Data Sheet
SS/8241_9

Silica Monitor

8241

- **Continuous sample reaction**
  – ensures optimum speed of response
- **Fully dynamic chemical mixing**
  – guarantees complete chemical reaction
- **Incorporates unique heated block assembly**
  – maintains full temperature control over chemical reaction and optical measurement system
- **Fully automatic programmable two-point calibration**
  – ensures maximum measurement accuracy
- **Large LCD graphics display module**
  – superb readability under all light conditions
- **Comprehensive inbuilt diagnostics**
  – monitors performance parameters
- **Programmable true auto-zero**
  – inhibits interference from color, turbidity and background silica in reagents
- **Minimal maintenance requirements**
  – maximizes on-line availability
- **Manual sampling facility**
  – allows measurement of grab samples to be made



Cost-effective automated monitoring of silica in a wide range of applications

Introduction

Many years of continuous experience and innovation in the design and successful application of on-line chemical analyzers has been combined with the latest electronics and production technologies to produce the 8240 Series of monitors from ABB.

Developed as fully continuous monitors, and offering wide dynamic ranging, the 8240 Series has been designed with greater simplicity than ever before. Based on colorimetric techniques they feature a carefully designed liquid handling section to reduce routine maintenance to a minimum. Utilizing fully microprocessor-based electronics, advanced features such as automatic calibration, continuous sample monitoring, and programmable multi-stream switching ensure cost-effective ownership.

The size of the instrument has been reduced to a compact, ergonomically-designed, wall-mounted case containing all the components in the electronic and liquid handling sections.

Applications

Typical applications for the Model 8241 in both water treatment (demineralisation) and water/steam cycle in power generation include:

- Monitoring silica breakthrough on both anion and mixed bed exchangers provides automatic control of the regeneration processes.
- Monitoring silica build-up in both boiler drum water and steam for turbines provides better control of impurities, thus reducing unplanned plant shutdowns and increasing overall plant efficiency.

A particularly useful application is in monitoring the performance of ion exchangers in condensate polishing systems where the exhaustion cannot be accurately predicted because of high fluctuations in the silica level of the incoming condensate. In the absence of automatic silica monitoring, frequent manual sampling and analysis is usually necessary.

Operation

General

The Model 8241 is a robust, on-line wet chemistry-of-silica monitor, designed for continuous stream monitoring of silica using the colorimetric analysis principle.

Liquid Handling

The chemistry employed for silica measurements is that of the molybdenum blue reaction. Sample and reagents are drawn continuously into the instrument by means of two new, precision-engineered multichannel peristaltic pumps, designed and constructed to ensure yearly intervals between tube or capstan maintenance requirements. The addition of four reagents is made sequentially, with full dynamic mixing included to ensure a fully reacted sample. A unique, heated block assembly optimizes thermal control of both the chemical reaction and optical measurement system. This obviates the requirement to control the temperature within the entire cabinet. A continuous reaction is ensured through the sample and reagents being pumped continuously. After reagent addition, the reacted sample is then pumped to the measurement cuvette. The new servo-controlled optical measuring system gives full analysis performance within the range 0 to 2000µg/l or 0 to 5000µg/l SiO_2.

The instrument also includes a manual sampling facility, which allows the analysis of grab samples to be made.



Liquid Handling Section

Electronics

The electronics are mounted on the monitor back plate with the display and key pad accessible from the front of the monitor. Easy access and indication of all parameters is provided by a large backlit LCD graphics display module, which is easy to read in all light conditions. Under normal operating conditions the measured value is displayed with programming data being displayed during setting-up and also on demand. Units and range of measurement, alarm values and standard solution values are examples of the many programmable functions.

Keeping simplicity of operation at the forefront of design, the operation of the monitor is made straightforward through five fingertip operated tactile membrane switches controlling the complete operation of the monitor.

On the single stream instrument there are two current outputs provided as standard with the option of a serial interface.

The microprocessor-based electronics package controls all instrument measurement and management functions. Two concentration alarm are provided, with the addition of further relays to indicate remotely when the monitor is carrying out a calibration and when the monitor is 'Out of Service'. This latter relay, normally energized, is also used for a comprehensive range of diagnostic alarms, including mains and calibration failure.

An 'Out-of-Sample' sensor is fitted, providing a further relay output that can be used for remote indication.



Display and Keypad

Multi-stream Facilities

A fully programmable multi-stream option is available on this instrument. This provides for up to six-stream capability for the 8240 Series on-line analyzers. One current output and one relay contact is provided per stream, the latter can be configured as a concentration or 'Out-of-Sample' alarm.

Specification

Installation Information

Install the monitor where the following conditions can be maintained:

Sample flow

5 to 750ml/min^{-1}

Suspended solids

< 10mgl^{-1}, < 60 microns

Sample connections

Inlet	6mm, flexible hose connection
Outlet	9mm, flexible hose connection

Ambient temperature

5 to 40°C (41 to 104°F)

Sample temperature:

5 to 55°C (41 to 131°F)

Reagent solutions

Consumption of each reagent is 10 liters per five weeks

Calibration solutions

A solution of one liter is required of concentration and formulation suitable for the particular range and application

Enclosure dimensions

Height 740mm (29 in.)

Width 540mm (21 in.)

Depth 240mm (9.5 in.)

Weight

25kg (55lb)

Power supply

110 to 120V or 220 to 240V, 50/60Hz, 100VA

Power supply tolerance

+6% to –20%

Isolation voltage

Input, output and power supply 1.5kV

Relay Contacts – Single Pole Changeover

Rating	250V AC 3A AC	250V DC maximum 3A DC maximum
Loading (non-inductive)	750VA	30W maximum
(inductive)	750VA	3W maximum

Degree of protection

Electronics section	IP65
Liquid handling	Case IP31
Critical internal components	IP65

General Specification

Range

0 to 2000µg/l SiO_2 or 0 to 5000µg/l SiO_2

Maximum current output scale expansion

0 to 20µg/l or 0 to 50µg/l

Accuracy

< ±2µg/l or < ±2% whichever is the greater

Reproducibility

< ± 2µg/l or < ± 2% whichever is greater

Response time

90% step change in approximately 16 minutes
(dead time approximately 8 minutes)

Chemical drift

Dependent on reagents – typically less than ±5% of reading/month

Control temperature range

35 to 45°C (95 to 113°F)

Temperature Resolution

±0.1 °C

Displays

Concentration and programming data by backlit LCD graphics display module

Status indication

Single stream

Two LEDs illuminated when concentration alarms are exceeded

Single LED illuminated when calibration in progress

Single LED illuminated when monitor is 'Out of Service'

Single LED illuminated when HOLD switch operated

Multi-stream

Six LEDs illuminated when concentration alarms are exceeded

Six LEDs (one per stream) when stream 'Out of sample'

Single LED illuminated when calibration in progress

Single LED illuminated when monitor is 'Out of Service'

Single LED illuminated when HOLD switch operated

Current outputs

Single stream

Two isolated current outputs 0 to 10, 0 to 20 or 4 to 20mA software selectable over the full range of the monitor as standard. Range independently selectable over the full range of the monitor

Maximum voltage load 15V

Multi-stream

One isolated current output per stream 0 to 10, 0 to 20 or 4 to 20mA, software selectable as standard. Range independently selectable over the full range of the monitor

Maximum voltage load 15V

Computer interface

Optional second current output or RS485 serial interface

Alarms

Single stream

Two concentration relay outputs.
Can be configured as high or low concentration

Remote 'Out of Sample' alarm

Remote calibration-mode indication

Remote monitor 'Out of Service' alarm

Multi-stream

Maximum of six (one per stream) relay outputs. Can be configured as high or low concentration, or 'Out of Sample' alarms

Remote calibration-mode indication

Remote monitor 'Out of Service' alarm

Concentration alarm adjustment

Programmable over monitor range

Calibration

Frequency and time of day programmable, fully automatic, plus manual initiation on demand

EMC

Conforms to EMC Directive (89/336/EEC)

Classifications	BS EN 500 81-2
	BS EN 500 82-2
Electrical safety	BS EM 61010-1

Maintenance

The instrument is designed for minimal maintenance requirement to maximize on-line availability.

Normal routine maintenance is limited to:
four-weekly; replenish reagents, clean flow system

twelve-monthly; replace tubing + pump capstans.

All consumable parts for one years normal operation, excluding reagents, are included in a consumable parts kit. This is available as an option and is required for the second and subsequent years operation.

Reagents are prepared from chemicals normally available from laboratory chemical suppliers. They can usually be prepared on-site without the necessity for specialized purchasing.

Options

Multi-stream Facility

As an option to the standard single stream unit, fully automatic stream switching facilities can be included for up to six streams. In this option an isolated current output is provided for each channel, also a concentration or 'Out-of-Sample' alarm, together with customer programmed stream sequencing. Visual indication of the stream being monitored is also available.

Additional options (please specify):
a) Serial interface

b) Multi-stream facility (indicate number of channels required).

c) Consumable spares kit

Ordering Information

Supplied with monitor:
a) Comprehensive instruction manual

b) Reagent and calibration containers

Each monitor as supplied is set up to suit the most frequently encountered requirement. This can be very simply reconfigured if desired at commissioning.

Maximum range must be stated on order i.e. 0 to 2000 or 0 to 5000µg/l.

Overall Dimensions

Dimensions in mm (in.)

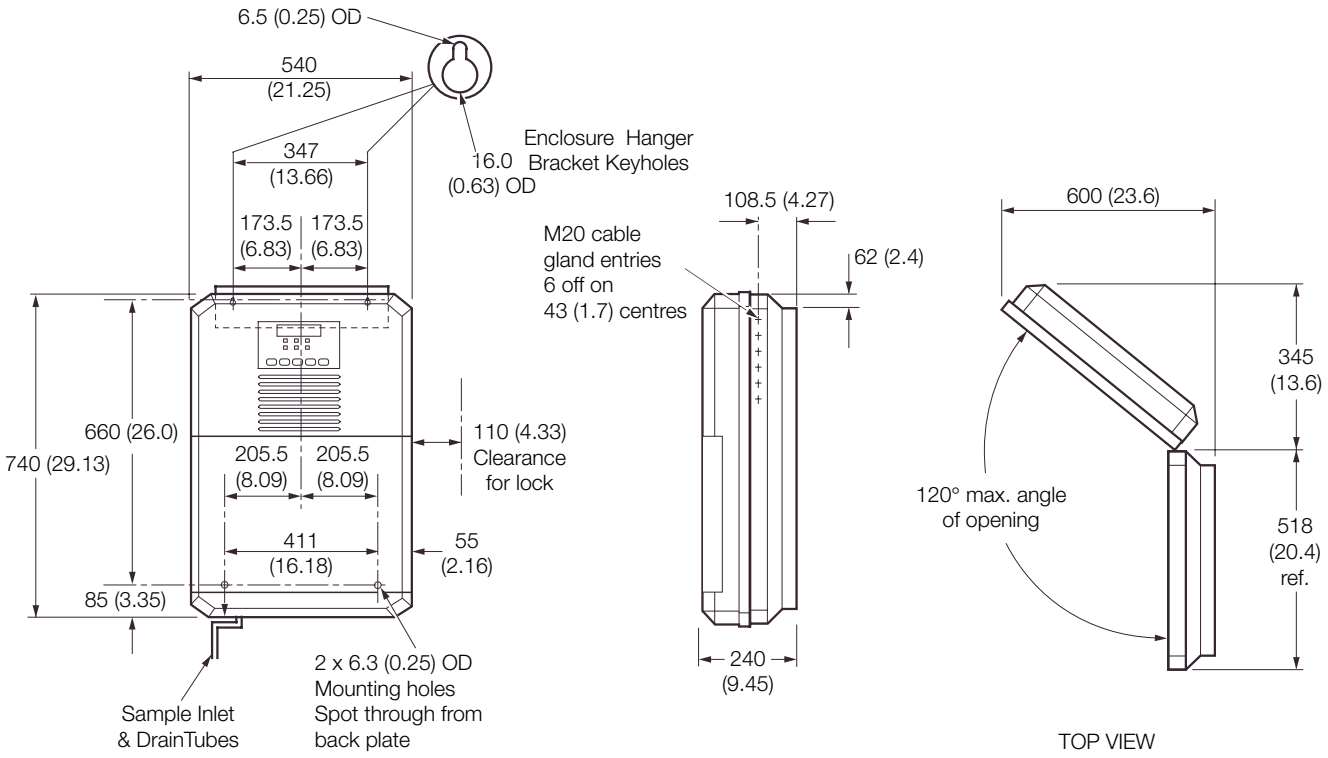


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SS/8241 Issue 9