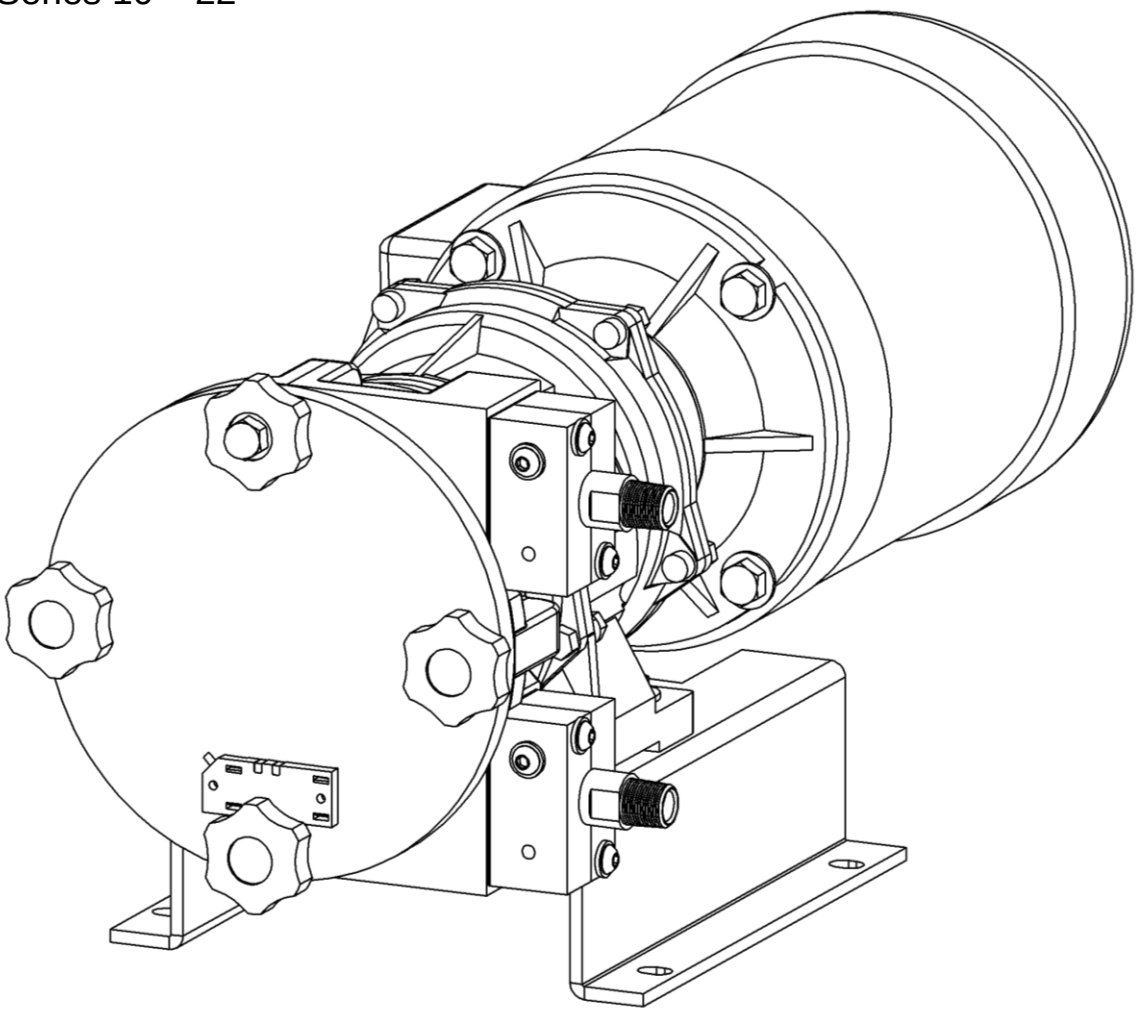
PULSAFEEDER®
ENGINEERED PRODUCTS

Installation, Operation & Maintenance Manual

Models: AMP Series 10 – 22



PeriFlo® AMP
PERISTALTIC PUMP

IOM-PFL-4500-Rev.B

Pulsafeeder® Factory Service Policy

Should you experience a problem with your PeriFlo® AMP pump, first consult the troubleshooting guide in your operation and maintenance manual. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Sales Representative or our Technical Services Department for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Warranty parts returned as defective, which test good, will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Pulsafeeder's Factory Service Policy is maintained online. Please source this document at this URL:

http://www.pulsa.com/pulsa-docs/Pulsafeeder-EPO-Limited-Warranty-Statement.pdf

All Pulsafeeder PeriFlo® manufactured products are guaranteed against defects in materials and workmanship under normal use for 12 months from the date of shipment from the factory.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

Safety Considerations:

1. Read and understand all related instructions and documentation before attempting to install or maintain this equipment.
2. Observe all special instructions, notes, and cautions.
3. Act with care and exercise good common sense and judgment during all installation, adjustment, and maintenance procedures.
4. Ensure that all safety and work procedures and standards that are applicable to your company and facility are followed during the installation, maintenance, and operation of this equipment.

Trademarks

PeriFlo® is registered trademarks of Pulsafeeder Inc.

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1. Equipment Inspection

Check all equipment for completeness against the order and for any evidence of shipping damage. Shortages or damage must be reported immediately to the carrier and your authorized representative or distributor of PeriFlo® pumps.

Included Items:

- PeriFlo® AMP Peristaltic Pump

Optional Items:

- Motor (pre-installed at the factory)
- Leak Detection
- Controls Package
- Spare Hoses, Grease or Oil, and Shims

1.1 General Description

The PeriFlo® peristaltic pump is constructed with simple yet robust components designed to create continuous, repetitive, positive flow. Modern materials are used to meet the needs of the toughest jobs from aggressive chemicals to highly abrasive slurries.

1.2 Construction of the Pump

The diagram below highlights the four main components of the PeriFlo® AMP peristaltic pump. The outer casing (Item 1) contains the pump components and supports the hose/tube. Inside the casing, the rotor (Item 2) supports the two rollers (Items 3). As the rotor turns, the rollers compress the hose/tube (Item 4) to create suction and generate the pumping action. A change in rotor direction will result in a change in direction of the pumped fluid.

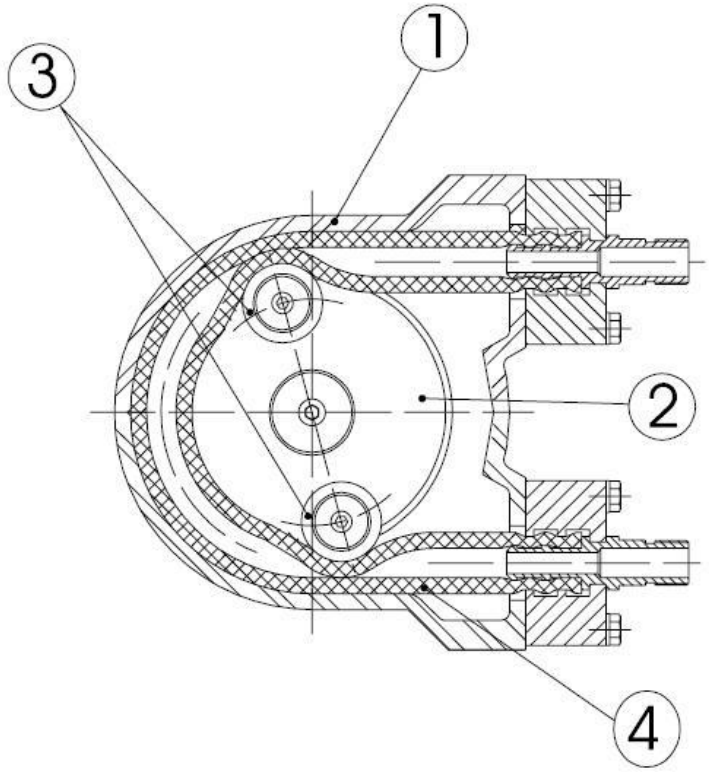


Figure 1 - Construction of Pump

Hoses are defined as the flexible element for fluid transfer comprised of natural rubber outer layers, nylon reinforcement, and an elastomer inner liner. The inner liner material is to be specified for chemical compatibility; Natural Rubber, EPDM, or Nitrile BUNA Rubber. Hoses are distinguished by their black outer layer of natural rubber and stamped with the inner liner material code.

Tubes are defined as the flexible element for fluid transfer made of extruded Norprene®. Tubes are distinguished by their cream color and stamped material code.

1.3 Storage Instructions

Short Term

Storage of a PeriFlo® AMP pump for up to 6 months is considered short-term. The recommended short-term storage procedures are:

- Store the pump indoors at room temperature in a dry environment. Avoid areas open to inclement weather or excessive humidity.
- Prior to start up; inspect the pump as outlined in Section 3.0.

Long Term

Storage of a PeriFlo® AMP pump for over 6 months is considered long-term. If long term storage is anticipated, the following procedures are recommended in addition to the procedures above:

- Remove one roller assembly from the pump and rotate the remaining roller to rest in the open space between the suction and discharge ports, leaving the hose uncompressed. Store the removed roller in a protective covering, preferably indoors.
- Keep the inside of the pump, the rotor, and rollers lightly greased with Periflo® lubricating grease.
- Every 12 months the motor should be connected to a power source in accordance with Local, National and Motor Manufacturer requirements and operated for a minimum of one hour. It is not necessary to have the hose/tube installed during this operation but the suction and discharge ports must be open to atmosphere when the hose/tube is present.

After 12 months storage, Pulsafeeder's warranty does not cover such items as lubricating grease, gaskets, hose/tubes (if left installed in the pump), and other items which are subject to deterioration with age. If the pump has been in storage for longer than 12 months, it is recommended that these items be replaced prior to going into service. Material and labor to recondition or replace this class of item is the purchaser's responsibility.

Hoses and Tubes

Spare hoses and tubes should be stored indoors and in their original protective covering. Always store hoses and tubes on a dry, flat surface. Never rest objects on top of hoses/tubes.

2. Installation

2.1 Location

When selecting an installation site or designing a chemical feed system, plan for operation and routine maintenance. Provide 3.25FT (1M) of space around the pump for this purpose.

PeriFlo® AMP pumps are designed to operate in an environment where the pump is protected from direct sunlight, and precipitation (i.e., under shelter). The ambient temperature must be between 32° F (0° C) and 104° F (40° C). If necessary, add environmental controls.

The pump must be rigidly bolted to a solid and flat foundation to minimize vibration and prevent loosening of the connections. The pump must be level within 5°.

2.2 Motor

The PeriFlo® AMP is typically shipped with the motor pre-installed. It must be wired in accordance with Local and National requirements by a qualified electrician. Please refer to the motor nameplate for further manufacturer specific information.

If the PeriFlo® AMP was purchased less motor, please refer to section 4.4 for further instructions.

2.3 Piping System

Attention to piping detail will assure an easy startup and long life of your AMP. Please follow these guidelines:

General

- Select piping component materials that are compatible with the fluid type, intended flow rate and pressure, and will not collapse due to internal vacuum.
- It is highly recommended to use a flexible connection between the rigid piping and the pump. This reduces vibration in the piping as well as aids in hose/tube replacement (see Section 4.1.1).
- Pipes should be sized to be equal or slightly larger than the hose/tube diameter. It is recommended to use larger diameter equipment for viscous fluids.
- If making a threaded joint to the connections, use a sealing compound chemically compatible to the process fluid or sealing tape.

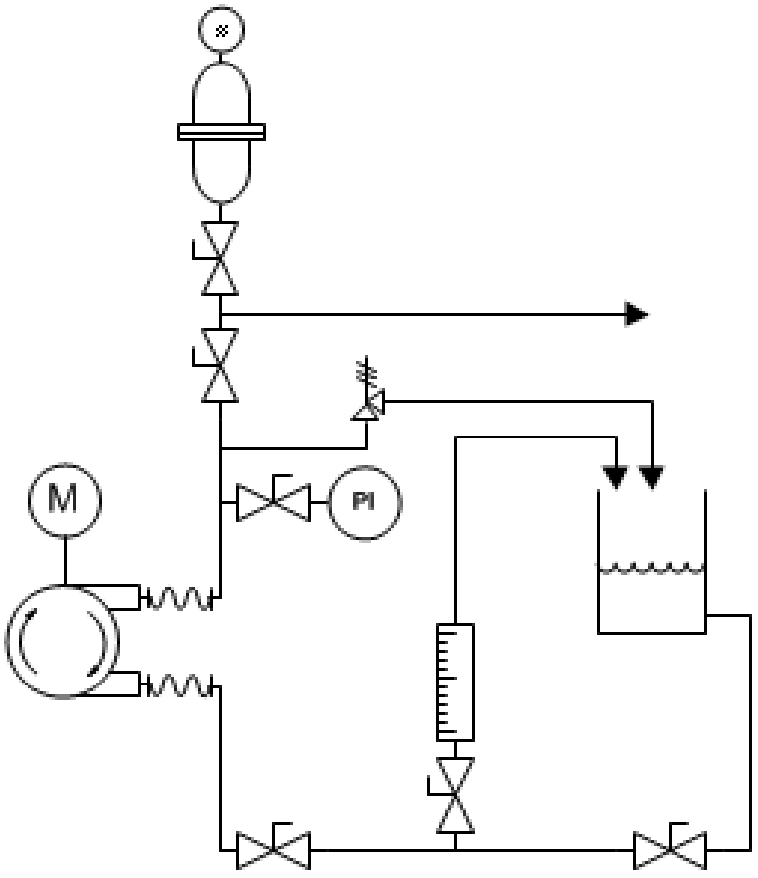


Figure 2- Pump P&ID

Piping System Recommendations

- Both new and existing piping should be cleaned, preferably by flushing with a clean liquid (compatible with process fluid, connection and hose/tube materials. Piping should be blown out with air prior to connection to the pump.

NOTE **Note - Debris from manufacturing the piping system (e.g., PVC shavings, TFE Tape, dirt, etc.) can be unknowingly assembled inside the pipe. When fluid is introduced this material can be transferred to the pump and damage the hose/tube.**

- Piping weight must not be supported by connections or other portions of the pump, as the resulting stresses can cause them to break. When temperature variations are expected, provide for thermal expansion and contraction of piping components so that force and/or moments are controlled within the allowable range.

Suction Piping

Location: Successful installations place the pump the shortest distance away from the process fluid supply. Minimal pipe bends and straight pipe runs are also ideal.

Isolation Valve and Unions: Isolation valves allow the system to be isolated from the process fluid to facilitate safe servicing. They also aid in the operation of calibration columns. Valves should include good visible indications of open/closed condition. Unions assist with installation and maintenance. Valves that integrate union fittings are ideal.

Calibration Column (Optional): Used to calibrate pump performance. Include an isolation valve and vent line back to the supply tank to facilitate safe operation.

Discharge Piping

Location: Figure 2 depicts the typical discharge piping connections and equipment for a successful installation. Minimal pipe bends and straight pipe runs are ideal.

NOTE **IMPORTANT: DO NOT Install an elbow directly into the discharge connection threaded fitting as it will create excessive back pressure that can lead to premature hose/tube failure.**

Pressure Relief Valve: Install a Pressure Relief Valve as close to the pump as possible. Using the leg of a T fitting for this purpose is acceptable (with the normal discharge taking the straight path and the relief flow taking the leg). The relief pressure must be to 10-15% over the system operating pressure but must not exceed the maximum rated discharge pressure of the pump. As a positive displacement pump, the AMP pump will continue to build pressure if the fluid pathway is stopped or blocked potentially resulting in hose/tube failure or “blowout.”

NOTE **NOTE: Failure to install and properly set a Pressure Relief Valve can lead to premature hose/tube failure that will not be covered under warranty.**

Pulsation Dampener: Peristaltic pumps do create a pulse of fluid during operation. Installation of an adequately sized Pulsation Dampener will smooth the associated flow/pressure variation to the downstream process.

2.4 Discharge Pressure Requirements

The specified discharge pressure experienced by the pump is a critical variable in peristaltic pump performance. Each AMP pump is factory set to match the specified discharge pressure in order to fully compress the hose/tube, preventing "back flow." Accurately specifying the discharge pressure helps find the balance of compression and back pressure to achieve accurate flow and optimize hose/tube life.

Hose Maximum Discharge Pressure: 115psi (8 bar)
Tube Maximum Discharge Pressure: 30psi (2 bar)

In the event that the discharge pressure conditions change or the pump requires a change in shimming to achieve specified flow see Section 4.3.

3. Equipment Startup

3.1 Fastener Inspection

All pump fasteners should be checked prior to pump operation and occasionally during use. This would include front cover knobs and hardware, motor mounting bolts, base mounting bolts, and the hardware that secures the pump to its foundation.

The front cover knobs should be hand tight with the acorn nut secured with a wrench. Motor mounting bolts and base mounting hardware should be torqued to 40 IN-LBF (4.5 N-M).

3.2 Pump Inspection

The PeriFlo® AMP pump should be checked prior to pump operation and occasionally during use.

- **Hose/Tube:** Ensure that the hose/tube is properly aligned and completely supported by the roller.

- **Lubrication:** Check that the entire outside surface of the hose/tube, surface of the rollers, and inside diameter of the pump casing that supports the hose/tube is coated with PeriFlo® lubricating grease. The specially formulated grease can be obtained from Pulsafeeder PeriFlo® or from an authorized distributor. See Section 4.0 for maintenance guidelines.

3.3 Preliminary Checks

- Verify the supply voltage is suitable for the motor.
- Verify the optional pump control components are connected to the control panel and test that they function correctly.
- Verify all gauges, valves, and instrumentation are sized and adjusted appropriately for the application.
- Verify that the predicted working conditions, such as flow, pressure, temperature and motor power, correspond to the application.

3.4 Calibration

3.4.1 Description

Peristaltic pumps should be calibrated to accurately correlate rotor speed to measured flow rates. The pump output is linear with respect to the rotor speed.

The theoretical output flow rate is based on the volume inside the hose/tube and the speed of the rotor. Pumps are rated for a certain flow at a specified pressure and speed. Whenever possible, calibration should be performed under actual process conditions (i.e., the same or a similar process liquid at system operating pressure).

To construct a calibration chart, measure the flow rate at three or more speed settings (e.g., 25%, 50%, 75%, and 100%), plot these values on linear graph paper, and draw a best-fit line through the points. For stable system conditions, this line will predict settings to attain required outputs.

Note - All users are encouraged to test the flow rate of their pump once installed in their system, to ensure best accuracy and reliable operation.

3.4.2 Calibration Procedure

1. Adjust the suction piping to supply the pump from the calibration column. The calibration column should be sized and filled accordingly to complete a timed draw down (typically 30 or 60 seconds).

Use appropriate precautions if handling process fluid. Ensure that any other fluid used for priming is compatible with the product that will be pumped.

2. Run the pump in the FORWARD direction at full motor speed. Verify fluid flow and pressure is accurately adjusted for the application.

Verify the direction of rotation of the pump. As it is reversible, the pump could generate excessive pressure and compromise the safety of the installation. The circulation of the fluid should be in the same direction as the turning direction of the pump as seen through the front cover.

3. Complete a timed draw down and record the amount of fluid pumped from the calibration column. Stop the pump and refill the calibration column. Repeat this step two more times and calculate the average maximum flow.

4. Verify the average flow meets the published flow rate as required per the application.

5. Repeat these steps at interval speed settings (example: 75%, 50%, and 25% motor speed).

Note – Verify the Discharge Pressure at each speed interval.

4. Maintenance

BEFORE PERFORMING ANY MAINTENANCE REQUIRING REMOVAL OF THE FRONT COVER OR HOSE/TUBE CONNECTIONS, BE SURE TO RELIEVE PRESSURE FROM THE PIPING SYSTEM AND, WHERE HAZARDOUS PROCESS MATERIALS ARE INVOLVED, RENDER THE PUMP SAFE TO PERSONNEL AND THE ENVIRONMENT BY CLEANING AND CHEMICALLY NEUTRALIZING AS APPROPRIATE. WEAR PROTECTIVE CLOTHING AND EQUIPMENT AS APPROPRIATE.

Accurate records from the early stages of pump operation will indicate the type and levels of required maintenance. A preventative maintenance program based on these records will minimize operational problems. The life of the hose/tube, the main wear item of a peristaltic pump, can only be estimated. Since corrosion rates and operational conditions affect functional material life, the life of a hose/tube must be considered according to its particular service conditions.

The PeriFlo® AMP KOPkit will contain all replacement parts normally used in a preventative maintenance program. It is recommended that KOPkits are kept available at all times. See Section 5.0.

4.1 Hose/Tube Inspection, Removal, & Reinstallation

IF THE HOSE/TUBE HAS FAILED, PROCESS FLUID MAY HAVE CONTAMINATED OTHER PARTS OF THE PUMP. HANDLE WITH APPROPRIATE CARE.

PeriFlo® AMP hoses and tubes do not have a specific cycle life. Periodic hose/tube inspection and replacement are recommended. Each user should perform regular inspections to determine the replacement interval that is appropriate to their system conditions.

Hose/Tube Inspection

The following wear characteristics can be attributed to normally accumulated service time, extended service in high pressure and/or high speed applications, incorrect shimming, chemical attack, accumulation of debris, lack of lubrication or contaminated lubrication. See Section 6.0 for corrective actions.

- Outer layer of the hose is peeling/shredding
- Hose/tube is flattened or set
- Cracking/creasing parallel or perpendicular to the hose/tube
- Excessive smoothing from rollers
- Bulging
- Discoloration

4.1.1 Hose/Tube Removal & Reinstallation

1. Disconnect the power source to the drive motor. Follow local Lockout/Tagout procedures.
2. Relieve all pressure from the piping system. Close the inlet and outlet shut off valves.
3. Place a pan underneath the pump casing to catch any liquid leakage.
4. Disconnect piping to the suction and discharge connections and drain any process liquid, following all recommended material safety precautions.

Caution – Process fluid may drain from the Piping. Take necessary precautions.

5. Remove the bolts that fasten the press plates to the pump casing on both the suction and discharge ports. Remove the bolts that clamp the press plates around the hose/tube. Visually inspect for any damage and set aside.

NOTE **If the hose/tube has NOT failed and is being replaced as part of Scheduled Preventative Maintenance (If the hose/tube has failed, proceed to step 14):**

6. Remove the suction port connection from the hose/tube.
7. Reconnect the motor to power and jog the pump FORWARD to push the hose/tube out of the discharge port of the pump.

WARNING **NEVER place fingers or hands into any part of the pump while the pump is running.**

8. Remove the new hose/tube from its protective packaging. Press one connection into one end of the hose/tube. A small amount of grease on the end of the barb can aid installation.
9. Completely coat the new hose/tube with a 1/16" layer of PeriFlo® lubricating grease.
10. Place the hose/tube end without the connection into the suction port. Reconnect the motor to power and jog the pump FORWARD to draw the hose/tube into the pump through the suction port until the other end is through the discharge port. Disconnect the power source to the motor. Follow local Lockout/Tagout procedures.
11. Install the press plates around the hose/tube on the suction side. Clamp them together with the hardware and then install the hardware to fasten the press plates to the pump casing.
12. Press the discharge connection into the hose/tube and install the remaining press plates.
13. Reconnect suction and discharge piping and prepare the pump for operation.

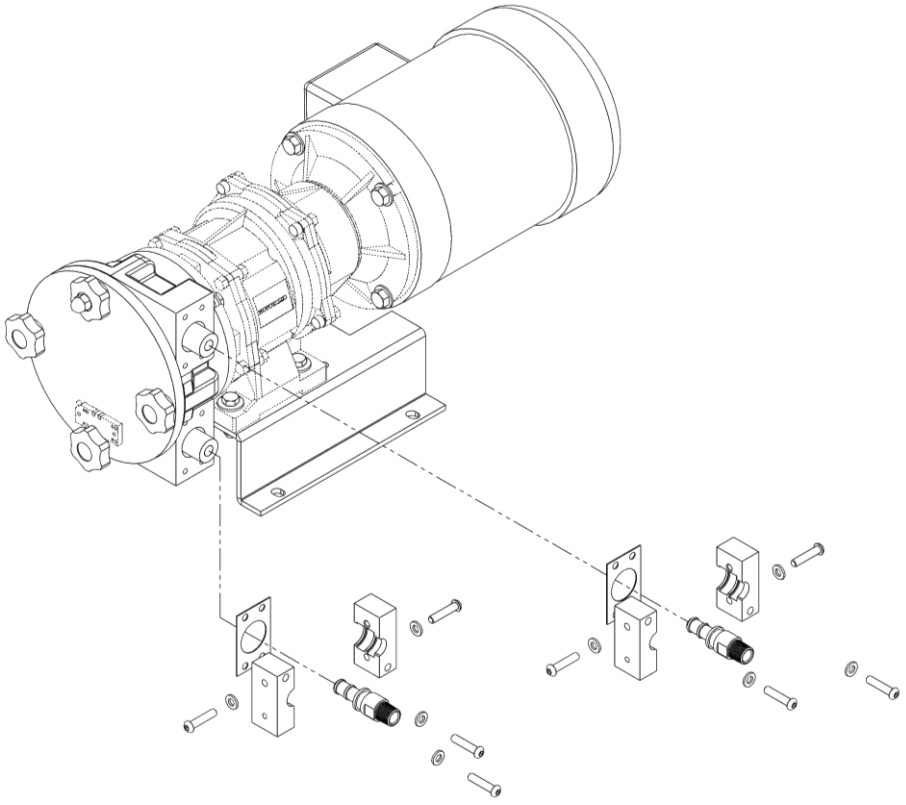


Figure 3 - Hose Change

NOTE

If the hose/tube has FAILED:

14. After the press plates have been removed, remove the front cover hardware to access the inside of the pump, continuing to follow safety precautions as appropriate.
15. Remove the hose/tube from the pump removing hose/tube connections as needed.
16. Use a clean cloth or paper towel to wipe away all the remaining grease from inside the pump casing, ports, and around the rotor and rollers. Wear personal protective equipment as appropriate. The pump casing should be free and clear of any process fluid, corrosion, or contaminants before replacing the hose/tube.
17. Check that the rollers continue to spin freely, all fasteners are tight, and there is no visible damage to the rotor, front plate, front cover or gasket.
18. Remove the new hose/tube from its protective packaging. Completely coat the new hose/tube and the inside of the cleaned pump casing with a 1/16" layer of PeriFlo® lubricating grease. Insert the hose/tube into the pump with the ends sticking through the suction and discharge ports. Press the connections into the ends of the hose/tube. A small amount of grease on the end of the barb can aid installation.
19. Install the press plates around the hose/tube on the suction side. Clamp them together with the hardware and then install the hardware to fasten the press plates to the pump casing.
20. Guide the hose/tube into alignment with the rollers. Add a small amount of grease to the exposed roller surfaces and on the hose/tube where the roller first contacts to hose/tube in rotation.
21. Replace the front cover. Install the front cover knobs to be hand tight with the acorn nut secured with a wrench.
22. Reconnect suction and discharge piping and prepare the pump for operation.

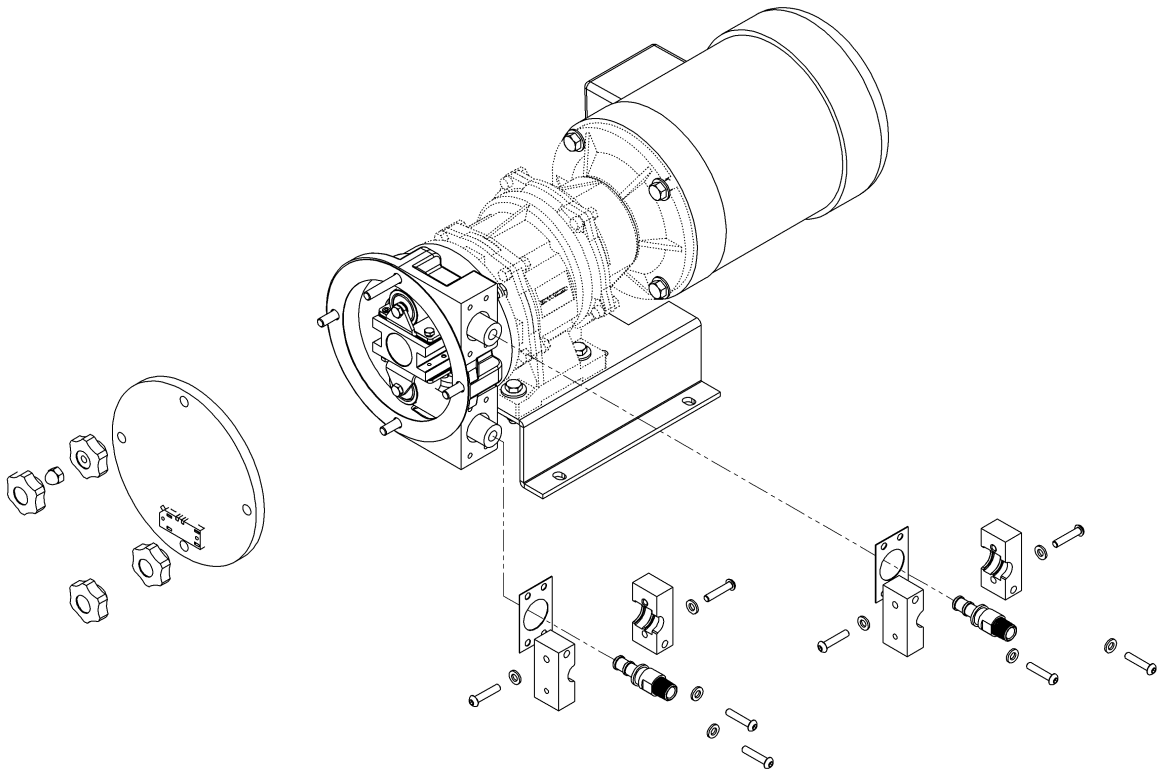


Figure 4 - Hose Change After Failure

4.2 Lubrication

PeriFlo® AMP pumps are lubricated at the factory with specially formulated lubricating grease for use with PeriFlo® hoses and tubes. For optimum pump performance, the grease should be replaced at all hose/tube changes. Grease should be applied to the outer layer of the hose/tube, inside diameter of the pump casing that supports the hose/tube, and the outer surface of the rollers.

Lubrication Chart	
AMP Series	**Required Amount of Grease per Pump (oz)**
AMP10	3
AMP13	3
AMP16	4
AMP19	4
AMP22	6

4.3 Hose/Tube Compression and Shimming

All PeriFlo® AMP pumps use adjustable methods to “shim” the rollers to optimize hose/tube compression based on the speed and discharge pressure of the application. While the compression is set at the factory based on the specified application, it may be necessary to change the shimming in actual operating conditions and with the installation of a new hose/tube. AMP Series pumps use shims to adjust compression.

Over compression: The hose/tube is shimmed more than necessary to seal against the discharge pressure to prevent back flow. This can lead to shortened hose/tube life.

Under compression: The hose/tube is not shimmed enough to seal against the discharge pressure. This is seen as a reduction in output capacity (back flow) and/or the pump is unable to reach the required discharge pressure.

4.3.1 AMP Shimming

1. Jog the motor so that one roller is stopped in the open space between the suction and discharge ports.
2. Disconnect the power source to the drive motor. Follow local Lockout/Tagout procedures.
3. Relieve all pressure from the piping system. Close the inlet and outlet shut off valves.
4. If the hose/tube is also being replaced follow the steps in Section 4.1.1 to remove the hose/tube and grease.
5. Refer to Figure 5 for item identification. Remove the front cover knobs and locking hardware to access the inside of the pump, continuing to follow safety precautions as appropriate.
6. Remove the bolts (Items 1 and 2) on the roller support bracket that retain the roller assembly and shims to the rotor. Add or remove shims (Item 3) as necessary and reinstall the roller assembly (Item 4) using the following Torque guide.

AMP Series	Fastener	Torque (IN-LB / N-M)
AMP10/13	SH Cap Screw (Item 1)	8 / 1.0
	Hex Screw (Item 2)	12 / 1.4
AMP19/16	SH Cap Screw (Item 1)	36 / 4.0
	Hex Screw (Item 2)	48 / 5.4
AMP22	SH Cap Screw (Item 1)	36 / 4.0
	Hex Screw (Item 2)	48 / 5.4

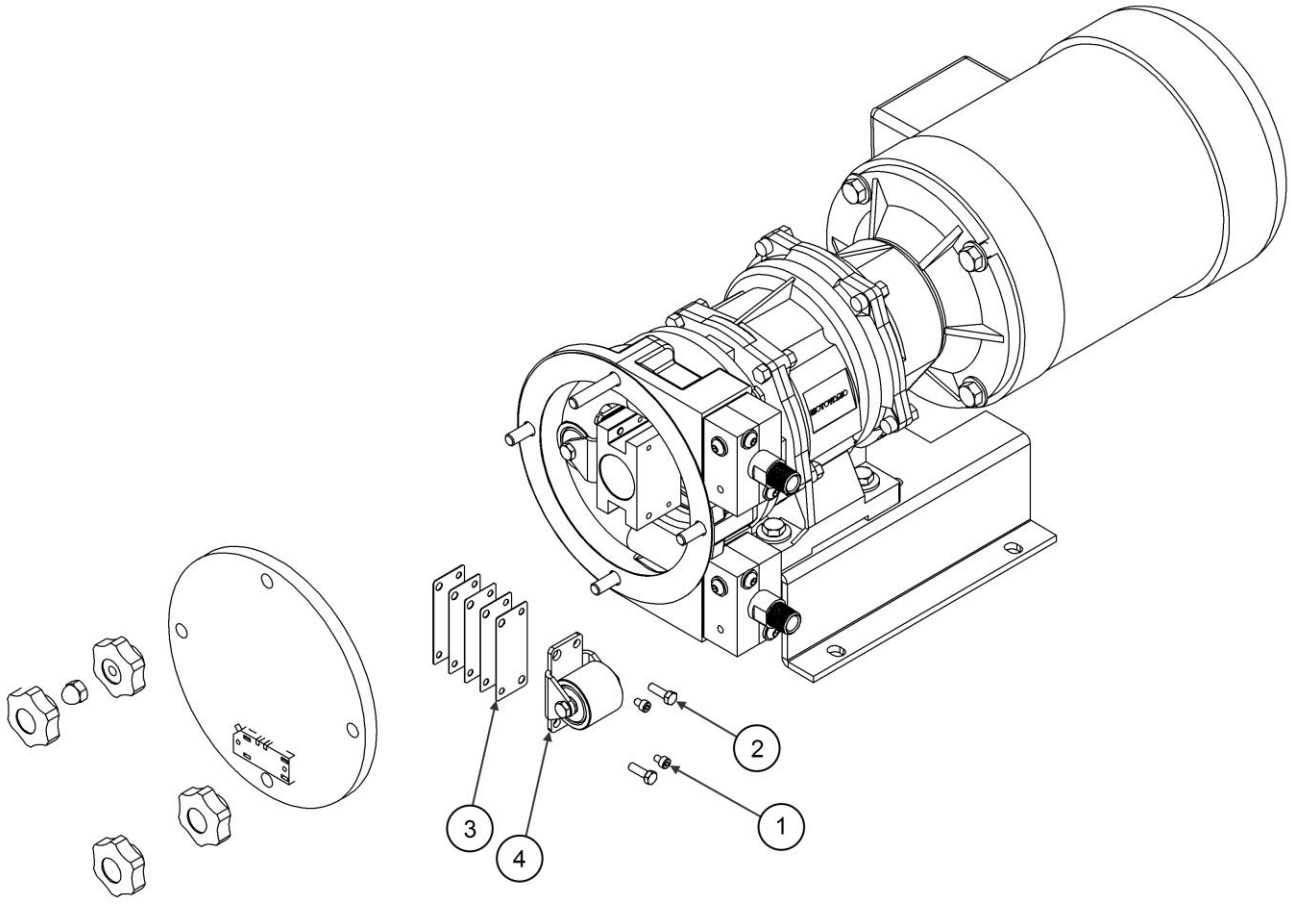


Figure 5- AMP Shimming

NOTE **Note – Some AMP Series pumps are factory shimmed with blocks and shims. A combination of blocks and shims may be required to correctly shim the pump for the expected system discharge pressure.**

7. Replace the front cover and tighten the knobs. Reconnect the motor to power and jog the motor to rotate the remaining roller is stopped in the open space between the suction and discharge ports.

WARNING **NEVER place fingers or hands into any part of the pump while the pump is running.**

8. Disconnect the motor from power following local Lockout/Tagout procedures. Remove the cover and repeat Step 7 to adjust the second roller.

Note – Both roller assemblies must have an equal number of shims to ensure uniform compression of the hose/tube.

9. If a new hose/tube is required follow the steps in Section 4.1.1 to reinstall. Replace the front cover. Install the front cover knobs to be hand tight with the acorn nut secured with a wrench. Prepare the pump for operation.

4.4 Motor Removal & Reinstallation

Removal

1. Disconnect the power supply to the drive motor. Follow local Lockout/Tagout procedures.
2. Disconnect the motor wiring from the motor.
3. Remove the four bolts retaining the motor to the gear reducer. Slide the motor horizontally to pull the motor shaft out of the gear reducer.

Installation

1. Check the motor key is in place on the motor shaft. Install the motor by sliding the motor horizontally into the gear reducer.
2. Align the motor bolts holes to the gear reducer mounting plate.
3. Install the 4 motor retaining bolts. Torque to 40 IN-LBF (4.5 N-M).
4. Connect the motor wiring to the motor in accordance with Local, National and Motor Manufacturer requirements.
5. Restore power.
6. Confirm rotation is correct for the desired pump flow direction.

The PeriFlo® AMP is designed to operate with any Motor rotation direction (clockwise or counter clockwise).

5. Replacement Parts

5.1 KOPkit Program

PeriFlo® AMP KOPkits contain all replacement parts normally used in a preventative maintenance program. There is a specific KOPkit for every AMP pump model. KOPkits can be selected from the technical data sheet below or by a Pulsafeeder representative. The kit can identified by the first six characters of the pump model number (***S10E1V***2A38BTVL1), adding "KU" at the beginning of the string and choosing the kit level, e.g. KUS10E1V-PRO. This identifies the series, hose/tube material, connection material, and components required.

NOTE **When ordering KOPKits or replacement parts always specify: Pump model and serial number (from pump nameplate), e.g., Model No. S10E12VA38BTVL1 and Serial No. Z987654-03.**

KOPkit - AMP and ChemTuff® Series

Pricing can be obtained through iPass, Pulsa.net or by contacting the factory.

KOPkit PeriFlo®	
KU	
Model - *Position 1*	
S	*AMP Series*
C	*ChemTuff® Series*
Size - *Position 2*	
10	
13	
16	
19	*(Norprene Tube only)*
22	
Hose/Tube Material - *Position 3*	
E1	*Norprene*
EP	*EPDM*
NR	*Natural Rubber*
BN	*Buna*
Connection Material - *Position 4*	
V	*PVC Male NPT*
S	*Stainless Steel Male NPT*
C	*PVC Male Camlock*
K	*PVDF Male NPT*
Kit Level - *Position 5*	
- STD	*Includes: Hose/Tube, grease, connections, press plate gaskets, cover gasket.*
- PRO	*Includes: -STD components plus - rollers/bearings, press plates, gaskets, hardware.*

KOPkit String	**KU**	____	____	____	____	____	____	-	____	____	____
Position		1		2		3	4			5	

6. Troubleshooting

Difficulty	Probable Cause	Remedy
Pump motor does not start	Faulty power source	Check power source
	Blown fuse, circuit breaker	Replace - eliminate overload
	Broken wire	Locate and repair
	Wired improperly	Check diagram
	Process piping blockage	Open valves, clear other obstructions.
No fluid delivery	Motor not running.	Check power source. Check wiring diagram
	Supply tank empty	Fill tank
	Line clogged	Clean and flush
	Closed in-line valve(s)	Open valve(s)
	Under compression	Add shims/increase compression setting
	Hose/tube ruptured	Replace hose/tube
Low fluid delivery	Motor speed too low	Check voltages, frequency, wiring, and terminal connections Check nameplate vs. specifications Increase motor speed
	Calibration system error	Evaluate and correct
	Under compression	Add shims/increase compression setting
	Hose/tube nearing end of life	Evaluate hose/tube condition, replace as necessary
	Product viscosity too high	Lower viscosity by increasing product temperature or dilution. Increase pump and/or piping size
Delivery gradually drops.	Leak in suction/discharge line	Locate and correct
	Product change	Check viscosity and other variables
	Supply tank vent plugged	Unplug vent
	Hose/tube nearing end of life	Evaluate hose/tube condition, replace as necessary
Delivery higher than rated.	Motor speed too high	Check voltages, frequency, wiring, and terminal connections Check nameplate vs. specifications Decrease motor speed
	Calibration system error	Evaluate and correct
Short hose/tube life	Chemical attack	Confirm compatibility of hose/tube, connections with pumped fluid
	Excessive pump speed	Reduce the speed of the pump
	Excessive discharge pressure	Reduce pressure, reduce pump speed, increase discharge pipe size
	High pumping temperature	Reduce temperature of product
	Abnormal elevation in temperature	Check rollers spin freely, apply additional grease
	Over compression	Reduce the hose compression
	Insufficient quantity of grease	Apply additional grease
Elevated Temperature	Hose/tube with no grease	Apply lubricating grease
	Elevated temperature of product	Reduce product temperature
	Rollers seized	Check fastener torque
	Excessive pump speed	Reduce pump speed

Difficulty	Probable Cause	Remedy
Noisy gearing, knocking	Water hammer	Install pulsation dampener
	Faulty gear reducer	Consult factory.
	Base assembly loose	Tighten base hardware Anchor base
Piping noisy.	Pipe size too small	Increase size of piping Install pulsation dampener
	Pipe runs too long	Install pulsation dampener in line
	Pulsation dampener inoperative or flooded	Refill with air or inert gas Inspect and replace diaphragm and recharge
	No surge chamber or dampener used	Install pulsation dampeners
Motor overheats.	Pump overloaded	Check operating conditions against pump design Verify discharge pressure
	High or low voltage	Check power source
	Loose wire	Trace and correct
	Incorrect motor wiring	Verify and correct

7. Piping Accessories

Pressure Relief Valves

Pressure relief valves are designed to protect chemical feed systems from damage that may be caused by defective equipment or a blockage in the discharge line. These valves function to limit the pressure downstream of the pump. Field adjust the pressure relief valve to operate when the system pressure exceeds operating discharge pressure by 10-15%. No potentially restrictive components, such as a valve, should be installed between the pump discharge and the PRV.

Pulsation Dampener

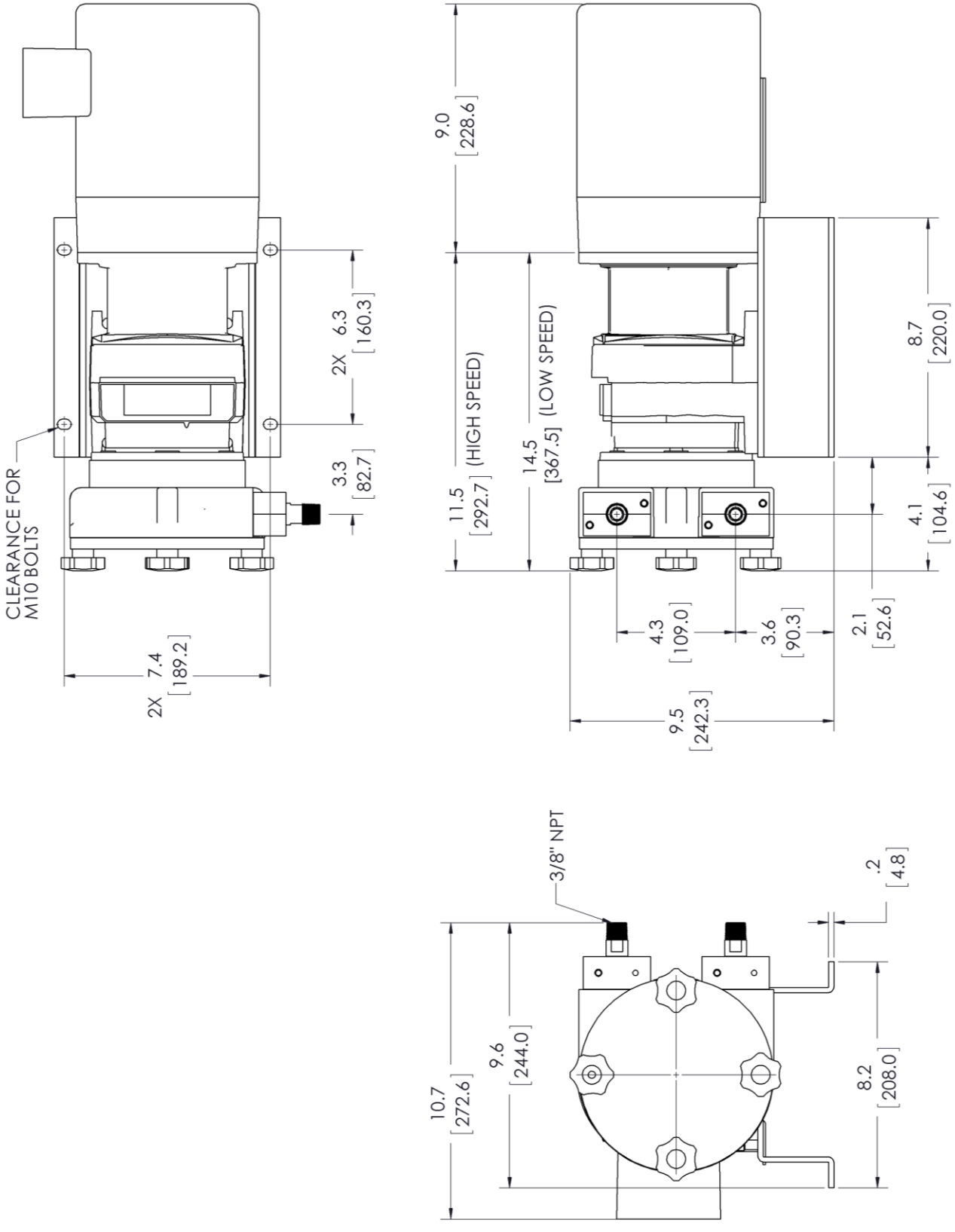
A pulsation dampener is a pneumatically charged diaphragm-type chamber that intermittently stores hydraulic energy. Used on the inlet, the dampener will stabilize pulsating flow variations as well as provide a full charge of process fluid to the pump. On the discharge line, it will reduce discharge pressure peaks and pulsating flow variations. The pulsation dampener should be charged according to the manufacturer's instructions.

8. Dimensional Drawing

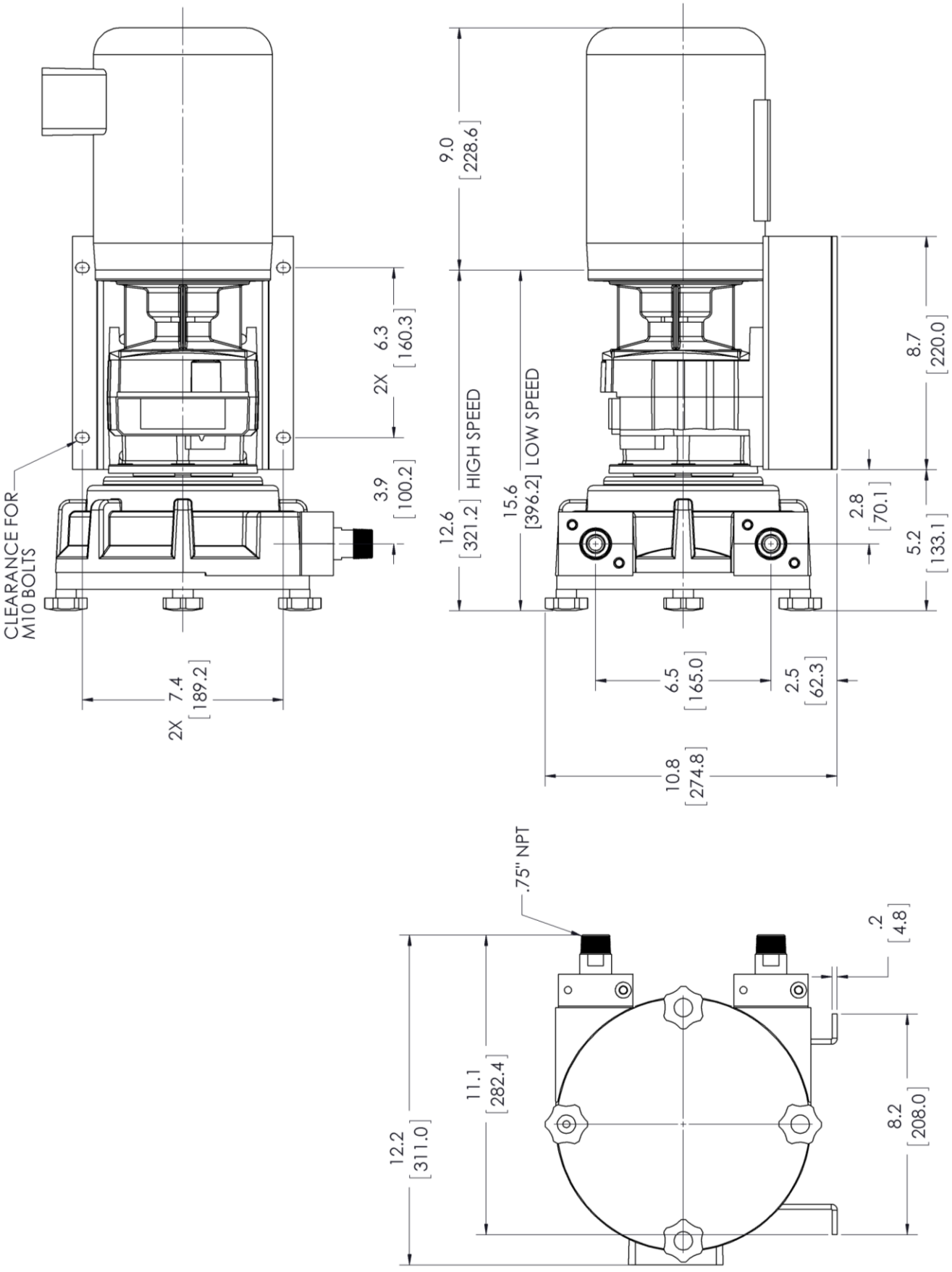
Dimensions in inches [mm]

Dimensions are with standard 56C frame motor

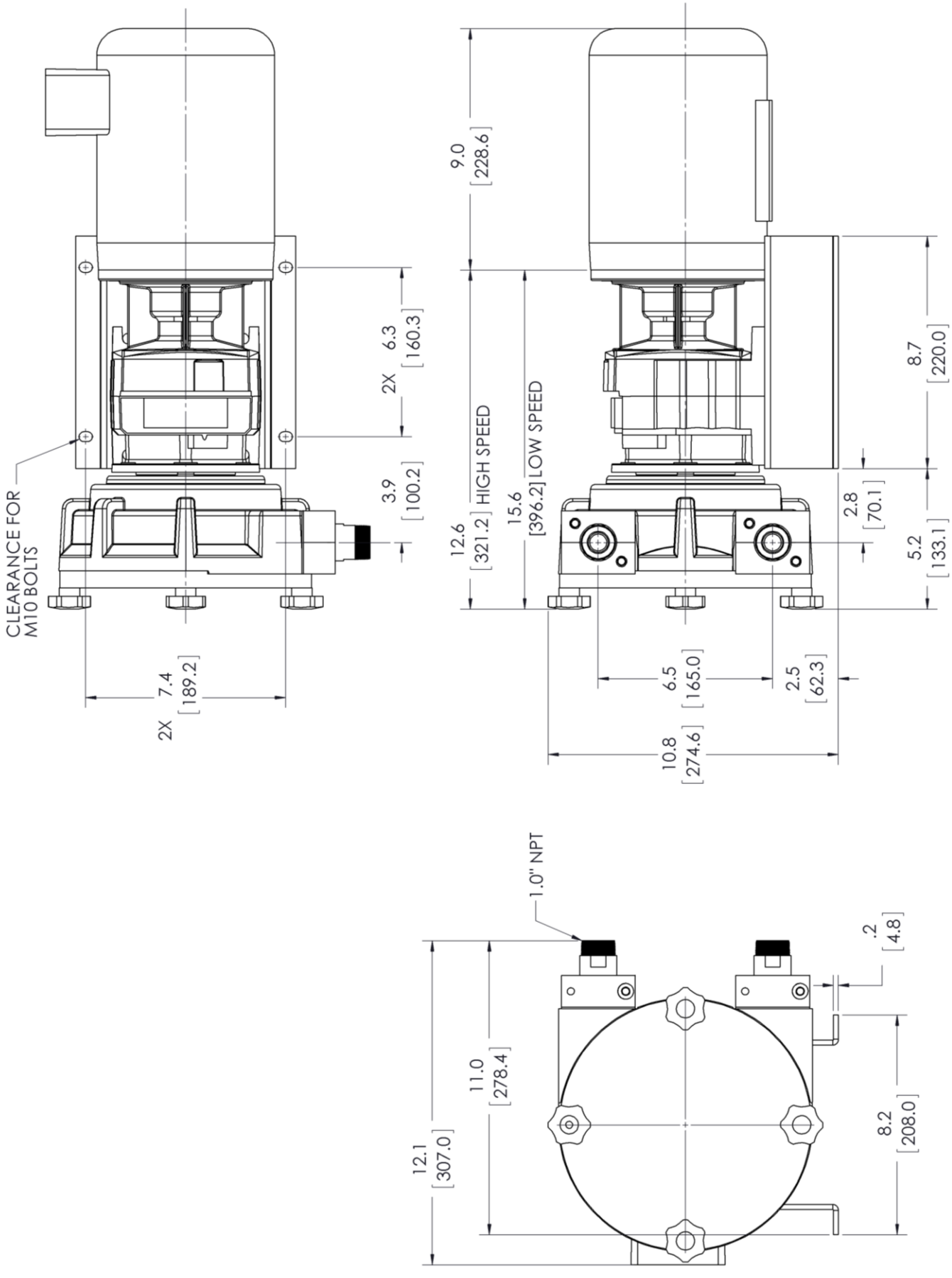
8.1 AMP10-13



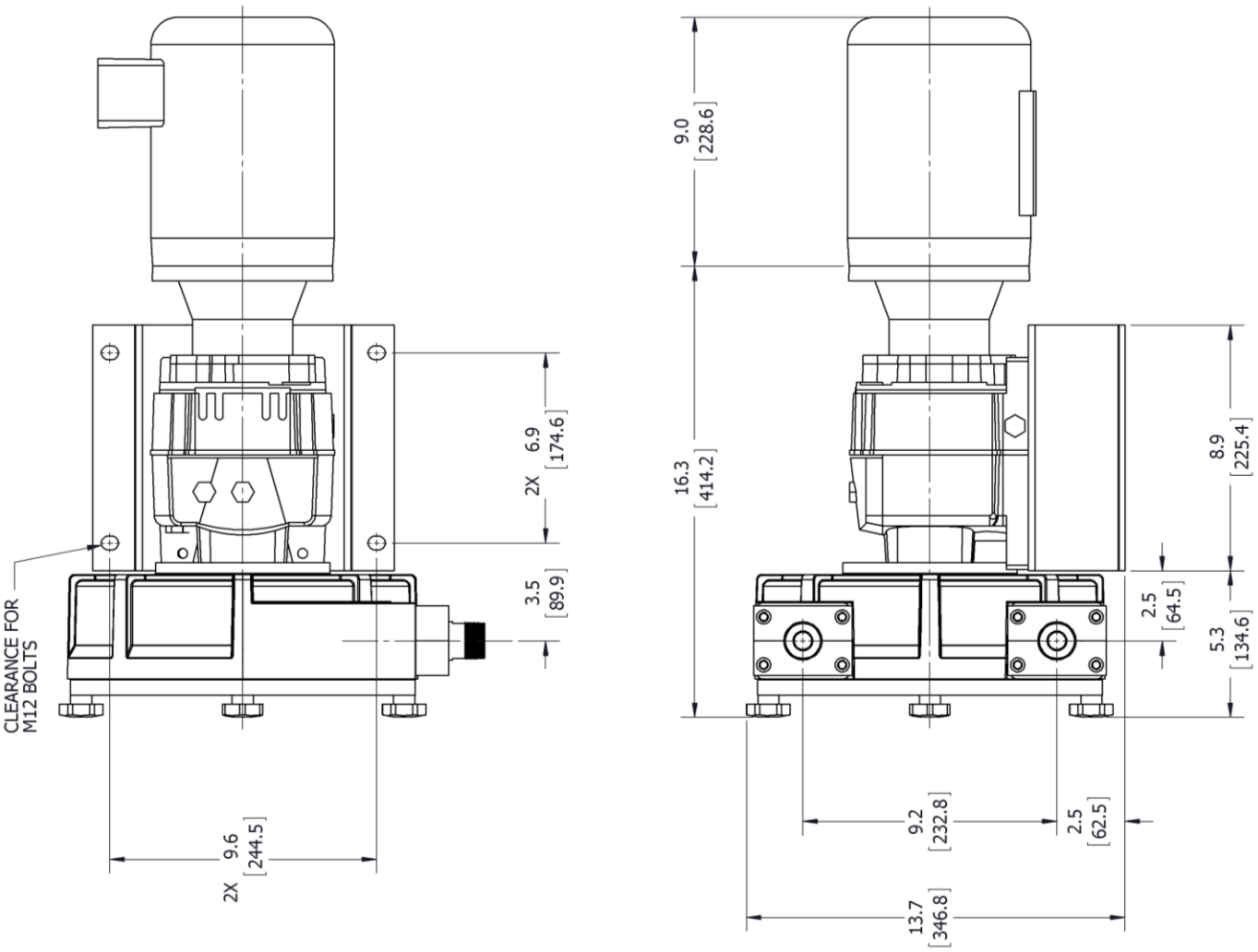
8.2 AMP16

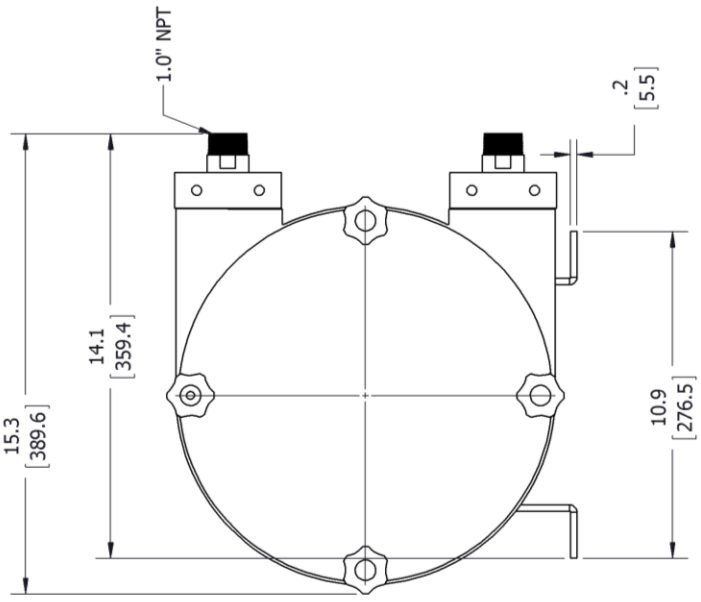

CLEARANCE FOR
M10 BOLTS
2X 7.4
[189.2]
2X 6.3
[160.3]
3.9
[100.2]
9.0
[228.6]
12.6
[321.2]
HIGH SPEED
15.6
[396.2]
LOW SPEED
8.7
[220.0]
2.8
[70.1]
5.2
[133.1]
6.5
[165.0]
2.5
[62.3]
10.8
[274.8]
.75" NPT
.2
[4.8]
12.2
[311.0]
11.1
[282.4]
8.2
[208.0]

8.3 AMP19


CLEARANCE FOR M10 BOLTS
2X 7.4 [189.2]
2X 6.3 [160.3]
3.9 [100.2]
9.0 [228.6]
12.6 [321.2] HIGH SPEED
15.6 [396.2] LOW SPEED
8.7 [220.0]
2.8 [70.1]
5.2 [133.1]
6.5 [165.0]
2.5 [62.3]
10.8 [274.6]
1.0" NPT
.2 [4.8]
11.0 [278.4]
12.1 [307.0]
8.2 [208.0]

8.4 AMP22


CLEARANCE FOR
M12 BOLTS
2X 6.9
[174.6]
3.5
[89.9]
2X 9.6
[244.5]
9.0
[228.6]
16.3
[414.2]
8.9
[225.4]
2.5
[64.5]
5.3
[134.6]
9.2
[232.8]
2.5
[62.5]
13.7
[346.8]


1.0" NPT
.2
[5.5]
15.3
[389.6]
14.1
[359.4]
10.9
[276.5]

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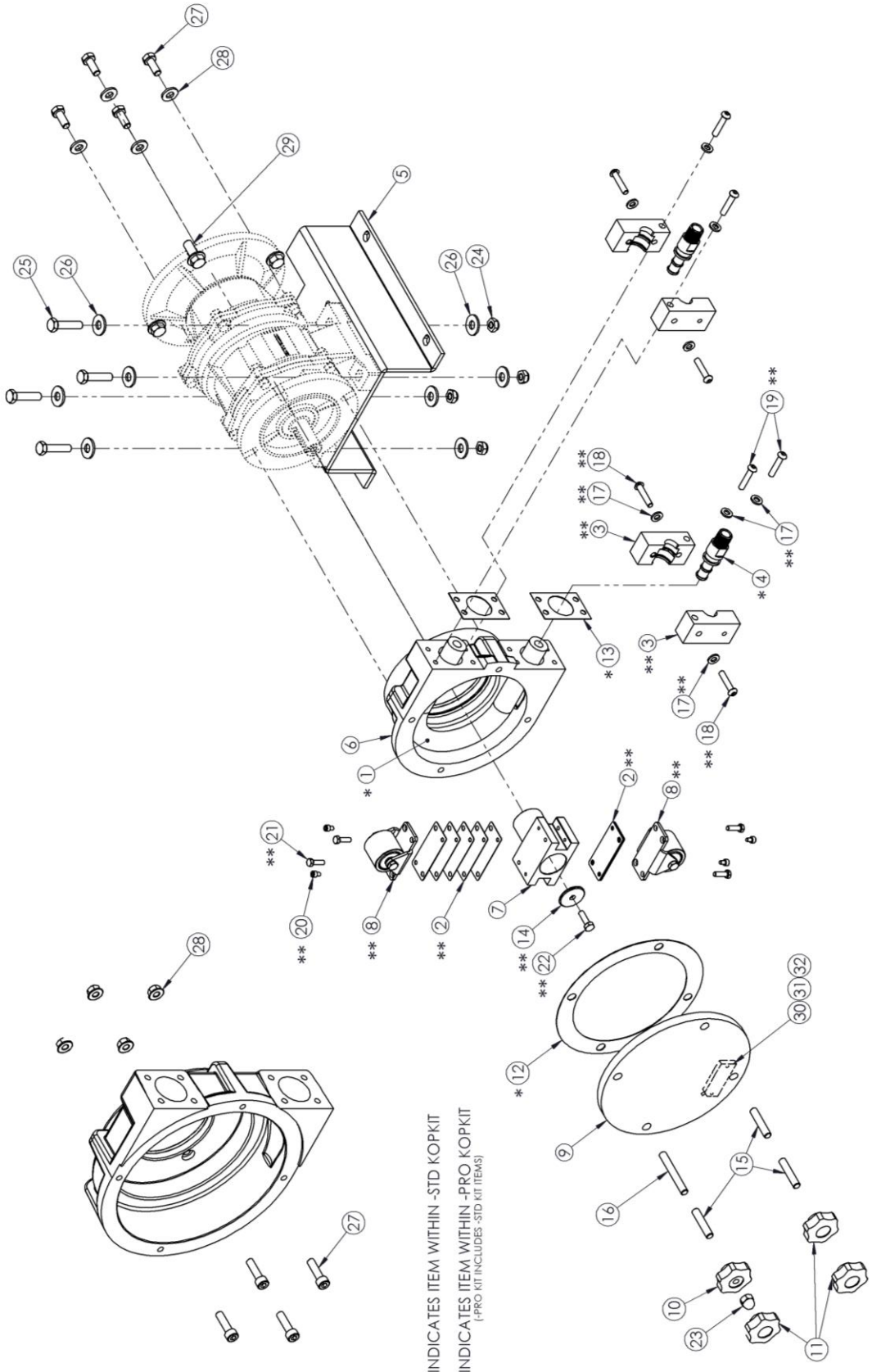
9. Parts Diagrams and Item Numbers

9.1 AMP10-19



QTY	PART No.	DESCRIPTION	ITEM No.	
4	NP991018-188	M 8 WSHR FLAT DIN 125A A2	28	
4	W770534-188	M 8-1.25X20MM BOLT HEXHD 0188	27	
8	W771008-188	.31 FLT WSHR, COMMERCIAL 0188	26	
4	NP990430-188	M 8-1.25 X35 HEXHD BOLT 931 A2	25	
4	NP994109-188	M 8-1.25 HEX NUT NYLOK 188	24	
1	NP994116-188	M 8-1.25 NUT ACORN 188	23	
1	W770546-188	M 6-1.00 X 20 BOLT HEXHD 20188	22	**
4	NP990479-188	M 5-0.8 X 16 BOLT HEXHD 20188	21	**
4	NP990005-188	M 4 -0.7 X 14 SKHD SCREW 912	20	**
4	NP994125-188	M 6-1.0 X 40 BH SKCS 188	19	**
4	NP994125-188	M 6-1.0 X 40 BH SKCS 188	18	**
8	NP991017-188	M 6 FLT NARR WSHR 125-A2	17	**
1	NP991004-026	M 8-1.25 X 60 SCR SCSET 913 A2	16	
3	NP991004-025	M 8-1.25 X 40 SCREW SETSC 188	15	
1	NH999002-316	WASHER,ROTOR AMP10/13	14	**
2	NH460004-EPD	GASKET,CONNECTION CT10/13	13	*
1	NH460001-EPD	GASKET,COVER AMP/CT10/13	12	*
3	NH260002-000	KNOB,COVER PRESS BLIND	11	
1	NH260001-000	KNOB,COVER PRESS 8MM THRU	10	
1	NH240025-PCR	COVER,FRONT CT,AMP10/13 PCR	9	
2	NH100002-000	ROLLER ASSY, AMP10/13	8	**
1	NH030001-000	ROTOR,AMP10/13 IRN	7	
1	NH010014-ALU	CASING,PMP AMP/CT/10/13 ALU	6	

AMP10/13 COMMON PARTS

AMP13T	AMP13H	AMP10T	AMP10H	PART No.	DESCRIPTION	ITEM No.	
1		1		NH580001-STL	BASE,PLATE AMP10,13,16,19 STL	5	
2		-		NH300036-PVC	CONN,.38NPT AMP/CT13	4	*
				NH300036-316	CONN,.38NPT AMP/CT13		
				NH300009-PVC	CONN,.75 CAMLOCK AMP/CT13 PVC		
				NH300036-PVD	CONN,.38NPT AMP/CT13		
-		2		NH300035-PVC	CONN,.38NPT AMP/CT10		
				NH300035-316	CONN,.38NPT AMP/CT10		
				NH300004-PVC	CONN,.75 CAMLOCK AMP/CT10 PVC		
				NH300035-PVD	CONN,.38NPT AMP/CT10		
4	-	4	-	NH360002-DLR	PLATE,PRESS TUBE CT/AMP10 DEL	3	**
-	4	-	4	NH360001-DLR	PLATE,PRESS HOSE CT/AMP 10/13		
1	-	-		NH470041-013	KIT, SHIM AMP13 TUBE	2	**
-	1			NH470040-013	KIT, SHIM AMP13 HOSE		
-		1	-	NH470041-010	KIT, SHIM AMP10 TUBE		
		-	1	NH470040-010	KIT, SHIM AMP10 HOSE		
1	-	-		NH040004-NRP	TUBE, AMP/CT13 NORPRENE	1	*
-	-			NH040003-EPD	HOSE, AMP/CT13 EPDM		
-	1			NH040003-RUB	HOSE, AMP/CT13 NATURAL RUBBER		
-	1			NH040003-NTR	HOSE, AMP/CT13 NITRILE		
		1	-	NH040002-NRP	TUBE, AMP/CT 10 NORPRENE		
-		-		NH040001-EPD	HOSE, AMP/CT10 EPDM		
		-	1	NH040001-RUB	HOSE, AMP/CT10 NATURAL RUBBER		
		-	1	NH040001-NTR	HOSE, AMP/CT10 NITRILE		

QTY	PART No.	DESCRIPTION	ITEM No.	
4	NP994094-188	M 8-1.25 FLANGE HEX NUT 188	28	
4	NP994133-188	M 8-1.25 X 30 SCREW SKHD 188	27	
8	W771008-188	.31 FLT WSHR, COMMERCIAL 0188	26	
4	NP990430-188	M 8-1.25 X35 HEXHD BOLT 931 A2	25	
4	NP994109-188	M 8-1.25 HEX NUT NYLOK 188	24	
1	NP994116-188	M 8-1.25 NUT ACORN 188	23	
1	W770546-188	M 6-1.00 X 20 BOLT HEXHD 20188	22	**
4	W770541-188	M 8-1.25X25 BOLT HEXHD 0188	21	**
4	NP990024-188	M 6-1.0 X 16 SKHD SCREW 188	20	**
4	NP994097-188	M 8-1.25 X 45 SCREW BUTHD 188	19	**
4	NP994128-188	M 8-1.25 X 40 BH SKCS 188	18	**
4	NP991018-188	M 8 WSHR FLAT DIN 125A A2	17	**
1	NP994127-188	M 8-1.25 X 75 STUD FULL THD A2	16	
3	NP994085-188	M 8-1.25 X 50 SKHD SETSC 913A2	15	
1	NH999035-316	WASHER, ROTOR AMP16/19	14	**
2	NH460005-EPD	GASKET,CONNECTION CT16/19	13	*
1	NH460002-EPD	GASKET,COVER AMP/CT16/19	12	*
3	NH260002-000	KNOB,COVER PRESS BLIND	11	
1	NH260001-000	KNOB,COVER PRESS 8MM THRU	10	
1	NH240035-PCR	COVER,FRONT CT16/19	9	
2	NH100003-000	ROLLER ASSY, AMP16/19	8	**
1	NH030002-000	ROTOR,AMP16/19 IRN	7	
1	NH010015-ALU	CASING,PMP AMP/CT16/19 ALU	6	

AMP16/19 COMMON PARTS

AMP19Y	AMP16T	AMP16H	PART No.	DESCRIPTION	ITEM No.	
1	1		NH580001-STL	BASE,PLATE AMP10,13,16,19 STL	5	
2	-		NH300038-PVC	CONN,1NPT AMP/CT19	4	*
			NH300038-316	CONN,1NPT AMP/CT19		
			NH300019-PVC	CONN,1.0 CAMLOCK AMP/CT19 PVC		
			NH300038-PVD	CONN,1NPT AMP/CT19		
-	2		NH300037-PVC	CONN,.75NPT AMP/CT16		
			NH300037-316	CONN,.75NPT AMP/CT16		
			NH300014-PVC	CONN,.75 CAMLOCK AMP/CT16 PVC		
			NH300037-PVD	CONN,.75NPT AMP/CT16		
-	4	-	NH360005-DLR	PLATE,PRESS TUBE AMP/CT16/19	3	**
4	-	4	NH360004-DLR	PLATE,PRESS CT/AMP16/19		
1	-		NH470041-019	KIT, SHIM AMP19 TUBE	2	**
-	1	-	NH470041-016	KIT, SHIM AMP16 TUBE		
	-	1	NH470040-016	KIT, SHIM AMP16 HOSE		
1	-		NH040008-NRP	TUBE, AMP/CT19 NORPRENE	1	*
-	1	-	NH040006-NRP	TUBE, AMP/CT 16 NORPRENE		
	-		NH040005-EPD	HOSE, AMP/CT16 EPDM		
	-	1	NH040005-RUB	HOSE, AMP/CT16 NATURAL RUBBER		
	-	1	NH040005-NTR	HOSE, AMP/CT16 NITRILE		

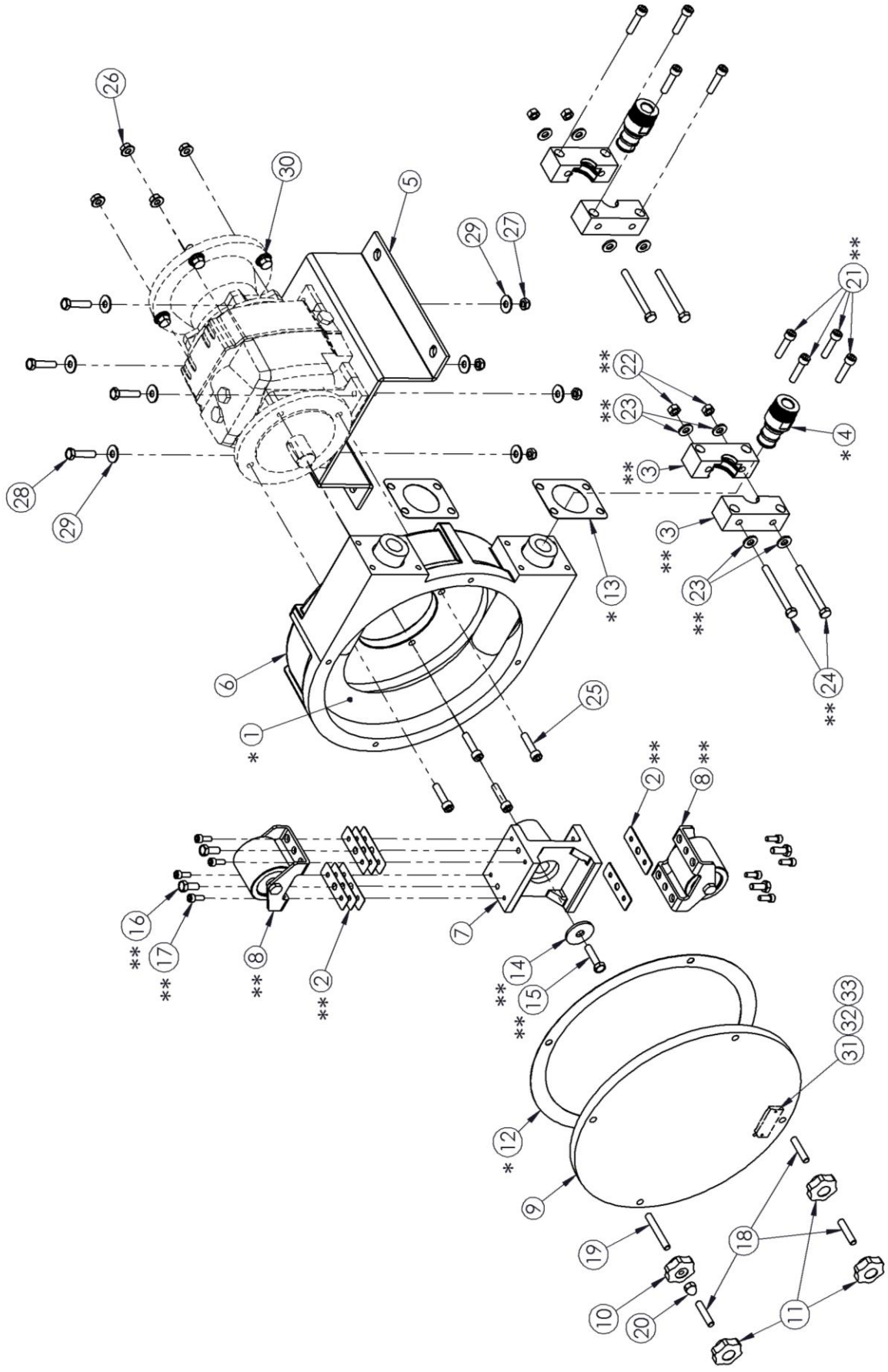
OPTION CODE	QTY	PART No.	DESCRIPTION	ITEM No.
T1, TV	1	NH480051-000	MTR MTG 56C, 143-5TC 3 PH	29
X4, XC		NH480051-001	MTR MTG 56C, 143-5TC 1 PH W/CORD	
HARDWARE KIT, MOTOR MTG.				

OPTION CODE	QTY	PART No.	DESCRIPTION	ITEM No.
L1	1	PCS101-IS	LEAK DETECT,5-30VDC INTRN SAFE	30
L1S		PCS101	LEAK DETECT,10-30VDC NO	
L1, L1S	1	NH530011-000	LIQUIDTITE, .50 NPT .157-.276	31
L1, L1S	2	W771001-033	#05-40 X .38 SCREW RDHD 2PSTL	32
LEAK DETECTION OPTION				

* INDICATES ITEM WITHIN -STD KOPKIT

** INDICATES ITEM WITHIN -PRO KOPKIT
(-PRO KIT INCLUDES -STD KIT ITEMS)

9.2 AMP22


* INDICATES ITEM WITHIN -STD KOPKIT
** INDICATES ITEM WITHIN -PRO KOPKIT
(-PRO KIT INCLUDES -STD KIT ITEMS)

T1, TV	1	NH480051-000	MTR MTG 56C, 143-5TC 3 PH	30
X4, XC		NH480051-001	MTR MTG 56C, 143-5TC 1 PH W/CORD	
OPTION CODE	**QTY**	**PART No.**	**DESCRIPTION**	**ITEM No.**
HARDWARE KIT, MOTOR MTG.				

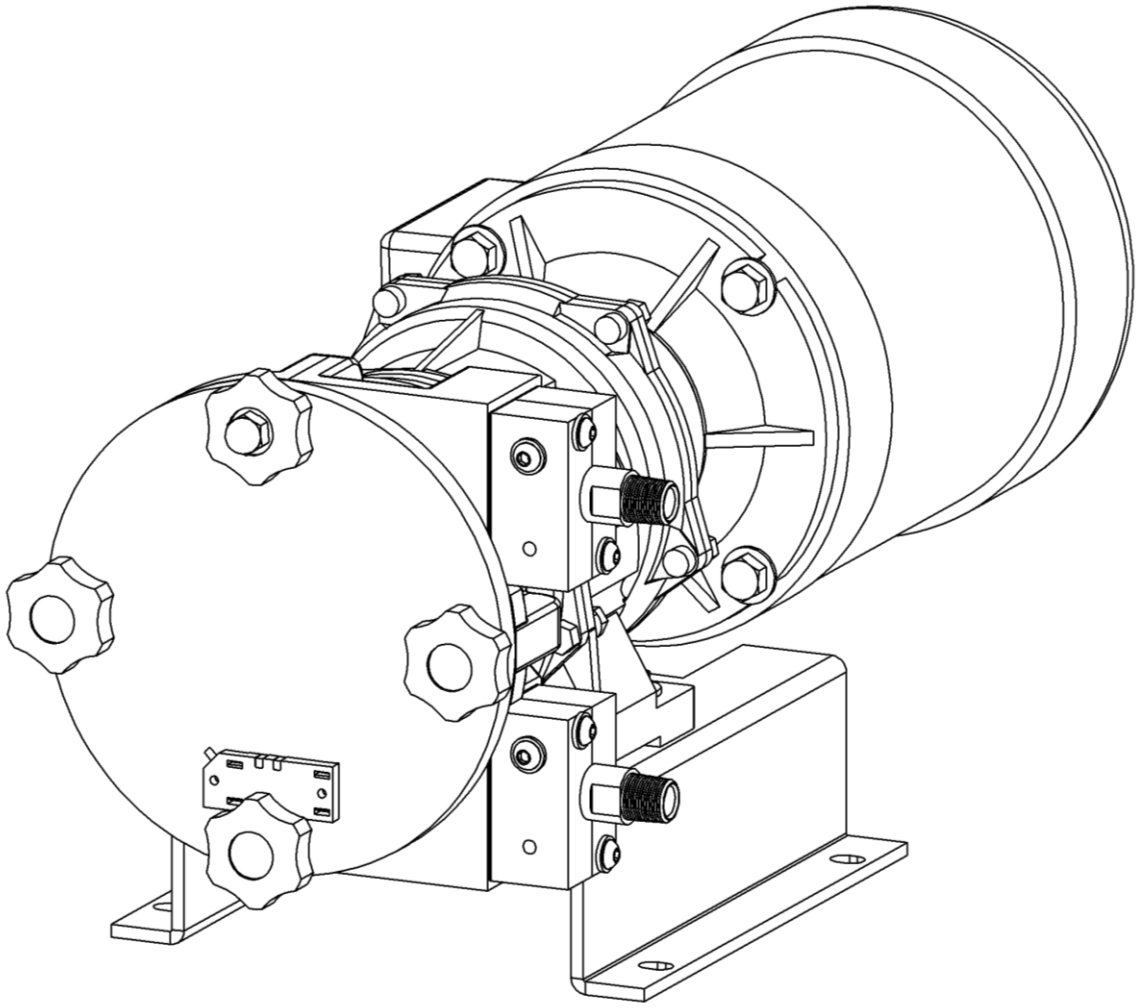
L1S	1	PCS101-IS	LEAK DETECT,5-30VDC INTRN SAFE	31
L1		PCS101	LEAK DETECT,10-30VDC NO	
L1, L1S	1	NH530011-000	LIQUIDTITE, .50 NPT .157-.276	32
L1, L1S	2	W771001-033	#05-40 X .38 SCREW RDHD 2PSTL	33
OPTION CODE	**QTY**	**PART No.**	**DESCRIPTION**	**ITEM No.**
LEAK DETECTION OPTION				

8	W771008-188	.31 FLT WSHR, COMMERCIAL 0188	29	
4	NP999004-188	M 8-1.25 X 45 BOLT HEXHD 188	28	
4	NP994109-188	M 8-1.25 HEX NUT NYLOK 188	27	
4	NP994094-188	M 8-1.25 FLANGE HEX NUT 188	26	
4	NP994096-188	M 8-1.25 X 35 SCREW SKHD 188	25	
4	NP990436-188	M 8 X 1.25 X 80 BOLT HEXHD A2	24	**
8	NP991018-188	M 8 WSHR FLAT DIN 125A A2	23	**
4	NP991218-188	M 8-1.25 NUT HEXHD DIN934 A2	22	**
8	NP994096-188	M 8-1.25 X 35 SCREW SKHD 188	21	**
1	NP994116-188	M 8-1.25 NUT ACORN 188	20	
1	NP991004-026	M 8-1.25 X 60 SCR SCSET 913 A2	19	
3	NP991004-025	M 8-1.25 X 40 SCREW SETSC 188	18	
8	NP990024-188	M 6-1.0 X 16 SKHD SCREW 188	17	**
4	W770534-188	M 8-1.25X20MM BOLT HEXHD 0188	16	**
1	NP994088-188	M10-1.50 X 35 BOLT HEX HD 188	15	**
1	NH999004-316	WASHER,ROTOR AMP22 316	14	**
2	NH460006-EPD	GASKET,CONNECTION CT22	13	*
1	NH460003-EPD	GASKET,COVER AMP/CT22	12	*
3	NH260002-000	KNOB,COVER PRESS BLIND	11	
1	NH260001-000	KNOB,COVER PRESS 8MM THRU	10	
1	NH240027-PCR	COVER,FRONT (LD) AMP22 PCR	9	
2	NH100001-000	ROLLER ASSY,AMP22	8	**
1	NH030003-000	ROTOR,AMP22 IRN	7	
1	NH010016-ALU	CASING,PUMP CT22 MACHINING	6	
QTY	**PART No.**	**DESCRIPTION**	**ITEM No.**	
AMP22 COMMON PARTS				

1		NH580002-STL	BASE,PLATE AMP22 STL	5	
2	2	NH300022-PVC	CONNECTOR,1.00NPT AMP22 PVC	4	*
		NH300021-316	CONNECTOR,1.00NPT AMP22 316		
		NH300024-PVC	CONN,CAMLOCK AMP22 PVC		
		NH300023-PVD	CONNECTOR,1.00NPT AMP22 PVD		
4	-	NH360023-DLR	PLATE,PRESS TUBE AMP/CT22	3	**
-	4	NH360022-DLR	PLATE,PRESS AMP/CT22		
1	-	NH470041-022	KIT, SHIM AMP22 TUBE	2	**
-	1	NH470040-022	KIT, SHIM AMP22 HOSE		
1	-	NH040010-NRP	TUBE, AMP/CT22 NORPRENE	1	*
-	1	NH040009-EPD	HOSE, AMP/CT22 EPDM		
-	1	NH040009-RUB	HOSE, AMP/CT22 NATURAL RUBBER		
-	1	NH040009-NTR	HOSE, AMP/CT22 NITRILE		
QTY		**PART No.**	**DESCRIPTION**	**ITEM No.**	
AMP22T	**AMP22H**				

* INDICATES ITEM WITHIN -STD KOPKIT

** INDICATES ITEM WITHIN -PRO KOPKIT
(-PRO KIT INCLUDES -STD KIT ITEMS)



PeriFlo® AMP

PERISTALTIC PUMP

IOM-PFL-4500-Rev.A

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