

Hooded Kjeldahl Apparatus

Models

21176, 21177, 21178, 21179, 21180

INSTRUCTION MANUAL

Product designs are subject to change without notice

2081600 Rev S / ECO A800

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INTRODUCTION

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 hooded Kjeldahl 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.

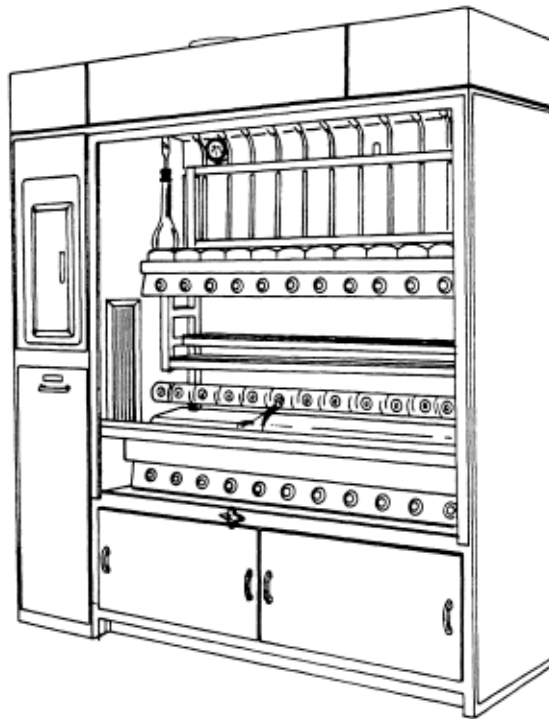


Figure 1

Performance

The Hooded Combination Kjeldahl 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 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.
4. **Water Ejector Exhaust System.** A water ejector fume removal system is available through which fumes are drawn through the chemical resistant manifold by way of an aspirator.
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 on the front of the cabinet. 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.

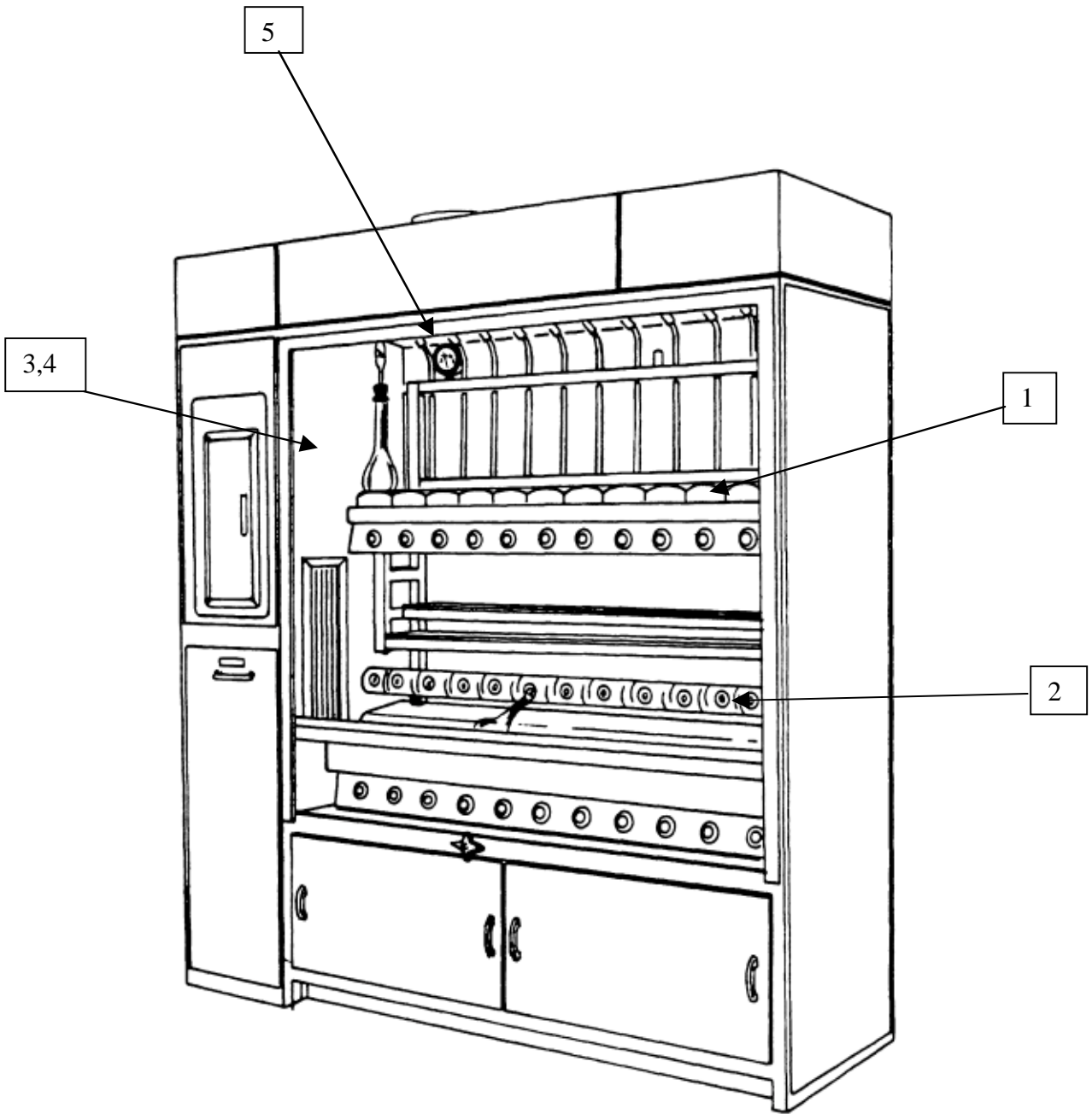


Figure 2

Your Hooded 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.

Installation Factors

Your Hooded Kjeldahl Nitrogen Apparatus is shipped in two sections. Only utility connections and glassware installation need to be made by the customer, once the top bonnet and glass sashes have been installed.

Location

If possible, the apparatus should be uncrated in the room, which it is to be placed. Remove the crating material taped to the machine carefully as fragile components are involved. Both the floor levelers and the thermometer are shipped installed.

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



Figure 3

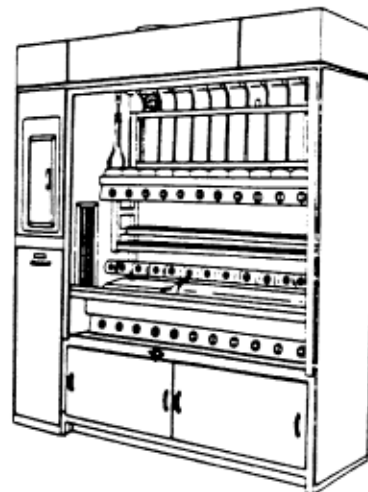


Figure 4

Hood Assembly

Bonnet Assembly

The hood bonnet must be installed on top of the substructure of the hood. This is accomplished by elevating the bonnet up on top of the substructure. It is not required to bolt the bonnet in place, as its weight on the foam gasket seal will hold it in its proper place.

Sash Assembly

The glass sashes are packaged separately and are installed into the hood assembly, by inserting the upper edge into its track first and then positioning the lower edge over the nylon runners in the lower sash track. See figure 8 for illustration of this procedure.

Electrical Connection

The electrical feed line supplying the lights in the bonnet section of the hood assembly needs to be connected to the lead wires coming off of the light switch that is located on the substructure of the hood assembly. Wire nuts have been supplied to aid in this connection.

NORMAL OPERATION

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

ROUTINE MAINTENANCE

Clean-Up and Cosmetic Procedures

Access to the blower exhaust or water ejector system is gained by removing the lower left front access panel, located below the electrical load center.

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.

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

Washing with a weak solution of caustic and rinsing with clear water can keep the equipment clean. Using No. 0 steel wool can clean shelves.

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. Average suction in the nipples should be 1/2" negative water pressure.

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!

Drip Shield

The drip shield is constructed of stainless steel and is resistant to most acid attack. Acid spills can however cause discoloration and eventual marring of the surface unless the following proper procedures are followed in their clean up.

1. Promptly wash down all major acid spills contained by the shield.
2. Periodically clean the stainless surface with Compound 302 by Arcal Chemical Inc., 223 West Hampton, Seat Pleasant, MD 20027.
3. After cleaning, renew the bright shiny appearance by lightly sanding with 220 grade emery paper.

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 box located on the apparatus.

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 plumbing connections on the distillation manifold 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 manifold must be free of back pressure to avoid restriction of the cooling water flow. The cooling water should not discharge into the same drain as the water flowing through 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 discharged through the water ejector is acid contaminated and should be drained through corrosion resistant drain lines.

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.

The ejector inlet is located on the left side of the hood assembly. Access to this area is obtained by removing the lower left-hand panel.

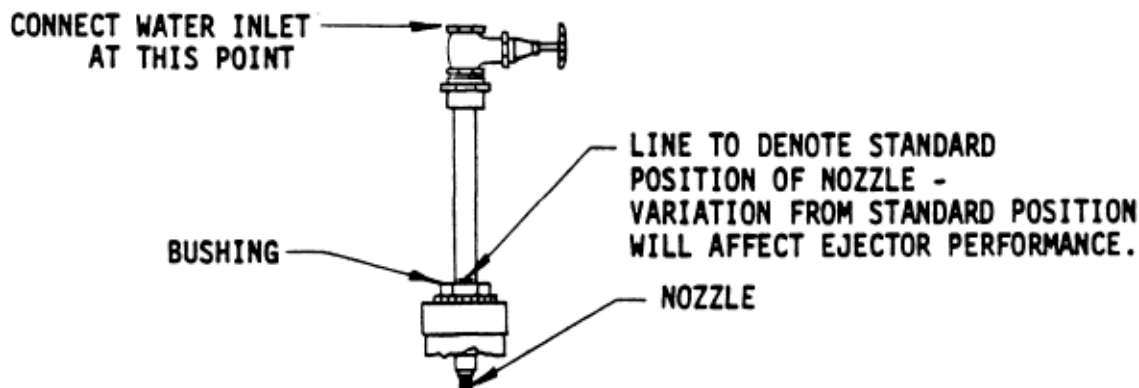


Figure 5

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. drain 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.

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).

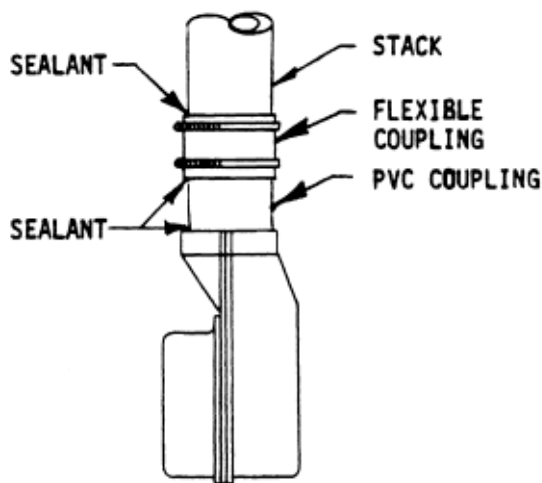


Figure 6

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.

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.

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

Stainless steel and asbestos 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.

UTILITY CONNECTIONS

Hood Exhaust system

The hood superstructure is fitted with a 10-3/4" I.D. duct connection. This connection is used to remove the heat build up that occurs with normal operation inside the unit superstructure. Specific airflow requirements for each model is shown on specification drawing, see Figure 7.

Hood Auxiliary Air System

The hood superstructure is fitted with a 10-3/4" I.D. duct connection to allow for the auxiliary air to be supplied into the hood. This air will in turn be exhausted out through the hood exhaust connection with additional room air and the heat load that builds up inside the hood structure.

The auxiliary make up air system is used when the existing room environment does not supply enough air to the hood to adequately remove the heat build up that is experienced.

Specific airflow requirements for each model are shown on the specification drawing, Figure 7 of this manual.

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 to properly 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, package 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
18505	Adjustable sheave (pulley) 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	Grommet and Rubber
20568	Fume pipe support – Blue
20568-01	Fume pipe support – Umber
21658	Teflon nipple
18801-28	Bolts for Teflon nipple

REPLACEMENT PARTS

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
20388	Wire, No 14 Black, SEWF-2, 30 ft length
20389	Wire No. 14 White, SEWF-2, 30 ft length
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
20788	Kit, replacement fume pipe to blower housing

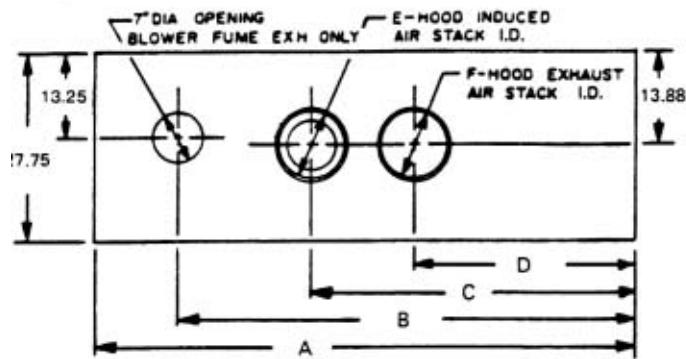
Belt Drive Replacement Parts

18505	Adjustable sheave (pulley)
20545	Blower bearing assembly
18518	Blower shaft bearing
21393	Grease line bearing lubrication
20555	Shaft blower
18511	V-Belt

DIMENSIONAL DRAWING

UNIT	EXHAUST CFM	ADD-AIR CFM	MAX KW
6	500	335	7
12	700	525	14
18	1000	750	21

UNIT	A	B	C	D	E	F
6	49.85	38.25	26.87	17.00	8.63	8.63
12	80.35	68.75	47.50	32.25	10.75	10.75
18	110.85	99.25	70.38	47.50	10.75	10.75



AC ELECTRICAL CODES FOR ALL MODELS		
60 CYC	50 CYC	DESCRIPTION
- 01	- 04	115 VOLTS SINGLE PHASE
- 02	- 05	230 VOLTS SINGLE PHASE
- 03	- 06	208 / 230 VOLTS THREE PHASE

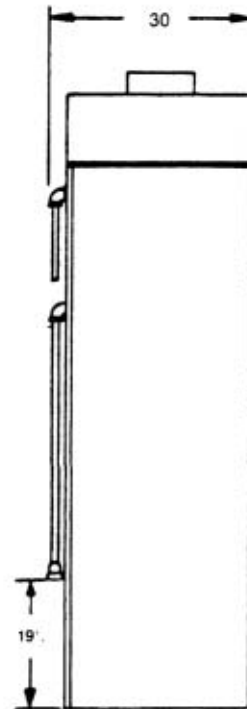
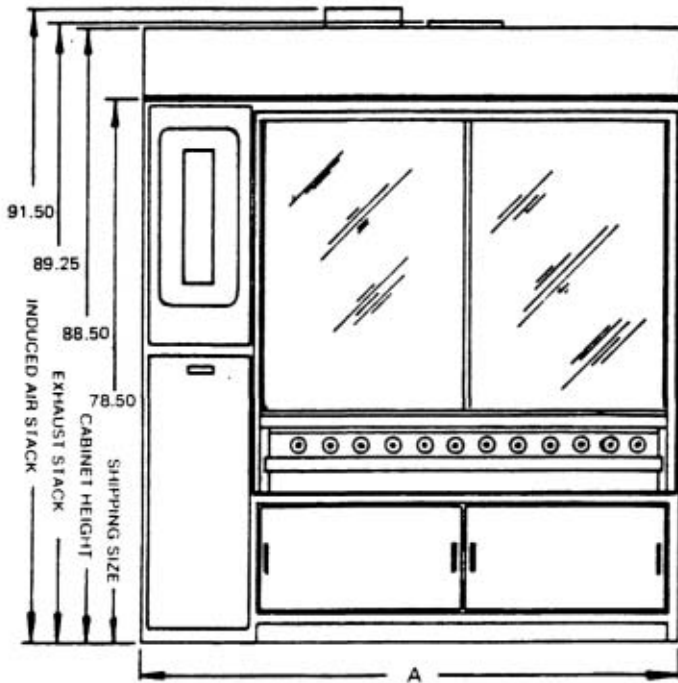


Figure 7

SASH INSTALLATION DETAIL

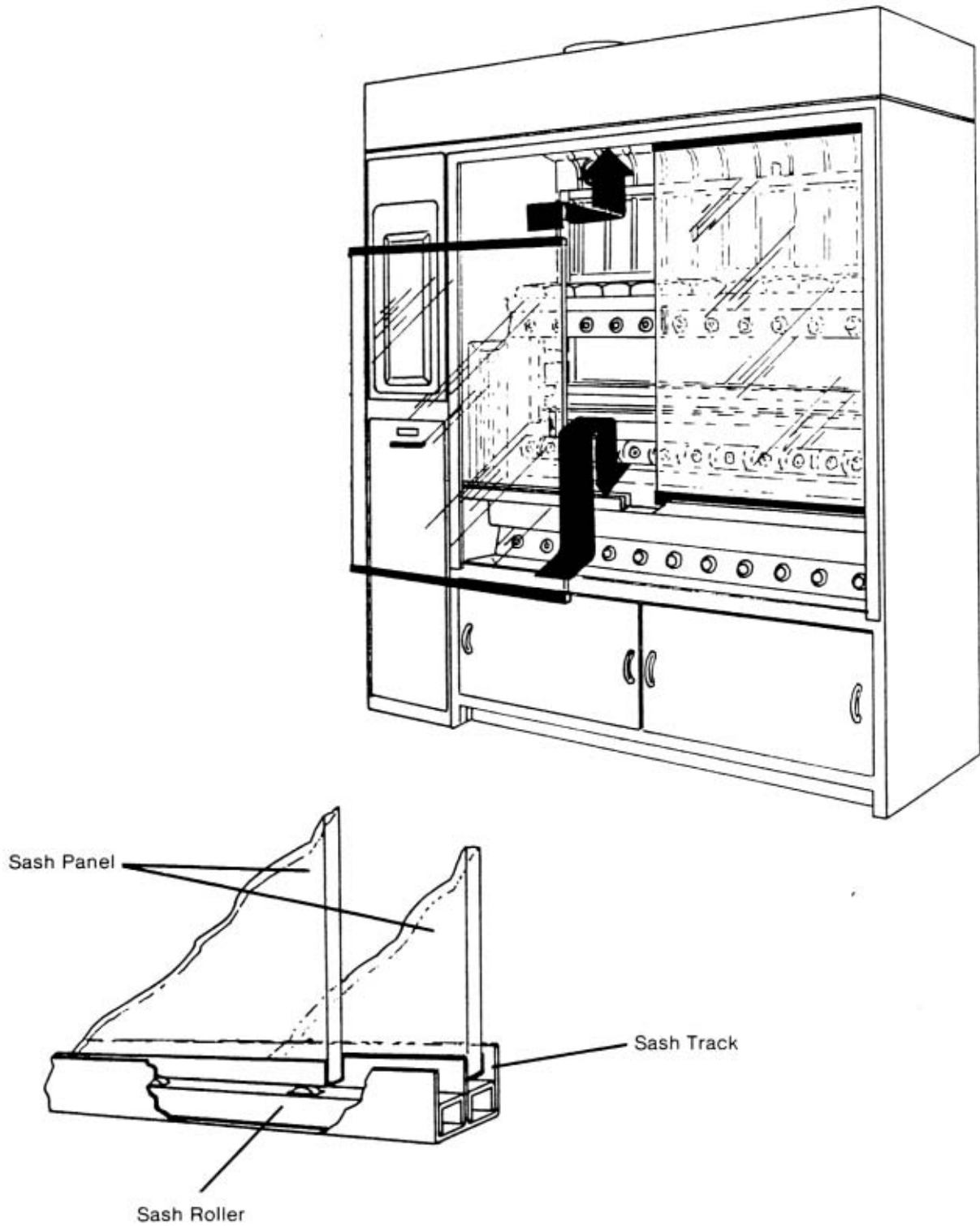


Figure 8

WATER ASPIRATOR CONNECTION DIAGRAM

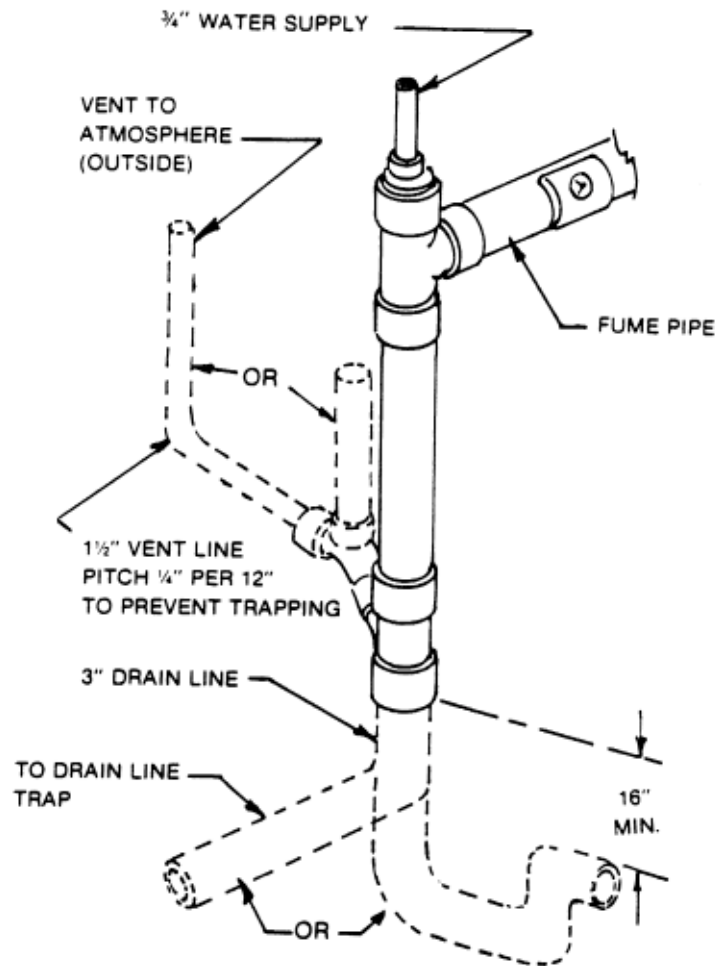


Figure 9

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.

GLASSWARE INSTALLATION

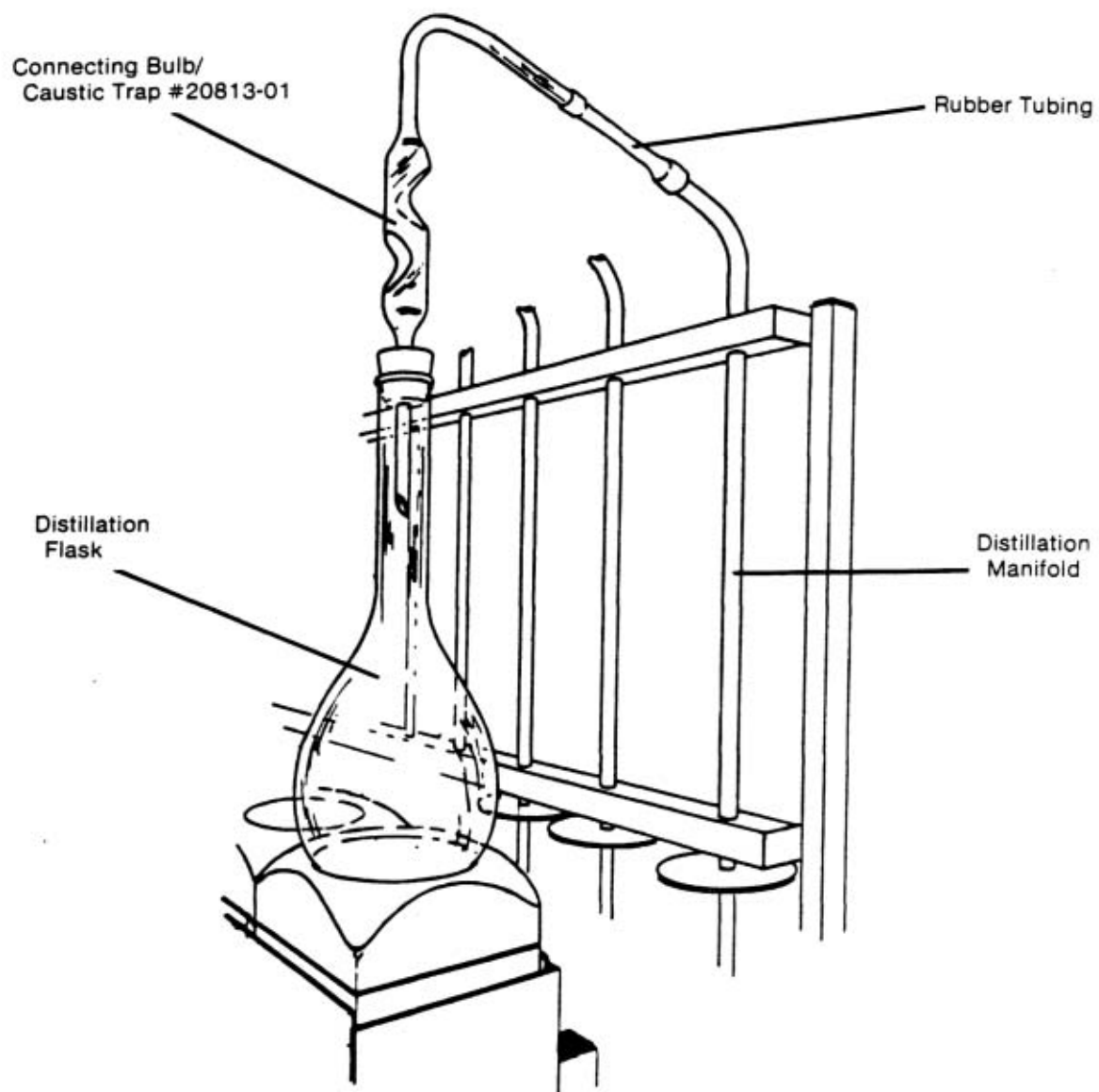


Figure 10

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. Damage due to corrosion or accidental breakage is also not covered.

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.

SHIPPING CLAIM

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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