

General Specifications

Model GC1000 MarkII Process Gas Chromatograph

GS 11B03A03-01E

GENERAL

A Gas Chromatograph analyzes a gas or volatile liquid sample by separating components for detection. The discrete separation and positive identification of components and measurement of the composition with no interference is a positive advantage of the gas chromatograph. Making good use of this advantage, the process gas chromatograph is widely used in many industries.

YOKOGAWA manufactures two models of GC1000 Process Gas Chromatographs: the GC1000 S/E/C (isothermal oven type) and the GC1000 D/T/W (programmed temperature type). The GC1000 S/E/C can analyze gas and liquid samples from room temperature up to elevated temperatures corresponding to their boiling points. The GC 1000 D/T/W is capable of performing high resolution analysis by using capillary columns similar to laboratory gas chromatograph.



F00.EPS

GC1000 Mark II

FEATURES

■ Capabilities of analyzing PIONA and the Distillation points

Techniques for laboratory analyses can also be utilized in the GC1000 series by configuring and installation of high resolution capillary columns. This allows for the analysis of properties such as PIONA and Distillation points.

■ Capability of analyzing high boiling point liquid samples

The liquid sampling valve with vaporizer having a tight seal provides highly accurate liquid sampling. The liquid sample is vaporized by an internal heater and introduced to the columns. This allows for highly consistent sample volume and excellent reproducibility.

■ Capability of analyzing samples in a very wide range of boiling points

In the thermostatic oven, temperature is accurately controlled within +/- 0.03(C) by an air-bath and circulation fan. For wide boiling point range samples, the programmed temperature oven enables the GC1000 to analyze these samples with high resolution.

■ Easy operation via User Friendly Displays

User friendly keyboard and display allows easy operation and display of analysis data. Many functions can easily be accessed to the user including auto gate tracking, column end-of-life warning and auto gain setting.

■ Enhanced maintenance using PC operation

With our maintenance terminal software (GCMT/ASMT), the GC1000 can be operated from remote location like the control room or office. In addition, the analyzer bus allows for total maintenance management system to include other field analyzers and data acquisition capabilities.

■ Achievement of High Sensitivity TCD

Most analysis which normally requires FID detector can now be done using the new high sensitivity TCD detector. This eliminates the requirement of fuel gas and presence of flame as in the FID.

■ Expectation of the effective result by EPC

EPC (Electronic Pressure Control) controls the utility gas pressure by electronics and software, providing the same efficiency as programmed temperature analysis.

Examples of Applications in Industries

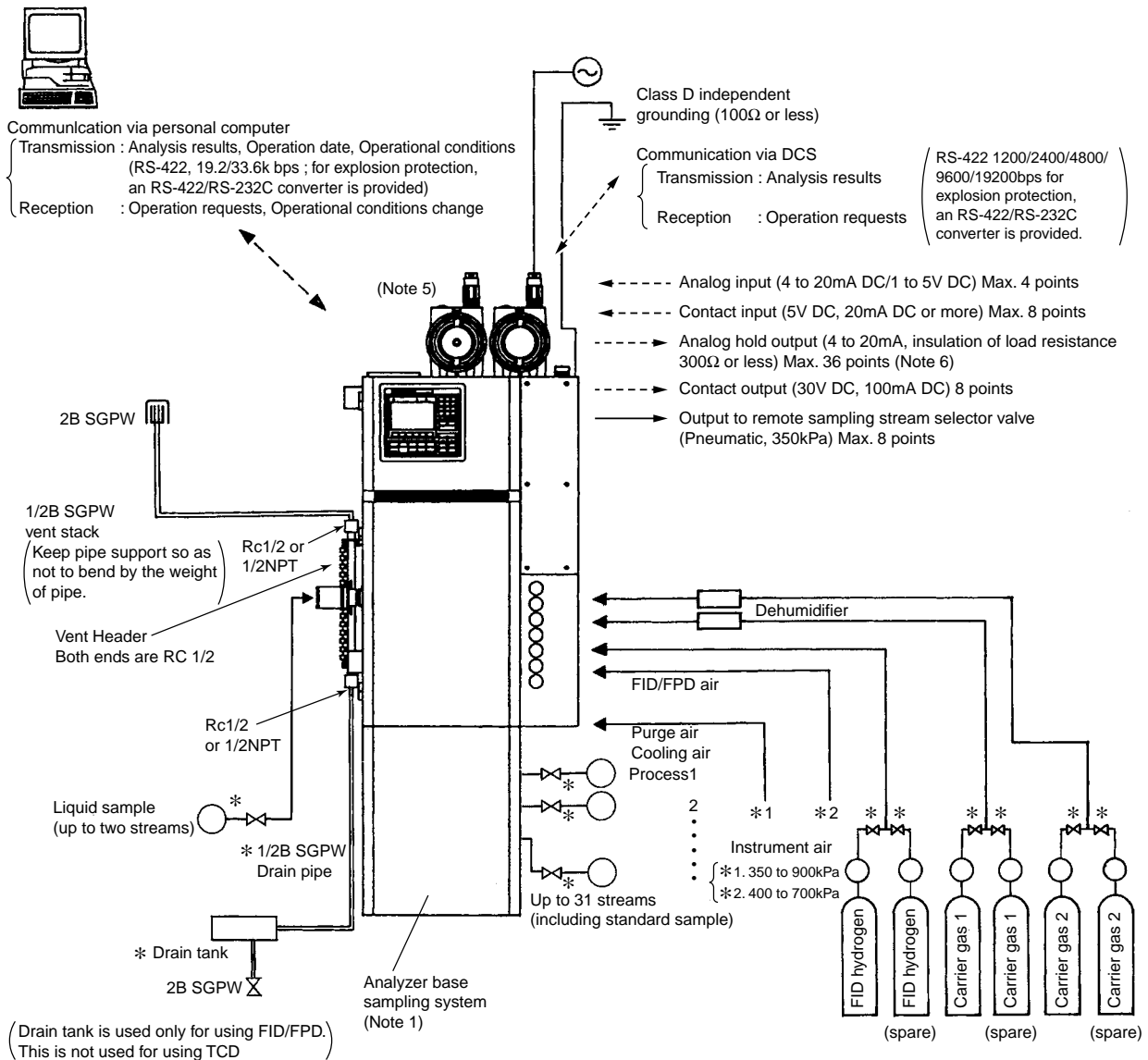
The GC1000 can be used for monitoring and quality control in following industries and applications.

- **Petrochemistry:** Ethylene, Poly-propylene, Poly-ethylene, BTX, Butadiene, Vinyl chloride, Styrene, Alcohol, Aldehyde, Ester, and Vinyl acetate
- **Petroleum refinery:** Distillation point analysis, PNA/PINA analysis, FCC, Sulfur Recovery
- **Chemistry:** Silicone, Chlorides, Fluorine compounds, Formalin, methanol, Urea, Ammonia, Phenol
- **Electric power/gas:** Fuel gas, Exhaust gases, Coal gasification/liquefaction, Fuel cell
- **Iron and steel:** Blast furnace, Coke oven
- **Air plant:** Inorganic gas analyses
- **Chemicals:** Chemicals, Agricultural Chemicals
- **Environmental monitoring:** Air pollution observation, Plant/Work environmental analyses

The GC1000 can, of course, respond to many other applications.

WIRING AND PIPING DIAGRAM

(1) Using Vent Stack



Note1: As an analyzer base sampling system is provided, in many cases, most applications require no external sampling equipment.

In addition, optimum sampling systems are prepared depending on various conditions. (For details, consult Yokogawa. Optimal sampling systems will be offered.)

Note2: For piping air purging, use stainless steel pipe of 1/2 inch or more. For another piping, see subsection External Dimensions (6 to 11 pages.)

Wiring cables, piping and installation materials marked with an * should be supplied by the user.

Note3: For I/O cables, see Subsection 2.2.3, "Recommended Cables".

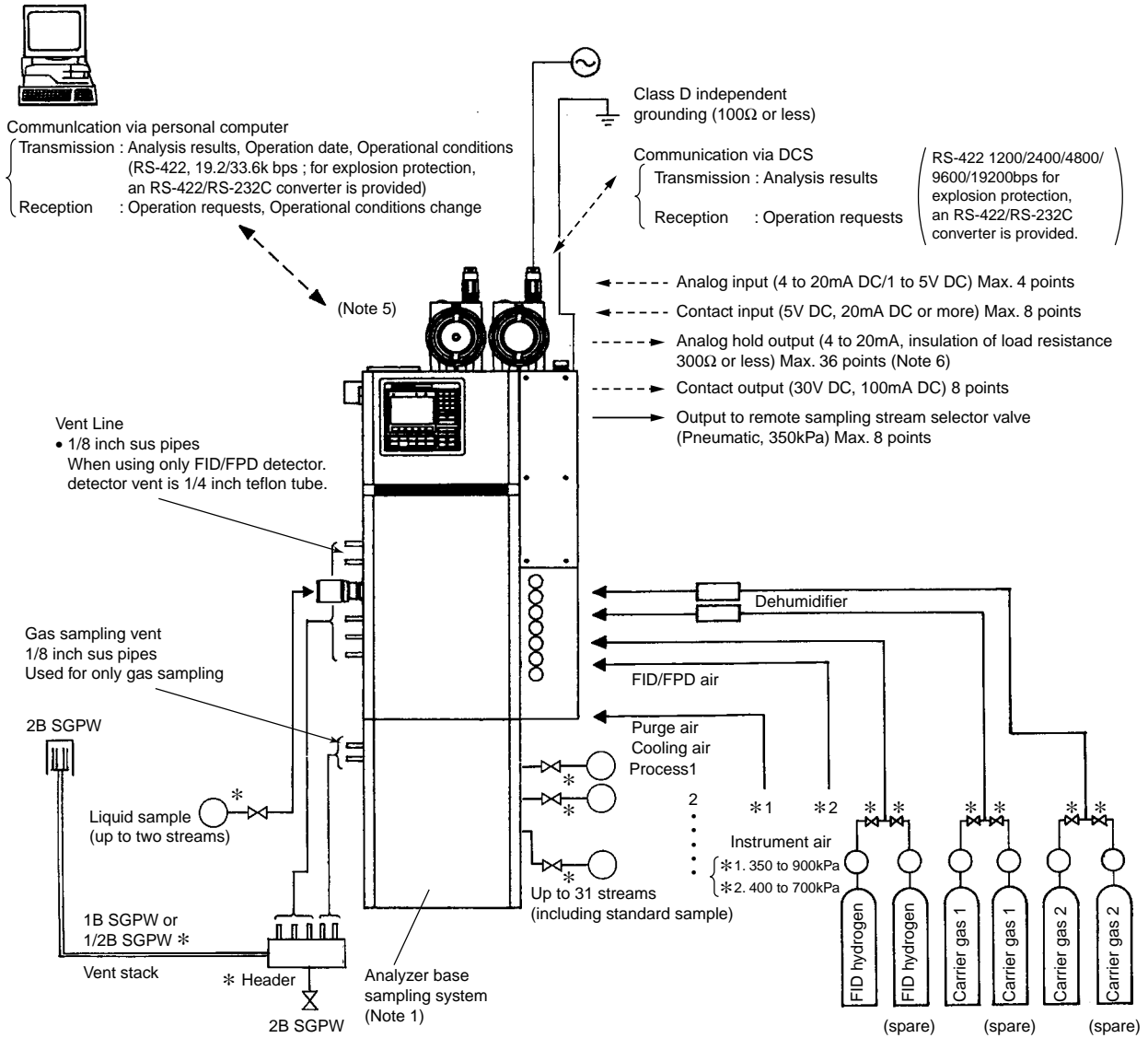
Note4: Fix venting pipes properly so that the dead load of the venting pipes does not apply to the assembling vents of this analyzer.

Note5: The specification decides the number of flameproof enclosure. No enclosure is applied for the general purpose or Y-purge type.

Note6: There is a case of analog output by via GCCU. GCCU is a computing unit to handle various types of signal such as A/O, analog serial output, trend output, digital output and so on. Refer to GS 11B03S03-01E for detail.

F01.EPS

(2) Using No Vent Stack



Note1: As an analyzer base sampling system is provided, in many cases, most applications require no external sampling equipment.

In addition, optimum sampling systems are prepared depending on various conditions. (For details, consult Yokogawa. Optimal sampling systems will be offered.)

Note2: For piping air purging, use stainless steel pipe of 1/2 inch or more. For another piping, see subsection External Dimensions (6 and 7 pages.)

Wiring cables, piping and installation materials with an * should be supplied by the user.

Note3: For I/O cables, see Table 1 "Recommended Cables".

Note4: Fix venting pipes properly so that the dead load of the venting pipes does not apply to the assembling vents of this analyzer.

Note5: The specification decides the number of flameproof enclosure. No enclosure is applied for the general purpose or Y-purge type.

Note6: There is a case of analog output by via GCCU. GCCU is a computing unit to handle various types of signal such as A/O, analog serial output, trend output, digital output and so on. Refer to GS 11B03S03-01E for detail.

F02.EPS

STANDARD SPECIFICATIONS

Measurable object : Gas or liquid
Measurement principle:
 Component separation by elution
 Detection TCD, FID, FPD
Measurable ranges: TCD 1ppm to 100%
 FID 1ppm to 100%
 FPD 1ppm to 0.1%
Number of streams to be measured:
 Maximum of 31 (including standard sample)
Number of components to be measured:
 Maximum of 255
Analysis period: Maximum of 99999.9 sec
Quantifying method:
 Absolute calibration
 Sensitivity-corrected absolute calibration
 Corrected area normalization
Material of the sample-contact parts:
 Stainless steel SS316,
 polytetrafluoroethylene (PTFE), fluorocarbon
 rubber, and glass
Repeatability: 1% of full scale (2 σ)
 * The value may vary depending on the specifications
 and conditions. For details, contact Yokogawa.

1. Analyzer

1.1 Specifications

Area classification
 : TIIS (JIS) Ex pd IIB+H2, T1 to T4 X
 FM/CSA X-purging, Y-purging class1,
 Div1, Groups B, C and D, T1 to T4
 CENELEC ATEX(KEMA) II2G EEx pd
 IIB+H2, T1 to T4
 Construction
 : Drip-proof and dust-proof construction
 (NEMA 3R, equivalent to IP53)
 Display : Liquid crystal display (LCD)
 Operating ambient conditions
 : -10 to 50°C, 95% RH or less
 Storage conditions
 : -10 to 85°C, No moisture
 condensation
 Coating : Epoxy resin coating
 Analyzer coating color
 2.5Y 8.4 / 1.2 (GC1000 analyzer)
 0.8Y 2.5 / 0.4 (flow control section and
 terminals)
 Mass : Approx. 120 kg
 (with analyzer base sampling system)

1.2 Isothermal Oven (GC1000S/E/W)

Volume : 40L (27L : with programmed Temp.
 Oven)
 Temperature setting
 : at fixed set point
 Setting temperature range
 : 55 to 225°C (Temperature can be set in
 one degree steps.)
 Temperature control accuracy
 : $\pm 0.03^\circ\text{C}$
 Temperature control
 : PID control
 Temperature sensor
 : Pt100 Ω RTD with over-heating preven-
 tion function

1.3 Programmed Temperature Oven (GC1000D/T/C)

Volume : 8.6L
 Temperature setting
 : Fixed point or programmed setting
 Temperature setting range
 : 60 to 320°C without cooler
 5 to 320°C with cooler
 Heating program : Maximum of three steps
 Heating rate : 1 to 30°C / min
 (Temperature can be set in one degree steps.)
 Temperature stability
 : $\pm 0.03^\circ\text{C}$ at a control point in the steady
 state.
 Stability to ambient Temperatures
 : $\pm 0.1^\circ\text{C} / 10^\circ\text{C}$
 Stability to supply voltage variation
 : $0.03^\circ\text{C} / 10\%$
 Temperature control
 : PID control
 Temperature sensor
 : Pt100 Ω RTD with over-heating preven-
 tion function.

1.4 Liquid Sampling Valve with Vaporizer

Sample pressure : 0 to 3MPa
 Sample temperature : 150°C or less
 Sample volumes : 0.1, 0.2, 0.5, 1, 2, and 3 μl
 <Vaporizing section>
 Temperature setting range
 : oven Temperature +5 to 250°C
 Temperature setting step
 : 1°C
 Temperature stability
 : $\pm 1^\circ\text{C}$
 Temperature control
 : PID control
 Temperature sensor
 : Pt100 Ω RTD with overheating prevention
 function

1.5 Cooler

The cooler serves for fixed point control of the thermo-
 static oven at the room temperature or below, or to force
 the oven to be cooled after analysis.
 Mounting : Externally mounted
 Cooling method : By vortex tube

2. Utility

Power supply
 : 100 to 120V AC $\pm 10\%$, 50 / 60
 Hz $\pm 5\%$ (for GC1000S/E/W), or
 200 to 250V AC, 50 / 60Hz $\pm 5\%$
 (for GC1000D/T/C)
 Power consumption
 : Maximum of 3.1kVA
 (for GC1000D/T/C)
 Maximum of 1.5kVA or 0.7kVA
 (for GC1000S/E/W)
 (It may vary depending on the
 specifications)
 Instrument air :
 Standard (without cooler)
 Pressure : 350 to 900kPa
 Flowrate : 150 L/min or more (for GC1000D/T/C)
 100 L/min or more (for GC1000S/E/W)

Dew point : -20°C or less
(It may vary depending on the specifications)

With cooler

Pressure : 500 to 900kPa

Flowrate : 300 L/min or more

Dew point : -20°C or less
(It may vary depending on the specifications)

Carrier gas :

Supplied method

: EPC (Electric Pressure Controller) or Regulator

Kinds : Any one or two of H₂, N₂, He, or Ar

Purity : 99.99% minimum
(Dew point -60°C or less)
Organic components 5ppm or less

Pressure : 500 to 700kPa

Consumption : 60 to 300mL/min

Hydrogen gas for FID/FPD

Purity : 99.99% minimum
(Dew point -60°C or less)
Organic components 5ppm or less

Pressure : 500 to 700kPa

Consumption : Approximately 40mL/min per detector

Air for FID/FPD

Purity : 99.99% minimum
(Dew point -60°C or less)
Organic components 5ppm or less

Pressure : 400 to 700kPa

Consumption : Approximately 300mL/min per detector

3.3 Communication

Item	Signal level	No.	Description
DCS communication	Standard : RS422 (4wires, Full-Duplex) Specification : Start bit 1, Stop bit 1, Parity 1, ASCII7 bit, Without procedure or Hand shake Speed : 1200/2400/4800/9600/19200 bps(selectable) For explosion protection : RS422/RS232C converter is provided.(2 wires of power line is needed except the signal line) The transmission type is full duplex for RS232C.	1	Transmission : Analysis result* ⁴ Calibration coefficient Alarm Reception : Operation request* ⁵
PC communication	Standard : RS422 (4wires, Full-Duplex) Speed : 19.6/33.6kbps For explosion protection : RS422/RS232C converter is provided.(2 wires of power line is needed except the signal line) The transmission type is full duplex for RS232C.	1	GCMT (GC Maintenance Terminal) Transmission : Analysis result* ⁴ Operation information* ⁶ Parameter list Reception : Operation request* ⁵ Change of Parameter list

*1) : 2-wires transmitter

*2) : It means the data which is averaged by every 1 second after filtered by a constant which the analog data is scanned by every 200msec. It can be output by DCS communication (Modbus protocol).

*3) : It means the current value which is set time in a cycle time.

*4) : Analysis result (concentration, simulated distillation result, base level, signal level, noise level, Deviation calculation, Liner calculation1-5, Ratio, Separation coefficient, Caloric value, Density, Compressive factor, Wobbe Index)

*5) : Operation request, (Stream sequence assign, Stream (cont.) assign, Run command, Stop command, Pause command, Range change)

*6) : Operation Information (Chromatogram, Oven temperature, measuring stream, Valve ON/OFF etc...)

T03.EPS

3. Externally Input and Output Signal list

3.1 Input

Item	Signal level	No.	Description
Analog Input	Isolated 4-20mA DC 1-5V DC 4-20mA DC (with 24 or 28V DC of Power)* ¹)	4	Accuracy : ±0.5%FS (-10 to 50°C) Function : Output of Current value* ² and Average value* ³
Contact Input	Specification : 5V DC, 20mA DC or more Input ON signal: 200Ω or less OFF signal: 100kΩ or more On operation: NC or NO (selectable)	8	Function : Alarm from outside Following command request Stream sequence assign Stream (cont.) assign Stream (1 cycle) assign Cal (Val) assign Change of Operation mode

T01.EPS

3.2 Output

Item	Signal level	No.	Description
Analog Output	Isolated or No-isolated 4-20mA DC Load: 300Ω or less	MAX. 36	Analysis result* ⁴
Contact Output	Specification (relay) : Voltage: 30V DC Current: 100mA DC On operation: NO or NC (selectable)	8	System alarm1 System alarm2 Component alarm (Conc./RT) Timing signal Code signal for stream ID (Max. 5 points)
Air output for stream valve	Air press : 350kPa	MAX. 8	Binary code signal for 9 to 31 stream (max.)

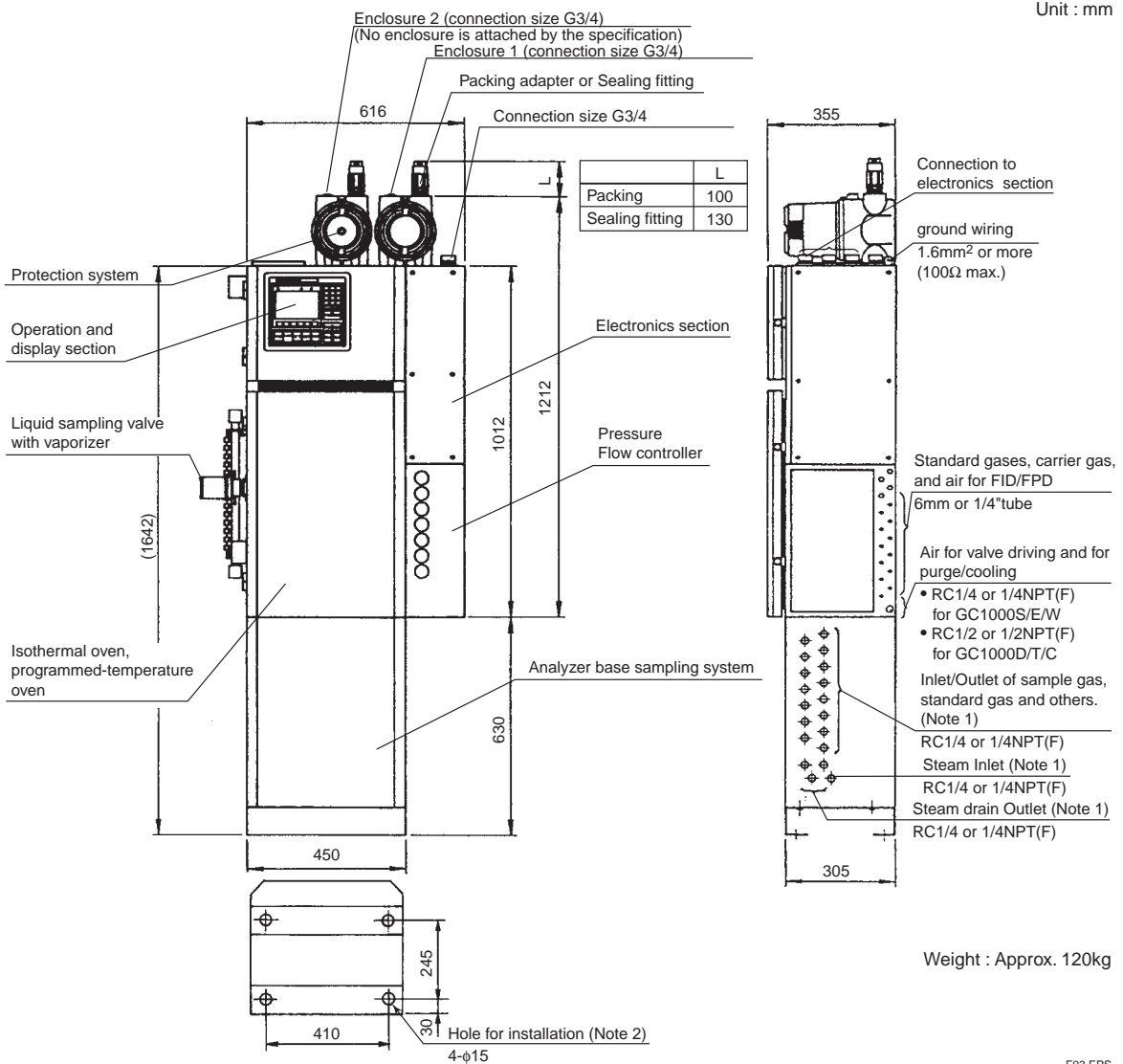
T02.EPS

3.4 Network

Refer to GC 11B05A01-01E.

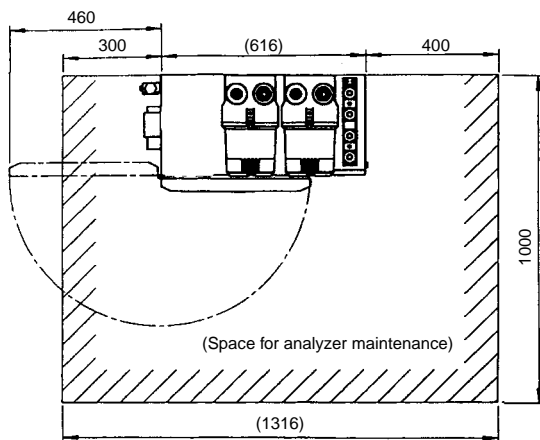
4. EXTERNAL DIMENSIONS

(1) GC1000D/GC1000S with analyzer base sampling system



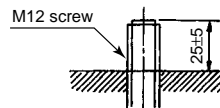
F03.EPS

Space for analyzer maintenance



Note 1 : Due to specification, there is the case of no use.

Note 2 : The height of M12 screw from installation floor is 25±5mm

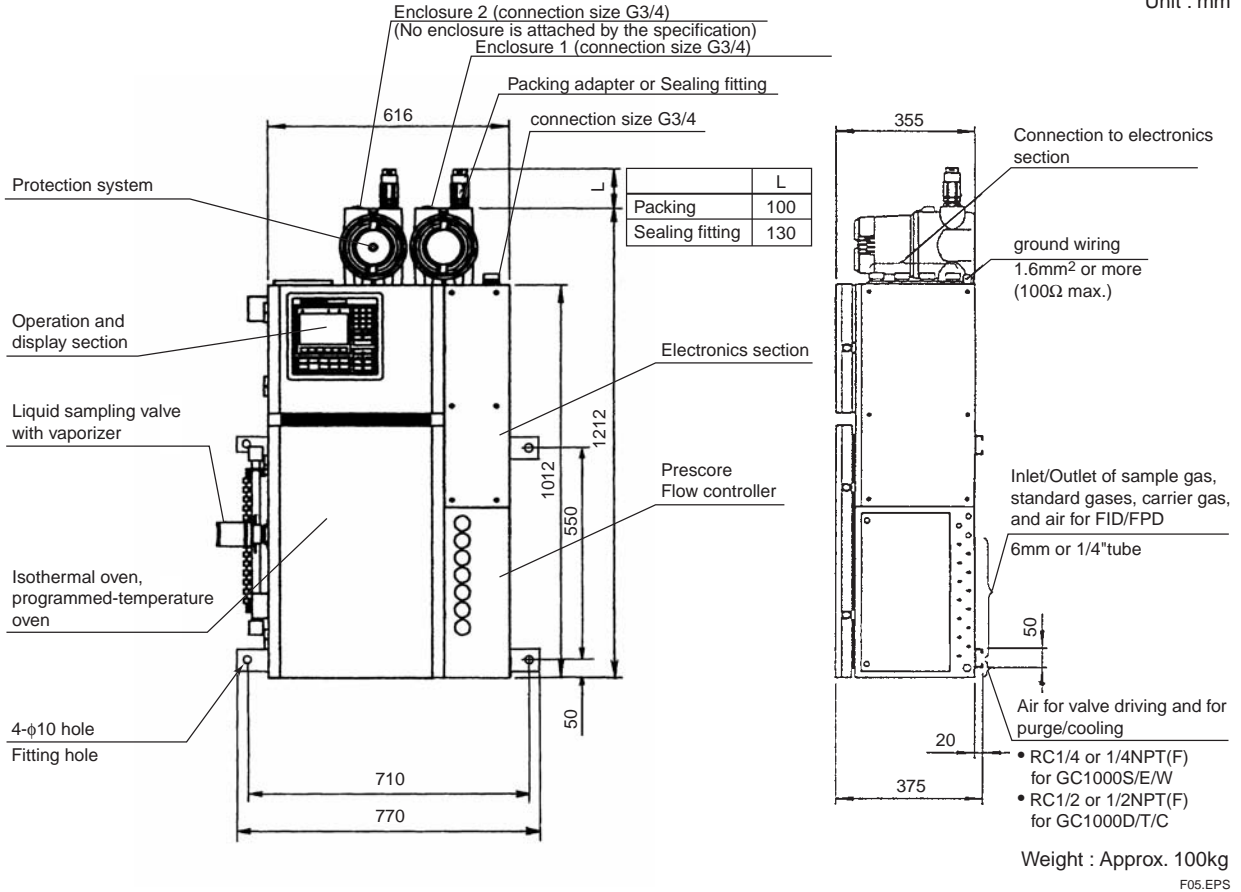


- Installation height : 1842 + L is Total height, including wiring fitting. Have space for maintenance of wiring

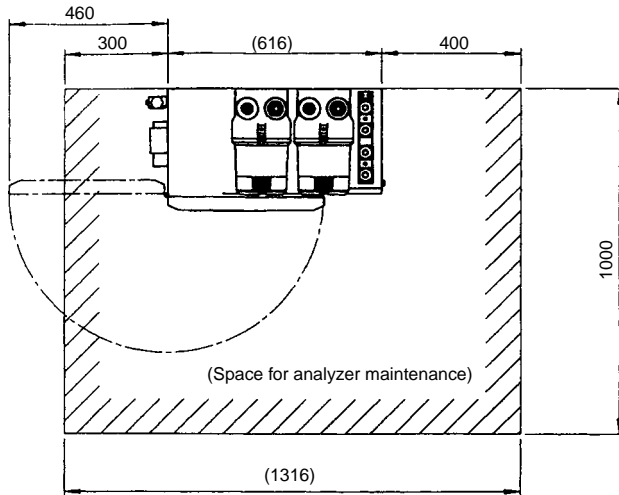
F04.EPS

(2) GC1000D/GC1000S without analyzer base sampling system

Unit : mm



Space for analyzer maintenance



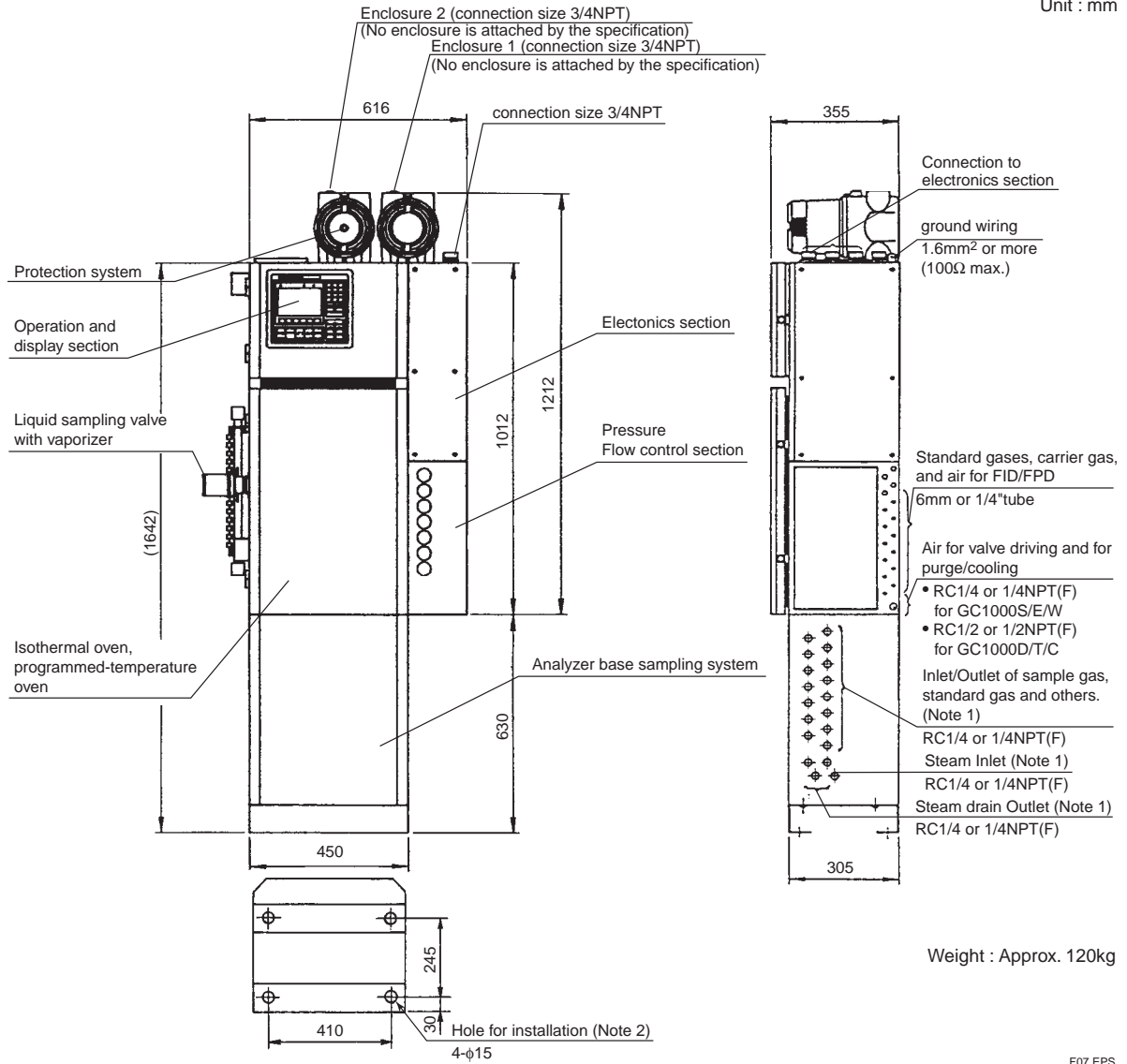
Wall construction shall withstand a force of four times the weight of equipment (approx. 100 kg).

• Installation height :
For the best installation, provide ample clearance on the top of the wiring fitting to meet the wire-lead requirements.

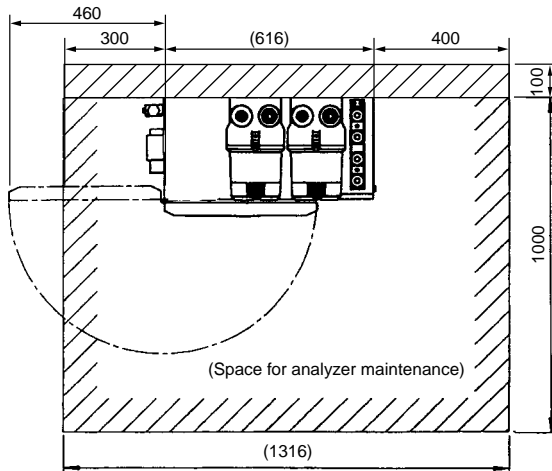
F06.EPS

(3) GC1000T/GC1000E with analyzer base sampling system

Unit : mm

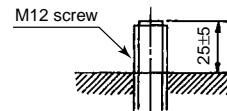


Space for analyzer maintenance



Note 1 : Due to specification, there is the case of no use.

Note 2 : The height of M12 screw from installation floor is 25±5mm

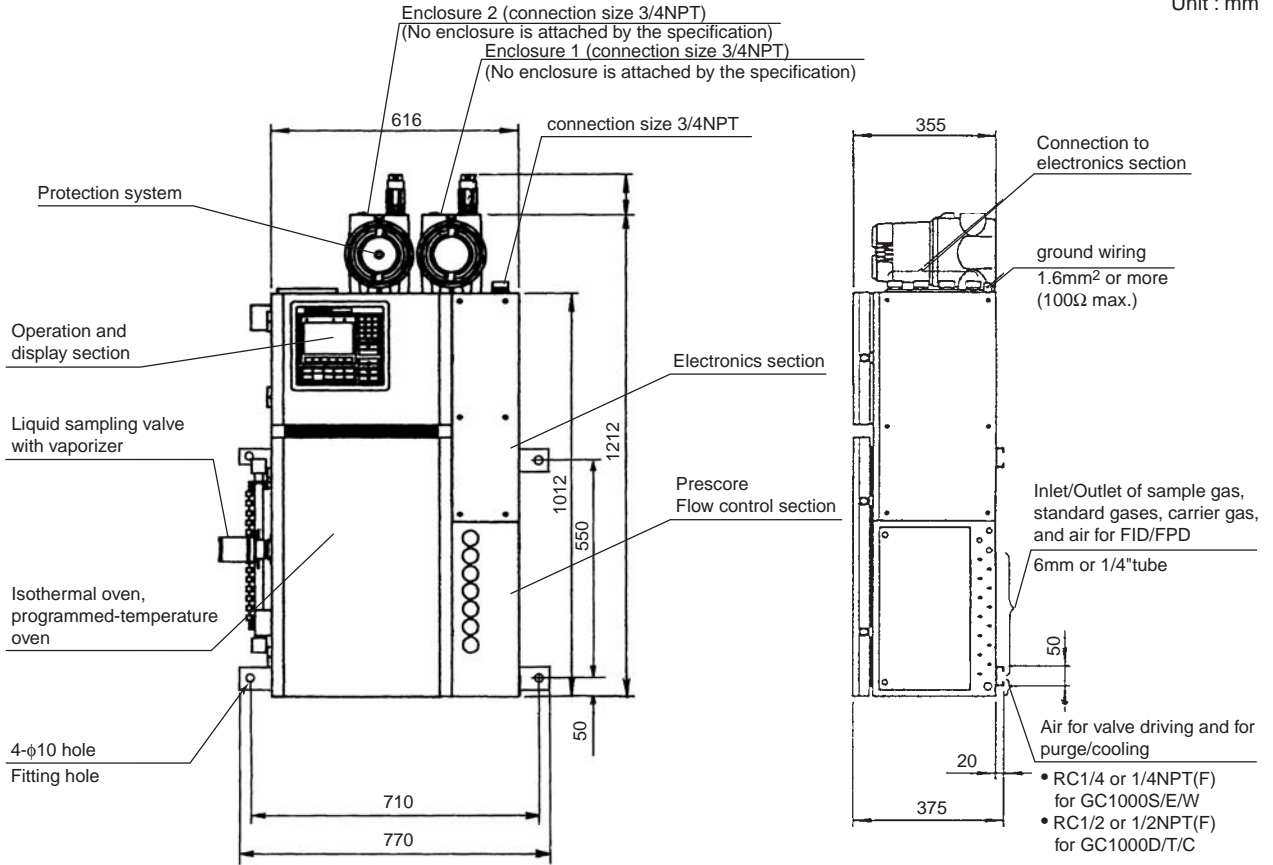


- Installation height :
1842 + L is Total height, including wiring fitting.
Have space for maintenance of wiring

F08.EPS

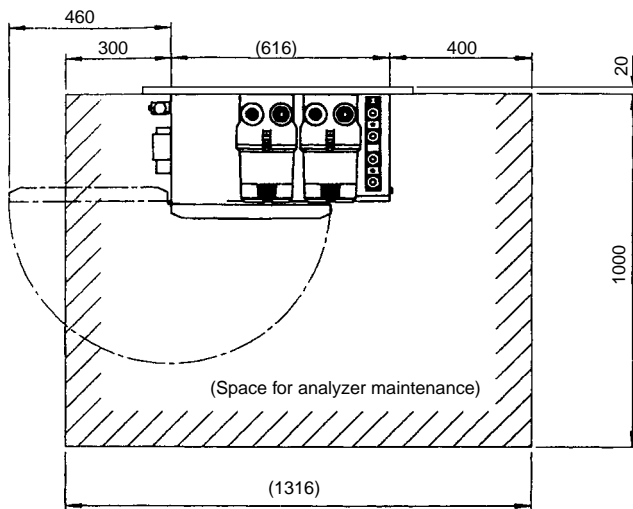
(4) GC1000T/GC1000E without analyzer base sampling system

Unit : mm



Weight : Approx. 100kg
F09.EPS

Space for analyzer maintenance

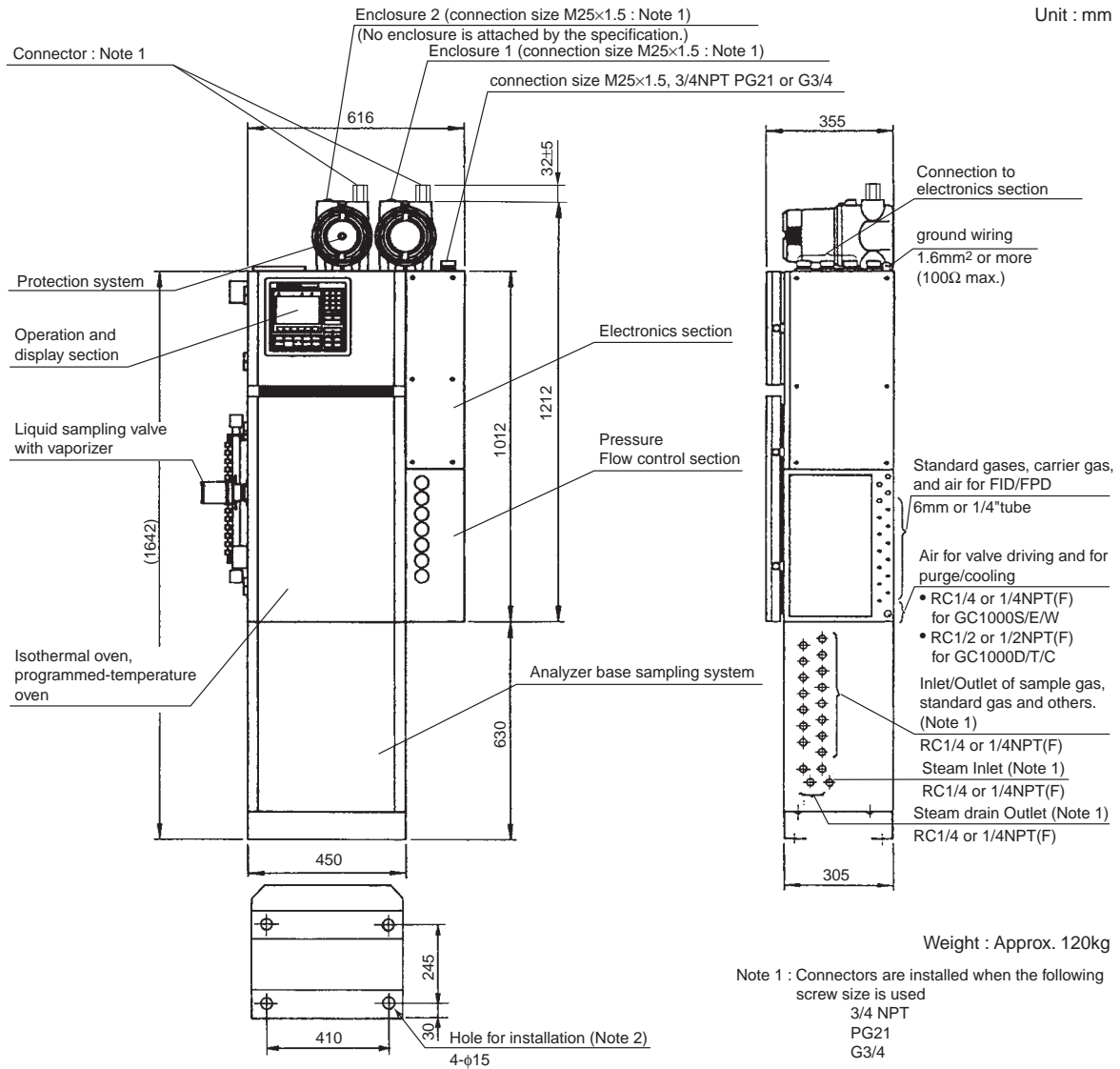


Wall construction shall withstand a force of four times the weight of equipment (approx. 100 kg).

• Installation height :
For the best installation, provide ample clearance on the top of the wiring fitting to meet the wire-lead requirements.

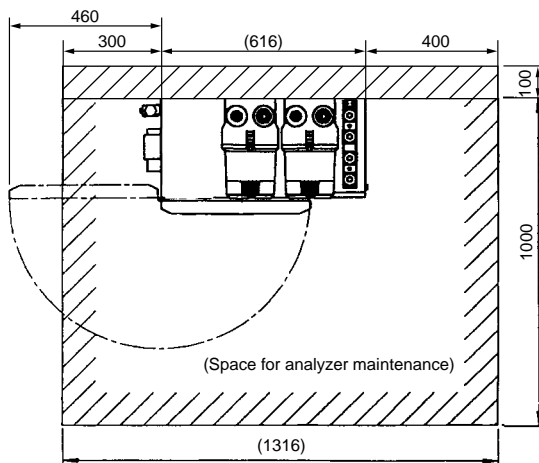
F10.EPS

(5) GC1000W/GC1000C with analyzer base sampling system



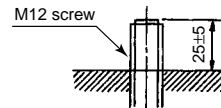
F11.EPS

Space for analyzer maintenance



Note 1 : Due to specification, there is the case of no use.

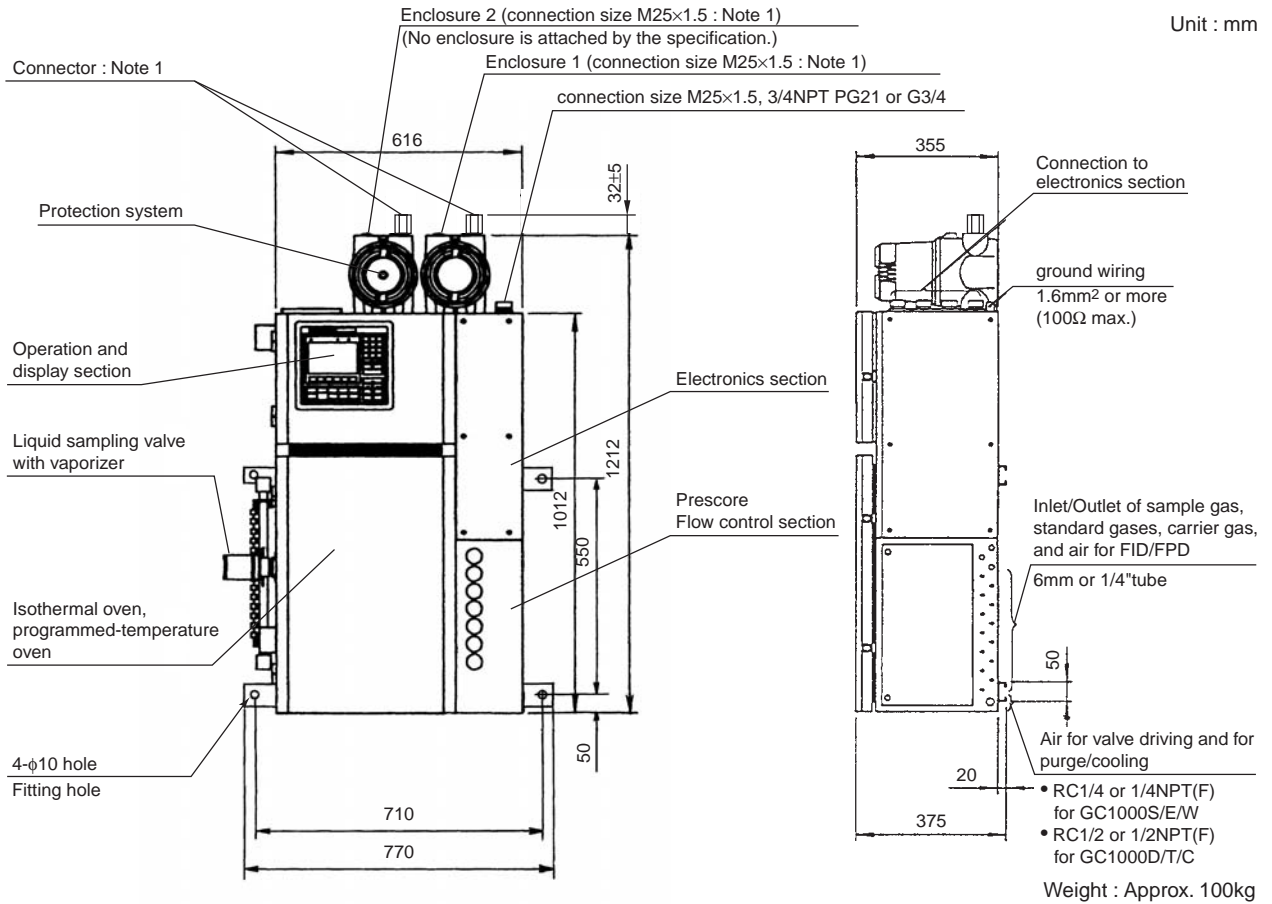
Note 2 : The height of M12 screw from installation floor is 25±5mm



- Installation height :
1842 + L is Total height, including wiring fitting.
Have space for maintenance of wiring

F12.EPS

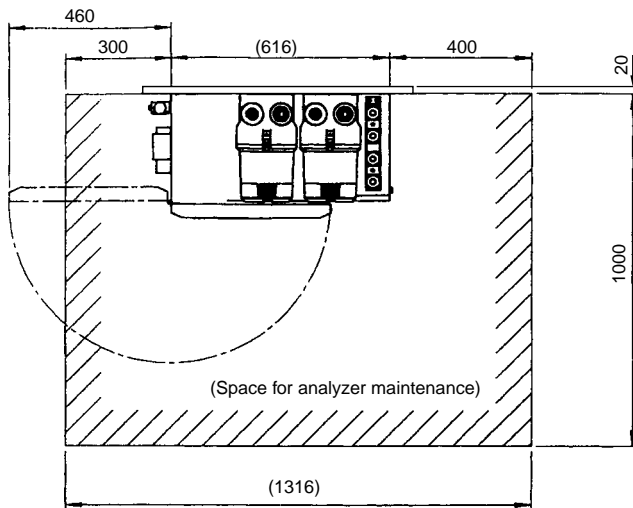
(6) GC1000W/GC1000C without analyzer base sampling system



Note 1 : Connectors are installed when the following screw size is used
 3/4 NPT
 PG21
 G3/4

F13.EPS

Space for analyzer maintenance



Wall construction shall withstand a force of four times the weight of equipment (approx. 100 kg).

• Installation height :
 For the best installation, provide ample clearance on the top of the wiring fitting to meet the wire-lead requirements.

F14.EPS

Table 1. Recommended Cables

Wiring Connections	Wiring Inlet Cables Used	Cables	Wiring	Cable O.D. and Length	Cable Shield
Protection System	Two inlets for each enclosure	8 to 15.9mm dia. for flameproof packing adapter	Two enclosures (A) Heater power line (B) Electrical circuitry power line	3.5mm ² to 5.5mm ² max. 1.25mm ² to 5.5mm ² max.	Not required
			One enclosure (C) Power line	1.25mm ² to 5.5mm ² max.	
			(D) Contact output line (8 points max.) (E) Analog input line (4 points max.)	0.75mm ² to 1.5mm ² max. cable length 1km max. 0.75mm ² to 1.5mm ² max. cable length 1km max.	Required Required
Electronics section	Four inlets	10 to 15.9mm dia. for packing adapter	(A) Heater power line (B) Electrical circuitry power line (C) Power line	3.5mm ² to 5.5mm ² max. 1.25mm ² to 5.5mm ² max. 1.25mm ² to 5.5mm ² max.	Not required
			(H) Contact input line (8 points max.)	0.75mm ² to 1.5mm ² max. cable length 1km max.	Required
			(I) Serial communications line	0.75mm ² to 1.5mm ² max. cable length 1km max. twisted pair cable	Required
			(J) Analog output line (36 points max.)	0.5mm ² to 1.5mm ² max. cable length 1km max.	Required
			(K) Grounding wire	5.5mm ² or more; grounding resistance up to 100Ω	Not required
			(L) Analyzer bus line (max of 2 point)	For use twisted pair cable 0.2mm ² to 1.5mm ² max. 300m or less	Required

Note 1: Wiring to Protection System and Terminal section

<JIS> It is available to use which sealing fitting or flameproof packing adapter. I.D. of the metal conduit for sealing fitting is 22mm. Cable size is of ø 8 to ø15.9mm for flameproof packing adapter. Select packing seal according to cable size.
<FM/CSA> It is only available to use sealing fitting.
<GENELEC> It is only available to use flameproof packing adapter.

Note 2: When shield is required, provide the shield to connecting side. (In GC1000, no shield terminal is supplied as standard.)

Note 3: Use "MKKDSN" Series terminals (manufactured by Phoenix Contact K.K.) for the contact output line (D), analog input line (E), contact input line (H), serial communications line (I), analog output line (J), and detector output line (K).

For these wiring connections, use AI Series crimp-on terminals also manufactured by the company. Four types of crimp-on terminals are used to meet wire diameters.

Please peel off the cover of wire by 5 mm if you do not use the terminal and contact with the terminal.

Note 4: There is no protection system when FM/CSA with Y-purge is applied, Terminal section is used for all wiring.

T04.EPS

5. Analyzer Base Sampling System

In order to ensure the process gas chromatograph operate stable over a long period of time, it is necessary to select the most appropriate sampling system corresponding to sample properties in addition to analyzer stability and reliability.

The GC1000 process gas chromatograph can accommodate an analyzer base sampling system in its analyzer, which contains the essence of sampling techniques utilizing long-term experience. This system not only enables the analyzer and sampling system to be operated and maintained integrally but also makes the system configuration simple.

The analyzer base sampling system should be selected as shown below.

- (1) As sample properties and the number of air operated valves, pressure regulators, and flowmeters to be mounted are limited, see Section 5.1, "Limitation in Selecting a Sampling System" when selecting the sampling system.
- (2) According to Section 5.2, "Flow Selection Diagrams," select the sample conditioning system, sample suction system, sample heating system, and / or standard gas (standard solution) introducing system.
- (3) Specify the analyzer base sampling system code depending on the system selected.

The sample flow diagram of the sampling section is a combination of the basic flow diagram, specified sample conditioning system, sample suction system, sample heating system and standard gas (standard solution) introducing system.

5.1 Limitation in Selecting a Sampling System

Sample properties that can be conditioned in the analyzer base sampling system are as follows: In addition, the specifications for the maximum number of air-operated

valves, pressure regulators, and flowmeters are limited. The sample properties and specifications exceeding these limits necessitate preparing an external sampling system.

5.1.1 Sample Properties

Sample	Temperature	Pressure	Dust	Mist	Boiling Point
Gas	150°C or less	0.01 to 3MPa	0.01g/Nm ³ or less	None	—
Liquid ; the rotary sampling valve is used.	Normal temperature	0.2 to 3MPa	None	—	270°C or less
Liquid ; the liquid sampling valve with a vaporizer is used.	150°C or less	0.2 to 3MPa	None	—	450°C or less

T05.EPS

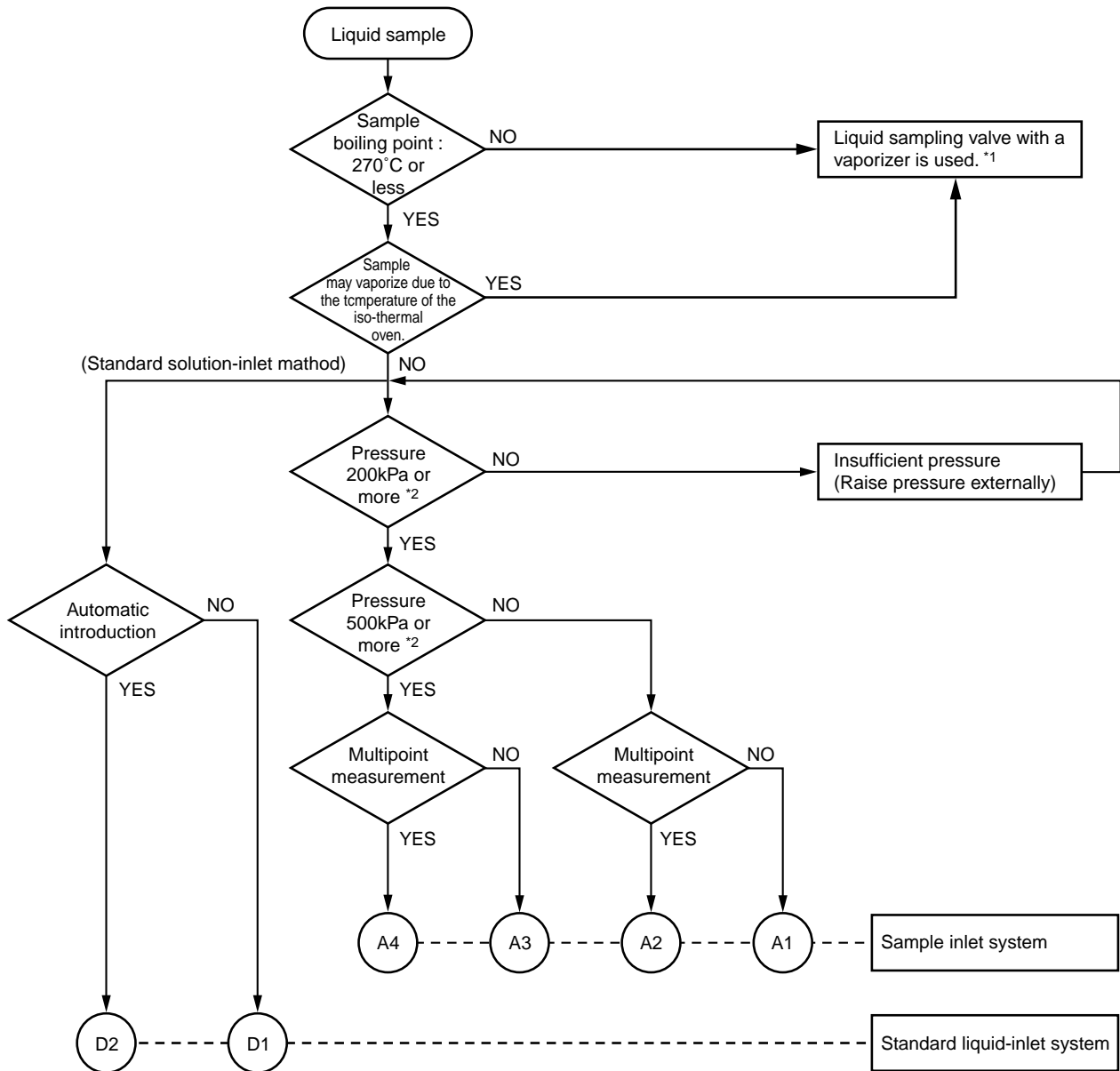
5.1.2 Limitation of Specifications Related to the Maximum Mountable Number of Air-operation Valves

Purpose of Air-operation Valve	Number of Mountable Valves
Automatic stream switching (1 to 8 streams)(including standard gas line) *1	1 for 1 stream A maximum of 8 *2
Atmospheric pressure balancing	1 for 1 stream A maximum of 2

- *1: • If the number of automatically switched streams exceeds 8, use an external sampling system.
By using the external sampling system, the number of automatic stream switching can be extended up to 31.
The external sampling system is driven by a pneumatic signal of 350kPa sent out from the analyzer.
 - The number of streams for automatic stream switching is up to 6.
- *2: The following cases have a maximum of 7 for mountable valves.
 - Sample outlet system is B1 without any sample heating system and 2 independent sample lines.
 - Sample outlet system is B1 with sample heating system.
 - Sample outlet system is B1 with 2 independent sample lines.

T06.EPS

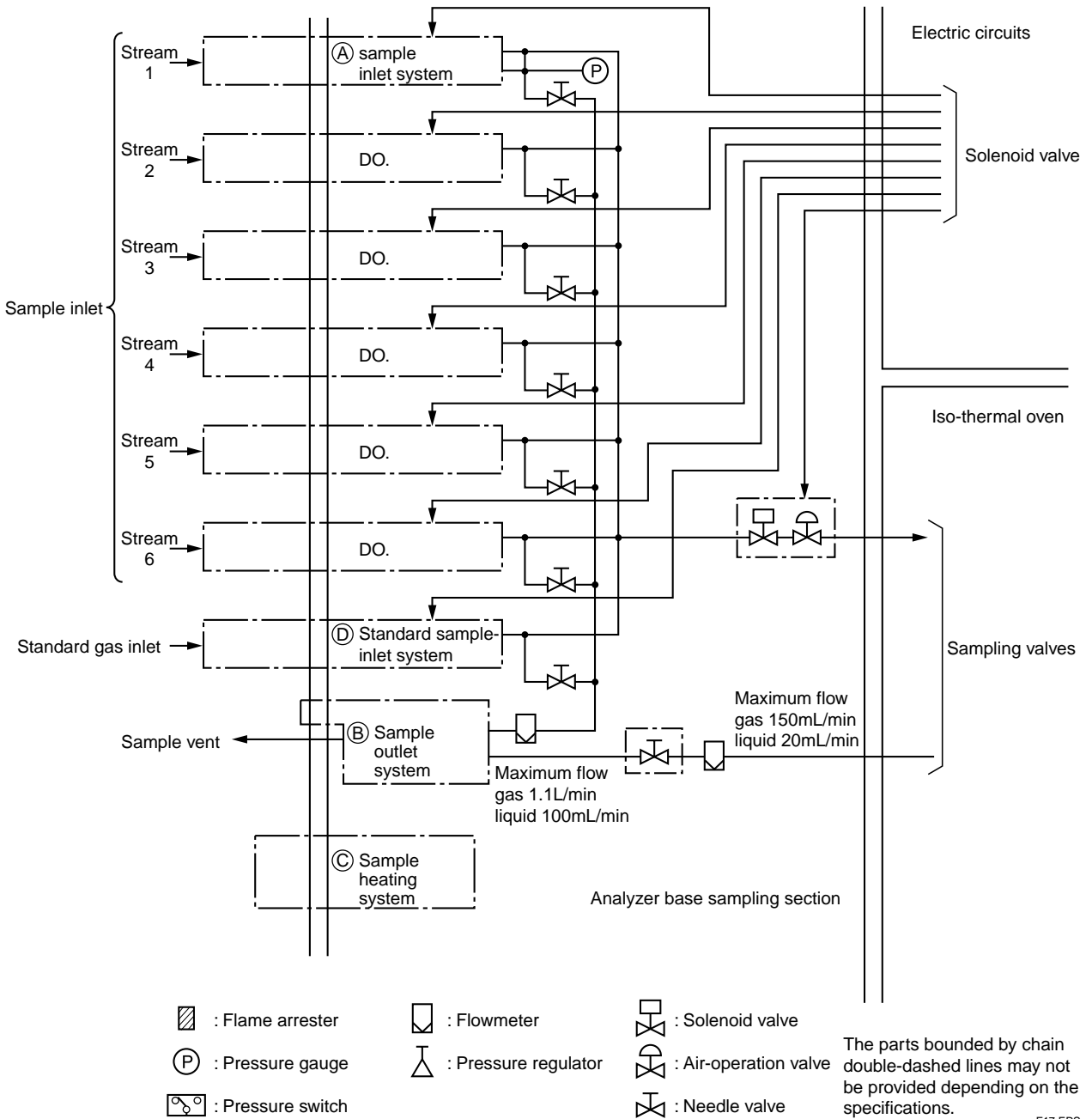
5.2.2 Liquid Sampling



*1: If a liquid sampling valve with a vaporizer is to be used, consult Yokogawa.

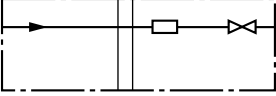
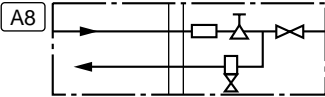
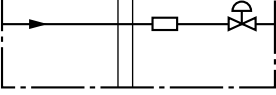
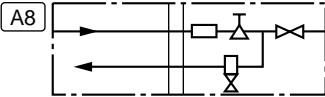
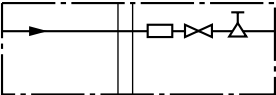

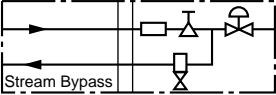
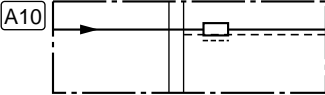
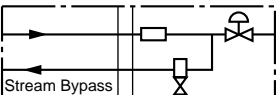
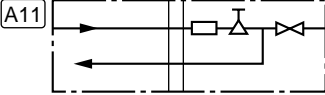
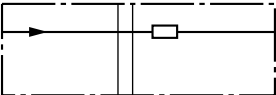
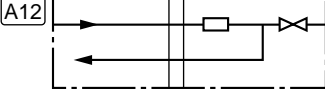
*2: The sample pressure should be set at about slightly more than the lowest pressure for maintaining a liquid state also for the purpose of sample valve protection. For this reason, a pressure regulator may be inserted even in the range of 200 to 500 kPa.

5.3 Sample Flow Diagram



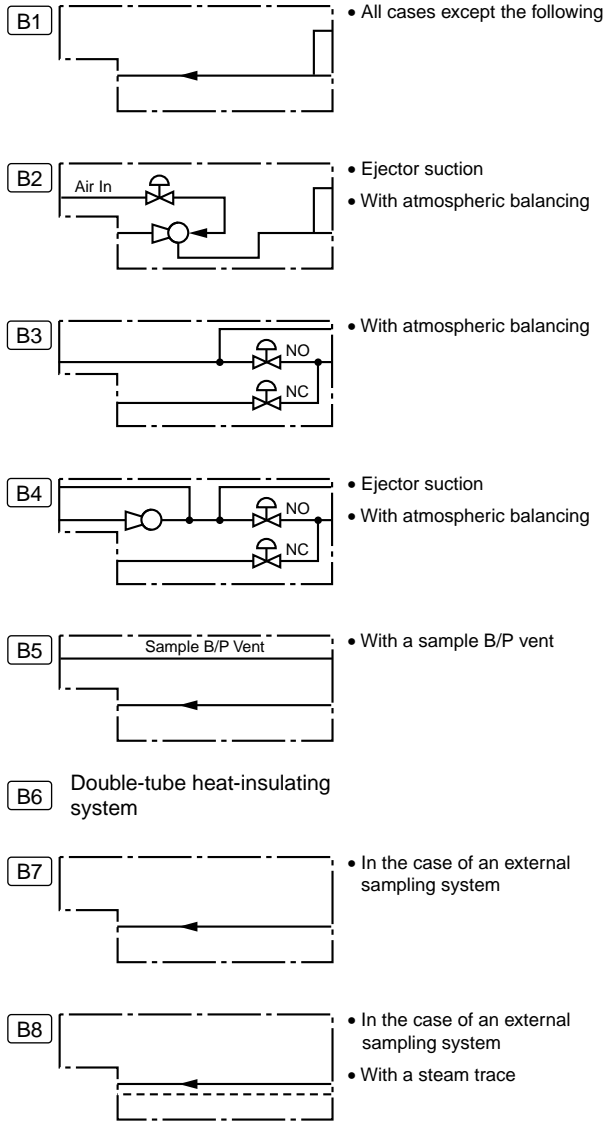
5.4 Standard Sampling System

A. Sample inlet system

<p>A1</p> 	<ul style="list-style-type: none"> • Manual opening and closing • 1 stream • Sample pressure 10 to 200kPa for a gas 200 to 500kPa for a liquid 	<p>A7 Double-tube heat-insulating system</p> 	<ul style="list-style-type: none"> • The analyzer base is not used
<p>A2</p> 	<ul style="list-style-type: none"> • Automatic opening and closing • Multi-streams • Sample pressure 10 to 200kPa for a gas 200 to 500kPa for a liquid 	<p>A8</p> 	<ul style="list-style-type: none"> • Manual opening and closing • Multi-streams • Sample pressure 0.2 to 3MPa for both gases and liquids • Bypass flowmeter scale 6.6L/min for a gas 100mL/min for a liquid
<p>A3</p> 	<ul style="list-style-type: none"> • Manual opening and closing • 1 stream • Sample pressure 0.2 to 3MPa for both gases and liquids 	<p>A9</p> 	<ul style="list-style-type: none"> • Manual opening and closing • 1 stream • Sample pressure 9.8 to 196kPa for a gas 200 to 500kPa for a liquid • Bypass flowmeter scale 6.6L/min for a gas 100mL/min for a liquid
<p>A4</p> 	<ul style="list-style-type: none"> • Automatic opening and closing • Multi-streams • Sample pressure 0.2 to 3MPa for both gases and liquids • Bypass flowmeter scale 6.6L/min for a gas 100mL/min for a liquid 	<p>A10</p> 	<ul style="list-style-type: none"> • Remote opening and closing • In the case of an external sampling system • With a steam trace
<p>A5</p> 	<ul style="list-style-type: none"> • Automatic opening and closing • Multi-streams • Sample pressure 10 to 200kPa for a gas 200 to 500kPa for a liquid • Bypass flowmeter scale 6.6L/min for a gas 100mL/min for a liquid 	<p>A11</p> 	<ul style="list-style-type: none"> • Manual opening and closing • 1 stream • Sample pressure 0.2 to 3MPa for both gases and liquids
<p>A6</p> 	<ul style="list-style-type: none"> • Remote opening and closing • In the case of an external sampling system 	<p>A12</p> 	<ul style="list-style-type: none"> • Manual opening and closing • 1 stream • Sample pressure 10 to 200kPa for a gas 200 to 500kPa for a liquid

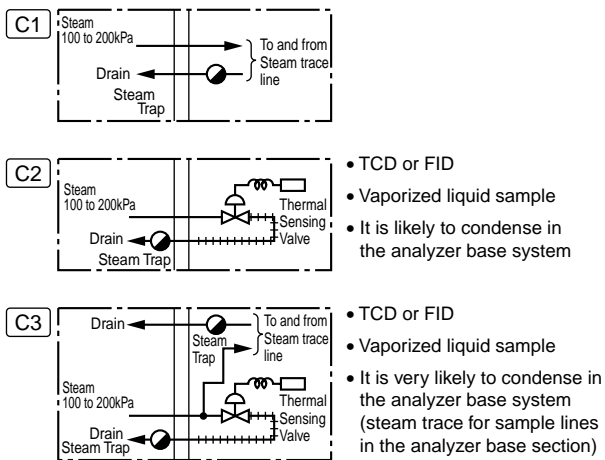
F18.EPS

B. Sample outlet system



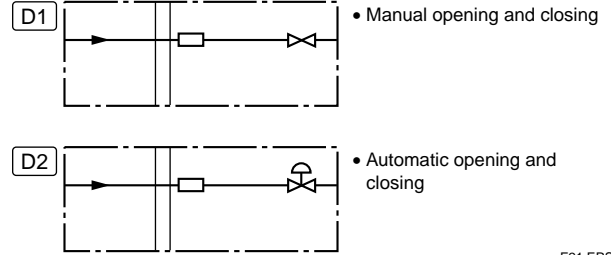
F19.EPS

C. Sample heating system



F20.EPS

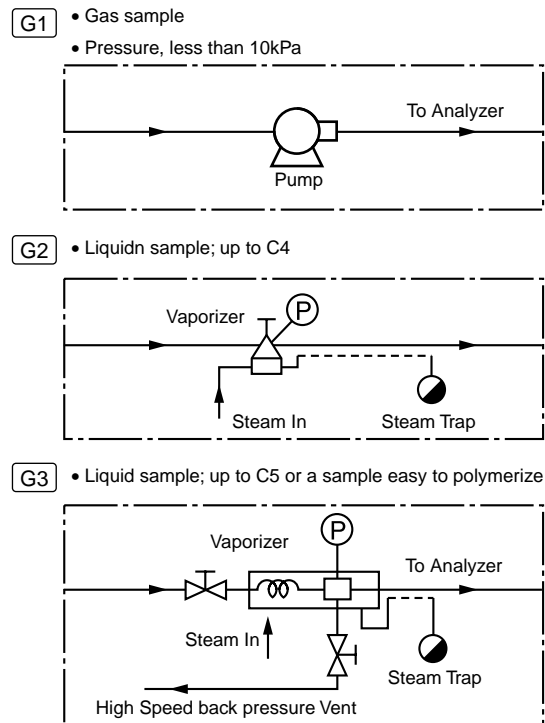
D. Standard gas inlet system



F21.EPS

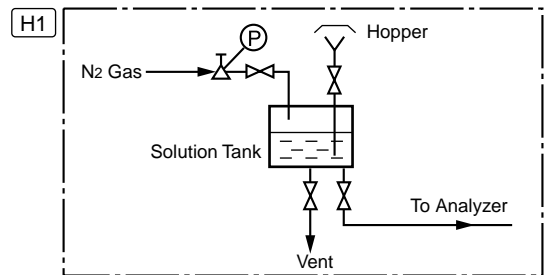
[Reference]

G. Examples of sample-conditioning system outside the analyzer



F22.EPS

H. Standard solution-introducing system outside the analyzer



F23.EPS

ITEMS TO BE SPECIFIED WHEN ORDERING A GC1000 SERIES ANALYZER

1. General

User's name : _____
Plant name : _____
Document : English Japanese

2. Utilities and Installation Conditions

Power supply : V AC± %; Hz± %
Instrument air : Pressure _____ kPa
Cooling air : Pressure _____ kPa
Steam : Pressure _____ kPa

3. Specifications

Explosion protection : JIS FM CSA CENELEC
Number of streams to be measured : _____
Number of standard sample streams : _____
Carrier gas desired : Any (manufacture's choice)
H₂ N₂ He Ar
Desired analysis cycle : _____ minutes/stream
Input : Analog input _____ points
Contact input _____ points
Output : Analog hold _____ points
Contact output _____ points
Stream switching valve : _____ points
communication: Communication via DCS
MODBUS Y-Protocol GCCU
Communication via personal computer
Network: GCAS _____ set
GCHUB _____ set
GCIU _____ set

4. Installation Conditions

Ambient Temperature : Max. _____ °C; Min. _____ °C
Corrosive gases : None Present
Vibration : No Yes
Location of analyzer and sampling system
Indoors Outdoors _____

5. Estimate of Items Needed

- | | | | |
|----|--|-------|-------------|
| 1 | Gas chromatograph (GC) | _____ | Number |
| 2 | Accessories for gas chromatograph | | 1set |
| 3 | Spare column | _____ | type / GC |
| 4 | Carrier gas cylinder | _____ | / GC |
| 5 | Carrier gas pressure regulator | _____ | / GC |
| 6 | Hydrogen (FID/FPD) gas cylinder | _____ | / GC |
| 7 | Hydrogen gas pressure regulator | _____ | / GC |
| 8 | Standard gas cylinder | _____ | / GC |
| 9 | Standard gas pressure regulator | _____ | / GC |
| 10 | Standard solution tank
(for liquid samples) | _____ | / GC |
| 11 | Standard solution pressure regulator | _____ | / GC |
| 12 | Carrier gas dehumidifier | _____ | / GC |
| 13 | Sample conditioner | _____ | set |
| 14 | Instruction manual | _____ | copies / GC |
| 15 | Operation data | _____ | copies / GC |
| 16 | Others | | |

6. Process Condition and Measuring Range Please fill out the next form.

PROCESS CONDITIONS AND MEASURING RANGE.

No.	Stream Name Component	Stream No. /					Stream No. /				
		Concentration()			Measuring Range ()	Priority	Concentration()			Measuring Range ()	Priority
		Min.	Norm.	Max.			Min.	Norm.	Max.		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
Inlet Phase		<input type="checkbox"/> Vapor			<input type="checkbox"/> Liquid		<input type="checkbox"/> Vapor			<input type="checkbox"/> Liquid	
Process Press.(kPa) Max. Norm. Min.											
Process Temp.(°C) Max. Norm. Min.											
Corrosive Components: Acid											
Dust: amount and particle size											
Stability: polymerizes, decomposes											
Moisture Contents (mol.%)		<input type="checkbox"/> vol.%			<input type="checkbox"/> °C saturated		<input type="checkbox"/> vol.%			<input type="checkbox"/> °C saturated	
Distance between sample point and GC		m					m				
Return Point: pressure / phase											
<p>Notes *1: It is needed to fill out not only the measuring components but also all components existed in the sample.</p> <p>*2: The priority stands for the mark as follows. ◎: MUST, ○; Hopefully, △: If possible</p> <p>*3: Please copy and use this sheet when there are more than 3 streams.</p>											

T07.EPS