

Section one: General description

I、 Introduction

This instrument is one of multifunctional and hi-precision frequency counters that measures frequency from 10Hz to 2700MHz

It features eight digits, bright seven segment LED display, four function performance. Low power consumption circuit design, small size, light weight, high-stabilized crystal over oscillator for measurement of accuracy and full input signal conditioning

The four functions are frequency, period, totalize and self check.

This is accomplished by a single chip microcontroller, The input signal can be conditioned by attenuation, It is recommended that whole information and details should be read and understood before attempting to operate the instrument for correct operation and best results.

II、 Specification

The pertinent specifications are listed as follows:

1、 Frequency measurements.

Channel A

Range: 10Hz~10MHz direct counter.

10MHz to 100MHz prescaled by proportion.

Resolution: Direct counter: 1Hz、 10Hz、 100Hz switch selectable.

Prescaled: 10Hz、 100Hz、 1000Hz switch selectable.

Gate time: 0.01s , 0.1s , 1s switch selectable.

Accuracy: $\pm 1 \text{ count} \pm \text{time base error} \times \text{measured}$

Channel B

Range: 100MHz~2.7GHz

Resolution: 100Hz、 1kHz、 10kHz

Gate time: 0.01s 、 0.1s、 1s

Accuracy: $\pm 1 \text{ count} \pm \text{time base error} \times \text{measured frequency}$

2、 Period measurements

Input: Channel A

Range: 10Hz~10MHz

Resolution: 10^{-7} s、 10^{-8} s、 10^{-9} s switch selectable

Accuracy: ± 1 count \pm timebase error measured period

Totalize measurements

Input : Channel A

Range: 10Hz~10MHz

Resolution: ± 1 count of input

Check: 8 bits repeating display 0~9 together

Input characteristics

Channel A

3、 Input sensitivity

10MHz range: 10Hz~8MHz 20mVrms

8MHz~10MHz 30mVrms

100MHz range: 10MHz~80MHz 20mVrms

80MHz~100MHz 30mVrms

Attenuation: $\times 1$ 、 $\times 20$ fixed

Filter(CH1 only)Low pass: AC 100kHz-3dB

Impedance: Approximate $1M\Omega$ then 35pF

Maximum voltage without damage: 250V(DC+ACrms)

Channel B

Input sensitivity: 20mVrms

Impedance: Approximate 50Ω

Maximum voltage without damage: 3V

4、 Time base

Timebase frequency: 10MHz

Short term stability: $\pm 3 \times 10^{-9}$ for 1s average

Long term stability: 2×10^{-5} month

Temperature: $\pm 1 \times 10^{-5}$; 0~40°C

Line voltage: $\pm 1 \times 10^{-7}$ for 10% change

5、 General

Display: 8 digits, 0.39 inch green LED display with decimal point, gate, overflow, kHz, MHz and μ s indication

Power requirement: line 220V ± 10% 45Hz~70Hz

Warm-up time: 20 minutes when cold started at 25°C

Temperature rated range of use: -5~50°C

Storage and transport: -40~60°C

Humidity operating: 10~90%RH

Dimension: width :207mm heigh: 85mm depth: 255mm

Weight: 2kg

6、 Supplied accessories

- (1) power cord
- (2) operating manual

Section two: Action principle

The operating theory is equal accuracy measurement in this instrument.

In reserved gate time, counter 1 counts N_x for measured integral pulses, counter 2 counts N_0 for standard pulses, frequency F_x and period P_x of the measured signal can be determined by calculating formular easily.

Frequency $F_x = N_x / T_x$

Period $P_x = T_x / N_x$

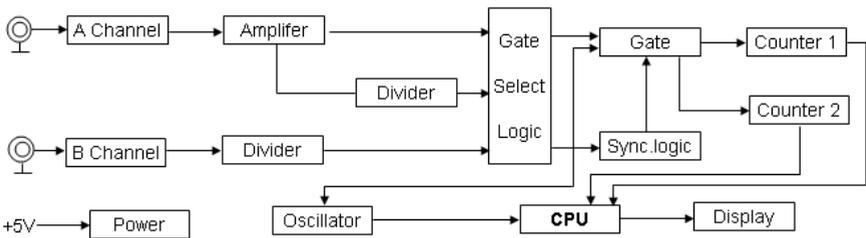


Figure 1

Section three: Operation instruction

I、 Introduction

This section provides complete operating information for this hi-precision frequency counter, This section includes a description of all front panel controls, connectors and indicators and indicators,

operating instructions, operator's maintenance.

II、 Preparation for use

Power requirements

It requires a power source of AC 220V ; 45~70Hz signal phase.

Power consumption is 10W maximum.

Wait about 20 minutes for correct measurement until the crystal oven oscillator gets stable in aging

III、 Front panel features

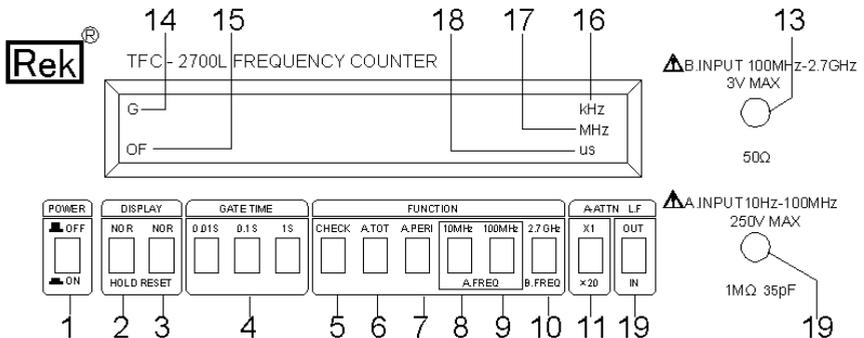


Figure 2

- 1、 Power switch: To turn on , depress push button, display this instrument model "F-2700L" in 2 seconds
- 2、 Hold: In hold, switch in, the measurement (except for totalize)in progress is stopped.
- 3、 Reset: When pressed, immediately reset the counter to begin a new measurement, usually used in the totalize mode to begin a new measurement.
- 4、 Gate time: For frequency measurement, this switch is used to change gate time when in the period measurement mode, it is used to change the multiplier factors.
- 5、 Check: Check this instrument status and 8 bits repeating display 0~9 together.
- 6、 A TOT.: Totalizer measurement.(channel A input)

- 7、 A PER1.: With this switch in placed in period mode.
- 8、 A FREQ.10MHz: With this switch in, placed in 10MHz frequency mode.(channel a input)
- 9、 A FREQ.100MHz: With this switch in ,placed in 100MHz range frequency mode.(channel A input)
- 10、 B FREQ.(channel B input)
- Switch: B FREQ. 2.7GHz
- Range: 100MHz~2.7GHz
- 11、 ATT: Input signal attenuator switch.
- When pressed, the sensitivity is attenuated by factor 20 for input signal.(only A input)
- 12、 A INPUT: Channel A input connector.
- 13、 B INPUT: Channel B input connector.
- 14、 Gate indicator: Displays the opened or closed state of the GATE,
When GATE is open, indicator is lit.
- 15、 OVERFLOW indicator: Indicates overflow of 8 digits.
- 16、 kHz annunciator.
- 17、 MHz annunciator.
- 18、 Ms annunciator
- 19、 Lowpass filter: AC 100kHz ; 3dB

All function keys to turn off display model: "F-2700L"

IV、 Rear panel features

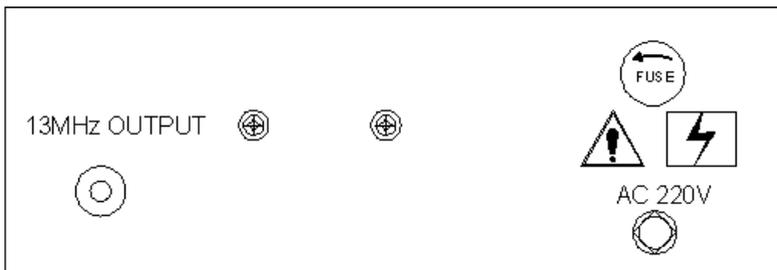


Figure 3

13MHz OUT: Output connector ofr internal reference oscillator, this connector provides a 13MHz signal, It may be used as a reference

signal for other frequency counters.

Fuse: AC power protection(0.3A)

AC INLET: Provides connection to Acpower.

AC SELECTOR: 115V or 230V.

V、 Operating characteristics

The following paragraphs describe the operating ranges and resolution for frequency, period, totalize and check function.

1、 Frequency measurements.

- (1) Perform frequency measurement as follows
- (2) Press the POWER switch to the ON position.
- (3) Press the FREQ. switch to select the frequency mode of operation.

Select the desired gate time.

- (4) Connect the input signal to the front-panel BNC connector.
- (5) Set ATT. To desired position , If input signal level is greater than 300mV, depressing the switch will decrease the triggering sensitivity of the input, section by a 20 and reduce errors.
- (6) Read the frequency on display, and observe the unit of measurement indication to the right of the display.

2、 Period measurement.

Perform period measurements as follow:

- (1) Press the POWER switch to the ON position.
- (2) Press the APERI switch to select the period mode of operation
- (3) Select the desired PERIMULTI
- (4) Connect the input signal to the front-panel A INPUT TBNC connector.
- (5) Set ATT to desired position, If input signal level is greater than 300mV, depressing the ATT switch will decrease the triggering sensitivity to the input section by a 20 and reduce errors.
- (6) Read the period time on display, and observe the unit of measurement indication to the right of the display.

3、 Totalize measurements.

- (1) Perform to talize measurements as follows:

(2) Press the POWER switch to the ON position.

(3) Press the A. TOT switch to select the totalize mode of operation, and the RESET switch to initialize the counter.

Connect the input signal to the front-panel A.INPUT BNC connector

(4) Set ATT. to desired position, If input signal level is greater than 300mV, depressing the ATT switch will decrease triggering sensitivity of the input section by a 20 and reduce errors.

(5) Read the accumulated total on display after hold switch in.

4. Check mode.

The self-check mode provides a means of verifying proper overall operation of counter, excluding input section, timebase accuracy, and timebase dividers used in the peios mode.

(1) Press the POWER switch to the ON position.

(2) Press the check switch to select the self-check mode.

(3) Press the IS GATE TIME selector: the display should read 10000.000

With the instrument gating once every second.

(4) Press the 0.1s GATE TIME selector: the display should read 10000.00

With a 100 millisecond gate time.

(5) Press the 0.01s GATE TIME selector, the display should read 10000.0

With a 10 millisecond gate time.

Section four: Calibration

I. Introduction

Calibration is limited to adjustment of the timebase oscillator frequency and the trigger level.

Timebase oscillator adjustment should be made when ever the oscillator is determined that accuracy of the counter is not within the accuracy desired perform timebase oscillator adjustment in an environment having an ambient temperature of 22~25°C, Allow the

instrument to warm up at least 30 minutes with case on before adjusting the timebase.

Warning

Maintenance described herein is performed with power supplied to the instrument, and protective covers removed. Such maintenance should be performed only by service-trained personnel who are aware of the hazard involved (For example, fire and electrical shock). Where maintenance can be performed without power applied, the power should be removed.

II、 Test instruments required.

Quartz oscillator Range: 13MHz~2.7GHz

Temperature coefficient: $\pm 1 \times 10^{-8}$

Sine wave generator Range; 10Hz~1MHz ; 1kHz~1GHz

III、 Timebase frequency adjustment

A Timebase

- 1、 Remove the counter from the case.
- 2、 Select A 10MHz output on the quartz oscillator (i.e. hours standard) and connect the 10MHz signal to the counter A.INPUT.
- 3、 Set the front panel controls as follow.

POWER.....ON
NOR / HOLD.....NOR
GATE TIME.....1s
FUNCTION.....A.FREQ.10MHz
ATT.....x1

- 4、 While observing the counter display, adjust the timebase oscillator controller (C5 located on the oven) to obtain a reading of 10000.000±1 digit. (Figure 4)

B Time base

- 1、 Remove the counter from the case.
- 2、 Select a 2.7GHz output on the quartz, oscillator (i.e. house standard) and connect the counter B. INPUT.
- 3、 Set the front panel controls as follow:

POWER.....ON
 NOR / HOLD.....NOR
 GATE TIME.....1s
 FUNCTION.....B.FREQ. ATT

4、 While observintg the counter display , adjust the time base oscillator (C28 located one the oven) to obtain a reading of 2700.0000±1Hz

IV、 Trigger level adjustment

- (1) Remove the counter from the case.
- (2) Set sine wave generator to A INPUT connector of the front panel.
- (3) Connect generator to a INPUT connector of the front panel

POWER.....ON
 NOR / HOLD.....NOR
 GATE TIME.....1s
 FUNCTION.....A.FREQ.10MHz
 ATT.....×1

(4) While observing the counter, display, adjust the trigger level control (RP1 on the PCB) to obtain a reading of stable value.

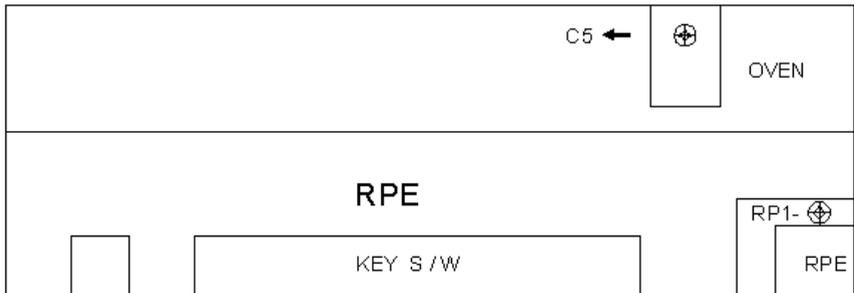


Figure 4



MEIRUIKE INSTRUMENT

高精度频率计

HI-PRECISION FREQUENCY COUNTER

使用说明书

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