

Noise and vibration tester

MVH 90E, MVH 200E
MVH 90EL, MVH 200EL



MVH 90E

General description

The SKF MVH equipment is used to precisely analyse the structure-borne noise and vibration of deep groove ball bearings, angular contact ball bearings, self-aligning ball bearings and spherical roller bearings, etc. These machines are also used as the SKF reference equipment for these measurements.

The MVHs are semi-automatic; with the only manual operation to be performed being: loading the bearing to be tested on the testing spindle, pressing the two-hand start and removal of the bearing when finished.



The MVH 90 and MVH 200 devices are similar equipments, but with different working ranges; please see the technical specifications on page 7.

There are two versions of each type available:

- MVH 90E/MVH 200E
These testers use the MEA 200 velocity-proportional pickup, which has an almost linear characteristic curve up to 10 000 Hz and receives the radial vibration of the bearing through its stationary outer ring. The pickup tip touches the outer ring.
Advantage: robust pickup, favourable price
- MVH 90EL/MVH 200EL
In this version the SKF Laser Vibrometer MSL-7000 picks-up the noise signal of the bearing in a contactless manner. This is very useful if a special bearing with non-symmetrical bearing outer ring with restricted sensor contact area should need to be tested. The SKF Laser Vibrometer combines a robust, integrated, single-box design with the clear advantages of non-contact, laser-based vibration measurement.
Advantage: contactless measurement, easy handling, and no wear or damage by wrong sensor positioning.

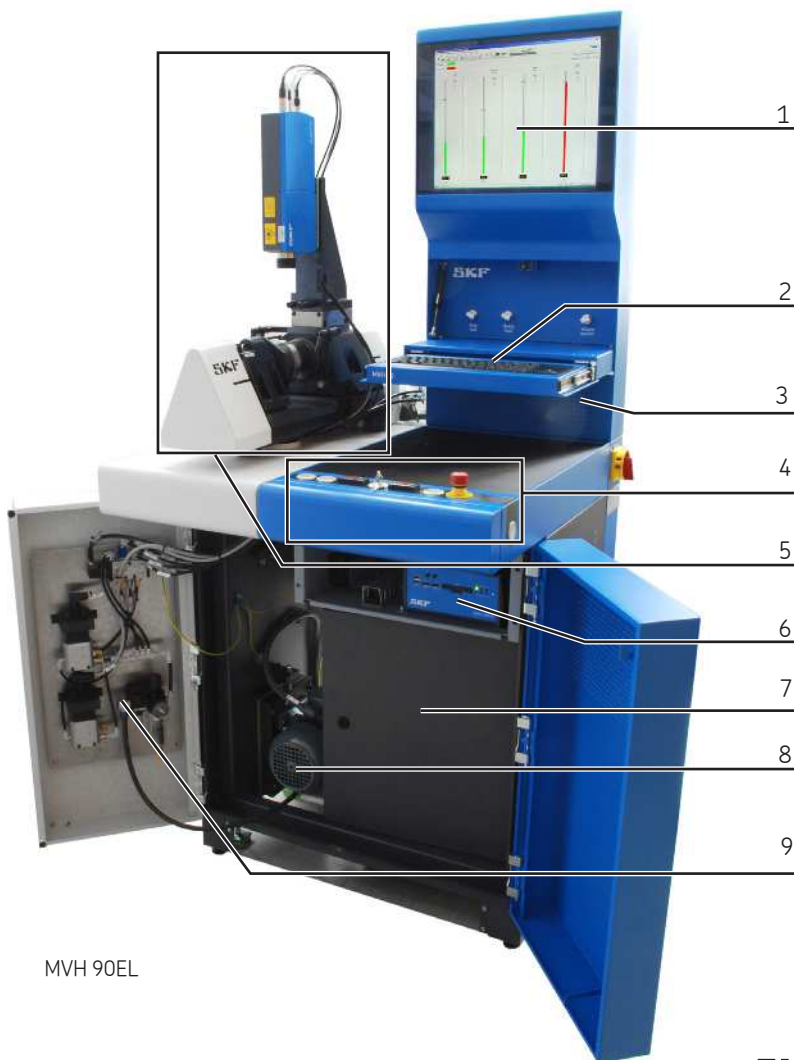
The MVH equipment can be described as follows:

- Has an extremely precise sliding-bearing spindle, which drives the inner ring of the bearing under test.

- Incorporates a pneumatic axial loading unit with adjustable test load. A radial loading unit is optionally available.
- A two-hand operation starts the automatic test cycle: then axial loading unit applies an axial load to the outer ring and moves the bearing against the testing spindle, and the pickup is applied to the stationary bearing outer ring. The bearing noise is measured (using a freely programmable measuring time), analysed and then displayed. Once the testing is completed, the loading unit returns to its initial position and the machine is ready for the next test cycle, etc.
- Resetting for another type of bearing can be done quickly and simply. The arbor on the spindle and the loading tool of the axial loading unit need to be exchanged and the pickup is to be positioned against the new bearing. If using the MSL-7000, then only the horizontal position and the focus must be adjusted.
- The pickups receive the radial vibration of the bearing through its stationary outer ring.
- The vibration analysis is performed by the CMME 7000 measuring electronics. Normally the three standard frequency bands are evaluated. Within these bands the tolerance limits are freely programmable and/or are available after selecting the appropriate bearing type. Evaluation criteria according to customer's requirements (i.e. specific spectrum masks) are possible. Frequency spectrum and detailed analysis of the spectrum is also used to determine the bearing vibration locations and their causes.

Machine description

- 1 LCD monitor
- 2 Keyboard with track ball (mouse)
- 3 Loudspeaker
- 4 Control panel
- 5 Measuring mechanics
- 6 CMME 7000 measuring electronics
- 7 Electrical cabinet
- 8 Drive motor
- 9 Pneumatics

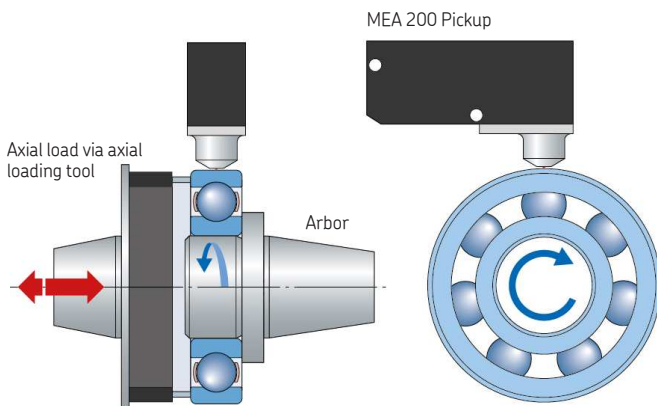


MVH 90EL

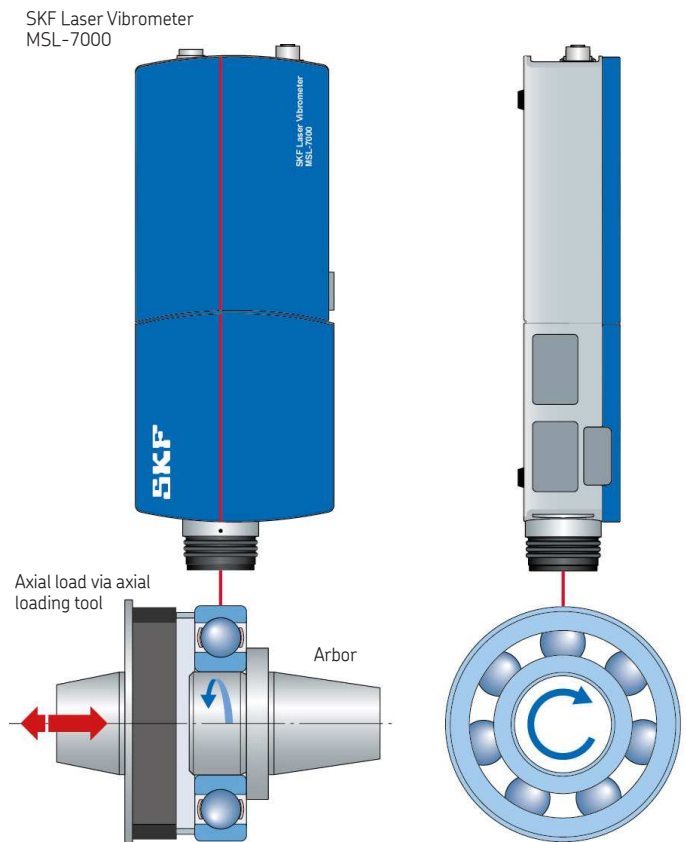
Functional principle

- During measurement, the inner ring of the bearing is rotated at a constant set speed.
- An axial load is applied to the outer ring of the bearing by a specially designed tool.
- The MEA 200 pickup (MVH 90E/200E) or the SKF Laser Vibrometer MSL-7000 (MVH 90EL/200EL) converts the radial vibration of the bearing into a velocity proportional electrical signal.
- The MEA 200 signal is amplified and digitalized using a high-resolution analogue-to-digital converter for evaluation in our measuring computer CMME 7000.
- The digital MSL-7000 laser signal is transferred via S/P-DIF format to the miniStreamer board in the CMME 7000.
- The SKF measuring electronics with the SKF evaluation software gives much more information in the narrow-band spectrum than the broad-band parameters L, M and H. These results can be shown in $\mu\text{m/s}$ or Anderson units.
- Different signal frequencies corresponding to a specific bearing component (e.g. inner ring, outer ring, or rolling elements) can be measured and analyzed using time domain, enveloping techniques, narrow-band frequency analyses, Fourier transformations and spectrum masks, together with a special digital filtering technique FPM.
- The result identifies one or more possible defect types such as: contaminated components, cage noise, or bearing component form deviations.
- Although relatively small damages can perhaps not be observed in any of the three vibration bands, they can be detected using the SKF peak analysis.
- The vibration measurement tolerances of various bearing types are stored in the computer and all measurement data are compared with these tolerances. If the measurement data are within the tolerances, then the bearing continues its testing regime within the machine. However, if the measurement data are outside the tolerances, then the screen shows a reject message.

Measuring principle MVH 90E, MVH 200E



Measuring principle MVH 90EL, MVH 200EL



Variants MVH 90

For all machines optionally an additional radial loading unit is available. The following shows all MVH 90 variants.



Noise and vibration tester MVH 90E

Features:

- Pickup MEA 200
- Axial load
- Test objects:
Deep groove ball bearings, angular contact ball bearings, self aligning ball bearings, spherical roller bearings, etc.



MVH 90E mechanics with axial load

Noise and vibration tester MVH 90E with radial loading unit

Features:

- Pickup MEA 200
- Axial load
- Radial load
- Test objects:
Deep groove ball bearings, angular contact ball bearings, self aligning ball bearings, spherical roller bearings, etc.
Additional cylindrical roller bearings, needle roller bearings, etc.



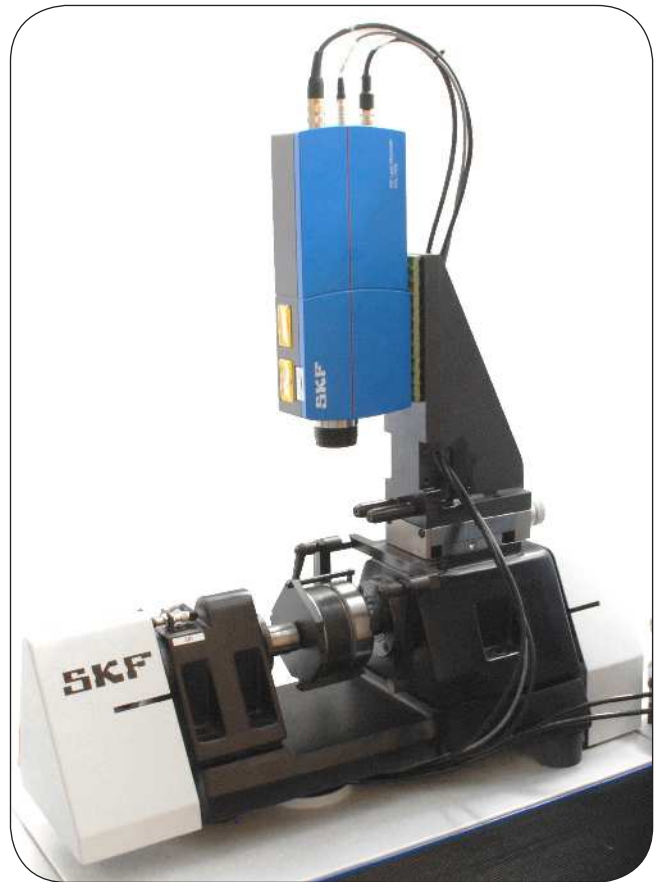
MVH 90E mechanics with axial load and radial load



Noise and vibration tester MVH 90EL

Features:

- SKF Laser Vibrometer MSL-7000
- Axial load
- Test objects:
Deep groove ball bearings, angular contact ball bearings, self-aligning ball bearings, spherical roller bearings, special bearings with unsymmetrical bearing outer ring, flange bearings, etc.



MVH 90EL mechanics with axial load

Noise and vibration tester MVH 90EL with radial loading unit

Features:

- SKF Laser Vibrometer MSL-7000
- Axial load
- Radial load
- Test objects:
Deep groove ball bearings, angular contact ball bearings, self-aligning ball bearings, spherical roller bearings, spherical roller bearings, special bearings with unsymmetrical bearing outer ring, flange bearings, etc.
Additional cylindrical roller bearings, needle roller bearings, etc.



MVH 90EL mechanics with axial and radial load

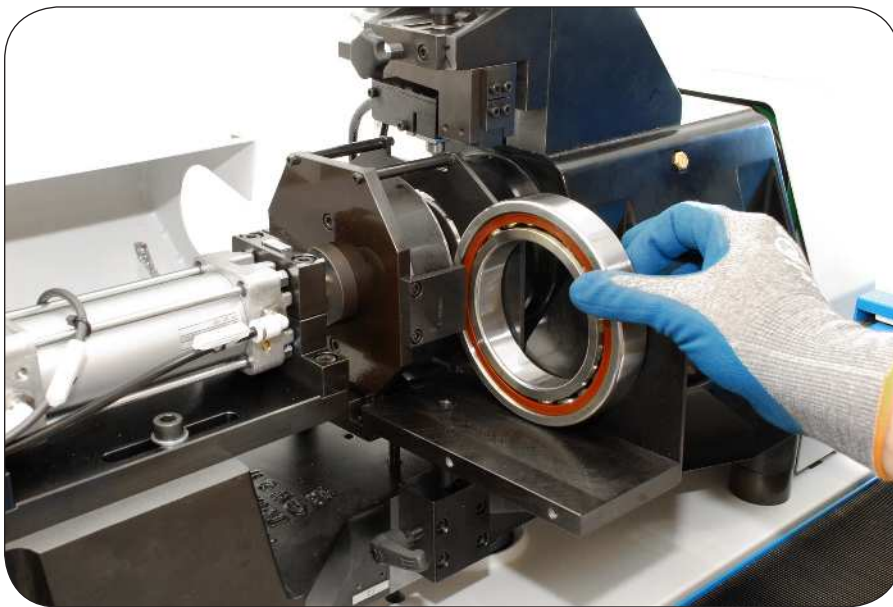
Variants MVH 200

Example noise and vibration tester
MVH 200E

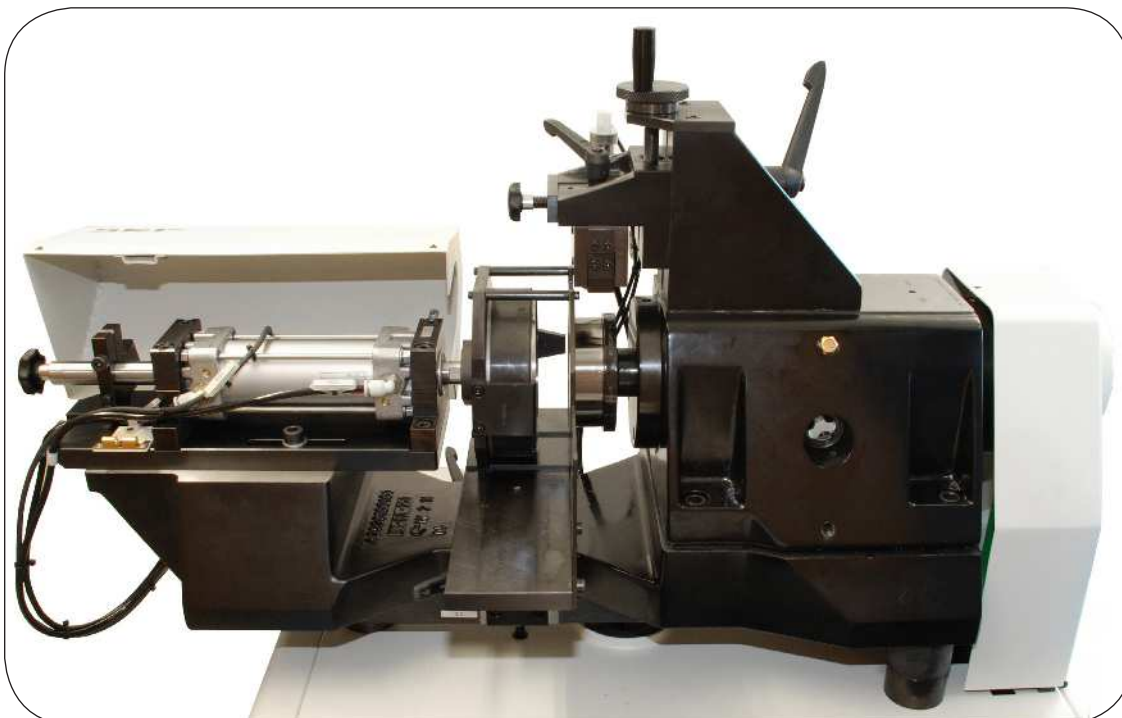
Features:

- Pickup MEA 200
- Axial load
- Test objects:
Deep groove ball bearings, angular contact ball bearings, self-aligning ball bearings, spherical roller bearings, etc.

The MVH 200 is available in the same configurations as the MVH 90 described above. You can order it with either the MEA 200 or MSL-7000 pickups and with a radial loading unit.



MVH 200E mechanics with axial load



MVH 200E mechanics with axial load



Control panel

Technical specifications

- Mechanics
 - Working range outer diameter:
 - MVH 90E/EL: 10 to 90 mm (0.39 to 3.54 in.)
optionally 10 to 26 mm (0.39 to 1.02 in.)
 - MVH 200E/EL: 80 to 200 mm (3.15 to 7.87 in.)
 - Resetting time: About 5 min.
 - Axial test load $\pm 10\%$:
 - MVH 90E/EL: Adjustable to 30 to 200 N
 - MVH 200E/EL: Adjustable to 100 to 900 N (6 bar)
 - Radial test load $\pm 10\%$:
 - MVH 90E: Adjustable to 80 to 350 N
 - MVH 200E: Adjustable to 140 to 650 N
 - MVH 90EL: Adjustable to 80 to 400 N
 - MVH 200EL: adjustable to 150 to 750 N
 - Spindle speed:
 - MVH 90E/EL: 1 800 r/min
 - MVH 200E/EL: 700 r/min to 1 800 r/min
 - Driving motor: 3 phases, 0,75 kW
 - Tools: One mandrel per bearing inner ring bore
One loading tool per bearing outer ring diameter
 - 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 7000; for details see data sheet CMME 7000
 - SKF Laser Vibrometer MSL-7000: Frequency range 0 to 22 000 Hz; for details see data sheet MSL-7000
 - Software: FPM, operating system Windows 7; for details see data sheet FPM
 - MEA 200: Frequency range 20 to 10 000 Hz, measuring range up to 5 000 $\mu\text{m/s}$
- Loudspeaker: Built into the housing
- Environmental protection: IP 53
- Dimensions and weights
 - Dimensions (H x W x D):
 - MVH 90E/EL: 1 780 x 780 x 816 mm (70.1 x 30.7 x 32.1 in.)
 - MVH 200E/EL: 1 780 x 780 x 1 104 mm (70.1 x 30.7 x 43.5 in.)
 - Weight:
 - MVH 90E/EL: Approx. 230 kg (507 lbs)
 - MVH 200E/EL: Approx. 320 kg (705 lbs)
- Requirements
 - Electrical system: See rating plate
3 x 400 V/50 Hz/2 kVA, 3 x 480 V/60 Hz/2 kVA
 - Pneumatic system, Air pressure: 5,5 to 6 bar (79.8 to 87.0 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 loading unit
 - Spring balance 0 to 100 N: To calibrate the belt tension
 - Tachometer: To calibrate the spindle speed
 - Only for MVH 90E/200E
Sensor calibration tool MEA 6A: To calibrate the sensor and electronics
Superball for spindle check:
 - MVH 90E: VK1
 - MVH 200E: VK2
 - Only for MVH 90EL/200EL
Calibration Exciter MSL-C 7000

¹⁾ One set recommended per factory.

Technical specifications subject to change without notice.

For more information on your specific application, please contact our engineers at QT.

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