40 75 XX – Process Liquid Analytical Measurement

STREAMING CURRENT ANALYSER

PART 1- GENERAL

SUMMARY

A programmable Streaming Current (SC) Controller/Analyser System shall be supplied for continuous monitoring and/or control of streaming current in water.

STREAMING CURRENT (SC) ANALYSER

1. Controller/Analyser Requirements

The controller/analyser shall:

a. Provide continuous, real-time monitoring and control of streaming current.

b. Have optional parameters available, including (but not limited to); free chlorine, turbidity, pH, conductivity, alkalinity and UV254.

c. Allow the setup of multiple password-enabled user logins, with access logs available. Logins will have configurable levels of access to system settings.

d. Provide viewable and downloadable data logs, status logs and service. reports.

e. Have optional automatic cleaning available for the sensor.

f. Have optional automatic verification of sensor function.

g. Provide options for the communication of data, statuses and errors to local SCADA systems (or similar).

2. Standards and Certifications

a. The manufacturer shall provide a controller enclosure rated to IP65/NEMA 4X. Any accompanying enclosures, e.g. for the purpose of expanding the capacity of the controller, shall also be rated to IP65/NEMA 4X.

b. The sensor shall be rated to IP65/NEMA 4X.

c. The controller system shall be manufactured in accordance with ISO 9001:2015, in an externally audited quality management system.

SYSTEM FEATURES

1. Control Feature Requirements

The controller will be capable of (either by default or optionally):

a. Providing dosing outputs in the following operator selectable modes: off, manual, automatic

b. Dosing via PID (Proportional/Integral/Derivative) algorithms. The controller will be able to provide a percentage output to chemical feed pumps for true PID control via 4-20mA signal and/or relay (digital output) in on/off, pulse width or pulse frequency modes

c. PID control which will have the following options and/or safety features:

   i. Dedicated failure mode, where dosing can be set to ‘off’ or a pre-defined percentage value in the event of an error state

   ii. Be capable of accepting a site stop signal to cease dosing

   iii. Be able to limit dosing % output to defined minimum and maximum values

   iv. Configurable overfeed protection, in the event of a failure of dosing hardware (e.g. blocked injectors, empty chemical tanks and the like)

   v. Viewable PID diagnostic screen, illustrating the extent to which the elements of the algorithm (proportional/integral/derivative) are contributing to the total percentage output

d. Dosing via alternatives to PID (e.g. ‘Feed Forward Control’) when the process is unsuitable for the application of PID control

e. Programmable events can be set via timer (e.g. every 24 hours) or scheduler (e.g. day/week/month)

f. Providing viewable and downloadable data logs, status logs and service reports on controller operations

g. When automatic cleaning options have been selected, both cleaning duration and interval can be modified

2. Hardware Requirements

The controller shall be supplied with a streaming sensor.

Additionally, the following options/upgrades must be made available:

a. Additional and/or replacement sensors, to include:
   i. Free chlorine
   ii. Total chlorine
   iii. pH
   iv. Conductivity
   v. Particle counts
   vi. Alkalinity
   vii. Turbidity

c. Digital outputs (relays) up to a maximum of 8 per enclosure

d. Digital inputs up to a maximum of 8 per enclosure

e. Analogue outputs (4-20mA) up to a maximum of 4 per enclosure

f. A backboard incorporating both controller/analyser and streaming current sensor

The system should also be expandable, by the addition of extra enclosures (or similar) to increase the capacity of an individual system beyond the limits stated above.

3. Communication Requirements

In addition to the outputs stated above, the controller shall have the followings features available either by default or optionally:

a. Digital industrial protocols, including; Modbus RS485, Modbus TCP/IP, Profibus DPV.

b. LAN Ethernet or GPRS connectivity, providing access to an MQTT server system that allows two-way remote communication with the controller/analyser. This communication should include the ability to remotely alter systems settings and download service/access logs, although this feature should be limited by the security/access requirements below.

c. The controller shall be accessible with a standard Internet browser using a fully interactive graphical interface that can include multiple accounts of varying security and access levels. The controller shall be capable of providing real-time monitoring and control via a personal computer, smartphone, or tablet device. Controllers that require software or apps for communications shall not be considered equal.

d. The controller shall be capable of e-mail and SMS text alerts upon alarm activation. Controllers without the option of email and text notifications shall not be considered equal.

e. Online data logging/storage for 30 days or more, with this data being made available for download (in an easily accessible, non-proprietary file format) via Internet browser.

f. The controller shall include at least two programmable threshold levels and at least two programmable alarm levels for each sensor parameter. Both audible and visible alarms should be provided with the controller/analyser.

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PART 2- PRODUCTS

SENSORS

1. Sensor Requirements

The sensor for the monitoring of SC shall utilize the following technology:

a. Water flows into a sample chamber, where is drawn into the bore during the upstroke of a reciprocating piston and expelled from the chamber on the upward stroke. Ionic species and colloidal-sized particles contained in the sample are temporarily immobilized on the piston and cylinder surfaces; as the water is moved back and forth by the piston, ionic charges that have collected on these surfaces are moved downstream to the electrodes. This movement of ions causes an alternating current to be generated, defined as the ‘streaming current’.

b. Calibration should be possible without the use of specialized reagents, i.e. ‘raw water’ that has not been treated with coagulant or other chemical additions.

c. The streaming current waveform can be made visible, for the diagnosis of piston wear and/or other issues.

2. Sensor Specifications

Streaming Current

Sample Flow Rate 1..40 litres per minute
Probe Type Quick replacement cartridge, user replaceable sleeve
Water Sample Connections Inlet 1" FNPT
Materials Contacting Sample Delrin, viton, stainless steel, neoprene
Enclosure Type NEMA 250 type 4X, reinforced fiberglass
Operating Temp. 0..50°C
Range ±1000
Signal Gain User-adjustable, 1..600x
Zero Offset User-adjustable
Gain and Zero Offset User-adjustable, Manual or Automatic
Repeatability (Conductivity Range) Better than 2% from 10 to 250µS/cm, better than 3% from 250 to 500µS/cm and better than 5% from 500 to 1000µS/cm.
Self Diagnostics Motor RPM, Signal Health

WARRANTY

The controller electronics and sensors shall be covered by a standard manufacturer warranty of one (1) year.

PART 3 EXECUTION

Preparation

The system shall be provided pre-mounted onto a backboard, to allow for easy installation onto a suitable wall

Storage temperature should be 0 to 60 degrees Celsius

Contractor will install the transmitter and sensors in strict accordance with the manufacturer's instructions and recommendation, including:

a. Suitable continual electrical supply (100-240VAC, or 9-36VDC in the case of DC-specified systems)

b. In the case of pipe insertion, cleaning water supply (for sensor optics cleaning) should be at least 2 bar in excess of the pressure within the pipe

END OF SECTION