

The Environics® Series 2010 Computerized Automotive Gas Divider is an advanced microprocessor controlled instrument for the dynamic calibration of automotive or mobile source emissions analyzers.

The Series 2010 automatically performs standard ten-step dilutions of all calibration gases in accordance with U.S. Environmental Protection Agency protocols. The 2010 may also be used to generate calibration standards in user specified concentrations (% , ppm or ppb) by dynamic dilution of higher concentration source cylinders. The concentrations generated may be varied infinitely within the operating range of the instrument.

The Series 2010 consists of a single chassis supporting three thermal mass flow controllers, a serpentine pre-mix zone and a zero dead space final mixing zone. All gas wetted surfaces are electropolished stainless steel, and seals are gas compatible elastomers. The instruments mass flow controllers are factory calibrated using a primary flow standard traceable to the United States National Institute of Standards and Technology (NIST).

Commands are entered from the front panel and displayed on a back-lit 25 x 80 character LCD display. Calibration sequences are stored in the internal microprocessor memory for recall by the keypad, optional RS-232 communication or optional status interface.

The Series 2010 is available in either a bench top or an optional 19" rack mount chassis.

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## PRODUCT FEATURES AND BENEFITS

- Automated 10 step divide mode which allows user to specify divide points, dwell time and sequence provides operational flexibility and saves technician time.
- 3 mass flow controller design which allows the user to go as low as a 1% step (% of cylinder gas concentration) with no loss of accuracy. The user can generate a wider range

of standards with each cylinder thus saving on gas costs.

- Optional RS-232 Serial Data Interface and status outputs permit integration with existing and future automotive emissions test benches.
  - Gas mixing on a mass flow basis eliminates complicated pressure controls and inaccuracies due to critical orifice erosion and temperature variations.
  - Internally-stored mass flow controller calibration data improves accuracy by as much as a factor of ten and simplifies field recalibration.
  - Optional ozone generator and gas phase titration module allows the user to automatically check NOX converter efficiency without investing in a second instrument.
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## SOFTWARE

The Series 2010 has six primary software routines.

- **Divide Mode:** Allows the user to operate the instrument as a computerized ten step gas divider.
  - **Concentration Mode:** User enters target output gas concentration for the span gas. The actual concentration is displayed during mixing.
  - **Automatic Sequencer:** Permits unattended automatic operation of the instrument on a programmable seven day schedule.
  - **Flow Mode:** User enters target flow rate for each component gas. Actual flow rates are displayed after mixing is initiated.
  - **Maintain Ports:** User enters the name of the component gas in the source cylinder, its concentration and the port to which it is connected.
  - **Purge Mode:** Purge component gas circuits and mixing zone.
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## **SPECIFICATIONS**

### **Performance (as a percent of setpoint)**

#### Accuracy

From 10 to 100% of Full Scale Flow

Concentration:  $\pm 1.0\%$

Flow:  $\pm 1.0\%$

Repeatability: 0.05%

NOTE: Mass flow controllers are calibrated using a NIST Traceable Primary Flow Standard, using a reference temperature of 0°C (32°F) and a reference pressure of 760 mm Hg (29.92 in. Hg).

#### Ozone Generator/GPT Module (optional)

Ozone Concentration Range: 250-500 ppm at 1 slpm (using pure O<sub>2</sub> as source gas)

### **Mechanical**

#### Inlets

Dilution: External 1/4" Swagelok™

Span(s): External 1/4" Swagelok™

Ozone source gas: External 1/4" Swagelok™

Outlet: External 1/4" Swagelok™

#### Operating Pressures

Minimum: 10 psig (0.67 Bar)

Recommended: 25 psig (1.68 Bar)

Maximum: 75 psig (5.04 Bar)

#### Wetted Surfaces

Tubing: Electropolished 316L Stainless Steel

MFC's: Stainless Steel

Seals: Viton®

Operating temperature: 32° - 122° F (0° - 50° C)

Performance temperature: 59° - 95° F (15° - 35° C)

#### Weight

Minimum: 16 Kg (35 lbs)

Maximum: 32 Kg (70 lbs)

#### Dimensions (w x h x d)

Portable: 17" x 7" x 23.5"

(43.18 cm x 17.78 cm x 59.69 cm)

Rack: 19" x 7" x 23.5"

(48.26 cm x 17.78 cm x 59.69 cm)

### **Electrical**

Standard: 115 VAC (100 to 130 VAC), 50/60 Hz

Optional: 220 VAC (200 to 260 VAC), 50/60 Hz

Current: 3 Amps (maximum)

### **Electronics**

Inmos T 400 series, 32 bit processor

12 bit A/D and D/A conversion

### **Operating Modes**

Front panel membrane keypad

Internal timer control

RS-232 terminal mode / Remote computer control (optional)

Status board interface (optional)

Other communications options available

### **Data Output**

Optional RS-232 serial port / Parallel printer port interface

### **OPTIONS**

- RS-232 / Parallel Port Interface
- Ozone Generator / GPT module
- Status Board
- Extra Gas Inlets (limit 6)
- Solenoid Valve on Output
- Humidification
- Pressurization

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