TIMKEN BELTS

TECHTIPS

Performance Driven. Performance Proven.

Frequency-Finder™

Tension your belts at the speed of light!

Overview

The Frequency-Finder (part number 109061) is an electronic instrument that precisely measures the static tension in synchronous, v-belts and v-ribbed belts. It consists of a hand-held, laser-operated sensor that is cable-connected to the gauge body. A microprocessor converts the signal from the sensor to a reading of belt vibration Frequency (Hz) on an LCD display.

Operating Principle

The Frequency-Finder works on the principle of forced vibration. The frequency of vibration is directly related to the tension of the belt, i.e. the higher the frequency reading, the higher the belt tension.

When the free span of a belt is plucked, tapped, or struck it will vibrate at a frequency known as its "natural" frequency.

The frequency is a function of the static belt tension, the belt mass, and the length of the free belt span according to the following relationship:

$$T = 0.0104 \times K \times L^2 \times F^2$$

Where:

T = static belt tension (lbs)
K = weight per inch of belt length (lbs/in)*
L = length of the free belt span (in)
F = natural frequency of the belt span (Hz)

*Specific weight values for standard Timken Belts are shown in the table to the right.

Specific Weights of Timken Belts

Belt Type	lbs/in • mm
3M	0.000154
5M	0.000242
8M	0.000332
14M	0.000685
8MPT	0.000293
14MPT	0.000575
20MPT	0.000885
D8M	0.000408
D14M	0.000726
8MXT	0.000293
14MXT	0.000575

Belt Type	lbs/in • in
MXL	0.002057
XL	0.003556
L	0.005817
H	0.005385
XH	0.016612
XXH	0.022403
XL DD	0.003000
L DD	0.004255
H DD	0.006806

lbs/in • mm = Pounds / inch (of length) per millimeter width

lbs/in • in = Pounds / inch (of length) per inch width

lbs/in Rib = Pounds / inch (of length) per rib

lbs/in = Pounds / inch (of length)

PV	lbs/in Rib
J	0.000500
L	0.001800
M	0.006566

Belt Type	lbs/in
A	0.006955
B	0.010529
C	0.017774
D	0.035258
AX	0.006569
BX	0.009177
CX	0.016325
DX	0.036996
A-R	0.006955
B-R	0.009563
C-R	0.020189
3VX	0.005313
5VX	0.012075
8VX	0.028496
3V	0.005313
5V	0.012074
8V	0.028496
AA	0.008308
BB	0.013173
CC	0.023766

Drive Engineer®

A reliable and practical method of determining the recommended frequency range for a drive is to use the Drive Engineer web app. The app works on desktop, iPhones/ iPads and android devices and calculates the required minimum and maximum static belt tension levels and the corresponding frequency levels for a specific set of drive parameters. Drive Engineer can be accessed at **www.driveengineer.com**

Battery Installation

The Frequency-Finder is shipped with a 9-volt alkaline battery packaged separately. Follow this procedure to install the battery:

1. Turn the gauge over. Using your forefinger press down on the battery compartment latch located just above the belt clip and pull the battery compartment cover towards you and off.
2. Install the battery being sure that the terminals are completely attached.
3. Replace the cover by inserting the two plastic tabs into the slots at the base of the compartment and press forward until the latch clicks shut.

Operational Use

1. Calculate the desired frequency range for the belt drive. This is generally accomplished by determining a minimum and maximum belt static tension and then calculating the corresponding minimum and maximum frequency levels for these tensions.
2. Switch on the unit by pressing the on/off button located on the keypad. The laser light will now be visible.
3. Tap or pluck the free belt span so that it begins to vibrate. Hold the laser probe at a distance of 1/2 inch above the free belt span with the laser light directed at the belt as shown below.

   Hint: On drives with long free belt spans or low tension you may have better success by tapping the belt very lightly and taking the reading near one of the pulleys.
4. Successful measurement is acknowledged by an audible beep.
5. The vibration frequency is displayed in Hz on the LCD display. Compare this reading to the desired frequency range for the drive. If the reading is below the desired range, tighten the belt. If the reading is above the range, the belt is too tight.

⚠ CAUTION

Failure to observe the following cautions could create a risk of serious physical injury or property damage. Follow all of the equipment manufacturer's safety recommendations, procedures and specifications.

WARNING: All measurements and adjustments must be made with the belt at standstill. Disconnect and lock out the power source. Observe all safety procedures. Follow recommendations of the equipment manufacturer.

Frequency-Finder™

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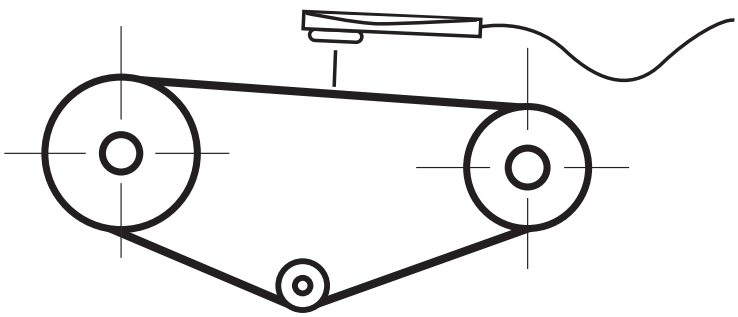
- K = weight per inch of belt length (lbs/in)
- L = length of the free belt span (in)
- F = natural frequency of the belt span (Hz)

on / off

TIMKEN BELTS



Troubleshooting

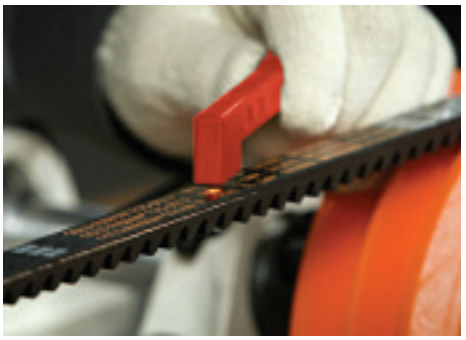
Measurement deviations of up to ± 10% for several measurements taken on the same drive belt are, as a rule, not caused by a measurement error or fault in the unit. In most cases, measurement deviations are due to the mechanical tolerances of the drive systems. If no measurement results are displayed despite careful preparations, this may be due to one of the following reasons:

1. The belt is vibrating below the minimum measurement limit of 10 Hz. This may occur on drives with low static belt tension, very long free span length, belts with heavy mass or a combination of these factors. This can be verified by calculating the frequency for the specific drive parameters.
2. Either no or low measuring values are displayed despite the drive belt being correctly tensioned. It may be that the light from the measuring probe is not sufficiently reflected. Simply pointing the light at the belt brand may be sufficient to obtain a reading. If this doesn't work then affix a piece of light-colored reflective tape to the belt or slightly moisten the belt at the measuring point.
3. Bright fluorescent lights will sometimes affect frequency readings. The effect will usually be obvious because frequency readings will be 120 HZ (+/- 10 HZ). Readings may sometimes even occur without pointing the probe at the belt. This situation can be easily resolved by shading the belt from the light source.

Specifications

Measuring range 10 – 400 Hz
Digital sampling error < 1%
Indication error ± 1 Hz
Total error < 5%
Nominal temp. 68 °F (20 °C)
Operating temp. 50 to 122 °F (10 to 50 °C)
Max. storage temp. 23 to 158 °F (–5 to 70 °C)
Gauge body material Plastic (ABS)
Dimensions, body 3.15 in. x 4.96 in. x 1.47 in (80 x 126 x 37mm)
Dimensions, case 8.9 in x 7.0 in x 2.0 in. (226 x 178 x 50mm)
Display 2-line LCD, 16 char./line
Free span length, max. 30 ft. (10 m)
Belt density, max. 10 kg/m
Power supply 9 volt alkaline battery

Note: The Frequency-Finder is calibrated at the factory and ordinarily will require no further calibration maintenance.



Training Video

View the helpful video on how to use the Frequency-Finder at:
https://youtu.be/sIYYUXIW2R0

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Timken Belts is part of The Timken Company's growing portfolio of engineered bearings and power transmission products. A manufacturer of premium performance power transmission belts, Timken Belts' associates and products help keep industry in motion and the world more productive.

www.timkenbelts.com