The Field Balancer for High-Precision Grinders **SB-8001**series

SB-8001 series is ultimate field balancer exclusively use for grinding wheel balancing. High accuracy, easy operation, low price are the results of serious research by Sigma Electronics.

Features

SB-8001G

1. Easy operation. Measured values i.e. unbalance displacement, balance weights angle and operation guide are indicated on large LEDs.
2. All parts are integrated in one trunk package. Right weight.

Integrated in one trunk case

SB-8001GB

1. All information are displayed on color graphical LCD, and all operation are done with touch screen diagnostics.
2. Battery and AC powered. Easy to use at field without power supply.
3. Measuring speed range is up to 61,000min^{-1}
4. USB port and microSD card slot are equipped

Instrument and all accessories are stored in a carrying case

Model		SB-8001G	SB-8001GB
Range of Measurement	Balancing Speed	180 to 61,000min^{-1}	180 to 61,000min^{-1}
	Amplitude range of synchronized vibration	0.001 to 999μm(at 1,200min^{-1})	
	Resolution of vibration	0.001μm(at 1,200min^{-1})	
	Vibration input channel	1ch	
	Measuring method	Fixed-speed method	
	No. of Correction plane	1 plane	
Correction method		Single plane balancing with arrangement of 2 or 3 balance weights on the circumference	
Others	USB interface	N/A	mini-B type
	microSD card slot	N/A	Available as standard (can be stored screenshot)
	Graphic display	7segLED	3.5" TFT color LCD
	Set up operation	LED	Dialog with touch screen
	Power supply	AC 100 to 240V ±10% 50/60Hz	AC 100 to 240V ±10% 50/60Hz
		N/A	Li-Ion battery (Operating time: up to 10hours)
	Environment Temperature	5 to 40°C	10 to 30°C
	Humidity (Non-condensing)	20 to 80%RH	20 to 80%RH
	Dimension of measuring unit	(Integrated in one trunk case)	180(W)×100(L)×45(H)mm
	Mass of measuring unit	Approx. 4.3kg	Approx. 0.35kg(main body)|Approx. 4.3kg*1
	Dimension of Carrying case	385(W) × 120(L) × 255(H)mm	
Standard accessories (one each)	Vibration sensor*1	P12SC (Sensitivity: 10pC/(m/s^2))	
	Fixing magnet	KM-025C (Holding force: 100N)	
	Sensor cable	LN-041 (2.5m straight)	
	Rotation sensor	SFS2-60 (with 2m cable)	SFS-M1H (with 2m cable)
	Fixing magnet stand	NB-B (Holding force: 800N)	NF2021 (Holding force: 320N)

*1 Mass of carrying case with main body and all accessories.
* In case of using in outside of Japan, use an AC adapter with interchangeable power cord. Please attach "E" as suffix for interchangeable cord. Ex: SB-8001GE.
Plug is attached type "A", please provide plug adapter for regional standard.

Specifications may be changed without any notice due to modification, etc.

The Field Balancer for General Rotating Machines

SB-8002R/RB max.61,000min^{-1}

SB-8003R max.61,000min^{-1}

A Member of Japan Testing Machine industrial Society
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Balance Monitor

The Field Balancer for High-Precision Grinders

SB-8001series

www.sigma-elec.co.jp

Easy-to-use and affordable than ever! Definitive grinding wheel balancer

AC powered model **SB-8001G** max.10,000min^{-1}

Battery and AC powered model **SB-8001GB** max.61,000min^{-1}

SIGMA's field balancer measures the vibration of a grinding wheel while they are rotating on grinding machines, so it allows you to correct the unbalance of the entire wheel and spindle system. Perfectly balanced wheel and spindle system leads to stable grinding force, improved surface finishing, longer machine life, and reduced grinding wheel wear.

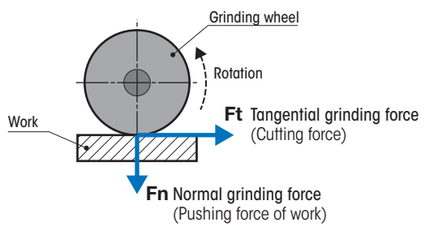
RoHS
SB-8001GB
Battery and AC powered model

CE
RoHS
SB-8001G
AC powered model

SIGMA ELECTRONICS **SIGMA ELECTRONICS Co., Ltd.**

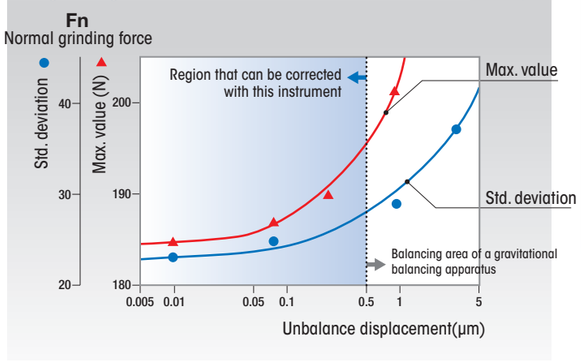
Balancing not only grinding wheel but also including spindle system.

The measurement is performed while a grinding wheel is rotating, which enables to balance the entire wheel spindle system instead of just the wheel.
Balanced grinding wheel stabilizes grinding force, which leads to longer machine life, reduced grinding wheel wear and improved surface finishing.



Followings are experimental data of influence between grinding quality and grinding wheel unbalance. Figure 1 indicates relation between grinding resistance and unbalance vibration. When unbalance vibration exceed 1μm, grinding resistance is remarkably increased.
Table 1 indicates waveform of grinding resistance. When unbalance vibration is 0.088μm, grinding resistance is steady. But when unbalance vibration is 2.860μm, grinding resistance (tangential and radial direction) are fluctuated, it means cutting depth is varied at synchronized with rotation of grinding wheel. Consequently, it causes not only bad surface accuracy but also uneven ware of grinding wheel.
Figure 2 indicates relation between surface roughness and unbalance vibration. When unbalance vibration exceed 0.5μm, surface roughness is extremely increased.
Table 2 indicates relation between surface roughness and unbalance vibration, and table 3 indicates relation of surface waviness. When unbalance vibration is increased, surface waviness become worse. From these results, balancing of grinding wheel should be performed at least below 0.5μm, below 0.1μm is ideal.

Relationship between unbalance displacement and grinding wheel Fig.1



Relationship between unbalance displacement and surface roughness Fig.2

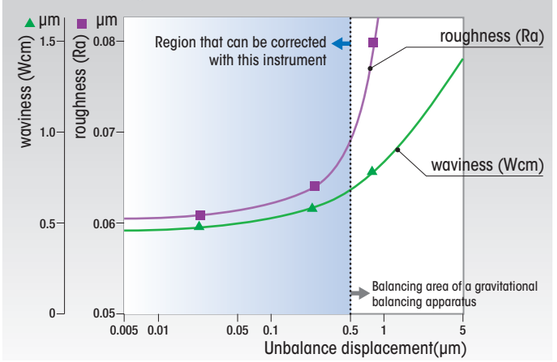


Table1 Unbalance displacement and grinding force

Measured part	Unbalance displacement: 0.088 μm	Measured waveform
Ft : Tangential grinding force (5 N/V)	Measured value = 25.4 N	
Fn : Normal grinding force (50 N/V)	Measured value = 187.5 N	
Measured part	**Unbalance displacement: 2.860 μm**	**Measured waveform**
Ft : Tangential grinding force (5 N/V)	Measured value = 38.4 N	
Fn : Normal grinding force (50 N/V)	Measured value = Approx. 214 N	

Table2 Unbalance displacement and surface roughness Ra (JIS B 0601)

	Unbalance displacement: 0.020 μm	Unbalance displacement: 0.830 μm
V = 0.2 μm/cm H = 0.1 mm/cm		
Measured condition: Surface roughness (JIS B 0601) Arithmetic mean roughness Ra is measured. Cut off 0.8 mm Measured length 2.5 mm	Measured value = 0.061 μm Ra	Measured value = 0.080 μm Ra

Table 3 Unbalance displacement and waviness Wcm (JIS B 0610)

	Unbalance displacement: 0.020 μm	Unbalance displacement: 0.830 μm
V = 0.2 μm/cm H = 0.2 mm/cm		
Measured condition Waviness (JIS B 0601) Filtered maximum waviness Wcm is measured. Cut off 0.8 mm Reference length 4 mm Grinding period is approx. 3.4 mm.	Measured value = 0.499 μm Wcm	Measured value = 0.796 μm Wcm

Grinding condition

Grinding method	Dry surface grinding, up cut
Grinding wheel	Diamond wheel with cast iron core (SD100N125M) O.D. 300 mm, width 16 mm I.D. 127 mm
Peripheral wheel speed	1600 m/min
Work piece feed speed	10 m/min
Grinding depth	4 μm/pass
Coolant	Water-soluble grinding liquid
Material of workpiece	Ceramics (SiC) 25 mm dia. 120 mm length

Instruments used

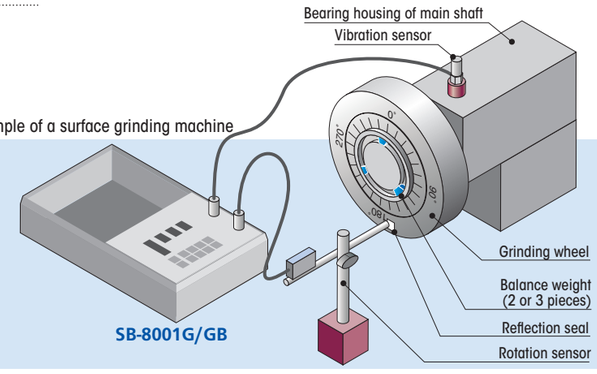
Grinding machine:	Horizontal surface grinding machine(Kuroda Precision) GS-BMHF
Grinding force:	Piezoelectric grinding force gauge (Kistler) 9257A Recorder (Graphtec) WR7600
Surface roughness:	Surface roughness tester (Tokyo Seimitsu) SURFCOM 1500A
Unbalance:	Field balancer (Sigma Electronics) SB-7100S

Preparations of measurement

Mounting each sensors

1. Vibration sensor should be mounted bay magnet or M6 screw perpendicular to grinding surface.
2. Angle (degree value) on grinding wheel should be scaled increasing to rotating direction. It will be very convenient that scaled on flange prior to measurement.

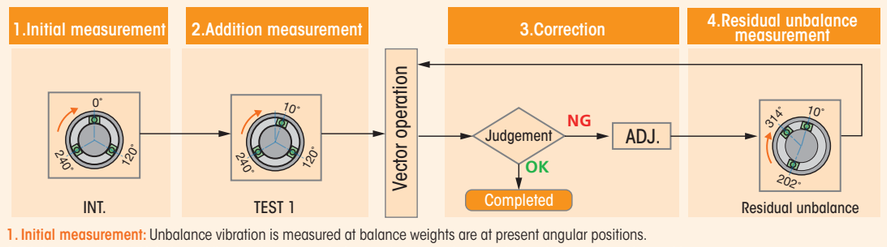
Example of a surface grinding machine



Procedure

Balancing with positioning balance weights

*Following balancing method (balance weights positioning) may make easy balancing of ordinary rotating machinery because not need adjusting mass of balancing weights.



1. **Initial measurement:** Unbalance vibration is measured at balance weights are at present angular positions.
2. **Trial measurement:** Unbalance vibration is measured after moving one balance weight at indicated angular position.
3. **Correction:** After trial measurement, the optimum angular positions of weights are indicated.
4. **Residual unbalance measurement:** Unbalance vibration is measured after moving balance weights at indicated angular positions. When indicated vibration is under allowable value, the operation is completed. When exceeding, move balance weights to angular positions indicated again.