RESIDUAL CHLORINE ANALYZER
RC400G

NON-REAGENT FREE CHLORINE ANALYZER
FC400G

RC400G

RESIDUAL CHLORINE ANALYZER

FC400G

NON-REAGENT FREE CHLORINE ANALYZER

Bulletin 12F01A01-01E

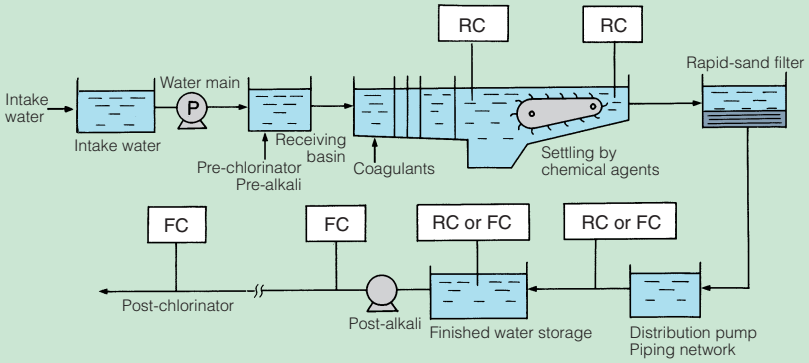
For Safe and Delicious Water

Chlorination is employed in most water treatment processes to remove metallic ions and biological contaminants, and to suppress subsequent growth of bacteria and other biota.
Excessive chlorination, however, is economically wasteful and can give water an unpleasant taste and odor. Thus there are strong incentives to inject just the right amount, making accurate measurement vital.

Residual Chlorine Analyzer Application Examples

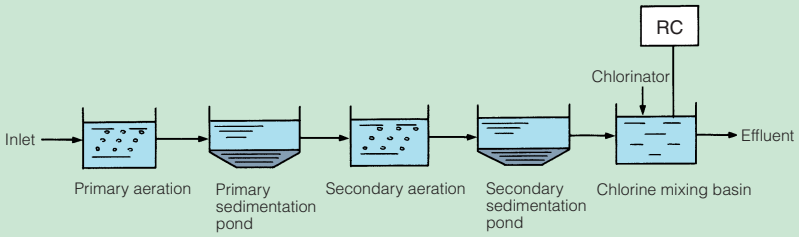
RC: Residual chlorine analyzer (Model RC400G)
FC: Non-reagent type free chlorine analyzer (Model FC400G)

1. Control of residual chlorine in sedimentation ponds and distribution mains at water treatment plant

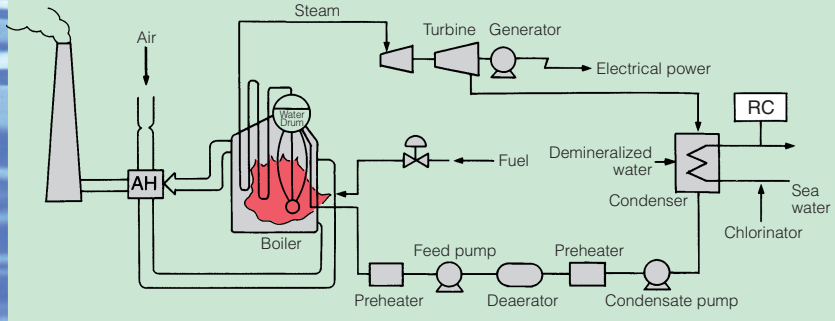


2. Sewage treatment plant pre-discharge residual chlorine monitoring

(Consult with YOKOGAWA for this application)



3. Boiler cooling water monitoring (sea water-borne microorganism suppression and corrosion prevention)



RC400G and FC400G Residual and Free Chlorine Analyzers
High performance and accuracy
Easy operation and self-diagnostics for easy maintenance

(1) Easy to operate, and highly accurate

- Easy calibration
  Just a couple of key presses while the calibration sample is flowing. The converter automatically makes the end point determination.
- Field-adjustable output range
  RC400G : Minimum span 1mg/l; remotely selectable dual range capability standard
  FC400G : Can select any range from 0-1 through 0-3mg/l
- Line-segment output linearization and contact outputs standard

(2) Easy sensor section maintenance

- Easy-to-maintain cell construction
  Just remove two screws to open cell for washing. Electrode maintenance can be done without turning off power or stopping sample flow.
- Continuous self-cleaning based on improved rotating-electrode/bead cleaning system.
- Highly reliable sliding-contact probe connection

(3) Enhanced dependability through self-diagnostics

- Self-diagnostic functions include checks on the sensor and process -- the areas that most need checking -- not just on the converter. These advanced self-diagnostics truly achieve the long-sought goal of fully dependable operation.

Self-diagnostic function summary

RC400G	Over-range, temperature abnormality, cell liquid loss, converter malfunction, temperature compensation range exceeded, high limit setting exceeded, zero point error, slope error, response problem
FC400G	Excessive diffusion current, temperature abnormality, converter malfunction, temperature compensation range exceeded, zero point error, slope error, response problem

- Easy verification of inter-electrode applied voltage/current characteristic (plateau characteristic). This enhances measurement reliability by enabling applied voltage to be set to the optimum value for the application.

(4) Broad application range

- A new 2-tube sand filtering unit has been added to the RC400G sampling unit (conditioning system) line-up, extending its application range to sewage treatment and secondary water treatment plants. (This unit can be mounted on the analyzer itself.)

Data display
Displays measurement and setup data.

Message display
Used to display data such as temperatures (other than measurement temperature), applied voltage, and slope, and operating dialog messages.

YES/NO key
Used to answer yes/no to messages.

Data setting keys

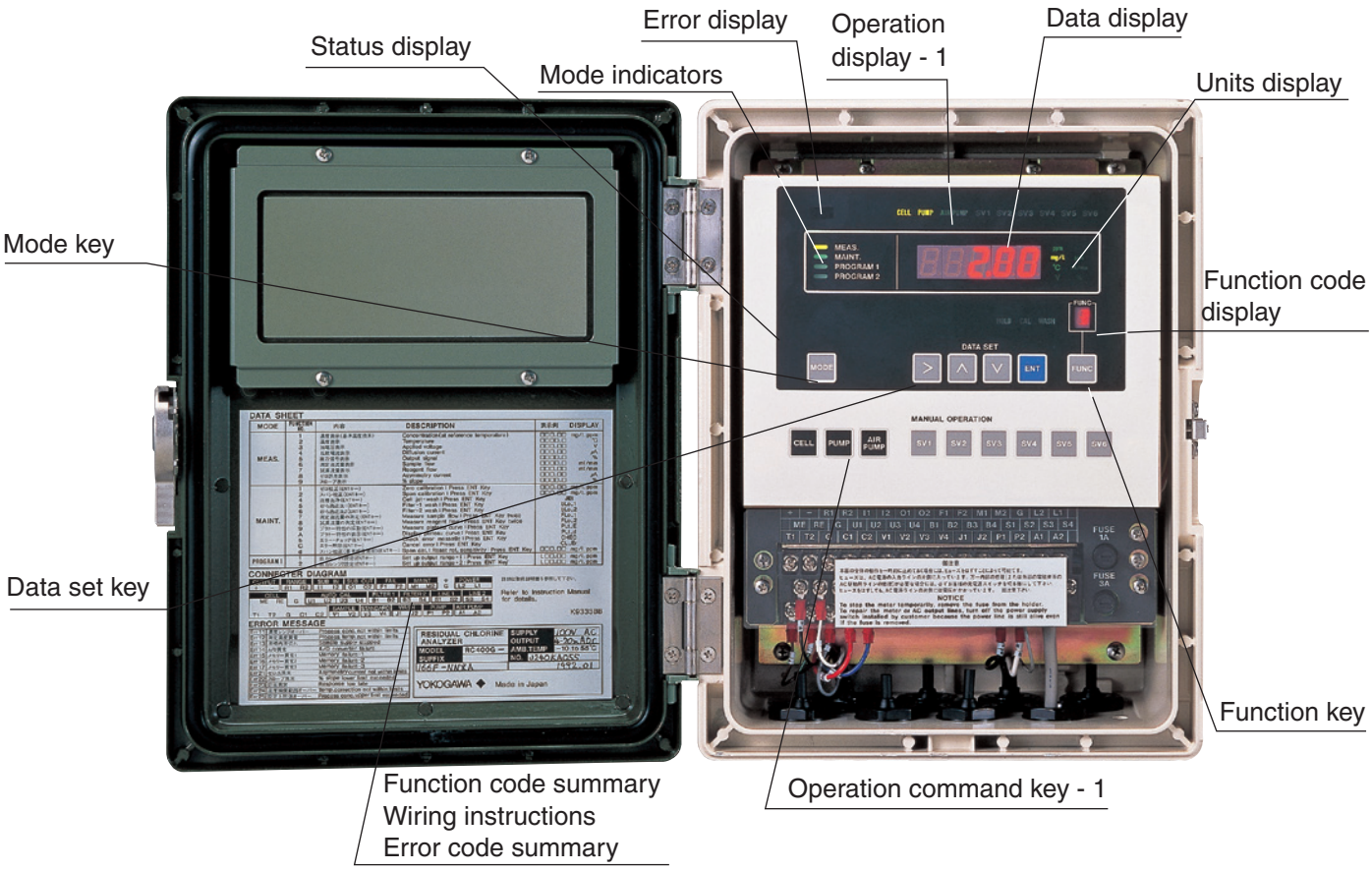
Mode indicator

Mode select key

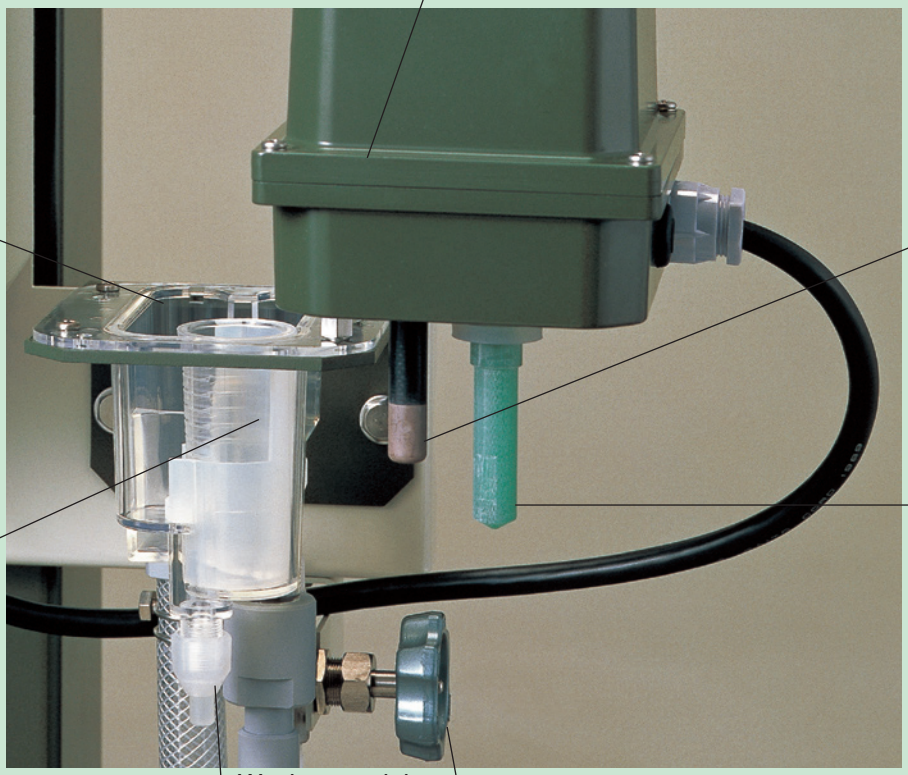
Status indicator LEDs

Enter key

FC 400G converter



RC400G Converter



* Photo shows FC400G component. RC400G component differs in shape.

Residual and Free Chlorine Analyzers based on our long and field-proven experience

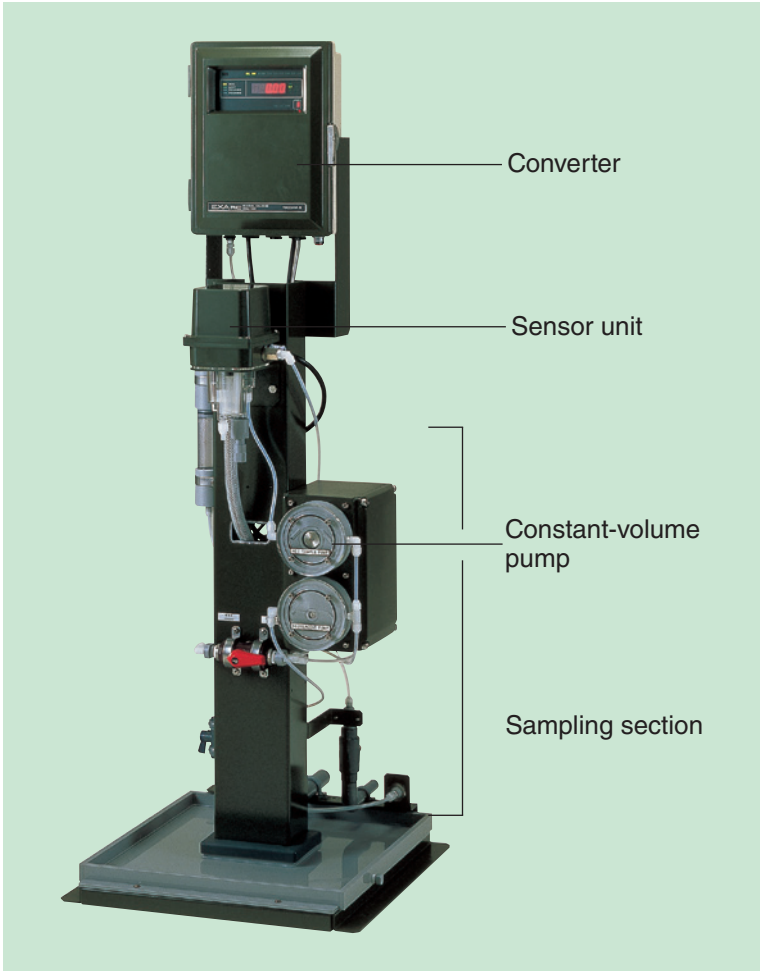
EXA RC™

Residual Chlorine Analyzer RC400G

Measures both free and residual chlorine in water. This is a general-purpose analyzer that enables switching between free and residual chlorine measurement, and employs reagents for sample pH adjustment. Applications center around municipal water treatment, and industrial and waste-water treatment.

Main Applications

- Municipal water treatment
- Industrial water supply facilities
- Large-scale boilers



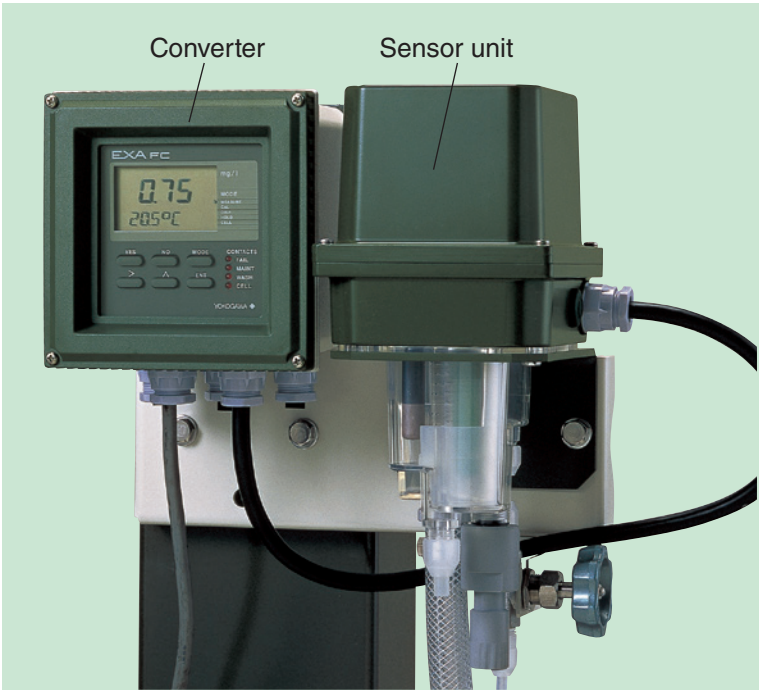
EXA FC™

Non-Reagent Free Chlorine Analyzer FC 400G

Measures free chlorine in drinking water and water distribution systems. This is a simplified analyzer which uses no reagent, and assumes that the sampled water is clean.
This analyzer is intended for measurements in the water distribution network, at pumping stations, water delivery points, schools, and public facilities.

Main Applications

- Water distribution network pumping stations
- Water delivery points
- Water quality monitoring systems at large office and apartment buildings, schools, hospitals, and public facilities
- Food processing facilities, particularly those consuming large quantities of potable water



Non-reagent and reagent type analyzer operating conditions comparison

Operating conditions	Non-reagent type free chlorine analyzer (FC400G)	Reagent type residual chlorine analyzer (RC400G)
Measured variable	Free chlorine	Free chlorine or total chlorine
Sample pH	6.5 to 7.5pH	3 to 9pH
Sample SS (suspended solids)	10 mg/l max.	500 mg/l max.
Sample conductivity	100 to 300 μS/cm	No particular limit
Effect of combined chlorine on free chlorine measurement	Large (see Note)	Almost none
Measurement points	Treated water, distributed water, and tap water	All processes from the receiving well to treated water output

(Note) Because treated water, distributed water and tap water contain almost no combined chlorine, there is no problem found in applications.

RC400G <Standard Specifications>

Measuring object	:	Free chlorine or residual chlorine (total chlorine) in water
Measuring system	:	Polarographic method using rotating electrode
Measuring range	:	0 to 10 mg/l
Output range	:	Settable in any range as long as the span is 1 mg/l or more
Output signal	:	4 to 20 mA DC or 1 to 5 V DC
Contact output	:	Fail contact, Range switching contact and Maintenance contact
Contact input	:	Remote range switching
Electrodes	:	
Indicator electrode	;	Rotating gold alloy electrode
Counter electrode	;	Platinum electrode (built-in Pt1000 Ω RTD), the combined chlorine insensitive version uses a silver chloride electrode (built-in Pt1000 Ω RTD)
Electrode cleaning	:	Glass beads cleaning
Weight	:	For pure water; Approx. 65 kg, For raw water (1-cylinder); Approx. 70 kg, For raw water (2-cylinder); Approx. 75 kg

Sample Conditions

Temperature	:	0 to 50°C
pH	:	3 to 9 pH
Flow rate	:	1 to 4 l/min, for pure water or municipal water application. 5 to 10 l/min, for raw water or sea water application. 10 to 20 l/min, for secondary sewage treatment application.
Pressure	:	20 to 500 kPa

Operating Conditions

Ambient temperature	:	-5 to 55°C
Ambient humidity	:	5 to 95% RH (non-condensing)
Storage temperature	:	-30 to 70°C
Installation	:	Indoors (A separate rainproof cover is required for outdoor installation. Avoid direct sunlight.)

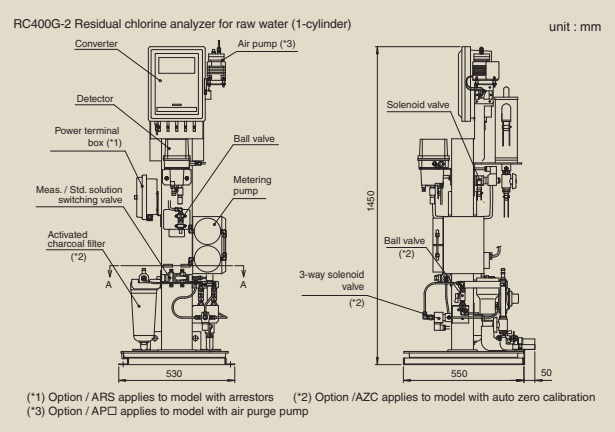
Utilities

Power supply	:	100/110/220 V AC±10%, 50/60 Hz
Cleaning water (required with sand filter system) :		
Quality	;	Clean water
Pressure	;	100 to 500 kPa
Flow	;	10 to 12 l/min
Consumption	;	Approx. 130 l/day (1-cylinder sand filter type) Approx. 470 l/day (2-cylinder sand filter type)
Air purge (using instrument air) :		
Supply pressure	;	140 kPa
Air consumption	;	Approx. 5 l/min

Characteristics (% display is computed with respect to whichever of output range 1 or output range 2 has the highest upper range value)

Repeatability	:	2%
Linearity	:	±3%
Drift	:	Zero drift: ±1%/month or less, Span drift: -5%/month or less
Response time (90% response) :		
For pure water	;	Approx. 3 min
For raw water and sea water	;	Approx. 4 min

External Dimensions



* Refer to GS 12F4A1-E for details.

FC400G <Standard Specifications>

Measuring object	:	Free chlorine in tap water
Measuring system	:	Polarographic method using rotating electrode
Measuring range	:	0 to 3 mg/l
Output range	:	Arbitrarily settable between the range of 0 to 1 mg/l and 0 to 3 mg/l
Output signal	:	4 to 20 mA DC or 1 to 5 V DC
Contact output	:	Event of Error (Excessive diffusion current value, sample temperature error, applied voltage error, converter error, temperature compensation range over) and Maintenance
Contact Input	:	Remote range switching
Electrode	:	Indicating electrode : Gold electrode, The combined chlorine insensitive version uses a gold alloy indicator electrode. Counter electrode : Silver chloride electrode (built-in Pt1000Ω RTD)
Electrode cleaning	:	Ceramic bead cleaning. The combined insensitive version uses glass beads.
Mounting	:	2B pipe mounting or wall mounting
Weight	:	Approx. 6kg

Sample Conditions

Temperature	:	0 to 50°C
pH	:	6.5 to 7.5 pH
Conductivity	:	100 to 300 µS/cm
Flow rate	:	0.1 to 2.5 l/min
Pressure	:	1 to 150 kPa, 100 to 750 kPa, for the case where dedicated sampling system ST401G is provided
Conductivity	:	100 to 300 µS/cm
Suspended Solid	:	10 mg/l or less

Operating Conditions

Ambient temperature	:	-10 to 55°C
Ambient humidity	:	5 to 95% RH (non-condensing)
Storage Temperature	:	-30 to 70°C
Installation	:	Indoor (Outdoor use separately requires rainproof measures.) (Direct sunlight must be avoided.)

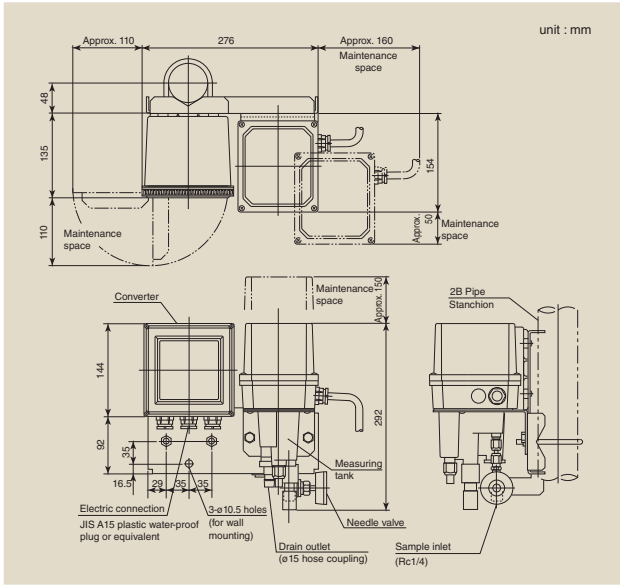
Utility

Power supply	:	100/110/200/220V AC±10%, 50 / 60Hz
Power consumption	:	Approx. 15VA

Characteristics (% display shows value relative to the upper limit of a range.)

Repeatability	:	2%
Linearity	:	±5%
Drift	:	Zero drift; within ±1%/month, Span drift; within -10%/month
Response time	:	Approx. 2 minutes (90% response time)

External Dimensions



* Refer to GS 12F5A1-E for details.

YOKOGAWA ELECTRIC CORPORATION **http://www.yokogawa.com/an/**
World Headquarters
9-32, Nakacho 2-chome, Musashino-shi, Tokyo 180-8750, JAPAN

YOKOGAWA CORPORATION OF AMERICA	http://www.yokogawa.com/us/
YOKOGAWA EUROPE B.V.	http://www.yokogawa.com/eu/
YOKOGAWA ENGINEERING ASIA PTE. LTD.	http://www.yokogawa.com/sg/
YOKOGAWA CHINA CO., LTD.	http://www.yokogawa.com/cn/
YOKOGAWA MIDDLE EAST & AFRICA B.S.C.(c)	http://www.yokogawa.com/bh/

Represented by:

ANA-01E

Subject to change without notice. [Ed:07/b] Printed in Japan, 801(KP)

YOKOGAWA