

## RESIDUAL CHLORINE ANALYSER FOR CITY WATER TREATMENT PLANTS (REAGENT TYPE)

Model: CLF-101

This instrument has been specially developed for accurate measurement of chlorine concentration in city water treatment plants. It can accurately measure free chlorine in the chlorination process of city water and also the individual kinds of residual chlorine.

### Features

- Measurement is not influenced by combined chlorine (when measurement set to Free Chlorine). Maximum interference from combined chlorine is 1%.
- Only one reagent type is required for discrete measurements such as free chlorine, combined chlorine, residual chlorine.
- 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-cleaning function.

### Standard Specifications

Product Name:	Residual Chlorine Analyser
Model:	CLF-101
Measurement Object:	1. <i>Batch</i> measurement of discrete Residual Chlorine. Measurement output can be one of the following: - Free Chlorine - Mono Chloroamine - Dichloroamine - Combined Chlorine - Residual Chlorine  2. <i>Continuous</i> measurement of Free Chlorine in water under chlorination process
Measurement Method:	Polarography by eccentric rotary micro electrode
Sensor:	CLR-32 swing rotary (with built-in Au-Pt temperature compensation sensor) sensing electrode type 2132
Measurement Range:	Select one of the following: 0~2 / 0~5 mg/L 0~3 / 0~6 mg/L 0~5 / 0~10 mg/L Note: PPM units are also available as an option
Measurement Range Switching:	Manual or remote range switching available (specify with order)
Display:	LCD Display, 4 digits (0.00~10.00)



Output Signal:	4~20mA isolated (max load; 600 Ω)
Contact Switching Outputs (contact rating DC30V, 0.1A):	Range indication, under maintenance, power failure, low sample flow, low reagent flow, flow error, temp. fault, under cleaning mode (when cleaning option is present), high conc., low conc.
Contact Switching Inputs (contact rating: DC30V, 0.1A):	Range selection (open contacts = low range, closed contacts = high range). Auto cleaning start (contacts closed for 100ms or longer) (remote range selection and auto cleaning are available when specified by client)
Sample Conditions:	Temperature: 0~40 °C (no freezing) Pressure: 0.02~0.3 MPa (0.2~3.0 Kg/cm <sup>2</sup> )
Sample Consumption:	1~3 l/min (flowrate of sample to be introduced into analyser: 50ml/min)
Reagent Composition:	Approx 1.1 ml/min (1.6 l/day, 50 l/month)
Reagent Information:	

Extra pure grade reagent	Composition	
	50L	100L
Potassium Bromide	1500g	3000g
Sodium Anhydride	500g	1000g
Acetic Acid	500ml	1000ml

Wetted Materials:	Hard PVC, Teflon tubing, Polyethylene tubing.
Liquid Transfer:	Sample and reagent solutions are transferred to the flow cell by solution pumps
Power Requirements:	Standard: 100VAC $\pm$ 10%, 50/60Hz Optional; 110/115/220/240 VAC (Client to specify operating power)
Power Consumption:	Approx: 60VA (Main instrument with cleaning option)
Construction:	Indoor, self standing, splash proof
Operating Ambient Temperature:	-5~50 °C
Operating Humidity:	< 85 RH
Main Materials of Construction:	Transmitter: ADC12 (aluminium die-casting) Sensor: A6063T (Al) Frame: A1100P (Al)
Paint Finish:	Transmitter: Pantone 537C (Munsell 5PB8/1) Mounting frame: Grey (Munsell N6)
Weight:	Approx 20kg
Piping Connections:	Sample inlet: VP16 pipe Reagent inlet: VP16 pipe Drain: VP25 pipe Cleaning Water (option): VP16 pipe
Wiring Connections	6mm~12mm cable entry port

## Optional Function

### Automatic Cleaning System

Cleaning Method:	Water or Ozone (Water+Ozone) (client to specify)
Cleaning Start Mode:	<i>Manual</i> ; cleaning start controlled by keypad command. <i>Auto</i> ; cleaning start controlled by internal timer. <i>Remote</i> ; cleaning start controlled by external contact switching signal (when internal timer is set to 0 hrs).
Cleaning Cycle:	Can be set by user between 0~24 hours (initial factory setting is 12 hours)
Cleaning Duration:	<i>Water jet</i> ; 2 minutes, fixed <i>Ozone</i> ; 8 minutes, fixed
Standby Time After Cleaning:	Can be set by user between 0~30 minutes (initial factory setting is 15 minutes)
Output Hold Time During Cleaning:	= Cleaning Time + Standby Time
Cleaning Water Conditions:	<i>Temperature</i> ; 2~30 °C <i>Pressure</i> ; 0.2~0.7 MPa (2~7 Kg/cm <sup>2</sup> ) <i>Consumption</i> ; Approx 3 l/min
Water Quality:	Equivalent to city water (potable water)

## Performance

Repeatability:	$\pm$ 2% FS (for Free Chlorine Measurement)
Linearity:	$\pm$ 3% FS (for Free Chlorine Measurement)
Response Time:	(1) Within 9 minutes for 90% response for 5 kinds of <i>Residual Chlorine</i> batch measurement (2) Within 3 minutes for 90% response for <i>Free Chlorine</i> continuous measurement (at flowrate 50ml/min from standard solution inlet)

### Model CLF-101 Application and Optional Functions:-

		Flowing City Water			
		Head water (before chlorine)	Settling pond (mid-chlorine)	High chlorination process	Supply water (after chlorine)
		0~5/ 10 mg/l	0~2/ 5 mg/l	0~2/ 5 mg/l	0~2/ 5 mg/l
Standard		--	--	--	O
Optional Functions	Water Cleaning	--	O	O	$\Delta$
	Ozone + water cleaning	O	$\Delta$	$\Delta$	--
Filter Unit		O	--	--	--

O: Application.  
 $\Delta$ : Recommended.

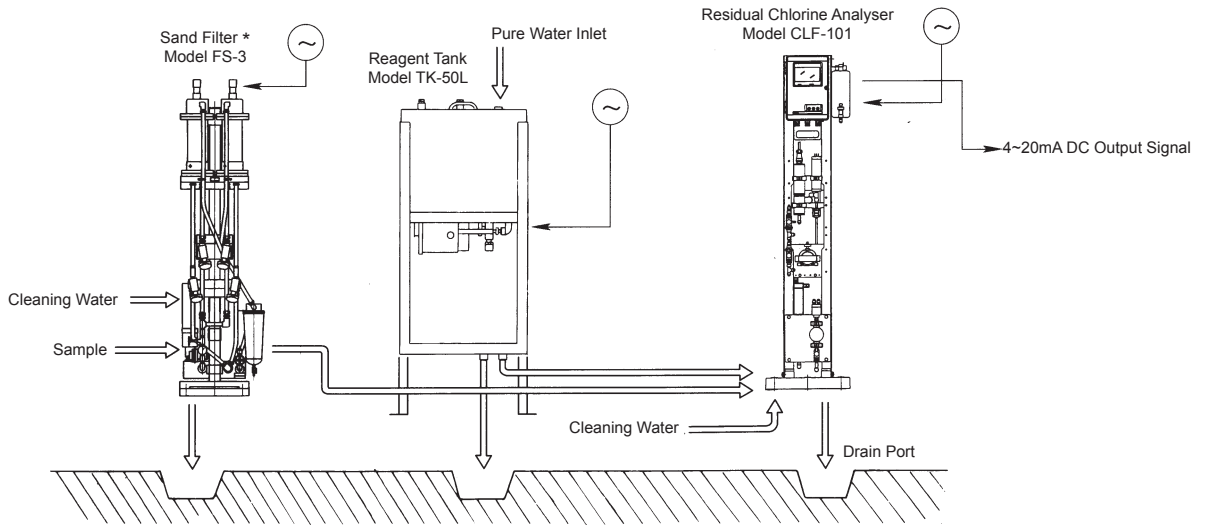
## Principle of Operation

This instrument consists of a sensor, transmitter, volumetric tank, 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 Br<sub>2</sub> corresponding to the chlorine concentration in the sample. The liberated Br<sub>2</sub> 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 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.

By changing the applied voltage, combined chlorine, residual chlorine can also be measured.

# Typical System Configuration

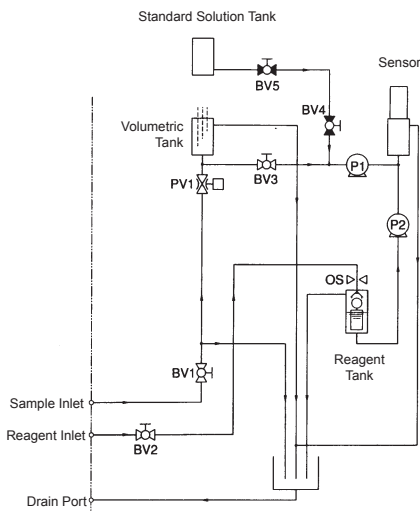


\* Sand filter required for removal of suspended solids in sample.

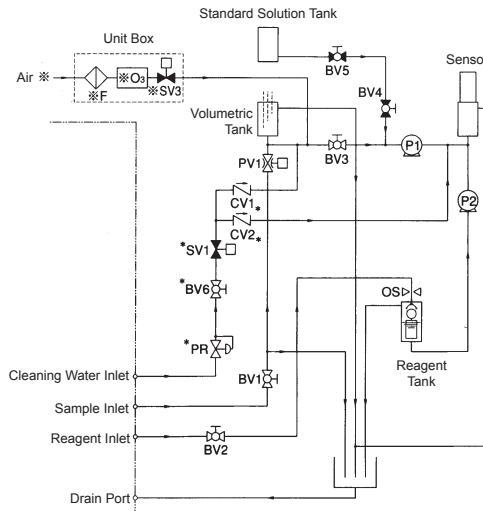
## Flow Schematic

### • Model CLF-101

#### Standard



#### With Cleaning System



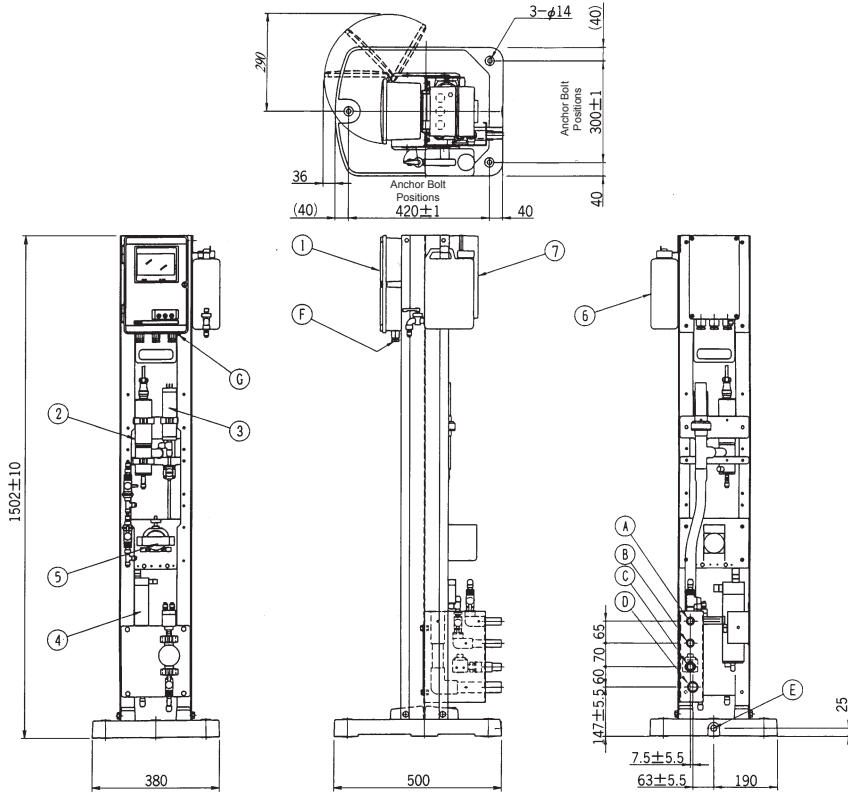
Symbol	Description
CV1	Check Valve *
CV2	Check Valve *
OS	Reagent Optical Flow Sensor
F	Air Filter *
PR	Pressure Regulator *
P1	Sample Pump
P2	Reagent Pump
BV1	Sample Adjustment Valve
BV2	Reagent Stop Valve
BV3	Sample Supply Valve
BV4	Std. Solution Supply Valve
BV5	Std. Solution Stop Valve
BV6	Cleaning Water Stop Valve *
PV1	Pinch Valve for Stopping Sample
SV1	Solenoid Valve *
SV3	Solenoid Valve *
O <sub>3</sub>	Generator *
* Optional Items	

Normally Open  
 Normally Closed

# Dimensions

Units: mm

## ● Model CLF-101



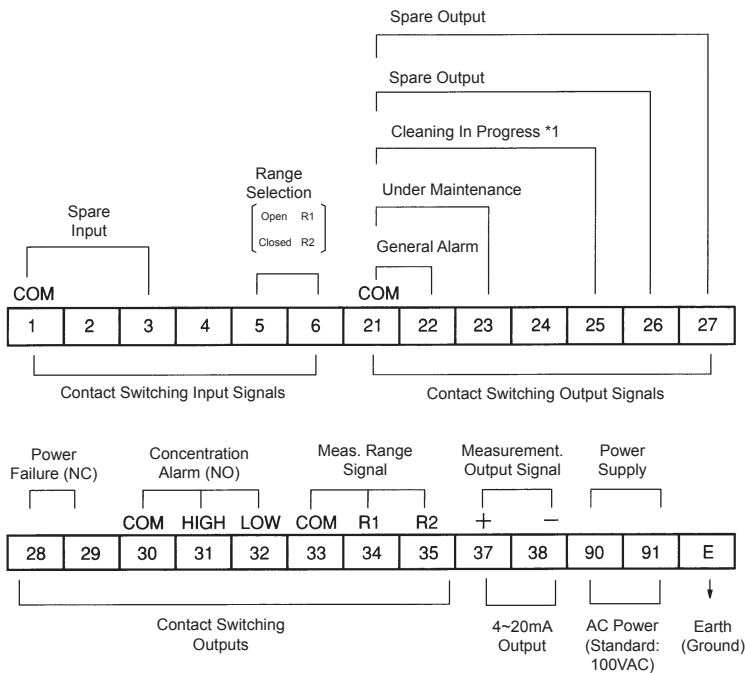
Item	Description	Remarks
1.	Transmitter	
2.	Sensor	
3.	Volumetric Tank	
4.	Reagent Tank	
5.	Pump	
6.	Standard Solution Tank	2 Litre
* 7.	Control Box	

Item	Description	Remarks
A.	Reagent Inlet	VP16
B.	Sample Inlet	VP16
* C.	Cleaning Water Inlet	VP16
D.	Drain Port	VP25
E.	Condensation Drain	Rc <sup>1</sup> / <sub>2</sub> (with plug)
F.	Cable Entry	6~12mm gland x 4
* G.	Air purge Inlet	Rc <sup>1</sup> / <sub>4</sub> (with plug)

\* Optional Items

# Terminal Connections

## ● Model CLF-101



Contact Switching Input Signals:  
Contact rating: DC30V, 0.1A

Contact Switching Output Signals:  
Contact rating: DC30V, 0.1A

Concentration Alarm Signals:  
Contact rating: DC30V, 0.1A

4~20mA Output Signal:  
Load Resistance: 600 Ohms

\*1 : With automatic cleaning option

# Related Equipment

## 1. Reagent Tank, Model TK-50

Capacity: 50 litres  
 Main Materials: Hard PVC  
 Stirring Pump Operating Power: 100VAC ± 10%, 50/60Hz  
 Power Consumption: Approx. 35VA  
 Weight: Approx. 40 kg (excluding reagents)  
 Pipe Connections: Outlet Port; VP16 A socket  
 Drain; VP16A socket  
 Cable: Waterproof plug for 6~12mm OD cable

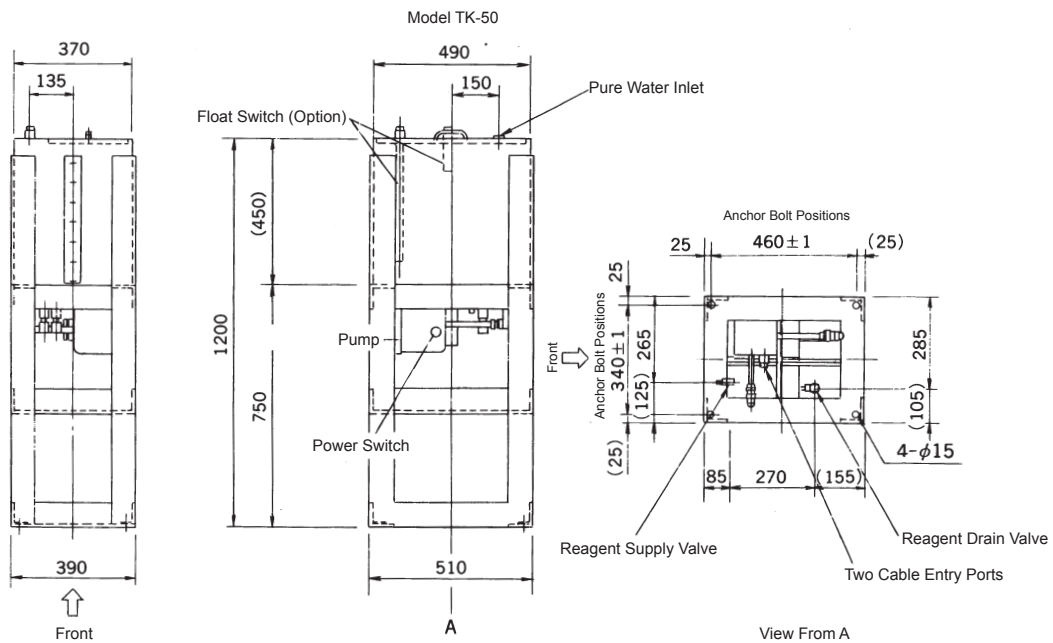
## 2. Sand Filter, Model FS-3

Application: Removal of Suspended Solids from the sample to be introduced into the analyser  
 Filtration Method: Dual cylinder, continuous sand filtration with automatic changeover between cylinders.  
 Filtration Material: Sand Particles (0.8mm & 1.0mm diameter)  
 Filtration Rate: 1~6 l/min (depending on the turbidity of the sample)

# Dimensions

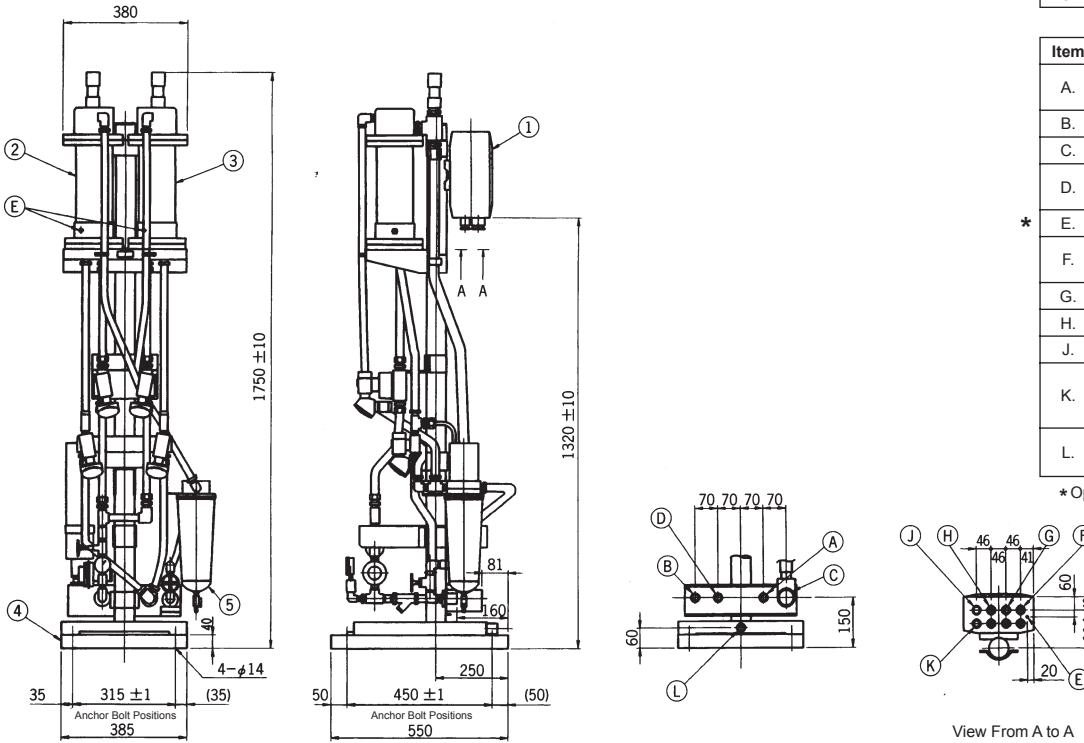
Units: mm

## ● Reagent Tank Model TK-50



# Dimensions

## ● Sand Filter Model FS-3



Item	Description	Remarks
1.	Controller	
2.	Filter Tank 1	
3.	Filter Tank 2	
4.	Mounting Frame	
5.	Sand Trap	

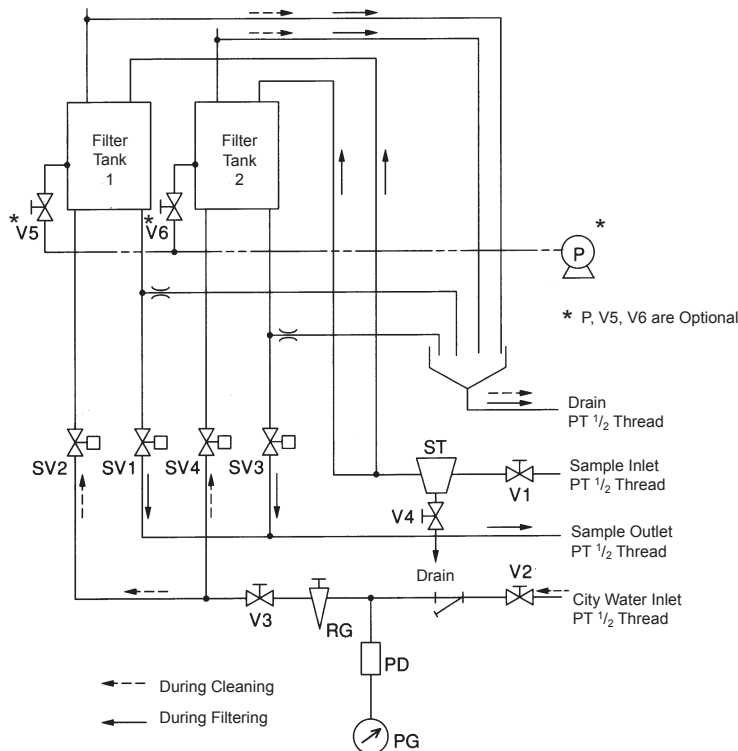
Item	Description	Remarks
A.	City Water Inlet	Rc 1/2
B.	Sample Inlet	Rc 1/2
C.	Drain Port	Rc 1/2
D.	Sample Outlet	Rc 1/2
* E.	Air Inlet	Rc 1/4 (with plug)
F.	Cable Entry (Power)	B20d
G.	Cable Entry	B20d (spare)
H.	Cable Entry	B20d (spare)
J.	Cable Entry	B20d (spare)
K.	Cable Entry (solenoid valve)	Pre-wired
L.	Condensate Drain	Rc 1/2 (with plug)

\* Optional Item

View From A to A

# Flow Schematic

## ● Sand Filter Model FS-3

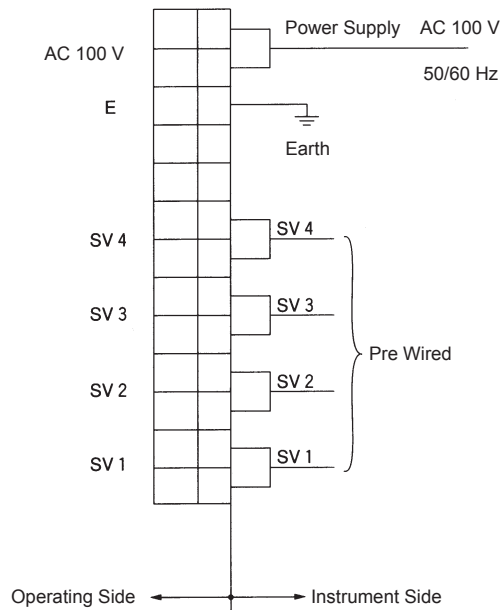


\* P, V5, V6 are Optional

Symbol	Description
V1	Sample Flow Adjust Valve
V2	City Water Shut-off Valve
V3	City Water Flow Adjust Valve
V4	Drain Valve
P	Gas Pump
V	Manual Valve
SV	Solenoid Valve
PD	Pressure Smoothing Connection
PG	Pressure Gauge 0~10 Kg/cm <sup>2</sup>
RG	Pressure Regulator
ST	Sand Trap

# Terminal Connections

- Sand Filter Model FS-3



Always read the instruction manual before operation.

Due to continuous product improvement, specifications contained herein are subject to change without notice.

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