Specification for Digital Multimeter PM 2525/.2.

(Terms used in these specifications are based on definitions layed down in IEC 458).

General

Manufacturer

: Philips HIG I&E

Type number Designation : PM 2525/.2. : Digital Multimeter

Measured functions : Vdc, Vac, Vac+dc, Vpeak,

Adc, Aac

Ohm 2W, Ohm 4W, →, cont, F, °C,

Hz, s.

General notes:

 Specification points, marked with * apply only on the /52. and /62. versions.

2. This specification describes the overlapping specification points of the versions /02., /22., /52., /62. and /72. .

Measurement performance DC voltage measurement

(VALID 1 HOUR AFTER POWER ON)

Ranges

Resolution

1000V) :*High speed mode: 100uV in 200mV range

: 200 mV - 2000V (max.input voltage

Normal mode: 10uV in 200mV range High resolution mode: 1uV in

200mV range

Number of representations

units.

:*High speed mode:2100 Normal mode:21000 High resolution mode: 210000

Accuracy at reference speed 1+2 conditions

speed 3

Temperature coefficient

Input impedance

: ±(0.02% of reading+0.01% of range)

: ±(0.15% of reading+0.1% of range) : ±0.002% of reading/°C

2V 20 MM // 50pF : 200mV -11 MM // 80pF 20 V 200 V - 2000 V 10 Mn // 90pF

Offset current in input

Maximum SM signal

CMRR

Max. CM-voltage

Response time

: < 20 pA

: >80 dB for AC signals 50 Hz ±0.1% >60 dB for AC signals 50 Hz ±1.0%

: 2x range except 2000 V range

: >120 dB for DC signals

>120 dB for signals 50 Hz ±0.1%

: 250 V RMS

350 V peak

: 0.2 /0.8 /5 s (without ranging)

depending on speed.

: 1 /1.5 /6 s (with ranging)

depending on speed.

1000 V RMS Maximum input voltage : Hi and Lo Hi and earth 1000 V RMS Lo and earth 250 V RMS Max. V - Hz product of : 107 input signal Zeroing : automatically Zero point drift : 0 - 35°C 2uV/°C 35°- 45°C 10uV/°C dB Measurement in DC ranges Range : -77...+62.2 dB (reference resistor 600Ω) Measured values less then 0.1 mV is displayed as - UL. Measured value > 1000V is displayed as OL. 0 dB reference : 1 mV in reference resistor or when selecting the zero function with push button "zero" on/off. Reference resistor : programmable between 0.0001 Ω and 9999 € Resolution : 0.1 dB for signals > 1 mV 1.0 dB for signals < 1 mV Number of representation : 999 for signals > 1 mV units : 99 for signals < 1 mV Accuracy signals > 5 mV; (speed 1+2) : ± 0.1 dB signals > 0.5 mV; < 5mV (speed 1+2) : ± 1.0 dB signals > 5 mV; (speed 3) : ± 0.4 dB Temperature coëfficient signals > 5 mV : ± 0.02 dB/°C signals < 5 mV : ± 0.2 dB/°C Input impedance for : 0 1.8 V . 20 M // 50 pF 1.8 V.. 18 V 11 M // 80 pF 18 V .. 600 V 10 M // 90 pf signals between CMRR : > 120 dB for DC signals > 120 dB for AC_signals 50 Hz ± 0.1% Response time : 1.5 s AC voltage measurement Possible measuring modes : AC voltages excl. DC component AC voltages incl. DC component Ranges : 200 mV - 2000 mV (max. input voltage 750 V RMS) Resolution :*High speed mode: 100uV on 200 mV range. Normal mode 10 uV on 200 mV range Measured value under < 1% of range displayed as 0000

14

Number of representation units

:*High speed mode: 2100 Normal mode: 21000

Function Vac

Accuracy at reference conditions over 3% - 100% of range.

All ranges (2000V only 20 Hz ... 70Hz)

20 Hz - 40 Hz : $\pm (0.6\%$ of reading+0.2% of range)

40 Hz - 100 Hz : $\pm (0.2\%$ of reading+0.1% of range)

100 Hz - 20 kHz : $\pm (0.8\%$ of reading+0.2% of range)

20 kHz - 50 kHz : $\pm (2.5\%$ of reading+0.5% of range)

50 kHz - 100 kHz : $\pm (4.0\%$ of reading+0.5% of range)

Function Vac/dc

Accuracy at reference : same as Vac conditions : Additional for DC component: $\pm (0.2\% \text{ of reading} + 0.1\% \text{ of range})$

Temperature coëfficient : ±(0.025% of reading+0.005% of range)/°C

Input impedance : 200 mV - 2V 20 M // 50 pF 20 V 11 M // 80 pF

200 V - 2000 V 10 M // 90 pF

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CMRR : >120 dB for DC signals

> 60 dB for AC signals 50 Hz

Freq. range : 20 Hz ... 100 kHz, incl. or excl. DC component, switchable on

front.

DC voltage on Vac for no

additional error Response time

AC detector

Crest factor

Maximum input voltage

Maximum V - Hz product

: 25x range

: 1.5 s (without ranging)
3.0 s (with ranging)

: True RMS

: 2 at full scale, increasing down

scale

via 2 x full scale/ranging : Hi and Lo 750 V RMS Hi and earth 750 V RMS Lo and earth 250 V RMS

: 107

dB measurements in AC ranges Possible measuring modes : AC voltage excl. DC component AC voltage incl. DC component (Vac/dc) : - 51.7 + 59.7 dB (reference Range resistor 600 Ω) Measured value less than 2 mV is displayed as UL. 0 dB reference : 1 mW in reference resistor or when selecting the zero function with pushbutton zero "on/off". Reference resistor : Programmable between 0.0001 Ω and 9999 ₽ : 0.1 dB Resolution Number of representation units. : 999 Function Vac Accuracy at reference conditions for signals - 42.2 dB- 32.6 dB : 20 Hz ... 20 kHz ± 0.8 dB : 20 Hz ... 20 kHz ± 0.4 dB - 32.6 dB+ 48.2 dB : 20 kHz ... 100 kHz ± 1 - 32.6 dB+ 48.2 dB Function Vac/dc Accuracy at reference conditions : same as Vac additional for the DC component : ± 0.2 dB Temperature coëfficient within specified range : ± 0.02 dB/°C Input impedance for signals between .. 1.8 V 0 20 M // 50 pF 11 M // 80 pF 10 M // 90 pF 1.8 V .. 18 V >18 V .. CMRR : >120 dB for DC signals > 60 dB for AC signals 50 Hz ± 1% Freq. range : 20 Hz ... 100 kHz, incl. or excl. DC component, switchable on front. Response time : 3 s AC detector : True RMS Crest factor Maximum input voltage : Hi and Lo 750 V RMS Hi and earth 750 V RMS Logand earth 250 V RMS Maximum V - Hz product : 107 Vpeak Possible measuring modes : V peak-peak; V peak pos; Vpeak neg Ranges : 2 V ... 2000 V (max. input voltage 850 Vpeak)

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: 1 mV on 2 V range Resolution Number of representation : 2100 for Vpeak neg/pos; 4200 for units Vpeak-peak Accuracy at reference conditions : ±(1% of reading+10 digits) notes dc+ 20 Hz ... 20 kHz 20 kHz ... 100 kHz : ±(5% of reading+10 digits) 1+2 Temperature coëfficient : ± 0.15% of reading /°C 20 M // : 2 V 50 pF Input impedance 11 M // 20 V 80 pF 200 V,2000V 10 M // 90 pf : 500 msec Measuring time DC voltage on Vpeak-peak for no additional error : 25 x range : 1 s (without ranging) Response time p+; p-2.5 s (with ranging) : 1.5 s (without ranging) p-p s (with ranging) 600 V AC or DC Max.input voltage : Hi and Lo 850 Vpeak Hi and earth 600 V AC or DC Lo_and earth 250 V AC or DC : 107 Max. V-Hz product : >120 dB for DC signals CMRR > 60 dB for AC signals 50 Hz Note 1 : Freq. range DC + 20 Hz ... 60 Hz 2000 V range Note 2 max dV/dt 2 V range V/us : 20 V/us 20 V range : 200 V/us 200 V range : 0.5 V/us 2000 V range DC current measurement : 1 µA 10A Ranges :*High speed mode 1 nA on 1 uA Resolution range Normal mode 0.1 nA on 1 uA range Number of :*High speed mode: 1100 representation units Normal mode: 11000 Accuracy : ±(0.1% of reading + 0.05% of speed 2 range) : ±(0.2% of reading + 0.2% of speed 3 range) : ±(0.01% of reading + 0.005% of Temperature coëfficient range) / ºC Voltage drop at end of : ranges 1 µA, 10 µA < 2.5 mV range ranges 100 µA, 10 mA, 1 A < 40 mV ranges 1 mA, 100 mA, 10 A < 400 mV

Response time : 0.8 s (without ranging) 2.5 s (with ranging) : 250 V RMS ranges 1 uA - 100 mA Protected up to Ranges 1 A ... 10 A not protected : 250 V RMS, 350 V peak Max. CM voltage Max. input - voltage : Hi and Lo 250 V RMS Hi and earth 250 V RMS Lo and earth 250 V RMS AC current measurements Ranges : 1 uA....10 A Resolution : *High speed mode: 1 nA on 1 uA range Normal mode: 0.1 nA on 1 uA range measured value under 2% of range is displayed as 0000 Number of representation :*High speed mode: 1100 units Normal mode: 11000 Accuracy (valid between 5% and 100% of range) Range 1 uA - 100 mA 20 Hz - 40 Hz : ±(0.6% of reading+0.2% of range) 40 Hz - 200 Hz : ±(0.4% of reading+0.15% of range) 200 Hz - 500 Hz : ±(0.6% of reading+0.2% of range) Range 1 A - 10 A 20 Hz - 40 Hz : ±(0.6% of reading+0.2% of range) 40 Hz - 200 Hz 1 : ±(0.4% of reading+0.15% of range) 200 Hz - 500 Hz : ±(3.0% of reading+1.0% of range) Temperature coëfficiënt : ±(0.04% of reading+0.015% of range)/°C Freq. range : 20 Hz ... 500 Hz : ranges 1 uA ... 1 mA < Voltage drop ranges 10 mA and 1 A < 40 mV ranges 100 mA and 10 A < 400 mV : RMS convertor, AC coupled AC detector Crest factor : 4 at full scale Responce time : 1.5 s (without ranging) 3 s (with ranging) Protected up to : 250 V RMS ranges 1 uA...100 mA Ranges 1 A... 10 A not protected Max. CM Voltage : 250 V RMS, 350 V peak Max. input voltage : Hi and Lo 250 V RMS Hi and earth 250 V RMS Lo and earth 250 V RMS Resistance measurement Possible measuring modes : two-wire configuration via Ω - 0 terminals. four-wire configuration via PROBE terminal selectable with switch on front

: 200 Ω200 MΩ Ranges two-wire : 200 Ω Ranges four-wire Maximum lead resistance on four wire configuration : 2 1 :*High speed mode: 100 mΩ on 200 Ω Resolution Normal mode: 10 m Ω on 200 Ω range Number of representation units 200 Ω ... 20 ΜΩ :*High speed mode: 2100 Normal mode: 21000 :*High speed mode: 210 200 MM Normal mode: 2100 Accuracy 200 Ω - 200 kΩ; speed 2 : ±(0.1% of reading+0.05% of range) 200 Ω - 200 kΩ; speed 3 : ±(0.15% of reading+0.15% of range) : ±(0.5% of reading+0.05% of range) $M\Omega$ - 20 $M\Omega$; speed 2 $M\Omega$ - 20 $M\Omega$; speed 3 : ±(0.5% of reading+0.15% of range) : ± (3% of reading+ 1% of range) 200 MΩ Temperature coëfficiënt : ±(0.01% of reading+0.005% of 200 Ω - 200 kΩ range)/°C : ±(0.05% of reading+0.01% of 2 MΩ - 20 MΩ range)/°C 200 MΩ : ±(0.5% of reading+0.1% of range)/°C : 1 mA, 1 mA, 100 uA, 10 uA, 1 uA, Measuring current 100 nA, 10nA at the separate ranges Maximum volt at open input : 4 V Polarity of input socket at two-wire : - on Hi + on Lo Response time 200 Ω - 200 kΩ : 0.8 s (without ranging) 2.5 s (with ranging) 2 MM - 20 MM : 2 s (without ranging) 3.5 s (with ranging) 200 MΩ s (without ranging) 10 s (with ranging) : 250 V RMS Protected up to Maximum input voltage : Hi and Lo 250 V RMS Hi and earth 250 V RMS Lo and earth 250 V RMS Diode measurements

Driving current : 1 mA
Range : 2000.0 mV
Resolution : 0.1 mV
Number of representation
units : 20000
Polarity input sockets : - on Hi
+ on Lo

: 0.8 s Response time : Hi and Lo 250 V RMS Maximum input voltage Hi and earth 250 V RMS Lo and earth 250 V RMS Continuity Driving current : 1 mA Short circuit : Audible tone from 0 ... 10 Ω : Resistance > 10 Ω , no tone Isolation : < 0.15 sec. Response time Capacity measurement : 20 nF ... 2000 uF Ranges Resolution :*High speed mode: 10 pF in 20 nF range Normal mode: 1 pF in 20 nF range Number of representation :*High speed mode: 2100 units Normal mode: 21000 (20 nF .. 200 uF range) 2100 (2000 uF range) Accuracy 20 nF .. 200 uF range : ±(1% of reading+0.1% of range) : ±(10% of reading+0.1% of range) 2000 uF range Temperature coëfficiënt: : ±(0.1% of reading+0.01% of 20 nF .. 200 uF range range)/°C 2000 uF of range : ±(1 % of reading+0.1% of range)/°C : 100 nA, 1 uA, 10 uA, 100uA, 1mA Measuring current at the separate ranges : 2.5 V Maximum voltage at input : - on Hi Polarity input socket + on Lo Responce time : 1 s (without ranging) 1.5 s (with ranging) : 250 V RMS Protected up to : Hi and Lo 250 V RMS Maximum input voltage Hi and earth 250 V RMS Lo and earth 250 V RMS Temperature measurements For temperature measurements : Pt 100 probe additional needed : - 100°C ...+ 850°C Range : * Normal mode: 1 °C Resolution High resolution mode: 0.1°C Number of representation Normal mode: 850 units High resolution mode: 8500 Accuracy(excl. probe) : ±(0.3% of reading+0.3°C) : ±(0.03% of reading+0.03°C)/°C Temperature coëfficient

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V			
Measuring current	: 1 mA : 0.5 s (excl. probe)		
Response time Linearisation	: probe characteristics is		
binear isacion	linearised within limits stated		
	in DIN 43760		
Max. voltage at probe tip	: depending on probe		
	7 1		
Frequency measurements			
Ranges	: 10 kHz20 MHz		
Resolution	: Normal mode 1 Hz in 10 kHz range		
•	High resolution mode 0.1 Hz in		
Number of representation	10 kHz range		
units 10 kHz 10 MHz	: Normal mode: 10000		
diffes to kine to kine	High resolution mode: 100000		
20 MHz	: Normal mode: 2000		
	Wigh wagalution made, 20000		
Accuracy	: ±(0.01% of reading+2 digits		
	Tange)		
Temperature coëfficient	: ± 0.001% of reading /°C		
Response time			
range 100 kHz 20 MHz	: Normal mode: 0.3 s (without		
	ranging) 0.5 s (with		
	0.5 s (with ranging)		
	High resolution: 2.5 s (without ranging)		
	3.0 s (with		
	ranging) : Normal mode: 1.5 s (without		
range 10 kHz	part garden		
	ranging)		
	2.0 3 (WICH		
	High resolution 13 0 s (with		
	manaina)		
Impedance	: 10 M // 50 pF		
Coupling	. 20		
For voltage > 5 V max.	: AC		
V-Hz product	: 10'		
Maximum input voltage	: Hi and Lo 250 V RMS Hi and earth 250 V RMS		
	Hi and earth 250 V RMS		
	Lo and earth 250 V RMS		
Sensitivity	: 10 Hz 100 Hz : 1 V peak		
	100 Hz 10 MHz : 250 mV peak		
	10 MHz 20 MHz : 500 mV peak		
	·		
Time measurements	inc.		
_	: 1 10 ⁵ seconds		
Range	· · · · · · · · · · · · · · · · · · ·		
Resolution Number of representation	: 10 us in 1 second range		
units	: 99999		
Accuracy for timer	. 33333		
measurements	: 0.01% of reading		
Temperature coefficient	: + 0.001% of reading /°C		

: 0.01% of reading : ± 0.001% of reading /°C

Temperature coefficient

	Hold of time Start
· 15.	Stop
age *	Reset
	Trigger level Result representation
·	

- : 30 us
- : By positive or negative slope passing the trigger level. Selectable by push button "s".
- : By positive and negative slope passing the trigger level. Selectable by push button "s".
- : By pushbutton on date hold probe if connected or stop pulse, if no data hold probe is connected.
- : < 1 V
- : Old measurement are displayed at least 500 ms. Display is updated at the "stop-condition" moment.10 seconds after a "start-condition" the display starts counting the time in seconds untill the "stop condition". If measuring time > 10 seconds, the beeper will be activated by the "stop condition" for a moment. A moving baragraph indicates a measurement in progress.

External triggering (/52. and /62. version only)
Response time (single trigger, without ranging):

Function	HSM(speed 3)	NM(speed 2)	HRM(speed 1)
Vdc	0.1	0.4	4
Vac	0.25	0.55	_
Vp+, Vp-	-	0.5	_
Vpp	-	1.0	-
Adc	0.1	0.4	-
Aac	0.25	0.55	_
Ω	0.1	0.4	_
Temp	-	0.5	4.5
Freq	-	0.3	1.2 (100 kHz-20 MHz range)
Freq	_	1.5	11 (10 kHz range)
Cont	0.1	-	-
Diode	0.1	0.5	-
Cap	0.2	0.5	_

Calculate functions

- Relative reference setting via push button "zero".
 Measured value is default reference value (Can be altered manually)
- b. Min/max. Highest and lowest measured values are stored and can be displayed afterwards.
- Display = 20 log \underline{X} X = measured value R R = reference value is function Vdc, Vac, Vac + Vdc

Conversion characteristics

Kind of conversion Operating principle Basic mode of operating Range setting

: lineair : Delta modulation

: repetitive triggered

: Manual - with UP and DOWN pushbutton Automatic - Uprangine at 100% of scale

2000/10.000/20.000/100.000/ 200.000 Down ranging at 9.5% of scale 190/900/1900/9000/19000

: Automatic setting on Vdc, Adc, Vpeak, °C, dB, relative reference

Display Visual representation

Polarity setting

Number of digits

Number of representation

units

Means of representation of output value

Means of polarity repre-

Means of measuring mode representation

sentation

: 5½, 4½, 4, 3½ depending of

function and range

depending of 2100 function and 11000 21000 range 210000

: liquid crystal display

Reflective Additional analog representation function by means of bargraph in LCD

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: Automatic indication of + or - or blanked according to measuring function

: High speed mode SPEED 3 Normal mode SPEED 2 High resolution mode SPEED 1

Note: SPEED 3 available on Vdc and on versions /52. and /62. for Vdc, Vac, O, Cap, Adc, and Aac functions. SPEED 2 for temperature function available only on /52. and /62. versions.

Means of decimal point representation

Means of functional representation

Means of overload representation Means of representation of exceeding crest factor Data hold Range hold

: Automatic indication, depending on range

: selected function is indicated in

: display indicates "OL"

: t in display

: By using data hold probe PM 9267 : possible via Auto/Man switch

Operating conditions (according to IEC 359)

a. Climatic conditions

: Group I with extension of the temperature limits

Temperature:

Reference temperature
Rated range of use
Adjustment temp. range
Limit range of
operation
Limit range of storage
and transport

: + 23 °C .. ± 5 °C : 0 °C ...+40 °C

: + 21 °C ...+25 °C (factory only)

: 0 °C ...+55 °C

: - 40 °C ...+70 °C

<u>Humidity</u>

Reference rel.hum. Limit range of storage and transport Max. dew point : 20 ...80% excluding condensation

: 5 - 95% RH : 26 °C

b. Mechanical conditions

: according UN-D 1639/03
class: portable equipment
subclass I

c. EMC Emmision

: CISPR publ. 11 and 14 VDE 871-B, VDE 875-K according Vfg. 1046/84

Line supply conditions

Group Reference value Rated range of use : S2

: 230 V ± 1%

: 230 V + 12% - 15%

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: Instruments can be altered for nominal mains voltage of 115 V

Mains supply frequency

Reference value Rated range of use : 50 Hz ± 1%

: 50 Hz ± 5%

Note 1

. 50 112 2 50

Note 2

: Instruments can be altered for nominal frequency of 60 Hz

: Mains frequency can influence Series Mode Rejection; see specification SMR to meet same spec. for 60 Hz as for 50 Hz signals, the settings of the PM 2525 must be altered in the check function.

Mains supply interruptions

Interruption < 30 ms : no influence

> 30 < 500 ms : instrument may either restart or

continue

> 500 ms : instrument will restart,

conditions equals situation after

switching on power.

Power consumption : 12 VA

Calibration

Recalibration interval : 1 year

Accessories

Supplied with instrument : Measuring leads PM9266

(incl.probes)
Main supply cable

Spare fuse

Operation manual

Optional available

Specific accessoires for

PM 2525

: 4 wire Ω cable 5322 321 20506

4 wire Ω cable PM 9264/01

Universal accessoires : High frequency probe PM 9210 Shunt PM 9244

Current transformer PM 9245 EHT probe PM 9246 113

123

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Temp.probe (PT100) PM 9249/01 Data hold probe PM 9267/01 Current gun PM 9101

Current gun PM 9101 Current probe PM 9102 HF probe PM 9213

Measuring leads PM 9260
Measuring leads PM 9266
Thermo couplerlinearizer PM 9877/J

Thermo couplerlinearizer PM 9877/K

19 inch rackmount PM 2193

Miscellaneous

Dimensions : (LxBxH) 287 x 210 x 86 (excl feet)

287 x 210 x 106(incl.feet)

Weight : 2.5 kg

3.5 kg /22., /52., /62. and /72.

version

Cabinet : BAYBLEND KL1441

/52., /62. and /72. version: steel

plate

Safety

back

Class 2, according IEC 348