Este manual es parte inseparable del aparato por lo que debe estar disponible a todos los usuarios del equipo. Le recomendamos leer atentamente el presente manual y seguir rigurosamente los procedimientos de uso para obtener las máximas prestaciones y una mayor duración del mismo.

This manual should be available for all users of these equipments. To get the best results and a higher duration of this equipment it is advisable to read carefully this manual and follow the processes of use.

Ce manuel fait partie de l'appareil, c'est pourquoi il doit être disponible à tous les utilisateurs. Nous vous recommandons de lire attentivement ce manuel et suivre tous les procédures d'emploi, afin d'obtenir les meilleures prestations et une plus grande durée de l'appareil.

Modelo / Model / Modèle 912/5 Dissolved oxygen analyzer

Thank you for choosing this equipment. We sincerely wish that you enjoy your dissolved oxygen analyzer Nahita model 912/5. We highly recommend looking after this equipment according to what is stated in this manual.

Nahita develops its products according to the CE marking regulations as well as emphasizing the ergonomics and security for its user.

The correct using of the equipment and its good quality will permit you to enjoy this equipment for years.

The improper use of the equipment can cause accidents and electric discharges, circuit breakers, fires, damages, etc. Please read the point of *Maintenance*, where we expose the security notes.

TO GET THE BEST RESULTS AND A HIGHER DURATION OF THE EQUIPMENT IT IS ADVISABLE TO READ THOROUGHLY THIS MANUAL BEFORE OPERATING WITH THE EQUIPMENT.

Please bear in mind the following:

- This manual is inseparable from the dissolved oxygen analyzer Nahita 912/5, so it should be available for all the users of this equipment.
- Follow all required **applicable laws about safety and health** (electrical security devices, inflammable, toxic and/or pathological products, etc.).
- You should carefully handle the dissolved oxygen analyzer avoiding sudden movements, knocks, free fall of heavy / sharp objects on it. Avoid spilling liquids inside the equipment.
- Never dismantle the different pieces of the dissolved oxygen analyzer to repair it yourself, since it could produce a defective use of the whole equipment and a loss of the product warranty, as well as injuries on people that handle the dissolved oxygen analyzer.
- To prevent fire or electric discharges avoid dry or dusty environments. In case it may happen unplug the equipment immediately.

- If you have any doubt about setting up, installation or functioning do not hesitate in contacting your wholesaler. You can also tell us any doubts or suggestions you have by contacting Nahita Technical Assistance Department by email to asistencia@auxilab.es.
- This equipment is protected under the Warranties and consumer goods regulation (10/2003).
- Overhaul is not covered by the dissolved oxygen analyzer warranty.
- Operations made by non-qualified staff will automatically produce a loss of the dissolved oxygen analyzer warranty.
- Neither fuses nor accessories (including their loss), are covered by the product's warranty. The warranty neither covers piece's deterioration due to the course of time.
- Please make sure you keep the invoice, either for having the right to claim or asking for warranty coverage. In case you have to send the equipment to Nahita Technical Assistance Department you should enclose the original invoice or a copy as guarantee.
- Manufacturer reserves the right to modify or improve the manual or equipment.

ATTENTION!! IF EQUIPMENTS ARE NOT PROPERLY CLEAN AND DISINFECTED THEY WOULD NOT BE ALLOWED TO REPAIR BY OUR TECHNICAL SERVICE.

INDEX OF LANGUAGES

INDEX OF CONTENTS

1. USES OF THE INSTRUMENT

912/5 Dissolved Oxygen Analyzer is used to measure oxygen of water solution in tap water factory, aquatic farm, environmental protection, sewage treatment plant, drink industry and scientific research departments.

With micro-processor technology, with the functions of automatic temperature compensation and calibration of zero oxygen, full scale, atmosphere pressure and salinity. The meter has the function of protection from electricity cutting off. The stored data and parameters will be kept even if unusual electricity cutting off happens.

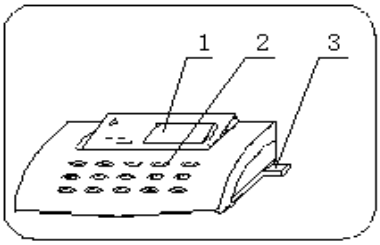
Measuring results can be stored, deleted, viewed and printed. At most 50 sets of data of DO concentration value, DO saturation value or current value can be stored. And 2 kinds of print modes are provided for users to select.

With the function of double displays of DO concentration value and temperature, DO saturation value and temperature, current and temperature in measuring system.

With RS-232 interface which is connected with TP-16 printer to print measuring results or connected with computer to communicate.

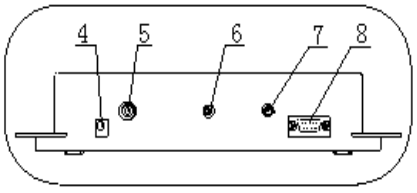
2. DESCRIPTION

Frontal panel of the meter



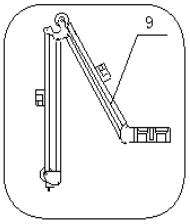
1. Screen
2. Keypad
3. Electrode frame seat

Rear panel of the meter

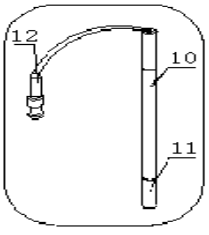


4. Power socket
5. Measuring electrode socket
6. Ground terminal
7. Temperature sensor socket
8. RS-232 interface

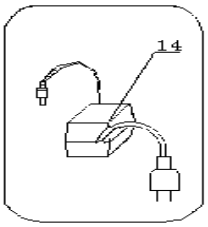
Fittings of the meter



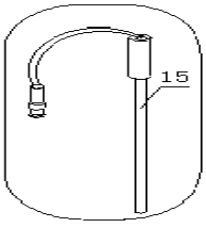
9. Multi-function electrode frame



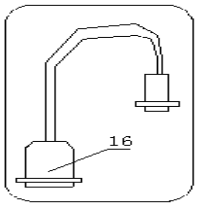
10. DO electrode
11. Electrode cap with membrane
12. Electrode plug



14. Universal power supply

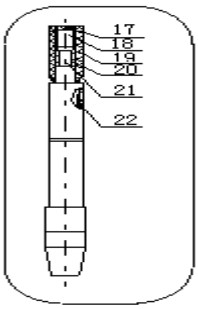


15. Temperature sensor
(Optional, not provided)



16. Printer connecting line

Electrode construction



17. Gold electrode
18. Silver electrode
19. Membrane cap
20. Electrolyte
21. Electrode core
22. Thermistance

3. TECHNICAL SPECIFICATIONS

Code **50912050**

Measuring range:

DO concentration	DO saturation	Temperature
0.00~19.99 mg/L	0.0~200.0 %	-5.0~105.0 ℃

Accuracy of electronic unit:

DO concentration	DO saturation	Temperature
±0.10mg/L	±1%(FS)	±0.3℃

Accuracy of the meter:

DO concentration	DO saturation	Temperature	Stability	Reproducibility
• ±0.30mg/L: When the difference between calibrating and measured solution temp. is not over ±3.0℃. • ±0.50mg/L: When the difference between calibrating and measured solution temp. is not over ±15.0℃.	• ±5.0%: When the difference between calibrating and measured solution temp. is not over ±3.0℃; • ±10.0%: When the difference between calibrating and measured solution temp. is not over ±15℃;	±0.5℃±1 bit Between 0.0~60.0℃ ±1.0℃±1 bit In the other range	±0.20mg/L/1h	0.20mg/L

Automatic temperature compensation range of measured solution: 0.0~40.0 ℃.
Remaining current: ≤0.10 mg/L.
Response time ≤45s (90% response at 20.0℃).
Salinity calibrating range: 0.0~40.0g/L.
Atmosphere pressure calibrating range: 77.0~110.0 kPa.
Normal operating conditions:
- Ambient temperature: 5.0~35.0 ℃.
- Relative humidity: ≤80%.
- Power supply: DC universal power supply (9V~15V, 300mA, positive inside, negative outside) without disturbing by electromagnetic field except terrestrial magnetic field

Outside dimension (L x W x H): 330 x 220 x 80 mm
Weight: ± 1kg.

4. INSTALLATION / SETTING UP

Preliminary inspection

- Unwrap the balance, take off the involving plastic and take off the poliespan protection in which it comes fitted.
- Please make sure that it does not present any damage because of the shipment. If it does please communicate to your transport agent or suministrator immediately, so that they can make the claims in the correct time limit.

We will only accept any equipment return within 15 days after delivery and provided it comes in its original package and with all accessories and documents supplied

- Please check that all the accessories are enclosed with the equipment:
  - DO electrode
  - DC universal power supply (9V DC, 500 mA)
  - Electrolyte bottle
  - Multi-function support stand

- 3 electrode membrane cap
- TP-16 serial printer connecting line
- Communicating connecting line
- Data collection software
- Protective cover
- User guide

Installation

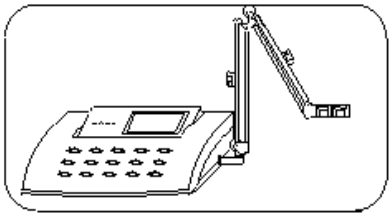
Before using this instrument, it is convenient for you to familiarize with its components and basic essentials.

PLEASE READ THOROUGHLY THE INSTRUCTIONS BEFORE CONNECTING AND OPERATING WITH THIS EQUIPMENT

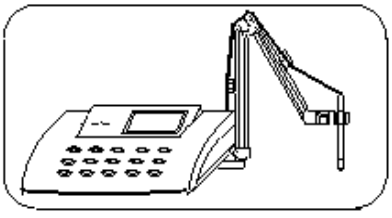
- Please put the dissolved oxygen analyzer on top of a horizontal, plane and stable table making a free space at least at 30 cm per side. Do not put the dissolved oxygen analyzer near any warm supply (burners, blowlamps…), nor expose it directly to the sun, etc.
- Avoid inflammable or toxic substances in the working area.
- The dissolved oxygen analyzer is supplied with a Schuko standard wire
- Please insert the wire that feeds the AC electric current in the base of current 220V 50Hz ±10% provided with earth wire and to the other end to the dissolved oxygen analyzer connector.

Neither the manufacturer nor the distributor will assume any responsibility for the damages produced to the equipment during its installation or damages to persons suffered by the improper use of the electric connection. The tension should be 220V 50Hz ±10%.

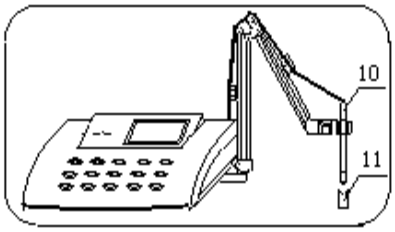
- If you are not using the dissolved oxygen analyzer for a long period of time please make sure it is disconnected from the net and protected from dust (this way you will avoid accidents and will extend its working-life).



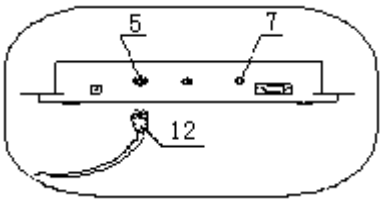
Insert multi-function electrode frame (9) in the seat (3).



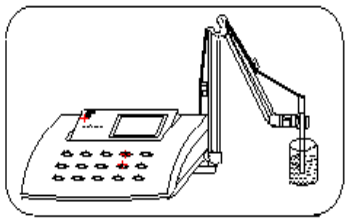
Put DO electrode (10) in the multi-function electrode frame (9).



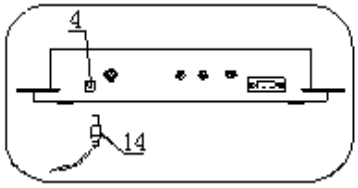
Take off the cap (11) of DO electrode (10).



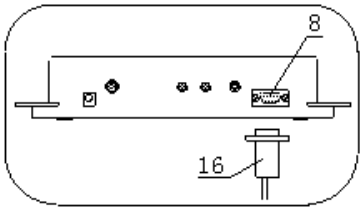
Insert the plug (12) of DO electrode (10) into measurement electrode socket.



Wash the electrode with distilled water, then immerge the electrode into measured solution. Put the beaker on the electromagnetic stirrer.



Insert universal power supply (14) plug into power socket (4). Then switch on the meter, you can begin to operate.



If user is fitted with TP-16 printer (installation of printer see operating instruction of this device), insert printer connecting line (16) in RS-232 interface (8) and printer sockets respectively.

Installation of electrode

The electrode is dry before operate, the electrode should be installed with membrane cap according to the following procedure:

- Wash the electrode core and membrane cap with distilled water for several times, then wash the electrode core and membrane cap with electrolyte for one time.
- Add a little of electrolyte into the membrane cap, hold the electrode vertical, turn the membrane cap into electrode core carefully to make membrane stuck to the surface of gold electrode.

- Clean the electrode surface with distilled water to remove the remaining electrolyte.

Note: Once the DO electrode is connected to the device, wait about 6 hours before use it to complete the polarization process.

Functions of the Meter

The meter has three measurement modes: DO concentration measuring, DO saturation measuring and current value measuring. The modes can be switched by pressing "MODE" button.

The meter has calibration functions of zero oxygen, full scale, atmosphere pressure and salinity. The measuring data obtained from various measuring modes can be printed, stored, deleted and viewed. Keyboard is form as follows:

MODE	ZERO	AIR	▲	ENTER
PRINT 1	FULL	SALT	▼	CANCEL
PRINT 2	SAVE	DEL	VIEW	ON/OFF

- **ON/OFF** button: turn on or off the meter.
- **MODE** button: select the measurement mode.
- **ZERO, FULL, AIR and SALT** buttons: Select calibration mode.
- **PRINT 1, PRINT 2, SAVE, DEL and VIEW** buttons: When the meter is in measuring mode, press certain above button, the meter will enter in the mode chosen (Print actual data, print save data, save data, delete and view data.).
- **ENTER** Button: Confirm the meter enters a certain function.
- ▲, ▼ Button: Adjust the parameter.
- **CANCEL** button: cancel the mistaken operation or exit from a certain function.

Start-up

Press "ON/OFF" button, several seconds later, the meter will enter DO concentration value measuring mode automatically.

 caution	It will take half an hour to preheat when the electrode is connected to the meter and the meter is turned on. If the meter is not connected with temperature sensor, the temperature of the meter should be set 25.0ºC Whatever working mode the meter is in, if "ov!" (Overflow) is shown on the meter, it indicates that the meter is out of measuring range or DO electrode is damaged.

In general, electrode must be calibrated before measuring. If users needn't calibrate zero oxygen, full scale, atmosphere pressure or salinity, at this time, the meter is in the mode of DO concentration measurement. Users can select measuring mode by pressing "MODE" button.

caution

After the meter is calibrated, the parameter value won't be lost even if the meter is off

Calibration of the Meter

- Zero oxygen calibration
  - Press "ZERO" button to start zero oxygen calibration;
    At the same time, put DO electrode into electrolyte solution (5% sodium sulfite).
  - Press "ENTER" button when the reading is stable, the meter has finished zero oxygen calibration and return to measurement mode.

  If users press "CANCEL" button in the process of calibration, the meter will cancel zero oxygen calibration and return to measurement mode.
  - In the process of calibration, press "MODE" button to select DO concentration, DO saturation or current value.

  When the meter finishes zero oxygen calibration, then full scale must be calibrated;

- Full scale calibration
  - Press "FULL" button to start full scale calibrating mode.
    Take DO electrode out of solution, clean it with water, absorb the water drops on surface of membrane carefully with filter paper, and then put it in the air, the electrode can't be touched water drop.
  - Press "ENTER" button when reading is stable, the meter has finished full scale calibration and return to measurement mode.

  If users press "CANCEL" button in the process of calibration, the meter will cancel full scale calibration and return to measurement mode.
  - In the process of calibration, press "MODE" button to select DO concentration, DO saturation or current value.

- Atmospheric pressure calibration

  After the meter has finished zero oxygen calibration and full scale calibration, if there is a great deal of difference between the atmospheric pressure at that time and standard atmospheric pressure, users must calibrate atmospheric pressure.
  - Press "AIR" button to start atmospheric pressure calibrating mode.
  - Then press "▲" or "▼" button to adjust atmospheric pressure parameters (atmospheric pressure value when measuring), parameter range is 77.0~110.0 kPa;
  - Press "ENTER" button, the meter has finished atmospheric pressure calibration and return to measurement mode.

  If users press "CANCEL" button in the process of adjustment, the meter will cancel atmospheric pressure calibration and return to measurement mode;

- Salinity calibration

When the meter has finished the above procedure, if the user need to measure sea water or sea water aquatic farm,
  - Press "SALT" button to start salinity calibration mode;

- Then press "▲" or "▼" button to adjust salinity parameter, its parameter is the salinity value of measured solution (Since this meter doesn't have salinity measuring function, users should define salinity value by themselves), parameter range is 0.0~40.0 g/L.
- After that press "ENTER" button, the meter has finished salinity calibration and return to measurement mode.

If users press "CANCEL" button in the process of adjustment, the meter will cancel salinity calibration and return to measurement mode.

In general water solution measurement, salinity does not need calibrating.

Measurement result treatment

- Store

The meter has three storages. One is for storing measured DO concentration value in DO concentration measuring working mode. The second is for storing measured DO saturation value in DO saturation measuring working mode. The third is for storing measured current value in current measuring working mode.

When the meter is in the mode of DO concentration, DO saturation or current measurement,

- Press "SAVE" button, the meter will store present measured value.
  At most 50 sets of measured data can be stored in each measurement mode. The meter will repeat storing from No.1 automatically if the sets of measuring data are more than 50 sets. While saving, the meter displays the present storing number and storing mark.

After saving finishes, the meter returns to measurement mode automatically.

- Delete

When the meter is in the mode of DO concentration, DO saturation or current measurement, if the users need to delete all stored data of a certain kind of storing,

- Press "DEL" button, the meter displays "All I datum saved Delete now?"
- Then press "ENTER" button, the saved data are all deleted.

After deleting finishes, the meter returns to the present measurement mode automatically.

If you press "DEL" button by mistake, please press "CANCEL" button, the meter will also be back to the present measuring working mode.

caution

1. If the stored data are cancelled, restoring the data is not available!
2. If the users need cancel a certain useless data, operate with deletion procedure according to view function of this chapter.

- Print

Before printing, please refer to operating instruction of the printer. Set baud rate as 9600; insert connecting line of the printer to RS-232 interface.

caution

1. The setting of TP-16 printer is: baud rate: 9600, no odd bit or even bit. DIP switch: 1-ON,2-OFF, 3-OFF, 4-OFF, 5-ON, 6-ON.
2. Printer must be connected to the meter as power is off.

- Current Print
  When the meter is in the working mode of DO concentration, DO saturation or current measurement, press "PRINT 1" button, the meter displays “Current PRN…” and print the data measured in the present measuring working mode. After printing, the meter will return to the present measuring working mode automatically.

Instant print form is as following:

Measurement mode	Form	Remarks
DO concentration	RESULT T: 25.0 DO: 8.25mg/L	 Temperature value DO concentration value
DO saturation	RESULT T: 25.0 SAT: 100.0%	 Temperature value DO saturation value
Electrode current	RESULT T: 25.0 I: 1008nA	 Temperature value Electrode current value

- Saved data print
  When the meter is in the work mode of DO concentration, DO saturation or current measurement, press "PRINT 2" button, the meter displays "Saved PRN…", and print all data in the storages in the present measuring working mode. After printing, the meter will return to measurement working mode before printing automatically.

Stored data print form is as following:

Measurement mode	Form		Remarks
DO concentration	No. 1 T: 21.0 DO: 8.31mg/L	No. 2 T: 25.0 DO: 8.25mg/L	Stored DO concentration data number Temperature value DO concentration value
DO saturation	No. 1 T: 20.0 SAT: 50.0%	No. 2 T: 10.5 SAT: 98.2%	Stored DO concentration data number Temperature value DO saturation value
Electrode current	No. 1	No. 2	Stored DO concentration data number

	T: 20.0 I: 900nA	T: 25.0 I: 1808nA	Temperature value Electrode current value

caution

1. During printing, if users need to end printing, press "cancel" button.
2. If there is no data saved in the storages, the meter will display "No saved data!" for several seconds and then the meter will return to measurement mode before printing automatically.

- View

When the meter is in the mode of DO concentration, DO saturation or current measurement.

- Press "VIEW" button, the meter starts view mode.
- Press "▲" or "▼" button to search all measuring data in the storages in the present measurement mode.
- Press "CANCEL" button to quit view mode and the meter will return to the present measurement mode automatically.

If user needs to delete certain useless stored data, proceed as follows:

- Press "▲" or "▼" button to move the arrow icon to that data;
- Then press "DEL" button.
- Press "ENTER" button when the meter indicates confirmation, the data is then deleted.

Once the data is deleted, it can't be restored. Please remember this. If the users press "DEL" button by mistake, please press "CANCEL" button, the meter will return to view mode automatically.

Security

- The dissolved oxygen analyzer must be used by previously qualified staff that knows how the equipment works thanks to the user manual.
- You should put the dissolved oxygen analyzer in a horizontal plane stable table, having a safety area of at least 30 cm per side.
- Follow all required **applicable laws about safety and health** (electrical security devices, inflammable, toxic and/or pathological products, etc.).
- Do not place the dissolved oxygen analyzer near any warm supply (burners, blowlamps, etc.), nor expose it directly to the sun. Avoid vibrations, dust and dry environments.
- During its functioning dangerous materials such as flammable or pathological substances must be out of the safety area.
- When you are not using the dissolved oxygen analyzer for a long period of time please make sure it is unplugged in order to avoid possible accidents.
- **It is essential to have the equipment switched off and unplugged from the net** before cleaning, checking components or replacing any piece (e.g. replacement of a fuse).
- Never try to repair the dissolved oxygen analyzer by yourself, since you will lose the warranty and may provoke damages to the general operating system or the

electrical installation, as well as injuries to the people that usually handle the equipment (burns, hurts…).

- Try not to spill any liquid on the control panel, though it is properly insulated. In case you have any doubts do please immediately unplug the dissolved oxygen analyzer (see *Maintenance*).
- Made under the European regulations for electrical security, electromagnetic compatibility and security on machines.

5. MAINTENANCE AND CLEANING

To get the best results and a higher duration of this equipment it is essential to follow the processes of use.

Note: All the processes of use mentioned below will not have any value unless you keep a continued and careful maintenance**.**

- Please follow the processes of use of this manual.
- This manual should be available for all users of this equipment.
- Always use original components and supplies. Other devices can be similar but they can damage the equipment.
- Before turn on the meter, make sure the connection between meter and power supply correct and safe. Connection of the meter must be reliable, and prevent the electrode from corrosive gas.
- The dissolved oxygen analyzer is supplied with a Schuko standard wire. It has to be plugged to an earth connection and the socket should be handy and ready to unplug the equipment in case of emergency.
- After turn on the meter, if the screen doesn't light, please check if power supply is correct and voltage remains good.
- In case measuring value is not correct, check if the electrode is properly connected to the socket, if the meter still doesn't work well, it is necessary to change the electrode
- The socket of the meter must be kept clean and dry. It mustn't be touched acidity, alkali and salt solution. When the DO electrode is not working, it should be preserved in boiled and cool distilled water. Avoid the electrode from immerging in sodium sulfite solution. If the above solution flows into the inside of the electrode, the performance of the electrode will be influenced seriously.
- After the electrode is installed with new electrolyte and membrane, output of DO electrode is low and the electrode is not able to be calibrated. After the electrode is connected to the meter for polarization, the reading still can't reach the needed value, there are two possibilities: One is that the membrane is not stuck to gold negative pole closely, the other is that the surface of gold negative pole is not wet, hit the DO electrode lightly on the desk or the bench. If reading increases, it indicates that the electrode function has restored. Otherwise, change electrode.
- After the DO electrode is electrified and polarized, zero oxygen value is higher than specification, check if negative pole is damaged, if there is hollow or small hole on

surface of gold negative pole; check if the surrounding of gold negative pole is out of the basic seat.

- If electrode signal is not right (response time is long, membrane is torn etc.), change membrane, electrolyte should be replaced once every two month. Detailed operating procedure is as follows:
    - Set the electrode vertical, revolve the old electrode membrane. Wash the electrode core with distilled water and dry it with paper.
    - After the electrode is used for a period of time, if the silver ring in electrode core becomes black, rub it with thin sand paper.
    - Pour electrolyte into new membrane cap; install the membrane cap according to installing procedure b.
    - Every time when membrane or electrolyte is replaced, the electrode must be polarized and calibrated again.
- Polarization: It means the electrode is connected with the meter to be electrified for 6 hours. Calibration should be made after polarization.
- Never try to repair the dissolved oxygen analyzer by yourself, since you will lose the warranty and may provoke damages to the general operating system or the electrical installation, as well as injuries to the people that usually handle the dissolved oxygen analyzer (burns, hurts…) or damages in nearby equipment.
- In the event of breakdown please contact your distributor to overhaul through Nahita Technical Assistance Department.

Cleaning

- Never use scourers or substances that can grate for cleaning metallic parts such as stainless steel, aluminum, coatings, etc. as they damage the dissolved oxygen analyzer and produce an early ageing of the equipment.
- Use a fluff-free cloth dampened with soaped water that does not contain abrasives.

ATTENTION!! IF EQUIPMENTS ARE NOT PROPERLY CLEAN AND DISINFECTED THEY WOULD NOT BE ALLOWED TO REPAIR BY OUR TECHNICAL SERVICE.

6. APPENDIX

This appendix is extracted from ISO 5813-1983 water quality analyses-DO determination in water iodometry.

Temperature ºC	C_S mg/L	ΔC_S mg/L	Temperature ºC	C_S mg/L	ΔC_S mg/L
0.0	14.46	0.0925	21.0	8.90	0.0467
1.0	14.22	0.0890	22.0	8.73	0.0453
2.0	13.82	0.0857	23.0	8.57	0.0440
3.0	13.44	0.0827	24.0	8.41	0.0427
4.0	13.09	0.0798	25.0	8.25	0.0415
5.0	12.74	0.0771	26.0	8.11	0.0404
6.0	12.42	0.0745	27.0	7.96	0.0393
7.0	12.11	0.0720	28.0	7.82	0.0382
8.0	11.81	0.0697	29.0	7.69	0.0372
9.0	11.53	0.0675	30.0	7.56	0.0302
10.0	11.26	0.0653	31.0	7.43	
11.0	11.01	0.0633	32.0	7.30	
12.0	10.77	0.0614	33.0	7.18	
13.0	10.53	0.0595	34.0	7.07	
14.0	10.30	0.0577	35.0	6.95	
15.0	10.08	0.0559	36.0	6.84	
16.0	9.86	0.0543	37.0	6.73	
17.0	9.66	0.0527	38.0	6.63	
18.0	9.46	0.0511	39.0	6.53	
19.0	9.27	0.0496	40.0	6.41	
20.0	9.08	0.0481			

Instructions on environment protection

At the end of its life cycle, please, does not dispose of this equipment by throwing it in the usual garbage; hand it over a collection point for the recycling of electrical and electronic appliances. It does not contain dangerous or toxic products for humans but a non adequate disposal would damage the environment.

The materials are recyclable as mentioned in its marking. By recycling material or by other forms of re-utilization of old appliances, you are making an important contribution to protect our environment.

Please inquire at the community administration for the authorized disposal location.