



# HIGH PRESSURE WATER COOLED AIR COMPRESSORS

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## *HW-1500 SERIES OPERATOR MANUAL*

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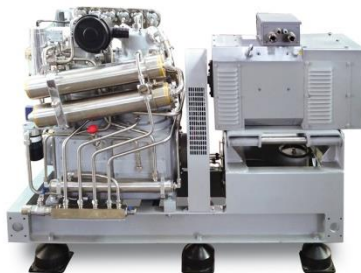


# HIGH PRESSURE WATER COOLED AIR COMPRESSOR MODELS

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- HW 1500 AC MOTOR -



- HW 1500 DC MOTOR -



**CERTIFICATE**

Verification  
 Certification

**ALKIN KOMPRESÖR SANAYİ VE TİCARET LİMİTED ŞİRKETİ**

(Address)

Çiğdemci Mahallesi Tabak Yolu No:12  
 34221 Mecidiyeköy/İstanbul

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 Issue Date: 27.06.2018  
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 Issue Date: 24.06.2019  
 Expiry Date: 24.06.2020

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(1) **Equipment or Protection System Intended for use in Potentially Explosive Atmosphere**  
 December 2014 (EN 618)

(2) EU-ULI Verification Certificate Number: IEP-ATX-0164  
 (3) Product name: Model: Serial number: WELT Compression /WELT-0-300-F08-00574  
 (4) Product name: Model: Serial number: WELT Compression /WELT-0-300-F08-00574  
 (5) Firm Name: Alkin Kompresör San. ve Tic. A.Ş.  
 (6) Firm Address: Çiğdemci Mah. Tabak Yolu No:12 Mecidiyeköy /İstanbul /Türkiye  
 (7) This product may only be supplied to countries specified in the schedule to this certificate and the document therein referenced.  
 (8) The EU-ULI (Verification) Report (including Test Reports or Certified Classified Experiments) To, Ltd. Inc., issued under number 2284 on 27 February 2018, certifies that this product has been found to comply with the European Health and Safety Requirements in accordance with the applicable standards for use in potentially explosive atmospheres.  
 (9) Compliance with Essential Health and Safety Requirements has been verified by competent persons.  
 (10) EN 618:2014, EN 618:2014+A1:2016  
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 (13) The marking of the equipment or protection system shall include the following:  
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 E 30 F 08 T 04 G

Responsible Person:  
 Name: Mustafa  
 Title: Head of Certification Body

Date of Issue: 18.06.2018

**TÜRK LOYDU**  
 TÜRK LOYDU

**TYPE APPROVAL CERTIFICATE**

This Certificate consists of 2 pages.  
 This is to certify that the  
**MEDIUM & HIGH PRESSURE BREATHING AIR COMPRESSOR**  
 with type designation  
 W1 - 700 - 302  
 Manufactured by  
**ALKIN KOMPRESÖR SAN. VE TİC. LTD. ŞTİ.**  
 is found to comply with  
 The Levels Refer to in Classification of Risks and  
 HD 1217 - 15 770 Displacement components - Air-pressure tests

**Application**  
 High pressure breathing air compressor (W11)  
 Medium pressure air compressor (700kg)  
 Max. working pressure: 200 bar and 40 bar  
 Operating mode: A-B

**Design**  
 High pressure breathing air compressor (W11)  
 Medium pressure air compressor (700kg)  
 Max. working pressure: 200 bar and 40 bar  
 Operating mode: A-B

**Drawings**  
 1 Set left page

**Address of Manufacturer**  
 Çiğdemci Mah. Tabak Yolu C/No:12 Mecidiyeköy/İstanbul

**Place and date**  
 İSTANBUL, 06.06.2018

Subject to the conditions referred to in the following pages, this certificate is valid until 05.03.2020

Erol B. AKIN  
 Head Building Systems Manager

**T.C. TÜRK PATENT ENSTİTÜSÜ**  
**MARKA TESCİL BELGESİ**  
 Marka No : 2012 4585 - Ticaret - Hizmet

**ALKIN**  
 KOMPRESÖR SANAYİ VE TİCARET LİMİTED ŞİRKETİ  
 TÜRKİYE CUMHURİYETİ  
 Başbakanlık Tescil No:127-Memorsuz ESMER  
 Etiler/İstanbul /Türkiye  
 Tescil No: 11, 29, 37

Marka Sahibi: ALKIN KOMPRESÖR SANAYİ VE TİCARET LİMİTED ŞİRKETİ  
 TÜRKiYE CUMHURİYETİ  
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 Tescil No: 11, 29, 37

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Erol B. AKIN  
 Başbakanlık Markalar Dairesi Başkanı  
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**T.C. TÜRK STANDARLARI ENSTİTÜSÜ**  
**HİZMET VETERİNERLİK BELGESİ**

Marka No: 18.01.016  
 Belge No: 18.01.016  
 Belge Tarihi: 18.01.2018  
 Belge Durumu: 18.01.2018  
 Belge Sahibi: ALKIN KOMPRESÖR SANAYİ VE TİCARET LİMİTED ŞİRKETİ  
 Belge Adı: ÇİĞDEMCI MAHALLESİ TABAK YOLU NO:12 MECİDİYEKÖY/İSTANBUL  
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 Belge No: 18.01.016  
 Belge Tarihi: 18.01.2018

# ALKIN COMPRESSORS

## High Pressure Water Cooled Air Compressors

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### Operator Manual

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- January, 2020 -

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## FOREWORD

**A** **ALKIN** air compressor will provide you with the solid and reliable performance that you should expect from an industrial air compressor.

*Please read this manual carefully before you operate your compressor. This will enable you to start-up your compressor in the proper manner, as well as maintain it using the simple instructions in the maintenance section of this manual. This way your air compressor will always be in top operating condition, giving you trouble free service.*

Your compressor is backed up with worldwide sales and service organization, ready to accommodate your everyday needs for parts & service. Service and parts supply anywhere in the world can be done by an ALKIN Compressors. For any questions please feel free to call our Menderes plant, in İzmir-Turkey.

Here are the contact details:

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In all correspondences, please provide serial number and a copy of invoice.

ALKIN has the right to change information without any prior notice.

Users are expected to safely operate and maintain the compressor, observe the rules and instructions, as well as the local safety codes to minimize the risk of accidents and injuries.



## **GENERAL INFORMATIONS**

### **1. General**

#### **1.1. General Safety Information**

All ALKIN air compressors are designed and manufactured with equipment and components that allow safe operation of the compressors. However, it is the user's responsibility to safely operate and maintain the compressor, observe the rules and instructions, as well as the local safety codes to minimize the risk of accidents and injuries. The following safety precautions are offered only as a guideline and it is recommended to follow them along with the local safety codes and regulations.

This compressor should only be operated by those who have been trained to do so, and who have read and understood the contents of this manual. Failure to do so will increase the risks of accidents and bodily injuries. Please read also the manual of the equipment (electric, etc.) delivered together with the compressor and perform the instructions.








Never start this compressor unless it is safe to do so. Do not operate it with known unsafe condition. Tag the compressor and render it inoperative by disconnecting the power supply, so that others who may not know of the unsafe condition will not attempt to operate it until the unsafe condition is corrected.

Install, use and operate this air compressor only in full compliance with all pertinent requirements and all relevant federal, state and local codes and regulations.

Do not modify this compressor and do not use beyond the specified limits (pressure, etc.) and speeds except with prior written approval of ALKIN.

# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

## 1.2. Safety Tags

Symbol	Explanation
	READ INSTRUCTION MANUAL
	USE HEADPHONES
	HOT SURFACE – DO NOT TOUCH
	EARTHING
	ELECTRIC HAZARD
	CAUTION: CAN START AUTOMATICALLY
	CAUTION: MOVING PARTS

### Read Instruction Manual



This compressor should only be used by persons who are trained in the use of compressors, knowledgeable and who have read this manual and understood the contents. Otherwise, it will increase the risk of accidents and the possibility of injury. Also read the instruction manual of the equipment supplied with the compressor (such as an electric motor) and follow the instructions.

### Use Headphones



The protective headphones are used to protect against continuous noise that exceeds the permissible sound level and thus can cause permanent hearing damage.

### Hot Surfaces, Sharp Edges and Corners



Avoid physical contact with hot oil, hot surfaces, sharp edges and corners. Keep all parts of the body away from all points of air discharge and away from hot cylinder heads, discharge pipes and intercooler

## **HW1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

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surface. Wear personal protective equipment, including gloves and protective hat when working on or around the compressor.

Keep a first aid kit handy. Call for medical assistance promptly in case of injury. Do not ignore small cuts and burns as they may lead to infections.

### **Electrical Shock**



Keep the compressor, hoses, tools and personnel at least 3 meters (10 ft.) away from power lines, panel and underground cables.

Keep all parts of the body and any hand held tools or other conductive objects away from exposed live parts of the electrical system. Maintain dry footing, stand on insulating surfaces, and do not contact any other portion of the compressor when making adjustments or repairs to exposed parts of the electrical system.

### **Earthing**



This machine has an earth connection to the electrical leakage. Be sure to connect the ground wire and check your grounding line. No grounding or sufficient grounding; In case of failure of the machine and electric leakage, it gives the electric current to the outer body and if it is contacted with the machine, it may cause electric current and result in serious injuries and death.

### **Can Start Automatically**



Automatic compressor control, unit may start--up without warning! Before carrying out maintenance and repair work, switch off at the main switch or disconnect from the mains and ensure unit will not restart.

### **Moving Parts**



Keep hands, arms and other parts of the body and clothing away from the belts, pulleys and other moving parts. Do not attempt to operate the compressor with the canopy cover removed at flywheel side.

Wear snug fitting clothing and confine long hair when working around the compressor, especially when exposed to hot and/or moving parts. Make sure all persons are clear of the compressor prior to attempting to operate it.

Make adjustments only when the compressor is shut off. When necessary, make adjustments, then start the compressor to check if the adjustment is correct or not. If incorrect, shut the compressor, blow down the air, re-adjust, than re-start to check the adjustment.

## **HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

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Keep hands, feet, floors, controls and walking surfaces clean and free from oil, water, anti-freeze or other liquids to minimize the possibility of slips, falls and shock hazard.

### **Pressure Release**



Run the compressor to see if the safety valves are operating properly or not. See and ensure, safety valves are discharging the pressure on their adjusted pressure values. Do not open the oil filling plug or any other connection, tube, hose, fitting, valve etc. when the compressor is running or when it is standing by (in only automatic start/stop compressors waiting for the pressure switch signal to re-start). Switch off the main electrical switch, shut off the discharge valve and discharge all pressurized sections before attempting to dismantle such components.

Keep all persons away from the discharge opening of hoses, tools and accessories during discharge. Do not use air pressure above 7 Bars (101 Psi) for blow cleaning purposes, without use of proper protective equipment. Do not let the hoses move free or don't play games with the filling hoses as they may cause accidents and injuries. Drain daily the condensate from the purifier, as it may accelerate the internal rusting and corrosion of the purifier.

### **Fire and Explosion**



Clean up oil spills immediately if and when it occurs. Shut off the air compressor and allow it to cool. Keep sparks, flame and other sources of ignition away and do not allow smoking in the vicinity when checking and draining or adding oil. Do not permit liquids such as airline anti-icer system anti-freeze compound, or oil film or any other combustible substance to accumulate on any external or internal surfaces of the compressor. Wipe down with aqueous industrial cleaner or steam to clean as required. Do not use flammable solvents for cleaning purposes.

Disconnect the power supply prior to attempting any repair or cleaning. Tag the power supply to avoid unexpected start by someone else.

Keep electrical wiring, including terminals in good condition. Replace any wiring that has cracked, cut, abraded or otherwise degraded insulation or terminals that are worn, discolored and corroded. Keep all terminals clean and tight. Keep grounded conductive objects such as tools, away from exposed live electrical parts such as terminals, to avoid arcing which might serve as a source of ignition.

Keep a suitable BC or ABC fire extinguisher(s) nearby while servicing and operating the compressor. Keep oil rags, trash, leaves litter and other combustibles away from the compressor. Do not spray volatile materials into the compressor

## HW1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

intake, as serious damage to the compressor and personal injury or death may result.

### Toxic and Irritating Substances



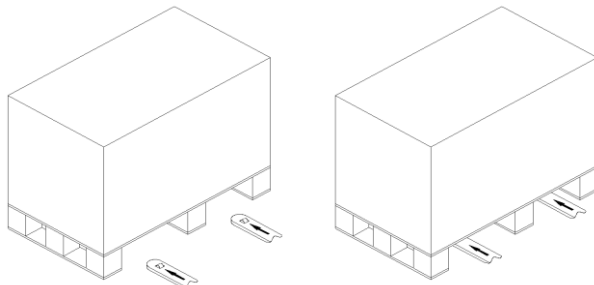
Do not use air from this compressor for breathing unless it is equipped with proper purification equipment. Make sure that Purifier Cartridge is installed inside the Purifier Housing.

Operate the compressor only in well ventilated areas. Lubricants used in this compressor are typical synthetic oil. Accidental ingestion and skin contact should be avoided. Wash with soap and water after skin contact. If swallowed, call for medical treatment promptly.

### Lifting and Carrying



If you must lift the compressor, lift in full compliance with codes and regulations. Make sure entire lifting, rigging and supporting structure has been inspected, is in good condition and has a rated capacity of at least the net weight of the compressor. If you are unsure of the weight, check before lifting. The distance between forklift's forks should be sufficient for lifting if the compressor will be carried and lifted with the forklift. Moreover, the forklift must have a rated capacity of at least the net weight of the compressor. The forks of the forklift should be positioned under the compressor just like shown in the figure below. The height of the compressor from the ground must be max. 10 cm during carriage.



**Figure 1** – Lifting and transporting by forklift

Do not distract the forklift operator during carriage.

Verify the lifting hook has a safety clamp, and ensure a robust fastening with tough ropes or chain. Avoid the compressor swinging while suspended, by using guide

## **HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

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ropes. Keep all persons clear from under and away from the compressor when it is suspended. Lift the compressor not higher than necessary. Keep lift operator in constant attendance whenever the compressor is suspended.

Set the compressor down on level surfaces, capable of carrying its full weight.

### **NOTE:**

**DO NOT RUN THE COMPRESSOR ON WOODEN PALLET WHERE THE UNIT IS MOUNTED FOR TRANSPORTATION PURPOSES.**

### **Warranty and Liability**

Alkin Compressors cannot be held responsible if your compressor is operated without observing the rules stated in the operator manual.

Your compressor will be out of warranty if:

- \* Non-compliance with the rules specified in the operator manual,
- \* Use of parts not produced / approved by Alkin Compressors,
- \* Installation and operation of the compressor on surface conditions that are not on a flat and stable,
- \* Installation and operation of the compressor in conditions that are not in compliance with national and local occupational safety rules,
- \* Interference of compressor operating parameters by third parties without approval of Alkin Compressors,
- \* Failure to comply with compressor control and component replacement times,
- \* Interventions that do not comply with Alkin Compressors maintenance / repair instructions,
- \* Removal of compressor label,
- \* Force Majeure

## **ABOUT COMPRESSOR**

### **2. General**

While air compressors generally convert 19-27% of the energy they receive from the motor driving them, the remaining part turns into heat. The heat generated during compression must be removed from the system by air or water cooling in order to ensure the continuity of the cycle. Air cooled compressors cannot be used efficiently in applications where high ambient temperature availability and ambient noise present functional difficulties. Therefore, unlike air-cooled compressors, water is circulated around the cylinder in order to reduce the heat in the compression chamber in water-cooled compressors. The high thermal capacity of the water is a better alternative in applications which high rpm and high ambient temperature are available, and therefore air cooling is not possible.

HW-1500 series high pressure water cooled air compressor is a single-acting, four-stage that compresses the air from atmospheric pressure to 275 bar pressure. The stages are placed in two sequential cylinder blocks. The first and third stage, second and fourth stage pistons are designed in a gradual manner and operate in the cylinder block in the same way to which they belong.

# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

## 2.1. Compressor Unit

HW 1500 series (AC Motor) high pressure water cooled compressor covers the following basic groups.

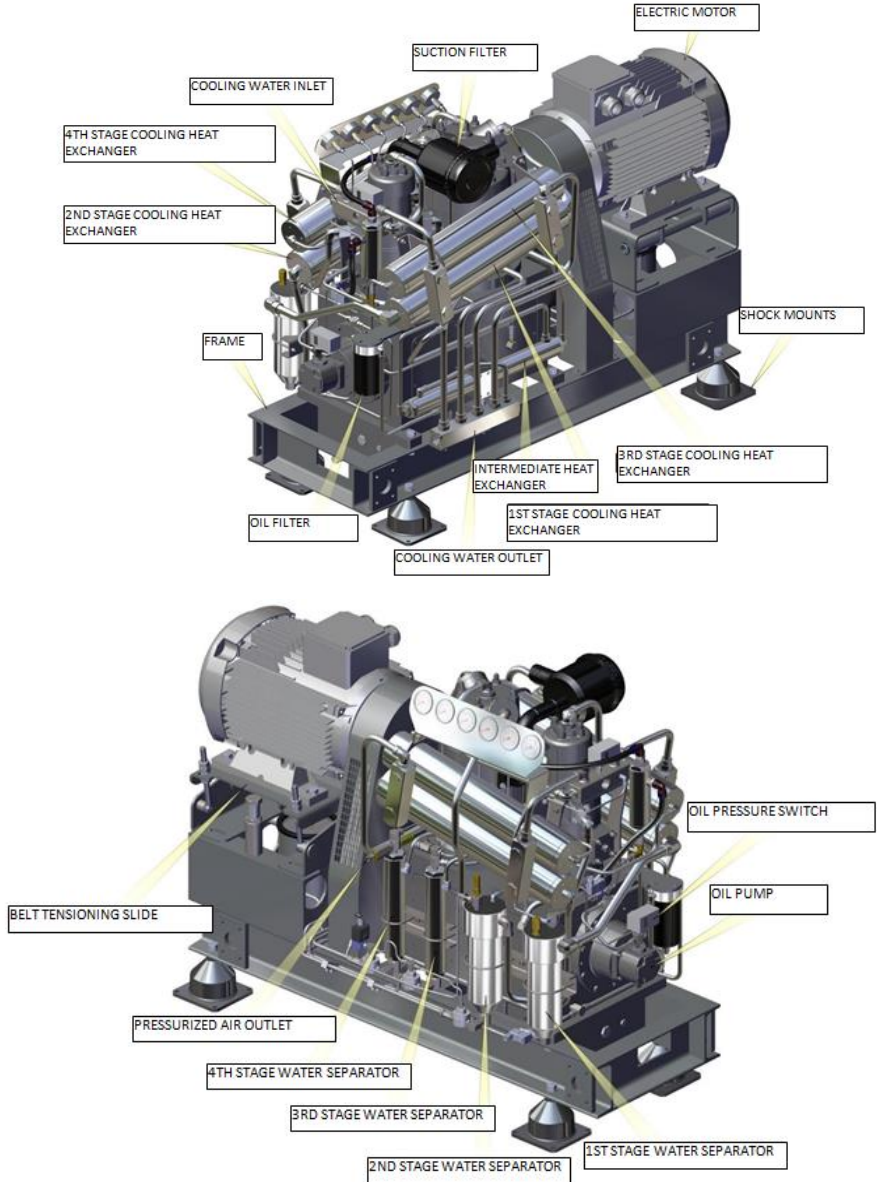
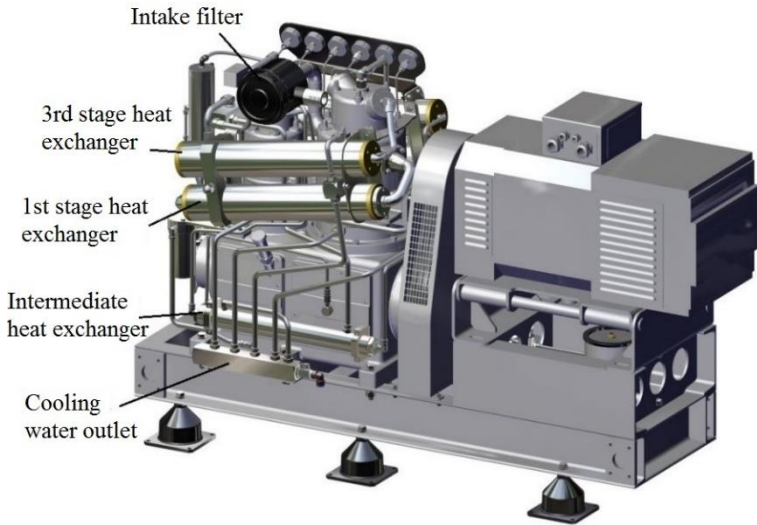
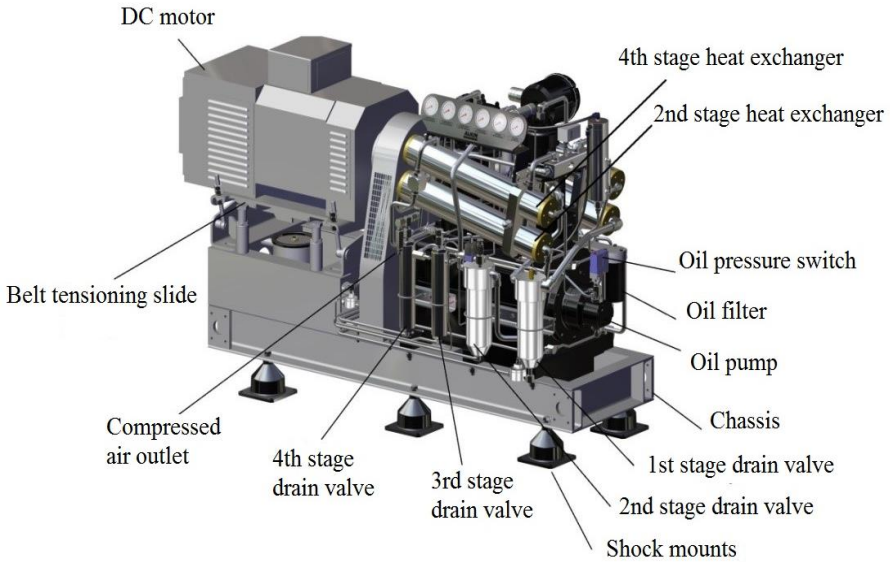


Figure 2 – HW 1500 series compressor general layout (AC motor)



# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

HW 1500 series (AC Motor) high pressure water cooled compressor covers the following basic groups.



**Figure 3** – HW 1500 series compressor general layout (DC motor)

**HW1500 SERIES  
HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

**2.2. Technical Data**

The model design for HW 1500 series compressors are based on the below data;

<b>Compressor</b>	<b>AC Motor</b>	<b>DC Motor</b>
Medium	Ship and submarine	
Intake pressure	Atmospheric	
Layout	Horizontal	
Roll	±45°	
Trim	±15°	
Working pressure	275 bar (3390 psi)	250 bar (3625 psi)
Max working pressure	310 bar (4496 psi)	
Free air delivery (FAD)	1500 lt/dk	
Voltage	440 V	220V (200-290V)
Power	34,5 kW	27 kW (36 Hp)
Motor protection class	IP 55	IP 23
Motor speed	1750 rpm	1900 rpm
Compressor speed	740 rpm @440V/AC	705 rpm @220V/DC
<b>Diameter of motor pulley</b>		
<b>Belt Dimension</b>		
<b>Diameter of compressor pulley</b>		
<b>Piston Stroke</b>		
Number of stage	4 (1 <sup>st</sup> and 3 <sup>rd</sup> stages in the same block, 2 <sup>nd</sup> and 4 <sup>th</sup> stages in the same block)	
Number of cylinder block	2	
Cylinder bore (1 <sup>st</sup> stage)	190 mm	
Cylinder bore (2 <sup>nd</sup> stage)	95,5 mm	
Cylinder bore (3 <sup>rd</sup> stage)	50 mm	
Cylinder bore (4 <sup>th</sup> stage)	25,4 mm	
Oil capacity	10 liter	
Yağ basıncı	4-12 bar	
Cooling water need	40 l/min	
Nominal water pressure	10 bar	
Permissible water pressure	till 40 bar	
Weight	1200 kg	
Dimensions WxLxH	740x1600x1320 mm	

# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

## 2.3. Process and Instrumentation Diagram (P&ID)

The following process and instrumentation diagrams are prepared with the drawing of the physical components rather than pneumatic symbols in order to facilitate the understanding of the system by users who are not specifically trained to understand pneumatic symbols.

This compressor is designed to operate at a “auto start-stop” or a “dual pressure” This is, when the compressed air is used to fill all the cylinders at that single pressure.

By looking at the P&ID, you can see the general layout of the system and operational turns.

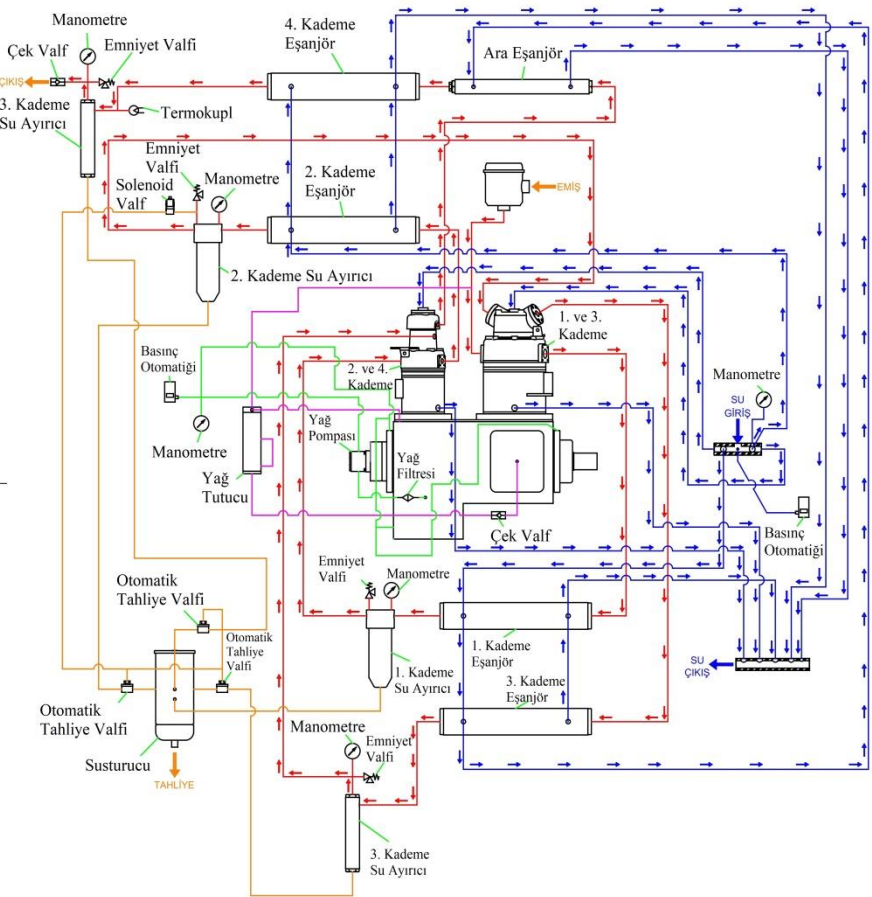
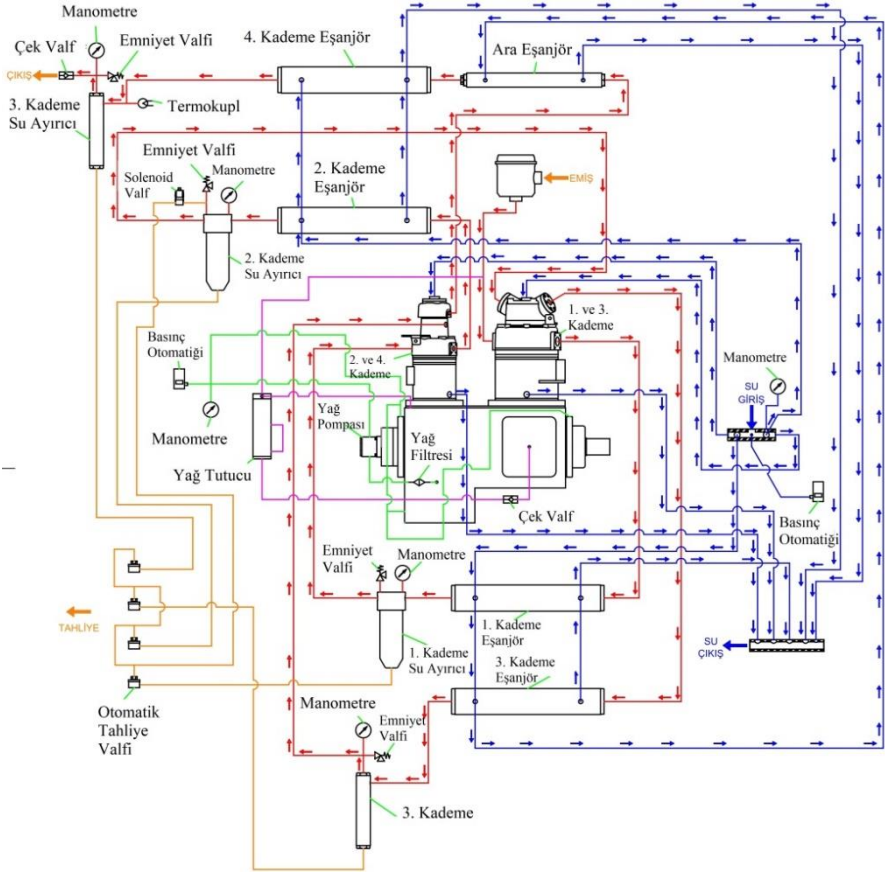


Figure 4 – HW-1500 series compressor P&ID (AC Motor)

# HW1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS



**Figure 5 – HW 1500 series compressor P&ID (DC Motor)**

**HW 1500 SERIES**  
**HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

**2.4. Identification of the Compressor**

Each compressor has an identification label attached to its frame.

	
CÜNEYTBAY MAH.TABAŞ YOLU KÜME EVLERİ NO:3 Menderes-İZMİR/TÜRKİYE Tel: +90 232 78 222 90 Fax: +90 232 78 222 89 www.alkin.com.tr alkin@alkin.com.tr	
HIGH PRESSURE WATER COOLED AIR COMPRESSOR YÜKSEK BASINÇ SU SOĞUTMALI HAVA KOMPRESÖRÜ	
MODEL	<input type="text"/>
SERIAL NR. SERİ NO.	<input type="text"/>
YEAR OF MANUFACTURE ÜRETİM YILI	<input type="text"/>
WORKING PRESSURE ÇALIŞMA BASINCI	<input type="text"/>
FREE AIR DELIVERY SERBEST HAVA DEBİSİ	<input type="text"/>
COMPRESSOR SPEED KOMPRESÖR DEVRİ	<input type="text"/>
MOTOR POWER MOTOR GÜCÜ	<input type="text"/>
MAINS SUPPLY ELEKTRİK VERİLERİ	<input type="text"/>
PROTECTION CLASS KORUMA SINIFI	<input type="text"/>
WEIGHT AĞIRLIK	<input type="text"/>
	

## **HW1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

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### **2.5. Principles of Operation**

The HW-1500 is a single-acting, four-stage, high-pressure compressor that compresses air sucked at atmospheric pressure till 275 bar pressure. The stages are placed in two sequential cylinder blocks. The first and third stage, second and fourth stage pistons are designed in a gradual manner and operate in the cylinder block in the same way to which they belong.

The air compressed in the compressor stages heats up. After each stage, the hot air is cooled by entering the water cooled heat exchangers. The cooling air passes through the water / oil separators to remove the water vapor and oil vapor. The condensing water is evacuated every 30 minutes with the aid of automatic discharge.

The cooling exchangers operate according to the counter flow principle. Cold water and hot air enter the heat exchangers from two far ends. The coolant is distributed to the exchanger and cylinder blocks by means of a manifold. The cooling water enters the cylinder from the third and fourth stage valves. The water distributed to the cylinder block comes out from the side bottom of the first and second stage cylinders. The cylinder temperatures are also controlled in this way.

Crankshaft and connecting rod bearings are lubricated with oil pump. From a hole on the connecting rod; oil is ejected to the pistons. The oil pressure can be monitored from the manometer panel.

A safety valve is fitted at each stage outlet. To reduce the corrosive effect of the coolant circulating in the cylinder cavities, zincs were used in each cylinder block.

### **2.6. Major Components**

#### **2.6.1. Compressor unit**

##### **Crankcase:**

This is the frame that holds everything on it. It contains the oil that lubricates the system. The cylinders are mounted on it. The crankshaft is inserted into the bearing housings which is an integral part of the crankcase. There is no maintenance or repair works that need to be done on this part; it needs to be cleaned inside when the oil is changed. If there is a visible damage, it should be replaced.

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##### **Crankshaft:**

It is overhung type; that means the bearings are on one side, and the crank pin (where connecting rods are mounted) are on the other side. This feature allows usage of single piece connecting rods which are far more accurate and safe than

## **HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS**

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split con rods. Large bearings in conjunction with low speeds, allow very long crankshaft life. Replace this part when life of bearings is over.

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### **Connecting Rods:**

In the compressor there are 2 connecting rods made of ductile cast iron in total. The bearings are made of high quality copper bronze alloy. There are oil holes in the connecting rod bearings for lubrication. The lubrication on the piston side is made from the crank side with the aid of a steel pipe placed in the connecting rod.

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### **Cylinders:**

The cylinders are fixed to the crank. The first and third stage and the second and fourth stage cylinders are arranged as a single block on top of each other. The cylinders are water jacketed for circulation of cooling water. Carefully honed cylinder sleeves were nailed into them. Suction and force valves are placed on each cylinder.

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### **Heat Exchangers:**

The heat exchangers are tube type and placed at the outlet of each stage. Hot air enters from one side and the he cooling water enters from the other side. The cooling water flows from outside the tube bundle while air flow occurs in the tube bundle. The counter flow type provides efficient cooling.

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### **Oil Pump:**

The oil pump is driven by the crankshaft. It sends the oil from the oil crankcase to the oil crankshaft by means of a pipe. Oil pressure can be read from the manometer panel as min. 4 bar.

### **Safety Valves:**

In order to prevent unexpected and undesired pressure increases which may occur as a result of a problem in the compressor's stage valves or any part thereof, safety valves are installed in all 4 stages of the compressor. All safety valves are pressure tested and fixed by adjusting the pressure values. If there is a pressure increase in the compressor stages, it opens the safety valves and reduces the pressure.

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Set Pressures of Safety Valves		
	AC Motor	DC Motor
1 <sup>st</sup> stage safety valve	7 bar	
2 <sup>nd</sup> stage safety valve	20 bar	
3 <sup>rd</sup> stage safety valve	65 bar	
4 <sup>th</sup> stage safety valve	265 bar	

## IMPORTANT:

Consult the nearest ALKIN dealer or ALKIN for replacement or maintenance

### Intake Filter:

Inlet Filter is used to filter the air particles in the first stage. Replace the inlet filter element in the periods shown in Maintenance Table.

### Electric Motor:



For surface ships, the supply voltage of the electric motor used to drive the compressor is 440 VAC, 60 Hz, 3 Phase. The motor which has 3545 rpm and 34.5 kW power characteristics is cooled by the fan on its own shaft.

For submarines, the supply voltage of the electric motor used to drive the compressor is 360 ~ 600 VDC. The motor which has 1750 rpm and 27-30 kW power characteristics is cooled by the fan on its own shaft.

### Pressure Switch:



The pressure switch is an electric switch that allows the compressor to automatically switch on and off at set pressures. When the compressor is started, it will operate until reaching the adjustment pressure and it will stop automatically when the adjustment pressure is reached. When the pressure drops, it will automatically switch on.

When compressor circuit reaches the operating pressure, the pressure switch interrupts the compressor motor supply current and stops the compressor. When the circuit pressure drops below the set activation pressure, the compressor is re-activated. When the compressor motor is switched off with the pressure switch, the



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fans on the top of the cabinet continue to run for 4 to 10 minutes depending on the ambient temperature.

The compressor deactivation pressure value is set with the screwdriver head adjuster bolt in the PH1 pressure switch. The pressure value increases when the adjuster bolt is turned in the clockwise direction, and the pressure value decreases when it is turned in the anticlockwise direction.

The lower pressure setting, which will allow the compressor to be re-activated automatically, is provided by the differential pressure range applied to the PL1 pressure switch. The differential pressure range value is set with the red adjustment screw on the screwdriver head on the pressure switch PL1. The pressure range is reduced when the adjuster bolt is turned in the clockwise direction, and the pressure range value is increased when it is turned in the anticlockwise direction.

### **Flasher Relay with Double Adjustment:**



Automatic discharging of condensing water at the compressor stages is carried out by means of automatic pneumatic discharge valves by the Td3 flasher relay with double adjustment in the controller.

The flasher relay allows the water to be discharged from the automatic pneumatic discharge valves by cutting off the electricity of the solenoid during the set period of time. The period in which the flasher relay is set is 10 seconds in 30 minutes. That is, the flasher relay turns off the solenoid's energy for 10 seconds at 30 minute intervals.

The setting of the flasher relay is changed by 2 setting dials on the relay. The dial at the top is the "OFF" time setting button, which can set the time value when the drain valves are left open between 0-10 seconds. There are no numbers on this dial and it needs to be adjusted proportionally. The entire dial shows 10 seconds, half of it shows 5 seconds. Under normal conditions this time should be 10 seconds, but if all water can be drained within 10 seconds and too much air is coming out, this time should be reduced. The lower button is the "ON" time setting button, and regulates the discharge period of the solenoid valve, ie the energized time of the solenoid. This time can be set to a time value between 0-30 minutes. The factory setting is 30 minutes and this time can be changed depending on special operating conditions.

### **Muffler:**

It is designed to minimize the sudden sound level of the pressure which is discharged out of the system together with water that accumulates.

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## Control Panel:



- Start** : Starts the compressor.
- Stop** : Stops the compressor.
- Compressor Fault** : If any fault occurs in the compressor, this red light turns on.
- Emergency Stop** : Immediately stops the compressor when pressed in an emergency.
- Loaded / Idle Switch** : The compressor has the ability to generate pressure in loaded position.
- In idle position, the compressors remain idle while the discharges remain open.
- Time Counter** : Shows the compressor operating time.
- MPR Fault** : The Motor Protection Relay fault light. It turns on in engine faults.
- PPR Fault** : The Fault Protection Relay fault light. It turns on in phase faults.
- Engine Thermal Failure** : Lights up when the engine drive blows.
- Oil Pressure Low** : Lights up when Oil Pressure is Low.
- Water Pressure Low** : Lights up when Water Pressure is Low.
- Emergency Stop** : This light turns on when the emergency stop is pressed.
- HORN** : Nonfunctional.
- DEL** : Resets fault lights after eliminating the faults.
- TEST** : Checks whether the fault lights are on.

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### 2.7. Startup

1. Make sure there are no foreign objects around the compressor.
2. Check the oil level.
3. Open the coolant line.
4. Check the pressure from the water inlet manometer. Make sure the water passes through.
5. Set the panel main switch to the open position.
6. Press the Start button.
7. Check the oil pressure from the oil pressure manometer.
8. Open the fill line valve to the tanks.
9. Each time the compressor is started, the compressor automatically idles for 2 minutes. At the end of this period it engages the load. At this point, it is checked from the manometers whether the stage pressures are between the red marked limit values.

#### **IMPORTANT:**

Replace the compressor oil after the first 50 hours.

#### 2.7.1. Operation

- Check the oil level.
- Check the pressure from the water inlet manometer. Make sure the water passes through.
- Set the panel main switch to the open position.
- Make sure that the idle button is off.
- Press the Start button.
- Check the oil pressure from the oil pressure manometer.
- Each time the compressor is started, the compressor automatically idles for 2 minutes. At the end of this period it engages the load. At this point, it is checked from the manometers whether the stage pressures are between the red marked limit values.

#### 2.7.2. Switching off

- Compressor automatically stops at 260 bar output pressure. This is a stand-by mode.
- Press the stop button to stop the compressor before the top pressure. The compressor does not automatically switch on after the stop button is pressed.
- Set the main switch to the off position so that the compressor is not switched on again.
- Close the water inlet valve.

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### 2.7.3. Long Term Switching Off

If the compressor is not to be used for 1 week or more, the compressor should be idle for 30 minutes a week to prevent oxidation of the cylinders and pistons. To do this, switch the idle switch to position 1 and press the start button. After 30 minutes, stop the compressor by pressing the stop button, move the idle switch to position 0 and the main switch to off position.

### 2.8. Oil recommendation

The oil level should be checked before each start up. **Top up to the overfill point when required 10 liter of oil should be loaded during each replacement.**

### RECOMMENDED OILS

Oil	Type	Quantity
Anderol 755	Synthetic	10 liters
Anderol 750 (equivalent)	Synthetic	10 liters
Shell Corena S2 P150 (equivalent)	Mineral	10 liters

#### Anderol 755

ANDEROL 755 is an ISO 150 synthetic di-ester based compressor lubricant specifically designed to provide long term lubrication in air and process gas compressors. It provides outstanding performance characteristics in splash lubricated reciprocating compressors.

PROPERTIES	TEST METHOD	ANDEROL 755
Viscosity, cSt		
@ 40 °C	ASTM D 445	136,3
@ 100 °C	ASTM D 445	12.6
Pour point, °C	ASTM D 97	-39
Flash point, COC, °C	ASTM D 92	264
Density, 15°C kg/l	ASTM D 4052B	0.964
Demulsibility, @ 82°C, mL oil/water/emulsion (min)	ASTM D 1401	10

- For more information please refer to the material safety data sheet (MSDS).
- Do not use another type of oil without prior written approval of the compressor manufacturer.
- Do not mix different brand and type of oils.
- If you will change the oil you use with another approved brand of oil, refill with the new oil after you make sure that you drain the old oil completely in the crankcase.
- Refill the oil every year unless you reach the replacement time of the oil stated in the Maintenance Table.

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### **2.9. Electrical Controls**

#### **IMPORTANT:**

Although all electrical instructions addressed to the reader directly, the actual inspection, wiring, installation, maintenance, repair, etc. must be carried out by licensed and certified electricians only.

Make electrical connections to the compressor in accordance with the wiring diagrams and in full compliance with all applicable federal, state and local standards, codes and regulations, including those dealing with the earthing requirements. A few electrical checks should be made to insure that the first start-up will be trouble free. Make the following checks before attempting any start up:

- a.** Check line voltage. Verify that the compressor motor corresponds with these specifications.
- b.** Check the electrical motor nameplate to verify the compliance with the available power and electrical supply.
- c.** Check tightness of all electrical connections including those in the electrical panel of the compressor.
- d.** At start up, check the direction of rotation to insure that flywheel rotates to the direction of the arrow on it. Although a few minutes of operation in the wrong direction of rotation will not seriously damage the compressor, it will cause serious damages on the compressor if it runs in this position for a long time as the cooling air flow will be reversed, the compressor cylinders cannot be cooled down and the oil pump will not pump oil, the compressors will run without lubrication.

Check starter and max. load for conformity with the motor power and current data.

#### **2.9.1. Wiring**

It is important to select the right size and capacity wire and fuses. Install a switch with magnetic protection and a capacity of bigger than the motor full load current on the wall.

### **2.10. Storage**

#### **NOTE:**

If the compressor will not be working but stored for a long time, you need to operate the compressor at least twice a month for 1 hour to lubricate inner parts in failure to do so, the oxidization may arise on the inner parts and cause trouble for the operator and compressor during next start up.

## MAINTENANCE

### **3. General**

As you proceed through this section, it will be easy to see how simple to maintain the compressor. By following these recommendations, you will get long and trouble free operation from your air compressor. The following are general guidelines for periodical maintenance; specific details will be mentioned in the following chapters. Use the **Maintenance Table** for maintenance and keeping records.

#### **CAUTION !**

Before attempting any maintenance or service work, isolate the compressor by switching off the power and blowing down the pressure inside all equipment like the filters, purifiers, piping, etc. If a bank system exists, isolate by closing the appropriate valves.

#### **CAUTION !**

The priority is working hours for the compressor control and part replacement. However, if the specified working hours do not expire depending on the operating conditions of the compressor, the specified periods (3 months, 6 months etc.) must be taken into consideration.

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The following warnings should be observed at all times.

- Take care not to let pollutants such as oil and water spill on the compressor.
- Make sure that there are no foreign materials in the vicinity of the compressor in each assembly process, operating tests and oil changes.
- Do not apply paint to labels, pipes, valves or bare parts.
- When disassembling and assembling the valves, check that the compressor is closed and there is no pressure from the manometers.

### **CAUTION !**

Do not repair the piping system of the compressor. In such a case, contact the manufacturer. It is dangerous to assemble the pipes without pressure tests.

### **3.1. Planned Maintenance (Hourly)**

#### **In the first 50 hours**

- First oil change
- Oil filter change

#### **Every 500 hours**

- Oil change
- Oil filter change
- Belt tension control
- Revision of pneumatic valves
- Muffler filter change

#### **Every 1000 hours**

- 500 hours maintenance
- Suction filter change
- Check suction and discharge valves
- Check rings

#### **Every 2000 hours**

- 1000 hours maintenance
- Oil seal change
- Belt change
- Measure & check cylinder liners
- Valves change
- Rings change
- 2<sup>nd</sup> and 4<sup>th</sup> stage piston change

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### 3.2. Planned Maintenance (On a daily basis)

#### Daily

- Clean the compressor
- Check the air and water leaks at the pipes and joints
- Check the oil level from the oil dipstick
- Check the oil pressure
- Check the stage pressures

#### Weekly

- Operate the compressor for at least 30 minutes

#### Monthly

- Check the tightness of the bolt connections

#### Quarterly

- Check the zincs

#### Yearly

- Change the oil at least once.

### 3.3. Oil Change

The oil used in the compressor is **Anderol 755**. The amount of oil used is 10 liters. Do not use any oil other than the recommended oils.

**WARNING:** The oil filter should be cleaned every time oil changes.

At the end of the first 50 hours, after every 500 hours or once a year, the compressor oil should be changed.

The following order should be followed for oil change.

- Make sure that the main switch is in the off position.
- Free container is provided for used oil.
- The oil drain plug is removed.
- Discharge the oil by setting the drain valve to the open position.
- The drain valve is closed.
- The drain plug is installed.
- The crankcase vent pipe (Ø16) is manually removed from the coupling socket on the oil retainer body.
- The socket supplied with the oil canister is mounted on the mouth by opening the oil canister.
- The plug in the extension end is fitted with a vent pipe (Ø16) to make the oil filling (10 liters).
- The vent pipe is detached from the extension end and attached to the oil retainer body.



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### **3.4. Oil Filter Cleaning**

It is necessary to clean the oil filter together with the oil every 500 hours. Cleaning is done in the following way.

- Make sure the main switch is in the off position.
- Remove the oil filter by turning it with two hands to the left.
- The filter is cleaned with diesel fuel.
- Fill the filter with Anderol 755 oil.
- Install again the oil-filled filter by turning it to the right.

### **3.5. Suction Filter Change**

A filter element is changed every 1000 hours.

- The suction filter is removed by separating the upper cover latches.
- The filter element inside is removed from its place.
- Replace the new filter and close the top cover.

### **3.6. Spare Parts for 5K2021003M type Electric Motor**

<b>No</b>	<b>Part No</b>	<b>Explanation</b>	<b>For a motor</b>
1	1KMRK2002M	Coal, K.200, Mersen EG319P Kalt. 16x32x45mm	12 Adet
2	1RU6313R3M	Front bearing, 6313 , C3 , P0 , plastic cover	1 Adet
3	1RU6314R3M	Back bearing , 6314 , C3 , P0 , plastic cover	1 Adet

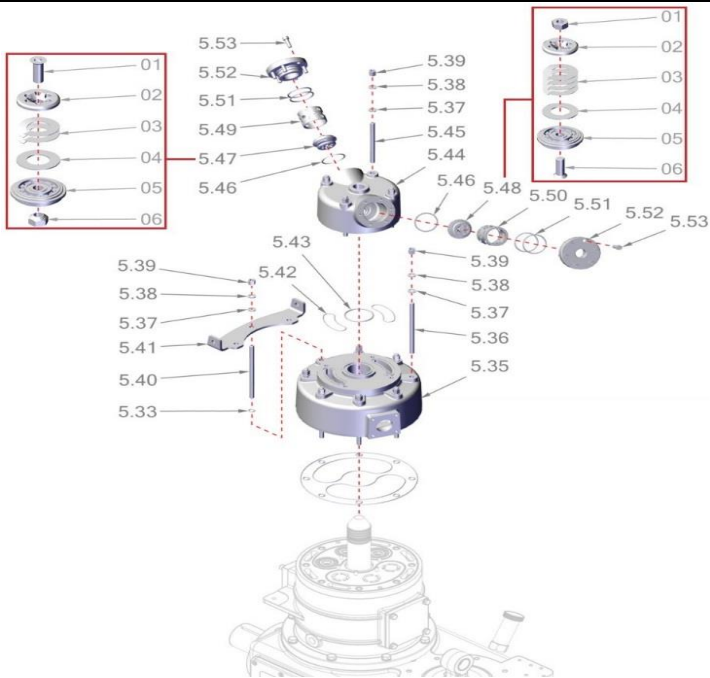
### **3.7. 1<sup>st</sup> and 3<sup>rd</sup> Stage Maintenance**

#### **Removal and Installation of 1<sup>st</sup> and 3<sup>rd</sup> Stage Valves**

Since these valves are on the same cylinder block, following the sequence of operations will facilitate disassembly.

- All of the water and air pipes connected to the top cover of the 3<sup>rd</sup> stage valve is removed from both ends by means of the appropriate wrench.
- Remove the hexagon bolts (M8x45) on the 3rd stage valve covers (5.39) using the appropriate wrench.
- Remove the cover by pulling it in the direction of the hole axis.
- Suction (5.41) and force (5.36) valves are removed.
- Repair or replacement is done.
- Place the valve elements according to the order shown. O-rings should be lubricated with heat-resistant grease.

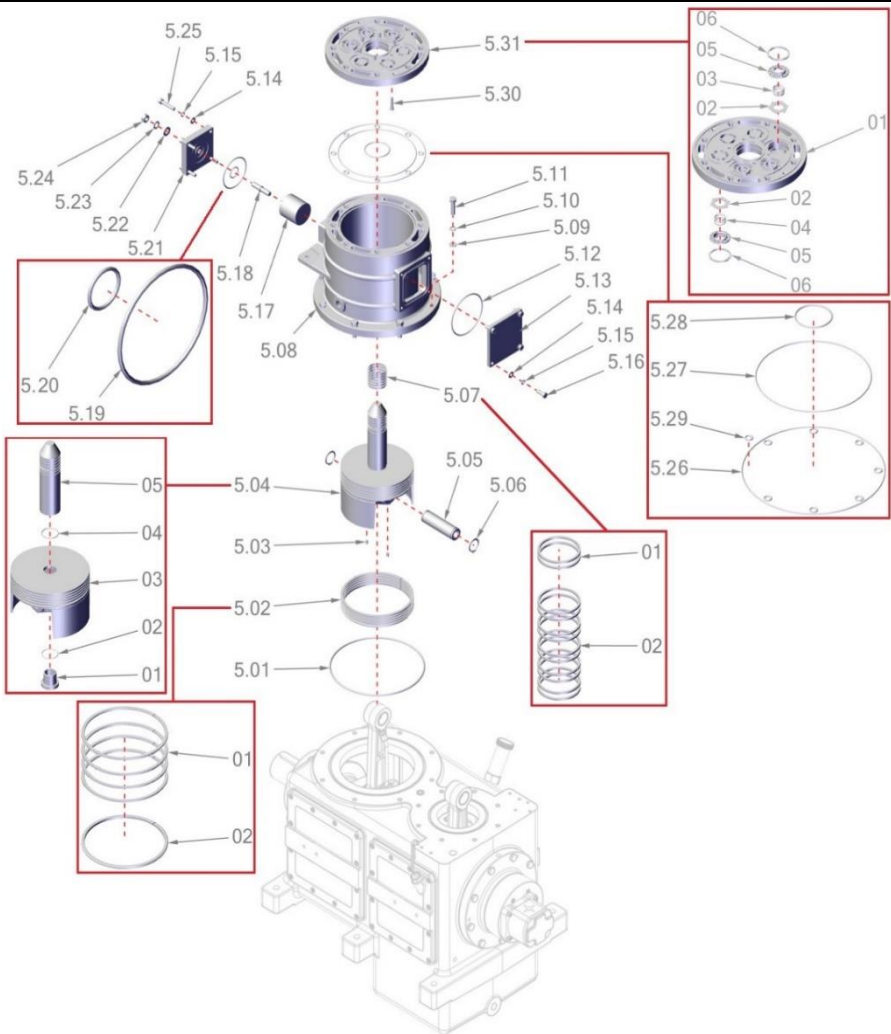
# HW1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS



**WARNING:** The suction and force valve connectors (5.37 and 5.42) look similar but are different from each other. Do not change their places.

- The valve covers are inserted by pushing in the direction of the hole.
- The hexagon bolts (M8x25) are screwed into place.
- To reach the 1st stage valve, the stud nuts (5.43) holding the valve cover are removed.
- The top cover is removed from its place.
- The heat exchanger connection plate (5.32) is removed.
- The suction tube and the force tube connected to the first stage (both ends) are removed.
- The nuts (M10x13,80) on the 3rd stage cylinder (5.28) are removed.
- The cylinder is carefully pulled up without damaging the piston rings.

# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS



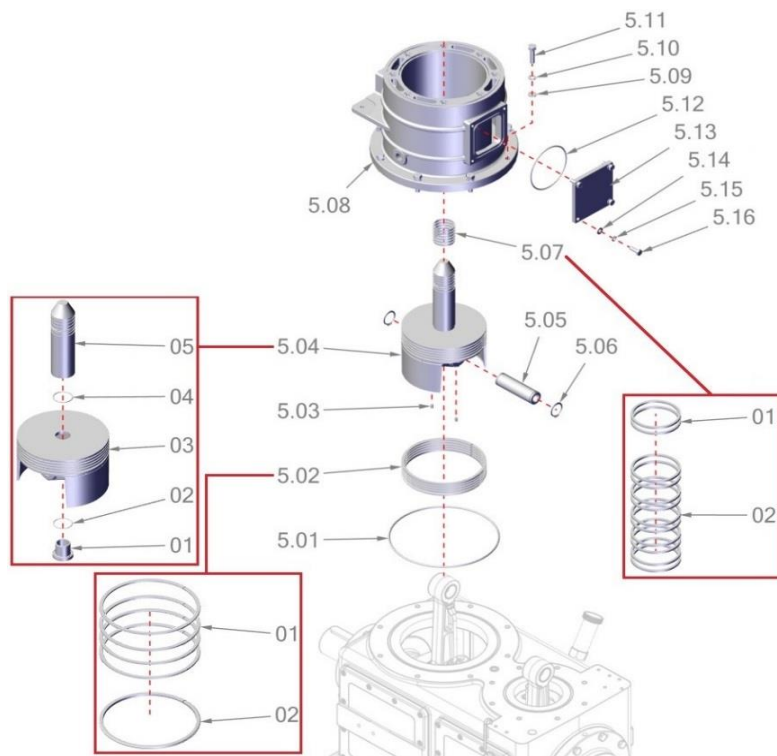
- The six hexagon bolts on the 1st stage valve (5.26) fitted on the cylinder (5.28) are removed.
- The cylinder (5.28) is placed on a flat floor with the valve on top.
- Two bolts on the valve are fitted to the M8 holes simultaneously and tightened. This will allow the 1st stage valve to disengage from the cylinder.
- When replacing the new valve, O-rings (5.21, 5.22, 5.23) should also be lubricated with grease resistant to high temperatures.

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### Removal and Installation of 1. and 3. Stage Piston Rings

- The plates of the heat exchangers are removed by disconnecting the cylinder (5.07) and the crankcase. If there are connected pipes, remove them.
- The bolts (5.09-M10x50) connected to the crankcase of the first stage cylinder (5.07) are removed.
- The cylinder is carefully pulled up.

**WARNING:** During removal, the piston will be free, so make sure that the piston does not hit the crankcase.

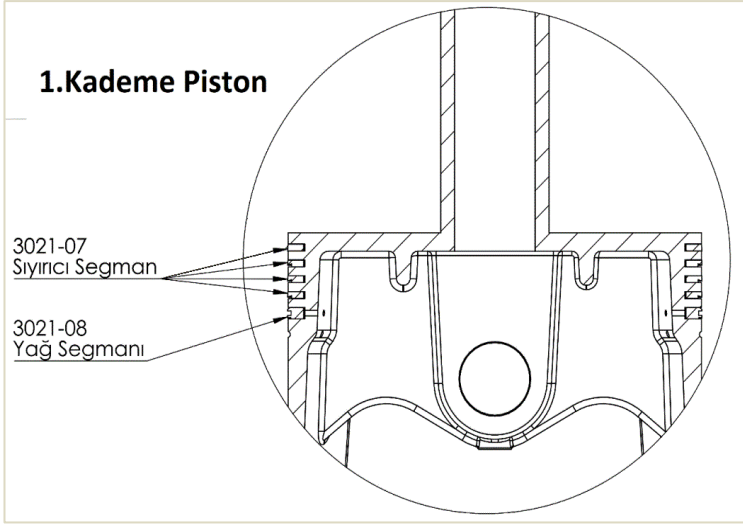


- One of the safety rings (5.05) is removed by a piston ring pliers to separate the 1st stage piston (5.03) from the connecting rod.
- Remove the piston pin (5.04).
- Take the piston to a clean surface.
- With the aid of the piston ring pliers, the piston rings on the 3rd stage piston (5.06) are removed.

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- With the help of the piston ring pliers, the piston rings (5.02) on the 1st stage piston are removed.
- The piston is thoroughly washed with a cleaner (diesel) before piston rings are installed. Make sure that there are no pollutants such as dust on the piston.
- Attach the new piston rings with the help of the piston ring pliers, paying attention to the order shown in the detailed image. The piston rings are installed in a way that the sides marked with "TOP" are fitted on the top.

**WARNING:** Each piston ring should be positioned so that its opening forms an angle of 180° with the upper opening.



- The cylinder liners are measured with the help of the comparator. The cylinder liners out of the following wear tolerance should be sent to ALKIN for replacement.

### **Wear Tolerances**

#### **1<sup>st</sup> Stage cylinder liner**

Design Dimension : Ø195

Wear Limit : Ø195,15 mm

#### **3<sup>rd</sup> Stage cylinder liner**

Design Dimension : Ø50

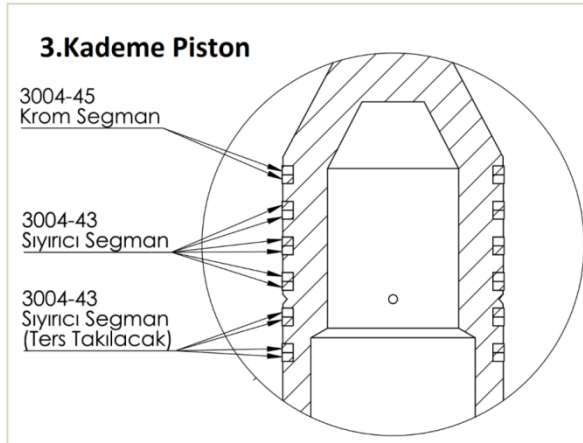
Wear Limit : Ø50,15 mm

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### 1<sup>st</sup> Stage Piston Pin

Piston Pin	: 32.00
Piston Pin Hole	: 32.01
Allowed Space	: 0.2 mm

- The piston pin hole is centered on the connecting rod hole and the piston pin is fitted in place.
- The snap ring is fitted to the pin socket with the piston ring pliers.
- The piston is brought to the flat position by putting the wooden support material under the 1st stage piston skirts.
- The new O-ring (5.01) is greased and is seated in the channel under the 1st stage cylinder.
- The piston rings on the 1st stage piston are tightened with piston ring fitting. While one person is doing this process, the other person places the 1st stage cylinder carefully in the piston.
- The pulley is manually moved to center the piston with the cylinder.
- M10x50 bolts (5.09) are mutually tightened.



- The piston rings of the 3rd stage piston are fitted with the help of a piston ring pliers in the order shown in the detailed image. The piston rings are installed in a way that the sides marked with "TOP" are fitted on the top.

**WARNING:** Each piston ring should be positioned so that its opening forms an angle of 180° with the upper opening.

- Firstly, O-ring (5.21) is greased and seated on the channel on the 1st stage cylinder.

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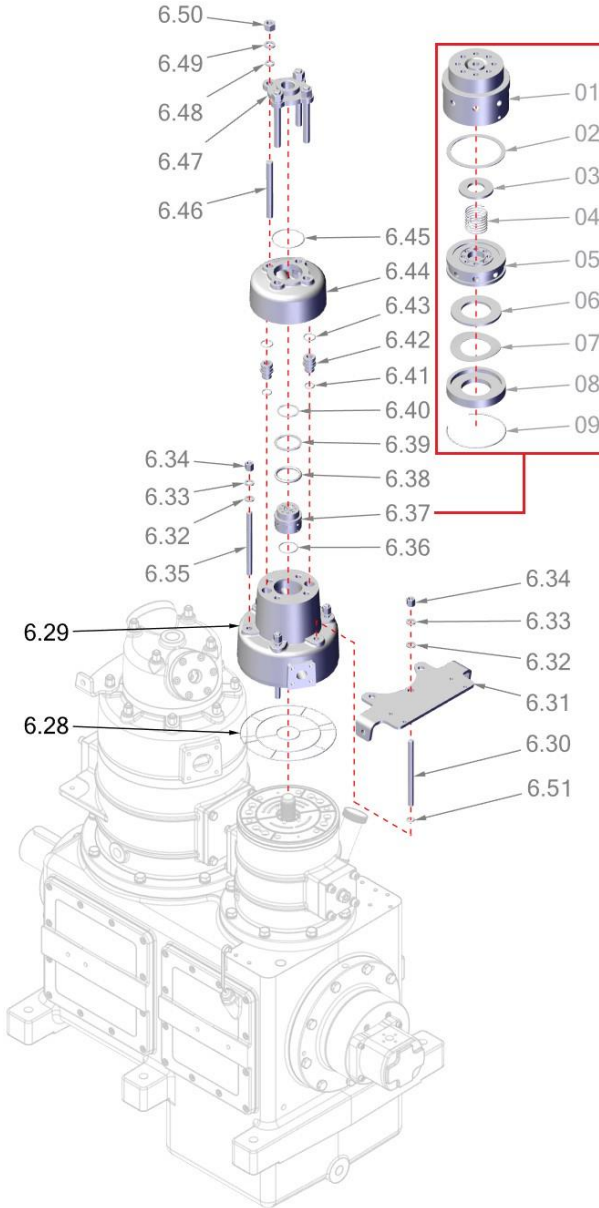
- Make sure that the O-rings (5.21, 5.22, 5.23) are greased and seated on the channels under the 1st stage valve are greased.
- With the aid of the piston ring fitting, the piston rings are tightened and the cylinder is carefully placed.
- The pulley is moved and the cylinder and the piston are centered.
- The other elements are fixed in the same way as they are dismantled.

### **3.8. 2<sup>nd</sup> and 4<sup>th</sup> Stage Maintenance**

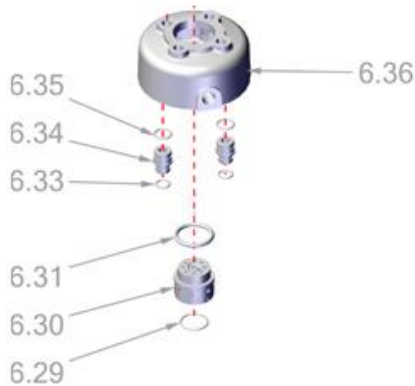
#### **Removal and Installation of 4<sup>th</sup> Stage Valve**

- Since these valves are on the same cylinder block, following the sequence of operations will facilitate disassembly.
- All the water and air pipes connected to the top cover of the 4th Stage Valve are removed from both ends with the aid of the appropriate wrench.
- Remove the 4 pieces of M12 reinforced nuts on the 4th stage valve cover (6.36).
- The cover is pulled out by turning in the direction of the hole axis.
- On the top of the 4th stage valve (6.36), any M6 bolt is tightened and the valve is pulled out by turning in the direction of the hole axis.
- Repair or replacement is done.

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- When installing the valve, the O-rings (6.29, 6.31) are also lubricated with heat-resistant grease and installed.
- The valve is pushed in the direction of the hole axis and placed in the housing.

#### **Removal and Installation of 2<sup>nd</sup> Stage Valve**

- The M10x13.80 (6.28) nuts on the 4th Stage are disassembled with the appropriate wrench.
- The exchanger joint plates and the water inlet manifold and the connected pipes and the manometer panel are removed.
- The outlet pipe and the inlet pipe connected to the 4th stage are removed (both ends).
- The 4th stage cylinder (6.24) is carefully pulled up without damaging the piston rings.
- Remove 4 pieces of M5x20 (6.22) hexagon bolts on the 2nd stage valve (6.23) fitted on the cylinder (6.24) are removed.
- The cylinder (6.24) is placed on a flat floor with the valve on top.
- 2 bolts suitable for the M6 hole are mounted simultaneously on the valve. This will ensure that the 2nd stage valve disengages from the cylinder.
- When replacing the new valve, the O-rings (6.21) should also be lubricated with heat-resistant grease and replaced.

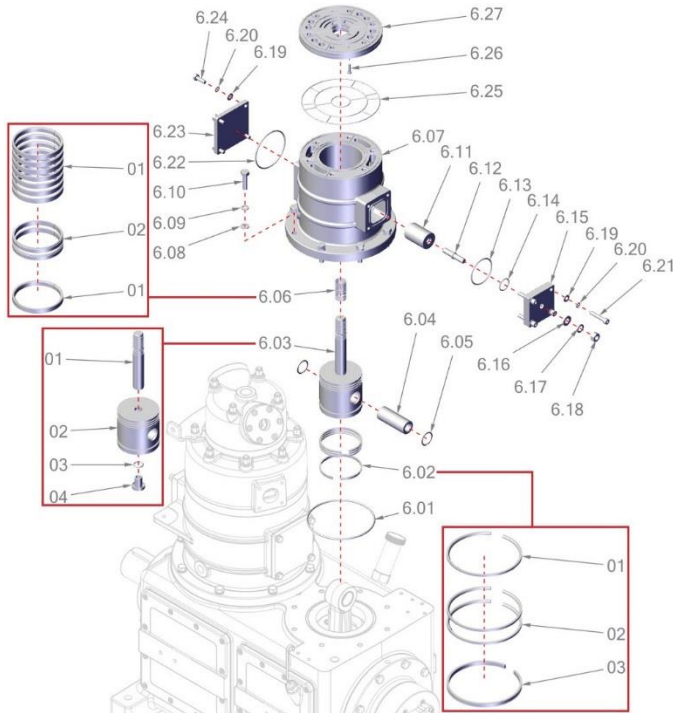
#### **Replacement of 2<sup>nd</sup> and 4<sup>th</sup> Stage Piston Rings and Pistons**

- The plates on which the heat exchangers are connected and the crankcase are removed. If there are connected pipes, remove them.
- The bolts (6.09-M10x50) connected to the crankcase of the 2nd stage cylinder (6.08) are removed.

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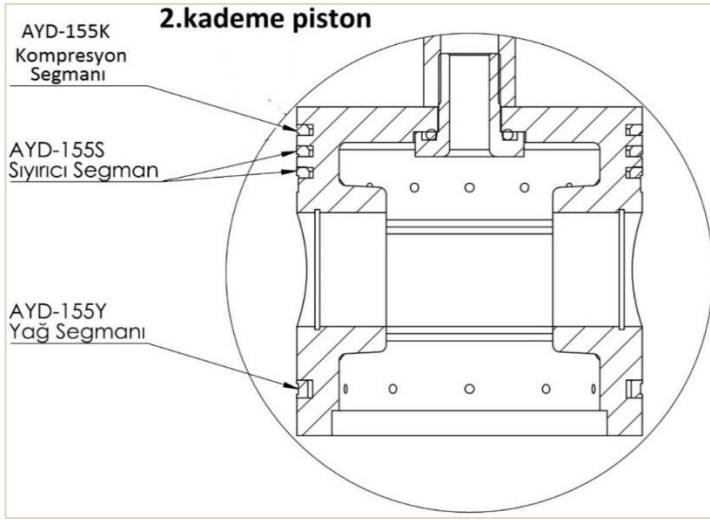
- The cylinder is carefully pulled upwards and removed.

**WARNING:** During removal, the piston will be free, so make sure that the piston does not hit the crankcase.



- One of the snap rings (6.05) is removed with the piston ring pliers to separate the 2nd and 3rd stage piston (6.03) from the connecting rod.
- Remove the piston pin (6.04).
- The piston is taken to a clean surface.
- With the help of the piston ring pliers, the piston rings on the 4th stage piston (6.06, 6.07) are removed.
- With the help of the piston ring pliers, the piston rings on the 2nd stage piston (6.02) are removed.
- The piston is thoroughly washed with the aid of a (cleaner) diesel fuel before piston rings are installed. Make sure that there are no pollutants such as dust and oil on the piston.

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- Attention is paid to the order shown on the detailed image while installing the new piston rings on the 2nd stage piston with the help of the piston ring pliers. The piston rings are installed in a way that the sides marked with "TOP" are fitted on the top.

**WARNING:** Each piston ring should be positioned so that its opening forms an angle of 180° with the upper opening.

- The cylinder liners are measured with the help of the comparator. The cylinder liners out of the following wear tolerance should be sent to ALKIN for replacement.

### **Wear Tolerances**

#### **2<sup>nd</sup> Stage cylinder liner**

- Design Dimension : Ø95.50
- Wear Limit : Ø95,60mm

#### **4<sup>th</sup> Stage cylinder liner**

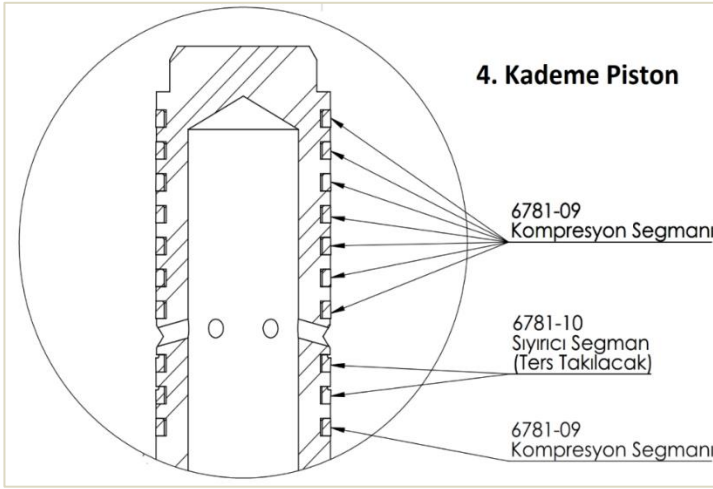
- Design Dimension : Ø25.40
- Wear Limit : Ø25,45mm

#### **2<sup>nd</sup> Stage Piston Pin**

- Piston Pin : 32.00
- Piston Pin Hole : 32.01
- Allowed Space : 0.2 mm

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- If a piston change is required (every 2000 hours), it is done.
- The piston pin hole is centered on the connecting rod hole and the piston pin is fitted in place.
- The snap ring is fitted to the pin socket with the piston ring pliers.
- The piston is brought to the flat position by putting the wooden support material under the 1st stage piston skirts.
- The new O-ring (6.01) is greased and is seated in the channel under the 2nd stage cylinder.
- The piston rings on the 2nd stage piston are tightened with piston ring fitting. While one person is doing this process, the other person places the 2nd stage cylinder carefully in the piston.
- The pulley is manually moved to center the piston with the cylinder.
- M10x50 bolts (6.09) are mutually tightened.



- The piston rings of the 4th stage piston are fitted with the help of a piston ring pliers in the order shown in the detailed image. The piston rings are installed in a way that the sides marked with "TOP" are fitted on the top. The ones that are to be fitted reversely are attached to the bottom.

**WARNING:** Each piston ring should be positioned so that its opening forms an angle of 180° with the upper opening.

- Firstly, O-ring (6.21) is greased and seated on the channel on the 2nd stage cylinder.

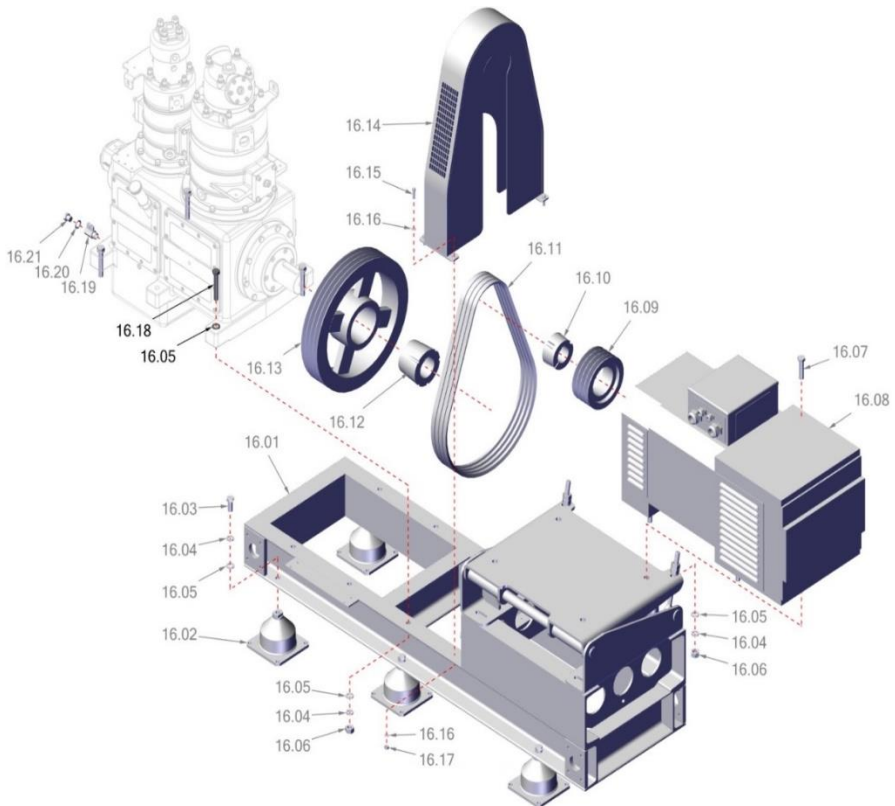
## HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

- Make sure that the O-rings (6.21) are greased and seated on the channels under the 2nd stage valve are greased.
- With the aid of the piston ring fitting, the piston rings are tightened and the 4th stage cylinder (6.24) is carefully placed.
- The pulley is moved and the cylinder and the piston are centered.
- The other elements are fixed in the same way as they are dismantled.

### 3.9. Replacement of Crank

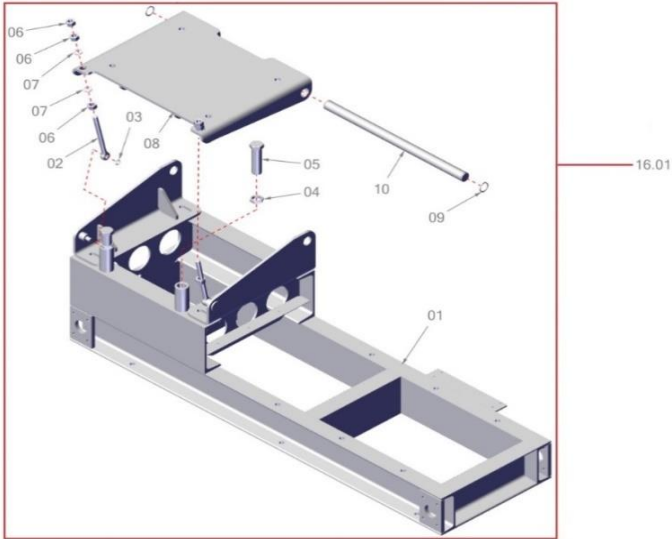
As described in stage 1 and 3, and stage 2 and 4 maintenance sections, after removal of the pistons from the connecting rods, crank replacement is carried out by following the steps below.

- Be sure that all pipes are removed.
- Remove all water separators from the crankcase.

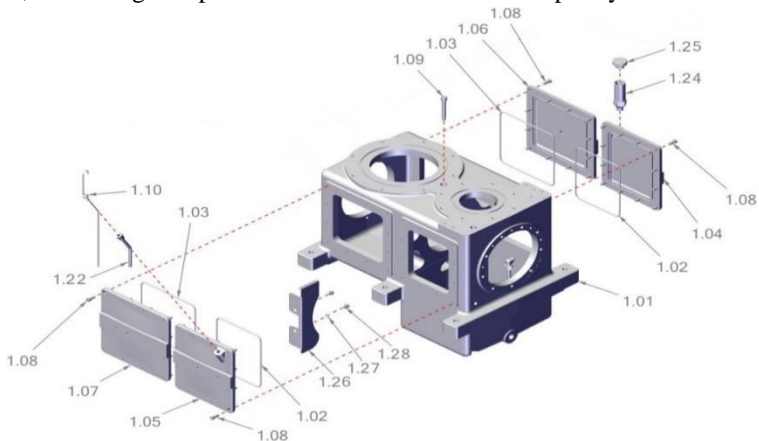


The pulley housing (6.15) bolts (16.16) are removed.

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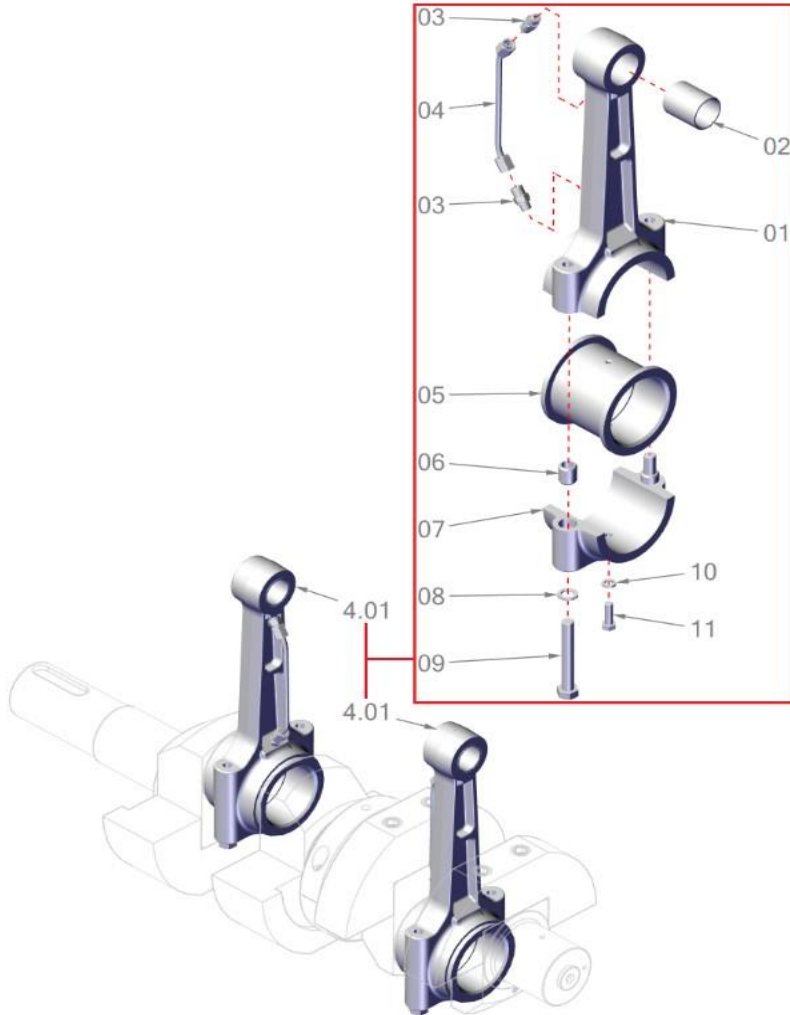


- Remove the nuts (16.01.06) on the engine tensioning bolts (16.01.02) (M16). The nuts under the slide are loosened to the bottom.
- Open the counter nut (16.01.04) of the belt tensioning jack (16.01.05) and turn the belt tensioning jack in the tightening direction.
- With this operation, the engine is lowered and the belts (16.12) are removed.
- Two hexagon bolts on the hub of the pulley (16.14) are removed.
- The same bolt is screwed into the empty holes on the bushing (16.13) and tightened clockwise. It is ensured that the pulley and the busing are separated from each other.
- First, the busing is separated from the crank. Then the pulley is removed.



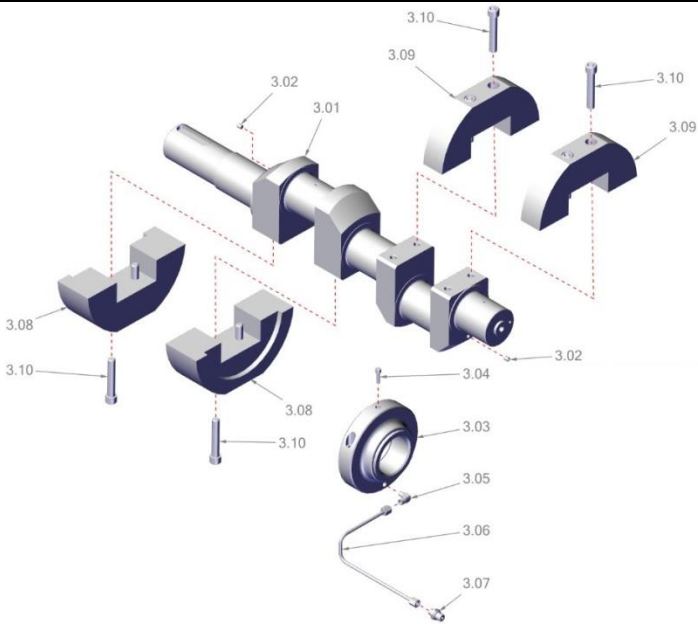
## HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

- The side covers of the crankcase (1.05, 1.06, 1.07, 1.08) are dismantled by removing the hexagon bolts M8x20.

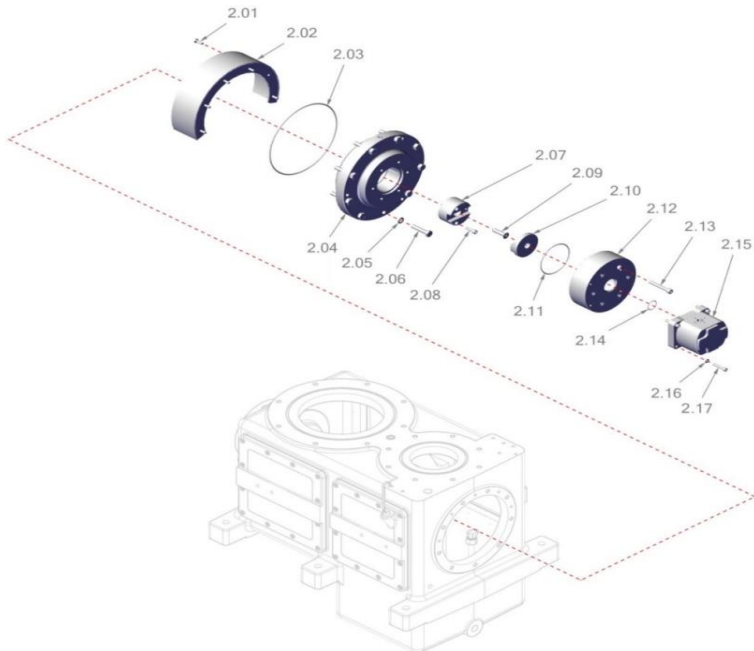


- The bolts (4.09) under the connecting rods are disassembled using the appropriate wrench.
- The connecting rod lower parts (4.07) are pulled downwards.
- The connecting rods are removed from the crankcase.
- The connecting rod is combined with the bolts of the lower and upper parts to measure the hole.

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- The crank weights (3.02, 3.13) are removed by unscrewing the bolts (3.03).

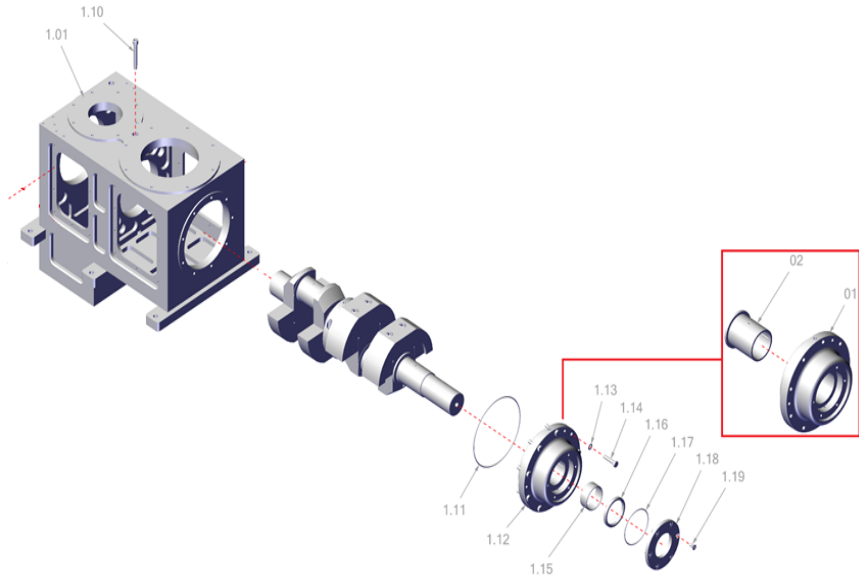




## HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

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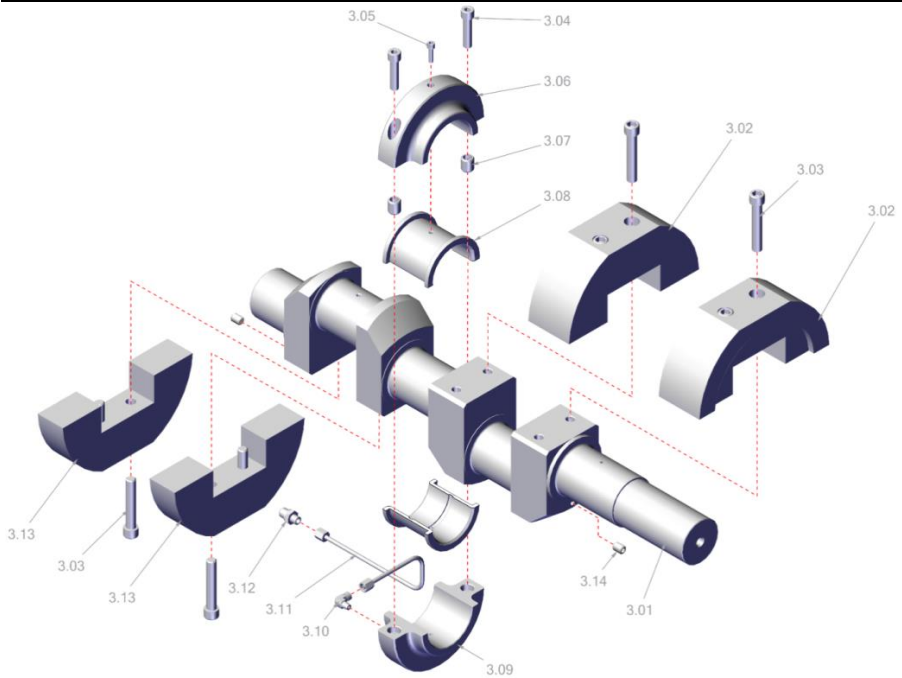
- The oil pump (2.13) bolts (2.15) are removed.
- The connector (2.10) is removed from the crankcase together with the oil pump by unscrewing the bolts (2.11).
- The bolts (2.06, 2.07) on the female coupling (2.05) are removed and the coupling is removed from the crank.
- The screws (2.04) on the crank bearing (2.02) are removed. The bearing is separated from the crankcase and the crank.



- To remove the crank bearing (1.12) on the pulley side, first the oil seal (1.18) bolts (1.19) are removed. M6 bolts are inserted into the two holes on the seal cover with pass and the seal cover is removed by pulling out. If only oil seal is to be replaced, the seal is separated from the cover by means of a screwdriver. The new seal is nailed in the cover.
- The crank bearing bolts (1.14) are removed. The crank bearing (1.12) is removed from the crankcase and crank by pulling out. The bolt (1.10) fixed on the crankcase is removed.

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- The elbow (3.10) on the center bearing is removed by first dismantling the pipe connection.
- The crank is carefully removed from the crankcase with the middle bearing.
- The bolts (3.04) on the middle bearing are removed and the bearing is separated from the crank.
- The two-piece bearing is again bolted and measured. Other bearings and crankshaft bearing diameters are measured. The following wear tolerances are compared with measurements made.

### **Crank and Bearing**

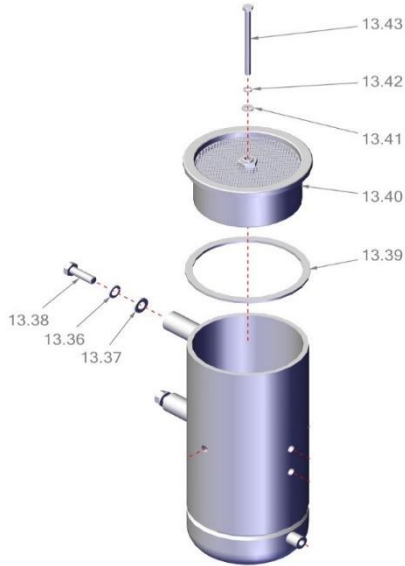
Design Space : 0,065 (min), 0,090 (max.)

Allowed Space : 0.2 mm

- New cranks and bearings are installed following the dismantling process reversely. All dismantled O-rings are replaced with new ones. The O-rings to be fitted are greased and placed.

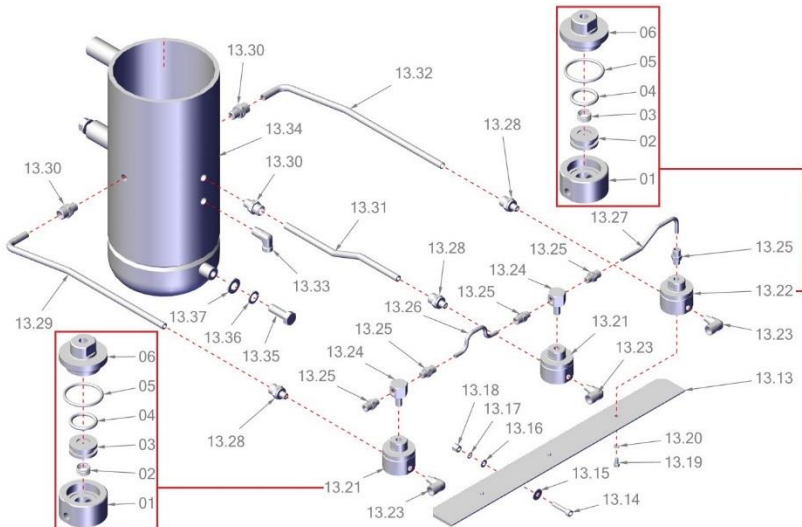
# HW 1500 SERIES HIGH PRESSURE WATER COOLED AIR COMPRESSORS

## 3.10. Replacement of Muffler Filter Element



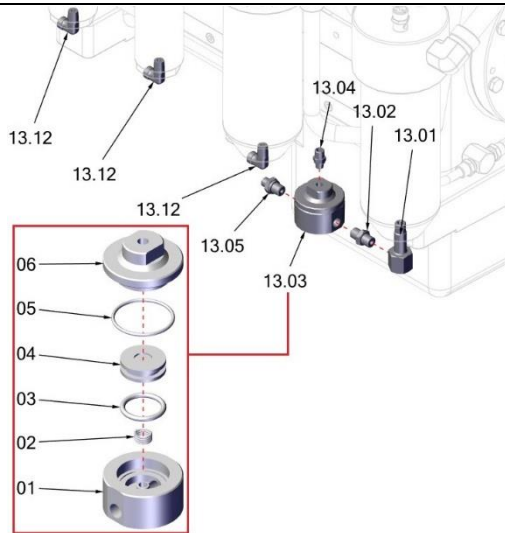
- The nut on the muffler filter element (13.25) is removed.
- The filter element is removed. The new seal (13.24) and filter element are inserted and the nut is tightened.

## 3.11. Revision of Pneumatic Discharge Valves



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- The compressor has 3 pneumatic valves. The 2nd Stage (13.07), and the 3rd Stage (13.07) are called Low Pressure pneumatic valves and the 4th Stage is called the High Pressure Pneumatic Valve (13.17). The revision of the valves is done as follows.
- Disconnect the pipe connections and nipples (13.06) of the pneumatic valves.
- The upper covers (6436-04) of the 2nd, 3rd and 4th stage relief valves (6436-01, 6436-03) are removed by turning counterclockwise with the help of an open-ended 22 wrench.
- The O-rings (6436-10) under all covers removed are replaced with new ones.
- From the position of the piston (6436-12), which is mounted on the disassembled cover (6436-04), the pneumatic discharge valve is removed by spraying air between 1 bar and 7 bars in the hole of the 1/8" fitting (7423-01) above the top cover. (Since the piston (6436-12) may pop out during the removal because of the sprayed air, this possibility should be considered.) The removed piston (6436-12) will not be used again.
- When the pistons (6436-12) are removed, the spring will come out between the piston and the valve top cover in one of the pneumatic discharge valves. These pneumatic discharge valves are the ones that serve high pressure stages (6436-01). Because the springs that come out during this process will not be used, they are disposed of.
- In two of the pneumatic valves, this spring is under the piston and in the valve body. These pneumatic valves are pneumatic discharge valves at low pressure stages (6436-03).

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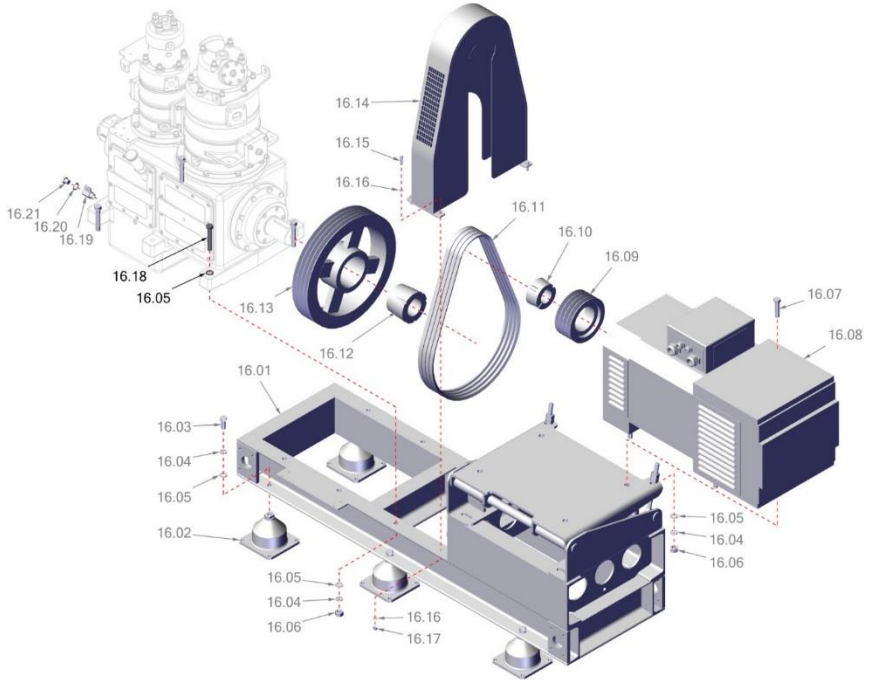
### HIGH PRESSURE WATER COOLED AIR COMPRESSORS

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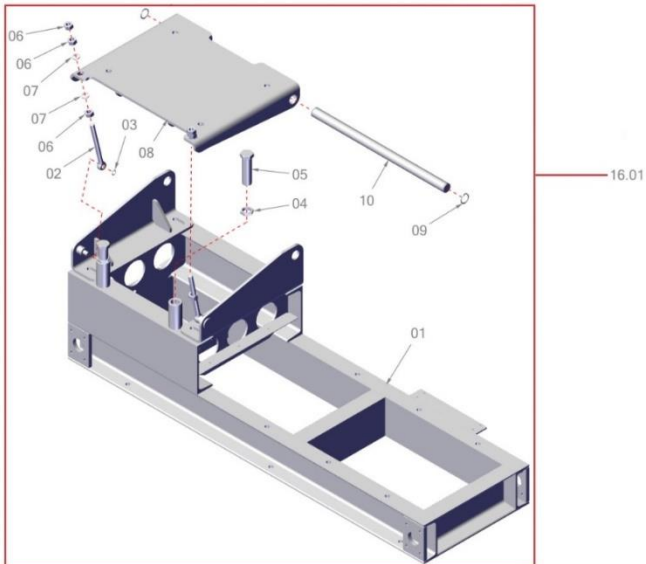
- The pneumatic valve cover (6436-04) and its body (6436-06) removed are washed with oil remover and dried with compressed air. Meanwhile, the compressed air is sprayed to the hole inside the pneumatic valve body again to check whether the hole is open. If the hole is clogged, the hole is opened with a thin wire.
- The springs (6436-11) are taken from the repair kit prepared by the manufacturer and placed in the middle section of the pneumatic discharge valve body (6436-06). The O-ring (6436-08) on the piston (6436-12) (on the piston O-ring) taken from the kit is lubricated with special molykote oil (80516-80). The pistons are seated in the valve top cover (6436-04) so that the teflon portion on the top of it remains on top. The O-ring (6436-10) is taken from the kit to fit into the O-ring channel on the cover and placed in a thinly creamed manner. The cover (6436-04) that has been assembled is manually tightened to the body (6436-06). The pneumatic valves serving the low pressure stages are thus assembled.
- From the repair kit prepared by the manufacturer, the piston (6436-12) mounted on the O-ring (6436-08) is seated in the valve body (6436-15) in such a way that the teflon portion of the piston faces downwards. The spring (6436-11) taken from the repair kit is then placed on the stepped portion on the piston. Then the valve top cover O-ring is replaced with the large diameter new O-ring (6436-10) from the kit and then tightened clockwise on the spring (6436-11). In this way, the assembly of pneumatic discharge valves that serve the high pressure stages is completed.
- Nipples should be wrapped in teflon or locktite should be used when placed.
- Other stainless pipes removed from pneumatic discharge valves are also installed in their places.
- To control the pneumatic discharge valves assembled, the compressor is started and the pressure is increased. The compressor is stopped. When the compressor is stopped, it should be seen that the manometers showing interstage pressures are reset. If the manometers are reset, then there is no problem with pneumatic discharge valves. But if interstage pressures do not decrease, there is a problem with the pneumatic discharge valves. In this case, pneumatic discharge valves need to be checked again.

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## 3.12. Revision of Oil Seal



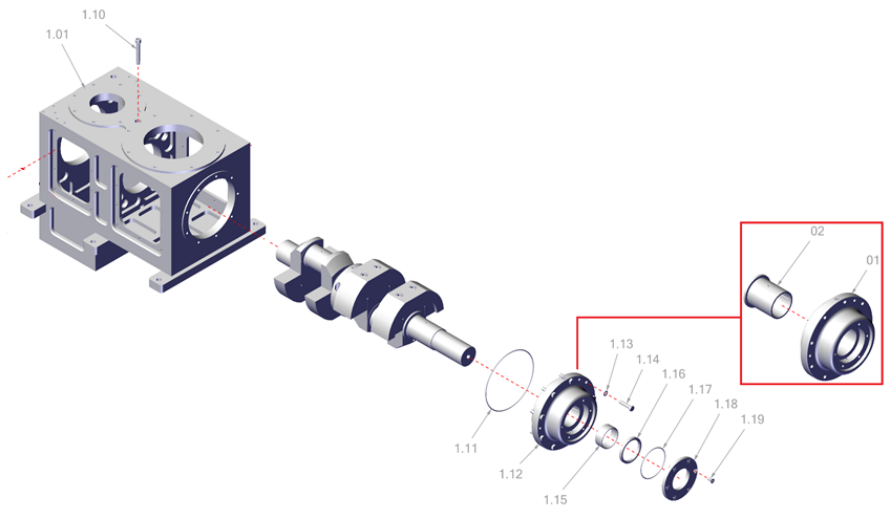
- The pulley housing (6.15) bolts (16.16) are removed.



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- Remove the nuts (16.01.06) on the engine tensioning bolts (16.01.02) (M16). The nuts under the slide are loosened to the bottom.
- Open the counter nut (16.01.04) of the belt tensioning jack (16.01.05) and turn the belt tensioning jack in the tightening direction.
- With this operation, the engine is lowered and the belts (16.12) are removed.
- Two hexagon bolts on the hub of the pulley (16.14) are removed.
- The same bolt is screwed into the empty holes on the bushing (16.13) and tightened clockwise. It is ensured that the pulley and the bushing are separated from each other.
- First, the bushing is separated from the crank. Then the pulley is removed.



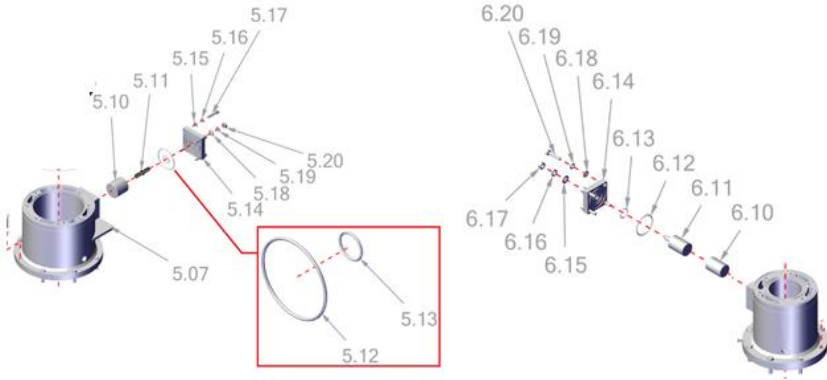
- The oil seal (1.18) bolts (1.19) are removed. M6 bolts are inserted into the two holes on the seal cover with pass and the seal cover is removed by pulling out.
- The seal is separated from the cover by means of a screwdriver.
- The new seal is nailed in the cover.
- Assembly process is done in the reverse order of the disassembly.

### 3.13. Revision of Zinc

Zincs are located on the 1st and 2nd stage cylinders.

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The bolts (5.17 or 6.17) on the zinc cover are removed.

The zinc is removed with the cover.



**SECTION  
4**

**TROUBLESHOOTING**

**4.1 COMPRESSOR DOES NOT WORK**

- |                                      |  |
|--------------------------------------|--|
| • No power                           | Control power line and turn power key ON.  |
| • Motor starter overload tripped     | Start and check if trips again. If it does, check if compressor in not staying under load. |
| • Pressure switch not making contact | Check all the terminals and wires. If pressure switch is defective, replace it.            |

**4.2 EXCESSIVE NOISE DURING OPERATION**

- |   |   |
|---|---|
| • Loose sheave, flywheel, belt, belt-guard, intercooler, bolts or accessories | Detect and tighten.   |
| • Faulty vibration mounts   | Check if the mounts are in good condition; if damaged, replace.                                   |
| • Lack of oil in the crankcase  | a. Check for possible damage to bearings.<br>b. Refill oil and check if the noise persists        |
| • Piston hitting the valve plate  | Remove the compressor cylinder head; replace the gasket with the brand new gasket and reassemble. |
| • Deflected crankshaft or crankshaft bearing failure                          | Replace the crankshaft.   |
| • Excessive dirt or carbon on piston(s)                                       | Remove the compressor air heads; clean pistons and valve(s), or replace if worn; reassemble.      |

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### 4.3 COMPRESSOR KNOCKS

- |  |  |
|--|--|
| • Crankshaft bearing failure           | Replace bearings or crankshaft assembly.   |
| • Connecting rod journal bearings worn | Replace the connecting rods; if worn, replace the crankshaft bushing center as well. |
| • Wrist pins and journals are worn     | Replace complete pin and rod assembly.   |
- 

### 4.4 MILKY OIL IN THE CRANCKASE

- |   |  |
|---|--|
| • High moisture and dirt content in the ambient air | a. Pipe air intake from less humid source.<br>b. Change oil more frequently. |
|---|--|
- 

### 4.5 EXCESSIVE OIL CONSUMPTION

- |                               |  |
|-------------------------------|--|
| • Restricted air intake       | Replace intake filter element.                               |
| • Oil leaks.                  | Tighten bolts and fittings; replace gaskets                  |
| • Worn piston rings           | Replace piston rings.  |
| • Low oil viscosity           | Drain oil; refill with oil of proper viscosity               |
| • Piston rings misassembled   | If piston rings are upside down, install in proper position. |
| • Compressor tilted too much  | Level compressor.  |
| • Scored or worn cylinder(s). | Replace cylinders.   |
- 

### 4.6 OIL IN DISCHARGE AIR

- |   |   |
|---|---|
| • Restricted air intake                   | Replace intake filter element, check for other restrictions at the inlet. |
| • Worn piston rings                       | Replace piston rings  |
| • Excessive oil in the crankcase          | Drain to the overflow level   |
| • Low oil viscosity                       | Drain oil; refill with oil of proper viscosity                            |
| • Piston rings misassembled               | If piston rings are upside down, install in proper position.              |
| • Consumed purifier cartridge filling kit | Refill the Purifier cartridge with refilling kit.                         |
- 

### 4.7 COMPRESSOR VIBRATION

- |                                   |  |
|-----------------------------------|--|
| • Mounting bolts are loose        | Tighten the mounting bolts.                            |
| • Compressor not properly mounted | Level the compressor so that all feet touch the floor. |
-

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- Motor belt and the sheave misaligned      Align.

**4.8 AIR FROM INTAKE**

- Broken 1<sup>st</sup> stg. inlet valve      Replace its spring and disc

**4.9 INSUFFICIENT AIR AT THE POINT OF USE**

- Leaks or restrictions      Check for leaks and restrictions in the piping and hoses.
- Restricted air intake      Replace the intake filter element
- Slipping belts      Tighten the belts.
- Excessive air consumption      a. Limit the air consumption to the capacity of the compressor.
- Worn piston rings      b. Increase your air capacity with an additional compressor unit.
- Worn cylinders      Replace piston rings.

**4.10 PRESSURE VESSELS DO NOT HOLD THE PRESSURE WHEN THE COMPRESSOR IS UNLOADED**

- Check valve leaks      Relieve the pressure vessels and replace the check valve.
- Excessive leaks in the plant piping      Check the pipings, repair the leaks.

**CAUTION!**

Do not service tank, valves, piping, etc. while compressed air exists in the system. Drain the air inside before attempting any repairs.

**4.11 EXCESSIVE BELT WEAR**

- Sheaves misaligned      Realign the motor sheave and the flywheel.
- Belts too tight      Adjust tension
- Belts too loose      Adjust tension
- Sheave or crankshaft wobble      Check for worn or bent crankshaft, keyway or sheave bore

**4.12 EXCESSIVE DISCHARGE AIR TEMPERATURE**

- Dirty valves / carbon on valves      Remove valves; clean or replace.
- Dirty intercoolers and/or cooling surfaces      Clean cooling surfaces of the cylinders, intercoolers and aftercooler.

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• Poor ventilation and air circulation	Relocate the compressor, improve ventilation.
• Blown head gasket	Replace the head gasket.
• Restricted air intake	Replace the intake filter element.
• Worn valves	Repair or replace valves.
• Compressor rotating in the wrong direction	Correct the direction of rotation
• Low oil level	Check and refill.

---

### **4.13 AIR LEAKING FROM THE INTERSTAGE SAFETY VALVE**

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• Safety valve faulty	Replace the safety valve.
• Inlet valve of the next stage leaks	Remove the valves; clean or replace.
• Inlet valve of the next stage is broken	Remove the valves; replace.

---

### **4.14 PRESSURE SLOWLY RISING**

---

• Restricted air intake	Replace the intake filter element.
• Blown cylinder gasket	Install a new gasket.
• Worn or broken valves	Replace valves.
• Air leaks in the system	Check for leaks; fix the problem
• Loose belts	Adjust tension
• Low Compressor Speed	Check RPM

---

### **4.15 RECEIVER PRESSURE RISING TO FAST**

---

• Water in the system	Drain the system more often.
• High compressor speed	Check RPM

---

### **4.16 COMPRESSOR DOES NOT DISCHARGE WHEN STOPPED**

---

• Automatic drain valves blocked	Check, disassemble and clean the drain valves; install new o-ring and seat if necessary.
• Solenoid valve faulty	Check and replace solenoid valve.

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## HIGH PRESSURE WATER COOLED AIR COMPRESSORS

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### 4.17 AUTO DRAIN VALVES DO NOT DRAIN

- Automatic drain valves blocked      Check, disassemble and clean the drain valves; install new o-ring and seat if necessary.
- Solenoid valve faulty      Check and replace solenoid valve.

### 4.18 AUTOMATIC DRAIN VALVE(S) REMAIN(S) OPEN ALL THE TIME

- Low 2nd stg. control air pressure      Check the interstage pressures.
- Solenoid Valve faulty      Replace solenoid valve.
- Blocked drain valve(s)      Clean the drain valve(s).

### 4.19 COMPRESSOR DOES NOT ACCESS NOMINAL OPERATING SPEED

- Low voltage      Check the line voltage.
- Motor and control panel connectors loosen      Check it, tighten if needed.
- Poor power regulation (unbalanced phases )      Notify the power company.

### 4.20 UNUSUAL PISTON, RING OR CYLINDER WEAR

- Improper oil      Replace with the proper oil.
- Low oil level      Check the oil level and fix the problem, refill oil.
- Extremely dirty ambient conditions      Pipe the intake filter to a cleaner location if possible; alternatively use a heavy duty two stage filter.

### 4.21 ODOR IN COMPRESSED AIR

- Purifier cartridge saturated      Replace the cartridge.
- Improper oil      Replace with the proper oil.
- Wrong direction of rotation      Check the arrow; the compressor flywheel must blow air onto the cylinders; if the direction of rotation is wrong, reverse the phases and make sure it is running in the right direction.
- Carbonization on valves      Clean; make sure that the ambient temperatures are within permissible limits.







## DECLARATION OF CONFORMITY

**2014/35/EU - 2006/42/EC**

**MANUFACTURER:** ALKIN KOMPRESÖR SAN.VE TİC.LTD. ŞTİ.

**ADDRESS:** Cüneytbey mah. Tabaş yolu Küme evleri No:3 35470  
Menderes/İZMİR

Alkin Compressors declare that under our sole responsibility of supply/manufacture of this compressor to which this declaration relates is in conformity with the below standarts and the essential health and safety requirements identified in the above directives.

**Model** : HW 1500 SERIES

This statement is in compliance with the following standards and the above basic health and safety requirements.

**Standart No** EN 12100  
EN 60204-1  
EN 1012-1

**ALKIN** ALKIN KOMPRESÖR  
SAN.VE TİC.LTD.ŞTİ.  
Cüneytbey Mah. Tabaş Yolu Küme Evleri No:3  
Menderes /İZMİR - Tel: 0 222 732 2699  
Menderes V.D.: 05427339161  
Meris No: 66090000000000000000000000000000

**Date:** 01/01/2020

**Özcan GÜRSOY**  
Factory Manager













ALKIN KOMPRESÖR SAN. ve TİC. LTD. ŞTİ.  
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