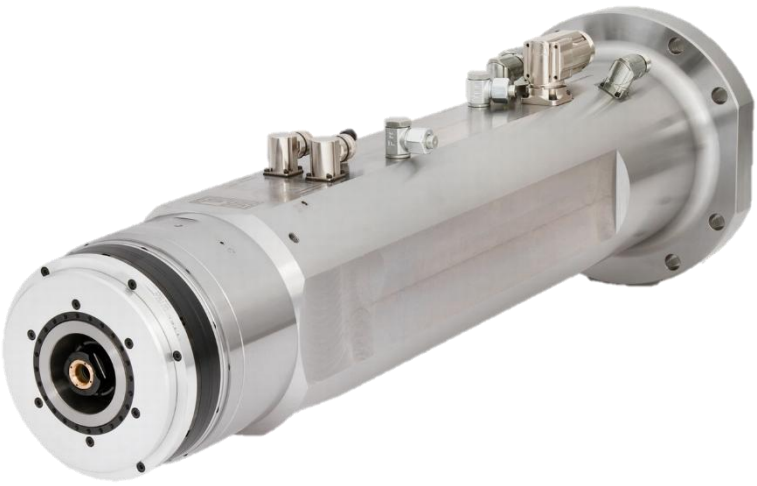
Hofmann.
Intelligent Balancing Solutions

Active balancing system AB 9000 MT

Automatic balancing during machine operation



Grinding Spindle (MB Spindle Technology GmbH / former Heinz Fiege GmbH)

Fields of application

- Balancing during machine operation
- Monitoring of unbalance vibrations
- Compensation of process unbalance

Advantages

- Achieving perfect running conditions
- Increased product quality and machine availability
- Ring design for universal adaptation
- Suitable for very high speeds
- Permanent vibration monitoring
- Time savings through fast electromagnetic drive and adaptive balancing methods
- Automatic calibration procedure for system identification
- Neutral position function for manual pre-balancing
- Integrated field balancing function
- Windows based software user interface (HMI)
- Profibus / Profinet interface for connection to plant control system

Application examples machine tools

- Automatic balancing of grinding wheels and grinding spindles in one and two planes
- In-process balancing of high-speed milling and lathe spindles
- Unbalance correction during turning/milling of asymmetrical workpieces (MillTurn), including clamping system unbalance
- Balancing the coupling components between the dynamo and the test specimen in engine test benches
- Correcting production-related, dynamic residual unbalances in laser engraving machines
- Optimizing unbalances in paper rollers caused by thermal deformation
- Compensation of variable unbalances in separators and centrifuges, arising during the production process
- Compensation of hydraulic unbalances on pumps

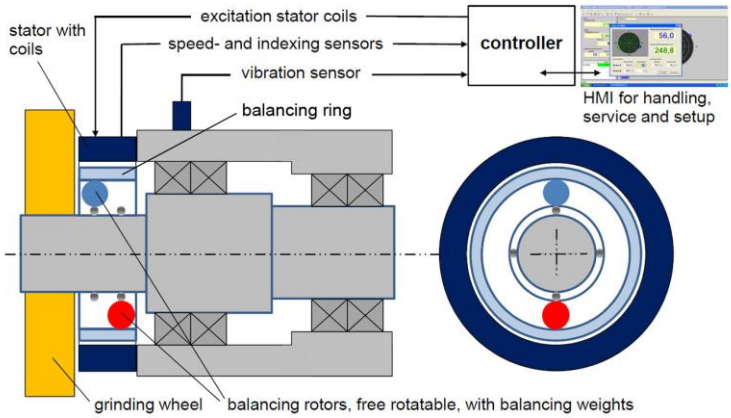
Functional principle

The AB 9000 active balancing system automatically compensates unbalances during machine operation. Two balancing rotors are arranged in the balancing ring part of a balancing unit, allowing them to move 360° on the rotor axis. If the balancing rotors are opposite each other, their effect cancel each other out (Neutral). The full balancing capacity is achieved when both balancing rotors act at the same angle.

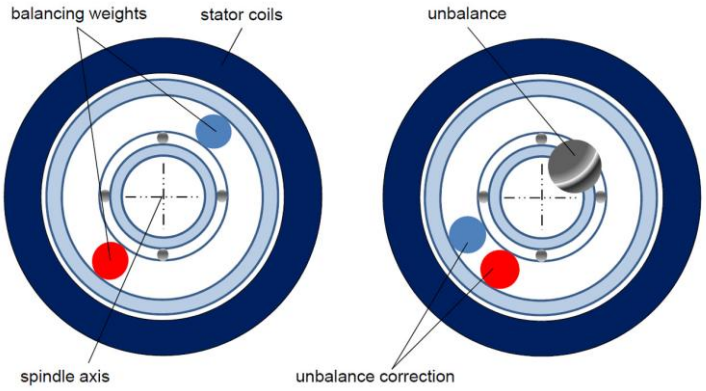
By adjusting to specific angles, any desired corrective unbalance can be generated within the specified limits, depending on the magnitude and direction. The measurement information - vibration, rotor speed and the angular positions of the balancing rotors - is recorded by fast measurement electronics equipped with adaptive algorithms. If the vibration exceeds the specified tolerance limits, a fully automatic balancing process is initiated. The balancing rotors are adjusted contact-free and wear-free via the control of the stator coils.

Adjustment, operation, and visualization of the automatic balancing process are carried out via PC software on a PC/laptop or directly on the HMI of a system control system. It also enables a field balancing procedure, for example, if the unbalance of a tool exceeds the balancing capacity of the balancing unit.

For this purpose, the two balancing rotors are first set to neutral position, then the unbalance of the tool is determined and after that only this tool unbalance is manually corrected. This avoids the consumption of balancing capacity.



Components of the AB 9000 balancing system



Functional principle of the spread angle method

System characteristics

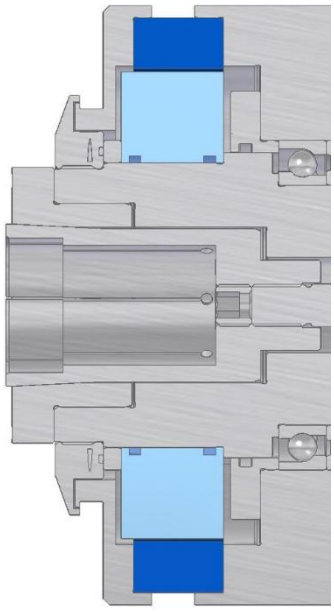
The AB 9000 balances using a direct, adaptive process. The balancing rotor positions required for unbalance correction are calculated from the real-time measurement data. This saves correction time not only in the 1-plane balancing, but especially when balancing automatically in 2 planes.

Because the system automatically adapts to new boundary conditions after each correction step, changes in the machines dynamic transmission characteristics, e.g. due to changes in temperature or speed, do not pose a problem.

The innovative active AB 9000 provides a solution that can extremely effectively eliminate operational unbalance vibrations. This significantly increases the availability of machines and systems, considerably extends maintenance intervals and largely prevents production losses and downtime.

With its ring design, the AB 9000 can be easily integrated into new or existing machine designs.

Visu CS 9000 – HMI software



BU 9000 – spindle integration

Technical data:

Measuring electronic AB 9000	**2-Channel**	**4-Channel**
Measuring channels	2	4
Max. controllable balancing units	2	4
Balancing planes	2x1 or 1x2	4x1 or 2x2
Speed range	200 to 50.000 rpm	
Vibration units	µm, mm/s, m/s², g	
Measuring range	0,01 bis 1.000 µm depending on speed and sensor	
PC interface	RJ 45	
Profinet- interface	2x RJ 45	
Profibus- interface	Sub-D 9 pin	
Digital PLC interface	2x Sub-D 25 pin	4x Sub-D 25 pin
Analog PLC interface	2x Sub-D 9 pin	4x Sub-D 9 pin
Dimensions (WxHxD)	210 x 120 x 280 mm	420 x 120 x 280 mm
Casing design	control cabinet installation or with 19" front panel (483 mm)	
Electrical connection	230 V / 50 – 60 Hz / 400 W	

Balancing units BU 9000 *Details and application data on request*

Vibration sensor	*Example:*
Accelerometer	HMA 1840
Input variable	Vibration acceleration
Physical measuring principle	Piezo
Type of reference system	Absolute vibration sensor
Sensitivity ± 10%	100 mV/g
Natural frequency	> 25 kHz
Operating frequency range ±3 dB	1 to 10.000 Hz
Measuring range	+/- 50 g resp. +/- 500 m/s²
Resolution	0,001 g
Alignment	any spatial direction
Measuring direction	towards the fastening screw
Directional selectivity	better as 1:20
Supply	2 to 10 mA
DC-component output voltage	10 to 12 VDC
Working temperature	-40 to +80°C
Protection class	IP 68
Overload limit (shock)	5.000 g
Housing material	Stainless steel, rustproof, anti-magnetic
Mounting type	M 6 screw thread
Weight (without cable)	approx. 50 g
Connection	5 m fixed cable

Other vibration sensors on request.

Scope of delivery

- Balancing unit BU 9000
  consisting of balancing ring and stator with sensors
- Measuring electronic AB 9000
- PC software Visu CS 9000
- Vibration Sensor
- Cable set
- Operating instructions

smallest and largest version of the BU 9000 model series