

Technical information for belt tension meter 22100



General:

The belt tension meter is used to perform a pre-tension test on commercially available belt systems quickly and easily by means of frequency measurement.

Fully electronic and equipped with state-of-the-art microprocessor technology, the meter enables precise adjustment of all V, toothed and flat belts that have to be tensioned within the 10 to 600 Hz range. As an acoustic principle is used, the belt type, colour and material have no influence on the readings.

The oscillating string principle is applied. The oscillating frequency of the natural vibration of a belt when stimulated by an impulse is in defined relationship to the tension of the belt. The higher the frequency of the stimulated belt, the higher the belt tension.

!! Safety warning

The measurement must never be carried out on a running drive. Before starting the measurement, ensure that the drive is switched off and secured against unintentional activation.

Display:

The meter is equipped with an easy-to-read 2 x 8 digit LCD display. In addition to the measurement result, other important information can also be read here.

Sensor:

The sensor is plugged directly into the housing. This enables one hand operation of the device. For measurements in inaccessible positions, the supplied extension cable can be attached between the device and the measuring head.

Power supply:

2 commercially available 1.5V type Micro batteries (AAA cells) are used. Please ensure adequate quality to guarantee a longer operating duration.

Operating instructions:

Press the left-hand button to switch the device on. The display shows „-----“. The device is now ready for use. If „L.B.“ appears instead of the dashes, the batteries must be replaced. After „L.B.“ appears, the device can still be operated for ca. 4 hours. Auto-power off: Automatic switch-off after 2 minutes of inactivity.

Calculating the strand tension:

The calculated oscillation frequency corresponds to the relationship:

$F_v = 4 \cdot m \cdot L^2 \cdot f^2$	$F_v =$ Preload force	[N]
	$m =$ Belt weight per metre	[kg/m]
	$L =$ Vibrational belt length	[m]
	$f =$ Belt vibration frequency	[Hz]

Measurement:

After installation, the drive should be rotated a few times by hand so that the belt settles completely and any differences in belt tension are compensated for before measurement.

Hold the measuring head of the device over the back of the belt (ca. 10 mm). The measurement should always be taken in the middle of the free strand length. In contrast to „free strings“, toothed belts have a certain lateral stiffness depending on the belt width. This can lead to results that are higher than the actual belt tension, especially with very short strand lengths. The measurement should therefore preferably be made on strand lengths that are more than twenty times as long as the belt pitch.

Strike the belt with your hand or a suitable tool (e.g. screwdriver handle, hammer handle); the meter will now start measuring.

After the measurement is completed, the results are displayed. Other information about the measurement is also displayed. The quality of the result is rated by a number between 1 and 4. A 1 means that only one successful measurement cycle was performed. Several measurements should be taken.

Where a 2 or higher is displayed, several successful measurements were taken and a statistical mean value was calculated. These measurements are very accurate and safe. Additional measurements are taken automatically as long as the sensor continues to receive signals. If an E appears after the number, one of the measuring cycles was outside the tolerance limit. This measurement should also be repeated. To clear the display, the reset button [ON] must be pressed.

Tension measurement on special belts:

Measuring the tension of belts with special constructions (e.g. back belt reinforcement, special rubber compounds, etc.) can lead to inaccurate results if the unit weights for standard belts are used for frequency calculation. In these cases, a simple calibration procedure can be used:

Mount the belt between two clamping plates and apply different tensions (e.g. by attached weights).

By measuring the frequency at different tensions, it is possible to display the strand frequency as a function of the tension values. This data can then be used to convert the measured strand vibration frequencies into the corresponding belt tensions. The data determined in this way is belt-specific and must not be transferred to drives with other belts or strand lengths.

Measurement problems:

Wind can adversely affect the tension meter results, as wind can generate excessive background noise. When measuring in a windy environment, the sensor should be protected (e.g. by using a protective screen). Very long free strand lengths lead to low vibration frequencies (<10 Hz) with large amplitudes, which are very difficult to measure and may be outside the measuring range.

In these cases, the belt should be fixated by suitable support elements over a defined distance of e.g. 1m, in order to reduce the vibration length and amplitude or to increase the frequency.

If no display appears despite repeated striking, this can have several causes:

- The belt vibrates outside the specified frequency range.
- There is an acoustic noise source within the measuring range of the measuring device, which is in the frequency range of the measurement.
- The belt has little or no vibration.

Warning!

- The belt tension meter is not approved or certified for use in potentially explosive working areas.
- Do not drop the device. Shocks of any kind can cause damage.
- Do not bring the device into contact with water, solvents or other liquids.
- Do not use volatile solvents for cleaning.
- Protect the device from dust and dirt.
- Do not expose the device to high temperatures or direct sunlight (e.g. storage in an automobile).

Technical data:

Measuring range:	10 - 600Hz
Measurement accuracy:	10 - 400Hz \pm 1% / >400Hz \pm 2%
Resolution:	10 - 99,9Hz: 0,1Hz: 1Hz
Measuring method:	Contactless (acoustic with electronic noise suppression)
Power supply:	2 x 1.5V Micro (AAA cells)
Operating duration:	> 48h Continuous measurement (depending on the quality of the batteries used). Automatic switch-off after 2 minutes inactivity.
Power consumption:	Max. 12mA
Display:	Two-line LCD, 2 x 8 digits
Dimensions:	Ca. 90 x 50 x 27 mm
Weight:	Ca. 100g (without batteries or microphone)

Calibration:

The device is calibrated during the final inspection. Further calibration is normally not required. However, a factory calibration can be requested from us if further calibrations are prescribed by internal guidelines. This involves checking the unit at defined measuring points within the measuring range and confirming the results in a calibration record.