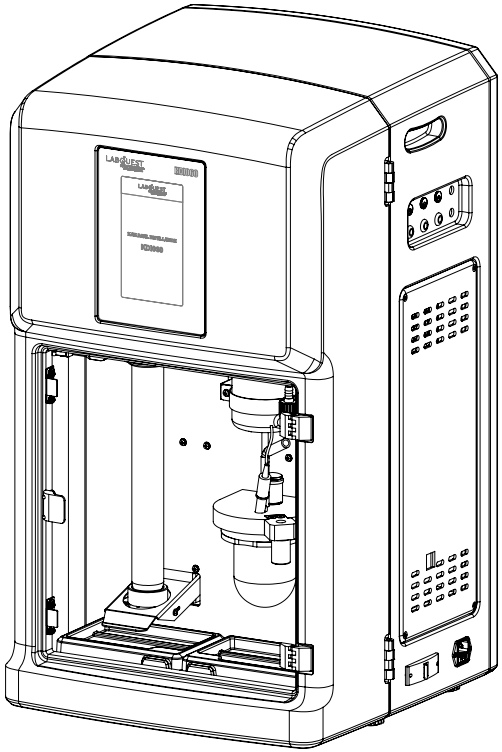
LABQUEST BY BOROSIL®

KJELDAHL DISTILLATION

OPERATING MANUAL
KDI060



DEALER :

THANK YOU NOTE

We Borosil, one of India's most customer oriented brands truly appreciate your business and express our gratitude for the trust you have placed on us.

We hope your choice serves you well in your scientific endeavors and aspire to have the pleasure of doing business with you for years to come.

TABLE OF CONTENTS

PACKING LIST - BOX 1

Sr. No	Description	Quantity
1	Automatic Kjeldahl Distillation Unit	01 No.

PACKING LIST - BOX 2

Sr. No	Description	Quantity
1	GL Cap Accessories	01 No.
2	NRV Accessories	02 Nos.
3	Silicon Tube 8 MM ID X 12MMOD	01 No.
4	Hose Pipe	01 No.
5	Drip Tray LH	01 No.
6	Drip Tray RH	01 No.
7	Product Brochure	01 No.
8	Warranty Certificate	01 No.
9	Service Report	01 No.
10	Test Report	01 No.
11	Door Lock Key 7PK	01 No.
12	Door Lock Key 8PK	01 No.
13	Power Cable 10A (3 Mtr)	01 No.
14	Cable Tie 100 MM	05 Nos.
15	Brass Connector Male	01 No.
16	Hose Clamp	03 Nos.
17	Oven Mitts	01 No.
18	Teflon Tape	01 No.
19	Dosing Head With Holder	01 No.
20	Condenser	01 No.
21	Teflon Pipe 8 MM ID	01 No.
22	Silicon Tube 8 MM ID For Condenser (210 MM)	01 No.

23	Silicon Tube 10 MM ID For Dosing Head (100 MM)	01 No.
24	Test Tube (250mL)	02 Nos.
25	Aspiration Bottles With Sensor	03 Nos.
26	2L Amber Reagent Bottle	01 No.
27	HPLC Cap W/Connector & Filter	01 No.
28	PH Electrode	01 No.
29	Dissolution Flask 250mL (Titration Flask)	01 No.
30	Potassium Chloride Solution 3M 60mL	03 Nos.

PRODUCT SPECIFICATION

PARAMETERS	KDI060
Steam Addition	Automatic
Distilled Water Addition	Automatic
Alkali Addition	Automatic
Acid Addition	Automatic
Titrant Addition	Automatic
Titration	Automatic
Display	7" touch screen
Tube Capacity (mL)	250 mL / 400 mL
Titration Flask Capacity (mL)	250 mL / 400 mL
Steam Power (Adjustable)	10 - 100%
Maximum Distillation Time (mins)	20
Reagent Level Sensor	Yes
Anytime Alkali Addition	Yes
Tube Error Detection	Yes
Door Close Sensor	Yes
One Point Calibration Alkali And Distilled Water Pump	Yes
Two Point Calibration For Acid Pump	Yes
Real Time Monitoring Of Process Parameters	Yes
SELV Protection	Yes
User Editable Programs	No. of programme
PC Connectivity	Yes
Print Readout	Yes
Auto Drain	Yes
N/P Recovery	>99.5%
Nitrogen Reproducibility	±1%
RSD	<1%
LOD	1- 200 mg with of $\overline{>}$0.1 mg of nitrogen 0.1% nitrogen & 0.2% protein
Current Consumption (A)	10
Power Consumption (W)	1500
Dimensions (L X B X H) mm	470 X 470 X 830 mm

CAUTION

- Always use proper protective equipment. (Clothing, gloves, etc.)
- Always follow good hygiene practices.
- Each individual is responsible for his / her own safety.
- Always wear shatter proof eye protection.

SAFETY AND WARNING

Important operating and maintenance instructions. Read the accompanying text carefully.

POTENTIAL ELECTRICAL HAZARDS

- Only qualified persons should perform procedures associated with this Symbol.
- Equipment being maintained or serviced must be turned off to prevent possible injury.
- Inadequate earthing at the installation facility can lead to hazardous electrical shocks.
- The manufacturer is not liable for any injury or death resulting from electrical hazards due to faulty earthing in the lab.

POTENTIAL HEAT HAZARDS

- Only qualified persons should perform procedures associated with this Symbol.
- Do not touch the KDI060 unit directly when the unit is in hot condition.

SAFETY PRECAUTIONS

The following precautions should be taken when operating or working near the KDI060:

- Do not use the product if there is any electrical or mechanical damage.
- Repair should be performed only by qualified individuals.
- Do not use accessories which are not recommended by the manufacturer as it may affect the performance.
- Do not use the unit in hazardous atmosphere or with hazardous material for which the unit is not designed.
- Always use the unit on a level & stable surface for best performance and maximum safety.
- The instrument is designed to be used in the laboratory environment.
- Clean the unit with a damp cloth using a mild detergent only. Do not use chemical cleaning agents.
- If liquid is spilled on the unit, first disconnect the unit from the external (main) power supply and then clean the unit with damp cloth.

UNBOXING OF THE PRODUCT

UNPACKAGING INSTRUCTION

- Remove the unit from wooden Box 1.

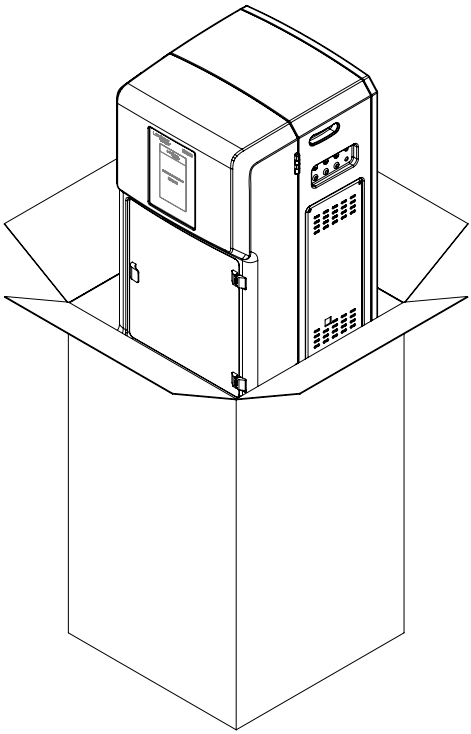


Fig. 12.1

UNPACKAGING INSTRUCTION

- For Glass parts & accessories open Box 2.

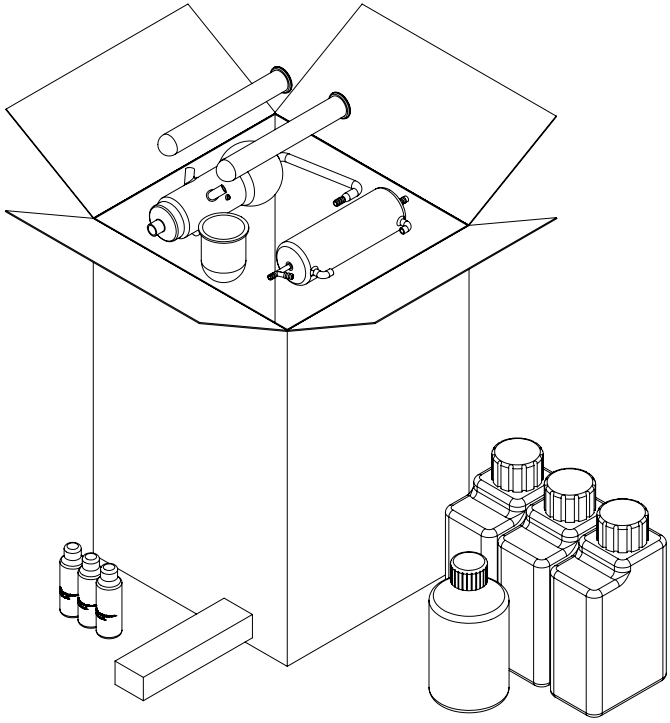


Fig. 13.1

PRODUCT IDENTIFICATION

A. DOSING HEAD
B. DISTILLED WATER INLET
C. ALKALI/NaOH INLET
D. DOSING HEAD HOLDER
E. FRONT PANEL LOCK
F. SAMPLE TEST TUBE
G. STEAM INLET TUBE
H. SAMPLE TEST TUBE LOADER
I. NRV VALVE
J. CONDENSER WATER DRAIN
K. CONDENSER
L. CONDENSER WATER INLET
M. TO NRV
N. CONDENSER COLLECTION TUBE
O. TITRATOR ASSEMBLY
P. pH PROBE CONNECTOR
Q. DRIP TRAY LH & RH

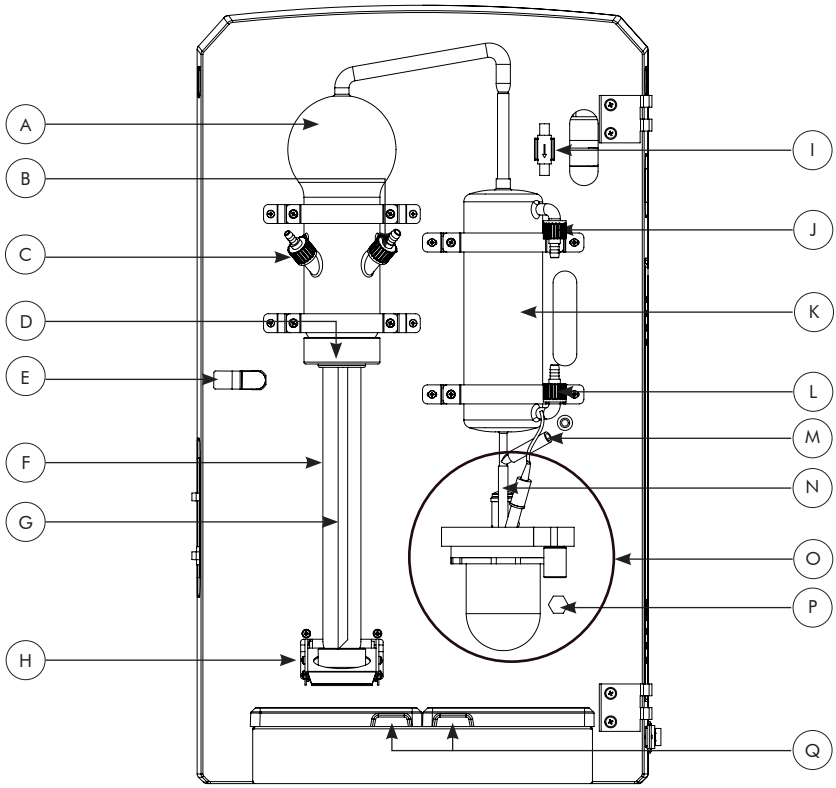


Fig. 14.1

PRODUCT IDENTIFICATION

TITRATOR ASSEMBLY

A. STIRRER ASSEMBLY
B. TITRATOR LID
C. FLASK HOLDING CAP
D. TITRANT INLET
E. CLEANING WATER INLET
F. PH PROBE
G. KCL BOTTLE FOR PH PROBE
H. BORIC ACID INLET
I. DRAIN TUBE
J. CONDENSER COLLECTION TUBE
K. TITRATION FLASK

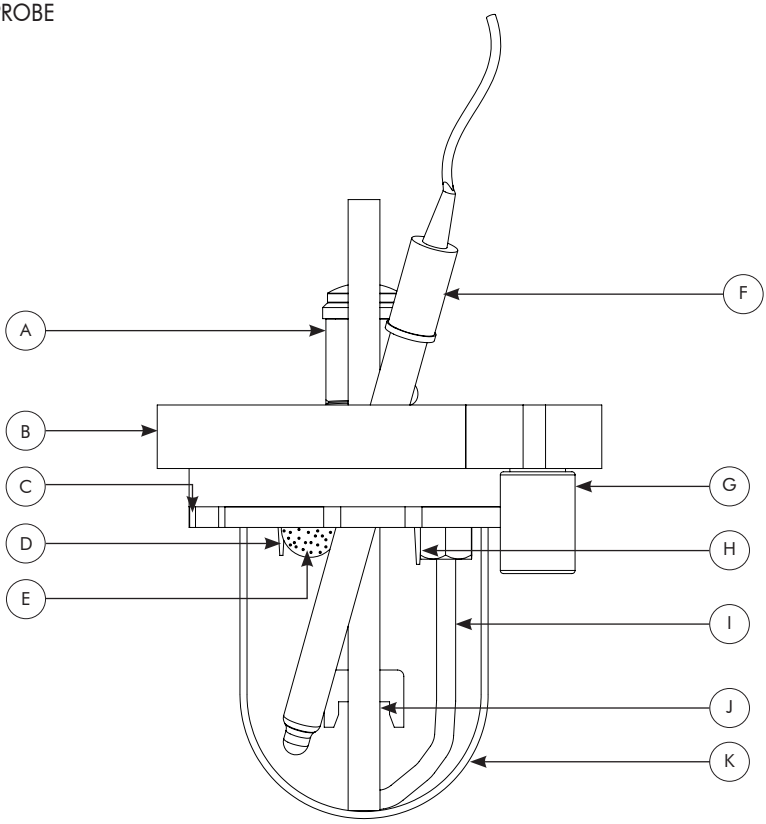


Fig. 15.1

PRODUCT IDENTIFICATION

A. TOUCH SCREEN
B. FRONT ACRYLIC DOOR
C. DOOR HANDLE
D. LEVELING SHOE
E. PCB SECTION 1
F. POWER PLUG SOCKET WITH FUSE
G. POWER SWITCH

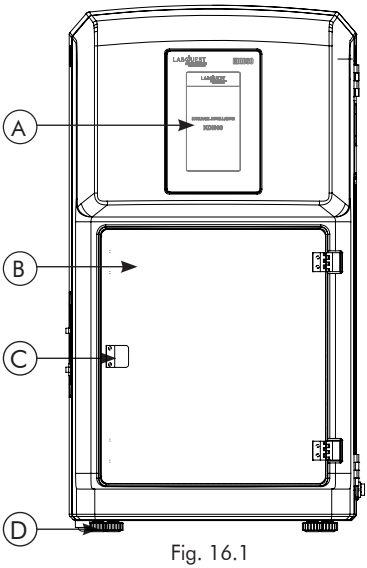


Fig. 16.1

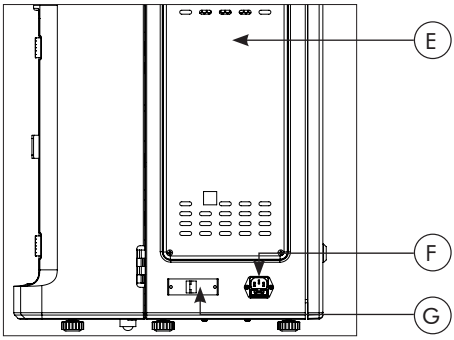


Fig. 16.2

H. COOLING WATER INLET

I. CHILLER WATER INLET

J. WASTE DRAIN

K. BOILER DRAIN

L. STEAM OUTLET

M. COOLING WATER OUTLET

N. EXCESS STEAM OUT

O. BACK DOOR LOCK

P. BACK DOOR

Q. BACK DOOR LOCK

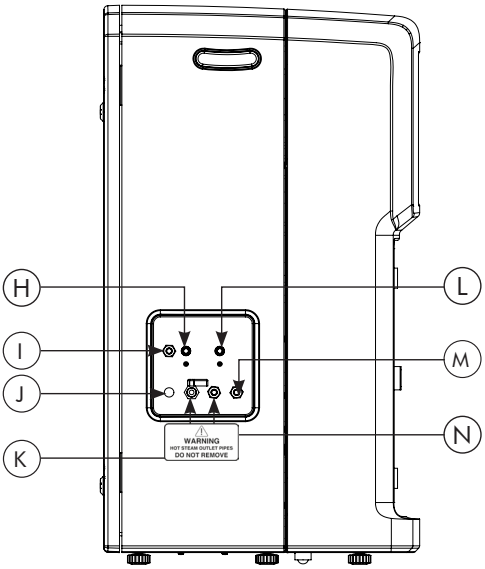


Fig. 17.1

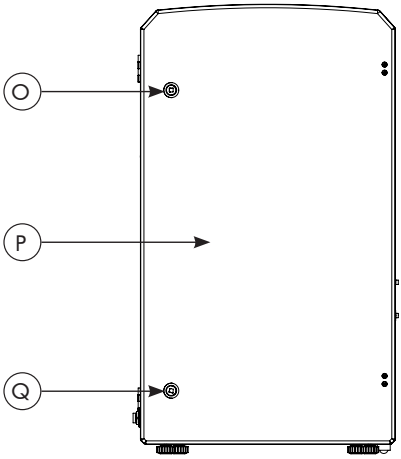


Fig. 17.2

PRODUCT IDENTIFICATION

A. BORIC ACID PUMP

B. NaOH PUMP

C. PRESSURE RELIEF VALVE

D. BOILER STEAM OUT

E. BOILER

F. BOILER DRAIN

G. PCB SECTION 2

H. STEAM SOLENOID VALVE (NC)

I. DOSING WATER SOLENOID VALVE (NC)

J. BOILER WATER SOLENOIDVALVE (NC)

K. TITRANT PUMP

L. TEST TUBE DRAIN PUMP

M. BOILER WATER IN

N. STEAM INLET FOR DOSING

O. FLOW SWITCH (COOLING WATER)

P. FRONT PANEL LOCK

Q. SOLENID VALVE FOR COOLING WATER

R. TITRATION FLASK WATER IN

S. TITRATION FLASK DRAIN

T. LIMIT SWITCH FOR TEST TUBE LOADER

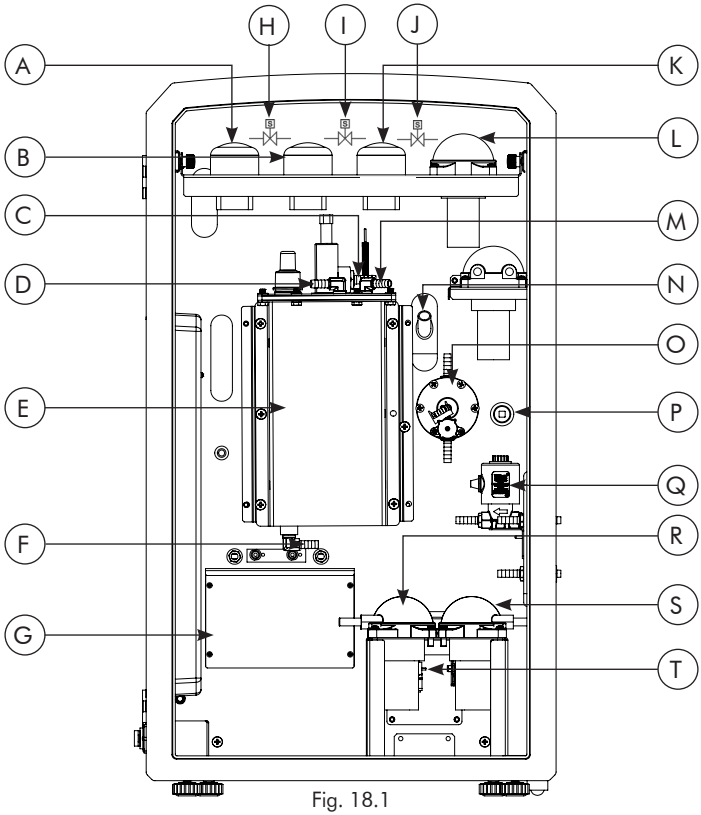


Fig. 18.1

PRODUCT IDENTIFICATION

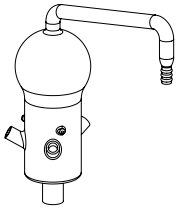


Fig. 19.1

Dosing Head
Product code :- BLG0DOH050KJV2DIST

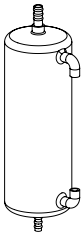


Fig. 19.2

Condenser
Product code :- BLG0CON050KJV2DIST

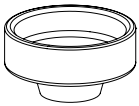


Fig. 19.3

Dosing Head Holder
Product code :- BLM0DHH0000KDI05V1

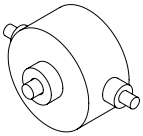


Fig. 19.4

Flow Switch
Product code :- BLMAKDI05010000001

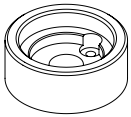


Fig. 19.5

Test Tube Loader
Product code :- BLGAFUT010PTFEKDI1

Fig. 19.6

Test Tube
Product code :- BLGATTB01041250001

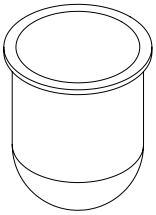


Fig. 20.1

Dissolution Flask 250mL (Titration Flask)
Product code :- BLGAKDI060DSFSK250

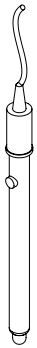


Fig. 20.2

PH Electrode
Product code :- BLE0PH0ELBNC0CAF11

DOSING REAGENT BOTTLE CONNECTION

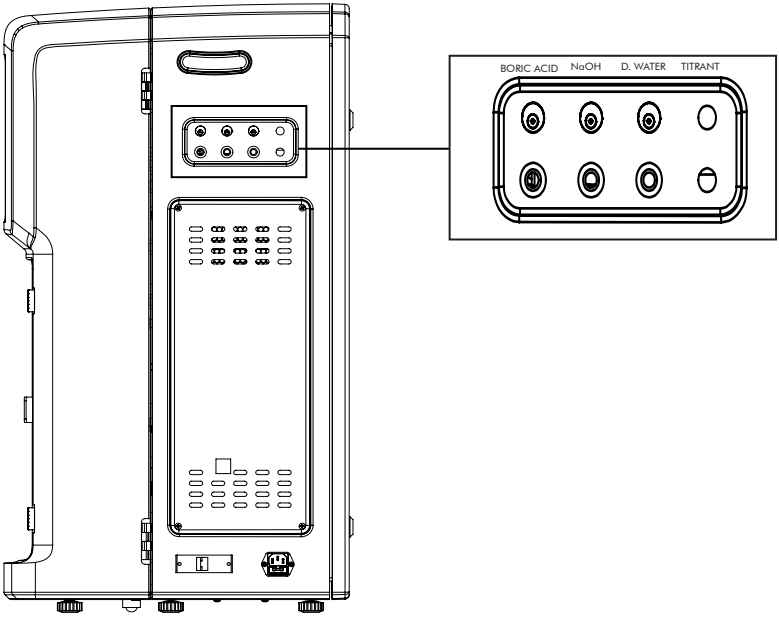


Fig. 21.1

1. Connect Boric Acid level sensor wire and Pump tube with Boric Acid Bottle.
2. Connect NaOH level sensor wire and Pump tube with NaOH Bottle.
3. Connect Distilled Water level sensor wire and Pump tube with Distilled Water Bottle.
4. Connect Titrant Tube with Titrant Bottle.
5. Put collection jar for waste drain.

INSTALLATION OF UNIT

CHECK BELOW POINTS BEFORE INSTALLATION OF THE UNIT.

1. The required water pressure for the unit should be around 5-6bar (70psi)
2. TDS value should be between 50ppm - 300ppm, if the TDS value is more than 1200ppm, it is recommend to install the water softener or the appliance protection filter to/for the unit.
3. It is recommend to connect chiller to condenser unit for better results.
4. Distilled water is recommend for Boiler to prevent scaling inside.
5. Boiler should be drained frequently after completing 10-20 cycles. If softener/ distilled water is not fed.

INSTALLATION OF DOSING HEAD AND CONDENSER

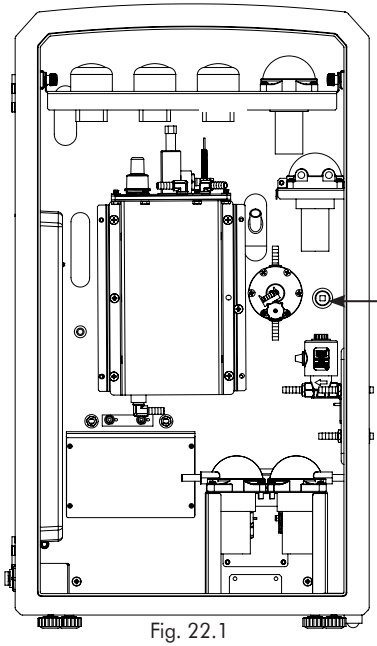


Fig. 22.1

ROTATE THE DOOR LOCK KEY ANTI CLOCKWISE TO OPEN THE FRONT PANEL

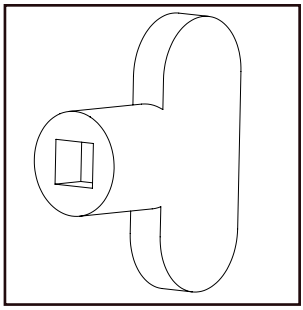


Fig. 22.2

1. To get the access of the Front Panel open the Back Door.
2. Behind the Test Tube Drain Pump there is door lock provided, insert the key and turn the lock anti-clock wise and carefully openthe Front Panel.

BEFORE OPENING THE BACK DOOR SWITCH OFF THE UNIT AND REMOVE THE POWER CABLE FROM THE SOCKET

1. Remove dosing head and condenser from box - 2.
2. Open the Front Panel as shown in (Ref page no. 22)
3. Fix them with the unit as shown in the figure.
4. Connect Condenser water inlet & Condenser water outlet with silicone tubing from the unit (Ref. fig. 26.1).
5. Connect Alkali tube and water tube(Ref. fig. 14.1 & 21.1) to the dosing head.
6. Insert Steam Inlet/ Suction Tube to the steam inlet of the dosing head(Ref. fig. 18.1) as shown in the image 23.1and connect steam inlet to the dosing head.
7. Connect dosing head to the condenser with the silicon tube as shown in the image 23.1.
8. Connect condenser to the NRV (Ref. fig. 14.1).
9. Connect collection tube to the condenser(Ref. fig. 14.1).
10. Close the Front Panel.
11. For connection of Dosing reagent bottles, insert tubings in their respective cans with level sensor connection on to the unit (Ref. fig. 21.1).

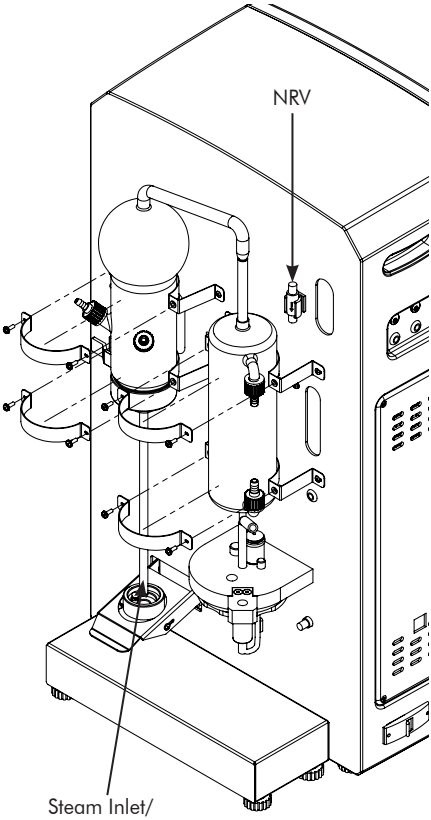


Fig. 23.1

TEST TUBE AND DISSOLUTION FLASK FIXING

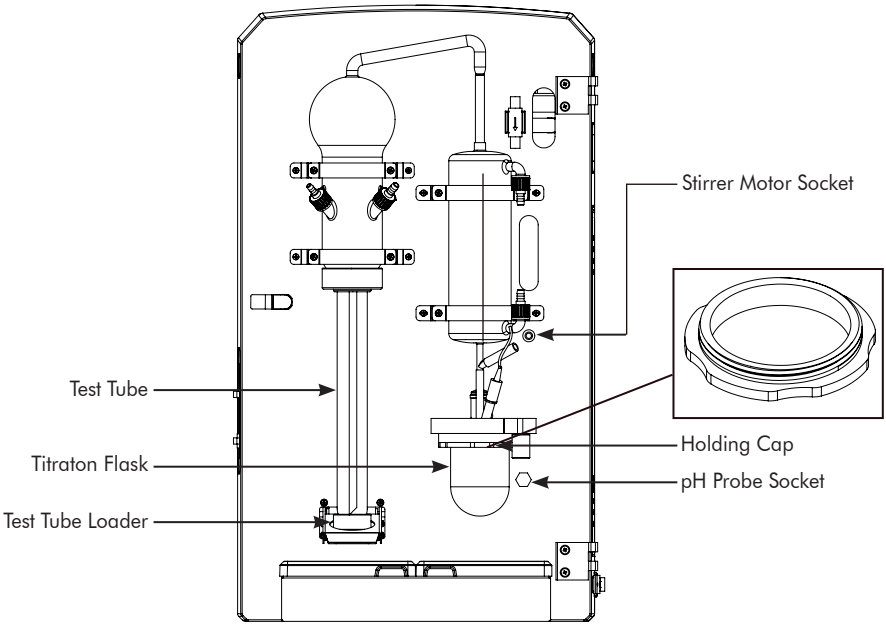


Fig. 24.1

1. To load the test tube push the loader downward and place the test tube as shown in the above image.
2. Insert the titration flask to the titration assembly and rotate the holding cap to fix it.
3. Connect the pH probe to the socket on the front panel as shown in the fig. 14.1.
4. Connect stirrer connector to the socket on the front panel as shown in the fig. 14.1.

TUBE CONNECTION FOR THE UNIT

1. Before starting the unit fix the drain valve which is provided in the accessories pouch with the unit.
2. Connect the Drain valve to the boiler drain and the steam inlet pipe to the Dosing Head as marked in the below fig.

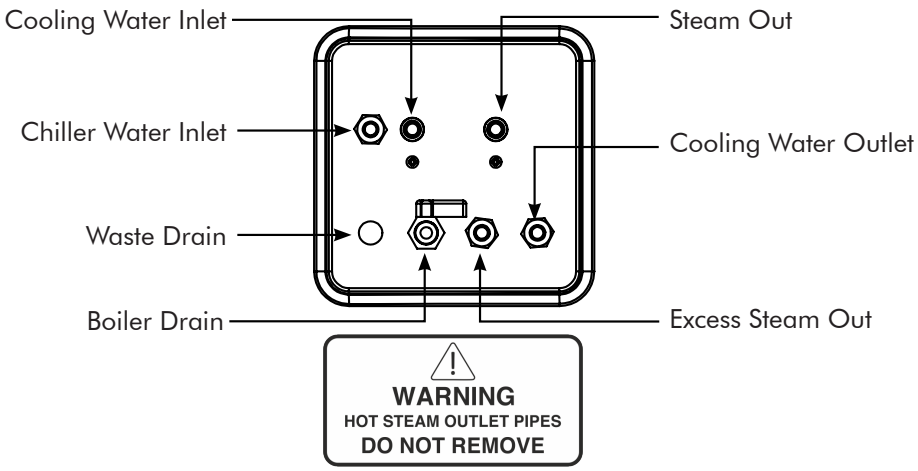


Fig. No. 25.1

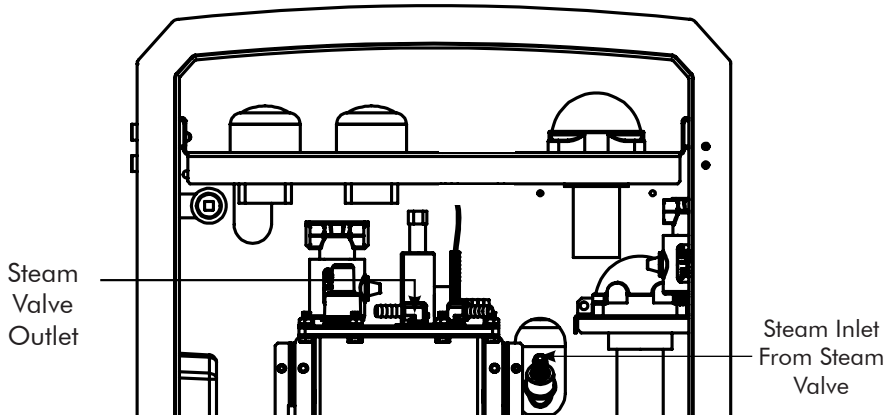


Fig. No. 25.2

PH PROBE HANDLING, MAINTENANCE AND SAFETY GUIDELINES

1. Turn off any connected instruments before removing or maintaining the probe.
2. Use clean, dedicated containers for rinsing and calibration.
3. Handle the probe by its body—never touch the glass bulb.
4. Never mix chemicals unless specifically instructed.
5. Rinse the probe with distilled water before and after cleaning or calibration.
6. Store the probe in the recommended storage solution (KCl solution).
7. Never store the probe dry or in distilled water—this can damage the membrane.
8. Keep the probe upright in its protective cap or designated holder.

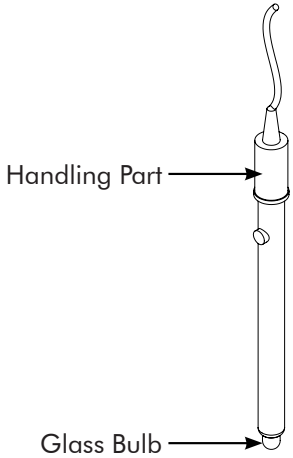


Fig. 26.1

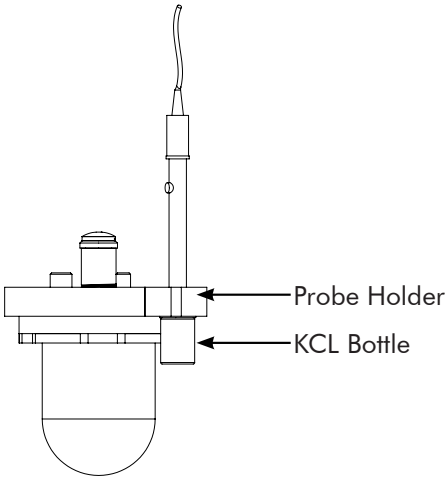


Fig. 26.2

OPERATIONS OF KDI060

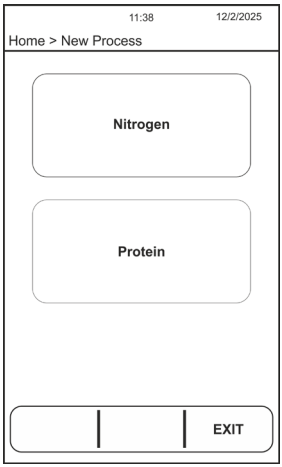
HOME SCREEN

- Home screen consist of following tabs:-
  1. New Process
  2. Presets
  3. Favourites
  4. Data
  5. Settings
  6. Clean
  7. Volume Cross Check
  8. Help

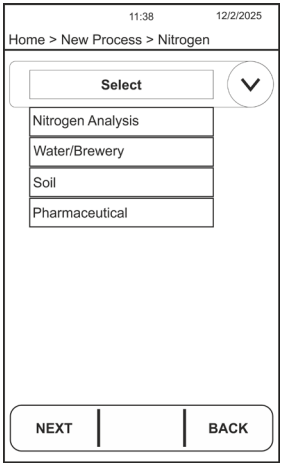
- As soon as the unit turns ON, it will check for distilled water level in the storage tank, and if the level is OK, then it will start the boiler filling back ground process and boiler heating to keep the unit ready to use always.
- The background process status is shown on the status bar at the top right corner below the time/date.

1. NEW PROCESS

- Click on the New process tab on the Home screen to go into the new process.



(Fig No. 29.1)



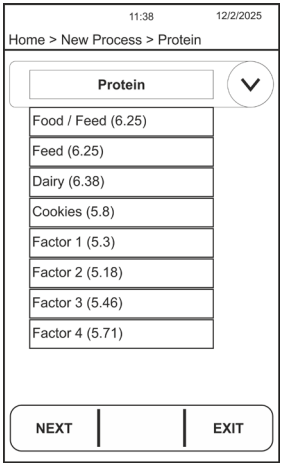
(Fig No. 29.2)

I. NITROGEN:

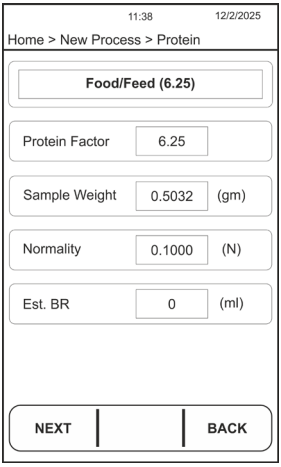
- For nitrogen analysis of a given sample select the “Nitrogen” option on the display.
- The following screen will appear when “Nitrogen” is selected.
- User can now select the type of nitrogen analysis from the drop down menu and press the “Next” button from the left bottom corner of the screen.
- As displayed on the screen the user has to enter Sample Weight, Est.Burette reading (if known), and Normality of the acid.
- Click on the value box and the numeric keypad will appear on the screen.
- Enter the desired value and press the OK button on the keypad.

II. PROTEIN:

- For protein analysis of a given sample select the “protein” option on the display.
- The following screen will appear when “protein” is selected.
- User can now select the type of protein analysis from the drop down menu and press the “Next” button from the left bottom corner of the screen.



(Fig No. 30.1)



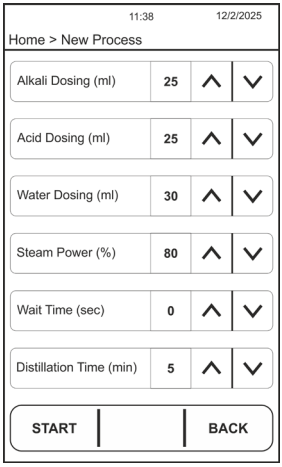
(Fig No. 30.2)

- As displayed on the screen the user has to enter Sample Weight, Est. Burette reading (if known), and Normality of the acid.
- Click on the value box and the numeric keypad will appear on the screen.
- Enter the desired value and press the OK button on the keypad.

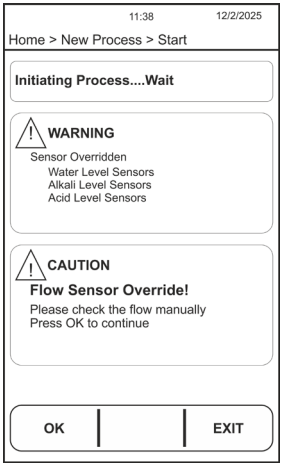
- It will go to the User Input screen consists of following information:
- User can change the values by using the UP/DOWN button on the screen beside every parameter.
- In this the user have to enter the input parameters required for the distillation process i.e.

i. Test tube loaded.
ii. Door Closed.
iii. Flow sensor/Input Water flow is OK.
iv. The level of the reagent inside the reagent bottle if the level sensor is not overridden.

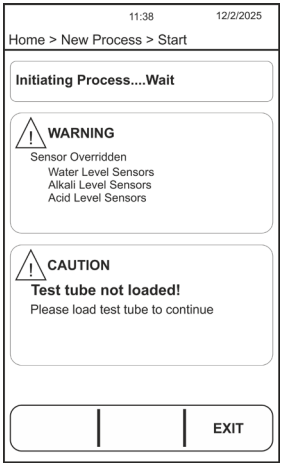
- The values can be changed using the UP/ DOWN arrow present on the screen. Click on the Up arrow to increase the value and Down arrow to decrease the value.
- Click on START present on the bottom left side of the screen to start the sample distillation process.



(Fig No. 31.1)



(Fig No. 31.2)



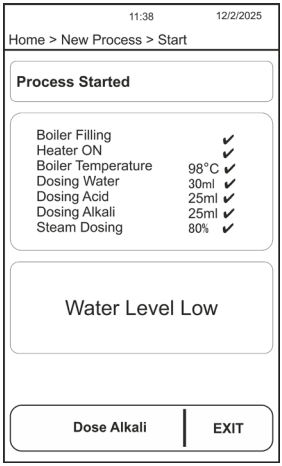
(Fig No. 31.3)

(Fig No. 31.4)

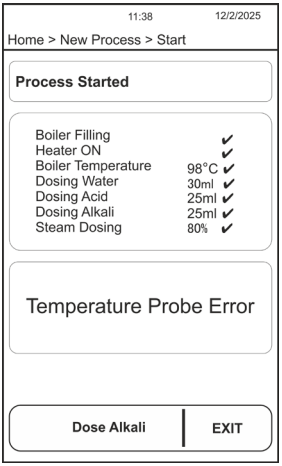
- The next screen will display the sensor override warning message. It will check for different error conditions i.e.
- Test tube loaded.
- Door Closed.
- Flow sensor/Input Water flow is OK.
- The level of the reagent inside the reagent bottle if the level sensor is not overridden.
- These Error conditions will be displayed on the screen in the Caution message box with the buzzer indication. The process will not go ahead until these error conditions are satisfied. If the Reagent level Low error message is displayed then the reagent bottle has to be filled with the reagent and click on the OK on the screen to continue.
- If the flow sensor is overridden then the message will be displayed in the Caution message box with a message to check for the flow inside the condenser visually and click on OK to continue.When done it will move to the next screen in the process.

(Fig No. 32.1)

- In this the first process done is boiler filling.
- Boiler Filling - The boiler starts filling after checking the level of the distilled water bottle. If the level is Low it will give an error message with buzzer indication. The bottle has to be filled with the water for the process to continue. If the boiler is filled the done symbol (tick mark) will be displayed on the screen beside boiler filling.



(Fig No. 33.1)



(Fig No. 33.2)

- Boiler Heating - The boiler starts heating after filling is completed. It heats the boiler water up-to 98^{0}C i.e. boiling temperature. If there is any probe failure the error will be displayed on the screen with the buzzer indication.
- Reagent Dosing - The dosing of the reagent starts after completion of heating. The display will show the amount that has been dispensed on the screen and a completion symbol after each reagent dosing is done. It will wait after every reagent dosing if wait time is kept above 0.
- Steam Dosing - The steam dosing start indication is given by buzzer and the symbol on the display with the Steam power% displayed which was entered by the user.

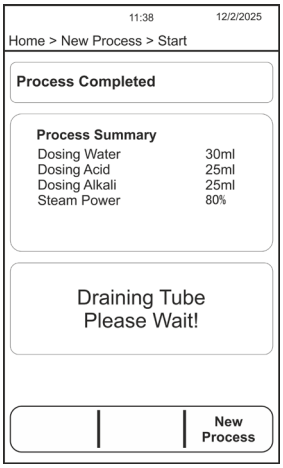
- The Start of steam dosing will start the timer and the countdown will be displayed on the screen message box, so user can have the track of remaining time for completion of the process.

- If the door is opened in between the process the process is paused and the “Door Open” error is displayed with the buzzer indication on the screen.
- The additional Alkali(NaOH) can be dosed in between the process if required by clicking on Dose Alkali present on the bottom left side of the screen.
- It will dose 5mL of alkali(NaOH) after every click on Dose Alkali.
- If the flow sensor is enabled and the input flow is low in between the process then the error is shown on the display to correct the input flow.
- The process is paused when this error occurs. After the input flow is resumed
- then the process continues from where it was interrupted.
- But if the flow is not resumed in some time then the process is automatically
- terminated.
- The user can terminate or Exit the process by clicking on EXIT present on bottom right corner of the screen.

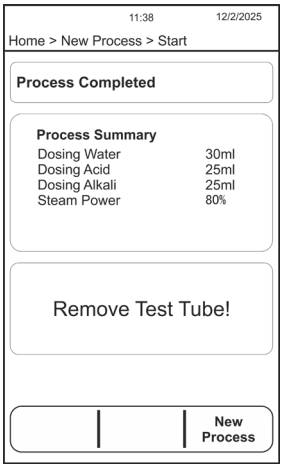
(Fig No. 34.1)

Process Completion:

- After steam dosing time completion the process is stopped and the Process Completion screen is displayed.



(Fig No. 35.1)

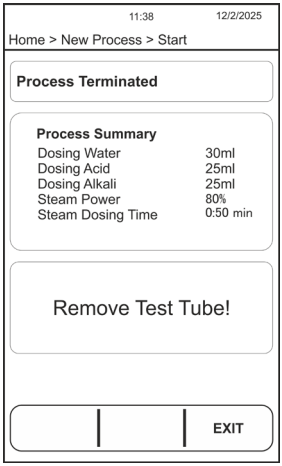


(Fig No. 35.2)

- All the details of the process i.e. Process Summary is displayed.
- The automatic tube drain starts and the message is displayed on the screen.
- After completion of the tube draining the Remove Test tube message is given on the display screen with the buzzer indication.
- The indication persists until the test tube is removed and sensed by the controller.
- There are two options for the user after completion.
- Users can proceed with a new process or cleaning cycle if required.

Process Termination:

- The can be process terminated by user or by any error. If process is terminated then the process termination screen is displayed.

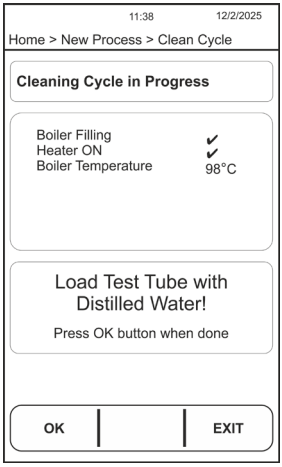


(Fig No. 36.1)

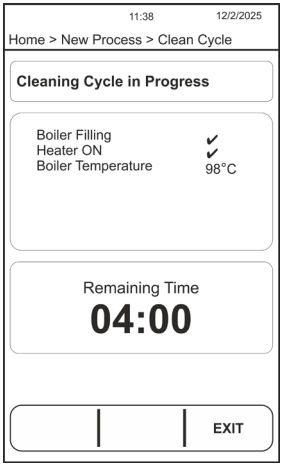
- The automatic drain of the test tube is disabled if the process is terminated.
- The “Remove Test Tube” message is given on the display screen with the buzzer indication.
- The indication persists until the test tube is removed and sensed by the controller.
- All the details of the process i.e. Process Summary is displayed.
- Steam dosing time/ remaining time at which the process was terminated is displayed.
- After this click the EXIT on the screen to continue with the next process.

CLEANING CYCLE

- In the Process Completion screen when the user clicks on Clean Cycle then the cleaning cycle process starts.
- It will display the message which asks the user to Load the test tube with distilled water and click OK when done.



(Fig No. 37.1)

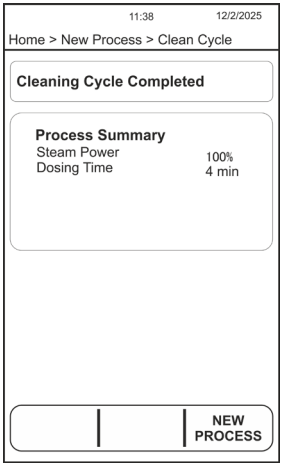


(Fig No. 37.2)

- After OK is clicked then the scream dosing starts and the cleaning process of a total duration of 4 minutes gets started.
- The elapsed time/ remaining time is displayed.

Cleaning Process Completed:

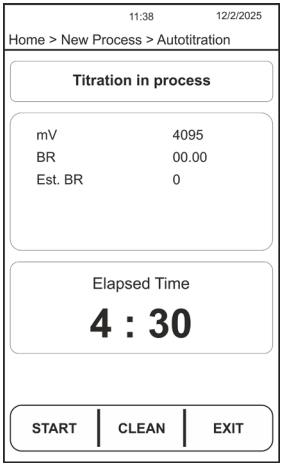
- All the details of the process i.e. Process Summary is displayed.
- The “Remove Test Tube” message is given on the display screen with the buzzer indication.
- The indication persists until the test tube is removed and sensed by the controller.
- User can then continue with the new process.



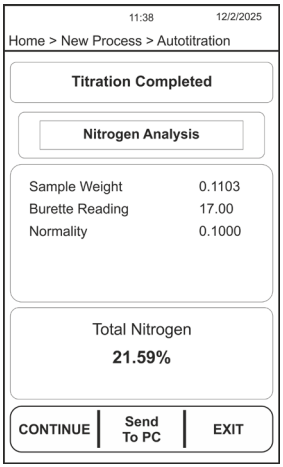
(Fig No. 38.1)

AUTOTITRATION

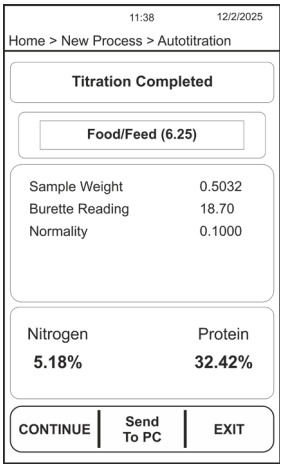
- After distillation is completed gently remove test tube, The system is automatically directed to titration page. (If ATT is enable from settings)
- Before titration make sure electrode probe is properly deeped inside the distilled sample, collected in vessel.
- To start titration press “START” button from bottom left corner of the screen.
- Elapsed time start increasing until system correctly detects END POINT of the given sample.
- Once system found correct END POINT it will direct to titration completed page.



(Fig No. 38.2)



(Fig No. 39.1)

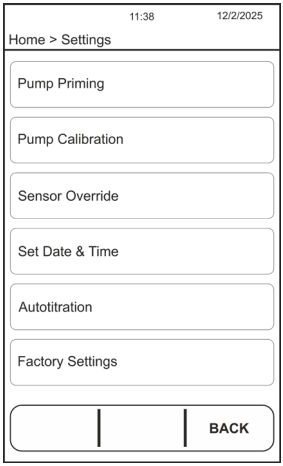


(Fig No. 39.2)

- The “titration completed” page is displays nitrogen and protein percentage (if protein analysis is selected) with burette reading, sample weight and normality of the given sample.
- System shows calculated percentage data according to user inputs like type of analysis, sample weight,normality etc. (filled before process start)
- System automatically takes burette reading value that found during titration to calculate nitrogen and protein from given sample.
- Press continue to start analysis for the same type of samples or press a new process for another new sample.
- User can click on the Send to PC button to send the data to the excel sheet on the PC.
- For this user has to connect the unit to the PC via Type A to Type B USB cable.
- User should have the Borosil_Datalog utility excel sheet on its PC opened and connected.

SETTINGS

- Click on the settings tab on the Home screen to go into the settings menu. The settings menu consists of the following settings option.

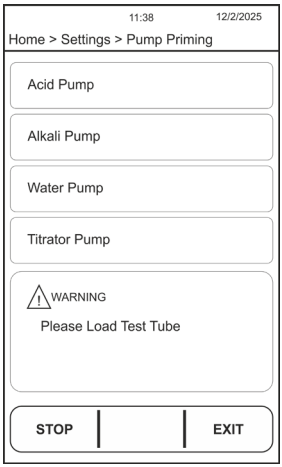


(Fig No. 40.1)

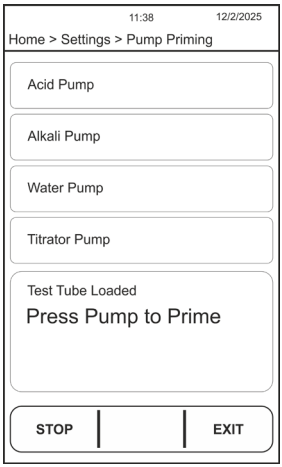
Note: To access the individual setting click on the particular setting option tab.

I. PUMP PRIMING

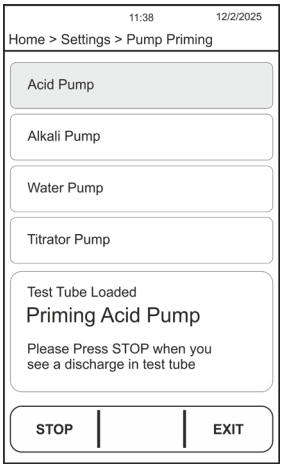
- This is used to prime the pump.
- Before performing the sample distillation after the power ON of the machine the priming of the pump has to be done compulsory to get the best results of the distillation process and accurate dispensing of the reagents.
- Before starting the priming process load the test tube and conical flask (Ref. Fig. No. 41.1).
- If the test tube is not loaded then the warning message will be displayed on the screen until the test tube is loaded.
- After loading the test tube, the test tube loaded message will be displayed on the screen and the priming can be done (Ref. Fig. No. 41.2).



(Fig No. 41.1)



(Fig No. 41.2)

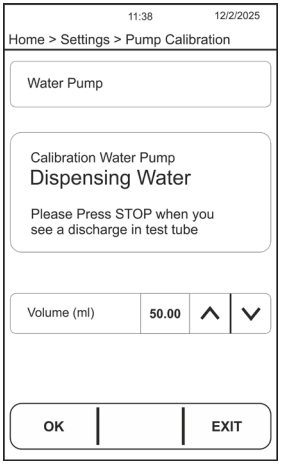


(Fig No. 41.3)

- To perform the priming click on the respective pump tab which has to be primed.
- Press the STOP button on the screen to stop priming (Ref. Fig. No. 41.3).
- After the pump is primed, the color of the pump tab changes.
- Press the EXIT button on the right bottom side of the screen to exit from pump priming (Ref. Fig. No. 41.3).

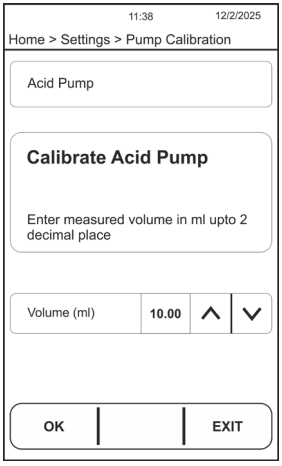
II. PUMP CALIBRATION

- After clicking on Pump Calibration tab following screen appears:
- Follow the instructions displayed on the screen message box (Ref. Fig. No. 41.4).
- Load test tube and conical flask before performing pump calibration operation.

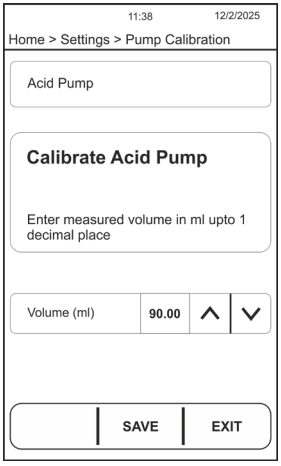


(Fig No. 41.4)

- The calibration technique used for Alkali and Distilled Water Pump Calibration is One point Calibration and Two point Calibration technique for Acid Pump Calibration and titrator pump to achieve higher accuracy of reagent dispensing.
- To start the calibration click on the pump tab to be calibrated.
- The dispensing of the pump reagent will start as soon as clicked on the pump, it will dispense 50mL in the sample test tube.
- The same message can be seen displayed in the message box on the screen.
- After dispensing is completed measure the reagent using the graded cylinder and enter the measured volume up to 1 decimal place.
- To enter the measured volume use the up/down arrow button on the screen to increase or decrease the volume.
- Press the OK button to calibrate the pump (Ref. Fig. No. 42.1).
- Repeat this procedure until the entered and the dosed volume is the same. Acceptable difference at 50mL is ±1mL.

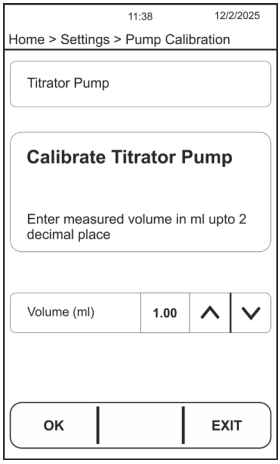


(Fig No. 42.1)

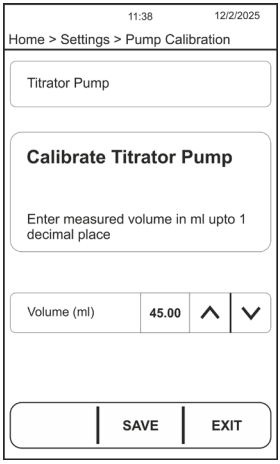


(Fig No. 42.2)

- For Acid Pump calibration the two different volumes are dispensed i.e. first 10mL is dispensed as Volume1 follow the same step as other pumps and press OK after entering measured volume (Ref. Fig. No. 42.1).
- Then the Volume2 will be dispensed i.e. 90mL, enter the volume measured and press OK button the pump will be calibrated (Ref. Fig. No. 42.2).
- Acceptable difference is ±0.25mL.



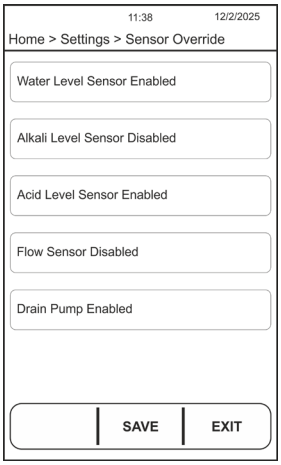
(Fig No. 43.1)



(Fig No. 43.2)

- For Titrator Pump calibration the two different volumes are dispensed i.e. first 1mL is dispensed as Volume1, Follow the same step as other pumps and press OK after entering measured volume (Ref. Fig. No. 43.1).
- Then the Volume2 will be dispensed i.e. 45mL, enter the volume measured and press SAVE button the pump will be calibrated (Ref. Fig. No. 43.2).
- Acceptable difference is ±0.1mL.

III. SENSOR OVERRIDE

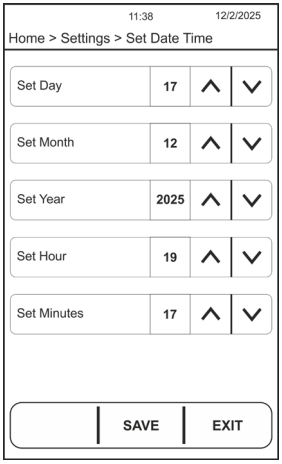


(Fig No. 44.1)

- After clicking on Sensor Override tab following screen appears (Ref. Fig. No. 44.1):
- There are 5 sensors that can be enabled or disabled.
- To enable or disable a particular sensor click on the sensor name tab displayed on the screen and the sensor will be enabled/ disabled.
- Click on the **SAVE** button in the bottom of the screen to save the changes made, click **EXIT** button to exit to the settings menu screen without saving the changes made.

Note: All sensors are set Enable from the factory. Do not Disable the sensor without consulting the service engineer/company contact person.

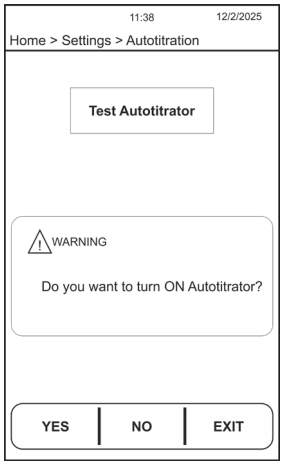
IV. SET DATE AND TIME



(Fig No. 44.2)

- After clicking on Set Date and Time tab following screen appears (Ref. Fig. No. 44.2):
- Set the date and time using this setting.
- The date/time values can be changed by using the **UP/DOWN** arrow keys on the screen beside every value to be changed.
- After setting the date and time press the **SAVE** button present at the bottom of the screen to save the date and time entered.
- Press the **EXIT** button to exit the settings menu screen without saving the date and time changes made.

V. AUTOTITRATION

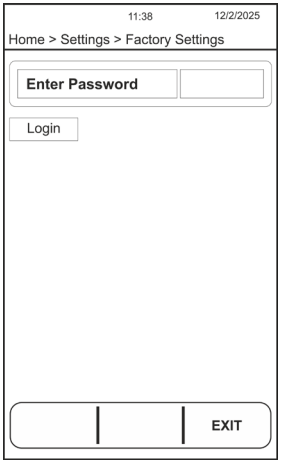


(Fig No. 45.1)

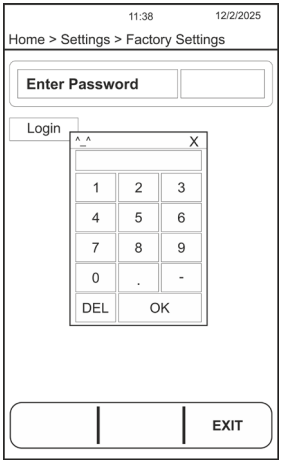
- After clicking autotitrator tab following screen appears (Ref. Fig. No. 45.1):
- Press '**YES**' button to enable autotitration, it will automatically go for the titration window after the distillation process is completed.
- Press '**NO**' button to disable autotitration,if autotitration is not required after the distillation process is completed.
- Press '**Test Autotitrator**' button to go to the test autotitration process page, before testing titration make sure that electrode is properly inserted in the distilled sample solution.

VI. FACTORY SETTINGS

- After clicking on factory settings tab following screen appears (Ref. Fig. No. 45.2):

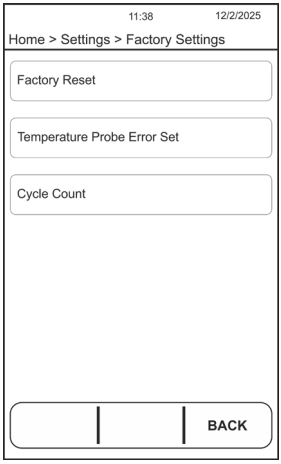


(Fig No. 45.2)



(Fig No. 45.3)

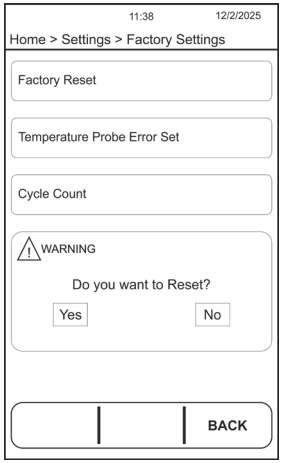
- Enter the password to change the factory settings (Ref. Fig. No. 45.3).
- After cliking on the blank box on the right side of the enter password box. Numeric keypad will popup for entering the password.
- Click on login to enter into factory settings.
- In the factory settings following options will apppear (Ref. Fig. No. 46.1).



(Fig No. 46.1)

A. FACTORY RESET

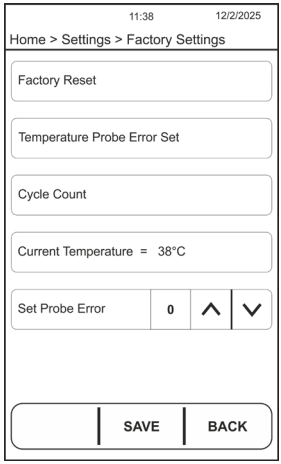
- This setting is used for resetting the whole unit.
- After clicking on factory reset tab, a window will pop up to confirm the factory reset (Ref. Fig. No. 46.2).
- If Yes button is pressed all settings will get reset and the settings done by users will be deleted.
- All the settings values will be assigned default value same as received from the factory.



(Fig No. 46.2)

B. TEMPERATURE PROBE ERROR SET

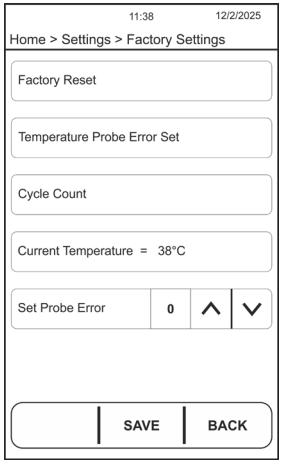
- This setting is used for correcting temperature probe error if any (Ref. Fig. No. 47.1).
- Compare the boiler temperature probe with a master probe and set the error if any into the set probe error field by pressing up down keys.
- Click on save button to save the changes made.



(Fig No. 47.1)

C. CYCLE COUNT

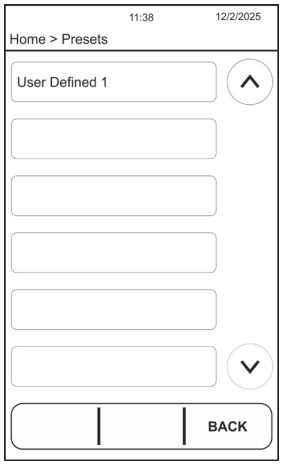
- This setting is used for viewing the number of distillation cycles performed on the unit (Ref. Fig. No. 47.2).
- It also shows the total run time of the unit.
- This value is not erased even after factory reset is done.
- This settings is used for the maintenance purpose of the unit.



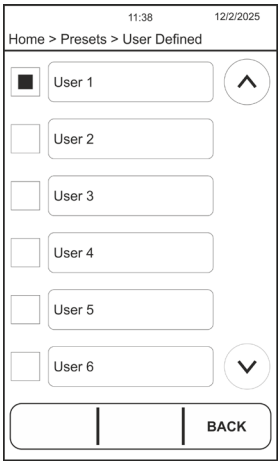
(Fig No. 47.2)

PRESETS

- Click on the preset tab on the Home screen to go into the preset menu. The preset menu consist of following preset options:



(Fig No. 48.1)



(Fig No. 48.2)

- The preset consists of different preset options. It has a total of 50 presets out of which 10 are user defined presets i.e the user can program it as they want.
- The other 40 presets are pre-defined and cannot be changed by the user. The major preset categories and their sub categories provided are:
  1. User Defined - User 1, User 2, User 3, User 4, User 5, User 6, User 7, User 8, User 9, User 10.
  2. Food - Pasta, Salami, Meat, Fish, Egg, Cookies, Papad, Savioury snacks, Raw material/Prepared food.
  3. Dairy - Liquid milk, Cheese powder, Skimmed milk Powder, Casein Protein, Whey Protein, Non Protein Nitrogen, Milk protein concentrate.
  4. Fertilizer - Available Nitrogen, Total nitrogen, Nitrate nitrogen.
  5. Soil - Available Nitrogen, Total nitrogen.

6. Effluents - Available Nitrogen, Total nitrogen, Nitrate nitrogen.
7. Feed - Chicken feed, Fish feed, Cattle feed, Pet Animal, Feed contains high silica, Feed contains high oil.
8. Pharma - Vaccines, Antibiotics, Raw material, Finish products, Excipients, Filters, Binders.

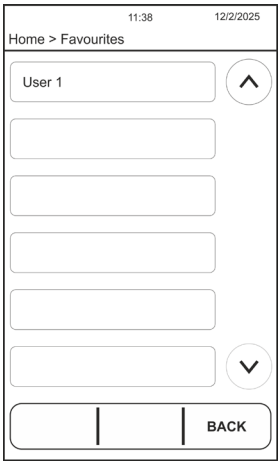
- To use the presets for distillation of samples click on the main preset name tab on the screen then click on the sub preset name on the screen.
- Use the **UP/DOWN** arrow button on the side of the screen to scroll through the sub preset menu.
- When clicked on the sub preset menu the screen with the presetted values of the parameters required for the process will be displayed.
- User can change the values if it he want.

Note: The changes made in the preset values can be used only for that particular cycle, it cannot be saved.

- The user can program for its own in user defined preset.
- Click on the sub preset of user defined preset the input parameter screen will appear.
- User can change the values by using the **UP/DOWN** button on the screen beside every parameter.
- Click on the **SAVE PREST** button on the bottom of the screen to save the preset values for future use.

FAVOURITES

- Click on the favorites tab on the Home screen to go into favorites menu. The favorites menu consist of following favourites options:



(Fig No. 50.1)

- The favorites selected in the preset menu is displayed here.
- The maximum number of favourites that can be selected and displayed is 6 nos.
- The user can directly access the most used preset from the favourites menu by selecting it as a favorite in preset menu.
- Click on the name of the sample to be used and the user can directly do the sample distillation.

DATA

- Click on the Data tab on the Home screen to go into data. The data consist of following options (Ref. Fig. No. 51.1):

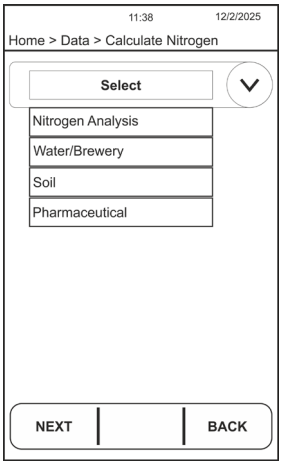
(Fig No. 51.1)

- The data is used to calculate the nitrogen and protein content of different samples and send the data to the computer to the excel sheet.

I. NITROGEN:

- When click on nitrogen it shows the screen (Ref. Fig. No. 51.2):
- Click on the DOWN arrow or drop down button on the screen to see the options of the nitrogen calculation of different sample. The option contains:

a. Nitrogen analysis - This is for all the common samples. The results are shown in %Nitrogen/ 1% Protein.



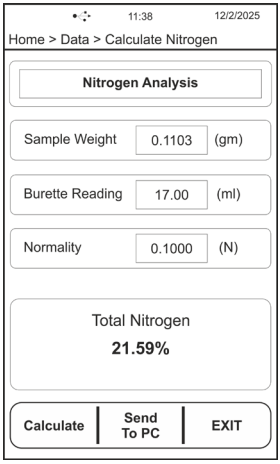
(Fig No. 51.2)

b. Water/Brewery - All the water and brewery sample calculation can be done here. The results are shown in ppm.

c. Soil - The soil sample calculation can be done. The results are calculated and shown in Kg/hectare.

d. Pharmaceutical - All the pharmaceutical related samples can be calculated in this. The results are shown in %Nitrogen and ppm both.

- Select the required type by clicking on the name and Click on NEXT button present on the bottom left of the screen.
- After this the calculation screen will appear as following:



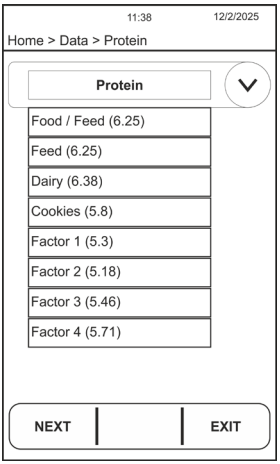
(Fig No. 52.1)

- As displayed on the screen the user have to enter Sample Weight, Burette reading and Normality of the acid.
- Click on the value box and the numeric keypad will appear on the screen.
- Enter the desired value and press the OK button on the keypad.
- After entering all the values Click Calculate button present on the left bottom side of the screen to calculate the result.
- The result will be displayed after clicking the Calculate button. User can click on the Send to PC button to send the data to the excel sheet on the PC.

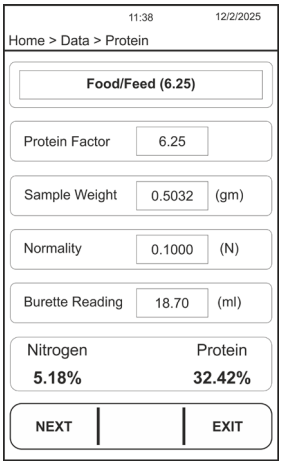
- For this user has to connect the unit to the PC via Type A to Type B USB cable.
- User should have the Borosil_Datalog utility excel sheet on its PC opened and connected.

II. PROTEIN:

- When click on protein it shows the screen (Ref. Fig. No. 53.1):
- Click on the DOWN arrow or drop down button on the screen to see the options of the protein calculation of different samples.
- The options are: Food/Feed (6.25), Dairy (6.38), Cookies (5.8), Factor 1 (5.3), Factor 2 (5.18), Factor 3 (5.46), Factor 4 (5.71).
- Select the required type by clicking on the name and Click on NEXT button present on the bottom left of the screen.



(Fig No. 53.1)



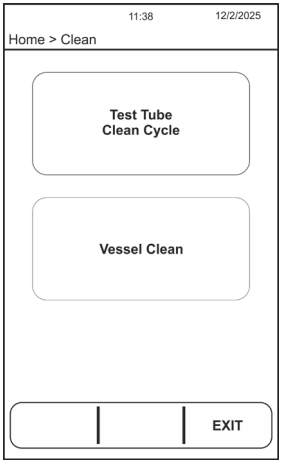
(Fig No. 53.2)

- After this the calculation screen will appear as shown in Fig. No. 53.2:
- As displayed on the screen the user has to enter Sample Weight, Burrette reading and Normality of the acid.
- The user can also enter the protein factor of its own if the factor it uses is not present in the option provided.
- Click on the value box and the numeric keypad will appear on the screen.
- Enter the desired value and press the OK button on the keypad.

- After entering all the values Click Calculate button present on the left bottom side of the screen to calculate the result.
- The result will be displayed in %Protein and %Nitrogen.
- User can click on the Send to PC button to send the data to the excel sheet on the PC.
- For this user has to connect the unit to the PC via Type A to Type B USB cable.
- User should have the Borosil_Datalog utility excel sheet on its PC opened and connected.

CLEAN

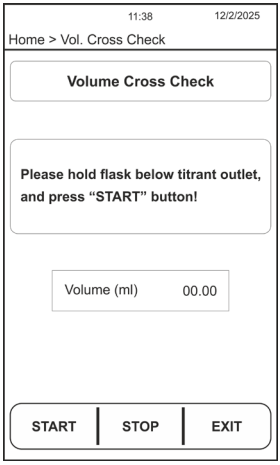
- To clean test tube please touch on first button of clean page, it will start draining test tube by turning ON pump.
- To clean vessel please touch on second button of clean page, and clean process will start sequentially.



(Fig No. 54.1)

VOLUME CROSS CHECK

- Volume cross check feature is useful tool for test accuracy of pump based burette volume dispenser.
- It very essential to cross check actual dispense volume of burette with stadard calibrated weighing balance machine to detect accurate “end point” of samples.
- After the priming & calibration is completed user can check the cross volume of burette with weighing balance machine having difference of ±0.1 mL.
- To cross check the volume of burette user need to weigh the flask on weighing machine and tare it. Then hold the flask below titrant outlet and press “START” button from bottom left corner of screen.
- Machine will start dispensing HCL acid from outlet pipe user should hold flask for approximately 3-4 min and then press “STOP” button on screen
- The dispensed volume is then displayed on the screen,Now user will be able to compare the volume of burette by measuring weight on weighing balance machine.



(Fig No. 55.1)

HELP

- Click on the help tab on the Home screen to go into help.
- The help consist of following information:

(Fig No. 56.1)

- The help screen consists of Customer support number and email id in case of any help/guidance required.
- It also has QR code which when scanned will take to labquest.co website where the KDI060 operational Manual can be downloaded in pdf form.

METHOD FOR AMMONIUM SULFATE FOR DISTILLATION UNIT VERIFICATION

SOLUTION PREPARATION

1. **40% NaOH**

   Make up 400 g of NaOH as 1 litre by using distilled water in a Borosil volumetric flask.

2. **4 % BORIC ACID**

   Make up the 40 g boric acid as 1 liter by using distilled water in a Borosil volumetric flask

3. **MIXED INDICATOR**

   0.1 g of bromocresol green (powder) and 0.05g of Methyl red in some amount of 95% ethanol. Then mix these two solutions thoroughly. Dilute to 100 mL of 95 % Ethanol.

4. **0.1 N HCl**

   Make up 8.5 mL of Hydrochloric Acid as 1 litre by using distilled water in a Borosil volumetric flask.

5. **0.1 N SODIUM CARBONATE**

   Make up 5.29 g dry AR grade Sodium Carbonate as 1 litre by using distilled water in a Borosil volumetric flask.

NOTE - Dry the Sodium carbonate at 100 degrees for 1 hour and then cool it in dessicator to get room temperature.

6. **Methyl Red indicator**

   Dissolve 0.1 g of methyl red in a few mL 95% ethanol and make it to 100 mL.

Standardisation of 0.1 N Hydrochloric Acid

1. Prepare 0.1 N Sodium Carbonate solution as said above.
2. Pipette out 10 mL of Sodium Carbonate in a conical flask and add 2 to 3 drops of methyl red indicator.
3. Fill the burette with 0.1 N hydrochloric acid.
4. Titrate the solution with Hydrochloric acid.
5. End point would be indicated from faint yellow to faint pink.
6. Note down the burette reading and calculate the normality of Hydrochloric acid using the formula.

$$N_1V_1 = N_2V_2$$

(Sodium carbonate) (Hydrochloric acid)

Sample

Ammonium sulfate is extremely soluble in water due to its ionic nature, therefore it can "salt out" proteins by precipitation. It is a fertilizer used to raise the level of nitrogen in farming. Ammonium sulfate standard Hi- AR, GRM1273 / EMPARTA-ACS-Ammonium sulfate was used for analysis.

Abstract

An easy and reliable method for nitrogen and that of protein analysis is introduced.
It is recommended to grind and dry the sample for a uniform sample size.
Use a Nitrogen free butter paper for accurate results.
Distillation was done by using Borosil auto Kjeldahl unit KDI040.
The titration was done using Borosil digital burette LH002014012

Chemicals

- Boric acid (4%)
- Sodium hydroxide (40 %)
- Hydrochloric acid (0.1 N)
- Mixed indicator

STEP 1 : DISTILLATION

1. Weigh 0.1 g of ammonium sulphate (dried and AR grade) in a kjeldahl's tube.
2. Dissolve the sample with a small quantity of water.
3. Switch on the distillation unit and allow it to proceed.
4. Set the parameters as below
   - NaOH : 40 mL
   - Boric Acid : 25 mL
   - Distilled Water : 20 mL
   - Time : 5 mins
5. Boric acid can be previously mixed with the prepared mixed indicator or few drops of mixed indicator can be added in the conical flask to keep the receiver's end.
6. Load the test tube along with a sample and 250 mL conical flask at the receiver end.
7. Start the process and let the cycle run for 5 mins at 100 % steam power.
8. Collected distillate is ready for titration.
9. The titration process will start automatically.
10. The result will show on display.

NOTE :

Given Method is for standard samples only. For other samples analysis application notes will be provided on request.

CHEMISTRY TROUBLESHOOTING

Reasons for failure or incorrect results are given and correlated to the corrective measures

Result	Possible cause	Corrections
%N is substantially higher than expected	Undried, non homogenized sample	Dry the sample and homogenise properly. (if possible grind it)
	Air bubbles in burette	Rinse the burette with any acid (HCl / H2SO4), wash with distilled water, rinse and refill with titrant
	Error in calculation	Check formula 1. %N = (14.01 x Normality of titrant x B.R x 100)/ (1000 x weight of sample) 2. % P = %N x conversion factor for protein 3. N(ppm) = 1000 x B.R x Normality of titrant / weight of sample taken
		Check the normality of titrant and standardize it. For HCl and H2SO4 - Use sodium carbonate as standard For NaOH - Use oxalic acid as a standard
%N substantially lower than the expected	Incomplete digestion	If it is an unknown sample and not defined in our SOP, increase digestion time
	Insufficient sulphuric acid used for digestion	If it is an unknown sample and not defined in our SOP, increase amount of sulfuric acid used- • For 0.1 g sample - take 10 mL of acid • For 0.5 g sample - Take 12 mL acid • For 1 g sample - Take 15 mL of acid
	Incorrect ratio of salt and catalyst(10:1)	Correct ratio will need to be established as a method
	Incorrect ratio of acid and mixture(4:1)	Correct ratio will need to be established as a method
	Incorrect ratio of acid and mixture(4:1)	Use less sample • For >1 % N :1 g of sample • For 1 to 35 % N : 0.5 g sample • For 35 above %N : 0.1 g sample

Result	Possible cause	Corrections
%N substantially lower than the expected	Less quantity of NaOH added	Add alkali until sample becomes black
	Leakages : There may be leakage in GLs connectors and glassparts	Check the glass parts and GL and fit it tightly / Seal it
	Wrong titrant	If the trapping agent is boric acid then use HCl or H2SO4 as titrant. If the trapping agent is HCl or H2SO4 then use NaOH as titrant
	Error in calculation	Same as above
	Tube leakage at the tube holder	Fit the tube properly into the holder
	Empty reagent container/ bottles (Incase of sensor overriding)	Refill the reagents and prime the silicone tubes
	Back sucks after process completion	Check the NRV direction. The flow direction arrow should come towards the Condenser Tee. NRV should keep an up-right position cable tied to the SS Clamp of the Condenser with an arrow pointing in upwards direction.
	Check if receiver pipe is dipped sufficiently into conical flask	Dip the pipe to at least 10-15 mm into the conical flask solution
	Steam dosing is not proper	Check the steam solenoid valve Check the steam out pipe and Check if the collection of distillate is low
Poor reproducibility	Weighing	Take accurate weight upto 4 decimals and tare the weight of butter paper. Calibrate the balance
	Incomplete digestion / Short digestion time	Check the color of the sample (it should be transparent/ sky blue). If it is an unknown sample and not defined in our SOP, increase digestion time

Result	Possible cause	Corrections
	Results variation	Clean the glass with a cleaning process. Recommended - 10 minutes
Poor Accuracy	Non homogeneous sample	Homogenize the sample
	Distillation unit not verified	Verify the distillation unit with ammonium sulfate standard. (if the sample has caught moisture, dry it at 102°C for 2hrs)
Foaming in digestion	Sample weight too large	Revise sample quantity. Recommended amount is 0.1-1gm only
	Insufficient sulphuric acid used for digestion	If it is an unknown sample and not defined in our SOP, increase amount of sulfuric acid used- • For 0.1 g sample - Take 10 mL of acid • For 0.5 g sample - Take 12 mL acid • For 1 g sample - Take 15 mL of acid
	Presets not defined	High fat or sugar content sample are prone to foaming and frothing. Use preset data or give ramps and add glass beads.
Post digestion crystallization	Sample solidifies	Dilute the cooled sample with distilled water and heat for 1-2mins in preheated block or water bath

TROUBLESHOOTING

S.NO.	PROBLEM	SOLUTION
1.	The unit is not turning ON	• Check the power supply in AC mains. • Make sure the power cable is inserted to the socket properly. • Check whether the main switch is ON or OFF. • Check if the illuminated switch is OFF. • Ensure the main switch is ON.
2.	If the fuse is blown	• Remove the power cable from unit. • Remove the holder from the back side of the equipment, in the control panel box. • Check the fuse, if it is damaged please change the fuse.

WARRANTY REGISTRATION

Please handover this Registration form to the distributor from where you have purchased this product. The warranty is valid only when this warranty registration card is received by us within 30 days from the date of purchase.

Product: KDI060 Product Sr. No.: _____

Date of Invoice : _____ Invoice No.: _____

Customer name & address

Name : _____

_____

Address: _____

_____

_____

_____

Telephone: _____

E-mail: _____

Customer sign & seal

Dealer name & address

Name : _____

_____

Address: _____

_____

_____

_____

Telephone: _____

E-mail: _____

Dealer sign & seal

BOROSIL®
Scientific
STATEMENT OF WARRANTY

Borosil confirms that this product has been manufactured in accordance with our technical specifications and quality requirements.

- Borosil warrants the product from manufacturing and workmanship defects for a period of 12 months from the date of invoice.
- Warranty void if apparatus is not operated as prescribed in operating manual supplied along with the unit.
- To be covered under warranty.
  - Units have to be connected to standard 230V, 50Hz, 5A wall sockets with proper earthing.
  - The units should never be run with wet or dripping glassware.
  - Warranty does not cover replacement of heating element more than once.
  - Warranty does not cover rust and physical damage to metal parts due to corrosive environment in the lab.

Terms:

- In the event of malfunction due to defect, the buyer will have to follow the Borosil's service process.
- Certain units can not be serviced/ rectified at the buyer's place and the units may have to be brought to Borosil's service center as advised by Borosil's representatives.
- In no event shall Borosil be liable for consequential or incidental damages.

INVOICE DATE	BUYER	AFFIX SERIAL NUMBER
INVOICE#		

Dealer name & address	Dealer sign & seal

BOROSIL SCIENTIFIC LIMITED
Corporate Office : 1101, Crescenzo G-Block, Opp. MCA Club, Bandra Kurla Complex, Bandra (E), Mumbai-400051, India

LABQUEST BY BOROSIL®

: MANUFACTURED BY :

Borosil Scientific Limited

Plot No.7, Sr. No. 234, 235 & 245,
Indialand Global Industrial Park,
Hinjewadi Phase 1, Pune - 411057
Write to us on above address.

: MARKETED BY :

Borosil Scientific Limited

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BKC, Bandra East, Mumbai - 51
Maharashtra, India

: CUSTOMER CARE CONTACT :

Phone : 1800 22 4551 | Email : lab.support@borosil.com

Website : www.borosilscientific.com