



**Unicla**



**UWX550 and UWX440  
Installation Guidelines**



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# UWX550 and UWX440 Installation Guidelines

## Table of contents

1	Initial handling .....	2
2	System cleanliness .....	2
3	Fitting of discharge hose manifold .....	3
4	Mounting angles .....	4
5	System oil quantity requirement .....	4
6	Oil type and grade .....	5
7	Compressor oil level .....	5
8	Compressor sight glass visualisation and diagnosis .....	6
9	Recommended suction line pipe size .....	7
10	Compressor speed .....	7
11	In-line suction filter and screen .....	7
12	Oil injector .....	8
13	Discharge line analysis – pressure and temperature .....	8
14	Refrigerant charging .....	9
15	Compressor operation analysis report .....	10
16	Other features & performance information .....	11
17	Compressor mounting dimensions .....	12

**Note:** This booklet is designed to assist the installing technician to ensure Unicla guidelines and procedures have been followed during the installation and initial commissioning of UWX550 and UWX440 compressors.

Please read carefully and if further information is required please visit: [www.unicla.hk](http://www.unicla.hk) where a copy of the **Unicla Compressor Fitting Guidelines to New Applications** booklet can be found, or contact the nearest Unicla dealer.

## 1. Initial Handling

### a) Removing transit gas

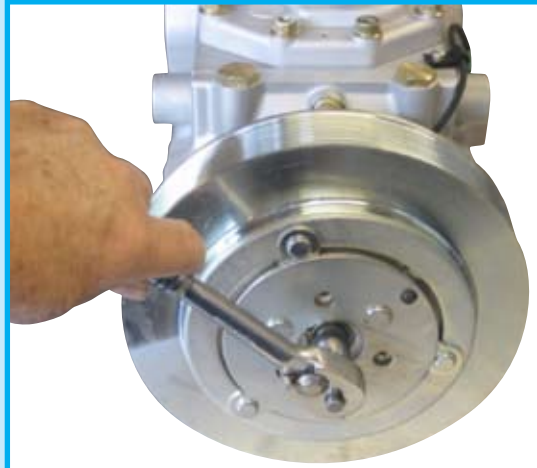
Before mounting and when handling a new Unicla UWX compressor for the first time, remove the dust cap from the discharge service valve and gently release the N2 gas as follows.

*Take care to not let oil escape.*



### b) Initial lubrication

Rotate the compressor armature manually for 4-5 revolutions to ensure proper lubrication to the working assembly components. This will avoid damage during initial start up.



## 2. System Cleanliness

### a) Contamination

The system must be free of both solid particle and chemical contamination before compressor fitting. Solid particle contamination will cause direct compressor damage and starvation due to blocked system filters and screens (see section 10). Chemical contamination can reduce solubility/miscibility of refrigerants and oils, reduce oil viscosity, and cause acid etching and sludge formation.

### b) Flushing

Contaminated systems must be flushed before fitting the new compressor. Individual component flushing is strongly recommended in systems where solid particle contamination has occurred during the system assembly process. The compressor, TX valve, pressure control valves, receiver driers/accumulators and mufflers/pulsation dampers **must not be flushed**.

### 3. Fitting of discharge hose manifold

- Choose either left or right hand discharge port.
- Remove shipping cap from discharge port to be used.

Fig. A.

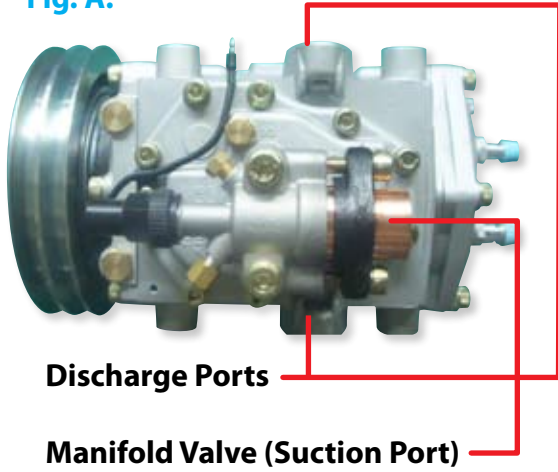


Fig. B.

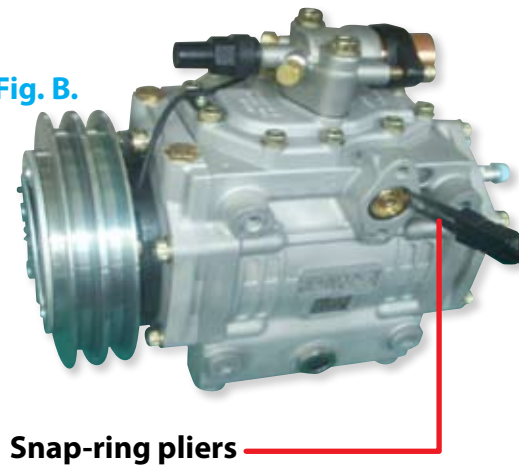


Fig. C.

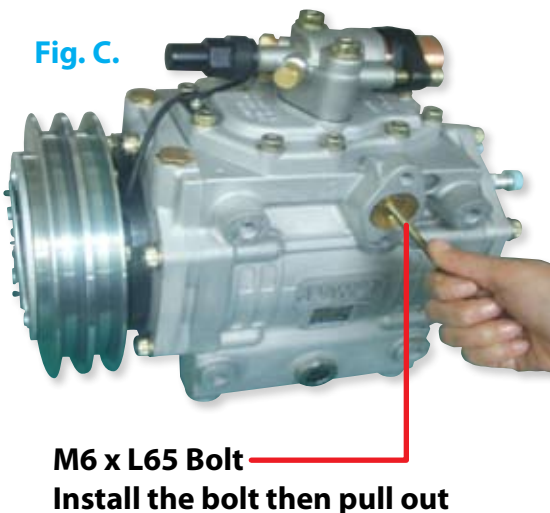


Fig. D.

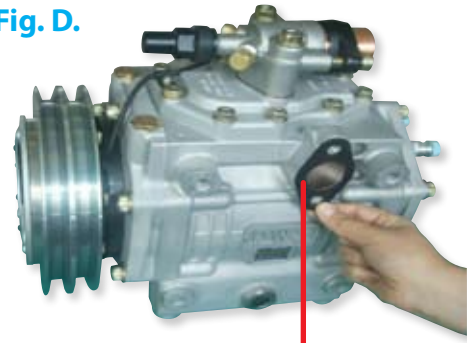


Fig. E.

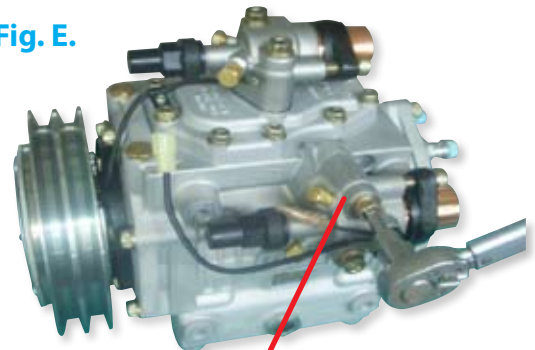
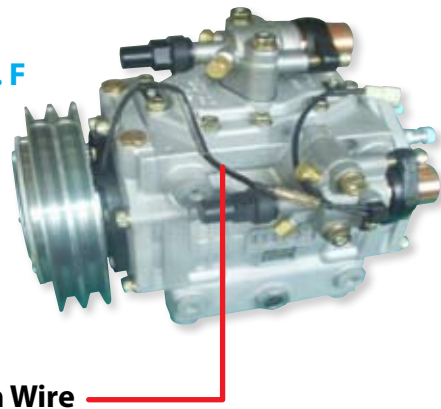


Fig. F



Connect the clutch wire with the sensor from Discharge Manifold Valve before operation

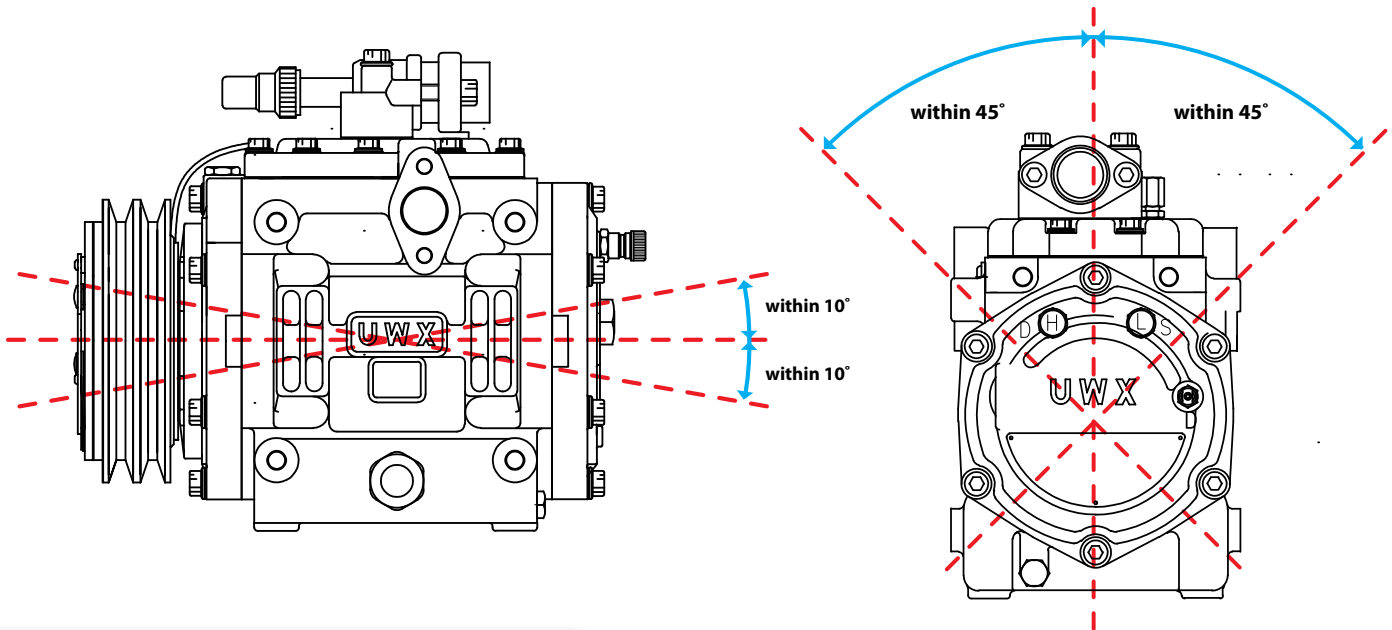
**Warning: Do not directly connect power to clutch wire.**



Removed port

## 4. Mounting angle

The limits for mounting Unicla UWX compressors are described in the following diagrams:



## 5. System oil quantity requirement

For the compressor and system, Unicla compressor oil circulation requires that the correct amount of oil must exist in the system to ensure oil and refrigerant flows back to the compressor in the correct mixture ratio. To achieve this, the total oil quantity added to the system is as follows:

Total Refrigerant in system	Oil quantity to add –if suction line < 6 metres in length	Oil quantity to add –if suction line > 6 metres in length
5kg	Nil	500cc
5.5kg	100cc	650cc
6.0kg	200cc	800cc
6.5kg	300cc	950cc
7.0kg	400cc	1100cc
7.5kg	1250cc	1250cc
8.0kg	1400cc	1400cc

**Note:** Oil quantity recommendations are in addition to the oil installed in the compressor. Unicla 440 and 550 series compressors are fitted with 1000cc of oil as standard, and this amount is *excluded* from the quantities recommend above.

**Note:** Oil quantity calculations are contained in the Unicla Service Handbook. Total system oil requirement is based on 20% and 30 % of refrigerant charge for systems with < 6m suction line and > 6m suction line respectively.

Larger capacity systems holding > 7.0 kg of refrigerant are deemed to require the maximum oil quantity (30% of refrigerant charge) due to the potential size of the heat exchangers and hose runs holding extra system oil.

## 6. Oil type and grade

Each Unicla UWX550 or UWX440 is fitted with either PAG oil ( Unidap 7) or POE oil (Unidap 6). When adding oil to the system, Unicla oil must be used or alternatively if Unidap oil is not available at the time of installation, then suitable known brand oil can be used as described in the following charts.

Compressor Model	Refrigerant	Oil Type (Unicla)	Viscosity @ 40°C	Viscosity @ 100°C	Application	Low side Saturation	Oil Separator
UWX	R134a	Unidap 7	48.01	10.51	Airconditioning	> 0°C	Optional
UWX	R134a	Unidap 6	65.5	9.3	Airconditioning	>0°C	Optional

**Note:** The correct amount and grade of oil must be maintained in the compressor and the system. Failure to comply with this may result in dramatically reduced oil circulation rates with subsequent starvation of the compressor.

**! Warranty is void if these guidelines are not followed.**

### Recommended alternatives for Unicla Lubricant:

Unicla Oil Type	Alternative
Unidap 6	POE 68
Unidap 7	PAG 46

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



POE type

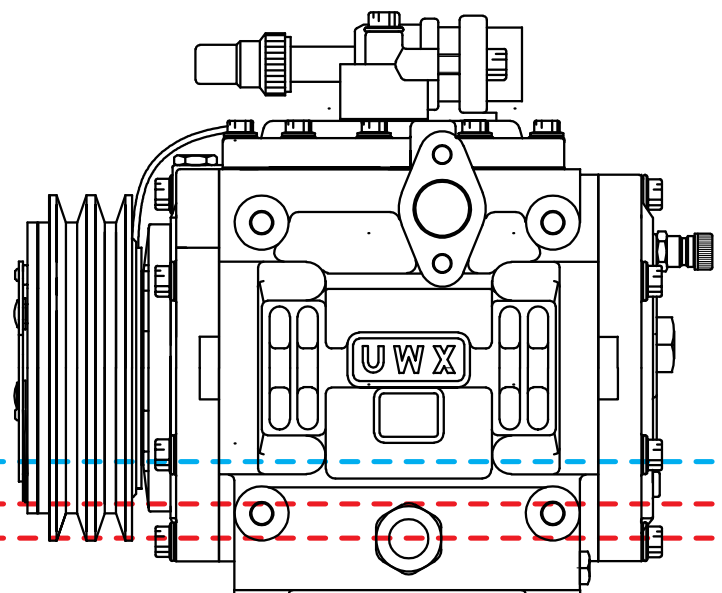


PAG type

## 7. Compressor oil level

**Note:** The following diagram shows oil level quantities at the sight glass to indicate actual oil level in the sump.

- 700cc - 1000cc to top of sump (Normal) ————
- 400cc to top of sightglass (Low) ————
- 200cc to centre of sightglass (Low) ————



## 8. Compressor sight glass visualisation and diagnosis

The following chart and images will assist the technician to check the sight glass of the compressor after commissioning of the system. Different operating conditions will present variable symptoms to appear at the sight glass, and Unicla recommends this must be checked immediately after commissioning and at future regular intervals during service.

To obtain the best possible visual of the sight glass, it is recommend the rear sight glass is back lit with a good quality white light , preferably from a LED torch or leadlight. This will produce good light through the centre of the compressor sump to allow accurate evaluation of the compressor level and quality.



Sight Glass	Normal > high point
Oil	Normal - clean and transparent
Operation	OK
Recommendation	Nil



Sight Glass	Normal > high point
Oil	Slight moisture contamination - orange to brown colour
Operation	OK
Recommendation	Monitor oil condition and change if necessary



Sight Glass	Normal > high point
Oil	Green colouration - exposure to copper oxidation
Operation	OK
Recommendation	Monitor oil condition and change if necessary



Sight Glass	Oil level low < half point
Oil	Normal - clean and transparent
Operation	Oil flow or level is low
Recommendation	Check suction pressure and system oil quantity



Sight Glass	Oil level low < half point
Oil	Normal - clean and partly transparent
Operation	Oil flow or level is low and running at high temperature
Recommendation	Check suction pressure and system oil quantity



Sight Glass	Oil level < low point
Oil	Not visible
Operation	Oil flow or level is critically low - damage to compressor will occur. Suction pressure is most likely at 1.0 bar (14 psi) or less and must be rectified
Recommendation	Cease system operation and check suction pressure and system oil quantity



Sight Glass	Normal > high point
Oil	Black and cloudy - severely contaminated
Operation	Compressor will fail
Recommendation	Cease system operation - clean and flush system, replace compressor oil



Sight Glass	Oil level < high point
Oil	Black and cloudy - foaming and severely contaminated
Operation	Compressor will fail
Recommendation	Cease system operation - clean and flush system, replace compressor oil

## 9. Recommended suction line pipe size

The following chart gives the suction pipe size recommendations for 440 and 550 compressors.

Unicla 550 series		3m Pipe Length			6m Pipe Length			10m Pipe Length			12m Pipe Length			18m Pipe Length		
RPM	Rated (kW)	Temp Diff (K)	Press Diff (kpa)	Pipe Size mm (inch)	Temp Diff (K)	Press Diff (kpa)	Pipe Size mm (inch)	Temp Diff (K)	Press Diff (kpa)	Pipe Size mm (inch)	Temp Diff (K)	Press Diff (kpa)	Pipe Size mm (inch)	Temp Diff (K)	Press Diff (kpa)	Pipe Size mm (inch)
1000	12.1	0.55	5.7	22 (7/8)	0.29	3	28 (1 1/8)	0.48	5	28 (1 1/8)	0.58	6	28 (1 1/8)	0.87	8.9	28 (1 1/8)
1500	18	0.29	3	28 (1 1/8)	0.58	6	28 (1 1/8)	0.98	10	28 (1 1/8)	0.41	4.2	35 (1 3/8)	0.61	6.3	35 (1 3/8)
2000	18	0.29	3	28 (1 1/8)	0.94	9.6	28 (1 1/8)	0.54	5.6	35 (1 3/8)	0.65	6.7	35 (1 3/8)	0.99	10.1	35 (1 3/8)
2500	26.7	0.64	6.5	28 (1 1/8)	0.44	4.5	35 (1 3/8)	0.74	7.6	35 (1 3/8)	0.89	9.1	35 (1 3/8)	0.56	5.7	41 (1 5/8)

These recommendations must be strictly adhered to ensure adequate refrigerant and oil flow back to the compressor. An undersized suction line will cause a pressure drop between the evaporator outlet and the compressor, and create poor refrigerant and oil flow at the compressor. Particularly at high revs and low evaporator temperatures.

## 10. Compressor speed

The following chart gives the Unicla speed recommendation for UWX440 and UWX 550 compressors. This should be strictly followed at all times.

Compressor series	Ideal operation speed rpm	Maximum continuous rpm	Maximum momentary rpm
440/550	1200-2500	3000	4500

## 11. In-line suction mesh screen and filter insert

The Unicla inline mesh screen and filter insert should be used whenever there is risk of debris and fine particles entering the compressor through the suction line.

### Unicla Suction Filter Insert

Part no: 43701-000290

Must be used in conjunction with Unicla Suction Mesh Screen, and **must** be removed after 2-12 hours from initial commissioning. This is ideal for removal of fine particles from a new system.

### Installation of mesh screen and filter insert



*In the case of older systems where the compressor is replacing a previous failure, the system must be flushed and the filter should be strictly monitored to ensure a blockage does not occur. More than one filter maybe required over several hours to properly clean the particles in the suction line.*

### Unicla Suction Mesh Screen

Part no: 43701-000270

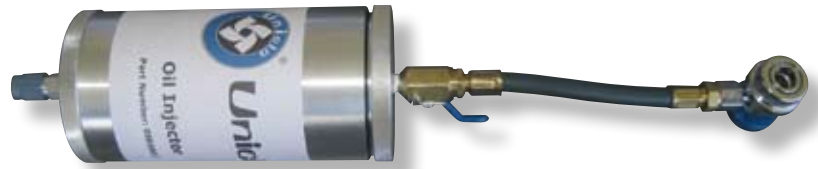
Can be left in place in the suction port to ensure continual removal of heavier particles in the system, however regular inspections of this mesh screen must take place to ensure a permanent blockage does not occur.

### Installation of mesh screen only



## 12. Unicla oil injector part no. OIRA803

Unicla oil injector can be used to add additional system oil during the evacuation or refrigerant charging process. Or alternatively any similar injection device can be used.



## 13. Discharge line analysis - pressure and temperature

After commissioning a Unicla compressor for the first time, some basic pressure and thermal loading checks will determine if the operating environment for the compressor is within Unicla specifications, and whether compressor durability is being maximised. The following chart should be used as a guide for UWX550 and UWX440 compressors to analyse normally acceptable high side (discharge/head) pressures and discharge line temperatures for given ambient conditions.

### Discharge Line Pressure - Temperature Chart - Unicla UWX compressors

Ambient		Ideal Discharge Pressure		Discharge Line Temp °C			Temp °C
°C	°F	kPa	PSI	1800rpm	2200rpm	3500rpm	Discharge line Superheat range
15	60	600 - 800	90 - 115	37 - 42	42 - 47	50 - 56	7 - 26
18	65	750 - 950	110 - 135	43 - 52	47 - 58	56 - 70	9 - 34
21	70	900 - 1100	130 - 160	50 - 57	55 - 64	66 - 76	10 - 36
24	75	1050 - 1300	155 - 190	58 - 64	66 - 73	77 - 83	12 - 37
27	80	1200 - 1550	185 - 220	65 - 72	73 - 80	75 - 89	13 - 37
30	85	1400 - 1750	200 - 250	68 - 77	75 - 86	79 - 92	14 - 38
33	90	1500 - 1900	215 - 275	72 - 85	80 - 94	89 - 97	14 - 39
35	95	1700 - 2100	245 - 300	77 - 90	86 - 98	93 - 102	15 - 40
38	100	1850 - 2250	265 - 325	85 - 92	94 - 102	• NR	17 > 40
41	105	200 - 2400	290 - 350	88 - 97	97 - 108	• NR	18 > 40
44	110	2250 - 2650	325 - 385	92 - 102	• NR	•• NR	18 > 50
47	115	2500 - 2900	370 - 420	102 - 110	• NR	•• NR	20 > 50

**Note:** Allow 20% tolerance for humidity above 60% relative humidity.

If the system high side pressure or discharge line superheat range is not within these parameters, reference to the Unicla Service Manual is required, or reference to additional technical information for specifications and faults regarding condensing to air differentials.

• **NR** = not recommended as a continuous running phase, superheat may exceed 40°C, however specific system design may allow for higher condensing capacity to maximise compressor durability and performance.

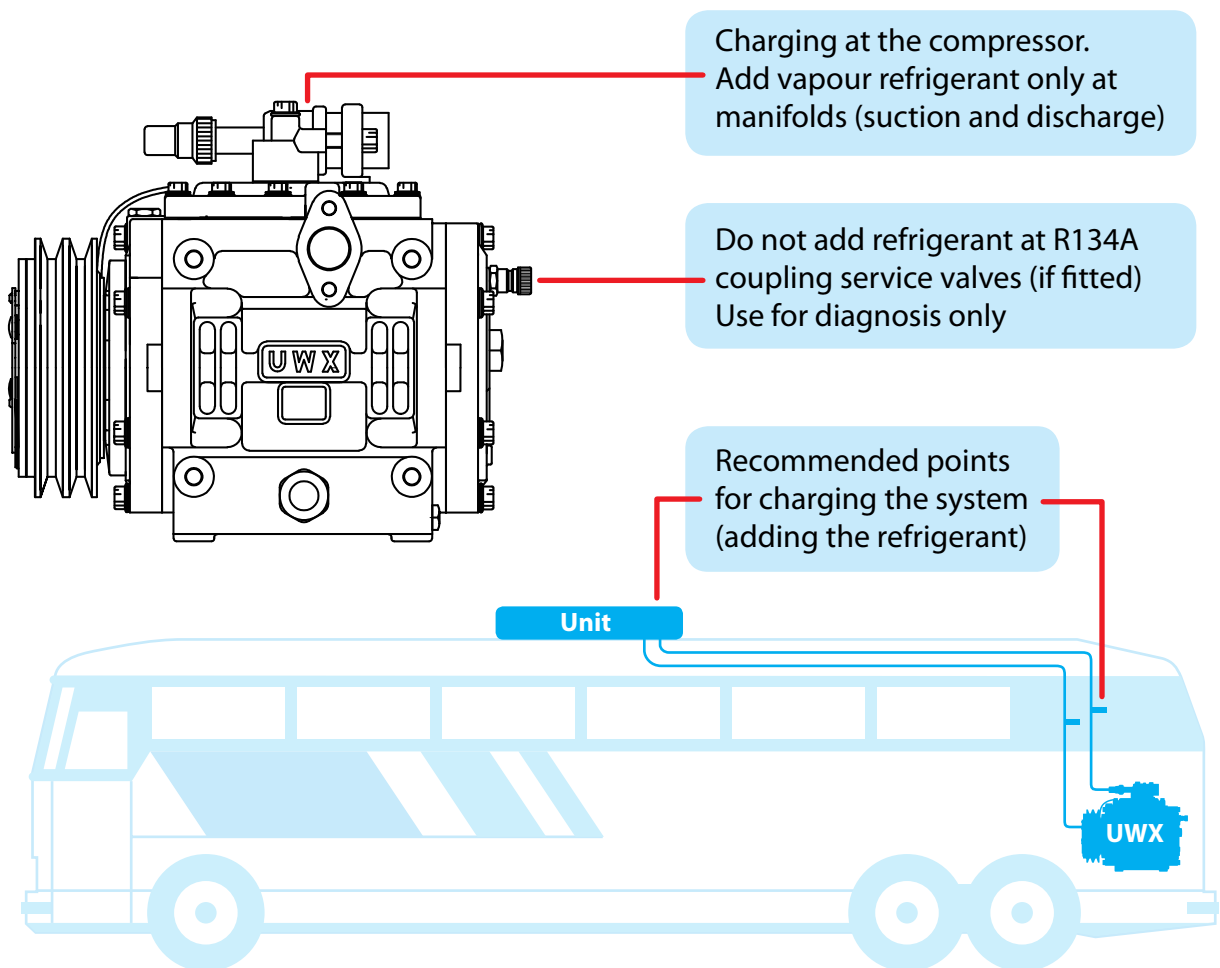
•• **NR** = not recommended in most instances, superheat may exceed 50°C, however if condensing capacity allows for < 50°C superheat, momentary running in this phase may be considered.

If any further assistance or information is required please go to [www.unicla.hk](http://www.unicla.hk) or contact your nearest Unicla dealer.

## 14. Refrigerant charging

When charging the air-conditioning system with refrigerant, it is important that oil is not pushed or washed away from the sump of the compressor; otherwise immediate damage to the compressor internal assembly will occur. To avoid this situation, the position of entry for the refrigerant to the compressor and system must be considered as follows;

- a) Most bus and coach applications have a system layout with the evaporator on the roof or at least in a position which is higher than the compressor. The preferred procedure for adding refrigerant and oil to the system is at this higher point. This will ensure the correct flow of refrigerant vapour and oil will pass through the compressor without any adverse effects to its initial operation.
- b) If it is not possible to access the system at the evaporator or roof level, then service points in suction and discharge lines away from the compressor are the next best option.
- c) If refrigerant must be added at the compressor, and there is no other alternative, only refrigerant vapour is to be added at the discharge and suction manifold valves at the side and top of the compressor (see diagram).
- d) Under no circumstances is refrigerant to be added at the R134a coupling service valves (if fitted) on the rear cap of the compressor. These valves are used for diagnosis only.



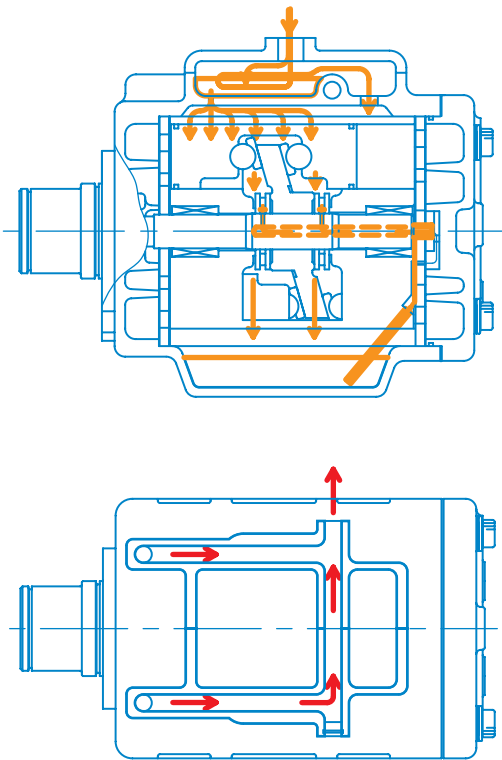
If any further assistance or information is required please go to [www.unicla.hk](http://www.unicla.hk) or contact your nearest Unicla dealer.

## 15. Compressor operation analysis report

To determine the performance of a Unicla UWX compressor in a specific application, the following Compressor Operation Analysis Report will assist in the collection of the necessary data.

Vehicle Details					
Date		Ref			
Owner Name					
Contact Details					
Phone					
AC System Type					
Compressor Details					
Compressor Model		Date Purchased			
Clutch Type		Invoice Number			
Clutch Voltage		Date Installed			
		Vehicle Type			
System Information					
Refrigerant	R12 / R134a / Other	UV Dye Added		Yes / No	
Purity	%	Oil Separator Fitted		Yes / No	
Oil Type		Accumulator Fitted		Yes / No	
Discharge	Suction			Other	
Operation Analysis at 1200 / 1500 / 1800 RPM (Indicate which)					
Discharge Pressure		Suct. Pressure at Evap		Duct Temp - In	oC
Condensor Temp	oC	Suct. Pressure at Comp		Duct Temp - Out	oC
Discharge Temp	oC	Pressure Drop		Temp Difference	oC
Liquid Line Temp	oC	Suct. Line Temp at Comp	oC	Airflows	
Discharge Superheat	oC	Evap Temp	oC	Condensor	m/s
Subcooling	oC	Suct. Line Temp at Evap	oC	Evap Duct - Front	m/s
		Suct. Line Superheat	oC	Evap Duct - Rear	m/s
Operation Analysis at 2000 / 2200 / 2400 RPM (Indicate which)					
Discharge Pressure		Suct. Pressure at Evap		Duct Temp - In	oC
Condensor Temp	oC	Suct. Pressure at Comp		Duct Temp - Out	oC
Discharge Temp	oC	Pressure Drop		Temp Difference	oC
Liquid Line Temp	oC	Suct. Line Temp at Comp	oC	Airflows	
Discharge Superheat	oC	Evap Temp	oC	Condensor	m/s
Subcooling	oC	Suct. Line Temp at Evap	oC	Evap Duct - Front	m/s
		Suct. Line Superheat	oC	Evap Duct - Rear	m/s
Operation Analysis at 2500 / 3000 / 3600 RPM (Indicate which)					
Discharge Pressure		Suct. Pressure at Evap		Duct Temp - In	oC
Condensor Temp	oC	Suct. Pressure at Comp		Duct Temp - Out	oC
Discharge Temp	oC	Pressure Drop		Temp Difference	oC
Liquid Line Temp	oC	Suct. Line Temp at Comp	oC	Airflows	
Discharge Superheat	oC	Evap Temp	oC	Condensor	m/s
Subcooling	oC	Suct. Line Temp at Evap	oC	Evap Duct - Front	m/s
		Suct. Line Superheat	oC	Evap Duct - Rear	m/s
Other Information					
Ambient Temp	oC	Clutch Cycle (set point)	oC	Comp oil Level	cc
Note: measure compressor oil level by sight glass for models 330, 440 & 550.					

## 16. Other features & performance information



### New Lubrication System

The new 14 cylinder operation features a completely new lubrication system, with oil supplied to the large swashplate area through two oil chambers. The lower chamber is a traditional sump which feeds an oil pump driven from the rear of the crankshaft, and oil is supplied through the centre of the crankshaft and on to the thrust bearings and swashplate. The upper chamber is situated at the suction entry point and features a series of baffles which collects the incoming oil and re-directs it directly on to the top of the moving swashplate. (See diagram)

### Crossover Chamber

The 550 and 440 series compressors have a unique discharge gas crossover chamber situated at the top of the crankcase which surrounds the oil chamber carrying the incoming suction gas. As the discharge gas flows through this area, sufficient heat is transferred into the suction side to protect the compressor from liquid slugging. In the event of liquid being present at the suction port, the heat supplied from the crossover chamber will be sufficient to convert this liquid refrigerant into a vapour state. (See diagram)

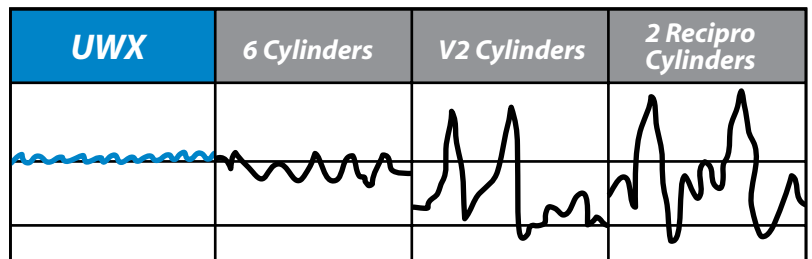
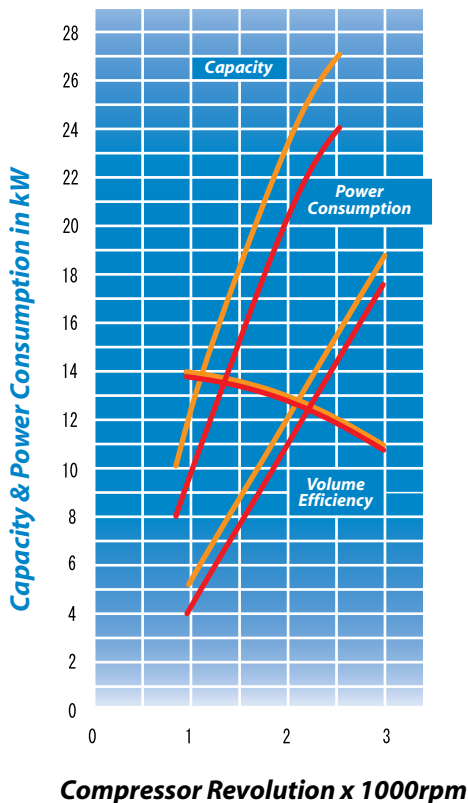
### Smooth Operation

Typical vibration analysis compared to other compressor types.

### Performance data operating on R134a

**Test Conditions:**  
 $P_{suc}/P_{dis}: 0.18\text{MPaG}/1.52\text{MPaG}$   
 $SH: 10^\circ\text{C}$   $SC: 5^\circ\text{C}$

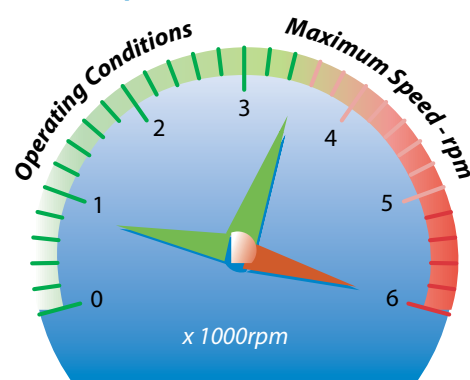
■ UWX550 ■ UWX440



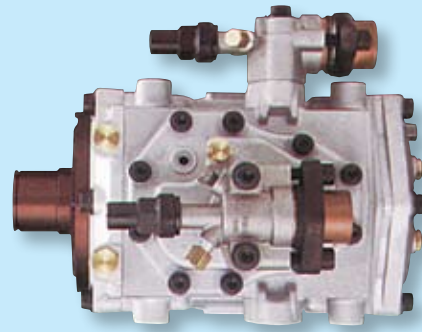
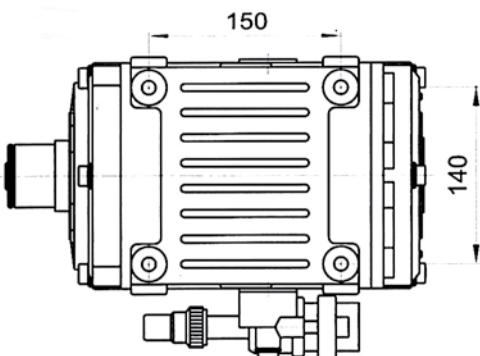
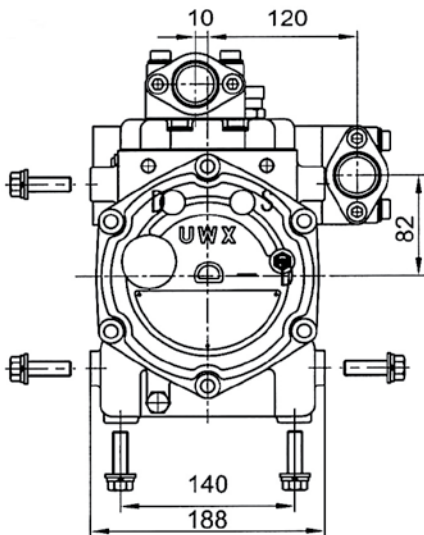
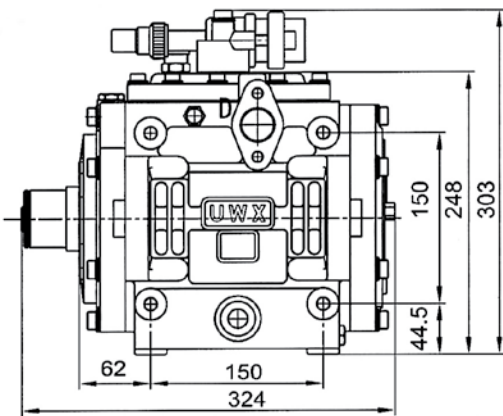
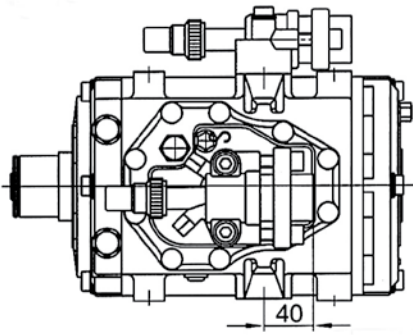
### Clutches Available for Unicla 440 & 550 Series Compressors

Type UX330	Pulley Diameter (mm)			Voltage	
	168	178	210	12V	24V
AA Groove	•			•	•
B Groove		•		•	•
BB Groove	•	•	•	•	•
8 Groove	•		•	•	•

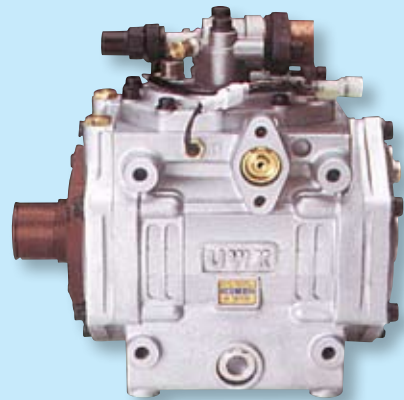
### Compressor Revolution Chart



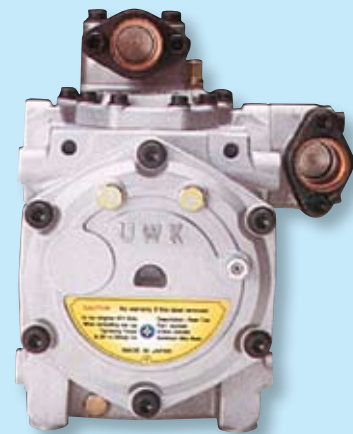
## 17. Compressor mounting dimensions



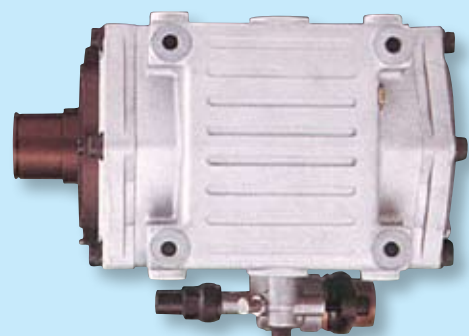
*Top View*



*Side View*



*Rear View*



*Bottom View*





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