BSWA TECH

PRODUCT CATALOG

www.bswa-tech.com

TABLE OF CONTENTS

COMPANY INTRODUCTION

MICROPHONES

REAL TIME ANALYZERS

MATERIAL TESTING DEVICES

AUDIO TESTING

SOUND SOURCES

SOUND LEVEL METER

CABLES

ACCESSORIES

BSWA TECH

COMPANY INTRODUCTION

Welcome to BSWA Product Catalogue which covers a full range of acoustic measurement devices. The products are sorted into easy-to-follow sections:

- Microphones
- Sound level meter
- Measuring systems
- Material testing
- Audio testing
- Outdoor monitoring systems
- Sound sources
- Cable and accessories

Established in 1998, BSWA Technology Co., Ltd. is becoming the preferred supplier for your acoustical measurements. With headquarter located in Beijing, BSWA currently employs 100 staffs with branch offices in Shanghai, Guangzhou, and Chengdu. BSWA's products are distributed in over 40 countries through our sales partners.

Production

BSWA's production facility is located 30 km from central Beijing and includes over 1200 m^2 of floor space. The facility comprises manufacturing areas, testing laboratories, environmental chambers, a full anechoic chamber, and a clean room. All products are individually tested to meet BSWA's high standards in quality and performance.

Quality

BSWA is fully committed to Quality Management ensuring that every product meets strict standards in performance. BSWA continues to invest in new machine tool technology, new methods of calibration, and new process control methods to further microphone and related equipment technology while reducing manufacturing costs. BSWA was awarded ISO9001 Certificate from TÜV in 2009.

BSWA TECHNOLOGY

Research & Development

As a technology-leading company, BSWA invests heavily in product research and development. BSWA hires skilled individuals, most with M.S. and Ph.D. degrees in acoustics and related sciences. This results in not only an incredibly knowledgeable team of developers and technicians, but also a team that is dynamic, highly motivated, and able to develop and manufacture high quality products.

BSWA is continuously improving its products while developing new ones in response to customer needs. From this new catalogue, you will find many new products such as ABox260 /380 for mobile phone testing; CA916 active coupler from microphone calibration; new features in AV-Lab software; CA111 new calibrator; BSWA308 sound level meter, and many more. BSWA strives for excellence in product design resulting in high quality and exceptional performance. The latest information about BSWA can be found at:

www.bswa-tech.com

2015

- MPA421 high pressure microphone -2015
- Low-Frequency Volume Source-2014
- New tapping machine and omni-directional sound source-2011
- BSWA SW420R Impedance Tube System for Pavements Absorption Testing according to ISO13472-2-2013
- SLM and Calibrator-2010
- R-Cabin System-2009
- Launched VA-Lab measurement software -2007
- Launched Outdoor Noise Monitoring System-2008
- Launched impedance tube measurement system-2005
- Expanded microphone product line, launched MP series - 2004
- Acquired microphone business from IOA. - 2002
- First InterNoise Show in Korea -2003
- Built anechoic chamber for Lenovo Computers -2001
- Established by five acoustic engineers partnered with Institute of Acoustics - 1998

1998

MICROPHONES
OVERALL INTRODUCTION

A microphone is an acoustic-to-electric transducer or sensor that converts sound into an electrical signal. Most microphones use the change of capacitance caused by the diagrapham mechanical vibration to produce an electrical voltage signal. In a condenser microphone, the diaphragm acts as one plate of a capacitor, and the vibrations produce changes in the distance between the plates. There are two types of microphones of this kind: Pre-polarized Microphones and 200V Polarized Microphones.

Pre-polarized Microphones

A nearly constant charge is maintained on the capacitor. As the capacitance changes, the charge across the capacitor does change very slightly, but at audible frequencies it is sensibly constant. Pre-polarized Microphones do not need a bias-voltage supply.

200V Polarized Microphones

There is no charge maintained on the capacitor, while there would be 200V bias-voltage between the plates. It would be necessary to have a 200V bias-voltage supply for the microphone. This type of microphone cannot tolerant high humidity. It is expected to be stored in the package to prevent humidity. But this type of microphone is much more stable and its operating temperature could reach up to 150 ℃.

BSWA TECH

Measurement microphones can be divided into three groups: Free-field, Pressure-field, and Random-incidence.

The difference of the testing results by three types of measurement microphones would be smaller than 0.3 dB when the frequency to be measured is lower than 5000Hz; while the difference could be larger than 10 dB if the frequency to be measured is higher than 16000 Hz. So it is crucial to choose the right microphone to get an accurate measurement result.

Free-field Microphones

A microphone can change the sound field in which it is placed. A free-field microphone is designed to compensate for the influence of its presence in the sound field. So it can measure the sound pressure as it exists before the microphone is introduced into the sound field and can be used in such environments as outdoors, anechoic room, or reverberation room.

Pressure-field Microphones

A pressure-field microphone can measure the sound pressure existing on the diaphragm of the microphone. It can be used in a coupler environment such as an ear simulator or to test the sound pressure on a surface.

Random-incidence Micophones

Only ANSI stnadards request for random-incidence microphones. A random-incidence microphone may be required to make the measuremnts according to ANSI standards.

Prepolarized Microphones-Free Field

MP201 / MP231 / MP215 / MP401 / MP411 / MP418

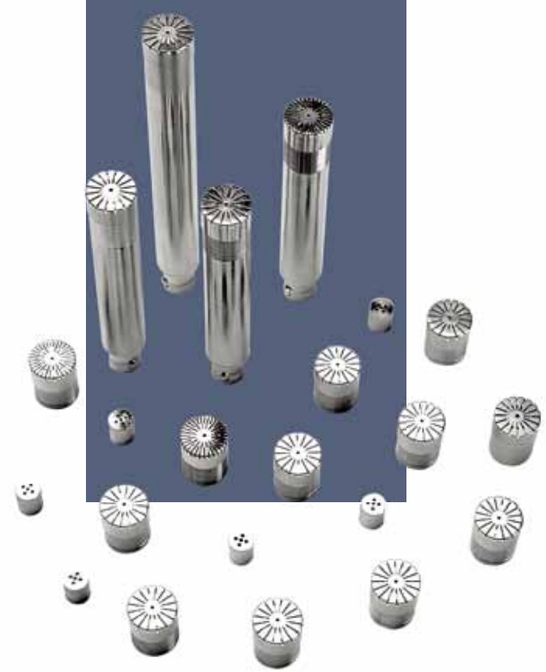
Model	MP201	MP231	MP215	MP401	MP411	MP418
Photos						
Optimized	Free-field	Free-field	Free-field	Free-field	Free-field	Free-field
Diameter	1/2″	1/2″	1/2″	1/4″	1/4″	1/4″
Standards (IEC61672)	Class 1	Class 1	Class 2	Class 1	Class 1	Class 2
Frequency Response (Hz)	6.3 ~ 20k	3 ~ 20k	20 ~ 12.5k	10 ~ 70k	10 ~ 40k	20 ~ 16k
Open-circuit Sensitivity (mV/Pa) (±2dB)	50	40	40	5	2	10
Dynamic Range (dBA)	17 ~ 146	17 ~ 146	23 ~ 146	35 ~ 164	45 ~ 168	36 ~ 137
Inherent Noise (dBA)	17	17	23	35	45	36
Venting	Rear	Rear	Rear	Rear	Rear	Front
Operating Temperature (°C)	-30 ~ 80	-30 ~ 80	-20 ~ 80	-30 ~ 80	-30 ~ 80	0 ~ 40
Operating Humidity (RH) (Without Condensed Water)	0 ~ 98%	0 ~ 98%	0 ~ 98%	0 ~ 98%	0 ~ 98%	0 ~ 98%
Capacitance (pF)	16	16	13	6	6	6
Equivalent Air Volume (mm^3)	46	46	45	0.6	0.6	1
Temperature Coefficient (dB/°C)	-0.012	-0.012	<± 0.3 dB (0 ~ 40 °C) with 250Hz, at reference temperature 23 °C	-0.02	-0.02	<± 0.6 (0 ~ 40 °C) with 250Hz, at reference temperature 23 °C
Humidity Influence	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.5
Pressure Coefficient (250 Hz) (dB/kPa)	-0.004	-0.004	-0.03	-0.007	-0.007	-0.06
Dimensions	IEC 61094-4 Type WS2	IEC 61094-4 Type WS2	IEC 61094-4 Type WS2	IEC 61094-4 Type WS3	IEC 61094-4 Type WS3	--
Screw Thread	M11.7 – 60UNS	M11.7 – 60UNS	M11.7 – 60UNS	M5.7 – 60UNS	M5.7 – 60UNS	M6 × 0.5
Matching Preamplifiers	MA231 / MA221 / MA231T	MA231 / MA221 / MA231T	MA231 / MA221 / MA231T	MA401	MA401	MA408

Prepolarized Microphones-Pressure Field & Random Incidence

MP251 / MP253 / MP451 / MP471 / MP281

Model	MP251	MP253	MP451	MP471	MP281
Photos					
Optimized	Pressure-field	Pressure-field	Pressure-field	Pressure-field	Random-incidence
Diameter	1/2″	1/2″	1/4″	1/4″	1/2″
Standards	Class 1	Class 1	Class 1	Class 1	ANSI Type 1
Frequency Response (Hz)	8 ~ 20k	8 ~ 10k	10 ~ 50k	10 ~ 40k	6 ~ 12.5k
Open-circuit Sensitivity (mV/Pa) (±2dB)	10	50	4	2	40
Dynamic Range (dBA)	25 ~ 146	17 ~ 146	35 ~ 164	45 ~ 168	17 ~ 146
Inherent Noise (dBA)	25	17	35	45	17
Venting	Rear	Rear	Rear	Rear	Rear
Operating Temperature (°C)	-30 ~ 80	-30 ~ 80	-30 ~ 80	-30 ~ 80	-30 ~ 80
Operating Humidity (RH) (Without Condensed Water)	0 ~ 98%	0 ~ 98%	0 ~ 98%	0 ~ 98%	0 ~ 98%
Capacitance (pF)	12	16	6	6	16
Equivalent Air Volume (250 Hz) (mm^3)	30	46	0.6	0.6	46
Temperature Coefficient (dB/°C)	-0.02	-0.02	-0.02	-0.02	-0.012
Humidity Influence	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pressure Coefficient (250 Hz) (dB/kPa)	-0.005	-0.005	-0.007	-0.007	-0.004
Dimensions	IEC 61094-4 Type WS2	IEC 61094-4 Type WS2	IEC 61094-4 Type WS3	IEC 61094-4 Type WS3	IEC 61094-4 Type WS2
Screw Thread	M11.7 – 60UNS	M11.7 – 60UNS	M5.7 – 60UNS	M5.7 – 60UNS	M11.7 – 60UNS
Matching Preamplifiers	MA231 / MA221 / MA231T	MA231 / MA221 / MA231T	MA401	MA401	MA231 / MA221 / MA231T

BSWA



200V Polarized Microphones

MK101 / MK201 / MK401 / MK411 / MK253 / MK451

Model	MK101	MK201	MK401	MK411	MK253	MK451
Photos						
Optimized	Free-field	Free-field	Free-field	Free-field	Pressure-field	Pressure-field
Diameter	1″	1/2″	1/4″	1/4″	1/2″	1/4″
Standards (IEC61672)	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1
Frequency Response (Hz)	3 ~ 16k	4 ~ 20k	4 ~ 70k	4 ~ 70k	4 ~ 10k	4 ~ 50k
Open-circuit Sensitivity (mV/Pa) (±2dB)	50	40	5	2	40	4
Dynamic Range (dBA)*	10 ~ 147	17 ~ 149	35 ~ 167	45 ~ 180	18 ~ 149	35 ~ 167
Inherent Noise (dBA)	10	17	35	45	18	35
Venting	Rear	Rear	Rear	Rear	Rear	Rear
Operating Temperature (°C)	-30 ~ 150	-30 ~ 150	-40 ~ 150	-40 ~ 150	-30 ~ 150	-40 ~ 150
Operating Humidity (RH) (Without Condensed Water)	0 ~ 90%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%
Capacitance (pF)	66	16	6	6	16	6
Equivalent Air Volume (mm^3)	150	46	0.6	0.6	46	0.6
Temperature Coefficient (dB/°C)	-0.005	-0.012	-0.02	-0.02	-0.017	-0.02
Humidity Influence	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pressure Coefficient (250 Hz) (dB/kPa)	-0.02	-0.01	-0.007	-0.007	-0.01	-0.007
Dimensions	IEC 61094-4 Type WS1	IEC 61094-4 Type WS2	IEC 61094-4 Type WS3	IEC 61094-4 Type WS3	IEC 61094-4 Type WS2	IEC 61094-4 Type WS3
Screw Thread	M23.11 – 60UNS	M11.7 – 60UNS	M5.7 – 60UNS	M5.7 – 60UNS	M11.7 – 60UNS	M5.7 – 60UNS
Matching Preamplifiers	MV201	MV201	MV401	MV401	MV201	MV401

The upper-limit of the dymamic range of the 200V-polarized-micrphones depends on the preamplifier supply volgate. For example, the upper-limit of the MK101 is 147 dB if the supply voltage of its preamplifier is 120V

BSWA

Preamplifiers

MA231 / MA221 / MA231T / MA401 / MA418 / MV201 / MV401

Model	MA231	MA221	MA231T	MA401	MA418	MV201	MV401
Photos							
Diameter	1/2″	1/2″	1/2″	1/4″	1/4″	1/2″	1/4″
Frequency Response (Hz) (±0.5dB)	19 ~ 150k	19 ~ 150k	19 ~ 150k	19 ~ 150k	19 ~ 150k	1 ~ 1M	1 ~ 1M
Attenuation (dB) (10 Hz ~ 100k Hz)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5
Input Impedance (GΩ||pF)	6||0.4	6||0.4	6||0.4	6||0.4	6||0.4	10||0.4	10||0.4
Output Impedance (Ω)	< 30	< 30	< 30	< 30	< 30	< 80	< 100
Inherent Noise	A Weighted < 3 μV 20 Hz ~ 20k Hz < 5 μV	A Weighted < 3 μV 20 Hz ~ 20k Hz < 5 μV	A Weighted < 3 μV 20 Hz ~ 20k Hz < 5 μV	A Weighted < 3 μV 20 Hz ~ 20k Hz < 5 μV	A Weighted < 3 μV 20 Hz ~ 20k Hz < 5 μV	A Weighted (20 pF) < 5 μV Z Weighted (20 pF) < 10 μV	A Weighted (20 pF) < 5 μV Z Weighted (20 pF) < 20 μV
Max. Output Voltage (Vrms)	5	5	5	5	5	23	23
Supply Power	ICCP (2 ~ 20 mA)	ICCP (2 ~ 20 mA)	ICCP (2 ~ 20 mA)	ICCP (2 ~ 20 mA)	ICCP (2 ~ 20 mA)	28 - 120 VDC	28 - 120 VDC
Operating Temperature (°C)	-40 ~ 80	-40 ~ 80	-40 ~ 80	-40 ~ 80	-40 ~ 80	-10 ~ 50	-10 ~ 50
Operating Humidity (RH)	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%
Dimensions	Ø12.7 × 74 mm	Ø12.7 × 31.7 mm	Ø12.7 × 90 mm	Ø7 × 56 mm	Ø7 × 56 mm	Ø12.7 × 86.6 mm	Ø6.3 × 63 mm
Connector	BNC	SMB	TNC	SMB	SMB	7-pin LEMO	7-pin LEMO
Screw Thread	M 11.7 mm × 60 UNS	M 11.7 mm × 60 UNS	M 11.7 mm × 60 UNS	M 5.7 mm × 60 UNS	M 6 mm × 0.5 UNS	M 11.7 mm × 60 UNS	M 5.7 mm × 60 UNS

Notice: ICCP = Integrated Constant Current Power

MPA Series Microphones

MPA201 / MPA231 / MPA215 / MPA241 / MPA416 / MPA436 / MPA418 / MPA401 / MPA421

Model	MPA201	MPA231	MPA215	MPA241	MPA416*	MPA436*	MPA418	MPA401	MPA421
Photos									
Diameter	1/2″	1/2″	1/2″	1/2″	1/4″	1/4″	1/4″	1/4″	1/4″
Standards (IEC61672)	Class 1	Class 1	Class 2	Class 1	Class 1	Class 1	Class 2	Class 1	Class 1
Microphone	MP201	MP231	MP215	MP241	Integrated	Integrated	MP418	MP401	MA421
Optimized	Free Field	Free Field	Free Field	Free-field, the overall specifications can be as diffused-field.	Free Field	Free Field	Free Field	Free Field	Free Field
Preamplifier	MA231(TEDS optional)	MA231(TEDS optional)	MA231(TEDS optional)	MA241	Integrated	Integrated	MA418	MA401	MA421
Frequency Response (Hz)	20 ~ 20k	20 ~ 20k	20 ~ 12.5k	20 ~ 20k	20 ~ 20k	20 ~ 20k	20 ~ 16k	20 ~ 70k	4-70k (±2dB)
Open-circuit Sensitivity (mV/Pa) (±2dB)	45	40	40	40	50	12.5	10	5	0.2
Output Impedance (Ω)	< 30	< 30	< 30	< 30	< 110	< 110	< 30	< 30	< 30
Dynamic Range (dBA)	17 ~ 134	18 ~ 136	23 ~ 135	18 ~ 136	29 ~ 127	35 ~ 130	36 ~ 135	35 ~ 155	69 ~ 180
Inherent Noise (dBA)	17	18	23	18	29	35	36	35	69
Operating Temperature (°C)	-30 ~ 80	-30 ~ 80	-20 ~ 80	-30 ~ 80	-10 ~ 50	-10 ~ 50	0 ~ 40	-20 ~ 80	-20 ~ 80
Operating Humidity (RH)	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 98%	0 ~ 98%	0 ~ 98%
Temperature Coefficient (dB/°C)	-0.012	-0.012	<± 0.3 dB (0 ~ 40 °C) with 250Hz, at reference temperature 23 °C	-0.012	15 ~ 35 °C: < ±0.3 dB; 0 ~ 40 °C: < ±1.5 dB; -10 ~ 50 °C: < ±3.0 dB; with 1000Hz, at reference temperature 23 °C	23°C(15 ~ 35 °C): < ±0.3 dB; 0 ~ 40 °C: < ±1.5 dB-10 ~ 50 °C: < ±3.0 dB; with 1000Hz, at reference temperature 23 °C	<± 0.6 (0 ~ 40 °C) at reference temperature 23 °C	-0.02	-0.02
Humidity Influence	< 0.1	< 0.1	< 0.2	< 0.1	20% ~ 90% RH: < ±0.8 dB with 1000Hz, at reference temperature 23 °C, Humidity 50% RH	20% ~ 90% RH: < ±0.8 dB with 1000Hz, at reference temperature 23 °C, Humidity 50% RH	< 0.5	< 0.1	< 0.1
Pressure Coefficient (250 Hz) (dB/kPa)	-0.004	-0.004	-0.03	-0.004	-0.06	-0.06	-0.06	-0.007	-0.007
Length (mm)	91	91	91	21.5 x 21.5 x 41.0	61	24	64	67	67
Input Connector	BNC	BNC	BNC	SMB	SMB	SMB	SMB	SMB	SMB
Corresponding Model with TEDS	MPA261	MPA271	MPA265	--	MPA466	--	MPA468	MPA461	MPA471

*The MPA416 & MPA436 are the most suitable models for array uses. The frequency responses meet the IEC 61672 Class 1 requirements.

MKV Series Microphones

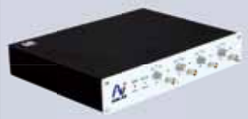
MKV101 / MKV201 / MKV401 / MKV411 / MKV253 / MKV451

Model	MKV101	MKV201	MKV401	MKV411	MKV253	MKV451
Photos						
Diameter	1″	1/2″	1/4″	1/4″	1/2″	1/4″
Standards (IEC61672)	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1
Microphones	MK101	MK201	MK401	MK411	MK253	MK451
Optimized	Free Field	Free Field	Free Field	Free Field	Pressure Field	Pressure Field
Preamplifiers	MV201(with adaptor)	MV201	MV401	MV401	MV201	MV401
Frequency Response (Hz)	3 ~ 16k	4 ~ 20k	4 ~70k	4 ~70k	4 ~10k	4 ~70k
Open-circuit Sensitivity (mV/Pa) (±2dB)	50	40	5	2	40	4
Output Impedance (Ω)	< 80	< 80	< 100	< 100	< 80	< 100
Dynamic Range (dBA)	14 ~ 147	17 ~ 149	35 ~ 146	45 ~ 180	18 ~ 149	35 ~ 167
Inherent Noise (dBA)	14	17	35	45	18	35
Operating Temperature (°C)	-10 ~ 50	-10 ~ 50	-10 ~ 50	-10 ~ 50	-10 ~ 50	-10 ~ 50
Operating Humidity (RH) (without condensed water)	0 ~ 90%	0 ~ 90%	0 ~ 90%	0 ~ 90%	0 ~ 90%	0 ~ 90%
Temperature Coefficient (dB/°C)	-0.005	-0.017	-0.02	-0.02	-0.017	-0.02
Humidity Influence	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pressure Coefficient (250 Hz) (dB/kPa)	-0.02	-0.01	-0.007	-0.007	-0.01	-0.007
Microphone Length (mm)	110	105	73	73	105	73
Connector	7-pin LEMO	7-pin LEMO	7-pin LEMO	7-pin LEMO	7-pin LEMO	7-pin LEMO
Cable Length (m)	2	2	2	2	2	2
Matching Power Supply	MC711 / MC722	MC711 / MC722	MC711 / MC722	MC711 / MC722	MC711 / MC722	MC711 / MC722
Corresponding Model with TEDS	MKV161	MKV261	--	--	MKV263	--

BSWA

Microphone Conditioning Units

MC102 / MC141 / MC104 / MC711 / MC722

Model	MC102	MC141	MC104	MC711	MC722
Photos					
Number of Input Channels	2	1	4	1	2
Connector of Input	BNC	BNC	BNC	7-pin LEMO	7-pin LEMO
Number of Output Channels	2	1	4	1	2
Connector of Output	BNC	BNC	BNC	BNC	BNC
Frequency Response (Hz)	5 ~ 200k	5 ~ 200k	5 ~ 200k	1 ~ 1M	5 ~ 200k
Gain	--	× 1 , × 10	× 0.1, × 1 , × 10	--	-20 dB, 0 dB, 20 dB, 40dB
Polarization Voltage	0 V	0 V	0 V	200 V or 0 V	200 V or 0 V
Output Power for Preamplifier	4 mA	4 mA	4 mA	28 V	28 V or 120 V
Power Supply	1 × 9 V Battery or 19 V/500 mA	19 V/500 mA	19 V/1 A	12 V/400 mA	12 V/1 A
Filter	--	--	--	--	Lin, AW, HP, Dir
Operating Temperature (°C)	-10 ~ 50	-10 ~ 50	-10 ~ 50	-10 ~ 50	-10 ~ 50
Operating Humidity (RH)	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%	0 ~ 95%
Dimension (mm)	113 × 70 × 45	113 × 70 × 45	310 × 250 × 65	113 × 70 × 45	260 × 60 × 150
Weight (g)	160	160	1500	190	1130

BSWA

Surface Microphone

MPS426

MPA426 is a low-cost surface microphone for aerodynamic noise measurements. It is widely used in ground vehicle and aerospace to investigate the wind induced noise. It can be easily mounted on surfaces using double sided adhesive tape.

The MPS426 has ICCP preamplifier and can be connected to any ICCP input channel. It has 5 m cable with SMB connector.

The MPS426 has a high sensitivity of 50mV/Pa and a flat frequency response between 20 Hz and 20 kHz.

The TEDS version of MPS426 is also available. It has a built-in TEDS chip written with such information as model, serial number, sensitivity, reference frequency, and etc.

SPECIFICATIONS

Surface Micophone & Probe Microphone	
Model	Surface Microphone MPS426
Front Microphone	--
Optimized	Free Field
Open-circuit Sensitivity	-26 dB ± 2 dB
Inherent Noise	29 dBA
Dynamic Range	127 dB
Frequency Response	20 Hz ~ 20k Hz
Power Supply	ICCP
Operating Temperature	-10℃ ~ 50℃
Diameter	60 mm
Thickness	7.5 mm
The length of cable	5 m
Calibration level	113.8 dB with CA 111 and adaptor
Front probe	--
Connector	SMB

TEDS Reader & Writer

TR100

TEDS stands for the Transducer Electronic Data Sheet as defined in IEEE 1451.4 standard.

BSWA TEDS Reader and Writer TR100 are designed especially for TEDS Microphones that meet IEEE 1451.4 standard. TR100 can read, write and rewrite the information in the TEDS microphones.

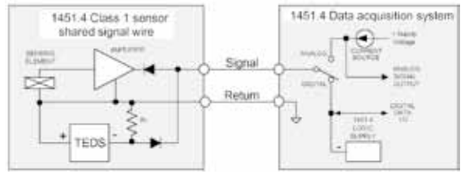
TR100 Features

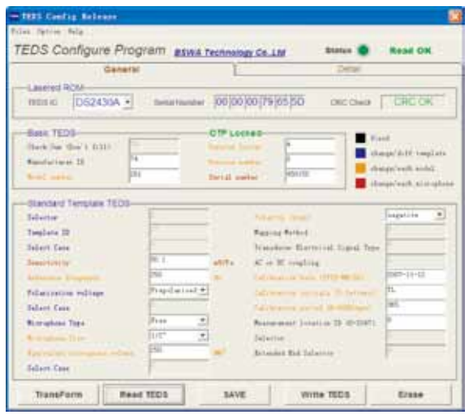
- Compatible with IEEE1451.4 standard
- Support Template 27 (Microphones with built-in preamplifier)
- USB connector
- Identify TEDS chips automatically.

TR100 can read and write the following electronic data

- Manufacturer ID
- Product Type #, Serial #, and Version #
- Sensitivity (mV/Pa)
- Reference Frequency (Hz)
- Polarization Type (Prepolarization or 28V/200V)
- Microphone Type (Free-field, Pressure-field, Diffuse-field, and others)
- Microphone Diameter (1″, 1/2″, 1/4″, 1/8″)
- Equivalent Air Volume
- Polarity
- Calibration Information (Calibration date and period of validity)

BSWA TEDS Microphones are with the combination of BSWA ICCP microphones and TEDS preamplifiers. TEDS microphones help to facilitate plug and play and shorten system's setup time.





Sound Intersity Probe

SI512

SI512 Sound Intensity Probe is built using ICCP type preamplifiers. SI512 is fitted with remote-control functions. It complies with IEC 1043 Class 2 Standard. Based on the technique of simultaneous determination of sound pressure and particle velocity by two closely spaced microphones, SI512 can be directly connected to ICCP inputs. With an USB end connected to the PC, SI512 can be remotely controlled to perform sound intensity measurements.

FEATURES

- ICCP® powered
- Remote-control functions
- Two BNC connectors for easy connection
- Accurate phase matched microphones
- Face to face configuration
- 1/3-octave centre frequency ranges: 63 Hz to 5 kHz
- Well-defined acoustical microphone separation.

SI512 comprises a robust frame which holds two ICCP preamplifiers and matched microphones in a face-to-face configuration. The distance between microphones is defined by solid, plastic spacers. Sound is constrained to act on each microphone through a narrow slit between the spacer and the microphone grid. This gives well-defined acoustic separation of the microphones and minimizes shadow and reflection effects.

Phase matching of 1/2″Microphone Pair selected from Type MP231 is better than 2 degrees in full test frequency range from 45 Hz to 6000 Hz. The normalized microphone frequency responses differ by less than 0.5 dB. SI512 is supplied with 8.5 mm, 12 mm and 50 mm spacers.

Each probe is individually calibrated in the anechoic chamber; the calibration data include phase matching, microphone sensitivities and actuator responses.

SPECIFICATIONS

Sound Intensity Probe SI512	
Standard	IEC 1043 Class 2
Frequency Range (1/3 Octave)	8.5 mm Spacer: 250 Hz ~ 5000 Hz 12 mm Spacer: 160 Hz ~ 5000 Hz 50 mm Spacer: 63 Hz ~ 1250 Hz
Weight	0.4 kg
Output Connectors	7-pin Lemo in the Probe
Cable to ICCP inputs	5 m cable with Lemo to 2 BNC connectors
Case Dimensions	400 x 200 x 70 mm
Microphone Pairs	
Microphones	Selected Type 1 MP231 for intensity microphone pair
Preamplifier	BSWA Type MA221 preamplifier
Diameter	1/2 inch
Response	Free Field
Combined Sensitivity	40 mV/Pa
Microphone Phase Response Difference	<0.3°, 45 Hz ~ 500 Hz <1°, 500 Hz ~ 2500 Hz <2°, 2500 Hz ~ 6000 Hz
Amplitude Response Difference (Ref 250 Hz)	< 0.5 dB ; 45 Hz ~ 6000 Hz
Equivalent Air Volume(250 Hz)	46 mm^3
Temperature Coefficient (-10 ~ 50℃)	-0.012
Humidity Influence	< 0.1
Pressure Coefficient (250 Hz)	-0.004 dB/kPa
Dimensions	IEC61094-4 Type WS 2

The remote-control function of SI512 can comply directly with such intensity system as BSWA, Müller-BBM, and etc.

Outdoor Microphones

OM231/ OM416

Outdoor microphones are for outdoor uses such as the outdoor acoustic measurement or community and traffic noises monitoring. BSWA outdoor microphones are fitted with a windscreen, a rain protection, and a bird spike to protect them from wind, rain, snow and other atrocious weather. An adaptor pole is also included in the package which helps to connect the outdoor microphone to a camera and which also plays a role for protectng the cable.

BSWA outdoor microphones can be calibrated by a pistonphone by removing the windscreen and the rain protection.

The directional angle is 0° for airport noise monitoring and 90 ° for community and traffic noises monitoring.

OM231 is 1/2 inch prepolarized condenser outdoor microphone. It is suitable for use in rainy days or in an environment at very high or very low temperature. OM231 uses IEC 61672 CLASS 1 measurement microphone which is outstanding for its stability. It is the best choice for permanent outdoor use such as the airport noise monitoring.

OM416 is a low-cost outdoor microphone. It uses1/4'' ICCP microphone, which makes it suitable for 0° and 90 ° measurements. The OM416 is designed with disposable microphone concept. The microphone is easily removed and replaced after about six months of outdoor uses.

SPECIFICATIONS

Outdoor Microphones		
Model	OM231	OM416
Sensitivity	40 mV/Pa	50 mV/Pa
Microphone Diameter	1/2''	1/4''
Frequency Response	20 Hz ~ 20 kHz	20 Hz ~20 kHz
Dynamic Range (3% Distortion Limit)	17 ~136 dB	29 ~127 dB
Polarization Voltage	0 V	0 V
Power Supply	4 mA	4 mA
Calibration Sound Press Level	94 dB	94 dB
Reference direction	0° or 90°	0° or 90°
Output Connector	BNC	SMB
IEC 61672	Class 1	Class 2
Temperature (℃)	-30 ~ 80	-10 ~ 50
Humidity (RH)	0 ~ 95%	0 ~ 95%

BSWA SM4000 series phantom powered studio microphones are for precision recording and measurement of sound with no color added. They can be used to record essentially any instrument for a truly accurate representation of the original sound. Each SM4000 microphone is supplied with its individual calibration chart with frequency response and sensitivity data. Its modular design allows the preamplifier to be used with any of the high quality BSWA microphone capsules.

SM4201 microphone is top of the line. It is suitable for the most critical recording applications requiring extreme performance and environmental stability. Its nickel alloy construction ensures durability and outstanding performance. The electronic circuitry coupled with a transformerless output stage provides a flat frequency response across the entire audio bandwidth while at the same time achieving an extremely low noise floor.

SM4215 microphone is a top performer that uses the same preamplifier as the SM4201. It has the same flat frequency response out to 12.5 kHz stemming from its nickel alloy diaphragm. It is a great choice for accurate acoustic recording requiring a large dynamic range.

SM4216 microphone offers an economical choice with incredible performance. Its polymer diaphragm and copper housing yields a flat frequency response out to 16 kHz with excellent dynamic range and low noise floor. It is a proven performer for the price.

SM4418 microphone is 1/4" recording microphone. It has a flat frequency response out to 16 kHz with excellent dynamic range and low noise floor. Its impulse response and polymer diaphragm settling time is exceptional. Its sound is uncolored and it has no handling noise.

SPECIFICATIONS

Studio Microhones				
Model	SM4201	SM4215	SM4216	SM4418
Microphone Capsule	MP201	MP215	MP216	MP418
Linear Frequency Range	20 Hz ~ 20 kHz	20 Hz ~ 12.5 kHz	20 Hz ~ 16 kHz	20 Hz ~ 16 kHz
Sensitivity	40 mV/Pa	30 mV/Pa	25 mV/Pa	8 mV/Pa
Max. SPL for 3% THD	130 dB	130 dB	135 dB	135 dB
Equivalent Noise Level	18 dB (A)	25 dB (A)	21 dB (A)	32 dB (A)
Output Impedance	200 Ω			
Max. Output Voltage	4.5 Vrms (load > 2000 Ω); 1.0 Vrms (load =1000 Ω)			
Connector	XLR			
Phantom Power	25 V ~ 48 V (current 3 mA)			
Weight	160 g			
Polar Pattern	Omni Directional			
Modular parts				
SMA4000P	Phantom Powered Preamplifier for SM4000 Series Microphones			
SM4000 K	Microphone Kit includes SMA 4000P, MP201, MP215, and MP216			

CA111/CA114/CA115 is small sound source for calibrating measurement microphones, sound level meters, and other sound measurement equipments. The calibrator can be used on 1/2-inch and 1/4-inch microphones with adaptor.

CA111 conforms to IEC 60942:2003 Class 1, ANSI S1.40-1984 and GB/T 15173-1994.

CA114/115 conforms to IEC 60942:2003 Class 2 standards.

APPLICATIONS

- Calibration of measurement microphones, sound level meters, and other sound measurement equipments.
- Checking the linearity of equipments.

FEATURES

- Conforms to IEC60942:2003 Class 1/Class 2, ANSI S1.40-1984, and GB/T 15173-1994.
- 1 kHz calibration frequency for all weighting networks.
- CA111: Dual 94 & 114 dB sound pressure level outputs.
- CA114: 94 dB sound pressure level outputs.
- CA115: 114 dB sound pressure level outputs.
- Calibration accuracy ± 0.3 dB.
- Designed with highly stable level and frequency.
- CA111 for two-keypad operation and CA114/115 for one-keypad operation.
- Fits 1/2” microphones and 1/4” microphones with adaptor.
- Powered by 2×AAA battery and automatic power off to conserve battery life.

SPECIFICATIONS

Sound Calibrators		
Model	CA111	CA114/CA115
Standard	IEC60942:2003 Class 1, ANSI S1.40-1984, GB/T 15173-1994	IEC60942:2003 Class 2, ANSI S1.40-1984, GB/T 15173-1994
Sound Pressure Level	94.0 dB ±0.3 dB and 114.0 dB ±0.3 dB	94.0dB/114.0 dB ±0.3 dB
Frequency	1000Hz ±0.5%	
Microphone Diameter	According to IEC61094-4: 1/2” & 1/4”	
Harmonic Distortion	<2% Stabilization Time: <10 s	
Equivalent Free-field Level	-0.2 dB for 1/2” Microphones	
Equivalent Random Incidence Level	+0.0 dB for 1/2”, 1/4”	
Reference Conditions	Ambient Temperature: 25°C (77°F) / Ambient Pressure: 101.3 kPa / Humidity: 55% RH / Effective Load Volume: 250 mm^3	
Environmental Conditions	Temperature: -10°C-50°C (14°F -122°F) Pressure: 65 kPa to 108 kPa Humidity: 10 to 90%RH (non-condensing)	
Power Supply	Batteries: 1.5 V LR6 (AA battery) × 2 Lifetime: Typically 40 hours with alkaline batteries at 25°C (77°F)	
Dimension	48 × 70 × 70 mm	
Weight	180 g, including batteries	

High Sound Pressure Calibrator/Full Frequency Coupler/ Low Frequency Coupler

CA915 / CA916 / CA917

CA915 is a high sound pressure calibrator using the comparison method. The built-in compression driver delivers up to 164 dB at a small cavity. Two 1/2" (or 1/4" with the adaptor) holes where the reference and test microphones are installed were connected to the cavity. The sound pressure levels were measured simultaneously by the reference and test microphones. The comparison was made between two microphones and calibration value was then obtained. The compression driver can handle the frequency from 2 KHz to 10 kHz and it is possible to calibrate the microphone at multi-frequencies.

The MKV451 (optional item) is recommended as the reference microphone with upper-limit of 167 dB. A power amplifier (SWA100) is also required to drive the CA915.

SPECIFICATIONS

High Sound Pressure Calibrator CA915	
Working Principles	Comparison Method
Test Objects	1/2'' and 1/4''
Build-in Loudspeaker	280W Compression
Max output SPL	> 154 dB SPL @ 2000 ~ 10000 Hz > 164 dB SPL @ 2000 ~ 2500 Hz, 6200 ~ 6600 Hz
Frequency response	2 kHz ~ 8 kHz
Connector for Input	BNC
Net weight	14.5 Kg

CA916 The comparison method plays an important role in frequency response measurement, especially for nonmetal diaphragm transducer which cannot be tested by electrostatic actuator. Nonmetal diaphragm transducer can only be tested in direct method or the comparison method. Since the direct method is more susceptible to the environment, we have to turn to the comparison method which can eliminate the environmental effect.

The BSWA full frequency coupler CA916 is designed based on the comparison method. A 1/2〃 microphone is mounted inside the housing of the coupler as a reference. Properly designed cavity ensures that the sound pressure on the DUT transducer diaphragm is the same as the one on the reference microphone. The measurement frequency range is from 20~20K Hz.

SPECIFICATIONS

Full Frequency Coupler CA916	
Working Principles	Comparison Method
Test objects	1/4″ or 1/2″ microphone
Frequency response	20 ~ 20k Hz
Size	110 × 95 × 90 mm
Net weight	1.2 Kg
Build-in Loudspeaker	0.8 W
Coupler Volume	1.13 cm^3
Reference Microphone	MPA231

CA917 low frequency coupler is a sound source design for frequency response measurement of sound level meter and microphone. It meets the requirement of low frequency measurement which described in GB/T 3785.1, JJG 188 and IEC 61672.1. The frequency range can be down to 3.15Hz with less than 1% THD+N. Thanks to the professional acoustic design, the cavity resonant frequency is increase to approx. 800Hz to keeps flat response at low frequency range. 3.15Hz~100Hz flatness is 0.3dB even without calibration, above 100Hz need calibration with standard microphone.

CA917 use high quality 4-inch aluminum-magnesium alloy diaphragm speaker with internal fix in order to lower the speaker vibration. Signal input connecter is BNC. Sound level meter or microphone can be easily fixed with the adjustable support. Adapter AD004 (1-inch to 1/2-inch) is include in the CA917 and AD002-1/4 (1/2-inch to 1/4-inch) is option.

SPECIFICATIONS

Low Frequency Coupler CA917	
Microphone	1-inch, 1/2-inch and 1/4-inch microphone (AD002-1/4 is option)
Frequency Response	3.15Hz ~ 500Hz
Sound level	>110dB
Speaker	4-inch aluminum-magnesium alloy diaphragm
Rated Impendence	8Ω
Rated Power	15W
Max Input Voltage	1Vrms
Size (mm)	W380 x H173 x D135
Weight	3.1kg

Electrostatic Actuator/Power /Calibration Stand

EA002 / AS011 / CS012

EA002 is an electrostatic actuator designed and manufactured by BSWA for testing frequency response of microphones. An electrostatic actuator comprises an electric metal plate which can be placed near the microphone diaphragm. A time-various voltage is applied in between the metal plate and the diaphragm and thus an electrostatic force simulating sound pressure can be distributed on the diaphragm surface.

EA002 is especially designed for testing the frequency response of 1'' microphones. It can be placed directly on the diaphragm of a microphone. It also could be used for 1/2'' and 1/4'' microphones with the corresponding adaptor.

EA002 conforms to IEC 61094-6 standard and can be calibrated periodically with a sound level meter in accordance with IEC 61672-3 standard.

SPECIFICATIONS

Electrostatic Actuator EA002	
Standards	IEC 61094-6
Microphone Diameter	1''
Dimension	Φ35 x 17.5 mm
Weight	40 g

AS011 is the electrostatic actuator power supply. It have built-in signal amplifier of 30 dB. It can take the signal directly from a data acquisition card. AS011 can provide an 800V, 200V and 0V DC bias voltage to drive the electrostatic actuator.

SPECIFICATIONS

Electrostatic Actuator Power AS011	
Max. Input Voltage	1 Vrms
Gain	30 dB
Max. Output Voltage	25 Vrms
DC Bias Voltage	800 V, 200 V, 0 V
Frequency Range	3 Hz ~ 200 kHz
Output Impedance	100 Ω
Power Supply	15 VDC/1A
Dimension	275 x224 x 85 mm
Weight	3.4 Kg

CS012 Calibration Stand CS012 is a platform for easy testing the technical specifications of the microphone in various situations.

The hollow pole in the middle of CS012 is used to fix preamplifiers. Square socket under the bottom is designed for cables. Locking devices are of 2 sizes which can be used for both 1/2'' and 1/4'' microhones.

SPECIFICATIONS

Calibration Stand CS012	
Matching Diameter of microphone	1/2″ , 1/4″
Dimension	Φ150 mm × 15 mm (base) Φ20 mm × 145 mm (pillar)
Weight	400 g

BSWA designs and manufactures microphone arrays for acoustical measurements. Our experience spans from simple linear array to complicated random array. The number of microphones in the arrays ranges from 16 to 256 according to the customers' requirements.

Microphones are the most important elements in the array; BSWA uses MPA416 (or MPA466 with TEDS) for 1/4" microphone array. The phases of the microphones are matched according to the customer's specifications. For critical applications where high accuracy and low noise are required, BSWA will recommend MPA231 (or MPA271 with TEDS) as microphone elements

To make the array structurally stable, BSWA uses stainless steel (or aluminum) and CNC cutting to fabricate the mechanical parts.

SPS980 Spiral Array

SPS490 Spiral Array

SPECIFICATIONS

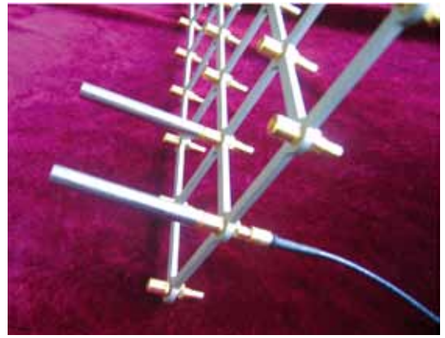
Microphone Arrays			
Model	SPT980	SPS980	SPS490
Type of Array	Spiral	Spiral	Spiral
No. of Microphones	36	36	16
Diameter	1.0 m	1.0 m	0.5 m
Microphone Model	MPA231T	MPA416	MPA416
Dynamic Range	17 ~ 136 dBA	29 ~ 127 dBA	29 ~ 127 dBA
Frequency Range	20 Hz ~ 20 kHz	20 Hz ~ 20 kHz	20 Hz ~ 20 kHz
Phase Match	±2 °	±5 °	±5 °
Cabling	8-pin LEMO - 8 SMBs	8-pin LEMO - 8 SMBs	8-pin LEMO - 8 SMBs

Study of array algorithm is a hot topic in the area of both acoustics and signal processing. BSWA can design and produce the microphone array based on the demands of customers. The following details are required when the customized microphone array is ordered:

- Positions of microphones to be fixed;
- Number of microphone to be used;
- Diameter of microphone to be used;
- Connector type of microphone to be used.

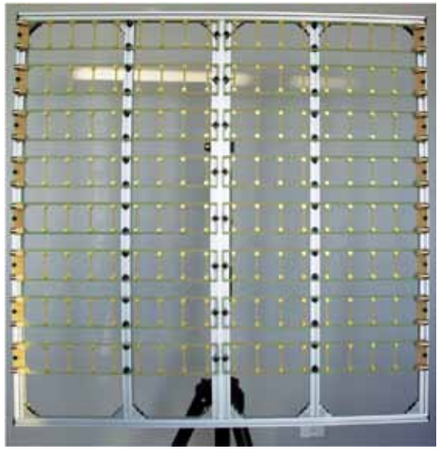
BSWA has the capability to design the mechanical structure, the layout of the cables, and the connector type of the Data Acquisition (DAQ).

To make the array structurally stable, BSWA uses stainless steel (or aluminum) and CNC cutting to fabricate the mechanical parts. The LEMO connectors are used for cables. Each Lemo connector corresponds to several microphones, so that the layout of the cable is very tidy.



Mechanical structure of microphone array with 8×8 channels

Part of microphone array with 6 channels, Lemo Connector on the end



256-channel rectangular microphone array

Microphone Spherical Surface Fixture for Sound Power

MF720 / MF710

In the measurement of sound power level according to ISO 3745-2003, the 20 measurement positions are required on a spherical measurement surface enveloping a noise source in anechoic and hemi-anechoic room. However, it is difficult to mount 20 microphones on tripods in a spherical surface.

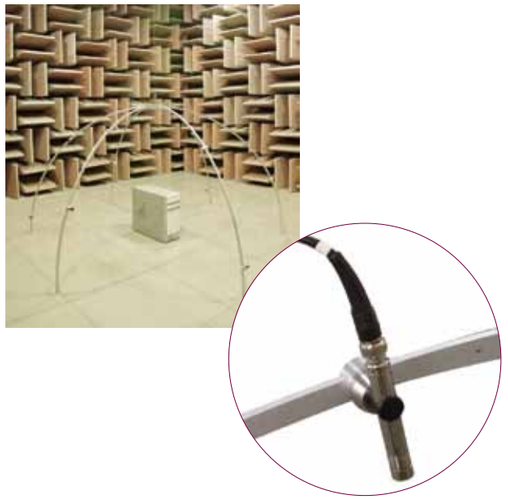
BSWA developed MF720 (and MF710) microphone fixture specifically for such measurements. MF720 is designed according to ISO 3745-2003 to mount 20 microphones over the spherical surface; MF710 is a 10 positions version according to ISO3745; ISO7779 and GB6882.

MF720/ MF710 Main Features

- 20 / 10 microphone positions
- The position and orientation of each microphone can be adjusted to fit the amendment of the ISO standards
- Portable with light weight and the parts can be disassembled for easy transportation

BSWA can supply the Sound Power Testing System which Consists of

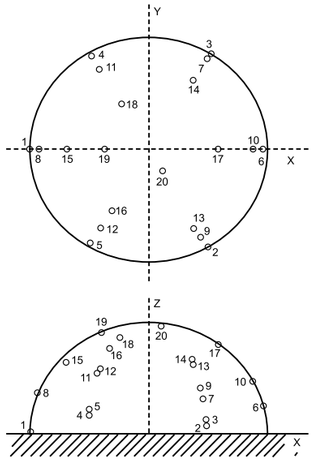
- MF710 /MF720 Spherical Surface Fixture and Microphones
- Data Acquisition Instrument(10-channel DAQ MC38102 OR 20-channel DAQ MC38200)
- Software(PC、VA-Lab10 BASIC+VA-Lab10 Power OR PowerVA-Lab20 BASIC+VA-Lab20 Power)



Microphone Mounting for MF710 and MF720

SPECIFICATIONS

Microphone Spherical Surface Fixture for Sound Power Testing		
Model	MF710	MF720
No.of Microphone Positions	10	20
Standards	ISO7779, GB6882-88; ISO3475-1982	ISO3745-2003
Radius (microphone positions)	1.0 mm	1.0 mm
Microphone Size to be Fixed on	1/2 inch	1/2 inch
Carrying Case	1500 × 350 × 200 mm	1500 × 350 × 200 mm
Weights	10 Kg	11 Kg
Optional Items		
MPA231 1/2" ICP Microphones	20	10
CBB 020 20 m BNC cables	20	10



Microphone positions for MF720

16-channel Microphone Array System

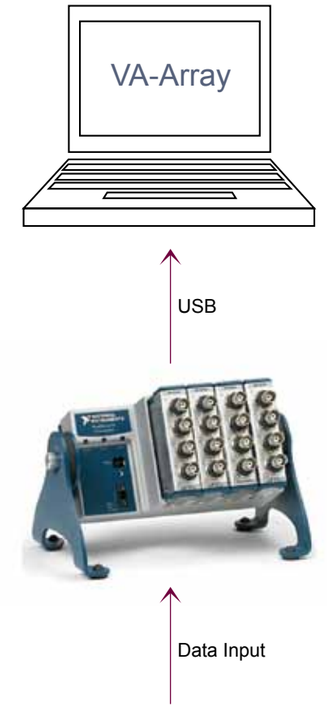
SPS490S

BSWA has just released its 16-channel array system. This system is developed based on the latest beam-forming theory. The array fixture is equipped with a camera, this make it possible showing the photo of the tested object and the real-time testing result on same graph.

The spiral design of the array can not only locate a stationary noise, it can also track a moving noise. The acquisition time resolution can be 0.04s to capture a transient or fast moving noise

Features:

- Using a laptop as a data processing platform makes it a portable sound source localization array system
- Modular components, easy to set up, light weighted
- Can be used with USB device that supports Plug and Play
- 16 Professional microphones are used for the array system
- Optical camera of high resolution.
- Efficient, simple, real-time display of noise source



The system is equipped with:

- Software: VA-Array 1.0
- DAQ: 16-channel DAQ: NI CompactDAQ USB Chassis + 4×9234 card / NI 1033 Chassis +4498 card
- Array: SPS490

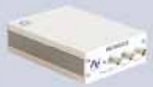
SPECIFICATIONS

SPS490S 16-Channel Array System	
Model	SPS490S
Type of Array	Spiral
No. of Microphone	16
Diameter of the Array Fixture	454 mm
Microphone Model	MPA416
Dynamic Range	29~127dBA
Frequency Range	500~10 kHz
Phase Match	±5 °
Cabling	8-pin LEMO-8 SMB

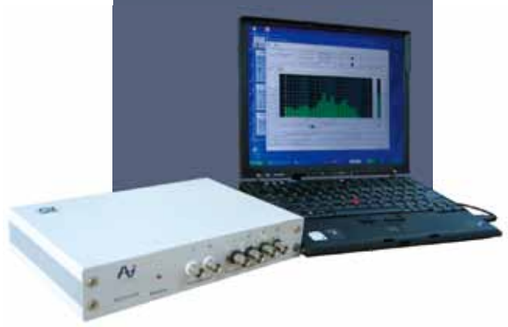
Data Acquisition Hardware

MC3522 / MC3022 / MC3322 / MC3242 / MC3642

The data acquisition hardware produced by BSWA is suitable for collecting data for noise and vibration measurement. The input channels supply ICCP power current. It is very convenient to be used with all kinds of ICCP type microphones or other sensors. Most BSWA data acquisition hardware has output channels, and can be used for audio and impendence measurements.

Model	MC3522	MC3022	MC3322	MC3242	MC3642
Photos					
Input Channels	2	2	2	4	4
Max. Input Voltage (Vrms)	1	2	10 (x 0.1), 1 (x 1), 0.1 (x 10)	3.6	3.6
ICCP Power Supply (mA)	4	4	4	4	4
Output Channels	1, with 20W power amplifier	1	2	2	2
Max. Output Voltage (Vrms)	1.0	1.0	1.85	1.0	1.0
Standards (IEC 61672)	Class 2	Class 2	Class 2	Class 1	Class 1
Input Connector	BNC	BNC	BNC,4mA/24V ICCP power supply (can be closed)	BNC	BNC
A/D Converter (bit)	16/24	16/24	16/24	24	24
Max. Sampling Frequency (Hz)	44.1k	44.1 k	8k / 16k / 3k2 / 44.1k / 48k / 96k	51.2 k	51.2 k
Gains	--	--	x 0.1, x 1, x 10	--	× 1, × 10, × 100
Internal Noise (dBA)	35	35	16dB(A) (20dB gain, external power supply)	30	18
Frequency Response (Hz) (Ref: 250 Hz, +0.5 dB/-1.0 dB)	20 ~ 20 k	20 ~ 20 k	6.3Hz ~ 46kHz (±0.5dB)	20 ~ 20 k	20 ~ 20 k
Measurement Range (dBA) (MP201)	35 ~ 125	35 ~ 125	24dBA ~ 140dBA (According to the IEC61672)	30 ~ 130	18 ~ 130
Connector to the Computer	USB	USB	USB	USB	USB
Power Requirement	USB (220 V or 110 V when power amplifier works)	USB	external power supply (7V~14V/500mA), USB power supply (5V/500mA)	USB	220V (with power adaptor)
Size (mm) (Length×Width×Height)	280 × 230 × 90	160 × 120 × 45	W170 xH43 x D125	240 × 190 × 50	280 × 230 × 90
Weight (g)	4000	610	640	1350	3600

BSWA



VA-Lab is acoustical measurement software developed by BSWA. VA-Lab takes the advantage of computer power and performs all signal analysis within the computer. With BSWA Data Acquisition Hardware and Microphones, VA-Lab represents the most cost-effective solution for all your needs in acoustic measurement and analysis.

VA-Lab is developed based on the international standards and BSWA's experiences in acoustics. These experiences cover environmental, architectural, material and industrial measurements. VA-Lab has module design with special applications according to ISO standard requirements, such as Sound Power, Sound Insulation, and Impedance Measurements.

The VA-Lab Main Application Modules Include:

- BASIC: FFT based signal analysis for vibration and acoustics
- ENV: Sound pressure level and environment noise measurements
- IMP: Two or four microphone methods for absorption and TL measurements in Impedance tube according to ISO10534
- SI: Sound intensity measurements
- REV: Reverberation time measurements according to ISO3382
- TL: Sound Insulation measurements for building material according to ISO 140.
- POWER: Sound Power Measurements according to ISO3745.

Environment Module

VA-Lab ENV is a powerful sound level meter. It supports maximum 10 channel sound pressure level measurements at 10 locations. Each channel can perform multi-task analysis such as statistical levels, 1/3 octave, and levels vs. time.

VA-Lab ENV has built-in data logger function, it can continuously log the overall and spectral data into the memory.

Impedance Tube Module

Impedance Tube Module is for impedance tube measurements. It supports sound absorption and sound insulation measurement for BSWA SW series impedance tubes. The software works with BSWA MC3022, MC3522, MC3242 and MC3642 hardware for data acquisition and analysis.

VA-Lab IMP supports two methods to measure the absorption coefficients of material:

- Method using Standing Wave Ratio (ISO10534-1)
- Transfer Function Method (ISO10534-2)

Sound Intensity Module

The measurement of Sound Intensity provides information of magnitude and direction of the sound field, which is used in a variety of applications such as the determination of sound power and the noise source localizations.

VA-Lab SI module provides a simple system for sound intensity measurements. The system requires two-channel (or two channels of multi-channel) data acquisition hardware and intensity probe SI512. With BSWA VA-Lab SI module, the measurements of sound intensity become very easy task.

Sound Power Module

In order to determine the sound power level produced by the noise source, one method is to measure the sound pressure level on the measurement surface enveloping a noise source.

VA-Lab Power module is specially designed to satisfy sound power level test according to ISO3745. With NI Compact DAQ and BSWA microphones, the noise level can be tested simultaneously in 10 channels; the sound power level is calculated automatically based on the measurement surface area.

With microphone conditioning unit MC104 (MC1010 is 10 channel version), the background noise can be below 20 dBA for some critical measurements.

Architectural Module

VA-Lab ARCH module provides reverberation time measurements and sound transmission loss measurements according to ISO standards. The main features of VA-Lab ARCH are as follows:

- Two methods: interrupted noise, impulse response measure reverberation time in 1/1 or 1/3 octave frequencies according to ISO 3382
- Sound pressure decay curves display, support user-defined reverberation time calculation
- Airborne sound insulation of building elements Measurement
- Measurements of impact sound insulation of floors
- Automatically calculate single-number quantity: Rw, Xw, and its spectrum adaptation

Impedance Tube

SW420 / SW470 / SW422 / SW477 / SW420R

BSWA SW series Impedance Tubes can accurately measure sound absorption coefficients and impedance according to relative ISO and ASTM standards. They also support the sound transmission loss measurements based on the Transfer Function Method. The Transfer Function Method separates the incident and reflected energy from the measured transfer function, and then estimates the acoustic properties of the tested sample installed in the tube.

SW422

SW420R

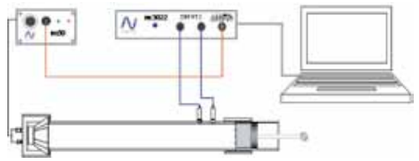
SW477

The SW ISO 10534-2 and ASTM standards series Impedance Tubes are specially designed to work with the cut samples. The small size and durable aluminum construction make it easy to be transported for field use.

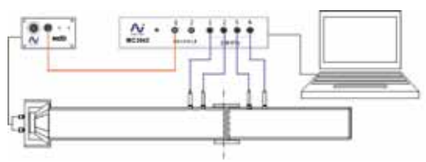
ISO 13472-2: 2010 specifies a test method for measuring in situ the sound absorption coefficient of road surfaces with impedance tube. This method enables evaluation of sound absorption characteristics without damaging the surface. SW420R is designed according to ISO 134722, and the performance satisfies the requirement of ISO 13472. The test results can be used to qualify the absorption characteristics of road surface for vehicle, tyre testing and other traffic noise studies. However, the field of application is limited to low absorption surfaces, such as those in accordance with ISO 18044. The method is not reliable if the measured sound absorption coefficient exceeds 0.15.

The use of SW420R is the same as description in ISO 10534, VA-Lab IMP module can be used with SW420R.

BSWA offers the complete set of Impedance Tube system, which includes: the tubes, microphones; DAQ hardware and measurement software.



Impedance Tube System for Sound Absorption Measurement



Impedance Tube System for Transmission Loss Measurement

SPECIFICATIONS

Impedance Tube				
Model	SW420	SW470	SW422	SW477
Value to be Measured	Sound Absorption Coefficient (α)		Sound Absorption Coefficient (α) and Transmission Loss (TL)	
Standard	GB/T-18696, 2-2002, ISO10534-2, 1998 ASTM E1050-08, ISO 13472-2 (SW420R)		Sound Absorption Standard: GB/T-18696, 2-2002, ISO10534-2, 1998; ASTM E1050-08; ASTM E2611-09	
Frequency Range (Hz)	63 ~ 1800	800 ~ 6300	63 ~ 1800	800 ~ 6300
Inner Diameter of Testing Tube	100 mm	30 mm	100 mm	30 mm
Loud speaker	4 “ in diameter, 20 Watts, 8 Ohm			
Optional Items Provided by BSWA				
1/4” Microphone	MPA416			
Data Acquisition Card	MC3022+PA50 or MC3622		MC3242	
Power Amplifier	PA50			
Software	VA-Lab2 Basic + VA-Lab2 IMP-A		VA-Lab4 Basic + VA-Lab4 IMP-AT	

Small Reverberation Chamber

R-Cabin

R-Cabin is a small reverberation chamber which can be used to measure the sound absorption of materials for automotive industries.

R-Cabin FEATURES

- Appropriate for measurement of sound absorption characteristics of small and irregular samples, such as car seat, roof panel, carpet and etc.
- The size of the tested sample can be up to 3 square meters
- Frequency range: 400~10000Hz

APPLICATIONS

- Designing and optimization of the inner-car decoration acoustic system.
- Testing of the sound absorption coefficients of the inner-car items.
- Quality Control of the tested items
- R&D of new materials and new items.

R-Cabin small reverberation chamber uses steel panes in its structure. The sound absorption quantity of the empty cabin is small to ensure the accuracy of the testing of the Sound Absorption Coefficients of the samples. R-Cabin has exceptional sound insulation characters so that the outer noises have no effects on the testing.

The bottom of R-Cabin is designed to be vibration -resistant. There are four wheels fixed to the cabin for easy movement. There are two omni-directional loudspeakers on the upper and base corners in the cabin individually as the sound sources. There are four microphones to make reverberation time measurements.

The System Consists of

- R-Cabin
- 4-Channel Data Acquisition and sound generator instrument MC3242 or MC3642
- 4 sets of microphones MPA 231
- 2 sets of OS002 sound source
- Audio Amplifier SWA-100
- VA-Lab software
- Standard samples for checking the measurement

Measurement System

R-Cabin is equipped with a complete set of measurement system. The system emits pink noise to drive the two sound sources in the cabin and receives the signals from the four microphones. The reverberation time from the four channels is calculated automatically. The whole calculation is controlled by the computer for easy the operation.

Together with the R-Cabin, BSWA also provides standard testing samples. With the certified results, the customers can use the standard samples for reference measurements.

SPECIFICATIONS

Small Reverberation Chamber R-Cabin	
Parameter to be tested	Sound Absorption Coefficients, Reverberation Time
Testing Channel #	4
Noise Generator Channel #	2
Frequency Range	400 Hz ~ 10000 Hz
Max. Sample Size	2.3 x 1.7 m
Inner Size	2.6(Length) x 1.9(Width) x 1.95 m (Height)
Door Size	0.8 x 1.3 m
Weight	4000 Kg

Audio Testing Software

VA-Audio

VA-Audio is a software module for characterizing the performance of electro acoustic products, audio electronics, and transducers. With the simplicity of operation required for production line QC, yet the extensive analysis tools necessary for R&D, VA-Audio is suitable for use throughout the design and manufacturing process.

Acoustic characteristic of product is electrocircuit-independent. The structure of loud speaker is important for its specifications. The best way to get frequency response and the harmonic distortion is by testing. The general method is to use signal generator to control the speaker to make a noise, and to use microphone to capture the noise and then to analysis the result.

BSWA audio test system consists of VA-Audio software, 2-channel data acquisition hardware, and standard microphones. The artificial mouth, artificial ear or Test Box are all optional items for audio measurements.

Main Features of VA-Lab Audio:

- Modes of Operations: Stepped Sine, Frequency Sweep, Multi-tone, and User-defined
- Real-time frequency analysis. Frequency response, THD, and Impedance test in one time
- Support autocontrol. With USB control, software can start or stop automatically which is very convenient for online test.
- Test result can be saved and counted automatically
- Supports maximum 30th order of harmonic distortion. User-defined distortion components can be calculated in one test
- Automatic adjustment for output signals to make flat response of sound sources.
- Support Directionality Test, With BSWA turntable, software can control the rotate speed and test every frequency one by one or together
- Phase test

Artificial Ear & Mouth Simulators

AM012 | AE002 | AE711

AM012

BSWA mouth simulator AM012 is developed for use in the testing of telephone, cell phone and other electro-acoustic parts where a sound field similar to the human voice field is required. AM012 produces a continuous output of 94 dB (200~8000Hz) at MRP (25mm from lip ring) and a continuous SPL of 110 dB (200~2000Hz) at MRP.

AM012 conforms to standards IEEE 269, IEEE 661 and ITU-T Rec. P51.

SPECIFICATIONS

Mouth Simulator AM012	
Standards	IEEE 269,661; ITU-T P.51
Output SPL	94 dB (200-8000Hz), 110 dB (200-2000Hz)
Opening Size	20mm in diameter
Source	8Ω/20W
Dia.of lip ring	40 mm
Height of lip ring	10 mm
Size	Diameter:100 mm; Height:98 mm
Weight	1.1 Kg

AE002

Human ear has a very complicated construction. Artificial ear is a receiving device in conformity to the human ear.

BSWA AE002 is designed for receiving response measurements. The design is based on the specifications in the standards IEC60318 and ITU-T P.57. It can be widely used in cell phone, telephone and electro-acoustic parts' testing.

AE711

BSWA ear simulator AE711 is composed of an IEC711 coupler and a press field microphone with pre-amplifier; it can be used for telephone, cell phone and earphone testing.

AE711 conforms to standards IEC711 and ITU-T P.57.

SPECIFICATIONS

Artificial Ear		
Model	AE002	AE711
Conforms standards	IEC60318; ITU-T P.57	IEC711; ITU-T P.57
Microphone (Opt.)	MP251/MP253	MP253
Pre-amplifier (Opt.)	MA231 ICCP	MA221(or MA231) ICCP
Measurement parameter	Refer to MP253/MA211	Refer to MP253/MA221
Size	ø 40 mm x 120 mm	ø 23.8 mm x 36.5 mm
Weight	1.2 Kg	100 g

Ear Speaker Testing Box

ABox260

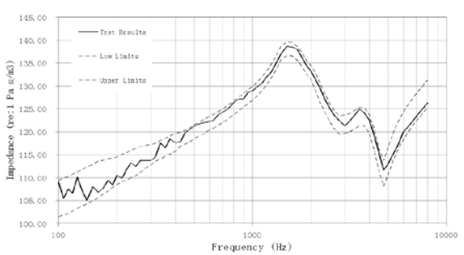
ABox260 is a small anechoic box fitted with modified ITU-T P.57 Type 3.2 simplified pinna simulator. It uses IEC711 artificial ear coupler for testing ear-speakers in the factory environments. ABox260 meets the ITU-T Rec. P.57 Artificial Ear Type 3.2 high-leak requirements.
The box is made of aluminum plate. The internal surface is fitted with BASOTECT sound absorption material. Type 3.2 simulator is fitted on top of the box. The Device Under Test (DUT) can be installed on simulator via the application adaptor.

To reduce the environmental noise, a silencer is specially designed. A linear bearing was used to move the silencer vertically. The DUT will be inside the silencer during the testing.

The pin-connectors are integrated with the silencer. When the silencer is pressed down, the pins will connect to the DUT to perform the testing. The pins also provide the 5-10 N force to the DUT.

SPECIFICATIONS

Ear Speaker Testing Box ABox260	
Standards	ITU-T Rec. P.57 and IEC60711
Size	260 x 250 x 500 mm
Artificial Ear	AE711 with Pressure Microphone MP253 and MA221
Pinna Simulator	Type 3.2 High Leak
Calibration Parameter	Acoustical Input Impedance
Application Adaptor	Customized design
Force on the DUT	5 ~ 10 N
Weight	8 Kg



Acoustical Input Impedance Results of ABox260

FEATURES

- Designed according to ITU-T Recommendation. P.57 “Artificial Ear” (11/2005) Type 3.2 with high-leak simplified pinna simulator.
- Specially designed anechoic box for artificial ear.
- Specially designed silencer to reduce factory noise influence.

APPLICATIONS

- High volume ear-speaker testing based on Type 3.2 high leak ear in factory environments.
- Other product testing which requires Type 3.2 high leak ear

Acoustical Input Impedance

ITU-T P.57 specified the acoustic input impedance of Type3.2 high leak ear. Each box was tested for the impedance and the typical results are shown in the figure.

Loud Speaker Testing Box

ABox380

ABox380 is a small anechoic box fitted with a 1/4 inch microphone. The internal surface is fitted with sound absorption material. It is used for testing loudspeakers of cellphones in the factory environments. The external dimensions are the same as the ABox260. The application adaptors can be ordered for different size and configuration of loudspeakers or loudspeaker assemblies. The DUT is installed on the application adaptor and the presser is moved down to provide 5-10 N force and connections on the DUT. The top panel acts as the baffle as referred to IEC 60268-5 standard.

FEATURES

- Microphone is fixed at the precise position for repeatable measurements
- Microphone distances can be set to 10 mm or 30 mm by changing the front panel.
- Special designed calibration adaptors for calibration of microphone at the defined distance.
- Special design absorption foam in the anechoic box to reduce the reflections
- Each ABox380 was calibrated using Golden samples and comparing with the results of IEC60268-5 method

APPLICATIONS

- High volume loudspeaker testing in factory environments.
- Loudspeaker assembly testing for cellphones

SPECIFICATIONS

Loudspeaker Testing Box ABox380	
Standards	Referred to IEC60268-5
Size	260 x 250 x 500 mm
Internal Size	160 x 170 x 90 mm
Microphone Type	MPA416
Microphone distance	10 or 30 mm
Calibration Adaptors	Two adaptors
Application Adaptor	Customized design
Force on the DUT	5 ~ 10 N

BinauralMic

PRO 750

Binaural recording which can restore the real noise in the car is the most commonly used tool for NVH Engineer. It is a powerful tool for research and improvement of sound quality. Binaural recordings usually require expensive artificial head, and it's not easy to use. The biggest problem is the test cannot carry out on the driver's seat that most of engineer and tester focus on. BinauralMic is popular in recent years recording equipment. The cost is very low compare to the artificial head and easy to use.

FEATURES

- MPA416 microphone with phase matching, TEDS is optional
- Calibration method is same to measurement microphone, calibrator adapter is attached.
- Sealed monitoring level headphone (Germany Ultrasone top professional monitoring headphone), can effectively isolate the ambient noise
- ICCP powered microphone with BNC connector, connect to standard data acquisition equipment
- headphone and microphone cable are independent, easy to change
- Suitable for indoor and outdoor noise measurement

APPLICATIONS

- Record sound for NVH, Analysis of noise
- Two channel recording and playback
- Cabin noise measurements
- Simulation of vehicles on the road

SPECIFICATIONS

BinauralMic PRO750	
Microphone	
Microphone	MPA416 (Prepolarized, need ICCP power supply)
Microphone Diameter	1/4"
Optimized	Free field
Frequency Range (Hz)	20 ~ 20 k
Open-Circuit Sensitivity (mV/Pa) (±2dB)	50
Output Impedance (Ω)	＜110
Dynamic Range (dBA)	29 ~ 127
Inherent Noise (dBA)	＜29
Operating Temperature (℃)	-10 ~ 50
Operating Humidity (%RH)	0 ~ 95
Temperature Coefficient (dB/℃)	15℃ ~ 35℃：＜±0.3 dB 0℃ ~ 40℃：＜±1.5dB -10℃ ~ 50℃：＜±3.0dB at 1kHz, reference temperature 23℃
Humidity Influence	20% ~ 90%RH, ＜±0.8 dB at 1kHz, reference temperature 23℃, humidity 50%RH
Pressure Coefficient (250 Hz) (dB/kPa)	-0.06
Connector	LEMO - 3 Pin, Lemo-BNC cable attached
TEDS	Optional
Headphone	
Headphone	Ultrasone PRO 750
Frequency Range (Hz)	8 ~ 35 k
Impedance (Ω)	40
Sound Pressure Level (dB)	94
Driver	40mm titanium-plated
Weight (g)	364

Mid-Frequency and Low-Frequency Volume Source

VSS210 / VSS058

VSS210 is a mid-frequency volume source. It is ideal acoustical source for reciprocity measurements and TPA analysis. VSS210 uses a power speaker driver to deliver up to 125 dB over the frequency range from 200 to 10,000 Hz. Two phase matched MPA416 microphones is installed at 2 cm apart in the outlet. The microphones provide the sound pressure and phase information for calculating the volume velocity radiated from the outlet.

VSS058 is a low-frequency volume source for analyzing the P/F, P/Q, and TPA. It can also be used for such accurate acoustics electrostatic testing as sound absorption, transmission loss, and SAE.

SPECIFICATIONS

Mid-Frequency Volume Source VSS210 and Low-Frequency Volume Source VSS058		
Standards	NONE	NONE
Nominal Impedance (Ω)	8	8
Power Handling	100 W continuous	200 W continuous
Frequency Range (Hz)	200 ~ 10 k	50 ~ 800
Sound Power Level	120 dB Pink Noise	98dB, 1m from the export
Connector	Audio Connector	SPEAKON Audio Connector
Loudspeaker Unit (W)	Compassion Diver 100	12PR300
Size (mm)	D30 x L300	W380 x H480 x D340
Weight (kg)	5	15.8
Carrying Case Dimensions (mm)	W420 x H420 x D320	W600 x H650 x D450

OS003 is a new style Omni Sound Source designed by BSWA. It uses 12 matched loudspeakers in a dodecahedral configuration. All the loudspeakers units are strictly selected and connected in a series-parallel network to ensure both in-phase operation and matching impedance.

The speaker enclosure is all metal providing a rugged, solid construction resulting in high acoustic performance. The OS003 is compact and about 28cm in diameter, With its high output power, it is an ideal choice for sound insulation, acoustic reciprocity and many other sound source measurements.

PA50 is a single-channel power amplifier with a power at 50W. Designed to be light weighted, PA50 is equipped with protection circuit that other power amplifiers of higher price have.

The PA50 is ideal unit for impedance tube and audio testing.

SWA100 Power Amplifier produces an amazing 100W per channel at 8 Ωfor its incredibly compact size and low weight. It has the same features and protection circuits normally found only in more expensive, larger, and heavier amplifiers. Its two channels can be used independently of each other. The SWA100 is specially designed to use passive cooling removing the need (and noise) of a cooling fan.

SPECIFICATIONS

Omni-Sound Source OS003	
Standards	SO140-3; ISO3382; DIN52210
Nominal Impedance	6 Ω
Power Handling	200W continuous
Frequency Range	100 Hz ~ 16 kHz
Sound Power Level	120 dB Pink Noise
Connector	SPEAKON Audio Connector
Loudspeaker Units	4” Diameter; 8 Ω; 50 W
Diameter	280 mm
Weight	4.5kg without base, 5.3kg with base
Carrying Case Dimensions	500 x 375 x 380 mm
Power Amplifiers PA50	
Audio Power	50 W
Power Supply	220 V/110 V
Dimensions	330 x 210 x 90 mm
Weight	5.6 Kg
Power Amplifiers SWA100	
Audio Power	100 W
Power Supply	220 V/110 V
Dimensions (including case)	495 x 430 x 150mm
Weight	12 Kg

TM003 Tapping Machine is a rugged, self-contained sound source for making footfall noise measurements to the latest international standards (ISO140, EN 20140, ASTM E492, GB J75-84, etc.).

FEATURES

- Five 500g hammers with falling heights of 40mm
- 10 impacts per second
- Solid aluminum base for stable operation
- Reduced machine noise via belt drive
- Long lasting industrial drive motor
- No metal-to-metal moving parts resulting in less wear and smooth operation
- 24V DC power supply via a 220V/110V AC /DC adaptor.
- Remote control with an operating distance of 2 floors.

Principle of Operation

TM003 uses an industrial stepper motor turning five cams via a belt drive for quiet operation. The cams in turn lift the hammers which fall 40 mm to impact the solid and durable base plate at a rate of 5 impacts per second. The base is made from 3/16"(50 mm) solid aluminum making the unit very stable during operation.

Maintenances

Special consideration was given to all the moving parts of the unit. No metal to metal contact is allowed. Teflon washers and spacers are used to guide the hammers, reducing friction, wear, noise, and maintenance.

SPECIFICATIONS

Tapping Machine TM003	
Standards	ISO140, BS5821, GBJ75, ASTM492, EN 20140
Hammers	Five in line, 100 mm between each hammer, single hammer weight 500±10g
Impact Frequency	Each hammer operates at 2Hz; tapping frequency for unit is 10±0.3 Hz
Impact Forces	Equivalent free-fall height of hammers 40 mm
Motor	Stepper Motor
Dimensions	580 145 275 mm
Carrying Case	700 260 400 mm
Net Weight	10 Kg (15 Kg including the case)
Power supply	24V DC power supply via a 220V/110V AC /DC adaptor
Fuse	0.5A
Operating Temperature	-10 ℃ ~ 50 ℃
Operating Humidity	0 ~ 98% RH
STANDARD ITEMS INCLUDED	
TM003	1
Power Supply Adaptor	1
Remote Control	1
User’s Manual	1
4mm L-type wrench	1
Testing Report	1
Carrying Case	1

Octave Sound Level Meter

BSWA308/309

BSWA 308/BSWA 309 are octave sound level meters updating the dual-core (DSP+ARM) architecture to single chip ARM with float point unit, and updating all fix-point calculation to float-point, which significantly improves the accuracy and stability. Re-design analog front end circuit also lower the noise floor and linear range of product.

BSWA 308 is Class 1 and **BSWA 309** is Class 2. Both instruments have certificated by the China CPA (Certification of Pattern Approval) and CMC (China Metrology Certification).

BSWA 308

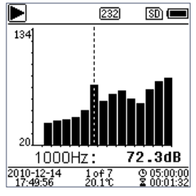
BSWA 309

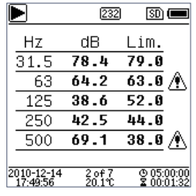
FEATURES

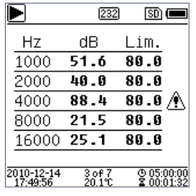
- Class 1 (BSWA 308) and Class 2 (BSWA 309) sound level meter
- Comply with IEC 61672-1:2013, ANSI S1.4-1983 and ANSI S1.43-1997
- 1/1 Octave in accordance with IEC 61260-1:2014 and ANSI S1.11-2004
- Linearity range: 20dBA~134dBA (BSWA 308), 25dBA~136dBA (BSWA 309)
- Single range to cover 123dB/122dB dynamic range
- Frequency weighting: A/B/C/Z. Time weighting: Fast/Slow/Impulse
- 3 profile calculation in parallel with different frequency/time weighting. 14 custom define measurement
- Calculate SPL, LEQ, Max, Min, Peak, SD, SEL, E
- LN statistics and time history curve display
- User define integral period measurement, integral period up to 24h
- High speed ARM core with FPU (Float Point Unit) to achieve wide frequency response, large dynamic range and low noise floor
- 4G MicroSD card (TF card) mass storage
- RS-232 remote control port
- Mini thermal printer for measurement data print
- Internal GPS module (option), support GPS timing.

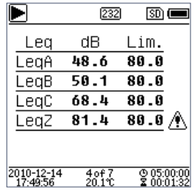
APPLICATION

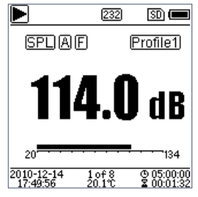
- Basic noise measurement
- Environmental noise assessment
- Product quality check
- Evaluation of noise reduction engineering

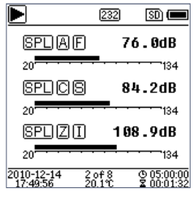


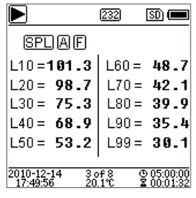


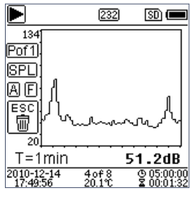


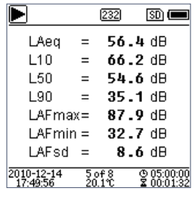


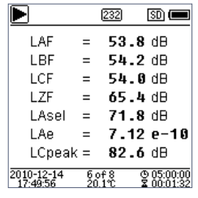












Specifications		
Type	BSWA 308	BSWA 309
Accuracy	Class 1 (Group X)	Class 2 (Group X)
Standard	GB/T 3785.1-2010, IEC 60651:1979, IEC 60804:2000, IEC 61672-1:2013, ANSI S1.4-1983, ANSI S1.43-1997	
Octave[1]	1/1 Octave, Centre Frequencies: 31.5Hz to 16kHz GB/T 3241-2010 Class 1, IEC 61260-1:2014 Class 1 ANSI S1.11-2004 Class 1	1/1 Octave, Centre Frequencies: 31.5Hz to 8kHz GB/T 3241-2010 Class 2, IEC 61260-1:2014 Class 2 ANSI S1.11-2004 Class 2
Supplied Microphone	MPA231T: 1/2" prepolarized measurement microphone, Class 1. Sensitivity: 50mV/Pa. Frequency Range: 10Hz~20kHz.	MPA309T: 1/2" prepolarized measurement microphone, Class 2. Sensitivity: 40mV/Pa. Frequency Range: 20Hz~12.5kHz.
Mic Interface	TNC connecter with ICCP power supply (4mA/24V)	
Detector / Filter	Fully float-point digital signal processing (digital detector and filter)	
Integral Period	1s-24h user define integral period. Repeat time: infinite, 1~9999	
Measurement Functions	$L_{XY(SPL)}$, L_{Xeq}, L_{XYSD}, L_{XSEL}, L_{XE}, L_{XYmax}, L_{XYmin}, L_{XPeak}, L_{XN}. Where X is the frequency weighting: A, B, C, Z; Y is time weighting: F, S, I; N is the statistical percentage: 1~99.	
24h Measurement	Automatic measurement and log the history data	
Frequency weighting	Parallel A, B, C, Z	
Time Weighting	Parallel F, S, I and Peak detection	
Self-noise[2]	Sound: 18dB(A), 23dB(C), 31dB(Z) Electrical: 11dB(A), 16dB(C), 21dB(Z)	Sound: 20dB(A), 26dB(C), 31dB(Z) Electrical: 14dB(A), 19dB(C), 24dB(Z)
Upper Limit[2]	134dB(A) Increase to 154dB(A) with 5mV/Pa Microphone	136dB(A) Increase to 154dB(A) with 5mV/Pa Microphone
Frequency Response[1]	10Hz~20kHz	20Hz~12.5kHz
Level Linearity Range[2, 3]	20dB(A)~134dB(A)	25dB(A)~136dB(A)
Dynamic Range[2]	123dB (11dB(A)~134dB(A))	122dB (14dB(A)~136dB(A))
Peak C Range[2, 3]	45dB(A)~137dB(A)	47dB(A)~139dB(A)
Electrical Input	Maximum input voltage: 5Vrms (7.07Vpeak). Input impedance of preamplifier: >6GΩ	
Range Setting	Single range to cover whole dynamic range	
Resolution	24Bits	
Sampling Rate	48kHz	
Noise Curve	Time domain noise curve display. Duration time: 1min, 2min, 10min	
LCD Display	160x160 LCD with white backlight, 14 step contrast level	
Mass Storage	4G MicroSD card (TF card)	
Post-processing	Post-processing software VA-SLM can read, analyze and generate reports of store data.	
Export Data	Directly connect to the computer to read the memory card (USB disk)	
Output	AC (max 5VRMS output), DC (10mV/dB), RS-232 serial interface and USB virtual serial port	
Alarm	User define alarm threshold. LED indicate the alarm status	
Power Supply	4x1.5V alkaline batteries (LR6/AA/AM3), sustainable use of approx.10 hours (depends on battery). It also can be supply by external DC power (7V~14V 500mA) and USB power (5V 1A)	
RTC	Built-in backup battery has been calibrated at factory to the error <26s in 30days (<10ppm, (25±16) ºC). It can keep RTC running when replacing the main batteries.GPS timing function available (option with GPS module)	
Language	English, Chinese, Portuguese, Spanish, German, French	
Firmware Update	Update firmware via USB port	
Conditions	Temperature: -10ºC ~ 50ºC. Humidity: 20% ~ 90%RH	
RT Temperature	Real-time temperature display on the main screen	
Size (mm)	W70 x H300 x D36	
Weight	Approx. 620g, including 4 alkaline batteries	
Option		
GPS	Receiver Type: 50 Channels; Time-To-First-Fix: Cold Start 27s, Warm Start 27s, Hot Start 1s; Sensitivity: Tracking -161dBm, Reacquisition -160dBm, Cold Start -147dBm, Hot Start -156dBm; Horizontal position accuracy: 2.5m, Timing accuracy: 30ns, Velocity accuracy: 0.1m/s; Update Rate: 1Hz, Operation Limits: Dynamic≤4g, Altitude<50000m, Velocity<500m/s	
Calibrator	CA111, Class 1, 94dB/114dB, 1kHz	
Printer	Mini thermal printer, RS-232 port	

Note:
1.Ignore the measurement result above 12.5kHz for type BSWA 309 alone due to microphone frequency response of Class 2 capsule.
2.The data was measured with 50mV/Pa microphone for BSWA 308 and 40mV/Pa microphone for BSWA 309.
3.Measurement according to GB/T3785 and IEC61672.

Model CBBnnn: BNC to BNC cables used to connect BNC microphones or transducers with date acquisition system or test equipment. Model number indicates cable length (i.e. BB020 for 20 m.)

Model CUBnnn: 10-32 UNF (or M5) to BNC cables commonly used to connect accelerometers or other transducers to acquisition system and analyzers. Model number indicates cable length. Also available are cables suitable for high temperature environments.

Model CSBnnn: SMB to BNC cables used for connecting SMB microphones to acquisition input channels.

Model CUUnnn: 10-32 UNF/M5 to 10-32 UNF/M5 Cables. Also available are cables suitable for high temperature environments.

Model CSSnnn: SMB to SMB Cables.

Model CLL7nn: 7 Pin LEMO female to 7 Pin LEMO male Cables. It is used with MV201 preamplifier.

Model CLS8nn: 8 pin LEMO male to 8 SMB connectors Cable. It is used with the microphone array.

Windscreens

WS002-9/WS004-9: 90mm diameter, spherical windscreen for 1/2″or 1/4″microphones.

WS002-5/WS004-5: 50mm diameter, spherical windscreen for 1/2″or 1/4″microphones.

WS002-3: Elliptical windscreen for 1/2″microphones.

Windscreen for outdoor microphones.

Adaptors for Calibration

AD002-1/2: Adapter from 1/2″to 1″

AD002-1/4: Adapter from 1/4″to 1/2″

Tripods

Tripods-01: It is used for microphones.
Tripods-02: It is used for Sound Level Meters.
Tripods-03: It is used for array.

Microphone Fixing Connectors

FC002/FC004: Used for fixing the 1/2″or 1/4″microphone to the fixture such as tripod with camera thread. It can also help to adjust the position of the microphone on the fixture.

Rain-protection Cap

OM-A02: It can be installed on the 1/2″microphones to protect from rain. When used for 1/4″microphones, an adaptor is needed.

Nose Cone

NC002: Specially designed windscreen for 1/2″microphones exposed to strong winds.

Microphone Adaptors for Preamplifiers

TA042: Adaptor for 1/4’’ microphone and 1/2’’ preamplifier.

TA021: Adaptor for 1’’ microphone and 1/2’’ preamplifier.

Rotation Stand for Microphone

MF701 is a microphone rotation stand designed according to ISO140 and GB19889. It is used for measuring space-averaged sound pressure level in the reverberation rooms. The MF701 rotates the microphones in the cycle motion. The microphones can be fixed on the arm in the MF701. The rotation speed is adjustable from 1 to 10 Rev/min.

Room 1003, North Ring Center
#18 Yumin Road
Xicheng District
Beijing 100029
China
Phone: 86 10 5128 5118
Fax: 86 10 8255 1626
Email: info@bswa-tech.com
Web: www.bswa-tech.com

Version 2015.6