Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Stamolys CA71SI

Silicate Analyzer

Compact photometric analysis system for the silicate measurement in ultrapure water and boiler feedwater

Application

- Ultrapure water
- Boiler feedwater
- Steam and condensate analysis
- Reversed osmosis
- Demineralizers

Industries:

- Pharmaceutical industry
- Power stations

Your benefits

Stamolys CA71SI measures the silicate content quasi-continuously to assure a constant optimum water quality. This is of special advantage in the performance monitoring of ion exchange and reversed osmosis systems. The analyzer replaces frequent manual sampling and exactly determines the silicate break through of the system.

- Stainless steel or glass-fibre reinforced carbon housing available
- Two channel version available
- Measured value storage using integrated data logger
- Automatic calibration and self-cleaning
- Free selectable measuring, cleaning and calibration intervals

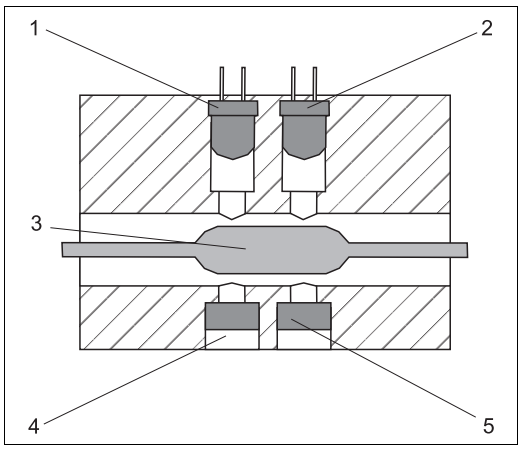
TI00364C/07/EN/14.12
71161856

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle upper measuring range (SI-B)

After sample conditioning, the analyzer sample pump conveys a part of the filtrate to a mixing vessel. The reagent pump adds reagent at a specific ratio. As a result of the reaction, the sample turns a characteristic colour. The photometer determines the sample's absorption of an emitted light at a specific wavelength (s. Fig., Pos. 2). The wavelength is parameter specific. The absorbance is proportional to the concentration of the specified parameter in the sample (Pos. 3). Additionally, the absorption of a reference light is determined to receive a genuine measuring result. The reference signal is subtracted from the measuring signal to prevent any effects due to turbidity, contamination and ageing of the LEDs.
The temperature in the photometer is controlled thermostatically so that the reaction is reproducible and takes place within a short period of time.

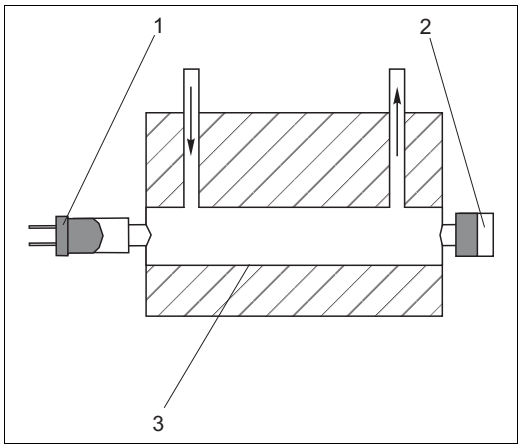


Photometric principle

1 Reference LED
2 Emitter LED
3 Sample
4 Reference detector
5 Measuring detector

Measuring principle lower measuring range (SI-A)

The LED sends light at a defined wavelength through the sample. The intensity of the received light is measured by the detector and converted to an electrical signal. In the analyzer, the respective concentration is calculated from the proportion of light absorbed by the sample.



Photometric measuring principle

1 LED
2 Detector
3 Sample

Silicate

With 18% silicon is the second most frequent element of the earth crust. It occurs chemically bonded as silicate or silicon dioxide in a variety of minerals. From these minerals silicate or silicic acid is washed out in low quantities to waters.
There are no standard limits for drinking water since silicate is not known to be harmful to health.
But in boiler feed water and boiler water, there may be only low silicate concentrations because under thermal charge or under high pressure insoluble silicon dioxide is formed. It solidifies in boilers, heat exchangers and turbine blades and thus reduces the heat exchanger's efficiency or causes overheating.
The standard limit for boiler feed water is 0.02 ppm silicic acid (SiO_2). For injection and boiler water the standard limits are pressure dependent. For example, at an operational pressure of 68 bar (986 psi), the concentration of silicic acid in boiler water must not exceed 10 ppb.

Photometric detection

Heteropoly blue method for silicate determination

Under acidic conditions silicate and phosphate react with molybdate to form yellow silicomolybdic and phosphomolybdic acid complexes. Addition of citric acid destroys the phosphate complexes. Last step is the addition of an amino acid. It reduces the yellow silicomolybdic complex to intensively blue silicomolybdic blue. The absorption is determined at a wave length of 810 nm. The absorption intensity is proportional to the silicate concentration in the sample.

Interferences

Interferring substance	Interference
Color	eliminated by calibration
Iron	interferences from 1 mg/l (ppm)
Phosphate	interferences from 50 mg/l (ppm)
Sulfide	interferences at high concentrations
Turbidity	eliminated by calibration

Sample conditioning

Analyzer and membrane filtration (Stamoclean CAT411)

A sample flow of 0.8 to 1.8 m^3/h (3.5 to 8 gal/min) is continuously conducted through the micro filter via a pressure pipe. A part of the sample passes the filter membrane and is then conveyed to the measuring device as filtrate.
Sampling is based on the cross flow filtration principle. The PTFE filter membrane separates particles with sizes > 0.45 µm from the filtrate. These particles are collected in front of the membrane and are washed away with the sample flow.
The medium is conducted in a meander-like channel through the filter element. This results in a constantly high flow rate. The high flow rate generates the self cleaning effect. Therefore, mechanical drives for the generation of a flow at the filter surface are not necessary.

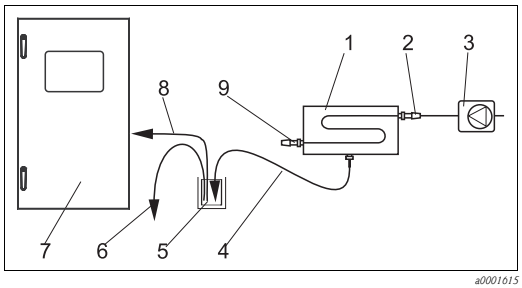
Analyzer without Endress+Hauser sample conditioning

Before analysis, the sample has to be conditioned, homogeneous and to be transported to an external or to the delivered collecting vessel.

Measuring system

A complete measuring system comprises:
- An analyzer
- A sample conditioning system (optionally):
  - Micro filtration / ultra filtration Stamoclean CAT411
  - Customer specific solution
- Collecting vessel (see product structure)

Micro / ultra filtration



Measuring system with Stamoclean CAT411

1 Stamoclean CAT411
2 Inlet
3 Sample pump or hydraulic main
4 Filtrate line
5 Collecting vessel
6 Overflow
7 Analyzer
8 Analyzer sample line
9 Outlet

Standard application

Reversed osmosis or demineralizer monitoring, steam and condensate analysis

Sampling from hydraulic main, measurement after cooling and pressure reduction:
- Analyzer with collecting vessel, Stamolys CA71SI-Ax0A3A1
  Expansion up to a six channel system by means of a separate SPS possible (s. special accessories)

Input

Measured variable	SIO_2 [µg/l, mg/l, ppb, ppm]
Measuring range	**SI-A** 1 to 200 µg/l **SI-B** 50 to 5000 µg/l
Wavelength	810 nm
Reference wavelength	565 nm (SI-B only)

Output

Output signal	0/4 to 20 mA
Signal on alarm	Contacts: 2 limit contacts (per channel), 1 system alarm contact optional: end of measurement (with two channel version display of channel no. available)
Load	max. 500 Ω
Load capacity	230 V / 115 V AC max. 2 A, 30 V DC max. 1 A
Data interface	RS 232 C
Data logger	1024 data pairs per channel with date, time and measured value 100 data pairs with date, time and measured value for calibration factor determination (diagnostic tool)

Power supply

⚠ CAUTION

Electrical connection

Shown diagram (→ 1) is an example

The terminal assignment and cable colors can deviate from the actual assignment and colors!

► Only use the terminal assignment of the sticker **in the device** (→ 2) to connect your analyzer!

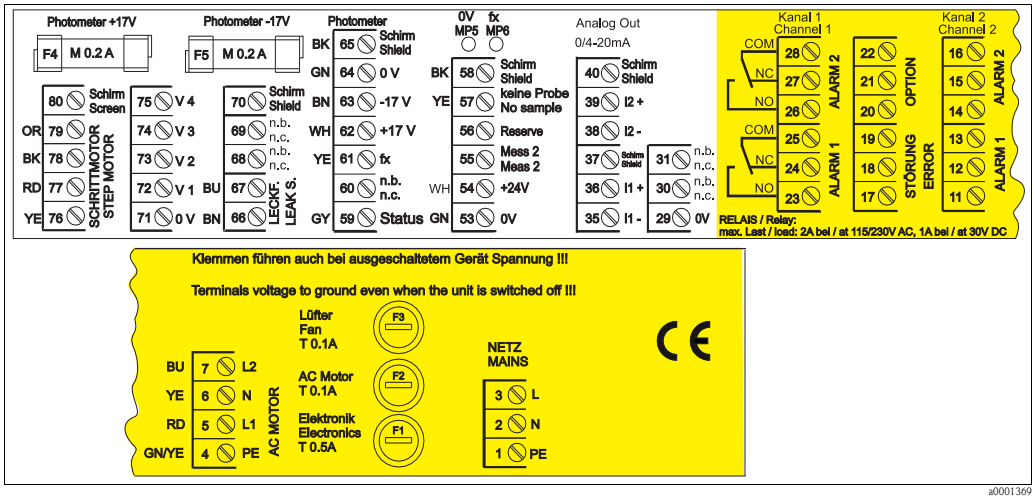


Fig. 1: Example of the connection sticker

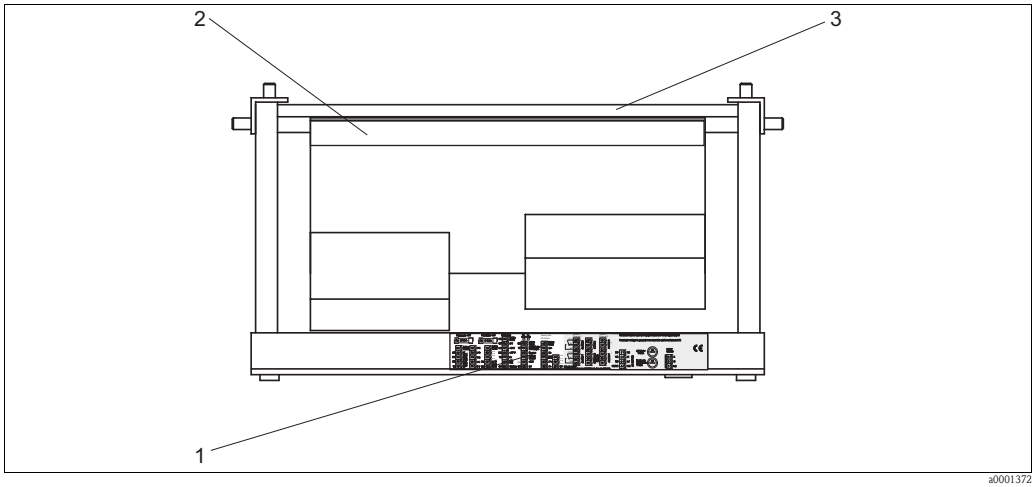


Fig. 2: Analyzer from top (open version resp. folded out)

1 Connection department sticker
2 Printed circuit board with terminal strip
3 Backside of the analyzer

Supply voltage	115 V AC / 230 V AC ±10%, 50/60 Hz
Power consumption	approx. 50 VA
Current consumption	approx. 0.2 A at 230 V approx. 0.5 A at 115 V
Fuses	1 x slow-blow 0.5 A for electronics 2 x semi-delay 0.2 A for photometer 1 x slow-blow 0.1 A for motors 1 x slow-blow 1 A for fan

Performance characteristics

Time between two measurements	t_{mes} = reaction time + rinse time + waiting time + rinse again time + filling time + sampling time + reagent refusal time (min. waiting time = 0 min)
Maximum measured error	**1 to 200 µg/l:** ±2 % of measuring range end there of 5 to 20 µg/l: ±2 µg/l **50 to 5000 µg/l:** ±2 % of measuring range end
Measuring interval	t_{meas} to 120 min
Reaction time	■ SI-A: 90 s ■ SI-B: 120 s
Sample requirement	20 ml (0.68 fl.oz.) per measurement
Reagent requirement	**SI-A** 3 x 0.288 ml (0.01 fl.oz.) 0.86 l (0.23 US.gal) per reagent per month with 15 minute measuring interval **SI-B** 3 x 0.18 ml (0.006 fl.oz.) 0.52 l (0.14 US.gal) per reagent per month with 15 minute measuring interval
Calibration interval	0 to 720 h
Rinse interval (SI-B only)	0 to 720 h
Rinse again time	30 s
Filling time	**SI-A** 24 s **SI-B** 17 s
Sample refusal	$t_{refusal}$ = 30 s (SI-A) $t_{refusal}$ = 0 s (SI-B)
Maintenance interval	6 months (typical)
Servicing requirement	15 minutes per week (typical)

Environment

Ambient temperature	5 to 35 °C (40 to 95 °F), avoid strong fluctuations
Humidity	below the condensation limit, installation in usual, clean rooms outdoor installation only possible with protective devices (customer supplied)
Ingress protection	IP 54

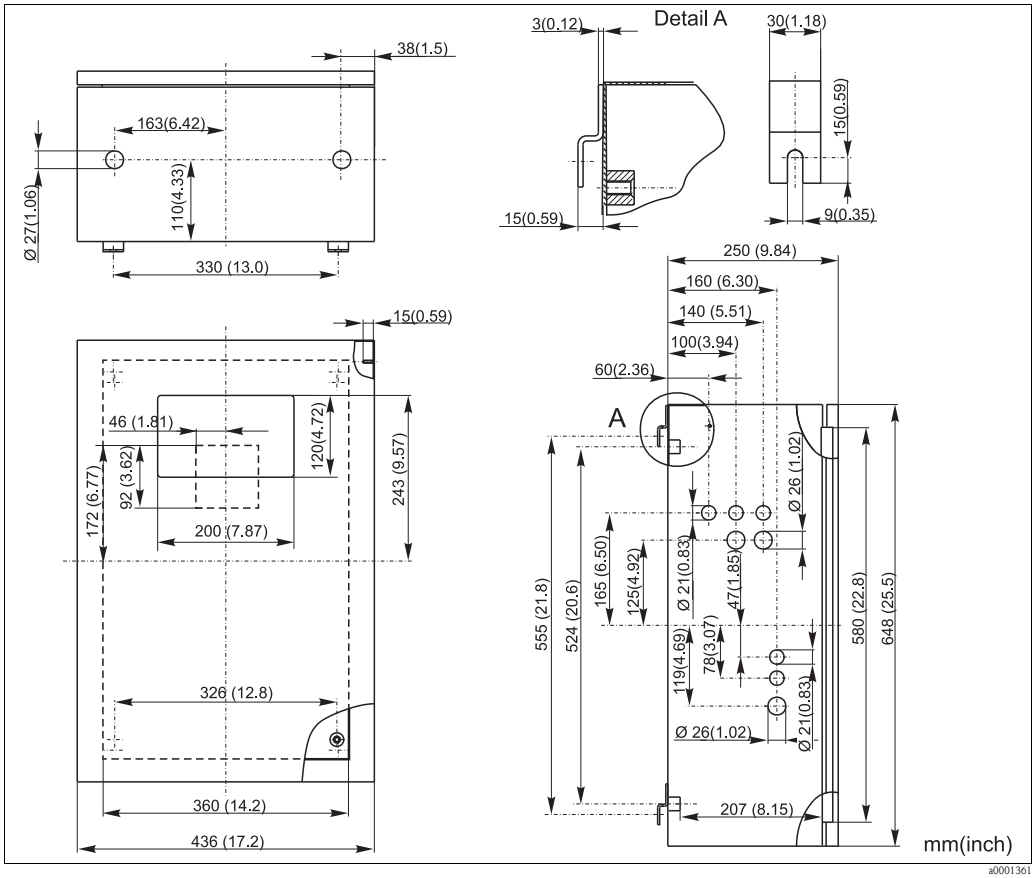
Process

Sample temperature	5 to 50 °C (40 to 120 °F)
Sample flow rate	min. 5 ml (0.17 fl.oz.) per min
Consistence of the sample	low solid content (< 50 ppm)
Sample inlet	Unpressurized
pH value of the sample	> pH 3 (not buffered)

Mechanical construction

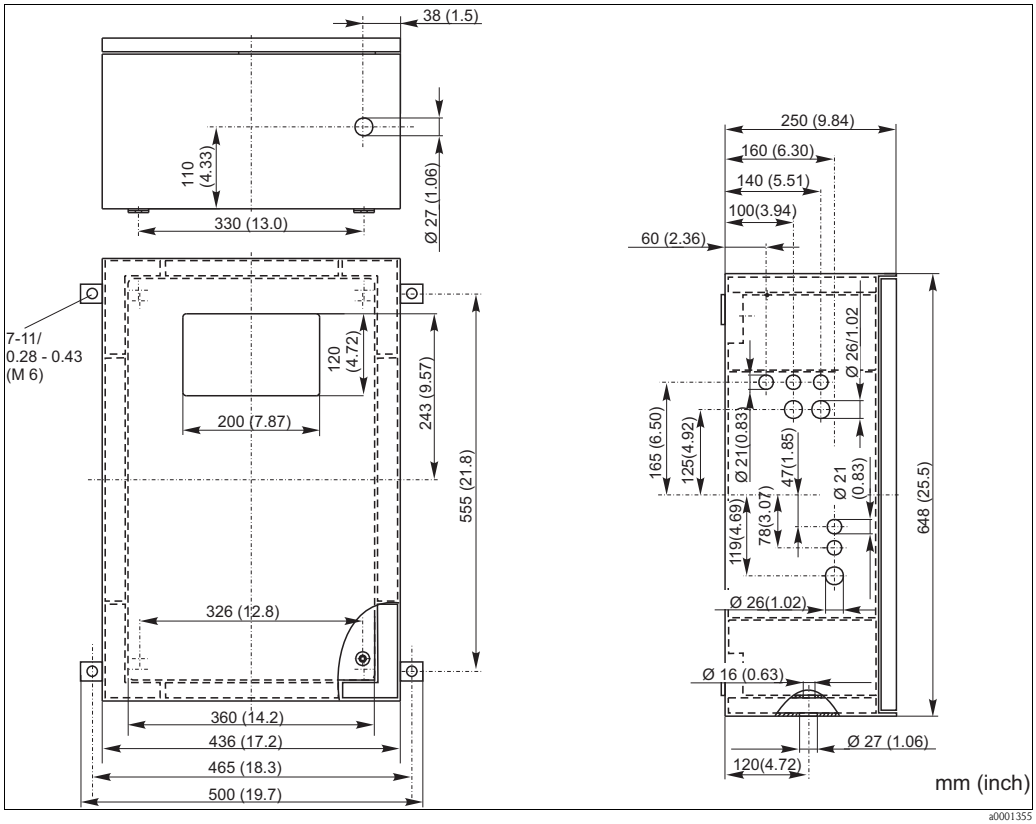
Design, dimensions

Analyzer, stainless steel version, SI-A and SI-B



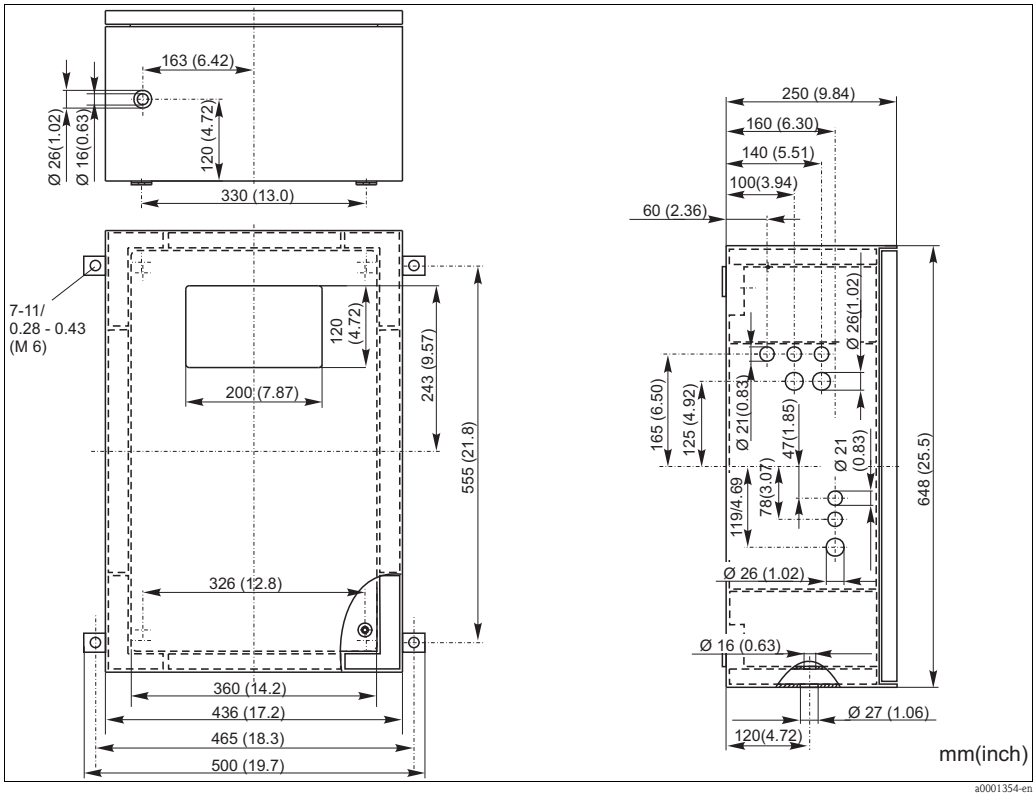
Stainless steel version

Analyzer, GFR version, SI-A



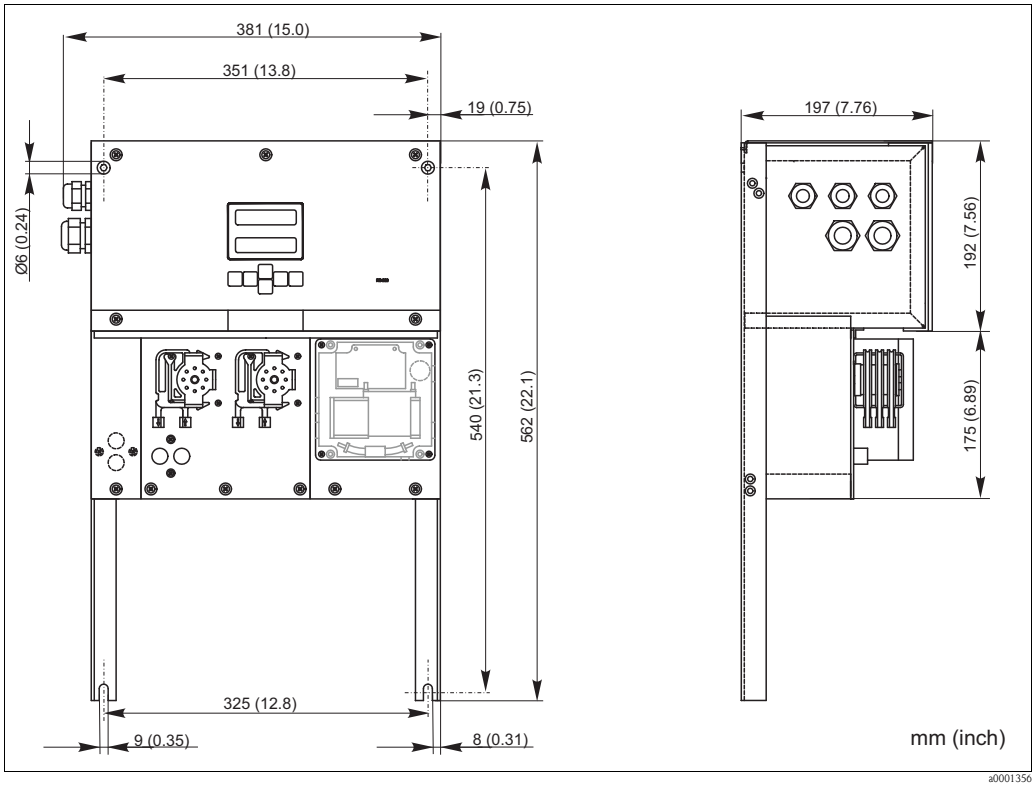
GFR version

Analyzer, GFR version, SI-B



GFR version

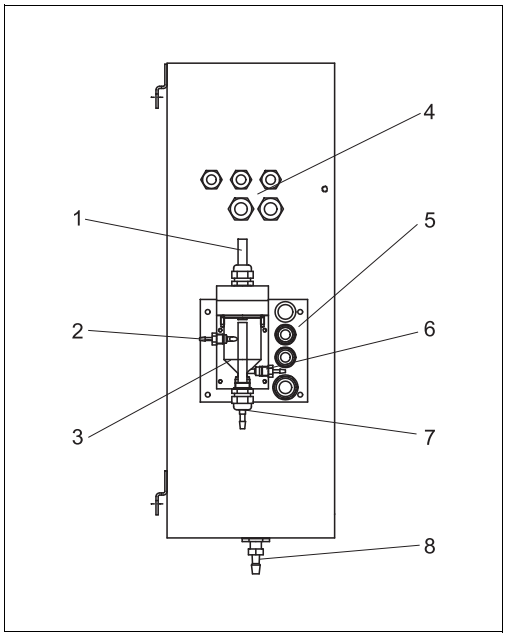
Analyzer, open version, SI-A and SI-B



Open version (without housing)

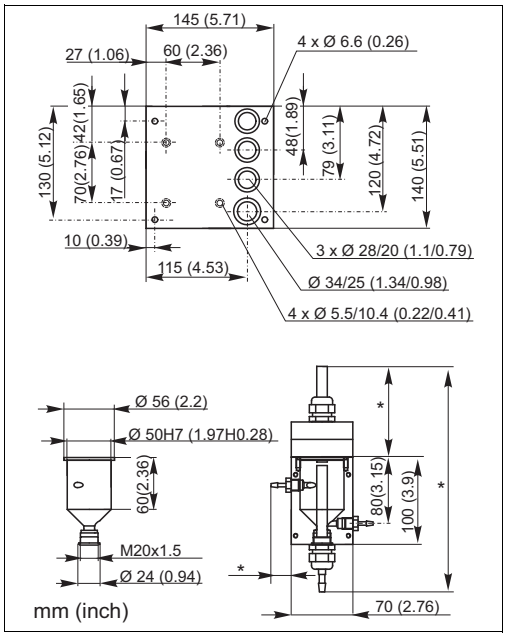
With the open version, you need an additional platform for the reagents. Mount this platform max. 35 cm (13.8 inch) below the pumps. The reagent bottels have the following dimensions: 90 x 90 x 215 mm (3.54 x 5.54 x 8.46 inch). The number of bottles varies from 2 to 5 depending on the analyzer version.
For these versions, the outlet pipe must be installed right of the analyzer.
The outlet pipe must be mounted to a wall so that the sample outlet hoses from the photometer have a gradient of 5 to 10 %. If neccessary, extend the hoses.

Collecting vessel



Collecting vessel at analyzer (optional)

1 Ventilation
2 Sample inlet from sampling
3 Collecting vessel
4 Electrical connections
5 Analyzer sample inlet



Collecting vessel dimensions

** variable, freely adjustable dimensions*
6 Sampling for analyzer
7 Sample overflow
8 Analyzer outlet

Weight

GFR housing	approx. 28 kg (62 lbs)
Stainless steel housing	approx. 33 kg (73 lbs)
Without housing	approx. 25 kg (55 lbs)

Material

Housing:	Stainless steel 1.4301 (AISI 304) or Glass-fibre reinforced carbon(GFR)
Front windows:	Polycarbonate
Endless hose:	C-FLEX, NORPRENE
Pump hose:	TYGON, Viton
Valves:	TYGON, silicone

Sample line connection

One channel version

Collecting vessel (at analyser, without level measurement)

Connection	hose ID 3.2 mm (0.13")

Customer collecting vessel

Connection	hose ID 1.6 mm (0.06")
Max. distance from collecting vessel to analyser	1 m (3.28 ft)
Max. height difference from collecting vessel to analyser	0.5 m (1.64 ft)

Two channel version

- Depending on the ordered version, one or two collecting vessels (without level measurement) are included in the scope of delivery.
- Only one collecting vessel can be mounted at the housing. The second is to be placed nearby the analyser.

Sample outlet SI-A

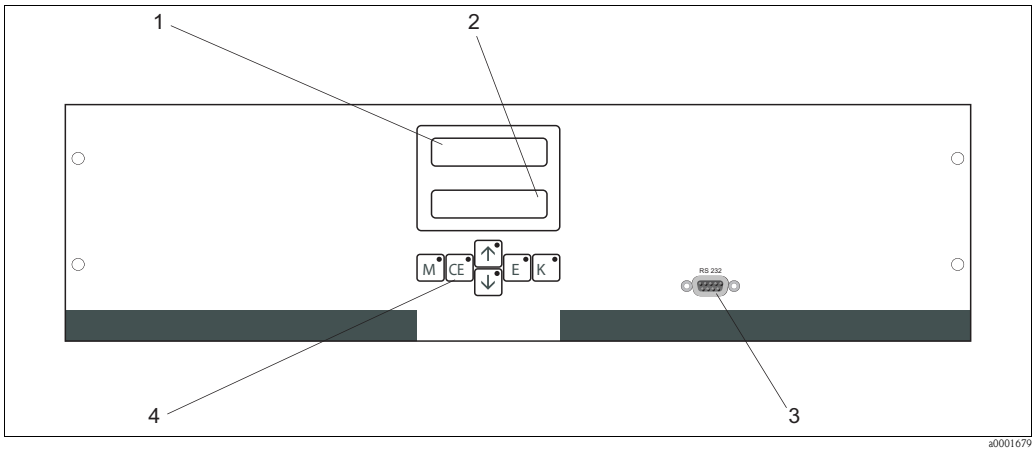
Connection	Hose ID 16 mm (0.63 inch) – Max. length of closed loop: 1 m (3.3 ft) – Open outlet downgrade installed – No combination of several devices to a closed-loop system
Min. volume per measurement	20 ml (0.68 fl.oz.)

Sample outlet SI-B

Connection	Hose ID 4 mm (0.16 inch) – Max. length of closed loop: 1 m (3.3 ft) – Open outlet downgrade installed – No combination of several devices to a closed-loop system
Min. volume per measurement	20 ml (0.68 fl.oz.)

Operability

Local operation



Display and operating elements

1 LED (measured value)
2 LC display (measured value and status)
3 Serial interface RS 232
4 Operating keys and control LEDs

Certificates and approvals

CE approval

Declaration of conformity
The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives.
The manufacturer confirms successful testing of the product by affixing the CE symbol.

Test reports

Quality certificate
Depending on the order code, you receive a quality certificate.
With the certificate the manufacturer confirms compliance with all technical regulations and the successful individual testing of your product.

Ordering information

Product page

You can create a complete and valid order code by using the configurator on the internet product page.

Enter the following address to access the product page:
www.products.endress.com/ca71si

Configurator

1. You can choose from the following options on the product page located on the right:

Product page function
:: Add to product list
:: Price & order information
:: Compare this product
:: Configure this product

2. Click "Configure this product".
3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.
4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.

Product structure

The following product structure represents the status of printing. You can create a complete and valid order code on the Internet using the configurator tool.

	Measuring range							
	A	Measuring range 1.0 ... 200 µg/l SiO_2						
	B	Measuring range 50 ... 5000 µg/l SiO_2						
	Y	Special version acc. to customer's specification						
		Sample transfer						
		1	Sample transfer from one measuring point (one-channel version)					
		2	Sample transfer from two measuring points (two-channel version)					
			Power supply					
			0	Power supply 230 V AC / 50 Hz				
			1	Power supply 115 V AC / 60 Hz				
				Collecting vessel for up to 3 analysers				
				A	Without collecting vessel			
				B	With collecting vessel without level measurement			
				D	With two collecting vessels without level measurement (two-channel version)			
					Housing version			
					1	Without housing (open version)		
					2	With GFR housing		
					3	With stainless steel 1.4301 (AISI 304) housing		
						Communication		
						A	0/4 ... 20 mA, RS 232	
							Additional equipment	
							1	Quality certificate
							2	Quality certificate + set of inactive reagents
							3	Quality certificate + three sets of inactive reagents
CA71SI -								**complete order code**

Scope of delivery

Order reagents separately with analyzer version CA71XX-XXXXXX1.
With all other versions, inactive reagents are included in the scope of delivery. You have to mix the reagents before using them. Please, read the instructions attached to the reagents.

SI-A

The scope of delivery comprises:
- An analyzer with mains plug
- A cleaning injector
- A tube of silicone grease
- A NORPRENE hose, length 2.5 m (8.2 ft), ID 1.6 mm (0.06 inch)
- A Grifflex hose, length 2.0 m (6.6 ft), ID 19 mm (0.75 inch)
- A C-FLEX hose, length 2.5 m (8.2 ft), ID 3.2 mm (0.13 inch)
- A C-FLEX hose, length 2.5 m (8.2 ft), ID 6.4 mm (0.25 inch)
- Two hose fittings of each size:
  - 1.6 mm x 1.6 mm (0.06 inch x 0.06 inch)
  - 1.6 mm x 3.2 mm (0.06 inch x 0.13 inch)
  - 6.4 mm x 6.4 mm (0.25 inch x 0.25 inch, version without housing only)
- Two T-hose fittings of each size:
  - 1.6 mm x 1.6 mm x 1.6 mm (0.06 inch x 0.06 inch x 0.06 inch)
  - 3.2 mm x 3.2 mm x 3.2 mm (0.13 inch x 0.13 inch x 0.13 inch)
- An interference suppressor for the current output
- A nozzle for outlet pipe, ID 16 mm (0.63 inch)
- A hose clamp
- Two pipe clamps (version without housing only)
- A screwed socket for the outlet pipe
- Four edge covers
- A roll of PTFE strip
- A quality certificate
- Operating Instructions (English).

SI-B

The scope of delivery comprises:
- An analyzer with mains plug
- A cleaning injector
- A tube of silicone grease
- A NORPRENE hose, length 2.5 m (8.2 ft), ID 1.6 mm (0.06 inch)
- A C-FLEX hose, length 2.5 m (8.2 ft), ID 6.4 mm (0.25 inch)
- A C-FLEX hose, length 2.5 m (8.2 ft), ID 3.2 mm (0.13 inch)
- Two hose fittings of each size:
  - 1.6 mm x 1.6 mm (0.06 inch x 0.06 inch)
  - 1.6 mm x 3.2 mm (0.06 inch x 0.13 inch)
  - 6.4 mm x 3.2 mm (0.25 inch x 0.13 inch)
- Two T-hose fittings of each size:
  - 1.6 mm x 1.6 mm x 1.6 mm (0.06 inch x 0.06 inch x 0.06 inch)
  - 3.2 mm x 3.2 mm x 3.2 mm (0.13 inch x 0.13 inch x 0.13 inch)
  - 6.4 mm x 6.4 mm x 6.4 mm (0.25 inch x 0.25 inch x 0.25 inch)
- An interference suppressor for the current output
- Four edge covers (version with GFR housing only)
- A roll of PTFE strip
- A quality certificate
- Operating Instructions (English).

Accessories

Reagents and standard solutions

- Reagent set active, 1 l SI1+SI2+SI3 each; order no. CAY643-V10AAE
- Reagent set, inactive, 1 l SI1+SI2+SI3 each; order no. CAY643-V10AAH
- Cleaning agent, 1 l; order no. CAY641-V10AAE
- Standard solution 0.0 µg/l SiO_2; order no. CAY642-V10C00AAE
- Standard solution 50 µg/l SiO_2; order no. CAY642-V10C50AAE
- Standard solution 100 µg/l SiO; order no. CAY642-V10C01AAE
- Standard solution 500 µg/l SiO_2; order no. CAY642-V10C05AAE
- Standard solution 1000 µg/l SiO_2; order no. CAY642-V10C10AAE

Cleaner for hoses

- Cleaning agent, alkaline, 250 ml (8.5 fl.oz.); order no. CAY746-V02AAE
- Cleaning agent, acidic, 250 ml (8.5 fl.oz.); order no. CAY747-V02AAE

Collecting vessel

– for sampling from pressurized systems
– results in an unpressurised continuous sample stream

- Collecting vessel without level measurement; order no. 51512088
- Collecting vessel with level monitoring for pure and ultrapure water, level monitoring with polypropylene float lever; Order no. C-A061019-50

Maintenance kit

CAV740, maintenance kit for CA71

- Pump hoses
- Valve hoses
- Hose connectors
- Ordering acc. to product structure

	For CA71 parameter		
	4	SI-B	
	6	SI-A	
		Inlet and outlet hoses	
		A	not selected
		B	selected, for CA71SI-B
		C	selected, for CA71SI-A
CAV740-			**complete order code**

Special accessories

- Interference suppressor for control, power and signal lines
  order no. 51512800
- Silicon grease, tube, 35 g
  order no. 71017654
- Valve set, 2 pieces, for two-channel version
  order no. 51512234
- Upgrade kit for upgrading from one-channel to two-channel version
  order no. 51512640

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People for Process Automation

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