



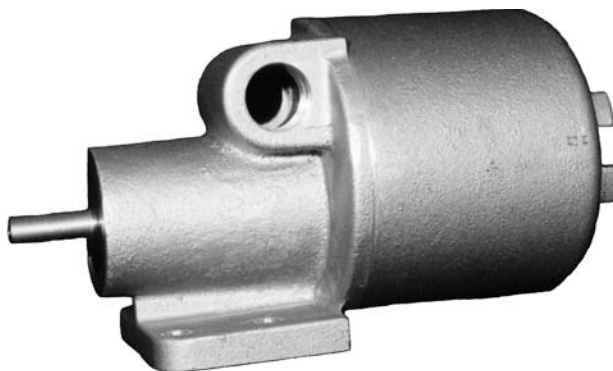
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## MODEL CMS INSTALLATION INSTRUCTIONS



### TABLE OF CONTENTS

	<u>PAGE</u>
A. INTRODUCTION	
1. USAGE	2
2. HOW IT OPERATES	2
B. SPECIFICATIONS	
1. ELECTRICAL	3
2. MECHANICAL	4
C. INSTALLATION	
1. LOCATION & MOUNTING	5
2. WIRING	6
3. SIGNAL SET POINT	7
4. TIME DELAY SETTING	8
D. TROUBLESHOOTING	
1. PROBLEMS & SOLUTIONS	9
2. FACTORY ASSISTANCE	9
E. MOUNTING DIMENSIONS	10
FIGURES	
1. SUGGESTED COUPLING ARRANGEMENT	5
2. SUGGESTED COG BELT OR ROLLER CHAIN ARRANGEMENT	5
3. SUGGESTED SPUR GEAR ARRANGEMENT	6
4. CIRCUIT BOARD ARRANGEMENT	6
5. MOUNTING HOLE DIMENSIONS	10
6. MOUNTING DIMENSIONS	10
7. MOUNTING DIMENSIONS	11
8. DRILL DIMENSIONS	11

## A. INTRODUCTION

### 1. USAGE

The model CMS motion sensing control is a compact switch designed to include all mechanical and electronic components in one housing. It will produce an output signal at a predetermined speed which may be either over-speed, under-speed or zero-speed.

Rugged, heavy-duty construction combined with solid state electronics and photo-electric technology makes this one of the most advanced motion detectors available. Model CMS protects all valuable rotating equipment including belt conveyors, bucket elevators, rotary feeders or screw conveyors. It operates in a clockwise or counter-clockwise direction and mounts in any position.

### 2. HOW IT OPERATES

The model CMS senses motion by means of a precision metal disc mounted on the input shaft. This disc generates measurable light pulses by a series of slots on its periphery, which rotate past an infrared light source. A photo-electric sensor monitors the series of light pulses and converts them to digital electronic signals. Solid state circuitry then analyzes the digital signals and activates or de-activates the output relay at the pre-set speed.

Field adjustment of the signal set point is easily accomplished by means of an adjustment screw on the electronics. For under-speed sensing, the signal point is set below the normal operating speed of the unit. The output relay will then de-energize if the speed drops below the signal point. For over-speed sensing, the pick-up point is set above the normal operating speed. The output relay will energize if the speed exceeds the pick-up point. Zero-speed sensing can be accomplished by turning the adjustment screw to its minimum setting. The output relay will then de-energize when the shaft speed of the unit approaches zero.

## B. SPECIFICATIONS

### 1. ELECTRICAL

Input Voltage:	105-135 volts AC, 50/60 Hz. 210-250 volts AC, 50/60 Hz. (Special Order)
Output:	DPDT relay to 3 Amp. Resistive at 120 volts AC DPDT relay to 3 Amp. Resistive at 240 volts AC DPDT relay to 3 Amp. Resistive at 30 volts DC 1/10 Horsepower at 120 volts AC 1/10 Horsepower at 240 volts AC
Operating Temperature Range:	-50 degrees F to +150 degrees F
Repeatability:	+2% maximum at constant voltage and temperature.
Power Consumption:	3 Watts
Pick-up Point:	3 speed ranges at which relay will energize: LOW: 0.1 to 10 RPM MEDIUM: 1 to 100 RPM HIGH: 10 to 1000 RPM
Signal Point:	Speed at which relay will de-energize. Recommended to be 15-20% lower than pick-up point. This will eliminate nuisance shutdowns.
Start-up Delay:	Adjustable up to 45 seconds.

## 2. MECHANICAL

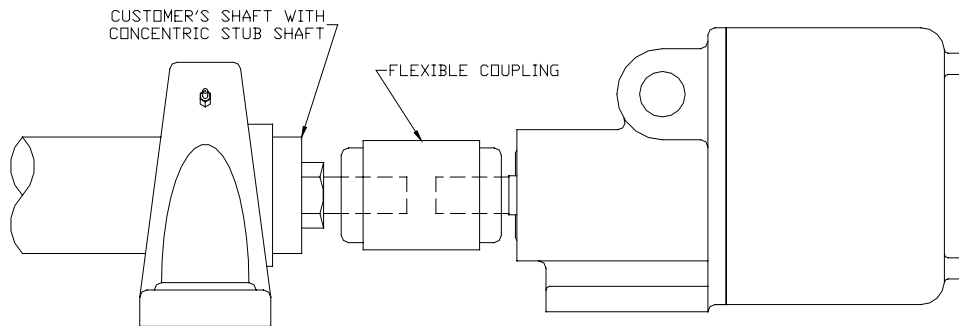
Radial Load on Input Shaft:	125 lbs. Maximum.
End Thrust on Input Shaft:	100 lbs. Maximum.
Rotation:	Either clockwise or counter-clockwise
Driving Torque:	1"/lb maximum.
Shaft:	5/8" diameter w/ 3/16" x 7/8" key
Enclosure:	Aluminum w/screw cover Cast iron w/screw cover
Meets:	CMS-G: NEMA 3S, 4 & 4X CMS-X: NEMA 3S, 4 & 4X NEMA 7: Class I groups C & D NEMA 9: Class II groups F & G 120 VAC units UL & CSA Listed
Bearings:	Ball, permanently lubricated and sealed for life.
Shaft Seal:	Leather type oil seal.
Weight:	5 lbs.
Size:	5" high x 5" wide x 8-1/2" long

## C. INSTALLATION

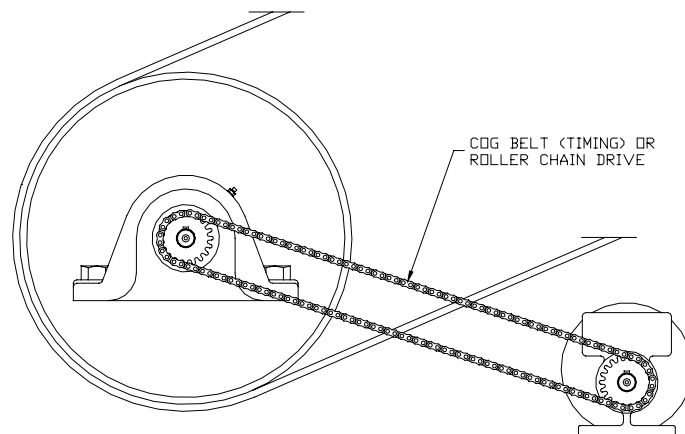
### 1. LOCATION & MOUNTING

The model CMS motion switch can be mounted for operation in any position. The surface to which the switch is affixed should be as flat and as smooth as possible. Bearing brackets and shim plate sets (models 311, 312, 313) can be used to mount the unit directly to the pillow block supporting a shaft. On installations where vibration conditions are not extreme, use 1/4" diameter machine bolts with lock washers through the four mounting holes in the base of the switch. (Mounting bolts and lock washers are not furnished with the switch.) If vibration conditions are extreme, use of a doweling is recommended through two mounting holes in the switch base. The switch should be mounted as axially in line, and/or parallel as possible to the existing shaft, which is to drive the switch. The model CMS motion switch can be driven by one of the following means:

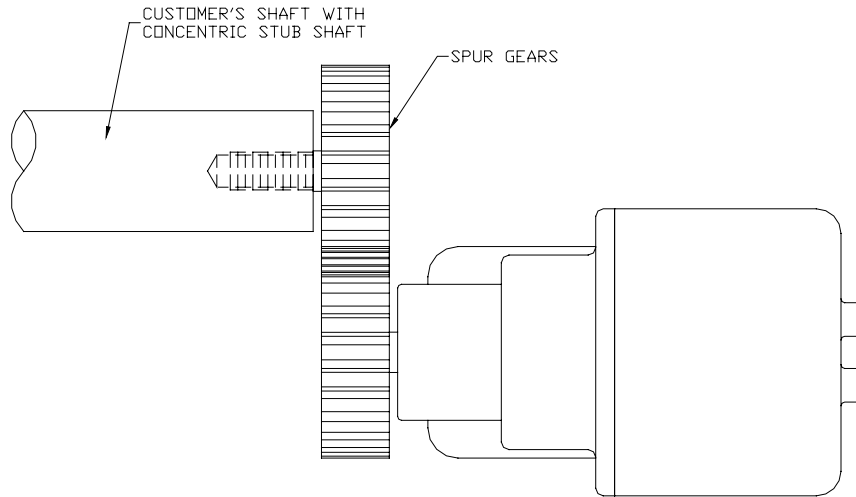
1. FIGURE 1: Suggested Coupling Arrangement, side view. Direct connection through a coupling (preferred means). Note: Switch should be concentric with the mating shaft. If Stub is used, it must be concentric with the main shaft. If a stub shaft is required, we suggest the use of a 5/8" stub shaft. Use with a split or flexible type coupling.



2. FIGURE 2: Cog Belt Drive (timing) or Roller Chain Drive: A V-Belt drive is not as desirable because of possible slippage.

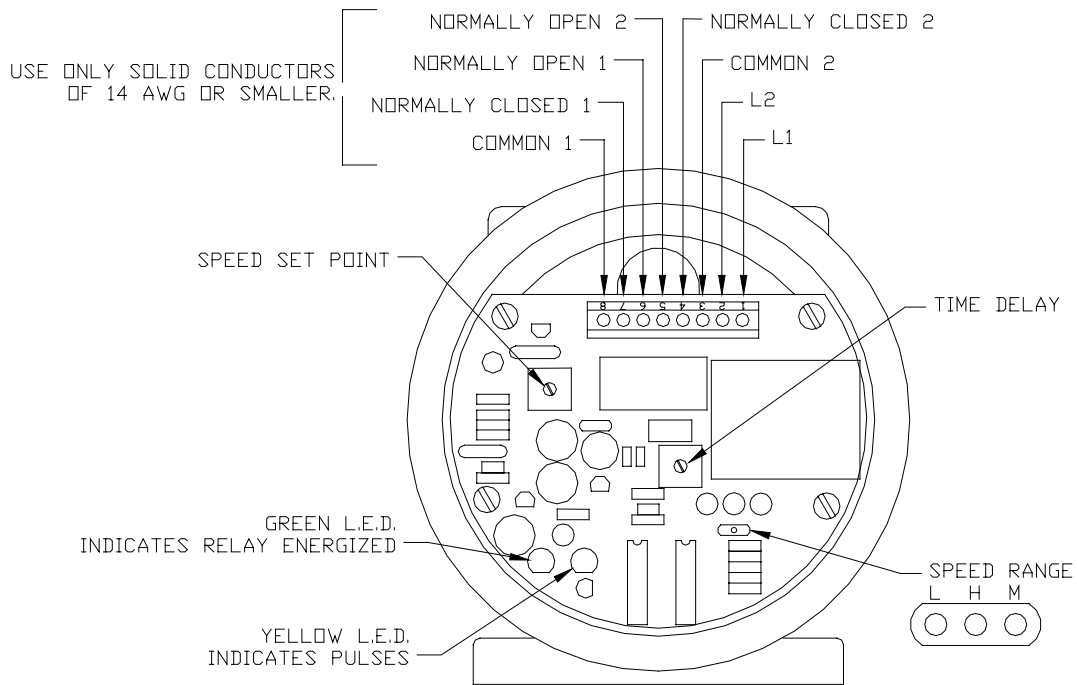


### 3. FIGURE 3: Suggested Spur Gear Arrangement (top view)



## 2. WIRING

FIGURE 4: Electronics View



Remove end cap to expose terminals and pick-up speed adjustment screw. Wire input power from source to terminals L1 & L2. Be certain to use the provided ground screw. The output of the model CMS is a DP/DT relay. There are two sets of output contacts. Each set includes normally open, normally closed and common. As a result, the unit can be used to control two separate circuits such as a motor starter and a signal light.

## CONDUIT INSTALLATION:

Use only hubs of suitable sizes that are UL/CSA approved for WATERTIGHT use. Install per the hub manufacturer's instructions. Be sure the location selected will provide adequate wire bending space.

### 3. SIGNAL SET POINT

#### FOR USE AS AN UNDERSPEED SWITCH:

Select the speed range required by changing the switch to LOW for 0.1 to 10 RPM, MEDIUM for 1 to 100 RPM and HIGH for 10 to 1000 RPM. Turn the set point potentiometer to the counter-clockwise stop. With motion present on the input shaft and at normal operating RPM, the yellow L.E.D. should blink. The green L.E.D. should turn on indicating that the output relay is energizing. Slowly turn the set point adjustment screw clockwise until the output relay de-energizes. (A "click" will occur at this point.) Back up until the output relay energizes. Thus, when speed drops below the set point, the green L.E.D. should turn off indicating that the output relay is de-energized. If the normal operating speed of the input shaft exceeds 10 RPM for the LOW, 100 RPM for the MEDIUM or 1000 RPM for the HIGH, the unit should be adjusted as follows. Turn the set point adjustment screw clockwise until it reaches the stop. When the speed drops below 10 RPM for the LOW, 100 RPM for the MEDIUM or 1000 RPM for the HIGH, the relay will energize.

NOTE: Typically, the motor contact is wired in series with one of the N.O. output contacts and an alarm is wired with one of the N.C. output contacts.

#### FOR USE AS AN OVERSPEED SWITCH:

Select the speed range required by changing the switch to LOW for 0.1 to 10 RPM, MEDIUM for 1 to 100 RPM and HIGH for 10 to 1000 RPM. Turn the set point potentiometer to the counter-clockwise stop. With motion present on the input shaft and at normal operating RPM, the yellow L.E.D. should blink. The green L.E.D. should turn on indicating that the output relay is energized. Slowly turn the set point adjustment screw clockwise until the output relay de-energizes and the green L.E.D. turns off. (A "click" will occur at this point.) With the potentiometer on that setting, if the speed increases the output relay will energize.

NOTE: Typically, the motor contact is wired in series with one of the N.O. output contacts and an alarm is wired with one of the N.C. output contacts.

#### FOR USE AS A ZERO SPEED SWITCH:

Select the LOW speed range by changing the switch to LOW for 0.1 to 10 RPM. Turn the set point potentiometer to the counter-clockwise stop. This will give a set point of 0.1 RPM. Thus, when the speed drops below 0.1 RPM, the output relay will de-energize.

NOTE: Wiring should be the same as for under-speed applications.

#### 4. TIME DELAY SETTING

The model CMS motion sensing control has a start-up delay that is adjustable up to 45 seconds. This setting should be set, depending on the application and the length of time it takes for the conveyor to reach it's normal operating RPM. This time delay takes effect upon power-up of the model CMS after shutdown. AC power to the model CMS must be interrupted for timer to be reset. This delay only effects start-up, avoiding nuisance start-up alarms.



## D. TROUBLESHOOTING

### 1. PROBLEMS & SOLUTIONS

***PROBLEM:***

No pulses from yellow LED.

***SOLUTION:***

Check power supply.  
Make sure input shaft is turning.

***PROBLEM:***

Relay is not energized or de-energized  
When expected. (I.e. green LED not on  
Or off when expected.)

***SOLUTION:***

Check power supply.  
Make sure input shaft is turning.  
Check for proper set point.  
Check for proper speed setting.  
(LOW, MEDIUM or HIGH)

***PROBLEM:***

Alarm sounds when equipment is started.

***SOLUTION:***

Check start-up delay setting.  
Check for proper connections  
between alarm and relay.  
AC power must be interrupted for  
alarm to reset.

***PROBLEM:***

Alarm does not go off when expected.

***SOLUTION:***

Check power supply  
Check for proper connections  
between alarm and relay.

***PROBLEM:***

Equipment is not shut off when expected.

***SOLUTION:***

Check power supply.  
Check for proper connections  
between control circuit and relay.

### 2. FACTORY ASSISTANCE

If assistance is needed to locate difficulties with a unit or you would like information about alternate control devices, please call the factory at 1-800-233-3233.

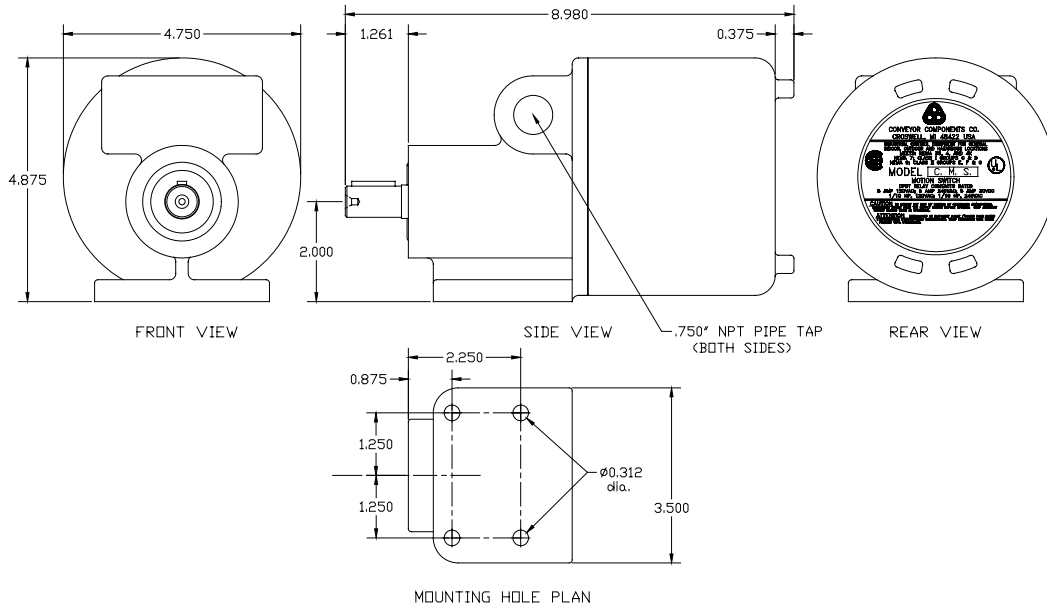
To help solve a problem quickly, please have as much of the following information as possible when you make your call:

- Model Number
- Date Purchased
- Brief Application Information
- Brief Description of the Problem.

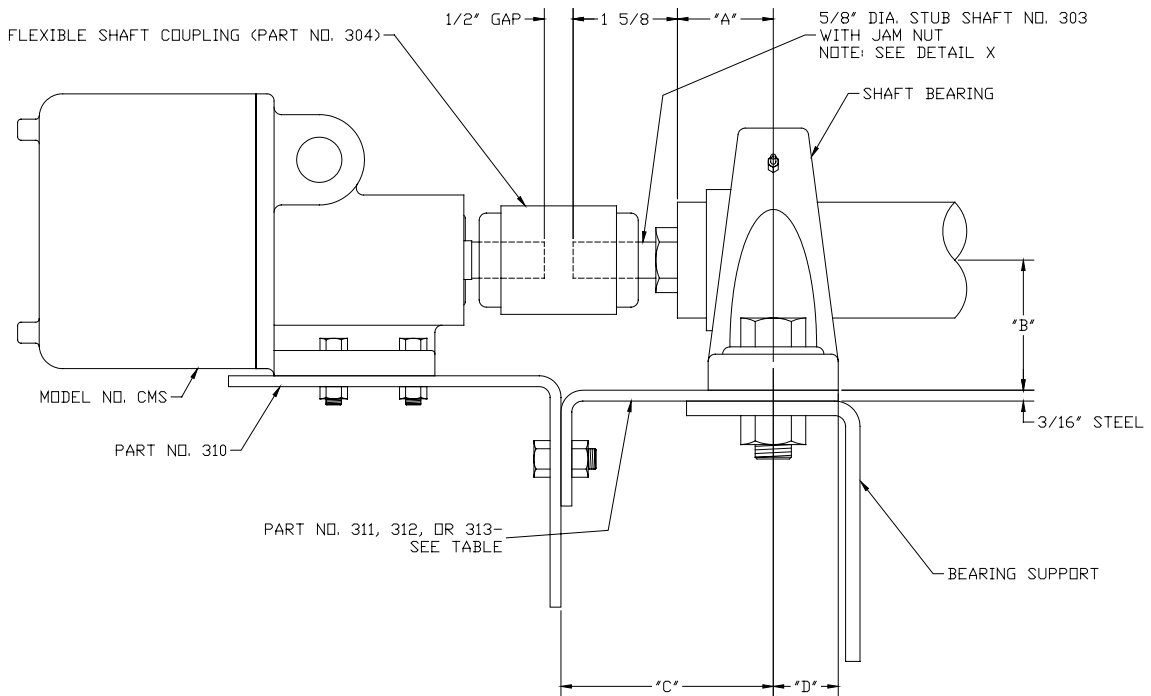
EQUIPMENT SHIPPED BACK TO THE FACTORY WITHOUT PROPER  
AUTHORIZATION WILL BE REFUSED AND RETURNED AT THE SHIPPER'S  
EXPENSE.

## E. MOUNTING DIMENSIONS

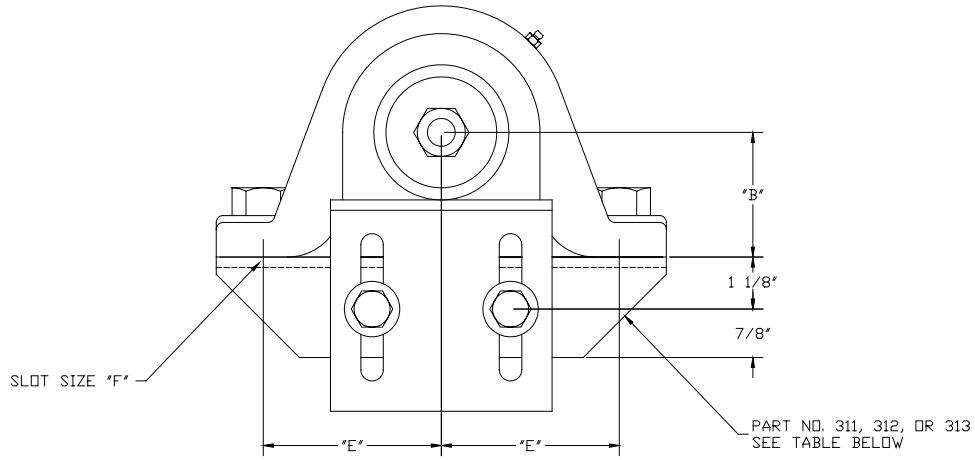
**FIGURE 5**



**FIGURE 6**



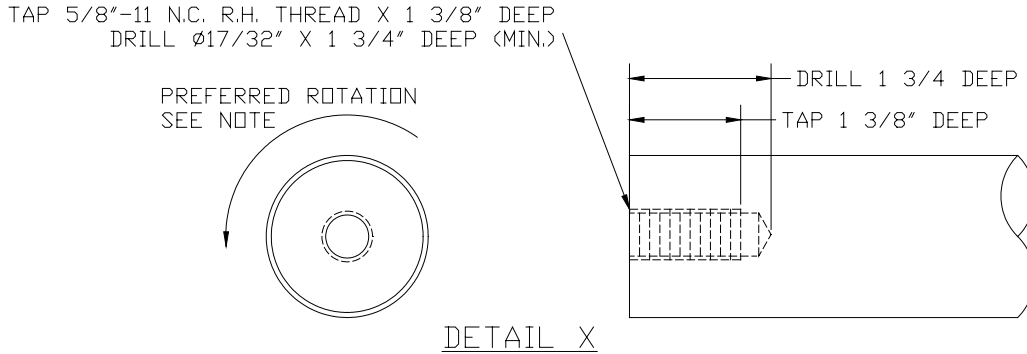
**FIGURE 7**



PART NO. 310 WILL FIT PARTS NO. 311, 312, OR 313

ALL DIMENSIONS ARE IN INCHES							BEARING BRACKET & SHIM PLATE PART NO.
SHAFT DIA.	"A"	"B"	"C"	"D"	"E"	"F"	
1 7/16	1 1/4 TO 2	1 7/8 TO 2 1/8	3 1/8	1 1/8	5 3/8	9/16 W x 1 5/16 Lg.	311
1 15/16 TO 2 7/16	1 1/2 TO 2 9/16	2 1/4 TO 3	3 3/4	1 5/8	7 3/8	13/16 W x 1 15/16 Lg.	312
2 15/16 TO 3 15/16	3 TO 3 3/4	3 1/8 TO 4 1/8	4 1/2	2 3/16	9 5/8	1 1/16 W x 2 9/16 Lg.	313

**FIGURE 8**



NOTE: WHEN THREADED STUB SHAFT (PART NO. 303) IS USED, IT IS RECOMMENDED THAT THE LOCATION OF THE STUB BE IN THE END OF THE SHAFT THAT ROTATES COUNTER-CLOCKWISE. THIS ALLOWS THE THREADS TO CONTINUE BEING UNDER A CONSTANT FASTENING TORQUE WHILE THE SHAFT TURNS. IF THE ROTATION IS CLOCKWISE OR THE SHAFT IS FOR REVERSING TYPE SERVICE, MAKE SURE THE JAM NUT IS LOCKED TIGHT AGAINST THE SHAFT.