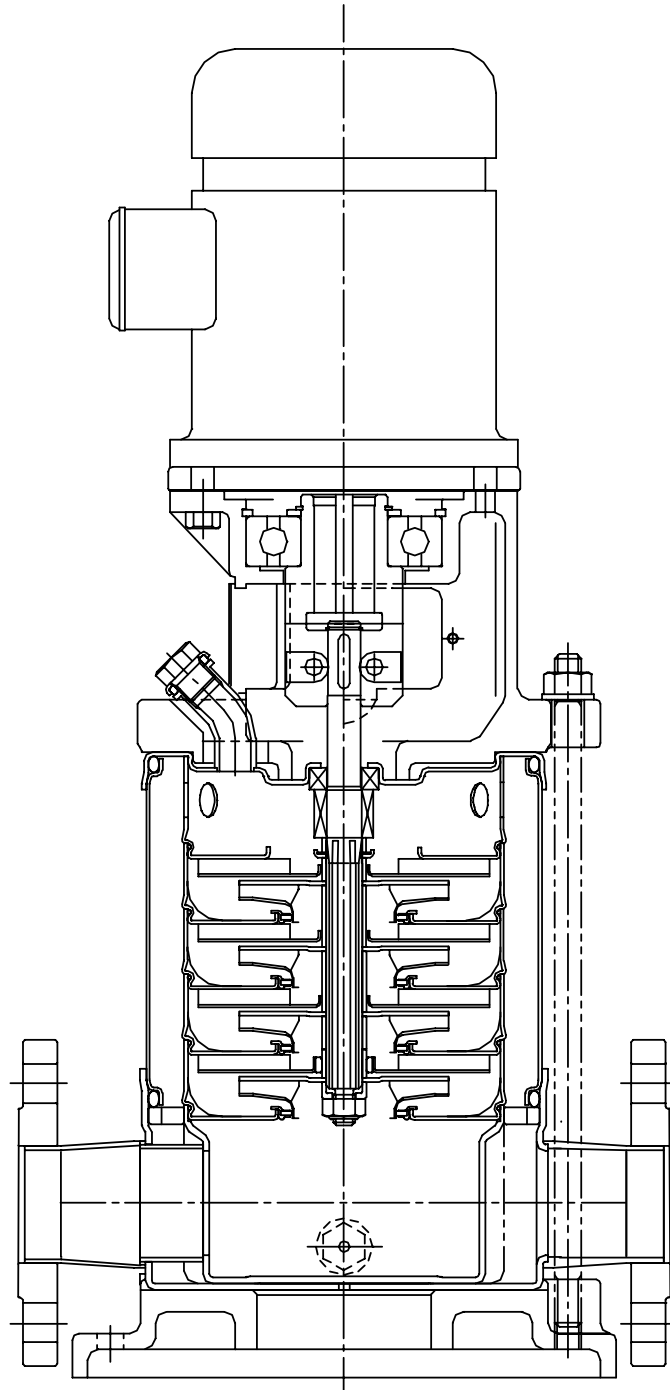


INSTALLATION AND OPERATING INSTRUCTIONS

COMMERCIAL PUMPS

SERIES 4700 VERTICAL MULTISTAGE PUMP



General Information and Warnings

- 1.1 The user must comply with all local and national regulations that apply to the installation and operation of electric pumps. Operation of the VMS pump must be compatible with the construction of the pump as shown in the **SPECIFICATION** section of these instructions.

Warning



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



Any electrical work should be preformed by a licensed electrician.

- 1.2 VMS 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.

Specifications

⚠ CAUTION

Be careful not to exceed the given specifications in the use of your products.

Models VMS 03, 05, 10, 18, 32, 45, 64

Size	VMS 03, 05, 10, 18		VMS 32, 45, 64	
Suction	ANSI raised face 1¼" for VMS 03 and 05 2" for VMS 10 and 18		ANSI raised face 2½" for VMS 32 3" for VMS 45 4" for VMS 64	
Discharge	ANSI raised face 1¼" for VMS 03 and 05 2" for VMS 10 and 18		ANSI raised face 2½" for VMS 32 3" for VMS 45 4" for VMS 64	
Range of HP	½ to 25hp		3 to 50hp	
Range of Performance	at 3450 rpm	at 2850 rpm	at 3450 rpm	at 2850 rpm
Capacity	4 to 118 gpm	3 to 96 gpm	66 to 340 gpm	50 to 330 gpm
Head	27 to 830 feet	20 to 580 feet	44 to 930 feet	40 to 640 feet
Liquid handled	Clean water +5° to +248°F (-15° to 120°C) 360 PSI (25 Bar) max		Clean water +5° to +248°F (-15° to 120°C) to 430 PSI (30 Bar) max	
Materials	AISI 304 AISI 304 AISI 304 AISI 304 AISI 304 AISI 316 PTFE/AISI 316		AISI 304 AISI 304 Cast Iron Cast Iron AISI 304 AISI 316 PTFE/AISI 316	
Impeller	AISI 304		AISI 304	
Intermediate casing	AISI 304		AISI 304	
Bottom casing	AISI 304		Cast Iron	
Casing cover	AISI 304		Cast Iron	
Outer casing	AISI 304		AISI 304	
Shaft	AISI 316		AISI 316	
Liner ring	PTFE/AISI 316		PTFE/AISI 316	
Motor bracket	Cast iron/304		Cast Iron	
Base	Cast iron/304		Cast Iron	
Pump Bearing	Sealed ball bearing/tungsten carbide		Sealed ball bearing/tungsten carbide	
Shaft Seal	Silicon/Carbide/Carbon/FPM		Silicon/Carbide/Carbon/FPM	
Mechanical seal	Silicon/Carbide/Carbon/FPM		Silicon/Carbide/Carbon/FPM	
Motor	NEMA C/TC/TSC frame	NEMA C/TC/TSC frame	NEMA TC/TSC frame	NEMA TC/TSC frame
Type	60 Hz, 3450 RPM (2 poles)	50Hz, 2850 (2 poles)	60 Hz, 3450 RPM (2 poles)	50Hz, 2850 (2 poles)
Speed	208-230/460/575V	380/415V	208-230/460/575V	380/415V
Three Phase				
Direction of Rotation	Clockwise when viewed from motor end.			
Test standard	ISO 9906 annex A			

Pump Checks and Installation

- 3.1 Always check to make sure pump was not damaged in shipment before accepting delivery. If damage is evident, a claim should be filed with the carrier at that time.
- 3.2 Always check the pump label against the requirement to make sure you are installing the proper pump specified for the job.
- 3.3 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.

⚠ CAUTION

On three phase motor installations, 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 instructions on motor name plate.

- 3.4 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.
- 3.5 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 than the respective pump port sizes.

- 3.6 Isolation valves should be installed on both the suction and discharge side of the pump in the event service of the pump is required.
- 3.7 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.

- 3.8 If the installation of the motor is necessary, refer to section 5 for instructions.

! CAUTION

EXTREME CAUTION SHOULD BE USED IF PRIMING THE PUMP IN THIS MANNER IN A HOT WATER APPLICATION.

3.9 Priming the Pump

Completely prime the pump by removing the vent plug (212).

Using a funnel, fill the pump body with water until it overflows and replace plug.

Alternatively for installations with positive suction heads, close the discharge valve and remove the vent plug.

Open the suction valve until liquid flows out of the vent plug opening and then replace the vent plug securely and open discharge valve.

- 3.10** It is recommended that a bleed valve be installed in 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.

- 3.11** Pipe, valves and fittings must have a pressure rating equal to or greater than the maximum system pressure.

- 3.12** 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.

Minimum flow is required for proper cooling and lubrication of the pump without which, damage and premature failure will occur.

Minimum Pumping Rate

Model	60Hz Minimum Flow Rate	50Hz Minimum Flow Rate
VMS 03	3.3 GPM	3 GPM
VMS 05	6.7 GPM	5 GPM
VMS 10	8 GPM	7 GPM
VMS 18	11 GPM	8 GPM
VMS 32	61 GPM	51 GPM
VMS 45	112 GPM	93 GPM
VMS 64	149 GPM	123 GPM

Operation

- 4.1 Make sure that the system is properly installed and primed as instructed in Pump Checks and Installation section.
- 4.2 Check that the suction valve is fully open and that the discharge valve is in its open position.

! CAUTION

Prolonged operation of the VMS pump with either valve in the closed position will cause severe damage to the pump.

- 4.3 Check to make sure all electric connections are correct.

! WARNING

OPERATING THE PUMP WITHOUT THE GUARDS IN PLACE CAN CAUSE PHYSICAL INJURY.

- 4.4 Apply power to the motor.

Check motor rotation. Rotation should be clockwise when viewed from the top.

Check that the noise, vibration, pressure, voltage and amps are at normal levels.

! WARNING

VMS 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.

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

Maintenance and Service

For maintenance and service for each specific VMS model, please refer to the section as indicated in the table below.

Pump Model	Install Motor	Remove Motor from Pump	Replace Mechanical Seal
VMS 0302 – VMS 0312	5A	6A	7A
VMS 0313 – VMS 0318	5B	6B	7B
VMS 0502 – VMS 0506	5A	6A	7A
VMS 0507 – VMS 0516	5B	6B	7B
VMS 1002 – VMS 1003	5A	6A	7A
VMS 1004 – VMS 1016	5B	6B	7B
VMS 1802	5A	6A	7A
VMS 1803 – VMS 1811	5B	6B	7B
VMS 3201	5A	6A	7A
VMS 3202-2 – VMS 3203-2	5B	6B	7B
VMS 3203 – VMS 3210-1	5B	6B	7C
VMS 4501-1 – VMS 4501	5B	6B	7B
VMS 4502 – VMS 4507-2	5B	6B	7C
VMS 6401-1	5B	6B	7B
VMS 6401 – VMS 6404	5B	6B	7C

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.

5A Procedure for mounting motors for the following models:

VMS 0302 – VMS 0312 VMS 1002 – VMS 1003
VMS 0502 – VMS 0506 VMS 1802
VMS 3201

- (1) Follow general safety and electrical instructions on the motor name plate.
- (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 motor into place. If necessary rotate the motor so that the mounting bolt holes line up with the corresponding holes in the pump bracket.
- (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. Now 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 re install the coupling guards.

5B Procedure for mounting motors for the following models:

VMS 0313 – VMS 0318 VMS 32 All Sizes (Except VMS 3201)
VMS 0507 – VMS 0517 VMS 45 All Sizes
VMS 1004 – VMS 1016 VMS 64 All Sizes
VMS 1803 – VMS 1811

- (1) Follow general safety and electrical instructions on the motor name plate.
- (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 keyway.
- (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.

Removing Motor from Complete Pump

! WARNING

For any removal or installation procedures, always disconnect the power first.

Failure to observe this precaution can result in serious accidents.

! CAUTION

Extreme caution should be exercised in this operation since the pump may be under system pressure at this point. Before proceeding with the removal of the motor be sure to relieve the system pressure in the pump.

Use a pressure bleed valve in hot water applications where water temperature could cause physical injury.

6A Removing the motor from models:

VMS 0302 – VMS 0312 VMS 1002 – VMS 1003
VMS 0502 – VMS 0506 VMS 1802
VMS 3201

- (1) Following 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 the 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 raise the pump into the air, dropping the pump end can cause damage. Fix the pump base to the floor or bench and lift motor again.



6B Removing the motor from models:

VMS 0313 – VMS 0318	VMS 32 All Sizes (Except VMS 3201)
VMS 0507 – VMS 0517	VMS 45 All Sizes
VMS 1004 – VMS 1016	VMS 64 All Sizes
VMS 1803 – VMS 1811	

- (1) Following 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 motor again.

General Pump Maintenance and Disassembly Instructions

Disassembly Tips

- 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”.
- Next, make corresponding alignment markings that indicate where the bottom of the can and lower casing assembly meet. Also make another marking to indicate where the top of the can and lower portion of the cast iron motor support meet.
- Always inspect for damage of other components and clean any debris that you may find during maintenance procedures.
- Cross sectional views of the pumps are a good reference for these procedures and can be found starting on page 15.

7A Replacing the Mechanical Seal in models:

VMS 0302 – VMS 0312	VMS 1002 – VMS 1003
VMS 0502 – VMS 0506	VMS 1802
VMS 3201	

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

BEFORE PROCEEDING TO STEP 2, PLEASE READ THE CAUTION BLOCK BELOW.

! CAUTION

- Extreme caution should be exercised in this operation since the pump is under system pressure at this point.
- Relieve 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 or drain plugs.
- (3) Remove the motor as detailed in Section 6A.
- (4) Remove the pump coupling bolts (120-5) and remove the coupling.
- (5) Remove 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: VMS 3201 will have a cartridge type 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 the o-rings (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 housing (111-3), be sure that 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 groove 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 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, page 14.
- (20) Slide the stationary seal seat (111-3) assembly over the shaft and into place. Secure the assembly by installing and tightening the 4 socket head screws (120-3).
- (21) Re-install the shaft pin (131-1).
- (22) Re-install 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 5A.

7B Replacing the Mechanical Seal:

VMS 0313 – VMS 0318	VMS 3202-2 – VMS 3203-2
VMS 0507 – VMS 0516	VMS 4501-1 – VMS 4501
VMS 1004 – VMS 1016	VMS 6401-1
VMS 1803 – VMS 1811	

- (1) For instructions on removing the motor from the pump see section 6B.
- (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 adapter 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 adapter (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: VMS models 32, 45 and 64 listed in section 7B 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.
Do not remove the shaft sleeve that is below the rotating assembly.
- (9) Remove the outer casing (007), remove the o-rings (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 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.
- (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, page 14.
- (19) 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: VMS 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 adapter (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.

- (21) Next, reinstall the shaft pin (131-1) 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, page 14.
- (22) Refer to Section 5B for motor installation instructions.

7C Replacing the Mechanical Seal

VMS 3203 – VMS 3210-1
VMS 4502-1 – VMS 4507-2
VMS 6401 – VMS 6404

- (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 out of the pump.
- (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. Re-install 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 (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 keyway 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.
- (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.

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 5B for motor installation.

Torque Specifications

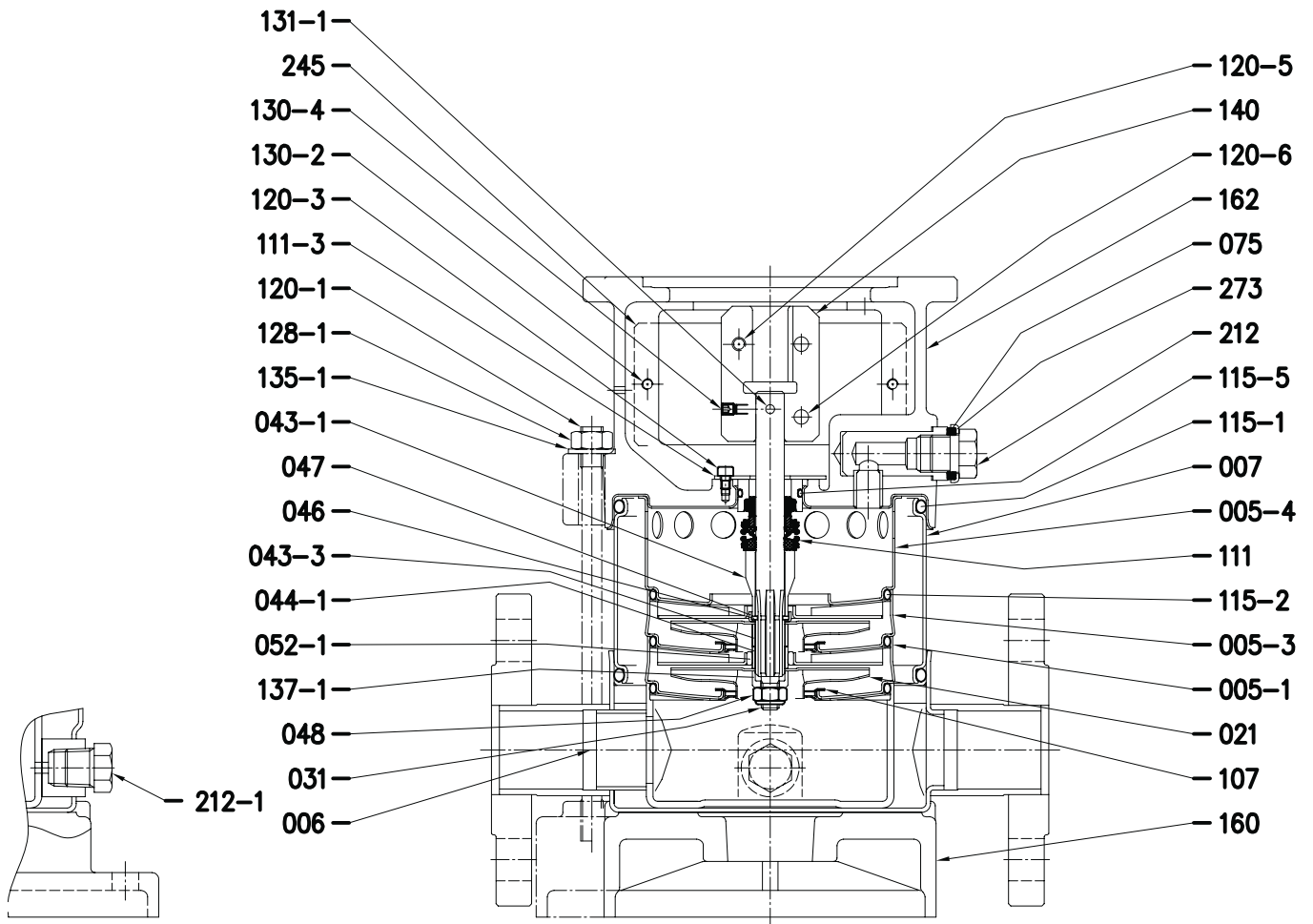
Tie Rods

Model	Thread Size		
VMS 03	M10	10 Ft lbs	13 N-m
VMS 05			
VMS 10	M12	19 Ft lbs	25 N-m
VMS 18			
VMS 32	M16	45 Ft lbs	61 N-m
VMS 45			
VMS 64			

Coupling Bolts

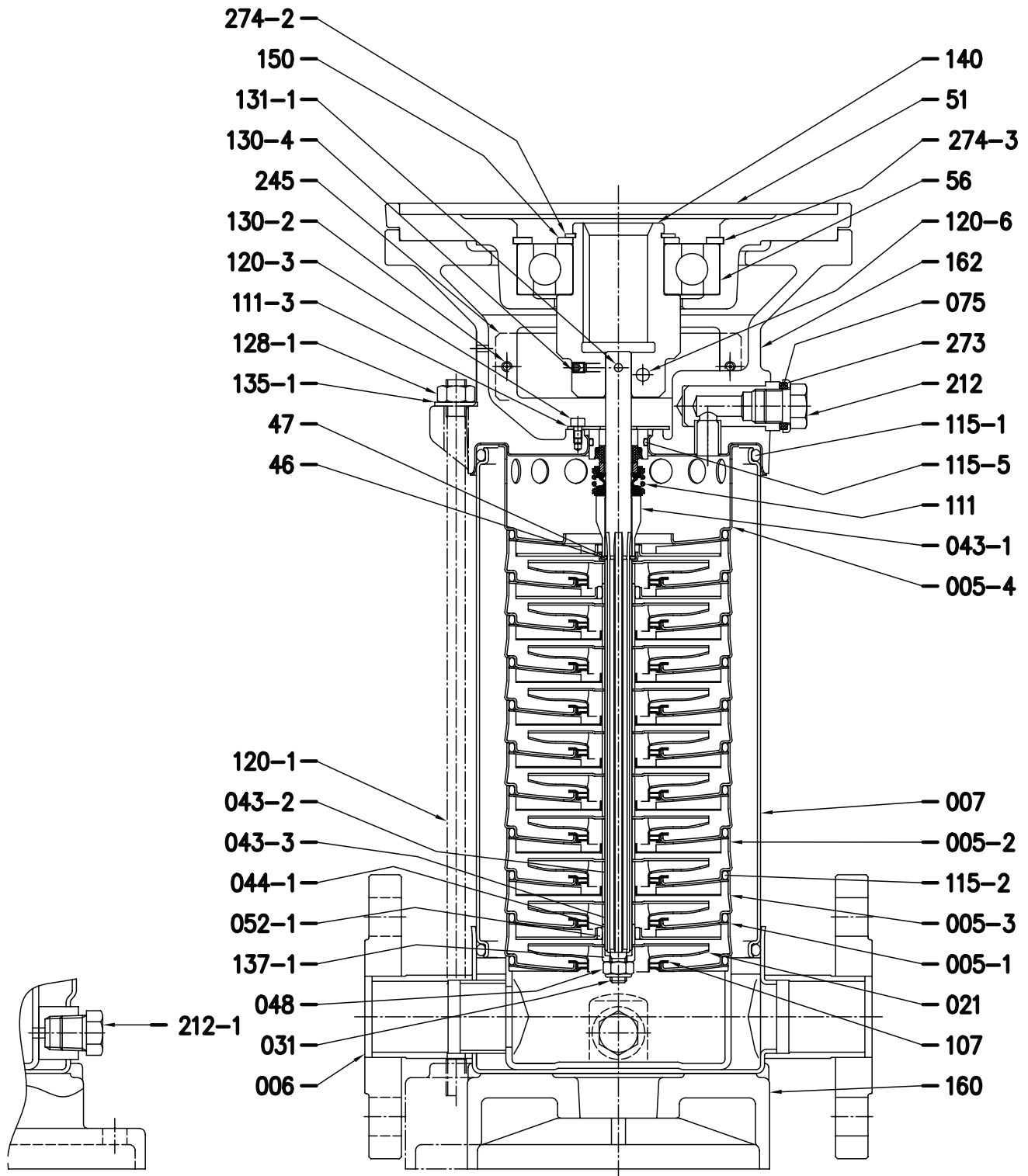
Model	Drawing Reference		120-5		120-6	
	Bolt Size				Bolt Size	
VMS 03	M6	6 Ft lbs	8.5 N-m	M6	6 Ft lbs	8.5 N-m
VMS 05						
VMS 1002 – VMS 1003	M6	6 Ft lbs	8.5 N-m	M6	6 Ft lbs	8.5 N-m
VMS 1004 – VMS 1012				M8	15 Ft lbs	20 N-m
VMS 1013 – VMS 1016				M10	30 Ft lbs	40 N-m
VMS 1802	M6	6 Ft lbs	8.5 N-m	M6	6 Ft lbs	8.5 N-m
VMS 1803 – VMS 1805				M8	15 Ft lbs	20 N-m
VMS 1806 – VMS 1811				M10	30 Ft lbs	40 N-m
VMS 3201	M6	6 Ft lbs	8.5 N-m	M6	6 Ft lbs	8.5 N-m
VMS 3202-2 – VMS 3203-2				M8	15 Ft lbs	20 N-m
VMS 3203 – VMS 3210-1	M10	30 Ft lbs	40 N-m	M12	50 Ft lbs	68 N-m
VMS 4501-1 – VMS 4501				M8	15 Ft lbs	20 N-m
VMS 4502-1 – VMS 4507-2	M10	30 Ft lbs	40 N-m	M12	50 Ft lbs	68 N-m
VMS 6401-1				M8	15 Ft lbs	20 N-m
VMS 6401-0 – VMS 6404-0	M10	30 Ft lbs	40 N-m	M12	50 Ft lbs	68 N-m

Sectional View
Models VMS 0302 – VMS 0312



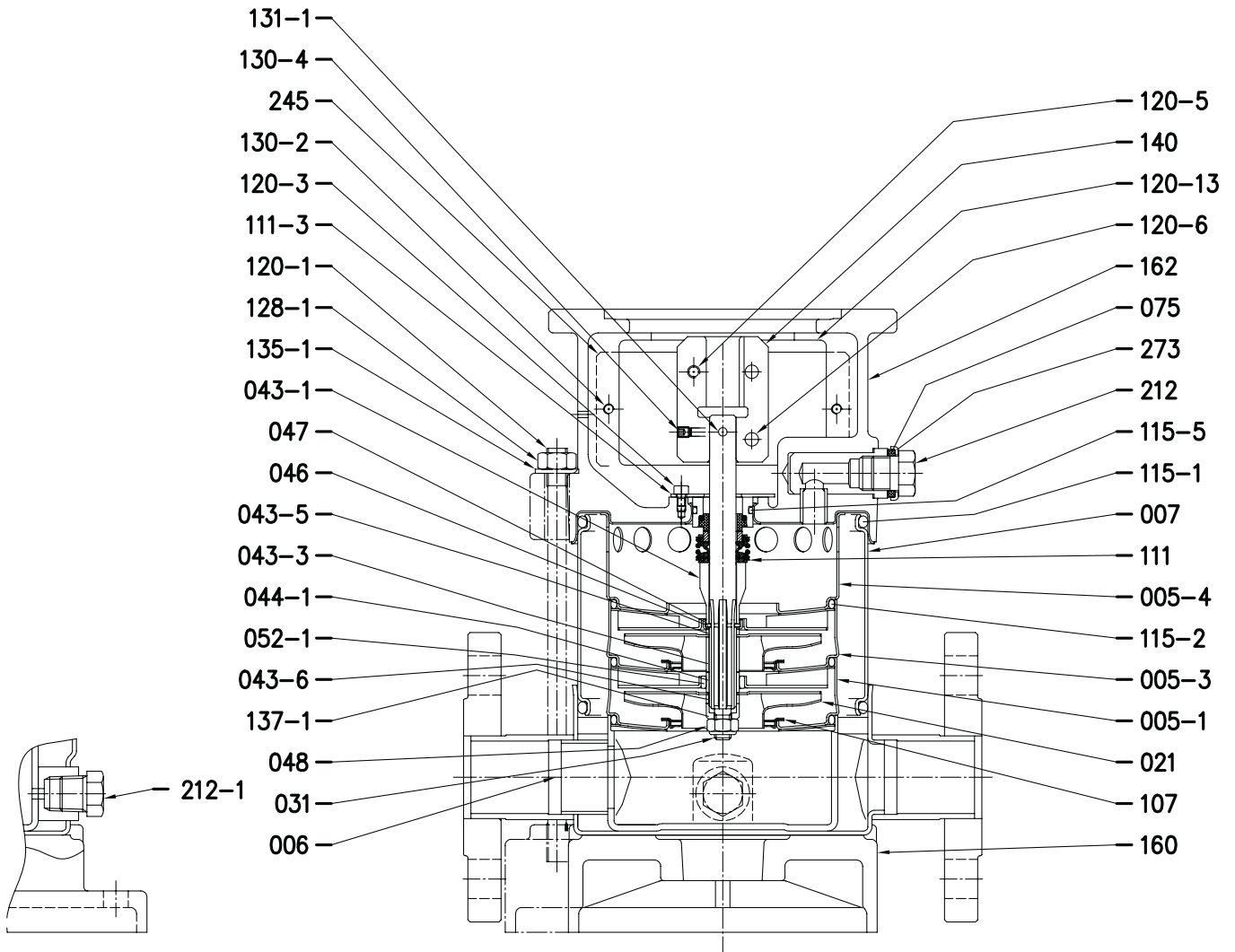
Refer to page 19 for material details.
(For reference only.)

Sectional View
Models VMS 0313 – VMS 0318



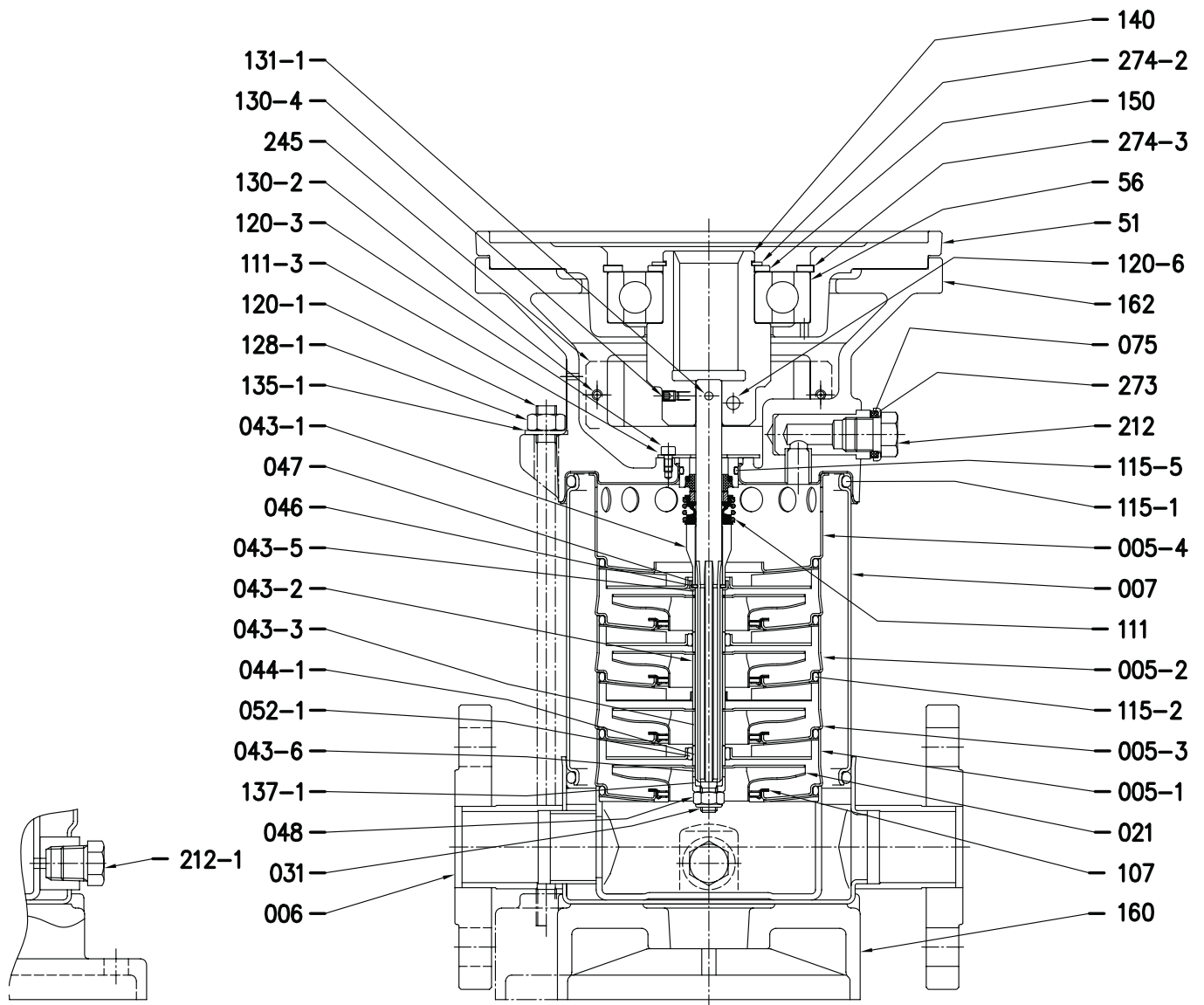
Refer to page 19 for material details.
(For reference only.)

Sectional View
Models VMS 0502 – VMS 0506



Refer to page 19 for material details.
(For reference only.)

Sectional View
Models VMS 0507 – VMS 0516



Refer to page 19 for material details.
(For reference only.)

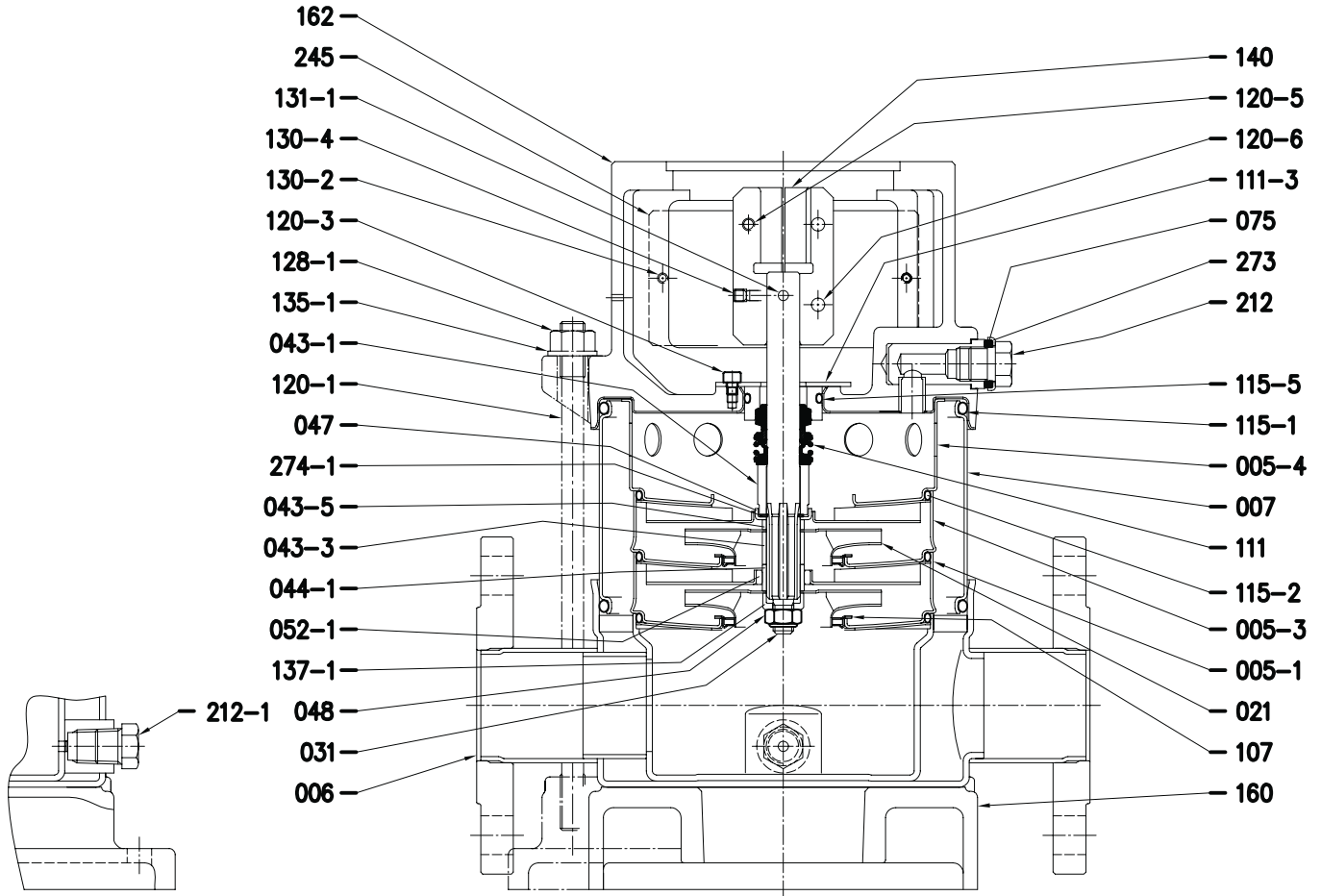
Sectional View – Part reference

Models **VMS 03**
VMS 05

No.	Part Name	Material
005-1	Suction casing	EN 1.4301 (ANSI 304)
005-2	Intermediate casing	EN 1.4301 (ANSI 304)
005-3	Intermediate casing bearing	EN 1.4301 (ANSI 304)
005-4	Discharge casing	EN 1.4301 (ANSI 304)
006	Bottom casing	EN 1.4301 (ANSI 304)
007	Outer casing	EN 1.4301 (ANSI 304)
021	Impeller	EN 1.4301 (ANSI 304)
031	Shaft	EN 1.4401 (ANSI 316)
043-1	Shaft sleeve (mechanical seal)	EN 1.4301 (ANSI 304)
043-2	Shaft sleeve (intermediate)	EN 1.4301 (ANSI 304)
043-3	Shaft sleeve (bearing)	EN 1.4301 (ANSI 304)
043-5	Shaft sleeve (last stage)	EN 1.4301 (ANSI 304)
043-6	Shaft sleeve (adjustment)	EN 1.4301 (ANSI 304)
044-1	Shaft sleeve bearing	Tungsten carbide
046	Split ring (mechanical seal)	EN 1.4301 (ANSI 304)
047	Ring holder	EN 1.4301 (ANSI 304)
048	Impeller nut	A2-70 UNI 7323 with inox insert
051	Motor adapter	Cast iron EN-GJL-200-EN 1561
052-1	Bearing	Tungsten carbide
056	Ball bearing	
070-1	Ring of bearing	EN 1.4301 (ANSI 304)
075	O-ring (plug)	FPM
075-1	O-ring (plug)	FPM
107	Liner ring	PTFE/EN 1.4401 (ANSI 316)
111	Mechanical seal	Silicon carbide/Carbon/FPM
111-3	Mechanical seal seat	EN 1.4301 (ANSI 304)
115-1	O-ring (outer casing)	FPM
115-2	O-ring (intermediate casing)	FPM
115-5	O-ring	FPM
120-1	Tie rod	Zincate steel
120-3	Screw	A2-70 UNI 7323
120-5	Screw for coupling	Zincate steel 8.8 strength class ISO 898/1
120-6	Screw for coupling	Zincate steel 8.8 strength class ISO 898/1
128-1	Nut for tie rod	Zincate steel
130-2	Screw for coupling guard	A2-70 UNI 7323
130-4	Set-screw	Carbon steel
131-1	Pin for shaft	Carbon steel
135-1	Washer	Zincate steel
135-4	Washer (bearing)	Carbon steel
137-1	Impeller spacer	EN 1.4301 (ANSI 304)
140	Coupling	Brass OT 58 UNI 5705
150	Spacer	Carbon steel
160	Base	Cast iron EN-GJL-200-EN 1561
162	Motor bracket	Cast iron EN-GJL-200-EN 1561 + EN 1.4301 (ANSI 304)
169	Motor adapter	Cast iron EN-GJL-200-EN 1561
212	Plug	EN 1.4301 (ANSI 304)
212-1	Plug	EN 1.4301 (ANSI 304)
245	Coupling gaurd	EN 1.4301 (ANSI 304)
273	Washer (plug)	EN 1.4301 (ANSI 304)
273-1	Washer (plug)	EN 1.4301 (ANSI 304)
274-2	C-type snap ring (coupling)	VMS 0313, VMS 0507, 08 VMS 0315, 18, VMS 0510 – 16 Carbon steel TC 80
274-3	C-type snap ring (bracket)	VMS 0313, VMS 0507, 08 VMS 0315, 18, VMS 0510 – 16 Carbon steel TC 80

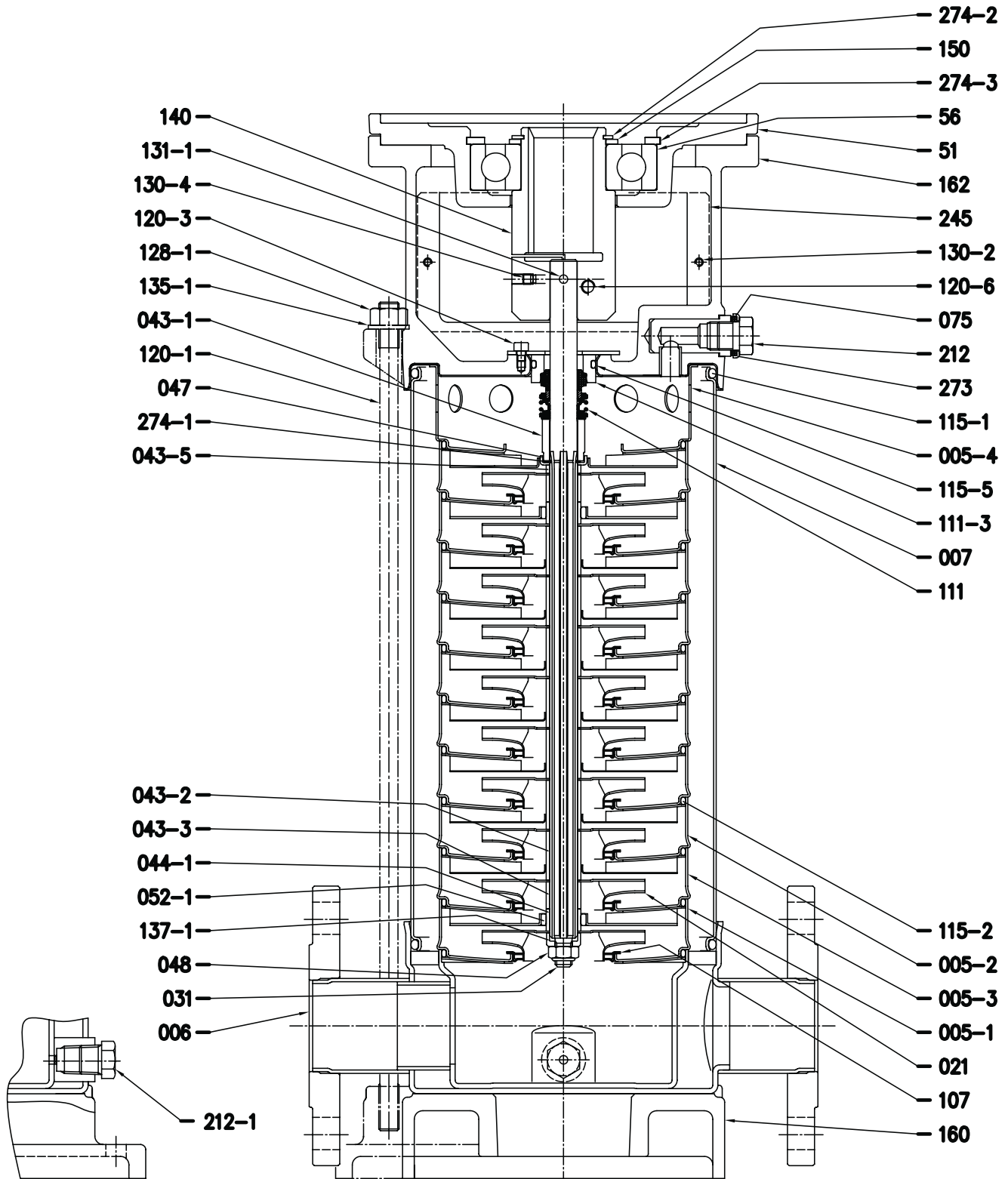
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Sectional View
Models VMS 1002 – VMS 1003



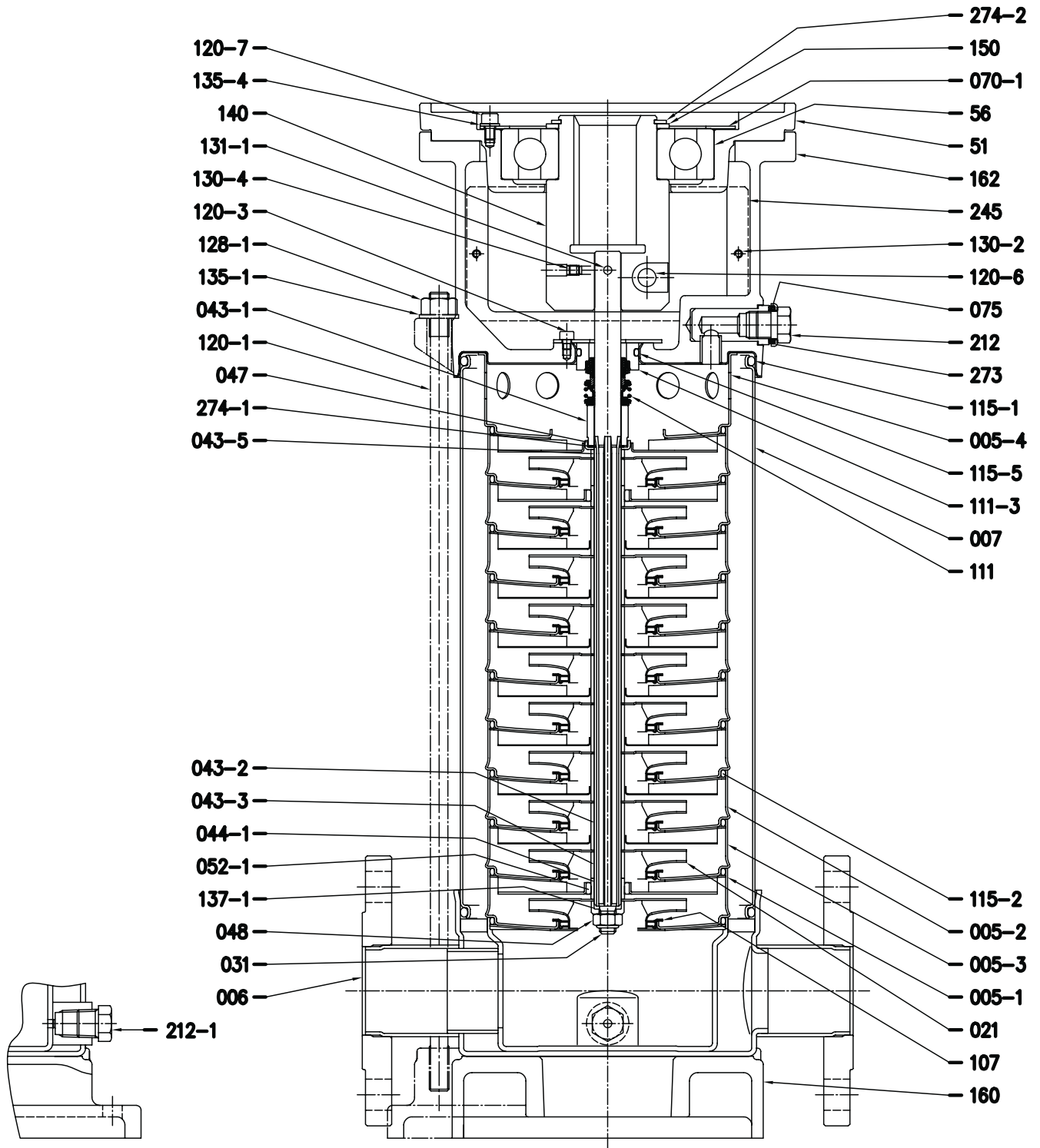
Refer to page 23 for material details.
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Sectional View
Models VMS 1004 – VMS 1012



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(For reference only.)

Sectional View
Models VMS 1014 – VMS 1016



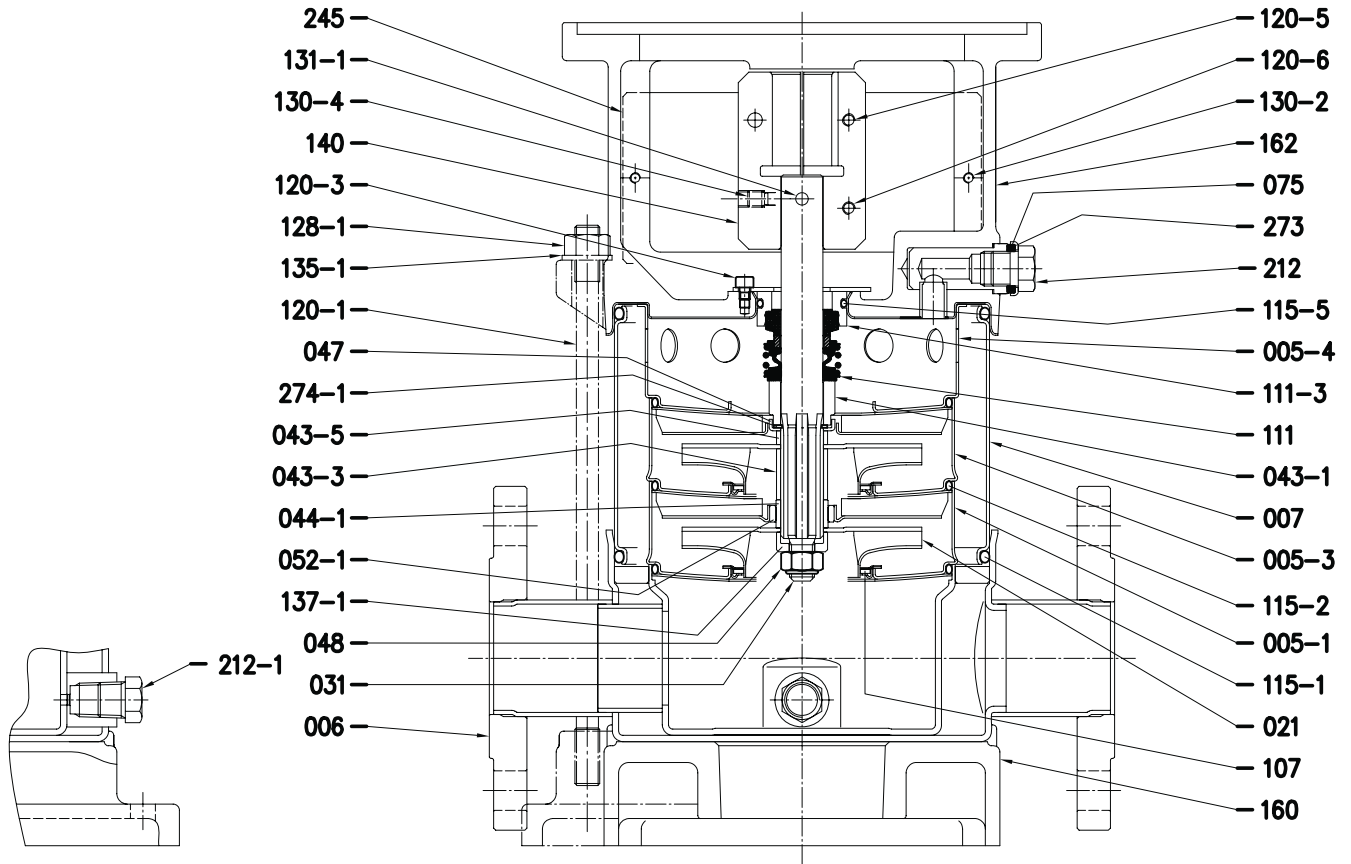
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(For reference only.)

Sectional View – Part reference Model VMS 10

No.	Part Name	Material
005-1	Suction casing	EN 1.4301 (ANSI 304)
005-2	Intermediate casing	EN 1.4301 (ANSI 304)
005-3	Intermediate casing bearing	EN 1.4301 (ANSI 304)
005-4	Discharge casing	EN 1.4301 (ANSI 304)
006	Bottom casing	EN 1.4301 (ANSI 304)
007	Outer casing	EN 1.4301 (ANSI 304)
021	Impeller	EN 1.4301 (ANSI 304)
031	Shaft	EN 1.4401 (ANSI 316)
043-1	Shaft sleeve (mechanical seal)	EN 1.4301 (ANSI 304)
043-2	Shaft sleeve (intermediate)	EN 1.4301 (ANSI 304)
043-3	Shaft sleeve (bearing)	EN 1.4301 (ANSI 304)
043-5	Shaft sleeve (last stage)	EN 1.4301 (ANSI 304)
043-6	Shaft sleeve (adjustment)	EN 1.4301 (ANSI 304)
044-1	Shaft sleeve bearing	Tungsten carbide
046	Split ring (mechanical seal)	EN 1.4301 (ANSI 304)
047	Ring holder	EN 1.4301 (ANSI 304)
048	Impeller nut	A2-70 UNI 7323 with inox insert
051	Motor adapter	Cast iron EN-GJL-200-EN 1561
052-1	Bearing	Tungsten carbide
056	Ball bearing	
070-1	Ring of bearing	EN 1.4301 (ANSI 304)
075	O-ring (plug)	FPM
075-1	O-ring (plug)	FPM
107	Liner ring	PTFE/EN 1.4401 (ANSI 316)
111	Mechanical seal	Silicon carbide/Carbon/FPM
111-3	Mechanical seal seat	EN 1.4301 (ANSI 304)
115-1	O-ring (outer casing)	FPM
115-2	O-ring (intermediate casing)	FPM
115-5	O-ring	FPM
120-1	Tie rod	Zincate steel
120-3	Screw	A2-70 UNI 7323
120-5	Screw for coupling	Zincate steel 8.8 strength class ISO 898/1
120-6	Screw for coupling VMS 1002, VMS 1003 VMS 1004 to 12 VMS 1014 to 16	Zincate steel 8.8 strength class ISO 898/1
120-7	Screw (bearing)	Zincate steel 8.8 strength class ISO 898/1
128-1	Nut for tie rod	Zincate steel
130-2	Screw for coupling guard	A2-70 UNI 7323
130-4	Set-screw	Carbon steel
131-1	Pin for shaft	Carbon steel
135-1	Washer	Zincate steel
135-4	Washer (bearing)	Carbon steel
137-1	Impeller spacer	EN 1.4301 (ANSI 304)
140	Coupling	Brass OT 58 UNI 5705
150	Spacer	Carbon steel
160	Base	/
162	Motor bracket	Cast iron EN-GJL-200-EN 1561 + EN 1.4301 (ANSI 304)
169	Motor adapter	Cast iron EN-GJL-200-EN 1561
212	Plug	EN 1.4301 (ANSI 304)
212-1	Plug	EN 1.4301 (ANSI 304)
245	Coupling gaurd	EN 1.4301 (ANSI 304)
273	Washer (plug)	EN 1.4301 (ANSI 304)
273-1	Washer (plug)	EN 1.4301 (ANSI 304)
274-1	C-type snap ring (coupling)	EN 1.4301 (ANSI 304)
274-2	C-type snap ring (coupling) VMS 1004 VMS 1005 to 08 VMS 1010 to 12 VMS 1014 to 16	Carbon steel TC 80
274-3	C-type snap ring (bracket) VMS 1004 VMS 1005 to 08 VMS 1010 to 12	Carbon steel TC 80

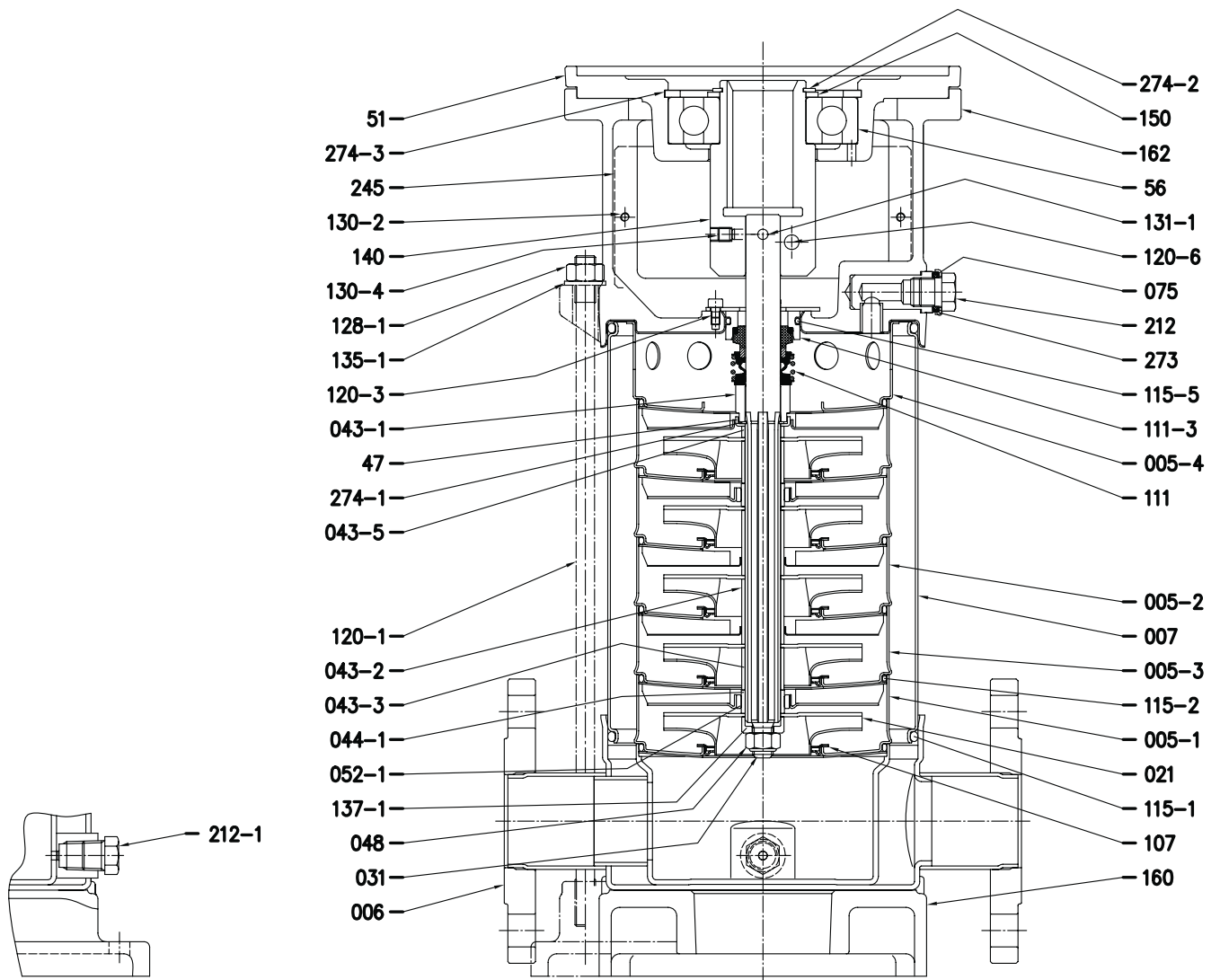
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**Sectional View
Models VMS 1802**



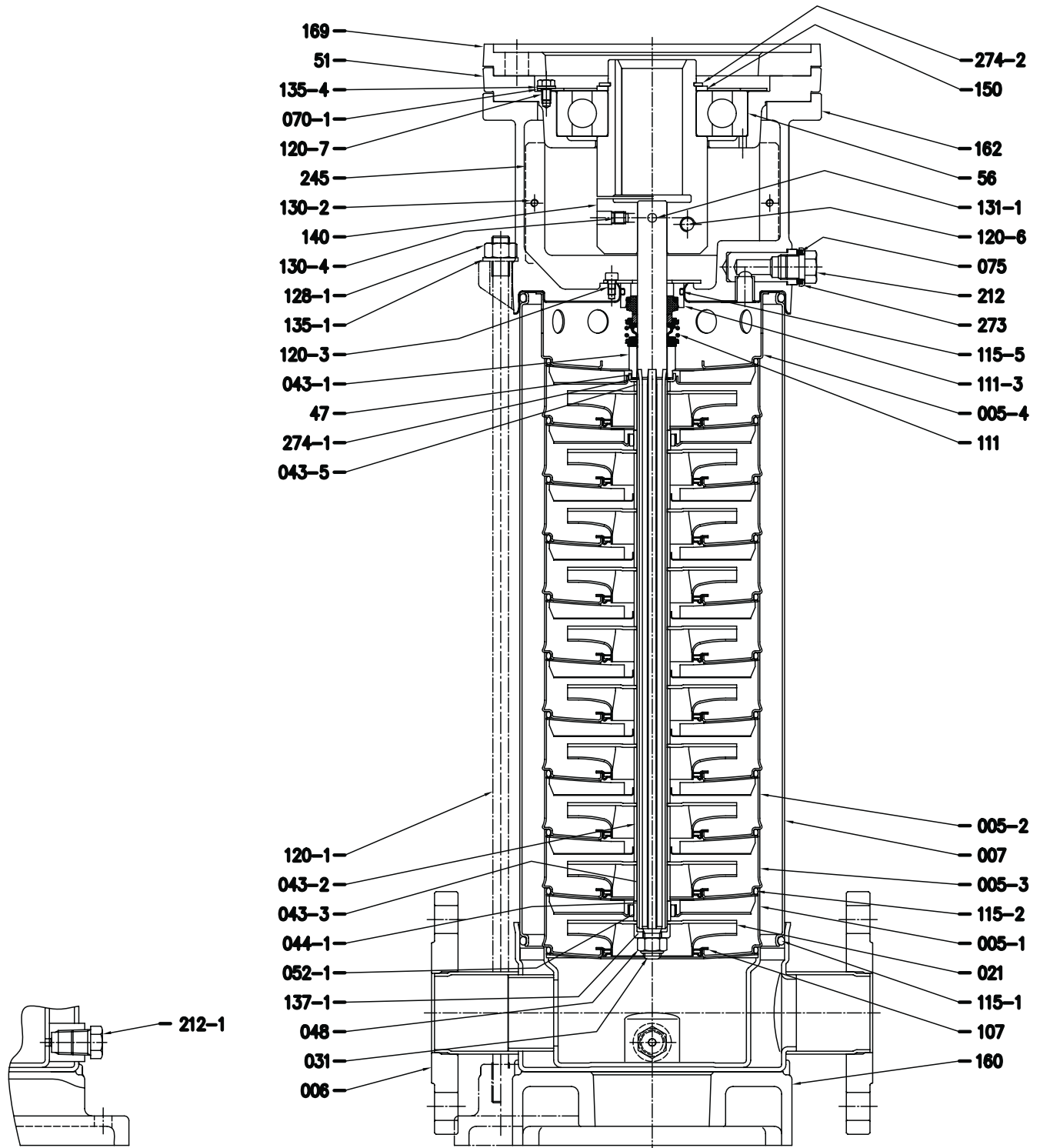
**Refer to page 27 for material details.
(For reference only.)**

Sectional View
Models VMS 1803 – VMS 1805



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(For reference only.)

Sectional View
Models VMS 1806 – VMS 1811



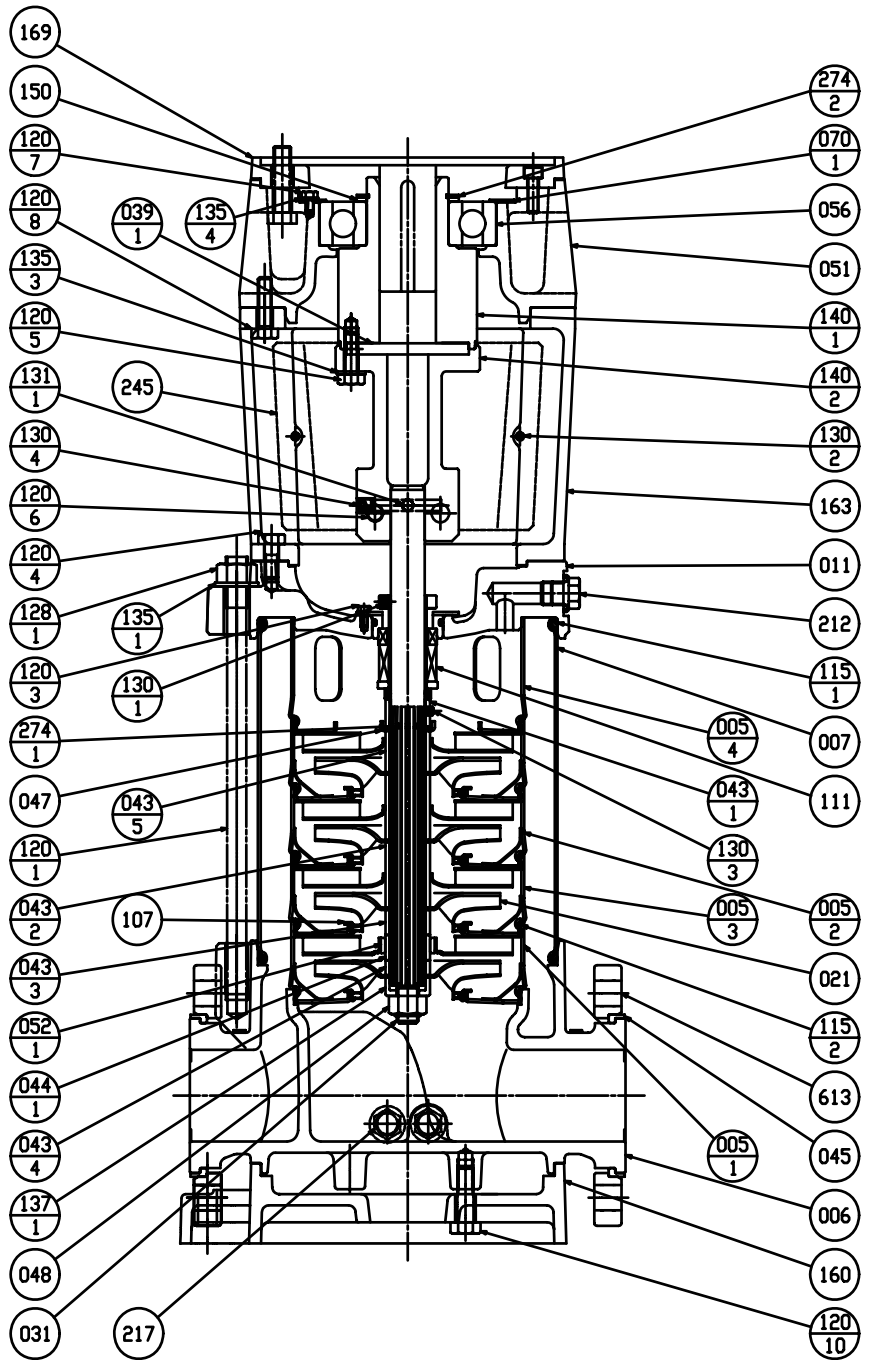
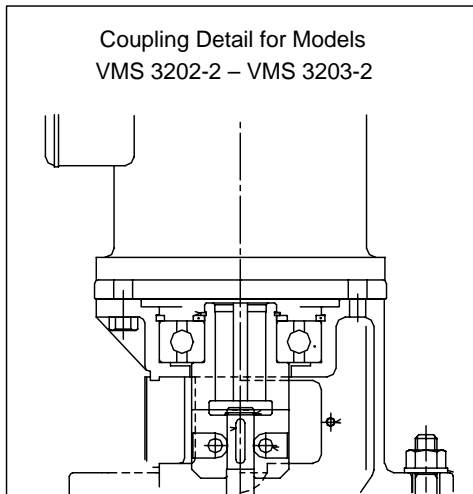
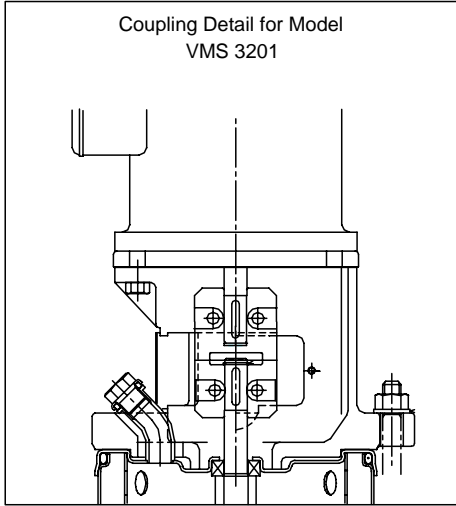
Refer to page 27 for material details.
(For reference only.)

Sectional View – Part reference Model VMS 18

No.	Part Name	Material
005-1	Suction casing	EN 1.4301 (ANSI 304)
005-2	Intermediate casing	EN 1.4301 (ANSI 304)
005-3	Intermediate casing bearing	EN 1.4301 (ANSI 304)
005-4	Discharge casing	EN 1.4301 (ANSI 304)
006	Bottom casing	EN 1.4301 (ANSI 304)
007	Outer casing	EN 1.4301 (ANSI 304)
021	Impeller	EN 1.4301 (ANSI 304)
031	Shaft	EN 1.4401 (ANSI 316)
043-1	Shaft sleeve (mechanical seal)	EN 1.4301 (ANSI 304)
043-2	Shaft sleeve (intermediate)	EN 1.4301 (ANSI 304)
043-3	Shaft sleeve (bearing)	EN 1.4301 (ANSI 304)
043-5	Shaft sleeve (last stage)	EN 1.4301 (ANSI 304)
043-6	Shaft sleeve (adjustment)	EN 1.4301 (ANSI 304)
044-1	Shaft sleeve bearing	Tungsten carbide
046	Split ring (mechanical seal)	EN 1.4301 (ANSI 304)
047	Ring holder	EN 1.4301 (ANSI 304)
048	Impeller nut	A2-70 UNI 7323 with inox insert
051	Motor adapter	Cast iron EN-GJL-200-EN 1561
052-1	Bearing	Tungsten carbide
056	Ball bearing	
070-1	Ring of bearing	EN 1.4301 (ANSI 304)
075	O-ring (plug)	FPM
075-1	O-ring (plug)	FPM
107	Liner ring	PTFE/EN 1.4401 (ANSI 316)
111	Mechanical seal	Silicon carbide/Carbon/FPM
111-3	Mechanical seal seat	EN 1.4301 (ANSI 304)
115-1	O-ring (outer casing)	FPM
115-2	O-ring (intermediate casing)	FPM
115-5	O-ring	FPM
120-1	Tie rod	Zincate steel
120-3	Screw	A2-70 UNI 7323
120-5	Screw for coupling	Zincate steel 8.8 strength class ISO 898/1
120-6	Screw for coupling VMS 1802 VMS 1803 to 5 VMS 1806 to 11	Zincate steel 8.8 strength class ISO 898/1
120-7	Screw (bearing)	Zincate steel 8.8 strength class ISO 898/1
128-1	Nut for tie rod	Zincate steel
130-2	Screw for coupling guard	A2-70 UNI 7323
130-4	Set-screw	Carbon steel
131-1	Pin for shaft	Carbon steel
135-1	Washer	Zincate steel
135-4	Washer (bearing)	Carbon steel
137-1	Impeller spacer	EN 1.4301 (ANSI 304)
140	Coupling	Brass OT 58 UNI 5705
150	Spacer	Carbon steel
160	Base	Cast iron EN-GJL-200-EN 1561
162	Motor bracket	Cast iron EN-GJL-200-EN 1561 + EN 1.4301 (ANSI 304)
169	Motor adapter	Cast iron EN-GJL-200-EN 1561
212	Plug	EN 1.4301 (ANSI 304)
212-1	Plug	EN 1.4301 (ANSI 304)
245	Coupling gaurd	EN 1.4301 (ANSI 304)
273	Washer (plug)	EN 1.4301 (ANSI 304)
273-1	Washer (plug)	EN 1.4301 (ANSI 304)
274-1	C-type snap ring (coupling)	EN 1.4301 (ANSI 304)
274-2	C-type snap ring (coupling) VMS 1803 to 4 VMS 1805 VMS 1006 to 10 VMS 1811	Carbon steel TC 80
274-3	C-type snap ring (bracket) VMS 1803 to 4 VMS 1805	Carbon steel TC 80

(For reference only.)

Sectional View Model VMS 32



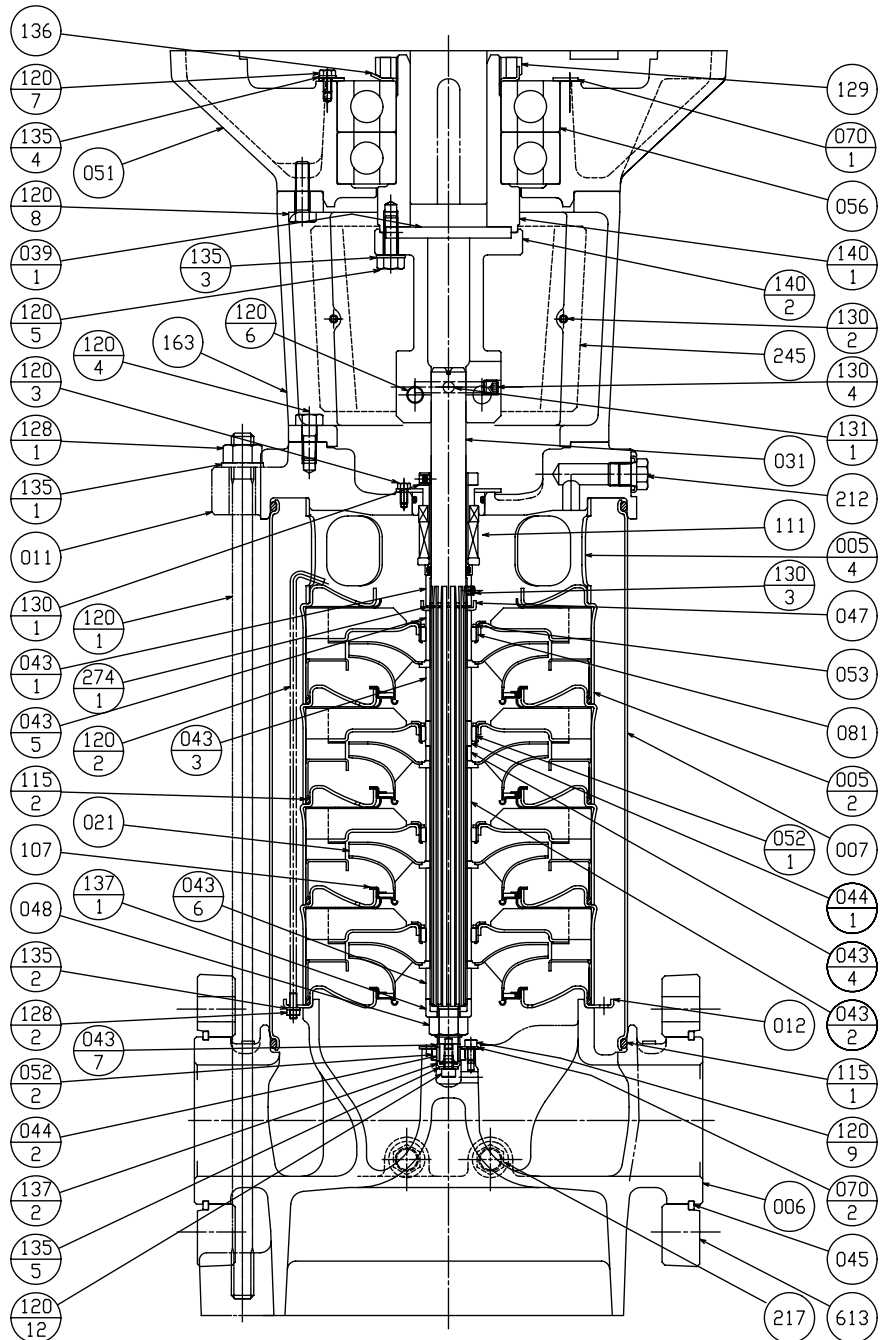
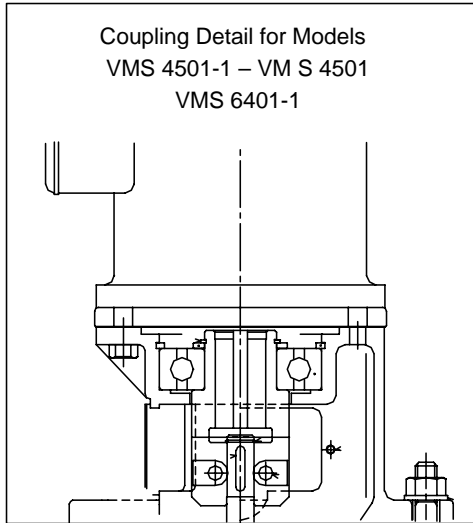
Refer to page 29 for material details.
(For reference only.)

Sectional View – part reference Model VMS 32

No.	Part Name	Material
005-1	Stage casing (suction)	AISI 304
005-2	Stage casing	AISI 304
005-3	Stage casing (bearing)	AISI 304
005-4	Stage casing (top)	AISI 304
006	Bottom casing	Cast iron EN-GJL-250
007	Outer sleeve	AISI 304
011	Casing cover	Cast iron EN-GJS-400-15
021	Impeller	AISI 304
031	Shaft	AISI 316
039-1	Key (coupling)	C45
043-1	Shaft sleeve (mechanical seal)	AISI 304
043-2	Shaft sleeve (stage)	AISI 304
043-3	Shaft sleeve (bearing/upper)	AISI 304
043-4	Shaft sleeve (bearing/lower)	AISI 304
043-5	Shaft sleeve (top)	AISI 304
044-1	Bearing sleeve (stage)	Tungsten carbide
045	Adjusting ring	C40
047	Split ring retainer	AISI 304
048	Friction nut	AISI 304
051	Bearing Housing	Cast iron EN-GJL-200
052-1	Bearing (stage)	Tungsten carbide
056	Ball bearing	-
070-1	Bearing Holder	AISI 304
107	Wear ring	AISI 316 + PTFE
111	Mechanical seal (cartridge ass'y)	Silicon carbide/Carbon/FPM/316
115-1	O-ring (outer)	FPM
115-2	O-ring (stage)	FPM
120-1	Tie rod bolt	Zincate steel 6.8 strength class ISO 898/1
120-3	Bolt (mechanical seal)	Stainless steel A2-70 ISO3506
120-4	Bolt (casing cover)	Stainless steel A2-70 ISO3506
120-5	Bolt (coupling M-side)	Zincate steel 8.8 strength class ISO 898/1
120-6	Bolt (coupling P-side)	Zincate steel 8.8 strength class ISO 898/1
120-7	Bolt (bearing)	Zincate steel 8.8 strength class ISO 898/1
120-8	Bolt (bearing housing)	Zincate steel 8.8 strength class ISO 898/1
120-10	Bolt (base plate)	Zincate steel 8.8 strength class ISO 898/1
128-1	Nut (tie rod bolt)	Zincate steel 6S strength class ISO 898/2
130-1	Screw (mechanical seal)	Stainless steel A2-70 ISO3506
130-2	Screw (coupling guard)	Stainless steel A2-70 ISO3506
130-3	Screw (mechanical seal)	Stainless steel A2-70 ISO3506
130-4	Screw (coupling pin)	Strength class 45H ISO 898/5
131-1	Pin (shaft)	CF35SMnPb10
135-1	Washer (tie rod bolt)	Zincate steel
135-3	Spring washer (coupling bolt M-side)	Zincate steel
135-4	Spring washer (bearing)	Zincate steel
137-1	Shaft and sleeve	AISI 304
140-1	Coupling upper half	Steel (36SMnPb14)
140-2	Coupling lower half	Steel (36SMnPb14)
150	Spacer (coupling)	C45
160	Base plate	Cast iron EN-GJL-200
163	Motor stool	Cast iron EN-GJL-200
169	Motor liner	Cast iron EN-GJL-200
212	Vent plug (with seal ring)	AISI 304/FPM
217	Plug (with seal ring)	AISI 304/FPM
245	Coupling gaurd	AISI 304
274-1	C-ring (top)	AISI 304
274-2	C-ring (coupling)	Carbon tool steel (TC80)
613	Pump flange	C40

(For reference only.)

Sectional View
Models VMS 45
VMS 64



Refer to page 31 for material details.
(For reference only.)



Sectional View – part reference

Model VMS 45 & VMS 64

No.	Part Name	Material
005-2	Stage casing	AISI 304
005-4	Top casing	AISI 304
006	Bottom casing	16 bar : Cast iron EN-GJL-250 25 bar : Cast iron EN-GJS-400-15
007	Outer sleeve	AISI 304
011	Casing cover	Cast iron EN-GJS-400-15
012	Suction Cover	AISI 304
021	Impeller	AISI 304
031	Shaft	AISI 316
039-1	Key (coupling)	C45
043-1	Shaft sleeve (mechanical seal)	AISI 304
043-2	Shaft sleeve (stage)	AISI 304
043-3	Shaft sleeve (bearing/upper)	AISI 304
043-4	Shaft sleeve (bearing/lower)	AISI 304
043-5	Shaft sleeve (top)	AISI 304
043-6	Shaft sleeve (suction)	AISI 304
043-7	Shaft sleeve (bottom bearing)	AISI 304
044-1	Bearing sleeve (stage)	Tungsten carbide
044-2	Bearing sleeve (bottom bearing)	Tungsten carbide
045	Adjusting ring	C40
047	Split ring retainer	AISI 304
048	Friction nut	AISI 304
051	Bearing Housing	Cast iron EN-GJL-200
052-1	Bearing (stage)	Tungsten carbide
052-2	Bearing (bottom)	Tungsten carbide
053	Bush holder	AISI 304
056	Ball bearing	-
070-1	Bearing holder	AISI 304
070-2	Bearing holder (bottom bearing)	AISI 304
081	Bush	PTFE (alloy)
107	Wear ring	AISI 316 + PTFE
111	Mechanical seal (cartridge ass'y)	Silicon carbide/Carbon/FPM/316
115-1	O-ring (outer)	FPM
115-2	O-ring (stage)	FPM
120-1	Tie rod bolt	Zincate steel 6.8 strength class ISO 898/1
120-2	Stack bolt	AISI 304
120-3	Bolt (mechanical seal)	Stainless steel A2-70 ISO3506
120-4	Bolt (casing cover)	Stainless steel A2-70 ISO3506
120-5	Bolt (coupling M-side)	Zincate steel 8.8 strength class ISO 898/1
120-6	Bolt (coupling P-side)	Zincate steel 8.8 strength class ISO 898/1
120-7	Bolt (bearing)	Zincate steel 8.8 strength class ISO 898/1
120-8	Bolt (bearing housing)	Zincate steel 8.8 strength class ISO 898/1
120-9	Bolt (bottom bearing)	Stainless steel A2-70 ISO3506
120-11	Bolt (shaft end)	Stainless steel A2-70 ISO3506
128-1	Nut (tie rod bolt)	Zincate steel 6S strength class ISO 898/2
128-2	Nut (stack bolt)	AISI 304
129	Bearing nut (coupling)	Carbon Steel
130-1	Screw (mechanical seal)	Stainless steel A2-70 ISO3506
130-2	Screw (coupling guard)	Stainless steel A2-70 ISO3506
130-3	Screw (mechanical seal)	Stainless steel A2-70 ISO3506
130-4	Screw (coupling pin)	Strength class 45H ISO 898/5
131-1	Pin (shaft)	CF35SMnPb10
135-1	Washer (tie rod bolt)	Zincate steel
135-2	Spring washer (stack bolt)	AISI 304
135-3	Spring washer (coupling bolt M-side)	Zincate steel
135-4	Spring washer (bearing)	Zincate steel
135-5	Spring washer (shaft end)	AISI 304
136	Bearing washer (coupling)	Carbon Steel
137-1	Shaft end sleeve	AISI 304
137-2	Shaft end sleeve	AISI 304
140-1	Coupling upper half	Steel (36SMnPb14)
140-2	Coupling lower half	Steel (36SMnPb14)
163	Motor stool	Cast iron EN-GJL-200
212	Vent plug (with seal ring)	AISI 304/FPM
217	Plug (with seal ring)	AISI 304/FPM
245	Coupling gaurd	AISI 304
274-1	C-ring (top)	AISI 304
613	Pump flange	C40

(For reference only.)

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