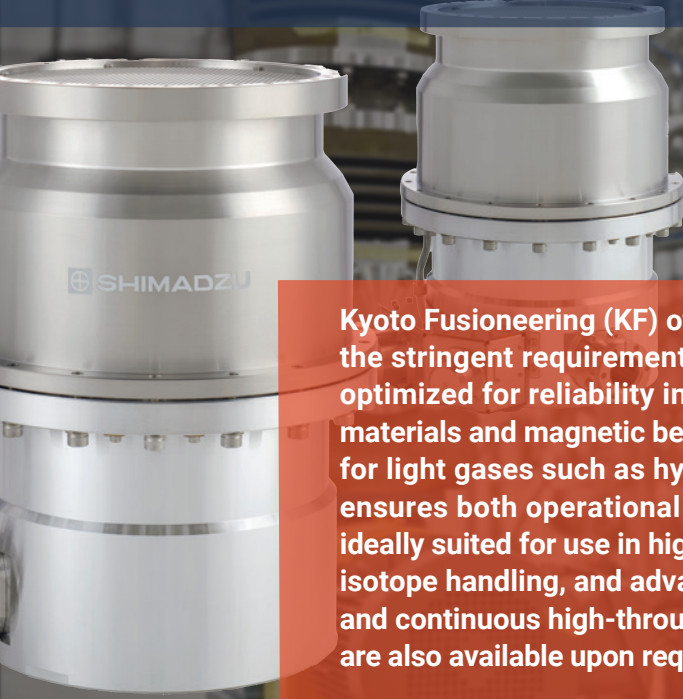


# FUSION FUEL CYCLE KF Turbo Molecular Pump



Kyoto Fusioneering (KF) offers advanced turbo molecular pumps (TMP) designed to meet the stringent requirements of fusion-related applications. Every aspect of the design is optimized for reliability in tritium environments, including the use of tritium-compatible materials and magnetic bearings that enable oil-free operation. High pumping performance for light gases such as hydrogen ( $H_2$ ), combined with rapid startup and high throughput, ensures both operational efficiency and adaptability. These features make KF's pumps ideally suited for use in high-purity, high-demand environments such as tritium processing, isotope handling, and advanced experimental facilities where gas purity, vacuum stability, and continuous high-throughput operation are critical. Pumps without tritium compatibility are also available upon request to meet a broader range of application needs.

## Product Features

### ● Tritium Compatibility

To ensure long-term stability and safety in tritium environments, all materials in contact with the process gas have been selected for tritium resistance. Epoxy-based materials, known to degrade under tritium exposure, have been eliminated from gas-contact components.\*

### ● Oil-Free for Tritium Environments

Our TMP is designed to operate without lubricating oil in the gas-contact and bearing regions. This avoids material degradation caused by tritium exposure, which can lead to mechanical failure, bearing loss, or the generation of contaminated waste. Oil-free operation thus enhances reliability and reduces the production of radioactive waste in tritium-handling systems.

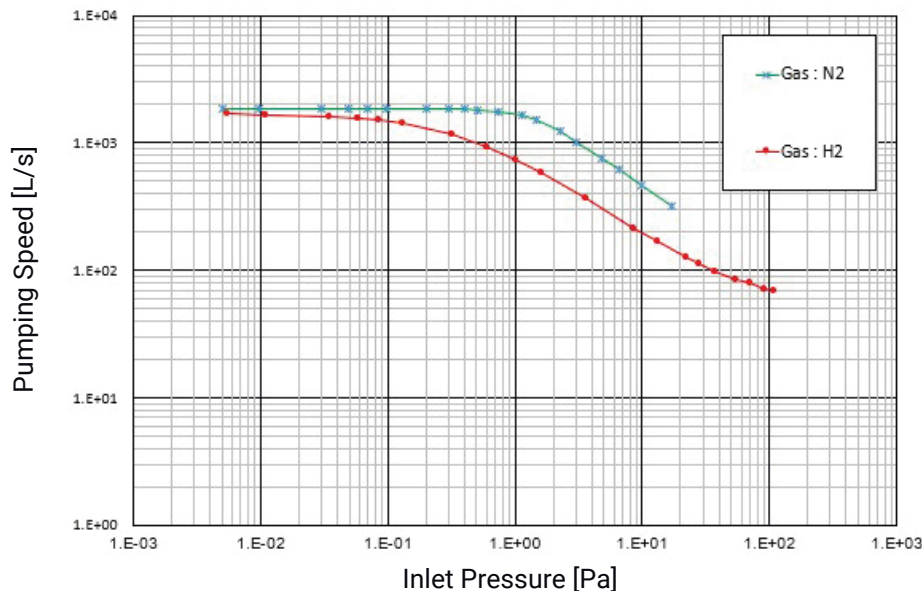
### ● High Pumping Performance for Hydrogen

Our TMP features a drag-type stage that enhances the transport of light molecules, providing excellent pumping capability even for gases such as hydrogen. This makes it well-suited for processes involving tritium or other low-mass gases, where efficient evacuation is essential.

\*This TMP will be tested at UNITY-2, the world first fully integrated commercially relevant fusion fuel cycle test facility to verify its resistance and reliability in a tritium environment.

### ● Operational Efficiency

With a pumping speed of 1,700 L/s ( $H_2$ ) and a startup time of less than 11 minutes, the pump ensures high throughput and quick response, making it ideal for time-sensitive or large-volume gas processing.



## Specification Details

Inlet flange		DN250 CF
Outlet flange		DN40 CF
Cooling method		Water-cooled
Pumping speed without protective net		N <sub>2</sub> : 2000 L/s H <sub>2</sub> : 1600 L/s
Rated speed		27000 rpm
Ultimate pressure (after baking)		10 <sup>-8</sup> Pa order
Maximum allowable inlet pressure (N <sub>2</sub> continuous exhaust)		40 Pa
Maximum allowable outlet pressure		500 Pa
Start-up time		≤11 minutes or less
Vibration level		≤ 0.01 μm (one-sided amplitude)
Noise		≤ 57 dB (A)
Permissible magnetic flux density		Radial direction: 3 mT Axial direction: 15 mT
Cooling water	Flow rate	2 – 4 L/min
	Water pressure	0.2 – 0.5 MPaG
	Water temperature	5 – 25 °C
Power supply	Voltage	Single phase 200–240 VAC (50/60 Hz)
	Max power consumption	1.5 kVA
Communication	Contact input	START / STOP / RESET / LOW SPEED
	Contact output	ROTATION / ACC. / BRAKE / NORMAL / REMOTE / ALARM / WARNING
	Serial interface	Front panel: RS-232C (D-sub 9 pin male, Screw lock size: M2.6) Rear panel: RS-485 (D-sub 9 pin female, Screw lock size: M2.6)
Mass		Pump 80 kg, Power supply 8 kg

## TMP not intended for tritium use

We also offer pumps that are not tritium-compatible.

The following are only a few examples from a wider range of available models.

Model	Description	Inlet Flange	Pumping Speed		Compression Ratio	
			N <sub>2</sub>	H <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>
TMP-5305LMC	World's only mass-produced 5 K TMP	VG400 / ISO400B	5300 L/s	3200 L/s	3×10 <sup>8</sup>	2×10 <sup>3</sup>
TMP-W2404LM	Base model for tritium-compatible TMP	VG250 / ISO250B	2100 L/s	1770 L/s	1×10 <sup>10</sup>	4×10 <sup>4</sup>
TMP-1103LMP	High compression type TMP	ICF253 VG200 / ISO200	1080 L/s	800 L/s	10 <sup>9</sup>	10 <sup>6</sup>
TMP-303LM	Compact TMP	ICF152 VG100 / ISO100C·B	320 L/s	320 L/s	1×10 <sup>9</sup>	10 <sup>4</sup>
TMP-V2304LM	TMP with integrated power supply	VG250 / ISO250B	2100 L/s	—	>10 <sup>8</sup>	9×10 <sup>2</sup>
TMP-B70 (0)	Bearing-type TMP	ICF114 / VG65 / ISO63K / KF40	70 L/s (except for KF40) 41 L/s (for KF40)	49 L/s (except for KF40) 41 L/s (for KF40)	1×10 <sup>9</sup>	4×10 <sup>5</sup>

