

## Model 4010T Trace Level Multi-gas Dilution Calibrator

*The Model 4010T is a simple, but powerful Intelligent Multi-gas Dilution Calibrator that can easily perform gas dilution, multi-source gas blending, ozone generation, and gas phase titration (GPT = NO + O3 => NO2) for environmental, laboratory, or point source monitoring.*



The Multi-gas system is designed to be either sequence based (gases are established, gases are assigned to source input ports, desired dilution flow defined, and output concentrations are established), or the unit can be manually controlled by the operator from the status window. Flexibility, without complicated menu systems or restrictions allow the operator to fully control the calibrator for various applications.

Users can easily navigate the menu system for setup or to check various parameters while the unit is idle or actively running. Flexibility allows any operator to easily start or stop an operation sequence, manually adjust flows while an operation is active, change ozone concentration, open/close source valves, manually purge the gas system while in operation, or view all active parameters from one simple status window. The status window will display the dilution of all gases present when using a multi-blend cylinder or the value of NO<sub>2</sub> generated during GPT. Additionally, users can switch from one sequence to another without stopping the entire system for seamless transition during testing.

The Model 4010T calibrator uses embedded microprocessor technology to precisely deliver and control gas concentrations along multiple curve fits to linearize the desired output for the intended application. The pneumatic system uses Mass Flow Controllers (MFC's) to precisely meter gas streams and implement multiple curve correction algorithms to deliver precise and repeatable concentrations.

The optional precision ozone generator allows the user to generate reliable, repeatable, and stable ozone for calibrating ozone analyzers or for creating NO<sub>2</sub> using gas phase titration for NO<sub>x</sub> analyzers. The stable and consistent ozone output eliminates the need for complicated and time-consuming ozone adjustments prior to GPT operation.

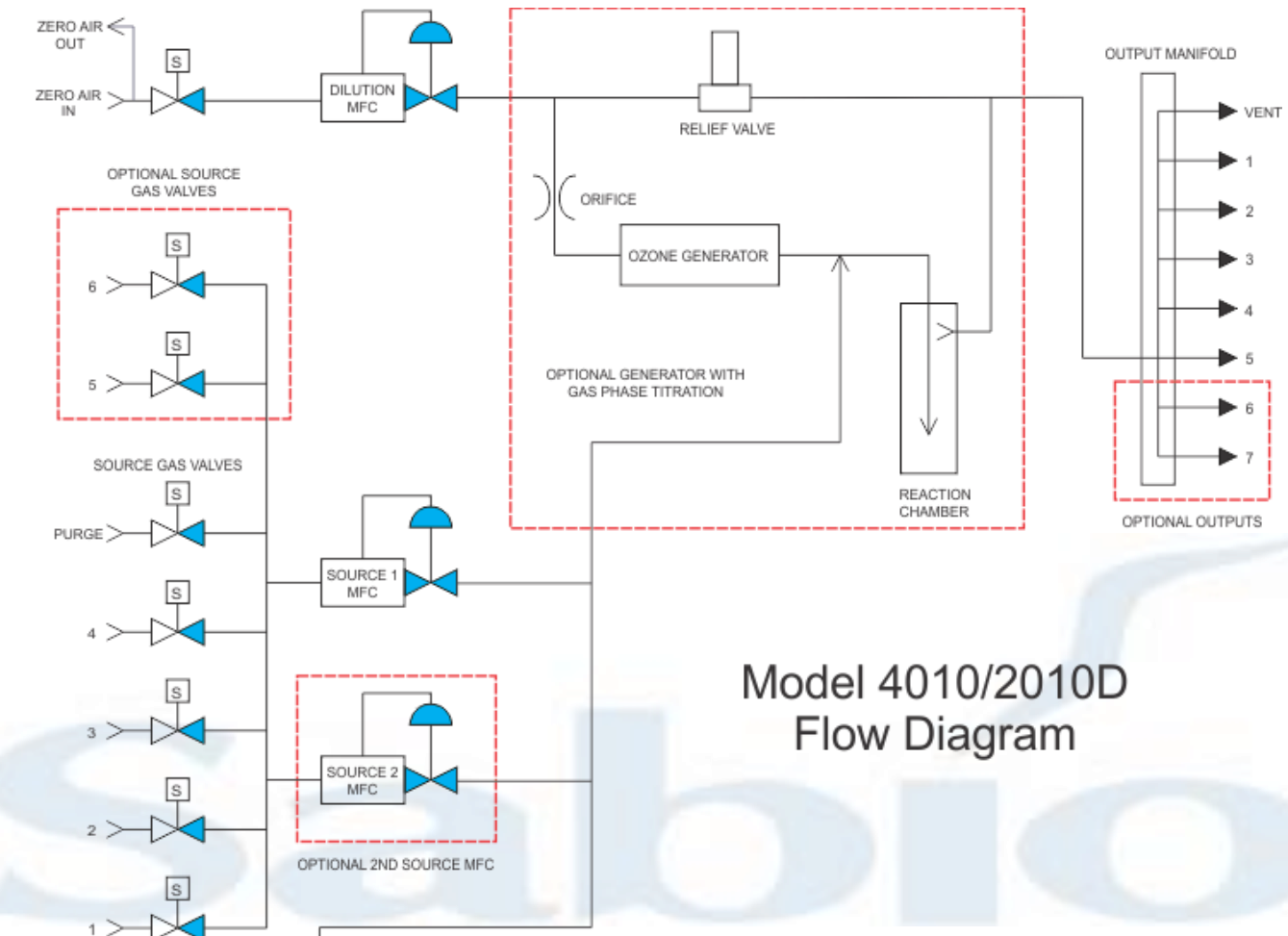
Users can measure the ozone concentration from the internal ozone generator with Sabio's optional internal ozone photometer or measure external ozone sources by manually activating the photometer or setting the photometer to continuous monitor mode. Alternatively, the internal ozone photometer can be used to control the ozone output while actively measuring the concentration using the ozone servo control mode.

The Sabio Multi-gas Dilution Calibrator design exceeds US EPA calibration method requirements. Dilution components are calibrated with standards and test equipment traceable to the National Institute of Standards and Technology.

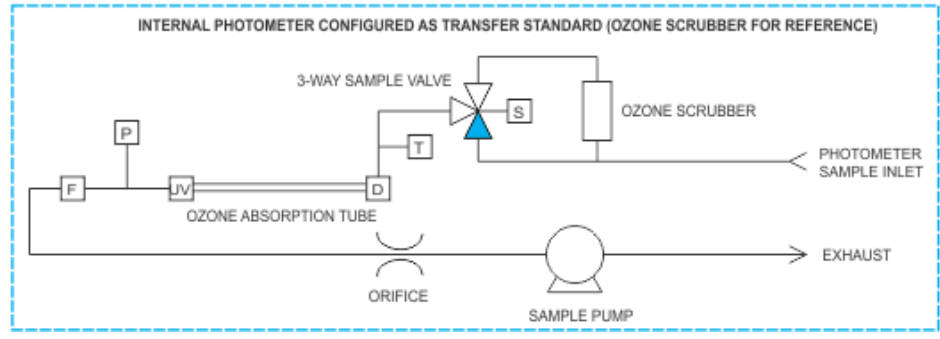
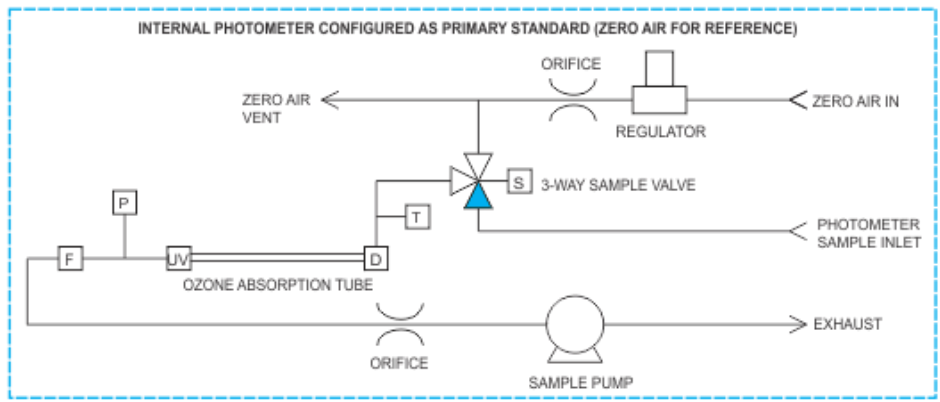
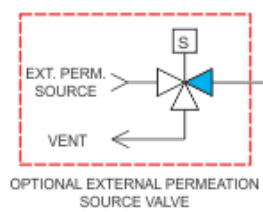
## Specifications

*Specifications subject to change without notice*

|  |                                 |   |
|--|---------------------------------|---|
| <b>Dilution System</b>                   | Input Dilution Gases            | 1 Standard (2 Optional)   |
|  | Input Source Gases              | 4 Standard, 1 Purge, Optional 2 Additional  |
|  | Output Manifold                 | 6 Outputs Standard, Optional 2 Additional   |
|  | Dilution Mass Flow Controller   | 0-10 SLM, Optional Ranges 0-20 SLM  |
|  | Source Mass Flow Controller     | 0-100 SCCM, Optional Ranges 0-2000 SCCM   |
|  | 2nd Source Mass Flow Controller | 0-100 SCCM, Optional Ranges 0-2000 SCCM   |
|  | Input Pressure                  | 15-45 PSI   |
|  | Flow Accuracy                   | $\leq \pm 0.5\%$ Full Scale   |
|  | Flow Repeatability              | $\leq \pm 0.15\%$ Full Scale  |
|  | Linearity                       | $\leq \pm 0.5\%$ Full Scale   |
|  | Response Time at Output         | < 1 Minute  |
| <b>Optional Internal Ozone Generator</b> | Output (Standard)               | 0-1000ppb, Max-6 ppm Flexcal  |
|  | Accuracy                        | $\pm 1\%$ of Set Point or $\pm 1$ ppb @ 5 SLM   |
|  | Nominal Flow                    | 100 SCCM, $\pm 1$ SCCM  |
|  | UV Lamp Temperature             | 50 °C, $\pm 0.1$ °C   |
| <b>Optional UV Absorption Photometer</b> | Standard Ranges                 | 0-0.5, 1.0, 2.0 ppm   |
|  | Linearity                       | < $\pm 1$ ppb or 0.5% of full scale   |
|  | Precision                       | < 1 ppb   |
|  | Zero Drift                      | < 1 ppb for 24 hours  |
|  | Flow Rate                       | 1 Liter (nominal)   |
|  | Analog Output                   | 3 Ranges: 5V, 1V, Optional 100mV  |
|  | Response Time                   | < 180 Seconds to 95% (system)   |
|  | Rise/Fall Time                  | < 20 Seconds (photometer)   |
| <b>Optional Internal Permeation Oven</b> | Chamber Materials               | Glass or Teflon   |
|  | Chamber Size                    | XXXXX   |
|  | Adjustable Temperature          | 5 °C Above Ambient Temperature to 65 °C   |
|  | Temperature Accuracy            | $\leq \pm 0.1$ °C   |
| <b>Calibrator Interface</b>              | Operation                       | Membrane Keypad, Keyboard, Serial, USB, Ethernet  |
|  | Calibration Definitions         | 20 User defined calibration sequences   |
|  | Calibration Types               | Gas Dilution, Ozone, GPT, Multi-gas, Multi-blend, Permeation  |
|  | Gas Definitions                 | 2 Diluent Gases, 20 Sources Gases   |
|  | Auto Calibrations               | 20 timer driven cal routines that perform user-defined calibration sequences on a 7-day calendar of event |
|  | Digital Inputs                  | 8 Status I/O bits for calibrator functions, Optional 24 bits  |
|  | Digital Input Types             | Contact Closure or TTL Logic  |
|  | Digital Outputs                 | 8 Status Outputs bits for monitoring calibrator functions, Optional 24 bits                               |
|  | Communications                  | RS232, Ethernet 10/100 Base-T, USB  |
| <b>Calibrator System</b>                 | Operating Temperature           | 5 °C to 40 °C   |
|  | Dimensions                      | 4010M 7.00" (17.8 cm) H x 16.2" (41.2 cm) W x 19.3" (48.9 cm)D  |
|  | Base Unit Weight                | 20 lbs. (9.1 kg)  |
|  | Input Voltage                   | 98-264 VAC, 150-300 VA, 50/60 HZ  |



## Model 4010/2010D Flow Diagram



Additional Options  
and Features  
Available



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