



User Manual
RS PRO 3102
stock number: 254-3502

EN



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1. SAFETY INFORMATION

To prevent bodily injury or damage to the meter, the following cautions must be observed.

CAUTION

- Do not place the meter on an unstable place (shaky table or sloping place).
If the meter falls down, it is very dangerous.
- Do not use and storage the place which moisture or dust, and where air with high salt or sulphur content, or other gase or chemicals. It causes fire or shock hazard.
- Take care not to drop the meter, and protect it from shocks and vibrations.
- Do not tap the LCD panel with a finger or a pen. It become the cause of defective display or malfunction.
- After using the meter, always turn the meter off and when the meter is not to be used for a week or longer, remove the batteries to prevent possible damage caused by battery leakage.
- Please be sure undergo periodic inspection the meter and the piezoelectric accelerometer 1 or 2 times in an year.
- Do not substitute parts or modify the meter.
- When powering the meter externally, use only the specified optional AC adapter (VA-03). Other type of adapter may cause malfunction or damage to the meter.
- When using the meter near rotating machinery, take care that cables cannot be caught in the machinery.

2. INTRODUCTION FEATURES

The meter is designed mainly for routine maintenance and monitoring of rotational and other industrial machinery.

Acceleration, velocity, and displacement can be easily measured using a suitable frequency range, allowing comprehensive and precise evaluation of machine vibrations.

Applications:

- Industrial hygiene investigations
- Industrial machinery check-ups
- Manufacturing QA

Features:

- Wide range of measurement applications supported by selecting different accelerometers
- Backup function instantly reactivates previous settings at next power-on
- Maximum/Minimum record function
- Manual data memory stores up to 99 data
- Auto data memory micro SD CARD (maximum capacity 32GB can be used)
- Headphone output for detecting noise in machine components

※ Protected by:

Taiwan: D176325

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3. SPECIFICATIONS

❑ Accelerometer Model PA-01 specification

1. Sensor: Voltage output type (built-in preamplifier)
2. Type: CCLD (Constant Current Line Drive)
3. Sensitivity: Listed on supplied calibration chart of PA-01
4. Transverse sensitivity: 5% or less
5. Frequency characteristics: 5Hz to 10kHz ($\pm 10\%$), 10kHz to 15kHz ($\pm 3\text{dB}$)
6. Resonance frequency: 27kHz
7. Amplitude non-linearity: $\pm 1\%$
8. Acceleration range: 200m/s^2
9. Constant current supply: DC24V, 2mA
10. Operating temperature and humidity: -20 to $+70^\circ\text{C}$, max. 90%RH
11. Storage temperature and humidity: -30 to $+80^\circ\text{C}$, max. 90%RH
12. Size and weight: 19(D) x 46(H) mm / 46g

❑ Accelerometer Model PA-02 specification

1. Sensor: Voltage output type (built-in preamplifier)
2. Type: CCLD (Constant Current Line Drive)
3. Sensitivity: Listed on supplied calibration chart of PA-02
4. Transverse sensitivity: 5% or less
5. Frequency characteristics: 5Hz to 5kHz ($\pm 10\%$), 5kHz to 12kHz ($\pm 3\text{dB}$)
6. Resonance frequency: 20kHz
7. Amplitude non-linearity: $\pm 1\%$
8. Acceleration range: 100m/s^2
9. Constant current supply: DC24V, 2mA
10. Operating temperature and humidity: -20 to $+70^\circ\text{C}$, max. 90%RH

11. Storage temperature and humidity: -30 to +80°C , max.
90%RH

12. Size and weight: 22(D) x 52(H) mm / 72g

□ **Meter specification**

Measurement range (with PA-01 or PA-02)

Acceleration (ACC): 0.02 ~ 200m/s² EQ PEAK 1Hz ~ 5kHz

Velocity (VEL): 0.3 ~ 1000mm/s RMS 3Hz ~ 1kHz

0.1 ~ 1000mm/s RMS 10Hz ~ 1kHz

Displacement (DISP): 0.02 ~ 100mm EQ PEAK 3Hz ~ 500Hz

0.001~100mm EQ PEAK 10Hz~500Hz

Upper and lower measurement limit may be further restricted, depending on accelerometer mounting method.

Upper measurement limit for velocity and displacement measurements is restricted by maximum input acceleration.

Frequency range

Acceleration (ACC): 3Hz ~ 1kHz, 3Hz ~ 5kHz,
1Hz ~ 100Hz, 3Hz ~ 20kHz

Velocity (VEL): 10Hz ~ 1kHz, 3Hz ~ 1kHz

Displacement (DISP): 10Hz ~ 500Hz, 3Hz ~ 500Hz

The above figures refer to the point where response is down by 10% from flat response, due to the action of a high-pass filter or low-pass filter.

For displacement measurements, the 500Hz limit is disposed by the maximum input acceleration.

The electrical characteristics of 10Hz to 1kHz for velocity correspond to ISO 2954:2012 (Mechanical vibration of rotating and reciprocating machinery-Requirements for instruments for measuring vibration severity).

Measurement range settings

For piezoelectric accelerometer PA-01 and accelerometers with sensitivity is 1.0 ~ 9.9mV/(m/s²)

Acceleration (ACC): 1, 10, 100, 1000 m/s²

Velocity (VEL): 10, 100, 1000 mm/s

Displacement (DISP): 0.1, 1, 10, 100 mm

For accelerometers with sensitivity is 0.1 ~ 0.99 mV/(m/s²)

Acceleration (ACC): 10, 100, 1000, 10000 m/s²

Velocity (VEL): 100, 1000, 10000 mm/s

Displacement (DISP): 1, 10, 100, 1000 mm

For accelerometers sensitivity is 10 ~ 99 mV/(m/s²)

Acceleration (ACC): 0.1, 1, 10, 100 m/s²

Velocity (VEL): 1, 10, 100 mm/s

Displacement (DISP): 0.01, 0.1, 1, 10 mm

Indication characteristics

Acceleration (ACC): EQ PEAK, RMS

Velocity (VEL): RMS, EQ PEAK

Displacement (DISP): EQ PEAK, EQ p-p, RMS

EQ PEAK = RMS $\times \sqrt{2}$, EQ p-p = EQ PEAK $\times 2$

Time constant of rms processing: 1 second

Manual data memory: Maximum 99 data (01 ~ 99) can be stored by manually.

Auto data memory: micro SD CARD (Maximum capacity 32GB can be used) or Maximum 99 blocks.

Gain calibration: After setting the accelerometer sensitivity, calibration is performed to provide proper gain.

Setting range: 0.10 to 0.99, 1.0 to 9.9, 10 to 99 mV/(m/s²)

Overload indication: "OVER" flashing shown on LCD display

Battery status indication: 4 – segment display

Display accuracy (electrical characteristics)

Acceleration (ACC): Range full-scale $\pm 2\%$ (159.2Hz)

Velocity (VEL): Range full-scale $\pm 3\%$ (159.2Hz)

Displacement (DISP): Range full-scale $\pm 5\%$ (159.2Hz)

Overall accuracy (in combination with PA-01 or PA-02)

Acceleration (ACC): Range full-scale $\pm 5\%$ (159.2Hz)

Velocity (VEL): Range full-scale $\pm 7\%$ (159.2Hz)

Displacement (DISP): Range full-scale $\pm 12\%$ (159.2Hz)

Headphone output: Vibration sound monitor

Operating temperature and humidity: $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$,
max. 90%RH

Storage temperature and humidity: $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$,
max. 90%RH

Power requirements: Four IEC R6 size AA batteries (zinc-carbon batteries, alkaline batteries, or nickel-metal hydride batteries) or AC adapter (VA-03 for 100 to 240V AC, optional)

Power consumption: Approx. 60mA (6V, backlight off)

Battery life: Continuous use, on room temperature, backlight off, accelerometer in stable condition.

Zinc-carbon batteries (R6KG): Approx. 8 hours

Alkaline batteries (LR6): Approx. 28 hours

Nickel-metal hydride batteries (HR6): eneloop xx
Approx. 23 hours

Dimensions: 169mm(L) x 78mm(W) x 40mm(H) (maximum)
158mm (L) x 78mm (W) x 40mm (H) (without protruding parts)

Weight: Approx. 286g (including four batteries, but excluding accelerometer and curled cable)

Supplied accessories: Piezoelectric accelerometer PA-01x1,
PA-02x1

Accessories for accelerometer

 Curled cable VA-02 x 1

 Magnet attachment VA-01 x 1

IEC R6 batteries zinc-carbon x 4

Instruction manual x 1

PA-01 calibration chart x 1

PA-02 calibration chart x 1

CD software x 1

Micro-USB cable x 1

Optional accessories: AC adapter VA-03

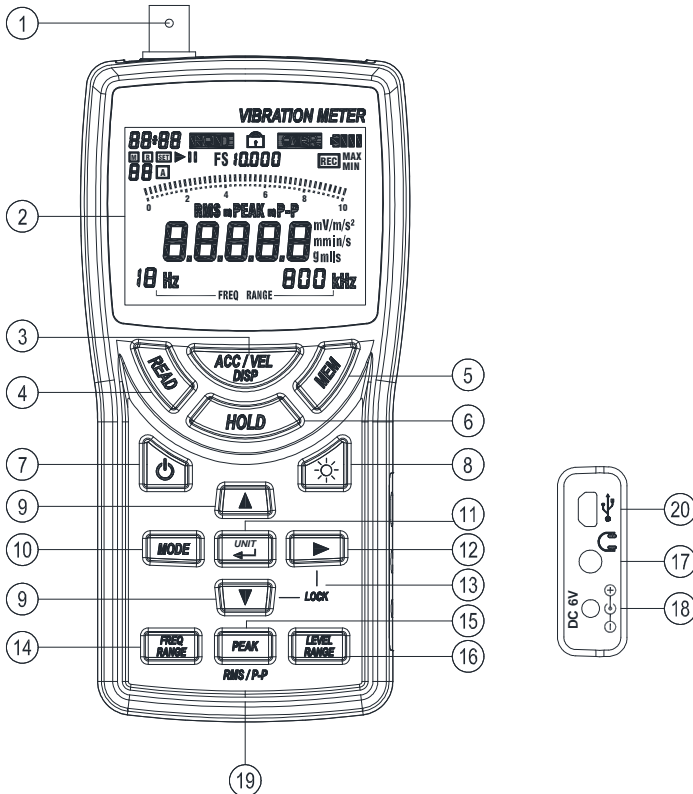
M5x0.8 screw VA-04

Hex flat attachment VA-05

Rod attachment VA-06

4. PARTS & CONTROLS

4-1 Description of Parts & Control Keys



1. BNC input connector:

The piezoelectric accelerometer is to be connected here, using the supplied curled cable. The power supply to drive the accelerometer (24V, 2mA) is always output from the BNC input connector.

2. LCD Display:

Shows the measurement value and status information.

3. ACC/VEL DISP key:

Press this key to select measurement of acceleration (ACC m/s²), velocity (VEL mm/s) or displacement (DISP mm) mode.

4. READ key:


Press this key to enter or exit the manual data memory READ mode.

5. MEM key:

Press this key one time to store the one data to memory. Total memory size is 99 sets.

6. HOLD key:

Press this key to freeze or unfreeze the display reading.

7.  key: Press this key to turn the meter on or off.**8.  key:**

Press this key to turn the backlighting on or off, the backlight will go off automatically after about 30 seconds.

9. ▲ ▼ keys:

- ① In the measurement mode, press “▲ ▼” keys to select the accelerometer model “**PR-01**”, “**PR-02**” or “**USER**” for measurement then press ↵ key to store the selecting and exit.
- ② In the setting mode, press “▲ ▼” keys to increase or decrease the displayed setting.
- ③ In the READ mode, press “▲ ▼” keys to select increase or decrease the memory address.
- ④ In the maximum/minimum record mode, press “▲ ▼” keys to select maximum, minimum, or current measured display indication.

10. MODE key:

Press this key to enter or exit the maximum/minimum recording mode.

11. UNIT/↵ key:

UNIT: In the measurement mode, press “UNIT” key to change the measurement units.

↵: In the setting mode, press ↵ key to enter or exit a setting mode or store the displayed setting.

12. ► key:


In the setting mode, press ► key to move among the available items.

In the measurement mode, press ► key to cycles through the following date/time display.

Minute and Seconds (**10:50**) → Year and Month (**16:06**) →

↶ Day and Hour (**16-14**) ↷

**13. LOCK keys:**

Press ► and ▼ two keys simultaneous to locks all the front panel keys except for the “**ACC/VEL DISP**”, “**MEM**”, “**HOLD**”, and “” power keys.

To cancel the locked condition, press ► and ▼ two keys simultaneous again.

14. FREQ RANGE key:

Press this key to select the frequency range for each measurement mode. Once the setting is made, that setting will be used every time the measurement made is selected. The following settings are available.

ACC: 3Hz to 1kHz, 3Hz to 5kHz, 1Hz to 100Hz,
3Hz to 20kHz

VEL: 10Hz to 1kHz, 3Hz to 1kHz

DISP: 10Hz to 500Hz, 3Hz to 500Hz

15. PEAK RMS/P-P key:

Press this key to select the display mode for each measurement mode. Once the setting is made, it will be used every time the measurement mode is selected. The following settings are available.

Acceleration (ACC): EQ PEAK, RMS

Velocity (VEL): RMS, EQ PEAK

Displacement (DISP): EQ PEAK, EQ P-P, RMS

The display characteristics settings have the following meaning.

RMS (effective value): The average intensity of the time waveform signal over a certain period is shown. The value is calculated as the square root of the mean (average) value of the squared function of the signal.

EQ PEAK (equivalent peak value): This is the maximum peak value based on the assumption that the RMS value is for a sinusoidal wave.

It is calculated as $\text{RMS} \times \sqrt{2} = \text{EQ PEAK}$

EQ P-P (equivalent peak-to-peak value): This is the difference between the minimum and the maximum peak value based on the assumption that the RMS value is for a sinusoidal wave.

It is calculated as $\text{EQ PEAK} \times 2 = \text{EQ P-P}$

16. LEVEL RANGE key:

Press this key to select the level range.

The available ranges for the various mode are listed below.

When using an accelerometer with a sensitivity of 1.0 to 9.9 mV/(m/s²).

ACC: 1, 10, 100, 1000 m/s²

VEL: 10, 100, 1000 mm/s

DISP: 0.1, 1, 10, 100 mm

When using an accelerometer with a sensitivity of 0.1 to 0.99 mV/(m/s²).

ACC: 10, 100, 1000, 10000 m/s²

VEL: 100, 1000, 10000 mm/s

DISP: 1, 10, 100, 1000 mm

When using an accelerometer with a sensitivity of 10 to 99 mV/(m/s²).

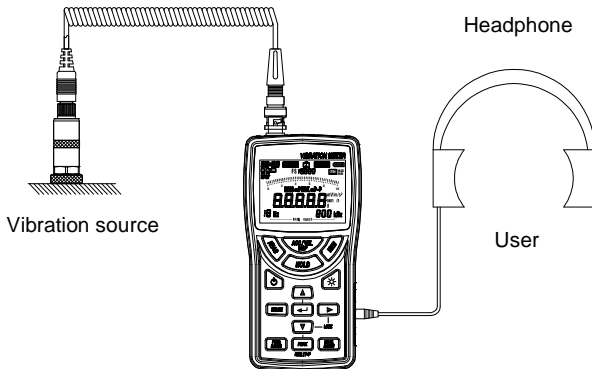
ACC: 0.1, 1, 10, 100 m/s²

VEL: 1, 10, 100 mm/s

DISP: 0.01, 0.1, 1, 10 mm

17. Headphone output: 1/8" Stereo Jack

Listen to vibration source, when you use headphone.



18. AC adapter input socket (DC 6V, 1A,)

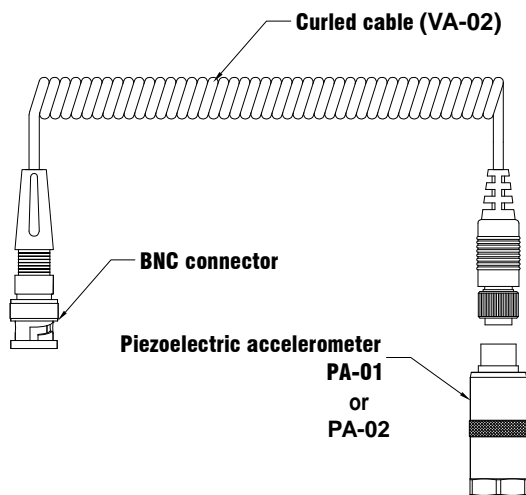
The optional AC adapter VA-03 can be connected here to power the meter.

Important

Use only the specified AC adapter. Using a different adapter may cause malfunction or damage.

19. Battery compartment:

Four batteries (IEC R6, size AA) are inserted here.

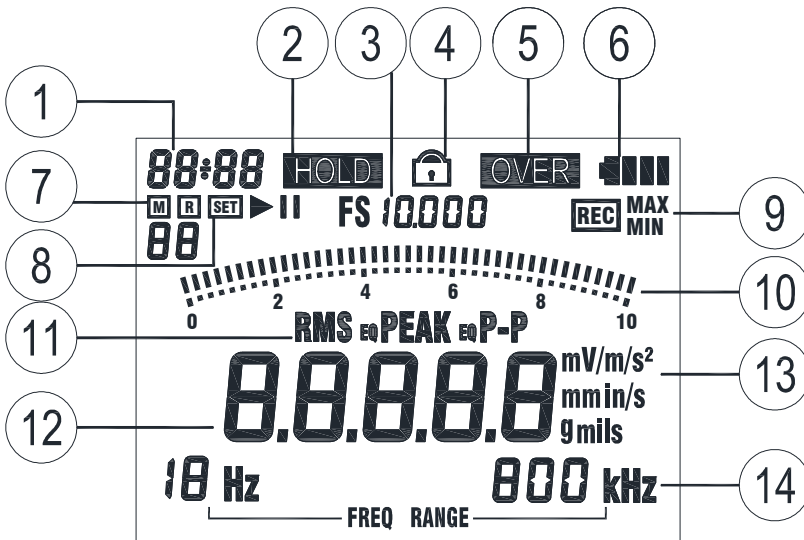
20. USB socket: micro USB interface**Piezoelectric accelerometer****BNC connector:**

Insert this connector into the input connector on the meter.

Piezoelectric accelerometer PA-01:

Detects vibrations and converts them into an electric signal. The accelerometer must be coupled on the measurement object using screw mounting or another method.

4-2 Description of Display



1. **Date/time:** Shows the current, memory or recorded year, month/day, hour/minute, or second.

16:06 : Year ÷ Month

12-15 : Day-Hour

56:10 : Minute ÷ Second


When power on the meter, will display the selected accelerometer model “**PA-01**”, “**PA-02**” or “**USER**” for measurement for 3 seconds.

2. **HOLD** : Data hold indicator
3. **Full-scale value:** Shows the full-scale value of the current range. The maximum value is 10000. The minimum value is 0.01.

4. : Key lock indicator

5. **OVER**: OVER indicator

If an overload condition has occurred during measurement, the indication OVER is flashing shown on the display.

6. : Battery status indicator

Four segment indicator shows the remaining batteries capacity. When the indication starts to flash, correct measurement is no longer possible. Replace the batteries immediately.

7. Data memory:

M: Manual stored measured value to memory indication,
M disappear one time store one data into the memory.

R: Read manual data memory mode indication.

88: Manual data memory address number (1 ~ 99).

▶: Auto data memory and No-cycle timer datalogging indication.

||: Auto-cycle timer datalogging indication.

8. **SET**: Setting mode indicator.

9. Maximum/Minimum recording indicator:

REC: Record mode and current measured value display indication.

REC MAX: Maximum measured value display indication.

REC MIN: Minimum measured value display indication.

10. Bar graph display:

Displays the present momentary value with a bar.

The bar displays the value of the displayed data in intervals of approx 0.01 seconds.

The scale value which agrees with the selected range is displayed.

11. Display mode:

RMS: True effective value

EQ PEAK: Equivalent peak value ($\text{RMS} \times \sqrt{2}$)

EQ P-P: Equivalent peak-to-peak value (EQ PEAK x 2)
(only Displacement)

12. Measurement value: Numeric indication of measurement value in intervals of approx. 1 second.

13. Measurement mode unit indicator:

m/s² : Acceleration (ACC)

g : Acceleration (ACC)

mm/s : Velocity (VEL)

in/s : Velocity (VEL)

mm : Displacement (DISP)

mils : Displacement (DISP)

mV/m/s² : Accelerometer sensitivity

14. Frequency range indicator:

Left (lower limit)

Right (upper limit)

1Hz

100Hz

3Hz

500Hz

10Hz

1kHz

5kHz

20kHz


5. PREPARATIONS

The required matter is indicated before beginning measurement. Always set the power to OFF before inserting batteries and making any connections.

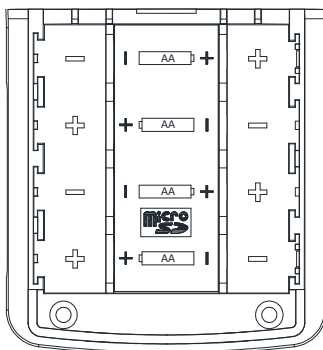
5-1 Power Supply

The meter can be powered by four IEC R6 (size AA) batteries or by the optional AC adapter VA-03 (for 100 to 240V AC).

Battery installation:

When the meter is in operation, press  key to turn off the meter.






- Insert four IEC R6 (size AA) batteries with correct polarity as follows.
- Make sure that all four batteries are of the same type.
- Do not mix different battery types or old and new batteries.
- **Prevention of battery fluid leakage:**
 1. When the battery power is low, replace the new battery in order to avoid the further battery fluid leakage possibility.
 2. When the meter will not be in use for the long period of time, please remove the batteries out of meter to prevent the possibility of battery fluid leakage damage.



Selecting the battery type:


Set the battery type used for the meter. The remaining battery capacity corresponding to the selected battery type is displayed.

Available settings are Zinc-carbon, Alkaline and Ni-MH (nickel-metal hydride) battery.

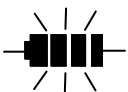
1. Press  key to turn on the meter.
2. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 1 bAt**” mark is displayed.
3. Press  key to enter the selecting battery type mode, the “**1.2, 0C**” mark is flashing displayed.
4. Press  or  key to select the battery type used for the meter.
 - “**1.2, 0C**” Zinc-carbon battery
 - “**2.ALA**” Alkaline battery
 - “**3.0, H**” Ni-MH battery
5. Press  key to store the selecting and exit this mode.
6. Press “**MODE**” key again to exit setting mode.

The battery indicator in the top right corner of the display shows the remaining battery capacity.

 : Full battery capacity.

 : Reduced number of segment shows decreasing capacity.

 : Battery low. Should be replaced soon.

 : When the indication starts to flash, correct measurement is no longer possible. Replace the batteries immediately.

5-3 Accelerometer Mounting

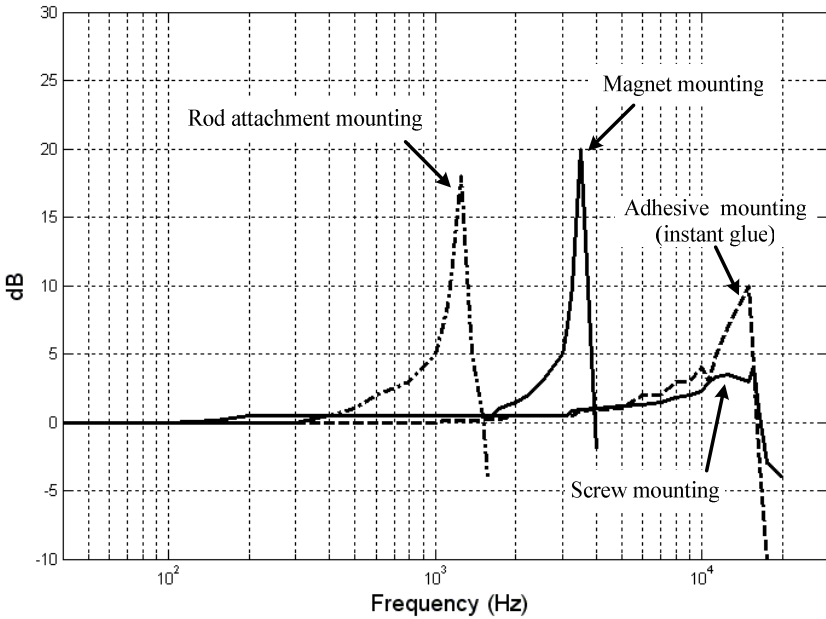
There are four basic methods of attaching the accelerometer to the measurement object. The accelerometer mounting method greatly affects the contact resonance frequency. Please perform suitable method in consideration of the advantages and disadvantages of the four methods are outlined below.

Contact resonance frequency:

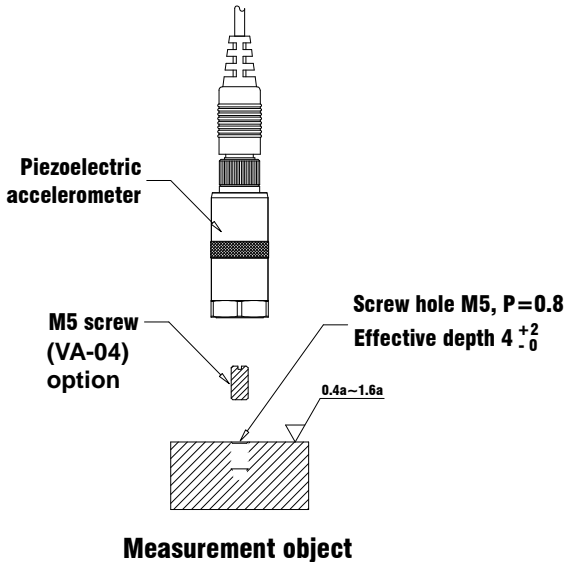
When the contact area between the accelerometer and the measurement object is partially deformed, a kind of spring system is created which vibrates at a frequency that is determined by the mass of the spring and the accelerometer. This is called contact resonance frequency. The contact resonance frequency varies by depending on the accelerometer mounting method. This affects the upper frequency limit of vibration that can be measured.

The figure below shows the change in high-frequency response by the accelerometer mounting method. To eliminate the effect of the contact resonance frequency as much as possible, the mounting method must be chosen so that measurement in the desired frequency range are possible. When the frequency range is generally less than about 1/3 of a contact resonance frequency, the flat frequency response is obtained.

An example of change in high-frequency response by the Accelerometer mounting method is shown below.

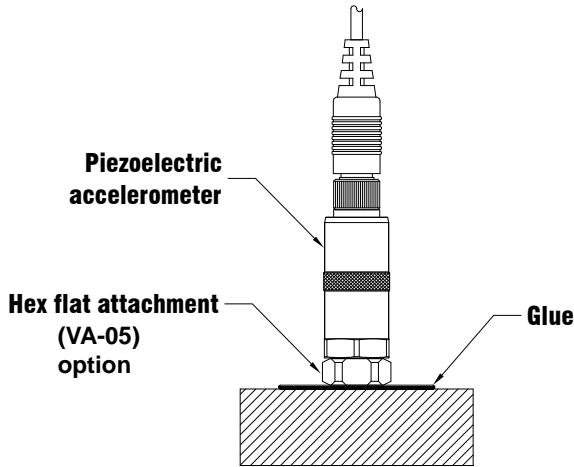


Screw mounting (VA-04):



This mounting method is the best vibration characteristics. The mounting surface must have a surface smoothness of $0.4a \sim 1.6a$. Use a fastening torque of $1 \sim 1.5 \text{ N}\cdot\text{m}$ for the accelerometer and the M5 screw that joins the accelerometer to measurement object.

Adhesive mounting (VA-05):



Measurement object

After screw mounting, this method is the next best vibration characteristics.

Instant glue, epoxy glue, or a similar adhesive material can be used.

When choosing the glue take the surface material of the measurement object into consideration. (For details, refer to the instructions of the glue.)

Make sure that the surface of the measurement object is completely clean and free from grease before attaching the Hex flat attachment.

Use a fastening torque of $1 \sim 1.5 \text{ N}\cdot\text{m}$ to join the accelerometer to the Hex flat attachment.

Flat magnet mounting (VA-01):

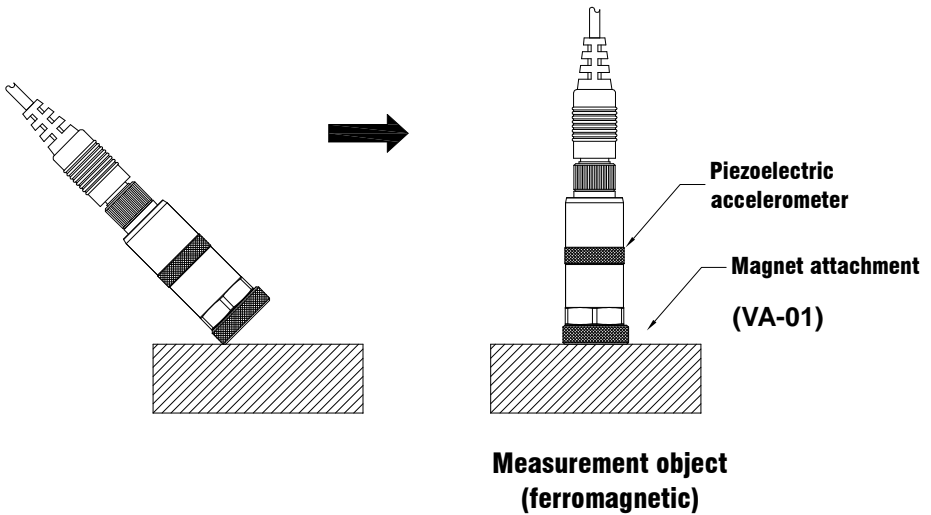
Although a magnet can be used when the measurement subject is made of the metal which sticks to a magnet, due to this mounting method the contact resonance frequency will be quite low, this method is mainly suited for vibration measurements in the medium to low frequency range. Use a fastening torque of 1 ~ 1.5N-m to join the accelerometer to the magnet attachment.



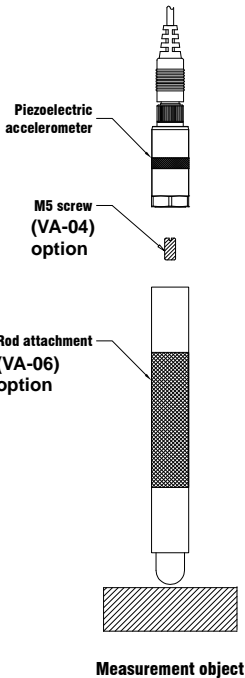
CAUTION

- The magnet attachment is very powerful (0.8kG ~ 1.0kG). Exercise careful when attaching it to the measurement object, to prevent injuries.
- Keep the magnet at least 50cm away from objects such as magnetic cards or other magnetic media, to prevent data loss.
- Do not let go of the magnet attachment until it is placed on the surface to be measured. If the magnet attachment slips from your hand, it can exert a strong force on the accelerometer equal to the shock from dropping the unit, which could result in fatal damage.

1. Verify the accelerometer is properly connected to the meter.
2. For setup on the surface to be measured, firmly grasp the magnet attachment on both sides.
3. Carefully bring the accelerometer into contact with the measuring surface while holding it at an angle.
4. Carefully lower the accelerometer onto the measuring surface until the magnet attachment is in full contact and perpendicular to the surface.



Rod attachment mounting (VA-06):



Pressing the accelerometer against the measurement object with a rod is the simplest method, but it is only suitable for measurement below 500Hz, due to the contact resonance frequency will be very low.







This method should only be used if the shape or material of the measurement object precludes the use of the other three mounting methods.

Use a fastening torque of 1 ~ 1.5 N-m to join the accelerometer to the rod attachment.





The rod attachment is made of aluminum alloy (A5052). Lightly grease the screw thread to prevent screw lockup.

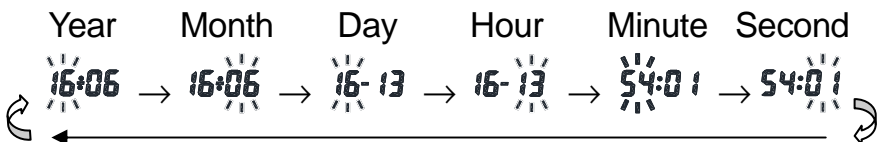
6. SETUP

6-1 Selecting the Accelerometer model



1. Press  key to turn on the meter.
2. Press  or  key to enter the select accelerometer model mode for measurements, the previous selected accelerometer model is displayed.
3. Press  or  key to select the “**PA-01**”, “**PA-02**” or “**USER**” accelerometer model for measurement then press  key store the selecting and exit this mode.

6-2 Setting the Real-Time

1. Press  key to turn on the meter.
2. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 01Bat**” mark is displayed.
3. Press  key one time to select this mode, the “**SET 02 rtc**” mark is displayed.
4. Press  key to enter this mode, the “**16-01**” and the flashing two number of year are displayed.
5. Using  key to moves the current setting item in the order Year→Month→Day→Hour→Minute→Second→Year etc.




Flashing

6. The currently flashing item can be changed.
Using  or  key to change the selected item value.

7. Press \leftarrow key to store the setting and exit this mode.
8. Press “**MODE**” key again to exit setting mode.











6-3 Enable the Auto Power off function

1. Press  key to turn on the meter.
2. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 1 bAt**” mark is displayed.
3. Press \blacktriangledown key 2 times to select this mode, the “**SET 03, APD, OFF**” mark is displayed.
4. Press \leftarrow key to enter this mode, the “**oFF**” mark is flashing displayed.
5. Press \blacktriangle key to select “**oN**” or “**oFF**”.
6. If select “**oFF**” then press \leftarrow key to disable auto power off function and exit.
7. If select “**oN**” then press \leftarrow key to enable auto power off function and exit.
8. Press “**MODE**” key again to exit setting mode.
9. If enable the auto power off function, the auto power off time is 30 minutes and the RTC mark “**÷, - or :**” will flashing displayed. When in the Maximum & minimum recording mode or Auto datalogging mode will auto disable the auto power off function.

6-4 Setting the Accelerometer Sensitivity

Change the setting at the meter so that it matches the sensitivity indicated on the calibration chart of the used piezoelectric accelerometer. Round the sensitivity up as necessary.

If you do not know about the accelerometer sensitivity, please refer to the section “7-4 calibration”.

1. Press  key to turn on the meter.
2. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 1 bAt**” mark is displayed.
3. Press  key 8 times to select this mode, the “**PA-0 1 SET 09 mV/m/s²**” mark is displayed.
4. Press  key to enter this mode, the “**PA-0 1**” mark is flashing displayed.
5. Press  or  key to select the desired “**PA-0 1**”, “**PA-02**” or “**USER**” accelerometer model.
6. Press  key to enter this mode, the previous accelerometer sensitivity value and the decimal point is flashing displayed.
7. Using  key to select the decimal point to desire display resolution position as follows.
Display resolution 0.10 ~ 0.99 “0.01” steps
1.0 ~ 9.9 “0.1” steps
10 ~ 99 “1” steps
8. Using  and  key to change the value.
9. Press  key to store the setting and exit this mode.
10. Press “**MODE**” key again to exit setting mode.

**Piezoelectric Accelerometer
Calibration Data**

Model PA- 01

Serial No. 1612278

Voltage Sensitivity 4.82 mV/(m/s²)
(159.2 Hz)

Temperature 25 °C Inspected by

Date 2016.12

RS PRO

**Piezoelectric Accelerometer
Calibration Data**

Model PA- 02

Serial No. 1612279

Voltage Sensitivity 7.2 mV/(m/s²)
(159.2 Hz)


Temperature 25 °C Inspected by

Date 2016.12

RS PRO

7. VIBRATION MEASUREMENT

7-1 Vibration Measurement

1. Press  key to turn on the meter.
2. Press “**ACC/VEL/DISP**” key to select the measurement mode.
 Press “**FREQ RANGE**” key to select the frequency range which suits the measurement purpose.
 Press “**LEVEL RANGE**” key to select the measurement range.

The relationship between measurement mode and accelerometer sensitivity level range, and frequency range is as shown in the table below.

Measurement mode	Accelerometer sensitivity	Measurement range	Frequency range
ACC (m/s²)	0.1 to 0.99	10 to 10000	3Hz to 1kHz
	1.0 to 9.9	1 to 1000	3Hz to 5kHz
	10 to 99	0.1 to 100	3Hz to 20kHz 1Hz to 100Hz
VEL (mm/s)	0.1 to 0.99	100 to 10000	3Hz to 1kHz
	1.0 to 9.9	10 to 1000	10Hz to 1kHz*
	10 to 99	1 to 100	
DISP (mm)	0.1 to 0.99	1 to 1000	3Hz to 500Hz
	1.0 to 9.9	0.1 to 100	10Hz to 500Hz
	10 to 99	0.01 to 10	

3. Press “**PEAK/RMS/P-P**” key to select the display mode as follows.

ACC: EQ PEAK or RMS

VEL: RMS or EQ PEAK

DISP: EQ PEAK, RMS, or EQ P-P

4. When the input signal overloads the circuitry of the meter, the indication “**OVER**” appears.

Using the “**LEVEL RANGE**” key to select the level range so that “**OVER**” does not appear and the measurement value is easy to read.

Note: The indication “**OVER**” may appear just after turn on the meter until the inner circuits become stable.

7-2 Manual Data Memory and Read







1. To memorize the data

- ① Press “**MEM**” key each time will store the measured data to the memory. At this moment, LCD “**M**” mark disappear one time and the store memory address is incremented by 1 count. Total memory size is 99 data from 01 ~ 99.
- ② When the memory is full, LCD will show “**M FU**” mark.





2. To recall the memorize data

- ① Press “**READ**” to enter the READ mode, the “**DATA READ**” mark appear one time, LCD will show the “**R**” mark and the memory address number.
- ② Press ▲ or ▼ key to select the desired memory address number data for display.
- ③ Press ► key to display the stored date and time.
- ④ Press “**READ**” key again to exit this mode.

3. To clear the manual memorized data













- ① Press  key to turn on the meter.
- ② Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 16At**” mark is displayed.
- ③ Press  key 6 times to select this mode, the “**SET 07 M CLR**” mark is displayed.
- ④ Press  key to enter this mode, the “**M CLR No**” mark is displayed.
- ⑤ Press  or  key to select “**YES**” or “**No**”, then press  key to exit. If you select “**YES**” the all memorized data will be cleared and the “**DATA DEL**” mark appear one time.
- ⑥ Press “**MODE**” key again to exit setting mode.

7-3 Maximum & Minimum Recording Measurement

1. Press “**MODE**” key to enter the recording mode, the “**REC**” mark is displayed.
2. Press  or  key to circulated the display of the Maximum
(**REC MAX**) reading with its recorded time, Minimum
(**REC MIN**) reading with its recorded time, and current
(**REC**) reading with current time
3. Press  key to display the date and time of recorded data.
4. Press  key to recording the new measurement.
5. Press “**MODE**” key again to exit this mode.

7-4 Calibration







Using Handheld Shake Calibrator (159.2Hz, 10m/s² rms or 1g rms) to verify the Accelerometer sensitivity.

1. Press  key to turn on the meter.
2. Fix the accelerometer to the calibrator, then turn on the calibrator.
3. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 1 bAt**” mark is displayed.
4. Press  key 9 times to select this mode, the “**SET 10 CAL RMS 10.0 m/s²**” mark is displayed.
5. Press  key to enter this mode, the “**159 CA**” mark is displayed.
6. Press  or  key to select the calibrator output acceleration value is “**RMS 10.0 m/s²**” or “**RMS 1.0 g**” or “**RMS FAcT**” to factory default value.
7. Press  key to enter select the accelerometer model mode then press  or  key to select desired accelerometer model for calibration.
8. Press  key to start calibration, the bar graph display will show the calibration progress schedule.
9. When the calibration is finished, the “**PASS**” mark is appears 2 seconds then display the accelerometer sensitivity value, otherwise the “**FA, L**” mark is displayed.
10. Press  key to stored the accelerometer sensitivity value or press  or  key to **AborT** the calibration.
11. Press “**MODE**” key to exit the setting mode.




7-5 Auto Datalogging

Only micro SD CARD (Maximum capacity 32GB can be used) or Maximum 99 blocks.

1. Clear the auto memorized data

- ① Press  key to turn on the meter.
- ② Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 16At**” mark is displayed.
- ③ Press  key 7 times to select this mode, the “**SET 08 Sd.LLr**” mark is displayed.
- ④ Press  key to enter this mode, the “**no**” mark is flashing displayed.
- ⑤ Press  key to select “**YES**” or “**no**”, then press  key to exit.
- ⑥ If you select “**YES**”, press  key to perform clear the auto memorized data, the “**Sd LLr**” is displayed, when the “**Sd LLr**” mark is disappeared, the clear work is finished. If no SD CARD in the meter, the “**no-Sd**” mark is displayed 2 seconds the exit.
- ⑦ Press “**MODE**” key again to exit setting mode.

2. Interval time selecting

- ① Press  key to turn on the meter.
- ② Press “**MODE**” key for 3 seconds to enter the setting mode, the “**SET 0 16At**” mark is displayed.
- ③ Press  key 3 times to select this mode, the “**SET 04 1t**” mark is displayed.
- ④ Press  key to enter this mode, the previous selected interval time is flashing displayed.

- ⑤ Press ▲ or ▼ key to select desired interval time
 “00:01” is 1s, 2s, 5s, 10s, 20s, 30s, 1m, 2m, 5m, 10m, 20m, 30m or 60m.
- ⑥ Press ↵ key to store the selecting and exit.
- ⑦ Press “MODE” key again to exit setting mode.

3. Auto data memory

- ① Press “MEM” key for 3 seconds to record data automatically. The “Sd run” mark is displayed 2 seconds and the “▶” mark is displayed, when the “M” mark disappear one time, one set of reading is stored to the memory.
 - ② If no SD CARD in the meter, the “No-Sd” mark is displayed 2 seconds then exit.
 - ③ If memory is full, the “Sd FULL” mark is displayed.
 - ④ Press “MEM” key for 3 seconds to exit.
4. Download the recording data to PC, connecting the USB cable to PC and the meter.

7-6 Auto-Cycle Timer Datalogging

The auto cycle timer means the starting time and record time is valid in the everyday.

- 1. Perform setting the Real-Time (refer to 6-1)
- 2. Perform interval time selecting. (refer to 7-5-2)
- 3. Press “MODE” key for 3 seconds to enter the setting mode, the “SET 01Bat” mark is displayed.
- 4. Press ▼ key 5 times to select this mode, the “SET 06 || CYC.OF” mark is displayed.
- 5. Press ↵ key to enter the Start-Time setting mode, the “StArt” mark and the flicking number of hour are displayed.

6. Using ► key, position the cursor on the time element to adjust.
7. Using ▲ and ▼ keys to setting the selected time element value.
8. Press ↵ key to enter the Record-Time setting mode, the “**REEL**” mark and the flicking number of hour are displayed.
9. Repeat step 6 and 7 to complete the record-time setting.
10. Press ↵ key to enter the ON/OFF selecting mode, the “**OFF**” mark is displayed.
11. Press ▲ or ▼ key to select “**ON**” or “**OFF**”.
12. If select “**OFF**” then press ↵ key to exit.
13. If select “**ON**” then press ↵ key to complete the action and to enter the auto-cycle timer datalogging mode, the “**||**” mark is flicking display.
14. When the Start-Time is reached, the “**||**” mark is stop flick. When the “**[M]**” mark disappeared one time means one set of data has been memorized.
15. If no SD CARD in the meter, the “**No-SD**” mark is displayed 2 seconds then exit.
- 16 If memory is full, the “**SD FULL**” mark is displayed.
17. Press “**MEM**” key for 3 seconds to exit.

7-7 No-Cycle Timer Datalogging

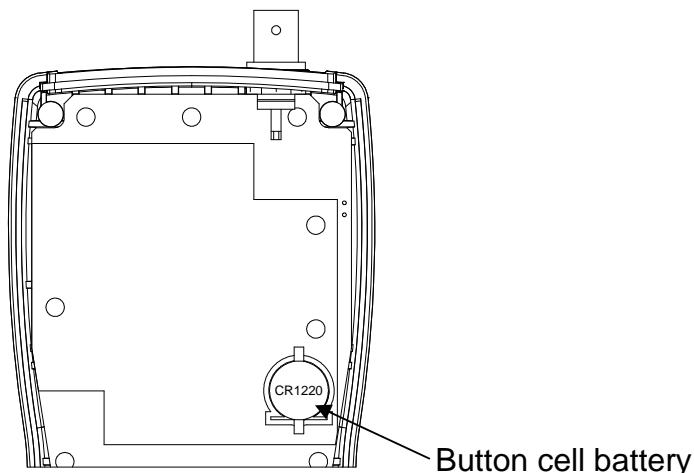
The no-cycle timer means the Start-Time and the Stop-Time is valid only one time.

1. Perform setting the Real-Time (refer to 6-1)
2. Perform interval time selecting. (refer to 7-5-2)
3. Press “**MODE**” key for 3 seconds to enter the setting mode, the “**[SET] 0 1 bAt**” mark is displayed.

4. Press ▼ key 4 times to select this mode, the “**SET 05 ▶**
No.CYC” mark is displayed.
5. Press ↵ key to enter the Start-Time setting mode, the
“**Start**” mark and the flicking number of year are
displayed.
6. Using ▶ key, position the cursor on the date or time
element to adjust.
7. Using ▲ and ▼ keys to setting the selected date or time
element value.
8. Press ↵ key to enter the End-Time setting mode, the “**End**”
mark and the flicking number of year are displayed.
9. Repeat step 6 and 7 to complete the end-time setting.
10. Press ↵ key to complete the action and to enter the
no-cycle timer datalogging mode, the “▶” mark is flicking
display.
11. When the Start-Time is reached, the “▶” mark is stop flick.
When the “**M**” mark disappeared one time means one set
of data has been memorized.
12. If no SD CARD in the meter, the “**No-SD**” mark is
displayed 2 seconds then exit.
13. If memory is full, the “**SD FULL**” mark is displayed.
14. Press “**MEM**” key for 3 seconds to exit.

8. RTC BUTTON CELL BATTERY REPLACEMENT

Open meter bottom cover, find the button cell battery. You can change button cell battery.



9. MAINTENANCE

Cleaning: Periodically wipe the case with a damp cloth and mild detergent.

Do not use abrasives or solvents. Clean and dry as required.

10. SOFTWARE INSTALLATION AND OPERATION

- ❑ For the detailed instruction, please refer to the content of attached CD-ROM, which has the complete instruction of software operation and relevant information.

Limited Warranty

This meter is warranted to the original purchaser against defects in material and workmanship for 3 years from the date of purchase. During this warranty period, RS Components will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction. This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling.

Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. RS Components shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you. For full terms and conditions, refer to the RS website.

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