Instruction Manual

Valid as of: 01.03.2012 • Please keep the manual for future reference!

CE

Contents

1 Warranty and Liability

In principle, the supply of the device is subject to our “General Conditions of Sale and Delivery.” These have been provided to the operating company on conclusion of the contract, at the latest.

Warranty:

- Trummeter belt tension meters are warranted for 12 months.

Parts subject to wear, electronic components and measuring springs are not covered by the warranty. No warranty or liability will be accepted for bodily injury or property damage resulting from one or several of the following causes:

- Misuse or abuse of the device.
- Improper mounting, commissioning, operation and maintenance of the device (e.g. verification interval).
- Operation of the device if any safeguards are defective or if any safety and protection precautions are not properly installed or not operative.
- Failure to comply with the notices in the Operating Instructions regarding transport, storage, mounting, commissioning, operation, maintenance and setup of the device.
- Any unauthorized structural alteration of the device.
- Insufficient inspection of device components that are subject to wear.
- Opening the device or improper repair work.
- Disasters caused by the effects of foreign objects or by force majeure.

1.1 Notices within the Operating Instructions

The fundamental prerequisite for the safe handling of this device and its troublefree operation is the knowledge of the basic safety notices and safety instructions.

These Operating Instructions contain the most important notices for the safe operation of the device.

These Operating Instructions, in particular the safety notices, must be observed by any person who works with the device. In addition, the local valid rules and regulations for the prevention of accidents must be complied with.

The representations within the Operating Instructions are not true to scale.

The dimensions given are not binding.

General indications of direction, such as FRONT, REAR, RIGHT, LEFT apply when viewing the front of the device.

1.2 Responsibilities of the Operating Company

In compliance with the EC Directive 89/655/EEC, the operating company agrees to only permit persons to work with the device who:

- are familiar with the basic regulations on industrial safety and accident prevention and who have been trained in handling the device.
- have read and understood the chapter on safety and the warning notices in these Operating Instructions and have confirmed this with their signatures.
- are examined regularly on their safe and conscientious working method.

1.3 Responsibilities of the Personnel

All persons who work with the device agree to perform the following duties before starting work:

- to observe the basic regulations on industrial safety and accident prevention.
- to read the chapter on safety and the warning notices in these Operating Instructions and to confirm with their signatures that they have understood them.

1.4 Informal Safety Measures

The Operating Instructions must always be kept on hand where the device is operated. Apart from the Operating Instructions, the general and local valid regulations on accident prevention and environmental protection must be provided and complied with.

1.5 Training of the Personnel

Only trained and instructed personnel is permitted to work with the device. The responsibilities of the personnel must be clearly defined for mounting, commissioning, operation, setup, maintenance, and repair. Trainees may only work with the device under the supervision of experienced personnel.

1.6 Intended Use

The device is intended exclusively to be used as a belt tension meter. Any other use or any use exceeding this intention will be regarded as misuse.
Under no circumstances shall HANS SCHMIDT & Co GmbH be held liable for damage resulting from misuse.
The intended use also includes:

- Complying with all notices included in the Operating Instructions and observing all inspection and maintenance works.

1.7 Dangers in Handling the Device

The device was designed according to the state of the art and the approved safety standards. Nevertheless, its use may cause serious or fatal injury to the user or third persons, and/or an impairment of the device or of other material assets.
The device may only be applied:

- For its intended use in a faultless condition with regard to the safety requirements.
- Malfunctions that could impair safety must be remedied immediately.
- Personal protective equipment must be used according to the EC Directive 89/686/EEC.

The device must not be operated in potentially explosive areas and must not come into contact with aggressive substances.

1.8 Copyright

1.9 Declaration of Conformity, RoHs II, protection against optical radiation and WEEE Registration

In compliance with the EU Directives 2014/30/EU, 2011/65/EU and 2006/25/EC

HANS SCHMIDT & CO GmbH is registered in compliance with the German Electrical and Electronic Equipment Act (ElektroG) under WEEE Reg. No. DE 48092317.

2 General Information

2.1 Specifications

Measuring Range	10 - 800 Hz Display of readings up to 800 Hz
Input Range	Free Strand Length Up to 9.99 m Belt Mass Up to 9.999 kg/m
Digital Sampling Error	< 1%
Indication Error	± 1 Hz
Total Error	< 5%
Nominal Temperature	+20° C
Operating Temperature	+10° to +50° C
Transport Temperature	-5° to +70° C
Display	2-line LCD, 16 char./line, with background lighting
Language Selection	10 languages German - English - Italian - French - Spanish Portuguese - Swedish - Norwegian - Danish - Finnish
Physical Units of Measure	SI: m, kg/m, N US: inch, lbs/foot, lbf, Hz
Power Supply	9 V E-block, e.g. long life 9 V lithium Optional: Rechargeable 9 V battery and charger
Housing	Plastic (ABS)
Dimensions, unit	80 x 126 x 37 mm
Dimensions, case	226 x 178 x 50 mm

2.2 Delivery Includes

Belt tension meter
1 Measuring probe with cable
1 Plug-in probe
1 Operating Instructions
1 Carrying case
1 Battery

2.3 Unpacking

Unpack the instrument and inspect it for any shipping damage. Notices of defect must be announced immediately, in writing, at the latest within 7 days on receipt of the goods.

3 Initial Setup and Operating Procedure

3.1 Notes Before Starting Measurement

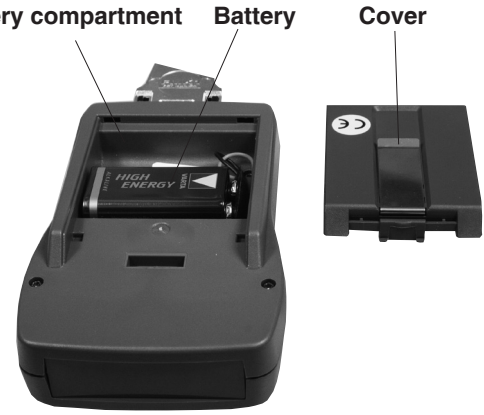
Have you read and understood the Operating Instructions, in particular Chapter 1 “Basic Safety Notices”? You are not permitted to operate the device before doing so.

Attention!

The belt tension can be measured only when the drive has been SHUT DOWN and is STATIONARY.

3.2 Battery Insertion and Replacement

The instrument is supplied with the battery inserted.
If the **DISPLAY** shows “!!! **LOW BAT** !!!” the battery is low and must be replaced immediately. Operating the instrument with a low battery may cause measurement errors.



To insert the battery:
- Open the **BATTERY COMPARTMENT** which is located on the rear side of the instrument.
- Insert a 9 V battery (E-block) into the **BATTERY COMPARTMENT**. Please ensure proper polarity.
- Close the **BATTERY COMPARTMENT**.

Used batteries must be disposed of in accordance with local regulations.

If the instrument will not be used for a longer period of time, the battery should be removed.

3.2.1 Switch-On

Press the on/off key.
The **DISPLAY** shows the software version, e.g. **V 9.1**.

3.2.2 Switch-Off

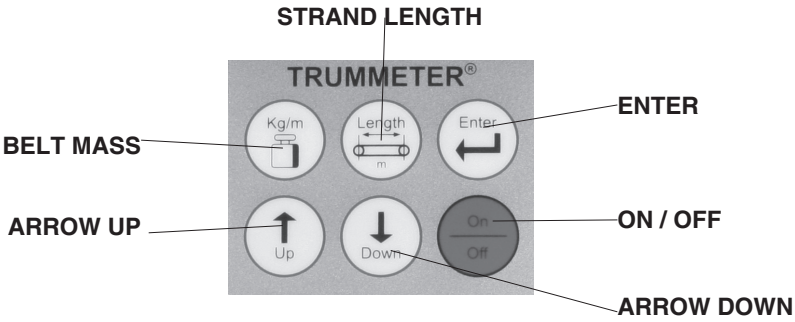
Auto power off:
- The instrument switches off automatically after approx. 3 minutes of non-use.

Manual switch-off:
- Press the on/off key for approx. five seconds.

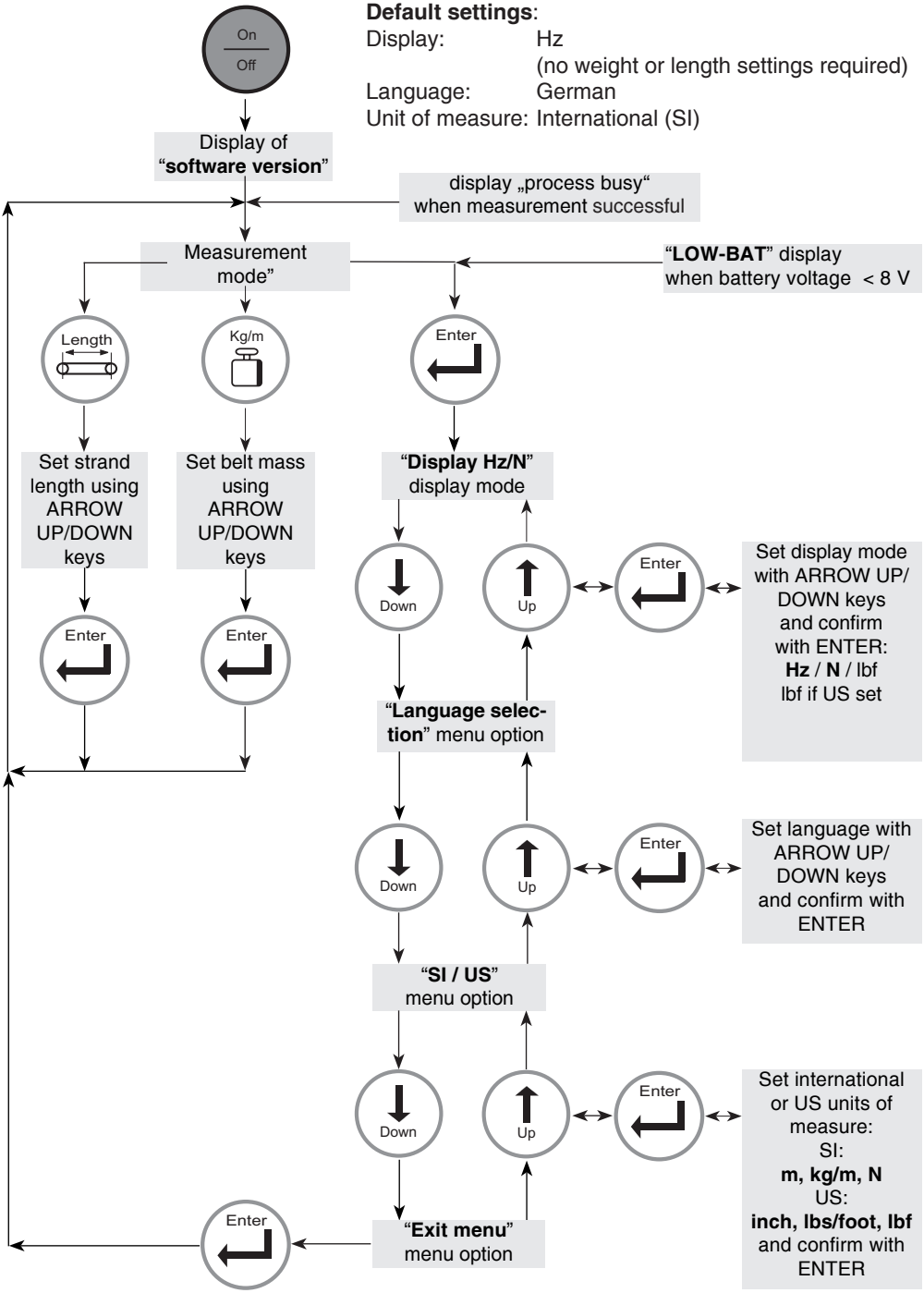
3.3 Operating Elements

DISPLAY
Displays measured and calculated values in:
German, English, Italian, French, Spanish, Portuguese, Swedish, Norwegian, Danish, Finnish

Measuring probe
Measures the natural frequency of the taut, free belt with the aid of pulsed light



3.4 Menu Structure



Default settings:
Display: Hz
(no weight or length settings required)
Language: German
Unit of measure: International (SI)

3.5 Measuring the Strand Force

3.5.1 Measuring the Belt Frequency in Hertz

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 that the light is sufficiently reflected by the belt. The measured values are displayed in hertz. Entering the belt mass and belt length is not necessary.

Drive belts expand after mounting. Therefore the belt should be mounted 30% above the calculated strand force value. Check again after one hour.

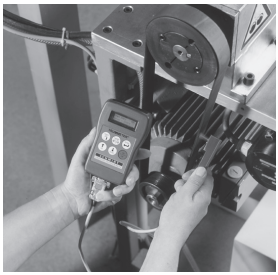
Attention!

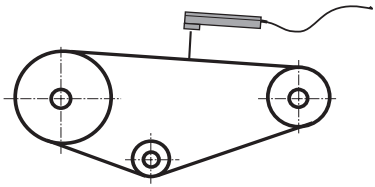
The belt tension can be measured only when the drive has been SHUT DOWN and is STATIONARY.

To measure the belt tension:

- Switch on the instrument.
- Set the instrument parameters as described in Chapter 3.4 Menu Structure on page 8.

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





The distance between the drive belt and the measuring probe should be between 3 and 20 mm.

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

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.
Recommendation: Repeat the measuring 3 - 5 times and use the average as measuring value.

3.5.2 Calculating the Strand Force in N / Lbf

To calculate the strand force, enter the belt mass and belt length with the membrane keypad as described in Chapter 3.4. The strand force calculated is compared with the set point value defined when the drive was designed.
The belt tension meter calculates the strand force using the formula:

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

Where:
F = 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

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.

The following table lists some examples of standard belt sizes:

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 = 0.23	AT 5 = 0.034	
	AT 10 = 0.063	AT 20 = 0.106	kg/m per 10 mm width

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.
Recommendation: Repeat the measuring 3 - 5 times and use the average as measuring value.

Attention!

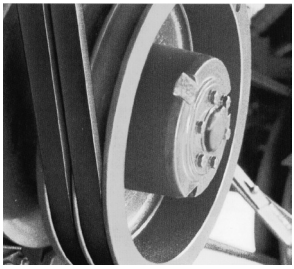
Newton or pound-force calculations have a SQUARE factor higher error result!

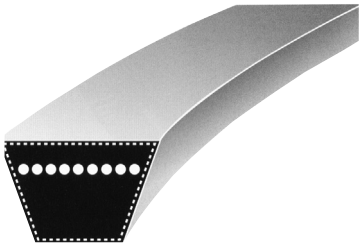
3.5.3 Measurement Errors

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 repeating measurement.
2. Either no or low measurement 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.

3.6 Calculation of the Strand Force Set Point in Newtons for V-Belts





In case you have no data from the machine producer about the set point of the strand force, you can calculate the approximate strand force with the following formula.

$$F = \frac{540 \times P \times 1{,}3}{z \times v} + m \times v^2$$

Where:

P	=	motor power (kW)
z	=	number of belts
v	=	belt speed = D x n/19100
D	=	effective diameter of the small wheel (mm)
n	=	speed of the small wheel (rpm)
$m \times v^2$	=	centrifugal force (relevant for speed > 800 rpm)
m	=	weight of one belt (kg/m), as specified in the table

Besides the best strand force "F" consider the permissible axial load of the bearings: AXIAL LOAD F_A = 2 x strand force

4 Service and Maintenance

The instrument is easy to maintain. Depending on operating time and load, the instrument should be checked according to the locally valid regulations and conditions.

5 Cleaning

For cleaning the unit, do not use any

AGGRESSIVE SOLVENTS

such as trichloroethylene or similar chemicals.

NO WARRANTY OR LIABILITY

shall be accepted for damage resulting from improper repair work.

6 Correspondence

Should you have any questions regarding the instrument or Operating Instructions, or their use, please indicate above all the following details which are given on the ID plate:

1) Model
2) Serial number

7 Repairs

Shipping instructions:

We kindly ask for return free of charge for us, if possible by airmail parcel. All occurring charges, if any (such as freight, customs clearance, duty etc.), will be billed to customer.

For return from foreign countries, we ask you to include a proforma invoice with a low value for customs clearance only, e.g. 50 Euro, each and to advise the shipment in advance by fax or eMail.

To avoid unnecessary follow-up questions, and the resulting loss of time or possible misunderstandings, please return the instrument with a detailed fault description to our service department.

Service address:

HANS SCHMIDT & Co GmbH
Schichtstr. 16
D-84478 Waldkraiburg
Germany

SCHMIDT
control instruments

More than 70 years - Worldwide -

Hans Schmidt & Co GmbH

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