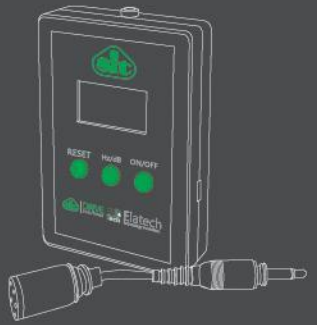
TEN-SIT®-C 皮带张力仪

使用说明书

INSTRUCTION MANUAL



产品简介

TEN-SIT®-C 是一款皮带张力电子测量仪，用于对所有类型的皮带传动进行正确的张力调整。其操作原理是基于皮带张力和皮带本身振动频率之间的关系。TEN-SIT®-C 因为具有柔性麦克风，因此能够准确测量所有皮带的张力。升级版增加了噪音测量功能。

产品特点

- 可靠性和精密度
- 适用于所有类型的皮带
- 方便且通用
- 轻便小巧
- 频率感应范围 8 ~600 Hz
- 单向麦克风
- 噪音感应范围 40~120dB

操作说明

1. 确保传动装置为静止状态。
2. 检查探头与测量仪连接。
3. 按下 "ON" 按钮，启动装置。
4. 将探头放置在尽可能靠近位于跨距中点 "L_f" 的皮带背面，振动时不会接触到皮带。
5. 使用手指拨动皮带或使用外力轻度敲击皮带，直至振动即可。
6. 一旦听到声音信号，读取显示器上的频率值 (Hz)。装置能够识别和区分皮带振动和背景噪声之间的差异。
7. 显示器将会显示频率值。
8. 安装“多个皮带”传动装置时，分别测量每个皮带，并采用平均值。
9. 如果仪器未检测到频率值，必须更好地对准麦克风，将其靠近皮带，重复测量。
10. Hz/dB 键可切换频率或噪音测量功能。
11. 按 RESET 键数值归零。

计算方法

- 皮带张力和频率之间的关系

$$T = 4 \cdot M \cdot L_f^2 \cdot f^2 \qquad f = \frac{1}{2 \cdot L_f} \sqrt{\frac{T}{M}}$$

其中：

T = 静态皮带张力 [N]
M = 线性皮带质量 [kg/m] (1)
L_f = 皮带跨度距离 [m]
f = 皮带跨度振动频率 [Hz]

使用（上述）公式，可以简单地计算出所有皮带传动所需的频率。如果所示测量值小于计算值，皮带需要进一步拉紧，但是，如果测量值大于计算值，则松弛传动装置。在这两种情况下，都要再次测量。

※ 注：有必要负载运行传动装置约 1 或 2 分钟，然后使用 TEN-SIT®-C 确认张力值，如有必要，重新拉紧。当您已完成使用 TEN-SIT®-C 测量仪，长按 “OFF” 按钮直至听到两个声音信号。

- 计算示例

皮带： 3150 HPPD Plus 14M 55

线性皮带质量	(0,421/40)·55 = 0,579 [kg/m] （从质量表中获取数值）
张力 T	2150 [N] （张力值 T，传动装置停止，皮带轮空转，沿着整个皮带保持恒定）
皮带跨度距离 L_f	0,65 [m]

必须在 TEN-SIT®-C 测量仪上获得和读取的正确频率值为：

频率 $f = \frac{1}{2 \cdot L_f} \sqrt{\frac{T}{M}} = \frac{1}{2 \cdot 0,65} \sqrt{\frac{2150}{0,579}} = 46,9\,[\mathrm{Hz}]$

为确定皮带的张力值，TEN-SIT®-C 所示的该皮带频率为 53 Hz，使用以下公式：

张力 $T = 4 \cdot M \cdot L_f^2 \cdot f^2 = 4 \cdot 0,579 \cdot 0,65^2 \cdot 53^2 = 2749\,[N]$

* 参考常见皮带类型的线性质量表，获得线性皮带质量。

INTRODUCTION

TEN-SIT®-C is an electronic belt gauge, used for the correct tensioning of all types of belt drives. Its operating principle is based on the relationship between belt tension and the vibration frequency of the belt itself. **TEN-SIT®-C** is able to accurately measure thetension of any belt due to its flexible microphone. The upgraded version adds noise measurement function.

CHARACTERISTIC

- Reliability and precision
- Handy and versatile
- Frequency sensitivity range 8 ~ 600 Hz
- Noise sensitivity range 40~120dB
- Suitable for any kind of belt
- Light and compact
- Unidirectional microphone

OPERATING INSTRUCTIONS

1. Ensure the drive is stationary.
2. Check that the probe is connected to the gauge.
3. Press the **"ON"** button to start the unit.
4. Place the probe as close as possible to the back of the belt at mid span **"L_f"** without touching it when it vibrates.
5. Use fingers to move the belt or gently knock the belt with external force until it vibrates.
6. Read the frequency value (Hz) on the display once the acoustic signal has been heard. The unit is able to recognise and differentiate the differences between belt vibrations and background noise.
7. The display will show the frequency.
8. When installing "multiple belt" drives measure each belt individually and use the average value.
9. If the instrument does not detect a frequency value, it must better target the microphone, to bring it closer to the belt and repeat the measurement.
10. Switch the frequency or noise measurement function by **Hz / DB key**.
11. Press the **RESET** key to return the value to zero.

CALCULATION

- RELATIONSHIP BETWEEN BELT TENSIONAND FREQUENCY

$$T = 4 \cdot M \cdot L_f^2 \cdot f^2 \qquad f = \frac{1}{2 \cdot L_f} \sqrt{\frac{T}{M}}$$

In which:
T = Static belt tension [N]
L_f = Belt span lenght [m]
M = Linear belt mass [kg/m] (1)
f = Belt span vibration frequency [Hz]

Using the (above) formula it is possible to simply calculate the desired frequency for any belt drive. If the indicated measurement is less than the calculated value the belt will require further tension, if however the measurement is greater than the calculated value slacken the drive. In both cases measure again.

※NOTE: It is necessary to run the drive under load for approximately one or two minutes and then use the **TEN-SIT®-C** to verify the tension value, and retighten if necessary. When you have finished using the **TEN-SIT®-C** gauge press and hold the **"OFF"** button until the twice acoustic signal is heard.

- CALCULATION EXAMPLE

Belt: 3150 HPPD Plus 14M 55

Belt mass linear	(0,421/40) · 55 = 0,579 [kg/m] (values taken from mass table)
Tension T	2150 [N] (Tension value T, with stopped drive and idle pulleys, is constant along the whole belt)
Belt span length L_f	0,65 [m]

The right frequency value that must be obtained and read on TEN-SIT®-C gauge is:

Frequency $f = \frac{1}{2 \cdot L_f} \sqrt{\frac{T}{M}} = \frac{1}{2 \cdot 0{,}65} \sqrt{\frac{2150}{0{,}579}} = 46{,}9\,[\mathrm{Hz}]$

To determine the tension value of a belt whose frequency is indicated by the TEN-SIT®-C as 53 Hz use the following formula:

Tension $T = 4 \cdot M \cdot L_f^2 \cdot f^2 = 4 \cdot 0{,}579 \cdot 0{,}65^2 \cdot 53^2 = 2749\,[N]$

* Refer to following table in order to obtain belt linear mass.

常见皮带类型的线性质量
LINEAR MASSES FOR MOST COMMON BELT TYPES

Belt Type 皮带类型	Pitch profile 节距齿形 [mm]	Width 宽度 [mm] groove 凹槽 N°	Linear mass 线性质量 [kg/m]
FALCON Pd®	8	21	0,112
	14	37	0,303
SILENT SYNC®	Yellow-8	16	0,071
	White-8	32	0,142
	Purole-8	64	0,283
	Blue-14	35	0,254
	Green-14	52,5	0,380
	Orange-14	70	0,507
	Red- 14	105	0,761
BlackHawk Pd®	8	30	0,146
	14	40	0,321
Speed	5	9	0,031
	8	20	0,112
	14	40	0,408
Torque	8	20	0,083
	14	40	0,328
HPPD Plus® SUPER TORQUE HTD	5	9	0,039
	8	20	0,115
	14	40	0,421
Polyurethane with steel cords	T5	10	0,021
	AT5	10	0,030
	DT5	10	0,026
	T10	10	0,050
	AT10	10	0,060
	DT10	10	0,051
	T20	10	0,080
	AT20	10	0,100
	XL	10	0,024
	L	10	0,039
	H	10	0,042
Banded moulded cogs V-Belts	BX	1	0,213
	CX	1	0,349

Belt Type 皮带类型	Pitch profile 节距齿形 [mm]	Width 宽度 [mm] groove 凹槽 N°	Linear mass 线性质量 [kg/m]
Polyurethane with Kevlar® cords SILENT SYNC®	T5	10	0,021
	T10	10	0,050
	T20	10	0,080
	MXL	10	0,010
	XL	10	0,022
	L	10	0,038
	H	10	0,040
Inches Pitch Trapezoidal tooth	XL	6,35	0,014
	L	12,70	0,041
	H	19,05	0,090
	XH	50,80	0,564
	XXH	50,80	0,812
Dual Inches pitch	Dual XL	6,35	0,015
	Dual L	12,70	0,049
	Dual H	19,05	0,090
Poly-V Belts	J	1	0,008
	K	1	0,020
	L	1	0,032
	M	1	0,110
Envelope V-Belts	Z	-	0,059
	A	-	0,118
	B	-	0,197
	C	-	0,335
	D	-	0,630
Moulded cogs V-Belts	ZX	-	0,053
	AX	-	0,100
	BX	-	0,158
	CX	-	0,251
Banded envelope V-Belts	B	1	0,252
	C	1	0,433
	D	1	0,850
Narrow V-Belts	SPZ	-	0,087
	SPA	-	0,120
	SPB	-	0,240
	SPC	-	0,400
Narrow moulded cogs V-Belts	XPZ	-	0,079
	XPA	-	0,110
	XPB	-	0,192
	XPC	-	0,310
WedgeV-Belts	3V	-	0,078
	5V	-	0,236
	8V	-	0,531
Wedge moulded cogs V-Belts	3VX	-	0,070
	5VX	-	0,192
	-	-	-
Wedge envelope Banded	3V	1	0,118
	5V	1	0,283
	8V	1	0,705

为了获得宽度与表格中所示宽度不同的同步带的每米质量，取表格中所示宽度和质量与其皮带宽度之间的比率。
To obtain the mass per linear meter of synchronous belts of a width different from that indicated in the table make the ratio between the widths and the mass indicated in the table and the width of its belt.

为了获得联组带或 Poly-V 皮带的每米质量，将表格中所示质量值乘以其皮带的棘数。
To obtain the mass per linear meter of banded or Poly-V belts multiply the mass value indicated in the table by the number of ribs of its belt.