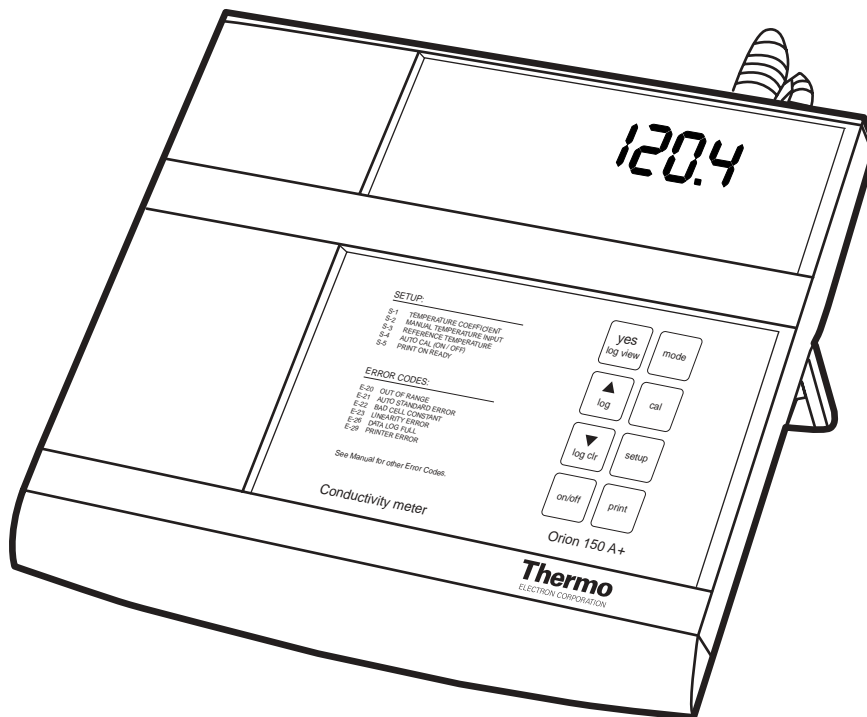


Orion 125A+, 150A+

Orion Aplus™

Advanced Conductivity Meters

INSTRUCTION MANUAL



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ORION Series A meters and 900A printer are protected by U.S. patents 5,108,578, 5,198,093, and German patents D334,208 and D346,753.

Sure-Flow electrodes are protected by European Patent 278,979 and Canadian Patent 1,286,720.

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

ROSS Ultra electrodes have patents pending.

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

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This publication supersedes all previous publications on this subject.

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Chapter I

Introduction

The Orion Portable 125Aplus and Benchtop 150Aplus Conductivity Meters are value priced, full featured meters which can be used for a wide variety of applications. Water quality, salinity, acids, bases and other samples can be easily analyzed for conductivity, salinity, and total dissolved solids.

These meters feature microprocessor design, which automates complicated and time consuming calibration and measurement procedures for a wide variety of applications. Orion's new DirectCal™ direct calibration technique allows calibration by direct input of actual calibration standard values, eliminating iterative adjustments of cell constants. Orion's new AutoCal™ calibration technique features automatic recognition of Orion conductivity standards. A wide variety of cells, Conductivity and TDS Standards and accessories are available.

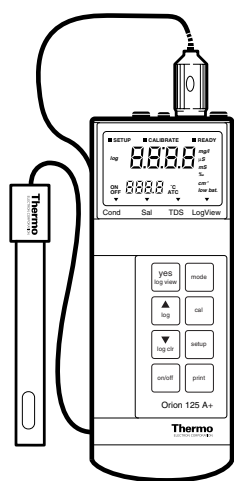


Figure #1 Orion 125Aplus

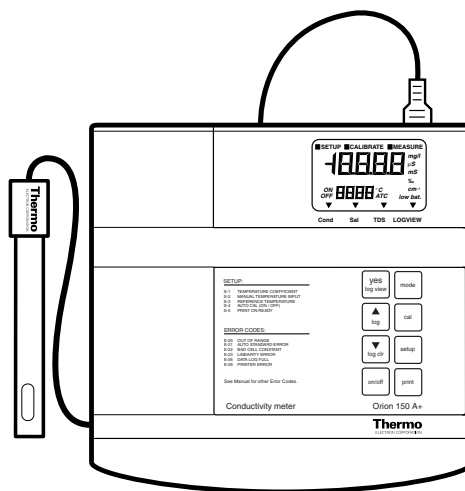


Figure #2 Orion 150Aplus

How to Use This Manual

For more detail on the operation of any of the models, please refer to the Table of Contents for the page location of an operation of a particular Orion meter. Troubleshooting instructions are common to all meters and this information is located toward the end of this manual.

Explanation of key functions and additional reference information are not required for calibration and measurement can be found in the appendices.

Chapter II

Measurement Theory

Conductivity Measurement

The term conductance refers to the ability of materials to carry an electric current. Liquids which carry an electric current are referred to as electrolytic conductors. Under the influence of an electric field, the flow of current through an electrolytic conductor is accomplished by the movement of positive and negative ions. The conductance of a liquid is defined by the ratio of current to voltage between any two points within the liquid. As the two points move closer together or further apart the ratio will change. For analytical purposes, a dimension is given to the measurement; i.e., the physical parameters of the measurement.

By defining the physical parameters of the measurement, a standard measure is created. The standard measure is referred to as specific conductance or conductivity, which is defined by the reciprocal of the resistance in ohms, measured between the opposing faces of 1 cm cube of liquid at a specific temperature.

The units used to define conductance are: $1/\text{ohm}=1 \text{ mho}=1\text{Siemen(S)}=1000 \text{ mS}=1,000,000 \text{ }\mu\text{S}$. The conductivity value is obtained by multiplying the conductance value by the cell constant. See Figure 3 for Conductivity Ranges of Common Aqueous Solutions.

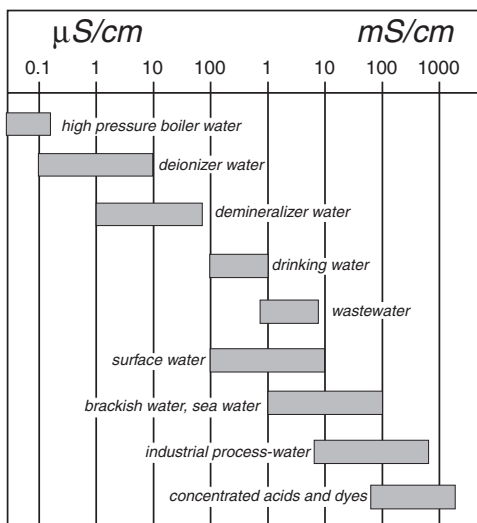


Figure #3 Ranges of Common Aqueous Solutions

Cell Constants

In theory, a conductivity measuring cell is formed by two 1 cm square surfaces spaced 1 cm apart. The theoretical cell just described has a cell constant of $K = 1.0 \text{ cm}^{-1}$. The cell constant, K , is defined as the ratio of the distance between the electrodes, d , to the electrode area, A . However, the existence of a fringe-field effects the electrode area by the amount AR , therefore $K = d/(A + AR)$. See Figure 4. Because it is normally impossible to measure the fringe-field effect and the amount of AR to calculate the cell constant, K , the actual K of a specific cell is determined by a comparison measurement to a standard solution of known conductivity (e.g., 0.01 M KCl).

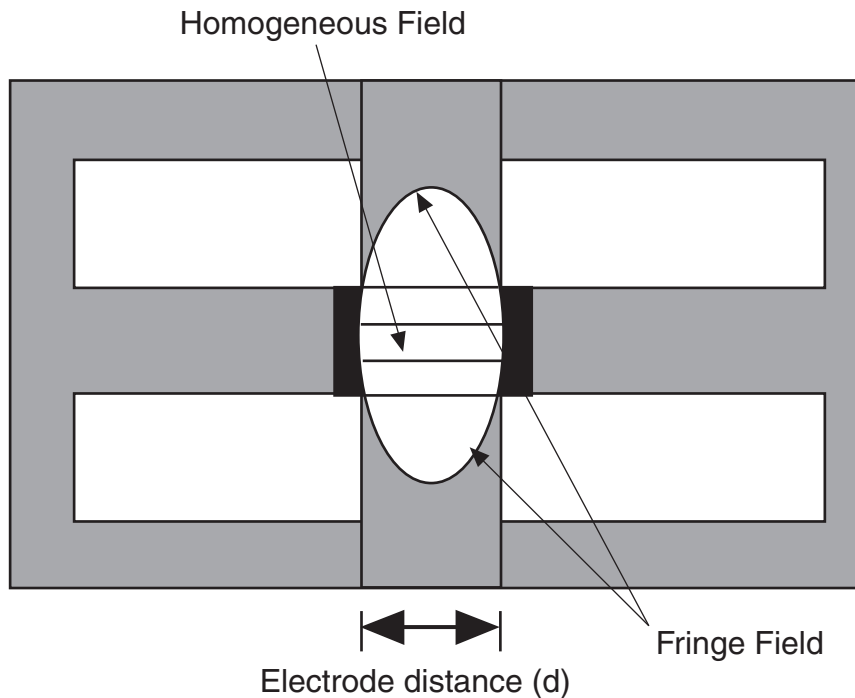


Figure #4

Cells of different physical configuration are characterized by their cell constant, K . Often for considerations having to do with sample volume or space, a cell's physical configuration is designed differently. Cells with constants of 1.0 cm^{-1} or greater normally have small, widely spaced electrodes. Cells with constants of 0.1 cm^{-1} or less normally have large closely spaced electrodes.

Since K is a “factor” which reflects a particular cell’s physical configuration, the cell constant must be multiplied by the observed conductance to obtain the actual conductivity reading. For example, an observed reading of 200 mS using a cell with $K = 0.1 \text{ cm}^{-1}$, the conductivity value is $200 \text{ mS} \times 0.1 \text{ cm}^{-1} = 20 \text{ mS/cm}$.

Solutions with low conductivity, up to 1-2 mS/cm, are best measured with cells having a cell constant of $K = 0.1 \text{ cm}^{-1}$. Cells with $K = 1.0 \text{ cm}^{-1}$ are best used for solutions with conductivity of 1 mS/cm to 1000 mS/cm. Cells with $K = 10.0 \text{ cm}^{-1}$ are best used for solutions with conductivity of 10 mS/cm to 2000 mS/cm. See Figure 5 for typical conductivity ranges for cell constants.

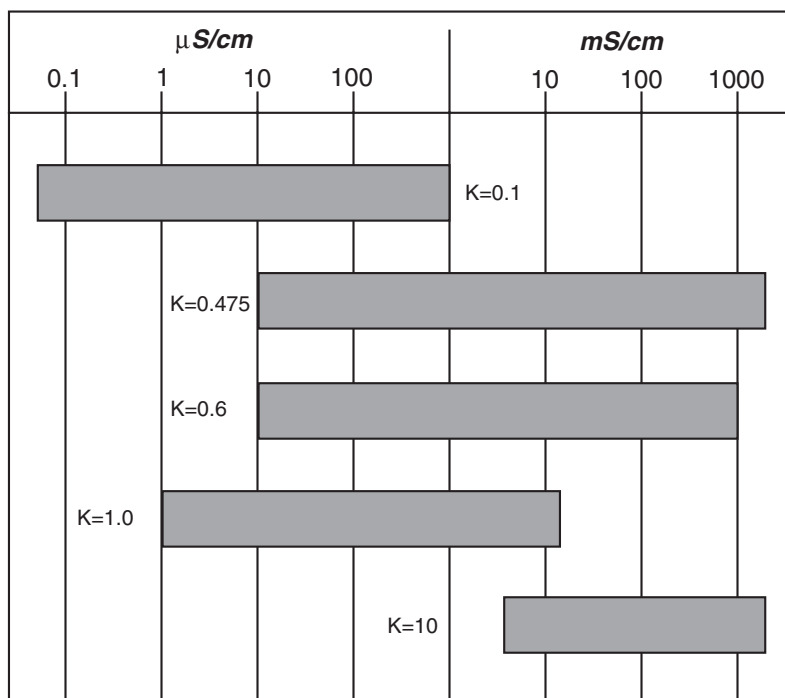


Figure #5 Typical Ranges of Conductivity Cells

Temperature Effects

The conductivity of a solution with a specific electrolyte concentration changes with temperature. The relationship of the change in conductivity as a function of temperature is described by a solution's temperature coefficient. Temperature coefficients vary with each solution. Some examples are shown in Table 1. The Orion 125Aplus and 150Aplus use 2.1%/°C as a default temperature coefficient, which is representative of many aqueous samples, to compensate for temperature changes. The meters have an adjustable temperature coefficient of 0.0 to 3.0%/°C. The meters also have a nonlinear temperature coefficient (nLF) which is helpful for measurements of natural waters.

By definition, temperature compensated conductivity of a solution is the conductivity which that solution exhibits at the reference temperature. The temperature is chosen to be either 25 °C or 20 °C. A measurement made at the reference temperature needs no compensation. The closer the sample is to the reference temperature, the smaller the error will be if the meter temperature coefficient is incorrect. The Orion 125Aplus and 150Aplus automatically compensate for temperature changes based on the temperature coefficient and the reference temperature when a simultaneous temperature measurement is made.

Table 1
Typical Temperature Coefficients Between 25 and 50 °C
(percent change of Conductivity per °C)

Solution	%/°C
Ultrapure Water	4.55
Salt (KCl)	2.01
Salt (NaCl)	2.12
5% NaOH	1.7
Dilute Ammonia	1.88
10% HCl	1.32
5% Sulfuric Acid	0.96
98% Sulfuric Acid	2.84
Sugar Syrup	5.64

Salinity

Salinity is a measure of the total dissolved salts in a solution and is used to describe seawater, as well as natural and industrial waters. Salinity is a relative scale based on a KCl solution. A Salinity value of 35 is relative to seawater at 15 °C and a conductivity value equivalent to a KCl solution containing 32.4356 g KCl in 1 Kg of solution. The units to describe salinity are ‰ or ppt (parts per thousand). Orion 125Aplus and 150Aplus calculate the salinity based on the Practical Salinity Scale of 1978, as referenced in Standard Methods.

Total Dissolved Solids Measurement

The standard method of determining TDS (Total Dissolved Solids) is by evaporating the sample to dryness at 180 °C and weighing the residue. Conductivity may be used to estimate TDS by calculating the concentration of sodium chloride equivalent to a given conductivity and temperature value. Orion conductivity systems report a sample's TDS value in mg/L of sodium chloride by comparing its conductivity and temperature to data stored in the meter's memory. Data was obtained from the International Critical Tables. For TDS values between 0 to 19,900 mg/L and temperature values between 5 and 50 °C, the displayed TDS value agrees with Critical Tables values with an accuracy of 0.87% R.S.D.

Conductivity Standard Values

The following table contains conductivity values for Orion Conductivity/TDS Standards at a range of temperatures. The conductivity value at the temperature of the standard should be used when using the DirectCal™ calibration procedure. For higher accuracy, data in this table may be interpolated between integral temperature readings. There may be small differences between the values shown here and other values in the literature. These small differences are due to using kilograms of water rather than liters, as well as changes in assigned molecular weights, definitions of the Siemen, the use of slightly different temperature scales, and whether the inherent conductivity of water was subtracted out. For further information, see "Review of Electrolytic Conductance Standards", Wu, Koch, Hamer and Kay, J. Soln. Chem. 1987,16, 985-997.

Table of Conductivity vs. Temperature for Orion Conductivity Standards. Values shown are in μS (microSiemens).

Temp. °C	12.9 mS/cm Standard Orion 011006	1413 $\mu\text{S}/\text{cm}$ Standard Orion 011007	100 $\mu\text{S}/\text{cm}$ Standard Orion 011008
0	7131	776	54
1	7344	799	56
2	7560	822	58
3	7776	846	59
4	7995	870	61
5	8215	894	63
6	8436	918	64
7	8659	943	66
8	8884	968	68
9	9110	992	70
10	9337	1017	72
11	9566	1043	73
12	9796	1068	75
13	10027	1094	77
14	10260	1119	79
15	10494	1145	81
16	10729	1171	83
17	10956	1198	85
18	11203	1224	87
19	11441	1251	88
20	11681	1277	90
21	11922	1304	92
22	12164	1331	94
23	12407	1358	96
24	12651	1386	98
25	12896	1413	100

Temp. °C	12.9 mS/cm Standard Orion 011006	1413 µS/cm Standard Orion 011007	100 µS/cm Standard Orion 011008
26	13142	1441	102
27	13389	1468	104
28	13637	1496	106
29	13885	1524	108
30	14135	1552	110
31	14385	1580	112
32	14636	1608	114
33	14888	1636	117
34	15141	1665	119
35	15394	1693	121
36	15648	1722	123
37	15903	1751	125
38	16158	1780	127
39	16414	1808	129
40	16671	1837	131
41	16928	1866	134
42	17185	1896	136
43	17443	1925	138
44	17701	1954	140
45	17960	1983	142
46	18220	2013	145
47	18479	2042	147
48	18739	2071	149
49	18999	2101	151
50	19260	2103	154

Chapter III

General Information

Instrument Descriptions

Orion 125Aplus Portable Meter
& 150Aplus Benchtop Meter

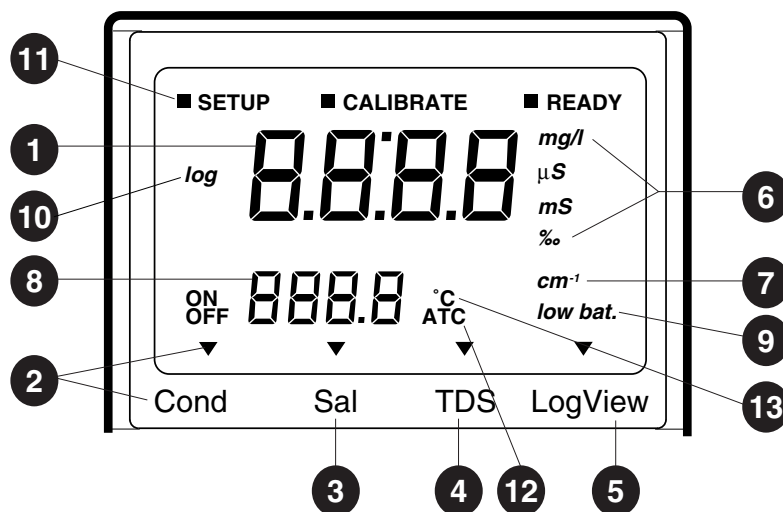


Figure #6 Orion 125Aplus & 150Aplus

Item	Display Feature	Function	Comments
1	Alphanumeric Display	Displays Conductivity, Salinity, TDS value, or User prompts	
2	Cond ▼	COND Indicator	Indicates Conductivity Mode
3	Sal ▼	SAL Indicator	Indicates Salinity Mode
4	TDS ▼	TDS Indicator	Indicates TDS Mode
5	LogView ▼	LogView Indicator	Indicates LogView Mode

Item	Display Feature	Function	Comments
6	mS μS ‰ mg/l	(milliSiemens/cm) (microSiemens/cm) (parts per thousand) (milligrams per Liter)	Conductivity Units Conductivity Units Salinity Units TDS Units
7	cm ⁻¹	Cell Constant Units	
8	Alphanumeric Display	Displays Temperature and Log Identification Points	
9	low bat.	Indicates Low Battery	(Orion 125Aplus only)
10	log	Indicates data is stored in memory	
11	READY SETUP CALIBRATE	Ready Indicator Setup Mode Indicator Calibration Mode Indicator	Displayed when reading is stable
12	ATC	Displayed when temperature sensor attached	
13	°C	Degree Centigrade	Temperature Units

Keypads, Orion 125Aplus & 150Aplus

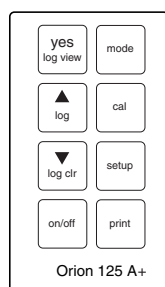


Figure #7 Orion 125Aplus

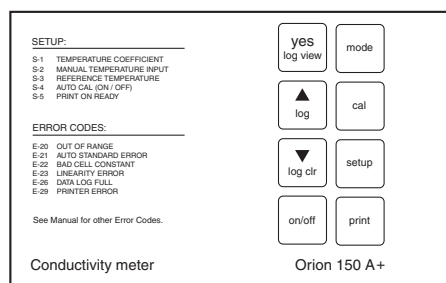


Figure #8 Orion 150Aplus Keypad

Key	Primary Function	Comments
YES/Log View	Accepts entered or displayed values	LogView in measurement modes only
MODE	Conductivity, Salinity or TDS Measurements	To return to active measurement from any mode, press the MODE key
▲	Scroll values up	
LOG	Log current value	In measurements modes only
▼	Scroll values down	
LOG CLEAR	Clears data in log	Hold down key for 3 seconds to clear data in log (in measurement modes only)
CAL	Calibration	
SETUP	Setup	
PRINT	Prints measured value or logged data	Prints logged data in LogView mode only
ON/OFF	Power	

Meter Connections, Orion 125Aplus and 150Aplus

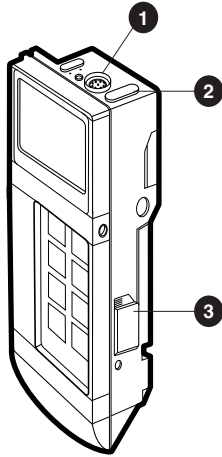


Figure #9 Orion 125Aplus Connections

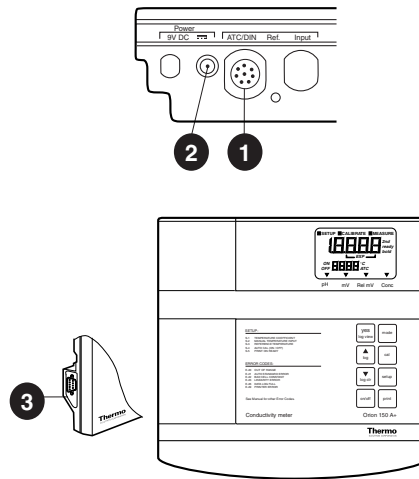


Figure #10 Orion 150Aplus Connections

Item	Feature	Function
1	DIN Connector	Conductivity Probe Connection
2	Power Connection	For connection of line adapter
3	RS232 Connector	For printer or computer

Chapter IV

System Setup

Instrument Setup

Power Source

Orion 125Aplus and 150Aplus operate on an AC line adapter (Orion 020125 for 110 V, Orion 020130 for 220 V, or Orion 020135 for 240 V). The Orion 125Aplus also operates on either one 9V alkaline battery or one 9 V lithium battery. The estimated battery life is 45 hours of continuous operation for an alkaline battery and 80 hours of continuous operation for a lithium battery.

Battery Installation (Orion 125Aplus)

1. Open battery compartment by pushing closure up. This is most easily accomplished by using a coin and inserting it into the slot on the side of the meter.
2. Insert battery by pushing gently until it locks in place. Verify polarity is correct as shown in the battery compartment.
3. Replace battery compartment cover.

Note: Recalibrate after replacing the battery. Without the battery installed or meter plugged into line power, the meter loses calibration data and other information in memory. To prevent loss of data in the field, turn meter off if the low battery signal comes on. Check and replace batteries regularly prior to field use.

Self-Diagnostics Checkout

It is recommended to perform this test when the meter is first received or when problems occur.

Note: Self test will not function with a low battery.

1. Disconnect the conductivity cell for the following test. If the cell is attached and immersed in solution, the meter will fail “Test 3.”
2. Press and hold the **YES** key while pressing the **ON/OFF** key to turn the meter on. The instrument automatically performs electronic and hardware diagnostic tests.
3. After Test 7, a “0” will appear on the display. Press each key (the numeric digits will change with each keypress).

Note: Time between each keypress must be less than 4 seconds.

4. After the Test 7, the meter will display “Test 8” and then turn off.
5. If any problems are found during self-test, the meter will display an operator assistance code until the **YES** key is pressed. See page 37 for operator assistance codes.
6. If the operator does not wish to perform the self-diagnostics checkout, the meter may be turned on by pressing the **ON/OFF** key.

Power Up

1. Connect the conductivity cell to the meter.
2. Press the **ON/OFF** key to turn meter on. All display indicators will be displayed briefly, followed by the meter model number. If “low bat.” indicator remains on, replace battery or use line adapter.

Auto Shutoff (Orion 125Aplus only)

The Orion 125Aplus meter will automatically shut off 20 minutes after the last keypress. The Auto Shutoff default setting is on. To turn the feature off, press the **MODE** key while turning the meter on. A low pitched beep indicates Auto Shutoff has been disabled. Auto Shutoff will be activated when the meter is turned off and on again.

Setup Menu

Five features are accessed by pressing the **SETUP** key to access the setup menu. The “SETUP” indicator at the top left of the display will be illuminated.

- Scroll through setup choices by pressing the **YES** key.
- Changes are made with the ▲ or ▼ keys.
- All changes must be acknowledged by pressing the **YES** key.
- Return to measure mode by pressing the **MODE** key.

Display	Feature	Options	Comments
S-1	Temperature	0.0 to 3.0%/°C or ----	Scroll to maximum setting (----) for nLF function
S-2	Manual Temperature Input	-5 to 105 °C	For Manual Temperature Compensation (sample temperature)
S-3	Reference Temperature	25 °C or 20 °C	Default is 25 °C
S-4	AutoCal™	ON or OFF	Set to ON to enable automatic recognition of Orion calibration standards

***Note:** Manual Temperature Input is not accessible in the Setup mode when a conductivity cell with an internal temperature sensor or an external temperature sensor is attached to the meter.*

Chapter V

Operation

Calibration of the Cell Constant

It is recommended to calibrate the cell constant against known conductivity standards as the conductivity cell constant may shift with time. The Orion 125Aplus & 150Aplus have three means of calibration. Each meter may be calibrated by a cell constant adjustment method. The meters may also be calibrated by performing either a DirectCal™ or an AutoCal™. A DirectCal™ is performed by entering the desired conductivity range and then inputting the temperature corrected standard value(s). The cell constant is then calculated by the meter. An AutoCal is performed by entering the nominal cell coefficient and then measuring the Orion calibration standard. When the reading stabilizes, the nominal calibration standard value is displayed. Whether using a temperature sensor or manual temperature, the meter corrects for temperature internally. For best results, calibrate at the chosen reference temperature. If a two point calibration is performed, the percent linearity of the conductivity cell will be displayed simultaneously with the cell constant. Percent linearity is a measure of the linearity of a given cell. Calibration for TDS and Salinity must be performed in the conductivity mode using conductivity standards.

Note: Cell Constant Adjustment & DirectCal™ may only be performed when AutoCal is disabled. Refer to Setup section to disable the AutoCal feature.

Calibration - Cell Constant Adjustment Method

*Note: To return to active measurement modes from the calibration mode, press the **MODE** key.*

1. Disable temperature compensation by entering the setup mode, scrolling the temperature coefficient (S-1) down to 0 and pressing the **YES** key. Press the **MODE** key to return to measure mode.
2. Initiate calibration by pressing the **CAL** key. The “CALIBRATE” indicator and the last cell constant will appear on the display.
3. Immerse the conductivity cell in the standard. Slightly agitate the cell to remove any air bubbles.

4. Enter the cell constant printed on the cell cable or estimate the cell constant of the cell you are using. Use the ▲ or ▼ key to move the decimal point, then press the **YES** key to accept the decimal placement. Enter the cell constant value by scrolling each digit with the ▲ or ▼ key, then accepting the value by pressing the **YES** key. The meter automatically returns to the measurement mode.
5. Compare the displayed value of the standard to its specified value at the standard's temperature. (See table page 8).
6. If the correct standard value is not displayed, calculate the percentage error in the displayed value from step 4.

$$\text{Percent Error} = \frac{\text{Standard Value}}{\text{Displayed Value}} \times 100$$

7. Return to step 2 and change the cell constant by this percentage.
8. Repeat steps 2 through 6 until the desired calibration accuracy is obtained.
9. Once the appropriate cell constant has been established, the temperature compensation feature may be enabled by changing the temperature coefficient in setup mode (see step 1).

DirectCal™ Direct Calibration Method

Note: To return to active measurement modes from the calibration mode, press the **MODE** key.

1. Initiate by pressing the **CAL** key twice. The “CALIBRATE” indicator will appear at the top center of the display while P1 is displayed to indicate the first calibration point.
2. Press the **CAL** key until the correct range for your standard appears on the display. The calibration ranges, 199.9 mS, 19.99 mS, 1999 µS and 199.9 µS, may be scrolled through multiple times by pressing the **CAL** key.

Note: The conductivity standard value should be 10% to 100% of the displayed range value. For example, 1413 µS would be in the 1999 µS range.

3. Immerse the conductivity cell in the standard. Slightly agitate the cell to remove any air bubbles.

4. Enter the value of the standard by scrolling each digit with the ▲ or ▼ key, then accepting the value by pressing the **YES** key. Be sure to select the standard value at the actual standard temperature (See table page 8).
5. After the last digit has been entered and accepted by pressing the **YES** key, the meter will check the input for a stable reading (indicated by the flashing **CALIBRATE** indicator). When stability is achieved, the **READY** indicator will light up followed immediately by P2 (indicating the second calibration point).
6. If a two point calibration is desired, rinse the probe and place it into the next calibration standard. Then follow steps 2 through 5 for the second point.
7. If a one point calibration is desired, press the **MODE** key when P2 is displayed.
8. The meter will perform the calibration, display the calculated cell constant and return to the measurement mode.

*Note: If "E-22," cell constant out of range, appears on the display, press the **YES** key to clear the error. See the Troubleshooting section for corrective action.*

AutoCal™

The AutoCalibration feature, when activated, allows the meter to recognize Orion Conductivity Standards. **Only the following Orion standards may be used: 12.9mS (Orion 011006), 1413µS (Orion 011007) and 100µS (Orion 011008).**

To perform an AutoCalibration, the user must first activate the AutoCalibration feature. Then, upon entering Calibration mode, the nominal cell constant or current value in memory must be entered. The meter is then ready to recognize Orion Conductivity Standards.

Note: When a standard is recognized, the nominal standard value is displayed. However, the temperature-corrected value is used internally as the calibration value.

AutoCal™ Method

1. Enter the SETUP mode by pressing the SETUP key.
2. Press the YES key until the AutoCal function is accessed. This is indicated by the SETUP code S-4.
3. Press a SCROLL key (s or t) until the ON indicator is displayed.
4. Press the YES key to activate the function.
5. Press the MODE key until the desired measure mode is accessed.
6. Place the conductivity probe into the standard. Slightly agitate the probe to remove air bubbles. Only the following Orion standards may be used: 12.9mS (Orion 011006), 1413mS (Orion 011007) and 100mS (Orion 011008).
7. Press the CAL key to initiate the calibration.
8. The current cell constant will then be displayed. This value may be accepted (if appropriate) or the cell constant may be changed to a nominal value (i.e. 1.0, 0.1 or 0.6) using a SCROLL key (s or t). When the desired cell constant is displayed, press the YES key.
9. The meter will then display P1 to indicate the first calibration point. While the meter is attempting to recognize the standard, dashes (----) will flash on the display.
10. When the meter recognizes a standard, the READY indicator will be displayed simultaneously with the nominal value of the recognized standard. If the probe input stabilizes without recognizing a standard, the dashes will stop flashing and the READY indicator will be displayed.
11. When the recognized standard value is displayed, press the YES key.
12. The meter will display P2 and dashes (----) to indicate the second calibration point. If a two-point calibration is desired, rinse the probe & place it into the next calibration standard. Then follow steps 10 and 11.
13. If a one-point calibration is desired, press the MODE key.
14. After the last calibration standard has been entered, the meter will display the calculated cell constant then return to measure mode.

Measurements

Press the MODE key to move between conductivity, salinity, and TDS modes. Significant errors may result if the effects of temperature are ignored. For best results, use a temperature compensated conductivity cell, a separate ATC probe, or manual temperature compensation with the actual sample temperature entered into the meter. (See Temperature Compensation and Measurement).

Note: Salinity and TDS measurements always require either automatic or manual temperature compensation.

Conductivity Measurement

Place the conductivity cell in the sample. Slightly agitate the cell to remove any air bubbles. Allow the reading to stabilize. The conductivity reading in units of either mS/cm (milliSiemens per centimeter) or μ S/cm (microSiemens per cm) will be displayed.

Salinity Measurement

Place the conductivity cell in the sample. Slightly agitate the cell to remove any air bubbles. Press the MODE key until the Salinity mode indicator is displayed. Allow the reading to stabilize. The salinity reading in units of ‰ (parts per thousand) will be displayed.

TDS Measurement

Place the conductivity cell in the sample. Slightly agitate the cell to remove any air bubbles. Press the MODE key until the TDS mode indicator is displayed. Allow the reading to stabilize. The TDS reading in units of mg/L will be displayed.

Ready Indication

After the signal has reached stability, the “READY” indicator at the top right of the display will be displayed.

Auto Range Selection

Both the 125Aplus and 150Aplus feature automatic range selection. The most accurate range is automatically chosen by the meter based on the sample's conductivity value. A small amount of overlap is provided between all ranges to avoid "range flip" when measuring a sample whose conductivity is near the end of a range.

Both meters choose the most accurate range from:

Range 1	0.0	to	199.9 μ S
Range 2	195	to	1999 μ S
Range 3	1.95	to	19.99 mS
Range 4	19.5	to	199.9 mS

Temperature Compensation and Measurement

The Orion 125Aplus and 150Aplus automatically compensate for temperature changes based on the temperature coefficient and the reference temperature when a temperature measurement is simultaneously made or manually entered in the meter. The temperature coefficient, reference temperature, and manual temperature input are accessed in the setup mode.

Temperature Coefficients

The Orion 125Aplus and 150Aplus have a default temperature coefficient of 2.1%/°C. The temperature coefficient can be adjusted from 0.0 to 3.0%/°C. If the value is scrolled above 3.0, dashes (----) will be displayed to activate the non-linear function. The non-linear function is most helpful in measuring natural waters.

Note: If the coefficient is set to zero, the conductivity reading will not be temperature compensated.

To adjust the temperature coefficient:

1. Press the **SETUP** key to enter the setup mode.
2. When "S-1" is displayed, 2.1%/°C or the last temperature coefficient in memory will be displayed.
3. Use the **▲** or **▼** key to change the value.
4. Press the **YES** key to accept the new value.
5. Return to active measuring mode by pressing the **MODE** key.

Reference Temperature (Tref)

When temperature compensation is activated, the conductivity value is referenced back to 25 or 20 °C. The default is 25 °C.

To adjust the reference temperature:

1. Press the **SETUP** key to enter the setup mode.
2. Press the **YES** key until “S-3” is displayed. The current Tref will be displayed.
3. Use the ▲ and ▼ keys to toggle between 25 °C and 20 °C.
4. Acknowledge the change by pressing the **YES** key.
5. Return to active measuring mode by pressing the **MODE** key.

Automatic Temperature Compensation

When a conductivity cell with an integral temperature sensor or an ATC probe is connected, the meter automatically recognizes the connection and the “ATC” Indicator will be displayed. The measured values are automatically temperature corrected based on the entered temperature coefficient and reference temperature.

Manual Temperature Compensation

Temperature corrected values based on the manually entered temperature, temperature coefficient and reference temperature will be displayed. It is recommended that the temperature of the sample be accurately determined for use with this method. Errors of 1% to 3% per °C are typically encountered if the effects of temperature are ignored.

Note: A temperature sensor must not be connected to the meter for manual temperature compensation. If a temperature sensor is connected, the manual temperature function (S-2) cannot be accessed.

1. Press the **SETUP** key to enter the setup mode.
2. Press the **YES** key until “S-2” is displayed.
3. Using the ▲ or ▼ keys adjust the displayed temperature to the sample temperature.
4. Press the **YES** key to accept the value.
5. Return to active measuring mode by pressing the **MODE** key.

No Temperature Compensation

Use of this mode is available for conductivity measurements only. The displayed value is the actual conductivity of the sample at its current temperature. In no temperature compensation mode, a temperature value is only displayed when a temperature sensor is recognized by the meter.

Note: In Salinity and TDS modes, all measurement values are temperature compensated. If a temperature probe is not plugged into the meter, manual temperature compensation at the currently selected manual temperature setting (default of 25 °C) is used.

1. Press the **SETUP** key to enter the setup mode.
- 2. Press the YES key until “S-1” is displayed. The last temperature coefficient in memory will be displayed.**
3. Use the ▼ key to change the value to 0.0%/°C.
4. Acknowledge the change by pressing the **YES** key.
5. Return to active measuring mode by pressing the **MODE** key.

Measurement with an External Temperature Probe

Temperature compensation and measurement is most conveniently accomplished by using an Orion Conductivity cell with an integral temperature sensor. A conductivity cell with a dual banana plug and a separate ATC probe may be used on the Orion 125Aplus and 150Aplus with an adapter, Orion 011210.

Data Logging

Storage

- 1 To log data from any measurement mode, simply press the **LOG** key. The current reading will be written to the log and a log point (L-01 to L-50) will be displayed in the temperature readout. After display of the logged reading for approximately one second, the display will return to an active reading.

2. A maximum of 50 points can be stored. Attempting to log data after 50 points will result in an “E-26” error message on the display. If this happens, the log must be cleared to continue logging data.
3. The “log” indicator on the display will be lit whenever there is any data in the log.

Readout of Stored Data

1. To view data, press the **LOG VIEW** key. Point L-01 will be displayed. The temperature display will alternate between the log point and the temperature of the data point (if applicable).
2. To view other points, use the ▲ and ▼ keys to scroll through the data.
3. To return to active measurement modes, press the **MODE** key or the **LOG VIEW** key.

Printing of Stored Data

1. To print all the logged data, press the **LOG VIEW** key.
2. Press the **PRINT** key while in LogView mode to start data transmission. The entire log will be printed. Each data set is separated by one blank line. The following information is printed:
 - Log Point
 - Measured value
 - Sample temperature
 - “MAN” if manually temperature compensated

Erasure of Stored Data

1. To clear all data in the log, exit from LogView by pressing the **MODE** key.
2. Press and hold the **LOG CLR** key for 3 seconds. The “log” indicator will disappear from the display, indicating that the log is cleared.

CAUTION: *This will permanently erase all data from the log. Print out needed data before clearing the log.*

Print Function

To print the current reading to a printer or computer while in any measurement mode, press the **PRINT** key.

Print on Ready

The Print on Ready SETUP function (S-5) enables the meter to send data to a printer or computer via the RS232 port. To activate the feature perform the following steps.

1. Enter the SETUP mode by pressing the **SETUP** key.
2. Press the **YES** key until the Print on Ready function is accessed. This is indicated by the SETUP code **S-5**.
3. Press a **SCROLL** key (**▲** or **▼**) until the **ON** indicator is displayed.
4. Press the **YES** key to activate the function.
5. Press the **MODE** key until the desired measure mode is accessed.
6. Printing of measurement data will occur automatically upon stability of the input signal. This will continue to occur until the feature is disabled.

Chapter VI

Use with Printers and Computers

One way communication to printers and computers is available on both meters. Bidirectional communication with computers is available only on the Orion 150Aplus.

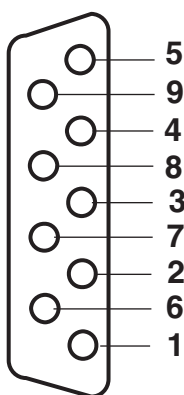


Figure #11

RS232 Interface

Connections

<i>Meter</i>	<i>Pin</i>
RXD	2
TXD	3
DSR	4
SIG GND	5
DTR	6
RTS	7
CTS	8

Note: Jumper 4 + 6 together.

Data Transmission Settings

Baud Rate	1200
Parity (PC only)	None
Data Bits (PC only)	8
Stop Bit (PC only)	1
Start Bit	1

Cables and Cable Connections

For Computer, use: Orion 0ACBL0 (DB25 Connector)

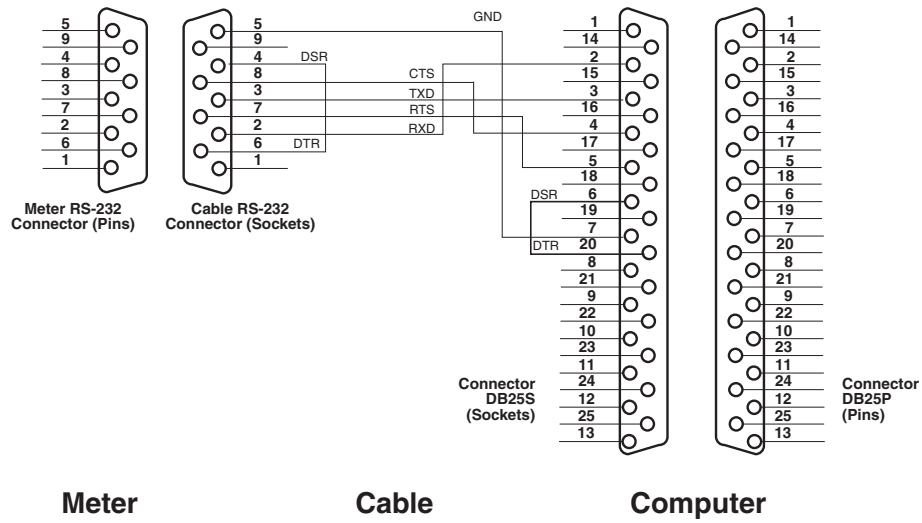


Figure #12

For Computer, use: DB9 Connector

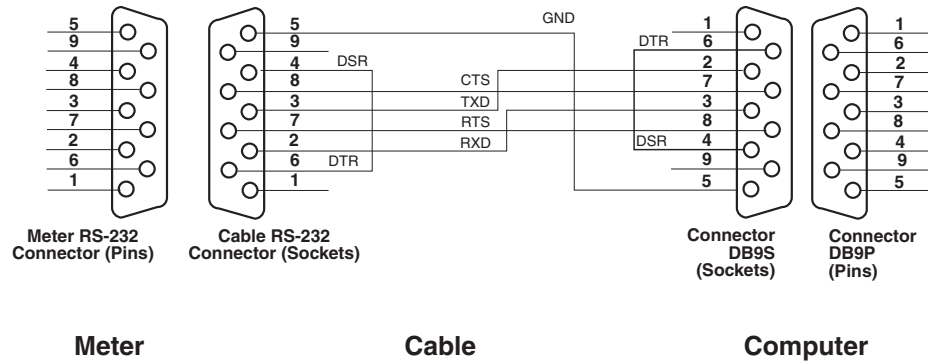


Figure #13

Use with Orion Printer 900A

Connect Orion 900A to the RS232 connector on the side panel. See **Ordering Information** for information on printers and accessories.

Orion 150Aplus Remote Control Computer Commands

The Orion 150Aplus meter has the capability to be operated by a remote device (computer or terminal). After connecting the meter to the device, press the carriage return (<CR>) to initiate remote control. The commands are as follows (x denotes numeric digit).

	Command	Function
Entering and exiting remote	<CR>	Start communication with the first carriage return
	CLOC<CR>	Reverts the Orion 150Aplus to normal operation
	HELP<CR>	Displays remote control command set
Calibration	SCxxxxx<CR>	Performs a manual calibration with the specified cell constant
	SD<CR>	Performs DirectCal calibration
	SACAL<CR>	Performs AutoCal calibration procedure
Setting Temperature Coefficient and Reference Temperature	STCxxx<CR>	Set temperature coefficient with specified value
	SREFxxx<CR>	Set reference temperature with specified value
Measure Conductivity and Temperature	CLF<CR>	0.0 to 199,900 measuring range, autoranging always on
Measure Salinity and Temperature	CSAL<CR>	0.0 to 80 measuring range
Measure TDS and Temperature	CTDS<CR>	0 to 19990 mg/L measuring range
Readout of Input Values	RC<CR>	Read cell constant
	RTC<CR>	Read temperature coefficient
	RREF<CR>	Read reference temperature

Command Specifics

Note: Meter must be in a measurement mode to initiate remote operation.

1) Logging On/Off

Before <CR> is entered, meter responds “Not Logged On” to all remote commands. When <CR> is entered, meter responds “150Aplus Logged On” (meter keypad is now inactive, except for power key). Meter will enter conductivity measure mode. When CLOC<CR> is entered, meter responds “Logged Off” (power-down always exits remote mode).

2) Calibrations

Note: During calibrations the meter display is active and displays the current measurement with the cell constant in effect applied to the measurement. If a standard is bad, “E-22:BAD STANDARD” is displayed on the terminal and the user is reprompted for the calibration point.

- a) Cell Constant Adjustment Calibration: SCxxxxx<CR>
When SCxxxxx<CR> is entered, the cell constant is checked to be between .0700 and 14.99 and, if valid, it is set. The new cell constant takes effect in the meter’s display as well. A confirmation message will be returned: “xxxxx,/cm” or an error message of “INVALID RANGE”.
- b) Direct Calibration: SDCAL<CR>
When SDCAL<CR> is entered, the user is prompted “P1 Value (wait for READY) or ‘ESC’(return)”. At this point, the user should have the cell in the first standard. When the input stabilizes, the terminal will display the measured conductivity and temperature values: “xxxxxuS Temp xx.xC”. The user should enter the standard value “xxxxx<CR>”. The terminal will prompt for units: “Enter ‘U’, ‘M’ or ‘ESC’(return)”. The user must enter “M” for millisiemens or “U” for microsiemens. A confirmation message will be returned: “P1=xxxxxu”, “P1=xxxxxm” or an error message of “INVALID RANGE”.

The entered values MUST conform to the following ranges:

0.0 to 199.9 uS (one decimal place)

200 to 1999 uS (no decimal places)

2.00 to 19.99 mS (two decimal places)

20.0 to 199.9 mS (one decimal place)

Values will be rounded to the appropriate precision.

At this point, a one point cal. is in effect. The user is prompted "P2 Value (wait for READY) or 'ESC'(return)". If a one point cal. is desired, enter "ESC<CR>". If a two point cal. is desired, the user should have the cell in the second standard. When the input stabilizes, the user should enter the standard value "xxxxx<CR>". The terminal will prompt for units: "Enter 'U', 'M' or 'ESC'(return)". The user must enter "M" for millisiemens or "U" for microsiemens. A confirmation message will be returned: "P2=xxxxxu", "P2=xxxxxm" or an error message of "INVALID RANGE". The computed cell constant and percent linearity are then displayed on the terminal.

c) AutoCal: SACAL<CR>

Note: Only the following Orion standards may be used: 12.9mS (Orion 011006), 1413mS (Orion 011007) and 100mS(Orion 011008).

Before AutoCal is entered, the approximate cell constant must be in the meter memory. This can be accomplished by either using the cell constant from the previous calibration or using the Manual Calibration command (SCxxxxx<CR>). The cell should then be placed into the first standard. At this point, the SACAL<CR> command should be entered. The terminal will display "P1, Start to Measure?" An affirmative response (Y<CR>) will cause the meter to attempt to recognize the standard. To cancel the calibration, enter "ESC<CR>".

If the standard is not recognized, the terminal will display "No Standard Found 'ESC<CR>' to exit, <CR> to continue:". The calibration standard should be checked. To cause the meter to reattempt to recognize the standard, enter "<CR>". To cancel the calibration, enter "ESC<CR>". If the standard is recognized, the terminal will display "Value=xxxxxm" for millisiemens or "Value=xxxxxu" for microsiemens. Then the terminal will prompt for the second calibration point "P2, Start to Measure?".

If a one point cal. is desired, enter “ESC<CR>”. The terminal will display “1 Pt Cal Complete” followed by the cell constant (xxxxx./cm). If a two point cal. is desired, the cell should be placed into the second calibration standard. Then the user should enter “Y<CR>”. The meter then attempts to recognize the standard. When the standard is recognized, the terminal will display “Value=xxxxxm” for millisiemens or “Value=xxxxxu” for microsiemens. Then the terminal will display “2 Pt Cal Complete” followed by the cell constant (xxxxx./cm) and the percent linearity (% Linearity= xxx.x).

3) **Setting Temperature Coefficient Reference Temperature**

a) Temperature Coefficient

When “STCx.x<CR>” is entered, the temperature coefficient is checked to be between 0.0 and 3.1 and set. If 0.0 is entered, Temp Compensation is disabled. If 3.1 is entered, Temp Coefficient is set to nLF. The terminal response is either “TC = x.x” or “INVALID RANGE”.

b) Reference Temperature

When “SREFxx<CR>” is entered, the reference temperature is checked to be 20 or 25 and set. The terminal response is either “RT = xx.0” or “INVALID RANGE”.

4) **Measurement**

When “CLF<CR>” is entered, conductivity and temperature are displayed on the terminal as “xxxxxx, uS/cm*, 27.2°C”.

When “CSAL<CR>” is entered, salinity and temperature are displayed on the terminal as “xx.xx,SAL,27.2°C”.

When “CTDS<CR>” is entered, TDS and temperature are displayed on the terminal as “xx.xx,mg/L,27.2°C”.

If a measurement is requested and the meter is autoranging, “AUTORANGING” will be displayed on the terminal. The user must input another display command.

Chapter VII

Troubleshooting

Operator Assistance Codes

Displayed Error Message	Cause	Action
E-2	Memory failure	Call Thermo Electron's Technical Edge for service
E-3 through E-6	Hardware failure	Disconnect the conductivity cell and repeat the self test
E-7	Keypad failure	Repeat the self test insuring that all keys are pressed within 4 seconds during test 7. If problem persists, call Thermo Electron's Technical Edge for service
E-20	Reading out of range	Adjust cell constant Verify cell constant appropriate for sample conductivity
E-22	Cell Constant out of range	Calibrate with fresh standards. Clean conductivity cell Replatinize conductivity cell (if applicable)
E-26	Data logger full	Clear data from memory <i>(Note: print out any needed logged data before clearing the log.)</i>
E-29	Printer error	Verify printer is attached Verify printer is on Check printer operation (on line)
E-40	Memory checksum error	Call Thermo Electron's Technical Edge for service

Chapter VIII

Warranty

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

The Thermo Electron Corporation, Orion products warranty covers failures due to manufacturer's workmanship or material defects from the date of purchase by the user. User should return the warranty card and retain proof of purchase. Warranty is void if product has been abused, misused, or repairs attempted by unauthorized persons.

Warranties herein are for product sold/installed by Thermo or its authorized dealers.

Any product sold by a U.S. or Canadian distributor must be returned to Thermo for any warranty work. Please contact our Technical Service department for further information. A Return Authorization Number must be obtained from The Technical EDGESM for Orion Products before returning any product for in-warranty repair or replacement.

In the event of failure within the warranty period, Thermo will at the company's option, repair or replace product not conforming to this warranty. There may be additional charges, including freight, for warranty service performed in some countries. For service, call Thermo or its authorized dealer outside the United States and Canada. Thermo reserves the right to ask for proof of purchase, such as the original invoice or packing slip.

Field Service is available on Orion BOD AutoEZTM, EZ Flash[®] GC Accessory and TEA Analyzer[®]. Contact our Field Service department for details on quotations and service, other field service-related activities.

The following products are warranted to be free from defects in material and workmanship in the period listed below from the date of purchase from the user or from the date of shipment from Thermo, whichever is earlier, provided use is in accordance with the operating limitations and maintenance procedures in the instruction manual and when not having been subjected to accident, alteration, misuse, abuse or breakage of electrodes:

Thirty-six months from date of purchase by the user (or forty-two months from date of shipment from Thermo)

- Waterproof Meters (Orion 630, 635, 830A, 835A, 260A, 261S, 265A, 266S, 130A, 131S, 135A and 136S), Conductivity Meters (Orion 105Aplus, 115Aplus, 125Aplus, 145Aplus, 150Aplus and 162A),

PerpHect® pH/ISE Meters (Orion 310, 320, 330, 350, 370) pH/ISE Meters (Orion 210Aplus, 230Aplus, 250Aplus, 290Aplus, 410Aplus, 420Aplus, 520Aplus, 525Aplus, 710Aplus, 720Aplus and 920Aplus), pHuture MMS™ Meters (Orion 535A and 555A), pH/Conductivity Meter (Orion 550A), Dissolved Oxygen Meters (Orion 805Aplus, 810Aplus, 850Aplus and 862A).

Twenty-four months from date of purchase by the user (or thirty-six months from date of shipment from Thermo)

- Orion ROSS Ultra® Electrodes, Orion AQUAfast® IV Colorimeters, Orion AQUAfast® IV Turbidimeter, Orion 925 Flash Titrator™, Series 100 DuraProbe™ Conductivity Cells and Series 800 Dissolved Oxygen Probes.

Twelve months from date of purchase by the user (or eighteen months from date of shipment from Thermo)

- Laboratory pH Meters, (Orion 301, 611 and 940), SensorLink®, pHuture™ pH Meters (Orion 610 and 620), Sage® Pumps, Cahn® Balances, 930 Ionalyzer®, 950 ROSS™ FAST QC™ Titrator, 960 Titrator PLUS®, Karl Fischer Titrators, Autosamplers, Liquid Handling Devices, Liquid Handling Automation Workstations (Orion AS2000, AS2500 and AS4000), Pumps (Orion SP201, SP201-HR, SP201-S, Peristaltic and Rinse), pHuture® Conversion Box, Wine Master®, 607 Switchbox, rf link™, AQUAfast® II Colorimeters, Vacuum Degasser and Flowmeter.
- Orion EZ Flash® GC Accessory, Orion TEA Analyzer® 610 and 510 excluding consumable items carry twelve months warranty only.
- Orion Ion Selective Electrodes, ionplus® Electrodes, ROSS™ Electrodes, Sure-Flow® Electrodes, PerpHecT® Electrodes, AquaPro Professional Electrodes, No Cal™ pH electrodes, Standard Line pH Electrodes, Tris pH Electrodes, KNIpHE® electrode, ORP Triode™ (Orion 9180BN), pHuture™ pH Probes (Orion 616500) and pHuture MMS™ Quatrode™ and Triode™ (Orion 616600 and 617900), Orion 97-08 DO Probe, Series 100 Conventional Conductivity Cells, temperature probes and compensators (except those products noted).
- Orion 93 and 97 ionplus Series sensing modules are warranted to give six months of operation if placed in service before the date indicated on the package, except 93-07 and 97-07 Nitrate modules are warranted to give ninety days of operation if placed in service before the date indicated on the package.

Six months from date of purchase by the user (or twelve months from date of shipment from Thermo)

- Orion Flash Titration™ Probe (Orion 092518), pHuture™ Electrode (Orion 615700), pHuture MMS™ Pentrode™ (Orion 617500), Quatrode™ (Orion 617800) and Triode™ (Orion 615800), Low Maintenance Triode™ (Orion 9107BN), ORP Low Maintenance Triode™ (Orion 9179BN), and PerpHecT® Low Maintenance Triode™ (Orion 9207BN), Waterproof Triode™ (Orion 9107WP, 9107WL, 9109WL and 9109WP), QuiKcheK® Meters and Micro Electrodes.

Three months from date of purchase by the user (or six months from date of shipment from Thermo)

- Economy Line Electrodes, Orion 91-05, 91-06, 91-15, 91-16, 91-25, 91-26, 91-35, 91-36, 92-06. Warranty also includes failure for any reason (excluding breakage), except abuse, provided the electrode is not used in solutions containing silver, sulfide, perchlorate, or hydrofluoric acid; or in solutions more than one (1) Molar in strong acid or base at temperatures above 50 °C.

“Out-of-Box” Warranty - Should any of the following products fail to work when first used, contact Thermo immediately for replacement.

- Orion Solutions, Standards, Reagents, Cables, Ferrules, Tubing, Line adapters, Printers, Software, Cases, Stands, Probe Membranes, AQUAfast® Test Strips, EZ Flash® columns, Liquid Handling Probes, Adapter Plates and Racks and general accessories.

For products in the catalog not listed in this warranty statement, please visit our website at: www.thermo.com

THE WARRANTIES DESCRIBED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM THE COURSE OF DEALING OR USAGE OF TRADE. THE BUYER'S SOLE AND EXCLUSIVE REMEDY IS FOR REPAIR OR REPLACEMENT OF THE NON-CONFORMING PRODUCT OR PART THEREOF, OR REFUND OF THE PURCHASE PRICE, BUT IN NO EVENT SHALL THERMO (ITS CONTRACTORS AND SUPPLIERS OF ANY TIER) BE LIABLE TO THE BUYER OR ANY PERSON FOR ANY

SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHETHER THE CLAIMS ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE), OR OTHERWISE WITH RESPECT TO OR ARISING OUT OF THE PRODUCT FURNISHED HEREUNDER.

REPRESENTATION AND WARRANTIES MADE BY ANY PERSON, INCLUDING ITS AUTHORIZED DEALERS, REPRESENTATIVES AND EMPLOYEES OF THERMO WHICH ALTER OR ARE IN ADDITION TO THE TERMS OF THIS WARRANTY SHALL NOT BE BINDING UPON THERMO UNLESS IN WRITING AND SIGNED BY ONE OF ITS OFFICERS.

Chapter IX

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 has 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.

“This digital apparatus does not exceed the (Class A) limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.”

“Le présent appareil numérique n’ émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.”

Declaration of Conformity

Thermo Electron Corporation

Manufacturer:

Thermo Electron Corporation
166 Cummings Center
Beverly, MA 01915 U.S.A.

hereby declares that the products

Conductivity Meter Models	105Aplus
	115Aplus
	125Aplus

conform with the following standards and documents

Safety: EC Directive 72/23/EEC Low Voltage Directive
DIN VDE 0700 Transformers
UL 1310 Class 2 Power Units
CSA C22.2 No. 223 Extra-Low Voltage
Transformers

Safety: EC 89/336/EEC Electromagnetic Compatibility

Emissions: EN 55022 Emissions Class A
FCC Part 15 Class A

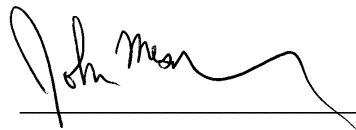
Immunity: EN 50082-1 Generic Immunity
IEC 801-2 ESD Susceptibility
IEC 801-3 Radiated Susceptibility
IEC 801-4 Conducted Susceptibility

These Orion products have been manufactured in compliance with the provisions of the relevant Thermo Electron manufacturing and test documents and processes. Further, these documents and processes are recognized as complying with ISO 9000:2000 by QMI, listed as File # 001911.

Place and date of issue:

Beverly, MA.

June, 2003



John Meserve

Quality Assurance Manager

Declaration of Conformity

Thermo Electron Corporation

Manufacturer:

Thermo Electron Corporation
166 Cummings Center
Beverly, MA 01915 U.S.A.

hereby declares that the products

Conductivity Meter Models	145Aplus 150Aplus
----------------------------------	----------------------

conform with the following standards and documents

Safety: EC Directive 72/23/EEC Low Voltage Directive
IEC 1010 Safety For Laboratory Equipment
UL 1262 Laboratory Equipment
CSA C22.2 No. 151 Laboratory Equipment

Safety: EC 89/336/EEC Electromagnetic Compatibility

Emissions: EN 55022 Emissions
FCC Part 15 Class A

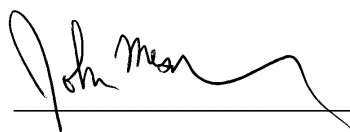
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Place and date of issue:

Beverly, MA.

June, 2003



John Meserve

Quality Assurance Manager

METER PERFORMANCE SPECIFICATIONS

	125Aplus	150Aplus
Display	LCD, 4 1/2 Digit	LCD, 4 1/2 Digit
Conductivity <i>Measurement Range</i> <i>Range 1</i> <i>Range 2</i> <i>Range 3</i> <i>Range 4</i> <i>Accuracy</i>	0 to 199,900 μ S 0.0 to 199.9 μ S 200 to 1999 μ S 2.00 to 19.99 μ S 20.00 to 199.9 μ S \pm 0.5% of full scale reading within each range, max	0 to 199,900 μ S 0.0 to 199.9 μ S 200 to 1999 μ S 2.00 to 19.99 μ S 20.00 to 199.9 μ S \pm 0.5% of full scale reading within each range, max
Cell Constant <i>Range Displayed</i> <i>Resolution</i>	0.07 to 14.99 0.0700, 1.000, 10.00	0.07 to 14.99 0.0700, 1.000, 10.00
Salinity <i>Measurement Range</i> <i>Accuracy</i>	0.0 to 80.0 ppt (‰) \pm 0.5% max	0.0 to 80.0 ppt (‰) \pm 0.5% max
Total Dissolved Solids <i>Measurement Range</i> <i>Accuracy</i> <i>Resolution</i>	0 to 19900 mg/L \pm 0.5% 3 significant digits, 1 mg/L	0 to 19900 mg/L \pm 0.5% 3 significant digits, 1 mg/L
Temperature Measurement <i>Range</i> <i>Relative Accuracy</i> <i>Resolution</i>	-5.0 to 105.0 °C \pm 1.0 °C 0.1 °C	-5.0 to 105.0 °C \pm 1.0 °C 0.1 °C
Temperature Compensation <i>Temperature Coefficient</i> <i>Reference Temperature</i>	Auto and Manual 0.0 to 3.0%/°C or nLF 2.1%/°C Default 25 or 20 °C	Auto and Manual 0.0 to 3.0%/°C or nLF 2.1%/°C Default 25 or 20 °C
Ready Indicator	Yes	Yes
Low Battery Indicator	Yes	N/A
Inputs <i>Conductivity Probe</i> <i>Power</i> <i>ATC Probe</i>	8 pin DIN Pin connector for power adapter No separate connector, use adapter 011210	8 pin DIN Pin connector for power adapter No separate connector, use adapter 011210
Outputs <i>RS232</i> <i>Connector</i> <i>Baud Rate</i> <i>Parity</i> <i>Handshake</i> <i>Data Bits</i> <i>Stop Bit</i> <i>Print on demand</i> <i>Print on READY</i>	output only Standard 9 Pin "DB9" 1200 None Yes 8 1 Yes Yes	bi-directional Standard 9 Pin "DB9" 1200 None Yes 8 1 Yes Yes

SPECIFICATIONS (Continued)

	125Aplus	150Aplus
Power	9V Alkaline Battery or 9V Lithium Battery; 110V, 220V or 240V Line Adapter	110V, 220V or 240V Line Adapter
Auto Shutoff	20 minutes	N/A
Operation time on alkaline batteries, typical	45 hours	N/A
Operation time on lithium batteries, typical	80 hours	N/A
Data Logging <i>Display output</i> <i>RS232</i>	50 Data points Yes Yes	50 Data points Yes Yes

ORDERING INFORMATION

Orion	Description
012500	Orion 125Aplus and Conductivity Cell
012502	Orion 125Aplus, meter only
015000	Orion 150Aplus and Conductivity Cell
015002	Orion 150Aplus, meter only
013005D	Four Electrode Conductivity Cell with Integral Temperature Sensor, Epoxy/graphite, K = 0.475
010500	Orion 105Aplus and Conductivity Cell, Orion 011510
010502	Orion 105Aplus, meter only
011500	Orion 115Aplus and Conductivity Cell, Orion 011510
011502	Orion 115Aplus, meter only
011510	Conductivity Cell with Integral Temperature Sensor, Epoxy, K = 1.0
011010	Conductivity Cell, Glass, K = 1.0
011020	Conductivity Cell, Glass, K = 0.1
011050	Conductivity Cell, Epoxy, K = 1.0
012210	Conductivity Cell, Epoxy, K = 0.609 (use with adapter, Orion 011211)
927005	ATC Probe, Epoxy Body
927006	ATC Probe, Glass Body
927007	ATC Probe, Stainless Steel
011006	Conductivity/TDS Standard, 12.9 mS/cm, 7230 ppm as NaCl, 5 x 60 mL Bottles
011007	Conductivity/TDS Standard, 1413 µS/cm, 692 ppm as NaCl, 5 x 60 mL Bottles
011008	Conductivity/TDS Standard, 100 µS/cm, 47 ppm as NaCl, 5 x 60 mL Bottles
0105PK	Platinizing Kit. Includes Fixture, Vessel, and Solution (60 mL)

ORDERING INFORMATION (Continued)

Orion	Description
010110	Platinizing Vessel and Solution (60 mL)
011210	Adapter, Dual banana plug connector Cells and ATC probes to 8 pin DIN connector
011211	Adapter, 7 pin DIN connector Cells to 8 pin DIN connector
011220	Calibration Kit, 4 precision conductance/resistance calibrators in container
080150	Field Carrying Case. For meter, probe, and accessories
020125	Line Adapter, 110V
020130	Line Adapter, 220V
020135	Line Adapter, 240V
0ACBL0	Cable, RS232, for use with IBM PC compatible
0900A0	Printer, Orion 900A, attachable, 110V (No cable required)
0900A1	Printer, Orion 900A, attachable, 220V (No cable required)
0900A2	Printer, Orion 900A, no line adapter
0900A4	Printer Paper for Orion 900A
0900A6	Printer Battery for Orion 900A, rechargeable
0900A7	Printer, Orion 900A, attachable, 240V (No cable required)

Thermo Electron offers a variety of probe accessories, materials & cable lengths. Refer to the Laboratory Products Catalog or call The Technical EdgeSM at 1-800-225-1480.

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