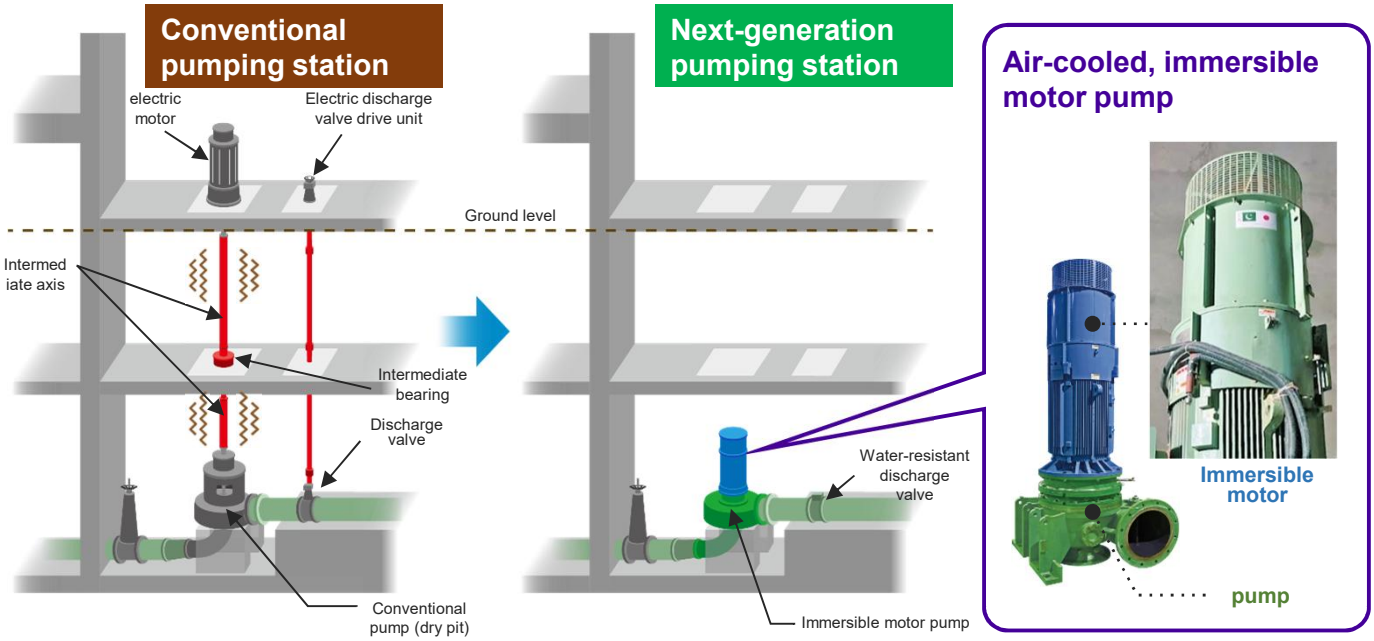
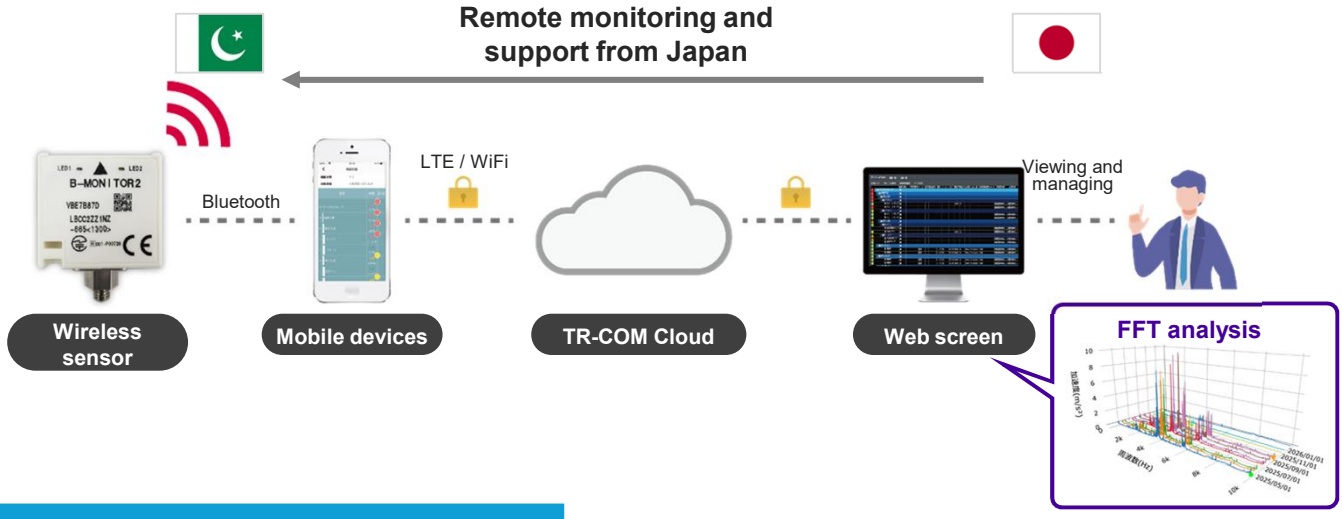
Air-cooled, Immersible motor pump

Implementing organization：Torishima Pump Mfg. Co. Ltd／
Nihon Techno Co. Ltd　Joint Venture.

❶ Air-cooled Immersible motor pump



❷ IoT Vibration and Temperature Monitoring System (TR-COM)



Outline of technology

In conventional pumping stations, it was common practice to install electric motors on the ground or at high elevations to prevent submersion failure. However, this structure resulted in long intermediate shafts connecting the pump and motor, which caused vibrations and noise, and also presented challenges in terms of maintenance, such as lubrication of the intermediate bearings.

❶**The air-cooled, Immersible motor-integrated pump** adopted in this demonstration test can continue operating even in the event of flooding, making it suitable for underground installation. Furthermore, the "air-cooled" technology, which is the core of this project, possesses extremely high heat resistance and cooling capabilities. In addition, ❷**the IoT vibration and temperature monitoring system (TR-COM)** continuously monitors the "vibration" and "ambient temperature" of the bearings, allowing for real-time remote monitoring and confirmation of condition-based maintenance (CBM) effectiveness via mobile devices and PCs, even from within Japan.

Features of the technology

(1)Water resistance

The entire pump has a watertight structure, allowing it to continue draining even in the event of flooding or complete submersion.

(2) Heat resistance performance

Air-cooled systems offer better cooling performance and superior heat resistance compared to water-cooled systems.

(3) Simplification of equipment and cost reduction

This eliminates the need for intermediate shafts and motor mounts that were required in conventional designs. As a result, equipment simplification, improved seismic resistance, and reductions in construction and maintenance costs are possible.

(4) Improved maintainability

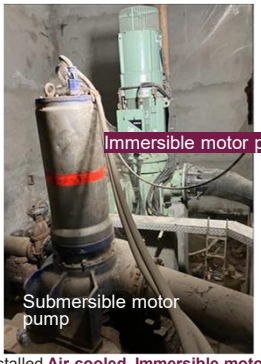
Under normal conditions, the motor is located on the ground (in the air), so there is little concern about insulation degradation, and grease can be injected in the same way as with a normal electric motor, making inspection and maintenance easy.

Specifications

	First-generation water-cooled pump	Next-generation air-cooled pump
Cooling method	Cooling jacket type water cooling	Cooling fan
Pump bore diameter	Maximum φ900*	φ200～800
Motor output	Max 850kW*	～400kW
Motor pole count	4P to 8P*	4P～18P
Outside temperature	**40°C**	**50°C**
Motor efficiency	**89～90%**	**94～95%**
maintenance	OH: Once every 1.5 years	OH: Once every 4 years

*Reference value

Forced cooling by fan



The installed **Air-cooled, Immersible motor pump** (right)
and
Existing water-cooled, Submersible motor pump (left)

Overview of the demonstration

From April 2025 to January 2026, a trial operation will be conducted for approximately 204 days. It was conducted in Multan, Pakistan.
In May and June of 2025, temperatures in Multan will exceed 45°C.
Despite the extremely harsh environment, we were able to use IoT sensors (TR-COM) from Japan.Under remote monitoring, the pump operated stably without any malfunctions.
The results of this demonstration clearly confirm our company's technological capabilities in the following areas.

[Key technological capabilities demonstrated]

Adaptation to harsh environments: High heat resistance and cooling performance ensures stable operation even in high-temperature climates more severe than those in Japan.
Next-generation maintenance management: The effectiveness of remote monitoring and maintenance support utilizing DX and IoT technologies.Long-term reliability: High reliability for environmental adaptation and long-term continuous operation in tropical regions such as South Asia.

WOW TO JAPAN Project
（Wonder Of Wastewater Technology Of JAPAN Project）

Torishima Pump Mfg. Co, Ltd. conducted a demonstration from 2024 to 2025 as part of the Ministry of Land, Infrastructure, Transport and Tourism’s “WOW TO JAPAN Project (Wonder of Wastewater Technology of JAPAN Project).”