

# Glass Tube Oven

Small capacity vacuum heating equipment

**MODEL : GTO-2000**



A glass tube oven is “small capacity vacuum heating equipment” in which high-boiling compounds or small capacity samples can be evaporated, concentrated, dried, or sublimated while heated under a reduced pressure. Because the heating part is made of a glass tube, samples inside can be observed. Glass tube ovens are sometimes called Kugelrohr (German, Kugel (sphere) + Rohr (tube)).

# GTO-2000

## Rotary Heating Type



## Drying Type



### Features

- Two types of models are available; rotary heating type is used for distillation, fractional distillation, and condensation can be performed for small amounts of samples under a reduced pressure and drying type is used to dry samples.
- By using the optional sublimation cooler with the oven, sublimation can be performed for sample purification.
- The glass heating element of the heater is nearly transparent, thereby allowing samples to be observed or monitored.
- Maximum temperature: 350 °C
- Rotation speed: 0 to 60 rpm (rotary heating type)
- As well as the temperature and time settings, temperature programs can be created (9 steps × 9 patterns).
- Since the outside of the heater has a vacuum jacket, the influence of the outer temperature is minimized to enable operation at a high temperature.
- Since the oven has a 0 to 400 mV output function, temperature transition can be recorded.

### Various kinds of experiments can be performed using options.



The product can be used as a sublimation unit by adding the sublimation cooler.



The heater part can be tilted by 45 degrees, which is convenient for drying operation. (Standard feature of the drying type)



By using the infrared ray reflective cylinder, the time to raise the temperature can be reduced.

### Specification

Model GTO-2000

Performance	Model:GTO-2000
Temperature rise time	Approx. 22 min. (Room temperature to 350 °C) *1
Temperature control range	Room temperature + 5 °C to 350 °C
Temperature control accuracy	±1 °C max
Heater capacity	Approx. 200 W
Program	9 steps (1 step: 99 hr., 59 min. and 59sec.) 9 patterns (9 steps per pattern)
Display	LCD (20 digits × 4 lines)/with a backlight
Control system	PID control
Temperature sensor	Platinum resistance thermometer, three-wire system, 100 Ω
Protection circuit	Heater disconnection, heater upper limit alarm, temperature sensor alarm, rotating section alarm (rotary heating type only)
Analog output	0 to 400 mV
Power supply	100 to 240 V AC *3, 50/60 Hz, 3 A (8 A)
Dimensions	295(W) × 285(D) × 330(H) mm (not including protrusions)
Weight	Approx. 10 kg

\*1 This is only used for reference because the temperature rise time is influenced by the ambient temperature.

\*2 Attainable vacuum level differs according to the operating temperature and the pump's performance.

\*3 The cable with a plug provided as standard is only for 100V AC.

#### ■ Rotary heating type

Product code	050600-2001
Product name	GTO-2000 Rotary Heating Type
Operating ambient temperature	5 to 40 °C (no condensation)
Rotation adjustment range	0 to 60 rpm
Attainable vacuum level	1.3 hPa (at 10 rpm)
Motor/drive system	Stepping motor / micro step system
Center joint outer diameter	Approx. 10 mm (diameter)
Rotating seal	PTFE
O-ring seal material	Fluoro rubber (Parfluor)
Sample bulb	10 mL (dia. 42 mm) × 1 pc.
Cooling bulb	Dia. 30 mm × 3 pcs.

#### ■ Drying type

Product code	050600-20002
Product name	GTO-2000 Drying Type
Drying tube capacity/material	Approx.280mL(Dia.41mm×21mm)/borosilicate glass
Attainable vacuum level	1.3 hPa min.
Desiccant flask capacity/material	Approx. 80 mL / borosilicate glass
Material of nut fixing desiccant flask	Poly Phenylene Sulfide (PPS)
O-ring seal material	Fluoro rubber (Viton)

## About Glass Tube Oven

### 1. What is a Glass Tube Oven?

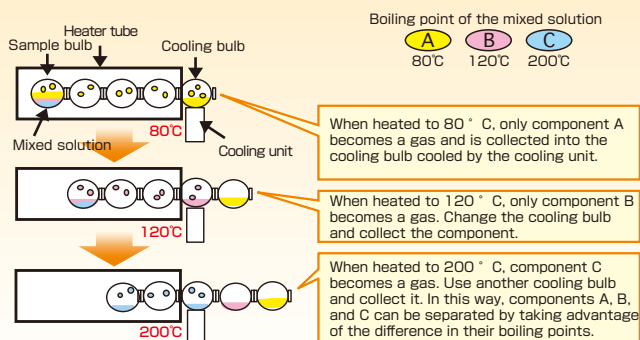
A glass tube oven is "small capacity vacuum heating equipment" in which high-boiling compounds or small capacity samples can be evaporated, concentrated, dried, or sublimated while heated under a reduced pressure. Because the heating part is made of a glass tube, samples inside can be observed. Glass tube ovens are sometimes called Kugelrohr (German, Kugel (sphere) + Rohr (tube)).

### 2. What are Glass Tube Ovens Used for?

Glass tube ovens are mainly used for concentration/drying tests of pharmaceuticals, organic industrial chemicals, dyes, and foods and also for drying highly-hygroscopic desiccant agents. Glass tube ovens can be classified into two types: rotary heating type and drying type.

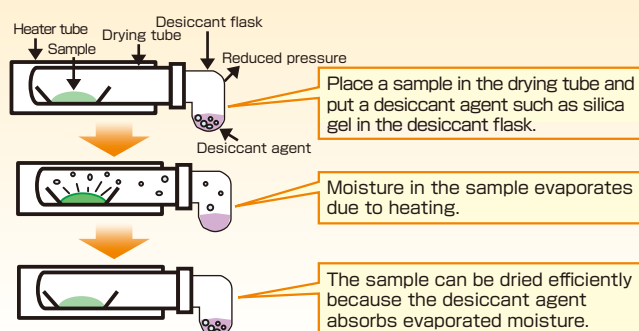
#### What is a Rotary Heating Type?

Sample bulbs containing a sample can be heated while being rotated under a reduced pressure.



#### What is a Drying Type?

Samples in the drying tube can be dried under a reduced pressure.



## "GTO-2000" New Model Glass Tube Oven

### 1. Features

- ① Temperature and time programs (9 steps) and timer (99 hours and 59 minutes) can be set.
- ② Temperature transition can be output to the recorder because the glass oven is equipped with a function for 0 to 400 mV (0 to 400 ° C) analog output.
- ③ A free power supply (100 to 240 V AC) is used.
- ④ Operation can be easily checked because selection can be made on the LC display panel.
- ⑤ Sealing parts are more resistant to organic solvents because PTFE and fluoro rubber (Parfluor) are used.

### 2. Differences from the Previous Model ?

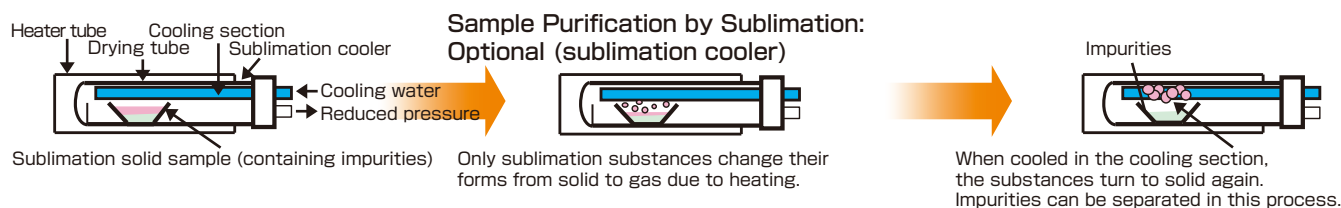
Rotation of the former glass tube oven was fixed or 20 rpm at the maximum. Rotation of the new model is selectable in a range from 0 to 60 rpm. The "vacuum jacket structure," where the outer sheath covers the entire heater part, minimizes the influence of the outside air temperature. The drying type uses an angle-adjustable (up to 45 degrees) Free Lock Block which enables processing of a greater number of samples. By installing a temperature sensor (option), the temperature of the sample bulb or drying tube can be checked. Up to nine patterns (1 pattern consists of 9 steps) of temperature programs can be created.

### 3. Sample Capacity

Rotary heating type: 10 mL, (30 mL, 50 mL are optional); Drying type: 280 mL (drying tube)

### 4. Compatibility with Previous Products

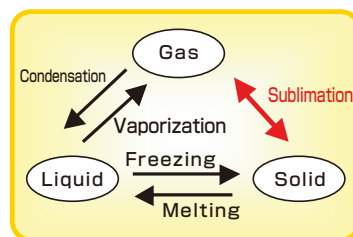
Desiccant flask, drying tube, sample bulb, and sublimation cooler can be used.



### 5. Types of Options and Their Purposes

- Turntable: The left and right sides are reversible. The table can be rotated according to the user's hand dominance or installation site.
- Infrared ray reflective cylinder: The temperature rise time can be reduced by up to 15 % by covering the heater tube.
- Sublimation cooler: Mounting the cooler on the drying type allows sublimation of samples.

#### Three Phases of Matter



## Parts and Accessories

	Code No.	Name of Parts	GTO-2000 Rotary Heating Type	GTO-2000 Drying Type
1	050600-21004	Rotary driving unit	●	
2	050600-21005	Shutter unit	●	
3	050600-210019	Vacuum seal	●	
4	050600-2100191	Vacuum seal PTFE adapter	●	
5	050600-31006	Cooling unit	●	
6	050600-17	Sample bulb, 10mL, $\phi$ 42mm	●	
7	A50600-166	Sample bulb, 30mL	○	
8	A50600-170	Sample bulb, 50mL	○	
9	050600-210016	Cooling bulb, $\phi$ 30mm	●	
10	D50000-835	Cooling bulb, $\phi$ 35mm	○*1	
11	D50000-833	Cooling bulb, $\phi$ 40mm	○*1	
12	050600-210018	Center joint, $\phi$ 10mm	●	
13	A50600-005	Trap for small volume (for 3mL)	○	
14	050600-24001	Free lock block		●
15	050600-21007	Glass part holder		●
16	050600-210013	Desiccant flask		●
17	050600-21008	Drying tube		●
18	012750-1830A	Weighing bottle, $\phi$ 18 x 30mm, 10pcs.		○
19	012750-1825A	Weighing bottle, $\phi$ 18 x 25mm, 10pcs.		○
20	050600-15	Weighing bottle holder for $\phi$ 18mm		●
21	050600-210020	Exhaust adapter		●
22	050600-42	Sublimation cooler	○*2	○
23	050600-23001	Turn table		○
24	050600-23002	Infrared reflecting tube	○	○

● Standard accessories ○ Optional accessories

\*1 It is attachable, however, a heat loss may become large since the size of the joints are different, and open area of shutter becomes large.  
\*2 A glass parts holder is needed to be attached.



3.Vacuum seal



5.Cooling unit



6.Sample bulb, 10mL,  $\phi$ 42mm



9.Cooling bulb,  $\phi$ 30mm



12.Center joint,  $\phi$ 10mm



13.Trap for small volume (for 3mL)



14.Free lock block



15.Glass part holder



16.Desiccant flask



17.Drying tube



20.Weighing bottle holder for  $\phi$ 18mm



21.Exhaust adapter



22.Sublimation cooler



23.Turn table



24.Infrared reflecting tube

Specifications, and appearance described in this document are based on information as of April 5, 2013. They are subject to change without notice for improvement of the product.

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