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# VIBRATION TEST SOLUTIONS >>>

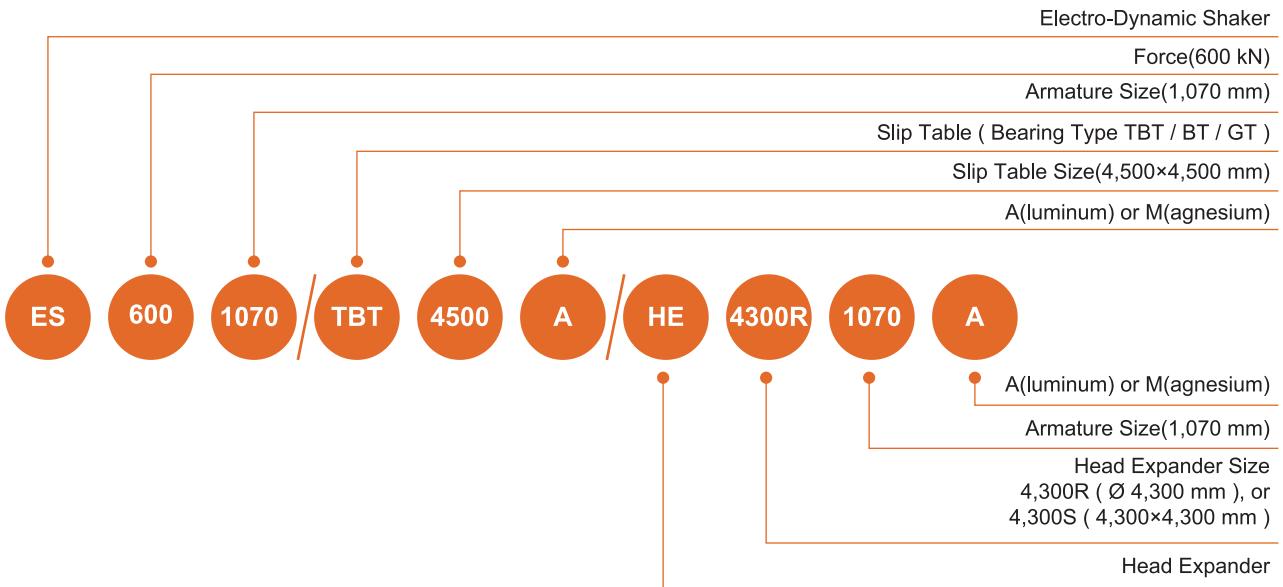
# COMPANY PROFILE

Since 1995, DONGLING's growth and development has attracted the attention of the testing industry worldwide. DONGLING has come to the forefront with its global research and development, technology and production of test equipment and has shown its strength in numerous international projects.

DONGLING has accomplished considerable advancements in reliability and environmental test equipment as well as fatigue and strength test equipment. Our more than 500 products incorporate the latest technologies and satisfy the highest international standards. DONGLING'S products and services are widely used in automotive, aerospace, rail transit, aviation, ship building, defense and the electronics industries. DONGLING is a leading supplier of test equipment and integrated solutions in more than 50 countries.



## System Model



## How to Size Your Electro-dynamic Shaker

Calculate the force requirement for the required vibration test using the following formula:

$$F = (m_0 + m_1 + m_2 \dots + m_x) \times a$$

F = Force (N)

$m_0$  = Mass of Armature

$m_1$  = Mass of Fixture and Head Expander/ Slip Table

$m_2$  = Mass of Specimen

$m_x$  = Mass of Bolts, Thermal Barrier, etc.

a = Acceleration

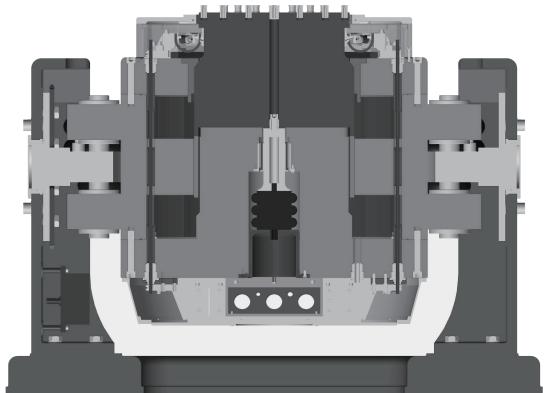
Example Calculation:

Mass of Armature  $m_0$  = 30kg

Mass of Fixture and Head Expander/ Slip Table  $m_1$  = 45kg

Mass of Specimen  $m_2$  = 35kg

Maximum Acceleration a = 196m/s<sup>2</sup>



The required force would be calculated as:

$$F = (30\text{kg} + 45\text{kg} + 35\text{kg}) \times 196.0\text{m/s}^2 = 21,560\text{N}$$

This calculation determines the minimum force required. In actual testing the required force would be 1.2 -1.3 times the minimum calculation depending on the actual test specifications. Therefore the actual minimum requirement would be calculated as  $21,650 \times 1.3 = 28,028\text{N}$ .

Refer to the shaker specifications to determine the shaker that can produce the required force that exceeds the minimum required in the above calculation which is 28,028N.

The ES-30-370 is the smallest shaker that can produce at least 28,028N. The ES-30-370 has a Sine force rating of 30kN.

Remember, it is very important to consider both your current and your future needs when sizing your shaker.

# Tri-axis Electro-dynamic Vibration Test System

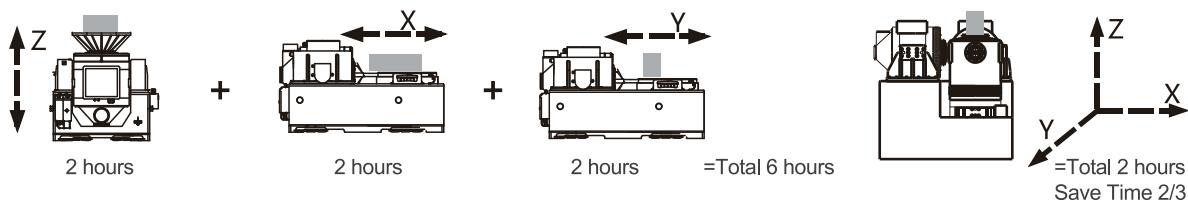


## Description

The DONGLING range of vibration test equipment includes the most advanced 3 axis electro-dynamic test system in the industry. This shaker system can more realistically simulate the dynamic environment of the real world by simultaneously exciting 3 different axis'. Additional benefits of simultaneous 3 axis testing are shortened test time, improvements in complex test analysis and a reduction in under and over testing that occurs when an article is only tested in a single axis. The 3 axis test system utilizes an advance hydraulic bearing to interconnect the 3 individual shakers and limits test article movement to the X, Y and Z axis'.

## Main Features

- Reduce test time – 3 axis testing can reduce test time versus performing 3 tests in a single axis.



- More closely reproduce real world environment. More realistic than single axis shaker testing.
- Interlock Protection – Safe design that will shut down all shakers in the event there is an abort or malfunction triggered on any single shaker to protect the test specimen and the shaker system.
- High frequency range – The functional frequency range is up to 2000Hz or more to offer more choices to test engineers.

## Orthogonal Coupling Bearing Unit(OCBU)

- High Pressure loading of hydrostatic bearing, no metal contact.
- Provides pre-tightening stiffness
- Optimized coupling structure using FEA to ensure low mode.
- Foundry integrated supporting round shape.
- Advanced throttle hole distribution to ensure transmission of force. Oil film surface provides stiffness and durability.



## Technical Parameters

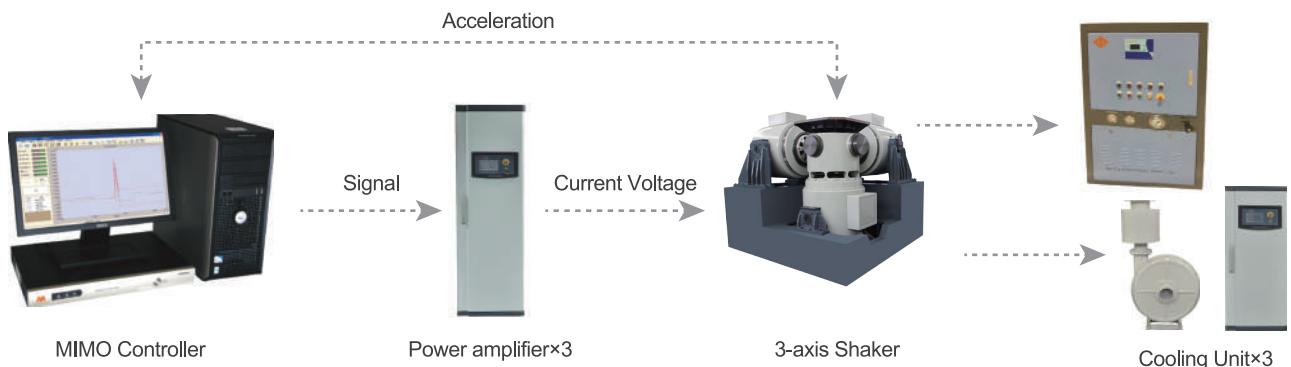
Max. Frequency(Hz)	Sine	1,000
	Random	2,000
Max. Acceleration(m/s <sup>2</sup> )		120
Max. Velocity(m/s)		1.6
Max. Displacement(mm)		51

The 3 axis system is customized based on customer test requirements.

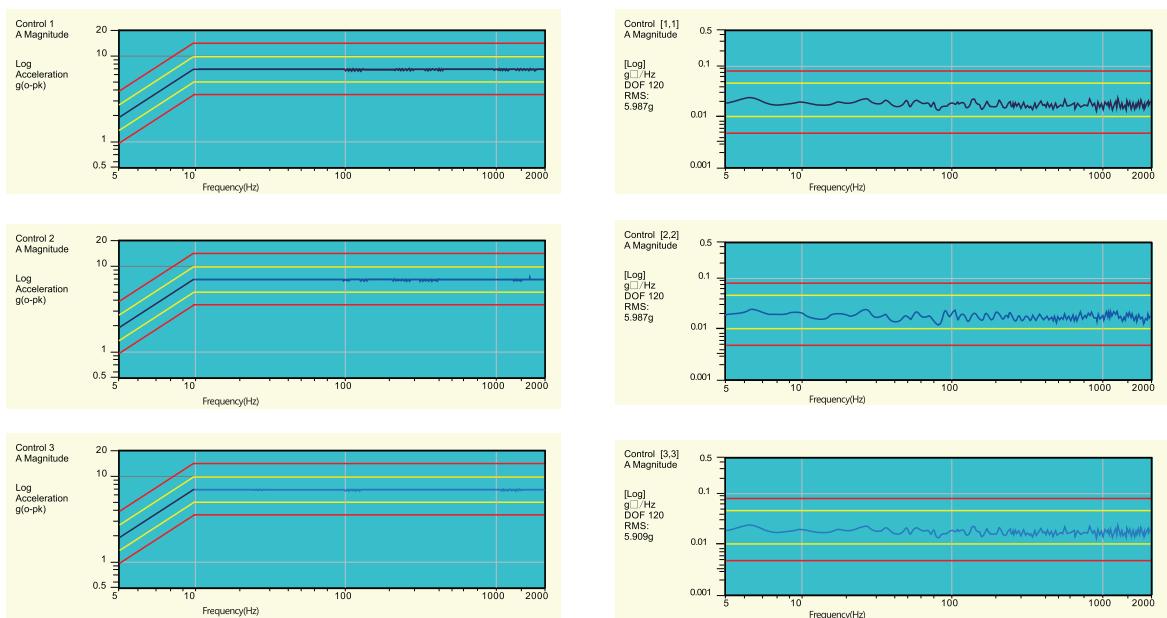
Contact our sales people and provide below parameters to get your customized 3 axis system:

- Specimen Dimension
- Specimen Mass
- Test Type
- Max. Acceleration
- Test Type
- Max. Displacement

## Working Principle



## Performance curve



# Air-cooling Vibration Test System

## Note

1. Optional accessories · Slip table · Head expander · Movable device · Thermal barrier · Climate chamber · Fixture · Sensor · Vibration controller · Power amplifier remote control · OPCS(Optical position centering system) · MPCS (Magnetic and pneumatic centering system) · Auto rotation mechanis
2. \* (3 times shock) is optional
3. MPCS is standard from 20kN, option for 10kN, not available below 6kN
4. Auto rotation mechanism is standard from 50kN, option for 20-40kN, not available below 20kN
5. Dimension of power amplifier exclude eyebolt
6. The shock force may be limited during high-speed shock test

System model	ES-1-150	ES-2-150	ES-3-150	ES-6-230	ES-10-240	ES-10LS3-240	ES-10D-240
							
Sine/Random Force (kN)	1/1	2/2	3/3	6/6	10/10	10/10	10/10
Shock Force @6ms (kN)	2	4	6	12	20	20	20
Frequency Range (Sine) (Hz)	5~4,500	5~4,500	5~5,000	5~3,500	5~3,200	5~3,000	5~5,000
Frequency Range (Random) (Hz)	5~4,500	5~4,500	5~5,000	5~3,500	5~3,200	5~3,000	5~5,000
Max. Acceleration (Sine) (g)	50	100	100	100	100	85	100
Max. Acceleration (Random) (g)	30	60	60	60	60	50	60
Max. Velocity (m/s)	2	2	2	2	2	2	1.8
Max. Displacement (mm)	25	40	25	51	51	76	51
Max. Load (kg)	70	70	120	300	300	300	300
Resonance Point (Hz)	3,900	3,900	2,900	3,400	2,700	2,500	3,300
Shaker Model	ET-1-150	ET-2-150	ET-3-150	ET-6-230	ET-10-240	ET-10-240	ET-10D-240
Moving Part Mass (kg)	2	2	3	6	10	13	10
Armature Diameter (mm)	150	150	150	230	240	240	240
Mass (kg)	395	395	480	590	900	1000	900
Dimension (LxWxH) (mm)	696x618x653	696x618x653	756x618x661	826x618x720	930x688x787	940x715x780	980x688x813
Isolation Airbag Resonance Frequency (Hz)	3	3	3	3	2.5	2.5	2.5
Power Amplifier Model	SDA-1	SDA-2	SDA-3	SDA-6	SDA-10	SDA-10	SDA-10
Output Power (kVA)	1	2	3	6	10	10	10
Power Consumption (kVA)	4	5.5	6.5	16	21	21	21
Mass (kg)	160	200	200	240	400	400	400
Dimension (LxWxH) (mm)	607x1,003x1545	607x1,003x1,545	607x1,003x1,545	607x1,003x1,545	607x1,003x1,545	607x1,003x1,545	607x1,003x1,545
Blower Model	B-200	B-200	B-200	B-1000	B-1000	B-1000	B-1000
Power (kW)	0.75	0.75	0.75	4	4	4	4
Flow Rate (m³/s)	0.1	0.1	0.1	0.3	0.3	0.3	0.3
Pressure (kPa)	2	2	2	4.5	4.5	4.5	4.5
Dimension (LxWxH) (mm)	498x373x905	498x373x905	498x373x905	794x540x1,260	794x540x1,260	794x540x1,260	794x540x1,260
Mass (kg)	30	30	30	115	115	115	115

### Performance Characteristics

- Sinusoidal excitation force range: 1kN ~ 70kN
- Random to sinusoidal excitation force ratio 1:1
- Two-times-sine shock force (Three times optional)
- Displacement peak-to-peak value of 25mm, 40mm, 51mm, 76mm or 100mm
- Lightweight armature with optimized design and good vibration-resistant performance with excellent vibration isolation with the air spring at the trunnion position
- High weight bearing capacity of center air spring support and good low-frequency performance
- Equipped with an automatic centering system, to ensure the armature is always in a balanced position during movement
- Double magnetic circuit design with low flux leakage and uniform magnetic field
- Sine, Random and Shock etc. test function capabilities
- Good cooling effect and low noise blower

System model	ES-20-320	ES-20LS3-340	ES-30-370	ES-40-370	ES-30LS4-370	ES-40LS4-370	ES-40-445
Sine/Random Force (kN)	20/20	20/20	30/30	40/40	30/30	40/40	40/40
Shock Force @6ms (kN)	40	40	60	80	60	80	80
Frequency Range (Sine) (Hz)	5~3,000	5~3000	5~2,800	5~2,800	5~2,600	5~2,600	5~2,700
Frequency Range (Random) (Hz)	5~3,000	5~3000	5~2,800	5~2,800	5~2,600	5~2,600	5~2,700
Max. Acceleration (Sine) (g)	100	80	100	130	85	100	80
Max. Acceleration (Random) (g)	60	48	60	78	51	60	48
Max. Velocity (m/s)	2	2	2	2	2.4	2.4	2
Max. Displacement (mm)	51	76	51	51	100	100	51
Max. Load (kg)	300	300	500	500	500	500	800
Resonance Point (Hz)	2,800	2,700	2,500	2,500	2,400	2,400	2,400
Shaker Model	ET-20-320	ET-20LS3-340	ET-30-370	ET-40-370	ET-30LS4-370	ET-40LS4-370	ET-40-445
Moving Part Mass (kg)	20	25	30	40	35	35	50
Armature Diameter (mm)	320	340	370	370	370	370	445
Mass (kg)	1,700	1,700	2,490	2,490	2,540	2,540	4,500
Dimension (LxWxH) (mm)	1,222x760x1,052	1,222x760x1,067	1,328x854x1,140	1,328x854x1,140	1,328x854x1,213	1,328x854x1,213	17,30x1,139x1,272
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-20	SDA-20	SDA-30	SDA-40	SDA-30	SDA-40	SDA-40
Output Power (kVA)	20	20	30	40	30	40	40
Power Consumption (kVA)	44	44	54	73	54	73	73
Mass (kg)	450	450	500	550	500	550	550
Dimension (LxWxH) (mm)	607x1,003x1,545	607x1,003x1,545	620x1,010x1,950	620x1,010x1,950	620*1,010*1,950	620*1,010*1,950	620*1,010*1,950
Blower Model	B-3000	B-3000	B-3000	B-5000	B-3000	B-5000	B-5000
Power (kW)	7.5	7.5	7.5	15	7.5	15	15
Flow Rate (m³/s)	0.52	0.52	0.52	1.05	0.52	1.05	1.05
Pressure (kPa)	5.8	5.8	5.8	5.6	5.8	5.6	5.6
Dimension (LxWxH) (mm)	927x644x1,440	927x644x1,440	927x644x1,440	1,159x863x1,882	927x644x1,440	1,159x863x1,882	1,159x863x1,882
Mass (kg)	180	180	180	255	180	255	255



System model	ES-50-445	ES-60-445	ES-50LS3-445	ES-60LS3-445	ES-50LS4-445	ES-60LS4-445	ES-70LS3-480
	① Ø200 ② Ø400 ③ Ø445 ④ 17×M12	① Ø200 ② Ø400 ③ Ø480 ④ 29×M12					
Sine/Random Force (kN)	50/50	60/60	50/50	60/60	50/50	60/60	70/70
Shock Force @6ms (kN)	100	120	100	120	100	120	140
Frequency Range (Sine) (Hz)	5~2,700	5~2,700	5~2,600	5~2,600	5~2,500	5~2,500	5~2,700
Frequency Range (Random) (Hz)	5~2,700	5~2,700	5~2,600	5~2,600	5~2,500	5~2,500	5~2,700
Max. Acceleration (Sine) (g)	100	100	90	100	85	100	100
Max. Acceleration (Random) (g)	60	60	54	60	51	60	60
Max. Velocity (m/s)	2	2	2	2	2	2	2
Max. Displacement (mm)	51	51	76	76	100	100	76
Max. Load (kg)	800	800	800	800	800	800	1,000
Resonance Point (Hz)	2,400	2,400	2,300	2,300	2,200	2,200	2,200
Shaker Model	ET-50-445	ET-60-445	ET-50LS3-445	ET-60LS3-445	ET-50LS4-445	ET-60LS4-445	ET-70LS3-480
Moving Part Mass (kg)	50	50	55	55	60	60	70
Armature Diameter (mm)	445	445	445	445	445	445	480
Mass (kg)	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Dimension (LxWxH) (mm)	1,730x1,139x1,272	1,730x1,139x1,272	1,730x1,139x1,293	1,730x1,139x1,293	1,730x1,139x1,348	1,730x1,139x1,348	1,730x1,139x1,304
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-50	SDA-60	SDA-50	SDA-60	SDA-50	SDA-60	SDA-70
Output Power (kVA)	50	60	50	60	50	60	70
Power Consumption (kVA)	82	95	82	95	82	95	108
Mass (kg)	550	700	550	700	550	700	700
Dimension (LxWxH) (mm)	620x1,010x1,950						
Blower Model	B-5000	B-7000S	B-5000	B-7000S	B-5000	B-7000S	B-7000L
Power (kW)	15	22	15	22	15	22	30
Flow Rate (m³/s)	1.05	1.47	1.05	1.47	1.05	1.47	1.6
Pressure (kPa)	5.6	7.3	5.6	7.3	5.6	7.3	7.5
Dimension (LxWxH) (mm)	1,159x863x1,882	1,158x959x1,882	1,159x863x1,882	1,158x959x1,882	1,159x863x1,882	1,158x959x1,882	1,247x1,053x2,182
Mass (kg)	255	340	255	340	255	340	340

# Water-cooling Vibration Test System

## Note

1. Optional accessories: Slip table·Head expander·Movable device·Thermal barrier·Climate chamber·Fixture·Sensor·Vibration controller·Power amplifier remote control·Outer
2. \* (3 times shock) is optional
3. Dimension of power amplifier and cooling unit exclude eyebolt

System model	ES-25WLS3-340	ES-35WLS3-340	ES-50W-445	ES-60W-445	ES-70W-445	ES-50WLS3-445
Sine/Random Force (kN)	25/25	35/35	50/50	60/60	70/70	50/50
Shock Force @6ms (kN)	50	70	100	120	140	100
Frequency Range (Sine) (Hz)	5~2,800	5~2,800	5~2,700	5~2,700	5~2,700	5~2,500
Frequency Range (Random) (Hz)	5~2,800	5~2,800	5~2,700	5~2,700	5~2,700	5~2,500
Max. Acceleration (Sine) (g)	100	130	100	100	100	90
Max. Acceleration (Random) (g)	60	48	60	60	60	54
Max. Velocity (m/s)	2	2	2	2	2	2
Max. Displacement (mm)	76	76	51	51	51	76
Max. Load (kg)	300	300	800	800	800	800
Resonance Point (Hz)	2,800	2,800	2,400	2,400	2,400	2,300
Shaker Model	ET-25WLS3-340	ET-35WLS3-340	ET-50W-445	ET-60W-445	ET-70W-445	ET-50WLS3-445
Moving Part Mass (kg)	25	25	55	60	70	55
Armature Diameter (mm)	340	340	445	445	445	445
Mass (kg)	1700	1700	4500	4500	4500	4500
Dimension (LxWxH) (mm)	1,240x715x1,071	1,240x715x1,071	1,730x1,104x1,296	1,730x1,104x1,296	1,730x1,104x1,296	1,730x1,104x1,308
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-30W	SDA-40W	SDA-50W	SDA-60W	SDA-70W	SDA-50W
Output Power (kVA)	36	48	50	60	70	50
Power Consumption (kVA)	62	73	90	100	110	90
Mass (kg)	500	550	1,000	1,000	1,000	1,000
Dimension (LxWxH) (mm)	620x1,010x2,020	620x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020
Blower Model	CU-1	CU-1	CU-1	CU-1	CU-1	CU-1
Internal Circle Flow Rate (L/min)	40	40	40	40	40	40
Internal Circle Water Pressure (MPa)	1	1	1	1	1	1
External Circle Flow Rate (L/min)	100	100	100	100	100	100
External Circle Water Pressure (MPa)	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4
Water Pump Power (I/E) (kW)	4/2.5	4/2.5	4/2.5	4/2.5	4/2.5	4/2.5
Mass (kg)	250	250	250	250	250	250
Dimension (LxWxH) (mm)	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020

## Performance Characteristics

- Random to sinusoidal excitation force ratio: 1:1
- Two-times-sine shock force (Three times optional)
- Displacement peak-to-peak: 51mm, 76mm or 100mm
- Lightweight armature and large working table
- Better vibration isolation effect with the air spring at trunnion position
- High weight bearing capacity of center air spring support and good low-frequency performance
- Equipped with an automatic centering system, to ensure the armature is always in a balanced position during movement
- Double magnetic circuit design, with low flux leakage and uniform magnetic field
- Electric power rotating mechanism is configured for horizontal and vertical switching

System model	ES-60WLS3-445	ES-70WLS3-445	ES-50WLS4-445	ES-60WLS4-445	ES-70WLS4-445	ES-80W-445
Sine/Random Force (kN)	60/60	70/70	50/50	60/60	70/70	80/80
Shock Force @6ms (kN)	120	140	100	120	140	160
Frequency Range (Sine) (Hz)	5~2,500	5~2,500	5~2,400	5~2,400	5~2,400	5~2,500
Frequency Range (Random) (Hz)	5~2,500	5~2,500	5~2,400	5~2,400	5~2,400	5~2,500
Max. Acceleration (Sine) (g)	100	100	80	100	110	100
Max. Acceleration (Random) (g)	60	60	48	60	66	60
Max. Velocity (m/s)	2	2	2	2	2	2
Max. Displacement (mm)	76	76	100	100	100	51
Max. Load (kg)	800	800	800	800	800	800
Resonance Point (Hz)	2,300	2,300	2,200	2,200	2,200	2,300
Shaker Model	ET-60WLS3-445	ET-70WLS3-445	ET-50WLS4-445	ET-60WLS4-445	ET-70WLS3-445	ET-80W-445
Moving Part Mass (kg)	60	70	60	60	60	60
Armature Diameter (mm)	445	445	445	445	445	445
Mass (kg)	4,500	4,500	4,500	4,500	4,500	4,500
Dimension (LxWxH) (mm)	1,730x1,104x1,308	1,730x1,104x1,308	1,730x1,104x1,334	1,730x1,104x1,334	1,730x1,104x1,334	1,730x1,104x1,308
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-60W	SDA-70W	SDA-50W	SDA-60W	SDA-70W	SDA-80W
Output Power (kVA)	60	70	50	60	70	80
Power Consumption (kVA)	100	110	90	100	110	140
Mass (kg)	1,000	1,000	1,000	1,000	1,000	1,800
Dimension (LxWxH) (mm)	1,200x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020	1,200x1,010x2,020	1,800x1,010x2,020
Blower Model	CU-1	CU-1	CU-2	CU-2	CU-2	CU-2
Internal Circle Flow Rate (L/min)	40	40	80	80	80	80
Internal Circle Water Pressure (MPa)	1	1	1	1	1	1
External Circle Flow Rate (L/min)	100	100	160	160	160	160
External Circle Water Pressure (MPa)	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4	0.25~0.4
Water Pump Power (I/E) (kW)	4/2.5	4/2.5	8/4	8/4	8/4	8/4
Mass (kg)	250	250	300	300	300	300
Dimension (LxWxH) (mm)	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020



System model	ES-80WLS3-445	ES-80WLS4-445	ES-90WLS3-480	ES-100-550	ES-120-550	ES-100LS3-550
Sine/Random Force (kN)	80/80	80/80	90/90	100/100	120/120	100/100
Shock Force @6ms (kN)	160	160	180	200	240	200
Frequency Range (Sine) (Hz)	5-2,500	5-2,400	5-2,700	5-2,500	5-2,500	5-2,500
Frequency Range (Random) (Hz)	5-2,500	5-2,400	5-2,700	5-2,500	5-2,500	5-2,500
Max. Acceleration (Sine) (g)	100	100	100	100	100	100
Max. Acceleration (Random) (g)	60	60	60	60	60	60
Max. Velocity (m/s)	2	2	2	2	2	2.5
Max. Displacement (mm)	76	100	76	51	51	76
Max. Load (kg)	800	800	1,000	1,000	1,000	1,000
Resonance Point (Hz)	2,300	2,200	2,200	2,200	2,200	2,200
Shaker Model	ET-80WLS3-445	ET-80WLS4-445	ET-90WLS3-480	ET-100-550	ET-120-550	ET-100LS3-550
Moving Part Mass (kg)	60	60	70	90	90	90
Armature Diameter (mm)	445	445	480	550	550	550
Mass (kg)	4,500	4,500	5,000	7,000	7,000	7,300
Dimension (LxWxH) (mm)	1,730x1,104x1,308	1,730x1,104x1,334	1,970x1,280x1,363	1,780x1,280x1,380	1,780x1,280x1,380	1,780x1,280x1,380
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-80W	SDA-80W	SDA-90W	SDA-100	SDA-120	SDA-100
Output Power (kVA)	80	80	80	100	120	100
Power Consumption (kVA)	140	140	140	160	180	160
Mass (kg)	1,800	1,800	1,800	1,900	1,900	1,900
Dimension (LxWxH) (mm)	1,800x1,010x2,020	1,800x1,010x2,020	1,800x1,010x2,020	1,800x1,010x2,020	1,800x1,010x2,020	1,800x1,010x2,020
Blower Model	CU-2	CU-2	CU-2	CU-2	CU-2	CU-2
Internal Circle Flow Rate (L/min)	80	80	80	80	80	80
Internal Circle Water Pressure (MPa)	1	1	1	1	1	1
External Circle Flow Rate (L/min)	160	160	160	200	200	200
External Circle Water Pressure (MPa)	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4
Water Pump Power (I/E) (kW)	8/4	8/4	8/4	8/4	8/4	8/4
Mass (kg)	300	300	300	300	300	300
Dimension (LxWxH) (mm)	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020

System model	ES-120LS3-550	ES-100LS4-550	ES-160-650	ES-180-650	ES-200-650	ES-200LS3-650
Sine/Random Force (kN)	120/120	100/100	160/160	180/180	200/200	200/200
Shock Force @6ms (kN)	240	200	320	360	400	400
Frequency Range (Sine) (Hz)	5-2,500	5-2,500	5-2,200	5-2,200	5-2,200	5-2,200
Frequency Range (Random) (Hz)	5-2,500	5-2,500	5-2,200	5-2,200	5-2,200	5-2,200
Max. Acceleration (Sine) (g)	100	100	100	100	100	100
Max. Acceleration (Random) (g)	60	60	60	60	60	60
Max. Velocity (m/s)	2.5	2.5	2.5	2	2.5	2
Max. Displacement (mm)	76	100	51	51	51	76
Max. Load (kg)	1,000	1,000	1,800	1,800	2,500	2,500
Resonance Point (Hz)	2,200	2,200	2,000	2,000	1,800	1,800
Shaker Model	ET-120LS3-550	ET-100LS4-550	ET-160-650	ET-180-650	ET-200-650	ET-200LS3-650
Moving Part Mass (kg)	90	95	150	150	150	150
Armature Diameter (mm)	550	550	650	650	650	650
Mass (kg)	7,300	7,300	11,000	11,000	11,000	11,000
Dimension (LxWxH) (mm)	1,780x1,280x1,380	1,780x1,280x1,380	2,130x1,480x1,527	2,130x1,480x1,527	2,130x1,480x1,553	2,130x1,480x1,553
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	2.5	2.5
Power Amplifier Model	SDA-120	SDA-100	SDA-160	SDA-180	SDA-200	SDA-200
Output Power (kVA)	120	100	160	180	200	200
Power Consumption (kVA)	180	160	230	250	280	280
Mass (kg)	1,900	1,900	2,600	2,600	3,300	3,300
Dimension (LxWxH) (mm)	1,800x1,010x2,020	1,800x1,010x2,020	2,400x1,010x2,020	2,400x1,010x2,020	3,000x1,010x2,020	3,000x1,010x2,020
Blower Model	CU-2	CU-2	CU-2	CU-2	CU-2	CU-2
Internal Circle Flow Rate (L/min)	80	80	80	80	80	80
Internal Circle Water Pressure (MPa)	1	1	1	1	1	1
External Circle Flow Rate (L/min)	200	200	260	300	300	300
External Circle Water Pressure (MPa)	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4
Water Pump Power (I/E) (kW)	8/4	8/4	8/4	8/4	8/4	8/4
Mass (kg)	300	300	300	300	300	300
Dimension (LxWxH) (mm)	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020

System model	ES-200LS4-650	ES-300-870	ES-350-870	ES-400-870	ES-500-1070	ES-600-1070
Sine/Random Force (kN)	200/200	300/240	350/250	400/300	500/400	600/480
Shock Force @6ms (kN)	400	600	700	800	1,250	1,500
Frequency Range (Sine) (Hz)	5-2,100	5-1,900	5-1,700	5-1,700	5-1,500	5-1,500
Frequency Range (Random) (Hz)	5-2,100	5-1,900	5-1,700	5-1,700	5-1,500	5-1,500
Max. Acceleration (Sine) (g)	100	100	100	100	100	100
Max. Acceleration (Random) (g)	60	60	60	60	60	60
Max. Velocity (m/s)	2	2	2	2	2	2
Max. Displacement (mm)	100	51	51	51	76	76
Max. Load (kg)	2,500	6,000	6,000	6,000	15,000	15,000
Resonance Point (Hz)	1,800	1,600	1,600	1,600	1,300	1,300
Shaker Model	ET-200LS4-650	ET-300-870	ET-350-870	ET-400-870	ET-500-1070	ET-600-1070
Moving Part Mass (kg)	150	300	300	330	500	500
Armature Diameter (mm)	650	870	870	870	1,070	1,070
Mass (kg)	11,000	23,000	23,000	23,000	32,000	32,000
Dimension (LxWxH) (mm)	2,130x1,480x1,553	2,900x2,066x1,986	2,900x2,066x1,986	2,900x2,066x1,986	3,500x2,200x2,250	3,500x2,200x2,250
Isolation Airbag Resonance Frequency (Hz)	2.5	2.5	2.5	2.5	3	3
Power Amplifier Model	SDA-200	SDA-380	SDA-420	SDA-460	SDA-500	SDA-600
Output Power (kVA)	200	380	420	410	550	600
Power Consumption (kVA)	280	390	440	490	600	600
Mass (kg)	3,300	4,000	6,100	6,100	7,000	7,000
Dimension (LxWxH) (mm)	3,000x1,010x2,020	6,000x1,010x2,020	6,000x1,010x2,020	6,000x1,010x2,020	7,760x1,010x2,020	7,760x1,010x2,020
Blower Model	CU-2	CU-3	CU-3	CU-3	CU-4	CU-4
Internal Circle Flow Rate (L/min)	80	120	120	120	260	260
Internal Circle Water Pressure (MPa)	1	1	1	1	1	1
External Circle Flow Rate (L/min)	300	500	500	500	670	670
External Circle Water Pressure (MPa)	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4
Water Pump Power (I/E) (kW)	8/4	8/6.5	8/6.5	8/6.5	18/12	18/12
Mass (kg)	300	300	300	300	450	450
Dimension (LxWxH) (mm)	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	607x1,010x2,020	1,157x1,010x2,020	1,157x1,010x2,020

# Slip Table Series

## V-shaped Bearing Slip Table

Note

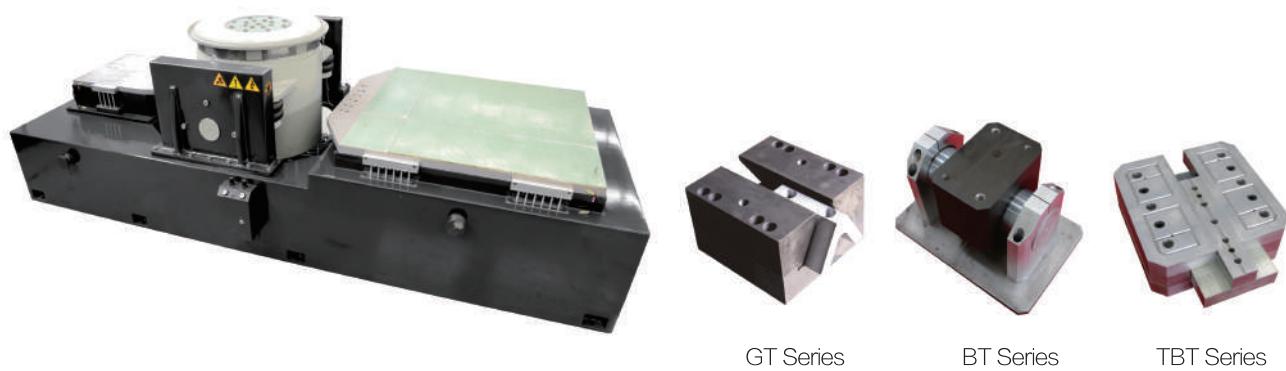
1.GT300:300mmx300mm

2.Effective mass includes slip plate, drive bar, swing pole, V-shaped bearing only

3.The above effective mass is under common design, if there are special requirement or special design, need to calculate the effective mass again

4.Working environment: Temperature range 5~35°C, humidity range ≤90% (non condensing)

Shaker model \ Slip table model	ES-1-150 ES-1.5-150 ES-2-150 ES-3-150	ES-2-230 ES-3-230	ES-6-230 ES-10-240 ES-10D-240	ES-20-320	ES-20-445	ES-20LS3-340 ES-30-370 ES-40-370 ES-25WLS3-340 ES-35WLS3-340
GT300	30 11.5	2,000 8.5	30 14.5	2,000 11.2	—	—
GT400	30 17.5	2,000 12.5	30 20	2,000 15	30 20	2,000 15
GT500	30 25.5	2,000 17.5	30 28	2,000 20.5	30 28	2,000 20.5
GT600	40 46	2,000 31	40 48.5	2,000 34	40 48.5	2,000 34
GT700	45 69	2,000 47	45 72	2,000 50	45 72	2,000 50
GT800	—	—	45 91	2,000 63	45 96	2,000 66
GT900	—	—	45 112	2,000 77	45 118	2,000 81
GT1000	—	—	45 136	2,000 93	45 142	2,000 97
GT1100	—	—	45 167	2,000 113	45 169	2,000 115
GT1200	—	—	45 196	2,000 133	45 198	2,000 135
GT1300	—	—	—	—	—	—
GT1400	—	—	—	—	—	—
GT1500	—	—	—	—	—	—
GT2000	Thickness(mm) Effective mass(AI) (kg)	Frequency(Hz) Effective mass(AI) (kg)	—	—	—	—



Shaker model \ Slip table model	ES-30-550	ES-30LS4-445 ES-40LS4-445 ES-40-445 ES-50-445 ES-60-445 ES-50W-445 ES-60W-445 ES-70W-445 ES-80W-445	ES-50LS3/4-445 ES-60LS3/4-445 ES-50WLS3/4-445 ES-60WLS3/4-445 ES-70WLS3/4-445 ES-80WLS3/4-445	ES-70LS3-480	ES-70LS3-550 ES-100-550 ES-120-550 ES-100LS3-550 ES-120LS3-550	Thickness(mm)	Frequency(Hz)	
						Effective mass(AL) (kg)	Effective mass(AL) (kg)	
GT300	—	—	—	—	—	—	—	
GT400	—	—	—	—	—	—	—	
GT500	40 60	2,000 49.5	45 56.5	2,000 43	45 62.5	2,000 47.5	45 61.5	2,000 48
GT600	40 73	2,000 58	45 73	2,000 54	45 79.5	2,000 59	45 78	2,000 59
GT700	45 98	2,000 76	45 93	2,000 68	45 101	2,000 73.5	45 98	2,000 73
GT800	45 118	2,000 88	45 114	2,000 82	45 122.5	2,000 88	45 119	2,000 107
GT900	45 140	2,000 103	50 139	2,000 98	50 148	2,000 104.5	50 144	2,000 103
GT1000	45 164	2,000 119	50 166	2,000 116	50 175.5	2,000 123	50 171	2,000 121
GT1100	45 191	2,000 137	50 195	2,000 136	50 205	2,000 143.5	50 200	2,000 141
GT1200	45 220	2,000 157	20 228	2,000 158	50 238.5	2,000 166	50 233	2,000 163
GT1300	—	—	—	—	—	—	50 298	2,000 211
GT1400	—	—	—	—	—	—	50 338	2,000 237
GT1500	—	—	—	—	—	—	50 379	2,000 265
GT2000	—	—	—	—	—	—	60 780	2,000 532

# Slip Table Series



## 710 Hydrostatic Bearing / T-shaped Bearing Slip Table

### Note

1. Effective mass includes slip plate, drive bar, swing pole, excluding mass of bearing (the effective mass of one BT hydrostatic bearing is 5kg, the effective mass of one TBT medium pressure bearing is 5.5kg)
2. BT600 and BT700 are also available, contact our sales people if required
3. Working environment: Temperature range 5~35°C, humidity range ≤90% (non condensing)

Slip table model \ Shaker model	ES-30-370	ES-40-370	ES-25WLS3-340	ES-35WLS3-340	ES-30LS4-445 ES-40LS4-445 ES-40-445 ES-50-445 ES-60-445 ES-50W-445 ES-60W-445 ES-70W-445 ES-80W-445	ES-30-550	ES-50LS3/4-445 ES-60LS3/4-445 ES-50WLS3/4-445 ES-60WLS3/4-445 ES-70WLS3/4-445 ES-80WLS3/4-445	ES-70LS3-480		
BT800-2/TBT800-4	50	2,000	50	2,000	50	2,000	50	2,000	50	2,000
	107	75	112	80	125	93	120	86	117	85
BT900-2/TBT900-4	50	2,000	50	2,000	50	2,000	50	2,000	50	2,000
	132	91	137	96	150	109	145.5	102.5	142	101
BT1000-4/TBT1000-4	50	2,000	50	2,000	50	2,000	50	2,000	50	2,000
	159	109	164	114	176	127	173	121	169	119
BT1100-4 /TBT1100-9	50	2,000	50	2,000	50	2,000	50	2,000	50	2,000
	188	129	193	134	206	147	202.5	141.5	198	139
BT1200-4/TBT1200-9	50	2,000	50	2,000	50	2,000	20	2,000	50	2,000
	221	151	226	156	239	169	236	164	231	161
BT1300-4/TBT1300-9	50	2,000	50	2,000	50	2,000	50	2,000	50	2,000
	256	174	261	179	274	192	271.5	187.5	266	184
BT1400-4/TBT1400-16	50	1,600	50	1,600	50	1,600	50	1,600	50	1,600
	294	199	299	204	312	217	310	213	304	209
BT1500-4/TBT1500-16	50	1,200	50	1,200	50	1,200	50	1,200	50	1,200
	334	226	339	231	352	244	350.5	240.5	344	236
--/TBT2000-25	Thickness(mm)		Frequency(Hz)							
	Effective mass(A <sub>1</sub> ) (kg)		Effective mass(M <sub>2</sub> ) (kg)							



Slender slip table



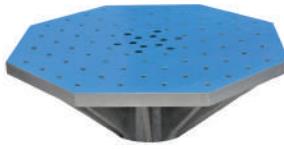
Dual slip table



Rotary slip table

Slip table model \ Shaker model	ES-70LS3-550	ES-100-550	ES-120-550	ES-100LS3-550	ES-120LS3-550	ES-160-590	ES-180-590	ES-160-650	ES-180-650	ES-200-650	ES-200LS3-650	ES-300-870	ES-350-870	ES-400-870	ES-500-1070
BT800-2/TBT800-4	50	2,000	50	2,000								Thickness(mm)	Frequency(Hz)		
	141	105	163	127								Effective mass(A) (kg)	Effective mass(Mg) (kg)		
BT900-2/TBT900-4	50	2,000	50	2,000											
	167	122	189	144											
BT1000-4/TBT1000-4	50	2,000	50	2,000											
	195	141	217	163											
BT1100-4 /TBT1100-9	50	2,000	50	2,000											
	226	162	248	184											
BT1200-4/TBT1200-9	50	2,000	50	2,000		50	2,000								
	260	182	282	206		282	206								
BT1300-4/TBT1300-9	50	2,000	50	2,000		50	2,000								
	296	209	318	231		318	231								
BT1400-4/TBT1400-16	50	1,600	50	1,600		50	2,000								
	336	235	358	257		358	257								
BT1500-4/TBT1500-16	50	1,200	50	1,200		50	2,000	50	1,200	50	1,200				
	377	236	399	285		399	285	534	420	644	530				
--/TBT2000-25	60	1,000	60	1,000		60	2,000	60	1,000	60	1,000				
	778	530	800	552		800	552	935	687	1100	820				

# Head Expander Series



Square (aluminium alloy)



Square (magnesium alloy)

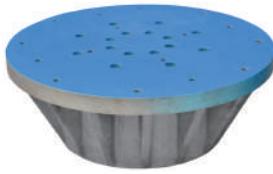
## Performance Characteristics

- All Dongling head expanders have passed finite element analysis
- Designed to optimize performance on your vibration test system
- High quality manufacturing process to ensure consistent performance with excellent technical indicators
- Options include "square" or "round" shape and "magnesium" or "aluminum" material
- Customized shapes and sizes are also available

## Square Head Expander

Model \ Table diameter	-150	-230/-240	-320	-370	-445/-480	-550	-590	-650	-870	-1070	Weight(Al)(kg)	Sine(Al)(Hz)
	7	2,000	10	2,000	—	—	—	—	—	—	Weight(Mg)(kg)	Sine(Mg)(Hz)
HE300S	7	2,000	10	2,000	—	—	—	—	—	—	—	—
	5	2,000	7	1,800	—	—	—	—	—	—	—	—
HE400S	12	2,000	21	2,000	—	—	—	—	—	—	—	—
	8.4	1,800	14.7	2,000	—	—	—	—	—	—	—	—
HE500S	20	2,000	32	2,000	32	2,000	35	2,000	—	—	—	—
	14	2,000	23	1,800	22.4	2,000	25	2,000	—	—	—	—
HE600S	29	1,200	41	1,350	41	2,000	40	2,000	57	2,000	—	—
	20.3	1,200	28	1,350	28	2,000	28	1,800	40	2,000	—	—
HE700S	—	43	1,000	72	1,000	75	1,800	80	2,000	—	—	—
	—	30.1	900	48	1,000	50	1,800	56	1,800	—	—	—
HE800S	—	63	1,000	72	1,200	83	1,300	88	1,300	125	1,500	—
	—	42	900	68	1,100	60	1,200	60	1,300	87.5	1,500	—
HE900S	—	76	500	94	800	101	600	100	1,000	135	1,000	—
	—	52.5	500	66	700	67	600	70	1,000	95	1,000	—
HE1000S	—	80	400	117	550	120	800	185	1,000	225	900	220
	—	54.5	400	78	550	85	600	129.5	900	150	900	154
HE1100S	—	—	—	—	—	185	600	230	500	245	700	250
	—	—	—	—	—	126	600	161	500	171.5	700	175
HE1200S	—	176	500	—	—	191	400	250	500	275	500	280
	—	123	500	—	—	140	400	195	500	206	500	196
HE1500S	—	283	200	345	350	337	450	358	400	415	400	420
	—	198	200	230	350	225	450	245	400	292	400	294
HE2000S	—	—	—	—	—	—	—	—	900	300	1,000	300
	—	—	—	—	—	—	—	—	630	300	700	300
HE2500S	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	2,300	300
HE3000S	—	—	—	—	—	—	—	—	—	—	2,600	250
	—	—	—	—	—	—	—	—	—	—	1,690	225
HE3500S	Weight(Al)(kg)	Sine(Al)(Hz)	—	—	—	—	—	—	—	—	3,700	200
	Weight(Mg)(kg)	Sine(Mg)(Hz)	—	—	—	—	—	—	—	—	2,405	180

# Head Expander Series



Round (aluminium alloy)



Round (magnesium alloy)

## Note

1. HE300S means it is square head expander, the effective size of the head expander is 300×300mm

HE600R means it is round head expander, the diameter of the head expander is Φ 600 mm

2. Standard pattern:

HE300S(HE300R) ~ HE500S(HE500R): 50×50mm in grid pattern of the inserts

HE600S(HE600R) and above: 100×100mm in grid pattern of the inserts

## Round Head Expander

Model \ Table diameter	-150	-230/-240		-320		-370		-445-480		-550		-590		-650		-870		-1070	
HE300R	7	2,000	9	2,000	—	—	—	—	—	—	—	—	—	—	Weight(AL)(kg)	Sine(AL)(Hz)			
	5	2,000	6	1,800	—	—	—	—	—	—	—	—	—	—	Weight(Mg)(kg)	Sine(Mg)(Hz)			
HE400R	10	2,000	14	2,000	16	2,000	—	—	—	—	—	—	—	—	—	—	—	—	
	7	2,000	10	2,000	11.2	2,000	—	—	—	—	—	—	—	—	—	—	—	—	
HE500R	20	2,000	23	2,000	32	2,000	32	2,000	—	—	—	—	—	—	—	—	—	—	
	14	2,000	16.1	2,000	22.4	2,000	22.4	2,000	—	—	—	—	—	—	—	—	—	—	
HE600R	—	31.5	1,200	33	1,800	39	1,600	38	2,000	—	—	—	—	—	—	—	—	—	
	—	22	1,200	23.1	1,800	27	1,600	26.6	1,900	—	—	—	—	—	—	—	—	—	
HE700R	—	33	800	58	1,500	69	2,000	70	2,000	—	—	—	—	—	—	—	—	—	
	—	23.1	800	41	1,500	48.3	2,000	49	2,000	—	—	—	—	—	—	—	—	—	
HE800R	—	37	500	64	800	70	1,200	72	1,500	85	1,800	—	—	—	—	—	—	—	
	—	26	500	45	800	49	1,200	50.4	1,500	59	1,800	—	—	—	—	—	—	—	
HE900R	—	—	—	—	—	85	1,200	100	1,200	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	59.5	1,200	70	1,200	—	—	—	—	—	—	—	—	—	
HE1000R	—	—	—	—	—	—	140	1,000	150	1,100	160	1,100	180	1,100	—	—	—	—	
	—	—	—	—	—	—	98	1,000	105	1,100	112	1,100	126	1,100	—	—	—	—	
HE1100R	—	—	—	—	—	—	200	800	210	900	230	1,000	260	1,000	—	—	—	—	
	—	—	—	—	—	—	140	800	147	900	161	1,000	182	1,000	—	—	—	—	
HE1200R	—	—	—	—	—	—	250	500	260	600	270	600	290	600	—	—	—	—	
	—	—	—	—	—	—	175	500	182	600	189	600	203	600	—	—	—	—	
HE1500R	—	—	—	—	—	—	330	400	350	400	400	400	475	400	—	—	—	—	
	—	—	—	—	—	—	231	400	245	400	280	400	333	400	—	—	—	—	
HE2500R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2,000	400	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13,00	360	—	—	
HE4300R	Weight(AL)(kg)	Sine(AL)(Hz)	—	—	—	—	—	—	—	—	—	—	—	—	7,000	200	—	—	
	Weight(Mg)(kg)	Sine(Mg)(Hz)	—	—	—	—	—	—	—	—	—	—	—	—	4,550	180	—	—	

# Power Amplifier

## Smart Power Amplifier

The Smart Power amplifier is composed of the logical unit, power unit and control unit and has the advantages of intelligent manipulation, stability, reliability, flexible configuration, efficient and energy saving, compact structure and easy maintenance.



## Performance Characteristics



### Customer friendly operation

Easy to use interface, modular system design, easy operation, multi-language switching and authority management



### Powerful function

External connection to industrial module, customized multimedia, running log, self protection built in and platform optimization



### Superior performance

All digital debugging, low harmonic distortion, excellent current sharing effect and multi-node monitoring.



### Easy to maintain

System self-diagnosis, fault log and power unit adopts N+1 mode parallel operation



### Test security

Hardware and software dual protection, output force limit, lineage protection and additional customized protections based on user requirements.

## Technical Specifications

Power range	• 0.1~1000kVA
Output voltage	• 120Vrms(rated), 150Vrms(max.)
Input impedance	• $\geq 10k\Omega$
Signal-to-noise ratio	• $\geq 65dB$
Harmonic distortion (resistive load)	• < 1.0% ( typical value)
Output voltage measurement error	• $\leq 1\%$
Output current measurement error	• $\leq 1\%$
Output current	• $\leq 4800A$ ( 120A step increase)
Output current crest factor	• $\geq 3$
Peak power of the module unit	• $\geq 150\%$ (20kVA)
DC stability	• Output terminal zero drift $\leq 50mv/8h$
Frequency response DC ~ 5000Hz	• $\pm 3dB$
Medium-frequency gain	• $\geq 80$
DC / AC conversion efficiency	• >95%
Nature of the load	• Optional of resistive, capacitive, inductive
Parallel operation current unbalance	• $\leq 1\%$



## Optional Functions



### Unattended Operation

The unattended operation function is extremely useful when performing a long duration reliability test. The user has the ability to track the equipment operating status and also has the ability to view and report the status in real time through sms (short message service) based on the parameters set by the user. This relieves the technician of the need to be present at all times and reduces labor costs while still maintaining real time monitoring.



### Authority Management

Authority to operate the test system can be set to different levels depending on the laboratory requirements. Implementation of authority levels helps to protect the specimen and the test equipment as well as maintain control and safety standards in the laboratory. Authorization levels can be set for different functions and operations of the test system.

### Force Limit Function

The maximum system force can be limited in real time by adjusting the system force limit parameters. Different limits can be set for each test profile. This feature can prevent large sudden force from the shaker due to external reasons that might damage the shaker or the specimen.



### History Records

Collect and store the system historical alarm information and key historical data in accordance with the user requirements. This function also provides the ability to view the historical data in real time for analysis by the user.



### Remote Control ( Direct Computer Control, Special Remote Control )

Real-time communication with the power amplifier is achieved via an Ethernet connection. This connection allows the user to perform remote control operations from more than 1 kilometer away from the system. In addition the connection provides the user with an interface to retrieve relevant information from the power amplifier as well as acquire data and perform analysis of the power amplifier.



### Composite Test Centralized Control

Combined centralized control can be performed with other third party equipment such as a temperature chamber. This control capability provides the ability to assure the test parameters and safety requirements related to the environmental testing are consistent with test requirements. The centralized control can be achieved through a variety of flexible control modes (for example: hardware interlock control, 485 bus control or Ethernet) depending on the third party equipment requirements.



### Energy-saving Mode

The user can select the optimal excitation level and power unit configuration related to the power needs of the actual test in order to save energy costs.



### Time Management

The user can set the system automatic shutdown process to begin upon completion of the test. In addition, the time management function provides the ability to view accumulated time data in real time which is convenient for scheduling and planning.



### System Self-test Source

The self-test source function provides failure source information in the event a problem occurs during the test process and a failure stops the test. This function does not require additional equipment.



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