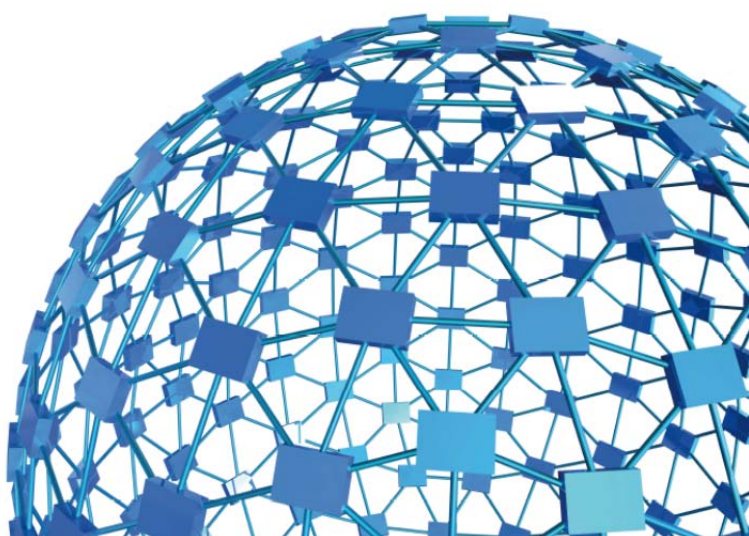




instruction manual

Rodent Ventilator
Cat. No. 7025 / 7125



UGO BASILE S.R.L.

sales@ugobasile.com / service@ugobasile.com www.ugobasile.com

UGO BASILE S.R.L.

Via G. Di Vittorio, 2
21036 GEMONIO, VA, ITALY
Phone: +39 0332 744574

sales@ugobasile.com / service@ugobasile.com
www.ugobasile.com

instruction manual

Rodent Ventilator
Cat. No. 7025 / 7125

Serial No.

SAFETY CONSIDERATIONS

ALTHOUGH THIS INSTRUMENT HAS BEEN DESIGNED WITH INTERNATIONAL SAFETY STANDARD, THIS MANUAL CONTAINS INFORMATION, CAUTIONS AND WARNINGS WHICH MUST BE FOLLOWED TO ENSURE SAFE OPERATION AND TO RETAIN THE INSTRUMENT IN SAFE CONDITIONS.

SERVICE AND ADJUSTMENTS SHOULD BE CARRIED OUT BY QUALIFIED PERSONNEL, AUTHORIZED BY UGO BASILE ORGANIZATION.

ANY ADJUSTMENT, MAINTENANCE AND REPAIR OF THE OPENED INSTRUMENT UNDER VOLTAGE SHOULD BE AVOIDED AS MUCH AS POSSIBLE AND, WHEN INEVITABLE, SHOULD BE CARRIED OUT BY A SKILLED PERSON WHO IS AWARE OF THE HAZARD INVOLVED.

CAPACITORS INSIDE THE INSTRUMENT MAY STILL BE CHARGED EVEN IF THE INSTRUMENT HAS BEEN DISCONNECTED FROM ITS SOURCE OF SUPPLY.

Rodent Ventilator

Cat. No. 7025

General

The 7025 Rodent Ventilator is a volume-controlled mechanical ventilator (according to Starling's ventilator method), designed for use with rats, guinea pigs, mice and small birds.

The 7025 drive consists of a variable speed geared motor linked by a novel variable stroke mechanism to easily interchangeable cylinder/piston assemblies.

In particular, the **7025 can be equipped with 5, 10 or 30ml** cylinder/piston assembly.

Its precisely regulated geared-motor speed provides the most accurate and reliable stroke rate control of any respirator available.

The operation of the 7025 may be "paused" by an external TTL logic signal.

The picture features a Rodent Ventilator 7025, together with the 6025 for Cat/Rabbit



**Best available
Starling
Pumps**

**THE CHOICE OF
THE CRITICS!**

"We have four of your respirators in our extended lab and they are wonderful - as is your service"

Dr. Nicholas Price, Monash University

Main Features

- Interchangeable cylinder/piston assemblies (5, 10, 30ml)
- Quiet operation, both acoustically and electrically (negligible R.F. broadcasting)
- Reliable mechanics and impeccable finishing: lifelong lasting
- Synchronised START/STOP function available as optional

Ugo Basile: more than 10,000 citations



CHECK-LIST

- ☐ **7025** Rodent Ventilator, 10 ml
☐ **7025-30** Rodent Ventilator, 30 ml
☐ **7025-5** Rodent Ventilator, 5 ml
☐ **7025-1** Rodent Ventilator, 5 ml
☐ **7125** Rodent Ventilator, Start/Stop, 10 ml
☐ **7125-30** Rodent Ventilator, Start/Stop, 30 ml
☐ **7125-5** Rodent Ventilator, Start/Stop, 5 ml
☐ **7125-1** Rodent Ventilator, Start/Stop, 1 ml

CLIENTE / CUSTOMER _____

Ordine No. / Order No. _____ Data / Date ____/____/____

UB code	CAT.No.	✓	Q.ty	DESCRIPTION	DESCRIZIONE
E-WP 008			1	MAINS CABLE	EUROPE
E-WP 008-1					U.S.A.
E-FT 008-1			2	FUSES (T800mA)	FUSIBILI (T800mA)
	7044		1	Y-CANULA	CANULA a Y
M-CM 081-F	7033		1	LITHIUM-GREASE	GRASSO AL LITIO
	7032		1	PERSPEX LID	COPERCHIO
E-AU 041	7025-302		1	INSTRUCTION MANUAL (on USB pen drive)	MANUALE DI ISTRUZIONE (su chiavetta USB)
CYLINDERS					
7025 7125	7026		1	10ml CYLINDER-PISTON ASSEMBLY	CILINDRO PISTONE 10ml
7025-30 7125-30	7027		1	30ml CYLINDER-PISTON ASSEMBLY	CILINDRO PISTONE 30ml
7025-5 7125-5	7128		1	5ml CYLINDER-PISTON WITH SUITABLE LINK	CILINDRO PISTONE 5ml con biella dedicata
7025-1 7125-1	7131		1	1ml CYLINDER-PISTON WITH SUITABLE LINK	CILINDRO PISTONE 1ml con biella dedicata
OPTIONAL					
	7025-150		1	CONNECTION KIT FOR ANESTHESIA SYSTEM TO VENTILATOR 7025	KIT CONNESSIONE DA SISTEMA DI ANESTESIA A POMPA DI VENTILAZIONE PER 7025

DATE / /	Serial No.	IMBALLATO DA / PACKED BY
Universal Input 85-264 VAC, 50-60Hz		

IMPORTANT/IMPORTANTE:	
FROM: Name	Company/Institution
DATE	REF.
NOTE	
MOD.04 REV 0	

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Rodent Ventilator

Cat. 7025 / 7125

1 GENERAL

The **7025 Rodent Ventilator** is a mechanically unique positive pressure pump, according to Starling's ventilation method, designed for use with guinea pigs, rats, mice and small birds, 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 are recessed into the chassis

Electrically,

- D. digital display of "strokes per minute"
- E. TTL start-stop command
- F. no electronic noise broadcasting

1.1 Synchronized START/STOP on model 7125

The operation of the Rodent Ventilator may be "paused" by an external TTL logic signal.

For more demanding electrophysiological-pharmacological investigations, an optional **synchronised command** is available to START and STOP the Ventilator during forced inspiration. Ask for special model Cat. **7125**.

This feature is particularly useful when coupling the operation of the Ventilator to software for physiology or neurophysiology experiments. See paragraph 4.6-Synchronised Start/Stop .

2 INSTRUMENT DESCRIPTION

2.1 Kinematics

A D.C. geared motor, operated by solid state speed control, is coupled to the cylinder/piston assembly, via a unique variable stroke linkage (see datasheet picture & Figure 1 "Linkage"), with the following advantages:

- The piston almost touches the cylinder end at each stroke, regardless of the pre-set volume. This ensures that all air taken into the pump is expelled with each stroke.

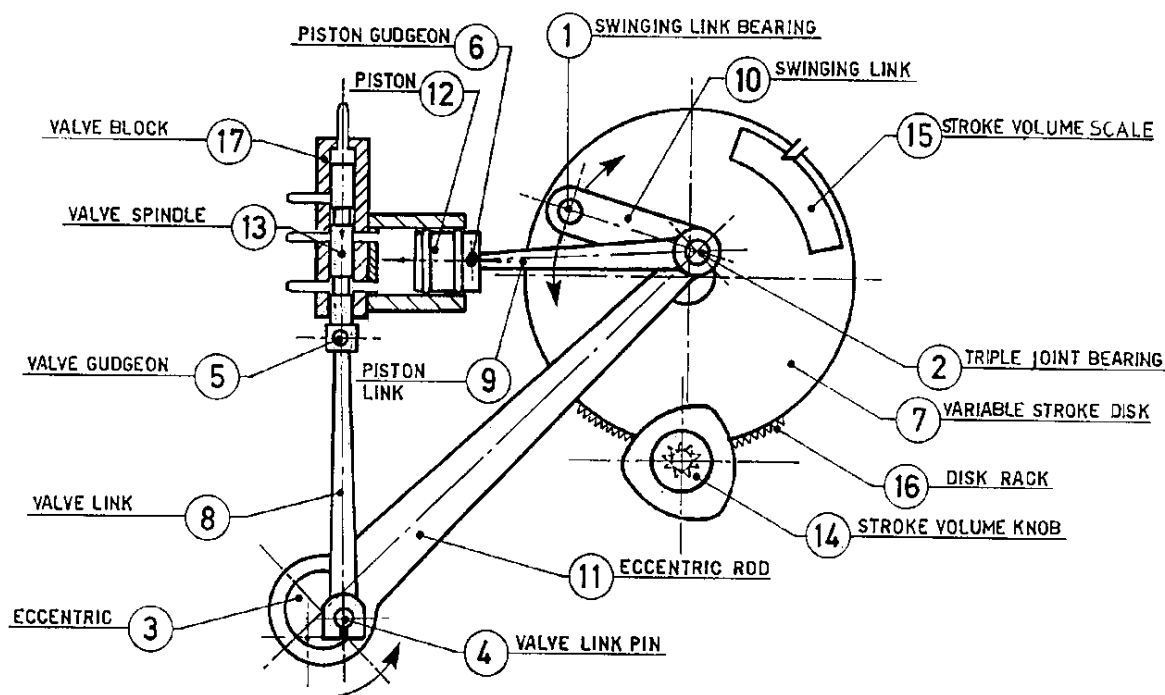


Figure 1 "Linkage"

- The stroke volume knob can be adjusted either while the pump is running or at a standstill. Volume is clearly indicated **on a stationary scale** 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.
- The mechanism does not incorporate the slotted link assembly found on other ventilators. The reciprocating motion is generated, adjusted and transmitted to the piston by pivoting joints and rods only.

This 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

Four different cylinder/piston assemblies are available: 1, 5, 10 and 30 ml.

Particular care has been taken in finishing the cylinder inside surface (diamond lapping), to minimize the O-ring wear. The piston fits snugly inside the cylinder and is made airtight by two conveniently spaced O-rings.

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 the seat and the spindle.

2.3 Pump Frame

The backbone of the instrument is a heavy gauge (10 mm) aluminium plate to which all mechanisms are fastened.

Figure 1 “Linkage” illustrates the external fittings, namely the valve block (17) the variable stroke disk (7) and its control knob (14).

The transformer, the geared motor and the electronic printed circuit board are fastened to the other side of the plate (see paragraph 7.2-Access to the Inside of the Instrument).

The plate is fastened to the left wall (the side of the air ports) by two M4 oval-head screws. The combination wall/plate forms a solid “T” structure, which glides out from the rails of an all welded 4-sided cabinet, by simply removing the six M4 screws indicated.

This impeccable design makes all internal and external components totally accessible in a matter of 30 seconds.

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.

The functional design of the cabinet which avoids protruding elements 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.

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



Protect the environment!

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

3.2 Notes on the Instruction Manual

The 7025 Instruction Manual included in the package (on the USB drive) is necessary for the correct installation and operation of the instrument.

We recommend reading the manual with attention, as it is essential for the correct installation and operation of the instrument.

Please save the manual, ready to be consulted by the qualified personnel who use the instrument. Print it, only if necessary.

Our Instruction Manuals are available as free download on our web, see <http://www.ugobasile.com/support/documentation.html>. For any additional information and/or assistance, you are welcome to contact our Service Department (see paragraph 5.4-Customer Support), specifying the serial number of your instrument.

3.3 Before Applying Power

Consider the Power Module, on the instrument back panel, which encompasses – from left to right - the inlet connection of the mains cord, the mains switch and the fuse holder.

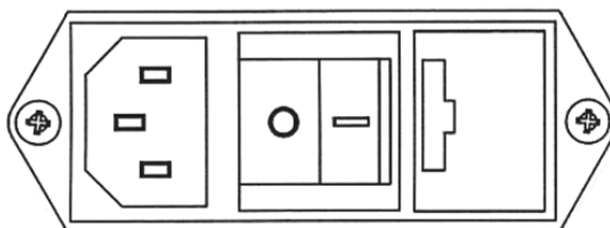


Figure 2 “Power Module”

The Ventilator has Universal input 85-264 VAC, 50-60Hz.

3.3.1 Mains Switch

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

- **OFF** when pressed the “O” side
- **ON** when pressed to the “I” side

3.3.2 Fuse Holder

The fuse holder comprises two fuses, one on the live, and the other on the neutral. We recommend 800 mA timed fuses, type T800 A. To replace the fuses, 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

- a. Place your Ventilator on a steady flat surface.
- 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 cable.
- 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 7.4-INSTRUMENT SPECIFICATIONS.
- f. Do not spray any liquid on the connectors.
- g. Use only acceptable, commercially available anaesthetic agents with this ventilator.

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 brought to your attention 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.

4 OPERATION

4.1 Switching On

Switch on the 7025 Ventilator by acting the Mains Switch placed on the left side wall of the instrument; see paragraph 3.3.1-Mains Switch. The digital display labelled STROKES PER MINUTE will light up, denoting that the instrument is on.

Familiarize with the stroke and rate control.

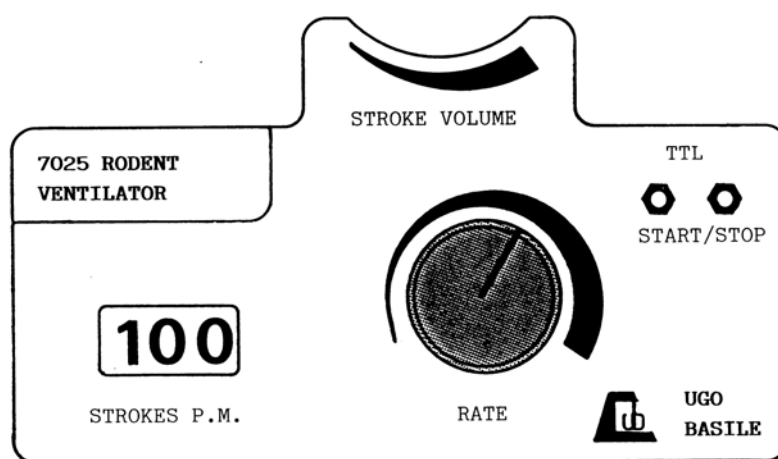


Figure 3 "Front Panel"

4.2 Rate

The speed control potentiometer adjusts the geared motor to the desired speed, which is indicated on the 3-digit LED display labelled **STROKE P.M.** (see Figure 3 “Front Panel”).

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

The digital display assures 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., 150 STROKES P.M. could be any value between 150 and 150.9.

4.3 Stroke Volume

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

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 10ml cylinder/piston assembly.

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

See also paragraph 4.4.



Figure 4 “Stroke Volume Scale”

4.3.1 Volume Scale Reading

VOLUME SCALE READING	1 ml Piston (reading / 10) ml	5 ml Piston (reading / 2) ml	10 ml Piston actual reading ml	30 ml Piston (reading x 3) ml
1	0.1	0.5	1	3
2	0.2	1	2	6
3	0.3	1.5	3	9
4	0.4	2	4	12
5	0.5	2.5	5	15
6	0.6	3	6	18
7	0.7	3.5	7	21
8	0.8	4	8	24
9	0.9	4.5	9	27
10	1	5	10	30

Table 1 “Stroke Volume Indication”

4.4 Ventilation Standards for Small Mammals

For a deeper evaluation of all the parameters involved in the artificial ventilation of experimental animals, we suggest the operator to read the basic paper on this subject: L.I. Kleinman & E.P. Radford: “**Ventilation Standards for Small Mammals**” J. Appl. Physiol. 19(2): 360-362, **1964** (copies are available on request).

4.5 TTL Start/Stop Command

Delicate electrophysiological-pharmacological investigations may require that the animal “holds its breath” for a while, to minimize all movements.

For this purpose, operation of the Ventilator may be “paused” by an external TTL logic signal, provided by miniature jacks to fit 2mm banana plugs located on the control panel (see Figure 3 “Front Panel”).

A voltage signal, 3 to 25V amplitude, RED JACK positive (max. current drain at 25V = 2.5 mA), causes the Ventilator to stop. Restarting takes place when the signal drops to zero!

Accidental reversing of polarity will not activate the circuit but causes no damage.

A special circuit has been designed, to minimize the mechanical-electrical inertia and electromagnetic interference which would be unavoidable via crude ON-OFF power switching.

Pause timing ought not to be too long nor too frequent. Compensating a pause with a faster rate may help; pause when the lungs are full.

For more demanding electrophysiological-pharmacological investigations, An optional **synchronised command** is available to START-STOP the Ventilator, see following paragraph.

4.6 Synchronised Start/Stop Model 7125

The operation of Ventilator may be “paused” by an external TTL logic signal. This feature, available on model **7125** (see paragraph 8-ORDERING INFORMATION) is particularly useful when the operation of the Ventilator is software controlled.

This special model of Rodent Ventilator is provided with optimal synchronous stop feature; you will notice two BNC connectors on the left side panel of the Ventilator case.

The BNC marked “**SYNCHRON**” supplies a square pulse (5V amplitude, 20ms duration) at each ventilator stroke, when the piston is at the upper dead point (i.e., when the piston almost touches the cylinder bottom and the lungs are inflated.)

This **trigger signal** can inform/command a number of recording and/or actuating devices. To obtain the synchronous stop, it is necessary to send a 5V pulse (grounded negative) to the STOP BNC-connector, for at least 5s.

The Ventilator will automatically restart after a 5 second time interval.

4.7 Connection 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 trachea as possible. See Figure 5 “Valve Connection to Animal”.

Expired air can be recovered via the exhaust tube for sampling, partial recycling, etc., see Figure 5 “Valve Connection to Animal”.

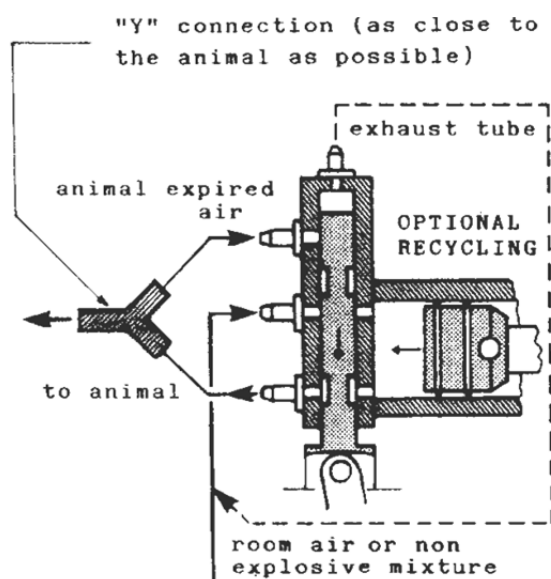


Figure 5 “Valve Connection to Animal”

Room air or any anaesthetic gas mixture can be used to feed the pump intake.

5 MAINTENANCE

While any service of the instrument ought 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 your facility.



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, and snap out the slide which houses the fuses. We recommend 800mA timed fuses, type T800.

After replacing the fuses, snap in the fuse slide: the mechanical “click” ensures that it is locked.

5.2 Mechanical

5.2.1 Changing Cylinder/Piston Assembly

To replace the cylinder/piston assembly proceed as follows:

- A. Run the pump until the piston is at a rearward position, that is, away from the valve block. Using the 3 mm Allen wrench provided, remove the two screws (18, see Figure 6 "Cylinder/Piston Assembly"), accessible from the air port side, which fasten the cylinder to the valve block.

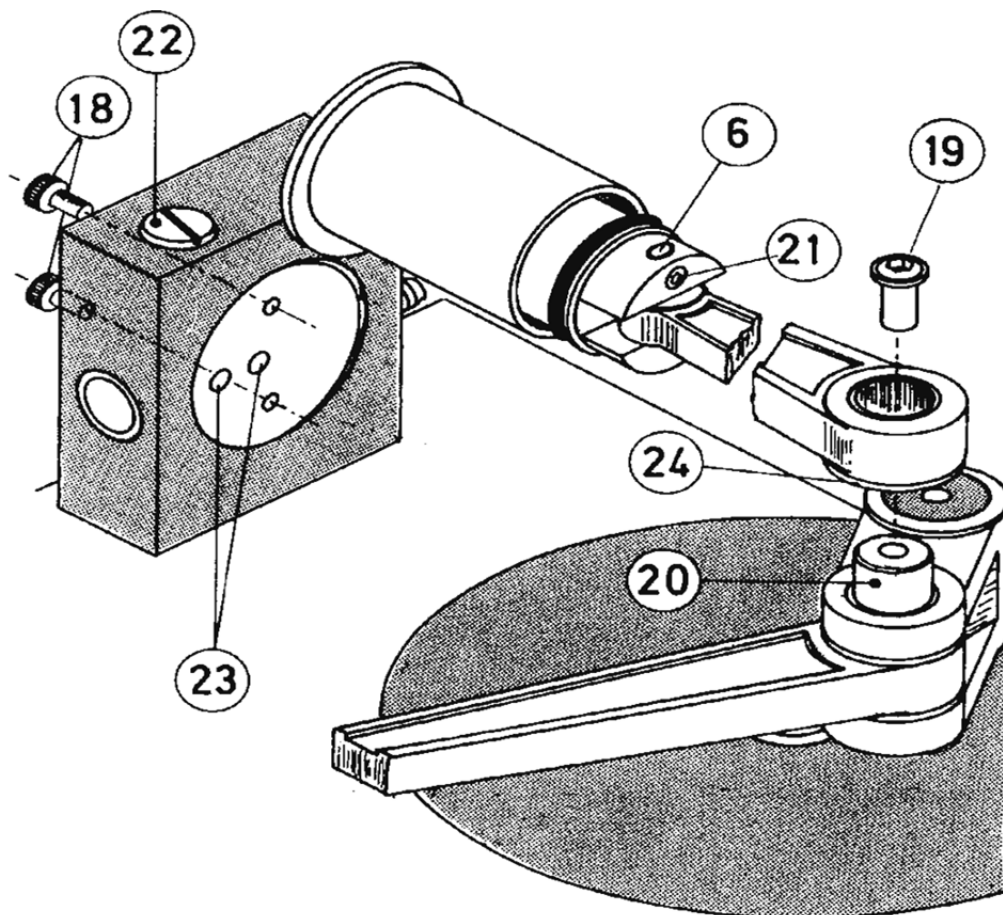


Figure 6 "Cylinder/Piston Assembly"

Pull the cylinder outward to detach it from the valve block, about 0.5cm. The cylinder may require a gentle side knock to pop out, as grease film on its bottom may cause it to stick, especially after long inactivity of the pump.

All cylinder/piston units require an identical sequence of moves to be separated from the pump mechanism.

However, the 30ml cylinder, having a larger bottom surface, may require a more energetic knock to separate it from the block. However we recommend avoiding a Karate chop: repeated tapping may be more effective and less dangerous to the cylinder integrity.

- B. Remove the 4mm Allen screw (19) from the shaft of the triple joint (2), then lift the cylinder and piston link assembly in one piece, to disengage the link from the precision triple joint shaft (20).
- C. Once you have removed the combination cylinder/piston, drive out the piston. Slacken the gudgeon set screw (21) with the 2 mm Allen wrench provided and drive out the gudgeon (6).

Remove the gudgeon from the replacement piston and connect the new piston to the link. Reposition the gudgeon, paying attention to its “flat”, which should face the set screw.

- D. Insert the replacement piston into its cylinder and position the cylinder onto the valve block, following the steps outlined in a) and b) in reverse order.



Each **cylinder/piston combinations** is complete with its dedicated link. Please make sure you use the correct link when replacing the assembly, store the link with the piston you are not using.

In case of doubt, ask for details to our after sales service: see 5.4-Customer Support.

Make sure that:

1. a film of grease is evenly smeared on the cylinder bottom, to make the fit air-tight.
2. the cylinder and block ports match correctly.
3. the piston link bearing flange (24) faces the triple joint fit (20).
4. you have not left loose parts lying around!

Insert the piston you are not using in its cylinder, lubricate and store. Complete the assembly with its link, if you have switched from 10 or 30ml to 1 or 5ml piston or vice versa.

5.2.2 Lubricating Linkage

The entire linkage is exposed for immediate visual inspection (see Figure 1 “Linkage”).

Lubricate the swinging link bearing (1), the triple joint (2) and the piston & valve gudgeon (5-6) every 200 hours of operation by applying 1-2 drops of machine oil of 20-30 grade, as the one provided with the standard package, see paragraph 8-ORDERING INFORMATION.

Before oiling, please remember to unplug the power cord; you can spout or – worse – your fingers, may be pinched by the shearing action of the “dynamic trio”, i.e., the 9-10-11 linking members!

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 valve link pin (4) are provided with sealed bearings which 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 200 hours of operation it is wise to lubricate the cylinder and valve gear (see following paragraph). It is possible to inject some grease into the cylinder open end with a syringe, when the piston is stopped at its most forward position (see also paragraph 6.1-Stroke Volume for guidance).

However, the O-ring spacing combined with the limited piston travel would lead to an uneven and limited spreading of grease over the working surface. In particular, the inner O-ring would hardly get any grease.

Not to speak of the problem of removing residual grease and cleaning. For a flawless job, it is recommended that you take the piston out, see paragraph 5.2.1-Changing Cylinder/Piston Assembly.

Remove the residual grease with a cloth; apply fresh grease to fill up ring grooves. Remove any excess. Insert the piston and reassemble the whole.

5.2.4 *Lubricating Valve Gear*

The valve gear is lubricated via the grease cup (22) placed on the valve block top, see Figure 6 “Cylinder/Piston Assembly”. A lithium-grease tube is supplied with the standard package, see 8-ORDERING INFORMATION.

When turning the cap clockwise, the grease contained in the cup is squeezed via two boreholes into the valve seat, where it is distributed by the tapered sections of the spindle (13). An even film of grease assures adequate air seal, quiet operation, minimum friction and wear.

1/4 turn of the cap every 8 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 into the cylinder or out via the “to animal” port.

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 compromise 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 which rotates the disk is also permanently lubricated (14 & 16).

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.

A large-size fine-pitch (MB12) set screw (25) presses a nylon pad against the bottom surface of the disk. See figure below:

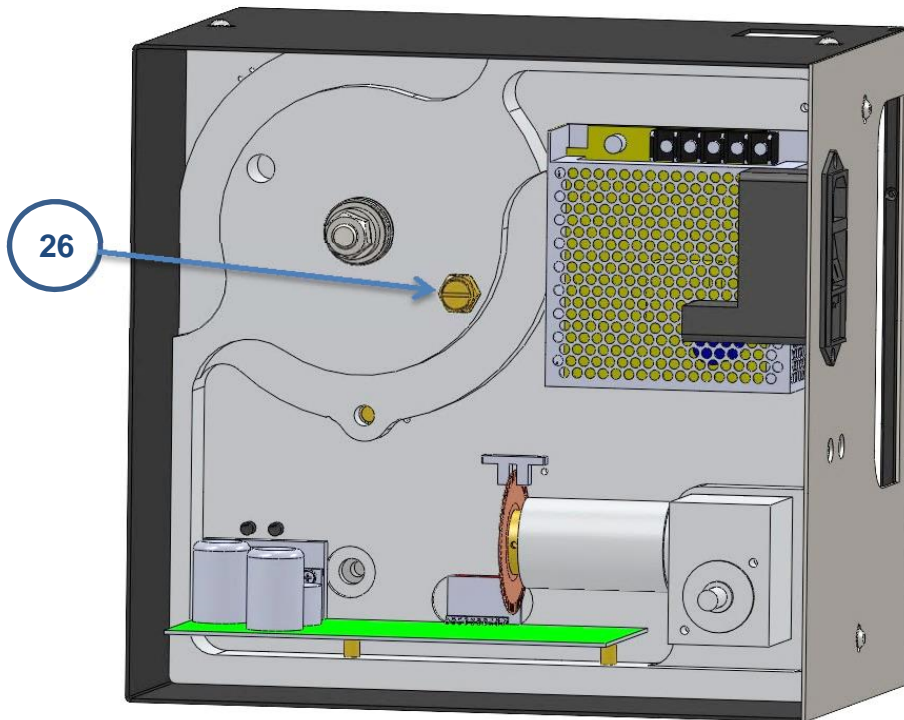


Figure 7 "Back Side of the Plate"

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

In case the stroke volume knob (14) becomes uncomfortably tight or – on the contrary – loose to the point that the disk inches from the preset volume by itself, adjust the set screw accordingly. 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 nut 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.

5.3 Long Inactivity

After long storage, the Ventilator may not start to run at the minimum setting (15 S.P.M.): the torque at that setting may not be sufficient to break away aged lubricant film, in particular at the piston O-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 use and/or maintenance of the ventilator and accessories, please do not hesitate to contact our **service department** (or our local distributor) either directly or via the support page on our website <http://www.ugobasile.com/support.html> :



UGO BASILE s.r.l.

Via G. Di Vittorio 2
21036 GEMONIO – Varese, ITALY



Phone : +39 0332 744574



service@ugobasile.com
logistics@ugobasile.com
sales@ugobasile.com

Before sending any instrument to our factory for repair, please contact our logistics department to obtain a return authorization number (RMA) and shipping/packing 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 5 ml (or 15 ml, if the 30 ml cylinder/piston is being used) and stop the pump motor when the piston reaches its most rearward position, that is, when the cylinder contains 5 ml (respectively 15 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, 15 S.P.M. or below, and then quickly turn the knob down to zero, or stop the motion by the TTL command, see paragraph 4.5-TTL Start/Stop Command, when the piston reaches its desired position.

- B. Attach a clean, freely moving 10ml (or 30ml) glass syringe via a short (5cm) length of tubing to the stem of a “Y” connector. Adjust the plunger so that 1-2 ml (or 3-6 ml) of air is in the syringe, before attaching the tube.

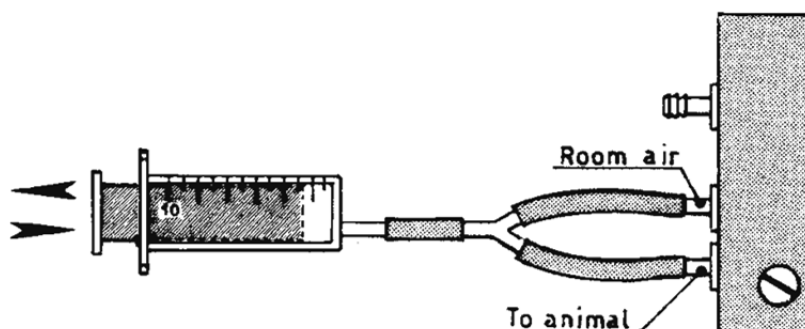


Figure 8 “Checking Stroke Volume”

- C. Attach the two arms of a “Y” to the “room air” and “to animal” ports of the valve block. Use short lengths of tubing. This will establish a closed system between the pump cylinder and the syringe, so that the air will move back and forth from pump to syringe.
- D. Set the speed at about 30 S.P.M. and observe the plunger excursion as it moves back and forth. Hold the syringe horizontally to minimize gravity effect on the plunger travel. The limits of its travel will indicate the actual amount of air being supplied by the pump at each stroke.

To check stroke to stroke volume, use a freely moving 50 ml glass syringe and connect it with a short length of Tygon® or rubber tubing to the “to animal” port. With the piston in the max. stroke position, run the pump at about 40 S.P.M. and observe how many strokes it takes to get 50 ml. On the 5ml setting, for instance, it should take 10 strokes.

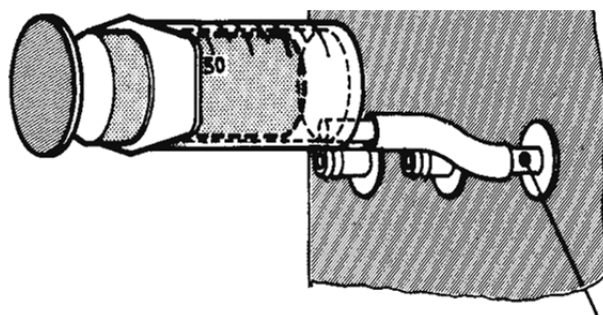


Figure 9 “Checking Stroke to Stroke Volume”

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.

6.2 Frequency

To check the frequency (strokes per minute), use a stopwatch. Run the pump at 60 S.P.M., i.e., one stroke per second. Count 10 piston strokes then stop the watch.

Elapsed time should be 10 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 120 S.P.M.

7 SERVICING

7.1 Air Leakage

As mentioned in 6.1 (last paragraph) the probable cause of any deviation between the pump output and the scale graduation is air leakage.

First check the condition of the piston O-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).

Valve damage should be a rare occurrence indeed if simple care is taken and proper lubrication performed (see paragraph 5.2.4-Lubricating Valve Gear). Wear of the hard aluminium oxide coating of 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, remove the cylinder (see paragraph 5.2.1-Changing Cylinder/Piston Assembly), then remove the spindle snap ring and push out its gudgeon (5). 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.

Set the pump at minimum speed and stop it when the spindle is at max. inward position. As before, it will be easier to stop at a set position by turning the speed knob “below 20” (see also 6.1-Stroke Volume, paragraph a) than by switching off the power switch.

Apply pressure with a sphygmomanometer hand-pump equipped with a gauge to the “room air” port. It should keep 30mm Hg (which is four times higher than normal ventilator pressure) for at least 1 minute, with a max. drop of 2-3mm.

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

If the leakage is greater than 2-3mm Hg, the cause is probably a damaged valve seat, which can be fixed only at the factory. If this is the case, 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 two M5 screws, whose heads are easily located on the back of the supporting plate.

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).

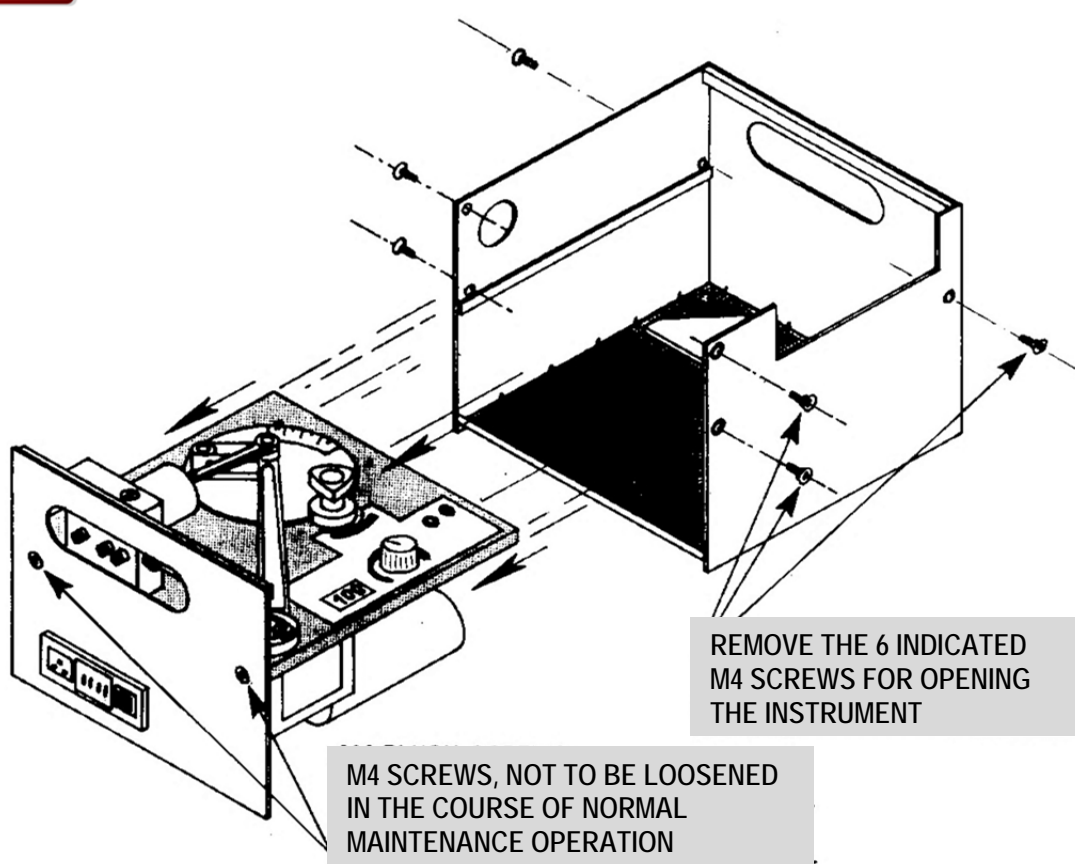


Figure 10 "Access to the Inside of the Instrument"

Remove the six M4 oval-headed screws (indicated in Figure 10 "Access to the Inside of the Instrument", on page 16) with the 2.5 mm Allen wrench provided.

Pull out the plate/wall assembly, see Figure 10 "Access to the Inside of the Instrument".

7.3 Rate Calibration

If the stroke frequency (see paragraph 6.2-Frequency) does not agree with the indication on the LED display (see paragraph 4.2-Rate), it is a simple matter to recalibrate the electronic circuit.

In fact, the unavoidable aging of the components, vibrations, accidental knocks or some

P.C.B. handling, e.g., to replace a component, may in the long run combine to produce a shifting of the rated speed values.

Proceed as follows:

- A. Open the instrument (see paragraph 7.2-Access to the Inside of the Instrument). Place the Wall/Plate T-assembly on a table (both stem and cross of the "T" vertical!)
- B. Switch on the Ventilator. See paragraph 3 of **SAFETY CONSIDERATION!**
- C. Check the stroke frequency. Turn the rate knob clockwise to maximum. Connect a **frequency meter** to **R12** (at the side of trimmer pot. R10) and to test point 1 (ground), see note¹.

In this way you pick up the pulses generated by the pump tacho-generator, whose rate is exactly proportional to the motor angular speed. Multiply the reading by the constant:

0.042

The result will indicate the actual STROKES PER MINUTE of the running ventilator. Compare this figure with the indication of the ventilator **digital display**. Adjust a possible discrepancy via trimmer pot. **R23**.

- D. Check the STROKES PER MINUTE range. Turn the rate knob C.C.W. to zero. Read the display which should indicate 000. Adjust trimmer pot. R20 in the remote event the ventilator is not perfectly at a standstill.

Turn the rate knob C.W. to maximum. Read the ventilator display. Adjust trimmer pot. R9 until you read 180 S.P.M.

7.4 INSTRUMENT SPECIFICATIONS

Operation	
Power Requirement	Universal input 85-264 VAC, 50-60Hz, 40W max
Rate	15 to 180 strokes per minute
Rate read-out	on digital display
Stroke volume	0.5 to 5 - 0.1 to 1 - 1 to 10 - 3 to 30ml depending on the cylinder/piston installed
Stroke Volume Reproducibility	+/-2%
Stroke Volume Scale	Double indication 1-10 & 3-30 ml
Start-Stop	7025= via TTL command 7125= by synchronised command

¹ to locate the components, refer to Board Component Layout, available on request, see paragraph 5.4

Operating Temperature 5° to 30° C

Sound Level < 70 dB

Physical

Total Weight 9.5 Kg

Shipping Weight 16 Kg approx.

Dimensions 27x26x19cm

Packing Dimensions 67x42x53cm

Warranty

7025 is covered by a 24-month warranty

8 ORDERING INFORMATION

7025 Rodent Ventilator, standard configuration, including following components and accessories:

7026 10 ml Cylinder/piston assembly, complete

7032 Perspex Lid

7033 Lithium-Grease Tube

7044 Y-Cannula

E-FT 008-1 Fuses (T800 mA)

E-WP 008 Mains Cord

E-AU 041 USB pen drive, including:
7025-302 Instruction Manual (on USB)

8.1 Other Available Configurations

7025-30 Rodent Ventilator, complete with 30ml cylinder/piston & standard accessories

7025-5 Rodent Ventilator, complete with 5ml cylinder/piston & standard accessories

7025-1 Rodent Ventilator, complete with 1 ml cylinder/piston & standard accessories

8.2 START/STOP Configurations

7125 Rodent Ventilator, provided with START/STOP circuit, complete with 10ml cylinder/piston & standard accessories

7125-30 Rodent Ventilator, provided with START/STOP circuit, complete with 30ml cylinder/piston & standard accessories

7125-5 Rodent Ventilator, provided with START/STOP circuit, complete with 5ml cylinder/piston & standard accessories

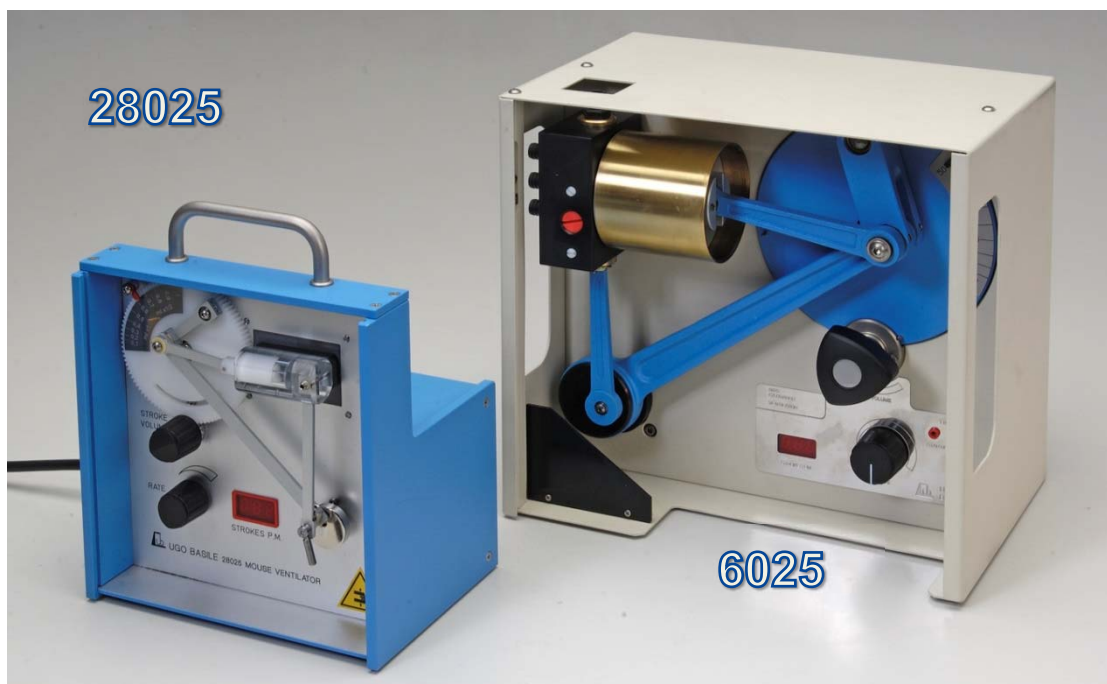
7125-1 Rodent Ventilator, provided with START/STOP circuit, complete with 1 ml cylinder/piston & standard accessories

8.3 Other Available Cylinder/Piston & Accessories

- 7025-150** Connection Kit for Anesthesia System to Ventilator 7025
- 7131** 1 ml Cylinder/Piston Assembly, complete with suitable link
- 7128** 5 ml Cylinder/Piston Assembly, complete with suitable link
- 7026** 10 ml Cylinder/Piston Assembly, complete with gudgeon
- 7027** 30 ml Cylinder/Piston Assembly, complete with gudgeon
- 7135** Set of two O-rings for 1 ml piston
- 7129** Set of two O-rings for 5 ml piston
- 7028** Set of two O-rings for 10 ml piston
- 7029** Set of two O-rings for 30 ml piston
- 7030** Valve Block, complete with spindle & gudgeon
- M-TF 011-F** Stretch of Tube 1m
- E-PE 010** Miniature Banana Plug (red)
- E-PE 001** Miniature Banana Plug (black)

8.4 To Complete Your Equipment...

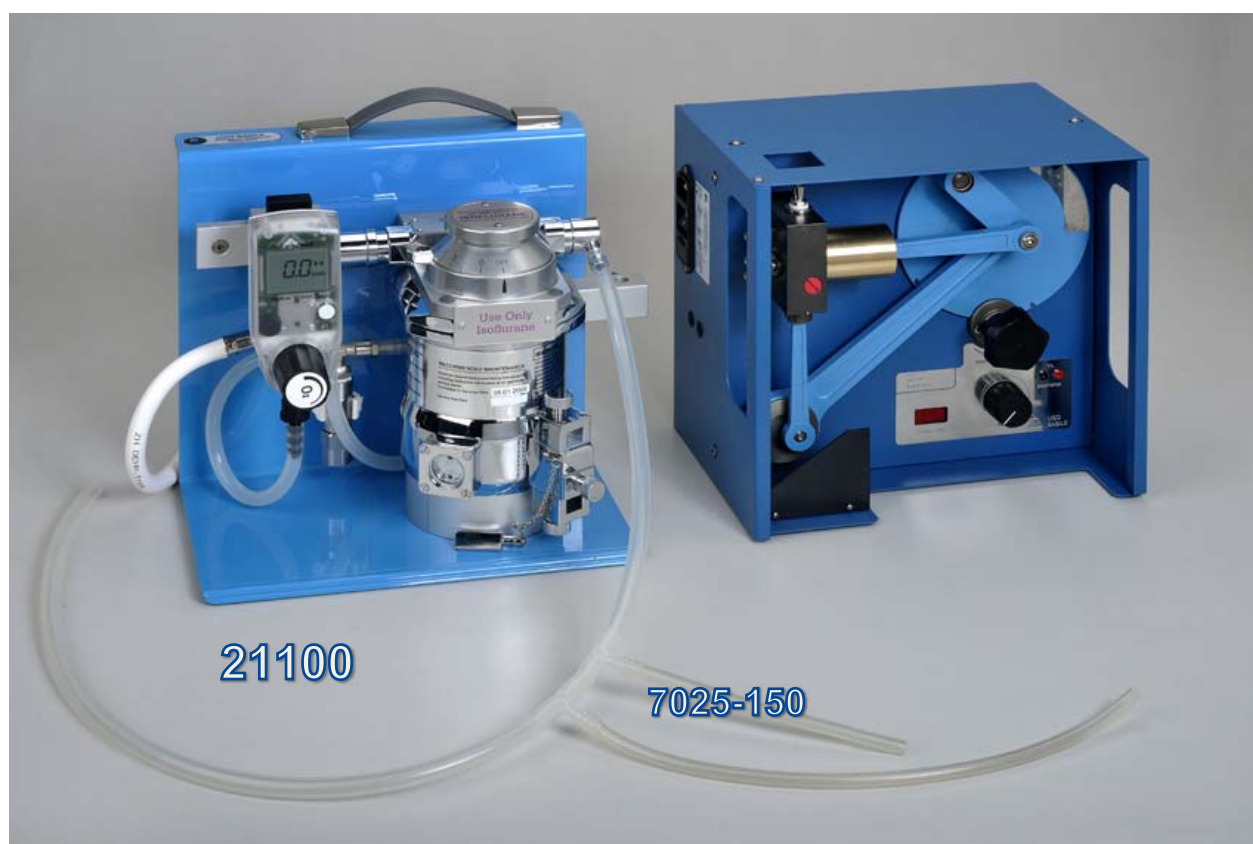
Our line of ventilators also includes models for Mouse, Cat/Rabbit and Dog. See the detailed leaflet!



- 28025** Mouse Ventilator, complete with 1 ml cylinder/piston assembly & standard accessories.
- 6025** Cat/Rabbit Ventilator, complete with 50ml cylinder/piston assembly and standard accessories. Universal input 85-264 VAC, 50-60Hz
- 5025** Dog Ventilator, complete with 700ml cylinder/piston assembly and standard accessories

For each model, different configurations are available

We also offer a complete line of **Anesthesia Systems** and accessories, series 21100, the ideal match to our Ventilators!



- 21100** Single-Output Anesthesia System, including Basic Single-Output Anesthesia System, scavenger (Activated Charcoal Canister), evac tubing
- 21200** Double-Output Anesthesia System, including 21050, scavenger (Activated Charcoal Canister), evac tubing and dual diverter manifold, for simultaneous connection of nose-cone/mask and induction box
- 7025-150** Connection Kit for Anesthesia System to Ventilator 7025

Other configurations are available, as well as accessories, induction boxes, rodent masks, active/passive scavengers, heating pads, etc.

9 BIBLIOGRAPHY

- T.T. Troelsen et alia: **"Impaired NO-mediated vasodilatation in rat coronary arteries after asphyxial cardiac arrest"** Acta Anaesthesiologica Scandinavica 59(5): 654–667, **2015**
- J. K. Marshall et alia: **"Intra-Operative Tissue Oxygen Tension Is Increased by Local Insufflation of Humidified-Warm CO₂ during Open Abdominal Surgery in a Rat Model"** PLoS One 10(4): e0122838, **2015**
- E.A. Stein et alia: **"Combination of RNA Interference and Virus Receptor Trap Exerts Additive Antiviral Activity in Cocksackievirus B3-induced Myocarditis in Mice"** J. Infectious Diseases 211(4) : 613-622, **2015**
- Darach O h-ici et alia: **"Closed-chest small animal model to study myocardial infarction in an MRI environment in real time"** Intl. J. Cardiovascular Imaging 31(1): 115-121, **2014**
- G.E. Peoples et alia: **"Autologous Pump-Perfused Rat Hindlimb Preparation for Investigating Muscle Function and Metabolism in Vivo"** Microcirculation 20 (6): 511–523, **2013**
- R. Rudz et alia: **"Acute Myocardial Infarction Inhibits the Neurogenic Tachycardic and Vasopressor Response in Rats via Presynaptic Cannabinoid Type 1 Receptor"** J.Pharmacol.Exp.Therap. 343: 198-205, **2012**
- A. Andersen et alia: **"Ischemic Preconditioning Reduces Right Ventricular Infarct Size through Opening of Mitochondrial Potassium Channels"** Cardiology 123 (3): 177-180, **2012**
- Y. Kalam et alia: **"Levosimendan Does Not Improve Cardiac Output or Blood Pressure in a Rodent Model of Propranolol Toxicity When Administered Using Various Dosing Regimens"** Intl. J. Toxicol. 31(2): 166–174, **2012**
- D. Bilbija et alia: **"Protecting the heart through delivering DNA encoding for heme oxygenase-1 into skeletal muscle"** Life Sciences 91 (17-18): 828-836, **2012**
- R. Nassini et alia: **"Acetaminophen, via its Reactive Metabolite N-acetyl-pbenzo-quinoneimine and Transient Receptor Potential ankyrin-1 Stimulation, Causes Neurogenic Inflammation in the Airways and Other Tissues in Rodents"** The FASEB Journal 24 : 1-13, **2010**
- S. Cicko et alia: **"Purinergic Receptor Inhibition Prevents the Development of Smoke-Induced Lung Injury and Emphysema"** J.Immunol. 185: 688-697, **2010**

Notes

Handwriting practice lines consisting of 25 horizontal dashed lines.



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This image shows a full page of white paper with horizontal dashed blue lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.





CE CONFORMITY STATEMENT

Manufacturer **UGO BASILE srl**
Address Via G. di Vittorio, 2 – 21036 Gemonio, VA, ITALY
Phone n. +39 0332 744574
Fax n. +39 0332 745488

We hereby declare that

Instrument. **RODENT VENTILATOR**
Catalog number **7025, 7125**

*It is manufactured in compliance with the following European Union Directives
and relevant harmonized standards*

- *2006/95/CE relating to electrical equipment designed for use within certain voltage limits*
- *2004/108/CE relating to electromagnetic compatibility*
- *2006/42/CE on machinery*
- *2011/65/UE on the restriction of the use of certain hazardous substances in electrical and electronic equipment*

Account Manager

Adriano Basile

Nome / Name

April 2014

Date

Firma / Signature