

GAS CHROMATOGRAPH

GC-4000



A Total New Design for Multi Purpose Gas Chromatography

① Inlets

☐ Direct Inlet...For Packed Column

Inlet for packed columns such as Glass Column (O.D.6.2mm) · Stainless Column (O.D.3.18mm).

On-Column style is available for Glass columns to introduce the sample directly into the column inlet port, and special SUS column adaptor is available for Stainless column.

☐ Split/Splitless Inlet...For Capillary Column

Back-Pressure Control Inlet for Capillary column for split/splitless modes.

Easy to change the split proportion as the column flow volume does not change along with the total flow volume.

☐ Direct Inlet with Septum Purge...For Wide Bore Column

Inlet to introduce the sample directly to the wide bore column (I.D.0.53mm)

Less bleeding effect with the Septum Purge function. Also can be used as an On-Column inlet for packed glass column.

☐ Insert Inlet...For Packed Column

Leave the involatile compounds in the sample in the glass insert to prevent the column from the contamination.

Glass column uses Inlet I. Stainless column uses Inlet I with SUS column adaptor (optional)



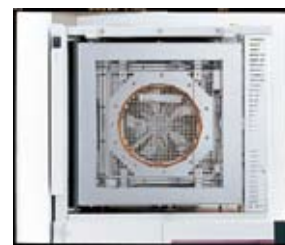
Stability

☐ Reproducibility of Retention Time

Reproducibility of retention time required with capillary column analysis is realized by stable column oven temperature control and carrier gas control. (Company Experiment)

保持時間の日内精度 Temperature 25°C Temperature Rise 10°C/min

	1	2	3	4	5	6	7	8	9	10	平均值	SD	RSD
n-octane	3.452	3.458	3.460	3.461	3.462	3.463	3.462	3.461	3.462	3.461	3.460	0.0032	0.0922
n-decane	6.557	6.564	6.567	6.570	6.572	6.571	6.572	6.569	6.571	6.570	6.568	0.0047	0.0711
1-octanol	7.437	7.446	7.450	7.451	7.453	7.454	7.453	7.451	7.452	7.452	7.450	0.0050	0.0677
2,6-dimethylphenol	7.817	7.825	7.828	7.830	7.831	7.833	7.832	7.831	7.831	7.830	7.829	0.0047	0.0602
2,6-dimethylaniline	8.670	8.677	8.681	8.683	8.685	8.686	8.685	8.683	8.683	8.683	8.682	0.0048	0.0552
n-dodecane	9.678	9.686	9.689	9.691	9.693	9.694	9.692	9.692	9.690	9.692	9.690	0.0047	0.0484
1-dodecanol	10.480	10.489	10.493	10.495	10.497	10.498	10.497	10.495	10.494	10.495	10.493	0.0053	0.0506
n-tridecane	11.119	11.126	11.131	11.133	11.134	11.135	11.135	11.133	11.132	11.133	11.131	0.0050	0.0447
methyl-n-caproate	11.206	11.214	11.218	11.219	11.223	11.223	11.223	11.221	11.220	11.221	11.219	0.0053	0.0471
1-chloronaphthalene	11.822	11.830	11.834	11.836	11.838	11.838	11.837	11.836	11.835	11.836	11.834	0.0049	0.0412
1-dodecanol	13.211	13.218	13.223	13.225	13.227	13.227	13.227	13.225	13.223	13.225	13.223	0.0050	0.0381
n-hexadecane	14.972	14.982	14.986	14.988	14.988	14.990	14.989	14.988	14.987	14.987	14.986	0.0053	0.0352
anthracene	16.741	16.750	16.753	16.756	16.758	16.760	16.757	16.756	16.754	16.756	16.754	0.0054	0.0320
methyl-n-parmitate	18.336	18.348	18.350	18.352	18.355	18.355	18.353	18.353	18.353	18.353	18.351	0.0056	0.0306
n-eicosane	19.252	19.259	19.262	19.266	19.269	19.268	19.264	19.266	19.266	19.268	19.264	0.0052	0.0269



Column Oven

② Column Oven

☐ Temperature Rising Speed

Temperature rising speed is improved for higher temperature setting.

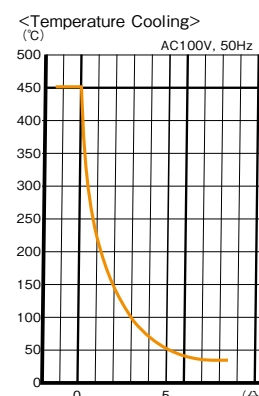
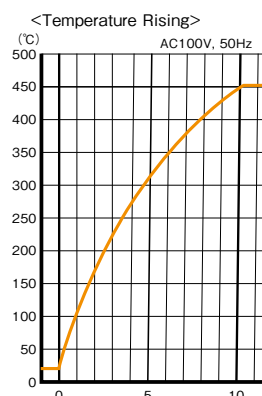
Linear temperature rising rate is 30°C/min up to 300°C and 20°C/min up to 450°C (Company Experiment)

☐ Cooling Time

Improved cooling function cools the column oven in a short time after the high temperature analysis. Improved temperature control function stabilizes the initial analysis temperature in a short time.

☐ Temperature Distributor

Provides favorable temperature distribution required by the capillary column analysis (Company Experiment)



■Detector

Thermal Conductivity Detector (TCD) ③

Auto-Zeo function is now added. A newly built Thermal Conductivity Detector(TCD) is installed in the GC-4000 detector part, and it does not disturb when auto injector or multi injector is installed.

Flame Ionization Detector (FID) ④

Improved rate of S/N between detector and electron meter made a minimum detecting volume 1/2 compared to GL's conventional systems. [5×10⁻¹²] → [2.5×10⁻¹²] (gC/sec, Octan)。

Pulse Discharge Detector (PDD)

Three kinds of modes are available: Electron Capture Detector(ECD) without radiation sources·Helium Ionization Detector(HID) which detects every chemical compounds expect Neon·Photolionization Detector(PID) Modes can be changed by changing the connection between the electro code and cable, and switching of the controller. For ECD mode, dopant gas is required. For PID mode, suitable discharging gas based on the analysis is required)

■Display & Key Board

Large LCD Display ⑤

More information is available by the 20 digits and 4 line LCD. Three colors, green, yellow, and red shows current status.

For better sight and smoother click touch, the silicon rubber key is equipped. It ensures the accurate touch and more efficient operation.



Green:Ready



Red:Error

※Luminescent color of the Back light can be difference than the actual.

Yellow:Not Ready / Busy



■Flow Controllers

Gathered Operating Part

Frequently used operating parts, such as gas controlling valve and gas outlets etc., are gathered at the bottom right.

It prevents the system from the glitch by closing the door.



Example) Flow Controller Operating Part
DSL(F) Specification

■GL Sciences Device Control (Optional)

EZChrom Elite Device Control (GC-4000/AS)

Method Setting

The EZChrom Elite Device Control enables the temperature or detector setting of the GC-4000. It also enables the setting of the auto injector ASI240.

Chromatograph digitally sent by UBS connection

From the GC-4000 to the EZChrom Elite, the chromatograph is sent digitally. EZChrom Elite connecting kit, SS420x is not required.



■Option Instruments

Auto Sample Injector ASI240

The ASI240 is an auto injector for liquid sample with microsyringes. The ASI240 is suitable not only for the sample injection, but also capillary column analysis that requires the injecting reproducibility.

Multi Injector System OPTIC3·DTD/DMI·FOCUS

The Multi Injector System OPTIC3 offers a number of sample introducing methods together with its a various optional devices.



Auto Sample Injector



Multi Injector System

Standard System

(Combinations of the Inlets and detector)

GC-4000 DDT		Direct Inlet×2,TCD
GC-4000 DDF	(F)	Direct Inlet×2 , Differential FID
GC-4000 DDTF	(F)	Direct Inlet ×2,TCD ,Differential FID
GC-4000 DSF		Direct Inlet ×1 ,Split/Splitless Inlet, Single FID
GC-4000 DSTF		Direct Inlet ×1 ,Split/Splitless Inlet,TCD, Single FID
GC-4000 DSF	•D2	Direct Inlet ×1 ,Split/Splitless Inlet,Single FID,HID,PID,ECD
GC-4000 DSF	•D4I	Direct Inlet ×1 ,Split/Splitless Inlet,Single FID,HID,PID
GC-4000 SF		Split/Splitless Inlet ×1 ,Single FID
GC-4000 WF		Direct Inlet with Septum Purge ×1 ,Single FID
GC-4000 IF		Insert Inlet ×1 ,Single FID
GC-4000 S	•D2	Split/Splitless Inlet,HID,PID,ECD
GC-4000 D	•D4I	Direct Inlet,HID,PID

Specification

Column Oven

Type	Forced circulation isothermal air oven
Dimensions	250 (W)×160 (D)×250 (H) mm
Temperature	Room Temperature +5 (inlet&detector @ 300) -450
Range	Use cooling unit for required temperature is below +5
Cooling	450 50 within 6 mins (Room Temperature 20)
Time	The heaters at inlet and detector are OFF
Temperature	Below 0.1 to Ambient Temperature 10
Coefficient	(Ambient Temperature 10~30)
Temperature Accuracy	Setting Temperature (Absolute Temperature) ±1%
Temperature	Within±1%
Deviation	(Coil Diameter 170m m, @ 15 0)
Overheating	1) Observation at the highest temperature
Prevention	(Settable in range of 80~450) 2) Observing circulation by the temperature sensor (Observing temperature fixed at approx 500)

Temperature Program

Rising Levels	5 levels
Temperature Setting	-50~450 (1)
Programming Time	650 min (All Steps)
Temperature Rise	0~99.9 /min (0.1 /min)
Program File Number	30

Body

Electric Source	AC100V±10% 50/60Hz, 20A(SF)~23A(DDTF(F)) *
Dimension	Approx.562 (W)×S20 (D)×450 (H) mm
Weights	Approx.46kg (DSF)

Inlets

Temperature Range	Room Temperature~450 (1)
Overheating Prevention	Observation at the highest temperature (80~450)
Type for packed column	Direct Inlet D
for capillary column	Split/Splitless Inlet S
for wide bore column	Direct Inlet with Septum Purge W
for packed column	Insert Inlet I

* Electric sources vary depending on the combination of the inlets and detectors.
Please contact GL Sciences for the details

Carrier Gas Flow Control

Type	Manual Setting of Mechanical Valve
Primary Pressure Control	Pressure Adjuster (No Pressure Indicator)
Column Flow Volume Control	
For packed Column	Flow Volume Control by Flow Control Valve
For Capillary Column	Pressure Control at the Column Inlet by Back-Pressure Control
For Wide Bore Column	Flow Volume Control by Flow Control Valve
Septum Purge Flow Volume	Flow Volume Control by Flow Control Valve

Flame Ionization Detector (FID)

Type	Voltage applied to nozzle
Sensitivity	0.01Coulomb/g (Cumene)
Minimum Detecting Volume	2.5×10 ⁻¹² g C/s (Octane)
Highest Usable Temperature	450
Overheating Prevention	Observation at the highest temperature (80~450)
Range	10 ⁰ ,10 ¹ ,10 ² ,10 ³ ,10 ⁴
Dynamic Range	10 ⁷

Thermal Conductivity Detector (TCD)

Cell Type	Distribution Type
Element	Rhenium Tungsten Filament (11 Ω, 4 element)
Temperature	~350
Overheating Prevention	Observation at the highest temperature (80~350)
Control Type	Standard provision (x10 amplifier)
Current Setting	0~200mA (with overflow electricity prevention)

Pulse Discharge Detector (PDD)

Sensitivity	10×Range:1.0V/nA, 1×Range:0.1V/nA
Range	10×10nA full scale, 1×100nA full scale
Temperature	400
Dimension	200(W)×300(D)×120(H) mm (Projections excluded)
Weights	Approx.3.1kg
電源	AC100V±10% 50/60Hz, 2A

See single item catalogue for Pulse Discharge Detector (PDD)



For Your Safety

Please read the operation manual thoroughly before trying to operate the GC-4000.

Due to improvements, we reserves the right to change the model names and specifications without notice.
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