NIEUWKOOP

METEN.NL

USER MANUAL

PH1210

DIGITAL pH-METER

AUTO CAL/DATA STORAGE

Rev: v.a. sn 156668

TO MEASURE = TO KNOW

INDEX

1 PRODUCT PRESENTATION

1.1 FUNCTIONAL PURPOSE OF THE UNIT

The basic system for pH and temperature measuring is made of three parts:

- the meter described in this instruction manual;
- a pH sensor
- a Pt1000 temperature sensor

The instrument has the necessary electric circuits and firmware to perform the following functions:

1) as the proper sensor is connected, it displays the pH and temperature values;
2) if a Pt1000 temperature sensor is connected, it will display the temperature values;
3) it performs an automatic or manual temperature compensation for pH measures;
4) it performs the manual or automatic pH calibration
5) it allows the memorization and the visualization up to 100 readings

1.2 FUNCTIONAL PRINCIPLES

When measuring pH, the instrument receives a mV signal from the sensor and it displays the value in pH units; this is done according to Nernst's law and the sensor used.

It is possible to make the necessary zero and sensitivity adjustments for pH and the zero adjustment for temperature.

Temperature influences the solution's ionic activity and the signal provided by the pH sensor.

For this, in applications where the liquid temperature is different from a reference value of 20 °C, it is important to use the temperature compensation function of the pH measuring.

In applications where there is a great variation of the temperature value, it is recommended to consider using a RTD and to use the automatic temperature function.

1.3 SENSORS AND ACCESSORIES

Electrodes

PH5110	*pH sensor, 1 m cable + BNC*

Temperature probes

TP5710	*Pt1000 probe in epoxy, 1.5 m cable + stereo jack*

Optional accessories

ZZ7310 ABC sample cup for measurements in soil.

Standard solutions

PH6010	*buffer solution pH=4.01 (@25°C), 125 cc*
PH6110	*buffer solution pH=6.86 (@25°C), 125 cc*

2.0 GENERAL WARNINGS AND INFORMATION FOR ALL USERS

2.1 WARRANTY

This product is guaranteed for all manufacturing defects.

2.2 AFTER SALES SERVICE

Nieuwkoop offers to all of its Customers the following services:

- a free of charge Technical Assistance over the phone for problems regarding installation, calibration and regular maintenance;
- a Repairing Service in our Aalsmeer (Holland) headquarter for all types of damages, calibration or for a scheduled maintenance.

Please take a look at the Technical Support data sheet at the end of the manual for more details.

2.3 CE MARKING

This instrument is manufactured according to the following European Community directives:

- 72/23/EEC "Electrical safety – low tension" amended in 93/68/EEC

The CE marking is placed on the packaging and on the S/N label of the instrument.

2.4 SAFETY WARNINGS

It is important to underline the fact that electronic instruments are subject to accidents. For this, it is important to take all necessary precautions to avoid damages caused by malfunctions.

All types of operations must be performed by authorized and trained staff.

3 INSTRUCTION MANUAL CONTENTS

This chapter describes the manual and gives suggestions to all users on how to read it and use it.

The manual is written according to the following norms:

- UNI 10893 "Instructions for use".
- UNI 10653 "Quality of product technical documentation".

3.1 MANUAL REVISION

This chapter shortly describes the differences between previously released versions of the same manual, so to help users that are already familiar with the product.

Rev. A: First release.

3.2 SYMBOLS

Throughout the manual You may find the following symbols, which are both dictated by a Norm or that are simply conventional:

Symbol	**Meaning**
	*Attention: pay great attention to what written next to this symbol*
---------- **WARNINGS** ----------	*This symbol is used to warn users that if the instructions are ignored or not correctly followed, damage to the instrument can be caused*
Note	*This symbol is to invite the user to pay particular attention to a specific section of the manual.*
"*"	*This symbol can be found in those chapters where there have been changes from the previous releases.*

3.3 HOW TO READ THE INSTRUCTION MANUAL

The manual includes all necessary information to fully comprehend the product, to use it and preserving it, and finally to achieve the performances for which you have selected it and purchased it.

The manual is intended for experienced and prepared personnel, who has knowledge of electronic instrumentations for field application.

The index guides the reader through the chapters and through the contents that he wishes to know or exploit.

In particular, the first chapters narrate the general characteristics and they allow the reader to become more familiar with the product by describing its accessories and its use.
The user can then verify if he/she has the necessary know-how to use the meter.

Note

Maintenance staff could be more interesting in the chapters regarding:

- users instructions;
- calibration;
- maintenance;
- warranty/repair terms and conditions.

3.3.1 USING THE INSTRUMENT ON THE FIELD

The end user can operate the meter by reading the pH/temperature and eventually recording up to 100 readings through the three keys on the front panel.

3.3.2 PLANT MAINTENANCE STAFF

Maintenance staff can select and set the desired parameters of the “set up” menu and perform the calibration of the measuring by using the standard solutions.

The set-up menu allows the selection of:

- the response time value of the filter software;
- the °C/°F temperature measuring unit;
- the auto switching-off time:

4.0 SPECIFICATIONS

4.1 FUNCTIONAL SPECIFICATION

Display

The instrument has an alphanumeric LCD display 8x1 characters.
The display shows the measures values and the messages to the operator.
After the switching-off time the display will switch off automatically.

Keyboard

The instrument has 3 keys that perform a second functions when pressed for more than 3 seconds.

Input

The meter can be connected to a pH sensor provided with a BNC connector.
If it is connected to a temperature PT1000 sensor, the meter can provide °C or °F readout.

pH temperature compensation

When measuring the pH and the temperature, the meter performs the automatic temperature compensation.
When the temperature sensor is not connected or it is malfunctioning, the meter performs the pH manual temperature compensation. The temperature display will show the messages °CM or °FM and the manual value.

Calibration

During the pH calibration, the meter recognize automatically the Nieuwkoop buffer solution pH 4.01 – pH 6.86.

Power supply

The meter is operated by a 9VDC battery.

Instrument setup

The meter has the set up menu to select, the response time of the filter software for small signal variations, the temperature °C/°F measuring unit and the time of the automatic switch off.

Data logger

The meter can memorize up to 100 pH and temperature measures. At the end of the calibration procedure it is possible to enter the date of the last calibration.

4.2 TECHNICAL SPECIFICATIONS

The DISP number next to the default values shows the location of data in the menu.

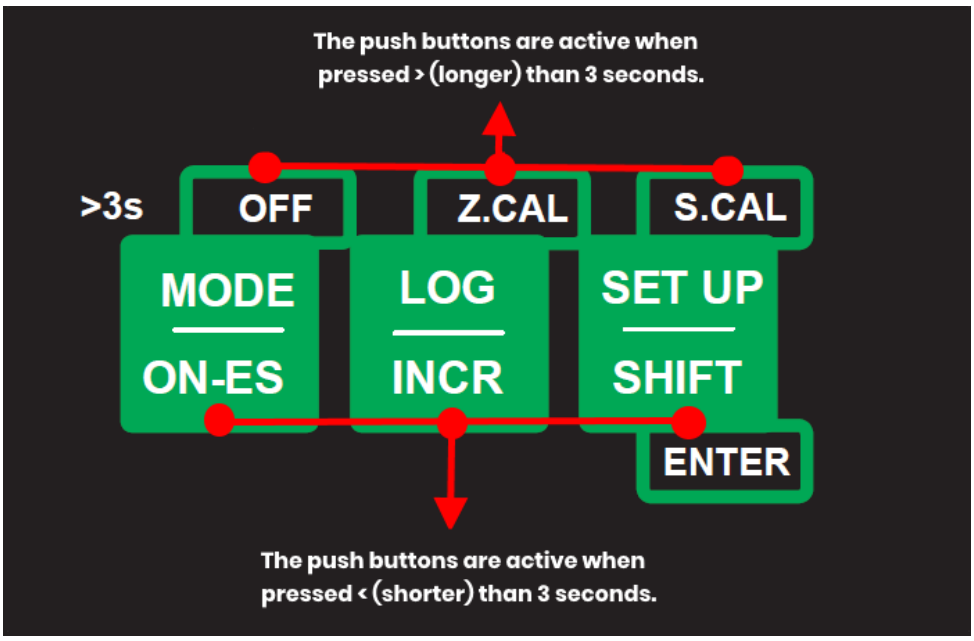
SETUP parameters are indicated by : "S x.y"

			DEFAULT	DISP
1.0	MAIN MEASURE			1.0
	SENSOR TYPE			
***	pH		pH	S1.0
	Electrode Glass (pH)			
	Slope:	59.16 mV/pH 25 °C		
	mV at 7.00 pH:	0.0		
	Zero:	+/- 2.00 pH	0.00 pH	1.1
	Sensitivity:	80 / 110 %	100 %	1.2
	Calibration:	man/auto with buffer BDH pH 4-7-9		
	INPUT RANGE			
	pH Range:	-1.00 / 12.00 pH		
	Resolution:	0.01 pH		
	Under Range:	-<<<< pH		
	Over Range:	>>>> pH		
2.0	SECONDARY MEASURE TEMPERATURE			2.0
***	Input:	RTD Pt1000		
***	Wiring:	3 wires jack		
	Temperature Unit:	°C/°F	°C	S3.0
	Temp. Compensation:	manual without RTD		
***		auto with RTD		
***	Temperature Range:	-10.0 / 110.0 °C		
***		14.0 / 230.0 °F		
	Resolution:	0.1 °C/°F		
***	Zero adjust:	+/- 2.0 °C	0.0 °C	2.1
***		+/- 3.6 °F	0.0 °C	2.1
	Manual Temperature:	0.0 / 100.0 °C	20.0 °C	2.0b
		32.0 / 212.0 °F	68.0 °C	2.0b

			DEFAULT	
3.0	SET-UP PARAMETERS			
	P/N and Release FW:	PH1210 Rev 1.XX		S1.0
***	Sensor type:	pH	pH	S2.0
	Response time 90%:	0 / 10 s	2 s	S3.0
	Temperature unit:	°C / °F	°C	S4.0
	Auto OFF time:	30 / 600 s	90 s	S5.0
4.0	MEASURE RECORD			
	Memory type:	non-volatile EEPROM		
	Memory capacity:	100 records erasable (block erase)		
	Record numbers:	0 / 99		
	Record format:	REC N°XX / XX.XX pH / XXX.X °C		
5.0	GENERAL SPECIFICATIONS			
	Operating temp.:	0 / 60 °C		
	Relative humidity:	20 / 95 % non-condensing		
	Power supply:	9 V Battery (6LR61 680 mAh)		
	Low Battery:	< 7.5 V (<6.5 V auto switch-off)		
	Autonomy:	350 hours approx. continuously		
	Weight:	180 g approx. battery included		
	Size:	125 x 75 x 25 mm		
	Display:	LCD COG 8x1 characters		
	Character dimension:	11.97 x 4.97 mm		
	Long message mode:	alternate message bar (title + variable)		
	pH Connection:	BNC		
***	Pt1000 Connection:	Jack 3.5 mm		

6.0 KEYBOARD

3 Key push button:



1) MODE/ON-ES	OFF		
2) LOG/INCR	Z.CAL		RESET
3) SET-UP SHIFT	S.CAL	ENTER	RESET

KEY push button functionality:

1) MODE/ON-ES (OFF)
- ON Instrument switch ON
- ESC Escape
- MODE Scrolling display
- OFF Instrument switch OFF for action >3 seconds

2) REC/INCR (Z.CAL)
- LOG Memo record (when in measure)
- INCR Increase value
  Scrolling vertical menu
- Z.CAL Zero cal for action >3 s (when in measure)

3) SET-UP/SHIFT (S.CAL)(ENTER)
- SET-UP Access to Set-up menu (when in measure)
- SHIFT Cursor shift
  Horizontal menu
- S.CAL Sens cal for action >3 s (when in measure)
- ENTER Enter for action >3 s (when in cal set-up)

RESET functionality is performed by INCR + SHIFT
for action >3 s
- Reset ZERO (when in cal)
- Reset SENS (when in cal)
- Erase all records (when in record visualization)

5 OPERATING PROCEDURES

5.1 OPERATING INSTRUCTIONS

5.1.1 MAIN MEASURING

pH measuring

Connect the pH sensor to the BNC of the meter according to the pH sensor type selected in the set-up menu.
Immerse the sensor in the sample.
Press the key **[MODE]** .
The meter will switch ON and it will show the date entered at the end of the last calibration.
After few seconds it will turn to the display D1.0 and it will show the pH value of the sample.
When the temperature sensor is connected, the meter will perform the automatic temperature compensation.

Temperature measuring

Connect the Pt1000 sensor to the stereo jack socket of the meter.
Press two time the key **[MODE]** .
The meter will go to the D2.0 display and it will show the temperature value of the sample in °C or °F according to the set-up selection.
The temperature measuring is available in the pH configuration.
The automatic/manual temperature compensation is available only for the pH measuring.

Data logging

During the pH measuring, press the key **[LOG]** to memorize the pH value and the temperature value.
The record will be stored in the memory with an assigned number from 0 to 99.
When the memory is full the display will show the message **Mem.full**.
The memory can be erased by the user. See page 15.

Low battery

In case of the battery voltage lower than 7.5 VDC, the message **Low Batt** will appear when switching on the meter.
If the voltage is lower than 6.5 VDC the power will be switched off automatically.

5.1.2 PH CALIBRATION

The meter must be configured for pH measuring.
The meter recognize automatically the Nieuwkoop buffer solutions at values pH 4.01 – pH 6.86.
Before performing the calibration through the buffer solutions, verify that the glass membrane of the sensor has been kept wet while in storage.

If the protective reservoir is empty and the electrode is dry, dip the electrode in a buffer solution or tap water (do not use deionized water) for three hours before proceeding.
You may also follow the instruction of the sensor's manufacturer.

Zero calibration
Dip the sensor into the buffer solution pH=6.86 to perform the first point calibration (zero calibration).

[Z.CAL] push the key for 3 seconds.
It appears the D1.1 display and message `Zero cal` alternate to the pH value.
Allow the pH value stabilization.
[SHIFT] push the key to read the memorized buffer solution value.
[ENTER] push the key for 3 seconds to confirm the buffer solution value.

If the new value is out of the accepted limits the display will show the error message `Zero err`
[ENTER] push the key for 3 seconds to delete the message and to turn to main display

If the new value is accepted, the display will show the message `Last cal` for few seconds and then it proposes to register the date by the flashing cursor under last digit. `XX / XX / XX`
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the date value.
This date value will be shown when switching ON the meter and when ending the next zero or sensitivity calibration so to be modified with the new date.

If the memorized buffer solution value doesn't correspond to the buffer solution used for the calibration, proceed as follow:
[SHIFT] push the key to read the memorized buffer solution value with the flashing cursor under the last digit `XX.XX pH`
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the adjusted value.
At this point the procedure is same as the above procedure with the recognized buffer solutions.

Sensitivity calibration
Dip the sensor into the buffer solution pH=4.01 or pH=6.86

[S.CAL] push the key for 3 seconds.
It appears the D1.2 display and message `Sens Cal` alternate to the pH value.
Allow the pH value stabilization.
[SHIFT] push the key to read the memorized buffer solution value.
[ENTER] push the key for 3 seconds to confirm the buffer solution value.

If the new value is out of the accepted limits the display will show the error message `Sens err`
If the new value is accepted, the display will show the message `Last cal` for few seconds and then it proposes to register the date by the flashing cursor under last digit. `XX / XX / XX`
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the date value.
This date value will be shown when switching ON the meter and when ending the next zero or sensitivity calibration so to be modified with the new date.

The message `Update` indicates the new calibration values have been memorized.

If the memorized buffer solution value doesn't correspond to the buffer solution used for the calibration, proceed as follow:

[SHIFT] push the key to read the memorized buffer solution value with the flashing cursor under the digit `XX.XX pH`
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the adjusted value.
At this point the procedure is same as the above procedure with the recognized buffer solutions.

We suggest to calibrate the second point with buffer pH=4.01 if the meter will operate in acidic range, and with the buffer pH=9 if the meter will operate in the alkaline range.
It is possible to perform the calibration by using the buffer solutions pH=4.01 and pH=6.86.

We suggest to rinse the electrode in tap water after each dipping in the buffer solution, in order to avoid their mixing and pollution.

In many applications it is enough to frequently perform only the zero calibration by using the buffer close to the measuring value in the process, and the zero/sensitivity calibration periodically.

The error messages during the calibration inform the operator about the bad condition of the pH electrode.
Verify the buffer solution and replace the electrode.

5.1.3 TEMPERATURE CALIBRATION

Automatic temperature
This calibration can be done when the Pt1000 sensor is connected and the user wants to adjust the temperature readout in one point of the scale.

Dip the Pt1000 into the sample at known temperature.

[MODE] push the key from the main display in order to reach the D2.0 display.
[Z.CAL] push the key for 3 seconds.
It appears the D2.1 display and message `Zero cal` alternate to the temperature value.
[SHIFT] push the key to read the temperature value with the flashing cursor on the last digit `XXX.X °C` or (°F)
INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the adjusted value.
At this point the procedure is same as the above steps.

The message `Update` indicates the new calibration values have been memorized.

If the new value is out of the accepted limits the display will show the error message `Zero Err`
[ENTER] push the key for 3 seconds to delete the message and to turn to main display

Manual temperature
This calibration can be done when the Pt1000 sensor is not connected or malfunctioning and the user wants to adjust the manual temperature compensation value.

[MODE] push the key from the main display in order to reach the D2.0 display.
[SHIFT] push the key to read the manual temperature value with the flashing cursor on the last digit `XXX.X °CM` or (°FM)
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the adjusted value.
At this point the procedure is same as the above steps.

The message `Update` indicates the new calibration values have been memorized.
If the new value is out of the accepted limits, the display will show the message `MIN/MAX 0/100°C` or `32/212 °F` for few seconds.

5.1.4 RECORDS

This function allows the memorization and the reading of the memorized measuring values.
[LOG] push the key to memorize the actual value of the pH and the temperature.
The meter will assign and show a progressive number up to 99 to the memorized values.
Follow the next procedure to read the memorized values.

[MODE] push the key two times from the main display in order to reach the D3.0 display `View Log`.
[SHIFT] push the key to read the number of the record, the alternate values of the pH and temperature.
[INCR] push the key more times to read the previous memorized records.

When the record number will reach 99, the message `Mem. full`

To erase the memorized data
[MODE] push the key two times from the main display in order to reach the D3.0 display.
[SHIFT] push the key to read the number of the record, the alternate values of the pH and temperature
[LOG] + [SHIFT] press the two keys for 3 seconds. The message `Logged erased` will appear.
[MODE] push the key to turn to the main display.

To verify if records are erased:
[MODE] push the key.
[SHIFT] push the key to read the message `Empty`.

5.1.5 SET-UP

This function allow the user to:

- choose the filter software response time
- select the temperature measuring unit °C/°F
- choose the time of the automatic switch-off
-

Sensor selection
The instrument is delivered with the pH configuration

Response time
The meter is delivered with response time of 2 seconds and it can be modified up to 10 seconds by means of the following procedure.

[SHIFT] push the key from the main display. The message `Set-up` will appear.
[SHIFT] push the key. The p/n and the firmware release will appear.
[INCR] push the key one time. The messages `Resp. time` and the actual value in sec. will appear.
[SHIFT] push the key. The actual response time with the flashing cursor on the last digit XX.s will appear.
INCR] push the key to modify the last digit if necessary.
[SHIFT] push the key to position the cursor on the other digit to be modified with the same procedure.
[ENTER] push the key for 3 seconds to confirm the new time in seconds.
The message `Update` will appear.
If the new value is out of the accepted limits the display will show `min/Max 1/10 s` for few seconds.
The display will show the message `T Unit °C` or °F.
[MODE] push the key two times to turn to the main display, unless it is requested to modify the temperature measuring unit.

Temperature measuring unit
The meter is delivered with the °C temperature measuring unit and it can be modified to °F by means of the following procedure.
(Follow the same procedure to turn back to °C unit)

[SHIFT] push the key from the main display. The message `Set-up` will appear.
[SHIFT] push the key. The p/n and the firmware release will appear.
[INCR] push the key two times. The messages `T Unit` and °C (°F) will appear.
[SHIFT] push the key and then **[INCR]** to set the °F (°C) measuring unit.
[ENTER] push the key for 3 seconds to confirm the °F (°C) measuring unit.
The message `Update` will appear.

The display will show the message `Auto Off` and the actual value in seconds.
[MODE] push the key two times to turn to the main display, unless it is requested to modify the automatic switching off time.

Switching off time
The meter will switch off automatically if any keys is not pressed within the time configured in the SET UP menu.
The meter is delivered with the automatic switching off time of 90 seconds but it can be modified to 30/600 seconds by means of the following procedure.

[SHIFT] push the key from the main display. The message `Set-uP` will appear.
[SHIFT] push the key. The p/n and the firmware release will appear.
[INCR] push the key 3 times. The messages `Auto Off` and the actual value in sec. will appear.
[SHIF] push the key to read the time value with the flashing cursor on the last digit `XXX s`
[INCR] push the key to modify the last digit if necessary
[SHIFT] push the key to position the cursor on the other digit to be modified with same procedure.
[ENTER] push the key for 3 seconds to confirm the adjusted value.
The message `Update` will appear
If the new value is out of the accepted limits the display will show `min/Max 0/600 s` for few seconds.

The display will show the p/n and the firmware release.
[MODE] push the key two times to turn to the main display.

5.1.6 MAINTENANCE OF THE UNIT

Quality components are used to give the controller a high reliability.
In this way it needs just the battery replacement.

Battery replacement

The meter controls the voltage of the battery.
If the value is lower than 7.5 volt the display will show the message `Low Batt.`
The meter will switch off automatically if the battery voltage is lower than 6.5 volt.

To replace the battery, remove the cover of the battery place on the back of the instrument.
Replace the 9 VDC battery,
Place the battery cover in the previous position.

5.1.7 MAINTENANCE OF THE SENSOR

The state of the electrode's surface is critical for the normal operation of the system and should be inspected more frequently when using alkaline liquids, oil and grease containing water, and bio-applications.

Suggested methods for cleaning the electrode include chemical cleaning (except hydrofluoric acid) and washing detergents:
- dip the sensor for 30 seconds in a 5% HCl solution or detergent in case of grease contamination,
- rinse thoroughly the sensor into deionised water,.

5.2 STORAGE AND TRANSPORTATION

In case of long storage period, keep the instrument in a dry area.
In case of tranportation, use the original suitcase.

TO MEASURE = *TO KNOW*

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