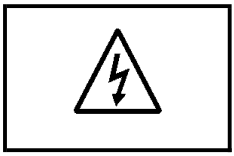
VIBRATION CONTROLLER/MONITOR

Model : PVB-8219

Your purchase of this VIBRATION CONTROLLER/ MONITOR marks a step forward for you into the field of precision measurement. Although this vibration controller is a complex and delicate instrument, its durable structure developed. Please read the following instructions carefully and always keep this manual within easy reach.

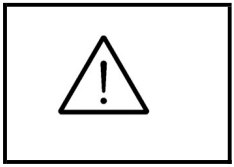
OPERATION MANUAL

Caution Symbol



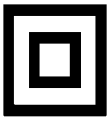
Caution :

* Risk of electric shock !



Caution :

* Do not use fingers or any tool to touch the Wire Terminals.
* Do not apply the relay contact load current > 0.5 Amp.
* The instrument contains no user serviceable parts and should not be opened by the user.
* Repair or after service should be done by a qualified technician only.
* Power supply should apply the correct ACV power voltage
* Cleaning - Only use the dry cloth to clean the plastic case !



* **Equipment protectted throughout by Double Insulation or Reinforced Insulation.**

Environmental Condition

* Comply with EN61010.
  Transient overvoltage at Mains Supply 2500V.
* Pollution Degree 2.
* Altitude up to 2000 meters.
* Indoor use.
* Relative humidity 80% max.

TABLE OF CONTENTS

1. FEATURES

* Applications for industrial vibration monitoring :
  All industrial machinery vibrates. The level of vibration is a useful guide to machine condition. Poor balance,misalignment & looseness of the structure will cause the vibration level increase, it is a sure sign that the
* Frequency range 10 Hz - 1 kHz, sensitivity relative meet ISO 2954.
* Professional vibration meter supply with vibration sensor & magnetic base, full set.
* Metric & Imperial display unit
* Acceleration, Velocity, Displacement measurement.
* Separate vibration probe with magnetic base, easy operation.
* Wide frequency range.
* Control setting, Hi/Lo alarm setting.
* Control relay output, alarm relay output.
* Control Relay will make action when the reading value reach to control value.
* Alarm Relay will make action when the reading value reach to high/low alarm value.
* Hysteresis value setting for control and alarm function.
* Large red LED display, high brightness and easy to read.
* RS232 computer interface, send out the vibration data .
* Optional data acquisition software.
* Microprocessor circuit ensures high accuracy and provides special functions and features.
* Standard 96 X 48 mm DIN case.

2. SPECIFICATIONS

2-1 General Specifications

<table>
<tr><td>Circuit</td><td colspan="3">Custom one-chip of microprocessor LSI circuit.</td></tr>
<tr><td>Display</td><td colspan="3">4 digits red LED, digit size : 14 mm.</td></tr>
<tr><td>Measurement</td><td colspan="3">Velocity, Acceleration, Displacement</td></tr>
<tr><td>Function</td><td colspan="3">Acceleration, Velocity : RMS

Displacement : p-p (peak-peak)</td></tr>
<tr><td rowspan="4">Display Unit</td><td>Measurement</td><td>Metric</td><td>Imperial</td></tr>
<tr><td>Acceleration</td><td>meter/s^2</td><td>ft/s^2</td></tr>
<tr><td>Velocity</td><td>mm/s</td><td>inch/s</td></tr>
<tr><td>Displacement</td><td>mm</td><td>inch</td></tr>
<tr><td>Frequency range</td><td colspan="3">10 Hz to 1 KHz
* Sensitivity relative during the frequency range meet ISO 2954
Refer to table 1, page 17</td></tr>
<tr><td>Offset adjust</td><td colspan="3">It can make the internal Offset setting</td></tr>
<tr><td>Gain adjust</td><td colspan="3">It can make the internal Gain setting</td></tr>
<tr><td>Sampling Time</td><td colspan="3">pprox. 1 second.</td></tr>
<tr><td rowspan="2">Setting Function</td><td>1st layer setting procedures</td><td colspan="2">CtLo (Control low limit)
CtHi (Control high limit)
ALLo (Alarm low limit)
ALHi (Alarm high limit)</td></tr>
<tr><td>Second layer setting procedures</td><td colspan="2">FiLt (Digital filter)
CtHy (Control hysteresis set)
ALHy (Alarm hysteresis set)
oFSt (Offset adjustment)
GAin (Gain adjustment)
Unit (Unit set)</td></tr>
</table>

Relay outputs	Number	2 relays
	Function	*Relay 1 :* Control relay. *Relay 2 :* High/Low alarm relay.
	Max load	0.5 ACA/250 ACV 0.5 DCA/24 DCV * ***Do not apply the relay contact load current > 0.5 A, other wise the relay may be damaged permanently without warranty.***
Data Output	RS 232 PC serial interface.	
Operating Temperature	0 to 50 ℃. ** Meter*	
Operating Humidity	Less than 80% R.H. ** Meter*	
Power Supply	90 to 260 ACV, 50/60 Hz.	
Power Consumption	Approx. 2.6 VA/AC 110V. Approx. 5.1 VA/AC 220V.	
Weight	282 g/ 0.62 LB. ** Meter only.*	
Dimension	DIN size : 96 x 48 mm. Depth : 110 mm.	
Accessories Included	Instruction manual..... 1 PC Case holder with screw..... 2 PCs Vibration sensor with cable..... 1 PC Magnetic base..... 1 PC	
Optional Accessories	* Data Acquisition software, SW-U801-WIN. * RS232 cable, UPCB-02. * USB cable, USB-01. * Real time SD card data logger DL-9602SD	

2-2 Electrical Specifications (23±5 ℃)

Acceleration (RMS)

Unit	m/s^2
Range	0.5 to 199.9 m/s^2
Resolution	0.1 m/s^2
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	50 m/S^2 (160 Hz)

Unit	ft/s^2
Range	2 to 656 ft/s^2
Resolution	1 ft/s^2
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	50 m/S^2 (160 Hz)

Velocity (RMS)

Unit	mm/s
Range	0.5 to 199.9 mm/s
Resolution	0. 1 mm/s
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	50 mm/s (160 Hz)

Unit	inch/s
Range	0.02 to 7.87 inch/s
Resolution	0.01 inch/s
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	50 mm/s (160 Hz)

Remark :

RMS : To measure the true RMS value.

Displacement (p-p)

Unit	mm
Range	1.999 mm
Resolution	0.001 mm
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	0.141 mm (160 Hz)

Unit	inch
Range	0.078 inch
Resolution	0.001 inch
Accuracy	±(5 % + 2 d) reading *@ 160 Hz, 80 Hz, 23 ± 5 ℃*
Calibration Point	0.141 mm (160 Hz)

Remark :

p-p :

To measure the Peak to Peak value.

@ *Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.*

3. FRONT PANEL DESCRIPTION

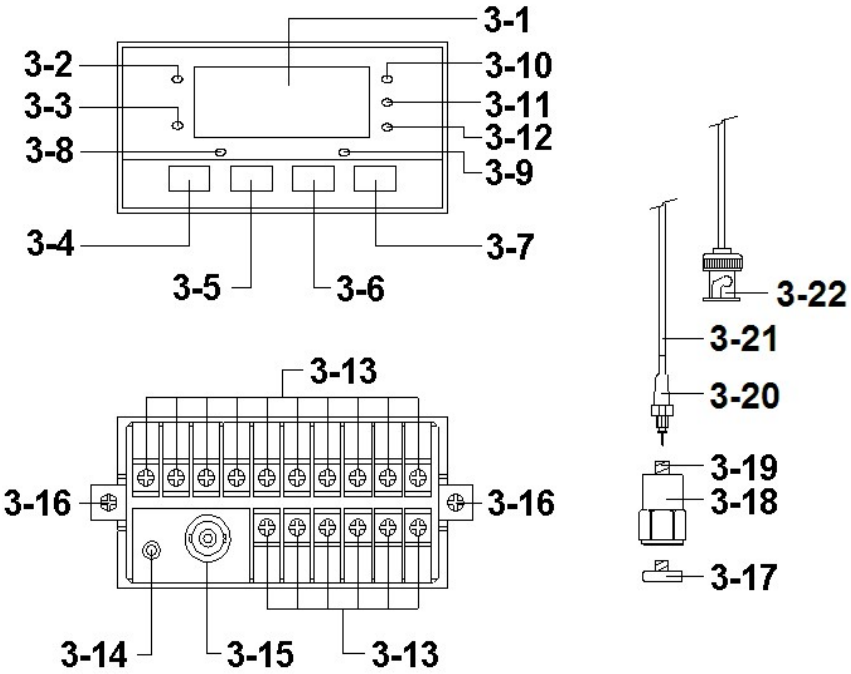


Fig. 1

3-1 Display
3-2 PV (process value) indicator
3-3 SV (set value) indicator
3-4 Set Button
3-5 ▼ Button
3-6 ▲ Button
3-7 Function Button
3-8 Control relay indicator
3-9 Alarm relay indicator
3-10Acceleration unit indicator
3-11 Velocity unit indicator
3-12 Displacement unit indicator
3-13Wire terminals
3-14 RS232 output terminal
3-15 BNC input socket
3-16 Case holder
3-17 Magnetic base
3-18 Vibration sensor
3-19 Input socket of vibration sensor
3-20 Mini plug of cable
3-21Sensor cable
3-22 Cable BNC plug

4. MEASURING PROCEDURE

4-1 Indicator Description

A. Metric units are red Indicators:

1) Acceleration: m/s²

2) Velocity: mm/s

3) Displacement: mm

B. Inch units are yellow. Indicators

1) Acceleration: ft/s²

2) Velocity: inch/s

3) Displacement: inch

C. Setting Indicators:

1) PROCESS VALUE(PV)

2) Lit during normal test will be light.

3) Lights up when the up / down key is not pressed in setup mode

D. SET VALUE(SV):

1) When the upper and lower values are adjusted, the light will be on and the PV will not turn on until the SET key is pressed. The setting value will be stored and the indicator will be off.

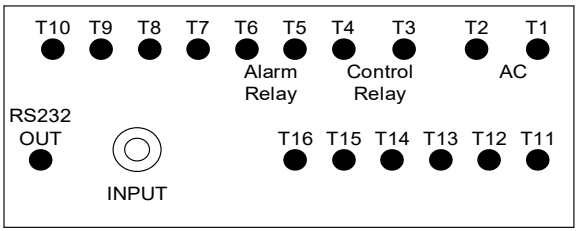
E. Control Indicators:

1) CONTROL RELAY (OUT): This light is on when Control RELAY ON, otherwise OFF

2) ALARM RELAY (ALM): When the ALARM RELAY ON , the light will be on, otherwise OFF .

4-2 Terminal layout

Fig. 2



4-3 Terminal connection

1) Input the ACV power (90 to 260 ACV) to T1, T2.

Do not input the over voltage to the AC input terminals.

2) Connect the " Alarm Relay " output from T3, T4.
   Connect the " Control Relay " output from T5, T6.

4-4 VIBRATION Measurement

A. PREPARE

1) Plug in the " Mini plug of cable " (3-20, Fig. 1) to the " Input socket of vibration sensor " (3-19, Fig. 1).
2) Plug in the " Cable BNC Plug " (3-22, Fig. 1) to the " BNC Input Socket " (3-15, Fig. 1).
3) Meter connect to ACV POWER ,Press the Function key(3-7 ,Fig 1) to select ACC(3-10 Fig.1) or VEL(3-11,Fig, 1) or Displacment (3-12 ,Fig. 1)The " Display " (3-1, Fig. 1) will show the vibration test value,

Remark :

1. *If the surface material of measuring article is not the ferrous material, hold the vibration sensor (3-18, Fig 1) by hand & touch the sensor to the surface of the measuring article,*

* *If the surface material of measuring article is the ferrous material, connect " Vibration sensor " (3-1 8 , Fig. 1) with the " Magnetic base " (3-17, Fig. 1)Put the whole unit (Vibration sensor and Magnetic base) to the surface of measuring article.*

* *Please do not use the finger or hand to touch the " Sensor cable " (3-2 1 , Fig. 1).*

B. Unit select

Press and hold the SET Button(3-4, Fig. 1) > 2 sec. into setting then short press SET Button (3-4, Fig. 1) 5 times,The screen will stay in Unit use " ▲(3-6,Fig.1)"、"▼(3-5,Fig.1)" Button select Metric or Imperial then short press "SET Button " once, wii be save select unit, short press "SET Button " once again ,will back to measure screen.

Metric unit indicater light color is red.
Imperial unit indicater light color is yellow.

Measurement	Metric	Imperial
Acceleration	m/s^2	ft/s^2
Velocity	mm/s	inch/s
Displacement	mm	inch

4-5 1st layer setting procedures

CtLo	Control Low Limit Value Setting
CtHI	Control High Limit Value Setting
ALLo	Alarm Low Limit Value Setting
ALHI	Alarm High Limit Value Setting

A . Control Low Limit Value Setting

1) Press the " Set Button " (3-4, Fig. 1) once, the Display will show " CtLo ", now the meter is ready for the Control Low Limit Value Setting.
2) In " CtLo " screen, short press Function button(3-7, Fig. 1) to select Acceleration or velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" button once, display will show control value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" button to adjustment control limit value, then short press the "SET Button " once ,will saved the setting value and back to " CtLo " screen.

Remark :

* When adjust the value, the " SV indicator " (3-3, Fig. 1)will light.
* ***Under Display show " LoLt ", if " Acceleration indicator " (3-10, Fig. 1) is lit, meter is ready for " Acceleration Low Limit " setting.***
* ***Under Display show " LoLt ", if " Velocity indicator " (3-11, Fig. 1) is lit, meter is ready for " Velocity Low Limit " setting.***

* ***Under Display show " LoLt ", if " Displacement indicator (3-12, Fig. 1) " is lit, meter is ready for " Displacement Low Limit " setting.***
* ***The function of " Low Limit value " setting, refer to page 13, Fig. 3.***

B . Control High Limit Value Setting

1) Finish " CtLo"setting, Press the " Set Button " (3-4, Fig. 1) once, the Display will show " CtHI ", now the meter is ready for the Control High Limit Value Setting.
2) In " CtHI " screen, short press Function Button(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show control Value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment control Limit Value, then short press the "SET Button " once ,will saved the setting value and back to " CtLo " screen.

Remark :

* When adjust the value, the " SV indicator " (3-3, Fig. 1)will light.
* ***Under Display show " HILt ", if " Acceleration indicator " (3-10, Fig. 1) is lit, meter is ready for " Acceleration Low Limit " setting.***
* ***Under Display show " HILt ", if " Velocity indicator " (3-11, Fig. 1) is lit, meter is ready for " Velocity Low Limit " setting.***
* ***Under Display show " HILt ", if " Displacement indicator (3-12, Fig. 1) " is lit, meter is ready for " Displacement Low Limit " setting.***
* ***The function of " High Limit value " setting, refer to page 13, Fig. 3.***

C . Alarm Low Limit Value Setting

1) Finish " CtHI"setting, Press the " Set Button " (3-4, Fig. 1) once, the Display will show " ALLo ", now the meter is ready for the Alarm Low Limit Value Setting.
2) In " ALLo " screen, short press Function Button(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show control Value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment control Limit Value, then short press the "SET Button " once ,will saved the setting value and back to " ALLo " screen.

Remark :

* When adjust the value, the " SV indicator " (3-3, Fig. 1)will light.

* ***Under Display show " ALLo ", if " Acceleration indicator " (3-10, Fig. 1) is lit, meter is ready for " Acceleration Low Limit " setting.***
* ***Under Display show " ALLo ", if " Velocity indicator " (3-11, Fig. 1) is lit, meter is ready for " Velocity Low Limit " setting.***
* ***Under Display show " ALLo ", if " Displacement indicator (3-12, Fig. 1) " is lit, meter is ready for " Displacement Low Limit " setting.***
* ***The function of " Alarm Low Limit value " setting, refer to page 14, Fig. 4.***

D . Alarm High Limit Value Setting

1) Finish " ALLo"setting, Press the " Set Button " (3-4, Fig. 1) once, the Display will show " ALHI ", now the meter is ready for the Alarm High Limit Value Setting.
2) In " ALHI " screen, short press "Function Button"(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show control Value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment control Limit Value, then short press the "SET Button " once ,will saved the setting value and back to " ALHI " screen.

Remark :

* When adjust the value, the " SV indicator " (3-3, Fig. 1)will light.
* ***Under Display show " ALHI ", if " Acceleration indicator " (3-10, Fig. 1) is lit, meter is ready for " Acceleration Low Limit " setting.***
* ***Under Display show " ALHI ", if " Velocity indicator " (3-11, Fig. 1) is lit, meter is ready for " Velocity Low Limit " setting.***
* ***Under Display show " ALHI ", if " Displacement indicator (3-12, Fig. 1) " is lit, meter is ready for " Displacement Low Limit " setting.***
* ***The function of " Alarm High Limit value " setting, refer to page 14, Fig. 4.***

4-6 2nd layer setting procedures

FiLt	**Digital Filter Value Setting**
CtHy	**Control Hysteresis Value Setting**
ALHy	**Alarm Hysteresis Value Setting**
oFSt	**Offset Value Setting**
Gain	**Gain Value Setting**
Unit	**Unit Setting**

A. Digital Filter Value

1) Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " FiLt ", now the meter is ready for the Digital Filter Value Setting.
2) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show digital value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Digital Filtet Value, then short press the "SET Button " once ,will saved the setting value and back to " FiLt " screen.

Remark :

* When adjust the value, the " SV indicator " (3-3, Fig. 1)will light.
* Digital Filter Value range 1 to 100, Factory default setting Value 3 .

B. Control Hysteresis Value Setting

1) Finish " FiLt"setting, Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " CtHy ", now the meter is ready for the Control Hysteresis Value Setting.
2) In " CtHy " screen, short press "Function Button"(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show digital value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Control Hysteresis Value, then short press the "SET Button " once ,will saved the setting value and back to " CtHy " screen.

Remark :

* *When adjust the Control Hysteresis value, the " SV indicator " (3-3, Fig. 1) will light.*
* ***The function of " Control Hysteresis value " setting, refer to page 13, Fig. 3.***

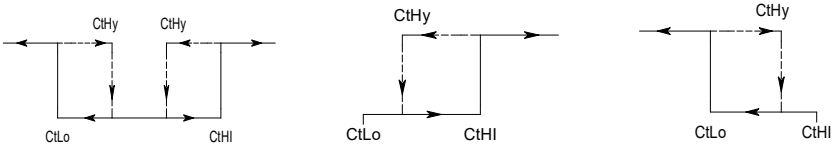


Fig. 3

For example :

Control High limit value : 39.0

Control Low limit value : 10.0

Control Hysteresis value : 0.5

a. When measurement value ≧39.0 The Control relay will On ,when measuring value ≦ 38.5 The Control relay will Off .
b. When measurement value ≦10.0 The Control relay will On ,when measuring value ≧ 10.5 The Control relay will Off .

C. Alarm Hysteresis Value Setting

1) Finish " CtHy"setting, Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " ALHy ", now the meter is ready for the Alarm Hysteresis Value Setting.
2) In " ALHy " screen, short press "Function Button"(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show digital value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Alarm Hysteresis Value, then short press the "SET Button " once ,will saved the setting value and back to " ALHy " screen.

Remark :

* *When adjust the Alarm Hysteresis value, the " SV indicator " (3-3, Fig. 1) will light.*
* ***The function of " Alarm Hysteresis value " setting, refer to page 14, Fig. 4.***

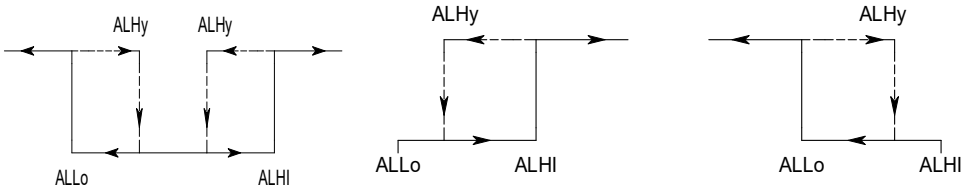


Fig. 4

For example :

Alarm High limit value : 10.0

Alarm Low limit value : 2.0

Alarm Hysteresis value : 0.5

a. When measurement value ≧10.0 The alarml relay will On ,when measuring value ≦ 9.5 The alarm relay will Off .
b. When measurement value ≦2.0 The alarml relay will On ,when measuring value ≧ 2.5 The alarm relay will Off .

D. Offset Value Setting

1) Finish " ALHy"setting, Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " oFSt ", now the meter is ready for the Offset Valu Setting.
2) In " oFSt " screen, short press "Function Button"(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show digital value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Offset value, then short press the "SET Button " once ,will saved the setting value and back to " oFSt " screen.

Remark :

* *When adjust the Offset Valu e , the " SV indicator " (3-3, Fig. 1) will light.*
* ***The function of " Offset Value " setting, Factory default setting 0.0***

E. Gain Value Setting

1) Finish " oFSt"setting, Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " Gain ", now the meter is ready for the Gain Value Setting.

2) In " Gain " screen, short press "Function Button"(3-7, Fig. 1) to select Acceleration or Velocity or Displacement Function .
3) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show digital value ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Gain Value, then short press the "SET Button " once ,will saved the setting value and back to " Gain " screen.

Remark :

* *When adjust the Gain Value, the " SV indicator " (3-3, Fig. 1) will light.*
* ***The function of " Gain Value " setting,Factory default setting Value 1.000***

F. Unit Setting

1) Finish " Gain"setting, Press the " Set Button " (3-4, Fig. 1) continuously at least two seconds, the " Display " will show " Unit ", now the meter is ready for the Unit Setting Setting.
2) Press the " ▲(3-6,Fig.1)"or"▼(3-5,Fig.1)" Button once, display will show SI or IMPE ,then use " ▲(3-6,Fig.1)"and"▼(3-5,Fig.1)" Button to adjustment Unit Setting, then short press the "SET Button " once ,will saved the setting value and back to " Unit " screen.

Remark :

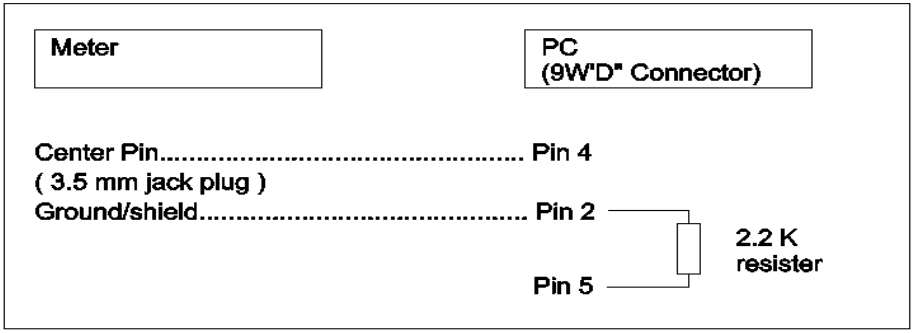
* *When adjust the Unit Setting, the " SV indicator " (3-3, Fig. 1) will light.*
* ***The function of " Unit Setting " setting, Factory default setting Metric .***

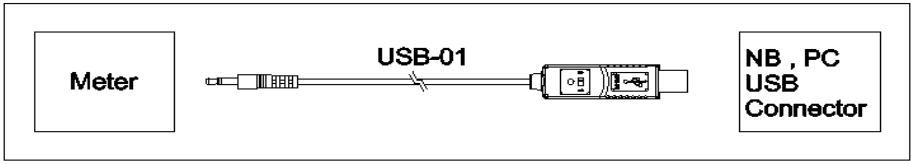
5. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-14, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.





The 16 digits data stream will be displayed in the following format :

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

Each digit indicates the following status :

D15	Start Word		
D14	4		
D13	When send the upper display data = 1 When send the lower display data = 2		
D12 & D11	Annunciator for Display		
	m/s^2 =92	mm/s = 93	mm = 94
	Ft/s^2 =97	inch/s =98	inch =96
D10	Polarity 0 = Positive 1 = Negative		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D8 = MSD, D1 = LSD. For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D0	End Word		

RS232 setting

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

6. SYSTEM RESET

Power on the meter, use the two fingers to press " Set Button " (3-4, Fig. 1) and " ▼ Button " (3-5, Fig. 1) continuously more than 2 seconds until the Display show the text " rSt ", release the buttons. After " rSt " text flashing 3 times will return to the normal screen. The meter internal function will return the default value.

7. SENSITIVITY RELATIVE to the reference sensitivity at 80 Hz , according ISO 2954

Frequency	Normal value	Relative sensitivity	
		Minimum value	Maximum value
10 Hz	1.0	0.8	1.1
20 Hz	1.0	0.9	1.1
40 Hz	1.0	0.9	1.1
80 Hz	1.0	1.0	1.0
160 Hz	1.0	0.9	1.1
500 Hz	1.0	0.9	1.1
1000 Hz	1.0	0.8	1.1

Table 1

7. THE ADDRESS OF AFTER SERVICE CENTER