

<BR-500L Magnetic Drive Reactor>

Instructions

Zhengzhou Keda Machinery and Instrument Equipment Co., Ltd.

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Catalogue

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A. Product Characteristics and Applications

Magnetic drive agitator is a new type of agitator developed in recent years after "packing seal" and "mechanical seal". Its main characteristics are changing "dynamic seal" to "static seal", no leakage, and it is the best equipment for toxic, harmful, flammable and explosive materials in chemical industry.

B. the key technical indexes

For detailed specifications, please refer to the product certificate and the magnetic drive nameplate.

nominal capacity	500L	total volume	550L
design pressure	4.5MPa	design temperature	200°C
working pressure	4.0MPa	working temperature	100°C
material quality	S31603+Q345R	heating power	/
Heating method	external circulation of thermal oil	temperature control accuracy	/
speed of agitator	0~300r/min	any power-generating or power-driven machine	7.5KW
driving mode	magnetic coupling	stirring method	high efficiency self-priming
Total height of the equipment	3300mm	gross weight of equipment	2200Kg

C. Construction and Working Principle

The magnetic drive stirred reactor is mainly composed of a motor, a reducer, a

water jacket, a sealed cylinder, and a support body.

The system consists of an outer magnetic steel body, an inner magnetic steel body, upper and lower stirring shafts, a paddle, a reactor body, and a control box (as shown in the figure).

The motor and reducer are mounted on the upper part of the water jacket, while the outer magnet is installed on the motor and reducer via the rotary assembly.

The upper inner magnetic steel body is mounted on the shaft of the support body and enclosed by a sealed cylinder. The lower end of the upper shaft is in contact with the lower shaft.

The coupling is integrated as a single unit. The motor and reducer drive the outer magnet body to rotate, transmitting motion through magnetic coupling to the assembly.

The inner magnetic steel body inside the sealed cylinder rotates, with its shaft coupled to the stirring shaft via a coupling.

Stir the material. Since the inner magnetic steel body and stirring shaft are installed inside the sealed cover, and the sealed cylinder is connected to the reactor...

The plane between the components can be secured by metal-graphite gaskets and bolts, fundamentally altering the interaction between the agitator shaft and the reactor vessel.

The dynamic seal is replaced by static seal, which can prevent leakage under high temperature and high pressure.

The reactor vessel is equipped with a pressure gauge and a safety rupture device, an inlet (liquid) valve, a sampling (discharge) valve, a cooling water pipe fitting, and a platinum resistance temperature sensor socket. The safety rupture device is typically

preconfigured with a specified operating pressure at the time of purchase. If the user exceeds the specified pressure during operation, the device will release pressure to protect other load-bearing components.

D. Installation and Use

1. As required, assemble the stirrer with the reactor vessel. Lubricate the reducer.
2. The grease filling port on the support body is sealed with special grease filling joint.
3. Open the motor fan cover and manually rotate the wheel to check for any abnormalities.

※ Important Note ※ Before turning the pot, check whether there are any fixed pull rods at the bottom of the pot. If

The fixed pull rod is removed.

4. Connect the motor to the control box and power supply. After confirming all connections are correct, power on the motor and test its rotation direction. (The mixing paddle must rotate clockwise.)
5. Connect all cooling water inlet and outlet pipes to ensure unobstructed flow. Regulate the cooling water volume and prohibit water overflow at the outlet pipe. (Recommendation: Connect the outlet with a transparent tube for observing water flow velocity)

※ Important Note ※ If the material in the pot is prone to volatilization and crystallization, a heat source must be supplied to the lower bearing to prevent damage from crystallization grains.

As per user specifications, some configurations require an electric control box to regulate both temperature and stirring speed within the reactor. The temperature control system typically incorporates a PID controller, with settings and feedback

adjustments following the manufacturer's manual or our factory's technicians' procedures. For speed regulation, a frequency converter adjusts the power supply frequency to achieve stepless speed control. Detailed operational instructions are provided in the manual or through our technicians' guidance.

6. The reactor is approved for factory release after passing the gas tightness test and hydraulic test.
7. The installation location must comply with the explosion-proof technical requirements for pressure vessels. It is not permitted to install it in combination with other instruments and equipment. When multiple reactors are installed simultaneously, there must be an explosion-proof partition wall between them. The operation room must have a direct passage to the outdoors, and the indoor ventilation must be maintained.
8. The newly installed reactor (or the repaired reactor) must undergo the following preparatory work before use:
 - (1) Inspect all pipe fittings and fasteners for looseness and ensure they are securely tightened, then close the valve.
 - (2) Connect the wiring according to the control instrument manual, verify all instruments are functioning properly, and install grounding wires at bolted connections on the main unit.
 - (3) Air-tightness test: Introduce nitrogen or other inert gases through the air valve at an experimental pressure of 1.15 times the working pressure. Continue increasing the pressure, with each stage maintained for 5 minutes. After reaching the test

pressure, maintain the pressure for 30 minutes. If leakage is detected, reduce the pressure for repair before repeating the test.

(4) Prior to trial operation, the inlet and outlet pipes of the cooling water jacket beneath the agitator must be properly connected. Conduct a temperature and pressure test with a heating rate not exceeding 80°C/hour.

(5) Normal operation: Reactants may be added only after all checks are completed, and the reaction shall proceed according to the specified process.

(6) Lid Opening, Cleaning, and Installation: To open the lid, first cool the reactor to room temperature and release pressure. Use a wrench to evenly loosen the nut, remove the lid, and place it on the stand for internal cleaning. For cleaning the reactor's inner walls and component surfaces, use liquid immersion based on the chemical reaction of the materials. Avoid using hard metal scrapers to prevent surface damage.

E. matters need attention

1、 When installing or removing the nut connecting the agitator and the pot cover, the force must be applied symmetrically and evenly. It is absolutely prohibited to tighten or loosen a nut in one go.

※Note※: To prevent bolts and nuts from seizing or rusting, apply rust-proof grease to the threaded parts.

2. The inlet and outlet pipes of the mixer cooling system must never be blocked or broken. The outlet water temperature should be maintained below 60°C. If the temperature exceeds this limit, the water supply flow rate may be moderately increased, but it must not be excessively high. Prolonged water discharge from

the overflow port is strictly prohibited to prevent the water jacket level from rising due to insufficient flow, which could corrode the coupling bearing or enter the motor and reducer.

3、 The key parameters of the mixer (maximum working pressure, maximum working temperature, and maximum stirring speed) are clearly marked on the label. Strictly avoid exceeding the specified operating range during use.

4. Under any circumstances, no repair, disassembly or tightening work shall be performed when pressure is present in the reactor.

※Note※: For mixers with high torque or rotational speed, direct startup is not permitted.

The inverter controls the motor to start slowly from low speed and then to normal operation.

5. Periodically inspect all components and fasteners for looseness and tighten them as needed.

6. Special attention should be given to lubricating and maintaining the upper and lower bearings of the mixer and the reducer. Since the inner magnetic steel bearings are housed within the sealed cylinder, both upper and lower bearings are pre-lubricated with "high-temperature grease" before leaving the factory. Additionally, grease filling ports for the upper and lower bearings are provided on the support flange. Oil should be added every 72 hours or so during continuous operation. When adding lubricating oil, the cover must be opened only after depressurizing the reactor. Use an oil gun and a dedicated oil filler to apply "high-temperature grease," with each application amounting to approximately 3–4g (Note: The grease's operating temperature is $\geq 300^{\circ}\text{C}$).

Under prolonged use or extended disuse, bearings may experience wear or corrosion. Therefore, users are advised to maintain proper care. Damaged bearings should be replaced promptly. Alternatively, specialized inspection, maintenance, or replacement of bearings should be performed during scheduled maintenance intervals.

***Important Note:* Do not operate the mixer with an empty vehicle.**

If organic solvents are present in the reaction materials and can dissolve the grease washed off, then

Increase the frequency or amount of oil injection to prevent the bearing from running without oil lubrication and causing damage.

7、 If abnormal noises are detected during operation, immediately stop the machine for inspection. Do not operate with faults to prevent aggravating damage to critical components inside the mixer.

8、 The stirring speed is regulated via a frequency converter, which must operate at a minimum frequency of 20Hz to prevent motor damage or overheating caused by insufficient cooling due to the fan's low speed.

9. ✖ Important Note ✖: After connecting the upper and lower shafts, the lower shaft end must not be left in a horizontal cantilever state if it is not secured.

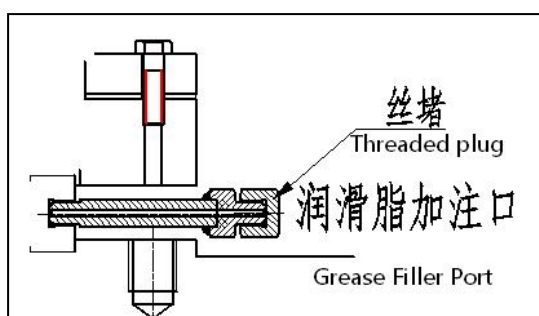
F. Common Faults and Troubleshooting

fault phenomenon	failure cause	elimination method
Abnormal vibration	1. The feeding speed is too fast.	Feed the material at the specified speed.

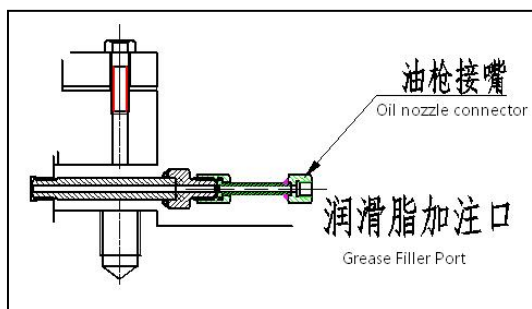
	2. Whether the bracket or component connections are secure.	fastening 。
	3. Whether to run the engine after long-term idling before starting it.	Check the car before driving.
	4. Bearing wear after long-term use.	Stop the train for maintenance and replace the bearing.
Abnormal sounds	1. Check for oil depletion and wear in bearings or reducers.	Fill the specified lubricating oil in time.
	2. Is the cooling water level too high? (Long-term overflow from the overflow pipe)	Adjust the cooling water flow appropriately to prevent overflow. Then check if the bearing needs replacement.
	3. Bearing wear after long-term use.	Stop the train for maintenance and replace the bearing.
	4. The inner magnetic steel is deformed and fails after long-term use.	Check the condition of the internal magnet and replace it if necessary.
	5. The water quality of cooling water is poor, which causes corrosion of the outer magnetic steel.	Adjust the cooling water usage and replace the external magnet when necessary.
	6. When the machine is stopped for a long time, the outer magnet is not isolated from water vapor, which leads to corrosion.	When the external magnet is in long-term idle, it should be treated for corrosion.
Run out of sync	1. Check whether the cooling water is cut off, which may cause the magnetic steel temperature to be too high and	Adjust the water volume and replace the magnet when necessary.

	demagnetize.	
	2. The water quality of cooling water is poor, which causes corrosion of the outer magnetic steel.	Adjust the cooling water usage and replace the external magnet when necessary.
	3. The inner magnetic steel is invalid after long-term use.	Inspect the inner magnet and replace it if necessary.
	4. High-speed start-up or greater material resistance.	Check the resistance of the turntable and start the low-speed variable frequency drive.
	5. When the machine is stopped for a long time, the outer magnet is not isolated from the water vapor, which leads to corrosion.	When the external magnet is in long-term idle, it should be treated for corrosion.

G.Operation diagram of lubricating oil filling



The diagram shows the mixer's operational state. The threaded plug must be installed and securely fastened.



The diagram shows the maintenance procedure for the mixer: first, attach the oil gun nozzle, then connect the oil gun to inject grease.

If the fuel nozzle is connected to the fuel inlet before the reactor starts, pressurized fueling can be performed without stopping the reactor.

四、 Schematic Diagram of Reactor and Magnetic Head (Including Model) Bearing

