HANNA® instruments
With Great Products, Come Great Results™

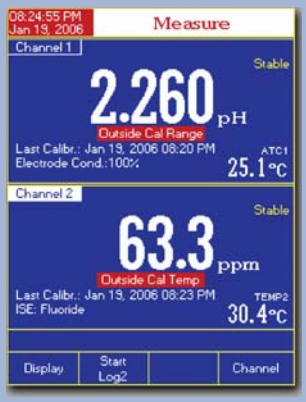
RESEARCH GRADE

pH • pH/ISE • EC • pH/EC • pH/ISE/EC • Dissolved Oxygen

BENCH METERS

pH Calibration Check™

Proper calibration of the pH meter and pH electrode system is critical in order to achieve reliable results. HANNA's exclusive Calibration Check™ system includes several features to help users reach that goal.



- Each time a pH calibration is performed, the instrument compares the new calibration with the previous one. When this comparison indicates a significant difference, the message alerts the user to either clean the electrode, check the buffer or both.
- When measurements are taken too far from the calibration points the instrument will warn the user with a message on the LCD.
- The condition of the pH electrode after calibration is shown on the display to track aging.
- To avoid taking readings with old calibrations, the instrument automatically reminds the user when the calibration has expired.

ISE Incremental Methods

Ion concentration determinations with ISEs can be made faster and easier using the streamlined Incremental Methods measurement mode found on the HI 4222 and HI 4522

Incremental methods involve adding a standard to a sample, or sample to a standard. A mV change occurs due to the addition. Historically the user would then use mathematical equations to determine the ion concentration of the sample but with the HI 4222 and HI 4522, the meter calculates the sample concentration automatically and then logs it into an ISE methods report. 200 reports can be saved for future recall. The entire process can be repeated on multiple samples without reentering sets of parameters.

Incremental Method techniques can reduce errors from variables such as temperature, viscosity, pH or ionic strength. The electrodes remain immersed throughout the process thus reducing measurement time as well as eliminating sample carry over and its associated errors.

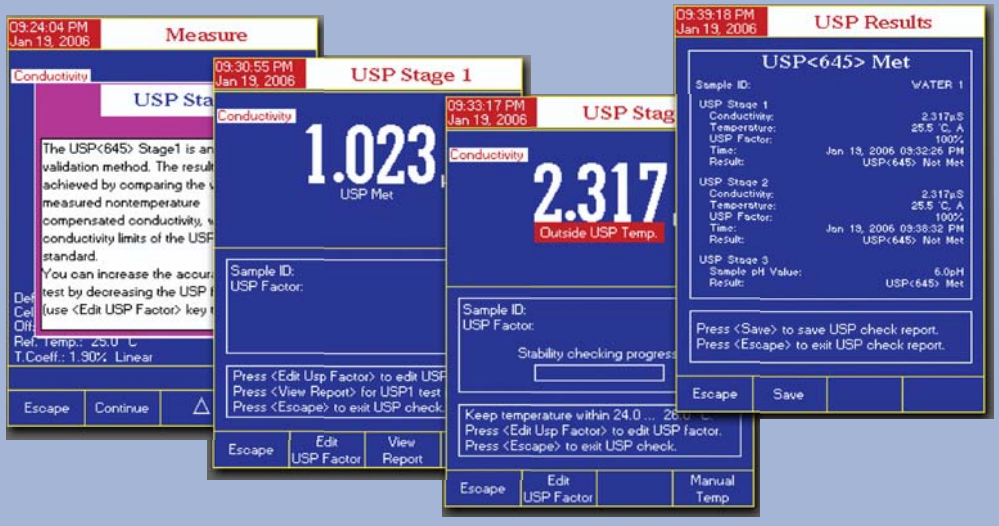
Known Addition, Known Subtraction, Analyte Addition, and Analyte Subtraction methods are standard method choices provided.

EC USP Mode

HANNA's HI 4521, HI 4522 and HI 4321 can be used to perform all 3 stages of United States Pharmacopeia testing requirements for water quality (USP <645>).

The instruments give clear instructions on how to perform each stage and automatically check that the temperature, conductivity and stability are within USP limits.

Comprehensive results are shown for all stages on a single screen at the end of the test. 200 reports can be saved for future recall.



Features

pH

- Exclusive HANNA CAL CHECK™
- Five point calibration with standard and custom buffers

ISE

- Direct calibration and measurement in multiple units
- Incremental methods:
  - Known addition
  - Known subtraction
  - Analyte addition
  - Analyte subtraction

EC

- EC, resistivity, TDS and salinity ranges
- Auto recognition of probe type (2 or 4 ring, and nominal cell constant)
- Extended range from 0.001 µS/cm to 1 S/cm
- Stages 1, 2 and 3 USP mode
- 3 salinity scales:
  - Practical salinity
  - Natural sea water
  - Percent
- Linear and natural water temperature compensation

Dissolved Oxygen

- Extended range up to 90 ppm and 600% saturation
- Barometric atmospheric pressure compensation
- Up to 100 logging lots, 200 OUR and SOUR reports and up to 200 BOD method entries

pH • pH/ISE • EC • pH/EC • pH/ISE/EC • Dissolved Oxygen

BENCH METERS

RESEARCH GRADE

HANNA's new family of research grade laboratory benchtop instruments feature a 240 x 320 dot-matrix color display with on-screen help, simultaneous graphing, language selection and custom configuration.

Six models are available to suit your application. Measure pH, ISE, conductivity, dissolved oxygen, resistivity, TDS, salinity and temperature. Just choose the model that fits your specific need.

HANNA's pH meters feature 5 point calibration with a choice of custom or memorized buffers and provide the user with the exclusive CAL CHECK™ electrode diagnostic system. ISE models allow direct calibration and measurement with a choice of units, as well as incremental methods.

Our new conductivity featured meters have EC, resistivity, TDS and salinity measuring scales. EC has an extended range from 0.001 µS/cm to 1 S/cm with auto recognition of the probe type used. Salinity measurements can be displayed in practical salinity, natural sea water or in percent scale. All conductivity models feature stages 1, 2 and 3 USP modes plus linear and natural water temperature compensation.

HI4421 features DO, BOD, OUR and SOUR* measurement modes in a compact versatile instrument.

All models are equipped with USB and RS 232 ports for PC connectivity and offer logging, graphing and GLP.

*BOD gives indication of the biodegradable organic material present in a sample of water. The dissolved oxygen concentration is measured before and after an incubation period of 5 days and the BOD is calculated in mg per liter from the difference.

OUR and SOUR are used to determine the oxygen consumption or respiration rate. OUR is measured in mg of oxygen consumed per liter per hour, and SOUR is measured in mg of oxygen consumed per gram of volatile suspended solids per hour.

HI 4522
pH/ISE and Conductivity (USP) Bench Meter

SPECIFICATIONS		HI 4522
pH	Range	-2.0 to 20.0; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
ISE	Range	1 x 10^{-7} to 9.99 x 10^{10} concentration
	Resolution	1; 0.1; 0.01 concentration
	Accuracy	±0.5% (monovalent ions); ±1%
Conductivity	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 999.9 mS/cm; 1000 mS/cm
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
Resistivity	Range	1.00 to 99.99 Ohm•cm; 100.0 to 999.9 Ohm•cm; 1.000 to 9.999 kOhm•cm; 10.00 to 99.99 kOhm•cm; 100.0 to 999.9 kOhm•cm; 1.00 to 9.99 MOhm•cm; 10.0 to 100.0 MOhm•cm
	Resolution	0.01 Ohm•cm; 0.1 Ohm•cm; 0.001 kOhm•cm; 0.01 kOhm•cm; 0.1 kOhm•cm; 0.01 MOhm•cm; 0.1 MOhm•cm
	Accuracy	±2% of reading (±1 Ohm•cm)
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
	Factor	0.40 to 1.00
Salinity	Range	Practical salinity: 0.00 to 42.00; Natural seawater: 0.00 to 80.00 ppt; Percent: 0.0 to 400.0%
	Resolution	0.01 for practical salinity/natural sea water; 0.1% for percent scale
	Accuracy	±1% of reading
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Calibration	pH	Automatic up to 5 points with 8 memorized values (pH 1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) + 5 custom buffers
	ISE	Automatic, up to 5 points with 6 standard + 5 custom values
	Conductivity	Auto standard recognition, custom calibration solution/4 point calibration
	Salinity	Percent scale—1 point (with HI 7037 buffer)
	Temperature	3 points
Relative mV Offset Range		±2000 mV
Input Channel(s)		1 pH/mV/ISE + 1 EC
Calibration Check		pH electrode and buffer condition
Temperature Compensation	pH	Automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
	EC	Linear and non-linear (natural water)
Log-on-demand / Auto Data Logging		10 Lots, 5000 samples per lot/10 Lots, 5000 samples per lot
Auto Endpoint		Yes
PC Connection		Opto-isolated USB and RS232
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
Power		12 Vdc adapter (included)
Dimensions/Weight		159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

HI 4521
pH and Conductivity (USP) Bench Meter

SPECIFICATIONS		HI 4521
pH	Range	-2.0 to 20.0; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
Conductivity	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 999.9 mS/cm; 1000 mS/cm
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
Resistivity	Range	1.00 to 99.99 Ohm•cm; 100.0 to 999.9 Ohm•cm; 1.000 to 9.999 kOhm•cm; 10.00 to 99.99 kOhm•cm; 100.0 to 999.9 kOhm•cm; 1.00 to 9.99 MOhm•cm; 10.0 to 100.0 MOhm•cm
	Resolution	0.01 Ohm•cm; 0.1 Ohm•cm; 0.001 kOhm•cm; 0.01 kOhm•cm; 0.1 kOhm•cm; 0.01 MOhm•cm; 0.1 MOhm•cm
	Accuracy	±2% of reading (±1 Ohm•cm)
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
	Factor	0.40 to 1.00
Salinity	Range	Practical salinity: 0.00 to 42.00; Natural seawater: 0.00 to 80.00 ppt; Percent: 0.0 to 400.0%
	Resolution	0.01 for practical salinity/natural sea water; 0.1% for percent scale
	Accuracy	±1% of reading
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Calibration	pH	Automatic up to 5 points with 8 memorized values (pH 1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) + 5 custom buffers
	Conductivity	Auto standard recognition, custom calibration solution/4 point calibration
	Salinity	Percent scale—1 point (with HI 7037 buffer)
	Temperature	3 points
Relative mV Offset Range		±2000 mV
Input Channel(s)		1 pH/mV + 1 EC
Calibration Check		pH electrode and buffer condition
Temperature Compensation	pH	Automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
	EC	Linear and non-linear (natural water)
Log-on-demand / Auto Data Logging		10 Lots, 5000 samples per lot / 10 Lots, 5000 samples per lot
Auto Endpoint		Yes
PC Connection		Opto-isolated USB and RS232
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
Power		12 Vdc adapter (included)
Dimensions/Weight		159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

HI 4222 rear

SPECIFICATIONS	
pH	Range
	Resolution
	Accuracy
mV	Range
	Resolution
	Accuracy
Temperature	Range
	Resolution
	Accuracy
Calibration	pH
	Temperature
Relative mV Offset Range	
Input Channel(s)	
Calibration Check™	
pH Temperature Compensation	
Log-on-demand / Auto Data Logging	
Auto Endpoint	
PC Connection	
Display	
Power	
Dimensions/Weight	

SPECIFICATIONS	
Conductivity	Range
	Resolution
	Accuracy
Resistivity	Range
	Resolution
	Accuracy
TDS	Range
	Resolution
	Accuracy
	Factor
Salinity	Range
	Resolution
	Accuracy
Temperature	Range
	Resolution
	Accuracy
Calibration	Conductivity
	Salinity
	Temperature
Input Channel(s)	
EC Temperature Compensation	
Log-on-demand/ Auto Data Logging	
Auto Endpoint	
PC Connection	
Display	
Power	
Dimensions/Weight	

ORDERING INFORMATION

HI 4522 (230V) and **HI 4522-01** (115V) are supplied with 4-ring EC probe, glass body pH electrode, temperature probe, power adapter, pH 4 and pH 7 buffer solutions, electrode refilling solution, electrode holder and instructions.

HI 4521 (230V) and **HI 4521-01** (115V) are supplied with 4-ring EC probe, glass body pH electrode, temperature probe, power adapter, pH 4 and pH 7 buffer solutions, electrode refilling solution, electrode holder and instructions.

HI 4321 (230V) and **HI 4321-01** (115V with 4-ring EC probe, electrode holder adapter and instructions.

HI 4221
-2.0 to 20.0; -2.00 to 20.00; -2.000 to 20.000 pH
0.1 pH; 0.01 pH; 0.001 pH
±0.1 pH; ±0.01 pH; ±0.002 pH
±2000 mV
0.1 mV
±0.2 mV
-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
0.1°C; 0.1°F; 0.1K
±0.2°C; ±0.4°F; ±0.2K
Automatic up to 5 points with 8 memorized values (pH 1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) + 5 custom buffers
3 points
±2000 mV
1 pH/mV
pH electrode and buffer condition
Automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
10 Lots, 5000 samples per lot / 10 Lots, 5000 samples per lot
Yes
Opto-isolated USB and RS232
240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
12 VDC adapter (included)
159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

HI 4221
pH Bench Meter

HI 4222
pH/ISE Bench Meter

SPECIFICATIONS		HI 4222
pH	Range	-2.0 to 20.0; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
ISE	Range	1 x 10^{-7} to 9.99 x 10^{10} concentration
	Resolution	1; 0.1; 0.01 concentration
	Accuracy	±0.5% (monovalent ions); ±1%
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Calibration	pH	Automatic up to 5 points with 8 memorized values (pH 1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) + 5 custom buffers
	ISE	Automatic, up to 5 points with 6 standard + 5 custom values
	Temperature	3 points
Relative mV Offset Range		±2000 mV
Input Channel(s)		2 pH/mV/ISE
Calibration Check™		pH electrode and buffer condition
pH Temperature Compensation		Automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
Log-on-demand / Auto Data Logging		10 Lots, 5000 samples per lot / 10 Lots, 5000 samples per lot
Auto Endpoint		Yes
PC Connection		Opto-isolated USB and RS232
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
Power		12 VDC adapter (included)
Dimensions/Weight		159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

HI 4321
0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 999.9 mS/cm; 1000 mS/cm
0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm
±1% of reading (±0.01 µS/cm)
1.00 to 99.99 Ohm•cm; 100.0 to 999.9 Ohm•cm; 1.000 to 9.999 kOhm•cm; 10.00 to 99.99 kOhm•cm; 100.0 to 999.9 kOhm•cm; 1.00 to 9.99 MOhm•cm; 10.0 to 100.0 MOhm•cm
0.01 Ohm•cm; 0.1 Ohm•cm; 0.001 kOhm•cm; 0.01 kOhm•cm; 0.1 kOhm•cm; 0.01 MOhm•cm; 0.1 MOhm•cm
±2% of reading (±1 Ohm•cm)
0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt
0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
±1% of reading (±0.01 ppm)
0.40 to 1.00
Practical salinity: 0.00 to 42.00; Natural seawater: 0.00 to 80.00 ppt; Percent: 0.0 to 400.0%
0.01 for practical salinity/natural sea water; 0.1% for percent scale
±1% of reading
-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
0.1°C; 0.1°F; 0.1K
±0.2°C; ±0.4°F; ±0.2K
Auto standard recognition, custom calibration solution/4 point calibration
Percent scale—1 point (with HI 7037 buffer)
3 points
1 EC
Linear and non-linear (natural water)
10 Lots, 5000 samples per lot/10 Lots, 5000 samples per lot
Yes
Opto-isolated USB and RS232
240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
12 Vdc adapter (included)
159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

HI 4321
Conductivity (USP) Bench Meter

HI 4421
Dissolved Oxygen Bench Meter

SPECIFICATIONS		HI 4421
Dissolved Oxygen	Range	0.00 to 90.00 ppm; 0.0 to 600.0 % saturation
	Resolution	0.01 ppm; 0.1% saturation
	Accuracy	±1.5% of reading ±1 digit
Barometric Pressure	Range	450 to 850 mmHg; 560 to 1133 mBar
	Resolution	0 to 45 ppt (g/L)
	Accuracy	± 3 mmHg within ±15°C from the calibration point
Measurement Modes		Direct D.O.; BOD (biochemical oxygen demand); OUR (oxygen uptake rate); SOUR (specific oxygen uptake rate).
Salinity	Range	0 to 45 ppt (g/L)
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C/K; ±0.4°F
	D.O.	0.0 to 50.0°C; 32.0 to 122.0°F; 237.1 to 323.1 K
Calibration	D.O.	Automatic/user standard, 1 or 2 points
Probe		Polarographic with built-in temperature sensor
Calibration Check		pH electrode and buffer condition
pH Temperature Compensation		Automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
Log-on-demand/Auto Data Logging		Up to 100 lots; 10000 samples/lot for automatic logging; 5000 samples/lot for manual logging; Logging Interval: 1 to 300000 sec
GLP		Last calibration data, calibration info
Alarm (DO, BOD, OUR, SOUR)		Yes (Inside/Outside limits)
Auto Endpoint		Yes
PC Connection		Opto-isolated USB and RS232
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
Power		12 VDC adapter (included)
Dimensions/Weight		159 x 230 x 93 mm (6.3 x 9.1 x 3.7")/800 g (1.8 lb.)

/) are supplied
, power

HI 4222 (230V) and **HI 4222-01** (115V)are supplied with glass body pH electrode, temperature probe, power adapter, pH 4 and pH 7 buffer solutions, electrode refilling solution, electrode holder and instructions.

HI 4221 (230V) and **HI 4221-01** (115V) are supplied with glass body pH electrode, temperature probe, power adapter, pH 4 and pH 7 buffer solutions, electrode refilling solution, electrode holder and instructions.

HI 4421 (230V) and **HI 4421-01** (115V) are supplied with power adapter, instruction manual, HI 76408 DO probe, HI 7040L zero oxygen solution (500mL), HI 7041S electrolyte solution (30mL), HI 76407A/P membrane caps (2pcs), HI 76404N electrode holder and quick reference card.

ISO 9001:2000 CERTIFIED

At HANNA we design and manufacture the most complete range of analytical products. We strive to work with you to develop a HANNA solution to address your specific instrumentation needs—on your budget.

Solid build quality, helpful customer service and competitive pricing place us ahead of the competition. Since 1978, more and more professionals all over the world choose and recommend HANNA for their laboratory testing needs.

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