

# General Specifications

## Model GC1000 Mark II Process Gas Chromatograph

GC1000 Mark II

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 GC1000E/C/S (isothermal oven type) and the GC1000T/W/D (programmed temperature type). The GC1000E/C/S can analyze gas and liquid samples from room temperature up to elevated temperatures corresponding to their boiling points. The GC1000T/W/D is capable of performing high resolution analysis by using capillary columns similar to laboratory gas chromatograph.

### ■ 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  $\pm 0.03^{\circ}\text{C}$  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.



GC1000 MarkII

#### ■ 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

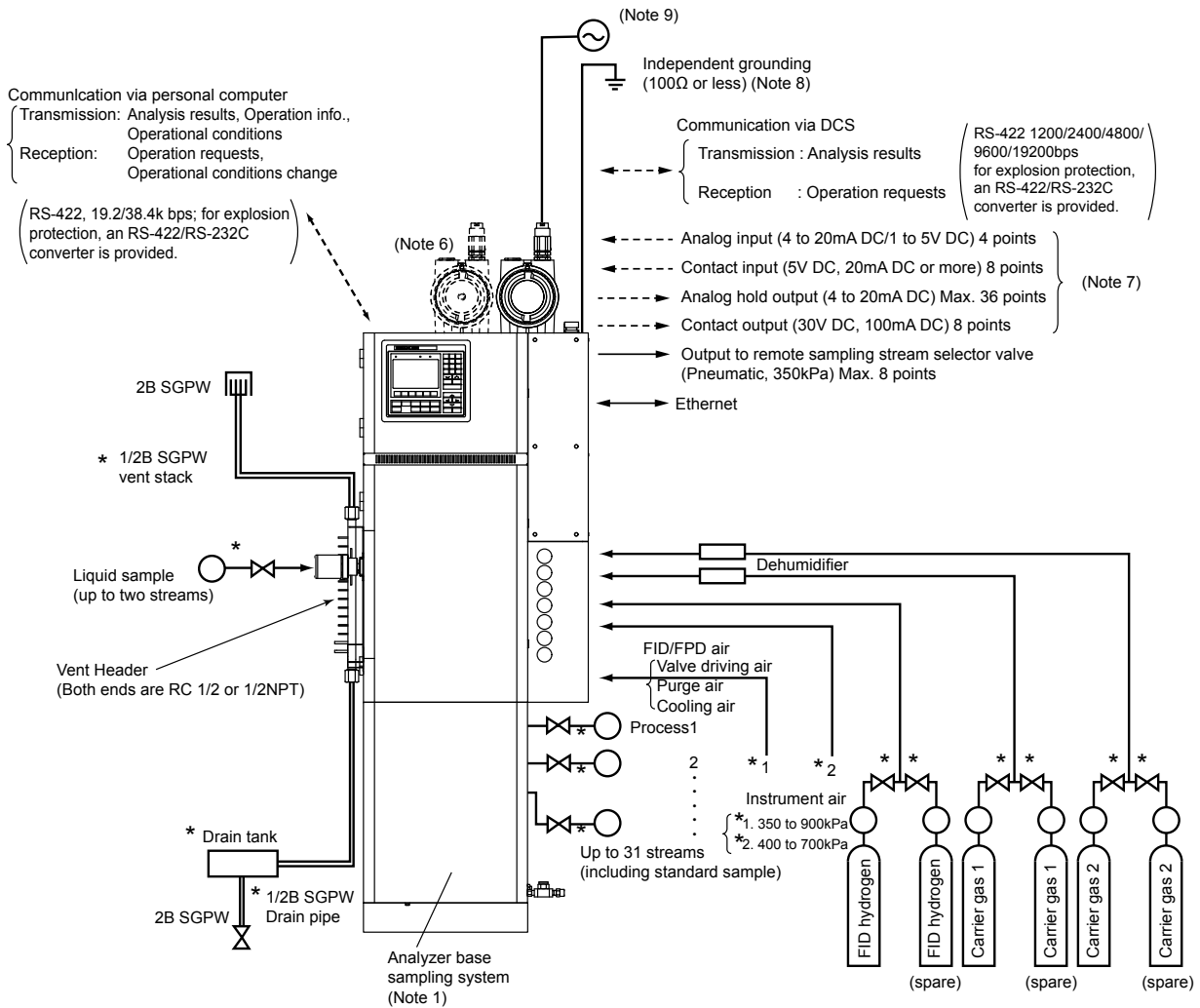
The GC1000 can be used for monitoring and quality control in following industries and applications.

- **Petrochemistry:** Ethylene, Poly-propylene, Polyethylene, 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.

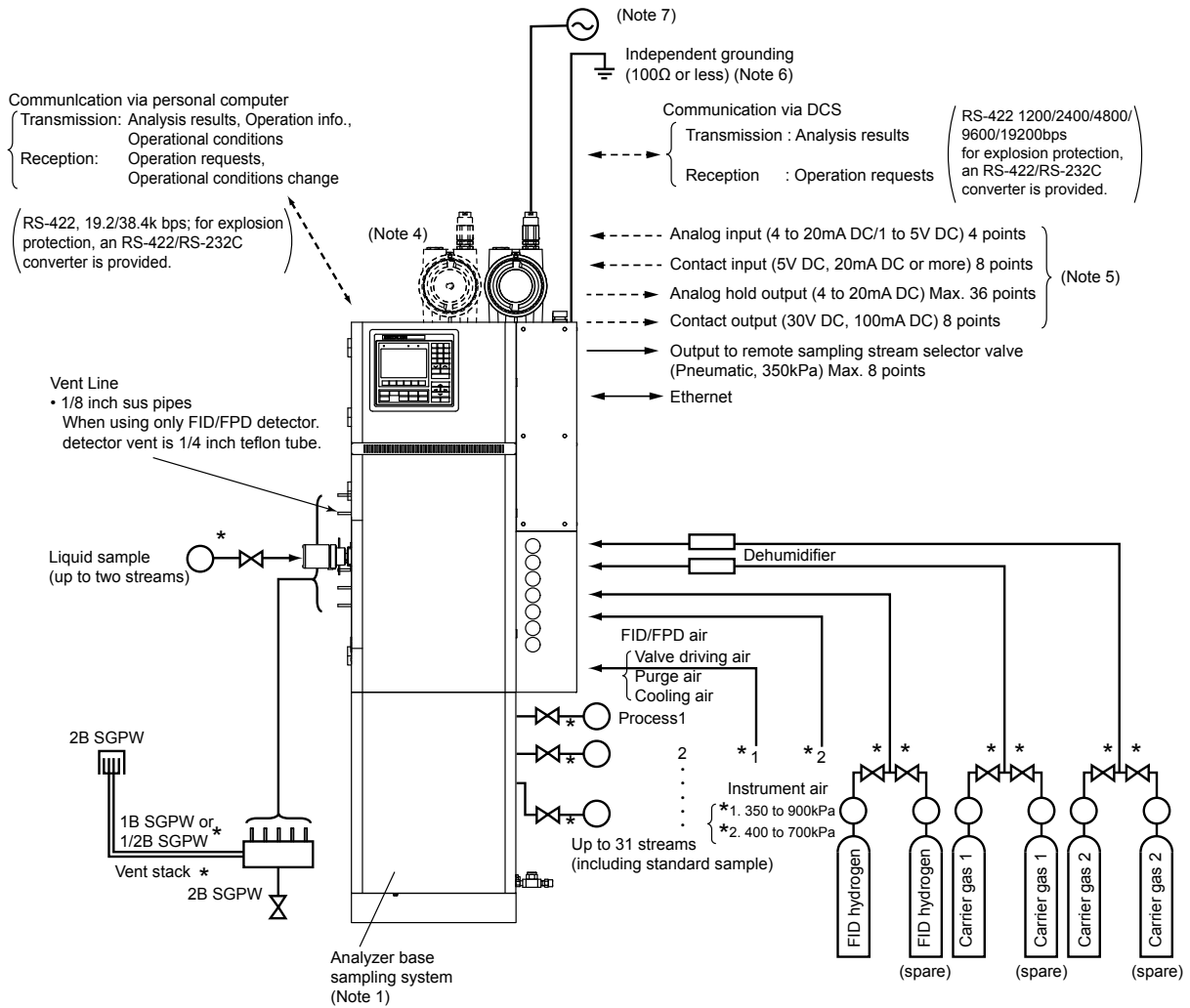
## ■ WIRING AND PIPING DIAGRAM

### (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 Table 1 "Recommended Cables" (12 page).
- 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: Drain tank is used only for using FID/FPD. This is not used for using TCD.
- Note6: The specification decides the number of flameproof enclosure. No enclosure is applied for the general purpose or Y-purge type.
- Note7: 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 11B03S03-02E for detail.
- Note8: Follow the domestic electrical requirements as regulated in each country. In the case of GC1000C/W, set ground resistance to 10 Ω or less.
- Note9: Circuit breaker shall be suitable for the item of the power supply described in the specification, and located near the analyzer. In the case of GC1000T/W/D, circuit breaker for the electronic circuit power (approx. 1.5 kVA) is needed in addition.

(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 11 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" (12 page).
- Note4: The specification decides the number of flameproof enclosure. No enclosure is applied for the general purpose or Y-purge type.
- Note5: 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 11B03S03-02E for detail.
- Note6: Follow the domestic electrical requirements as regulated in each country. In the case of GC1000C/W, set ground resistance to 10 Ω or less.
- Note7: Circuit breaker shall be suitable for the item of the power supply described in the specification, and located near the analyzer. In the case of GC1000T/W/D, circuit breaker for the electronic circuit power (approx. 1.5 kVA) is needed in addition.

## ■ 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 $\sigma$ )  
 \* The value may vary depending on the specifications  
 and conditions. For details, contact Yokogawa.

### 1. Analyzer

#### 1.1 Specifications

Area classification:  
 FM/CSA X-purging, Y-purging class1, Div1,  
   Groups B, C and D, T1 to T4  
 ATEX Group II Category 2G, KEMA  
   98ATEX4675  
   EEx pd IIB+H2, T1 to T4  
 NEPSI Ex pxd IIC, T1 to T4 (IIC only for H<sub>2</sub>)  
 TIIS (JIS) Ex pd IIB+H2, T1 to T4 X  
 Construction:  
   Drip-proof and dust-proof construction  
   (NEMA 3R, 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)  
 Weight: Approx. 120 kg  
   (with analyzer base sampling system)

#### 1.2 Isothermal Oven (GC1000S/E/C)

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 $\Omega$  RTD  
   with over-heating prevention function

#### 1.3 Programmed Temperature Oven (GC1000T/W/D)

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°C  
 Stability to supply voltage variation:  
   0.03°C / 10%  
 Temperature control: PID control  
   Temperature sensor; Pt100 $\Omega$  RTD  
   with over-heating prevention 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 $\mu\text{l}$   
 <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 $\Omega$  RTD  
   with overheating prevention function

#### 1.5 Cooler

The cooler serves for fixed point control of the  
 thermostatic 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:  
 GC1000T/W/D; 200/220/230/240V AC  
    $\pm 10\%$ , 50/60Hz  $\pm 5\%$   
 GC1000E/C/S; 100/110/115/120/200/220/  
   230/240V AC, 50/60Hz  $\pm 5\%$   
   Don't exceed 250V AC.  
 Power consumption:  
 GC1000T/W/D; 2.3 to 3.3kVA  
 GC1000E/C/S; 0.6 to 1.4kVA  
   (It may vary depending on the  
   specifications)  
 Instrument air:  
 Standard (without cooler)  
   Pressure; 350 to 900kPa  
   Flowrate; GC1000T/W/D; 150 L/min or more  
   GC1000E/C/S; 100 L/min or more  
   (It may vary depending on the  
   specifications)  
 Dew point; -20°C or lower (at pressure)  
   \* Compressed air should not dew at  
   the installation ambient temperature.  
 With cooler  
   Pressure; 500 to 900kPa  
   Flowrate; 450 L/min or more  
   (It may vary depending on the  
   specifications)  
 Dew point; -20°C or lower (at pressure)  
   \* Compressed air should not dew at  
   the installation ambient temperature.  
 Carrier gas:  
 Kinds; Any one or two of H<sub>2</sub>, N<sub>2</sub>, He, or Ar  
 Purity; 99.99% minimum  
   (Dew point -60°C or lower)  
   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 lower)  
 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 lower)  
 Organic components 5ppm or less  
 Pressure; 400 to 700kPa  
 Consumption; Approximately 300mL/min per detector  
 Utility gas supplied method:  
 EPC (Electric Pressure Countroller) or Regulator

### 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	Function: Output of Average value *2 and Current value *3 Accuracy: ±0.5%FS (-10 to 50°C)
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

#### 3.2 Output

Item	Signal level	No.	Description
Analog Output	Isolated or No-isolated 4-20mA DC Load: 300 Ω 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: 350 kPa	MAX. 8	Binary code signal for 9 to 31 stream (max.)

### 3.3 Communication

Item	Signal level	No.	Description
DCS communication	Standard: RS-422 (4wires, Full-Duplex) Protocol: Modbus/GC6 type/GC8 & GC1000 type Specification: Start bit 1, Stop bit 1, Parity 1, ASCII7 bit, Without procedure or Hand shake Speed: 1200/2400/4800/9600/192 00 bps (selectable) For explosion protection: RS-422/RS-232C converter is provided.(2 wires of power line is needed except the signal line) The transmission type is full duplex for RS-232C.	1	Transmission: Analysis result *4 Calibration coefficient Alarm Reception: Operation request *5
PC communication	Standard: RS-422 (4wires, Full-Duplex) Speed: 19.2/38.4 kbps For explosion protection: RS-422/RS-232C converter is provided.(2 wires of power line is needed except the signal line) The transmission type is full duplex for RS-232C.	1	GCMT (GC Maintenance Terminal) Transmission: Analysis result *4 Operation information Alarm Reception: Operation request *5
Analyzer bus	Standard: Ethernet 100BaseTX (Twisted pair) or 100BaseFX (Fibre-optics) For explosion protection Twisted pair line should be disconnected when the explosion-proof status is not kept at the GC1000 MarkII. Shut down output of the analyzer should be used turn ON/OFF the power line of the hub.	1	Transmission: Analysis result *4 Operation information *6 Alarm Reception: Operation request *5

\*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, Calorific value, Density, Compressive factor, Wobbe Index)

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

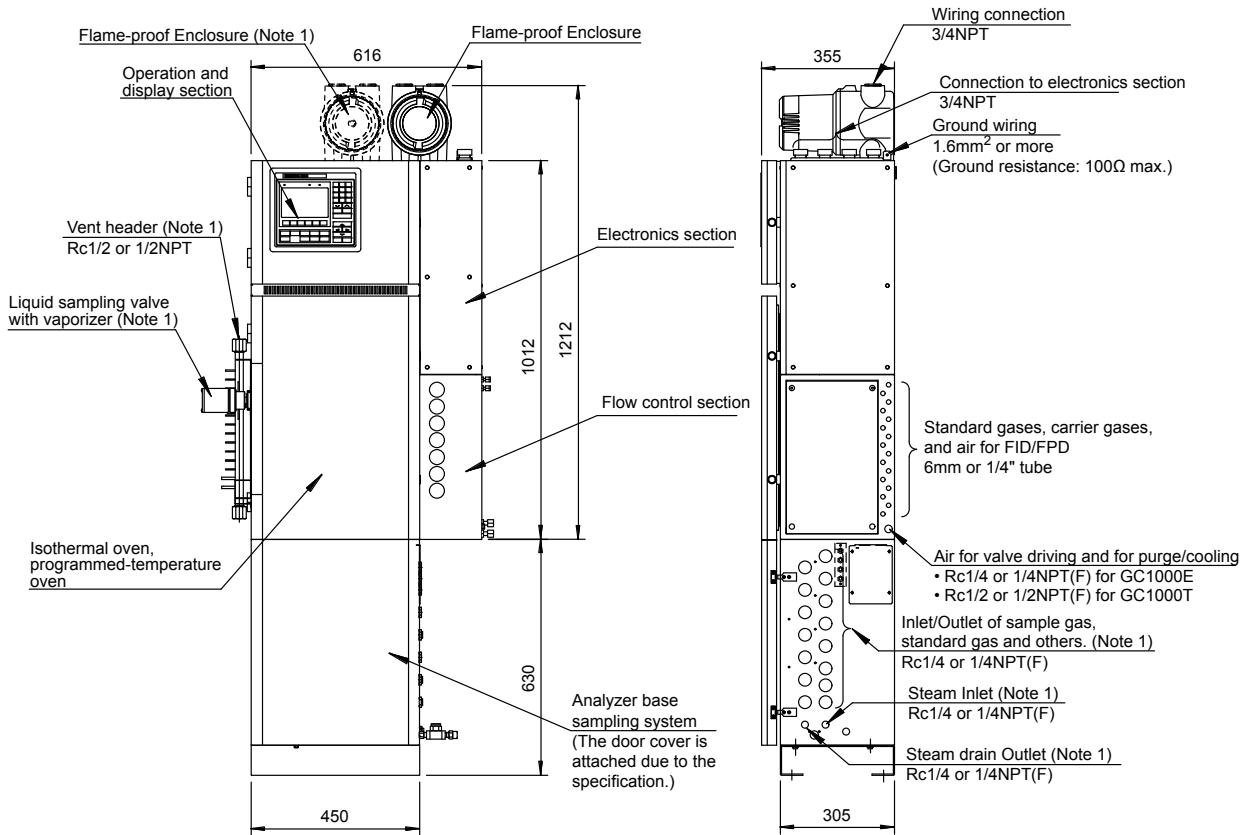
\*6 : Operation Information (Chromatogram, Oven temperature, measuring stream, Valve ON/OFF etc...)

Refer to GS 11B03G02-02E GC1000 MarkII  
 Modbus communication, GS 11B03G03-01E  
 GC1000 Communication Function and GCMT Gas  
 Chromatpgraph Maintenance Terminal, and GS  
 11B06A01-01E GC1000 Analyzer Bus System.

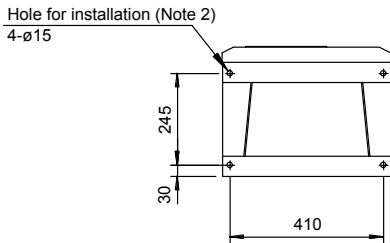
4. EXTERNAL DIMENSIONS

(1) GC100T/GC100E (for FM/CSA exproof) with analyzer base sampling system

Unit : mm

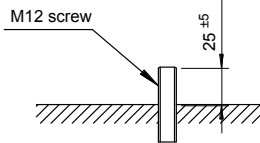


Weight : Approx. 120kg

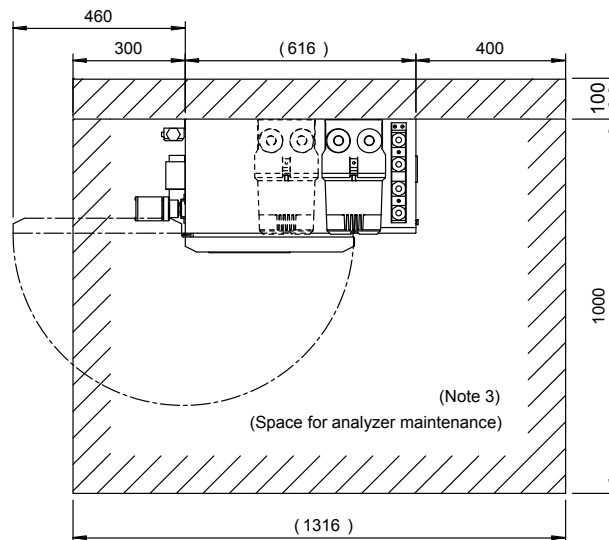


Note 1: Due to specification, it is attached.

Note 2: The height of M12 screw is 255mm from the floor installed

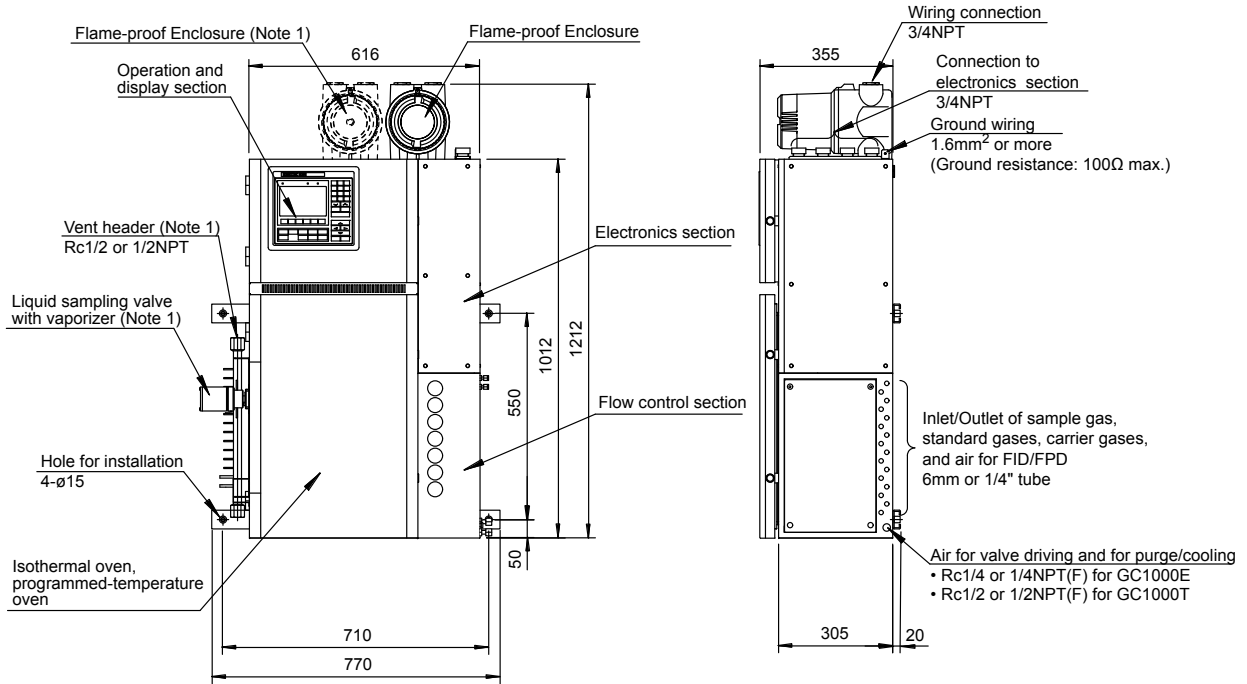


Note 3: The height for Maintenance 1842 is whole height, including wiring fitting. Take an enough space for maintenance of wiring.



(2) GC1000T/GC1000E (for FM/CSA exproof) without analyzer base sampling system

Unit : mm

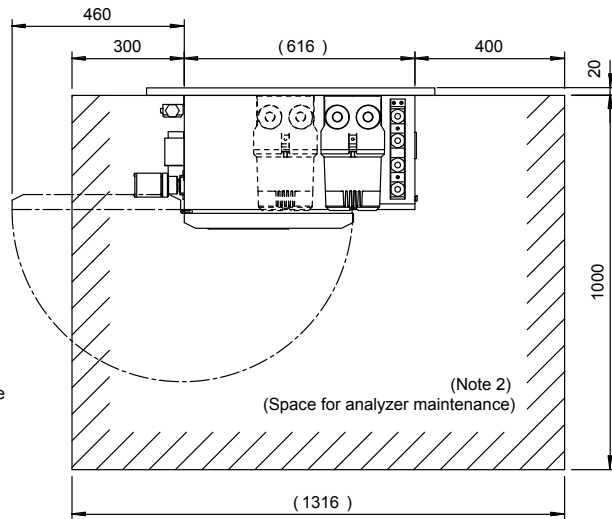


Note 1: Due to specification, it is attached.

Weight : Approx. 100kg

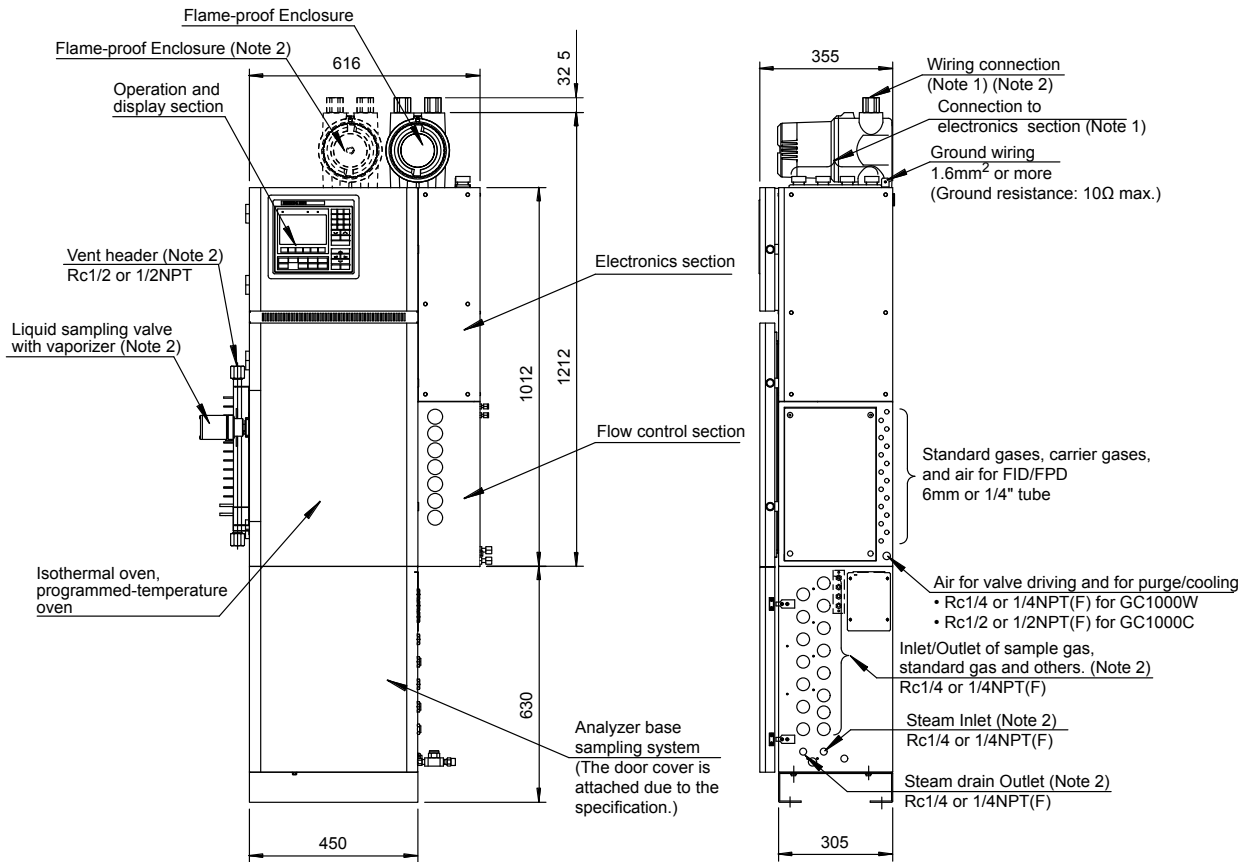
**<CAUTION>**  
The wall construction for mounting has to be endured by 4 times of the weight (approx. 100 kg) of the analyzer.

Note 2: The height for Maintenance  
For the best installation, take an enough space on the top of the wiring fitting to meet the wire-lead requirements.

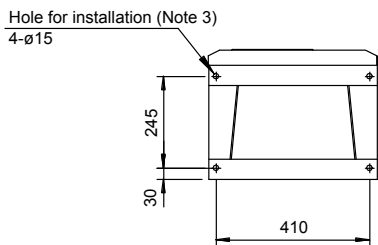


**(3) GC1000W/GC1000C (for ATEX exproof) with analyzer base sampling system**

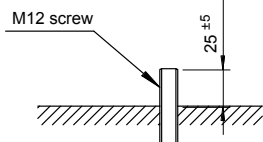
Unit : mm



Weight : Approx. 120kg

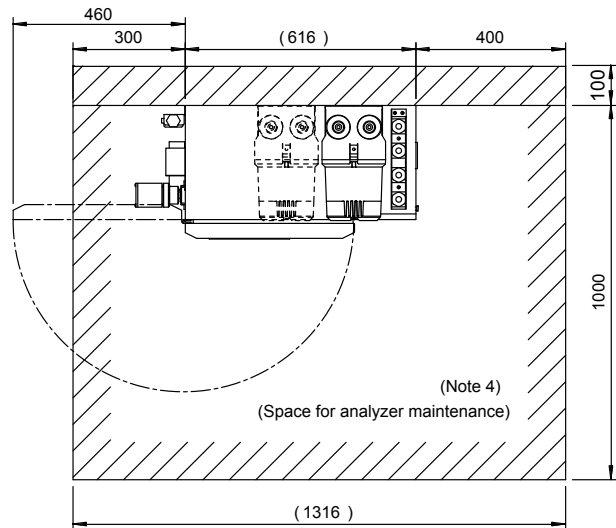


Note 3: The height of M12 screw is 255mm from the floor installed



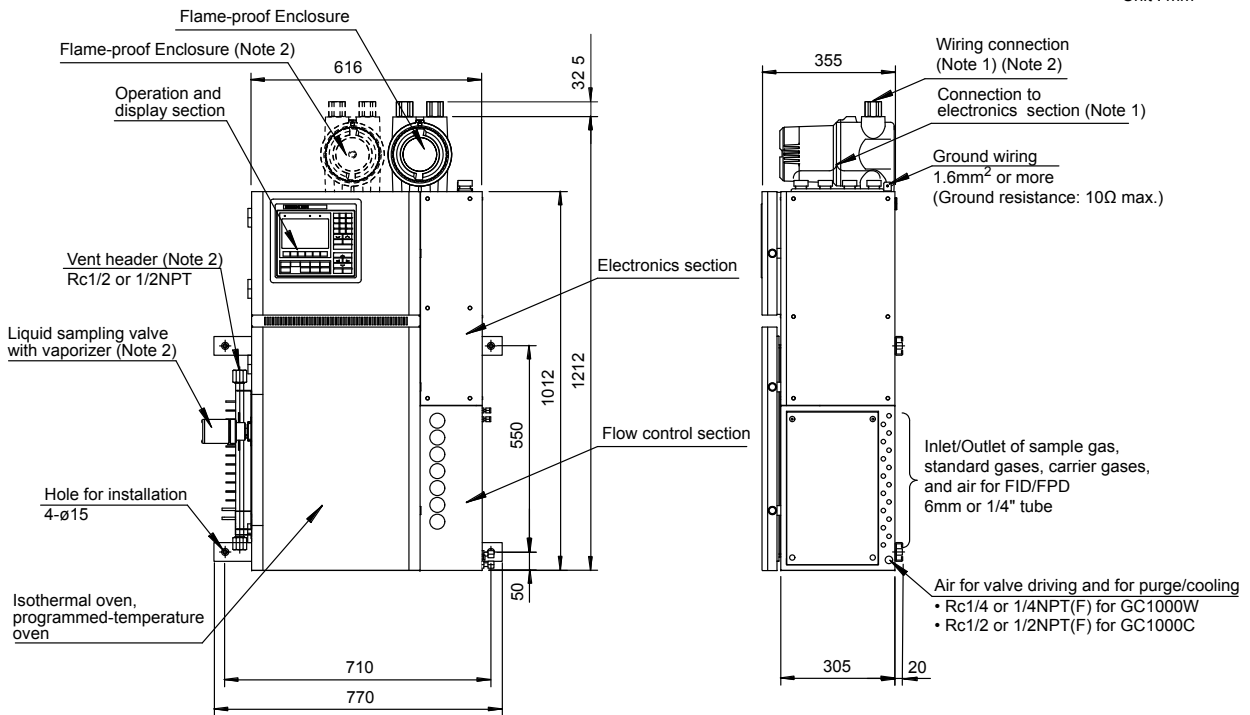
Note 4: The height for Maintenance 1874.5 is whole height, including wiring fitting. Take an enough space for maintenance of wiring.

Note 1: The connection size is selected by follows;  
3/4NPT, G3/4, Pg21, or M25x1.5  
Note 2: Due to specification, it is attached.



**(4) GC1000W/GC1000C (for ATEX exproof) without analyzer base sampling system**

Unit : mm

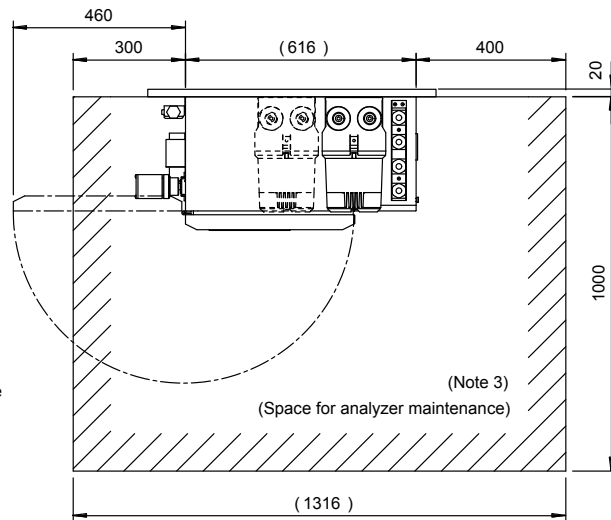


Note 1: The connection size is selected by follows;  
3/4NPT, G3/4, Pg21, or M25x1.5  
Note 2: Due to specification, it is attached.

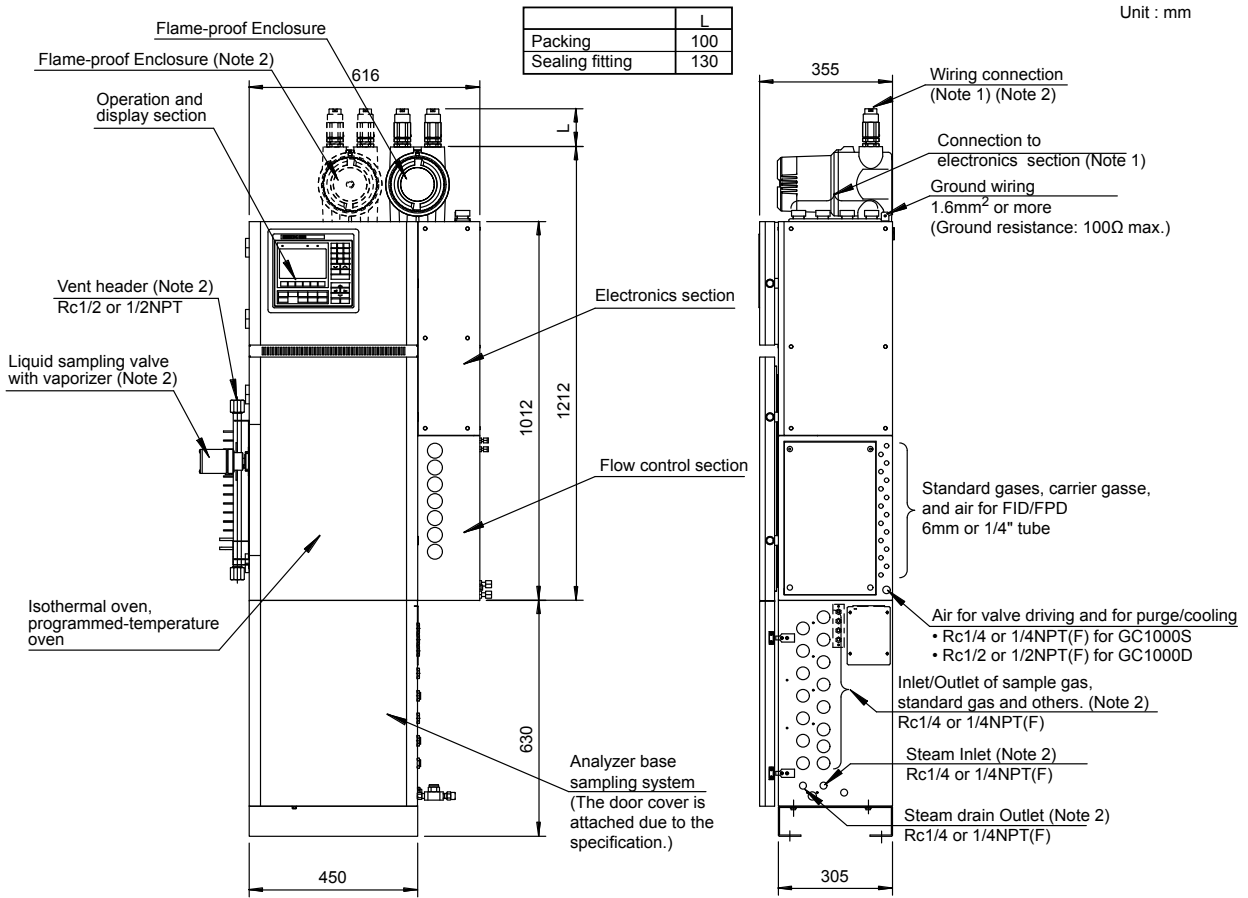
Weight : Approx. 100kg

**<CAUTION>**  
The wall construction for mounting has to be endured by 4 times of the weight (approx. 100 kg) of the analyzer.

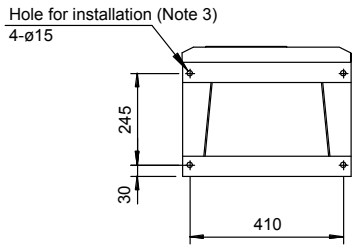
Note 3: The height for Maintenance  
For the best installation, take an enough space on the top of the wiring fitting to meet the wire-lead requirements.



**(5) GC1000D/GC1000S (for TIIS exproof) with analyzer base sampling system**

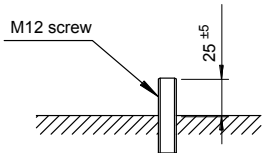


Weight : Approx. 120kg

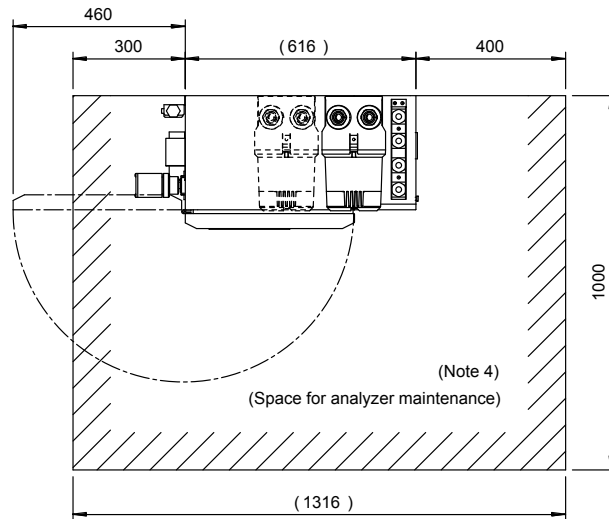


Note 1: The connection size is selected by follows;  
 3/4NPT or G3/4  
 Note 2: Due to specification, it is attached.

Note 3: The height of M12 screw is 255mm from the floor installed

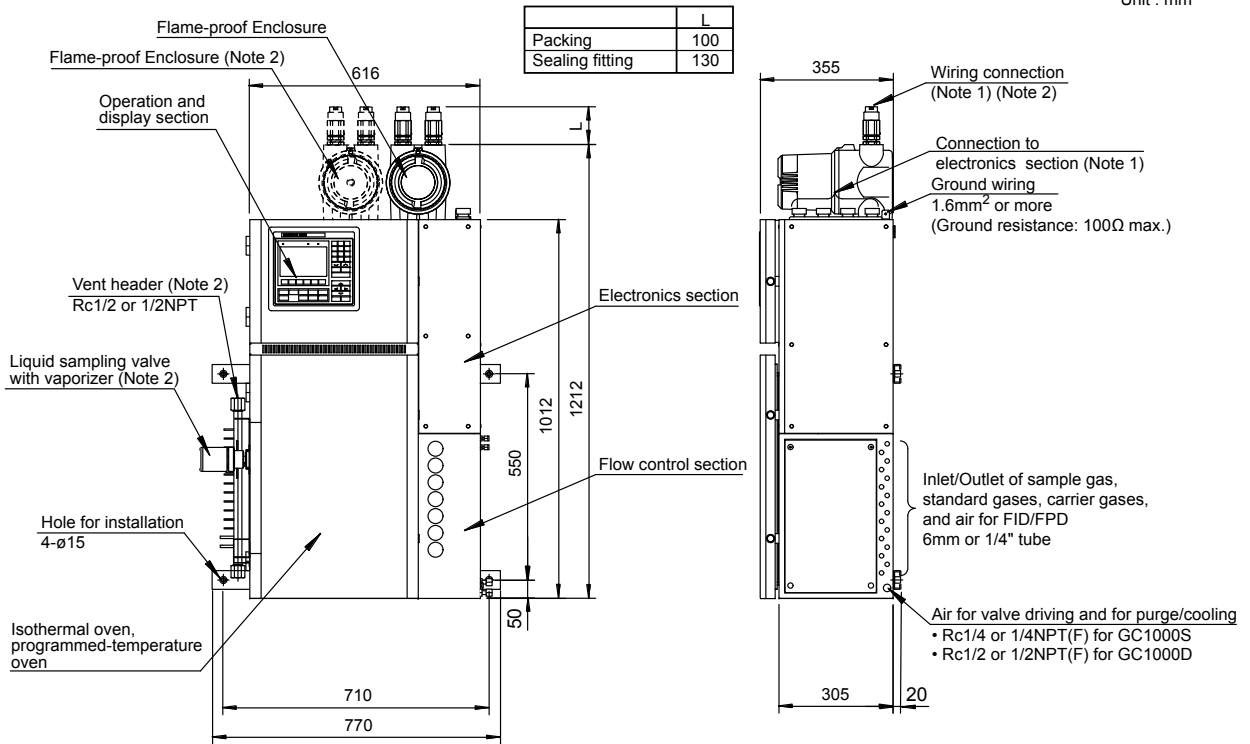


Note 4: The height for Maintenance  
 1842 + L is whole height, including wiring fitting.  
 Take an enough space for maintenance of wiring.



(6) GC1000D/GC1000S (for TIIS exproof) without analyzer base sampling system

Unit : mm



Note 1: The connection size is selected by follows;  
3/4NPT or G3/4  
Note 2: Due to specification, it is attached.

Weight : Approx. 100kg

**<CAUTION>**  
The wall construction for mounting has to be endured by 4 times of the weight (approx. 100 kg) of the analyzer.

Note 3: The height for Maintenance  
For the best installation, take an enough space on the top of the wiring fitting to meet the wire-lead requirements.

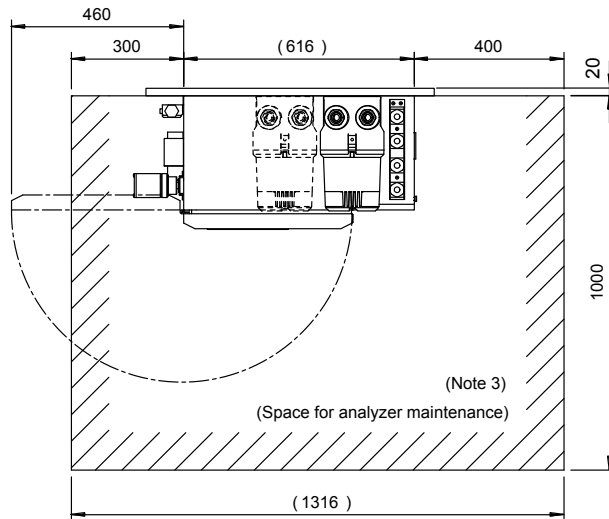


Table 1. Recommended Cables

Wiring Connections	Wiring Inlet Cables Used	Cables	Wiring	Cable O.D. and Length	Cable Shield
Protection System	Two inlets for each enclosure	8 to 15.9 mm dia. for flameproof packing adapter	Two enclosures Heater power line Electrical circuitry power line One enclosure Power line	3.5 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max. 1.25 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max.  1.25 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max.	Not required
			Contact output line (8 points max.)	0.75 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. cable length 1 km max.	Required
			Analog input line (4 points max.)	0.75 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. cable length 1 km max.	Required
Electronics section	Four inlets	10 to 15.9 mm dia, for packing adapter	Heater power line Electrical circuitry power line Power line	3.5 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max. 1.25 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max. 1.25 mm <sup>2</sup> to 5.5 mm <sup>2</sup> max.	Not required
			Contact input line (8 points max.)	0.75 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. cable length 1 km max.	Required
			Serial communications line (Note3)	0.75 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. cable length 1 km max. twisted pair cable	Required
			Analog output line (36 points max.)	0.5 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. cable length 1 km max.	Required
			Grounding wire	5.5 mm <sup>2</sup> or more; grounding resistance up to 100 Ω	Not required
			Analyzer bus line (max of 2 point)	For use twisted pair cable 0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> max. 300 m or less	Required
			Ethernet line (Twisted pair)	RJ45 connector	Required ScTP
			Ethernet line (Fibre-optics)	SC Connector, Multimode For 1300mm Outdoor type	

Note 1: Wiring to Protection System and Terminal section

<TIIS> It is available to use which sealing fitting or flameproof packing adapter. I.D. of the metal conduit for sealing fitting is 22mm. Cable O.D. size is 8 to 15.9mm for flameproof packing adapter. Select packing seal according to cable size.

<FM/CSA> It is only available to use sealing fitting.

<ATEX> 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 the transmission cable for computers with electric shielding.

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

**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-operaed valves 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 3 MPa	0.01 g/m <sup>3</sup> (stp) or less	None	-----
Liquid ; the rotary sampling valve is used.	Normal temperature	0.2 to 3 MPa	None	-----	270°C or less
Liquid ; the liquid sampling valve with a vaporizer is used.	150°C or less	0.2 to 3 MPa	None	-----	450°C or less

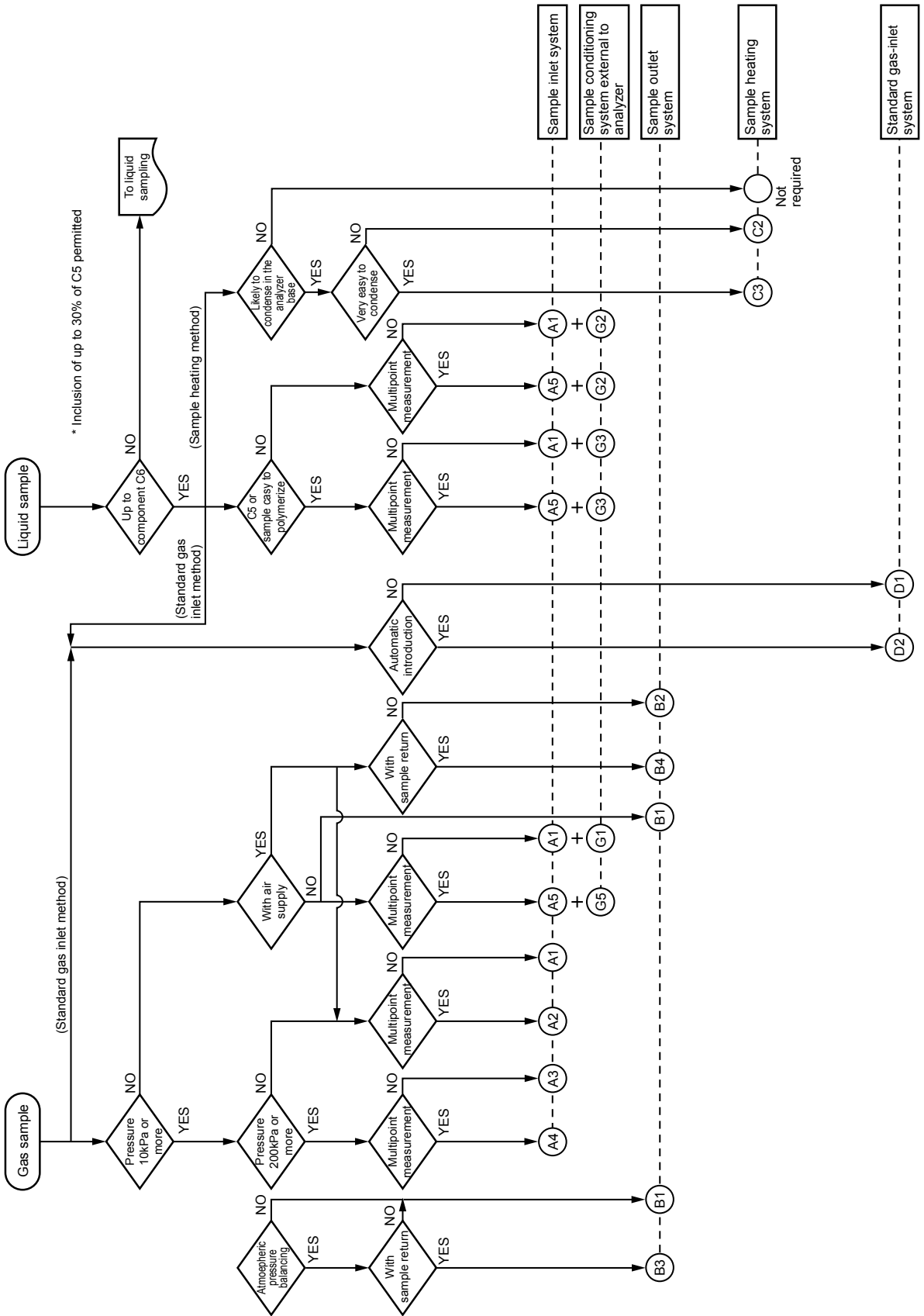
**5.1.2 Limitation of Specifications Related to the Maximum Mountable Number of Air-operation Valves**

Purpose of Air-operation Valve	Number of Mountable Valves
Automatic stream switching (1 to 6 streams) (including standard gas line) *1	1 for 1 stream maximum of 6
Atmospheric pressure balancing	1 for 1 stream maximum of 2

- \*1: • If the number of automatically switched streams exceeds 6, 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 pneumatic signal is outputed by 4-bit or 5-bit binary. A binary to decimals converter is required when you need decimals signal.

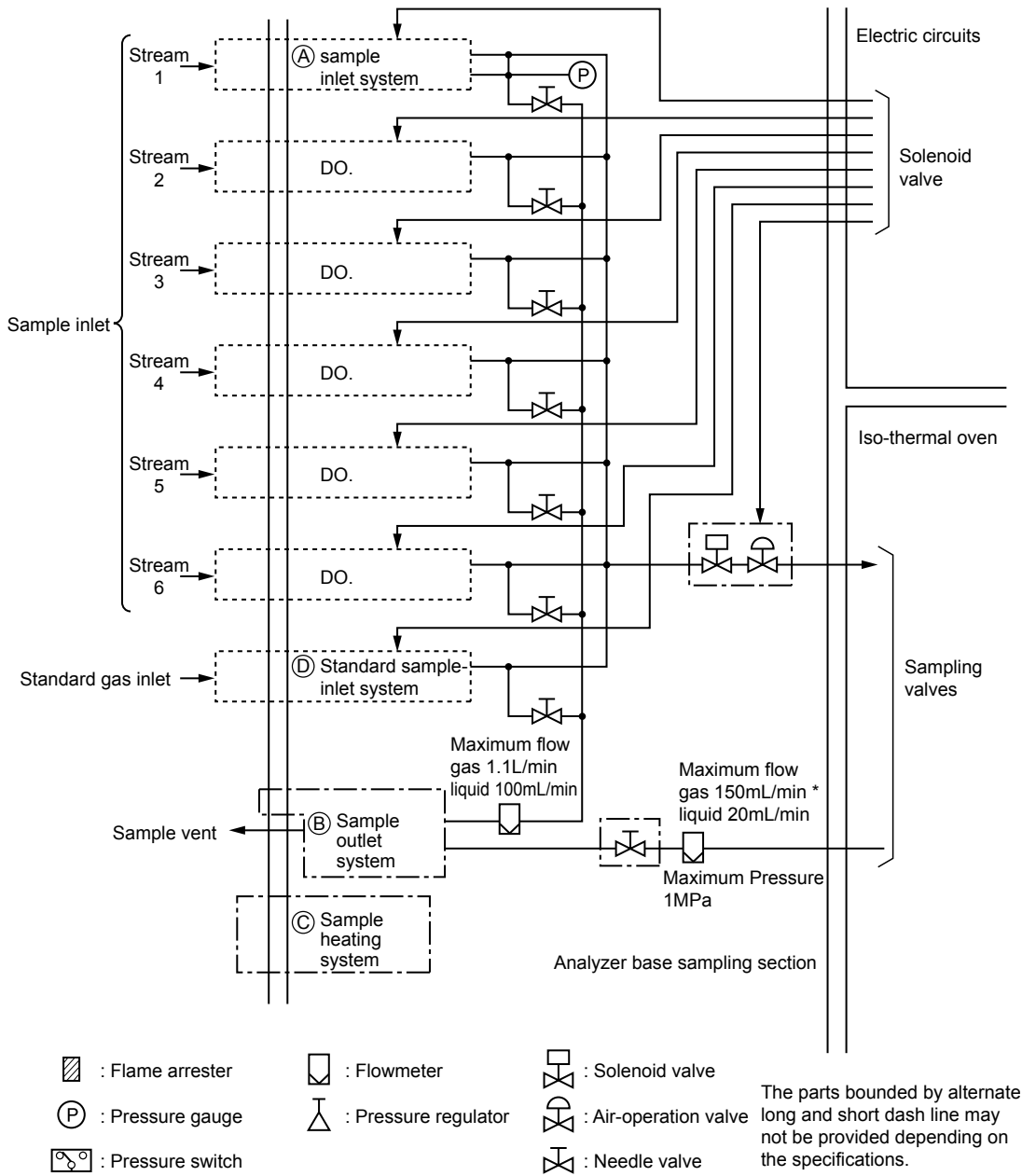
5.2 Flow Selection Diagrams

5.2.1 Gas Sampling





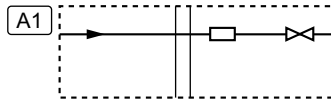
5.3 Sample Flow Diagram



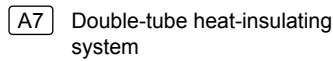
\*: When the sample outlet system is B3, maximum gas flow is 1.1 L/min.

### 5.4 Standard Sampling System

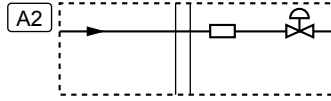
#### A. Sample inlet system



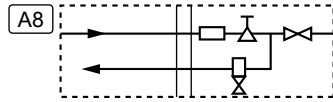
- Manual opening and closing
- 1 stream
- Sample pressure  
10 to 200kPa for a gas  
200 to 500kPa for a liquid



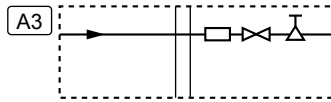
- Double-tube heat-insulating system
- The analyzer base is not used



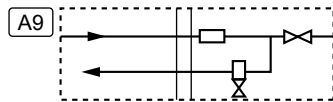
- Automatic opening and closing
- Multi-streams
- Sample pressure  
10 to 200kPa for a gas  
200 to 500kPa for a liquid



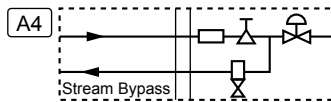
- Manual opening and closing
- Multi-streams
- Sample pressure  
0.2 to 3MPa for both gases and liquids
- Bypass flowmeter scale  
6.6L/min for a gas  
100mL/min for a liquid



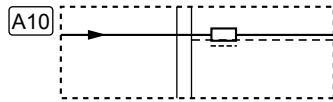
- Manual opening and closing
- 1 stream
- Sample pressure  
0.2 to 3MPa for both gases and liquids



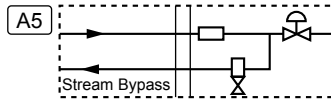
- Manual opening and closing
- 1 stream
- Sample pressure  
9.8 to 196kPa for a gas  
200 to 500kPa for a liquid
- Bypass flowmeter scale  
6.6L/min for a gas  
100mL/min for a liquid



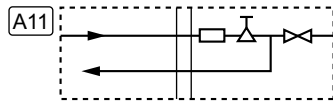
- Automatic opening and closing
- Multi-streams
- Sample pressure  
0.2 to 3MPa for both gases and liquids
- Bypass flowmeter scale  
6.6L/min for a gas  
100mL/min for a liquid



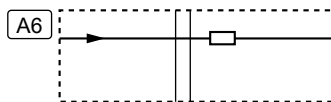
- Remote opening and closing
- In the case of an external sampling system
- With a steam trace



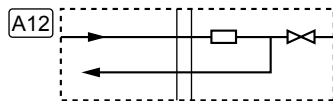
- Automatic opening and closing
- Multi-streams
- Sample pressure  
10 to 200kPa for a gas  
200 to 500kPa for a liquid
- Bypass flowmeter scale  
6.6L/min for a gas  
100mL/min for a liquid



- Manual opening and closing
- 1 stream
- Sample pressure  
0.2 to 3MPa for both gases and liquids

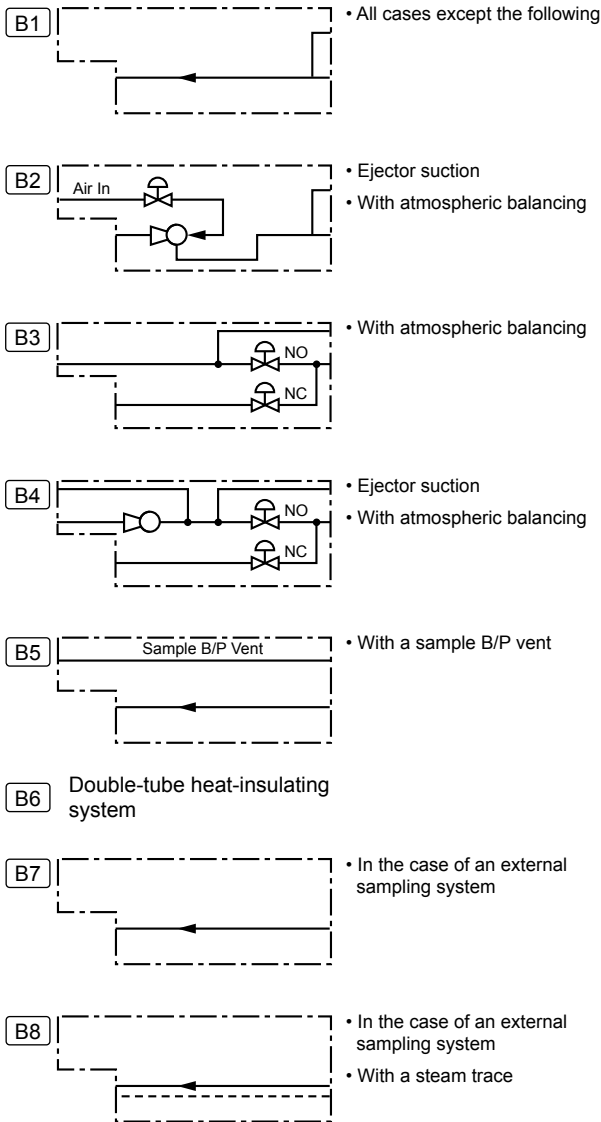


- Remote opening and closing
- In the case of an external sampling system

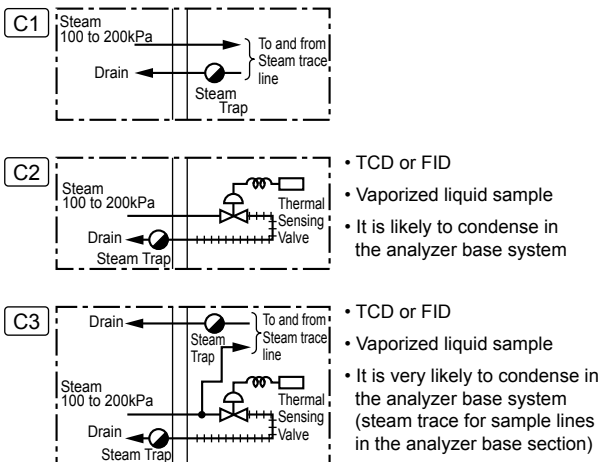


- Manual opening and closing
- 1 stream
- Sample pressure  
10 to 200kPa for a gas  
200 to 500kPa for a liquid

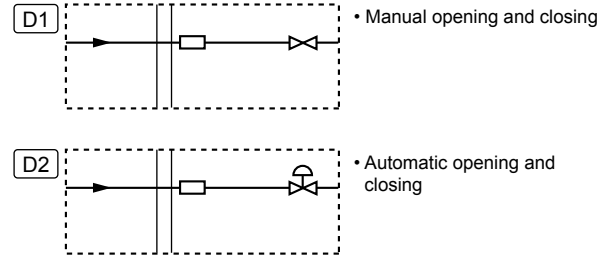
**B. Sample outlet system**



**C. Sample heating system**

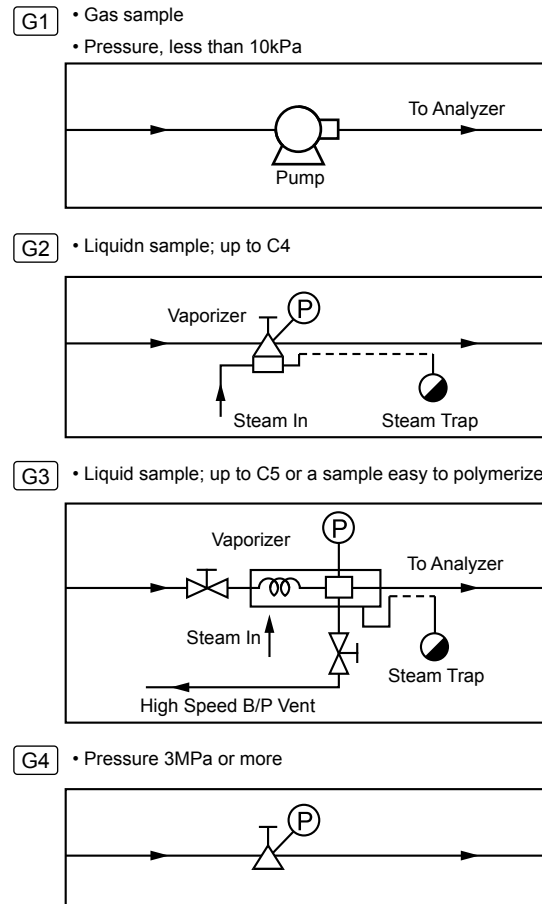


**D. Standard gas inlet system**

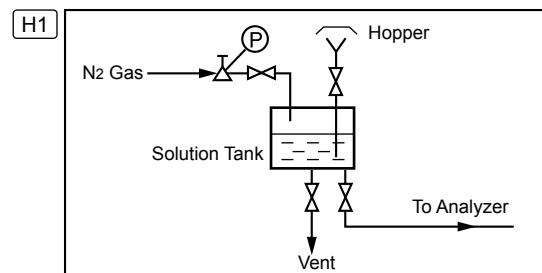


**[Reference]**

**G. Examples of sample-conditioning system outside the analyzer**



**H. Standard solution-introducing system outside the analyzer**



**■ 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:  
 FM  CSA  ATEX  
 NEPSI  TIIS

Number of streams to be measured: \_\_\_\_\_

Number of standard sample streams: \_\_\_\_\_

Carrier gas desired:  
 Any (manufacture's choice)  
 H<sub>2</sub>  N<sub>2</sub>  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: PCAS \_\_\_\_\_ set  
 ASET \_\_\_\_\_ set  
 GCET \_\_\_\_\_ set  
 ASGW \_\_\_\_\_ set  
 ASIU \_\_\_\_\_ set  
 Ethernet

**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 1 set
- 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 \_\_\_\_\_ copies/GC
- 15 Operation data copies \_\_\_\_\_ copies/GC
- 16 Others

### 6. Process Condition and Measuring Range

Please fill out the next form.

Stream Name		Stream No. /				Stream No. /				
		Concentration ( )			Measuring Range ( )	Priority	Concentration ( )			Measuring Range ( )
No.	Component	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, Alkalis, others										
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										
Notes *1: It is needed to fill out not only the measuring components but also all components existed in the sample. *2: The priority stands for the mark as follows. A: MUST, B: Hopefully, C: If possible *3: Please copy and use this sheet when there are more than 3 streams.										