TEXIO
Test and Measurement Solutions

Instruction Manual

AC Millivolt Meter
VT-201E

B71-0388-21

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USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read this instruction manual to the end. Before using this product, understand how to correctly use it.
If you read this manual but you do not understand how to use it, please ask us or your local dealer. After you read this manual, save it so that you can read it, anytime as required.

■ Pictorial indication

This instruction manual and product show the warning and caution items required to safely use the product. The following pictorial indication and warning character indication are provided.

<Pictorial indication>	
	Some part of this product or the instruction manual may show this pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to this instruction manual.
 	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided. If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

Please be informed that we are not responsible for any damages to the user or to the third person, arising from malfunctions or other failures due to wrong use of the product or incorrect operation, except such responsibility for damages as required by law.

USING THE PRODUCT SAFELY

■ **Do not remove the product's covers and panels**

Never remove the product's covers and panels for any purpose.
Otherwise, the user's electric shock or fire may be incurred.

■ **Warning on using the product**

Warning items given below are to avoid danger to user's body and life and avoid the damage or deterioration of the product.
Use the product, observing the following warning and caution items.

■ **Warning items on power supply**

- Power supply voltage
  There are two kinds of products 'AC100V exclusive use model' and 'Change of AC115V/AC230V model' depending on the rated voltage. However, if the attached power cord is specified for a rating of AC125 V, and it is used at a power supply voltage exceeding AC125 V, it must be changed. If the power cord is not changed to one for AC250 V specification, an electric shock or fire may be incurred.

- Power cord
  (Important) The attached power cord set can be used for this device only.
  If the attached power cord is damaged, stop using it and call the company or each sales office. If the power cord is used without the damage being removed, an electric shock or fire may be caused.

- Protection fuse
  If an input protection fuse is blown, the product does not operate. When the fuse is blown, the user cannot replace it. It is needed to remove the product's covers and rear panel, for changing a fuse. In such case, keep the case closed and consult us or your local dealer.

- Changing the power supply voltage
  When the rated power supply voltage is AC100V exclusive use, the rated power supply voltage cannot be changed. When the rated power supply voltage is AC115V or AC230V change, the rated power supply voltage can be changed to AC230V or AC115V. Use the product only at the rated power supply voltage indicated on the product. Otherwise, a fire may occur. (Please use the power supply code corresponding to a set voltage.)

USING THE PRODUCT SAFELY

■ Warning item on Grounding

If the product has the GND terminal on the front or rear panel surface, be sure to ground the product to safely use it.

■ Warnings on Installation environment

- Operating temperature and humidity

  Use the product within the operating temperature indicated in the “rating” temperature column. If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur.

  Use the product within the operating humidity indicated in the “rating” humidity column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity. Also, do not operate the product with wet hands. Otherwise, an electric shock or fire may occur.

- Use in gas

  Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire. Do not operate the product in such an environment.

  Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product. Do not operate the product in such an environment.

- Installation place

  Avoid installing the product on inclined places or on places subject to vibration. Otherwise, the product may slip or fall down to cause damages or injury accidents.

■ Do not let foreign matter in

Do not insert metal and inflammable materials into the product from its vent and spill water on it. Otherwise, electric shock or fire may occur.

■ Warning item on abnormality while in use

In abnormal situations, such as “smoke”, “fire”, “abnormal smell” or “irregular noise” occur from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, ask us or your local dealer.

USING THE PRODUCT SAFELY

■ Input / Output terminals

Maximum input to terminal is specified to prevent the product from being damaged. Do not supply input, exceeding the specifications that are indicated in the "Rating" column in the instruction manual of the product.
Also, do not supply power to the output terminals from the outside.
Otherwise, a product failure is caused.

■ Calibration

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may be deviated more or less by deterioration of parts due to their aging or others.
It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable.
For consultation about the product calibration, ask us or your local dealer.

■ Daily Maintenance

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene. Otherwise, the paint may peel off or resin surface may be affected.
To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it. During cleaning, be careful that water, detergent, or other foreign matters do not get into the product.
If a liquid or metal gets into the product, an electric shock and fire are caused. During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items. Because the instruction manual indicates caution items even in individual items, observe those caution items to correctly use the product.

If you have questions or comments about the instruction manual, ask us or E-Mail us.

1 INTRODUCTION

The VT-201E is versatile AC voltmeter which is able to measure AC voltage from ranges of 10 Hz to 1 MHz with full scale ranges from 300μV to 100 V. The dB scale measures 1V as 0dB and ranges from -90 dB to +41 dB. The 600Ω(1mW) dBm scale ranges from -90 dBm to +43 dBm.

The scales on the meter are graduated up to 1.1 (for +1dB) and these extended scales are especially useful when measuring the characteristics of audio amplifiers.

2 Preliminary Notes

2-1 Chassis grounding terminal

Make sure the chassis ground terminal is connected to the earth.

2-2 Maximum input voltage

The voltmeter may be damaged if any input voltage exceeding the specified voltage is applied to it. The specified voltage is determined by adding the peak value of the input signal and the superimposed DC voltage

300μV ranges: 300 V
3 V to 100 V ranges: 500V

2-3 Connection leads

When the measured signal level is low (i.e. 300μV) or the measured signal source impedance is high, the input line is susceptible to external noise. To resist the noise, shielded wires or a coaxial cable should be used depending on the noise frequency.

2-4 Full scales:

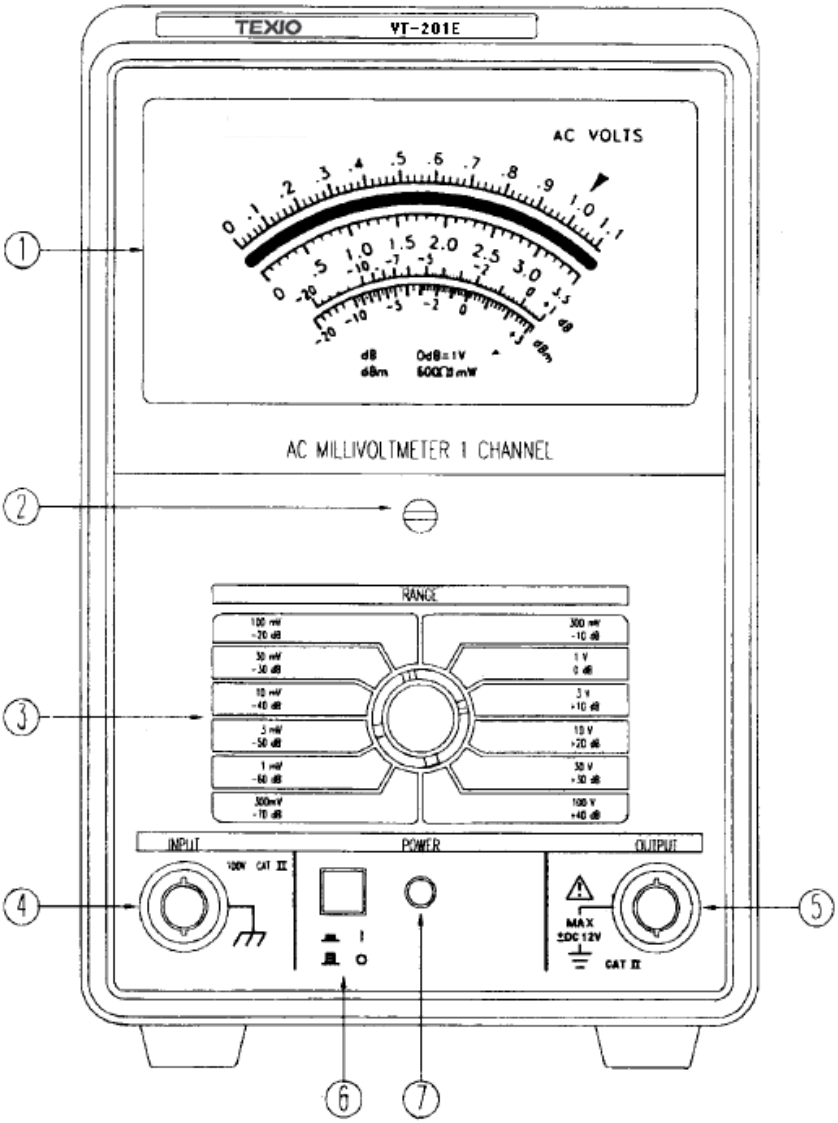
The VT-201E millivoltmeter adopts a special extended scale which has a reading range larger than the conventional full scale.

Conventional	VT-201E
0 to 1.0	0 to 1.12
0 to 3.1 (3.2)	0 to 3.5
-20 to 0 dB	-20 to +1 dB
-20 to +2 dBm	-20 to +3.2 dBm

The term “full scale” considers ‘1.0’ on the 0 - 1.12 scales as the rated value. The red ▼ mark is setting at ‘1.0’ on the outermost scale.

3 FRONT AND REAR PANELS

3-1 Front Panel



① Meter

Provide easy readings for both voltage and dB scales.

② ZERO adjustment

Mechanical ZERO adjustment for the pointer.

③ Range selector switch

10 dB step attenuator to select a desired voltage range for an easy readout.

④ Input connector

The terminal where the measured signal is applied.

The maximum voltage of DC isolation is ±30V (peak value)

⑤ Output connector

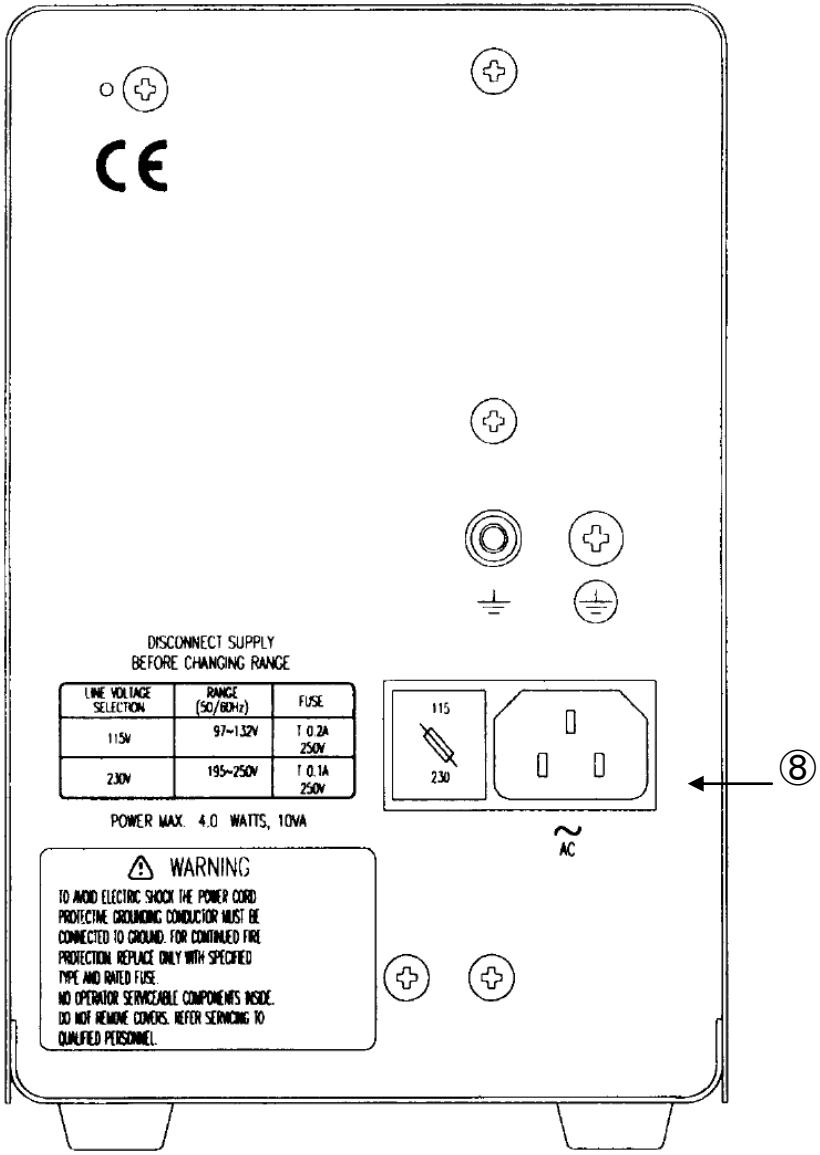
Provide output signals when the meter is used as a preamplifier. When the range selector switch is setting at 100 mV, the output voltage will be approximately equal to the input voltage. However, when the range selector switch is setting to the next higher or lower voltage range, the amplification factor is decreased or increased by 10 dB respectively.

The maximum voltage of DC isolation is ±12V (peak value)

⑥ Power Switch

⑦ Power Indicator

3-2 Rear Panel



⑧ Appliance AC Inlet

4 Basic Operation

4-1 Voltage measurement

① Turn off the power.

② Check the ZERO setting of the pointers. If there is offset, you could use a screwdriver to adjust the zero adjustment screw at the center of the meter front cover.

③ Plug the AC plug into the AC line.

④ Set the RANGE to 100 V and turn on the power.

⑤ Connect leads to the INPUT terminal and the load is under testing.

⑥ Alter the RANGE selector switch until the pointer is at a position which located at ≧1/3 of the scale, therefore, the reading can be taken easily.

4-2 Use of decibel ranges

There are two dB scales provided on the dial which have been calibrated as

0dB = 1V

0dBm = 0.775V(1 mW into 600Ω)

4-2-1 dB

"Bel" is a logarithmic unit which expresses the ratio of two powers. One "decibel" (abbreviated dB) is one-tenth of a Bel. The dB is defined as follows:

dB = 10 log P2 / P1

If the impedance is at the place where P_1 and P_2 are equal to each other, the ratio of power could be expressed as follows:

dB = 20 log E2 / E1 = 20 log I2 / I1

Decibel is originally the ratio of power as explained above. However, the logarithm of the ratio of other values (ratio of voltage or current) can also been called "decibel".

For example, If the input voltage of an amplifier is 10 mV and its output voltage is 10 V, the degree of amplification could be 10 V / 10 mV = 1000 times. This is

also expressed in dB as follows:

Degree of amplification = 20 log 10 V / 10 mV = 60 dB

4-2-2 dBm

"dBm" is the abbreviation of dB (mW). This decibel value expressed the power ratio with respect to 1 mW. Normally, "dBm" implies the condition where the power exists in an impedance of 600Ω
Therefore, "0 dBm" can be signified as the following:

0dBm = 1mW or 0.775V or 1.291mA

The power or voltage levels are determined by adding up the scale readings and the selected RANGE settings.

Scale		Range		Level
(-1 dB)	+	(+20 dB)	=	+19 dB
(+2 dBm)	+	(+10 dBm)	=	+12 dBm

The dB and dBm scales of the indicating meter are as stated the following:

Range setting	dB	dBm
+40	+20 ~ + 41	+20 ~ +43
+30	+10 ~ +31	+10 ~ +33
+20	0 ~ +21	0 ~ +23
+10	-10 ~ +11	-10 ~ +13
0	-20 ~ + 1	-20 ~ + 3
-10	-30 ~ - 9	-30 ~ - 7
-20	-40 ~ -19	-40 ~ -17
-30	-50 ~ -29	-50 ~ -27
-40	-60 ~ -39	-60 ~ -37
-50	-70 ~ -49	-70 ~ -47
-60	-80 ~ -59	-80 ~ -57
-70	-90 ~ -69	-90 ~ -67

5 Specifications

Channel	1
Indicating Meter	1-Pointer(Orange)
Scale Values	V_{rms} value of sinusoidal wave dB: 0 dB = 1 V dBm:0 dBm = 1 mW (600 Ω)
Voltage Measurement (12 ranges)	Voltage : 300 μV, 1 mV, 3 mV, 10 mV, 30 mV, 100 mV, 300 mV, 1V, 3V, 10V, 30V and 100 V of full scale dB: -70 dB to +40 dB dBm: -70 dBm to +40 dBm
Decibel Range	-20 to +1 dB (0 dB = 1 V), -20 to +3 dBm (0 dBm = 1 mW [600 Ω])
Voltage Accuracy	Within ±3% of full scale at 1 kHz
Frequency Response (Reference : 1 kHz)	300μV Range: 20 Hz to 200 kHz≦±3% 10 Hz to 500 kHz≦±10% Other ranges: 20 Hz to 200 kHz≦±3% 10 Hz to 1 MHz≦±10%
Distortion Factor	≦2 % of full scale at 1 kHz
Input Impedance	Approximately 1MΩ
Input Capacitance	≦50 pF
Input Maximum Voltage (DC + AC peak)	300 V (300 μV to 1 V ranges) 500 V (3 V to 100 V ranges)
** DC isolation Resistance	0.1 Ω or less
AC Output Voltage	0.1 V_{rms} ±10% for each range of 1 kHz (at full scale without load)

Stability against Line Voltage Fluctuation	Indication change with respect to line voltage fluctuation of ±10% : is within ±0.5% of full scale.	
AC Power Requirement	AC115V(97V to 132V) , 50/60 Hz AC230V(195V to 250V), 50/60 Hz	
AC Power Consumption	10VA or 4.0 Watts, Maximum	
Fuse	115V：0.2 A, 250V(T type) 230V：0.1 A, 250V(T type)	
Operation Environment	Indoor use, Altitude up to 2000M Installation Category II Pollution Degree 2 Operating Temperature： $+0^0$C ~ $+40^0$C, <80% relative humidity Storage Temperature： -10^0 C ~ $+60^0$C, <70% relative humidity	
*** Compatible Specification	LVD	EN61010-1:1993+A2:1995
	EMC	EN61326-1:1997+A1:1998
Dimensions	131.9 (W) x 196 (H) x 250 (D) mm	
Maximum Dimensions	131.9 (W) x 212.9 (H) x 291.4 (D) mm	
Weight	Approximately 2.7kg	

**: Between the input common and chassis.

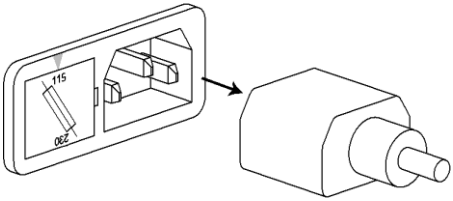
***: Applicable only for units with the CE mark on the rear panel.
NOT applicable for modified units.

6 APPENDIX

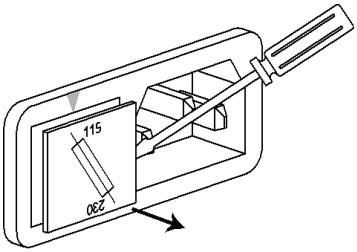
6-1 Fuse Replacement

Replace the AC source fuse

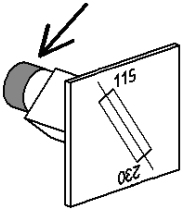
① Remove the power cord.



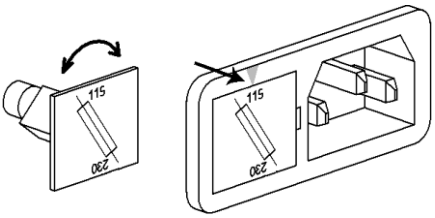
② Remove the fuse socket using a flat screwdriver.



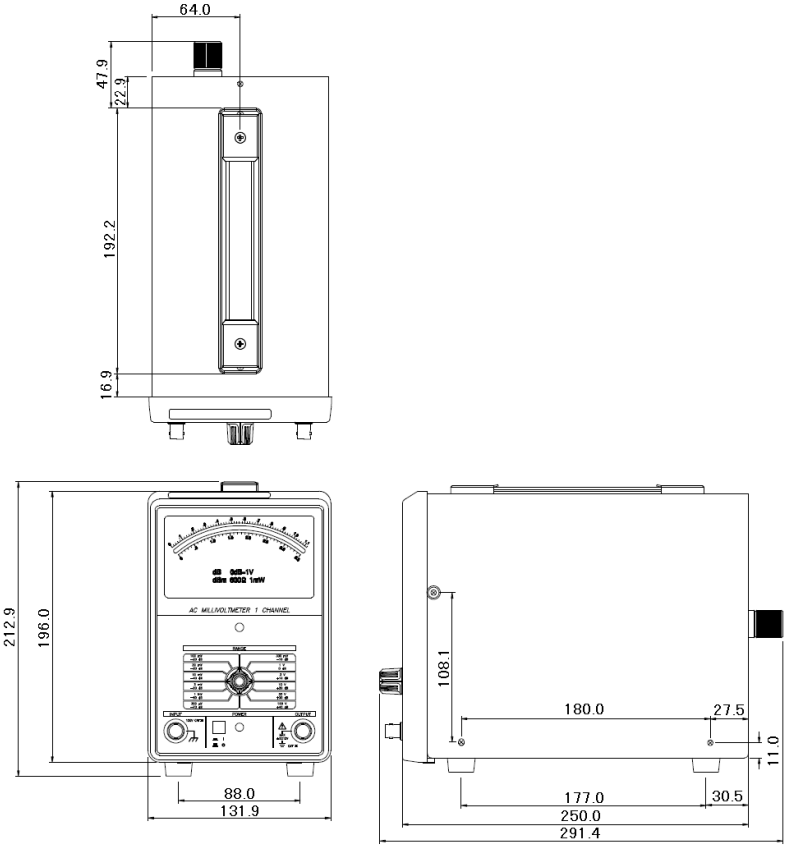
③ Replace the fuse in the holder.



④ Ensure the correct line voltage is lined up with the arrow on the fuse holder. Insert the fuse socket.



6-2 External Dimensions Figure



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