

RESIDUAL CHLORINE ANALYZER

Model: CLF-100

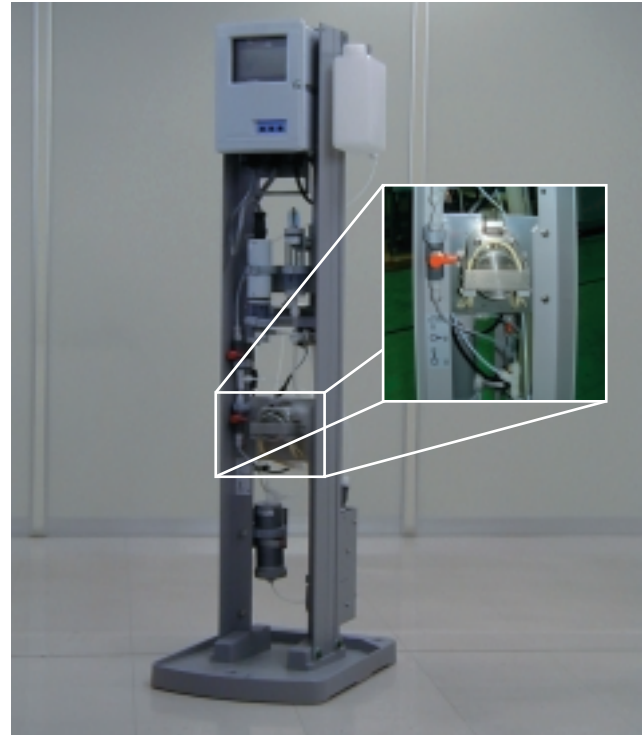
This instrument is used for measuring the residual chlorine concentration of city water and sewerage effluent after chlorination (both residual chlorine concentration and free available chlorine concentration can be measured by using the appropriate reagents).

FEATURES

- Long term, stable measurement using a sensor which contains a contact-free swing rotary residual chlorine electrode (includes beads cleaning system).
- Transmitter with built-in microcomputer including various diagnostic functions such as flow rate fault detection and calibration error etc.
- Stable and reliable operation can be further enhanced by adding an optional auto-calibration system and optional auto-cleaning system.

STANDARD SPECIFICATIONS

- Product Name** : Residual chlorine analyzer.
Model : CLF-100.
Measurement Object : Residual chlorine (total chlorine) of water or free available chlorine (free chlorine).
Measurement Method : Polarography by eccentric rotary micro-electrode.
Sensor : CLR-31 swing rotary (with built-in Pt-Pt temperature compensation resistor) sensing electrode, type 2133.
Measurement Range : Select one of the following:-
 0~0.5/1.0 (Residual chlorine measurement only).
 0~1/2, 0~2/5, 0~3/6, 0~5/10 mg/ℓ (ppm units are also available if specified).
Measurement Range Switching : Manual or remote switching (client to specify).
Indication : Digital (LCD 0.00~10.00).
Output Signal : 4~20mA DC, maximum load 600W, isolated output.
Contact Switching Outputs : Range indication, under maintenance, power fail, low sample flow, low reagent, flow error, temperature fault, in cleaning mode, in calibration mode, calibration error, (contact rating: 30V DC, 0.1A).
 High concentration, low concentration (contact rating: 30V DC, 0.1A).
Contact Switching Inputs : Range switching (open contacts=low range, closed contacts=high range) (contact rating: 30V DC 0.1A).
 Start cleaning, start calibration (contact closed for 100mS or longer) (contact rating: 30V DC, 0.1A).
Sample Conditions : Temperature: 0~+40°C (no freezing).
 Pressure: 0.02~0.3 MPa (0.2~3 kgf/cm²).
 Consumption: 1~3ℓ/min. (flow rate of sample to be introduced into analyzer: 50mℓ/min).



- Reagents Composition** : Residual chlorine measurement: Table 1.
 Free chlorine measurement: Table 2.
 Consumption: Approx 1.1 mℓ/min (Approx 1.6 ℓ/day).

Table 1: Residual chlorine measurement (composition of 50 liters).

Extra pure grade reagent	Measurement range	
	0~6mg/ℓ or Less	0~7mg/ℓ or Greater
KI	250g	500g
NaCH ₃ CO ₂ Anhydride	62.5g	125g
C ₂ H ₄ O ₂	500ml	1000ml

Table 2: Free effective chlorine measurement (composition of 50 liters).

Extra pure grade reagent	Measurement range 0~10mg/ℓ or less.
KBr	1500g
NaCH ₃ CO ₂ Anhydride	500g
C ₂ H ₄ O ₂	500ml

- Wetted Materials** : Hard PVC, Teflon tubing, polyethylene tubing.
Liquid Transfer : Sample and reagent solution are transferred to flow cell by solution pumps.
Power Requirements : 100V/110V AC ±10%, 50/60Hz.
Power Consumption : Approx. 60 VA (main body of instrument; approx. 40VA, with cleaner; approx. 50 VA, with calibration; approx. 60VA).
Construction : Indoor, self-standing, drip-proof.
Operating Temp Range : -5~+50°C.
Operating Humidity Range : <85% RH.

- Main Materials:** Transmitter: ADC12 (Al. die cast).
 Sensor: A1050 (Al.).
 Frame: A1050P (Al.).
- Paint Colour** : Transmitter/sensor: Pantone 537C (Equivalent to Munsell 5PB8/1).
 Frame: Grey (Equivalent to Munsell N6).
- Weight** : Approx. 20kg.
- Piping Connections** : Sample inlet: VP16 pipe, reagent inlet: V16 pipe, Drain: VP25 pipe, cleaning water: VP16 pipe (option).
- Wiring Connections** : Four 6mm~12mm cable entries.

OPTIONS

1) Automatic Cleaning Function

- Cleaning Method** : Water cleaning or ozone cleaning. (ozone+water) as specified by client.
- Cleaning Start Mode** : Manual: cleaning starts by keypad command.
 : Auto cleaning starts by internal timer.
 : Remote cleaning starts by external contact input signal (when cleaning period is set at 0 hr).
- Cleaning Cycle** : 0~24 hrs variable (initial value: 12 hrs).
- Cleaning Duration** : Water jet cleaning; 2 min fixed. Ozone cleaning; 8 min fixed.
- Stand-by Time After Cleaning** : 0~30 min variable (initial value 15 min).
- Output Hold Time During Cleaning** : Cleaning time + stand-by time.
- Cleaning Water Conditions** : Temperature: 2~30°C.
 Pressure: 0.2~0.7 MPa (2~7 kgf/cm²).
 Consumption: approx. 3ℓ/min.
- Water quality** : equivalent to city water.

2) Automatic Calibration Function (Added in combination with automatic cleaning)

- Calibration Method** : Zero; water filtrated by active charcoal filter is introduced.
 Span; after zero calibration, I₂ or Br₂ is produced electrically from Reagent, then water is introduced.
- Calibration Start Mode** : Manual: calibration starts by keypad command.
 Auto calibration starts by internal timer.
 Remote: cleaning starts by external contact input signal (when cleaning period is set at 0 hr).

	Flowing City Water			Effluent Water		
	High	Medium	Low	Sewage	Seawater	
	0~5 10 mg/ℓ	0~2 5 mg/ℓ	0~1 2 mg/ℓ	0~0.5 1.0 mg/ℓ	0~0.5 1.5mg/ℓ	
Standard	--	--	○	--	--	
Options (Possible with auto-calibration)	Water Cleaning	--	○	Δ	--	○
	Ozone cleaning Ozone + water cleaning	○	Δ	--	○	○

○: Application. Δ: Recommended.

- Calibration Period** : 0~999 hr. variable (Initial value 240 hrs).
- Calibration Duration** : Zero calibration: approx. 10 mm.
 Span calibration: approx. 10 mm.
- Stand-by Time after Calibration** : 0~30 min. variable (Initial value 15 min).
- Output Hold Time during Calibration** : Cleaning time + calibration time + stand-by time.

PERFORMANCE

- Repeatability** : ±2%FS (with chlorine standard solution) (±0.02mg/ℓ on 0~0.5mg/ℓ range).
- Linearity** : ±3%FS (with chlorine standard solution) (±0.03mg/ℓ on 0~0.5mg/ℓ range).
- Response time** : Within 2 minutes for 90% response (measured from sample inlet at flow rate of 3ℓ/min).

PRINCIPLE OF OPERATION

This instrument consists of a sensor, transmitter, sampler and solution pump all mounted on a self-standing frame. A reagent tank is mounted separately. The sample and the reagent are sent to the sensor by the solution pumps. The sample mixes and reacts with the reagent to liberate I₂ or Br₂ corresponding to the chlorine concentration in the sample. The liberated I₂ or Br₂ is subjected to electrolytic reduction by the sensing electrode (a negative voltage is applied to this electrode in relation to the counter-electrode) and changed to iodine ions or bromide ions.

The reduction current (diffusion current) between the sensing electrode and the counter-electrode is then amplified. This amplified signal is the indication of residual chlorine concentration.

RELATED EQUIPMENT

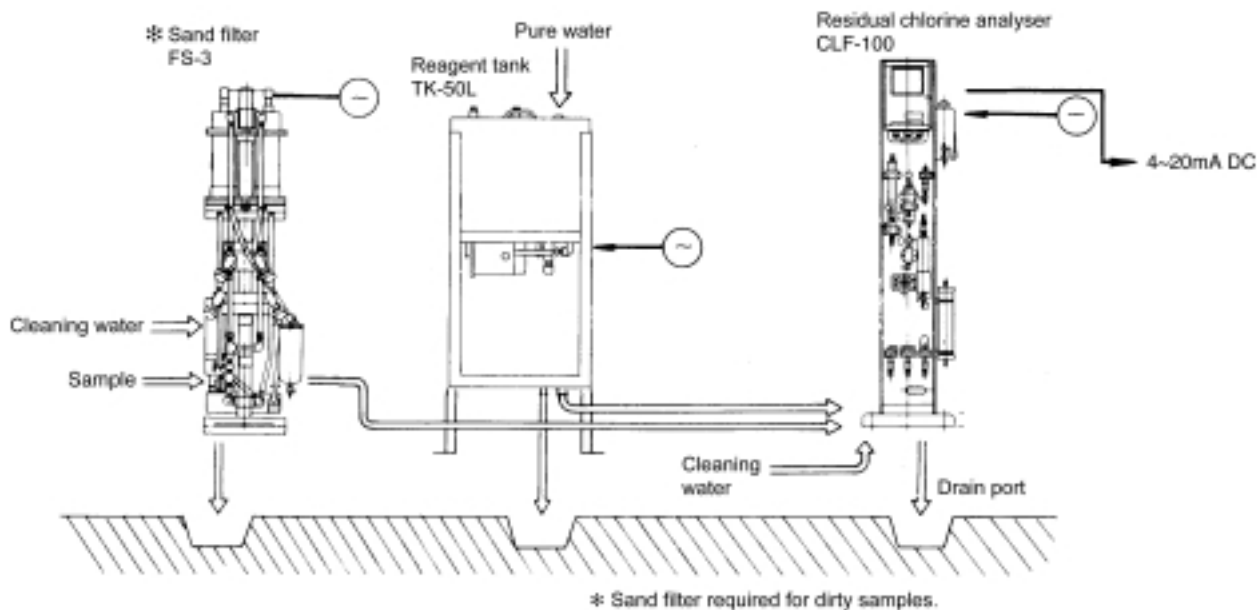
1) Reagent Tank TK-50L

- Capacity** : 50 litres.
- Material** : Hard PVC.
- Stirring Pump Power Source** : 100V/110V AC ±10%, 50/60 Hz.
- Power Consumption** : Approx. 35 VA.
- Weight** : 50 litre: Approx. 40kg (excluding reagents).
- Piping Connections** : Transfer port: VP16A socket, drain port: VP16A socket, 2 X glands for 6~12mm outer diameter cable.

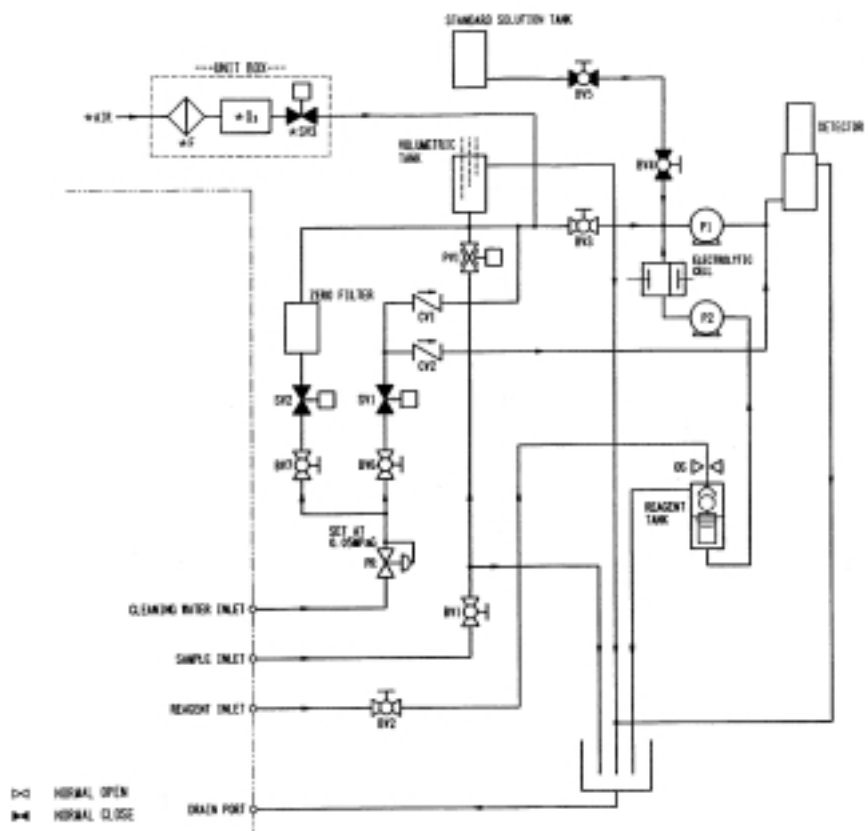
2) Sand Filter FS-3

- Application** : SS removal from the sample to be introduced into the water quality analyzer.
- Filtration Method** : 2 cylinder, continuous sand filtration (automatic changeover)
- Filtration Rate** : 1~6 ℓ/min (depending on sample turbidity).

TYPICAL SYSTEM ARRANGEMENT



FLOW SCHEMATIC



Symbol	Description
CV1	Check valve
CV2	Check valve
OS	Reagent optical flow sensor
PR	Pressure regulator
P1	Sample pump
P2	Reagent pump
BV1	Sample adjustment valve
BV2	Reagent stop valve
BV3	Sample supply valve
BV4	Span supply valve
BV5	Span stop valve
BV6	Cleaning water stop valve
BV7	Zero sample stop valve
PV1	Pinch valve for stopping sample
SV1	Solenoid valve
SV2	Solenoid valve

*Option	
O ₃	Generator
F	Air filter
SV3	Solenoid valve

