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Find the *Harvard Apparatus 613* at our website: ***Click HERE***

Large Animal Volume Controlled Ventilator User's Manual

Large Animal Volume Controlled Ventilator, 115 VAC/60 Hz55-0715
Large Animal Volume Controlled Ventilator, 230 VAC/50 Hz55-0723



HARVARD
APPARATUS

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Warranty and Repair Information

Serial Numbers

All inquires concerning our product should refer to the serial number of the unit(s).

Warranty

Harvard Apparatus warranties the instrument(s) for a period of one year from date of purchase. At its option, Harvard Apparatus will repair or replace the unit(s) if it is found to be defective as to workmanship or material.

This warranty does not extend to damage resulting from misuse, neglect or abuse, normal wear and tear, or accident.

This warranty extends only to the original customer purchaser.

IN NO EVENT SHALL HARVARD APPARATUS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. Some states do not allow exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR USE, OR OF ANY OTHER NATURE.** Some states do not allow this limitation on an implied warranty, so the above limitation may not apply to you.

If a defect arises within the one-year warranty period, promptly contact ***Harvard Apparatus, Inc. 84 October Hill Road, Holliston, Massachusetts 01746-1371*** using our U.S. only toll free number 1-800-272-2775 or dial (508) 893-8999. Goods will not be accepted for return unless an RMA (returned materials authorization) number has been issued by our customer service department. The customer is responsible for shipping charges. Please allow a reasonable period of time for completion of repairs, replacement and return. If the unit is replaced, the replacement unit is covered only for the remainder of the original warranty period dating from the purchase of the original device.

This warranty gives you specific rights, and you may also have other rights which vary from state to state.

Repair Facilities and Parts

Harvard Apparatus stocks replacement and repair parts. When ordering, please describe parts as completely as possible, preferably using our part numbers. If practical, enclose a sample or drawing. We offer a complete reconditioning service.



CAUTION: Not for clinical use on human patients.

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General Information

Description

The Large Animal Volume Controlled Ventilator, Model 613, is designed for use with dogs and other large animals over 1 kilogram body weight. It has variable controls for inspiration rate (speed control) and inspiratory ratios ranging from 25-50%. The vertical slide valve provides separate pathways for inspired and expired air.

Volume adjustment is made on the piston shaft, and therefore accurate volume adjustment cannot be made while the ventilator is running. However, the rate and the I:E % can be varied while the ventilator is running.

Air/gas valving is by the four port system with separate ports for gas inlet, gas outlet (to animal), gas return (from animal), and ventilator exhaust.

The gas inlet can be used to supply air or any non-flammable gas supply. Like the other Harvard mechanical ventilators, attachment of the ventilator exhaust to a column of water can be used to produce a positive and expiratory pressure (PEEP).

Specifications

Volume	Adjustable from 30 to 750 cc/stroke. Note: Volume adjustment is made on crank, and therefore accurate volume adjustments cannot be made while ventilator is running
Rate	Adjustable from 7 to 50 strokes/min while ventilator is running
Phase	Adjustable from 25 to 50% of single stroke cycle continuously variable while pump is in operation
Port Size:	
ID	12.7 mm (1/2 in)
OD	15.9 mm (5/8 in)
Dimensions, HxWxD	30 x 50 x 22.5 cm (12 x 20 x 9 in)
Weight	21 kg (45 lb)
Power Requirements	110-120 V / 50-60 Hz unless otherwise specified; 110 watt max
Inspire/Expire Ratio	25/75 to 50/50
Motor	Dual phase, 1/15 h.p. gear head motor
Variable Speed Control	Motor speed is electronically controlled by solid state SCR system. AC line voltage is rectified to provide fixed DC voltage to motor field and variable DC voltage to armature
Variable Phase Control	Solid-state, dual phase electronic motor control is coupled to DC shunt wound motor. Cam-actuated micro-switch operates electronic phase control.
Fuse	Motor control is protected by 2 Amp Slo-Blo fuse. DO NOT REPLACE with higher-rated fuse.
Plug	3-prong molded connector

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CAUTION: This pump is not to be used in an explosive atmosphere or with any explosive gases such as ether, cyclopropane, etc.

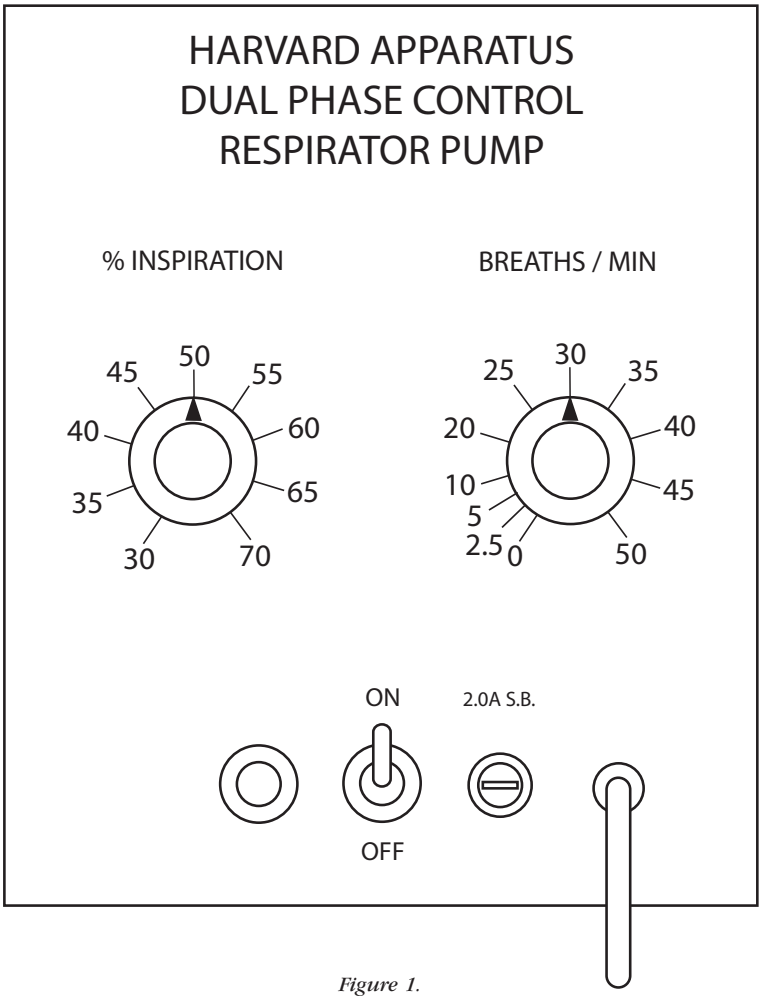


Figure 1.
Control Panel for Large Animal Volume Controlled Ventilator, Model 613

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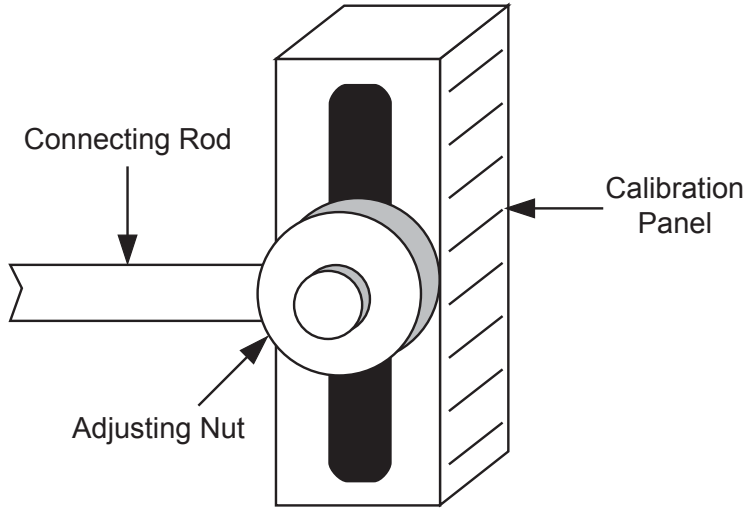


Figure 2. Stroke Volume Adjustment

% Inspiration

This knob controls the inspiratory ratio. The inspiratory ratio can be changed from 25-50% of a single stroke cycle. This control is continuously variable while the pump is in operation.

Breaths/Min

This knob controls the number of strokes/minute to be delivered by the pump. The stroke rate is affected by the phase control setting. Please refer to graph on page 7. The Stroke Rate Control is continuously variable while the pump is in operation.

Stroke Volume Adjustment

Stroke Volume is determined by the position of the Connecting Rod on the crank. Loosen the Adjusting Nut, set the Connecting Rod to the desired position according to the Calibration Panel, and then tighten. (See Ventilation Graph, pg. 8).

CAUTION: Stroke volume should not be adjusted while the pump is in operation.

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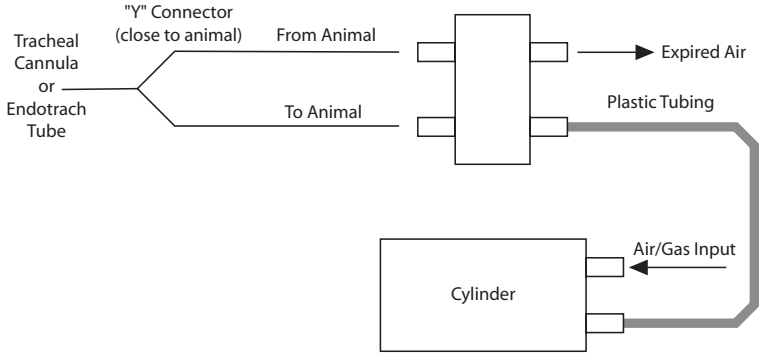


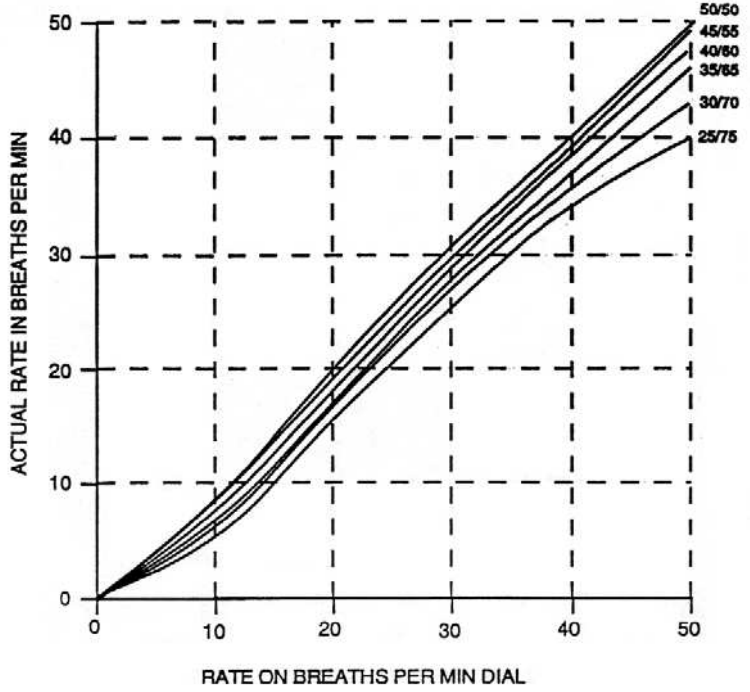
Figure 3. Setup Configuration

Recommended Setup

The basic pump is equipped with a length of plastic tubing connecting the output port on the Cylinder to the input port on the Valve. The lower port (Input) on the Valve directs air to the animal while the upper port (Output) conducts air from the animal to the room atmosphere. A "Y" Connector should be used to couple the upper and lower port tubes to the tracheal cannula. The "Y" Connector should be placed as close as possible to the animal in order to minimize the common pathway between inspired and expired air.

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Dual Phase Rate Compensation Chart



Typical plot of actual stroke rate at various ratios and strokes.

Figure 4. Dual Phase Rate Compensation Chart

Note: Actual I/E ration range is 25/75 to 50/50.

The graph above, taken from tests on a Harvard Model 613 Ventilator, is typical of the performance expected from a dual phase motor control pump. As observed, actual stroke rate varies considerably as the phase ratio reaches its outer limits. Users should be aware of this relationship and develop appropriate curves to assure experimental data.

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Ventilation Graph

Tidal Volume vs. Weight and Rate
for
Laboratory Mammals in Resting State
(apparatus dead space must be added)

Ventilation Graph

Tidal Volume vs. Weight and Rate
for
Laboratory Mammals in Resting State.
(Apparatus dead spade must be added)

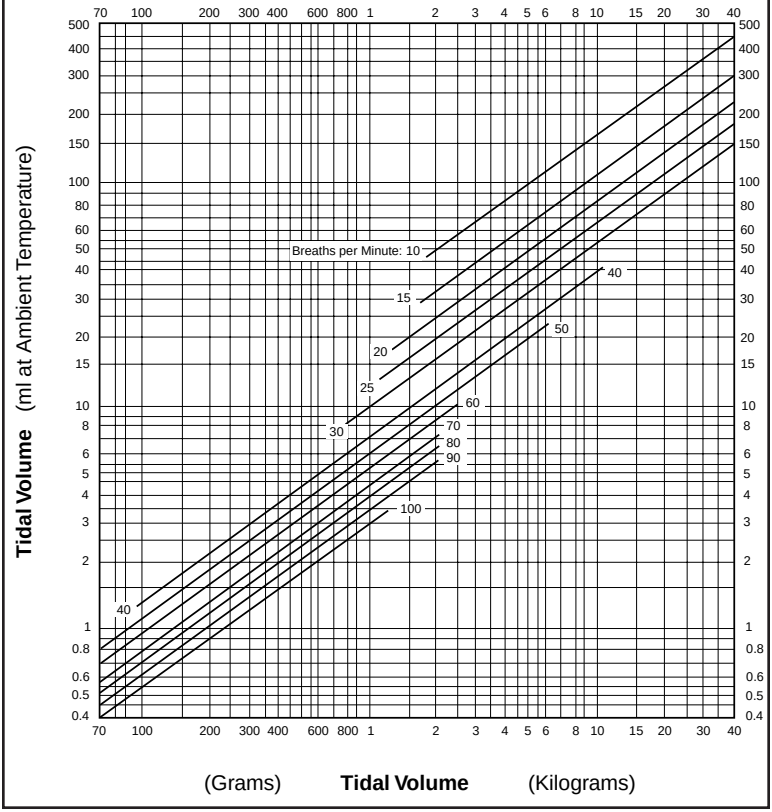


Figure 5. Ventilation Graph

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Lubrication Requirements

Pump:
The slide valve and the inside of the cylinder should be lubricated every six months with Dow Corning #33 Compound silicone grease (1 ounce jar is provided). This grease is also available as part of the Model 616 Repair Kit for Model 613 Ventilators. The connecting rod has an oil hole at each end for application of light machine oil. Machine oil is also available as part of the 616 kit.

Motor:
Motor bearings and ball bearings–all bearings are grease lubricated. Additional lubrication is required if the pump has been run for 5 years or 10,000 operating hours, whichever comes first. These figures should serve as a guide providing that the pump is run at normal ambients and is not overly abused. For more severe conditions, more frequent servicing is required. Andok C. (Penola, Inc.) or BRB #4 (Socony Oil) should be used for lubrication.

Gear Reducers:
Reducer housings have no sight gauge or level plug. The housings are filled to 3/4 capacity with Hodson #2-1000 No-Melt Grease. This will be sufficient for a 5 year period. To relubricate types N-10R6 reducers, remove the gear housing, clean out the old grease, and refill to 3/4 capacity with Hodson Lubricant mentioned above. To relubricate types N-1RH, N-3R, N-3RH, and N-5R reducers, remove the gear housing end shields supporting the drive shaft, clean out the old lubricant and refill to 3/4 capacity with the same Hodson grease.

Note: Some gear reducers also have oilers on the output shaft binding hubs. For normal duty, lubricate every 3 months with .02 fluid ounces of the oil supplied, or any equivalent oil (such as '3 in 1' oil).

Cylinder Valves:
Disassemble every six months for inspection and removal of foreign matter.

Water Removal:
Water removal plug is provided at the bottom of the cylinder. Periodically release the valve to drain off any excess moisture that has accumulated.

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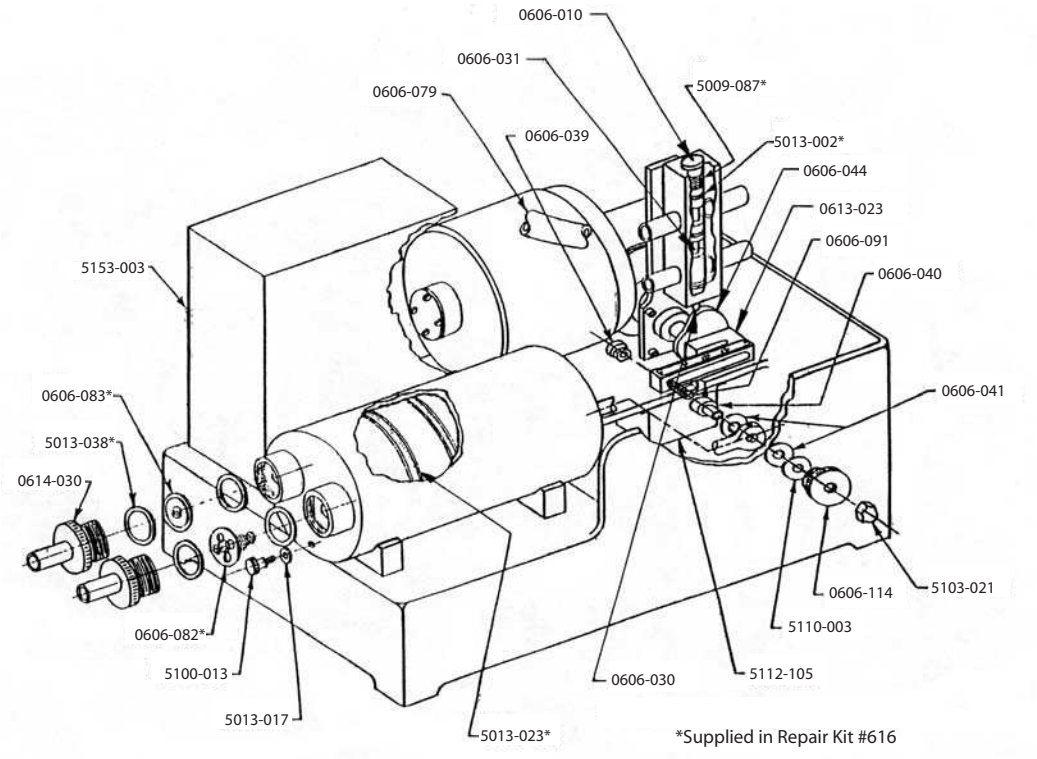


Figure 6. Large Animal Volume Controlled Ventilator Model 613 Parts and Assembly Drawing

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Model 613 Ventilator Parts List

Model No.	Description	Quantity Per Unit
0606-010	Cap (Chrome)	1
0606-030	Cam Follower	1
0606-031	Plunger	1
0606-039	Block-Crank Sliding	1
0606-041	Washer-Flat Precision	1
0606-044	Cam	1
0606-079	Tubing, Plastic, 24" long	1
0606-082	Assembly Intake Valve	1
0606-083	Assembly Exhaust Valve	1
0606-091	Pin Crank	1
0606-114	Volume Adjusting Knob	1
0613-023	Crank	1
0614-030	Male Valve Cover	2
5009-087	Spring	1
5013-002	"O" Ring, Parker #2-111	3
5013-017	"O" Ring, Parker #2-8	1
5013-023	"O" Ring, Parker #2-336	2
5013-038	"O" Ring, Parker #2-21	4
5100-013	Thumb Screw #10-32	1
5103-021	Acorn Nut #1/4-28	1
5110-003	Curved Spring Washer	1
5112-105	Micro Switch Only	1
5153-003	Motor Speed Control	1

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Model 616 Repair Kit for #607 and #613 Ventilators

The 613 Ventilator is built for many years of reliable operation. However, it does require reasonable care and maintenance to keep it in good condition. We strongly recommend that the pump undergo yearly parts replacement and lubrication. The Model 616 Repair Kit for the 613 Ventilator contains a complete collection of rings, valves, springs, gaskets, and lubricants. Also included is a set of instructions for overhauling procedures. The kit contains the following items:

Model No.	Description	Quantity Per Unit
0606-028	Gaskets, Intake and Exhaust Valves	4
0606-030	Nylon Plunger Tip	1
0606-060	Oil, 3/4 oz. Bottle	1
0606-082	Intake Valve Assembly	1
0606-083	Exhaust Valve Assembly	1
0606-084	Silicone Grease	1
5009-152	Spring for Slide Valve	1
5013-002	"O" Rings for Slide Valve Rod (5/8")	3
5013-023	"O" Rings for Piston (3-1/4" OD)	2
5013-038	"O" Rings, Intake and Exhaust Valves	4

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