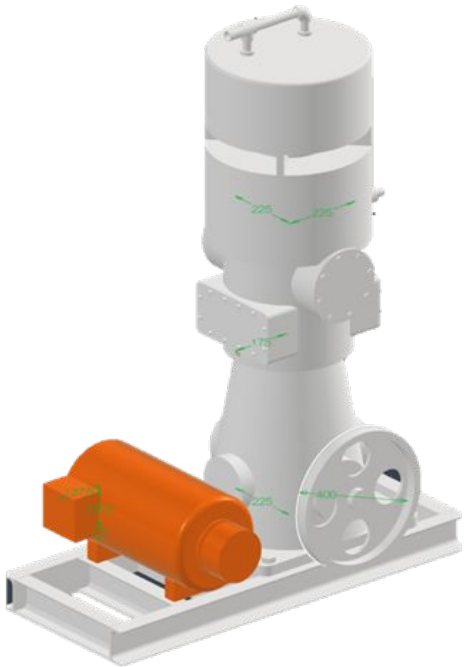
KF Reciprocating Pump (KFRP)

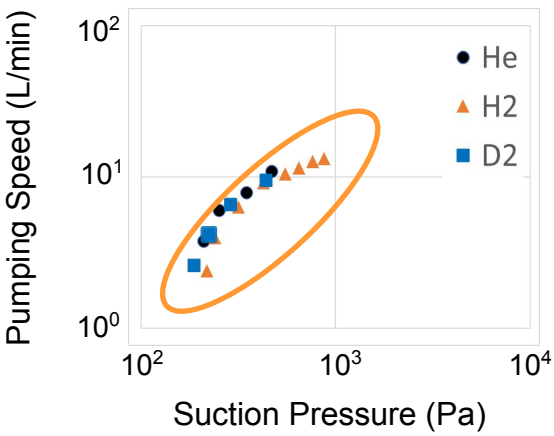
The KFRP will provide rough vacuum pumping (10 Pa) at the suction side, pressurize and transfer the tritium containing gas at approximately atmospheric pressure at the delivery side. This new series of KFRP pumps can be used for the main circulation pump of the fusion fuel cycle as transfer pump. Therefore, the KFRP can be regarded as the substitute of the combination of scroll pumps and metal bellows pumps. It comes in three different sizes providing flow rates for all situations.

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 for the previous model. No powder debris has been observed after the extended period of operation. Another big advantage of this pump is the small difference observed in performance for different gas species (H, D, T, He).

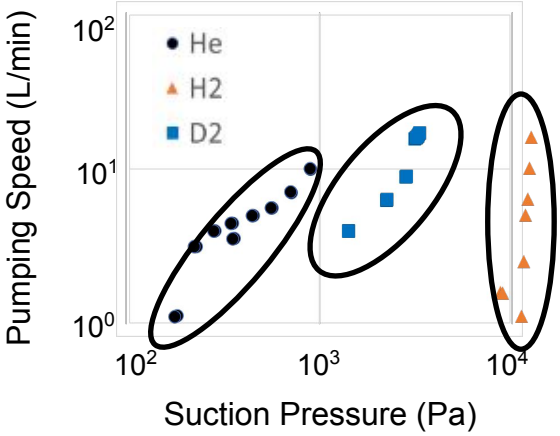
Product Index	KFRP46	KFRP20A	KFRP20B
Pump Type	Reciprocating vacuum pump		
Min Suction Pressure	10 Pa		
Flow Rate (at 650 Pa)	70 NL/h	41 NL/h	29 NL/h
Max Allowable Leak Rate (He)	10^{-8} atm.cc/sec		
Cooling Method	Water cooling		
Power Draw	5.5 kW		
Pump Weight	550 kg	300 kg	250 kg
Nozzle Type	1 inch, JIS B2290		
Leadtime	About 14 months from the order to delivery		
Remarks	High tritium compatibility almost same performance with different light gas species		



KFRP (previous model)



Conventional Scroll Pump

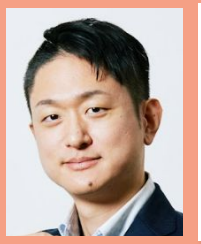


KYOTO FUSIONEERING

KF Plasma Exhaust System Team

Prof. Satoshi Konishi **Chief Fusioneer**

Co-founded KF in 2019 while working as a professor at Kyoto University. PhD in Engineering from the University of Tokyo, has been involved in R&D in fusion technology, advanced nuclear system design and tritium engineering, including on the ITER project, for four decades. Has a lifelong ambition to find a solution for harmonized co-existence of humankind and the natural environment.



Prof. Shutaro Takeda **Chief Strategist**

Co-founded KF in 2019 after finishing his Ph.D. in fusion engineering at Kyoto University. An international award-winning young scientist, currently one of the youngest Associate Professors at Kyushu University and chairs International Programme Advisory Committee for IAEA Fusion Enterprises Workshop. Previous career includes a United Nations officer at the International Atomic Energy Agency (IAEA) for private fusion partnership.

Colin Baus **Head of Plant Technology**

Ph.D. at Large Hadron Collider at CERN on heavy-ion cross sections and astroparticle physics. As co-author of simulation tool CRMC, has deep knowledge in nuclear physics. Held "Chief Quant" position at SBI and CTO position at two start-ups.

Masato Tabuchi **Manager**

Engaged in PWR core designs and development of calculation code at Nuclear Engineering, Ltd.. Received Ph.D. through research on the advancement of computational methods. Specialized in neutron transport calculation.

Yoshifumi Kume **Manager**

Previously worked at Mitsubishi Chemical and engaged in heat balance and production management, equipment modification and purchasing. Later joined Mitsubishi Corp as a crude oil and derivatives trader in Singapore, and moved to London to work on low-carbon business development.

Reference

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- S Konishi *et al.* "Design of tritium collecting system from Lipb and Lipb dropping experiment ." AMER NUCLEAR SOC , Vol. 60, 2011.
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Tritium Fuel Cycle

KF team is led by Satoshi Konishi, who is a world-leading specialist and has unparalleled experience in blanket, divertor and primary loop engineering from involvement at QST, ITER, TSTA and other institutions.

KF team can provide a tritium fuel cycle design itself and components (turbo molecular pump, proton conductors pump, tritium storage, tritium measuring system, isotope separation system, fuel clean-up system, air detritiation system, water detritiation system, etc.).

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