VARIABLE SPEED PUMP SYSTEM
OPERATION & MAINTENANCE MANUAL

Manufactured With Pride
In The USA

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VARIABLE SPEED PUMP SYSTEM INTRODUCTION

THEORY OF OPERATION

The variable speed pump controls out going variable pressures of the water for better equipment operation by maintaining a constant pressure on the system.

The variable speed pump system is controlled by the AquaBoost II Controller, Model 2AB2 (6.9A). The AquaBoost II is a self-diagnosing controller.

INSTALLATION

The following guidelines should be met at installation.

1. Install the variable speed pump system on firm level floor.

2. Inlet water supply piping should be equal or greater than the inlet pipe on the variable speed pump system.

3. Outlet piping from the variable speed pump system should be equal or greater than the outlet pipe on the variable speed pump system.

4. Locate the variable speed pump controller on a wall as close to the variable speed pump system as possible.
   See controller mounting directions located on page number 5 of this manual.

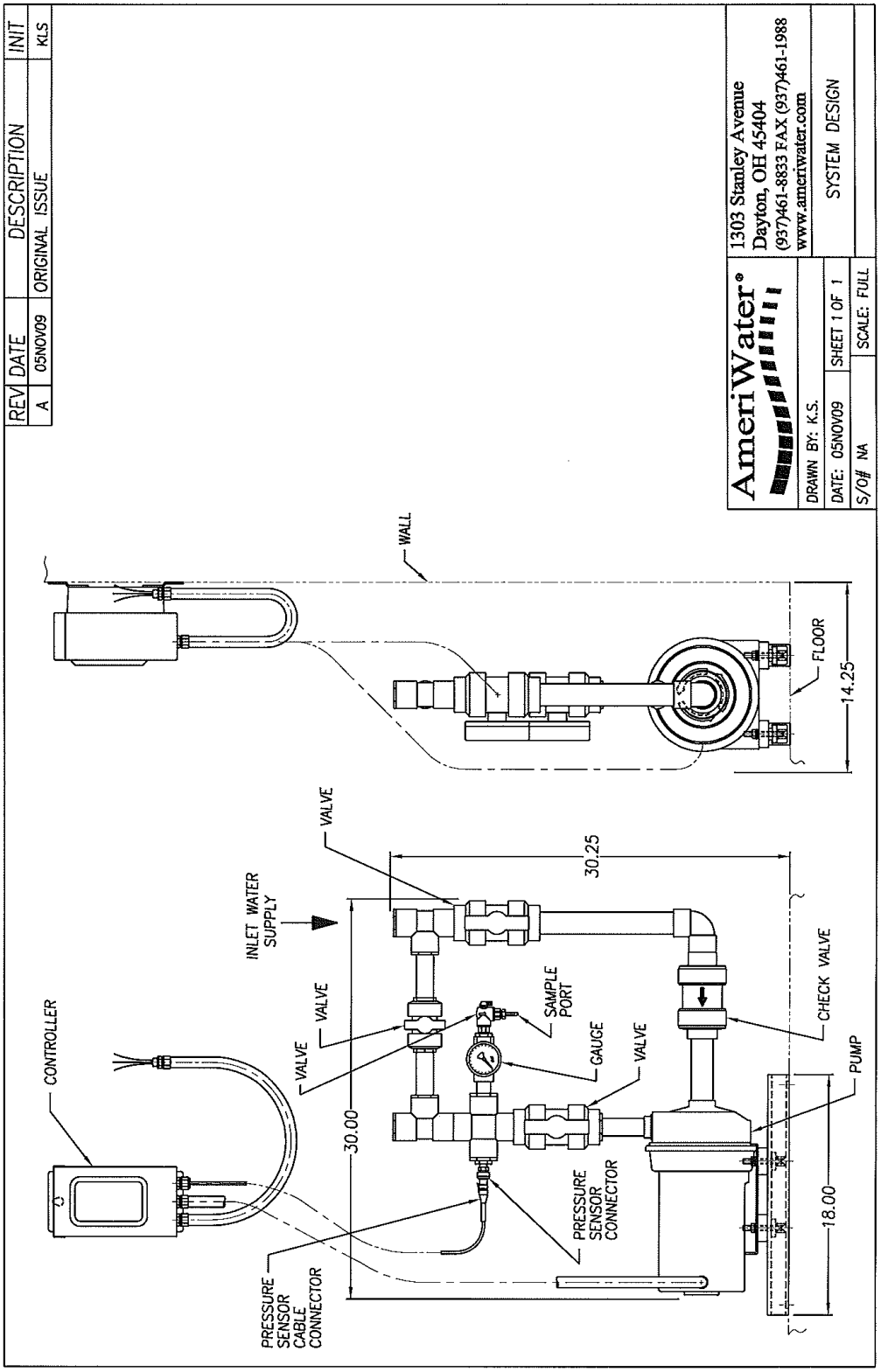
5. Align the connector on the end of the pressure sensor cable with the mating connector on the pressure sensor and push it on. The tab will lock it in place. (Refer to System Design Drawing on page number 2).To prevent failure to the controller in the case of a leak, create a “drip loop” in the cable. This will prevent water from following the cable and entering the sensor connector.

6. Connect the wiring from the controller to the pump.
   See AquaBoost II Contoller wiring diagram located on page number 9 of this manual.

7. Follow all local plumbing and electrical codes.

START-UP

See page number 7-8 for Starting the System instructions for the controller.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DRAWN BY: K.S.
DATE: 05NOV09
S/O# NA
SHEET 1 OF 1
SCALE: FULL
SYSTEM DESIGN
WALL
FLOOR
14.25
30.25
VALVE
INLET WATER SUPPLY
VALVE
VALVE
SAMPLE PORT
GAUGE
VALVE
CHECK VALVE
CONTROLLER
30.00
PRESSURE SENSOR CONNECTOR
PRESSURE SENSOR CABLE CONNECTOR
PUMP
18.00

Goulds Pumps

AquaBoost™ II Controller

Variable Speed Pump Control

Installation, Operation & Maintenance

Models Covered:
1151AB2 (115V, 4.2A)
1AB2 (230V, 4.2A)
2AB2 (230V, 6.9A)

GOULDS PUMPS

Goulds Pumps is a brand of ITT Corporation.

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! Safety Instructions

Important: Read all safety information prior to installation of the AquaBoost II Controller.

Note

This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in this manual, look for one of the following signal words and be alert to the potential for personal injury or property damage. Obey all messages that follow this symbol to avoid injury or death.

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
CAUTION	Used without a safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.
NOTE	Indicates special instructions which are very important and must be followed.

Note

All operating instructions must be read, understood, and followed by the operating personnel. Goulds Pumps accepts no liability for damages or operating disorders which are the result of non-compliance with the operating instructions.

1. This manual is intended to assist in the installation, operation and repair of the system and must be kept with the system.
2. Installation and maintenance **MUST** be performed by properly trained and qualified personnel.
3. Review all instructions and warnings prior to performing any work on the system.
4. Any safety decals **MUST** be left on the controller and pump.
5. **DANGER** Hazardous voltage — The system **MUST** be disconnected from the main power supply before attempting any operation or maintenance on the electrical or mechanical part of the system. Failure to disconnect electrical power before attempting any operation or maintenance can result in electrical shock, burns or death.
6. **CAUTION** Hazardous Pressure — When in operation, the motor and pump could start unexpectedly and cause serious injury.

! Safety Instructions

Warning

⚠WARNING
Hazardous voltage

⚠CAUTION
Hazardous Pressure

DO NOT power the unit or run the pump until all electrical and plumbing connections, especially the pressure sensor connection, are completed. The pump should not be run dry. All electrical work must be performed by a qualified technician. Always follow the National Electrical Code (NEC), or the Canadian Electrical Code (CEC) as well as all local, state and provincial codes. Code questions should be directed to your local electrical inspector. Failure to follow electrical codes and OSHA safety standards may result in personal injury or equipment damage. Failure to follow manufacturer's installation instructions may result in electrical shock, fire hazard, personal injury, death, damage to equipment, unsatisfactory performance and may void manufacturer's warranty.

Mounting the Controller

General

Mount the controller in a well ventilated, shaded area using the supplied mounting kit. The controller must be mounted vertically. Be sure to leave 8 inches of free air space on every side of the unit. The controller must be in an area with an ambient between 34° F (1.1° C) and 104° F (40° C). If installation is above 3300 feet above sea level, ambient temperatures are derated 2% per 1000 feet above 3300 feet. Model 2AB2 will automatically decrease (derate) the maximum output current of the drive (6.9A) if the ambient temperature exceeds 104° F (40° C). The maximum output current of the drive will be decreased by 0.069A for every degree Fahrenheit above 104° F, or -1%/° F. The maximum output current of the drive will be decreased by 0.12A for every degree Celsius above 40° C, or -1.75%/° C. Model 1AB2 does not require ambient derating and will maintain a maximum output current of 4.2A in high ambient temperatures.

Note

Do not block the heat sink (fins) and do not set anything on the units.

Warning

⚠WARNING
Hazardous voltage

The controller access cover should always be securely fastened to the control box due to the dangerous voltage/shock hazard inside the unit.

Power Supply and Wiring

Power Supply

DANGER Hazardous voltage

The 1151AB2 Controller requires a single phase power supply of 115 volts +/– 15%. The 1AB2 and 2AB2 Controllers require a single phase power supply of 230 volts +/– 15%. All controllers require a dedicated 20 amp two-pole circuit breaker. A dedicated circuit means no other appliances use the same circuit! The output power from the motor controller is three-phase, variable frequency and variable voltage. Maximum output voltage and frequency are line input voltage and 60 Hz, respectively. Low supply voltage will reduce pump performance.

Note

Installation and maintenance MUST be performed by properly trained and qualified personnel. Always follow the National Electric Code or Canadian Electric Code, as well as all local, state and provincial codes when wiring the system.

Wire and Conduit

Factory installed input and output power leads are supplied with the controller. Do not use wire smaller than 14 AWG. Use of Metal Conduit with Metal Conduit Connectors is recommended for all electrical connections.

Output Power Connections

DANGER Hazardous voltage

Connect the motor leads for 230 volt or 208 volt operation using the nameplate as a reference. Connect the output power leads from the controller to the 3 motor leads in the conduit box on the motor. Connect the ground (green) output power lead to the ground screw in the conduit box on the motor. This step is performed in its entirety at the factory for complete systems. See diagram 4 for details.

Note

If the pump has more than 50 feet of wire from the controller, consult factory for selection of an output load filter (load reactor).

Connecting Input Power

DANGER Hazardous voltage

Connect the single-phase power supply leads and Safety Ground wire from a 20 amp two-pole circuit breaker (in the OFF position) to one side of a 20-amp two-pole disconnect switch. Connect the input power leads supplied with the controller to the other side of the disconnect switch. Be sure to use Metal Conduit with Metal Conduit Connectors for electrical connections.

Danger

DANGER Hazardous voltage

The controller has a high leakage current to ground. The terminals marked "GND" in the controller must be connected to the safety ground from the electrical service entrance. Failure to properly ground the controller or motor will create an electrical shock hazard.

Note

Do not use GFCI protection with this controller. Nuisance tripping will result.

Starting the System

Danger

DANGER Hazardous voltage

Status Code Indicator Light is not a voltage indicator! Always turn off disconnect switch and circuit breaker before servicing.

Danger

DANGER Hazardous voltage

Once the controller is powered it will remain electrically charged for 5 minutes after power is turned off. Wait 5 minutes after disconnecting power before opening controller access cover as there is a severe shock hazard.

Setting the Motor Overload Switches

Danger

DANGER Hazardous voltage

When the unit is powered, the Motor Overload Setting Switches are at a high voltage potential. DO NOT touch the Motor Overload Setting Switches while the power is on.

The Motor Overload Setting Switches adjust the level of motor overload current protection needed to protect the motor from damage due to overcurrent conditions. Turn the circuit breaker and disconnect switch to the off position, and wait 5 minutes. Remove controller access cover. On the inside of the access cover is the Motor Overload Setting table. *See Diagram 6 for details.* This table shows the switch setting for the desired Motor Overload Setting. Read the Service Factor Amps off the motor nameplate. Use the Motor Overload Setting table to match the Service Factor Amps (SF Amps) of the motor to the correct switch setting. *See Diagram 5 for details.* Set the Motor Overload Switches according to the correct combination on the table. If the Service Factor Amps of the motor do not match any of the Motor Overload Settings, use the next lowest switch setting. *See Diagram 3 for details.*

Note

The Motor Overload Setting Switches are preset at the factory for complete systems.

Caution

Failure to perform this step will result in loss of Motor Overload Protection and will void the Motor Warranty. Nuisance Motor Overload Error tripping or motor damage can occur if these switches are not set properly.

Note

The Motor Overload Switch is set when the Variable Speed Pump System is built. It should be checked periodically. The DIP Switch Setting has been set at (1011) for a 5.8 AMP Motor.

Setting the Pressure

Turn the circuit breaker and disconnect switch to the off position, and wait 5 minutes. Remove controller access cover. Open a faucet in the system and turn the breaker/disconnect switch to the ON position. The pump will start and pressure will increase to the factory preset 50 PSI. After the pressure has stabilized, use the Increase/Decrease Pressure Adjust Pushbuttons on the right-hand side of the controller to adjust the pressure setting. **Push and Hold** the Increase or Decrease Pressure Adjust Pushbutton until the desired pressure setting is reached. The new pressure setting is automatically saved. Close the faucet and turn power to controller off. Wait 5 minutes before installing the controller access cover.

Note

The maximum allowable pressure setting is 85 psi.

Starting the System

Setting the Application Switches

Danger

DANGER Hazardous voltage

When the unit is powered, the Application Setting Switches are at a high voltage potential. **DO NOT** touch the Application Setting Switches while the power is on.

The controller has 6 possible Application Settings. These settings are used to adjust the Minimum Speed of the motor and the Ramp Setting, or acceleration and deceleration ramp. This allows the controller to fit a wide range of applications.

Before adjusting the Application Switches, turn the circuit breaker and disconnect switch to the off position. Wait 5 minutes. Remove the controller access cover. On the inside of the access cover is the Application Switch Setting Table. *See Diagram 6 for details.* This table shows the switch setting needed for the desired system response. *See Diagram 3 for details.*

Select a Minimum Speed of 10 Hz if the pressure at the pump's suction is within 20 PSI of the desired pressure setting. Select a Minimum Speed of 30Hz if the pressure at the pump's suction is more than 20 PSI below the desired pressure setting, if pumping from a tank or if drawing a suction lift.

Changing the Ramp Setting changes how fast the controller can change the speed of the motor. A Slow Ramp Setting allows the controller to work better in applications where the average demand for water is low (less than 3GPM or about 1 faucet). A Fast Ramp Setting allows the controller to work better in applications where the demand for water is high because the motor is allowed to change speed faster.

Note

The Application Switches are preset at the factory to "0000" or Minimum Speed = 30 Hz, Ramp Setting = Fast.

Motor Rotation Direction

If the pressure or flow seems low, check motor rotation direction. Turn the circuit breaker and disconnect switch to the off position, and wait 5 minutes. Switch any two leads on the controller output (T1, T2, or T3). Turn the circuit breaker and disconnect switch to the on position. Observe pressure and flow. If pressure or flow still seems low check plumbing.

Note

It is possible for the pump to maintain constant pressure with a low flow or a high positive suction head even if the pump is rotating backwards. While the pump is running, use an amp probe on one of the output power leads connected to the motor and compare the current draw between the two rotation directions. The lowest current reading indicates the pump is running in the correct direction.

System Status

The controller is always powered. A Solid Green Status Code indicates that the pump is in standby mode (pump not running) or that the line input voltage is low.

Danger

DANGER Hazardous voltage

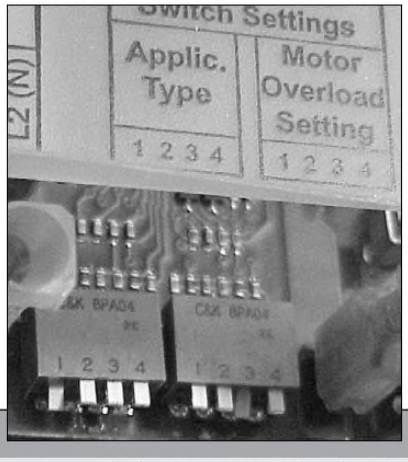
Status Code Indicator Light is not a voltage indicator! Always turn off disconnect switch and circuit breaker and wait 5 minutes before servicing.

A Blinking Green Status Code indicates that the pump is running. A Blinking or Solid Red Light Indicates a problem with the controller. Refer to the access cover side panel or Diagram 6 for Status Codes. See Troubleshooting Section on pages 11 & 12 for more details.

Diagrams

Motor Overload and Application Switch Setting

Example: For 30 Hz minimum speed and medium ramp setting, set application switch setting as indicated.



Example: If motor nameplate service factor amps = 3.3 A for 1AB2 or 5.3A for 2AB2, set motor overload switches as indicated.

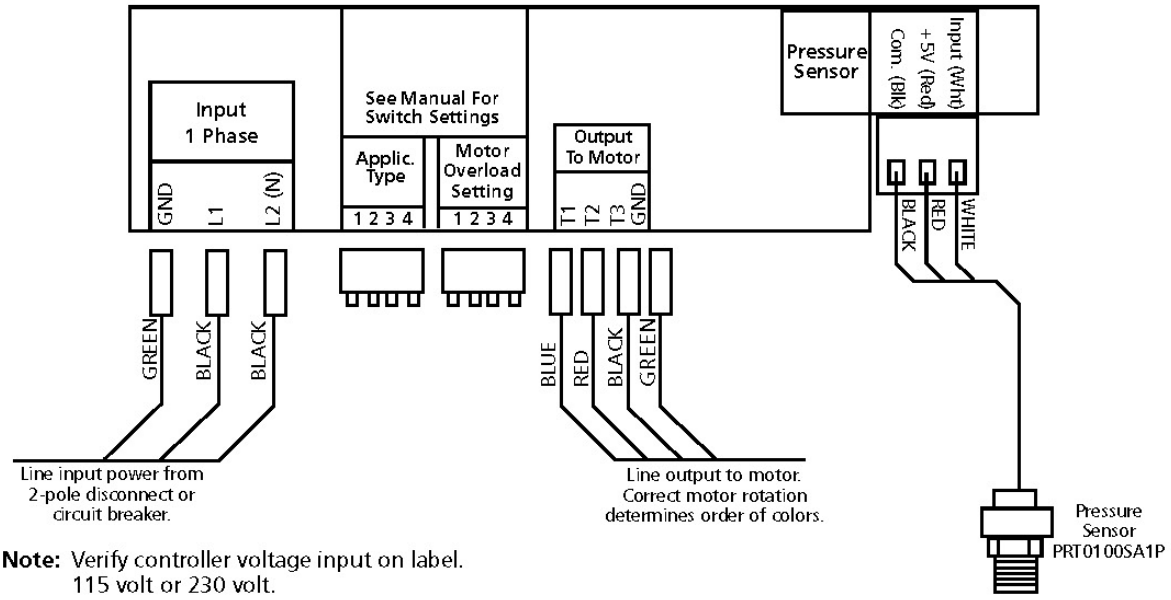
Danger

DANGER Hazardous voltage

When the unit is powered, the Motor Overload and Application Setting Switches are at a high voltage potential. Always turn off the disconnect switch and circuit breaker and wait 5 minutes before touching the Motor Overload or Application Setting Switches.

Diagram 3

AquaBoost II Wiring Diagram

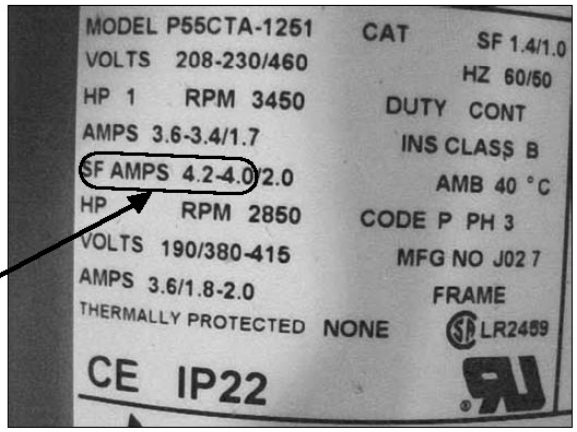


Note: Verify controller voltage input on label. 115 volt or 230 volt.

Diagram 4

Diagrams

Typical Motor Nameplate Showing Service Factor Amps (SF AMPS)



Service Factor Amps (SF AMPS) that are used to set the Motor Overload Setting Switches.

In this example, use the 4.2 Amp setting indicated on the Motor Overload Setting Table. This setting is used to account for any voltage fluctuation.

Diagram 5

Labels found on the Controller Access Cover:

Motor Overload Setting		
⚠WARNING Disconnect Power And Wait For LED Indicator To Turn Off Before Touching Motor Overload Setting Switches.		
1 = UP 0 = DOWN		
DIP Switch Setting	Motor Overload Setting (Amps)	
1 2 3 4	1AB2	2AB2
1 1 1 1	2.5	4.6
1 1 1 0	2.8	5.2
1 1 0 1	3.3	5.3
1 0 1 1	3.5	5.8
0 1 1 1	3.8	6.5
0 0 0 0	4.2	6.9

Motor Overload Setting Label

Use this label to choose the correct Motor Overload Switch Setting. This label is found under the controller access cover.

Status Code Label

Use this label to diagnose any system errors. This label is found on the side of the controller access cover.

Status Codes*	
Green Light Codes	
Constant	Standby/Low Voltage
Blinking	Pump Running
Red Light Codes	
Constant	Replace Controller
1 Blink	No Water/Loss Of Prime
2 Blinks	Tank Water-Logged
3 Blinks	Pressure Sensor Fault
4 Blinks	Pump or Motor Bound
5 Blinks	Short Circuit
6 Blinks	Ground Fault
7 Blinks	High Temperature
8 Blinks	Over Voltage (>264V)
9 Blinks	Motor Overload
*No Light - No/Very Low Voltage	

Application Switch Setting		
⚠WARNING	Disconnect Power And Wait For LED Indicator To Turn Off Before Touching Application Setting Switches.	
DIP Switch Setting	1 = UP 0 = DOWN	
1 2 3 4	Minimum Speed (Hz)	Ramp Setting
1 1 1 1 *	10	Slow
1 1 1 0 *	10	Medium
1 1 0 1 *	10	Fast
1 0 1 1	30	Slow
0 1 1 1	30	Medium
0 0 0 0	30	Fast
*THESE SETTINGS ARE NOT TO BE USED WITH SUBMERSIBLE PUMPS.		

Application Switch Setting Label

Use this label to choose the correct Application Switch Setting. This label is found under the controller access cover.

Diagram 6

Troubleshooting

General

The AquaBoost II is a self-diagnosing controller. If a problem occurs, observe the Status Code Indicator Light on the front of the unit. No Status Code Indicator Light means either no or low input voltage (less than 50 V).

Danger

DANGER Hazardous voltage

Status Code Indicator Light is not a voltage indicator! Always turn off disconnect switch and circuit breaker and wait 5 minutes before servicing. High voltage may still remain on controller.

Refer to the status code label on the side of the controller access cover to diagnose system errors.
See Diagram 6 for details.

Use the following table to help troubleshoot problems.

Green Light Codes		
Indicator Code	**Status**	**Description**
Constant	Standby/Low Voltage	Constant Green Light indicates the pump is off. The system is in Standby mode when there is no flow in the system and the pressure setting has been reached. The system is in a Low Voltage condition when the line input voltage drops below 196VAC for 1AB2 and 2AB2 controllers and 98VAC for 1151AB2 controllers.
Blinking	Pump Running	Flashing Green Light indicates the pump is running. If pump is not running, **turn off power to controller and wait 5 minutes**. Check output power connections from controller to motor.
Red Light Codes		
Constant	Controller Error	Replace AquaBoost II Controller
1 Blink	No Water/Loss Of Prime	This fault is indicated if system pressure drops below 10 PSI for more than 20 seconds and motor is unloaded (low water movement). The system will automatically restart after 5 minutes. If 10 faults occur in an hour, the system will not restart and needs to be manually reset. If problem reoccurs, please verify well capacity and/or pump capacity, motor overload settings.
2 Blinks	Tank Water-Logged	This fault is indicated if there is a drastic drop in system pressure in a short amount of time. The pump will continue to run. This can be caused by low air pressure in the tank or the tank bladder may have failed. This can also be caused by extreme changes in flow. The error is cleared each time the pump starts. If the error reoccurs often, check the air pressure in the tank. Before checking tank air pressure, **turn power to control off** to prevent pump from turning on. Relieve system pressure by opening a faucet. The tank pre-charge may be set anywhere between the factory preset 18 PSI and 10 PSI below the pressure setting.

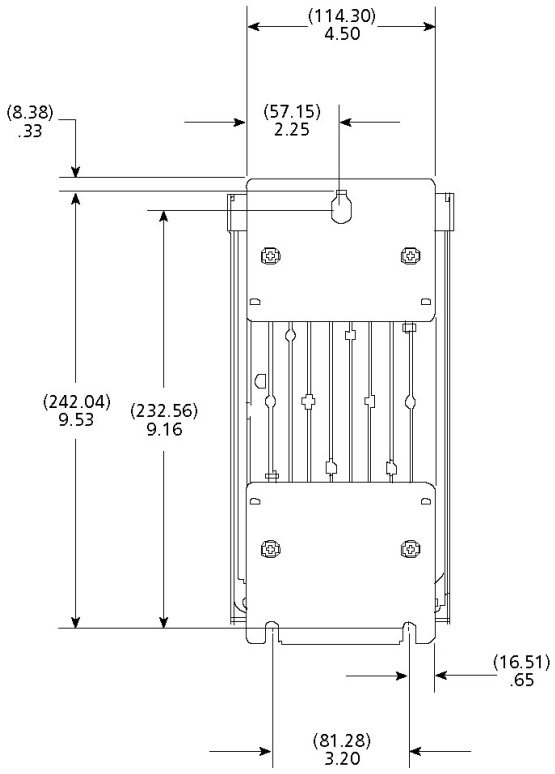
Note

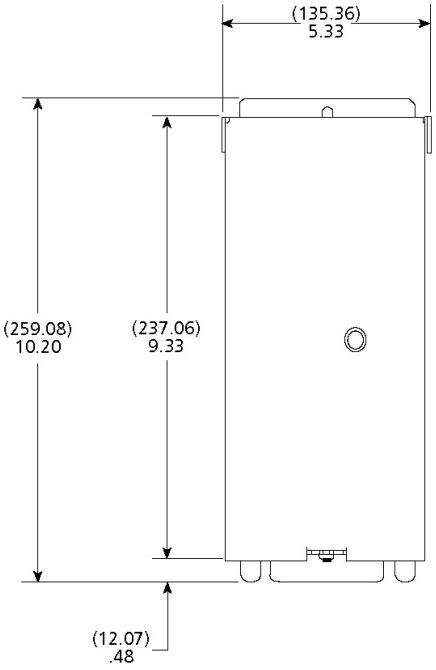
See the Pump's Trouble Shooting Chart on page 18 in reference to the Controller's Trouble Shooting Indicator Code, Status & Description.

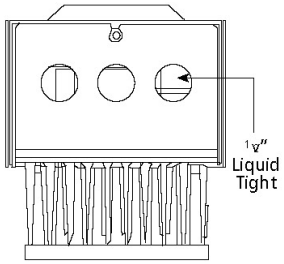
Troubleshooting

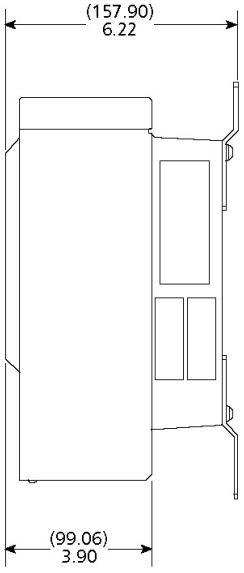
Indicator Code	Status	Description
3 Blinks	Pressure Sensor Fault	This fault indicates a problem with the pressure sensor feedback. Verify the connections from the AquaBoost II Controller to the pressure sensor. **Turn power to controller off and wait 5 minutes.** Remove controller access panel. Be sure sensor cable is wired as shown in Diagram 4. If cable is wired correctly, check the voltage on the Input (White) pressure sensor terminal connection in the AquaBoost II controller. Using a DC voltmeter, connect the positive lead to the Input (White) pressure sensor terminal connection, connect the negative lead to the Com. (Black) pressure sensor terminal connection. Turn power to controller on. The DC voltage measured should be in the valid range of 0.5 Vdc to 4.5 Vdc (+/- 0.2 Vdc). If the voltage is outside this range, replace pressure sensor.
4 Blinks	Pump or Motor Bound	This fault can be caused by mechanical binding from debris in pump or from an electrical failure in the motor. Verify the error by turning power to controller off for 1 minute and then on. Pump must be checked if error persists.
5 Blinks	Short Circuit	Check wiring for shorting phase to phase and phase to ground. **Turn power to controller off and wait 5 minutes.** Remove controller access panel. Disconnect motor leads marked T1, T2, and T3. Measure resistance between all motor leads using an ohmmeter. **Note:** Motor winding resistance is typically 2 to 10 OHMS depending on motor.
6 Blinks	Ground Fault	Check wiring for shorting phase to ground. **Turn power to controller off and wait 5 minutes.** Remove controller access panel. Disconnect motor leads T1, T2, T3, and Ground from controller. Measure resistance between all motor leads and ground using a Megohmmeter. Connect one Megohmmeter lead to any one of the motor leads and the other to ground lead. Set Megohmmeter to 500V DC output. Resistance readings less than 500,000 ohms or 0.5 Megohms indicate a damaged motor.
7 Blinks	High Temperature	This fault is caused by a high temperature inside of the controller. The controller will shut off when the temperature inside the controller reaches 158° F (70° C). The controller will turn back on when the temperature inside the controller reaches 150° F (65.5° C). Avoid installing the controller where ambient temperatures exceed 104° F (40° C). Avoid installing the controller where it is exposed to direct sunlight.
8 Blinks	Over Voltage	Measure input voltage using an AC voltmeter. Connect the positive and negative leads to L1 and L2 on the AquaBoost II controller. Verify line input voltage is not greater than 264 VAC for 1AB2 and 2AB2 controllers and 132VAC for 1151AB2.
9 Blinks	Motor Overload	This fault is indicated when the current supplied to the motor exceeds the Motor Overload Setting on the AquaBoost II controller. Refer to , *Setting the Motor Overload DIP Switches* for details. If switches are set according to , check motor.

Controller Dimensions









ITT

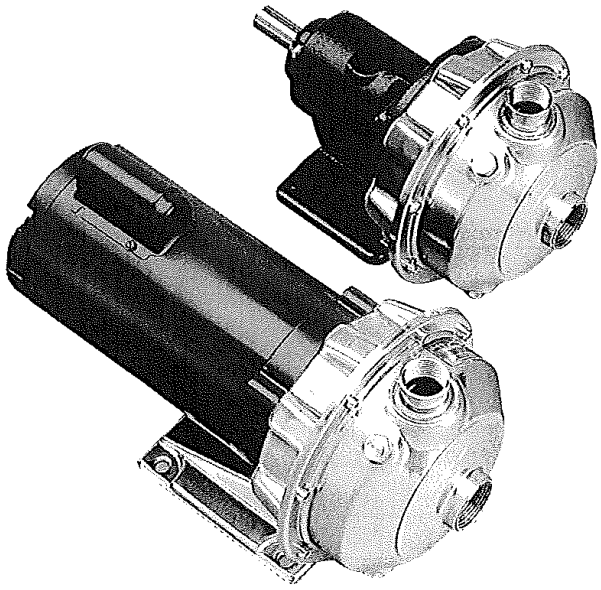
Commercial Water

Goulds Pumps

G&L SERIES

MODEL NPE/NPE-F

Installation, Operation and
Maintenance Instructions



GOULDS PUMPS

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- a subsidiary of ITT Industries, Inc.

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Engineered for life

SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that WILL cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that CAN cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that CAN cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

DESCRIPTION & SPECIFICATIONS:

The Models NPE (close-coupled) and NPE-F (frame-mounted) are end suction, single stage centrifugal pumps for general liquid transfer service, booster applications, etc. Liquid-end construction is all AISI Type 316 stainless steel, stamped and welded. Impellers are fully enclosed, non-trimable to intermediate diameters. Casings are fitted with a diffuser for efficiency and for negligible radial shaft loading.

Close-coupled units have NEMA 48J or 56J motors with C-face mounting and threaded shaft extension. Frame-mounted units can be coupled to motors through a spacer coupling, or belt driven.

1. IMPORTANT:

1.1. Inspect unit for damage. Report any damage to carrier/dealer immediately.

1.2. Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and Local electrical codes. Install an all-leg disconnect switch near pump.

⚠ CAUTION **Always disconnect electrical power when handling pump or controls.**

1.3. Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.

1.4. Always use horsepower-rated switches, contactor and starters.

1.5. Motor Protection

1.5.1. Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.

1.5.2. Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

1.6. Maximum Operating Limits:

Liquid Temperature:	212° F (100° C) with standard seal 250° F (120° C) with optional high temp seal
Pressure:	75 PSI
Starts Per Hour:	20, evenly distributed

1.7. Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

2. INSTALLATION:

2.1. General

2.1.1. Locate pump as near liquid source as possible (below level of liquid for automatic operation).

2.1.2. Protect from freezing or flooding.

2.1.3. Allow adequate space for servicing and ventilation.

2.1.4. All piping must be supported independently of the pump, and must "line-up" naturally.

⚠ CAUTION **Never draw piping into place by forcing the pump suction and discharge connections.**

2.1.5. Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

2.2. Close-Coupled Units:

2.2.1. Units may be installed horizontally, inclined or vertically.

⚠ CAUTION **Do not install with motor below pump. Any leakage or condensation will affect the motor.**

2.2.2. Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.2.3. Tighten motor hold-down bolts before connecting piping to pump.

2.3. Frame-Mounted Units:

2.3.1. It is recommended that the bedplate be grouted to a foundation with solid footing. Refer to Figure1.

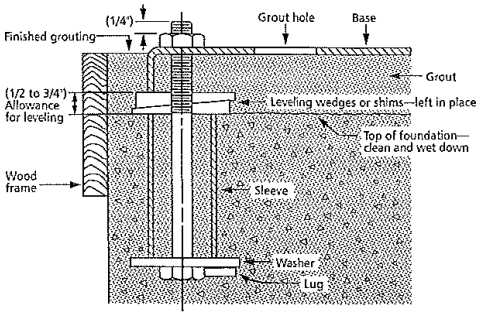


Figure 1

2.3.2. Place unit in position on wedges located at four points (two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit. Level or plumb suction and discharge flanges.

2.3.3. Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

2.3.4. Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are filled solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

2.3.5. Tighten pump and motor hold-down bolts before connecting the piping to pump.

3. SUCTION PIPING:

3.1. Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperatures over 120 F, consult pump performance curve for Net Positive Suction Head Required.

3.2. Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.

3.3. If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.

3.4. Installation with pump below source of supply:

3.4.1. Install full flow isolation valve in piping for inspection and maintenance.

⚠ CAUTION **Do not use suction isolation valve to throttle pump.**

3.5. Installation with pump above source of supply:

3.5.1. Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

3.5.2. All joints must be airtight.

3.5.3. Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

3.5.4. Suction strainer open area must be at least triple the pipe area.

3.6. Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figures 2-5

3.7. Use 3-4 wraps of Teflon tape to seal threaded connections.

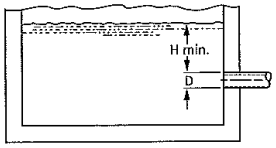


Figure 2

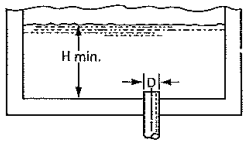


Figure 3

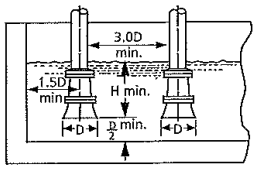


Figure 4

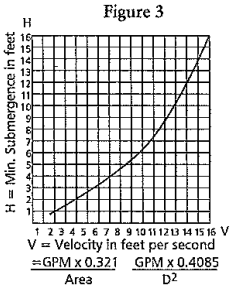


Figure 5

4. DISCHARGE PIPING:

4.1. Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

4.2. If an increaser is required, place between check valve and pump.

4.3. Use 3-4 wraps of Teflon tape to seal threaded connections.

5. MOTOR-TO-PUMP SHAFT ALIGNMENT:

5.1. Close-Coupled Units:

5.1.1. No field alignment necessary.

5.2. Frame-Mounted Units:

5.2.1. Even though the pump-motor unit may have a factory alignment, this could be disturbed in transit and must be checked prior to running. See Figure 6.

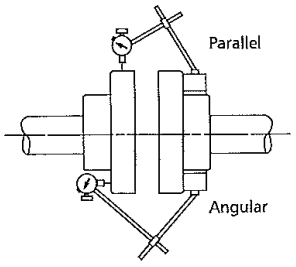


Figure 6

5.2.2. Tighten all hold-down bolts before checking the alignment.

5.2.3. If re-alignment is necessary, always move the motor. Shim as required.

5.2.4. Parallel misalignment - shafts with axis parallel but not concentric. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total Indicator Reading is .005", or less.

5.2.5. Angular misalignment - shafts with axis concentric but not parallel. Place dial indicator on one hub and rotate this hub 360 degrees while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005", or less.

5.2.6. Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

⚠ CAUTION **Always recheck both alignments after making any adjustment.**

6. ROTATION:

6.1. Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:

6.1.1. Single-phase motor: Non-reversible.

6.1.2. Three-phase motor: Interchange any two power supply leads.

7. OPERATION:

7.1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

⚠ CAUTION **Pumped liquid provides lubrication. If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing.**

7.2. Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping. On frame-mounted units coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment.

8. MAINTENANCE:

8.1. Close-Coupled Unit. Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

8.2. Frame-Mounted Units:

8.2.1. Bearing frame should be regreased every 2,000 hours or 3 month interval, whichever occurs first. Use a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seals, then wipe off excess.

8.2.2. Follow motor and coupling manufacturers' lubrication instructions.

8.2.3. Alignment must be rechecked after any maintenance work involving any disturbance of the unit.

9. DISASSEMBLY:

Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work needed.

9.1. Turn off power.

9.2. Drain system. Flush if necessary.

9.3. Close-Coupled Units: Remove motor hold-down bolts.

Frame-Mounted Units: Remove coupling, spacer, coupling guard and frame hold-down bolts.

9.4. Disassembly of Liquid End:

9.4.1. Remove casing bolts (370).

9.4.2. Remove back pull-out assembly from casing (100).

9.4.3. Remove impeller locknut (304).

⚠ CAUTION **Do not insert screwdriver between impeller vanes to prevent rotation of close-coupled units. Remove cap at opposite end of motor. A screwdriver slot or a pair of flats will be exposed. Using them will prevent impeller damage.**

9.4.4. Remove impeller (101) by turning counter-clockwise when looking at the front of the pump. Protect hand with rag or glove.

⚠ CAUTION **Failure to remove the impeller in a counter-clockwise direction may damage threading on the impeller, shaft or both.**

9.4.5. With two pry bars 180 degrees apart and inserted between the seal housing (184) and the motor adapter (108), carefully separate the two parts. The mechanical seal rotary unit (383) should come off the shaft with the seal housing.

9.4.6. Push out the mechanical seal stationary seat from the motor side of the seal housing.

9.5. Disassembly of Bearing Frame:

9.5.1. Remove bearing cover (109).

9.5.2. Remove shaft assembly from frame (228).

9.5.3. Remove lip seals (138 and 139) from bearing frame and bearing cover if worn and are being replaced.

9.5.5. Use bearing puller or arbor press to remove ball bearings (112 and 168).

10. REASSEMBLY:

10.1. All parts should be cleaned before assembly.

10.2. Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

10.3. Reassembly is the reverse of disassembly.

10.3.1. Impeller and impeller locknut assembled onto motor shaft with 10 ft-lbs of torque.

10.4. Observe the following when reassembling the bearing frame:

10.4.1. Replace lip seals if worn or damaged.

10.4.2. Replace ball bearings if loose, rough or noisy when rotated.

10.4.3. Check shaft for runout. Maximum permissible is .002" T.I.R.

10.5. Observe the following when reassembling the liquid-end:

10.5.1. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.

It is permissible to use a light lubricant, such as glycerin, to facilitate assembly. Do not contaminate the mechanical seal faces with lubricant.

10.5.2. Inspect casing O-ring (513) and replace if damaged. This O-ring may be lubricated with petroleum jelly to ease assembly.

10.5.3. Inspect guidevane O-ring (349) and replace if worn.

⚠ CAUTION **Do not lubricate guidevane O-ring (349). Insure it is not pinched by the impeller on reassembly.**

10.6. Check reassembled unit for binding. Correct as required.

10.7. Tighten casing bolts in a star pattern to prevent O-ring binding.

11. TROUBLE SHOOTING CHART:

MOTOR NOT RUNNING
(See causes 1 thru 6)

LITTLE OR NO LIQUID DELIVERED:
(See causes 7 thru 17)

POWER CONSUMPTION TOO HIGH:
(See causes 4, 17, 18, 19, 22)

EXCESSIVE NOISE AND VIBRATION:
(See causes 4, 6, 9, 13, 15, 16, 18, 20, 21, 22)

PROBABLE CAUSE:

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged.
11. Low voltage
12. Phase loss (3-phase only)
13. Air or gasses in liquid
14. System head too high
15. NPSHA too low:
    Suction lift too high or suction losses excessive. Check with vacuum gauge.
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned

NOTE:
See the AquaBoost Controller's Trouble Shooting Indicator Code, Status & Description on pages 11 & 12 in reference to the Pump's Trouble Shooting Chart.

NPE STANDARD REPAIR PARTS LIST

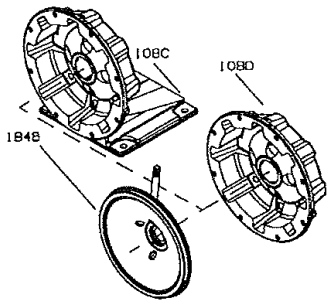
Item No.	Description	Materials of Construction
100	Casing	AISI 316L Stainless Steel
101	Impeller	
108A	Motor adapter with foot	
108B	Motor adapter less foot	
108C	Motor adapter with foot and Flush	
108D	Motor adapter less foot with Flush	
123	Deflector	BUNA-N
184A	Seal housing std.	AISI 316L S.S.
184B	Seal housing with seal flush	
240	Motor support	300 S.S.
	Rubber channel	Rubber
304	Impeller locknut	AISI 316 S.S.
347	Guidevane	AISI 316L S.S.
349	Seal-Ring, guidevane	Viton (standard)
		EPR
		BUNA
370	Socket head screw, casing	AISI 410 S.S.
371	Bolts, motor	Steel/plated
383	Mechanical seal	
408	Drain and vent plug, casing	AISI 316 S.S.
412B	O-Ring, drain plugs	Viton (standard)
		EPR
		BUNA
513	O-Ring, casing	Viton (standard)
		EPR
		BUNA

MECHANICAL SEAL APPLICATION CHART

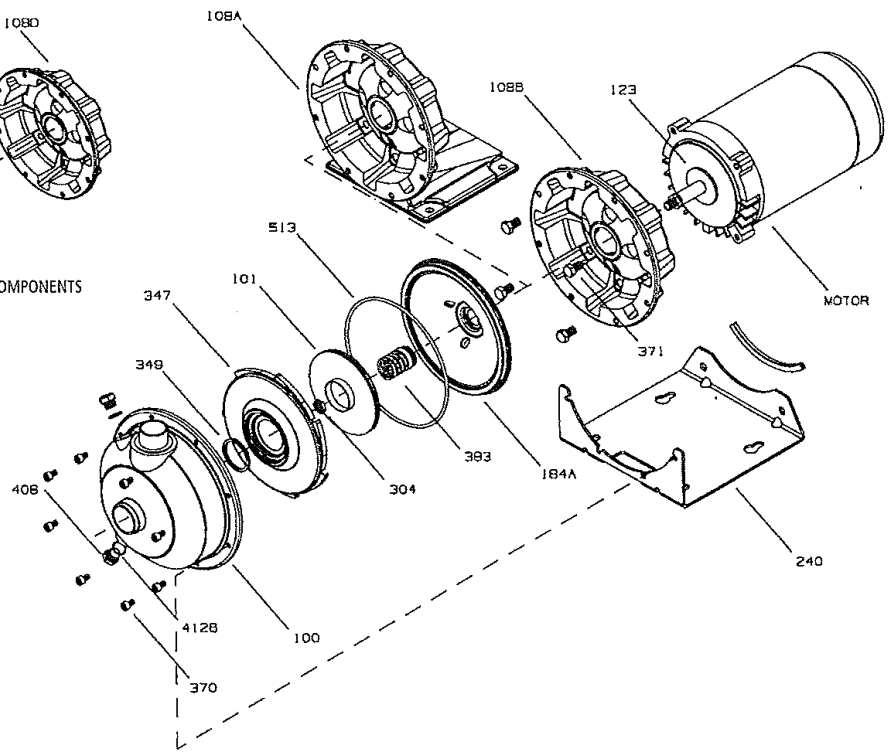
Item 383 Mechanical Seal (⅝" seal)				
Rotary	Stationary	Elastomers	Metal Parts	Part No.
Carbon	Sil-Carbide	EPR	316SS	10K18
		Viton		10K55
Sil-Carbide		EPR		10K81
		Viton		10K62

NOTE: Close coupled units supplied with ½ HP 1750 RPM, ½ - 3 HP Explosion Proof or 5 HP motors, utilize motor adapter less foot and a footed motor.

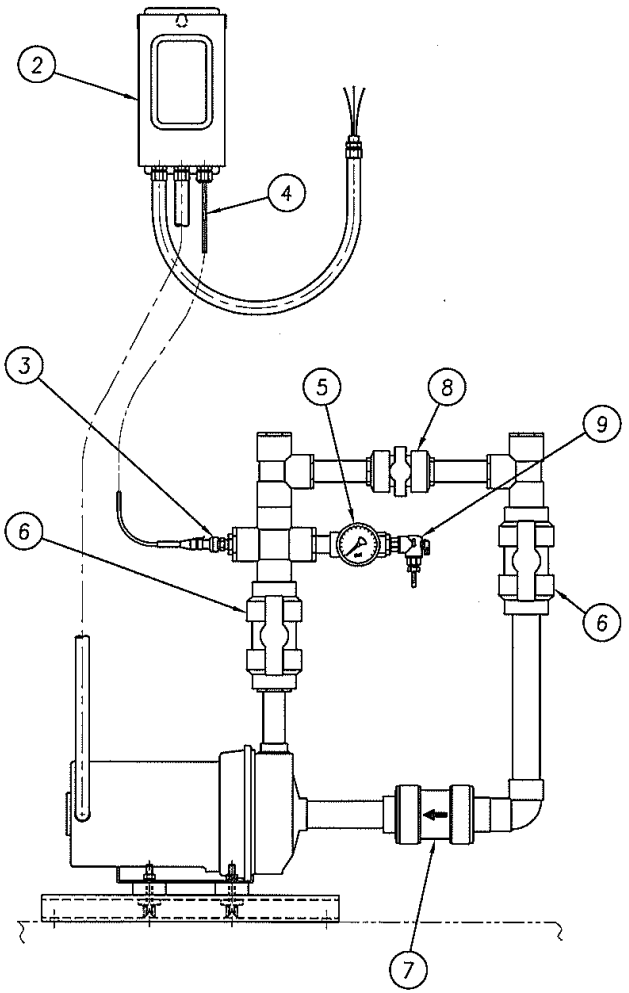
NOTE: Frame mounted units (NPE-F) utilize the XS Power frame and motor adapter less foot. For repair parts for the power frame refer to the XS-Power frame repair parts page in the parts section of your catalog. To order the power frame complete order item 14L61

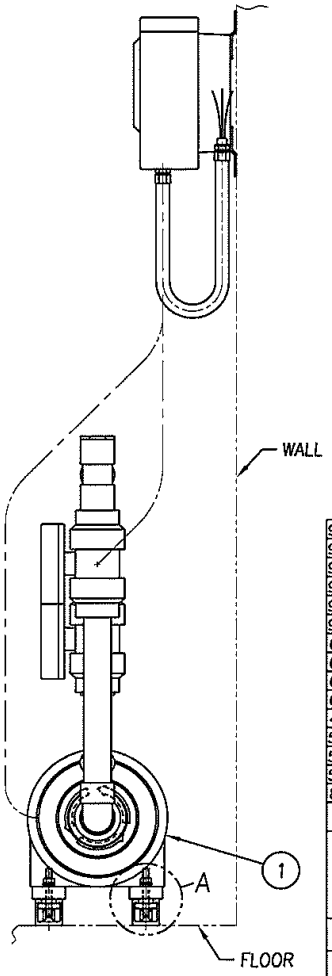


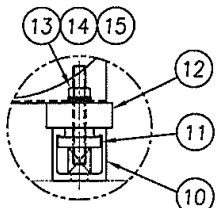
NOTE: OPTIONAL SEAL FLUSH COMPONENTS



REV	DATE	DESCRIPTION	INIT
A	05NOV09	ORIGINAL ISSUE	KLS







VIEW A
2 X SIZE

AWI P/N	ITEM #	QTY	DESCRIPTION
92531903	15	4	WASHER, .38 FLAT SS
93730123	14	4	WASHER LOCK .38IN. SS
92531204	13	4	NUT,FLANGE,.38-16,HEX,SS
94725431	12	4	VIBRATION ISOLATORS 3/8-16
91730212	11	4	UNST,SPRING NUT,.38,PLTD
91730086	10	3"	UNST,1.625,FIBERGLASS PE
041004	9	1	VAL,BALL,EL,.25,MPT X FPT,PVC80
041720169	8	1	VAL,BALL,1,TU,PVC80
041730384	7	1	VAL,CHECK,BALL,1.25,PVC80
041732001	6	2	VAL,BALL,1.25,TU,PVC80
43-0020	5	1	GAU,0-100,.25,CBM,2.5,LF,SS/BR
53-0014	4	1	TRANSDUCER CABLE,10',FOR GOULDS AQUABOOST II CONTLR
53-0013	3	1	PRESSURE TRANSDUCER FOR GOULDS AQUABOOST II CONTLR
53-0006	2	1	CONTLR,GOULDS,AQUABOOST II, 2AB2 (6.9 AMP)
80-0117	1	1	GOULDS PUMP,1ST,1.5HP,208V,ODP

AmeriWater®

1303 Stanley Avenue
Dayton, OH 45404
(937)461-8833 FAX (937)461-1988
www.ameriwater.com

DRAWN BY: K.S.

DATE: 05NOV09 | SHEET 1 OF 1

S/O# NA | SCALE: FULL

ASSY,VARIABLE SPEED PUMP, REPLACEMENT PARTS DRAWING

⚠ WARNING

This product can expose you to chemicals such as vinyl chloride (used in the production of PVC) or Nickel (used in the production of stainless steel), that are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Dear Valued Customer,

California Proposition 65 (Prop 65) is the Safe Water and Toxic Enforcement Act of 1986. The State of California began enforcing amendments to California Prop 65 at the end of August 2018. Prop 65 requires manufacturers to provide a clear and reasonable warning to residents of California about chemicals used in products that they purchase that are included on the Prop 65 Chemical List. The chemicals included on the list are chemicals that are known to the State of California to cause cancer, birth defects, or other reproductive harm. One such chemical is Vinyl Chloride, a compound used to produce Polyvinyl Chloride (PVC). The AmeriWater system you have purchased may contain PVC or stainless steel parts.

While warnings are only required in the State of California, AmeriWater has initiated the use of Prop 65 labeling for all products to ensure compliance with California regulations. Please note that the above warning does not necessarily mean that the product that you have purchased is unsafe. Products that have been cleared for market by FDA have been determined to be safe and effective by the United States Food and Drug Administration. The warning is simply a requirement by the State of California. If you wish to obtain additional information, please visit: p65warnings.ca.gov. You may also contact your AmeriWater representative if you have any questions.

Thank you for your understanding and we look forward to continuing to serve you.