

3 GHz Programmable Counter HM8123

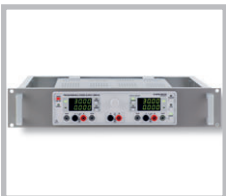
HM8123



HZ33, HZ34
Test cable BNC/BNC



HZ42 19" Rackmount kit 2 RU



HZ20 Connector
BNC to 4 mm socket



Measurement range from 0 Hz to 3 GHz

2 measurement inputs DC to 200 MHz,
1 measurement input 100 MHz to 3 GHz

Input A/B: Input impedance 1 MΩ/50 Ω (switchable),
maximum sensitivity 25 mV_{rms}

Input C: Input impedance 50 Ω, maximum sensitivity 30 mV_{rms}

400 MHz time base with 0.5 ppm stability

9-digit resolution at 1 sec. gate time

9 measurement functions, external gate and arming

Input for external time base (10 MHz)

Display modes: numeric, histograms or trend plots

Optional: OCXO (temperature stability: $\pm 0.5 \times 10^{-8}$)

Standard: TCXO (temperature stability: $\pm 1 \times 10^{-6}$)

Intuitive one-pushbutton operation each function directly
addressable

RS-232 Interface, optional: USB, IEEE-488

3 GHz Programmable Counter HM8123

Valid at 23 °C after a 30 minute warm-up period

Input characteristics (Input A and B)

Connection:	BNC socket	
Frequency range:		
0 – 200 MHz	(DC-coupled)	
10 Hz – 200 MHz	(1 MΩ, AC-coupled)	
500 kHz – 200 MHz	(50 Ω, AC-coupled)	
Input impedance:	1 MΩ 30 pF or 50 Ω (switchable)	
Attenuation:	1:1, 1:10, 1:100 (selectable)	
Sensitivity: (normal triggering)		
0 to 80 MHz	25 mV _{rms} (sine wave), 80 mV _{pp} (pulse)	
80 MHz to 200 MHz	65 mV _{rms} (sine wave)	
20 Hz to 80 MHz	50 mV _{rms} (sine wave, auto trigger)	
Trigger (programmable via encoder or software)		
Attenuation:	Trigger level:	Resolution:
1:1	0 to ± 2 V	1 mV
1:10	0 to ± 20 V	10 mV
1:100	0 to ± 200 V	100 mV
Max. input voltage:		
Input 1 MΩ:	250 V [DC + AC _{peak}] from 0 to 440 V decreasing to 8 V _{rms} at 1 MHz	
Input 50 Ω:	5 V _{rms}	
Minimum pulse duration:	<5 ns for single pulse	
Input noise:	(typ.) 100 μV	
Auto trigger (AC coupling):	trigger point: 50% of peak-to-peak value	
Trigger slope:	positive or negative	
Filter:	100 kHz low-pass filter (switchable)	

Input characteristics (Input C)

Connection:	SMA socket	
Frequency range:	100 MHz – 3 GHz	
Input sensitivity:		
up to 1 GHz:	30 mV _{rms} (typ. 20 mV _{rms})	
1 GHz–3 GHz:	100 mV _{rms} (typ. 80 mV _{rms})	
Input impedance:	50 Ω nominal	
Max. input voltage:	5 V [DC + AC _{peak}]	

Input characteristics

	External Reset	Reference	Gate/Arming
Input impedance:	5 kΩ	500 Ω	5 kΩ
Max. input voltage:	± 30 V	± 20 V	± 30 V
Input sensitivity:	-	typ. 2V _{pp}	-
High level:	> 2 V	-	> 2 V
Low level:	< 0.5 V	-	< 0.5 V
Min. pulse duration:	200 ns	-	50 ns
Input frequency:	-	10 MHz	-
Min. eff. gate time:	-	-	20 μs

Measurement functions

Frequency A/B/C; period duration A; width A; duty cycle A; totalize A; RPM A; frequency ratio A:B; time interval A:B; time interval A:B (average); phase A to B; Duty cycle A; burst measurements

Frequency measurement (Inputs A, B, C)

Frequency range:	0 to 200 MHz (3 GHz)
LSD:	(1.25 x 10 ⁻⁸ s x frequency) / measurement time
Resolution:	± 1 or 2 LSD
Accuracy:	± (resolution / frequency ± time inaccuracy ± trigger error ²¹ / measurement time)

Period duration measurement

Range:	10000 sec. to 5 ns
LSD:	(1.25 x 10 ⁻⁸ s x period) / measurement time
Resolution:	1 or 2 LSD
Accuracy:	± resolution / period ± (trigger error ²¹ B / measurement time)

Totalization A

	(manual control)	(external control)
Range:	0 – 200 MHz	0 – 200 MHz
Min. pulse duration:	10 ns	10 ns
LSD:	1 count	± 1 count
Resolution:	LSD	LSD
Accuracy:	(resolution ± ext. gate time error x frequency A)/total	

Pulse resolution:	10 ns	10 ns
Ext. gate error:	-	100 ns

Time interval / Average time interval

(Input A = start; input B = stop)

LSD:	10 ns (10 ns to 1 ps in "average" mode)	
Resolution:	1 LSD (1 or 2 in "average" mode)	
Accuracy:	± (resolution + trigger error ²¹ + system error) / time interval ± time basis uncertainty (system error: ≤ 4 ns)	
Number of average:	N = 1-25	LSD = 10 ns
	N = 26-2500	LSD = 1 ns
	N = 2501-250000	LSD = 100 ps
	N = 250001 – 25000000	LSD = 10 ps
	N = > 25000000	LSD = 1 ps

RPM measurement

NPR²¹ presetting:	1 – 65535 pulses per revolution
Gate time:	330 ms fixed
LSD:	7.5 x 10 ⁻⁸ revolution speed
Resolution:	1 or 2 LSD
Accuracy:	± (trigger error ²¹ / 0.33) ± time basis error

Offset

Range:	Covers the entire measurement range
Resolution:	Same resolution as in normal measurement. If the gate time is changed in the offset mode, the offset resolution is the reference value resolution or the current reading resolution (whichever is less precise).

Gate time

Range:	1 ms – 65 sec.
Resolution:	1 ms
External gate time:	min. 20 μs

Time base

Frequency:	400 MHz clock rate; 10 MHz crystal
Temperature stability	TCXO (standard): ± 0,5 x 10 ⁻⁶
(0 to 50 °C):	OCXO (type HM8123X): ± 1 x 10 ⁻⁸
Ageing:	< 0.27 ppm per month, 0.05 ppm per day
External Reference:	10 MHz ± 20 ppm

Miscellaneous

Interface:	RS-232 (serial), IEEE-488, USB (optional)
Safety class:	Safety Class I [EN61010-1]
Display:	LCD display (83 x 21 mm)
Power supply:	115/230 V ± 10 %, 45–60 Hz
Power consumption:	approx. 20 Watt
Operating temperature:	+10 °C to +40 °C
Max. relative humidity:	10%–90% (without condensation), 5%–95% RH
Dimensions (W x H x D):	285 x 75 x 365 mm
Weight:	approx. 4 kg

²¹ NPR=number of pulses per revolution

²² Trigger error= ± noise input (V_{pp}) / slew rate of the input signal

Accessories supplied: Operator's Manual and power cable

Optional accessories:

HZ42 19" Rackmount kit 2RU
 HZ33/34 Test cable 50 Ω (BNC-BNC)
 HZ24 Attenuators 50 Ω
 HZ20 Adapter plug
 HO870 USB Interface
 HO880 IEEE-488 (GPIB) Interface
 OCXO (Installation only ex factory, Type HM8123X)

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