Automatic noise and vibration tester

MVM 90E

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General description

Measurement of vibration is of great importance when aiming for a high quality bearing production. Some types of vibration are related to diminished bearing life, or can be a source of customer dissatisfaction.

Vibrations in bearings are caused by time varying forces in bearing. The contact forces move around the bearing, giving rise to perfect bearing vibrations in the outer ring. The geometric imperfections of the raceways are:

- Waviness
- Local defects
- Dirt particles
- Roughness
- Cage problems

With the SKF noise and vibration equipment we can quantify and trace the reasons for the vibrations.

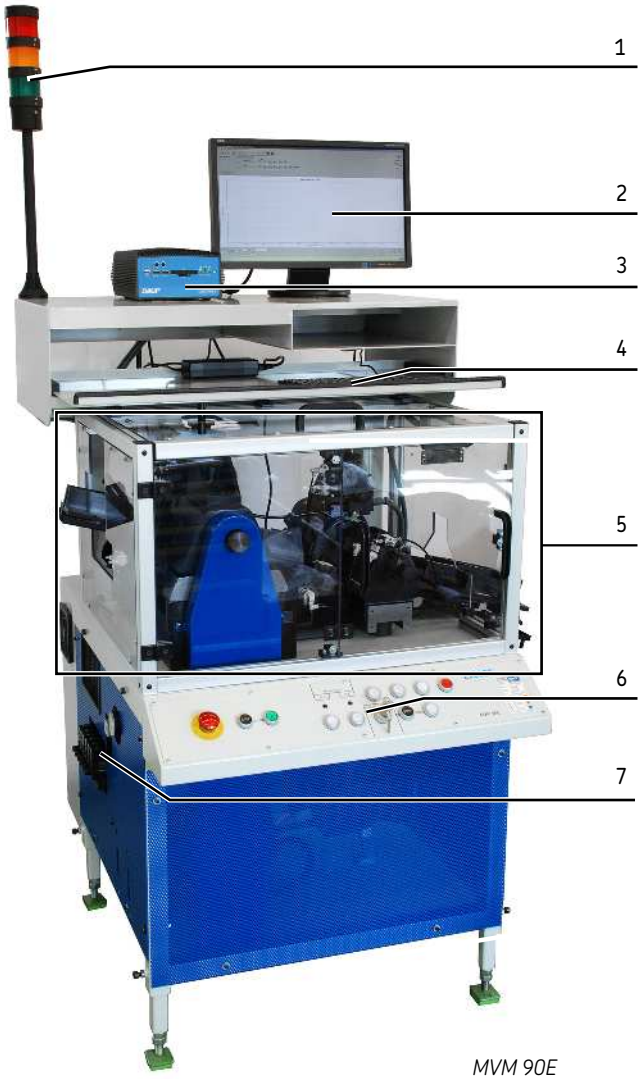
The MVM family is mainly intended for deep groove ball bearings but other bearing types like self-aligning ball bearings and double row angular contact ball bearings can also be measured.

Features

- Handling according to the gravity-feed principle.
- Extremely precise sliding-bearing spindles which drive the inner rings of the bearing during test.
- Each machine has two spindles to be able to load the bearings on two slides to cover a large raceway surface.
- MEA 200 velocity-proportional pickup with an almost linear characteristic curve up to 10 000 Hz receives the radial vibration of the bearing through its stationary outer ring.
- Automatic sorting in two different chutes, user-defined sorting criteria.
- Quick measurements.
- AFBMA and ISO standard.
- Statistical process control facilities.
- Spectrum analysis, including defect evaluation.
- CE-marked, safety covering.

In the included measuring electronics the vibration analysis takes place. Usually the three standard frequency bands are evaluated. Within these bands the tolerance limits are freely programmable and/or are available after calling the appropriate bearing type. Evaluation criteria according to customers requirements (specific spectrum masks) are possible. Frequency spectrum and detailed analysis of the spectrum is also used to go into depth with the locations and causes of the bearing vibrations.

Machine description



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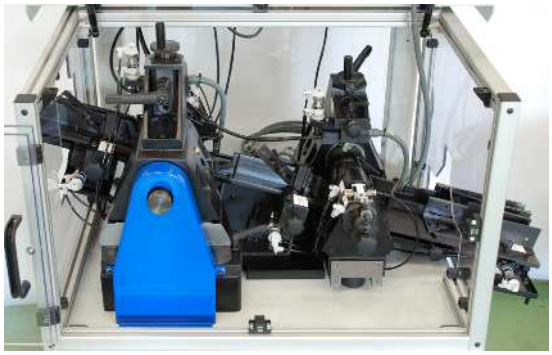
1 Signal lamps
2 Monitor
3 CMME 7001 A measuring electronics (with housing)
4 Keyboard with touchpad (mouse)
5 Measuring mechanics
6 Control panel
7 Pneumatics



Measuring mechanics

Functional principle

Special sensor equipment measures radial vibrations of the outer ring. The bearing is fitted to a precise spindle and rotates at 1 800 r/min.

The outer ring is stationary as loaded by a certain loading tool. Basically the signal from a pickup is amplified and passed to three wideband filters. The Low, Medium and High band comply with the AFBMA and ISO standards.

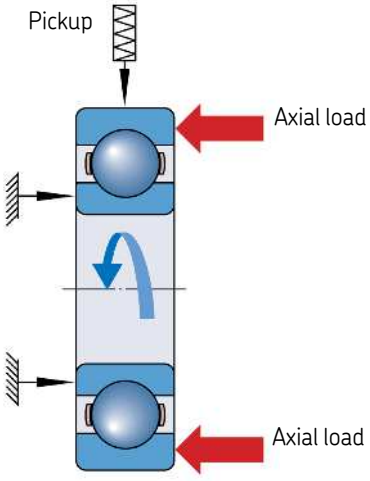
In SKF noise and vibration equipment, the vibration from a bearing is transformed into electrical signals by a special developed pickup, working according the inductive principle. The very small velocity proportional signal should not be drowned by noise or other surroundings in factory environment, therefore a high sensitive low noise amplifier is integrated in the pickup.

The analogue signal from the pickup is then digitalized with a high-resolution analogue-to-digital converter for analysis in a industrial measuring computer.

The special SKF measuring electronics give much more information in the narrow-band spectrum than the broad-band parameters L, M and H.

These results can be shown in µm/s or Anderon units. Using time domain, enveloping techniques, narrow-band frequency analyses, Fourier transformation, spectrum mask and a special digital filtering technique FPM, different signal frequencies corresponding to a bearing component (inner ring, outer ring, ball) can be measured and analyzed.

The result identifies one or more of a possible number of defect types like: dirt, defects on components, cage noise, form deviations of components of a bearing. The tolerances for vibration measurement of various bearing types are stored in the computer.



Technical specifications

- Mechanics
  - Working range, outer diameter: 26 to 90 mm *(1.02 to 3.34 in)*
  - Inner diameter: 10 to 80 mm *(0.39 to 3.14 in)*
  - Width: 8 to 38 mm *(0.31 to 1.49 in)*
  - Resetting time: About 6 min
  - Cycle time: > 1,7 s
  - Axial test load: 30 to 200 N
  - Spindle speed: 1 800 r/min
  - Driving motor: 3 phases / 0,75 kW
  - Tools: Two mandrels per bearing inner ring bore
    Two loading tools per bearing outer ring diameter
  - Paint: Light creamy grey RAL 7035, RAL 5017; optionally other colours

- Electronics
  - Measuring electronics: CMME 7001; for details see datasheet CMME 7001
  - Software: FPM, operating system Windows 10; for details see datasheet FPM
  - MEA 200 pickup: Frequency range 20 to 10 000 Hz, measuring range up to 5 000 µm/s
  - Loudspeaker (option): MEB 122C
  - Control equipment: SIEMENS PLC
  - Environmental protection: IP 53

- Dimensions and weights
  - Dimensions (H × W × D): 2 080 × 1 040 × 1 000 mm *(81.9 × 40.9 × 39.4 in.)*
  - Weight approx.: 520 kg *(1 146 lbs)*
- Requirements
  - Electrical system: See rating plate 3 × 400 V/50 Hz/3,1 kVA, 3 × 480 V/60 Hz/3,1 kVA
  - Pneumatic system: Air pressure: 5,5 bar *(80 psi)*, clean and dry air

- Calibration tools [1)]
  - Sensor calibration tool MEA 6A: To calibrate the sensor and electronics
  - Digital load cell: To calibrate the axial bearing load
  - Alignment tools: To calibrate the alignment of the loading unit and the spindle axis
  - Spring balance 0 to 100 N: To calibrate the belt tension
  - Tachometer: To calibrate the spindle speed
  - Superball for spindle check: VK 1

1) One set per factory recommended

Technical specifications subject to change without notice.
For more information on your specific application please contact:

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