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HYDRAULIC CORE DRILL



**Safety, Operation
and Maintenance Manual**

SAFETY PRECAUTIONS

Tool operators and maintenance personnel must always comply with the safety precautions given in this manual and on the stickers and tags attached to the tool.

These safety precautions are given for your safety. Review them carefully before operating the tool and before performing maintenance or repairs.

Before you proceed to operate the tool, make sure that all warning labels are attached to the device.

GENERAL SAFETY PRECAUTIONS

The Hydraulic Core Drill will provide safe and dependable service if operated in accordance with the instructions given in this manual. Read and understand the safety precautions given in this manual and any stickers and tags attached to the tool before operation. Failure to do so can result in personal injury or equipment damage.

- Operators must start in a work area without bystanders.
- Establish a training program for all operators to ensure safe operation.
- The operator must be familiar with all prohibited work areas such as excessive slopes and dangerous terrain conditions.
- Do not operate the tool if it is damaged, improperly adjusted or not completely and correctly assembled.
- Always wear safety equipment such as goggles, ear and eye protection, and safety shoes when operating the tool.
- Do not overreach. Maintain proper footing and balance at all times.
- Do not inspect or clean the tool while the hydraulic power source is connected. Accidental engagement of the tool can cause serious injury.
- Always connect hoses to the tool hose couplers before energizing the hydraulic power source. Be sure all hose connections are tight.
- Do not operate the tool unless thoroughly trained or under supervision of an instructor.
- When working near electrical conductors, always assume that all conductors are energized and that insulation, clothing and hoses can conduct electricity. Use hose labeled and certified as non-conductive.
- Do not operate tool at fluid temperatures above 140° F / 60°C. Operation at higher temperatures can cause higher than normal temperatures at the tool, which can result in operator discomfort.
- Never wear loose clothing that can get entangled in the working parts of the tool.
- To avoid personal injury or equipment damage, all tool repair, maintenance and service must only be performed by authorized and properly trained personnel.

HYDRAULIC SYSTEM REQUIREMENTS

The hydraulic system should provide a flow of 5.8-13.2 gpm / 22-50 lpm at an operating pressure of 950-2000 psi / 66-140 bar. Recommended relief valve setting is 2100-2250 psi / 145-155 bar.

The system should not have more than 250 psi / 17 bar back pressure measured at the tool end of the operating hoses. The system conditions for measurement are at maximum fluid viscosity or 400 ssu / 82 centistokes (minimum operating temperatures).

The hydraulic system should have sufficient heat rejection capacity to limit the maximum oil temperature to 140° F / 60° C at the maximum expected ambient temperature. The recommended minimum cooling capacity is 5 hp / 3.73 kW at a 40° F / 4° C difference between ambient temperature and oil temperature.

The hydraulic system should have a minimum of 25 micron full-flow filtration. It is recommended that filter elements be sized for a flow of at least 30 gpm / 114 lpm for cold temperature startup and maximum dirt holding capacity.

The hydraulic fluid used should have a viscosity between 100 and 400 ssu / 20 and 82 centistokes at the maximum and minimum expected operating temperatures. Petroleum base hydraulic fluids with anti-wear and non-conductive properties and a viscosity index over 140 meet the recommended requirements over a wide range of operating temperatures.

The recommended hose size is .500 inch / 12 mm I.D. to 50 ft / 15 m long and .625 inch / 16 mm I.D. minimum up to 100 ft / 30 m long.

The drill return hose must connect directly to the circuit return line and go straight through the oil filter, thermal valve, and oil cooler to the reservoir. To prevent trapped or reversed pressure, fluid should not be returned through a blocking or reversing valve.

The Core Drill cannot be operated with the hydraulic flow reversed. Supply (IN) and return (OUT) hoses must be connected as marked on the sides of the tool ports.

IMPORTANT!

Do not run the tool return hose through stack or directional valves. If the circuit is operated from a stack valve, tap only the pressure port to the valve. Connect the tool return directly to the return fluid line

Your Hydraulic Core Drill is an open-center tool. Operate open-center tools from open-center hydraulic circuits only. Operate closed-center tools from closed-center hydraulic circuits only.

EQUIPMENT PROTECTION AND CARE**IMPORTANT!**

In addition to the Safety Precautions on pages 2 and 3 of this manual, observe the following for equipment protection and care.

Always store the tool in a clean, dry space, safe from damage or pilferage.

Always keep critical tool markings, such as labels and stickers, legible.

Always replace hoses, couplings and other parts with replacement parts recommended by SPITZNAS. Supply hoses must have a minimum working pressure rating of 2500 psi / 175 bar.

Always use hoses that have an oil resistant inner surface and an abrasive resistant outer surface. Whenever near electrical conductors, use clean hose labeled and certified non-conductive hose.

Tool repair should be performed by experienced personnel only.

Make sure all couplers are wiped clean before connection.

The hydraulic power supply valve must be in the "OFF" position when coupling or uncoupling hydraulic tools. Failure to do so can result in damage to the quick couplers and cause overheating of the hydraulic system.

Do not exceed 13.2 gpm / 50 lpm flow rate. Rapid failure of the tool's internal seals might result.

Make sure the circuit PRESSURE hose (with male quick disconnect) is connected to the "IN" port below the right-hand side of the tool. The circuit RETURN hose (with female quick disconnect) is connected to the "OUT" port below the tool center.

Do not reverse the fluid flow from that marked on the tool ports. Flows, when reversed, will not be limited by the priority flow control valve

Always use the open-center (OC) tool on open-center circuits.

OPERATION

GENERAL

The tool comes with a set of accessories which may be customized by each purchaser, so as to facilitate performance of all works occurring within the scope of his specific application. Tools included are for mounting and dismounting.

- single-head wrench	SW 24
- single-head wrench	SW 32
- single-head wrench	SW 41
- hex wrench	SW 5

DRILL BIT INSTALLATION

WARNING!

Before you start changing the drill bit, make sure that the tool is disconnected from power source in order to avoid unintentional operation of the tool and injury. Disconnect only unpressurized hoses.

Use a single-head wrench SW 24 (small drill bit) or SW 41 (large drill bits) and a single-head wrench SW 32 to manually unscrew the drill bit to be removed and to screw on the new one. There is no need to use any additional tools.

DIMENSION OF DRILL BIT

Drill head thread: male 1 ¼" UNC and female R ½"

Which drill bit at which speed?

	gear #1	gear #2	gear #3
speed [1/min]	380	900	1800
drill bit diameter [mm]	100 - 162	40 - 100	20 - 40
cutting speed [m/s]	2 - 5,9	2 - 4,5	2 - 4

CHECK POWER SOURCE

1. Using a calibrated flowmeter and pressure gauge, check that the hydraulic power source develops a flow of 5.8-13.2 gpm / 22-50 lpm at 950-2000 psi / 66-140 bar.
2. Make certain that the hydraulic power source is equipped with a relief valve set to open at 2100-2250 psi / 145-155 bar.
3. Check that the hydraulic circuit matches the tool for open-center (OC) operation.

CHECK THE TOOL

1. Make certain all tool accessories are correctly installed. Failure to install tool accessories properly can result in damage to the tool or personal injury.
2. There should be no signs of leaks.
3. The tool should be clean and dry with all fittings and fasteners tight.

CONNECT HOSES

1. Wipe all hose couplers with a clean lint-free cloth before making connections.
2. Connect the hoses from the hydraulic power source to the tool fittings or quick disconnects. Connect the return hose first and disconnect it last to eliminate or reduce trapped pressure for easier quick-connect fitting attachment.

Note: If uncoupled hoses are left in the sun, pressure increase within the hoses can make them difficult to connect. When ever possible, connect the free ends of hoses together.

3. Observe the flow indicators stamped on the hose couplers to ensure that the flow is in the proper direction. The female coupler on the tool's "IN" port is the inlet coupler. See illustration on page 1.
4. Squeeze the drill trigger momentarily. If the drill does not operate, the hoses might be reversed. Verify correct connection of the hoses before continuing.

STAND-AIDED DRILLING

First, fix the stand at the point where you wish to drill the opening or hole. To do so, drill a hole matching the size of the corresponding plug and screw the stand onto the surface. Align the stand such that the drill bit will make contact with the surface precisely at the point where you want to drill the opening or hole.

1. Fasten the core drill with bolts M8 to the drill stand.
2. Now, manually screw the corresponding drill bit from below onto the drill bit adapter. Manual tightening is sufficient because the drill bit will automatically fasten further during drilling operation.
3. If necessary to attain an angled drill hole, adjust the stand position by swiveling the arm of the stand.
4. Connect the tool to water supply. For this purpose the device comes with a 10 liter pump barrel, which has to be pressurized first. You may alternatively connect the device to a water tap, using the "Gardena" hose couplings. Maximum water pressure is 60 psi / 4 bar.
5. Finally connect the tool to the power source.
6. Move the hydraulic circuit control valve to the "ON" position.
7. To operate the drill, regulate check valve to adjust the water supply flow as desired.
8. With the so prepared drill, you may now proceed to carry out your work.

IMPORTANT!

Monitor continuously the water supply to ensure that sufficient water is supplied to the cut surface to avoid unnecessary wear of drilling equipment.

9. You may continuously control the advance motion of the drill by adjusting the star knob at the side of the drilling stand.
10. To switch off the machine, unlock the lever.
11. To change drill bits, proceed as described above. Adhere to safety instructions!

12. For dismantling the drill upon completion of drilling work, follow the mounting instructions in reverse order.

IMPORTANT!

When drilling into a structure that might contain electrical wiring, be sure to know the location of the wiring and avoid drilling into it. The housing can carry electrical current from live electrical wires into which the drill is accidentally drilled resulting in injury or death.

COLD WEATHER OPERATION

If the drill is to be used during cold weather, preheat the hydraulic fluid at low engine speed. When using the normally recommended fluids, fluid temperature should be at or above 50 °F/10 °C (400 SSU/ 82 centistokes) before use. Damage to the hydraulic system or drill can result from use with fluid that is too viscous or too thick.

SPECIFICATIONS

Capacity	4,2 hp / 3,1 kW
Free speed 1st gear	380 rpm
2nd gear	900 rpm
3rd gear	1800 rpm
Pressure	2000 psi / 140 bar
Flow Range	5.8-13.2 gpm / 22-50 lpm
Hose diameter	.500 in / 12 mm
Drill bit connection	1 1/4" UNC male / R 1/2" female
Water connection	Gardena system
Water pressure	max. 60 psi / 4 bar
Length	19.3 in / 490 mm
Weight	19,8 lbs. / 9,0 kg
Porting	SAE PORT NO.8
Noise Level	LPA80dBA at operator's position
Vibration Level	Less than 2,5m/sec²

ACCESSORIES

Anchor stand	41238
Motor mount	41239
7/8" Core bit W/crown	41241
1" Core bit W/crown	41242
1-1/4" Core bit W/crown	41243
2" Core bit segmented	41244
3" Core bit segmented	41245
4" Core bit segmented	41246
6" core bit segmented	41247
Carrying case	41778
Pipe clamp	41781
Water tank	45109
Vacuum pump accessory	44957
Vacuum pump instruction	44958

SERVICE PARTS

Filter element	44969
Gasket	44970
Muffler element	44971
Stand gasket	44972
Seal kit	45110
Seal kit instruction	45111

SERVICE INSTRUCTIONS

Good maintenance practice keeps the core drill on the job and increases its service life.

The most important maintenance practice is to keep the hydraulic fluid clean at all times. Contaminated fluid causes rapid wear and/or failure of internal parts.

Follow the procedure contained in the "HYDRAULIC SYSTEM REQUIREMENTS" section of this manual to ensure peak performance from the tool.

Do not disassemble the tool until you know whether the problem is in the hydraulic power supply, the gearbox module, or the power and control (rear) module. Then only disassemble the tool as necessary to repair as required. **KEEP CONTAMINANTS SUCH AS DIRT AND GRIT AWAY FROM INTERNAL PARTS AT ALL TIMES**

Always determine and correct the cause of the problem prior to reassemble. Further wear and tool failure can result if the original cause is not corrected.

TOOL MODULE ASSEMBLIES

The Core Drill consists of three modules, 1st a gearbox module with three-speed gearbox, slip-clutch, water supply, 2nd a motor module and 3rd a valve module.

Isolate the service problem to the circuit or one of the modules before separating the referring modules. The TROUBLESHOOTING section contains information to help isolate the problem.

PRIOR TO DISASSEMBLY

Clean the exterior of the tool.

Make sure to have all new seals so they can be replaced during reassembly. Note the orientation of seals before removal. Install new seals in the same position as the original seals.

Note: For orientation of the parts identified in the following procedures, refer to the sectional drawing and parts list located at the end of this manual.

Disassembly

Disassemble into main components valve, motor and gearbox. Remove complete valve housing after loosening screws item 302. Remove screws item 429 and separate gearbox from motor. Continue to disassemble.

1. Valve

Valve item 301 exchange complete when defect.

2. Motor

First remove snap ring item 120 and pull out countershaft assembly, then remove the second snap ring item 120. Take out motor parts items 108-114. Then push off snap ring item 105. Now you can push out the motor shaft item 102 with thrust washer item 106 and thrust bearing item 107. Press out shaft seal item 104 and remove spur gear item 103.

3. Gearbox

Unscrew complete water connection items 211-217. After removing snap ring item 433 draw off gearshift lever item 431. Take off snap rings item 427 and pull out spur gear item 406, notched wheel item 405, feather key item 426, ball item 418 and compression spring item 419. After removing snap rings item 425 and 421 the output shaft item 402 with bearing item 420 can be pressed out of housing item 401. Take out washer item 422 and press out radial shaft seals items 435 and 436 after removing snap ring item 424. To disassemble countershaft assembly items 403-433 unscrew hexagonal nut item 410. After that remove shims item 414, belleville springs item 409, washers item 408 and 411 and spur gear item 407. After removing snap ring item 413 press off roller bearing item 412.

Reassembly

Before starting reassembly check all parts for wear and replace them if necessary. Wear parts are in particular O-rings, radial shaft seals, bearings and the slip clutch washers.

1. Valve

Mount the valve with item 302 to item 116.

2. Motor

Reassembly is done essentially in reverse order. Grease all seals before assembly. Observe the position of Geroler rotor item 112 and the square head of spool drive item 109 as shown at the drawing to get the right direction of rotation.

3. Gearbox

After installing new radial shaft seals into housing item 401, washer item 422 and output shaft item 402 (pre-assembled with bearing) have to be pushed-in and made complete. If countershaft assembly items 403-433 was disassembled, use shims item 414 to get a slip torque of $45 \pm 1,5 \text{ Nm}$ = $33 \pm 1 \text{ lbf.ft.}$ = $396 \pm 12 \text{ lbf.in.}$ After tightening hexagonal nut item 410 fix the countershaft assembly in a vice at the spur gear item 407 and check the slip torque with a torque wrench by turning at the hexagonal nut item 410. If the torque is not $45 \pm 1,5 \text{ Nm}$ add ore remove shims item 414.

CAUTION!

Never use the tool with the slip clutch torque set higher than 45 Nm!

At installing the gearshift lever item 431 take care that positioning is correct. After inserting the countershaft assembly in the motor housing item 104 pour in approx. 0.2 liter grease lubricating oil and bolt the gearbox housing and motor housing. Subsequently the assembly of the main components can be done.

Use only ORIGINAL SPITZNAS SPARE PARTS for repairs.

**Use sodium saponified semi-fluid grease GP 000 M - 30, DIN 51502, approx. 100 g,
Use lithium base or synthetic grease NLG1./ or 2**

TROUBLESHOOTING

If symptoms of poor performance develop, the following chart can be used as a guide to correct the problem.

When diagnosing faults in operation of the core drill, always check that the hydraulic power source is supplying the correct hydraulic flow and a pressure to the tool as listed in the table. Use a flowmeter known to be accurate. Check the flow with the hydraulic fluid temperature at least 80°F/270°C.

PROBLEM	CAUSE	REMEDY
Drill will not start.	Power not being supplied.	Check to make certain that both hoses are connected. Turn hydraulic circuit control valve "ON".
	Defective quick disconnect.	Check each disconnect separately. Replace as necessary.
	Jammed motor and or parts.	Separate modules and inspect. See SERVICE INSTRUCTIONS. Do not force parts together
	Flow reversed through hoses.	Correct the power source control valve position. Prevent reverse flow by using only one port from the valve for pressure, the return tool hose to the cooler and the filter line. Correct the quick-disconnect male/female routing per instructions and the arrows on the fittings.
Low drilling torque.	Incorrect hydraulic flow.	Check that the hydraulic power source is producing 5.8-13-2 gpm / 22-50 lpm at 950-2000 psi/66-140 bar.
	Defective quick disconnect.	Check each quick disconnect separately.
	Hydraulic circuit relief set too low, hoses too restrictive or the hydraulic fluid is too thick.	Set relief valve at 2100 psi / 145 bar.
	Fluid restriction in hose or valve. Excess back pressure.	Locate and remove restriction.
		Use correct fluid.
		Fluid not warmed-up. Preheat system.
	Hoses too long for hose I.D. Use shorter hose.	
Priority flow control valve is	Do not separate modules. See SERVICE	

	malfunctioning.	INSTRUCTIONS.
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PROBLEM	CAUSE	REMEDY
Low drilling torque.	Flow reversed through hoses.	Correct the power source control valve position. Prevent reverse flow by using only one port from the valve for pressure, the return tool hose to the cooler and the filter line. Correct the quick-disconnect male/female routing per instruction and the arrows on the fittings.
	To low slip clutch torque	Inspect and replace slip clutch washers if necessary. Set torque to 20±1,5 Nm. See SERVICE INSTRUCTIONS. Do not overload drill to avoid wear of slip clutch.
Drill runs too fast.	Incorrect hydraulic flow.	Check that hydraulic power source is not producing over 13.2 / 50 lpm at 950-2000 psi / 66-140 bar.
	Hydraulic flow reversed.	Correct the tool hoses, "IN" and "OUT" per instructions and if the power supply valve is reversible, reconnect the tool return hose to the oil cooler or to the filter directly.
	Priority valve faulty.	Do not separate modules. Remove, inspect and replace priority valve if necessary. See SERVICE INSTRUCTIONS.
Fluid leak at air gap between motor and valve housing.	Motor capscrews loose.	Separate modules. Tighten to recommended torque.
	Motor O-Rings worn.	Separate modules. Replace as required.
	Motor cap/main housing damaged.	Separate modules. Replace as required.
Fluid leaks at flow control valve	Damaged O-rings.	Do not separate modules. Replace them as required.
	Wrong hydraulic fluid. Circuit too hot.	See OPERATING INSTRUCTIONS for correct fluid/circuit specifications.
	Hydraulic pressure and return hoses reversed.	Correct hose connections.

PROBLEM	CAUSE	REMEDY
Fluid gets hot. Power unit working hard.	Open center tool on a closed center circuit or vice versa.	Use tools to match circuit.
	Circuit relief set too low.	Adjust relief valve to 2100-2250 psi / 145-155 bar.
	Too much fluid going through tool.	Adjust flow for 13.2 gpm / 50 lpm maximum.
	Circuit is generating high heat with flow controls.	Use pump size and rpm for producing needed flow only. Eliminate circuit heating causes.
	Circuit has contaminants that have caused wear and high heat generation.	Replace worn pump and valves. Install a large clean filter and keep the fluid clean.
Gearshift knob turn to hard.	Oil leak at motor shaft seal into gearbox causes high pressure in gearbox.	Repair or replace. See SERVICE INSTRUCTIONS.
No gearshift function.	Shifter pin worn or broken.	Repair or replace. See SERVICE INSTRUCTIONS.
Water leaking out of shaft seal or side hole.	Output shaft seals worn.	Repair or replace. See SERVICE INSTRUCTIONS.
	Water pressure too high. Seals damaged	Maximum water pressure 60 psi / 4 bar