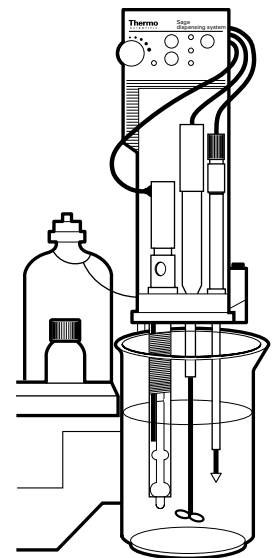


Thermo Scientific Orion Auxiliary Dispenser

User Guide



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This publication supersedes all previous publications on this subject.

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Chapter 1 Introduction

The Thermo Scientific Orion auxiliary dispenser automates reagent handling and expands the titration capability of the Thermo Scientific Orion 960 titration system. It enables the 960 titrator user to have dedicated work stations and remote analysis with automated reagent addition, complex sequences, and back titrations.

Complete automation tailored to each specific application can be achieved with minimal setup or sample preparation time. The auxiliary dispenser is easy to operate with all the programming done on the 960 titrator keypad. All auxiliary dispenser methods can be saved with the ability to add up to eight auxiliary dispensers.

The auxiliary dispenser is available in two configurations: with the electrode tower, Cat. No. 096010, and without the electrode tower, Cat. No. 096011. The auxiliary dispenser without the tower offers automated pre-addition of reagent, SEQUENCES using more than one titrant, and dedicated setup with the 960 titrator autosampler. The version with the tower offers all of the above plus the capability to have separate dedicated work stations or remote stations for potentially hazardous analyses.

Chapter 2 Instrument Description

The two configurations of the auxiliary dispenser contain a dispenser base unit, wire reagent rack, distilled water reservoir, dispenser probes, cable, tubing and accessories necessary to commence operation.

Auxiliary Dispenser Front Cover Components

Part	Function
DI Water Container	Reservoir for flushing tubing or diluting
Wire Rack	Holder for reagent
Dispenser Probe	Delivers working solution to the analysis beaker
Cable Cover	Consolidates cable and tubing

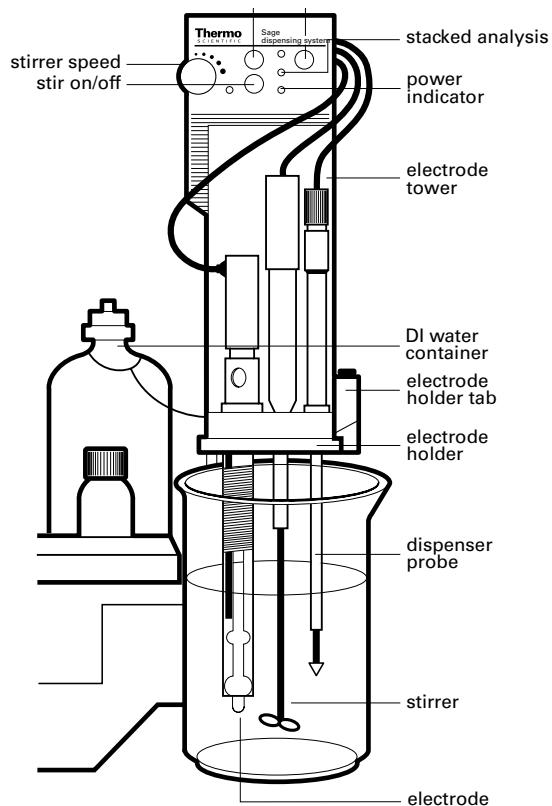


Figure 1 – Front Cover of Auxiliary Dispenser

Auxiliary Dispenser Front Tower Components

Part	Function
Power LED	Lights up when 960 titrator is powered up
Dispenser LED	Lights up when AUTOdispenser is pumping solution
Stacked Analysis LED	Does not light on auxiliary dispenser tower
Stirrer LED	Lights when stirrer is on
Stirrer Control	Controls the speed of the stirrer. Rotate forward to decrease speed, rotate back to increase.
Dispenser Key	Press and hold to operate the auxiliary dispenser manually
Stirrer Key	Press to turn the stirrer on and off manually
Pause Key	Press to interrupt the dispenser controlled by the tower
Electrode Tower	Consists of the electrode holder, stirrer control, stir, dispense, and pause keys with their associated LEDs
Electrode Holder Tab	Use to raise and lower the electrode holder
Electrode Holder	Holds two standard size electrodes, stirrer, and one or two dispenser probes
Stirrer	Mixes reagents and sample

Auxiliary Dispenser Rear Panel Components

Part	Function
Dispenser	Pump with dispenses working solution or diluent
Working Solutions Tubing	Tubing from the working solution bottle to the dispenser
Dispenser Tubing	Tubing from the Auxiliary dispenser to the dispenser probe
RS232 PORT (Female)	Allows interface to Orion 960
RS232 PORT (Male)	Allows interface to additional auxiliary dispensers or Orion 960 Sample Changer
Auxiliary Dispenser Tower	
Electrode Tower	Consists of the electrode holder, stirrer control, stir, dispense, pause keys and their associated LEDs
Cable Clip	Holds the electrode cable/cable cover in place
Stirrer Jack	Allows connection of stirrer

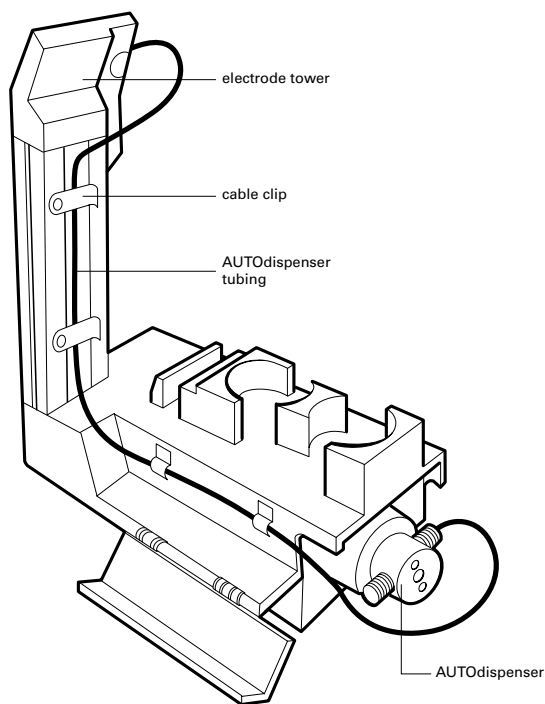
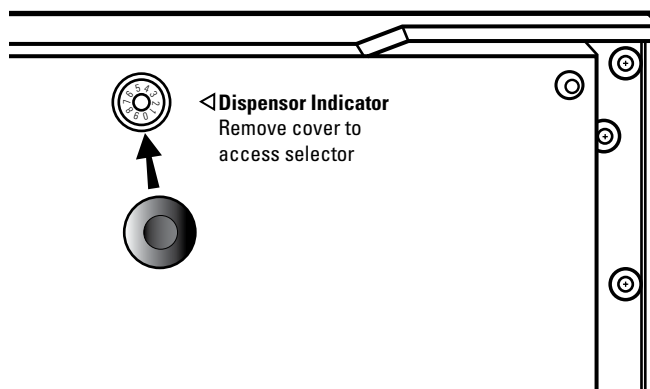


Figure 2 – Rear Panel of Auxiliary Dispenser

Auxiliary Dispenser Bottom Panel Components

Part	Function
Dispenser Identity	Allows 960 to recognize each dispenser in the program

Figure 3 – Base Unit Bottom of Auxiliary Dispenser



Chapter 3 Instrument Setup

Note: The Thermo Scientific Orion 960 titrator system must have a software revision level of 3.00 or greater. If you do not have this level of software, contact Technical Service or your local distributor.

Required Tools

1. Phillips screwdrivers (sizes 1 and 2)
2. Flat-head screwdrivers (1/8")

Electrode Tower and Base Unit

1. Unpack the auxiliary dispenser and accessories.
2. Set the location number on the bottom panel by pointing the screw to the desired number (see **Figure 3**).

Note: The auxiliary dispenser requires the designation of a location number to identify each dispenser to the Orion 960 program. The Orion 960 base unit is always designated as the primary dispenser or location 1, the first auxiliary dispenser as location 2, the second auxiliary dispenser as location 3 and so on up to the maximum of 9 locations.

Cable Connections

1. Insert the auxiliary dispenser interface cable into the computer port on the 960 titrator and in into the female RS232 port on the auxiliary dispenser. Screw the connectors firmly into place.
2. Connect any additional dispensers by connecting the interface cable to the male RS232 port on the dispenser already linked to the 960 titrator and the female RS232 port on the next auxiliary dispenser.
3. Connect the autosampler, if used, to the auxiliary dispenser with the interface cable from auxiliary dispenser male RS232 port to the serial output port on the autosampler.
4. Connect the computer to the last auxiliary dispenser male RS232 port (to use the computer to control the 960 titrator system) or connect the computer to the printer port of the 960 titrator system (to collect data, only). If an autosampler is connected to the auxiliary dispenser male RS232, the computer can only be connected to the 960 printer port.

Deionized Water Container

1. Rinse and fill the container with deionized or distilled water.
2. Screw on the cover to the deionized water container.
3. Place the container onto the circular depression in the base unit.
4. Insert the working solution tubing into the top of the deionized water container cover.
5. Rinse the tubing and auxiliary dispenser with deionized water before connecting new working solutions and at the end of each day. Use the speed 5 (dispense/flush) keys on the 960 titrator to flush 30 mL of water through the system.

Electrical Connections

All 960 titrator system components (EA940 meter, 960 base module, GLP printer, auxiliary dispenser and autosampler) must be at a common ground. Plug them into the same power strip, outlet or series of outlets known to be at a common ground.

The 960 titrator system must be operated on a stabilized power supply, and the voltage must be within 10% of the expected level.

1. Connect the power cord from the 960 titrator to a power supply. The green power LED on the tower will light.

Note: This connection must be done first.

2. Connect the power cord from the EA940 meter to a power supply.
3. Connect the power cord from the auxiliary dispenser(s) to a power supply.
4. Connect the power cord from the printer to a power supply, and turn the printer power switch on.
5. Wait approximately one minute for downloading, while the EA940 meter is retrieving information from the 960 titrator.

Checkout

After completing the instrument setup section, perform the checkout procedure in the 960 titrator user guide.

Chapter 4 Using the Auxiliary Dispenser

Initial Setup

The key to operating the auxiliary dispenser is in remembering the auxiliary dispenser is an extension of the 960 titrator system and not a separate entity. Once the operation of the 960 titrator is mastered there are a few simple steps required to program the auxiliary dispenser.

The purpose of the initial setup is to calibrate the auxiliary dispenser and to program the 960 titrator to recognize the auxiliary dispenser as an active accessory. The 960 titrator will prompt for all the necessary parameters for both operations. After responding YES to ANALYZER, the prompts for identifying the auxiliary dispenser as an accessory are as follows:

Display	Action
ORION 960 ACCESSORIES?	Press YES
ORION 960 CONNECTED TO A PRINTER	Press YES if printer (or computer) is connected to printer RS232 port
ORION 960 ? CONNECTED TO SAMPLE CHANGER	Press YES if autosampler is connected to computer RS232 port.
ORION 960 CONNECTED TO COMPUTER?	Press NO if an auxiliary dispenser is connected to computer RS232 port (this message will not appear if display #3 was answered YES)
ORION 960 CONNECTED TO A 607 SWITCHBOX?	Press YES if switchbox will be connected to 960. If NO, only 3 electrodes may be identified for use.
ORION 960 CONNECTED TO A BALANCE?	Press YES to select balance if one will be interfaced with 960, press NO if not.
ORION 960 CONNECTED TO 1 DISPENSER?	Press number 1 - 9, then press YES (the number of dispensers connected including the 960 AUTODispenser).

Dispenser Calibration

The auxiliary dispenser requires calibration in the same manner that the 960 AUTODispenser is calibrated. Like the AUTODispenser, the auxiliary dispenser is based on a rotary reciprocating pump built into its base. It is set at the factory to dispense 0.05 mL per pump revolution. For best results, the pump should be calibrated before initial use and once a month for maintenance. The prompts will appear as follows:

Display	Action
CALIBRATE DISPENSER No. 1?	Press YES. Then follow the AUTODispenser calibration procedure in the 960 user guide until CALIBRATION CONSTANT X.XXXX (remember AUTODispenser 1 is the 960 AUTODispenser).
CALIBRATION CONSTANT X.XXXX + X.XXX%	The calibration constant is automatically stored in memory. Calibration constant should be 0.900 to 1.100, and relative standard deviation should be less than 0.1%. If not, recalibrate taking special care when weighing vials (for best results it is recommended that rubber gloves are worn when handling vials).
CALIBRATE DISPENSER No. 2?	Press 'YES'. Repeat the steps above for each dispenser with a maximum of 9. After the last dispenser has been calibrated, the message AUTOCHEM STANDBY will be displayed. Press YES to start.
	To inspect the calibration constant or to manually enter a value, press NO. This should only be done if the dispenser has already been successfully calibrated.

Method Setup with the Auxiliary Dispenser

The auxiliary dispenser can be used to set up separate work stations for each measurement, remote stations for potential hazardous reagents or to dispense additional reagents within any given method. For each application, it is very important that the initial setup be performed before starting a method. Writing of a method is as simple as any other 960 titrator method. The message prompts will continue as follows (the 960 AUTOdispenser is always labeled station 1):

Display	Action
DISPENSER IS...	No action necessary, momentary display.
AUTOMATIC...PRESS 1 PIPET...PRESS 2	Press 1 for use of the auxiliary dispenser
DISPENSER NO. 1 TO BE USED?	Enter the dispenser number (N-1*) of the titrant, and then press YES.
STIRRER NO. 1 TO BE USED?	Enter the stirrer number (N-1*), and then press YES.
ELECTRODE NO. 1 TO BE USED?	Enter the electrode channel number, and then press YES.
SAMPLE VOLUME = 2.000?	Enter sample volume (mL), and then press YES.
STANDARD = 0.100000 M?	Enter concentration of standard (or titrant) in molarity, and then press YES.
PRE-DOSE VOL** = 0.00 mL	Enter volume of titrant to predose (0 if no pre-dose), and then press YES.
ADD AUXILIARY*** REAGENT	Press YES if an auxiliary reagent is to be dispensed from the auxiliary dispenser. If the auxiliary dispenser is only used for the titrant, press NO.
DISPENSER NO. 1 TO BE USED?	Enter dispenser number (N-1*), and then press YES.
AUX REAGENT VOLUME = 0.000 mL?	Enter the reagent volume (mL), and then press YES.
MAX TOTAL TITRANT VOL = 5.000 mL?	Enter the maximum titrant volume (mL), and then press YES.
	Continue to follow the prompts for each particular method per the 960 titrator user guide.

* N= Number of dispensers originally defined

** PRE-DOSE will precede auxiliary dispenser for most techniques. A PRE-DOSE VOLUME is a pre-analysis addition of titrant.

*** Auxiliary reagent is any additional reagent other than the titrant.

Chapter 5 Electrode Tower Key Functions

The keys on the auxiliary dispenser electrode tower are used for manual operation of the stirrer and pump of the auxiliary dispenser as well as allow the analysis to be stopped on demand. They function similarly to the 960 tower keys.

Stir – Stir function allows manual operation of stirrer. This may be useful for dissolving a slowly soluble sample prior to analysis. Also use to adjust the stirrer speed prior to analysis, or for EA940 meter measurements.

Press the stir key to turn the stirrer on and the stir LED will light. Press the stir key again to stop stirring and the stir LED will turn off.

If stirring is started manually prior to analysis, the 960 titrator will automatically take over stirring function when analysis has begun. The manual stirring function is not available during an analysis.

Dispense – Dispense function allows manual operation of the AUTODispenser. This may be useful for flushing the system or dispensing an unmeasured quantity of solution.

Rinse the tubing and auxiliary dispenser with deionized water before connecting new working solutions and at the end of each day. Use the speed 5 (dispense/flush) keys on the 960 titrator to flush 30 mL of water through the system.

Connect the working solution tubing to the solution to be dispensed. Press and hold the dispense key to dispense a quantity of solution to prime the system. The LED will light while dispensing. Release the dispense key to stop dispensing.

Also use this function to rinse out the dispenser probe tip.

Warning: The manual dispense function key is active during methods and will dispense reagents if pressed.

Pause – The pause function on each auxiliary dispenser interrupts only the dispensing of that particular dispenser and only if it is currently dispensing.

To pause analysis, press the pause key on the 960 tower. This will allow the analysis to be interrupted or exited if an error has been made.

To stop analysis, press the pause key on the 960 tower until the 960 displays *** pausing. This is a momentary display. To continue or stop analysis, wait until display reads

RESUME...1 STANDBY...2 PROCESS data now...3

Press 1 to continue the analysis at the same point from which it was interrupted.

Press 2 to stop the analysis and return to AUTOCHEM STANDBY (or in autosampler mode, AUTOSAMPLE STANDBY).

Press 3 to stop the analysis, process the data generated up to that point, calculate a result, and then return to AUTOCHEM STANDBY (or AUTOSAMPLE STANDBY). If a result cannot be found by the chosen technique, HELP analysis will attempt to calculate a result from the data available (HELP is not available in autosampler mode).

Note: If the 960 titrator or auxiliary dispenser has not yet added the first full addition of working solution to the sample, the option to process data now is not available.

Chapter 6 Customer Services

Storage **Note:** Rinse the tubing and auxiliary dispenser with deionized water before connecting new working solutions and at the end of each day. Use the speed 5 (dispense/flush) keys on the 960 titrator to flush 30 mL of water through the system.

Rinse the dispenser probe and stirrer with water.

Store electrodes as directed in electrode user guide.

Maintenance Recalibrate the AUTOdispenser and auxiliary dispenser monthly.

If the dispenser probe becomes clogged (by salt deposits, sample, etc) disassemble the dispenser probe from the tubing and insert the cleaning wire to clean out the probe. Reassemble the probe and thoroughly flush it with water. If the probe is damaged or the blockage cannot be removed, replacement dispenser probes, Cat. No. 096016 may be ordered.

Whenever the 960 titrator will not be used for a day or more, thoroughly flush the system with deionized water prior to storage.

Wipe off spills of solvents and strong acids or bases to avoid discoloration of instrument case.

Troubleshooting

The auxiliary dispenser is an accessory to the 960 titrator. This is an important consideration when troubleshooting. The following steps should be taken to isolate the auxiliary dispenser as the source of a problem.

1. Check all connections to power, the 960, or additional auxiliary dispensers.
2. Check all tubing connections.
3. Check that each station and electrode is identified correctly.
4. Consult the **Troubleshooting** section of the 960 titrator user guide.

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.

Warranty For the most current warranty information, visit www.thermo.com/water.

Notice of Compliance

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It was been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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