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TRUMMETER

Precision instrument for measuring belt tension

Hilger u. Kern Drive Technology

TRUMMETER

Precision instrument for measuring belt tension

A belt drive achieves its maximum lifetime when it is configured specifically to the application, the belt is perfectly tensioned and the pulleys are precisely aligned.

The TRUMMETER is an electronic measuring instrument that consists of a measuring probe and a microprocessor and is used for measuring the belt tension and checking the strand force of a belt drive.

The measurement result is displayed either in hertz or newtons.

Product advantages

- Exact measurement of the belt tensioning force
- Exact calculation of the strand force
- Required for recording in accordance with DIN EN ISO 9001ff
- Operator prompts and measured value displays in 4 languages
- Simple and safe operation
- Compact and handy to use

Scope of delivery

The TRUMMETER is supplied in a strong plastic case.
Included in the scope of delivery are a measuring probe and a 9-V battery.

Measuring the belt tension

The belt tension can be measured only when the drive has been shut down and is stationary.
The fitted and taut drive belt is tapped in order to make it oscillate with its natural oscillation.
This static natural frequency is then measured by the probe with the aid of pulsed light. Care must be taken to ensure the light is sufficiently reflected by the belt.
The measured values are displayed in hertz.

Measuring the strand force

To calculate the strand force, the values measured for the belt tension, the belt mass and the belt length are entered into the microcomputer, which then uses these values to calculate the actual strand force. The force calculated is compared with the specified value defined when the drive was designed.

The microcomputer calculates the strand force using the formula

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

Where:

T = strand force in N
m = linear belt mass in kg/m
L = length of the free belt strand in m
f = natural frequency of the free belt measured in Hz

Technical data

Measuring range	10 – 300 Hz
Digital sampling error	< 1%
Indication error	+/- 1 Hz
Total error	< 5%
Nominal temp.	+20°C
Operating temp.	+10 – +50°C
Shipping temp.	-5 – +70°C
Casing	Plastic (ABS)
Dimensions, unit	80 x 126 x 37
Dimensions, case	226 x 178 x 50
Display	2-line LCD, 16 char./line
Languages	4
Input range:	
free strand length	up to 9.990 m
belt mass	up to 9.999 kg/m
Power supply	9-V battery

Buttons on the membrane keyboard

Belt mass

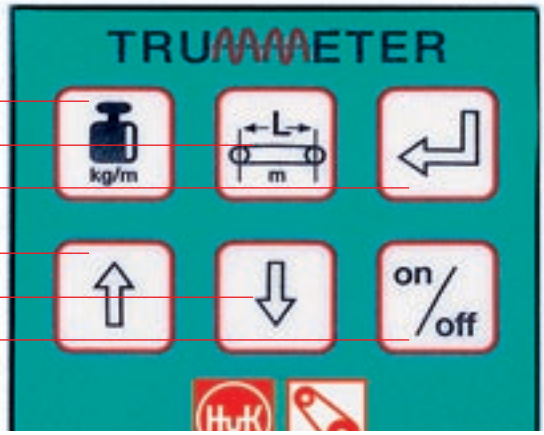
Strand length

ENTER

ARROW UP

ARROW DOWN

ON/OFF



Measuring procedure

Attention!
The belt tension can be measured only once the drive has been shut down and is stationary.

Measuring steps

1. Switch on the TRUMMETER.
2. Tap the drive belt so that it begins to oscillate with its natural oscillation.
3. Hold the measurement probe approximately at the center of the free strand length at a distance of 3 to 20 mm above the drive belt.
4. Successful measurement is acknowledged by an acoustic signal and the indication "Measurement" appears on the display.
5. The measured value is displayed in Hz.

Switching value display mode

The measured values can also be displayed in newtons.
Please refer to the section entitled "Menu structure" on Page 5 for instructions on how to switch display mode.

Note

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 two reasons:

1. The drive belt oscillates below the minimum measurement limit of 10 Hz.

   Remedy

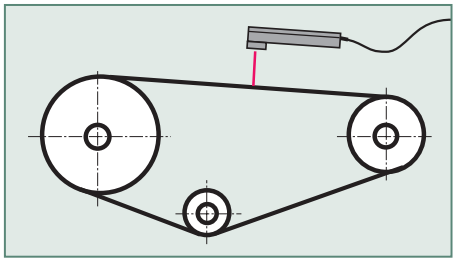
   Tighten the belt or, if the strand length is very long and open, support the belt in order to shorten the strand length. Enter the new belt length before repeting measurement.

2. Either no or low measuring values are displayed despite the drive belt being correctly tensioned.

   Remedy

   It may be the case that the light from the measuring probe is not sufficiently reflected. To improve reflection, affix a piece of light-colored adhesive tape to the belt or slightly moisten the belt at the measuring point.

The distance between the drive belt and the measuring probe should be between 3 and 20 mm. See sketch for positioning.



Important note

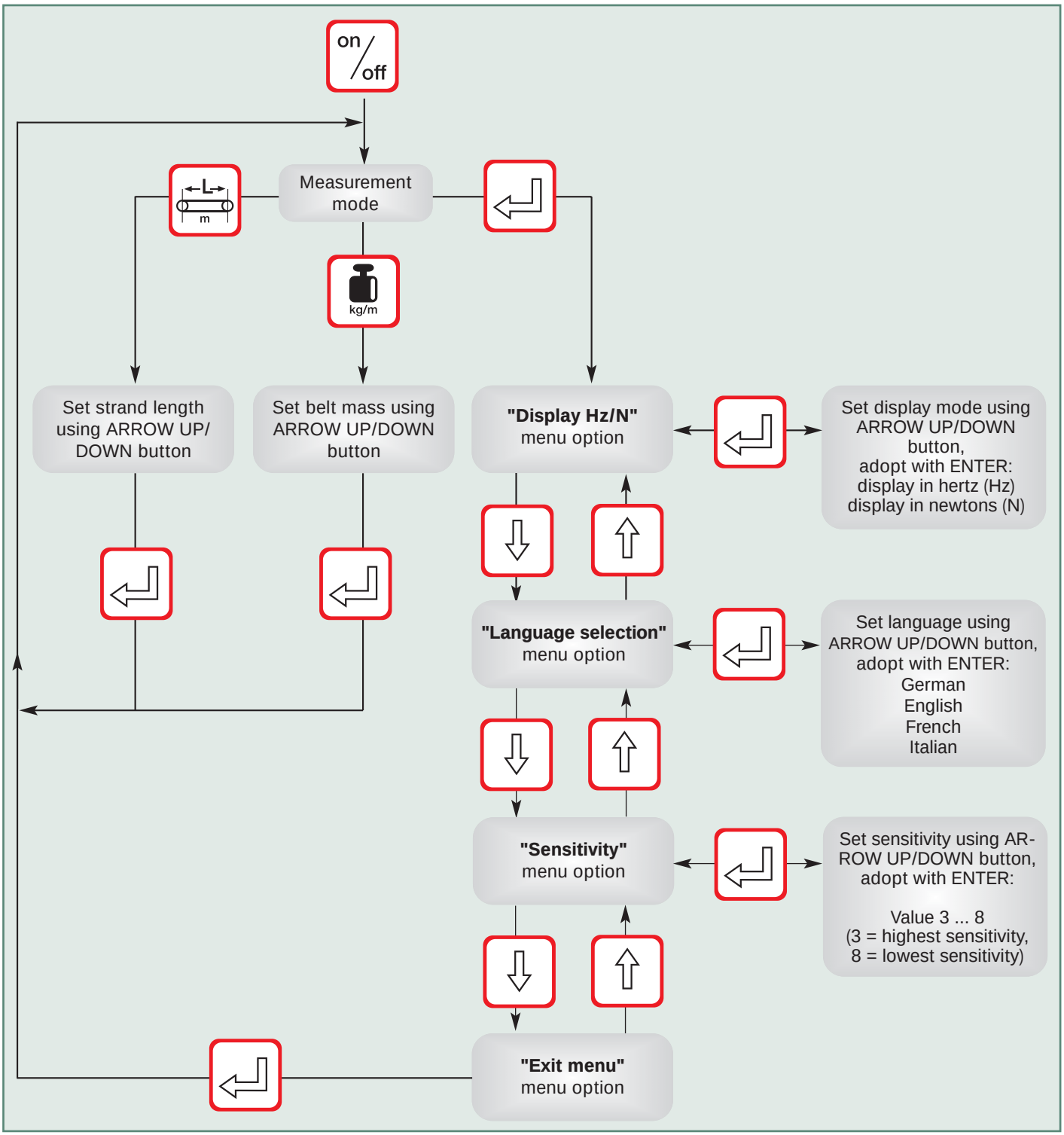
Preferably, the belt tension should always be measured at the center of the longer belt strand between the two drive pulleys.

Belt masses

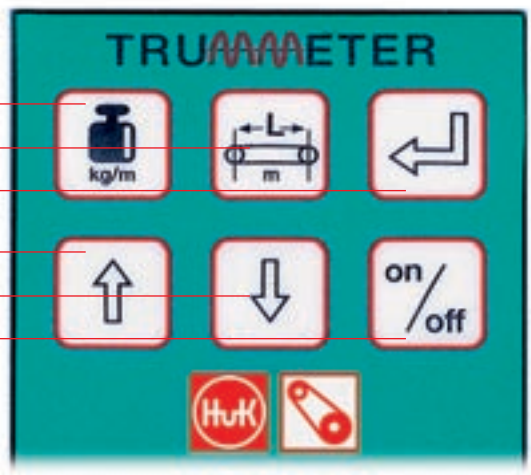
To measure the belt mass precisely, we recommend that you weigh the drive belt and then recalculate this weight based on a belt length of 1 meter.

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	
	32 = 0.668	40 = 0.958	kg/m per belt
Power belts	SPZ = 0.120	SPA = 0.166	
	SPB = 0.261	SPC = 0.555	kg/m per rib
	3V/9J = 0.120	5V/15J = 0.252	
	8V/25J = 0.693		kg/m per rib
Polyurethane toothed belts	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 = 0.023	AT 5 = 0.034	
	AT 10 = 0.063	AT 20 = 0.106	kg/m per 10 mm width

Menu structure



Buttons on the membrane keyboard



Belt mass

Strand length

ENTER

ARROW UP

ARROW DOWN

ON/OFF

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