

HI 2221 • HI 2223

Calibration Check™ pH Benchtop Meters

- On-screen electrode condition and response
- Log up to 500 samples (HI 2223)
- Up to 5 point calibration with 7 standard buffers
- On-screen calibration guides
- Automatic Temperature Compensation
- GLP (Good Laboratory Practice)
- Last calibration data
- USB



Calibration Check

A properly manufactured and maintained pH electrode will retain its measuring integrity for a long time. As a result of many factors such as age, poor maintenance or improper handling, any electrode in time will lose its integrity. HI 2221 and HI 2223 were designed to alert the user if the electrode integrity has been compromised.

The most common cause for pH measurement inaccuracies is an unclean or improperly cleaned electrode. This is very important to note, because during calibration, the instrument assumes that the electrode is clean and that the standardization curve created during the calibration process will remain a valid reference until the next calibration. pH meters on the market today will allow an offset of approximately ± 60 mV. The deviation from 0 mV is not unusual, in fact it represents the true characteristics of the pH electrode. A dramatic deviation from 0 mV becomes a problem if it is the result of calibrating a dirty electrode.

HANNA HI 2221 and HI 2223 compare the characteristics of the pH electrode from one calibration to the next. In the case of large variances in the electrode condition that can only be the result of a soiled sensor, these meters alert the user that the electrode needs to be properly cleaned prior to calibration and measuring.

Calibration Check™ For Solutions

HI 2221 and HI 2223 are able to detect if the calibration buffer solution is contaminated or if the temperature is outside the defined range.

Calibration Check™ For Electrodes

When a pH electrode is dirty, it has a slow response time and unstable reading. HI 2221 and HI 2223 warns the user in the event the electrode is dirty.



Enhanced Calibration Messages

The calibration history is used to issue error and warning messages during calibration to help ensure the highest accuracy.

Electrode aging is a slow process, if a substantial change is seen from a previous calibration, it is likely due to a temporary problem with the electrode or buffers. Calibrating under these conditions will give measurement errors.

Error messages such as to clean or check the electrodes and/or buffers appear if the calibration parameters are out of accepted windows. Calibrations cannot be completed until the errors are corrected.



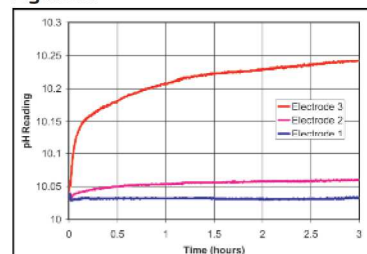
Enhanced Diagnostic Messages

When using an appropriate HANNA P Type BNC electrode with pin, HI 2221 and HI 2223 will assess electrode condition and response time during each calibration and display the status for the rest of the day.

The digital gauge for electrode condition is a representation of the offset and slope performance of the electrode. The response gauge is a function of the stabilization time between the first and second calibration buffers.

The condition and response are also visible when viewing GLP data.

Figure A



Electrode 1 was properly cleaned prior to calibration. Electrodes 2 and 3 were not.

Figure A (above) shows that the pH measured by a dirty electrode changes over a short period of time. This results from the residue on the pH electrode bulb dissolving into the solution and the electrode gradually returning close to its true characteristics. The resulting pH measurements, based upon the calibration of a dirty electrode, will then be incorrect.

SPECIFICATIONS		HI 2221	HI 2223
Range	pH	-2.00 to 16.00 pH	-2.00 to 16.00 pH; -2.000 to 16.000 pH
	mV	± 699.9 mV; ± 2000 mV	± 999.9 mV; ± 2000 mV
	Temperature	-20.0 to 120.0 °C	
Resolution	pH	0.01 pH	0.01 pH; 0.001 pH
	mV	0.1 mV (± 699.9 mV); 1 mV (± 2000 mV)	0.1 mV (± 999.9 mV); 1 mV (± 2000 mV)
	Temperature	0.1 °C	
Accuracy	pH	± 0.01 pH	± 0.01 pH; ± 0.002 pH
	mV	± 0.2 mV (± 699.9 mV); ± 1 mV (± 2000 mV)	± 0.2 mV (± 999.9 mV); ± 1 mV (± 2000 mV)
	Temperature	± 0.2 °C excluding probe error	
pH Calibration	automatic, up to 5 point calibration with 7 standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45)		
Temperature Compensation	manual or automatic from -20.0 to 120.0 °C (-4.0 to 248.0°F)		
pH Electrode	HI 1131P glass body pH electrode with BNC + pin connectors and 1 m (3.3') cable (included)		
Temperature Probe	HI 7662 stainless steel temperature probe and 1 m (3.3') cable (included)		
PC Connection	opto-isolated USB		
Data Logging	100 points	500 points	
Input Impedance	10 ¹² ohm		
Power Supply	12 VDC adapter (included)		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	235 x 222 x 109 mm (9.2 x 8.7 x 4.3")		
Weight	1.3 Kg (2.9 lb)		

ORDERING INFORMATION

HI 2221 and HI 2223 are supplied with HI 1131B pH electrode, HI 7662 temperature probe, HI 76404N electrode holder, HI 70004 pH 4.01 buffer solution sachet, HI 70007 pH 7.01 buffer solution sachet, I700661 cleaning solution sachet, HI 70715 electrolyte solution (30 mL), 12 VDC adapter and instructions.

ELECTRODES

Combination pH electrodes. All part codes ending with P are provided with BNC & Pin connectors, and 1 m (3.3') cable:

- HI 1043P** Use: strong acids and bases. glass-body, double junction, refillable
- HI 1053P** Use: emulsions. glass-body, triple ceramic junction, refillable
- HI 1083P** Use: biotechnology. glass-body, open junction, refillable
- HI 1131P** Use: general purpose. glass-body, ceramic junction, refillable
- HI 1332P** Use: general purpose. PEI body, double junction, refillable
- HI 7662** Temperature probe

SOLUTIONS

- HI 5004L** pH 4.01 buffer solution, 500 mL
- HI 5007L** pH 7.01 buffer solution, 500 mL
- HI 5010L** pH 10.01 buffer solution, 500 mL
- HI 7061L** Electrode cleaning solution, 500 mL
- HI 70300L** Electrode storage solution, 500 mL

ACCESSORIES

- HI 920010** RS232 cable for PC connection
- HI 92000** Windows® compatible software