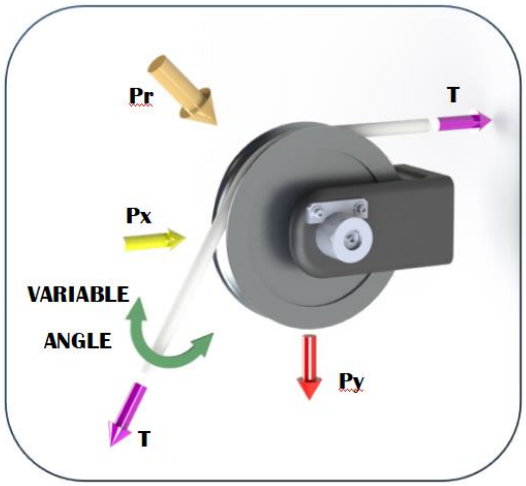
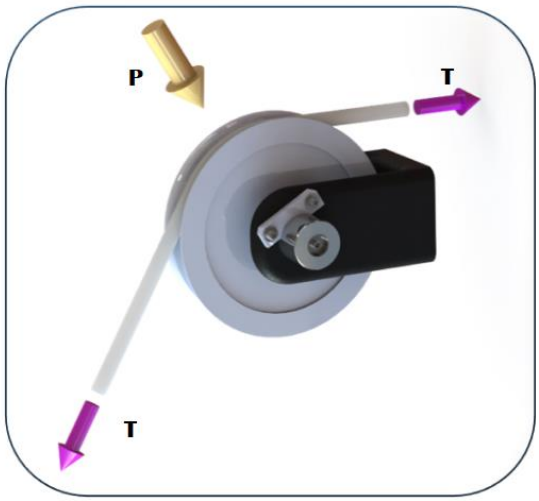
Strainsert Load Pin for Sheave Applications Note



Variable Wrap Angle



Constant Wrap Angle

Applications

- *Crane/Hoist*
- *Line Towing*
- *Line Tensioning*

Overview

Load Pins are designed into sheave applications for measuring line tension. Sheaves are designed with either a variable or constant wrap angle. For the variable wrap angle case, two strain gage bridges are installed perpendicularly (P_x and P_y). For the constant wrap angle case, one strain gage bridge is installed along the primary (sensing) axis of force (P).

Sheave Load Pin General Specifications		***Units***
Bridge Composition	*Full*	
Bridge Excitation	*10 (typical), 12 maximum*	*VDC*
Bridge Resistance	*350 (nominal)*	*Ohms*
Bridge Sensitivity	*0.5 and higher*	*mV/V*
Temperature, Zero	*±0.01% (nominal)*	*F.S./°F*
Temperature, F.S.	*±0.01% (nominal)*	*load/°F*
Zero Balance	*±3.0% (nominal)*	*F.S.*
Non-Repeatability	*±0.25% (nominal)*	*F.S.*
Non-Linearity	*±1 % (nominal)*	*F.S.*
Hysteresis	*±1 % (nominal)*	*F.S.*
Safe Overload	*150% (typical)*	*F.S.*
Ultimate strength	*300% (typical)*	*F.S.*
Minimum Pin Diameter	*1 (standard), 0.5 (with limitations)*	*inch*
Material	*17-4 Stainless Steel (typical)*	

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Variable Wrap Angle

For a sheave with a variable wrap angle, the line enters and exits the sheave at 1 fixed angle point and 1 variable angle point.

During installation, ensure that the fixed angle point is oriented along either the X or Y axis. This is referred to as the "Level Line", which is required for proper operation. If needed, ensure that P_x and P_y are crosstalk corrected prior to line tension and angle calculations using the Strainsert Crosstalk Correction Data report provided with the job and either the Crosstalk Correction User's Guide or the Crosstalk Correction Quick Reference, provided separately.

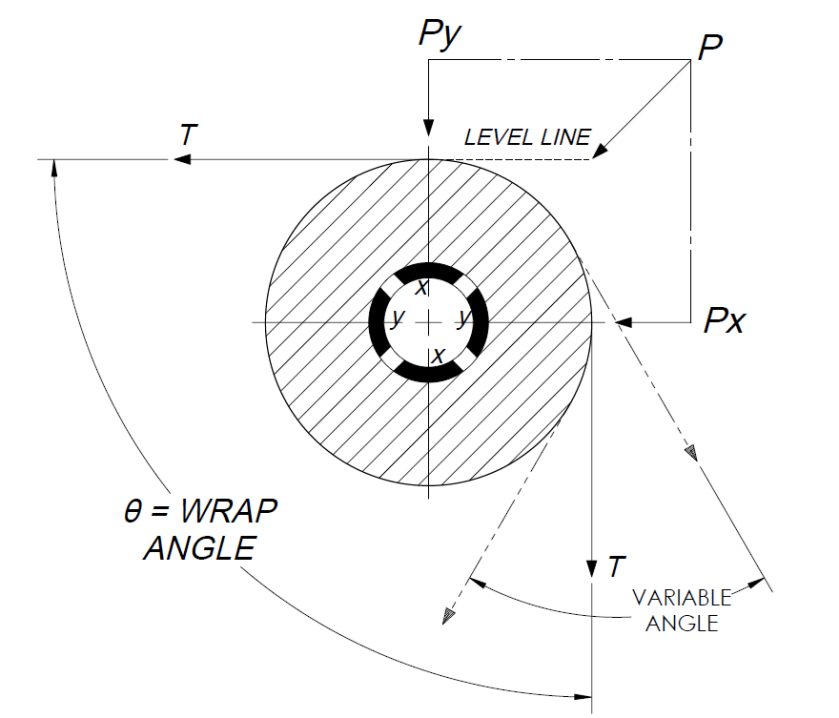
To calculate the line tension (T) and angle (θ), refer to the diagram and equations below:

$$T = \frac{{P_x}^2 + {P_y}^2}{2P_L}$$

Where P_L is either P_x or P_y, depending on which axis is aligned with the Level Line.

$$P = \sqrt{{P_x}^2 + {P_y}^2}$$

$$\theta = 2\cos^{-1}\frac{P}{2T}$$



Constant Wrap Angle

For a sheave with constant wrap angle, the line enters and exits the sheave at 2 fixed angle points.

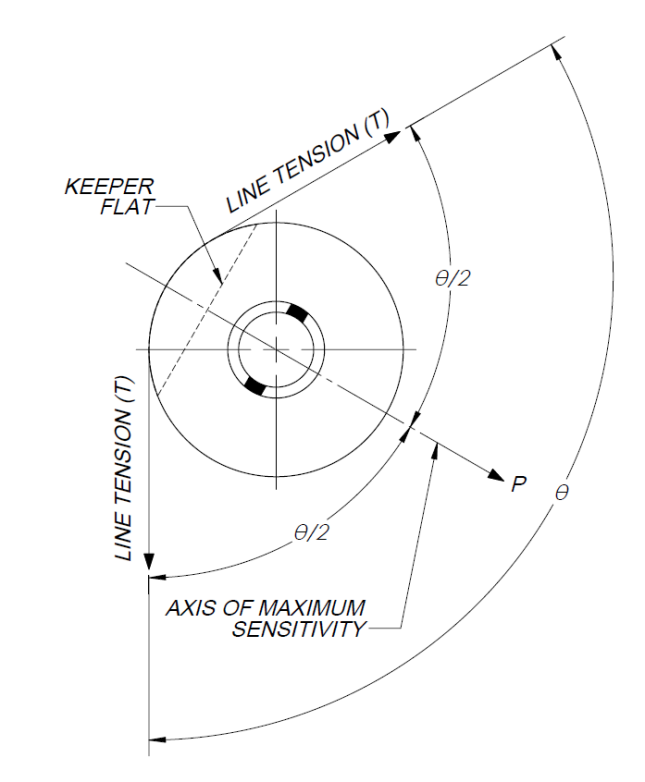
To allow for proper orientation, ensure that the clevis pin and keeper flat are aligned with the axis of maximum sensitivity, which is at the center point of the wrap angle (θ).

To calculate the line tension (T), refer the diagram and equation below:

$$T = \frac{P}{2\cos\left(\theta/2\right)}$$

Example:

For a Wrap Angle of θ = 118° and a measured load (P) of 10,000 lbs, the calculated line tension (T) is T = 9,708 lbs. (T = 10,000 lbs / (2cos(118°/2)).



Contact

For documentation, tools, and support, or to discuss your application with one of our engineers, please call 610-825-3310, email info@strainsert.com, or complete a questionnaire using one of the following links:

1. *Clevis Pin (https://www.strainsert.com/questionnaire-clevispin-rt/)*
2. *Clevis Pin, Sheave Installation (https://www.strainsert.com/questionnaire-sheavepin-rt/)*