Gates Unitta Asia

Sonic Tension Meter
U-507

CAT.512

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

UNITTA COMPANY

Division of GATES UNITTA ASIA COMPANY

More user-friendly through great upgrading of functions. Higher functions are realized at an improved cost/performance ratio Sonic tension meter by Gates Unitta Asi

Analyzes 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.

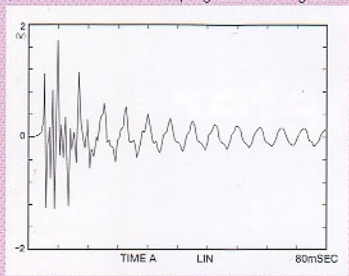
[Design right pending]

■ 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 intrinsic 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 so far to capture the cycle 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. 1931781]

●Oscillation attenuation progress of timing belt



Measurement step

1. **Gain adjustment (automatic canceling of background noise)**
   This unit measure the surrounding noise environment periodically after power-on until pressing of "MEASURE" button, and automatically adjusts the sensitivity of microphone. Press "MEASURE" button to fix the sensitivity of microphone.
2. **Detection of vibration waveform**
   The microphone detects sonic wave which was generated by flipping the static belt with a finger.
3. **Removal of noise component**
   Self-contained filter automatically removes noise component.
4. **Measurement of cycle**
   Cycle measurement circuit measures every cycle of input waveform.
5. **Signal processing**
   Measures basic waveform by oscillation pattern which differs from condition to condition by data processing established in simulation.
6. **Frequency conversion process**
   Converts continuous stable waveform into frequency.
7. **Tension calculation process**
   The unit converts belt tension when unit weight, width, and span length of corresponding belt are input with numeric key.

● Calculation formula

Tension: $To = 4 \times M \times W \times S^2 \times f^2 \times 10^{-9} N$

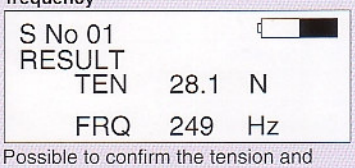
M: Unit mass (For belt: Per g/1m L x 1 mm W, For wire: Per 1m length)
W: Width (For belt: Input the belt width in mm. For wire: Input "1" which represents "1 piece".)
S: Measuring span length (mm)
f : Primary intrinsic frequency of belt (Hz) measured by sensor

New functions

Mounting graphic LCD.

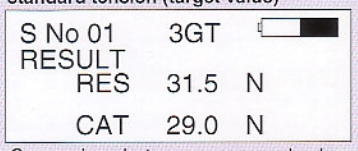
By mounting a graphic LCD U507 is capable of displaying by far a greater information volume than the conventional unit.

Dual displays of measured tension and frequency



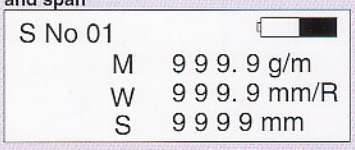
Possible to confirm the tension and frequency at the same time.

Dual display of measured value and standard tension (target value)



Comparison between measured value and standard tension (target value) is enabled. (Timing belt only)

Triple display of unit mass, belt width, and span



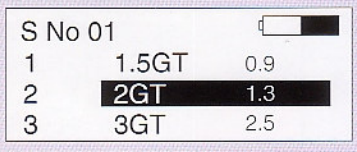
Input data can be checked at a glance.

Backlight Equipped

LCD newly equipped with backlight has further improved workability in darkness, etc.

Unit mass of timing belt is preinstalled.

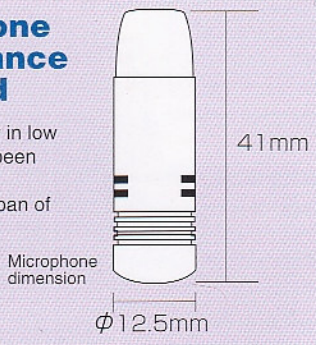
Conventional model (U-505) used a system to input unit mass manually for each belt type, but U-507 displays unit mass in a moment when a belt type is specified. (Manual input is also accepted.)



Data is already input of timing belt 30 types and V-belt 16 types.

Microphone performance improved

Microphone sensitivity in low frequency range has been improved.
It is effective in long span of large-size belt, etc.



Measurement frequency area extended

Conventional model (U-505) used a measurement frequency up to 1000 Hz at the maximum, but while U-505 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 cancellation of background noise by automatic gain adjustment

Noise environment around is measured and microphone sensitivity adjusted automatically after input of power until "MEASURE" button is pressed. Microphone sensitivity is fixed by pressing "MEASURE" button.

Basic specification of U-505 remains the same.

- Automatic trigger function
- Protection of input data by mounting EEP-ROM
- 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)

Traceability system established

The sonic wave belt tension meter series compares the change of sonic wave taken from the microphone with the basic transmitter built in the body thereby measuring the frequency (while measurement of absolute for sonic pressure is impossible, which is affected by deterioration of vibration receiving film of microphone). Data is processed digitally. Therefore this model is free from drift of value due to deterioration with time and wear and abrasion associated with use, and requires no periodic inspection in principle. However, traceability system of measuring instrument which is essential for acquiring ISO 9000 is established and system is arranged to issue an inspection result report and traceability certificate. Calibrator is also available to be provided.

Light-weight and compact design for mobility.

This model is designed light and compact easy to carry, and uses only usual battery. It allows measurement of tension in various sites, and helps the users keeping maintenance of equipment, etc.

Specification of Sonic Wave Belt Tension Meter U-507

Model	U-507
Feature	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
Measurement range	10Hz~5,000Hz
Power supply	Alkaline dry cell (AAA x 2)
Outer dimension	59 wide x 26 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: Timing 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 - 325N/ 5000 Hz

Note) Tension calculation system and input capacity: $To = 4 \times M \times W \times S^2 \times f^2 \times 10^{-9}N$ [M = 000.0g/m, W = 000.0 mm/#R, S = 0000 mm]

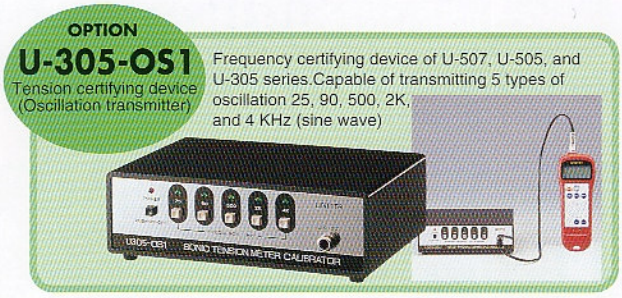
■ Note in use

- 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

Model	Feature	Transmission frequency	Frequency angle	Output waveform	Distortion factor	Out voltage	Current consumption	Power supply	Outer dimension	Mass	Use environment
Tension meter certification device U-305-OS1	Special device for certifying the frequency of sonic wave belt tension meter (oscillation transmitter)	5 points of 25 Hz, 90 Hz, 500 Hz, 2 kHz, and 4 kHz	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	300g	-10 to 50℃ Below 80% (Free from condensation)

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



Contact the following for inquiry and order.

GATES UNITTA ASIA COMPANY http://www.unitta.co.jp/

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

ISO14001 EG-045

December 20, 2004 1,000 part .D

TOKYO branch 2-1 GINZA 8-CHOME CHUO-KU TOKYO 104-0061 ,JAPAN
TEL:03-3572-4031 FAX:03-3572-3354
NAGOYA branch 17-23 MEIEKIMINAMI 1-CHOME NAKAMURA-KU NAGOYA 450-0003, JAPAN
TEL:052-589-1331 FAX:052-566-2006