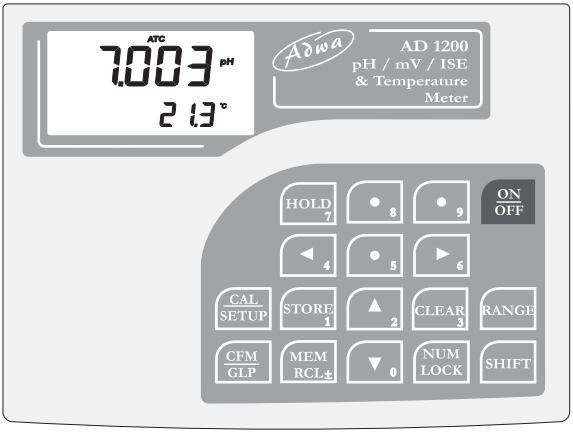
USER MANUAL

AD1030, AD1040, AD1200
pH /mV/ISE/Temperature
Bench Meters



www.adwainstruments.com

Dear Customer,

Thank you for choosing an Adwa product.

Please read carefully this manual before starting operations.

This instrument is in compliance with the EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC for electrical equipments.

For additional technical information, please e-mail us at **sales@adwainstruments.com**.

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INTRODUCTION

AD1030, **AD1040** and **AD1200** are professional bench meters for pH, ORP (Oxidation Reduction Potential), ISE (**AD1200** only) and temperature measurements. Relative mV readings are also provided. Main features include:

- Up to three-point calibration with seven memorized buffers (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and two custom buffers
- Calibration time-out alarm
- pH calibration using buffers with 0.001 resolution
- pH readings with manual or automatic temperature compensation
- Up to 50 samples for log-on-demand (not for **AD1030**)
- Two selectable alarm limits
- Large easy-to-read LCD showing the pH, ISE (**AD1200** only) or mV and temperature simultaneously, together with graphic symbols
- HOLD feature to freeze the stable reading on the LCD
- GLP feature (not for **AD1030**) to view last calibration data for pH, ISE and relative mV ranges

Each model is supplied complete with:

- **AD1131B** refillable pH electrode with glass body, BNC connector and 1 m cable
- **AD7662** stainless steel temperature probe with 1 m cable
- pH 4.01 and pH 7.01 calibration buffers (20 ml sachet each)
- Electrode holder
- 12 Vdc power adapter
- User manual

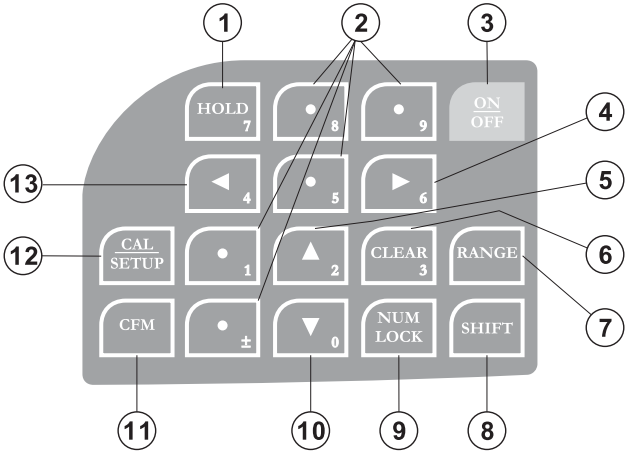
TECHNICAL DATA

Range	-2.00 to 16.00 pH / -2.000 to 16.000 pH ±2000 mV 0.001 to 19999 ppm (**AD1200** only) - 20.0 to 120.0°C (- 4.0 to 248.0°F)
Resolution	0.01 pH / 0.001 pH 0.1 mV (±999.9) / 1 mV (outside) 0.001 ppm (0.001 to 9.999) 0.01 ppm (10.00 to 99.99) 0.1 ppm (100.0 to 999.9) 1 ppm (1000 to 19999) (**AD1200** only) 0.1°C (0.1°F)
Accuracy **(@25°C/77°F)**	±0.01 pH / ±0.002 pH ±0.2 mV up to ±699.9 mV ±0.5 mV up to ±999.9 mV ± 2 mV outside ± 0.5% f.s. for ISE (**AD1200** only) ±0.4°C (±0.7°F) (excluding probe error)
Relative mV Offset	± 2000 mV
Analog Output	± 2000 mV

pH Calibration	Up to 3 point calibration, with 2 custom and 7 standard buffers (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45)
ISE Calibration **(AD1200 only)**	Up to two-point calibration, 5 standard solutions available (0.1,1,10,100,1000 ppm)
Temperature Compensation	Manual or automatic, -20.0 to120.0°C (-4.0 to 248.0°F)
pH Electrode	**AD1131B**
Temperature Probe	**AD7662**
Input Impedance	10^{12} Ohm
Log-on-demand	Up to 50 samples **(AD1040 & AD1200)**
Environment	0 to 50°C (32 to 122°F) RH max. 95% non-condensing
Power Supply	12 Vdc adapter
Dimensions	230 x 180 x 50 mm
Weight	1.8 kg

FRONT AND REAR PANELS

Keyboard for AD1030

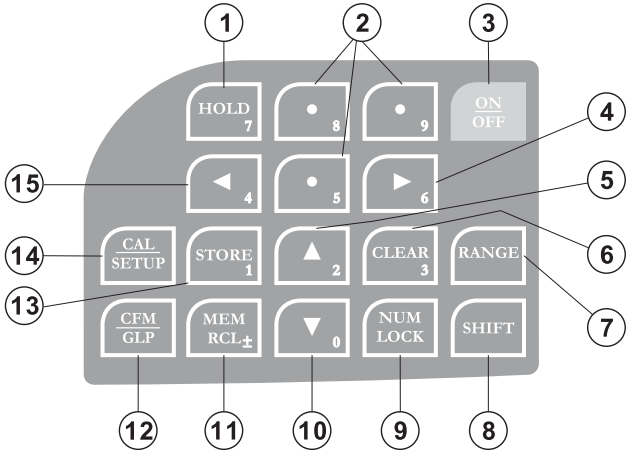


1. **HOLD** key, to freeze the stable reading on the LCD
2. Numerical keys only
3. **ON/OFF** key, to turn the instrument ON and OFF
4. **Right arrow** key, to toggle between parameters while in SETUP mode (forwards), to toggle between absolute mV and temperature while in relative mV mode and between pH buffer and temperature while in pH calibration mode

5. **Up arrow** key, to manually increase temperature value or other parameters
6. **CLEAR** key, to clear calibration data
7. **RANGE** key, to select measurement unit or switch focused data
8. **SHIFT** key, to activate the second function key
9. **NUM LOCK** key, to active numerical keys (0 to 9, ±)
10. **Down arrow** key, to manually decrease temperature value or other parameters
11. **CFM** key, to confirm values
12. **CAL/SETUP** key, to enter/exit calibration mode and to enter/exit SETUP mode
13. **Left arrow** key, to toggle between parameters while in SETUP mode (backwards), to toggle between absolute mV and temperature while in relative mV mode and between pH buffer and temperature while in pH calibration mode

Note: To select second function, press first SHIFT and then the desired key. The SHIFT tag will appear on the LCD until the desired key is pressed. To leave second function mode, press SHIFT again.

Keyboard for AD1040 and AD1200

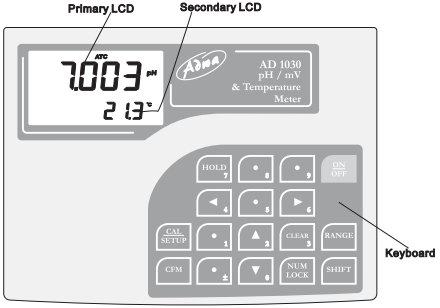


1. **HOLD** key, to freeze the stable reading on the LCD
2. Numerical keys only
3. **ON/OFF** key, to turn the instrument ON and OFF
4. **Right arrow** key, to toggle between parameters while in SETUP mode (forwards), to toggle between absolute mV and temperature while in relative mV mode and between pH buffer and temperature while in pH calibration mode

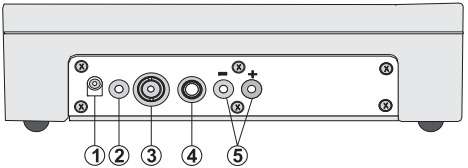
5. **Up arrow** key, to manually increase temperature value or other parameters
6. **CLEAR** key, to clear calibration data
7. **RANGE** key, to select measurement unit or switch focused data
8. **SHIFT** key, to activate the second function key
9. **NUM LOCK** key, to active numerical keys (0 to 9, ±)
10. **Down arrow** key, to manually decrease temperature value or other parameters
11. **MEMRCL** key, to recall stored value
12. **CFM/GLP** key, to confirm values and view GLP data
13. **STORE** key, to store readings (log-on-demand)
14. **CAL/SETUP** key, to enter/exit calibration mode and to enter/exit SETUP mode
15. **Left arrow** key, to toggle between parameters while in SETUP mode (backwards), to toggle between absolute mV and temperature while in relative mV mode and between pH buffer and temperature while in pH calibration mode

Note: To select second function, press first SHIFT and then the desired key. The SHIFT tag will appear on the LCD until the desired key is pressed. To leave second function mode, press SHIFT again.

Front Panel

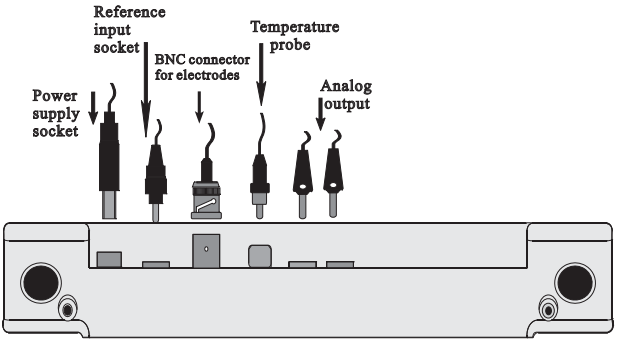


Rear Panel



1. Power adapter socket
2. Reference input socket
3. BNC connector for pH, ISE and ORP electrodes
4. Temperature probe socket
5. Analog output sockets

CONNECTIONS



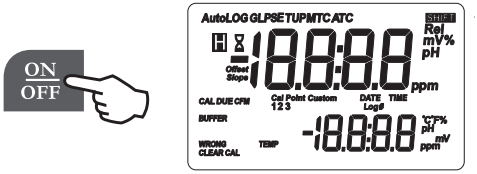
- Plug the 12 Vdc adapter into the power supply socket.

Note: These instruments feature a non-volatile memory to keep calibration data and all meter settings even when unplugged.

- Attach the pH, ISE (**AD1200** only) or ORP electrode and the temperature probe to the appropriate sockets on the rear panel. For electrodes with separate reference, connect the reference to the proper input socket.
- Attach the analog output to the proper connectors on the back of the instrument.

INSTRUMENT START-UP

Turn the instrument on by pressing the ON/OFF button. All LCD tags are displayed and a beep is heard (if beep is ON) while the instrument performs a self test.



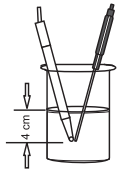
The instrument will display the date on the primary LCD and the time on the secondary LCD, and then it will enter the same measurement range as it was at power off.

pH MEASUREMENTS

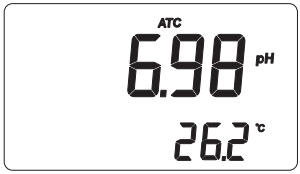
Make sure the instrument has been calibrated before taking pH measurements.

- Press RANGE to enter pH range. Press RANGE again to change the pH measurement resolution.

- Immerse pH electrode tip and temperature probe approximately 4 cm into the solution to be tested. Allow for the electrode to stabilize and put the temperature probe tip as close as possible to the pH electrode.



- The pH reading is displayed on the primary LCD and the temperature value on the secondary LCD.



- If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly with deionized or tap water and then with some of the next sample. This will prevent cross contaminations and condition the electrode before immersing it into the solution to be tested.
- The pH reading is affected by temperature. In order to measure the pH accurately, the temperature effect must be compensated for.

To use the ATC (Automatic Temperature Compensation) capability of the instrument, connect the **AD7662** temperature probe, immerse it into the sample as close as possible to the pH electrode and wait for a few seconds.

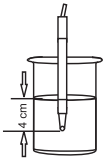
- If the sample solution temperature is known, MTC (Manual Temperature Compensation) can be performed by disconnecting the temperature probe. The display will show the default temperature of 25°C (or 77°F) or the last temperature reading with the °C (or °F) tag blinking.
- The temperature can be adjusted using the arrow keys from -20.0 to 120.0°C (or from -4.0 to 248.0°F).

ORP (mV) MEASUREMENTS

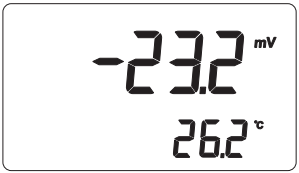
Oxidation-reduction potential (REDOX) measurements provide the quantification of the oxidizing or reducing power of the tested sample.

To correctly perform a redox measurement, the surface of the ORP electrode must be clean and smooth.

- Press RANGE to enter the mV range.
- Immerse the ORP electrode tip 4 cm into the solution to be tested and wait a few seconds for the reading to stabilize.



- The instrument displays the mV reading on the primary LCD and the temperature on the secondary LCD.



- If reading is out of range, the closest full-scale value will blink on the primary LCD.

RELATIVE mV MEASUREMENTS

To enter relative mV mode, press RANGE. The relative mV reading will be displayed on the primary LCD and the current temperature value on the secondary LCD.

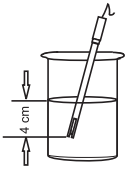
Note: Press the right or left arrow key to toggle between temperature and absolute mV reading on the secondary LCD.

The relative mV reading is equal to the difference between the absolute mV input value and relative mV offset established in the relative mV calibration.

ISE MEASUREMENTS (AD1200 only)

To measure the ion concentration, enter the ISE mode by pressing RANGE.

- Immerse the tip of the ISE electrode 4 cm into the solution to be tested and wait a few seconds for stable reading.
- The instrument will display the ppm reading on the primary LCD and the temperature on the secondary LCD.



TEMPERATURE MEASUREMENTS

Connect the **AD7662** temperature probe to the appropriate socket, immerse the probe into the solution and allow the reading to stabilize.

Note: The temperature can be displayed in Celsius (°C) or Fahrenheit (°F) degrees (see "Setup" section for details).

pH CALIBRATION

The instrument should be recalibrated:

- Whenever the pH electrode is replaced
- At least once a week
- After testing aggressive chemicals
- If the “CAL DUE” message is blinking during measurement

PREPARATION

Pour small quantities of the buffer solutions into clean beakers. If possible, use plastic or glass beakers to minimize any EMC interferences.

For accurate calibration and to minimize cross-contamination, use two beakers for each buffer solution: the first one for rinsing the electrode and the second for calibration.

If you are measuring in the acidic range, use pH 4.01 or 1.68 as second buffer. If you are measuring in the alkaline range, use 10.01/9.18 or 12.45 as second buffer.

For extended range measurements (acidic and alkaline), perform a three-point calibration by selecting three of the available buffers.

PROCEDURE

If 0.001 pH resolution is selected, each selected standard buffer value can be updated accordingly with the value of the production lot certificate at 25°C (77°F). From calibration mode, when a standard pH buffer with 0.001 resolution is selected, press SHIFT and then SETUP. The buffer value will start blinking and it can be changed within a ±0.020 pH window using the arrow keys.

The instrument allows to choose among 7 memorized pH buffers (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and 2 custom buffers.

Custom buffers allow the user to calibrate using a solution with a pH value different from a standard one. Up to two custom buffers can be set through the setup menu. The custom buffer value can also be changed within a ±1.0 pH window around the set value.

For accurate measurements it is recommended to perform a three-point calibration. However, at least a two-point calibration is suggested.

The instrument will automatically skip the buffers already used and require a minimum difference of 0.2 pH unit between two buffers used for calibration.

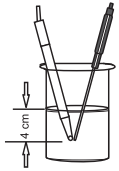
A new calibration will override existing stored calibration data. The slopes adjacent to the calibration points will be reevaluated.

If the new calibration point has no correspondence in the existing stored calibration data, it is simply added or the instrument will ask which buffer will be replaced by the current one.

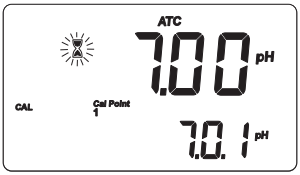
If at least a two-point calibration has been performed and an offset correction of the electrode is desired, keeping unchanged the existing slopes, perform a one-point calibration selecting the “OFFS” option in the setup menu. If the “Pnt” option is selected, the slopes adjacent to the calibration points will be reevaluated.

THREE-POINT CALIBRATION

- Immerse the pH electrode and the temperature probe approximately 4 cm into a buffer solution of your choice (pH 1.68, 4.01, 6.86, 7.01, 10.01, 12.45, custom buffer 1 or 2, if set) and stir gently. The temperature probe should be close to the pH electrode.



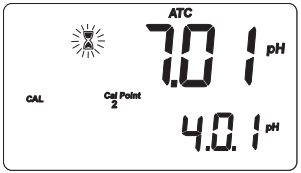
- Press CAL and the instrument will display the measured pH on the primary LCD and the "7.01 pH" buffer on the secondary LCD, together with CAL and "Cal Point 1" tags.



- If necessary, press the up and down arrow keys to select a different buffer value.

- The hourglass tag will blink on the LCD until the reading is stable.
- When the reading is stable and close to the selected buffer, the CFM tag appears. Press the CFM key to confirm.

- The calibrated value is then displayed on the primary LCD and the secondary LCD will display the second expected buffer value, together with CAL and “Cal Point 2” tags.



- After the first calibration point is confirmed, immerse the pH electrode and the temperature probe approximately 4 cm into the second buffer solution and stir gently. The temperature probe should be close to the pH electrode.
- If necessary, use the arrow keys to select a different buffer value.
- The hourglass tag will blink on the LCD until the reading is stable.

- When the reading is stable and close to the selected buffer, “CFM” tag appears.
- Press CFM key to confirm. The calibrated value is then displayed on the primary LCD and the secondary LCD will display the third expected buffer value.

- After the second calibration point is confirmed, immerse the pH electrode and the temperature probe approximately 4 cm into the third buffer solution and stir gently. The temperature probe should be close to the pH electrode.
- If necessary, use the arrow keys to select a different buffer value.
- The hourglass tag will blink on the LCD until the reading is stable.
- When the reading is stable and close to the selected buffer value, the CFM tag appears. Press the CFM key to confirm.
- The instrument stores the calibration values and returns to normal measurement mode.

TWO-POINT CALIBRATION

Proceed as described in the “Three-point calibration” section and press CAL after the second calibration point is accepted. The instrument will memorize the calibration data and return to normal measurement mode.

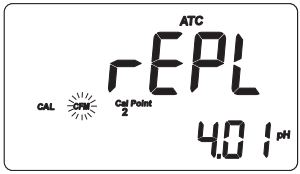
ONE-POINT CALIBRATION

- Two setup options are available: “Pnt” and “OFFS”.
- If the “Pnt” option is selected, the adjacent slopes will be reevaluated.
- If the “OFFS” option is selected, an electrode offset correction is performed keeping unchanged the existing slopes.
- Proceed as described in the “Three-point calibration” section and press CAL after the first calibration point is accepted. The instrument will memorize the single point calibration data and return to normal measurement mode.

Notes:

- During calibration press RANGE or the right or left arrow keys to toggle between pH buffer and temperature reading on the secondary LCD.

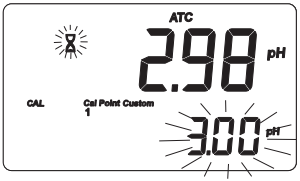
- Each time a buffer is confirmed, the new calibration parameters replace the old data of the corresponding buffer.
- If current confirmed buffer has no correspondence in the stored calibration, it will be added to the existing calibration data. If the stored calibration is a three-point procedure, the instrument will ask which buffer should be replaced.



Use the arrow keys to select the buffer to be replaced, then press CFM to confirm or CAL to exit calibration without replacing.

CUSTOM BUFFERS

If at least one custom buffer was set in SETUP menu, it can be selected for calibration using the arrow keys. Press SHIFT and then SETUP key if you want to adjust the buffer value. The buffer value, displayed on the secondary LCD, will start blinking.



Use the ARROW keys to change the buffer value.

After about 5 seconds the last change has been performed, the buffer value is updated and the meter exit from the changing mode. Press SHIFT and then SETUP key if you want to change again the value.

Note: Custom buffer value can be adjusted in a ±1.00 pH window, around the set value.

CLEAR CALIBRATION

If the CLEAR key is pressed at any time during calibration, the "CLEAR CAL" tag lights up and the "donE" message is displayed on the secondary LCD.

All previous calibrations are cleared and the instrument continues the procedure. The points already confirmed for the current calibration are not deleted.

Note: If CLEAR is pressed during the first calibration point, the instrument returns to measurement mode.

RELATIVE mV CALIBRATION

- Press CAL from relative mV measurement mode. The relative mV value is displayed on the primary LCD and the absolute mV value on the secondary LCD.
- If desired, change the displayed relative mV value using the arrow or the numerical keys (press NUM LOCK to activate them).

Notes:

- Press RANGE to change the resolution of the displayed value, if possible (e.g. 199.9 will change to 1999, while 19.9 will not change).
- If CLEAR is pressed outside NUM LOCK mode, the displayed value is set to 0.0 mV.

- Press NUM LOCK again to leave the numerical keys.

- When the reading is stable and the relative mV offset is within the offset window (±2000 mV), the CFM tag will be displayed.
- Press CFM to confirm relative mV calibration. The instrument will return to measurement mode.
- If the absolute mV reading is out of range or the relative mV offset is outside the offset window, the WRONG tag will blink. To complete the calibration procedure the input value or the relative mV offset has to be changed.

ISE CALIBRATION (AD 1200 only)

For greatest accuracy, it is recommended to calibrate the instrument frequently.
Due to electrode conditioning time, keep the electrode immersed for a few seconds in the solution to be tested.
To make the calibration a simple and error-free procedure, the user will be guided step by step during calibration with easy messages on the display.

PREPARATION

- Set the proper ion charge through the setup item "IonCG".

Note: If the "undF" option is selected in setup menu, the calibration must be a two-point procedure. If the user try to exit the calibration mode after confirming the first point, the "----" message appears on the LCD.

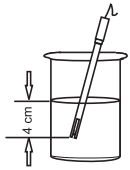
- Pour small quantities of the standard solutions into clean beakers. If possible, use plastic beakers to minimize any EMC interferences.
- For accurate calibration and to minimize cross-contamination, use two beakers for each standard solution, the first one for rinsing the electrode and the second for calibration.

PROCEDURE

One and two-point procedures are available, with five memorized standard solutions: 0.1, 1.0, 10, 100, 1000 ppm.

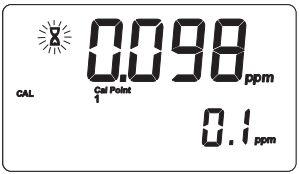
- Press RANGE to enter the ISE mode.

TWO-POINT CALIBRATION



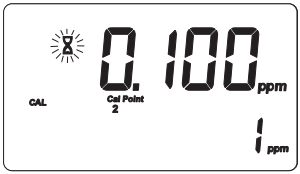
- Immerse the ISE electrode approximately 4 cm into the first standard solution and stir gently.

- Press CAL key. The primary LCD will display the ppm value using current offset and slope.
- The “CAL” and “Cal Point 1” tags light up, and the 0.1 ppm standard value is shown on the secondary LCD.
- If necessary, use the arrow keys to select a different standard solution.
- The hourglass symbol will blink on the LCD until the reading becomes stable.



- When the reading is stable and close to the selected standard, the CFM tag starts blinking.

- Press CFM to confirm calibration.
- The calibrated value will be displayed on the primary LCD and the second expected standard solution on the secondary LCD.



Note: The instrument will automatically skip the standard value used for the first point.

- After the first calibration point is confirmed, immerse the ISE electrode approximately 4 cm into the second standard solution.
- If necessary, use the arrow keys to select a different standard solution.
- The hourglass symbol will blink on the LCD until the reading becomes stable.
- When the reading is stable and close to the selected standard, the CFM tag starts blinking.
- Press CFM key to confirm calibration. The instrument stores the calibration data and returns to normal measurement mode.

Notes:

- If the mV value is out of the ±2000 mV range, the "WRONG" and "BUFFER" tags are displayed. Check if the correct standard has been used, or refresh the electrode by following the maintenance procedure described on page 60. If necessary, change the standard solution or the electrode.
- If the ion charge is not specified ("undF" selected in setup menu), the slope window is between ±20 mV and ±105 mV. If a ion charge value is set, the slope value is between 50% and 120% of the default slope for the corresponding ion charge.
  Default slope value (mV/decade):
  -59.16 (monovalent anion) - ion charge is -1
  59.16 (monovalent cation) - ion charge is 1
  -29.58 (divalent anion) - ion charge is -2
  29.58 (divalent cation) - ion charge is 2
  100 - ion charge is "undF"
- To reset to the default values and clear calibration data, press the CLEAR key during calibration. The instrument will display the "CLR" message and return to measurement mode.

ONE-POINT CALIBRATION

- To perform a single point calibration, press CAL after the first calibration point has been confirmed.

  The instrument will store the one-point calibration data and return to normal measurement mode.

GLP (GOOD LABORATORY PRACTICE)

GLP is a set of functions that allows data storage (and retrieval) about the electrode status and maintenance.

All data regarding pH, relative mV and ISE calibrations are stored in the instrument memory.

CALIBRATION TIME-OUT ALARM

The instrument allows to set the number of days (from 1 to 7) before the next required pH calibration. The default setting is “OFF” (disabled).

At start-up the instrument checks if the calibration time-out has expired. If yes, the “CAL DUE” message blinks to advise the user that a new calibration is required.

Note: If the instrument was not calibrated or all calibration data were cleared, the “CAL DUE” message is displayed even if the feature is disabled in the setup menu.

LAST pH CALIBRATION DATA

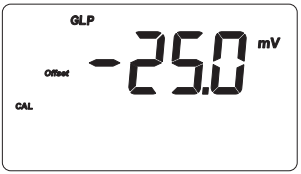
The last pH calibration data are stored automatically after a successful calibration.

To view the pH calibration data, from pH measurement mode press SHIFT and then GLP key. The instrument will display the date (yyyy.mm.dd) of the last calibration.

Use the up arrow key to view all calibration parameters in the following sequence:

- Time (hh:mm) of the last calibration.

- pH calibration offset value.



- pH calibration slope (the GLP slope is the average of the calibration slopes; the percentage is referred to the ideal value of 59.16 mV/pH).

- Calibration buffers in the order used for calibration, together with the corresponding warnings.

Notes:

- The “OLd” message displayed beside a buffer value means that this buffer was not used during last calibration. Press SHIFT and then SETUP key to see the old calibration date (or time, if old calibration date is the same as the last procedure).
- Each buffer is displayed with the resolution used during calibration.
- The “no bUF” message means that calibration was performed at less than five points.

- Calibration time-out alarm status. The display shows “OFF” if the feature is disabled, or the days remaining before the calibration alarm will be activated (e.g. 5 days), or after the calibration is expired (e.g. -3 days).

- The instrument ID.

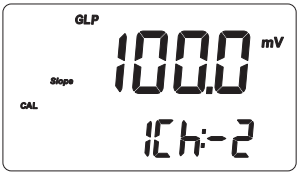
LAST ISE CALIBRATION DATA (AD 1200 only)

Last ISE calibration data are stored automatically after a successful calibration.

To view the ISE calibration data, from ISE measurement mode press SHIFT and then GLP key. The instrument will display the date (yyyy.mm.dd) of last calibration.

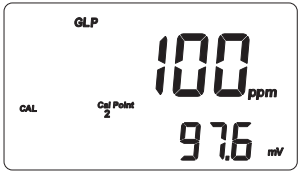
Use the up arrow key to view all logged calibration parameters in the following sequence:

- ISE calibration time as in pH GLP mode.
- ISE calibration slope (mV/decade) on the primary LCD and ion charge on the secondary LCD.



- First ISE calibration buffer on the primary LCD and corresponding mV value on the secondary LCD.

- Second ISE calibration buffer on the primary LCD and corresponding mV value on the secondary LCD.



Notes:

- If a single point calibration is performed after a two-point calibration, the instrument will keep the old slope.
- The “no bUF” message means that calibration was performed at one point.

- The instrument ID as in pH GLP mode.

LAST RELATIVE mV CALIBRATION DATA

Last relative mV calibration data are stored automatically after a successful calibration.

To view the relative mV calibration data, from relative mV measurement mode press SHIFT and then GLP key.

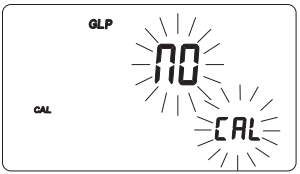
The instrument will display the date (yyyy.mm.dd) of the last calibration.

Use the up arrow key to view all logged calibration parameters in the following sequence:

- Relative mV calibration offset and time (hh:mm) as in pH GLP mode.
- Instrument ID as in pH GLP mode.

Notes:

- Press SHIFT and then GLP key at any moment to return to normal measurement mode.
- If calibration has not been performed, the “no CAL” message will blink on the LCD.

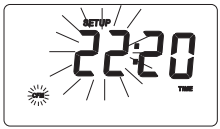


SETUP

Setup mode allows viewing and modifying the following parameters:

- Calibration time-out alarm
- One-point calibration behavior
- Custom buffer 1
- Custom buffer 2
- Ion charge (AD1200 only)
- Alarm high limit
- Alarm low limit
- Temperature measure unit
- Current date (yyyy.mm.dd)
- Current time (hh:mm)
- Keyboard beep status
- Instrument ID

- To enter SETUP mode, from measurement mode press SHIFT and then SETUP.
- Press CAL to change the item value. The selected item (e.g. hour, while setting the time) and “CFM” tag will blink.



- Use the arrow keys to scroll the available values or insert the desired value with the numerical keys.

Note: To activate the numerical keys, press NUM LOCK. The SHIFT tag will blink. The new introduced digit is always the last one and all previous digits will shift to left.

- To delete the digits press CLEAR key before entering the NUM LOCK mode.
- If another item has to be set (e.g. minutes), press RANGE or left/right arrow key, and the item will start blinking.

- Use the arrow keys to scroll the available values or insert the desired value with the numerical keys.
- Press CFM to confirm or CAL to escape.
- Use the arrow keys to select the next/previous parameter.
- Press SHIFT and then SETUP to exit the setup menu at any time.

The table below lists all available setup parameters, their valid values and the factory settings (default).

Item	Description	Valid values	Default
CAL DUE	Alarm time-out	OFF or 1 to 7 days	OFF
1 Pnt	1-point cal. behavior	Pnt, OFFS	Pnt
Custom C1	Custom buffer 1	-2.00 to 16.00 pH	no
Custom C2	Custom buffer 2	-2.00 to 16.00 pH	no
IonCG	Ion charge	undF, -2, -1, 1, 2	undF
AL.HI	Alarm high limit	pH, mV, Rel mV ranges	no
AL.LO	Alarm low limit	pH, mV, Rel mV ranges	no
tEMP	Temperature unit	°C, °F	°C
Date	Date (yyyy.mm.dd)	2000.01.01 to 2099.12.31	
Time	Time (hh:mm)	00:00 to 23:59	
bEEP	Beep status	ON, OFF	OFF
In Id	Instrument ID	0000 to 9999	0000

Notes:

- The custom buffers can be set only with 0.001 resolution. If 0.01 pH resolution is selected during calibration, the displayed custom buffer value will be a rounded one.
- While in setup changing mode for items calibration alarm time-out, custom buffer and alarm limits, press CLEAR to set the selected item to the default value.
- Refer to the table below to select the correct ion charge for each ion type (AD1200 only):

ION CHARGE	ION TYPE
-2 (divalent anion)	S, CO_3
-1 (monovalent anion)	F, Cl, Br, I, CN, SCN, ClO_4, NO_3
+1 (monovalent cation)	H, Na, K, Ag, NH_4
+2 (divalent cation)	Mg, Ca, Ba, Cd, Cu, Pb
undf	undefined ion

ALARM SETUP

- Select one of the alarm items. The displayed value will be the one previously set.
- Press RANGE to select the range for the alarm and the corresponding range tag will blink.
- Press the CAL key to enter setup changing mode. Set the new value using the arrow or the numerical keys.

Notes:

- While in setup changing mode, press RANGE to select a different resolution, if possible (e.g. if 199.9 is displayed, by pressing RANGE the value will change to 1999; if 19.9 is displayed, nothing will happen if pressing RANGE).
- Pressing CLEAR key, the displayed item will be reset to the default value ("no").
- Press NUM LOCK key to activate the numerical keys. The SHIFT tag will blink.
- Press CFM to confirm the set value.

While in normal measurement mode:

- If only the "AL.LO" item is set, the instrument will beep when the reading is below alarm low limit.
- If only the "AL.HI" item is set, the instrument will beep when the reading is above alarm high limit.

- If both alarm items are set, the instrument will beep when the reading is above alarm high limit or below alarm low threshold.

Note: If the “AL.HI” value is minor than or equal to the “AL.LO” value, the WRONG tag will blink.

LOG-ON-DEMAND (AD1040 and AD1200)

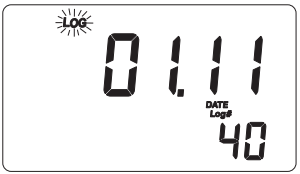
This feature allows the user to log pH, ISE (AD1200 only) and Rel mV measurements, together with temperature.

Up to 50 samples can be stored into the instrument memory.

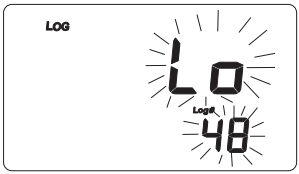
LOGGING

To store the current reading into memory, press the STORE key from measurement mode.

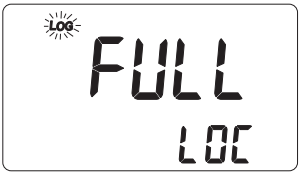
The instrument displays the current date (mm.dd) on the primary LCD, while the secondary LCD shows the record number with the "LOG" tag blinking for a few seconds and then the number of free locations.



If there are less than 6 memory locations left, the record number and the “Lo” message will blink for a few seconds to alert the user, and then the number of free locations is displayed.



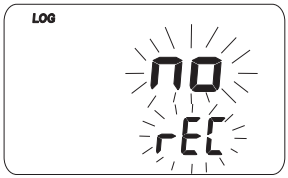
If the logging space is full, the “FULL LOC” message will be displayed for a few seconds together with the “LOG” tag blinking, followed by the “FrEE 0” message.



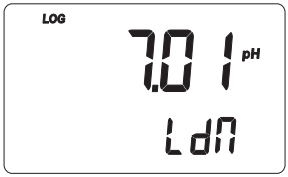
The instrument returns to normal measurement mode.

VIEWING LOGGED DATA

To retrieve the information stored, press MEMRCL from measurement mode. If no data were logged, the “no rEC” message blinks on the LCD.



Otherwise, the instrument displays the memorized pH, relative mV or ppm (**AD1200** only) reading, and the lot number.



Pressing SHIFT and then SETUP key while in memory recall mode, the secondary LCD will toggle between the “LdM” indication and the record number. Use the arrow keys to select a different record.

Press RANGE or right arrow key to scroll all logged parameters, displayed as shown in the table below:

Parameter	Primary LCD	Secondary LCD
mV	mV reading	Temperature
TIME	Hour & minutes	Seconds
DATE	Year	Month & day
OFFSET	Offset value	"LdM" or record number
SLOPE	Slope value	"LdM" or ion charge (ISE range)

Notes:

- To view the previous logged parameter, press the left arrow key.
- In relative mV memory recall mode, the offset value is not available and the display shows dashes "----".
- The record number is an identification number for the logged sample.

After scrolling all logged parameters, the meter displays the "dEL" message together with the "LdM" indication.

Note: Pressing SHIFT and then SETUP key, the instrument toggles between lot and record number or all lots.

- Press CLEAR to delete the selected lot/record or all lots.

Note: Positions remain free in the log-on-demand lot by deleting the last logged sample or all lots.

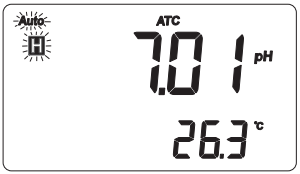
- If the “dEL All” option was selected, all logged data are deleted and the instrument returns to normal measurement mode.

- Press MEMRCL at any time to return to measurement mode.

HOLD

To freeze a stable reading on the LCD, press HOLD key from normal measurement mode.

The "Auto" and "H" tags will blink on the LCD until the reading stabilizes.



When the reading is stable, the "Auto" and "H" tags stop blinking and the reading is frozen.

Press HOLD key again to return the normal measurement mode.

Note: Pressing RANGE the instrument will skip to the displayed range, without leaving the HOLD mode. The STORE key also holds HOLD mode. Pressing MEM RCL key, SHIFT and then SETUP or GLP, the instrument leaves the HOLD mode and performs the selected function.

TEMPERATURE CALIBRATION

(for technical personnel only)

The instruments are factory calibrated for temperature. Adwa's temperature probes are interchangeable and no temperature calibration is needed when they are replaced.

If temperature measurements are not accurate, temperature new calibration should be performed.

For an accurate recalibration, contact your dealer or the nearest Adwa Customer Service Center, or follow the instructions below.

- Prepare a vessel containing ice and water, and another one containing hot water at approximately 50°C (122°F). Place insulation material around the vessels to minimize temperature drift.
- Use a calibrated thermometer with a resolution of 0.1°C (or 0.1°F) as reference thermometer. Connect the supplied **AD7662** temperature probe to the appropriate socket on the rear panel.
- With the instrument off, press and hold the CAL & up arrow keys, then power on the instrument. The "CAL" tag lights up and the secondary LCD shows 0.0°C (or 32.0°F). The primary LCD will display the measured temperature or "----", if the reading is out of range.

- Immerse the temperature probe into the vessel with ice and water as close as possible to the reference thermometer. Allow a few seconds for probe thermal stabilization.
- Use the arrow keys to set the reading on the secondary LCD to that measured by the reference thermometer.

- When the reading is stable and close to the selected calibration point, the CFM tag starts blinking.
- Press CFM to confirm. The secondary LCD will display 50.0°C (or 122.0°F).

- Immerse the temperature probe into the second vessel as close as possible to the reference thermometer. Allow a few seconds for probe thermal stabilization.
- Use the arrow keys to set the reading on the secondary LCD to that of the hot water measured by the reference thermometer.
- When the reading is stable and close to the selected calibration point, the CFM tag starts blinking.

• Press **CFM** to confirm. The instrument returns to normal measurement mode.

Note: If the reading is not close to the selected calibration point, the WRONG tag will blink. Change the temperature probe and restart calibration.

mV CALIBRATION (for technical personnel only)

The instruments are factory calibrated for mV range.

Adwa's ORP electrodes are interchangeable and no mV calibration is needed when they are replaced.

If measurements are not accurate, a mV recalibration should be performed.

For an accurate recalibration, contact your dealer or the nearest Adwa Customer Service Center, or follow the instructions below.

A two or three-point procedure can be performed at 0.0, 600.0 and 1800.0 mV.

- Attach a mV simulator with an accuracy of ±0.1 mV to the BNC connector on the rear panel.
- With the instrument off, press and hold the CFM & STORE keys, then power on the instrument.

  The CAL tag lights up and the secondary LCD shows 0.0 mV.
- Set the simulator to 0.0 mV. When the reading is stable and close to the selected calibration point, the CFM tag starts blinking.
- Press CFM to confirm and the secondary LCD will display the second expected value (600.0 mV).

- Set the simulator to 600.0 mV. When the reading is stable and close to the selected calibration point, the CFM tag starts blinking.
- Press CFM to confirm. The secondary LCD will display the third expected value (1800 mV).
- Set the simulator to 1800.0 mV. When the reading is stable and close to the selected calibration point, the CFM tag starts blinking.
- Press CFM to confirm. The instrument returns to measurement mode.

Notes:

- If the reading is not close to the selected point, the WRONG tag will blink. Verify the calibration conditions or contact your dealer if calibration can not be performed.
- To return to normal measurement mode, press CAL at any moment during calibration.
- If the calibration procedure is ended after the 600.0 mV point is confirmed, the meter returns to normal measurement mode and stores a 2-point calibration data.

ANALOG OUTPUT

For the full range of each measurement, the analog output varies from - 2000 to 2000 mV.

pH ELECTRODE CONDITIONING & MAINTENANCE

PREPARATION PROCEDURE

Remove the pH electrode protective cap. DO NOT BE ALARMED IF SALT DEPOSITS ARE PRESENT. This is normal with electrodes and they will disappear when rinsed with water.

During transport, tiny bubbles of air may form inside the glass bulb affecting proper functioning of the electrode. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer.

If the bulb and/or junction are dry, soak the electrode in **AD70300** storage solution for at least one hour.

For refillable electrodes:

If the filling solution (electrolyte) is more than 2.5 cm below the fill hole, add **AD7082** electrolyte solution.

For faster response, unscrew the fill hole screw during measurements.

STORAGE PROCEDURE

To minimize clogging and assure a quick response time, the glass bulb and the junction of the pH electrode should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of **AD70300** storage solution.

NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

PERIODIC MAINTENANCE

Inspect electrode and cable. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

For refillable electrodes:

Refill the electrode reference chamber with fresh **AD7082** electrolyte solution. Allow the electrode to stand upright for 1 hour. Follow the storage procedure above.

CLEANING PROCEDURE

Soak in deionized water for approximately 30 minutes.

IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with deionized water, refill the reference chamber with fresh electrolyte and soak the electrode in **AD70300** storage solution for at least 1 hour before taking measurements.

ELECTRODES, PROBES AND SOLUTIONS

AD1131B	Refillable pH electrode with glass body, tip protection bottle, BNC connector and 1 m cable
AD1230B	pH electrode with Epoxy body, tip protection bottle, BNC connector and 1 m cable
AD3230B	ORP electrode with Epoxy body, tip protection bottle, BNC connector and 1 m cable
AD7662	Stainless steel temperature probe with 1 m cable.
AD70004P	pH 4.01 buffer, 20 ml sachet, 25 pcs
AD70007P	pH 7.01 buffer, 20 ml sachet, 25 pcs
AD70010P	pH 10.01 buffer, 20 ml sachet, 25 pcs
AD7082	Refilling solution, 3.5M KCl, 4x30 ml
AD70300	Sorage solution, 230 ml

TROUBLESHOOTING GUIDE

SYMPTOM	PROBLEM	SOLUTION
Slow response/ excessive drift.	Dirty pH electrode.	Soak the electrode tip in deionized water for 30 min. and then clean the electrode .
Readings fluctuate up and down (noise).	Clogged/dirty junction. Low electrolyte level (refillable electrodes only).	Clean the electrode. Refill with fresh electrolyte (refillable electrode only).
The display shows blinking dashes during pH measurements.	Out of range in the pH scale.	Make sure the pH sample is in the specified range. Recalibrate. Check the electrolyte level and the general state of the pH electrode.
The display shows blinking reading in measurement mode.	Reading out of range. Electrode not connected.	Check the sample. Connect the electrode.
Out of range in the mV scale.	Dry membrane/ junction.	Soak in A70300 storage solution for at least one hour.

SYMPTOM	PROBLEM	SOLUTION
The meter does not work with temperature probe.	Out of order temperature probe.	Replace the probe.
The meter fails to calibrate or gives faulty readings.	Broken or out of order pH electrode.	Replace electrode.
Explicit warnings are displayed during pH calibration.	Dirty/broken pH electrode, contaminated reference or buffers.	Follow displayed instructions.
At start-up the meter displays full LCD permanently.	One key is blocked.	Check the keyboard or contact the vendor.
Long beep heard when a key is pressed.	Key not working in current mode. End of range reached with the arrow keys.	
Digits can not be introduced with the numeric keys.	Maximum value reached for corresponding range.	Delete digits.

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