

4700 Vertical multi-stage centrifugal pumps

VMS, VMSB

Installation and operating instructions

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1.0 INTRODUCTION

1.1 PREFACE

Observe all operation and maintenance instructions contained herein to obtain best results from the product. If you need further information, please contact the nearest authorized dealer.

No part of these illustrations and/or text may be reproduced for any reason.

1.2 ICONS AND SYMBOLS

The following symbols have been used in the compilation of this instruction booklet to make the reader aware of what may happen if instructions are not complied with:

WARNING



- Risk of damaging the pump or system.
- Electrical hazard

CAUTION



Risk of causing injury or damaging property

2.0 MANUFACTURER IDENTIFICATION DATA

2.1 MANUFACTURER DATA

Armstrong Fluid Technology

93 East Avenue

North Tonawanda, New York

U.S.A. 14120-6594

Web site: ArmstrongFluidTechnology.com

Models: VMS01B-20B and VMS32-64 certified to NSF/ANSI 61 & 372.

NOTE: Only products bearing the NSF Mark on the product, product packaging, and/or documentation shipped with the product are Certified.

3.0 GENERAL INFORMATION

Failure to observe the instructions outlined in this manual and/or work done on the product by anyone other than our service centers will void the warranty and relieve the manufacturer of all liability for personal injury and damage to the product.

Always check to make sure that the pump was not damaged in shipment before accepting delivery. If damage is evident, a claim should be filed with the carrier at that time. Check that the model on the pump nameplate matches that of your order.

The following parts are subject to wear during normal operation:

- Bearings
- Mechanical seals
- Grommets
- Capacitors

If a fault that is not listed in the **Troubleshooting** table (section 13) occurs, please contact the nearest authorized retailer.

4.0 GENERAL SAFETY WARNINGS

Before using the product, you must be sure you can follow the instructions given in this manual and apply them whenever using or servicing it.

4.1 PREVENTIVE MEASURES TO BE TAKEN BY THE USER



The user must comply with all local and national regulations that apply to the installation and operation of electric pumps. Operation of the pump must be compatible with the pump construction as shown in the **specifications** section of this manual. Always wear protective gloves when handling the pump or performing maintenance.



When repairing or servicing the product, always disconnect the power first. Before starting the pump, make sure that all cables, electrical connections, and controls are in working order and are properly grounded. Improper installation may result in serious or even fatal injury.



Any electrical work should be performed by a qualified electrician. Attempting to service, install or handle the product while its connected to a power source can result in serious and even fatal injury. When starting up the product, make sure you are wearing shoes, not standing in water, and that your hands are dry.



Users **must not perform any work** on the motor or pump not covered within this manual.

4.2 IMPORTANT PROTECTIONS AND CAUTIONS



All products are designed with guards over moving parts. Operating the pump without the guards in place can cause physical injury.



The pump is supplied with a grounding conductor or a grounding type plug. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded electrical supply.

Do not connect pump to a power supply until permanently grounded.

4.3 ADDITIONAL RISKS INCLUDE THE FOLLOWING

- A Possible contact with the motor cooling fan by inserting any objects (e.g. screwdrivers, sticks and similar) through the fan cover holes.
- B Possible restart without warning due to automatic re-arming of the motor protection device, if tripped due to motor overheating.

5.0 HANDLING AND STORAGE

5.1 HANDLING



Crushing hazard: The pump and its components are **heavy** and must be handled carefully. Use proper lifting equipment and work apparel. 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.

The following must be done when moving or dismantling the motor pump:

- A Disconnect the electric supply.
- B Remove the suction and discharge pipes (where present) if too long or bulky.
- C If present, unscrew the screws that secure the pump to its supporting surface.
- D Lift the pump using equipment suitable to the pump weight and dimensions (refer to the technical section specifications).

The product is packed horizontally in a cardboard box, with handles on request. If its weight and size demand it, it will be packed on a wooden pallet.

Handling a complete pump with motor

To move the pump from its horizontal packed position, simply attach a suitable strap securely to the motor and lift it slowly with a hoist while checking that the load remains balanced.

WARNING



VMS and VMS B 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.

Handling a bare pump

Follow the same procedure as for a complete pump with motor; in this case, the strap must be attached to the motor mount.

5.2 STORAGE

- A The product must be stored in a covered and dry place, far away from heat sources and protected against dirt and vibrations.
- B Protect the product against damp conditions, heat sources and mechanical damage.
- C Do not place heavy objects on the packaging.
- D The product must be stored at an ambient temperature between +5°C and +40°C (41°F — 104°F) with a relative humidity of 60%.

6.0 PRODUCT OVERVIEW

6.1 DESCRIPTION

Armstrong's VMS B is a vertical multi-stage multi-purpose, non-self-priming pump for coupling to standard electric motors to provide pumping of potable water and provide transfer, on varying flow, pressure and temperature variances in a wide range of applications.

The abbreviations VMS B and VMS identify a wide range of vertical multi-stage pumps with in-line ports, sized for nine nominal flow rates (VMS B 1, 3, 5, 10, 15 and 20 and VMS 32, 45, 64 m³/h), and a various number of stages available either as a complete pump with motor or pump alone.

If you have purchased a bare pump, please make sure your motor is suited to coupling with the pump.

6.2 APPLICATIONS

The pump is designed for:

- Commercial and industrial water distribution systems
- Washing systems
- Water treatment
- Fire systems
- Cooling systems
- Pressurisation systems
- Irrigation systems

6.2.1 USE WITH DRINKING WATER

The product is constructed with materials suited for pumping drinking water. Before being used, the pump must be run with clean water at its nominal flow rate for the time indicated in the following table:

VMS01B 60 mins (min.)	VMS32 15 mins (min.)
VMS03B 60 mins (min.)	VMS45 15 mins (min.)
VMS05B 30 mins (min.)	VMS64 15 mins (min.)
VMS10B 30 mins (min.)	
VMS15B 15 mins (min.)	
VMS20B 15 mins (min.)	

6.3 PUMPS ARE NOT DESIGNED FOR USE IN THE FOLLOWING APPLICATIONS



Improper use of the pump is hazardous and can result in personal injury and damage to property.

WARNING



Improper use of the product may void the warranty.

The pumps may not be used for

- Dirty water
- Highly acidic water
- Corrosive fluids
- Water at temperatures higher than indicated in **technical data** - sea water
- Flammable/explosive fluids
- Fluids incompatible with the pump's materials
- Installation outdoors without protection against atmospheric agents
- Dry running

All specifications subject to change without notice. The manufacturer reserves the right to amend technical data for the purpose of product improvements.

7.0 PREPARING FOR USE

WARNING



Installation must be performed by qualified or factory trained personnel.



When lifting the pump/motor, use appropriate lift equipment, and check position and tightness of lift system so that the weight of the pump remains balanced.

Failure to observe this precaution may result in serious accidents.

Lifting eye(s) attached to the motor (if provided) are intended only for lifting the motor and must not be used to lift the complete pump assembly.

7.1 COUPLING TO THE MOTOR

The motors to be coupled to the vms and vms B pumps must meet NEMA standards.

Check that all power is off and that the motor is disconnected from the power supply prior to ANY work performed on the pump and/or motor.

It is strongly suggested to perform a start-up test run following coupling to check operation. If possible, it is suggested to perform coupling once the pump has been fastened down in its working position and connected to the suction and discharge pipes.

7.1.1 ASSEMBLING THE MOTOR TO THE PUMP

WARNING



The following procedure must be done with the unit disconnected from its electrical power supply.

vms01B to vms20B [- A -] and vms32-1

- 1 Position and secure the pump vertically on a flat, rigid surface.
- 2 Unscrew the 4 coupling guard screws, then remove the two coupling guards.
- 3 Loosen the four coupling screws.
- 4 vms B only: Evenly loosen the three set screws in the seal holder (shaft locking collar) by one full turn.
- 5 vms B only: Remove the motor key from the motor and install the half-key.

WARNING



The half-key should not protrude from the slot in the motor shaft.

- 6 Set the motor vertically with its shaft downwards and place it over the pump. For vms B, the half-key must face away from the gap between the coupling halves.
- 7 Insert and evenly tighten down the 4 motor bolts to the torque specified on page 14.
- 8 Use a suitable lever to pry the coupling upward until it stops against the end of the motor shaft.
- 9 With the coupling raised, tighten the four coupling bolts evenly to the torque specified on page 14.
- 10 Rotate the coupling by hand and use a feeler gauge to check that the gap between the coupling halves is even. If not, repeat from step 9.
- 11 vms B only: Evenly tighten the three set screws on the seal holder to the torque specified on page 15.

WARNING



The seal holder set screws must be tightened prior to operation or damage to the pump may occur.

- 12 Temporarily connect the suction and discharge lines, then open the discharge valve.
- 13 Fill the pump with water as described in **Section 9**.
- 14 Reinstall the two coupling guards (4 screws).

- 15 Connect the motor to its power supply.
- 16 Check motor rotation. Rotation should be clockwise when viewed from the top (fan end) of the motor.
- 17 Run the pump for a few minutes.
- 18 Check that running noise and vibration are not excessive.
- 19 Shut off power to the motor and wait for the coupling to come to a stop.
- 20 Unscrew the 4 screws and remove the two coupling guards.
- 21 Inspect the interior of the mount for water. If you find any water, drain the pump and reposition the coupling. Repeat the process from step 4.
- 22 Reinstall the two coupling guards (4 bolts)
- 23 Permanently connect the suction and discharge lines. Flange torque values are listed on page 9.
- 24 The pump is now installed

VMS32-3-2 to 32-10-1, VMS45 and VMS64, ALL SIZES

- 1 Position and secure the pump vertically on a flat, rigid surface.
- 2 Attach a strong sling or chains to the motor lifting lugs or eyebolts to ensure that the motor is balanced when lifted.
- 3 Set the motor vertically with its shaft downwards and place it over the pump.
- 4 Insert and evenly tighten down the 4 motor bolts: $\frac{1}{2}$ " – 58.3 Nm (43 lb-ft), $\frac{5}{8}$ " – 124.8 Nm (92 lb-ft)
- 5 Temporarily connect the suction and discharge lines, then open the discharge valve.
- 6 Fill the pump with water as described in Section 9.
- 7 Connect the motor to its power supply.
- 8 Check motor rotation. Rotation should be clockwise when viewed from the top (fan end) of the motor.
- 9 Run the pump for a few minutes.
- 10 Check that running noise and vibration are not excessive.
- 11 Permanently connect the suction and discharge lines. Flange torque values are listed on page 9.
- 12 The pump is now installed

7.2 GENERAL INSTALLATION PRECAUTIONS

WARNING



Remove the suction and discharge caps before hooking the product up to the lines.

- A Use metal or rigid plastic pipes to avoid any strain or collapse due to possible force created at suction;
- B Support and align pipes so that they do not put any stress on the pump;
- C Avoid throttling caused by bending suction and discharge hoses;

- D Seal any piping connections: air infiltration in the suction pipe negatively affects pump operation;
- E Isolation valves should be installed on both the suction and discharge side of the pump in the event service of the pump is required; it is recommended that a bleed valve be installed in the discharge line to allow pressure in the pump to be relieved for service;

WARNING



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

- F Fix the piping to the reservoir or to any fixed parts so that it is not supported by the pump;
- G Use minimal bends (goosenecks) and valves;
- H In suction lift installations, the suction pipe should be fitted with a foot valve and filter in order to prevent foreign matter from entering and its end should be immersed at a depth that is at least twice the diameter of the pipe; its distance from the bottom of the reservoir should also be one and a half times its diameter.
For suction piping exceeding 13 feet use an oversized pipe ($\frac{3}{4}$ " wider at suction) for improved efficiency;
- I Ensure 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;
- J 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.

7.2.1 INSTALLATION

- A Position the pump on a flat surface that is as close as possible to the water source. Leave enough space and ventilation around the pump to allow safe use and maintenance. There must be a minimum distance of 4 inches of **free space** in front of the cooling fan;
- B Use standard plumbing practices to avoid unnecessary line losses, cavitation, and air lock.

7.2.2 POSITIONING THE PRODUCT

WARNING

Install the pump in a ventilated area protected from inclement weather or destructive elements (rain, frost, etc).

NOTE: The ambient temperature and altitude ranges are provided in Section 10.1.

Place the pump away from walls, the ceiling or other obstacles so that the pump can be fastened, operated and serviced safely.

7.2.3 FASTENING DOWN

Bolt the pump on to a concrete base or suitable metal structure. Use of anti-vibration supports is highly recommended in commercial buildings (with occupants) if the concrete base is an integral part of the reinforced concrete structure of buildings. When fastening, use a drill bit to center mark the 4 holes in the base of the pump on the surface it is due to be installed on.

Use a drill to make 4 holes (dia. 12mm ($1\frac{5}{32}$ ")) for VMS 01B, 03B, 05B, 10B, 15B, 20B pumps and dia. 14mm ($\frac{9}{16}$ "") for VMS 32, 45, 64 pumps). Move the pump back into position, line it up with the pipes and tighten the screws all the way.

The position of the fastening holes is also illustrated in section 15.6

7.2.4 PIPEWORK

In addition to the instructions given below, also comply with the general instructions found in section 15.7 of the manual and with the directions in FIG. 1.



Suction and discharge piping must be sized to withstand the maximum working pressure of the pump.

It is recommended a pressure gauge is installed on the discharge line before the non-return valve and isolating valve. Use adequate supports for the suction and discharge lines to avoid stress on the pump flange. If the pump is installed with a suction lift arrangement (liquid level lower than the pump) and it feeds an open circuit, install a foot valve at the end of the suction line and use a hose connected to the pump.

WARNING



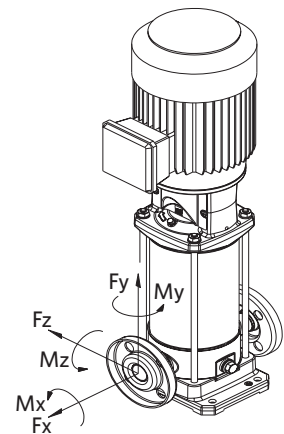
Ensure that available NPSH is greater than NPSH required by the pump. Insufficient NPSH will result in cavitation, which reduces pump performance and may result in damage to the pump. Refer to the pump curves.

7.3 FLANGE LOADING AND TIGHTENING TORQUES

FLANGE TIGHTENING TORQUE								
MODELS		F	ANSI	FLANGE	BOLT SIZE	NO. OF BOLTS	TIGHTENING TORQUE	
							[lb-ft]	[Nm]
VMS B	1-3-5	F	ANSI	1 1/4"	5/8"	4	52	70
VMS B	10-15-20	F	ANSI	2"	5/8"	8	26	35
VMS	32	F	ANSI	2 1/2"	5/8"	4	59	80
VMS	32	F	ANSI	2 1/2"	3/4"	8	59	80
VMS	45	F	ANSI	3"	5/8"	4	59	80
VMS	45	F	ANSI	3"	3/4"	8	59	80
VMS	64	F	ANSI	4"	5/8"	8	59	80
VMS	64	F	ANSI	4"	3/4"	8	74	100

ALLOWABLE STRAIN ON THE FLANGE										
MODELS		F	ANSI	FLANGE	STRAIN X		STRAIN Y		STRAIN Z	
					[lb-ft]	[Nm]	[lb-ft]	[Nm]	[lb-ft]	[Nm]
VMS B	1-3-5	F	ANSI	1 1/4"	61	270	52	230	47	210
VMS B	10-15-20	F	ANSI	2"	110	490	101	450	90	400
VMS	32	F	ANSI	2 1/2"	236	1050	208	925	191	850
VMS	45	F	ANSI	3"	281	1250	253	1125	230	1025
VMS	64	F	ANSI	4"	377	1075	337	1500	303	1350

ALLOWABLE TORQUE ON THE FLANGE										
MODELS		F	ANSI	FLANGE	TORQUE X		TORQUE Y		TORQUE Z	
					[lb-ft]	[Nm]	[lb-ft]	[Nm]	[lb-ft]	[Nm]
VMS B	1-3-5	F	ANSI	1 1/4"	170	230	207	280	140	190
VMS B	10-15-20	F	ANSI	2"	251	340	310	420	221	300
VMS	32	F	ANSI	2 1/2"	442	600	553	750	406	550
VMS	45	F	ANSI	3"	479	650	590	800	424	575
VMS	64	F	ANSI	4"	535	725	645	875	461	625



8.0 FILLING THE PUMP

WARNING



Do not start the pump until it has been positioned and installed in the final place of operation.

The pump and suction line must be filled with water. Running the pump without water inevitably causes serious damage to the pump.



Extreme caution should be used if priming the pump in a hot water application

8.1 FILLING PUMP IN SUCTION LIFT ARRANGEMENT

- A** Unscrew the fill plug (large plug) located above the outer jacket in front of the coupling guard (remove coupling guards if necessary);
- B** Using a funnel, fill the suction line and pump casing with water to overflowing;
- C** Screw the fill plug back on until it is locked tight;
- D** Areas that have become wet as a result of water leaks must be dried thoroughly;
- E** Reinstall the coupling covers if they have been removed;

8.2 FILLING PUMP IN A FLOODED INSTALLATION

- A** Loosen the vent plug (small plug) several turns. Complete removal of the plug is not necessary to prime the pump;
- B** Open the suction valve until the water flows out around the vent plug;
- C** Retighten the vent plug back on until it is locked tight.

9.0 USE, STARTING AND RUNNING

Never allow the motor-driven pump to operate without water. Doing so can seriously damage the internal components.

9.1 GENERAL WARNINGS

- A** The pumps are designed to operate at a temperature no higher than 104°F (40°C) and a level no higher than 3280 feet;
- B** The pumps cannot be used in swimming pools or similar plants;
- C** Prolonged operation with the discharge pipe closed can cause damage;

WARNING



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

- D** Avoid switching the motor pump on and off too frequently (check motor specifications);
- E** During power cuts, it is advisable to disconnect the power to the pump.

9.2 STARTING

Once the pump has been properly installed and primed, check its direction of rotation before using it.

- A** Start the electric pump with the discharge valve closed.
- B** Check that the motor rotates clockwise (starting from the fan end - by looking through the slots in the fan cover. This is best seen when starting or stopping the motor.
- C** If it is rotating in the wrong direction (counterclockwise), shut off power and swap two of the motor's power phases in the electrical enclosure or terminal block.
- D** Start the pump two or three times to check system conditions;
- E** Partially close, then re-open the discharge line a few times to cause a rapid pressure increase.
- F** Check that noise, vibration, pressure, voltage, and amps levels are at normal levels.

9.3 RUNNING

Start the pump with the isolating valve on the discharge line closed, then open it gradually. The pump must operate smoothly and quietly. Close the isolating valve again and make sure that the reading on the discharge line pressure gauge is close to the that indicated in the pump specifications. (This approximation is mainly attributable to tolerances and to possible suction lift). If the pressure gauge reading is much lower than specified, repeat the priming procedure in section 9 of this manual. The pump is working properly if the two readings are close in value. If the trouble with the isolating valve open continues, it typically is an electrical or mechanical motor system problem or of pump cavitation due to:

- Excessive difference in height or excessive pressure loss along suction line,
- Low backpressure in the discharge line;
- Temperature of the liquid being pumped.

NOTE: Motor output is reduced if the temperatures and height of pumpage is higher than those specified, the motor with greater output is needed.

Fast-closing valves (exceeding 1.5 times the pump nominal pressure) can cause pressure peaks or water issues and damage to the pump.



Do not operate the pump with the isolating valve closed on the discharge line.

Operating the pump continuous duty at a flow rate below the minimum rate indicated on the nameplate will result in the pumped liquid overheating and cause in overloading the motor bearings.

9.4 STOPPING

- A Gradually shut off water to the discharge line to avoid over-pressure in the piping and pump;
- B Cut off the power supply.

10.0 MAINTENANCE AND REPAIRS



Always disconnect all power before performing any maintenance work on the pump and motor.



Before servicing the pump, be sure to relieve the system pressure. Removing components under pressure may result in injury or damage. Use a pressure bleed valve in hot water applications where water temperature could cause physical injury.

Regularly scheduled maintenance should not be necessary. However, periodic inspection is recommended to ensure the pump is running properly. Periodic checks and preventive maintenance will reduce sudden or significant problems and repairs. Common maintenance operations include:

- Replacement of mechanical seals
- Replacement of grommets
- Replacement of bearings
- Replacement of capacitors.

Although subject to typical wear, correct operation of the pump will prolong the service life of these parts.

If the pump will not be operated and inactive for a long period, it should be emptied completely, with the discharge and fill caps removed, then washed and rinsed carefully with clean water. Avoid leaving residual water inside the pump.

These steps should be followed if installation occurs where a chance of frost is possible in order to avoid the breakdown of the pump components.



When performing repair work, order original spare parts from our sales and customer support network. Non-original spare parts can damage the product and are a hazard for persons and property.

10.1 REPLACEMENT OF SHAFT SEAL

See pictorial instructions on pages 16-19.

WARNING



The mechanical seal must be set following the procedure outlined in the seal replacement instructions. Ensure that the seal holder (locking collar) set screws are tightened. Failure to set the mechanical seal may result in damage to the pump.

11.0 DISPOSAL

The user is responsible for disposing of the equipment by taking it to a collection and recycling facility authorized to dispose of electrical waste. Please adhere to local waste disposal regulations should the product become defunct and need to be **scrapped**. Completely empty the product of all fluids — do not leave any treated fluid inside it. Armstrong pumps should not (typically) contain hazardous polluting material. For further information on equipment collection points, contact your local waste disposal authority.

12.0 TROUBLESHOOTING

DISPLAYED FAULT	CAUSE	SOLUTION
The pump does not work The motor does not turn	Float sticking	Check that the float reaches the level ON
	Thermal protection activated (single phase)	It reactivates automatically (single phase only)
	Incorrect electrical connection	Check the terminal board and the electrical panel
	Automatic switch triggered or fuses blown*	Reset the switch or replace the fuses and verify the cause
	No electricity	Check the electrical supply meter
	Plug not inserted	Check the connection to the power supply
	Built-in thermal overload protection device (if fitted) or thermal cutout in control panel tripped*	Wait for built-in thermal overload protection device to reset or reset thermal cutout in control panel
	Device protecting against dry running tripped*	Check water level and/or correct connection of system devices
The pump does not work The motor turns	Decrease in the line voltage	Wait for voltage to return to normal
	Suction filter / inlet blocked	Clean filter/inlet
	Foot valve blocked**	Release or clean the valve and check that it works properly
	Pump has not been filled**	Fill (sect. 9)
	Water level low (if no protection system is fitted)**	Restore water level
	Pump not primed	Prime the pump, Check any isolation and check valves, Check the liquid level
	Pressure too low	Restrict the discharge line
The pump works With a reduced flow rate	System undersized	Ensure that pump is sized for the application
	System dirty	Clean the piping, valves, filters
	Water level too low	Switch off the pump or immerse the foot valve
	Incorrect rotational direction (three-phase only)	Swap two of the line phases
	Incorrect supply voltage	Supply the pump with the voltage indicated on the name-plate
	Leaks from piping	Check the joints
	Pressure too high	Recheck the system
Pump stops after running for short time As a result of thermal overload protection tripping	Supply voltage outside motor's accepted range	Check whether there are excessive drops in voltage due to undersized line or cables
	Inadequate thermal cutout setting	Adjust setting to motor's rated current (see rating plate)
	Motor overload due to dense and/or viscous liquid	<ul style="list-style-type: none"> Reduce flow rate throttling the discharge line or replace motor with more powerful one Check actual power absorbed by the pump based on liquid pumped
	Pump delivers liquid at higher rate than max. flow rate on rating plate	Reduce flow rate by throttling discharge line
	Panel exposed to sun or other sources of heat	Protect panel from sun or sources of heat.
	Foreign matter blocking impeller rotation	<ul style="list-style-type: none"> Disassemble and clean pump Call our nearest Servicing Department to do the job
	Motor bearings worn	<ul style="list-style-type: none"> Replace bearings In this case, motor is noisy, too

DISPLAYED FAULT	CAUSE	SOLUTION
The pump stops after working for brief periods Thermal protection intervention The pump stops after working for brief periods Pressure applications	Liquid temperature too high	The temperature exceeds the technical limits of the pump
	Internal fault	Contact the nearest authorized distributor or service center
The pump does not stop Pressure applications	The difference between maximum and minimum pressure is minimal	Increase the difference between the two pressures
	Maximum pressure too high	Set maximum pressure at a lower value
The pump vibrates Or is too noisy during operation	Flow rate too high	Reduce the flow rate
	Cavitation	Contact the nearest retailer
	Piping not secured	Secure piping
	Noisy bearing	Contact the nearest authorized distributor or service center
	Debris contacting the motor fan	Remove debris
	Incorrect priming	Prime the pump and/or fill it again
Circuit breaker trips or fuses blow when starting pump	Motor short-circuited	Check and replace
	Short-circuit due to incorrect connection	Check and reconnect correctly
GFCI current circuit breaker trips as soon as switch closes	Leakage current caused by damaged insulation of motor, cables or other electric components	Check and replace electric component with ground fault
Pump performs a few turns in opposite direction when stopping	Foot valve leaking	Check, clean or replace
	Suction pipe leaking	Check and repair
Pump vibrates and is unusually noisy	Motor bearings worn	Replace bearings
	Foreign matter between fixed and rotating parts	<ul style="list-style-type: none"> ▪ Disassemble and clean pump ▪ Call nearest authorized service center
	Pump operation affected by cavitation	Reduce flow rate by throttling discharge line. If cavitation persists, check: <ul style="list-style-type: none"> ▪ Suction height ▪ Pressure loss along suction line (diameter of pipe, elbows etc.) ▪ Liquid temperature ▪ Discharge line backpressure

Note:

* If you encounter the same trouble again, call our Service Department

** Caution: mechanical seal could be damaged

13.0 ADDITIONAL TECHNICAL DOCUMENTATION

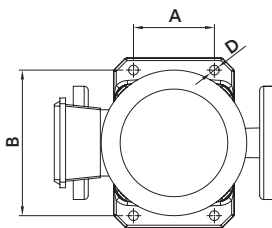
13.1 MAXIMUM WORKING PRESSURE CHART

MAXIMUM WORKING PRESSURE (PSI)	PUMP MODEL		
	VMS01B	VMS03B	VMS05B
232	2-18	2-15	2-12
360	20-29	16-23	13-19

MAXIMUM WORKING PRESSURE (PSI)	PUMP MODEL		
	VMS10B	VMS15B	VMS20B
232	1-10	1-7	1-6
360	11-16	8-12	8-10

MAXIMUM WORKING PRESSURE (PSI)	PUMP MODEL		
	VMS32	VMS45	VMS64
232	1-4	1-3	1-3
360	5-8	4-7	4
430	9-10	-	-

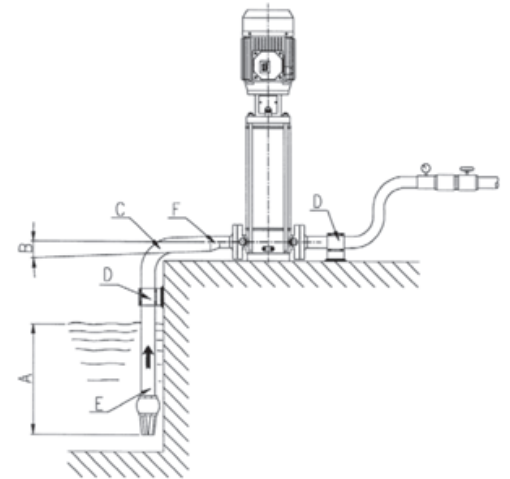
13.2 POSITIONING OF HOLES FOR FASTENING DOWN



PUMP MODEL	DIMENSION in inch (mm)		
	A	B	D
VMS01B	0.46 (12)	3.94 (100)	7.09 (180)
VMS03B	0.46 (12)	3.94 (100)	7.09 (180)
VMS05B	0.46 (12)	3.94 (100)	7.09 (180)
VMS10B	0.46 (12)	5.12 (130)	8.47 (215)
VMS15B	0.46 (12)	5.12 (130)	8.47 (215)
VMS20B	0.46 (12)	5.12 (130)	8.47 (215)
VMS32	0.56 (14)	6.69 (170)	8.44 (240)
VMS45	0.56 (14)	7.47 (190)	10.47 (266)
VMS64	0.56 (14)	7.47 (190)	10.47 (266)

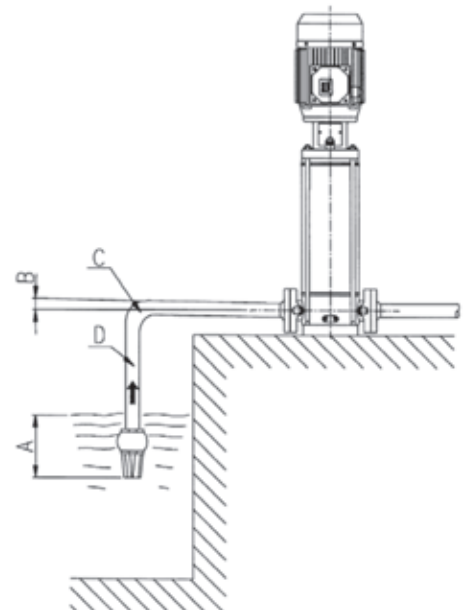
13.3 WARNINGS FOR CORRECT OPERATION OF VMS MOTOR-DRIVEN PUMPS

FIG. 1



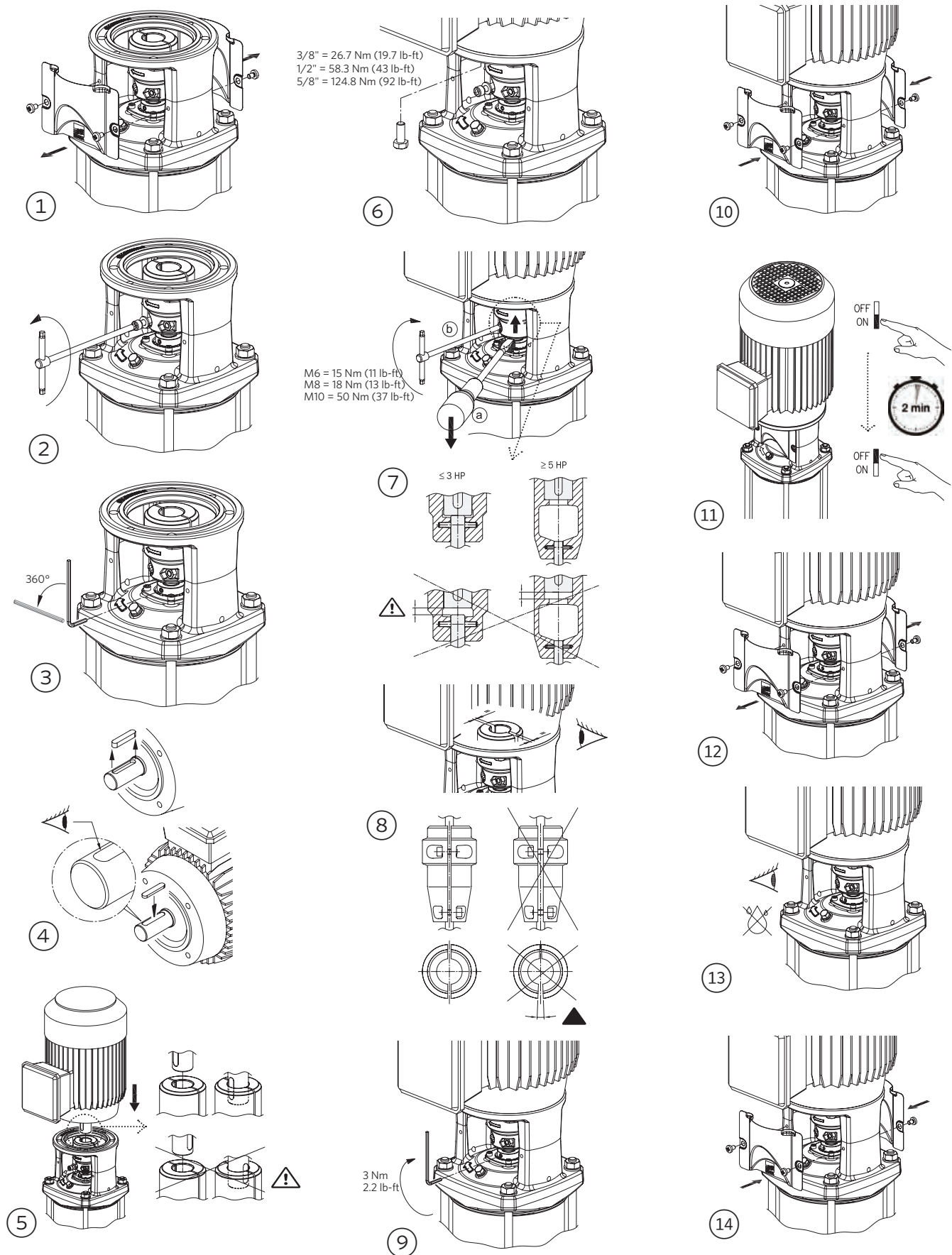
- A Good immersion;
- B Positive slope;
- C Wide-radius bend
- D Pipework with independent supports;
- E Suction pipe diameter \geq pump port diameter;
- F Reducing coupling for eccentric pipes.

FIG. 2

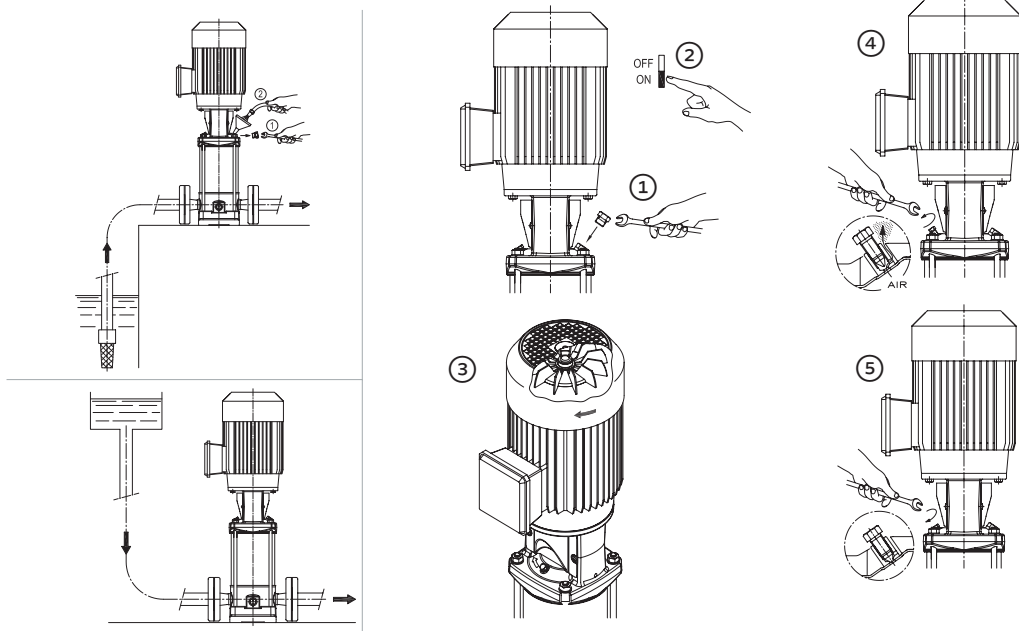


- A Insufficient immersion;
- B Negative slope, air pockets created;
- C Tight bend, pressure loss;
- D Pipe diameter $<$ pump port diameter, pressure loss

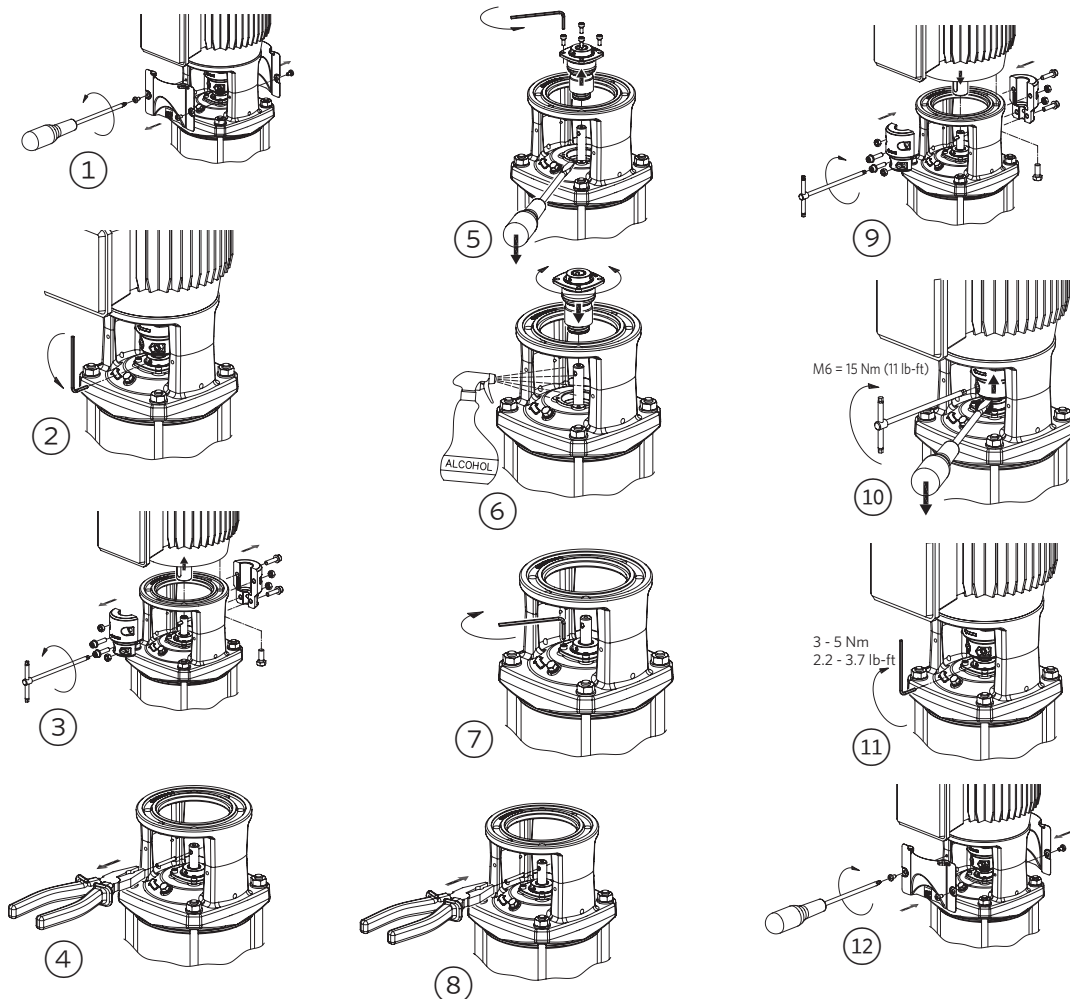
ASSEMBLING THE MOTOR TO THE PUMP - VMS01B TO VMS20B



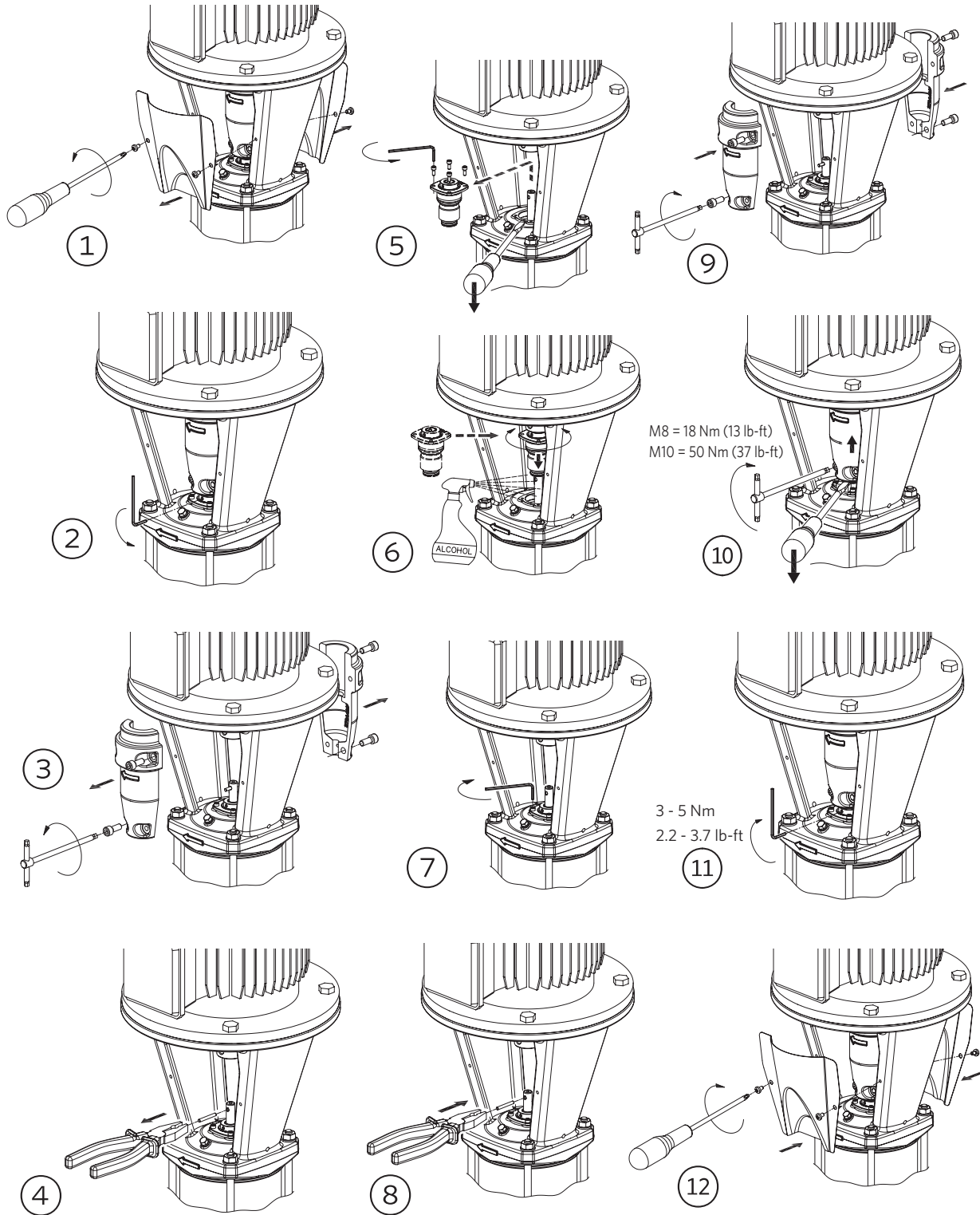
USE, STARTING, AND RUNNING [-B-]



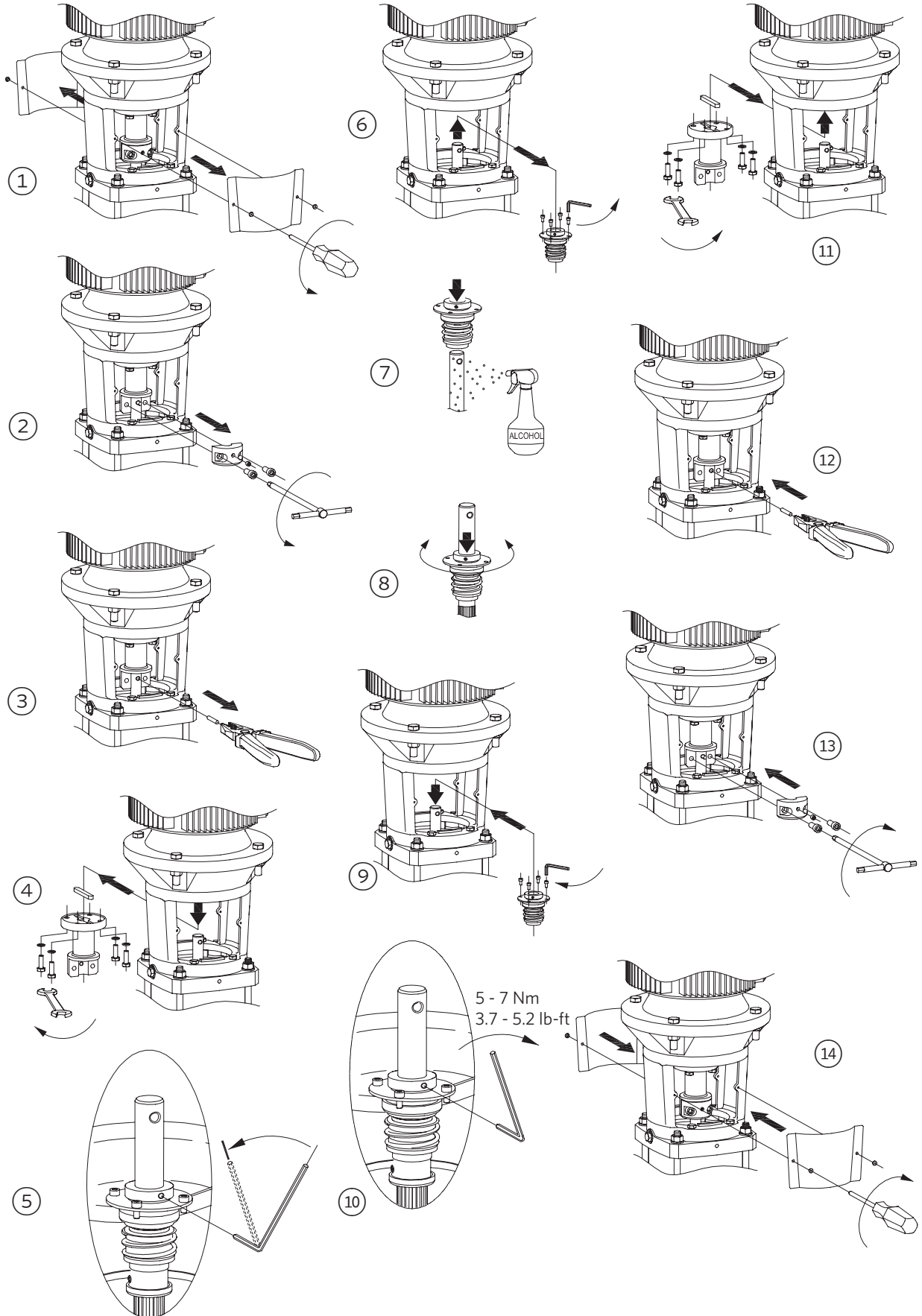
REPLACEMENT OF SHAFT SEAL VMS B 01-03-05-10-15-20 NON-SPACER COUPLING [-C-]



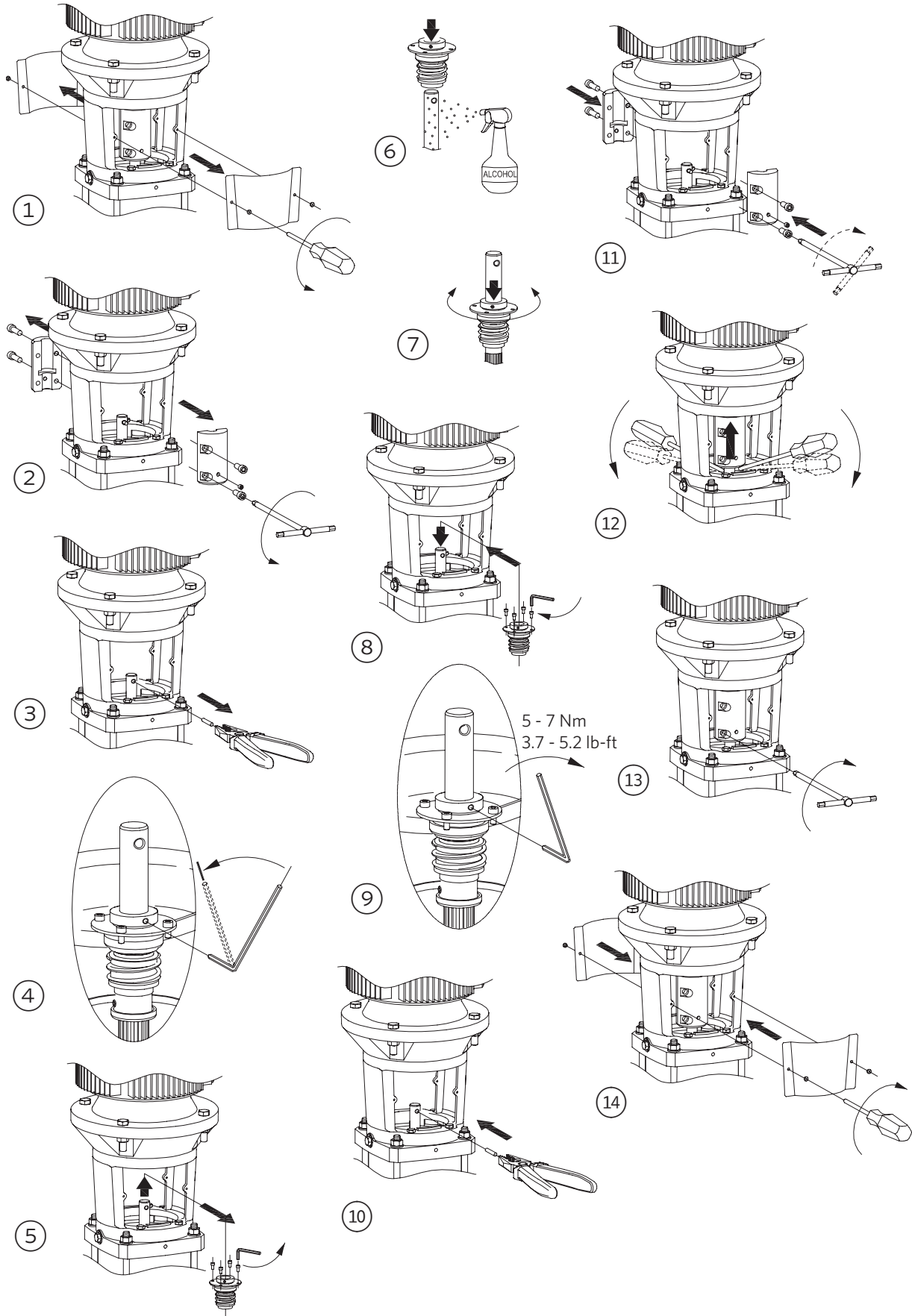
REPLACEMENT OF SHAFT SEAL VMS B 01-03-05-10-15-20 SPACER COUPLING [-C-]



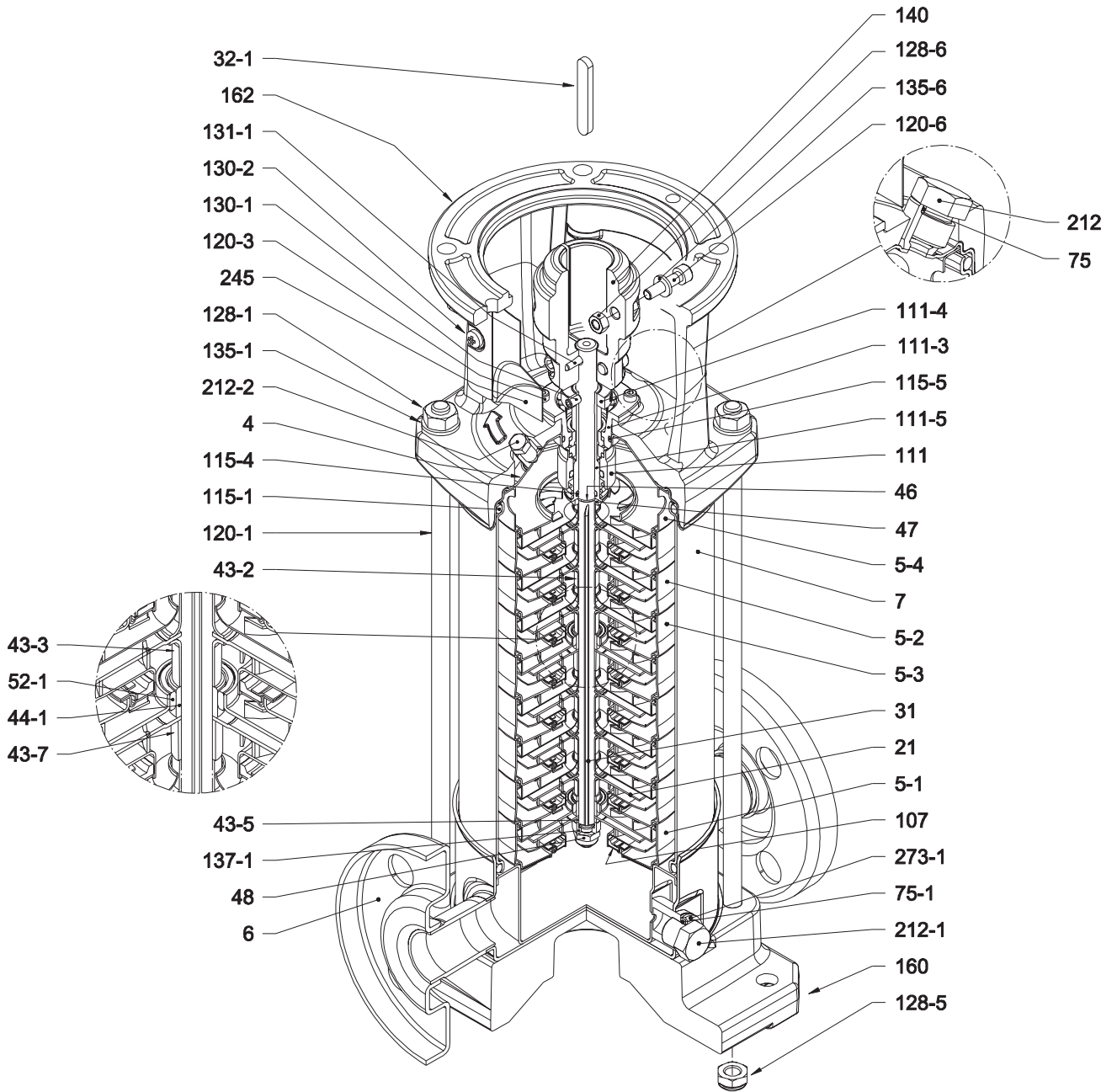
REPLACEMENT OF SHAFT SEAL VMS32-45-64 WITH BEARING [-C-]



REPLACEMENT OF SHAFT SEAL VMS32-45-64 WITHOUT BEARING [-C-]



SECTION VIEW - VMS01B

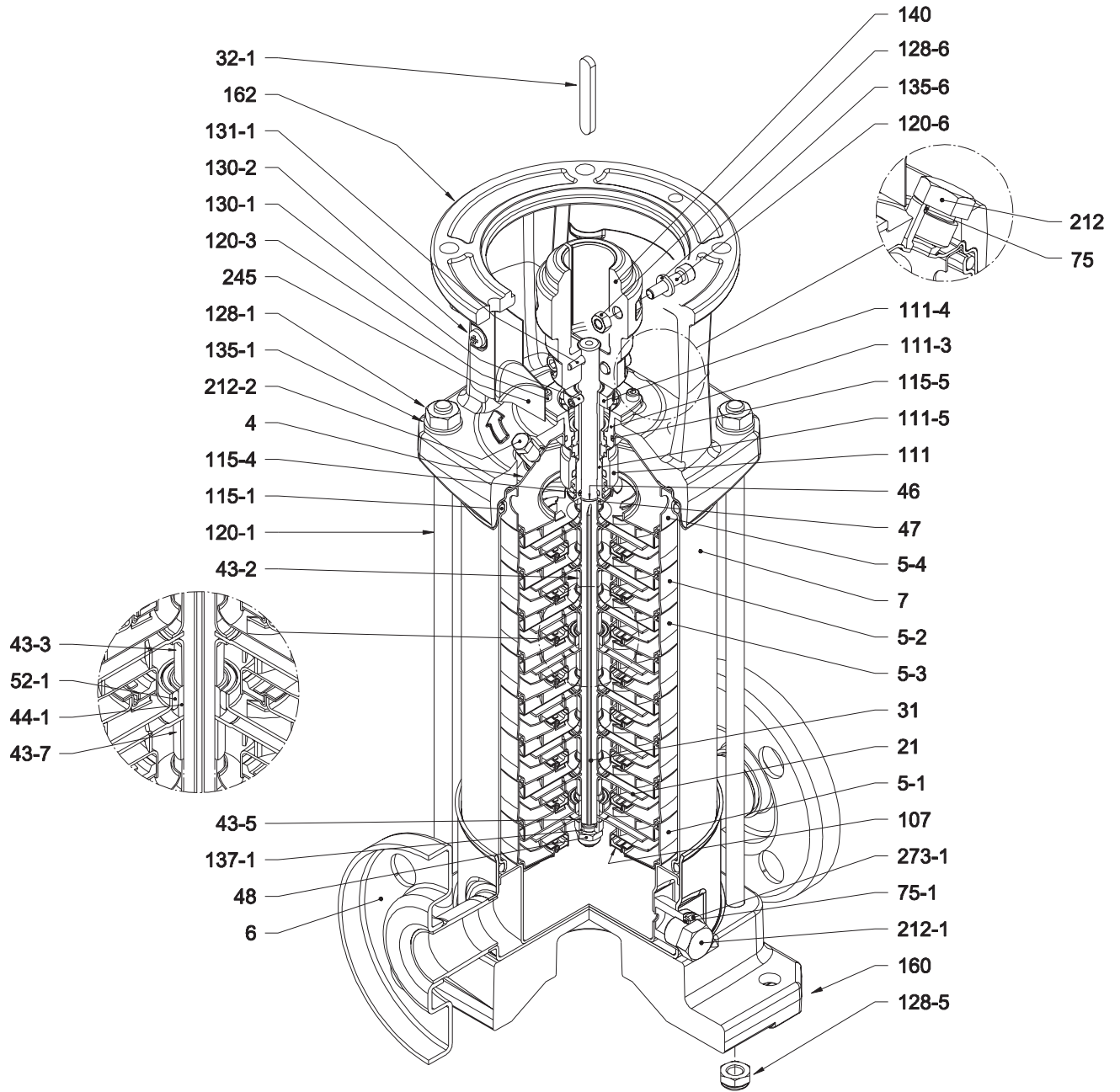


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS01B

NUMBER	PART NAME	MATERIAL		DIMENSIONS [mm]	STANDARD
4	Casing cover	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-1	Suction casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-2	Intermediate Casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-4	Discharge casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
6	Bottom casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
7	Outer casing	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
21	Impeller	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
31	Shaft	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
32-1	Adjuster Key	AISI 304 (EN 1.4301)			
43-2	Shaft sleeve (intermediate)	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)	12×10	
43-3	Shaft sleeve (bearing)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-5	Shaft sleeve (last stage)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-7	Spacer	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)	12×10	
44-1	Shaft sleeve bearing	Tungsten carbide			
45	Flange holder	AISI 304 (EN 1.4301)			
46	Ring (mechanical seal)	AISI 316L (EN 1.4404)			
47	Ring holder	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
48	Impeller nut	A2-70 UNI 7323 with inox insert	A4-70 UNI 7323 with inox insert	M8	
52-1	Bearing	Tungsten carbide			
75	O-Ring (plug)	FPM		D.12.37×2.62	OR 305
75-1	O-Ring (plug)	FPM			
107	Liner ring	AISI 304 (EN 1.4301)+ PPS	AISI 316 (EN 1.4401) + PPS		
111	Mechanical seal	SiC/Carbon/FPM			
111-3	Mechanical seal seat	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
111-4	Seal holder	AISI 304 (EN 1.4301)			
111-5	Mechanical seal cartridge	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
115-1	O-Ring (outer casing)	FPM		D.129.54×5.34	OR 6510
115-3	O-Ring	FPM			
115-4	O-Ring (cartridge sleeve)	FPM		D.11.91×2.62	OR 115
115-5	O-Ring (seal cover)	FPM		D.32.99×2.62	OR 3131
120-1	Tie-rod	Galvanized steel 6.8 strength class ISO 898/1		M10	
120-3	Screw	A2-70 UNI 7323		M4×10	ISO 4762
120-6	Screw for coupling	Galvanized steel		M6×25	ISO 4762
120-11	Screw for counterflange	A2-70 UNI 7323			
128-1	Nut for tie rod	Galvanized steel		M10	UNI 5588
128-5	Nut for tie rod	A2-70 UNI 7323		M10	UNI 7474
128-6	Nut for coupling	Galvanized steel		M6	ISO 4032
130-1	Set screw	A2-70 UNI 7323		M5×8	UNI 5923
130-2	Screw for coupling guard	A2-70 UNI 7323		M5×6	UNI 7687
131-1	Pin for shaft	Carbon Steel		D.4×32	UNI 4838
135-1	Washer	Galvanized steel		D.10.5×21×2	UNI 6592
135-6	Washer	Carbon Steel		Ø6	
137-1	Impeller spacer	AISI 304(EN 1.4301)	AISI 316 (EN 1.4401)		
140	Coupling up to 5 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
160	Base	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
162	Motor bracket	Cast iron EN-GJL-200-EN 1561			
212	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-1	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-2	Venting plug	AISI 316L (EN 1.4404)			
219	Counter flange	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
245	Coupling guard	AISI 304 (EN 1.4301)			
273-1	Plug Washer	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
615	Flange	Nodular Cast Iron			

SECTION VIEW - VMS03B

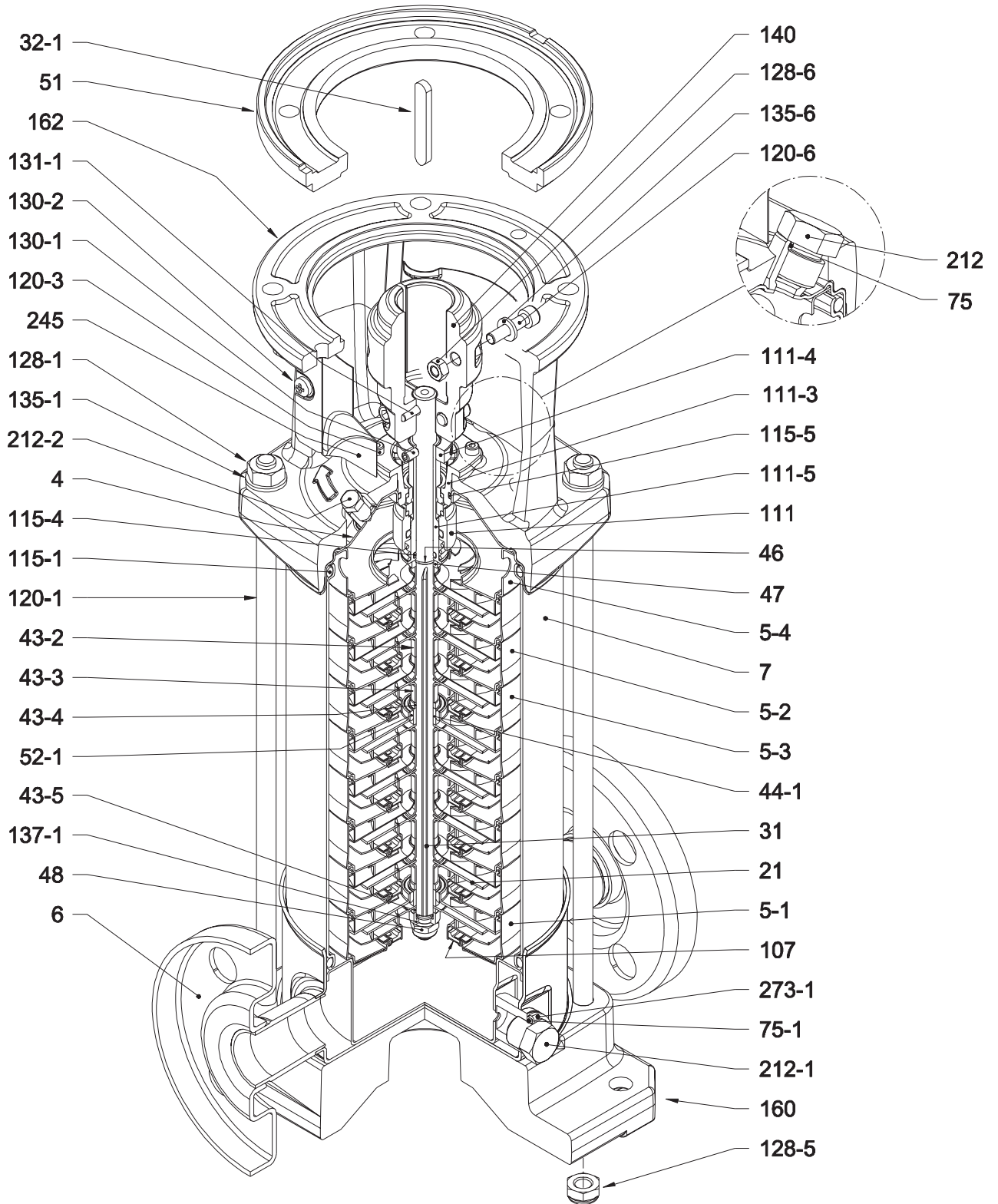


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS03B

NUMBER	PART NAME	MATERIAL		DIMENSIONS [mm]	STANDARD
4	Casing cover	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-1	Suction casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-2	Intermediate casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-4	Discharge casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
6	Bottom casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
7	Outer casing	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
21	Impeller	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
31	Shaft	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
32-1	Adjuster key	AISI 304 (EN 1.4301)			
43-2	Shaf sleeve (intermediate)	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
43-3	Shaft sleeve (bearing)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-5	Shaf sleeve (last stage)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-7	Spacer	AISI 304 (EN 1.4301)		12x10	
44-1	Shaf sleeve bearing	Tungsten carbide			
45	Flange holder	AISI 304 (EN 1.4301)			
46	Ring (mechanical seal)	AISI 316L (EN 1.4404)			
47	Ring holder	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
48	Impeller nut	A2-70 UNI 7323 with inox insert	A4-70 UNI 7323 with inox insert	M8	
52-1	Bearing	Tungsten carbide			
75	O-Ring (plug)	FPM		D.12.37x2.62	OR 3050
75-1	O-Ring (plug)	FPM			
107	Liner ring	AISI 304 (EN 1.4301) PPS	AISI 316 (EN 1.4401) PPS		
111	Mechanical seal	SiC/Carbon/FPM			
111-3	Mechanical seal seat	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
111-4	Seal holder	AISI 304 (EN 1.4301)			
111-5	Mechanical seal cartridge	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
115-1	O-Ring (outer casing)	FPM		D.129.54x5.34	OR 6510
115-3	O-Ring	FPM			
115-4	O-Ring (cartridge sleeve)	FPM		D.11.91x2.62	OR 115
115-5	O-Ring (seal cover)	FPM		D.32.99x2.62	OR 3131
120-1	Tie-rod	Galvanized steel 6.8 strength class ISO 898/1		M10	
120-3	Screw	A2-70 UNI 7323		M4x10	ISO 4762
120-6	Screw for coupling	Galvanized steel		M6x25	ISO 4762
120-11	Screw for counter flange	A2-70 UNI 7323			
128-1	Nut for tie rod	Galvanized steel		M10	UNI 5588
128-5	Nut for tie rod	A2-70 UNI 7323		M10	UNI 7474
128-6	Nut for coupling	Galvanized steel		M6	ISO 4032
310-1	Set screw	A2-70 UNI 7323		M5x8	UNI 5923
130-2	Screw for coupling guard	A2-70 UNI 7323		M5x6	UNI 7687
131-1	Pin for shaf	Carbon Steel		D.4x32	UNI 4838
135-1	Washer	Galvanized steel		D.10.5x21x2	UNI 6592
135-6	Washer	Carbon Steel		Ø6	
137-1	Impeller spacer	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
140	Coupling up to 5 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
160	Base	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
162	Motor bracket	Cast iron EN-GJL-200-EN 1561			
212	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-1	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-2	Venting plug	AISI 316L (EN 1.4404)			
219	Counter flange	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
245	Coupling guard	AISI 304 (EN 1.4301)			
273-1	Plug washer	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
615	Flange	Nodular Cast Iron			

SECTION VIEW - VMS05B

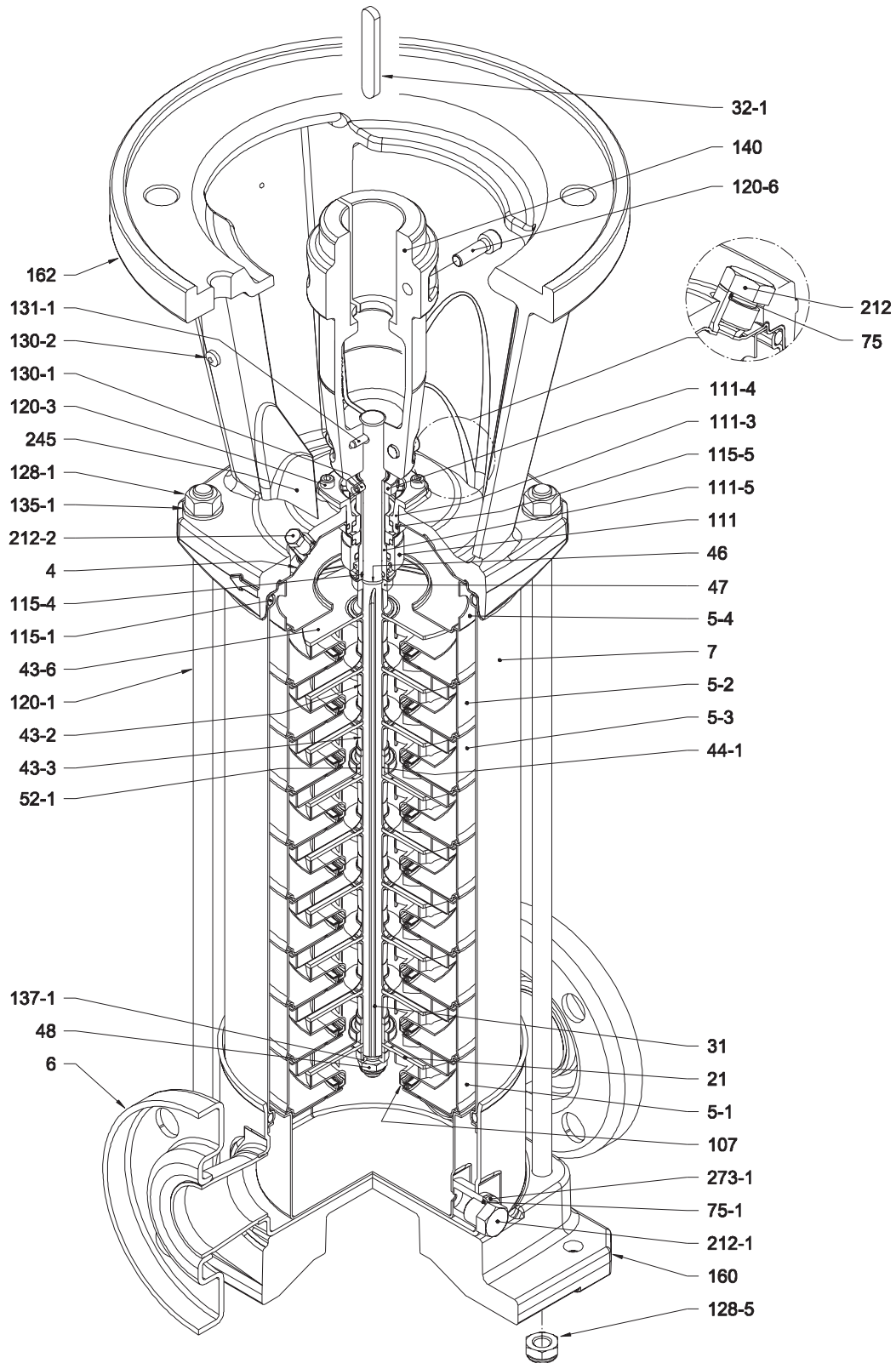


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS05B

N°	PART NAME		MATERIAL		DIMENSIONS [mm]	STANDARD
4	Casing cover		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-1	Suction casing		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-2	Intermediate casing		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-4	Discharge casing		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
6	Bottom casing		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
7	Outer casing		AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
21	Impeller		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
31	Shaft		AISI 304 (EN 1.4301) - AISI 329A (EN 1.4462)	AISI 316L (EN 1.4404) - AISI 329A (EN 1.4462)		
32-1	Adjuster key		AISI 304 (EN 1.44301)			
43-2	Shaft sleeve (intermediate)		AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
43-3	Shaft sleeve (bearing)		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-4	Shaft sleeve (adjustment)		AISI 316L (EN 1.4404)			
43-5	Shaft sleeve (last stage)		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
44-1	Shaft sleeve bearing		Tungsten carbide			
45	Flange holder		AISI 304 (EN 1.4301)			
46	Ring (mechanical seal)		AISI 316L (EN 1.4404)			
47	Ring holder		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
48	Impeller nut		A2-70 UNI 7323 with inox insert	A4-70 UNI 7323 with inox insert	M8	
51	Motor adapter		Cast iron EN-GJL-200-EN 1561			
51-1	Bearing		Tungsten carbide			
75	O-ring (plug)		FPM		D.12.37×2.62	OR 3050
75-1	O-ring (plug)		FPM			
107	Liner ring		AISI 304 (EN 1.4301)+ PPS	AISI 316 (EN 1.4401) + PPS		
111	Mechanical seal		SiC/Carbon/FPM			
111-3	Mechanical seal seat		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
111-4	Seal holder		AISI 304 (EN 1.4301)			
111-5	Mechanical seal cartridge		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
115-1	O-ring (outer casing)		FPM		D. 129.54×5.34	OR 6510
115-3	O-ring		FPM			
115-4	O-ring (cartridge sleeve)		FPM		D. 11.91×2.62	OR 115
115-5	O-ring (seal cover)		FPM		D. 32.99×2.62	OR 3131
120-1	Tie-rod		Galvanized steel 6.8 strength class ISO 898/1		M10	
120-3	Screw		A2-70 UNI 7323		M4×10	ISO 4762
120-6	Screw for coupling	Up to 5 hp	Galvanized steel		M6×25	ISO 4762
		Above 7.5 hp	Galvanized steel		M8×20	ISO 4762
120-11	Screw for counterflange		A2-70 UNI 7323			
128-1	Nut for tie rod		Galvanized steel		M10	UNI 5588
128-5	Nut for tie rod		A2-70 UNI 7323		M10	UNI 7474
128-6	Nut for coupling		Galvanized steel		M6	ISO 4032
130-1	Set screw		A2-70 UNI 7323		M5×8	UNI 5923
130-2	Screw for coupling guard		A2-70 UNI 7323		M5×6	UNI 7687
131-1	Pin for shaft		Carbon Steel		D.4×32	UNI 4838
135-1	Washer		Galvanized steel		D.10.5×21×2	UNI 6592
135-6	Washer		Carbon Steel		Ø6	
137-1	Impeller spacer		AISI 304(EN 1.4301)	AISI 316 (EN 1.4401)		
140	Coupling	Up to 55 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
		Above 7.5 hp	Cast Iron			
160	Base		Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
162	Motor bracket		Cast iron EN-GJL-200-EN 1561			
212	Plug		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G $\frac{3}{8}$ (BSPP)	
212-1	Plug		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G $\frac{3}{8}$ (BSPP)	
212-2	Venting plug		AISI 316L (EN 1.4404)			
219	Counter flange		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
245	Coupling guard		AISI 304 (EN 1.4301)			
273-1	Plug washer		AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
615	Flange		Nodular Cast Iron			

SECTION VIEW - VMS10B

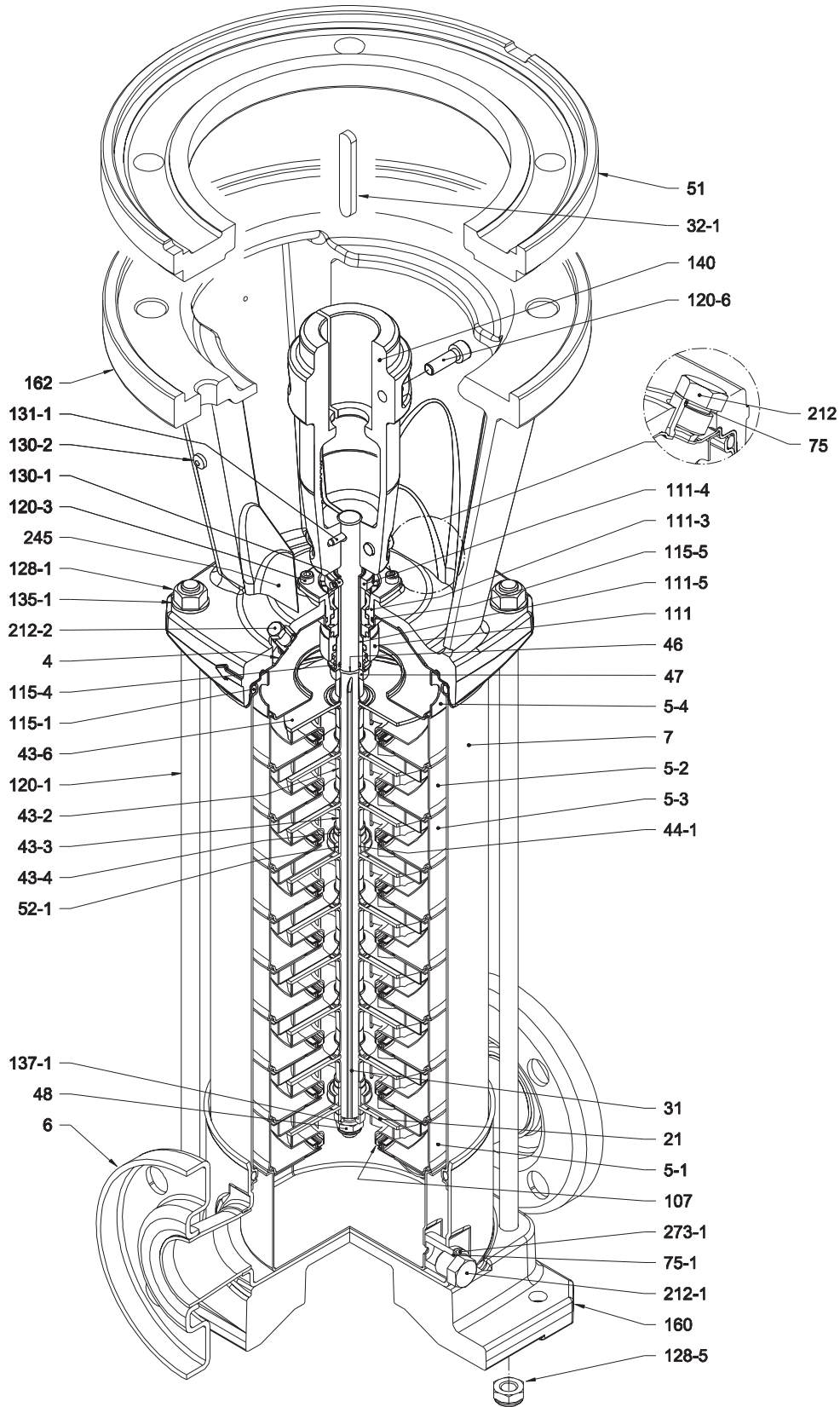


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS10B

N°	PART NAME		MATERIAL	DIMENSIONS [mm]	STANDARD
4	Casing cover		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-1	Suction casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-2	Intermediate casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-4	Discharge casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
6	Bottom casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
7	Outer casing		AISI 304 (EN 1.4301) AISI 316L (EN 1.4404)		
21	Impeller		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
31	Shaft		AISI 304 (EN 1.4301) AISI 316L (EN 1.4404)		
32-1	Adjuster key		AISI 304 (EN 1.4301)		
43-2	Shaft sleeve (intermediate)		AISI 304 (EN 1.4301) AISI 316L (EN 1.4404)		
43-3	Shaft sleeve (bearing)		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
43-6	Washer		AISI 316L (EN 1.4404)	D.26x1.2	
44-1	Shaft sleeve bearing		Tungsten carbide		
45	Flange holder		AISI 304 (EN 1.4301)		
46	Ring (mechanical seal)		AISI 316L (EN 1.4404)		
47	Ring holder		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
48	Impeller nut		A2-70 UNI 7323 with inox insert A4-70 UNI 7323 with inox insert	M10	
52-1	Bearing		Tungsten carbide		
75	O-ring (plug)		FPM	D. 12.37x2.62	OR 3050
75-1	O-ring (plug)		FPM		
107	Liner ring		AISI 304 (EN 1.4301)+ PPS AISI 316 (EN 1.4401) + PPS		
111	Mechanical seal		SiC/Carbon/FPM		
111-3	Mechanical seal seat		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
111-4	Seal holder		AISI 304 (EN 1.4301)		
111-5	Mechanical seal cartridge		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
115-1	O-ring (outer casing)		FPM	D. 164,46x5,34	OR 6645
115-3	O-ring		FPM		
115-4	O-ring (cartridge sleeve)		FPM	D. 15,88x2,62	OR 121
115-5	O-ring (seal cover)		FPM	D. 37,77x2,62	OR 3150
120-1	Tie-rod		Galvanized steel 6.8 strength class iso 8981	M12	
120-3	Screw		A2-70 UNI 7323	M5x12	ISO 4762
120-6	Screw for coupling	Up to 5 hp	Galvanized steel	M6x25	ISO 4762
		Above 7.5 hp to 11 hp		M8x20	ISO 4762
		Above 15 hp		M10x30	ISO 4762
120-11	Screw for counterflange		A2-70 UNI 7323		
128-1	Nut for tie rod		Galvanized steel	M12	UNI 5588
128-5	Nut for tie rod		Galvanized steel	M12	UNI 7474
130-1	Set screw		A2-70 UNI 7323	M5x8	UNI 5923
130-2	Screw for coupling guard		A2-70 UNI 7323	M5x6	UNI 7687
131-1	Pin for shaft		Carbon Steel	D. 5x32	UNI 4838
135-1	Washer		Galvanized steel	D. 13x24x2,5	UNI 6592
137-1	Impeller spacer		AISI 304(EN 1.4301) AISI 316 (EN 1.4401)		
140	Coupling	Up to 55 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)		
		Above 7.5 hp		Cast Iron	
160	Base		Die cast Aluminium EN AB-AISI11Cu2 (Fe)		
162	Motor bracket		Cast iron EN-GJL-200-EN 1561		
212	Plug		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-1	Plug		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)	G¾ (BSPP)	
212-2	Venting plug		AISI 316L (EN 1.4404)		
219	Counter flange		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
245	Coupling guard		AISI 304 (EN 1.4301)		
273-1	Plug washer		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
615	Flange		Nodular Cast Iron		

SECTION VIEW - VMS15B

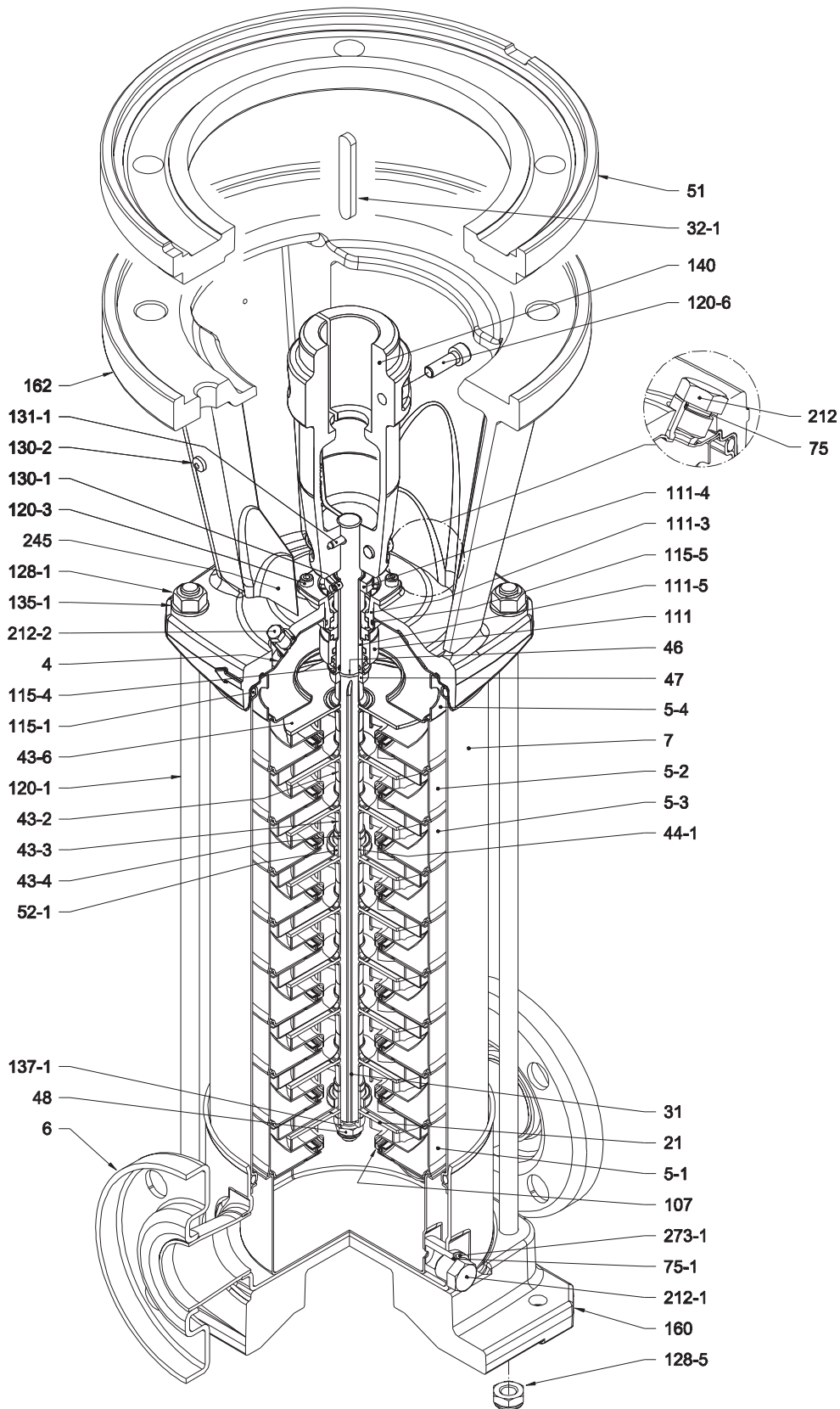


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS15B

N°	PART NAME	MATERIAL		DIMENSIONS [mm]	STANDARD
4	Casing cover	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-1	Suction casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-2	Intermediate casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
5-4	Discharge casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
6	Bottom casing	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
7	Outer casing	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
21	Impeller	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
31	Shaft	AISI 304 (EN 1.4301) - AISI 329A (EN 1.4462)	AISI 316L (EN 1.4404) - AISI 329A (EN 1.4462)		
32-1	Adjuster key	AISI 304 (EN 1.4301)			
43-2	Shaft sleeve (intermediate)	AISI 304 (EN 1.4301)	AISI 316L (EN 1.4404)		
43-3	Shaft sleeve (bearing)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-4	Shaft sleeve (adjustment)	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
43-6	Washer	AISI 316L (EN 1.4404)		D. 26×1.2	
44-1	Shaft sleeve bearing	Tungsten carbide			
45	Flange holder	AISI 304 (EN 1.4301)			
46	Ring (mechanical seal)	AISI 316L (EN 1.4404)			
47	Ring holder	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
48	Impeller nut	A2-70 UNI 7323 with inox insert	A4-70 UNI 7323 with inox insert	M10	
51	Motor adapter	Cast iron EN-GJL-200-EN 1561			
51-1	Bearing	Tungsten carbide			
75	O-ring (plug)	FPM		D. 12.37×2.62	OR 3050
75-1	O-ring (plug)	FPM			
107	Liner ring	AISI 304 (EN 1.4301)+ PPS	AISI 316 (EN 1.4401) + PPS		
111	Mechanical seal	SiC/Carbon/FPM			
111-3	Mechanical seal seat	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
111-4	Seal holder	AISI 304 (EN 1.4301)			
111-5	Mechanical seal cartridge	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
115-1	O-ring (outer casing)	FPM		D. 164.46×5.34	OR 6645
115-3	O-ring	FPM			
115-4	O-ring (cartridge sleeve)	FPM		D. 15.88×2.62	OR 121
115-5	O-ring (seal cover)	FPM		D. 37.77×2.62	OR 3150
120-1	Tie-rod	Galvanized steel 6.8 strength class ISO ^{89%} 4		M12	
120-3	Screw	A2-70 UNI 7323		M5×12	ISO 4762
120-6	Screw for coupling	Up to 5 hp	Galvanized steel	M6×25	ISO 4762
		Above 7.5 hp to 11 hp		M8×20	ISO 4762
		Above 15 hp		M10×30	ISO 4762
120-11	Screw for counterflange	A2-70 UNI 7323			
128-1	Nut for tie rod	Galvanized steel		M12	UNI 5588
128-5	Nut for tie rod	Galvanized steel		M12	UNI 7474
130-1	Set screw	A2-70 UNI 7323		M5×8	UNI 5923
130-2	Screw for coupling guard	A2-70 UNI 7323		M5×6	UNI 7687
131-1	Pin for shaft	Carbon Steel		D. 5×32	UNI 4838
135-1	Washer	Galvanized steel		D. 13×24×2.5	UNI 6592
137-1	Impeller spacer	AISI 304(EN 1.4301)	AISI 316 (EN 1.4401)		
140	Coupling	Up to 55 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)		
		Above 7.5 hp	Cast Iron EN-GJL-200-EN 1561		
160	Base	Die cast Aluminium EN AB-AISI11Cu2 (Fe)			
162	Motor bracket	Cast iron EN-GJL-200-EN 1561			
212	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G 3/8 (BSPP)	
212-1	Plug	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)	G 3/8 (BSPP)	
212-2	Venting plug	AISI 316L (EN 1.4404)			
219	Counter flange	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
245	Coupling guard	AISI 304 (EN 1.4301)			
273-1	Plug washer	AISI 304 (EN 1.4301)	AISI 316 (EN 1.4401)		
615	Flange	Carbon Steel			

SECTION VIEW - VMS20B

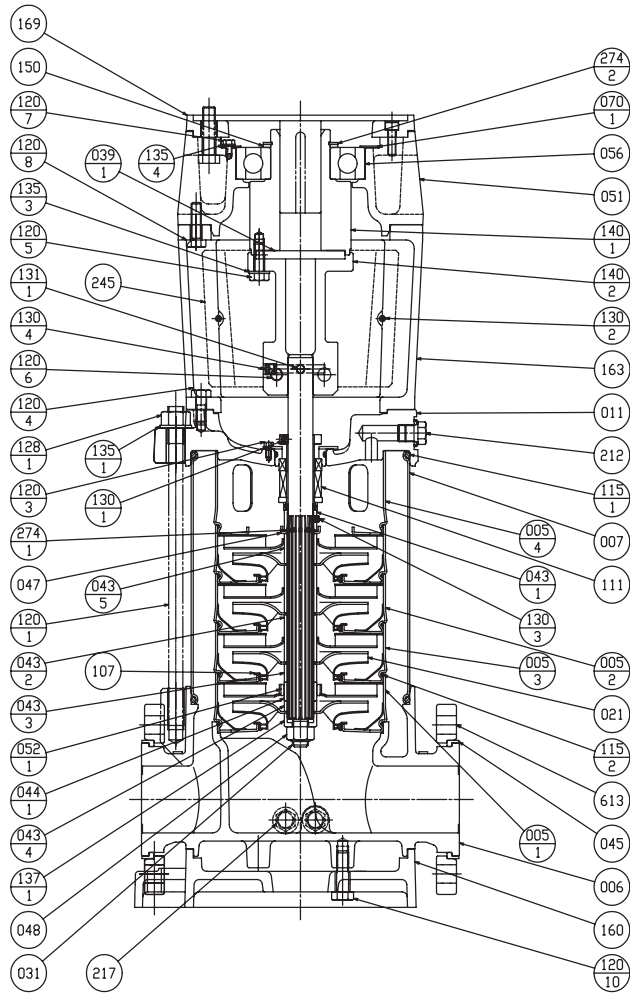
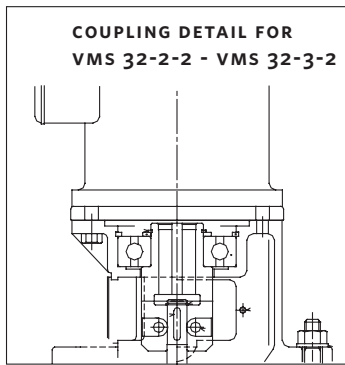
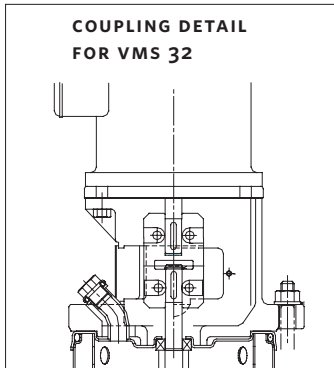


WITH ROUND (ANSI COMPATIBLE) FLANGE (F)

SECTIONAL VIEW PART REFERENCE - VMS20B

N°	PART NAME		MATERIAL	DIMENSIONS [mm]	STANDARD
4	Casing cover		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-1	Suction casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-2	Intermediate casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-3	Intermediate casing bearing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
5-4	Discharge casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
6	Bottom casing		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
7	Outer casing		AISI 304 (EN 1.4301) AISI 316L (EN 1.4404)		
21	Impeller		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
31	Shaft		AISI 304 (EN 1.4301) - AISI 329A (EN 1.4462) AISI 316L (EN 1.4404) - AISI 329A (EN 1.4462)		
32-1	Adjuster key		AISI 304 (EN 1.4301)		
43-2	Shaft sleeve (intermediate)		AISI 304 (EN 1.4301) AISI 316L (EN 1.4404)		
43-3	Shaft sleeve (bearing)		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
43-4	Shaft sleeve (adjustment)		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
43-6	Washer		AISI 316L (EN 1.4404)	D. 26x1.2	
44-1	Shaft sleeve bearing		Tungsten carbide		
45	Flange holder		AISI 304 (EN 1.4301)		
46	Ring (mechanical seal)		AISI 316L (EN 1.4404)		
47	Ring holder		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
48	Impeller nut		A2-70 UNI 7323 with inox insert A4-70 UNI 7323 with inox insert	M10	
51	Motor adapter		Cast iron EN-GJL-200-EN 1561		
51-1	Bearing		Tungsten carbide		
75	O-ring (plug)		FPM	D. 12.37x2.62	OR 3050
75-1	O-ring (plug)		FPM		
107	Liner ring		AISI 304 (EN 1.4301)+ PPS AISI 316 (EN 1.4401) + PPS		
111	Mechanical seal		SiC/Carbon/FPM		
111-3	Mechanical seal seat		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
111-4	Seal holder		AISI 304 (EN 1.4301)		
111-5	Mechanical seal cartridge		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
115-1	O-ring (outer casing)		FPM	D. 164.46x5.34	OR 6645
115-3	O-ring		FPM		
115-4	O-ring (cartridge sleeve)		FPM	D. 15.88x2.62	OR 121
115-5	O-ring (seal cover)		FPM	D. 37.77x2.62	OR 3150
120-1	Tie-rod		Galvanized steel 6.8 strength class ISO 89/1	M12	
120-3	Screw		A2-70 UNI 7323	M5x12	ISO 4762
120-6	Screw for coupling	Up to 5 hp	Galvanized steel	M6x25	ISO 4762
		Above 7.5 hp to 11 hp		M8x20	ISO 4762
		Above 15 hp		M10x30	ISO 4762
120-11	Screw for counterflange		A2-70 UNI 7323		
128-1	Nut for tie rod		Galvanized steel	M12	UNI 5588
128-5	Nut for tie rod		Galvanized steel	M12	UNI 7474
130-1	Set screw		A2-70 UNI 7323	M5x8	UNI 5923
130-2	Screw for coupling guard		A2-70 UNI 7323	M5x6	UNI 7687
131-1	Pin for shaft		Carbon Steel	D. 5x32	UNI 4838
135-1	Washer		Galvanized steel	D. 13x24x2.5	UNI 6592
137-1	Impeller spacer		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
140	Coupling	Up to 5 hp	Die cast Aluminium EN AB-AISI11Cu2 (Fe)		
		Above 7.5 hp	Cast Iron EN-GJL-200-EN 1561		
160	Base		Die cast Aluminium EN AB-AISI11Cu2 (Fe)		
162	Motor bracket		Cast iron EN-GJL-200-EN 1561		
212	Plug		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)	G 3/8 (BSPP)	
212-1	Plug		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)	G 3/8 (BSPP)	
212-2	Venting plug		AISI 316L (EN 1.4404)		
219	Counter flange		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		
245	Coupling guard		AISI 304 (EN 1.4301)		
273-1	Plug washer		AISI 304 (EN 1.4301) AISI 316 (EN 1.4401)		

SECTION VIEW - VMS32

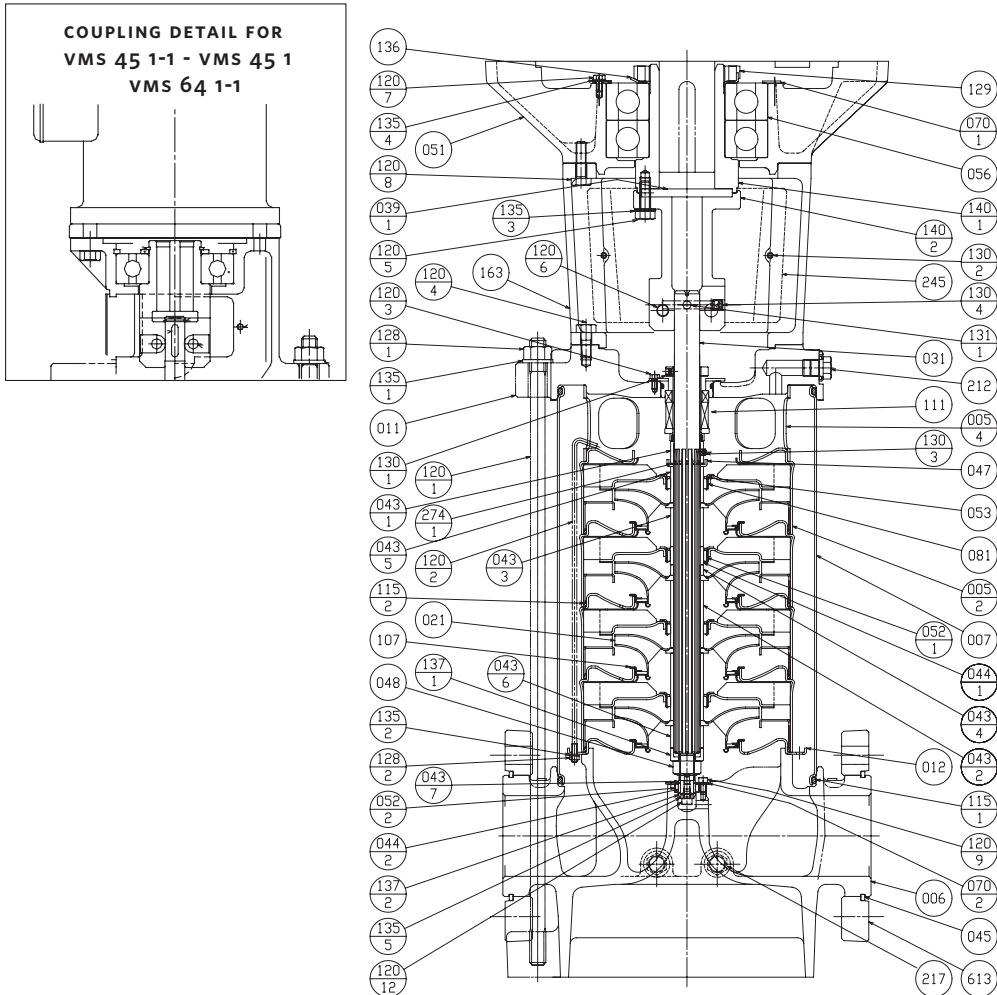


(FOR REFERENCE ONLY. SEE PRICING FOR PART AVAILABILITY.)

SECTIONAL VIEW PART REFERENCE - VMS32

NO.	PART NAME	MATERIAL
005-1	Stage casing (suction)	AISI304 AISI316
005-2	Stage casing	AISI304 AISI316
005-3	Stage casing (bearing)	AISI304 AISI316
005-4	Stage casing (top)	AISI304 AISI316
006	Bottom casing	Cast iron EN-GJL-250 Cast AISI316 (G-X6CrNiMo180)
007	Outer sleeve	AISI304 AISI316
011	Casing cover	Cast iron EN-GJS-400-15 Cast iron EN-GJS-400-15+AISI304
021	Impeller	AISI304 AISI316
031	Shaft	AISI316
039-1	Key (coupling)	C45
043-1	Shaft sleeve (mechanical seal)	AISI304 AISI316
043-2	Shaft sleeve (stage)	AISI304 AISI316
043-3	Shaft sleeve (bearing/upper)	AISI304 AISI316
043-4	Shaft sleeve (bearing/lower)	AISI304 AISI316
043-5	Shaft sleeve (top)	AISI304 AISI316
044-1	Bearing sleeve (stage)	Tungsten carbide
045	Adjusting ring	C40
047	Split ring retainer	AISI304 AISI316
048	Friction nut	AISI304 AISI316
051	Bearing housing	Cast iron EN-GJL-200
052-1	Bearing (stage)	Tungsten carbide
056	Ball bearing	—
070-1	Bearing holder	AISI304
107	Wear ring	AISI316+PTFE
111	Mechanical seal Cartridge ass'y	SiC/Carbon/FPM/316
115-1	O-ring (outer)	FPM
115-2	O-ring (stage)	FPM
120-1	Tie-rod bolt	Zincate steel with 6.8 strength class iso 89% 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 with 8.8 strength class iso 89% ₁
120-6	Bolt (coupling P-side)	Zincate steel with 8.8 strength class iso 89% ₁
120-7	Bolt (bearing)	Zincate steel with 8.8 strength class iso 89% ₁
120-8	Bolt (bearing housing)	Zincate steel with 8.8 strength class iso 89% ₁
120-10	Bolt (base plate)	Zincate steel with 8.8 strength class iso 89% ₁
128-1	Nut (tie-rod bolt)	Zincate steel with 6S strength class iso 89% 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 ISO89% 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 end sleeve	AISI304 AISI316
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)	AISI304/FPM AISI316/FP M
217	Plug (with seal ring)	AISI304/FPM AISI316/FP M
245	Coupling guard	AISI304
274-1	C-ring (top)	AISI304 AISI316
274-2	C-ring (coupling)	Carbon tool steel (TC 80)
613	Pump flange	C40

SECTION VIEW - VMS45 & VMS 64



(FOR REFERENCE ONLY. SEE PRICING FOR PART AVAILABILITY.)

SECTIONAL VIEW PART REFERENCE - VMS45 & VMS64

NO.	PART NAME	MATERIAL	
005-2	Stage casing	AISI304	AISI316
005-4	Top casing	AISI304	AISI316
006	Bottom casing	16bar:Cast iron EN-GJL-250	Cast AISI316 (G-X6CrNiMo180)
		25bar:Cast iron EN-GJS-400-15	
007	Outer sleeve	AISI304	AISI316
011	Casing cover	Cast iron EN-GJS-400-15	Cast iron EN-GJS-400-15+AISI316
012	Suction cover	AISI304	AISI316
021	Impeller	AISI304	AISI316
031	Shaft	AISI316	
039-1	Key (coupling)	C45	
043-1	Shaft sleeve (mechanical seal)	AISI304	AISI316
043-2	Shaft sleeve (stage)	AISI304	AISI316
043-3	Shaft sleeve (bearing/upper)	AISI304	AISI316
043-4	Shaft sleeve (bearing/lower)	AISI304	AISI316
043-5	Shaft sleeve (top)	AISI304	AISI316
043-6	Shaft sleeve (suction)	AISI304	AISI316

NO.	PART NAME	MATERIAL
043-7	Shaft sleeve (bottom bearing)	AISI304 AISI316
044-1	Bearing sleeve (stage)	Tungsten carbide
044-2	Bearing sleeve (bottom bearing)	Tungsten carbide
045	Adjusting ring	C40
047	Split ring retainer	AISI304 AISI316
048	Friction nut	AISI304 AISI316
051	Bearing housing	Cast iron EN-GJL-200
052-1	Bearing (stage)	Tungsten carbide
052-2	Bearing (bottom)	Tungsten carbide
053	Bush holder	AISI304 AISI316
056	Ball bearing	—
070-1	Bearing holder	AISI304
070-2	Bearing holder (bottom bearing)	AISI304 AISI316
081	Bush	PTFE(alloy)
107	Wear ring	AISI316+PTFE
111	Mechanical seal Cartridge assy	SiC/Carbon/FPM/316
115-1	O-ring (outer)	FPM
115-2	O-ring (stage)	FPM
120-1	Tie-rod bolt	Zincate steel with 6.8 strength class ISO 898/1
120-2	Stack bolt	AISI304 AISI316
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 with 8.8 strength class ISO 898/1
120-6	Bolt (coupling P-side)	Zincate steel with 8.8 strength class ISO 898/1
120-7	Bolt (bearing)	Zincate steel with 8.8 strength class ISO 898/1
120-8	Bolt (bearing housing)	Zincate steel with 8.8 strength class ISO 898/1
120-9	Bolt (bottom bearing)	Stainless steel A2-70 ISO3506
120-12	Bolt (shaft end)	Stainless steel A2-70 ISO3506
128-1	Nut (tie-rod bolt)	Zincate steel with 6S strength class ISO 898/2
128-2	Nut (Stack bolt)	AISI304
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 ISO898/5
131-1	Pin (shaft)	CF35SMnPb10
135-1	Washer (tie-rod bolt)	Zincate steel
135-2	Spring washer (Stack bolt)	AISI304 AISI316
135-3	Spring washer (coupling bolt M-side)	Zincate steel
135-4	Spring washer (bearing)	Zincate steel
135-5	Spring washer (shaft end)	AISI304 AISI316
136	Bearing washer (coupling)	Carbon steel
137-1	Shaft end sleeve	AISI304 AISI316
137-2	Shaft end sleeve	AISI304 AISI316
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)	AISI304/FPM AISI316/FPM
217	Plug (with seal ring)	AISI304/FPM AISI316/FPM
245	Coupling guard	AISI304
274-1	C-ring (top)	AISI304 AISI316
613	Pump flange	C40

TORONTO

23 BERTRAND AVENUE
TORONTO, ONTARIO
CANADA
M1L 2P3
+1 416 755 2291

BUFFALO

93 EAST AVENUE
NORTH TONAWANDA, NEW YORK
U.S.A.
14120-6594
+1 716 693 8813

BIRMINGHAM

HEYWOOD WHARF, MUCKLOW HILL
HALESOWEN, WEST MIDLANDS
UNITED KINGDOM
B62 8DJ
+44 (0) 8444 145 145

MANCHESTER

WOLVERTON STREET
MANCHESTER
UNITED KINGDOM
M11 2ET
+44 (0) 8444 145 145

BANGALORE

#59, FIRST FLOOR, 3RD MAIN
MARGOSA ROAD, MALLESWARAM
BANGALORE, INDIA
560 003
+91 (0) 80 4906 3555

SHANGHAI

UNIT 903, 888 NORTH SICHUAN RD.
HONGKOU DISTRICT, SHANGHAI
CHINA
200085
+86 (0) 21 5237 0909

SÃO PAULO

RUA JOSÉ SEMIÃO RODRIGUES AGOSTINHO,
1370 GALPÃO 6
EMBU DAS ARTES
SAO PAULO, BRAZIL
+55 11 4781 5500

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