>12345</td>
<td>5/2/2003</td>
<td>9:47AM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Example of Calibrations (cldat.xls) File

<table>
<thead>
<tr>
<th>Meth</th>
<th>Lot</th>
<th>Date</th>
<th>Time</th>
<th>Cal Product</th>
<th>Cal Lot</th>
<th>Calc Type</th>
<th>Set Up By</th>
<th>Accepted By</th>
<th>Mode</th>
<th>Cal ID</th>
<th>Instr SN</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALB</td>
<td>BM7123</td>
<td>6/12/2006</td>
<td>10:24 AM</td>
<td>tp/alb cal</td>
<td>Sedo65</td>
<td>LINEAR</td>
<td>gk</td>
<td>Operator</td>
<td>606121424 ALB.BM7123</td>
<td>973875</td>
<td>-1.8086</td>
<td></td>
</tr>
<tr>
<td>TSH</td>
<td>FK6280</td>
<td>6/12/2006</td>
<td>10:30 AM</td>
<td>thy cal</td>
<td>3d009</td>
<td>LOGIT</td>
<td>gk</td>
<td>Operator</td>
<td>606121430 TSH.FK6280</td>
<td>973875</td>
<td>-2451.12</td>
<td></td>
</tr>
<tr>
<td>CREA</td>
<td>CR7055</td>
<td>6/12/2006</td>
<td>10:24 AM</td>
<td>chem1</td>
<td>6ad039</td>
<td>LINEAR</td>
<td>gk</td>
<td>Operator</td>
<td>606121424 CREA.CR7055</td>
<td>973875</td>
<td>-0.4381</td>
<td></td>
</tr>
<tr>
<td>BUN</td>
<td>EM7047</td>
<td>6/12/2006</td>
<td>10:24 AM</td>
<td>chem1</td>
<td>6ad039</td>
<td>LINEAR</td>
<td>gk</td>
<td>Operator</td>
<td>606121424 BUN.EM7047</td>
<td>973875</td>
<td>-0.6063</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>BF7059</td>
<td>6/13/2006</td>
<td>10:45 AM</td>
<td>CHEM1 CALI</td>
<td>SJD200</td>
<td>LINEAR</td>
<td>LB</td>
<td>gep</td>
<td>Operator</td>
<td>606131445 CA.BF7059</td>
<td>-290.6962</td>
<td></td>
</tr>
<tr>
<td>ALB</td>
<td>BM7123</td>
<td>6/15/2006</td>
<td>10:10 AM</td>
<td>TP/ALB CL</td>
<td>SJD204</td>
<td>LINEAR</td>
<td>gep</td>
<td>gep</td>
<td>Operator</td>
<td>606131509 BM7123</td>
<td>-1.446</td>
<td></td>
</tr>
<tr>
<td>AMON</td>
<td>CN6245</td>
<td>6/15/2006</td>
<td>11:59 AM</td>
<td>AMON VERIF</td>
<td>SGN061</td>
<td>LINEAR</td>
<td>gep</td>
<td>gep</td>
<td>Operator</td>
<td>606131536 AMON.CN6245</td>
<td>0.1521</td>
<td></td>
</tr>
<tr>
<td>GLU</td>
<td>CN6301</td>
<td>6/15/2006</td>
<td>8:39 AM</td>
<td>CHEM1 CALI</td>
<td>SJD200</td>
<td>LINEAR</td>
<td>gep</td>
<td>gep</td>
<td>Operator</td>
<td>606151209 GLU.CN6301</td>
<td>19.492</td>
<td></td>
</tr>
<tr>
<td>BUN</td>
<td>EM7047</td>
<td>6/15/2006</td>
<td>8:10 AM</td>
<td>CHEM1 CALI</td>
<td>SJD200</td>
<td>LINEAR</td>
<td>gep</td>
<td>gep</td>
<td>Operator</td>
<td>606151210 BUN.EM7047</td>
<td>6.1172</td>
<td></td>
</tr>
</tbody>
</table>
### Understanding the Data Fields

#### Fields in qcdat.xls File

These fields are from example shown in this chapter of field structure in QC data. Since headings are not included in the data download, your report may be different.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Abbreviation for the test method</td>
</tr>
<tr>
<td>QC level</td>
<td>Shows one of these QC levels: SerumQC1, SerumQC2, SerumQC3, UrineQC1, UrineQC2</td>
</tr>
<tr>
<td>Result</td>
<td>Shows the QC test result.</td>
</tr>
<tr>
<td>HI/LO</td>
<td>Might show one of these indicators: HI – result exceeds high QC value, LO – result is below low QC value</td>
</tr>
<tr>
<td>QC Lo</td>
<td>The operator-entered low value for QC range.</td>
</tr>
<tr>
<td>QC Hi</td>
<td>The operator-entered high value for QC range.</td>
</tr>
<tr>
<td>Error</td>
<td>Error, if any, for the result.</td>
</tr>
<tr>
<td>Units</td>
<td>Units used for the method.</td>
</tr>
<tr>
<td>Prod Name</td>
<td>The name entered by the operator in the Patient Name field (on Enter Sample Data screen) or downloaded from the LIS.</td>
</tr>
<tr>
<td>QC Lot #</td>
<td>The lot number entered by the operator in the Sample No. field (on Enter Sample Data screen) or downloaded from the LIS.</td>
</tr>
<tr>
<td>Flex Lot #</td>
<td>Lot number of the Flex® reagent cartridge used in the QC run. Note: LYTE will appear in this field for Na, K, and Cl.</td>
</tr>
<tr>
<td>Inst Type</td>
<td>DIMMAX means Dimension® RxL Max® system.</td>
</tr>
<tr>
<td>Inst ID</td>
<td>Unique identifier entered in the Instrument ID field in the Communication Set Up screen.</td>
</tr>
<tr>
<td>Date</td>
<td>The date the instrument reported the QC result.</td>
</tr>
<tr>
<td>Time</td>
<td>The time the instrument reported the QC result.</td>
</tr>
</tbody>
</table>
**Fields in rsdat.xls File**

These fields are from the example shown in this chapter of field structure in test results. Since headings are not included in the data download, your report may be different.

- **Patient Name**: Name of the patient entered in the ENTER DATA screen or downloaded from LIS.
- **Sample No.**: Sample number entered on the ENTER DATA screen or downloaded from LIS.
- **Method**: Abbreviation for the test method.
- **Result**: Shows the patient test result.
- **Hi/LO hp/Ip**: Might show one of these indicators:
  - HI – result exceeds high reference value
  - LO – result is below low reference value
  - hp - result exceeds high panic value
  - Ip - result exceeds low panic value
- **R Lo**: The operator-entered low reference value for the method.
- **R Hi**: The operator-entered high reference value for the method.
- **Error**: Error, if any, for the result.
- **Units**: Units used for the method.
- **Fluid**: Fluid type tested.
- **Flex Lot #**: Lot number of the Flex® reagent cartridge used in the run.
  - Note: LYTE will appear in this field for Na, K, and Cl.
- **Inst Type**: DIMMAX means Dimension® RxL Max® system.
- **Inst ID**: Unique identifier entered in the Instrument ID field in the Communication Set Up screen.
- **Date**: The date the instrument reported the test result.
- **Time**: The time the instrument reported the test result.
Fields in cldat.xls File

These fields are from the example shown in this chapter of field structure in calibration data. Since headings are not included in the data download, your report may be different. The example shows a small number of the fields used for storing calibration data.

- **Meth**: Abbreviation for method that was calibrated
- **Lot**: Reagent lot number that was calibrated
- **Date**: Date calibration was accepted
- **Time**: Time of day calibration was accepted
- **Cal Product**: Name of calibrator product used
- **Cal Lot**: Lot number of calibrator product used
- **Calc Type**: Calibration calculation type: Logit, linear, verify
- **Set Up By**: Operator who set up the calibration
- **Accepted By**: Operator who accepted the calibration (if auto-accept, operator who entered the parameters)
- **Mode**: Calibration mode: Operator, Instr-Default, or Instr-Customized
- **Cal ID**: System-assigned calibration ID
- **Instr SN**: Instrument serial number
- **C0, C1, C2, C3**: Coefficients used in calibration calculation
- **E Coeff**: Coefficient used in HA1C calibration
- **esd**: Standard Deviation for HA1C E Coeff only
- **Trip Level**: Trip point, extended vs. short read, used only in HM methods
- **Scaler A, B, C, D**: If used, apply to HA1C or PBNP calibrations only
- **Units**: Measurement units
- **BV #**: Bottle value entered for the calibration level; this field appears multiple times, identified by the level number it is associated with
- **Mean#**: Mean of results; this field appears multiple times, identified by the level number it is associated with
- **SD#**: Standard deviation of results for the level; this field appears multiple times, identified by the level number it is associated with
- **Lev#, Rep#**: Result concentration replicate for the level; this field appears multiple times, identified by the QC fluid level number it is associated with
- **QC Level**: Level of related QC material; this field appears multiple times, identified by the number it is associated with
- **QC Result**: QC result displayed when calibration was accepted; this field appears multiple times, identified by the QC fluid level number it is associated with
- **QC Error#**: Identifies error during QC processing
- **Ref Range Lo, Hi**: Low and high end of QC reference range when calibration was accepted; this field appears multiple times, identified by the QC fluid level number it is associated with
- **QC out?**: Lo, Hi or blank as compared to reference range.
- **HB BV L3/L4**: Bottle value for HB level; this field appears multiple times, identified by the level number it is associated with
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB SD L3/L4</td>
<td>Standard deviation for HB level results; Bottle value for HB level; this field appears multiple times, identified by the level number it is associated with</td>
</tr>
<tr>
<td>Hb 3-1/4-1</td>
<td>Result 1 for HB level; Bottle value for HB level; this field appears multiple times, identified by the level number it is associated with</td>
</tr>
<tr>
<td>Hb 3-2/4-2</td>
<td>Result 2 for HB level; Bottle value for HB level; this field appears multiple times, identified by the level number it is associated with</td>
</tr>
<tr>
<td>m</td>
<td>Slope of curve when calibration was accepted</td>
</tr>
<tr>
<td>b</td>
<td>Intercept when the calibration was accepted</td>
</tr>
<tr>
<td>r</td>
<td>Correlation coefficient when the calibration was accepted</td>
</tr>
</tbody>
</table>
Test Key Assignments

You can customize the key(s) used to select a test method by programming keys using the Assign Method Keys screen.

The key assignment for each method in the Dimension® instrument test menu is preset in the software. However, these preset (or default) key assignments may not be convenient to use in your laboratory because:

- the laboratory does not run all these methods.
- you want to group the methods you do run.

The test keys have been assigned numbers to use with the Assign Method Keys screen. The illustration at the bottom of this page shows the number given to each test key.

Each test key has four possible positions for assigning test methods. These are referred to as positions 1 – 4. However, some positions on these test keys cannot be customized since they already have a specific purpose. For example, Position 1 on test keys 11 – 15 and 26 – 30 is reserved for use as a Panel key.

Follow the “Programming Test Keys” procedure on the next page to program your test keys.
Programming Test Keys

1. Go to the Assign Method Keys screen. Use the function keys F1 - F4 to select the view you want to use in programming your method(s).

   **Different ways to view your test key assignments:**
   
   **F1: View By Method**
   Test key assignments sorted alphabetically by method. This is the view that always appears when you enter the Assign Method Keys screen.

   **F2: View By Group**
   Test key assignments sorted by the additional keys (none, Shift, Control, Alt) used with a key.

   **F3: View By Key**
   Test key assignments sorted by key number.

   **F4: Unassigned**
   Displays the Unassigned Method Keys screen. Use this screen to see what key/ key combinations have not been assigned to a method.

2. Move the cursor to the method. Use the current key(s) assigned to the method (or use the page up, page down, and arrow keys) to locate the method.

3. With the method highlighted, press **F5: Assign Key** and then press the new key(s) you want to assign to that method. After pressing the new key(s), a message will appear to indicate the change you made. If your new key assignment causes a method that you run in your laboratory to be unassigned, you should reassign it at this time following steps 2 and 3.

4. Repeat steps 2 and 3 to program keys for other methods

5. After changing the method(s), press **F8: Store** and enter your password when prompted.

To return to the default key assignments in the software:

Press **F6: Default Keys**
Automatic Cuvette Removal

If your system will be idle for a long period, such as overnight or through a weekend, you may want to activate the Automatic Cuvette Removal option. With this option you can specify a number of idle hours after which all used cuvettes will be removed from the cuvette wheel. For example, if you activate this option and select 4 hours as the time period, cuvettes will be removed after the instrument has been in Standby for four continuous hours.

The time period choices for this option are 4, 8, 12, 16, 20 and 24 hours.

To activate Automatic Cuvette Removal:

1. Display the Process Control Secondary Menu:

2. Press **F5: Cuvt Auto Rem** until the number of hours you want is displayed. The specification remains in effect until you change it to OFF or to a different number of hours.
Selecting a Test Result Order

To delete a test...
Use the arrow keys to highlight the test in the box and press F2: Delete Test. The next test you select will appear wherever the cursor is located.

Do not use Default Fill
After you select your specific test order, do not use F4: Default Fill to select the remaining tests. Using this option will change your selection.

Want to start over again?
Press F3: Clear Screen.

To print out this selected order...
Press F5: Print Order.

1. From the Test Result Order screen, use the test keys to select the first test you want to have printed on your test results printout.
   The test will appear on the lower portion of the screen and also be highlighted on the top portion of the screen.
2. When you have finished selecting the order of tests for your test result printout, press F1: Store Changes.
3. Use F8 to select how you want these tests to appear on the test result printout. F8 toggles between Selected Ord and Sample Seq.
   - Press F8: Selected Ord to list your test results in the order you selected using this procedure (Selected Order);
   - Press F8: Sample Seq to list them in the order in which the tests were actually processed (Sample Sequence).
   A message prompt will appear indicating which order you have selected.
7: User-Defined Methods on the Dimension® RxL Max® clinical chemistry system

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Use this page for Notes
User-Defined Methods

This section contains all the information that you need to understand and operate the User-Defined Method feature on the Dimension® RxL Max® clinical chemistry system.

It enables users to define their own methods using reagents that are not purchased from Dade Behring Inc. Users define their methods by choosing the characteristics that fully describe an analysis. Up to ten methods can be defined and stored.

Dade Behring Inc. provides validated instructions for using certain Emit® assays as user-defined methods. Contact the Technical Assistance Center or your local representative for the method-specific Application Sheet.

All methods that have been defined in User-Defined Methods are requested for sample processing in the same way that Dade Behring methods are requested. They can be processed along with Dade Behring methods in random, batch, or profile modes.

Before using User-Defined Methods, you should be familiar with the basic operation of the Dimension® system because the procedures for calibrating, performing quality control, and running patient samples are the same as for Dade Behring Inc. methods.

To program and run a user-defined method, you will need to perform the following 12 steps in sequence:

1. Enter the method reaction parameters on the User-Defined Method screen.

2. Program your calculations on the template and calculation screens.

3. Accept your template.

4. Accept your calculation.

5. Store the method reaction parameters and calculation routine.

6. Print the method reaction parameters and calculation routine.

7. Enter the method parameters under the System Configuration screen.

8. Fill a Flex® reagent cartridge.

9. Load a Flex® reagent cartridge.

10. Calibrate your method.

11. Run QC samples.

12. Run patient samples.

Identifying the Method

Defining the Reagent and Sample Deliveries

Defining the Photometry Reading Times

Defining the Flex® Cartridge Configuration

Defining the Calculation

Storing a User-Defined Method

Entering User-Defined Method Parameters

Filling a Flex® Cartridge

Loading the Flex® Cartridge

Calibration and QC of User-Defined Methods

Running a User Defined Method
**Customer Responsibility**

The Customer assumes all responsibility for the selection of the proper reagents and entering the proper test parameters, use of the proper test protocol, correctness of the test results, and any associated errors or omissions.

**Warranty**

DADE BEHRING INC. EXPRESSLY DISCLAIMS ALL WARRANTIES WITH RESPECT TO THIS USER-DEFINED METHODS PRODUCT WHETHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Since Dade Behring Inc. does not manufacture the reagents that our customers may use in the user-defined Flex® reagent cartridge, the warranty for the Dimension® RxL Max® clinical chemistry system does not extend to the performance of user-defined reagents (including user-defined test results or standard Dimension® RxL Max® system test results that are affected by user-defined testing), their effect on the system operation and types and frequency of maintenance, or their effect on operator safety.
Identifying the Method

Is there any significance to the colored characters?
Yes. You cannot change fields that have blue characters. Only fields with white characters can be changed.

F6: Undo Changes?
This function key will erase all changes on the screen that were made since the method was last stored.

Method Identification Fields

Field | Information
--- | ---
Channel | Ten channels (numbers 1–10) are available for user programming.
Name | User-defined method names always start with an X. You can add up to three additional characters (XABC, XAB1, etc.). Each user-defined method must have a different name.
Mode | Absorbance or Turbidimetric.
Defining the Reagent and Sample Deliveries

Reagent Delivery R1

1. Enter a delivery time (in seconds) for the reagent to be delivered. The delivery time for R1 is preset and cannot be changed.
2. Select a component (Component 1) for the reagent delivery by pressing F1: Next Select.
3. Enter the volume of Component 1 to be added to the cuvette.
4. If your method requires more than one component, repeat steps 2 and 3 for Components 2 and 3 as necessary.
5. Enter the volume of chase to follow the reagent delivery.
6. Select a mix level for the reagent delivery by pressing F1: Next Select.

Sample Delivery (S1)

1. Enter the volume of sample to be added to the cuvette. Sample volumes can range from 2 µL to 60 µL.
2. Enter the volume of chase to follow the sample delivery.
3. Select a mix level for the sample addition by pressing F1: Next Select.

Reagent Deliveries R2 and R3

Repeat steps 1 through 6 in “Reagent Delivery R1” above for a second (R2) and third (R3) delivery as required by your method.
### Reagent and Sample Delivery Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Time  | R1 –57.6 seconds. Cannot be changed.  
|       | S1 00.0 seconds. Cannot be changed.  
|       | R2 Enter any time between 60.0 and 257.3 seconds.  
|       | R3 Must be at least 30 seconds later than R2 but not more than 461.3 seconds. In addition, you may not specify a time between 257.3 and 389.3 seconds. Refer to the "Error Message List" at the end of this module for details on timing restrictions.  
|       | The R2 and R3 times that actually appear on the screen when you press Enter may be a few seconds different from the times that you entered because of the competitive scheduling of the instrument.  

#### Component

A component is a reagent that is stored in a well of the Flex® cartridge. The cartridge may contain up to five different components, but a component may be stored in more than one well. You may add as many as three components in any single reagent delivery. Components are designated by the letters A–E and correlate to well positions 1–5 in the Flex® cartridge. Refer to “Filling a Flex® Cartridge” for details on specifying the location of components within a cartridge. No order of use or delivery is implied by these letters.

#### Volume

Enter volume in increments of whole µL. The total sample volume delivered (including chase) must be less than 100 µL. Total volume, V, in the cuvette (includes reagent, chase, and sample volumes) must be between 350 and 500 µL. We recommend that you use at least 15 µL of chase per reagent delivery to ensure that the reagents are adequately washed from the probe.

#### Chase

Chase is a diluent (water) supplied by the instrument to flush the reagent lines, sample probes, or systems after an addition. Enter any amount of chase (water) that is consistent with the volume limitations described above and the mix strength described below.

#### Mix

Describes how vigorously to mix the reagent components (or sample) and chase. GENTLE, MODERATE, STRONG, or NONE are the available choices. The mix strength involves a combination of how long the solution is mixed, how much energy is used, and how many pulses are applied. For gentle mixes, the ultrasonics pulse for longer times at a lower energy level, while strong mixes occur over a shorter time period with a higher energy level.

When selecting a mix level you should:
- be careful to prevent foaming.
- consider the chemical properties (such as viscosity) of the reagent(s) and sample.

The reagent chase volume must be at least 20 µL when a reagent mix is requested. The sample chase volume must be at least 10 µL when a sample mix is requested.

---

**R2 delivery times...**  
Instrument throughput will be reduced when the R2 delivery time is greater than 244 seconds.
Defining the Photometry Reading Times

When defining a photometry read time...
There must be at least 350 μL in the cuvette when any photometric reading occurs.

Photometry read times...
Instrument throughput will be reduced when photometry read times are greater than 440 seconds.

1. Enter a time (in seconds) for the first photometry reading (P1).

   **WARNING:** Do not schedule a photometry reading within 10 seconds of a reagent or sample delivery.

2. If your method requires additional photometry readings, repeat step 1 for P2, P3, and P4 as necessary.

**Allowable Photometry Reading Time Ranges**

<table>
<thead>
<tr>
<th>Reading</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>−30 to 675 seconds.</td>
</tr>
<tr>
<td>P2</td>
<td>0 (zero) to 675 seconds, but must be later than the first reading (P1).</td>
</tr>
<tr>
<td>P3</td>
<td>must be greater than P2, but less than 675 seconds.</td>
</tr>
<tr>
<td>P4</td>
<td>must be greater than P3, but less than 675 seconds.</td>
</tr>
</tbody>
</table>
Defining the Flex® Cartridge Configuration

**For a detailed explanation of these fields...**
See the table on the next page.

1. Enter the component location for each well in the Flex® cartridge by putting the letter identification of the component under the appropriate cartridge configuration number (well number 1, 2, 3, 4, 5, or 6) where it is located in the Flex® cartridge.

To do this, position the cursor in the parentheses under the well number and press F1: Next Select until the proper letter appears.

2. Enter the number of tests for each well.

The total number of tests must be equal for each component (but not necessarily for each well) within a Flex® cartridge.

3. Enter the Well Life, which is the number of hours that each well will remain stable after the well has been punctured by the reagent probe.

**WARNING:** The Well Life, On-Board Life, and Calibration fields should be carefully determined prior to routine use of a user-defined method.

4. Enter the On-Board Life, which is the number of hours that the Flex® cartridge remains stable after it has been placed in the instrument.

5. Enter how often this method must be calibrated (in hours).

**WARNING:** Use caution in determining the calibration life with respect to variations in reagent preparation. Make sure that the calibration will hold from cartridge-to-cartridge.

6. Do not press F4: Store. You must define the calculation to be used with this method before storing. Continue with “Defining the Calculation.”
**Flex® Cartridge Configuration Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Reagent component designation and well location. Reagent components can be located in one or more wells. Nominal Flex® cartridge dead volume is 200 µL per well when used with a user-defined method. The maximum volume of each well is 4.0 mL.</td>
</tr>
<tr>
<td>Number of Tests</td>
<td>Relates to the number of test volumes in a cartridge well. This is the number of tests available for all components in a cartridge. For example:</td>
</tr>
</tbody>
</table>

```
CARTRIDGE CONFIG 1 2 3 4 5 6
COMPONENT A B B C
NUMBER OF TESTS 20 10 10 20
```

Notice that, as required, components A, B, and C each have a total of 20 tests available.

**Maximum number of tests per well...**

You can assign up to 99 tests per well in the Flex® cartridge.

**Well Life**

The number of hours that a reagent (a component in a given well) remains stable after the well has been punctured by the instrument. This can be up to 760 hours. The default time is 72 hours.

**On-Board Life**

The number of hours that reagents in a cartridge remain stable after the cartridge has been placed on the instrument. This can be a maximum of 760 hours. The default time is 720 hours (or 30 days).

The instrument will maintain the cartridge at 2°–8°C as with all other reagents.

**Calibration**

The maximum number of hours allowed between calibration. This can be a maximum of 8760 hours (or 365 days). The default time is 2160 hours (or 90 days). Calibration will remain valid within the same lot number of a method, as with Dade Behring Inc. chemistries.

**WARNING:** Well Life, On-Board Life, and Calibration should be carefully determined prior to routine use of a user-defined method.

**WARNING:** Use caution in determining the calibration life with respect to variations in reagent preparation. Make sure that the calibration will hold from cartridge to cartridge.
Defining the Calculation

Press F7: Calculation to go to the Multipoint MAU Calculation screen. At this screen, you will program the instrument to calculate a result for the user-defined method that you have just created.

You may write your own calculation program on the lines provided or you may choose a standard program (template) that is compatible with the data you have entered in defining your method.

Writing Your Own Calculation Program

1. Enter your programming commands on the lines provided using acceptable programming terms described in “Programming Terms” later in this module.
   
   Up to 25 lines of programming can be written.

2. When you are satisfied with your entries, press F4: Accept.
   
   The User-Defined Method: Multipoint MAU Calculation screen will appear with the calculation (in acceptable programming terms).


4. Press Exit.

5. Press F4: Store.
Using a Predefined Calculation Template

For a detailed explanation of these fields... See the table on the next page.

1 For a two-point calculation, you will need to select a calculation mode. Move the cursor to the Mode field. Select a calculation mode by pressing F1: Next Select.
2 Select a measuring filter by pressing F1: Next Select.
3 Select a blanking filter (if desired) by pressing F1: Next Select.
4 For a three-point calculation, you will need to enter a depletion factor. (This field appears only on a three-point calculation screen.) Move the cursor to the Depletion Factor field and enter a number using the keypad keys.
5 For a single-point or two-point calculation, you will need to enter a dilution value. Move the cursor to the Dilution field on the P1 line. Enter a dilution value for P1 using the keypad keys.
6 Enter the IOD or FOD value in mAU using the keypad keys. Then use F1: Next Select to choose your IOD or FOD message indicator and press the Enter key again.
7 Repeat steps 5 and 6 for P2 and P3 as required by your method.
8 Press F4: Accept when you are satisfied with your entries.
   The User-Defined Method: Multipoint MAU Calculation screen will appear with the calculation in acceptable programming terms.
9 Press F4: Accept.
10 Press Exit.
11 Press F4: Store.
### Calculation Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode</strong></td>
<td>Calculation mode: Rate or Endpoint.</td>
</tr>
<tr>
<td><strong>Measuring Filter</strong></td>
<td>293, 340, 383, 405, 452, 510, 540, 577, 600, 700, or NONE.</td>
</tr>
<tr>
<td><strong>Blanking Filter</strong></td>
<td>293, 340, 383, 405, 452, 510, 540, 577, 600, 700, or NONE.</td>
</tr>
<tr>
<td><strong>Depletion Factor</strong></td>
<td>The instrument will calculate a P1/P2 rate and a P2/P3 rate. If these rates differ from each other by more than a given percentage (the depletion factor entered by the user), an absorbance error message will appear on the printed test results. A depletion factor must be entered on three-point calculation templates.</td>
</tr>
<tr>
<td><strong>Dilution</strong></td>
<td>Indicates the weighting factor or multiplier that compensates for the dilution of the sample. This applies when sample or reagent is added between photometry readings. For example:</td>
</tr>
<tr>
<td></td>
<td>• R1 (at –60.0 seconds) involved the addition of 370 µL to the cuvette.</td>
</tr>
<tr>
<td></td>
<td>• P1 is at –30.0 seconds (the volume in the cuvette is 370 µL at this time).</td>
</tr>
<tr>
<td></td>
<td>• S1 (30 µL) the addition of 30 µL of sample occurred at 0.0 seconds.</td>
</tr>
<tr>
<td></td>
<td>• P2 is 65.0 seconds after the sample was added. (Total volume in the cuvette is now 370 + 30 = 400 µL.)</td>
</tr>
<tr>
<td></td>
<td>The dilution value is 400 µL divided by 370 µL (1.081).</td>
</tr>
<tr>
<td></td>
<td>The dilution value may be positive or negative. An undiluted sample would have a dilution value of:</td>
</tr>
<tr>
<td></td>
<td>• 0 or 1.0 for a rate method</td>
</tr>
<tr>
<td></td>
<td>• 1.0 for an end point method</td>
</tr>
<tr>
<td><strong>Initial Optical Density (IOD)</strong></td>
<td>No limitations. Enter an IOD (in mAU) in the numerical field. Next to this field is a field inside parentheses where you must select whether you want an absorbance error message to be printed on the test results report. Select BELOW if you want the message to appear when results fall below the IOD you entered. Select ABOVE if you want the message to appear when results fall above the IOD you entered. Select INACTIVE if you do not want a message to be printed.</td>
</tr>
<tr>
<td><strong>Final Optical Density (FOD)</strong></td>
<td>No limitations. Enter an FOD (in mAU) in the numerical field. Next to this field is a field inside parentheses where you must select whether you want an absorbance error message to be printed on the test results report. Select BELOW if you want the message to appear when results fall below the FOD you entered. Select ABOVE if you want the message to appear when results fall above the FOD you entered. Select INACTIVE if you do not want a message to be printed.</td>
</tr>
</tbody>
</table>
Storing a User-Defined Method

1. At the end of your programming, go back to the first User-Defined Method screen and press F4: Store to store the method reaction parameters.

2. The instrument will perform checks on the data you have entered. If there is an error, a message will appear on the screen. The data will not be stored until you correct the error and press F4: Store.

   If all data entries are acceptable, the message “Method Parameters have been stored” will appear on the screen.

3. Press F8: Print to obtain a final printout for your records.
## Entering User-Defined Method Parameters

Method parameters must be entered for all user-defined methods before inserting a user-defined Flex® cartridge into the instrument or running a sample.

These parameters are different from the ones entered on the User-Defined Method screen. Some of these include the linear range, the reference range, auto-dilution volume, C0, C1, etc. They tell the instrument general information included on the results report. You must enter information in the following areas for your method to operate: reference interval, assay range, calculation type, C terms, and lot number. The procedure for entering method parameters for user-defined methods is the same as for Dade Behring Inc. methods. Refer to Module 6: Customizing, “Entering Method Parameters.”
WARNING: Use caution when considering reagents such as strong alkaline and acid solutions, organic solvents, viscous liquids, heavy metals, or metal chelating agents. They may have adverse effects on the system.

To fill a Flex® cartridge, puncture the clear film that covers the individual wells (as needed) and fill the wells with the appropriate volume of reagent, as defined in the Cartridge Configuration section of the User-Defined Method screen. To maintain reagent integrity, the clear film should not be removed and you should not attempt to reseal the punctured holes.

You must use the six-well Flex® cartridge (Order Number DF99) as the reagent vessel with User-Defined Methods. This is an empty Flex® cartridge to which you will add your own reagents. The empty Flex® cartridge can be stored at room temperature until the expiration date.

CAUTION! Use only liquid reagents! No on-board preparation is permitted.

CAUTION! Do not try to use an eight-well Flex® cartridge because this will damage the reagent probe.
Loading the Flex® Cartridge

Method parameters must already be entered before inserting a user-defined Flex® cartridge into the instrument.

1. From the Reagent Cartridge Control screen, place the Flex® cartridge in the automatic loader.

2. When you are instructed to do so, use the keyboard to enter the Flex® cartridge information.

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Enter the same name that you have already assigned to this method on the Method Parameters screen.</td>
</tr>
<tr>
<td>Lot number</td>
<td>A unique and valid six-character designation.</td>
</tr>
<tr>
<td>Sequence number</td>
<td>A unique, five-digit number. This number must be different for all reagent cartridges for this method.</td>
</tr>
</tbody>
</table>


What composes a valid lot number?
Six digits, such as FM1082, in the following sequence:

1. Any two letters (FM).
2. The last digit of the year the Flex® cartridge will expire (1 for 2001).
3. The month and day the reagent cartridge will expire, expressed as a Julian date (082 for March 23).

Need to remove a user-defined reagent cartridge?
It’s the same as removing any reagent cartridge from the instrument. See “Removing Reagent Cartridges” in Module 3: Maintaining.
Calibration and QC of User-Defined Methods

Calibration of user-defined methods is the same as for Dade Behring Inc. methods. However, the user is responsible for determining how often calibration must be performed. Refer to “Calibrating/Verification Overview” in Module 2: Using for further information on calibration and verification.

It is also up to you, the user, to determine which quality control products to use and how often to use them. Ordering a quality control test for a user-defined method is the same as for any Dade Behring Inc. method.
Running a User-Defined Method

CAUTION! Method parameters must already be entered before attempting to run a sample with a user-defined method.

User-defined methods can be requested and processed along with Dade Behring Inc. methods in random, batch, or profile modes.

To request a user-defined method, refer to the following table:

<table>
<thead>
<tr>
<th>To Request This User-Defined Test Method</th>
<th>Press This Key Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>X01</td>
<td>Control / GGT</td>
</tr>
<tr>
<td>X02</td>
<td>Control / GLU</td>
</tr>
<tr>
<td>X03</td>
<td>Control / LDH</td>
</tr>
<tr>
<td>X04</td>
<td>Control / LYTES</td>
</tr>
<tr>
<td>X05</td>
<td>Control / NA/K</td>
</tr>
<tr>
<td>X06</td>
<td>Control / PHOS</td>
</tr>
<tr>
<td>X07</td>
<td>Control / TBL</td>
</tr>
<tr>
<td>X08</td>
<td>Control / TP</td>
</tr>
<tr>
<td>X09</td>
<td>Control / TRIG</td>
</tr>
<tr>
<td>X10</td>
<td>Control / URCA</td>
</tr>
</tbody>
</table>

WARNING: Use caution when considering reagents such as strong alkaline and acid solutions, organic solvents, viscous liquids, heavy metals, or metal chelating agents. They may have adverse effects on the system.
Reviewing a Method’s Kinetics

The Method Kinetics program allows you to observe and review a method’s kinetics while it is running.

**About the Method Kinetics Screen**

At the top of the screen are several fields of data. These fields may be blank or they may contain default data until you select a method and press **F1: Start Assay**.

The fields shown at the top of this screen are described in the table on the next page.

At the bottom of this screen is a graph that displays absorbance vs. time for the user-defined method that you choose to review. The x-axis represents time (seconds) and the y-axis represents absorbance (mAU).

---

For a detailed explanation of these fields...
See the table on the next page.
## Method Kinetics Screen Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method ( )</td>
<td>The method name will appear in this field when you select the method. The description “6 well” for the Flex® cartridge will always be displayed within the parentheses.</td>
</tr>
<tr>
<td>Filters</td>
<td>Three 3-digit fields to describe the wavelengths to be graphed on the kinetics screen.</td>
</tr>
<tr>
<td><strong>1st field</strong></td>
<td>Shows which single wavelength to display on the graph. Press F6: Filter Display to change this field. If you want to display more than one wavelength, choose “bic” for bichromatic, or “---” to display all ten wavelengths.</td>
</tr>
<tr>
<td><strong>2nd and 3rd fields</strong></td>
<td>Initially shows the Measuring Filter and Blanking Filter wavelengths you chose when programming the method. These wavelengths appear on the graph if you chose “bic” for the 1st field. To change the first wavelength, press F3: 1st Bichrome; to change the second, press F4: 2nd Bichrome. If a single wavelength or all ten wavelengths were chosen, these last two fields will display the wavelengths that were programmed into the method. Changing them will not affect what is displayed on the graph. If you chose turbidimetric mode when identifying your method, an asterisk (*) will follow the Filters field until the kinetics reaction has started. After the kinetics reaction has started, the running time of the assay will follow the Filters field regardless of which mode was selected.</td>
</tr>
<tr>
<td>Scale mAU</td>
<td>Describes the absorbance scale (in mAU) of the y-axis.</td>
</tr>
<tr>
<td>Time</td>
<td>Describes the time scale (in seconds) of the x-axis.</td>
</tr>
<tr>
<td>Filename</td>
<td>A file name will appear in the Filename field whenever the data is archived. For user-defined methods, the file name will always be “kinetics.ar” and the system will save the most recent study. Press F5: Archive Data to archive the data.</td>
</tr>
<tr>
<td>Marker</td>
<td>You can display up to two markers (blue vertical lines, x and o) on the graph. You can also move these markers during the reaction, but only to the point where the reaction has progressed. Move the cursor to the Marker field and press Enter to select the marker(s) that you wish to view or move. Then use the arrow keys to move the marker(s) that you have selected. You can continue to select and move markers throughout the reaction process. Other fields related to the x and o markers</td>
</tr>
<tr>
<td>dmA(x-o)</td>
<td>The change (delta) in mAU between the x&amp;o markers.</td>
</tr>
<tr>
<td>dT</td>
<td>The change (delta) in time between the x&amp;o markers.</td>
</tr>
<tr>
<td>mA, bic dmA</td>
<td>mAU with respect to a bichromatic reaction, specifically the change (delta) in mAU, x&amp;o.</td>
</tr>
<tr>
<td>mA/min</td>
<td>With respect to bichromatic reactions, this is the change (delta) in mAU per minute.</td>
</tr>
</tbody>
</table>

*Changing filters using F3, F4, and F6 doesn’t affect the programmed method! They only change the wavelengths displayed on the Method Kinetics screen that you are viewing, but do not change what has been programmed in the method itself.*

*If you are using an external printer... All the photometrics data from the kinetics assay you ran will be printed when you press F5: Archive Data.*
Using Method Kinetics

1. From the Method Kinetics screen, load the sample in segment #1, position #1.

   **WARNING:** Do not load samples/segments into the sample area if:
   - that segment’s status box is red
   - the instrument is initializing and processing
   - the moving wheel light is lit
   - the message “Moving Wheel . . .” is in the photometric sampler status box

   Do not place your hands in the sample wheel area while the system is initializing or processing. You could injure yourself, be exposed to biohazards or damage the instrument.

2. Select a user-defined method.
   Event markers (R1, R2, S, etc.) appear on the x-axis at the times you programmed.


4. When the message “Insert 6-well Flex®. (**Investigative Use Only**)” appears, place the Flex® cartridge to be used with this method in the automatic loader.

   **CAUTION!** Do not load the Flex® cartridge into the automatic loader until this prompt appears.

5. Observe the messages as the method reaction progresses.
   After the time clock has started, you can stop the reaction at any time by pressing F1: Stop Assay.
   You can also change the filter display during the reaction and the graph will automatically update to the new wavelengths.
6 After the reaction is complete, you can:
   • Choose a print option:
      - Press Control/P key combination for a printout of the screen.
      - Press F8: Print (with 1 or 2 wavelengths displayed) for a graph of
        the active wavelength.
      - Press F8: Print (with all wavelengths displayed) for a complete
        data dump of all readings for all wavelengths.
   • Make note of any data that you want to edit into the User-Defined
     Methods screen for that method.

7 Press Exit to leave the Method Kinetics screen.
   The instrument will prompt you to remove the investigative-use Flex®
   cartridge.

8 Remove and discard the investigative-use Flex® cartridge.

   **WARNING:** Always prepare a new Flex® cartridge for running routine
   samples because the cartridge used for kinetics is not tracked
   in inventory.
Programming Terms

The Dimension® instrument user-defined software application provides a versatile method of specifying how raw photometric data is transformed prior to conversion to analyte concentration through the method’s standard curve. Examples of simple transformations would include bichromatic endpoints and two-point rates. More complex transformations would include polychromatic sums (e.g., Allen Corrections), volume-corrected blanking for endpoint reactions, and checking for substrate depletion through comparison of early/late reaction rates.

The capability provided by the transformation program is similar to the functionality provided by a four-function calculator. The four common arithmetic functions—add, subtract, divide, multiply—are provided, as well as parentheses. Twenty-six temporary memory registers are provided for the storage of intermediate results. Functions are available for calculating monochromatic and bichromatic rates and endpoints from the raw photometric data arrays.

Programming Structure

All programs must have a left brace (\{) as the first character and a right brace (\}) as the last. At least one RETURN statement is required to forward meaningful results from the calculation.

Enclosed within the braces are program statements. Statements are used to assign intermediate results to registers, test logical conditions, set error codes, and return transformed mAU to the system.
Implementation

The MAU Calculation screen provides the user with 25 lines in which to enter a transformation program. The input is in the form of a simple programming language, which provides functions to retrieve raw data from the photometric data arrays, algebraic statements to transform that data mathematically, and test statements (if/else) that can be used to set error flags. In addition, there are 26 registers labeled A–Z that can be used for temporary storage of intermediate results. The final result is RETURNED for input into the standard curve transformation.

For instance, the program

1 {  
2 A = BICH(P1,340NM,383NM);  
3 RETURN A;  
4 }

calculates a bichromatic 340–383 nm endpoint. The braces {} surrounding the calculation (lines 1 and 4) demarcate the beginning and end of the calculation, and must be included in all programs. Any text outside of these brackets is ignored. The BICH function on line 2 calculates the bichromatic difference observed for photometric reading P1. The value is placed in the temporary register A, whose value is RETURNED to the system by statement 3.

Similarly, the program

1 {  
2 A = RATE(P1,P2,340NM,383NM);  
3 RETURN A;  
4 }

calculates a bichromatic 340–383 nm rate. The RATE function on line 2 calculates the rate of reaction (in mAU/min) observed between photometric readings P1 and P2. The value is placed in the temporary register A, whose value is RETURNED to the system by statement 3.

For these simple examples, there is no need to place the intermediate result in register A. The endpoint program could have been written simply as:

1 {RETURN BICH(P1,340NM,383NM);}  

To improve readability, statements can be broken across lines, and spaces can be inserted:

1 {  
2 RETURN  
3 BICH(P1, 340NM, 383NM);  
4 }
Statements
Statements can take any of the following forms:

- \( \text{register} = \text{numerical expression}; \)
- \( \text{SET} \ \text{errorcode \ ERROR}; \)
- \( \text{RETURN} \ \text{numerical expression}; \)
- \( \{ \text{statement1; statement2; ...; statement N;} \} \)
- \( \text{IF} \ (\text{logical expression}) \ \text{statement} \)
- \( \text{IF} \ (\text{logical expression}) \ \text{statement \ ELSE \ statement} \)

Examples of these types of statements appear below and on the next page.

**register = numerical expression**
This statement is used to assign an intermediate result to a register. \( \text{Register} \) can be any of the 26 general registers A,B,C...X,Y,Z. \( \text{Numerical expressions} \) are described later.

**SET errorcode ERROR**
This statement is used to set error codes on the report slip. Accepted values for \( \text{errorcode} \) are \( \text{ABSORBANCE, ARITHMETIC, MEASUREMENT,} \) and \( \text{REACTION} \). For simplicity, the last error set is the one that is forwarded for publication. Therefore, the programmer can establish error precedence. If an arithmetic error is detected by the system (e.g., an attempted divide by 0), the system will automatically forward an ARITHMETIC error with no numerical result.

**RETURN numerical expression**
This statement is used to forward a transformed mAU to the system. The \( \text{numerical expression} \) is frequently a register, but may be any \( \text{numerical expression} \) (refer to “Expressions” later in this module). Once a RETURN statement is encountered in a program, no further statements are executed.

\( \{ \text{statement1; statement2; ...; statement N;} \} \)
The statement syntax is a compound statement, used to group several statements. This syntax is most useful when multiple simple statements must be executed as a group, as within the context of an \( \text{IF} \) or \( \text{IF/ELSE} \) statement.
**IF (logical expression) statement**

This statement is used to test logical conditions and execute a statement if the logical condition is TRUE. **IF** statements are most often used to conditionally execute **SET errorcode ERROR** statements, as in this substrate depletion scenario:

```
1 {  
2   A = RATE(P1,P2,340NM,383NM);  
3   B = RATE(P2,P3,340NM,383NM);  
4   IF (B < 0.80 * A) {  
5     SET ABSORBANCE ERROR;  
6     RETURN A;  
7   } ELSE {  
8     RETURN B;  
9   }  
10 }
```

The first statement calculates the rate of reaction between readings P1 and P2, and assigns it to register A. The second statement calculates the rate between readings P2 and P3, and assigns it to register B. The IF statement will flag an absorbance error (if the later rate is less than 80% of the earlier rate) and RETURN the value of the early rate as the transformed mAU value. Otherwise, no error is set, and the later rate in register B is returned. Note that the TRUE clause of the IF/ELSE statement contains a compound statement, which is used to group the SET and RETURN statements into a single clause.

**IF (logical expression) statement ELSE statement**

This statement is similar to the IF statement. However, the ELSE statement is executed when the logical expression is FALSE.
Expressions
Two classes of expressions are possible, depending on the kind of value produced by the expression. The first class, referred to as numerical expressions, produce numerical results that can be assigned to registers or returned as values. The other class, called logical expressions, produce logical results from Boolean operations. Logical expressions are used exclusively within IF statements. The output of a logical expression cannot be used to assign values to registers, nor can it be returned.

Numerical Expressions
Numerical expressions allow the user to combine values from function calls, registers, and constants together using the arithmetic operators *, /, +, and – . The precedence of these operators corresponds to common usage, where * and / have the same precedence, and are evaluated as encountered in left-to-right order; + and – have lower precedence than * and /, and are also evaluated in left-to-right order. Operator precedence and evaluation order can be modified through use of parentheses, which can be nested. The following are valid expressions:

(a) \( A + (B + C) \times D \)
(b) \( (A + B) \times 0.5 \)
(c) \( \text{MAU}(P1,340\text{NM}) - \text{MAU}(P1,383\text{NM}) \)
(d) \( A/B \times \text{RATE}(P1,P2,340\text{NM},510\text{NM}) \)

The resulting value from a numerical expression is usually assigned to a register or returned:

(e) \( \text{RETURN} \ A + (B + C) \times D; \)
(f) \( C = (A + B) \times 0.5; \)
(g) \( Z = \text{MAU}(P1,340\text{NM}) - \text{MAU}(P1,383\text{NM}); \)
(h) \( \text{RETURN} \ A/B \)
\( * \ \text{RATE}(P1,P2,340\text{NM},510\text{NM}); \)

Note that assignment and return statements are always terminated by a semicolon. Also, expressions may be broken into multiple lines to enhance readability as in (h) above.

In addition to assignment (=) and being RETURNED, the value of a numerical expression may be used in a comparison operation within a logical expression (refer to Logical Expressions discussion below).

Logical Expressions
Logical expressions are used within IF statements, which allow a statement or group of statements to be executed when the logical expression evaluates to TRUE.

Logical expressions are composed of comparison operations, combined together using the AND and OR operators. (No NOT operator is provided, since the comparison operations can be structured to effect the NOT operator). Comparison operators include > (greater than), < (less than), and two equal signs == (equal to). Numerical expressions serve as operands for these comparison operators. (Note that testing for equality is strongly discouraged, since floating point calculations often experience rounding errors, which cause equality comparisons to fail.)
Several **AND** and **OR** operators may appear within a logical expression. The **AND** operator has higher precedence than the **OR** operator. The default precedence and order of evaluation may be altered using parentheses. For example:

(a) \( A > B \)
   TRUE if register A is greater than register B.

(b) \( A > B \) AND \( C/D < 0.5 \)
   TRUE if register A exceeds register B, and \( C/D \) is less than 0.5.

(c) \( A > 100.0 \) OR \( B < 100.0 \) AND \( A/B > 0.50 \)
   TRUE if either of the two the conditions listed below tests TRUE:
   (1) register A exceeds 100.0 or
   (2) register B is less than 100.0 and the ratio of register A to register B exceeds 0.50.

Note that in example (c) the **AND** operator has precedence over the **OR** operator; the **AND** operation is tested first, despite the fact that it is the rightmost operator.

The operators **AND** and **OR** are lower in precedence than the arithmetic *, /, \(-\), and + operators. Consequently, there is no need to use parentheses to surround numerical expressions in comparison operations.

**Functions**

There are several functions that are useful for extracting data from the raw photometer data arrays. In all cases, arguments must be supplied to the function that tells the system which photometric reading(s) and which wavelength(s) are of interest. Photometric readings are specified as \( P_1, P_2, P_3, \) or \( P_4 \) and correspond to the readings specified on the User-Defined Method screen. Wavelengths are specified as \( 293\text{NM}, 340\text{NM}, 383\text{NM}, 405\text{NM}, 452\text{NM}, 510\text{NM}, 540\text{NM}, 577\text{NM}, 600\text{NM}, \) or \( 700\text{NM} \). In addition, the value \( ---\text{NM} \) is accepted as a null wavelength specifier, which indicates that no wavelength is desired.

The available functions are:

- **MAU(Px, yyyNM)** returns the milliabsorbance value of wavelength \( yyy\text{NM} \) of photometric reading \( Px \).
- **BICH(Px, yyyNM, zzzNM)** returns the bichromatic difference in mAU of wavelength \( yyy\text{NM} \) minus mAU wavelength \( zzz\text{NM} \) of photometric reading \( Px \).
- **RATE(Pw, Px, yyyNM, zzzNM)** returns the rate of reaction (mAU/min) between photometric readings \( Pw \) and \( Px \) for the bichromatic difference of wavelength \( yyy\text{NM} \) minus wavelength \( zzz\text{NM} \).

Note that there is no explicit monochromatic rate function. In order to obtain a monochromatic rate, the null wavelength specifier should be used:

- **RATE(Pw, Px, yyyNM, ---NM)** returns the monochromatic rate of reaction (mAU/min) between photometric readings \( Pw \) and \( Px \) for the wavelength \( yyy\text{NM} \).

In addition to these data abstraction functions, an absolute value function is provided:

**ABS** *(numerical expression)* returns the absolute value of the expression.
Error Message List

Understanding this list...
Error messages are in **bold** and arranged in alphabetical order. Their explanation (where included) is indented.

A reagent delivery component or component volume is inconsistently specified.
Each reagent delivery component must specify both an identifier (**A**, **B**, **C**, **D**, **E**) and a nonzero volume. If these two conditions are not met, this message will be displayed.

A time must be provided for the second reagent delivery.
This message occurs when the user neglects to enter a time for the R2 delivery.

A time must be provided for the third reagent delivery.
This message occurs when the user neglects to enter a time for the R3 delivery.

A total volume of 0 for the first reagent delivery is not permitted.
All assays must provide some volume during the first reagent delivery. Either chase or reagent component(s) (or both) need to be specified for the R1 delivery.

A well component or aliquot needs to be provided.
If a well has nonzero aliquots but no identifier (**A**, **B**, **C**, **D**, **E**), this message will be displayed. Similarly, an identifier with zero aliquots will generate this message.

Every reagent component delivered must appear in at least one well.
If a component identifier (**A**, **B**, **C**, **D**, **E**) appears in a reagent delivery (R1, R2, or R3), it must also appear in the reagent cartridge.

Photometries must be time-ordered, and at least 15 seconds apart.

Photometry must occur within the interval <–30...675> seconds.

Please UNDO CHANGES before attempting to advance channel.
This message appears when the user attempts to move to another channel without storing changes on the current channel.

Syntax errors have been found on this line.
If a syntax error is detected, the system attempts to move the cursor to the line in which the error was detected. Note that occasionally the syntax error may be on a preceding line; the program parser was unable to conclude that there was an error until it had “looked ahead” a bit to see what came later!

The calculation is either too complex or not correctly terminated.
If a trailing right brace is missing, or a compound statement was not correctly closed, the system will be unable to detect the end of the program. Check that the braces balance, i.e., that total number of left braces (\(\{\)) equals the number of right braces (\(\}\)).

This error may also occur if an expression is found that contains deeply nested pairs of parentheses [e.g., \(((1 + (2/3) / (3 * (A) + (((0.1)))))))\]. If such an expression exists, simplify it using register assignments!
The second reagent delivery must fall within the interval <60...257.3 seconds>.

In order to easily access the reagent delivery stations, reagent deliveries should fall within this time interval. Deliveries are excluded between 257.3 and 389.3 seconds, since the cuvette cannot be accessed during this time. However, there is opportunity for access during the interval 389.3 to 461.3 seconds, which has an undesirable side effect of requiring the system to index cuvettes until the cuvette enters an accessible zone. The system will accept a reagent delivery during this interval, although it may sometimes result in wasted cuvettes.

The sum of all volumes exceeds the maximum cuvette capacity (500 ul).

The cuvette can only hold 500 µL of volume. When this message appears, try scaling all volumes to bring the total volume under 500 µL.

WARNING: No error is generated if the total volume is unrealistically low. 350 µL of volume is required to fill the optical area of the cuvette. Therefore, it is particularly important that there be at least 350 µL of volume present in the cuvette before a photometric read is attempted!

The sum of the reagent component volumes plus chase cannot exceed 490 ul.

The reagent syringe can only accommodate 500 µL of total volume; 10 µL is reserved for air separators. Either the reagent volume(s) or chase volume must be reduced.

The sum of the sample volume plus sample chase cannot exceed 100 ul.

The sample syringe can only accommodate 100 µL of total volume. You must reduce either the sample or chase volume.

The system must be in STANDBY before attempting to STORE any changes.

Upon entry, or in response to pressing F4: Store, the system checks to be sure no assays are in process. Since storing data may affect assays that are in process, the system will not store new parameters until the system returns to Standby.

The third reagent delivery must fall within the interval <60...257.3 seconds>.

In order to easily access the reagent delivery stations, reagent deliveries should fall within this time interval. Deliveries are excluded between 257.3 and 389.3 seconds, since the cuvette cannot be accessed during this time. However, there is opportunity for access during the interval 389.3 to 461.3 seconds, which has an undesirable side effect of requiring the system to index cuvettes until the cuvette enters an accessible zone. The system will accept a reagent delivery during this interval, although it may sometimes result in wasted cuvettes.
The third reagent delivery must follow the second by at least 30 seconds.

The reagent delivery system requires time to complete each delivery cycle. R2 and R3 reagent deliveries are precluded from being within 30 seconds of each other.

The well aliquots total for each component must be the same (and non-zero).

The number of aliquots for each reagent component identified must be the same. It is not necessary that the number of aliquots for all components A, B,... be the same in each well. However, the total of all the A component aliquots in all A wells must equal the number of B aliquots in all B wells.

There are no current changes to undo. Do you wish to NULL the entire record?

This message appears when F6: Undo Changes is pressed and there are no current changes made to the channel. If the user enters Y, the channel is initialized. Otherwise, the operation is aborted.

This password is not correct. You will not be permitted to STORE any changes.

The user is prompted for the system password upon entry into User-Defined Methods. If no password or an incorrect password is entered, this message is presented to the user. If an invalid password is entered, an attempt to store using F4: Store will again result in a prompt for password, at which time correct entry of the system password will permit data to be stored.

Undo current changes to this channel?

This message appears when F6: Undo Changes is pressed. If the user enters N, the undo operation is aborted.

When reagent mix is requested, the reagent chase volume must be at least 20 µL.

The ultrasonic system requires some chase to be expelled as ultrasonic mix begins. When reagent mix is requested, there must be at least 20 µL of chase available.

When sample mix is requested, the sample chase volume must be at least 10 µL.

The ultrasonic system requires some chase to be expelled as the ultrasonic mix begins. There must be at least 10 µL of chase available when you request sample mix.
# User-Defined Methods Worksheet

## USER-DEFINED METHOD

**Channel:** Name: X  
**Mode:** ( )  
**Std Curve:** ( )

### Delivery

<table>
<thead>
<tr>
<th>Time</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Chase</th>
<th>Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>-60.0</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td>0.0</td>
<td>ul</td>
<td>****</td>
<td>****</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td></td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td></td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
</tbody>
</table>

### Photometry

<table>
<thead>
<tr>
<th>Time</th>
<th>Cartridge Configuration</th>
<th>Component:</th>
<th>Number of Tests:</th>
<th>Well Life [hours]:</th>
<th>On Board Life:</th>
<th>Calibration:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6</td>
<td>( ) ( ) ( ) ( ) ( ) ( )</td>
<td></td>
<td></td>
<td>hrs</td>
<td>hrs</td>
</tr>
</tbody>
</table>

### Cartridge Configuration:

- **Well #**
  - Well 1
  - Component
  - Volume (max 4.0 mL)
  - # tests/well

### Reaction Kinetics:

**Reaction Timeline**

- **Event**
  - ______
  - ______
  - ______
  - ______
  - ______
  - ______
- **Time**
  - ______
  - ______
  - ______
  - ______
  - ______
  - ______
- **Volume:**
  - Component 1
  - Component 2
  - Component 3
- **Total Volume in Cuvette**

(Reminder: Volume in the cuvette must be > 350 µL whenever a photometer reading is programmed.)

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**User-Defined Methods Worksheet**

**USER-DEFINED METHOD**

Channel: Name: X Mode: ( ) Std Curve: ( )

<table>
<thead>
<tr>
<th>Delivery</th>
<th>Time</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Chase</th>
<th>Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1:</td>
<td>-60.0</td>
<td>( ) ul</td>
<td>( ) ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td>S1:</td>
<td>0.0</td>
<td>ul</td>
<td>----</td>
<td>----</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td>R2:</td>
<td>( )</td>
<td>ul</td>
<td>( ) ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
<tr>
<td>R3:</td>
<td>( )</td>
<td>ul</td>
<td>( ) ul</td>
<td>ul</td>
<td>ul</td>
<td>ul</td>
</tr>
</tbody>
</table>

**Photometry**

<table>
<thead>
<tr>
<th>Time</th>
<th>Cartridge Configuration</th>
<th>Component:</th>
<th>( ) ( ) ( ) ( ) ( ) ( ) ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1:</td>
<td></td>
<td>Number of Tests:</td>
<td></td>
</tr>
<tr>
<td>P2:</td>
<td></td>
<td>Well Life [hours]:</td>
<td></td>
</tr>
<tr>
<td>P3:</td>
<td></td>
<td>On Board Life: hrs Calibration: hrs</td>
<td></td>
</tr>
</tbody>
</table>

**Cartridge Configuration:**

Well #

<table>
<thead>
<tr>
<th>Component</th>
<th>Volume (max 4.0 mL)</th>
<th>#tests/well</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reaction Kinetics:**

Reaction Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Volume: Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Total Volume in Cuvette</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Reminder: Volume in the cuvette must be > 350 µL whenever a photometer reading is programmed.)
Appendix

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Photometric Calibration (or Verification) Review Flow Chart ...................... A-4
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Use this page for Notes
Photometric Calibration (or Verification) Setup Flow Chart

Operating Menu

Press Alt/I

F5: Process Control

F1: Calibration

Enter your Password

F2: Setup and Run

Press a test key.

Is the lot number correct?
If not press F1: Other Lot

Enter:
Operator ID
Calibrator (or Verifier) Name/Lot# Segment Position Calibrator (or Verifier) Values

F8: QC Yes/No

F4: Assign Cups

Yes

Setup more methods?

No

F7: Load/Run

Load cups in assigned positions

Press Run key

To print this list: press F5: Print and then Exit.
Photometric Calibration (or Verification) Review Flow Chart

**Acceptance Criteria**
- Precision: No obvious outliers
- Slope (m): Verified: 0.90 - 1.10
  - Calibrated: Linear: 0.97 - 1.03
  - Logit: 0.95 - 1.05
- Intercept (b): close to zero or clinically insignificant
- Correlation Coefficient (r): 0.990 - 1.000
- Quality Control (QC): within acceptable range

**Operating Menu**
- F5: Process Control
- F1: Calibration
- Enter your Password
- F3: Review Data

```
Press a test key.
```

*If the lot number is not correct, press F1: Other Lot.*

**Verified Methods**
- Review precision.
- Obvious outliers?
  - No
  - Yes
    - Place the cursor on the outlier and press F3: Delete Result

**Calibrated Methods**
- Linear
  - F7: Calculate
  - Review Precision.
  - Obvious outliers?
    - No
    - Yes
      - Place the cursor on the outlier and press F3: Delete Result
  - F7: Un-calculate
  - F7: Calculate

- Logit
  - F7: Calculate
  - Review Precision.
  - Obvious outliers?
    - No
    - Yes

**Evaluate m, b, and r**
- Are the criteria met?
  - Yes
    - F2: Accept Data
  - No
    - F8: Reject Data
      - Troubleshoot and recalibrate/reverify

**Is QC acceptable?**
- No
  - Troubleshoot and rerun QC
- Yes
  - Save printouts
Help Keys

The Help keys provide the exact type of help you want. You can obtain help on:
- a specific screen
- what tasks you can perform from that screen
- what the Function keys on that screen do
- some cases, a brief procedure for how to perform the tasks

The various help opportunities are listed below.

<table>
<thead>
<tr>
<th>Press</th>
<th>What Appears</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help (from the Operating Menu)</td>
<td>The Quick Index. The Quick Index is a listing of specific tasks and how to go to the screens where help on performing that task is available. The Quick Index includes the Function key sequence to get to those screens from the Operating Menu.</td>
</tr>
<tr>
<td>Help (from any other screen)</td>
<td>Displays information on how to use the screen and the function keys that are currently on the display.</td>
</tr>
<tr>
<td>Shift/Help</td>
<td>This is a two-keystroke combination. If the cursor was in a field in which you can enter data (e.g., Patient Name on the Enter Sample Data screen), information on acceptable entries for that field appears.</td>
</tr>
<tr>
<td>Alt/Help</td>
<td>This two-keystroke combination presents a screen that explains how Help works and a list of the Alt key combinations. It contains much of the same information that is provided in this table.</td>
</tr>
<tr>
<td>Control/Help</td>
<td>This two-keystroke combination creates an arrow pointing to the most recent operating conditions icon that has appeared in the Operating Conditions Status area on the screen. You can then use the arrow keys to move from one icon to another.</td>
</tr>
<tr>
<td>Alt/M</td>
<td>Pressing the Alt and M keys simultaneously displays error messages that are active. It does not display error messages that have been viewed and reset.</td>
</tr>
</tbody>
</table>
### Operating Conditions Status Area Icons

When an icon appears in the Operating Conditions Status Area, press the **Control/Help** key combination and then use the right arrow key to move the indicator to the icon. The icons below are shown in the left to right sequence that they appear on the screen.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Service Key Icon" /></td>
<td>The Service key switch is in the Interlock Override position. The sample and IMT arms will continue to move even if the sample lid is raised.) Only trained operators should use this key switch position and then only as directed in this manual (e.g., various alignment procedures). <strong>WARNING:</strong> Do not process samples with the key in the Interlock Override position. Processing samples in this position can result in operator injury, exposure to biohazardous samples, or damage to the instrument.</td>
</tr>
<tr>
<td><img src="image" alt="Reagent Temperature Icon" /></td>
<td>Refrigerator Hot: The temperature of the Dimension® reagent cooling system is above specified limits. When the RMS is installed on the Dimension® system, the lettering in the box indicates the specific area that is above specified limits: RFG = the Dimension® system and RMS reagent trays RFG1 = only the Dimension® system reagent tray RFG2 = only the RMS reagent tray HYD = only the RMS hydration station RMS = both the RMS reagent tray and hydration station Refrigerator Cold: The temperature of the Dimension® reagent cooling system (and, if the RMS is in use, the RMS reagent tray, or RMS hydration station) is below specified limits.</td>
</tr>
</tbody>
</table>

---

240883B-132a
### 3 - Cuvette Temperature

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVT HOT</td>
<td>Cuvette Hot: The cuvette heating system temperature is above the acceptable range for processing. The system will stop processing and no results for the current test will be calculated.</td>
</tr>
<tr>
<td>CVT COLD</td>
<td>Cuvette Cold: The cuvette heating system temperature is below the acceptable range for processing. The system will stop processing and no results for the current test will be calculated.</td>
</tr>
<tr>
<td>HM HOT</td>
<td>HM Hot: The HM heating system temperature is above the acceptable range for processing. The HM will stop processing and no results for the current test will be calculated.</td>
</tr>
<tr>
<td>HM COLD</td>
<td>HM Cold: The HM heating system temperature is below the acceptable range for processing. The system will stop processing and no results for the current test will be calculated.</td>
</tr>
</tbody>
</table>

### 4 - UPS (Uninterruptible Power Source)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ –</td>
<td>A red “ON” inside this icon Indicates that power to the instrument has just been interrupted and the UPS is in use. An intermittent alarm will also be sounding. This will change to the word LOW when the instrument is preparing to shut down before the UPS loses all power. The UPS will be recharged whenever normal electric power is restored. If LOW appears continuously while the instrument is connected to its wall outlet, call the Technical Assistance Center.</td>
</tr>
</tbody>
</table>
5 - HM Vessel Feeder Empty

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image" /></td>
<td>The HM reaction vessel sensor, located near the top of the reaction vessel feeder chute, is not detecting a reaction vessel. Add reaction vessels to the reaction vessel holder or check for a reaction vessel jam in the vessel transfer system.</td>
</tr>
</tbody>
</table>

Aliquot Wheel (non-HM)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Image" /></td>
<td>This is the number of aliquot wheel positions remaining. Replacement of the aliquot wheel will be required shortly.</td>
</tr>
</tbody>
</table>

6 - Cuvette Film Cartridge

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Image" /></td>
<td>This is the number of cuvettes remaining in the cuvette film cartridge. Replacement of the cuvette film cartridge will be required shortly.</td>
</tr>
</tbody>
</table>

7 - Reagent Manager

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Image" /></td>
<td>The system has a problem with adding, removing (or, if the RMS is in use, transferring) reagent cartridges, or a reagent cartridge has been added to the reagent tray which would force calibration of a third lot. Press the Alt/R key combination to see why this icon is blinking and to remove the icon from the screen.</td>
</tr>
</tbody>
</table>

**Additional Reagent Manager icon information:**
A number appearing with the icon indicates the total number of empty slots remaining in the Dimension® system reagent tray (and, if in use, in the RMS reagent tray).

If the word "FULL" appears in black with the icon, the reagent tray (and, if in use, in the RMS reagent tray) is full. If it appears in red, the instrument has a system need for a new reagent cartridge to process tests but there is no room on the reagent tray; you must remove a reagent cartridge before one can be inserted.
8 - Printer

**Icon** | **Meaning**
--- | ---
[![LINE icon](image)](image) | This icon appears with one of four possible words:
OFF – the printer power switch is off.
OUT – the printer is out of paper.
LINE – the printer is off-line. Press the **Select** button on the printer to put the printer back on-line.
ERR – there is a communications problem between the PC and the printer.

9 - Short Sample

**Icon** | **Meaning**
--- | ---
[![Short Sample icon](image)](image) | One or more sample containers in the current Load List does not have enough sample volume to run all its requested tests. Hold down the **Alt** key and press **L** to view a list of these short samples. See "Resolving a Short Sample Detected" procedure in Module 2: Using.

10 - Check Needs

**Icon** | **Meaning**
--- | ---
[![Check Needs icon](image)](image) | The yellow Needs Check icon appears when the system is checking itself for any needs to process the Load List.

If the red Check Needs icon appears, the system has found needs that require operator attention before samples can be processed. Hold down the **Alt** key and press **N** to go to the System Needs screen and see which needs are required. To fill these system needs, see "Responding to System Needs" in Module 2: Using.

11 - Alarm Status

**Icon** | **Meaning**
--- | ---
[![Alarm Status icon](image)](image) | The alarm is sounding. A message will appear in the error message area indicating the reason for the alarm.

The alarm has been turned off by the operator. If an error condition occurs, the alarm will not sound; however, a message indicating the reason for the alarm will appear in the error message area.
Keystroke Combinations

To use a keystroke combination, hold down the first key and press the second key.

<table>
<thead>
<tr>
<th>Key Combination</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control/Stop</strong></td>
<td>Stops all operations in progress in a manner that will not damage the instrument. <em>All tests in progress</em> will be aborted. However, <em>all scheduled tests</em> will be retained in instrument memory. To resume operations, press the <strong>Reset</strong> key.</td>
</tr>
<tr>
<td><strong>Shift/Delete</strong></td>
<td>When entering information in a field, hold down the <strong>Shift</strong> key and press <strong>Delete</strong> to delete all characters to the right of the cursor in a field.</td>
</tr>
<tr>
<td><strong>Shift/Exit</strong></td>
<td>Moves you from the current screen directly to the Operating Menu.</td>
</tr>
<tr>
<td><strong>Shift/ →</strong></td>
<td>When entering information in a field, hold down the <strong>Shift</strong> key and press the <strong>right or left arrow key</strong> to move the cursor one space to the left or right. This will not delete any information in the field.</td>
</tr>
<tr>
<td><strong>Alt/I</strong></td>
<td>Takes you directly to the Reagent Cartridge Inventory screen.</td>
</tr>
<tr>
<td><strong>Alt/L</strong></td>
<td>Takes you directly to the Load List – Short Samples screen. To display the All and New Samples views, press <strong>F2: Next Status</strong>.</td>
</tr>
<tr>
<td><strong>Alt/M</strong></td>
<td>Displays an explanation and troubleshooting information for the error message that is on the screen.</td>
</tr>
<tr>
<td><strong>Alt/N</strong></td>
<td>Takes you directly to the System Needs screen.</td>
</tr>
<tr>
<td><strong>Alt/O</strong></td>
<td>Advances the paper feed on the system printer.</td>
</tr>
<tr>
<td><strong>Alt/P</strong></td>
<td>Prints out the entire screen appearing on the display. You cannot move to any other screen until this printing is complete. This will not affect instrument processing.</td>
</tr>
<tr>
<td><strong>Alt/R</strong></td>
<td>Whenever the reagent manager icon appears in the Operating Conditions Status area of the screen, press <strong>Alt/R</strong> to see information on why this icon appeared.</td>
</tr>
<tr>
<td><strong>Alt/S</strong></td>
<td>Takes you directly to the Segment Status screen from which you can view the status of either the segment positions currently loaded on the instrument (On Board Segments view) or all segments (All Segments view).</td>
</tr>
</tbody>
</table>
These keystroke combinations can be used in the same way as the touchscreen alert keys.

<table>
<thead>
<tr>
<th>Key Combination</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt/Z</td>
<td>STAT Alert Key</td>
</tr>
<tr>
<td>Alt/A</td>
<td>Sample Alert Key</td>
</tr>
<tr>
<td>Alt/D</td>
<td>Supply Alert Key</td>
</tr>
<tr>
<td>Alt/B</td>
<td>QC Alert Key</td>
</tr>
<tr>
<td>Alt/C</td>
<td>Calibration Alert Key</td>
</tr>
</tbody>
</table>
Operating Passwords

Operating Passwords are passwords that let operators customize the instrument operation to their work.

To start or stop using a password: go to the System Configuration Menu screen, press **F7: Password**, and type in the password *exactly* as it appears below.

<table>
<thead>
<tr>
<th>Password</th>
<th>What it Does</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOWCL</td>
<td>A chloride test will automatically be requested whenever the Na/K test key is pressed. This does not require additional sample.</td>
</tr>
<tr>
<td>ignoredup</td>
<td>The software will not process samples on the instrument that have the same bar code ID. However, there may be special situations where you must run a load list with samples that have the same bar code ID. You can do this using a special password &quot;ignoredup&quot; (short for &quot;ignore duplicates&quot;). Any samples that have the same bar code ID will now be run.</td>
</tr>
<tr>
<td>DATA</td>
<td>Turns on Method Diagnostic Data and allows the operator to print out filter data for test result troubleshooting with the Technical Assistance Center. <em>(See Module 5: Troubleshooting)</em></td>
</tr>
</tbody>
</table>
Test Report Messages and Reference Range Indicators

A test result on the printed test report may appear with a test report message and/or a reference range indicator. Depending on the specific test report message, the test result may or may not be reportable.

Test Results with Test Report Messages

A test result on the printed test report may have a test report message in the Reference Range column of the printout. Depending on the specific test report message, the test result may or may not be reportable.

WARNING: Do not report a test result that appears on the printed report with a message indicating that the result is NON-REPORTABLE.

A test result line on the test report can display only one test report message. If more than one test report message has affected the result, the instrument prints the highest priority message. See “Test Report Message Priorities” later in this Appendix.

Test Results with Reference Range Indicators

A test result on the printed test report may contain a reference range indicator next to the result. There are four reference range indicators: HI, LO, hp, and lp. Test results that appear with only a reference range indicator are reportable.

WARNING: Do not report a test result that appears on the printed test report with a reference range indicator if it also appears with a test report message indicating that the result is NON-REPORTABLE.

These reference range indicators appear next to a result according to the ranges you have programmed for that method in the Method Parameters screen. See “Entering Method Parameters” in Module 6: Customizing. Remember to follow your laboratory procedures for lp and hp indicators.
Understanding Test Report Messages

Abnormal Assay (abnl assay)

Explanation: The Result Monitor feature in the software uses existing photometric reads to check for the quality and delivery of reagents and, for some methods, sample delivery. The Abnormal Assay message indicates that the expected absorbance was not met for a specific cuvette.

What to Do: This result cannot be reported. Rerun the sample. If the same message appears:

1. Run a QC sample for that method.
   - If the error does not reoccur for this QC sample, call the Technical Assistance Center.
   - If the message reoccurs, remove and confirm the removal of the Flex® reagent cartridge for the method. Then add that same Flex® reagent cartridge back into the instrument. If the instrument will not accept it, obtain and add a new Flex® reagent cartridge.

2. Rerun the sample. If the message reoccurs, call the Technical Assistance Center.

Abnormal Reaction (abnl reaction)

Explanation: For non-HM methods:
An abnormal condition (foaming, air bubbles, or turbidity) occurred in the reaction mixture in the cuvette.

For HM methods:
Absorbance readings are taken to ensure that the reaction is completely transferred from the HM module to the cuvette and that there is no system contamination of reagents.

What to Do: For non-HM methods:
This result cannot be reported. Align the sample and reagent probes, and then rerun the sample.

For HM methods:
This result cannot be reported. If the sample is fibrinated, centrifuge the sample and rerun. If the sample is not fibrinated or the error persists, call the Technical Assistance Center.

Aborted Test

Explanation: An action by either the operator or instrument aborted this test.

What to Do: Rerun the test.

Absorbance

Explanation: The result is above the method assay range and cannot be calculated.

What to Do: Check the method Insert Sheet to determine if the sample can be diluted. If yes, manually dilute the sample (see Insert Sheet for recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. (See the “Dilution of a Sample” example later in this section.)
Above Assay Range (above asy rng)

**Explanation:** The result is above the method assay range and cannot be calculated.

**What to Do:** Check the method Insert Sheet to determine if the sample can be diluted. If yes, manually dilute the sample (see Insert Sheet for recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. (See the “Dilution of a Sample” example later in this section.)

Antigen Excess (antign excess)

**Explanation:** The result is extremely high for that method.

**What to Do:** Check the method Insert Sheet to determine if the sample can be diluted. If yes, manually dilute the sample (see Insert Sheet for recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. (See the “Dilution of a Sample” example later in this section.)

Arithmetic

**Explanation:** This error is associated with nonlinear (logit) methods only. This error occurred in result calculations because the change in absorbance was less than the C0 or greater than C0 + C1.

**What to Do:** If on a patient sample, the concentration is either very high or very low. Rerun the sample or call the Technical Assistance Center. If QC has also shifted low, change the R2 reagent pump 2500 µL syringe, cancel the well in use and prepare new reagent.

Assay Range

**Explanation:** The result is above or below the method assay range listed in Method Parameters on the instrument. Can be either low or high.

**What to Do:** If the result is LOW, analyte values may be depressed below the assay range because the patient sample has very little or no concentration of the analyte, insufficient sample, is falsely depressed because of interfering substances, or there was an instrument system failure. Each laboratory should establish its own protocol for addressing the "Below Assay" test report message before reporting the result as less than the established clinical reportable range. The procedure should check:

- the sample container has sufficient usable sample for the tests ordered
- the sample container was placed in the appropriate segment and cup position
- verify instrument function

If no obvious reason for the low analyte result is found, or the result is inconsistent with the available clinical information and prior tests, you can confirm the accuracy of the result with additional testing such as:

- If the result is a negative number, perform a 50% recovery of a known standard or QC material to confirm that there was no activity in the sample, that there was enough sample volume used by the instrument, and that there was no system malfunction. (See "50% Recovery of a Standard Using a Sample" later in this section.)
Assay Range (cont'd)

- If the result is below the reportable assay range, prepare and run a mixture of the sample with a known standard or QC material to confirm that there was low activity in the sample below the assay range, that there was enough sample volume used by the instrument, and that there was no system malfunction. (See "50% Recovery of a Standard Using a Sample" later in this section.)

If the result is HIGH, check the method Insert Sheet to determine if the sample can be diluted. If yes, manually dilute the sample (see Insert Sheet for recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. (See the “Dilution of a Sample” example later in this section.)

Assay range diluted (assy rng/dilu)

Explanation: Test result exceeded the assay range. The sample was then autodiluted and rerun. The result of the rerun still exceeded the assay range.

What to Do: Check the method Insert Sheet to determine if the sample can be diluted. If yes, manually dilute the sample (see Insert Sheet for recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. (See the “Dilution of a Sample” example later in this section.)

Below Assay Range (below asy rng)

Explanation: The result is below the method assay range and cannot be calculated.

What to Do: Analyte values may be depressed below the assay range because the patient sample has very little or no concentration of the analyte, insufficient sample, is falsely depressed because of interfering substances, or there was an instrument system failure. Each laboratory should establish its own protocol for addressing the "Below Assay" test report message before reporting the result as less than the established clinical reportable range. The procedure should check:
- the sample container has sufficient usable sample for the tests ordered
- the sample container was placed in the appropriate segment and cup position
- verify instrument function

If no obvious reason for the low analyte result is found, or the result is inconsistent with the available clinical information and prior tests, you can confirm the accuracy of the result with additional testing such as:
- Perform a 50% recovery of a known standard or QC material to confirm that there was no activity in the sample, that there was enough sample volume used by the instrument, and that there was no system malfunction. (See "50% Recovery of a Standard Using a Sample" later in this section.)

Calibration Expired (calib'n exp'd)

Explanation: The calibration for this method/lot is expired.

What to Do: Recalibrate/reverify the method lot number.
Diluted

**Explanation:** The test has been autodiluted.

**What to Do:** If test result is printed, the result (which exceeds the assay range) may be reported.
If no test result is printed, the result did not exceed the assay range. Do the following:
- Ensure that sufficient sample volume was available in the sample container.
- Verify the sample quality (fibrin, air bubbles, etc.).
- Rerun the test.

**Explanation:** For HA1C, a dilution factor has been inappropriately downloaded from your LIS.

**What to Do:** No test result is printed. Process diluted whole blood sample without entering a dilution factor.

**Explanation:** For HIL, a dilution factor has been entered for the sample.

**What to Do:** No HIL index is printed. The HIL feature applies to undiluted samples only.

**Hemoglobin (TBI and DBI)**

**Explanation:** When this message appears with the DBI result, it indicates a hemoglobin concentration greater than 50 mg/dL and will lower the DBI result for that sample.

**What to Do:** Follow your laboratory’s procedures for reporting results when the sample is hemolyzed.

**Explanation:** When this message appears with the TBI result, it indicates a hemoglobin concentration greater than 1000 mg/dL and will lower the TBI result for that sample.

**What to Do:** Follow your laboratory’s procedures for reporting results when the sample is hemolyzed.

**Hemoglobin (TBIL and DBIL)**

**Explanation:** When this message appears with the TBIL result, it indicates a hemoglobin concentration greater than 100 mg/dL and will lower the DBIL result for that sample.
When TBIL and DBIL tests are ordered together, the hemoglobin message appears next to the TBIL and DBIL results.
When TBIL and DBIL tests are ordered separately, the hemoglobin message appears next to the TBIL result only.
If a TBIL and a DBIL are ordered together and the TBIL result contains a nonreportable test report message or error condition, the DBIL test will be aborted.

**What to Do:** If only a TBIL was ordered, report the TBIL result.
If both TBIL and DBIL were ordered, together or separately, report the TBIL result.
Follow your laboratory’s procedures for reporting DBIL results when the sample is hemolyzed.

**WARNING:** Do not report a DBIL result while the TBIL for the sample is still running because the hemoglobin error can appear only after the TBIL result is complete.

**WARNING:** Do not run a DBIL without running a TBIL because hemoglobin interference will not be checked and can falsely depress the DBIL result.
HI

**Explanation:** Result is higher than the reference interval.

**What to Do:** Result may be reported.

High ‘A’ Error (high ‘A’ err)

**Explanation:** The absorbance at the measurement wavelength was higher that the limit set in the system software for that method.

**What to Do:** Urine drugs of abuse methods should be centrifuged and rerun. For other methods, manually dilute the sample (refer to the method’s Insert Sheet for the recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you.

For UCFP:
During calibration of the UCFP method, the high ‘A’ error may be observed on the level 5 calibration. This error for UCFP does not affect the proper method calibration and may be disregarded. Successful calibration can be verified using quality control materials. (See “Dilution of a Sample” later in this section.)

**Explanation:** Autodilution was not performed.

**What to Do:** If your system is set up to perform automatic dilutions, refer to “Automatic Dilutions” in the Customizing section for possible reasons why autodilution was not performed.

HIL interf

**Explanation:** One or more of the HIL indexes for the method is equal to or greater than the HIL Alert Index entered during HIL Setup.

**What to Do:** Follow your laboratory’s procedures for reporting results when the sample is hemolyzed, icteric, and/or lipemic.

hp

**Explanation:** Result is higher than the panic interval.

**What to Do:** Follow your laboratory’s procedure for panic values that are out of range.

LO

**Explanation:** Result is lower than the reference interval.

**What to Do:** Result may be reported.

Low ‘A’ error (low ‘A’ err)

**Explanation:** The absorbance at the measurement wavelength was lower than the limit set in the system software for that method.

**What to Do:** Urine drugs of abuse methods should be centrifuged and rerun. For other methods, manually dilute the sample (refer to the method’s Insert Sheet for the recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. Enter the dilution factor as a whole number on the Enter Sample Data screen and the instrument will multiply the result by this factor for you. Automatic dilution is not performed for this error since it can be caused by extreme substrate depletion or other conditions which may require method troubleshooting. (See the “Dilution of a Sample” example later in this section.)
lp

**Explanation:** Result is lower than the panic interval.

**What to Do:** Follow your laboratory’s procedure for panic values that are out of range.

**Measurement**

**Explanation:** During photometric measurement, the system detected an insignificant software timing error.

**What to Do:** Rerun sample.

- If this error recurs for a photometric method, a problem may exist in the instrument measurement system. Call the Technical Assistance Center.
- If this error recurs for an IMT method, troubleshoot the IMT error message.

**No Reagent**

**Explanation:** There is no reagent cartridge on the reagent tray for this method.

**What to Do:** Load a new reagent cartridge into the instrument. If you had previously loaded a reagent cartridge but did not obtain any results, check for and troubleshoot any reagent preparation errors listed on the Error Log screen.

**Not Calibrated (no calib’n)**

**Explanation:** The method lot used for this test was never calibrated.

**What to Do:** Calibrate/verify the method lot number.

**Process Error**

**Explanation:** An error occurred that prevented the system from determining the result.

**What to Do:** If this error message appears in the message field on the screen, press Alt/M and follow the steps that appear. If it does not appear in the message field, go to the Error Log screen. Move the cursor to the error, press F5: More Info, and follow the steps to resolve it. To get to the Error Log screen from the Operating Menu, press F5: Process Ctrl, then F6: Error Log.

**Substrate Depletion (subst dplet’n)**

**Explanation:** The kinetic check on the reaction exceeded the limits set in the system software for that method.

**What to Do:** Manually dilute the sample (see the method’s Insert Sheet for the recommended diluent) and rerun the test. Make the smallest dilution possible to bring the result down into the assay range. A minimum dilution of 1:10 is recommended. Enter the dilution factor as a whole number on the Enter Sample Data screen. (See the “Dilution of a Sample” example at the end of these messages.)

**Temperature**

**Explanation:** The cuvette temperature is out of range.

**What to Do:** Calibrate the cuvette system temperature.
Dilution Examples
This section contains three examples of dilutions and how they are used to resolve samples with test report messages.

Dilution of a Sample
When a test result exceeds the assay range for a method, the Dimension® RxL Max® clinical chemistry system will automatically dilute the sample (based on the AutoDilute Vols field on the Method Parameters screen) and rerun the test.

If the test result still exceeds the assay range the printed test report will contain the message “assy rng/dilu” indicating that the instrument diluted the sample and the result is still above the assay range for the method.

You will now need to make a manual dilution of the sample and rerun it. If the sample can be diluted, make the smallest dilution possible to bring the result down into the assay range. Make a dilution slightly greater than what was done by the instrument.

Example:
The “assy rng/dilu” test report message was printed next to the GLU method on the printed test report. According to the volume programmed in the Method Parameters screen for the GLU method, the instrument made a 1:1.5 dilution. According to the Method Insert Sheet, water can be used to dilute the sample.

To make a 1:5 dilution of 100 µL of sample, you would add 400 µL of water to the 100 µL of sample.

Volume of Sample * Dilution Factor = Total Dilution Volume

\[ 100 \mu L \times 5 = 500 \mu L \]

Total Dilution Volume – Volume of Sample = Volume of Diluent.

\[ 500 \mu L - 100 \mu L = 400 \mu L \]

To run this diluted sample, enter the number 5 in the Dilution field on the Enter Sample Data screen and the instrument will multiply the result by this factor for you.
Mixture of a Sample and a Known Standard

If a test result is low (below the reportable assay range), a mixture of the sample with a known standard may be rerun to confirm the result was below the reportable assay range, that there was adequate volume of sample used by the instrument, and that there was no system malfunction.

Example:
The “assay range” test report message was printed next to a TP result of 0.5 g/dL on the printed test report. Before reporting a result of “less than 2.0 g/dL,” a mixture of the sample with a known standard must be rerun to confirm the result.

Make a mixture of equal volumes of sample and a known standard. Run this mixture and obtain a result. Enter this mixture result into the formula below. If the calculated sample concentration matches the original sample concentration, then a result of “less than 2.0 g/dL” may be reported for the original sample.

\[
\frac{(\text{Mixture Vol} \times \text{Mixture Result}) - (\text{Std Vol} \times \text{Std Conc})}{\text{Sample Vol}} = \text{Calculated Sample Conc}
\]

Volume of sample = 0.5 mL
Volume of known standard = 0.5 mL
Mixture volume = Volume of sample + Volume of known standard = 1.0 mL
Concentration of known standard = 10.0 g/dL
Result of running the mixture on Dimension® system = 5.25 g/dL

\[
\frac{(1 \text{ mL} \times 5.25 \text{ g/dL}) - (0.5 \text{ mL} \times 10.0 \text{ g/dL})}{0.5 \text{ mL}} = 0.5 \text{ g/dL}
\]

Since this calculated result matches the original sample result of 0.5 g/dL you may report a result of “less than 2.0 g/dL” for the original sample.
**50% Recovery of a Known Standard Using a Sample**

If a sample has a negative result, a 50% recovery of a known standard may be done to confirm that there was no activity in the sample, that there was enough volume of sample used by the instrument, and that there was no system malfunction.

Example:

The “assay range” test report message was printed next to an ALC result of -1 on the printed test report. Before reporting no activity or “0,” a 50% recovery of a known standard must be performed.

Prepare a 1:2 dilution of a known standard using the formulas below. If the ALC test result for this mixture matches the concentration of ALC in the known standard, then a “0” may be reported for the original sample.

To make a 1:2 dilution of a 300-µL sample, you would add 300 µL of known standard to the 300 µL of sample.

Volume of Sample * Dilution Factor = Total Dilution Volume

\[
300 \, \mu\text{L} \times 2 = 600 \, \mu\text{L}
\]

Total Dilution Volume – Volume of Sample = Volume of Known Standard.

\[
600 \, \mu\text{L} - 300 \, \mu\text{L} = 300 \, \mu\text{L}
\]

To run this mixture, enter the number 2 in the Dilution field on the Enter Sample Data screen and the instrument will multiply the result by this factor for you.
Test Report Message Priorities

There is room for only one test report message for each test result on the printed test report. If a test had more than one message associated with it, the message with the highest priority will appear. For example, if a test had both an “assay range” and an “abnl reaction” message only the “abnl reaction” message would appear on the test report slip.

Test report message priorities, from highest to the lowest:

- system error
- process error
- aborted test
- no aliquot
- no reagent
- no calib'n
- arithmetic
- above asy rng
- below asy rng
- abnl assay
- abnl reaction
- subst deplet'n
- antigen excess
- high ‘A’ error
- low ‘A’ error
- absorbance
- HIL interf
- hemoglobin
- measurement
- assy rng/dilu
- assay range
- calib'n exp’d
- diluted
- temperature
General Code Compliance Information

Safety Compliance
The Dimension® RxL Max® clinical chemistry system has been designed and tested to comply with safety standards CSA-C22.2 No. 1010.1B/UL61010A-1, and EN61010-1 under the following environmental conditions [subclause 1.4]:

- **Temperature**: 5°C (41°F) to 40°C (104°F)
- **Humidity**: Maximum 80% at 31°C to 50% at 40°C
- **Altitude**: Maximum 2,000 m (6,562 ft)
- **Mains supply**: 115 ±10% VAC or 230 ±10% VAC, 50/60 Hz
- **Overvoltage Category**: Category II, connected to a branch circuit
- **Pollution Degree**: Degree 2, normal indoor laboratory environment. Air contains only nonconductive pollutants with occasional condensation.

Additional instrument-specific functional environmental conditions are in Module 1: Introducing.

Emission Compliance
The Dimension® RxL Max® system has been designed and tested to EN55022 Class A. In a domestic environment it may cause radio interference, in which case, you may need to take measures to mitigate the interference.

The Dimension® RxL Max® system should not be used next to any Industrial Scientific and Medical (ISM) equipment that must functionally produce RF energy (e. g., diathermy equipment).

Barcode Scanner
The barcode scanner uses Class I LEDs (light-emitting diodes), and is not hazardous to your eyes.

**WARNING**: The Dimension® RxL Max® system should not be used next to any Industrial Scientific and Medical (ISM) equipment that must functionally produce RF energy (e. g., Diathermy Equipment).
Plumbing Diagrams

Wash Station

- Pressure Switch Assembly
- Wash Probe Motor
- Wash Probe #1
- Wash Probe #2
- Wash Aspirate #1
- Wash Aspirate #2
- Cable Clamp
- Wash Buffer #1 Conduit
- Wash Buffer #2 Conduit
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