

AFSX Speed Responsive Switch

Signal Range: .1 RPM, to 1000 RPM.

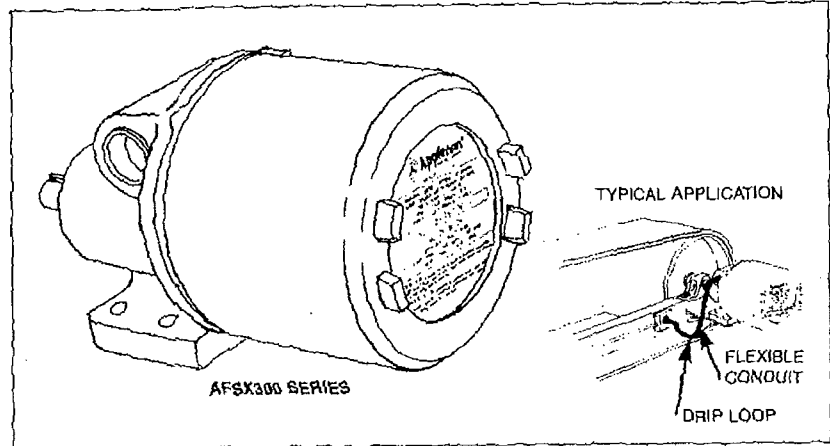
Class I, Div. 1 and 2; Groups C, D
Class II, Div. 1 and 2; Groups E, F, G
Class III
NEMA 7 C, D, 9E, F, G
NEMA 3, 4, 4X

Applications

- For use in bulk material handling processing systems to monitor speeds of belt conveyors, screw conveyors, bucket elevators and rotating machinery.
- Used where alarm or computer interface capabilities are needed.
- For installation in steel mills, mining (ore and coal) operations, grain handling, chemical and plastic industries to protect elevators, feeders, and conveyors from speed related damage resulting from broken belts, overloads or belt slippage.
- For installation in mining and industrial areas where rugged control enclosures are needed for protection from falling ores, other heavy aggregates, and from dripping water or hosesdowns.
- Used in Class I and Class II areas where flammable vapors or highly combustible dusts are present.
- Employs a cover with O-Ring providing a NEMA 3, 3R, 4 and 4X Rating.
- Designed to monitor material flow by sequencing the operation of multiple conveyors feeding a common bin or conveyor.
- Used as overspeed switches to detect motor overrun conditions: Pick-up speed should be set above normal operating speeds. The output relay will energize if operating speed exceeds the set-point.
- Used as underspeed switches to detect slipping belts, jammed conveyors or equipment and stalled motors: Pick-up speed setting should be below normal operating speeds. The output relay will de-energize if operating speed falls below the set-point.
- Used as zero speed switch: When speed approaches zero (.1 RPM), the output relay will de-energize.

Features

- **SIGNAL RANGE:** Three settings available (.1-10 RPM, 1-100 RPM, 10-1000 RPM).
- Adjustable time delay (up to 45 Sec.).
- Cast iron version requires epoxy powder coat for NEMA 4X rating.



- Input power is applied to the speed responsive switch at all times. The switch then senses input shaft speed in either direction.
- When input shaft speed exceeds the pick-up set-point, the output relay is energized.
- If shaft speed falls below 80-85% of the pick-up speed the relay will de-energize.
- Clockwise or counter-clockwise rotation.
- Senses speed changes as slight as 1%.
- Operating temperatures are -50° F to 150° F.
- 3/4" NPT standard, two conduit openings.
- Radial load is 125 lb. maximum at center of the key.
- Axial thrust load is 100 pound maximum.
- Driving torque required is one inch-pound maximum.
- Flexible coupling accessory allows up to 7.5° misalignment, high shock resistance and eliminates transmission of thrust loads.

Electrical Specifications

- **Input voltage:** 105 -135 volts A.C., 50/60 Hz.
- **Output:** DPDT relay to 5 Amp. Resistive at 120 volts /V.C.
DPDT relay to 5 Amp. Resistive at 240 volts A.C.
DPDT relay to 5 Amp. Resistive at 30 volts D.C.
1/10 Horse Power at 240 volts A.C.
1/10 Horse Power at 120 volts A.C.
- **Operating Temperature Range:** - 50 deg. F to +150 deg. 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: .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

Standard Materials

- Cast aluminum housing.
- Shaft is stainless steel, 5/8" diameter, #11 Woodruff Key stainless steel hardware.
- Flexible coupling is cast zinc.
- Sleeve is neoprene with textile reinforced cement.

Options

- For epoxy powder coated switches, add suffix G1.
- Cast iron enclosure available, consult factory.

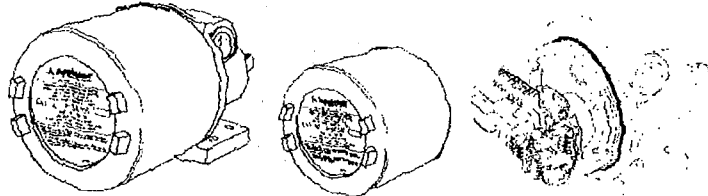
Standard Finishes

- Standard enclosure is shot peened.

Accessories

- Mounting Bracket: AFSA1, AFSB1, AFSB2, AFSB3.
- Flexible coupling: AFSC1.
- Coupling Guard: AFSG1.
- Stub shaft: AFSS1.

MATERIAL	CATALOG NUMBER
CAST ALUMINUM	AFSX300
CAST IRON	AFSX300M

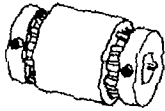


ACCESSORIES (Dimensions on page 3)



AFSS1 STUB SHAFT

5/8" dia., 3" threaded one end, keyed other end. With jam nut and 3/16" x 7/8" key.



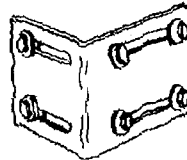
AFSC1 FLEXIBLE COUPLING.

For connection of the speed responsive switch unit to the drive shaft.



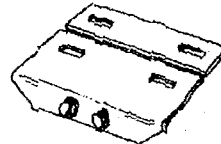
AFSG1 COUPLING GUARD

Protection cover for flexible coupling connection (AFSC1).



AFSA1 MOUNTING BRACKET

For mounting speed responsive switch to rotary machinery.



AFSB1 - AFSB2 - AFSB3 BEARING BRACKETS.

Attaches AFSA1 mounting bracket to pillow block bearing assembly. (See mounting instructions pg.4)

WARNING GENERAL

1. DO NOT MODIFY UNIT IN ANY WAY. Modification may affect safety and reliability.
2. Improper use or failure to follow these instructions could result in serious injury or property damage.
3. Operator should be instructed in the safe and proper usage and maintenance of this product.

WARNING ELECTRICAL

1. Disconnect electrical power before installation, adjustment and maintenance.
2. DO NOT overload; the amperage and voltage indicated on the name plate must not be exceeded.
3. Check continuity before connecting electrical power.

OPERATION INFORMATION:

• The Speed Responsive Switch 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 infra-red light source. A photo-electric sensor monitors the series of light pulses and converts them to a digital electronic signal. Solid state circuitry then analyzes the digital signal and activates or de-activates the output relay at the pre-set speed.

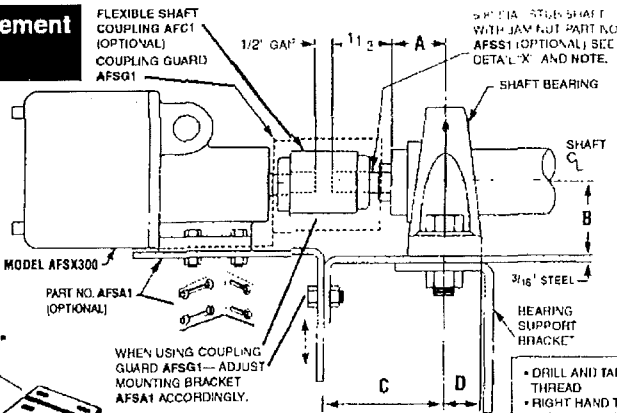
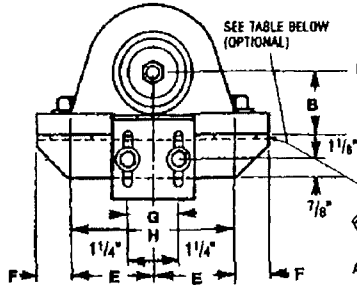
• field adjustment of the signal set point is easily accomplished by means of an adjustment screw on the electronics. For underspeed sensing, the signal point is set below the normal operating speed of the unit. The output relay will then de-energize if the speed drops below the signal point. For overspeed sensing, the pickup 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.

All statements, technical information and recommendations herein are based upon data and tests believed to be reliable. The accuracy or completeness of such data or test results are not guaranteed. Pursuant to Appleton Electric Company's "Terms and Conditions of Sale", because Appleton neither knows nor controls the applications or conditions in which the product will be used, the purchaser must determine the appropriateness of the product for the intended use and the product in such applications or conditions.

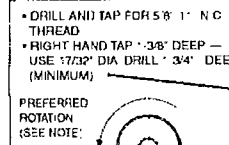
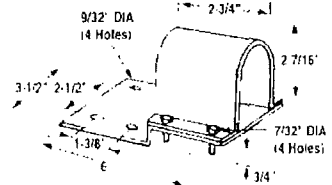
Dimensions: AFSX Speed Responsive Switch

Suggested Mounting Arrangement For Model AFSX300

For Model AFSX300
SHAFT BEARING ASSEMBLY
PART NUMBER: AFSB1, AFSB2 AND AFSB3



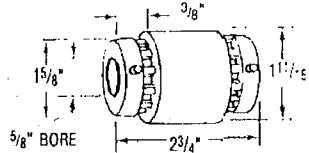
FLEXIBLE SHAFT COUPLING GUARD AFSG1 (OPTIONAL)



FLEXIBLE COUPLING AFSC1 (OPTIONAL)

This coupling will operate at up to a 7-1/2° axial misalignment with no significant life reduction. This unit features high shock resistance and eliminates transmission of lateral thrust from one shaft to the other (no end thrust).

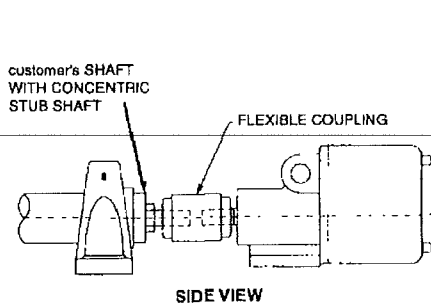
Sleeve: With axially molded internal teeth. Made of neoprene with textile reinforcement. — Two end fittings grooved to mate with sleeve teeth. One fitting attached to each shaft.



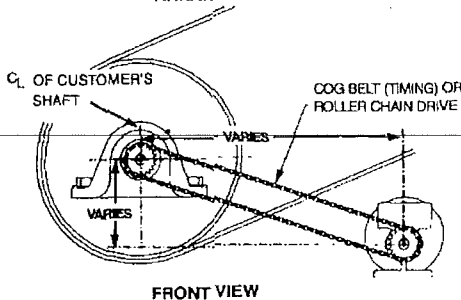
NOTE: When threaded stub shaft (Part AFSS1 or equal) is to be used, it is recommended that the location of the stub be the end of the shaft that rotates counter-clockwise. This allows the threads to continue being under a constant fastening torque while the shaft turns. If the rotation is clockwise or the shaft is for reversing type service, make sure the jam nut is locked tight against the shaft.

All Dimensions are in inches									
Bearing Bracket and Shim Plate Part #	Shaft Diameter	A	B	C	D	E	F	G	H
AFSB	1- 7/16	1-1/4 - 2	1-7/8 - 2-1/8	3-1/8	1-1/8	2-11/16	1-13/16	—	9/16 W x 1-5/16 Lg.
AFSB2	1-15/16 - 2-7/16	1-1/2 - 2-9/16	2-1/4 - 3	3-3/4	1-5/8	3-11/16	1-15/16	13/32 x 1 Lg.	13/16 W x 2 Lg.
AFSB3	2-15/16 - 3-15/16	3 - 3-3/4	3-1/8 - 4-1/8	4-1/2	2-3/16	4-13/16	2-11/16	—	1-1/16 W x 2-1/16 Lg.

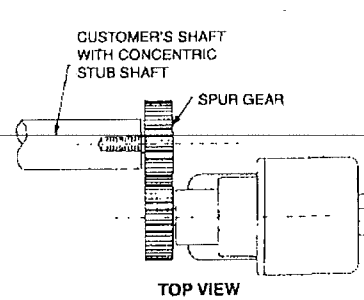
SUGGESTED COUPLING ARRANGEMENT



SUGGESTED COG BELT OR ROLLER CHAIN ARRANGEMENT



SUGGESTED SPUR GEAR ARRANGEMENT



MOUNTING INSTRUCTIONS:

1. Switch can be mounted for operation in any position.
2. The surface to which the switch is affixed should be as flat and as smooth as possible.
3. 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 the use of doweling is recommended through the four mounting holes in the switch base.
4. The Switch should be mounted as axially in line and/or parallel as possible to the existing shaft which is to drive the switch.

5. The Speed Responsive Switch can be driven by one of the following means.

A. Direct connection through a coupling (preferred means).

NOTE: Switch should be concentric with the mating shaft.

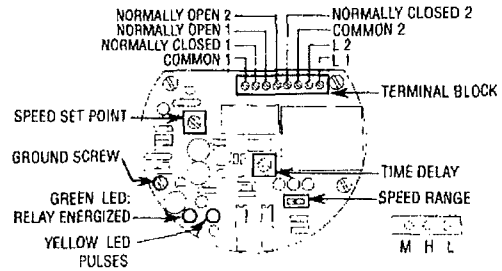
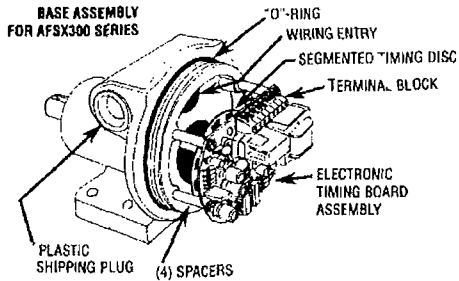
• If stub is used it must be concentric with the main shaft.

• If a stub shaft is required we suggest the use of a 5/8" stub shaft. Use with a split or flexible type coupling.

B. Cog belt drive (timing): A v-belt drive is not as desirable because of possible slippage.

C. Roller chain drive.

D. Spur gears.



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 inch-pound maximum.
Shaft:	5/8" diam. with # 11 woodruff key (3/16"x7/8").
Enclosure:	Aluminum with screw cover.
Meets:	NEMA 3S, 4, and 4X. NEMA 7: Class I groups C & D. NEMA 9: Class II groups E, F, & G.
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.

WIRING UNIT FROM POWER SOURCE

1. Make mechanical connection to the shaft being plastic monitored.

IMPORTANT: Remove all unused conduit plugs and reinstall with threaded close up plug.

2. Remove cover to expose terminals and pick-up speed adjustment screw with locknut (See Figure 1 and cut away view). The output is a DP/DT relay connected to the terminal block at the rear of the unit. 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. Input power is connected from the source to contacts L1 and L2. A ground connection is also furnished.

MONITOR SHAFT SPEEDS:

To prevent speed related damage to conveyor belts.

Should a speed change occur due to overloading, slippage, or perhaps a broken belt, the switch can be wired to perform two separate functions:

- (A) Shut down the system and actuate a warning light. OR
- (B) Shut down and sound alarm.

• This sensitive switch operates in either a clockwise or counter-clockwise direction and monitors speed changes of as little as 1%.

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 setpoint potentiometer to the counterclockwise stop. With motion present on the input shaft and at normal operating R.P.M., 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 setpoint 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 setpoint, 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 R.P.M. for the LOW or 100 R.P.M. for the MEDIUM or 1000 R.P.M. for the HIGH, the Unit should be adjusted as follows. Turn the setpoint adjustment screw clockwise until it reaches the stop. When the speed drops below 10 R.P.M. for the LOW or 100 R.P.M. for the MEDIUM or 1000 R.P.M. for the HIGH, the relay will energize.

Note: Typically, the motor contactor 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 setpoint potentiometer to the counterclockwise stop. With motion present on the input shaft and at normal operating R.P.M., 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 setpoint 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 contactor 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 setpoint potentiometer to the counterclockwise stop. This will give a setpoint setting of 0.1 R.P.M. Thus, when the speed drops below 0.1 R.P.M., the output relay will de-energize.

Note: Wiring should be the same as for underspeed applications.

4. Time delay setting.

The Speed Responsive Switch 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 R.P.M. This time delay takes effect upon power-up of the Switch after shut-down. AC power to the Switch must be interrupted for timer to be reset. This delay only affects start up, avoiding nuisance start up alarms.

DIMENSIONS (IN INCHES)

