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DOG VENTILATOR

Cat. 5025

1 GENERAL

The **5025 Dog Ventilator** is a mechanically unique positive pressure pump, according to Starling's ventilation method, designed for use with dogs weighing up to 40 Kg, which features:-

Mechanically,

a) a unique valve gear with negligible dead space

b) a novel variable stroke linkage mechanism, without sliding components

c) no protruding elements: both the controls and the tubing connectors for all ports are recessed into the trolley frame

Electrically,

d) digital display of "stroke per minute"

e) no electronic noise broadcasting

2 INSTRUMENT DESCRIPTION

2.1 Kinematics

An asynchronous geared motor, operated by a solid state speed control, is coupled to one of two interchangeable cylinder/piston assemblies, 700 or 350 ml, via a unique variable stroke linkage (see picture and Figure 1 "Linkage"), with the following advantages:-

i) The piston almost touches the cylinder end at each stroke, regardless of the preset volume. This insures that all air taken into the pump is expelled with each stroke.

ii) The stroke volume knob can be adjusted either while the pump is running or at a standstill, by means of a thumb wheel. Volume is clearly indicated **on a stationary dial** rather than on a mobile slotted link or by graduation marks on the cylinder, either of which leads to uncomfortable volume setting, the latter adjustable only when the pump is in motion.

iii) The mechanism does not incorporate the slotted link assembly found on other ventilators.

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Legend

(1) Coupling Link/ Boomerang Bearing
(2) Triple Joint Bearing
(3) Eccentric Rod Bearing
(4) Valve Link/Crank
(5) Valve Spindle/Gudgeon
(6) Piston Gudgeon
(7) Variable stroke Disk
(8) Valve Link
(9) Piston Link
(10) Coupling Link
(11) Eccentric Rod
(12) Piston
(13) Valve Spindle
(14) Stroke Volume Thumb-Wheel
(15) Volume Scale
(16) Gear Mating of Variable-Stroke Adjusting-Mechanism
(17) Valve
(18) Piston Link/Boomerang Bearing
(19) Boomerang
(20) Swinging Link
(21) Swinging-Link Bearing
(22) Cranking Handle for Disk Locking
(23) Disk Locking Brake-Shoe
(24) Brake Lining
(25) Boomerang Bearing

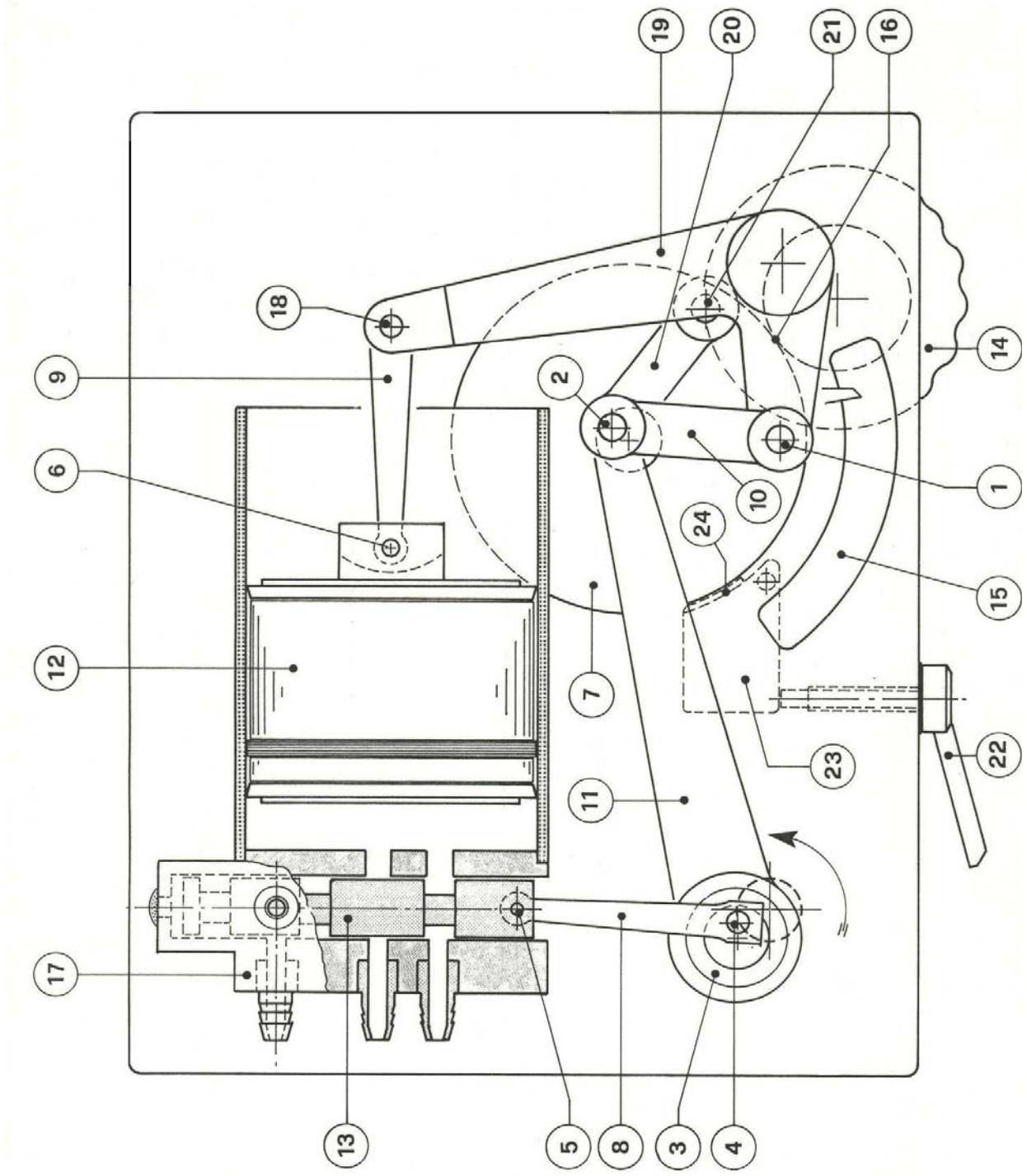


Figure 1 "Linkage"

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The reciprocating motion is generated, adjusted and transmitted to the piston by pivoting joints and rods only.

The lack of sliding friction leads to:

a. practically no wear
b. no backlash and hence silent operation
c. exact stroke reproducibility
d. minimal maintenance requirements.

2.2 Cylinder/Piston & Valve

The cylinder is turned from a thick-wall brass tube. Particular care has been taken in finishing its inside surface (diamond lapping), to minimize the lip-seal ring wear.

The aluminium alloy piston (**12**) fits snugly inside the cylinder and is made airtight by two conveniently spaced lip-seal rings (**28**, detailed on Figure 6 “Cylinder/Piston Assembly”).

The slide valve is placed perpendicular to the cylinder to minimize dead space, and is operated by a crank-link mechanism (**4-8**, see Figure 1 “Linkage”).

The valve is made airtight by an exact fit between a bronze broached surface (seat) and a precision ground hardened steel spindle (**13**).

This method, although costly evades a chronic problem encountered with conventional “O” ring seals on cylindrical slide valve mechanisms. As a rubber “O” ring slides past a side channel port opening, it must bulge into the opening.

This results in a scalping effect as the “O” ring slides on past the trailing edge of the port opening. The inevitable end result is rapid wear and leakage.

2.3 Pump Frame/Trolley

The backbone of the instrument is a heavy gauge (15 mm) aluminium plate to which all mechanisms are fastened.

The diagram in Figure 1 “Linkage” illustrates the external fittings, namely the valve block (**17**) to which the cylinder is fastened, the variable stroke disk (**7**) and its control thumbwheel (**14**).

The geared motor (**36**), the electronic block (**37**) and the transformer (for oper. at 115V only) are fastened to the other side of the plate (see *Figure 8 “Exploded View”*).

The plate is fastened to the trolley frame by four M4 flush screws. The combination frame/plate forms a solid structure with no protruding elements.

This impeccable design makes all internal and external components totally accessible in a matter of a few seconds, after having removed the side panels.

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A hinged Perspex hood (Cat. No. 5031, see 8-ORDERING INFORMATION) protects the cylinder, valve block and linkage from dust and prevents any accidental finger pinching when the pump is in motion. A micro-switch inhibits the pump motion when the hood is lifted in open position.

The trolley frame is built from square-section tubes, fitted together with die-cast angles. Angles and tubes are made of aluminium alloy. The tubes are anodized whilst the angles have a stove-enamel black finish.

Two shelves are provided made from perforated steel plate.

The trolley moves on four heavy-duty casters, two of which are provided with pedal operated brake/release mechanism.

2.4 Electronic Module

The motor driving Electronic Module (**37**, see Figure 8 “Exploded *View*”, on page 14), consolidated in a metal housing, is a commercially available product, manufactured by MINIMOTOR of Reggio Emilia.

Operational data, wiring diagrams, etc., are indicated in the wiring diagrams section.

3 INSTALLATION

3.1 Unpacking & Preliminary Check

Check the contents of the shipment for completeness, packing list to hand, and visually inspect the instrument as soon you take it out of the packaging. Use the ***Check List*** supplied.



Protect the environment!

Dispose of packaging properly, according to existing and applicable waste management rules and regulations.

The functional design of the 5025 which avoids protruding elements (see paragraphs 1-GENERAL and 2.3-Pump Frame/Trolley) is the best known defence against rough transport handling. If however the instrument is damaged or, after having tested it, fails to meet rated performances, notify the carrier and our company immediately.

The casters are not factory fitted to the frame, to decrease the bulk of the shipping carton. Fix them to the trolley and tighten them with the wrench provided.

Remove any excess grease you may find smeared on valve spindle head, gudgeon, etc. to preserve the mechanical components against storage and transport hazards.

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3.2 Notes on the Instruction Manual

The 5025 Instruction Manual included in the package is necessary for the correct installation and operation of the instrument.

We recommend keeping the manual in good conditions, ready to be consulted by the qualified personnel who use the instrument.

Free of charge copies of the instruction manual are available upon request: please contact our service department (see paragraph 5.4-Customer Support) specifying the series number of your instrument.

3.3 Before Applying Power

Position the instrument on a steady floor.

Take a look at the Power Module, on the back wall of the Ventilator, which encompasses the inlet connector of the mains cord, the mains switch and the fuse holder/voltage selector.

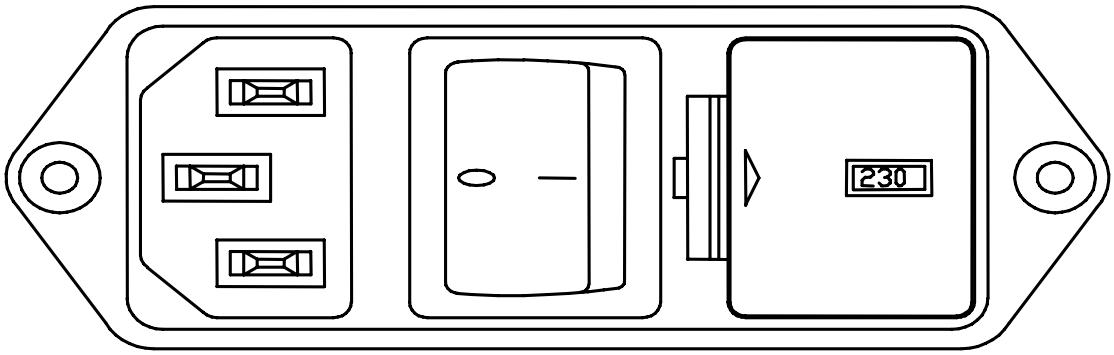


Figure 2 "Power Module"

3.3.1 Mains Switch

This two-pole toggle switch, which complies with international safety standards, provides a visual cue, meaning:-

- **OFF** when pressed to the "**O**" side
- **ON** when pressed to the "**I**" side

3.3.2 Fuse Holder & Voltage Selector

The fuse holder comprises two fuses, one on the live, and the other on the neutral. For operation at 220-230 Volts, we recommend 2.5 A timed fuses (type T2.5A). Use 5 A fuses (type T5 A) for operation at 115 Volts. To replace the fuses, see paragraph 5.1-Electrical.

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The fuse holder also embodies the Voltage Selector. Make sure that the flag indicates the correct voltage (i.e., the voltage of your mains).

Changing the selected voltage, from 230 to 115 or viceversa, ideally requires the ventilator to be returned to our factory, see paragraph 5.1-Electrical.

3.3.3 Mains Cord

It is a standard cable, Cat. # E-WP008. Make sure your power outtake is provided with a reliable ground connection, see also 3.4 & 3.5.

3.4 Connections

Connect the mains cord to a power outtake, ***provided with a reliable earth connection***.

3.5 Additional Safety Consideration

UGO BASILE DOES NOT ACCEPT ANY RESPONSIBILITY FOR PROBLEMS OR HARM CAUSED TO THINGS OR PERSONS ARISING FROM:

- INCORRECT ELECTRICAL SUPPLY;
- INCORRECT INSTALLATION PROCEDURE;
- INCORRECT OR IMPROPER USE OR, IN ANY CASE, NOT IN ACCORDANCE WITH THE PURPOSE FOR WHICH THE INSTRUMENT HAS BEEN DESIGNED AND THE WARNINGS STATED IN THE INSTRUCTION MANUAL SUPPLIED WITH THE INSTRUMENT;
- REPLACEMENT OF ORIGINAL COMPONENTS, ACCESSORIES OR PARTS WITH OTHERS NOT APPROVED BY THE MANUFACTURER;
- SERVICING CARRIED OUT BY UNAUTHORIZED PERSONNEL.

a. Place your Ventilator on a steady floor.

b. Do not obstruct free and comfortable access to the power module.

c. Use original accessories and spare parts only, see also paragraph 8-ORDERING INFORMATION.

d. Immediately disconnect and replace an accidentally damaged mains cord.

e. Do not operate the Ventilator in hazardous environments or outside prescribed environmental limitations (i.e. 10°C / +40°C, 95% relative humidity, non-condensing), see also paragraph 8.2-Specifications.

f. Do not spray any liquid on the connectors.

g. Do not feed the pump intake with explosive gas mixture.

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4 OPERATION

4.1 Switching On

Switch on the 5025 by acting on the Mains Switch placed on the back wall of the instrument; see paragraph 3.3.1-Mains Switch. The digital display labelled STROKES PER MINUTE will light, denoting that the instrument is on.

Get familiar with the stroke and rate control.

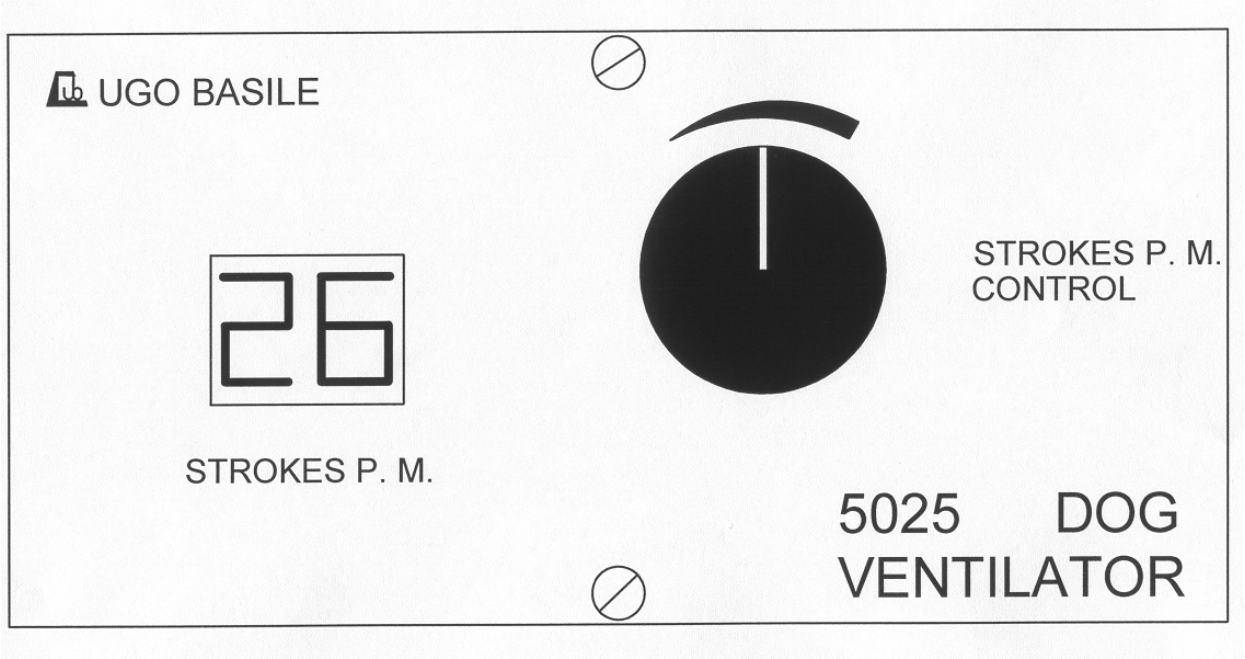


Figure 3 "Front Panel"

4.2 Rate

The speed control potentiometer adjusts the geared motor to the desired speed, which is indicated on the 2-digit LED display labelled **STROKE PER MINUTE** (see Figure 3 "Front Panel").

The speed is unaffected by either mains voltage variations and changes of torque load brought about by different stroke volumes, different cylinder/piston combination, airway alterations, wear of the sliding components, status of the lubrication, etc.

The digital display assures an excellent reproducibility: you adjust the actual speed of the geared motor against a displayed number, in lieu of trying to overlap a pointer and a scale mark.

The digital reading involves the incertitude of the last figure. E.g., 80 STROKES P.M. could be any value between 80 and 80.9.

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4.3 Stroke Volume

The stroke volume is adjustable via the **STROKE VOLUME** thumb-wheel (**14**, see Figure 1 “Linkage”) located on the front panel (see Figure 3 “Front Panel”) **while the pump is either running or at standstill**.

First make sure that the lock handle (**22**) is loose, then act on the thumb wheel. It is interesting to watch the corresponding linkage configuration change.

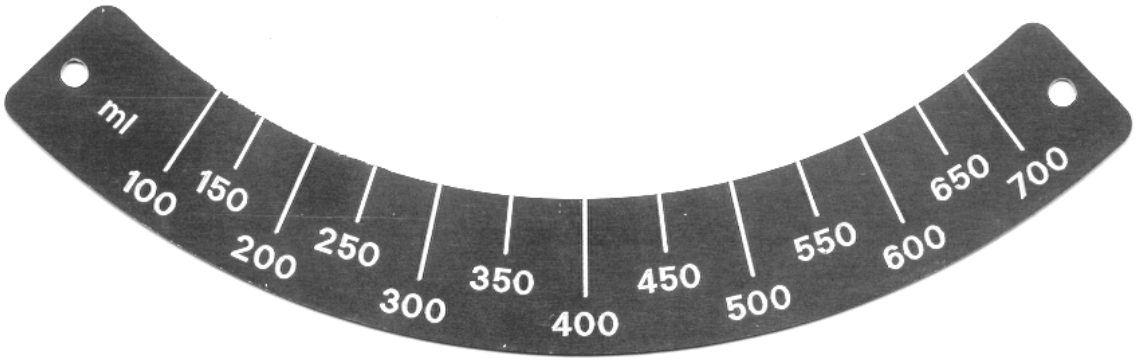


Figure 4 “Stroke Volume Scale”

Volume is clearly indicated by a pointer on a stationary dial (**15**): see picture and Figure 4 “Stroke Volume Scale”.

The scale indicates the volume obtained with 700ml cylinder/piston assembly.

Please refer to Table 1 ”Stroke Volume Indication” table to find the volumes obtained when different pistons are used:-

VOLUME SCALE READING	700 ml Piston actual reading ml	350 ml Piston (reading / 2) ml
100	100	50
150	150	75
200	200	100
250	250	125
300	300	150
350	350	175
400	400	200
450	450	225
500	500	250
550	550	275
600	600	300
650	650	325
700	700	350

Table 1 ”Stroke Volume Indication”

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4.4 Hook up to Animal

A “Y” connection should be inserted between the tracheal cannula and the two tubes coming from the pump.

Dead space is minimized if the “Y” is as close to the animal as possible.

Expired air can be recovered at the exhaust tube for sampling, partial or total recycling, etc., see Figure 5 “Valve Hook-up to Animal”.

Room air or any **non explosive** gas mixture can be used to feed the pump intake.

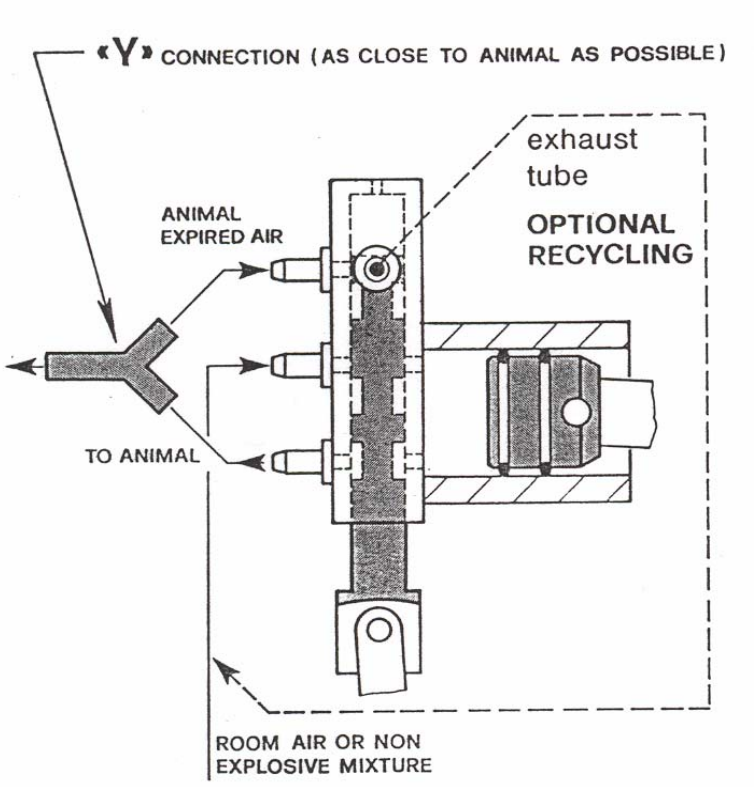


Figure 5 “Valve Hook-up to Animal”

5 MAINTENANCE

While any service of the instrument is to be carried out by Ugo Basile personnel or by qualified personnel, authorized by UGO BASILE organization, this section of the instruction manuals describes normal maintenance procedures which can be carried out at the customer’s facilities.

UNPLUG THE MAINS CORD BEFORE CARRYING OUT ANY MAINTENANCE JOB!

5.1 Electrical

To inspect and/or replace the fuses, **disconnect the mains cable first!** Insert a miniature screwdriver in the slot indentation, see paragraph 3.3-Fuse Holder & Voltage Selector, and snap out the slide which houses the fuses.

For operation at 220-230 Volts, we recommend 2.5 A timed fuses (type T2.5A). Use 5 A fuses (type T5 A) for operation at 115 Volts.

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Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of repaired fuses and short circuiting of the fuse holder must be avoided.

Snap in the fuse slide: the "*click*" ensures that it is locked. Check the voltage flag before applying power.

Shifting from 230 to 115 or viceversa requires the addition/removal of a transformer and the replacement of the fan. Ideally, this job should be carried out at our factory; please get in touch with our service department for returning the ventilator, see paragraph 5.4-Customer Support, or ask for directions in case you desire to carry out the job yourself.

5.2 Mechanical

5.2.1 Changing Cylinder/Piston Assembly

To replace the cylinder/piston assembly proceed as follows:-

a) Adjust the stroke volume by the knurled wheel to maximum volume (700 or 350 ml, according to the cylinder/piston assembly installed)

b) Run the pump until the piston is at a rearward position, that is, away from the valve block.

c) Remove the gudgeon of the piston. Using the 2 mm Allen wrench provided, remove the set screws, then push out the gudgeon by a blunt "tool", i.e., the same hex. key, a pencil or the like.

d) Swing the link aside; it may be necessary in some cases to inch the piston inwards a couple of millimetres.

e) Slacken the 3 holding socket-head screws which hold the cylinder in position; the cylinder, having a large bottom surface, may require some side tapping to pop out, as a grease film on its bottom may cause it to stick, especially after long inactivity of the pump.

   We recommend to refrain from a Karate stroke; repeated tapping may be more effective and less dangerous to the cylinder's integrity.

f) Take out the cylinder/piston assembly and store it.

g) Take the replacement cylinder/piston (either 700 or 350 ml), make sure that the piston is at maximum outward position and that the valve block flat is duly smeared with grease to assure air tightness.

   ATTENTION

   A centering pin has been provided to ease the cylinder positioning; make sure that the pin doesn't stick to the cylinder you have just taken out. If so, reposition it on the fresh cylinder bottom.

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h) Fasten the fresh cylinder. The 3 holding screws (5mm hex. Key) are purposefully located asymmetrically, to prevent the cylinder to be mounted in the wrong way, i.e., mismatching the air ports.

i) Swing the link in and insert the gudgeon; lock it by its set screw. Make sure that you have not left loose parts lying around!

j) Run the pump for some tens of seconds at minimum speed and stroke, then increase both to make sure you have acted as a professional mechanic!

k) Insert the piston you are not using in its cylinder, lubricate and store.

5.2.2 Lubricating Linkage

The entire linkage is in sight for immediate visual inspection (see picture and Figure 1 “Linkage”).

Lubricate every 100 hours of operation by applying n the following parts 1-2 drops of 20-30 grade machine oil of, as the one provided with the standard package, see paragraph 8-ORDERING INFORMATION:-

-	coupling link/boomerang	(sleeve bearing)	(**1**)
-	triple joint	(sleeve bearing)	(**2**)
-	valve link/crank	(ball bearing)	(**4**)
-	valve spindle/gudgeon	(sleeve bearing)	(**5**)
-	piston gudgeon	(sleeve bearing)	(**6**)
-	piston link/boomerang	(sleeve bearing)	(**18**)
-	swinging link	(needle bearing)	(**21**)

Before oiling, please remember to unplug the power cord; your can spout or – worse – your fingers, may be pinched by the shearing action of the “dynamic quartet”, i.e., the **10-11-19-20** linking members!

After oiling, turn the pump on for 1-2 minutes: the motion and capillary action will combine for a thorough bearing lubrication.

The eccentric (**3**) and the boomerang ball bearings (**25**) are permanently lubricated and protected from dust: they may require attention after several thousand hours of operation, at which time a major overhaul of the entire mechanism is recommended.

5.2.3 Lubricating Cylinder/Piston

Every 80 hours of operation it is wise to lubricate (at least 2ml!) the cylinder, for which **oil lubrication** has been selected.

In fact, the substantial diameter of the piston and the large lip-seal (**31**) spacing would lead to an uneven and limited grease spreading over the working surface unless a num-

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ber of grease nipples or cups would be provided on the accessible piston bottom disk (**30**), not to speak of a maze of boreholes to distribute the grease on the piston side (**28**). See Figure 6 “Cylinder/Piston Assembly”

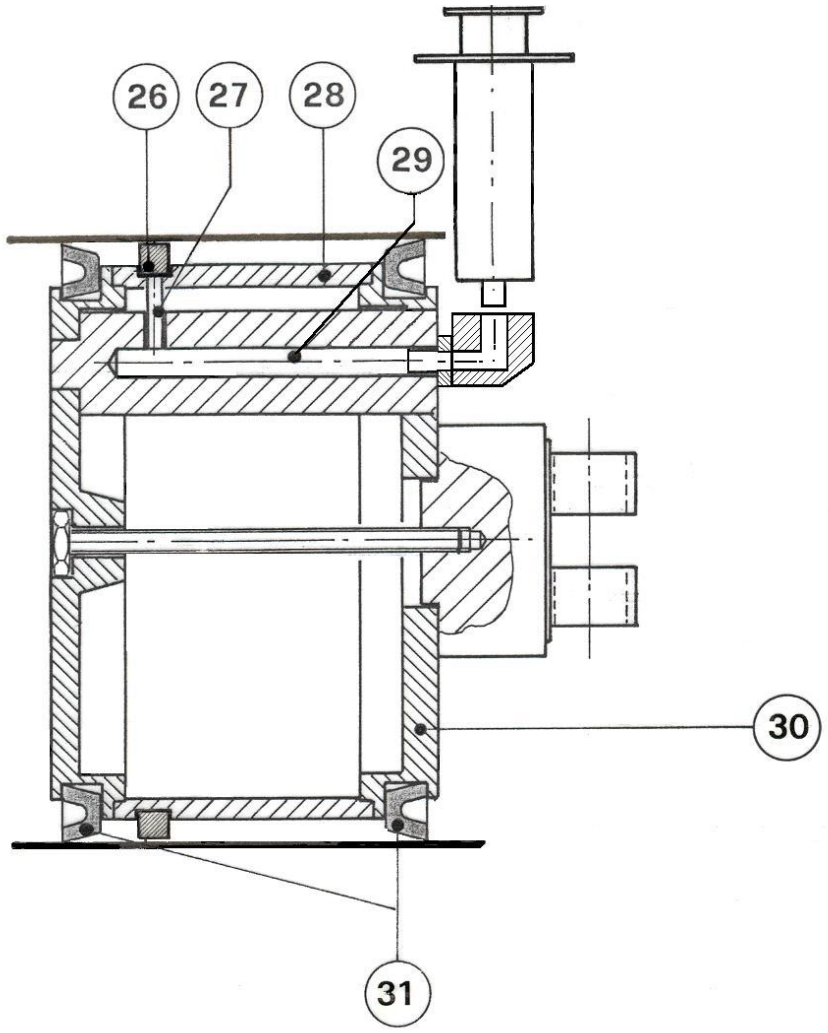


Figure 6 “Cylinder/Piston Assembly”

Oil (a brand which features a low vapour pressure at room temperature is recommended), injected in the borehole (**29**) with the syringe provided, is led by the channel (**27**) to the felt ring (**26**) which skims the cylinder inside surface.

Combined gravity and capillary action provide to soak the entire ring; the reciprocating motion of the piston distributes the oil in an even film which assures air rightness, quiet operation and minimum wear.

Any excess oil will be collected in a small drip pan (**34**) milled on the plate (Figure 7 “Slide Valve”). A similar drip pan (**32**) is milled at the valve block side, to collect any possible minute quantities of water (exhaust air condensation), oil or excess grease.

Drain them when necessary wit a cotton swab (**PUMP SWITCHED OFF**!).

A thin groove is turned on the cylinder outer wall, near its open end, to thwart the perverse attitude of the oil to creep along surfaces until – given enough time – you find oil **everywhere**!

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5.2.4 Lubricating Slide Valve

The slide valve is lubricated via two grease cups (33) placed on the valve block top, see Figure 7 “Slide Valve”.

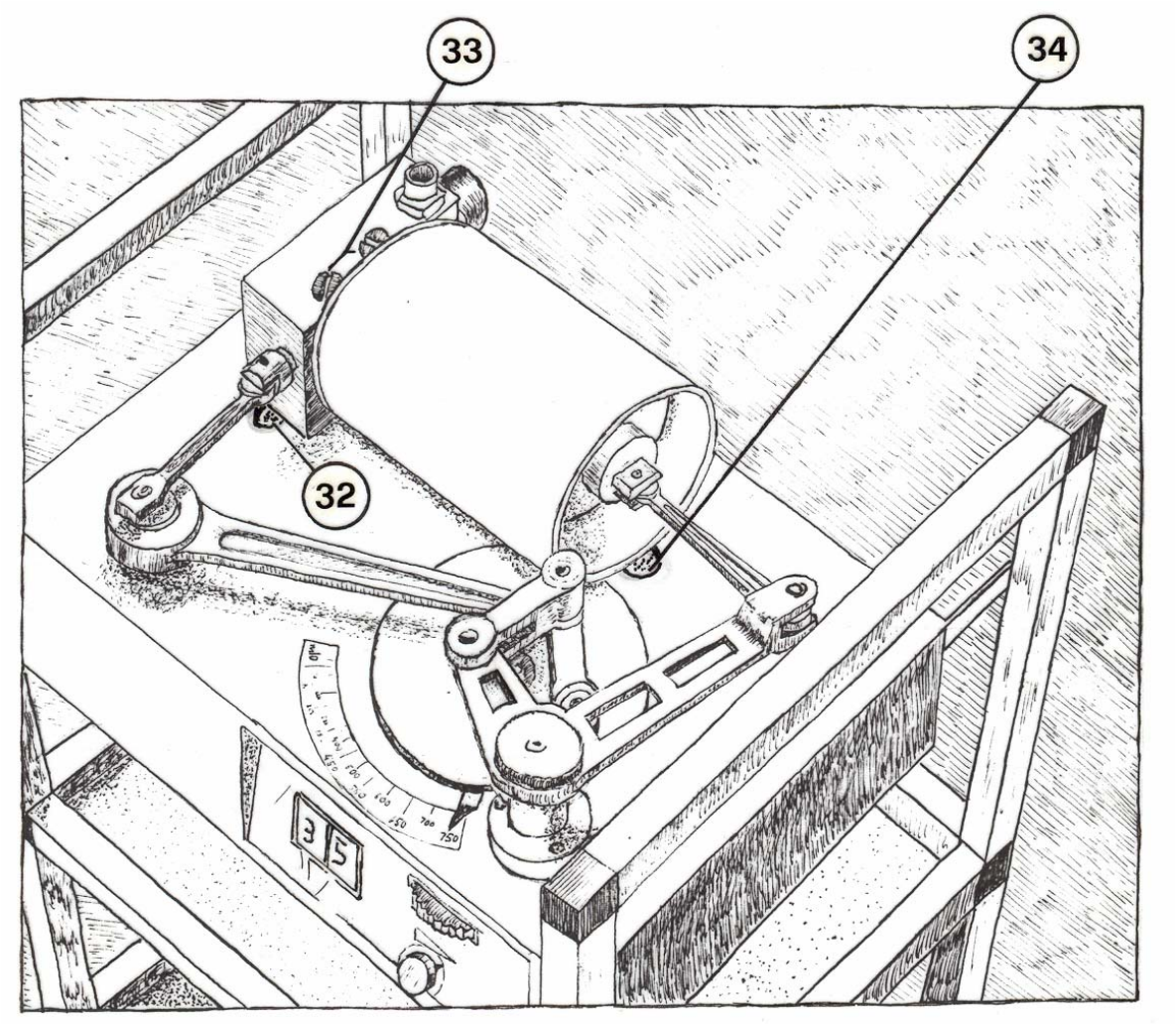


Figure 7 “Slide Valve”

Turning the caps clockwise squeezes the grease contained in the cups via two boreholes into the valve cylinder, where it is collected and distributed by the tapered sections of the spindle (**13**).

An even film of grease assures adequate air seal, quiet operation, and minimum friction and wear.

¼ turn of the cap every 50 hours of operation is sufficient to deliver adequate lubricant.

Occasional inspection of the cup (and consequent refilling if empty!) will prevent the risk of “running dry”, which might damage the working surfaces of the spindle and valve seat.

An excess of grease squeezed into the valve will not cause any damage. The pumping action will squirt the excess out via the “to animal” port.

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If you need to clean excess grease from the air ports, use a cotton swab, not a metallic tool such as a screwdriver; an untoward movement may cause a scratch in the polished valve seat or spindle which will degrade the air seal.

5.2.5 Variable Stroke Disk

The variable stroke disk (**7**) turns on generously dimensioned, permanently lubricated thrust ball bearings. The pinion/ring gear drive (**16**) which rotates the disk is also permanently lubricated.

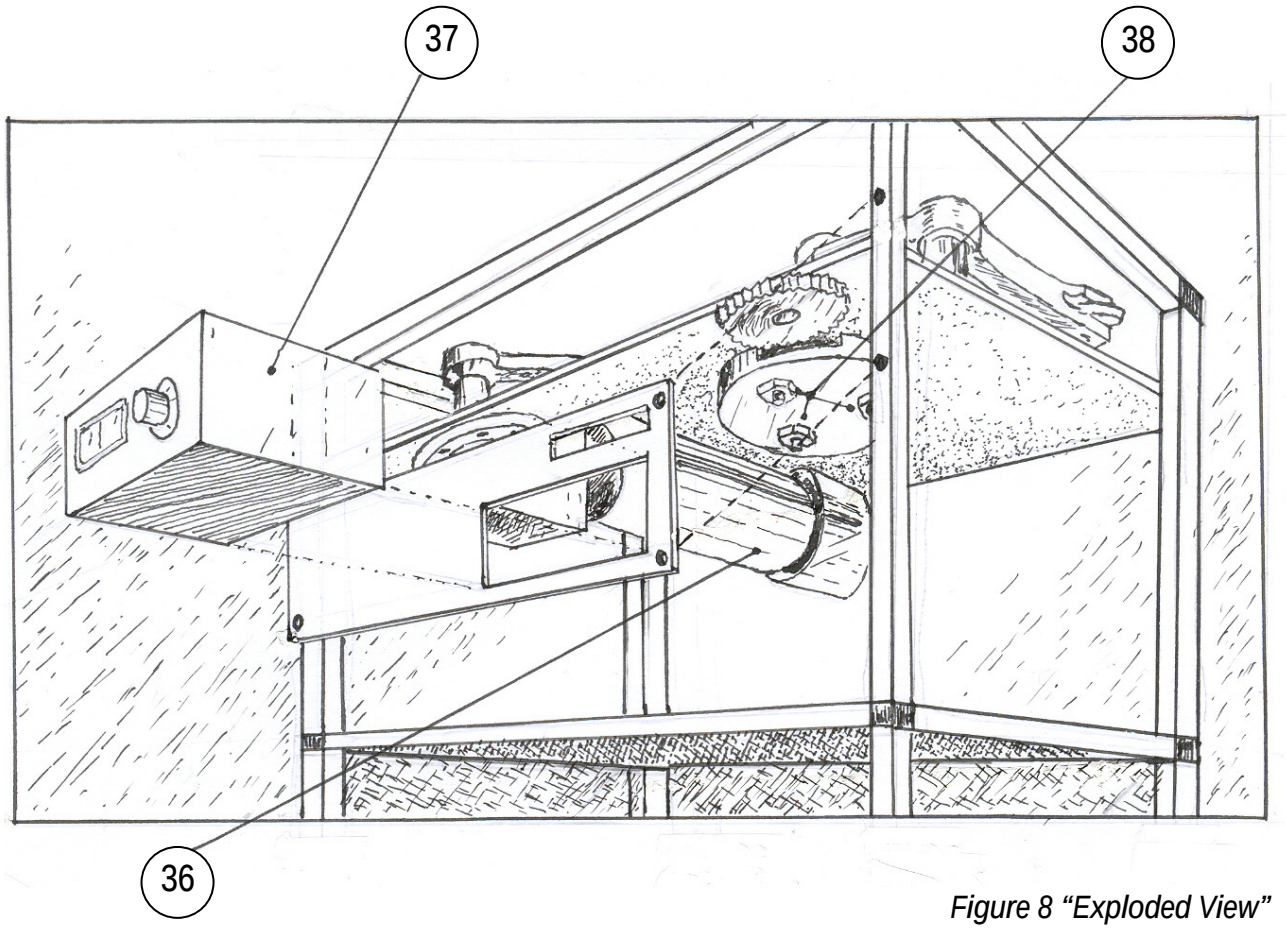


Figure 8 "Exploded View"

Both mechanisms may require inspection during major overhaul, after several thousand hours of operation, just as the previously mentioned (see paragraph 5.2.2-Lubricating Linkage) valve link pin and eccentric ball bearing.

Three large-size fine-pitch (MB12) set screws (**38**) provided with a lock nut, press a nylon pad against the bottom surface of the disk. See Figure 8 "Exploded *View*".

The consequent friction prevents the disk from altering its setting under the torque induced by the linkage motion.

In case the stroke volume thumb-wheel (**14**) becomes uncomfortably tight or – on the contrary – loose to the point that the disk inches from the preset volume by itself, adjust

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the set screws accordingly. This requires the side panels to be removed. See paragraph 7.2 for the Access to the Inside of the Instrument.

Bear in mind that as little as 1/8 turn of the set screw affects the “braking action” to a notable degree. Tightening the lock nuts may cause the set screw to turn a little bit past the selected setting.

Hold the screw in position with a large screwdriver while tightening the lock nut with an M14 wrench. A minimum of dexterity is desirable and patience is recommended.

Incidentally, if this job under the ventilator plate restrains your movements and degrades your mechanical skill, beside being uncomfortable, lay the ventilator on its side or upside down on a solid table or bench top; use a cloth to avoid scratching the anodized frame beams.

Due to the large diameter of the piston, its motion may confront sudden forces of several kilograms (force = piston surface x pressure!) due to accidental peaks of the forced inspiration pressure, caused by a temporary tube pinching, small amounts of mucus or blood in the cannula or tubing, etc.

While the feedback controlled geared motor and the amply dimensioned linkage can easily negotiate these force peaks, the disk under the torque induced by the linking members will possibly move off the preset position.

To eliminate this inconvenience, a lock has been provided (see also paragraph 4.3-Stroke Volume.

By turning the small cranking handle (**22**), see picture and Figure 1 “Linkage”, the “shoe” (**23**) rotates until the lining (**24**) presses against the disk side.

Once a convenient setting has been found, no mater whether the pump is at standstill or in operation, it is advisable to lock the disk by acting on the mentioned handle. Loose it before any resetting by the thumb-wheel (**14**)

5.3 Long Inactivity

After long storage, the Ventilator may not start to run at the minimum speed setting (10 S.P.M.): the torque at that setting may not be sufficient to break away aged lubricant film, in particular at the piston lip-seal ring/cylinder interface.

After some 10 seconds at the higher speed, the problem will be over.

5.4 Customer Support

For any further information you may desire concerning the operation and/or maintenance of the Ventilator, please do not hesitate to get in touch with our local distributor or with our **service department** at:-

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UGO BASILE S.r.l.
Via Guido Borghi 43
21025 COMERIO – Varese, ITALY
Phone : +39 0332 744574
Fax : +39 0332 745488
e-mail : service@ugobasile.com

Before sending any instrument to our factory for repair, we recommend you to get in touch with our service department (mentioning the serial number of your instrument) to obtain a return authorization number (R.A.N.) and shipping instructions.

We may not be held responsible for damages during transport due to poor packing. Whenever possible, please use the original packing.

6 CHECKING PUMP PERFORMANCES

6.1 Stroke Volume

If you have any reason to suspect that the output of the pump at any given setting is not that given on the graduation marks on the scale (**15**), there is a simple accurate method for testing the calibration:-

a) Set the speed control knob to about 30 strokes per minute. Set the pump piston for a volume of 250 ml (*see note* [1]) and stop the pump motor when the piston reaches its most rearward position, that is, when the cylinder contains 250 ml (respectively 125 ml) of air.

Incidentally, it may prove to be a bit difficult to stop the piston exactly at the desired max. rearward position, because of the inertia of the geared motor combined with the reaction time of the operator in tripping the power switch off.

It is easier to set the speed control at minimum, 10 S.P.M. or below, and then quickly turn the knob down to zero, when the piston reaches its desired position, then switch off the power.

Connect the ventilator to a spirometer, arranging an air-tight coupling between the corrugated rubber tube (or mouth piece) of the spirometer and the “to the animal” port of the 5025. See Figure Figure 9 “Checking Stroke Volume”.

b) Adjust the spirometer bell or volume indicator so that the pointer is perfectly at the zero of the volume scale.

[1] or 125 ml, if the 350 ml cylinder/piston is being used

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c) Turn on the ventilator and observe how many strokes it takes to collect, say, 5 litres. Having set 250 ml, it should take 20 strokes (40 if the 350 ml piston is used)

d) Every 5025 is factory tested with a precision spirometer: the output corresponding to each division of the volume scale is duly checked.

Before claiming any discrepancy, be sure your test is carried out in ideal conditions: good levelling of the spirometer, accurate zeroing, minimum parallax error in the readings, negligible friction of the bell lifting system, etc.

Should the foregoing test show an error in the volume output of the pump, the most probable cause is air leakage. See paragraph 7.1-Air Leakage.

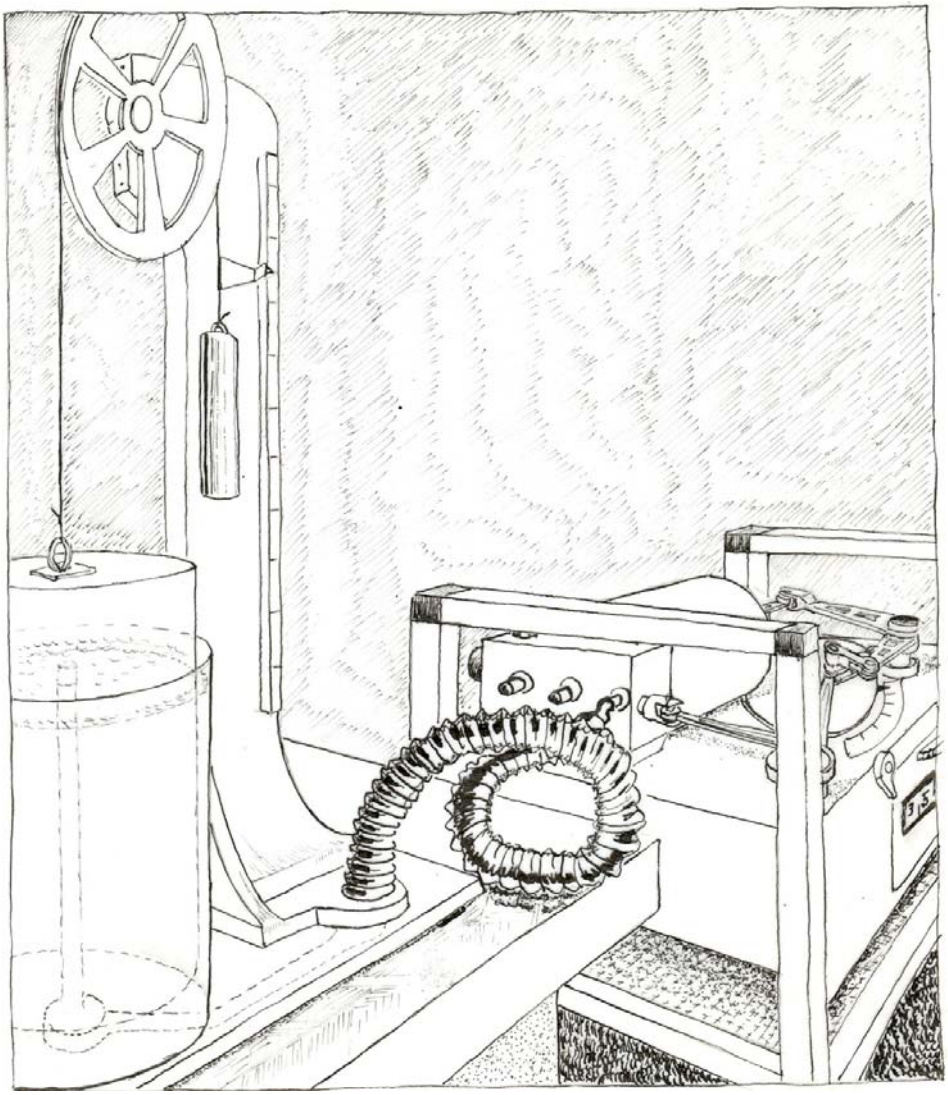


Figure 9 "Checking Stroke Volume"

6.2 Rate

To check the frequency (strokes per minute), use a stopwatch. Run the pump at 20 S.P.M., i.e., one stroke every 3 seconds. Count 10 piston strokes, then stop the watch.

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Elapsed time should be 30 seconds. A more precise measure would involve (if you have the patience to count!) counting more strokes, e.g., 20-30. In this way, the reaction time of the operator affects the precision to a lesser degree.

Repeat the measure at different speeds; we suggest round figures to make the computing easier, e.g., 30 or 40 S.P.M.

7 SERVICING

7.1 Air Leakage

As mentioned in paragraph 6.1-Stroke Volume, the probable cause of any deviation between the pump output and the scale graduation is air leakage.

First check the condition of the piston lip-seal rings: remove the piston (see paragraph 5.2.1-Changing Cylinder/Piston Assembly) and visually inspect the texture of the rubber and the lubrication on the rings (see paragraph 5.2.3-Lubricating Cylinder/Piston).

If there is any doubt about the rubber consistency, the rings should be replaced; see paragraph 8.1-Spares & Accessories for Cat. No. of replacement rings.

Valve damage should be a rare occurrence indeed if simple care is taken and proper lubrication performed (see paragraph 5.2.4-Lubricating Slide Valve). Metal wear to the valve seat and/or spindle sufficient to cause a serious leak would require more than three to four years of continuous operation!

To inspect the valve, run the pump and stop it when the spindle gudgeon (5) is well clear of the valve block (see also paragraph 6.1-Stroke Volume). Loosen the two set screws with the 2 mm hex. wrench provided. Drive out the gudgeon and remove the spindle. Swing the link (**8)** aside.

Pull out the spindle and ascertain that there is no visible damage: pitting, scratches, indentations. The spindle should give the “feel” of a precision syringe plunger when moved back and forth.

If the spindle is sound, reinstall it, following the same steps in reverse order. When repositioning the gudgeon, pay attention to its “flat” which should face the set screws.

Without the piston (you have removed it, to inspect the lip-seal rings), set the pump at minimum speed and stop it when the spindle is at the max. inward position. It will be easier to stop at a set position by turning the speed know “below 10” rather than switching off the power switch.

Apply pressure with a sphygmomanometer hand-pump equipped with a gauge to the “room air” port. It should keep 100 mm Hg for at least one minute, with a max. drop of 10-11 mm.

Perform the same test on the “expired air” port.

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Position the spindle at its max. outward position and repeat the test on the “to the animal” port.

If the leakage, in any above tests, is greater than 10-11 mm Hg, the cause is probably a damaged valve seat, which can be fixed at the factory only.

If the leakage is larger than 2-3 mm Hg, the cause is probably a damaged valve seat, which can be fixed only at the factory. Please contact our service department; see paragraph 5.4-Customer Support.

In case you need to remove the valve block, please refer to paragraph 7.2-Access to the Inside of the Instrument. The block is fastened by four M5 screws, whose heads are easily located on the back of the supporting plate.

Do not detach the cylinder from the valve block! Send **both the valve blodk/cylinder and the spindle** to the factory.

7.2 Access to the Inside of the Instrument

Access to the inside of the instrument is immediate.



Make sure first that the power cord is disconnected from its power outlet (see SAFETY CONSIDERATION).

Each side of the panel is fastened by four Allen screws (hex. Wrench 2.3 & 3 mm). Take the panels out after having removed their screws.

The components below the aluminium plate which forms the backbone of the pump, are now in sight, see also Figure 8 “Exploded *View”* on page 14.

You will notice:-

a) The **geared motor** (**36**) plus its cooling fan and the stroke adjusting thumbwheel, both fastened to the plate.

b) The **power module**, fastened to the back panel.

c) The **electronic block** (**37**) (command/control of the geared motor) fastened to the front panel

d) The **transformer** (only if the pump is set for 115 V operation)

To inspect/service the electronic block, it is not necessary to remove its cabinet. Simply extract the 21-pin AMP connector by depressing its central tooth and exerting a strong pull.

Then remove the anodized aluminium panel by taking out its two cross-slotted screws and push out from behind the printed circuit board.

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Pay attention to the small-gauge cable which connects the PCB to the rate adjusting multi-turn potentiometer which is fastened to the panel.

By removing the front and back panels (front screws, Allen wrench 2.5 & 3 mm), the plate can be lifted and separated from the trolley.

If it becomes necessary, free the power module by removing its holding screws, disconnect the power module, if not already done, and lift the plate, exerting due caution as you are handling a bulky and heavy assembly, not to speak of the dangling electrical connections below.

Beside the plate, even the perforated aluminium bottom panel can be removed by sliding it aside, after having taken out two small locking brackets.

8 ORDERING INFORMATION

5025 **Dog Ventilator,** complete with standard accessories (*****) and 700 or 350 ml cylinder/piston assembly, according to order

8.1 Spares & Accessories

5026 700 ml Cylinder/Piston Assembly, complete with gudgeon

5027 350 ml Cylinder/Piston Assembly, complete with gudgeon

5028 Set of two Lip-Seal Rings for 700 ml piston

5029 Set of two Lip-Seal Rings for 350 ml piston

5030 * Valve Block, complete with spindle & gudgeon

5031 * Hinged Perspex Hood

5032 * Oiler (general use)

5033 * Oiler (silicone oil for cylinder)

7033 * Lithium-Grease Tube

5034 * Set of Allen Wrenches (2 - 2.5 - 3 - 4 - 5 mm)

5035 * Instruction Manual

E-WP008 Power Cord – Europe (or *E-WP008-1* U.S.A. / *E-WP008-2* U.K.)

***** Set of 2 fuses for either 115 VAC or 230 VAC mains

OUR LINE OF VENTILATORS ALSO INCLUDES MODELS FOR MOUSE (CAT. 28025), RODENT (CAT. NO. 7025) AND CAT/RABBIT (CAT. NO. 6025).

Ask for the detailed leaflets!

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8.2 Specifications

Rate	:	10 to 50 strokes per minute
Stroke Volume	:	0 to 700 or 0 to 350 ml depending on the cylinder/piston installed
Stroke Volume Reproducibility	:	+/- 2%
Stroke Volume Scale	:	0 - 700 ml, 50 ml divisions
Power Requirements	:	115 or 230 V, 50/60 Hz, 200 Watt max.
Operating Temperature	:	0° to 40° C
Sound Level	:	< 70 dB
Weight (net)	:	Kg 30.0
Shipping Weight	:	Kg 55.0 approx.
Dimensions	:	48 x 38 x 83 cm
Packing dimensions	:	74 x 65 x 107 cm

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WIRING DIAGRAMS

5025-02EX01	Electronic List (external components)
Sh 1 of 4 *	Electronic Module
Sh 2 of 4 *	Electronic Module
Sh 3 of 4 *	Electronic Module
Sh 2 of 4 *	Electronic Module

***** The Electronic Module, consolidated in a metal housing, is a commercially available product, manufactured by MINIMOTOR of Reggio Emilia.

Its operational data, wiring diagrams, etc., are indicated in the following pages.

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