Unicla® oDrive™

UWX Series
Service Manual

Unicla Cat No. M2401

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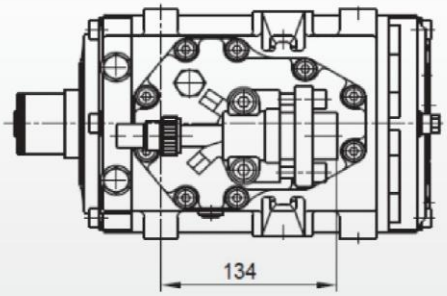
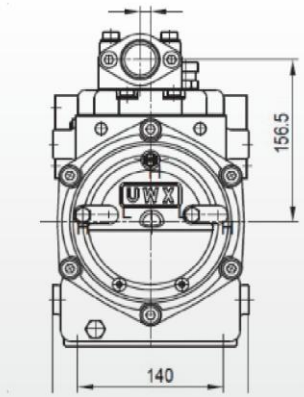
1. Specifications

1.1 UWX440/550/660

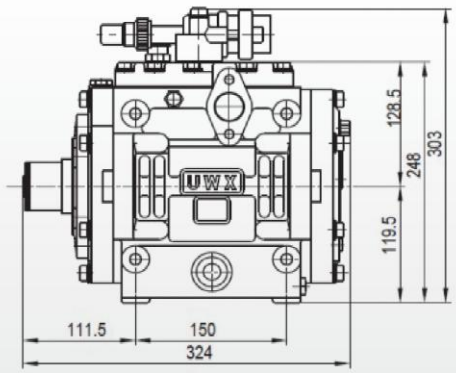
Compressor model	UWX440	UWX550	UWX660
Number of cylinders	14	14	14
Displacement	508 cc/rev	607 cc/rev	675 cc/rev
Refrigerant	HFC-134a	HFC-134a	HFC-134a
Internal oil charge	1000ml	1000ml	1000ml
Oil type	PAG / POE	PAG / POE	PAG / POE
Weight without clutch	24kg	24kg	24kg
Weight with clutch	38kg	38kg	38kg



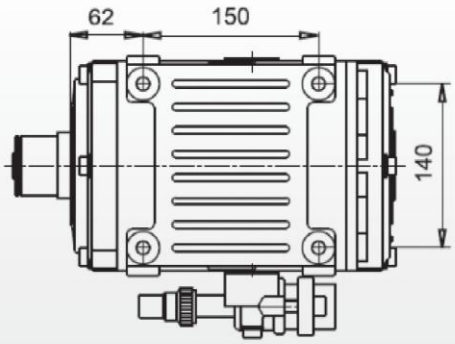
Top view



Rear view

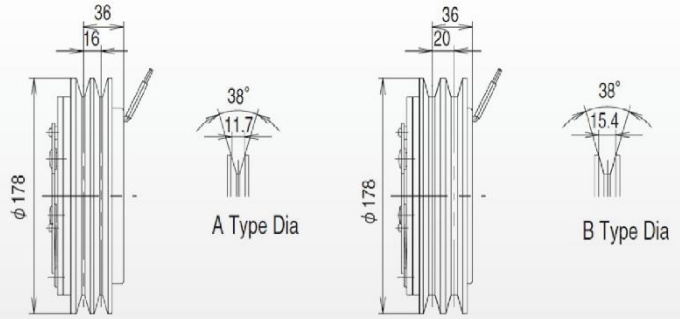


Side view



Bottom view

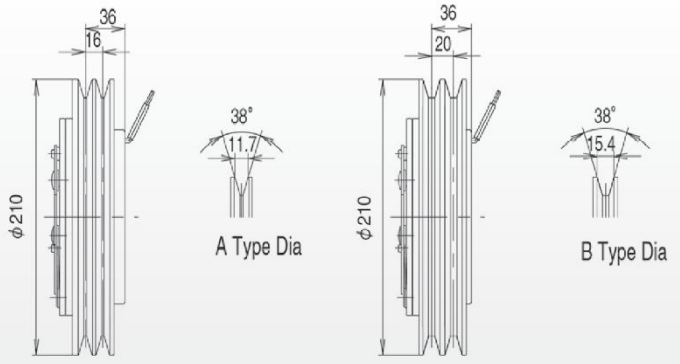
1.2 Magnetic clutch pulleys



AA-φ178
27205-000560 (D.C.12V)
27205-000550 (D.C.24V)

BB-φ178
27205-000580 (D.C.12V)
27205-000570 (D.C.24V)

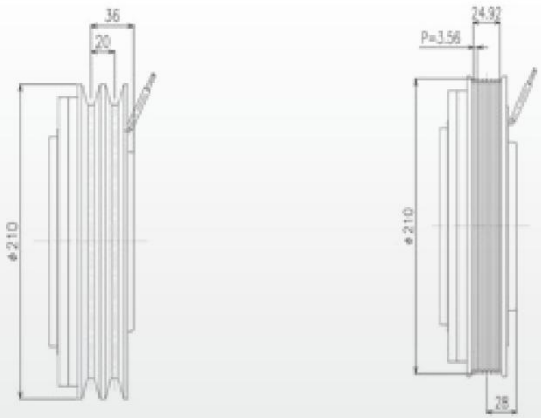
Diameter 178 mm



AA-φ210
27205-000590 (D.C.24V)

BB-φ210
27205-000600 (D.C.24V)

Diameter 210 mm



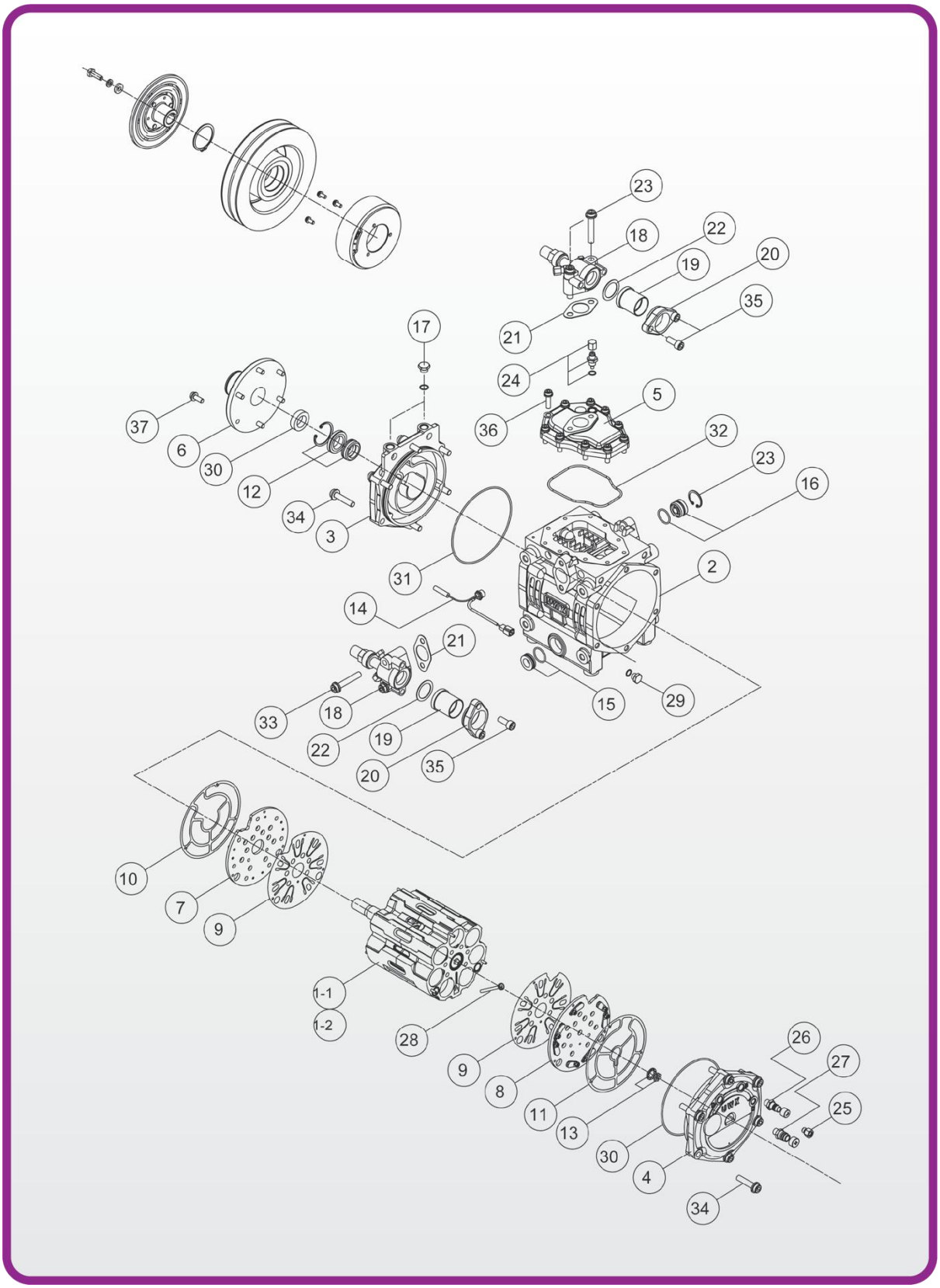
Heavy Duty Diameter 210 mm

2. Component part list

2.1 Compressor part numbers

No.	Part number	Description	Qty
1.1	22010-000360	440 working assembly	1
1.2	22010-000370	550 working assembly	1
1.3	22010-000540	660 working assembly	1
2	21405-000750	Body	1
3	21510-000040	Front cap	1
4	21505-000250	Rear cap	1
5	21501-000010	Head cover	1
6	21510-000060	Front nose	1
7	22601-000080	Front discharge valve plate	1
8	22601-000090	Rear discharge valve plate	1
9	22602-000260	Suction valve plate	2
10	93204-00009	Front cap gasket	1
11	93204-000100	Rear cap gasket	1
12	92503-000110	Mechanical seal assembly	1
13	23101-000010	Oil pump	1
14	53101-000080	Thermal switch	1
15	35801-000010	Sight glass	2
16	13201-000240	Blanking plug side fitting	2
17	13201-000230	Blanking plug front cap top (M14)	2
18	38101-000040	Shut-off valve	2
19	42203-000200	Copper spigot	2
20	32308-000590	Flange	2
21	93203-000010	Manifold gasket	2
22	93203-000020	Flange gasket	2
23	92404-000005	Snap ring	2
24	42203-000161	Oil return fitting	1
25	38305-000030	Relief valve	1
26	38101-000020	Low side R134a service valve	1
27	38101-000030	High side R134a service valve	1
28	42102-000010	Oil return tube	1
29	13201-000010	Blanking plug (M12)	1
30	11950-11000	Felt	1
31	92501-000500	O-Ring Front/Rear cap	2
32	92501-000490	O-Ring Head cover	1
33	91915-1060	Bolt – Shut off valve (M10 x 60)	4
34	91915-10045	Bolt – Front/rear cap (M10 x 45)	12
35	91015-10035	Bolt - Flange (M10 x 35)	4
36	91915-08030	Bolt – Head cover (M8 x 30)	10
37	91915-08020	Bolt – Front nose (M8 x 20)	6

2.2 Exploded view



3. Service

3.1 Service tool details

Genuine Unicla Tools

No.	Part number	Description
1	03301-004230	Working assembly stand
2	03301-003140	Stand
3	03301-003180	Shaft seal remover / installer
4	03301-003190	Installer, ring
5	03301-004950	Crank handle
6	03301-000490	Guide pin
7	03301-003230	Shaft seal plate remover
8	03301-000350	Pulley installer
9	03301-000370	Clutch wrench
10	03301-012370	Pulley remover pad
11	03301-010010	Armature remover
12	03301-013480	Shaft seal remover / installer
13	03301-013920	Lip seal installer

Optional Generic Tools

No.	Description
14	Torque wrench
15	14 mm socket
16	8 mm hex key socket
17	Thickness gauge
18	Pulley remover
19	Rubber hammer
20	Snap ring pliers (Shaft)
21	Snap ring pliers (Hole)
22	6 mm hex key socket
23	4 mm hex key socket
24	Hub remover, clutch (heavy duty type)
25	Vernier Depth Gauge

3.2 Bolt torque specifications

Description	Bolt diameter (mm)	Tightening torque (Nm)
Front / rear cap bolts	M10 x P1.5	34.3 ±1
High/low R134a service valve	M12 x P1.0	11.7 ±1
Head cover / front nose bolts	M8 x P1.25	24.5 ±1
Clutch coil bolts	M6 x P1.0	7.8 ±1
Armature bolt	M8 x P1.25	19.6 ±1

3.3 Service tools

Genuine Unicla Tools

Optional Generic Tools

3.4 Removal of magnetic clutch

Tools Required

Stand, Clutch wrench, 14mm socket, wrench, guide pin, snap ring tool, pulley remover, pulley pad, screwdriver, 4mm hex socket.

Standard clutch type

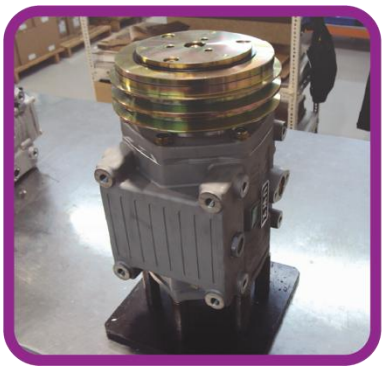


Heavy duty clutch type



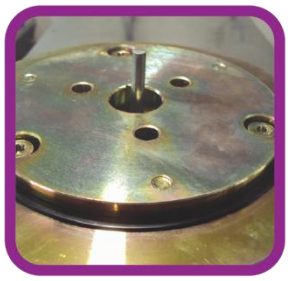
3.4.1 Place the compressor onto stand

Procedure: Place the compressor onto the stand as shown by aligning the bolt heads into the stand arms.



3.4.2 Removal of the armature

Procedure: Hold the armature in place using the clutch wrench, place the 14mm socket/wrench onto the bolt and loosen in an anticlockwise motion. Remove the clutch wrench and bolt, place the guide pin in the bolt hole which will assist with keeping the shims in place when lifting away the armature. If the armature is tight, remove the guide pin and use the armature remover tool to assist with the removal.

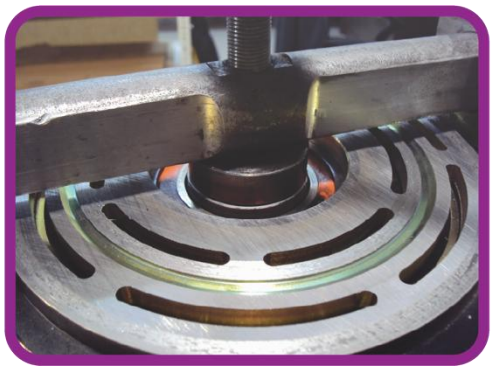



3.4.3 Removal of the snap ring and shaft key

Procedure: Remove the snap ring with snap ring pliers.
Caution: When removing the snap ring, place hand over the snap ring to prevent it becoming a projectile. Remove shaft key from the shaft using a flat blade screwdriver.


3.4.4 Removal of the pulley

Procedure: Place the pulley remover pad on the pulley bearing, fit the pulley remover and ensure the remover claws do not hook onto the coil.
Caution: Without the use of the pulley pad, damage can be caused to the shaft and internal components.




3.4.5 Removal of a coil

Procedure: Using the 4mm hex socket or a screwdriver depending on the clutch type, remove the screws holding the coil in place. Unscrew the coil wire clip, the coil will be free to remove.

3.5 Installation of magnetic clutch

Tools Required

Stand, Clutch wrench, 14mm socket, wrench, guide pin, snap ring tool, pulley remover, pulley pad, screwdriver, 4mm hex socket.

3.5.1 Place the compressor onto stand

Procedure: Place the compressor onto the stand as shown by aligning the bolt heads into the stand arms.

3.5.2 Installation of coil

Procedure: Place the coil onto the nose cone ensuring the coil wire is pointing at 1 O'clock. Using the 4mm hex socket or a screwdriver depending on the clutch type, fit the screws to hold the coil in place. **Torque** 7.8 Nm ±1. Screw the coil wire clip to the body.



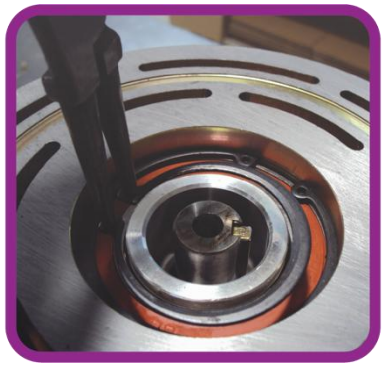

3.5.3 Installation of pulley

Procedure: Place the pulley on the nose cone and ensure that it is level, place the installer on the pulley bearing. Hold the installer in place and tap on the installer until the pulley is seated fully on the nose cone.
Caution: Too much force can warp the bearing. The snap ring groove on the nose cone should be fully visible.



3.5.4 Installation of shaft key and snap ring

Procedure: Install the snap ring into the groove (tapered side up). Using a flat blade screwdriver check that the snap ring is seated properly. Insert the shaft key into the shaft.

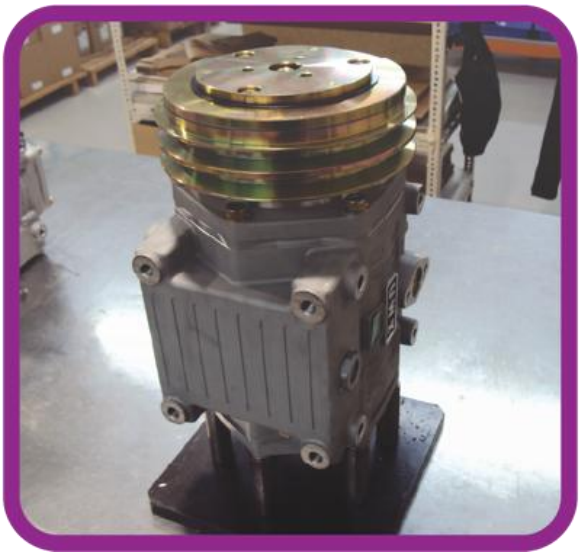

3.5.5 Installation of armature

Procedure: Install the guide pin into the centre threaded hole of the shaft and select shims (T=0.1, 0.3, 0.5 and 1.0mm) to ensure the correct clutch clearance of 0.3mm – 0.6mm. place the armature onto the shaft using the shaft key as a guide for the correct position. Remove guide pin and insert bolt with washers and tighten using the clutch wrench and 14mm socket.



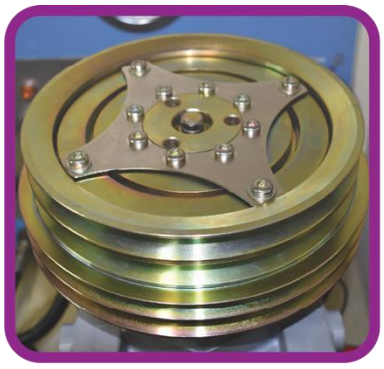

3.5.6 Air gap and final checks

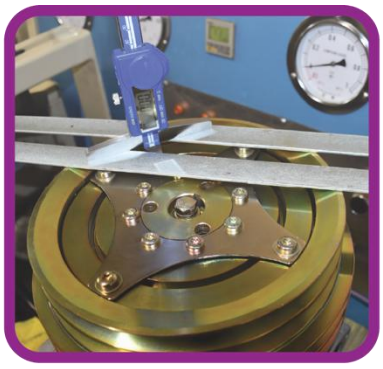
Procedure: Check the air gap using a gauge, if the gap is too small/large remove the armature and adjust the shims accordingly. Place the compressor off the stand and check the pulley can spin freely and true.

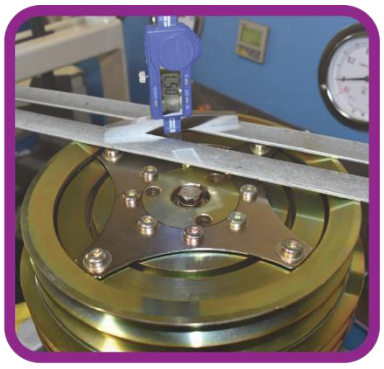



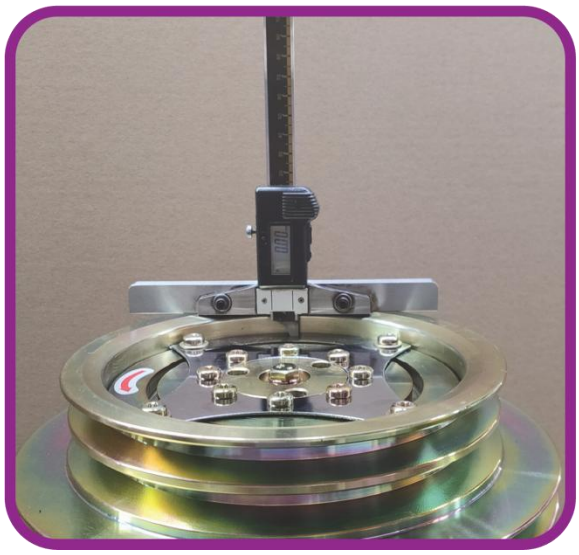
3.5.7 Air gap for overhanging pulley

Procedure: To check the air gap of an over hanging clutch a vernier depth gauge is required. Place the depth gauge across the pully ensuring it is flat (a straight edge may need to be used if the depth gauge is short) make sure the gauge is reading 0.00mm. Engage the clutch using a 12v or 24v power supply. The armature should be pulled down to the pulley, press the gauge against the armature and the distance shown will be the air gap. Adjust the shims as required to achieve the required air gap 0.3 – 0.6mm.









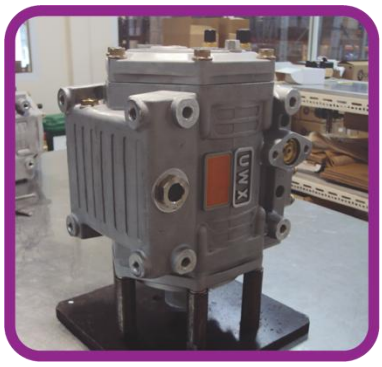
3.6 Removal of shaft seal

Tools Required

Stand, snap ring pliers, shaft seal remover, shaft seal plate remover, hook tool, 6mm hex key.

3.6.1 Release internal pressure

Procedure: Place the compressor onto the stand as shown by aligning the bolt heads into the stand arms with the rear cap facing up. Remove the caps of the high/low side service valves or 7/16" ports. Release the internal pressure by slowly pressing the valve core using a pin.



3.6.2 Remove front nose cone

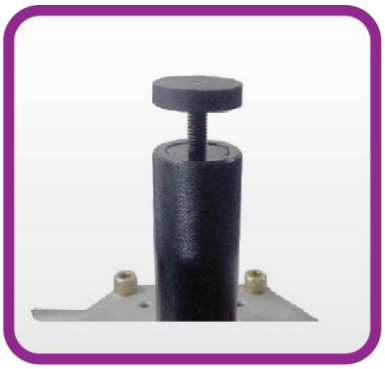
Procedure: Position the compressor on the stand so the nose cone is facing upright. Remove the 6 x M8 bolts around the edge of the nose cone and remove.

3.6.3 Removal of snap ring

Procedure: Remove the snap ring slowly with pliers as shown. For lip seal remove shaft felt first.
Caution: Do not scratch or damage the shaft during this process.

3.6.4 Removal of shaft seal plate (mechanical only)

Procedure: Using the plate remover tool push the remover lightly over the shaft onto the plate ring, turn clockwise to lock onto the plate, pull upward slowly to remove the plate.
Caution: Do not scratch or damage the shaft during this process.

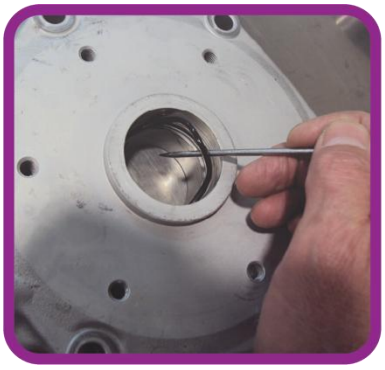


3.6.5 Removal of shaft seal (mechanical / lip)

Procedure: Using the shaft seal remover tool push the remover lightly over the shaft onto the seal, turn clockwise to lock onto the seal, pull upward slowly to remove the plate.
Caution: Do not scratch or damage the shaft during this process.

3.6.6 Removal of O-Ring

Procedure: Using a hook tool remove the O-Ring seated in the cap as shown.



3.7 Installation of shaft seal (mechanical / lip)

Tools Required

Stand, snap ring pliers, shaft seal installer, shaft seal plate remover, hook tool, 6mm hex key.

3.7.1 Installation of O-Ring

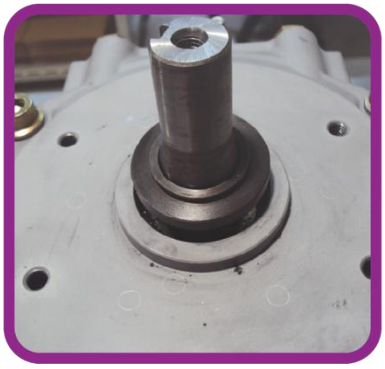
Procedure: Lubricate O-Ring and place into O-Ring groove in the front cap.

3.7.2 Installation of shaft seal (mechanical / lip)

Procedure: Ensure the shaft is free from any dirt/debris, lubricate the shaft with oil to assist with ease of the shaft seal installation. Fit the shaft seal to the installer tool, place the seal onto the shaft and lightly push down the shaft to position. Turn the tool to unhook from the seal and lift away.

3.7.3 Installation of shaft seal (mechanical only)

Procedure: After installing the shaft seal, place the shaft plate onto the shaft, using the plate installer push the plate into place.



3.7.4 Installation of snap ring

Procedure: Place snap ring onto shaft (ensure taper side facing downwards) using the snap ring tool push the snap ring down into the groove. For lip seal place felt on top of the snap ring.

3.8 Disassembly of body

Tools Required

Stand, crank handle, 8mm Hex key, flat blade screw driver

3.8.1 Removal of clutch

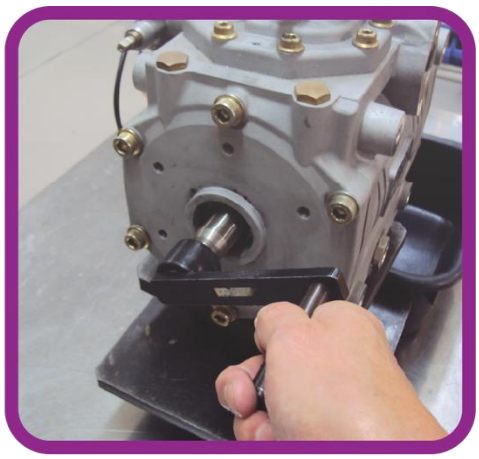
Procedure: Refer to *3.4 Removal of magnetic clutch*.

3.8.2 Removal of shaft seal

Procedure: Refer to *3.6 Removal of shaft seal*.

3.8.3 Drain internal oil

Procedure: Remove drain plug from the rear of the compressor. Tilt compressor to allow all oil to be removed. Using the crank handle turn the internals to ensure any trapped oil is removed.



3.8.4 Removal of rear cap bolts

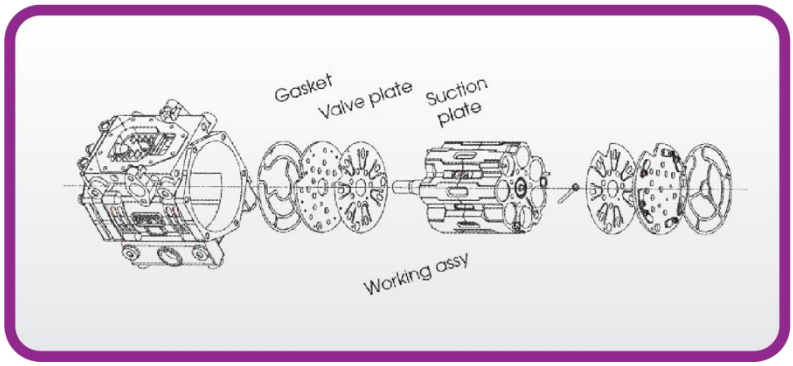
Procedure: Remove M10 bolts in the rear cap.

3.8.5 Removal of rear cap

Procedure: Remove the rear cap by gently inserting a screw driver or lever into the recess. Lever all around, not in one position.
Caution: When placing rear cap down, keep the internal face clear of debris and rough surfaces.

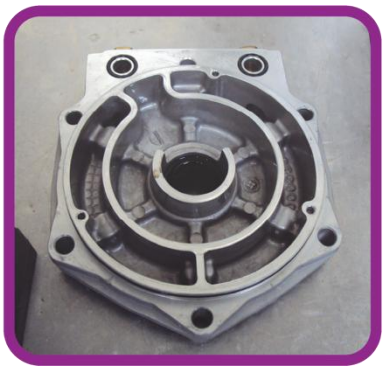

3.8.6 Removal of valves and working assembly

Procedure: Remove rear gasket, discharge valve plate and suction valve. Place the compressor off the stand and onto the bench, remove oil return tube first then remove working assembly by pressing the end of the shaft into the front of the body as shown. Remove front gasket, valve and suction valve.



3.8.7 Removal of front cap

Procedure: Remove the M10 bolts (6pcs) from the front cap. Remove the front cap by gently inserting a screwdriver or lever into the recess. Lever all around, not just at one position.
Caution: When placing rear cap down, keep the internal face clear of debris and rough surfaces.

3.9 Assembly of body

Tools Required

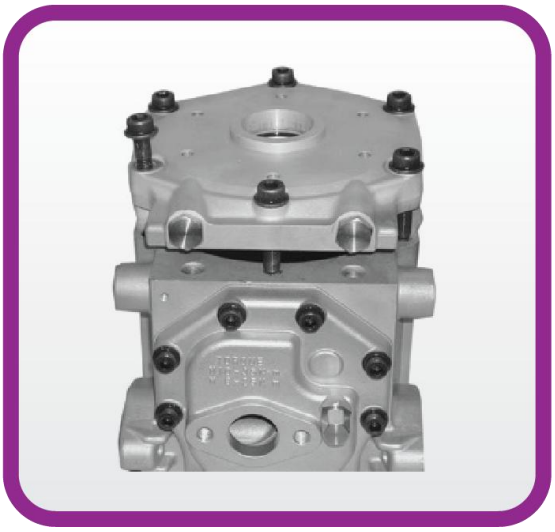
Stand, working assembly stand, crank handle, 8mm Hex key, 6mm hex key, torque wrench

3.9.1 Installation of O-Rings

Procedure: Install new O-Rings on the front and rear cap, as well as the two small O-Rings in the front cap. All O-Rings must be free from marks and debris. Thoroughly lubricate the O-Ring and insert into O-Ring groove, ensure the O-Ring is not twisted.

3.9.2 Installation of front cap

Procedure: Place the body with the front section facing upward. Place front cap on the body, tighten the M10 bolts with a torque wrench. Caution not to pinch the O-Ring. Tightening torque: 34.3 Nm ±1



3.9.3 Installation front valve plate and body

Procedure: Place the working assembly on the locating pins on the stand, stack the suction plate, discharge valve plate and gasket as shown on the locating pins on the body. Carefully lower the body over the working assembly until it stops.

3.9.4 Installation of rear valve plates and gasket

Procedure: Carefully turn the compressor so the rear (open side) is now facing up on the stand. Insert the oil return tube (if it will not go into place the working assembly is not completely pushed into the housing) using the pins in the working assembly place the suction valve plate onto the working assembly. Then place the discharge valve plate followed by the gasket as shown.

3.9.5 Installation of rear cap

Procedure: Place the rear cap on the body (be careful not to twist/pinch the O-Ring). Tension the M10 bolts (6pcs) diagonally, only a few turns at a time so the cap can press down as even as possible. Once down using a torque wrench tighten the bolts to 34.3Nm ±1. Check the rear cap clearance is 0.4≤ - ≤1.2mm



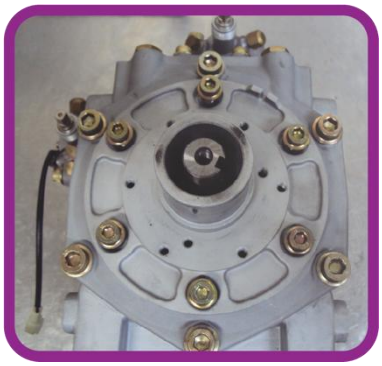
3.9.6 Installation of shaft seal

Procedure: Refer to *3.7 Installation of shaft seal (mechanical / lip)*

3.9.7 Installation of front nose cone and shaft key

Procedure: Place the nose cone into position on the front cap as shown. Note the coil wire groove is to be at 1 o'clock position. Tightening torque 24.5 ±1 N.m. Install the key in the keyway.





3.9.8 Test working assembly rotation

Procedure: Place the crank handle into the front section of the shaft and turn clock wise, the compressor should rotate smoothly.

3.9.9 Filling the compressor oil

Procedure: Place the compressor on the bench in the normal standing position, remove the top low side manifold and filter as shown. Fill oil directly into the compressor.
Standard oil type: PAG or POE
Oil amount: 1000ml ±20ml

3.10 Storage guidelines

I. Evacuate compressor for 3 minutes and fill with nitrogen (N) at 0.1 ~ 0.2 MPa
II. Place the compressor in a clean and dry area with low humidity and tag with details
III. Keep compressor away from direct sunlight
IV. Store the compressor horizontally on a flat, even surface
V. Do not store the compressor in temperatures above 30˚C
VI. Place the compressor in a well-ventilated area to avoid corrosion damage

3.11 System oil quantity

The correct amount of oil must be maintained in the compressor and system. Long hose runs and dual evaporator systems must have additional oil added to the system. Severe oil starvation problems may result from insufficient system oil being allowed. To determine oil quantity required, Unicla recommends a calculation as a percentage of refrigerant charge as follows:

- 20% for UWX compressors in standard applications where the suction and discharge lines are less than 6 meters in length
- 30% for UWX compressors in applications where suction and discharge lines exceed 6m in length

Example

Calculate oil charge as 20% of refrigerant charge, 6 kg charge = 6000 g x 20% = 1200 ml (cc) of oil. If fitting a UWX550 compressor, then deduct the compressor initial oil charge to determine amount of oil to be added. Therefore 1200 – 1000 = 200cc oil to be added to system.

3.12 Oil type and grade

Each Unicla UWX compressor is fitted with either PAG oil *(Unidap 7)* or POE oil *(Unidap 6)*. When adding oil to the system, Unicla oil must be used. ⚠ **Warranty is void if these guidelines are not followed**

Compressor Model	Refrigerant	Oil Type (Unicla)	Viscosity @ 40°C	Viscosity @ 100°C	Application	Low side saturation	Oil separator
UWX440/550	R134a	Unidap 7	48.01	10.51	Air conditioning	>0°C	Optional
UWX440/550	R134a	Unidap 6	65.5	9.3	Air conditioning	>0°C	Optional
UWXF440/550	R404A	Unidap 3	32.5	5.8	Air conditioning	>0°C	Optional

The following labels will determine the type of oil in each UWX compressor:

R134a
(PAG type) UNIDAP 7

R134a
(POE type) UNIDAP 6

R404a
(POE type) UNIDAP 3

The contents of this manual are subject to change without prior notice.

Unicla® oDrive™

The compressor only Unicla makes.

For over 60 years.

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