

# **Sanden SD7H15 Type C Service Manual**

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**SANDEN**

To the reader:

Service shall be given at risk of owner, user, operator or service personnel of the A/C system and/or the compressor for which this Service Manual is destined.

Sanden Corporation shall neither assume responsibility nor be kept liable for any loss or damage to the human life or body and/or the property which occurs or has occurred in conducting or in relation to services carried out in accordance with or in reference to this Service Manual.

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# **1. Cautionary Information**

## **1. System Pressure Release**

Before disconnecting any lines, always make sure that the refrigerant has been removed from the A/C system by recovering it with the appropriate equipment. When working on compressors, always be sure to relieve internal pressure first. Internal compressor pressure can be relieved by removing the oil plug (if necessary) or by removing shipping caps/pads from both ports.

## **2. Recovery of Refrigerant**

Never discharge refrigerant to the atmosphere. Always use approved refrigerant recovery equipment.

## **3. Handling of refrigerant**

Always wear eye and hand protection when working on an A/C system or compressor.

## **4. Ventilation**

Keep refrigerants and oils away from open flames. Refrigerant can produce poisonous gasses in the presence of a flame. Work in a well ventilated area.

## **5. Avoid use of Compressed Air**

Do not introduce compressed air into an A/C system due to the danger of contamination.

## 2.Compressor Specifications

### 2.1 SD7H15 Assembly Torques

ITEM	N•m
Armature retaining nut, M8	18.0±3.0
Cylinder head bolts	34.0±5.0
Oil filler plug	20.0±5.0
Pad fitting bolt M8x1.25	34.0±4.0
Clutch lead wire clamp screw	1.30±0.3
High pressure relief valve	10.0±2.0
Armature dust cover	3.50±0.5

### 2.2 SD7H15 TYPE C PAG OIL

The SD7H15 Type C compressors leave the factory production line with SP10 PAG oil.

## 3. Service Operations – Clutch

### 3.1 Armature Assembly Removal

1. If armature dust cover is present, remove the 3 bolts holding it in place and remove cover.
2. Insert pins of armature plate spanner into holes of armature assembly. (Threaded if armature dust cover present)
3. Hold armature assembly stationary while removing retaining nut with 14mm socket wrench.(Fig.1)
4. The armature can be removed by pulling it manually upwards off the splined shaft.(Fig.2)
5. Remove bearing dust cover (if present). Use caution to prevent distorting cover when removing it.



Fig.1 Removal of armature retaining nut



Fig.2 Slide armature up and off shaft

# Service Operations - Clutch

## 3.2 Rotor Assembly Removal

1. Remove rotor retaining snap ring using snap ring pliers.(Fig.3)
2. Remove rotor using Sanden removing tool. (Fig.4)
3. The rotor bearing is not changeable as it is staked into position.(Fig.5)

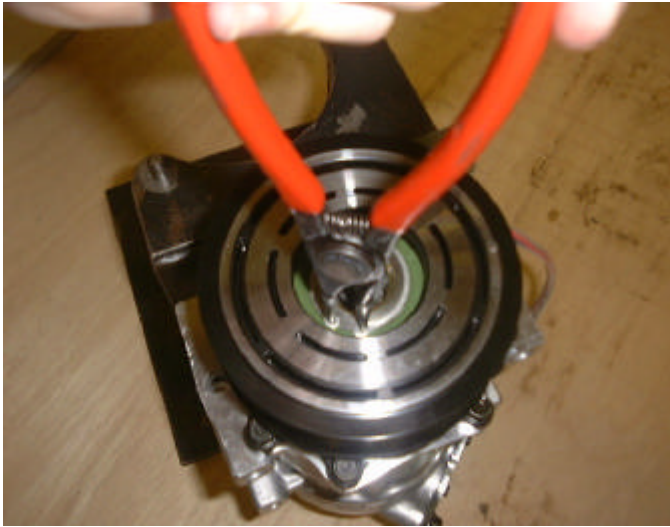


Fig.3 Remove snap ring



Fig.4 Remove rotor



Fig.5 Remove rotor.

Note: Bearing staked into place

# Service Operations – Clutch

## 3.3 Field Coil Assembly Removal

1. Remove lead wire clamp screw with Phillips screwdriver so that coil wires are free. Take care not to round off retaining screw head. (Fig.6)
2. Remove coil retaining snap ring using snap ring pliers.(Fig.7)
3. Remove the field coil assembly.
4. Remove the shims from the shaft. Use a pointed tool and a small screwdriver to prevent the shims from binding on the shaft.(Fig.8)



Fig.6 Remove clamp screw

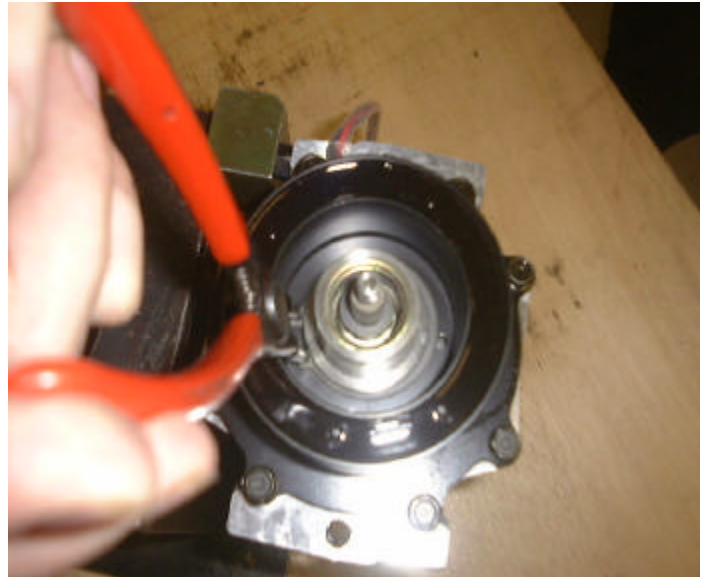


Fig.7 Remove snap ring



Fig.8 Remove shims



# Service Operations – Clutch

## 3.4 Field Coil Assembly Installation

1. Reverse the steps of Section 3. The protrusion on the underside of the coil ring must match hole in the front housing to prevent the movement and rotation of the coil and to correctly locate the lead wire(s).

## 3.5 Rotor Assembly Installation

1. Place the compressor on support stand, supported at rear end of compressor.
2. Set rotor squarely over the front housing boss.
3. Place the rotor installer ring into the bearing bore. Ensure that the edge rests only on the inner race of the bearing, not on the seal, pulley, or outer race of the bearing.
4. Place the driver into the ring and drive the rotor down onto the front housing with a hammer or arbor press. Drive the rotor against the front housing step. A distinct change of sound can be heard when using a hammer to install the rotor.(Fig.9)
5. Reinstall the rotor retaining snap ring using snap ring pliers.(Fig.10)
6. Reinstall rotor bearing dust cover (if present) by gently tapping it into place.

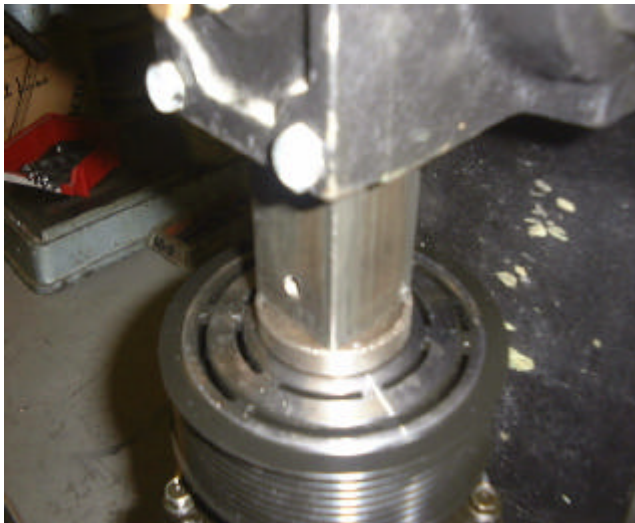


Fig.9 Installation of rotor using arbor press

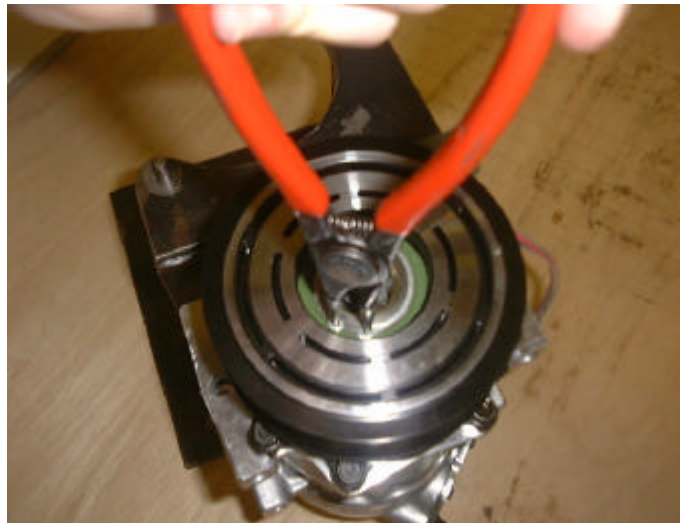


Fig.10 Re-install snap ring

## Service Operations – Clutch

### 3.6 Armature Assembly Installation

1. Install clutch shims. Note: Clutch air gap is determined by shim thickness. When installing a clutch on a used compressor, try the original shims first. When installing a clutch on a compressor that has not had a clutch installed before, first try 1.0, 0.5 and 0.1mm shims.(Fig.11)
2. Reinstall the armature on the splined shaft. Manually push the armature down the shaft until it bottoms on the shims.
3. Replace retaining nut and torque to specification. M8-  $18.0\pm 3.0\text{N}\cdot\text{m}$
4. Check air gap with feeler gauge. Specification is 0.4-0.8mm. If air gap is out of specification remove armature and change shims as necessary.(Fig.13)
5. Replace armature dust cover (if used) Reapply thread lock and torque 3 bolts to  $3.50\pm 0.5\text{N}\cdot\text{m}$



Fig.11 Replace shims



Fig.12 Torque armature retaining nut



Fig.13 Check air gap with feeler gauges

## 4. Service Operations – Shaft Seal

### 4.1 Replacement of Lip type shaft seal.

Note: Lip seal assembly and felt ring must never be reused.

Always replace these components.

1. Be sure all gas pressure inside the compressor has been relieved.
2. Remove clutch assembly as detailed in section A.
3. Remove the felt ring assembly using a small screwdriver to pry it out.(Fig.14)
4. Remove seal snap ring with internal snap ring pliers.(Fig.15)
5. Use lip seal removal and installation tool to remove lip seal assembly. Twist the tool until the 2 lips on the tool engage the slots in the lip seal housing and pull the seal out with a twisting motion.(Fig.16) Clean out shaft seal cavity completely. Make sure all foreign material is completely removed.



Fig.14 Felt ring removal



Fig.15 Snap ring removal



Fig.16 Shaft seal removal

## Service Operations – Shaft Seal

6. Place shaft seal protector sleeve over compressor shaft. Inspect the sleeve to ensure that it has no scratches and is smooth so that the lip seal will not be damaged. Make sure there is no gap between the end of the sleeve and the seal surface of the shaft (Fig.17).



Fig.17 Protector sleeve fitting

7. Engage the lips of the seal removal and installation tool with the slots in the new lip seal housing. Make sure the lip seal assembly, especially the O-ring is clean. Dip the entire lip seal assembly, on the tool, into clean refrigerant oil. Make sure the seal assembly is completely covered with oil.
8. Install the lip seal over shaft and press firmly to seat. Twist the tool in the opposite direction to disengage it from the seal and withdraw the tool.(Fig.18)



Fig.18 Replacement of lip seal

9. Reinstall shaft seal snap ring with internal snap ring pliers. Bevelled side should face up. (Away from the compressor body). Ensure that the snap ring is completely seated in the groove.
10. Tap new felt ring assembly into place.
11. Reinstall clutch assembly as detailed in section A.

## 5. Service Operations – Cylinder head

### 5.1 Cylinder head, valve plate removal and installation.

1. Be sure all internal compressor pressure has been relieved. This can be achieved by undoing the oil plug slowly.
2. Remove cylinder head bolts.(Fig.19)
3. Use a small hammer and gasket scraper to separate the cylinder head from the valve plate. Be careful not to scratch the gasket surface of the cylinder head.
4. Carefully lift the cylinder head from the valve plate.(Fig.20).



Fig.19 Removal of cylinder head bolts

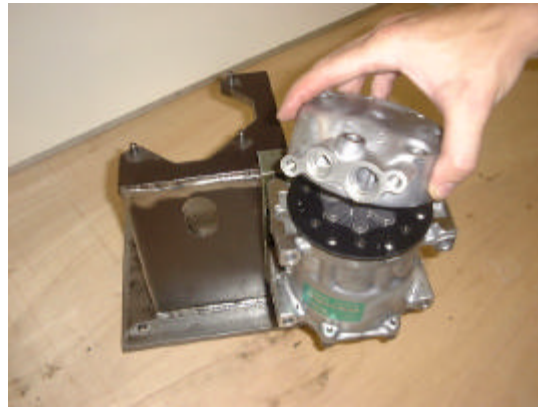


Fig.20 Removal of cylinder head

5. It is recommended that both the head gasket (between the cylinder head and the valve plate) and the block gasket (between the valve plate and the cylinder block) be replaced at any time the cylinder head is removed. However, if no service is required to the valve plate, it may be left in place. If the valve plate comes loose from the cylinder block, the block gasket must be replaced.
6. Carefully remove old head gasket from top of valve plate with gasket scraper. Be careful not to disturb the valve plate to cylinder block joint if valve plate is to be left in place. If valve plate comes loose from cylinder block, proceed to section 5.2 Valve plate removal.

## Service Operations – Cylinder head

### 5.2 Valve plate removal

1. Using a small hammer and gasket scraper carefully separate valve plate from cylinder block. Be careful not to damage sealing surface of cylinder block.(Fig.21)
2. Inspect reed valves and retainer. Replace valve plate assembly if any part is damaged.
3. Carefully remove any gasket material remaining on valve plate, cylinder block or cylinder head.

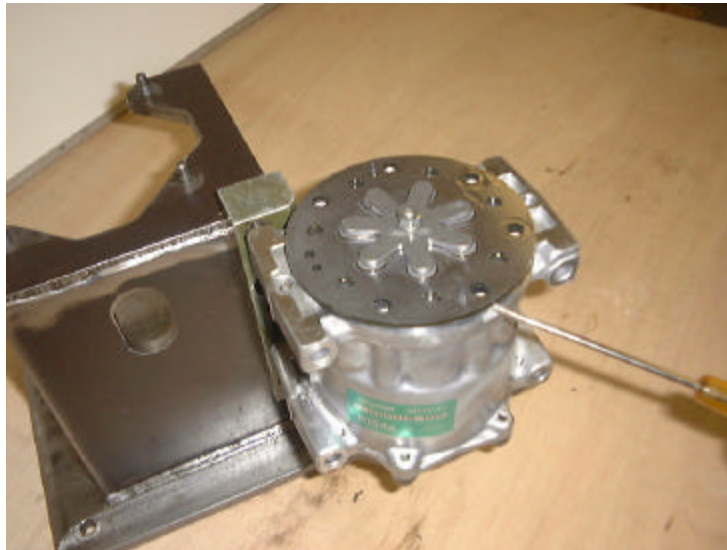


Fig.21 Removal of valve plate

### 5.3 Valve plate and cylinder head installation.

1. Coat new block gasket with clean refrigerant oil.
2. Install block gasket. Align new gasket to location pin holes and orifice(s). Notch (if present) should face same direction as oil plug or adapter.
3. Place valve plate on cylinder block with discharge valve, retainer and nut facing up (away from cylinder block) and location pins properly located in holes.
4. Ensure that there is no residual oil in each bolt hole. If oil is present it must be removed to prevent thread damage.
5. Coat head gasket with clean refrigerant oil.
6. Install head gasket over location pins, checking for correct orientation.
7. Install cylinder head.

## Service Operations – Cylinder head

8. Install cylinder head bolts and tighten in a star pattern.(Fig.22)  
Torque first to approximately 20.0N•m, then finish by torquing to  $34.0 \pm 5.0\text{N}\cdot\text{m}$  (Fig.23)

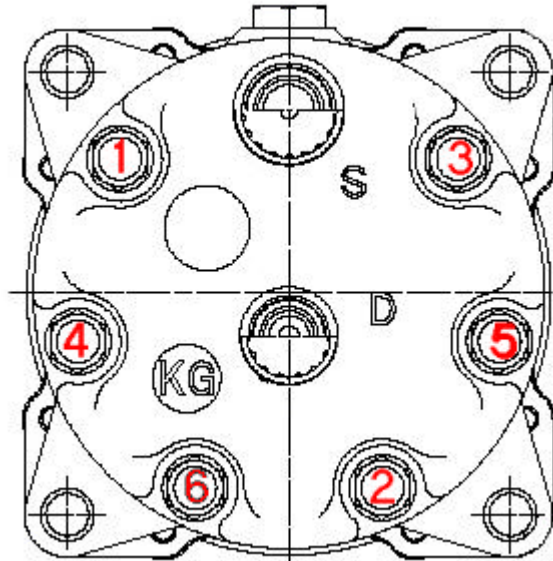


Fig.22 Torque sequence of cylinder head bolts

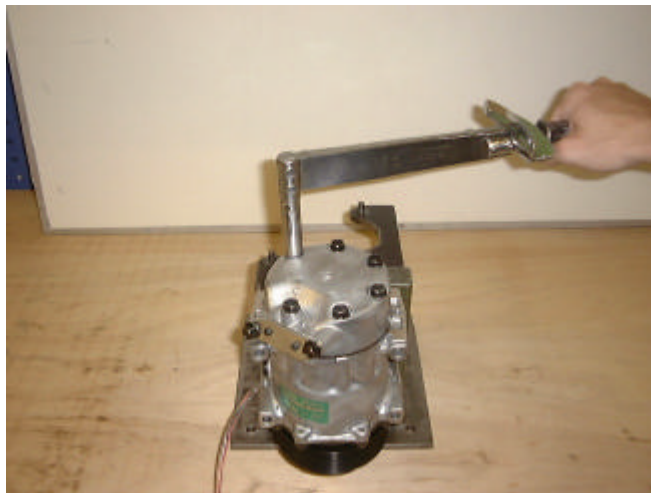


Fig.23 Torquing cylinder head bolts

