SPECTRUM INSTRUMENS LTD

USER'S MANUAL

For the

SVS-3 & SVS-3M

Vibration Shaker

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Remarks

Thank you for selecting one of our SVS Series Vibration Shakers. In order to help you to understand the performance of this instrument better and to use it correctly, please pay attention to the following:

1 Please read this instruction carefully before use.

2 When performing the calibration, follow the procedures according to the different types of the transducers.

3 To avoid excess vibration of the top of the vibrostand, the “AMPLITUDE ADJUST” potentiometer shall be turned counterclockwise to minimum before turning on the power.

4 The parameters of the SVS-3M (Metric)Vibration Shaker are defined as following:

Acceleration (m/s^2): PEAK
Velocity (mm/s): RMS
Displacement (um): PK- PK

Note: the SVS-3 is virtually the same as the SVS-3M except the SVS-3 is for use in an imperial units environment (ie calibration, mounting studs etc)

5 During calibration, the instrument shall be placed firmly on a flat surface.

6 During the calibration of velocity transducers, attention should be paid to the direction of the installation of the transducer. If it is a horizontal transducer, the Shaker shall be placed horizontally. If it is a vertical transducer, the Shaker shall be placed vertically.

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For general type transducers, the Shaker may be placed either horizontally or vertically.

General Description

SVS Series Vibration Shaker can be used to calibrate many kinds of vibration transducers, such as acceleration transducers, velocity transducers and proximity transducer system. Also the system can be used to calibrate vibration measuring instruments and vibration monitoring systems as well as data collecting systems that use the said transducers. Standard sine wave signals with eight levels of frequency, i.e. 10, 20, 40, 80, 160, 320, 640 and 1280 Hz can be generated from the Shaker. The amplitude of the three kinds of vibration output, i.e., acceleration, velocity and displacement, can be changed through potentiometers and shown on digital displays. They can be used in either horizontal or vertical direction to calibrate horizontal or vertical transducers.

SVS Series Vibration Shaker combines a sine wave signal generator, power amplifier, standard transducer and the vibrostand all in one. It features a small foot-print, high

accuracy and easy operation. It can be used either in laboratory or on site.

Specifications (SVS-3M)

Frequency
10, 20, 40, 80, 160, 320, 640, 1280Hz ±0.01%
Unit
Acceleration: m/s^2 (PEAK)
Velocity: mm/s (RMS)
Displacement: um (PK-PK)
Amplitude accuracy
Acceleration(@30m/s^2 pk)
40Hz to 320Hz ± 0.3dB ± 1digit
20Hz to 1280Hz ± 0.5dB ±1digit
Velocity (@25mm/sec pk)
40Hz to 320Hz ±0.5dB ±1digit
Displacement(@10μm pk-pk, 80Hz)
40Hz to 320Hz ± 0.5dB ± 1digit
Proximity probe linearity
Prode: 5mm and 8mm probes
Range: 0~4.0mm
Display
$3\ ^1/_2$ digit display for acceleration, velocity or displacement

Maximum vibration amplitude and maximum load

Because the vibrostand used in SVS Series Vibration Shaker is rather small, during the calibration of transducers of different weight under different frequencies the output amplitude of the Shakers are also different. Maximum vibration amplitude and maximum load are related to the maximum acceleration. maximum velocity and maximum displacement output generated from the Shaker under a certain frequency and with a certain weight of the transducer to be calibrated. The specific figures can be seen in the following table.

Wt / Freq	≤100g			≤250g			≤650g		
	a(m/S^2)	v(mm/S)	d(μm)	a(m/S^2)	v(mm/S)	d(μm)	a(m/S^2)	v(mm/S)	d(μm)
10Hz	2.5	28	1300	3.5	40	1800	4	45	2000
20Hz	15	85	1900	10	60	1300	5	28	640
40Hz	60	170	2000	35	100	1100	12	35	380
80Hz	100	141	800	40	60	320	14	20	110
160Hz	75	53	150	35	25	70	12	8.5	24
320Hz	50	18	25	30	10	15	10	3.5	5
640Hz	30	5	3	20	3.5	2	6	1	*
1280Hz	23	2	*	10	0.9	*	5	0.4	*

- *With higher frequency the value of the displacement of vibration is very small so there will be no vibration signal output from the Shaker.*

Description of the Control Panel

The control panel of SVS-3M Vibration Shaker is shown as follows:

1 Vibration amplitude output display
Shows the amplitude of the different vibration signal outputs of the Shaker
2 Calibration potentiometer
3 Function selecting switch Switches the output of the Shaker to acceleration, velocity or displacement
4 Potentiometer for adjusting the output amplitude
5 Adjusting the the output vibration amplitude slowly
6 The table for fixing the transducer to be calibrated
7 The thread hole for fixing the stand of proximity probe
During the calibration of proximity probe, the stand of the transducer is fixed on the control panel through this thread hole.
8 Power switch 120 VAC optional 220 VAC
9 Socket for 120 VAC power input optional 220 VAC
Used for connecting 120 V AC power.
10. Socket for power output
For monitoring the wave shape of the output signal of the power amplifier of the Shaker.
11 Output socket for – 24 V voltage
Provides power at – 24 V for proximitor during the calibration of proximity probe.
12 Frequency selecting switch
For selecting the frequency of the output signal

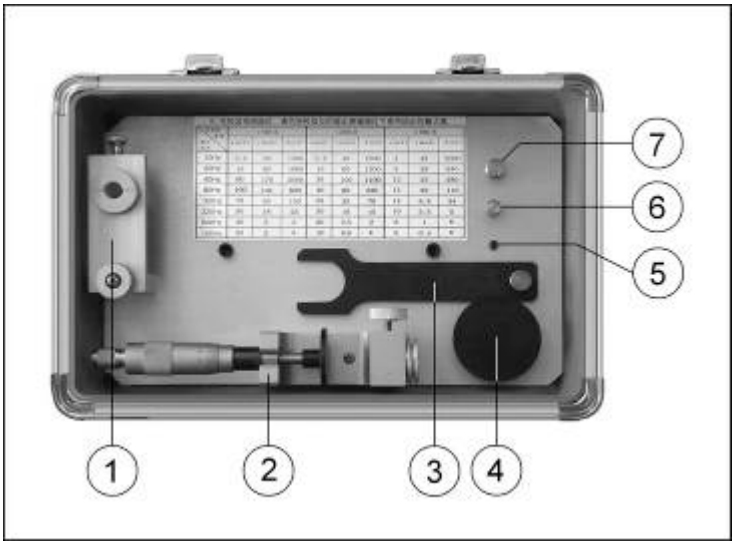
Accessories

Different fixing screws shall be used to install acceleration transducers or velocity transducers. Fixing stand shall be used for the installation of proximity probe.

- The accessories used with SVS-3M Vibration Shaker include M5 screw for fixing acceleration transducer, M5 – M8, M5 – M10 transition screw for fixing velocity transducer, and the fixing stand for fixing proximity probe.
- Different accessories for SVS-3M Vibration Shaker are stored in the cover of the container of the Shaker.

Open the cover of the Container

Push the cover to right and take it down



Accessories:

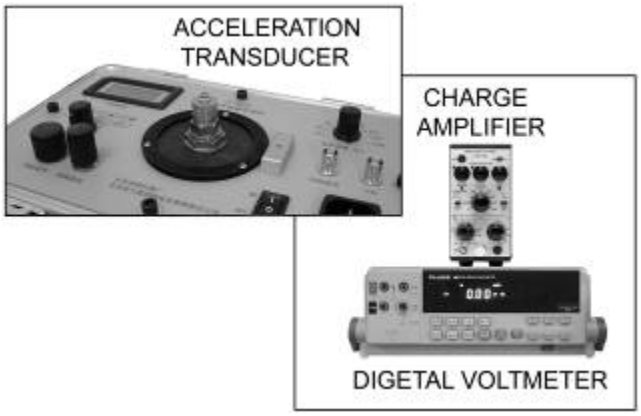
1 Fixing stand for proximity probe
2 Spindle micrometer
3 Tool to fix the sensor
4 Testing plate for proximity probe
5 M5 Fixing screw for acceleration transducer
6 M5-M8 Transition screw for velocity transducer
7 M5-M10 Transition screw for velocity transducer

1  Fixing stand	2  Spindle micrometer
3  Tool to fix the sensor	4  Testing plate
5  M5 Fixing screw	6  M5-M8 Transition screw
7  M5-M10 Transition screw	

The calibration of acceleration transducer

1

Fix M5 screw, Acceleration transducer on the transducer fixing table of the Shaker respectively.



2

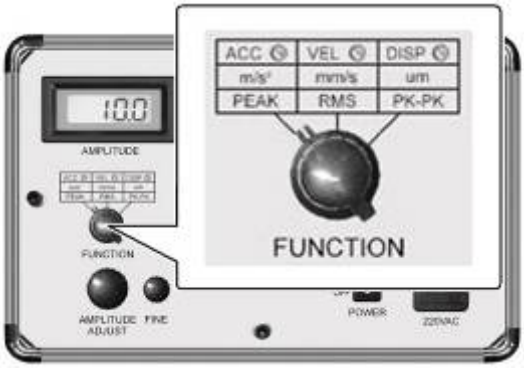
Connect the acceleration transducer to be calibrated with the input of the Charge Amplifier; connect the voltage output of the Charge Amplifier with a digital voltmeter.

- See Operating Instruction of the Charge Amplifier for its setting.

3

Set the **FREQ.SELECT** switch to **80** Hz

- In general, the frequency shall be set at 80Hz. During calibration although other frequencies may also be used.

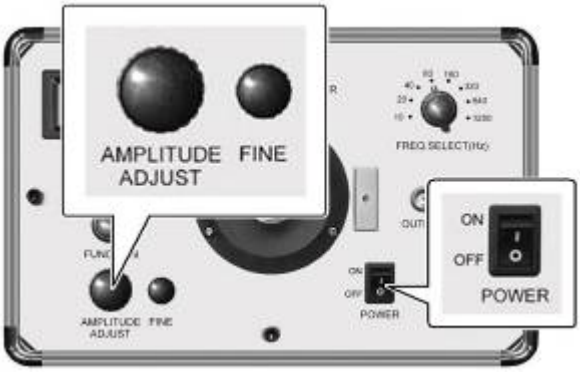


4

Set the **FUNCTION** switch to "**ACC**".

5

Set the **AMPLITUDE ADJUST** Potentiometer to minimum; set the **POWER** to **ON**.



6

Adjust the **AMPLITUDE ADJUST** Potentiometer until the output amplitude of vibration acceleration of the Shaker is shown on the display as 10.0 (m/s^2).

7

Use a digital voltmeter to measure the voltage output of the Charge Amplifier.

8

Based on the measured value of the voltage output from the Charge Amplifier and the standard voltage value of the Charge Amplifier at acceleration of 10 m/s^2 the error of the transducer calibrated can be calculated.

$$\text{Error} = \frac{\text{Standard Value} - \text{Measured Value}}{\text{Standard Value}} \times 100\%$$

The standard value is determined by the setting of the Charge Amplifier. If the acceleration is $10m/S^2$,the voltage output of the Charge Amplifier is set at 1 V (Peak value), RMS value will be 707.00mV

The calibration of velocity transducer

1

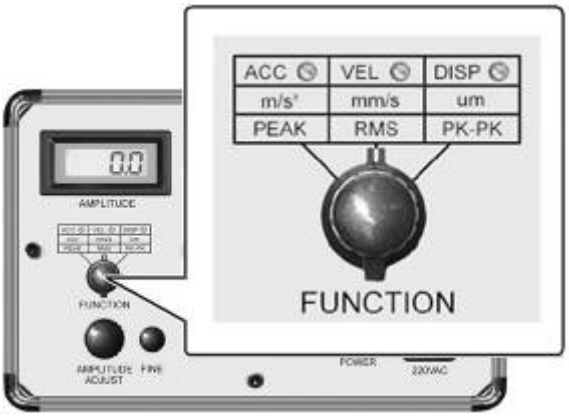
Fix M5-M8 or M5-M10 transition screw (according to the velocity transducer to be calibrated)and the transducer on the transducer fixing table respectively.

2

Connect the output lead of the velocity transducer to be calibrated with a digital voltmeter.

3

Set the **FREQ. SELECT** switch to **80**Hz.
In general the frequency shall be set at 80Hz during the calibration although other frequencies may be used also.



4

Set the **FUNCTION** Switch to "**VEL**".

5

Set the **AMPLITUDE ADJUST** Potentiometer to minimum; set the **POWER** to **ON**.

6

Adjust the **AMPLITUDE ADJUST** Potentiometer until the output amplitude of the vibration velocity of the Shaker shown on the display reaches 10(mm/s)

7

Use a digital voltmeter to measure the voltage output of the transducer to be alibrated. Based on the measured value of the voltage output of the transducer the error of this transducer can be calculated.

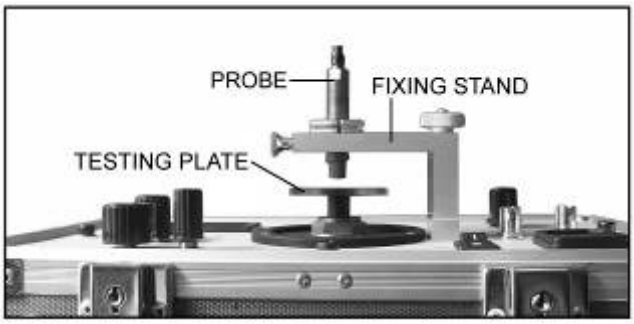
$$\text{Error} = \frac{\text{Standard Value} - \text{Measured Value}}{\text{Standard Value}} \times 100\%$$

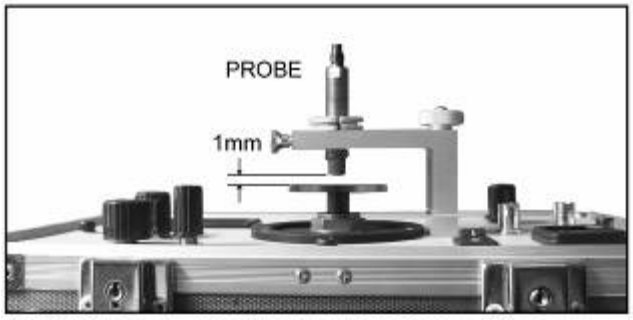
- Standard value is determined by the sensitivity of the transducer, for example:
  If the sensitivity of the transducer is 200mV/cm/s, its voltage output (standard value) will be 200 mV.
  If the sensitivity of the transducer is 280mV/cm/s, its voltage output (standard value) will be 280 mV.
- If the transducer to be calibrated is a horizontal transducer the Shaker shall be placed horizontally and if it is a vertical one, the Shaker shall be placed vertically.

The calibration of Proximity Transducer Systems

1

Fix the testing plate, Probe fixing stand and Probe on the control panel of the Shaker respectively.



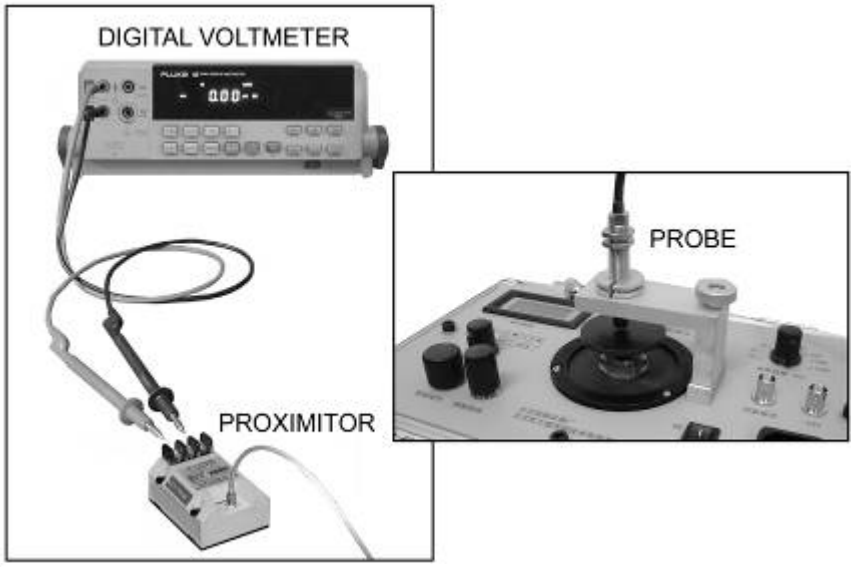


2

Adjust the distance between sensor to vibration surface to1mm.

3

Connect the Probe, Proximitor And digital voltmeter correctly.



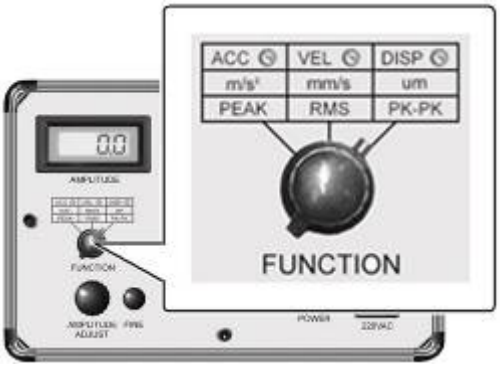
4

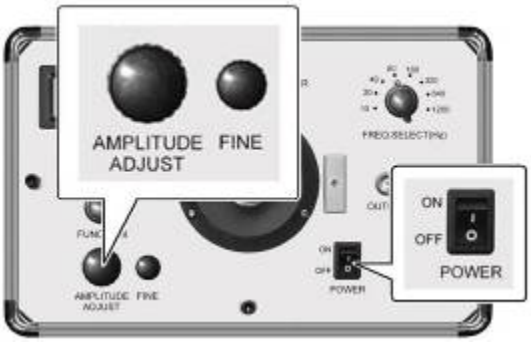
Set the **FREQ.SELECT** switch to **80** Hz

- When calibrating a displacement Transducer, a lower frequency shall Be selected to obtain a larger Displacement output from the Shaker

5

Set the **FUNCTION** Switch to “**DISP**”.



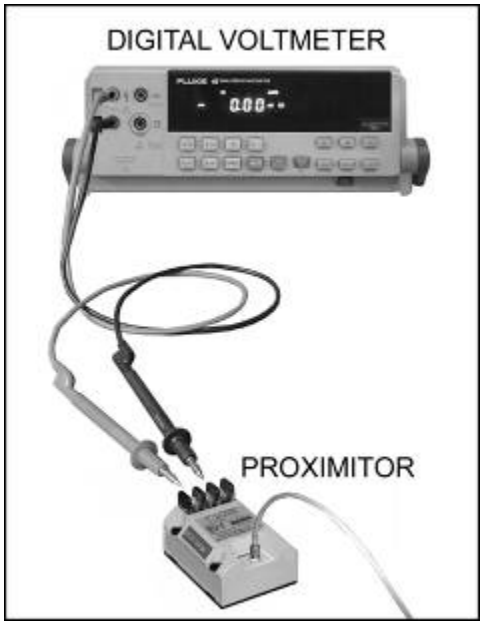


6

Set the **AMPLITUDE ADJUST** Potentiometer to minimum and set **POWER** to **ON**.

7

Set the **AMPLITUDE ADJUST** Potentiometer according to the full range of the transducer to make the amplitude of the vibration displacement output to reach an appropriate value. At this time the display shows the PK-PK, say,800um.



8

Use a digital voltmeter to measure the voltage output of the Proximitor.

Based on the actual value measured the error of the transducer can be calculated.

$$\text{Error} = \frac{\text{Standard Value} - \text{Measured Value}}{\text{Standard Value}} \times 100\%$$

- The standard value is determined by the sensitivity of the transducer to be calibrated.

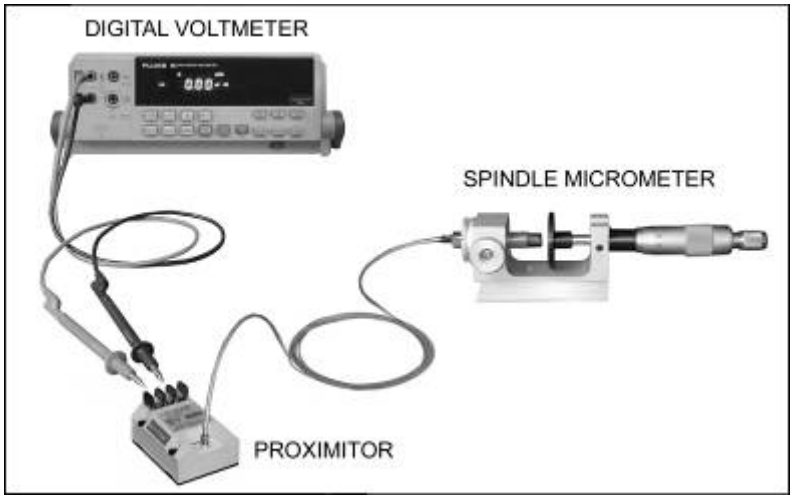
For example

If the sensitivity of the transducer is 8mV/um (PK-PK) and the displacement is 800um, then the voltage output of the proximitor will be 800 um x 8 mV/um = 6400 mV (PK-PK). At this time the RMS value of the voltage output of the proximitor shall be:

6400 mV(PK-PK) / 2.828=2263mV=2.263V(RMS)

9

A spindle micrometer is used to check the transducer system . A probe mounting adapter provided with the SVS-3M holds the probe while the target is moved toward or away from the probe tip in calibrated increments,and the Proximitor's output is recorded using a voltmeter.



Physical

Size: 280 x 180 x 250(mm)

Weight: 20lb

Environmental

Temperature

Operation: 0°C to 50 °C

Storage: -20 °C to 70 °C

Humidity

90% non -condensing