OPERATING INSTRUCTIONS

pH/mV Temperature Meter

430-020

ELE International Chartmoor Road, Chartwell Business Park Leighton Buzzard, Bedfordshire, LU7 4WG England phone: +44 (0) 1525 249200 fax: +44 (0) 1525 249249 email: ele@eleint.co.uk http://www.ele.com ELE International, a division of Hach Lange Ltd.	**Distributor:**	**ELE International** Soiltest Product Division PO Box 389, Loveland, CO 80539 USA phone: +1 (800) 323 1242 fax: +1 (970) 663 9781 email: soiltest@eleusa.com http://www.eleusa.com

Contents

1 Safety

Please read this information carefully prior to installing or using this equipment.

1.1 The unit described in this manual is designed to be operated only by trained personnel. Any adjustments, maintenance and repair must be carried out as defined in this manual, by a person qualified to be aware of the hazards involved.

1.2 It is essential that both operating and service personnel employ a safe system of work, in addition to the detailed instructions specified in this manual.

1.3 Other than for those items defined in the maintenance procedures herein, there are no user serviceable items in this instrument. Removal of covers and attempted adjustment or service by unqualified personnel will invalidate the warranty and may incur additional charges for repair.

1.4 References should always be made to the Health and Safety data supplied with any chemicals used. All available information, advice and warnings on the handling, storage, use and disposal of such must be carefully observed. Generally accepted laboratory procedures for safe handling of chemicals should be employed. Suitable safety and personal protective equipment must be used at all times.

1.5 If it is suspected that safety protection has been impaired in any way, the unit must be made inoperative and secured against any intended operation. The fault condition should immediately be reported to the appropriate servicing authority.

2 Introduction

2.1 General

The 430-020 is a general purpose hand-held pH/mV and temperature meter offering 2 point calibration and automatic buffer recognition. This model simultaneously displays either temperature compensated pH readings or electrode potential and temperature.

2.2 Instrument Specification

Model	430-020
Type	pH/mV and temperature
Waterproof	Yes (IP67)
pH Range	-2 to 16pH
pH Resolution	0.01pH
pH Accuracy	+/-0.02pH
mV Range	-1000 to 1000mV
mV Resolution	1mV
mV Accuracy	+/- 1mV
ATC	0 to 100°C
Temperature Range	-39.9 to 149.9°C
Temperature Resolution	0.1°C
Temperature Accuracy	+/-0.4°C (-10 to 70°C)
No. of Calibration Points	2
Automatic Buffer Recognition	Yes, 4, 7 and 10 pH
Auto Shut Off	10 mins
Operating Temperature	0 to 100°C
Battery Life (hours)	2500
pH Connector	BNC
Temperature Connector	Waterproof Lumberg screw-locking type
Dimensions (l x w x d)	141 x 71 x 32mm
Weight	230g
Instrument Warranty	1 year
Electrode/Temperature probe warranty	6 months

3 Installation

3.1 Unpacking

Remove the 430-020 from the packaging and ensure the following items are included:

a) Model 430-020 pH and temperature meter
b) Epoxy bodied combination pH electrode (430-020/10)
c) Temperature probe (430-020/12)
d) pH 4, 7 and 10 buffer sachets
e) 3 x AAA alkaline batteries (fitted)
f) Instruction manual (9907X0088)

3.2 Connection

Connect the electrode to the BNC socket on the instrument and remove the protective cap covering the electrode. Connect the temperature probe to the connector on the instrument and remove the protective sheath. Press the ON/OFF key to turn the instrument on.

3.3 Display and Controls

The pH meter has an LCD display which displays either the temperature compensated pH readings or electrode potential and temperature simultaneously. The keypad used for this meter enables an easy and effective way of calibrating and performing a measurement.

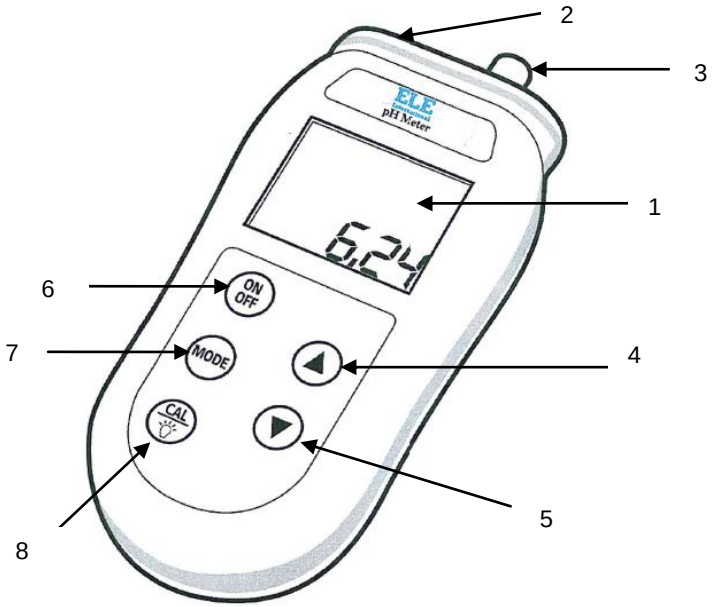

Fig. 1 - Display and Controls

1. Display showing pH or electrode potential and temperature reading
2. BNC connector for pH electrode
3. Connector for temperature probe
4. UP arrow Key for adjusting values
5. DOWN arrow key for adjusting values
6. On/Off key
7. MODE key to change the display between pH or mV and temperature (single press), changing between °C and °F units (long press)
8. Calibration and Backlight key for calibrating the instrument and switching on the backlight respectively

The instrument will switch off automatically after 10 minutes of inactivity (i.e. no key presses). To disable the auto-off function press and hold the Up arrow key whilst switching the unit on. “Auto-off disable” will be displayed across the screen. When the unit is turned off the auto-off function will be re-enabled.

To change the instrument temperature units between °C and °F, press and hold the MODE key for 3 seconds.

When the instrument is turned on a single press of the CAL and backlight key will turn the backlight on. Another press will switch the backlight off. When the backlight is on it will automatically turn off after 10 seconds. If the low battery icon is showing the backlight function will not work.

If mV is selected instead of pH the instrument will read the voltage generated by a pH, redox or ion type electrode within the range of ±1000mV.

4 Temperature Adjustment

Model 430-020 is supplied with a temperature probe enabling automatic temperature compensation to be used. If the probe is disconnected then manual temperature compensation can be used instead.

4.1 Manual Temperature Adjustment

If the temperature probe is disconnected 'MANUAL' will be displayed above the temperature value. To manually adjust the temperature press or hold the Up or Down arrow keys to adjust the temperature in whole degrees.

Note that manual temperature adjustment can only be performed if the temperature probe is not connected.

4.2 Automatic Temperature Correction (ATC)

When the temperature probe is connected the 430-020 meter will automatically detect the connection and the temperature will be displayed continuously on the screen. The pH reading will be automatically compensated depending on the temperature of the sample being measured. The ATC range is 0 to 100°C (32 to 212°F). If the temperature probe is removed the temperature will be displayed for 10 seconds.

'Hi Temp Err' is displayed if the readings are above 100°C.

'Lo Temp Err' is displayed if the readings are below 0°C.

5 Calibration and Measurement

Before performing a measurement the instrument must be calibrated. It is recommended that the instrument is calibrated daily to achieve consistent and accurate results. Model 430-020 has a 2 point calibration process. The first calibration point MUST be buffer pH 7.00. The second calibration point depends on the acidity of the solution which is to be measured. For samples with a pH around 5 the second calibration point should be 4.01 pH buffer. For samples with a pH around 8 the second calibration point should be 10.01pH buffer. Always rinse the pH and temperature probes in de-ionised water before placing in each buffer solution. If the ATC probe is connected the instrument automatically compensates for the resulting change in electrode response due to temperature during the calibration process.

Press the ON/OFF key to switch the instrument on. If the temperature probe is not connected 'MANUAL' will be displayed above the temperature value. If manual temperature adjustment is being used, the temperature of the solution must be measured using a thermometer so that the temperature can be manually adjusted.

Place the pH electrode and temperature probe into 7.00 pH buffer solution and allow the reading to stabilise. Stir, then press and hold down the CAL key for 3 seconds. Auto-Cal will flash up on the display and then the current reading will be displayed. Once the reading has stabilised press the CAL key, rinse the electrode and temperature probe in deionised/distilled water and place them into 4.01 pH or 10.01 pH solution and allow the reading to stabilise, again stir the solution to remove any air bubbles. To finish press the CAL key, 'Calibrated Ok' will flash up and the display will show the solution value of the buffer.

To abort the calibration point at any time press the ON/OFF key and the meter will revert back to any previous calibration values.

During the calibration process the instrument will automatically detect the buffer solution. However if you know the exact pH value for the buffer at a given temperature (temperature coefficient) you can change the offset BS (buffer solution 7.00pH) and slope BS (buffer solution 4.01 or 10.01) by using the Up or Down arrow keys. Refer to your calibration solutions/capsules temperature coefficients before any alterations are carried out.

'**FAIL**' will be shown if 7.00 pH buffer isn't used as the first calibration point.

If the electrode and buffer solution's combined error is greater than 0.5 pH or 30mV then '**Error I/P**' will be displayed and the calibration aborted. If the electrode and buffer solution's combined error is greater than 30mV then '**FAIL**' will be displayed and the calibration aborted. If the electrode and buffer solution's combined slope error (4.01 or 10.01) is greater than 0.5pH or 15% '**Slope error**' will be displayed. If the slope error is greater than 15% the '**FAIL**' will be displayed.

If an error is displayed during a correctly performed pH calibration this can be investigated using the mV reading from the pH electrode to determine if the electrode needs to be replaced. With the instrument in mV mode place the clean/conditioned electrode and temperature probe into buffer pH 7.00 at a temperature of 25°C and leave for 30 seconds to stabilise. Record the mV reading (Asymmetry Potential). Rinse the electrode and temperature probe in distilled or deionised water, blot and repeat the process in buffer pH 4.01. Record the mV reading and calculate the difference between the two to obtain the span.

Example:

Reading at 7.00 pH: 4 mV

Reading at 4.01 pH: 178 mV

Span = 178 – 4 = 174mV

In order to calculate the slope percentage (Condition), divide the calculated span by the theoretical span and times it by 100. The theoretical span between 7.00 pH and 4.01 pH is 176.9 mV.

Slope % = 174/176.9 x 100 = 98%

If your results are below 85% or your mV reading exceeds ±30mV at 7pH, then you will need to replace the electrode.

Once the instrument is calibrated the sample can be measured. Place the pH electrode and temperature probe into the sample and allow to stabilise.

If ‘Over Range pH Err’ is displayed the readings are higher than 16pH or 1000mV.

If ‘Under Range pH Err’ is displayed the readings are below -2pH or -1000mV.

If ‘No Probe Err’ is displayed the pH electrode is not connected.

6 Care And Maintenance

Over time the electrode sensor will degrade, but regular calibrating, cleaning and the correct storage will prolong its life. The epoxy bodied combination electrode supplied with this instrument is suitable for the majority of tests carried out in aqueous solutions. For other applications, such as low ionic strength, Tris buffers, high temperatures and strongly acidic solutions a more suitable pH/reference electrode pair may be required. Details or advice are supplied on request at ele@eleint.co.uk.

If the electrode readings are slow or erratic, place the electrode into cleaning solution or 7.00 pH solution for at least half an hour to one hour before testing again. The temperature probe and pH electrodes are not waterproof and cannot be fully immersed in water. It is recommended that the instrument is calibrated daily to achieve consistent and accurate results.

The following general guidelines indicate the care and maintenance required:

Always rinse the pH electrode with cleaning solution or deionised water before next use.

Electrodes should be stored:

- away from direct sunlight
- in a vertical position
- within their specified temperature range

Always ensure the electrode is used within its specified temperature range. Ageing of electrodes used above their specified temperature is rapid and irreversible.

DO NOT touch the sensitive glass pH membrane or reference junction. Excess droplets of solution may be removed by gently blotting with filter paper or tissue.
DO NOT rub the electrode as this may induce an electrostatic charge. During use ensure the electrode is rinsed between each measurement to eliminate the contamination of solutions.

6.1 Battery Replacement

Replace the battery when the battery icon is low.

This meter will continue to measure accurately but after further usage the meter will display 'FLAt bAT' and shutdown.

Unscrew the screws on the back of the meter and replace with three AAA batteries ensuring that the polarities are correct.

7 Spare Parts

Part Code	Description of Spare Part
430-020/10	Epoxy bodied electrode
430-020/12	Temperature probe

8 Service and Support

8.1 Service

Our dedicated service staff are on hand to help in the unlikely event that your equipment develops a fault. Please contact them by one of the following means with a clear description of the problem:

E-mail: ele@eleint.co.uk
Tel: +44 (0) 1525 249200
Fax: +44 (0) 1525 249249

On occasion it may be necessary for your equipment to be sent back to our Service Department for repair. In this case please contact the Service Department for a reference number which you should include with your faulty equipment. Please also ensure you include a clear description of the fault.

All replacement parts are guaranteed for 6 months and wherever possible returned equipment is turned around in 10 working days.

8.2 Technical Support

ELE International have a dedicated Technical Support team who are on hand to help with any applications advice and questions you may have about our products and how to use them. If you require any technical or application assistance please contact the team at:

E-mail: ele@eleint.co.uk
Tel: +44 (0) 1525 249200

Declaration of Conformity

pH/mV Temperature Meter, Model 430-020

This product complies with the requirements of the EU Directives listed below:

2004/108/EC **EMC Directive.**

2011/65/EC **RoHS Directive.**