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Multi-Function Digital Counter

Users Manual

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Introduction

This manual contains information and warnings, which must be followed to ensure safe operation and retain the instrument in safe condition.

⚠ WARNING

READ " SAFETY INFORMATION " BEFORE USING THE INSTRUMENT

This is an intelligent multiple function digital counter. It is controlled by an 8-Bit micro-controller and with eight-digit LED high bright display. Four measuring functions of frequency, period, totals and self-check are involved in this counter. Otherwise there is a 10MHz OSC.OUT. The input signal can be conditioned by attenuation.

Two kinds of power 110VAC and 220VAC can be supplied to the instrument. User can conveniently select it. This instrument has been designed according to IEC1010 – 1 concerning safety requirements.

Unpacking and Inspection

Upon removing your new instrument from its packing, you should have the following items:

1. multiple function digital counter.
2. BNC to BNC Test Lead, 50 ohm, 100cm
3. Power Cord
4. Users Manual

If any of the above items are missing or are received in a damaged condition, please contact the distributor from whom you purchased the unit.

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⚠ Safety Precautions

Injury or death can occur even with low voltages and low current. It is extremely important that you read these safety informations before using your instrument. Follow all safety practices and proper operating procedures for equipment being tested.

1. Exercise extreme caution when: Measuring voltage above 20 volts, measuring current greater that 10 mA, measuring AC power line with inductive loads, measuring AC power line during electrical storms.
2. Always inspect your instrument, test lead and accessories for sign of damage or abnormality before every use. If any abnormal conditions exist (i.e., broken or damaged test lead, cracked case, display not reading, etc.), do not attempt to take measurements.
3. Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, which might be at ground potential. Keep your body isolated from ground by using dry clothing; rubber shoes, rubber mats, or any approved insulating material.
4. Never touch exposed wiring, connections, test probe tips, or any live circuit conductors when attempting to make measurements.
5. Never replace the protective fuse inside the instrument with a fuse other than the specified or approved equal fuse. Replace only with same type of fuses. To avoid electrical shock, disconnect the Power Cord, test lead and any input signals before replacing the fuses.
6. Do not operate this instrument in an explosive atmosphere (i.e., in the presence of flammable gases or fumes, vapor or dust.)

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7. Measuring voltage that exceeds the limits of the instrument may damage it and expose the operator to a shock hazard. Always recognize the instrument voltage limits as stated on the front of the instrument.
8. Never apply more than 250V between the A input and earth ground. Never apply more than 3V between the B input and earth ground.
9. Do not attempt calibration or service unless trained and another person capable of rendering first aid and resuscitation is present.
10. Remember: Think Safety, Act Safely.

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⚠ Safety Information

CE

This product complies with the requirements of the following European Community Directives: 89/336/EEC (Electromagnetic Compatibility) and 73/23/EEC (Low Voltage) as amended by 93/68/EEC (CE Marking).

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Chapter 1
A Quick Tour

Symbol Explanation

 Caution! Refer to the Instruction Manual

 Dangerous Voltage May Be Present at terminals

 Earth （Ground Terminal）

 AC （Alternating Current）

 DC （Direct current）

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Instrument forward Layout

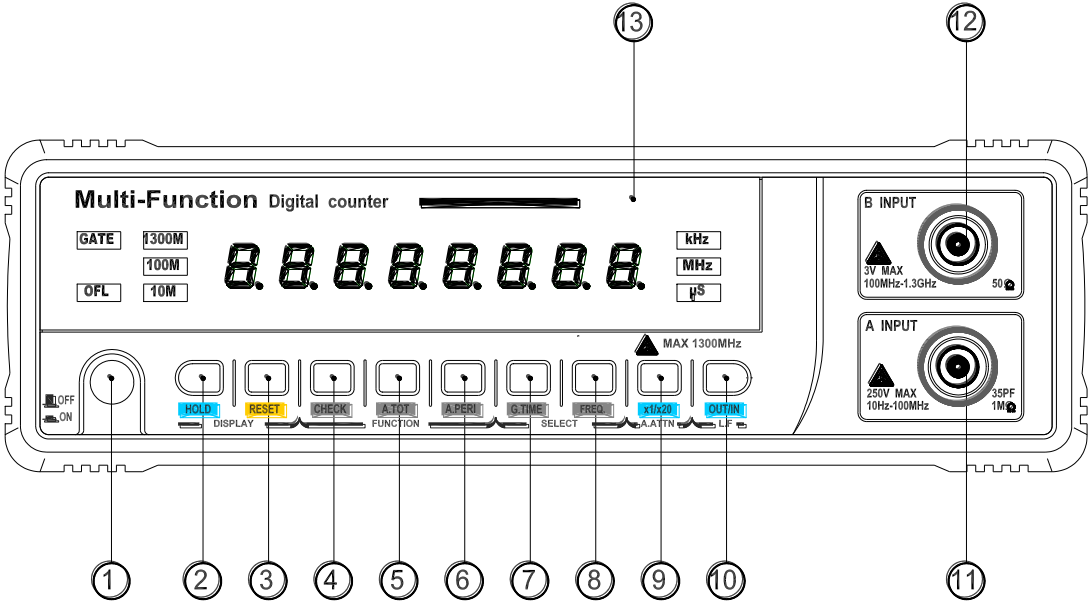


Figure 1-1. Multi-Function Digital Counter Features (Forward)

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1. POWER SWITCH

To turn on, depress push – button. To turn off, again depress push – button.

2. HOLD

Depress HOLD button to toggle in and out of the Data Hold mode. Releasing Data Hold mode again press the button.

3. RESET

Pressing RESET, immediately eight-digit LED and eight LED indicators of the instrument are full lit. After RESET, the instrument is auto 10Mz frequency measurement range.

4. CHECK

Pressing the CHECK button, eight-digit LED and eight LED indicators are lit from 0 to 9 to eight LED indicators. So circle.

5. A.TOT

Pressing A.TOT button to Total measurement mode.

6. A.PERI

Pressing A.PERI button to period measurement mode.

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7. G.TIME

For frequency measurement mode, this button is used to change gate time. When period measurement mode, this button is used to change the multiplier factors. Each range is as follows:

CHANNEL A INPUT MODE

FREQUENCY RESOLUTION

Gate Time	10MHz Range Resolution	100MHz Range Resolution
0.02 Sec	00000.0kHz	000.000MHz
0.2 Sec	00000.00kHz	000.0000MHz
2 Sec	00000.000kHz	000.00000MHz

PERIOD RESOLUTION

Gate Time	Resolution
0.02 Sec	0.0μS
0.2 Sec	0.00μS
2 Sec	0.000μS

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CHANNEL B INPUT MODE

FREQUENCY RESOLUTION

Gate Time	1300MHz Range Resolution
0.025 Sec	0000.00MHz
0.25 Sec	0000.000MHz
2.5 Sec	0000.0000MHz

8. FREQ.

For frequency measurement mode, this button is used to change frequency range. After RESET, The instrument is auto into 10MHz-frequency measurement range. This button is pushed one time; instrument is auto into 100MHz-frequency measurement range. This button is pushed one time again; instrument is auto into 1300MHz-frequency measurement range. So circle.

9. A.ATTN

Input signal attenuate button. When depress, the sensitivity is attenuated by a factor 20 for input signal.

10. L.F

Low pass filter button. When depress:

~100kHz, -3dB

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11. A INPUT

Channel A input BNC connector.

Put a signal in to measure for 10 Hz ~100MHz frequency, period and total.

12. B INPUT

Channel B input BNC connector.

Put a signal in to measure for 100M Hz ~1300MHz frequency.

13. DISPLAY

EIGHT-DIGIT LED: Display measurement value.

GATE INDICATOR: Display the opened or closed state of the GATE. When GATE is open, indicator is lit.

OFL INDICATOR: When overflow, the indicator is lit.

1300MHz INDICATOR: When selecting the 1300MHz range, the indicator is lit.

100MHz INDICATOR: When selecting the 100MHz range, the indicator is lit.

10MHz INDICATOR: When selecting the 10MHz range, the indicator is lit.

kHz INDICATOR: The unit of frequency.

MHz INDICATOR: The unit of frequency.

μS INDICATOR: The unit of period.

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Instrument Rear Layout

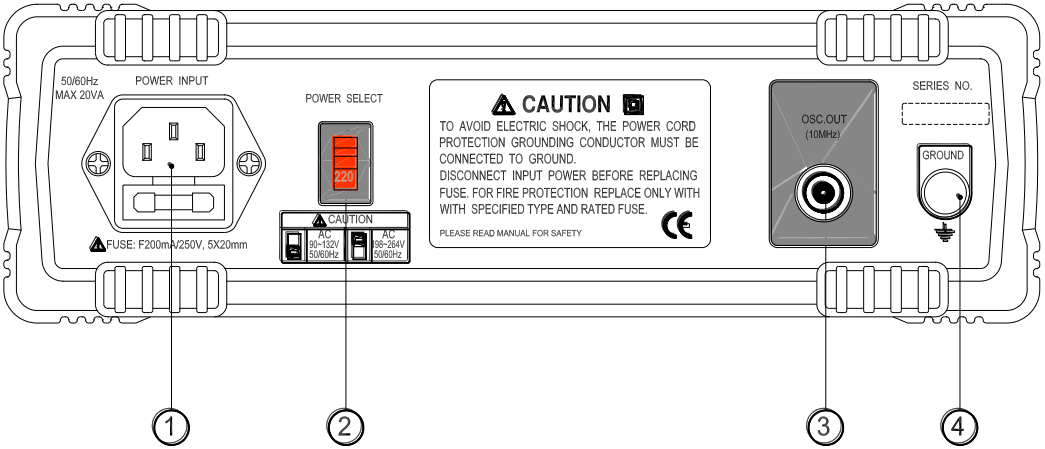


Figure 1-2. Multi-Function Digital Counter Features (Backward)

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1. POWER INPUT WITH FUSE

⚠ WARNING

To avoid user for injury and the instrument for damage, the voltage value of AC power must be examined with same the power requirements of instrument before connect power cord to live power source and the power select switch is turned on.

⚠ WARNING

To avoid electrical shock, disconnect power cord from live power source and remove the test leads and any input signals before replacing the power fuses. Replace only with the same type of fuses.

2. POWER SELECT

Two kinds of power 110VAC and 220VAC can be supplied to the instrument. According to the user's needs, select it.

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3. OSC.OUT

Output connector for reference oscillator. This connector provides a 10MHz signal. It may be used as used as a reference signal for other frequency counter. When the output signal (10 MHz) is used, is always terminated by 50ohms.

4. GND TERMINAL

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Chapter 2
Making Measurements

Introduction

⚠ WARNING

To avoid user for injury and the instrument for damage, the voltage value of AC power must be examined with same the power requirements of instrument before connect power cord to live power source and the switch is turned on.

Before making any measurements always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, ect.) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the instrument jacks. If any abnormal exist do not attempt to make any measurements.

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Frequency Measurement

ℵ Press the POWER button to the ON position.
ℑ Press the FREQ. button to select the appropriate range that you are desirous to.
ℜ Press the G. TIME button to select the desired gate time.
℘ Connect the input signal to the front –panel BNC connector.
⊗ Set A.ATTN. to desired position. If input signal level is greater than 300mV, depress the A.ATTN. button to decrease the triggering sensitivity of the input section by a 20 and reduce errors.
⊕ Read the frequency on display, and observe the unit of measurement indication.

Period Measurement

ℵ Press the POWER button to the ON position.
ℑ Press the A.PERI. button to select the period mode.
ℜ Press the G. TIME button to select the desired gate time.
℘ Connect the input signal to the A INPUT BNC connector.
⊗ If input signal level is greater set A.ATTN. button to decrease the triggering sensitivity of the input

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section by a 20 and reduce errors.

⊕ Read the period time on display, and observe the unit of measurement indication.

Total Measurement

ℵ Press the POWER button to the ON position.

ℑ Press the A.TOT. button to select the total mode.

ℜ Connect the input signal to the A INPUT BNC connector.

℘ If input signal level is greater, set A. ATTN. button to decrease the triggering sensitivity of the input section by a 20 and reduce errors.

⊗ Read the accumulated total on display after HOLD button in.

Check mode

The self – check mode provides a means of verifying proper overall operation of counter, excluding input section, time base accuracy, and time base dividers used in the period mode.

ℵ Press the POWER button to the ON position.

ℑ Press the CHECK button to select the self – check mode.

ℜ Eight-digit LED and eight LED indicators are lit from 0 to 9 to eight LED indicators. So circle.

℘ Press RESET button to stop the check.

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Chapter 3
Specifications

General Specifications

Display: 8 digit, about 10mm high red LED display with decimal point.
Overrange indications: OFL indication is lit.
Power Requirement: AC198~264V 50/60Hz or 90~132V 50/60Hz
Temperature: Operating 0 °C to 40 °C
Storage -10 °C to 50 °C
Relative Humidity: 20% to 80% RH (0 °C to 40 °C)
Safety: Designed to IEC 1010-1 standard
Size: 300mm (L) × 260mm (W) × 74mm (H)
Weight: Approx. 1850g.

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Frequency measurement:
±1 count ± time base error × frequency

Period measurement:
±1 count ± time base error × period

Time base error:
Long term stability 1 $\times 10^{-5}$ (month)
Short term stability 5 $\times 10^{-6}$(minute)

Accuracy is given as at 18 °C to 28 °C, with relative humidity up to 80%. All specifications assume less than 1 year since calibration.

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Resolution and Accuracy

Frequency measurements

Channel	Range	Resolution	Accuracy
A	10MHz 10Hz to 10MHz	1,10,100Hz selectable	$\pm$1 count $\pm$ 1 $\times 10^{-5}$ $\times$ frequency (month) $\pm$ 1 count $\pm$ 5 $\times 10^{-6}$ $\times$ frequency (minute)
	100MHz 10MHz to 100MHz	10,100, 1000Hz selectable	
B	1300MHz 100MHz to 1300MHz	100Hz,1kHz, 10kHz selectable	

Period measurements

Channel	Range	Resolution	Accuracy
A (only)	0.1S to 0.1μS (10Hz to 10MHz)	0.0μS, 0.00μS 0.000μS selectable	$\pm$1 count $\pm$ 1 $\times 10^{-5}$ $\times$ period (month) $\pm$1 count $\pm$ 5 $\times 10^{-6}$ $\times$ period (minute)

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Total measurements

Channel	Range	Resolution
A (only)	10Hz to 10MHz	1 count input

Input Characteristics

Channel A

Input voltage sensitivity:

10MHz range: 10Hz to 8MHz 25mV rms. 8MHz to 10MHz 50mV rms.

100MHz range: 10MHz to 80MHz 25mV rms. 80MHz to 100MHz 50mV rms.

Attenuation: ×1, ×20 fixed

Impedance: approx. 1MΩ less than 35pF

Maximum voltage protection: 250V RMS

Channel B

Input voltage sensitivity: 20mV rms.

Impedance: approx. 50Ω

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Maximum input voltage: 3V RMS

Chapter 4
Maintenance

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
Dirt or moisture in the terminals can affect readings.
To clean the terminals:

1. Press the power button to OFF.
2. Remove the power Cord from live power source.
3. Remove the test leads from the input terminals.
4. Shake out any dirt that may be in the terminals.

⚠ WARNING

To avoid electrical shock, disconnect power cord from live power source and remove the test leads and any input signals before replacing the power fuses.

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Replace only with same type of fuses.

Replacing the Power Fuse

Use the following procedure to examine or replace the power fuses:

1. Press the power button to OFF.
2. Remove the power cord from live power source.
3. Remove the test leads from the input terminals.
4. Replace the power fuse from the supply power Inlet with fuse. Replace the blown fuse with same ratings.
5. The power fuse: Fast, 200mA / 250V, Φ5×20mm.

Other Note

1. Do not use abrasives or solvents on the instrument, use a damp cloth and mild detergent only.
2. If any faults or abnormalities are observed, the instrument can not be used any more and it has to be checked out.

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