

**Volume**

**1.2**

# **OPERATIONAL MANUAL**

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MODEL: 4"Z1 DRILLING RIG STAND



**by BLUEROCK® Tools**



### UNPACKING THE ITEM

**CAUTION:** This machine is packed together with items that may be sharp, oily and overly heavy objects. Remove the machine from the packaging in a safe manner. Check to ensure all accessories are included with the item while unpacking. If any parts are found to be missing, contact the retailer as soon as possible. Do not throw away the packaging until the item is out of the guarantee period. Dispose of the packaging in an environmentally responsible manner. Recycle if possible. Keep all plastic bags away from children due to risk of suffocation.



WEEE - Waste Electrical & Electronic Equipment. Note this machine should be disposed of as electrical & electronic waste.

### SLURRY DISPOSAL

**NOTE:** It is recommended to dispose of the drilling slurry (the muddy/dusty water material) in an environmentally responsible manner. The disposal of slurry directly into sewage systems, sewers, lakes, rivers, or direct earth without treatment can be environmentally harmful and possibly illegal. Ask your local public authorities about current regulations in your area.

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## Safety

**DO NOT USE THESE MACHINES UNLESS YOU HAVE READ THE OPERATING INSTRUCTIONS!**



Safety glasses must be worn at all times in work areas.



Appropriate footwear must be worn.



Safety gloves should be worn at all times and jewelry must not be worn.



Hard-hat must be worn while using machine.



Read operational manual prior to use.



Long and loose hair must be contained.



Close fitting/protective clothing must be worn.



Hearing protection should be worn when using this machine.



Dust mask must be worn while using this machine.

### PRE-OPERATIONAL SAFETY CHECKS

- Examine the power cord and plug for damage. This tool is supplied with a ground plug and must always be used with the proper grounded circuit.
- Examine the body of the machine and inspect for damage or defects.

### OPERATIONAL SAFETY CHECKS

- ONLY to be operated by qualified personal who have read instructions.
  - NOTE: Failure to read and follow instructions could result in electrical shock, fire, property damage and/or serious injury!
- DO ensure all non-essential people are clear of the immediate work area.
- DO be attentive at all times. Keep your eye on the work piece. Always be in a sensible state of mind and do not use the machine if you cannot fully concentrate.

#### 4" Z1 DRILLING RIG

➤ DO keep body parts, clothing & power cords clear of turning/cutting pieces. Stay alert and use common sense when using this tool.
➤ DO allow machine to reach operating speed before starting a hole.
➤ DO unplug machine while changing or adjusting cutting bits so as not to accidentally turn machine on.
➤ DO remove adjusting wrenches prior to turning the machine on.
➤ DO guard against electric shock by only operating this tool on a properly functioning GFCI (Ground Fault Circuit Interrupt) circuit.
➤ DO be mindful that power tools can expose an operator to vibrations transmitted through contact with the machine. Prolonged exposure can lead to medical issues which should be discussed with a medical professional.
➤ DO tie in a drip loop in the power cord to prevent water from running into the power receptacle.
➤ DO use a dust extraction system for cutting materials that create dust. The operator should also wear a protective respiratory device.
➤ DO NOT make adjustments to machine while the machine is running.
➤ DO NOT switch off the machine when it is under load, except in an emergency.
➤ DO NOT remove or modify grounding plug. Only to be used on a properly grounded GFCI circuit.
➤ DO NOT leave the machine running when not in use.
➤ DO NOT hold the work piece by hand or using body. Always mechanically clamp or secure work piece.
➤ DO NOT allow operator to make contact with grounded surfaces such as metal objects.
➤ DO NOT allow liquids to enter the machine's ventilation system.
➤ DO NOT operate machine outside of machine specifications.
➤ DO NOT touch moving parts while the machine is running as death or dismemberment could occur.
➤ DO NOT operate machine overhead (Inverted) when drilling "wet" type cores.
➤ DO NOT remove machine's electrical components while connected to a power source. Only to be removed for service by qualified personnel and put back on the machine after service is complete.
➤ DO NOT allow children or untrained personnel to operate machine.
➤ DO NOT use this machine in the rain or a wet environment.
➤ DO NOT operate in the presence of explosive materials as power tools create sparks which may ignite dust or fumes.
➤ DO NOT drill into an area that may contain a live electrical wire/circuit.

#### 4" Z1 DRILLING RIG

- **DO NOT** use this machine without safely securing to the work piece being drilled.
  - **DO NOT** use full water pressure when drilling with “wet” type bits! You need minimal water to drill with these machines. Extreme water pressure can cause water to enter the gearbox!
  - **DO NOT** operate this machine on a lower voltage as it may result in reduced power level and the machine could become unstable while cutting. This could also limit the motor life.
- **NOTE:** Use of long small gauge power extension cords can result in decreased voltage. As local voltages can vary, it may be a good idea to test the voltage at the end of the extension cord to ensure proper voltage requirements are met. You might also consult an electrician to make sure the length of cord matches up with the proper wire gauge for this size motor. Make sure to use outdoor cords when operating outdoors.

#### HEALTH WARNINGS

- Certain dust created by drilling contains chemicals known to cause cancer, birth defects or other reproductive harm. The examples of these chemicals are below:
- Lead from lead based paint.
  - Crystalline silica from bricks, cement and assorted masonry products.
- **TO REDUCE RISK OF EXPOSURE TO THESE CHEMICALS, WORK IN A WELL VENTILATED AREA WITH VACUUM SYSTEMS, RESPIRATORS AND WITH ALL SUITABLE SAFETY EQUIPMENT.**

## Specifications

<b>MECHANICAL DATA</b>	
Hand held capable	Yes
Hand Held Drill	BLUEROCK 4" Z1CD
Max Hole Diameter	4"

<b>SHIPPING DATA</b>	
Shipping Weight	35 Lbs
Shipping Carton	35" x 10" x 15"

## Included Accessories

<b>DESCRIPTION</b>	<b>QTY</b>
Instruction Manual	1
Feed Handle	1
Top Bolt for Binding in Ceilings	1
Black Frame Handle	1
Side Black Carriage Bolt	1

### Note

**UPON RECEIPT, CHECK CAREFULLY TO ENSURE THAT THE MACHINE IS IN GOOD CONDITION AND HAS ALL ACCESSORIES LISTED ABOVE.**

## Additional Available Accessories

Additional accessories for this machine can be found in BLUEROCK® Tools online shop at [www.bluerocktools.com](http://www.bluerocktools.com) or from your local retailer.

DESCRIPTION
4" Z1 Handheld Core Drill by BLUEROCK® Tools
1" Wet Coring Bit
1.25" Wet Coring Bit
1.5" Wet Coring Bit
1.75" Wet Coring Bit
2" Wet Coring Bit
2.5" Wet Coring Bit
3" Wet Coring Bit
3.5" Wet Coring Bit
4" Wet Coring Bit
1" Dry Coring Bit
1.25" Dry Coring Bit
1.5" Dry Coring Bit
1.75" Dry Coring Bit
2" Dry Coring Bit
2.5" Dry Coring Bit
2.75" Dry Coring Bit
3" Dry Coring Bit
3.5" Dry Coring Bit
4" Dry Coring Bit
1-1/4" 7 UNC to 5/8" 11 UNC Core Bit Adapter
10" Extension Rod
12" Extension Rod
18" Extension Rod



## Operations

### Note

**THOROUGHLY READ THROUGH THE ENTIRE MANUAL BEFORE OPERATING THIS MACHINE!**

#### PURPOSE

- The purpose of the 4"Z1 Drilling Rig is to connect a handheld drill (sold separately) for the purpose of cutting through masonry, concrete or other mineral rock types using annular coring bits. Only a proper drill must be connected to this drilling rig that is specifically made to fit this rig.
- These drill rigs are designed to be bolted to the drilling surface using their base.
  - NOTE: Make sure the base fits completely on the surface and the base is securely fastened using wedge anchors to bolt to the surface.
- These drilling rigs machines can be used vertically, horizontally or overhead (inverted) provided an acceptable work environment. NOTE: For safety, when drilling horizontally or overhead a safety chain/strap should always be used.
  - CAUTION: If drilling overhead you are only permitted to use dry type core bits with a vacuum system. "Wet" type holes overhead would allow water into the motor and create an extremely dangerous situation.

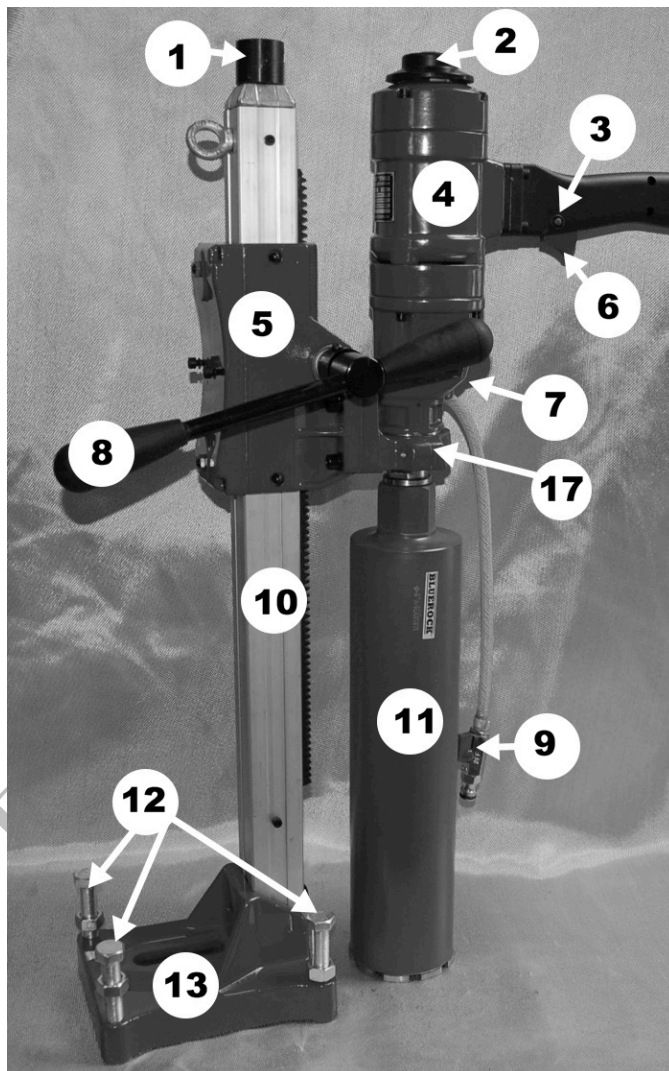
#### OPERATIONAL PRINCIPLES WHEN USING A SEPARATE HAND HELD CORE DRILL

- The main drilling shaft rotates in a forward clockwise direction. The main drilling motor connects to the tool spindle to make contact with a surface and slowly bore a hole. Using the feed handles on the side of the drilling rig, the user can raise or lower the drilling motor.
- These drills are ONLY to be used with diamond impregnated coring bits.
  - When drilling with "wet" type bits, the bit ends pulverizes the material and the water brings the material out of the cut.
  - When drilling with "dry" type bits, the bit end pulverizes the material and dust brings the material out of the cut.

# MACHINE COMPONENTS

- The main components of the 4"Z1W/S are the spindle, gearbox, motor and drilling rig (carriage, stand and base). The spindle is driven by the transfer case and the motor.
  - These components must not be removed except by a qualified technician. Power must be disconnected prior to any service.
- This machine has one primary adjusting point for the travel between the drill carriage and the drill stand. The main way to increase or decrease the users ability to move the drill by hand is with this system. These are the black hex bolts on the side and back of the machine that have a locking nut around them. These are generally used to tighten up the travel as the slides wear over time. Be mindful to evenly adjust these so that the travel is even and smooth. The ideal travel generally keeps the drill in place when the user is not using the drill (this is usually on the tighter side) although individual users needs may vary. The side black carriage bolt can also be used for temporarily locking the carriage in place.

## 4"Z1 MACHINE MOUNTED IN DRILLING RIG



- |                                     |
|-------------------------------------|
| 1) Top Bolt for Binding in Ceilings |
| 2) Motor End Cap Level              |
| 3) Motor "On" Hold Button           |
| 4) Drill Motor                      |
| 5) Drill Carriage                   |
| 6) Motor On/Off Switch              |
| 7) Gearbox                          |
| 8) Feed Handle                      |
| 9) Water Valve                      |
| 10) Drill Stand                     |
| 11) Coring Bit (not included)       |
| 12) Stand Leveling Bolts            |
| 13) Stand Base                      |
| 14) Gear Shifter                    |
| 15) Gear 1                          |
| 16) Gear 2                          |
| 17) C Clamp Assembly                |

### TRANSPORTING THE MACHINE

- When transporting the drilling rig, always use two hands.
- DO NOT transport the rig with bits in the spindle.
- If transporting inside a vehicle, it is recommended to transport it on its side so as to avoid the item falling over.
- If transporting with the 4"Z1 attached, DO NOT carry the machine by the cord.
  - DO NOT allow the cord or plug to drag along the floor when transporting.

### RUNNING THE OPTIONAL 4"Z1 MACHINE USING THE DRILLING RIG

- Do all pre-operational and operational safety checks from Chapter 1.
- Consider your security and stability as well as the orientation of the machine in the work area.
  - Consider the work surface material, condition, strength, density and rigidity. These factors directly affect the tools efficiency.
- Ensure the drill is secure in the drilling assembly by inspecting the C clamp assembly and checking the tension on the C clamp bolts.
  - Ensure the machines axis are parallel with the drill stand.
- Secure the machine base to the work surface by using a wedge anchor or other method to ensure the base does not move.
- Use the four leveling bolts on the corners of the base to level the machine.
- After placing the machine in work area, connect a safety chain or strap if necessary.
  - The safety chain should attach to the machine (preferably through the carrying handle or O bolt) as well as attached to the work area in such a manner that prevents the machine from detaching or falling from the work area.
- Ensure the feed handles are securely attached to the feed spindle.
- Ensure the work surface is free of debris, oil, etc.
- Select the gear you will be using.
  - Do not force the gear shifter when changing between gears. There is a neutral position between gear 1 and gear 2.
  - Change gears when the machine is stopped or almost stopped.
- Select and set up fluid delivery method or dust system.
- If using the machine horizontally with the water system, connect hose to the side of the machine using the connector.
  - This connector takes standard 3/4" US garden hose hookup.

<ul style="list-style-type: none"> <li>○ Make sure the water valve is in the off position.</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ This is generally at a 90 degree angle from the valve hose.</li> </ul>
<ul style="list-style-type: none"> <li>○ Partially turn the water spigot on (usually half a turn).</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ CAUTION: DO NOT turn the hose on fully! You need sufficient water when using wet type bits. Using too much water pressure can cause the bits to not cut properly as well as water entering the gearbox.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Select appropriate size cutting bit and install. See section below for details on securing bit.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Check that the machine is firmly attached to the work area.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Plug the machine into power source.</li> </ul>	
	<ul style="list-style-type: none"> <li>○ Form a loose knot in the power cord close to the plug connection to prevent fluid from running down the cord and into the power receptacle.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Turn feed handle raising the cutter until the bit is above the work surface.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Open the water valve to allow water to come out to the work surface.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ ATTENTION: BE AWARE THESE MACHINES ARE EXTREMELY POWERFUL. THEY HAVE A TREMENDOUS AMOUNT OF TORQUE WHICH MIGHT NOT BE SUITABLE FOR ALL POTENTIAL USERS. ESPECIALLY IN LOW GEAR AND WITH LARGER BITS. DESPITE THE SAFETY CLUTCH, THESE DRILLS CAN STILL INJURE THE USER. IF IN DOUBT, CONTACT A PROFESSIONAL FOR ADVICE.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Turn the machine on by engaging the motor into the "on" position.</li> </ul>	
	<ul style="list-style-type: none"> <li>○ If wanting the machine to continue in the "on" position, engage the hold button on the side of the handle above the finger "on" switch. To disengage the motor when in the hold function, quickly depress the finger "on" switch to turn the motor off. You may want to cycle through this sequence a couple times before using the machine for the first time to familiarize the user with this process.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Very slowly engage the cutting bit with the material surface by lightly engaging the hand crank down towards the material.</li> </ul>	
<ul style="list-style-type: none"> <li>○ NOTE: During the initial stages of contact the bit may wander.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ After about 1/8" of cutting has been achieved in the work surface, slightly more force can be applied. This will be the normal amount of force the rest of the hole.</li> </ul>	
	<ul style="list-style-type: none"> <li>○ NOTE: Do not force the hole. Let the machine do most of the work. Excessive physical effort should be avoided as it can cause damage to the machine or the user.</li> </ul>
<ul style="list-style-type: none"> <li>○ If the unit jams in a hole, stop the drill immediately by quickly depressing the "on" switch to prevent injury. Disconnect the drill from the power supply and loosen the cutter by turning drill spindle counterclockwise. Never attempt to free bit by starting motor!</li> </ul>	

<ul style="list-style-type: none"> <li>▪ After an interruption in drilling, make sure the drill bit is free and turns before restarting the hole. Be very careful at this point to make certain the drill does not bind when restarting.</li> </ul>
<ul style="list-style-type: none"> <li>○ CAUTION: It can take a 1-2 seconds for the safety clutch to engage otherwise excessive wear and heat will develop.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Make sure to keep the cutting material lubricated.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Ease up on feed pressure as the cutter starts breaking through the backside of the material.</li> </ul>
<ul style="list-style-type: none"> <li>○ Be certain all is clear on the output side of this core to prevent injury to persons or property.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Finish drilling the hole.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Turn the motor off and disconnect power once the drill is safely back up in the non-drilling position.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Turn water valve off.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Unbolt the wedge anchor.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Disconnect safety chain/strap and move the drill to a new drilling location.</li> </ul>

**INSTALLING CORING BITS WHEN USING THE 4"Z1 CORE DRILL WITH THIS DRILLING RIG**

<ul style="list-style-type: none"> <li>➤ WARNING: Core bits can be sharp and should only be handled with gloves so as not to cut the user during installation or removal.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Check that the bits are not damaged.</li> </ul>
<ul style="list-style-type: none"> <li>○ Coring bits that are damaged should not be used.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Make certain the machine is unplugged from power.</li> </ul>
<ul style="list-style-type: none"> <li>➤ If using the drilling rig, raise the drill motor to ensure ample room to install the bit.</li> </ul>
<ul style="list-style-type: none"> <li>○ Apply grease to the spindle thread to prevent corrosion and allow easier core bit removal.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Insert the coring bit and screw it onto the drill spindle.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Tighten the bit until fully tightened.</li> </ul>
<ul style="list-style-type: none"> <li>○ Use wrenches that fit the spindle and coring bit to fully tighten.</li> </ul>

## Troubleshooting When Using the 4"Z1 With Drilling Rig

### Note

**SERVICING SHOULD ONLY BE DONE BY A QUALIFIED TECHNICIAN.**

**DON'T FORGET TO UNPLUG POWER TO UNIT PRIOR TO SERVICE!**

PROBLEM	SOLUTION
Motor does not turn on.	<ol style="list-style-type: none"> <li>1) Check external power source (extension cord, breaker, etc).</li> <li>2) Loose internal wire. Check and secure if necessary.</li> <li>3) Motor brushes defective. Replace if necessary.</li> <li>4) Check to ensure the motor on/off switch is operable. Replace if necessary.</li> </ol>
Excessive sparking when motor is running.	<ol style="list-style-type: none"> <li>1) This may indicate the presence of debris in the motor or worn out carbon brushes. Check the brushes for unusual wear and replace if necessary. Clean out the internal motor armature if necessary.</li> <li>2) Armature has a rough edge. Inspect and replace if necessary.</li> </ol>
Hole is not cutting.	<ol style="list-style-type: none"> <li>1) Cutting bit is dull. Replace bit.</li> <li>2) Work area material is not appropriate for bit type.</li> </ol>
Bit is jammed while coring.	<ol style="list-style-type: none"> <li>1) Debris is lodged between core hole and bit. Rotate bit in both directions to and inspect bit for debris.</li> <li>2) Make sure stand is secured to work surface.</li> </ol>
Coring speed has reduced.	<ol style="list-style-type: none"> <li>1) Bit has hit rebar. Adjust feed control to prevent motor overload while cutting through rebar.</li> <li>2) Diamonds on bit have glazed over. Deglaze bit or dress diamond rim on bit and check water flow rate.</li> <li>3) Diamonds on bit have worn away. Replace core bit.</li> <li>4) New core bit. Core at slow rate with new bits for 2-3 coring cycles.</li> <li>5) The safety clutch is slipping. Tighten clutch.</li> <li>6) Drilling progress is prevented by an accumulation of dust. Use suitable vacuum cleaner.</li> <li>7) Water flow rate is too low. Increase water flow.</li> <li>8) Core is stuck in the core bit. Remove core.</li> </ol>
Core bit appears to wobble.	<ol style="list-style-type: none"> <li>1) Spindle is damaged. Replace spindle and check bearings.</li> <li>2) Bit is bent or damaged. Replace bit.</li> <li>3) The core bit is not screwed securely onto the spindle.</li> <li>4) Coring material is attaching to the bit. Inspect bit and increase water flow rate.</li> </ol>
Water escapes at the water swivel or gear housing.	<ol style="list-style-type: none"> <li>1) The water pressure is too high. Turn down water flow.</li> <li>2) The shaft seal is defective. Replace seal</li> <li>3) The water hose is damaged. Replace hose.</li> </ol>

## General Maintenance for Drilling Rig and Optional 4"Z1 Core Drill

- |   |
|---|
| ➤ Inspect electrical cords and electrical connections.  |
| ➤ Keep machine clean and free of debris. Do not forget to grease the drill spindle.                     |
| ➤ Check for misalignment, binding and breakage of all moving parts. If damaged, repair tool before use. |
| ➤ Keep cutting tools sharp and clean. Sharp bits are less likely to bind and are easier to control.     |

## Occasional Maintenance

- |   |
|---|
| ➤ Have the power tool serviced by a qualified service technician using identical replacement parts. |
|---|

○ Change motor brushes:
-------------------------

1) Disconnect drill from power.
---------------------------------

2) Open rear motor cover.
---------------------------

3) Take out old brushes.
--------------------------

○ If you need to, use the screw driver to nudge them out.
---

4) Replace with exact same size new brushes.
--

○ Adjusting Carriage:
-----------------------

1) Periodically check and adjust slides as necessary.
---

2) Use hex wrench to loosen the lock nuts and hex screws.
---

3) Adjust the screws evenly while moving the handle up and down so that there's no free play yet not binding anywhere through its range of travel.
--

4) Retighten the lock nuts.
-----------------------------

○ Change Gear Oil:
--------------------

1) Change if necessary using NLGL-2 grade grease. This service is generally done around the 50 hour service mark.

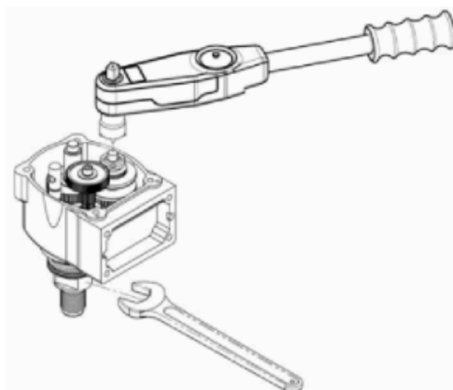
○ Adjust Safety Clutch:

1) Adjust clutch as necessary.

- NOTE: A torque wrench is necessary for this service.
- Make certain the spindle is facing the ground so as not to get oil/grease everywhere. Locate the hex screws holding the gear housing together and remove them.
- Gently pull the gear housing apart. You may use a couple flat screwdrivers to gently apply pressure to separate the housings.
- Take the main clutch nut off of the clutch. Apply some Loctite type of thread glue on the clutch threads.
- Reapply the nut to the thread.
- Hold the spindle in place using the box wrench. See diagram below.
- Use the torque wrench to tighten the clutch nut.
- Torque the tensioning nut to 13 NM (115 inch/lbs, 9.5 ft/lbs).

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- With the clutch nut tightened, reassemble the housings. Make sure the orientation of the internal gears is correct and the housings mate correctly.
- Reattach the bolts that hold the housing together.

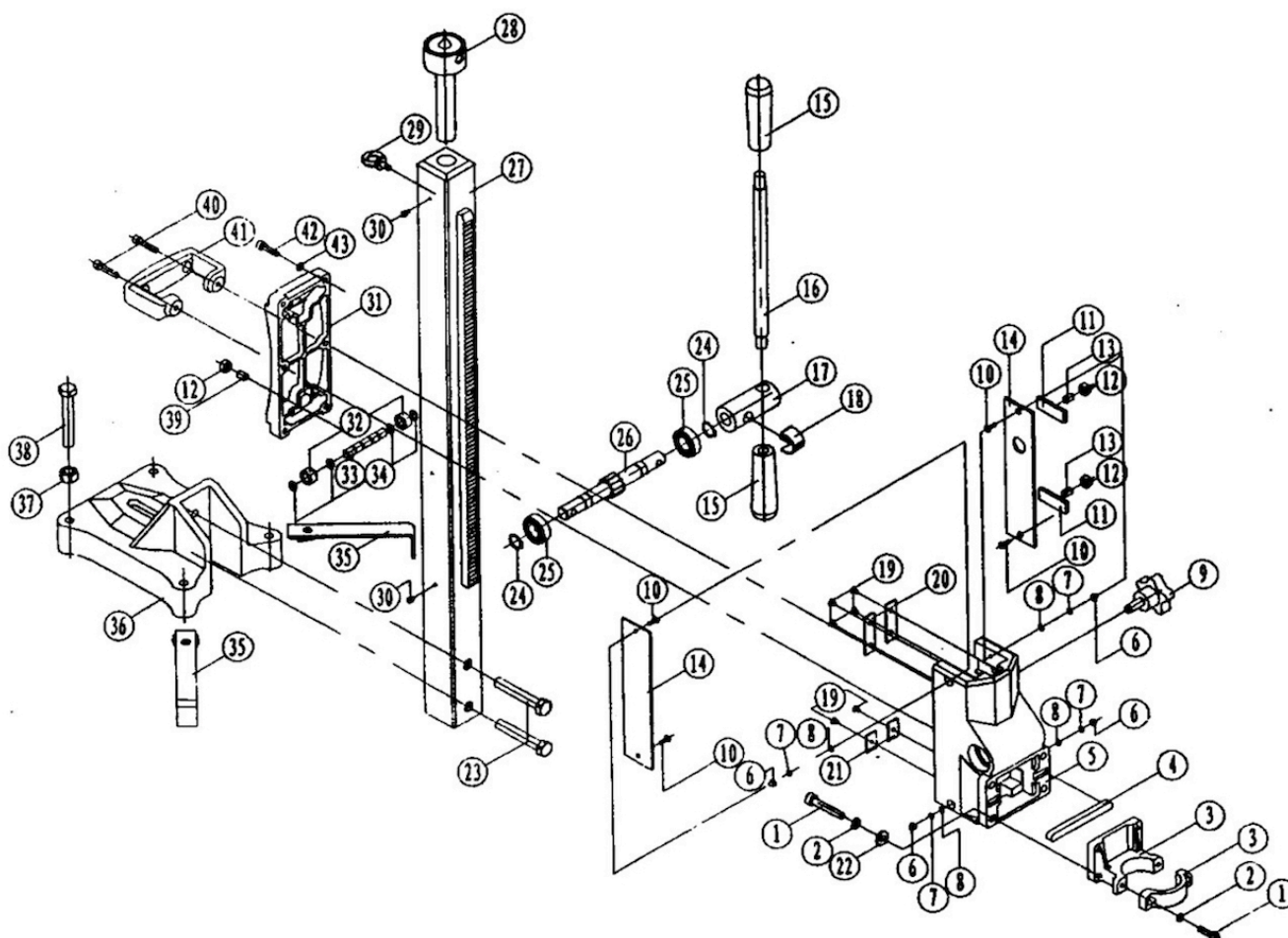




## Parts List – 4"Z1 Drilling Rig

4"Z1 Drilling Rig					
#	Spec	Name	#	Spec	Name
1	M8×30	Inner hexagonal round head bolt	27		Stand pole groupware
2	φ8	Spring ring	28	Z3Z-CF-180-27	Rod
3	02-80/036	Rear handle base	29	M8×10	Flying rings bolt
4	10×8×100	Flat Key	30	M5×8	Lock bolt catch
5	CF-180-07	Lift	31	CF-180-07/1	Lift body cover
6	M14	Acorn nut	32	CF-180-34	Rotate wheel
7	φ4	Spring washer	33	CF-180-33	Shaft pin
8	φ4	Flat washer	34	φ10	Cir clips for shaft
9	CF-180-39	Stop knob	35		Cable press board assembly
10	M4×16	Crossed countersunk head bolt	36	CF-180-32	Base
11	CF-180-07/2	Screw	37	M16	Hexagonal nut
12	M8	Thin hexagonal nut	38	M16×75	Hexagonal bolt
13	M8×16	Inner hexagonal round head bolt	39	M8×20	Screw
14	CF-180-07/6	Orbit strip	40	M6×30	Inner hexagonal round head bolt
15	CF-255/3-14	Ellipse handle cover	41	CF-180-07/3	Handle of lift body
16	CF-180-28	Operating stick for machine	42	M6×20	Inner hexagonal round head bolt
17	CF-180-29	Sleeve operating stick	43	φ10	Spring washer
18		Sleeve fasten assembly			
19	M4×6	Crossed countersunk head bolt			
20	CF-180-07/4	Orbit strip			
21	CF-180-07/5	Orbit strip			
22	φ8	Flat washer			
23	M12×65	Inner hexagonal head bolt			
24	φ17×1	Cir clips for shaft			
25	6003Z	Deep groove ball bearing			
26	Z3Z-CF-180-16	Operating gear wheel axle			

## Breakdown View – Drilling Rig Close-up



## Parts List - Optional 4"Z1 Coring Drill

4"Z1 Core Drill (Optional)											
#	Spec	Name	#	Spec	Name	#	Spec	Name	#	Spec	Name
1	02-80/00 1	Output shaft	28	φ17	Unmark uncork shielding for shaft	55	φ4	Flat washer	82	02-80/0 68	Handle bracket cover board
2	φ4	Stell ball	29	HK121 0	Quill bearing	56	02-80/2 01	Stator assembly	83	ST2. 9×1 6	Crossed slot tapping bolt
3	02-80/05 0	Small spring 3.6×14.5×12	30	M16×3 5	Butterfly nut	57	02-80/0 22	Stator insulating cover	84	M5× 35	Inner hexagonal roud head bolt
4	A5×32	Flat key	31	02-80/045	Assistant handle	58	02-80/0 23	Insulating shim	85	06-80/0 20	Left handle
5	φ47× 1.5	Spring shield ring for holes 47	32	M14×4 5	Hexagonal bolt	59	02-80/0 33	Name plate	86	02-80/0 67	Inductance

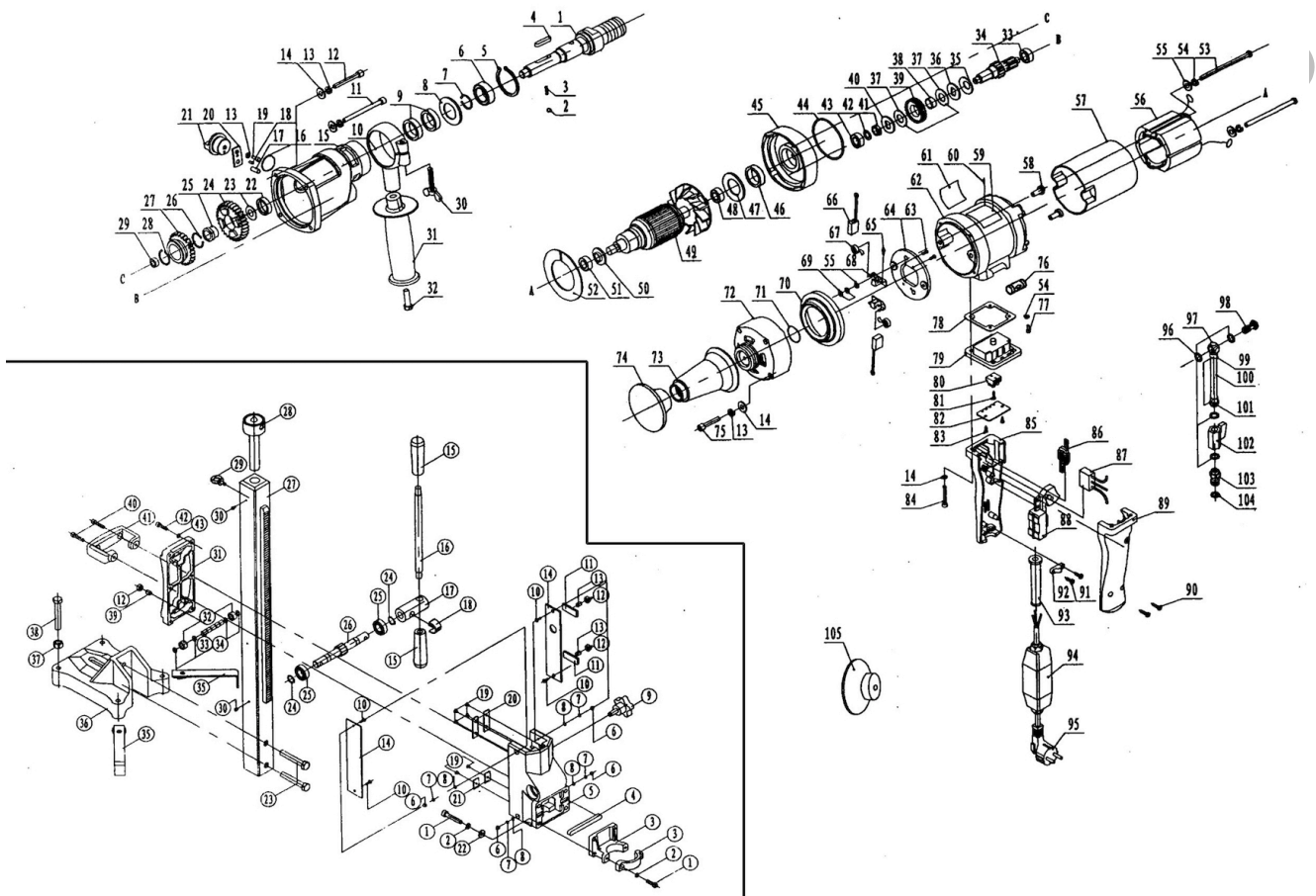
# 4" Z1 DRILLING RIG

6	KS-NS K6005 2Z	Deep groove of ball bearing	33	KS- NSK62 9	Deep groove ball bearing	60	2x4	Scutcheon rivet	87		Capacitance0.33uF+ 3300PF
7	φ25× 1.2	Shield ring for shaft	34	02- 80/004	3#gear shaft	61	02- 80/0 34	Scutcheon	88		Switch
8	02- 80/04 1	Shim cover	35	02- 80/009	Butterfly spring	62	02- 80/0 15	Shell of drill	89	06- 80/0 19	Right handle
9	FB25× 40×7	Bracket rubber sealing ring	36	02- 80/049	Preforming	63	3×6	Mushroom head rivets	90	ST4. 2×1 9	Crossed slot tapping bolt
10	02- 80/04 4	Assistant handle cover	37	02- 80/008	Friction plate	64	02- 80/0 25	Brush-holder base plate	91	ST4. 2×1 6	Crossed slot tapping bolt
11	M5×7 5	Inner hexagonal round head bolt	38	02- 80/007	Copper cover	65	M3× 6	Crossed slot bolt	92	02- 80/0 29	Cable press board
12	M5×5 5	Inner hexagonal round head bolt	39	02- 80/003	2#gear	66	02- 80/0 47	Brush assembly	93	02- 80/0 31	Jacket
13	φ5	Spring washer	40	02- 80/010	Press ring	67	02- 80/0 28	Coil spring	94		PRCD (optional)
14	φ5	Flat washer	41	M12×1 .25	Hexagonal nut	68		Brush frame assembly	95		Cable & Plug
15	02- 80/00 2	Reducer casing	42	02- 80/040	Spacer	69	M14	Hexagonal nut	96	02- 80/0 60	Washer for water faucet
16	φ3×2 0	O-shape sealing ring	43	HK101 0	Quill bearing	70	02- 80/0 24	Rear cover jacket	97	02- 80/0 62	Connector of water faucet
17	φ5×1 6	Round pin	44	φ78×2	O-shape sealing ring	71	φ30 ×2.5 ×35	O-shape sealing ring	98	02- 80/0 61	Tightening screw
18	φ3×1 2	Column pin	45	02- 80/014	Middle cover	72	02- 80/0 16	Rear cover	99	02- 80/0 65	Tightening ring
19	M5×1 2	Inner hexagonal round head bolt	46	02- 80/037	Sealing oil ring	73	02- 80/0 17	Rear handle base	100		Inner φ8×350 mesh tube
20	02- 80/01 2	Adjustable speed block	47	02/80/ 053	Oil sealing base shim	74	02- 80/0 18	Rear handle	101	02- 80/0 63	Connector of water faucet
21	02- 80/01 3	Adjustable speed knob	48	NSK62 01	Deep groove ball bearing	75	M15 ×40	Inner hexagonal round head bolt	102	02- 80/0 43	Mini ball valve
22	FB20× 35×7	Bracket rubber sealing ring	49	02- 80/101	Armature assembly	76	02- 80/0 51	Level pole	103	02- 80/0 64	Connector of water switch
23	02- 80/05 8	Oil sealing (φ24×φ18×0 .8)	50	02- 80/052	Armature insulating rear cover	77	M4× 6	Crossed slot bolt	104	11.2 ×2.6 5×1 6.5	O-shape sealing ring
24	02- 80/00 6	6#gear	51	NSK62 00	Deep groove ball bearing	78	02- 80/0 39	Handle lining	105	02- 80/0 38	Rear cover
25	02- 80/00 6-1	Copper cover	52	02- 80/035	Shield board	79	02- 80/0 21R	Handle bracket			
26	φ18×	Shield ring	53	M14×1	Cross slot bolt	80		Post bead			

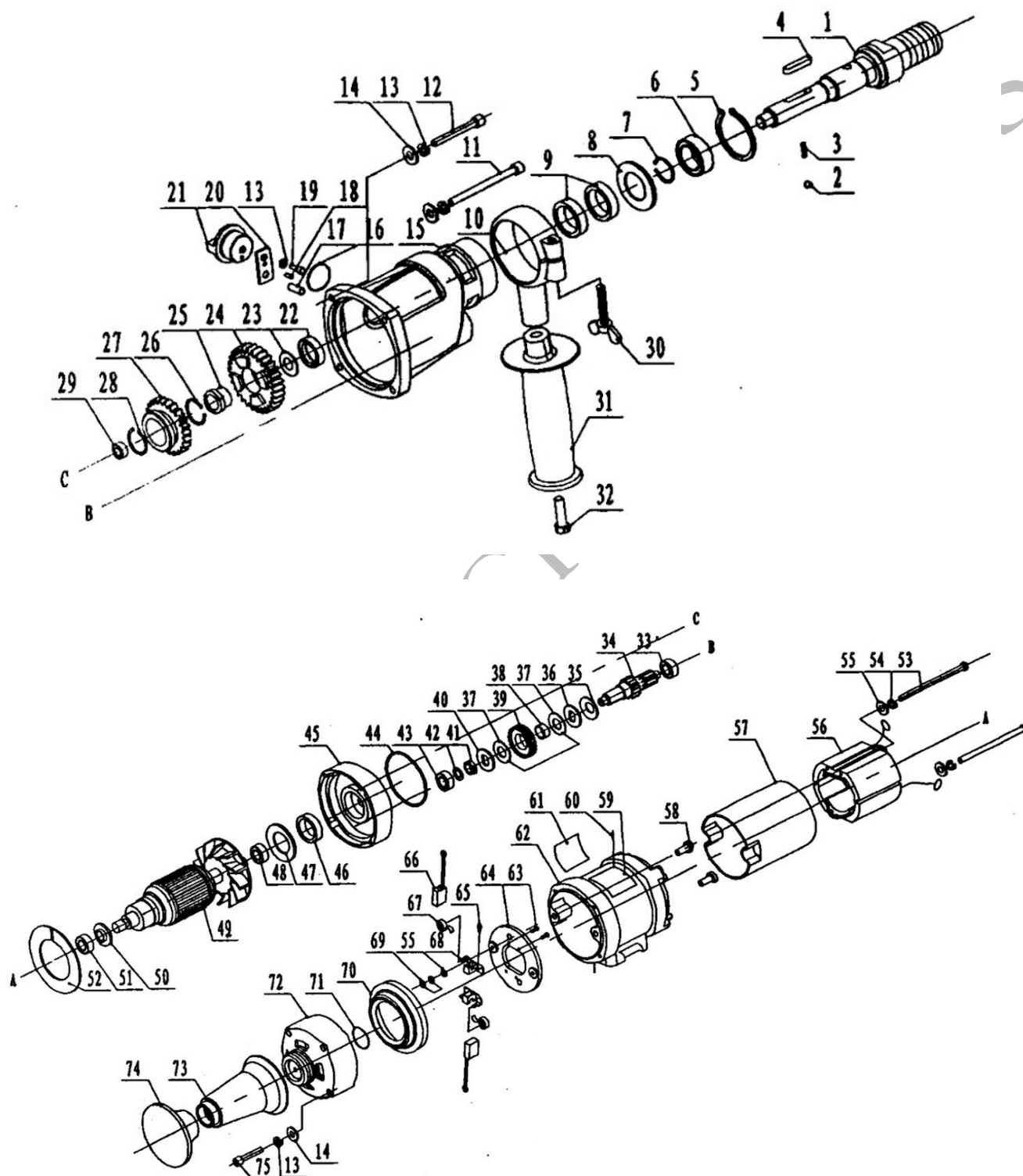
# 4" Z1 DRILLING RIG

	1	for shaft		05			DG8H-0			
27	02-80/005	4# gear	54	φ4	Spring washer	81	ST2. 9×9.5	Crossed slot Apping bolt		

## Breakdown View – Optional 4"Z1 Core Drill



## Breakdown View – Optional 4" Z1 Gearbox/Motor Close-up



4" Z1 DRILLING RIG

