

Shimadzu ICP Mass Spectrometer

ICPMS-2040/2050 Series

Pre-Installation Requirements

(For Preparation and Check List)

Shimadzu Corporation

Analytical & Measuring Instruments Division

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1 Introduction

Carefully prepare the location and configuration of incidental instrument by referring to the following guidelines, before installing a Shimadzu ICPMS-2040 or ICPMS-2050 ICP Mass Spectrometer system.

2 Installation

2.1 Temperature and Humidity of Installation Site

The installation site should be air conditioned and meet the following conditions:

- A. Set the room temperature between 18 °C and 28 °C. Keep room temperature variations within ± 2 °C an hour.
- B. Position instruments where they are not exposed to drafts or air flow from the air conditioning system.
- C. Position instruments where they are not exposed to direct sunlight.
- D. Keep humidity between 20 % and 70 % throughout the year.

Example of heat discharge: Using a vacuum pump with PFPE oil

- For normal operation: Heat discharge in 1.2 kW high-frequency output mode is approx. 3,560 kcal/h
- For maximum operation: Heat discharge in 1.6 kW high-frequency output mode is approx. 4,060 kcal/h

Heat Discharge Site (Itemization)	Heat Discharge (kcal/h)
Heat discharge from plasma stand into the exhaust duct due to high-frequency power supply <ul style="list-style-type: none"> • 1.2 kW high-frequency output mode: • 1.6 kW high-frequency output mode: 	Approx. 1500 kcal/h Approx. 2000 kcal/h
Heat discharge from units not from high-frequency power supply (exhaust from back of instrument)	Approx. 200 kcal/h
Heat discharge from cooling water circulator	Approx. 1000 kcal/h
Heat discharge from vacuum pump <ul style="list-style-type: none"> • When a vacuum pump with PFPE oil is used: • When a dry pump is used: 	Approx. 860 kcal/h Approx. 400 kcal/h

2.2 Transportation and Relocation

Transporting the ICPMS-2040 or ICPMS-2050 requires a minimum clearance width of 800 mm. Before transporting the instrument, check whether an elevator, as well as carrying machines such as a forklifts, are available on site.

If the instrument needs to be relocated after initial installation, contact a Shimadzu service engineer. The instrument weighs 144 kg, so it is recommended that six people work together when relocating the instrument. Use of hand lifters and other instrument are recommended to ensure safety.

Note: The exterior of this instrument has the risk of deformation and thus does not support rigging.

2.3 Other

- This instrument uses argon, helium, hydrogen, and third gas. Make sure to ventilate the room well.
- Make sure that the environment is appropriate for installing cylinders of high-pressure gases, such as incombustible and flammable gases.
- Hydrogen gas is flammable, so it must be stored in a cylinder cabinet when storing it indoors.
- Check the space for installing the PC for data processing and the optional autosampler.
- Do not install the instrument near any instrument that generates a strong magnetic field. Add a means of noise blocking (noise filter) if there is significant noise in the power supply line.
- Do not install the instrument in any place where there is a significant amount of corrosive gas or dust in order to maintain the service life and performance of the instrument.
- Install the instrument in a location that meets the installation requirements (IEC standards). (Installation Category II, Pollution Degree 2, Altitude: 2000 m max., Indoor use)
- Be sure to discharge the exhaust gas from the rotary pump and the vapor collected in the liquid waste container into a fume hood or other duct system.
- Due to the structure of the rotary pump, the lubricant oil may seep out of the sealed part of the shaft. Before using the instrument, ensure that the oil level is in the appropriate range. A rotary pump platform (P/N S225-27850-05) is available for preventing oil drips from the rotary pump onto the floor.

Comply with the following precautions when using a high-pressure gas cylinder for supplying gas.



WARNING

When using a high-pressure gas cylinder, please observe the High Pressure Gas Safety Law, or the applicable laws for high pressure gas cylinders governing the installation site.

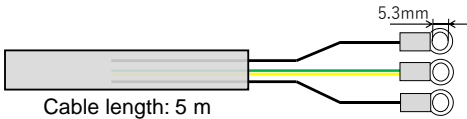

- (1) Gas cylinders should be sited outdoors at a location where there is a good passage of air and no exposure to direct sunlight, and the gas should be fed indoors through tubing.
- (2) Do not place high-pressure gas cylinders where the temperature can rise over 40 °C.
- (3) Ensure good ventilation when using a high-pressure gas, and check for gas leaks before starting operation using soap water or other means. Do not smoke or use fire of any sort within 5 m of any instrument using flammable gas (acetylene, hydrogen, propane, etc.) or gas that increases the susceptibility of substances to burn (oxygen, nitrous oxide, etc.). Additionally, keep an effective fire extinguisher ready on site.
- (4) Make sure that the high-pressure gas cylinders are fixed in place with a cylinder stand or chains to keep it from falling over.
- (5) Be sure to use only oil-free pressure reducing valves. Do not use any cylinder with a pipe that has oil adhesion inside where gas comes into contact with the oil.
- (6) Once the use of gas is finished, close the main valve of the cylinder immediately.
- (7) Inspect the functionality of pressure gauges at least once in three months.

3 Power Supply

3.1 Main Spectrometer Unit

Provide a 6 kVA single-phase 200 V to 240 V power supply (50/60 Hz) (M5 screw terminal) to near the back panel of the instrument. The terminal of the instrument's power cable is shown below. (A plug is required to connect to a power outlet.)

Maximum allowable voltage fluctuation is within $\pm 10\%$. A 6 kVA capacity voltage stabilizer with output voltage precision within $\pm 5\%$ is required for power supplies that vary by more than $\pm 10\%$. The vacuum pump is powered by the main spectrometer unit and does not require a separate power supply.

 <p>Cable length: 5 m</p>	
<p>Power Cable for the Main Spectrometer Unit (Cable is integrated with the spectrometer)</p>	<p>Plug (When connecting to a power outlet)</p>

3.2 Data Processing Unit

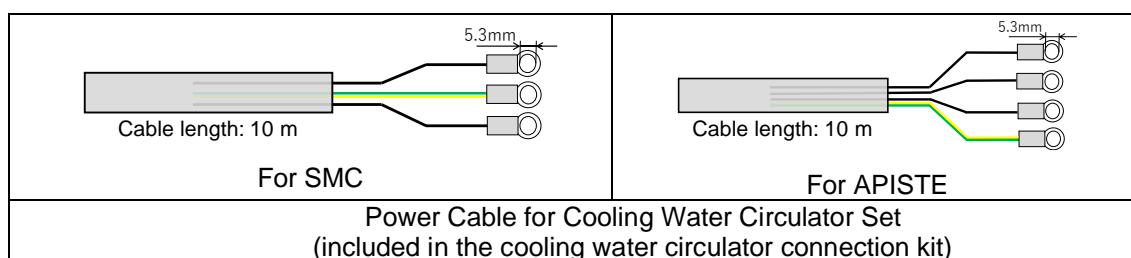
The PC used for data processing with the ICPMS-2040 and ICPMS-2050 requires the following specifications.

- | | |
|----------------------|--|
| 1) Operating System | Microsoft Windows 10 Pro (64 bit version)
English version or Simplified Chinese version |
| 2) CPU | Core i5-8500 (3.0 GHz) or better |
| 3) RAM | 4GB RAM or better |
| 4) Network | 1000BASE-T/100BASE-TX/10BASE-T compatible LAN interface |
| 5) HDD | 2GB free space or better
Sufficient free space is separately required for data storage |
| 6) Optical Drive | Drive capable of reading DVD-ROM/CD-ROM |
| 7) Monitor | 1,920 x 1080 pixels or better |
| 8) Peripheral device | Monitor, Keyboard, Mouse, Printer |

3.3 Cooling Water Circulator (Optional)

The ICPMS-2040 and ICPMS-2050 need a cooling water circulator. Provide the following power supply.

Cooling Water Circulator	Required Power Supply
<ul style="list-style-type: none"> • Cooling Water Circulator SMC (P/N S211-97273-41) • Chiller Connection Kit (P/N S211-93827-43) 	<p>Single-phase 200 V to 230 V; Capacity 1.2 kVA min.; Maximum allowable voltage fluctuation within $\pm 10\%$ (with M5 screw terminal) (See below for cable terminal on the power supply side.)</p>
<ul style="list-style-type: none"> • Cooling Water Circulator APISTE (P/N S211-97274-41) • Chiller Connection Kit (P/N S211-93827-42) 	<p>Three-phase 200 V to 230 V; Capacity 1.2 kVA min.; Maximum allowable voltage fluctuation within $\pm 10\%$ (with M5 screw terminal) (See below for cable terminal on the power supply side.)</p>



3.4 Autosampler (Optional)

- A single-phase 100 V to 240 V power supply (50/60 Hz) with 50 VA minimum capacity is required when using the AS-20.

The power cable is sold separately.

- S071-60821-08 CORD, UC-975-N01 (125V)
 - S071-60814-05 CORD SET, KP-4819D+KS-31A 2.4 (250V)
 - S071-60827-05 Cord, KP-722+KS-31A 2.4M (250V, For China)
- A single-phase 100 V power supply (50/60 Hz) with 200 VA minimum capacity is required when using the ASX-560 or ASX-280. A 1.8 m power cable with 3-pin grounded plug is supplied.

3.5 Dual Valve Unit (Optional)

- A single-phase 100 V to 240 V power supply (50/60 Hz) with 65 VA minimum capacity is required when using the solution switching valve.

A 24 V AC adapter and Power cable is not included in the Dual Valve Unit. Please purchase the following separately.

AC adapter

P/N	Description	Remarks
Local procurement	Cincon Electronics, TRH70A240-26E11	*1

*1: The above is an example. An AC adapter with the following specifications is required:

- ✓ Output Voltage: 24V, Output Current: 3A, Center Plus, DC Plug
Type: Straight/Inner+Outer-(5.5X2.5X9.5), Cable Length: 720 with Ferrite Core

Power cable

P/N	Description	Remarks
S071-60815-04	CORD SET, KP300C+KS16F U9 *1	*1
S465-06046	POWER CABLE, CCC A9 *2	*2
S071-60845-01	CORD SET, 3VTJ1/3VTJA H05VV-F L9 *3	*3

*1: UL, CSA marks for US.

*2: CCC mark for China.

*3: VDE mark for EU.

Note: There are laws around the world that ensure the safe use of electrical products, and power cords are especially regulated in many countries. Power cords must conform to regulations established in each country.

Note: For other areas, procure a power cord that complies with the laws and regulations of the country or region.

100V to 120V	Rated current 15A, Instrument side connector type: C13
200V to 240V	Rated current 10A, Instrument side connector type: C13

4 Ground

This instrument produces high-power radio frequency radiation, and a long wiring distance from the grounding point to the instrument may increase the impact of noise.

Avoid sharing a grounding point with other instrument whenever possible. Connect to a stable grounding device using short wiring. (Grounding resistance: 100 Ω or lower)

Make sure to use equipotential bonding with optional products, including the PC, that are connected to the instrument. Otherwise, communication problems between the instrument and optional products or a malfunction may occur.

5 Table

The ICPMS-2040 and ICPMS-2050 each weight 144 kg. Provide a table with sufficient load capacity. See the external diagram of the ICPMS-2040 and ICPMS-2050 (Fig. 1) for the exterior dimensions, center-of-gravity position of the instrument, and leg positions.

Note: The table's load capacity may be noted in equal load.

Other Precautions

- The main spectrometer unit is equipped with a relocation detection unit. Vibrations from the rotary pump creates a risk of false detection. Install the rotary pump and any other instrument that generates significant vibrations away from the table.
- An optional anti-earthquake kit (S211-94404-91: Adjuster Fastening Kit) is available for preventing the instrument from falling.

6 Space around the Spectrometer

Space must be provided around the instrument to ensure performance is maintained and to allow access for servicing.

Provide the space indicated in Fig. 2.

7 Argon Gas and Associated Plumbing

Provide an argon gas supply with a minimum 99.95 % purity.

500±10 kPa of pressure is required at the instrument inlet port. Pipe length should be within 10 m from the pressure reducer to the gas inlet port of the instrument. A plumbing tube (5 m) is supplied with the spectrometer for connecting to the customer's instrument. See Fig. 4 and Fig. 5 for examples of plumbing to be prepared at the customer site.

If argon gas is to be branched into multiple systems, an argon gas pipe connection kit can be used to prevent pressure fluctuation impact to the spectrometer. To use argon gas branched into multiple flows, the supply source pressure before branching should be between 700 kPa and 800 kPa, and the pressure of the pressure regulator near the instrument should be 500±10 kPa. See Fig. 6 for a plumbing example.

7.1 Argon Gas Consumption

If a mini torch is used, the argon gas consumed for analysis is 0.65 m³/h.

(Reference) 47 L gas cylinder at 15000 kPa allows for gas consumption of 6.5m³, which lasts approximately 10 hours.

7.2 Precautions for Locating Argon Gas Cylinders Outdoors

Use either copper or stainless steel tubing for plumbing. A plumbing example is shown in Fig. 4.

7.3 Precautions for Locating Argon Gas Cylinders Indoors

A plumbing example is shown in Fig. 5.

7.4 Precautions for Plumbing the Argon Gas

Use clean copper or stainless steel tubing for plumbing the gas.

Protect tubing from oil or other contaminants.

Thoroughly flush the tubing after preparing the plumbing to remove any debris, dust or organic substance from inside the tubing.

Then connect the tubing to the instrument.

8 Helium Gas and Associated Plumbing

Provide helium gas with a minimum 99.999 % purity. 200±20 kPa of pressure is required at the instrument inlet port. Pipe length should be within 3 m from the container to the gas inlet port of the instrument. See Fig. 7 for an example of plumbing to be prepared at the customer site.

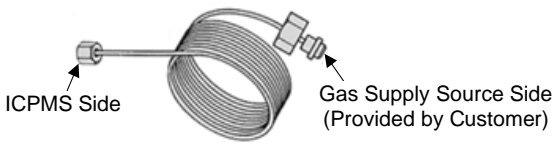
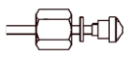
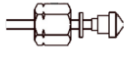
8.1 Helium Gas Consumption

Given standard specifications, 0.0003 m³/h of helium gas is used during analysis and 0.0003 m³/h during purging. To prevent degradation of gas purity, regular gas cylinder replacement is recommended. (Generally about once a year)

8.2 Precautions for Plumbing the Helium Gas

A helium gas pipe that connects the customer's gas supply port and the spectrometer is not supplied. Use the tubing specified by Shimadzu as follows as needed. A plumbing example is shown in Fig. 7, including a pressure reducer, etc.

P/N	Name	Length [m]	Connected to					
			Supply Source Side			ICPMS Side		
			Standard	Screw(s)		Standard	Screw(s)	
				Right	Left		Right	Left
S201-48067	Carrier Gas Pipe	2.5	M16X1.5 (female)	●		M10X1.0 (MF)	●	

	Screw(s)	Reference Diagram
	Right	
	Left	
Plumbing Diagram for Helium Pipe and Hydrogen Gas Pipe		Screw Orientation Reference Diagram

9 Hydrogen Gas and Associated Plumbing (ICPMS-2050 only)

Provide hydrogen gas with a minimum 99.999 % purity. A hydrogen generator is also available as an optional product. Contact Shimadzu for more information. (PEAK's Precision series)
200±20 kPa of pressure is required at the instrument inlet port. Pipe length should be within 3 m from the container to the gas inlet port of the instrument.

9.1 Hydrogen Gas Consumption

Given standard specifications, 0.0003 m³/h of hydrogen gas is used during analysis and 0.0003 m³/h during purging.

To prevent degradation of gas purity, regular gas cylinder replacement is recommended. (Generally about once a year)

9.2 Precautions for Plumbing the Hydrogen Gas

A hydrogen gas pipe that connects the customer's gas supply port and the spectrometer is not supplied. Use the tubing specified by Shimadzu as follows as needed. Plumbing examples are shown in Fig. 8 and Fig 9, including a pressure reducer, etc. Be sure to install gas leak detectors when using hydrogen gas.

Example: New Cosmos Electric one-point gas detector alarm for flammable gas (Model NV-120CV)

Comply with the following precautions when using hydrogen gas.

- (1) Be sure to close the main valve of the hydrogen gas cylinder and check for leaks when the instrument is not in operation.
- (2) Check for any leaks in the hydrogen gas flow path from the hydrogen cylinder to the instrument during every inspection before use.
- (3) Ensure good ventilation in the instrument installation site in order to prevent hydrogen gas explosion in case of an accident. Do not use fire unless it is necessary.

- (4) Once you finish using the instrument, close the main valve of the hydrogen cylinder immediately and perform the ending procedure.

P/N	Name	Length [m]	Connected to					
			Supply Source Side			ICPMS Side		
			Standard	Screw(s)		Standard	Screw(s)	
				Right	Left		Right	Left
S221-73474-25	Hydrogen Gas Tube (left)	2.5	M16X1.5 (female)		●	M10X1.0 (MF)		●

* See 8.2 for the plumbing diagram.

10 Third Gas and Associated Plumbing (Optional with ICPMS-2050)

Provide a mixed gas of 10 % ammonia and 90 % helium with a purity of 99.999 % min.

200±20 kPa of pressure is required at the instrument inlet port.

Given standard specifications, 0.0002 m³/h of third gas is used during analysis and 0.0002 m³/h during purging.

Pipe length should be within 3 m from the container to the gas inlet port of the instrument.

10.1 Third Gas Consumption

Given standard specifications, 0.0002 m³/h of third gas is used during analysis and 0.0002 m³/h during purging.

(Reference) 47 L gas cylinder at 15000 kPa allows for gas consumption of 6 m³, which lasts approximately 650 hours.

To prevent degradation of gas purity, regular gas cylinder replacement is recommended.

(Generally about once a year)

10.2 Precautions for Plumbing the Third Gas

A third gas pipe that connects the customer's gas supply port and the spectrometer is not supplied. Use the tubing specified by Shimadzu as follows as needed. A plumbing example is shown in Fig. 10.

P/N	Name	Length [m]	Connected to					
			Supply Source Side			ICPMS Side		
			Standard	Screw(s)		Standard	Screw(s)	
				Right	Left		Right	Left
S211-94942	Plumbing Carrier Gas	2.0	M16X1.5 (female)	●		Exterior 1/8 in.	●	

11 Oxygen-Argon Mixed Gas and Associated Plumbing (Optional)

The oxygen-argon mixed gas ratio is 70 % argon and 30 % oxygen. 450±10 kPa of pressure is required at the instrument inlet port. Pipe length should be within 5 m from the container to the gas inlet port of the instrument. See Fig. 11 for an example of plumbing to be prepared at the customer site.


11.1 Oxygen-Argon Mixed Gas Consumption

As an example, when analyzing ethanol, the mixed gas consumed for analysis is 0.009 m³/h. (Reference) 47 L gas cylinder at 15000 kPa allows for gas consumption of 6 m³, which lasts approximately 650 hours.

To prevent degradation of gas purity, regular gas cylinder replacement is recommended. (Generally about once a year)

11.2 Precautions for Plumbing the Oxygen-Argon Mixed Gas

An oxygen-argon mixed gas pipe that connects the customer's gas supply port and the spectrometer is not supplied. Use the tubing specified by Shimadzu as follows as needed. A plumbing example is shown in Fig. 9.

P/N	Name	Tubing Shape
S016-43505	Polypropylene Tube, 44-PP (Available in meter units)	

12 Local Ventilation Instrument

Ventilate the exhaust gases from the plasma stand to outside the room. Fig. 3 is an example of duct installation.

- Use oxidation-resistant materials for the plasma stand ventilation system (exhaust ducting, hood, fan, etc.) that are appropriate for acids from samples. If this is not possible, it can be made of polyvinyl chloride.
- The outer diameter of plasma stand exhaust pipe is 122 mm. Exhaust should be adjusted so that it is in the range of 2.4 m³/min to 3.3 m³/min at exhaust pipe outlet. An exhaust duct inlet port with an exhaust capacity between 2.4 m³/min and 3.3 m³/min under no load is required for the exhaust system. Include an adjustment damper in the plasma stand exhaust ventilation system. Provide a setup that allows raising exhaust duct by 50 mm min. during installation or maintenance of the instrument.
- If the plasma stand exhaust pipe is directly connected to the exhaust duct, the internal temperature around the exhaust duct inlet can reach 40 °C.

13 Cooling Water Circulator

The ICPMS-2040 and ICPMS-2050 need a cooling water circulator. Provide either of the following:

Cooling Water Circulator	Specifications, etc.
<ul style="list-style-type: none"> • Cooling Water Circulator SMC (P/N S211-97273-41) • Connection Kit SMC (P/N S211-93827-43) 	<ul style="list-style-type: none"> • Air-Cooled Thermo-Chiller HRS024-A20 (Manufacturer: SMC) Refrigerant: hydrofluorocarbons (R407 (HFC), Filled: 0.36 kg) • Connection Kit Check valve, filter, supply/drainage hoses (10 m each), etc.
<ul style="list-style-type: none"> • Cooling Water Circulator APISTE (P/N S211-97274-41) • Connection Kit APISTE (P/N S211-93827-42) 	<ul style="list-style-type: none"> • Non-Freon Chiller PCU-NE2500 (Manufacturer: APISTE) Refrigerant: Non-freon refrigerant (HFO-1234yf) • Connection Kit Check valve, filter, supply/drainage hoses (10 m each), etc.

Precautions for use:

1. Tap water, ultra-pure water, and ion-exchange water cannot be used as cooling water for the cooling water circulator. Always use pure water with an electric conductivity of 1 $\mu\text{S}/\text{cm}$ to 300 $\mu\text{S}/\text{cm}$. Using water that does not have the specified water quality can lead to problems in the piping, such as corrosion and clogging.
2. Set the temperature of the cooling water to 20 °C for use. If the cooling water temperature is too high, it may cause a malfunction of the high-frequency power supply or other unit.
3. Use supply and drainage hoses that are within 10 m in length.

14 Dust

This instrument uses high voltages and tiny electrical currents. Therefore, dust can cause it to malfunction.

Implement dust-proof measures in the doors and windows of the room where the instrument is installed.

15 Vibration

Do not install the instrument in any place where there is significant vibration. If major vibration is applied to the table where the instrument is installed, the relocation detection unit of the instrument may falsely detect relocation. Install the instrument on a table free of vibration.

[Reference] 55 dB (0.8 gal) max., or a level that does not cause discomfort to humans

16 Liquid Waste Tank

Approximately 1 mL/min of sample solution is discharged from the plasma stand sample injection area when plasma is emitted. Therefore, provide a liquid waste tank that is resistant to corruptions. Alternatively, use an optional liquid waste tank.

Liquid Waste Tank	10 L Polyethylene Tank (P/N S228-79328-02)
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Tubing (2 m) from the drain trap to the liquid waste tank is included.

After operating the instrument, close the cap of the liquid waste tank or remove the waste liquid promptly. If waste liquid is left for long time with the cap open, off-gassing could cause metal corrosion in the area around the liquid waste tank.

Also provide a liquid waste tank if an optional autosampler is used. Up to 6 mL/min of sample solution is discharged from the autosampler AS-20, in case of ASX-520/260, 23 mL/min, when it is in operation.

17 Using the High-Frequency Instrument

Observe applicable regulations for the country where it is used. The 27 MHz magnetic field leakage at 1 meter from the side of the instrument is 1 V/m or less.

18 Lighting and Daylighting

This system is operated via a (computer) video display terminal (VDT).

The same considerations as for general office appliances are required for lighting and daylighting, in order to keep analytical operators healthy.

- (1) Avoid large differences between light and dark areas inside rooms and prevent glare.
- (2) Adjust the vertical illuminance and horizontal illuminance levels on documents and keyboards to appropriate levels.

<Guidelines>

- Vertical illuminance should be 500 lux or less
 - Horizontal illuminance should be between 300 and 700 lux
- (3) Cover bright windows with blinds, curtains or other coverings, and adjust the brightness as necessary.
 - (4) The operator's field of vision should be free from bright light fixtures, windows, wall surfaces, or flashing lights and such lights should be kept from reflecting on the display screen.

19 Installation Preparation Items

Have the following necessary items ready when installing the instrument:

Item	Purpose
Pure Water	For rinsing and the cooling water circulator
5 % Nitric Acid	For cleaning the sample suction tube
Sample for Instrument Calibration	For instrument calibration The samples for instrument calibration that the service engineer brings will be used for performance check during installation. This is necessary when customer starts using the instrument.
Liquid Waste Tank	2 units, one for ICPMS and another for the autosampler
Power Plug	2 units, one for ICPMS and another for the cooling water circulator Use a power plug that fits the shape of the outlet. This is unnecessary when connecting to a circuit breaker.
AA Battery	Four as power supply for the relocation detection unit

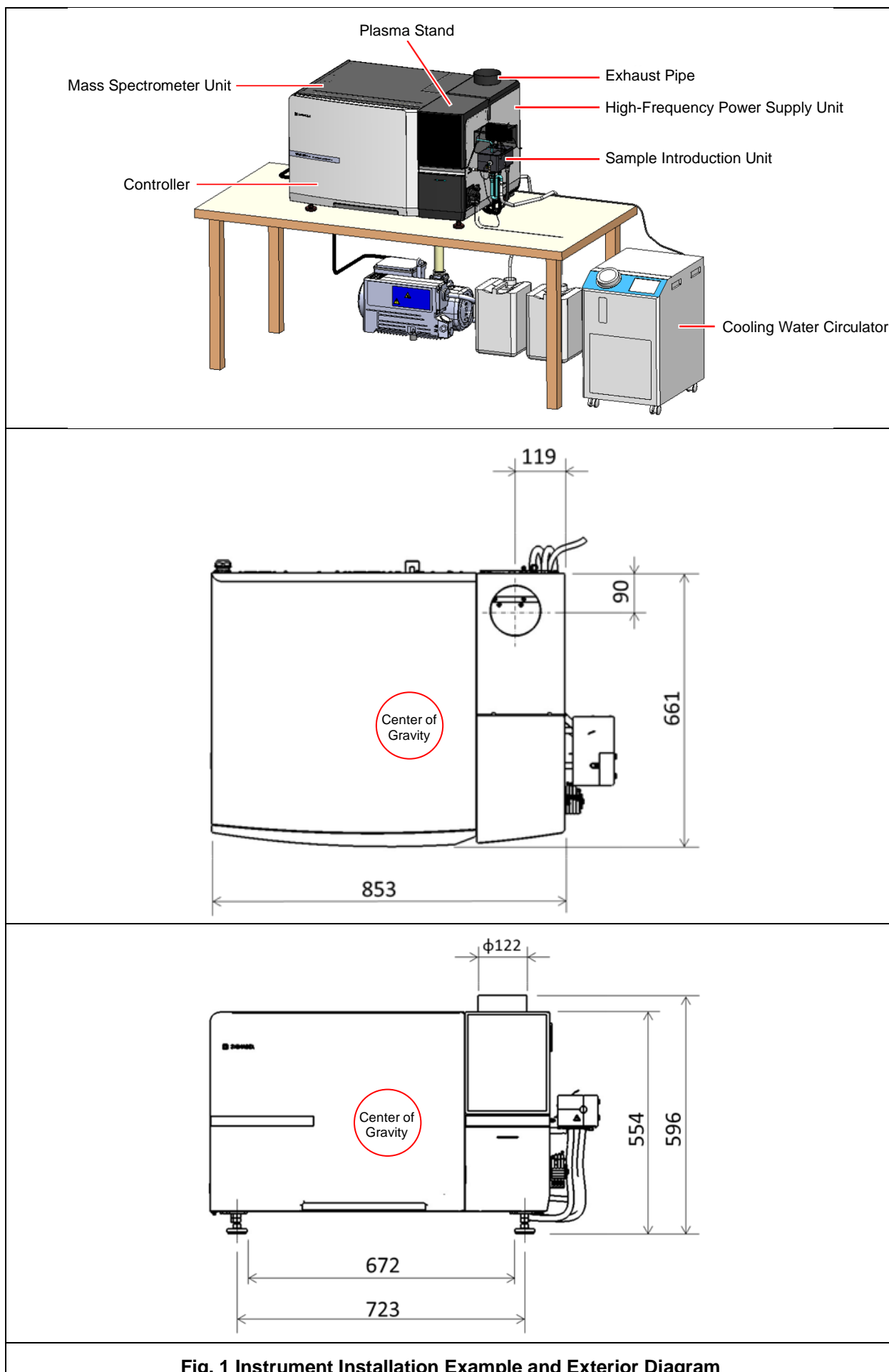
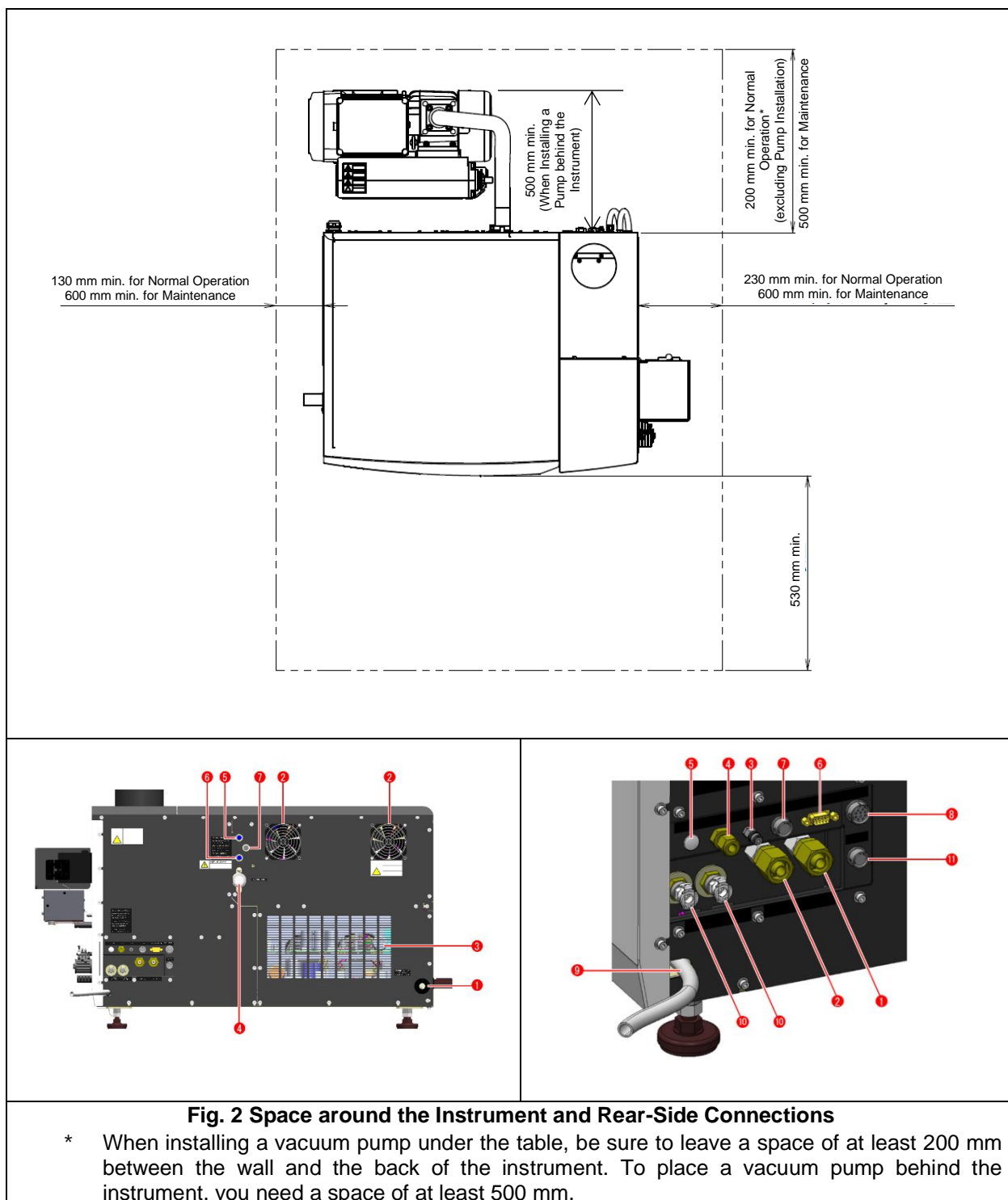
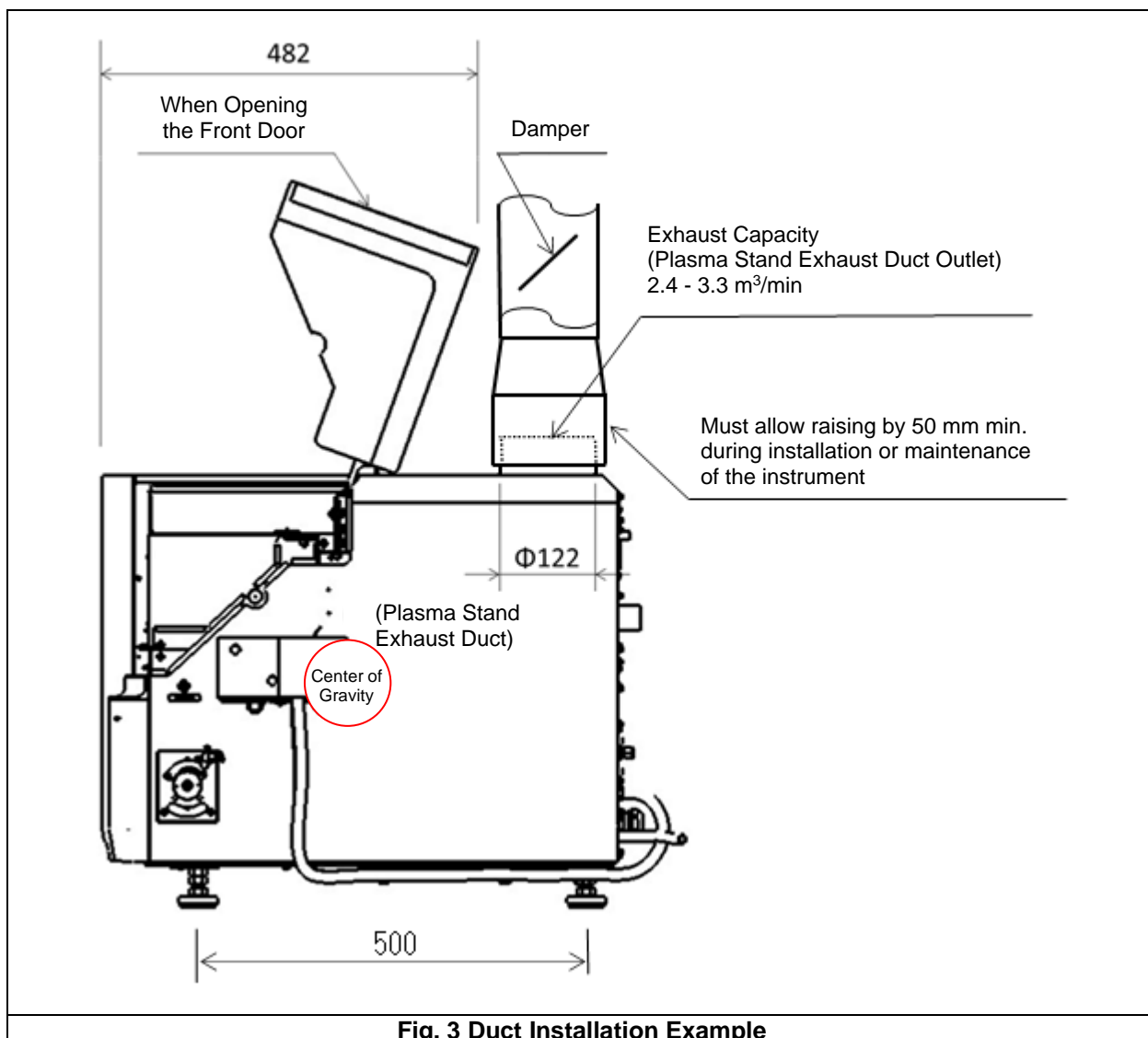


Fig. 1 Instrument Installation Example and Exterior Diagram



**Fig. 3 Duct Installation Example**

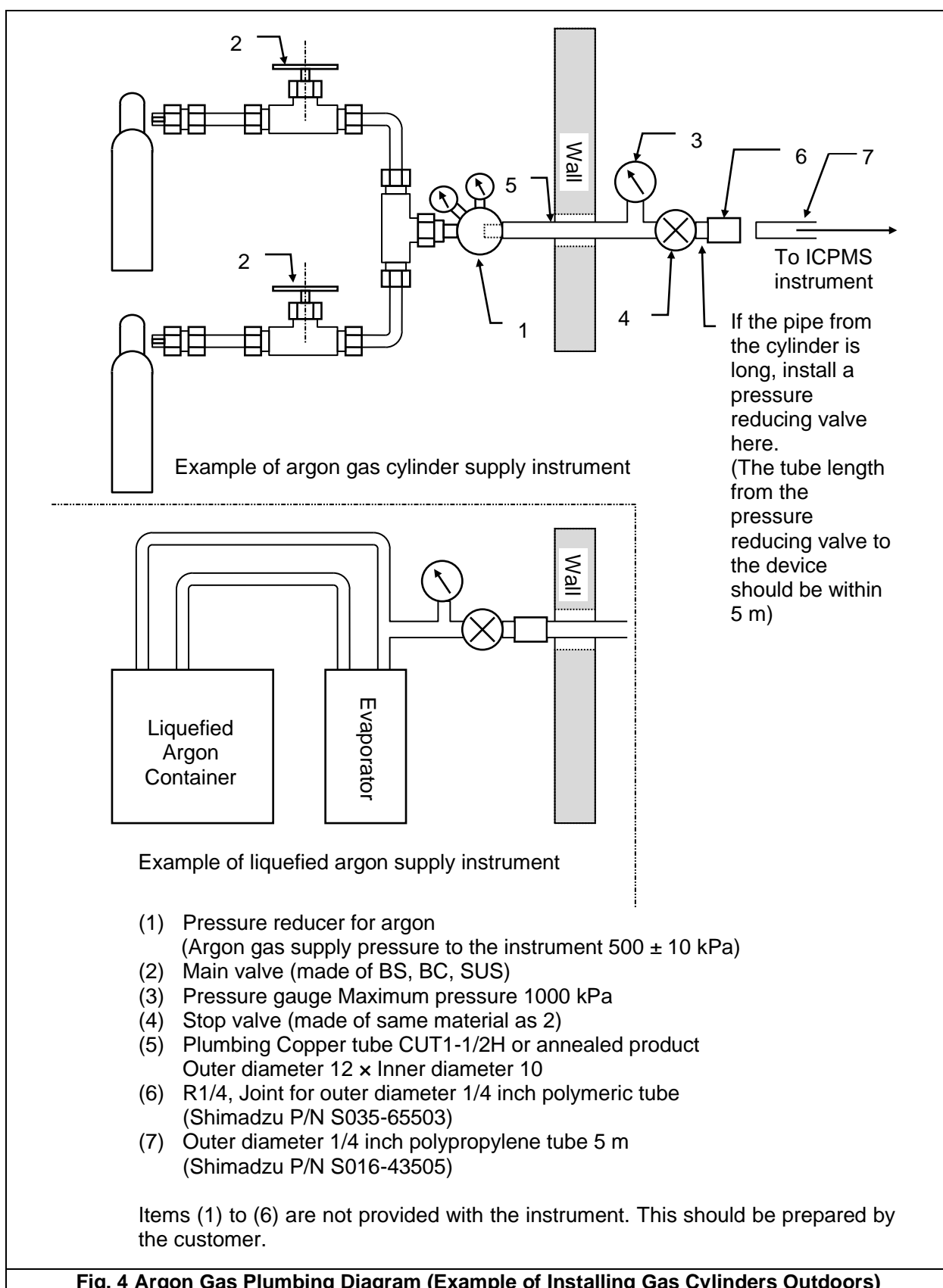
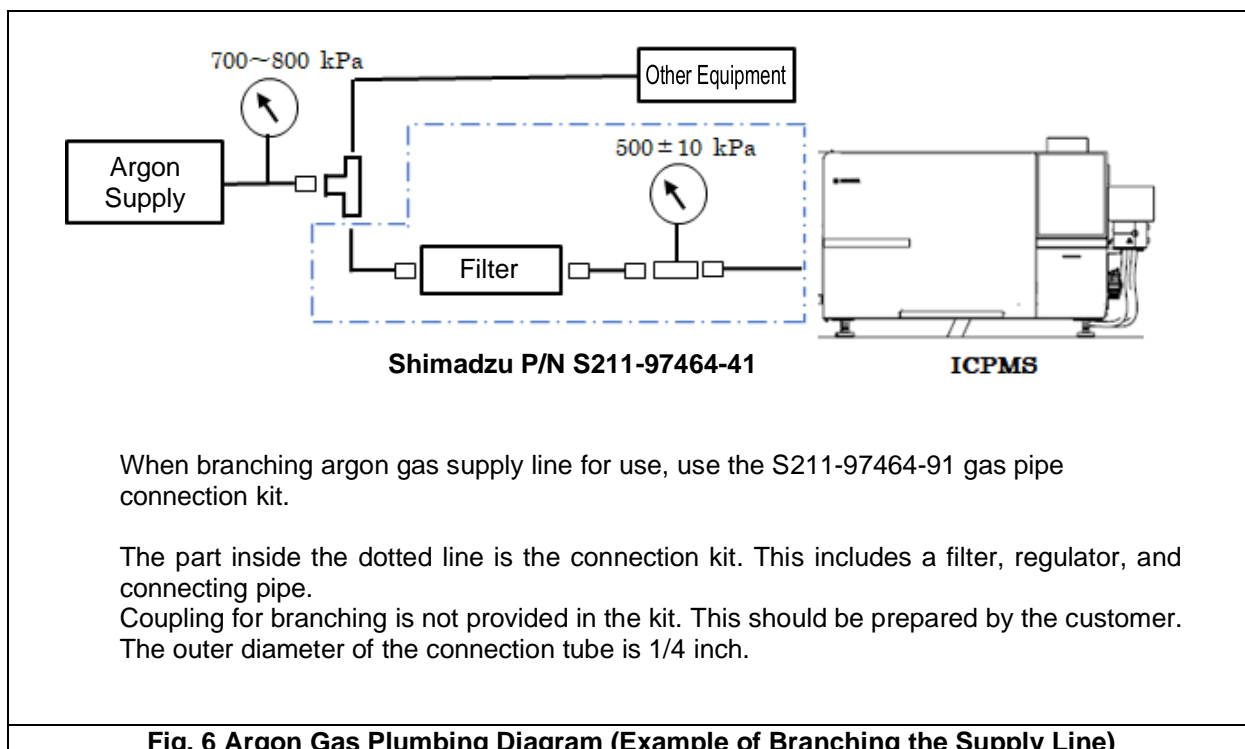
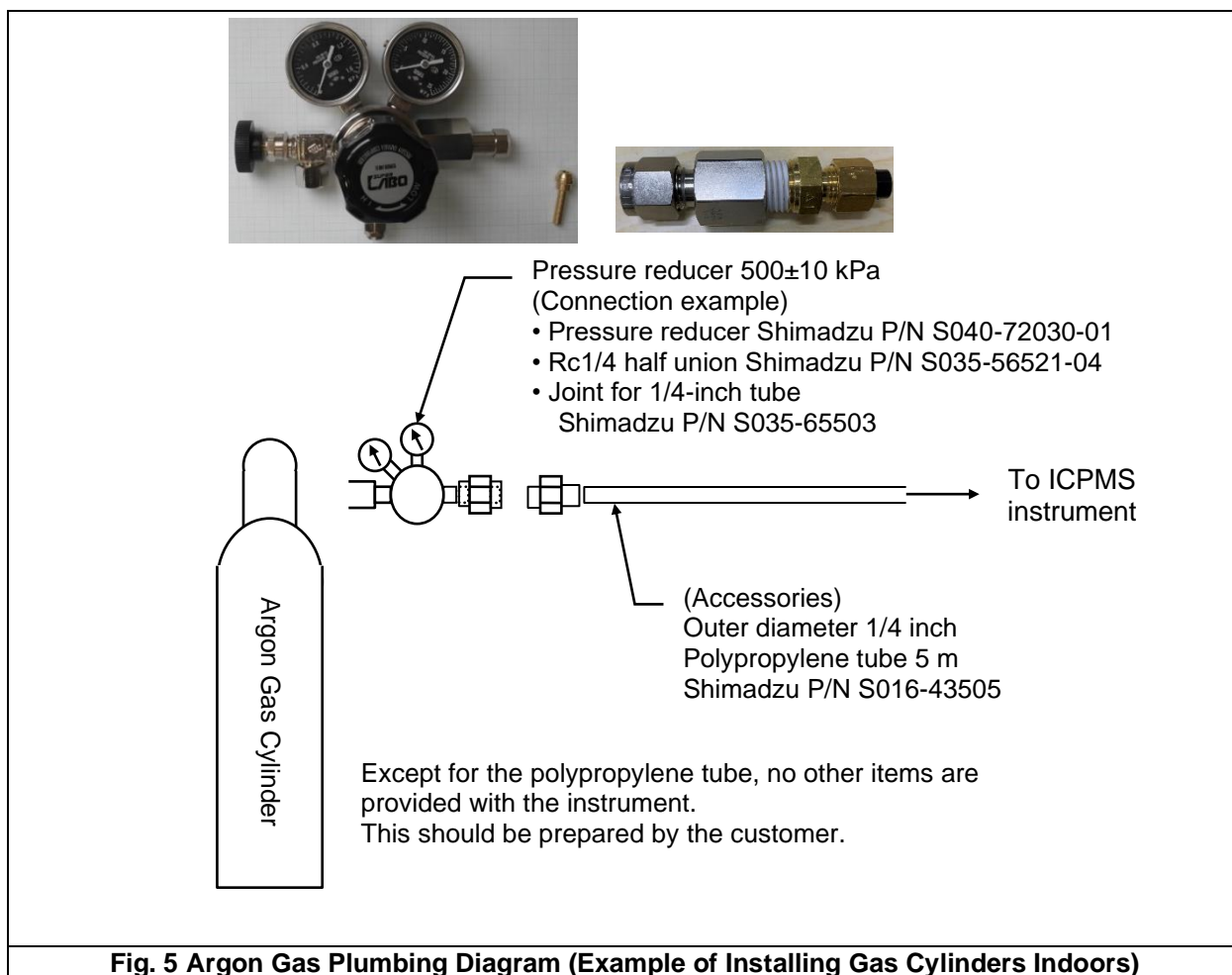
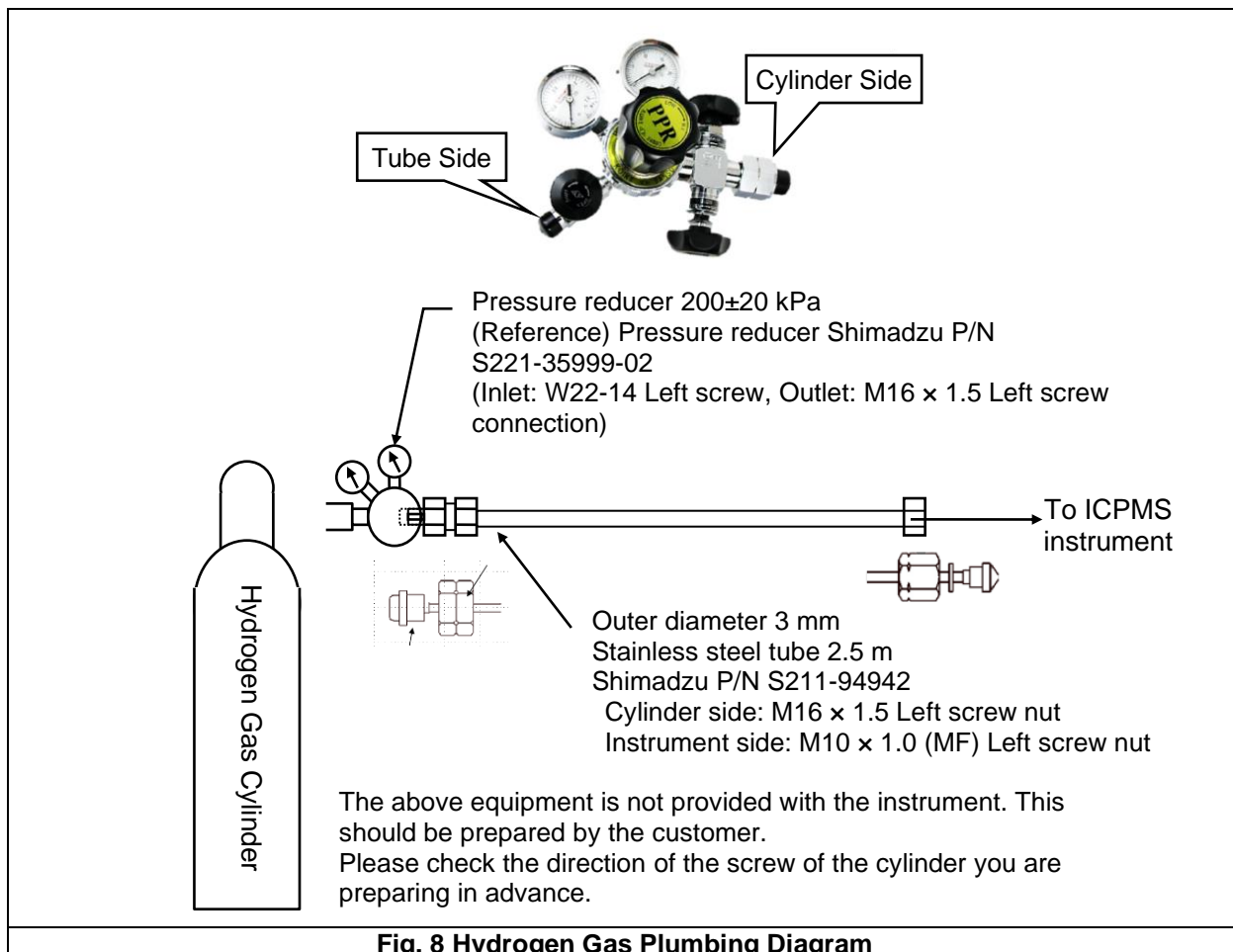
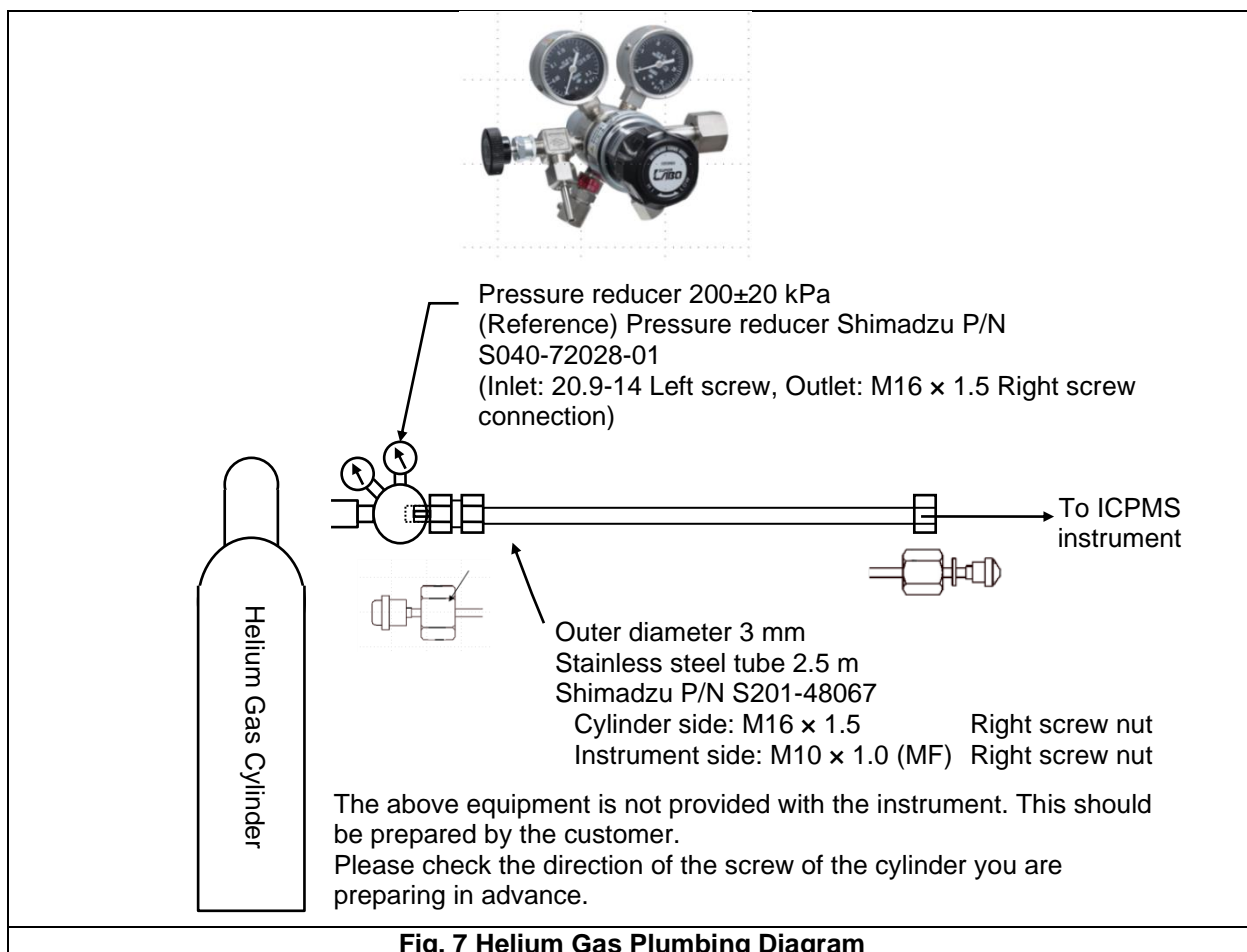


Fig. 4 Argon Gas Plumbing Diagram (Example of Installing Gas Cylinders Outdoors)

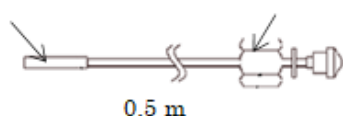




Shimadzu P/N S201-48576-50

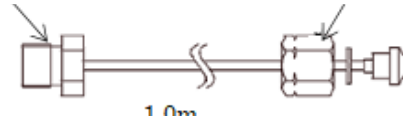
1/8-inch O.D.

Right Screw

**Shimadzu P/N S221-73557-00**

Right Screw

Left Screw



Hydrogen Generator



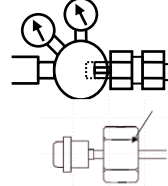
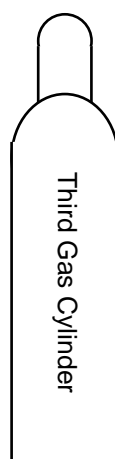
ICPMS

This diagram shows an example of connecting the hydrogen generator
(Precision series manufactured by PEAK).

If a different hydrogen generator is used, check the pipe connection port on the hydrogen generator side.

Fig. 9 Example of Pipe Connection with Hydrogen Generator

Pressure reducer 200±20 kPa
(Reference) Pressure reducer Shimadzu P/N
S040-72028-31
(Inlet: W22-14 Right screw, Outlet: M16 × 1.5 Right
screw connection)

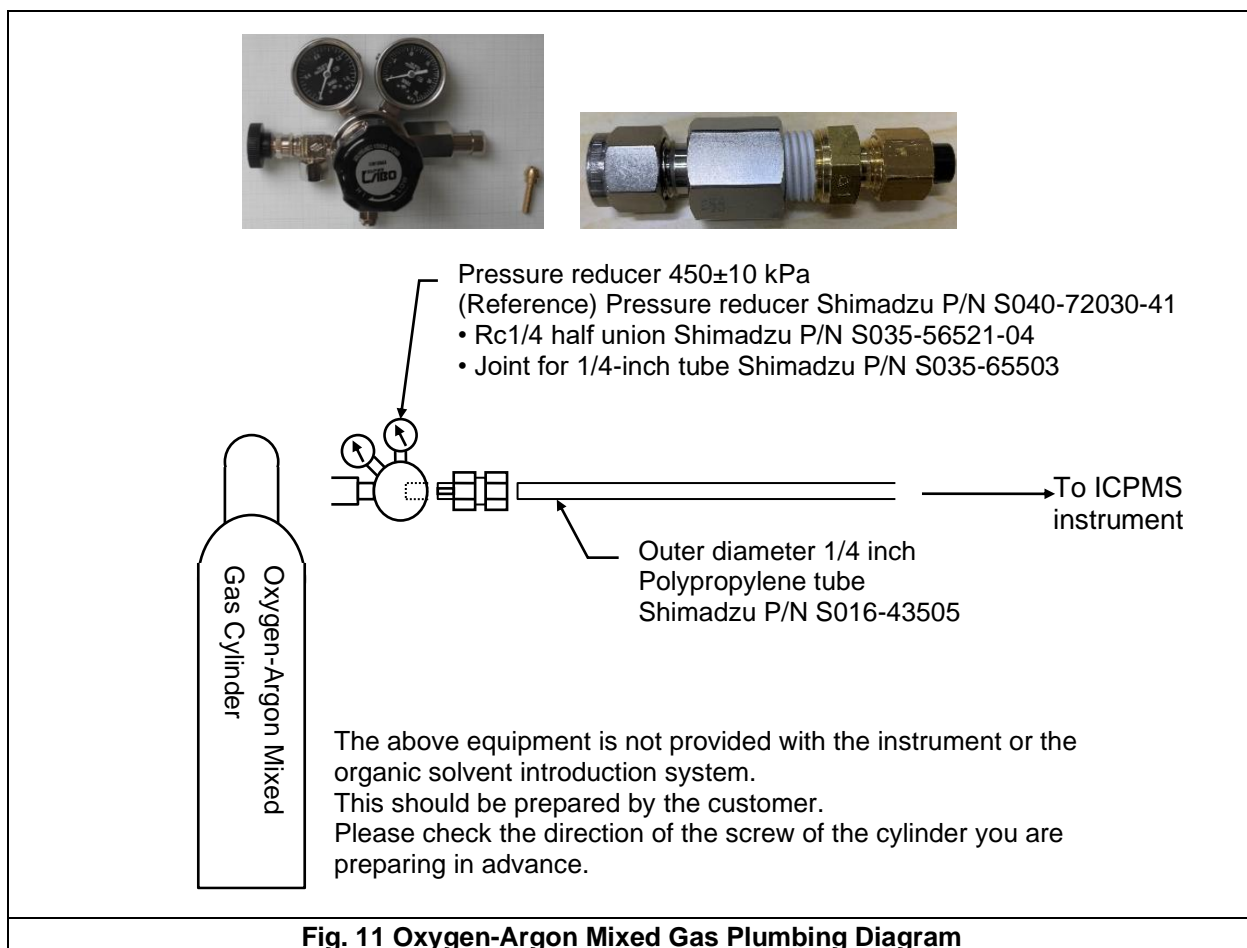


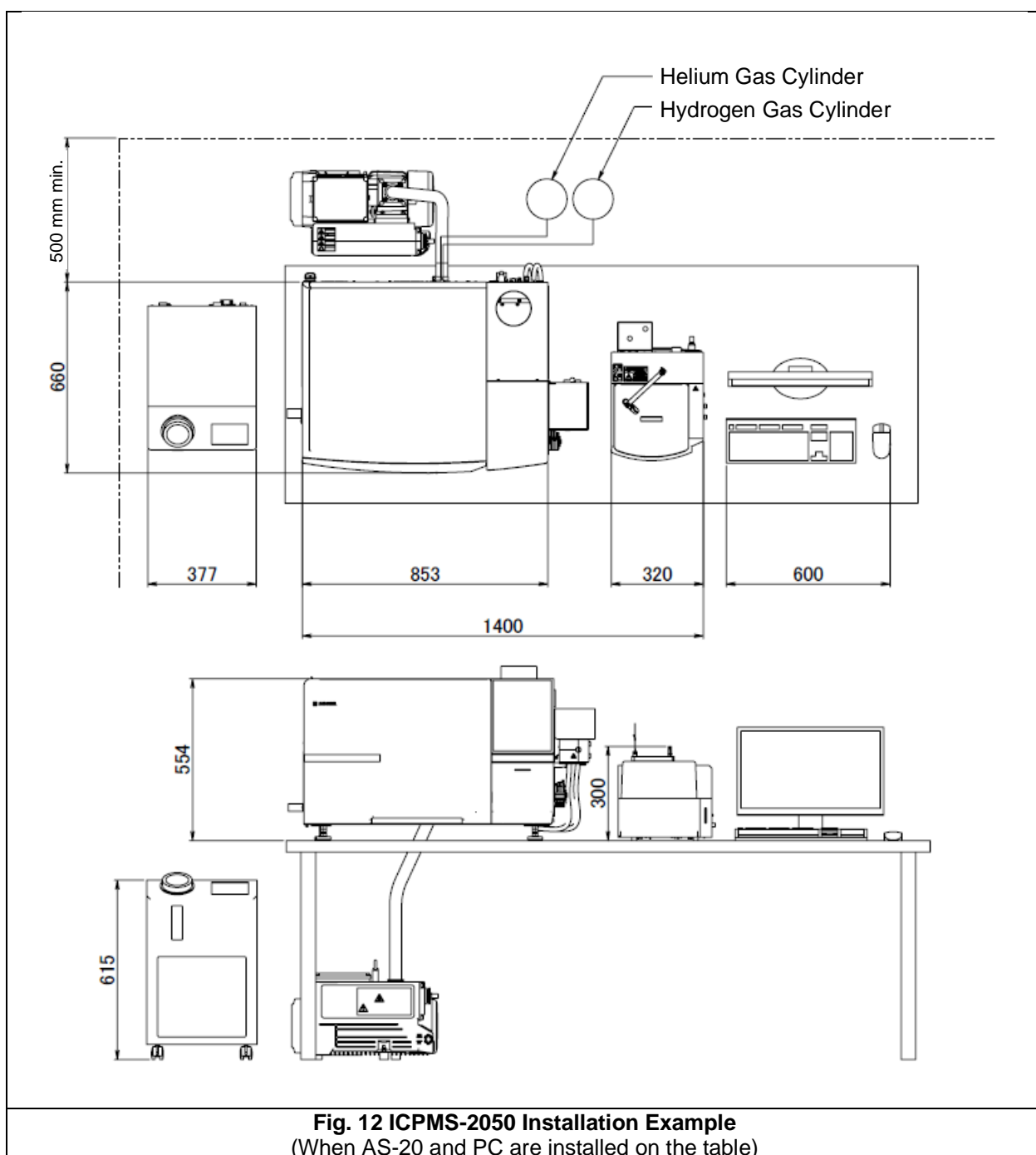
Outer diameter 3 mm
Stainless steel tube 2.5 m
Shimadzu P/N S211-94942
Cylinder side: M16 × 1.5 Right screw nut
Instrument side: Swagelok coupling 1/8 inch

To ICPMS
instrument

The above equipment is not provided with the instrument. This
should be prepared by the customer.
Please check the direction of the screw of the cylinder you are
preparing in advance.

Fig. 10 Third Gas Plumbing Diagram





20 Preliminary Check List

To: _____

Address: _____

The following page summarizes each of the installation conditions described so far as a check list.
The customer should fill in this sheet himself and hand it over to the Shimadzu representative.

Customer: _____

Address: _____

TEL: _____

Check List (ICPMS-2040, ICPMS-2050)

Item		Requirement	Check
1. Installation	1.1 Temperature and Humidity of Installation Site (Air-conditioning system must be in place in the installation site.)	A. Room temperature should be 18 °C to 28 °C (short-term temperature fluctuations should be within 2 °C per hour)	<input type="checkbox"/>
		B. Area is not exposed to direct airflow from air-conditioning system	<input type="checkbox"/>
		C. Area is not exposed to direct sunlight	<input type="checkbox"/>
		D. 20 % to 80 % RH (No condensation)	<input type="checkbox"/>
	1.2 Transportation and Relocation	If the installation location is not on the ground floor, the building must have an elevator. The doorway clearance for transporting must have a minimum width of 800 mm.	<input type="checkbox"/>
	1.3 Other	<ul style="list-style-type: none"> This instrument uses argon, helium, hydrogen, and third gas. Make sure to ventilate the room well. Make sure that the environment is appropriate for installing cylinders of high-pressure gases, such as incombustible and flammable gases. Make sure that there is space to install a computer, autosampler, and other necessary instrument. 	<input type="checkbox"/>
2. Power Supply	2.1 Main Spectrometer Unit	Single-phase 200 V to 240 V (50/60 Hz) Capacity 6 kVA (Voltage fluctuation: within ± 10 %) Power cable: 5 m with M5 rounded terminal (with grounding wire)	<input type="checkbox"/>
	2.2 Data Processing Unit (Optional)	Meet the required specifications. (See Section 3.2)	<input type="checkbox"/>
	2.3 Cooling Water Circulator (Optional)	<u>Cooling water circulator set SMC (P/N S211-97273-41)</u> Single-phase 200 V to 230 V; Capacity 1.2 kVA (Voltage fluctuation: within ± 10 %) Cable: 10 m with M5 rounded terminal (with grounding wire) * Cooling water circulator connection kit SMC (P/N S211-93827-43) required.	<input type="checkbox"/>
		<u>Cooling water circulator set APISTE (P/N S211-97274-41)</u> Three-phase 200 V to 220 V; Capacity 1.2 kVA (Voltage fluctuation: within ± 10 %) Cable: 10 m with M5 rounded terminal (with grounding wire) * Cooling water circulator connection kit APISTE (P/N S211-93827-42) required.	
	2.4 Autosampler (Optional)	AS-20 Single-phase 100 V to 240 V (50/60 Hz); Capacity: 50 VA Power cable (sold separately)	<input type="checkbox"/>
	2.5 Dual Valve Unit (Optional)	Single-phase 100 V to 240 V (50/60 Hz); Capacity: 65 VA Power cable: 24 V AC adapter power cable required. Arrange for a power cable that meets the regulatory requirements of the country where the instrument is used.	<input type="checkbox"/>
3. Grounding	Main Spectrometer Unit	Prepare a stable grounding line without noise interference. Grounding resistance of 100 Ω or lower	<input type="checkbox"/>
4. Table	Table on which the instrument (+ autosampler, PC, printer) will be placed (See Fig. 1)	<ul style="list-style-type: none"> Instrument dimensions: W853 × D660 × H554 mm Instrument weight: 144 kg Prepare a table with sufficient strength as the instrument's load will be on the four legs. See Fig. 1 for the center-of-gravity position of the instrument and the leg positions. (Width excludes the cooling chamber unit.) * The table's load capacity may be noted in equal load.	<input type="checkbox"/>

Item		Requirement	Check
5. Space around the Instrument	(See Fig. 2)	For normal operation: Right side 230 mm, left side 130 mm, rear side 200 mm) min. For Maintenance: (Right side 600 mm, left side 600 mm, rear side 500 mm) min.	<input type="checkbox"/>
6. Argon Gas	Purity of 99.95 % min. Pressure (instrument inlet): 500±10 kPa * When branching argon gas for use, use the gas pipe connection kit (P/N S211-97464-41) in order to prevent fluctuations in source pressure. (See Fig. 6)		<input type="checkbox"/>
	6.1 Argon Gas Consumption	During analysis: 0.65 m ³ /h (If a mini-torch is used, 47 L gas at 15000 kPa is consumed in approximately 10 hours)	<input type="checkbox"/>
	6.2 Precautions for Locating Argon Gas Cylinders Outdoors	Use copper or stainless steel pipes. (See Fig. 4)	<input type="checkbox"/>
	6.3 Precautions for Locating Argon Gas Cylinders Indoors	Pipe length should be within 5 m from the container to the gas inlet port of the instrument (See Fig. 5). (A 5-m tube is supplied for connection.)	<input type="checkbox"/>
	6.4 Precaution for Argon Gas Plumbing	Use clean copper or stainless steel pipe. If using a gas cylinder, make sure that it is fixed in place for use to keep it from falling over.	<input type="checkbox"/>
7. Helium Gas	Purity of 99.999 % min. Pressure (instrument inlet): 200±20 kPa SUS pipe length should be within 3 m.		<input type="checkbox"/>
	7.1 Helium Gas Consumption	During analysis: 0.00036 m ³ /h; During purge: 0.0006 m ³ /h (Recommended cylinder replacement cycle: Once a year)	<input type="checkbox"/>
	7.2 Precaution for Helium Gas Plumbing	Use the pipe specified by Shimadzu. (See Fig. 7) Make sure that the gas cylinder is fixed in place to keep it from falling over.	<input type="checkbox"/>

Item		Requirement	Check
8. Hydrogen Gas (ICPMS-2050 only)	Purity of 99.999 % min. Pressure (instrument inlet): 200±20 kPa SUS pipe length should be within 3 m. (Optional) Hydrogen generator PEAK's Precision series (See Fig. 9)		<input type="checkbox"/>
	8.1 Hydrogen Gas Consumption	During analysis: 0.0003 m ³ /h; During purge: 0.0003 m ³ /h (Recommended cylinder replacement cycle: Once a year)	<input type="checkbox"/>
	8.2 Precaution for Hydrogen Gas Plumbing	Use the pipe specified by Shimadzu. (See Fig. 8) Be sure to install gas leak detectors. (Example: New Cosmos Electric one-point gas detector alarm for flammable gas NV-120CV) Perform a gas purge to remove impurities from inside the pipes. If using a gas cylinder, make sure that it is fixed in place to keep it from falling over.	<input type="checkbox"/>
9. Third Gas (Optional, ICPMS-2050 only)	Purity of 99.999 % min., mixed gas of 10 % ammonia and 90 % helium Pressure (instrument inlet): 200±20 kPa SUS pipe length should be within 3 m.		<input type="checkbox"/>
	9.1 Third Gas Consumption	During analysis: 0.0003 m ³ /h; During purge: 0.0003 m ³ /h (Recommended cylinder replacement cycle: Once a year)	<input type="checkbox"/>
	9.2 Precaution for Third Gas Plumbing	Use the pipe specified by Shimadzu. (See Fig. 10) Make sure that the gas cylinder is fixed in place to keep it from falling over.	<input type="checkbox"/>
10. Oxygen-Argon Mixed Gas (Optional)	Mixed gas of 70 % argon and 30 % oxygen Pressure (instrument inlet): 450±10 kPa Pipe length should be within 5 m.		<input type="checkbox"/>
	10.1 Oxygen-Argon Mixed Gas Consumption	When analyzing ethanol: 0.009 m ³ /h (47 L gas at 15000 kPa is consumed in approximately 650 hours)	<input type="checkbox"/>
	10.2 Precaution for Oxygen-Argon Mixed Gas Plumbing	Use the pipe specified by Shimadzu. (See Fig. 11) Make sure that the gas cylinder is fixed in place for use to keep it from falling over.	<input type="checkbox"/>
11. Local Ventilation Instrument	Ventilate the exhaust gases from the plasma stand to outside the room. (See Fig. 3)	A. Materials that tolerate corrosion by acid from samples	<input type="checkbox"/>
		B. Exhaust pipe outlet in the range of 2.4 m ³ /min to 3.3 m ³ /min (Use a damper.)	<input type="checkbox"/>
12. Cooling Water (Optional)	• Cooling water circulator set SMC (P/N S211-97273-41) • Cooling water circulator connection kit SMC (P/N S211-93827-43)	Power supply: Single-phase 200 V (50/60 Hz) 1.2 kVA (M5 screw terminal) (with supply and drainage hoses, 10 m each)	<input type="checkbox"/>
	• Cooling water circulator set APISTE (P/N S211-97274-41) • Cooling water circulator connection kit APISTE (P/N S211-93827-42)	Power supply: Three-phase 200 V to 220 V (50/60 Hz) 1.2 kVA (M5 screw terminal) (with supply and drainage hoses, 10 m each)	
13. Dust	Implement dust-proof measures in the doors and windows of the room where the instrument is installed.		<input type="checkbox"/>
14. Vibration	Do not install the instrument in any place where there is significant vibration.		<input type="checkbox"/>
15. Liquid Waste Tank	About 1 ml/min of sample drains out of the sample introduction unit. Liquid waste tank is available as an optional product. 10 L polyethylene tank (P/N S228-79328-02)		<input type="checkbox"/>
16. Using the High-Frequency Instrument	Observe applicable regulations for the country where it is used.		<input type="checkbox"/>
17. Lighting and Daylighting	The same considerations as for general office appliances are required for lighting and daylighting.		<input type="checkbox"/>

Item		Requirement				Check
18. Installation Preparation Items	<ul style="list-style-type: none">• Pure water (for rinsing and cooling water circulator), 5 % nitric acid, and samples for instrument calibration• Liquid waste tank (for ICPMS and autosampler)• Power plug for ICPMS and cooling water circulator (when connecting to an outlet)• Power cable and AC adapter cable for optional products• Four AA batteries for relocation detection unit					<input type="checkbox"/>
External Dimensions Weight		Width [mm]	Depth [mm]	Height [mm]	Weight [kg]	<input type="checkbox"/>
	ICPMS-2040/2050	853 (Excluding the cooling chamber)	660	554	Approx. 144	
	Vacuum Pump (PFPE Oil)	325	551	340	Approx. 50	
	Data Processing Unit	-	-	-	-	
	AS-20	290	508	300 (excluding arm)	Approx. 11	
	ASX-560	580	550	620 (including sample probe)	Approx. 12	
	ASX-280	356	580	660 (including sample probe)	Approx. 8.1	
	Dual Valve Unit	95	115	135	Approx. 2.0	
	Cooling Water Circulator Set SMC	377	500	615	Approx. 43	
	Values from cooling water circulator					
	Cooling Water Circulator Set APISTE	400	600	697	Approx. 58	
	Values from cooling water circulator					