

Noise and vibration tester

MVU 150A, MVU 150B

MVU 250A, MVU 250B



MVU 150A

General description

The more and more demanding quality standards in the automobile industry initiated the development of new automatic bearing noise testers for “typical automobile bearings”, such as angular contact ball bearings, taper roller bearings and hub-units.

In addition to the quality assurance of the supplier and the incoming inspection, these automatic testing machines are used in the development of vehicles, where it is necessary to apply axial thrust test loads conforming to the actual application of the bearing and to adapt the test speeds according to the actual application speeds.

SKF QT offers several standard variants of the MVU 150/MVU 250 automatic noise testing machines for bearings which are capable of carrying thrust loads:

- MVU 150/250A: Axial load can be applied to the bearing outer ring from upper side.
- MVU 150/250B: Axial load can be applied to the bearing outer ring from upper and lower side.

All machines work fully automatically and are equipped with a vertical high-precision hydrodynamic oil spindle. The spindle is driven via a flat belt by an electric drive motor, which is mechanically isolated from the machine frame. This guarantees an optimum isolation from environmental vibrations.

The automatic machines are equipped with a handling system. However all machines are also available as off-line machines without a handling system for laboratory use. The reject chute on the automatic versions are usually provided by the customers, but can also be provided by QT on special request.

A SIEMENS PLC controls all mechanical movements of the machine from feed loading, axially loading, sensor adjustment, unloading, sorting, and so on.

The test setup for a new bearing type (run-in time, measuring time, spindle speed, quality limits, spectrum mask, and so on) is freely programmable in the CMME 7001 measuring electronics with the FPM evaluation software. Once the setup is completed, all data can be saved to a configuration file under an arbitrary name and can be retrieved again when the bearing is produced the next time.

The CMME 7001 acquires the measured bearing vibration signals, and determines the bearing quality in terms of user-defined quality classes. Usually the three standard frequency bands are evaluated with user defined limits. Special evaluation criteria according to customer requirements (e.g. specific frequency spectrum mask) are also possible. All important measurement results are documented and statistically compressed on various screens. The electronics are also prepared for network to other computer systems so that the results can be shared with other departments, e.g. to provide noise test data to the company's quality assurance systems.

During the commissioning of an MVU equipment at the customer's site, SKF QT can provide support to integrate the machines into automatic production lines.

Machine description



MVU 150BLA – application with automatic in- and outfeed

- 1 Measuring mechanics
- 2 Safety cover
- 3 Handling unit (behind the cover)

- 4 Signal lamp
- 5 Monitor
- 6 Control unit

- 7 Control electronics (SIMATIC)
- 8 Keyboard with touch pad

Functional principle

Feeding

Feeding of bearings onto the loading station of the vibration tester is done by a FlexLink belt and an in-feed pusher, which are usually provided by the customer. From the loading station the MVU handling unit (pick and place handling) takes the bearing and positions it onto the mandrel. After measuring the bearing vibration the MVU handling unit removes the bearing from the mandrel and puts it onto the unloading station. From there, the bearing is usually handled further by the customer.

Measuring

After the bearing is placed onto the mandrel, the spindle accelerates to its correct measurement speed and an axial load is applied to the bearing outer ring by the loading units. In the A type, the load is applied from top, in the B and C types, the bearings are loaded subsequently from top and bottom. Then the pick-up is precisely applied to the outer ring surface in a radial direction. or bearings with large outer diameter tolerances.

Optionally we offer the new SKF Laser Vibrometer MSL-7100 for non-contact vibration measurement for use instead of the MEA 200 pickup. The advantage is a much longer life time even in extreme environment and for bearings with rough outer diameter surfaces (e.g. hub-units)

The CMME 7001 electronics triggers the measurement, acquires the measured signal and evaluates the bearing vibrations according to user defined limits and specifications. Finally the bearings are classified as GOOD or BAD and an appropriate signal can be sent to the reject gate.

Sorting

After moving the bearing from the mandrel to the unloading position, usually a device from the customer transports the bearing further in the production line. Based on the test result from the CMME 7001 electronics, the SIEMENS PLC provides a sorting signal which can be used by the customer to control a reject gate to feed BAD bearings into a reject chute

Technical specifications

Mechanics

- Working range outer diameter:
 - MVU 150: 40 to 150 mm (1.58 to 5.91 in.)
 - MVU 250: 90 to 250 mm (3.54 to 9.84 in.)
- Working range width:
 - MVU 150: up to 100 mm (up to 3.94 in.)
 - MVU 250: up to 100 mm (up to 3.94 in.)
- Resetting time: Approx. 9 min.
- Cycle time: Approx. 320 to 500 pcs/h (depending on bearing type, bearing size and measuring parameter)
- Axial test load: Up to 750 N – other loads on request
- Spindle speed: Standard 700 r/min or 1 800 r/min, any speed below 1 800 r/min possible
- Driving motor: 3 phases, 1,1 kW
- Spindle type: Hydrodynamic oil spindle
- Handling system: Electric pick-and-place handling
- Paint: SKF Product White RAL 9002, SKF Product Blue RAL 5015, SKF Product Grey RAL 7024; other colours available as options

Electronics

- Measuring electronics: CMME 7001; for details see data sheet CMME 7001
- Software: FPM, operating system Windows 10; for details see data sheet FPM
- Vibration sensors, two versions possible:
 - SKF Laser Vibrometer MSL-7100: Frequency range 0 to 10 000 Hz, optionally up to 25 000
 - MEA 200: Frequency range 20 to 10 000 Hz, measuring range up to 5 000 $\mu\text{m/s}$
- Loudspeaker (option): MEB 122E
- Control equipment: SIEMENS PLC
- Environmental protection: IP 53

Dimensions and weight

depend on machine version. Example:

- Dimensions (H x W x D): 2 258 x 2 540 x 1 560 mm (88.9 x 82.0 x 58.1 in.)
- Weight: Approx. 1 740 kg (3 836 lbs)

Requirements

- Electrical system: See rating plate
3 × 400 V/50 Hz/3 kVA, 3 × 480 V/60 Hz/3 kVA
- Pneumatic system:
Air pressure: 5 bar (72.5 psi) at least, clean and dry air

Calibration tools ¹⁾

- Digital load cell: To calibrate the axial bearing load
- Alignment tools: To calibrate the alignment of the vertical loading cylinder
- Spring balance 0 to 100 N: To calibrate the belt tension
- Tachometer: To calibrate the spindle speed
- Calibration exciter MSL-C 7000 for SKF Laser Vibrometer MSL-7100
- Sensor calibration tool MEA 6A: To calibrate the vibration sensor and electronics – only MEA 200

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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PUB GTD-P2 XXXXX EN · July 2019