**PLEASE NOTE: The following specification contains areas, highlighted in yellow and with the [ ] symbol. In these areas, the engineer has to make a selection, add specific, project related information and has to delete what is not applicable for the specific project.**

GENERAL

* 1. Section includes:
     1. Instrument designed for semi-continuous, online monitoring of Volatile Fatty Acids (VFA) in aerobic digestion processes. The determination of Volatile Fatty Acids shall be for:

[ ] Volatile Fatty Acids

[ ] Volatile Fatty Acids and Bicarbonate and Total and Partial Alkalinity

* 1. Measurement Procedures

The analytical method to determine Volatile Fatty Acids in water is acid-base titration using a combined pH electrode.

* 1. Alternates
     1. Analyzers that do not automatically calculate FOS/TAC are not acceptable.
     2. Analyzers without standard automatic procedures for calibration, validation and cleaning are not acceptable.
     3. Analyzers without option to measure up to 5 parameters in parallel are not acceptable.
     4. Analyzers without the ability for single sample ("grab sample") measurement are not acceptable.
     5. Analyzers without option for up to 8 sample streams are not acceptable.
     6. Analyzers without analog and digital output options are not acceptable.
     7. Analyzers without an integrated industrial panel PC are not acceptable.
  2. System Description
     1. Performance Requirements
        1. Measuring Range

[ ] VFAs 10 to 500 mg/L as acetate equivalent

[ ] VFAs 20 to 1,000 mg/L as acetate equivalent

[ ] VFAs 100 to 5,000 mg/L as acetate equivalent

[ ] VFAs 500 to 10,000 mg/L as acetate equivalent

[ ] VFAs 10 to 500 mg/L as acetate equivalent; Bicarbonate, Total and Partial Alkalinity 1 to 50 meq/L or 5,000 mg/L as CaCO3

[ ] VFAs 20 to 1,000 mg/L as acetate equivalent;, Bicarbonate, Total and Partial Alkalinity 1 to 50 meq/L or 5,000 mg/L as CaCO3

[ ] VFAs 100 to 5,000 mg/L as acetate equivalent; Bicarbonate, Total and Partial Alkalinity 5 to 100 meq/L or 10,000 mg/L as CaCO3

[ ] VFAs 500 to 10,000 mg/L as acetate equivalent; Bicarbonate, Total and Partial Alkalinity 5 to 100 meq/L or 10,000 mg/L as CaCO3

* + - 1. Limit of detection
         1. ≤ 10 mg/L (range 10 to 500 mg/L VFAs)
      2. Precision
         1. Better than 3% full scale range for standard test solutions
    1. Other Specifications
       1. Cycle Time
          1. 10 – 15 minutes
       2. Cleaning
          1. Automatic; frequency freely programmable
       3. Calibration
          1. NA
       4. Validation
          1. Automatic; frequency freely programmable
       5. Alarm
          1. 1x malfunctioning, 4x user-configurable, max. 24 VDC/0.5 A, potential free contacts
       6. Protection class
          1. Analyzer cabinet: IP55
          2. Panel PC: IP65
       7. Material
          1. Hinged part: Thermoform ABS, door: plexiglass
          2. Wall section: Galvanized steel, powder coated
       8. Power Supply
          1. 100 – 240 VAC, 4 A, 50/60 Hz
          2. Max. power consumption: 150 VA
  1. Certifications
     1. CE compliant
     2. UL certified
  2. Environmental Requirements
     1. Operational Criteria
        1. Operating temperature: 10 to 30 °C ±4 °C deviation (50 to 86 °F ±7.2 °F deviation)
        2. Relative humidity: 5 to 95 %, non-condensing
        3. Reagent temperature: keep between 10 to 30 °C (50 to 86 °F)
  3. Warranty
     1. Warranted from manufacturer defects for two years (Europe) or one year (all other geographies) from date of shipment.
  4. Maintenance and Service
     1. Unscheduled Maintenance
        1. Check and clean the analyzer components, depending on cleanliness of the sample
     2. Scheduled Maintenance / preventative
        1. Monthly
           1. Reagents refill; validation and / or calibration
        2. Quarterly
           1. Pump tubing replacement
        3. Annually
           1. Calibration
           2. Replacement of all tubing
           3. Replacement of valves and pistons

1. PRODUCTS
   1. Manufacturer
      1. Hach
      2. EZ7200 Series Volatile Fatty Acids Analyzer
   2. Manufactured Unit
      1. The Volatile Fatty Acids analyzer consists of a microprocessor controlled volumetric analyzer designed to monitor Volatile Fatty Acids (optional: Bicarbonate, Total Alkalinity, Partial Alkalinity) semi-continuously in a sample stream. Automatic cleaning and validation are available.
   3. Equipment
      1. Online Analyzer
         1. Utilizes volumetric measurement with a high-precision micropumps for reagent dosing.
         2. With automatic validation, priming and cleaning
         3. If chosen, the instrument can monitor up to 8 sample streams.
         4. If chosen, includes capability to monitor up to 4 parameters in parallel.
         5. Plug-and-play airtight fittings for connecting reagent tubing
         6. High precision micropumps for reagent dosing
      2. Controller
         1. Industrial panel PC with 5.7” TFT color display, compact flash memory, modular compact I/O system
         2. User interface with different user levels (Automatic, User Level 1, User Level 2, Administrator)
         3. If chosen, includes capability to communicate measurements via 4-20 mA outputs, Modbus TCP/IP, Modbus RS485 or RS232.
      3. Reagents and Standards
         1. The analyzer shall use quick connect reagent containers with pre-installed tubing.
         2. Reagents and standards shall be prepared according instructions on the Method + Reagent sheet.
   4. Components
      1. Analytical instrument  
         To deliver:
         1. Volatile Fatty Acids Analyzer as selected in section 1.1.A.
         2. Wall-mount bracket
         3. Reagent containers
         4. User Manual
         5. Method + Reagent Sheet
      2. Dimensions: refer to analyzer drawings
      3. Weight: 25 kg (55 lb)
   5. Instrument Options,

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Must be added to instrument at time of order.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Number of sample streams (fill in, select up to 8):

[ ] sample streams

Outputs (select / fill in one)

[ ]x 4-20 mA Outputs (fill in, select up to 8)

[ ]x 4-20 mA Outputs and Modbus RS485 (fill in, select up to 4)

[ ]x 4-20 mA Outputs and Modbus TC/IP (fill in, select up to 4)

[ ] Modbus RS485

[ ] Modbus TCP/IP

[ ] RS232

* 1. Instrument Accessories

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Select as many as required

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[ ] Table Stand

[ ] Floor Stand

[ ] Self-cleaning heavy-duty filtration system for sample preconditioning in anaerobic applications, able to handle sludge and wastewaters charged with high levels of suspended solids.

Specifications

* + - 1. Cleaning: Automatic blowback by solenoid controlled instrument air
      2. Pore size:
         1. [ ] 200 µm
         2. [ ] 500 µm
      3. Required fast loop: 2 m/s
      4. Sample temperature: max. 65 °C
      5. Instrument air: Dry and oil free according to ISA-S7.0.01-1996 quality standard for instrument air
      6. Drain: Overflow sample D=50 mm; overflow Static Pressure Regulator 3/8” OD
      7. Rinse water pressure: 3/8” BSPF, 4 bar max.
      8. Power: 24 VDC, powered by analyser or external supply
      9. Earth connection: Dry and clean earth pole with low impedance (< 1 Ohm) using an earth cable of > 2.5 mm²
      10. Protection class: IP55
      11. Material:
          1. Filter: SS 316L
          2. Piping: PVC
          3. Manual ball valves: PVC
          4. Tubing: Norprene, PFA, PE
          5. Panel: weather resistant Trespa
      12. Dimensions (H x W x D): 1150 mm x 750 mm x 200 mm
      13. Weight: 18 kg

1. EXECUTION
   1. Preparation
      * 1. Mounting
           1. As shown on the drawings
        2. Inlet and outlet connection sizes
           1. As shown on the drawings
        3. Sample Flow Rate
           1. 100 to 300 mL/minute
        4. Sample Pressure
           1. By external overflow vessel
        5. Sample Temperature
           1. 10 to 30 °C ±4 °C deviation (50 to 86 °F ±7.2 °F deviation)
        6. Other sample requirements
           1. Maximum particle size 100 µm, <0.1 g/L suspended solids, turbidity <50 NTU  
              Most applications require the use of a heavy-duty filtration system for sample preconditioning.
        7. Instrument air
           1. Dry and oil free according to ISA-S7.0.01-1996 quality standard for instrument air
        8. Demineralized water
           1. For rinsing and/or dilution
        9. Drain
           1. Atmospheric pressure, vented, min. ø 64 mm
        10. Earth connection
            1. Dry and clean earth pole with low impedance (> 1 Ohm) using an earth cable of > 2.5 mm2
        11. Power supply
   2. Installation
      1. Install analyzer following transmittal drawings and instrument user manual.
   3. Manufacturer’s Service and Start-Up
      1. Contractor will include the manufacturer’s services to perform start-up on instrument to include basic operational training and certification of performance of the instrument.
      2. Contractor will include a manufacturer’s Service Agreement that covers all the manufacturer’s recommended preventative maintenance, regularly scheduled calibration and any necessary repairs beginning from the time of equipment startup through to end user acceptance / plant turnover and the first 12 months of end-user operation post turnover.
      3. Items A and B are to be performed by manufacturer’s factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
      4. Use of manufacturer’s service parts is required. Third-party parts are not approved for use.

END OF SECTION

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