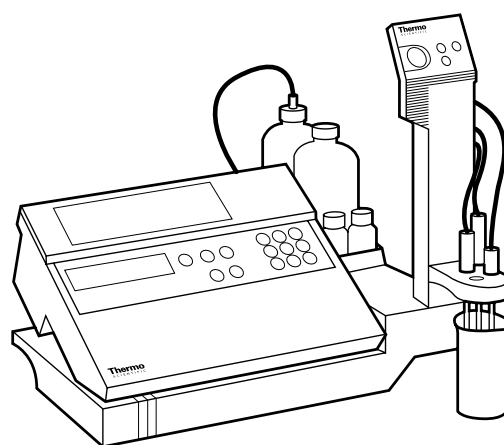


**Thermo Scientific  
Orion 960 Titrator**

**Addendum**



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PerpHecT meters are protected by U.S. patent 6,168,707.

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ORION Series A meters and 900A printer are protected by U.S. patents 5,198,093, D334,208 and D346,753.

ionplus electrodes and Optimum Results solutions are protected by US Patent 5,830,338.

ROSS Ultra electrodes are protected by US patents 6,793,787.

Orion ORP Standard is protected by US Patent 6,350,367.

Orion NoCal electrodes with stabilized potential patent pending.

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This publication supersedes all previous publications on this subject.

# Chapter 1 Calibrate pH/ISE in the Autosampler Mode

The Thermo Scientific Orion 960 titrator with revision 5.6 or higher software allows the operator to automatically calibrate a pH or an ion selective electrode in the autosampler mode. A two point pH or ISE calibration is allowed in beaker position 1 and 2 of the autosampler. Simply place two buffers or standards in beaker 1 and 2 and chose the appropriate electrode channel. By identifying the electrode channel the 960 titrator will know whether a pH or ISE calibration is required.

## New Autosampler Protocol

Press YES to “AUTOSAMPLE STANDBY”

New frame: 1. CHAN 1      2. CHAN 2      3. NO CAL

If 3 is chosen, then continue with the routine autosampler procedure. If 1 or 2 is chosen, then perform calibration based on the current electrode ID.

pH:

- Two point calibration (4,7; 4,10; or 7,10).
- Auto-buffer recognition in beakers 1 and 2.
- No manual editing of buffer values are allowed.
- If one of the buffers is not recognized, the 960 continues with a one point calibration.
- One point calibration will use the existing electrode slope.
- If both beakers fail, the 960 will use the existing, previous or default slope and  $E_o$ .
- New slope and  $E_o$  will be used in all methods.

ISE:

- Two point ISE calibration with fixed standards 1 and 10.
- Electrode is calibrated in beaker position 1 and 2.
- No manual editing of standard values are allowed.

## Stability Handling

For the stability handling during the electrode calibration in the autosampler mode, electrode potentials will be read based on the following criteria:

1. Stir for 10 seconds.
2. The 960 uses stability calculation based on the current 960 algorithm.
3. A reading will be taken when electrode reaches stability criteria of less than 5.0 mV/min.
4. Before moving to the next method 960 will print the electrode channel, Eo, and slope.

**Note:** After 3 minutes, the 960 will take a reading regardless of the stability criteria. A new slope and Eo will substitute the 940 slope and Eo.

## Chapter 2 Automatic Blank Handling (Calculation and Substitution into the Methods)

The Thermo Scientific Orion 960 titrator with revision 5.6 or higher software offers automatic blank determination and substitution for techniques 1, 2, 3, 6, 7, 8, 9, and 10. For example, a first derivative technique with mmol as a unit triggers a blank determination routine. With this routine, an average of the last three blank values are calculated by consecutively running a method with mmol unit. Immediately after commencing a new method (manually or on the autosampler) the new average blank value is calculated, printed and substituted into the designated methods. To select a method for blank substitution, a new menu is added to the method protocol that is prompted by choosing the mmol unit.

### New Changes to the Method Protocol

1. While editing a method, the prompt for blank “ENTER NOW or LATER” option is removed.
2. If the mmol unit is selected, the following frames are displayed before saving the method:

|   |   |
|---|---|
| FIRST DERIVATIVE?<br>(technique 6)                  | Select a number 0 to 11   |
| PRINT OUT:<br>1. short 2. long                      | Press 1 or 2 (short now)  |
| Result unit = M?<br>1 = g 2 = mg<br>3 = mmol 4 = ml | Press NO to select alternate units                                  |
| Reaction ration chosen = 1.0000?                    | The reaction ratio is usually 1, see<br>the 960 user guide for help |
| BLANK REQUIRED?<br>Blank value = 0.0000 mmol?       | Press YES or NO<br>For back titrations or blank<br>correction #,Y   |

3. New messages:

APPLY TO METHODS: Press 1 or 2

1. ALL 2. SELECT

If 1 is chosen, the 960 will apply the average blank to all methods

If 2 is chosen, the 960 will display:

CHOOSE METHOD xx ? Press YES or NO

If YES is chosen, select up to 5 methods

If NO is chosen, no method will be selected for blank substitution

SAVE METHOD? Press YES or NO to continue

## Chapter 3 Standardization (Titrant Concentration Calculations and Substitution into the Methods)

The Thermo Scientific Orion 960 titrator with revision 5.6 or higher software offers standardization of the titrant concentration followed by automatic substitution of the mean value of the titrant in the selected saved methods. This feature eliminates the need for rewriting any saved methods. A standardization technique triggers a routine to calculate an average concentration of the titrant and new menus to select saved methods for automatic substitution of the titrant concentrations.

### **Standardize System Technique**

- Choose and edit STANDARDIZE (technique 11) and save it as method (x).
- Standardize by weight or by volume.
- Run method x consecutively on or off the autosampler.
- Immediately after changing to a new method, the average titrant concentration is calculated and automatically substituted into the selected methods.
- Average titrant or standard concentration with the %CV is printed.
- Change titrant or standard concentration in techniques 1, 2, 3, 6, 7, 8, 9, and 10.

## 960 Titrator with Software Rev 5.50 and Higher

New prompts are displayed at end of the method before saving:

|                                       |                  |
|---------------------------------------|------------------|
| STANDARDIZE SYSTEM?<br>(technique 11) | Press YES        |
| STANDARD by<br>1. VOL 2. WEIGHT       | Press 1 or 2     |
| MAX TOTAL TITRANT<br>VOL = 5.00 mL?   | Enter MAX VOLUME |

New messages:

|                                       |              |
|---------------------------------------|--------------|
| APPLY TO METHODS:<br>1. ALL 2. SELECT | Press 1 or 2 |
|---------------------------------------|--------------|

If 1 is chosen, the 960 will apply the average titrant/standard concentration to all methods.

If 2 is chosen, the 960 will display:

|                    |                 |
|--------------------|-----------------|
| CHOOSE METHOD xx ? | Press YES or NO |
|--------------------|-----------------|

If YES is chosen, select up to 5 methods

If NO is chosen, no method will be selected for titrant/standard concentration substitution

|              |                             |
|--------------|-----------------------------|
| SAVE METHOD? | Press YES or NO to continue |
|--------------|-----------------------------|

### Important Notes

- The first method of a SEQUENCE must be STANDARDIZE method, followed by a PH READ method in order to run this technique in a sequence.
- If STANDARDIZE methods fail in the autosampler mode, analysis on other beakers will continue without substituting any titrant concentrations (960 uses the concentration in the saved methods). A message of STANDARDIZE METHODS FAILED will be printed before starting a new method.
- A seven digit code is added to the above new messages so DataPLUS2 software may receive them like other variables.

## Chapter 4 Miscellaneous Changes

- The unit lbs/gal in ABC calculation has been changed to lbs/cubic feet.
- System reset can be done by pressing PAUSE while powering up the 960. This must be done only if the system has been locked up by power surge or other external factor. Keep in mind, the system reset wipes out all saved methods and saved calibration parameters in the 960. Always keep hard copy printout of your methods in case you have to do a system reset.

- The message of:

1: PRINTER  
2: PC DATA COLLECT?

has replaced with:

ORION 960 CONNECTED TO A PRINTER?

- In the new accessory menu, if “1” is selected then the 960 printer port can be used with the printer. If “2” is selected then the printer port on the 960 can be used for data collection with the DataPLUS2 software. In revision 5.6 software, data and the messages in the 960 has been coded with a seven digit number so DataPLUS2 software can identify the 960 parameters. The seven digit coded part of the data is transparent to the user.

**Assistance** After troubleshooting all components of your measurement system, contact Technical Support. Within the United States call 1.800.225.1480 and outside the United States call 978.232.6000 or fax 978.232.6031. In Europe, the Middle East and Africa, contact your local authorized dealer. For the most current contact information, visit [www.thermo.com/contactwater](http://www.thermo.com/contactwater).

**Warranty** For the most current warranty information, visit [www.thermo.com/water](http://www.thermo.com/water).

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