

Automatic Multimeter PM2519

Operating Manual/Gebrauchsanleitung/Notice d'Emploi

4822 872 30021

850325/01/21



PHILIPS

CONTENTS

Page

Page

1. SAFETY	1
2. GENERAL INFORMATION	2
2.1. Versions	2
2.2. Features	2
2.2.1. Relative reference measurements	2
2.2.2. Bargraph display	2
2.2.3. dB measurements	3
2.2.4. Audible signals and indicators	3
3. CHARACTERISTICS	4
3.1. Performance characteristics	4
3.2. Safety characteristics	5
3.3. Initial characteristics	5
3.4. Environmental characteristics	5
3.5. Climatic conditions	5
3.6. Mechanical requirements	6
3.7. Mains supply conditions	6
3.8. Battery supply conditions (/21 version only)	6
3.9. Electromagnetic interference	6
3.10. Accessories	6
4. INSTALLATION INSTRUCTIONS	7
4.1. Initial inspection	7
4.2. Safety instructions	7
4.2.1. Earthing	7
4.2.2. Mains voltage setting and fuses	7
4.3. Location and replacement of fuses	7
4.4. Operating position of the instrument	7

5. OPERATING INSTRUCTIONS	8
5.1. General information	8
5.2. Switching on	8
5.3. Display	8
5.4. Control features	8
5.4.1. Relative reference (ZERO SET)	8
5.4.2. Preset	10
5.4.3. Ranging	11
5.5. Control functions	11
5.5.1. V $\overline{\sim}$ measurements	11
5.5.2. mV $\overline{\sim}$ measurements	11
5.5.3. V $\overline{\sim}$ $\square$ > PRESET measurements	11
5.5.4. V $\sim$ rms measurements	12
5.5.5. A $\overline{\sim}$ measurements	12
5.5.6. A $\sim$ rms measurements	12
5.5.7. Ω measurements	12
5.5.8. $\rightarrow$ $\square$ < 10 Ω measurements	13
5.5.9. $^{\circ}\text{C}$ measurements	13
5.5.10. Hz measurements	13
5.5.11. dB measurements	13

APPENDIX 1. OPTIONAL ACCESSORIES	15
A1.1. HT Probe PM9246	15
A1.2. Shunt PM9244 and current transformer PM9245	15
A1.3. HF probe PM9210 and accessory set PM9212	16
A1.4. DATA HOLD probe PM9267	17
A1.5. Current gun	17

1. SAFETY

Read this page carefully before installation and use of the instrument.

1.1. INTRODUCTION

The instrument described in this manual is designed to be used by properly-trained personnel only. Adjustment, maintenance and repair of the exposed equipment shall be carried out only by qualified personnel who is aware of the hazards involved.

1.2. SAFETY PRECAUTIONS

For the correct and safe use of this instrument it is essential that both operating and service personnel follow generally-accepted safety procedures in addition to the safety precautions specified in this manual. Specific warning and caution statements, where they apply, will be found throughout the manual.

Where necessary, warning and caution statements and/or symbols are marked on the apparatus.

1.3. CAUTION AND WARNING STATEMENTS

CAUTION is used to indicate correct operating or maintenance procedures in order to prevent damage to or destruction of equipment or other property.

WARNING calls attention to a potential danger that requires correct procedures or practices in order to prevent personal injury.

1.4. SYMBOLS



Read the operating instructions

1.5. IMPAIRED SAFETY PROTECTION

Whenever it is likely that safety protection has been impaired, the instrument **must** be made inoperative and be secured against any unintended operation. The matter should then be referred to the appropriate servicing authority.

Safety protection is likely to be impaired if, for example, the instrument fails to perform the intended measurements or shows visible damage.

2. GENERAL INFORMATION

The PM2519 automatic multimeter is a digital multi-function measuring instrument with an internal micro-processor that results in a simple but extremely powerful measuring tool.

The standard measuring functions of voltage, current and resistance are provided with auto-ranging and true r.m.s. a.c. measurements.

Additional measuring functions include:

- dB measurements with choice of 0 dB reference
- frequency measurements
- temperature measurements with a Pt 100 probe
- relative reference measurements against a selected or set zero
- continuity checks, and the measurement of the forward/backward resistance of diodes.

Output values are indicated on a 4½ - digit liquid-crystal display (LCD) with decimal points and a wide variety of function indications.

A built-in bargraph gives an analog indication of outputs, enabling trends and orders of magnitude to be seen at a glance.

An audible signal is available for continuity and level checks against a set relative reference value.

The PM2519 is normally operated from an a.c. mains supply, but a /21-version is available for field operation that can be powered from internal batteries for a approx. 30 hours, these batteries are rechargeable in situ via the instrument's mains supply.

A wide range of optional accessories are available, including temperature, EHT, HF and data hold probes, shunts and current transformers.

2.1. VERSIONS

- PM2519/01 The PM2519/01 is the basic version of the automatic multimeter. From this typenumber the following versions are derived.
- PM2519/21 A PM2519/01 with a built-in battery option. The rechargeable batteries of the PM2519/21 can be charged via the instrument's mains supply.
- PM2519/51 The PM2519/51 version has a system adaptor and an IEC-625/IEEE-488 bus interface for digital output data and remote control (except for the main function switch).

Besides these versions also adaptations kits are available to convert from a basic version to a PM2519/21 or to a PM2519/51.

- PM9121 Adaption kit to convert a PM2519/01 to a PM2519/21. This adaption kit includes a topcover with an accubox.

- PM9120 The PM9120 is a system adaptor which makes the PM2519/01 suitable to install the IEC-625/IEEE-488 interface. It includes a topcover with a galvanic separation and a metal rear.

- PM9191 IEC-625/IEEE-488 interface. The PM2519/01, PM9120 and the PM9191 together form a PM2519/51.

2.2. FEATURES

Some of the PM2519 features referred to in the previous section are now discussed in more detail.

2.2.1. Relative reference measurements

For comparison testing and to simplify measurement it is often useful to measure against a different reference than zero. For instance, in batch testing of circuits or components, a reference value can be taken as a standard and stored in the PM2519 memory.

Subsequent measurements will then indicate the deviation from the stored reference, together with the + or - polarity sign.

Also, when measured levels need to be adjusted to a certain value, this value can be first stored as the reference and the measured levels adjusted for zero indication in the display.

When necessary, the reference value to be stored can be either obtained from an externally measured value or set up on the PM2519 itself by a PRESET function.

Reference values obtained by the PRESET method are stored in the memory of the microprocessor, one value for each of the measuring functions, and are saved even when the instrument is switched off.

2.2.2. Bargraph display

When the magnitude of a signal or its minimum/maximum value needs to be observed, then an analog representation is more easy to read than a digital display. The bargraph analog display, with its semi-logarithmic indication of the magnitude of the signal, offers a simple means of checking and adjusting for minimum, maximum or zero deflection.

2.2.3. dB Measurements

When dB mode is selected (only in V_{DC} and V_{rms}), the dB value, referred to 1mW in the last selected and stored reference resistor is displayed with 0,1 dB resolution.

If other 0 dB reference values are required, for example, for direct amplification or attenuation measurements, the new reference can be obtained from a measurement. A new reference resistor can be selected out of 16 values in the PRESET mode.

dB readings are also available in the d.c. voltage ranges for measuring h.f. signals via an h.f. probe.

2.2.4. Audible signals and indicators

An audible tone is available to denote low-ohmic connections in continuity checks (less than 10Ω) and for voltages greater than the PRESET value (on a separate function switch position).

Input voltages above 110 V are indicated in the display with a high voltage sign ().

If in case of a.c. measurements the crest factor is exceeded, the display shows an arrow () before the result.

3.1. PERFORMANCE CHARACTERISTICS

— Properties expressed in numerical values with stated tolerance are guaranteed by N.V. Philips Gloeilampenfabrieken
Specified non-tolerance numerical values indicate those that could be nominally be expected from the mean of a range of identical instruments.

— This specification is valid after the instrument has warmed up for 60 minutes.
Reference temperature 23°C ± 2°C.

MEASURING FUNCTIONS		V _{DC}	V _{AC} (rms)	V _{DC} dB	V _{AC} dB	FREQUENCY	I _{DC}	I _{AC} (rms)	RESISTANCE	°C	CONTINUITY (driving I = 1mA)
Display units (max.)	11 000	11 000	11 000	999 (signals ≥ 10 mV) 99 (signals < 10 mV)		11 000	2 200		11 000	200 0	11 000
Ranges (* = no auto-ranging)	100 mV* 1 V 10 V 100 V 1000 V	1 V 10 V 100 V 1000 V (max. 600V)	-57 dB to +43 dB (at 600 Ω)		-51 dB to +43 dB (at 600 Ω)	1000 Hz* 10 KHz 100 KHz 1MHz	20 mA 200 mA 2 A 20 A		1000 Ω 10kΩ 100kΩ 1000kΩ 10MΩ	-50°C to +200°C	1 V
Resolution (max.)	10 μV	100 μV	0,1 dB (signals ≥ 10 mV) 1 dB (signals < 10 mV)			0,1 Hz	10 μA		100 mΩ	0,1°C	100 μV
Accuracy (% readings + % of range)	± (0,1% + 0,02%)	± (0,5% + 0,1%) 40 Hz to 1 KHz ± (1,0% + 0,1%) to 10 KHz ± (5,0% + 0,5%) to 20 KHz (valid between 3% and 100% of range)	> 10 mV: ± 0,2 dB ≤ 10 mV: ± 1,0 dB		Signals 10-80 mV: ± 1 dB 40 Hz up to 10 KHz ± 4 dB 10 KHz up to 20 KHz full-scale Signals ≥ 80 mV: ± 0,3 dB 40 Hz up to 10 KHz ± 1 dB 10 KHz up to 20 KHz	± 0,02% of full-scale	± (0,5% + 0,1%) (valid between 3% and 100% of range) ± (0,8% ± 0,1%) 40 Hz up to 1 KHz ± (5% ± 0,1%) 1 KHz up to 5 KHz		to 100 kΩ ± (0,3 + 0,1%) to 10 MΩ ± (0,5 + 0,1%)	-50°C to 0°C ± (3% ± 0,5°C) 0°C to 100°C ± (1% ± 0,5°C) 100°C to 200°C ± (2% ± 0,5°C)	
Temperature (%/°C) coefficient	± 0,015%/°C	< 0,03%/°C	0,0013 dB/°C		0,003 dB/°C		0,05%/°C	0,05%/°C	to 1 MΩ ± 0,02%/°C to 10 MΩ ± 0,05%/°C		
Input impedance (± 1%) — d.c. 100 mV range — 1 V, 10 V ranges — over 10 V ranges	1 MΩ ± 1% 10 MΩ ± 1% 9,11 MΩ ± 1%	2 MΩ ± 1% 1,802 MΩ ± 1%	10 MΩ ± 1% 9,11 MΩ ± 1%	2MΩ ± 1% 1,802MΩ ± 1%		2 MΩ AC coupled input	Voltage Drop at end of range 20 mA, 2A range < 60 mV 200 mA range < 300 mV at 10A in 20 A range < 200 mV		Open input voltage 3V		Open input voltage: 3V
Overload protection							250 V _{rms} up to 200 mA		250 V _{rms}		250 V _{rms}
Audible tone	> PRESET (special function)										Audible test tone at < 10 Ω
Relative reference: — available — max. reading	one range 19,999	one range 11,000	full range 101	full range 94		One range 11,000	One range 4,400	One range 2,200	One range 11,000	Full range 250,0	
Crest factor at full scale		2						9			
High voltage sign.	> 110 V	> 110 V	> 110 V	> 110 V							

3. CHARACTERISTICS

Relative reference setting

Last measured value	: press ZERO SET ON/OFF
Preset value (not valid for dB measurements)	: select PRESET value and press ZERO SET ON/OFF
Recall relative reference setting	: press ZERO SET RCL

Conversion characteristic

Type of conversion	: linear
Operating principle	: delta modulation
Basic mode of operation	: repetitive triggered
Range setting	: automatic or manual by UP/DOWN steps
Polarity setting	: automatic on V ..., A ..., °C , dB and ZERO SET

Visual representation

Range changing	: Range up at $2200 + 0$, - 4 digits for [m]A ..., [m]A ~ rms ranges; Range up at $11000 + 0$, - 4 digits for other ranges. Range down at 200 ± 4 di- gits for [m]A ..., [m]A ~ rms ranges; 1000 ± 4 digits for other ranges.
Output representation	: Liquid-crystal display (LCD) 11 mm, reflective front illumination. Additional analog represen- tation by means of bar- graph in LCD.
Polarity representation	: automatic + and - in LCD (combined sign).
Function representation	: by function selector switch
Unit representation	: automatic in LCD
Overload representation	: OL indicated in LCD
Underload representation (dB ranges)	: UL indicated in LCD
Decimal point represen- tation	: automatic indication in LCD depending on range se- lected
Data hold	: with Data Hold Probe PM9267
Range hold	: via AUTO/MAN  switch

3.2. SAFETY CHARACTERISTICS

This apparatus has been designed and tested in accordance with Safety Class II requirements of IEC Publication 348, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This manual contains some information and warnings which must be followed by the user to ensure safe operation and to retain the apparatus in a safe condition.

3.3. INITIAL CHARACTERISTICS

- Maximum dimensions:
 - Height : 95 mm
 - Width : 235 mm
 - Depth : 280 mm
- Maximum weight (mass) : 2 kg
- Cabinet material : ABS

3.4. ENVIRONMENTAL CONDITIONS

The environmental data mentioned in this instruction manual are based on the results of the manufacturer's checking procedures. Details on these procedures and failure criteria are supplied on request by the Philips organisation in your country, or by SCIENTIFIC & INDUSTRIAL EQUIPMENT DIVISION, EINDHOVEN, THE NETHERLANDS.

3.5. CLIMATIC CONDITIONS

In accordance with Group I of IEC 359 with extension of the temperature limits.

Reference temperature	$23^{\circ}\text{C} \pm 1^{\circ}\text{C}$
Rated range of use	$\pm 0^{\circ}\text{C} \dots + 40^{\circ}\text{C}$
Upper temperature limit	$+ 45^{\circ}\text{C}$
Limit range of storage and transport	$- 40^{\circ}\text{C} \dots + 70^{\circ}\text{C}$
Relative humidity	20 ... 80% non-condensing max. dew-point 26°C

3.6. MECHANICAL REQUIREMENTS

In accordance with Group 2 of IEC 359
Calibration interval 1 year

3.7. MAINS SUPPLY CONDITIONS

In accordance with IEC 359, Group S2
Reference value 220 V $\pm$ 1%
Rated range of use 220 V $\pm$ 10%

NOTE: Instrument can be altered for nominal voltage of 240 V.

Mains supply frequency:

- reference value 50 Hz/60 Hz
- rated range of use 47 ... 63 Hz
- Power consumption 5 VA

3.8. BATTERY SUPPLY CONDITIONS (/21-version only)

Operating time $\geq$ 20 hours
Charging time 18 hours
Low battery indication  on the display of the PM2519/21
Charging method In case of a low battery indication the maximum operating time is 10 minutes. After this 10 minutes the instrument will be switched off by the micro computer.
The battery should be charged as soon as possible (instrument switched off and connected to mains). However the instrument can be used with a low battery. To do this connect the PM2519/21 to the mains and switch the instrument off and then on again.

3.9. ELECTROMAGNETIC INTERFERENCE

This instrument meets the requirements of:
CISPR-Publ. II.

3.10. ACCESSORIES

Supplied with the instrument	Measuring leads (including test pins)
	Mains supply cable
	Fuses
	Operating Manual
Optional	Temperature probe PM9249
	EHT probe PM9246
	Current transformer PM9245
	HF probe PM9210
	LF probe PM9213
	Shunt PM9244
	Current Gun PM9101
	Data hold probe PM9267
	Measuring leads PM9260
	Measuring leads PM9266
	Every ready case PM9279
	Adaption kit
	PM2519/01, -/21 PM9121
	System adapter PM9120
	IEC-625/IEEE-488 interface PM9191

4. INSTALLATION INSTRUCTIONS

4.1. INITIAL INSPECTION

Check the contents of the shipment for completeness and note whether any damage has occurred during transport.

If the contents are incomplete, or there is damage, a claim should be filed with the carrier immediately, and a Philips Sales or Service organisation should be notified in order to facilitate the repair or replacement of the instrument.

4.2. SAFETY INSTRUCTIONS

4.2.1. Earthing

This instrument has a double-insulated power supply. In normal operation the need of a protective earth connection is obviated.

4.2.2. Mains voltage setting and fuses

- Before inserting the mains plug into the mains socket, make sure that the instrument is set to the local mains voltage.

NOTES: *If the mains plug has to be adapted to the local situation, such adaption should be done by a qualified person only.*

As the mains transformer is secondary switched, the instrument is still live even with the POWER ON switch in the OFF position.

- The instrument shall be set to the local mains voltage only by a qualified person who is aware of the hazard involved.
- Make sure that only fuses of the required current rating and of the specified type, are used for renewal. The use of repaired fuses, and/or the short-circuiting of fuse holders are prohibited.
- Fuses shall be renewed only by a qualified person who is aware of the hazard involved.

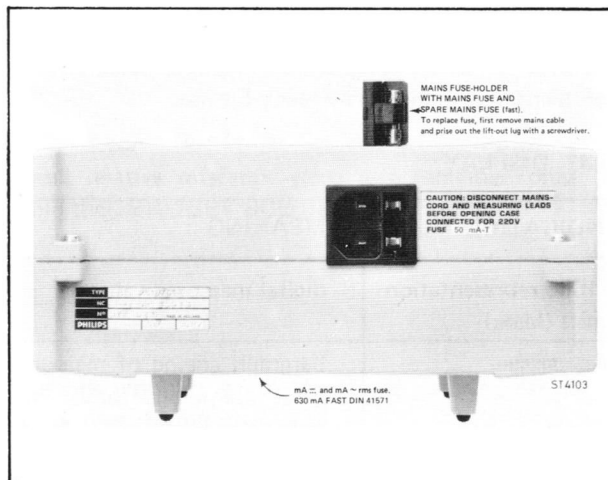
WARNING: The instrument shall be disconnected from all voltage sources when a fuse is to be renewed, or when the instrument is to be adapted to a different mains voltage.

4.3. LOCATION AND REPLACEMENT OF FUSES

From the factory on the PM2519 is set to a local mains voltage of 220 V. For modification to another voltage refer to the service manual of this instrument.

NOTE: *Measuring d.c. currents in high inductive circuits, the instrument may be damaged. In that case the fuse in the current range must be replaced by a 630 mA sand-filled DIN 41660 one.*

However the voltage drop across this type of fuse is greater so that the inaccuracy increases.



4.4. OPERATION POSITION OF THE INSTRUMENT

- The instrument may be operated in any position.
- Do not position the instrument on any surface which produces, or radiates heat, or in direct sunlight for any length of time.

5. OPERATING INSTRUCTIONS

5.1. GENERAL INFORMATION

This section outlines the procedures and precautions necessary for operation. It identifies and briefly describes the functions of the front and rear panel controls and indicators, and explains the practical aspects of operation to enable an operator to evaluate quickly the instrument's main functions.

5.2. SWITCHING ON

After the instrument has been connected to the mains (line) voltage in accordance with Clauses 4.2.1 and 4.2.2, it can be switched on. Having switched on the instrument, it is immediately ready for use.

5.3. DISPLAY

INDICATION	MEANING
11000 representation units (Max.)	: digital measured value
	: bargraph analog of measured value (semi-logarithmic characteristic expanding lower values). Not available for: °C, Hz and dB functions.
OL	: overload indication
UL	: underload indication in dB ranges; 1.0 mV in d.c. range 2.0 mV in a.c. range
↑	: crest factor exceeded
÷	: polarity
~	: alternating voltage or current
■	: audible tone function switched on
S	: PRESET function switched on (Store)
Z	: displayed value is ZERO SET value
ZS	: ZERO SET mode is switched on. Displayed value is measured value deviation from ZERO SET (relative reference value)
★	MAN ranging switched on

INDICATION	MEANING
(k) Hz, (m) V, (m) A, (k) Ω, (M) Ω, dB, °C	: measured quantity indication
+	: low battery indication
⚡	: high voltage sign ($V_{in} > 110V$)
Err	: function indicates an error *
call	: call service for calibration
----	: instrument measures
50, 75, 93, 110, 125, 135, 150, 250, 300, 500, 600, 800, 900, 1000, 1200, 8000 (ohms)	: reference resistors selected in dB function with PRESET knob

*1) Plug in 10A terminal and no (m)A function selected.

2) Function change when the instrument is in the HOLD mode, via the optional DATA HOLD Probe PM9267.

5.4. CONTROL FEATURES

A number of control features are common to all or several of the measuring functions: namely, relative reference (ZERO SET), PRESET and auto-ranging. The general operating procedures are now considered for these control features before considering the various measuring functions individually.

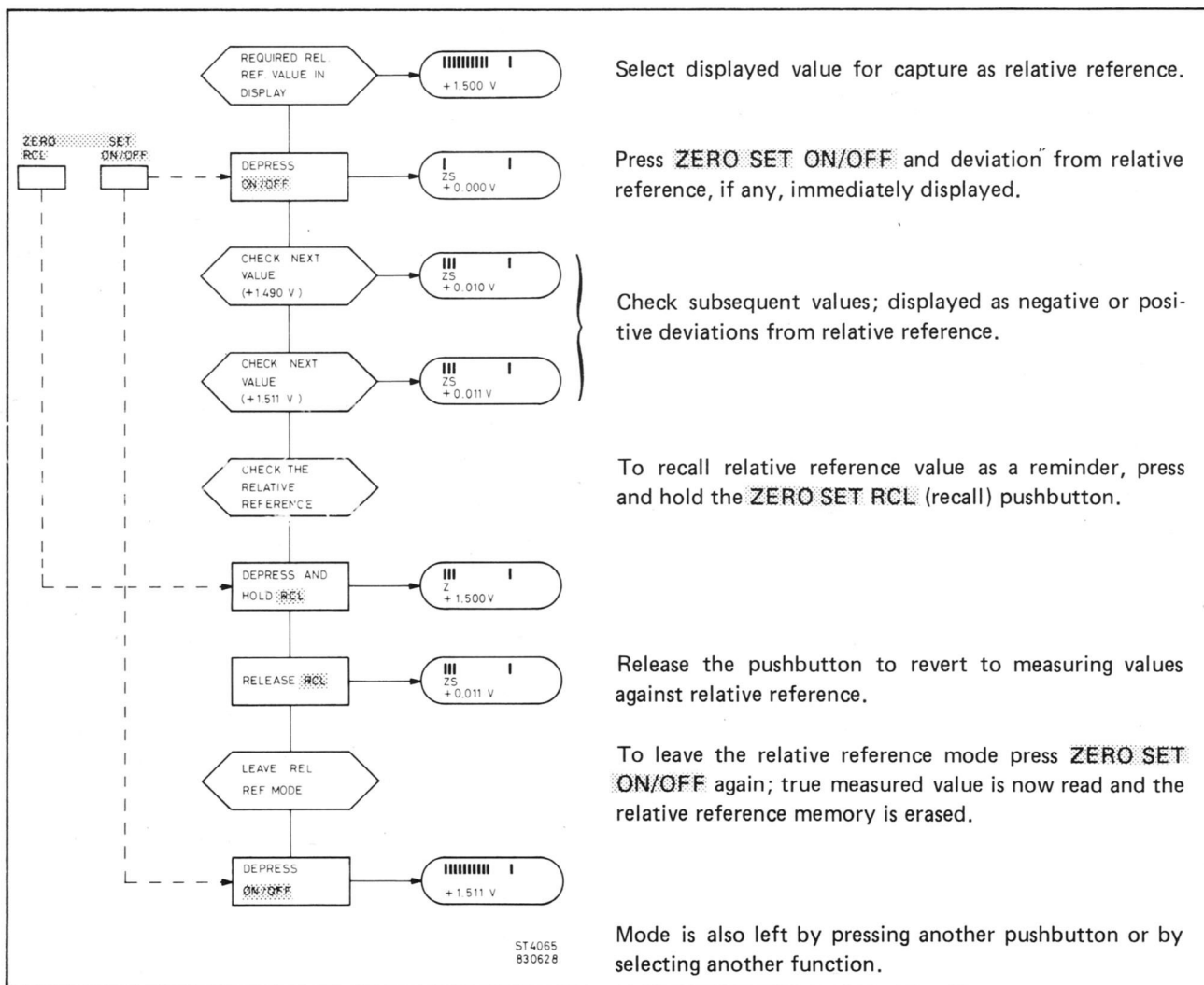
5.4.1. Relative reference (ZERO SET)

As stated in section 2.2.1, the relative reference mode enables either a displayed measured value or an internally-set value to be captured and stored as a reference for subsequent comparison purposes. A displayed measured value in any function can be captured by pressing the ZERO SET ON/OFF button. An indication ZS in the display confirms that the instrument is in the ZERO SET mode. The value in the display with ZS indication is the measured value deviation from the relative reference value captured.

The relative reference mode can be switched off by pressing the ZERO SET ON/OFF button again, but the instrument stays in the same function and range (manual ranging). The mode is also switched off if another push-button is selected or the function switch is changed; i.e. the ZERO SET value is zero again.

In the relative reference mode, the ZERO SET RCL pushbutton, while depressed (Z indicated in display), recalls the selected ZERO SET to the display as a reminder.

Example of ZERO SET ON/OFF and RCL



5.4.2. Preset

All functions, except the special case dB function, can be preset to store a pre-selected value into memory for reference purposes.

This value is held in store even after switching off the instrument.

The **PRESET RCL** button selects the PRESET mode, denoted by an S in the display, together with the last PRESET value and range of the selected function.

In the dB function, the actual reference resistor is displayed and can be changed by the up ($\blacktriangle$) and down ($\blacktriangledown$) buttons. The continue dB measurements with the new selected reference resistor, press the **ZERO SET ON/OFF** key.

The blinking digit of the recalled last PRESET value can be changed by the up ($\blacktriangle$) or down ($\blacktriangledown$) pushbuttons.

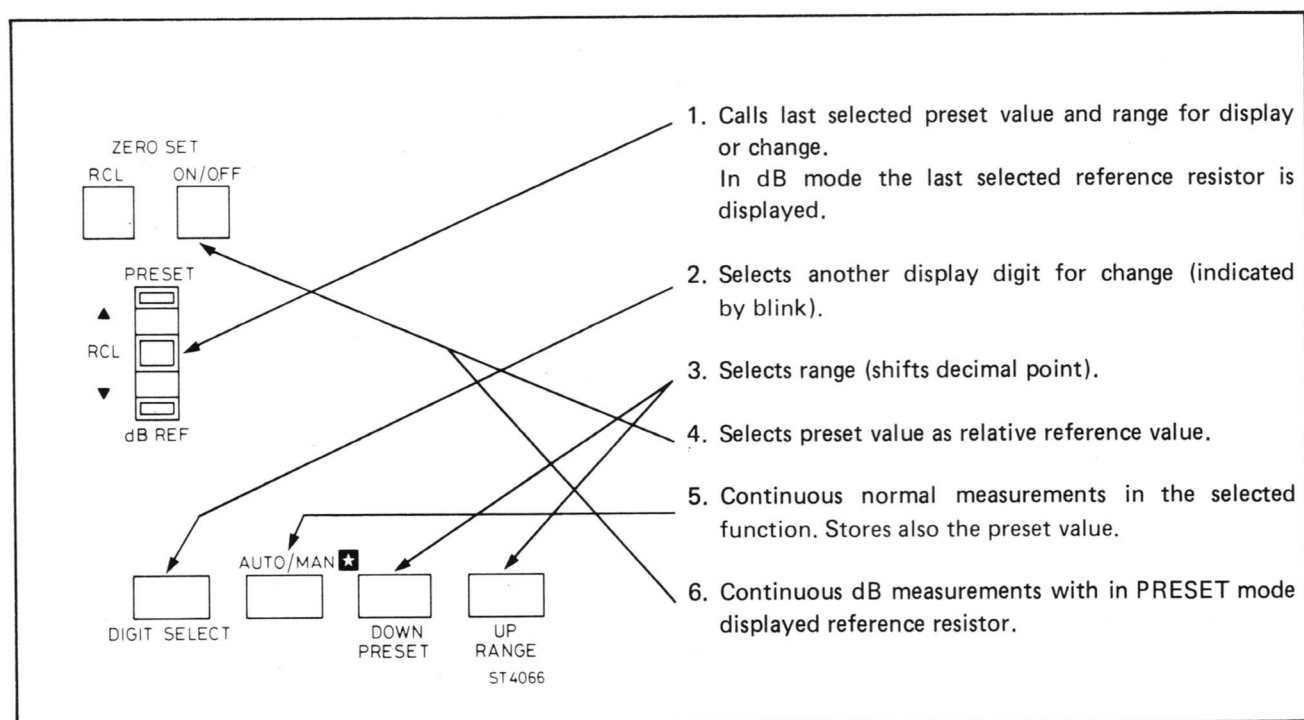
A single press gives a one digit change; continuous pressing gives continuous change with roll-over (or roll-under) to the next display digit.

The **DIGIT SELECT** pushbutton allows direct selection of the next digit in the display. The range can be changed by **PRESET RANGE UP** or **DOWN**.

The PRESET value can be used as relative reference value by pressing the **ZERO SET ON** button.

The instrument continuous normal measurements in the selected function by pressing the **AUTO/MAN** $\square$ key.

The new selected PRESET value is automatically stored, in a battery powered RAM. The life time of the battery is 5 years. For replacement refer to the service manual of this instrument.



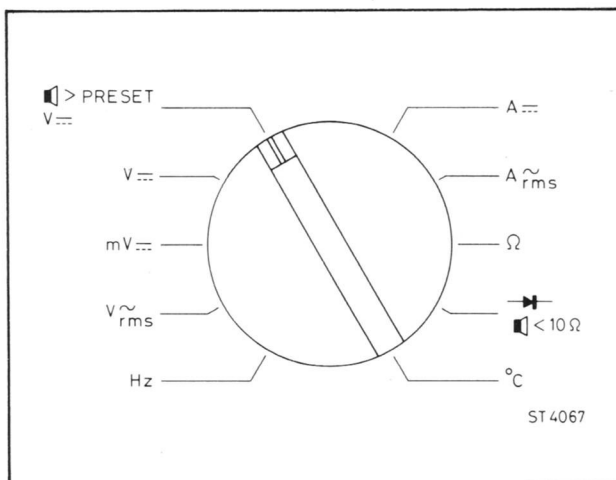
5.4.3. Ranging

The **AUTO/MAN**  pushbutton selects either automatic or manual ranging.

The **DOWN** and **UP** pushbuttons are effective in the manual mode ( displayed) and in the hysteresis area (1000-1100). They are ineffective for single range functions (mV $\sim$, $\rightarrow$ Ω < 10 Ω , $^{\circ}\text{C}$).

5.5. CONTROL FUNCTIONS

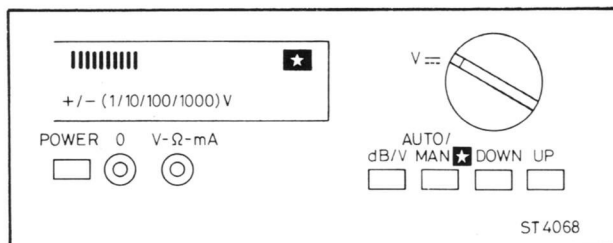
The measuring functions available on the PM2519 are selected by the function selector switch positions as indicated. Having selected the required function, further control actions that are necessary are referred to in the following quick-check measuring procedures.



5.5.1. V $\sim$ measurements

- Set function selector to V $\sim$
- POWER ON
- Select **AUTO/MAN**  as required ( in display for manual ranging)
- Connect 0 and V Ω mA terminals to voltage source  in display if the input voltage exceeded 110 V
- Max. input voltage 1000 V.

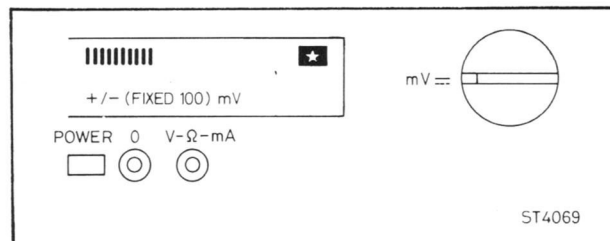
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.2. mV $\sim$ measurements

- Set function selector to mV $\sim$
- Connect 0 and V- Ω -mA terminals to voltage source (max. input 250 V $_{\text{rms}}$).

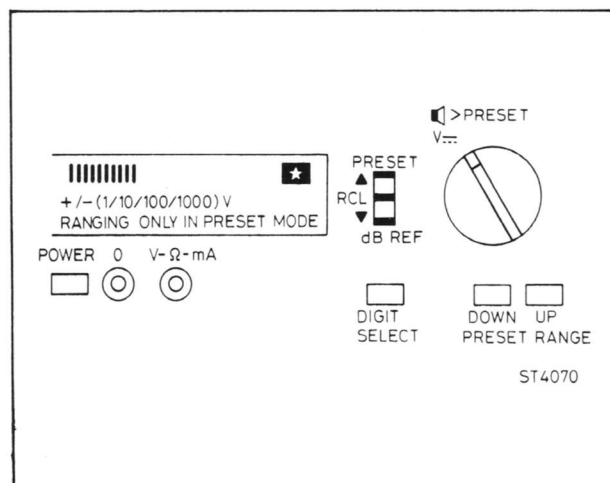
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.3. V $\sim$ > PRESET measurements

- Set function selector to  > PRESET
- Check PRESET value and range, if necessary change, see Sect. 5.4.2.
- Connect 0 and V Ω mA to voltage measuring source Audible tone emitted if V $_{\text{in}}$ exceeds selected PRESET value.
At PRESET ± 1 digit the tone is intermitten (useful for approximate calibration purposes)  if input voltage exceeds 110 V.
- Max. input voltage 1000 V.

NOTE: No ZERO SET mode available.

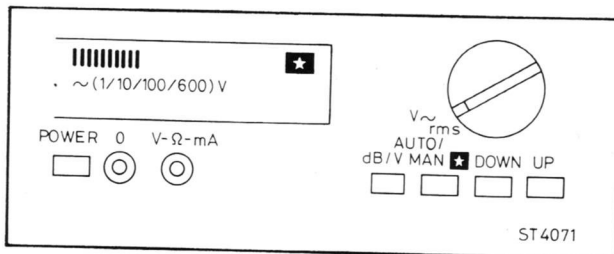


5.5.4. $V \sim$ rms measurements

- Set function selector to $V \sim$ rms
- Connect 0 and $V \Omega$ mA to a.c. voltage measuring source.
Maximum input voltage 600 V
⚡ in display if input voltage exceeds 110 V.
- The crest factor is 2 at full scale, indicated by (⚡) if exceeded.

NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.

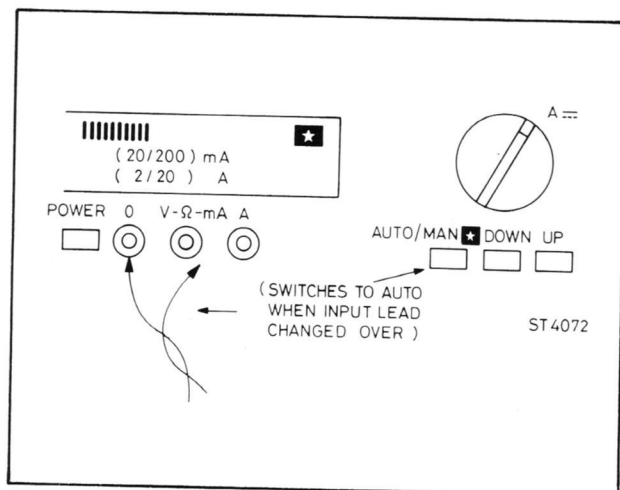
The frequency range is 40 Hz to 20 Hz.



5.5.5. $A \sim$ measurements

- Set function switch to $A \sim$
- Connect 0 and either $V \Omega$ -mA or A terminals to d.c. current source depending on current to be measured.
- Maximum input current 10 A;

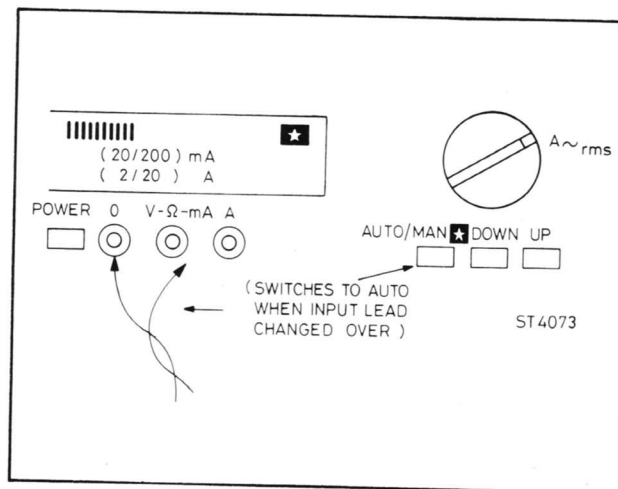
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.6. $A \sim$ rms measurements

- Set function selector to $A \sim$ rms
- Connect 0 and either $V \Omega$ -mA or A terminals to a.c. current source depending on current to be measured.
- Maximum input in highest range 10 A:
The crest factor is 9 at full scale, indicated by (⚡) if exceeded.
The frequency range is 40 Hz to 20 kHz.

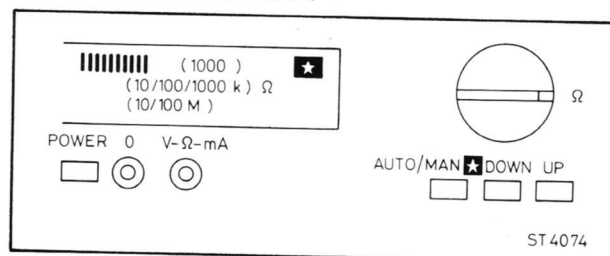
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.7. Ω measurements

- Set function selector to Ω .
- Connect 0 and $V \Omega$ -mA terminals to resistance to be measured.
- Maximum voltage at open input 3 V; protected to 250 V rms.

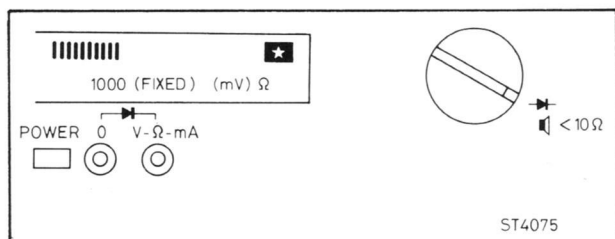
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.8. < 10Ω (diode and continuity) measurements

- Set function selector to   < 10Ω position.
- Connect 0 and V-Ω-mA terminals to circuit under test.
- Maximum voltage at open input 3 V; protected to 250 V_{rms}.
-  Audible tone indication of continuity < 10Ω.
- Measuring current 1mA.

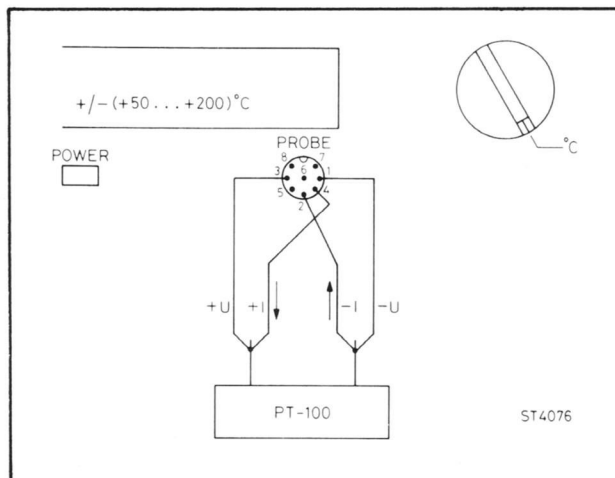
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.9 °C measurements

- Set function selector to °C position.
 - Connect temperature measuring probe to circuit under test.
- 4-wire quick-response probe PM9249 recommended for surface measurements as well as for use in liquids to + 200°C max.

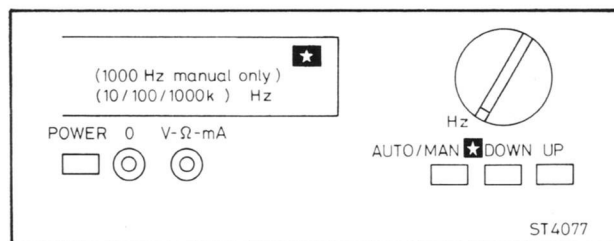
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.10 Hz measurements

- Set function selector to Hz position.
- Connect 0 and VΩmA terminals to circuit under test
- Gate time: 10 seconds for 1000 Hz range.
1 second for other ranges.
- Input attenuation automatically.
- Input sensitivity 10 Hz ... 100kHz 1,5V peak-peak
- Input is AC coupled 100kHz ... 1MHz 5V peak-peak

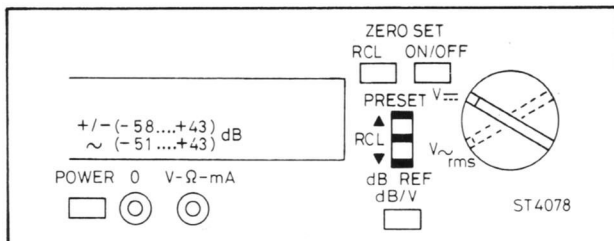
NOTE: ZERO SET and PRESET modes available; see Sect. 5.4.1. and 5.4.2.



5.5.11. dB measurements in V_~ and V_{rms} ranges

- Set function selector to V_~ or V_{rms} position.
- Select dB function (dB/V pushbutton).
- Recall the PRESET mode to display the reference resistor.
- Change if necessary with ▲▼ (16 values 50 ... 8000 ohms).
- Press ZERO SET ON/OFF to continue measurements with new reference resistor.
- Connect 0 and VΩmA terminals to circuit under test
- dB values are calculated with the reference resistor selected in PRESET mode and now displayed.
- OL and  is displayed if the input value exceeds 110 V.
- UL displayed for values less than: 1mV (d.c.); 2 mV (a.c.).
- Leave dB mode by depressing dB/V pushbutton again

NOTE: ZERO SET available.



APPENDIX 1 OPTIONAL ACCESSORIES

This section provides additional information on the use of the optional accessories that are available with the PM2519.

A1.1. HT PROBE PM9246 (fig. 1.)

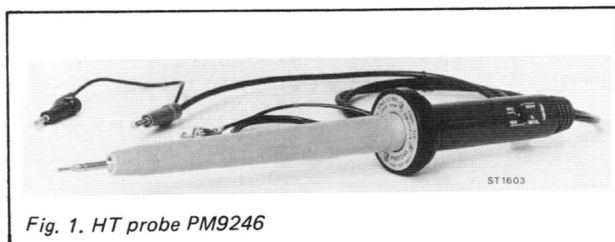


Fig. 1. HT probe PM9246

Characteristics:

Range	: direct voltages to 30 kV
Attenuation factor	: 1000
Function	: V $\overline{\text{---}}$ (all d.c. voltage ranges except mV $\overline{\text{---}}$ function)
Ranging	: MAN $\boxed{*}$ or AUTO
Connections	: as shown in Fig. 2.
Impedance	: select 10 M Ω on the probe
Facilities	: as for V $\overline{\text{---}}$ measurements (Sect. 5.4.1.)

WARNING: High voltages are present that are dangerous. When measuring with an HT probe pay special attention to ensure that zero connections are safe.

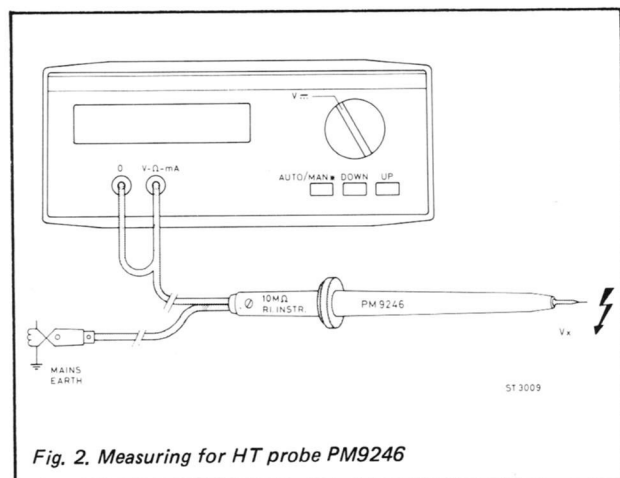


Fig. 2. Measuring for HT probe PM9246

A1.2. SHUNT PM9244 and CURRENT TRANSFORMER PM9245

Shunt PM9244 (fig. 3.)



Fig. 3. Shunt PM9244

Characteristics:

Range	: d.c. and a.c. currents to 31.6 A
Frequency	: 1 kHz max.
Output voltage	: selection between 31,6 mV or 100 mV
Function	: V $\overline{\text{---}}$ or V $\sim$ rms
Ranging	: MAN $\boxed{*}$ or AUTO
Connections	: as shown in Fig. 4.
Facilities	: as for V $\overline{\text{---}}$ measurements (Sect. 5.5.1.) and V $\sim$ rms measurements (Sect. 5.5.4.)

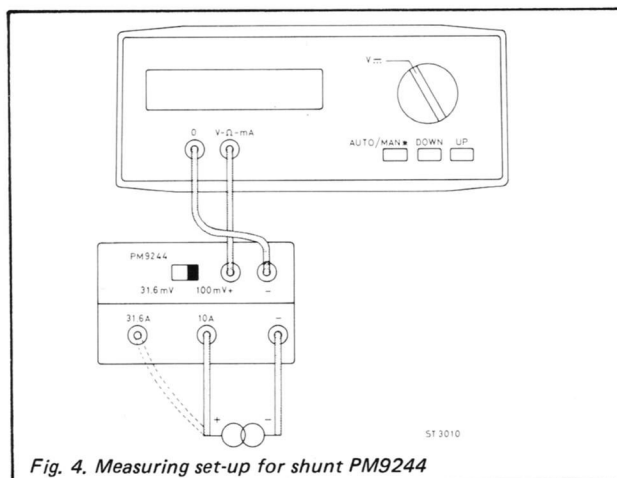


Fig. 4. Measuring set-up for shunt PM9244

NOTE: Two current ranges are available on the PM9244: 10 A and 31.6 A. Each can be selected to give either 31.6 mV or 100 mV.

Current transformer PM9245 (fig. 5.)

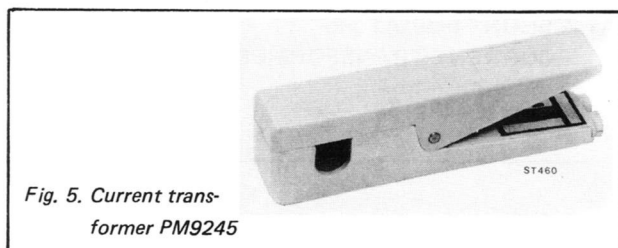


Fig. 5. Current transformer PM9245

Characteristics:

Range	: a.c. currents 10 A to 100 A
Frequency	: 45 Hz to 1 kHz
Transfer factor	: 1000 (100 A represented by 100 mA)
Function	: $A \sim_{rms}$ (all a.c. current ranges)
Ranging	: MAN ☒ or AUTO
Connections	: as shown in Fig. 6.
Facilities	: as for $A \sim_{rms}$ measurements (Sect. 5.4.6.)

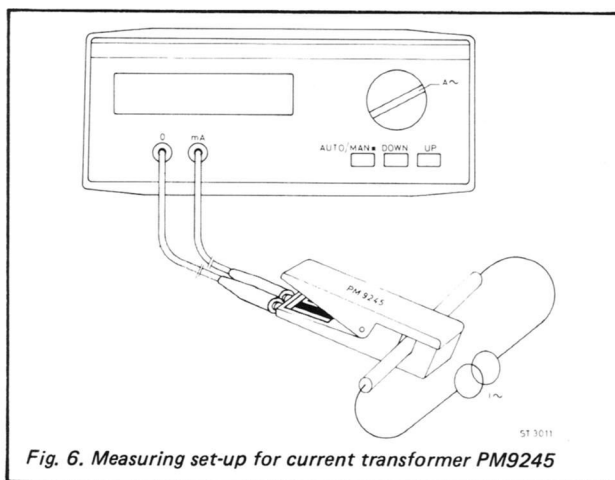


Fig. 6. Measuring set-up for current transformer PM9245

NOTE: Before measuring always connect the current transformer to the PM2519 first. Avoid contamination of the core parts.

A1.3. HF PROBE PM9210 AND ACCESSORY SET PM9212 (Fig. 7. and 8.)

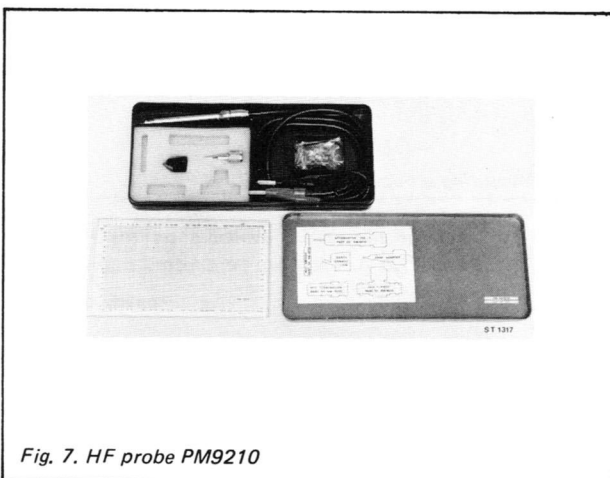


Fig. 7. HF probe PM9210

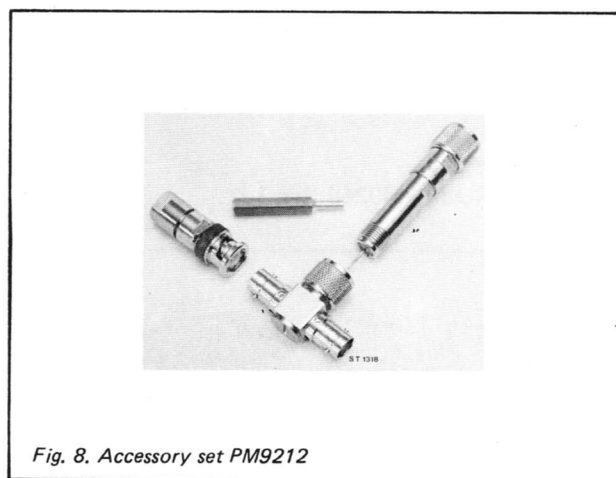


Fig. 8. Accessory set PM9212

Characteristics:

Range	: 150 mV to 15 V (standard)
Frequency	: 100 kHz to 1 GHz
Function	: $V \sim$ (all d.c. voltage and dB ranges) (except 100 mV range and mV $\sim$ function)

Range with capacitive attenuator of PM9212 : 15 V to 200 V
100 : 1 adjustable transfer ratio

T-piece : (PM9212 facility) for use when no earth point in vicinity of point to be measured. Imperative for accurate measurements over 100 MHz.

Ranging : MAN ☒ or AUTO
Calibration chart : supplied with probe for measurements in the non-linear range.

Connections : as shown in Fig. 9.
Pay attention to earthing when measuring at high frequencies. Connection between object under test and the probe should be as short as possible. The earthing of the probe should have negligible self-inductance.

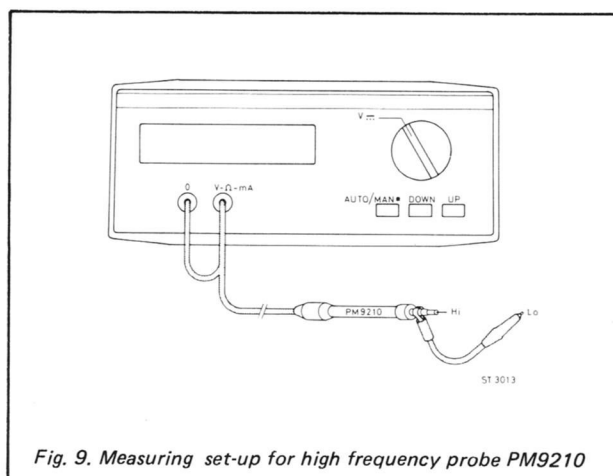


Fig. 9. Measuring set-up for high frequency probe PM9210

A1.4. DATA HOLD PROBE PM9267

The data hold probe PM9267 enables a read-out to be 'frozen' by pressing a pushbutton to 'hold' it, to be read later; a useful facility for measuring in intricate circuits where immediate reading is difficult.

The data hold probe is connected to the front-panel 0, V- Ω -mA terminals and the PROBE socket, as shown in Fig. 10.

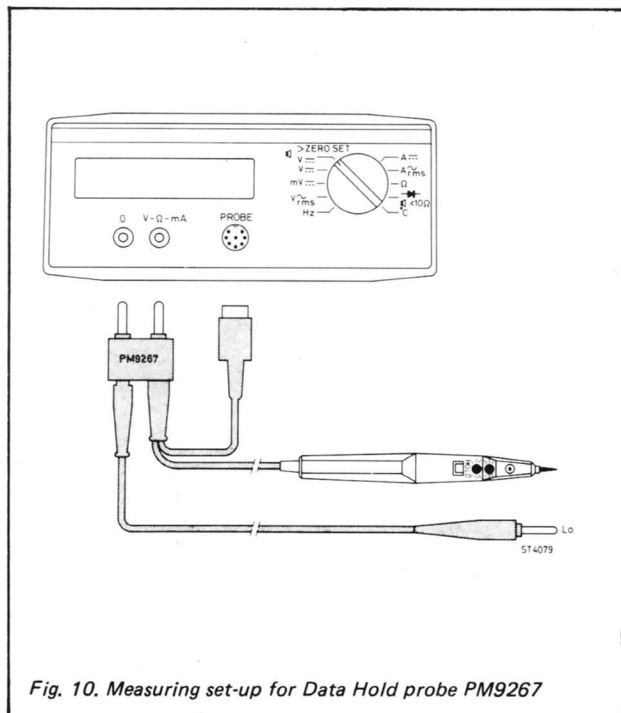


Fig. 10. Measuring set-up for Data Hold probe PM9267

NOTE: Only the data on the display when the HOLD button is pressed is held. Meanwhile the PM2519 continues measuring. On the probe a LED is lighted when the display is held. In a function with an audible tone, a LED is lighted when beeping

A1.5. CURRENT GUN PM9101 (Fig. 11.)

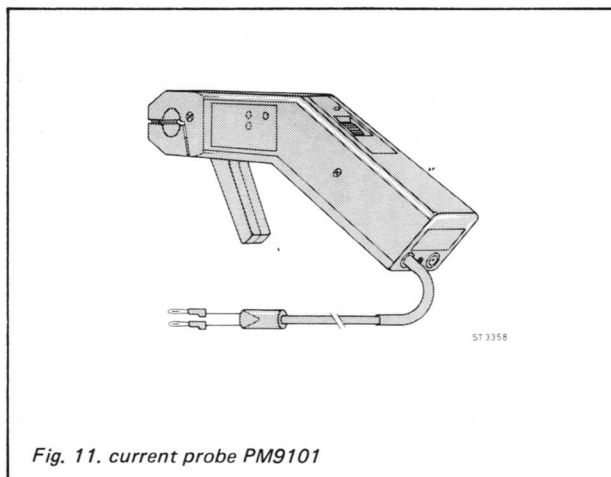


Fig. 11. current probe PM9101

Characteristics:

Range	: 100 A
Overrange capability	: 100 %
Output voltage	: 1 mV equals 1 A (100 A = 100 mV)
Function	: V $\dots$ or V $\sim_{rms}$
Ranging	: MAN ☒ or AUTO
Facilities	: as for V $\dots$ measurements (Sect. 5.5.1.) and V $\sim_{rms}$ measurements (Sect. 5.5.4.)