

# PNJ INTERNATIONAL

MANUFACTURER OF DOWN HOLE HAMMERS AND BITS

## Technical Manual



Address(Office) : 272, Wolpyeong-ro, Nam-gu, Ulsan-city, #44699, Korea  
Factory : 32, Cheoyongsaneop 3-Gil, Onsan-eup, Ulju-gun, Ulsan-city, Korea  
Tel : 82-10-4789-7099 / 82-10-4628-6750  
Fax : 82-52-970-6750 Email : [sales@pnjmach.com](mailto:sales@pnjmach.com)  
Website : [www.pnjmach.com](http://www.pnjmach.com)

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## 1. INTRODUCTION

The P series hammer is a pneumatically operated tool designed to utilize various diameter bits in rock formations under a wide range of operating conditions.

The P series hammer design incorporates a hardened wearsleeve.

The simple design the P series hammer provides performance and dependability without sacrificing tool life.

The P series hammer is designed to operate efficiently at air pressure between 100psi(7bar) and 350psi(24bar)

## 2. HAMMER SPECIFICATIONS

### 2-1. SPECIFICATIONS

#### P SERIES HAMMERS SPECIFICATION

===== STANDARD TYPE =====

MODEL SPECIFICATION	P30	P40	P50	P60	P80	P100	P112	P320	P370	P410	P530	P640	P800
(BACKHEAD) CONNECTION	API 2-3/8" REG PIN	API 2-3/8" REG PIN	API 3-1/2" REG PIN	API 3-1/2" REG PIN	API 4-1/2" REG PIN	API 6-5/8" REG PIN	API 6-5/8" REG PIN	API 7-5/8" REG	API 8-5/8" REG PIN	API 8-5/8" REG PIN	API 8-5/8" REG PIN	API 8-5/8" REG PIN	API 8-5/8" REG PIN
CHUCK CONNECTION CONFIGURATION	DHD3.5	DHD340 SD4	DHD350 SD5	DHD360 SD6	DHD380 SD8	N100 SD10	DHD112 SD12	OWN MODEL	SD18 OWN MODEL	N180 OWN MODEL	N240 OWN MODEL	OWN MODEL	OWN MODEL
AVAILABLE BIT SIZE / mm	85-127	105-130	125-152	149-225	191-311	251-311	301-445	380-480	445-630	457-650	675-800	775-975	975-1175
LENGTH / mm (WITHOUT BIT)	IR893	IR1040 MS1088	IR1162 MS1162	IR1368 MS1383	IR1420 MS1390	IR1545 MS1527	IR 1890 MS1895	1961	2155	2053	2489	2399	2516
OUTSIDE DIAMETER / mm	78	97	117	138	180	226	272	320	370	410	530	640	800
CYLINDER BORE / mm	58	75	91	108	148	170	216	266	260	310	410	445	508
PISTON STROKE / mm	100	100	100	100	100	100	100	110	125	150	150	150	127
NET WEIGHT / Kg (WITHOUT BIT)	28	40	65	108	185	335	620	920	1180	1510	2764	3839	6435
GROSS WEIGHT / Kg (W/WOODEN BOX)	35	46	69	115	200	355	640	945	1205	1540	2794	3869	6465

- ☉ In line with our policy of continuous product development, the information and specifications in this catalogue are subject to change without notice.

## 2-2. BIT SPECIFICATION

HAMMER SIZE	BIT SIZE	BIT WEIGHT(Lbs)/(kg)	FACE DESIGN
P30 HAMMER (DHD3.5/SD3)	90MM	8.8Lbs / 4kg	Flat,Concave,Convex
	100MM	9.3Lbs / 4.2kg	Flat,Concave,Convex
P40 HAMMER (DHD340/SD4)	4"	18Lbs / 8.2kg	Flat,Concave,Convex
	4-1/2"	22Lbs / 10kg	Flat,Concave,Convex
	5"	22.9Lbs / 10.4kg	Flat,Concave,Convex
P50 HAMMER (DHD350/SD5)	5"	32Lbs / 14.5kg	Flat,Concave,Convex
	5-1/2"	35.3Lbs / 16kg	Flat,Concave,Convex
P60 HAMMER (DHD360/SD6)	6"	57.27Lbs / 26kg	Flat,Concave,Convex
	6-1/2"	65.78Lbs / 29.9kg	Flat,Concave,Convex
	8"	80Lbs / 36.3kg	Flat,Concave,Convex
	10"	125Lbs / 57kg	Flat,Concave
P80 HAMMER (DHD380/SD8)	7-7/8"	91Lbs / 41.3kg	Flat,Concave
	8"	92.84Lbs / 42.2kg	Flat,Concave
	10"	154.66Lbs / 70.3kg	Flat,Concave
	12"	207.46Lbs / 94.3kg	Flat,Concave
P100 HAMMER (N100/SD10)	10"	237.6Lbs / 108kg	Flat,Concave
	12"	275Lbs / 125kg	Flat,Concave
P112 HAMMER (SD12/DHD112)	12"	384Lbs / 174kg	Flat,Concave
	15"	478Lbs / 217kg	Flat,Concave
	17-1/2"	517Lbs / 259kg	Flat,Concave
P320 HAMMER (OWN MODEL)	15"	451Lbs / 205kg	Flat,Concave
	17-1/2"	781Lbs / 355kg	Flat,Concave
P370 HAMMER (SD18/OWN MODEL)	17"	640Lbs / 290kg	Flat,Concave
	19"	773Lbs / 350kg	Flat,Concave
	21"	909Lbs / 412kg	Flat,Concave
P410 HAMMER (N180/OWN MODEL)	22"	1,345Lbs / 610kg	Flat,Concave
	23"	1,411Lbs / 640kg	Flat,Concave
	25"	1,543Lbs / 700kg	Flat,Concave
P530 HAMMER (N240/OWN MODEL)	25"	2,425Lbs / 1,100kg	Flat,Concave
	27"	2,601Lbs / 1,180kg	Flat,Concave
	30"	2,976Lbs / 1,350kg	Flat,Concave
P640 HAMMER (OWN MODEL)	27"	3,902Lbs / 1,770kg	Flat,Concave
	30"	4,696Lbs / 2,130kg	Flat,Concave
	32"	5,159Lbs / 2,340kg	Flat,Concave
P800 HAMMER (OWN MODEL)	34"	5,093Lbs / 2,310kg	Flat,Concave
	36"	5,401Lbs / 2,450kg	Flat,Concave
	40"	5,732Lbs / 2,600kg	Flat,Concave

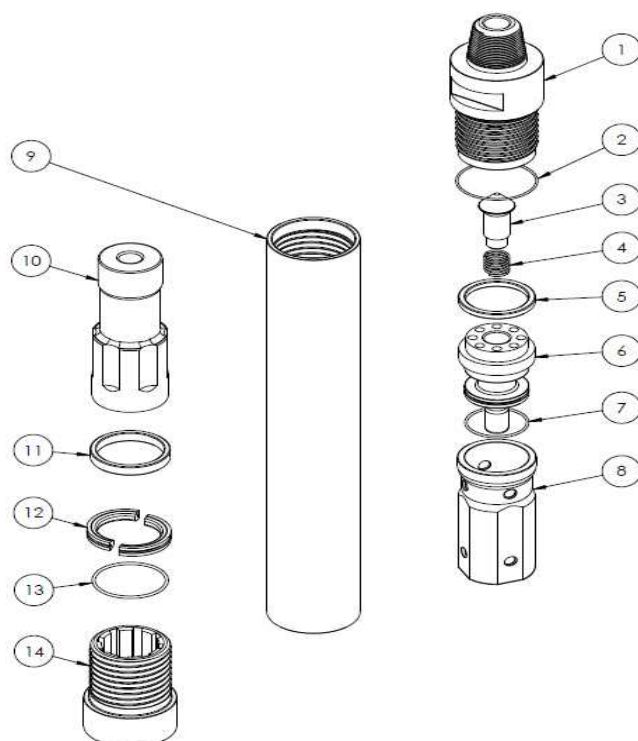
## 2-3. AIR CONSUMPTION

### AIR CONSUMPTION, AT SEA LEVEL CFM & (M<sup>3</sup>/min)

MODEL SPECIFICATION		P30	P40	P50	P60	P80	P100	P112	P320	P370	P410	P530	P640	P800
A I R C O N S U M P T I O N	100PSI (6.8BAR)	170 (4.8)	190 (5.4)	200 (5.7)	270 (7.6)	400 (11.3)	500 (14.1)	600 (16.9)	800 (22.7)	950 (26.9)	1220 (34.5)	1450 (40.6)	1850 (52.4)	2300 (65.1)
	150PSI (10.3BAR)	245 (6.9)	265 (7.5)	285 (8.1)	385 (10.8)	585 (16.5)	750 (21.2)	880 (24.8)	1100 (31.1)	1350 (38.2)	1430 (40.5)	2150 (60.9)	2800 (79.3)	3500 (99.1)
	200PSI (13.8BAR)	350 (9.8)	365.5 (10.3)	400 (11.3)	545 (15.3)	840 (23.7)	1050 (29.7)	1100 (31.1)	1700 (48.1)	1930 (54.7)	2120 (60.0)	2900 (82.1)	3700 (104.8)	5300 (150.1)
	250PSI (17.2BAR)	485 (13.7)	485 (13.7)	520 (14.7)	715 (20.2)	890 (25.2)	1200 (34.0)	1450 (41.1)	2040 (57.8)	2720 (77.0)	3000 (84.95)	3930 (111.3)	4600 (130.3)	7250 (205.3)
	300PSI (20.7BAR)	582 (16.5)	600 (16.9)	645 (18.3)	865 (24.5)	1085 (30.7)	1600 (45.3)	1880 (53.2)	2448 (69.3)	3000 (84.95)	4070 (114)	4830 (135.2)	5500 (154.0)	9200 (257.6)
	350PSI (24.1BAR)	669 (19)	700 (19.8)	770 (21.7)	924 (26.2)	1520 (43.0)	1800 (51.0)	2068 (58.6)	2693 (76.3)	4070 (114)	4760 (133)	5780 (161.8)	6400 (179.2)	11000 (308.0)

### 3. HAMMER COMPONENTS & PART LIST

#### 3-1. P SERIES STANDARD TYPE HAMMER

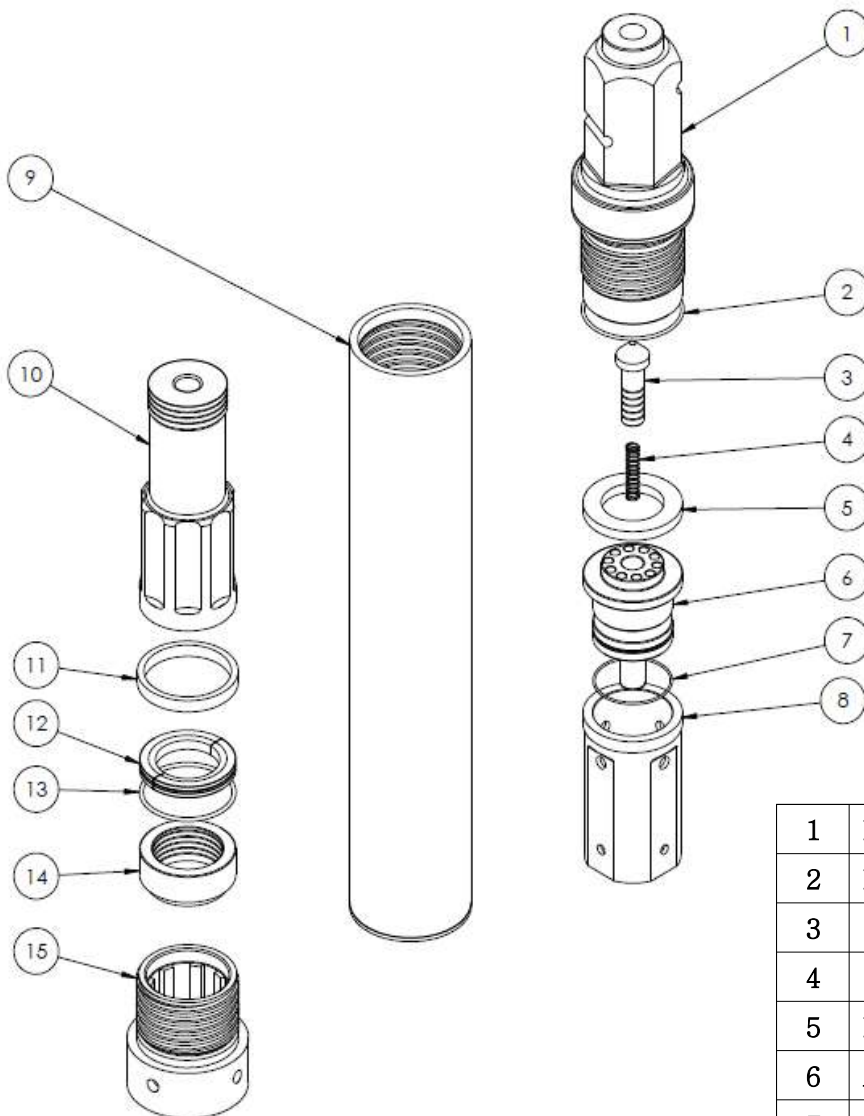


1	BACKHEAD
2	BACKHEAD O-RING
3	CHECK VALVE
4	CHECK VALVE SPRING
5	BUFFER RING
6	AIR DISTRIBUTOR
7	AIR DISTRIBUTOR O-RING
8	CYLINDER
9	WEARSLEEVE
10	PISTON
11	PISTON STOP RING
12	BIT RETAINING RING
13	BIT RETAINING RING O-RING
14	CHUCK

\* There is a washer between part No.9 and No.1 and No.14 from the P100 Hammer model.

\* Only the P60 DHD360 Hammer model has a spacer and a stop ring between part No.11 and 12.

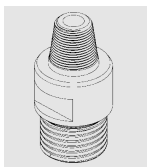
### 3-3. P SERIES HAMMER BIG HOLE SIZE



1	BACKHEAD
2	BACKHEAD O-RING
3	CHECK VALVE
4	CHECK VALVE SPRING
5	BUFFER RING
6	AIR DISTRIBUTOR
7	AIR DISTRIBUTOR O-RING
8	CYLINDER
9	WEARSLEEVE
10	PISTON
11	PISTON STOP RING
12	BIT RETAINING RING
13	BIT RETAINING RING O-RING
14	GUIDE BUSH
15	CHUCK

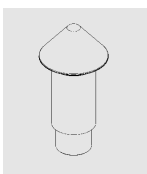
## 3-4. HAMMER COMPONENT DESCRIPTION

### 1. BACKHEAD



The backhead connects the hammer to the drill rod. It is threaded into the top end of the wearsleeve with a large cross section thread form and into the drill rod with a standard REG. API thread. Other threads are available upon request.

### 2. CHECK VALVE



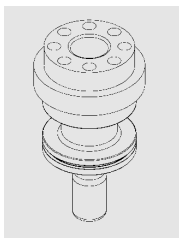
The check valve maintains pressure in the hammer when the air supply has been shut off. The pressure in the hammer balances the hydro-static pressure in the hole thereby preventing contaminants from entering the hammer.

### 3. CHECK VALVE SPRING



The check valve spring provides tension under the check valve to keep it closed. It is compressed as the air is turned on.

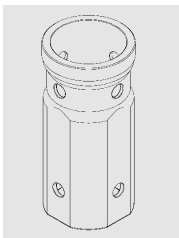
### 4. AIR DISTRIBUTOR



The air distributor locating on the top of cylinder and guides the check valve and the check valve spring.

The air distributor plays a role for hammering and flushing with distributing air from the check valve into the cylinder & piston.

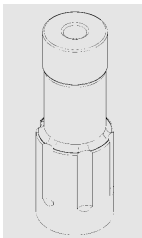
### 5. CYLINDER



The cylinder is cylinder shaped inside wearsleeve, structures air flow for cycling of piston, with complex holes at upper & lower part.

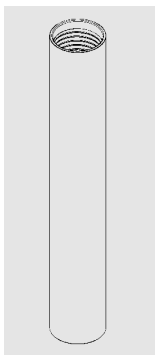


## 6. PISTON



The piston functions as the only moving part in the hammer, controlling the operational air cycle. The percussive action of the piston striking the bit transfers the energy through the bit in order to fracture rock formation.

## 7. WEARSLEEVE



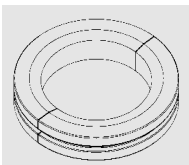
The wearsleeve is designed to contain the internal parts which make up the hammer assembly. The wearsleeve is hardened to extend life in abrasive conditions.

## 8. PISTON STOP RING



The piston stop ring is a hardened steel ring installed in the chuck end of the wearsleeve. The piston stop ring prevents the piston from falling out when the chuck, the bit retaining rings and the bit are removed.

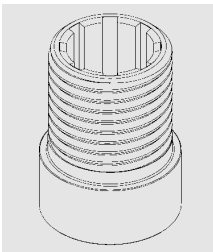
## 9. BIT RETAINING RING



The bit retaining ring are designed to allow the bit to move between the drilling and cleaning positions and prevent the bit from coming completely out of the hammer.

The bit retaining ring consists of two matched halves and are held together with an "O" ring.

## 10. CHUCK



The chuck threads into the bottom of the wearsleeve with a large cross section thread form. It has internal splines that mesh with the splines on the bit body to transmit rotation.

## 3-5. ASSEMBLY

### NOTICE

- Assembly should be performed in a clean environment.
- All parts should be cleaned thoroughly and wiped dry before assembly.
- Oil all parts by hand using Rock Drill Oil to insure easy assembly.
- Coat all thread connections with a thread compound to allow joints to screw freely.

1. Stand the wearsleeve on the floor, chuck end upwards.
2. Insert the piston stop ring into the bore of wearsleeve. piston stop ring is positioned in the correct grooves for the particular chuck conversion.
3. Coat the piston with rock drill oil and slide it into the backhead end of the wearsleeve.  
(ensure the piston striking face enters first.)
4. assemble air distributor and cylinder then push the assembly into the backhead end of the wearsleeve.
5. Slide the buffer ring on to the air distributor
6. Insert the spring into the check valve, and then slide the assembly into the air distributor upper bore.  
push the whole assembly down onto the buffer ring.
7. Fit a "o" ring to the backhead and coat the threads in copper based thread grease.  
Screw the backhead into the wearsleeve until it is hand tight
8. Place the bit retaining ring "o" ring around the bit retaining ring and place in the chuck end of wearsleeve.
9. Thread the chuck into the wearsleeve and hand tighten.

### WARNING

- Mind your fingers!
- Keep your clothing, hair etc.
- Carelessness can result in serious injury.

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## 4. MAINTENANCE

### 4-1. DISASSEMBLY

- If at all possible, the backhead and chuck should be broken loose on the drill rig; this is much easier than trying to do so after the drill has been removed from the drill rig.
- Maintenance should be performed in a clean environment.
- Tools needed: overhead crane, hammer stand, chain vise, brass rod, snap ring pliers, press, a drift pin and a small screwdriver.
- Clean the outside of the hammer. This will insure a good surface to clamp on.
- Using an overhead crane, place the hammer horizontally on a hammer stand and secure the hammer with a chain vise. Place the chain vise on the area of the wearsleeve where the piston stop ring is housed when working on the chuck end of the hammer. When working on the backhead end of the hammer, place the chain vise on the area of the wearsleeve where the check valve housing is housed.
- Unscrew and remove the backhead from the wearsleeve. Remove the backhead "o"ring from the backhead.
- Remove the check valve, the check valve spring from the backhead end of the wearsleeve.
- Remove the buffer ring from the top of the air distributor.
- Unscrew and remove the chuck, bit and the bit retaining rings from the wearsleeve.
- Remove the bit retaining rings "o"ring from the bit retaining rings.
- Using a brass rod, slide the piston against the air distributor and push the cylinder out the backhead end of the wearsleeve.
- Slide the piston out the backhead end of the wearsleeve.
- Removal of the spacer and piston stop ring is not necessary for routine maintenance. If necessary, use a press, apply pressure to the brass rod and force the piston stop ring press plate and the piston stop ring out of the chuck end of the wearsleeve.

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## 4-2. INSPECTION

- All parts should be washed in a cleaning solvent before they are inspected and reassembled.
- Handle all part carefully, hardened parts may chip if dropped on a hard surface.

### BACKHEAD

- Inspect the threads for cracks and burrs.
- Remove all burrs on the thread area with a fine file.
- Replace if necessary.

### CHECK VALVE

- The check valve should be smooth and free from abrasions.
- Replace if necessary.
- Replace the check valve spring if it is worn or broken.

### AIR DISTRIBUTOR

- Inspect the outside diameter for nick, burrs and scoring.
- Inspect all make up surfaces for indentations or nicks caused by wear.
- Remove all minor irregularities with emery cloth.
- Replace if necessary.

### PISTON

- Inspect the striking face, inside and outside diameters for nicks, scoring and cracks.
- Polish the piston with emery cloth to remove all minor irregularities, cracked pistons should be replaced.
- Wash the piston thoroughly, inside and out, to remove all emery dust.

### WEAR SLEEVE

- Inspect the outside diameter for excessive wear or cracks. Inspect the internal case bore for scoring.
- Remove all minor irregularities with fine honing stones.

### CHUCK

- Inspect for cracks and burrs.
- For continued use, the outside diameter should be larger than the outside of the ware sleeve or the same.
- Replace if necessary.

### "O" RINGS

- Inspect for damage such as cracks and deformations.
- Replace if necessary.

### 4-3. LUBRICATION

Inadequate supply of the correct type of oil is a major contributor to excessive component wear and consequently, a rapid fall off in performance.

An air line lubrication should be installed, preferably on the drill rig. This should be of sufficient capacity to supply the required volume of oil for a full shift.

The lubrication must be adjustable and set to ensure the correct flow of oil required by the hammer.

The amount of lubricating oil will vary the operating pressure and volume of air used by the hammer.

As a general guide, any P SERIES hammer will require 1/3 rd of a pint per hour 100 CFM through the hammer (0.07 ltr per 1.0 M<sup>3</sup>/min) per hour.

When drilling with foam or water, the amount of lubricating oil should be increased by 50%.

When new drilltubes are put into use, it is recommended that 1/2 a pint of oil (0.25 ltrs) be poured into each new tube to give them a good coating of oil and to prevent the hammer from running dry at any time.

Ambient temperatures will determine the grade of Rock Drill oil to be used. Should the ambient temperature be between 225-325°F, use a 30 grade oil. When the ambient temperature is over 325°F, use a 50 grade oil.

A selection of recommended Rock Drill oils suitable for P SERIES hammers is given below.

DISCHARGE AIR TEMPERATURE °F  MAKER	BELOW 225° F	225-325° F	OVER 325° F
	GRADE 10	GRADE 30	GRADE 50
MOBIL	ALMO #1	ALMO #3	ALMO #5
GULF		ROCK DRILL 63	
SHELL	TONNA R OIL 27	41	72
TEXACO	1541 EPM	1542 EPM	1543 EPM

## 4-4. STORAGE

When storing a P SERIES Hammer it is important to take the necessary steps in order to insure a smooth operation after restarting. When the hole is completed and the hammer is to be inactive for several weeks or longer the following steps should be followed. Each drill rod should be blown clear of all water. During this process, turn on the in line lubricator and blow until the rock drill oil can be seen from the bottom end of each drill rod. In addition, each rod (pin and box end) should be wiped clean and capped to prevent foreign contaminants from sticking to the connector end.

### ■ SHORT TERM STORAGE

When the P SERIES hammers will be stored for only a short period of time the following steps should be taken:

- Blow the hammer clear of all water.
- Pour 1 quart (1 liter) of rock drill oil into the backhead.
- Turn the air on and cycle for 10 seconds. This will lubricate the internal parts.
- Cap the backhead and chuck end.
- Store the hammer horizontally in a dry environment.

### ■ LONG TERM STORAGE

When the P SERIES hammers will be stored for a long period of time the following steps should be taken:

- Blow the hammer clear of all water.
- It at all possible, the backhead and chuck should be broken loose on the drill rig, this is much easier than trying to do so in the shop.
- Disassemble the hammer.
- Inspect and wipe all the parts clean.
- Lubricate all the internal parts with rock drill oil.
- Cap the backhead and chuck ends.
- Store the hammer horizontally in the dry environment.

### ■ RESTARTING

Before restarting the hammer after prolonged of inactivity, disassemble and inspect all internal hammer parts.

If any internal hammer parts have oxidized, use an emery cloth to polish each part.

Wash each hammer part, wipe dry, relubricate with rock drill oil and reassemble the hammer.

## ⚠ CAUTION

- Failure to check internal parts before restarting the hammer May cause serious damage to the hammer.

## 5. SERVICE

### 5-1. TROUBLE SHOOTING

This trouble-shooting guide has been prepared to aid the operator to locate the probable cause and then remedy when trouble has occurred. If trouble has been caused, obtain details as following check points and contact your local service shop or distributor.

#### ☛ Check point

Fault	Cause	Remedy
Inoperative Drill	Drill bit blow holes blocked	Unlock holes
	Dirt inside drill	Strip and clean drill
	Worn or damaged parts	Replace damaged parts
	Insufficient lubrication	Check oil level Adjust lube needle valve
	Excessive lubrication	Adjust lube needle valve
	Hanging piston	Piston struck Emery out the score Marks
	Insufficient air pressure	Check compressor discharge and increase to operational valve
Slow penetration	Insufficient air pressure	Increase discharge pressure
	Dull drilling bit	Regrind or change bit
	Worn drill parts	Replace worn parts
	Too much or too little lubrication	Check oil level and if necessary adjust lube needle valve
	Dirt in drill	Strip and clean
Low return air velocity	Low air pressure	Increase air pressure
	Insufficient hole	Install large orifice
	Drill bit exhaust holes blocked	Clean out blockage
Spasmodic operation	Failed or damaged parts	Overhaul drill
	Lack of oil	Check lubricator
	Drill bit broken	Replace bit
	Dirt in drill	Strip and clean

### 5-2. LIMITED WARRANTY

PNJ International warrants that all P Series hammers and bits are free from defects in materials and workmanship under normal use for a period of three (3) months from the date of delivery. This warranty does not cover misuse, improper installation, or operation beyond rated specifications. PNJ disclaims all other warranties, including merchantability or fitness for a particular purpose. If a defect is confirmed within the warranty period, PNJ may, at its discretion, repair or replace the product. No liability is assumed for incidental or consequential damages.

● HQ & FACTORY

Address(Office) : 272, Wolpyeong-ro, Nam-gu, Ulsan-city, #44699, Kore

Factory : 32, Cheoyongsaneop 3-Gil, Onsan-eup, Ulju-gun, Ulsan-city, Korea

Tel : 82-10-4789-7099 / 82-10-4628-6750

Fax : 82-52-970-6750 Email : [sales@pnjmach.com](mailto:sales@pnjmach.com)

Website : [www.pnjmach.com](http://www.pnjmach.com)