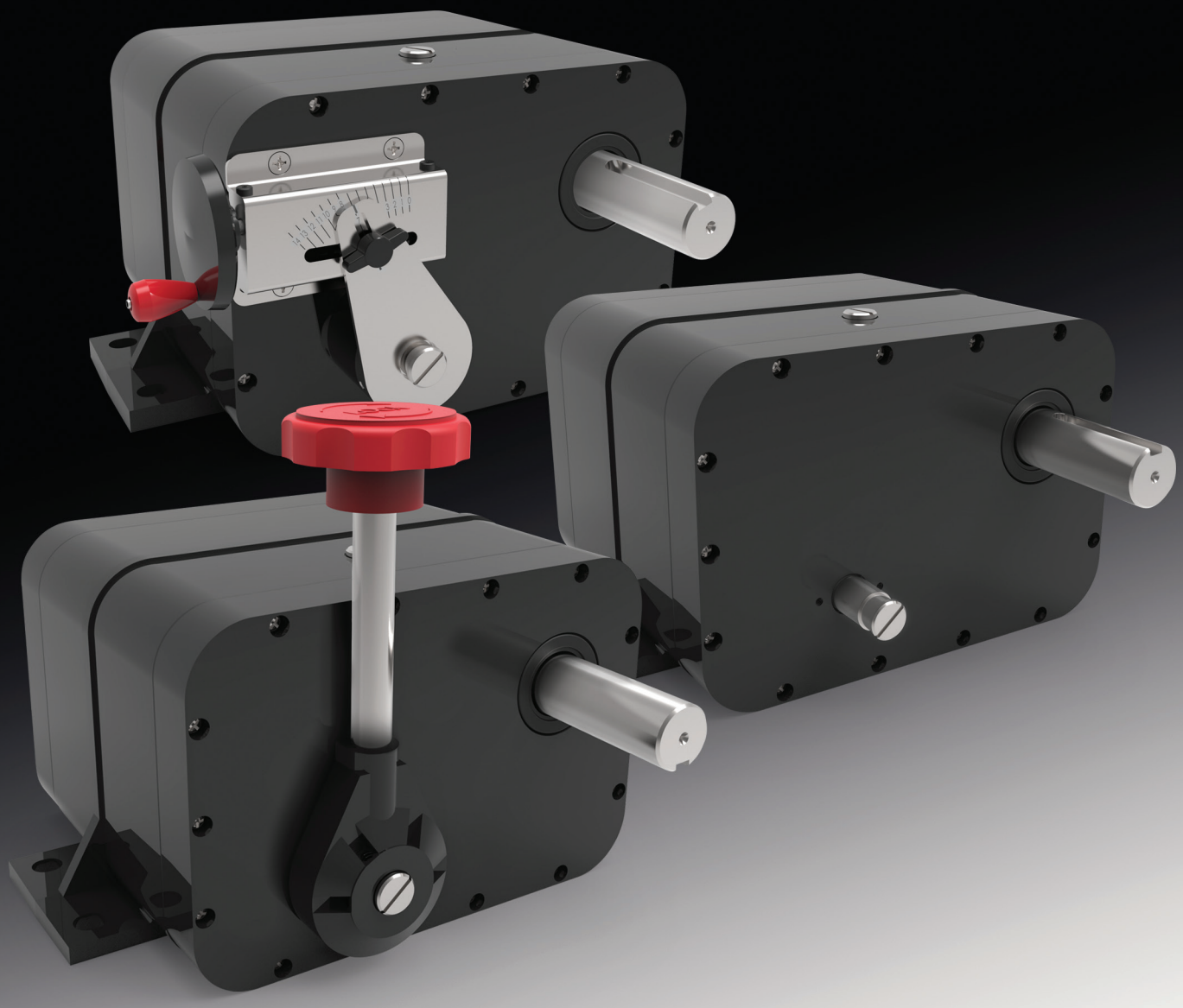
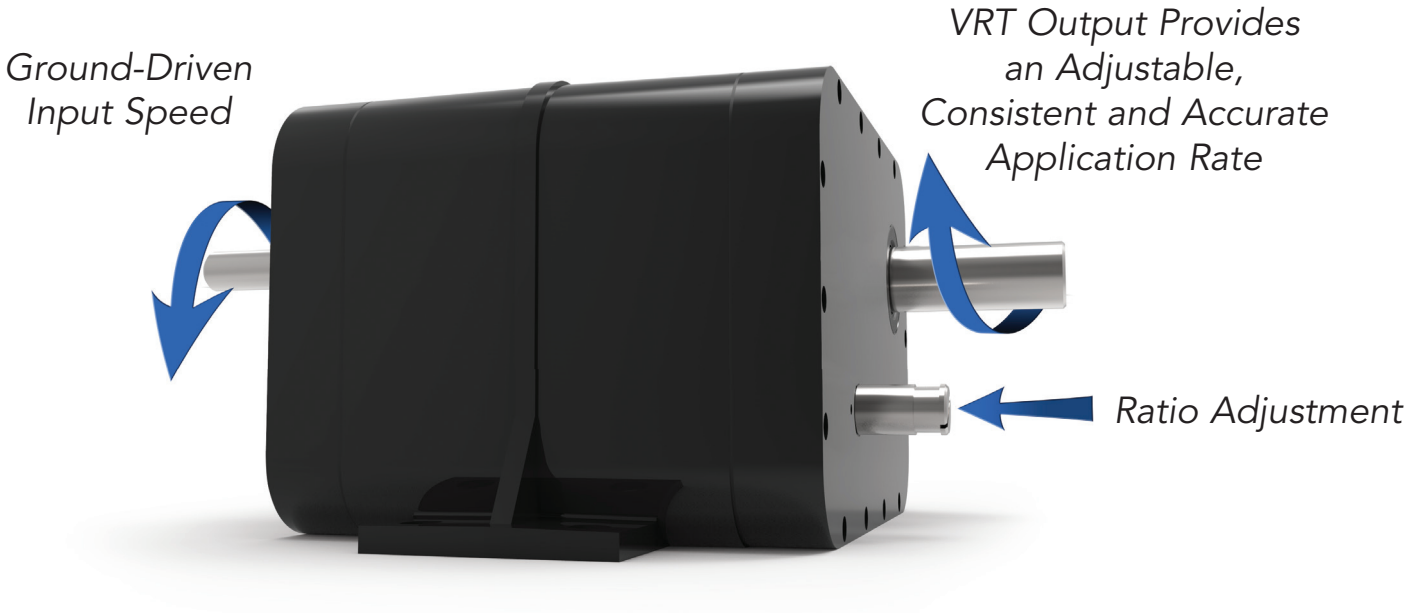
ZERO-MAX®

VRT™
Variable Ratio Transmission





Zero-Max has more than 70 years of experience with Adjustable Speed Drives. Our compact solutions are simple to handle, install, and operate. Their use in the field as Infinitely Variable Ratio Transmissions for the Agriculture Industry also dates back decades. The Zero-Max VRT line of solutions can ensure optimum performance, efficiency, and economy.

Zero-Max VRTs (Variable Ratio Transmissions) are a simple, efficient, and cost-effective way to ensure **accurate and consistent application rates** for agricultural seeding and fertilizing equipment. Our Adjustable Speed Drives have been used successfully in agricultural applications ranging from Air Seeders to Plot Seeders for decades. Now, **the newly optimized design of the VRT** takes this to the next level by providing uniform seed dispersal in a more compact solution for these applications requiring lower input speed and higher torque capacity.

RELIABLE. ROBUST. AVAILABLE.

The VRT can provide a critical link between the control system and the mechanical seed distribution mechanism. This seeding system, often ground-driven from the wheels of the implement, will maintain seed placement accuracy even when the ground speed of the equipment changes. The VRT is designed to meet the performance requirements for today's agricultural equipment. The mechanical drive of the VRT is encased in a secure heavy-duty housing to resist dirt and debris, is pre-lubricated, and can withstand the harshest environments and climates. As a result, the VRT can be operated with minimal or no maintenance.

Applications

Agricultural Seeding and Fertilizing Equipment

- Air Seeders
- Plot Seeders
- Grass Seeding
- Air Carts
- Research Plots
- Cover Crop Planting
- Turf Care
- More...

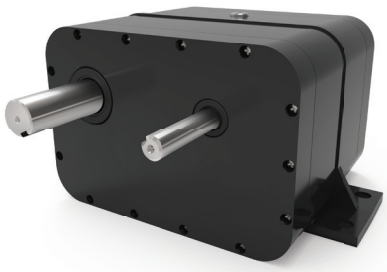
The VRT is available in different sizes, with the input and output shafts on the same side or opposite sides of the housing, with the output shaft rotation in the clockwise or counter-clockwise direction, and with a variety of control options.

VRT-150

- Output Torque up to 150 in-lbs
- Input speeds up to 300 RPM
- Output speed ratio: 0 to 0.25:1 of input speed
- Special designs available

VRT-300

- Output Torque up to 300 in-lbs
- Input speeds up to 300 RPM
- Output speed ratio: 0 to 0.25:1 of input speed
- Special designs available



- Rugged and sealed housing.
- Can be installed in any mounting orientation.
- Infinitely adjustable to obtain exact desired ratio.
- Ratio can be adjusted when idle or when running.
- Easily, quickly, and precisely make speed adjustments.
- Variable Ratio or Fixed Ratio Operation.
- Factory lubricated. Minimal to no maintenance.
- Delivers constant torque throughout the speed range.
- Speed and torque capabilities can be expanded by use of chain and sprocket ratios at the VRT shafts.

Input Speed should not exceed 300 RPM. There is no minimum, but as input speeds approach zero, slight variations in the angular velocity of the output may become noticeable. It is preferrable to use higher input speeds and take as much reduction as possible from the output shaft to maximize precise speed control. The recommended input rotation direction is shown above.

The output shaft is driven by one-way clutches so the direction of the input rotation does not affect direction of output rotation, but does affect the ratio range of the VRT. Using the non-preferred input direction will result in a slightly higher output ratio. The preferred input rotation direction will provide the smoothest output rotation.

Output Speed is infinitely adjustable from a 0 to 0.25:1 ratio of the input speed. Direction of output rotation is to be specified at time of order and does not change with input rotation direction.

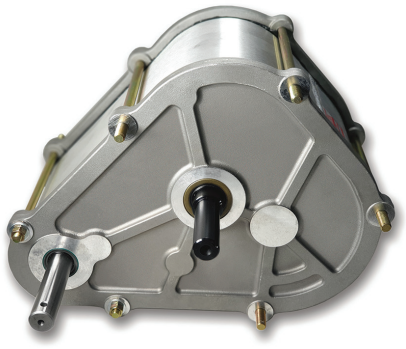
Temperature rises of 40°C (104°F) above ambient can be expected. The VRTs are built to withstand high operating temperatures but they should never exceed 90°C (194°F).

Model VRT-XXX	***Note:*** *Shaft rotations are always referenced by viewing the end of that shaft*	Output Rotation *As viewing the shaft end*	Preferred Input Rotation
Type -1	Input / Output	CCW	CW
Type -2	Input / Output	CW	CCW
Type -41	Input Output	CCW	CCW
Type -42	Input Output	CW	CW

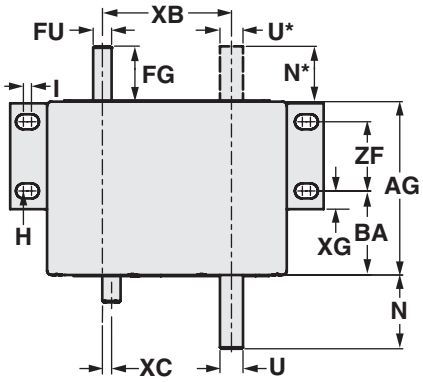
Features and Benefits

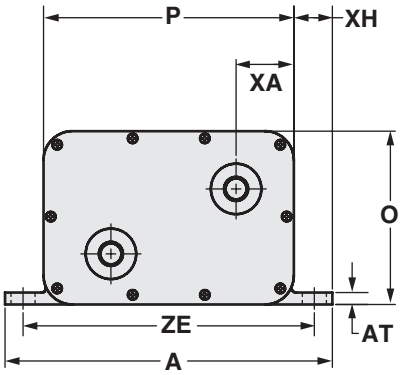
Zero-Max products are **known for**:

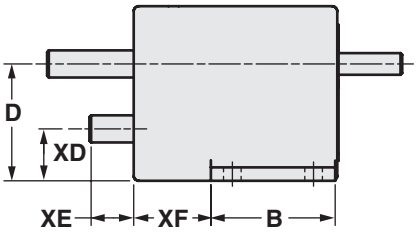
- Engineered Performance
- Reliable Operation
- Customizable Robust Designs
- ~~Fast~~ **Fast Reliable Delivery**



Special Designs available. Modifications include special shaft lengths/diameters, higher ratio units, custom controls, special housings/ materials, and more.



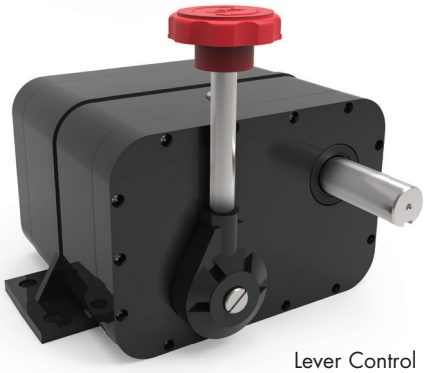




VRT-	A	AG	AT	B	BA	D	FG	FU	H (slots)	I	N	N*	O	P	U	U*	XA	XB	XC	XD	XE	XF	XG	XH	ZE	ZF
150-1 150-2	8.56	4.73	0.32	2.89	2.31	3.04	1.31	0.50	0.40 dia.	0.22	2.15	---	4.57	6.56	0.625	---	1.53	3.50	0.25	1.36	0.75	1.81	0.50	1.00	7.50	1.88
150-41 150-42	8.56	4.73	0.32	2.89	2.31	3.04	1.31	0.50	0.40 dia.	0.22	---	2.15	4.57	6.56	---	0.625	1.53	3.50	0.25	1.36	0.75	1.81	0.50	1.00	7.50	1.88
300-1 300-2	10.25	6.81	0.38	3.00	2.41	3.60	2.43	0.56	0.40 dia.	0.10	2.50	---	5.50	8.00	1.00	---	1.70	4.00	0.27	1.60	0.91	1.91	0.50	1.13	9.25	2.00
300-41 300-42	10.25	6.81	0.38	3.00	2.41	3.60	2.43	0.56	0.40 dia.	0.10	---	2.50	5.50	8.00	---	1.00	1.70	4.00	0.27	1.60	0.91	1.91	0.50	1.13	9.25	2.00

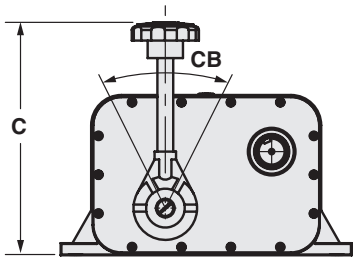
Speed adjustments are easily and precisely made via the control shaft. The user has the option of having the VRT supplied with a **lever control** that can be moved through an arc, a **screw control** that allows for repeatable and controlled fine adjustments by simply turning a hand-wheel, or with **no control** mechanism attached to the control shaft such that a customer-supplied control can be added. A mechanical or electric actuator is often used for this purpose.

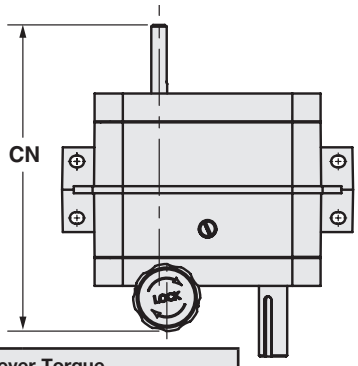

No Control


Lever Control

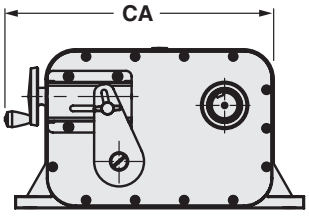

Screw Control

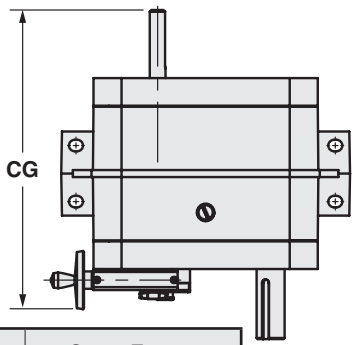
Shaft Keyway Details		
Model	Output Shaft	Input Shaft
VRT-150	3/16" x 1-3/8"	1/16" Flat x 15/16"
VRT-300	1/4" x 2"	3/16" x 2"





Lever Control Dimensions				Lever Torque	
Model	C	CB	CN	(Running, no load)	(Not running, full load)
VRT-150	6.75	45°	7.00	38 in. lbs.	149 in. lbs.
VRT-300	8.14	43°	10.85	75 in. lbs.	243 in. lbs.





Screw Control Dimensions			Number of Screw Turns	Screw Torque (inch-Lbs.)
Model	CA	CG		
VRT-150	8.10	7.40	34	3 in. lbs.
VRT-300	9.60	10.70	32	4 in. lbs.

VRT- ☐ - ☐ - ☐

Example:

- Required output torque is 150 in-lbs.
- Output shaft rotation is clockwise.
- Input and output shaft arrangement to be on same side of housing.
- Screw control option is desired.

Model Code is: VRT-150-42-SC

Model

Size	Output Torque
150	150 in-lbs
300	300 in-lbs

Configuration

Type	Output Rotation*	Shaft Configuration
1	Counter Clockwise	Input / Output
2	Clockwise	
41	Counter Clockwise	Input Output
42	Clockwise	

*As viewing the shaft end

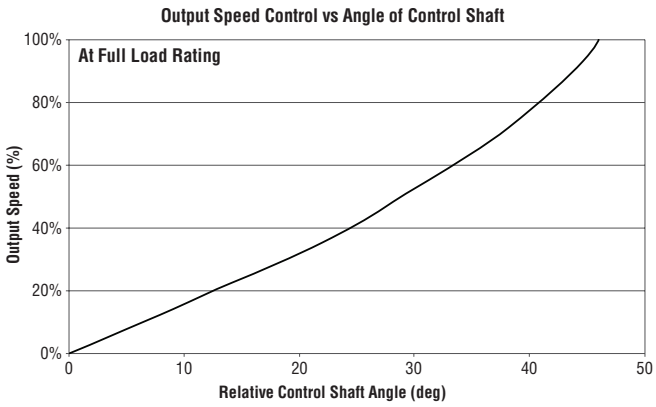
Control Options

Control	Output Torque
NC	Control Shaft Only
LC	Lever Control
SC	Screw Control

Control Linearity

Movement of the VRT speed control shaft (via lever control, screw control, or customer-supplied remote control) produces a change in output speed that is non-linear. A typical speed-control curve of a VRT, under full rated load, is shown in the chart to the right.

Typical Speed-Control Curve



Overhung Load & Thrust Load

The overhung and thrust load ratings of the VRT units are shown to the right. NOTE: The overhung loads assume the load is applied at the mid-point of the input and output shaft.

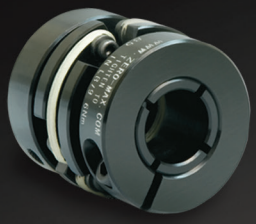
Model	Overhung Load Pounds*		Thrust Load Pounds
	Output	Input	
VRT-150	40	30	75
VRT-300	50	40	100

*Note: At mid-point of Input and Output Shafts

3D CONFIGURABLE DOWNLOADS

Zero-Max Configurable 3D CAD Downloads.
www.zero-max.com

PRECISE. RELIABLE. ROBUST. AVAILABLE.

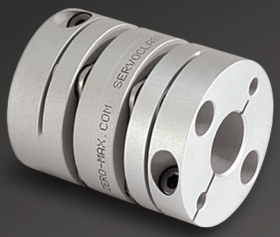


CD® Couplings

High-performance couplings that outperform and outlast bellows and steel disc designs. The unique design of the composite disc enables the CD Couplings to withstand punishing applications and deliver high precision performance. Fully Customizable.

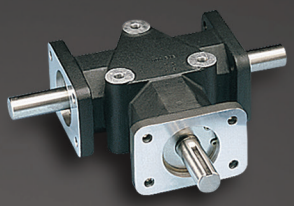
Keyless Shaft Locking Devices

ETP® keyless connections and Posi-Lok® keyless bushings provide quick, easy and accurate assembly of mounted shaft components. Both inch and metric bore sizes are available from stock.



ServoClass® Couplings

Designed for demanding servomotor applications. Zero backlash, high torsional stiffness, high speed design. Features flexible metal discs for high misalignment capacity and keyless clamp-type mounting hubs.



Crown Gear Drives

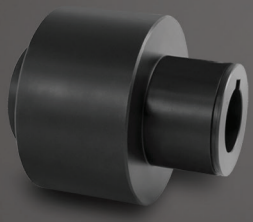
Available in 5-sizes, 3 configurations, and with 1:1 and 2:1 ratios. High quality AGMA class 10 spiral bevel gears. Stainless steel shafts and either black anodized or IP65-Rated nickel-plated aluminum housing.

Schmidt Offset Couplings

Designed to handle high amounts (up to 17") of parallel shaft offset with constant angular velocity. Standard models with torque capacities up to 459,000 in-lbs and extensive custom capabilities.

Adjustable Speed Drives

Easy to install and maintenance free. Zero-Max® Drives offer infinitely variable speeds from 0 rpm to 1/4 of input rpm. 5 models with torque ranges from 12 in-lbs to 200 in-lbs.



Overload Safety Couplings

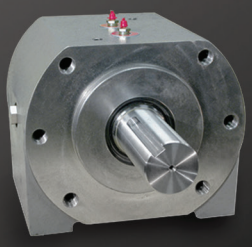
Torque Tender® Couplings provide reliable overload protection in any mechanical power transmission system. Full selection of styles and sizes with set-point torque ranges from 3 to 3,000 in-lbs.

Roh'Lix® Linear Actuators

Simple conversion of rotary motion into precise linear motion. Available in five models and multiple configurations. Roh'Lix actuators have thrust ratings from 5 to 200 lbs. All models feature built-in overload protection.

Control-Flex Couplings

Zero backlash couplings designed for encoder and instrumentation type applications. Features high misalignment capacity, constant velocity, and an electrically isolated hub design.



OHLA® Overhung Load Adaptors

Designed to protect hydraulic motors and pumps from radial/axial loads and to provide additional seal protection. 11 models available for mounts from SAE A to SAE F. Fully customizable.

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ZERO-MAX®

13200 Sixth Avenue North, Plymouth, Minnesota 55441-5509
Phone 800.533.1731 763.546.4300 FAX 763.546.8260

zero-max.com