SKF Belt Frequency Meter user manual

User manual box edition

General safety tips

Safety first – read and understand this manual before operating the SKF Belt Frequency Meter.

Never use your SKF Belt Frequency Meter on moving belts.

Switch off and isolate any belt drive system prior to taking tension measurements or attempting any other installation work.

Do not drop the meter or subject either the meter or the optical sensor to other sharp impact.

Do not put water, solvents (including cleaning solutions) or any other liquid on the unit. Clean meter and sensor with dry cotton cloth.

Do not pull on sensor cord. Disconnect sensor from meter by grasping the connector grip only.

Do not leave the unit in places that are humid, hot, dust filled or in direct sunlight.

Hint: When SKF Belt Frequency Meter is not used for a while, remove batteries and store unit in the case provided.

Do not use your SKF Belt Frequency Meter in any potentially explosive environment.

Do not disassemble or attempt to modify either the meter or the sensing head.

Table of contents

1.0 Device description

The SKF Belt Frequency Meter is a two component system consisting of a hand-held meter attached to an optical sensor via an electronic cable. The sensor uses an infrared beam to detect the vibration of a belt strand and sends a signal to the meter. (The sensor includes an LED that produces an orange light beam to help aim the invisible infrared ray.) Comparing this input to the vibration of a quartz crystal, the meter computes the natural frequency of the belt. The result is shown in the display window as hertz (oscillations per second). The internal programming of the meter is also able to report the belt tension in units of force (either newton or pounds-force) provided the operator has entered the belt mass and span length using the manually operated key pad.

The meter operates on four "AA" batteries. Battery life is approximately 20 hours. The battery compartment is accessible at the back of the meter. This manual, a tuning fork for checking calibration and a storage case are included with the complete kit.

2.0 Quick start

3.0 Functions

3.1 Keys

ON/OFF

This key switches the meter on or off. If the meter is on and sits idle for more than 3 minutes, it automatically switches off to preserve battery life. When the meter is first switched on a battery check is made see Section 3.4 for a description of the visual and audible low battery signal.

SPAN (m)

This key is used to enter the belt span length. The span key is held down while the UP or DOWN keys are used to set the belt span in metres. Releasing the SPAN key results in an audible beep to indicate the setting has been accepted. Pressing the SPAN key alone, shows the current setting.

MASS (kg/m)

This key is used to enter the belt mass. The mass key is held down while the UP or DOWN keys are used to set the belt mass in kg/m. Releasing the MASS key results in an audible beep to indicate the setting has been accepted. Pressing the MASS key alone shows the current setting.

Important Note:

Belt span and belt mass are required entries if tension results in force units (N or lbf) are desired. Entries must be in SI units (m and kg/m)

UP (Hz/N)

This key has two functions. The first is to increase either the SPAN or MASS parameters when used in conjunction with these keys. The second use is to toggle between the Hz and the newton measurement modes.

DOWN (Lbs)

This key has two functions. The first is to decrease either the SPAN or MASS parameters when used in conjunction with those keys. The second use is to toggle between the Hz and the pound measurement modes.

MEM 1

MEM 2

MEM 3

The memory keys allow up to 3 sets of belt parameters to be stored in the meter registry. Pressing the MEM 1 key recalls the first set of belt parameters and likewise for MEM 2 and MEM 3.

To store the belt parameters to a key, the belt span and mass parameters must first be entered and then immediately after release of either the SPAN or MASS keys the appropriate MEM key should be pressed. Two beeps indicate that the parameters have been successfully assigned to the key.

3.2 Audio/visual display

The SKF Belt Frequency Meter is an interactive tool. It provides both visual and audible communication with the operator. Each signal or combination of signals has a meaning. While all these signals are discussed in other sections of this manual, a compilation of all the available signals will be presented here.

Generally visual signals alone give measurement results while audible signals, either alone or in combination with a visual signal, indicate some operational step.

Visual measurement results

A line segment will appear to indicate the units assocaited with the number displayed

Frequency mode, results displayed as hertz

Tension displayed in newton

Tension displayed in pound-force.

Audible signals

Signal	When	Means
One Beep	Upon release of “Span” key	Input accepted
One Beep	Upon release of “Mass” key	Input accepted
One Beep	While sensor is aimed at vibrating belt	Measurement taken
Two Beeps	Upon pushing “Memory” key after releasing “Span” key	Span data has been stored
	Upon pushing “Memory” key after releasing 'Mass' key	Mass data has been stored
Four Beeps	Combined with “0000” N display	Newton result is out of range
	Combined with “0000” lb display	Pound result is out of range
	After pushing “On” key combined with “zero” countdown	Low battery condition

3.3 Optical sensor

The sensor uses an invisible infrared beam to detect vibrations of the belt. A narrow angle orange LED generated beam is provided to guide the aiming of the sensor.

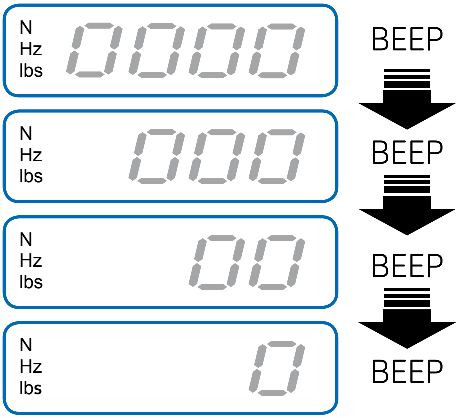
The very best signal from the belt is seen when the sensor is held perpendicular to the belt at the centre of the span at 9,5 mm (3/8 in) distance.

When physical restrictions are present, it is possible to get useable readings with the sensor up to 50 mm (2 in) distance from the belt and/or tipped up to 45° from perpendicular.

It is possible to take measurements from the edge of the belt. The toothed side of a belt is equally acceptable as a target for the sensor. The sensor LEDs should be kept clean by wiping with a soft cotton cloth. Solvents are never to be used.

3.4 Battery condition

When the SKF Belt Frequency Meter is first switched on, a battery condition check is automatically performed. A low battery condition is signalled both visually and audibly. The display window will flash an array of zeros, starting with four and progressing to only one. There will be an audible signal of four “beeps” as the display changes



If these signals are seen and heard, batteries should be replaced. Batteries are accessed through the removable cover on the back of the meter. New batteries should be inserted within 30 seconds of removal of old batteries. Taking longer risks loss of any data stored by the memory keys. Batteries are expected to provide approximately 20 hours of continuous operation before replacement is required.

3.5 Charging batteries

Do not charge batteries with the sensor head attached to the meter. Do not attempt to use the meter while batteries are being charged. Damage to the optical sensor could result.

The SKF Belt Frequency Meter is compatible with user supplied rechargeable batteries and charging unit. A convenient 3,5 mm, positive center charging socket is located on the bottom end of the meter body adjacent to the sensor cable plug-in port.

Batteries:	1 300 mAh minimum (user supplied)
Charging unit:	12 to 15 volt DC output (user supplied)
Connection:	3,5 mm positive tip mini plug/socket

The built in circuit of the meter controls the charging current. Charging current is internally limited to 100 mA. Charging time is typically 12 to 14 hours for a full charge.

You may turn the unit on while charging. The meter’s software will then signal that the batteries are charging. The display window will flash an array of zeros, starting with only one and progressing to four. There will be an audible signal of four 'beeps' as the display charges.

Suitable rechargeable batteries and charger may be obtained directly from the manufacturer Integrated Display Systems Ltd., UK (www.clavis.co.uk).

4.0 Setup and use procedure

1. Plug sensor head into meter body. This is a keyed plug. Line it up, do not use force!

2. Turn unit on using ON/OFF .

3. Load span and mass data or recall previously loaded data.

To load span data simply hold down SPAN (m) while using UP (Hz/N) or DOWN (Lbs) to set the number.

When the correct number appears in the display window, simply release the span key. The unit will beep once to acknowledge acceptance of this setting.

To load mass data simply hold down MASS (kg/m) while using UP (Hz/N) or DOWN (Lbs) to set the number.

When the correct number appears in the display window, simply release the mass key. The unit will beep once to acknowledge acceptance of this setting.

To save individual entries into memory, press appropriate key

MEM 1 , MEM 2 or MEM 3 .

As soon as the span or mass keys have been released, the meter will beep twice to acknowledge the entry into memory.

To recall stored span and mass data simply press MEM 1, MEM 2 or MEM 3, depending upon where you stored the data for this specific drive. Afterwards press span or mass key in order to display the appropriate saved value (mass or span).

4. Aim sensor at centre of selected belt span. Tap or pluck the belt. The meter will beep once to indicate that a measurement was taken.

5. Display window will show frequency result.

6. Press UP (Hz/N) to toggle to newton.

7. Press DOWN (Lbs) to toggle to pounds.

Note: Pressing the same key a second time will return display to the hertz value.

8. Re-adjust belt tension and repeat measurement until target tension results are attained.

5.0 Operating tips

Here are some procedures and “best” practices that may ease use or help increase the reliability of your belt tensioning efforts.

Take your tension reading as close to the centre of the selected span as practical.

Use the longest belt span that can be readily accessed. Minimum useable span length is equal to 20 times the belt tooth pitch for synchronous belts and 30 times the belt top width for “v” configuration belts. Using too short a span yields indicated tensions that may be much higher than actual belt tension due to effects of belt stiffness.

When possible, orientate the sensor head with the long edge of the sensor parallel to the centre-line of the belt. This tends to eliminate any non-reading conditions due to aiming error.

On new installations, rotate the system by hand at least one full revolution of the belt to seat and normalize the components.

If the top surface of the belt is not accessible, try to beam the sensor against the edge of the belt. The inside surface of the belt is equally acceptable.

The meter will not give a measurement for a belt under extremely low tension. Simply increase the drive tensioning until the meter responds. The meter will beep to indicate that a reading has been taken.

It is good practice to take three successive readings. This will show the consistency of your methods. If the readings vary by more than 10% re-assess your measurement technique.

Taking multiple readings at different belt orientations may help you identify problems with other drive components. Tension excursions are indicative of component problems such as a bent shaft, poorly mounted sprocket or pulley or an irregular pulley groove.

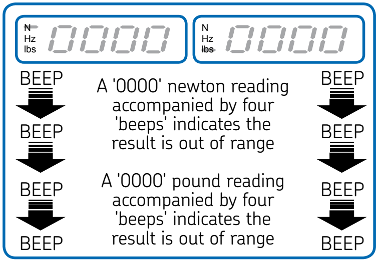
When tensioning an array of multiple V-belts, use a single belt toward the centre of the array. Please, also check the tension of the belts on each side of the array in order to secure that there is no angular misalignment between the pulleys.

6.0 Meter range

The SKF Belt Frequency Meter is capable of measuring belt vibration frequencies between 10 Hz and 400 Hz.

If the measured frequency is below 10 Hz, the meter will display “10.00” briefly and then change to “000.0”.

If the measured frequency is above 400 Hz, the meter will display “400” briefly and then change to “000”.



On multi-shaft (three or more shafts) it may be possible to get valid measurements by selecting a different belt span for measurement. If the measured frequency is below 10 Hz choose an available shorter span. If the measured frequency is above 400 Hz choose a longer span if available.

Based upon the measured belt frequency, the meter is capable of calculating belt tensions up to 9 990 N (2 200 lb.). When these limits are exceeded the meter will react as previously described.

Belt tensions greater than these values are unusual. It is therefore advisable to check that the span and mass parameters have been entered correctly. If they are found to be correct then check the calculation of your target values. If everything looks correct then this drive is simply beyond the capacity of the SKF Belt Frequency Meter. The drive will have to be tensioned by traditional force and deflection techniques.

Special Note:
Tensioning a drive generally involves moving one component shaft with respect to another. On some drives, especially larger installations, tensioning the drive will involve sufficient movement that the span length is appreciably altered. Frequency (Hz) values will remain accurate but if a precise tension value is to be calculated it may become necessary to update the span input to reflect the new shaft spacing.

7.0 Calibration

7.1 Spot check

The measurement system of the SKF Belt Frequency Meter is based upon a very stable quartz crystal that should never wander. However, a precision mechanical resonator (tuning fork) is included with the meter so that a calibration check at a spot frequency of 250 Hz may be performed at any time.

Tap the tip of the tuning fork on a hard surface and then hold STEADY in front of the optical sensor at a distance of 10 to 15 mm. The meter will measure a frequency of 250 Hz thus demonstrating that it is in calibration.

Results within ±1% are acceptable. There is no adjustment possible. If greater variance is experienced, the meter should be returned for calibration. See section 7.2 for manufacturer's contact information.

7.2 Annual certification

Technical support relating to calibration certification and/or operation of the SKF Belt Frequency Meter can be obtained from SKF:

The meter may be returned to SKF for repair or recalibration at any time.

A factory calibration certificate is included with each meter. Although the very stable solid-state quartz crystal based system is not likely to go out of calibration, some operating procedures call for annual gauge certification. For certification/calibration purposes the meter may be returned to SKF at yearly intervals to have the meter recalibrated and certified to NAMAS/
UKAS (National Accreditation of Measurement and Sampling/United Kingdom Accreditation Standards) standards.

Please, contact your local SKF representative for detailed costs and shipping procedures prior to any return.

8.0 Technical specification

Measurement range
Frequency range .... 10 to 400 Hz
Measurement accuracy
Below 100 Hz............................. ± 1 significant digit
Above 100 Hz.............................. ± 1%
Belt mass input range ....0,001 to 9,990 kg/m
Belt span input range .... 0,001 to 9,99 m
Maximum belt tension display .... 9 990 N
2 200 lb

Environmental conditions
Operating temperature .... +10 to +50 °C
Shipment and storage temp .... –50 to +70 °C
Protection class................................... IP54

Sensor
Type..Infrared optical
IR wavelength....................................... 970 nm
Visible aiming beam............................ Narrow angle orange LED
Housing .... Machined aluminium
Cable length ....1 m

Power supply
Battery type.. AA (MN1500) Alkaline only
Number 4
Expected life..20 hrs
Compartment location ....Back of meter

Optional rechargeable batteries
Battery type.. AA (1 300 mAh minimum)
Charger.. 12 to 15 V DC output
Socket/polarity..................................... 3,5 mm positive centre

9.0 Formulae and conversions

Force conversion constants

newton x 0,2248 = lb
pound x 4,4482 = N
kilogram x 9,8067 = N

Length conversion constants

inch x 0,0254 = m
metre x 39,3701 = in
mm x 0,001 = m

Span length calculation

$$S = \sqrt{CD^2 - \frac{(D - d)^2}{4}}$$

where:
S = Span length (mm)
CD = Center distance (mm)
D = Large pulley diameter (mm)
d = Small pulley diameter (mm)

Weight (for mass calculation use)

ounce x 0,02835 = kg
pound x 0,45359 = kg

Reminder: Belt span and mass inputs to the meter must be in SI units, m for the belt span and kg/m for the belt mass.

Appendix

1.0 Theory of operation

There is a direct relationship between belt tension and a belt's natural frequency of vibration. As the tension is increased, the vibration frequency also increases. The relationship between tension and frequency has been determined to be:

$$T = 4ml^2 f^2$$

Where
T = Belt tension (N)
m= mass per unit length (kg/m)
l = span length (m)
f = vibration frequency (Hz)

The SKF Belt Frequency Meter is a dual function tool. The optical sensing head uses an invisible infrared beam to detect vibration while the integral calculator determines the time base and performs the necessary calculations to support the results shown in the display window.

The meter may be used with all power transmission belts regardless of type or construction.

2.0 Weights and tension values

The values listed in the tables on following pages provide a guideline for belt tensioning. More accurate values for your specific belt drive can be obtained from belt drive calculations on skfptp.com.

Timing belts

Belt type	Belt type	Belt Tension		Mass
		New belt	Run in belt	
		N	N	kg/m
HiTD	5M 9	99	71	0,037
	5M 15	174	124	0,061
	5M 25	311	222	0,102
	8M 20	372	266	0,128
	8M 30	593	424	0,192
	8M 50	1 037	741	0,320
	8M 85	2 044	1 460	0,545
	14M 40	1 297	926	0,429
	14M 55	1 912	1 366	0,590
	14M 85	3 142	2 244	0,911
	14M 115	4 480	3 200	1,233
	14M 170	7 139	5 099	1,823
STPD	S8M20	390	279	0,111
	S8M30	620	443	0,167
	S8M50	1 110	793	0,278
	S8M85	2 030	1 450	0,473
	S14M40	1 340	957	0,462
	S14M55	1 925	1 375	0,634
	S14M85	3 165	2 261	0,981
	S14M115	4 465	3 189	1,327
	S14M170	6 975	4 982	1,962
Timing belts	XL 025	13	11	0,014
	XL 037	24	20	0,020
	L050	51	41	0,043
	L075	87	70	0,065
	L 100	122	98	0,087
	H075	220	176	0,084
	H100	311	249	0,112
	H150	485	388	0,168
	H200	667	534	0,223
	H300	1 045	836	0,335
	XH 200	907	726	0,572
	XH 300	1 428	1 142	0,858
	XH 400	2 019	1 615	1,144
	XXH 200	1 130	904	0,809
	XXH 300	1 748	1 398	1,213
	XXH 400	2 478	1 982	1,617
	XXH 500	3 198	2 558	2,022

Wrapped V, wedge and banded belts

Belt type	Smallest pulley diameter		Speed range		Belt tension per single belt*		Mass	
					New belt	Run in belt	Single belt	Belt in a band**
	from	incl.	from	incl.				
	mm		rpm		N	N	kg/m	
Z	40	60	1 000	2 500	104	69	0,051	n/a
			2 501	4 000	121	81		
	61 over		1 000	2 500	174	116		
			2 501	4 000	174	116		
A	75	90	1 000	2 500	332	222	0,115	0,150
			2 501	4 000	254	169		
	91	120	1 000	2 500	391	261		
			2 501	4 000	332	222		
	121	175	1 000	2 500	469	313		
			2 501	4 000	411	274		
B	105	140	860	2 500	469	313	0,193	0,260
			2 501	4 000	391	261		
	141	220	860	2 500	567	378		
			2 501	4 000	528	352		
C	175	230	500	1 740	1 017	678	0,320	0,417
			1 741	3 000	841	561		
	231	400	500	1 740	1 251	834		
			1 741	3 000	1 115	743		
D	305	400	200	850	2 210	1 473	0,669	0,870
			851	1 500	1 877	1 251		
	401	510	200	850	2 698	1 799		
			851	1 500	2 268	1 512		
SPZ	56	79	1 000	2 500	338	226	0,076	n/a
			2 501	4 000	262	175		
	80	95	1 000	2 500	383	255		
			2 501	4 000	415	276		
	96 over		1 000	2 500	477	318		
			2 501	4 000	438	292		
SPA	71	105	1 000	2 500	575	383	0,134	0,155
			2 501	4 000	524	349		
	106	140	1 000	2 500	696	464		
			2 501	4 000	628	418		
	141 over		1 000	2 500	872	581		
			2 501	4 000	876	584		
SPB	107	159	860	2 500	978	652	0,223	0,272
			2 501	4 000	941	627		
	160	250	860	2 500	1 255	837		
			2 501	4 000	1 116	744		
	251 over		860	2 500	1 496	997		
			2 501	4 000	1 275	850		

Wrapped V, wedge and banded belts

Belt type	Smallest pulley diameter		Speed range		Belt tension per single belt*		Mass	
					New belt	Run in belt	Single belt	Belt in a band**
	from	incl.	from	incl.				
	mm		rpm		N	N	kg/m	
SPC	200	355	500	1 740	2 026	1 350	0,354	0,394
			1 741	3000	2 043	1 362		
	356 over		500	1 740	2 305	1 537		
			1 741	3 000	2 671	1 781		
3V	61	90	1 000	2 500	313	209	0,076	0,099
			2 501	4 000	274	182		
	91	175	1 000	2 500	430	287		
			2 501	4000	391	261		
5V	171	275	500	1 740	1 134	756	0,223	0,272
			1 741	3 001	997	665		
	276	500	500	1 740	1 369	912		
			1 741	3 001	1 291	860		
8V	315	430	200	850	2 933	1 955	0,504	0,654
			851	1 500	2 386	1 590		
	431	570	200	850	3 520	2 346		
			851	1 500	3 129	2 086		

* Multiply the belt tension required for a single belt by the number of the belts in the banded belt unit to get total tension to apply.

** Multiply the mass of one belt in a band by the number of the belts in the banded belt unit to get total mass to apply.

Wrapped and narrow wedge belts

Belt type	Smallest pulley diameter		Speed range		Belt tension per single belt*		Mass	
					New belt	Run in belt	Single belt	Belt in a band**
	from	incl.	from	incl.				
	mm		rpm		N	N	kg/m	
SPZ-XP	56	79	1 000	2 500	372	249	0,079	-
			2 501	4 000	288	193		
	80	95	1 000	2 500	421	281		
			2 501	4 000	457	304		
	96 over		1 000	2 500	525	350		
			2 501	4 000	482	321		
SPA-XP	71	105	1 000	2 500	633	421	0,122	-
			2 501	4 000	576	384		
	106	140	1 000	2 500	766	510		
			2 501	4 000	691	460		
	141 over		1 000	2 500	959	639		
			2 501	4 000	964	642		
SPB-XP	107	159	860	2 500	1076	717	0,202	-
			2 501	4 000	1035	690		
	160	250	860	2 500	1381	921		
			2 501	4 000	1228	818		
	251 over		860	2 500	1646	1097		
			2 501	4 000	1403	935		
SPC-XP	200	355	500	1 740	2229	1485	0,350	-
			1 741	3 000	2247	1498		
	356 over		500	1 740	2536	1691		
			1 741	3 000	2938	1959		
3V-XP	61	90	1 000	2 500	344	230	0,079	-
			2 501	4 000	301	200		
	91	175	1 000	2 500	473	316		
			2 501	4 000	430	287		
5V-XP	171	275	500	1 740	1247	832	0,202	-
			1 741	3 001	1097	732		
	276	500	500	1 740	1506	1003		
			1 741	3 001	1420	946		
8V-XP	315	430	200	850	3226	2151	0,520	-
			851	1 500	2625	1749		
	431	570	200	850	3872	2581		
			851	1 500	3442	2295		

* Multiply the belt tension required for a single belt by the number of the belts in the banded belt unit to get total tension to apply.

** Multiply the mass of one belt in a band by the number of the belts in the banded belt unit to get total mass to apply.

Cogged raw edge V, wedge and banded belts

Belt type	Smallest pulley diameter		Speed range		Belt tension per single belt*		Mass	
					New belt	Run in belt	Single belt	Belt in a band**
	from	incl.	from	incl.				
	mm		rpm		N	N	kg/m	
ZX	40	60	1 000	2 500	119	80	0,051	n/a
			2 501	4 000	139	93		
	61 over		1 000	2 500	199	133		
			2 501	4 000	199	133		
AX	75	90	1 000	2 500	372	248	0,115	0,153
			2 501	4 000	293	196		
	91	120	1 000	2 500	450	300		
			2 501	4 000	391	261		
	121	175	1 000	2 500	508	339		
			2 501	4 000	450	300		
BX	85	105	860	2 500	430	287	0,193	0,225
			2 501	4 000	372	248		
	106	140	860	2 500	626	417		
			2 501	4 000	547	365		
	141	220	860	2 500	763	508		
			2 501	4 000	645	430		
CX	175	230	500	1 740	1 310	873	0,320	0,398
			1 741	3 000	1 056	704		
	231	400	500	1 740	1 408	939		
			1 741	3 000	1 291	860		
XPZ	56	79	1 000	2 500	362	241	0,076	n/a
			2 501	4 000	299	199		
	80	95	1 000	2 500	438	292		
			2 501	4 000	418	279		
	96 over		1 000	2 500	499	332		
			2 501	4 000	469	313		
XPA	71	105	1 000	2 500	657	438	0,134	0,156
			2 501	4 000	598	399		
	106	140	1 000	2 500	796	531		
			2 501	4 000	718	478		
	141 over		1 000	2 500	997	665		
			2 501	4 000	897	598		
XPB	107	159	860	2 500	1 116	744	0,223	0,279
			2 501	4 000	1 075	717		
	160	250	860	2 500	1 435	957		
			2 501	4 000	1 330	886		
	251 over		860	2 500	1 596	1 064		
			2 501	4 000	1 455	970		

Cogged raw edge V, wedge and banded belts

Belt type	Smallest pulley diameter		Speed range		Belt tension per single belt*		Mass	
					New belt	Run in belt	Single belt	Belt in a band**
	from	incl.	from	incl.				
	mm		rpm		N	N	kg/m	
XPC	200	355	500	1 740	2 313	1 542	0,354	0,548
			1 741	3 000	2 333	1 555		
	356 over		500	1 740	2 632	1 755		
			1 741	3 000	3 050	2 034		
3VX	55	60	1 000	2 500	293	196	0,076	0,102
			2 501	4 000	254	169		
	61	90	1 000	2 500	372	248		
			2 501	4 000	332	222		
	91	175	1 000	2 500	469	313		
			2 501	4 000	430	287		
5VX	110	170	1 000	2 500	899	600	0,223	0,252
			2 501	4 000	489	326		
	171	275	500	1 740	1 310	873		
			1 741	3 001	1 212	808		
	276	400	500	1 740	1 525	1 017		
			1 741	3 001	1 486	991		

* Multiply the belt tension required for a single belt by the number of the belts in the banded belt unit to get total tension to apply.

** Multiply the mass of one belt in a band by the number of the belts in the banded belt unit to get total mass to apply.

Ribbed belts

Belt type	Smallest pulley diameter	Speed range	Belt tension per one rib*		Mass**
			New belt	Run in belt	Single belt
	mm	rpm	N	N	kg/m
PJ	<80	n/a	67	45	0,010
	>80		90	60	
PK	<95	n/a	139	93	0,018
	>95		178	119	
PL	<150	n/a	216	144	0,057
	>150		312	208	
PM	<250	n/a	672	448	0,120
	>250		912	608	

* Multiply the belt tension required for one rib by the number of the ribs in the ribbed belt unit to get total tension to apply.

** Multiply the mass of one rib by the number of the ribs in the ribbed belt to get total mass to apply.

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