FAQ# MTN-99GLV2 - How to calculate Pn205 in Sigma-5?

Sigma-5 parameter Pn205 is the Multi-turn Limit Setting. It is used in rotary applications which rotate in one direction and utilize the absolute encoder.   Example applications include indexing tables, spindles, turrets, winders, conveyors.

Pn205 is used to make sure that the absolute encoder correctly maintains the table's position even after the multi-turn counter passes its rollover point. Its value is chosen so that the motor will roll over based on full rotations of load. If it is set incorrectly, the mechanism's home position will not be correct after a power cycle. For a more detailed explanation, see section 5.9.6 of the Sigma-5 Analog/Pulse User's Manual (document MNEN-5CJMSW).

The formula for setting Pn205 is:

$$Pn205 = (\text{Mechanical Gear Ratio} * n) – 1$$

where *n* represents the number of load rotations as any integer such that the total does not exceed 65535. Note that Pn205 must be an <u>integer value</u>, not decimal.

Rotary Index Table Example 1: Customer has an index table with a 120:1 gearbox and uses the locating pin for initial setup of the home position. Depending on how many load rotations of the index table are desired, integer *n* increases respectively. Apply the formula above:

- Pn205= (120 * 1 load rotation) – 1 = **119**
  - Also acceptable: (120 ***** 2 load rotations) – 1 = **239** or (120 * 3 load rotations) – 1 = **359**, etc.
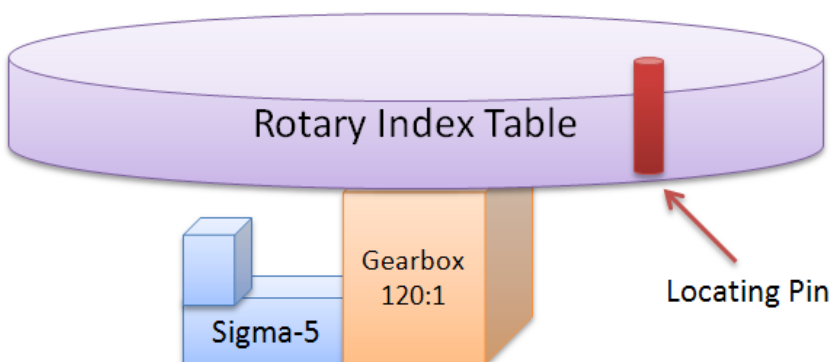
Rotary Conveyor Example 2: Customer has a conveyor belt using a 15:1 gearbox. There is a photo eye detecting one section of the conveyor belt to establish the home position one time during initial setup. The distance between each index is 21 inches. Every load rotation from the DriveR sprocket is 15 inches.

Note: If the number of indexes is known, this can be entered in the excel spreadsheet "Calculating Pn205.xlsx". If the number of indexes is NOT known, leave the field at 1.

Some Calculations are provided below:

- (Distance between each index / Units per revolution of the Driver Sprocket) * Gearbox Ratio = Mechanical Gear Ratio of System
- (21 inches / 15 inches per rev) * 15 = 21

Apply the formula above:

- Pn205 = (21 * 1) – 1 = **20**
  - Also acceptable**:** (21 * 2) – 1 = **41** or (21 * 3) – 1 = **62**
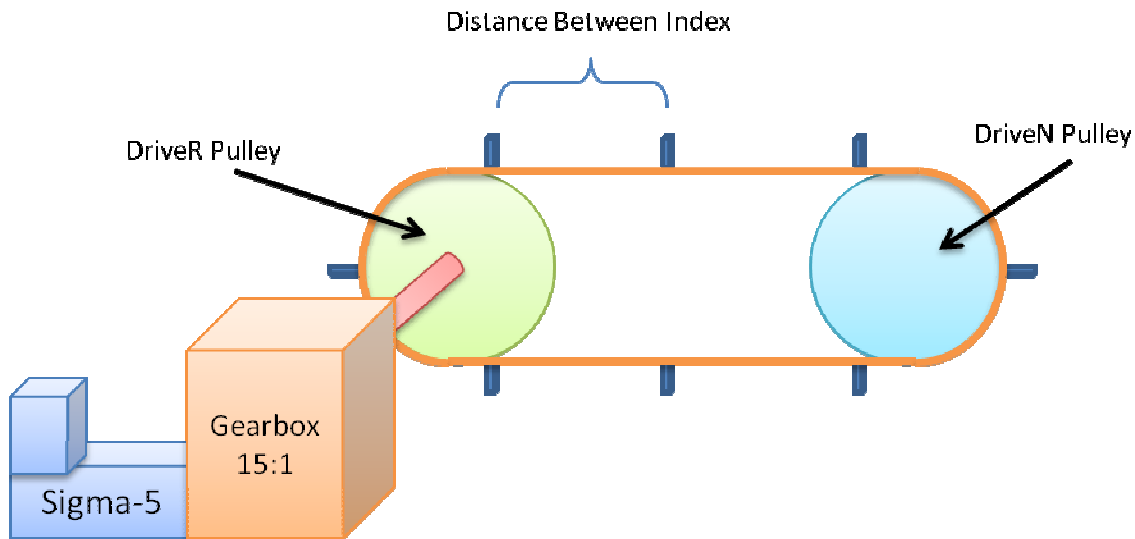
Rotary Complex Ratios Example 3: Customer has a rotary load using a 318:57 gearbox with a 31:24 pulley system followed by a second 22:31 pulley system to move a rotating load. It may be necessary to reduce the ratio by finding the greatest common denominator (GCD). This may be required to stay within the 65535 limit of the multi-turn setting.

Please see excel spreadsheet "Calculating Pn205.xlsx" to input ratios and find the resulting Pn205 setting.