Installation, Operation & Maintenance Manual

Split Coupled Vertical In-line Pumps

BVL

1 - 500 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Barmesa product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Barmesa Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER

Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

This pump is **not** intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER

Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 77º F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER

Do not lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER

Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER

These pumps are **not** to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

Model Number: _____

Serial: _____

Amps:_____ Voltage:_____

Phase:_____ HP:_____

CASING: Cast iron ASTM A-48 class 30, horizontal suction and discharge. 150 PSI rated flange. With lubrication, drainage and pressure connections.

IMPELLER: Close type, cast iron ASTM A-48 class 30 or bronze ASTM-B584, Gr. C84400.

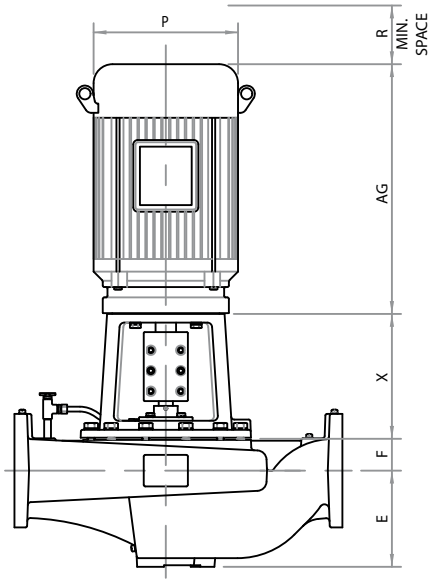
SPLIT COUPLING: Aluminum 6061-T6.

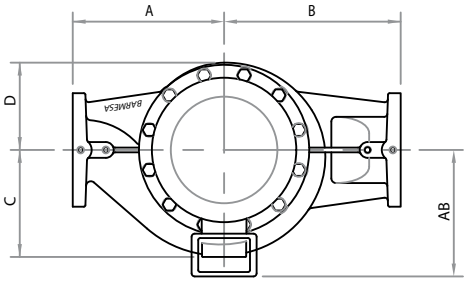
SHAFT: Stainless Steel 416.

COUPLING: Cast iron ASTM A-48 class 30.

MECHANICAL SEAL: Carbon/Silicon Carbide-Viton-SS304

ELECTRIC MOTOR: TEFC or ODP, vertical, "C" flange and standard shaft.





Size	Dimensions					
	A	B	C	D	E	F
1.5 x 1.5 x 6	7	7.25	4.5	4.5	4.5	1.75
2 x 2 x 6	8	7	5.25	4.5	4.88	1.88
3 x 3 x 6	9.75	8.25	5.88	4.75	6	1.88
4 x 4 x 6	12	10	5.88	4.75	7.75	2.25
6 x 6 x 6	17.5	12	8.5	6.35	9.68	4
1.5 x 1.5 x 8	8	8	5.75	5.75	4.63	2.5
2 x 2 x 8	9.5	8.5	5.75	5.75	5.13	2.5
3 x 3 x 8	12	10	6.75	5.75	6.38	2.5
4 x 4 x 8	14	11	8	6.25	8	2.5
5 x 5 x 8	13	12	7.5	6.25	8	2.5
6 x 6 x 8	19.5	13.5	9.75	7.5	10.38	3.25
8 x 8 x 8	22	16	11	8.5	11.5	5.5
2 x 2 x 10	10	9	6.75	6.75	5.38	2.5
3 x 3 x 10	11.5	9.5	7.25	6.75	5.5	2.5
4 x 4 x 10	14	12	7.75	6.88	7.63	2.5
6 x 6 x 10	17	15	10.63	8.25	8.13	2.5
8 x 8 x 10	22	17	11.5	9	9.75	3
4 x 4 x 11.5	15.25	12.75	8.16	7.38	7.69	2.5
5 x 5 x 11.5	17.25	13.75	9.03	8.03	8.88	2.75
6 x 6 x 11.5	18.5	16.5	9.88	8.56	9.75	2.75
8 x 8 x 11.5	22	17.5	12	9.63	10	3.25
3 x 3 x 13	13.5	12	8.75	8.25	6.63	2.5
6 x 6 x 13	19	17	11	9	10.25	2.75
8 x 8 13	23	19	12	9.75	10	2.94
10 x 10 x 13	26	21.38	14	11	16	3.25
12 x 12 x 13	22	24.25	17	12	12.5	12
8 x 8 x 15	25.88	22.88	13.88	11.5	12.38	3.25
10 x 10 x 15	26	22.5	14.5	11.5	13.44	3.25
14 x 14 x 15	25	27	20.1	13.5	13.75	13.88

Frame	Dimensions				
	AG	AB	P	R	SHAFT Ø
143TC	9.88	6.5	6.9	5	0.875
145TC	11.1				
182TC	11.62	7.38	8.9	5	1.125
184TC	12.62				
213TC	14.88	9	10.62	5	1.375
215TC	15.88				
254TC	18.5	9.9	12.62	6	1.625
256TC	20.25				
284TC	23	12.94	14.19	8	1.875
284TSC					1.625
286TC	24.5				1.875
286TSC					1.625
324TC	27	15.75	15.94	10	2.125
324TSC	26.5				1.875
326TC	27				2.125
326TSC	26.5				1.875
364TC	28.5	15.75	17.81	12	2.375
364TSC	28.63	17.69			1.875
365TC					2.375
365TSC					1.875
404TC	32.5	17.5	19.9	14	2.875
404TSC					2.125
405TC					2.875
405TSC					2.125
444TC	37.31	19.94	21.9	16	3.375
444TSC					2.375
445TC					3.375
445TSC					2.375
447TC	40.88	19.94	21.9	20	3.375
447TSC					2.375
449TC	45.85				3.375
449TSC					2.375

Impeller diameter	Dimensions		Impeller diameter	Dimensions	
	Frames	X		Frames	X
6"	143 - 145TC	8.75	13"	182 - 256TC	12.5
	182 - 256TC	10.5		284 - 286TC	13.25
8"	143 - 145TC	8.25		324 - 326TC	14
	182 - 256TC	10		444 - 445TC	14.75
	284 -286TSC	13		364 - 365TC	15.25
	324 - 326TSC	13.75		404 - 405TC	16
10"	143 - 145TC	8.25		444 - 449TC	16.75
	182 - 256TC	10	14"	364 - 365TC	15.26
	284 - 286TC	10		404 - 405TC	16
	326 - 326TC	135		444 - 446TC	16.5
11.5"	182 - 256TC	9.88		447 - 449TC	17
	284 -286TC	12.88	15"	364 - 365TC	16.75
	324 - 326TC	14.12		404 - 405TC	18.38
				444 - 449TC	18.38

Receiving inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly. Do not pump out of liquid.

Location

Locate the unit as close as possible to the liquid being pumped in order to reduce friction losses in the suction pipe. Suction and discharge piping should be perfectly aligned with the pump flanges and supported independently using pipe hangers or floor mounted supports.

***Consult pipe friction table and accessories in order to determine your piping dimensions.*

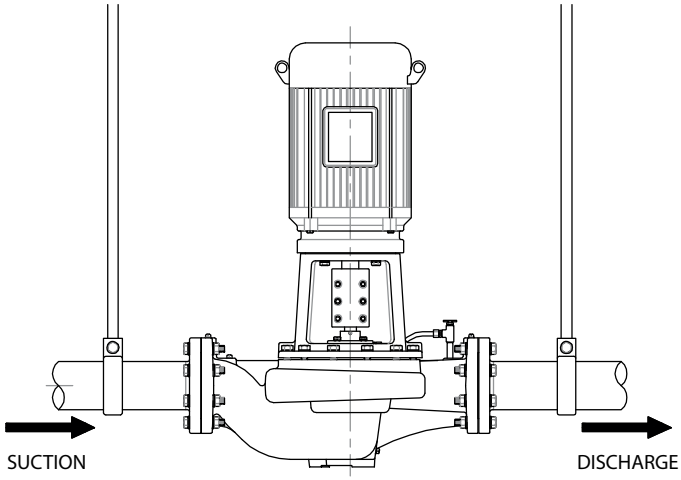
Suction

Recommended to use robust and self-supported piping and inspect for any leakage.

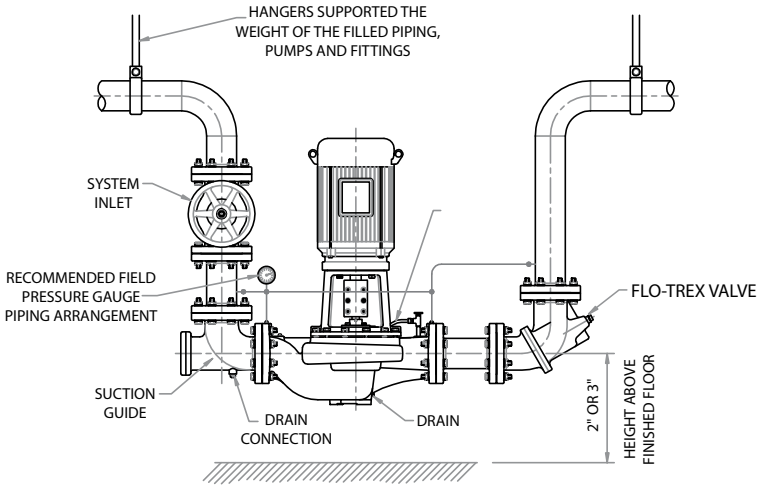
For a successful installation you need to rely on the friction loss calculation in the suction part taking into consideration the acceptable limits. The minimum suction pipe to be used can be determine by comparing the NPSH available in the suction part versus the NPSH require by the impeller, as illustrated in the performance curve.

Generally, we recommend to use ½" to 1" bigger diameter piping to what the pump suction diameter is.

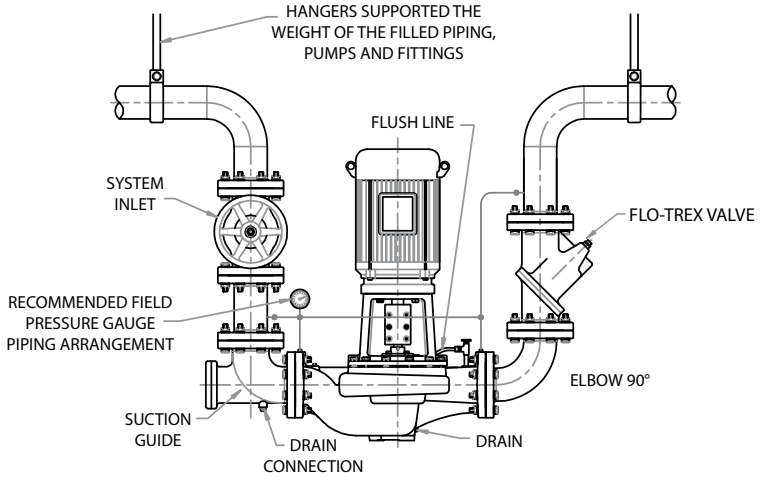
Typical installation diagrams for BVL's



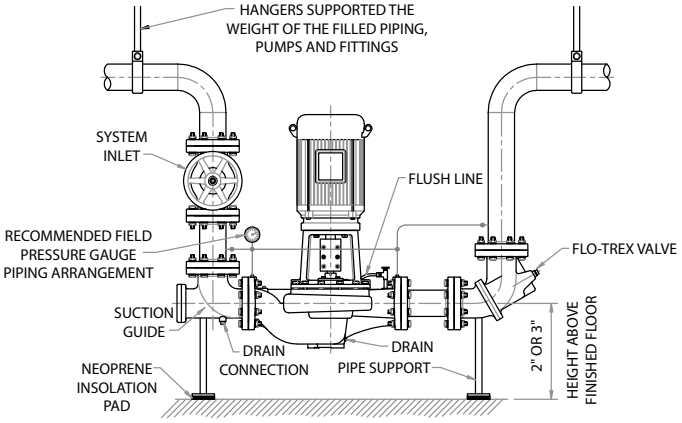
HANGER SUPPORTED
PIPE MOUNTED



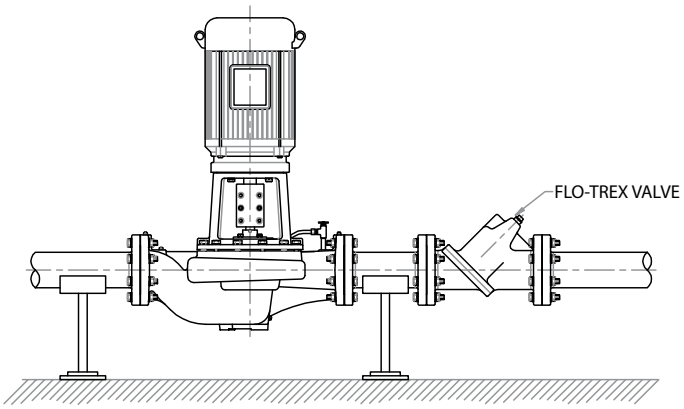
PIPE MOUNTED SUPPORTED AT CEILING



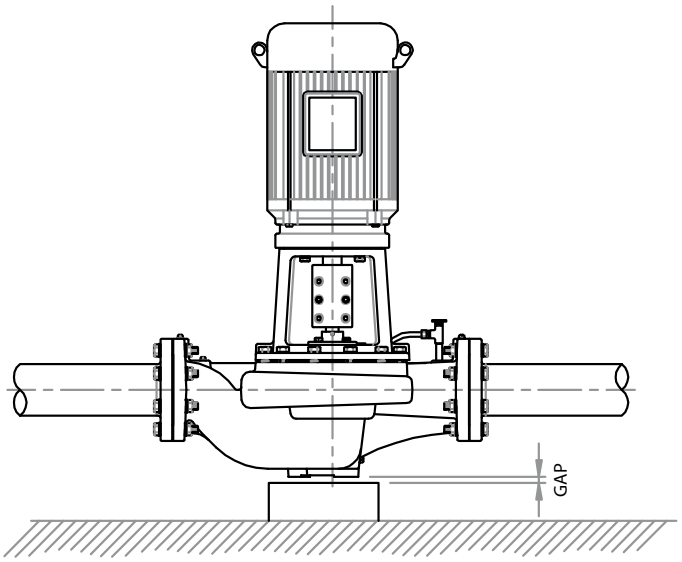
DISCHARGE ELBOW FOR MINIMUM FOOTPRINT



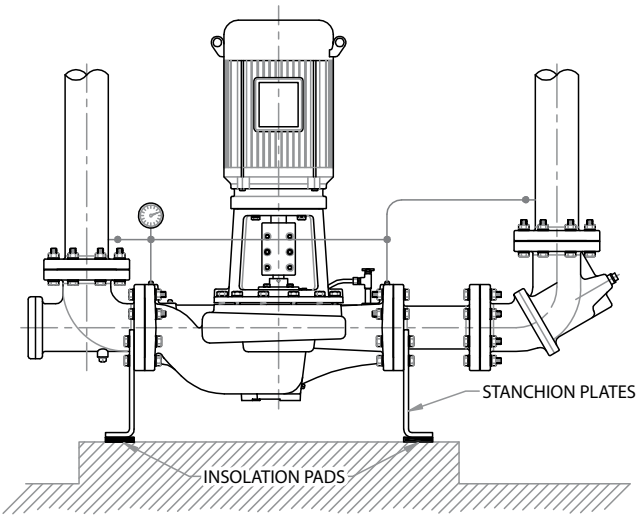
WITH ADDITIONAL PIPE SUPPORTS



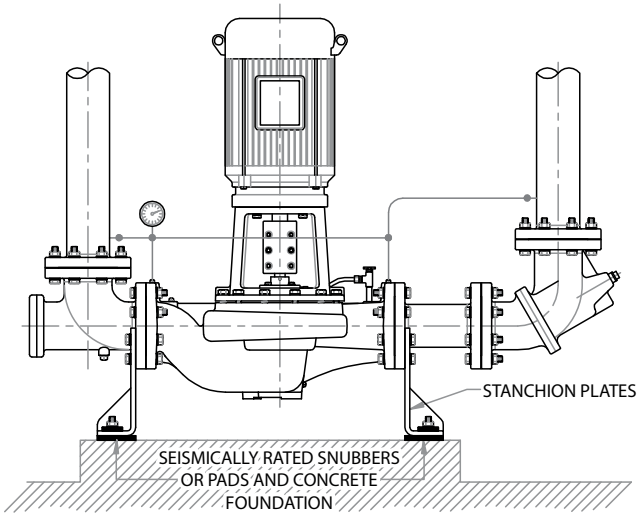
FLOOR SADDLE SUPPORT



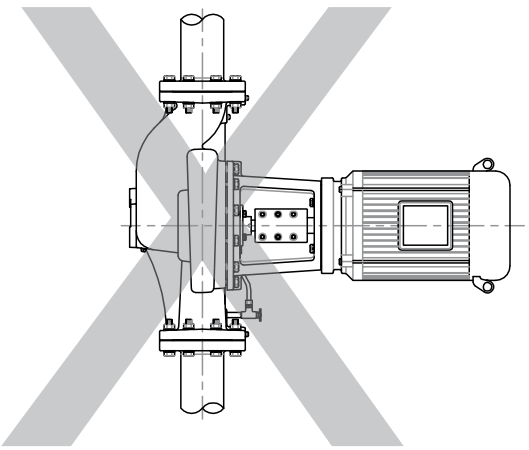
ADDITIONAL FLOOR SUPPORT



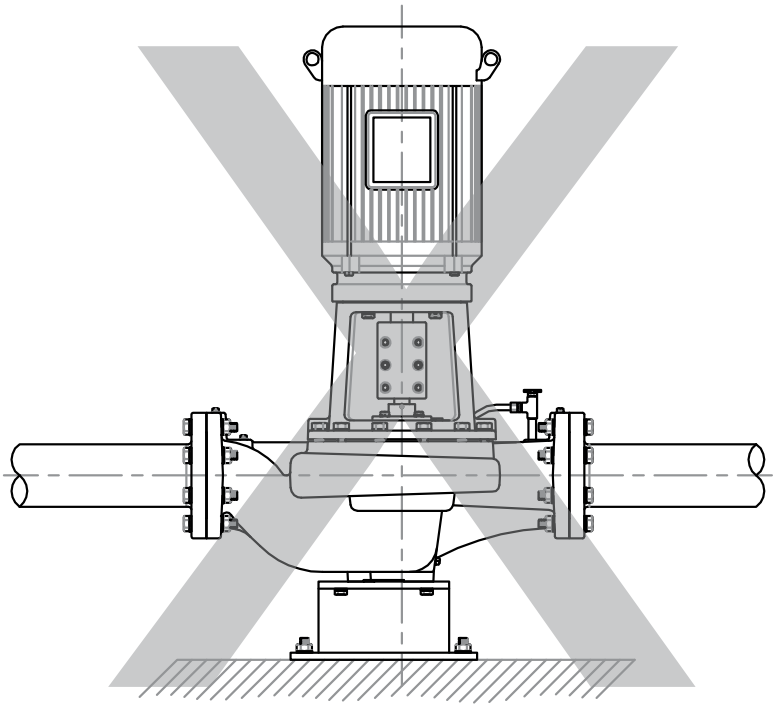
WITH STANCHION PLATES



SEISMICALLY REGION INSTALLATION



HORIZONTAL MOUNTING



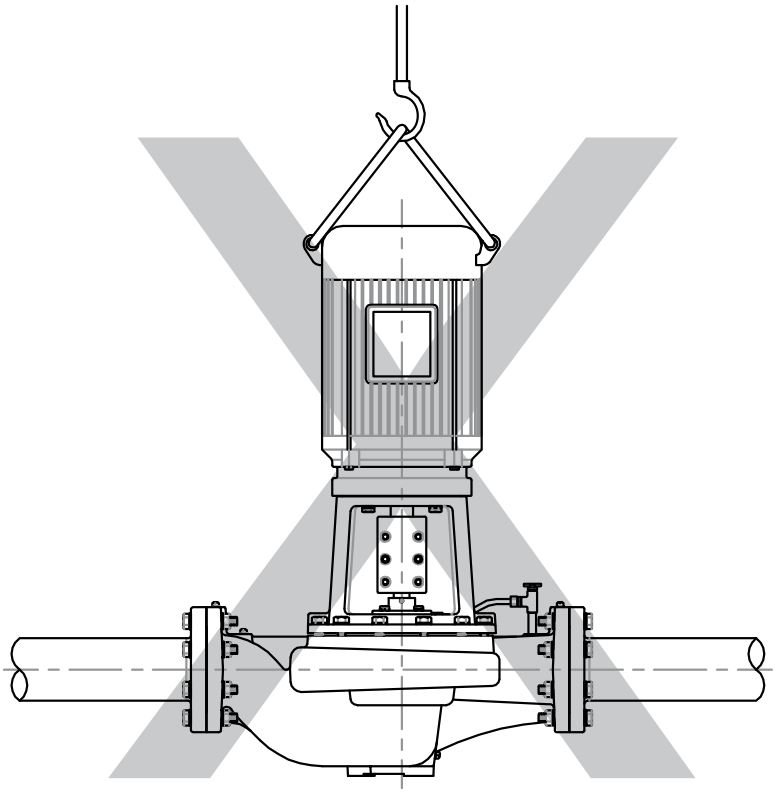
MOUNTED ON RIGID BASE
WITHOUT FLEXIBLE CONNECTORS

Discharge

Recommended to use robust and self-supported piping to maintain the pump stable and firm during operation.

Due to the high energy cost or BHP necessary to overdue friction generated by using a small diameter pipe, usually a large diameter pipe is used in the discharge side.

Piping, valves, etc. should be perfectly aligned with the suctions and discharge line and supported to avoid excessive force on the pump casing. If necessary install expansion joints to protect from any thermal or pressure force.



MOTOR LIFTING
HOOK SUPPORTED

Priming

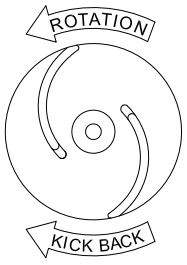
The pump must be fully primed before start up, fill the casing with liquid and rotate shaft by hand in order to remove any trapped air in the impeller.

Install a foot valve in the suction side and fill with liquid through the upper part. Remove the male plug locate on the superior part of the casing until liquid comes out, then seal the male plug.

IMPORTANT! - Do not operate the pump without being fully primed.

Rotation

Rotation is indicated by the directional arrow marked on the pump casing. If motor is operated in three phase, it is very important that motor shaft rotation match the direction as the directional arrow on casing. Energize the motor momentarily and check for the correct shaft rotation. Do not let the pump operate against the directional arrow.



Bottom of Pump

Starting the Pump

Start the pump with the discharge valve 90% close. Gradually open the discharge valve until motor is at operating speed. Never allow the amperage consumed by the pump exceeds the maximum allowed by the engine.

Mechanical Seal

The mechanical seal installed in BVL models are water lubricated, do not run the pump unless properly filled with water. Different kind of seals are used of a distinctive operational use and liquid being pumped, consult your Barmesa Pumps distributor for more information.

Repair, Maintenance & Service

IMPORTANT! - Always de-energize the motor and lose the discharge valve before any repair, maintenance or service perform on the pump.

Remove the Mechanical Seal

The BVL model futures an external mechanical seal which facilitates the mechanical seal replacement without the need to remove the pump or motor, saving time and money.

- Begin by disconnecting power to the motor and locked and seal the power supply so the motor doesn't not accidentally start. Close the suction and discharge valve and drain the remaining liquid by removing the plug, once all the liquid is drained reinstall the plug.
- Remove the coupling guard to gain access to the mechanical seal.
- Using the "Allen" wrench loosen and remove the coupling bolts from the split coupling. Separate the coupling house gently in order to avoid damage in the coupling. Remove the second half of the coupling and note that the pump shaft will drop down as you do this.
- Remove both the motor shaft key and pump shaft key. Do not remove the motor shaft collar, this will help you on the coupling reinstallation.
- Place a wrench on the hole in the pump shaft to keep it from rotating and continue to remove the cap screw, lock washer and collar from the pump shaft. There you will find a minimum distance of 35 mm (1-3/8") between the pump shaft and motor shaft.
- Inspect shaft in order to find any bump or damage part, correct if necessary.
- Remove the mechanical seal rotating assembly by sliding it up the pump shaft and slipping it through the gap between shafts.
- Remove the connector and cooling seal flush piping connected in the seal plate. Remove the 4 screws and lock washers that hold the seal plate and remove the mechanical seal stationary part with its gaskets

Replace the Mechanical Seal

Be precautious while handling the mechanical seal and avoid any damage or scratches on the seal faces. Do not touch the seal faces as this may affect the mechanical seal performance.

- Replace the stationary seal with the large gasket down and make sure the seal flush hole is position towards the flush line connection.
- Install the seal plate on the pump with the seal flush hole aligned to the seal flush hole on the stationary seal.
- Place the seal plate bolts and washers, make sure to hand tighten evenly.
- Carefully, in a diagonal pattern, tighten each bolt evenly giving them a few turns.

- Repeat pattern until all the bolts have been completely tighten. Do not over tighten this bolts, it may damage the pumps casing and stationary seal.

- Once the stationary part and the seal plate have been installed, using silicon lubricant, lightly lubricate the Viton seal O-ring. This will help to position the assembly down the shaft.

- Inspect the pump shaft and look for imperfections that may damage the mechanical seal O-ring. In case you find one make sure to correct this imperfections.

- Slide the rotating assembly carefully down the pump shaft onto the stationary seal.

- Install the collar, lock washer and cap screw and place a wrench on the hole in the pump shaft to keep it from rotating, tighten the cap screw.

- Place the key on the motor shaft and pump shaft.

- Identify the coupling half that is machined to receive the two shafts keys. Slide the coupling between the two shafts and position the motor collar in the coupling. (motor collar was not removed)

- To connect the pump shaft collar to the coupling half you will need to slightly raise the shaft using an Allen key or a wrench inserted in the shaft hole.

- Place the second half of the coupling and insert the coupling bolts and washers. Hand tighten them at this point.

- Make sure both motor shaft and pump shaft rotate freely.

- Adjust the mechanical seal rotating assembly on top of the stationary seal and tighten the set screw.

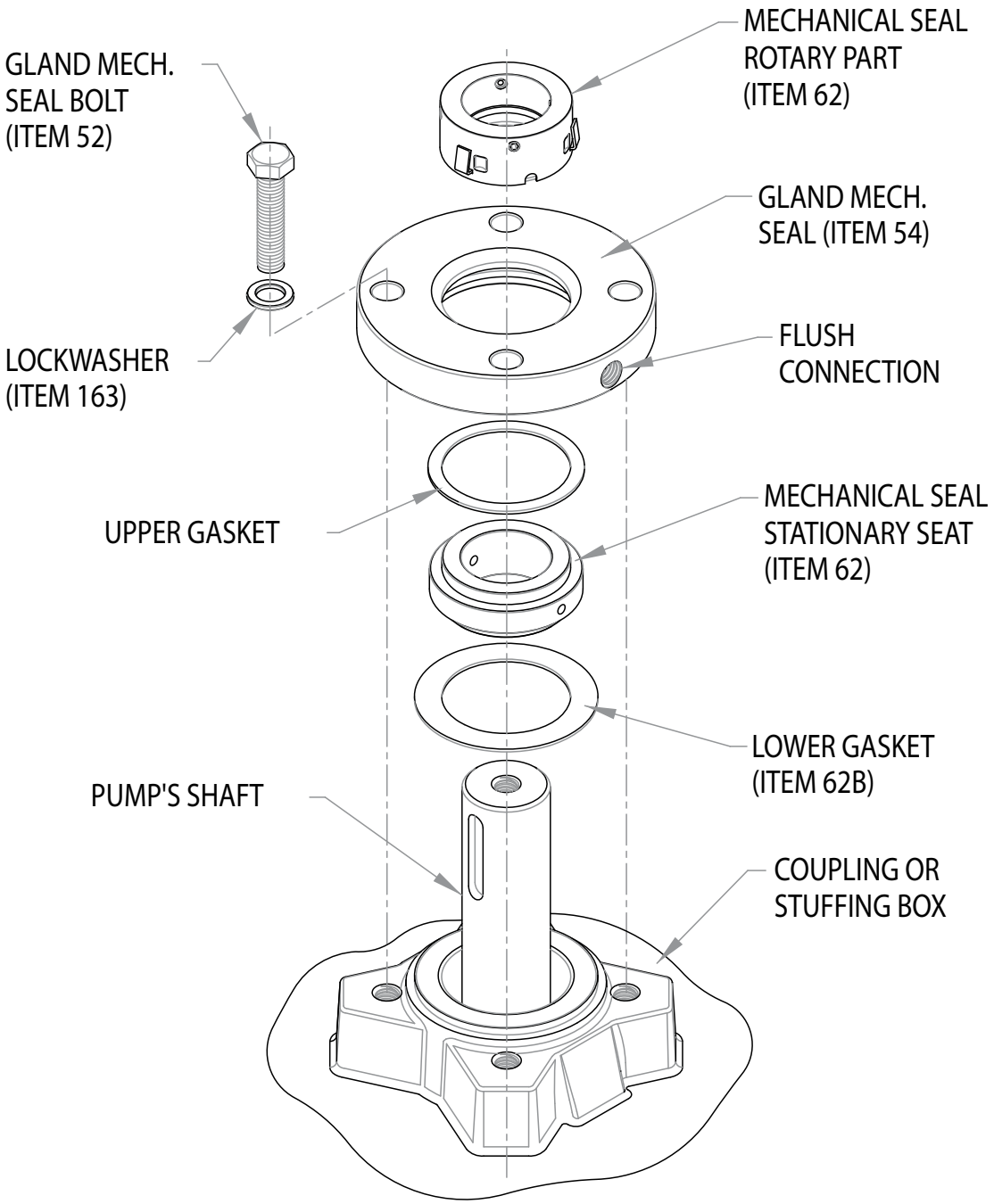
- Remove the holding clips with a small flat head screwdriver.

- Open discharge and suction valves and make sure the pump is primed.

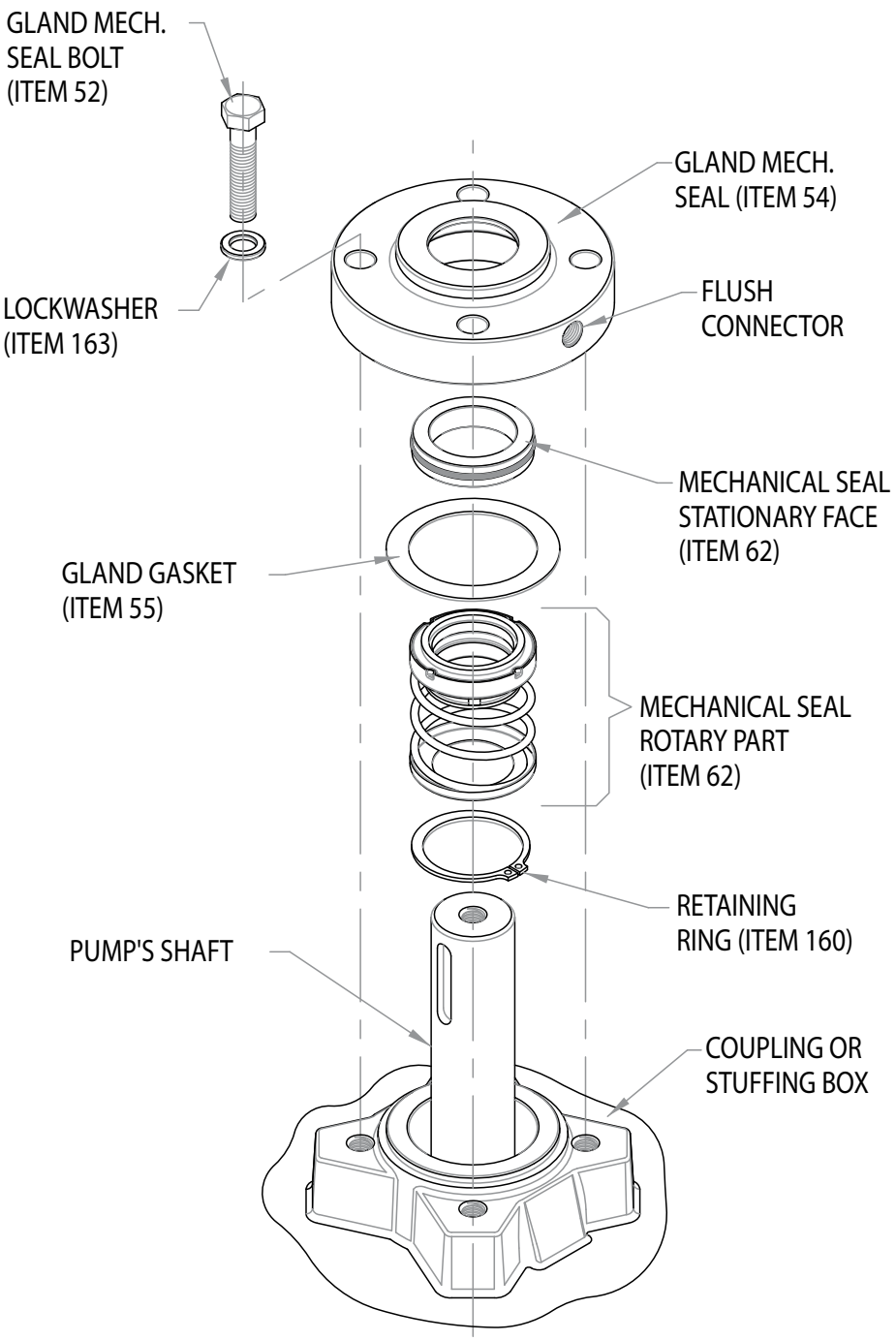
- To ensure a proper priming, open the plug in the mechanical seal lubrication line until liquid starts bursting out, then close it. Now you can re-energize the motor and reconnect the power supply.

When ordering repair parts always provide the following information:

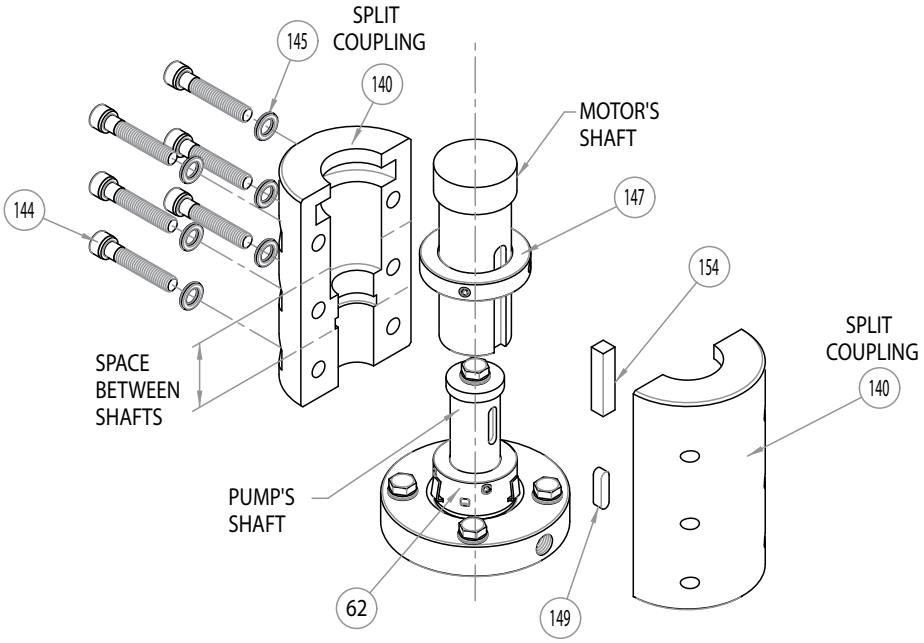
- Pump serial number:
- Pump model:
- Pump Part number:
- Part description:
- Quantity requiered:
- Shipping instructions:



EXPLODED VIEW
OUTBOARD MECH. SEAL

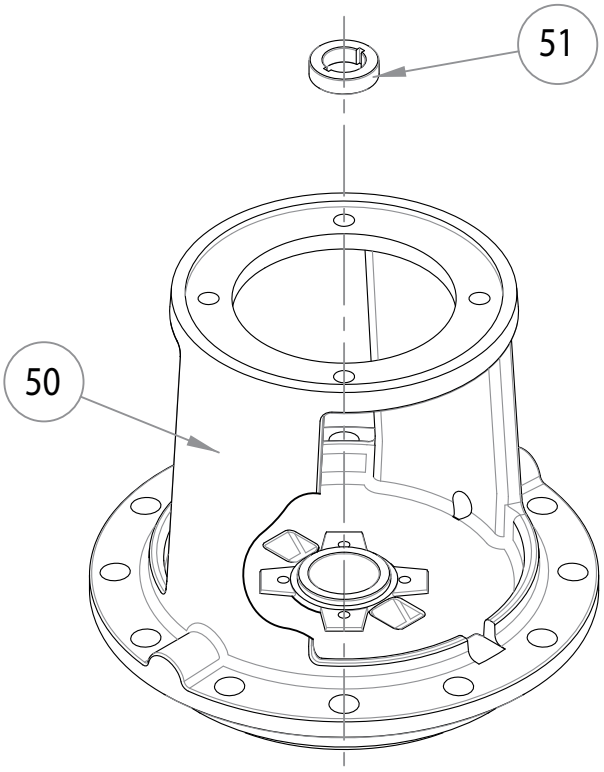


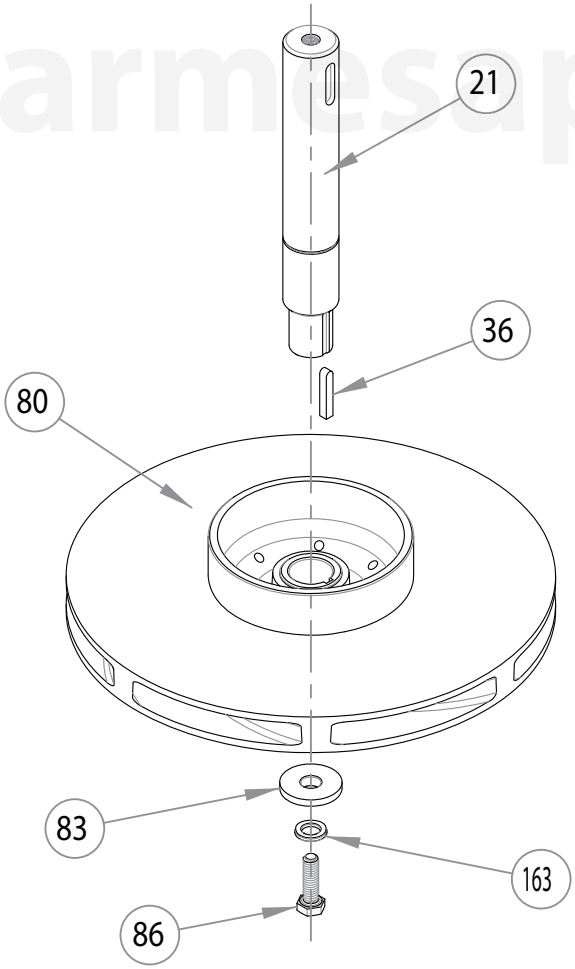
EXPLODED VIEW
INBOARD MECH. SEAL



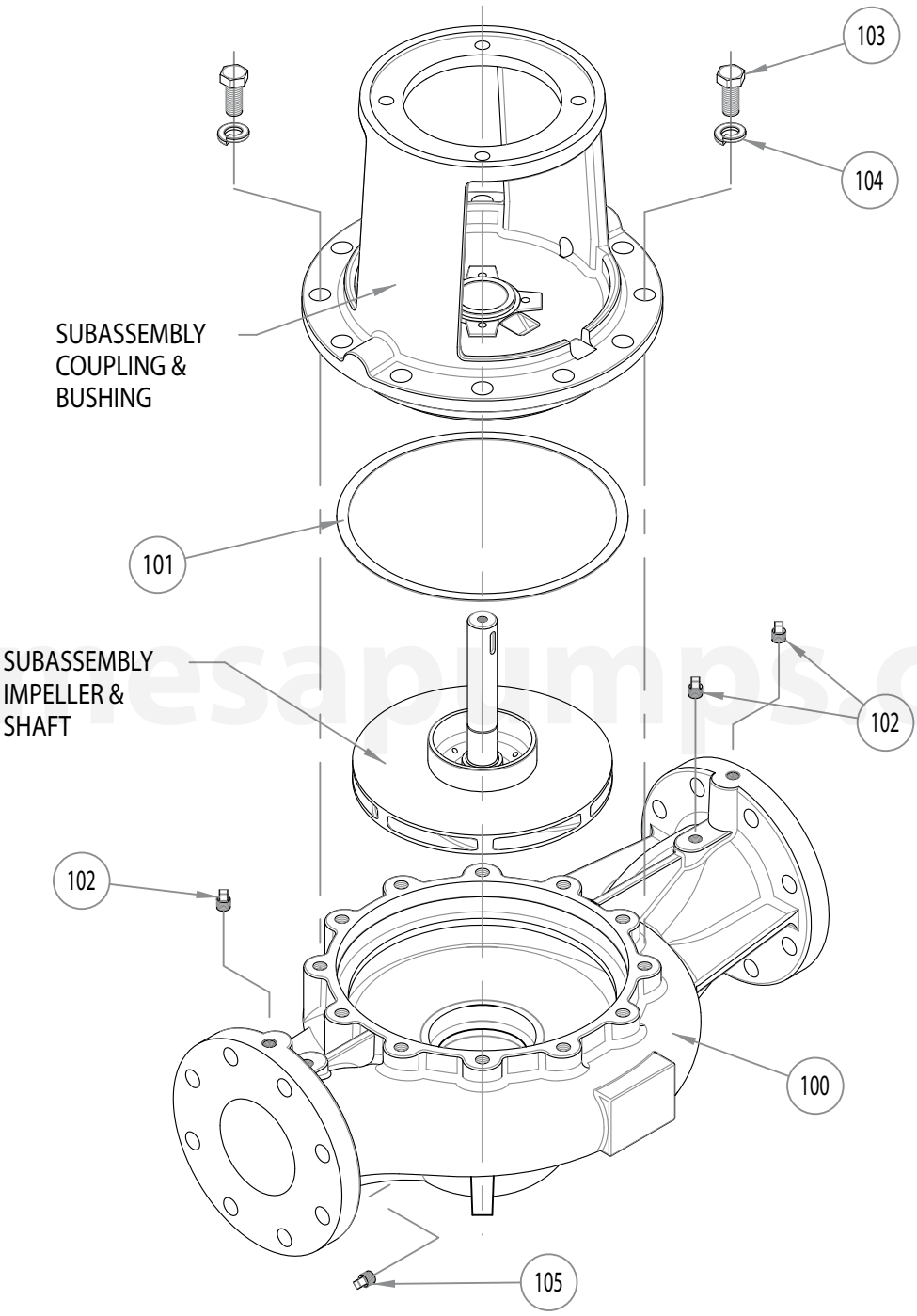
ITEM 140 PART #	MOTOR		SPACE BETWEEN	PUMP SHAFT'S Ø	ITEM 62 PART #	ITEM 147 PART #
	FRAME	Ø SHAFT'S				
30405001	143-145 TC	7/8"	1 3/8"	1 1/8"	31030250	31030501
30405002	182-184 TC	1 1/8"	2 1/2"			31030502
30405003	213-215 TC	1 3/8"	2"			31030503
30405004	254-256 TC	1 5/8"	1 3/8"			31030504
30405005	284-286 TSC	1 5/8"	2 3/4"	1 5/8"	31030251	
30405006	324-326 TSC	1 7/8"	2 7/8"			31030505
	364-365 TSC					
30405007	404-405 TSC	2 1/8"	2 3/8"			31030506
30405008	284-286 TC	1 7/8"	1 3/8"			31030505
30405009	324-326 TC	2 1/8"				31030506
30405010	364-365 TC	2 3/8"				31030507
	445-447 TSC					
30405011	182-184 TC	1 1/8"	2 1/2"			31030502
30405012	213-215 TC	1 3/8"	2"			31030503
30405013	254-256 TC	1 5/8"	1 3/8"			31030504
30405014	324-326 TC	2 1/8"	1 3/8"	2 1/8"	31030252	31030506
30405015	364-365 TC	2 3/8"				31030507
30405016	404-405 TC	2 7/8"	2 1/2"			31030508
30405017	444-445 TC	3 3/8"	1 3/8"			31030509
	447-449 TC					

COUPLING & BUSHING SUBASSEMBLY

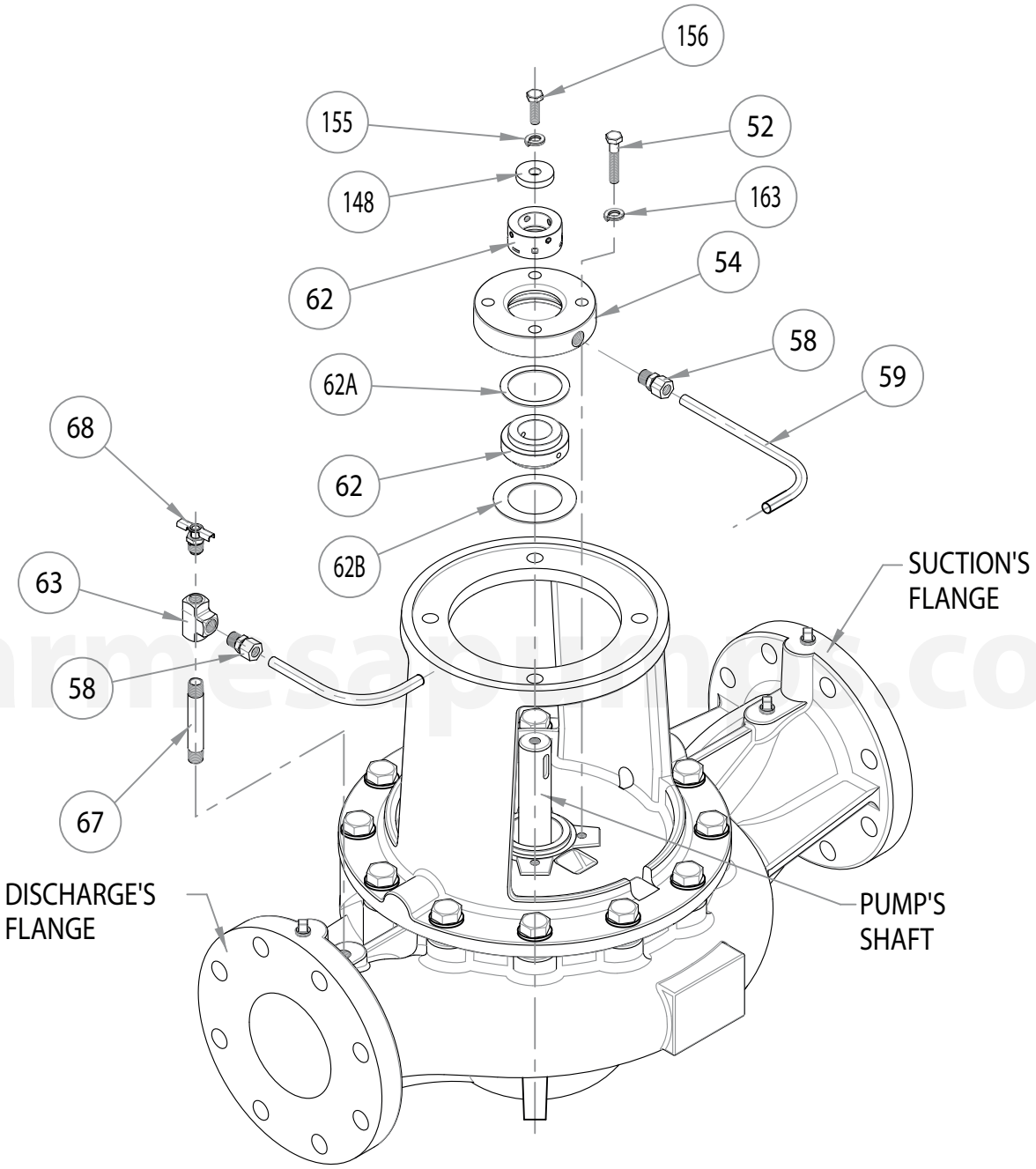




IMPELLER & SHAFT SUBASSEMBLY



VERTICAL IN-LINE PUMP



MECHANICAL SEAL & FLUSH