

Foremost Industries
Model 306430
Floating Cushion Sub

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Model 306430 Floating Cushion Sub

Function

The Foremost Floating Cushion Sub has been designed specifically to fit all mid range and large blast hole rotary drills which are utilized to drill in soft to medium hard rock formations. When mounted into the drive spindle of the gear box it will provide a minimum of two and one half inches of free travel between the top of the drill string and the rotary drive. The extended travel capacity built into the cushion sub enables the drill operators to quickly and easily make-up and breakout connections on the drill pipe with minimal thread damage. When the rotary drive is lowered to pick up on the threads of the drill pipe, the piston component in the cushion sub will move up into the housing of the sub when the threads come in contact which will considerably lessen the impact not only on the threads of the drill pipe but also the bearings and gears retained within the rotary drive. The unique configuration of the housing assembly will not only provide direct drive forces from the rotary drive to the drill string but due to its design also absorb torsional vibration from the rotary bit or DTH hammer assembly through the use of polymers incorporated in the drive system. Whether using pull-down or hold back methods of drilling, urethane cushions located on both the top and bottom ends of the piston stroke as well as some hydraulic dampening from within the housing cavity, the shock and vibration from the rock bit will be greatly reduced and therefore enhance the drills performance and decrease maintenance.

Configuration

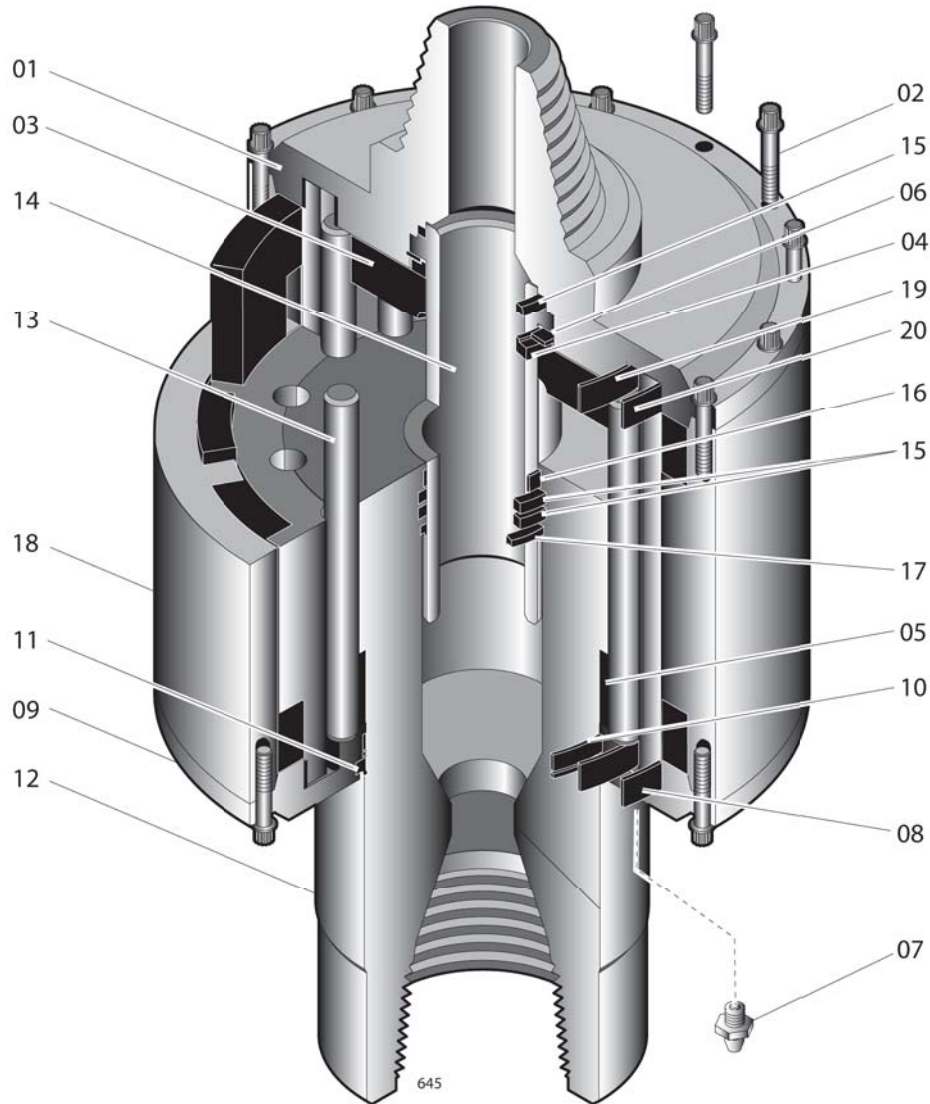
The Foremost Cushion Sub will accommodate drill string combinations up to and including nine and one quarter inches in diameter. Typically, the assembly is supplied with a pin up / box down thread combination cut to customer specifications as per the drill application. The cushion sub assembly has been configured to fit into mid range and large rotary drills so as not to interfere with the operation of the carousel and to allow the operator to install the unit without any modifications to the drill. In most cases, there will be room in the mast to install a short saver sub below the cushion sub to make up the required length as per the original extended sub supplied by the drill manufacturer. Seals, cushions and other wear parts can be easily replaced in your own facility as no special tools or equipment are necessary for dismantling and rebuilding the complete assembly. Lubrication of internal components to reduce wear and prevent corrosion within the housing is accomplished by means of a grease fitting conveniently located on the bottom surface of the lower cover plate.

Features

1. Sliding spindle with 2 1/2 inches of extension.
2. Standard seals, wipers and wear rings are utilized to isolate drilling fluids and air.
3. Unique drive system to transfer rotary torque to the drill string.
4. Precision machined components manufactured from high strength alloy steel.
5. Manufactured to suit O.E.M. drill specifications.
6. Large through bore in a stationary washpipe assembly.
7. Heavy duty urethane upper and lower cushions.

Benefits

1. Sliding spindle reduces thread damage to drill pipe and allows drill operators to quickly and easily make-up and breakout connections.
2. Reduced maintenance to rotary drive bearings and gears.
3. Repairs and rebuilds can be accomplished at the mine property.
4. Axial and torsional vibration and shock is drastically reduced.
5. No modifications to the carousel or drill are required.
6. No restriction of air flow to the bit.
7. Maintenance costs on the drill and drilling tools are greatly reduced.



No.	Drawing #	Description	No.	Drawing #	Description
01	306650	Upper Cap	12	307021	Piston
02	310422	Cap Screws - Rework	13	307337	Drive Pins
03	307000	Upper Cushion	14	307027	Washpipe
04	307208	Spacer Ring	15	307249	Poly Paks Seal
05	307012	Lower Cushion	16	307245	Wear Ring
06	16-38-289787	Retainer Ring	17	307246	Wiper Ring
07	9285-00-0610	Grease Zerk	18	310309	Housing Assembly
08	310364	Poly Paks Seal	19	307247	Wear Ring
09	307020	Lower Cap	20	307248	Wear Ring
10	307390	Wear Ring	21*	307350	Locating Pin
11	307244	Wiper Ring	22*	307354	Torque Keys

*Not Shown

Model 306430 Floating Cushion Sub General Specifications

Hoist	200,000 lbs. Proof load
Pulldown	200,000 lbs. Std. Cushion
Torque	30,000 lbs. / ft.
Extension	S - S Length extended 28.50 inches
Retracted	S - S Length retracted 26.00 inches
Weight	1,100 lbs.

Model 306430 Floating Cushion Sub Parts List

Item No.	Part No.	No. Req'd	Description
1	306650	1	Upper Cap
2	310422	40	Cap Screws
3	307000	1	Upper Cushion
4	307208	1	Spacer Ring
5	307012	1	Lower Cushion
6	16-38-289797	1	Retaining Ring
7	9285-00-0610	1	Grease Fitting
8	310364	1	Seal
9	307020	1	Lower Cap
10	307390	1	Wear Ring
11	307244	1	Wiper Ring
12	307021	1	Piston
13	307337	12	Drive Pins
14	307027	1	Wash Pipe
15	307249	3	Seals
16	307245	1	Wear Ring
17	307246	1	Wiper Ring
18	310309	1	Housing Assembly
19	307247	2	Wear Ring
20	307248	2	Wear Ring
21	307350	1	Locating Pin
Pt. No.	306430-30	1	Seal Kit (4,6,8,10,11,15,16,19,20,21)
Pt. No.	306430-31	1	Seal & Cushion Kit (3,4,5,6,8)

Foremost Floating Cushion Sub Model 306430 Maintenance Schedule

During the final assembly process at the factory, the Floating Cushion Sub had one (1) cartridge or approximately 400 grams of grease installed in the housing for lubrication of the internal components. This initial lubrication, under average operating conditions will last approximately one (1) week.

After this period, the cushion sub should be lubricated on a daily basis. The lubricant can be a general purpose grease of the same type used to lubricate bearings or other drill components.

The grease fitting is located on the face of the lower cover plate that is bolted to the housing. Grease should be installed when the sliding spindle is in the retracted or up position. The operator should pump in five to ten strokes of the handle to maintain lubrication of the components.

If at any time the sliding spindle will not retract or extend from the housing, there could be too much grease in the housing cavity. If this happens, remove the grease fitting and cycle the spindle up and down a couple of times to remove the excess grease and then reinstall the fitting into the lower cover plate. Wait a couple of days before beginning the lubrication cycle over again.

It will be necessary to periodically change the seals and wear rings in the assembly. The frequency of this maintenance will depend upon the drilling application and the amount of lubrication the unit receives during its operating cycle. If at any time during the drilling operation air or fluids are being blown out the lower end past the seals and spindle, the cushion sub should be removed immediately from the drill to have a new seal kit installed.

Under average drilling conditions a preventative maintenance inspection should be performed at six month intervals or approximately every 2500 hrs.

Under no circumstances should any welding or wrenching be done on the chrome surface of the spindle.

Floating Cushion Sub Operating Parameters Model 306430

Function

The Model 306430 Floating Cushion Sub was developed to perform two important functions. The first function is to allow a limited amount of axial movement between the drill string and the rotary drive while making up and breaking out threaded connections in the drill string; the second is to reduce both torsional and axial shock which is introduced by the rotary bit or the DTH hammer bit during the drilling operation. These functions are accomplished by means of a piston, which is able to slide axially inside a splined housing. The piston displaces the rotary torque and vibrations to the urethane compound, which integrates the internal and external drive housings together. This area is where torsional vibration is reduced. Utilizing urethane cushions, positioned at both the upper and lower limits of the piston stroke, reduces axial displacement of shock. Drilling fluids and or air are isolated from the housing by means of a wash pipe and seal arrangement which prevent corrosion from taking place on the internal components.

The severity of the drilling applications will determine the cycle time in which the cushion sub will be required to have a rebuild performed. The following are some visual indicators as to when the cushion sub should be removed from service for maintenance purposes:

1. If air or fluids are being blown past the wiper seal located in the lower cover plate at the bottom of the assembly. (cause – leaking seal in the wash pipe assembly)
2. When purchased new, the piston will have two and one half (2 ½) inches of axial movement. As the lower cushion compresses, the amount of travel will increase. When the movement exceeds 3 ½ inches, the lower cushion should be replaced. This will also be a convenient time to replace all of the seals, wipers and wear rings.
3. Backlash in the piston and housing between the time the rotary spindle starts to rotate and the drill pipe starts to rotate. (The splines in the piston and internal housing will eventually start to wear due to the torque transfer from the rotary drive and the bit – when the backlash between the members exceeds ½” (.500) the piston and or internal housing may need to be replaced) To check this, mark a position on the piston and the lower cover plate parallel with each other, rotate the drive slowly and measure the distance the housing has moved axially prior to any movement of the piston.

- Piston, run out with the housing. The piston is centered through the lower cover plate by means of a
4. wear ring, as it becomes worn by the sliding action of the piston, the piston will begin to have some run out where it is connected to the drill string. If the run out is greater than one eighth (1/8) of an inch change the wear ring.

Procedure for Rebuilding Model 306430 Floating Cushion Sub

Inspection and Disassembly Procedure

1. Clamp the cushion sub in the vertical position - box up
2. Remove Cap Screws (20) from the Lower Cap (Item 09)
3. Install a lift nubbin into the thread of the Piston (Item 12)
4. Lift the Piston out the housing assembly
5. Slide the lower cap off the end of the piston
6. Slide the Lower Cushion (Item 05) off the end of the piston
7. Remove the Drive Pins (Item 13) from the housing
8. Remove the Upper Cushion from the housing
9. Remove the Spacer Ring (Item 04) and Retaining Ring (Item 06)
10. Remove the Washpipe (Item 14) and Seal (Item 15)
11. Remove Wiper Ring (Item 11), Seal (Item 08), Wear Ring (Item 10) from the lower cap
12. Remove Wiper Ring (Item 17), Seals (Item 15), Wear Ring (Item 16) from the piston
13. The Upper Cap (Item 01) can also be removed to replace Wear Rings (Item 19,20) but for the initial rebuild it may not be necessary
14. Clean all parts with cleaning fluid and inspect for wear - deburr any parts and remove sharp edges - any corrosion must be removed with emery cloth and or buffing wheel prior to assembly to prevent air leakage into the housing
15. Seals, Wear Rings and Cushions can be replaced by purchasing a Seal and Cushion Kit Part Number 306430-31

Assembly

1. Replace one Seal (Item 15) in the seal fit of the Upper Cap (Item 1)
The o-ring of the seal against the shoulder of the location fit
2. Insert the Wash pipe (Item 14) in the location fit
3. Install the Retaining Ring (Item 06) into the groove making sure to cover the Wash pipe locating pin
(tap the Retaining Ring to make sure it is properly seated in the groove)
4. Install the Spacer Ring over the Wash pipe
5. Install the Upper Cushion over the Wash pipe
6. Install the new Seals, Wiper and Wear Ring into the Piston
7. Slide the Piston back into the Housing lining up the splines for the Drive Pins
8. Install the Drive Pins between the Housing and the Piston
9. Install the new Seal, Wiper and Wear Ring into the Lower Cap
10. Install the Lower Cushion into the Housing line up the grease groove in the cushion with the grease fitting in the lower cap
11. Install the Wear Rings (Item 19,20) into the Lower Cap
12. Install the Lower Cap over the Piston and into the Housing
13. Install Cap Screws alternating across the Cover Plate (Torque to 210ft. lbs.)
14. Wire the Cap Screws for safety purposes
15. Install 1 cartridge of grease or approximately 400 grams