Power Transmission Products

TensionRite® Belt Frequency Meter

User Manual

Folio Edition

www.contitech.us

ContiTech

1.0 GENERAL SAFETY TIPS

SAFETY FIRST

Read and understand this manual before operating the TensionRite® Belt Frequency Meter.

- Do not drop meter or subject either meter or 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 a 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 the TensionRite® Belt Frequency Meter is not to be used for a while, remove the batteries and store unit in the case provided.
- Do not use your TensionRite® Belt Frequency Meter in any potentially explosive environment.
- Do not disassemble or attempt to modify either the meter or the sensing head.

LOCK OUT – TAG OUT

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

2.0 Device Description

Continental ContiTech TensionRite® 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 newtons 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.

An abridged manual, a tuning fork for checking calibration and a storage case are included with the complete kit.

3.0 Quick Start

Following these simple steps will allow you to measure the vibration frequency of the belt. This value is independent of span or mass values but is very useful as an index for belt system maintenance, sometimes the only number you will need. For example, the MaximizerPro™ drive analysis program gives tensioning targets in Hz as well as in force units (newtons and pounds-force).

For tensioning results in units of force, follow the procedures defined in Section 5.0.

4.1 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 4.4 for a description of the visual and audible low battery signal.

SPAN (m)

This key is used to enter the belt span length. Hold down the span key and use the UP or DOWN keys to set the belt span in meters. Releasing the span key results in an audible beep to indicate the setting has been accepted. Pressing a MEM(ory) key immediately after releasing the SPAN key will load the span constant just entered into the appropriate memory register. 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 kilograms/meter (kg/m). Releasing the MASS key results in an audible beep indicating that the setting has been accepted. Pressing a MEM(ory) key immediately after releasing the MASS key will load the mass constant just entered into the appropriate memory register. Pressing the MASS key alone displays the current setting.

Important Note:
Belt span and belt mass are required entries if tension results in force units (newtons or pounds-force) are desired. Entries must be in SI units (meters and kg/meter.)

UP (Hz/N)

This key has two functions. The first is to increase either the SPAN or MASS parameters when used in conjunction with those keys. The second use is to toggle between the Hz and the newton measurement modes. If this key is pressed while either the SPAN or MASS keys are being held down, the number shown in the display window will increase in value. If only this key is pressed, the display will automatically toggle between frequency and newtons. The calculation of the force in newtons will be based upon the mass and span constants currently in the active register.

DOWN (Hz/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 pounds-force measurement modes. If this key is pressed while either the SPAN or MASS keys are being held down, the number shown in the display window will decrease in value. If only this key is pressed, the display will automatically toggle between frequency and pounds. The calculation of the force in pounds will be based upon the mass and span constants currently in the active register.

MEM 1 **MEM 2** **MEM 3**

The memory keys allow up to three 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 selected MEM key should be pressed. Two beeps indicate that the parameters have been successfully assigned to the key.

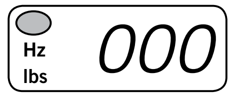
To use the stored span and mass constants, simply press the desired MEM(ory) key prior to taking a measurement. To check if you have the correct values, you may press the SPAN or MASS keys and the current constant will show in the display window.

4.2 Audio/Visual Display

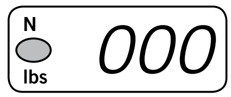
The TensionRite® Belt Frequency Meter is an interactive tool. It provides both visual and audible communication with the operator. Each signal or combination of signals has meaning. While all these signals are discussed in other sections of this manual, here will be presented a compilation of all the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

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

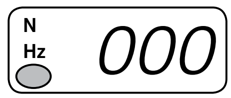
Visual Measurement Results



Tension displayed in newtons.



Frequency mode, results displayed as hertz (cycles/sec).



Tension displayed in pounds-force.

A dark oval will appear to indicate the units associated with the number displayed.

Audible Signals

Signal	When	Means
One beep	Upon release of SPAN key	Input accepted
	Upon release of MASS key	Input accepted
	While sensor is aimed at vibrating belt	Measurement taken
Two beeps	Upon pushing MEM key after releasing SPAN key	Span data has been stored
	Upon pushing MEM key after releasing MASS key	Mass data has been stored
Four beeps	Combined with "000" newton display	Newton result is out of range
	Combined with "000" pound display	Pound result is out of range
	After pushing ON key and combined with "zero" countdown	Low battery condition

4.3 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 center of the span and at a 3/8 in. (9.5mm) distance. It is also a good practice to orient the long edge of the sensor head parallel to the centerline of the belt. This helps reduce the effect of any divergence between the aiming beam and the infrared sensing beam.

When physical restrictions are present, it is possible to get usable readings with the sensor at up to 2 in. distance from the belt and/or tipped up to 45 degrees 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.

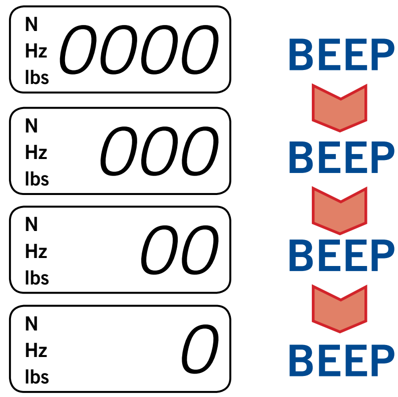
The sensor LEDs should be kept clean by wiping with a soft cotton cloth. **Solvents are never to be used.**

4.4 Battery Condition

When the TensionRite® Belt Frequency Meter is first switched on, a battery condition check is automatically performed. A low battery condition is signaled 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 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.

Dispose of old batteries in an environmentally sensitive manner as prescribed by the battery manufacturer. In no case should batteries be disposed of in an open flame.



Low Battery Signal

4.5 Charging Batteries

IMPORTANT

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 TensionRite® Belt Frequency Meter is compatible with user-supplied rechargeable batteries and recharging unit. A convenient 3.5mm, positive center charging socket is located on the bottom end of the meter body adjacent to the sensor cable plug-in port.

Batteries – 1300 mAH minimum (user supplied)

Charging unit – 12 to 15 volt DC output (user supplied)

Connection – 3.55mm O.D. positive tip mini plug/socket

The built-in circuit of the meter controls the charging current, automatically providing a fast and a trickle charge. Charging current is internally limited to 100 mA. Charging time is typically 12-14 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 changes.

Alternatively, a separate battery charging station may be utilized. Using two sets of batteries, one set in use with the meter, the other set in the charging station, would ensure freshly charged batteries were always available. Again, batteries should have a minimum rating of 1300 mAH.

5.0 Setup & 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 by pressing ON/OFF .

3. Load span & mass data or recall previously loaded data. To load span data simply hold down SPAN while using UP (Hz/N) or DOWN (Hz/Lbs) to set the number.

   SPAN (m) + UP (Hz/N) OR DOWN (Hz/Lbs)

   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 while using UP (Hz/N) or DOWN (Hz/Lbs) to set the number.

   MASS (kg/m) + UP (Hz/N) OR DOWN (Hz/Lbs)

   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 the appropriate memory key,

   MEM 1 MEM 2 MEM 3

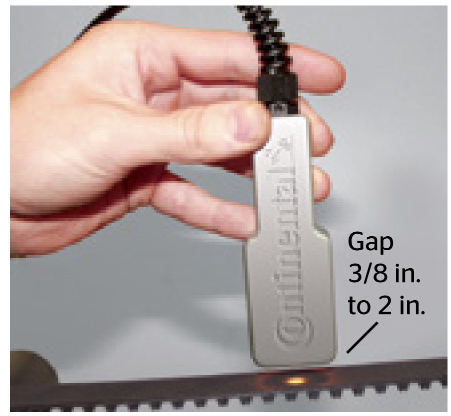
   or as soon as the SPAN or MASS keys have been released. The meter will beep twice to acknowledge the entry into memory.

   To recall stored span and mass data, simply press

   MEM 1 , MEM 2 OR MEM 3

   according to where you previously entered the values.

4. Aim sensor at center 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 results.

   N lbs 97.4

6. Press UP (Hz/N) to toggle results to newtons. UP (Hz/N)

   Hz lbs 0225

7. Press DOWN (Hz/Lbs) to toggle results to pounds$_f$. DOWN (Hz/Lbs)

   N Hz 0050

   NOTE: Pressing either toggle a second time will return display to the Hz value.

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

6.0 Operating Tips

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

LOCK OUT – TAG OUT

- Take your tension reading as close to the center of the selected span as is 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 the effects of belt stiffness.

- When possible, orient the sensor head with the long edge of the sensor parallel to the centerline of the belt. This tends to eliminate any non-reading condition 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 a good practice to take three successive readings. This will show the consistency of your methods. If the readings vary by more than 10%, reassess 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, a poorly mounted sprocket or pulley, or an irregular pulley groove.

- The TensionRite® Belt Frequency Meter will measure vibration frequency (Hz) of all style belts, even belt brands other than Continental ContiTech. Tension values will also be computed provided you input the appropriate span and mass constants.

- When tensioning an array of multiple V-belts, use a single belt toward the center of the array. Banded belts (Torque Team,™ etc.) are to be treated as a single unit with the mass constant calculated as a multiple of the single belt value (see "Belt Mass Constants").

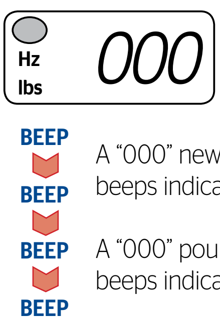
7.0 Meter Range

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

If the measured frequency is below 10Hz, the meter will display "10.00" briefly and then change to "000.0". If the measured frequency is above 400Hz, the meter will display "400" briefly and then change to "000."

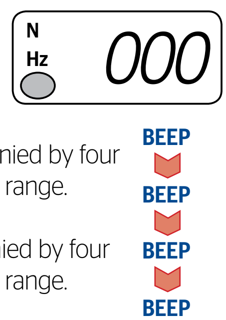
If these limits are exceeded on a multi-shaft (three or more shafts) system, it may be possible to get valid measurements by selecting a different belt span for measurement. If the measured frequency is below 10Hz, choose an available shorter span. If the measured frequency is above 400Hz, choose a longer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

It is possible to have a frequency reading that is within the meter's range but the calculated force numbers are beyond the meter's range. The meter is capable of calculating belt tensions up to 9,990 newtons and 2,200 pounds-force. When these limits are exceeded, the meter will react as follows.



A "000" newton reading accompanied by four beeps indicates the result is out of range.

A "000" pound reading accompanied by four beeps indicates the result is out of range.



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 meter's tension range. The drive will have to be tensioned by using frequency (Hz) values alone. Of course, traditional force and deflection techniques can also be used.

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.

8.1 Spot Check

The measurement system of the TensionRite® 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 250Hz 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 1/2 in. The meter will measure a frequency of 250Hz, thus demonstrating that it is in calibration.

Results within +/- 1% are acceptable. There is no adjustment possible. If greater variance is experienced, meter should be returned for recalibration. See Section 8.2 for recalibration return procedures.

8.2 Annual Certification

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

techsupport@clavis.co.uk
phone: 011-44-191-2627869
fax: 011-44-191-2620091

The meter may be returned to the manufacturer 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 the manufacturer at yearly intervals to have the meter recalibrated and certified to UKAS (United Kingdom Accreditation Standards) ISO/IEC 17025:2005.

The manufacturer must be contacted for detailed cost and shipping procedures prior to any return. Contact information for Integrated Display Systems Limited (Clavis) is shown in Appendix 5.0.

There will be a charge for these services.

9.0 Technical Specifications

Measurement Range

Frequency range	10 to 400Hz
Measurement accuracy	
Below 100Hz	+/- 1 significant digit
Above 100Hz	+/- 1%
Belt Mass input range	0.001 to 9.990kg/m
Belt Span input range	0.001 to 9.990 meters
Maximum belt tension display	9990 newtons
	2200 lbs.

Environmental Conditions

Operating temperature	+10°C to +50°C
	+50°F to +122°F
Shipment & storage temp	-5°C to +70°C
	+23°F to +158°F
Protection class	IP54

Sensor

Type	Infra-red optical
IR wavelength	970nm
Visible aiming beam	Narrow angle orange LED
Housing	Machined aluminum
Cable length	1 meter

Power Supply

Type	Dry cell battery
Voltage	6 volt
Battery type	AA (MN1500) alkaline
Number	4
Expected life	20 hours
Compartment location	Back of meter

Optional Rechargeable Batteries

Battery type	AA (1300 mAH min.)
Charger	12 – 15VDC output
Socket/polarity	3.5mm OD/positive center

10.0 Formulas & Conversions

Force Conversion Constants

newtons x 0.2248 = $pounds_f$
$pounds_f$ x 4.4482 = newtons
kilograms x 9.8067 = newtons

Length Conversion Constants

inches x 0.0254 = meters
meters x 39.3701 = inches
mm x 0.001 = meters

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)

ounces x 0.02835 = kilograms
pounds x 0.45359 = kilograms

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

1.0 Belt Mass Constants

SilentSync®

Pitch	Width	Belt Mass (kg/m)
8M	Yellow	0.071
	White	0.142
	Purple	0.283
14M	Blue	0.254
	Green	0.380
	Orange	0.507
	Red	0.761

Conti® Synchrochain Carbon

Pitch	Width	Belt Mass (kg/m)
8M	12mm	0.055
	21mm	0.096
	36mm	0.164
	62mm	0.283
14M	20mm	0.156
	37mm	0.289
	68mm	0.531
	90mm	0.703
	125mm	0.976

FALCON Pd®

Pitch	Width	Belt Mass (kg/m)
8M	12mm	0.064
	21mm	0.112
	36mm	0.192
	62mm	0.330
14M	20mm	0.163
	37mm	0.301
	68mm	0.550
	90mm	0.738
	125mm	1.023

HAWK Pd®

Pitch	Width	Belt Mass (kg/m)
5M	9mm	0.034
	15mm	0.057
	25mm	0.095
8M	20mm	0.118
	30mm	0.176
	50mm	0.289
	85mm	0.507
14M	40mm	0.438
	55mm	0.583
	85mm	0.913
	115mm	1.233
	170mm	1.835
20M	115mm	1.583
	170mm	2.341
	230mm	3.167
	290mm	3.993
	340mm	4.681

BLACKHAWK Pd®

Pitch	Width	Belt Mass (kg/m)
8M	12mm	0.045
	22mm	0.069
	35mm	0.159
	60mm	0.226
14M	20mm	0.164
	42mm	0.344
	65mm	0.532
	90mm	0.737
	120mm	0.983

Pd™ (trapezoidal)

Pitch	Width	Belt Mass (kg/m)
MXL	0.12 in.	0.006
	0.19 in.	0.009
	0.25 in.	0.010
XL	0.25 in.	0.014
	0.37 in.	0.023
L	0.50 in.	0.047
	0.75 in.	0.071
	1.00 in.	0.094
H	0.75 in.	0.083
	1.00 in.	0.111
	1.50 in.	0.167
	2.00 in.	0.222
	3.00 in.	0.333
XH	2.00 in.	0.549
	3.00 in.	0.823
	4.00 in.	1.098
XXH	2.00 in.	0.782
	3.00 in.	1.172
	4.00 in.	1.563
	5.00 in.	1.954

Super Torque Pd®

Pitch	Belt Mass (kg/m)
S3M	0.061 x inch width
S4.5M	0.090 x inch width
S5M	0.100 x inch width
S8M	0.143 x inch width
S14M	0.298 x inch width

DUAL Hi-Performance Pd™

Pitch	Width	Belt Mass (kg/m)
8M	20mm	0.206
	30mm	0.313
	50mm	0.517
	85mm	0.876
14M	40mm	0.739
	55mm	1.006
	85mm	1.548

DUAL Pd® (trapezoidal)

Pitch	Width	Belt Mass (kg/m)
XL	0.25 in.	0.028
	0.37 in.	0.040
L	0.50 in.	0.053
	0.75 in.	0.080
	1.00 in.	0.107
H	0.75 in.	0.092
	1.00 in.	0.122
	1.50 in.	0.183
	2.00 in.	0.244
	3.00 in.	0.366

POLY-V®

Pitch	Belt Mass (kg/m)
J	0.009 x # of ribs
K	(weigh actual belt)
L	0.041 x # of ribs
M	0.154 x # of ribs

Hy-T® WEDGE

Pitch	Belt Mass (kg/m)
3V	0.076
5V	0.186
8V	0.495
3VX	0.068
5VX	0.149
8VX	0.486

Metric

Pitch	Belt Mass (kg/m)
XPZ	0.068
SPA	0.128
XPA	0.114
SPB	0.186
XPB	0.149
SPC	0.353
XPC	0.289

WEDGE TLP™

Pitch	Belt Mass (kg/m)
3VT	0.082
5VT	0.212
8VT	0.565

Hy-T® PLUS

Pitch	Belt Mass (kg/m)
A	0.100
B	0.168
C	0.296
D	0.671

TORQUE-FLEX®

Pitch	Belt Mass (kg/m)
AX	0.093
BX	0.161
CX	0.282

HEX (double-V)

Pitch	Belt Mass (kg/m)
AA	0.137
BB	0.238
CC	0.407
CCP	0.602

FHP

Pitch	Belt Mass (kg/m)
2L	0.031
3L	0.066
4L	0.099
5L	0.144

Hy-T® WEDGE TORQUE TEAM®

Pitch	Belt Mass (kg/m)
3VX	0.096 x # of ribs
5VX	0.217 x # of ribs
3V	0.094 x # of ribs
5V	0.243 x # of ribs
8V	0.596 x # of ribs

TORQUE TEAM PLUS®

Pitch	Belt Mass (kg/m)
5VF	0.242 x # of ribs
8VF	0.603 x # of ribs

Hy-T® TORQUE TEAM®

Pitch	Belt Mass (kg/m)
B	0.216 x # of ribs
C	0.367 x # of ribs
D	0.755 x # of ribs
BX	0.211 x # of ribs
CX	0.344 x # of ribs

2.0 Theory of Operation

The vibration frequency of a plucked string is dependent upon the tension of that string. As the tension is increased, the vibration frequency also increases. Laboratory investigations show that power transmission belts react in a similar manner. Data indicates that there is a direct relationship between belt tension and a belt's natural frequency of vibration. This relationship holds true except for the very extreme high-tension zones (well above where any belt system can operate). Using load cells and accelerometers while applying Newtonian law, the linkage between strand tension and natural vibration frequency has been defined. It was found that unlike with a string, the mass of a belt does play a role in the results. The relationship between tension and frequency has been determined to be:

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

where T = belt tension in newtons (N)
m = mass per unit length expressed as kilograms/meter (kg/m)
l = span length in meters (m)
f = vibration frequency in hertz (Hz)

String theory ignores flexural stiffness. A belt does have some stiffness so the calculated tension for a given frequency will be slightly higher than the actual tension. For belt spans greater than 0.25m, the above equation will provide results within 10% of the actual values. Beam analysis may give improved accuracy but the required inputs are generally too cumbersome for field application.

The TensionRite® 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 TensionRite® Belt Frequency Meter may be used with all power transmission belts regardless of type or construction.

3.0 Frequently Asked Questions (FAQs)

I am more comfortable using inches and pounds rather than millimeters and newtons. Why SI units?
Belt tensioning became particularly critical with the advent of 2nd generation synchronous belts. All such belts are of metric design with the tooth pitch, width and length specified in SI (System International d'Unites) units. It follows that tools for use with such belts should also utilize the SI system. While the TensionRite® Belt Frequency Meter requires span and mass inputs to be made in SI units, the output can be toggled to pounds-force if you wish. Conversion factors for English to SI and SI to English are also shown in the TensionRite® Belt Frequency Meter User Manual.

Which is the best span to use when tensioning a multi-span drive (a dR with more than one dN)?
Best practice is to use the longest span that can be readily accessed. Using too short a span can compromise accuracy. The natural frequency of a span should be between 10Hz and 400Hz to be properly read by the TensionRite® Belt Frequency Meter. It is highly unlikely that your drive will be outside this window. However, if the measured frequency is below 10Hz, choose a shorter span. If the measured frequency is above 400Hz, chose a longer span.

What constitutes "too short a span" and why?
Let's start with the "why" part of your question. Transverse vibration of string theory (the science behind frequency based tension measurement) overlooks the rigidity of the string. Although hard to quantify, belts have considerable internal rigidity (stiffness). The shorter the span, the greater is the effect of this stiffness in dampening both the natural frequency and amplitude of strand vibration. The effect is that belt tension in a short span is lower than the vibration frequency would indicate (measured results are much higher than actual belt conditions).

To limit such error there have evolved some informal guidelines for the most common belt constructions. For synchronous belts (toothed belts) the recommended minimum span length is defined as greater than 20 times the tooth pitch. For example: an 8mm pitch belt would require a minimum span of 160mm (approximately 6.3 in.) to yield reliable frequency based tension data. For V-belts the recommended minimum span length is about 30 times the belt top width.

These are guidelines or rules of thumb that have evolved over time. It is the link between frequency and tension, as well as the optical signal that degrades as these minimums are approached. A practical test is to take several readings (from 3 to 5 repeats) under identical conditions. If the results vary wildly or if frequency exceeds 400Hz (top of meter range) you need to select a longer span. If you have concerns about a specific drive, you should contact Continental ContiTech Customer Service or your local Continental ContiTech Products Distributor. Telephone or e-mail contact information for Technical Support is given in the User Manual.

What if I cannot access the top surface of the belt span selected?
If the flat face of the belt is not accessible it may be possible to beam the sensor onto the edge of the belt to take your measurement. The inside surface (toothed side of a synchronous belt) is equally acceptable as a target for the sensor. Regardless of the surface selected, the best readings are obtained with the sensor held square to the target surface at a distance of 3/8 in. In practice, valid readings have been taken at distances up to 2 in. and at angles varying from vertical to plus/minus 45 degrees.

Does the sensor need to be aimed at the exact center of the span?
Let specific drive conditions be your guide. Best shop practice is to take your reading as close to the span center as is practical. A strummed belt vibrates with the same frequency everywhere along the unsupported span. The amplitude of vibration is greatest in the center of the span, degrading geometrically as the tangent points (sprocket or pulley contacts) are approached. Bigger features are generally the easiest to see (think eye chart). The TensionRite® Belt Frequency Meter is an optical system so the best reading is taken directly above the center of the span, although on most belts valid and accurate readings can be achieved almost anywhere along the belt span.

Sometimes I have trouble getting a reading on a narrow belt such as a Torque Flex AX, any suggestions?
Best shop practice is to orient the sensor with the long edge of the sensor parallel to the centerline of the belt. There may be a slight difference in focus between the aiming LED and the infrared beam at the distance you happened to be holding the sensor. Orienting with the long edge parallel to the belt centerline simply provides a larger target area thus easing the need for very precise aiming. This suggestion also applies when taking measurements from the edge of a belt.

What are some of the advantages of the new TensionRite® Belt Frequency Meter over the older sonic meter?
Accuracy, reliability and ease of use are the primary benefits of the TensionRite® Belt Frequency Meter. The accuracy of measurement is largely determined by the method of measurement. While both sonic and optical tension meters rely upon the same transverse vibration of string theory (think tuning a violin) to determine belt strand tension, the two methods differ in how the frequency of vibration (Hz) is actually determined.

A sonic meter (also known as an acoustic meter) indirectly measures vibration. It predicts vibration frequency based upon sensing disturbances in the pressure of the air (essentially noise) adjacent to the belt. The sensor is really a specialized microphone. Ambient conditions are a critical factor. Background noise and air currents can and will affect the accuracy of this type of sensor. Some sonic meters incorporate internal filters in an attempt to counter stray inputs while other units include a "gain" adjustment for the sensor.

An optical meter directly measures belt vibration. Using advanced solid-state infrared technology, the sensor actually "sees" the belt surface. Any displacement of the belt is observed and the frequency of displacement over time is measured. This method of direct measurement is unaffected by ambient conditions resulting in superior accuracy without the need for filters or manual tuning.

If the meter uses an infrared beam, what is the lighted spot I see on the belt?
The orange-lighted spot is generated by a narrow angle LED (Light Emitting Diode). It is focused to the same area as is the infrared generator and is to be used as an aiming guide for the invisible infrared beam.

What about operator safety? Isn't an infrared beam really an invisible death ray?
Don't confuse the optical sensor with a laser. Lasers are intensifiers that project a coherent beam (parallel rays) with low divergence and high brightness. The result is a focused beam with very high energy density. The sensor of the TensionRite® Belt Frequency Meter uses the non-coherent infrared output of a small low-energy diode.

Do I need to input span length and belt mass parameters each time the meter is used?
Not necessarily. If you are dealing with a drive on a regular basis, the memory feature of the TensionRite® Belt Frequency Meter may be to your advantage. Up to three different sets of belt parameters can be stored in the meter, each assigned to one of the three MEM keys. The next time that particular drive is tensioned, pressing the appropriate key will recall and load the belt mass and span information.

You can also eliminate completely the need for span and mass parameters by working directly with the belt vibration frequencies (f) measured in hertz (Hz) rather than with belt tension values (expressed in units of force). Hz values are independent of mass and span values. The output of the MaximizerPro™ program gives target Hz values in addition to traditional tension values. Armed with the correct Hz information simply follow the steps shown in the "Quick Start" section of the User Manual.

How do I determine span length?
There are three common methods to determine span length: using the output from the MaximizerPro™ drive-analysis program, performing a mathematical calculation or by direct measurement. MaximizerPro™, a user-friendly drive analysis program, will automatically report belt tensioning parameters (including span length) as part of your drive selection process. Or, you can make the calculation manually using the formula shown in the User Manual. You must know the center distance (dimension between shaft centers) as well as the diameter of both driveR and driveN to complete the calculation.

The least accurate but sometimes most practical method to determine span length is by direct measurement. Span length is defined to be the length of the unsupported belt between the exit point of one pulley and the entry point of the adjacent pulley. Simply locate these two tangent points as best as you can and then measure between them along the back of the belt. The resulting measurement (expressed in meters) is your span length.

Our company operating procedures require periodic calibration and certification of measuring tools. Are there such procedures for the TensionRite® Belt Frequency Meter?
Yes there are. The solid-state circuitry of the TensionRite® Belt Frequency Meter is based upon a very stable quartz crystal which requires no adjustment. Included with your meter is a precision mechanical resonator (fancy term for a tuning fork) to allow a spot check at a frequency of 250Hz any time you wish. See section "Calibration" in the User Manual for a depiction of the procedure. Labeling the meter as a "Process Aid" coupled with performance of this spot check on a periodic basis might well satisfy your procedural requirements. If more rigorous documentation is required, the meter may be returned to the manufacturer at yearly intervals to have the calibration certified to UKAS (United Kingdom Accreditation Standards) ISO/IEC 17025:2005. Such certification is generally acceptable for ISO9001. The manufacturer must be contacted for detailed return procedure prior to sending the meter. There will be a charge for this service. The section "Annual Certification" in the TensionRite® User Manual gives contact information for the manufacturer.

Will the meter work for belt brands other than Continental ContiTech?
Yes, the TensionRite® Belt Frequency Meter will give accurate results for belts from other manufacturers. The frequency (Hz) measuring mode is immediately applicable. In order to harvest accurate tension values (in units of force rather than frequency) you must know the belt mass constant for your actual belt.

How do I determine belt mass short of contacting a manufacturer?
There is no secret to belt mass. It is defined as the unit weight of the belt or the linear belt mass and is expressed in kg/m. So simply weigh the belt on an accurate scale such as a postage scale, convert that weight to kilograms, then divide the result by the length of the belt expressed in meters. For example: say you have a generic synchronous belt of part number 1280 8M 50 (8mm pitch, 50mm wide, 1280mm long). Your postage scale says the belt weighs 9.9 ounces. Your calculations become:

9.9 ounces x 0.02835kg per oz = 0.281kg
(conversion constant from chart)
1280mm x 0.001 = 1.28m (metric convention)

0.281kg / 1.28m = 0.2195kg/m = round to = belt mass = 0.220kg/m

This is the number to then input as belt mass.

We are being asked to comply with some new environmental regulations called RoHS (Restrictions on Hazardous Substances). What is the status of the TensionRite® Belt Frequency Meter in relation to RoHS?
The manufacturer of the TensionRite® Belt Frequency Meter states that they are in full compliance with the restricted materials listed in the Directive 2002/95/EC of the European Parliament and the Council of 27 January 2003, commonly referred to as RoHS.

Can the TensionRite® Belt Frequency Meter be used with rechargeable batteries?
The TensionRite® Belt Frequency Meter can be successfully energized with an array of any AA size batteries, either rechargeable or disposable. The meter does not feature recharging circuitry so the user must supply a separate battery charging station in order to use rechargeable batteries. A second set of batteries is also recommended to avoid leaving the meter without power while the batteries charge. Leaving the meter unenergized for longer than approximately 30 seconds will result in the loss of any stored data.

May the TensionRite® Belt Frequency Meter continue to be used while on-board charging of the batteries is taking place or even when connected to the charger with batteries removed?
In theory, maybe: in practice, no. A software block has been placed to prevent operation of the optical sensor while the batteries are under on-board charging.

Most commercial charging units utilize only a rectifier for nominal smoothing of the output. The optical sensor requires a ripple-free current supply. To preclude potential damage to the infrared circuitry and to eliminate the harvest of faulty data, the meter has been “taught” to display a charging indication (similar to the “low battery” signal) when turned on during a charging cycle. In addition, we strongly recommend that the sensor head be totally disconnected during the on-board battery charging process. Refer to Section 4.5 of this User Manual for further information.

Will tramp IR signals from other systems affect the operation of the TensionRite® Belt Frequency Meter?
The answer is a definite no. The amount of environmental IR reaching the sensor (which has a narrow beam of only 15 degrees) is very small when compared with the IR signal from the sensor emitter that is reflected from the belt. In addition, the meter uses a technique called “synchronous demodulation” to recover the reflected belt signal while rejecting all external signals not modulated in synchrony with the meter.

Will tramp signals from the TensionRite® Belt Frequency Meter affect other equipment using IR communication?
It is not possible to give a definitive universal statement on this topic. It depends primarily upon the quality of the third party equipment. Again, the narrow beam in addition to the very low energy of that focused beam make it highly unlikely that the signal from the TensionRite® Belt Frequency Meter will interact with any other device. If this is a concern in your location, a carefully controlled trial is suggested prior to releasing the device for general use in your facility.

Is the TensionRite® Belt Frequency Meter rated as intrinsically safe as defined by International Standard IEC 60079-11?
The TensionRite® Meter does not qualify for I.S. certification. As such, the meter is not to be used in locations with potentially explosive atmospheres. The meter circuitry generally complies with the technical requirements of the standards. However, the meter housing will not pass scrutiny. The ease in which the batteries could, in some circumstances, fall free and thus have no current/power limit protection prevents the housing from qualifying for I.S. certification.

4.1 Synchronous Belt Tensioning Tables

Belt Type		Belt Strand Tension (lbs.) 0-100 RPM		Belt Strand Tension (lbs.) 101-1000 RPM		Belt Strand Tension (lbs.) 1000-up RPM		Belt Weight (kg/m)	Deflection Forces for Belt Tensioning (lbs.) 0-100 RPM		Deflection Forces for Belt Tensioning (lbs.) 101-1000 RPM		Deflection Forces for Belt Tensioning (lbs.) 1000-up RPM	
		New Belt	Used Belt	New Belt	Used Belt	New Belt	Used Belt		New Belt	Used Belt	New Belt	Used Belt	New Belt	Used Belt
SilentSync®	Yellow	224	160	176	112	128	96	0.071	15	11	12	8	9	7
	White	449	305	353	241	273	177	0.142	30	21	24	17	19	13
	Purple	897	625	689	481	545	369	0.283	60	43	47	34	38	27
	Blue	817	561	657	449	561	385	0.254	54	38	44	31	38	27
	Green	1210	842	986	682	842	586	0.380	80	57	66	47	57	41
	Orange	1618	1122	1314	914	1122	786	0.507	107	76	88	63	76	55
	Red	2436	1700	1956	1364	1700	1172	0.761	161	115	131	94	115	82
Conti® Synchrochain Carbon	CTD8M 12	256	174	196	131	172	114	0.055	18	13	14	10	13	9
	CTD8M 21	448	305	342	229	301	200	0.096	31	22	25	18	22	16
	CTD8M 36	769	523	587	393	516	342	0.164	54	38	42	30	38	27
	CTD8M 62	1324	901	1011	677	888	589	0.283	93	66	73	52	65	47
	CTD14M 20	960	660	605	407	484	321	0.156	65	47	43	31	36	26
	CTD14M 37	1776	1222	1119	753	896	594	0.289	121	87	80	57	66	47
	CTD14M 68	3263	2246	2056	1383	1647	1091	0.531	223	159	147	105	122	87
	CTD14M 90	4319	2972	2721	1831	2180	1444	0.703	295	210	195	139	161	115
	CTD14M 125	5999	4128	3780	2543	3028	2006	0.976	409	292	271	193	224	160
Falcon Pd®	8GTR 12	370	258	210	146	130	98	0.064	24	17	14	10	9	7
	8GTR 21	648	456	376	264	232	168	0.112	42	30	25	18	16	12
	8GTR 36	1111	775	631	439	391	295	0.192	72	51	42	30	27	21
	8GTR 62	1913	1337	1081	761	681	505	0.330	124	88	72	52	47	36
	14GTR 20	571	427	459	331	411	299	0.163	38	29	31	23	28	21
	14GTR 37	1052	796	844	620	764	556	0.301	70	54	57	43	52	39
	14GTR 68	1939	1459	1555	1123	1395	1011	0.550	129	99	105	78	95	71
	14GTR 90	2570	1930	2074	1498	1850	1354	0.738	171	131	140	104	126	95
	14GTR 125	3578	2666	2874	2074	2570	1866	1.023	238	181	194	144	175	131
Blackhawk Pd®	8MBH 12	179	131	131	99	99	67	0.045	12	9	9	7	7	5
	8MBH 22	345	249	233	169	185	137	0.069	23	17	16	12	13	10
	8MBH 35	539	379	379	267	299	219	0.159	36	26	26	19	21	16
	8MBH 60	928	656	656	464	512	368	0.226	62	45	45	33	36	27
	14MBH 20	553	393	409	297	345	249	0.164	36	26	27	20	23	17
	14MBH 42	1167	831	863	623	735	527	0.344	76	55	57	42	49	36
	14MBH 65	1796	1284	1348	964	1140	804	0.532	117	85	89	65	76	55
	14MBH 90	2487	1783	1863	1335	1575	1127	0.737	162	118	123	90	105	77
	14MBH 120	3332	2372	2484	1764	2084	1492	0.983	217	157	164	119	139	102
Hawk Pd®	8M 20	226	162	194	146	178	130	0.118	15	11	13	10	12	9
	8M 30	347	251	299	219	283	203	0.176	23	17	20	15	19	14
	8M 50	590	430	526	382	478	350	0.289	39	29	35	26	32	24
	8M 85	1046	742	918	662	838	598	0.507	69	50	61	45	56	41
	14M 20	715	507	571	411	475	347	0.438	47	34	38	28	32	24
	14M 55	1069	765	845	605	717	509	0.583	70	51	56	41	48	35
	14M 85	1778	1266	1410	1010	1186	850	0.913	116	84	93	68	79	58
	14M 115	2486	1782	1974	1414	1654	1174	1.233	162	118	130	95	110	80
	14M 170	3827	2739	3059	2179	2579	1843	1.835	249	181	201	146	171	125

1. The table deflection forces and strand tensions are typically at maximum values to cover the broad range of loads, RPM and pulley combinations for all possible drives.
2. For drives where hub loads are critical, high speed drives or other drives with special circumstances, the belt deflection force and strand installation tension should be calculated by using formulas found in existing Engineering Manuals or use the MaximizerPro™ Drive Selection Analysis Program.
3. Consult the TensionRite® Belt Frequency Meter manual for detailed information on using the frequency based tension gauge.
4. Three different levels of Continental ContiTech tension gauges are offered to aid you in properly tensioning your power transmission belts. See your sales representative or your local authorized Power Transmission distributor for more information on these tensioning gauges.

4.2 V-Belt Tensioning Tables

Cross Section	Smallest Sheave Diameter Range	RPM Range	Deflection Forces for Belt Tensioning (lbs.): Noncogged Single, Torque Team* & Torque Team Plus* Belts – New Belt	Used Belt	Deflection Forces: Cogged Single & Torque Team* – New Belt	Used Belt	Belt Strand Tension (lbs.): Noncogged Single, Torque Team* & Torque Team Plus* Belts – New Belt	Used Belt	Belt Strand Tension: Cogged Single & Torque Team* – New Belt	Used Belt	Belt Weight (kg/meter)
A, AX	3.0 - 3.6	1000 - 2500 2501 - 4000	5.5 4.2	3.7 2.8	6.1 5.0	4.1 3.4	84.0 64.0	56.0 41.0	94.0 76.0	62.0 51.0	A = 0.100
	3.8 - 4.8	1000 - 2500 2501 - 4000	6.8 5.7	4.5 3.8	7.4 6.4	5.0 4.3	105.0 88.0	68.0 57.0	115.0 99.0	76.0 65.0	
	5.0 - 7.0	1000 - 2500 2501 - 4000	8.0 7.0	5.4 4.7	9.4 7.6	5.7 5.1	124.0 108.0	83.0 72.0	147.0 118.0	88.0 78.0	AX = 0.093
B, BX	3.4 - 4.2	860 - 2500 2501 - 4000	N/A N/A	N/A N/A	7.2 6.2	4.9 4.2	N/A N/A	N/A N/A	110.3 94.3	73.5 62.3	B = 0.168 Torque Team B = 0.216 x # of ribs
	4.4 - 5.6	860 - 2500 2501 - 4000	7.9 6.7	5.3 4.5	10.5 9.1	7.1 6.2	121.5 102.3	79.9 67.1	163.1 140.7	108.7 94.3	BX = 0.161
	5.8 - 8.6	860 - 2500 2501 - 4000	9.4 8.2	6.3 5.5	12.6 10.9	8.5 7.3	145.5 126.3	95.9 83.1	196.7 169.5	131.1 111.9	Torque Team BX = 0.211 x # of ribs
C, CX	7.0 - 9.0	500 - 1740 1741 - 3000	17.0 13.8	11.5 9.4	21.8 17.5	14.7 11.9	264.6 213.4	176.6 143.0	341.4 272.6	227.8 183.0	C = 0.296 Torque Team C = 0.367 x # of ribs
	9.5 - 16.0	500 - 1740 1741 - 3000	21.0 18.5	14.1 12.5	23.5 21.6	15.9 14.6	328.6 288.6	218.2 192.6	368.6 338.2	247.0 226.2	CX = 0.282 Torque Team CX = 0.344 x # of ribs
D	12.0 - 16.0	200 - 850 851 - 1500	37.0 31.3	24.9 21.2	N/A N/A	N/A N/A	581.9 490.7	388.3 329.1	N/A N/A	N/A N/A	D = 0.671
	18.0 - 20.0	200 - 850 851 - 1500	45.2 38.0	30.4 25.6	N/A N/A	N/A N/A	713.1 597.9	476.3 399.5	N/A N/A	N/A N/A	Torque Team D = 0.755 x # of ribs
3V, 3VX, XPZ	2.2 - 2.4	1000 - 2500 2501 - 4000	N/A N/A	N/A N/A	4.9 4.3	3.3 2.9	N/A N/A	N/A N/A	75.9 66.3	50.3 43.9	3V = 0.076 Torque Team 3V = 0.094 x # of ribs
	2.65 - 3.65	1000 - 2500 2501 - 4000	5.1 4.4	3.6 3.0	6.2 5.6	4.2 3.8	79.1 67.9	55.1 45.5	96.7 87.1	64.7 58.3	3VX, XPZ = 0.068
	4.12 - 6.90	1000 - 2500 2501 - 4000	7.3 6.6	4.9 4.4	7.9 7.3	5.3 4.9	114.3 103.1	75.9 67.9	123.9 114.3	82.3 75.9	Torque Team 3VX = 0.096 x # of ribs
3VT	2.65 - 3.65	1000 - 2500 2501 - 4000	5.4 4.7	4.6 4.0	N/A N/A	N/A N/A	83.8 72.4	69.8 60.3	N/A N/A	N/A N/A	3VT = 0.082
	4.12 - 6.9	1000 - 2500 2501 - 4000	7.6 6.9	6.3 5.8	N/A N/A	N/A N/A	118.0 107.0	98.3 89.2	N/A N/A	N/A N/A	
SPA, XPA	3.0 - 4.1	1000 - 2500 2501 - 4000	N/A N/A	N/A N/A	9.0 7.9	6.1 5.2	N/A N/A	N/A N/A	140.3 122.7	93.9 79.5	SPA = 0.128
	4.2 - 5.7	1000 - 2500 2501 - 4000	10.1 8.3	6.7 5.6	12.4 11.2	8.3 7.4	157.9 129.1	103.5 85.9	194.7 175.5	129.1 114.7	
	5.7 - 10.1	1000 - 2500 2501 - 4000	14.6 12.6	9.7 8.5	15.3 13.7	10.1 9.2	229.9 197.9	151.5 132.3	241.1 215.5	157.9 143.5	XPA = 0.114

*Multiply table values by the number of Torque Team ribs to achieve recommended tensioning value.

1. The table deflection forces and strand tensions are typically at maximum values to cover the broad range of loads, RPM and pulley combinations for all possible drives.
2. For drives where hub loads are critical, high speed drives or other drives with special circumstances, the belt deflection force and strand installation tension should be calculated by using formulas found in existing Engineering Manuals or use the MaximizerPro™ Drive Selection Analysis Program.
3. Consult the TensionRite® Belt Frequency Meter manual for detailed information on using the frequency based tension gauge.
4. Three different levels of Continental ContiTech tension gauges are offered to aid you in properly tensioning your power transmission belts. See your sales representative or your local authorized Power Transmission distributor for more information on these tensioning gauges.

4.2 V-Belt Tensioning Tables (cont'd)

			Deflection Forces for Belt Tensioning (lbs.)				Belt Strand Tension (lbs.)				
			Noncogged Single, Torque Team* & Torque Team Plus* Belts		Cogged Single & Torque Team*		Noncogged Single, Torque Team* & Torque Team Plus* Belts		Cogged Single & Torque Team*		
Cross Section	**Smallest Sheave Diameter Range**	**RPM Range**	**New Belt**	**Used Belt**	**New Belt**	**Used Belt**	**New Belt**	**Used Belt**	**New Belt**	**Used Belt**	**Belt Weight (kg/meter)**
5V, 5VX, SPB, XPB	4.4 - 6.7	500 - 1749	N/A	N/A	15.2	10.2	N/A	N/A	238.8	158.8	5V, SPB = 0.186
		1750 - 3000	N/A	N/A	13.2	8.8	N/A	N/A	206.8	136.4	
		3001 - 4000	N/A	N/A	8.5	5.6	N/A	N/A	131.6	85.2	
	7.1 - 10.9	500 - 1740	18.9	12.7	22.1	14.8	298.0	198.8	349.2	232.4	Torque Team 5V = 0.243 x # of ribs
		1741 - 3000	16.7	11.2	20.1	13.7	262.8	174.8	317.2	214.8	5VX, XPB = 0.149
	11.8 - 16.0	500 - 1740	23.4	15.5	25.5	17.1	370.0	243.6	403.6	269.2	Torque Team 5VX = 0.217 x # of ribs
		1741 - 3000	21.8	14.6	25.0	16.8	344.4	229.2	395.6	264.4	
5VT	7.1 - 10.9	500 - 1740	22.1	18.5	N/A	N/A	348.2	290.2	N/A	N/A	5VT = 0.212
		1741 - 3000	19.6	16.4	N/A	N/A	308.9	257.4	N/A	N/A	
	11.8 -16	500 - 1740	25.8	21.6	N/A	N/A	408.2	340.2	N/A	N/A	
		1741 - 3000	23.2	19.4	N/A	N/A	366.0	305.0	N/A	N/A	
SPC, XPC	8.3 - 14.3	500 - 1000	31.0	20.7	33.3	22.3	488.6	323.8	525.4	349.4	SPC = 0.353
		1000 - 1750	28.6	19.1	32.4	21.6	450.2	298.2	511.0	338.2	
	14.4 - 20.1	500 - 1000	39.3	26.3	41.8	27.9	621.4	413.4	661.4	439.0	XPC = 0.289
		1000 - 1750	37.5	25.2	45.6	30.3	592.6	395.8	722.2	477.4	
8V	12.5 - 17.0	200 - 850	49.3	33.0	N/A	N/A	779.3	518.5	N/A	N/A	8V = 0.495
		851 - 1500	39.9	26.8	N/A	N/A	628.9	419.3	N/A	N/A	Torque Team 8V = 0.546 x # of ribs
	18.0 - 22.4	200 - 850	59.2	39.6	N/A	N/A	937.7	624.1	N/A	N/A	
		851 - 1500	52.7	35.3	N/A	N/A	833.7	555.3	N/A	N/A	8VX = 0.486
8VT	12.5 - 17.0	200 - 850	51.6	43.1	N/A	N/A	813.6	678.0	N/A	N/A	8VT = 0.565
		851 - 1600	42.2	35.3	N/A	N/A	662.7	552.2	N/A	N/A	
	18.0 - 22.4	200 - 850	61.4	51.3	N/A	N/A	969.7	808.1	N/A	N/A	
		851 - 1600	55.2	46.1	N/A	N/A	871.1	725.9	N/A	N/A	
5VF	7.1 - 10.9	200 - 700	30.9	21.1	N/A	N/A	467.1	310.3	N/A	N/A	Torque Team 5VF = 0.242 x # of ribs
		701 - 1250	26.3	18.0	N/A	N/A	393.5	260.7	N/A	N/A	
		1251 - 1900	23.4	16.7	N/A	N/A	347.1	239.9	N/A	N/A	
		1901 - 3000	23.0	15.8	N/A	N/A	340.7	225.5	N/A	N/A	
	11.8 - 16.0	200 - 700	39.5	26.8	N/A	N/A	604.7	401.5	N/A	N/A	
		701 - 1250	34.7	23.5	N/A	N/A	527.9	348.7	N/A	N/A	
		1251 - 2100	33.3	22.7	N/A	N/A	505.5	335.9	N/A	N/A	
8VF	12.5 - 20.0	200 - 500	65.8	44.7	N/A	N/A	1008.4	670.8	N/A	N/A	Torque Team 8VF = 0.603x # of ribs
		501 - 850	56.6	38.5	N/A	N/A	861.2	571.6	N/A	N/A	
		851 - 1150	51.6	35.2	N/A	N/A	781.2	518.8	N/A	N/A	
		1151 - 1650	49.0	33.5	N/A	N/A	739.6	491.6	N/A	N/A	
	21.2 - 25.0	200 - 500	97.6	65.9	N/A	N/A	1517.2	1010.0	N/A	N/A	
		501 - 850	90.6	61.2	N/A	N/A	1405.2	934.8	N/A	N/A	
		851 - 1200	84.3	57.0	N/A	N/A	1304.4	867.6	N/A	N/A	

*Multiply table values by the number of Torque Team ribs to achieve recommended tensioning value.

1. The table deflection forces and strand tensions are typically at maximum values to cover the broad range of loads, RPM and pulley combinations for all possible drives.
2. For drives where hub loads are critical, high speed drives or other drives with special circumstances, the belt deflection force and strand installation tension should be calculated by using formulas found in existing Engineering Manuals or use the MaximizerPro™ Drive Selection Analysis Program.
3. Consult the TensionRite® Belt Frequency Meter manual for detailed information on using the frequency based tension gauge.
4. Three different levels of Continental ContiTech tension gauges are offered to aid you in properly tensioning your power transmission belts. See your sales representative or your local authorized Power Transmission distributor for more information on these tensioning gauges.

5.0 Limited Warranty

Limited Warranty Time of warranty is 12 months from date of original purchase provided that proper product registration has been completed. Product registration may be completed online at:

www.clavis.co.uk/tensionritemeter

Warranty covers defects in materials and workmanship for the device only. Warranty does not cover accessory items such as batteries and applies only to parts that were not damaged as a result of inappropriate handling or use. The warranty expires immediately if the device itself is opened.

Unit must be returned to Integrated Display Systems Limited (IDS, also known as Clavis) for evaluation of all warranty claims. Any TensionRite® Belt Frequency Meter claimed to have a covered warranty condition involving material or workmanship shall, upon Clavis's approval, be returned to Clavis as designated, at the Customer's expense. Under no circumstances will liability exceed the original purchase price of the meter. Clavis reserves the right to repair or replace the unit or to refund the original purchase price at their sole option.

Limitation of Warranty: Continental ContiTech and its affiliates exclude any further liability for software, handbooks and information material. Furthermore, Continental ContiTech does not accept liability for damages resulting from the use of the TensionRite® Belt Frequency Meter.

CONTINENTAL CONTITECH'S TOTAL RESPONSIBILITY AND LIABILITY FOR ANY AND ALL CLAIMS, LOSSES AND DAMAGES OF ANY KIND WHATSOEVER ARISING OUT OF ANY CAUSE WHATSOEVER (WHETHER UNDER ANY WARRANTY OR BASED IN CONTRACT, NEGLIGENCE, OTHER TORT, STRICT LIABILITY, BREACH OF WARRANTY, OTHER THEORY OR OTHERWISE) SHALL NOT EXCEED THE ORIGINAL PURCHASE PRICE OF THE TENSIONRITE® BELT FREQUENCY METER IN RESPECT TO WHICH SUCH CAUSE ARISES, AND IN NO EVENT SHALL CONTINENTAL CONTITECH BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXAMPLARY, OR PUNITIVE DAMAGES RESULTING FROM ANY SUCH CAUSE. NO EMPLOYEE, AGENT AND/OR REPRESENTATIVE HAS AUTHORITY TO MAKE ANY REPRESENTATION, PROMISE OR AGREEMENT, EXCEPT AS STATED HEREIN. CONTINENTAL CONTITECH SHALL NOT BE LIABLE FOR, AND CUSTOMER ASSUMES ALL LIABILITY FOR, ALL PERSONAL INJURY AND PROPERTY DAMAGE CONNECTED WITH THE USE OF THE PRODUCT. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, AND CONTINENTAL CONTITECH DISCLAIMS WARRANTY OF FITNESS FOR PURPOSE OR ANY OTHER IMPLIED WARRANTIES.

Continental ContiTech Customer Service
800-235-4632
www.contitech.us

Integrated Display Systems Limited (Clavis)
Tel: +44 (0) 191 2627869
Fax: +44 (0) 191 2620091
www.clavis.co.uk/tensionritemeter

Information you will need to register warranty online (keep log for your records)

Date of Purchase ______________________________

Serial Number (on back of unit) ______________________________

Purchaser's Name ______________________________

Purchaser's Mailing Address ______________________________

____

City ____________________ State ____________ Country ____________________

E-mail (optional) ______________________________

Purchased from ______________________________

ContiTech

Distributor Policy

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ContiTech. Engineering Next Level

As a division of the Continental Group, ContiTech is a recognized innovation and technology leader in natural rubber and plastics. As an industry partner with a firm future ahead of us, we engineer solutions both with and for our customers around the world. Our bespoke solutions are specially tailored to meet the needs of the market. With extensive expertise in materials and processes, we are able to develop cutting-edge technologies while ensuring we make responsible use of resources. We are quick to respond to important technological trends, such as function integration, lightweight engineering and the reduction of complexity, and offer a range of relevant products and services. That way, when you need us, you'll find we're already there.

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