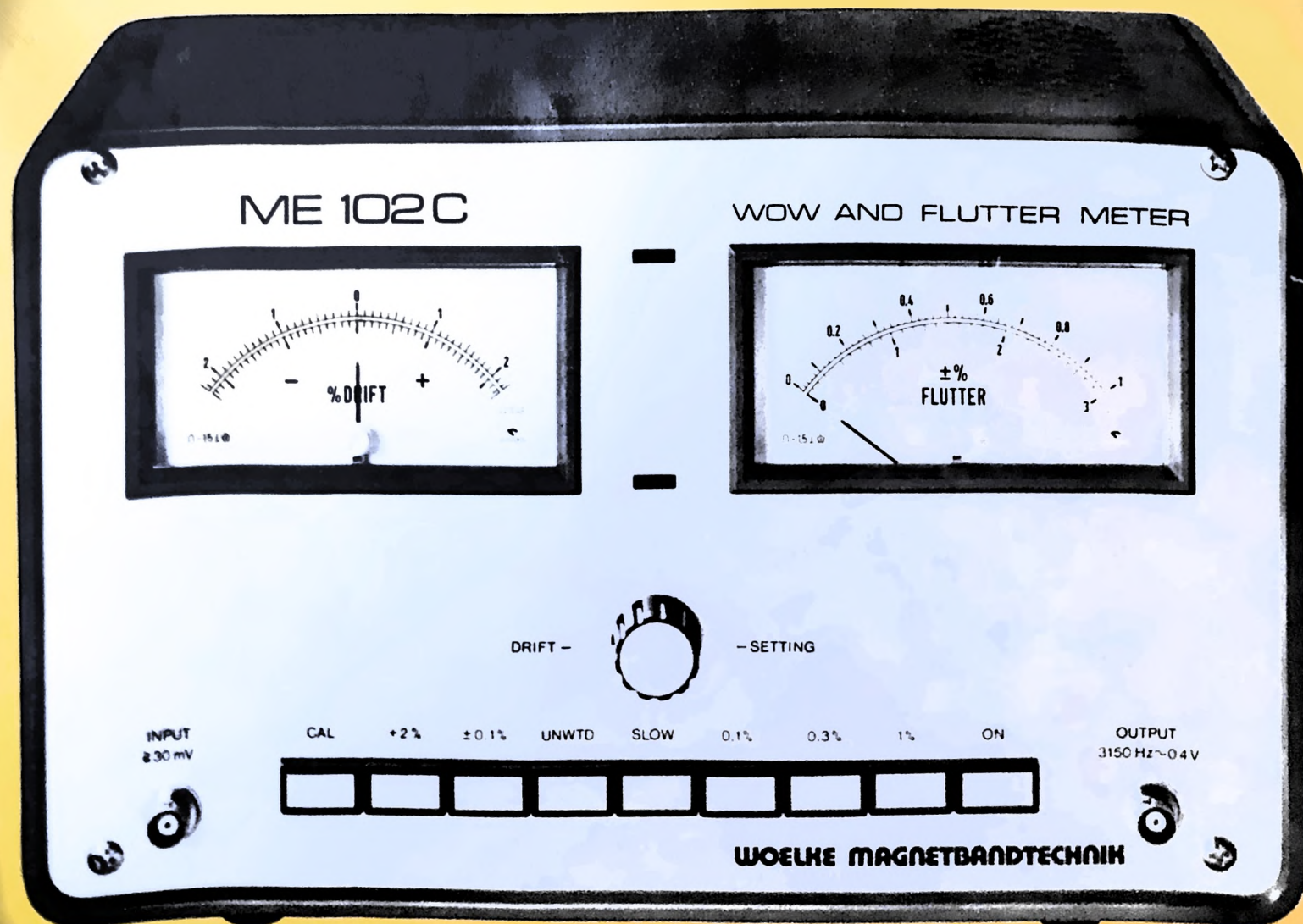


# WOELKE MAGNETBANDTECHNIK

WOW AND FLUTTER METER

ME 102 C  
ME 102 CE

*mk 3.910,-*



# Specifications-ME 102 C /102 CE

Operating voltage:	110/125 or 220/240 V (switchable) 40–60 Hz
Power consumption:	approx. 6 W
OSCILLATOR SECTION:	
Test frequency:	3150 Hz (drift $1 \times 10^{-3}$ after initial warmup)
Test voltage:	approx. $0.4 V_{\text{rms}}$ at the test socket output and approx. 20 mV at the DIODE CABLE socket.
Calibrating device:	+ 2 % detuning for static and $\pm 0.1 \%$ (AC supply frequency as squarewave signal) for dynamic calibration of the metering section.
METERING SECTION:	
Input voltage:	30 mV to 30 V without adjustment; 3150 Hz and 3000 Hz $\pm 5 \%$ .
Input impedance:	$\geq 10 \text{ k}\Omega$
Measuring ranges:	$\pm 0.1 \%$ , $\pm 0.3 \%$ and $\pm 1.0 \%$ (quasi-peak indication according to DIN and CCIR)
Frequency-dependence of flutter indication:	in position LINEAR 0.5 to 500 Hz ( $-3 \text{ dB}$ ); in position WEIGHTED according to DIN and CCIR; external filter as desired
ME 102 CE	in position "NAB/JIS" according to NAB and JIS-standard "weighted" or "unweighted"
Drift indication:	max. $\pm 2 \%$
Output voltage for oscilloscope or level recorder:	approx. $10 V_{\text{pp}}$ ( $Z_{\text{out}} = 22 \text{ k}\Omega$ )
Dimensions:	$300 \times 180 \times 190 \text{ mm}$
Weight:	3,5 kg

## General

The Model ME 102 C is designed for the testing of flutter in all types of recording and playback devices for acoustical recording as well as data storage. It is fitted exclusively with silicon transistors, very light-weight and therefore suited not only to laboratory investigations, but especially for testing highquality sound recorders.

A built-in oscillator generates the standard (IEC) frequency of 3150 Hz. This tone can be detuned for purposes of static and dynamic calibration of the metering section of the unit, using the AC supply frequency to modulate the tone.

Flutter between  $\pm 0.01$  and  $\pm 1.0\%$  can be measured LINEAR or WEIGHTED using quasi-peak evaluation according to DIN and CCIR. The unit is therefore suitable for measuring the flutter both in high quality tape recorders and record players as well as in normal phonographic equipment. The characteristic of the flutter indicating instrument corresponds to the DIN standard and to the according standards of CCIR, IEC and ANSI.

A second meter, the "drift" indicator, indicates the deviation of the test frequency from the nominal frequency. Both meters may be switched to FAST or SLOW indication. The ME 102 C incorporates an indication amplifier which indicates by way of a pilot lamp whether the level of the input signal is sufficient for a satisfactory measurement. If the input signal is too low or the test item disconnected, the built-in oscillator automatically switches over the input.

If required, the measuring frequency of 3150 Hz can be changed over to 3000 Hz by means of a switch provided on the rear. This does not, however, apply to the oscillator. Besides the normal test sockets on the front panel of the instrument, a standard socket is provided on the rear for direct connection of "diode cables" as used for home tape recorders. Further connections are provided for the insertion of external filters, oscilloscopes and high-speed recorders.

## Operating Principle

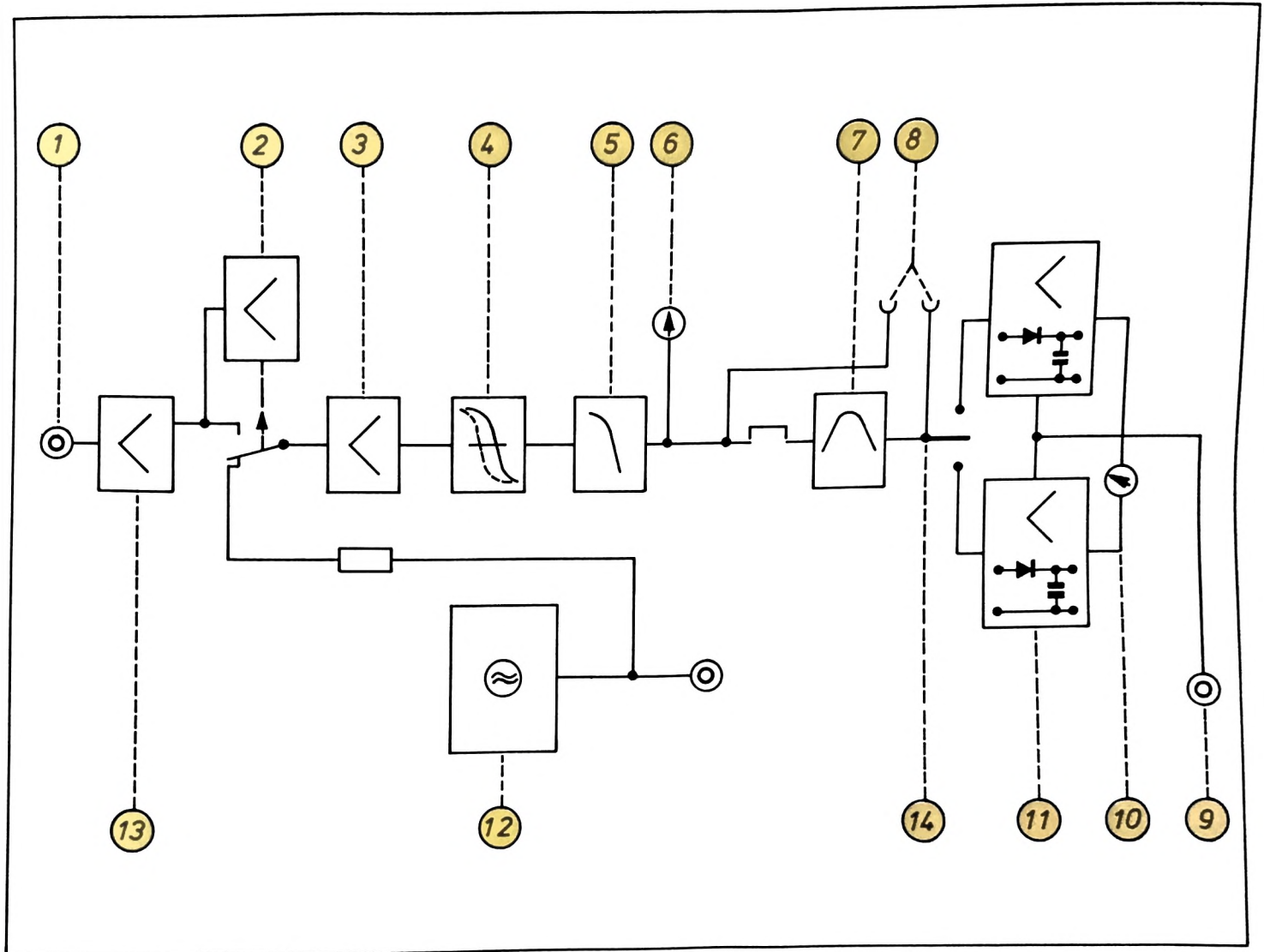
(See also diagramm overleaf)

The signal delivered by the device under test first passes through a limiting amplifier, is demodulated at the steep edge of the following low-pass filter and fed to the "drift" indicator after separating the carrier. After further amplification the signal is applied to the weighting filter, and this in turn is followed by the indication amplifier and peak rectifier for flutter indication. The connection for level recorder or oscilloscope is parallel to the output of the indication amplifier. A built-in oscillator supplies the test frequency of 3150 Hz with a stability of  $1 \times 10^{-3}$  after a short warmup. By pushing the appropriate test buttons, the oscillator frequency is detuned by a defined amount for the purpose of calibrating the "drift" meter, and is frequency-modulated using the AC supply frequency for calibrating the flutter indication.

## AC Connection and Operation

The flutter meter is factory-adjusted for an AC supply voltage of 220–240 Volts and may only be operated with an AC of 40 to 60 Hz. To switch to 110–125 Volts remove the six screws at the top and the bottom of the unit and the entire housing may be drawn off the device. Actual switchover is accomplished by moving the fuse to the "110–125 Volt" fuse holder. The instrument should be so situated as to prevent inordinate cooling due to draughts, or unnecessary heating (for example by stacking with other instruments).

# Block Diagram of ME 102 C / 102 CE



- |   |   |    |   |
|---|---|----|---|
| 1 | Input 30 mV min (BNC)                               | 8  | External filter/Output for recorder (in connection with RECORDING ADAPTER ME-Z) |
| 2 | Switching amplifier                                 | 9  | Oscilloscope/Recorder   |
| 3 | 2nd limiter/amplifier                               | 10 | Flutter indicating instrument   |
| 4 | Low-pass demodulator (switch-selected 3000/3150 Hz) | 11 | Final amplifier/rectifier   |
| 5 | Carrier filter                                      | 12 | Oscillator 3150 Hz with output (BNC)  |
| 6 | Drift indicating instrument                         | 13 | 1st limiter/amplifier   |
| 7 | Weighting Network                                   | 14 | NAB/JIS-Button  |

# Putting into Operation and Testing

Operate the pushbuttons ON and TEST. Although, being transistorized, the instrument is instantly ready to operate, it is suggested that it be left on for approximately ten minutes to assure greater measurement accuracy. Set the left meter to "0", using the control in the middle of the unit and push the button marked "+ 2%". The instrument should now indicate + 2%. Should a correction be necessary, use the "+ 2%" potentiometer on the rear of the equipment. After this, push the buttons LINEAR and "± 0.1%" (the button marked SLOW must not be depressed), as well as the measuring range button "0.1%". The right-hand instrument should now indicate ± 0.1%. If necessary, correct using the potentiometer "± 0.1%" at the rear of the unit. Both potentiometers are to be adjusted using only the screwdriver which is delivered with each unit. The potentiometer OSCILLATOR serves to correct the oscillator frequency. Normally a precision frequency meter to the BNC socket "3150 Hz".

## Measuring Procedure

Before the start of a measurement, make sure that no pushbutton besides the button ON is depressed with the exception of the measurement range button 0.1, 0.3 or 1.0. The measuring frequency is only released by a threshold switch when a sufficiently high test voltage ( $> 30$  mV) is available at the input; only then is a measurement possible. This state is indicated by the lower, green pilot lamp, which then lights up.

### 1. Measuring Playback Devices

(Record Players, Optical or Magnetic Film Players):

Connect the output of the device under test to the INPUT of the flutter meter. The output voltage of the unit under test must be at least 30 mV and may not exceed 30 V. The test record or test film is then played. The left-hand meter shows the deviation of the mean playback device speed from the nominal value, and the right-hand meter the flutter weighted according to DIN-CCIR. Only the maximum pointer deflections are to be read. According to the standard, measurements may only be made in position FAST. Should the pointer fluctuate widely, switch to SLOW. A reading of the arithmetic mean value is then obtained. By pushing button LINEAR, the built-in weighting filter is cut out of circuit. Linear indication of all flutter in the range from 0.5 to 500 Hz ( $-3$  dB) is now obtained. This form of measurement often gives values many times the weighted measurement. In practice this comparison is often of advantage, since it facilitates analysis of the various flutter frequencies, especially when using a level recorder, and thus also trouble-shooting. This kind of test can be made with fast or slow indication.

### Note:

Measurement is undertaken using the standard frequency 3150 Hz. Should test records or test films having a test frequency of 3000 Hz be employed, switch over to this frequency at the rear of the instrument.

## 2. Testing of Tape Recorders

The test signal of 3150 Hz is recorded on the device under test. The input of the tape recorder is connected to the BNC socket "3150 Hz" on the front panel of the unit (the signal is available here with a voltage of approximately 400 mV).

When checking home tape recorders of European manufacture, this connection can easily be made to the back of the unit using the socket DIODE CABLE (the available signal here is approximately 20 mV). This cable simultaneously connects the output of the tape recorder to the input of the meter for the later flutter test. After the signal has been recorded on the tape machine, its output is connected to the BNC socket INPUT of the flutter meter. Measurement is undertaken as described previously.

## Connection of External Filters

After removal of the plug in the socket marked EXTERNAL FILTER, other types of filters may be connected which permit either selective measurements on interfering frequencies or a weighting of the noise spectrum other than specified by DIN. Especially suited to this task is the Model ME 301 which allows an accurate analysis of all frequencies between 1 and 1000 Hz.

## Connection of High-Speed Recorders or Oscilloscopes

High-speed recorders and oscilloscopes may readily be connected to the BNC socket marked OSCILLOSCOPE/RECORDER. The output of the flutter meter here is approximately  $10 V_{pp}$  into 22 kOhms.

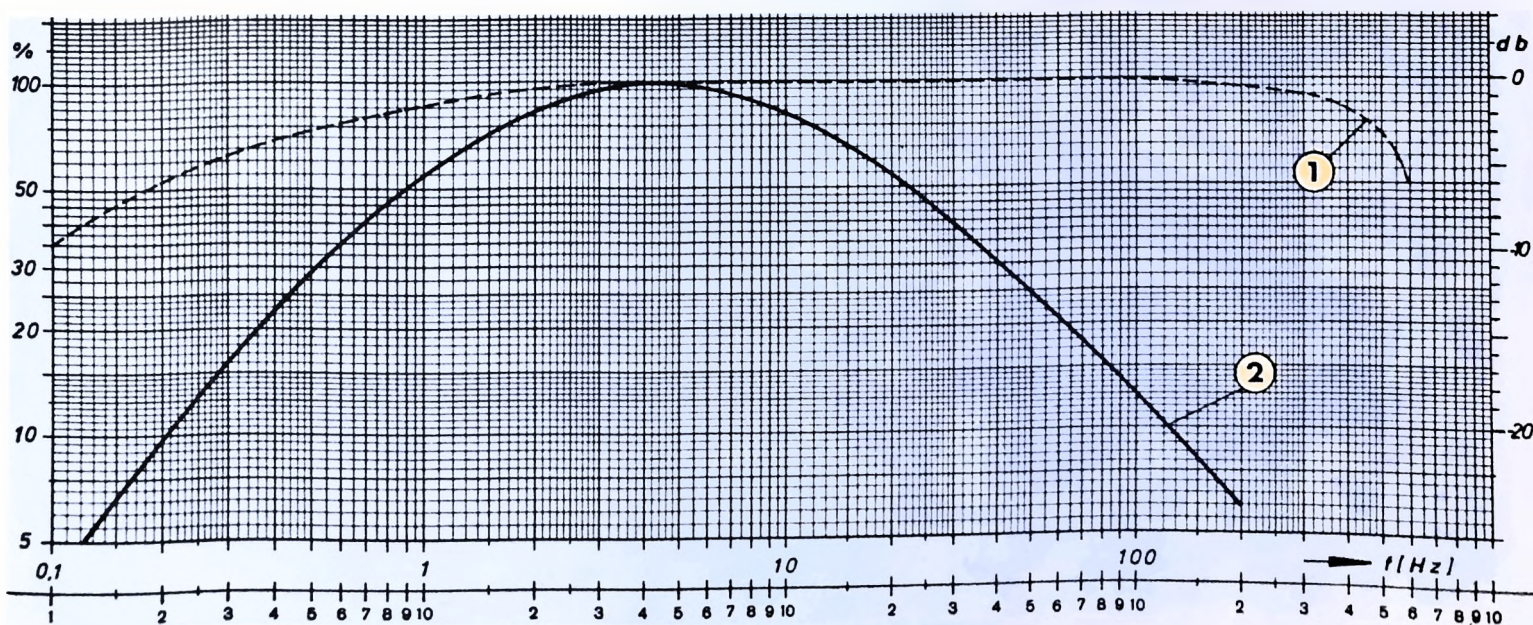
If the input voltage of the recorder respectively oscilloscope shall be according to the indication of the flutter instrument, this can be achieved by employing our **recording adapter ME-Z**. The adapter is connected to the external filter socket and has an own output for the recording equipment.

## ME 102 CE

All the afore mentioned paragraphs are also effective for the ME 102 CE. Only the function of the slow button has been replaced by offering the facility of measuring flutter according to the old american NAB standard (respectively the japanese JIS standard). Depending on the position of the button "unweighted" the measurement of flutter according to NAB/JIS can be carried out "unweighted" as well as "weighted".

# Maximum permissible flutter for tape recorders according to DIN 45511

	Class							Comments
	Studio Devices			Home Devices				
	76	38	19s	19h	9.5	4.75	2.4	
Tape speed cm/sec. (ips)	76.2 (30)	38.1 (15)	19.5 (7½)	9.53 (3¾)	4.76 (17/8)	2.38 (15/16)		Nominal values –
Deviation of the mean speed from the nominal speed averaged over 30 sec. %	±0.2	±0.2	±0.2	±2	±2	±2	±2	under the operating conditions indicated by the manufacturer –
Short-time speed variations; maximum %	±0.1	±0.1	±0.2	±0.15	±0.3	±0.6	±1	measured “weighted” using the unit for measurement of frequency deviations according to DIN 45507. The value to be used is the most unfavourable value resulting from recording and sub- sequent playback on the same machine.



Peak voltage with and without weighting

- 1 Unweighted
- 2 Weighted according to DIN-/IEC-/ANSI-Standards

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