DEC 2016

RSV Series - In-Line Vertical Multi-Stage, Ring Section Pump

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Part Number: _____

Serial Numbers: _____

These operating instructions contain fundamental information and precautionary notes. Please read the manual thoroughly prior to installation of unit, electrical connection and commissioning. It is imperative to comply with all other operating instructions referring to components of individual units.

This manual shall always be kept close to the unit's location of operation or directly on the pump set.

SERVICE RECORD PAGE

Service No. _____Model _____ Size and Type _____

Customer Order No. _____Date Installed _____

Installation Date	Location	Application

PUMP RATING

Capacity _____ Total Head _____

Suction Pressure _____ Speed (RPM) _____

Liquid pumped _____ Temperature _____

Specific Gravity _____ Viscosity _____

Serivce _____

PUMP MATERIALS

Casing _____ Impeller _____ Shaft _____

Gaskets _____ Bearing Frame _____

Mechanical Seal/Packing _____

MOTOR DATA

Motor _____ Make _____ Serial No. _____

Type _____ Frame _____ AC or DC _____

HP _____ RPM _____ Volts _____

Phase _____ Cycles _____

NOTES ON INSPECTION AND REPAIRS

INSPECTION DATE	REPAIR TIME	REPAIRS	COST	REMARKS

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

TABLE OF CONTENTS

SECTION/PARAGRAPH **PAGE**

I. GENERAL DESCRIPTION AND SAFETY PRECAUTIONS 1
- A. General Information 1
- B. Disclaimer 1
- C. Personnel Qualification and Training 1
- D. Pump Identification 1
- E. Parts Inventory Guide 1
- F. Parts Ordering 1
- G. Safety Precautions 2

II. INSPECTION AND STORAGE 3
- A. Inspection 3
- B. Storage of Pump 3

III. INSTALLATION 3
- A. Location 3
- B. Handling 3
- C. Coupling Alignment 3
- D. Pre-Installation Procedures 4
- E. Piping 4
- F. Auxiliary Piping Connections and Gauges 4
- G. Motor 4
- H. Direction of Rotation 4

SECTION/PARAGRAPH **PAGE**

IV. OPERATION 5
- A. Pre-start Cautions 5
- B. Priming 5
- C. Starting the Pump 5

V. MAINTENANCE 6
- A. Lubrication of Motor 6
- B. Torque Values 6

VI. SERVICE AND REPAIR 7
- A. Motor Installation on Bare Pump 7
- B. Removing Motor from Complete Pump 9
- C. General Pump Maintenance and Disassembly Instructions 10

LIST OF TABLES

NUMBER **TITLE** **PAGE**

1. Minimum Pumping Rate 5
2. Recommended Tie Rod Torque Values (ft-lbs) 8
3. Recommended Coupling Bolt Torque Values (ft-lbs) 6
4. RSV Model Specific Service and Repair ... 8

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I. GENERAL DESCRIPTION AND SAFETY PRECAUTIONS.

A. GENERAL INFORMATION. Carver RSV pumps are vertical, multi-stage, centrifugal water pumps. If properly installed, maintained, and operated, should provide maintenance-free operation and a long service life.

CAUTION

These instructions must always be kept close to the product's operating location or directly with the product.

This manual is designed to provide sufficient material to properly maintain the total pumping unit. The information presented should improve your knowledge and understanding of the RSV, Multi-Stage Water Pump, thus upgrading the reliability, service life, and quality of pump maintenance.

These operating instructions do not take into account local regulations; the operator must ensure that such regulations are strictly observed by all, including the personnel called in for installation. Compliance with such laws relating to the proper installation and safe operation of the pumping equipment is the responsibility of the equipment owner and all necessary steps should be taken by the owner to assure compliance with such laws before operating the equipment. These instructions are intended to facilitate familiarization with the product and its permitted use to help satisfy safety requirements. Always coordinate repair activity with operations personnel, and follow all plant safety requirements and applicable safety and health laws/regulations.

Refer to the appropriate sectional assembly for the location of parts identified by item numbers. Variations do exist between configurations, not all parts described in the text may be on your configuration.

CAUTION

These instructions should be read prior to installing, operating, using and maintaining the equipment in any region worldwide and in conjunction with the main user instructions provided. The equipment must not be put into service until all the conditions relating to safety instructions have been met.

B. DISCLAIMER. Information in these User Instructions is believed to be reliable. In spite of all the efforts of Carver Pump Company to provide sound and all necessary information the content of this manual may appear insufficient and is not guaranteed by Carver Pump Company as to its completeness or accuracy.

C. PERSONNEL QUALIFICATION AND TRAINING. All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided. If required the operator may commission the manufacturer/supplier to provide applicable training.

Follow instructions in this manual carefully. Factory warranty applies only when pump operates under conditions as specified on order acknowledgment, and if pump is properly installed and maintained as recommended herein. A copy of this manual should be available to operating personnel. Additional copies of this manual are available upon request from Carver Pump Company and your local distributor. For comments and/or questions about information provided, please contact Carver Pump Company or your local distributor.

D. PUMP IDENTIFICATION. The type of pump, pump size, operating data, and serial number are all stamped on the nameplate attached to the pump. Pump specifications should be recorded upon receipt of the pumping unit. Record all necessary information on the pump service record page and inspection and repair record provided at the front of this manual. This information must be included in all correspondence regarding the unit. This will ensure that the correct pump and/or parts are ordered in a timely manner.

E. PARTS INVENTORY GUIDE. To avoid unnecessary delays for maintenance, spare parts should be readily available, purchase before and keep in stock, for normal service. Most conditions will be covered if this manual is followed.

F. PARTS ORDERING. When ordering replacement parts, please specify:

- Serial number of pump (located on nameplate)
- Part name (located on parts list)
- Quantity of parts needed

Carver Pump Company may ship an interchangeable part that is not identical in appearance or symbol. This is done only if the part has been improved. Examine parts carefully upon delivery before questioning factory or company representative. Never return parts to the factory without authorization from Carver Pump Company.

If an impeller is ordered, specify diameter across blade tips. Be sure diameter was NOT trimmed further than diameter shown on Carver Pump Company records.

If a driver or driver parts are ordered, specify name of manufacturer and all other data found on the driver nameplate.

G. SAFETY PRECAUTIONS. The manual is designed to provide adequate instructions for the safe and efficient installation, operation, or maintenance of the pump. Failure or neglect to properly install, operate, or maintain the pump may result in personal injury, property damage, or unnecessary damage to the pump. This manual must be read and understood both by the installing personnel and the responsible trained personnel/operators prior to installation and operation, and it must always be kept close to the location of the pumping unit for easy access.

G.1 Summary of Safety Marking.

The safety instructions contained in this manual whose non-observance might cause hazards to persons are specially marked with the symbol:

General hazard sign to ISO 7000 - 0434.

The word "Caution" is used to introduce safety instructions whose non-observance may lead to damage to the machine and its functions. The word “Danger” is used to introduce safety instructions whose non-observance may lead to injury or loss of life to people and damage to the machine or its functions.

Instructions attached directly to the machine, e.g.

- Arrow indicating the direction of rotation
- Markings for fluid connections must always be complied with and be kept in a perfectly legible condition at all times.

Observe all note, caution or danger tags attached to the equipment or included in this manual.

G.2 Non-compliance with Safety Instructions.

Non-compliance with safety instructions may result in personal injury, property damage, or unnecessary damage to the pumping unit. Non-compliance with these safety instructions will also lead to forfeiture of any and all rights to claims for damages. Non-compliance, can for example, result in:

- Failure of important pumping unit functions.
- Failure of prescribed maintenance and servicing practices.
- Hazard to personnel by electrical, mechanical, and chemical effects as well as explosion.
- Hazard to the environment due to leakage of hazardous substances.

G.3 Safety Instructions for Maintenance, Inspection, and installation Work.

The operator is responsible for ensuring that all maintenance, inspection and installation work be performed by authorized, qualified personnel who are thoroughly familiar with the manual and pumping unit.

The pumping unit must have cooled down to ambient temperature, pump pressure must have been released and the pump must have been drained before working on any pumping unit.

Work on the pumping unit must be carried out during shutdown. The shutdown procedure described in the manual for taking the unit out of service must be adhered to.

Pumps handling fluids that are hazardous to personnel must be decontaminated prior to being worked on.

Immediately following completion of the work, all safety relevant and protective devices must be reinstalled and/or reactivated.

Please observe all instructions set out in the section on start-up before returning the pumping unit to service.

G.4 Unauthorized Modification and Manufacture of Spare Parts.

Modifications or alterations of the pumping unit supplied are only permitted after consultation with Carver Pump and to the extent permitted by Carver Pump. Original spare parts and accessories authorized by Carver Pump ensure safety. The use of other parts can invalidate any liability of Carver Pump for consequential damage and/or warranty.

G.5 Unauthorized Modes of Operation.

The warranty relating to the operating reliability and safety of the unit supplied is only valid if the pumping unit is used in accordance with its designated use as described in the following sections. The limits stated on the nameplate must not be exceeded under any circumstances.

II. INSPECTION AND STORAGE.

A. INSPECTION. Upon receipt of the shipment, unpack and inspect the pumping unit and individual parts to insure none are missing or damaged. Carefully inspect all boxes and packing material for loose parts before discarding them. Immediately report any missing parts or damage incurred during shipment to the factory and to the Transportation Company and file your "damage and/or lost in shipment" claim with the carrier.

B. STORAGE OF PUMP. If the equipment is not to be immediately installed and operated, store it in a clean, dry, well-ventilated place, free from vibrations, moisture and rapid or wide variations in temperature.

NOTE

Storage requirements vary depending on climatic environment, length of storage and equipment. For storage periods of three months or longer, contact manufacturer for specific instructions. Improper storage could damage equipment and would result in non-warranty covered restoration of non-warranty covered product failures.

When storing the pump up to three months rotate the shaft for several revolutions at least once per month to coat the bearings with lubricant, retard oxidation and corrosion, and prevent possible false brinelling.

Consider a unit to be in storage when:

1. It has been delivered to the job site and is waiting to be installed.
2. It has been installed but operation is delayed pending completion of construction.
3. There are long (30 days or more) periods between operating cycles.
4. The plant (or department) is shut down for periods of longer than 30 days.

Measures to be taken for prolonged shutdown of installed pumping unit. If the pumping unit remains installed a periodic check of operation is in order to make sure that the pump is always ready for instant start-up and to prevent the formation of deposits within the pump and the pump intake area. Start up the pumping unit regularly once a month or once every 3 months for a short time (approximately 5 minutes) during prolonged shutdown periods. Prior to operation check run ensure that there is sufficient liquid available for operating the pump.

III. INSTALLATION.

A. LOCATION. The pump assembly should be located in an area that will permit periodic inspection and maintenance. Head room and access should be provided and all units should be installed in a dry location with adequate drainage. The discharge piping should be direct with as few elbows and fittings as possible.

B. HANDLING.

CAUTION

Use a hoist with adequate lifting capacity.

Do not pick up the complete unit by the motor or the pump shafts or motor lifting eyes.

If the pumping unit slips out of the sling arrangement, it may cause injury to personnel and/or damage to the pumping unit.

Moving the unit requires proper preparation and handling. Always make sure that the pump cannot slip out of the transport suspension arrangement. The RSV pumps with motor installed tend to be top heavy; care should be taken in handling and transporting to prevent damage or injury caused by the pump falling over.

C. COUPLING ALIGNMENT. The pump and motor are connected by a coupling. The base aligns the pump and motor. No further alignment is necessary.

D. PRE-INSTALLATION PROCEDURES.

1. Always check the pump label against the requirement to make sure you are installing the proper pumps specified for the job.
2. Make sure that the pump suction marked by a sticker, is connected to the liquid source and that the discharge, similarly marked, is connected to the discharge line.

WARNING

Before work is performed on the RSV pump, care should be taken to ensure that the electrical power is disconnected to the motor to prevent electric shock or premature starting which could cause damage to persons, things or the pump.

CAUTION

On three phase motor insulations, always check for proper motor rotation prior to starting by jogging the motor. Shaft rotation must turn clockwise when viewed from the top of the motor.

Make sure the motor is correctly wired; refer to instruction on the motor nameplate.

3. Make sure that the pump base is firmly secured to a solid flat surface and that the suction and discharge lines are aligned and properly supported to prevent pipe strain on the pump.
4. Ensure that the suction and discharge gaskets are properly installed to prevent leaks and that they do not restrict the flow to or from the pump.

   Standard ANSI mating flanges should be used to connect the pump to the piping. Suction and discharge piping should be no smaller that the respective pump port sizes.
5. Isolation valves should be installed on both the suction and discharge side of the pump in the event service of the pump is required.
6. Provide adequate space and ventilation around the pump for service and motor cooling.

WARNING

Use standard plumbing practices to ensure unnecessary line losses, cavitation and prevent air lock.

7. If the installation of the motor is necessary, refer to Section VI, Paragraph A for instructions.

E. PIPING. All piping should be independently supported near the pump so that pipe strain will not be transmitted to the pumping unit.

CAUTION

All piping connections must be made with the pipe in a freely supported state. Do not apply vertical or side pressure to align the piping with the pump flange.

Before connecting suction, discharge, and auxiliary piping, check to see that the piping is absolutely clean internally. Any debris in the piping will be drawn into the pump passageways and can cause extreme damage. The internal diameters of the suction and discharge lines must be equal to the internal diameters of the pump suction and discharge nozzles.

F. AUXILIARY PIPING CONNECTIONS AND GAUGES. In addition to primary piping connections, the pump may require other connections such as gauges or drains. All these lines and gauges should now be installed.

G. MOTOR. See motor vendor's manual for motor information and information on connecting to the power supply.

WARNING

Connection to the power supply must be completed by a trained electrician only. Check available main voltage against the data on the motor rating plate and select appropriate start-up method.

H. DIRECTION OF ROTATION. The standard direction of rotation, when viewed from the motor end, is clockwise.

The rotation arrow is located on the motor bracket, the below photo shows the rotation arrow location on the motor bracket. There is an arrow on both sides of the motor bracket.

IV. OPERATION.

A. PRE-START CAUTIONS.

WARNING

Before activating the pumping unit, check to make sure there are no personnel working on the unit. Serious injury or death to personnel could result if the unit is activated while being worked on.

1. Before starting or operating the pump, read this entire manual, especially the following instructions.
2. Observe all caution or danger tags attached to the equipment.

WARNING

Make sure that all cables, electrical connections and controls are in perfect working order and properly grounded. Improper installation can result in serious or even mortal accidents to persons.

CAUTION

Never run the pump dry. Close running fits within the pump are liquid lubricated. Dry running will result in pump seizure or damage.

B. PRIMING. Dry running a centrifugal pump can result in extensive damage and possible seizing. It is, therefore, imperative that the pump be primed prior to initial start-up and that prime must be maintained through subsequent start-stop cycles.

Follow the procedure listed below:

1. Completely prime the pump by removing the vent plug (212).
2. Using a funnel, fill the pump body with water until it overflows and replace vent plug (212).
3. Alternatively for installations with positive suction heads, close the discharge valve and remove the vent plug (212).
4. Open suction valve until liquid flows out of the vent plug opening and then replace the vent plug securely and open the discharge valve.
5. It is recommended that a bleed valve be installed in the discharge line or in a line from the vent port to the reservoir. This will allow the pressure in the pump to be relieved for service.

CAUTION

Installing a bleed valve is especially necessary in hot water applications to prevent injury.

6. Pipe, valves and fittings must have a pressure rating equal to or greater than the maximum system pressure.
7. A bypass or pressure relief valve should be installed in the discharge line if there is any possibility the pump may operate against a closed valve in the discharge line.
8. Minimum flow is required for proper cooling and lubrication of the pump without which, damage and premature failure will occur.

Table 1. Minimum Pumping Rate

Model	Minimum Flow Rate (GPM)
RSV3	3.3
RSV5	6.7
RSV10	8
RSV18	11
RSV32	61
RSV45	112
RSV64	149

C. STARTING THE PUMP.

WARNING

Do NOT operate pumping unit against a closed discharge system. If pump has any chance of operation against a closed system, a bypass system allowing a minimum design flow should be installed. This bypass will be satisfactory for short periods of operation. For extended periods of operation the bypass should be sized for the minimum continuous flow required by the pump.

1. Check pump for proper priming per Section IV, Paragraph B and install per Section III, Paragraph D.

2. Starting – When the pump is up to operating speed, open discharge valve to obtain desired capacity or pressure.
3. Check to make sure that all electric connections are correct.

WARNING

Operating the pump without the guards in place can cause physical injury.

4. Apply power to the motor. Check motor rotation. Rotation should be clockwise when viewed from the top of the motor. Rotation arrows are located on the motor brackets refer to Section III, Paragraph H for photo.

WARNING

RSV pumps are designed for continuous and normal off/on operation. Rapid cycling can cause high heat and loading that can cause damage to the pump or motor.

5. Please refer to the motor manufacturer specifications for starts per hour.

V. MAINTENANCE.

Generally the pump does not need continuous supervision. The pump should always run quietly and smoothly, without vibration. To ensure such operation, the following maintenance schedule should be applied at regular intervals during operation of the pump. Occasional visual checks are recommended. Data should be recorded for each pump to keep track of maintenance which has been performed and to note operational problems. A sample maintenance record sheet is provided for this purpose at the front of this manual.

Daily Inspection:
- Visually inspect unit.

Weekly Inspection:
- Check power (amps) readings.
- Check pump discharge pressure.

Monthly Inspection:
- Check foundation bolts.

Semi-annual Inspection:
- If stand-by pumps are installed, it is advisable to operate pumps on a rotation system to give each pump a certain duty. This ensures that stand-by pumps will always be in good condition for instant start-up.

A. LUBRICATION OF MOTOR. See motor manufacturer's instructions to be sure motor bearings are properly lubricated.

B. TORQUE VALUES. Refer to Tables 2 and 3 for recommended torque values. Clean and properly lubricate threads and bearing face of the fastener to obtain the proper fastener loading from these torque values. Fasteners should be tightened evenly and in stages. Refer to your torque wrench manual for the proper use of your wrench.

Table 2. Recommended Tie Rod Torque Values (ft-lbs)

Model	Tie Rod Thread Size	Specification
RSV3	M10	10ft-lbs 13N-m
RSV5		
RSV10	M12	19ft-lbs 25N-m
RSV18		
RSV(G)32	M16	45ft-lbs 61N-m
RSV(G)45		
RSV(G)64		

Table 3. Recommended Coupling Bolt Torque Values (ft-lbs)

	Drawing Reference			
	120-5		120-6	
Model	**Bolt Size**	**Specification**	**Bolt Size**	**Specification**
RSV3 RSV5	M6	6 ft-lbs 8.5 N-m	M6	6 ft-lbs 8.5 N-m
RSV10 2 – RSV10 3	M6	6 ft-lbs 8.5 N-m	M6	6 ft-lbs 8.5 N-m
RSV10 4 – RSV10 12			M8	15 ft-lbs 20 N-m
RSV10 13 – RSV10 16			M10	30 ft-lbs 40 N-m
RSV18 2	M6	6 ft-lbs 8.5 N-m	M6	6 ft-lbs 8.5 N-m
RSV18 3 – RSV18 5			M8	15 ft-lbs 20 N-m
RSV18 6 – RSV18 11			M10	30 ft-lbs 40 N-m
RSV32 1	M6	6 ft-lbs 8.5 N-m	M6	6 ft-lbs 8.5 N-m
RSV32 2-2 – RSV32 3-2			M8	15 ft-lbs 20 N-m
RSV32 3 – RSV32 10-1	M10	30 ft-lbs 40 N-m	M12	50 ft-lbs 68 N-m
RSV45 1-1 – RSV45 1			M8	15 ft-lbs 20 N-m
RSV45 2-1 – RSV 45 7-2	M10	30 ft-lbs 40 N-m	M12	50 ft-lbs 68 N-m
RSV64 1-1			M8	15 ft-lbs 20 N-m
RSV64 1-0 – RSV64 4-0	M10	30 ft-lbs 40 N-m	M12	50 ft-lbs 68 N-m

VI. SERVICE AND REPAIR.

For service and repair for each specific RSV model, please refer to Section as indicated in Table 4.

A. MOTOR INSTALLATION ON BARE PUMP.

WARNING

When lifting the pump/motor, use appropriate crane (or hoist), check position and tightness of lift system so that weight of the pump is not unbalanced. Failure to observe this precaution can result in serious accidents.

A.1 Procedure for mounting motors for the following models:

- RSV3 2 – RSV3 12
- RSV5 2 – RSV5 6
- RSV32 1
- RSV10 2 – RSV10 3
- RSV18 2

WARNING

Before attempting to disassemble the pump, the electrical power supply to the driver must be locked and tagged in the “OFF” position to prevent injury or death to personnel servicing the pumping unit.

1. Follow general safety and electrical instructions on the motor nameplate.
2. Remove coupling guard from the pump end.
3. Carefully loosen the screws on the coupling.
4. Position the motor vertically over the pump with the keyways lined up on the motor and the pump. Then lower the motor into place. If necessary rotate the motor so that the mounting bolt holes line up with the corresponding holes in the pump bracket.

A.1 Procedure for mounting motors for the following models: - Continued

5. Insert the mounting bolts and tighten firmly using a crisscrossing pattern.
6. Using two screwdrivers, lever between the motor bracket and the coupling raise the pump shaft until it touches the motor shaft. Then tighten the coupling screws to secure the motor and pump shaft into position.
7. Rotate the coupling to assure that the pump turns freely. If rubbing occurs loosen the coupling screws on the motor side and repeat step (5).
8. Be sure to reinstall the coupling guard.

Table 4. RSV model Specific Service and Repair

Pump Model	Install Motor	Remove Motor from Pump	Replace Mechanical Seal	Replace Mechanical Seal & Hydraulic Seal
RSV3 2 – RSV3 13	Section VI, Paragraph A.1	Section VI, Paragraph B.1	Section VI, Paragraph C.1	Section VI, Paragraph C.4
RSV3 15 – RSV3 18	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV5 2 – RSV5 6	Section VI, Paragraph A.1	Section VI, Paragraph B.1	Section VI, Paragraph C.1	Section VI, Paragraph C.4
RSV5 7 – RSV5 16	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV10 2 – RSV10 3	Section VI, Paragraph A.1	Section VI, Paragraph B.1	Section VI, Paragraph C.1	Section VI, Paragraph C.4
RSV10 4 – RSV10 16	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV18 2	Section VI, Paragraph A.1	Section VI, Paragraph B.1	Section VI, Paragraph C.1	Section VI, Paragraph C.4
RSV18 3 – RSV18 11	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV32 1	Section VI, Paragraph A.1	Section VI, Paragraph B.1	Section VI, Paragraph C.1	Section VI, Paragraph C.4
RSV32 2-2 – RSV32 3-2	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV32 3 – RSV32 10-1	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.3	Section VI, Paragraph C.6
RSV45 1-1 – RSV45 1	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV45 2 – RSV45 7-2	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.3	Section VI, Paragraph C.6
RSV64 1-1	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.2	Section VI, Paragraph C.5
RSV64 1 – RSV64 4	Section VI, Paragraph A.2	Section VI, Paragraph B.2	Section VI, Paragraph C.3	Section VI, Paragraph C.6

A.2 Procedure for mounting motors for the following models:

- RSV3 13 – RSV3 18
- RSV5 7 – RSV5 17
- RSV10 4 – RSV10 16
- RSV18 3 – RSV18 11
- RSV32 All Sizes (Except RSV32 1)
- RSV45 All Sizes
- RSV64 All Sizes

WARNING

Before attempting to disassemble the pump, the electrical power supply to the driver must be locked and tagged in the "OFF" position to prevent injury or death to personnel servicing the pumping unit.

1. Follow general safety and electrical instructions on the motor nameplate.
2. Attach a strong sling or chains to the motor lifting lugs or eyebolts to ensure that the motor is balanced when lifted vertically.
3. Position the motor, shaft down, above the pump assembly.
4. Apply a thin coat of anti-seize to the motor shaft and to the inside of the coupling.
5. Ensure that the motor key has been placed firmly into the motor shaft keyway.
6. Align the motor key and keyway with the coupling keyway and slowly lower the motor into position ensuring that the key slides into the coupling key.
7. Prior to lowering the motor completely, rotate the motor so that the mounting holes are aligned with the holes in the motor support.
8. Insert the four motor bolts into the proper holes and tighten evenly using an alternating crossing pattern to ensure proper alignment.

B. REMOVING MOTOR FROM COMPLETE PUMP.

WARNING

Before attempting to disassemble the pump, the electrical power supply to the driver must be locked and tagged in the "OFF" position to prevent injury or death to personnel servicing the pumping unit.

CAUTION

Extreme caution should be exercised in this operation since the pump may be under system pressure at this point.

Relieve the pressure before performing work on the pump. Use a pressure bleed valve in hot water applications where water temperature could cause physical injury.

B.1 Procedure for removing motors for the following models:

- RSV3 2 – RSV3 12
- RSV5 2 – RSV5 6
- RSV32 1
- RSV10 2 – RSV10 3
- RSV18 2

1. Follow the general safety and electrical instructions, disconnect the power to the motor and remove power cords.
2. Loosen and remove the four motor bolts.
3. Attach a strong sling or chains to the motor lifting lugs or eyebolts to ensure that the motor is balanced when lifted vertically.
4. Remove coupling guards.
5. Loosen, but do not remove the coupling bolts.
6. Slowly lift the motor off the pump assembly being careful to retain the shaft key. If the motor does not slide easily out of the coupling do not rise the pump into the air, dropping the pump end can cause damage. Fix the pump base to the floor or bench and lift the motor again.

B.2 Procedure for removing motors for the following models:

- RSV3 13 – RSV3 18
- RSV5 7 – RSV5 17
- RSV10 4 – RSV10 16
- RSV18 3 – RSV18 11
- RSV32 All Sizes (Except RSV32 1)
- RSV45 All Sizes
- RSV64 All Sizes

1. Follow the general safety and electrical instructions, disconnect the power to the motor and remove power cords.
2. Loosen and remove the four motor bolts.
3. Attach a strong sling or chains to the motor lifting lugs or eyebolts to ensure that the motor is balanced when lifted vertically.
4. Slowly lift the motor off the pump assembly being careful to retain the shaft key. If the motor does not slide easily out of the coupling do not raise the pump into the air, dropping the pump end can cause damage. Fix the pump base to the floor or bench and lift the motor again.

C. GENERAL PUMP MAINTENANCE AND DISASSEMBLY INSTRUCTIONS. The instructions that follow are an aid for properly trained personnel to service your pump. If a specific sectional assembly drawing exists for a particular job then that drawing should be referred to for service work. Read this entire section before disassembling the pump.

NOTE

Before beginning, it is recommended that tape or some other method of marking be used to make markings on the outer "can" assembly to indicate orientation, such as "top" and "bottom".

Make corresponding alignment markings that indicate where the bottom of the can and lower casing assembly meet. Also make another mark to indicate where the top of the can and lower portion of the cast iron motor support meet.

Always inspect for damage of the other components and clean any debris that you may find during maintenance procedures.

Cross sectional view of the pumps are good references for these procedures.

C.1 Procedure for replacing the mechanical seal for the following models:

- RSV3 2 – RSV3 12
- RSV5 2 – RSV5 6
- RSV32 1
- RSV10 2 – RSV10 3
- RSV18 2

1. Isolate the pump by closing the isolation valves on the suction and discharge lines.

CAUTION

Extreme caution should be exercised in this operation since the pump may be under system pressure at this point.

Relieve the pressure before performing work on the pump. Use a pressure bleed valve in hot water applications where water temperature could cause physical injury.

2. Carefully relieve the pressure in the pump by opening the vent valve or drain plugs.
3. Remove the motor as detailed in Section VI, Paragraph B.1.
4. Remove the pump coupling bolts (120-5) and remove the coupling.
5. Remove the shaft pin (131-1)
6. Remove the 4 socket head screws (120-3) from the stationary mechanical seal seat (111-3). Remove the seal seat and stationary seal. Press the old stationary seal assembly out of the stationary seal housing (111-3). The stationary seat is rubber O-ring mounted.

NOTE

RSV32 1 will have a cartridge type of mechanical seal. The rotating and stationary pieces of the seal will all be removed in this step, proceed to step 20.

7. Loosen and remove four tie rod nuts (128-1).
8. Gently tap upward on the base of the motor bracket (162) with a soft mallet to loosen the fit. Remove the motor bracket.
9. Remove the old rotating seal assembly by lifting vertically off the pump shaft. **Do not remove**

the shaft sleeve that is below the rotating assembly.

10. Remove the outer casing (007), remove O-ring (115-1) from the top and bottom of the outer casing.
11. Slide the rotating seal assembly onto the shaft taking care not to scratch or touch the seal face. Apply a small amount of non-petroleum based lubricant on the inside of the rotating assembly. (i.e. dish soap, or Dow Corning #4 lubricant or similar) If touching the seal face is necessary, gently wipe with a clean soft tissue.
12. Push the assembly into place on the shaft, seating the rubber boot snugly.
13. Carefully, press the stationary seal assembly into the stationary seal is evenly seated.
14. Using a new outer casing O-ring (115-1) apply a light film of lubricant such as Dow Corning #4 or similar to the O-ring and place it in the lower O-ring groove in the outer casing (007). Ensure that it is seated smoothly and evenly in the groove.
15. Place the outer casing (007) over the entire assembly and into the bottom casing (006). The outer casing may not seem to seat at this time, but the tie rods will be tightened in a later step, which will complete the seating of the outer casing (007).
16. Using a new outer casing O-ring (115-1), apply a light film of lubricant such as Dow Corning #4, or similar, to the O-ring and place it into the O-ring groove on the upper pump body (007) ensuring that it is seated smoothly into the O-ring grove at the top of the outer casing (007).
17. Carefully place the motor bracket (162) over the pump shaft and the tie rods and onto the outer casing.
18. Replace the tie rod washers and nuts onto the tie rods finger tight.
19. Commence staggered tightening of the tie rod nuts to endure even distribution of pressure and proper seating of the motor bracket onto the pump casing (007). Tighten all nuts to fit snugly. See torque specifications in Tables 2 and 3.
20. Slide the stationary seal seat (111-3) assembly over the shaft into place. Secure the assembly by installing and tightening the 4 socket head screws (120-3).
21. Reinstall the shaft pin (131-1).
22. Reinstall the coupling by sliding one half and then the other half of the coupling over the shaft pin. Install the bolts in the lower half of the coupling tightening only until the shaft pin is secured in place and the coupling will not fall down the shaft. Final tightening of the coupling bolts will occur upon motor installation.
23. For reinstallation of the motor, see Section VI, Paragraph A.1.

C.2 Procedure for replacing the mechanical seal for the following models:

- RSV3 13 – RSV3 18
- RSV5 7 – RSV5 16
- RSV10 4 – RSV10 16
- RSV18 3 – RSV18 11
- RSV32 2-2 – RSV32 3-2
- RSV45 1-1 – RSV45 1
- RSV64 1-1

1. For instructions on removing the motor from the pump see Section VI, Paragraph A.2.
2. Remove the coupling guards from each side of the pump motor support.
3. Remove the two socket head bolts that hold the shaft coupling together. Remove the front half of the shaft coupling exposing the shaft pin.
4. Using pliers carefully grasp the shaft pin (131-1) and remove it from the coupling and pump shaft. This will release the pump shaft from the fixed half of the coupling assembly.
5. Remove the motor adaptor assembly (051) that houses the upper bearing and the fixed portion of the coupling assembly. Insert two screwdrivers or small pry bars into the groove between the motor adaptor (051) and the motor bracket (162) to separate them. Take care as not to damage or crack these parts.
6. Remove the four small socket head bolts that secure the stationary seal seat (120-3). After removing these bolts, remove the stationary seal assembly (111-3). Slide the stationary seal seat over the pump shaft to remove.

NOTE

RSV models 32, 45 and 64 listed in Paragraph VI, Section C.2, are equipped with a cartridge type mechanical seal. You will be removing both the stationary and rotating pieces of the mechanical seal in this step. After removal of the seal go to step 19.

7. Remove the tie rod nuts and washers. The motor bracket support (162) can now be removed.
8. Remove the old rotating seal assembly by lifting vertically off the pump shaft. The rotating assembly is rubber boot mounted.

NOTE

Do not remove the shaft sleeve that is below the rotating assembly.

9. Remove the outer casing (007), remove the O-ring (115-1) from the top and bottom of the outer casing.
10. Slide the new rotating seal assembly onto the shaft taking care not to scratch or touch the seal face. Apply a small amount of non-petroleum base lubricant on the inside of the rotating assembly. (i.e., dish soap or Dow Corning #4 lubricant or similar) If touching the seal face is necessary, gently wipe with a clean soft tissue.
11. Push the rotating seal assembly into place on the shaft, seating the rubber boot snugly.
12. Carefully press the stationary seal assembly into the stationary seal housing (111-3). Be sure that the stationary seal is evenly seated.
13. Using a new outer casing O-ring (115-1) apply a light film of lubricant such as Dow Corning #4 or similar to the O-ring and place it in the lower O-ring groove in the outer casing (007). Ensure that it is seated smoothly and evenly in the groove.
14. Place the outer casing (007) over the entire assembly and install into the bottom casing (006). The outer casing may not seem to seat at this time, but the tie rods will be tightened in a later step, which will complete the seating of the outer casing (007).
15. Using a new outer casing O-ring (115-1), apply a light film of lubricant such as Dow Corning #4, or similar, to the O-ring and place it into the upper O-ring groove on the outer casing (007) ensuring that it is seated smoothly into the O-ring groove.
16. Carefully place the motor bracket (162) over the pump shaft and the tie rods and onto the outer casing.
17. Replace the tie rod washers and nuts onto the tie rods finger tight.
18. Commence staggered tightening of the tie rod nuts to ensure even distribution of pressure and proper seating of the motor bracket onto the pump casing (007). Tighten all nuts to fit snugly. See torque specifications in Tables 2 and 3.
19. Slide the stationary seal seat assembly (113-1) (or cartridge sea assembly if equipped) over the shaft and into place. Secure the assembly by installing and tightening the 4 socket head screws (120-3).

NOTE

For RSV models 32, 45 and 64, after securing the seal in place as instructed above, tighten the three setscrews in the locking collar.

20. With the hole in the end of the pump shaft visible through the side opening of the motor bracket (162), reinstall the upper motor adaptor (051) and bearing assembly into the motor bracket. Be sure that the motor mounting holes are aligned correctly and the hole in the end of the pump shaft is lined-up with the hole in the back of the motor coupling behind that pump shaft.
21. Next, reinstall the shaft pin (131-1) into the hole in the pump making sure that it seats inside the hole in the back of the coupling also. Reattach the other coupling half and tighten the two coupling bolts with an allen wrench. See torque specifications in Tables 2 and 3.
22. Refer to Section VI, Paragraph A.2 for motor installation instructions.

C.3 Procedure for replacing the mechanical seal for the following models:

- RSV32 3 – RSV32 10-1
- RSV45 2-1 – RSV45 7-2
- RSV64 1 – RSV64 4

1. Remove the coupling guard on each side of the pump's cast iron motor bracket (162).
2. Remove the two socket head bolts that hold the two halves of the lower spacer coupling together (120-6). Remove the front half of the shaft coupling which will then expose the shaft pin (131-1).

3. Next, loosen but do not remove the four hex head bolts (120-5) that secure the remaining half of the spacer coupling to the upper coupling and bearing assembly above. With these bolts loosened, use pliers to carefully grasp and remove the shaft pin (131-1) from the pump shaft. This will disengage the pump shaft from the coupling.
4. Completely remove the four hex head bolts (120-5) that were loosened in the previous step. With these bolts removed, remove the remaining half of the spacer coupling.
5. Remove the four retaining bolts from the stationary seal plate (120-3). Loosen the three setscrews in the locking collar above the stationary seal plate and slide the entire cartridge seal.
6. Carefully install the new cartridge seal over the pump shaft and into the top of the pump being sure that it is firmly seated. Reinstall the four retaining bolts (120-3) that secure the cartridge seal to the pump and tighten the three setscrews in the locking collar.
7. Reinstall the spacer coupling. Thread the hex head bolts (102-5) back through the top of the spacer coupling loosely so it is supported but do not fully tighten. Be sure that the cross key in aligned with the keyway in the bearing assembly above. Spin the spacer coupling so that hole in the pump shaft is aligned with holes in the rear of the spacer coupling.
8. Reinstall the shaft pin (131-1) through the hole in the pump shaft making sure that it seats in the blind hole in the back of the spacer coupling. Once the locking pin has been installed and the pump shaft and spacer coupling are engaged via the locking pin, install the front half of the spacer coupling and install the two socket head bolts (120-6) that secure it.
9. Firmly tighten the four hex head bolts (120-5) that secure the spacer coupling to the upper coupling and bearing assembly above being sure that the drive key is positioned correctly so that these parts are properly engaged with each other.

NOTE

The working length of the seal is set by completion of this step. There is no other adjustment that needs to be made to the seal.

10. Reattach the coupling guards to each side of the pump and then reinstall the motor to complete.
11. See Section VI, Paragraph B.2 for motor installation.

C.4 Procedure for replacing the pump hydraulic assembly for the following models:

- RSV3 2 – RSV3 12
- RSV5 2 – RSV5 6
- RSV32 1
- RSV10 2 – RSV10 3
- RSV18 2

1. Remove the old mechanical seal assembly and the outer casing as detailed in Section VI, Paragraph C1, steps 1 through 10.
2. Remove old hydraulic assembly.
3. Ensure that the proper replacement hydraulic (stack) assembly has been selected and provided for the pump.
4. Lift the replacement hydraulic (stack) assembly and place it onto the bottom casing (006) ensuring that it is seated properly. The bottom impeller should slip into the casing wear ring.
5. Using a new outer casing O-ring (115-1) apply a light film of lubricant such a Dow Corning #4 or similar to the O-ring and place it in the lower O-ring groove in the outer casing (007). Ensure that it is seated smoothly and evenly in the groove.
6. Place the outer casing (007) over the entire assembly and install onto bottom casing (006). The outer casing may not seem to seat at this time, but the tie rods will be tightened in a later step, which will complete the seating of the outer casing (007).
7. Using a new outer casing O-ring (115-1), apply a light film of lubricant such as Dow Corning #4, or similar, to the O-ring and place it into the O-ring groove on the upper pump body (007) ensuring that it is seated smoothly into the O-ring groove.
8. Ensure that the rotating mechanical seal assembly in installed as detailed in Section VI, Paragraph C.1, steps 11 and 12.
9. Carefully place the motor bracket (162) over the pump shaft and the tie rods and into the outer casing.
10. Replace the tie rod washers and nuts onto the tie rods finger tight.
11. Commence staggered tightening of the tie rod nuts to ensure even distribution of pressure and

proper seating of the motor bracket onto the pump casing (007). Tighten all nuts to fit snugly. See torque specifications in Tables 2 and 3.

12. Slide the stationary seal seat assembly (111-3) over the shaft and into place. Secure the assembly by installing and tightening the 4 socket head screws (120-3).
13. Reinstall the shaft pin (131-1).
14. Reinstall the coupling by sliding one half and then the other over the shaft pin. Install the bolts in the lower half of the coupling tightening only until the shaft pin is secured in places and the coupling will not fall down the shaft. Final tightening of the coupling bolts will occur upon motor installation.
15. For installation of the motor, see Section VI, Paragraph A.1.

C.5 Procedure for replacing the pump hydraulic assembly for the following models:

- RSV3 13 – RSV3 18
- RSV5 7 – RSV5 16
- RSV10 4 – RSV10 16
- RSV18 3 – RSV18 11
- RSV32 2-2 – RSV32 3-2
- RSV45 1-1 – RSV45 1
- RSV64 1-1

1. Remove the old mechanical seal assembly and the outer casing as detailed in Section VI, Paragraph C.2.
2. Remove the old hydraulic assembly.
3. Ensure that the proper replacement hydraulic (stack) assembly has been selected and provided for the pump.
4. Lift the replacement hydraulic (stack) assembly and place it into the bottom casing (006) ensuring that it is seated properly. The bottom impeller should slip into the casing wear ring.
5. Using a new outer casing O-ring (115-1) apply a light film of lubricant such as Dow Corning #4 or similar to the O-ring and place it in the lower O-ring groove in the outer casing (007). Ensure that it is seated smoothly and evenly in the groove.
6. Place the outer casing (007) over the entire assembly and install it into the bottom casing (006). The outer casing may not seem to seat at this time, but the tie rods will be tightened in a later step, which will complete the seating of the outer casing (007).
7. Using a new outer casing O-ring (115-1), apply a light film of lubricant such as Dow Corning #4, or similar, to the O-ring and place it into the upper O-ring groove on the outer casing (007) ensuring that it is seated smoothly into the O-ring groove.

NOTE

For RSV models 32, 45 and 64 listed in Section VI, Paragraph C.5 are equipped with a cartridge type mechanical seal; this step can be skipped. The cartridge seal will be installed at step 12. Proceed to Step 9.

8. Ensure that the rotating mechanical seal assembly is installed as detailed in Paragraph VI, Section C.2, steps 10 and 11.
9. Carefully place the motor bracket (162) over the pump shaft and tie rods and onto the outer casing.
10. Replace the tie rod washers and nuts onto the tie rods finger tight.
11. Commence staggered tightening of the tie rod nuts to ensure even distribution of pressure and proper seating of the motor bracket (162) onto the pump casing (007). Tighten all nuts to fit snugly. See torque specifications in Tables 2 and 3.
12. Press the stationary seal and O-ring into the seal seat. Slide the stationary seal seat assembly (111-3) (or cartridge seal assembly, if equipped) over the shaft and into place. Secure the assembly by installing and tightening the 4 socket head screws (120-3).

NOTE

For RSV models 32, 45 and 64, after securing the seal in place as instructed above, tighten the three setscrews in the locking collar.

13. With the hole in the end of the pump shaft visible through the side opening of the motor bracket (162), reinstall the motor adaptor (051) and bearing assembly into the motor bracket. Be sure that the motor mounting holes are aligned correctly and the hole in the end of the pump shaft is lined-up with the hole in the back of the motor coupling behind the pump shaft.
14. Next, reinstall the locking pin into the hole in the pump shaft making sure that it seats inside the hole in the back of the coupling also. Reattach

the other coupling half and tighten the two coupling bolts with an allen wrench. See torque specifications in Tables 2 and 3.

15. For reinstallation of the motor, see Paragraph VI, Section B.2.

C.6 Procedure for replacing the mechanical seal and hydraulic assembly for the following models:

- RSV32 3 – RSV32 10-1
- RSV45 2-1 – RSV45 7-2
- RSV64 1 – RSV64 4

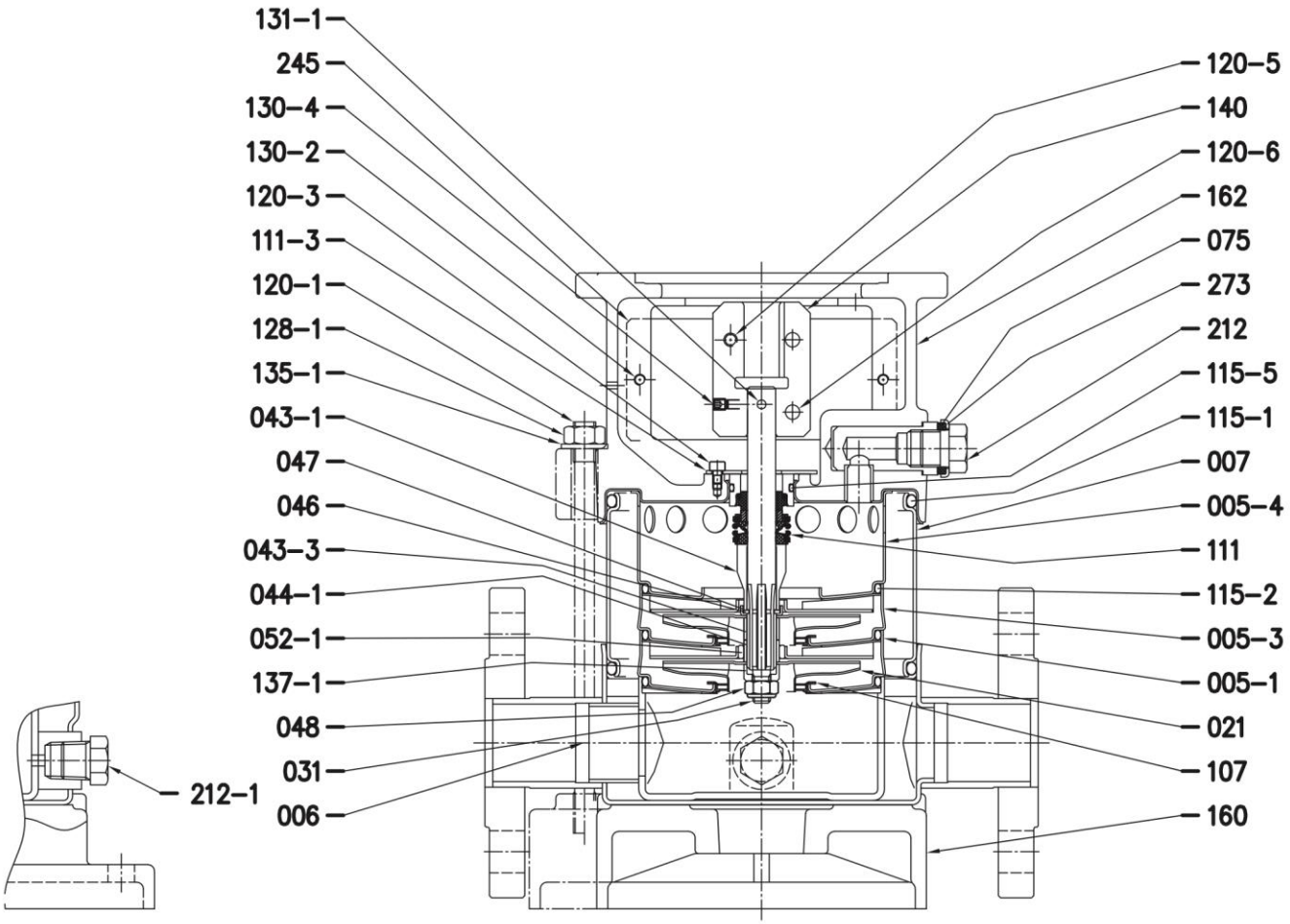
1. Complete step 1 through step 5 from Section VI, Paragraph C.3.
2. Remove the tie rod nuts and washers. The cast iron motor stool (163) and upper bearing assembly can now be removed.
3. Remove the outer casing (007). Remove the O-rings (115-1) from the top and bottom of the outer casing.
4. Lift the replacement hydraulic assembly and place it onto the pump casing (006) ensuring that it is seated properly. The bottom impeller should slip into the casing wear ring.
5. Using a new outer casing O-ring (115-1) apply a light film of lubricant such as Dow Corning #4 or similar to the O-ring and place it in the lower O-ring groove in the outer casing (007). Ensure that it is seated smoothly and evenly in the groove.
6. Place the outer casing (007) over the entire assembly and install it into the bottom casing (006). The outer casing (007) may not seem to seat at this time, but the tie rods will be tightened in a later step, which will complete the seating of the outer casing (007).
7. Using a new outer casing O-ring (115-1), apply a light film of lubricant such as Dow Corning #4, or similar, to the O-ring and place it into the O-ring groove on the upper pump body (007) ensuring that it is seated smoothly into the O-ring groove.
8. Carefully place the motor stool (163) over the pump shaft and the tie rods and onto the outer casing.
9. Replace the tie rod washers and nuts onto the tie rods finger tight.
10. Commence staggered tightening of the tie rod nuts to ensure even distribution of pressure and proper seating of the motor bracket onto the pump casing (007). Tighten all nuts to fits snugly. See torque specifications in Tables 2 and 3.
11. Carefully install the new cartridge seal over the pump shaft and into the top of the pump being sure that it is firmly seated. Reinstall the four retaining bolts (120-3) that secure the cartridge seal to the pump and tighten the three setscrews in the locking collars.
12. Reinstall the spacing coupling. Thread the hex head bolts (120-5) back through the top of the spacer coupling loosely so it is supported but do not fully tighten. Be sure that the cross key is aligned with the key in the bearing assembly above. Spin the spacer coupling so that hole in the pump shaft is aligned with hole in the rear of the spacer coupling.
13. Reinstall the shaft pin (131-1) through the hole in the pump shaft making sure that it seats in the blind hole in the back of the spacer coupling. Once the shaft pin has been installed and the pump shaft and spacer coupling are engaged via the shaft pin, install the front half of the spacer coupling and install the two socket head bolts (120-6) that secure it.
14. Firmly tighten the four hex head bolts (120-5) that secure the entire spacer coupling to the upper coupling and bearing assembly above being sure that the drive key is positioned correctly so that these parts are properly engaged with each other.

NOTE

The working length of the seal is set by completion of this step. There is no other adjustment that needs to be made to the seal.

15. Reattach the coupling guards to each side of the pump and then reinstall the motor to complete.
16. Refer to Section VI, Paragraph B.2 for motor installation.

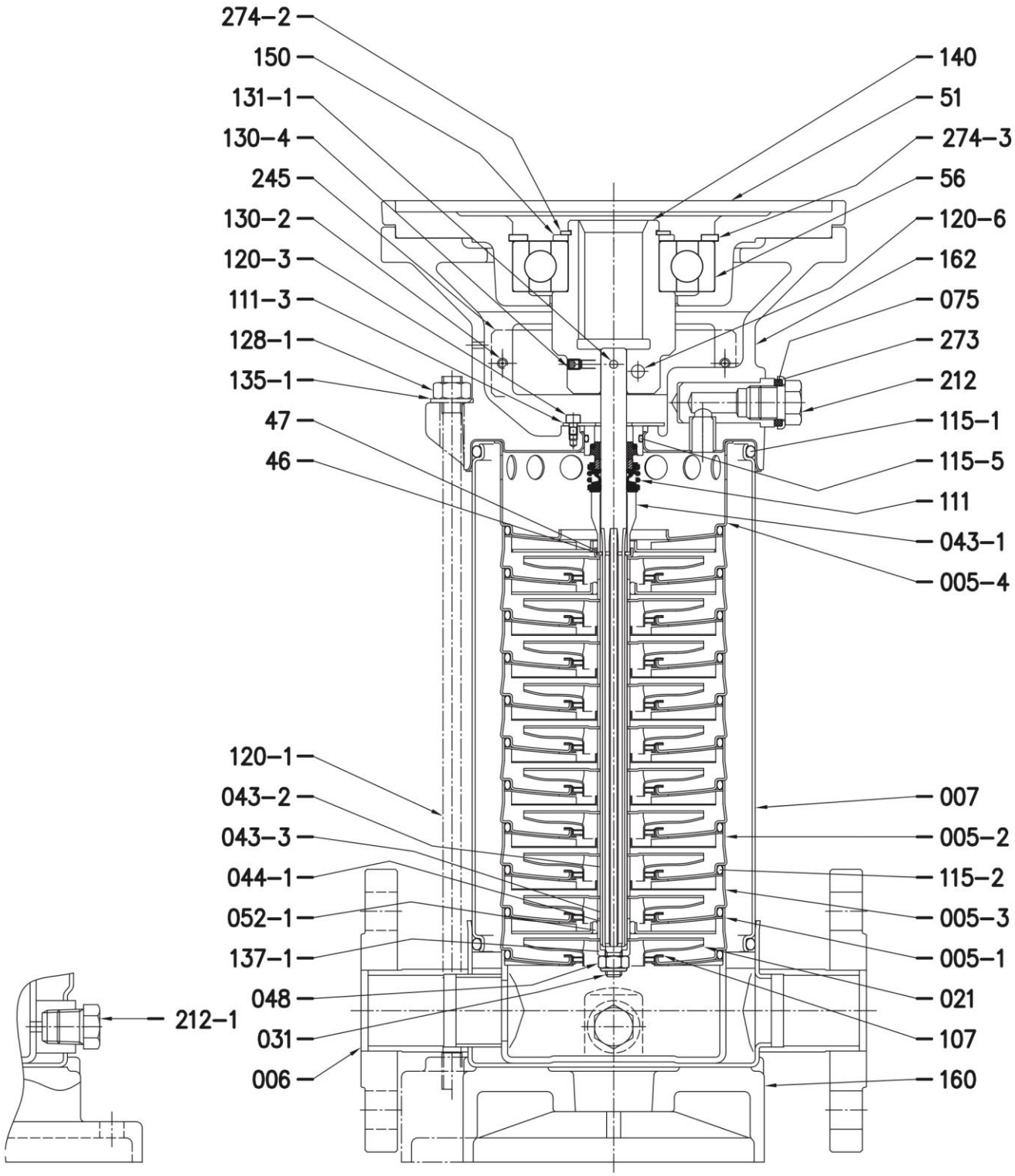
Sectional View Models RSV(L)3 2 – RSV(L)3 12



Refer to Page 20 for part description.

(For reference only, see pricing for part availability.)

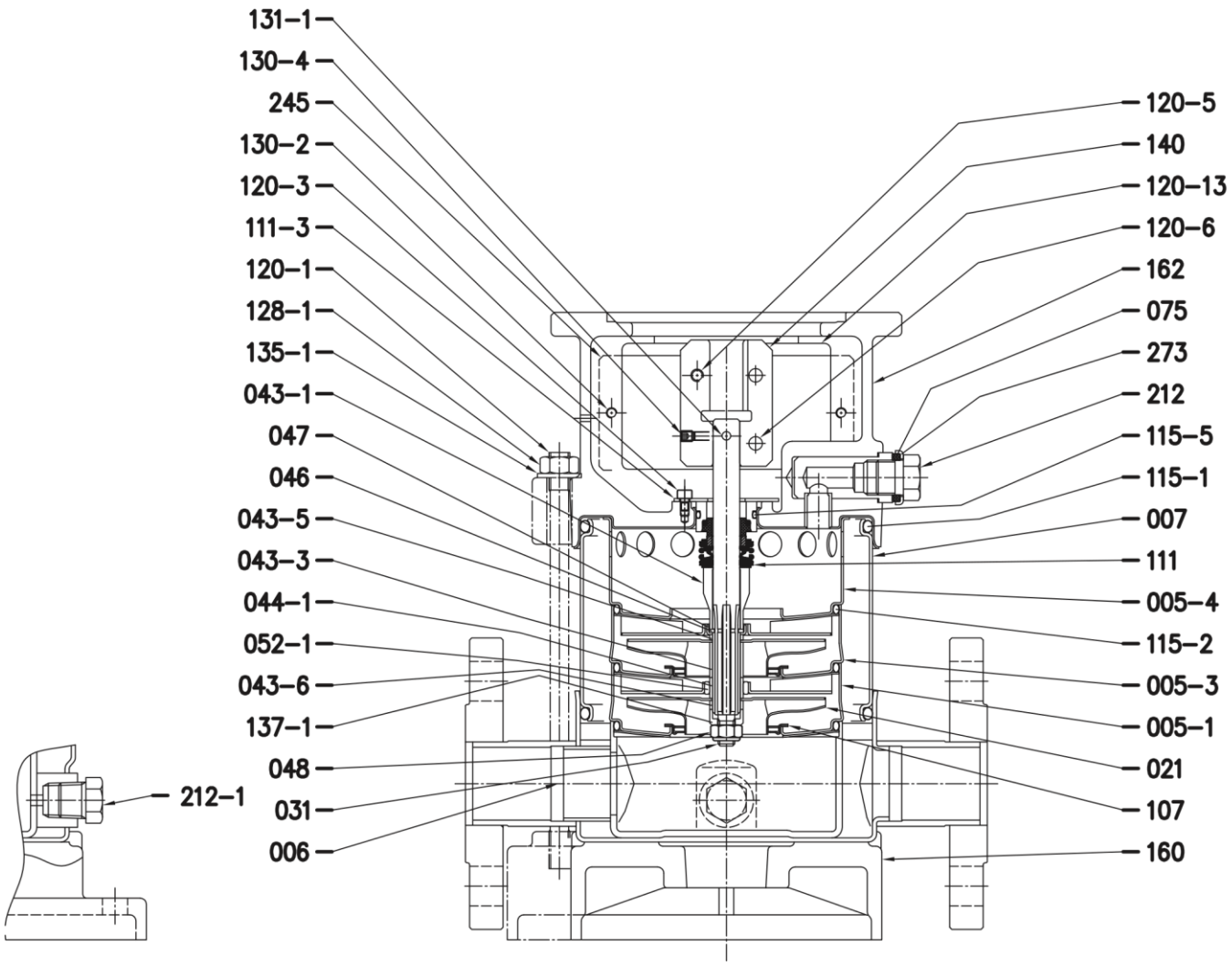
Sectional View Model RSV(L)3 13 – RSV(L)3 18



Refer to Page 20 for part description.

(For reference only, see pricing for part availability.)

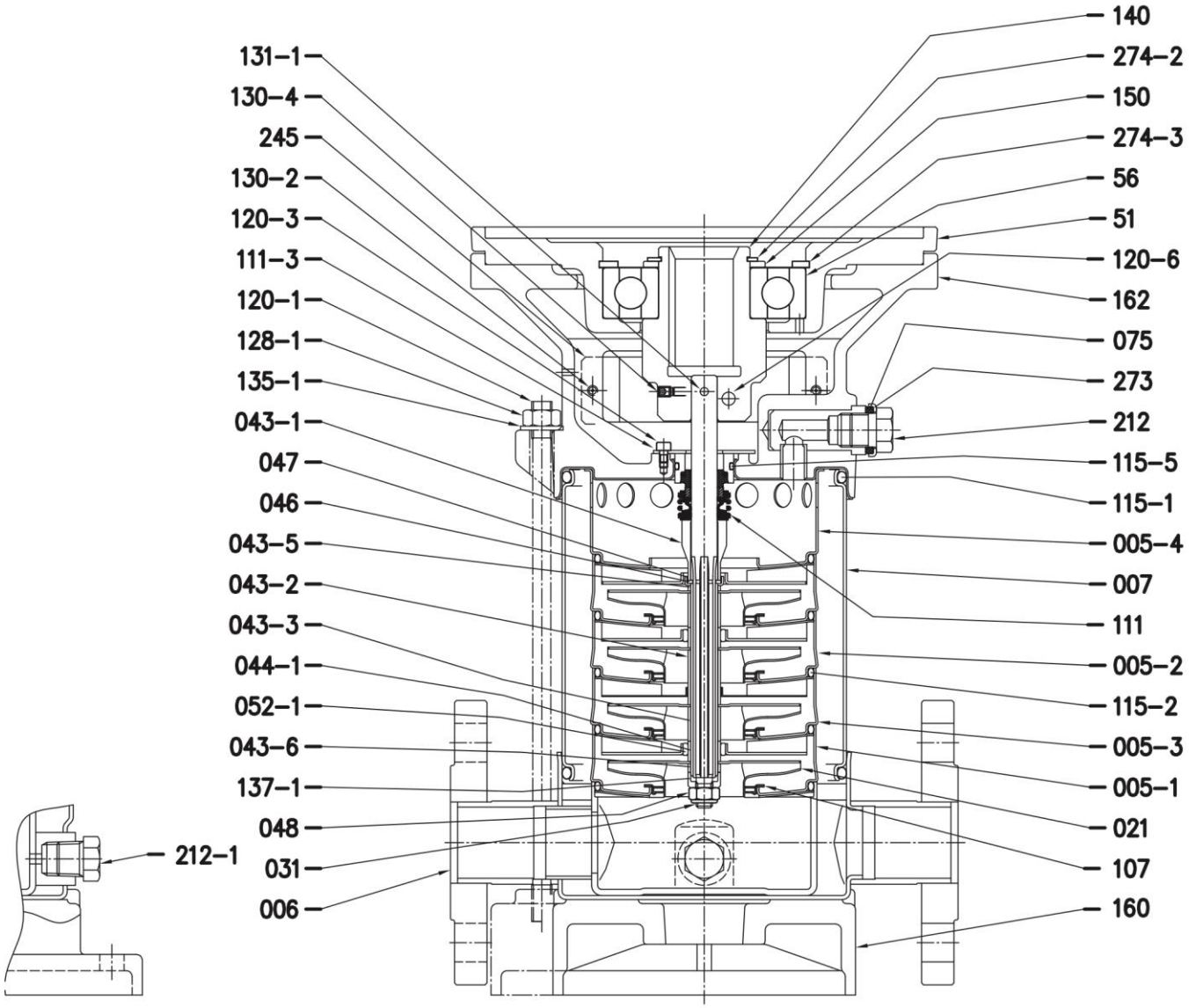
Sectional View Models RSV(L)5 2 – RSV(L)5 6



Refer to Page 20 for part description.

(For reference only, see pricing for part availability.)

Sectional View Model RSV(L)5 7 – RSV(L)5 16



Refer to Page 20 for part description.

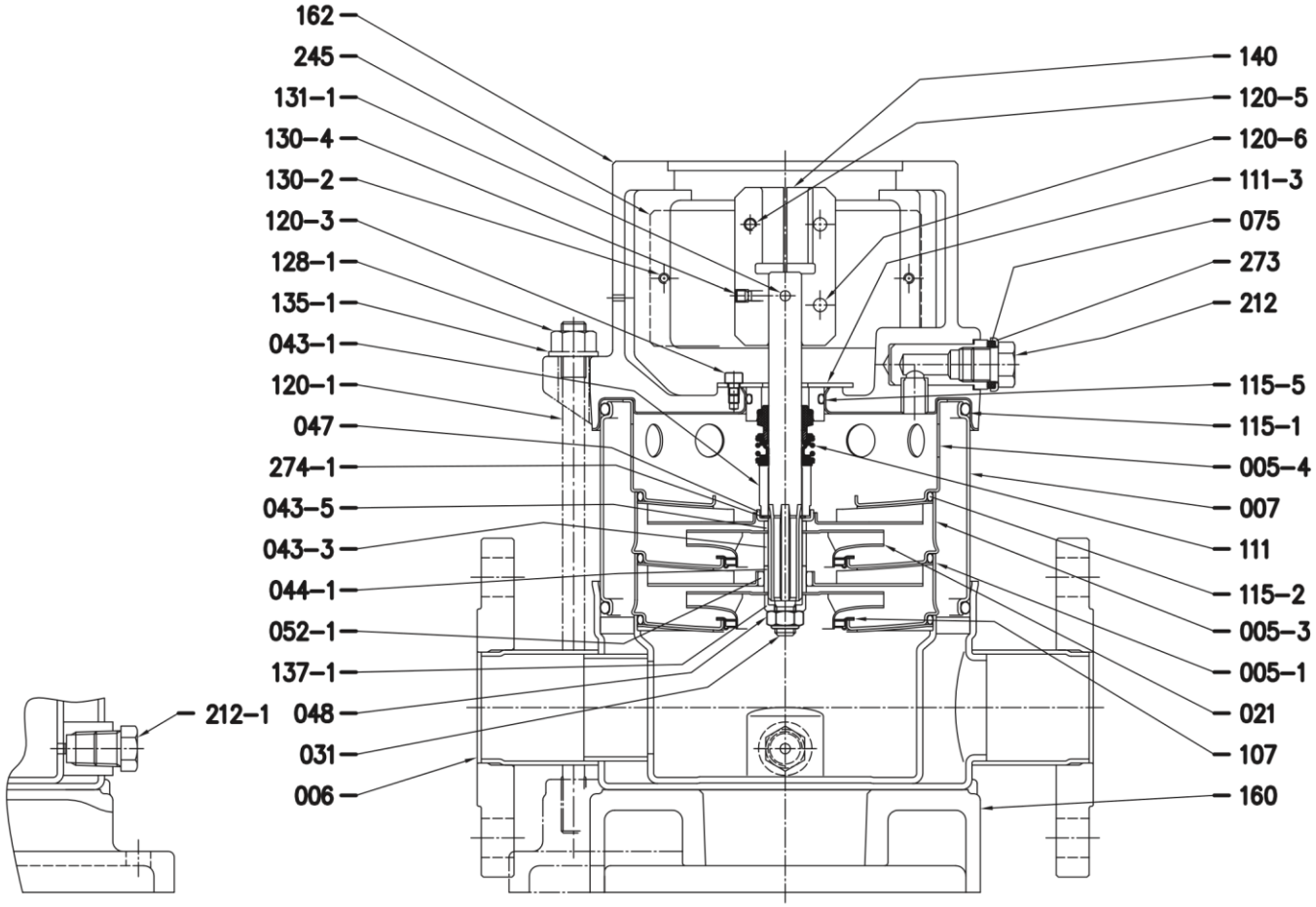
(For reference only, see pricing for part availability.)

Sectional View – Part Reference Models RSV(L)3 and RSV(L)5

(For reference only, see pricing for part availability.)

Part Number	Part Description	Part Number	Part Description
005-1	Suction Casing	115-1	O-ring (Outer Casing)
005-2	Intermediate Casing	115-2	O-ring (Intermediate Casing)
005-3	Intermediate Casing Bearing	115-5	O-ring
005-4	Discharge Casing	120-1	Tie Rod
006	Bottom Casing	120-3	Screw
007	Outer Casing	120-5	Screw for Coupling
021	Impeller	120-6	Screw for Coupling
031	Shaft	128-1	Nut for Tie Rod
043-1	Shaft Sleeve (Mechanical Seal)	130-2	Screw for Coupling Guard
043-2	Shaft Sleeve (Intermediate)	130-4	Setscrew
043-3	Shaft Sleeve (Bearing)	131-1	Pin for Shaft
043-5	Shaft Sleeve (Last Stage)	135-1	Washer
043-6	Shaft Sleeve (Adjustment)	135-4	Washer (Bearing)
044-1	Shaft Sleeve Bearing	137-1	Impeller Spacer
046	Split Ring (Mechanical Seal)	140	Coupling
047	Ring Holder	150	Spacer
048	Impeller Nut	160	Base
051	Motor Adaptor	162	Motor Bracket
052-1	Bearing	169	Motor Adaptor
056	Ball Bearing	212	Plug
070-1	Ring for Bearing	212-1	Plug
075	O-ring (Plug)	245	Coupling Guard
075-1	O-ring (plug)	273	Washer (Plug)
107	Liner Ring	273-1	Washer (Plug)
111	Mechanical Seal	274-2	C-Type Snap Ring (Coupling) RSV3 13, RSV3 13, RSV5 7 & 8, RSV5 10 to 16
111-3	Mechanical Seal Seat	274-3	C-Type Snap Ring (Bracket) RSV3 13, RSV3 15 & 18, RSV5 7 & 8 RSV5 10 to 16

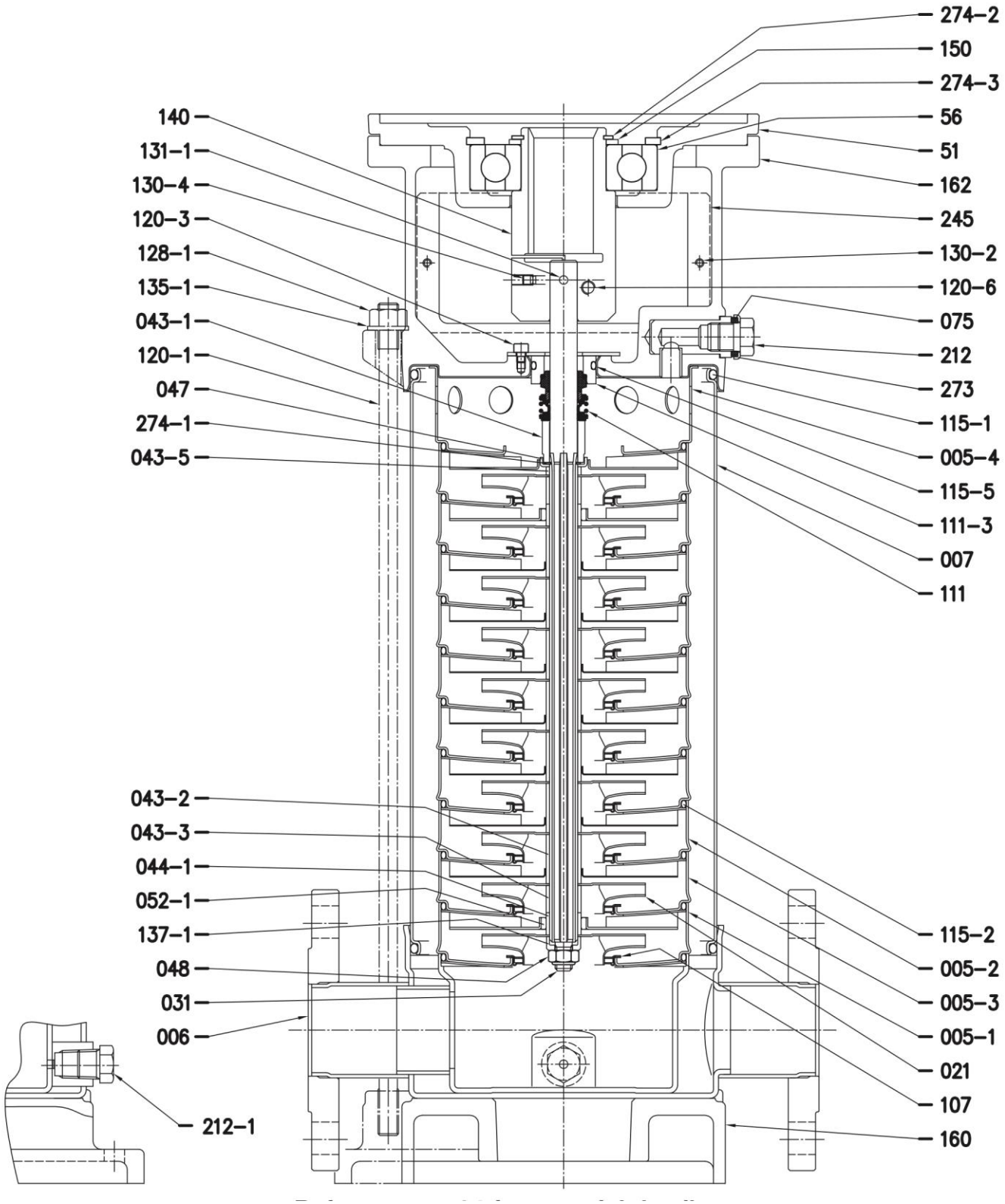
Sectional View Model RSV(L)10 2 – RSV(L)10 3



Refer to Page 24 for part description.

(For reference only, see pricing for part availability.)

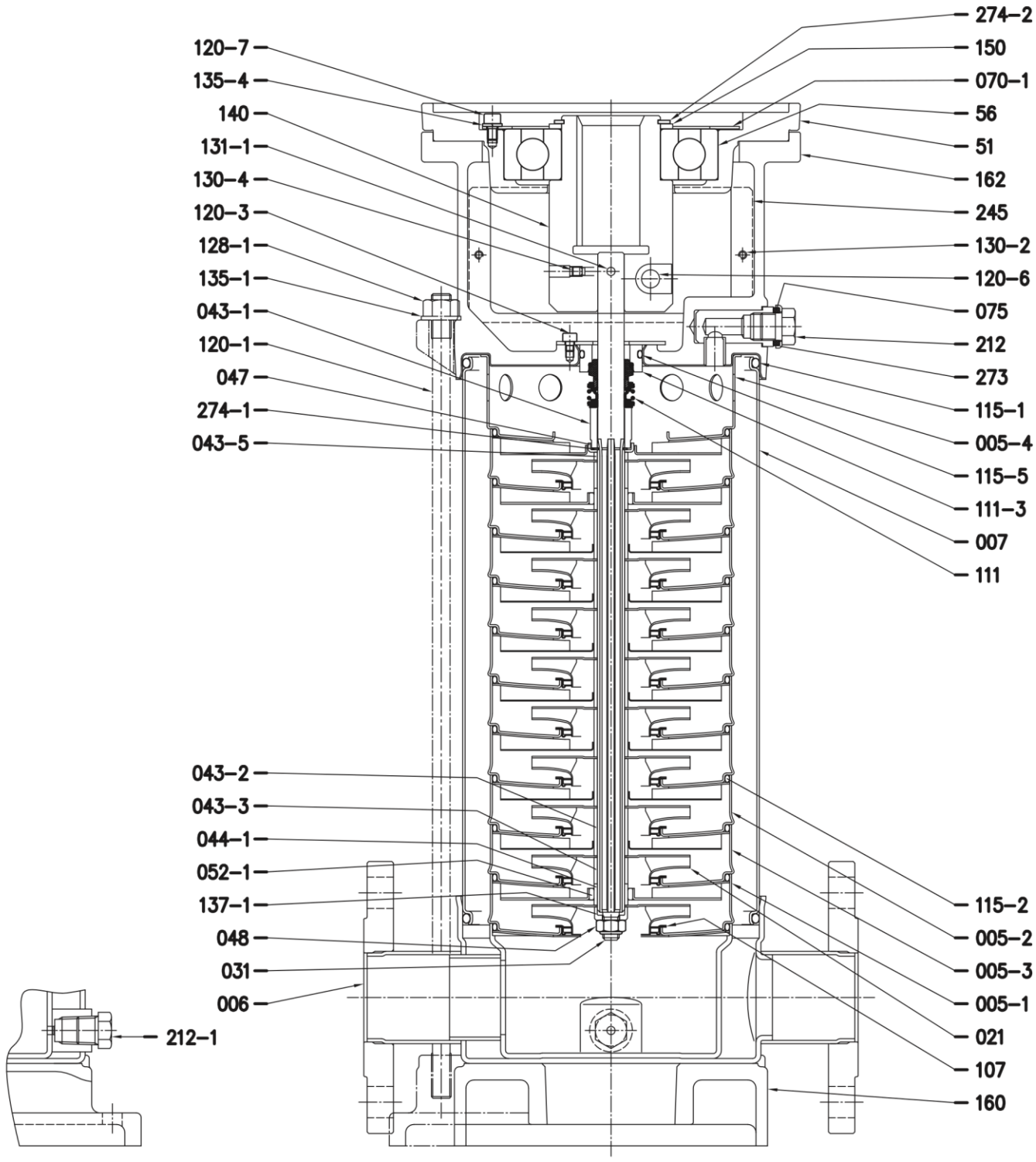
Sectional View Model RSV(L)10 4 – RSV(L)10 12



Refer to Page 24 for part description.

(For reference only, see pricing for part availability.)

Sectional View Model RSV(L)10 14 – RSV(L)10 16



Refer to Page 24 for part description.

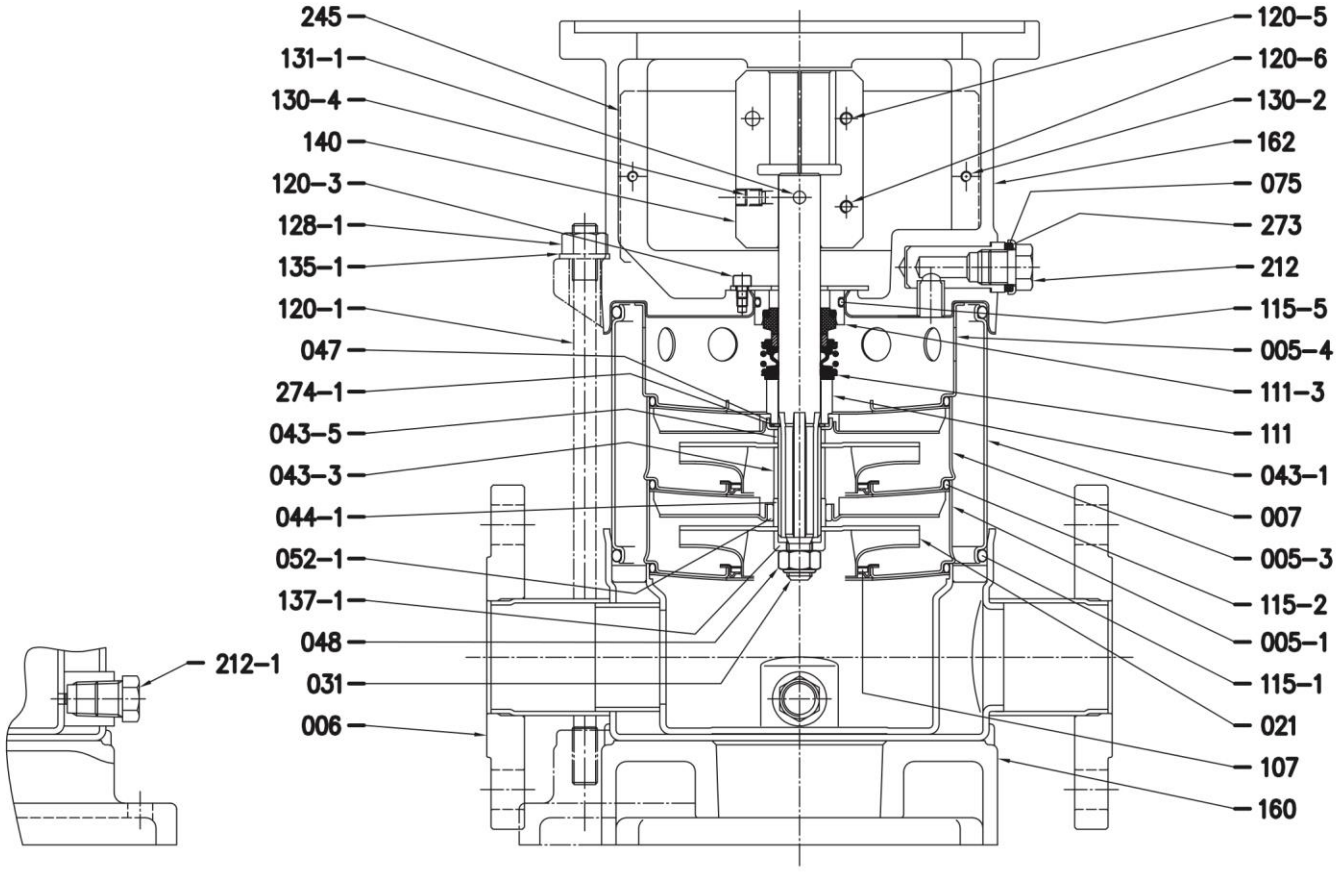
(For reference only, see pricing for part availability.)

Sectional View – Part Reference Models RSV(L)10

(For reference only, see pricing for part availability.)

Part Number	Part Description	Part Number	Part Description
005-1	Suction Casing	115-2	O-ring (Intermediate Casing)
005-2	Intermediate Casing	115-5	O-ring
005-3	Intermediate Casing Bearing	120-1	Tie Rod
005-4	Discharge Casing	120-3	Screw
006	Bottom Casing	120-5	Screw for Coupling
007	Outer Casing	120-6	Screw for Coupling RSV10 2, RSV10 3, RSV10 4 to 12 RV10 14 to 16
021	Impeller	120-7	Screw (Bearing)
031	Shaft	128-1	Nut for Tie Rod
043-1	Shaft Sleeve (Mechanical Seal)	130-2	Screw for Coupling Guard
043-2	Shaft Sleeve (Intermediate)	130-4	Setscrew
043-3	Shaft Sleeve (Bearing)	131-1	Pin for Shaft
043-5	Shaft Sleeve (Last Stage)	135-1	Washer
043-6	Shaft Sleeve (Adjustment)	135-4	Washer (Bearing)
044-1	Shaft Sleeve Bearing	137-1	Impeller Spacer
046	Split Ring (Mechanical Seal)	140	Coupling
047	Ring Holder	150	Spacer
048	Impeller Nut	160	Base
051	Motor Adaptor	162	Motor Bracket
052-1	Bearing	169	Motor Adaptor
056	Ball Bearing	212	Plug
070-1	Ring for Bearing	212-1	Plug
075	O-ring (Plug)	245	Coupling Guard
075-1	O-ring (plug)	273	Washer (Plug)
107	Liner Ring	273-1	Washer (Plug)
111	Mechanical Seal	274-1	C-Type Snap Ring (Coupling)
111-3	Mechanical Seal Seat	274-2	C-Type Snap Ring (Coupling) RSV10 4, RSV10 5 to 8, RSV10 10 to 12, RSV10 14 to 16
115-1	O-ring (Outer Casing)	274-3	C-Type Snap Ring (Bracket) RSV10 4, RSV10 5 to 8, RSV10 10 to 12

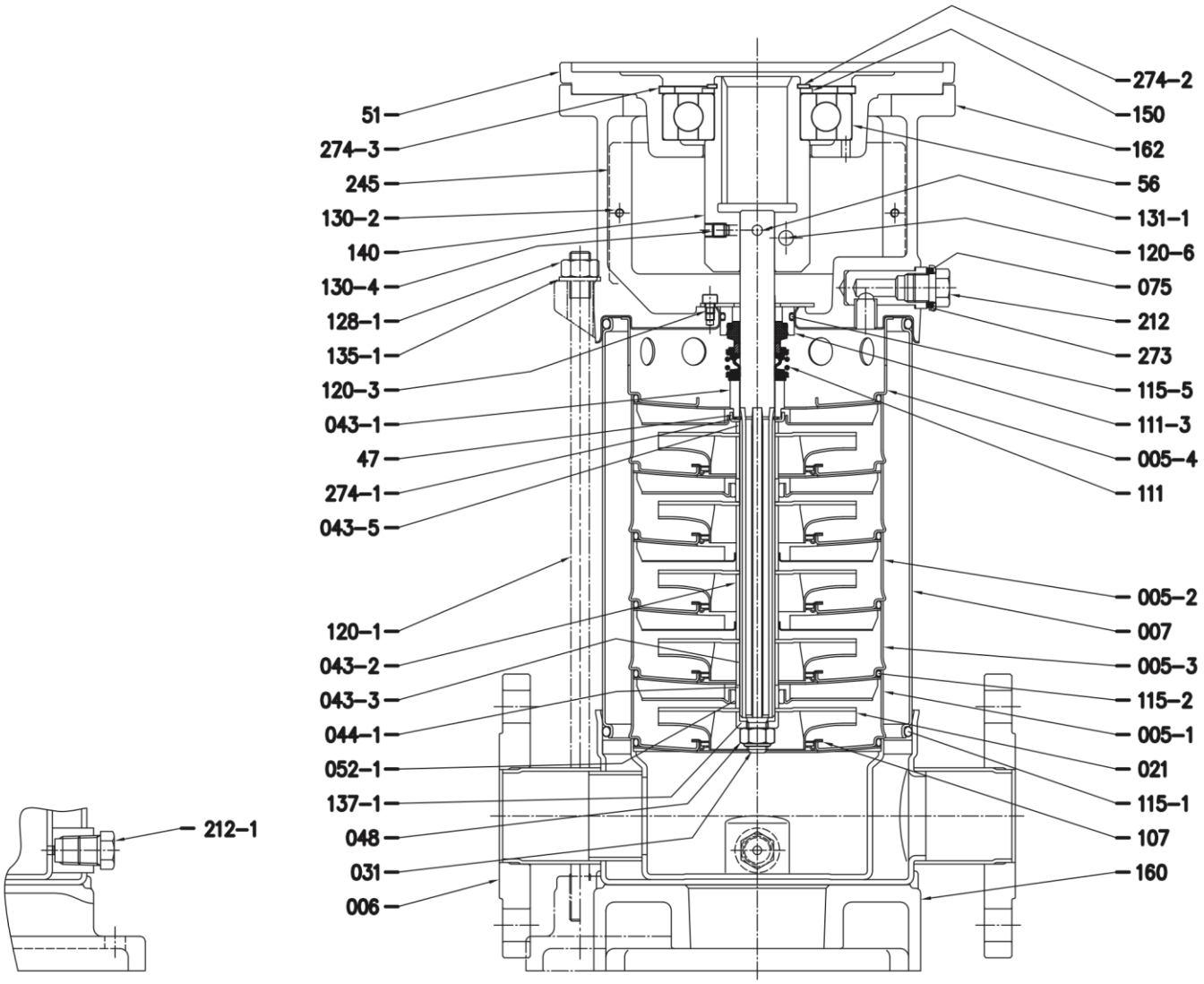
Sectional View Model RSV(L)18 2



Refer to Page 28 for part description.

(For reference only, see pricing for part availability.)

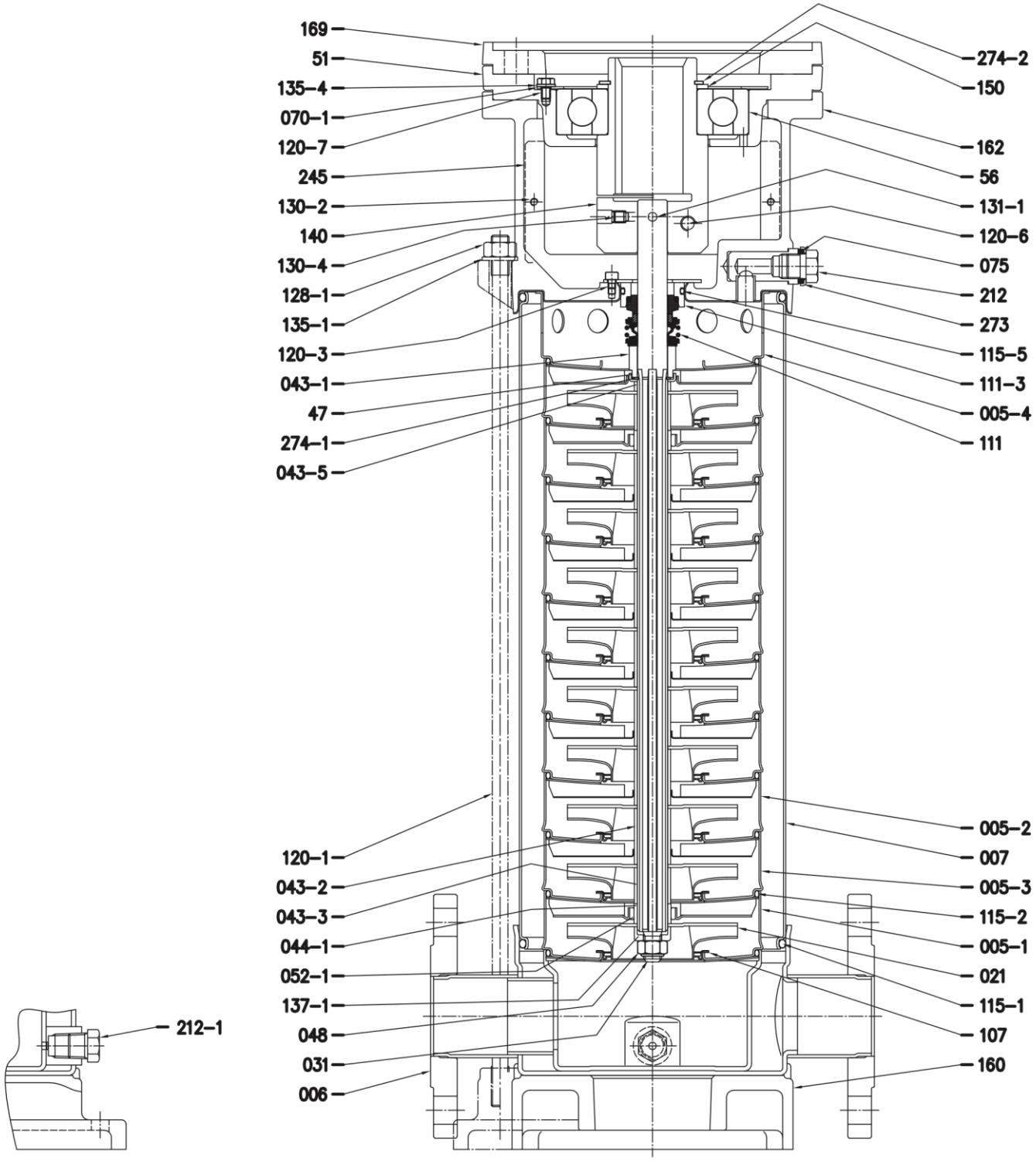
Sectional View Model RSV(L)18 3 – RSV(L)18 5



Refer to Page 28 for part description.

(For reference only, see pricing for part availability.)

Sectional View Model RSV(L)18 6 – RSV(L)18 11



Refer to Page 28 for part description.

(For reference only, see pricing for part availability.)

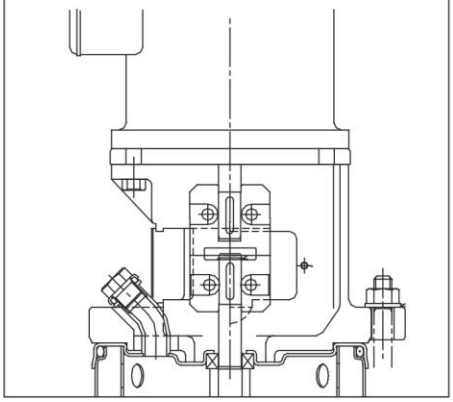
Sectional View – Part Reference Models RSV(L)18

(For reference only, see pricing for part availability.)

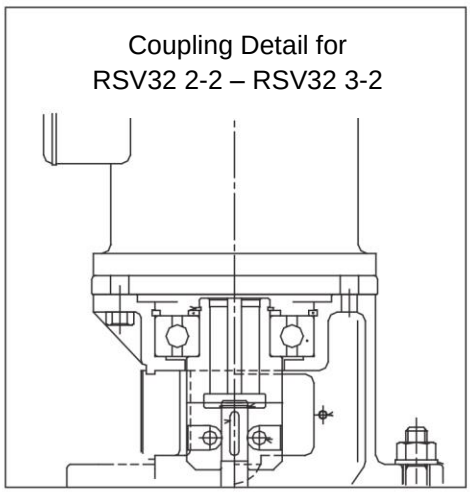
Part Number	Part Description	Part Number	Part Description
005-1	Suction Casing	115-2	O-ring (Intermediate Casing)
005-2	Intermediate Casing	115-5	O-ring
005-3	Intermediate Casing Bearing	120-1	Tie Rod
005-4	Discharge Casing	120-3	Screw
006	Bottom Casing	120-5	Screw for Coupling
007	Outer Casing	120-6	Screw for Coupling RSV18 2, RSV18 3 to 5 RV18 6 to 11
021	Impeller	120-7	Screw (Bearing)
031	Shaft	128-1	Nut for Tie Rod
043-1	Shaft Sleeve (Mechanical Seal)	130-2	Screw for Coupling Guard
043-2	Shaft Sleeve (Intermediate)	130-4	Setscrew
043-3	Shaft Sleeve (Bearing)	131-1	Pin for Shaft
043-5	Shaft Sleeve (Last Stage)	135-1	Washer
043-6	Shaft Sleeve (Adjustment)	135-4	Washer (Bearing)
044-1	Shaft Sleeve Bearing	137-1	Impeller Spacer
046	Split Ring (Mechanical Seal)	140	Coupling
047	Ring Holder	150	Spacer
048	Impeller Nut	160	Base
051	Motor Adaptor	162	Motor Bracket
052-1	Bearing	169	Motor Adaptor
056	Ball Bearing	212	Plug
070-1	Ring for Bearing	212-1	Plug
075	O-ring (Plug)	245	Coupling Guard
075-1	O-ring (plug)	273	Washer (Plug)
107	Liner Ring	273-1	Washer (Plug)
111	Mechanical Seal	274-1	C-Type Snap Ring (Coupling)
111-3	Mechanical Seal Seat	274-2	C-Type Snap Ring (Coupling) RSV18 3 to 4, RSV18 5, RSV18 6 to 10, RSV18 11
115-1	O-ring (Outer Casing)	274-3	C-Type Snap Ring (Bracket) RSV18 3 to 4, RSV18 5

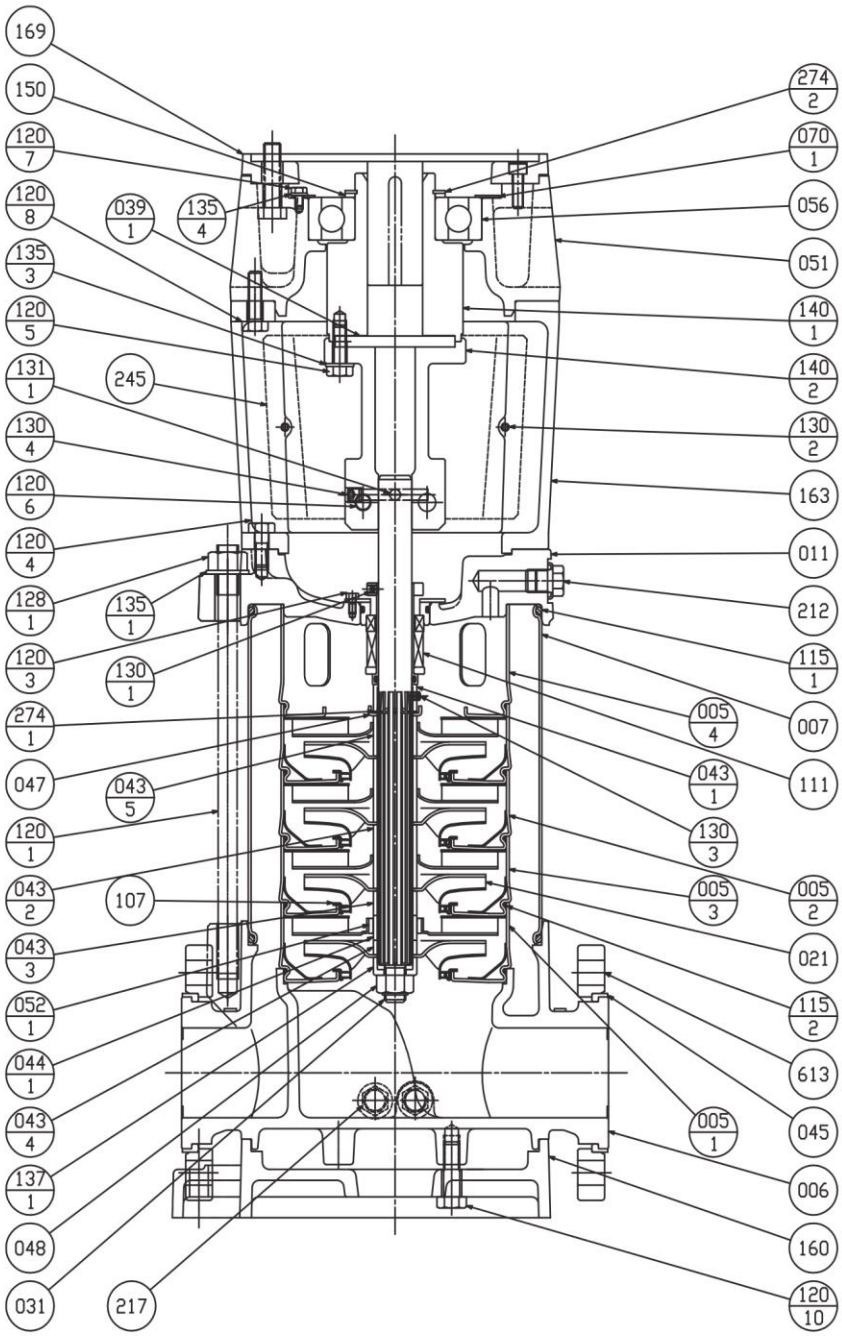
Sectional View Model RSV(G)32 & RSV(L)32

Coupling Detail for
RSV32 1



Coupling Detail for
RSV32 2-2 – RSV32 3-2





Refer to Page 30 for part description.

(For reference only, see pricing for part availability.)

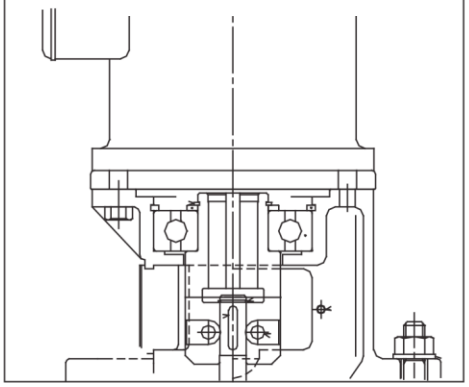
Sectional View – Part Reference Models RSV(G)32 & RSV(L)32

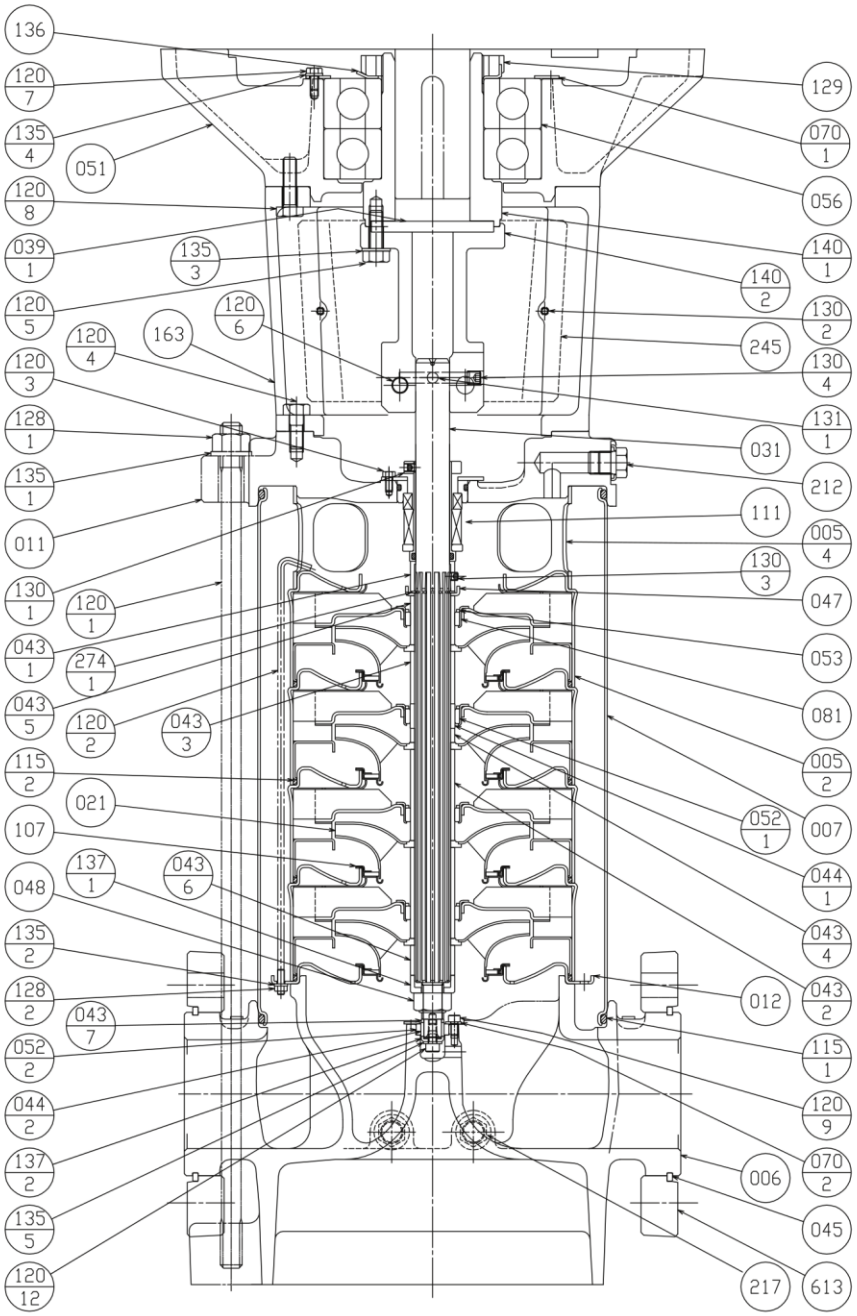
(For reference only, see pricing for part availability.)

Part Number	Part Description	Part Number	Part Description
005-1	Stage Casing (Suction)	120-4	Bolt (Casing Cover)
005-2	Stage Casing	120-5	Bolt (Coupling M-Side)
005-3	Stage Casing (Bearing)	120-6	Bolt (Coupling P-Side)
005-4	Stage Casing (Top)	120-7	Bolt (Bearing)
006	Bottom Casing	120-8	Bolt (Bearing Housing)
007	Outer Sleeve	120-10	Bolt (Base Plate)
011	Casing Cover	128-1	Nut (Tie Rod Bolt)
021	Impeller	130-1	Screw (Mechanical Seal)
031	Shaft	130-2	Screw (Coupling Guard)
039-1	Key (Coupling)	130-3	Screw (Mechanical Seal)
043-1	Shaft Sleeve (Mechanical Seal)	130-4	Screw (Coupling Pin)
043-2	Shaft Sleeve (Stage)	131-1	Pin (Shaft)
043-3	Shaft Sleeve (Bearing/Upper)	135-1	Washer (Tie Rod Bolt)
043-4	Shaft Sleeve (Bearing/Lower)	135-3	Spring Washer (Coupling Bolt M-Side)
043-5	Shaft Sleeve (Top)	135-4	Spring Washer (Bearing)
044-1	Bearing Sleeve (Stage)	137-1	Shaft End Sleeve
045	Adjusting Ring	140-1	Coupling Upper Half
047	Split Ring Retainer	140-2	Coupling Lower Half
048	Friction Nut	150	Spacer (Coupling)
051	Bearing Housing	160	Base Plate
052-1	Bearing (Stage)	163	Motor Stool
056	Ball Bearing	169	Motor Liner
070-1	Bearing Holder	212	Vent Plug (With Seal Ring)
107	Wear Ring	217	Plug (With Seal Ring)
111	Mechanical Seal (Cartridge Assembly)	245	Coupling Guard
115-1	O0ring (Outer)	274-1	C-Ring (Top)
115-2	O-ring (Stage)	274-2	C-Ring (Coupling)
120-1	Tie Rod Bolt	613	Pump Flange
120-3	Bolt (Mechanical Seal)		

Sectional View Models RSV(G)45, RSV(G)64, RSV(L)45 and RSV(L)64

Coupling Detail for
RSV45 1-1 – RSV45 1
RSV64 1-1





Refer to Page 32 for part description.

(For reference only, see pricing for part availability.)

Sectional View – Part Reference Models RSV(G)45, RSV(G)64, RSV(L)45, and RSV(L)64

(For reference only, see pricing for part availability.)

Part Number	Part Description	Part Number	Part Description
005-2	Stage Casing	120-4	Bolt (Casing Cover)
005-4	Stage Casing (Top)	120-5	Bolt (Coupling M-Side)
006	Bottom Casing	120-6	Bolt (Coupling P-Side)
007	Outer Sleeve	120-7	Bolt (Bearing)
011	Casing Cover	120-8	Bolt (Bearing Housing)
012	Suction Cover	120-9	Bolt (Bottom Bearing)
021	Impeller	120-12	Bolt (Shaft End)
031	Shaft	128-1	Nut (Tie Rod Bolt)
039-1	Key (Coupling)	128-2	Nut (Stack Bolt)
043-1	Shaft Sleeve (Mechanical Seal)	129	Bearing Nut (Coupling)
043-2	Shaft Sleeve (Stage)	130-1	Screw (Mechanical Seal)
043-3	Shaft Sleeve (Bearing/Upper)	130-2	Screw (Coupling Guard)
043-4	Shaft Sleeve (Bearing/Lower)	130-3	Screw (Mechanical Seal)
043-5	Shaft Sleeve (Top)	130-4	Screw (Coupling Pin)
043-6	Shaft Sleeve (Suction)	131-1	Pin (Shaft)
044-1	Bearing Sleeve (Stage)	135-1	Washer (Tie Rod Bolt)
045	Adjusting Ring	135-2	Spring Washer (Stack Bolt)
047	Split Ring Retainer	135-3	Spring Washer (Coupling Bolt M-Side)
048	Friction Nut	135-4	Spring Washer (Bearing)
051	Bearing Housing	135-5	Spring Washer (Shaft End)
052-1	Bearing (Stage)	136	Bearing Washer
052-2	Bearing	137-1	Shaft End Sleeve
053	Bush Holder	137-2	Shaft End Sleeve
056	Ball Bearing	140-1	Coupling Upper Half
070-1	Bearing Holder	140-2	Coupling Lower Half
070-2	Bearing Holder (Bottom Bearing)	150	Spacer (Coupling)
081	Bush	163	Motor Stool
107	Wear Ring	212	Vent Plug (With Seal Ring)
111	Mechanical Seal (Cartridge Assembly)	217	Plug (With Seal Ring)
115-1	O0ring (Outer)	245	Coupling Guard
115-2	O-ring (Stage)	274-1	C-Ring (Top)
120-1	Tie Rod Bolt	613	Pump Flange
120-3	Bolt (Mechanical Seal)		

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