

MRI-1 Volume Cycled Ventilator

MRI-compatible rodent ventilator



STANDARD FEATURES

- Non-magnetic pneumatic valves allow for ventilation in an MRI environment
- All-electronic ventilator
- Wide tidal volume and rate range
- Mice to Guinea pig size
- Safe with oxygen and anesthesia
- Direct readout of volume and rate

The MRI-1 Ventilator is a small animal ventilator designed for use in MRI and other high magnetic field environments. The system comprises a microprocessor-based control unit and a set of remote, pneumatically operated, non-metallic valves. The MRI-1 can operate by itself or can be controlled and/or monitored by a computer. Because of the non-electrical nature of the ventilation valves, this unit is particularly well suited to sensitive electrophysiology recording situations.

The MRI-1 operates on the flow-time principle: an inspiratory airflow is established and gated into the animal for a known time, thus producing a known volume. This approach provides extraordinary flexibility — a wide range of volumes, breaths-per-minute, and I/E ratios are possible with no hardware changes, and using just three front-panel controls.

Respiratory airflow is provided by an internal airpump. Alternatively, an external pressurized gas source can be attached (oxygen or anesthetic gasses).

The remote high-speed, miniature pneumatic valves do

the actual airflow switching. By locating these valves close to the animal (including inside the magnet bore if necessary), dead-space and tubing compliance are minimized.

Operation

Setting up and operating the MRI-1 is easy. Two lengths of flexible tubing connect the control unit and the valves; one supplies the inspiratory airflow and the other is the pressure source for operating the valves. Only three controls are required: respiratory rate is set in breaths/minute; the flow rate is set using the front-panel control; and the percent inspiration is set to establish the ratio of inspiration to expiration time (I/E ratio). All respiratory parameters are shown on the front-panel LCD display. The tidal volume and minute ventilation reflecting the current settings is also continuously displayed, and can easily be changed by adjusting the flow rate.

Expandable

The MRI-1 can also be used in as a standard benchtop ventilator. Besides the standard miniature pneumatic valves, the MRI-1 accepts any CTP-VA series valve assemblies available for the SAR-series ventilators. Using the MVA-4 multi-valve expander, it is also possible to ventilate several rodent-sized animals simultaneously using just one MRI-1 as the control unit. The external valves operate synchronously, but tidal volumes are independently set by varying the flow rate to each valve assembly.

A source of compressed air is required for operating the pneumatic valves. This is attached to the rear panel of the unit, and the pressure is internally switched on or off as required for remote valve operation. All models feature switchable 120/240VAC operation.

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MRI-1 Ventilator

Important safety notification!

The MRI-1 control unit contains magnetic and ferrous materials and MUST be located outside of strong magnetic fields. In the presence of an MRI scanner, this instrument could be drawn towards the bore of the magnet, resulting in injury or death.

Only the remote valve and associated tubing is magnetic-compatible.

SPECIFICATIONS

| | |
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| Respiratory rate range..... | 5 - 200 breaths/min |
| Inspiratory flow range | 20 - 1000ml/min |
| Inspiration/Expiration (I/E ratio) range..... | 20 - 80% |
| Tidal volume range | 0.1 - 30ml |
| Manual control functions | HOLD (suspends inspiration), MAN (manual inflation) |
| LCD panel..... | 4 lines x 20 chars, backlit |
| Indicator lights | INSPIRATION, LOW PRES WARNING, ERROR |
| Internal airpump capacity | 4 lpm |
| Pneumatic valve switching speed (air actuation) | < 75mS |
| Pneumatic valve switching speed (Helium actuation)..... | < 55mS |
| Pneumatic valve actuation pressure | 3 - 5 bar |
| Pneumatic valve flow orifices | 0.080 in. (2.0mm) |
| Pneumatic valve materials | PTFE body, non-metallic fasteners, one non-ferrous coil spring |
| Dimensions, main unit | 9W x 5.5H x 9D in. (23 x 14 x 23cm) |
| Dimensions, pneumatic valve (each, of two) | 1.0 dia x 1.8 long, in. (47 x 25mm) |
| Port connections, respiratory and pressure functions | 0.125" (3mm) ID Tygon tubing |
| SYNC OUT connector | BNC |
| Data Port connector..... | DB-25S |
| Power requirements | 120/240V (switchable), 100VA |

ORDERING INFORMATION

| Part No.: | Model: | Description: |
|------------------|------------------------|--|
| 12-07000 | MRI-1 | Ventilator with remote pneumatic valve set |
| 12-07100 | Pneumatic Valve XS | Non-metallic pneumatic valve w/ tubing & fittings, extra small (mice, rats) |
| 12-07200 | Pneumatic Valve S | Non-metallic pneumatic valve w/ tubing & fittings, small (rabbit, large rodents) |
| 12-071100 | Replacement Tubing Set | Special high-pressure tubing & Tygon tubing set |
| 12-01101 | MRI-1 Accessory Kit | MRI-1 Accessory Kit with tubing, adapters, connectors, clamps, etc. |
| 12-04000 | CTP-VA-1 | External Solenoid Valve Assembly, mouse to rat size |
| 12-05000 | CTP-VA-3 | External Solenoid Valve Assembly, rabbit to cat size (up to 10kg maximum) |

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