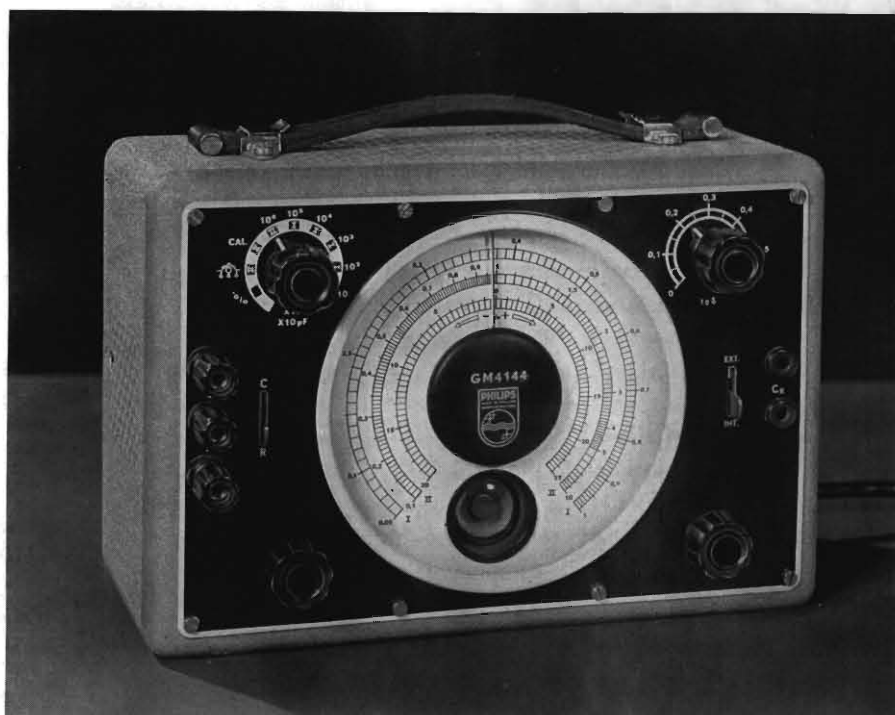


PHILIPS

**Universal Measuring Bridge
GM 4144**



Features

- Suitable for the measurement of capacitors, also electrolytic capacitors, resistors and the comparative measurement of inductances
- Large spread scale (0.1 ... 1)
- Inertialess electronic indicator
- Direct zero adjustment
- Very high and adjustable sensitivity
- Bridge supply possible by internal or external source

Industrial equipment division
Electronic measuring apparatus
Universal measuring bridge
Type GM 4144



Owing to its extremely simple operation and the many possibilities it offers, this measuring bridge is highly suitable for applications in laboratories and service workshops.

Thanks to the construction, this bridge permits many measuring possibilities as the measurement of capacitors, resistors and the comparative measurement of inductances. Testing the insulation resistance of paper capacitors, measurement of loss angles or $\text{tg } \delta$ and others can be performed with high accuracy due to the large, wide spread scale.

Direct measurements can be obtained of percentage differences of coils, resistors or capacitors from -20 up to $+25\%$. The instrument can also be used in "open bridge" position.

Description

The principle of the GM 4144 is based upon that of the Wheatstone bridge. In this apparatus, however, the usual galvanometer has been replaced by an electronic circuit comprising an amplifier and an electronic indicator. The latter is not only more sturdy than a galvanometer but is also unsusceptible to overload and mechanical shocks, whilst at the same time the reading is parallax-free and inertialess. If, notwithstanding the fact that they are already extensive, the measuring ranges do not meet particular requirements they can be further extended by employing external resistors or capacitors (e.g. up to some hundreds of Megohms and thousands of microfarads).

Technical data

MEASURING RANGES

Capacitances

10 pF ... 100 μ F subdivided into six ranges:

10	...	100	pF
100	...	1000	pF
1000	...	10000	pF
0.01	...	0.1	μ F
0.1	...	1	μ F
1	...	100	μ F

Measurements down to 1 pF are possible.

Loss angles

$\text{tg } \delta$ of 0.01 ... 0.6 for capacitors of 1 ... 100 μ F.

Regenerating voltages for electrolytic capacitors

10, 25, 50, 100 and 250 V D.C.

Leak test

A capacitor leakage of 200 $\text{M}\Omega$ can be registered.

Resistances

0.5 ... 10 $\text{M}\Omega$ subdivided into 6 ranges:

1	...	10	Ω
10	...	100	Ω
100	...	1000	Ω
1000	...	10000	Ω
0.01	...	0.1	$\text{M}\Omega$
0.1	...	10	$\text{M}\Omega$

The range of 0.1 ... 10 $\text{M}\Omega$ has an adjustable phase correction for sharp minimum adjustments.

Percentage differences

From -20 to $+25\%$

In this position of the bridge the unknown impedance is compared with an exactly known standard impedance, to be connected externally.

PRECISION

Absolute error, including reading error:

Scale 1

$(0.1-1) \times 10, 10^2, 10^3, 10^4, 10^5$
 $< 1.5\%$

The error may increase from $< 1.5\%$ to $< 3\%$ at the ends of the scale (0.1 and 1).

In the range 10 ... 100 pF the error may be between < 2.5 % in the centre, and 5 % at the extreme ends.

Scale II

$(0.1-1) \times 10^6$
< 2.5 %

The error may increase from < 2.5 % to < 6 % at the ends (0.1 and 1) of the scale.

Open bridge position

< 1.5 %

The error may increase from < 1.5 % to < 5 % at the ends of the scale.

% position

Absolute error < 0.3 %

This error may increase to < 0.6 % at the ends of the scale.

Calibration

Within 1 %

Valves

EF 40
EM 34
EZ 40

SUPPLY

Mains

110, 125, 145, 200, 220 or 245 V, 40 ... 100 c/s;
A.C. approx. 20 W

Bridge supply

Internal (mains frequency) as well as external;
3 V Max.

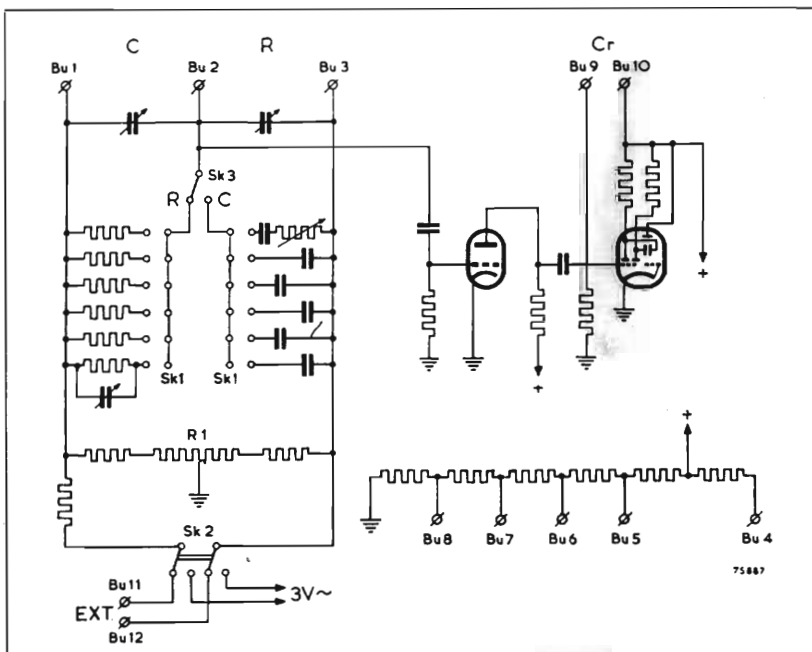
CONSTRUCTION

Dimensions

17 x 25 x 13 cm

Weight

6 kg



Simplified circuit diagram of the GM 4144