

KENWOOD

WOW-FLUTTER METER

FL-140

INSTRUCTION MANUAL

KENWOOD CORPORATION

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A product of
KENWOOD CORPORATION

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1. FEATURES

- a. The FL-140 provides on-meter direct readings of wow and flutter and rotational drift of tape recorders, record players and other various recording equipment.
- b. It is designed for measurements compliant with JIS, CCIR and DIN Standards.
- c. The meters provide RMS value indications (in compliance with JIS) or peak value indications (in compliance with CCIR/DIN Standards). Values can be read directly on the meter.
- d. Five ranges, 0.03%, 0.1%, 0.3%, 1%, and 3%, offers wide range of measurement.
- e. The FL-140 incorporates 3kHz/3.15kHz signal generator with highly stable crystal oscillators which can be used for self calibration of the drift meter. The FL-140 is suitable as a signal source for recording.
- f. Only checking The monitor lamp enables wow and flutter measurements without adjusting the input level and input frequency.
- g. The FL-140 has the TO SCOPE terminal for analyzing wow and flutter components and the RECORDER terminal for recording wow and flutter.

2. SPECIFICATIONS

【Wow Flutter Meter】

Measuring center frequency :

Within 3kHz \pm 300Hz (JIS/CCIR)

Within 3.15kHz \pm 300Hz (DIN)

Input level : 3mV \sim 30V

Input impedance : Approx. 300k Ω , unbalanced

Wow flutter measuring range :

0.03 \sim 3%, 5 ranges

Display system RMS value (JIS)

Peak value (CCIR/DIN)

Display accuracy : \pm 5% of full scale

Freq. response

Weighted characteristics :

In accordance with JIS, CCIR,
and DIN (at 0.2 \sim 200Hz)

Wow characteristics :

0.5 \sim 6Hz ($-3\text{dB} \pm 1\text{dB}$) [JIS]

0.3 \sim 6Hz ($-3\text{dB} \pm 1\text{dB}$) [CCIR/DIN]

Flutter characteristics :

6 \sim 200Hz ($-3\text{dB} \pm 1\text{dB}$)

Unweighted characteristics :

0.5 \sim 200Hz ($-3\text{dB} \pm 1\text{dB}$) [JIS]

0.3 \sim 200Hz ($-3\text{dB} \pm 1\text{dB}$) [CCIR/DIN]

Roll off :

0.5Hz or less :

-6dB/OCT or more [JIS]

200Hz or more :

-15dB/OCT or more [JIS]

0.3Hz or less :

-6dB/OCT or more [CCIR/DIN]

200Hz or more :

-15dB/OCT or more [CCIR/DIN]

Maximum input voltage :

100V (DC+AC peak)

Input monitor :

INPUT MONITOR lamp changes
from red into green at input
voltage of 3mV or more.

【Output terminals】

Output signal for recording

Signal frequency : 3kHz and 3.15kHz

Accuracy : $\pm 5 \times 10^{-5}$

Output voltage : Approx. 0.2Vrms (Open output)
Output impedance : Approx. 600Ω (Unbalanced)
Distortion : 1% or less (600Ω termination)

TO SCOPE output terminal

Output voltage : Approx. 1.5Vrms for full scale
Output impedance : Approx. 600Ω (Unbalanced)

RECORDER output terminal

Output voltage : 1 VDC for full scale
Output impedance : Approx. 600Ω (Unbalanced)

【Drift Meter】

Indication accuracy : ±5% of full scale

Drift measuring range :

±5%

【Power Requirements】

Supply voltage : 100/120/220/240V AC
±10% (Max. 250V) 50/60Hz

Power consumption : Approx. 8W

【Environmental】

Within specification temp. & humidity :
10 ~ 35°C, 85%RH

Operating temp. & humidity :
0 ~ 40°C, 85%RH

【Dimensions】 212W×133H×272D mm
Max. dimensions : 212W×156H×312D mm

【Weight】 Approx. 3.8kg

【Accessories】 Cord with pair plug and
banana plug (CA-36) : 1
AC power cable : 1
Instruction manual : 1
Replacement fuse : 2

3. PANEL EXPLANATION

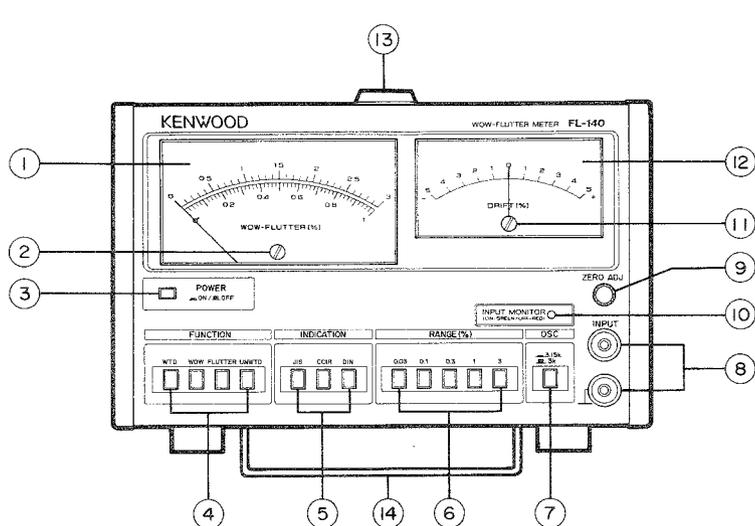


Fig. 1 Front panel

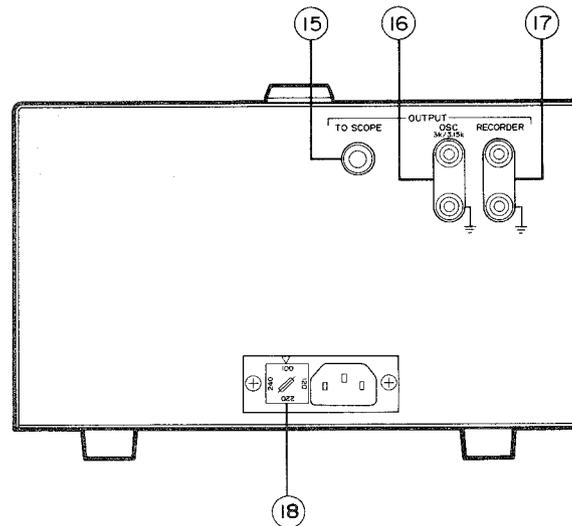


Fig. 2 Rear panel

3-1 Front panel

① Wow-flutter meter

This meter reads wow and flutter directly.

② Wow-flutter meter adjust screw

For adjustment of the mechanical zero point of the wow-flutter meter. Prior to turning on power, adjust the meter to the accurate zero point with a phillips type screwdriver.

③ POWER switch

Pressing this switch (button engaged) supplies power to this meter, and the INPUT MONITOR lamp ⑩ goes on.

④ FUNCTION switches

Select frequency components to be measured.

◇ WTD

Used for measurement based on weighted characteristics common to JIS, CCIR and DIN Standards.

◇ WOW

Measures wow with frequency components from 0.5 to 6Hz (or 0.3 to 6Hz) (-3dB). [Values enclosed in parentheses are for DIN/CCIR.]

◇ FLUTTER

Measures flutter with frequency components from 6 to 200Hz (-3dB).

◇ UNWTD

Measures wow and flutter with frequency components from 0.5 to 200Hz (or 0.3 to 200Hz) (-3dB). [Values enclosed in parentheses are for DIN/CCIR.]

⑤ INDICATION switches

Select the standard for wow and flutter measurement.

◇ JIS

The meter ① reads effective values based on JIS.

◇ CCIR

The meter ① reads peak values based on CCIR Standard.

◇ DIN

The meter ① reads peak values based on DIN Standard.

⑥ RANGE switches

Select the full scale of the wow-flutter meter ① out of five ranges, 0.03%, 0.1%, 0.3%, 1%, and 3%.

⑦ OSC selector switch

Selects the frequency of the signal output from

the OSC terminal on the rear panel, 3.15kHz based on DIN or 3.0kHz based on JIS and CCIR, used for recording and drift meter self calibration.

⑧ INPUT terminal

Apply the signal to be measured to this terminal. Its input impedance is 300k Ω and the maximum input voltage is 100V (DC+AC peak).

⑨ ZERO ADJUST control

For 0% calibration of the drift meter. Adjust the drift meter to 0% under the condition where no input is applied and "the INPUT MONITOR lamp lights red".

If the DIN of the INDICATION buttons is pressed, set the OSC selector switch ⑦ to 3.15kHz for 0% calibration. If the JIS/CCIR button is pressed, set OSC to 3kHz.

⑩ INPUT MONITOR lamp

This lamp lights red if no signal or improper signal is applied to the INPUT terminal.

It lights green if proper signal is applied to the INPUT terminal (i. e., the input frequency is 3kHz \pm 300Hz for JIS/CCIR or 3.15kHz \pm 300Hz for DIN

and input level is 3mV or more).

⑪ Drift meter zero adjust screw

For adjustment of the mechanical zero point of the drift meter. Prior to turning on power, adjust the meter to the accurate zero point with a Phillips type screwdriver.

⑫ Drift meter (Zero center type)

This meter reads the drift of the revolution of a test piece to be measured such as a tape recorder. It measures up to \pm 5% of drift.

⑬ Handle

Use this handle to transport the meter.

⑭ Stand

Pull the stand in the direction of the arrow and lock it.

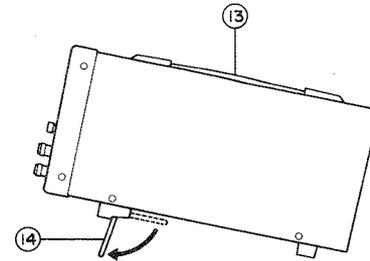


Fig. 3

3-2 REAR PANEL

⑮ TO SCOPE terminal

Outputs AC voltage in proportion to wow and flutter. If the meter reads the full scale value, approx. 1Vrms is output, which slightly differs with standards. Output impedance is 600Ω.

Use this terminal for waveform observation or frequency analysis.

⑯ OSC 3k/3.15k terminal

Outputs the sine wave for recording at a frequency selected with the OSC selector switch ⑦.

Output voltage is approx. 0.2Vrms. Output impedance is 600Ω. Distortion is 1% or less.

Use this signal to measure wow and flutter of tape recorders, etc. in accordance with the standard.

⑰ RECORDER terminal

Outputs DC voltage in proportion to the meter reading when measuring wow and flutter.

If the meter reads the full scale value, output voltage is approx. 1V. Output impedance is 600Ω.

⑱ Supply voltage selector / Fuse holder

Set this switch to the supply voltage used.

A 0.3A fuse is built in for the 100/120V areas.

If this meter is used in the 200/240V area, replace the fuse with a 0.2A fuse.

Note : Do not use an improper fuse.

Usage of Output Terminals on Rear Panel

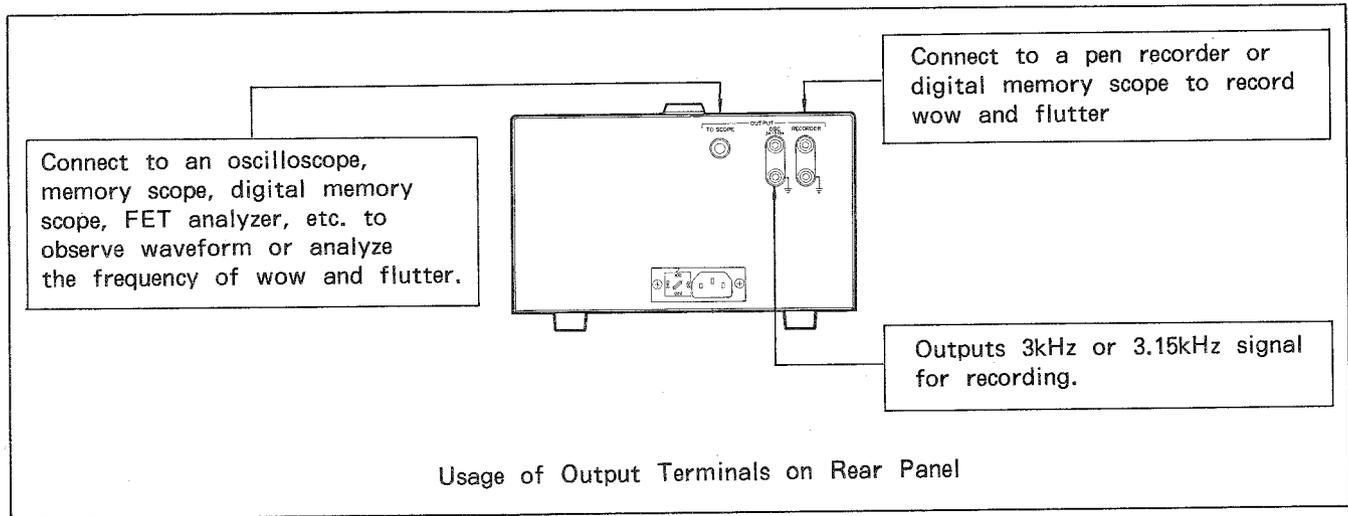


Fig. 4

4. PRECAUTIONS FOR USE

1. Do not use this meter in a place exposed to the direct sun light. Otherwise, the internal temperature rises excessively, resulting in unstable operation and, in some cases, breakage of transistors and/or ICs.
2. Do not use this meter at high temperature and humidity.
3. Do not use this meter in a place with excessive vibrations. Otherwise, the meter may malfunction.
4. The AC supply voltage shall be the rated voltage $\pm 10\%$. The supply frequency shall be 50 or 60Hz.
5. Prior to turning on power, check for the mechanical zero point of the meters.
6. Use this meter within the specification temperature and humidity range from 10 to 35°C, 85%RH.
7. Prior to starting wow and flutter measurement, confirm the standard used and conditions.
8. The maximum input voltage of this meter is 100V (DC+AC peak). Do not input a voltage over it. Do not apply voltage to any of the output terminals.
9. Note that accurate wow and flutter measurement is not secured if this meter is set up and put down.

5. OPERATING PROCEDURE

Preliminary Work

1. Make sure that the is suitable for the supply voltage used, then set the supply voltage selector to the supply voltage used. (See item ⑱ in paragraph REAR PANEL.)
2. Prior to activate the POWER switch, adjust the mechanical zero points of the WOW-FLUTTER meter ① and DRIFT meter ⑫ to the 0% point. (See items ② and ① in paragraph FRONT PANEL.)
3. Press the POWER switch without applying input signal ; the INPUT MONITOR lamp lights red. After idle running for 20 to 30 minutes, calibrate the DRIFT meter to 0% with ZERO ADJ control ⑨. If the JIS/CCIR of the INDICATION buttons ⑤ is selected, set the OSC switch ⑦ to 3kHz, then adjust the DRIFT meter to 0%. If the DIN button is selected, set the OSC switch to 3.15kHz, then adjust the DRIFT meter to 0%.
Accurate measurement is not secured unless this 0% calibration is performed.

How to Use as Wow-Flutter Meter

1. Connect this meter and a test piece (i. e., a tape recorder, record player, etc.) as shown in Fig. 5. To measure wow and flutter of a tape recorder, use the tape for wow and flutter measurement, or record the signal output from the OSC terminal ⑩ on tape and play back the tape. For measurement of a record player, use the record for wow and flutter measurement.

Note : For measurement based on JIS/CCIR Standard, use tape or a record containing signals whose center frequency is 3.0kHz. (For measurement based on DIN Standard, the center frequency shall be 3.15kHz.)

2. Select a FUNCTION button ④ corresponding to desired frequency components. Frequency components are as follows :

FUNCTION	Frequency component (Band width)
WTD	weighted characteristics common to standards 0.2 ~ 200Hz
WOW	0.5 (0.3) ~ 6Hz
FLUTTER	6 ~ 200Hz
UNWTD	0.5 (0.3) ~ 200Hz

※ Values enclosed in parentheses are for
DIN/CCIR Standards.

3. Select an INDICATION button ⑤ in accordance with the standard used.
4. Set the RANGE switch ⑥ to a range where the WOW-FLUTTER meter ① can be read easily in accordance with the magnitude of wow and flutter.
5. The DRIFT meter reads shift and fluctuation of the revolution of a test piece.

6. MAINTENANCE

Caution : Read this page carefully to keep your safety.
For Electric Shock Protection : Be sure to disconnect the power cable from the socket before conducting the following operation.

REPLACING THE FUSE

In case the fuse has blown, locate the cause. If the fuse itself is the cause, replace it as follows :

1. Pull the plug of the power cord from the power outlet.
2. Remove the fuse holder in the rear panel using a standard screwdriver (see Fig. 6).
3. Take out the blown fuse, and in its place, insert a new fuse.
4. Set the label of your line voltage to the mark ▼, then plug the fuse holder containing the new fuse into the rearpanel.

CHANGING THE SUPPLY VOLTAGE

Remove the fuse holder in the rear panel using a standard screwdriver. Then set the label of your line

voltage to the mark ▼ and plug the fuse holder back into place. When changing the supply setting from 100/120V to 220/240V, change the 0.3A fuse for a 0.2A one. (see Fig. 6).

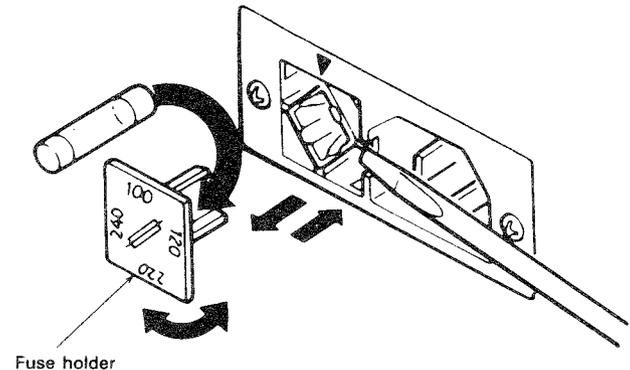


Fig. 6