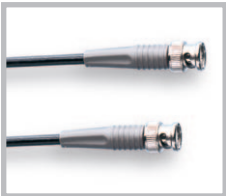


## 3 GHz Programmable Counter HM8123



HZ33, HZ34  
Test cable BNC/BNC



HZ42 19" Rackmount kit 2RU



HZ20 Connector  
BNC to 4 mm socket



Frequency range from 0 Hz to 3 GHz

400 MHz time base with 0.5 ppm stability

Two identical inputs, up to 200 MHz each

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

OCCO optional

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)

<b>Frequency range:</b>		
0 – 200 MHz	(DC-coupled)	
10 Hz – 200 MHz	(1 M $\Omega$ , AC-coupled)	
500 kHz – 200 MHz	(50 $\Omega$ , AC-coupled)	
<b>Input impedance:</b> 1 M $\Omega$    30 pF or 50 $\Omega$ (switchable)		
<b>Attenuation:</b> 1:1, 1:10, 1:100 (selectable)		
<b>Sensitivity:</b> (normal triggering)		
0 to 80 MHz	20 mV <sub>rms</sub> (sine wave), 80 mV <sub>pp</sub> (pulse)	
80 MHz to 200 MHz	60 mV <sub>rms</sub> (sine wave)	
20 Hz to 80 MHz	50 mV <sub>rms</sub> (sine wave, auto trigger)	
<b>Trigger</b> (programmable via encoder or software)		
<b>Attenuation:</b>	<b>Trigger level:</b>	<b>Resolution:</b>
1:1	0 to $\pm$ 2 V	1 mV
1:10	0 to $\pm$ 20 V	10 mV
1:100	0 to $\pm$ 200 V	100 mV
<b>Max. input voltage:</b>		
<b>Input 1 M<math>\Omega</math>:</b>	250 V (DC + AC <sub>peak</sub> ) from 0 to 440 Hz decreasing to 8 V <sub>rms</sub> at 1 MHz	
<b>Input 50 <math>\Omega</math>:</b>	5 V <sub>rms</sub>	
<b>Minimum pulse duration:</b>	<5 ns for single pulse	
<b>Input noise:</b>	(typ.) 100 $\mu$ V	
<b>Auto trigger (AC coupling):</b>	trigger point: 50% of peak-to-peak value	
<b>Trigger slope:</b>	positive or negative	
<b>Filter:</b>	100 kHz low-pass filter (switchable)	

### Input characteristics (Input C)

<b>Frequency range:</b>	100 MHz - 3 GHz	
<b>Input sensitivity:</b>	up to 1 GHz:	30 mV <sub>rms</sub> (typ. 20 mV <sub>rms</sub> )
	1 GHz-3 GHz:	100 mV <sub>rms</sub> (typ. 80 mV <sub>rms</sub> )
<b>Input impedance:</b>	50 $\Omega$ nominal	
<b>Max. input voltage:</b>	5 V (DC + AC <sub>peak</sub> )	

### Input characteristics

	External Reset	Reference	Gate/Arming
<b>Input impedance:</b>	5 k $\Omega$	500 $\Omega$	5 k $\Omega$
<b>Max. input voltage:</b>	$\pm$ 30 V	$\pm$ 20 V	$\pm$ 30 V
<b>Input sensitivity:</b>	-	typ. 2 V <sub>pp</sub>	-
<b>High level:</b>	> 2 V	-	> 2 V
<b>Low level:</b>	< 0.5 V	-	< 0.5 V
<b>Min. pulse duration:</b>	200 ns	-	50 ns
<b>Input frequency:</b>	-	10 MHz	-
<b>Min. eff. gate time:</b>	-	-	20 $\mu$ s

### 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; totalize A during B; time interval A:B (average); phase A to B; burst measurements

### Frequency measurement (Inputs A, B, C)

<b>Frequency range:</b>	0 to 200 MHz (3 GHz)
<b>LSD:</b>	(1.25 x 10 <sup>-8</sup> s x frequency) / measurement time
<b>Resolution:</b>	$\pm$ 1 or 2 LSD
<b>Accuracy:</b>	$\pm$ (resolution / frequency $\pm$ time inaccuracy $\pm$ trigger error / measurement time)

### Period duration measurement

<b>Range:</b>	10000 sec. to 5 ns
<b>LSD:</b>	(1.25 x 10 <sup>-8</sup> s x period) / measurement time
<b>Resolution:</b>	1 or 2 LSD
<b>Accuracy:</b>	$\pm$ resolution / period $\pm$ (trigger error B / measurement time)

### Totalization A

	(manual control)	(external control)
<b>Range:</b>	0 – 200 MHz	0 – 200 MHz
<b>Min. pulse duration:</b>	10 ns	10 ns
<b>LSD:</b>	1 count	$\pm$ 1 count
<b>Resolution:</b>	LSD	LSD

<b>Accuracy:</b>	(resolution $\pm$ ext. gate time error x frequency A)/total	
<b>Pulse resolution:</b>	10 ns	10 ns
<b>Ext. gate error:</b>	-	100 ns

### Time interval / Average time interval

(Input A = start; input B = stop)

<b>LSD:</b>	10 ns (10 ns to 1 ps in "average" mode)	
<b>Resolution:</b>	1 LSD (1 or 2 in "average" mode)	
<b>Accuracy:</b>	$\pm$ (resolution + trigger error + system error) / time interval $\pm$ time basis uncertainty (system error: $\leq$ 4 ns)	
<b>Number of average:</b>	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

<b>NPR<sup>1)</sup> presetting:</b>	1 – 65535 pulses per revolution
<b>Gate time:</b>	330 ms fixed
<b>LSD:</b>	7.5 x 10 <sup>-8</sup> revolution speed
<b>Resolution:</b>	1 or 2 LSD
<b>Accuracy:</b>	(trigger error/0.33) $\pm$ time basis error

### Offset

<b>Range:</b>	Covers the entire measurement range
<b>Resolution:</b>	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

<b>Range:</b>	1 ms – 65 sec.
<b>Resolution:</b>	1 ms
<b>External gate time:</b>	min. 20 $\mu$ s

### Time base

<b>Frequency:</b>	400 MHz clock rate; 10 MHz crystal
<b>Stability:</b>	$\pm$ 5 x 10 <sup>-7</sup> between +10°C and +40°C
<b>Ageing:</b>	< 0.27 ppm per month, 0.05 ppm per day
<b>External Reference:</b>	10 MHz $\pm$ 20 ppm

### Miscellaneous

<b>Safety class:</b>	Safety Class I (EN61010-1)
<b>Display:</b>	LCD display (83 x 21 mm)
<b>Power supply:</b>	115/230 V $\pm$ 10%, 45-60 Hz, 40 VA
<b>Operating temperature:</b>	+10°C to +40°C
<b>Max. relative humidity:</b>	10%-90% (without condensation), 5%-95% RH
<b>Dimensions (W x H x D):</b>	285 x 75 x 365 mm
<b>Weight:</b>	approx. 4 kg

1) NPR=number of pulses per revolution

**Accessories supplied:** Operator's Manual and power cable

#### Optional accessories:

HZ10S/R Silicone test lead  
 HZ42 19" Rackmount kit 2RU  
 HZ33/34 Test cable 50  $\Omega$  (BNC-BNC)  
 HZ24 Attenuators 50  $\Omega$   
 HZ20 Adapter plug  
 H0870 USB Interface  
 H0880 IEEE-488 interface

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