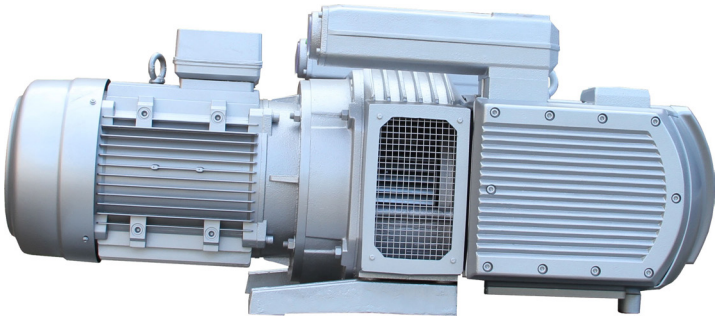
REPUBLIC MANUFACTURING

VRT/DRT/DVT-SERIES
DRY-RUNNING ROTARY VANE PUMPS
Installation & Operating Instructions



OM040 Rev.A

Republic Single Stage Dry-Running Pumps
VRT/DRT/DVT-Series
Installation Instructions & Operating Manual

Republic Manufacturing®
5131 Cash Road
Dallas, TX 75247
(214) 631-8070
www.republic-mfg.com
info@republic-mfg.com

Working Principle

Rotary vane pumps consist of a cylindrical housing (1), eccentrically positioned rotor (2), and numerous free-moving vanes (4). The vanes are placed in the slots of the rotor (3) and, as the rotor turns, the centrifugal force throws the vanes against the cylindrical wall, creating a chamber between the rotor and the cylinder (7). The chamber volume changes as the rotor turns. From the inlet port (5), the chamber volume enlarges, and then decreases towards the outlet port (6). As air enters the inlet port (5) and the chamber enlarges (7), the vanes create a vacuum. As the air is pushed through the chamber and it becomes compressed, pressure is produced at the outlet port (6).

NOTE: It is best practice to install an inlet check valve with the vacuum pump.

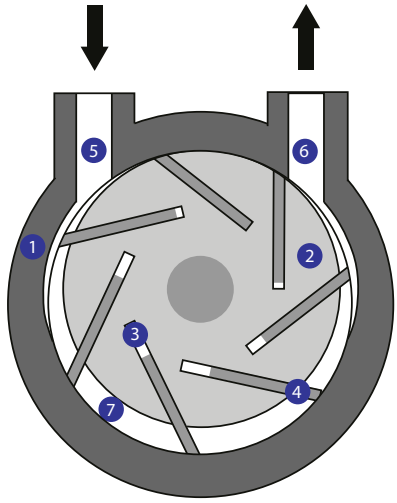


Table of Contents

Safety Instructions

To ensure safe operation, we have provided many important safety guidelines in this manual for the Republic Dry-Running Rotary Vane Pumps. Please read this manual carefully and pay particular attention to instructions with the following signs:

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

DEFINITION: For the purpose of these instructions, "handling" the pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the pump.

1. Always use qualified electrical and mechanical personnel for installation and maintenance of Republic Rotary Vane Pumps and motors.

2. Disconnect the electrical power at the motor starter, fuse box or circuit breaker before working on the system. Take special precautions to make sure the power cannot be turned on while you are working on the blower. **Use an approved lockout/tagout system.**

3. Make sure the motor is electrically grounded, the mounting bolts are properly secured, and all guards are in place before start-up.

4. Wear safety glasses and earplugs when working on the blower or components within a Republic Vacuum/Pressure system.

5. **Check the final installation for proper amp loads.**

6. Keep all tools, loose clothing and hands away from rotating or moving parts while the unit is running.

7. Inspect the pump at regular intervals for damaged or worn parts. **Replace damaged parts immediately! Do not connect or turn on a damaged pump!**

8. Inspect the inlet air filter at regular intervals and replace when necessary. A dirty air filter can cause improper pump performance.

9. Use only genuine Republic Manufacturing brand replacement parts.

10. Refer to Troubleshooting section of manual.

11. Make sure to install the inlet air filter or piping to pump inlet before starting the pump/motor.

12. Water, other liquids, aggressive or flammable gases and vapors may not be handled. Consult Republic Manufacturing for recommendations if flammable gases and vapors exist.

13. Improper use of the unit can result in serious or even fatal injuries. Only operate the pump for the purposes indicated under "Intended Use", with the fluids indicated under "Intended Use" and with the values indicated under "Technical Data".

14. High temperatures of up to approximately 176°F (80°C) can occur on the surface of the pump. Allow to cool down after shut-down.

Protect Eyes and Ears

Danger, Warning, Caution

Hot Surface

Toxic/ Bio Hazard

Explosion Risk

Risk of Electrical Shock

Lockout/Tagout Procedures

1. Notify all affected employees that a lockout or tagout is about to occur on a specific piece of equipment or machinery. The authorized employee to use the lockout/tagout system shall know the type and magnitude of energy that the machine or equipment utilizes and the hazards that exist with the energy source before preparing to shutdown.
2. If the machine or equipment is operating, please use normal stopping or rundown procedures for that machine.
3. Operate the switch, valve, or other energy isolating devices so that the equipment is isolated from its energy source. Isolating the equipment from its energy source may involve turning off such items as the operating control, a line valve, or an electrical circuit breaker.
4. Apply the lockout/tagout isolating device with assigned individual locks or tags.
5. Release any potentially-hazardous stored or residual energy. In order to do so, this may mean to return springs to a normal position, or bleeding down. Since the machine must be in a zero energy state, if there is any chance the stored energy may reaccumulate, verification of isolation must be continued until the servicing or maintenance is complete.
6. The machine or equipment is now locked out or tagged out.
7. Keep all tools, loose clothing and hands away from rotating or moving parts while the unit is running.

Model Identification

Republic Dry-Running Rotary Vane Pumps have a nameplate containing the serial and model number located on the pump body. When placing a service call, please provide the Republic serial number. Call us at (800) 847-0380 or e-mail info@republic-mfg.com.

Equipment Arrival & Inspection

Inspect the pump at time of receipt to ensure that all components and accessories, as noted on the packing slip, were received and in good condition. Verify that the serial number on the packing slip matches the serial number shown on the pump nameplate. Inspect the pump and motor assembly to ensure that the motor horsepower and voltage are correct.

If any equipment was damaged in transit, you will need to make a claim against the freight carrier immediately. If you have any shortages, discrepancies, or damage, please call your Republic Manufacturing Distributor or Republic Manufacturing at (800) 847-0380.

DANGER: Possible danger to health and or the environment. Personal protective equipment must be worn. Liquids must be disposed in compliance with applicable regulations.

Intended Use

This operating manual

- is intended for dry-running rotary vane pump models DVT 416-3140, DRT 408-3140, and VRT 408-3250 .
- contains instructions regarding transport and handling, installation, commissioning, operation, shut-down, storage, services, and disposal.
- must be completely read and understood by all operating and servicing personnel before beginning to work with or on the pumps.
- must be strictly observed.
- must be available at the site of operation.

The VRT/DRT/DVT-Series

- are pump-motor units for generating vacuum/pressure.
- are used to extract, pump and compress the following gases:
  - Air.
  - Non-flammable, non-aggressive, non-toxic and non-explosive gases or gas-air mixtures.
  - For differing gases/gas-air mixtures, inquire with Republic Manufacturing.

These operating instructions apply only to pump units with a standard design:

- are intended for industrial applications or designed for continuous operation.
- With increased switch-on frequency (6x per hour with equal pauses and operating times) or with increased gas inflow and ambient temperature, the excess temperature limit of the coil and the bearing can be exceeded. Consult Republic Manufacturing under such conditions.

Foreseeable Misuse

It is prohibited

- to use the VRT/DRT/DVT Dry-Running Rotary Vane Pumps in applications other than industrial applications unless the necessary protection is provided on the system, e.g. guards suitable for children's fingers;
- to use the device in areas in which explosive gases can occur if the pump is not expressly intended for this purpose;
- to extract, to deliver and to compress explosive, flammable, corrosive or toxic fluids, unless the pump is specifically designed for this purpose;
- to operate the pump with values other than those specified in "Technical Data".

Any unauthorized modifications of the pump are prohibited for safety reasons. The operator is only permitted to perform the maintenance and service work described in these operating instructions. Maintenance and servicing work which goes beyond this may only be carried out by companies which have been authorized by Republic Manufacturing.

Product Description

Republic Manufacturing Dry-Running Rotary Vane Pumps are industrial grade pumps made for continuous duty. These pumps provide the vacuum to 25.5 HgV and pressure up to 21.8 psi. Several models are available:

- The Republic DVT dry-running combination pump series has capacities from 3.5 to 68.3 cfm.
- The Republic DRT dry-running pressure pump series has capacities from 5.0 to 98 cfm.
- The Republic VRT dry-running vacuum pump series has capacities from 5.0 to 177 cfm.

The pump is intended for the suction of air and other dry, non-aggressive, non-toxic and non-explosive gases. Conveying media with a higher density than air leads to an increased thermal and mechanical load on the pump and is permissible only after prior consultation with Republic Manufacturing.

The pump is intended for placement in a non-potentially explosive environment. The pump is thermally suitable for continuous operation.

Noise Emission

For the sound pressure level in free field according to SKU, see "Technical Data".

WARNING: The pump emits noise of high intensity. Risk of damage to the hearing. Persons staying in the vicinity of a non-noise insulated pump over extended periods shall wear ear protection.

Transport

1. Attach lifting gear securely to the eyebolt on the cylinder.
2. Attach lifting gear to a crane hook with safety latch.
3. Lift the pump with a crane hook.

DANGER: Do not walk, work or stand under suspended loads.
WARNING: Check the weight of the pump before lifting. (See "Technical Data".) Use adequate lifting gear as needed.
ATTENTION: The position of the eyebolt fits to the center of gravity of the pump, including the drive motor. If a pump without a drive motor is to be lifted, attach another belt/rope at a suitable point.

Transport in Packaging

Packed on a pallet, the pump is to be transported with a forklift. Remove the stud bolts from the rubber feet.

Transport without Packaging

In the event the pump is bolted to a pallet or a base plate, remove the bolting between the pump and pallet/base plate.

Weight Limitations

Pump may be lifted manually or utilizing lifting equipment based on the instructions below. All pumps heavier than the maximums stated below must be lifted using lifting equipment. Manual handling of the unit is only permitted within the following limits:

- Max. 66 lbs (30 kg) for men
- Max. 22 lbs (10 kg) for women
- Max. 11 lbs (5 kg) for pregnant women

Suitability & Environmental Conditions

- The units are suitable for use in the industrial field.
- Use only clean, dry air. Do not use explosive gases or atmosphere that contains such gases.
- The ambient and suction temperatures must be <104°F (40°C). For temperatures outside this range please contact your supplier.
- In all applications where an unplanned shut down of the pump could possibly cause harm to persons or installations, a corresponding safety backup system must be installed.
- Protect all surrounding items from exhausted air. This exhausted air can be very hot.
- When using the pump at a high altitude or high temperatures, please consult with Republic Manufacturing prior to use.
- Water, other liquids, aggressive or flammable gases and vapors may not be handled. Handling of flammable or aggressive gases and vapors is only possible with special versions.
- Do not dispose of solid material directly into suction inlet or use filter before inlet. Doing so may cause damage to the pump.
- Do not dispose of acid, alkali or flammable gas. Doing so may cause an explosion or damage.
- Do not dispose of high temperature liquid or air.

DANGER: Possible danger to health and/or the environment. Personal protective equipment must be worn. Liquids must be disposed in compliance with applicable regulations.

Storage Conditions

- Store in original packaging.

- Must store pump in a place that meets the following conditions: dry, indoors, dust-free and low vibration (<2.8mm/s).
- The temperature during storage must be ambient temperature <104°F (40°C).
- Store with the inlet and discharged plugged.

Installation and Commissioning

Installation Prerequisites

DANGER: In case of non-compliance with the installation prerequisites, particularly in the case of insufficient cooling, risk of damage or destruction of the pump and adjoining plant components. Risk of injury. The installation prerequisites must be complied with.

Mounting Position and Space Required for Installation

- Upon installation, please check for and remove any obstruction around pump suction inlet and install under cover to avoid motor damage or electric shock caused by contact with water.
- To avoid overheating, ensure airflow to the pump is undisturbed.
- A distance of at least 4 ft (1.2 meter) must be maintained between pump motor fan and wall to avoid overheating. Heat-resistant piping material is recommended within 4 ft (1.2 meter) of the pump.
- Ventilation screens and openings must remain clear so that discharge air of other units may not be directly sucked in again.
- Do not use the pump in areas where it would be exposed to high temperatures, excessive dust, smoke, rain, caustic air, or combustible air.
- Install the pump on a level, stable operating surface. The pump causes low vibration, but a special base is not required.
- Make sure that the environment of the pump is not potentially explosive.
- Make sure that the following ambient conditions will be complied with:
  - Ambient temperature: see "Technical Data"
  - Ambient pressure: atmospheric
- Make sure that the environmental conditions comply with the protection class of the drive motor (according to the name-plate).
- Make sure that the pump will be placed or mounted horizontally.
- Make sure that the base for placement / mounting base is even.
- Make sure that the pump can neither inadvertently nor intentionally be stepped on and cannot be used as a support for heavy objects.
- Make sure that the pump cannot be hit by falling objects.
- Inlet/outlet piping must be at least the same diameter as pump's inlet/outlet connection.
- The mounted pipes should cause no tension on the pump's inlet/outlet connections. Be careful of overhung load from piping on pump's manifold. If necessary, install a pipe support to reduce stress on the pump's manifold.
- Avoid unusual or sudden diameter shrinkage, enlargement, or curvature of piping to ensure best pump air efficiency.
- Make sure that in order to warrant a sufficient cooling there will a clearance of minimum 2 ft (0.6 meter) between the fan hood and nearby walls.
- Make sure that no temperature sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the pump.
- Make sure that the installation space or location is vented such that a sufficient cooling of the pump is available.
- Make sure that the pump will not be touched inadvertently during operation. Provide a guard if appropriate.

DANGER: Make sure the motor is electrically grounded, the mounting bolts are properly secured, and all guards are in place before start-up.

DANGER: During operation the surface of the pump may reach temperatures of more than 176°F (80°C). Risk of burns!

Plumbing & Accessories

The VRT/DRT/DVT Dry-Running Pump includes:

- Inlet air filter(s) to clean the air of debris before entering the pump.
- Vacuum/pressure relief valve to control inlet pressure when pump is used on vacuum/pressure duties.

- Remove any foreign material (e.g. burrs, chips, welding drops, pipe cuttings, excess sealant, etc.) from plumbing.
- Verify the motor is securely mounted and proper pump rotation before connecting to plumbing. The inlet and outlet port are not designed to support the plumbing without proper supporting elements.
- Remove safety rubber plugs from the inlet and outlet ports.
- Connect the plumbing with properly sized fittings.
- Install an intake filter to prevent foreign material from entering the pump. This is especially recommended for dirty/dusty environments. In applications where there is high humidity or liquids being used in the process, install a moisture separator with a drain valve.
- When the diameter of the main pipe must be reduced, a tapered pipe should be used.
- Install two (2) gauges - one before and one after the filter - to monitor differential air flow through the filter element. As filters become clogged, performance efficiency will be reduced. Filters should be checked periodically and replaced when necessary.
- Recommended piping should be, at minimum, the same size as the inlet port on systems.

WARNING: Exhaust air temperature increases significantly above 65"WC (162 mbar). Discharged air is typically too hot for most plastic piping, therefore metal piping is recommended. This piping must be guarded and marked "DANGER-HOT-DO-NOT TOUCH".

Suction Connection

DANGER: Do not put hands into the inlet aperture. Risk of body damage!
WARNING: Intruding foreign objects or liquids can destroy the pump.

In case the inlet gas can contain dust or other foreign solid particles:

- Make sure that a suitable filter (5 micron or less) is installed upstream of the pump.
- Make sure that the suction line fits to the suction connection/gas inlet of the pump.
- Make sure that the gas will be sucked through a vacuum-tight flexible hose or a pipe.
- Make sure that the pipe will cause no stress on the pump's connection. If necessary use bellows.
- Make sure that the line size of the suction line over the entire length is at least as large as the suction connection/gas inlet of the pump.

In case of very long suction lines it is prudent to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your Republic Manufacturing representative.

If two or more pumps work on the same suction line, or if the vacuum/pressure shall be maintained after switching off the pump:

- Provide a manual or automatic operated valve (non-return valve) in the suction line.

If the pump is planned to be used for the suction of gas that contains limited quantities of condensable vapor:

- Provide a shut-off valve, a drip-leg and a drain valve in the suction line, so that condensates can be drained from the suction line.
- Make sure that the suction line does not contain foreign objects, e.g. welding scales.

Discharge Connection

DANGER: Do not put hands into the inlet aperture. Risk of body damage!

The following guidelines for the discharge line do not apply if the aspirated air is discharged to the environment right at the pump.

- Make sure that the discharge line fits to the gas discharge connection of the pump.

In case of using a pipe:

- Make sure that the pipe will cause no stress on the discharge connection. If necessary use bellows.
- Make sure that the line size of the discharge line over the entire length is at least as large as the gas discharge connection of the pump.

In case of very long discharge lines it is prudent to use larger line sizes in order to avoid a loss of efficiency and an overload of the pump. Seek advice from your Republic Manufacturing representative.

- Make sure that the discharge line either slopes away from the pump or provide a liquid separator or a drip leg with a drain cock, so that no liquids can back up into the pump.

DANGER: Discharge lines made from non-conducting material can build up static charge. The discharge line must be made of conducting material or provisions must be made against static discharge.

On/Off Switch

The pump comes without on/off switch. The control of the pump is to be provided in the course of installation.

Electrical Connection

DANGER: Malpractice can result in severe injuries and material damage. The electrical connection may be performed by trained and authorized electricians only.

ATTENTION: Before beginning work on the unit or system, the following measures must be carried out:

1. De-energize.
2. Perform proper lockout/tagout procedures such that electricity cannot be turned on again.
3. Confirm unit is de-energized.
4. Ground and short-circuit.
5. Cover or block-off adjacent energized parts.
6. Make sure the voltage and frequency of power supply fits the requested electrical condition marked on pump rating plate or label, otherwise injury or motor damage may occur due to incorrect voltage.
7. Install overload protection according to the voltage marked on rating plate or label and choose the appropriate overload device.
8. Make sure that the drive of the pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary seek advice from the Republic Manufacturing service.
9. Avoid turning pump switch on and off more than 10 times per hour, otherwise motor may overheat.
10. In case of mobile installation, provide the electrical connection with grommets that serve as strain-relief.

DANGER: Risk of electrical shock, risk of damage to equipment. Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations: 1) IEC 364 or CENELEC HD 384 or DIN VDE 0100; 2) IEC-Report 664 or DIN VDE 0110; 3) BGV A2 (VBG 4) or corresponding national accident prevention regulation.

DANGER: Risk of damage to the drive motor. The inside of the terminal box shall be checked for drive motor connection instructions/schemes.

WARNING: Incorrect connection of the motor can lead to serious damage to the unit.

Electrical Power Supply

Observe the rating plate. It is imperative that the operating conditions correspond to the data given on the rating plate. Deviations permissible without reduction in performance include:

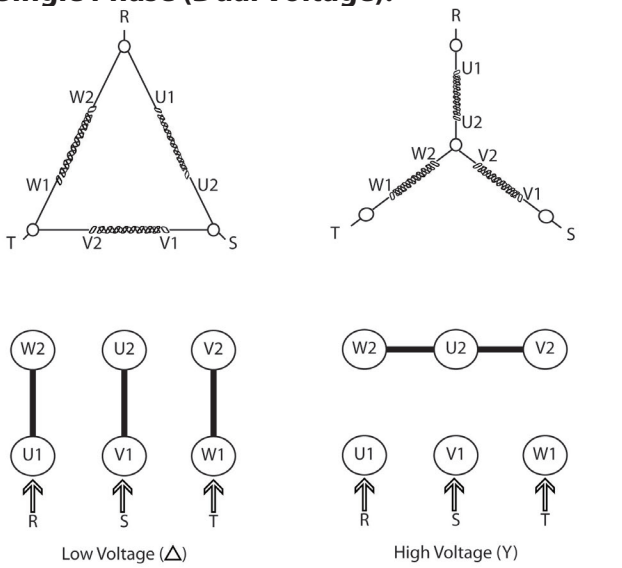
- +/- 5% voltage deviation
- +/- 2% frequency deviation

Connection to Terminal Box

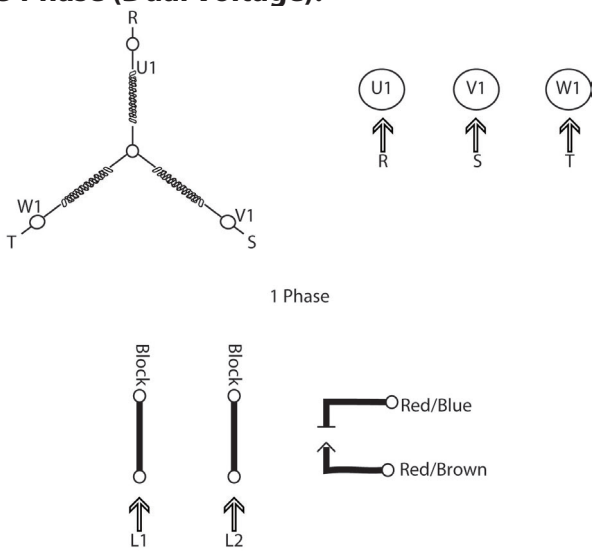
11. Remove the motor's terminal box cover.
12. Mount cable glands on the terminal box. Proceed as follows:
    1. Select one cable gland in each case which is suitable for the cable diameter.
    2. Insert this cable gland in the opening of the terminal box. Use a reducer if necessary.
    3. Screw on the cable gland so that no moisture, dirt, etc. can penetrate into the terminal box.
13. Carry out the connection and arrangement of the jumpers in accordance with the wiring diagram. The electrical connection must be carried out as follows:
    1. The electrical connection must be permanently safe.
    2. The terminal box must be free from foreign bodies, dirt, and humidity. Terminal box cover and cable entries must be tightly closed so as to make them dust-proof and waterproof. Check for tightness at regular intervals.
    3. There may be no protruding wire ends.
    4. Clearance between bare live parts and ground : $\geq$ 0.22 in. (5.5 mm) at a nominal voltage of $U_N \leq 690$ V.
14. For motor overload protection, use motor circuit breakers and adjust to the specified nominal current as listed on the rating plate.

DANGER: There is danger of an electrical shock when a defective pump is touched. Mount motor circuit breaker. Have electrical equipment checked regularly by an electrician.

Single Phase (Dual Voltage):



3 Phase (Dual Voltage):



DANGER: Operation in the wrong direction of rotation can damage the pump in a short time. Prior to starting-up it must be made sure that the pump is operated in the proper directions.

14. Determine the intended direction of rotation with the arrow.
15. "Bump" the drive motor.
16. Watch the fan wheel of the drive motor and determine the direction of rotation just before the fan wheel stops.
17. If the rotation of the fan wheel must be changed, switch any two of the drive motor wires in the terminal box.

Installation Mounting

Make sure that the "Installation Prerequisites" are complied with. Set down or mount the pump at its location.

Connecting Lines/Pipes

In case the suction line is equipped with a shut-off valve:

- Connect the suction line.
- Connect the discharge line .

Installation without discharge line:

- Make sure that the gas discharge is open.
- Make sure that all provided covers, guards, hoods etc. are mounted.
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.

Recording of Operational Parameters (optional)

As soon as the pump is operated under normal operating conditions:

- Measure the drive motor current and record it as reference for future maintenance and troubleshooting work.

Commissioning

DANGER: Improper use of the unit can result in serious or even fatal injuries. Do not proceed without reading "Safety Instructions".

DANGER: Danger from rotating parts cutting/cutting off extremities, grasping/winding up of hair and clothing.

DANGER: Danger due to vacuum and pressure, sudden escape of vapor (skin and eye injuries), sudden drawing in of hair and clothing, or burns.

Only start-up and operate under the following conditions:

- The pump must be completely assembled. Pay particular attention to the following components:
  - the pump cover;
  - the muffler on inlet and discharge connections; and
  - the fan guard;
- The pipes/hoses must be connected to inlet and discharge connections.
- Inlet and discharge connections and the connected pipes/hoses may not be closed, clogged or soiled.
- Check the mounting elements, connections of the pipe/hose, lines, fittings and containers for strength, leaks and firm seating at regular intervals.

Preparation

DANGER: Pump can overheat causing damage to the drive motor winding if intake or discharge connections are closed/soiled. Before start-up, make sure the inlet and discharge connections are not closed, clogged or soiled.

WARNING: Before starting up after a longer standstill, measure the insulation resistance of the motor. With values $\leq$ 1 kΩ per volt of nominal voltage, the winding is too dry.

1. Check the direction of the rotation. The intended rotating direction of the shaft is marked with arrows on the motor.
2. The gas delivery direction is marked with arrows on the inlet connection.
3. Make sure the pipes/hoses on the inlet and discharge connections are properly connected.
4. Switch the pump on briefly and then off again.
5. Compare the actual rotating direction of the external fan with the intended shaft rotating direction indicated with the arrows shortly before the pump comes to a standstill.
6. If necessary, reverse the direction of the rotation of the motor.
7. Observe the operating speed specified on the rating plate. This may not be exceeded, as otherwise the noise radiation, vibration behavior, grease consumption duration and bearing change interval worsen. To prevent damage as a result of higher speeds, it may be necessary to inquire with Republic Manufacturing as to the maximum speed.

Start-Up

1. Open shut-off device in intake/discharge pipe.
2. Switch on power supply for drive motor.
3. Operate pump for an hour, and then check:
   - Ambient temperature - increased room temperatures may require stronger ventilation especially for larger pumps. Room temperature should not exceed 104°F (40°C).
   - Vacuum/Pressure valves - adjust relief valve vacuum/pressure setting if needed.
   - Motor current - check that current supply matches recommended current rating on pump nameplate.
   - Electrical overload cutout - check that current matches rating on pump nameplate.

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for the motor and that the motor is turning in the proper direction.

Shut-Down

1. Switch off power supply for drive motor.
2. Close shut-off device in intake/discharge pipe, if applicable.

Preparing for a Long-Term Stop

If the pump will not be used for over two months, close down all open ports and store in a dry location, away from dust. Before restarting after long term stop, complete the following steps:

1. Manually rotate vanes to ensure they are not stuck before starting the motor.
2. Follow the before start steps listed above.

Commissioning After Longer Standstill:

Before recommissioning after a longer standstill, measure the insulation resistance of the drive motor. With values $\leq$ 1kΩ per volt of nominal voltage, the winding is too dry.

Operation

DANGER: Improper use of the unit can result in serious or even fatal injuries. Do not proceed without reading "Safety Instructions". The pump is designed for operation under the conditions described in this manual.

DANGER: Danger due to vacuum/pressure, sudden escape of vapors (skin and eye injuries), sudden drawing in of hair and clothing.

DANGER: Danger of overheating due to hot surface of pump. High temperatures of up to approximately 176°F (80°C) can occur on the surface of the pump. Risk of burns. Do not touch during operation. Allow to cool after shut-down. The pump shall be protected against contact during operation.

DANGER: Danger of overheating due to hot surface of pump. Temperature sensitive parts, such as lines or electronic components, may not come into contact with the surface of the pump.

DANGER: Danger of rusting due to collection of condensed water in drive motor area. On drive motors with closed condensed water openings, remove closures occasionally to allow any water which has collected to drain off.

DANGER: Danger of bearing damage. Heavy mechanical impacts must be avoided during operating and while at standstill.

DANGER: The pump emits noise of high intensity. Risk of damage to hearing. Persons staying in the vicinity of a non-noise insulated pump over extended periods shall wear ear protection.

- Make sure that all provided covers, guards, hoods etc. are mounted.
- Make sure that protective devices will not be disabled.
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Make sure that the installation prerequisites are complied with and will remain complied with, particularly that a sufficient cooling will be ensured.

At process start:

- Open the shut-off valve in the suction line.

At process end:

- Close the shut-off valve in the suction line.
- Operate the pump for another approximately 30 minutes.

Maintenance

DANGER: In case the pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in filters. Danger to health during inspection, cleaning, or replacement of filters. Danger to the environment. Personal protective equipment must be worn during the handling of contaminated filters. Contaminated filters are special waste and must be disposed of separately in compliance with applicable regulations.

DANGER: During operation the surface of the pump may reach temperatures of more than 176°F (80°C). Risk of burns. Use approved lockout/tagout system. Replace damaged parts immediately. Do not turn on a damaged pump.

- Prior to action that requires touching of the pump, let the pump cool down.
- Prior to disconnecting connections make sure that the connected pipes/lines are vented to atmospheric pressure.
- Conveying air with high moisture may shorten the pump's service life. Air with a high moisture content should be avoided. If unavoidable, inspect pump's parts periodically to prevent pump damage or injury caused by corrosion.
- Bearings, vanes, and filters are consumable parts with limited life. Please inspect and replace periodically, especially in operations beyond normal ambient operating conditions.
- The inlet filter and the exhaust filter must be cleaned at regular intervals, depending on the amount of dust in the air being pumped. Blow out the filter cartridges with compressed air gun from the inside outwards.
- If the filter cartridge is too dirty to be cleaned, it must be replaced. The cartridges can be taken out after the removal of the filter cover.
- Cooling fan, hood, and motor should be inspected regularly for dirt. Dirt prevents cool air intake and may lead to overheating of the pump.

Maintenance Schedule

NOTE: The maintenance intervals depend very much on the individual operating conditions. The intervals given below shall be considered as starting values which should be shortened or extended as appropriate. Particularly heavy duty operation, such as high dust loads in the environment or in the process gas, other contaminations or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

Daily Maintenance

- Clear the inlet air filter by using compressed air to blow from the inside to the outside.
- Check the pipeline.
- Clear dust from the inner pipeline.

Weekly Maintenance

- Make sure that the pump is shut down and locked against inadvertent start up.
- Check the function of the exhaust filters .
- In case an inlet air filter is installed, check the inlet air filter, if necessary clean (with compressed air) or replace.
- In case of operation in a dusty environment, make sure that the housing is free from dust and dirt, clean if necessary.

Every 6 Months

- Make sure that the pump is shut down and locked against inadvertent start up.
- Clean the fan cowlings, fan wheels, ventilation protection screen and cooling fins.

Yearly

- Make sure that the pump is shut down and locked against inadvertent start up.
- In case an inlet filter is installed, clean (with compressed air) or replace the inlet air filter.

Every 3000 hours, at the latest once per year:

- Replace the full set of vanes.

Every 16000 Operating hours, at the latest after 4 Years:

- Have a major overhaul on the pump.

Refill Bearing Grease

Periodically refill the bearing grease as follows:

Model Number	Position Number	Refill Amount
VRT/DRT/DVT 3060-3080	27 & 28	5 grams
VRT/DRT/DVT 3100	27 & 28	5 grams
VRT/DRT/DVT 3140	27 & 28	7 grams
VRT 3250	27 & 28	10 grams

Vane Replacement

Change carbon vanes as follows:

Model Number	Minimum Width of Carbon Vane
VRT/DRT/DVT 410	1.063 in.
VRT/DRT/DVT 416	1.063 in.
VRT 425 DRT/DVT 425K	1.299 in.
VRT 440 DRT/DVT 440K	1.299 in.
VRT/DRT/DVT 3060	0.827 in.
VRT/DRT/DVT 3080	1.024 in.
VRT/DRT/DVT 3100	1.024 in.
VRT/DRT/DVT 3140	1.221 in.
VRT 3250	1.614 in.

Replacing Air Inlet Filter

1. Stop the pump and check that there is no pressure in the system.
2. Remove the three clips on the inlet air filter and open the inlet filter lid.
3. Remove the old filter and replace with the new filter.
4. Close the air filter lid and reattach the three clips on the inlet air filter lid.

Fan Cover

Check the fan cover regularly. Poor maintenance of the fan cover will affect the pump cooling and may lead to overheating of the pump.

Motor Cover

Check the motor cover regularly. Poor maintenance of the motor cover will affect the pump cooling and may lead to overheating of the pump.

Overhaul

DANGER: In order to achieve best efficiency and a long life the pump was assembled and adjusted with precisely defined tolerances. The adjustment will be lost during dismantling of the pump. It is therefore strictly recommended that any dismantling of the pump that is beyond what is described in this manual shall be done by Republic Manufacturing.

DANGER: Improper work on the pump puts the operating safety at risk. Risk of explosion! Approval for operation will be void! Any dismantling of the pump that is beyond what is described in this manual must be done by specially trained c Manufacturing service personnel only.

DANGER: In case the pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in oil and condensates. Danger to health during dismantling of the pump. Danger to the environment.

Removal from Service

Temporary Removal from Service

Prior to disconnecting pipes/lines make sure that all pipes/lines are vented to atmospheric pressure.

Recommissioning

DANGER: Vanes can stick after a long period of standstill. Risk of vane breakage if the pump is started with the drive motor. After longer periods of standstill the pump shall be turned by hand.

After longer periods of standstill:

1. Make sure that the pump is shut down and locked against inadvertent start up.
2. Remove the cover around the fan of the drive motor.
3. Slowly rotate the fan wheel by hand several revolutions in the intended direction of rotation.
4. Mount the cover around the fan wheel of the drive motor.
5. Observe the chapter "Installation and Commissioning".

In the Event of a Breakdown

1. Use a lockout/tagout procedure to ensure the pump may be worked on safely.
2. Refer to the "Troubleshooting" section of the manual to determine the cause of the breakdown and the appropriate action to take.
3. If further assistance is needed, please call Republic Manufacturing at 800-847-0380.

When to Ship the Pump Back to Republic

If you cannot fix or troubleshoot your pump system using this manual then a skilled Republic Manufacturing professional is required. Please ship your pump back to Republic Manufacturing.

Disabling, Dismantling, and Scrapping of Pump

DANGER: In case the pump conveyed gas that was contaminated with harmful foreign material the harmful material can reside in pores, gaps, and internal spaces of the pump. Danger to health during dismantling of the pump. Danger to the environment. During dismantling of the pump personal protective equipment must be worn. The pump must be decontaminated prior to disposal.

1. Make sure that materials and components to be treated as special waste have been separated from the pump.
2. Make sure that the pump is not contaminated with harmful foreign material.
3. Dispose of special waste in compliance with applicable regulations.
4. Dispose of the pump as scrap metal.

According to the best knowledge at the time of printing of this manual the materials used for the manufacture of the pump involve no risk.

Warranty Terms and Conditions

Republic Manufacturing warrants all finished Republic Manufacturing products to be free from functional defects in material and workmanship for a period of twelve (12) months from the date of installation, or no longer than eighteen (18) months from shipment.
Wear parts such as filter elements, hoses and piping are not covered by the 12 to 18 month warranty.

DISASSEMBLY OF PUMP MAY VOID WARRANTY.

To obtain service within the warranty period, first contact your authorized Republic Manufacturing dealer or Republic Manufacturing Service Department. Republic's responsibility under this warranty shall be to provide an analysis of the pump, which will determine course of action. Any product found to be defective within the warranty period will merit either:

a. A no charge repair of existing pump. Any freight charges will be the purchaser's responsibility.
b. A replacement pump*. Any freight charges will be the purchaser's responsibility.

*This option would be a chargeable replacement until the original pump is received by Republic Manufacturing, and warranty is approved.

Republic Manufacturing shall not be liable for incidental nor consequential damages resulting from the use of this product. There are no expressed nor implied warranties, which extend beyond the warranty of merchantability or fitness for a particular purpose to the equipment and/or its parts and components.

Troubleshooting

DANGER: Risk of electrical shock, risk of damage to equipment. Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations: 1) IEC 364 or CENELEC HD 384 or DIN VDE 0100; 2) IEC-Report 664 or DIN VDE 0110; 3) BGV A2 (VBG 4) or equivalent national accident prevention regulation.

DANGER: During operation the surface of the pump may reach temperatures of more than 176°F (80°C). Risk of burns! Let the pump cool down prior to required contact or wear heat protection gloves.

Problem	Possible Cause	Remedy
The pump is blocked	Solid foreign matter has entered the pump.	Repair the pump. If necessary additionally provide a filter.
	Corrosion in the pump from remaining condensate.	Repair the pump. Check the process. Observe the chapter "Installation and Commissioning".
	The pump was run in the wrong direction.	Repair the pump. When connecting the pump make sure the pump will run in the correct direction (see "Installation and Commissioning").
	Condensate ran into the pump chamber. When the pump was restarted too much condensate was enclosed between the vanes. Condensate could not be compressed and thus broke a vane.	Repair the pump. Make sure no condensate will enter the pump, if necessary provide a drip leg and a drain cock. Drain condensate regularly.
Pump operation failure, but motor still operational	Check coupling.	Replace if broken.
The pump does not reach the usual pressure Evacuation of the system takes too long. Ultimate pressure failure; current overload; long time for vacuum	The system or suction line is not leaktight.	Check the hose or pipe connections for possible leak.
	Blockage or leakage of inlet pipe or system.	Check pipe for blockage and remove blockages.
	Air inlet filter blocked.	Clean or replace air inlet filter.
	Blocked suction valve.	Clean suction valve and air inlet filter.
	Limited air inlet/outlet pipe diameter.	Replace pipes.
	Partial clogging in the suction, discharge or pressure line.	Remove the clogging.
	Stuck or broken vane.	Clean rotor and vanes or replace vanes.
	Incorrect space between rotor and pump.	Adjust space between rotor and pump.
	Components broken, worn or damaged.	Repair pump.

Problem	Possible Cause	Remedy
Abnormal noise and overload	Lost phase of motor.	Inspect power supply and cord.
	Vanes rotating in the wrong direction.	Adjust to correct rotation.
	Long running time.	Shut air inlet and run pump to raise temperature.
	Foreign body inside pump.	Repair pump.
	Broken vane or bearing.	Repair pump.
	Stuck vanes.	Repair the pump.
	Connection(s) in the drive motor terminal box are defective. Not all drive motor coils are properly connected. The drive motor operates on two phases only.	Check the proper connection of the wires against the connection diagram. Tighten or replace loose connections.
	Standstill over several weeks or months.	Let the pump run warm with inlet closed.
Excessively high temperature of pump	Excessively high ambient air temperature at inlet.	Strengthen cooling aeration; clean vanes, cooler and vane cover.
	Bad aeration.	Strengthen cooling aeration; clean vanes, cooler, and vane cover.
	Limited air inlet/outlet pipe diameter.	Replace pipes.
	Incorrect voltage.	Correct power supply voltage.
	Blocked air inlet/outlet pipe or filters.	Clean air inlet/outlet pipe and change filters.
	Insufficient air ventilation.	Make sure that the cooling of the pump is not impeded by dust/dirt. Clean the fan cowlings, fan wheels, ventilation screens and cooling fins. Install the pump in a narrow space only if sufficient ventilation is ensured.
	Ambient temperature too high.	Observe the permitted ambient temperatures.
	Temperature of the inlet gas too high.	Observe the permitted temperatures for the inlet gas.
	Mains frequency or voltage outside tolerance range.	Provide a more stable power supply.

Problem	Possible Cause	Remedy
Motor failure	Low voltage or excessively long power cord.	Adopt suitable power cord and power supply.
	The drive motor is not supplied with the correct voltage or is overloaded.	Supply the drive motor with the correct voltage.
	Poor protection for motor overload.	Choose correct motor overload protector according to electric current rating.
	The drive motor starter overload protection is too small or trip level is too low.	Compare the trip level of the drive motor starter overload protection with the data on the nameplate. Correct if necessary. In case of high ambient temperature: Set the trip level of the drive motor starter overload protection 5% above the nominal drive motor current.
	Broken fuse.	Join fuse.
	Exceeding capacitance in single phase motor.	Repair motor.
	Blocked pump or motor.	Make sure the drive motor is disconnected from the power supply. Remove the fan cover. Try to turn the fan by hand. If the unit pump/drive motor is still frozen: Remove the drive motor and check the drive motor and the pump separately. If the pump is blocked: Repair the pump.
	Broken motor.	Repair or replace motor.
Broken vane	Foreign body inside pump.	Repair pump.
	Corrosive gas inhalation.	Repair pump and inspect flow.
	Incorrect rotation.	Repair pump and correct rotation.
The drive motor is running, but the pump stands still	The coupling between the drive motor and the pump is defective.	Replace the coupling.

Replacement Parts

Model	Vane (sold ea.)	Qty. Needed	Rebuild Kit	Gasket Set	Inlet Filter	Qty. Needed
DRT-408	5310007	5	910408RK	N/A	C 44	1
DRT-410	5310000	7	910410RK	N/A	C 44	2
DRT-416	5310001	7	910416RK	N/A	C 64/3	1
					C 63	1
DRT-425K	5310002	7	910425RK	N/A	C 75/2	1
					C 78/6	1
DRT-440K	5310003	7	910440RK	N/A	C 75/2	1
					C 78/6	1
DRT-3060	5310004	4	903060RK	503060GS	C 713	1
					C 1112/2	1
DRT-3080	5310004	4	903060RK	503060GS	C 713	1
					C 1112/2	1
DRT-3100	5310006	4	903100RK	503100GS	C 718	1
					C 1112/2	2
DRT-3140	5310008	4	903140RK	503140GS	C 718	1
					C 1112/2	2
DVT-416	5310001	7	910416RK	N/A	C 64/3	1
					C 63	1
DVT-425K	5310002	7	910425RK	N/A	C 75/2	1
					C 78/6	1
DVT-440K	5310003	7	910440RK	N/A	C 75/2	2
DVT-3060	5310004	7	913060RK	513060GS	C 713	1
					C 1112/2	2
DVT-3080	5310004	7	913060RK	513060GS	C 713	1
					C 1112/2	2
DVT-3100	5310006	7	913100RK	513100GS	C 718	1
					C 1112/2	2
DVT-3140	5310008	7	913140RK	513140GS	C 718	1
					C 1112/2	2
VRT-408	5310007	5	900408RK	N/A	C 78/6	1
VRT-410	5310000	7	900410RK	N/A	C 44	1
VRT-416	5310001	7	900416RK	N/A	C 64/3	1
VRT-425	5310002	7	900425RK	N/A	C 75/2	1
VRT-440	5310003	7	900440RK	N/A	C 75/2	1
VRT-3060	5310004	4	903060RK	503060GS	C 713	1
					C 1112/2	1
VRT-3080	5310004	4	903060RK	503060GS	C 713	1
					C 1112/2	1
VRT-3100	5310006	4	903100RK	503100GS	C 718	1
					C 1112/2	2

Model	Vane (sold ea.)	Qty. Needed	Rebuild Kit	Gasket Set	Inlet Filter	Qty. Needed
VRT-3140	5310008	4	903140RK	503140GS	C 718	1
					C 1112/2	2
VRT-3250	5310010	5	903250RK	503250GS	C 22115	1
					C 713	2

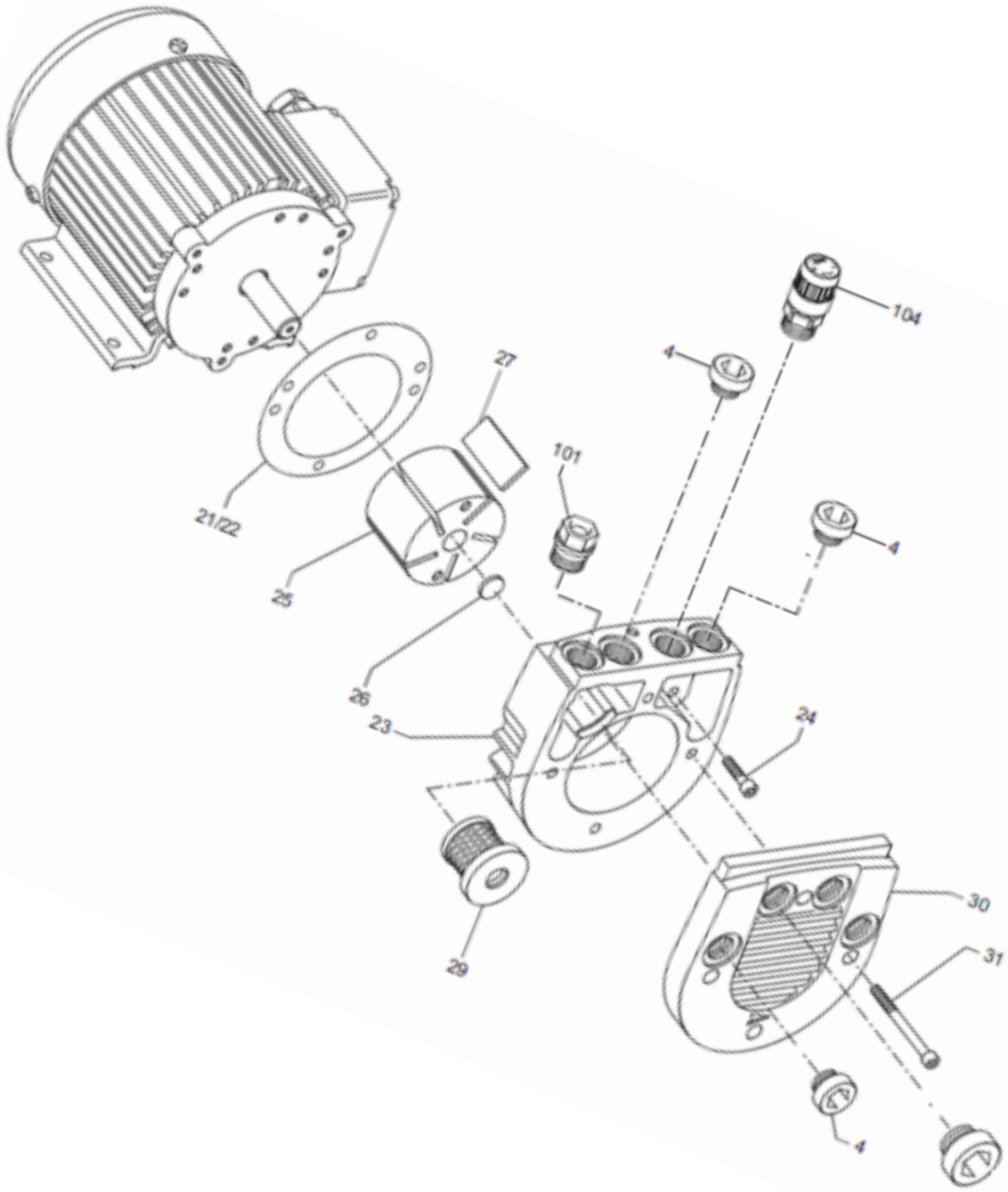
Grease

All dry vane pumps use the following grease:

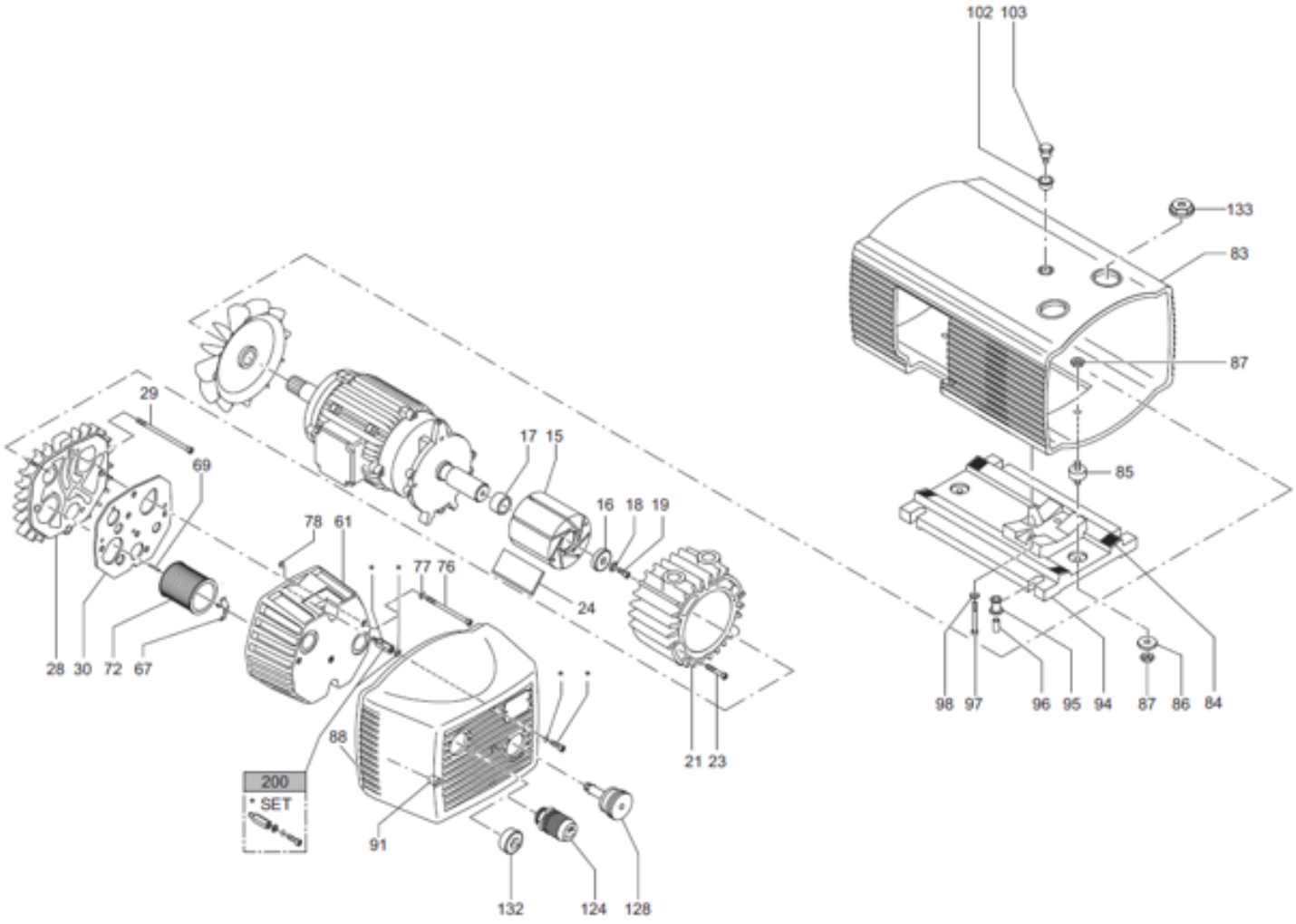
Part Number	Description
320573	50 g Synthetic Kluber Petamo Filled Grease Gun

Exploded Views

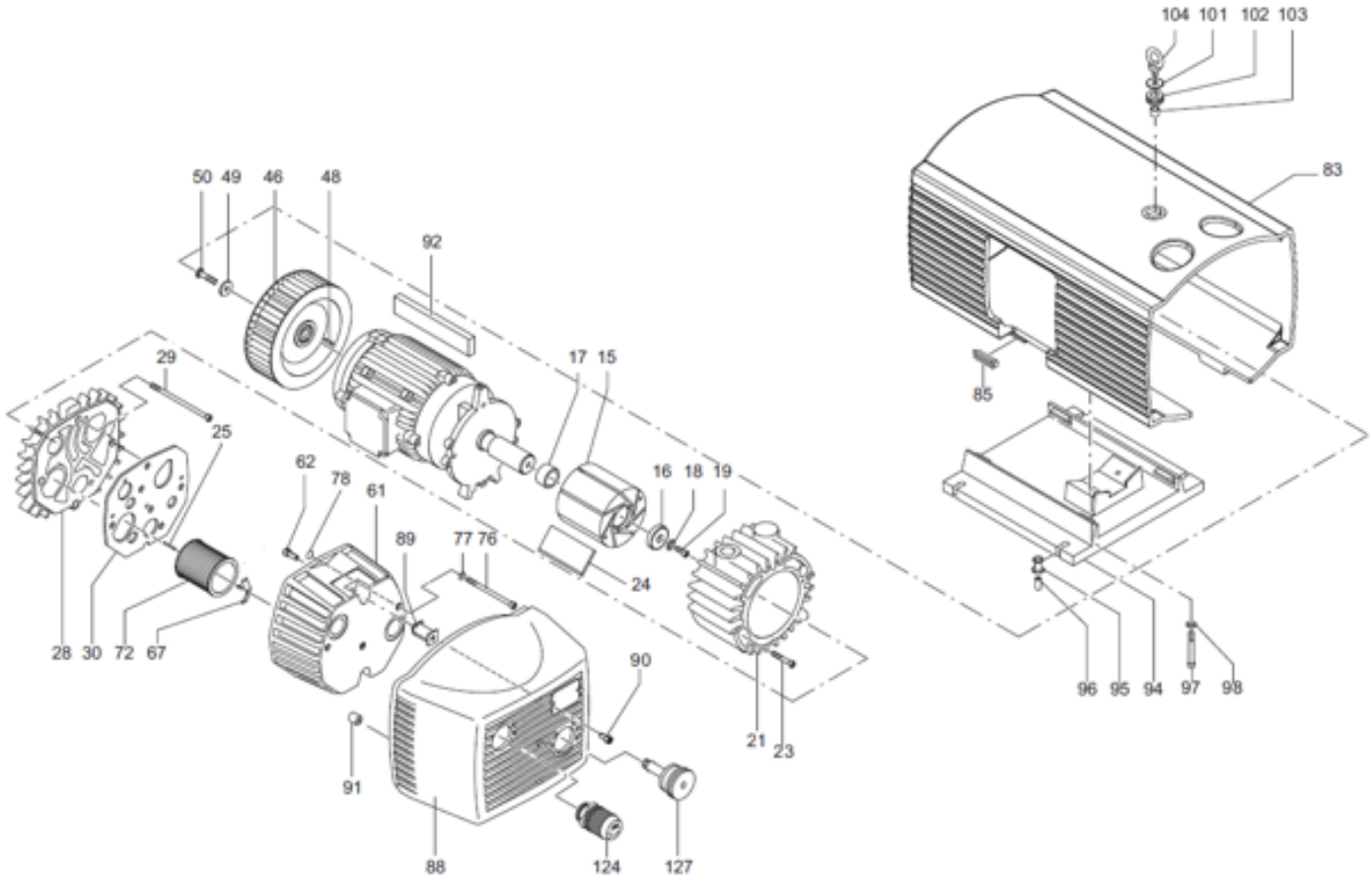
VRT-408 Parts Breakdown



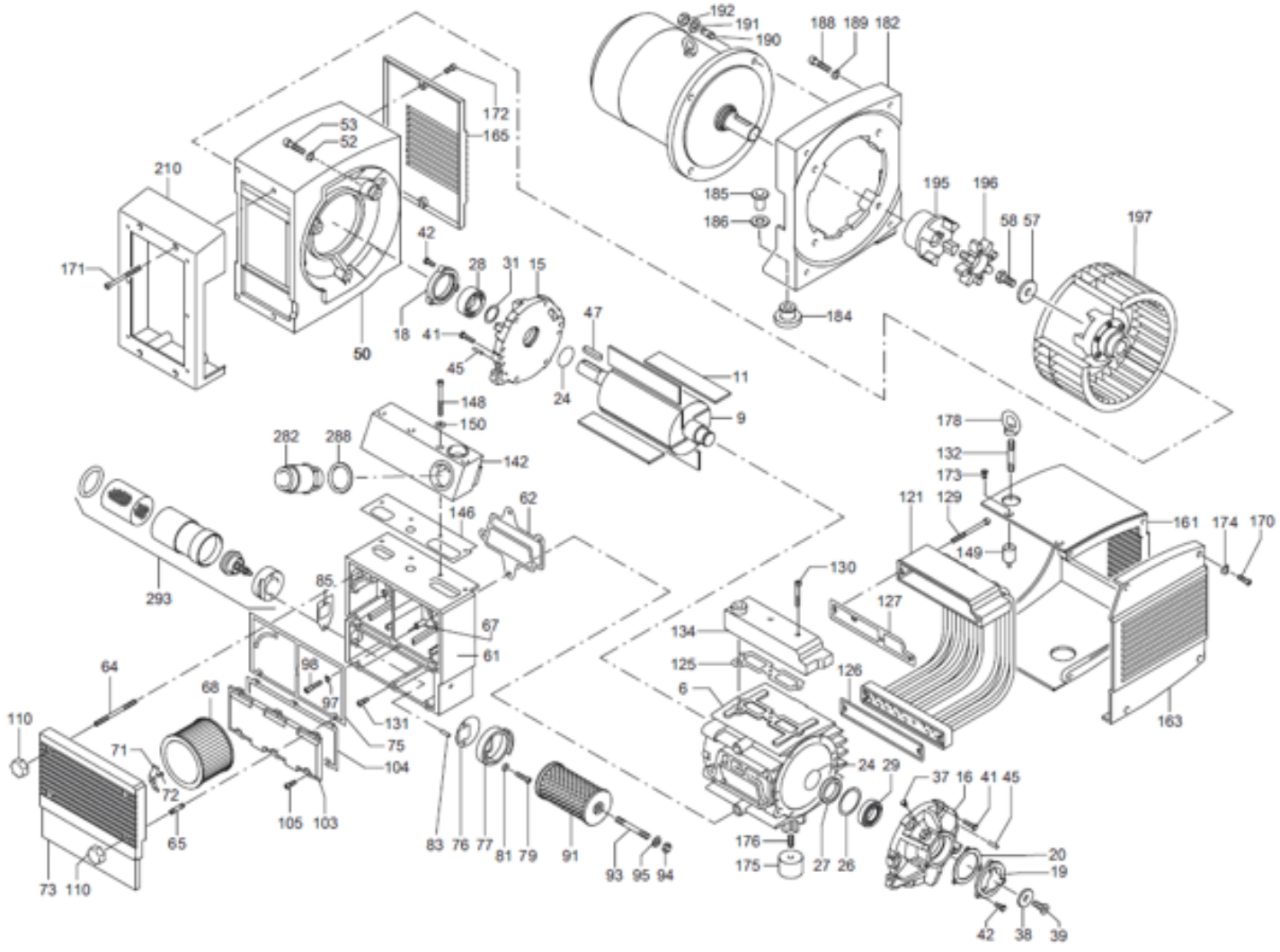
VRT-410-416 Parts Breakdown



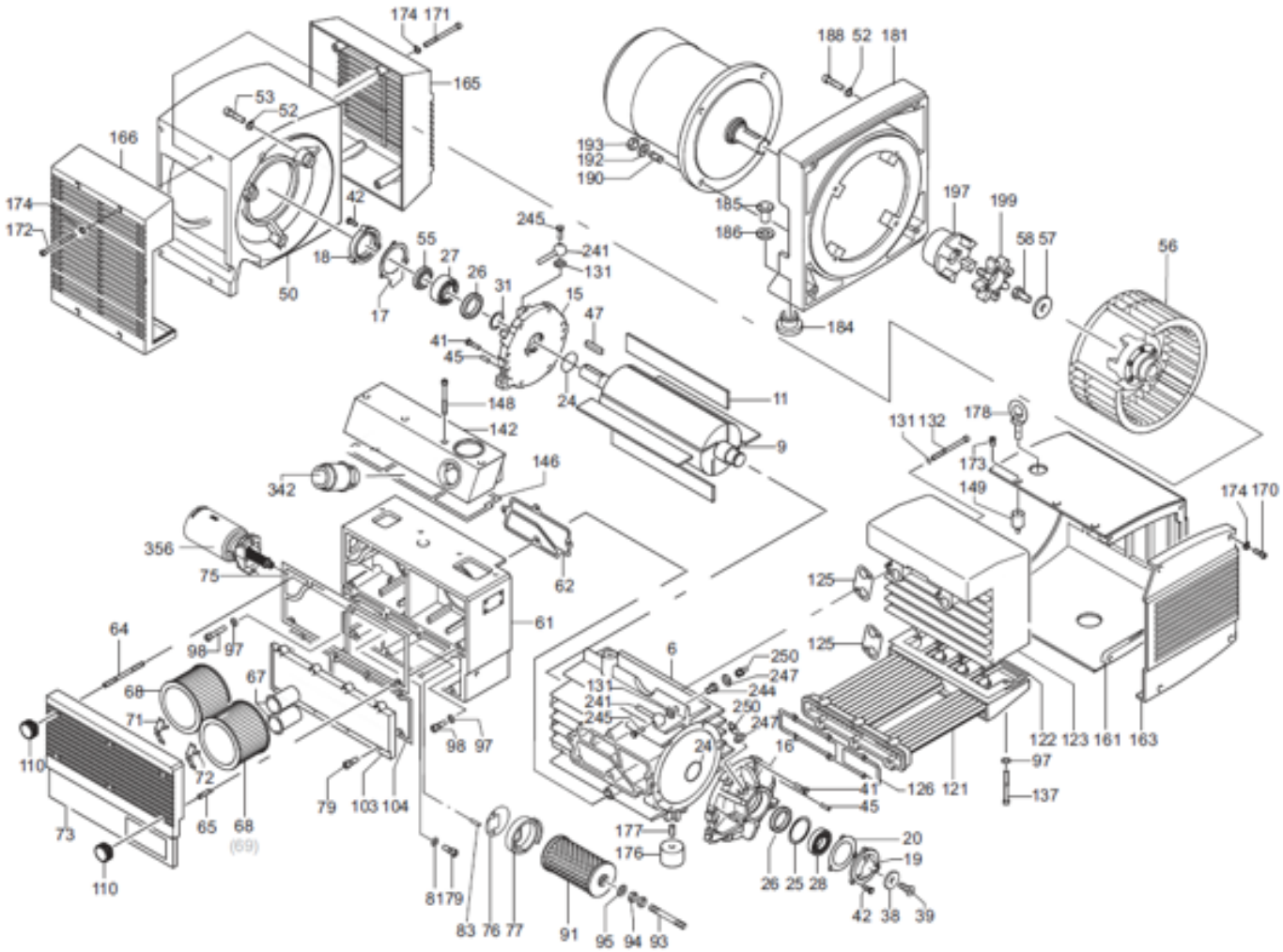
VRT-425/440 Parts Breakdown



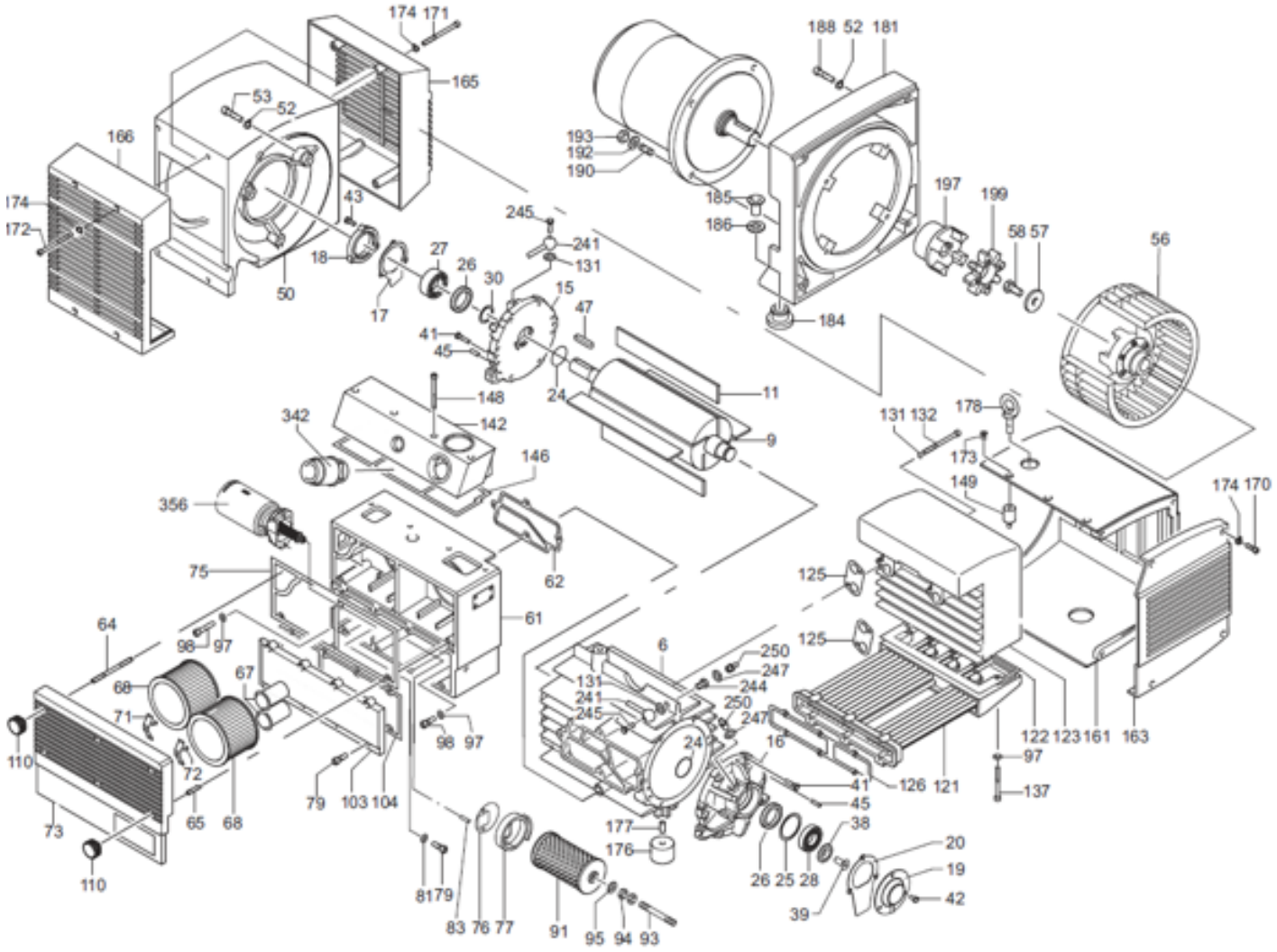
VRT-3060/3080 Parts Breakdown



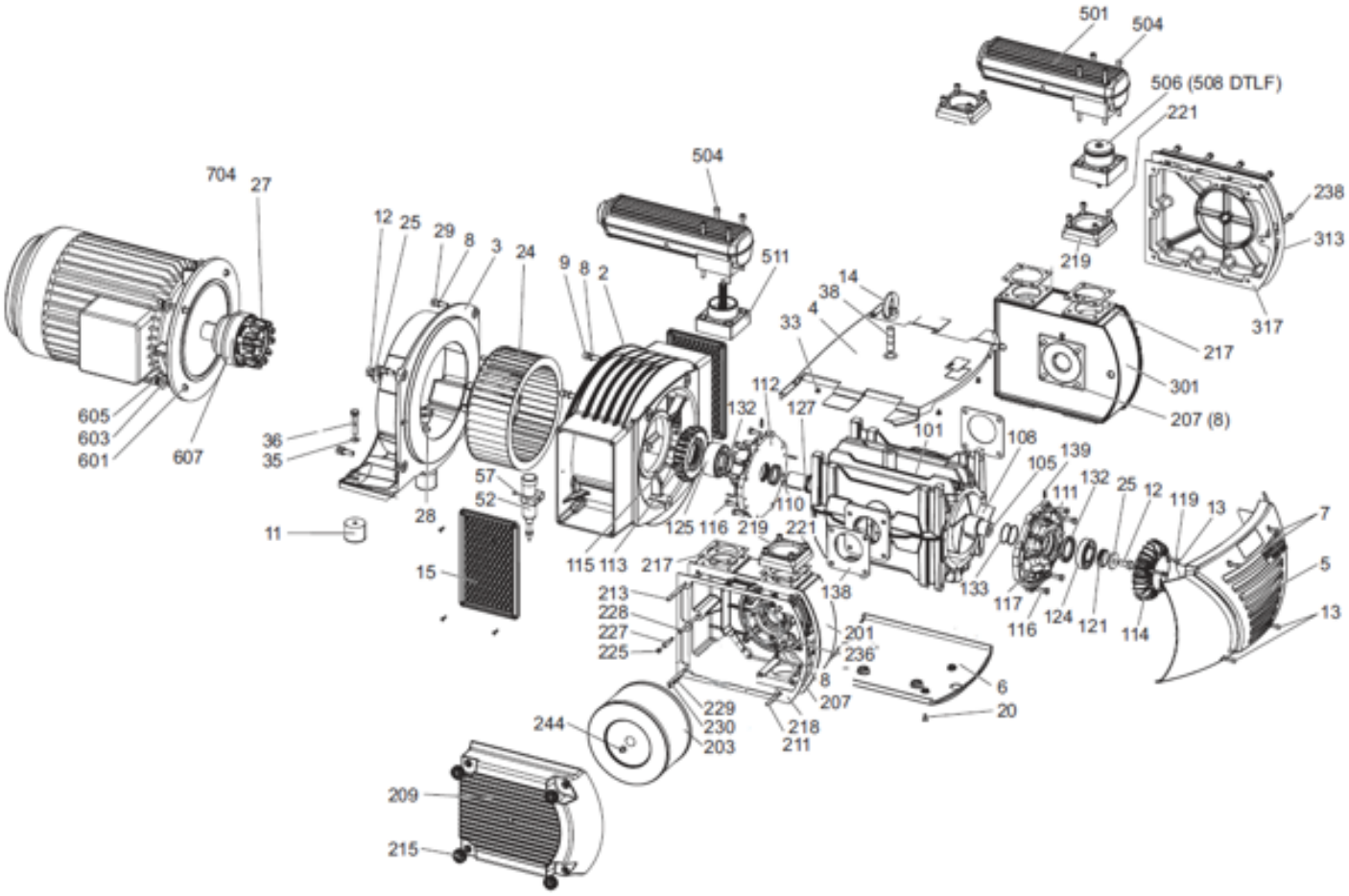
VRT-3100 Parts Breakdown



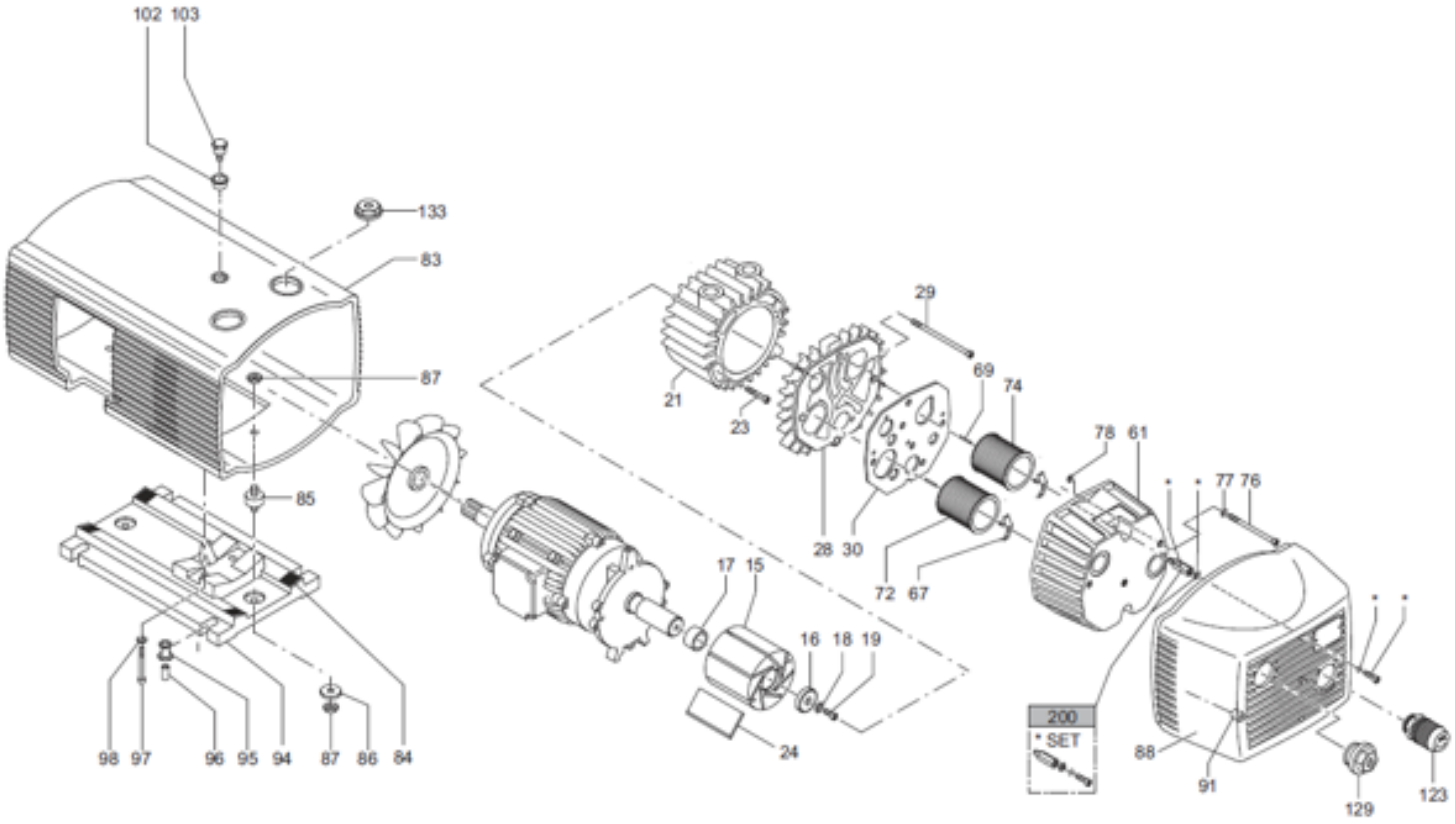
VRT-3140 Parts Breakdown



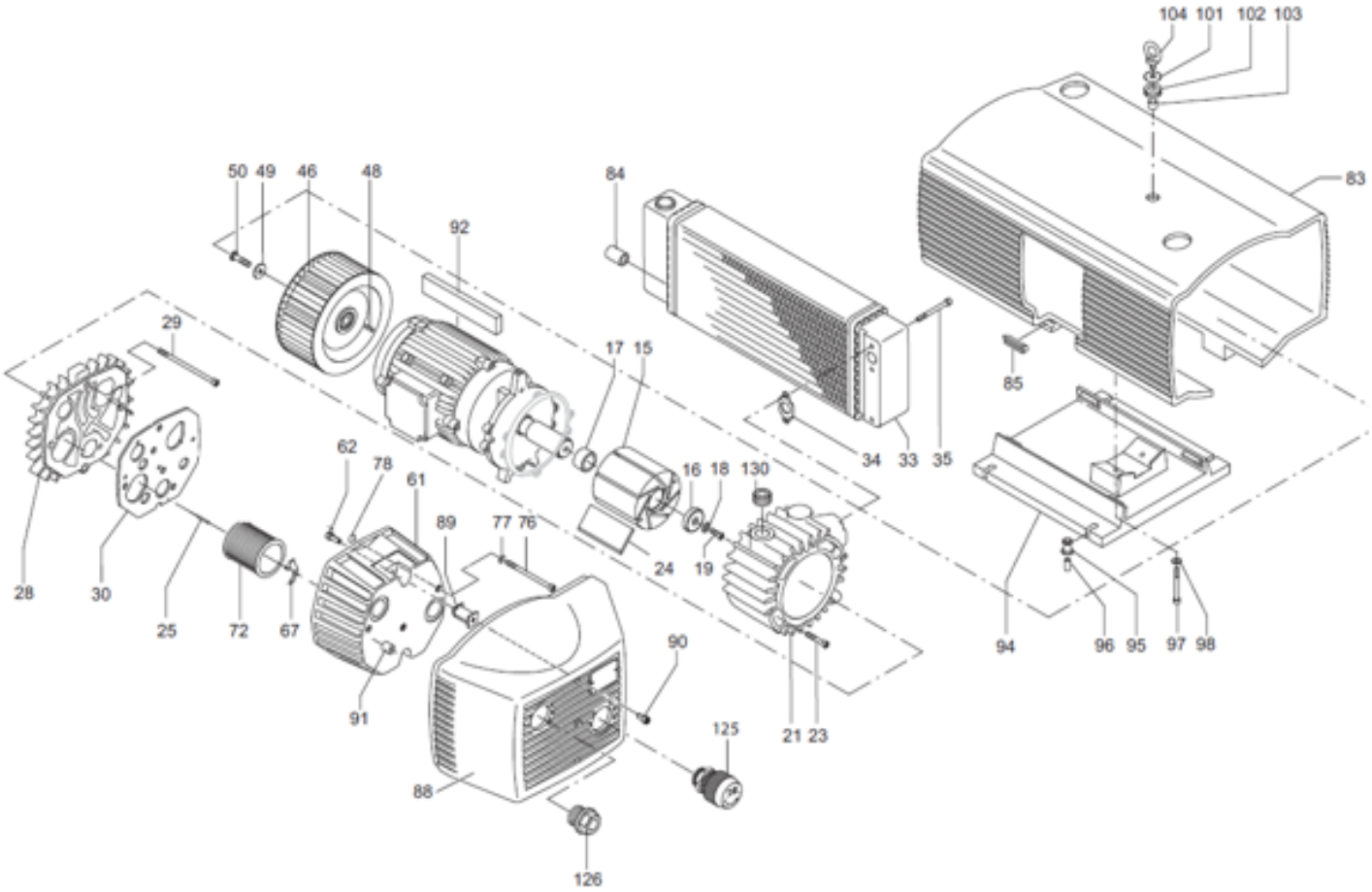
VRT-3250 Parts Breakdown



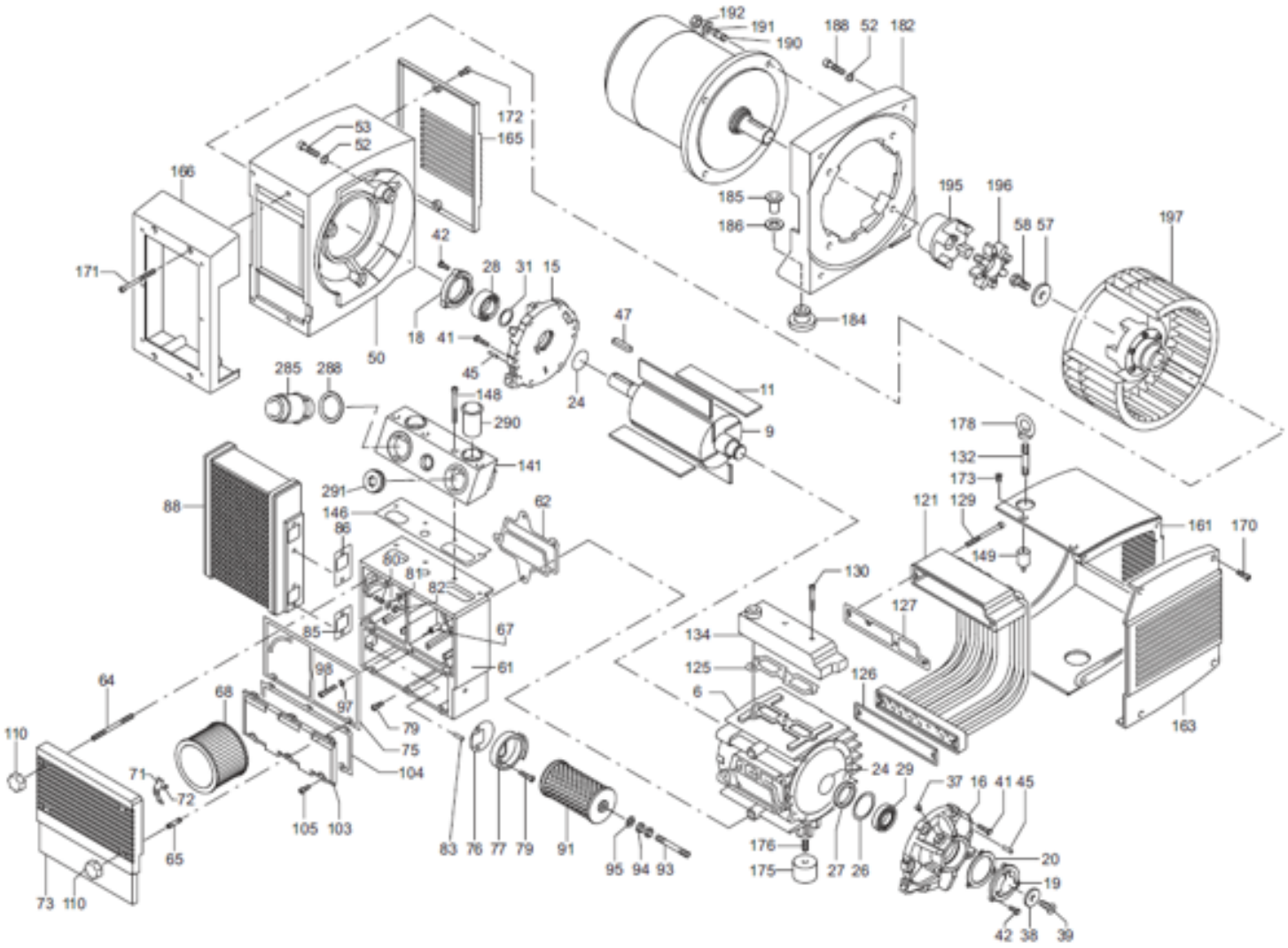
DRT-410-416 Parts Breakdown



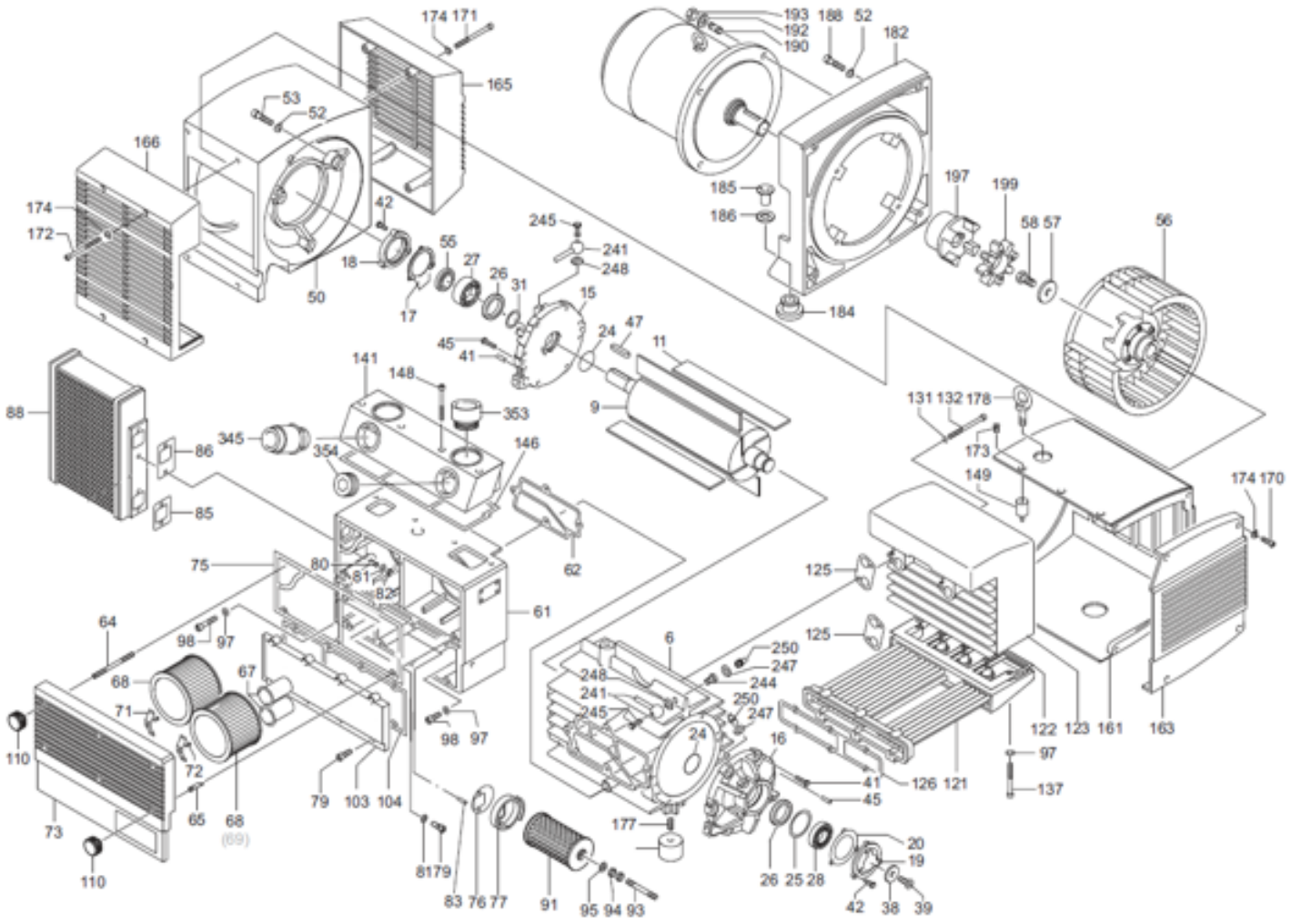
DRT-425K/440K Parts Breakdown



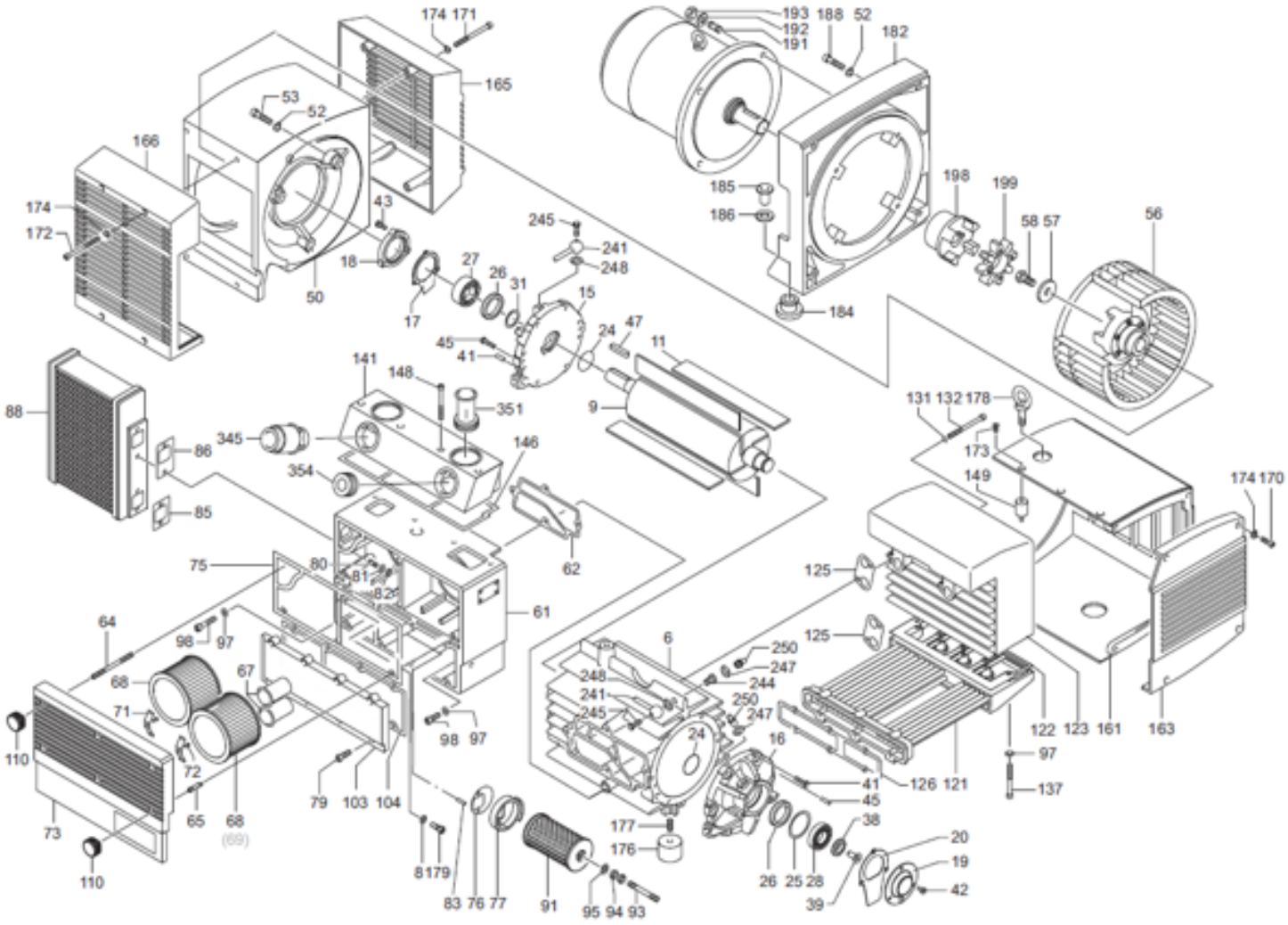
DRT-3060/3080 Parts Breakdown



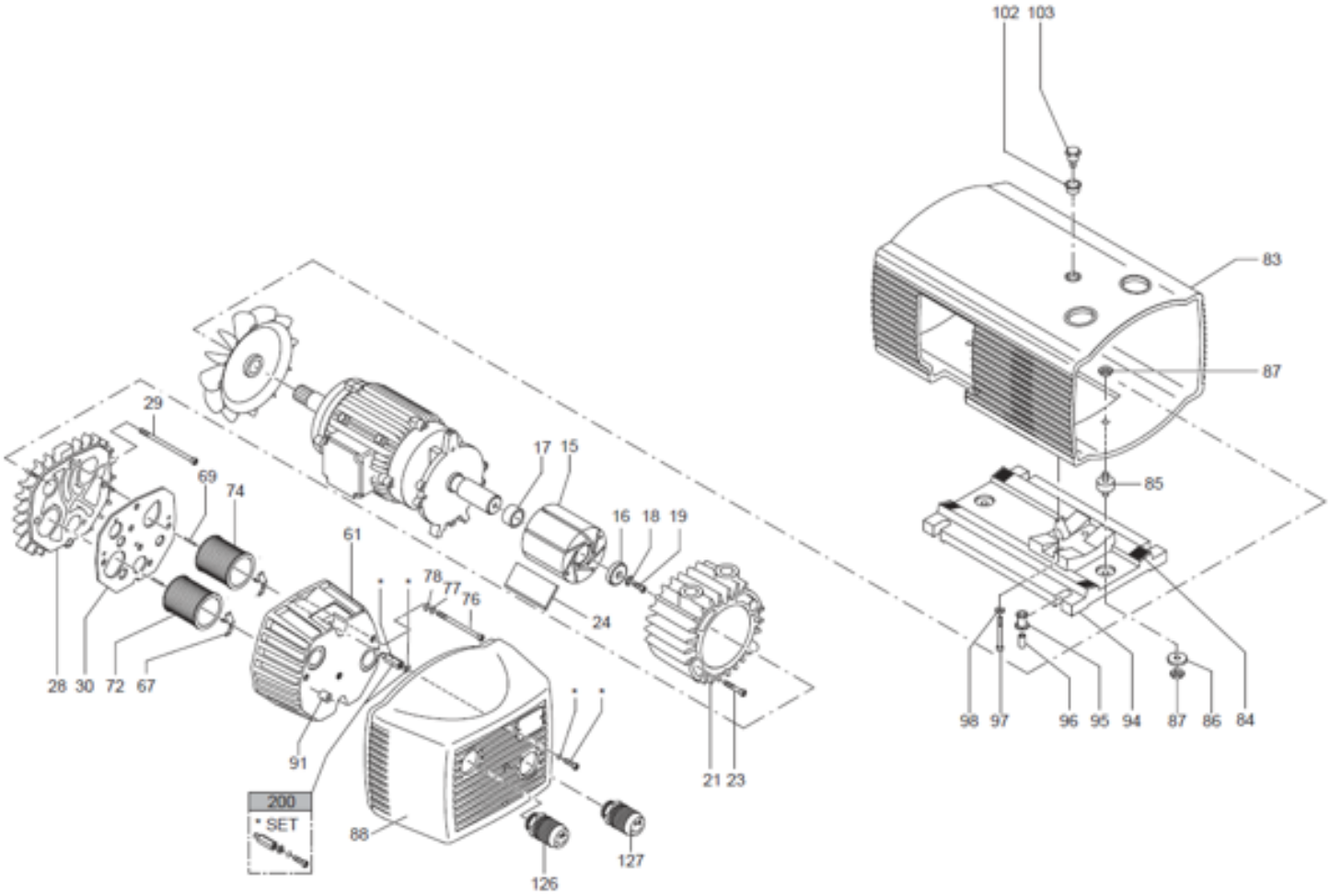
DRT-3100 Parts Breakdown



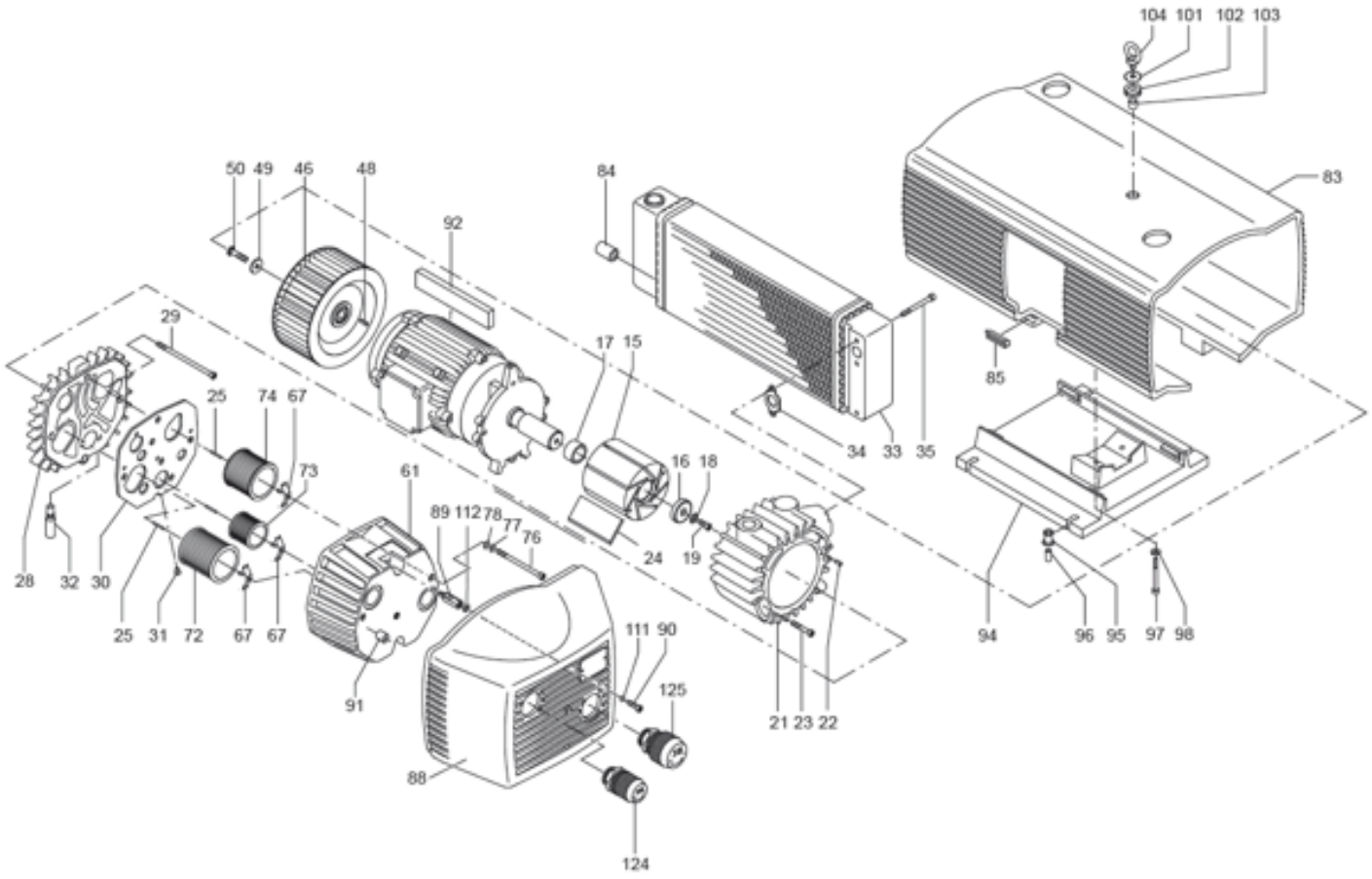
DRT-3140 Parts Breakdown



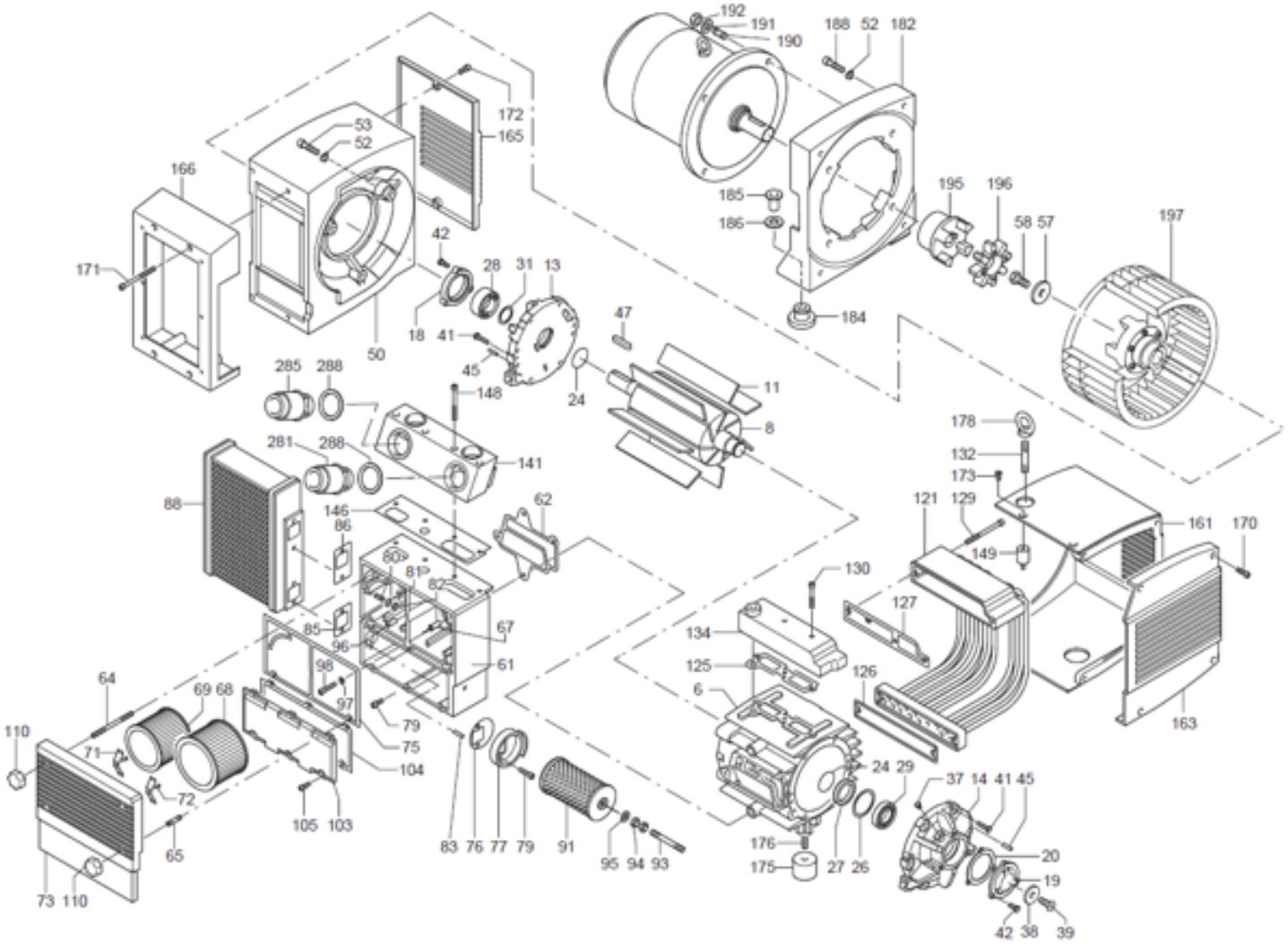
DVT-416 Parts Breakdown



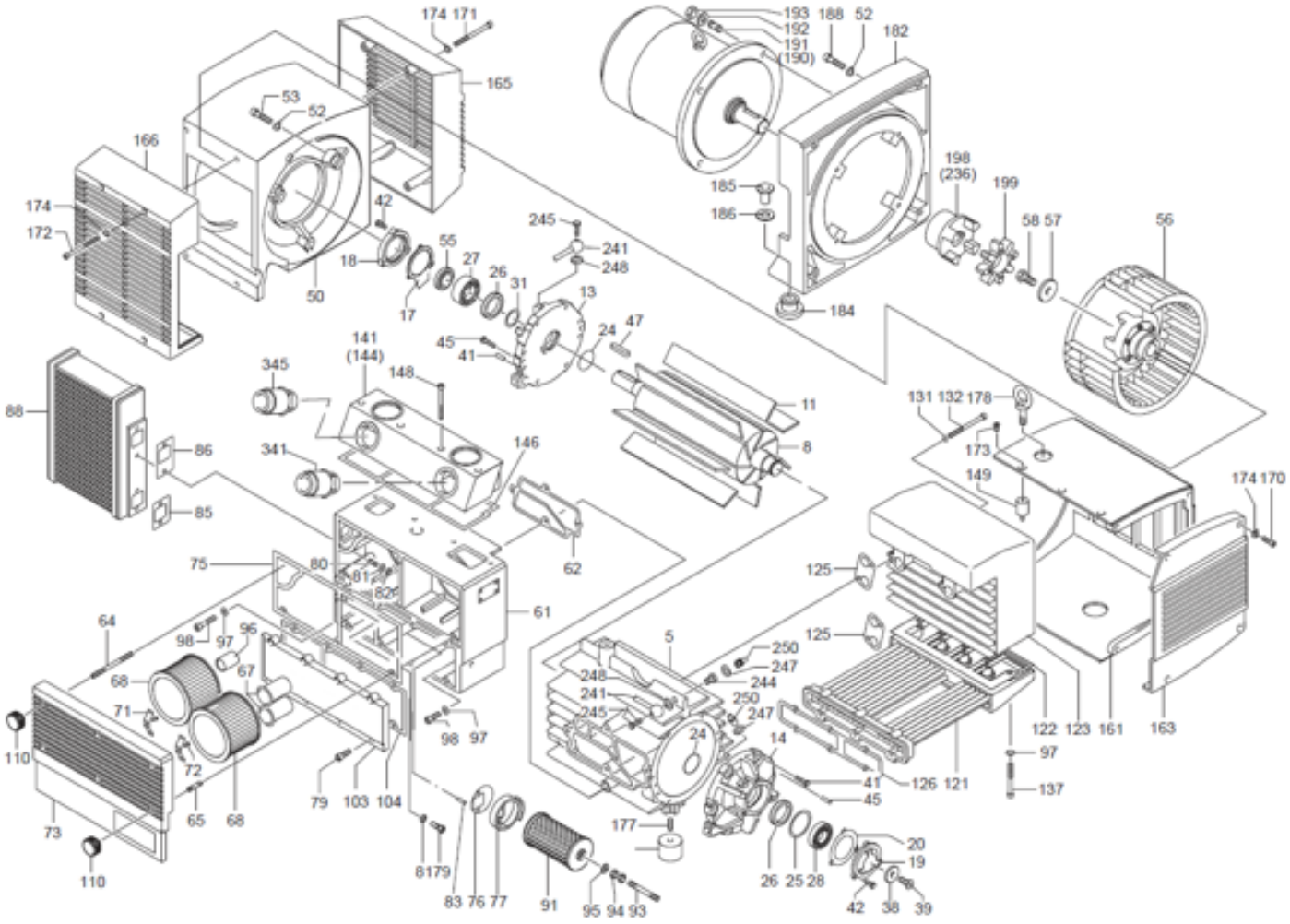
DVT-425K/440K Parts Breakdown



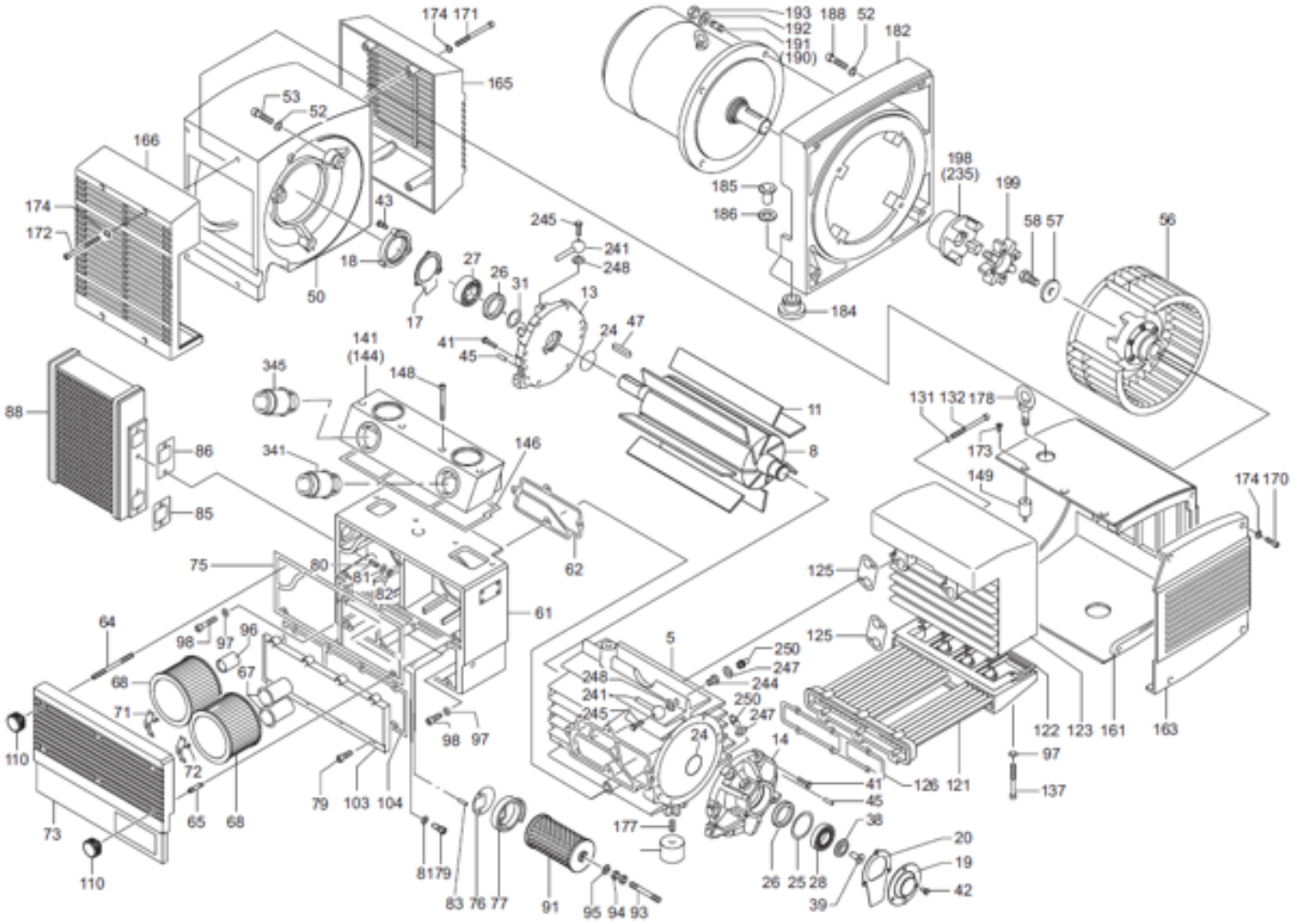
DVT-3060/3080 Parts Breakdown



DVT-3100 Parts Breakdown

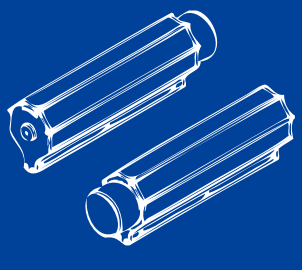


DVT-3140 Parts Breakdown

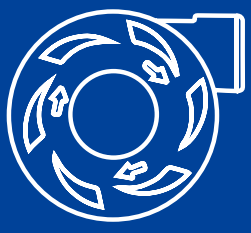


REPUBLIC MANUFACTURING

Air Knife Systems



Centrifugal Pumps



Regenerative Pumps

Vacuum Pumps

5131 Cash Road, Dallas, TX 75247 | 800.847.0380 | republic-mfg.com