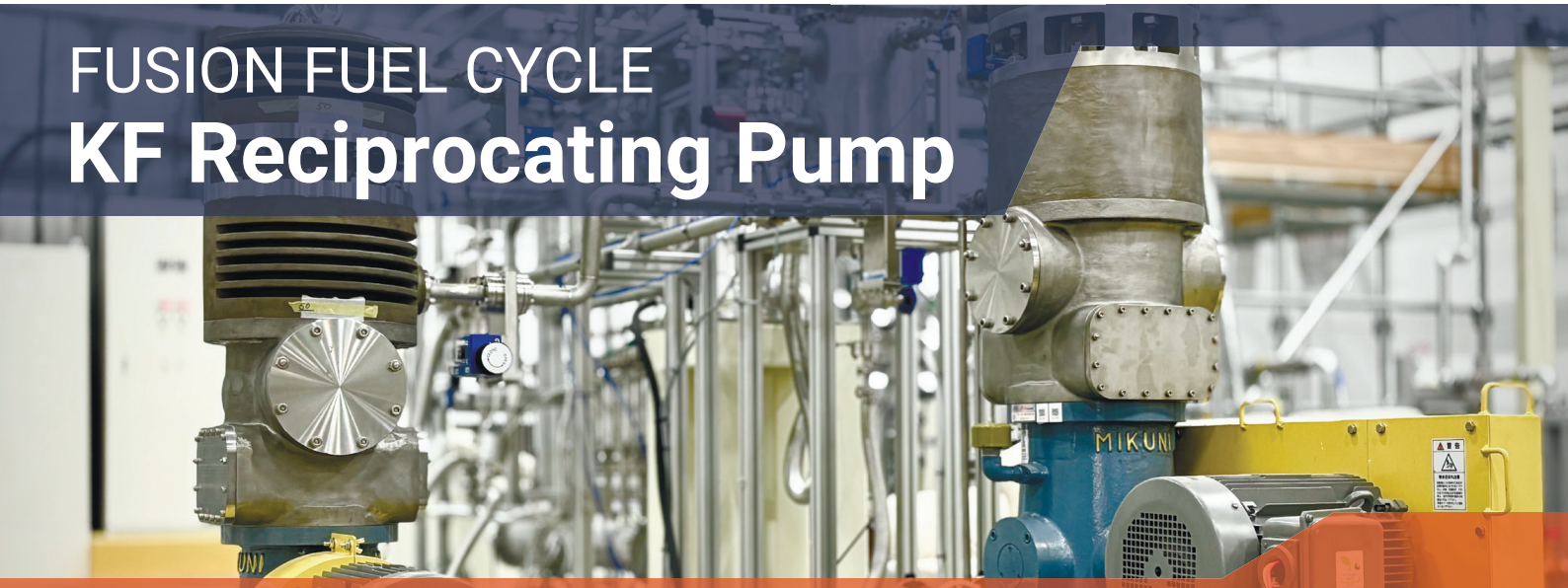
KYOTO FUSIONEERING

FUSION FUEL CYCLE
KF Reciprocating Pump



Kyoto Fusioneering's Reciprocating Pump (KFRP) will provide rough vacuum pumping (about 70 Pa) at the suction side, to pressurize and transfer the tritium containing gas at approximately atmospheric pressure at the delivery side. This new series of KFRP pumps can be used as the main circulation pump of the fusion fuel cycle acting as a transfer pump. Therefore, the KFRP can be regarded as the substitute for the former combination of scroll pumps and metal bellows pumps. It currently comes in three different sizes providing a range of flow rates.

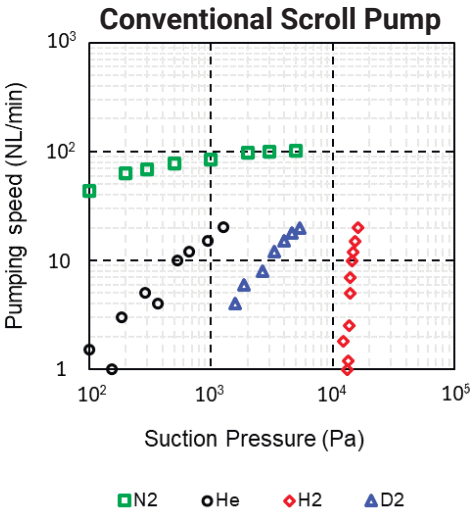
The KFRP is oil-free and has a 4-stage series of compression with a single coaxial piston and a cylinder made of stainless steel. Piston rings made of polyimide-carbon composite provide dry lubrication with minimum clearance.

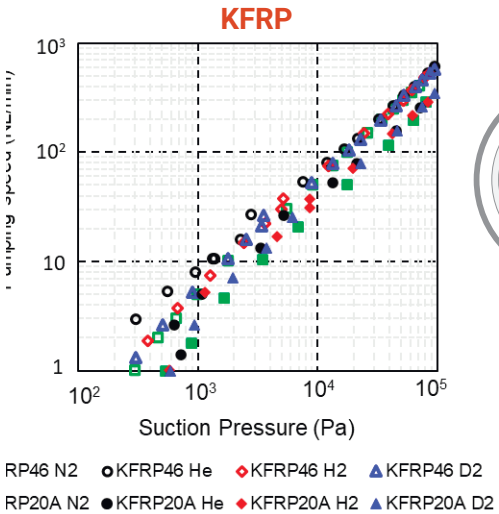
Compatibility of these materials has been confirmed with high concentration of tritium up to 100% for several years duration, based on testing in the previous model; no powder debris was observed after this extended period of operation.

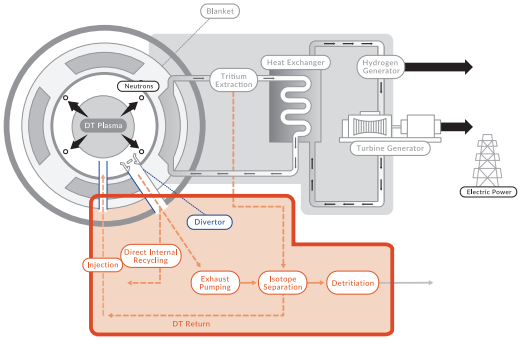
A key advantage of this pump is the small difference observed in performance for different gas species such as hydrogen (H), deuterium (D), tritium (T), helium (He).

Product Index	KFRP46	KFRP20A	KFRP20B*
Pump Type	Reciprocating vacuum pump		
Min Suction Pressure	(N_2) 69 Pa	35 Pa	_*
	(H_2) 150 Pa	206 Pa	_*
Flow Rate at 650 Pa (N_2)	180 NL/h	70 NL/h	50 NL/h
Helium Leak Test	10^{-8} Pa·m³/sec		
Cooling Method	Water cooling	Air cooling	Water cooling*
Power Draw	5.5 kW		
Pump Weight	620 kg	560 kg	480 kg
Nozzle Type	1 inch, JIS B2290	3/4 inch, JIS B2290	
Lead time	About 14 months from the order to delivery		
Remarks	High tritium compatibility almost same performance with different light gas species		

*Under development, subject to change







Kyoto Fusioneering's Fuel Cycle Team

The team is led by world-leading specialists with unique and extensive experience in blanket, divertor, primary loop engineering, and fusion fuel cycles, gained through involvement in the National Institutes for Quantum Science and Technology (QST), ITER, the Tritium Systems Test Assembly (TSTA), EUROfusion, and other institutions.

Building on its proven expertise in the fusion fuel cycle, Kyoto Fusioneering can provide the design of a tritium fuel cycle system as well as its components, including a turbo molecular pump, proton conductor pump, tritium storage, tritium measuring system, isotope separation system, fuel clean-up system, air detritiation system, and water detritiation system.

Prof. Satoshi Konishi - Chief Executive Officer

Co-founded Kyoto Fusioneering in 2019 while serving as a professor at Kyoto University. Holds a Ph.D. in Engineering from the University of Tokyo and has over 40 years of experience in fusion technology, advanced nuclear system design, and tritium engineering, including contributions to TSTA and the ITER project. Spent 22 years at JAERI (now JAEA), 5 years at LANL in the USA, and 5 years leading the ITER TBM Project Steering Committee. Committed to advancing sustainable fusion energy for the harmonious coexistence of humankind and the natural environment.

Dr. Christian Day - Senior Vice President of Plant Technology

Ph.D. in Process Engineering at University of Karlsruhe, Germany. For almost three decades working at Karlsruhe Institute of Technology in all areas of tritium, fueling and vacuum technologies for ITER and other fusion devices. Developed the concept of Direct Internal Recycling to arrive at an attractive reactor scale fuel cycle architecture. Held responsibility for the EUROfusion fuel cycle program for 10 years.

Yoshifumi Kume - Vice President of Plant Technology

Leading fusion fuel cycle and fusion thermal cycle technology development as Co-Head of Plant technology. Previously worked at Mitsubishi Chemical and engaged in heat balance and production management, equipment modification and purchasing. Has led concept design of fusion power plant, including UNITY-1 (Japan) and UNITY-2 (Canada), and develop new components and technology related to fusion thermal and fuel cycle.

Yoshinao Matsunaga – Head of Fuel Cycle Department

Specializes in chemical engineering, previously worked at Mitsubishi Chemical and engaged in an ethylene production plant. Currently, working on R&D for Exhaust Pumping Train, Direct Internal Recycling (DIR), Fuel Clean Up System (FCUS), and other systems, and is spearheading the overall R&D of Kyoto Fusioneering's Fuel Cycle Team.

Tomoya Yokoi – Fuel Cycle Engineer

Expert in the design, construction, and validation of equipment and plants related to Fuel Cycle. Led the commissioning of Japan' s Fuel Cycle research facility and advanced the engineering of UNITY-2. Previously engaged in the construction of large-scale facilities and buildings at Takasago Thermal Engineering Co., Ltd., executing project management. Extensive knowledge of mechanical, electrical, and instrumentation systems.

Reference

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Our Whitepaper

Our Website