Advantus 6E Foam System for ONE STEP CAFSystem Operation / Installation Guide

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Read through the installation instructions carefully.

NOTE: Instructions subject to change without notice.

Waterous Company, 125 Hardman Avenue South, South St. Paul, Minnesota 55075 USA (651) 450-5000
www.waterousco.com

Warnings, Cautions, and Notes

Warning:	A warning alerts you to a procedure, practice or condition that may result in death or long term injury to personnel or destruction of equipment.

Caution:	A caution alerts you to a procedure or condition that may result in serious damage to equipment or its failure to operate as expected

Note: A note points out important information. Failure to read the note may not result in physical harm to personnel or equipment. It may waste time and money.

ATTENTION:

Defects in replacement part(s), component(s) or product(s) manufactured by others and furnished by WATEROUS is understood that the only warranty provided for such replacement part(s), component(s) or product(s), shall be the warranty provided by the manufacturer of said replacement part(s), component(s) or product thereof which, if assignable, WATEROUS will assign to Buyer, if requested by Buyer.

Defects in replacement part(s), component(s) or product(s), not furnished by Waterous, but suggested in the installation guide, are the responsibility of the installer and the manufacturer of said replacement part(s), component(s) or product(s). Waterous will not be responsible for any replacement part(s), component(s) or product(s) that are not furnished or purchased from Waterous.

Disclaimer: These instructions are guidelines only and in no way meant to be definitive. During installation, standard safety precautions and equipment should be used where appropriate. Because the tools used and the skill/experience of the installer can vary widely, it is impossible to anticipate all conditions under which this installation is made, or to provide cautions for all possible hazards. Proper installation is the responsibility of the purchaser. All bolts, setscrews, and belts must be checked prior to start-up AND after the initial operation. Damages due to poor installation are the responsibility of the installer.

Waterous reserves the right to make modifications to the system without notice

SECTION 1. SAFETY INFORMATION

Please read all of the following safety precautions and follow carefully. They are important to the prevention of personal injury or damage to the equipment.

1. Do not pump at pressures higher than the maximum recommended pressure. [400 psi (28 BAR)]
2. Do not permanently remove or alter any guarding devices or attempt to operate the system when these guards are temporarily removed.
3. Always disconnect the power source before attempting to service any part of the pump.
4. Release all pressure within the system before servicing any of its components.
5. Drain all concentrate and water from the discharge system before servicing any of its component parts.

6. Check all hoses for weak or worn conditions on a regular basis. Ensure that all connections and fittings are tight and secure.

7. Use only pipe, hose, and fittings from the foam pump outlet to the injector fitting, which are rated at or above the maximum pressure [400 psi (28 BAR) minimum] rating at which the water pump system operates.

8. Any electrical system has the potential to cause sparks during service. Take care to eliminate explosive or hazardous environments during service/repair.

Caution: Do not attempt to operate the system at or above a temperature of 160°F (71°C)

Ensure that the electrical source of power for the unit is the appropriate 12 or 24 volt, negative ground DC system, with a minimum current rating of at least 80 amps for 12 VDC or 50 amps for 24 VDC System.

Periodically inspect the pump and the system components. Perform routine preventive maintenance as required. Failure to perform routine maintenance may cause damage to the pump.

Read and understand “Operation” section before attempting to operate the unit.

Always disconnect the ground straps and control cables from the control module or other Advantus equipment before electric arc welding at any point on the apparatus. Failure to do so will result in a power surge through the unit that could cause irreparable damage to the system components.

The cables shipped with each Advantus unit are tested at the factory. Improper handling and forcing connections can damage these cables which could result in other system damage.

This document explains how to set up and operate the Advantus Foam Control system.

SECTION 2. INSTALLATION PLANNING (See DPL83575 for details on installing the Advantus Foam System.)

The Waterous recommends that you spend time planning where and how you intend to install this unit in the equipment before beginning the actual installation.

Determine the locations of the components to be installed such as; foam tank, Motor / Pump Assembly and Manifold).

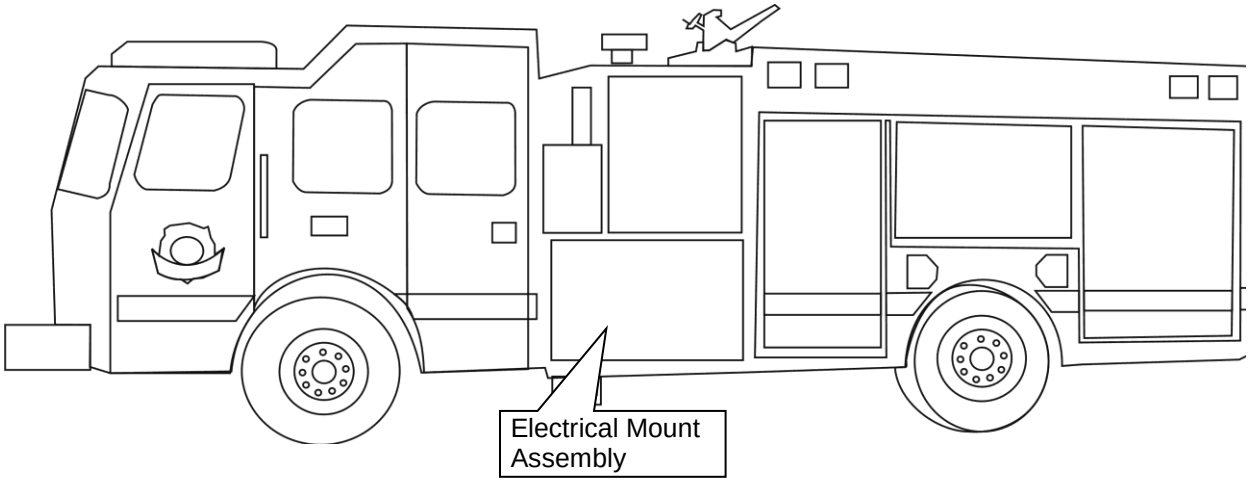
- Locate the pump as close to the supply source as possible. Install it in a clean space where it will be easy to inspect and maintain. Allow room for checking the oil level, changing the oil, and general servicing.
- Try to place components in locations that require the least amount of cables, hoses and fittings.
- Position the Motor / Pump Assembly in an area that is protected from road debris and excessive heat buildup.
- It is recommended that the Motor / Pump Assembly be installed in an accessible compartment located in the vicinity of the HMI Panel.
- Place the foam tank so that the refilling can be done safely.
- Most water tank manufacturers will build the foam tank into the booster tank.
- When specifying an integral foam tank, make sure provisions are made for installation of the optional low tank level sensor as well as foam suction connections and tank drainage according to NFPA.

Caution: **Ensure Adequate Concentrate Supply.**

Advantus 3 - a minimum of ¾ inch ID tubing
Advantus 6 - a minimum of 1 inch ID tubing

Safety Guards.
Follow all codes and regulations regarding installation and operation of the Advantus system.

Shut-Off Valves.
Never install shut-off valves between the pump and discharge pressure regulator, or in the regulator bypass line.



SECTION 3. PLUMBING COMPONENTS

A. Motor / Pump Assembly

The Motor / Pump Assembly must be mounted horizontally. The base must be anchored to a surface or structure that is rigid and of adequate strength to withstand the vibration and stresses of apparatus operation.

The mounting plate, **Error! Reference source not found.**, provides the mounting dimensions for the Motor / Pump Assembly. Flexible hose is required to make the hose connections from the Motor / Pump Assembly to the foam tank.

DO NOT hard pipe the system.

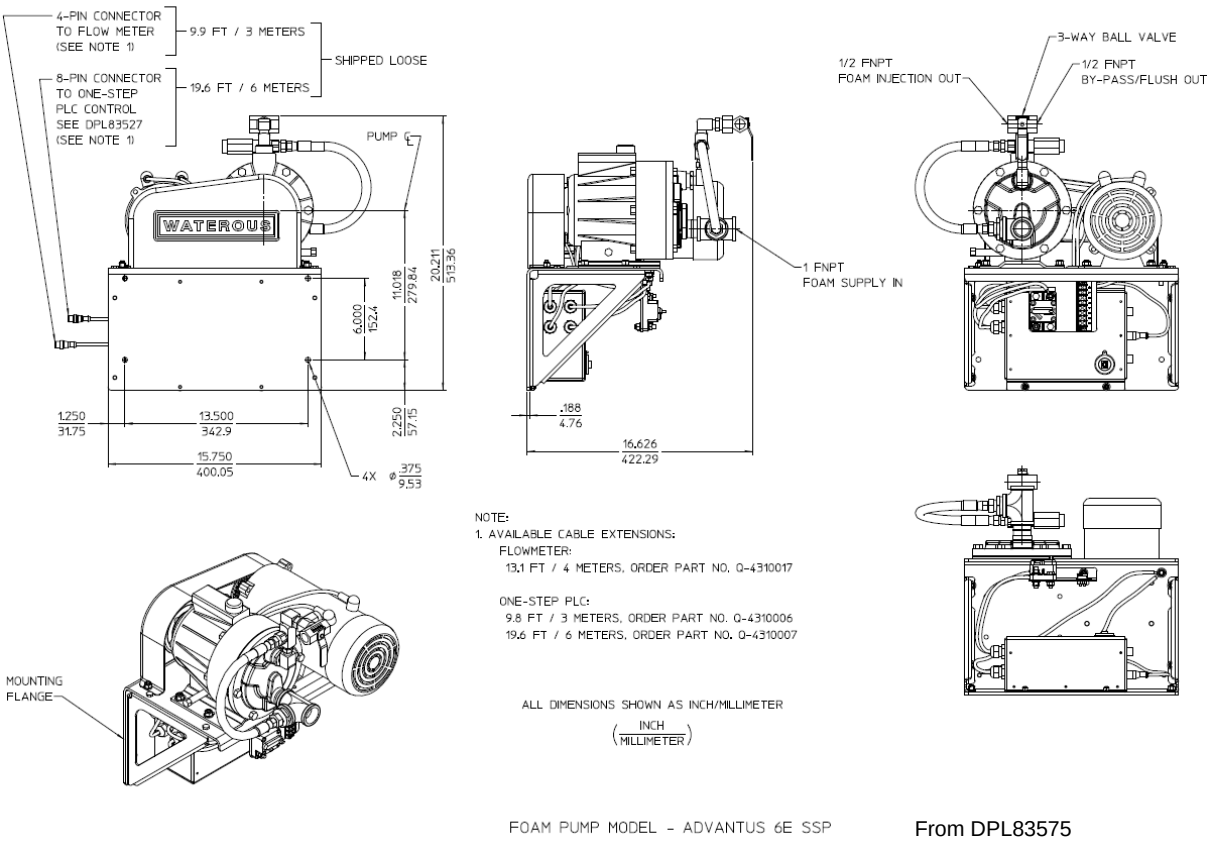
Consider access requirements for checking the foam pump. Be sure the foam concentrate hoses can be properly routed to the inlets and outlets on the foam pump.

Foam concentrates should gravity feed to the foam pump inlet from the foam tank. However the systems are capable of drafting up to 1 meter vertically. The Motor / Pump Assembly must be mounted in an area to avoid excessive exhaust system heat buildup.

Protect the hoses and wiring to prevent chafing and abrasion during operation of the foam system.

Protect the Motor / Pump Assembly from excessive road spray and debris. Although the system is sealed and designed to be resistant to the harsh environment of firefighting apparatus, a protected compartment with easy operator access is the recommended installation location.

Warning:	DO NOT run system with foam shutoff valve in the OFF position. Damage to foam pump will occur.



From DPL83575

Figure 1. Advantus 6E GPM Mounting

The large circuit breaker is used to connect the 12 VDC input power.

Make sure you provide adequate electrical power (80 amps minimum for 12 VDC or 50 amps for 24 VDC) from the battery. Use 8 AWG (minimum) wire directly to the battery or battery switch. Long wire runs may require 6 or 4 AWG wire for proper operation.

Recommended wire sizes	
Wire Size	Wire Length (approx.)
8 awg	Less than 10 feet
6 awg	10 feet to 20 feet
4 awg	20 feet or more

I. Power Supply

Electrical devices can be easily damaged by a weak or erratic power supply. The better the power supply, the better the Advantus system will perform. At maximum output, the Advantus system can draw 80 amps at 12 VDC or 50 amps at 24 VDC.

Connect the ground lead from the chassis frame or the negative battery terminal. Use the same size wire as the power lead.

DO NOT connect the main power leads to small leads that are supplying some other device such as a light bar or siren.

CAUTION:	Be careful not to damage or short circuit the wires leading to the circuit breaker. Only the Advantus system is protected by the circuit breaker..

II. Pump Maintenance

a) Daily

Check the oil level and the condition of the oil. The oil should be ¾ in. (20mm) from the top of the fill port.

Use the appropriate pump oil or equivalent, motor oil for the application (SAE 10W/30).

Operation	Every 8 Hours	Every 50 Hours	Every 500 Hours
Check Oil Level	X		
Check Tubes-Fittings		X	
Check & Clean Inlet Filter		X	
Control Pump Connection to the Engine		X	
Change Oil		X-First Change	X
Check Suction / Delivery Valves			X
Check Pump Bolt and Nut Setting			X
Check Regulation Valve			X

b) Periodically

Change the oil after the first 50 hours of operation and every 500 operating hours after. When changing oil, remove the drain plug at the bottom of the pump so all oil and accumulated sediment will drain out.

Check the inlet pressure or vacuum periodically with a gauge.

CAUTION – DO NOT turn the drive shaft while the oil reservoir is empty.
CAUTION – Protect the pump from freezing.

B. Discharge Relief Valve

The discharge relief valve is installed on the outlet port of the foam concentrate pump. It is provided to protect the pump from excessive pressures. The relief valve is factory set at 450 psi [31 BAR].

C. Wye Strainer

The line strainer provided with the unit has 1 inch NPT female threaded ports will need to be installed, in-line, between the foam supply tank and the foam pump. The hose from the foam tank should have adequate wall stiffness to withstand the vacuum of the foam pump while it is operating.

NOTE: If a pressurized water flush from one of the discharges is incorporated, the plumbing and line strainer exposed to this pressure must be rated at or above the operating pressure of all other discharge plumbing components.

D. Flow Sensor

The flow sensor measures the water flow through the foam manifold system and sends the information to the Control Box and to the HMI.

E. Manifolds

Advantus 6 is supplied completely assembled, but orientation can vary. There are two manifolds available, one for the 500 GPM model and one for the 1000 GPM model. Both contain a flow meter and 3/8 inch foam injection check valve that meets NFPA requirement for a non-return device in the foam injection system.

In horizontal runs, the mix side of the manifold w/ flow meter should be mounted upright.

F. Injector

The brass injector fitting ensures the foam concentrate is injected into the center of the water flow for better mixing.

G. Drain Lines

On apparatus with multiple drain lines, the drains from the foam solution discharge line should not be piped into a multi drain system before the check valves. The standard multi drain system from most manufacturers will allow cross talk between the drain lines and the apparatus water tank, resulting in contamination of the water tank with foam. A separate drain system should be provided for foam solution piping to prevent contamination of the water tank and fire pump.

H. Flushing System

Depending on the corrosiveness of the foam concentrates to be used, a flushing system may be required in the foam concentrate injection system. Most Class A foam concentrates are less corrosive and therefore may not require flushing.

I. Inject / Bypass Valve

The Inject/Bypass valve is mounted on the discharge side of the foam pump. This valve shall be accessible by the pump operator during normal operations. The valve is a 3-way directional valve that selects where the output of the foam pump will go.

Check to make sure the valve is installed properly. Look at the ports as you move the handle, the flow should go from the center port to each of the other ports.

The hose and fittings from the Inject port to the foam injector fitting should have minimum 3/8 inch inside diameter and be rated at 400 psi [28 BAR] minimum working pressure or maximum discharge pressure of the fire pump.

The hose from the Bypass port may have a lower pressure rating since it is plumbed to the atmosphere and will not receive high pressures. This hose is used for pumping the concentrate into a container to empty the tank or to assist in priming of the foam pump. The hose from the Bypass port must be long enough to reach a container outside the truck. This hose must be coiled for storage when not in use.

SECTION 4. ELECTRICAL COMPONENTS

Warnings:

Follow the system electrical diagram for proper hookup of each of the electrical components. Complete molded cable sets are provided with each Advantus system to make all the necessary connections.

The cables and receptacles are keyed so they only go in the correct receptacle and they can only go in one way.

DO NOT FORCE MISMATCHED CABLE CONNECTIONS. The system can only perform when the electrical connections are sound, so make sure each one is correct.

DO NOT hook up the main power cables until all of the connections are made to each of the electrical components. The last connection should be the power cable to the foam pump/motor base assembly.

Disconnect the leads of the battery.

DO NOT cut molded cables.

Make sure you provide at least 80 amps of electrical power for 12 VDC systems or 50 amps for 24 VDC systems from the battery to the main power terminal. Use 8 AWG (minimum) wire directly to the battery or battery switch.

This system is designed for 12 or 24 volt negative ground direct current systems only.

Use care when installing molded cables. Count pins before connecting. Bent pins caused by improper hookup can prevent proper operation even when cables are reattached properly.

If the seal washer is missing or damaged, water can enter the connector and cause corrosion of the pins and terminals that will cause system failure.

The cables shipped with each Advantus unit are tested at the factory with that unit. Improper handling and forcing connections can damage these cables which could result in other system damage.

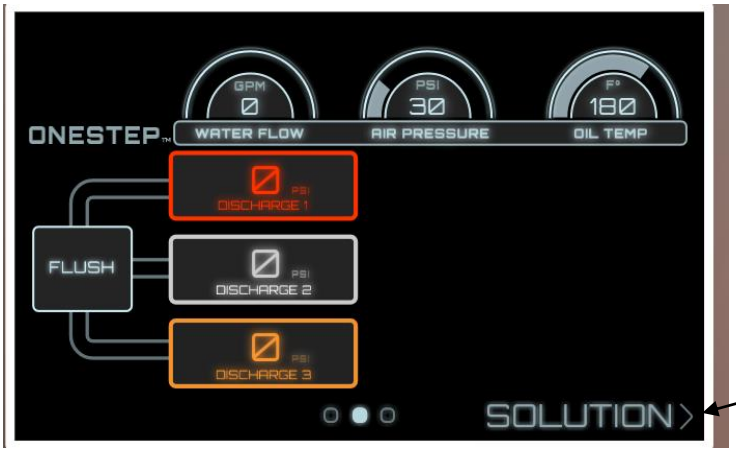
Always disconnect the ground straps and control cables **"before"** electric arc welding at any point on the apparatus. Failure to do so may result in a power surge through the unit that could cause irreparable damage to the system components.

SECTION 5. Foam System Operation

The foam systems is controlled by the HMI Digital Control Panel. The foam proportioning rate is set at the factory at 0.3%. If different foam solutions are used and a different desired foam is needed, the foam solution ratio can be adjusted on the HMI Digital Control Panel.

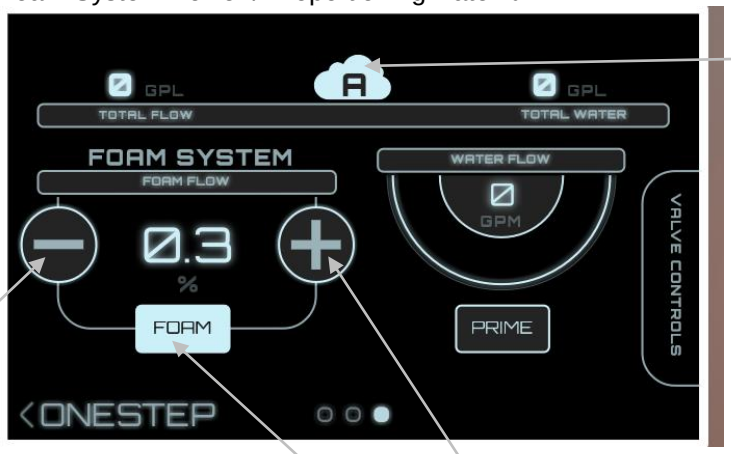
The foam system can also be turned on or off using the HMI. The following screen shots will assist in performing the above operations.

Selecting the Foam System Screen



Press SOLUTION Button to open Foam Solution

Foam System Power / Proportioning Rate %



Foam Type Indicator

Decrease Foam %

Foam System On / Off Button

Increase Foam %

WATEROUS SINCE 1886

NFPA 1901 / 1906
Advantus 6 Foam System Certification

Certified Manufacturer Type Test | **OEM Certification Test**

2" Foam Manifold Certified

Range	Water Flow	Range	Water Press. PSI	Range	Foam Cap. (gpm)
Min	10	Min	0	Min	.01
Max	325	Max	400	Max	4.1
Min	10	Max	400	Min	.01
Max	325	Min	0	Max	6.8
Mid	160	Mid	150	Mid	4.8

		Foam Pump Test Points					
Range	Test Points	Simulated Flow	Set Foam %	Range	Water Press. PSI	Range	Foam (gpm)
Min				Min		Min	
Mid				Mid		Mid	
Max				Max		Max	

2 1/2" Foam Manifold

Range	Water Flow	Range	Water Press. PSI	Range	Foam Cap. (gpm)
Min	20	Min	0	Min	.02
Max	750	Max	400	Max	4.1
Min	20	Max	400	Min	.02
Max	750	Min	0	Max	6.8
Mid	375	Mid	150	Mid	6.0

		Foam Pump Test Points					
Range	Test Points	Simulated Flow	Set Foam %	Range	Water Press. PSI	Range	Foam (gpm)
Min				Min		Min	
Mid				Mid		Mid	
Max				Max		Max	

3" Foam Manifold

Range	Water Flow	Range	Water Press. PSI	Range	Foam Cap. (gpm)
Min	30	Min	0	Min	.03
Max	1200	Max	400	Max	4.1
Min	30	Max	400	Min	.03
Max	1200	Min	0	Max	6.8
Mid	600	Mid	150	Mid	6.0

		Foam Pump Test Points					
Range	Test Points	Simulated Flow	Set Foam %	Range	Water Press. PSI	Range	Foam (gpm)
Min				Min		Min	
Mid				Mid		Mid	
Max				Max		Max	

Installer Certification
Installed, Calibrated and Tested to Waterous AZ's Installa tion Recommendations and Purchaser's Performance Specifications

Tester: _____

Date: _____

SECTION 6. TROUBLESHOOTING CHART

Advantus Troubleshooting Chart		
Symptom	**Probable Cause(s)**	**Corrective Action**
1. Pump runs but produces no flow	Pump is not primed.	See Advantus instructions for priming instructions
	No foam in tank	Fill foam tank
	Foam tank valve closed	Open valve
	Strainer plugged	Remove and clean strainer
	Check valves stuck in pump	Remove and clean check valves
2. Pump loses prime	Air leak in suction hose or inlet fittings.	Remove suction hose and test for leaks by pressurizing hose with water. Make sure thread sealant has been used on all fittings.
	Suction line is blocked, collapsed or too small.	Remove suction line and inspect it for debris lodged in hose.
		Replace line with larger if it is too small.
		Avoid all unnecessary bends. Do not kink hose.
3. Proportioner uses excessive amounts of concentrate (runs rich)	Speed sensor position incorrect.	Reset speed sensor position by referring to manual for instructions.
	Paddle wheel out of calibration.	Calibrate paddle wheel flow per instructions in manual.
	Foam pump out of calibration.	Contact Waterous for reprogramming.
4. Proportioner uses too little of concentrate (runs lean)	Paddle wheel out of calibration.	Calibrate paddle wheel flow per instructions in manual.
	Foam pump out of calibration.	Contact Waterous for reprogramming.
	Foam pump low on oil.	Fill foam pump to correct level with oil.
	Pump diaphragm is ruptured.	Replace foam pump.
5. Pump runs full speed whenever the proportioner is either on or off	Faulty driver box.	Replace driver box.
6. Poor foam quality during low water flows	Foam percentage is too low.	Increase foam percentage.
	Foam strainer restricted.	Remove and clean foam strainer.
	Foam system calibration incorrect.	Re-calibrate.
	System not sized properly for application.	Contact Waterous.
7. Pump runs full speed whenever the proportioner is on	Poor ground to motor driver box on pump/motor	Make sure screws are tight and a good ground
8. Proportioner will not inject concentrate.	Power not on.	Turn power on.
	Relief valve is set too low. (factory preset at 450 psi)	Reset relief to factory setting.
	Clogged piccolo tube.	Clean piccolo tube.
	Inject/Bypass valve in bypass position.	Move to inject position.
	Pump diaphragm is ruptured.	Replace foam pump.
9. B light is on when using A tank and A tank is not selected on A/B selector valve	Low level switch is wired to wrong terminal.	Move wire to correct terminal position.
10. System is powered up and the Foam ON/OFF switch has been pressed but the foam pump doesn't run.	Control cable(s) defective.	Replace control cable(s).
	No water is flowing in any of the foam discharges.	Flow water through a foam capable discharge.
	Poor paddle wheel connection.	Check and reconnect.
	Paddle wheel obstructed.	Clear paddle wheel of debris.
	Paddle wheel not functioning.	Replace paddle wheel.
11. Delay in foam showing at nozzle	Low foam percentage and or low water flow.	Increase as needed.
	Foam inject check valve stuck open.	Replace foam inject check valve.
	Proportioner not primed.	Prime proportioner per instructions.
	A/B selector in flush position.	Move selector to A or B.
	Foam pump low on oil.	Fill foam pump to correct level with oil.
12. Foam in the water tank	Foam was poured in the wrong tank.	Flush water tank.
	Injection check valve stuck open.	Replace injection check valve.
	Foam manifold check valve fails to seal.	Inspect and clean or replace as necessary.
	Foam manifold drain is plumbed to master drain.	Isolate foam manifold drain.
	Improper calibration.	Check and re-calibrate.
13. For system equipped with overboard pick-up system fails to prime	Failure to vent injection line.	Open vent valve or Inject/Bypass valve.
	System not supplied with priming switch.	Add priming switch.

SECTION 7. ILLUSTRATED PARTS LIST

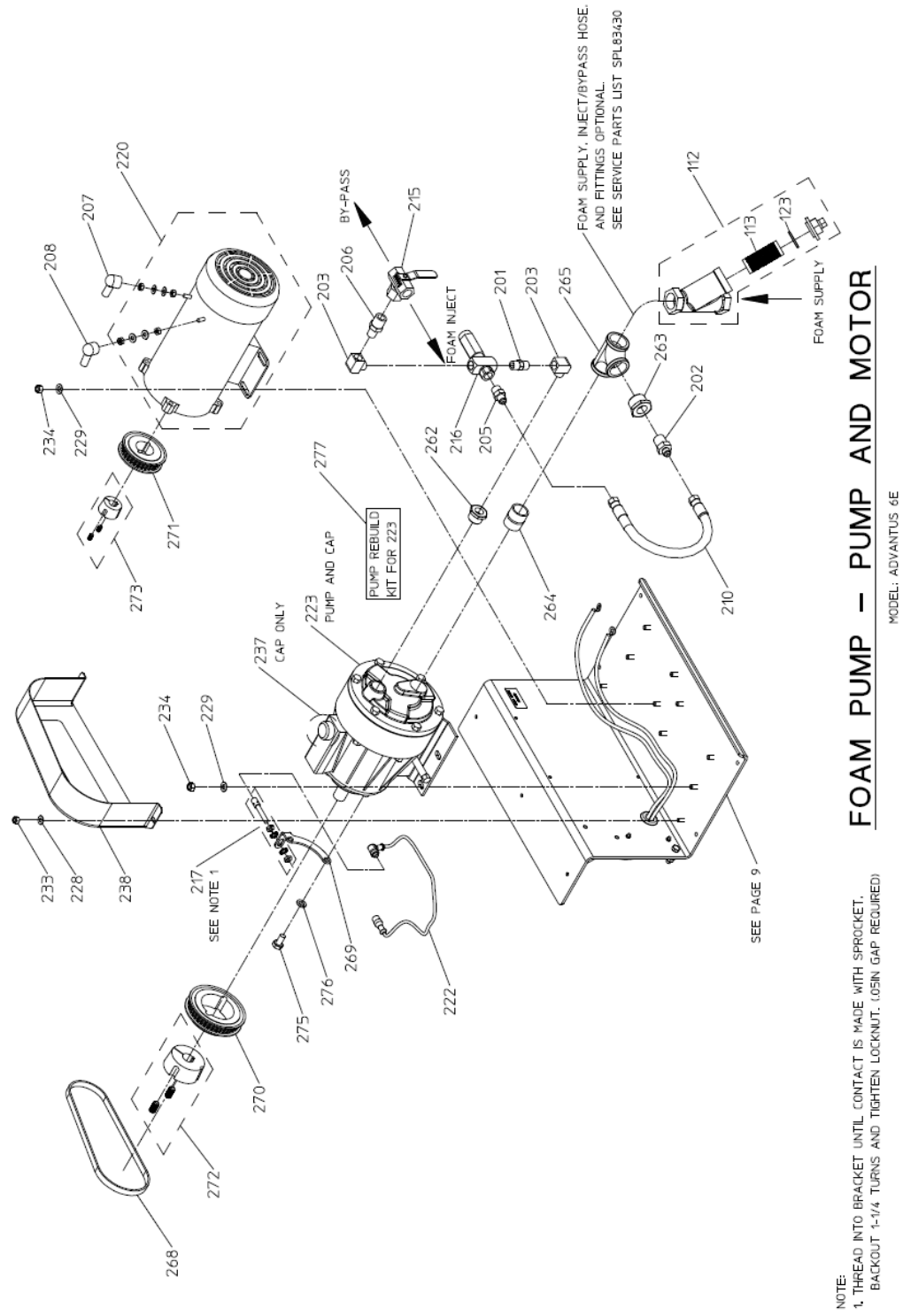


Figure 2 Motor / Pump Assembly