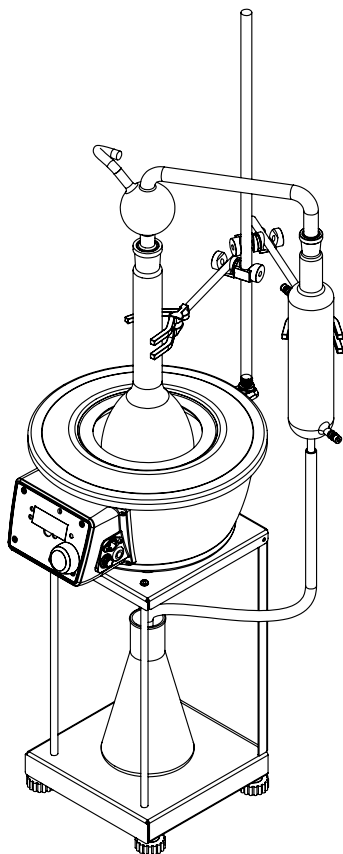


LABQUEST
BY **BOROSIL®**

CLASSICAL KJELDAHL

OPERATING MANUAL

CKD015



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.

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PACKING LIST

1. GMC500 unit..... 1 No.
2. CKD015 Stand Assembly..... 1 No.
3. Retort Rod..... 1 No.
4. Graham condenser..... 1 No.
5. Vertical pear shaped Splash Head..... 1 No.
6. 500ML Kjeldahl Flask, Interchangeable Joint 24/29..... 1 No.
7. BL Conical Flask 500ml..... 1 No.
8. Bosshead Zinc PDC..... 2 Nos.
9. Two Fing Clamp Zinc PDC..... 2 Nos
10. Plastic clip B24..... 6 Nos.
11. Plastic clip B19..... 6 Nos..

PRODUCT SPECIFICATION

PARAMETERS	CKD015
Temperature Range	Ambient to 400°C
Temperature Control	Digital energy regulator
Process Timer	1-999 mins and infinite
Max flask capacity	500 ml
Unit External Dimensions	395 x 366 x 980 mm
Power consumptions	200 W
Display timer	0-999 min
Fuse rating	0.87 A

**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 hot plate in case of CKD015 directly when the unit is in hot condition.

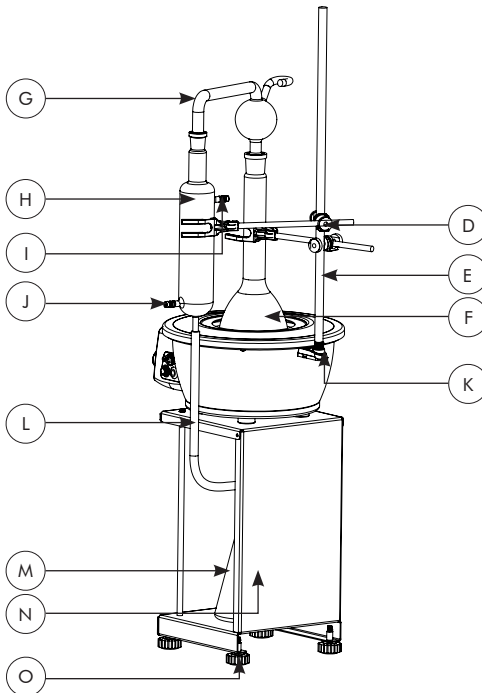
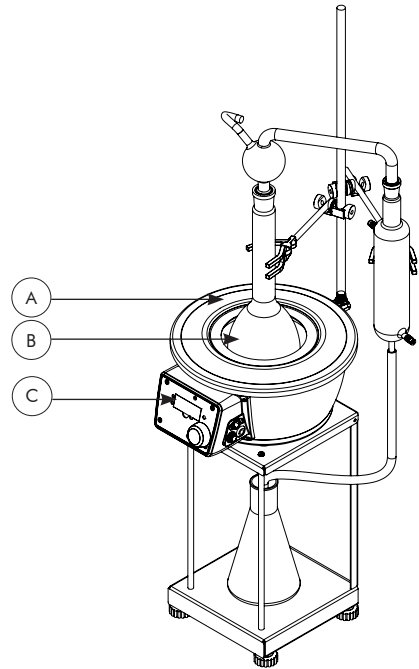
SAFETY PRECAUTIONS

The following precautions should be taken when operating or working near the Hot plate of Soxhlet:

- Do not operate the CKD015 without any flask on its mantle, if not used can reduce the life of the mantle due to over heating.
- Always supervise the CKD015 when it's set to high temperature.
- 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.

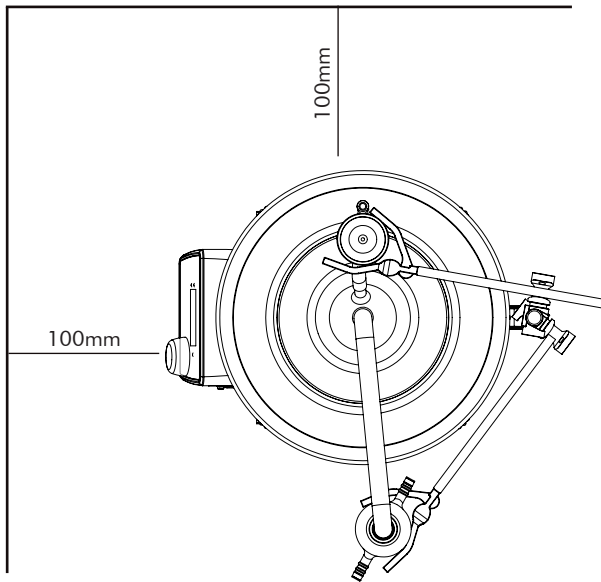
PRODUCT IDENTIFICATION

- A. TOP PLATE
- B. HEATER COIL
- C. CONTROL PANEL
- D. FINGER CLAMPS
- E. RETORT STAND
- F. ROUND BOTTOM FLASK
- G. SPLASH HEAD
- H. CONDENSER
- I. OUTLET PIPE CONNECTION FOR WATER
- J. INLET PIPE CONNECTION FOR WATER
- K. RETORT STAND ADAPTER
- L. SILICONE TUBING
- M. CONICAL FLASK
- N. CKD SINGLE POSITION STAND
- O. RUBBER SHOES



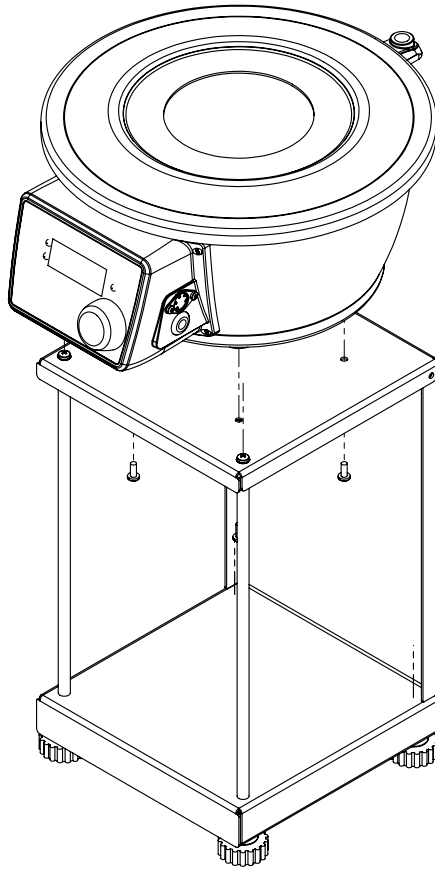
PRODUCT INSTALLATION

- Locate the unit on a level, stable surface near a grounded electrical outlet.
- The surface should be clean, free of dust and moisture.
- Ensure that there are no flammable substances present near the unit .
- Allow sufficient clearance on all sides of the unit for proper ventilation.
- With the power switch in the OFF position, plug the power cord into a grounded receptacle.
- Make sure that a minimum 100 mm gap is maintained between the unit , wall and also with other instruments present in the lab as shown in the figure below.
- Connect the male end of the power cable to the wall socket.
- The unit is ready to operate for first usage.



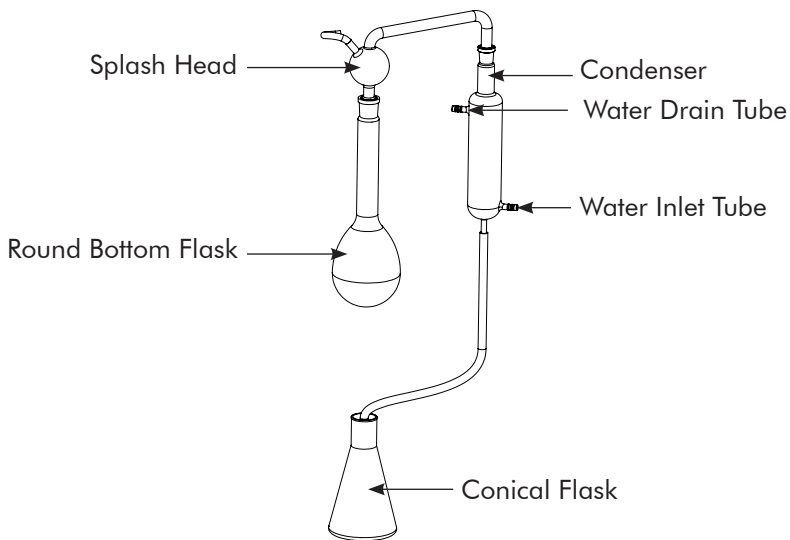
OPERATING INSTRUCTIONS

- All operating controls are located on the front panel of the unit.
- Place round bottom flask of desired dimension filled with samples in the heating mantle. Ensure the RBF is placed well in the heating mantle.
- Connect Splash Head, Condenser and Dosing Funnel above it with plastic kecks and clamps.
- Dose the sample with the dosing funnel placed on the top.
- Please ensure that the flask is dry from outside. Do not use wet flask.
- Do not pour or spill the liquid on mantle.
- Press the main switch, display will turn ON showing the previous set step values.
- Rotate the selector knob to change the step values.
- One can rotate the selector knob in clockwise to increase step values and can rotate in anticlockwise to reduce the step values.
- User can proceed with previous set energy regulator values and time. Single press the selector to start the process.
- User can change set energy regulator values and time. Long press the selector knob and it allow to change the energy regulator values and time.
- Once the desired energy regulator value and the time is set then again single press the selector knob to save the data.
- Single press the selector knob to start the process.
- Once the time is complete the unit will give a buzzer sound indicating the process is completed. The unit will switch OFF heating automatically and display the previous set step values.

ASSEMBLY OF THE UNIT

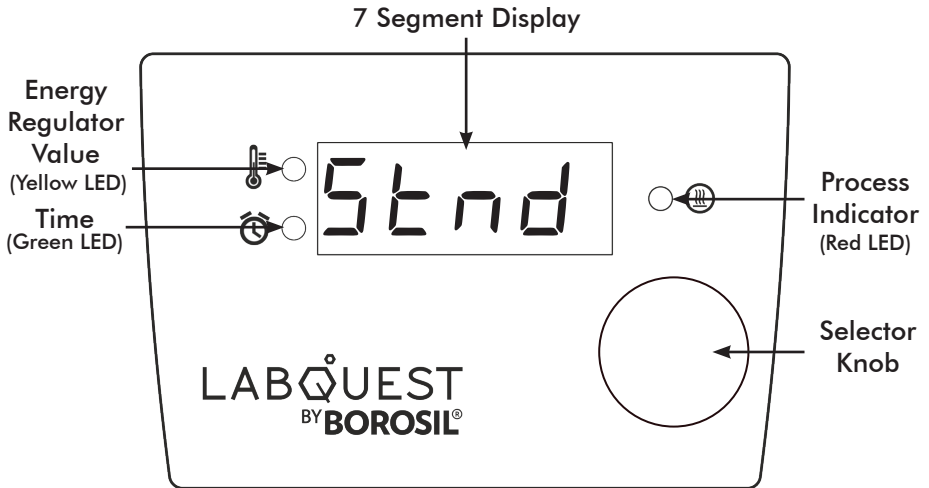
Assemble the CKD stand and the GMC unit by using the 4 screws provided in the packaging box.

INSTALLATION OF AN APPARATUS



1. Please ensure the heating mantle is switched OFF.
2. Make adequate space on the lab countertop.
3. Take a ground neck flask, pour the solution and dry it from outside.
4. Put the flask in mantle.
5. Install retort rod in the retort rod adaptor.
5. Place the round bottom flask in the mantle.
6. Install the Boss head on the retort stand.
7. Install finger clamps at necessary height.
8. Place the vertical pear shaped splash head on the RBF and hold the RBF neck with the finger clamp.
9. Ensure the RBF is held vertical.
10. Attach Graham's condenser to the splash head and hold it secure with finger clamps.
11. Place conical flask of necessary volume below the condenser to collect the condensate.
12. Please ensure that the weight is balanced after installing the apparatus.

DESCRIPTION FOR KNOB AND LED



1. Selector Knob

- **Clockwise Rotation**
 - » To increment the set parameter value.
- **Anti Clockwise Rotation**
 - » To decrement the set parameter value.

2. Switch

- **Single Press** : To save set parameter and start the process.
- **Long Press**: To edit the set parameter, to exit the process and to reset the set parameters.

3. Yellow LED

- This indicates the set energy regulator value and process energy regulator value.

4. Green LED

- This indicates the set time and process time.

5. Red LED

- This indicates the process status.

WORKING MODES

In default power ON condition, it will show previous selected mode.

1. STANDARD MODE



In standard mode user can set one energy regulator value and one time value.

2. DIGESTION MODE



In digestion mode user can set digestion's parameters in 3 steps i.e. energy regulator values and time values.

3. DISTILLATION MODE



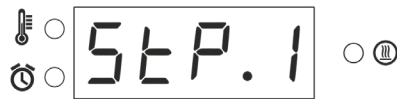
In distillation mode user can set distillation's parameters in 3 steps i.e. energy regulator values and time values.

WORKING

1. In default power ON condition, it will show previous selected mode.



2. Rotate the knob clockwise and anticlockwise to change the mode.
3. Long press to change set parameters of selected mode.
4. In standard mode, display will show energy regulator value and then time value.
5. In distillation and digestion mode display will shortly shown current step value after that display will show energy regulator value and then time value.

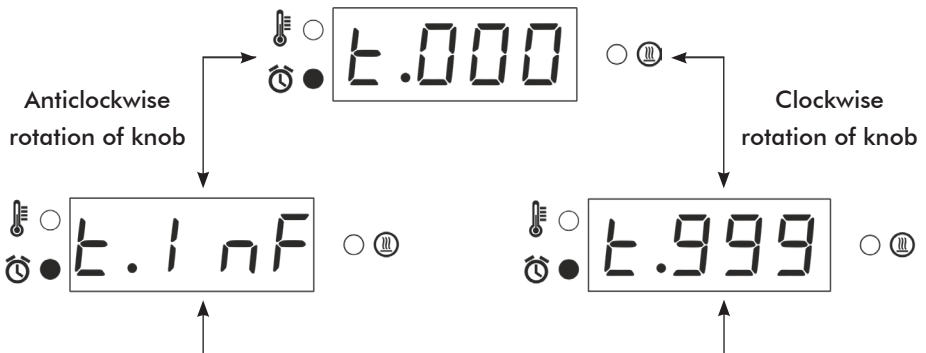


6. In set parameter,

- User can set energy regulator : 0 to 10.



- User can set the time 1 to 999 minutes and also can set the infinite time by rotating knob anticlockwise in standard mode.
- User can set time 1-333 minutes in digestion and distillation mode.



7. In digestion and distillation mode, step will appear on window.



8. Single click to change from energy regulator value to time.

9. Single click to save parameters and display will shortly shown following window.

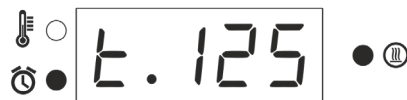


10. Mode will appear on window.



11. Single click to start the process.

12. Red LED indicates process ON.



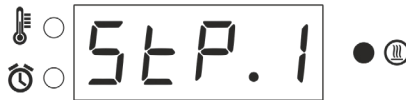
13. In process, if user select standard mode then 2 windows will be alternately appear in the display (energy regulator value and time) and if user select digestion and distillation mode then 3 windows will be alternately appear in the display (step value, energy regulator value and time).

14. While in process, user can STOP the process by long pressing the selector knob.

15. If user set the time between 1 to 999 mins, then countdown time will be display in process and once the time is complete process will terminate automatically.

**NOTE : The unit will continuously beep two minutes before process time.
Remove flask, to avoid back suction.**

16. If user set the infinite time, then elapse time will be displayed upto 999mins and process will be continue until user terminates it.
17. Display will alternately show the Step value, energy regulator value and time.
 - Both LED will be OFF while indicates step values.
 - YELLOW LED indicates the energy regulator value.
 - GREEN LED indicates the elapsed time or countdown time.



Step value



Energy regulator



Time

Example:

1. If user want to set digestion values.
2. In default power ON condition, it will show previous selected mode.
3. If previous selected mode is standard mode then following window will appear.



4. Rotate the knob clockwise to change the mode.



5. Long press to change set parameters of selected mode.
6. First user will set first step of digestion.



7. After above window appear energy regulator value window will appear and user can set energy regulator value.



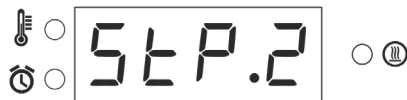
8. After single press user can set time parameter.



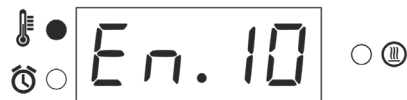
9. Only in standard mode user can select infinite time.



10. After single press user will set second step of digestion.



11. Energy regulator value window will appear and user can set energy regulator value.

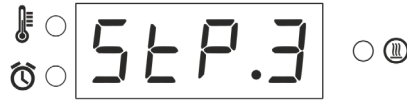


12. After single press user can set time parameter.

NOTE : If user want to skip any step please set that set time parameter as 0.



13. After single press user will set third step of digestion.



14. Energy regulator value window will appear and user can set energy regulator value.



15. After single press user can set time parameter.



16. Single press to save all the parameters.



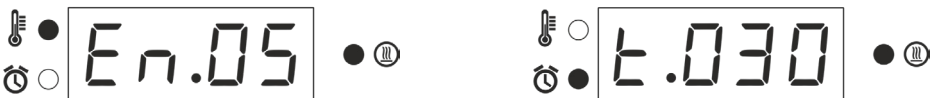
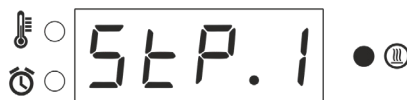
17. Once all paramters save, it returns to main page.



18. Single press to start the process.

19. After process start, Red LED will turn ON.

20. Display will alternately show the Step value, energy regulator value and time.



FEATURES

- Once the user saves all mode's energy regulator values and time values will save until the user will change it.

Selection of steps

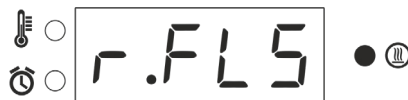
- In this mode, user can set different energy regulator value for different time.
- In this mode, user can set ramps upto 3.
- When user don't want ramp, select standard mode.



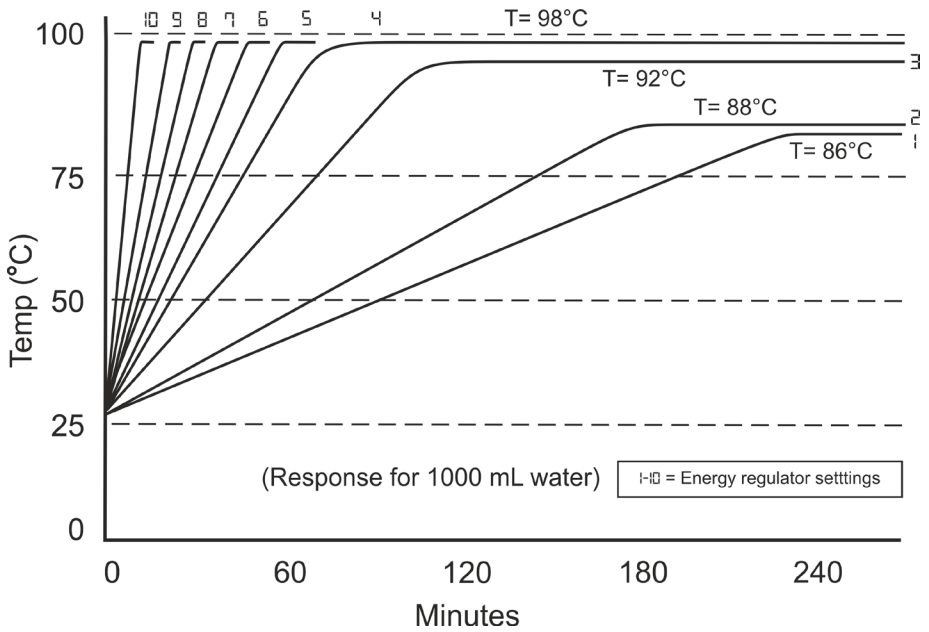
NOTIFICATION

Remove flask indication

- This notification comes after completion of process time to avoid back suck.
- This indication come for a two minute and in this heater is ON with selected energy regulator value.



RESPONSE GRAPH OF CKD IN ENERGY REGULATOR MODE



STANDARD OPERATING PROCEDURE

SOLUTION PREPARATION

1. CATALYST MIXTURE

Potassium sulphate and Copper sulphate in the ratio of 10:1 (eg. 10g of potassium sulphate and 1g of copper sulphate).

2. DIGESTION ACID

95% - 98 % Concentrated Sulphuric acid

3. 40% NaOH

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

4. MIXED INDICATOR

0.1g of methyl red (powder) dissolved 50ml 98% ethanol and 0.05g of Bromocresol green (powder) in 50ml of distilled water. Then mix these two solutions thoroughly.

5. 0.1N HCL

Make up 8.6 ml of Hydrochloric Acid as 1 litre by using distilled water in a Borosil volumetric flask.

6. 0.1N NaOH

Make up 4g of Sodium hydroxide as 1 litre by using distilled water in a Borosil volumetric flask.

7. 0.1N OXALIC ACID

Make up 6.3g of Oxalic acid as 1 litre by using distilled water in a Borosil volumetric flask.

STANDARDISATION OF 0.1 N NaOH

1. Pipette out 10ml of Oxalic acid in a conical flask and add to it 2 to 3 drops of phenolphthalein indicator.
2. Fill the burette with 0.1 N NaOH.
3. Titrate the solution with NaOH.
4. End points would be indicated from colorless to faint pink.
5. Note down the burette reading and calculate the normality of Hydrochloric acid using the formula

$$N_1V_1 = N_2V_2$$

(NaOH) (Oxalic acid)

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.
- Both Digestion & Distillation was done by using Borosil classical Kjeldahl Distillation Unit CKD015. The titration was done using Borosil digital burette LH002014012.

CHEMICALS

- Sodium hydroxide (40 %)
- Hydrochloric acid (0.1 N)
- Sulphuric acid (Concentrated)
- Indicator - methyl red

PROCEDURE

STEP 1.1: DIGESTION USING CKD015

1. Weigh 0.5g of sample on a calibrated weighing balance.
2. Transfer it carefully to Kjeldahl's flask.
3. Weigh 15g of potassium sulphate, sodium sulphate and 0.1g of copper sulphate and add to kjeldahl's flask.
4. Carefully add 50ml of concentrated sulphuric acid to the kjeldahl's flask
5. Connect the assembly as mentioned in the manual.
6. Select the digestion mode.
7. Clear bluish and greenish color after 45 minutes marks the completion of digestion.
8. Sample is to be cooled post digestion. In semi cooled condition add 20 to 30ml of distilled water to avoid crystallisation.
9. For digestion we can set the following program,

Digestion Mode

Steps	Energy Regulator	Time (min)
1	6	10
2	10	25
3	5	10

STEP 1.2: DISTILLATION OF DIGESTED SAMPLE USING CKD015

1. Dilute the digested samples to 250ml of volumetric flask.
2. Take 25ml of aliquote from stock and pour it into the 800ml of kjeldahl flask.
3. Add adequate amount of 40 % NaOH directly into the kjeldahl flask.
4. Take 50ml of 0.1 N HCl in 500 ml of conical flask and put this flask at the receiver end.
5. Now start tap and check the flow rate.

6. For distillation we can set the following program,

Distillation Mode

Steps	Energy Regulator	Time (min)
1	6	8
2	10	15
3	5	4

STEP 1.3: DISTILLATION OF AMMONIUM SULPHATE USING CKD015

1. Weigh 0.1g of ammonium sulphate sample (sample should be dry).
2. Dissolve it in water and make it volume 25ml with distilled water and transfer it to 500ml of kjeldahl flask.
3. Connect the assembly as mentioned in the manual.
4. Add 20ml of 40 % NaOH through the funnel.
5. Take 50ml of 0.1 N HCl and add 2 to 3 drops of methyl red indicator in a conical flask. Put this flask at the receiver end.
6. Now start tap and check the flow rate.
7. For distillation we can set the following program,

Standard Mode

Steps	Energy Regulator	Time (min)
1	10	25
2	8	5
3	6	5

STEP 2: TITRATION OF THE DISTILLATION

1. Fill the burette with 0.1 N NaOH solution (concentration of the NaOH should be accurate otherwise the result will vary).
2. Now titrate the solution with NaOH and note down the burette reading.
3. Calculate the % nitrogen.

STEP 3: CALCULATIONS

The results were calculated as the percentage of Nitrogen.

FORMULA :

$$1. \% N = (14.01 \times 100 \times B. R. \times 250 \times N) / (1007 \times 25)$$

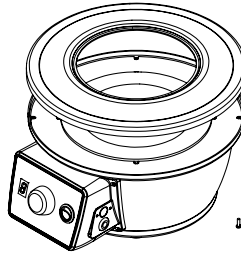
$$2. \% N = (14.01 \times 100 \times B. R. \times N) / (1007 \times W)$$

Where,

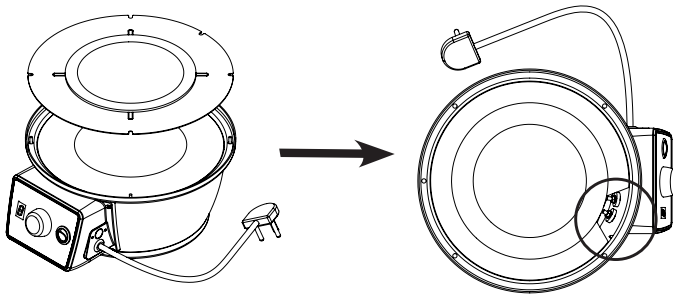
1. 14.01 = Molecular weight of Nitrogen
2. 1007 = Constant factor
3. W = Weight of sample taken for analysis
4. N = Exact normality of acid (0.1N)
5. B.R. = Burette reading
6. % N = Percentage of Nitrogen
7. 250 = Dilution factor.

MANTLE CHANGING PROCEDURE

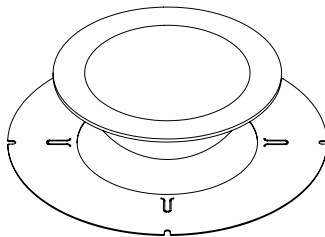
1. Remove the 5 screws which present beneath the top plate, then remove the top plate and keep it aside.



2. Pull out the heater tray from the body by loosening the terminal screws to which the heater wires are connected.



3. Unfold the 4 tabs from the heater coil ring.



4. Replace the coil.
5. Follow the reverse procedure to close it.
6. Wipe the unit with dry cloth.

TROUBLESHOOTING

S.NO.	PROBLEM	SOLUTION
1.	The unit is not turning ON.	<ul style="list-style-type: none"> • Check the power supply in AC mains. • Make sure power cable is inserted to the socket properly. • Check whether the main switch is ON or OFF. • Check if the illuminated switch present in the unit is OFF or ON. • Check if the unit is running and the switch is not illuminating, then the switch needs to be replaced.
2.	If the fuse is blown.	<ul style="list-style-type: none"> • Switch OFF the unit and remove power cable from AC mains. • Remove the plastic tray present in the power socket located at the back side of the unit. • Remove the glass tube fuse. • Check if the fuse is blown. • If the fuse is blown, replace it with a glass tube fuse that is given in the product specification table.



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: CKD015

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 this operating manual.
- To be covered under warranty.
 - Units have to be connected to standard 230V, 50Hz, 5A wall sockets with proper earthing for CKD015.
 - 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

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: MANUFACTURED BY :

Borosil Scientific Limited

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Write to us on above address.

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Maharashtra, India

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Website : www.borosilscientific.com