

Open Kjeldahl Apparatus

INSTRUCTION MANUAL

21232	21237	21276
21233	21256	21284-01
21236	21260	21285-01

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INTRODUCTION

Components Shipped

Carefully check the contents of the carton for damage that might have occurred in transit. Do not discard the carton or packaging material until all components have been checked and the equipment has been installed and tested.

General Description

The Kjeldahl Nitrogen Apparatus is designed for nitrogen determinations on materials such as feeds, grains, soils, fertilizers, plant tissue, water effluent, organic wastes, and food products. The apparatus consists of both the digestion and distillation systems used in normal Kjeldahl determinations.

The apparatus can be used for digestion and distillation used in normal Kjeldahl determinations. The apparatus can be used for the digestion and distillation of all types of nitrogen containing samples.

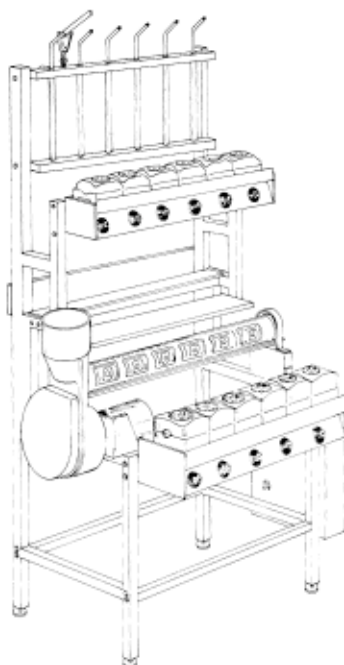


Figure 1

Performance

The Macro Kjeldahl Distillation, Digestion, and Combination apparatus has been designed for usage in the determination of protein and nitrogen in such products as plant tissues, fertilizers, organic wastes, and water effluents.

Nitrogen determinations on the macro sized Kjeldahl apparatus are limited to samples up to and including 5 grams in size.

Detailed procedures as developed by AOAC, are compatible with all Labconco Macro Kjeldahl apparatus.

INTRODUCTION

Component Identification

1. **Electric Heaters.** 600-watt heaters are used in both the digestion and distillation portions of the unit. Infinite control switches regulate each of the heaters. The curved heater elements follow the round base of the flasks, providing faster and more evenly distributed heat.
2. **Fume Manifold.** Located at the back of the unit above the digestion heaters, this manifold is manufactured from chemical resistant chlorinated polyvinyl chloride and fitted with heat resistant Teflon® nipples designed to prevent leakage of sulfuric acid fumes. The nipple design, extending to the flask neck, eliminates sample loss while efficiently removing fumes.
3. **Blower Fume Exhaust System.** Located on the left-hand side of the unit, this system removes the fumes from the digestion flasks.(not applicable to 2 unit)
4. **Water Ejector Fume Removal System.** Available through which fumes are drawn through the chemical resistant manifold by way of an aspirator. The 2-unit digestion apparatus is provided with a nipple located on the left side of the fume pipe for connection to a small laboratory water aspirator pump. (See water ejector hook up system for 2-unit on Page 13.
5. **Gauge Monitor** The distillation cooling water temperature can be adjusted to suit individual requirements with the remote control flow valve located under the distillation heaters (not found on 2-unit). Water temperature is indicated on the thermometer, which is located at the water outlet of the distillation manifold.

NOTE: The Kjeldahl units described in this manual feature either the blower exhaust or water ejector exhaust system to remove the digestion fumes through the fume manifold system. Designate one of these two exhaust systems, for our installation, as they are not capable of working in conjunction with one another.

The blower exhaust system is located on the left end of the digestion fume manifold. The direct drive blower with corrosion resistant impeller wheel pulls the acid fumes through the manifold and discharges them out through the exhaust duct connection.

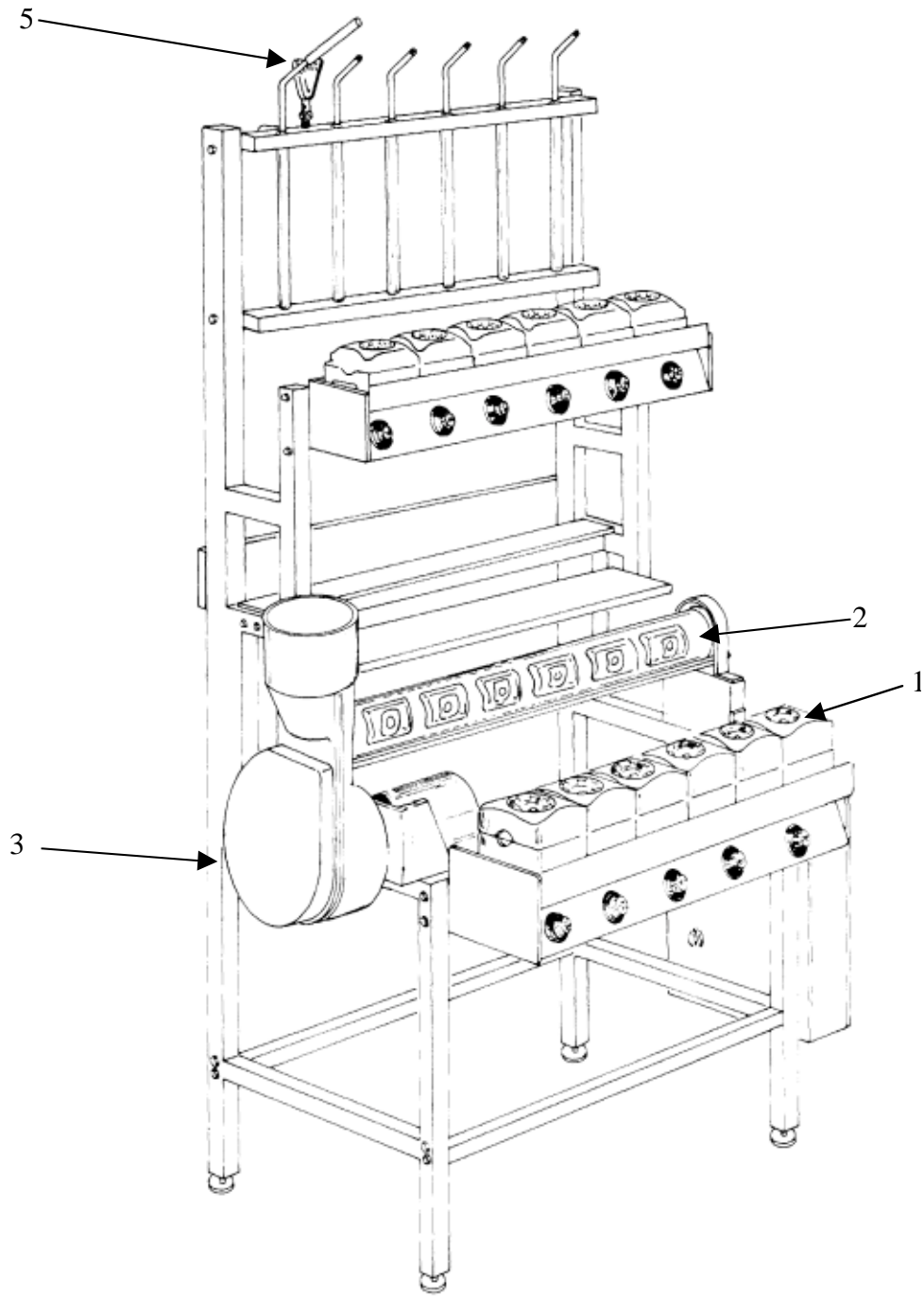


Figure 2

INSTALLATION

Your Kjeldahl Nitrogen Apparatus has been shipped to you, fully crated to minimize damage that may occur in transit.

Make sure to inspect your Kjeldahl apparatus thoroughly **prior** to installation and report any damage that may have occurred in transit.



Figure 3

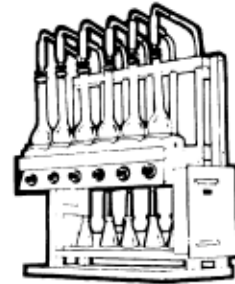


Figure 4

Installation Factors

Your Kjeldahl Nitrogen Apparatus is shipped fully assembled. Only utility connections and glassware installation need to be made by the customer.

Remove the crating material taped to the machine runway carefully as fragile components are involved. Levelers are shipped installed, as are the thermometers (on units that use them).

Location

If possible, the apparatus should be uncrated in the room in which it is to be placed.

If special instruction tags are attached to the apparatus, they must **not** be removed until the installation has been completed.

NORMAL OPERATION

The standard methods of tests, as outlined by the A.O.A.C., or other technical procedures involved with nitrogen determinations by the Kjeldahl methods, are to be referred to in all cases. When operating this piece of equipment.

ROUTINE MAINTENANCE

Clean-Up and Cosmetic Procedures

The stainless steel condensing tubes on the distillation apparatus should be thoroughly washed out before commencing operation.

In the operation of the condensers, the temperature of the water should not exceed 110° F. Watch your thermometer and regulate water flow by the control valve.(Thermometer not provided on 2-unit).

Keeping the apparatus clean will not only add to the appearance, but will also mean longer life for the equipment.

The equipment can be kept clean by washing with a weak solution of caustic, and rinsing with clear water.

At times sulphate may build up between the channel iron support and the fume manifold. Neutralize this with soda periodically to keep the unit clean and to prevent build up of sulphate.

Fume Pipe Suction Adjustment

The suction along the fume pipe is adjusted as follows:

Water Ejector Exhaust System

Suction is adjusted by changes in the water supply flow rate. The suction may be decreased by decreasing the flow rate.

Blower Exhaust System

No adjustment is required on the suction pressure at the manifold when used in conjunction with a blower fume exhaust system.

Exhaust Systems Maintenance

Sometimes the suction in the nipples is retarded due to obstruction within the exhaust system. These obstructions can usually be washed from the fume pipe, blower housing or water ejector by boiling water in a number of flasks placed on the digestion heaters. The blower or water ejector should be in operation to draw the steam through the fume pipe. If this does not work and the problem persists, contact Labconco Corporation directly for service.

The direct drive motor should be lubricated in accordance with the manufacturer's recommendations for heavy-duty usage by adding 30 to 40 drops of S.A.E. 10 automotive type oil annually or at least every 1500 hours of operation.

CAUTION: Do not over oil!

UTILITY CONNECTIONS

Electrical

This Kjeldahl apparatus has been wired in accordance with electrical characteristics specified. It will be necessary for an electrician to provide the main electrical leads to the apparatus from the main breaker box and to connect them into the circuit breaker. The 2-unit apparatus is provided with power cords for insertion into proper electrical outlet as specified on unit. With other units, the following steps should be followed:

1. Remove circuit breaker box cover panel.
2. Main line lead connection terminals are identified and connections must be made accordingly.
3. Line leads to the apparatus must conform to local electrical codes.
4. Provide an electrical ground to the apparatus per code.
5. Before applying power to apparatus, check the electrical panel and breakers for loose connections.
6. Reinstall box cover panel.
7. Power the breaker box and reset breakers to check circuits in the apparatus.

Plumbing-Supply Water

NOTE: All plumbing connections and components must be free of foreign material before final connections are made.

Distillation Manifold

The inlet and outlet connections for water on the 2-unit Model No. 212850-01 are 3/8" NPT. Connection of this unit to a water source with tubing is usually adequate, I.D. of tubing and fittings should not be less than 5/16 for proper water flow. With the other KNA units, the inlet and outlet are 3/4" NPT and the supply line should be 1/2" minimum for proper water flow through the unit.

The plumbing line for the outlet side of the distillation portion of the apparatus must be free of back pressure to avoid restriction of the cooling water flow and should not discharge into the same drain as the digestion water ejector (if apparatus is so equipped) unless provisions have been made to handle this volume of flow without backup into the vent line on the water aspirator.

Water discharged from the distillation manifold is **not** acid contaminated and standard drain lines may be used for its removal.

Water Ejector Exhaust System

(Not applicable to 2-unit)

The water inlet to the ejector is sized for 3/4" NPT and a 3/4" supply line with a minimum of 60 psi line pressure is required for efficient ejector operation. See Figure 5.

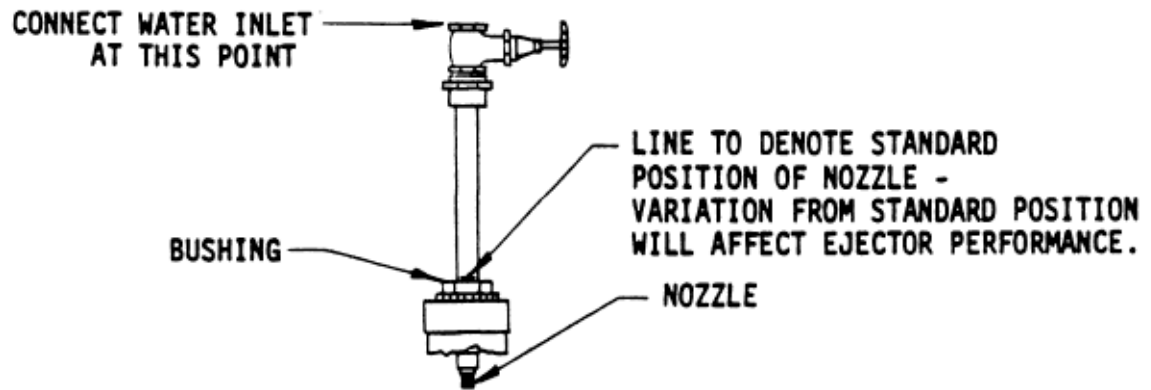


Figure 5

Plumbing Drain Connections

Water Ejector Exhaust System

(Not applicable to 2-Unit)

The water ejector system is sized for use with a nominal 3" dia. line. The ejector terminates on the discharge side with a 3" dia. PVC coupling to the drain and a 1-1/2" dia. PVC vent coupling to the vent. The discharge drain for the ejector must be acid proof as water from the ejector will be acid laden. The drain should be capable of carrying up to 6 gpm of discharge without backing up over the vent connection on the ejector body itself. See plumbing diagram Figure 9.

The 1-1/2" dia. vent line must be vented to the outside to release the air down from the fume manifold and to prevent back pressure in the system. It is recommended that this vent be of acid resistant material as corrosive fumes will be present in this vent line.

As previously mentioned, the drain line must be free of back pressure to prevent closing of the atmosphere vent and stopping the removal of the acid fumes through the manifold. The drain on the water ejector system should be a sealed installation to avoid fumes in the laboratory.

The position of the ejector nozzle relative to the fume manifold is factory set and should not require field adjustments for normal conditions. Care should be taken to maintain this "set" position when connecting the water line to the ejector and should be checked periodically to be maintained in optimum working condition. See Figure 5.

UTILITY CONNECTIONS

Water Ejector Exhaust System

2-Unit Kjeldahl Digestor

P/N 21284-01

1. It is suggested that the 2-unit digestor be used in a laboratory fume hood containing a cup sink and faucet to which a laboratory water aspirator may be attached.
2. The water aspirator should be constructed of a non-metallic, non-corrosive material. One suggested aspirator is: Water Jet Pump, P/N 23174. It is made of polypropylene material with a rating of as low as 7.5 psig for a minimum water consumption and an ultimate vacuum of 28.5 HG (mercury). Incorporated into the aspirator, there should also be a 3/8" NPT connecting thread to install into the faucet and a check valve for proper aspiration.
3. A 3-foot length of PVC tubing should be connected from the nipple on the fume manifold of the digestor to the water aspirator. Care should be taken to avoid any low spots to be formed by the tubing, and thus preventing proper aspiration. The tubing connections should be secured with a clamp or tie.
4. Adjust the water aspirator to give a moderate to low flow of water but one that will insure aspiration of fumes.

Ductwork Exhaust Connections

Blower Fume Exhaust System

The blower exhaust connection is sized for use with 6" nominal (6-5/8" O.D.) vent duct. The blower assembly is supplied with a short piece of 6" PVC pipe and a flexible coupling with clamps to connect the blower housing assembly to the vent stack. (See Figure 6).

Joints under the flexible coupling must be sealed with an acid-resistant sealant (silicone or acid resistant cement) before tightening clamps to prevent leakage of acid condensate at this point.

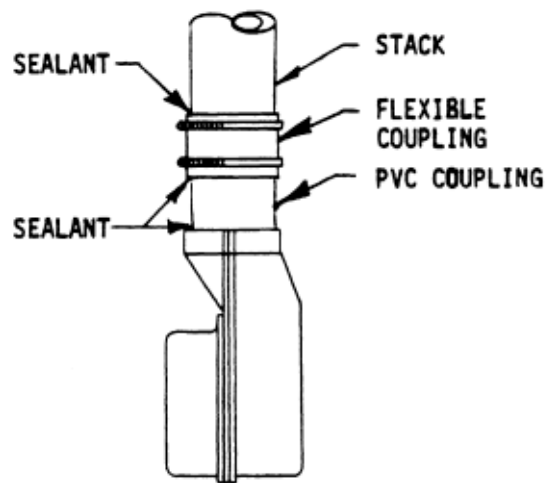


Figure 6

The bottom of the blower housing is fitted with a condensate drain and corrosion resistant tubing. This condensate can be collected in an acid proof container, which should be emptied regularly or it may be plumbed to an acid resistant drain line. The condensate is concentrated acid and care must be exercised in handling it.

The exhaust stack rising from the blower exhaust connection must be vented to the outside atmosphere. A 6" diameter duct is sufficient for carrying the fumes a distance not exceeding 60 feet. In estimating the duct length count each 90° elbow as 12 feet and add to the straight length total of duct for the duct system. If the duct system exceeds 60 feet in length equivalent, it may be necessary to increase the duct size to compensate for the friction loss generated by this additional length.

WARNING: Acid resistant duct must be used on the exhaust connection on your Kjeldahl Apparatus.

UTILITY CONNECTIONS

Highly corrosive fumes produced from boiling sulfuric acid will flow through the ductwork, so acid-resistant duct **must** be used. Polyvinyl chloride (PVC) or fiberglass duct is recommended.

Stainless steel ducting have not generally proven satisfactory for this application. The exhaust ducting **must** be supported independent of the apparatus to avoid distortion of the blower housing.

Water Ejection Exhaust System

In addition to the 3" diameter water drain, a 1-1/2" diameter acid vent line is required to allow the water ejector exhaust system to function properly. This 1-1/2" diameter vent line should be fabricated out of acid resistant material, as acid laden air will be passing through it. The vent line must run to the exterior of the building and vented properly so as to dispose of the corrosive materials.

START-UP AND CHECKOUT

1. The KNA apparatus is designed for use with either 500 or 800-ml flasks. The digestion heaters are free to move forward or backward on the runway to accommodate either size flask.
2. Turn on heater to high setting on both the digester and distillation units. Wait 2 – 3 minutes to insure proper heating.
3. Turn on distillation water and check for leaks.
4. Turn on either the blower or water ejector (depending upon customer option). Place a small piece of paper over the nipple on the manifold. Suction should be sufficient to hold paper in place.

REPLACEMENT PARTS

Electrical Heaters and Parts

<u>Part Number</u>	<u>Description</u>
13154/13155	Control, heater, infinite, 115 Volts/230Volts
20115	Core plate casting, package of 6
20232	Heater base casting (use with gas or electric)
20331-20332	Heater element, 115 V, 600 W, Pkg. of 6/230 V, 600 W package of 6
20231	Heater top casting (use with gas or electric)
20318	Heater lead wire assembly, package of 6 pair
18702	Knob for infinite heater control
13171	Blower Motor Switch

Plastic Fume Duct Parts

<u>Part Number</u>	<u>Description</u>
18505	Adjustable sheave (pulley) for belt drive only
20545	Blower bearing assembly – for belt drive only
20539	Blower housing assembly
12000/12091	Blower motor 1/3 H.P., 115 V, 60 cycle/50 cycle
12032/12036	Blower motor 1/3 H.P., 230 V, 60 cycle/50 cycle
18518	Blower shaft bearing belt drive only
14513	Blower wheel
20566	Ceramic nipple
20554	Cover, blower wheel
21393	Grease line, bearing lubrication belt drive only
20555	Shaft, blower belt drive only
18511	V-belt drive only
15798-01	Adhesive Silaprene, 3 oz. Tube
20530	Water ejector nozzle
19670	Clamp
21446	Flex sleeving
16622	Gromment and Rubber
20568	Fume pipe support – Blue
20568-01	Fume pipe support – Umber
21658	Teflon nipple
18801-28	Bolts for Teflon nipple
21640	Motor shield (non-hooded)

Miscellaneous Replacement Parts

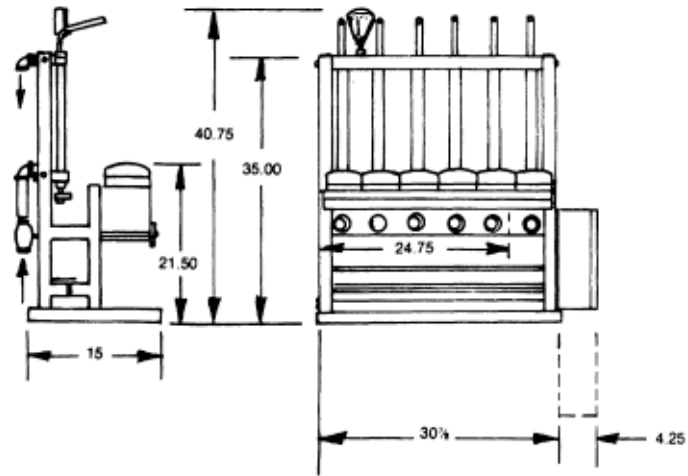
<u>Part Number</u>	<u>Description</u>
21524-06	Distillation manifold – 6 place stainless steel – Umber
21524-05	Distillation manifold – 6 place stainless steel – Blue
16205	Tubing, rubber condenser connecting, per foot
20388	Wire, No 14 Black, SEWF-2, 30 ft length
20389	Wire No. 14 White, SEWF-2, 30 ft length
20788	Coupling, fume pipe to exhaust housing
20313	Hose connectors (blower to ejector and elbow to stack – 2 per set
21473	Kit, ceramic nipple, 3 oz. Silaprene adhesive
15798-01	Adhesive Silaprene
20317 (not shown)	Heater terminal assembly, package of 24
21464 (not shown)	Assembly inlet & outlet manifold (12 unit only)
20813	Connector bulb/caustic trap, package of 6
21288	Delivery tube, package of 6

Belt Drive Replacement Parts

<u>Part Number</u>	<u>Description</u>
18505	Adjustable sheave (pulley)
20545	Blower bearing assembly
18518	Blower shaft bearing
21393	Grease line bearing lubrication
20555	Shaft blower
18511	V-Belt

DIMENSIONAL SPECIFICATIONS

Model #21276



Model #21256, 21260

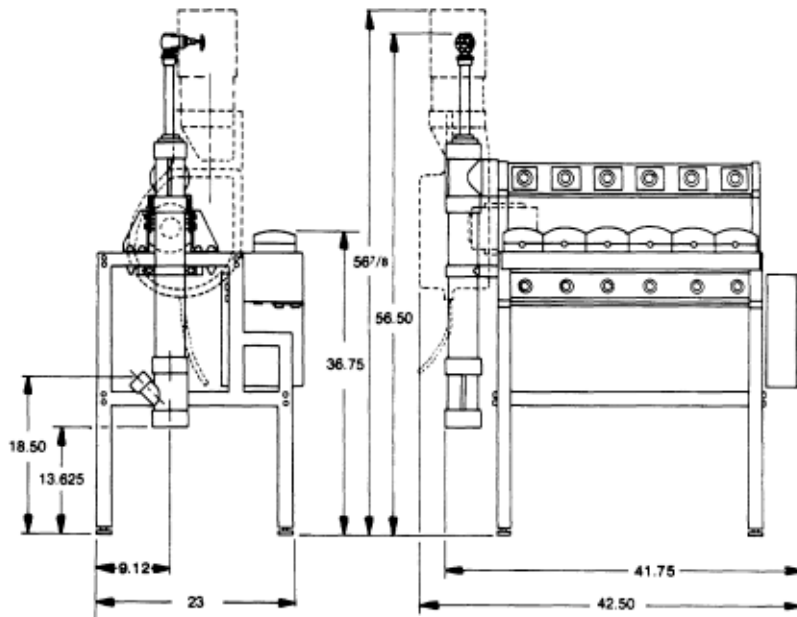
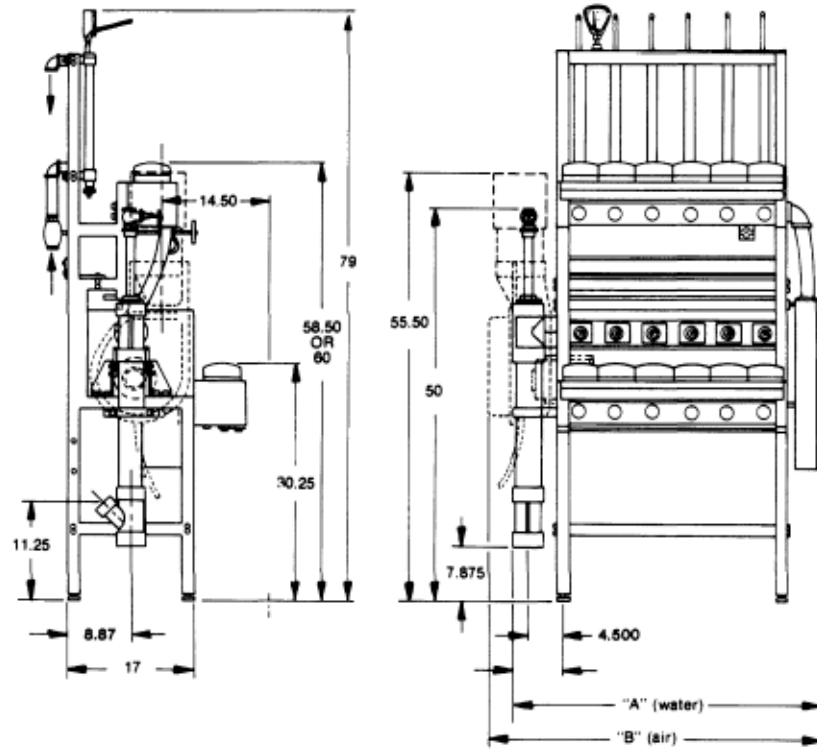


Figure 7

DIMENSIONAL SPECIFICATION

Model #21232, 21233, 21236, 21237



	TYPE FUME EXHAUST	
	WATER EJECTOR UNITS	BLOWER EXHAUST UNITS
CAPACITY	A	B
8-UNIT COMB	41 $\frac{3}{4}$ "	44"
12-UNIT COMB	71 $\frac{3}{4}$ "	74"

Figure 8

WATER ASPIRATOR PLUMBING CONNECTION DIAGRAM

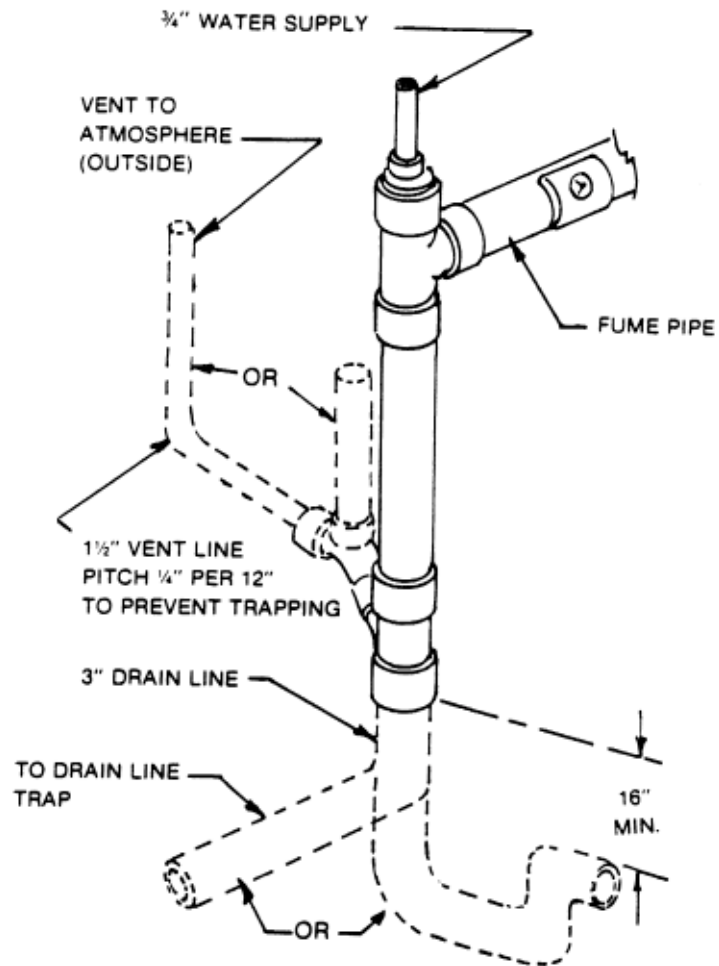


Figure 9

Do not locate trap directly below water ejector stub, or water may backup into the air vent and stop the fume removal through your exhaust manifold.

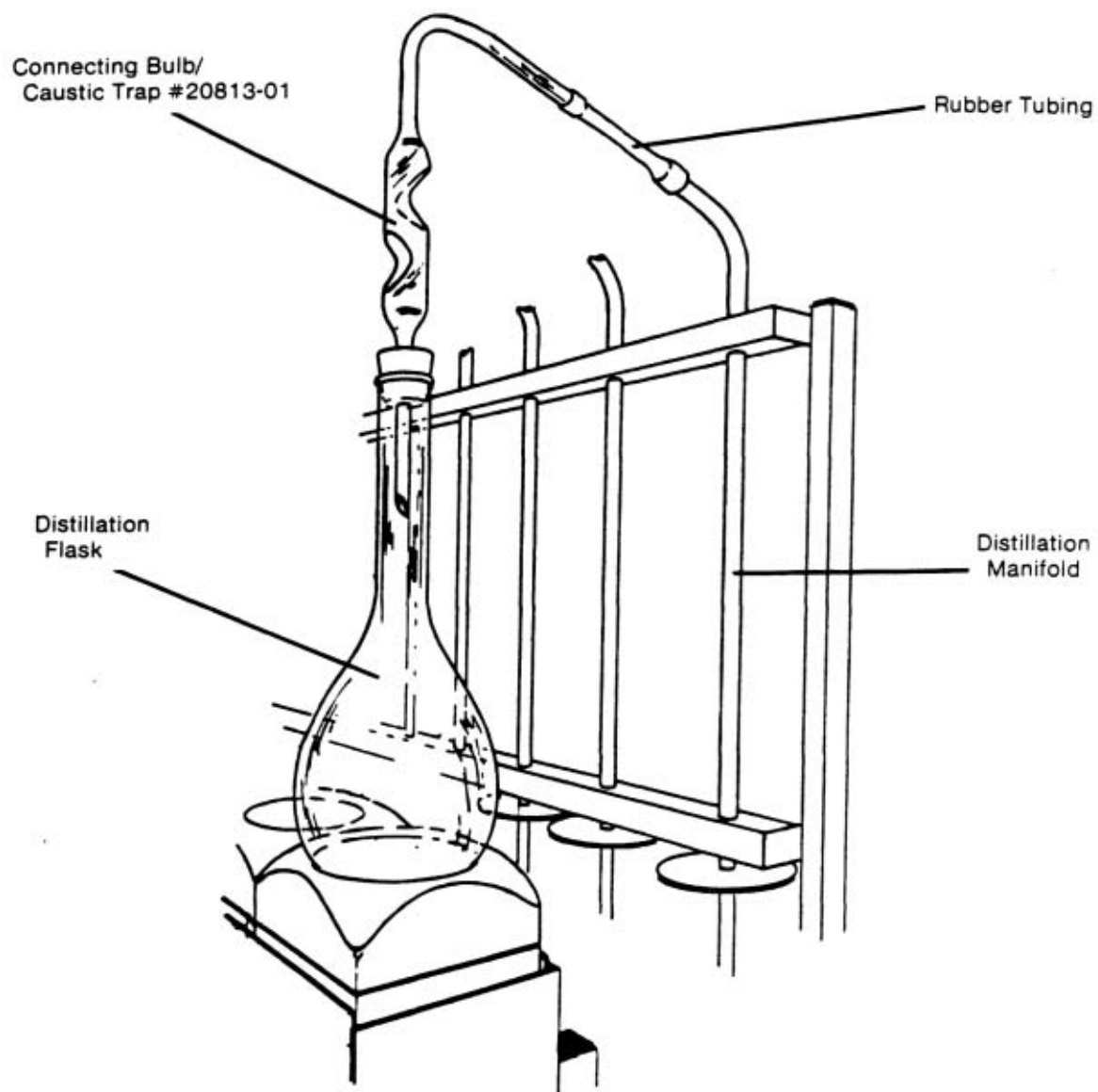


Figure 10

WARRANTY

We are committed to providing our customers with quality equipment and service after the sale. Part of this objective involves keeping you informed of changes and new product additions. We therefore request that you take a moment to fill out the product registration card so we may know your location as well as some of the reasons that prompted you to purchase our products.

Labconco provides a warranty on all parts and factory workmanship. The warranty includes areas of defective material and workmanship, provided such defect results from normal and proper use of the equipment.

The warranty for all Labconco products will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner, except the following:

- Purifier® Delta™ Series Biological Safety Cabinets, which carry a three-year warranty from date of installation or four years from date of shipment from Labconco, whichever is sooner.
- Carts carry a lifetime warranty.
- Glassware is not warranted from breakage when dropped or mishandled.

This limited warranty covers parts and labor, but not transportation and insurance charges. In the event of a warranty claim, contact Labconco Corporation or the dealer who sold you the product. If the cause is determined to be a manufacturing fault, the dealer or Labconco Corporation will repair or replace all defective parts to restore the unit to operation. Under no circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This statement may be altered by a specific published amendment. No individual has authorization to alter the provisions of this warranty policy or its amendments. Lamps and filters are not covered by this warranty

WARNING: The disposal and/or emission of substances used in connection with this equipment may be governed by various federal, state or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land or air and to comply with such regulations.

If a shipment is received in visibly damaged condition, be certain to make a notation on the delivering carrier's receipt and have his agent confirm the damage on your receipt. Otherwise, the damage claim may be refused.

If concealed damage or pilferage is discovered, notify the carrier immediately and retain the entire shipment intact for inspection. Interstate Commerce Commission rules requires that the claim be filed with the carrier within 15 days after delivery.

NOTE: Do not return goods. Goods returned without prior authorization will not be accepted. Labconco Corporation and its dealers are not responsible for shipping damage. Claims must be filed directly with the freight carrier by the recipient. If authorization has been received to return this product, by accepting this approval, the user assumes all responsibility and liability for biological and chemical decontamination and cleansing. Labconco reserves the right to refuse delivery of any products, which do not appear to have been properly cleaned and/or decontaminated prior to return.

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