**Specification of Sonic Wave Belt Tension Meter U-507**

<table>
<thead>
<tr>
<th>Model</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-507</td>
<td>Graphic LCD screen, equipped with backlight, 46 types of belt, and unit mass preinstalled, Automatic gain control, 20 types of setting memory, Automatic trigger, and automatic power-off function</td>
</tr>
</tbody>
</table>

- **Measurement range**: 10Hz - 3,000Hz
- **Power supply**: Alkaline dry cell (AAA x 2)
- **Outer dimension**: 59 wide x 30 thick x 160 long (mm)
- **Mass**: 120g

**Accessory**
- Sonic wave microphone (Flexible arm type)
- Carrying case
- Alkaline dry cell (AAA x 2)

---

**Example of measurement**

**Example 1: Toothed belt**
- For 8YU tooth type x 20 mm wide, span length 250 mm
  - Input: M = 5.2 (unit mass per g/mm wide x m long)
  - W = 20 (mm wide), S = 250 (mm span length)
  - Relation between tension (N) and frequency (Hz)
    - 2.6N/ 10 Hz - 9.360 N/600 Hz

**Example 2: V-ribbed belt**
- For micro V/PK section x 5 ribs, span length 250 mm
  - Input: M = 21.0 (unit mass per g/rib x m length)
  - W = 5.0 (number of ribs), S = 250 (mm span length)
  - Relation between tension (N) and frequency (Hz)
    - 2.63N/ 10 Hz - 9.450 kg/ 600 Hz

**Example 3: Steel wire**
- For steel wire of diameter 0.6 mm, span length 50 mm
  - Input: M = 1.3 (unit mass per g/m length)
  - W = 1.0 (Enter 1 because steel wire is single.), S = 50 (span length)
  - Relation between tension (N) and frequency (Hz)
    - 0 N/ 10 Hz - 325 N/ 5000 Hz

---

**Measurement range**

**Power supply**

**Outer dimension**

**Mass**

**Accessory**

---

**Note in use**
- Read the operation manual carefully for proper use.
- Always make sure that the machine is stopped by turning off motor power or the like before measuring the tension.
- Use this product only for measuring the tension.
- Adhesion of water or grease to this product, or shock given to the unit by dropping may cause failure or malfunction. Use caution well enough in handling the unit.

---

**OPTION**

- **Tension meter certification device**: U-305-OS1
  - Special design for testing for certification of sonic wave belt tension meter (oscillation transmitter)
  - 0.1% or below
  - Sine wave
  - Within 1%
  - 20mV (P-P)
  - 50 mA (in outputting) 10 mA or below (in no outputting)
  - Dry cell (AAA x 4), AC adapter (DC 6V, 50 mA)
  - The same as U-305
  - 155 (W) x 46 (H) x 134 (D) mm
  - 300 g

---

**Cord type microphone**

- Outer diameter of microphone: 12.5 mm / Total length: 1 m / Measurable frequency band: 10 Hz - 5000 Hz

---

**Display screen renewed, featuring a lot of new functions. Belt tension meter easier to use.**

---

**Contact the following for inquiry and order.**

**HEAD OFFICE**
4-26 SAKURAGAWA 4-CHOME, NANIWA-KU OSAKA 556-0022, JAPAN
TEL: 06-6563-1284 FAX: 06-6563-1285

---

**GATES UNITA ASIA COMPANY**

---

**May 16, 2001 0.000000**
More user-friendly through
great upgrading of functions.
Higher functions are realized
at an improved cost/performance ratio

Sonic tension meter by Gates Unitta Asia.

Analyses belt tension with no contact
by analyzing acoustic wave.
Our innovative tension meter has been further upgraded.
(Patent pending)

Measurement of belt tension, closely related with the life of belt, has so far greatly depended on the measurer’s scent, and sometimes involved rather a significant individual difference in measurement result.

Now the sonic belt tension meter has been developed in order to allow anybody to make measurement easily and correctly. Acoustic wave (natural frequency) generated from a belt is captured by sensor, and is processed by high-performance computer. Belt tension is accurately displayed in digital mode.

Upon our customer’s request bigger LCD is equipped in U507, which shows extended information. It was developed again more friendly to users. It also incorporates a lot of new features such as improved sensitivity of microphone and extended area of frequency, and further realizes a cost/performance ratio greater than so far.

- **Measurement principle of belt tension**
  - **Overview**
    - When the belt stretched between pulleys is subjected to impact, it oscillates first with an irregular waveform containing high-frequency component and impact component, then progresses to a regular waveform (sinusoidal) to the belt. Such oscillation attenuates in a short time, and in addition the oscillation of high-order component is generated, therefore it was very difficult to capture the onset of basic waveform. However, a unique data processing system was developed which captures oscillation frequency making full use of microcomputer, which attained this purpose. Calculation formula contained in the program enables display of accurate tension.
    - [Patent No. 1051716]
  - **Measurement step**
    - Gain adjustment (automatic canceling of background noise)
      - This unit measures the surrounding noise environment periodically after power-on until pressing of "DIAGNOSIS" button, and automatically adjusts the sensitivity of microphone. Press "DIAGNOSIS" button to test the sensitivity of microphone.
    - Detection of vibration waveform
      - The microphone detects sonic wave which was generated by flipping the static belt with a finger.
    - Removal of noise component
      - Belt-coated fiber automatically removes noise component.
    - Measurement of cycle
      - Cycle measurement/actual measurement every cycle of input waveforms
    - Signal processing
      - Measures basic vibration by oscillation system which differs from condition to condition and data processing established in simulation.
    - Frequency conversion process
      - Converts continuous sine waveform into frequency.
    - Tension calculation process
      - The unit converts belt tension when unit weight, width, and span length of corresponding belt are input with numeric keypad.
  - **Calculation formula**
    - Tension (N) = \( F \cdot w \cdot s \cdot f \cdot P \)
    - M: Unit mass (for belt. Per g for wire, Per mm for wire)
    - W: Width (for belt. Input the width in mm. For wire, input "1" which represents "1 place")
    - S: Measuring span length (mm)
    - P: Primary inherent frequency of belt (Hz) measured by sensor

- **New functions**
  - **Mounting graphic LCD.**
    - By mounting a graphic LCD U507 is capable of displaying for far a greater information volume than the conventional unit.
    - Dual displays of measured tension and frequency
    - Dual display of measured value and standard tension (target value)
    - Triple display of unit mass, belt width, and span

  - **Backlight Equipped**
    - LCD newly equipped with backlight has further improved workability in darkness, etc.

  - **Unit mass of timing belt is preinstalled.**
    - Conventional model (U-505) used a system to input unit mass manually for each belt type, but U-507 displays unit mass in a moment when a belt type is specified. (Manual input is also accepted.)

  - **Automatic cancellation of background noise by automatic gain adjustment**
    - Noise environment around is measured and microphone sensitivity adjusted automatically after input of power unit. "MEASURE" button is pressed. Microphone sensitivity is fixed by pressing "MEASURE" button.

  - **Microphone performance improved**
    - Microphone sensitivity in low frequency range has been improved.
    - It is effective in measuring high frequency area of short span of belt, wire, etc.

  - **Measurement frequency area extended**
    - Conventional model (U-505) used a measurement frequency up to 1000 Hz at the maximum. U-507 accepts up to 1000Hz at the maximum. It is effective in measuring high frequency area of short span of belt, wire, etc.

  - **Data selecting function enriched**
    - Data selecting function to save input data is expanded to 20 types. (10 types of conventional model (U-505).)

  - **Automatic trigger function**
    - Protection of input data by mounting EEPROM.
    - Saving energy by automatic power-off function (It turns off automatically in about 5 minutes.)

  - **Ready for measurement in narrow space**
    - Sensor unit (microphone) is a tiny small single microphone, which allows easy measurement in narrow space. (Compatible to U-305 and U-505)

  - **Light-weight and compact design for mobility.**
    - This model is designed light and compact easy to carry, and uses only basic battery. It allows easy measurement in various sites, and helps the users keep the maintenance of equipment, etc.