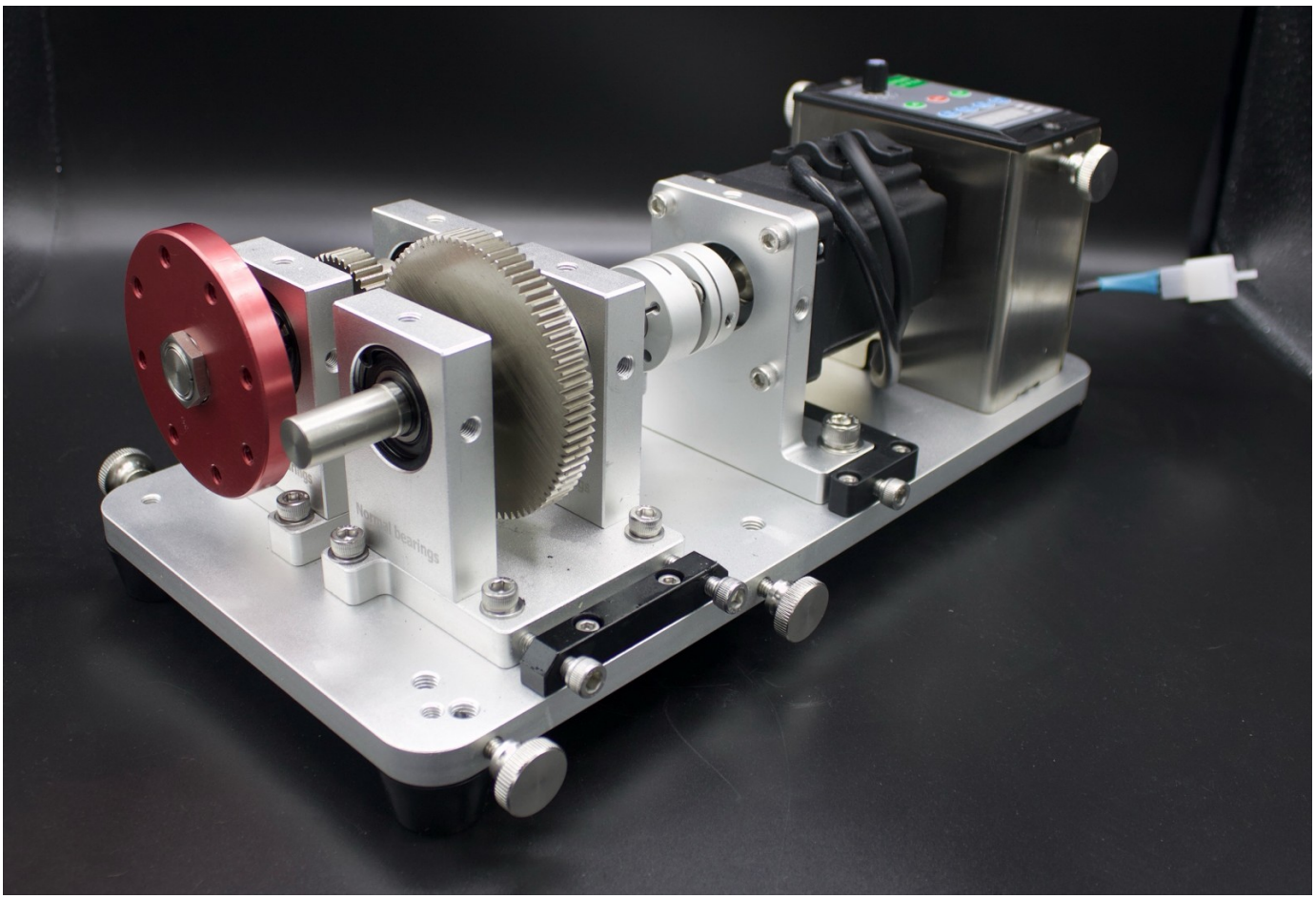
ERBESSD INSTRUMENTS®

BALANCING - VIBRATION - ONLINE MONITORING - LASER ALIGNMENT - MASTERS OF MACHINE HEALTH

EI-TSIM4

Erbessd Solution Simulator - PRO



Catalog

Safety Precautions

Consistently following safety precautions helps prevent accidents and avoid potential hazards.

- Before connecting to the power supply, check if the power cable is damaged. After connecting to the power supply, check if there is smoke or a short circuit. If any of the above occurs, immediately replace the cable.
- Do not operate any switch knobs with wet hands to prevent electric shock
- Keep all body parts away from rotating components while the device is operating. To prevent injury, long hair should be securely tied back or covered with a cap to avoid entanglement in the equipment.
- Before changing any equipment accessories, ensure the machine has come to a complete stop. Only then should you open or access any related components.
- Only authorized personnel are permitted to open the control cabinet. Unauthorized access is strictly prohibited.
- If an accident occurs during operation, immediately shut off the machine.

1. Operating Procedures for Vibration Testing Bench

1.1. Before Startup

1. Check the control panel to ensure that the speed control knob switch button is turned counterclockwise to the off position.
2. Manually rotate the equipment to check for any signs of jamming or restricted movement If any issues are detected, inspect each component individually to identify and resolve the cause.
3. Inspect all screws on the equipment's components to ensure they are securely tightened.

1.2 Test the Machine

1. Slowly turn the adjustment knob to operate the equipment at low speed. Observe for any unusual vibrations or abnormal noises during operation.
2. Let the equipment run continuously for about one minute and observe any unusual vibrations or abnormal noises during operation.
3. If any abnormal vibrations or noise occur during jogging or short-term operation, stop the machine immediately. Inspect each component individually to identify and resolve the issue before resuming operation.
4. If no abnormal vibrations or noises are detected during testing, the equipment can be operated normally, and the related experiments can proceed.

1.3 Shutdown Procedures

1. Confirm that all components are returned to their original positions and store the faulty parts and related tools.
2. Turn off the power, unplug the equipment, and store it properly.

2. Vibration Testing Bench Configurations

2.1 Function Description

This experimental platform can simulate the fault states in shafts, bearings, rotors and their bases. Approximately 80% of the equipment is made of high-strength aluminum alloy, which greatly reduces the weight of the equipment while ensuring its strength, making it easy to transport. The surface has been treated physically and chemically to enhance the machine's appearance. This equipment is widely used in scientific research, teaching, product development, personnel training, and participating in exhibitions in universities, industrial and mining industries, and research institutions.

1. Can simulate fault characteristics of shafts, bearings, and other components at various speeds, with an adjustable range from 0 to 3000 RPM.
2. The shaft assembly can simulate shaft angle misalignment, mass imbalance, loose mounting base, and bearing failure.

The bearing faults that can be simulated include cracks in the inner ring, damage to the outer ring, defects in the bearing balls, combined bearing faults, and fractures in the retainer.

2.2 Composition and Main Component Parameters

Composition

The EI-TSIM4 vibration testing platform consists of a drive motor, drive shaft, driven shaft, large gear, small gear, bearing seat, rotor, foundation base, backlash adjustment screw, and motor controller.

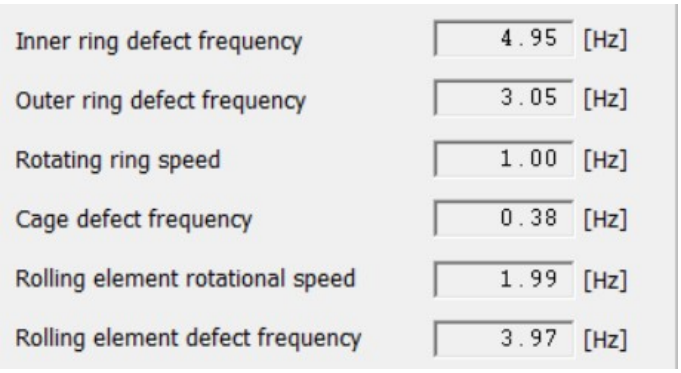
Main Component Parameters

Serial Number	Name	Technical specifications	Quantity	Description
1	Aluminum Alloy Base	350mm*180mm*150mm	1	Aluminum alloy with surface anodizing treatment
2	Brushless DC Motor	Speed 3000 RPM	1	Used in motor bracket assembly
3	Motor Controller	AC110V-220V	1	Controls motor speed
4	Bearing Seat (Normal)	SKF 6202-2RS1	4	Includes M6 sensor mounting holes
5	Gear Set (Normal)	Small gear: 40 teeth Large gear: 80 teeth Module: 1.0 Inner hole: 15mm With keyway	2	One large and one small open spur gear; includes keyway for installation
6	Shaft	Diameter 15mm	2	
7	Aluminum Rotor Disc	Diameter: 80mm Anodized surface	1	Includes M6 threaded hole for counterweight placement
8	Coupling	Bore: 8mm-14mm	1	Diaphragm-type coupling
9	Faulty Bearing Seat	Laser engraved	5	Includes inner ring, outer ring, rolling element, cage, and one major defect
10	Faulty Gear	Modulus: 1.0 Teeth: 40	4	Straight gear with adjustable backlash; includes broken/missing/worn teeth
11	Shim	Thickness: 0.2mm	6	Stainless steel; for simulation only
12	Unbalanced Rotor (Fast Test)	M6 screw	5	Used for dynamic balancing simulations
13	Centering Adjustment Block		3	Used in simulated misalignment experiments

14	Dismantling Tool		1	Includes hex socket, adjustable wrench, and clamp pliers
15	Portable Box		1	Made from ABS plastic
16	Reflective sticker	3M	3	Used for speed measurement

(1) Bearing model: **6202-2RS1 (SKF)**

Type	Specifications	Outer Diameter	Inner Diameter	Thickness	Ball Diameter	Node Diameter	Number of Ball Bearings	Contact Angle
deep groove ball bearing	6202	35mm	15mm	11mm	6mm	25.26mm	8	0°



Characteristic Frequencies of Faulty Bearings

(2) Rotor
   a) Material: Aluminum alloy
   b) Surface treatment: Anodizing
   c) Installation and fastening method: Spring tube clamp with adjustable position that can be loosened
   d) Indexing threaded holes M6, quantity: 8, evenly distributed
   e) Size: Φ 80mm x 10mm

(3) Bearing housing
   a) Material: Aluminum alloy
   b) Surface treatment Anodizing
   c) Specification and method of sensor installation thread: M6, threaded installation, installation position horizontal and vertical, faulty and good bearings have been marked with laser engraving for identification.

(4) Base
   a) Material: Aluminum alloy
   b) Surface treatment Anodizing
   c) Size: 350mm x 180mm x 150mm

(5) Faulty bearings
   a) Bearing type: Deep groove ball bearing

b) Bearing model: 6202-2RS1 (SKF)
c) Fault types include cracks in the bearing's inner ring, damage to the outer ring, defects in the bearing balls, comprehensive bearing faults, cage fractures

(6) Faulty gear
a) Gear type: spur
b) Gear parameters: large gear with 80 teeth, small gear with 40 teeth, module 1
c) Fault types: missing teeth, broken teeth, wear, cracks

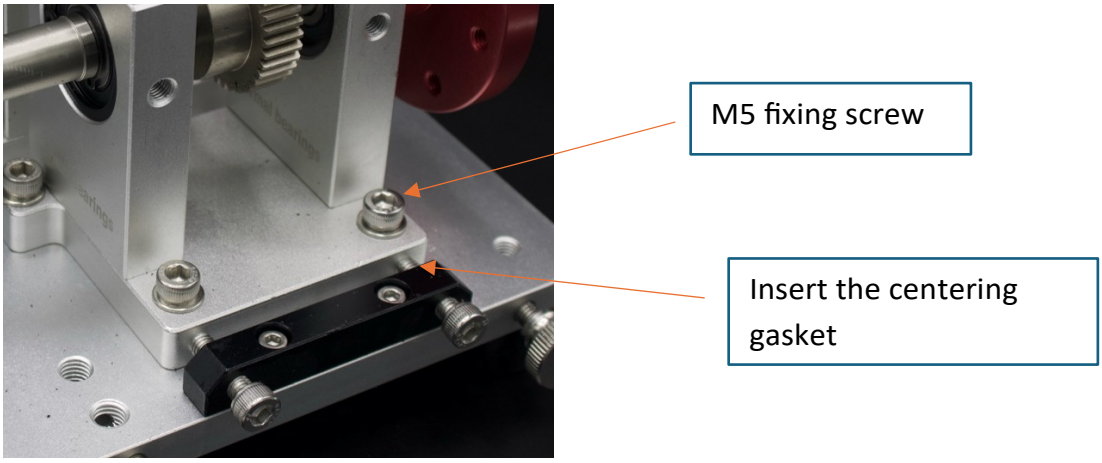
(7) Controller
a) Rotate the knob to adjust the speed
b) Adjustable motor for forward and reverse rotation
c) Power supply: single-phase 110-220V, 50Hz

3. Simulating Fault States

Attention: The following steps must be performed while the device is TURNED OFF!

3.1 Angle Misalignment Fault Setting

1. Use a matching hex wrench to turn the M5 fixing screw on the bearing seat counterclockwise and loosen it.
2. Select the appropriate gasket from the misaligned gasket storage box, making sure the groove faces the screw, and place it between the bearing seat and the base plate. For angular misalignment, insert a gasket under one bearing seat. For parallel misalignment, place gaskets under both bearing seats, ensuring the thickness is the same. Each gasket is marked with its thickness.
3. Turn the M5 fastening screw clockwise and tighten it on the bearing seat to proceed with the experiment.
4. After the experiment, remove the misaligned gaskets and reset the shaft system to its original state.



3.2 Setting of Defective Bearings

- The faulty bearing is installed inside the bearing seat, with the fault type marked on the surface of the bearing seat

(1) Use a matching hex wrench, turn counterclockwise to loosen the drive shaft and coupling fastening bolts. Then, loosen the four M5 fixing screws on the bearing seat along with the backlash adjustment screw. Remove the entire module and store It properly. Finally, use clamp pliers to remove the bearing limit clamp and set it aside.

(2) Stand the entire bearing seat module on its side, loosen the two fasteners at the bottom of the bearing seat, and remove them.

(3) Pull the rear bearing seat away from the shaft.

(4) Remove the faulty bearing seat for the experiment, take out the two M5 screws, and fasten the bearing seat to the base to complete the replacement. Then, reinstall the bearing base module and repeat the previous steps to finish replacing the faulty bearing.

3.3 Unbalanced Settings

(1) Take the required number of M6 hex socket screws from the quality screw storage box

(2) Insert the screw and gasket into any threaded hole on the rotor and tighten them. Place the spring washer between the flat washer and the screw to help prevent loosening.

(3) After the experiment, promptly remove the mass block and return it to the storage box.

3.4 Tightening, Moving, and Dismantling of Rotors

- The rotor is secured to the shaft using a spring collet and collet nut. To disassemble, loosen the nut with a special wrench.

(1) Use a specialized barrel clamp nut wrench to turn the nut counterclockwise. After loosening it for several turns, the rotor can be moved or removed from the shaft.

(2) After positioning the rotor where desired, tighten the nut by turning it clockwise with a wrench.

3.5 Replacement and Disassembly of Faulty Gears

(1) All current faulty gears are small gears.

(2) Loosen the two limit screws on the driven shaft, then loosen and remove the four fixing screws to take out the entire driven shaft module and set it aside. Next, loosen the bottom screw on the left bearing seat and remove the removal screw. Remove the shaft end clamp spring, then use an Allen wrench to loosen (but not remove) the set screw on the small gear. The small gear can now be slid off the shaft end and removed

(3) Replace the faulty gear to be tested, then reinstall it by following the disassembly steps in reverse order.

Note: The driven gear and driving gear must be properly aligned along the full width of the tooth surface, with no noticeable misalignment.

Adjust the gear mesh clearance so that it is neither too tight nor too loose—there should be no noticeable impact noise during low-speed operation.

4. Motor Control

4.1 LED Indicator Lights

(1) LOCK: Multi-functional indicator light

(2) FWD: Forward running/stopping indicator light.

(3) REV: Reverse operation/stop indicator light.

4.2 Button Introduction

(1) SHIFT/SAVE: Long press the SHIFT/SAVE button for 3 seconds. When the device is powered on, pressing the SHIFT button will cycle through the display of temperature, current, voltage, and speed.

(2) FWD/REV: Motor forward/motor reverse button

(3) MENU: Long press the button for 3 seconds to enter the menu settings.

(4) ▲ : Data plus buttons.

(5) ▼ : Data reduction button.

(6) RUN/STOP: Start/stop button.

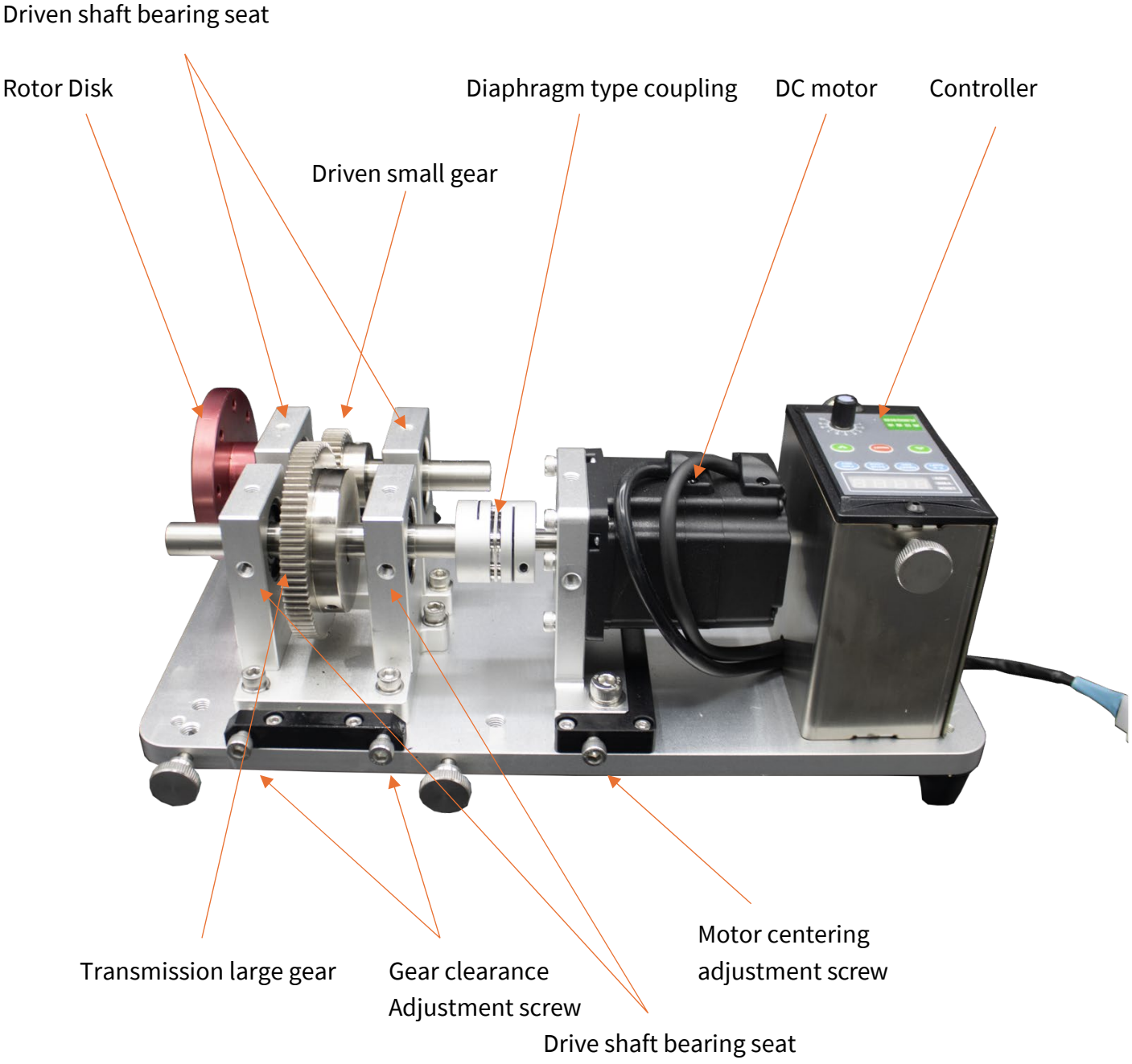
4.3 Knob Switch

(1) Rotate clockwise to manually increase speed.

(2) Rotate counterclockwise to manually decrease speed.

5. Appendix

5.1 Overall Diagram of the Vibration Testing Platform



5.2 Overhaul Manual

Serial Number	Project Content	Maintenance cycle	Measure
1	Normal operationof the motor	At the beginning of the experiment	Repair or replace if not operating
2	Installation of each module	At the beginning of the experiment	Ensure all screws are tightened
3	Experimental platform	At the end of the experiment	Perform cleaning and dust-proofing

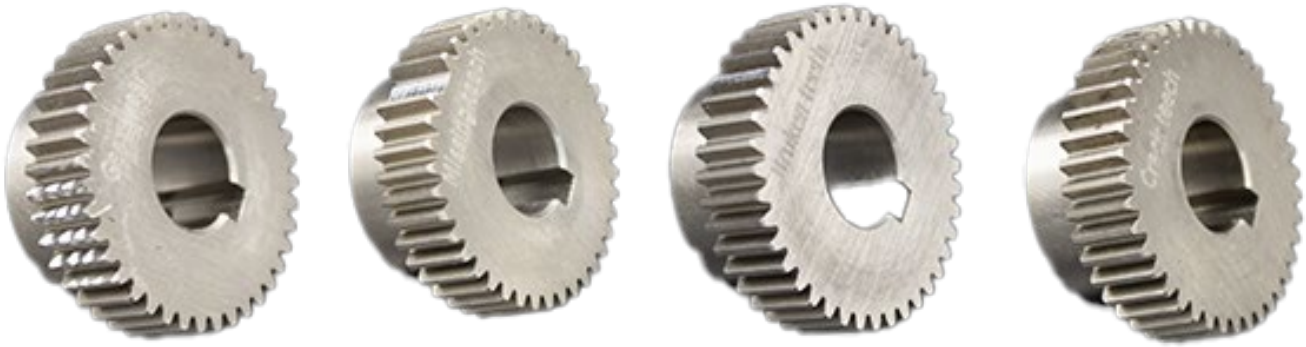
5.3 Main technical parameters of the product:

Power supply: Single-phase 220VAC/50Hz, power less than 120W, power cord length 1.5m
Speed range: 0-3000 RPM, knob adjustment, LCD display screen
Material: Aluminum alloy, surface anodized
Weight: 7 kilograms
Size: 350mm=*180mm*150mm

Motor Bearing model 6001.
6001 is a single row deep groove ball bearing with an inner diameter of 12mm, an outer diameter of 28mm, and a thickness of 8mm
According to different sealing and structural designs, its main derivative models include standard open type (6001), groove type with stop ring (6001N/NR), and non-contact sealing ring type (6001KV)

5.4 Main accessories and specifications:

Laser Engraved Faulty Bearings and Bearing Seats



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Mechanical Fault Simulation System

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