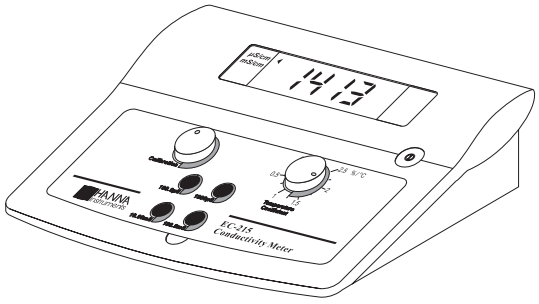
Instruction Manual

EC214
EC215 • EC215R

Multi-Range Conductivity Meters for Laboratories



HANNA® instruments

www.hannainst.com

Dear Customer,

Thank you for choosing a HANNA instruments® product.

Please read this instruction manual carefully before using the instrument. This manual will provide you with all the necessary information for correct operation.

If you need additional technical information, do not hesitate to e-mail us at **tech@hannainst.com**.

These instruments are in compliance with the CE directives.

TABLE OF CONTENTS

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any damage, notify your dealer.

Each meter is supplied complete with:

- 4-ring conductivity probe with 1 m (3.3') cable
  - **HI 76300** for **EC 214**
  - **HI 76303** for **EC 215** and **EC 215R**
- 12 Vdc adapter
- Instruction manual

Note: Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing with the supplied accessories.

GENERAL DESCRIPTION

EC 214 and **EC 215** are bench top multi-range conductivity meters for the laboratory.

Four measurement ranges ensure the highest resolution and precision for your measuring requirements.

Single point calibration is performed manually simply by adjusting a knob on the front of the meter.

Temperature compensation of the readings is automatic for the **EC 215** models, thanks to the temperature sensor incorporated in probe, with userselectable temperature coefficient.

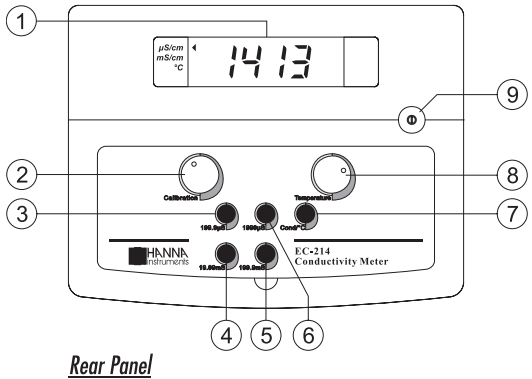
With **EC 214** the temperature compensation is manual and the temperature value can be also set with a knob.

The rugged probe with platinum 4-ring sensor responds faster than conventional stainless steel models and can be also used for measuring highly acidic or alkaline samples, or at high temperature.

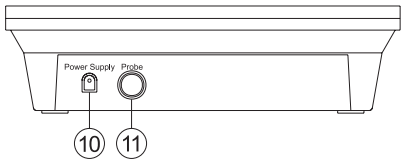
In addition, the **EC 215R** model offers analog output of 0 to 5V that represents the full conductivity scale across all 4 ranges.

FUNCTIONAL DESCRIPTION EC 214

Front Panel



Rear Panel



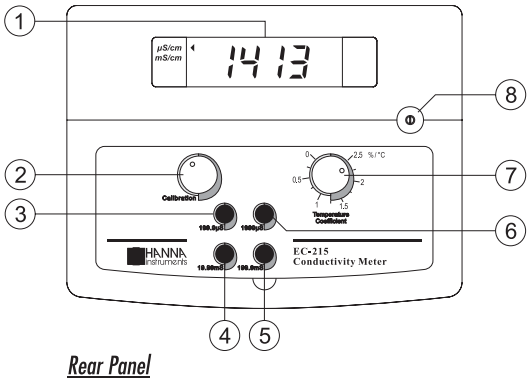
1) Liquid Crystal Display (LCD)
2) Conductivity calibration knob
3) 199.9 µS key for range selection
4) 19.99 mS key for range selection
5) 199.9 mS key for range selection
6) 1999 µS key for range selection
7) COND/°C key, to select conductivity reading or temperature setting for manual compensation
8) Temperature setting knob for manual compensation
9) ON/OFF switch
10) Power adapter socket
11) Probe connector

SPECIFICATIONS EC 214

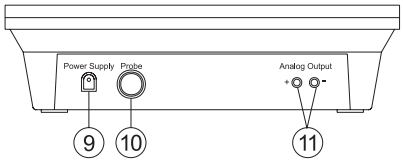
Range	0.0 to 199.9 µS/cm / 0 to 1999 µS/cm 0.00 to 19.99 mS/cm / 0.0 to 199.9 mS/cm
Resolution	0.1 µS/cm / 1 µS/cm 0.01 mS/cm / 0.1 mS/cm
Accuracy (@20°C/68°F)	±1% FS (excluding probe error)
Typical EMC Deviation	±1% F.S.
Calibration	Manual, single point, through front knob
Temperature Compensation	Manual, 0 to 50°C (32 to 122°F) with β=2%/°C
Probe	**HI 76300**, platinum 4-ring sensor, with 1 m (3.3') cable **(included)**
Power Supply	12 Vdc (power adapter included)
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	240 x 182 x 74 mm (9.4 x 7.1 x 2.9")
Weight	1.0 kg (2.2 lb.)

FUNCTIONAL DESCRIPTION EC 215

Front Panel



Rear Panel



1) Liquid Crystal Display (LCD)
2) Conductivity calibration knob
3) 199.9 µS key for range selection
4) 19.99 mS key for range selection
5) 199.9 mS key for range selection
6) 1999 µS key for range selection
7) Temperature coefficient setting knob
8) ON/OFF switch
9) Power adapter socket
10) Probe connector
11) Analog output (**EC 215R** only)

SPECIFICATIONS EC 215

Range	0.0 to 199.9 µS/cm / 0 to 1999 µS/cm 0.00 to 19.99 mS/cm / 0.0 to 199.9 mS/cm
Resolution	0.1 µS/cm / 1 µS/cm 0.01 mS/cm / 0.1 mS/cm
Accuracy (@20°C/68°F)	±1% F.S. (excluding probe error)
Typical EMC Deviation	±1% F.S.
Calibration	Manual, single point, through front knob
Temperature Compensation	Automatic, 0 to 50°C (32 to 122°F) with β adjustable from 0 to 2.5%/°C
Probe (included)	**HI 76303**, platinum 4-ring sensor, built-in temperature sensor and 1 m (3.3') cable
Analog Output (EC 215R only)	0 to 5 Vcc not isolated output; accuracy ±0.1% of reading; resolution ±2.5 mV
Power Supply	12 Vdc (power adapter included)
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	240 x 182 x 74 mm (9.4 x 7.1 x 2.9")
Weight	1.0 kg (2.2 lb.)

OPERATIONAL GUIDE

Power connection

Plug the 12 Vdc adapter into the power supply socket.

Note: Make sure the main line is protected by a fuse.

Probe connection

Connect the conductivity probe to the proper socket on the rear panel.

Note: Make sure that the instrument has been calibrated before taking any measurement (see "Calibration" section).

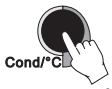
Note: If possible, use plastic beakers to minimize EMC interferences.

TAKING CONDUCTIVITY MEASUREMENTS WITH EC214

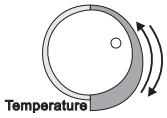
- Switch the instrument on by pressing ON/OFF.

- Immerse the probe in the solution while completely submerging the holes of the sleeve. Tap the probe lightly on the bottom of the beaker to remove any air bubbles trapped inside the sleeve. Measure the solution temperature with a ***Checktemp*** or another accurate thermometer.

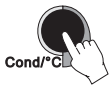
- Press the "COND/°C" key to select temperature setting.



- Adjust the "TEMPERATURE" knob to display the temperature of the solution on the LCD.



- Press the "COND/°C" key to select conductivity reading.



- Select the appropriate conductivity range.

Note: If the display shows "1", there is an over-range condition. Select the next higher range.

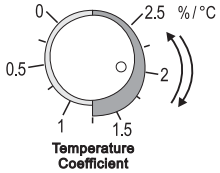
- Allow a few minutes for the reading to stabilize. The LCD will display the temperature compensated conductivity reading.

TAKING CONDUCTIVITY MEASUREMENTS WITH EC215

- Switch the instrument on by pressing ON/OFF.

- Immerse the probe in the solution while completely submerging the holes of the sleeve. Tap the probe lightly on the bottom of the beaker to remove any air bubbles trapped inside the sleeve.

- Adjust the "TEMPERATURE COEFFICIENT" knob to the temperature coefficient value of the solution (see "Determination of the Temperature Coefficient of a Solution" section for details).



- Select the appropriate conductivity range.

Note: If the display shows "1", there is an over-range condition. Select the next higher range.

- Allow a few minutes for the reading to stabilize. The LCD will display the temperature compensated conductivity reading.

CALIBRATION

The instrument should be calibrated at least once a month, or when the probe is changed.

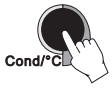
INITIAL PREPARATION

For better accuracy of measurements it is recommended to use the calibration solution with a conductivity value as close as possible to the sample to be measured. See the "Accessories" section for a complete list of available HANNA calibration solution.
Rinse the probe thoroughly in distilled water.
If possible, use plastic beakers to minimize any EMC interferences.

PROCEDURE FOR EC214

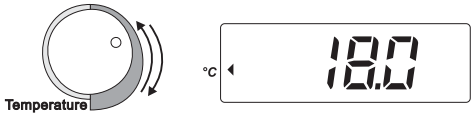
- Pour a small quantity of the appropriate calibration solution, e.g. **HI 7030** (12.88 mS/cm @ 25°C), into a plastic beaker.

- Immerse the probe in the solution while completely submerging the holes of the sleeve. Tap the probe lightly on the bottom of the beaker to remove any air bubbles trapped inside the sleeve. Measure the solution temperature with a ***Checktemp*** or another accurate thermometer.



- Press the "COND/°C" key to select temperature setting.

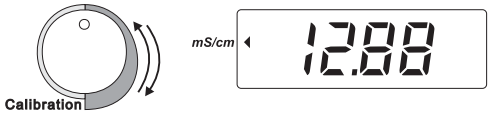
- Adjust the "TEMPERATURE" knob to display the temperature of the solution on the LCD.



- Press "COND/°C" to select conductivity reading and select the appropriate range:
  "199.9 µS" for **HI 7033**
  "1999µS" for **HI 7031**
  "19.99 mS" for **HI 7030**
  "199.9 mS" for **HI 7034**

Note: If the display shows "1", there is an over-range condition. Select the next higher range.

- Allow a few minutes for the reading to stabilize, then adjust the "CALIBRATION" knob to read the calibration solution conductivity value at 25°C (77°F), e.g. 12.88 mS/cm.

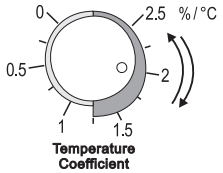


- All subsequent measurements will be referenced to 25°C (77°F).
- To reference the measurements to 20°C (68°F), adjust the "CALIBRATION" knob to read the calibration solution conductivity value at 20°C (68°F), e.g. 11.67 mS/cm. See the "Conductivity vs. Temperature Chart" on page 13.
- Calibration is now complete and the instrument is ready for use.

PROCEDURE FOR EC215

- Pour a small quantity of the appropriate calibration solution, e.g. **HI 7030** (12.88 mS/cm @ 25°C), into a plastic beaker.

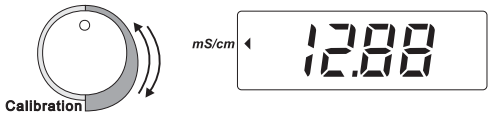
- Immerse the probe in the solution while completely submerging the holes of the sleeve. Tap the probe lightly on the bottom of the beaker to remove any air bubbles trapped inside the sleeve.
- Adjust the "TEMPERATURE COEFFICIENT" knob to 2%/°C.



- Select the appropriate range:
  "199.9 μS" for **HI 7033**
  "1999μS" for **HI 7031**
  "19.99 mS" for **HI 7030**
  "199.9 mS" for **HI 7034**

Note: If the display shows "1", there is an over-range condition. Select the next higher range.

- Allow a few minutes for the reading to stabilize, then adjust the "CALIBRATION" knob to read the calibration solution conductivity value at 25°C (77°F), e.g. 12.88 mS/cm.



- All subsequent measurements will be referenced to 25°C (77°F).
- To reference the measurements to 20°C (68°F), adjust the "CALIBRATION" knob to read the calibration solution conductivity value at 20°C (68°F), e.g. 11.67 mS/cm. See the "Conductivity vs. Temperature Chart" on page 13.
- Calibration is now complete and the instrument is ready for use.

CONDUCTIVITY VERSUS TEMPERATURE CHART

The conductivity of an aqueous solution is the measure of its ability to carry an electrical current by means of ionic motion.

The conductivity invariably increases with increasing temperature.

It is affected by the type and number of ions in the solution and by the viscosity of the solution itself. Both parameters are temperature dependent. The dependency of conductivity on temperature is expressed as a relative change per degree Celsius at a particular temperature, commonly as %/°C.

Since a small difference in temperature causes a large change in conductivity, the readings are usually normalized at 25°C.

°C	°F	HI 7030 (μS/cm)	HI 7031 (μS/cm)	HI 7033 (μS/cm)	HI 7034 (μS/cm)	HI 7035 (μS/cm)	HI 7039 (μS/cm)
0	32	7150	776	64	48300	65400	2760
5	41	8220	896	65	53500	74100	3180
10	50	9330	1020	67	59600	83200	3615
15	59	10480	1147	68	65400	92500	4063
16	60.8	10720	1173	70	67200	94400	4155
17	62.6	10950	1199	71	68500	96300	4245
18	64.4	11190	1225	73	69800	98200	4337
19	66.2	11430	1251	74	71300	100200	4429
20	68	11670	1278	76	72400	102100	4523
21	69.8	11910	1305	78	74000	104000	4617
22	71.6	12150	1332	79	75200	105900	4711
23	73.4	12390	1359	81	76500	107900	4805
24	75.2	12640	1386	82	78300	109800	4902
25	77	12880	1413	84	80000	111800	5000
26	78.8	13130	1440	86	81300	113800	5096
27	80.6	13370	1467	87	83000	115700	5190
28	82.4	13620	1494	89	84900	117700	5286
29	84.2	13870	1521	90	86300	119700	5383
30	86	14120	1548	92	88200	121800	5479
31	87.8	14370	1575	94	90000	123900	5575

EC 214 manually compensates for temperature differences with a fixed coefficient of 2%/°C.

EC 215 automatically compensates for temperature differences, and features an user-selectable coefficient that can be manually adjusted through a front knob, from 0 (no compensation) to 2.5%/°C.

DETERMINATION OF THE TEMPERATURE COEFFICIENT OF A SOLUTION (EC 215)

- Immerse the probe into a solution sample and adjust the "TEMPERATURE COEFFICIENT" knob to 0% (no compensation).
- Condition sample and probe at 25°C, and note the conductivity reading C_{25}.
- Condition sample and probe to a temperature t°C (approximately 5°C to 10°C different from 25°C), and note the conductivity reading C_t.
- The temperature coefficient (β)of the solution is then calculated using the following formula:

$$\beta = 100 \times (C_t - C_{25}) / [(t - 25) \times C_{25}]$$

The above procedure is suitable for determining the temperature coefficient in the laboratory where the temperature of the solution can be determined and controlled.

If this is not possible, e.g. during on-site measurements, the following procedure should be used:

- Immerse the probe into the test solution and turn the "TEMPERATURE COEFFICIENT" knob to 0% (no compensation).
- Allow the conductivity reading to stabilize (the reading should not change by more than $\pm$0.2 mS within 1 minute) and record the value, C.
- Repeat the procedure with a different solution temperature, changed by more than 10°C. Wait for the reading to stabilize.
- Adjust the "TEMPERATURE COEFFICIENT" knob until the display reads the previously recorded "C" value.
- The value indicated by the knob is the temperature coefficient of the solution.

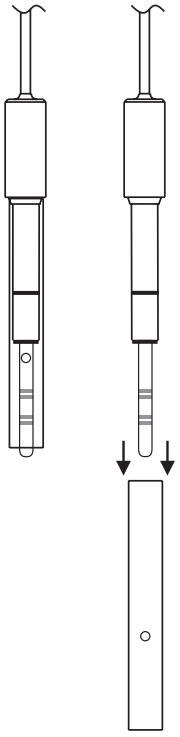
PROBE MAINTENANCE

After every series of measurements, rinse the probe with tap water.

If a more thorough cleaning is required, remove the sleeve and clean the probe with a cloth or a non-abrasive detergent.

After cleaning the probe, always re-calibrate the instrument.

The 4-ring platinum probe body is made of glass. For this reason great care while handling the probe must be taken.



ACCESSORIES

CONDUCTIVITY PROBES

HI 76300	Platinum 4-ring conductivity probe with 1 m (3.3') cable (for **EC214**)
HI 76303	Platinum 4-ring conductivity probe with built-in temperature sensor and 1 m (3.3') cable (for **EC215**)

CONDUCTIVITY CALIBRATION SOLUTIONS

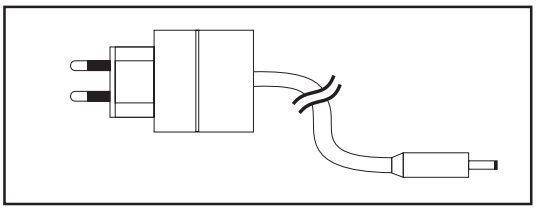
HI 7030M	12880 µS/cm, 230 mL bottle
HI 7030L	12880 µS/cm, 500 mL bottle
HI 8030L	12880 µS/cm, 500 mL FDA bottle
HI 7031M	1413 µS/cm, 230 mL bottle
HI 7031L	1413 µS/cm, 500 mL bottle
HI 8031L	1413 µS/cm, 500 mL FDA bottle
HI 7033M	84 µS/cm, 230 mL bottle
HI 7033L	84 µS/cm, 500 mL bottle
HI 8033L	84 µS/cm, 500 mL FDA bottle
HI 7034M	80000 µS/cm, 230 mL bottle
HI 7034L	80000 µS/cm, 500 mL bottle
HI 8034L	80000 µS/cm, 500 mL FDA bottle
HI 7035M	111800 µS/cm, 230 mL bottle
HI 7035L	111800 µS/cm, 500 mL bottle
HI 8035L	111800 µS/cm, 500 mL FDA bottle
HI 7039M	5000 µS/cm, 230 mL bottle
HI 7039L	5000 µS/cm, 500 mL bottle
HI 8039L	5000 µS/cm, 500 mL FDA bottle

PROBE MAINTENANCE SOLUTIONS

HI 7061M	General cleaning solution, 230 mL bottle
HI 8061M	General cleaning solution, 230 mL FDA bottle
HI 7061L	General cleaning solution, 500 mL bottle
HI 8061L	General cleaning solution, 500 mL FDA bottle

OTHER ACCESSORIES

HI 98501	***ChecktempC*** electronic thermometer (range -50.0 to 150.0°C)
HI 710005	115 Vac / 12 Vdc voltage adapter, US plug
HI 710006	230 Vac / 12 Vdc voltage adapter, European plug



HI 740036	100 mL plastic beaker (6 pcs)
HI 740034	Cap for 100 mL beakers (6 pcs)
HI 76404	Probe holder

WARRANTY

All Hanna Instruments **meters are guaranteed for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

Electrodes and the probes are guaranteed for six months.

This warranty is limited to repair or replacement free of charge.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument.

If under warranty, report the model number, date of purchase, serial number and the nature of the failure.

If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Customer Service department and then send it with shipping costs prepaid.

When shipping any instrument, make sure it is properly packaged for complete protection.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

CE DECLARATION OF CONFORMITY

HANNA instruments

CE

DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl
via E.Fermi, 10
35030 Sarmeola di Rubano - PD
ITALY

herewith certify that the bench-top EC meters

EC 214 EC215

have been tested and found to be in compliance with EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC according to the following applicable normatives:

EN 50082-1: Electromagnetic Compatibility - Generic Immunity Standard
IEC 801-2 Electrostatic Discharge
IEC 801-3 RF Radiated
IEC 801-4 Fast Transient

EN 50081-1: Electromagnetic Compatibility - Generic Emission Standard
EN 55022 Radiated, Class B

EN61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use

Date of Issue: 02.02.2001

A. Marsilio - Technical Director
On behalf of
Hanna Instruments S.r.l.

Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.
Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.
The metal band at the end of the sensor is sensitive to electrostatic discharges. Avoid touching this metal band at all times. During calibration of instruments, ESD wrist straps should be worn to avoid possible damage to the sensor by electrostatic discharge. Use plastic beakers to minimize any EMC interferences.
Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.
To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24 Vac or 60 Vdc.
To avoid damages or burns, do not perform any measurement in microwave ovens.

SALES AND TECHNICAL SERVICE CONTACTS

Australia:
Tel. (03) 9769.0666 • Fax (03) 9769.0699

China:
Tel. (10) 88570068 • Fax (10) 88570060

Egypt:
Tel. & Fax (02) 2758.683

Germany:
Tel. (07851) 9129-0 • Fax (07851) 9129-99

Greece:
Tel. (210) 823.5192 • Fax (210) 884.0210

Indonesia:
Tel. (21) 4584.2941 • Fax (21) 4584.2942

Japan:
Tel. (03) 3258.9565 • Fax (03) 3258.9567

Korea:
Tel. (02) 2278.5147 • Fax (02) 2264.1729

Malaysia:
Tel. (603) 5638.9940 • Fax (603) 5638.9829

Singapore:
Tel. 6296.7118 • Fax 6291.6906

South Africa:
Tel. (011) 615.6076 • Fax (011) 615.8582

Taiwan:
Tel. 886.2.2739.3014 • Fax 886.2.2739.2983

Thailand:
Tel. 66.2619.0708 • Fax 66.2619.0061

United Kingdom:
Tel. (01525) 850.855 • Fax (01525) 853.668

USA:
Tel. (401) 765.7500 • Fax (401) 765.7575

For e-mail contacts and complete list of Sales and Technical offices, please see ***www.hannainst.com***

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