



## Using I9121 Ammonia Gas Sensing Probe on 3200I/M

### Overview

This document demonstrates how to use I 9121 Ammonia Gas Sensing Probe on 3200I or 3200 M to measure pN or the concentration of  $[\text{NH}_4^+]$ .

### Applied to

3200I Ion Meter; 3200M Multi-Parameter Analyzer

### What are required

3200I or 3200M; I9121; ATC Probe; Stirrer; Electrode Holder; Sulphuric Acid;  $\text{NH}_4\text{Cl}$  (Analytical Grade); DI Water; Dust-free Paper

### Procedure

1. Prepare non-ammonia water and alkalizer.

	Formula	Usage
Non-ammonia water	<ul style="list-style-type: none"> <li>• Add 0.1ml sulphuric acid (<math>\rho=1.84\text{g/ml}</math>) into 1L deionized water.</li> <li>• Distill the water with a glass container. Give up the first 50ml distillate. Collect the rest distillate in the glass container sealed with the glass plug.</li> <li>• Add 10g strong acid ion exchange resin (hydrogen) into 1L distillate.</li> </ul>	Cleaning & Standard Preparation & Alkalizer Preparation
Alkalizer	<ul style="list-style-type: none"> <li>• Weigh 10g NaOH to a 1000ml flask.</li> <li>• Add non-ammonia water and dilute to 1000mL.</li> <li>• Transfer it to the polyethylene bottle and seal the bottle.</li> </ul>	Used to adjust the pH of standard solutions and sample solutions

2. Prepare standard solutions

	Formula
$1 \times 10^{-1}$ mol/L ammonia nitrogen standard solution	<ul style="list-style-type: none"> <li>• Dry solid <math>\text{NH}_4\text{Cl}</math> for 2h in the temperature of 100 -105 °C.</li> <li>• Weigh 5.349g <math>\text{NH}_4\text{Cl}</math>.</li> <li>• Dissolve it in non-ammonia water and dilute to 1000ml.</li> <li>• Store it in the plastic bottle.</li> </ul>
$1 \times 10^{-2}$ mol/L ammonia nitrogen standard solution	<ul style="list-style-type: none"> <li>• Take 100ml <math>1 \times 10^{-1}</math> mol/L ammonia nitrogen standard solution</li> <li>• Dilute to 1000ml.</li> </ul>



**[Agilent Technologies] [Electrochemistry Products]  
Quick Reference**

$1 \times 10^{-3}$ mol/L ammonia nitrogen standard solution	<ul style="list-style-type: none"><li>• Take 100ml <math>1 \times 10^{-2}</math> mol/L ammonia nitrogen standard solution</li><li>• Dilute to 1000ml.</li></ul>
$1 \times 10^{-4}$ mol/L ammonia nitrogen standard solution	<ul style="list-style-type: none"><li>• Take 100ml <math>1 \times 10^{-3}</math> mol/L ammonia nitrogen standard solution</li><li>• Dilute to 1000ml.</li></ul>
$1 \times 10^{-5}$ mol/L ammonia nitrogen standard solution	<ul style="list-style-type: none"><li>• Take 100ml <math>1 \times 10^{-4}</math> mol/L ammonia nitrogen standard solution</li><li>• Dilute to 1000ml.</li></ul>

3. Adjust mV Zero (Optional)

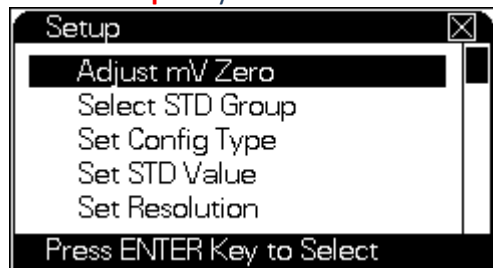
- 1) Connect the short circuit plug into pH/ISE port.



- 2) Turn on the meter.  
3) Press **<Measure>** key.  
4) Monitor the potential (mV) reading and it should be in the range from -0.5 mV to 0.5 mV (also called mV Zero).  
5) If yes, the meter is functioning properly.

If not, adjust mV Zero first.

Press **<Setup>** key.



Highlight "Adjust mV Zero" and press **<Enter>** key. Press **<Enter>** key to confirm.

4. Connect I9121 and ATC probe.



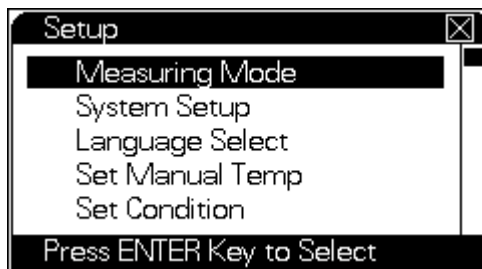
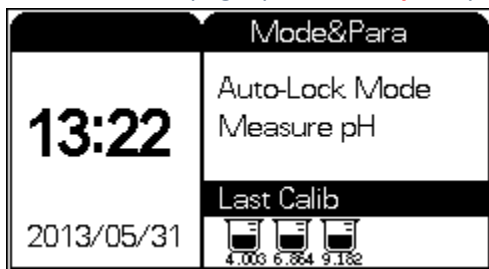
[Agilent Technologies] [Electrochemistry Products]  
Quick Reference



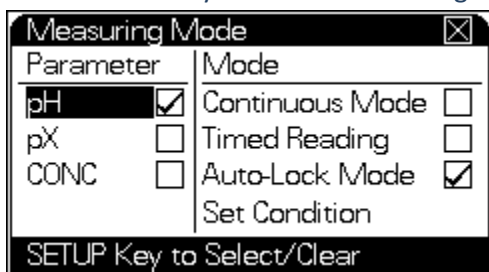
- 1) Fix I9121 and ATC probe to the Electrode Holder.
- 2) Route the cables as the picture shown.  
Connect the connector of I9121 to **pH/ISE** port.  
Connect the connector of ATC probe to **Temp.** port.
5. Clean I9121 and ATC probe using non – ammonia DI water by stirring. After cleaning dry them gently with dust-free paper.

6. Set parameters

- 1) From the Homepage, press **<Setup>** key



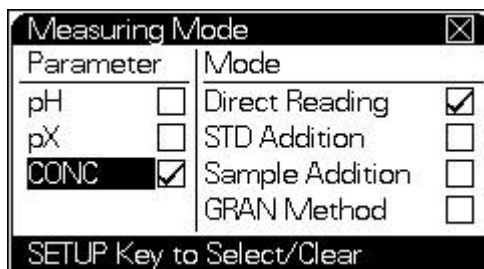
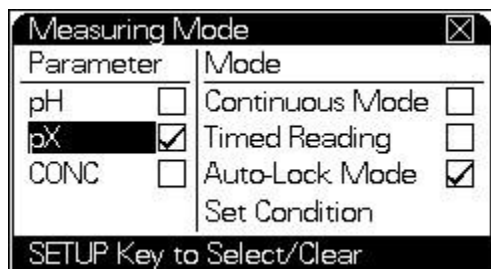
- 2) Press **<Enter>** key to select “Measuring Mode”



- 3) Use **the downward arrow** key to highlight “pX” or “CONC”. Press **<Setup>** key to select it.

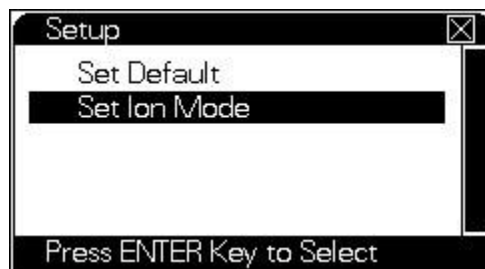
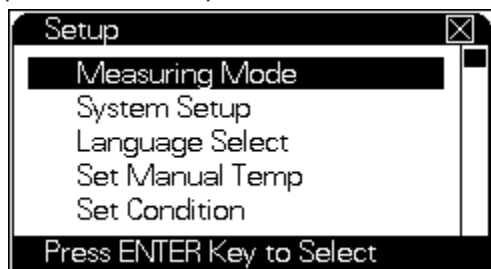


[Agilent Technologies] [Electrochemistry Products]  
Quick Reference

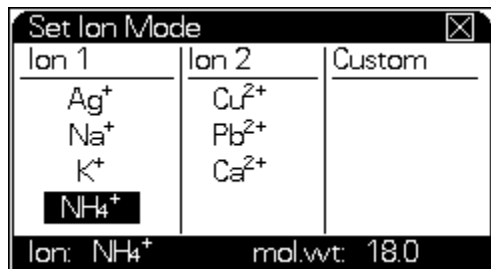


- 4) Use the **right arrow key** to switch from Parameter to Mode. Use **the downward arrow key** to highlight the appropriate mode and press **<Setup>** key to select it.  
 For Parameter – pX, Auto-Lock mode is as default.  
 For Parameter –CONC, Direct Reading is as default.  
 Change the mode if necessary.

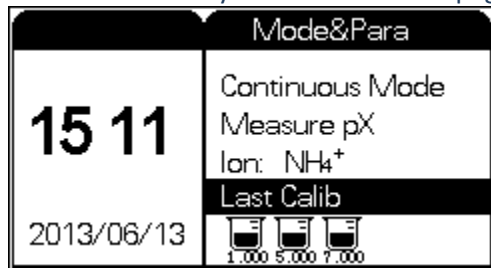
- 5) Press **<Enter>** key to return to previous page. Use **the downward arrow key** to highlight “Set Ion Mode” and press **<Enter>** key to select it.



- 6) Use **the downward arrow key** to highlight “NH<sub>4</sub><sup>+</sup>” and press **<Enter>** key to select it.



- 7) Press **<Cancel>** key to return to Homepage.

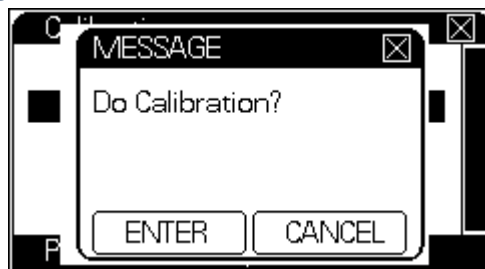
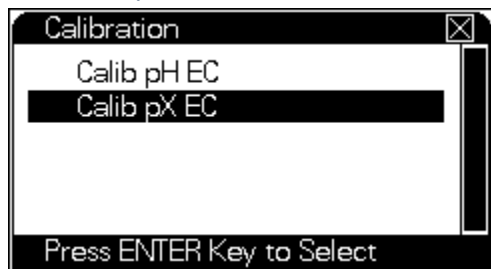


7. Calibration

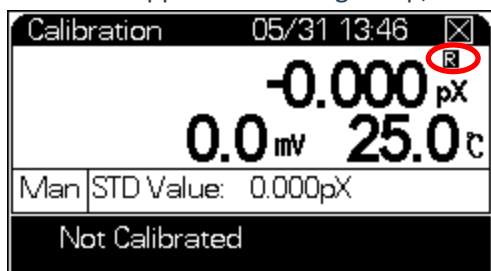


**[Agilent Technologies] [Electrochemistry Products]  
Quick Reference**

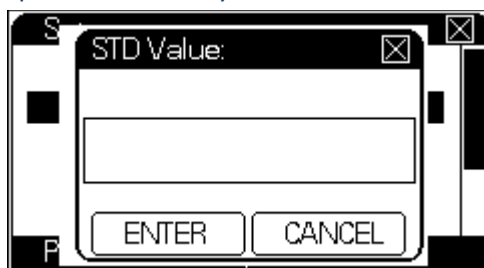
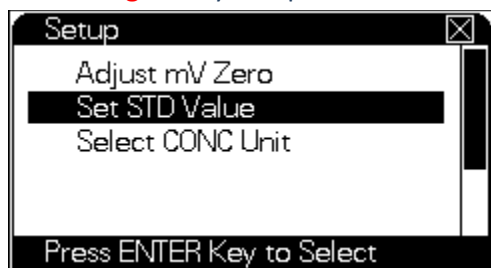
- 1) Place the first standard solution (eg. pN 4, from low concentration to high concentration) on the Stirrer. Immerse the measuring tips into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.
- 2) Add Alkalizer to this solution under stirring until the pH value is above 11 by using pH test paper.
- 3) Press **<Calibrate>** from the Homepage. Use **the downward arrow** key to highlight “Calib pX EC” and press **<Enter>** key to select it. Press **<Enter>** key again to confirm it.



- 4) When “R” appears on the right top, it indicates the reading is stable.



- 5) Press **<Setup>** key. Use **the downward arrow** key to highlight “Set STD Value” and press **<Enter>** key to select it. Use **the digital** key to input “STD Value” and press **<Enter>** key to confirm it.



- 6) Press **<Enter>** key. It will store the first point calibration result and press **<Enter>** key again to continue with the second point.



[Agilent Technologies] [Electrochemistry Products]  
Quick Reference



- 7) Take out I9121 and ATC probe from the first standard solution and clean them with fresh non – ammonia DI water. Dry them with dust-free paper.
- 8) Place the second standard solution (eg. pN 3, from low concentration to high concentration) on the Stirrer. Immerse the measuring tips into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.
- 9) Add Alkalizer to this solution under stirring until the pH value is above 11 by using pH test paper.
- 10) When “R” appears on the right top, it indicates the reading is stable.
- 11) Press **<Setup>** key. Use **the downward arrow** key to highlight “Set STD Value” and press **<Enter>** key to select it. Use **the digital** key to input “STD Value” and press **<Enter>** key to confirm it.
- 12) Press **<Enter>** key. It will store the second point calibration result and press **<Enter>** key again to continue with the third point or press **<Cancel>** key to terminate the calibration.
- 13) Repeat until all points have been calibrated.
- 14) Press **<Cancel>** key to terminate the calibration.



- 15) It will display calibration result automatically.



[Agilent Technologies] [Electrochemistry Products]  
Quick Reference

NO	Slope	E0	Y/N
STD1-2	100.00%	0.0mV	Y
STD2-3	100.00%	0.0mV	Y

It is an example for three-point calibration.

8. Measure unknown sample

- 1) Clean I9121 and ATC probe with fresh non – ammonia DI water by stirring. After cleaning dry them with dust-free paper.
- 2) Place the unknown sample on the Stirrer. Immerse the measuring tips into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.
- 3) Add Alkalizer to this solution under stirring until the pH value is above 11 by using pH test paper.
- 4) Press **<Measure>** key from the Homepage. Press **<Enter>** key again to confirm it.
- 5) When “R” appears on the right top, it indicates the reading is stable.

If the measuring parameter is “pX”

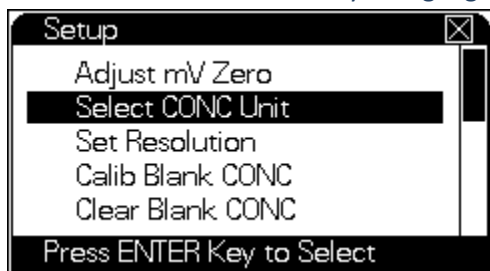
- 6) Press **<Save>** to save data.
- 7) If the display is frozen, press **<Measure>** key to unlock the display.
- 8) Press **<Cancel>** key to end measuring. Press **<Enter>** key to confirm it.

If the measuring parameter is “CONC”

- 5) Press **<Enter>** key to transfer “pX” data to “CONC” data. And the measurement ends.
- 6) Use **the right arrow key** to switch between different CONC units. (ppm, %, mg/L, ug/L, mol/L). Once the desired unit appears, just stop pressing the right arrow key.

Or you could define the CONC unit during measuring.

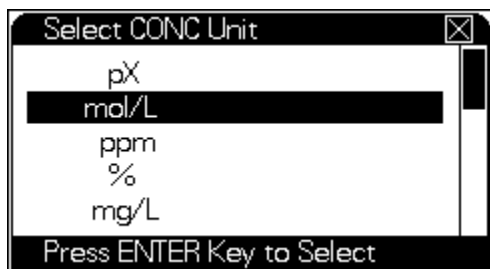
- Under measuring, press **<Setup>** key.
- Use **the downward arrow** key to highlight “Select CONC Unit” and press **<Enter>** key to select it.



- Use **the downward arrow** key to highlight your expected unit and press **<Enter>** key to select it.



[Agilent Technologies] [Electrochemistry Products] Quick Reference

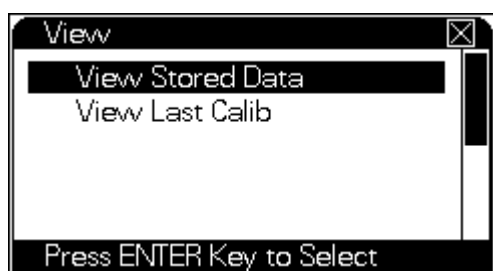


In this way, you don't need to use the right arrow key to switch among the different units. It will display the CONC data in this expected unit automatically.

- 7) Press **<Save>** to save CONC data.
- 8) Press **<Enter>** key to confirm it.
- 9) Press **<Measure>** key to start another measurement.

9. Review data through two ways,

- 1) Under measurement or calibration, press **<View>** key.



If the selected parameter is "pH"



If the selected parameter is "pX"



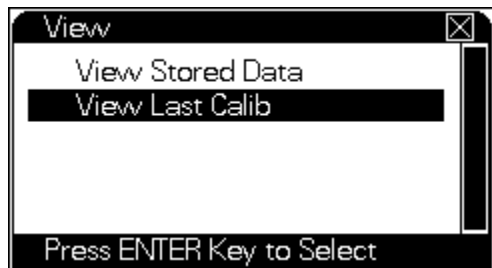
If the selected parameter is "CONC"



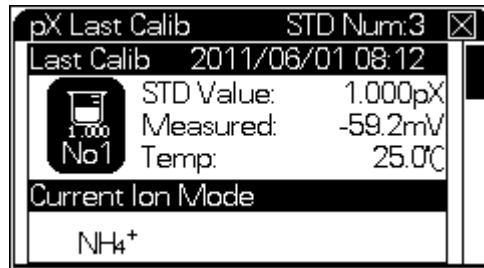




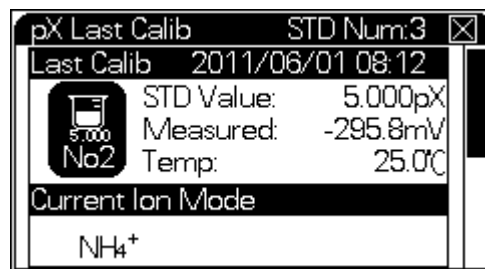
[Agilent Technologies] [Electrochemistry Products] Quick Reference



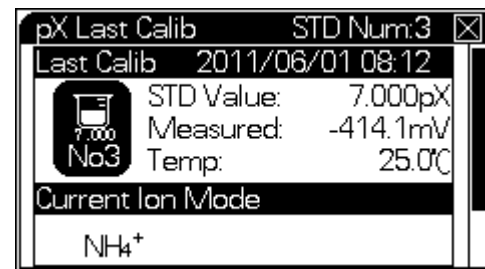
Press <Enter> key



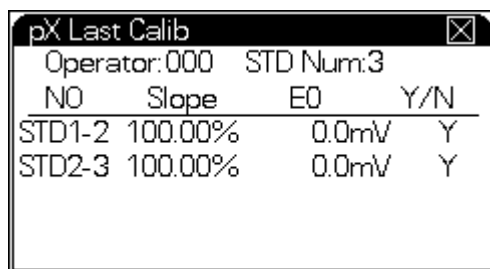
Press the downward arrow key



Press the downward arrow key



Press the downward arrow key



It's an example of three-point calibration.

2) From Homepage, press <View> key.

