



All-inclusive safety & invisible benefits

Industrial pumps securely circulate, or transfer chemical or food raw materials and safety is of utmost importance in advanced and precision production lines or devices. This article examines the “all-inclusive safety” of Sanwa’s MP stainless steel magnetic drive pump series.

With its performance range up to 15 kW, the flagship MP series heads the SANWA stainless steel magnetic drive pumps’ product line-up. As their fundamentals, the pump parts that contact with the pumping liquid, such as the pump casing and impeller, are made of robust stainless steel, which has excellent corrosion resistance and integrity, and yet has resistance to a wide range of temperatures.

With space saver configuration made possible by driving the C-face motor through the closed and compact magnet coupling design, they are designed to facilitate precise liquid transfer/circulation for the applications of low flow, high lift, high and low temperature applications without any cooling water. High efficiencies, low motor power optimisation, low NPSHreq,

long meantime between failures (MTBF) are also highlighted characteristics of the pump.

Not only organic solvents, which are difficult to pump without a leak, but also inorganic acids such as sulphuric acid and caustic soda, inorganic alkalis, and ultrapure water can be usually pumped. In addition, since they have a wide temperature range specs (-80°C to +280°C), they are appropriate for incorporating various devices that use heat media or refrigerants.

As high-value-added industrial pumps, they are used in any manufacturing situations where high environmental and hygienic performance and functionality are required, and where liquid leakage is not allowed.

Discussed below are the default safety standard features of the MP series.

1. High lubrication, low wear submersible bearings (SiC-D). In Sanwa’s magnetic drive

pumps, the structural design and quality of the submerged bearings that support the rotating body are at the heart of safety measures. Sanwa is the first in the world to use silicon carbide (SiC) bearing for the pumps and has done since the 1980s. It has high hardness, excellent heat resistance and corrosion resistance, as the submersible bearing material. However, SiC has high thermal conductivity and transfers a lot of frictional heat generated during high-speed rotation, which may lead to troubles during accidental dry operation. The solution to this problem is the SiC-D bearing that is a default standard part of the MP series.

SiC-D are the submerged bearings with a special coating that has low frictional resistance on the conventional SiC bearings. By using SiC-D bearings, the pumps drastically improve their lubricity, stable rotation, and

Customer comment 1

"Using these pumps saved water and they were easy to maintain. 'Save Water' is part of our corporate philosophy."

Meet "SANWA PUMP" at AICHEMA 2022

Sanwa will be exhibiting its "MP series" at AICHEMA 2022, 4 – 8 April at Frankfurt am Main, Germany. The company will be pleased to meet attendees at their booth **Number L69 in Hall No.8**



Coefficient of static friction (μ)	
Material : SiC	Material : SiC-D
0.391	0.099

Figure 1. Data of friction.

Gas/liquid mixed Operation (Continuity observed)	
Material : SiC	Material : SiC-D
✗ after 10 min	○ for 60 min run

Figure 2. Gas-liquid mixing operation.

DRY-RUN operation (Continuity observed)	
Material : SiC	Material : SiC-D
45 sec to stop	1hr45min still runs

Figure 3. Duration comparison of DRY-RUN operation.

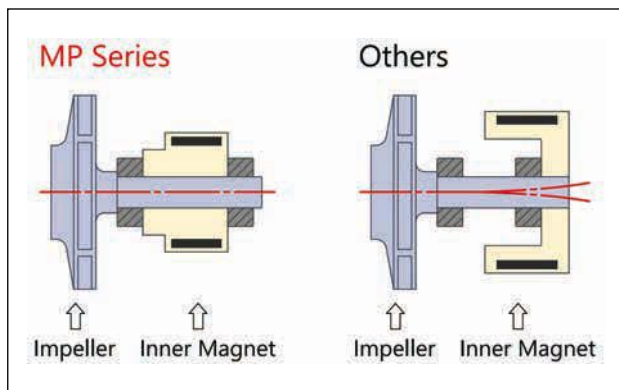
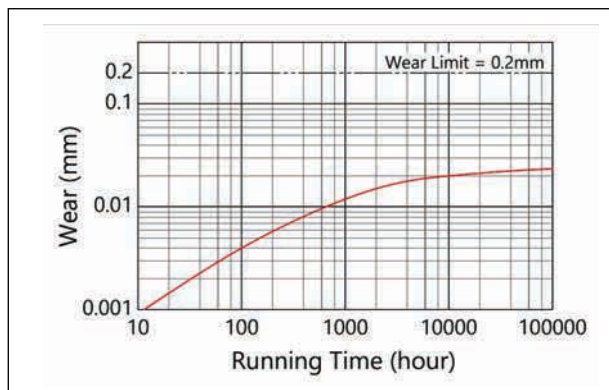
low wear levels. Figure 1 shows the coefficient of static friction under dry conditions. SiC-D bearings have 1/4 of the frictional resistance of conventional SiC bearings.

The results of comparative tests in gas-liquid mixing operation can be seen in Figure 2. The SiC-D bearings were in good condition even over 60 minutes of continuous operation. The results of comparative tests in dry operation are illustrated in Figure 3. Whereas conventional SiC bearings broke in less than a minute, SiC-D bearings did not break after an hour of dry operation. It is effective for dry operation problems at the initial stage of pump operation and extends the life of the pump.

2. Durability and compactness by means of front and rear two bearing structure. Differing

from the cantilever structure of the other pumps (Figure 4), the MP series uses two pairs of front and rear bearing structures. By sandwiching the magnet coupling between the front and rear bearings and firmly holding the rotating body, defective rotation is greatly suppressed. In addition, the bearing can be made smaller in diameter, which has the advantage of reducing friction loss.

The amount of wear of the submersible bearing is illustrated in Figure 5. The amount of wear may be seen levelled-off after a certain period of operation, and thus the life of the pump thereafter will last longer. As a durability test, after several thousand hours of continuous operation, an ON-OFF test was conducted more than 100,000 times, and as a result, the amount

**Figure 4.** A structure of cantilever and front and rear to compare.**Figure 5.** Bearing wear.

Customer comment 2

“The MP series pump’s performance is smooth and steady. The pump requires little maintenance and can be cleaned every day. This is different from other pumps where disassembly and cleaning is a long process.”

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of wear of the bearing was 0.01 mm or less. This result shows the synergistic effect of the above-mentioned front and rear two bearing structure and the high lubricity and low friction of the SiC-D bearing.

3. Only one seal structure that never leaks.

It is necessary to pay close attention to the seal part during maintenance of a pump, but while many magnet pumps use two or more seal parts, the MP series simply seals at only one place (Figure 6). Furthermore, it is not necessary to pay attention to multiple places, and maintainability is improved. In addition, except for the seal part, it is made of strong stainless steel and sealed by a container without welded parts, so there is no risk of liquid leakage structurally.

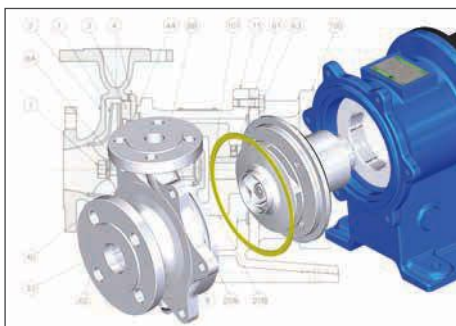


Figure 6. A design structure of one seal.

4. The building block structure making maintenance easy.

The MP series is designed with a simple building block structure and features a small number of parts (Figure 7). They can be easily disassembled, cleaned, and reassembled in a short time without the need for skilled workers or special tools for maintenance.

5. Originally designed rare-earth magnet coupling

Rare earth magnets are used for the magnets to realise a high torque and compact magnet coupling design. Furthermore, a wide range of magnets can be supported by selecting Neodymium magnets (Nd) and Samarium-Cobalt magnets (SmCo) according to the specified temperature of the liquid.

6. Pump by pump quality controls & cares.

Many pump manufacturers will probably perform performance tests using actual liquids such as water before shipping. Sanwa also carries out such tests before shipping, but after the pre-shipping tests, the company can carry out overhauls with wiping one pump by one. This is done to prevent the water used in the test from reacting with the customer fluid after delivery. After reassembly, an airtight inspection is carried out to provide customers with the highest quality possible. ☺

Customer comment 3

“Sanwa pumps are trouble-free. It is important that the liquid handling process is problem-free in the pursuit of producing quality gin.”



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Figure 7. Parts' consolidation.

ABOUT THE AUTHOR

This article was supplied by the Sanwa Hydrotech Corporation, a Japanese company founded 87 years ago in 1934 which initially produced stainless cast steel products, pumps, and valves. In 1983, Sanwa commenced the development of a completely leak-free stainless steel magnet pump that does not require a shaft seal and began deliveries in Japan. Sales to the US started in 1985, and the company now has regional sales in Europe, Asia and South America. To date, cumulative worldwide shipments have exceeded 120,000 units. www.sanwapump.com