DESCHNER CORPORATION

OUR PRODUCTS AND HOW THEY WORK

Cushioneer®

KINECHEK®

CUSHIONEERS AND KINECHEKS

INTRODUCTION:

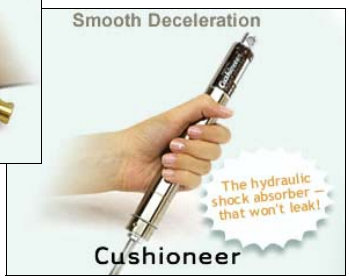
Cushioneer Shock Absorbers and Kinechek Speed/Feed Controls were originated by Deschner Corporation in 1961. They represent a "State of the Art" advancement in hydraulic motion control. Both products are leakproof, miniaturized, and fully adjustable. They will operate for millions of cycles without maintenance and provide the user with unmatched performance and reliability in a very compact size. The features that make Cushioneers and Kinecheks unique are that they do not leak fluid because of their rolling diaphragm rod seal, contain no sliding seals to wear and contaminate the fluid, incorporate super clean and temperature stable silicone fluid for consistent performance, and are infinitely adjustable.

Most equipment is driven by electric, hydraulic, or pneumatic power. Because pneumatic (air) power is so economical and readily available it is the most popular choice of most designers. However, because air is compressible it is difficult to control the equipment it powers. Therefore, most users of pneumatic equipment must seek an alternative method to provide control. The majority of control devices are hydraulic. However, prior to the introduction of Cushioneers and Kinecheks, users had to choose from rather large, bulky designs that contained sliding seals, leaked, and required frequent fluid replenishment. They also used temperature sensitive petroleum oils that became contaminated with seal wear particles and dirt from refilling. They required frequent readjustments and maintenance costs were high.

Cushioneers and Kinecheks were welcomed by industry because they were compact, reliable, and eliminated most of the previous problems the user had to tolerate.

Over the years several firms have attempted to copy Deschner's designs. Although these "copy cat" designs look similar on the outside, their construction lacks the design sophistication and quality of the Cushioneer and Kinechek. They usually lack a leakproof rolling diaphragm rod seal and do not incorporate a hardened precision finished cylinder, making it a necessity to resort to an undesirable (but inexpensive to manufacture) sliding piston seal design. Deschner Corporation has numerous customers that have changed from "copy-cat" designs to genuine Cushioneers and Kinecheks which provide the consistent control and maintenance free features they desire.

How they work



Cushioneers and Kinecheks use a patented rolling diaphragm seal, which make the units leak proof and allows the plunger rod to operate without friction. The diaphragm seal is attached to the plunger rod and the inner body wall so there is no leak path. However, the plunger rod must never be twisted in the housing or allowed to twist while operating because twisting the plunger rod will wrinkle the diaphragm seal and shorten the service life.

The high-pressure cylinder used in these products is hardened and honed to a mirror finish and individually mated to its piston within a clearance of nominally .0005 inch. This metal-to-metal fit eliminates the need for a sliding piston seal, which provides a greater capacity for its size and an extremely long service life due to no sliding seal wear.

Cushioneers and Kinecheks get hot when operated at high cycle rates or under heavy loads because the energy absorbed from the moving load is converted into heat. If the unit gets too hot while operating, increase the airflow around the unit (by a fan or air blast on the unit) to keep the temperature below 135° F. At working temperatures over 135° F the seals begin to "cook" and will stiffen and crack, shortening the service life. This will not be an abrupt occurrence but will inevitably lead to premature failure. Cushioneers are more likely to require cooling than Kinecheks due to the high energy and cycle rates they are usually subjected to.

The plunger rod on our products extend instantaneously due to the internal fluid pressure and the absence of any sliding seals, which create frictional drag. The main function of the spring is to keep the fluid pressurized so that the diaphragm seal will remain expanded allowing the seal to roll back and forth smoothly. The internal fluid pressure is what provides the plunger rod extension force. The large, non-convoluted, return flow paths in conjunction with the free flowing balance poppet and check valve assure a rapid plunger rod return. Caution your customers that if the plunger rod does not return fully the user should immediately remove the unit from service.

Adjustable Cushioneer

The Adjustable Cushioneer has up to 25 variably spaced and sized ports drilled into the high-pressure cylinder. When the moving load impacts the plunger rod the fluid ahead of the piston can escape through all the ports. As the plunger rod travels down the cylinder the piston shuts off successive ports increasing the resistance and bringing the load to a smooth stop.

The cylinder is assembled in the lower end of the body, which has been machined with a tapered eccentric wall. When adjusting the Cushioneer the cylinder is rotated within the body so that the ports are either closer to the wall (restricting the fluid flow and increasing the plunger rod resistance) or further away from the wall (allowing freer fluid flow and less plunger rod resistance). This adjustment design alters the flow restriction at all escape ports according to the effect each port has on the decelerating action. This provides a smooth rate of deceleration at any setting as opposed to the squish/bang adjustment found on most other shocks.

Self-Adjusting Cushioneer

The Self-Adjusting Cushioneer incorporates all the same features as the adjustable Cushioneer except the high-pressure cylinder in the Self-Adjusting Cushioneer contains a pattern of grooves through which the fluid bypasses the advancing piston. The grooves are distributed over the length of the cylinder in a way that reduces the available bypass area the further the piston travels. The grooves are designed to maintain a constant flow rate under wide variations in impact energy and the changes in fluid pressure. This allows the unit to automatically adjust to a wide range of impact loads and still provide a smooth stopping action.

The Self-Adjusting Cushioneer is ideal for use in applications where the impact load fluctuates but a precise stopping point is required. Unlike the adjustable Cushioneer, the entire stroke length of the Self-Adjusting Cushioneer must be utilized to provide an optimum stopping action.

Slimline Kinecheks

The high-pressure cylinder in the Kinecheks has only one escape port. When the plunger rod is depressed the fluid ahead of the piston must pass through this single port thus maintaining a constant rate through its entire stroke length.

The adjustment knob is mated to the high-pressure cylinder within a clearance of less than .0005 inch. The adjustment knob has a compound V groove that is wide and deep at the fast end and

very narrow and shallow at the slow end. The adjustment knob is assembled in the cylinder so that the V groove locates under the single escape port. When adjusting the Kinechek the adjustment knob turns within the cylinder and controls the flow of fluid through the escape port.

The V groove extends approx 300° around the adjustment knob. Rotating the adjustment knob more than 300° does no harm. However, the area between the slowest setting and the fastest setting is a null area with no adjustment. Turning the adjustment knob past the null area will simply return the adjustment to the fastest or slowest setting depending on which direction the adjustment knob is rotated.

A common problem with any velocity control is cleanliness of the fluid. Any dust particles in the fluid media will collect around the orifice and cause the plunger to move slower and slower until enough pressure is built up to blow the dust particles through the orifice and return the plunger speed to the original setting. We take 5 steps to avoid this problem.

1) The use of super clean (food grade) silicone fluid.
2) Hardened tool steel cylinder and special alloy piston specially selected and tested to provide little or no wear.
3) Individually mated piston to cylinder eliminating the need for a sliding seal. (No seal wear particles to contaminate the fluid.)
4) Use of a filter to continually trap any contaminates in the fluid.
5) Maintaining a clean shop and assembly area and emphasizing the importance of cleanliness with all employees.

In addition, our patented rolling diaphragm seal design hermetically seals our products eliminating any outside contaminants. Further, the use of silicone fluid has the added advantage of being very constant in viscosity so changes in plunger speed due to any changes in operating temperature, is almost imperceptible.

Mini K and Super K Kinecheks

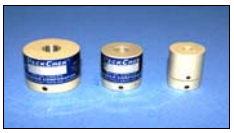
Mini K and Super K Kinecheks contain the same quality features as Slimline Kinecheks (rolling diaphragm seal, stainless steel plunger rod, special alloy piston mated to tool steel cylinder, etc). However, these products are packaged to provide a long stroke in a very small overall length (the overall length of a 4” stroke Super K is only .16” longer than a 3” stroke Slimline)

To accomplish this the fluid reservoir is constructed of an elastomeric bladder backed by an expansion spring that is precisely wound around the bladder. When the plunger rod is pushed down, the fluid metering through the flow control passage flows into the reservoir area expanding

the bladder. When the load on the plunger rod is reversed the spring squeezes the bladder forcing the fluid through the return passages propelling the instantaneous extension of the plunger rod. To provide sufficient fluid to maintain optimum performance and a long service life it was necessary to enlarge the diameter of these units. The bladder and spring are encased in a thin wall steel tube to prevent contaminants from interfering with their movement. These products should not be mounted on the casing, which could interfere with the movement of the bladder and spring. Also, the casing can be rotated if sufficient torque is applied. Rotating the casing will not affect the function of the unit but the scale line on the nameplate affixed to the casing will be miss-located, which will visually change the adjustment settings.

PeckCheks

PeckCheks are designed for use in deep hole drilling applications. Drilling to a depth of more than three times the drill diameter often requires peck drilling where the drill is repeatedly withdrawn from the hole, to remove chips, while advancing deeper and deeper during each feed movement (Peck drilling). The use of a regular Kinechek in peck drilling applications slows the process because the plunger rod automatically extends when the drill is retracted. Then, when the drill tries to re-enter the hole, the Kinechek checks the feed rate even though the drill is only drilling air. For efficient peck drilling the Kinechek must be made to act only while the drill is cutting. This means that except for a slight extension the plunger rod must remain stationary while the drill retracts to clear the chips and reenters the hole. The slight extension (approx. .005 inches) is to check the drill (when it re-enters the hole) just before its last stopping point to prevent the drill from impacting the work piece each time it re-enters the hole. The PeckChek Control in conjunction with a special Kinechek is designed to operate in this manner.



The PeckChek Control is a one-way ball clutch that prevents the automatic extension of the plunger rod. It fits over the plunger rod and attaches to the body. However, PeckChek Controls must be used only with special Kinecheks that use plunger rods that are hardened full length, to withstand the brinelling action of the ball clutch, and are approx ½" longer in length to accommodate the PeckChek Control without loss of controlled stroke. Although the PeckChek Control when mounted on the special Kinechek forms a single unit, the PeckChek Control is sold separately from the Kinechek. This is because the same PeckChek Control can be used on Kinechek models with different stroke lengths. PeckChek Controls are available for use with Slimline, Super K, and Mini K Kinecheks.

Specialty Kinecheks

Over the years we have designed several special units for specific applications as follows:

Cushion-Start Kinechek – Uses approx 25% at the beginning of the stroke for cushioning then goes into controlled stroke mode. This model was originally designed to control the table on a vertical mill. The customer used an air cylinder to power the table. The table rapidly moved the work piece to the cutter then a Kinechek was used to control the table movement while the mill was cutting. On some parts, the weight of the table coupled with the fixture and part imparted too heavy an impact on the Kinechek. By providing a Cushion-Start Kinechek the user was able to get by without having to use a Cushioneer shock absorber together with a Kinechek speed control to do the same job. Since their release, Cushion-Start Kinechecks have been used extensively on reciprocating ball slides.

The "Cushion" is accomplished by drilling 4 escape ports in the cylinder and is designed for modest impact loads only. Cushion length and capacity are shown in Kinechek Bulletin S-66.

Slow Return Kinechek – This model was developed for a manufacturer of a second operation lathe. The instantaneous extension of the plunger rod was interfering with one of the operation sequences on the machine. By slowing the plunger rod extension on the Kinechek the manufacturer was able to program the sequence to move into the work piece, complete its operation, and retract before the plunger rod fully extended. The extension of the plunger rod is slowed by restricting the units return flow passages. The time required for the plunger rod to fully extend can range from 6 seconds to 22 seconds per inch of stroke. This return time depends on the size of the orifice in the restrictor and is measured at the slowest adjustment. The restricting orifice is not adjustable but the return time is affected by where the unit adjustment is set i.e. the plunger rod extends quicker at the faster settings.

Skipchek – This unit was designed for use in drilling applications where an in-line hole must be drilled in multi-walled parts such as tubing or clevis mounts. A wheel chair manufacturer needed to speed up his drilling operation. A regular Kinechek controlled the drill feed while cutting the first wall but maintained the same feed rate while the drill passed through the tube to drill the second wall. This lost time was adversely affecting his production. By using a Skipchek, which controls the feed rate while cutting through the first wall, then rapidly advances across the tube and controls the feed rate through the second wall, the user was able to avoid using 2 drill heads (one on each side of the tube) and still speed up his drilling operation. The rapid advance (skip) feature is accomplished by machining a bypass flow passage in the cylinder. When the piston traveling down the cylinder reaches the bypass it surges forward (skips) for the length of the bypass. The skip distance is not adjustable and must be specifically engineered for each application.

If you learn of applications that do not seem to fit our regular products we would appreciate it if you would let us know. We may be able to make some changes that would make our products suitable for these special cases.

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