Sonic Belt Tension Tester

AT-180S

User's Manual

Thank you for purchasing the product. To make it convenient for you to use the product, this manual offers a brief introduction to its various functions. Please read the manual carefully before using the product.

Overview

This instrument can be used to measure the vibration frequency (unit: Hertz) of the transmission belt when it is hit or moving fast.The tester uses a microphone mounted at the end of the measuring probe for measurement.After measuring in Hertz, the tester can use this data to calculate the belt tension in newtons.

NOTE: The operation of the is reliant on the correct belt informationbeing inputted.Please ensure the correct belt manufacturers' data is used.

Matters needing attention

•Avoid impact; any impact may cause instrument damage.

•Avoid splashing water, solvent or any other liquid on the instrument.

•Avoid placing the instrument in a dusty environment.

•Keep away from excessive heat. Do not expose it to strong directsunlight.

•Don't wash the instrument with volatile solvents.

•The probe is tubular structure. Do not use the probe bent into acute Angle.

Features

•Adjustable directional probe

•Stores up to 20 set frequency readings

•Maximum frequency: 680Hz

•Automatically powers-off after if not used for 5 minutes. Note: User canpower-off by pressing On/Off switch for 2s.

•Power source: 4 x AAA batteries. Install in the back of the instrument.

Panel shows:
As shown in the figure below

→ Adjustable direction probe

Components

1
6
2
7
3-1
3-2
4
8
5
9

AT-180S
Sonic Belt Tension Tester
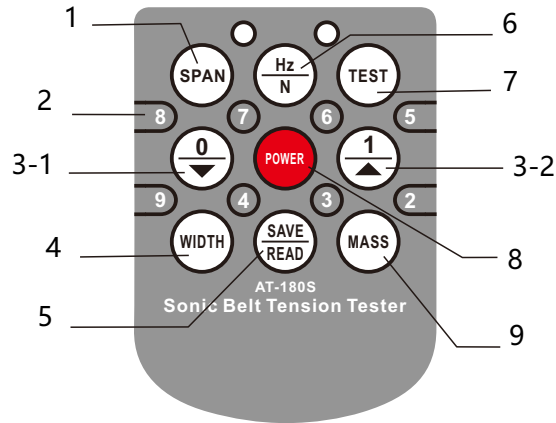
Ref	Description
1	Span Button (use to enter belt span in mm)
2	Numbers 2 to 9 Buttons
3	3-2 up /3-1 down roll
4	Width Button (use to enter belt width in mm, ribs or strands)
5	Save/preview button (on the start screen, short press the stored reading, according to measurement history - to long scroll history, please press the button 1 or 0) 1
6	Hertz Button (use to switch between hertz and tension (N))
7	Measure Button (use to start measurement)
8	on/Off Button (press & hold)
9	Mass Button (use to enter belt mass g/m)

NOTE:
The total tension of multiple ribs/strands is the product of the number ofbelts and the tension of a single belt.
The mass of multiple ribs/strands is the product of the number of belts andthe mass of a single belt if user is going to measure total tension of multipleribs/strands at once.

CALIBRATION
User Calibration

NOTE: for user calibration a tuning fork or sound generator will be required.Frequency generators are available free to download for mobile devicesfrom your mobile apps provider.

1. Press and hold the Power Button (POWER) to switch on the power, then press the Hertz Button (Hz/N) to enter the frequency measurement.
2.Press the Measure Button (TEST) to enter the test mode, and use the tester to measure the calibration source (e.g. tuning fork or tone generator).
3. Press Number Buttons 7 and 9 at same time,"CAL" will appear on thetop left corner of the LCD screen. Enter the calibration frequency beingused in Hertz (frequency must be between 10 to 680Hz).
4. Press the Measure Button (TEST) to save the calibration.

Restore Factory Calibration
1.Press and hold the Power Button (POWER) to switch on the power, then press the Hertz Button (Hz/N) to enter the frequency measurement.
2. Press the Measure Button (TEST) to enter the test mode.
3. Press Number Buttons 7 and 9 at same time to enter the calibration mode, and"CAL" will appear on top left of the LCD screen.
4.Press the Select Button (SAVE/READ) to restore the factory calibration setting.

Switching Between User and Factory Calibration
1. Press and hold the Power Button (POWER) to switch on the power, then pressthe Hertz Button (Hz/N) to enter the frequency measurement.
2. Press the Measure Button (TEST) to enter the testing mode, press Number Buttons 7 and 9 at same time to enter the calibration mode,and "CAL" will appear on top left of the LCD screen.
3.Press the Save/Preview (SAVE/READ) to use Factory Calibration, or press the Hertz Button (Hz/N) to use User Calibration figure.
4. If the meter is set to User Calibration mode, a capital "U" will appear on the top left of the LCD screen.

Battery Replacement
The instrument will auto power-off after 5 minutes without any operation.
The battery capacity is shown on the top right of the screen. it indicates theremaining battery power.
Full-dark icon means the battery capacity is full. Empty icon means batterypower is low.

Synchronous Timing Belts
Unit: g/m x mm2

HTD belt type	g/m
5M (9mm)	36.9
8M (20mm)	128.2
14M (40mm)	428.9

STPD	g/m
S8M (20mm)	110.9
S14M (40mm)	462

Wrapped v, Wedge and Banded belts

Single Belt	Banded Belt	g/m
Z (40mm)	51	n\a
A (75mm)	115	150
B (105mm)	193	260
C (175mm)	320	417
D (305mm)	669	870
SPZ (56mm)	76	n\a
SPA (71mm)	134	155
SPB (107mm)	223	272

Single Belt	V-Ribbed	g/m
SPC (200mm)	354	394
3V (61mm)	76	99
5V (171mm)	223	272
8V (315mm)	504	654
SPZ-XP (56mm)	79	n\a
SPA-XP (71mm)	122	n\a
SPB-XP (107mm)	202	n\a
SPC-XP (200mm)	350	n\a
3V-XP (61mm)	79	n\a
5V-XP (171mm)	202	n\a
Zx (40mm)	51	n\a
Ax (75mm)	115	153
Bx (85mm)	193	225
Cx (175mm)	320	398
XPZ (56mm)	76	n\a
XPA (71mm)	134	156
XPB (107mm)	223	279
XPC (200mm)	354	548
Vx (55mm)	76	102
Vx (110mm)	223	252

Switch on LCD Display


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 1 ─────   No  0      ▭▬▮ ───── 5
 2 ─────► Mas: 023.5   g /m
 3 ─────► Wid: 1.0     mm/R
 4 ─────► Spa : 0115   mm
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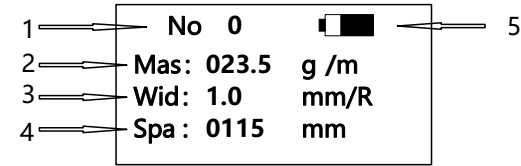
Ref	explain
1	No = A total of 20 some belt data:
2	Mas - mass of belt
3	wid = Width or group (default is 1.0 high torque belt input width)
4	Spa = span of belt being used for reading
5	Battery Capacity

Operation
IMPORTANT NOTE:
The belt information must be entered in to the instrument to obtain accuratetension readings.
The belt information can be obtained from the belt or vehicle manufacturer.The frequency will still be measured even if the wrong information has beenentered, however the tension value in N will be wrong. If the calculatedtension value is outside the display range of the screen, ERROR and a redlight will show on the dlisplay panel.
Belt Mass:
Mas = XXX_Xg/m.Please refer to belt manufacturer,vehicle manufacturer or the data tableprovided.Press Mass Button (MASS)then enter the value.Please ensure the decimal point vallue is correctly entered.Press Save/Preview (SAVE/READ) to return to the initiall screen.IInput range:0O0.1g to 999.9g.
Belt Width & Number of Ribs/Strands:
Wid - XDOX.XmmR,Enter the value from 000.1mm to 9999mm.For synchronous (timing) belts,please input the belt wiith (mm).For V-belts,enter the number of ribs or strands of the belt to be measured.NOTE: refer to the belt manufacturers data for rib/strand value.For example:f the width of HDT timing belt is 20mm, enter "020.0".If it"s a single strand V-belt,enter "001.0".For the measurement of multiple single belts or banded belts, please enterthe correct number of ribs or strands of belt.
Span Length
Spa = xXXXmm.The span length is the tangent length between 2 adjacent pulleys.Thedistance can be measured directly by measuring from the contact pointon one pulley to the contact point on the second. Input range: 000.1 to9999mm.

For more accurate results the spa length can be calculated using thefollowing formula

$$S=\sqrt{CD^2-\frac{(D-d)^2}{4}}$$

where:
s = span of tangent line (mm)
cD= distance between two gears (mm)
D= diameter of big pulley (mm)
d= diameter of small pulley (mim)

Note:Data Storage and Restore
Commend tester can store 20 groups of belt data: yesterday the king.The stored data can be reviewed bya long press of the Save/Preview (SAVE/READ) from the opening screen.To scrollthrough the saved data repeatedlly press theSave/Preview (SAVE/READ) until therequired data is shown or use the number buttons.The data shown can bechanged by pressing the WidthMass/Span Buttons and entering the newvalue.

Taking a Measurement
NOTE: for newly fitted belts please turn the belt system at least 3 rotationsto settle the belt before measuring.
1. Place the probe within 10mm of the belt and press the Measure Button(TEST).
2.Tap the belt to make it vibrate while maintaining the 10mm or less gap.Do not allow the probe to touch the belt.
3. The will show "Testing" on the screen.。
4."Calculating" will be shown on the screen when a reading has been taken.
5. The measured results will be shown when the buzzes once and shows a green LED. Note: if the screen shows a red LED this indicatesthe measured frequency or calculated tension is over the specified range.
6. For best results always take the average of 3 measurements.
7.To view the frequency or tension readings press the Hertz Button (Hz/N).

Error
If the calculated tension or measurement is over the specified range, thered LED will light up and Error indication will be displayed on screen.Please check mass/width/span length has been inputted correctly andrepeat the measurement until the tension has appeared.Please obtain 3measurements at least, for contrast. lIf the 3 results are close to each other,the measurement is correct.
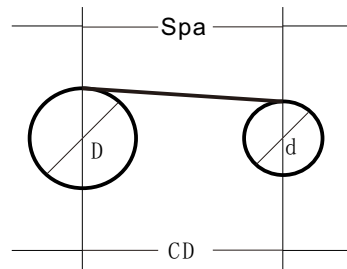
In low tension ranges, a bigger vibration may be generated more easily,which may cause measurement errors. If the tension value cannot beobtained, the belt may be too loose to make a clear frequency signal.Formore accurate tension values, try to tighten the belt.

Measurement tips:
Minimum Span Length
When measuring a synchronous belt, the span length must be more than 20times the length of the pitch of the teeth.
when measuring a V-belt,the span length has to be more than 30 times oftop width of the belt.
New Belt Installation
For newly installed belts, please rotate the pulley system by hand severaltimes before taking any measurement.
Windy Environment
The noise from a windy environment may affect the sensor, please avoidwindy environments.
Non-Standard Belt Measurement
Since the instrument is designed for standard belts, measurement of somenon-standard belts (for example: belts with thicker backs or made fromother materials) may cause incorrect results. For such conditions,the userwill need to calibrate the frequency and tension of the belt.
To calibrate, the user will nced to place the belt on a fixture with a knownspan length.By hanging different welghts on the belt, the user can varythe tension with known tension values.By repeating this procedure, theuser will be able to collect the information of frequency vS tension withvarious span lengths. By referring to this information, the user will know thecorresponding tension with the frequency measured from the instrument.Beaware,the user must use the same span length as the test fixture.

THEORY
The calculation and measurement is based on " "transverse vibration of astring"theory.Thewill capture the vibration of the belt, and recordit as a frequency. By entering the mass, width and span length, the relationship between frequency and tension can be found by the followingformula:
$T=4\times M\times W\times S^2\times F^2\times10^{-9}$
Where:
T= tension of span length (N)
w = width (mm) or number of ribs or strands
S = span length (mm)
F = frequency (Hz)