

# DIGITAL FREQUENCY COUNTER

**4 FUNCTIONS 5 RANGES**

**Model - KM 3165**

**FEATURES :**

- It is a high resolution multifunction intelligent Frequency Counter based on microprocessor technology.
- Frequency, period and equal-precision measurement
- Wide measuring range from 0.01 Hz to 2.4 GHz
- 3-step function selection, work state, unit and 8 - digit LED display.
- Continuous and adjustable gate time.
- Low frequency and other precision measurement.
- Input attenuation, AC / DC coupling selectable



**ELECTRICAL SPECIFICATIONS : KM 3165**

**BASIC FUNCTION**

<b>1. Frequency Range</b>	<b>CH.A measuring range : 0.01Hz - 50 MHz</b>
	DC Couple 0.01 Hz to 100Hz      AC Couple 100Hz to 50MHz
<b>Sensitivity</b>	*AC* 100Hz - 50MHz    80m Vrms      *DC* 0.01 Hz - 1Hz    500m Vp-p, 1Hz - 100Hz    80m Vrms
<b>Attenuator</b>	X 1, X 20
<b>2. Frequency Range</b>	<b>CH.B measuring range : 50 MHz - 2.4 GHz</b>
<b>Sensitivity</b>	50MHz - 1.2GHz    80m Vrms      1.2GHz - 2.4GHz > 80m Vrms
<b>Coupling</b>	AC only
<b>Cyclic Measurement</b>	CH. A measuring range : 0.02 S - 10S    Sensitivity 80mVrms > 1S CH. B measuring range : 0.5 nS - 0.02 S    Sensitivity 500mVrms > 1S
<b>Cyclic Measurement Range</b>	0.5 nS - 10 S
<b>Input Impedance</b>	1M (CH. A);    50 (CH. B)
<b>Max. Safety Voltage</b>	30V (DC / AC peak)(CH. A);    3V (CH. B)
<b>Basic Accuracy</b>	± (2 x 10 <sup>-5</sup> + 3)
<b>Gate Time</b>	Continuously variable, from 100ms to 10s.
<b>Display</b>	8 digits 19 x 12.5 mm LED with steps, frequency, period, kHz/s and MHz/ms, indicator.
<b>Precision</b>	Standard time error (t) x frequency (f) ± 1d
<b>Preheat Time</b>	20 minutes
<b>Operating Temperature</b>	0°C - 50°C, 10 - 90% R.H.
<b>Storage Temperature</b>	-40°C - 60°C, 5 - 90% R.H.
<b>Short / Long Time Stability</b>	Short : ± 3 x 10 <sup>-6</sup> / second    Long : ± 2 x 10 <sup>-6</sup> / month
<b>Power Supply</b>	AC 220V / 110V ± 10%, max.      Power consumption 5W
<b>Dimension</b>	270 x 215 x 100 mm
<b>Weight</b>	Approx. 1.6 kg.

**RESOLUTION**

Step	Coupling	Frequency Range	Resolution	
			Gate Time Min.	Gate Time Max.
1	AC	1GHz - 2.4 GHz	1kHz	100Hz
1	AC	50MHz - 1 GHz (no including 1GHz)	1kHz	10Hz
2	AC	2MHz - 50MHz	1kHz	10Hz
3	AC	100Hz - 2MHz	10Hz	0.1Hz
3	DC	0.01Hz - 100Hz (no including 100Hz)	0.001Hz	

**All Specifications are subject to change without prior notice**

## FREQUENCY COUNTER MODEL KM 3165

### 1. INTRODUCTION:

Step	Coupling	Freq. Range	Resolution	
			Gate time min.	Gate time max.
1	AC	1GHz-2.4GHz	1kHz	100Hz
1	AC	50MHz-1GHz (no including 1GHz)	1kHz	10Hz
2	AC	2MHz-50MHz	1kHz	10Hz
3	AC	100Hz-2MHz	10Hz	0.1Hz
3	DC	0.01Hz-100Hz (no including 100Hz)	0.001Hz	

It is a high-resolution multifunction intelligent frequency counter based on microprocessor. Features include: frequency, period and equal-precision measuring. Also, 3step function selection, work state, unit and eight-digit LED display.

All function depend on a single CPU. A crystal controlled temperature circuit provides constant compensation for temperature change thereby reducing measurement errors typically caused by temperature drift. The CH.B input has an attenuator (x1, x20), & AC/DC coupling for a low-pass filter.

The instrument measures signals over a wide range from 0.01Hz to 2.4GHz. The gate time is continuously variable from 100ms to 10s.

The instrument provides high performance stability, & function at a low cost.

Note: Read this chapter carefully before using your instrument retain these instructions.

### 2. ELECTRICAL SPECIFICATIONS:

Input characteristics:

1) CH.A (0.01Hz~50MHz)

frequency range :DC couple 0.01Hz to 100Hz

AC couple 100Hz to 50MHz

Sensitivity : "AC" 100Hz-50MHz < 120mVrms  
"DC" 0.01Hz-1Hz ≤ 500mVp-p,  
1Hz-100Hz ≤ 80mVrms.

Input impedance : 1M

Attenuator : X1, X20

Max. safety voltage : 30V (DC/AC peak)

2) CH.B (50MHz~2.4GHz)

Frequency range : from 50MHz to 2.4GHz

Sensitivity : 50mVrms~300mVrms

Coupling : AC only

Input impedance : 50

Max. safety voltage : 3V

3) Resolution: . Resolution depends on gate time control setting.

4) Time base

short time stability : ±3X10<sup>-9</sup>/second

Long time stability : ±2X10<sup>-8</sup>/month

Temperature drift coefficient : ±1X10<sup>-7</sup>, 10°C ~ 40°C

Line voltage variation : ±1X10<sup>-7</sup> for line voltage ±10%

5) Gate time : Continuously variable, from 100ms to 10s.

6) Display : 8 digit, 19X12.5mm LED with steps, frequency, period, kHz/s and MHz/ ms, indicator.

7) Precision : standard time error (t) x frequency (f) ±1d

8) Power supply : 220V/110V ±10%, 50Hz or 60Hz ±10%.

9) Preheat time : 20 minutes

10) Operation environment: -5°C ~ 50°C, 10 ~ 90% R.H.

Storage environment : -40°C ~ 60°C, 5 ~ 90% R.H.

11) Weight : Approx. 1.6kg

12) Dimension : 270mm X 215mm X 100mm

13) Accessories : Manual, power cord, test probe.

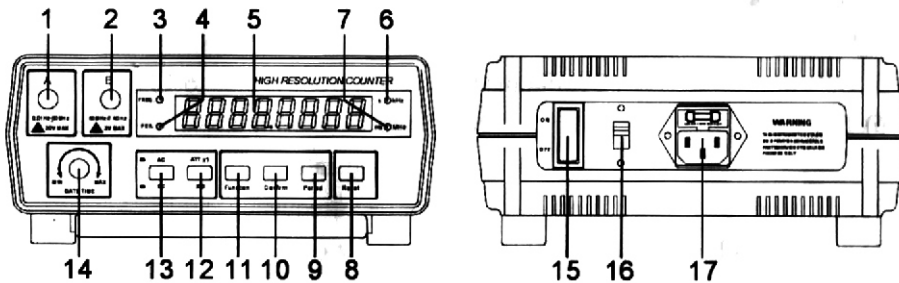
**OPERATION:**

**1. REQUIREMENTS:**

- a. Power: AC 220V/110V±10%, max. consumption 5W.
- b. Before measuring, turn the unit on for 20 minutes. This preheats the unit & the crystal oscillator to ensure accurate readings & stability.

**2. PANEL DESCRIPTION:**

- 1) CH.A port
- 2) CH.B port
- 3) Frequency indication LED
- 4) Period indication LED
- 5) LED display
- 6) KHz/s indication LED
- 7) MHz/ms indication LED
- 8) RESET key
- 9) PERIOD key
- 10) CONFIRM key
- 11) FUNCTION key
- 12) ATT key
- 13) AC/DC COUPLING key
- 14) GATE TIME knob
- 15) POWER SWITCH
- 16) 220V/110V Transform SWITCH
- 17) POWER JACK and FUSE BOX



**Note:**

**11)FUNCTION KEY:** (including 3 steps)

- 1 Step: 50MHz--2.4GHz range, from CH.B input, measurement unit indication "MHz/ms";
- 2 Step: 2MHz---50MHz range, input from CH.A, measurement unit indication "MHz/ms";

- 3 Step: 0.01Hz--2MHz range, input from CH.A, measurement unit indication "kHz/s".

These are frequency measurement steps and "FREQ." indication LED flicker.

- 9)PERIOD KEY:** Press the key down, the instrument will enter into period measure mode.

- 10)CONFIRM KEY:** Press the key down, the instrument will start working according to preset state.

- 13)AC/DC COUPLING KEY:** Press the key down for DC measurement, push the key up for AC measurement.

- 8)RESET KEY:** when instrument is abnormal, press it once to reset.

- 12)ATT KEY:** Press the key down for attenuated 20dB measurement, push it up for no attenuator.

**2. OPERATION STEPS:**

First, connect power cord (AC220V/110, 50Hz or 60Hz) and set power switch to ON position. Allow unit to warm up for 20 minutes to ensure accurate readings.

**Frequency measurement:**

- 1). Select CH.A or CH.B (depends on the range being measured) and connect to signal source by cable.
- 2). For signal to be measured, if frequency is less than 100Hz, press " AC/DC " coupling key down.
- 3). If input signal amplitude is high, then press "ATT" key down to ensure the instrument measures an attenuated signal.
- 4) When the "FUNCTION" key is pressed, the last digit display value is the current selection step, (for figure 2.1 2 step)

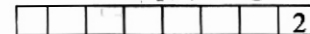
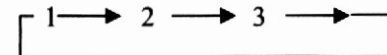


Figure 2.1

frequency measurement has only three steps (1--3) and its circle displaying;

Figure 2.2



- 5) Complete steps 1-3, press "CONFIRM" key, the instrument will start working and



display result, unit, etc.

- 6) Gate time may adjust variably.
- 7) When measuring 100Hz signal, the instrument will auto enter into equal-precision measurement state.

#### Period measurement:

On frequency measurement state, press "PERIOD" key, instrument will start measuring period and display test result, working state and unit simultaneously.

### 3. WARNING!!:

- 1) When measuring high voltage or strong RF signal by cable input, cables should be in series with large resistance to prevent damage. Wireless input of very strong signals should be measured in coarse mode to avoid damage.
- 2) When instrument is working abnormally or goes "dead", only press the "RESET" key once or turn off power once to reset the system.
- 3) When there is no input signal, instrument display may not be zero. This is normal, it doesn't effect measurements or accuracy.
- 4) Avoid exposing this instrument to extreme temperatures, damp conditions, dirt, dust, chemical contamination etc. Do not remove the cover for electrical shock could occur.
- 5) When instrument working on strong interference source, sensitivity will reduce.

### 4. FOR EXAMPLE:

- 1) Connect power cable to AC220V/110V power socket.
- 2) Setting power switch to ON position and preheat for 20 minutes.
- 3) Connect attach test cable to input port on front panel, according frequency range to select CH.A or CH.B.
- 4) Select proper function (step) and gate time. Gate time is shorter, measuring frequency speed is faster, but resolution is lower; however, gate time is longer, measuring frequency speed is slower, but resolution is higher.
- 5) If measure period, press down "PERIOD" key.
- 6) Press down "CONFIRM" key, then instrument start working.

#### EXAMPLE 1:

Analog handset measurement: user may connect test cable to input CH.B and set the

FUNCTION key to 1step position, gate time may be selected by need (manual adjust: from 100ms to 10s). Figure 5.1 and figure 5.2 are LED display reads.

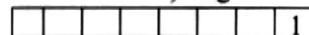


Figure 5.1 1step

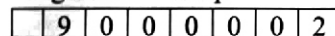


Figure 5.2 900MHz

#### EXAMPLE 2:

30MHz interphone emit frequency measurement: user may set the function key to 2 step position and gate time may be selected by need (manual adjust: from 100ms to 10s). Figure 5.3 and figure 5.4 are LED display reads.



Figure 5.3 2 step

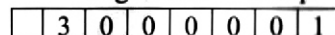


Figure 5.4 30MHz

#### EXAMPLE 3:

Self-oscillation frequency measurement (of BP, controlling and controlled telephone, interphone): user may set the function key to 2 step position. Connect one of feet of a 5pF capacitance to red clamp of test cable, the other as probe to directly contact frequency point, then frequency value will be measured.

MUMBAI

## TEST CERTIFICATE

### FREQUENCY COUNTER

This Test Certificate warrants that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. KM 3165

SERIAL NO. \_\_\_\_\_

DATE: \_\_\_\_\_

ISO 9001 REGISTERED



17, Bharat Industrial Estate, T. J. Road, Sewree (W),

Mumbai-400015. INDIA

**Tel.:**022-24124540, 24181649, 27750662, 27750292

**Fax:** 24149659, 27750612

**E-mail :** kusam\_meco@vsnl.net, sales@kusam-meco.co.in

**Website :** www.kusamelectrical.com

## WARRANTY

Each "KUSAM-MECO" product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a "KUSAM-MECO" authorized dealer.

This warranty does not apply for damaged Ic's, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in "KUSAM-MECO's" opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

"KUSAM-MECO" authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of "KUSAM-MECO".

"KUSAM-MECO's" warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a "KUSAM-MECO" authorized service center within the warranty period.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. "KUSAM-MECO" SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER.

All transactions are subject to Mumbai Jurisdiction.