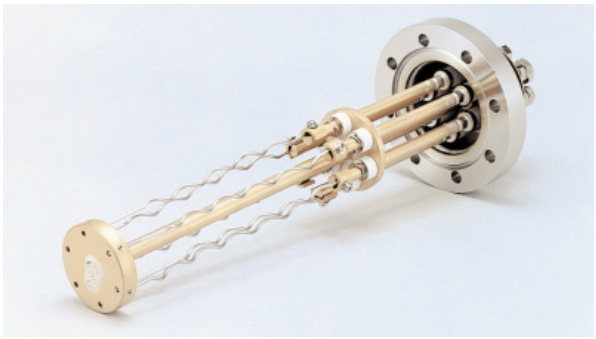
Titanium Getter Pump PGT / GGT Series

PGT-3F



PGT-6F

Titanium getter pumps (PGT/GGT series) pass current directly through titanium alloy placed in a vacuum chamber in order to sublimate the titanium. The sublimated titanium creates a large active metallic surface on the surrounding walls for absorbing and removing chemically active gases (H_2, N_2, O_2, H_2O, CO, CO_2).
Since an active metallic surface made of titanium does not absorb inactive gases (He, Ne, Ar, CH_4, C_2H_6, and other organic gases), these units are used in combination with such equipment as sputter ion pumps and turbo molecular pumps.

Features

- If an absorbing surface of sublimated titanium is selected, a large pumping speed can be obtained and ultimate pressure performance is improved.
- The titanium alloy filaments have a long lifespan. One filament lasts for approximately 75 hours with standard continuous operation (30 seconds of current/60 seconds of rest) and approximately 25 hours with continuous current.
- A knife-edge type metal seal is used in the connection flange. A maximum bake-out temperature of 250 °C is therefore possible.
- Surface treatment for ultra high vacuum conditions has been done on all structural materials.

Specifications

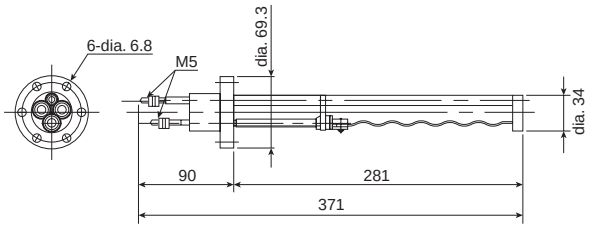
	Item / Model	PGT-3F	PGT-6F
Titanium getter pump	Pumping speed *1	24 $m^3/(s \cdot m^2)$ [20 °C]/64 $m^3/(s \cdot m^2)$ [–196 °C]	
	Applicable pressure range	Ultra high vacuum range of 10^{-1} to 10^{-9} Pa	
	Applicable gases	H_2, N_2, O_2, H_2O, CO, CO_2	
	Inapplicable gases	He, Ne, Ar, CH_4, C_2H_6, other organic gases	
	Leak volume	1.3 x 10^{-11} Pa · m^3/s or less	
	Maximum bakeout temperature	250 °C	
	Power consumption	270 W	
	Filament material	Titanium alloy	
	Filament lifespan	Standard continuous*2 : Approx. 75 hours per filament, continuous current: Approx. 25 hours per filament	
	Number of filament	3	6
	connection flange *3	UFC070-FH	UFC114-FH
	Weight	1.0 kg	2.5 kg
Power source for titanium getter pump	Item / Model	GGT-3	
	Output	Variable AC0 to 6 V, maximum 60 A	
	Control method	ON/OFF control by timer	
	Timer setting range	0.05 seconds to 300hours (for both ON and OFF)	
	Output display	Output current display	
	Output display gradations	Analog display/60A full scale	
	Interlock input	1 point	
	Allowable surrounding temperature	5 to 40 °C	
	voltage/frequency	Single phase AC200 to 220 V, 50/60 Hz selectable Frequency	
	Current	3.5A maximum	
	Weight	12 kg	
	External dimensions (W x D x H) *4	240 x 400 x 150 mm (Not including protruding parts)	
	Accessories: Output cable	Standard 3 m (single prong) x 2	
	Accessories: Input cable	5 m (3 prong) x 1	
	Accessories: Operation manual	1	

*1 Calculated in ultra high vacuum pressure region using nitrogen and a temperature of 20 °C.
*2 Cycle containing 30 seconds of current at 270 W and 60 seconds of rest.
*3 ULVAC standard stainless steel knife-edge metal seal flange
*4 W=Width, D=Depth, H=Height

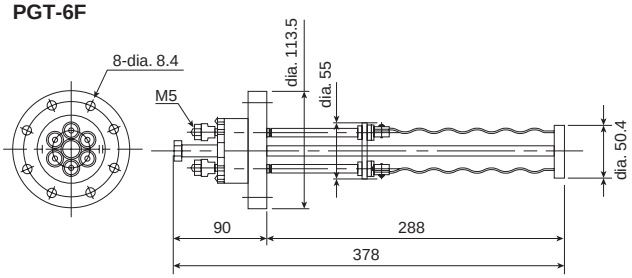
External Dimension Diagram

(unit: mm)

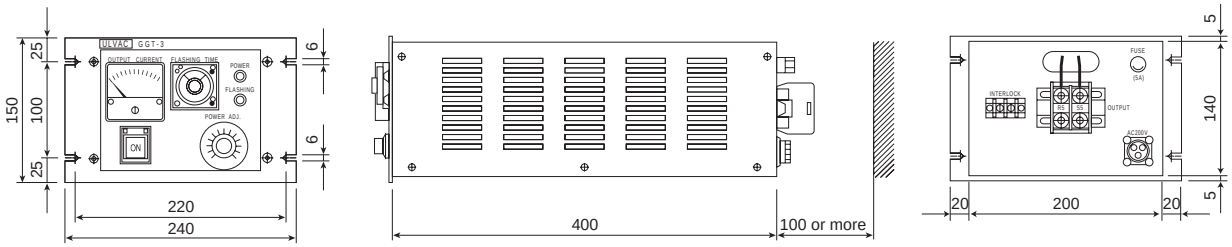
PGT-3F



PGT-6F



GGT-3



- **Pumping speed and pressure**

An example of the relationship between pumping speed and pressure for the titanium getter pump is shown in Fig. 1. The pumping speed is controlled by the conductance of the connected exhaust tube and the getter surface area and is nearly constant at 10^{-5} Pa or less. At 10^{-5} Pa or more the pumping speed varies depending on the pressure region. Since the pumping rate depends on the sublimation rate of the getter material in this range, the sublimation rate must be increased when using large pumping volumes.

The characteristic pumping speeds for various gases, when using a fresh titanium deposition film surface, are shown in Table 1.

- **Filament lifespan**

The number of atoms sublimated due to flushing by a fixed current decreases with each cycle. The quantity of titanium within the filament also decreases. The filament lifespan is defined as the time required to reach a titanium quantity equal to 1/2 of the original quantity. With this definition the filament lifespan is approximately 3000 cycles or 75 hours when used under standard continuous operating conditions (total rest time: 50 hours, total current time: 25 hours).

Table 1: Characteristic Pumping Speeds for Various Gases When Using Fresh Titanium Deposition Film Surface

unit: $m^3/(s \cdot m^2)$

Gas type / Getter surface temperature	H_2	N_2	O_2	CO	CO_2	H_2O	CH_4	Ar	He
Room temperature	24	24	16	48	40	32	N.A.	N.A.	N.A.
Liquid nitrogen temperature	64	64	N.A.	110	92	140	N.A.	N.A.	N.A.

Options

Titanium filament	6/set (for both PGT-3F and 6F)
Electrode cover	Stainless steel
Output cable	5, 10 m
Heat resistant output cable	Cable material: PFA wire Maximum allowable temperature: 250 °C Cable lengths: 3, 5, and 10 m

Pumping Speed Curve

Figure 1