



Instruction Manual

Models 260A and 261S

**Waterproof and Intrinsically Safe
Portable pH Meters**



60934

Thermo Orion

AQUAfast, Cahn, Ionplus, KNiPHE, ORION, PerpHecT, perpHecTion, Sensing the future, SensorLink, Sure-Flow, Titrator PLUS and TURBO2 are registered trademarks of Thermo Orion.

1-888-pHAX-ION, All in One, AssuredAccuracy, AUTO-BAR, AUTO-CAL, AUTO DISPENSER, AUTO-LOG, AUTO-STIR, AUTO-READ, Cable-Free, CERTI-CAL, CISA, DataCOLLECT, digital LogR, DirectCal, DuraProbe, Extra Easy/Extra Value, FAST QC, GLPcal, GLPcheck, GLPdoc, Ionalyzer, KAP, KNiPHE, LogR, Minimum Stir Requirement, MSR, NISS, One-Touch, One-Touch Calibration, One-Touch Measurement, Optimum Results, PEN-Pal, pHISA, pHix, Phuture, Pure Water, QuickKcheK, rlink, ROSS, ROSS Resolution, Sage, SAOB, Stat Face, The Enhanced Lab, ThermoSense, Triode, TRIUMPH, Unbreakable pH, Universal Access and Wine Master are trademarks of Thermo Orion.

Guaranteed Success and The Technical Edge are service marks of Thermo Orion.

PerpHecT meters are protected by U.S. patent 4,321,544. Other patents pending.

ROSS and PerpHecT ROSS are protected by U.S. patent 4,495,050. Other patents pending.

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

ORION 81, 82, 91, and 92 series glass electrodes are protected by U.S. patents 4,661,236 and 4,687,500.

Sure-Flow electrodes are protected by European patent 278,979 and Canadian patent 1,286,720. Other patents pending.

ionplus electrodes and Optimum Results solutions have patents pending.

© Copyright 2000, Thermo Orion. All rights reserved.

The specifications, descriptions, drawings, ordering information and part numbers within this document are subject to change without notice.

This publication supersedes all previous publications on this subject.

Changes for Software Version 3

In addition to one- and two-point calibration, the meter can perform a three-point calibration.

You can stop the calibration procedure after each completed buffer evaluation by pressing the HOLD key. Depending on the number of buffer evaluations made, the meter performs a one-, two-, or three-point calibration.

With three-point calibration the E_0 and slope are calculated for each line segment. An average E_0 is reported. Sample values are determined using the appropriate line segment.

Safety Precautions

Be sure to read and observe the following requirements!



The Model 261S pH meter may only be opened to change the batteries outside hazardous areas. If repairs are necessary, the meter must be sent in to the factory.



When using the meter in hazardous areas, watch for electrostatic charges! For example, never wipe off the meter with a dry cloth. Observe the relevant regulations concerning ESD.

Whenever it is likely that the protection has been impaired, the meter shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:

- the meter shows visible damage
- the meter fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stresses

Before recommissioning the meter, a professional routine test according to EN 61 010-1 shall be performed. This test should be carried out at our factory.

Information on this Instruction Manual

Italics are used for texts which appear in the display of the Thermo Orion Models 260A or 261S.

Bold print is used to represent keys, e.g. **cal**.



Display examples

or



keys whose functions are explained are frequently shown in the left-hand column.

Note



Notes provide important information that should be strictly followed when handling the meter.

Warning



Warning means that the instructions given must always be followed for your own safety. Failure to follow these instructions may result in injuries.

Contents

Safety Precautions	V
Information on this Instruction Manual	VI
1 Models 260A and 261S pH Meters	1
Package Contents	1
Short Description of Meters	1
2 Operation	3
Meter Design	3
Display	4
Keypad	4
StatFacet Electrode Monitoring	5
Connection and Start-up	6
Configuration	7
Calibration	9
Measurement	13
3 Troubleshooting and Maintenance	14
StatFace™ Electrode Monitoring	14
Error Messages	16
Maintenance	20
Appendix	22
Declarations of Conformity	22
Certificate of Conformity	24
Control Drawing	26
Ordering Information	28
Warranty	33
Specifications	36
4 General Information on Measurement	38
Technical Terms	43
Index	45

1 Models 260A and 261S pH Meters

Package Contents

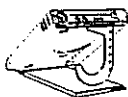


Please check the completeness of the package after un-packing.

The package should include:

- Thermo Orion Model 260A or 261S pH meter (ready for operation)
- Neck strap
- This instruction manual
- Quickstart instructions

Short Description of Meters



- The Models 260A and 261S are used for pH and temperature measurement in industry, environment, food processing and waste-water treatment.
- Operation of the Model 261S is also permitted in hazardous areas Zone 1.
- The meters meet the European EMC regulations (89-336-EEC) and the recommendations of NAMUR NE 21.
- The meters are IP 66 protected to EN 60529.



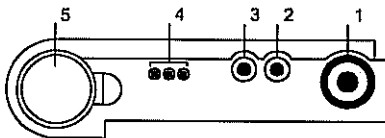
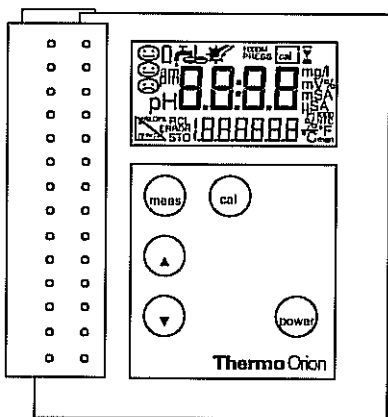
- Temperature compensation is automatic with a Triode™ electrode or an ATC temperature probe or through manual temperature.
- Calibration can be performed with buffer solutions from various, preselectable buffer sets. The buffer is then automatically recognized by the AutoCal feature.
- You can also calibrate manually by entering individual buffer values.



- ❑ The StatFace electrode monitoring system checks the connected electrode and provides information on its state.
- ❑ Only three alkaline AA batteries are required for uninterrupted operation for approx. 2,000 hours.

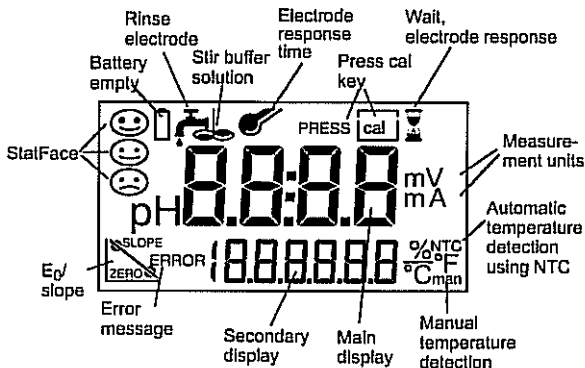
2 Operation

Meter Design



- 1 Electrode connection
- 2, 3 Temperature probe connection
- 3 Reference electrode connection
- 4 Unused
- 5 Electrode holder

Display



Keypad



Pressing the **power** key switches the meter on or off. When the meter is switched off, one of the StatFace status indicators is visible on the display. After power-up, the meter automatically performs a self-test and checks if a temperature probe is connected. After that it automatically goes to pH measuring mode.

Note



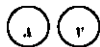
You can also power the meter up using the **meas** key. However, only an abbreviated self-test is performed.



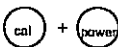
Pressing the **meas** key selects the desired measurement mode (pH or mV).



Pressing the **cal** key starts a calibration. You can choose between one or two-point calibration either using AutoCal automatic buffer recognition or with manual buffer entry.



For manual temperature compensation (no temperature probe connected), the temperature is set using the ▲ and ▼ keys.
During buffer selection, you can select the buffer set using the ▲ and ▼ keys.



Pressing the **cal** + **power** keys when the meter is switched off, activates the buffer selection.

Note



When pressing two keys at the same time, make sure that the key shown at the left is pressed first.

StatFace™ Electrode Monitoring



The StatFace automatic electrode monitoring system provides information on the electrode state. E_0 , slope, response time, impedance and drying out of the electrode are evaluated.
In addition, StatFace reminds you to regularly calibrate the meter.

For more detailed information on the displayed electrode state and the individual evaluations of the parameters, please see chapter "Troubleshooting and Maintenance" (Pg. 14).

Connection and Start-up

If no temperature probe has been connected, the meter operates with the manually set temperature and the *man* indicator appears on the display.

Note



Prior to first measurement, the buffer set to be used must be selected and the meter calibrated.

Start-up

With the meter switched off, one of the StatFace status indicators is always visible.



Pressing the **power** key switches the meter into measure mode.

After power-up, the meter determines if the temperature probe is connected and performs a self test:

- Simultaneous appearance of all display segments, symbols and StatFace indicators
- Display of Model number
- Display of software version
- Display of selected buffer set

Note



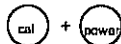
The meter can also be switched on with the **meas** key. However, only an abbreviated test is performed.

Configuration

Note



If you calibrate using the Thermo Orion buffer set, you do not have to change the configuration.



To activate the configuration, hold down the **cal** key and then press the **power** key while the meter is switched off.



The menu items of the configuration menu are worked through in sequence.



To change the setting of the respective menu item, press the **▲** or **▼** key.



Pressing the **cal** key switches to the next menu item and stores the displayed settings.



Pressing the **meas** key exits the configuration menu at any time. The value last displayed and possibly changed will then not be saved.

Automatic or manual calibration

By pressing the **▲** or **▼** key, you can select whether you wish to calibrate with the AutoCal automatic buffer recognition system or with manual entry of the individual buffer values.



When calibrating with AutoCal automatic buffer recognition (AutoCal on), you only have to enter the buffer set used once in the configuration menu. The temperature-corrected buffer values are stored. During calibration the meter then automatically recognizes the buffer used (default setting: automatic calibration on, Thermo Orion buffers).

Buffer selection



Press the **cal** key to display the current buffer set.



Select a buffer set using the **▲** and **▼** keys. Press the **cal** key to enter the choice and return to measure mode.



Pressing the **meas** key exits the buffer selection function without storing the buffer set.

The following buffer sets are permanently stored in the meter:

<i>BUFFER -00-</i>	Knick technical buffers pH 2.00 4.01 7.00 9.21
<i>BUFFER -01-</i>	Mettler Toledo technical buffers (former Ingold) pH 2.00 4.01 7.00 9.21
<i>BUFFER -02-</i>	Merck/Riedel pH 2.00 4.00 7.00 9.00 12.00
<i>BUFFER -03-</i>	DIN 19 267 pH 1.09 4.65 6.79 9.23 12.75
<i>BUFFER -04</i>	Ciba (94) pH 2.06 4.00 7.00 10.00
<i>BUFFER -05-</i>	THERMO ORION pH 1.68 4.01 7.00 10.01 12.46
<i>BUFFER -06-</i>	DIN 19 266 and NIST (NBS) pH 1.679 4.006 6.865 9.180
<i>BUFFER -07-</i>	HACH pH 4.00 7.00 10.18

Note



The meter can only operate properly if the buffer solutions used correspond to the selected, activated buffer set. Other buffer solutions, even those with the same nominal values, demonstrate a different temperature behavior. This leads to measurement errors.

OFF
AuTcAL

For manual calibration (AuTcAL off), the pH value of the buffer solution must be entered for the correct temperature. This allows calibration using any other buffer solutions.

Calibration

AutoCal automatic calibration

For calibration using AutoCal automatic buffer recognition, you only have to enter the buffer set used once in the configuration menu. With the AutoCal feature, the meter automatically recognizes the buffer solutions and calculates the slope and E_0 (based on 25 °C).

Note



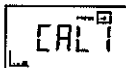
The meter can only operate properly when the buffer solutions used correspond with the buffer set selected in the configuration menu.

Other buffer solutions, even with the same nominal values, may demonstrate different temperature behavior, which leads to measurement errors.



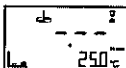
Pressing the **cal** key activates calibrations.

Calibration can be exited by pressing the **meas** key. If exited prior to entry of the first calibration point, E_0 and slope of the last calibration are displayed for a moment.

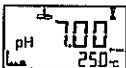


Immerse the electrode and temperature probe in the first buffer solution. Begin with the more neutral buffer, i.e. pH 7.00.

Press the **cal** key again to calibrate to the first buffer solution.



During buffer recognition, the lower line indicates the temperature, while the hour glass indicator flashes.

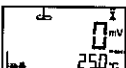


The nominal value of the recognized buffer solution is displayed for approx. 5 s. Electrode and temperature probe must remain in the first buffer solution until the display prompts for the second buffer.

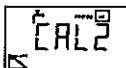
Note



Stirring the buffer solution shortens the response time of the electrode, providing stable values more quickly.



The electrode stability is checked and the measured mV value is displayed. Stability check can be overridden with the **cal** key. However, this reduces calibration accuracy.



Calibration with the first buffer is complete. Remove electrode and temperature probe from the first buffer solution and rinse off both thoroughly.

- If you want to perform a one-point calibration, press the **meas** key to terminate the calibration now. The meter then shows the newly determined E_0 in the main display and the previous slope in the lower display and returns to pH measuring mode.
- If you want to perform a two-point calibration, immerse the electrode and temperature probe in the second buffer solution. Continue the calibration with the **cal** key. The calibration process runs again as for the first buffer.



Calibration with the second buffer is complete. Remove electrode and temperature probe from the second buffer solution and rinse off both thoroughly.

- For two-point calibration, press the **meas** key to terminate the calibration. The meter then shows the newly determined E_0 in the main display and the new slope in the lower display and returns to pH measuring mode.
- If you want to perform a three-point calibration, immerse the electrode and temperature probe in the third buffer solution. Continue the calibration with the **cal** key. The calibration process runs again as for the previous buffers and is automatically terminated. E_0 and slope are calculated for each line segment.



At the end of the calibration, the E_0 and slope (based on 25 °C) of the electrode are displayed. Then the meter switches back to measure mode.

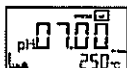
Manual calibration

For calibration with manual buffers, you must first disable the AutoCal function. Then, you must enter the pH value of the buffer solution used for the correct temperature. The buffer temperature table is on the buffer package. This allows calibration with any buffer solution.



Pressing the **cal** key activates calibration.

Calibration can be cancelled by pressing the **meas** key. In that case, E_0 and slope of the last calibration are displayed for a moment.



Enter the temperature-corrected pH of your buffer solution using the \blacktriangle and \blacktriangledown keys. Press the **cal** key to start the calibration.

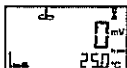
The buffer value set is stored so that you do not have to enter it for the next calibration (which must be performed at the same temperature).

If the temperature has changed, the pH value must be adjusted before proceeding.

Note



Stirring the buffer solution shortens the response time of the electrode, providing stable values more quickly.

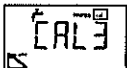


The electrode stability is checked and the measured mV value displayed. Stability check can be overridden with the **cal** key. However, this reduces calibration accuracy.



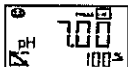
Calibration with the first buffer is complete. Remove electrode and temperature probe from the first buffer solution and rinse off both thoroughly.

- If you want to perform a one-point calibration, press the **meas** key to terminate the calibration now. The meter then shows the newly determined E_0 in the main display and the previous slope in the lower display and returns to pH measuring mode.
- If you want to perform a two-point calibration, immerse the electrode and temperature probe in the second buffer solution. Enter the pH value of the second buffer solution. Then press the **cal** key to continue the calibration. The calibration process runs again as for the first buffer.



Calibration with the second buffer is complete. Remove electrode and temperature probe from the second buffer solution and rinse off both thoroughly.

- For two-point calibration, press the **meas** key to terminate the calibration. The meter then shows the newly determined E_0 in the main display and the new slope in the lower display and returns to pH measuring mode.
- If you want to perform a three-point calibration, immerse the electrode and temperature probe in the third buffer solution. Enter the pH value of the third buffer solution. Then press the **cal** key to continue the calibration. The calibration process runs again as for the previous buffers and is automatically terminated. E_0 and slope are calculated for each line segment.



At the end of the calibration, the E_0 and slope (based on 25 °C) of the electrode are displayed. Then the meter switches back to measure mode.

Converting slope % → mV/pH			
%	mV/pH	%	mV/pH
78	46.2	91	53.9
79	46.8	92	54.5
80	47.4	93	55.1
81	48.0	94	55.6
82	48.5	95	56.2
83	49.1	96	56.8
84	49.7	97	57.4
85	50.3	98	58.0
86	50.9	99	58.6
87	51.5	100	59.2
88	52.1	101	59.8
89	52.7	102	60.4
90	53.3	103	61.0

Measurement

Measure mode

Pressing the **meas** key accesses the measure mode from all functions. In measure mode, the main display indicates the measured value and the secondary display shows the temperature. The measure mode is selected with the **meas** key.



You can choose between the following modes:

- pH
- Electrode potential [mV]

Note



Stirring the buffer solution shortens the response time of the electrode, providing stable values more quickly.

Manual temperature

The *man* indicator signals that no temperature probe is connected. The meter operates with the manual temperature. The manual temperature can be edited using the ▲ and ▼ keys.

3 Troubleshooting and Maintenance

StatFace™ Electrode Monitoring



The automatic StatFace electrode monitoring system provides information on the electrode state. It evaluates E_0 , slope and response time of the electrode.

Note



The deterioration of the electrode condition is signified by 😞 or 😓 of the StatFace Indicator.

This evaluation is permanent. An improvement 😊 can only take place after a calibration.



This StatFace indicator provides information on the electrode response time. The value is determined during calibration.



Due to wear, aging and lack of maintenance, the electrode junction may become clogged. This leads to a longer response time and the electrode becomes sluggish.

😓 The electrode response is slow. You should consider maintaining or replacing the electrode. It may be possible to achieve an improvement by cleaning or, for an electrode returned to duty after dry storage, by rehydrating.

😞 The electrode response is very slow. Correct measurement is no longer ensured. The electrode should be maintained. If appropriate maintenance fails to remedy the situation, the electrode should be replaced.



This StatFace display provides information on the electrode E_0 and the slope.

-  E_0 and slope of the electrode are still okay, however the electrode should be maintained or replaced soon.
-  E_0 and/or slope of the electrode have reached values which no longer ensure proper calibration. See electrode Instruction manual for cleaning and maintenance information.

Note



The E_0 and slope values are determined during calibration. Accurate information is required for proper calibration. For this reason, always use fresh buffer solutions.

Error Messages

Measurement limits exceeded If a measured value lies outside the measurement ranges, an error message appears and the measured-value display flashes.

ERROR 1 The measured pH is less than -2 or greater than $+16$.

Possible causes:

- Electrode defective or dirty
- Improper level of internal filling solution in the electrode
- Electrode not connected
- Break in electrode cable
- Wrong electrode connected

ERROR 2 The measured electrode potential is less than $-1,300$ mV or greater than $+1,300$ mV.

Possible causes:

- Electrode defective or dirty
- Electrode not connected
- Break in electrode cable

ERROR 3 The measured temperature is less than -20 °C or greater than $+120$ °C

Possible causes:

- Temperature probe defective
- Wrong temperature probe connected

Calibration error messages

If errors occur during calibration, or if the determined electrode data are outside the valid range, an error message appears (ERROR 4 ... ERROR 11).

ERROR 4

The electrode E_0 determined during calibration is outside the permissible range (pH 6 to pH 8). This message appears in measure mode following a calibration. It can only be remedied by recalibration with fresh buffer solutions.

Possible causes:

- Electrode "worn out"
- Need fresh buffers
- Buffer does not belong to configured buffer set
- Temperature probe not immersed in buffer solution
- Wrong buffer temperature set (for manual temperature specification)
- Electrode has different nominal E_0

ERROR 5

The electrode slope determined during calibration lies outside the permissible range (78 % to 103 %). This message appears in measure mode following a calibration. It can only be remedied by recalibration with fresh buffer solutions.

Possible causes:

- Electrode "worn out"
- Need fresh buffers
- Buffer does not belong to configured buffer set
- Temperature probe not immersed in buffer solution
- Wrong buffer temperature set (for manual temperature specification)
- Electrode used has different nominal slope

-
- ERROR 8** The meter has recognized two identical buffer solutions. Calibration must be repeated with fresh buffer solutions.
- Possible causes:
- Same or similar buffer solution was used for both calibration steps
 - Need fresh buffers
 - Electrode defective or dirty
 - Electrode not connected
 - Break or short circuit in electrode cable
- ERROR 9** The meter cannot recognize the buffer solution used. Calibration must be repeated with fresh buffer solutions.
- Possible causes:
- Buffer does not belong to configured buffer set
 - Electrode defective or dirty
 - Electrode not connected
 - Break in electrode cable
 - Wrong buffer temperature set (for manual temperature specification)
- ERROR 10** During manual calibration, the buffer solutions were not used in the specified order. Calibration must be repeated.
- ERROR 11** Calibration was cancelled after approx. 2 minutes because the electrode drift was too large. Calibration must be repeated with fresh buffer solutions.
- Possible causes:
- Electrode defective or dirty
 - Improper level of filling solution in the electrode
 - Electrode cable insufficiently shielded or defective
-

- Strong electric fields influencing the measurement
- Major temperature fluctuation of the buffer solutions
- Electrode junction not sufficiently submerged
- Need fresh buffers

ERROR 18

If the meter determines an error during the self-test, this error message appears: Configuration data defective

Possible causes:

- Configuration or calibration data are defective. Completely reconfigure and recalibrate the meter.

ERROR 19

FAIL

Error in the factory settings or system memory. "FAIL" appears in the display.

Possible causes:

- EPROM or RAM defective
- Error in meter factory settings

Note



This error message should normally not occur as the data is protected from loss by multiple safety functions. Should this error message appear, no remedy is available. The meter must be repaired and recalibrated at the factory. Contact Thermo Orion's Technical Service for a Return Authorization Number and Instructions for returning the meter.

Maintenance

Changing batteries



If the battery symbol appears on the display, the batteries need replacement. However, you can still use the meter for a few days. When the battery voltage decreases further, the meter switches off.

Never change the batteries within a hazardous area. Only use alkaline AA cells. Make sure the meter is carefully closed again and the protective cover is properly mounted on the meter after changing the batteries.

To replace the batteries, you need 3 alkaline AA cells and a screwdriver.

- Close the protective cover and remove the electrode holder.
- Unscrew the four screws on the back of the meter and remove the lid.
- Remove the old batteries from the battery holder.
- Insert the new batteries in the specified direction.
- Make sure the protective cover is in the notches provided and the rubber seal is correctly seated, especially near the pH socket.
- Replace the lid and secure it with the screws. Be sure to tighten the screws thoroughly.
- Replace the electrode holder.

Note



When changing the batteries, all calibration data are retained. The meter switches to pH measurement mode.

Warning



If you want to store the meter for a longer time, the batteries must always be removed beforehand. Leaky batteries may damage the meter.

Cleaning the meter To remove dust and dirt, the external surfaces of the meter may be cleaned with water, and also with a mild household cleaner if necessary.

Appendix

Declarations of Conformity

Orion Research, Inc. Declaration of Conformity

Manufacturer:

Orion Research, Inc.
3-10 Cummings Center
Beverly, MA 01515 U.S.A.

I hereby declare that the products

Warrapac pH Meter Models 262A and 263A

conform with the following standards and documents

Safety	HC Directive 72/23/EEC Low Voltage Directive
	EN 61010-1: 1990 Laboratory Equipment
EMC	EC Directive 89/324/EEC Electromagnetic Compatibility
Emissions	EN 50081-1 / C1:1992 Emissions FCC Part 15 Class A
Immunity	EN 50082-2 / C1:1995 Generic Immunity IEC 100-2 ESD Susceptibility IEC 100-3 Radiated Susceptibility IEC 100-4 Conducted Susceptibility

These products have been manufactured in compliance with the provisions of the relevant Orion manufacturing and test documents and processes. Further, these documents and processes are recognized as complying with ISO 9002: 1994(E) by Q911, listed as File # 002911.

Place and date of issue:
Beverly, MA, U.S.A.
January 27, 1979



John Gervase
Quality Assurance Manager

231676 - 011 Rev A

Orion Research, Inc.
Declaration of Conformity

Manufacturer:

Orion Research, Inc.
503 Cummings Center
Beverly, MA 01915 U.S.A.

hereby declares that the products

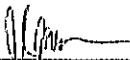
Waterproof pH Meter Models 260A and 261S

conform with the following standards and documents

Safety	IEC Directive 73/23/EEC Low Voltage Directive EN 50114: 1977 Gen. Requirements EN 50090: 1977 Intrinsically Safe EN 61010-1: 1992 Laboratory Equipment	
EMC	EC 89/336/EEC Electromagnetic Compatibility	
Emission:	EN 50081-1 / 91.1992 Radiated FCC Part 15 Class A	
Immunity:	EN 50082-2 / 91.1992 IEC 801-2 IEC 801-3 IEC 801-4	Ceramic Resonance ESD Susceptibility Radiated Susceptibility Contacted Susceptibility

These products have been manufactured in compliance with the provisions of the relevant Orion manufacturing and test documents and processes. Further, these documents and processes are recognized as complying with ISO 9001:1994(B) by QNT, dated as P/No 0-C01911.

Place and date of issue:
Beverly, MA, U.S.A.
January 27, 1999


John Henner
Quality Assurance Manager

Certificate of Conformity

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



- (1) **CERTIFICATE OF CONFORMITY**
(2) **PTB No. Ex-97.D.2127**
(TRANSLATION)

- (3) This certificate is issued for the electrical apparatus
pH Meter Model 29.5
- (4) manufactured by Orion Research Inc.
Beverly MA 01915 USA
- (5) This electrical apparatus and any acceptable variation thereto is specified in the Schedule to this Certificate of Conformity.
- (6) The Physikalisch-Technische Bundesanstalt, being an Approved Certification Body in accordance with article 14 of the Council Directive of the European Communities of December 18, 1975 (76/117/EEC), confirms that this electrical apparatus has been found to comply with the harmonized European Standards

Electrical apparatus for potentially explosive atmospheres

EN 50 014:1977 + A1...A5 (VDE 0170/0171 Part 1/1:87) General Requirements
EN 50 020:1977 + A1...A5 (VDE 0170/0171 Teil 7:4:92) Intrinsic Safety "T"

after the apparatus has been successfully subjected to pattern evaluation. The results of this pattern evaluation have been recorded in a confidential test report.

- (7) The apparatus marking shall include the code
EEx Ia IIC T8
- (8) The manufacturer shall be responsible for ensuring that any apparatus bearing the above marking conforms to the test documents specified in the Schedule to this certificate and that the routine verifications and tests prescribed have been carried out successfully.
- (9) The electrical apparatus may be marked with the Definitive Community Mark according to Annex II to the Council Directive of February 6, 1979 (79/196/EEC). A facsimile of this mark is printed on this sheet of the certificate.

By order

Dr.-Ing. Johannmeyer
Oberregierungsrat



Braunschweig, 27.06.1997

THIS IS A SPECIAL COPY OF THE ORIGINAL CERTIFICATE OF CONFORMITY WHICH IS NOT VALID.
The manufacturer may be contacted only through the address:
Contact is obtained and is subject to approval by the Physikalisch-Technische Bundesanstalt
in Berlin or Braunschweig, the German body of PTB approval.

Physikalisch-Technische Bundesanstalt

SCHEDULE

to Certificate of Conformity PTB No. Ex-97.D.2127

The apparatus and the according pH- resp. Redox- and temperature measuring electrodes are used for measurement in the electrochemical and environmental range of application

PT 1000- resp. NTC-sensors which are either separate or mounted inside the pH-electrode enable general, precise temperature measurements and an automatic temperature compensation during the pH-measurement.

The permissible ambient temperature range is -10 °C to +55 °C.

Electrical Data

Auxiliary supply three mounted Alkaline-Manganese-cells, type AA

pH temperature measuring circuit (BU 2, 3, 4) type of protection "Intrinsic Safety" EEx ia IIC
 maximum values:
 $U_n \leq 5 \text{ V}$
 $I_n \leq 11 \text{ mA}$
 $P_n \leq 13 \text{ mW}$
 $R_n \geq 457 \ \Omega$

maximum permissible external capacitance 1 μF
 maximum permissible external inductance 5 mH
 internal capacitance 30 nF
 internal inductance negligible small

Interface circuits RaD, IaD (BU 5, 6, 7) $U_n = 250 \text{ V}$
 Operation outside hazardous areas only.
 The pH temperature measuring circuit may not lead into the hazardous area if the interface is connected to a non intrinsically safe circuit.

Test document

1 Certificate of Conformity PTB No. Ex-96.D.2139

By order

 Dr.-Ing. Johannes
 Obereggenburg



Braunschweig, 27.06.1997

Sheet 1/1

Control Drawing

Hazardous (Classified) Locations

Portable pH Meter Model 26a5

Portable Conductivity Meter Model 13a5

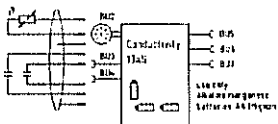
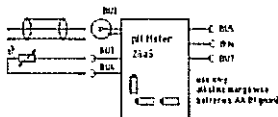
Intrinsically Safe with respect to locations for Class I Division 1, Groups A, B, C, D, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z

Temp. $T_c = 125^{\circ}\text{C}$

INTRINSICALLY SAFE

NON-FLAMMABLE

The product must be FMIC approved or be tested separately



Portable pH Meter, Model 26a5

Functional Temperature Measuring Circuit
(BU2, 2, 3)

$V_s = 12\text{V}$ $R = 150\text{k}\Omega$ $Z_{max} = 11\text{M}\Omega$

Class I, Division 1, Groups A & B $C_p = 1\mu\text{F}$ $I_a = 100\text{mA}$

Class I, Division 1, Groups C & E $C_p = 9\mu\text{F}$ $I_a = 1\text{A}$

Class I, Division 1, Groups D, F & G $C_p = 24\mu\text{F}$ $I_a = 5\text{A}$

entity concept

$V_a = V_s = V_{max}$ $I_a = I = I_{max}$

$C_p = C_1 + C_{max}$ $I_a = I_1 + I_{max}$

Portable Conductivity Meter, Model 13a5

Functional Temperature Measuring Circuit
(BU2, 2, 3)

$V_s = 12\text{V}$ $R = 62.5\text{k}\Omega$ $Z_{max} = 151\text{M}\Omega$

Class I, Division 1, Groups A & B $C_p = 1\mu\text{F}$ $I_a = 100\text{mA}$

Class I, Division 1, Groups C & E $C_p = 9\mu\text{F}$ $I_a = 1\text{A}$

Class I, Division 1, Groups D, F & G $C_p = 24\mu\text{F}$ $I_a = 5\text{A}$

WARNING: TO PREVENT IGNITION OF A HAZARDOUS ATMOSPHERE,
BATTERIES MUST ONLY BE CHARGED IN AN AREA KNOWN TO BE NONHAZARDOUS.
BATTERY REPLACEMENT USE ONLY AN INVERTED ALKALINE-MANGANESE
BATTERIES NOT EXCEEDING 25 VOLTS. SEE MANUAL FOR DETAILS.
SUBSTITUTION OF COMPONENTS MAY IMPAIR INSTRUMENT SAFETY.

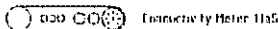
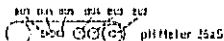
AVERTISSEMENT: AFIN DE PREVENIR L'APPARITION D'UNE ATMOSPHERE DANGEREUSE,
NE CHARGEZ LES BATTERIES QUE DANS DES ESPACES IDENTIFIES A CE CARACTERE.
LA SUBSTITUTION DE COMPOSANTS PEUT COMROMETTRE LA SECURITE INSTRUMENTALE.

Input Impedance: 10¹² Ω at 250 V
10¹¹ Ω at 2 V

WARNING: THE FOLLOWING CONNECTIONS TO TERMINALS B1, B2, B3 AND B4
MUST NOT BE USED WHEN THE APPLIANCE PROVIDES HAZARDOUS

INTRINSICALLY SAFE EQUIPMENT MUST BE IEC Approved or
be a made appliance in areas which will neither operate nor store
more than 12 V, 0.1 A, 25 mW, or 21 mJ. For example switches,
thermistors (100 Ω and 100 Ω).

SA features in drawing without prior IEC Approval.



Version 01/2011

Date of issue		No. of sheets		Serial No.		Page No.	
11/11		1		1		1	
Title		Author		Drawing No.		Revision	
Control / Installation drawing		193.060-027		1		1	
Description		pH-Meter Model 260S		Conductivity Meter Model 13aS		193.060-027	
Drawing No.		193.060-027		1		1	
Drawing Date		11/11		1		1	
Drawing Scale		1:1		1		1	
Drawing Status		Final		1		1	
Drawing Author		193.060-027		1		1	
Drawing Checker		193.060-027		1		1	
Drawing Approver		193.060-027		1		1	

Ordering Information

	Thermo Orion Cat. No.	Description
Meters	0260A0	Model 260A Basic Waterproof pH Meter and Electrode
	0260A2	Model 260A Basic Waterproof pH Meter Only
	0260A3	Model 260A Basic Waterproof pH Meter, Electrode and Field Kit
	0261S0	Model 261S Basic Waterproof Intrinsically Safe pH Meter and Electrode
	0261S2	Model 261S Basic Waterproof Intrinsically Safe pH Meter Only
	0261S3	Model 261S Basic Waterproof Intrinsically Safe pH Meter, Electrode and Field Kit
	0265A0	Model 265A Advanced Waterproof pH Meter and Electrode
	0265A2	Model 265A Advanced Waterproof pH Meter Only
	0265A3	Model 265A Advanced Waterproof pH Meter, Electrode and Field Kit
	0266S0	Model 266S Advanced Waterproof Intrinsically Safe pH Meter and Electrode
	0266S2	Model 266S Advanced Waterproof Intrinsically Safe pH Meter Only
	0266S3	Model 266S Advanced Waterproof Intrinsically Safe pH Meter, Electrode and Field Kit
	0130A0	Model 130A Basic Waterproof Conductivity Meter and Probe
	0130A2	Model 130A Basic Waterproof Conductivity Meter Only
	0130A3	Model 130A Basic Waterproof Conductivity Meter, Probe and Field Kit

Models 260A and 261S Portable pH Meters

Thermo Orion Cat. No.	Description
0131S0	Model 131S Basic Waterproof Intrinsically Safe Conductivity Meter and Probe
0131S2	Model 131S Basic Waterproof Intrinsically Safe Conductivity Meter Only
0131S3	Model 131S Basic Waterproof Intrinsically Safe Conductivity Meter, Probe and Field Kit
0135A0	Model 135A Advanced Waterproof Conductivity Meter and Probe
0135A2	Model 135A Advanced Waterproof Conductivity Meter Only
0135A3	Model 135A Advanced Waterproof Conductivity Meter, Probe and Field Kit
0136S0	Model 136S Advanced Waterproof Intrinsically Safe Conductivity Meter and Probe
0136S2	Model 136S Advanced Waterproof Intrinsically Safe Conductivity Meter Only
0136S3	Model 136S Advanced Waterproof Intrinsically Safe Conductivity Meter, Probe and Field Kit
0830A0	Model 830A Basic Waterproof Dissolved Oxygen Meter and Probe
0830A2	Model 830A Basic Waterproof Dissolved Oxygen Meter Only
0830A3	Model 830A Basic Waterproof Dissolved Oxygen Meter, Probe and Field Kit
0835A0	Model 835A Advanced Waterproof Dissolved Oxygen Meter and Probe
0835A2	Model 835A Advanced Waterproof Dissolved Oxygen Meter Only
0835A3	Model 835A Advanced Waterproof Dissolved Oxygen Meter, Probe and Field Kit

	Thermo Orion Cat. No.	Description
Probes	9109WP	Epoxy-Body, Triode™ 3-in-1 pH/ATC Probe, Non-refillable
	9157WP	Epoxy-Body, Triode 3-in-1 pH/ATC Probe, Refillable
Buffer solutions	910104	pH 4 Buffer Solution, 475 mL
	910105	pH 5 Buffer Solution, 475 mL
	910107	pH 7 Buffer Solution, 475 mL
	910110	pH 10 Buffer Solution, 475 mL
	910410	perpHect® Buffer Solution pH 4, 10 pk
	910425	perpHect Buffer Solution pH 4, 25 pk
	910710	perpHect Buffer Solution pH 7, 10 pk
	910725	perpHect Buffer Solution pH 7, 25 pk
	911010	perpHect Buffer Solution pH 10, 10 pk
	911025	perpHect Buffer Solution pH 10, 25 pk
	910460	pH 4.01 Buffer Solution, 60 mL (2 oz.) bottles, 5 pk
	9104CB	pH 4.01 Buffer Solution, 19 L (5 gallon) cubitainer
	910760	pH 7.00 Buffer Solution, 60 mL (2 oz.) bottles, 5 pk
	9107CB	pH 7.00 Buffer Solution, 19 L (5 gallon) cubitainer
	911060	pH 10.01 Buffer Solution, 60 mL (2 oz.) bottles, 5 pk
9110CB	pH 10.01 Buffer Solution, 19 L (5 gallon) cubitainer	
Accessories	026AKT	Field Case for Thermo Orion Waterproof Meters
	013650	Replacement Quiver for 130A/135A/131S/136S WP Meters

Models 260A and 261S Portable pH Meters

Thermo Orion Cat. No.	Description
026650	Replacement Quiver for 260A/265A/ 261S/266S WP Meters
083550	Replacement Quiver for 830A/835A WP Meters
013651	Replacement Neck Strap for WP Meters
013652	Replacement PC/Printer Cable for Advanced WP Meters
013653	Replacement Software for Advanced WP Meters
013654	Replacement Gender Adapter for PC/ Printer Cable for Advanced WP Meters
917008	Stainless Steel Body ATC
PRT300	Ink-based Printer, 110 V, Cable Included
PRT301	Ink-based Printer, 220 V, Cable Included
PRT302	Replacement Printer Ribbon, 1 each
911110	perpHect Electrode Rinse, 10 pk
911125	perpHect Electrode Rinse, 25 pk
910001	pH Electrode Storage Solution, 475 mL
910060	pH Electrode Storage Solution, 60 mL (2 oz.) bottles, 5 pk
9100CB	pH Electrode Storage Solution, 19 L (5 gallon) cubtainer
900022	pH Cleaning Solution B – For general cleaning and removing bacterial con- taminants. Includes four 2 oz. bottles, 15 mL Beaker and Pipette
900024	pH Cleaning Solution D – For removing oil and grease contaminants. Includes four 2 oz. bottles, 15 mL Beaker and Pipette

Note

A wide selection of pH, Ion Selective Electrodes and replacement parts are available. Contact Thermo Orion or your local authorized distributor for more information.

Warranty

The Thermo Orion 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 to Thermo Orion 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 Orion or its authorized dealers.

Any product sold by a U.S. or Canadian distributor must be returned to Thermo Orion for any warranty work. A Return Authorization Number must be obtained from Thermo Orion's Laboratory Technical Service before returning any product for in-warranty repair or replacement.

In the event of failure within the warranty period, Thermo Orion will at Thermo Orion'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 Orion (or its authorized dealer outside the United States and Canada). Thermo Orion reserves the right to ask for proof of purchase, such as the original invoice or packing slip.

Laboratory pH Meters, SensorLink[®], pH/ISE Meters, PerpHect[®] pH/ISE Meters, Sage[™] Pumps, Cahn[®] Balances, 930 Ionalyzer[™], 950 ROSS[™] FAST QC[™] Titrator, 960 Titrator PLUS[®], Karl Fischer Titrators, pHuture[™] Conversion Box, Wine Master[™], 607 Switchbox, rFlnk[™], Vacuum degasser, Flowmeter are warranted to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase by the user or eighteen (18) months from date of shipment from Thermo Orion, 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, or abuse.

The warranty period for 960 Titrator PLUS, 950 Fast QC Titrator, Wine Master and 930 Ionalyzer pumps is three (3) months from date of purchase.

ThermaSense[™] Dataloggers are warranted for a period of twelve (12) months from date of purchase.

Economy Line Electrodes, Models 91-05, 91-06, 91-15, 91-16, 91-25, 91-26, 91-35, 91-36 and 92-06, are warranted to be free from defects in material and workmanship for a period of three (3) months from date of purchase by customer or six (6) months from date of shipment from Thermo Orion, whichever is earlier. 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.

Ion Selective Electrodes, Ionplus® Electrodes, ROSS Electrodes, Sure-Flow® Electrodes, PerpHecT Electrodes, Standard Line pH Electrodes, Tris pH Electrodes, pHuture pH probes (Cat. Nos. 615900 and 616500), Series 100 Conventional Conductivity Cells, temperature probes and compensators (except those models noted) are warranted to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase by the customer or eighteen (18) months from date of shipment from Thermo Orion, whichever is earlier, except for abuse or breakage of electrodes. 93 and 97 ion-plus Series sensing modules are warranted to give six (6) 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 (90) days of operation if placed in service before the date indicated on the package.

Thermo Orion pHuture probes (Cat. Nos. 615700, 615800 and 617500), Low Maintenance Triode™ (Cat. No. 9107BN), and PerpHecT Low Maintenance Triode (Cat. No. 9207BN), Waterproof Triode (Cat. Nos. 9107WP, 9107WL, 9109WL and 9109WP), QuiKcheK™ Meters, and Micro Electrodes are warranted to be free from defects in material and workmanship for a period of six (6) months from date of purchase by the customer or twelve (12) months from date of shipment from Thermo Orion, whichever is earlier when used in accordance with the operating limitations and maintenance procedure in the instruction manual and when not having been subjected to accident, alteration, misuse or abuse.

Series 100 Conductivity Meters (Models 105, 115, 125, 145 and 150), Series 100 DuraProbe™ Conductivity Cells and Series 800 Dissolved Oxygen Meters (Models 810 and 850) and probes are warranted to be free from defects in material and workmanship for a period of twenty-four (24) months from the date of purchase by the user or thirty (30) months from the date of shipment from Thermo Orion, 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, or abuse.

Waterproof meters (Models 830, 830A, 835, 835A, 260A, 261S, 265A, 266S, 128, 130A, 131S, 135A, 136S, 1230, 142 and 842) Conductivity meters (Models 162 and 162A), pH/Conductivity meters (Models 545, 550 and 550A), and Dissolved Oxygen meters (Models 862 and 862A) are warranted to be free from defects in material and workmanship for a period of thirty-six (36) months from the date of purchase by the user or forty-two (42) months from date of shipment from Thermo Orion, 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 or abuse.

Thermo Orion Meter, Electrode, Analytical System Accessories, Solutions, Se-

ries 800 Dissolved Oxygen Probe Membranes and Cahn Balance Accessories such as cables, printers, and line adapters carry an "out-of-box" warranty. Should they fail to work when first used, contact Thermo Orion immediately for replacement. Should Thermo Orion Solutions or Buffers be unusable when first "out-of-box", contact Thermo Orion immediately for replacement.

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 ORION (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.

Specifications

Ranges	pH: -2.00 to +16.00 mV: -1,300 to +1,300 °C: -20.0 to +120.0
Display	LC display 35 x 67 mm, character height 15 mm
Measurement Cycle	approx. 1 s
Accuracy (+ 1 count)	pH: < 0.01 mV: < 0.1 % of meas. value + 0.3 mV °C: < 0.3 K
Input	WP DIN
Input Resistance	> 1 x 10 ¹² Ω
Input Current (20 °C)	< 1 x 10 ⁻¹² A
Electrode Standardization	AutoCal automatic calibration with automatic buffer recognition manual calibration
Instrument and Electrode Monitoring	StatFace: evaluates the calibration interval, E ₀ , electrode slope, response time and glass impedance of the electrode, resulting in indication of good/average/poor Meter self test: during power-up
Temperature Compensation	NTC 30 kΩ (automatic recognition) or manual
Data Retention	configuration and calibration data >10 years
Autoshutoff	after 1 hour
RFI Suppression	to EN 50 081-1 and EN 50 081-2
Immunity to Interference	to EN 50 082-1, EN 50 082-2 and NAMUR NE 21
Explosion Protection (only Model 261S)	EEX Ia IIC T6, PTB No. Ex-97.D.2127 FM approved
Environmental Temperature	Operation: -10 to +55 °C Transport and storage: -20 to +70 °C
Power Supply	3 alkaline AA cells
Operating Time	approx. 2,000 h

Models 260A and 261S Portable pH Meters

Enclosure	Material: PA, IP 66 protected, with integrated electrode holder
Dimensions	133 x 160 x 30 mm (w x h x d)
Weight	approx. 560 g including batteries

4 General Information on Measurement

During pH measurement, simultaneous temperature detection is required. Combination electrodes with integrated temperature probe are particularly advantageous. For this reason, the Thermo Orion Triode 3-In-1 pH/ATC electrode is the ideal probe to use.

Calibration and measurement

The measuring characteristics of pH electrodes are different for each electrode. Therefore, the meter must be adjusted to the characteristics of the current electrode. This process is called calibration.

For calibration, you take measurements of buffer solutions. These are solutions with exactly defined pH values. With the Models 260A and 261S meters, two calibration modes are available – automatic calibration using AutoCal and manual calibration.

AutoCal automatic calibration

In the Models 260A and 261S pH Meters the corrected pH values of various buffer sets are stored for various temperatures. Simply select and enter the buffer set once upon initial start-up of the meter (see Pg. KEIN MERKER). Then the AutoCal will calibrate the meter at the press of a key.

Calibration is conducted with two or three different buffer solutions from the preset buffer set. Use pH 7 or neutral buffer first. The pH meter measures the electrode voltages and temperatures and compares them with the programmed pH temperature tables for the buffer solutions. From the measured values, the meter calculates the slope and E_0 of the electrode.

For a one-point calibration, only the E_0 is adjusted. The previous slope value is retained. As two- or three-point calibrations are only slightly more complicated, they are always preferable.

Note



The buffer solutions used for calibration must always correspond to the buffer set selected in the meter.

Manual calibration

If you want to work with special buffer solutions not included in the stored buffer sets, select manual calibration (see Pg. 10). Here, you enter your individual buffer value at the correct temperature (pH at calibration temperature). Values entered once remain stored. During the next calibration, the meter will suggest these values. However, the sequence of the last calibration must be repeated .

Note

Make sure that the buffer values are entered for the proper calibration temperature. Do not enter the nominal buffer value but instead the pH of the buffer solution at the calibration temperature.

Calibration intervals

A one or two point calibration should be performed using fresh buffers before pH is measured. It is recommended that a two buffer calibration, using buffers that bracket the expected sample range, be performed at the beginning of each day to determine the slope of the electrode. This serves the dual purpose of determining if the electrode is working properly, and storing the slope value in memory. For maximum accuracy, perform a one buffer calibration every two hours to compensate for electrode drift, using a fresh aliquot of pH 7 buffer.

However, the calibration can be performed at a frequency determined by the user. For measurements under constant conditions, a longer interval may be sufficient. On the other hand, calibration may be necessary prior to each measurement when measuring in media with large temperature or pH differences.

Observe the following:

- For refillable electrodes, open the filling hole for calibration, measurement and cleaning.
- Immerse the electrode in the buffer solution ensuring that the junction is completely immersed.
- Electrode response time is shortened when the buffer solution is stirred.
- Always rinse the electrode with deionized water before immersing it in buffer solution.
- Use two- or three-point calibration with fresh buffers whenever possible.

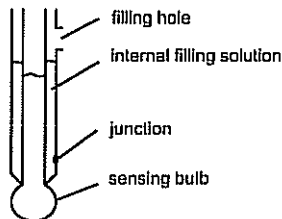
-
- ❑ If you calibrate without a temperature probe, make sure that the manually set temperature matches the actual temperature of the buffer solutions and samples.

Note



For additional information, refer to the electrode instruction manual.

Design of a refillable combination electrode



Buffer solutions

For a two-point calibration, the values of the buffer solutions should differ by at least two pH units and bracket the expected sample range.

Note



To ensure measurement accuracy, the buffer solutions should be fresh.

- ❑ Never pour used buffer solution back into the bottle. Never use used buffer solution.
- ❑ Never immerse the electrode directly into the bottle.
- ❑ Always keep the bottle closed. The carbon dioxide from the air can lead to incorrect buffer solution values.

Note



The problems described above can be avoided by using perPect® buffer packs (Cat. Nos. 910425, 910725, 911025, 910410, 910710 and 911010).

Electrodes Combination electrodes are commonly used due to ease of use.

The Models 260A and 261S pH meters are compatible with the Thermo Orion Triode™ 3-in-1 Combination pH/ATC Electrodes, Cat. Nos. 9109WP and 9157WP. The nominal isopotential point of these electrodes is pH 7. For additional information, refer to the appropriate electrode instruction manual.

Electrode care Proper cleaning and care increases electrode service life and measurement accuracy. Therefore, you should observe the following points:

- When not in use, store electrodes in Thermo Orion Storage Solution, Cat. No. 910001.
- Soak dry electrodes in Thermo Orion Storage Solution for up to 2 hours prior to initial use.
- For refillable electrodes, open the filling hole for calibration, measurement and cleaning.
- Make sure the internal filling solution in the electrode is always at least 1 inch higher than the sample level. Fill electrode with solution if necessary. Use the Thermo Orion filling solution specified for the electrode being used.

Grease and oil deposits on the electrode can be removed with Thermo Orion Detergent Cleaning Solution D, Cat. No. 900024.

Protein contaminations can be removed by soaking the electrode in Thermo Orion Cleaning Solution B, Cat. No. 900022.

- Do not rub the electrode dry with a cloth or fleece, as this will cause electric charging which may later result in incorrect measurements or even make them impossible.

Temperature compensation

The temperature compensation takes the temperature dependency of the electrode slope into account. Reference temperature for E_0 and slope of the meter is 25°C. The pH of the sample is also temperature-dependent. This temperature dependence is unknown and depends on the composition of the sample. As a result, this temperature dependence cannot be compensated. Therefore, always indicate the measuring temperature together with the pH.

Note



In the case of a major temperature difference between the calibration and measuring temperature, an additional temperature effect on E_0 may affect the electrode performance. These effects are not subject to any general rules (in contrast to the temperature dependence of the slope). To achieve a particularly high degree of measurement accuracy, this error can be eliminated by calibrating at the measuring temperature. The temperature dependence of the calibration buffer pH values is automatically taken into consideration during an AutoCal calibration.

Technical Terms

AutoCal	Automatic buffer recognition. Before the first calibration, the buffer set used must be activated once. The AutoCal then automatically recognizes the buffer solution used during calibration.
Autoshutoff	To protect the batteries, the meter switches off automatically when not operated for a longer period.
Buffer set	Contains selected buffer solutions which can be used for automatic calibration with the AutoCal feature. The buffer set must be selected prior to initial calibration.
Buffer solution	Solution with an exactly defined pH for calibrating a pH measuring instrument.
cal	Key for activating calibration.
Calibration	Adjustment of the pH meter to the current electrode characteristics. The E_0 and slope are adjusted. A one-, two-, or three-point calibration can be performed. With one-point calibration, only the E_0 is adjusted.
Calibration buffer set	See buffer set.
Combination electrode	Combination of sensing and reference electrode in one probe.
Electrode E_0	The pH which is exhibited at 0 mV. This typically corresponds to the isopotential point of an electrode. The E_0 is different for every electrode and changes with age and wear.
Electrode slope	Is indicated in % of the theoretical slope (59.2 mV/pH at 25 °C). The electrode slope is different for every electrode and changes with age and wear.
GLP	Good Laboratory Practice: Rules for conducting and documenting measurements in the laboratory.

meas	This key is used to return to measure mode from all other modes. In measure mode, it switches between mV and pH.
NAMUR	German committee for measurement and control standards in the chemical industry
One-point calibration	Calibration with which only the E_0 is taken into consideration. The previous slope value is retained. Only one buffer solution is required for a one-point calibration.
pH electrode system	A pH electrode system consists of sensing and reference electrodes. If they are combined in one body, they are referred to as a combination electrode.
Response time	Time from the start of a calibration step to the stabilization of the electrode potential. This time is one of the criteria for the StatFace indicator.
StatFace	Automatic electrode monitoring. The StatFace indicators provide information on the status of the electrode and the meter. Calibration interval, E_0 , slope and response time of the electrode are evaluated.
Slope	See electrode slope.
Three-point calibration	Calibration in which the E_0 and slope are taken into consideration. Three buffer solutions are required for three-point calibration. E_0 and slope are calculated for each line segment during calibration. The line segment which includes the mV measured in the sample is used to calculate the pH of the sample. An average of the two E_0 points is used for reporting purposes.
Two-point calibration	Calibration in which the E_0 and slope are taken into consideration. Two buffer solutions are required for two-point calibration.

Index

☺☹☹, 14

A

AutoCal, 9, 38
configuration, 7
definition, 43

Autoshutoff, definition, 43

B

Battery replacement, 20

Buffer set
definition, 43
selection, 7

Buffer solution, 40
definition, 43

C

Calibration, 9, 38
automatic, 9, 38
configuration, 7
buffer solution, 40
definition, 43
manual, 10, 39
configuration, 8

Calibration buffer set, definition,
43

Calibration Intervals, 39

Certificate of Conformity, 24

Cleaning, 21

Combination electrode, definition,
43

configuration, 7

configuration menu, 7

Control Drawing, 26

D

Declarations of Conformity, 22

Diagnostics, StatFace, 14

Display, 4

E

E0, definition, 43

Electrode monitoring, StatFace,
14

Electrode slope, definition, 43

Electrodes, 41
care, 41
monitoring, 5

Error messages, 16–19

G

GLP, definition, 43

K

Keypad, 4

M

Maintenance, 20

Manual calibration, 39

Manual temperature specification,
13

-
- Measure mode, 13
- Measurement, 13
- Measurement, general, 38
- Messages, StatFace, 14
- Meter design, 3
- mV measurement, 13
- N**
- NAMUR, definition, 44
- O**
- One-point calibration, 10, 11
definition, 44
- Ordering information, 28
- P**
- Package contents, 1
- pH electrode system, definition,
44
- pH measurement, 13
- R**
- Response time, definition, 44
- S**
- Safety precautions, V
- Short description, 1
- Slope, definition, 44
- Smiley, 14
- Specifications, 36
- StatFace, 5, 14
definition, 44
diagnostic, 14
messages, 14
- T**
- Technical terms, 43
- Temperature compensation, 42
- Three-point calibration, 10, 12
definition, 44
- Two-point calibration, 10, 11
definition, 44
- W**
- Warranty, 33

Thermo Orion

500 Cummings Center
Beverly, MA 01915-6199 USA
Tel: 978-232-6000
Dom. Fax: 978-232-6015
Int'l. Fax: 978-232-6031

Thermo Orion Europe

12-16 Sedgeway Business Park
Wichford, Cambridgeshire
England CB6 2HY
Tel: 44-1353-666111
Fax: 44-1353-666011

Thermo Orion Far East

Room 904, Federal Building
369 Lockhart Road
Wanchai, Hong Kong
Tel: 852-28360981
Fax: 852-28345160

Thermo Orion India

105, 1st Floor, Ashoka Apartments
Ranjit Nagar Commercial Complex
New Delhi 110008, India
Tel: +91-11-570-5775
Fax: +91-11-570-5778

Thermo Orion Customer Support

Toll Free: 800-225-1480
WWW: <http://www.thermoorion.com>
Dom. e-mail: [domcs1 @ thermoorion.com](mailto:domcs1@thermoorion.com)
Int'l. e-mail: [intcs1 @ thermoorion.com](mailto:intcs1@thermoorion.com)

Thermo Orion

233848-001 Rev. C

A Thermo Electron business