# UZ 2400 Universal Counter

## *digimess*® compact

**Order No. H.UC 10-00**


The UZ 2400 universal counter is a compact counter for up to 2.4 GHz. It features two counter channels (channel A: 10 Hz to 100 MHz and channel C: 50 MHz to 2400 MHz).

The measured values are displayed in a 16-character line on a large, backlit alphanumeric LCD.

A maximum of 8 places and one decimal point are used to display the measured values. The format depends on the measuring mode.

Full remote control (without trigger level at channel A) of the counter is possible via an RS-232 interface.

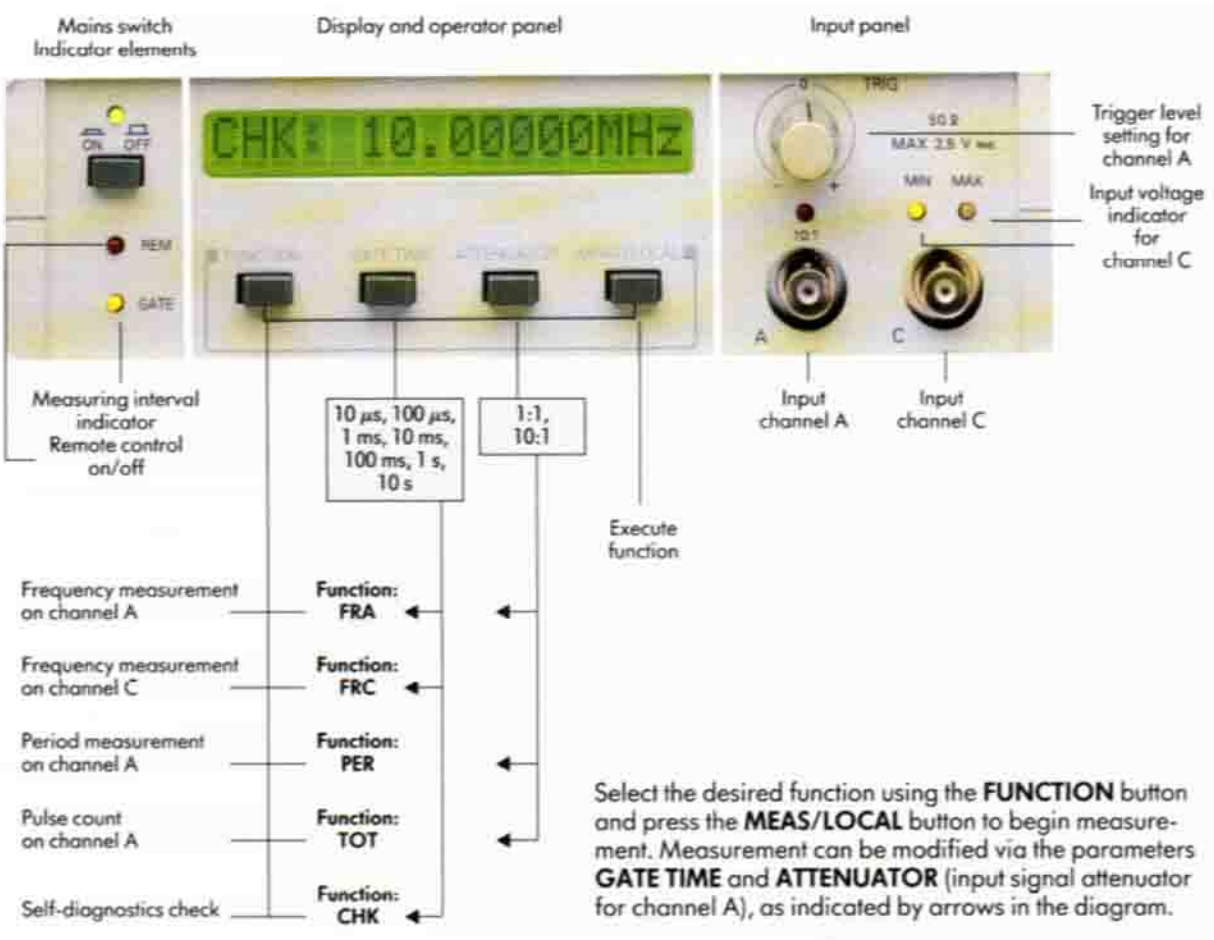
Special features of the UZ 2400 include a high basic accuracy of $10^{-10}$ (short-term) due to the quartz oven oscillator, and a longterm stability of $10^{-8}$ over 24 hours.

The built-in microprocessor carries out a self-diagnostics check and makes operation extremely simple.

The many outstanding features of the UZ 2400 allow it to set new standards in its class.

## Measuring is easy with the UZ 2400!

### Direct input mode




Select the desired function using the **FUNCTION** button and press the **MEAS/LOCAL** button to begin measurement. Measurement can be modified via the parameters **GATE TIME** and **ATTENUATOR** (input signal attenuator for channel A), as indicated by arrows in the diagram.

### Remote control mode


This menu is called up by pressing the **FUNCTION** and **MEAS/LOCAL** buttons simultaneously.

Baud rate setting: 1200, 2400, 4800, 9600 baud

Pressing the **MEAS/LOCAL** button in remote control mode returns you to direct entry mode.

## Technical data

### Characteristics of channel A

| | |
|---|---|
| Frequency range | 10 Hz ... 100 MHz |
| Basic sensitivity (voltage divider 1:1) | $V_{rms}$ = 25 mV – sine signal<br>$V_{pp}$ = 75 mV with pulses (minimum width 10 ns) |
| Input voltage | AC voltage |
| Input impedance | 1 MΩ (< 20 pF) |
| Input divider | 1:1 or 10:1 |
| Dynamic range<br>with divider 10:1 | $V_{pp}$ = 75 mV ... $V_{pp}$ = 5 V<br>$V_{pp}$ = 750 mV ... $V_{pp}$ = 50 V |
| Maximum input voltage | 50 V ($V_{=}$ + $V_{pp}$ with divider 10:1) |
| Range of trigger level adjustment<br>Voltage divider 1:1<br>Voltage divider 10:1 | Adjustable via potentiometer<br>+0.5 V ... –0.5 V<br>+5 V ... –5 V |

### Characteristics of channel C

| | |
|---|---|
| Frequency range | 50 MHz ... 2400 MHz |
| Division ratio | 100:1 |
| Sensitivity | $V_{rms}$ = 25 mV where f = 100 MHz ... 2 GHz<br>$V_{rms}$ = 50 mV where f = 50 MHz ... 100 MHz and where f = 2 GHz ... 2.4 GHz |
| Input impedance | 50 Ω |
| Standing wave ratio | ≤ 2.5 |
| Input voltage | AC voltage |
| Maximum input voltage | $V_{rms}$ = 2.5 V (sine signal)<br>± 40 V DC voltage content |
| Optimal input voltage | "MIN" and "MAX" LEDs are both off |

## Functions

### Self-diagnostics check (CHK)

| | |
|---|---|
| Measuring frequency | 10 MHz (internal) |
| Gate time | 10 µs, 100 µs, 1 ms, 10 ms, 100 ms, 1 s, 10 s |
| Accuracy | ± 1 LSD[1] |
| Display of result | MHz with decimal point |

### Frequency measurement on channel A (FRA)

| | |
|---|---|
| Measurement range | 10 Hz ... 100 MHz |
| Gate time | $t_{gate}$ = 10 µs, 100 µs, 1 ms, 10 ms, 100 ms, 1 s, 10 s |
| Frequency resolution | f = 1 / $t_{gate}$ (max. 8 digits) |
| Accuracy | ± 1 LSD[1] ± time base error |
| Results display | Hz, kHz, MHz with decimal point |

### Frequency measurement on channel C (FRC)

| | |
|---|---|
| Measurement range | 50 MHz ... 2.4 GHz |
| Gate time | $t_{gate}$ = 10 µs, 100 µs, 1 ms, 10 ms, 100 ms, 1 s, 10 s |
| Input voltage | 25 mV ≤ $V_{rms}$ ≤ 2.5 V |
| Frequency resolution | f = 100 / $t_{gate}$ (max. 8 digits) |
| Accuracy | ± 1 LSD[1] ± time base error |
| Results display | MHz, GHz with decimal point |

### Period measurement on channel A (PER)

| | |
|---|---|
| Measurement range | 100 µs ... 100 ms |
| Sensitivity | $V_{rms}$ = 100 mV |
| Resolution | 100 ns |
| Accuracy | ± 1 LSD[1] ± time base error ± trigger error[2] |
| Results display | µs, ms, s with decimal point |

### Pulse count on channel A (TOT)

| | |
|---|---|
| Measurement range | 1 ... $10^9$ events |
| Frequency range | 0 ... 100 MHz |
| Accuracy | ± 1 LSD[1] |
| Results display | without unit of measurement and decimal point |

### Time base

| | |
|---|---|
| Warm-up time | 15 min. |
| Nominal frequency of crystal | 10 MHz |
| Accuracy of frequency setting | $\pm 5 \cdot 10^{-9}$ |
| Short-term stability | $1 \cdot 10^{-10}$/s |
| Frequency deviation after 24 hours | $\leq \pm 10^{-8}$ |
| Temperature effect | $< 5 \cdot 10^{-9}$/°C |

**Display:** 16-digit alphanumeric LCD-matrix, backlit

**RS-232 C interface**
Full remote control (without trigger level at channel A) of the counter is possible via the integrated RS 232 C serial interface.
Possible baud rates: 1200 baud, 2400 baud, 4800 baud, 9600 baud

### Environmental conditions

| | |
|---|---|
| Nominal temperature | + 23 °C ± 2 °C |
| Operating temperature | + 5 °C ... + 40 °C |
| Relative atmospheric humidity | 20% ... 80% |
| Atmospheric pressure | 86000 .... 106000 Pa |
| Interference suppression | in accordance with Vfg. 1046/1984, VDE 0871 Category B |
| Dimensions (W × H × D) | 225 mm × 85 mm × 200 mm |
| Dimensions (W × H × D)<br>incl. packaging | 310 mm × 110 mm × 265 mm |
| Weight | approx. 1.8 kg |
| Weight incl. accessories and packing | approx. 2.6 kg |

### Power supply

| | |
|---|---|
| Operating voltage | 220 V/110 V ± 10% (internally switchable) 50 Hz ... 60 Hz ± 5% |
| Power consumption | 20 VA |
| Fuses | Mains fuse T 100 mA/250 V (220 V), T 200 mA 250 V (110 V) |
| Protection class | Protection class I in accordance with IEC 348 ≙ DIN VDE 0411 Part 1 E 81 |

### Accessories included in packing:

– Mains cable
– BNC-BNC-cable
– Operating instructions
– Replacement fuse 100 mAT

**Note:**
The adjustment of the gate time has no effect on the functions period measurement and pulse count. The repetition rate of the measurement during automatic operation is approx. 200 ms.

1) LSD: the last significant digit is the smallest possible value to be displayed and corresponds to the resolution of the current measurement range.

2) The trigger error (RMS value) is computed as follows:

$$\Delta Ts = \sqrt{\frac{\left(V_{noise}^2 + V_{in\text{-}noise}^2\right)}{S}}$$

$V_{noise}$ = noise voltage in signal
$V_{in\text{-}noise}$ = internal noise voltage in amplifier
S (V/s) = pulserate-off-rise of the measured signal content at the trigger point