



DATASHEET

Issue 1.0



Multifunction Meters

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Digital Panel Meters

Current Transformers

Analogue Panel Meters

Shunts

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GAMMA 20 DIGITAL MULTIMETER

Gamma 20 multimeter is 5 ³/₄ digital high performance precision instruments for laboratory use, as well as for service and training. With a display range of 300,000 digits, as well as outstanding accuracy and long-term stability, the fulfill all requirements for use.

Features

- Convenient triple display
- High resolution and precision
- RMS value with distorted waveshape
- Overload protection
- Automatic blocking sockets (ABS)

SUBJECT TO CHANGE WITHOUT NOTICE

This manual superseded all previous versions – please keep for future reference



Application

Gamma 20 multimeter is 5^{3/4} digit high performance precision instruments for laboratory use, as well as for service and training. With a display range of 300,000 digits, as well as outstanding accuracy and long-term stability, they fulfill all requirements for use.

Product Features

Convenient Triple Display	Simultaneous measurement of voltage and frequency or voltage and min, max values is possible. Also current and frequency or the current measurement and minimum and maximum values are displayed simultaneously. The usual switching back and forth between display values is no longer necessary. Main display resolution for AC is 4 ^{3/4} places and for DC it is 5 ^{3/4} places	Overload Protection	The instrument is safeguarded for up to 1000V in all measuring functions by overload protection. An acoustic signal is generated if the upper voltage or current range limit is exceeded. FUSE appears at the display if the fuse for the current
High Resolution & Precision	5 ^{3/4} places (309,999 digits) for DC measured quantities and 4 ^{3/4} places (30,999 digits) for AC measured quantities allow for precision reference measurements and use as a calibration standard for testing devices and assemblies.	Measuring Category	1000V CAT III/600V CAT IV as per IEC Standard 61010-1.
RMS Value with Distorted Waveshape	The utilized measuring method allows for waveshape independent RMS measurement (TRMS AC)	Automatic Blocking Sockets (ABS)	Automatic blocking sockets prevent incorrect connection of measurement cables and inadvertent selection of the wrong measured quantity. This significantly reduces danger to the user, the instrument and the system under test, and in many cases eliminates it entirely.
Additional Functions	Resistance (Ω), Temperature (°C), Continuity, Diode, Capacitance, Frequency, Duty cycle	Backlit Display	The instrument is provided with user selectable Back-lit for taking measurements in poor lighting conditions / dark areas.

Technical Specifications

Reference conditions for Accuracy	
Reference temperature	23°C ± 2K
Relative Humidity	45%...55% RH
Waveform of measured quantity	Sinusoidal
Input frequency	50 or 60 Hz ±2%
Battery Voltage	8 V ± 0.1 V
Safety	
Pollution degree	2
Installation category	III IV
Operating voltage	1000V 600V
High Voltage Test	6.7 kV (IEC 61010-1-2001)
Fuses	
For ranges up to 300 mA	FF 1.6A /1000V/6.3mm x 32 mm. Rating 20 KA with 1000 V~ and ohmic load. In conjunction with diodes protects all current measuring ranges up to 300 mA.
For the range 10A	16 A /1000V /10 mm X 38 mm, protects 10 A range up to 1000 V.

Applicable Regulations and Standards	
IEC 1010-1/EN61010-1	Safety regulations for electrical measurement, Control, regulating and laboratory devices
IEC 61326:2002 Class B	Electrical equipment for control technology and laboratory use - EMC requirements
IEC 61000-4-2	8kV atmosphere discharge. 4kV contact discharge
IEC 6100-4-3	3VT/m
DIN EN 60259	Test equipment & test procedures
DIN VDE 0470 part 1	-Degrees of protection provided by enclosures (IP Code).
Applicable Standards	
EMC	IEC 61326: Class B
Immunity	IEC 61000-4-2 8 KV atmosphere discharge, 4 KV contact discharge IEC 61000-4-3: 3 V/m
IP for water & dust	IEC 60529 : IP 50 for Housing

Technical Specifications

Battery	
Battery Voltage	9V flat cell battery
Battery type	Manganese Dioxide cell as per IEC 6 F22 or alkaline manganese cell according to IEC 6 LR61 suitable NiCd storage battery.
Battery Life	Minimum 300 hours on Vdc, Adc, 150 hours on Vac, Aac. Without Backlit

Environmental	
Operating temperature	-10 to +50°C
Storage temperature	-25 to +70°C
Relative humidity	<75% non condensing.
Altitude	Up to 2000 m
Mechanical Configuration	
Protection type	IP 50, for the connection sockets IP 20.
Dimensions	84 mm X 195 mm X 35mm
Weight	350 gm approx, including battery.

Meas. function	Meas. range	Resolution at Meas. Range Upper Limit		Input impedance		Inherent deviation at highest resolution under reference condition		Overload value	Capacity ⁴⁾ Overload duration	Meas. function
				DC	AC	DC Accuracy ±(.% of rdg + .. %rng +...Digit)	AC Accuracy ⁹⁾ ±(.% of rdg + ...Digit)			
1	2	300000⁴⁾	30000⁴⁾	DC	AC	DC Accuracy ±(.% of rdg + .. %rng +...Digit)	AC Accuracy⁹⁾ ±(.% of rdg + ...Digit)	Overload value	Overload duration	
V	3.0V	100 μV	100 μV	11 MΩ	5 MΩ // < 50pF	0.02+0.008+20	0.2+30	DC AC RMS Sine 1000V	Cont.	V
	30.0V	1 mV	1 mV	10 MΩ	5 MΩ // < 50pF	0.02+0.008+20	0.2+30			
	300V	10mV	10 mV	10 MΩ	5 MΩ // < 50pF	0.02+0.008+	20 0.2+30			
	1000V	100 mV	100 mV	10 MΩ	5 MΩ // < 50pF	0.02+0.008+20	0.2+30			
	300mV	10 μV	10 μV	>20MΩ	5 MΩ // < 50pF	0.02+0.015+30 6)	0.5+30			
				Voltage drop. approx. for upperrange limit B		DC Accuracy ±(.% of rdg + .. %rng +...Digit)	AC Accuracy⁹⁾ ±(.% of rdg + ...Digit)			
A	300μA	10nA	10nA	300mV	300mV	0.05+0.02+20	0.5+30	0.36A	Cont.	A
	3 mA	100nA	100nA	300mV	300mV	0.02+0.01+20	0.5+30			
	30mA	1nA	1 μA	300mV	300mV	0.02+0.01+20	0.5+30			
	300mA	10 μA	10 μA	300mV	300mV	0.1+0.01+20	0.5+30			
	10A	1mA	1mA	400mV	400mV	0.2+0.05+30	0.5+30			
				Open-circuit voltage		±(.% of rdg + .. %rng +...Digit)				
Ω	300Ω	10mΩ		1.3V	--	0.05+0.015+20 6)		1000V DC AC RMS Sine	10 Sec	Ω
	3.0 kΩ	100mΩ		0.5V	--	0.05+0.015+20				
	30 kΩ	1Ω		0.5V	--	0.05+0.015+20				
	300 kΩ	10Ω		0.5V	--	0.05+0.025+20				
	3.0 MΩ	100Ω		0.5V	--	0.1+0.025+20				
	30 MΩ	1kΩ		0.3V	--	1+0.25+20				
Ⓜ)	300 Ω	0.1 Ω		max. 1.3V	--	1.2+0+10				Ⓜ)
✱	2.0 V	100μV		max. 2.5 V		0.2+0+10				✱
				Discharge resistor	U₀ max.	±(.% of rdg +... %rng)				
F	3.0 nF	1 pF		10 MΩ	3 V	2.5+0.2 6)		1000V DC AC RMS Sine		F
	30 nF	10pF		10 MΩ	3 V	1.2+0.2				
	300nF	100pF		1 MΩ	3 V	1.2+0.2				
	3.0μF	1 nF		100 kΩ	3 V	1.2+0.2				
	30μF	10nF		11 kΩ	3 V	1.2+0.2 10 Sec				
	300μF	100nF		2 kΩ	3 V	3.2+1				
	3000μF	1 μF		2 kΩ	3 V	3.2+1				
	30000μF	10 μF		2 kΩ	3 V	3.2+1				
				f min 3)		±(.% of rdg. +...Digit)				

Technical Specifications

Meas. function	Meas. range	Resolution at Meas. Range Upper Limit	Input impedance	Inherent deviation at highest resolution under reference condition	Overload	Capacity ⁴⁾	Meas. function
Hz	300.00Hz	0.01Hz	10 Hz	0.1+3 ⁷⁾	< 3 KHz 1000V < 30 KHz 300V < 100 Khz 30V	Cont.	Hz
	3.0000kHz	0.1Hz	100 Hz	0.1+3 ⁷⁾			
	30.0000kHz	1Hz	100Hz	0.1+3 ⁷⁾			
	300.000kHz	10Hz	1kHz	0.05+10 ⁷⁾			
⊗	100 min 2)	10 ms		±20Digit	1000V		⊗
				±(.% of rdg. +...Digit)			
°C	Pt100	-200.0... +100.0 °C	0.1 °C	1Kelvin +3 ⁸⁾	1000V DC AC RMS Sine	10 Sec	°C
		+100.0... +850.0 °C		1% + 3 ⁸⁾			
	Pt1000	-100.0... +100.0 °C		1 Kelvin + 3 ⁸⁾			
		+100.0... +850.0 °C		1% + 3 ⁸⁾			

1) Display : 5 ¼ places for DC , 4 ¾ places for AC

2) Stopwatch : Format : mm : ss : hh

 Where m = minute, s = second and h = hundredth second,
 max. : 99 : 59 : 59

 3) Lowest measurable frequency with sinusoidal measurement
 signal symmetric to zero point.

4) at 0 4 °C

5) 12A – 5min, 16A – 30 s

6) With zero adjuster; Without zero adjuster.

7) Vac > 1Veff/rms


8) Without sensor

9) Values less than 150 counts are suppressed.

Response time (After manual range selection)

Measured Quantity/Measured range	Response time	Transient response for step function of the measured quantity
VDC,VAC,A AC+DC,A AC	1.5 s	From 0 to 80 % of upper range limit.
30Ω...3 MΩ	2 s	From ∞ to 50 % of upper range limit.
30 MΩ	5 s	
→+	1.5s	
°C	3 s	From 0 to 50 % of upper range limit.
3.0nF,300μF,	Max. 1... 3 s	
3000 μF	Max. 7 s	
30000 μF	Max. 14 s	
300 Hz,3KHz	Max 2 s	
30 KHz,300 KHz	Max 0.7 s	

Influence Quantities & Influence Errors:

Influence Quantity	Range of Influence	Measured Quantity / Measuring Range	Variation 1) ± (...% of rdg. +...digits)
Temperature	-10 °C +21 °C and +25 °C...+40°C	VDC	0.05+3
		V ~	0.2+3
		300µA ... 300mA DC	0.2+3
		300µA ... 300mA AC	0.3+3
		10 A AC, 10 A DC	0.5+3
		300 Ω ²⁾	0.1+5
		3 KΩ – 3 MΩ	0.1+3
		30 MΩ	0.6+3
		30 nF ²⁾ – 30 µF	0.5+3
		30 µF-30mF	2.0+3
		Hz	0.1+3
		-200...+200 °C	0.5 Kelvin+2 Digits
+200...+850°C	0.5+2		
Frequency of the measured quantity	25 Hz...< 45 Hz	300 mV ~	1.0+20
	> 65 Hz... 200 Hz		1.0+20
	25 Hz...< 45 Hz	3...300V ~	1.0+20
	> 65 Hz... 400 Hz		0.5+20
	>400 Hz...1 <KHz		0.5+20
	>1 KHz ...20 KHz		0.5+20
	25 Hz...< 30 Hz	1000V ~	1.0+20
	> 30 Hz... 45 Hz		0.5+20
	>65 Hz...1 <KHz		2.0+20
25Hz ...< 45 Hz		1.0+20	
>65 Hz... 1 kHz	A~	1.0+20	
Wave form of the measured quantity3)	Crest factor CF	1...3	± 1 % of rdg
		3...5	± 3 % of rdg
Battery Voltage	 5) ...< 7.5 V > 8.1 V ...10.0 V	V DC	±15 Digit
		V~	±30 Digit
		ADC	±20 Digit
		A AC	±40 Digit
		30Ω / 300 Ω/°C	±40 Digit
		3 kΩ – 30MΩ	±40 Digit
		Capacitance	±50 Digit
Hz	±10 Digit		
Relative humidity	75% 3Days Meter off		±1 Digit
DATA	-		± 1 digits
MIN/MAX	-	V ac/dc , A ac/dc	± 2 digits

Influence Quantity	Range of Influence	Measuring Ranges	Attenuation
Common Mode interference Voltage	Noise quantity max. 1000 V	V dc	> 120 dB
	Noise quantity max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	300 mV~ ... 30V~	> 80 dB
		300 V~ 1000 V~	> 70 dB > 60 dB
Normal Mode interference voltage	Noise quantity V ~ Value of the measuring range at a time Max. 1000V~ ,50Hz, 60Hz Sinusoidal	V dc	> 50dB
	Noise quantity max. 1000 V-	V~	>110dB

Ordering Information

GM20 - 9NB4000000000	GAMMA 20	Gamma 20 TRMS Backlit
GM20 - 9FB4000000000		Gamma 20 Fine Tip TRMS Backlit

Contact



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