

Instruction Manual

Models 130A, 131S

**Waterproof and Intrinsically Safe
Portable Conductivity Meters**



60937

Thermo Orion

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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.

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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.

Safety Precautions

Be sure to read and follow these instructions !



The Model 131S 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, for example:

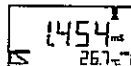
- the meter shows visible damage
- the meter fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stresses

Before recommissioning the meter, a professional routine test according to EN 61010-1 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 Model 130A or 135S.

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 which should always be observed when using 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.

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1 The Models 130A and 131S Conductivity Meters

Package Contents



Please check the completeness of the shipment after unpacking.

The package should include:

- Thermo Orion Model 130A or 131S Conductivity Meter (ready for operation)
- Neck strap
- This instruction manual
- Quickstart instructions

Short Description of Meters



- The Models 130A and 131S measure conductivity, salinity, TDS and temperature in industry, the environment, food processing and waste-water treatment.

- Operation of the Model 131S is also permitted in Zone 1 hazardous areas.



- 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 60 529.



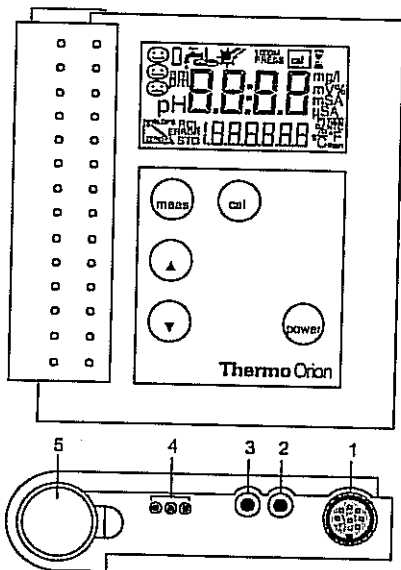
- Temperature compensation is automatic with a conductivity probe with integral temperature sensor or a separate ATC probe, or the temperature may be manually entered.



- Calibration can be carried out by directly entering the cell constants, by calibrating with Thermo Orion Conductivity Standards, or with any other buffer solutions.
- To minimize battery consumption, the meter switches off after 12 hours when it is not operated.
- Only three alkaline AA batteries are required for uninterrupted operation for approx. 1,000 hours.

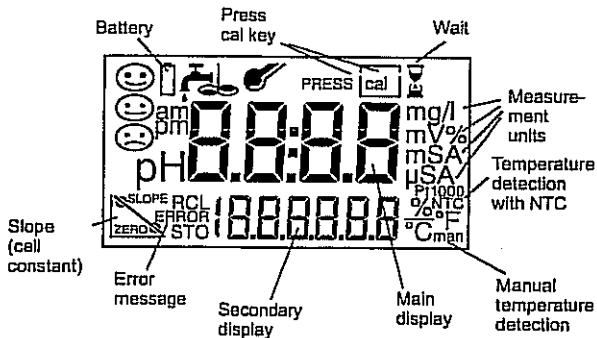
2 Operation

Meter Design



- 1 Sensor connection
- 2, 3 Separate temperature probe connection
- 4 Unused
- 5 Probe holder, removable

Display



Keypad



Pressing the **power** key switches the meter on or off. After switching on, the meter automatically performs a self-test and checks for the presence of a temperature probe. Then it goes into the measuring mode.



Pressing the **meas** key returns the meter to the measuring mode from any function. Pressing the **meas** key in the measuring mode displays the following parameters:
Cond measuring mode: temperature compensation
t/dS measuring mode: TDS factor

Note



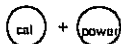
You can also power the meter up using the **meas** key. However, only an abbreviated self-test is performed.



Pressing the **cal** key starts calibration.



With the ▲ and ▼ keys you can select and change parameters and select a mode.



Pressing the **cal** and **power** keys when the meter is switched off, activates the configuration menu.

Note



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

Connection and Start-up

Connecting sensor The following sensors from the line of accessories can be connected to the meter.

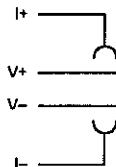
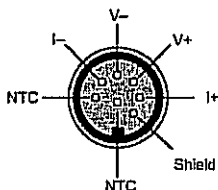
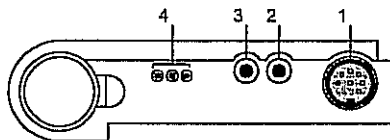
013610 4-electrode epoxy/graphite sensor with integrated temperature probe, 3 meter cable
K = 0.55 /cm

013660 4-electrode epoxy/graphite sensor with integrated temperature probe, 20 meter cable
K = 0.55 /cm


Connection assignment


Connection **Socket**


Sensor 1
 Separate temperature probe 2, 3
 Unused 4



If no temperature probe is used for measurement, the meter operates with the manually set temperature and *man* appears in the display.

Note  When using a sensor with temperature probe, an external temperature probe may not be connected simultaneously.


Note  Prior to first use, the cell constant, temperature compensation and time and date must be checked and set, if required.


Note  The calibration and configuration data remain permanently stored both with the meter switched off and with the batteries removed (battery replacement).



Pressing the **power** key switches the meter into measuring mode.
When switched on, the meter determines the connected temperature probe and conducts a self-test:

- Simultaneous appearance of all display segments
- Display of the model number
- Display of the software version

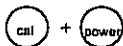
Note  For recognition of the temperature probe, the conductivity sensor must be connected to the meter before power-up.

Note  The meter can also be switched on with the **meas** key. However, only an abbreviated test is performed. The meter assumes that the last temperature probe determined is used.

Configuration

The following basic settings can be changed in the configuration:

- Function *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids)
- Calibration by entering the cell constants (AutCal Off) or calibration with Thermo Orion Conductivity Standards (AutCal On)
- Temperature display
°C or °F



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

CONF

The menu items of the configuration menu are worked through in sequence. Press the ▲ or ▼ key to change the setting of the respective menu item. The **CAL** key saves the parameters and switches to the next menu item.



Pressing the **meas** key exits the configuration menu at any time. The value last displayed will not be saved unless the **CAL** key was pressed.

Function

Select the measuring function *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids).

Automatic or manual calibration

Select whether you wish to manually set the cell constant or calibrate using Thermo Orion Conductivity Standards and automatic drift check.
(Default setting: Direct entry of the cell constant (*AutCAL OFF*))

OFF
AutCAL

Direct entry of the cell constants (*AutCal OFF*) from 0.010 cm^{-1} to 199.9 cm^{-1} .
(Default setting 0.475 cm^{-1})



AutCAL

Automatic calibration (*AutCAL On*) with 0.1 molar KCl solution (Thermo Orion 12.9 mS Conductivity Standard, Cat. no. 011006), 0.01 molar KCl (Thermo Orion 1413 μ S Conductivity Standard, Cat. no. 011007) or entry of the temperature-compensated conductivity of another known calibration solution.

Temperature display



07
TEMP

The temperature can be displayed either in $^{\circ}$ C or $^{\circ}$ F. (Default setting: $^{\circ}$ C)

Calibration

With calibration the Models 130A and 131S are adjusted to the cell constants of the sensor.

General information on calibration

Calibration solutions	Solutions for calibration of conductivity meters are unbuffered systems. Care should be taken to use fresh conductivity standards and to avoid contamination of the conductivity standard by water droplets adhering to the conductivity sensor.
Clean sensors	Before calibration, make sure that the conductivity sensor is clean. Residues should be rinsed off with distilled water. Afterwards, the sensor should be wiped dry and rinsed with the calibration solution to be used.
Cell constant	The cell constant is determined by the size and geometric arrangement of the measuring electrodes. It is the characteristic parameter of conductivity sensors. The cell constant changes very little over time.
4-electrode sensors	With 4-electrode sensors the principle of separate current/voltage electrodes results in virtually no measuring errors even in the case of partial soiling of the measuring electrodes. However, electrodes completely soiled with insulating coatings cause the measurement to fail.
2-electrode sensors	With 2-electrode sensors with $K = 0.1 \text{ cm}^{-1}$ for the measurement of low conductivities, e.g. ultrapure water, calibration should be carried out using Thermo Orion 100 $\mu\text{S/cm}$ Conductivity Standard (Cat. no. 011008).

Calibration by direct entry of the cell constants (*AufCAL OFF*)



Press the **cal** key to activate calibration. The cell constant determined or set during the last calibration is displayed. Pressing the **meas** key exits calibration again.



Set the cell constant of the sensor used with the ▲ and ▼ keys and confirm with the **cal** key. Then the meter switches back into the measuring mode.

Calibration with 0.1 or 0.01 molar KCl solution (AutCAL On)
(Thermo Orion 12.9 mS or 1413 μ S Conductivity Standard)

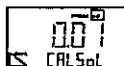
Note



Impurities must always be prevented from getting into the calibration solutions.



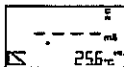
Pressing the **cal** key activates calibration. Calibration can be cancelled by pressing the **meas** key. Then the cell constant of the last calibration is displayed briefly.



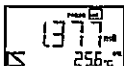
Select the calibration solution used (CAL SOL). A 0.1 and a 0.01 molar KCl solution are available to choose from. Confirm the corresponding solution with the **cal** key.

Immerse the clean and dry sensor in the calibration solution (also see "Clean sensors", Pg. 10).

Press the **cal** key to start calibration. If calibration is not desired, cancel the process with the **meas** key.

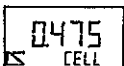


During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hour glass flashes.



When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

Confirm with the **cal** key.



The determined cell constant is displayed for a few seconds. Then the meter switches back into the measuring mode.

Calibration with any calibration solution (*Au/CAL ON*)

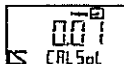
Note



Impurities must always be prevented from getting into the calibration solutions.



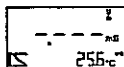
Pressing the **cal** key activates calibration. Calibration can be exited again with the **meas** key. Then the cell constant of the last calibration is displayed briefly.



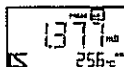
First confirm any of the 0.1 or 0.01 mol/l KCl solutions (*CALSol*) with the **cal** key.

Immerse the clean and dry sensor in the calibration solution (also see "Clean sensors", Pg. 10).

Press the **cal** key to start calibration. If calibration is not desired, cancel the process with the **meas** key.



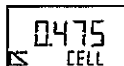
During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hour glass flashes.



When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

See the table of your calibration solution for the conductivity value which belongs to the displayed measuring temperature.

Set the temperature-compensated conductivity in the meter with the **▲** and **▼** keys, then confirm it with the **cal** key.



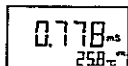
The determined cell constant is displayed for a few seconds. Then the meter switches back into the measuring mode.

Measurement

Measuring mode

Pressing the **meas** key accesses the measuring mode from all functions. In the measuring mode the main display indicates the measured variable and the secondary display shows the temperature.

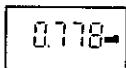
Measuring the conductivity (Cond)



The main display indicates the measured conductivity, the secondary display shows the temperature.

Temperature compensation

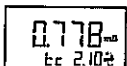
The instrument offers various temperature compensation methods. With the **meas** key and the **▲** or **▼** key, the temperature compensation method can be selected and set:



(*tc OFF*) No temperature compensation



(*tc nLF*) Temperature compensation with non-linear characteristic for natural water and ultrapure water (reference temperature 25 °C). In the secondary display *tc* also appears.



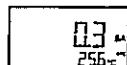
(*tc 0.01 – 9.99 %/°C*) Temperature compensation with linear characteristic and definable temperature coefficients (reference temperature 25 °C). In the secondary display *tc* also appears.

Note



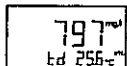
When you have selected temperature compensation with linear characteristic, you can only exit this function or select the nonlinear function when the temperature coefficient has been set to 0.00.

Measuring the salinity (SAL)




The main display indicates the measured salinity in ‰ (parts per thousand), the secondary display shows the temperature.

TDS determination (TDS)



The main display indicates the concentration of the dissolved solids contributing to the solution conductivity (TDS, comparable to the evaporation residue) in mg/l, the secondary display shows the temperature.

TDS factor Pressing the **meas** key and then the ▲ or ▼ key sets the TDS factor within the range 0.40 – 1.00.

Note  The TDS factor depends on the composition of the water to be tested and must be determined for each water type.

Manual temperature The *man* indicator signals that no temperature probe is connected. The meter operates with the manually specified temperature. The manual temperature can be edited with the ▲ and ▼ keys in the *Cond* measuring mode.

3 Troubleshooting and Maintenance

Error Messages

Range limits exceeded If a measured value lies outside the ranges accepted by the meter, an error message appears and the measured-value display flashes.

ERROR 1 The measurement range was exceeded.

Possible causes:

- Sensor defective
- Break in sensor cable
- Wrong sensor connected
- Wrong cell constant entered

ERROR 3 The measured temperature is outside the ranges:

Conductivity $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$

nLF: $0\text{ }^{\circ}\text{C}$ to $120\text{ }^{\circ}\text{C}$

Salinity: $0\text{ }^{\circ}\text{C}$ to $30\text{ }^{\circ}\text{C}$

TDS: $10\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$

Possible causes:

- Temperature probe in conductivity sensor defective
- Short circuit in temperature probe
- Wrong temperature probe connected

Note



When changing the conductivity sensor, note that the temperature probe type is only recognized when the meter is switched on with the **power** key.

Calibration error messages If errors occur during calibration, or if the determined sensor data are outside the valid range, an error message appears (ERROR 6, ERROR 11).

ERROR 6 The cell constant lies outside the permissible range $< 0.01 \text{ cm}^{-1}$ or $> 199.9 \text{ cm}^{-1}$.

Possible causes:

- No sensor connected during calibration
- Wrong calibration solution
- Sensor not immersed far enough in calibration solution

ERROR 11 The calibration was cancelled after approx. 2 minutes because the drift was too large. This message only appears briefly during calibration.

Possible causes:

- Sensor defective or dirty
- Sensor cable insufficiently shielded or defective
- Strong electric fields influence the measurement
- Major temperature fluctuation of the calibration solution
- Calibration solution unstable

ERROR 18 Error during the meter self-test sequence.

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 are protected from loss with multiple safety functions. Should this error message appear, 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



When the battery symbol appears in the display, the batteries need replacement. However, you can still use the meter for a few days. If the battery voltage continues to drop, the meter will switch itself off.



Never change the batteries within a hazardous area. Use only alkaline AA batteries. Be sure that 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 probe 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 sensor socket.
- Replace the lid and secure it with the screws.
- Replace the probe holder.

Note



When changing the batteries all calibration and configuration data are retained.

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.
500 Cummings Center
Beverly, MA 01913 U.S.A.

hereby declares that the products

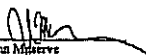
Waterproof Conductivity Meter Models 130A and 135A

conform with the following standards and documents

Safety	EC Directive 72/23/EEC Low Voltage Directive EN 61010-1: 1990 Laboratory Equipment	
EMC	EC 89/336/EEC Electromagnetic Compatibility	
Emissions:	EN 50081-1 / 01.1992 Emissions FCC Part 15 Class A	
Immunity:	EN 50082-2 / 03.1995 IEC 801-2 IEC 801-3 IEC 801-4	Generic Immunity 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 9002: 1994(E) by QMI, listed as File # 001911.

Place and date of issue:
Beverly, MA, USA
January 27, 1999


John M. Stieve
Quality Assurance Manager

Orion Research, Inc.
Declaration of Conformity

Manufacturer:

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

hereby declares that the products

Waterspac Conductivity Meter Models 1103 and 1135

conform with the following standards and documents:

Safety	EC Directive 70/239/EEC Low Voltage Directive EN 5014: 1977 Gen. Requirements EN 50123: 1977 Instructional Sign EN 51010-1: 1993 Laboratory Equipment
EMC	EC 89/318/EEC Electromagnetic Compatibility
Emission:	EN 50081-1 + 01: 1992 Emissions FCC Part 15 Class A
Immunity:	EN 50082-2 + 03: 1995 General Immunity IEC 601-2 ESD Susceptibility IEC 601-3 Radiated Susceptibility IEC 601-4 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 (IE) by QMI, listed as File # 001511.

Place and date of issue:
Beverly, MA, U.S.A.
January 27, 1989


John H. Morse
Quality Assurance Manager

221072 - 001 Rev. A

Certificate of Conformity

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) **CERTIFICATE OF CONFORMITY**
 (2) **PTB No. Ex-87.D.211B**
(TRANSLATION)

(3) This certificate is issued for the electrical apparatus
Conductivity Meter Model 12.5

(4) manufactured by **Oxon 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 (75/117/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:

EEEx ia IIC T5

(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 Distinctive Community Mark according to Annex II to the Council Directive of February 6, 1976 (76/198/EEC). A facsimile of this mark is printed on this sheet of the certificate.

By order

Braunschweig, 30.06.1987


 Dr.-Ing. Johannes Meyer
 Oberprüferpräsident



This certificate's original signature and printed stamp must not be used.
 The certificate may be reproduced only without alteration.
 Extracts or photocopies are subject to control by the Physikalisch-Technische Bundesanstalt.
 In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt

SCHEDULE

to Certificate of Conformity PTB No. Ex-97.D.2118

The apparatus is mainly used for the measurement of conductivity and temperature in the electrochemical and environmental range of application.

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

The permissible ambient temperature range is $-10\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$.

Electrical Data

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

Conductivity/temperature

measuring circuit

(BU 2, 3, 4)

type of protection "Intrinsic Safety" EEx ia IIC

maximum values:

$U_n \leq 10\text{ V}$

$I_n \leq 88\text{ mA}$

$P_n \leq 80\text{ mW}$

$R_n > 57\ \Omega$

maximum permissible external capacitance 1 μF

maximum permissible external inductance 1 mH

internal capacitance 50 nF

internal inductance negligible small

interface circuit

(BU 5, 6, 7)

$U_n = 253\text{ V}$

Operation outside hazardous areas only.

The conductivity/temperature measuring circuit may not lead into the hazardous area if the interface is connected to a non intrinsically safe circuit.

Test documents

1. Certificate of Conformity PTB No. Ex-97.D.2118

By order

Dr.-Ing. Johannes
Oberregierungsrat



Braunschweig, 30.08.1997

Sheet 1/1

Control Drawing

Hazardous (Classified) Locations

Portable pH Meter Model 26a5

Portable Conductivity Meter Model 13a5

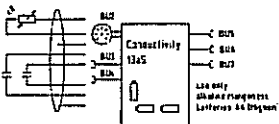
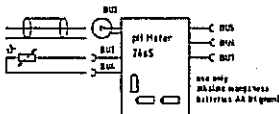
Inherently Safe with output connections for Class I Division 1, Groups A, B, C & D, 0.5 to +55°C
Class I Zone 1A/2a, C, T4 to +55°C

$I_a = I_c = 924 \mu A$

INTRINSICALLY SAFE

EXEMPT FROM DIRECT

The devices must be PNEU protected or be flame arrester.



Portable pH Meter, Model 26a5

pH/Temperature Measuring Circuit

BU2, 3, 41

$V_i = 12 V$ $I_i = 99 mA$ $P_{max} = 11 mW$

Class I, Division 1, Groups A & B $C_p = 3 \mu F$ $L_p = 300 mH$

Class I S.H. Division 1, Groups C, D, E $C_p = 9 \mu F$ $L_p = 9 mH$

Class I, S.H. Division 1, Groups D, F & G $C_p = 76 \mu F$ $L_p = 9 mH$

entity concept

$V_{oc} = V_i = V_{oc}$ $I_{sc} = I_i = I_{sc}$

$C_p = C_p + C_{ext}$ $L_p = L_p + L_{ext}$

Portable Conductivity Meter, Model 13a5

Temp/Temperature Measuring Circuit

BU2, 3, 41

$V_i = 12 V$ $I_i = 123 mA$ $P_{max} = 153 mW$

Class I, Division 1, Groups A & B $C_p = 3 \mu F$ $L_p = 65 mH$

Class I S.H. Division 1, Groups C, D, E $C_p = 9 \mu F$ $L_p = 49 mH$

Class I, S.H. Division 1, Groups D, F & G $C_p = 76 \mu F$ $L_p = 72 mH$

Ordering Information

	Thermo Orion Cat. No.	Description
Meters	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
	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
	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	

Thermo Orion Cat. No.	Description
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
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

Models 130A and 131S Portable Conductivity Meters

	Thermo Orion Cat. No.	Description
Probes	013610	4-electrode epoxy/graphite cell, 3 meter cable, K = 0.55 /cm
	013660	4-electrode epoxy/graphite cell, 20 meter cable, K = 0.55 /cm
	013016	2-electrode stainless steel cell, 1 meter cable, K = 0.1 /cm
	013016A	2-electrode stainless steel cell, 1 meter cable, K = 0.1 /cm
Standards	011006	Conductivity standard 12.9 mS (0.1 KCl), 5 x 60 mL
	011007	Conductivity standard 1413 μ S (0.01 KCl), 5 x 60 mL
	011008	Conductivity standard 100 μ S, 5 x 60 mL
Accessories	026AKT	Field Case for Thermo Orion Waterproof Meters
	013650	Replacement Quiver for 130A/135A/ 131S/136S WP Meters
	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	

Thermo Orion Cat. No.	Description
PRT300	Ink-based Printer, 110 V, Cable Included
PRT301	Ink-based Printer, 220 V, Cable Included
PRT302	Replacement Printer Ribbon, 1 each

Specifications

Ranges	Conductivity:	0.1 $\mu\text{S}/\text{cm}$ to 1,000 mS/cm ($c > 0.8 \text{ cm}^{-1}$) 0.1 $\mu\text{S}/\text{cm}$ to 500 mS/cm ($c = 0.2$ to 0.8 cm^{-1}) 0.01 $\mu\text{S}/\text{cm}$ to 199.9 $\mu\text{S}/\text{cm}$ ($c < 0.2 \text{ cm}^{-1}$)
	Temperature:	-20.0 to +120.0 $^{\circ}\text{C}$ / -4 to 248 $^{\circ}\text{F}$ nLF: 0 to 120 $^{\circ}\text{C}$
	Salinity:	0.0 to 45.0 g/kg (0 to 30 $^{\circ}\text{C}$)
	TDS:	0 to 1,999 mg/l (10 to 40 $^{\circ}\text{C}$)
Display	LCD 35 x 67 mm, character height 15 mm	
Measurement cycle	Approx. 2 sec	
Measurement error (± 1 count)	Conductivity:	< 0.5 % of measured value ¹⁾
	Temperature:	< 0.3 K
Input 1 (Sensor)	Multi-contact for 2 and 4-electrode sensors with integrated temperature probe	
Input 2 (Temperature)	4 mm sockets for separate temperature probe	
Permissible cell constant	0.010 to 199.9 cm^{-1} (adjustable)	
Sensor standardization	Direct entry of the cell constants, Automatic determination of the cell constants with Thermo Orion conductivity standards, Sensor standardization with any known solutions	
Meter self-test	During power-up, segment test, display of model no. and software version	
Temperature measurement	NTC 30 $\text{k}\Omega$ (automatic recognition during power-up) or manual temperature entry	
Temperature compensation	Linear characteristic: 0.01 to 9.99 $\%/^{\circ}\text{C}$ nLF (non-linear characteristic for ultrapure water and natural water)	
Data retention	Configuration/calibration data and factory settings >10 years	
Autoshutoff	After 12 hours	
Explosion Protection (only Model 131S)	EEX Ia IIC T6, PTB No. Ex-97.D.2118 FM approved	
¹⁾ For conductivities > 500 mS/cm < 1% meas. value		

Ambient temperature	Operation: Transport and storage:	-10 to +55 °C -20 to +70 °C
Power supply	3 alkaline AA batteries	
Operating time	Approx. 1,000 h	
Enclosure	Material: PA, IP 66 protected, with integrated probe holder	
Dimensions	133 x 160 x 30 mm (W x H x D)	
Weight	Approx. 560 g with batteries	

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, rlink[™], 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.

ThemaSense[™] 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, pHure 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 pHure 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, 280A, 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, Series 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.

Technical Terms

Autoshutoff (AutoFF)	To protect the batteries, the meter switches off automatically after twelve hours when it is not operated.
cal	Key for activating calibration.
Calibration	Adjustment of the conductivity meter to the cell constant of the sensor used.
Calibration solution	Solution with exactly defined conductivity for calibrating a conductivity meter.
Evaporation residue	See TDS.
GLP	Good Laboratory Practice: Rules for conducting and documenting measurements in the laboratory.
meas	Pressing this key returns to the measuring mode from all other levels. In the measuring mode <i>Cond</i> the set temperature compensation is displayed by pressing meas , in the TDS mode the TDS factor.
NAMUR	German committee for measurement and control standards in the chemical industry
nLF	Non-linear temperature compensation for ultrapure water with NaCl traces and for natural water, reference temperature = 25 °C.
Response time	Time from the start of a calibration step to the stabilization of the measured value.
Salinity	The salinity indicates the salt content, particularly of sea waters as a cumulative parameter. It is specified in parts per thousand (‰). It is denoted by SA.
TDS	Total Dissolved Solids, corresponds to the concentration of the dissolved solids contributing to the conductivity – comparable to the evaporation residue. It is reported in milligrams per liter (mg/L).

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232106-001 Rev. B

A Thermo Electron business