

# General Specifications

## EXA AUTO CLEAN Chemical Cleaning pH Measuring System

EXA AUTO CLEAN

GS 12B7A1-E

### GENERAL

The EXA AUTO CLEAN chemical cleaning pH measuring system incorporates an intelligent pH converter that provides advanced sensor diagnostic functions. This measuring system features automatic chemical cleaning of the pH sensor as well as highly-reliable pH measurement; thus, it successfully meets an increasing need for accurate, reliable, and maintenance-free measuring systems.

Process pH measuring systems have played an important role in many fields including the chemical, food, metal, and paper pulp industries. They measure / manage raw materials, control / monitor the reacting conditions in manufacturing processes, and determine the quality of products. These pH measuring systems are also used for controlling wastewater disposal processes, monitoring the pH level in rivers, and so on. Generally, pH sensors are subject to aging due to contamination and deterioration, and require periodic cleaning to maintain their performance. The EXA AUTO CLEAN chemical cleaning pH measuring system solves this problem, while facilitating labor savings and eliminating dangerous operations at the job site.

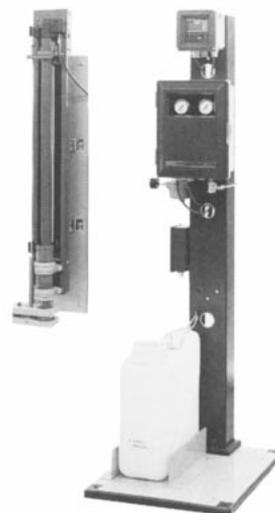
### FEATURES

- The EXA AUTO CLEAN chemical cleaning pH measuring system cleans the sensor by immersing it in HCl or another chemical solution which is agitated by air bubbling. This can remove scaling (e.g., CaCO<sub>3</sub>) as effectively as manual cleaning.
- The EXA PH intelligent pH converter can diagnose deterioration of electrodes, and check for a decline in a process liquid level.
- Since the sensor holder can raise the pH sensor, the driving part does not come into contact with the liquid; thus, reliable operation is ensured for extended periods.
- Output signals are held during cleaning.

### SYSTEM CONFIGURATION

	Chemical Cleaning pH Measuring System	
	2-wire pH Transmitter	4-wire pH Converter
1. Sensor	PH8EFP-□-TT2	PH8EFP-□-TT2
2. Holder	PH8HS3	PH8HS3
3. pH converter	PH200G	PH400G
4. Chemical cleaning unit	PH8SM3	PH8SM3
5. Distributor	PH201G	—
6. Accessory	PH8AX	PH8AX

Note: For effective cleaning, specify a pH sensor with a medium-pressure KCl reserve tank (basic code: "-TT2"). In addition, select an appropriate chemical solution for cleaning.



### STANDARD SPECIFICATIONS

#### 1. pH Sensor

The sensor used in this system is filed with KCl from a medium-pressure reserve tank (PH8EFP-□-TT2). For details, refer to GS 12B7C1 - E or GS 12B7D1 - E.

#### 2. Holder

**Model:** PH8HS3

**Functions:** Moves the pH sensor up or down using an air cylinder, and provides facilities for chemical cleaning.

**Structure:** Constructed for outdoor use

**Max. External Dimensions:**

190 (W) × 170 (D) × Approx. 830 to 1530mm (H)  
(when the sensor is raised)

**Mounting:** Mounted on a 50A vertical pipe (outside diameter: 60.5mm). Two mounting brackets are supplied.

**pH Sensor Up/Down Movement (nominal):**

300mm, 600mm, 1000mm

**Weight:** Approx. 8kg (holder with 300mm movement)  
Approx. 10kg (holder with 600mm movement)  
Approx. 12kg (holder with 1000mm movement)

<Materials>

Frame: Baking finish over SUS316

Bottom Cover Pull-up Mechanism:

Rod (PPS resin) and screws (PEEK)

Mounting bracket: SUS316

Holder : Polypropylene and hard PVC  
 (for part of a holder)  
 Solution Chamber : Hard PVC  
 O-ring : Fluororubber  
 Gasket : EPDM

**Solution Temperature Range** : -5 to 80°C  
**Flow Speed** : 4m / s or less  
**Accessory** : One gasket (material : EPDM)

**3. Intelligent pH Converter / Transmitter**

Either of the following can be selected :

- EXA PH (4-wire) : PH400G
- EXA PH (2-wire) : PH200G+PH201G

For details, refer to GS 12B7C1 - E or GS 12B7D1 - E.

**4. Chemical Cleaning Unit**

**Model** : PH8SM3

**Cleaning Method** : Automatic chemical cleaning using air bubbling

**Cleaning Intervals** : 0.1 to 24.0 hours  
 (for the PH200G)  
 0.1 to 36.0 hours  
 (for the PH400G)

**Cleaning Duration** : 0.1 to 10 min  
 (factory setting : 4 min)

**Relaxation Time** : 0.1 to 10 min  
 (factory setting : 0.5 min)

**Bubbling (SV1 : On) Time** : 0 to 10 min  
 (factory setting : Approx. 2 min)

**Cylinder Failure Time** : 0 to 1 min  
 (factory setting : Approx. 0.5 min)

**Structure** : Free-standing rack for outdoor installation

**Main Components** : Chemical solution tank, control box, air-pressure regulator, and power supply unit (for 4-wire pH converter only)

**Chemicals for Cleaning** : Acid solution (e.g., hydrochloric acid or diluted sulfuric acid).  
 Organic solvents are not allowed.

**<Material, Finish, and Color of Main Components>**

- Control Box
  - Material : Aluminum alloy casting
  - Colors : Deep sea moss green  
 (Munsell 0.6GY3.1 / 2.0) and frosty white  
 (Munsell 2.5Y8.4 / 1.2)
  - Finish : Baked polyurethane resin coating
- Power Supply Unit (for 4-wire pH converter only)
  - Material : Carbon steel (body)
  - Color : Deep sea moss green  
 (Munsell 0.6GY3.1 / 2.0 or equivalent)
- Mounting Rack
  - Material : Carbon steel
  - Color : Deep sea moss green  
 (Munsell 0.6GY3.1 / 2.0)
  - Finish : Baked polyurethane resin coating

To be set in the pH converter.

- Chemical Solution Tank (20 l tank containing 2 to 10% of diluted hydrochloric or sulfuric acid; approximately 100ml is used for each cleaning)  
 Material : Polyethylene resin (for solution tank), and hard PVC resin (for internal tank)
- Tubing for Solution, Air, or KCl  
 Material : Polyethylene resin for tubing, and polypropylene resin for joints

**Ambient Temperature** : 0 to 45°C

**Power Supply** : 100V AC ± 10%, 50 / 60Hz ± 5%

**Power Consumption** : Approx. 60VA

**Air Supply** : 300 to 950kPa (3 to 9.5kgf / cm<sup>2</sup>)

**Max. Air Consumption** : Approx. 10Nl / min

**External Dimensions** : 500 (W) × 600 (D) × 1610mm (H)\*

(\*: If the suffix code "TT2" for the KCl tank is specified, the height will be 1780mm.)

**Weight** : Approx. 50kg

**Output Contact Signal** : Cylinder failure

Contact State : Normally open

Contact Capacity : 24V DC, 1A

110V AC, 0.3A (resistance load)

**Output :**

4 to 20mA DC

(isolated transmission output; maximum load of 600Ω)

0 to 1V DC

(isolated transmission output; minimum load of 1KΩ)

pH or temperature can be set arbitrarily.

**Cable Connection** : G 1/2 gland packing is supplied.

Terminal Size : M4

Outside Cable Diameter : Ø9 to 12mm

**<Piping Connection>**

Washing Solution : VP16A socket

Air for Instrumentation : Rc 1/4 (PT 1/4) female thread

- Note** : ① The KCl reserve tank is installed in an appropriate place at the job site or attached to the stand for the chemical cleaning unit.  
 ② The wiring and piping between the chemical cleaning unit, sensor, KCl reserve tank, and holder are to be done by the user.  
 ③ The wiring between the switch in the holder and the chemical cleaning unit is to be done by the user. The terminal size is M4.

## MODEL AND SUFFIX CODES

### 1. pH Sensor

For the pH sensor in the system, specify the PH8EFP-□-TT2 model (KCl-filled with a medium-pressure reserve tank), such as PH8EFP-03-TN-TT2-N-T\*A. For details, refer to GS 12B7C1 - E or GS 12B7D1 - E.

### 2. Holder (Product Code: J208)

Model	Basic Code	Option Code	Specifications
PH8HS3	.....	.....	Holder
Material	-PP .....	.....	Polypropylene
Movement	-03 .....	.....	300mm (with 2 mounting brackets)
	-06 .....	.....	600mm (with 2 mounting brackets)
	-10 .....	.....	1000mm (with 2 mounting brackets)
pH measuring system	-C .....	.....	EXA PH 4-wire pH converter system (PH400G)
	-T .....	.....	EXA PH 2-wire pH transmitter system (PH200G)
Cleaning system	-YP .....	.....	Acid or alkali solutions can be used.
—	*B .....	.....	Style B

### 3. Intelligent pH Converter / Transmitter

\*Specify either of the following:

- Intelligent 4-wire pH converter system (PH400G)
- Intelligent 2-wire pH transmitter system (PH200G+PH201G)

For details, refer to GS 12B7C1 - E or GS 12B7D1 - E.

### 4. Chemical Cleaning Unit (Product Code: J207)

Model	Basic Code	Option Code	Specifications
PH8SM3	.....	.....	Chemical cleaning unit
pH measuring system	-C .....	.....	EXA PH 4-wire pH converter system (*1)
	-T .....	.....	EXA PH 2-wire pH transmitter system (*1)
KCl reserve tank	-TT2 .....	.....	Medium-pressure reserve tank (*2)
Pressure regulator for KCl tank	-N .....	.....	None
	-PR .....	.....	Attached to the stand (*3)
Air connection	-JP .....	.....	Rc 1/4 (PT 1/4) female thread
	-NP .....	.....	1/4 NPT female thread
Tubing for cleaning chemicals	-L□□ .....	.....	Enter the appropriate length (in meters) in the blank boxes. If the length is 3m, for example, the suffix code will be "-L03." The maximum length is 10m. (*4)
—	*B .....	.....	Style B
—		/H .....	With hood

(\*1): The converter system is attached to the chemical cleaning unit when shipped.

(\*2): Specify a sensor with a medium-pressure KCl tank (basic code "TT2").

(\*3): For a cleaning unit with a pressure regulator, a 10m tube is provided to connect the regulator to the KCl reserve tank.

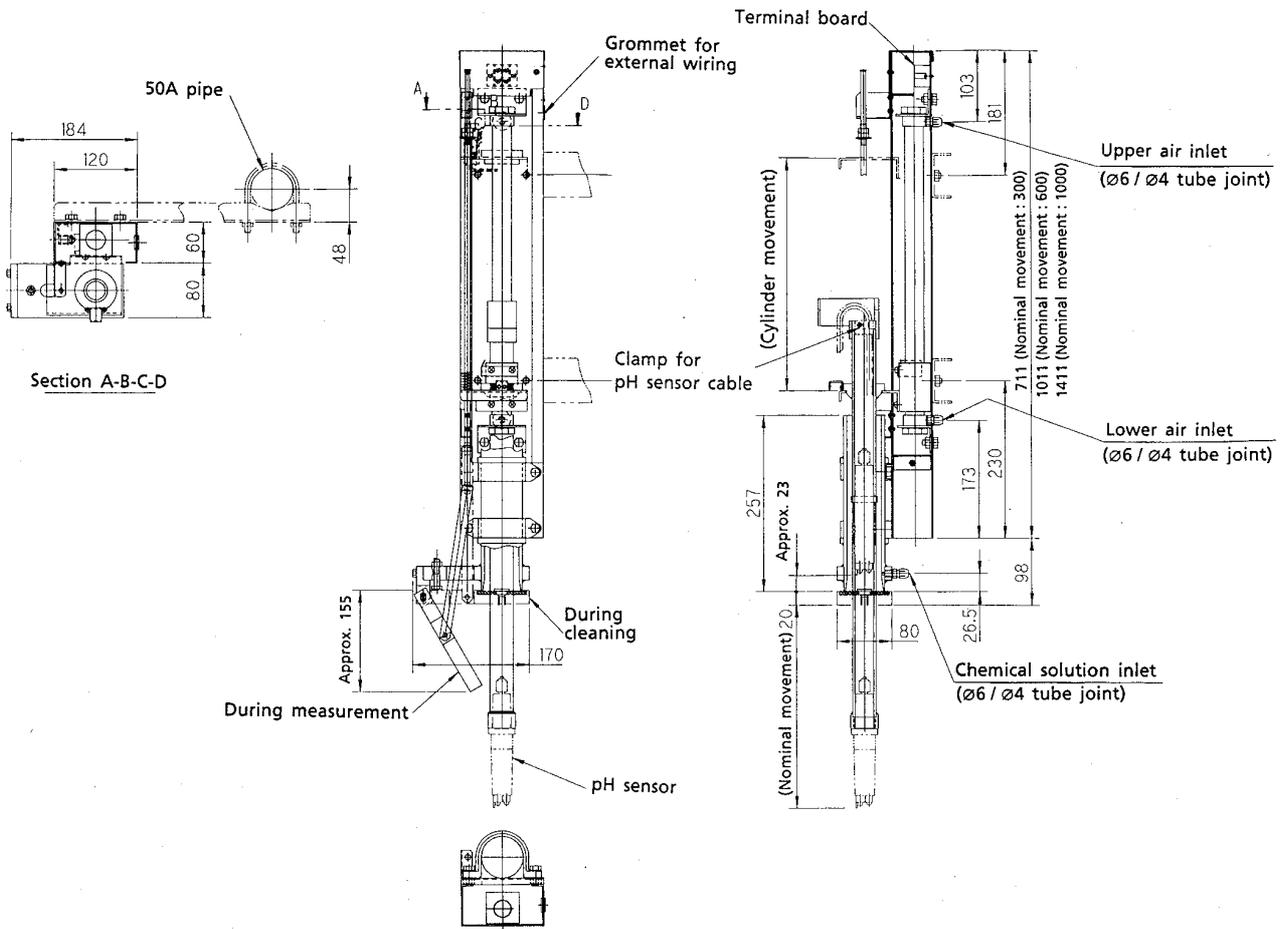
(\*4): Specify the length of the three tubes according to the distance between the chemical cleaning unit and holder.

Note: The system must undergo start-up service when the chemical cleaning pH measuring system is installed.

# EXTERNAL DIMENSIONS

## (1) Sensor Holder

Unit : mm



Unit : mm

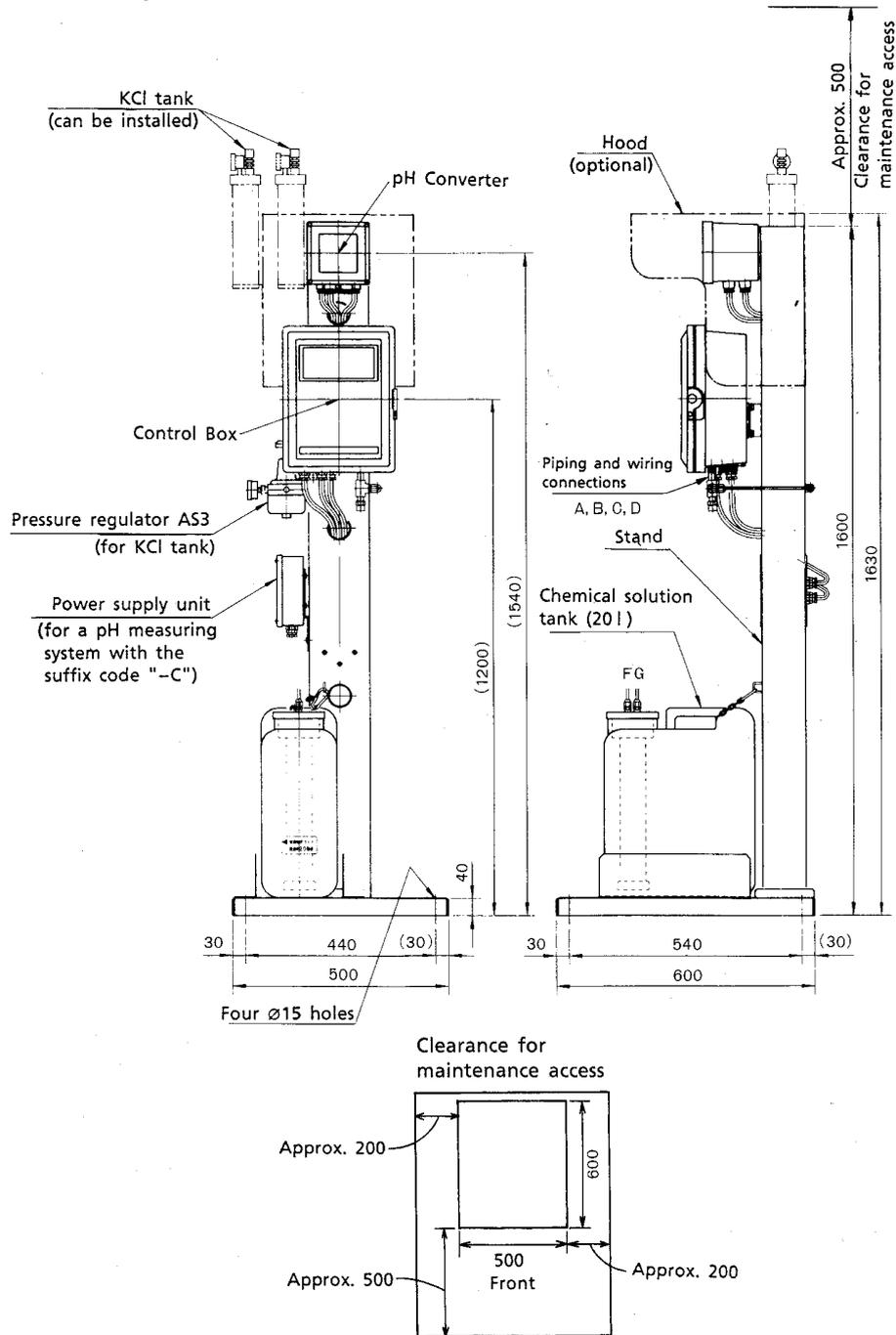
Nominal movement	Actual movement	L1	L2	L3	L4	L5
300mm	340mm	1107	712	395	—	—
600mm	640mm	1407	1012	695	300	—
1000mm	1040mm	1807	1412	1095	300	300

Note: ● Specify nominal movement when ordering.

- L4 and L5 designate the movable position for the pipe mounting bracket.
- A 50A pipe is to be provided by the user.

(2) Chemical Cleaning Unit / Converter

Unit : mm



Piping Connections : A : Air

B : Air for pneumatic transmission of chemical solution

C : Air to the lower inlet on the cylinder

D : Air to the upper inlet on the cylinder

F : IN (air for pneumatic transmission of chemical solution)

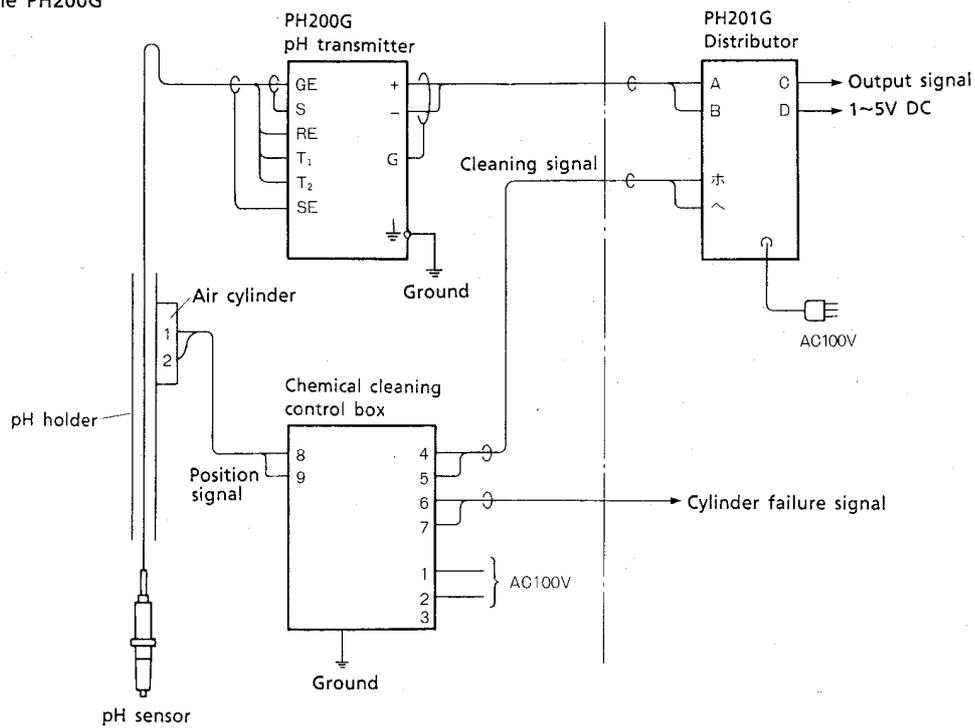
G : OUT (chemical solution and air)

Note :

- The maximum piping distance to the holder is 10m.
- It is preferable to install the stand at the same level as the sensor holder. If this is not possible, the stand can be installed a maximum of 2m below the holder level. Installation above the holder level causes no problems.

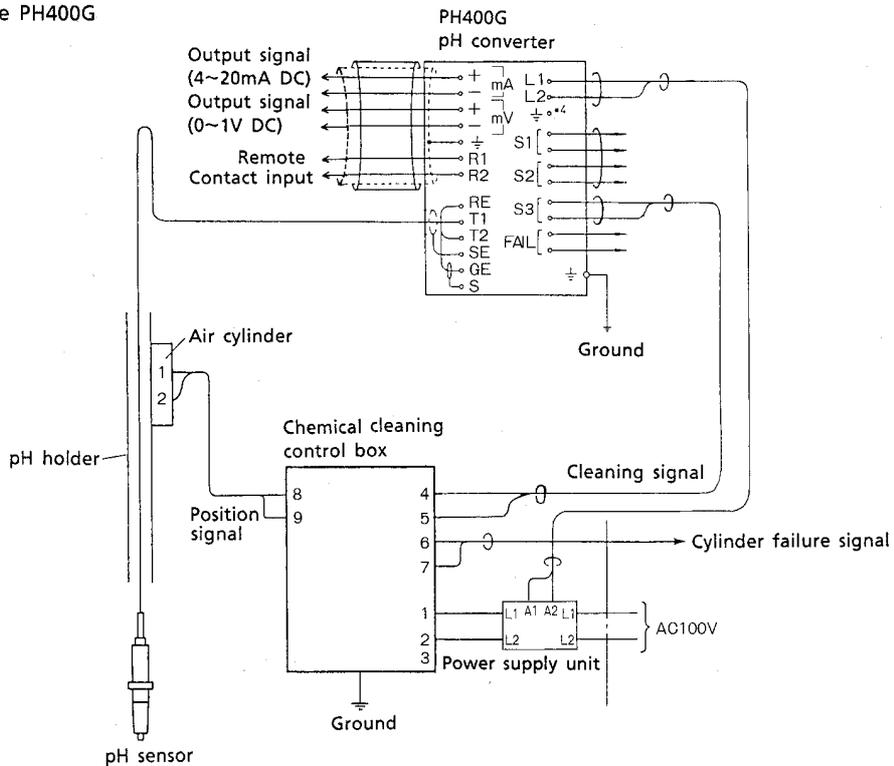
(3) Wiring Diagrams

For the PH200G



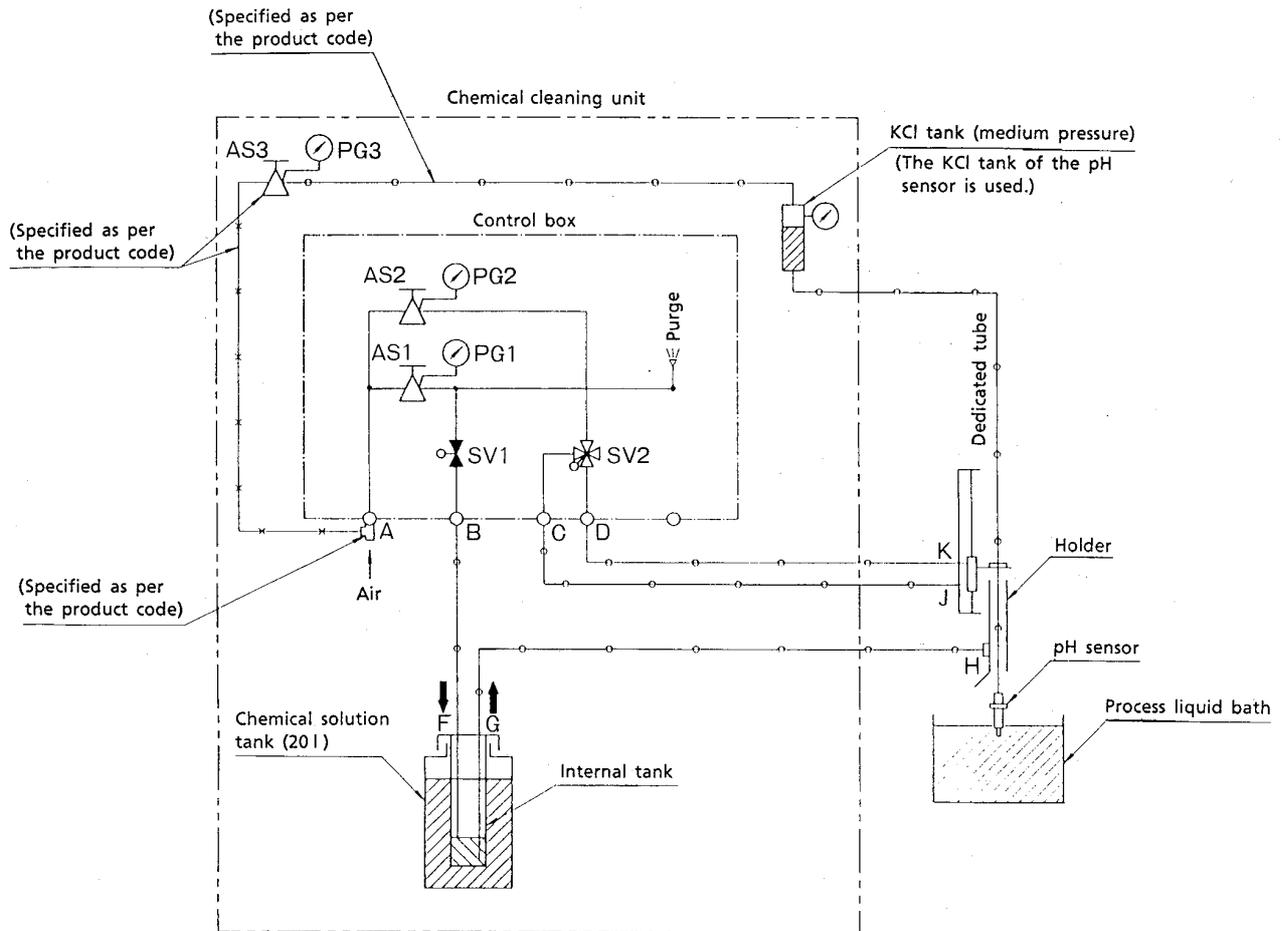
Control box electrical connections : Watertight plastic gland equivalent to JIS A15 (outside cable diameter : 9 to 12mm)

For the PH400G



Electrical connections on the control box and power supply unit : Watertight plastic gland equivalent to JIS A15 (outside cable diameter : 9 to 12mm)

(4) Piping Diagram



<Symbols>

- AS1, 2 : Air-pressure regulator
- SV1 : 2-way solenoid valve (N.C)
- SV2 : 4-way solenoid valve
- PG1, 2 : Pressure gage

<Connection>

- A, B, C, D : Rc 1/4 (PT 1/4) female thread (ø6 / ø4 tube joints are supplied.)
- F, G : ø6 / ø4 tube joints
- H, J, K : ø6 / ø4 tube joints

<Piping>

- : ø4 / ø2.5 nylon tube
- ⊖ : ø6 / ø4 polyethylene tube
- ⊗ : ø6 / ø4 stainless steel tube

<Function>

- J : Air inlet (air to raise the sensor holder)
- K : Air inlet (air to lower the sensor holder)
- AS1 : For pneumatic transmission of chemical solution
- AS2 : For driving the air cylinder
- AS3 : For pneumatic transmission of KCl

Note 1: The tubes between the cleaning unit and the sensor holder are provided with the product. The maximum length is 10m (including joints).

Note 2: The tubes and joints are made of polyethylene resin. They should be replaced approximately once a year, although the intervals may vary depending on the chemicals used.

## EXA AUTO CLEAN Chemical Cleaning pH Measuring System Quotationnaire

Thank you for requesting a quote for a Yokogawa EXA AUTO CLEAN Chemical Cleaning pH Measuring System Quotationnaire.

Please fill in this specification form by placing a check "X" marks in the appropriate boxes, and filling in the blanks.

### 1. General Information

Name of inquirer (company/organization): \_\_\_\_\_  
 Person in charge: \_\_\_\_\_ Department/section: \_\_\_\_\_ (Phone: \_\_\_\_\_)  
 Plant name: \_\_\_\_\_  
 Measurement site: \_\_\_\_\_  
 Applications:  Indication  Recording  Alarming  Control  Others

### 2. Measuring Conditions

(1) Liquid temperature: \_\_\_\_\_; normal \_\_\_\_\_ [°C]  
 Flow rate: \_\_\_\_\_; normal \_\_\_\_\_ [l/min]  
 (2) Flow speed: \_\_\_\_\_; normal \_\_\_\_\_ [m/s]  
 (3) Slurry or contaminants?:  No  Yes \_\_\_\_\_  
 (4) Name of process liquid: \_\_\_\_\_  
 (5) Liquid constituent: \_\_\_\_\_  
 (6) Others: \_\_\_\_\_

### 3. Site

(1) Ambient temperature: \_\_\_\_\_ [°C]  
 (2) Installation location:  Outdoors  Indoors \_\_\_\_\_  
 (3) Others: \_\_\_\_\_

### 4. Required Specifications

(1) Measuring range:  pH 0 to 14  \_\_\_\_\_  
 (2) Transmission output:  4 to 20mA DC  
 (3) System configuration:  Sensor  Holder  pH transmitter  pH converter  Chemical cleaning unit  
 Distributor  Accessories  
 (4) Sensor cable length:  3m  5m  \_\_\_\_\_m  
 (5) Tube length between sensor holder and cleaning unit: \_\_\_\_\_m  
 (6) Holder movement:  300mm  600mm  1000mm  
 (7) Others: \_\_\_\_\_

Note: The system must undergo startup service when the EXA AUTO CLEAN chemical cleaning pH measuring system is installed.