

MMX Series Metabolic Monitor Expanders

Accurate oxygen consumption measurement for small animals



MMX-8 front panel

Introduction

The MMX Series Expansion Units allow multiple animals to be monitored when attached to the MM-100 Metabolic Monitor System. This system measures oxygen consumption (VO_2) and CO_2 production (VCO_2) of small animals using the open circuit technique. Each animal is placed in a closed chamber with a known flow of fresh air passing through it. Oxygen and carbon dioxide concentrations are measured at the inlet and outlet of the chamber. The three measurements (flow, O_2 , and CO_2) enable the computation of oxygen consumption and CO_2 production.

MMX-2, MMX-8, and MMX-16 expansion units are available to monitor two, eight, or sixteen channels respectively.

The MMX is connected to, and controlled by a host MM-100 monitor. The airflow to each cage is individually set by a front-panel needle-valve. These flows are continuously monitored by a linear thermal mass flowmeter. The cage flow rates are shown on the front-panel LCD panel.

The effluent air from each cage is sequentially sampled using digitally controlled valves, and sent to the host MM-100 for analysis. This cycling allows a per-animal cycling time of

approximately 3 minutes. A **MANUAL** mode allows any one of the cages to be selected for continuous monitoring.

Connections to MM-100 monitor

A single cable connects the **EXPANSION PORTS** of the MM-100 host and MMX expansion unit. The **FRESH AIR INLET** is connected to an air pump or other source of low-pressure air. This flow is split into multiple channels, each controlled by an adjustable needle valve, and sent to the inlets of multiple cages using standard Tygon[®] tubing. The effluent sample ports of the cages are connected to the **SAMPLE INLETS** on the rear panel. A single **SAMPLE OUTLET** connects to the MM-100 **SAMPLE INLET** using small-bore tubing.

The MMX comes complete with rat and mouse cages, connecting cables, and required tubing and fittings. A complete system for monitoring multiple animals consists of one MM-100 system, an MMX expansion unit, an air pump, and a monitoring computer running Windows95/98/XP.

Software

Supplied software provides a visual representation of the measurements. With this software, operation of the multi-cage system is fully automatic. The animals are placed in the chambers and allowed to become accustomed to the environment. Readings from all (or selected) cages are graphically and numerically displayed. Measurements are also saved to a disk file in a standard ASCII format for later analysis. The monitoring computer connects to the MM-100 unit with a standard included serial cable.

Standard Features (with MM-100):

- Expands MM-100 to two, eight, or sixteen cages
- O_2 consumption (VO_2)
- CO_2 production (VCO_2)
- Automatic measurement of multiple animals
- Solid-state mass flow meter for each cage
- No additional equipment required
- Supplied with Windows[®] monitoring software

ANIMAL VENTILATORS • GAS ANALYZERS • ANESTHESIA • RESPIRATION



CWE, Inc. 25 St. Paul's Road, Ardmore, PA 19003 U.S.A.
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MMX Series Metabolic Monitor Expanders

Specifications:

Flow transducers	thermal mass flowmeter
Flow range	0 - 10,000 ml/min
Linear flow range	50 - 10,000 ml/min
Response time	< 2S
Operating temperature	-20 - 70°C
Flow output	1mV/ml/min
Flow output zero offset	1.250V
O ₂ output	0.1667V/%O ₂
CO ₂ output	.10V/%CO ₂
Sequential sampling interval	approximately 3 min per cage
Sample inlets, outlet (rear panel)	.Luer-loc female
Fresh air inlet (rear panel)	.0.187"D hose barb
Cage airflow outlets (rear panel)	.0.125"D SS hose barbs
Expansion port connector (rear panel)	DB25 female
Dimensions	19W x 5.25H x 15D in.
Power requirements	+5V @ 500mA, ±12V @ 250mA, +24V @ 1A (supplied by host MM-100)



MMX-8 rear panel

Ordering Information:

<u>Part No.</u>	<u>Model</u>	<u>Description</u>	<u>Applications</u>
11-20000	MM-1000	Metabolic Monitor system with mouse chamber	Measure O ₂ consumption, CO ₂ production
11-22000	MMX-2	Two-chamber expansion unit w/ 2 chambers	Monitor two animals simultaneously
11-23000	MMX-8	Eight-chamber expansion unit w/ 8 chambers	Monitor eight animals simultaneously
11-24000	MMX-16	Sixteen-chamber expansion unit w/ 16 chambers	Monitor sixteen animals simultaneously
11-20100	Mouse cage	Measurement chamber, approx. 1 liter	For mice and similar size animals
11-20110	Rat cage	Measurement chamber, approx. 2.5 liter	For rats and similar size animals
11-20200	Drying tube	Spare Drierite tube, pk of 4	Can be regenerated by oven heating
11-20210	Drying column	Large dessicant column, 6.7cmD x 29cmH	For long-term monitoring
11-20211	Dessicant	Bulk Drierite dessicant, 12 1 lb packs	Refill for drying tubes or columns

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