
Galloping Control for Single Conductors
Shorter Spans, Optical Ground Wires, Shield Wires
Smaller Horizontal and Vertical Transmission Lines



A vibration control and anti-galloping damper, this solution for lighter-weight lines twists a single conductor, by inertia offset, both statically and dynamically. Vibration control is achieved by allowing the eccentric weight to move against the vibration. Used on power line conductors having shorter spans, it has been installed by helicopter at hot line voltages up to 161kV, and by bucket truck at voltages up to 345kV. The AR®Twister has eliminated breaker operations on treated lines.

APPLICATIONS

A gallop control solution for single conductors, the AR® Twister is designed for the control of Aeolian vibration on shorter spans, smaller conductors, shield and OCG wires. There are three AR®Twister designs –piston, canister and slider. Each model has a range of sizes and applications. All employ the same damping principle, kinetic impact. There is no messenger wire to wear out, nor is there any elastomer to wear out. As vibration or galloping starts to occur, the AR®Twister deploys a twisting action directly on the line. Twisting is the primary method for galloping control in all AR®Products. In addition to providing a lighter weight solution to control galloping on shorter spans, the AR®Twister can also meet the unique needs of optical ground wires and distribution feeder lines.

The designs allow scaling for a range of conductor sizes.

Galloping Control. Twisting of the conductor is a proven remedy to control galloping. Tests have shown that a small amount of twist - as little as 10 degrees – will reduce gallop amplitudes to harmless levels.

HOW IT WORKS

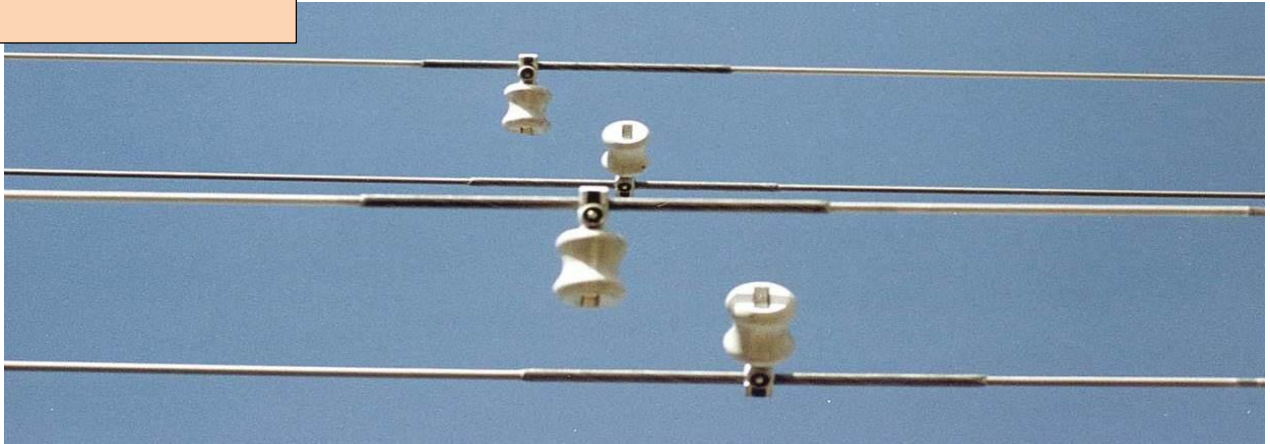
All models of the AR®Twister reduce or eliminate galloping of the line by forcing the conductor to twist and unload its aerodynamic lift. It is an inertial device that relies on metal-to-metal friction resulting from small movements between the device's weight and its clamp, thus providing damping sufficient to control high-frequency Aeolian vibrations.

AR®Twisters do not hang below the line but are mounted by clamping it vertically above the conductor or at an angle of 45 to 60 degrees below the vertical. Gravity forces make the device want to fall, thereby introducing an initial twist in the conductor. When galloping begins under the critical ice and wind conditions, inertial forces act upon the AR®Twister causing the conductor to twist against its initial set. Twisting the conductor when there is ice on it, enables the ice shape itself to also dampen; then the twisting of the ice shape acts as an aerodynamic damper. This counter twisting results in unloading of the aerodynamic lift of the ice layer.

CONSTRUCTION

AR®Twisters are constructed of aluminum for weight and strength. The smooth outer edges of the AR®Clamps, recessed placement of hardware and corona donuts when specified all guard against corona. For the largest AR® Twister the total weight is 20 lbs. The smallest weighs less than 3 lbs. Benefits include easier assembly of a simple single clamp and single bolt attachment; easier installation at a single span point location and lower cost of installation (helicopter or bucket truck). The induced shear stress due to twisting is harmless.

In action....



AR TWISTER | PISTON. In each span, one damper is clamped first to the Armor Rods then secured to the conductor. The final position depends upon the torsional stiffness of the conductor, previously calculated. The final position of 90 to 120 degrees from vertical is ideal.

SPECIFICATIONS

Designed for transmission lines having shorter spans, the AR®Twister method uses an initial twist of 15° on the conductor so the lift forces that induce galloping may be reduced to zero. Models vary given conductor parameters of weight, diameter, span length and environment.



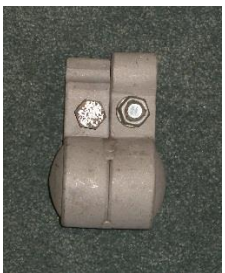
For span lengths of 250-700 ft. this design controls galloping on lines up to 345kV.

Model	Weight	Conductor	Clamp Sizes	Application
I	8.5 lbs.	0.8-1.0"	1" to 3 1/2"	
II	12 lbs.	0.75-1.0"		Shaped for reduced corona
III	20 lbs.	0.75-1.50"		Shaped for reduced corona
IV	8 lbs.	0.625-0.875"		

AR®Twister | Canister

A cast aluminum cylinder encloses a clutch of galvanized iron washers which introduce frictional damping for high-frequency vibration control.

Model	Weight	Conductor	Clamp Sizes	Application
VII	3 lbs.	0.250-0.6250"	1/2" to 1 1/16"	For shield wires and guy wires
VIII	10 lbs.	0.75-1.12"	1 1/8" to 1 7/8"	Used for severe Aeolian vibration
IX	6 lbs.	0.25 - 1.20"	1/2" to 1 1/16"	High Frequency vibration control
X	20 lbs.	0.75 - 1.76	1 1/8" to 2 1/4"	For higher voltages, corona protection



AR®Twister | Piston



AR® Twister | Slider

Using clusters of loose, galvanized iron washers this damper design can be modified to control galloping of the smaller conductor, static lines, OGC, or steel shield wires.

Model	Weight	Conductor	Clamp Sizes	Application
V	2.7 lbs.	0.625-0.875"	15/16" to 1-7/16	Ultra-Light-weight conductors
VI	7 lbs.	0.625-1.80"	15/16" 10 1-7/16	Range of conductors

Hardware

Units are installed over Armor Rods by a single bolt and locknut.

Aluminum holding brackets in standard and long lengths.

Clamp holding hardware is HDG steel, 5/8D cap screw with ANCO locknut & split lock washer.

AR® Clamp

Strength tests were conducted at Helical Line Products.

Holding Tests

Clamp slipped at tensile loads of 1000 lbs./Alligator grip and 1200 lbs./Nutcracker grip.

Note: Most AR® Twisters are designed for use with Armor Rods. Armor Rod specifications will be included in the recommendations for the galloping solution together with specifications for the appropriately sized AR® Twister, number of units and placement on the phases of the transmission line.

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