Unicla®

eDrive™

# UD150 | UD200

## Service manual

48 and 72 Vdc series

Unicla Cat No. M2102-2_Unicla_eDrive_48-72Vdc_ServiceManual_0824

Unicla®

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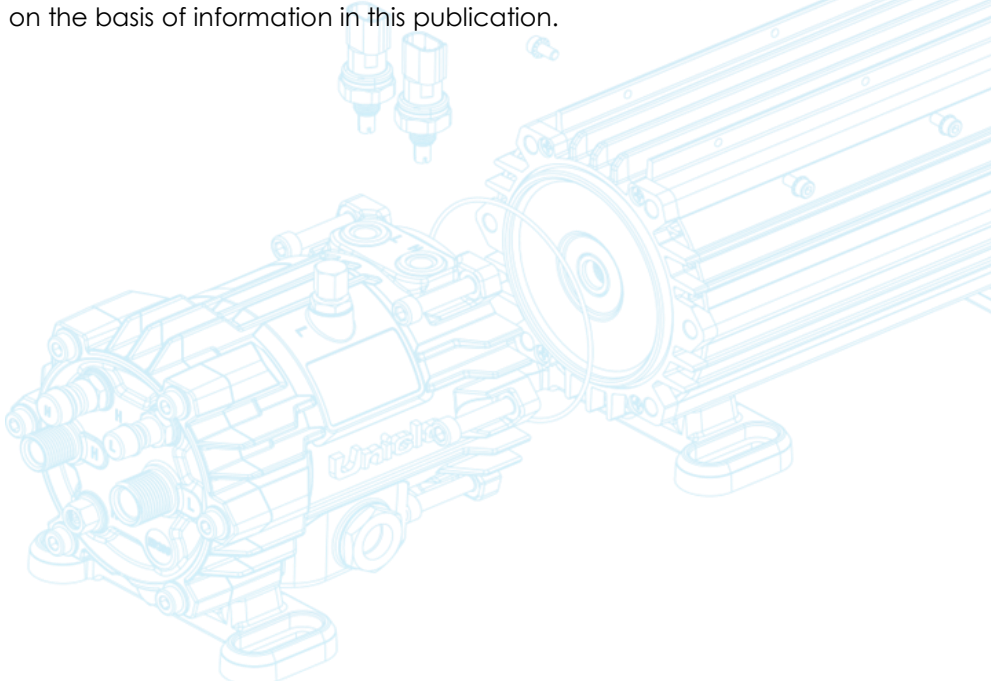

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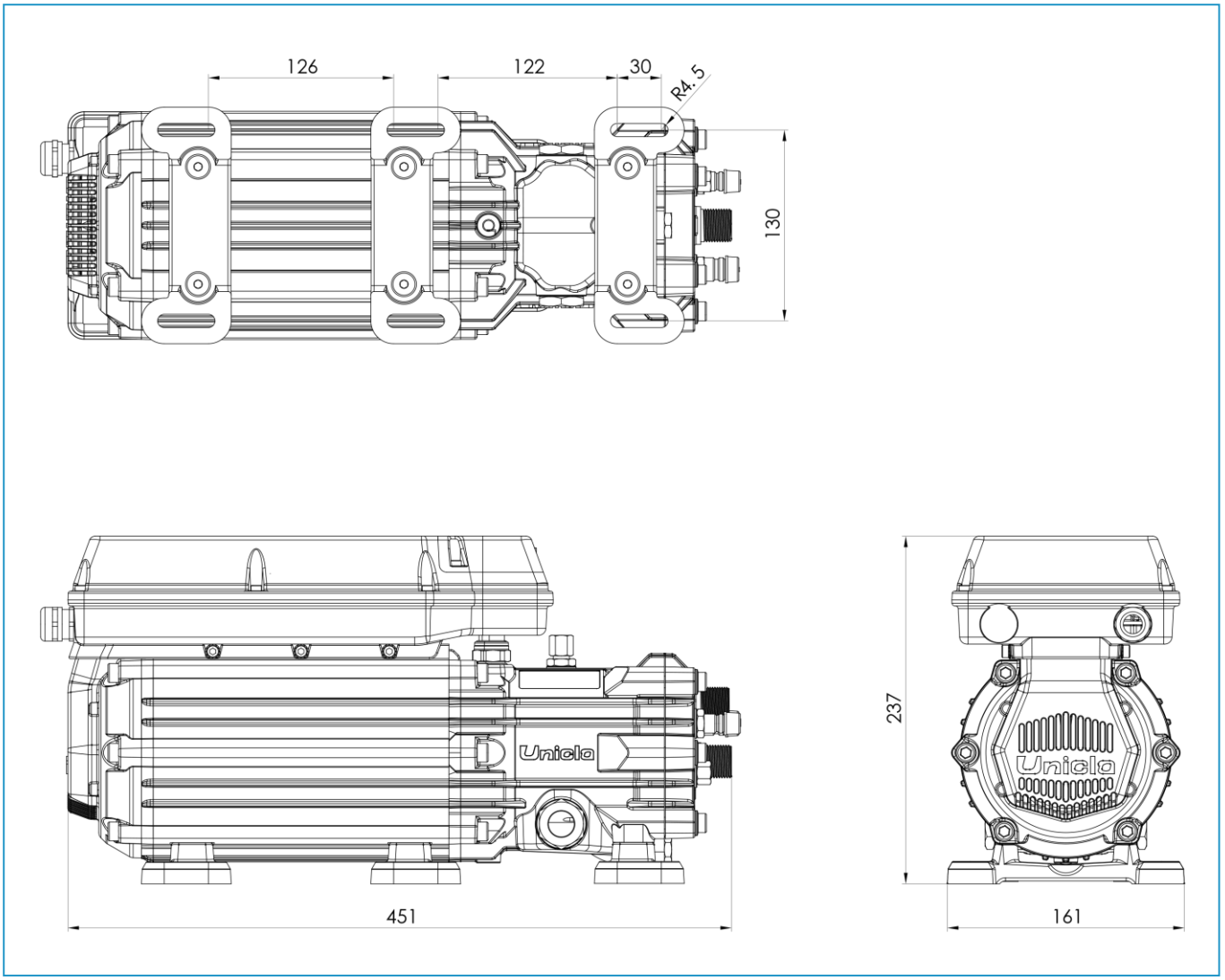
# 1. Specifications

| Model | UD150 |
|---|---|
| Number of cylinders | 10 |
| Displacement | 145cc/rev |
| Refrigerant | R134a – R513a – R1234yf |
| Initial oil change | 200cc |
| Oil type* | Depends on the refrigerant type |
| Weight | 25kg |
| Motor | 48 or 72 V dc |

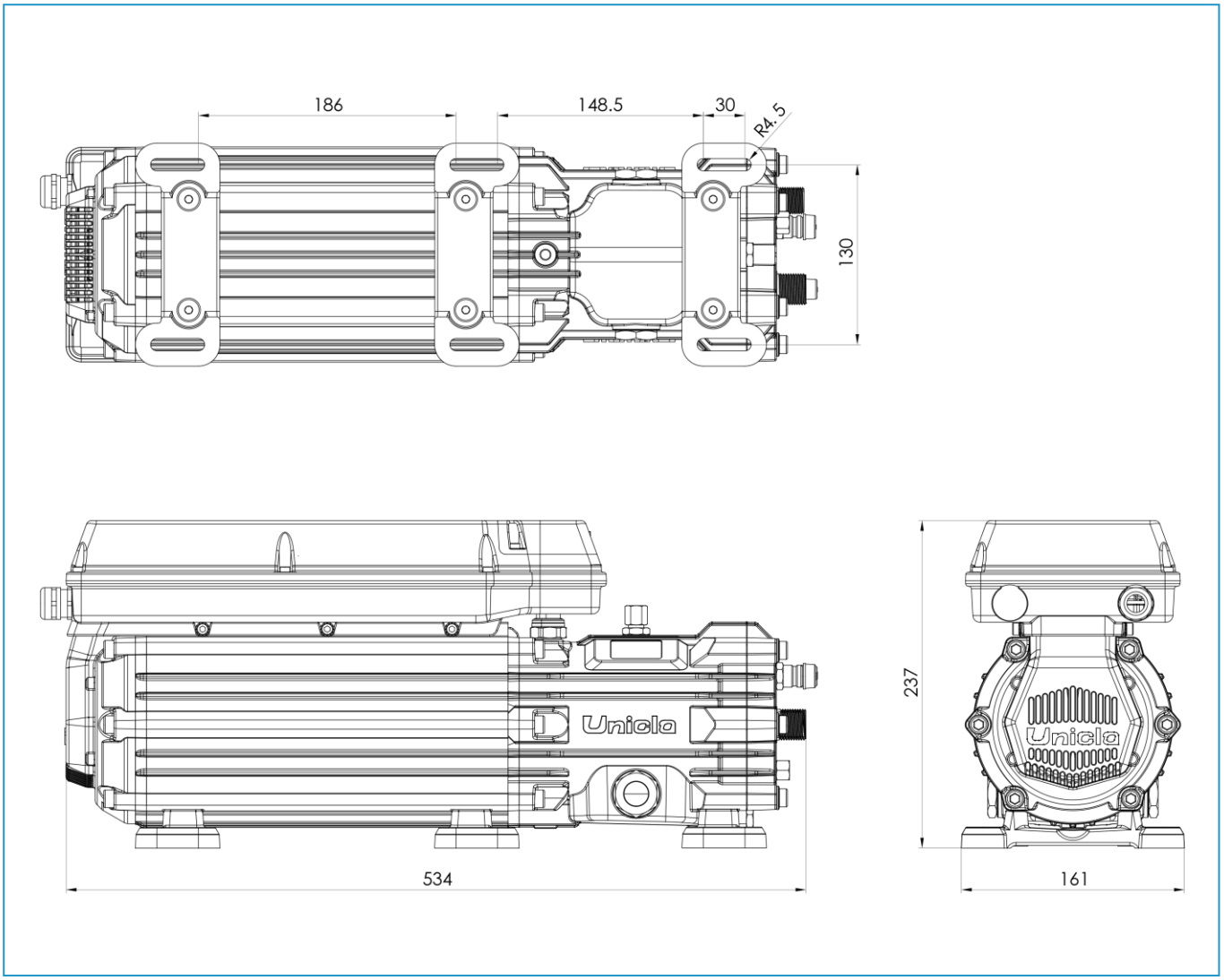
***Refer to section 5 (System oil) for more details of the oil type**



# 1. Specifications

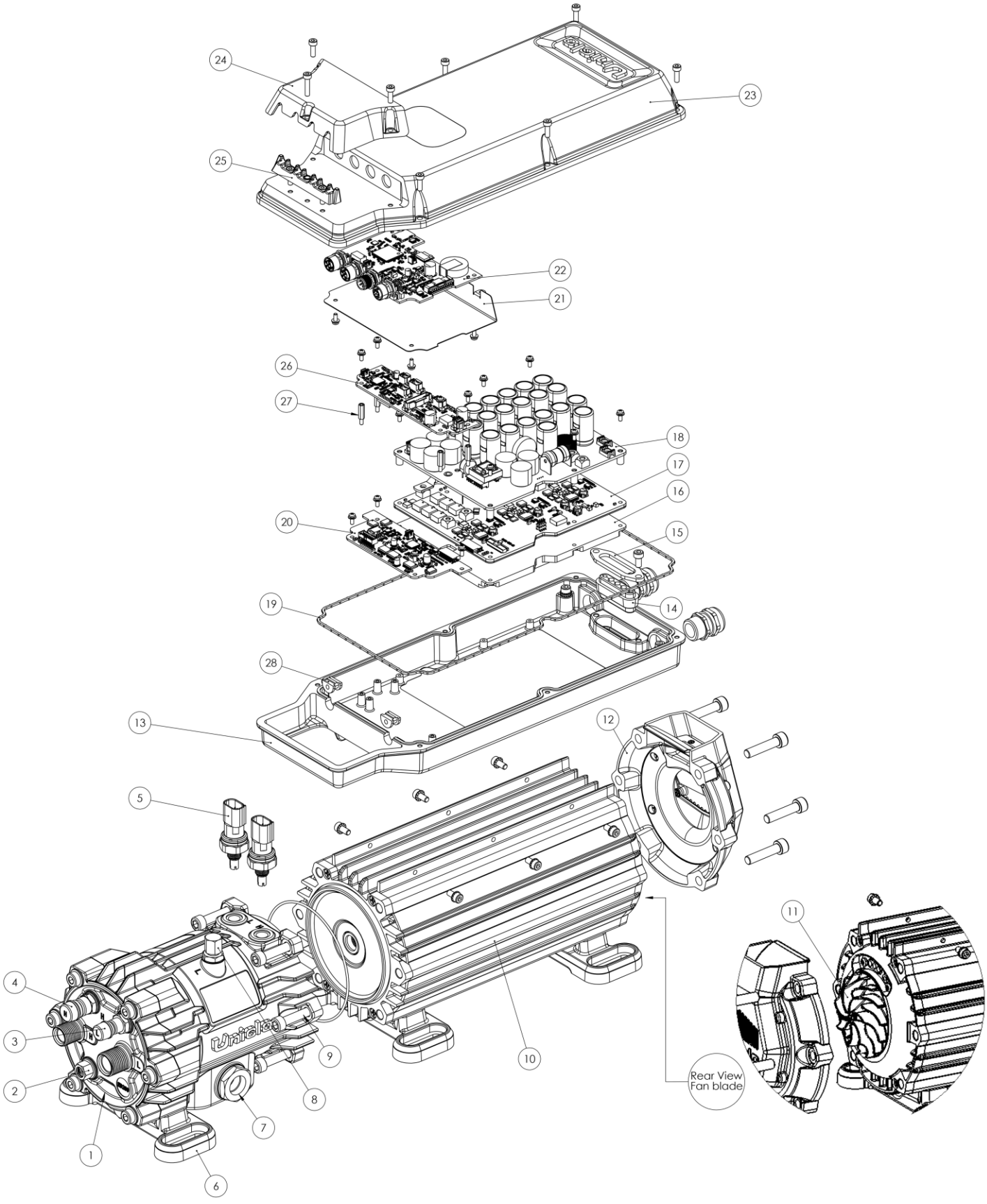
| Model | UD200 |
|---|---|
| Number of cylinders | 10 |
| Displacement | 200.4cc/rev |
| Refrigerant | R134a – R513a – R1234yf |
| Initial oil change | 250cc |
| Oil type* | Depends on the refrigerant type |
| Weight | 26kg |
| Motor | 48 or 72 V dc |

***Refer to section 5 (System oil) for more details of the oil type**



# 2. Exploded view

## Part numbers next page



# 2. Part numbers

| Item No. | Description | Part number |
|---|---|---|
| 1 | Rear cap | 21504-000230 |
| 2 | Relief valve | 38305-000030 |
| 3 | Low side service valve | 38101-000020 |
| 4 | High side service valve | 38101-000030 |
| 5 | Transducer | 53101-000190 |
| 6 | Mounting foot | 32308-001120 |
| 7 | Sight glass | 35801-000010 |
| 8 | Oil return port | 42203-000161 |
| 9 | Dust O-ring | 92701-000010 |
| 10 | Motor assembly UD150-48 V dc | 60100-00075 |
| | Motor assembly UD150-72 V dc | 60100-00025 |
| | Motor assembly UD200-72 V dc | 60100-00035 |
| 11 | Fan motor | Part of motor |
| 12 | Fan motor housing | 60030-00005 |
| 13 | Controller housing UD150 48-72 V dc | 60040-00025 |
| | Controller housing UD150 400-600 V dc | 60040-00005 |
| | Controller housing UD200 72 V dc | 60040-00025 |
| | Controller housing UD200 400-600 V dc | 60040-00015 |
| 14 | Motor cable gland | 62020-000100 |
| 15 | Motor cable retainer | 62020-000090 |
| 16 | UDPC power card heat spreader | 64040-000040 |
| 17 | UDPC power card 48 V | 62020-000330 |
| | UDPC power card 72 V | 62020-000330 |
| 18 | UDPC mezzanine power card 48 V | 62020-000320 |
| | UDPC mezzanine power card 72 V | 62020-000310 |
| 19 | Enclosure gasket | 92601-000010 |
| 20 | UDCMC compressor card | 62020-000080 |
| 21 | UDXC shield | 62020-000180 |
| 22 | UDXC communication card | 62020-000050 |
| 23 | Enclosure lid | Part of housing |
| 24 | Connections cover | 62020-000020 |
| 25 | Cable support | 62020-000140 |
| 26 | UDFMC fan control card | 62020-000060 |
| 27 | PCB stand | 62020-000110 |
| 28 | Transducer gland | 62020-000160 |
| **Accessories** | | |
| 1 | USB communication cable | 50402-001100 |
| 2 | Ethernet communication cable | 50402-001120 |
| 3 | Control cable with 4P Deutsch plug | 50402-001190 |
| 4 | Control cable no plug | 50402-001080 |
| 5 | CAN communication cable | 50402-001130 |

# 3. Service tools

**Circlip pliers**
***Generic***

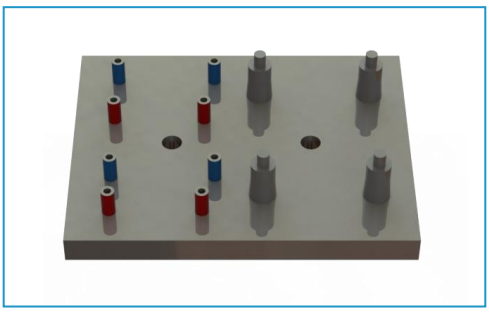
**Guide sleeve**
***Part 03301-000330***

**Shaft rotating handle**
***Part 03301-000340***

**Installer – ring and seal**
***Part 03301-000320***

**Seal remover**
***Part 03301-001000***

**Torque wrench**
***Generic***



**Assembly stand**

**Flat screwdriver**
***Generic***

**Phillips screwdriver**
***Generic***

**Allen key**
***Generic***

**Socket wrench set**
***Generic***

**Adjustable wrench**
***Generic***

**Safety equipment**

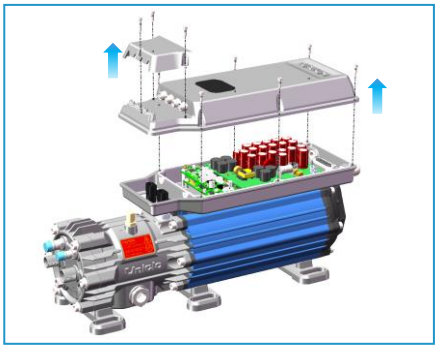
Always carry out a risk assessment before starting any work on the system or compressor

Always use appropriate protective equipment where required such as safety glasses, gloves and safety boots

# 4. Assembly and disassembly procedure

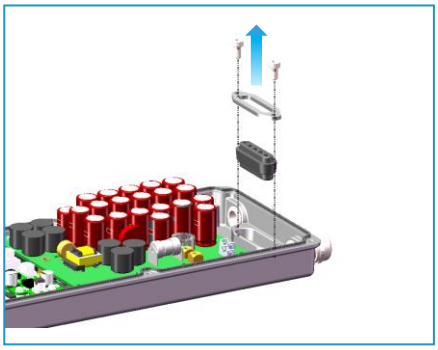
## 4.1 Removal of the compressor from the motor

### a) Remove the electrical enclosure lid



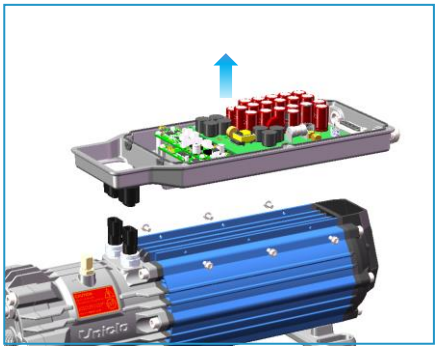
**Tools required:** Allen key
**Procedure:**
Confirm the power supply is isolated.
Remove the six screws and gently lift the lid up by approximately 100mm.
Disconnect the interconnecting cable and earth lug between the base and the lid.
Remove the lid assembly.

### b) Loosen the interconnecting cables



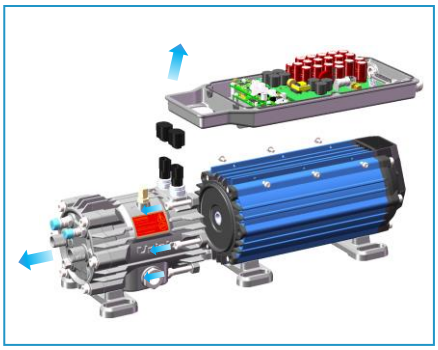
**Tools required:** Allen key
**Procedure:**
Remove the two screws from the cable gland retainer near the fan end of the base. Slide the retainer over the cable assembly free of the gland hole and remove the gland halves from the base. The cables now have free movement of the enclosure.

### c) Loosen the controller housing



**Tools required:** Allen key
**Procedure:**
Remove the transducer plugs from the top of the transducers.
Remove the six screws retaining the enclosure base to the motor and slowly lift the enclosure base upward while feeding the cables through the hole in the enclosure base. (It needs to be raised only 20 to 30mm). Lay the base back onto the motor.

### d) Remove the compressor from the motor



**Tools required:** Allen key
**Procedure:**
Remove the six bolts retaining the compressor to the motor.
Gently raise the enclosure base at the transducer end so that the base is above the height of the transducers. While the base is elevated, support the underside of the compressor with one hand and gently pull it away from the motor.

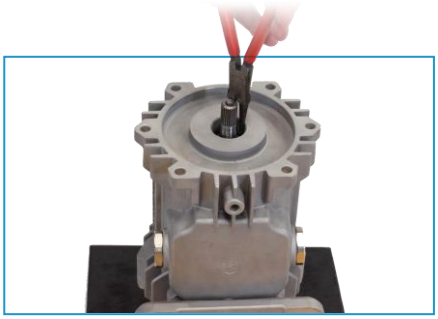
Assembly is the reverse procedure.

## 4.2 Compressor assembly/disassembly procedure

### 4.2.1 Lip seal

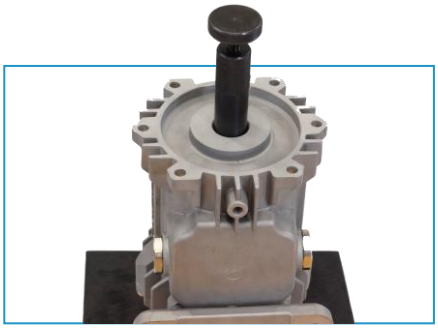
#### a) Remove snap ring

**Tools required:** Snap ring pliers (hole)
**Procedure:** Remove the snap ring slowly with pliers.



#### b) Remove lip seal

**Tools required:** Lip seal remover
**Procedure:** Insert the lip seal into the recess, turn around lightly and pull out.
**Note: Inspect the condition of lip seal and snap ring to ensure they are both in one piece and not deformed**.



#### c) Setting the guide sleeve

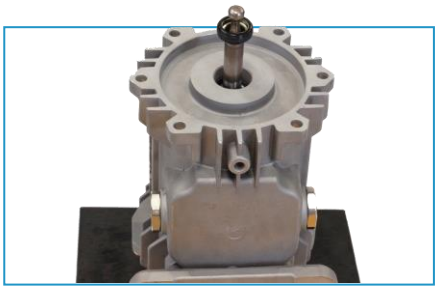
**Tools required:** Stand guide sleeve
**Procedure:** Place compressor on the stand. Lubricate outside of the guide sleeve and insert into the shaft of the compressor.
***Caution - the sleeve must be clean and unmarked***.

#### d) Installation of the lip seal

**Tools required:** Guide sleeve lip seal installer

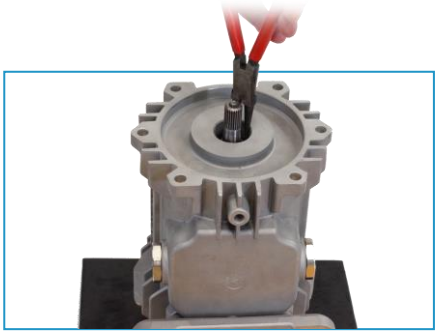
**Procedure:** Slip the lip seal over the guide sleeve by hand. Place the installer on the lip seal correctly.

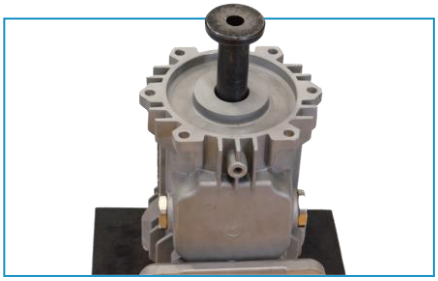
Press the lip seal with the remover until it stops. Then remove the guide sleeve.



# 4.2 Compressor assembly/disassembly procedure

## 4.2.1 Lip seal





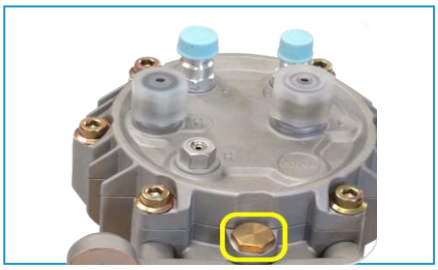
### e) Assembly of the snap ring

**Tools required:** Snap ring pliers (hole) installer ring

**Procedure**: Insert the snap ring into nose section (tapered part of the snap ring must be facing downwards).

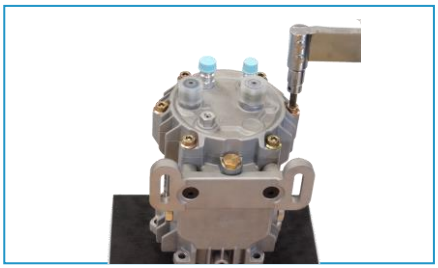
Push the snap ring downward with the installer ring and fit into groove.

## 4.2.2 Rear cap



### a) Remove oil

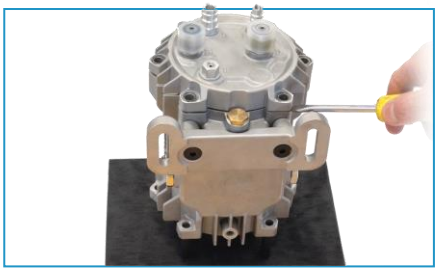
**Tools required:** 17mm socket, wrench and shaft rotating handle
**Procedure:** Remove the drain plug and drain the oil. Use the shaft rotating handle to assist with evacuating oil by rotating the working assembly (if required).



### b) Remove bolts on rear cap

**Tools required:** 6mm AF In-hex socket, wrench and assembly stand

**Procedure:** Remove the securing cap bolts (5pcs) from the rear cap.



### c) Remove the rear cap

**Tools required**: Screwdriver (flat) or suitable lever and assembly stand

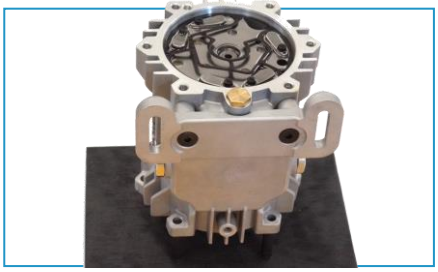
**Procedure:** Remove the rear cap by gently inserting a screwdriver or lever into the recess. Lever all around, not just at one position.

***Caution - Do not damage the end of front cap and body.***

### d) Working assembly

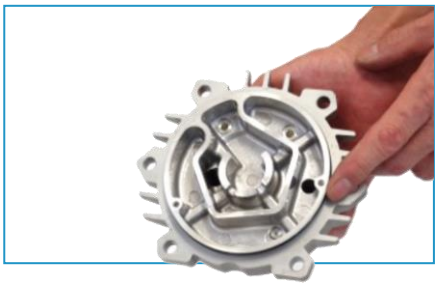
**Inspection:** Once the rear cap is removed the working assembly is exposed including the valve plate and gasket.

**Caution – do not allow dirt and debris to enter the compressor casing and working assembly.**



### e) Installation of the rear cap O-ring

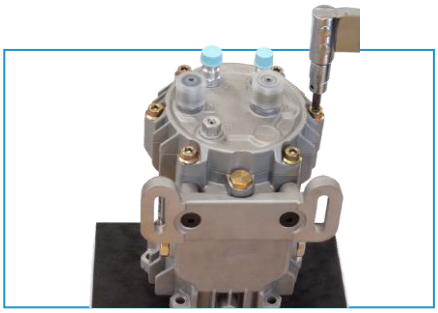
**Procedure:** The O-ring must be free from marks and dust. Thoroughly lubricate new O-ring properly and insert into the groove. Ensure the O-ring is lying straight in the groove without a twist.

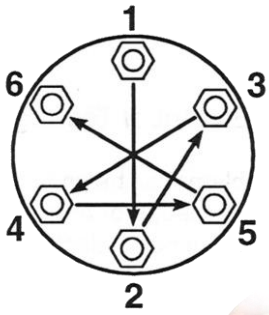


### f) Assembly of the rear cap

**Tools required:** Torque wrench with 6mm in-hex socket

**Procedure:** Place the body with front section facing upward. Place the rear cap on the body (be careful not to twist the O-ring).Tighten in-hex cap bolts (5pcs) with torque wrench to a torque setting of 34.3 ±1 N.m. Use a proper tightening sequence to ensure a uniform pull down across the cap.

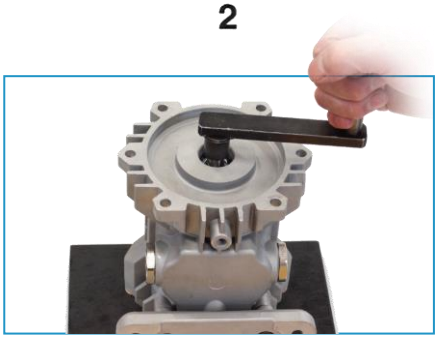




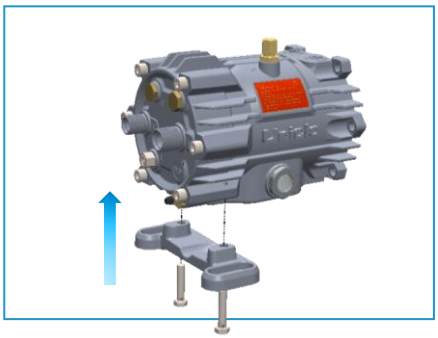

### g) Test the rotation

**Tools required:** Shaft rotating handle

**Procedure:** Install the handle into the front section to check the shaft rotates smoothly.



## 4.2.3 Mount

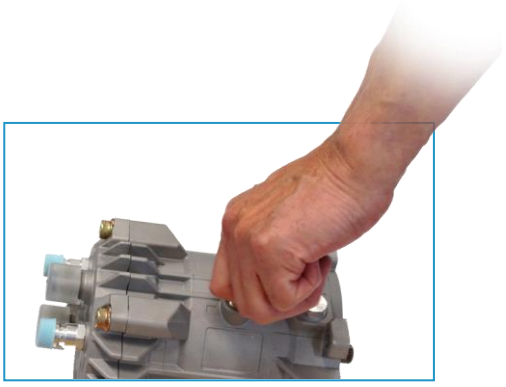


### a) Installation of the compressor mounting

**Tools required:** Allen key wrench

**Procedure:** Align the bolt holes of the mount with the compressor. Insert hex bolts and tighten.

## 4.2.4 Oil

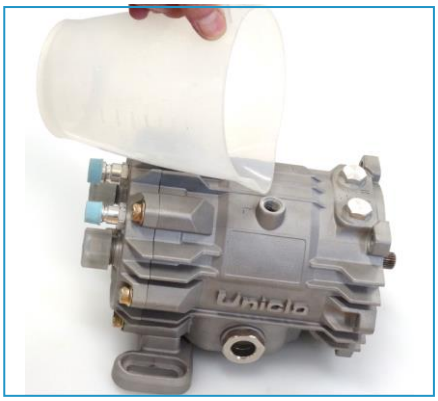


### a) Add oil to compressor

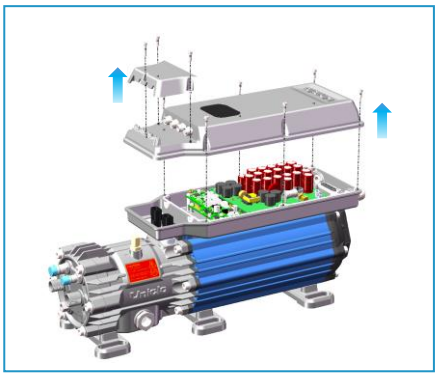
**Tools required:** 17mm socket and wrench - funnel (if required) - pouring jug

**Procedure:** Remove the oil return port. Use a funnel or jug with pouring lip to fill the compressor via the oil return port. UD150 sump capacity is 200ml.

**Standard oil type:** Unidap 7 (PAG) or Unidap 6 (POE). Refit the oil return port and tighten to a torque of 24.5 ±1 Nm. Use nitrogen at 150psi to confirm for leaks. Leave the nitrogen holding charge in the compressor until installation.



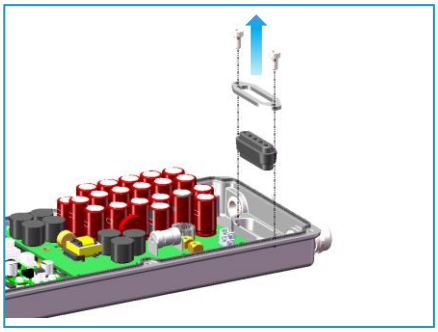
## 4.3 Remove fan assembly



### a) Remove electrical enclosure lid

**Tools required:** Allen key

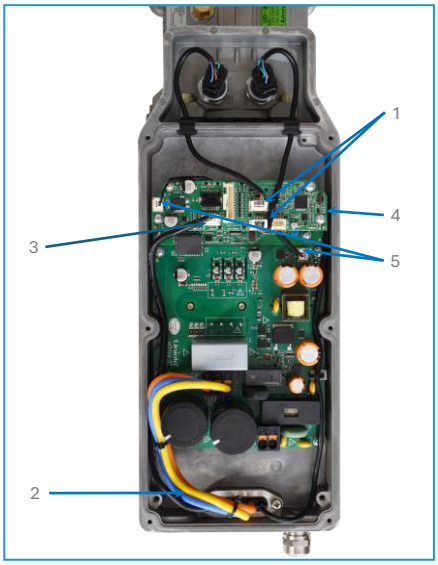
**Procedure:** Confirm the power supply is isolated.
Remove the six screws and gently lift the lid up by approximately 100mm. Disconnect the interconnecting cable and earth lug bolt between the base and the lid and remove the lid assembly.



### b) Remove gland and retainer

**Tools required:** Allen key

**Procedure:** Remove the two screws from the cable gland retainer near the fan end of the base. Remove the retainer and gland halves from the base.

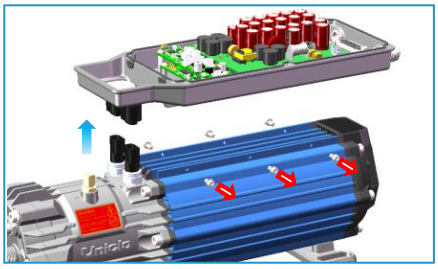



### c) Interconnecting cables

**Tools required:** Various

**Procedure:** Depending on the length of cables, it may be necessary to disconnect the cables as shown. Unplug or remove wire where applicable.

| Cable No. | Connection |
|---|---|
| 1 | Transducer cables |
| 2 | Motor 3 Phase 48-72Vdc |
| 3 | Fan motor cable |
| 4 | Motor PTC cable |
| 5 | 24V interconnect |



### d) Loosen the controller housing

**Tools required:** Allen key

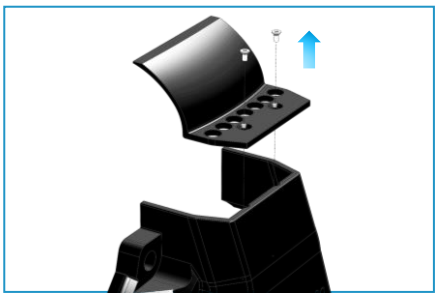
**Procedure:** Remove the transducer plugs from the top of the transducer.
Remove the six screws retaining the enclosure base and slowly lift the controller and enclosure (disconnect the cables if necessary).

**Note: Protect the PCBs from moisture, dust and static charges**

### e) Remove air deflector

**Tools required:** Phillips head screwdriver

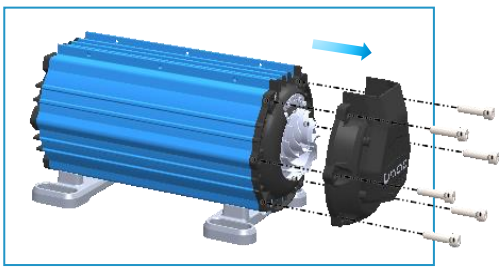
**Procedure:** Remove the two screws retaining the plastic air deflector and slide it along the cables out of the way.



### f) Remove fan housing assembly

**Tools required:** Allen key

**Procedure:** Remove the six bolts retaining the outer fan housing and remove the housing.

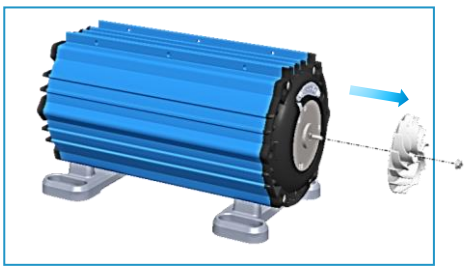


### g) Remove impeller fan assembly

**Tools required:** Socket

**Procedure:** Remove the nut retaining the fan impeller onto the motor shaft and remove the fan impeller.

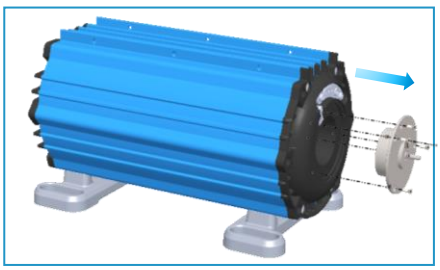
**Note: There is a flattened shaft keyway so the impeller can go on in only one orientation.**



### h) Remove impeller fan assembly

**Tools required:** Phillips screwdriver

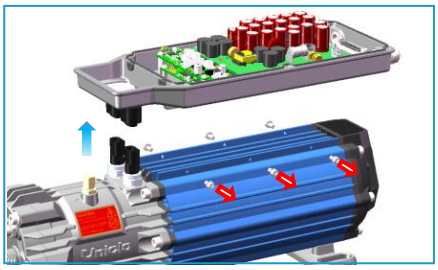
**Procedure:** Remove the three screws retaining the fan motor into the casing. Gently dislodge the motor housing and plastic cable retainer before pulling the motor from the assembly.



## 4.4 Remove transducers

### a) Preparation

**Procedure:** Remove the electrical enclosure assembly as described previously in the fan removal section. Confirm the system is de-pressurised or carry out de-pressurisation and refrigerant recovery from the system.

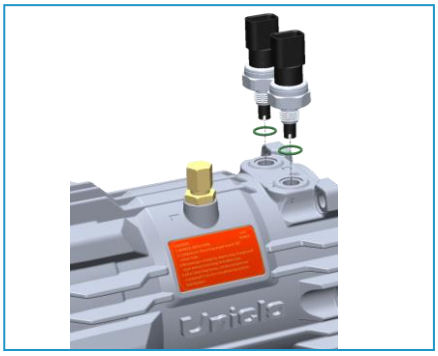


### b) Remove/Install transducers

**Tools required:** Adjustable wrench

**Procedure:** Screw/unscrew the transducers with the adjustable wrench.

**Note: Ensure the sealing O-ring is in place and lubricate it with compressor oil. Do not overtighten.**

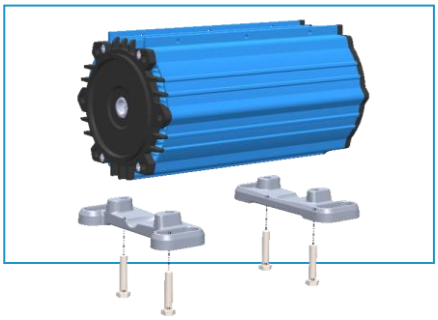


## 4.5 Mount

### Installation of the motor mounting

**Tools required:** Allen key wrench

**Procedure:** Align the bolt holes of the mount with the motor. Insert in hex bolts and tighten.



# 5. System oil

## 5.1 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. To determine the required oil quantity, Unicla recommends a calculation as a percentage of refrigerant charge as follows:

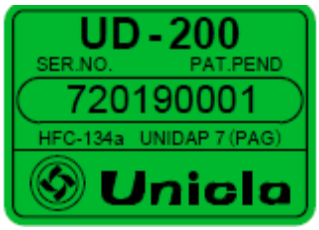
*20% for UD200 compressors in standard applications where the suction and discharge lines are less than six metres in length.*

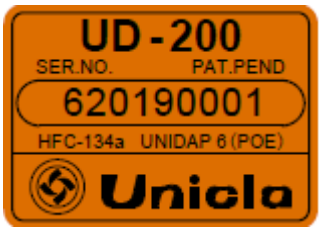
**Example:**
Calculate oil charge as 20% of refrigerant charge, 5kg charge = 5000g x 20% = 1000ml (cc) of oil. If fitting a UD200 compressor, then deduct the compressor initial oil charge to determine amount of oil to be added. Therefore 1000 – 200 = 600cc oil to be added to system.

## 5.2 Oil type and grade

Each eDrive compressor is factory charged with either Unidap PAG or POE oil. The compressor is fitted with a specific label that will identify the factory charged oil type in each eDrive compressor. When adding oil to the system, Unicla Unidap oil or a factory approved equivalent oil must be used.

**Note:** Warranty is void if non-approved oils and refrigerants are used.



## 5.2 Storage guidelines

I. Evacuate compressor for three minutes and fill with nitrogen (N2) at 0.1 ~ 0.2MPa.
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.

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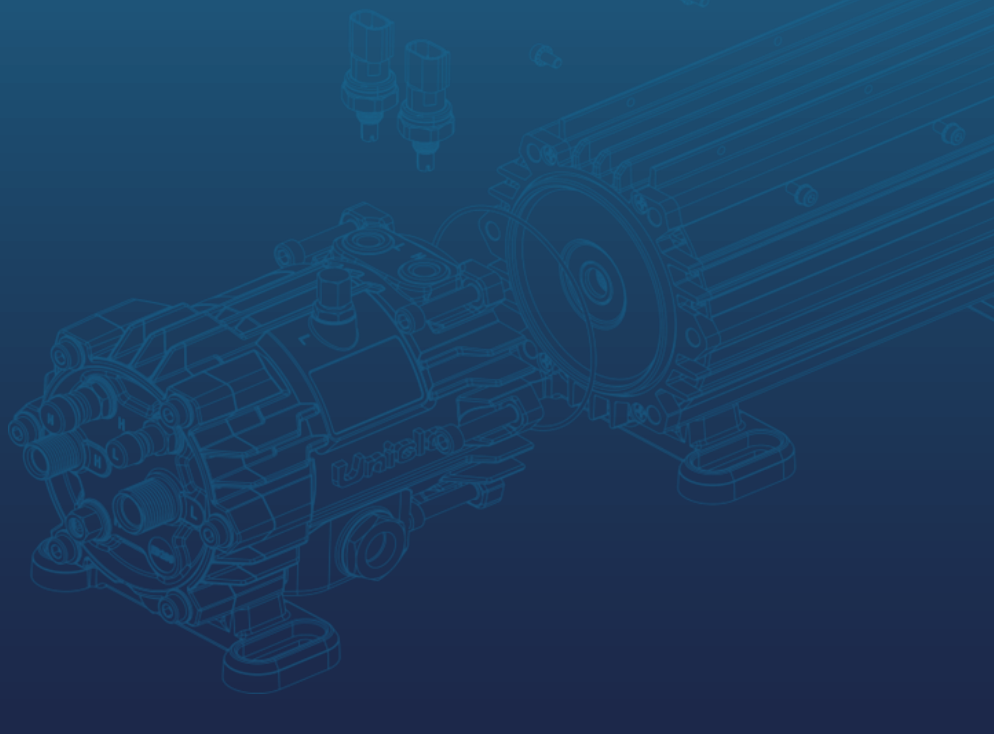
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