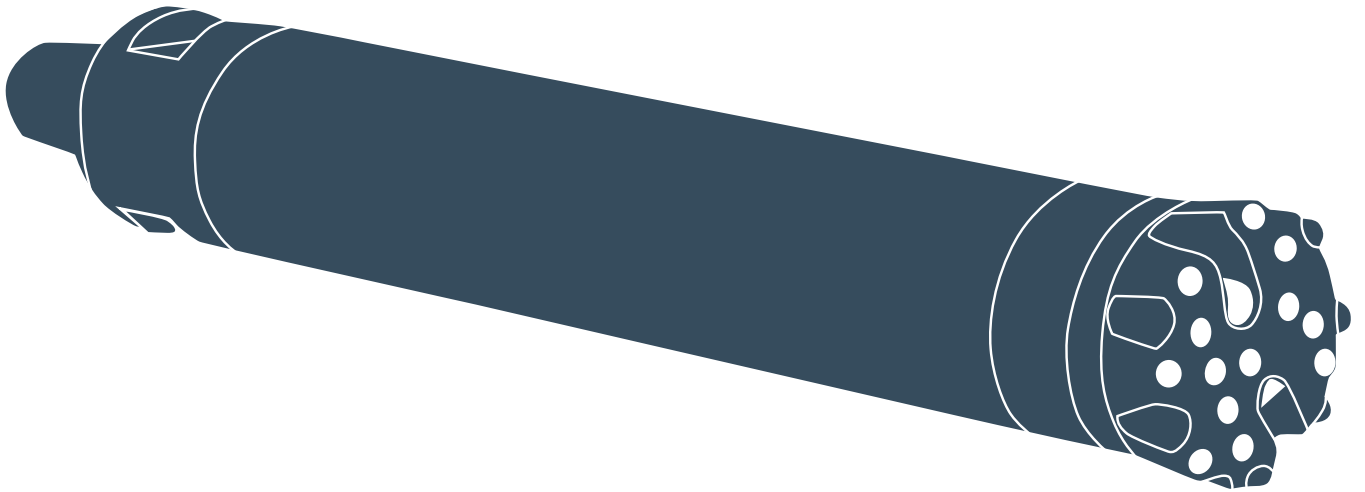


# QL300/QL300S downhole drills

Technical manual



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## INTRODUCTION

The Quantum Leap® QL300 downhole drill is a valveless cycle drill capable of drilling 30" to 36" (762 mm to 914 mm) diameter holes in the standard version, and 38" to 48" (965 mm to 1219 mm) diameter holes with an oversize chuck (QL300S). It is primarily intended for foundation and ground engineering applications in consolidated rock formations, but is suitable for any rock drilling application.

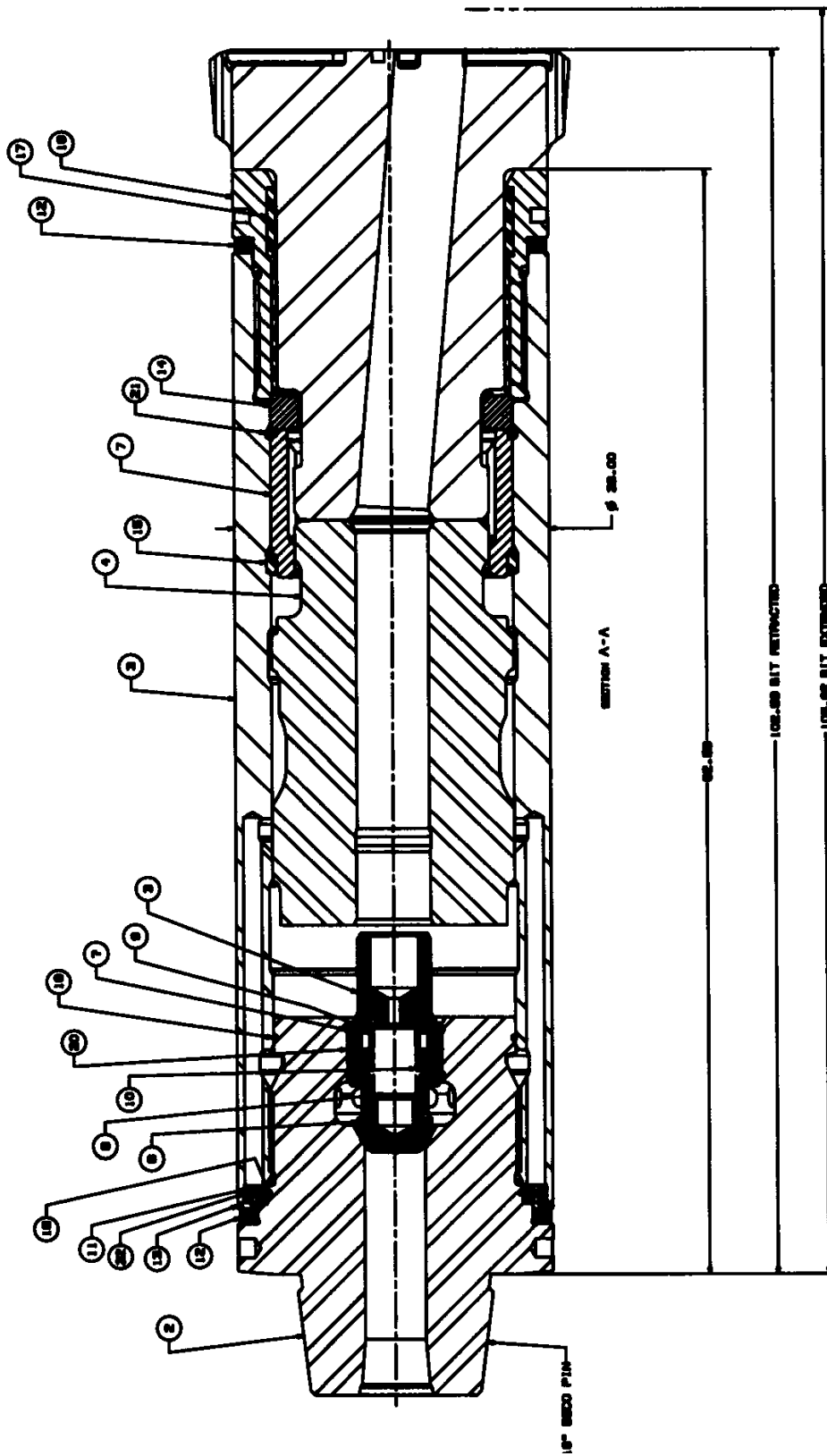
The QL300 is designed for use on drilling machines with either top head or kelly drive rotation. The rig must be capable of supplying sufficient hold down, hold back, rotation speed, torque, hammer lubrication, air pressure, and air flow for proper hammer function.



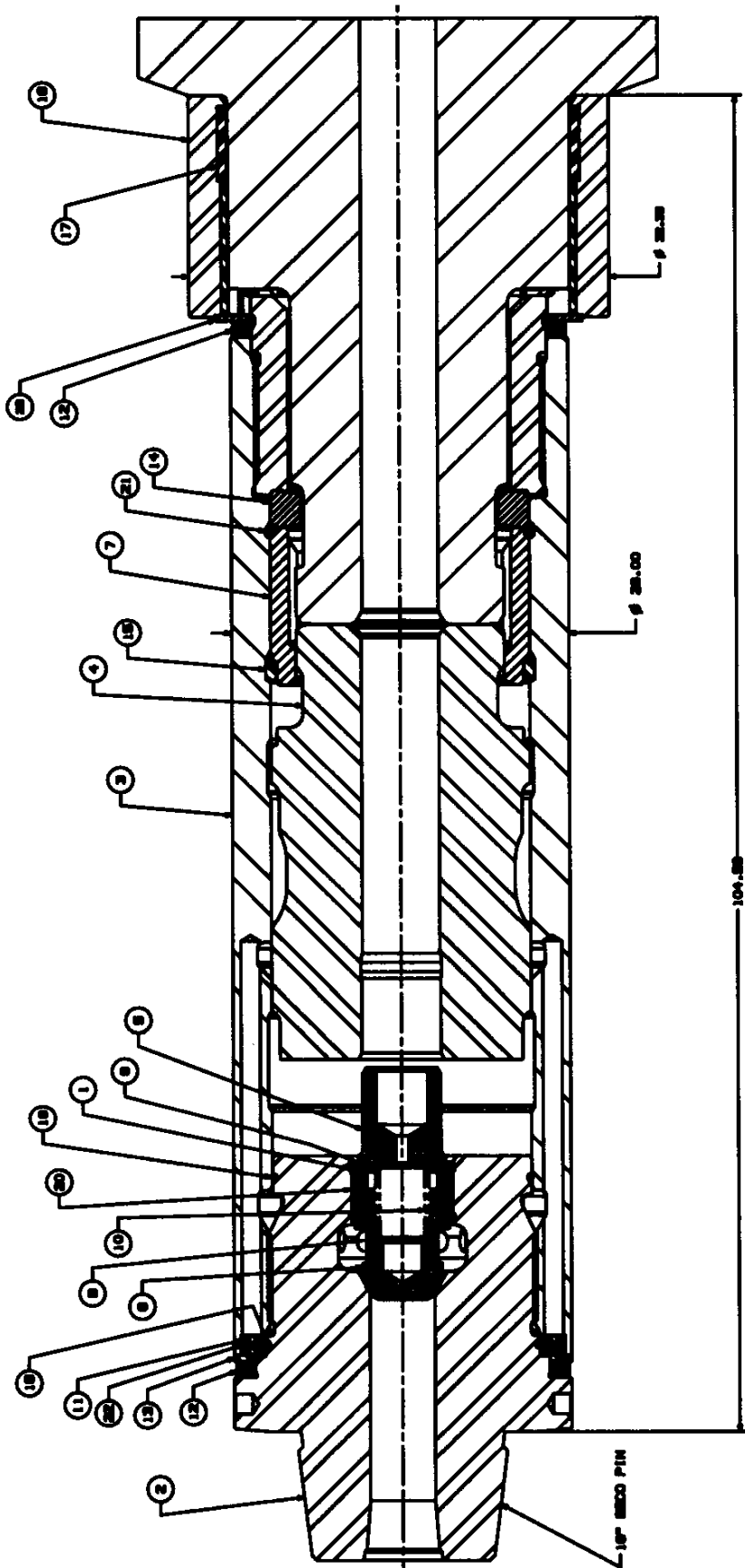
# QL300 SPECIFICATIONS

Model: CPN: Description:	QL300 52339363 QL300 with 16" BECO connection.		QL300S 52339371 QL300S with 16" BECO connection and Super Chuck to accommodate 48" bits.	
	English	Metric	English	Metric
<b>General specifications:</b>				
Connection:	16 BECO		16 BECO	
Outside diameter (in & mm)	26.00	660.4	26.00	660.4
Length w/o bit shoulder to shoulder (in & mm)	92.1	2339.3	103.4	2626.4
Length with bit extended (in & mm)	116.3	2954.0	122.3	3106.4
Length with bit retracted (in & mm)	113.0	2870.2	119.0	3022.6
Weight w/o bit (lb & kg)	10800	4909.1	11300	5136.4
Backhead across flats (in)	special		special	
Minimum bit size (in & mm)	wrench/tongs		wrench/tongs	
Maximum bit size (in & mm)	30.00	762.0	38.00	965.2
Bore (in & mm)	36.00	914.4	48.00	1219.2
Piston weight (lb & kg)	20.000	508.00	20.000	508.00
Stroke (in & mm)	2263	1028.6	2263	1028.6
Maximum pressure differential (psig & bar)	4.00	101.6	4.00	101.6
Maximum choke diameter (in & mm)	150.0	10.3	150.0	10.3
Make-up torque (ft-lb & N-m)	1.00	25.40	1.00	25.40
	1,500,000	2,031,000	1,500,000	2,031,000
<b>Air consumption:</b>				
75 psi/ 5,2 bar (scfm & m <sup>3</sup> /min)	3,400	96.2	3,400	96.2
75 psi (bpm)	370	370	370	370
100 psi/ 6,9 bar (scfm & m <sup>3</sup> /min)	4,300	121.7	4,300	121.7
100 psi (bpm)	410	410	410	410
125 psi/ 8,6 bar (scfm & m <sup>3</sup> /min)	5,200	147.2	5,200	147.2
125 psi (bpm)	450	450	450	450
150 psi/ 10,3 bar (scfm & m <sup>3</sup> /min)	6,115	173.2	6,115	173.2
150 psi (bpm)	480	480	480	480
<b>Operational specifications:</b>				
Feed force (lbs)	19,600 - 68,500		19,600 - 68,500	
Rotation speed (rpm)	4-10		4-10	

# PARTS



DOWNHOLE DRILL MODEL QL300



DOWNHOLE DRILL MODEL QL300S

## PARTS LIST FOR QL300

<i>Item No.</i>	<i>Part CPN</i>	<i>Part description</i>	<i>Qty per</i>
1	52339082	RETAINER, GUIDE QL300	2
2	52339389	BACKHEAD, QL300	1
3	52339397	HAMMER CASING, QL300	1
4	52339405	PISTON, QL300	1
5	52339413	GUIDE, QL300	1
6	52339421	VALVE, CHECK ASSEMBLY	1
not shown	52339868	O-RING, CHECK VALVE	
7	52339439	BEARING, BIT QL300	1
8	52339447	STOP,CHECK VALVE SPRING	1
9	52339454	GUIDE,CHECK VALVE SPRING	1
10	52339462	SPRING,CHECK VALVE,QL300	1
11	52339470	PLUG,CASING,QL300	10
		WASHER, BREAKOUT,QL300 & QL300S	2
12	52339488	QL300S	2
13	52339504	WASHER,CASING,QL300 & QL300S	1
14	52339512	RING, BIT RETAINING	1
15	52339546	RING,BEARING RETAINING	1
16	52339553	CHUCK,STANDARD,QL300	1
17	52339561	BEARING,CHUCK,STD,QL300	1
18	52339843	O'RING,BACKHEAD REAR	1
19	52339850	O'RING,BACKHEAD FRONT	1
20	52339876	O'RING,GUIDE QL300	1
21	52339884	O'RING,BEARING RETAINER	1
22	95086153	O-RING	10

## PARTS LIST FOR QL300S

<i>Item No.</i>	<i>Part CPN</i>	<i>Part description</i>	<i>Qty per</i>
1	52339082	RETAINER, GUIDE QL300	2
2	52339389	BACKHEAD, QL300	1
3	52339397	HAMMER CASING, QL300	1
4	52339405	PISTON, QL300	1
5	52339413	GUIDE, QL300	1
6	52339421	VALVE, CHECK ASSEMBLY	1
not shown	52339868	O-RING, CHECK VALVE	
7	52339439	BEARING, BIT QL300	1
8	52339447	STOP,CHECK VALVE SPRING	1
9	52339454	GUIDE,CHECK VALVE SPRING	1
10	52339462	SPRING,CHECK VALVE,QL300	1
11	52339470	PLUG,CASING,QL300	10
		WASHER, BREAKOUT,QL300 &	
12	52339488	QL300S	2
13	52339504	WASHER,CASING,QL300 & QL300S	1
14	52339512	RING, BIT RETAINING	1
15	52339520	RING,BEARING RETAINING	1
16	52339538	CHUCK,SUPER,QL300S	1
17	52339546	BEARING,CHUCK,SUPER	1
18	52339843	O'RING,BACKHEAD REAR	1
19	52339850	O'RING,BACKHEAD FRONT	1
20	52339876	O'RING,GUIDE QL300	1
21	52339884	O'RING,BEARING RETAINER	1
22	95086153	O-RING	10
23	52339579	WASHER,THRUST,QL300S	1

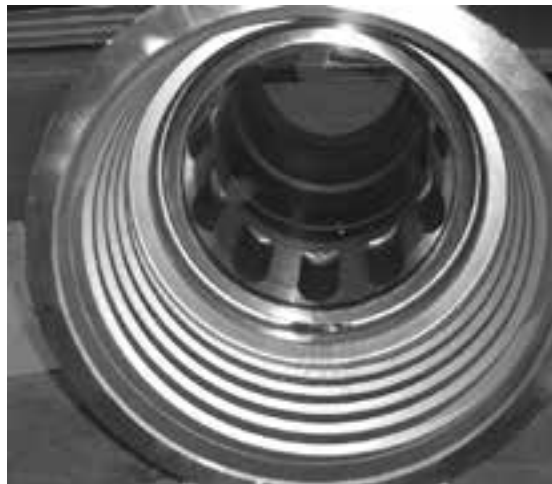


## ASSEMBLY INSTRUCTIONS

- I. With casing horizontal or with the chuck end slightly elevated, install Bearing/ Piston Retainer ring.



- II. Install Bit Bearing, insuring part is seated against retainer ring.



- III. Install Bearing O-ring (cord stock). A screwdriver or similar device may be needed to force o-ring into the groove.



- IV. Raise casing to a vertical position. Avoid dislodging bearing from its position.



- V. Rig a strap (capacity rating >2200 lb) through the piston ID and pass a 2" (min) diameter x 11" to 15-1/2" long bar through the loop at the small end of the piston to form a toggle. Lift the piston with a hoist, position over the casing bore and lower it until it rests on the bearing. Do not drop the piston on the bearing. Lower the strap until the toggle falls free of the strap. Remove the strap.



- VI. After installing a casing plug o-ring into each of the ten casing plugs, install one plug in each hole in the backhead end of the casing. The plugs can be installed either end first. Be sure the plugs are seated properly and do not stand proud of the casing end face.



- VII. Install front and rear backhead o-rings in their respective grooves on the OD of the backhead.

VIII. Install one guide retainer in the rear groove in the backhead ID. Do not install the second ring at this time.



- IX. Install the guide o-ring in its groove on the OD of the guide.
- X. Install the check valve spring guide in the back bore of the guide. The spring guide should be facing with the cup facing the back end of the guide.
- XI. Place the check valve spring stop in the check valve ID.
- XII. Place the check valve spring in the check valve ID and slide these parts into the guide bore. Make sure the check valve is free to cycle.



XIII. Install the assembled check valve, spring, and guide into the backhead bore.



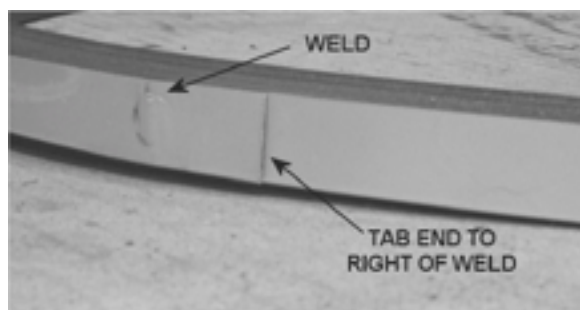
- XIV. Push the guide back into the backhead as far as it will go and install the second guide retainer in its groove in the backhead ID. Release the guide. It should extend to shoulder against the retainer.



- XV. Check to insure the check valve cycles freely and seats when released.
- XVI. Place the casing washer on the end of the casing. Place a breakout washer on the casing washer. Be sure to orient the breakout washer so the tightening action of the thread will tend to tighten the wraps of the laminated washer.



When positioned correctly, the end tab of the laminated washer will face to the right of the spot weld.



XVII. Using an adapter sub or lift-type thread protector (6-5/8 Reg) installed in the inner thread of the backhead, raise the backhead into position and thread it into the casing using a bar in one of the 1-9/16" holes to rotate the backhead. Take care to avoid damaging the guide when raising the backhead from a horizontal to a vertical position.



XVIII. Overlap the ends of the chuck bearing to reduce its diameter. Install the bearing (either end first) in the groove in the chuck ID.

XIX. With the bit standing on end, place the chuck over the bit shank and let it rest on the bit head shoulder.



XX. Install one drive pin in the each pocket formed between the bit and chuck splines. Be sure the end of the drive pin marked "TOP" is facing up.

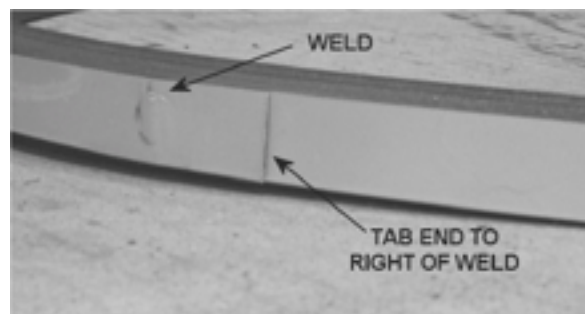


XXI. For QL300S only: Place the chuck thrust washer over the drive pin holes of the chuck.

XXII. Place a breakout washer on the chuck shoulder. Be sure to orient the breakout washer so the tightening action of the thread will tend to tighten the wraps of the laminated washer.



When positioned correctly, the end tab of the laminated washer will face to the right of the spot weld.





XXIII. Place both halves of the bit retainer around the bit and on the end of the chuck.



XXIV. Lift the drill and position it over the chuck and bit. Lower the assembly carefully and thread the chuck and casing together.

# DISASSEMBLY INSTRUCTIONS

## Loosening the threaded joints

The QL300 can be loosened conventionally by rotating the chuck and backhead counter-clockwise relative to the casing using hydraulic disassembly tools. Blind holes are provided in the casing, backhead, and chuck to provide attachment points for the break-out equipment. Extreme caution should be exercised when loosening the threads by this method since very high torsion force is required to loosen the threads.

Since it is common for these threads to become very tight and difficult to loosen, the QL300 has been designed with laminated breakout washers (patent pending). These washers consist of a coil of tightly wound steel with the ends welded to prevent undesired unwrapping. When the hammer is to be disassembled, the threads can be loosened by unwinding the coiled washer. This action relieves the contact pressure between the mating faces of the threads, allowing them to be unscrewed with minimal torque.

The washer coil can be unwound by breaking the weld using a hand grinder or hammer and chisel and using available hand tools to grip the coil and pull it out of the opening. Care must be used to avoid hand injury, as the edges of the steel

A special wrench, part number 52342409, has been designed to facilitate breakout washer removal by the following procedure:

- I. Break the weld securing the end of the breakout washer using a hand grinder or chisel. Pull a short length of the washer coil out of the groove using pliers to grip the coil.
- II. Remove one of the joint screws, open the wrench, and position it over the breakout washer so that the guide rollers contact the washer and the



wedge is under the tag end of the coil. The wedge should be facing away from the tag end of the coil.

- III. Rotate the wrench manually. The wedge will dislodge and extract the coil from the groove. Light tension may be required on the end of the coil to insure smooth removal from the groove.



- IV. When the extracted end of the coil gets too long, it should be cut near the wrench with tin snips or similar means to avoid tangling and interference with removal.



- V. One wrap of the washer may remain in place. This is of no consequence, as the load between the thread faces will be relieved. Simply cut the coil as close as possible to the hammer.
- VI. Remove the wrench. The threaded joint can be unscrewed by hand tools.

The laminated breakout washer cannot be reused once it is unwound, and must be replaced. If the threaded joint is unscrewed conventionally, the laminated washer may be reused if undamaged.

## Disassembling the hammer

Disassembly of the QL300 is best accomplished with the hammer in a vertical position. Be sure the hammer is resting on a stable, level surface, and that hoists, straps, and other handling devices are capacity rated for the weight of the drill. This disassembly procedure assumes the chuck and backhead threads are loosened per the above procedures.

- I. Using a spanner wrench or bar inserted in the casing wrenching holes, unscrew the chuck thread while slowly lifting the DHD. Once the threads are disengaged, lift the hammer off the bit/chuck assembly.



- II. Remove the bit retaining ring halves and the breakout washer (if it was not removed in loosening the thread). For the QL300S only, remove the chuck washer.
- III. Remove the chuck from the bit.
- IV. Using a spanner wrench or bar inserted in the backhead wrenching holes, unscrew the backhead thread while slowly lifting the backhead. Take care to not damage the guide when setting the backhead down.





VII. Lay the casing on its side and remove bearing o-ring.



VIII. Remove the bearing from the casing.





VII. Lay the casing on its side and remove bearing o-ring.



VIII. Remove the bearing from the casing.



IX. Remove the bearing stop ring.



X. For best results in cleaning the air passages of the casing, remove the 10 plastic casing plugs from their holes. To remove the plugs, screw a M12x1.75 bolt into the plug and pull it out of the hole.

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