SPECIFICATIONS: SULFUR DIOXIDE ANALYZER

A: **Analyzer Section**

1. Measurement Method: Microprocessor controlled UV Fluorescence

2. Must have an operating temperature range of 5-40°C. Must be U.S. EPA or TUV certified over the 5 to 40°C temperature range.

3. Must have current certification under EN 14212:2005

4. Must have current *m*CERT*s* certification under the range of 0 to 500 PPB

5. Ranges shall be user selectable from 0 -50 ppb to 0 - 20 PPM in increments of 1 ppb, user selectable. With any two independent ranges simultaneously, auto range capability.

6. Minimum Detectable Limit: <0.4 ppb. (RMS)

7. Zero Noise: <0.2 ppb. (RMS)

8. Span Noise: 0.5% of Reading (RMS) above 50 ppb

9. Precision: 0.5% of Reading

10. Linearity: 1% of Full Scale

11. Zero Drift: <0.5 ppb/24 hrs, <1 ppb/7 days

12. Span Drift: <0.5%/24 hours, <1%/7 days

13. Rise and Fall time (to 95%): <120 seconds

12. Sample flow rate shall be less than 1 LPM.

13. Outputs: Three (3) separate analog outputs for a recorder and a datalogger. Outputs can be independently set to be * +/-100 mV, * +/-1 V, * +/-5 V, * +/-10 V.

14. UV Lamp power supply shall be high-frequency switching type

15 Must use a Zinc UV lamp with an emission line at 214 nm

16 UV source shall require no stabilization or feedback circuitry

17. SO2 concentration shall include corrections for lamp intensity, and PMT dark current

18. Zero drift shall be corrected by an Auto Zero routine, which physically removes the lamp light from the fluorescence chamber

19. Particulate filter shall be front panel accessible with ability to view filter condition without

disassembly.

20. Pump shall be internal to the analyzer.

21. Flow rate through the analyzer controlled by critical orifice and be displayed using front panel display

22. Measurement shall be temperature and pressure compensated.

23. Unit to be supplied with a complete instruction and maintenance manual.

24. Warranty shall be two years, with five years guarantee of microprocessor.

25. Spare parts and technical support guaranteed for 10 years from date of purchase.

26. Shall contain internal data logging capability with capacity to log a minimum of 900,000 data values.
    a. To log five years worth of 5 minute averages for SO2 along with calibration factors, flow and pressure data.
    b. Ability to log data at a selectable frequency or upon occurrence of a defined event.
    c. Ability to log averages, instantaneous or min-max values.
    d. Ability to log multiple averaging periods simultaneously

27. All printed circuit boards shall be contained in the analyzer. All circuit boards shall use surface mount technology for durability. The analog input digitizing card and the computer card shall be separate cards to facilitate servicing.

28. Shall provide Diagnostic warning messages in case of out of tolerance of key parameter:
    Analog Cal
    Box Temp
    Dynamic Span
    Dynamic Zero
    Configuration Erased
    Dark Calibration
    DAS Data Erased
    PMT Power Supply
    IZS Temperature
    PMT Temperature
    UV Detector
    Reaction Cell Temperature
    Motherboard Communication
    Relay Board Communication
    Sample Pressure
    System Reset
    UV Lamp
    Flow

29. In addition to SO2 concentrations, the instrument shall be able to view the following parameters in real time without disrupting data collection

Range
Stability
Sample Pressure
Sample Flow
PMT Output
Normalized PMT Output
UV Lamp
Output Lamp
Ratio Stray Light
PMT Dark Output
UV Detector Dark Output
Slope
Zero Offset
HV Power Supply Output
Reaction Cell Temperature
Chassis Temperature
PMT Temperature
IZS Temperature
Time
Test Channel Output

30. Must use transmission optical filter centered on 214 nanometers

31. Must use ultraviolet pulses in excess of 5 kHz

B: **Zero/Span Check: (Option)**

1. Zero and span check shall be accomplished manually from the front panel, by remote contact closure, via RS-232, Ethernet or on a timed basis using built-in fluorocarbon zero and span valves. Or zero air and span sources shall be generated internally, using activated charcoal and a permeation oven, respectively

C: **RS232, Ethernet, and Status Output**

1. Shall provide bi-directional RS232 interface capability to accommodate both printers and host computers/terminals.

2. Any function that can be accomplished from keyboard shall be capable of being performed through the RS232.

3. RS232 message types shall include:
   DAS Reports (R)Warning Messages
   Analyzer Control/Status Reports
   Diagnostics Commands/Reports
   Test Measurements/Instrument Variables: Monitoring/Modifying

4. Status output shall provide isolated contact closures for zero cal, span cal, flow, temperature, system warning, and when in diagnostic mode

5. Analyzer shall have ability to connect to an Ethernet and shall support a unique IP address for access from anywhere on the network.

6. Ethernet port shall have a standard RJ45 connector

7. Analyzer must be capable of TCP/IP multi-session