

NEUTRALAB[®] PLUS

LIQUID WASTE TREATMENT SYSTEM
EXTRACTION OF DANGEROUS AND TOXIC SUBSTRACT,
NEUTRALIZATION AND DISINFECTION





OPERATING MANUAL

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	In event of not conforming to the standards specified in this guide, not only may the operation of the system be risked, but also it may damage the property and may conduce to human injuries.
	Any technical intervention to the system, including installation and uninstallation, must only be made by Authorized Technical Service .

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1. AIM AND SCOPE

This guide has been designed for the user to understand and operate the system in a more simplified way. It also constitutes as a source to enable the user to take necessary actions and to carry out maintenance and reparations procedures that could be done by the user.

Areas of usage

- Non-particle, alkali and acid cleaning liquids of full blood analysis devices and auto-analyzers operating in biochemical and hormone labs
- Waste liquids from dialysis treatment

Liquids that are NOT used in Neutralab Device:

- Liquids that contain particles and substances,
- Radioactive and toxic waste liquids,
- Dyes, formaldehyde, xylene etc. untreatable wastes according to regulations.

1. RESPONSIBILITIES

2.1. User's Responsibilities

The owner of the device is responsible for the implementation of safety rules specified in this manual or for having these rules implemented by delegating his/her authority to third parties, or for the problems occurring as a result of not having these rules implemented. Furthermore, s/he is responsible for the periodic maintenance of the device unless there is an agreement on after-sales service.

2.2. Operating Conditions

- 1- The device must be located in a place where the height and floor space of the room specified by the manufacturer depending on the application.
- 2- The isolation material applied to walls and ceiling of the room should have high insulating effect.
- 3- Indoor temperature should not be less than 10°C and more than 40°C.

-
- 4- There should be a drain connection which is at least 35 mm diameter for discharging the treated waste into the sewer.
 - 5- The floor and walls up to 120cm height from the ground should be covered with wet room floor materials like tiles or epoxy.
 - 6- There must be at least one water drainage on the ground.
 - 7- Mains water connection and a sink should be available in the room.
 - 8- Appropriate lighting for wet rooms should be installed.
 - 9- The room should have ventilation system. (The total room volume is intended to be emptied/ventilated at least 10 times in 1 hour)
 - 10- The main fuse of the room should be 25A and there should be an electrical panel consisting of 16A fuses that are connected to group plugs mounted at last two different walls.
 - 11- Room door should be at least 90 cm wide.

2.3 Safety

A direct contact with chemicals or waste should be avoided. It is important to comply with domestic regulations and safety guidelines of health units about the waste treatment.

2.4. Manufacturer's Responsibilities

Manufacturer is responsible for the problems related to production and installation provided that all the requirements specified in this manual be met.

3. DEFINITIONS

Reactive; chemical substances used in the analysis for diagnosis. Must be appropriate to EC norms. Chemical content of the reactive is available in the Safety Data Sheet and the supplier or the manufacturer is required to provide reactive ecologically slightly hazardous to water and ground.

Concentrated waste: Auto-analyzers separately store the reactive used during the analysis with a separate storing system. These wastes are called "Concentrated Wastes" and they are separately collected and stored. They should not mixed with flushing water.






Flushing Solutions: Acid ($\text{pH} \leq 2$) and alkaline ($\text{pH} \geq 12$) chemical substances used for removing inorganic and organic substances accumulated in the auto-analyzers due to operation.

Flushing Liquids; It is the liquid emitted from each analysis of auto-analysers during the removal of residues. Particularly since it contains serum (patient's blood) contamination (infection) risk (bacteria, virus, etc.) is high. Due to high alkalinity and acidity as a result of alkaline and acid flushing solutions. So these do not suit the standards presupposed in the regulation "Waste-water Standards required for discharging the waste water into the sewage or in any other infrastructure facility". Therefore, neutralization and disinfection are required.

Neutralization; is a chemical reaction in which an acid and a base react with each other and the pH parameter converge to 7.

Disinfection; is the process medium in order to inactivate or destroy pathogenic bacteria, fungi, viruses and other microorganisms.

4. SYMBOLS












	WARNING: This symbol indicates that it is necessary to conform to the instructions and if not, there could be damage and hazards.
	CAUTION: This symbol warns that if not complied, injuries in persons and damage to the device may occur. Attention has to be paid.
	DANGER: This shows the high risk of person's getting injured. Therefore it indicates the rules necessary to obey.
	DANGER: It shows the high risk that people could be electrocuted and thus be injured.
	DANGER: This indicates that people can get poisoned and/or killed when exposed to toxic hazard.

5. TECHNICAL FEATURES

	NEUTRALAB PLUS 100	NEUTRALAB PLUS 300
Waste Tank Capacity :	100 L	400L
Chemical Tank Capacity	20- 50L	100L
Waste Processing Capacity (Max.)	< 100L/h	< 1000L/h
Ventilation(m³/h), pipe size (mm)	90 m ³ /h, 95	90 m ³ /h, 95
Waste inlet number and pipe size (inch)	Unpressurized or pressurized - 1	Unpressurized or pressurized - 1
Drainage Pipe Size (inch)	> 1	> 1
Total Head (m) Maximum	1,5	1
Pipetting capacity	200 L/h	200 L/h
Power (kW)	1	1,5
Voltage V/Hz	230/50	230/50
Height (mm)	2200	3000
Floor Area (meter square)	10	40
Weight , empty (kg)	100	300
pH regulator	Sodium Hydrogen Sulphate, 5% HCL / Sodium Carbonate; 10% NaOH	Sodium Hydrogen Sulphate, 5% HCL / Sodium Carbonate; 10% NaOH
Disinfectant Used	Ozone, UV	Ozone/ Uv/ Sodium dichloroisocyaurate/ sodium hypochlorite
Disinfectant Concentration	-	0,1 ppm – 5 ppm (ORP controlled)
Dechlorinate		Sodiumthiosulphate, Activated carbon.

Kros reserves the right to make any changes to offer better service as necessary.

6. TRANSPORTATION AND INSTALLATION OF NEUTRALAB

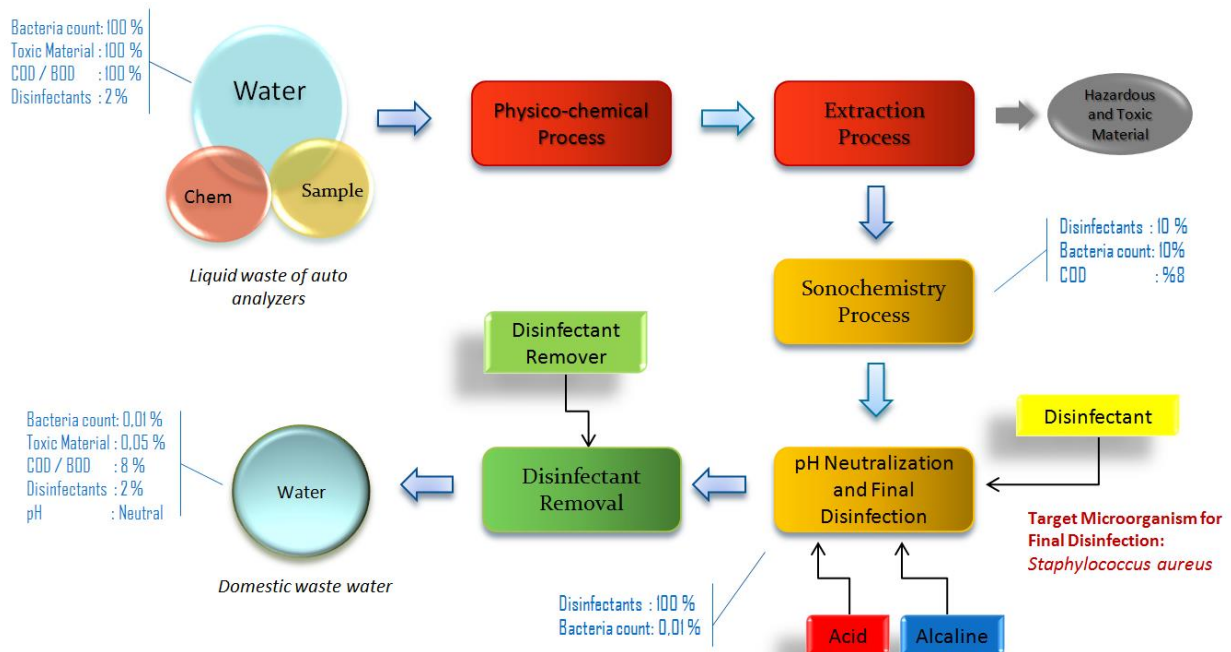
	Necessary cautions have to be taken against falling and rolling while handling.
	While handling and transporting the device be sure that it is in upright position with the original package and the security belts attached to the pallet.
	Device must be placed on a smooth and firm surface.
	Before installation and operation, this manual must carefully be read.
	Once the outer package is opened, the device has to be protected against atmospheric conditions (direct sunlight, rain, etc.)
	If wastes are to be sent to the device with a level difference, maximum distance and maximum height has to be calculated.
	To move the device from one place to another indoors, the tanks must be empty first and foremost.
	Liquid wastes that need neutralization and disinfection must be connected to the NEUTRALAB [®] inlet. In distances where there is no level difference and no automatic flow, an interim tank is used. Waste hose of the device must be connected to the drain.
	Power cable must be connected to 230V 50 Hz mains.
	A proper ventilation is required where the device operates and the ventilation unit of the device has to be connected to outdoor through a pipe with appropriate size.
	All safety procedures including protection of eyes, face, hands and use of suitable clothing are strictly required.

7. DEVICE FUNCTIONS

Primary Features:

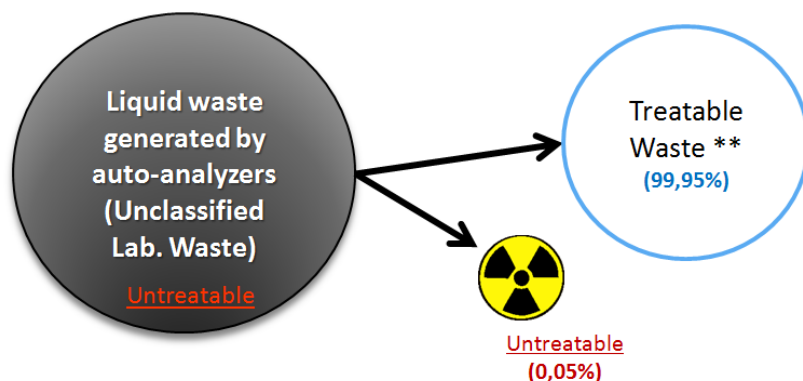
- Elution of the hazardous 0,5% of liquid waste produced by auto analyzers and the adequate discharge of the remaining 99,5% into sewer systems.
- In comparison with other procedures and systems which are applied, this device is not only more cost efficient, but is also more energy efficient.
- With its disinfection procedure this device is capable to operate with less chemicals whilst achieving superior results, due to synergy effect.
- Constant results/quality of disinfection. (99,9%)
- Automatic pH-adjustment.
- Does not require a big foundation to install and operate.
- Liquid waste which has not been classified as hazardous has to be disposed adequately by a specialized cooperation as if it was hazardous.

* Treatable waste contains the blood serum of patients, microorganisms etc.



7.1. EXTRACTION SYSTEM

Neutralab Plus extracts toxic and hazardous chemicals from the liquid waste by chromatographic methods and collects them as concentrated waste. After separating approximately 5% concentrate of the total waste, the device neutralizes and disinfects the remaining 95%.



Inlet Parameters	Unit	Sample Value
Visual analysis/Odour		Turbid/ Fragrant
pH Value (aqueous solution)		3,2
COD - Chemical Oxygen Demand	mg/lit	> 2000
Toxicity Class (EC50 - ISO 11348)		3 (very toxic)

Outlet Parameters	Unit	Sample Value	Method
Visual analysis/Odour		Transparent / Odourless	
pH Value (aqueous solution)		7,28	EN 12176
Water content	(% weight)	> 99,9	EN 12880
Solid content (% weight)	(% weight)	< 0,1	EN 12880
Dissolved Oxygen	mg/lit	8	SM-4500 OG
COD - Chemical Oxygen Demand	mg/lit	< 10	SM-5220-B Open Reflux
TOC - Total Organic Carbon	mg/lit	8,43	SM 5310B
Determination of Flash Point		105 <	ASTM D93
Phenol	mg/lit	< 0,07	
Fat - Grease	mg/lit	1,73	ASTM D7066
Toxicity Class (EC50)		0	ISO 11348
GHS Category		GHS 5	
LD50 value	mg/kg	5	

Sample analyses are carried out by TUBITAK (The Scientific and Technological Research Council of Turkey)

7.2. DISINFECTION SYSTEM

Disinfection system consists of 4 mechanisms;


1. Chemical disinfection
2. Ozone disinfection
3. Physio-chemical process
4. UV system

7.2.1. Chemical Disinfection

The disinfection process is carried out by transferring a certain concentration of disinfecting agent (disinfectant) into the liquid according to Oxidation Reduction Potential (ORP / Redox) and providing the required disinfectant contact time.

This phase performed by 4 hardware;

1. Controller
2. ORP Probe
3. Disinfectant Pump
4. Chemical tank

	Prior to any intervention to device, it is necessary that the power cable should be unplugged and all safety procedures including protection of eyes, face, hands and use of suitable clothing are strictly required.
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7.2.1.1 Controller

Chemical measurement range: 0÷14.0 pH or ±1500 mV for Redox

Precision: 1% FS pH o 1% FS Redox

Chemical measurement input impedance: 1 x 10¹³ ohms

Chemical measurement probe connection: BNC

Probe calibration: Software assisted

Temperature measurement range: -10 to +100 °C (Resolution 1 °C)

Automatic temperature compensation from 0 to 100 °C by means of PT 100 sensor or manual setting of the instrument.

Relay output: Set Point 2 (max. resistance load: 10 A 250 VAC)

Current outputs: 1 (max. load 500 ohm) [Precision $\pm 2\%$ F.S.]

Input: 15 \div 30 VAC/DC

Power Supply: 90 \div 265 VAC 50/60 Hz

Power rating: 5VA Max

Fuses: 500 mA (delayed)

Display: 2-line 16-character LCD

Keyboard: 4 keys

Protection level:

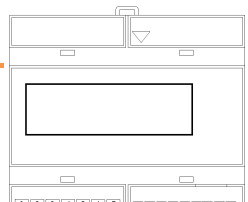
- ✓ Din-Rail = IP40
- ✓ 48x96 = IP40
- ✓ 96x96 = IP65 Front panel
- ✓ 144x144 = IP65 Full box



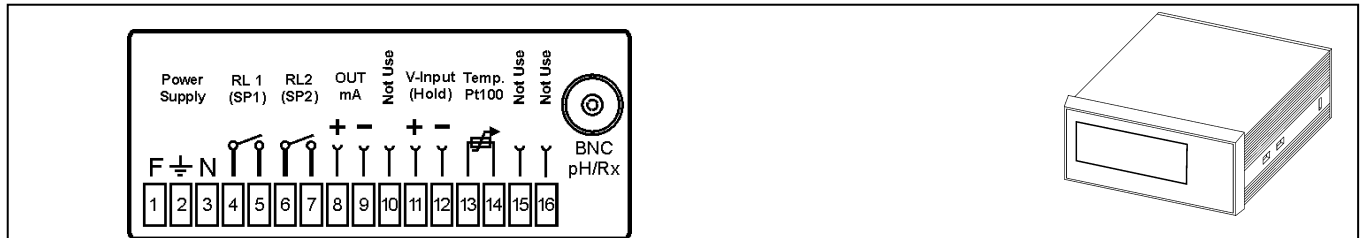
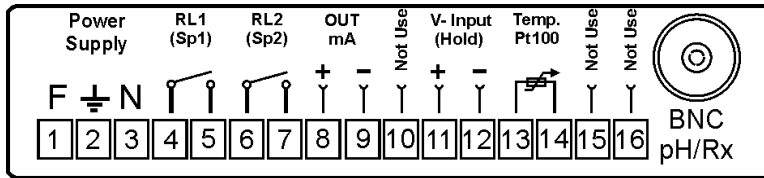
Terminal	Description
1	Phase (230 VAC supply)
2	Earth
3	Neutral (230 VAC supply)
4 -5	Set Point 1 Relay
6-7	Set Point 2 Relay
8-9	0/4 \div 20 mA power output
10	Not in use
11-12	VDC input VDC 15 \div 30 Vdc grip
13-14	Temperature Probe Input
15-16	Not in use
BNC	pH/Redox Probe Input

Electrical connection label

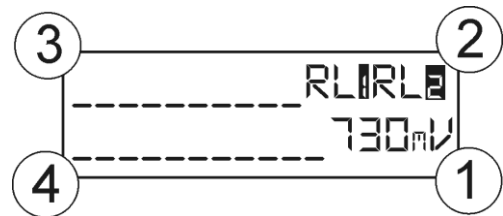
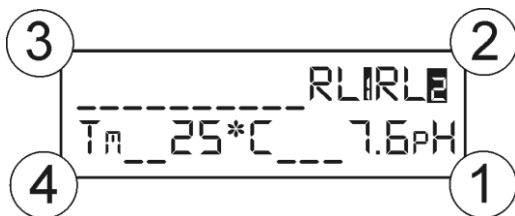
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KRS-NP-01/02-21/OE



Instrument Display



Area 1 = pH or Redox chemical measurement display

Area 2 = Relay 1 and 2 status display. If the relay's number is blinking, the contact has changed status.

Area 3 = Alarms display

Area 4 = Manual or automatic temperature display for pH measurement; this area is empty for Redox version.

Note: The RL2 icon becomes RLA when Set Point 2 is set as an Alarm.

Instrument keyboard

Esc/Mode = Double-function key: **Esc** = Immediate exit from menu, **Mode** = quick settings menu

Enter/ Cal = Double-function key: **Enter** = Confirm function, **Cal** = Immediate calibration access

Up = Increase key

Down = Decrease key

Probe calibration function (Press the **Cal** key for 3 seconds [press **Esc** to exit])

- ✓ **Calibrating the pH probe**
 - Immerse the probe in the 7 pH solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
 - Immerse the probe in the 4 pH or 9.22 pH solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
- ✓ **Calibrating the Redox probe**
 - Immerse the probe in the 465 mV solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
- ✓ **Mode Function (quick programming menu)** (Press the **Mode** key for 1 second. Select using the up and down keys)
 - ✓ **Set Point 1** 7.4 pH (Press the Enter key and adjust the value using the up and down keys)
 - ✓ **Set Point 2** 7.4 pH (Press the Enter key and adjust the value using the up and down keys)
 - ✓ **Relay 1** (Press the Enter key to change the relay's status)
 - ✓ **Relay 2** (Press the Enter key to change the relay's status)
 - ✓ **Note:** The instrument exits automatically after 10 seconds.

- ✓ **Value settings menu function** (Press the **Enter** and **Esc** keys for 5 seconds)
- ✓ **??**Language (Set menu's language)
 - Available in English (UK), French (FR), Spanish (ES), German (DE), Italian (IT)
- ✓ **??**Set Point 1 (Set dosing or control functions via relay 1)
- ✓ **??**Set Point 2 (Set dosing or control functions via relay 2)
- ✓ **??**Temperature (Menu available only for pH measurement)
- ✓ **??**mA output (Set current output)
- ✓ **??**Advanced (technical management menu)
- ✓ **Default parameters reset function**
- ✓ **??**Switch off the instrument.
- ✓ **??**Press the **Up** and **Down** keys together and turn on the instrument.
- ✓ **??**The instrument displays "init._Default". Select Yes using the Up or Down keys and press Enter.
- ✓ **??**The instrument reloads all of the default parameters.
- ✓ **Note:** To exit the menus, press **Esc**.

GENERAL SETTINGS

Press the **Enter** and **Esc** keys at the same time. Value Programming:

Programming Menu (Default parameters)	
Language setting UK	
Set Point value 7.4 pH	Type of dosing Acid
Proportional band 0.4 pH	Hysteresis 0.0 pH
ON Timer OFF	OFF Timer OFF
Delay Start OFF	Delay End OFF
Set Point 2 (Set Point 1 Dosing or Alarm can be selected, see advanced menu)	Set Point value 7.4 pH
Type of dosing Acid	Proportional band 0.4 pH
Hysteresis 0.0 pH	ON Timer OFF
OFF Timer OFF	Delay Start OFF
Delay End OFF	Temperature (*)
Measurement unit °C	Manual Value 25 °C
mA Output	Range 0/4÷20 mA 4÷20 mA
Value for 0 / 4 mA Value 0 pH	Value for 20 mA Value 14 pH
Advanced	Select pH/Redox pH
Dosing or Alarm Set Point 2 Dosing	Hold input enabled or disabled Disabled = ON
Calibration enabled or disabled Enabled = ON	Statistics
Number of measurement alarms 0	Number of RL1 activations 0
Number of RL2 activations 0	Number of Hold input signals 0
Statistics reset	
Relay 1 contact normally open or closed Normally open	Relay 2 contact normally open or closed Normally open
Manual current output 0÷20 mA current generator	mV input probe signal Displays signal in mV
Hold signal present Signal present, ON; missing, OFF	
Offset calibration Offset in %, last calibration	Gain calibration (*) Gain in %, last calibration
Firmware version X.X	Instrument reset Restore default values
Password 0000	*menu present only with pH measurement
** menu present only with temperature probe installed	
Programming Menu (Default parameters)	Language
Language setting UK	Set Point 1
Set Point value 7.4 pH	Type of dosing Acid
Proportional band 0.4 pH	Hysteresis 0.0 pH
ON Timer OFF	
Delay Start OFF	Delay End OFF

Set Point 2 (Set Point 1 Dosing or Alarm can be selected, see advanced menu)	Set Point value 7.4 pH
Type of dosing Acid	Proportional band 0.4 pH
Hysteresis 0.0 pH	ON Timer OFF
OFF Timer OFF	Delay Start OFF
Delay End OFF	Temperature (*)
Measurement unit °C	Manual Value 25 °C

*menu present only with pH measurement

** Menu present only with temperature probe installed

PROGRAMMING SPECIFIC SETTINGS MENU

Press the Enter and Esc keys together for 5 seconds to access the instrument's programming menu.

Language menu: Set the desired language from the following:

- Italian
- English
- French
- Spanish
- German

Set Point 1 menu: Set the dosing parameters; all settings will be activated by Relay 1.

The menu contains the following items:

Item	Default	Limits
Set Point value	7.4 pH / 750 mV	0÷14 pH / ±1500 mV
Type of dosing	Acid / Low	Acid or Alkaline/High or Low
Proportional band	0.4 pH / 40 mV	0.4÷3 pH / 40÷300 mV
Hysteresis	0.0 pH / 0 mV	0÷3 pH / 0÷300 mV
ON Timer	OFF	OFF...1÷480 minutes
OFF Timer	OFF	OFF...1÷480 minutes
Delay Start	OFF	OFF...3÷960 seconds
Delay End	OFF	OFF...3÷960 seconds

Set Point 2 menu: Set the dosing parameters; all settings will be activated by Relay 2.

The menu contains the same items as Set Point 1 if **SET POINT 2 = Dosing** (see Advanced menu, page 8).

If **SET POINT 2 = ALARM** (see Advanced menu, page 8), Relay 2 can be used as a measurement alarm for Set Point

The menu therefore changes as follows:

Item	Default	Limits
Set Point 1 alarm band	3 pH / 300 mV	1÷10 pH; 100÷1000 mV
OFA (Set Point 1 over feed alarm)	OFF	OFF÷960 minutes

Temperature menu: Set the temperature for automatic compensation of the pH measurement. The measurement unit may also be set.



Before Opening The Pump, Always Disconnect The Main Power Cable.

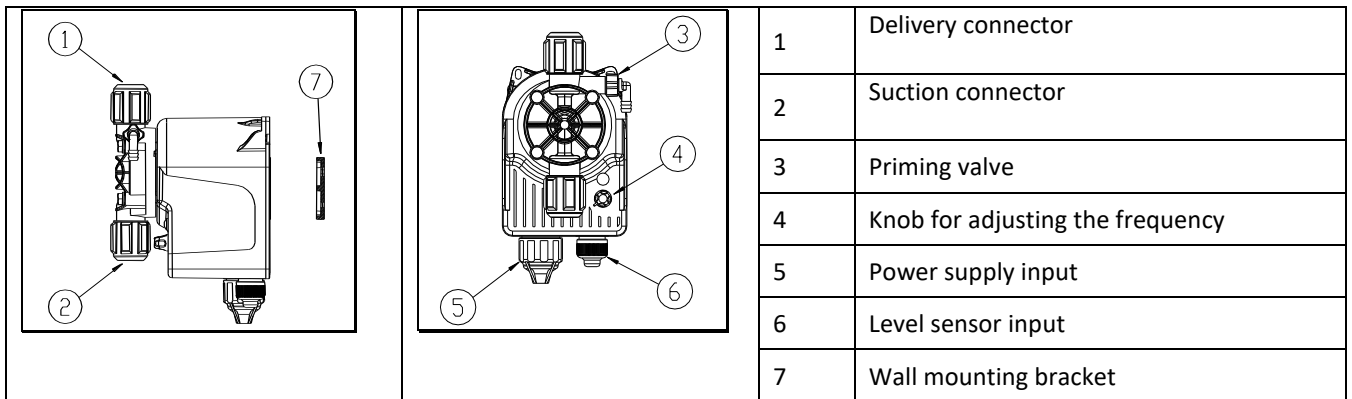
7.2.1.2 ORP Probe

Technical Properties:

Measurement Range	: ± 1000 mV
Operating Temperature	: 0 – 60 °C
Operating Pressure	: 0 – 4 bars
Material	: Epoxy
Membrane Material	: Platinum
Reference Electrolyte	: Gel
Diaphragm Type	: Ceramic / Pellon
Electrical Connection	: BNC, Ø12

7.2.1.3. Disinfectant Pump

It is the dosage pump controlled by time and ORP to deliver disinfectant necessary for the disinfection to the waste tank.



OPERATION

Once all installation operations have been completed you are ready to start the pump.

Priming

- Connect the suction hose to the suction fitting on the pump.
- Connect the other end of the suction hose to the foot filter.
- Immerse the foot filter inside the product jerry can.
- Connect the drain hose to the fitting and put the other end into the tank, above the maximum liquid level.
- Start the pump at top speed, open the priming fitting by turning the knob anticlockwise and wait until liquid flows out of the hose connected to it.
- Once you are sure that the pump is completely full of liquid, close the fitting and the pump will start dosing.




Adjusting the flow rate

The flow rate can be varied by adjusting the frequency regulating knob on the front of the pump. Pump operation is stopped by turning the knob fully anticlockwise.

Indication LED

The LED on the front of the pump indicates its operating status:

- Flashing in time with the magnet – Normal operation.
- Flashing slowly without dosing – Functional stop.
- Flashing quickly without dosing – Level alarm.
- LED switched off – power supply disconnected or insufficient voltage (< 90 Vac).

	All the maintenance operations on the pump must be done only by authorized and trained personnel.
	Before doing any operation on the pump, power supply cable must be unplugged.
	While pouring chemical products into the pump after dosing, remember to wear protective clothes and gloves as well as providing proper protection for your eyes.

7.2.1.4 Chemical Tank

Disinfectant and disinfectant removal chemicals used for disinfection of liquid are stored in chemical tanks.

Tank capacity : 25 – 250 Liters (depending on the application)

Material : Polyethylene

7.2.2. OZONE DISINFECTION

Ozone is used for disinfection because of its high oxidation power. Due to its unstable structure, it turns into its raw material oxygen after disinfection and leaves no residue.

Ozone generator type : Corona
Production capacity : 0,4 – 2,0 gr/hr
Hose connection : M8 PTFE hose
Power : 66W – 150W
Cooling : Air
Corona Frequency : 10 kHz (mean)

- Name: Ozone, Triatomic oxygen
- Molecular formula: O₃
- Molecule weight: 48
- Boiling point: -111,3 °C
- Colour: colourless at +°C, light blue liquid at – 146 °C, dark blue crystal at – 220 °C
- Odour: a strong door >0,02 ppm
- Solubility in water at 0 °C: 0,64 mg/litre
- Density: 2,144
- Flammability: Not flammable but boosts combustion



7.2.3. PHYSICO-CHEMICAL PROCESS

Physicochemical processes helps disinfection applied at the final stage to get ready. Using combined disinfectants technique during disinfection process helps decrease the hazard to the environment due to low levels of chemical usage and thus it increases the efficiency of total disinfection. Since two or more disinfectants are used in the above mentioned method, a more effective pathogen inactivation can be ensured through both instant and sequential applications.

This method is known as interactive disinfection in the literature and its four different versions are used sequentially in Neutralab Plus device. Thanks to this technique, it is possible to prevent bacteria from getting more resistant. By using physicochemical method, organic substances and microorganisms can be removed from the medium. At the same time, by adjusting pH and temperature, efficiency has been maximized.

7.2.4. UV SYSTEM


When UV rays come into contact with microorganisms, they damage their DNA by photo oxidation. All cell activities, including reproduction, of a living creature whose DNA has been destroyed are stopped and cell death occurs.

Housing material	: AISI 304 Stainless Steel
Operating Pressure	: < 8 bars
Lamp life-cycle	: 9000 hours
Flow rate	: 0,4 – 10 m ³ /hour
Power	: 14 – 300 W

7.3. NEUTRALIZATION SYSTEM

Neutralization system consists of 4 hardware;

1. Controller
2. ORP Probe
3. Chemical Pump
4. Chemical tank


 Prior to any intervention to device, it is necessary that the power cable should be unplugged and all safety procedures including protection of eyes, face, hands and use of suitable clothing are strictly required.

7.2.1.1 Controller

Chemical measurement range: 0÷14.0 pH or ±1500 mV for Redox
Precision: 1% FS pH o 1% FS Redox

Chemical measurement input impedance: 1×10^{13} ohms
Chemical measurement probe connection: BNC
Probe calibration: Software assisted

Temperature measurement range: -10 to +100 °C (Resolution 1 °C)
 Automatic temperature compensation from 0 to 100 °C by means of PT 100 sensor or manual setting of the instrument.

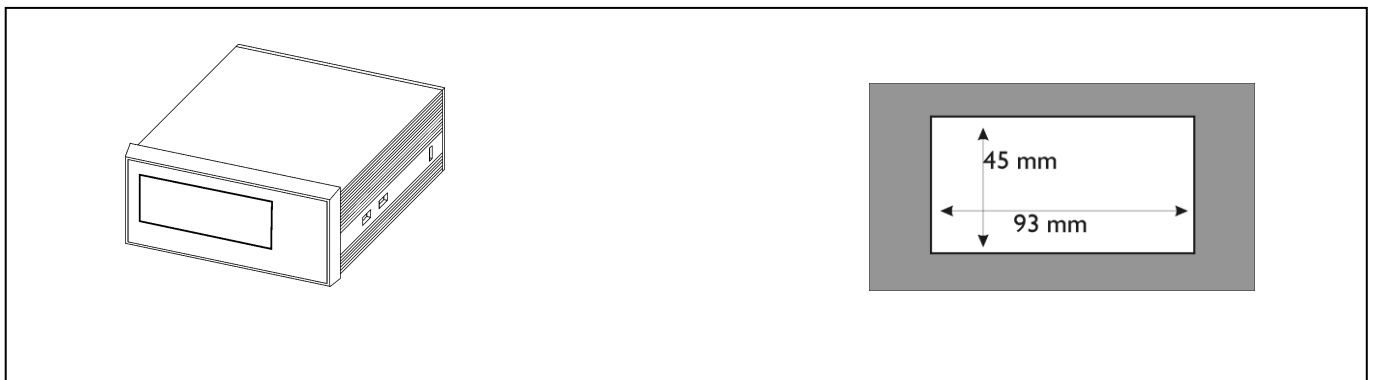
Relay output: Set Point 2 (max. resistance load: 10 A 250 VAC)

Current outputs: 1 (max. load 500 ohm) [Precision ±2% F.S.]
Input: 15÷30 VAC/DC

Power Supply: 90÷265 VAC 50/60 Hz
Power rating: 5VA Max
Fuses: 500 mA (delayed)
Display: 2-line 16-character LCD
Keyboard: 4 keys

Protection level:

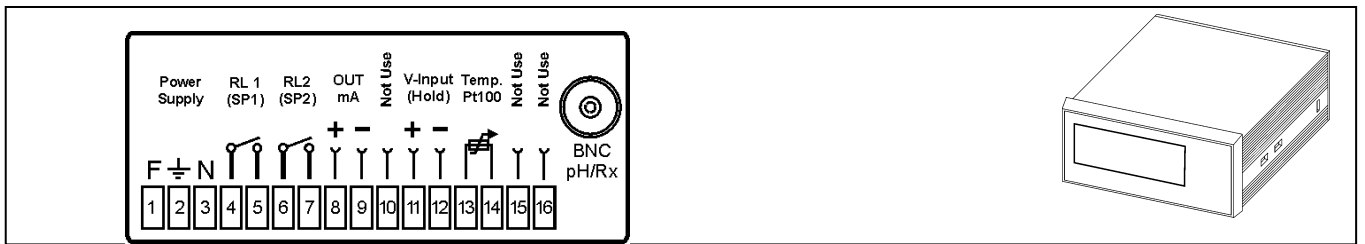
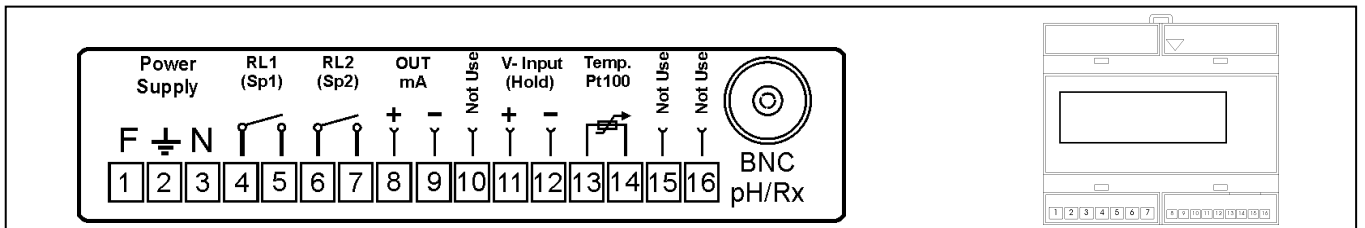
- ✓ Din-Rail = IP40
- ✓ 48x96 = IP40
- ✓ 96x96 = IP65 Front panel
- ✓ 144x144 = IP65 Full box



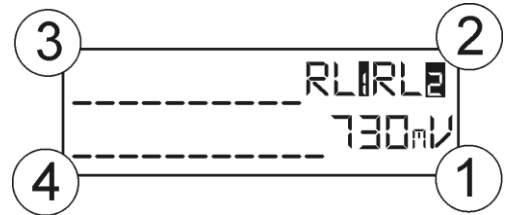
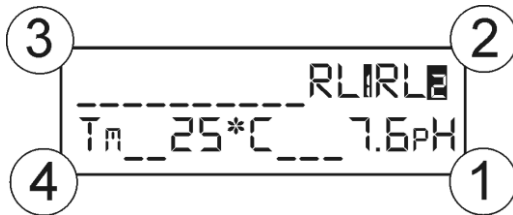
Terminal	Description
1	Phase (230 VAC supply)

2	Earth
3	Neutral (230 VAC supply)
4 -5	Set Point 1 Relay
6-7	Set Point 2 Relay
8-9	0/4÷20 mA power output
10	Not in use
11-12	VDC input VDC 15÷30 Vdc grip
13-14	Temperature Probe Input
15-16	Not in use
BNC	pH/Redox Probe Input

Electrical connection label



Instrument Display



Area 1 = pH or Redox chemical measurement display

Area 2 = Relay 1 and 2 status display. If the relay's number is blinking, the contact has changed status.

Area 3 = Alarms display

Area 4 = Manual or automatic temperature display for pH measurement; this area is empty for Redox version.

Note: The RL2 icon becomes RLA when Set Point 2 is set as an Alarm.

Instrument keyboard

Esc/Mode = Double-function key: **Esc** = Immediate exit from menu, **Mode** = quick settings menu

Enter/ Cal = Double-function key: **Enter** = Confirm function, **Cal** = Immediate calibration access

Up = Increase key

Down = Decrease key

Probe calibration function (Press the **Cal** key for 3 seconds [press Esc to exit])

- ✓ **??** Calibrating the pH probe
 - Immerse the probe in the 7 pH solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
 - Immerse the probe in the 4 pH or 9.22 pH solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
- ✓ **??** Calibrating the Redox probe
 - Immerse the probe in the 465 mV solution and press Enter.
 - Wait 60 seconds for self-calibration. When finished, probe accuracy is shown as a percentage.
- ✓ **Mode Function (quick programming menu)** (Press the **Mode** key for 1 second. Select using the up and down keys)
 - ✓ **??** Set Point 1 7.4 pH (Press the Enter key and adjust the value using the up and down keys)
 - ✓ **??** Set Point 2 7.4 pH (Press the Enter key and adjust the value using the up and down keys)
 - ✓ **??** Relay 1 (Press the Enter key to change the relay's status)
 - ✓ **??** Relay 2 (Press the Enter key to change the relay's status)
 - ✓ **Note:** The instrument exits automatically after 10 seconds.
- ✓ **Value settings menu function** (Press the **Enter** and **Esc** keys for 5 seconds)
 - ✓ **??** Language (Set menu's language)
 - Available in English (UK), French (FR), Spanish (ES), German (DE), Italian (IT)
 - ✓ **??** Set Point 1 (Set dosing or control functions via relay 1)
 - ✓ **??** Set Point 2 (Set dosing or control functions via relay 2)
 - ✓ **??** Temperature (Menu available only for pH measurement)
 - ✓ **??** mA output (Set current output)
 - ✓ **??** Advanced (technical management menu)
- ✓ **Default parameters reset function**
 - ✓ **??** Switch off the instrument.
 - ✓ **??** Press the **Up** and **Down** keys together and turn on the instrument.
 - ✓ **??** The instrument displays "init._Default". Select Yes using the Up or Down keys and press Enter.
 - ✓ **??** The instrument reloads all of the default parameters.
 - ✓ **Note:** To exit the menus, press **Esc**.

GENERAL SETTINGS

Press the **Enter** and **Esc** keys at the same time. Value Programming:

Programming Menu (Default parameters)	
Language setting UK	
Set Point value 7.4 pH	Type of dosing Acid
Proportional band 0.4 pH	Hysteresis 0.0 pH
ON Timer OFF	OFF Timer OFF
Delay Start OFF	Delay End OFF
Set Point 2 (Set Point 1 Dosing or Alarm can be selected, see advanced menu)	Set Point value 7.4 pH
Type of dosing Acid	Proportional band 0.4 pH
Hysteresis 0.0 pH	ON Timer OFF
OFF Timer OFF	Delay Start OFF
Delay End OFF	Temperature (*)
Measurement unit °C	Manual Value 25 °C
mA Output	Range 0/4÷20 mA 4÷20 mA
Value for 0 / 4 mA Value 0 pH	Value for 20 mA Value 14 pH
Advanced	Select pH/Redox pH
Dosing or Alarm Set Point 2 Dosing	Hold input enabled or disabled Disabled = ON
Calibration enabled or disabled Enabled = ON	Statistics

Number of measurement alarms 0	Number of RL1 activations 0
Number of RL2 activations 0	Number of Hold input signals 0
Statistics reset	
Relay 1 contact normally open or closed Normally open	Relay 2 contact normally open or closed Normally open
Manual current output 0÷20 mA current generator	mV input probe signal Displays signal in mV
Hold signal present Signal present, ON; missing, OFF	
Offset calibration Offset in %, last calibration	Gain calibration (*) Gain in %, last calibration
Firmware version X.X	Instrument reset Restore default values
Password 0000	*menu present only with pH measurement
** menu present only with temperature probe installed	
Programming Menu (Default parameters)	Language
Language setting UK	Set Point 1
Set Point value 7.4 pH	Type of dosing Acid
Proportional band 0.4 pH	Hysteresis 0.0 pH
ON Timer OFF	
Delay Start OFF	Delay End OFF
Set Point 2 (Set Point 1 Dosing or Alarm can be selected, see advanced menu)	Set Point value 7.4 pH
Type of dosing Acid	Proportional band 0.4 pH
Hysteresis 0.0 pH	ON Timer OFF
OFF Timer OFF	Delay Start OFF
Delay End OFF	Temperature (*)
Measurement unit °C	Manual Value 25 °C

*Menu present only with pH measurement

** Menu present only with temperature probe installed

PROGRAMMING SPECIFIC SETTINGS MENU

Press the Enter and Esc keys together for 5 seconds to access the instrument's programming menu.

Language menu: Set the desired language from the following:

- Italian
- English
- French
- Spanish
- German

Set Point 1 menu: Set the dosing parameters; all settings will be activated by Relay 1.

The menu contains the following items:

Item	Default	Limits
Set Point value	7.4 pH / 750 mV	0÷14 pH / ±1500 mV
Type of dosing	Acid / Low	Acid or Alkaline/High or Low
Proportional band	0.4 pH / 40 mV	0.4÷3 pH / 40÷300 mV
Hysteresis	0.0 pH / 0 mV	0÷3 pH / 0÷300 mV
ON Timer	OFF	OFF...1÷480 minutes
OFF Timer	OFF	OFF...1÷480 minutes
Delay Start	OFF	OFF...3÷960 seconds
Delay End	OFF	OFF...3÷960 seconds

Set Point 2 menu: Set the dosing parameters; all settings will be activated by Relay 2.

The menu contains the same items as Set Point 1 if **SET POINT 2 = Dosing** (see Advanced menu, page 8).

If **SET POINT 2 = ALARM** (see Advanced menu, page 8), Relay 2 can be used as a measurement alarm for Set Point

The menu therefore changes as follows:

Item	Default	Limits
Set Point 1 alarm band	3 pH / 300 mV	1÷10 pH; 100÷1000 mV
OFA (Set Point 1 over feed alarm)	OFF	OFF÷960 minutes

Temperature menu: Set the temperature for automatic compensation of the pH measurement. The measurement unit may also be set.



Before Opening The Pump, Always Disconnect The Main Power Cable.

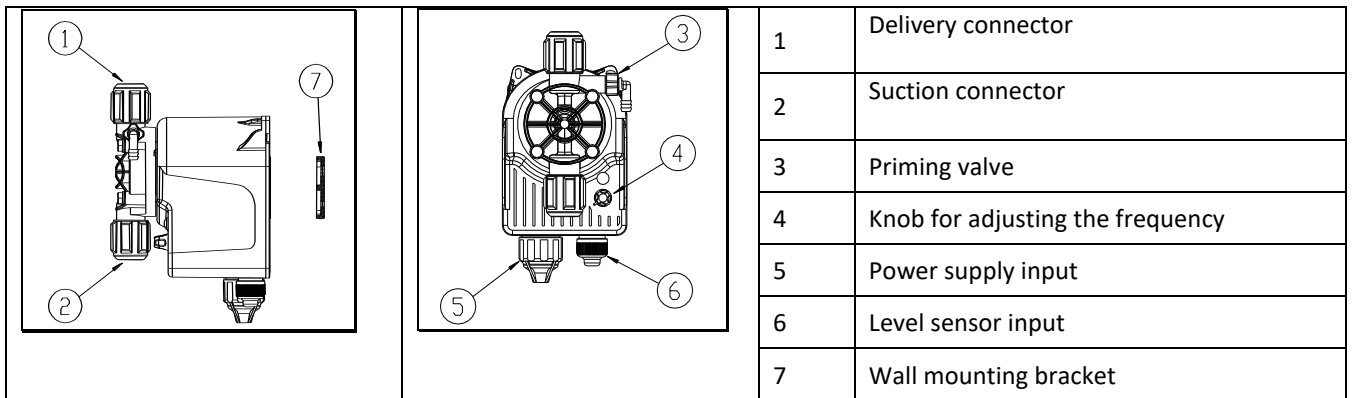
7.2.1.2 pH Probe

Technical Properties:

Measurement Range	: 2 - 12
Operating Temperature	: 0 – 60 °C
Operating Pressure	: 0 – 4 bars
Material	: Epoxy
Membrane Material	: Glass
Reference Electrolyte	: Gel
Diaphragm Type	: Ceramic / Pellon
Electrical Connection	: BNC, Ø12

7.2.1.3. Chemical Pump

Acid dosage pump controlled by pH meter and that dosages acid into the system in case the waste in the incubation tank has pH values higher than the tolerated level. Alkaline dosage pump controlled by pH meter and that dosages alkaline into the system in case the waste in the incubation tank has pH values higher than the accepted level.



OPERATION

Once all installation operations have been completed you are ready to start the pump.

Priming

- Connect the suction hose to the suction fitting on the pump.
- Connect the other end of the suction hose to the foot filter.
- Immerse the foot filter inside the product jerry can.
- Connect the drain hose to the fitting and put the other end into the tank, above the maximum liquid level.
- Start the pump at top speed, open the priming fitting by turning the knob anticlockwise and wait until liquid flows out of the hose connected to it.
- Once you are sure that the pump is completely full of liquid, close the fitting and the pump will start dosing.




Adjusting the flow rate

The flow rate can be varied by adjusting the frequency regulating knob on the front of the pump. Pump operation is stopped by turning the knob fully anticlockwise.

Indication LED

The LED on the front of the pump indicates its operating status:

- Flashing in time with the magnet – Normal operation.
- Flashing slowly without dosing – Functional stop.
- Flashing quickly without dosing – Level alarm.
- LED switched off – power supply disconnected or insufficient voltage (< 90 Vac).

	All the maintenance operations on the pump must be done only by authorized and trained personnel.
	Before doing any operation on the pump, power supply cable must be unplugged.
	While pouring chemical products into the pump after dosing, remember to wear protective clothes and gloves as well as providing proper protection for your eyes.

7.2.1.4 Chemical Tank

Acid and alkaline chemicals used for pH neutralization of liquid are stored in chemical tanks.

Tank capacity : 25 – 250 Liters (depending on the application)

Material : Polyethylene

8. CHEMICAL TANKS AND PREPARATION OF SOLUTIONS


Chemical tanks are color-coded.

— **Natural / White: Disinfectant** and disinfectant removal chemical

- **Blue:** pH reducer (acid)
- **Red:** pH oxidizer (alkaline)

Chemical	Colour Code	Stock Concentration
Dichloride / Sodium hypochlorite	Natural / White	min.50g/L max.100g/L
Sodium Thiosulphate / Sodium Sulphate	Natural / White	min.50g/L max.200g/L
Sodium hydrogen Sulphate / Hypochlorite acid HCL / Sulfuric acid H ₂ SO ₄	Blue	Saturated Solution (90- 100%w/w) / HCL max. % 5 v/v / H ₂ SO ₄ Max. %5 v/v
Sodium Carbonate / Sodium hydroxide NaOH / Potassium Hydroxide KOH	Red	Saturated solution (90- 100%w/w) / NaOH max. % 5 w/w / KOH max. % 5 w/w

8.1. SAFETY WARNINGS

	All safety procedures including protection of eyes, face, hands and use of suitable clothing are strictly required.
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8.2. PREPARATION OF CHEMICAL SOLUTIONS

Chemical solutions must be prepared according to the concentration levels specified in the table above or under the supervision of the authorized personnel after necessary safety precautions are taken.

- If no solvent is specified beforehand, always use distilled water while preparing solution.
- While acid solution is prepared, no water is added to concentrated acids. On the contrary, concentrated acid is added to the distilled water over the wall of the glass case slowly and by cooling under tap water.
- All equipment used to prepare solution must be rinsed thoroughly.
- While weighing the chemicals, in order to protect the chemicals from going bad because of humidity in the air, the package must immediately be sealed off.
- Before preparing solid chemicals, read the labels carefully.
- Any residue left on the scale pan must be washed into the chemical tank with a washing bottle.
- After the dissolved substance is added, solution must be added to the balloon as much as half of its volume and be sure that the substance is dissolved completely. After it is dissolved completely, add distilled water up to volume line.

Preparing Solution by Percent (%)

A Sample

Preparing NaOH stock solution of 10.000 ml at 1%.

100g NaOH is weighed in a beaker on scales and some water is added to the NaOH to dissolve. A funnel is placed on the mouth of the tank. The solution in the glass beaker is poured into the tank via the funnel. Some more completion liquid is added to the beaker and the beaker is rinsed with water. Then, using the funnel, it is poured into the balloon. This is repeated until the glass beaker and the funnel are completely cleaned. It is filled with water up to tank line (10.000 ml).

Preparing a 50.000 ppm-sodium hypochlorite stock solution

Any bleach (sodium hypochlorite) available on the market contains 50g substance (50.000ppm). It can be directly added to the chemical tank via a funnel up to the line.

Preparing 100.000ppm dichloride stock solution (*Sodium dichloroisocyaurate*)

1000g dichloride is weighed in a plastic beaker. Then it is dissolved by adding some water. A funnel is placed onto the mouth of the tank. The solution in the plastic beaker is poured into the balloon via funnel. Some more liquid is added from the completion liquid to the plastic beaker and the beaker is rinsed with water. Then, using the funnel, it is poured into the balloon. This is repeated until the glass beaker and the funnel are completely cleaned. It is filled with water up to tank line (10.000 ml).

Preparing solutions from liquids (solutions by volume)

Sample

Preparing %1 g HCl solution:

It is necessary to find how many grams of HCl in 1 ml of a %37 HCl main solution. Since the specific gravity of %37 HCl solution is $d = 1,19$, in 1 ml of it,

$$1.19 \times (37 / 100) = 0,4403 \text{ g HCl}$$

From this point, it is needed to calculate how many millilitres of %37 solution is needed for 1 gram of HCl.

$$1 / 0,4403 = \sim 2,3 \text{ ml}$$

So 2.3 ml is needed from %37 solution.

In other words, 230 ml of solution is taken from %37 HCl solution by using a measured cylinder and added to a chemical tank half-filled with water via a funnel slowly. Chemical tank is completed up to the waterline. Thus, 1% HCl is prepared.

The solutions, after prepared, are filled in the tanks and then they are sealed.

9. USEAGE AND MAINTENENCE

According to the scope of the device in the user interface on the controller of the device;

- Alarms,
- Date and time,
- Probes used (pH, ORP, etc.) lifetime (hours),
- Downtime (hours, minutes),
- Working time (hours, minutes),
- pH values,
- Temperature (° C),
- Disinfectant / disinfectant type,
- Concentrations of disinfectants / disinfectants (mV,%, ppm),
- Contact time of disinfectants / disinfectants (minutes),
- Waste disinfectant concentration (mV,%, ppm),
- Amount of sewage (liters) and
- Monitoring of chemical tanks and the amount of expenditure (liters) can be monitored.

After the installation of the device by the technical service, the user does not need to intervene when performing normal operations.

10. TROUBLESHOOTING AND ALARMS

- Device does not operate...
 - **Be sure that all the electric cables are connected properly.**
 - **Check if there is a power supply.**
 - **Check the safety fuses.**
 - **Emergency Stop Button might have been left pressed.**
- No display on the screen...
 - **Check the screen contrast.**
 - **Check if there is a power supply.**
- Pipetting does not function...
 - **Check the pipette connection.**
 - **Check the collection tank. It may be full.**
 - **Check the pipetting pump.**
- Fan does not work...
 - **Check the cable connection.**
 - **Check the power supply.**
 - **Press F3 button 5 seconds.**

Not: Should the trouble continue, contact the authorized service.

Alarm Table:

Alarm	Screen	Alarm Shut-Off	Cause	Solution
Low Chemical in Chlorine Removal Tank	KLOR GİDERME SEVİYE AZ (CHLORINE REMOVAL LOW)	Press F3 button to deactivate alarm	Chlorine Removal tank is empty. Level Key is stuck / broken	Fill the chlorine removal tank, check the level key
Low Liquid in Alkaline	ALKALİ SEVİ AZ	Press F3 button to	Alkaline Tank is empty.	Fill the alkaline tank,

Tank	(ALKALINE LOW)	deactivate alarm	Level Key is stuck / broken	check the level key
Low liquid in the chlorine tank	KLOR SEVİYE AZ (Low Chlorine)	Press F3 button to deactivate alarm	Chlorine Tank is empty. Level Key is stuck / broken	Fill in the chlorine tank, check the level key
Low liquid in the Acid tank	ASİT SEVİYE AZ (Low Acid)	Press F3 button to deactivate alarm	Acid tank is empty. Level key is stuck / broken	Fill in the acid tank, check the level key
Insufficient Incubation time	DDP UZUN (DDP LONG)	Press F3 button to deactivate alarm	Before the Disinfectant Dosage Pump stops, incubation time is over	Increase chlorine concentration, extend incubation time
Liquid Overflow	TANK I TASMA (TANK I OVERFLOW)	Press F3 button to deactivate alarm	Excessive liquid entry to the Collection Tank, 1st Transfer pump not working	Check the 1st Transfer pump. Amount of waste might have increased
Liquid Overflow	TANK II TASMA (TANK II OVERFLOW)	Press F3 button to deactivate alarm	Excessive liquid entry to the Incubation Tank, 2nd Transfer pump not working	Check the 2nd Transfer pump. Amount of waste might have increased
Liquid Leakage	SIVI KACAGI (LIQUID LEAKAGE)	Press F3 button to deactivate alarm	A leakage might occur in the system.	Check the inside of the device

11. MAINTENANCE

For a smooth operation of the device, it needs monthly, 6-monthly and yearly maintenance by the technical service.

11.1. DAILY CARE BY THE USER

- Chemical liquid level check,
- pH and ORP data entry

11.2. MONTHLY MAINTENANCE BY THE AUTHORIZED TECHNICAL SERVICE

- All mechanical parts are checked.
- Pump and motors performances are observed.
- Waste tank storage time and incubation efficiency are checked.
-

11.3. 6 MONTHLY MAINTENANCE BY THE AUTHORIZED TECHNICAL SERVICE

- Chemical absorption filters are checked.
- Calibration of measuring instruments is done.
- Dosage pumps are checked.
-

11.4. ANNUAL MAINTENANCE BY THE AUTHORIZED TECHNICAL SERVICE

- Measurement Props changes are done (pH –ORP).
- Repair kit change of dosage pumps is done.
- Tank cleaning is done.

11.5. SAFE-USE LIFE

Safe-use life of the device is 10 years.

12. BIBLIOGRAPHY

ORGANISM	pH	Temp. (°C)	Contact Time	Free Chlorine amount (ppm)	Decrease as a result of Antimicrobial effect	References
Bacteria						
Bacillus anthracis spores	7,2	22	120 min	2,3 - 2,4	%100	Brazis, et al. (1958:8)
Bacillus globigii spores	7,2	22	12 min	2,5 - 2,6	% 99,99	Brazis, et al. (1958:18)
Bacillus subtilis spores	7,0	25	30 min	1000	4 log decrease	Sykes, (1970:7)
Mycobacterium tuberculosis	8,4	20	10 min	1000	%100	Rutala, et al. (1991:19)
Pseudomonas aeruginosa	8,2 - 9,2	20	10 min	100	%100	Rutala, et al. (1997:1)
Legionella pneumophila	---	25	0 min	3,3	%100	Shakliy, et al. (1980:21)
Staphylococcus aureus	7,2	25	30 sec	0,8	%100	Bolton, et al. 1988:15)
Listeria monocytogenes	9,5	20	30 sec	100	%100	Lopes, (1986:25) & El-Kest, et al. (1988:26)

ORGANISM	pH	Temp. (°C)	Contact Time	Free Chlorine amount (ppm)	Decrease as a result of Antimicrobial effect	References
Viruses						
HIV (%50 plasmatic medium)	---	23 -27	1 min	5000	≥ 7 log decrease	Resnick, et al. (1986: 28)
Hepatitis A virus	7,0	5	3,6 min	0,5	4 log decrease	Sobsey, et al. (1988 :29)
Hepatitis B virus (Dried plasmatic medium)	9,2	20	10 min	500	%100	Bond , et al. (1983:30)
HSV-1	7,3	25	10 min	2000	> 5.0 log decrease	Croughan, et al. (1988:(31)
HSV-2	7,2	25	10 min	2000	> 4.75 log decrease	Croughan, et al. (1988:31)

ORGANISM	pH	Temp. (°C)	Contact Time	Free Chlorine amount (ppm)	Decrease as a result of Antimicrobial effect	References
Fungi						
Aspergillus niger	10-11	20	30-60 min	100	%100	Dychdala, (1961:3)
Rhodotorula flava	10-11	20	5 min	100	%100	Dychdala, (1961)

ORGANISM	pH	Temp. (°C)	Contact Time	Free Chlorine amount (ppm)	Decrease as a result of Antimicrobial effect	References
Protozoons						
Entamoeba cysts	7,0	25	150 min	0,08 -0,12	%99-100	Clarke, et al. (1956:36)
Acanthamoeba castellanii	7,0	25	30 min	1,02	%100	Cursons,et al. (1980:39)
Cryptosporidium parvum	7,0	25	90 min	80	≥2.0 log decrease	Korich, et al. (1990:40)
Giardia lamblia	6,0 - 7,2	25	10 min	1,5	%100	Jarroll, et al. (1981:41)
Naegleria fowleri	7,0	25	30 min	95 - 100	%100	Cursons, et al.(1980:39)

ORGANISM	pH	Temp. (°C)	Contact Time	Free Chlorine amount (ppm)	Decrease as a result of Antimicrobial effect	References
Nematodes						
C.quadrilabiatu	6,6-7,2	25	30 min	95 - 100	%93	Chang,et al.(1960:42)
D.nudicapitatus	6,6-7,2	25	30 min	95 - 100	%97	Chang,et al.(1960:42)