

# GSM-4 Programmable Gas Mixer

## Accurate fast-response blender for custom gas mixtures



### STANDARD FEATURES AND APPLICATIONS

- Accurate custom gas mixtures
- Wide range of gasses and flows
- Custom gas configurations at no extra cost
- Stored programs for immediate retrieval
- Stand-alone or computer controlled
- Gas mixtures for in vivo or in vitro studies
- Control of breathing studies
- Environmental chambers
- Gas analyzer calibration mixtures
- Hypoxia and sleep studies

The GSM-4 Gas Mixer is a versatile and accurate device for creating custom respiratory gas mixtures. Any four gasses can be connected as inputs, and the output is the user-programmed mixture of these gasses. The instrument can operate in a stand-alone mode, with mixture programming done from the front panel controls, or it can be controlled using an attached computer running the supplied software. Besides the mixing function, the GSM-4 can operate as an accurate flow source for a single gas.

The mixer uses fast-response thermal mass flow controllers (MFC's) to provide programmed mixtures with a resolution of 0.1% concentration. Front panel controls are used to set the total desired total output flow, as well as the concen-

tration of each of the three component gasses. The LCD display shows the set concentrations, as well as the computed flow rates for each gas.

Up to four custom mix programs can be created and stored in non-volatile memory for future use. Any of these stored mixtures can be immediately selected and executed by pushbutton. This function allows step-changes in concentrations to be performed with the push of a button.

The typical configuration of the GSM-4 includes two or three *active* gasses (often O<sub>2</sub>, CO<sub>2</sub>, He, etc.). The fourth channel is usually a neutral, or *fill* gas (often N<sub>2</sub>) to make up the balance of the mixture. The MFC's are factory calibrated for the desired gasses for maximum accuracy. Alternatively, all channels can be calibrated for N<sub>2</sub>, and *correction factors* can be applied in software. The highest accuracy is achieved with the direct gas calibration, but the correction factors offer flexibility if future experiments might use other gasses.

The GSM-4 can be operated as a completely stand-alone instrument, but is most conveniently run by remote-control using the supplied GSM-4-CommVS software. This software allows convenient setting up and storage of user-defined gas mixtures, and allows programmed timed mixture switching to perform complex experimental protocols.

The GSM-4 Gas Mixer comes ready to use with CD-ROM software and a serial cable. Up to three input gasses can be attached, which should be regulated to 25-50psi, with a minimum pressure requirement of 20psi.

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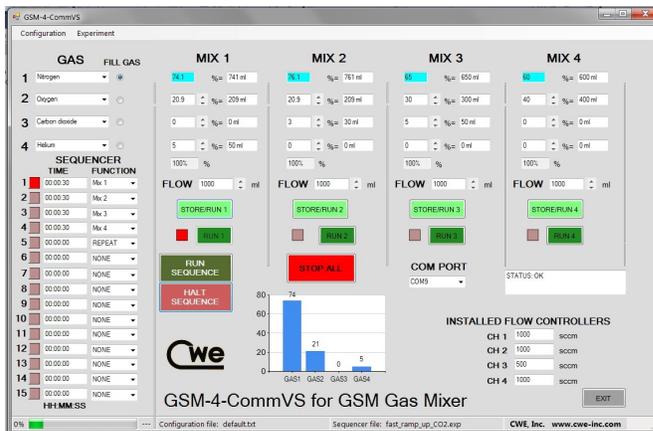
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# GSM-4 Programmable Gas Mixer

## SPECIFICATIONS

Controlled flow range for any input gas... 2 ch10 liters/min, 1 ch 1 liter/min (other ranges available)	
Flow accuracy (percent of full scale) .....	+1.0%
Flow setting repeatability .....	+0.15%
Resolution .....	0.1%
Temperature coefficient .....	0.05% / oC
Pressure coefficient .....	0.01% / oC
Response time (to 0.2%) .....	<1 second
Materials exposed to gas .....	Delrin with Viton seals
Typical gasses for input (Note 2) .....	Air, O <sub>2</sub> , CO <sub>2</sub> , He, and N <sub>2</sub>
Operating temperature range.....	5 - 40° C
Input gas temperature range.....	0 - 50° C
Minimum input gas pressure.....	20psi
Absolute maximum input gas pressure.....	100psi
Gas inlet connections .....	quick push/pull 1/4" OD tubing connectors
Gas mixture outlet connection .....	quick push/pull 1/4" OD tubing connector
Analog gas concentration output scaling for each channel .....	0.05V / %
Serial data format .....	9600 baud, 8 data, no parity, 1 stop bit (9600,N,8,1)
Electrical requirements .....	120VAC/220VAC switchable, 35VA
Dimensions .....	19W x 5.25H x 12D in., 49W x 13H x 30D cm
Weight.....	20 lbs. (9kg)

Note 1:  
Note 2:  
which



*Not to be used for Human Life Support applications. Many other gasses can be selected, except explosive mixtures, MAY NOT be used.*

*GSM-4-CommVS remote-control software. Custom gas blends can be quickly created, executed, and stored. The sequencer allows fully automated studies to be performed, where different gas blends are switched, started, or stopped according to simple user programs.*

## ORDERING INFORMATION

Part No.:  
18-20000

Description:  
GSM-4 Programmable Gas Mixer with software and serial cable

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