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**5900-HZ18**  
**LASER BELT TENSION METER**  
**OPERATION MANUAL**

PLEASE SCAN QR CODE TO  
WATCH THE OPERATION  
VIDEO OF PRODUCTS.



## FEATURE

The laser belt tension meter can measure the belt tension of motor and other machines quickly.

- ◆ Laser sensor, direct measurement, easy to use
- ◆ Two sensors: internal and external, external sensor is suitable for measurement in narrow spaces
- ◆ Automatic power off

## SPECIFICATION

The meter can measure the natural vibration frequency of the belt through the emission and reception of the laser, and then calculate the tension value of the belt by combining the input belt mass and the free belt length.

Measurement range: 10~800Hz  
 Input range : max free belt length 99.99m  
                   max belt mass 9.999kg/m  
 Digital sampling error: <1%  
 Display error: ±1Hz  
 Total error: <5%  
 Operating temperature range: 10~50°C  
 Transportation temperature range: -5~70°C  
 Display: LCD  
 Unit: metric: m, kg/m, N  
       imperial: inch, lbs/foot, lbf  
 Optical path measurement distance: 3~20mm  
 Depth of external sensor: about 66mm  
 Power supply: 4×1.5V battery  
 Dimension: main unit: 178x72x34mm  
               external sensor: 124x21x12mm  
 Weight: 180 g (not including battery)



**Note: If the belt has good light absorption and the product does not have a reading during measurement, please attach reflective paper to the belt before measuring.**

## DESCRIPTION



- |                       |                             |
|-----------------------|-----------------------------|
| 1 MENU/ENTER/EXIT key | 7 battery cover on the back |
| 2 UP key              | 8 DOWN key                  |
| 3 LENGTH key          | 9 MASS key                  |
| 4 external sensor     | 10 POWER key                |
| 5 sensor interface    | 11 internal sensor          |
| 6 display             |                             |

## OPERATION INSTRUCTIONS

1. Installation and replacement of batteries  
 When the battery power is insufficient, "Low Battery" indication is displayed, indicating that the battery must be replaced. Measurement error will be caused when the battery power is low.  
 Open the battery cover, remove the batteries. Install new ones, and pay attention to the correct polarity direction of the batteries.  
 Close the battery cover.

### NOTE:

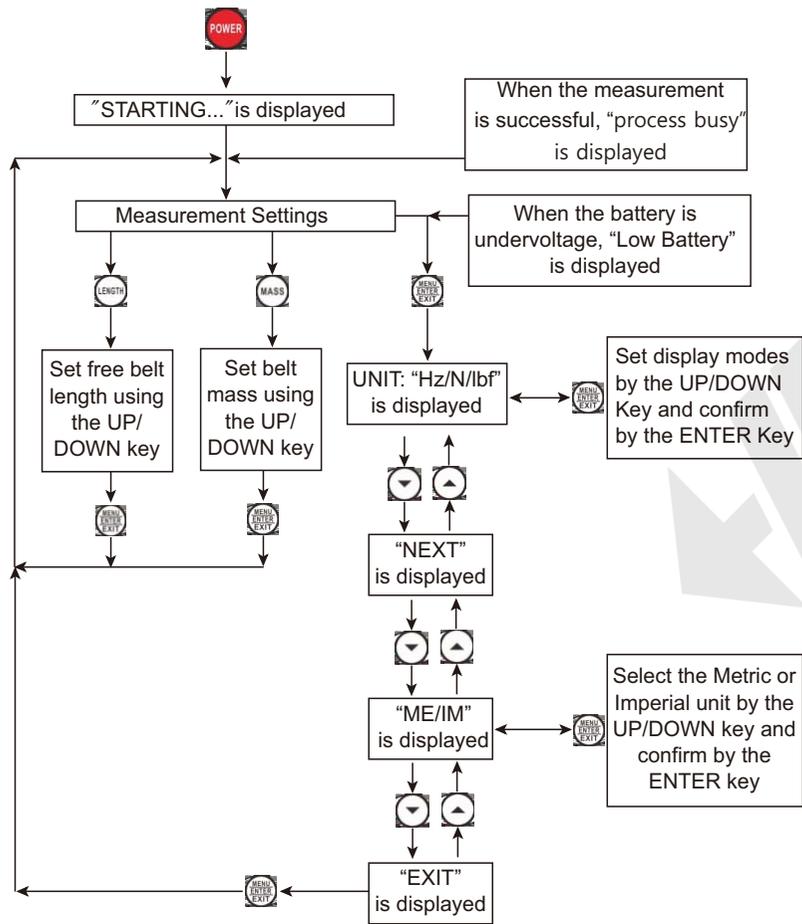
- \* When the battery power is too low. Please replace the batteries immediately to prevent further leakage.
- \* When you do not use the tester for a long time, please take the battery out of the tester to avoid damage of battery leakage.

2 Power On And Power Off The Tester

2.1 Power On Press the POWER Key to power on the tester, and 'STARTING...' will be displayed.

2.2 Power Off After power on, if there is no key operation within 3 minutes, the instrument will automatically power off. To turn it off manually, press and hold the POWER Key for about 5 seconds.

3. Setting before measurement



4. Measuring belt tension

4.1 Measuring the frequency of the belt

Press the POWER key to power on the tester, and set the measurement unit to "Hz" according to the steps in 3.

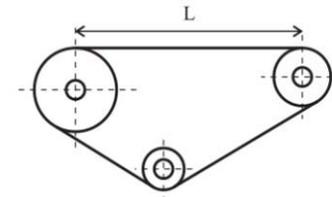
Make sure that the belt is stationary. Align the laser of the measuring probe with the middle position of the belt, and the distance between the probe and the belt shall be within 3~20 mm.

Tap the installed tension belt to make it vibrate at natural frequency, and the screen displays "process busy". Then the measuring probe can detect the static natural frequency with pulse light.

When the measured values are displayed in Hz, the belt mass and length are not required to be input.

4.2 Measuring belt tension

Press the POWER key to start the tester, set the measurement unit to N/lbf according to the steps in 3, and input the belt mass and free length (the belt length between the center points of two driving wheels). The free length L of the belt is as shown in the figure.



Make sure that the belt is stationary. Align the laser of the measuring probe with the middle position of the belt, and the distance between the probe and the belt shall be within 3~20mm.

Tap the installed tightening belt to make it vibrate at natural frequency, and the screen displays "process busy". Then the measuring probe can detect the static belt tension with pulse light.

NOTE:

- \*The belt tension can only be measured when the belt is stationary.
- \*In several measurements, the measurement results will fluctuate within  $\pm 10\%$  which is not caused by measurement error or mistake. In most cases, it is caused by the mechanical tolerance of the driving system.

5. Calculate the tension value based on the natural vibration frequency of the belt

In order to calculate the tension value, it is necessary to input the mass of the belt and the free length of the belt as described in 3. The belt tension meter calculates the tension value of the belt according to the following formula :

$$T = 4 \times m \times L^2 \times f^2$$

Parameters:

T = belt tension (N)

m = mass of belt (kg/m)

L = free belt length (m)

f = belt natural vibration frequency (Hz)

The following table lists some examples of standard belts:

Ribbed V-belts	PJ = 0.082	PL = 0.320	
	PM = 1.100		kg/m per 10 ribs
V-belts	SPZ = 0.074	SPA = 0.123	
	SPB = 0.195	SPC = 0.377	kg/m per belt
	10 = 0.064	13 = 0.109	
	17 = 0.196	20 = 0.266	
	22 = 0.324	25 = 0.420	
Power belts	32 = 0.668	40 = 0.958	kg/m per belt
	SPZ = 0.120	SPA = 0.166	
	SPB = 0.261	SPC = 0.555	kg/m per rib
	3V/9J = 0.120	5V/15J = 0.252	
Polyurethane toothed belts	8V/25J=0.693		kg/m per rib
	T 2.5 = 0.015	T 5 = 0.024	
	T 10 = 0.048	T 20 = 0.084	kg/m per 10 mm width
	AT 3 = 0.23	AT 5 = 0.034	
	AT 10 = 0.063	AT 20 = 0.106	kg/m per 10 mm width

NOTE:

\* In order to measure the belt quality more accurately, we suggest to measure the quality of one meter belt.

\* The numerical calculation of Newton or pound contains the square parameter, which will cause higher error.

6 Calculating the tension setting value of the toothed belt

If the mechanical supplier does not provide the belt tension setting values, the approximate value can be calculated by the following formula,

$$F = \frac{540 \times P \times 1.3}{z \times v} + m \times v^2$$

Parameters,

P = engine power (kW)

z = number of teeth on pinion

v = belt speed =  $D \times n / 19100$

D = effective diameter of pinion (mm)

n = speed of pinion (rpm)

$m \times v$  = centrifugal force (related to the speed of 800 rpm)

m = mass of belt (kg/m), as shown in the table

NOTE!

In addition to the optimal stranding force, the allowable axial load of the bearing shall also be considered, axial load

$$F_a = 2 \times \text{stranding force.}$$