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**User's  
Manual**

**Model ST401G  
Sampling System**

IM 12A0V2-E

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# INTRODUCTION

This manual explains the installation, operation and use of the sampling system. Read through this manual before operation for your safety and to obtain the specified performance from the sampling system.

Refer to the manuals shown below for the handling of pH converter system and free available chlorine analyzer used with this sampling system.

Model	Title	IM No.
FLXA402	4-Wire Converter	IM 12A01F01-02EN
PH8EFP	KCl filling type pH Sensor	IM 12B7J1-01E
FC800D	Non-reagent Type Free Available Chlorine Sensor Unit	IM 12F05B10-02EN
PG400	Pulse Generator for Clean Unit	IM 19C01B05-01EN
PH8HF	Flow-Through Type Holder	IM 12B07N01-01E

## ■ Safety, Protection, and Modification of the Product

- In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user's manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- If this instrument is used in a manner not specified in this user's manual, the protection provided by this instrument may be impaired.
- If any protection or safety circuit is required for the system controlled by the product or for the product itself, prepare it separately.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereafter simply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following symbols are used in the product and user's manual to indicate that there are precautions for safety:

## ■ Notes on Handling User's Manuals

- Please hand over the user's manuals to your end users so that they can keep the user's manuals on hand for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation.
- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

## ■ Warning and Disclaimer

The product is provided on an "as is" basis. YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA can not predict in advance.

## ■ Notes on Hardware

Check the following when you receive the product:

- **Appearance and Accessories**

Contact our sales representative or your local distributor if the product's coating has come off or it has been damaged.

- **Model and Suffix Codes**

The name plate on the product contains the model and suffix codes. Compare them with those in the general specification to make sure the product is the correct one. If you have any questions, contact our sales representative or your local distributor.

## ■ **Symbol Marks**

Throughout this user's manual, you will find several different types of symbols are used to identify different sections of text. This section describes these icons.



### **WARNING**

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Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

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### **CAUTION**

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Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

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### **CAUTION**

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Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

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### **NOTE**

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Draws attention to information essential for understanding the operation and features.

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## ◆ After-sales Warranty

- **Do not modify the product.**
- **During the warranty period, for repair under warranty consult the local sales representative or service office. Yokogawa will replace or repair any damaged parts. Before consulting for repair under warranty, provide us with the model name and serial number and a description of the problem. Any diagrams or data explaining the problem would also be appreciated.**
  - If we replace the product with a new one, we won't provide you with a repair report.
  - Yokogawa warrants the product for the period stated in the pre-purchase quotation. Yokogawa shall conduct defined warranty service based on its standard. When the customer site is located outside of the service area, a fee for dispatching the maintenance engineer will be charged to the customer.
- **In the following cases, customer will be charged repair fee regardless of warranty period.**
  - Failure of components which are out of scope of warranty stated in instruction manual.
  - Failure caused by usage of software, hardware or auxiliary equipment, which Yokogawa Electric did not supply.
  - Failure due to improper or insufficient maintenance by user.
  - Failure due to modification, misuse or outside-of-specifications operation which Yokogawa does not authorize.
  - Failure due to power supply (voltage, frequency) being outside specifications or abnormal.
  - Failure caused by any usage out of scope of recommended usage.
  - Any damage from fire, earthquake, storms and floods, lightning, disturbances, riots, warfare, radiation and other natural changes.
- **Yokogawa does not warrant conformance with the specific application at the user site. Yokogawa will not bear direct/indirect responsibility for damage due to a specific application.**
- **Yokogawa Electric will not bear responsibility when the user configures the product into systems or resells the product.**
- **Maintenance service and supplying repair parts will be covered for five years after the production ends. For repair for this product, please contact the nearest sales office described in this instruction manual.**



# Model ST401G Sampling System

IM 12A0V2-E 14th Edition

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# 1. OVERVIEW

Model ST401G is a compact sampling system which can be used with the pH converter system and the non-reagent type free available chlorine analyzer.

The measurement can be started after only simple installation because the ST401G is provided with a pressure-reducing valve and ball valve, and shipped with customer ordered devices.

## 1.1 System configuration

There are three types of sampling system. With free available chlorine analyzer, with pH converter (with the ultrasonic cleaner according to order) and with both non-reagent type free available chlorine analyzer and pH converter.

The model name and suffix codes are shown in Table 1.1. The outline is shown in item 1.2 to 1.5.

**Table 1.1 Model and Codes**

Model	Suffix Code	Option Code	Description
ST401G	.....	.....	Sampling system
System	-FC5	.....	With free available chlorine analyzer (FC800D/FLXA402T) (Note 5)
	-PH7	.....	With pH converter (FLXA402) (Note 1)
	-PF7	.....	With free available chlorine analyzer (FC800D/FLXA402T) and pH converter (FLXA402) (Note 1) (Note 5)
	-PF8	.....	With free available chlorine analyzer and pH analyzer (FC800D/FLXA402T_2 inputs type) (Note 1) (Note 6)
Ultrasonic oscillator (for pH meter)	-N -P	.....	Not supplied
		.....	Supplied (PG400)
—		-A	Always -A
Option		/R	Piping connections on the back
		/AN	Without instrument
		/S	With stainless steel stand (note 2)
		/ARS	With arrester (power and signal lines only) (note 3)
		/AZC1	With auto zero calibration for 100 V AC (note 4)
		/AZC2	With auto zero calibration for 110 V AC (note 4)
		/AZC3	With auto zero calibration for 200 V AC (note 4)
		/AZC4	With auto zero calibration for 220 V AC (note 4)
		/SCT	With stainless tag plate
		/TT3	With 500 ml KCl reserve tank for pH sensor (note 2)

Model ST401G refers only to a sampling system and does not include a free available chlorine analyzer and/or a pH meter (sensor, holder, converter and ultrasonic oscillator). (Instrument should be purchased separately).

Note that the ST401G Sampling System accepts the following models of note 1 or note 1 only, and depending on system configuration.

Note 1: 4-wire type pH converter system (refer to GS 12A01F01-01EN, GS 12B07B02-E, GS 12J05C02-00E)

- pH sensor: PH8EFP-03-TN-TT1-N-G\*A  
PH8EFP-03-TN-TT3-N-G\*A (when option code of "/TT3" specified)
- pH holders: PH8HF-PP-JPT-T-NN-NN\*A (without cleaning system)  
PH8HF-S3-JPT-T-NN-NN\*A (without cleaning system)  
PH8HF-PP-JPT-T-S3-C1\*A (with ultrasonic cleaning)  
PH8HF-S3-JPT-T-S3-C1\*A (with ultrasonic cleaning)
- pH converter: FLXA402-A-□ -AJ-P1-NN-A □ - □ - □ -N-NN (when suffix code of "-PH7" or "-PF7" specified)  
when suffix code of "-PF8" specified, one converter FLXA402T connects both free available chlorine sensor unit and pH sensor and FLXA402 isn't used. Refer to note 6.
- Ultrasonic oscillator: PG400 - A - □ - -AJ - PU - 00 - □ - ST (when suffix code of "-P" specified)

Note 2: Specify if needed, instead of the standard stanchion made of carbon steel.

Note 3: Available only when the suffix code "-FC5", or "-PH7-N (not Ultrasonic oscillator supplied.)" is specified. When "-PH7-P (Ultrasonic oscillator supplied.)" is specified, an arrester is supplied automatically without this option.

Note 4: Available when free available chlorine analyzer is specified, singly or in combination with pH meter, by suffix code, "-FC5", "-PF7" or "-PF8".

Note 5: Non-reagent type free available chlorine analyzer (refer to GS 12F05B10-01EN)  
Sensor unit : FC800D : Option code "/ST" (integration into ST401G sampling system) must be specified.  
Converter : FLXA402T : FLXA402T-A-□ -AJ -CL-NN-N □ -WR-N-□ -N-ST-NN / □

Note 6: Non-reagent type free available chlorine analyzer and pH analyzer (refer to GS 12F05B10-01EN)  
One converter FLXA402T hooks up both free available chlorine sensor unit and pH sensor.  
Sensor unit : FC800D : Option code "/ST" (integration into ST401G sampling system) must be specified.  
Converter : FLXA402T : FLXA402T-A-□ -AJ -CL-P1-N □ -WR-N-□ -N-ST-NN / □



Dimensions, wiring and piping diagram for the ST401G are shown on following pages. For figure numbers to be referred corresponding each models and codes are shown in the Table 1.2 below. Table 1.2 uses following signs.

FC: free available chlorine analyzer	pH: pH meter
US: ultrasonic oscillator	ARS: arrester
AZC: auto zero calibration	TT3: 500 ml KCl reserve tank for pH sensor
RR: remote range switching	R: piping connections on the back
Yes: installed	No: not installed
Op: optionally installed	

**Table 1.2 Index of dimensions, wiring and piping diagram**

Model and codes	FC	pH	US	ARS	AZC	TT3	RR	R	Dimensions	Wiring	Piping
ST401G-FC5-N-A (/ARS)	Yes	No	No	Op	No	No	Yes	No	Figure 3.1	Figure 3.23 Figure 3.25	Figure 4.1
ST401G-FC5-N-A /AZC	Yes	No	No	No	Yes	No	Yes	No		Figure 3.24	Figure 4.2
ST401G-FC5-N-A /AZC /ARS	Yes	No	No	Yes	Yes	No	Yes	No		Figure 3.26	
ST401G-FC5-N-A /R (/ARS)	Yes	No	No	Op	No	No	Yes	Yes	Figure 3.2	Figure 3.23 Figure 3.25	Figure 4.1
ST401G-FC5-N-A /R /AZC	Yes	No	No	No	Yes	No	Yes	Yes		Figure 3.24	Figure 4.2
ST401G-FC5-N-A /R /AZC /ARS	Yes	No	No	Yes	Yes	No	Yes	Yes		Figure 3.26	
ST401G-PH7-N-A (/ARS)	No	Yes	No	Op	No	No	No	No	Figure 3.3	Figure 3.27 Figure 3.28	Figure 4.3
ST401G-PH7-P-A	No	Yes	Yes	Yes	No	No	No	No		Figure 3.29	
ST401G-PH7-N-A /TT3 (/ARS)	No	Yes	No	Op	No	Yes	No	No	Figure 3.4	Figure 3.27 Figure 3.28	
ST401G-PH7-P-A /TT3	No	Yes	Yes	Yes	No	Yes	No	No		Figure 3.29	
ST401G-PH7-N-A /R (/ARS)	No	Yes	No	Op	No	No	No	Yes	Figure 3.5	Figure 3.27 Figure 3.28	
ST401G-PH7-P-A /R	No	Yes	Yes	Yes	No	No	No	Yes		Figure 3.29	
ST401G-PH7-N-A /R /TT3 (/ARS)	No	Yes	No	Op	No	Yes	No	Yes	Figure 3.6	Figure 3.27 Figure 3.28	
ST401G-PH7-P-A /R /TT3	No	Yes	Yes	Yes	No	Yes	No	Yes		Figure 3.29	
ST401G-PF7-□-A	Yes	Yes	Op	Yes	No	No	Yes	No	Figure 3.7	Figure 3.30	Figure 4.4
ST401G-PF7-□-A /TT3	Yes	Yes	Op	Yes	No	Yes	Yes	No	Figure 3.8		
ST401G-PF7-□-A /R	Yes	Yes	Op	Yes	No	No	Yes	Yes	Figure 3.9		
ST401G-PF7-□-A /R /TT3	Yes	Yes	Op	Yes	No	Yes	Yes	Yes	Figure 3.10		
ST401G-PF7-□-A /AZC	Yes	Yes	Op	Yes	Yes	No	Yes	No	Figure 3.11	Figure 3.31	Figure 4.5
ST401G-PF7-□-A /AZC /TT3	Yes	Yes	Op	Yes	Yes	Yes	Yes	No	Figure 3.12		
ST401G-PF7-□-A /R /AZC	Yes	Yes	Op	Yes	Yes	No	Yes	Yes	Figure 3.13		
ST401G-PF7-□-A /R /AZC /TT3	Yes	Yes	Op	Yes	Yes	Yes	Yes	Yes	Figure 3.14		
ST401G-PF8-□-A	Yes	Yes	Op	Yes	No	No	Yes	No	Figure 3.15	Figure 3.32	Figure 4.4
ST401G-PF8-□-A /TT3	Yes	Yes	Op	Yes	No	Yes	Yes	No	Figure 3.16		
ST401G-PF8-□-A /R	Yes	Yes	Op	Yes	No	No	Yes	Yes	Figure 3.17		
ST401G-PF8-□-A /R /TT3	Yes	Yes	Op	Yes	No	Yes	Yes	Yes	Figure 3.18		
ST401G-PF8-□-A /AZC	Yes	Yes	Op	Yes	Yes	No	Yes	No	Figure 3.19	Figure 3.33	Figure 4.5
ST401G-PF8-□-A /AZC /TT3	Yes	Yes	Op	Yes	Yes	Yes	Yes	No	Figure 3.20		
ST401G-PF8-□-A /R /AZC	Yes	Yes	Op	Yes	Yes	No	Yes	Yes	Figure 3.21		
ST401G-PF8-□-A /R /AZC /TT3	Yes	Yes	Op	Yes	Yes	Yes	Yes	Yes	Figure 3.22		

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## 1.2 ST401G-FC5

ST401G-FC5 is composed of free available chlorine analyzer (FC800D/FLXA402T), and sampling system. Please refer to Figure 3.1 and Figure 3.2 for the configuration.

### NOTE

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Put ceramic beads in the cell of detector before the measurement. Refer to Section 3.3 "Filling beads" of IM 12F05B10-02EN "FC800D Non-reagent Type Free Available Chlorine Sensor Unit".

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## 1.3 ST401G-PH7

ST401G-PH7 is composed of the FLXA402, PH8EFP pH sensor, PH8HF flow-through type pH holder, and sampling system. Moreover, PG400 pulse generator for clean unit can be built in (optional). Refer to Figure 3.3 to Figure 3.6 for the configuration.

### NOTE

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The pH sensor is packed separately. Install and wire as per the manual IM 12B7J1-01E "PH8EFP pH Sensor (KCl filling type)". Refer to Figure 3.27 to Figure 3.29 for the wiring. When option code "/TT3" is specified, the 500 ml KCl reserve tank for pH sensor will be installed in the system before factory shipping.

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## 1.4 ST401G-PF7

ST401G-PF7 is composed of pH converter system (converter, sensor, and flow-through type holder), free available chlorine analyzer (converter and detector), and sampling system. Please refer to Figure 3.7 to Figure 3.14 for the configuration.

### NOTE

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The pH sensor is packed separately. Install and wire as per the manual IM 12B7J1-01E "PH8EFP pH Sensor (KCl filling type)". Refer to Figure 3.30 and Figure 3.31 for the wiring. When option code "/TT3" is specified, the 500 ml KCl reserve tank for pH sensor will be installed in the system before factory shipping. Put ceramic beads in the cell of detector before the measurement. Refer to Section 3.3 "Filling beads" of IM 12F05B10-02EN "FC800D Non-reagent Type Free Available Chlorine Sensor Unit".

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## 1.5 ST401G-PF8

ST401G-PF8 is composed of pH converter system (converter, sensor, and flow-through type holder), free available chlorine analyzer (converter and detector), and sampling system. Please refer to Figure 3.15 to Figure 3.22 for the configuration.

### NOTE

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The pH sensor is packed separately. Install and wire as per the manual IM 12B7J1-01E "PH8EFP pH Sensor (KCl filling type)". Refer to Figure 3.32 and Figure 3.33 for the wiring. When option code "/TT3" is specified, the 500 ml KCl reserve tank for pH sensor will be installed in the system before factory shipping. Put ceramic beads in the cell of detector before the measurement. Refer to Section 3.3 "Filling beads" of IM 12F05B10-02EN "FC800D Non-reagent Type Free Available Chlorine Sensor Unit".

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## 2. SPECIFICATIONS

Measurement: Free available chlorine concentration of tap water, pH of tap water or industrial water.  
Instruments integrated:

FC800D Non-reagent type Free Chlorine Sensor Unit /FLXA402T Liquid Analyzer for Turbidity and Chlorine,  
4-wire pH converter system (FLXA402)  
Refer to respective General Specifications:  
GS12F05B10-01EN: FC800D/FLXA402T  
GS 12A01F01-01EN: FLXA402  
GS 12B07B02-E: PH8EFP  
GS 12J05C02-00E: PH8HF  
GS 19C01B05-01EN: PG400

Calibration method:

Chlorine analyzer: Manual/auto zero calibration  
pH meter: Manual calibration

Cleaning system:

Chlorine analyzer: Not provided  
pH analyzer: Ultrasonic cleaning

Sample (process) conditions:

Pressure: 100 to 750 kPa (Under 100 kPa, consult Yokogawa)  
Flow rate: Chlorine analyzer: 0.1 to 10 L/min  
pH analyzer: 3 to 10 L/min  
Temperature: 0 to 50°C when using FC800D -F1 or -C1  
0 to 40°C when using FC800D -F2 or -F3

Note: When the system is used for measurement in heavily contaminated water other than tap water and industrial water, the filter of the pressure reducing valve may be clogged early. In that case take measures to avoid contamination, e.g., changing the sampling point.

Ambient conditions:

Temperature: -5 to 50°C  
(Protection against freeze should be provided when necessary in winter)  
Humidity: 5 to 95% RH, non-condensing (10 to 90% for pH converter system)

Storage temperature: -30 to 70°C

Materials:

Piping: Hard PVC, polypropylene resin  
Stanchion: Carbon steel or stainless steel

Finish: Baked polyurethane resin coating

Color: Equivalent to Munsell 0.6GY3.1/2.0

Installation site: Indoors or in cabinet: not exposed to the weather. Minimal vibration and shock allowed. Maintenance space required. No corrosive gases present. Moderate humidity.

Piping connection:

Sample inlet: VP16  
Drain: VP40

Cable inlet: Watertight plastic cable gland equivalent to JIS A15

Cable size: 9 to 12 mm OD

Power supply: 100 V AC  $\pm$ 10%, 50/60 Hz

110 V AC  $\pm$ 10%, 50/60 Hz

200 V AC  $\pm$ 10%, 50/60 Hz

220 V AC  $\pm$ 10%, 50/60 Hz (depending on system configuration)

Power consumption:

Approx.115 VA (with non-reagent type free available chlorine analyzer, pH converter system, and Ultrasonic oscillator) (depending on system configuration)

Apparent power of solenoid valve for auto zero calibration

When activated: 22/17 VA (50/60 Hz)

When non-activated: 35/27 VA (50/60 Hz)

Weight: Approx. 45 kg (depending on system configuration)

Remote range switching:

-FC5, -PF7, -PF8 is equipped as standard with the remote range switching function for the Non-reagent Type Free Available Chlorine Sensor Unit. Two measurement ranges can be switched when -N2 on FLXA402T is specified. Three ranges can be switched when -N4 is specified. For the specifications of the remote range switching contact input, remote range switching contact output, refer to FC800D general specification GS 12F05B10-01EN.

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## 3. INSTALLATION, PIPING, AND WIRING

### 3.1 Unpacking

The ST401G sampling system is sufficiently packed for shipment to prevent damage during transportation.

Unpack carefully near the place of installation.

### 3.2 Installation place

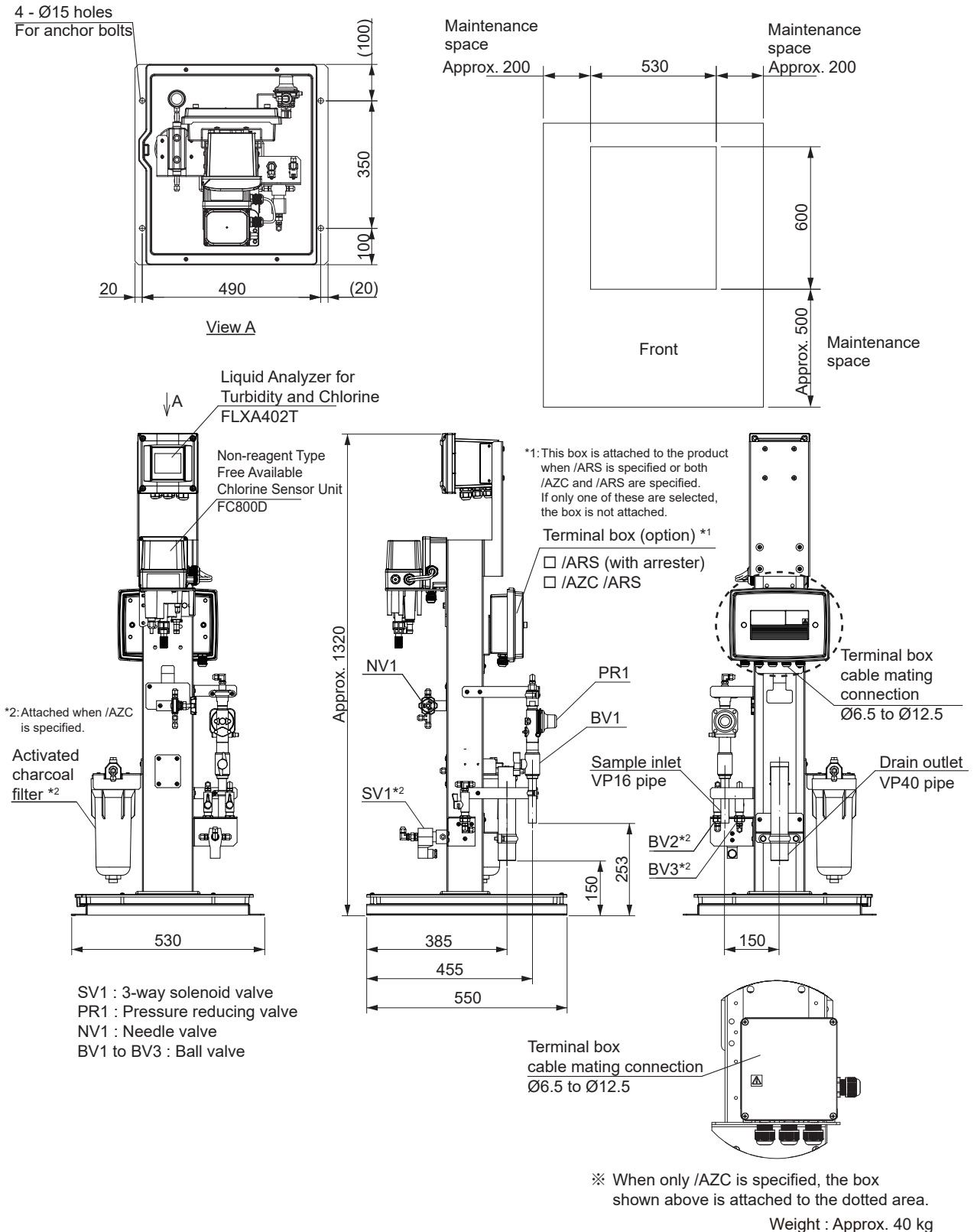
Install the ST401G sampling system at a location as below:

- (1) Free from rain water such as indoor or in a cubicle
- (2) Low vibration
- (3) Low corrosive gas
- (4) Low humidity
- (5) Low temperature variation and the temperature is maintained at or as near to room temperature as possible
- (6) Sufficient maintenance space and easy maintenance access

### 3.3 Installation

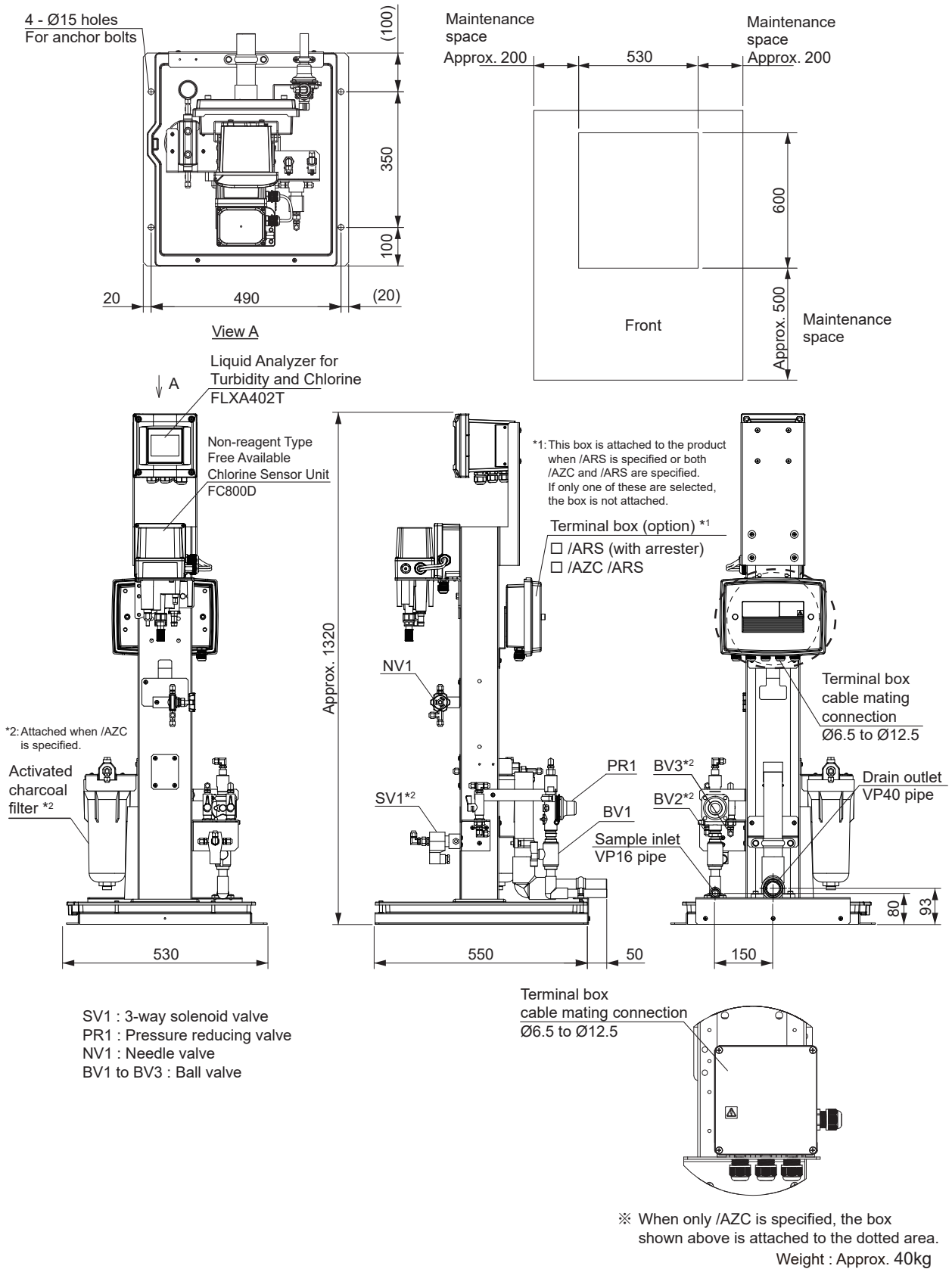
Install the sampling system on a well-drained concrete foundation or the equivalent with anchor bolts (M12). Refer to external dimensions (Figure 3.1 to Figure 3.22) for the position of the anchor bolts.

Keep sufficient maintenance space around the sampling system.



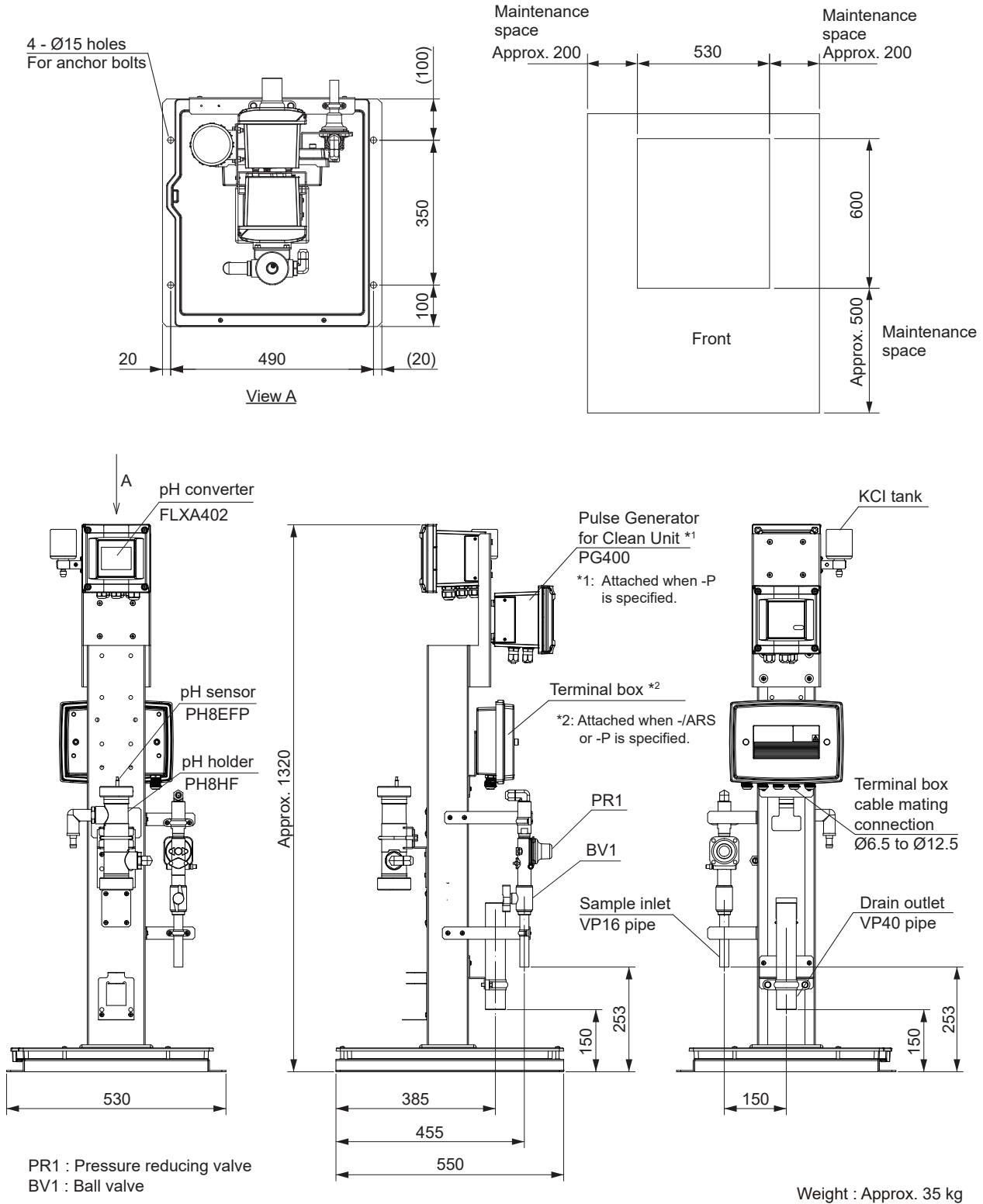
**Figure 3.1** ST401G-FC5-N-A (/ARS) With free available chlorine analyzer (arrester)  
 ST401G-FC5-N-A /AZC With free available chlorine analyzer, auto zero calibration  
 ST401G-FC5-N-A /AZC /ARS With free available chlorine analyzer, auto zero calibration, arrester

Unit: mm



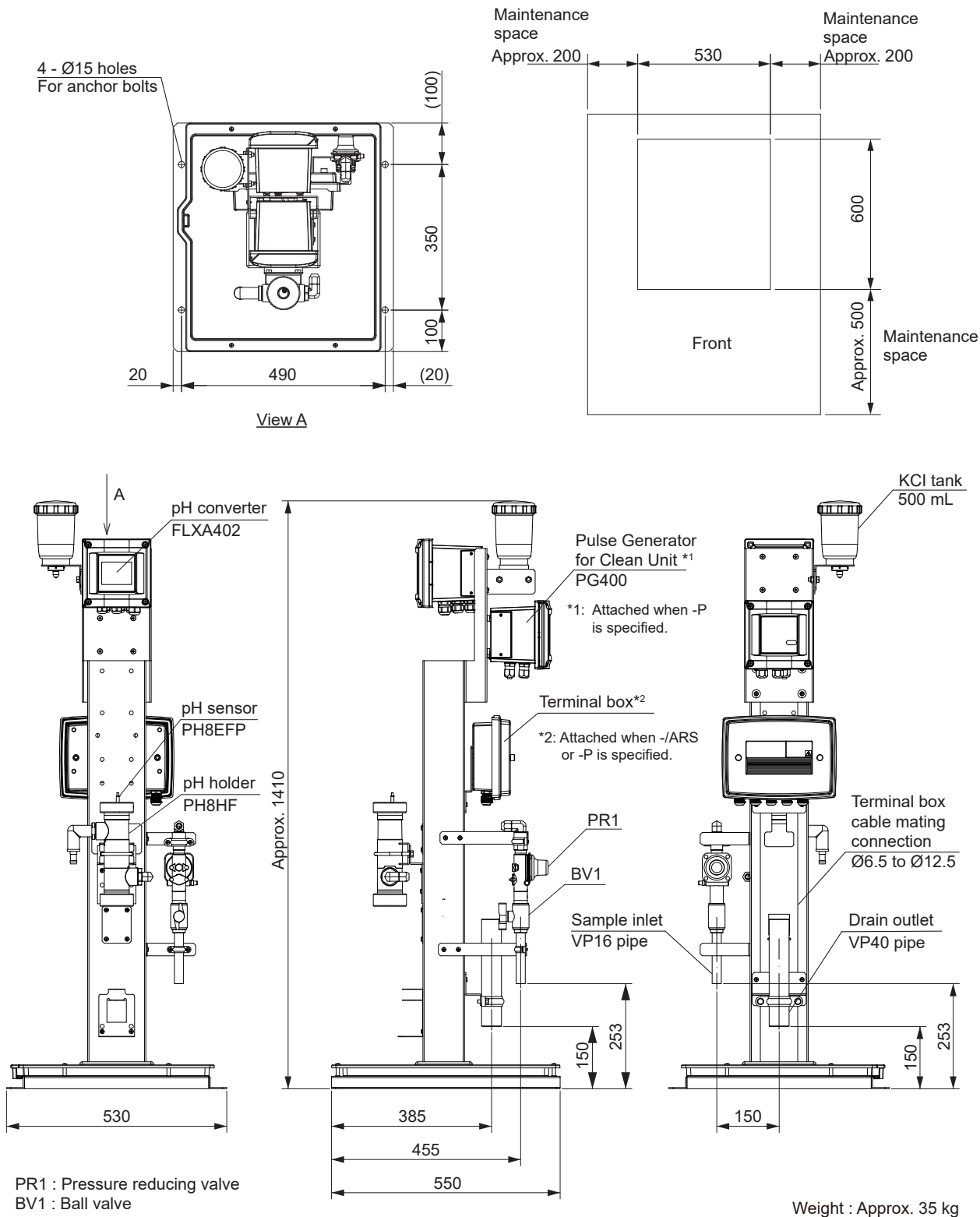
**Figure 3.2** ST401G-FC5-N-A/R (/ARS) With free available chlorine analyzer, back piping, (arrester)  
 ST401G-FC5-N-A/R /AZC back piping, auto zero calibration  
 ST401G-FC5-N-A/R /AZC /ARS back piping, arrester, auto zero calibration



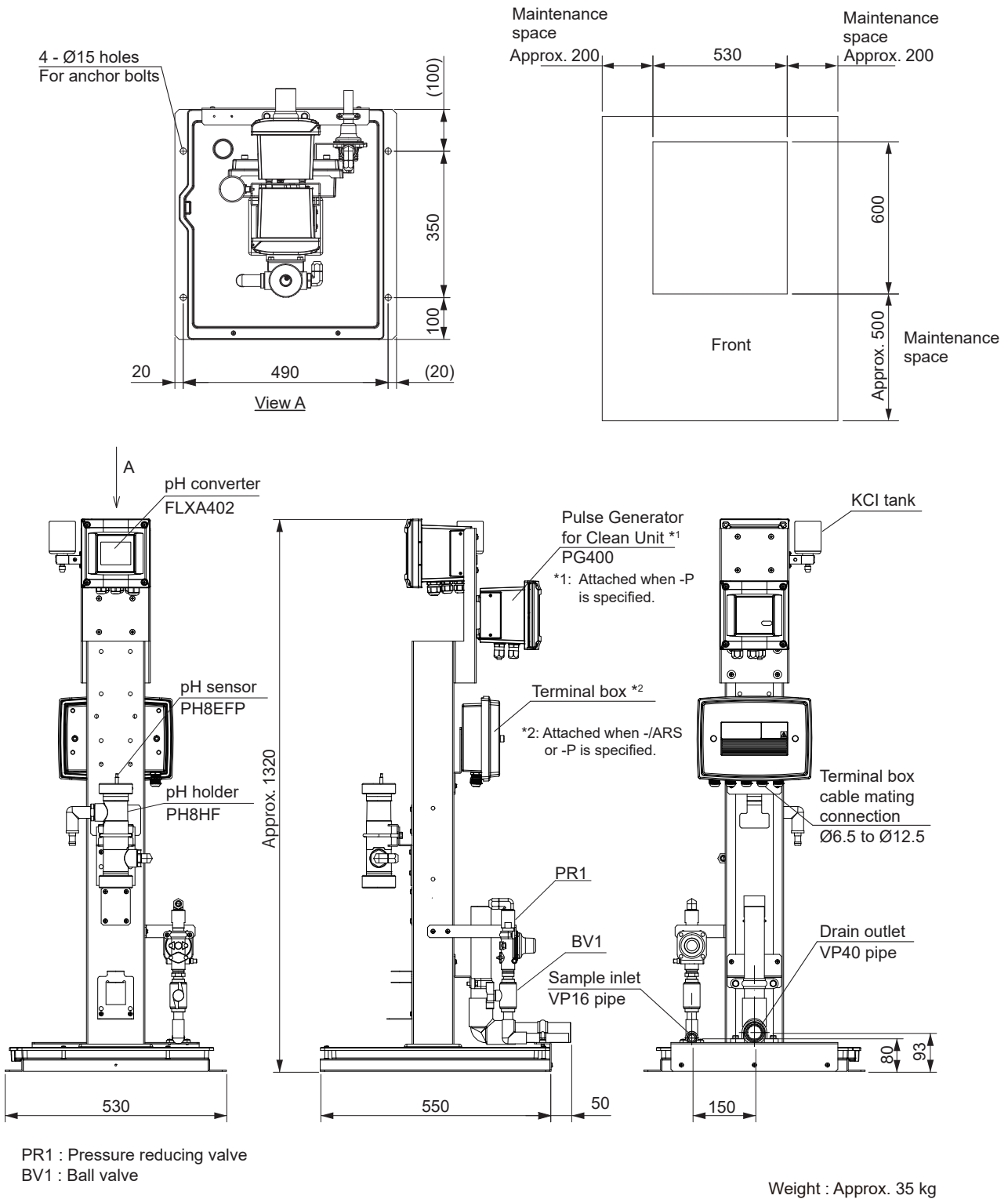


**Figure 3.3** ST401G-PH7-N-A (/ARS) With pH converter, (arrestor)  
ST401G-PH7-P-A With pH converter, ultrasonic oscillator

Unit: mm



**Figure 3.4** ST401G-PH7-N-A/TT3 (/ARS) With pH converter, 500 ml KCl tank, (arrestor)  
 ST401G-PH7-P-A/TT3 With pH converter, ultrasonic oscillator, 500 ml KCl tank



**Figure 3.5** ST401G-PH7-N-A/R (/ARS) With pH converter, back piping, (arrestor)  
ST401G-PH7-P-A/R With pH converter, ultrasonic oscillator, back piping

Unit: mm

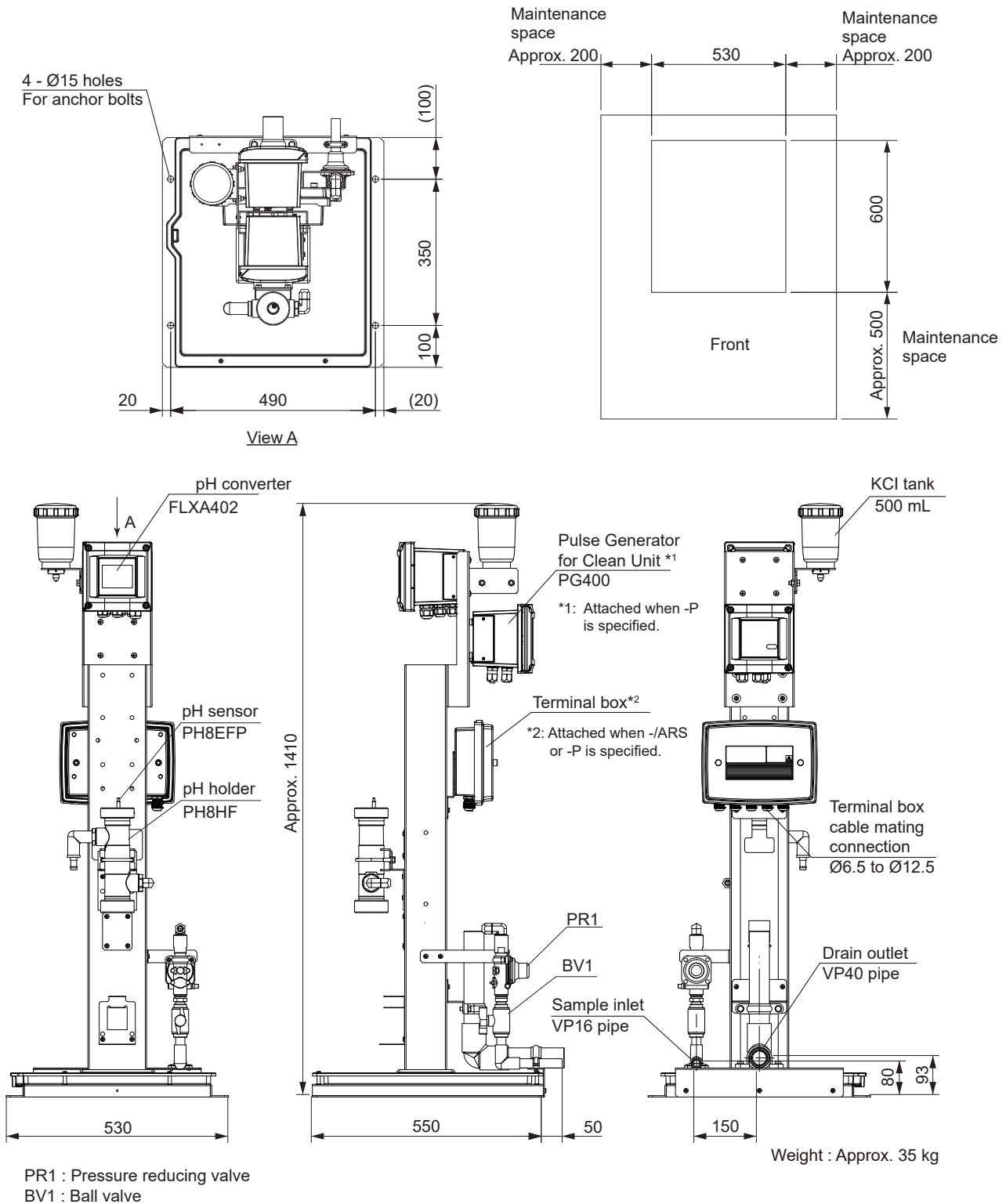


Figure 3.6

ST401G-PH7-N-A/R/TT3 (/ARS) With pH converter, back piping, 500 ml KCl tank, (arrester)

ST401G-PH7-P-A/R/TT3 With pH converter, ultrasonic oscillator, back piping, 500 ml KCl tank

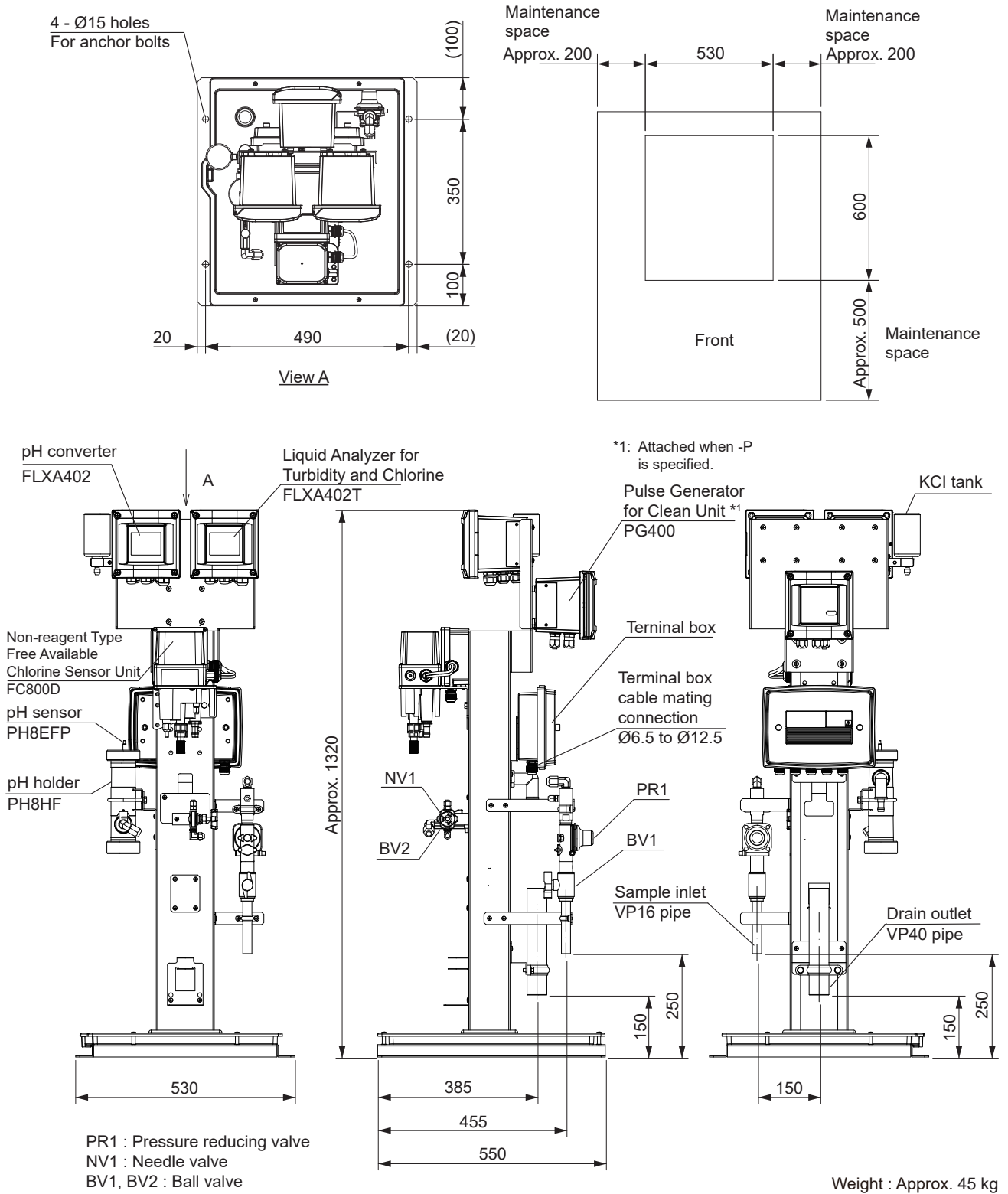
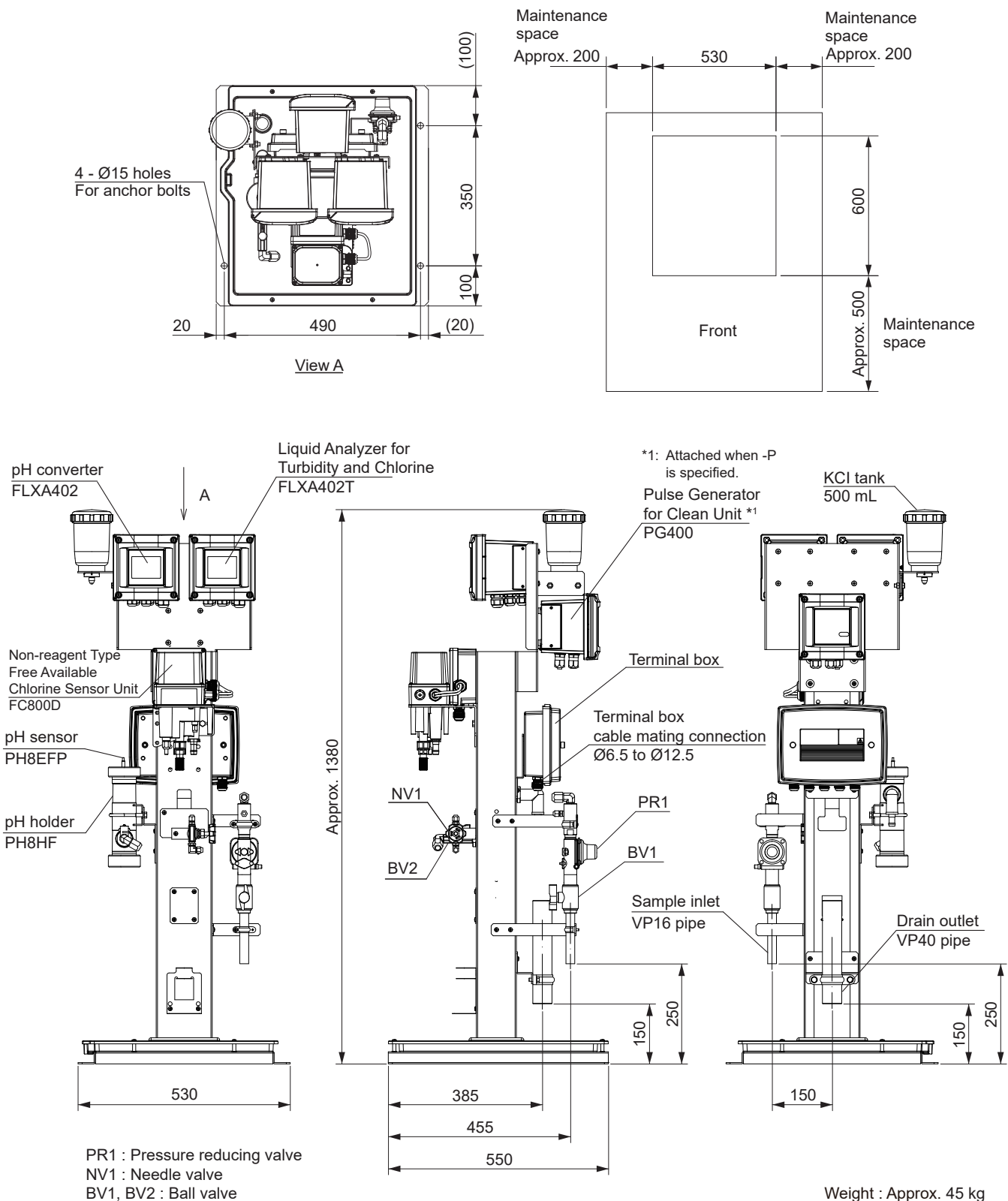
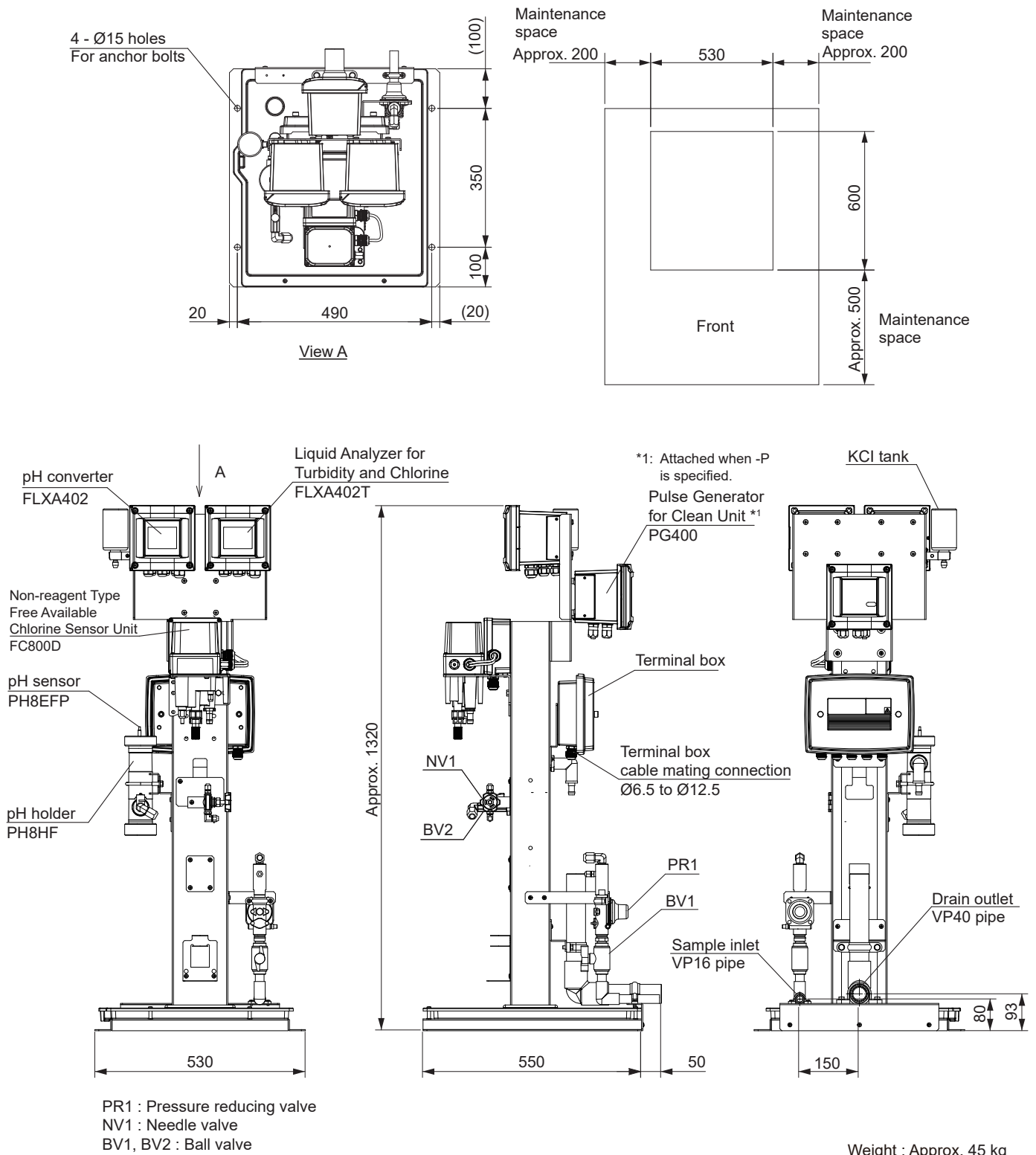


Figure 3.7 ST401G-PF7-□-A With free available chlorine analyzer and pH converter, (ultrasonic oscillator)

Unit: mm

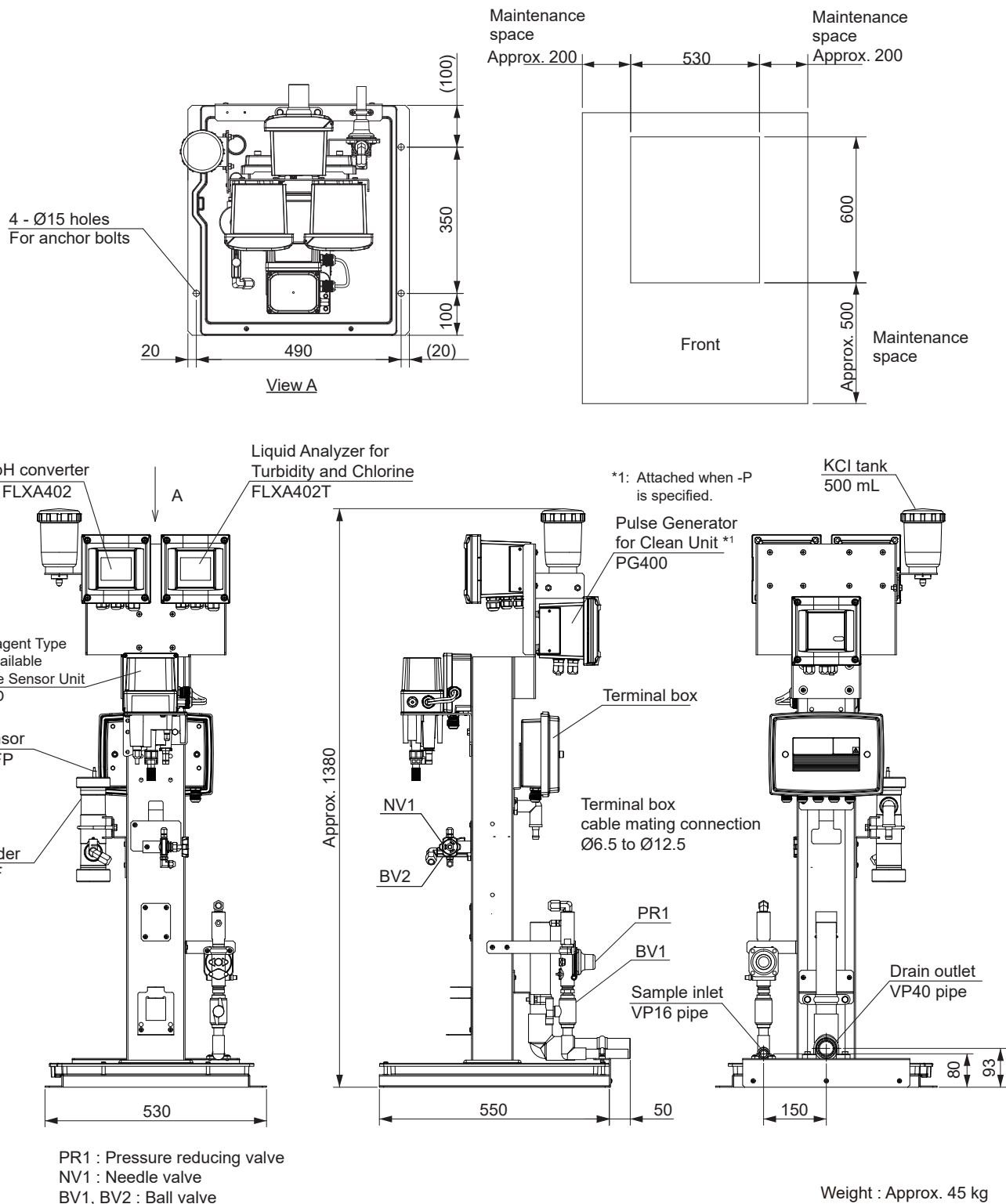


**Figure 3.8** ST401G-PF7-□-A/TT3 With free available chlorine analyzer and pH converter, (ultrasonic oscillator), 500 ml KCl tank



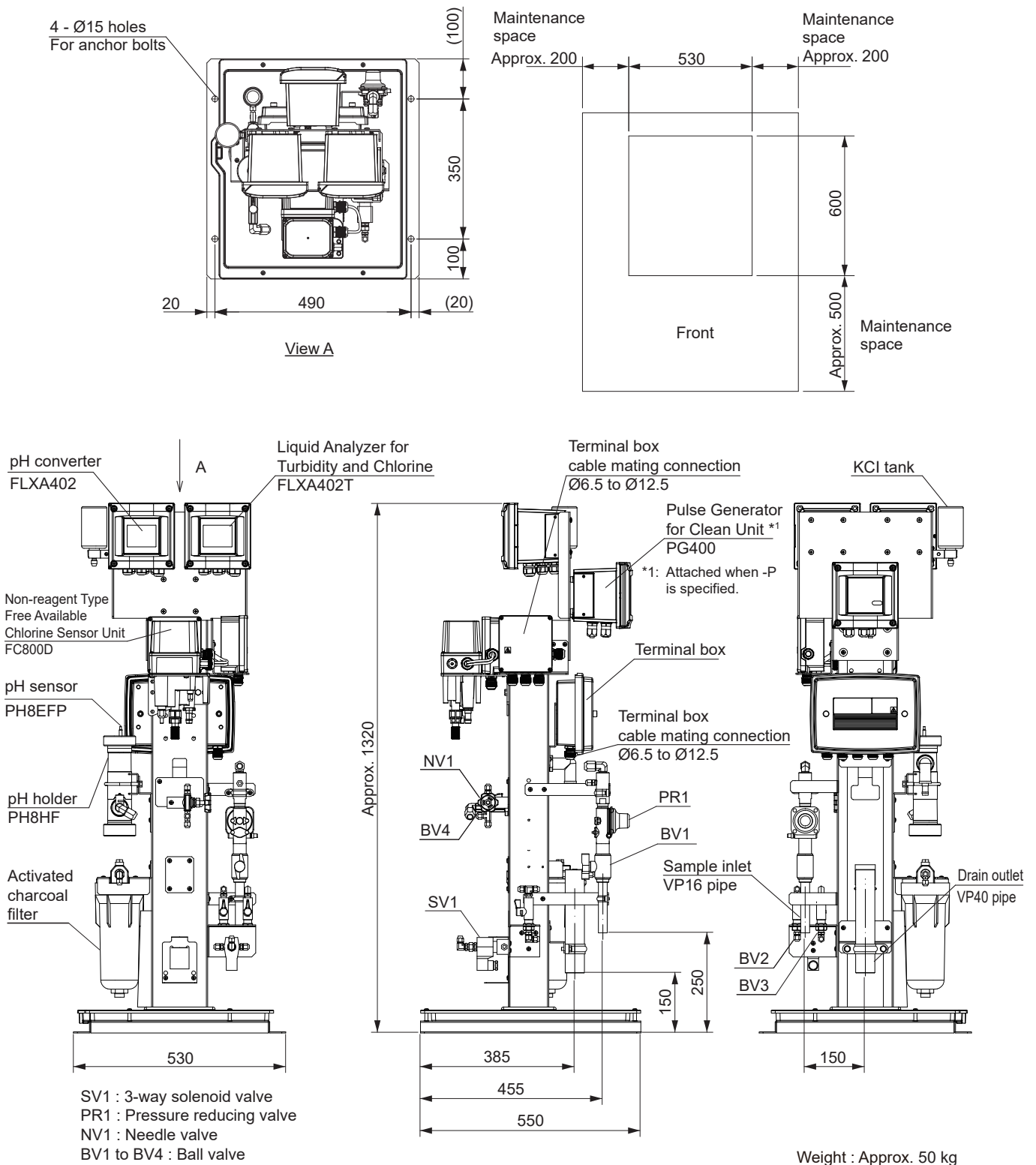
**Figure 3.9** ST401G-PF7-□-A/R With free available chlorine analyzer and pH converter, (ultrasonic oscillator), back piping

Unit: mm



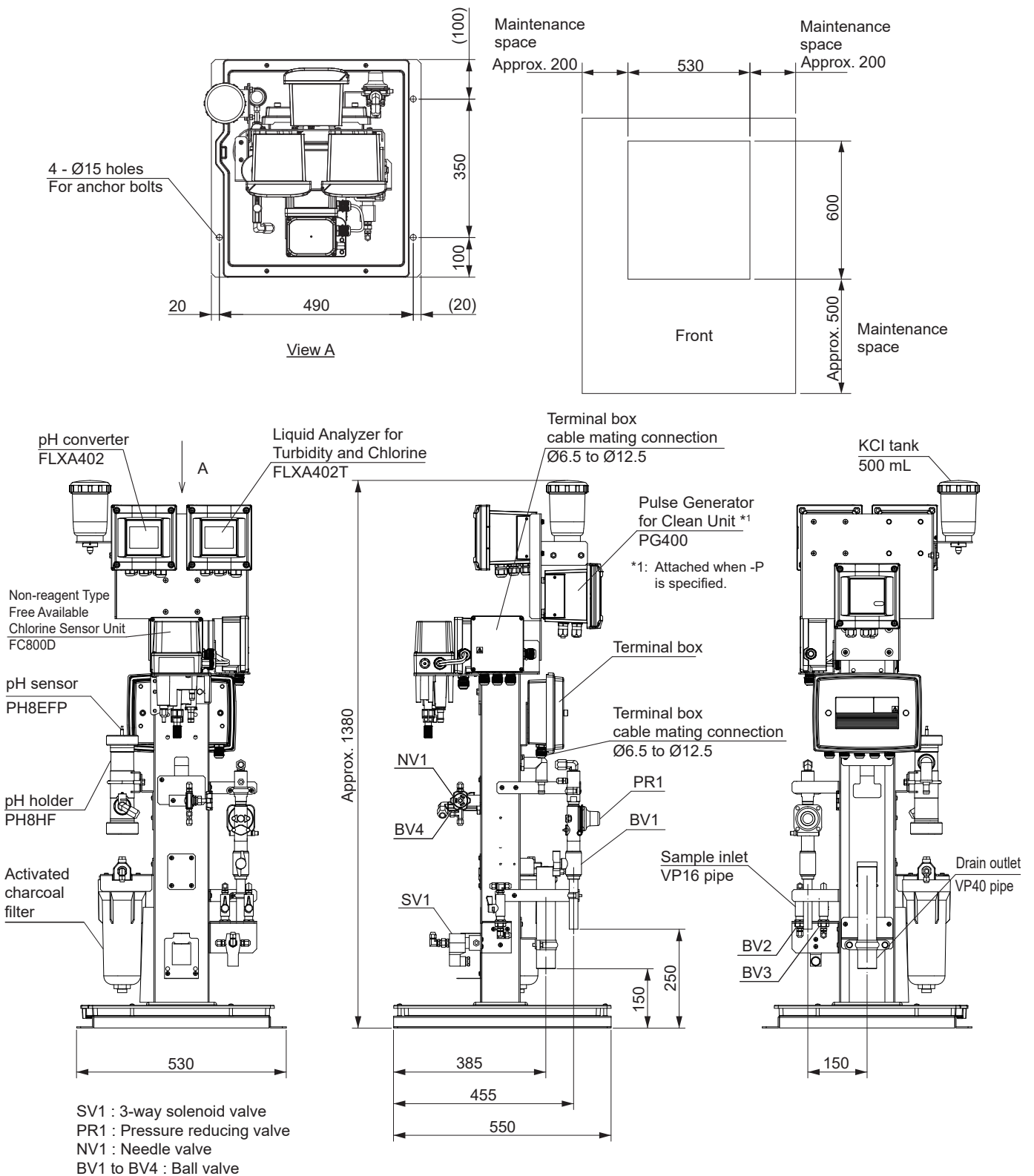
**Figure 3.10** ST401G-PF7-□-A/R/TT3 With free available chlorine analyzer and pH converter, (ultrasonic oscillator), back piping, 500 ml KCl tank



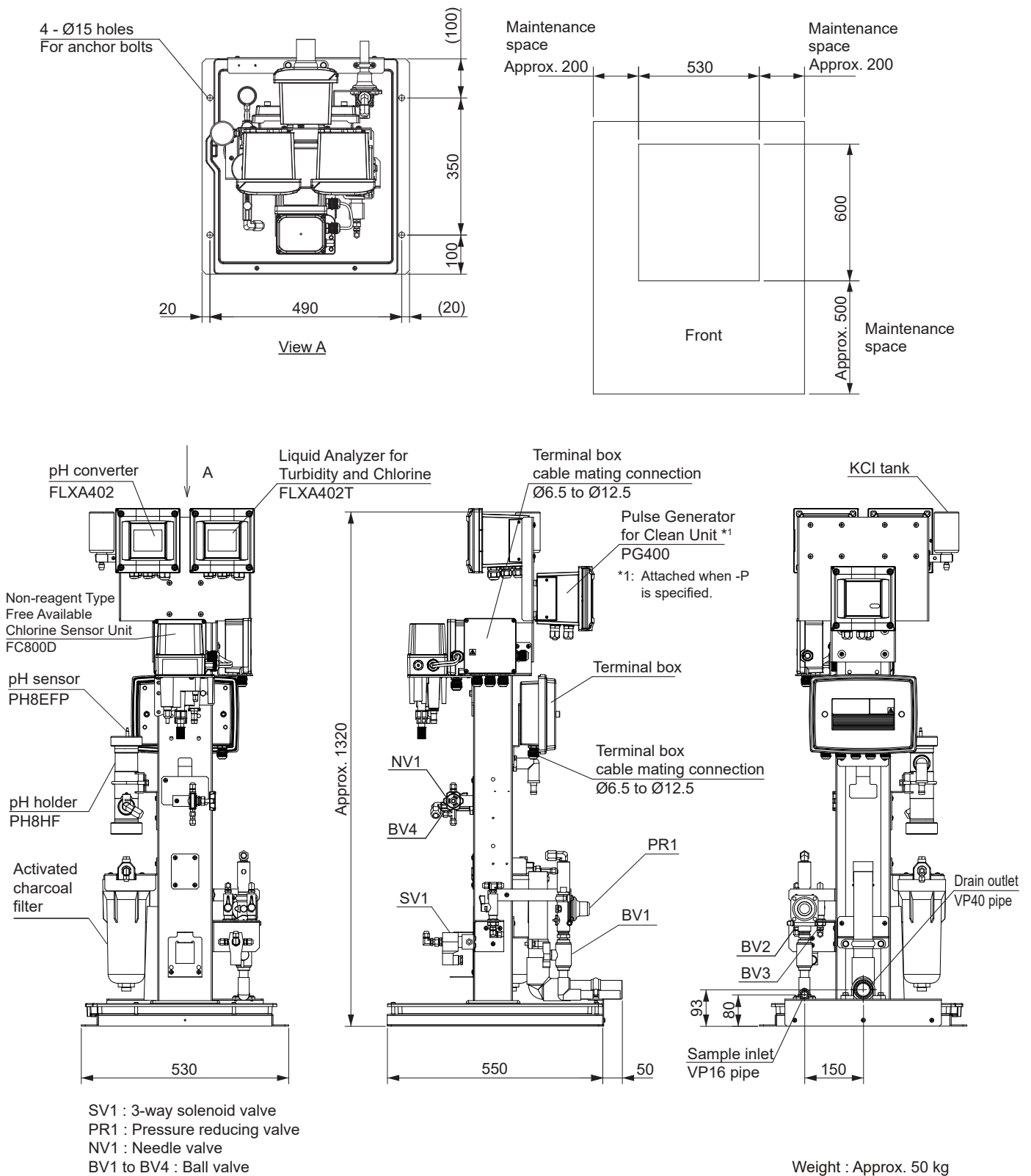


**Figure 3.11** ST401G-PF7-□-A/AZC With free available chlorine analyzer and pH converter, (ultrasonic oscillator), auto zero calibration

Unit: mm

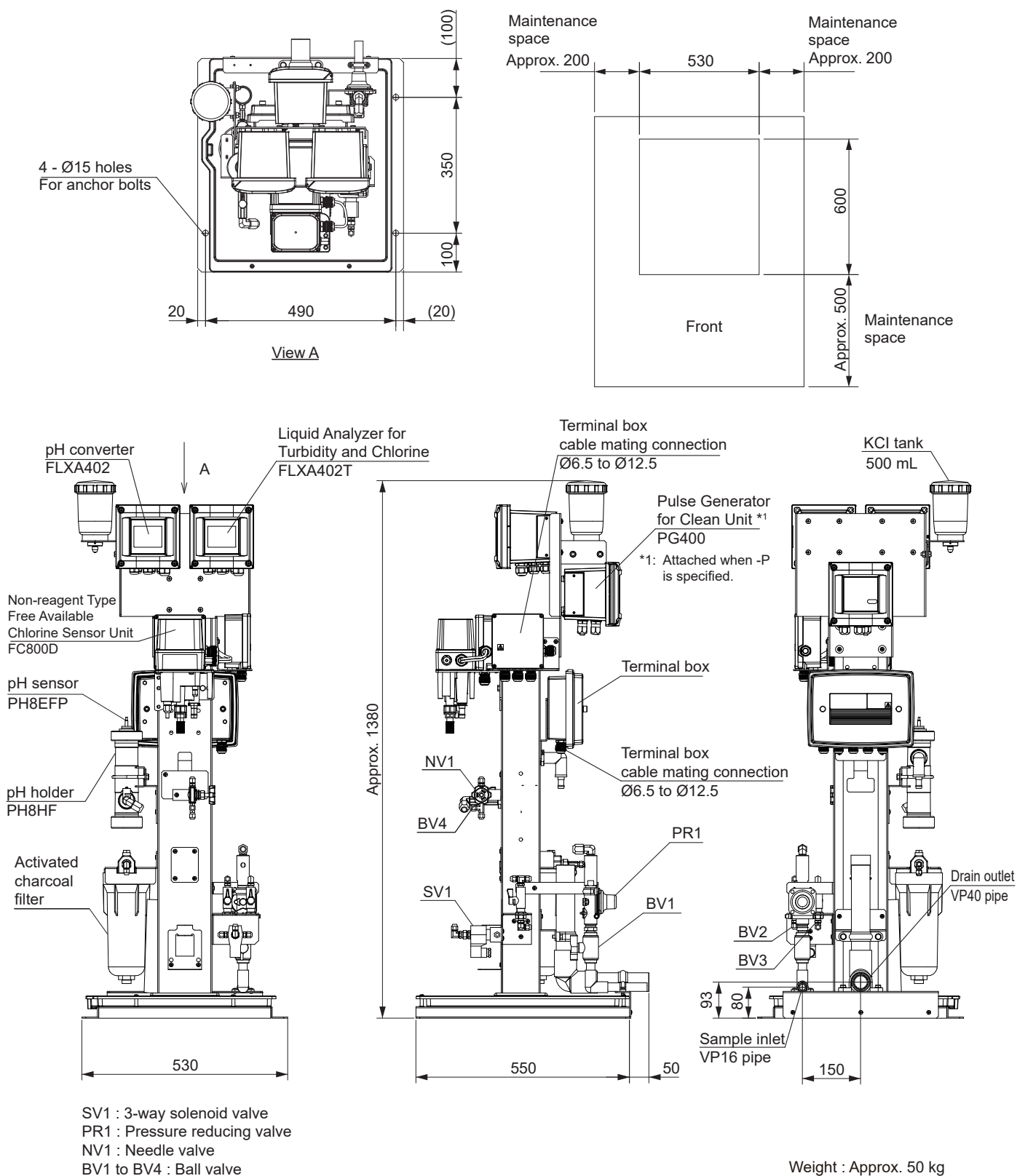


**Figure 3.12** ST401G-PF7-□-A/AZC/TT3 With free available chlorine analyzer and pH converter, (ultrasonic oscillator), auto zero calibration, 500 ml KCl tank

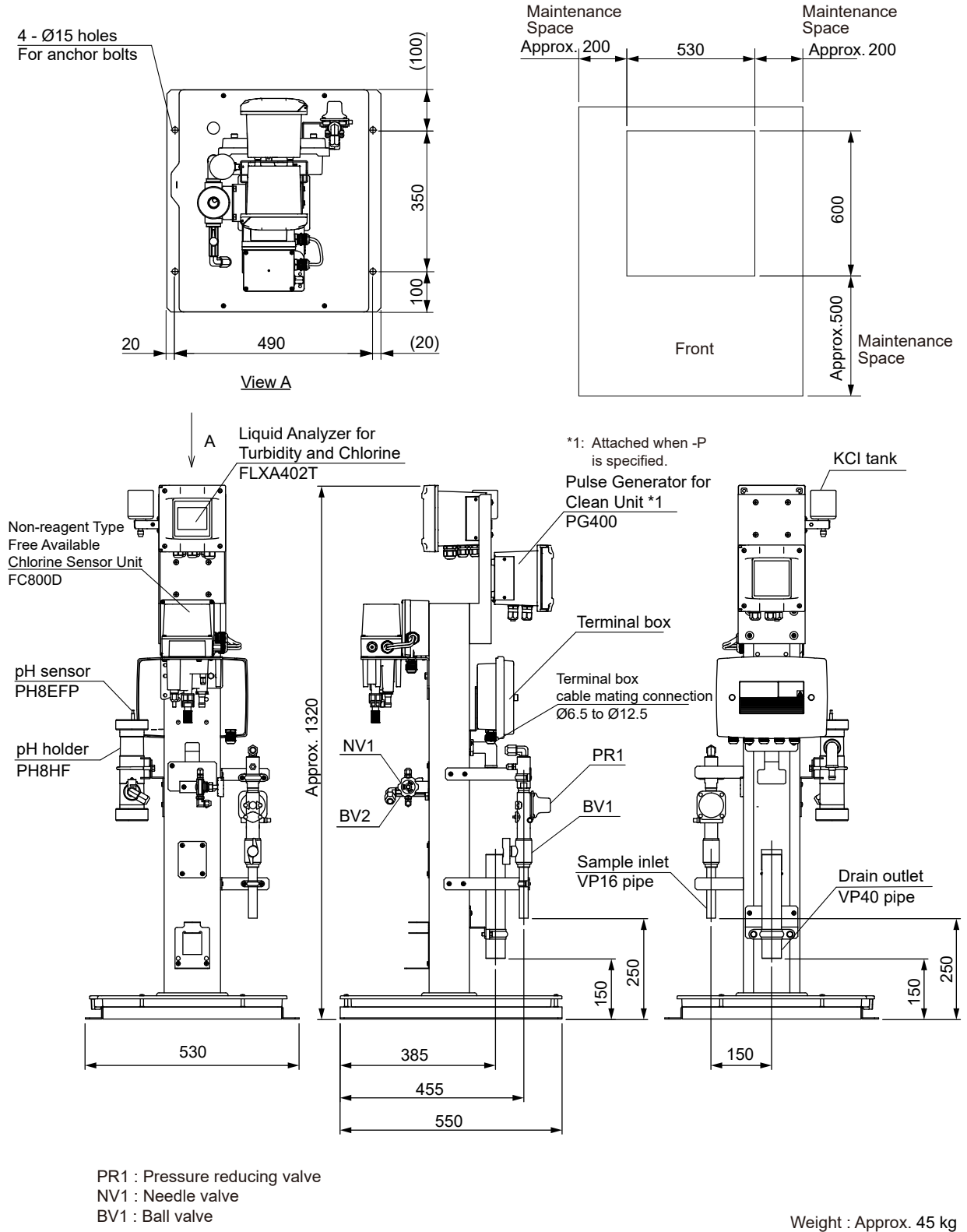


**Figure 3.13** ST401G-PF7-□-A/R/AZC With free available chlorine analyzer and pH converter, (ultrasonic oscillator), back piping, auto zero calibration

Unit: mm

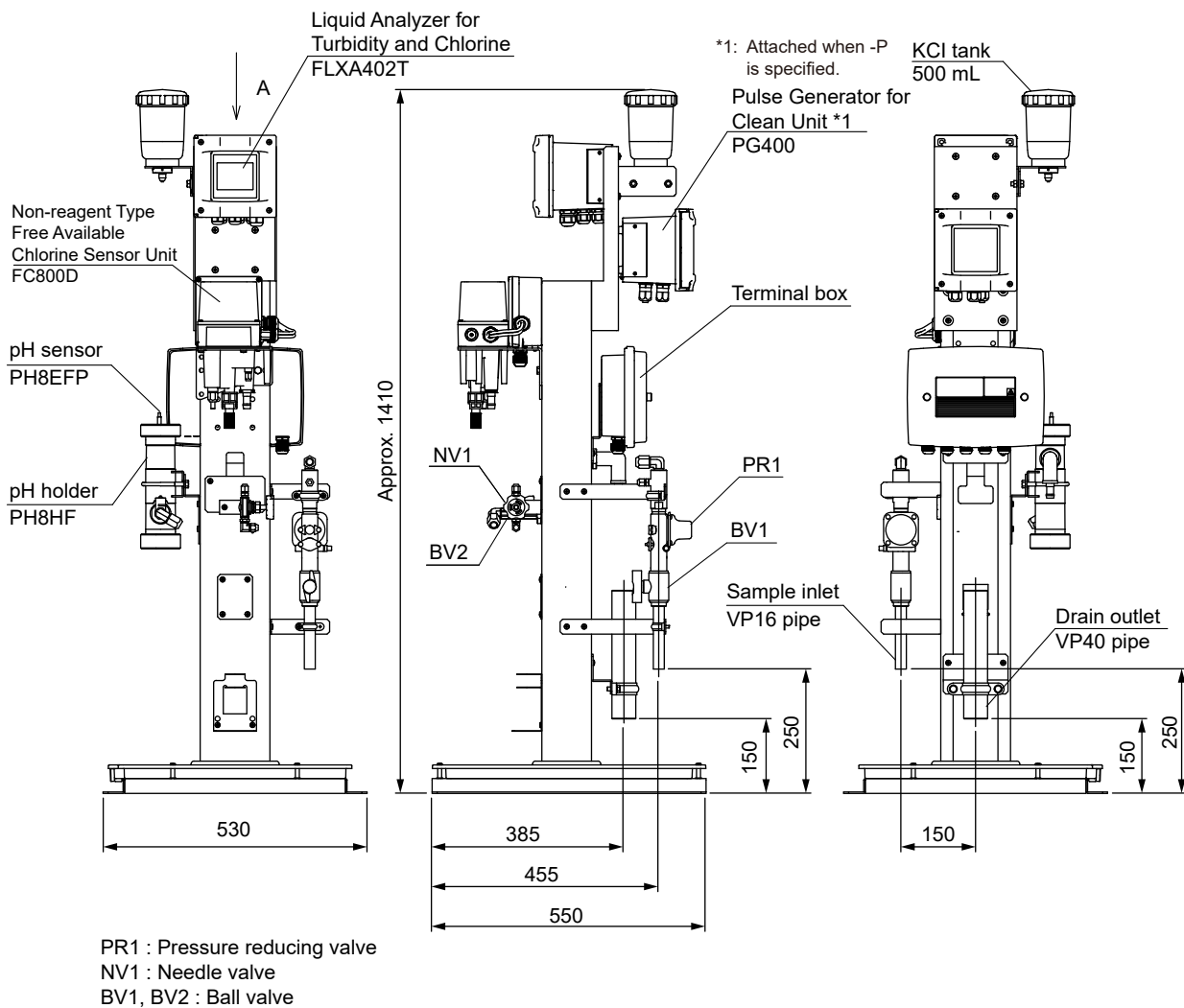
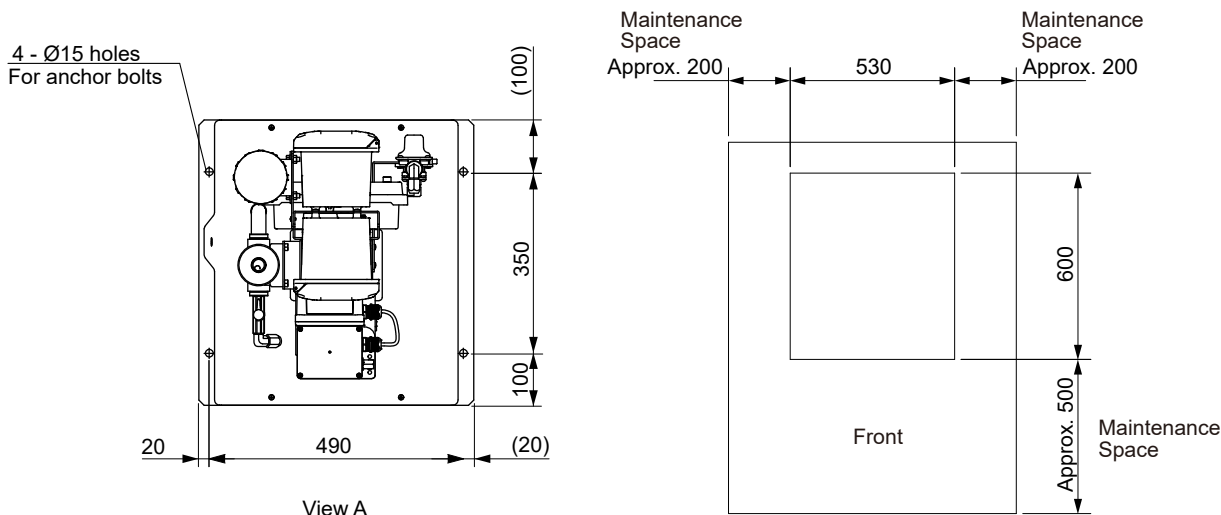


**Figure 3.14** ST401G-PF7-□-A/R/AZC/TT3 With free available chlorine analyzer and pH converter, back piping, auto zero calibration, 500 ml KCl tank



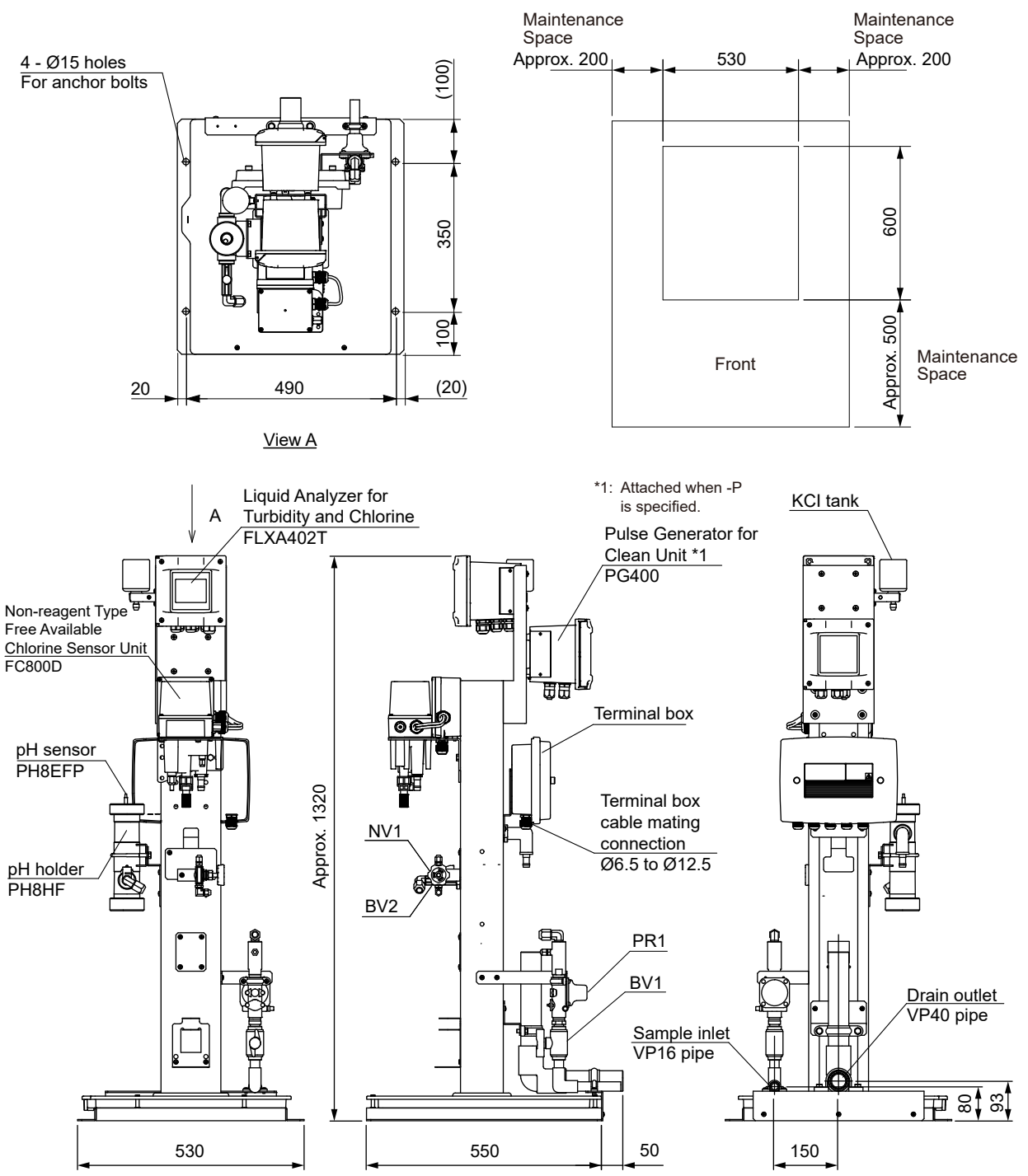
**Figure 3.15** ST401G-PF8-□-A With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator)

Unit: mm



**Figure 3.16** ST401G-PF8-□-A/TT3 With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), 500 ml KCl tank

Unit: mm

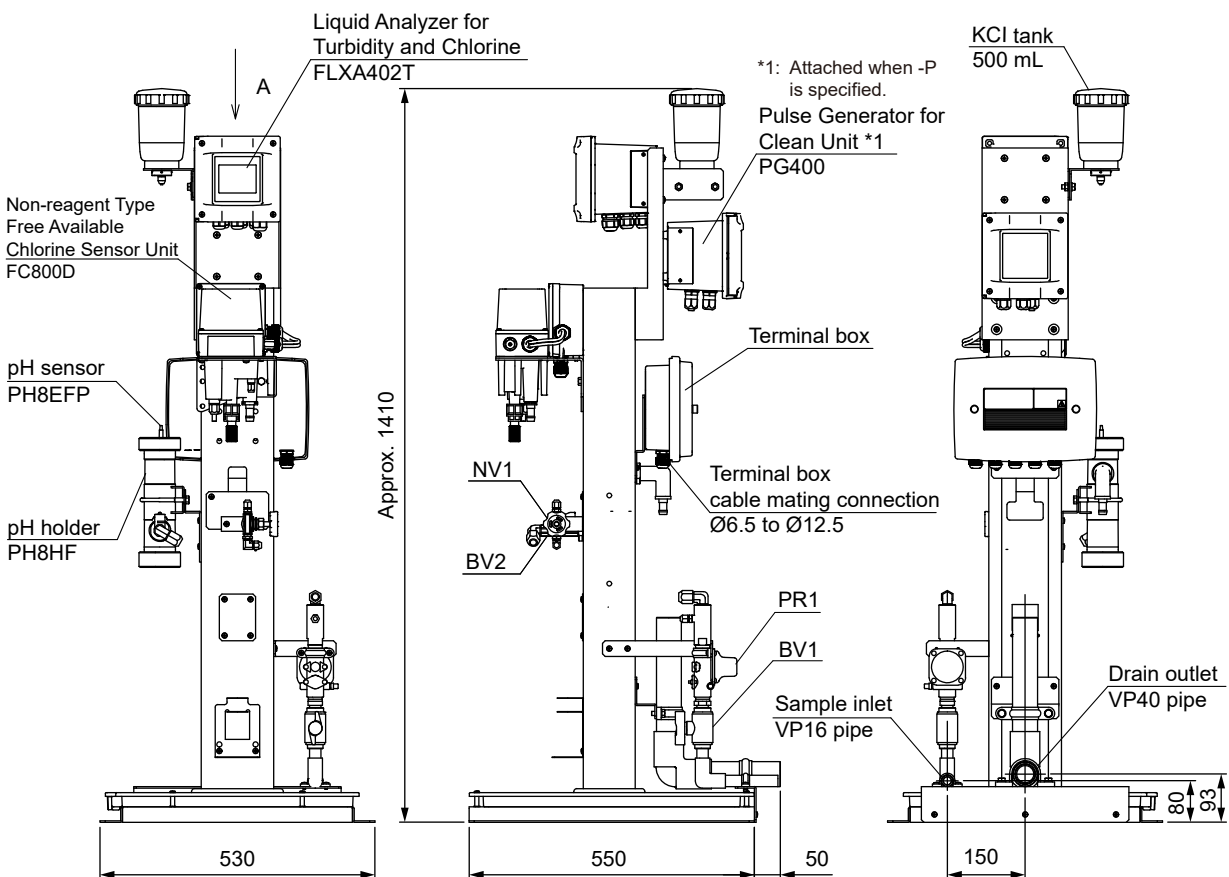
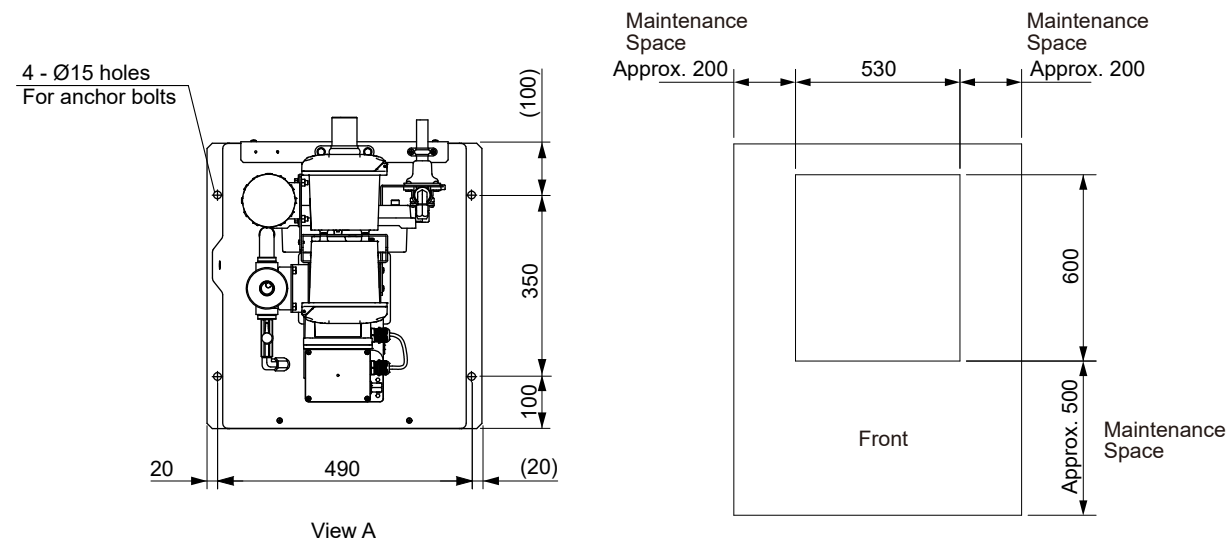


PR1 : Pressure reducing valve  
 NV1 : Needle valve  
 BV1, BV2 : Ball valve

Weight : Approx. 45 kg

**Figure 3.17** ST401G-PF8-□-A/R With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), back piping

Unit: mm



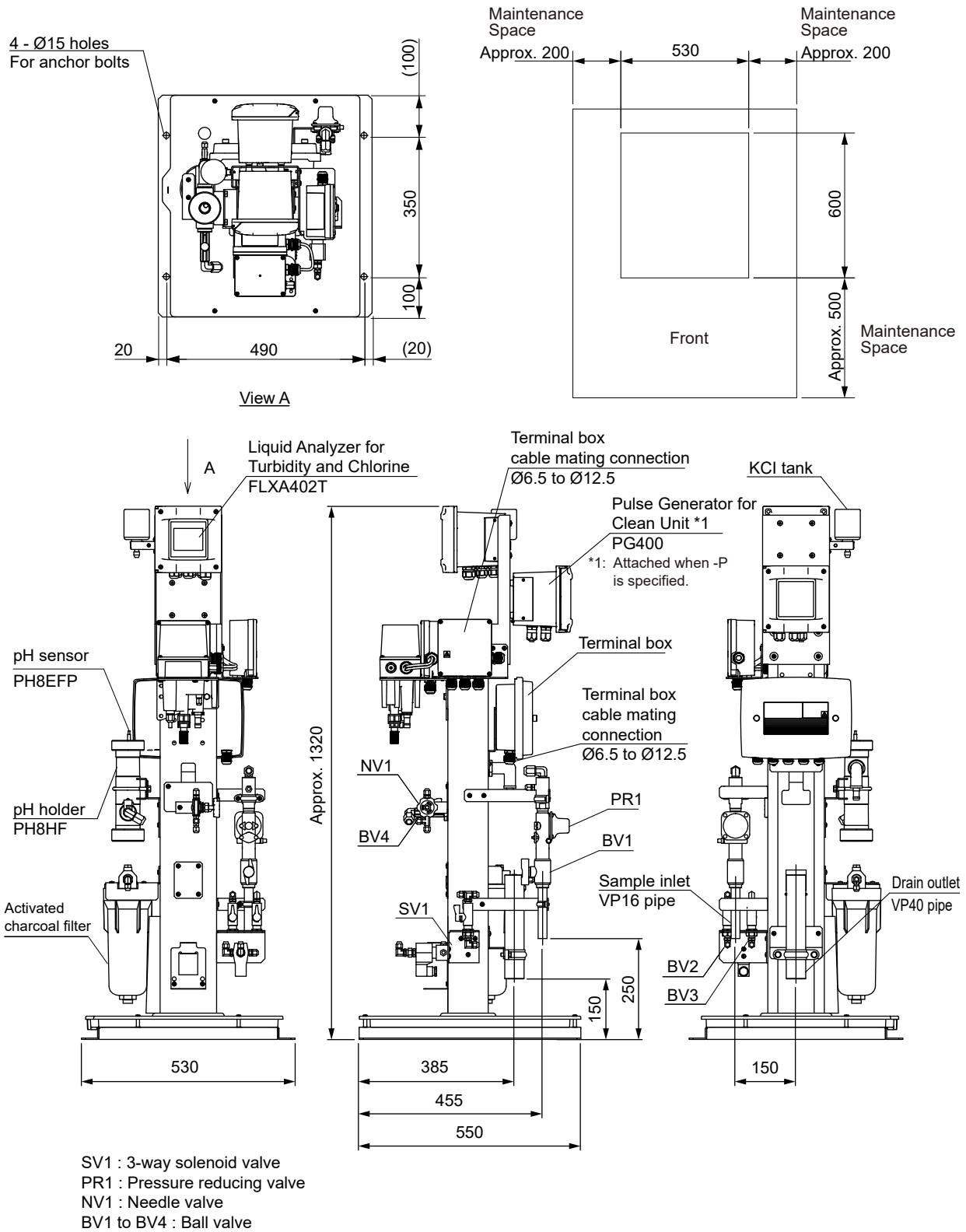
PR1 : Pressure reducing valve  
 NV1 : Needle valve  
 BV1, BV2 : Ball valve

Weight : Approx. 45 kg

**Figure 3.18** ST401G-PF8-□-A/R/TT3 With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), back piping, 500 ml KCl tank

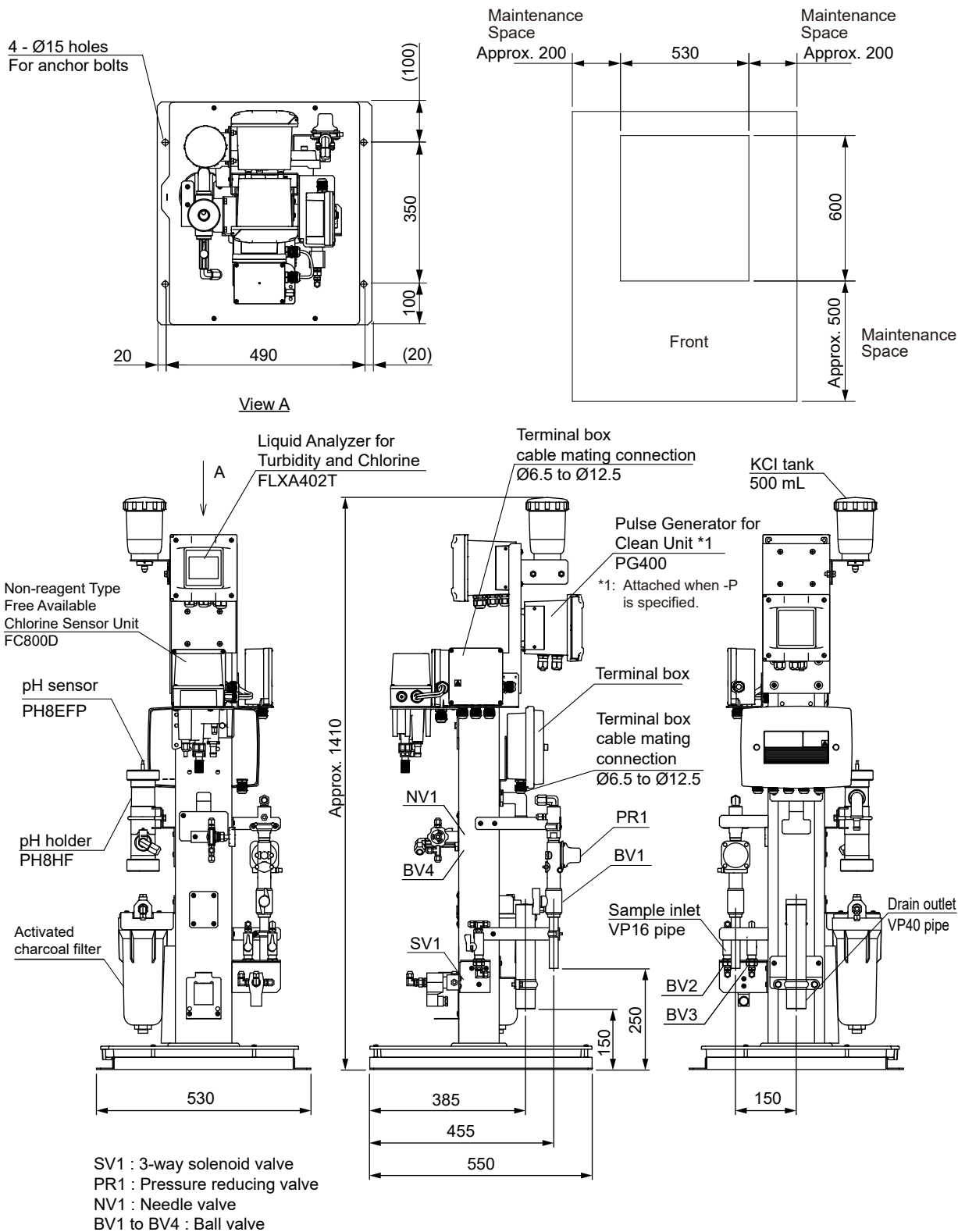


Unit: mm



**Figure 3.19** ST401G-PF8-□-A/AZC With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), auto zero calibration

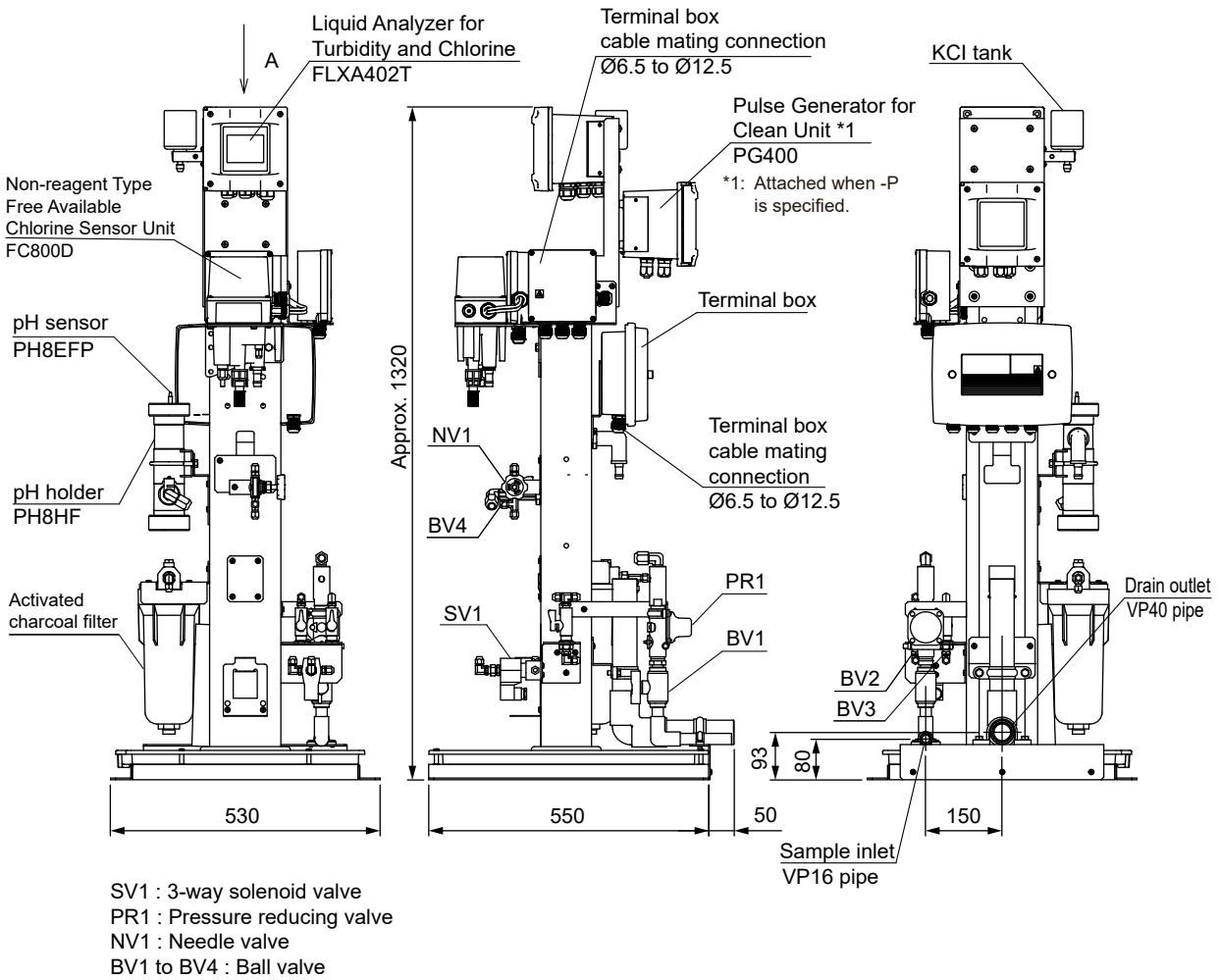
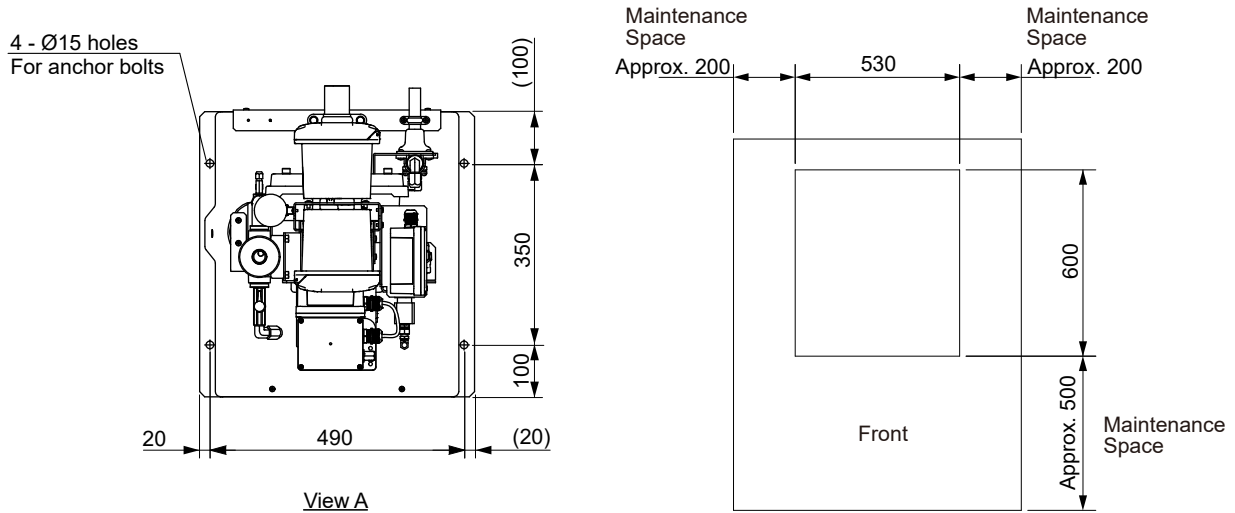
Unit: mm



Weight : Approx. 50 kg

**Figure 3.20** ST401G-PF8-□-A/AZC/TT3 With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), autozero calibration, 500 ml KCl tank

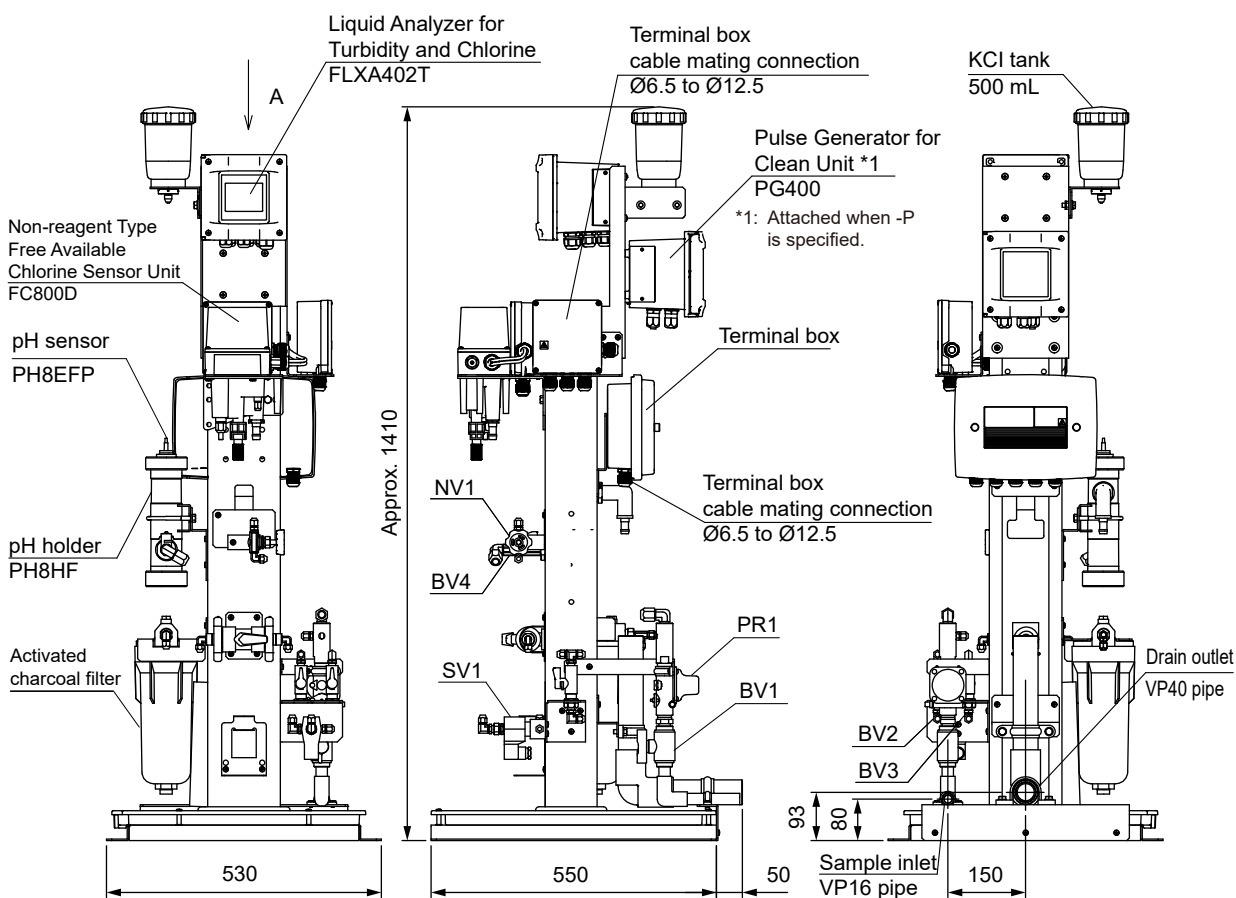
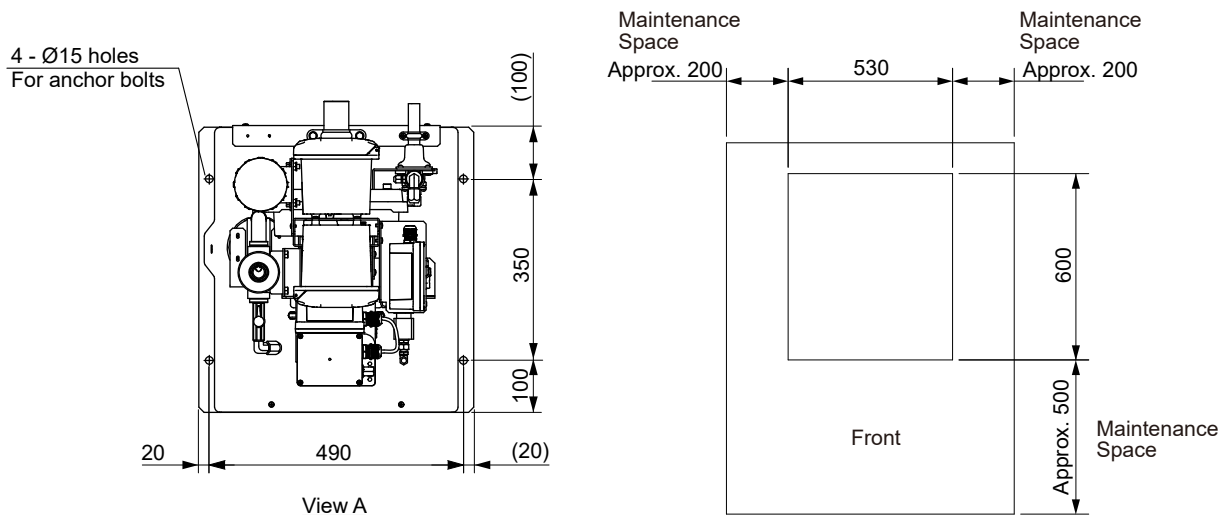
Unit: mm



Weight : Approx. 50 kg

Figure 3.21 ST401G-PF8-□-A/R/AZC With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), back piping, auto zero calibration

Unit: mm



- SV1 : 3-way solenoid valve
- PR1 : Pressure reducing valve
- NV1 : Needle valve
- BV1 to BV4 : Ball valve

Weight : Approx. 50 kg

**Figure 3.22** ST401G-PF8-□-A/R/AZC/TT3 With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), back piping, auto zero calibration, 500 ml KCl tank

## 3.4 Piping

Pressure range of measuring water is from 100 to 750 kPa (1 to 7.5 kg/cm<sup>2</sup>) and the flow rate is from 0.1 to 10 L/min.

Measuring water pipe should be hard PVC and VP16 (22 mm O.D.). Drain pipe should be hard PVC and VP40 (48 mm O.D.).

Use proper sized or other fittings which suit those pipe sizes. Refer to external dimension (Figure 3.1 to Figure 3.22) for the piping.

Drain pipe should be inclined, to prevent build up of deposits and blockage. Horizontal piping should be as short as possible and should have a slope.

### NOTE

When the system is used for measurement in heavily contaminated water other than tap water and industrial water, the filter of the pressure reducing valve may be clogged early. In that case take measures to avoid contamination, e.g., changing the sampling point.

## 3.5 Wiring



### WARNING

Do not supply the electric power until the wiring is completed. Electric shock may cause serious injury or death

#### (1) Power supply

The converter unit should be directly wired if only the pH converter system or the free available chlorine analyzer is installed in the sampling system.

Refer to Figure 3.23 to Figure 3.33 for the wiring of each equipment.

A terminal box is installed when there are two or more converters including ultrasonic cleaner, or when arrestor option is specified.

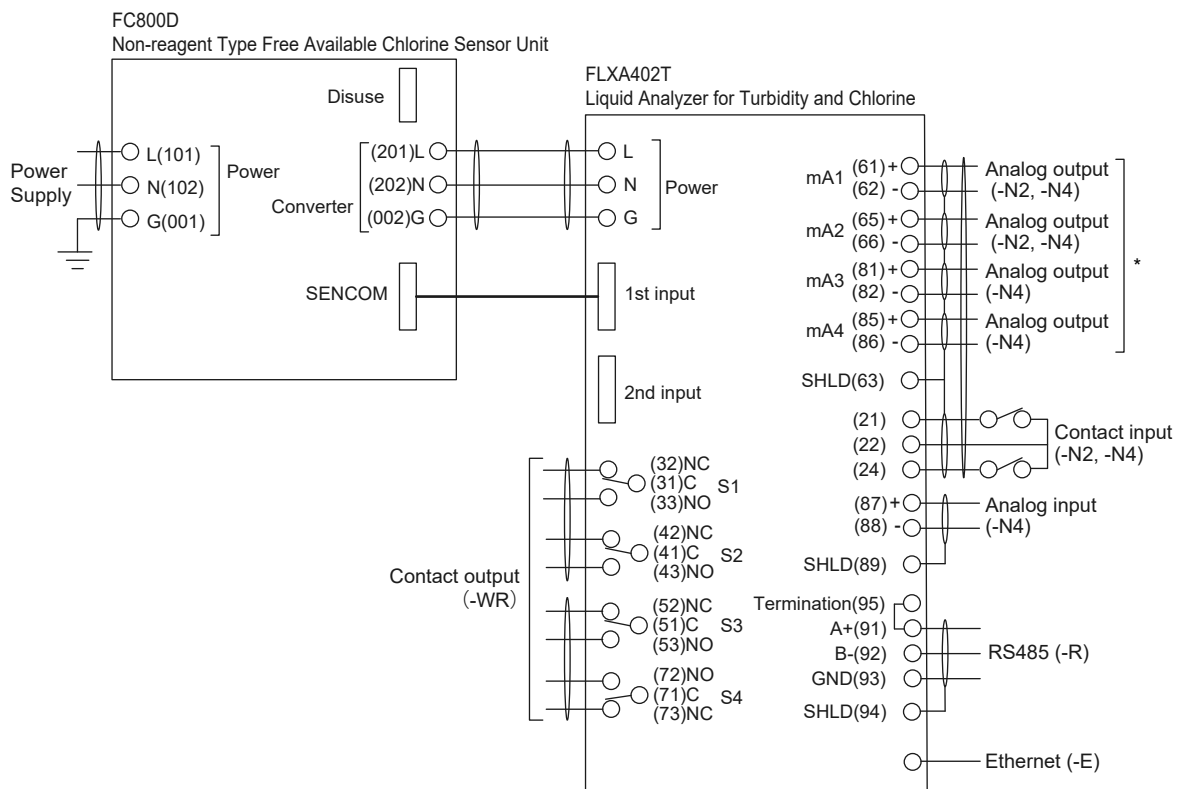
The power supply of pH converter, ultrasonic cleaner, and free available chlorine converter is wired from this terminal box.

Connect the power supply wiring to corresponding terminals of the terminal box, refer to Figure 3.24 to Figure 3.26, Figure 3.28 to Figure 3.33.

The terminal screw is M4. Use suitable terminal.

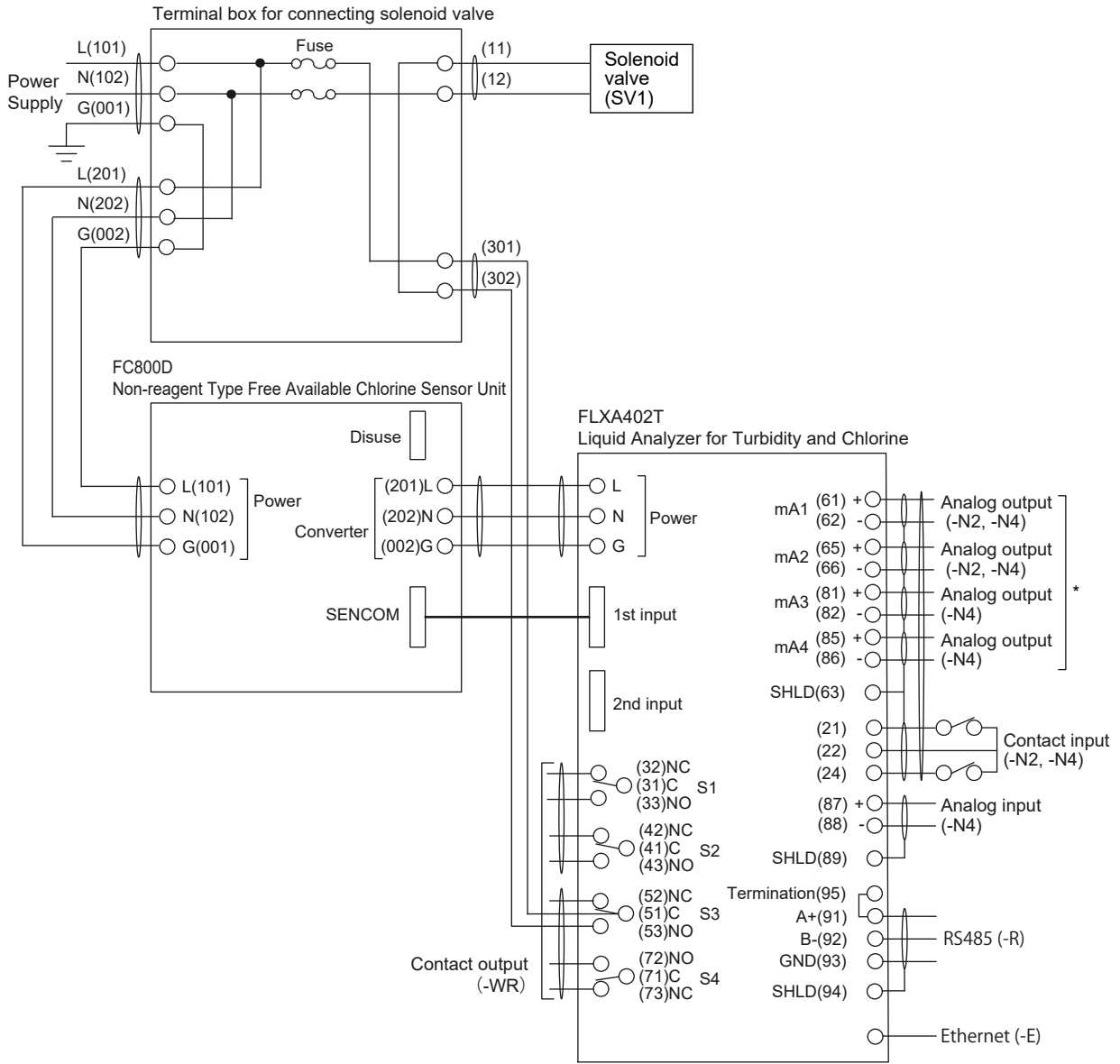
#### (2) Analog output and contact output

Refer to the manuals of pH converter and free available chlorine converter for their analog output and contact output wiring. Connect each wiring to corresponding terminals of the terminal box, refer to Figure 3.24 to Figure 3.26, Figure 3.28 to Figure 3.33.



\*: The analog output is protected by the arrester.

Figure 3.23 ST401G-FC5-N-A (/R) With free available chlorine analyzer, (back piping)



\*: The analog output is protected by the arrester.

Figure 3.24 ST401G-FC5-N-A (R) /AZC With free available chlorine analyzer, (back piping), auto zero calibration

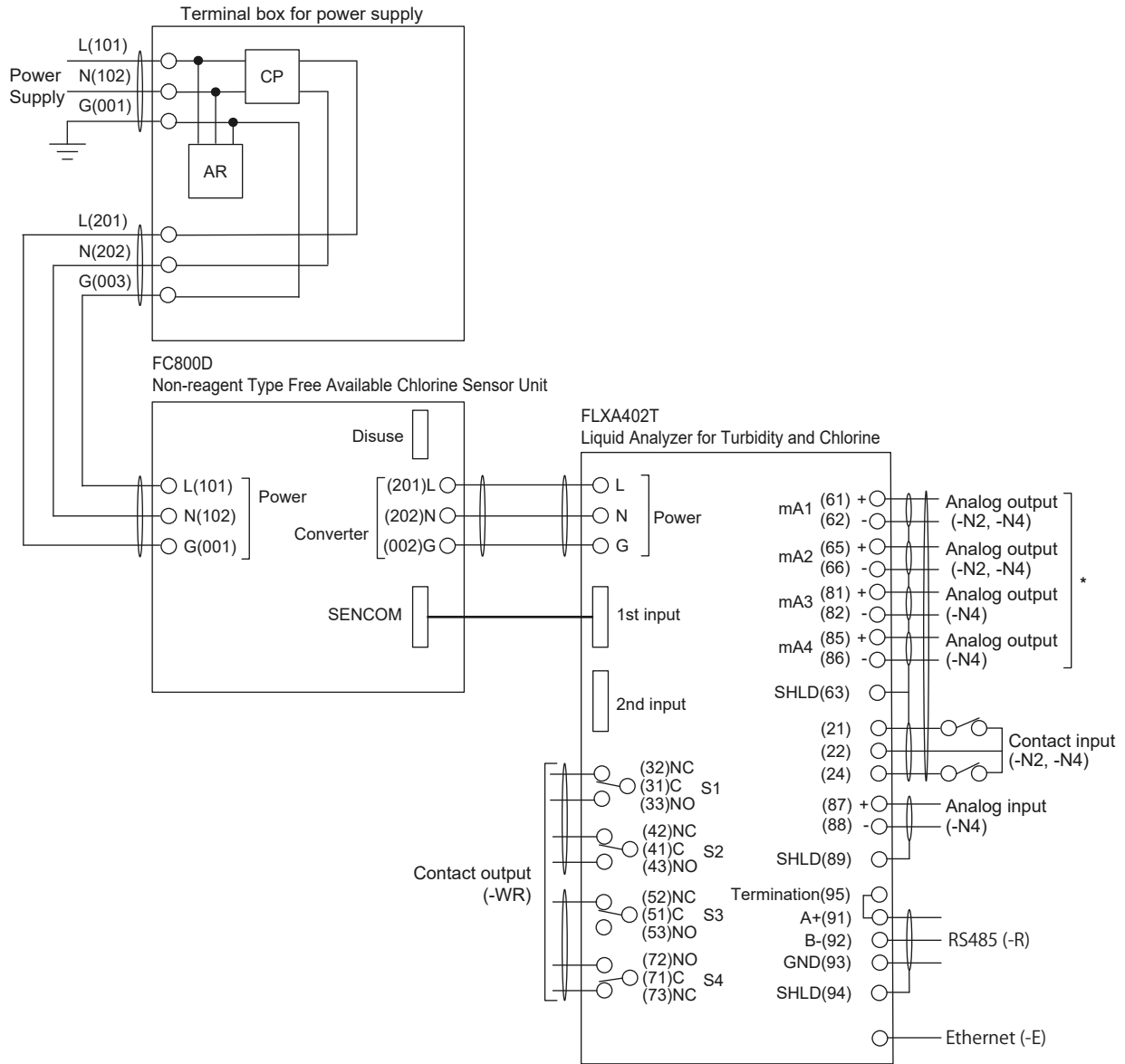


Figure 3.25 ST401G-FC5-N-A (/R) /ARS With free available chlorine analyzer, (back piping), arrester



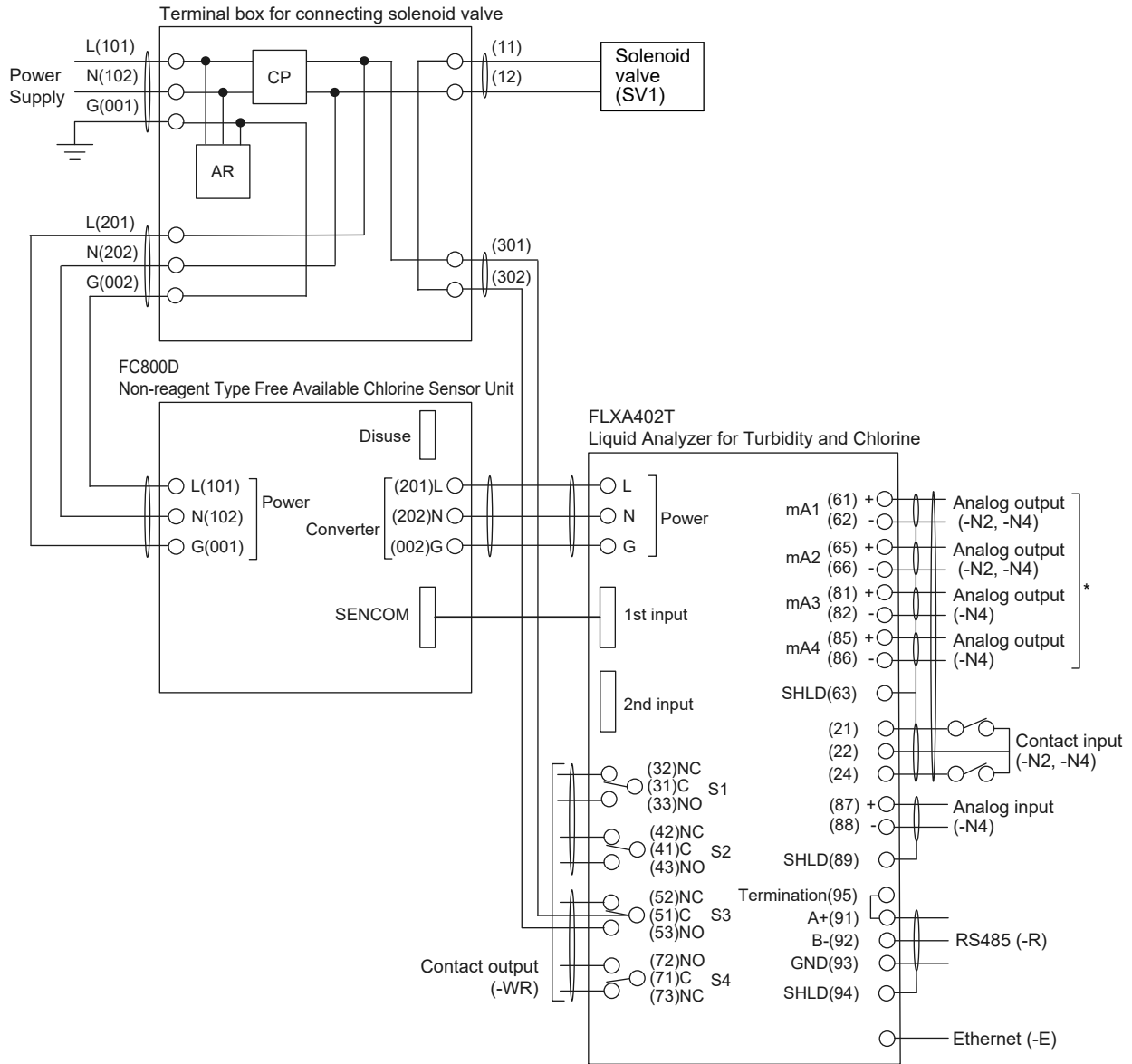
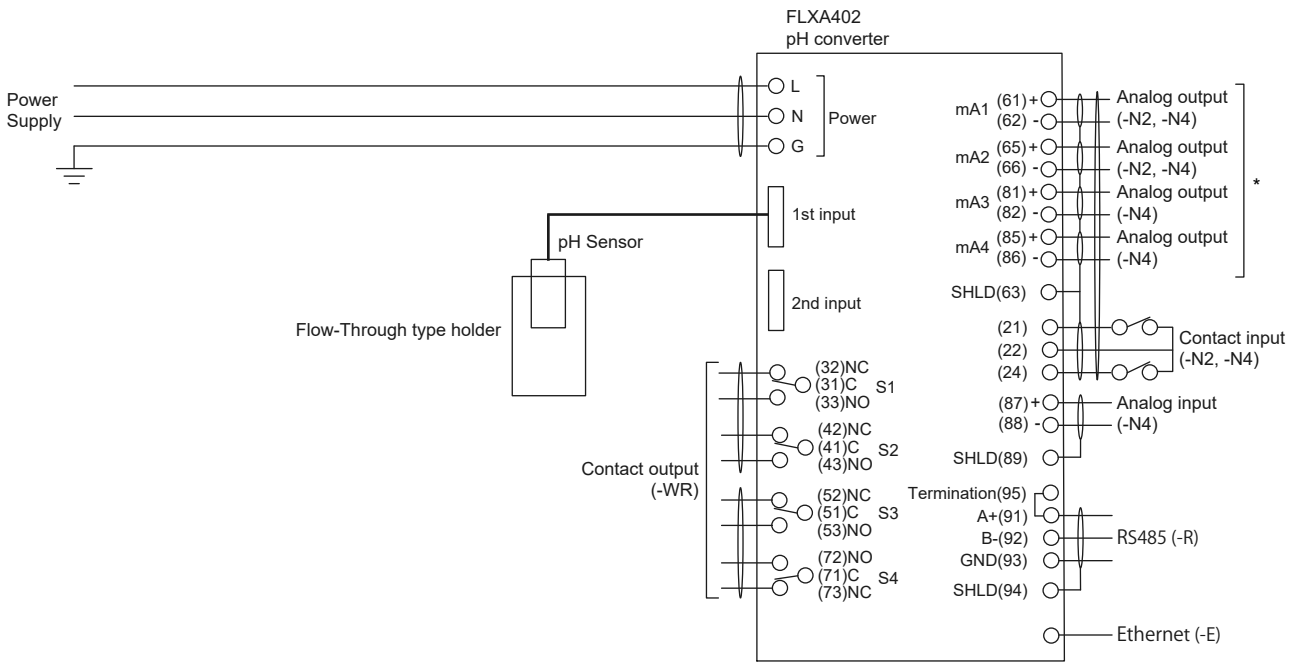
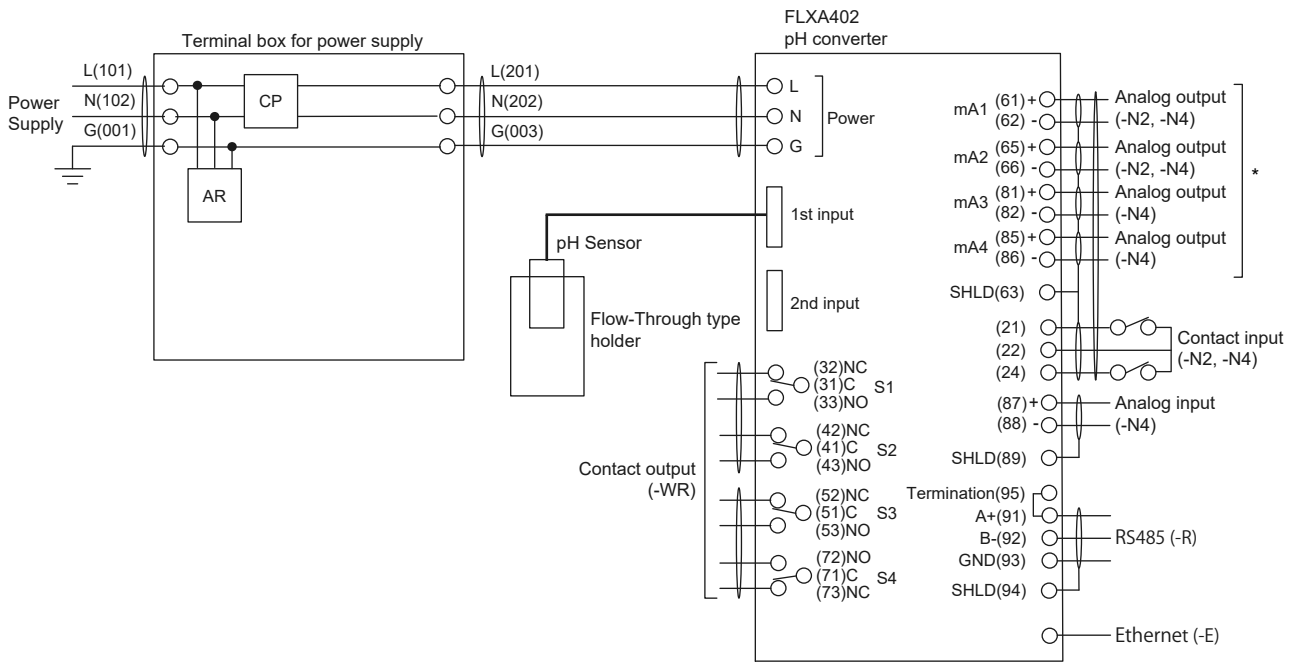


Figure 3.26 ST401G-FC5-N-A (R) /AZC /ARS With free available chlorine analyzer, (back piping), auto zero calibration, arrester



\*: The analog output is protected by the arrester.

Figure 3.27 ST401G-PH7-N-A (/R) (/TT3) With pH converter, (back piping), (500 ml KCl tank)



\*: The analog output is protected by the arrester.

Figure 3.28 ST401G-PH7-N-A (/R) (/TT3) /ARS With pH converter, (back piping), (500 ml KCl tank), arrester

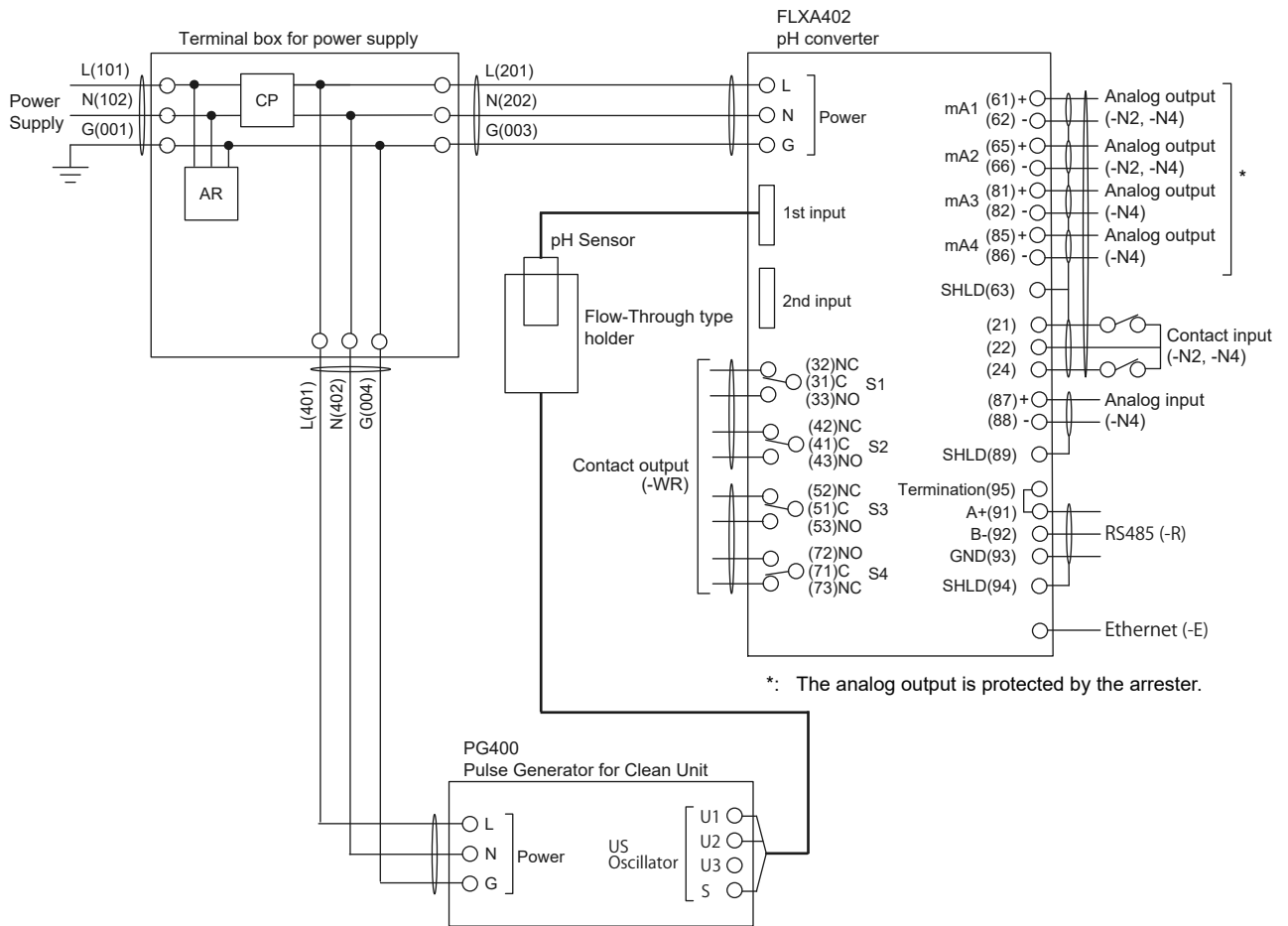
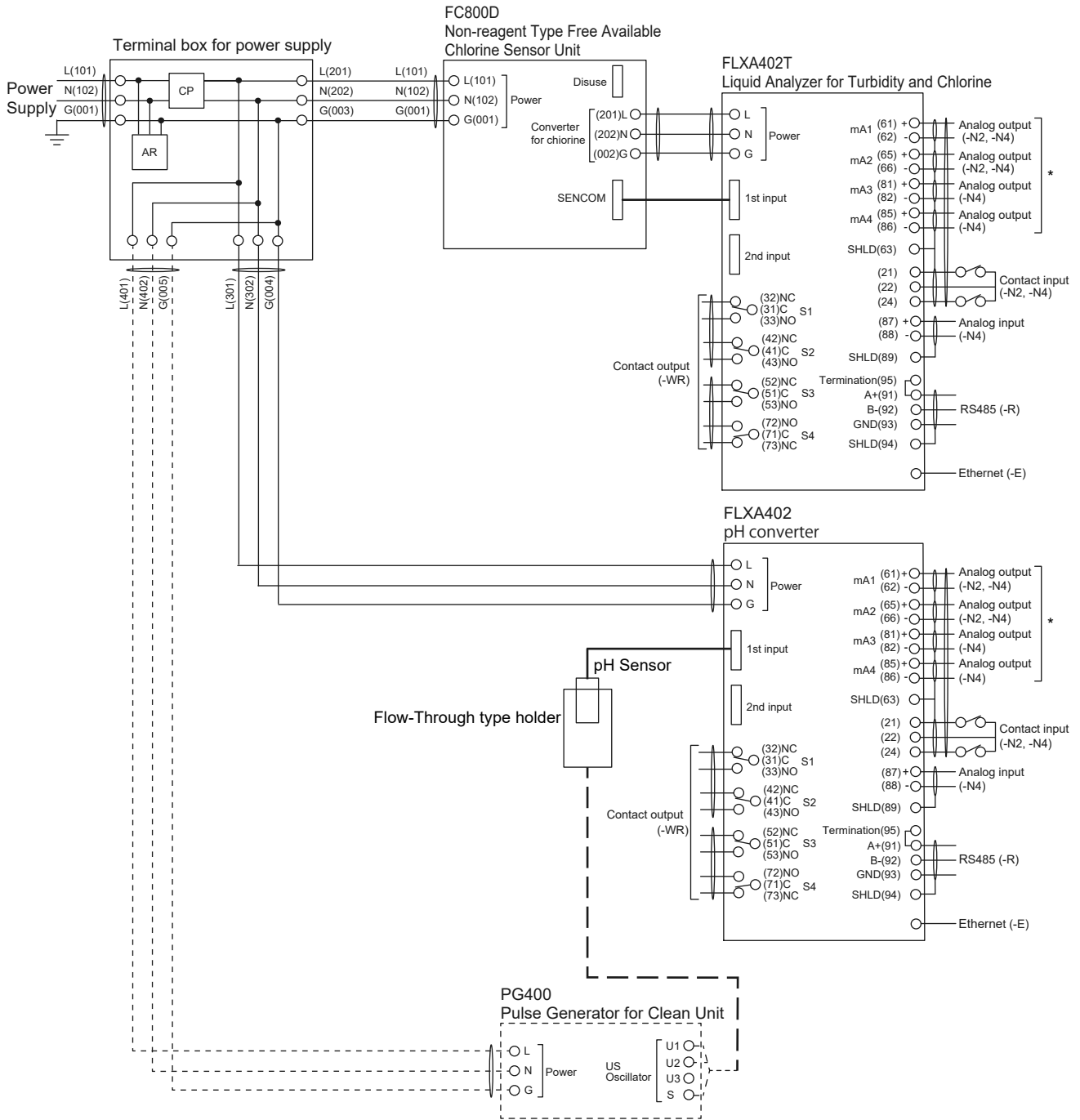
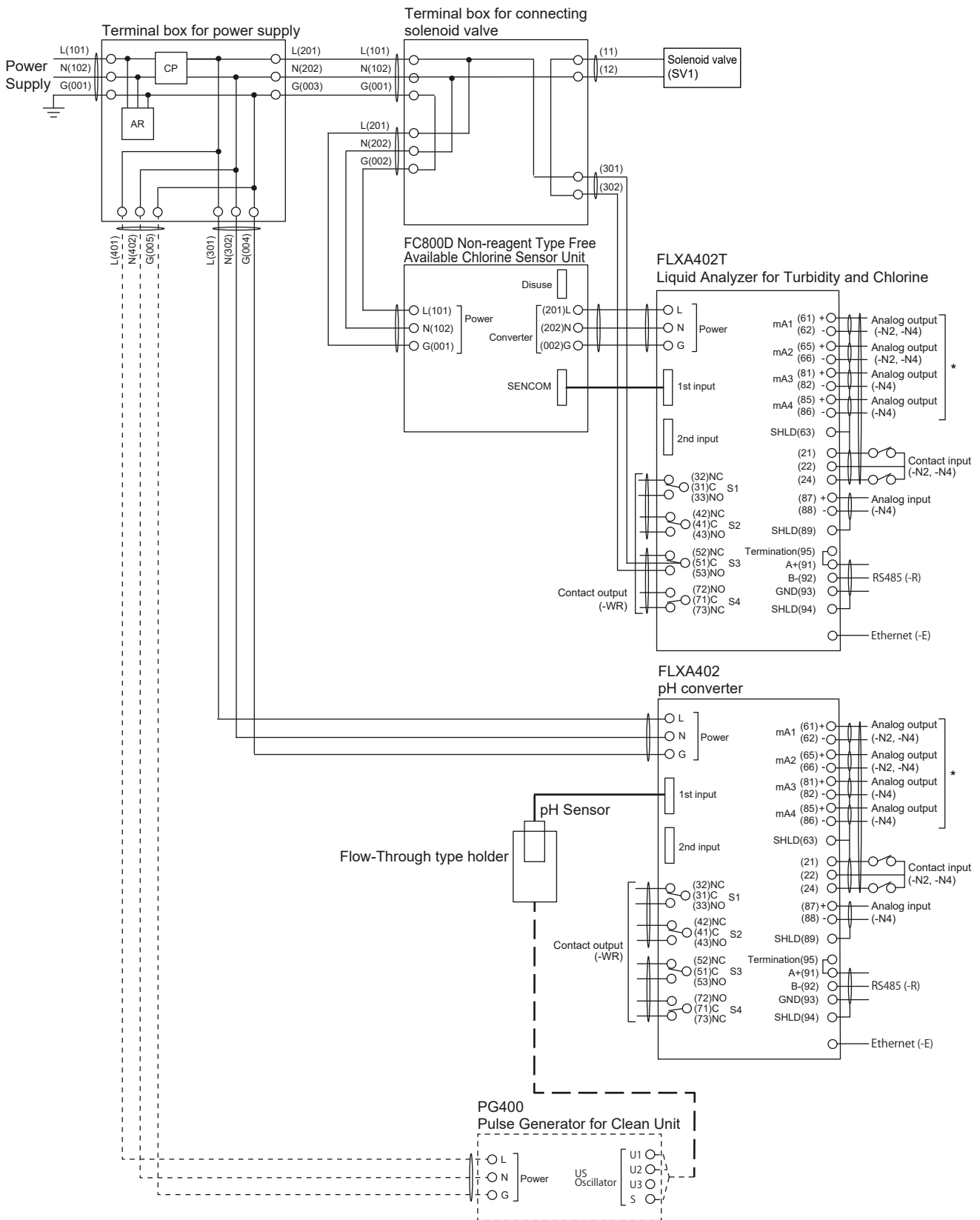


Figure 3.29 ST401G-PH7-P-A (R) (TT3) With pH converter, ultrasonic oscillator, (back piping), (500 ml KCl tank)



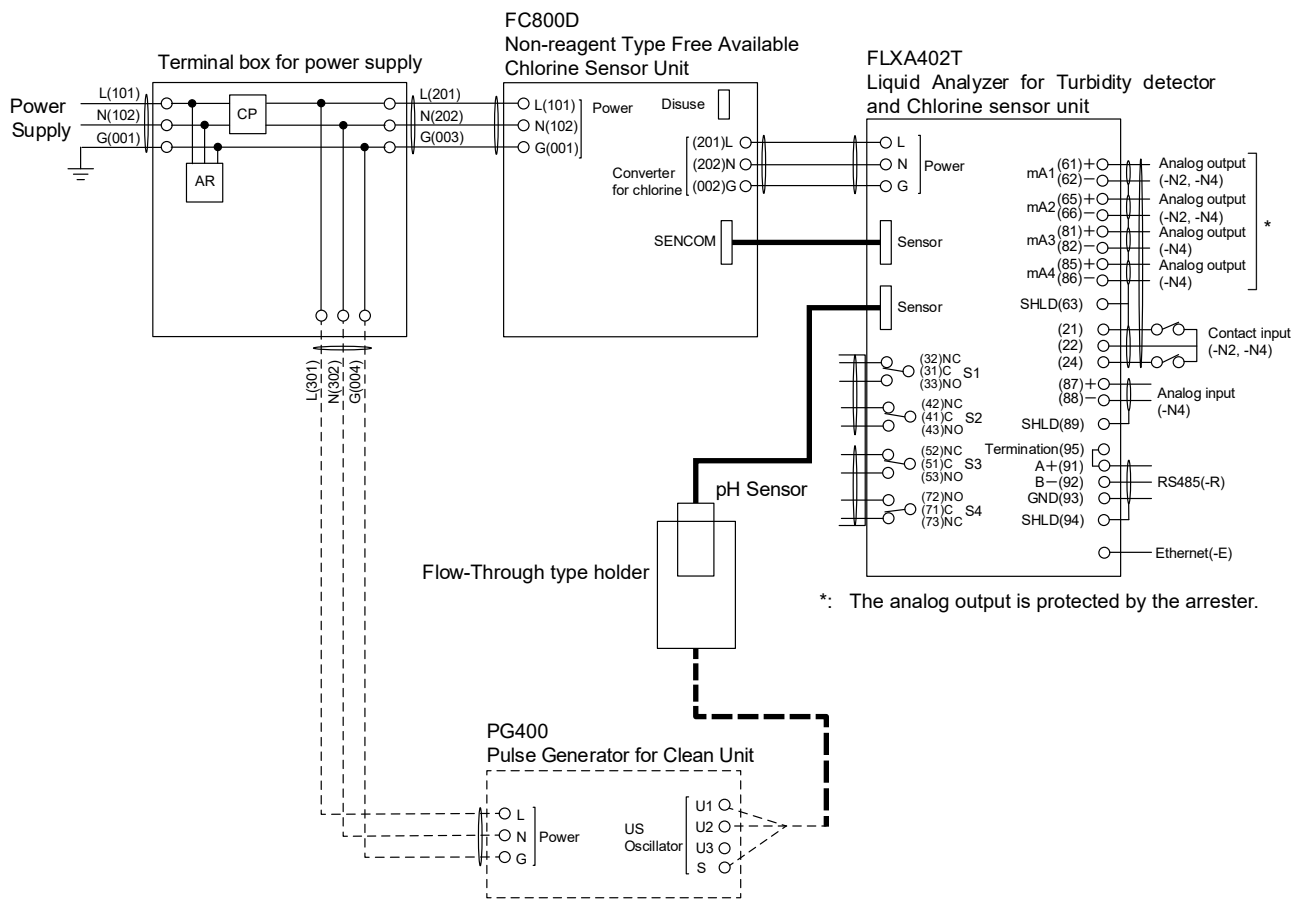
\*: The analog output is protected by the arrester.

Figure 3.30 ST401G-PF7-N-A (R) (TT3) ST401G-PF7-P-A (R) (TT3) With free available chlorine analyzer and pH converter, (back piping), (500 ml KCl tank)

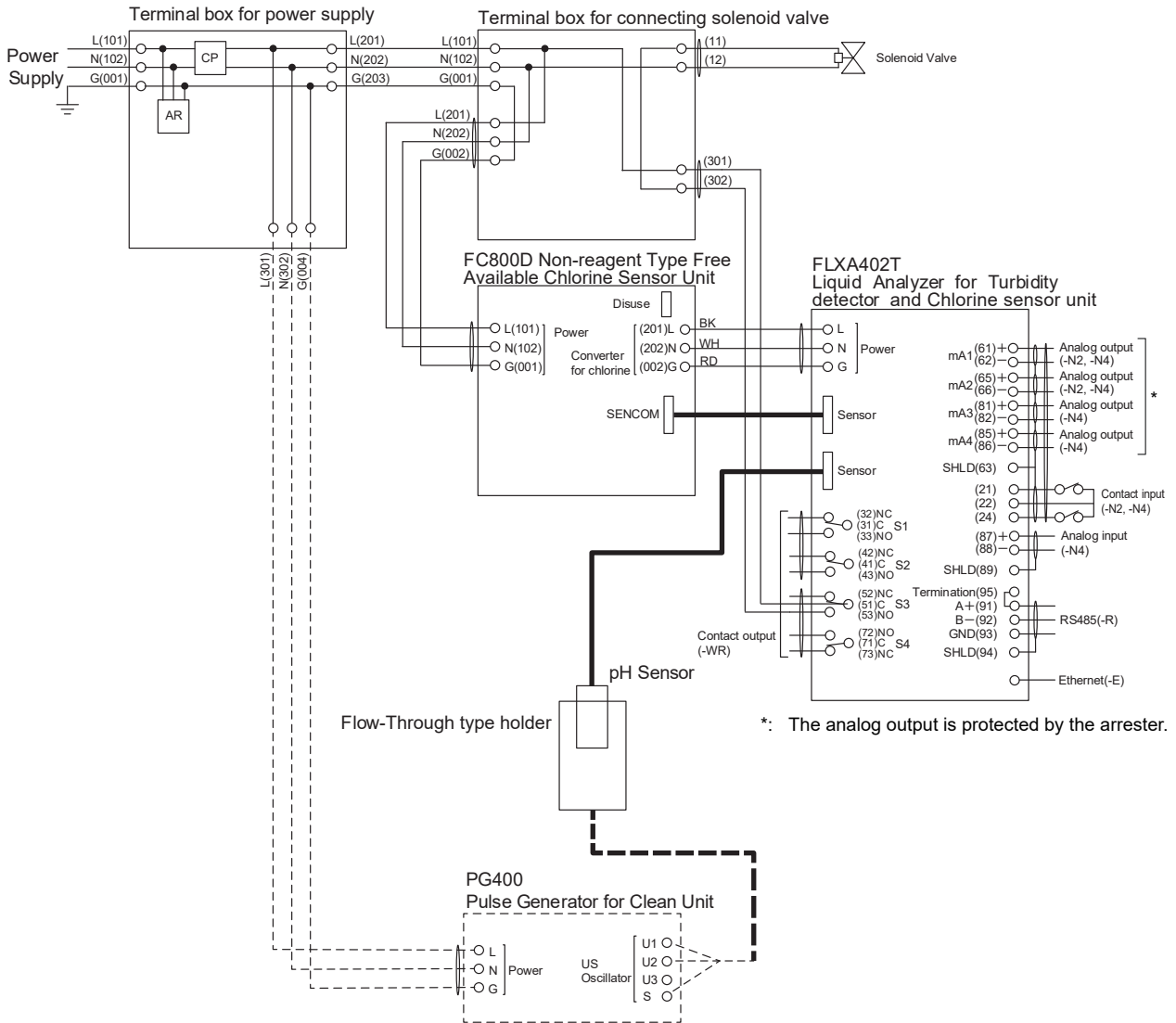


\*: The analog output is protected by the arrester.

**Figure 3.31** ST401G-PF7-P-A /AZC (I/R) (TT3) With free available chlorine analyzer and pH converter, auto zero calibration, (back piping), (500 ml KCl tank)  
 ST401G-PF7-N-A /AZC (I/R) (TT3) With free available chlorine analyzer and pH converter, ultrasonic oscillator, auto zero calibration, (back piping), (500 ml KCl tank)



**Figure 3.32** ST401G-PF8-N-A (/R) (/TT3) With free available chlorine analyzer and pH analyzer (back piping), (500 ml KCl tank)  
 ST401G-PF8-P-A (/R) (/TT3) With free available chlorine analyzer and pH analyzer, ultrasonic oscillator, (back piping), (500 ml KCl tank)



**Figure 3.33** ST401G-PF8-N-A /AZC (R) (TT3) With free available chlorine analyzer and pH analyzer, auto zero calibration, (back pipping), (500 ml KCl tank)  
 ST401G-PF8-P-A /AZC (R) (TT3) With free available chlorine analyzer and pH analyzer, ultrasonic oscillator, auto zero calibration, (back pipping), (500 ml KCl tank)

# 4. OPERATION

The following operation must start after the preparation of pH converter system and free available chlorine analyzer referring to the manuals of each equipment.

## 4.1 ST401G-FC5-N-A

Open ball valve (BV1) completely. Adjust needle valve (NV1) and make the flow rate into free available chlorine detector between 0.1 and 2.5 L/min.

Refer to Figure 4.1 for piping.

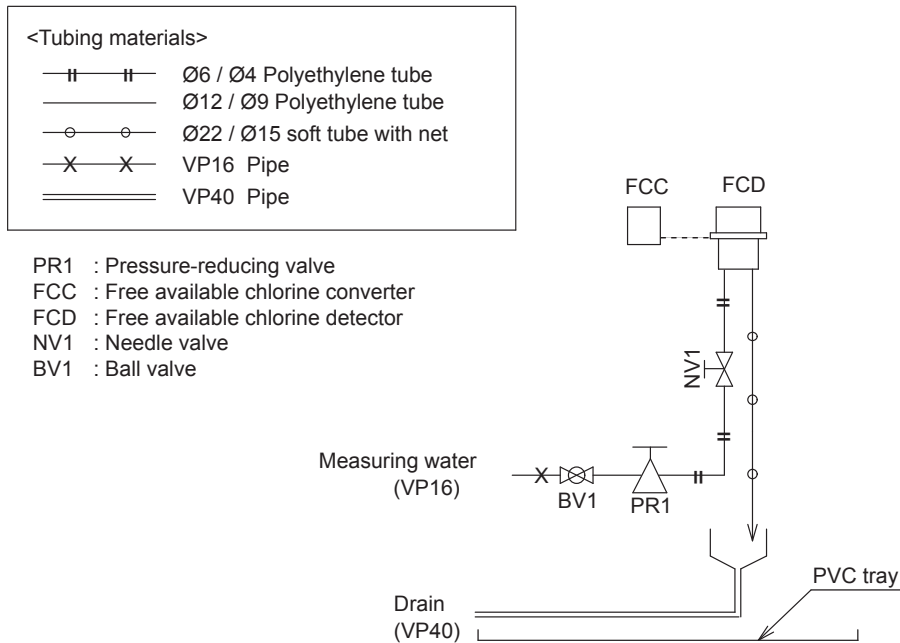


Figure 4.1 Piping diagram of ST401G-FC5-N-A (With free available chlorine analyzer)

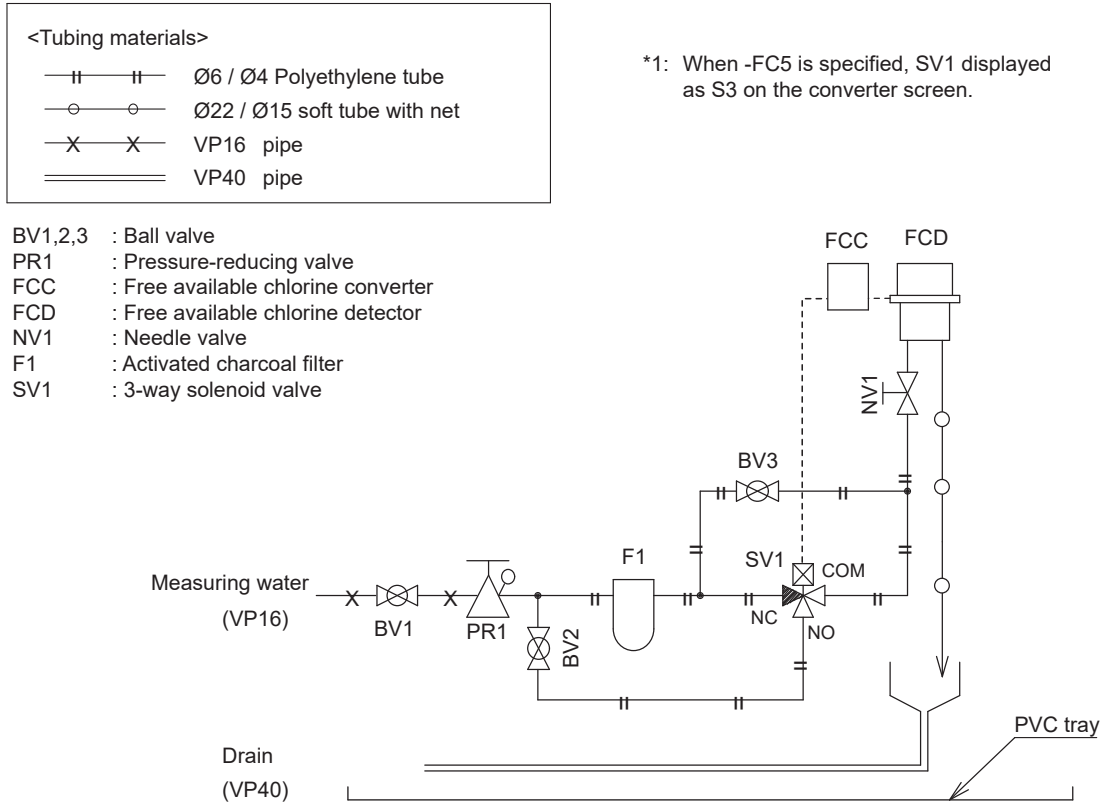


## 4.2 ST401G-FC5-N-A/AZC□

Open ball valve (BV1) completely. (BV3) closed. Adjust ball valve (BV2) and needle valve (NV1) and make the flow rate into free available chlorine detector between 0.1 and 2.5 L/min.

(BV3) is used for manual zero adjustment and washing. To stabilize the zero filter with water, refer to Section 3.8 of IM 12F05B10-02EN.

Refer to Figure 4.2 for piping.







**Figure 4.2** Piping diagram of ST401G-FC5-N-A/AZC□  
(With free available chlorine analyzer, auto zero calibration)

### 4.3 ST401G-PH7-□-A

Adjust ball valve (BV1) and make the flow rate into pH flow-through type holder between 3 and 10 L/min.

Refer to Figure 4.3 for piping.

<Tubing materials>	
	Ø12 / Ø9 Polyethylene tube
	Ø22 / Ø15 soft tube with net
	VP16 pipe
	VP40 pipe

- PR1 : Pressure-reducing valve
- BV1 : Ball valve
- PHC : pH converter
- PHH : Flow-through type holder
- PHS : pH sensor
- TK1 : KCl tank
- PG : Pulse Generator for Clean Unit  
(Suffix code: -P)

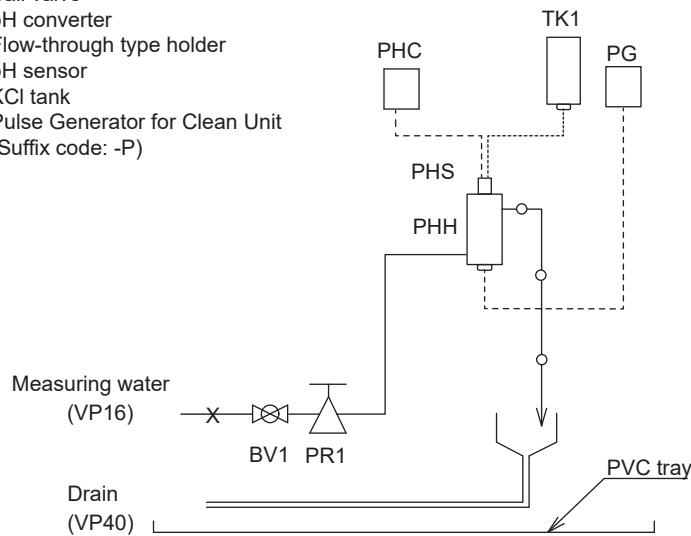
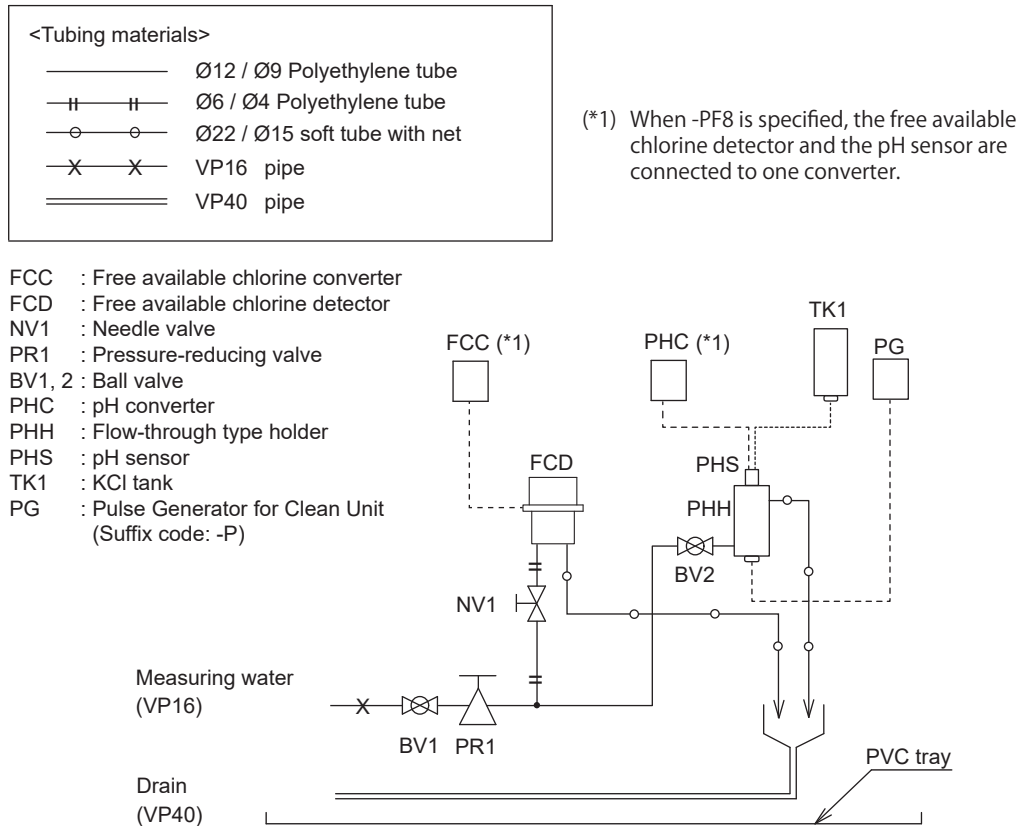


Figure 4.3 Piping diagram of ST401G-PH7□-A (With pH converter, (ultrasonic oscillator))

## 4.4 ST401G-PF7-□-A, ST401G-PF8-□-A

Open ball valve (BV1) completely. Adjust ball valve (BV2) and needle valve (NV1) and make the flow rate into pH flow-through type holder between 3 and 10 L/min and into free available chlorine detector between 0.1 and 2.5 L/min.

Refer to Figure 4.4 for piping.



**Figure 4.4 Piping diagram of ST401G-PF7-□-A (With free available chlorine analyzer and pH converter, (ultrasonic oscillator)), ST401G-PF8-□-A (With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator))**

# 4.5 ST401G-PF7-□-A/AZC□, ST401G-PF8-□-A/AZC□

Open ball valve (BV1) completely, (BV3) closed. Adjust ball valve (BV2, BV4) and needle valve (NV1) and make the flow rate into pH flow-through type holder between 3 and 10 L/min and into free available chlorine detector between 0.1 and 2.5 L/min.

(BV3) is used for manual zero adjustment and washing. To stabilize the zero filter with water, refer to Section 3.8 of IM 12F05B10-02EN.

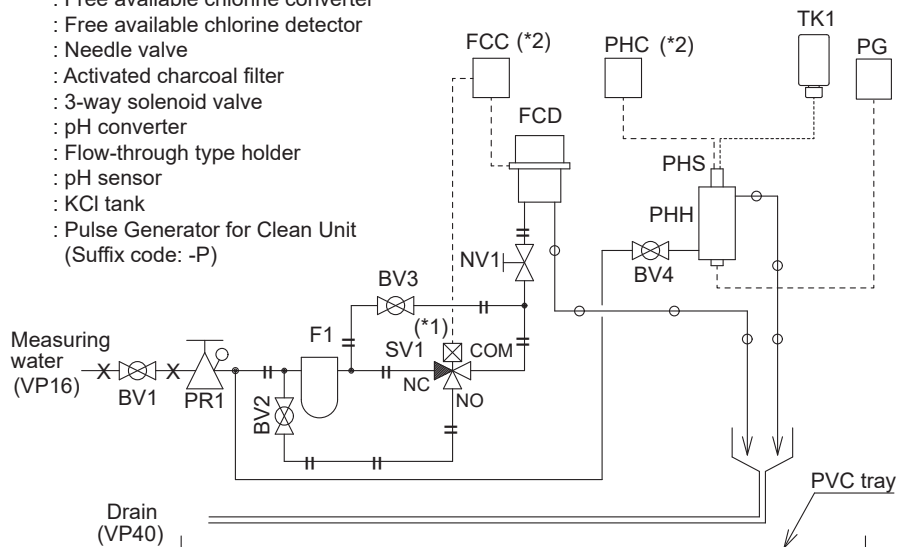
Refer to Figure 4.5 for piping.

<Tubing materials>	
	Ø22 / Ø15 soft tube with net
	Ø6 / Ø4 Polyethylene tube
	Ø12 / Ø9 Polyethylene tube
	VP16 pipe
	VP40 pipe

- (\*1) SV1 displayed as S3 on the converter screen.
- (\*2) When -PH8 is specified, the free available chlorine detector and the pH sensor are connected to one converter.

BV1,2,3,4 : Ball valve

- PR1 : Pressure-reducing valve
- FCC : Free available chlorine converter
- FCD : Free available chlorine detector
- NV1 : Needle valve
- F1 : Activated charcoal filter
- SV1 : 3-way solenoid valve
- PHC : pH converter
- PHH : Flow-through type holder
- PHS : pH sensor
- TK1 : KCl tank
- PG : Pulse Generator for Clean Unit (Suffix code: -P)



**Figure 4.5 Piping diagram of ST401G-PF7-□-A/AZC□ (With free available chlorine analyzer and pH converter, (ultrasonic oscillator), auto zero calibration), ST401G-PF8-□-A/AZC□ (With free available chlorine analyzer and pH analyzer, (ultrasonic oscillator), auto zero calibration)**



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## 5. MAINTENANCE

### 5.1 Confirmation of flow rates of sample

Check the flow rate of the sample regularly and adjust into necessary amounts.

### 5.2 Leakage check

Check the leakage from pipes and fittings. At this time, check the appearance of pipes and fittings. Repair or exchange them when any crack or defect is observed.

### 5.3 Maintenance of each built-in equipment

Maintain and inspect pH converter system and free available chlorine analyzer regularly according to each manual.

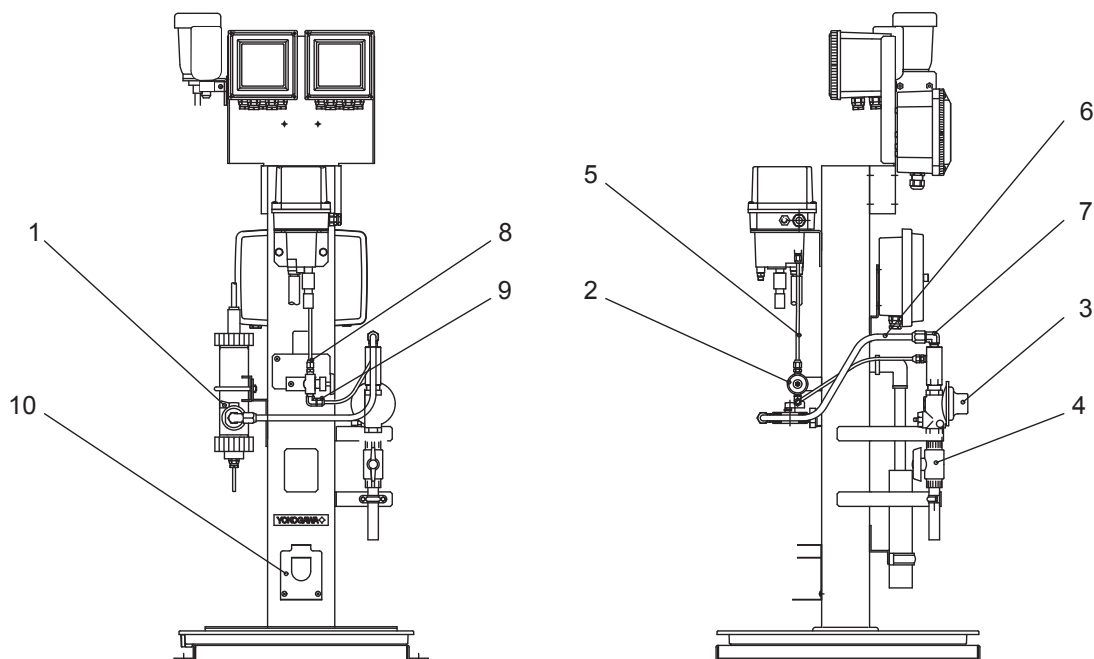
For auto zero calibration option, the activated charcoal filter should be periodically replaced. Refer to Section. 8.4 of IM 12F05B10-02EN "FC800D Non-reagent Type Free Available Chlorine Sensor Unit".



# Customer Maintenance Parts List

# Model ST401G Sampling System

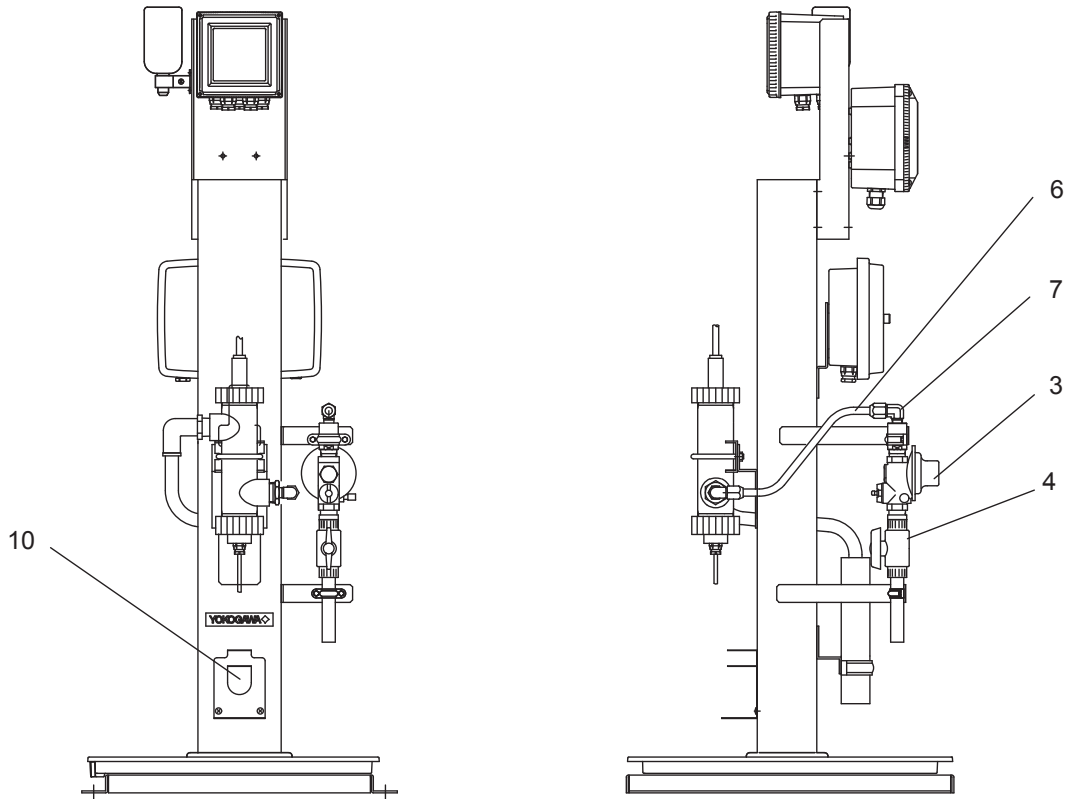
When suffix code of "- PF□"



Item	Part No.	Qty	Description
1	L9854CL	1	Ball Valve
2	L9852CB	1	Needle Valve
3	K8004QG	1	Regulator
4	K9326HT	1	Ball Valve Assembly
5	L9901CA	1	Ø6 / Ø4 P.E. Tube
6	L9901CK	1	Ø12 / Ø9 P.E. Tube
7	L9831MH	1	Elbow Union
8	L9831JE	1	Half Union
9	L9831NE	1	Elbow Union
10	K9146BB	1	Sensor Stand

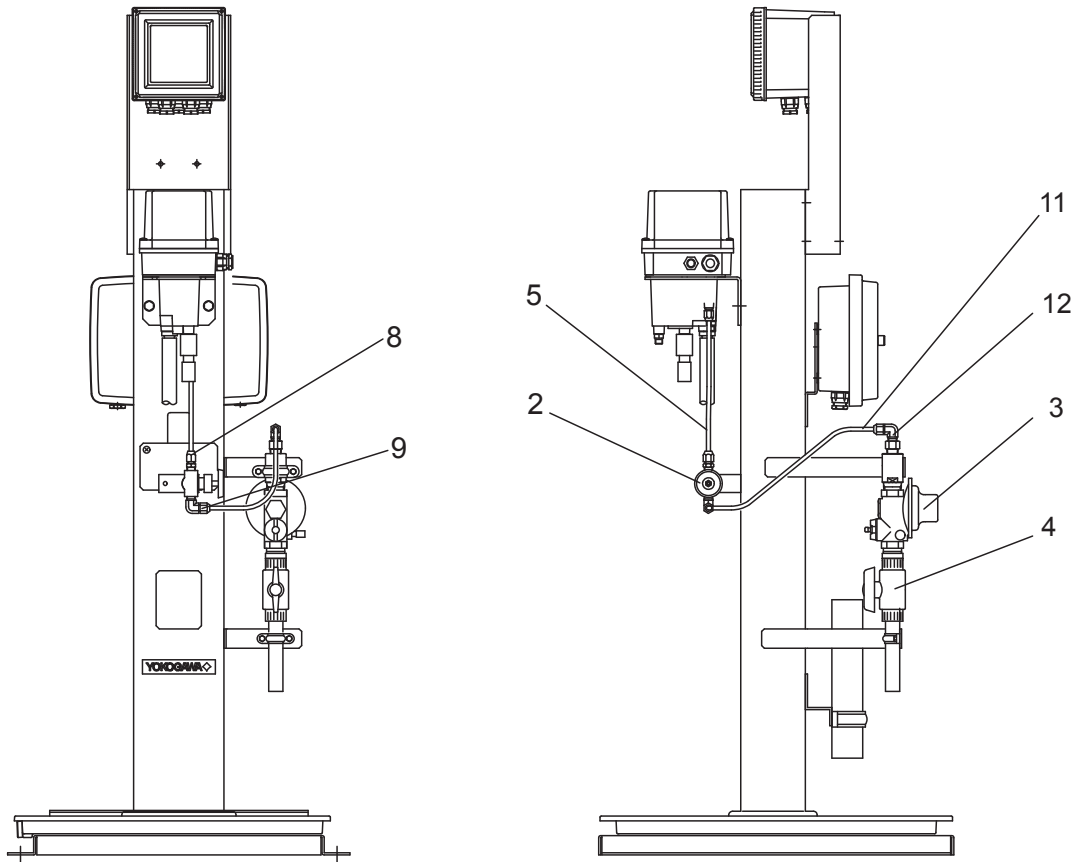


## When suffix code of "- PH□"



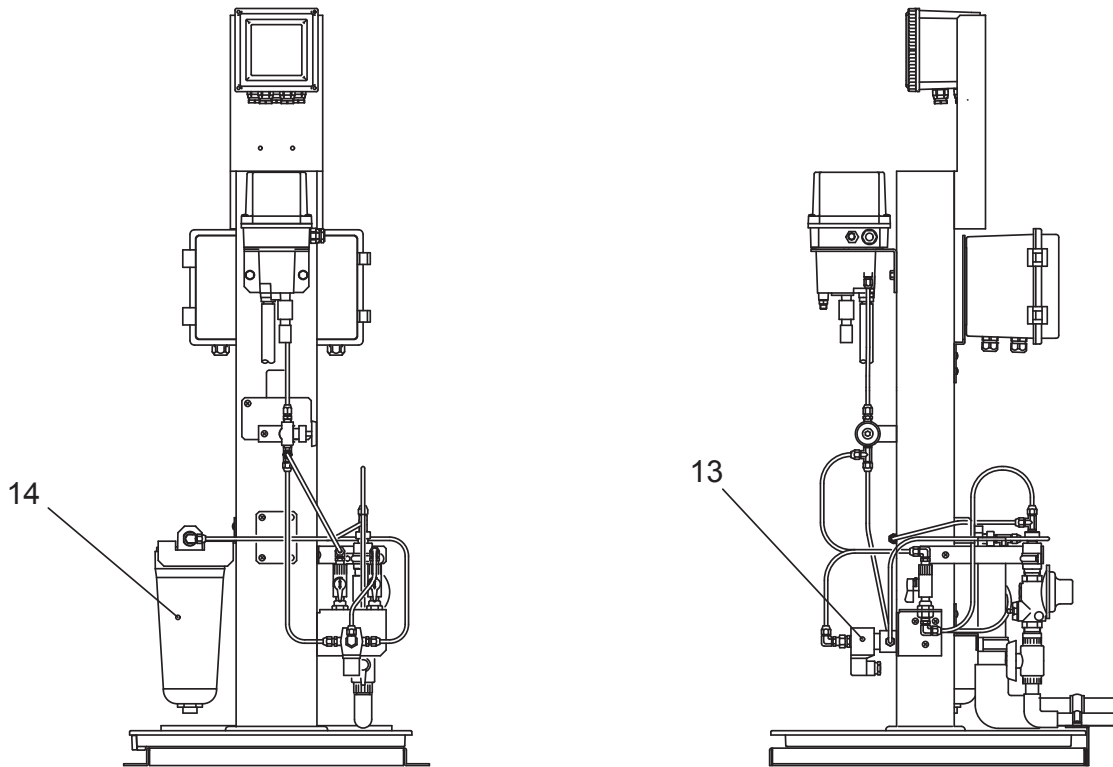
Item	Part No.	Qty	Description
3	K8004QG	1	Regulator
4	K9326HT	1	Ball Valve Assembly
6	L9901CK	1	Ø12 / Ø9 P.E. Tube
7	L9831MH	1	Elbow Union
10	K9146BB	1	Sensor Stand

## When suffix code of "- FC□"



Item	Part No.	Qty	Description
2	L9852CB	1	Needle Valve
3	K8004QG	1	Regulator
4	K9326HT	1	Ball Valve Assembly
5	L9901CA	1	Ø6 / Ø4 P.E. Tube
8	L9831JE	1	Half Union
9	L9831NE	1	Elbow Union
11	L9901CA	1	Ø6 / Ø4 P.E. Tube
12	L9831NE	1	Elbow Union

## When option code of "/AZC"



Item	Part No.	Qty	Description
13	—	1	Solenoid Valve
	A1029MV		For 100 V AC
	K9460ET		For 110 V AC
	K9726KR		For 200 V AC
	K9726KS		For 220 V AC
14	K9726EG	1	Filter Assembly
	L9862AY	1	Filter Element

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# Revision Information

- Title : Model ST401G Sampling System
- Manual No. : IM 12A0V2-E

**Feb. 2023/14th Edition**

CMPL revised to 6th edition

**Jan. 2022/13th Edition**

Revised the terminal numbers in the wiring diagram (Pages 3-31, 3-32)

**Nov. 2021/12th Edition**

Added footnote to the wiring diagrams. (Figure 3.23 to Figure 3.33)

**Nov. 2021/11th Edition**

Corrected the external dimensions. (Figure 3.1 to Figure 3.6, Figure 3.8 to Figure 3.12, Figure 3.14 to Figure 3.22)

**Oct. 2021/10th Edition**

Corrected the wiring diagrams. (Figure 3.23 to Figure 3.33)

**Oct. 2021/9th Edition**

Deleted -PH4, -PH6, -PF6, -U (Chapter 1 to Chapter 5)

**Jul. 2021/8th Edition**

Deleted -PH5, -PF5

Added -FC5, -PH7, -PF7, -PF8 (Chapter 1 to Chapter 5)

**Non. 2019/7th Edition**

Deleted PH400G (deleted -PH4, -PF4) Added FLXA402 (-PH6, -PF6) (pages i, Chapter 1, Chapter 3)  
CMPL revised to 5th edition

Correction (page 1-1)

**Dec. 2010/6th Edition**

Addition of built-in PH450G converter and 500 ml KCl reserve tank option; Applied InDesign format to all pages; Sec. 2. Specification and Sec. 3. Installation, wiring diagram almost modified; Sec. 4. Piping diagram some modified; CMPL revised to 4th edition, some drawings changed.

**Dec. 2006/5th Edition**

The overall revised.

**June. 2003/4th Edition**

Option code /AZC changed to /AZC1 to /AZC4.

**Nov. 2002/3rd Edition**

Dimension of stanchion changed; Ms-code some changed; Sec.3 Installation, piping and wiring all changed; Sec.4 Operation some changed of Auto-zero Calibration; CMPL revised to 3rd edition, some parts added.

**Dec. 1996/2nd Edition**

Some page changed.

**May. 1996/1st Edition**

Newly published.

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