O & M Manual

Model Q45P
Portable pH
Measurement System

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Set 2.5V #2

These functions set the output range for each of the two instrument outputs. The value stored for the 0V point may be higher or lower than the value stored for the 2.5V point.

The entry values are limited to values within 0.00 and 14.00 pH and must be separated by at least 1% of this range. Use the LEFT arrow key to select the first digit to be modified. Then use the UP and LEFT arrow keys to select the desired numerical value. Press ENTER to store the new value.

Output #1 will always be in units of pH, as it is fixed to track pH. Output #2 will be in either units of pH or C/F, depending on whether pH or temperature is set for Out#2 in the CONFIG menu.

4.12 Diagnostics Menu [DIAG]

The diagnostics menu contains all of the user settings that are specific to the system diagnostic functions, as well as functions that aid in troubleshooting application problems.

Set Hold

The Set Hold function locks the voltage output values on the present process value. This function can be used prior to calibration, or when removing the sensor from the process, to hold the output in a known state. Once HOLD is released, the outputs return to their normal state of following the process input.

The transfer out of HOLD is bumpless on the both analog outputs - that is, the transfer occurs in a smooth manner rather than as an abrupt change. An icon on the display indicates the HOLD state, and the HOLD state is retained even if power is cycled. Press ENTER to initiate user entry mode, and entire value will flash. Use the UP arrow key to modify the desired value, selections are **ON** for engaging the HOLD function, and **OFF** to disengage the function. Press ENTER to store the new value.

Fault List

The Fault List screen is a read-only screen that allows the user to display the cause of the highest priority failure.

The screen indicates the number of faults present in the system and a message detailing the highest priority fault present. Note that some faults can result in multiple

displayed failures due to the high number of internal tests occurring. As faults are corrected, they are immediately cleared.

Faults are not stored; therefore, they are immediately removed if power is cycled. If the problem causing the faults still exists, however, faults will be displayed again after power is re-applied and a period of time elapses during which the diagnostic system re-detects them. The exception to this rule is the calibration failure. When a calibration fails, no corrupt data is stored. Therefore, the system continues to function normally on the data that was present before the calibration was attempted.

After 30 minutes or if power to the transmitter is cycled, the failure for calibration will be cleared until calibration is attempted again. If the problem still exists, the calibration failure will re-occur. Press ENTER to initiate view of the highest priority failure. The display will automatically return to normal after a few seconds.

Sim Out

The Sim Out function allows the user to simulate the pH level of the instrument to check the output settings. The user enters a pH value directly onto the screen, and the output responds as if it were actually receiving the signal from the sensor.

This allows the user to check the function of attached monitoring equipment during set-up or troubleshooting. Escaping this screen returns the unit to normal operation. Press ENTER to initiate the user entry mode, and the right-most digit of the value will flash. Use arrow keys to modify desired value.

The starting display value will be the last read value of the input. The output will be under control of the SIM screen until the ESC key is pressed.

Note: If the HOLD function is engaged before the Sim Output function is engaged, the simulated output will remain the same even when the ESC key is pressed. Disengage the HOLD function to return to normal output.

Glass Diags This function allows the user to shut off the glass breakage/leak diagnostics. It does not affect the state of the remaining system diagnostics. This capability is provided to eliminate nuisance trips in electrically noisy applications, such as some plating operations.

Default All The Default All function allows the user to return the instrument back to factory default data for all user settings. It is intended to be used as a last resort troubleshooting procedure. All user settings are returned to the original factory values. Hidden factory calibration data remains unchanged. Press ENTER to initiate user entry mode and the value **NO** will flash. Use the UP arrow key to modify value to **YES** and press ENTER to reload defaults.

Part 5 – Calibration

5.1 Overview and Methods

Since the sensor slope (mV/pH output) will degrade over time, the instrument must be calibrated periodically to maintain a high degree of measurement accuracy. Frequency of calibration must be determined by the application. High temperature applications or applications involving extreme pH operating conditions may require more frequent calibration than those that operate at more neutral pH levels and ambient level temperatures. It is important for the user to establish a periodic cleaning and calibration schedule for sensor maintenance to maintain high system accuracy.

Before calibrating the instrument for the very first time after initial installation, it is important to select the proper operating parameters in the configuration menus for items like Sensor Type and Auto Buffers.

If Auto Buffers is not enabled, select buffers with values that are close to the normal operating pH of the process. For example, if the process is operating normally at 8 pH, buffer values of 9.18 pH and 7.00 pH are preferred over buffers of 4.00 pH and 7.00 pH. If possible, select one of the buffers to be near 7.00 pH.

NOTE: Buffers must be at least 2 pH units apart to ensure accurate calibration.

The system provides two methods of pH calibration: 2-point and 1-point. These two methods are significantly different. See Sections 5.13 and 5.14 for a brief description of their uses.

5.11 Sensor Slope

The sensor slope is a number (expressed as a percentage) which represents the current condition of the sensor electrodes. The slope display is updated after every calibration. When new, the sensor slope should be between 95% and 105%. A 100% slope represents an ideal sensor output of 59.16 mV/pH, from standardization (7.00 pH at 25°C). Over time, the glass electrodes in the sensor will age with use. This results in a reduction of the slope (mV/pH output) of the sensor. Thus a sensor slope of 85% is equivalent to an output of 50.29 mV/pH from standardization. The instrument will not allow calibrations on a sensor with a slope less than 80%. The slope information from the most recent calibration can be viewed at any time in the Measure Menu (see Section 4.7).

5.12 Sensor Offset

Sensor offset is a number that indicates sensor output (expressed in mV) in 7.00 pH buffer at 25 ºC. Ideally, the sensor will output 0 mV under these conditions. A sensor offset reading of +10 mV indicates that the sensor will output +10 mV when placed into a perfect 7.00 pH buffer at 25 ºC. In other words, sensor offset shifts the entire mV/pH curve up or down. Sensor offset is generally produced by a small voltage drop at the sensor reference junction. Large offsets are most typically the result of foulants on the reference junction, an aged reference junction, or a weak reference fill solution. The instrument does not allow calibrations on a sensor with an offset greater than +90 mV or less than –90 mV. Sensor offset information from the most recent calibration can be viewed at any time in the Measure Menu (See Section 4.7).

5.13 2-Point Calibration Explained

The 2-point calibration method involves the movement of the sensor through two known pH buffer values. Therefore, the sensor must be removed from the application to utilize this method. Two-point calibration adjusts both the slope and the offset of the sensor. It is the recommended method of calibration for highest accuracy. In addition, this calibration method utilizes an automatic buffer recognition and compensation method.

IMPORTANT: the 2-point calibration mode MUST be performed when a new sensor is first put into operation so that accurate calibration data is available for possible later 1-point calibrations.

5.14 1-Point Calibration Explained

The 1-point calibration method is generally known as the "grab sample" calibration method. In the 1-point calibration method, the sensor may be removed from the application and placed into one buffer. It may also be left in the measurement process and calibrated by reference. 1-point calibration adjusts only the sensor offset. Since the sensor slope degrades much slower than the sensor offset, this method may be used as a frequent calibration method between more involved 2-point calibrations. For example, a user may choose to perform on-line 1-point calibrations weekly and 2-point calibrations monthly.

5.2 Performing a 2-Point Calibration

The 2-point calibration method utilizes an automatic buffer recognition and compensation system. For this system to operate properly, the user must first configure the proper buffers in the Set Buffers screen (see Section 4.9). If the

buffers are not present in this menu, the user can override the automatic values and enter arbitrary values. However, the highest accuracy is provided when the user selects and uses buffers from this pre-defined table list. With the pre-defined buffers, the temperature variations in the buffer are automatically compensated for during the calibration process. If the buffer data is manually entered, the calibration buffer sample must be very temperature stable to achieve the same degree of accuracy.

Procedure

1. Remove sensor from application. Rinse and clean if necessary.

2. Allow sensor to temperature equilibrate with the buffer as best as possible. With the sensor coming from an application solution that differs greatly in temperature from the buffer, the user may have to wait as much as 20 minutes for this to occur.

3. Scroll to the CAL menu section using the MENU key and press ENTER or the UP arrow key. **Cal pH** will then be displayed.

4. Press the ENTER key. The screen will display a flashing 1 for 1-point or a 2 for 2-point calibration. Using the UP arrow key, set for a 2-point calibration and press ENTER.

5. The display will prompt the user to place the sensor in the first buffer and press ENTER. If the sensor has been placed into this buffer already, once the temperature has stabilized, press ENTER to continue.
6. The present pH value will be displayed and the secondary line of the display will flash **Wait** for approximately 10-15 seconds. At this time the system is attempting to recognize the first buffer value from the two values entered into the Set Buffers selection.
7. The screen will display the buffer value to be used for calibration. If the user chooses to change this value, the arrow keys can be used to modify the value. Any value between 0.00 and 14.00 pH can be entered. After adjusting this value, or to accept the automatic value, press ENTER.
8. The system now begins acquiring data for the calibration value of this buffer point. As data is gathered, the units for pH and temperature may begin to flash. Flashing units indicates that this parameter is unstable. The data point

acquisition will stop only when the data remains stable for a pre-determined amount of time. This can be overridden by pressing ENTER. If the data remains unstable for 10 minutes, the calibration will fail and the message **Cal Unstable** will be displayed.

9. Once the first calibration value has been established, the screen will prompt the user to move the sensor to the second buffer. At this point, rinse sensor with water and move the sensor into the second buffer solution. Allow temperature to stabilize, and then press ENTER.

10. The present pH value will be displayed and the secondary line of the display will flash **Wait** for approximately 10-15 seconds. At this time the system is attempting to recognize the second buffer value from the two values entered into the Set Buffers selection.

11. The screen will display the buffer value to be used for calibration. If the user chooses to change this value, the arrow keys can be used to modify the value. Any value between 0.00 and 14.00 pH can be entered. The second buffer must be at least 2 pH units away from the first. After adjusting this value, or to accept the automatic value, press ENTER.

12. The system now begins acquiring data for the calibration value of this buffer point. As data is gathered, the units for pH and/or temperature may again flash, indicating unstable parameters.

13. If accepted, the screen will display the message **PASS** with the new slope and offset readings, then it will return to the main measurement display. If the calibration fails, a message indicating the cause of the failure will be displayed and the FAIL icon will be turned on.

The sensor offset value in % from the last span calibration is displayed on the lower line of the Default Menus for information purposes.

5.3 Performing a 1-Point Calibration

The 1-point, or sample calibration method does not utilize the automatic buffer recognition and compensation system. This calibration method is intended to be primarily used as an on-line calibration method, in which the actual calibration point will not be a buffer value. However, the sensor can be removed and calibrated in a separate buffer. During calibration, the system will display the current pH reading and the user can manually enter a reference value from a lab grab-sample or a comparative reference instrument.

Procedure

1. Determine whether the calibration will be done on-line or with the sensor removed and placed into a buffer. If the sensor is removed from the application, rinse and clean if necessary.

2. If the sensor has been removed and placed into a buffer, allow sensor to temperature equilibrate with the buffer as much as possible. With the sensor coming from an application which differs greatly in temperature difference, the user may have to wait as much as 20 minutes. If the sensor is on-line, the user may want to set the output HOLD feature prior to calibration to lock out any output fluctuations.

3. Scroll to the CAL menu section using the MENU key and press ENTER or the UP arrow key. **Cal pH** will then be displayed.

4. Press the ENTER key. The screen will display a flashing 1 for 1-point or a 2 for 2-point calibration. Using the UP arrow key, set for a 1-point calibration and press ENTER.

5. The system now begins acquiring data for the calibration value. As data is gathered, the units for pH and temperature may flash. Flashing units indicate that this parameter is unstable. The calibration data point acquisition will stop only when the data remains stable for a pre-determined amount of time. This can be overridden by pressing ENTER. If the data remains unstable for 10 minutes, the calibration will fail and the message **Cal Unstable** will be displayed.

6. The screen will display the last measured pH value [or the auto buffer value, if activated] and a message will be displayed prompting the user for the lab value. The user must then modify the screen value with the arrow keys and press ENTER. The system then performs the proper checks.

7. If accepted, the screen will display the message **PASS** with the new offset reading, and then it will return to the main measurement display. If the calibration fails, a message indicating the cause of the failure will be displayed and the FAIL icon will be turned on.

5.4 Temperature Calibration

The temperature input is factory calibrated for the highest accuracy. Temperature calibration is not recommended; however, it is provided for applications in which very long cable lengths are needed. For example, at 50 feet, readings may be off ±0.2 °C.

The temperature calibration sequence is essentially a 1-point offset calibration that allows adjustments of approximately ±5 °C.

The sensor temperature may be calibrated on line, or the sensor can be removed from the process and placed into a known solution temperature reference. In any case, it is critical that the sensor be allowed to reach temperature equilibrium with the solution in order to provide the highest accuracy. When moving the sensor between widely different temperature conditions, it may be necessary to allow the sensor to stabilize as much as one hour before the calibration sequence is initiated. If the sensor is on-line, the user may want to set the output HOLD (see section 4.11) feature prior to calibration to lock out any output fluctuations.

Procedure

1. Scroll to the CAL menu section using the MENU key and press ENTER or the UP arrow key.

2. Press the UP arrow key until **Cal Temp** is displayed.

3. Press the ENTER key. The message **Place sensor in solution then press ENTER** will be displayed. Move the sensor into the calibration reference (if it hasn't been moved already) and wait for temperature equilibrium to be achieved. Press ENTER to begin the calibration sequence.

4. The message **Adjust temp value then press ENTER** will be displayed, and the right-most digit will begin to flash, indicating that the value can be modified. Using the UP and LEFT arrow keys, modify the value to the known ref solution temperature. Adjustments up to ± 5 °C from the factory calibrated temperature are allowed. Press ENTER.

5. The calibration data gathering process will begin. The message **Wait** will flash as data is accumulated and analyzed. The **°C** or **°F** symbol may flash periodically if the reading is too unstable.

6. Once completed, the display will indicate **PASS** or **FAIL**. If the unit fails, the temperature adjustment may be out of range, the sensor may not have achieved complete temperature equilibrium, or there may be a problem with the temperature element. In the event of calibration failure, it is recommended to attempt the calibration again immediately.

Part 6 – System Maintenance

6.1 System Checks

1. If the FAIL icon is flashing on the display, check the Fault List to determine the cause of the failure. To access the Fault List, press the MENU/ESC key until the DIAG menu appears. Then press the UP arrow key until the Fault List appears. Press the ENTER key to access the Fault List, and the highest priority fault message will be displayed. For a list of all messages and possible causes/solutions, refer to Section 6.3.

2. Perform a two-point calibration with two fresh buffers prior to sensor installation.

3. Check sensor cable color to terminal strip markings.

4. For highly unstable behavior, remove sensor from the process and measure the process solution in a plastic beaker. If the reading now stabilizes, place wire in beaker solution and actual process solution to determine if a ground loop exists.

5. Verify that the black rubber shipping boot has been removed from the end of the sensor prior to submersion. If the sensor has been left to dry out, allow sensor to be submerged in buffer or water to re-hydrate for at least 4 hours. The saltbridge may need replacement if the sensor has dried out for too long.

6.2 Instrument Checks

1. Remove sensor completely and connect 1100 Ohms from the yellow to black sensor input leads. Make sure the unit is configured for a Pt1000 thermal element and that the temperature is not in manual locked mode. Also, connect a wire jumper from the red cable lead input to the green cable lead input. The temperature reading should be approximately 25°C, the pH reading should be approximately 7.00 pH, and the sensor mV reading should be between -20 and +20 mV.

2. With a DMM, measure the DC voltage from the white sensor lead connection to the black sensor lead connection. With the positive DMM lead on the white wire, the meter should read between -4.5 and -5.5 VDC.

(NOTE: See sensor manual for specific sensor tests to be performed.)

6.3 Display Messages

The Q45 Series instruments provide a number of diagnostic messages that indicate problems during normal operation and calibration. These messages appear as prompts on the secondary line of the display or as items on the Fault List (see Section 4.11).

The following messages will appear as prompts:

MESSAGE	DESCRIPTION	POSSIBLE CORRECTION
Max is 200	Entry failed, maximum value allowed is 200.	Reduce value to **≤** 200
Min is 200	Entry failed, minimum value allowed is 200.	Increase value to **≥** 200
Cal Unstable	Calibration problem, data too unstable to calibrate.	Clean sensor, get fresh cal solutions, allow temperature and pH readings to fully stabilize, do not handle sensor or cable during calibration.
Slope HIGH	Sensor slope from calibration is greater than 110%.	Get fresh cal solutions, allow temperature and pH readings to fully stabilize, check for correct buffer values
Slope LOW	Sensor slope from calibration is less than 80%.	Clean sensor, get fresh cal solutions, allow temperature and pH readings to fully stabilize, check for correct buffer values.
Out of Range	Input value is outside selected range of the specific list item being configured.	Check manual for limits of the function to be configured.
Locked!	Transmitter security setting is locked.	Enter security code to allow modifications to settings.
Unlocked!	Transmitter security has just been unlocked.	Displayed just after security code has been entered.
TC-F25 lock!	The TC selection is in F25 mode, locked at 25 ºC	Calibration and TC adjustment cannot be performed while the TC is in F25 mode. To allow access to TC calibrations, change TC mode from F25 (fixed 25) to SENS (sensor).

The following messages will appear as items on the Fault List:

MESSAGE	DESCRIPTION	POSSIBLE CORRECTION
Sensor High	The raw signal from the sensor is too high.	Check wiring connections to sensor.
Sensor Low	The raw signal from the sensor is too low.	Check wiring connections to sensor.
pH too High	The pH reading is > 14.00 pH.	The pH reading is over operating limits.
pH too Low	The pH reading is < 0.00 pH.	The pH reading is under operating limits.
Temp High	The temperature reading is > 110 ºC.	The temperature reading is over operating limits. Check wiring and expected temp level. Perform RTD test as described in sensor manual. Recalibrate sensor temperature element if necessary.
Temp Low	The temperature reading is < -10 ºC	The temperature reading is under operating limits. Check wiring and expected temp level. Perform RTD test as described in sensor manual. Recalibrate sensor temperature element if necessary.
TC Error	TC may be open or shorted.	Check sensor wiring and perform RTD test as described in sensor manual.
Meas Break	Leakage detected on measuring electrode of sensor.	Measuring electrode glass may be cracked or broken. Electrical noise may falsely trip this diagnostic. Turn off glass diagnostic feature and see if sensor operates correctly. If it does not, sensor must be replaced.
Ref Break	Leakage detected on reference electrode of sensor.	Reference glass electrode may be cracked or broken. Electrical noise may falsely trip this diagnostic. Turn off glass diagnostic feature and see if sensor operates correctly. If it does not, sensor must be replaced.

MESSAGE	DESCRIPTION	POSSIBLE CORRECTION
pH Cal Fail	Failure of pH calibration.	Clean sensor, get fresh cal solutions, regenerate sensor (if necessary) and redo calibration. If still failure, sensor slope may be less than 80% or offset may be out of range. Perform sensor tests as described in sensor manual. Replace sensor if still failure.
TC Cal Fail	Failure of temperature calibration.	Clean sensor, check cal solution temperature and repeat sensor temp calibration. TC calibration function only allows adjustments of +/- 6 ºC. If still failure, perform sensor tests as described in sensor manual. Replace sensor if still failure.
Eeprom Fail	Internal nonvolatile memory failure	System failure, consult factory.
Chcksum Fail	Internal software storage error.	System failure, consult factory.
Display Fail	Internal display driver fail.	System failure, consult factory.
mV Cal Fail	Failure of factory temperature calibration.	Consult factory.

Part 7 – Maintenance and Troubleshooting

7.1 Cleaning the Sensor

Keep the sensor as clean as possible for optimum measurement accuracy - this includes both the saltbridge and the measuring electrode glass. Frequency of cleaning depends upon the process solution.

Carefully wipe the measuring end of the sensor with a clean soft cloth. Then rinse with clean, warm water - use distilled or de-ionized water if possible. This should remove most contaminate buildup.

Prepare a mild solution of soap and warm water. Use a non-abrasive detergent (such as dishwashing liquid).

NOTE: DO NOT use a soap containing any oils (such as lanolin). Oils can coat the glass electrode and harm sensor performance.

Soak the sensor for several minutes in the soap solution.

Use a small, extra-soft bristle brush (such as a mushroom brush) to thoroughly clean the electrode and saltbridge surfaces. If surface deposits are not completely removed after performing this step, use a dilute acid to dissolve the deposits. After soaking, rinse the sensor thoroughly with clean, warm water. Placing the sensor in pH 7 buffer for about 10 minutes will help to neutralize any remaining acid.

NOTE: DO NOT soak the sensor in dilute acid solution for more than 5 minutes. This will help to prevent the acid from being absorbed into the saltbridge.

WARNING: ACIDS ARE HAZARDOUS. Always wear eye and skin protection when handling. Follow all Material Safety Data Sheet recommendations. A hazardous chemical reaction can be created when certain acids come in contact with process chemicals. Make this determination before cleaning with any acid, regardless of concentration.

7.2 Replacing the Saltbridge and Reference Buffer Solution

1. Hold the sensor with the process electrode pointing up. Place a cloth or towel around the saltbridge. Turn the saltbridge counterclockwise (by hand) to loosen and remove the saltbridge. Do NOT use pliers.

2. Pour out the old reference buffer by inverting the sensor (process electrode pointing down). If the reference buffer does not run out, gently shake or tap the sensor.

3. Rinse the reference chamber of the sensor with de-ionized water. Fill the reference chamber of the sensor with fresh Reference Cell Buffer. The chamber holds 6 to 7 mL of solution. MAKE SURE that 6 to7 mL is used when refilling. The chamber should be FULL.

4. Inspect the new saltbridge to verify that there are 2 o-rings inside the threaded section of the saltbridge

5. Place the new saltbridge over the ground assembly of the sensor. Place a cloth or towel around the saltbridge and hand-tighten the saltbridge by turning it clockwise.

NOTE: Every ATI Q25P Sensor includes a spare bottle of Reference Buffer Solution, 7.0 pH. This is NOT typical pH 7 buffer, it is a special "high-capacity" buffer developed to ensure the highest possible stability of the reference portion of the pH measurement. No substitutions should be made.

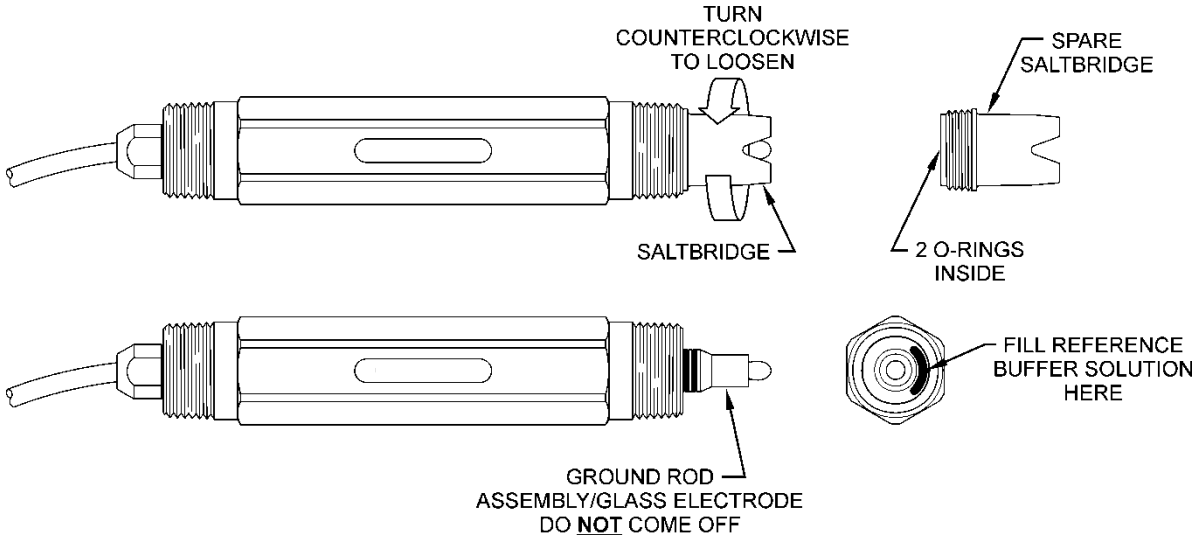

Figure 10 - Replacing the Saltbridge and Reference Buffer

7.3 Troubleshooting

The first step in resolving any measurement problem is to determine whether the trouble lies in the sensor or the transmitter. Since measurement problems can often be traced to dirty sensor electrode glass and/or saltbridge, cleaning the sensor using the method outlined in Section 3.1 should always be the first step in any troubleshooting.

If the sensor cannot be calibrated after cleaning, replace the saltbridge and reference cell buffer 7 pH as outlined in Section 3.2.

If the sensor still cannot be calibrated, perform the following test. A multimeter, 7 pH buffer and another buffer at least 2 pH units away will be needed.

1. With transmitter power on and sensor connected, place the multimeter's positive (+) lead on the white position of the transmitter terminal strip and the negative (-) lead on the black position. The multimeter should read between –4.2 and –6.5 VDC.

2. Disconnect the sensor's red, green, yellow, and white wires from the transmitter or junction box. Re-check Step 1.

3. Place the sensor in pH 7 buffer. As in calibration, allow the temperatures of the sensor and buffer to equilibrate at room temperature (approximately 25 ºC).

4. Verify that the sensor's temperature element (Pt1000 RTD) is functioning properly by measuring the resistance between the sensor's yellow and black wires. The nominal resistance value at 25 ºC is 1097 ohms. Use the following table as a guide to the approximate resistance value:

ºC	RTD Ω
20	1078
25	1097
30	1117
35	1136

5. Reconnect the yellow and white wires.

6. Connect the multimeter's positive (+) lead to the red wire and its negative (-) lead to the green wire. With the sensor in the pH 7 buffer at approximately 20-30 ºC, measure the DC millivolts. The sensor offset reading should be between –50 and +50 mV. If it is not, replace sensor reference solution and saltbridge (See Section 3.2) and re-test.

7. With the multimeter connected as in Step 5, rinse the sensor with clean water and place it in the second buffer. Allow the temperatures to equilibrate as before. Now measure the sensor span reading. Use the following table to determine approximate mV:

pH	mV
2.00	+296
4.00	+178
7.00	0
9.18	-129
10.00	-178

NOTE: The mV values listed above are for ideal conditions (sensor offset = 0 mV) and therefore represent midpoints in a range. The table shows the difference in mV which should be seen when going from one pH value to another. For example, at 7.00 pH, the mV reading will be from –50 to +50 mV (at room temperature) if the sensor is working properly. If the reading is exactly +20 mV, then going to 4.00 pH buffer should produce a reading of +198 mV, or a difference of +178 mV.

Spare Parts

Part No.	**Description**
07-0004	Q45P pH transmitter, 9 VDC, Dual 0-2.5 VDC outputs
07-0062	pH Sensor with 30’ cable
05-0060	Saltbridge
05-0057	Regeneration Kit (saltbridge & fill solution)

Lock/Unlock Code: 1451

PRODUCT WARRANTY

Analytical Technology, Inc. (Manufacturer) warrants to the Customer that if any part(s) of the Manufacturer's products proves to be defective in materials or workmanship within the earlier of 18 months of the date of shipment or 12 months of the date of start-up, such defective parts will be repaired or replaced free of charge. Inspection and repairs to products thought to be defective within the warranty period will be completed at the Manufacturer's facilities in Collegeville, PA. Products on which warranty repairs are required shall be shipped freight prepaid to the Manufacturer. The product(s) will be returned freight prepaid and allowed if it is determined by the manufacturer that the part(s) failed due to defective materials or workmanship.

This warranty does not cover consumable items, batteries, or wear items subject to periodic replacement including lamps and fuses.

Gas sensors, except oxygen sensors, are covered by this warranty, but are subject to inspection for evidence of extended exposure to excessive gas concentrations. Should inspection indicate that sensors have been expended rather than failed prematurely, the warranty shall not apply.

The Manufacturer assumes no liability for consequential damages of any kind, and the buyer by acceptance of this equipment will assume all liability for the consequences of its use or misuse by the Customer, his employees, or others. A defect within the meaning of this warranty is any part of any piece of a Manufacturer's product which shall, when such part is capable of being renewed, repaired, or replaced, operate to condemn such piece of equipment.

This warranty is in lieu of all other warranties (including without limiting the generality of the foregoing warranties of merchantability and fitness for a particular purpose), guarantees, obligations or liabilities expressed or implied by the Manufacturer or its representatives and by statute or rule of law.

This warranty is void if the Manufacturer's product(s) has been subject to misuse or abuse or has not been operated or stored in accordance with instructions, or if the serial number has been removed.

Analytical Technology, Inc. makes no other warranty expressed or implied except as stated above.

WATER QUALITY MONITORS

Dissolved Oxygen
Free Chlorine
Combined Chlorine
Total Chlorine
Residual Chlorine Dioxide
Potassium Permanganate
Dissolved Ozone
pH/ORP
Conductivity
Hydrogen Peroxide
Peracetic Acid
Dissolved Sulfide
Residual Sulfite
Fluoride
Dissolved Ammonia
Turbidity
Suspended Solids
Sludge Blanket Level
MetriNet Distribution Monitor

GAS DETECTION PRODUCTS

NH_3	Ammonia
CO	Carbon Monoxide
H_2	Hydrogen
NO	Nitric Oxide
O_2	Oxygen
CO	Cl2 Phosgene
Br_2	Bromine
Cl_2	Chlorine
ClO_2	Chlorine Dioxide
F_2	Fluorine
I_2	Iodine
H_X	Acid Gases
C_2H_4O	Ethylene Oxide
C_2H_6O	Alcohol
O_3	Ozone
CH_4	Methane (Combustible Gas)
H_2O_2	Hydrogen Peroxide
HCl	Hydrogen Chloride
HCN	Hydrogen Cyanide
HF	Hydrogen Fluoride
H_2S	Hydrogen Sulfide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
SO_2	Sulfur Dioxide
H_2Se	Hydrogen Selenide
B_2H_6	Diborane
GeH_4	Germane
AsH_3	Arsine
PH_3	Phosphine
SiH_4	Silane
HCHO	Formaldehyde
$C_2H_4O_3$	Peracetic Acid
DMA	Dimethylamine