

## Adjustable Speed Drives

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For lower speed/ higher torque applications, some Zero- Max drives are available with our [right angle gearbox](#). Some Zero- Max drives may be purchased with standard electric motors or they may be connected to any rotating power source up to 2000 RPM. Adjustable speed drive speed adjustments are easily made by moving a lever control through an arc or turning the hand- wheel of a screw type control. In either case, easy and precise speed control settings are possible with Zero- Max adjustable speed drives - also referred to interchangeably as variable speed drives.

Externally, the Adjustable Speed Drive consists of a rugged, sealed cast case, an input shaft, output shaft and adjustable speed control. Speed of the output shaft is regulated precisely and easily through a control lever which includes a convenient locking mechanism or a screw control to hold speed at a desired speed setting. Adjustable speed drive models are available with output in clockwise or counter- clockwise rotation to meet individual speed control requirements. Two models are equipped with a reversing lever that permits clockwise, neutral and counter- clockwise operation.

The general principle of operation of Adjustable Speed Drives gives infinitely variable and adjustable speed by changing the distance that four or more one- way clutches rotate the output shaft when they move back and forth successively.

### Adjustable Speed Drive History

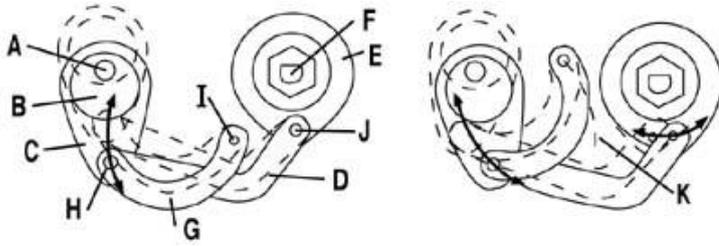
Zero- Max actually began when inventor Sterling Stageberg designed a mechanical adjustable speed transmission drive used on automotive windshield wipers. His design allowed a variable drive output speed from a constant input from zero to maximum (thus, Zero- Max).

Zero- Max has been involved with the design of adjustable speed drives for over half a century, and is the leading manufacturer of adjustable speed drives today.

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The general principle of operation of Zero- Max Adjustable Speed Drives gives infinitely adjustable speed by changing the distance that four or more one- way clutches rotate the output shaft when they move back and forth successively. The number of strokes per clutch per minute is determined by the input speed. Since one rotation of the input shaft causes each clutch to move back and forth once, it is readily apparent that the input speed will determine the number of strokes or urgings the clutches give the output shaft per minute.

For example, with four clutches working in series and an input of 1800 RPM, the output shaft is urged 7200 times per minute ( $1800 \times 4$ ) or 120 times per second ( $7200 \div 60$ ). If the input speed is dropped to 900 RPM, the shaft is urged only 3600 times per minute and the maximum output speed will be cut in half.



Looking at Figure 1, the input section, consisting of a shaft (A), eccentrics (B), and connecting rods (C), converts rotary motion into linear motion. At the zero setting, the main links (D) pivot on points (H) and (J) without moving the clutches. At any setting other than zero, the clutches (E) transfer the linear motion back into rotary motion and drive the output shaft (F). A control link (G) swings through arc (K) when the control lever is moved. At any point along arc (K) a different output speed is produced because the direction of throw of the connecting rod is altered from vertical (Figure 1 zero RPM position) toward horizontal (Figure 2 maximum speed position), varying the length of the strokes the main links deliver to the overrunning clutches.

### Adjustable Speed Drive Features

- Compact and easy to handle.
- Simple to install. No special wiring or training.
- Easy to operate with lever or screw control. Repeatable
- Use adjustable speed drives anywhere on machine. Accepts input to 2,000 RPM. Ideal secondary controller.
- Delivers constant torque throughout the speed range.
- 4:1 speed reduction. Drive is often usable without additional speed reduction.

### Adjustable Speed Drive Benefits

- Permits slow or fast, small or large speed changes. Speed set-ups are made quickly and easily. Ideal for dancer applications / constant speed changes.
- Leave drive at one setting. No daily speed cycling.
- Accurate speed holding. No "wear- in" period / constant speed operation.
- Zero- Max adjustable speed drives accepts any input. It's the world's most versatile, economical secondary drive.
- Goes to zero output. Ideal for use as a clutch.
- Simple maintenance. Factory lubricated.
- Low cost and proven design. More than 1,000,000 sold. Ideal for users and original equipment manufacturers.
- Sealed housing. Use in most atmospheres. Can be mounted in any position.
- Versatile shaft / control / motor options.
- Infinitely adjustable. 0-400 RPM speed range with 1800 RPM input.

To achieve the exact performance characteristics you desire, Zero- Max provides the following matching components for adjustable speed drives:

For Model E and JK Drives, a selection of gearheads and motors is available.

For models Y, QX and ZX Drives, C- Flange adapters are available for connecting customer supplied motors to the drive you have selected.

Lever control is standard on all adjustable speed drives. Optional controls include: screw control, extended screw control, extended lever control, extended control shaft, plus flatted and drilled control levers.

Direction of output rotation must be specified and is independent of input direction. Model numbers ending in "1" are CCW output, "2" are CW output and "3" are reversible.

Zero- Max adjustable speed drives are used on a wide variety of machinery. They may be used as a primary or secondary drive and are available with several control options and shaft arrangements.

Applications for adjustable speed drives include: textile machinery such as looms; food processing machinery such as hamburger presses; [agricultural machinery](#) including grain dryers and seeder drives; [printing presses](#) utilizing high speed sheeters for stacking finished sheets; metalworking machinery; packaging systems, automated sewing systems, [conveying and specialized machines](#).

[Product Name](#)



[Unidirectional Drives](#)



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