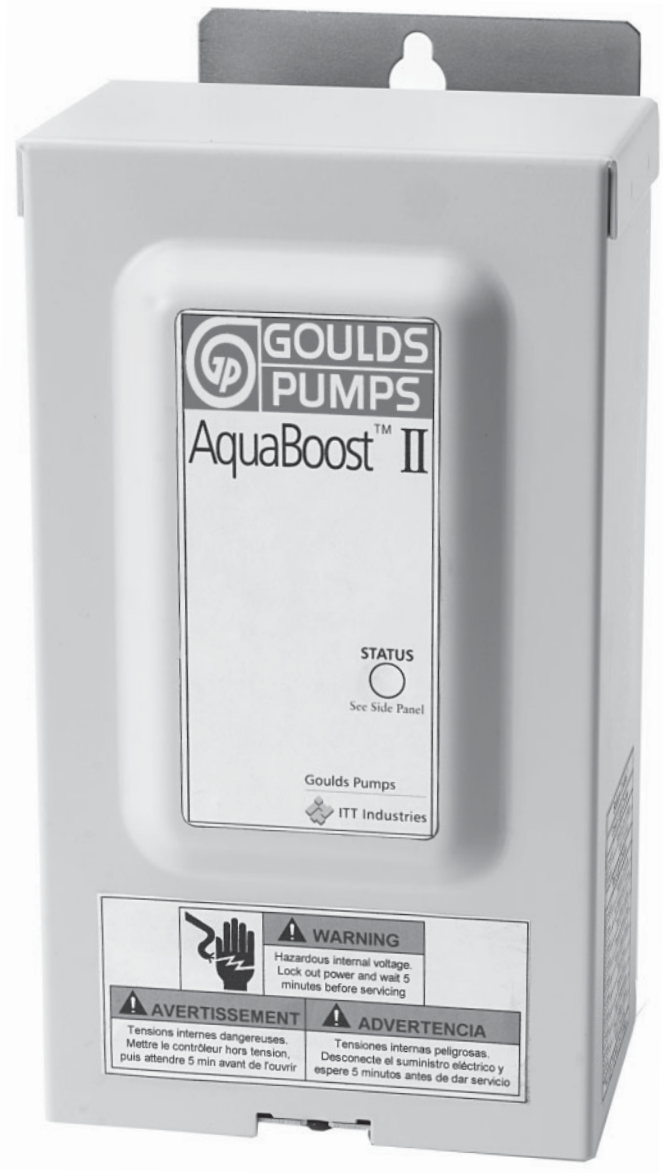


AquaBoost™ II Controller

Variable Speed
Pump Control

Installation, Operation & Maintenance

Models Covered:
1AB2 (4.2A)
2AB2 (6.9A)



INDEX

Index

Important Safety Instructions	3
System Components	4
System Design	5
Piping	6
Mounting the Controller	7
Power Supply and Wiring	8
Starting the System (Amp Settings and Pressure Settings)	9
Application Switches, Motor Rotation	10
Diagrams, Motor Overload, Switch Settings	11
Troubleshooting	13
Controller Dimensions	15
Goulds Pumps Limited Warranty	16

! Safety Instructions

Section 1

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.

System Components

Section 2

Please review the AquaBoost II components and insure that you have all the parts and are familiar with their names. Be sure to inspect all components Goulds Pumps supplies for shipping damage.

AquaBoost II:

1. Pump with Motor
2. AquaBoost II Controller with Integral Pressure Sensor Cable
3. Pressure Tank
4. Pressure Sensor
5. Mounting Kit
6. Tank Tee with Pipe Plug
7. Pressure Gauge

Warning



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.

System Design

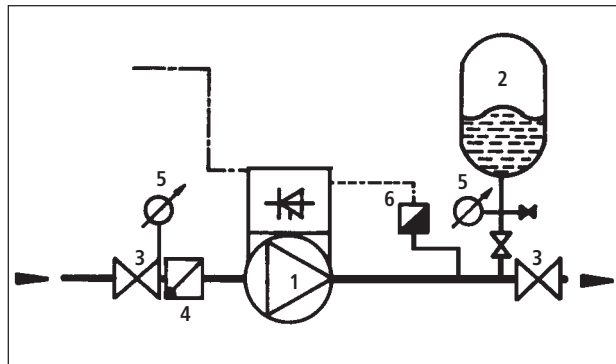
Section 3

Note

Systems MUST be designed by qualified technicians only and meet all applicable state and local code requirements.

The following diagrams show a typical system using the AquaBoost II Constant Pressure System. Connection can be made directly to a water supply or water can be drawn from a supply tank. Diagram #1 shows a typical set up for a supply tank.

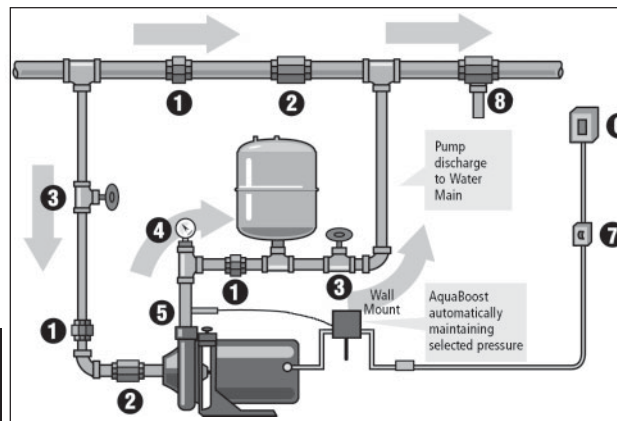
Diagram 1
System Layout for
Supply Tank



- 1 Pump with AquaBoost Controller
- 2 Diaphragm tank
- 3 Gate valves
- 4 Check valves
- 5 Pressure gauges
- 6 Pressure transducer

Diagram #2 shows a set-up for municipal water connection. This allows pump maintenance without main line shut-off.

Diagram 2
System Layout
for Municipal Hook-Up



- 1 Union
- 2 Check valve
- 3 Gate valve
- 4 Pressure gauge
- 5 Pressure transducer
- 6 Main power box
- 7 Disconnect switch
- 8 Pressure relief valve

Piping

Section 4

General

Note

All plumbing work must be performed by a qualified technician. Always follow all local, state and provincial codes.

A proper installation requires a pressure relief valve, a ¼" female N.P.T. threaded fitting (found on tank tee) for the pressure sensor, and properly sized pipe. Piping should be no smaller than the pump discharge and/or suction connections. Piping should be kept as short as possible. Avoid the use of unnecessary fittings to minimize friction losses.



Some pump and motor combinations supplied with this system can create over 200 PSI. Select pipe and fittings accordingly per your pipe suppliers' recommendation. Consult local codes for piping requirements in your area.

All joints must be airtight. Use Teflon tape or another type of pipe sealant to seal threaded connections. Please be careful when using thread sealant as any excess that gets inside the pipe may plug the pressure sensor.

Galvanized fittings or pipe should never be connected directly to the stainless steel discharge head or casing as galvanic corrosion may occur. Barb type connectors should always be double clamped.

Pressure Tank, Pressure Relief Valve and Discharge Piping

The standard Hydro-Pro V6P tank has a pre-charge of 18 PSI. You may set the tank pre-charge anywhere between this value and 10 PSI below the system operating pressure. Use the higher tank pre-charge setting if the system drifts over 5 PSI at a constant flow rate. Use only "pre-charged" tanks on this system. Do not use galvanized tanks. Select an area that is always above 34° F (1.1° C) in which to install the tank and pressure relief valve. If this is an area where a water leak or pressure relief valve blow-off may damage property, connect a drain line to the pressure relief valve. Run the drain line from the pressure relief valve to a suitable drain or to an area where water will not damage property. Use the supplied tank tee to connect the discharge pipe to the pressure tank and house plumbing. It is allowable to pump to multiple locations.

Warning

Maximum working pressure of V6P tank is 125 psi.

Installing the Pump

Warning



Risk of electric shock - This pump system has not been investigated for use in swimming pool areas.



Plumb suction and discharge of pump into piping. Be sure to install a check valve on the suction side of the pump. Use a minimum of 6 inches of straight pipe between the check valve and the suction of the pump. Locate the pump as near liquid source as possible. When pumping out of an atmospheric tank locate the pump below the level of the liquid in the tank. All piping must be supported independently of the pump. Be sure that suction and discharge piping are in line with the suction and discharge of the pump. For additional information refer to Installation, Operation and Maintenance Instructions supplied with the pump.

Piping

Section 4 (continued)

Installing the Pressure Sensor

Install the pressure sensor in the tank tee provided with the unit. The pressure sensor cable supplied with the controller is 80 inches long. Locate the controller so there will be enough cable to properly install the pressure sensor.

Caution



Do not install any shut-off valves, filters or flow/pressure control devices between the pressure sensor and the discharge of the pump as this could create a hazardous situation.

Use ONLY the pressure sensor provided with the unit. Install the pressure sensor into one of the 1/4" holes on the tank tee provided in the kit. Do not install the pressure sensor upside down. Do not install the tank tee with the 1/4" holes facing down. 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. Prevent water from following the cable and entering sensor connector by creating a "drip loop" in the cable.

Mounting the Controller

Section 5

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



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

Section 6

Power Supply

⚠ DANGER Hazardous voltage The controller requires a single-phase power supply of 230 volts +/- 15% on 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, 200 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 230 volt, 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

Section 7

Danger



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

Danger



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



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.

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

Section 7 (continued)

Setting the Application Switches

Danger



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



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

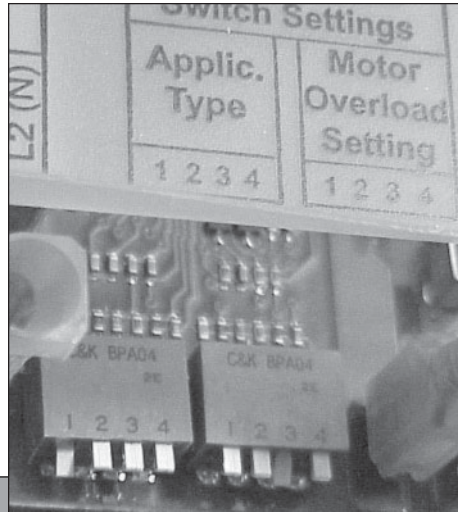
A Blinking Green Status Code indicates that the pump is running. A Blinking or Solid Red Light indicates a problem with the controller. Refer to the access cover side panel or *Diagram 6* for Status Codes. See *Section 9* for more details.

Diagrams

Section 8

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



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

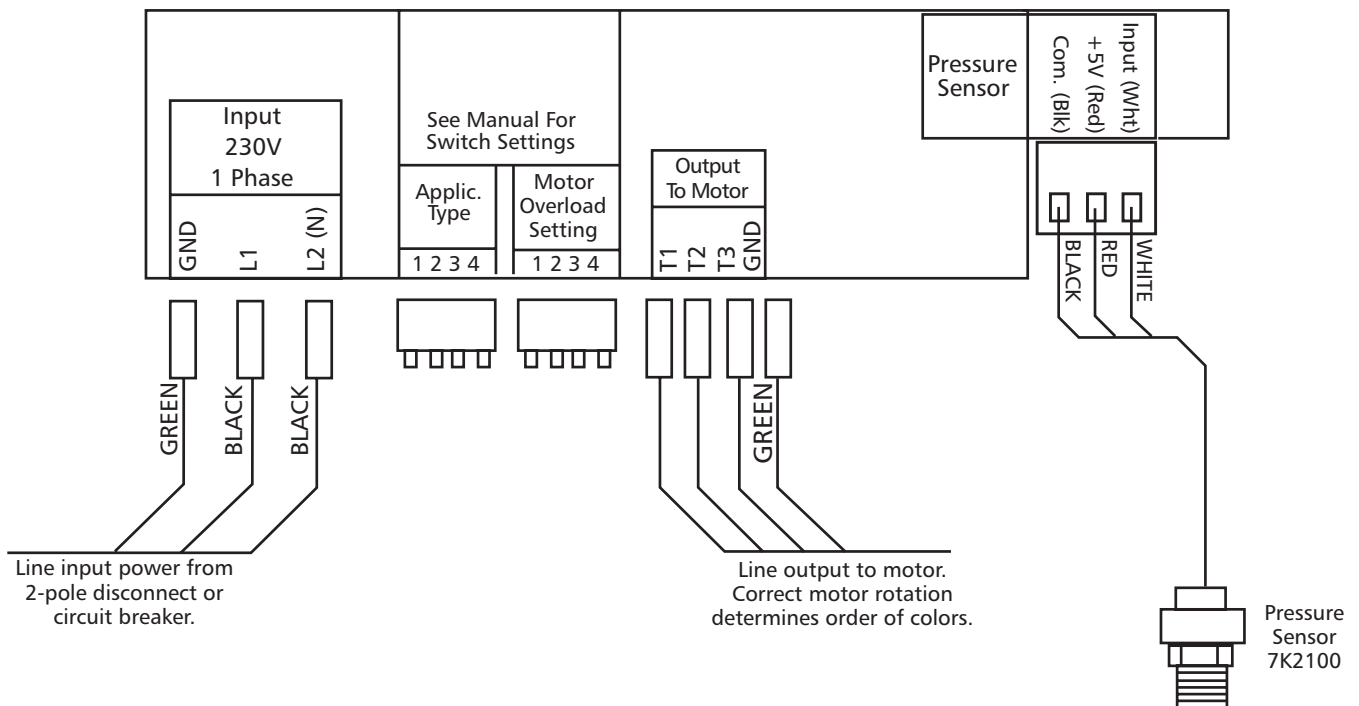
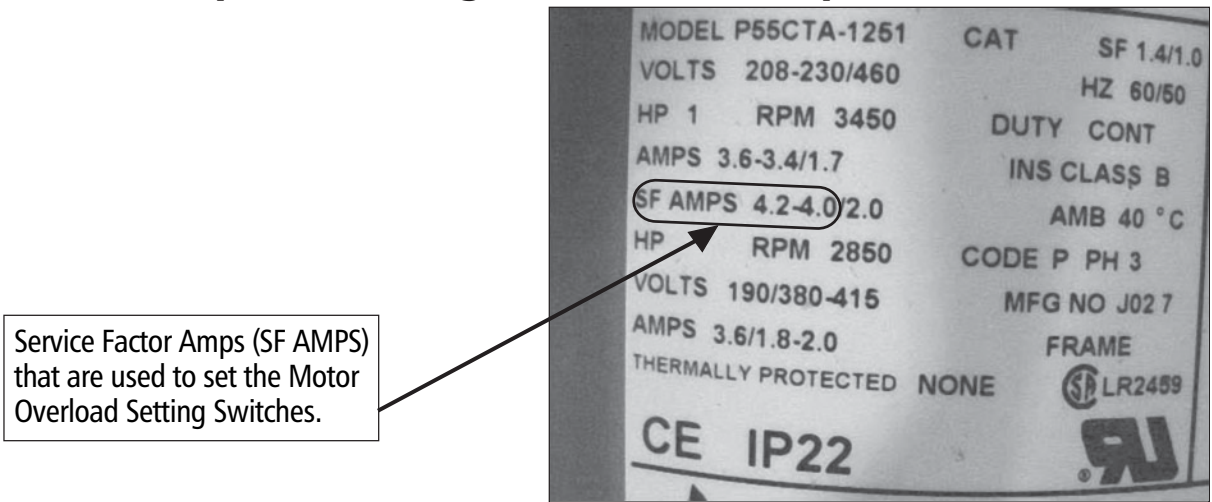


Diagram 4

Diagrams

Section 8 (continued)

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	
1	1	1	1	1AB2
1	1	1	1	2.5
1	1	1	0	2AB2
1	1	1	0	2.8
1	1	0	1	3.3
1	0	1	1	3.5
0	1	1	1	3.8
0	0	0	0	4.2
0	0	0	0	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.

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	
1	1	1	1	*
1	1	1	0	*
1	1	0	1	*
1	0	1	1	
0	1	1	1	
0	0	0	0	

*THESE SETTINGS ARE NOT TO BE USED WITH SUBMERSIBLE PUMPS.

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 Label

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

Diagram 6

Troubleshooting

Section 9

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



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.

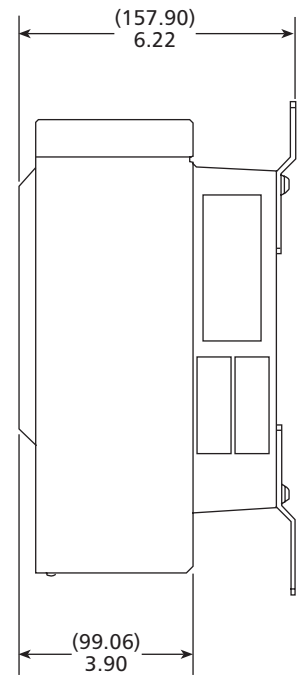
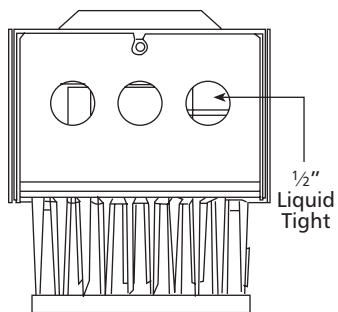
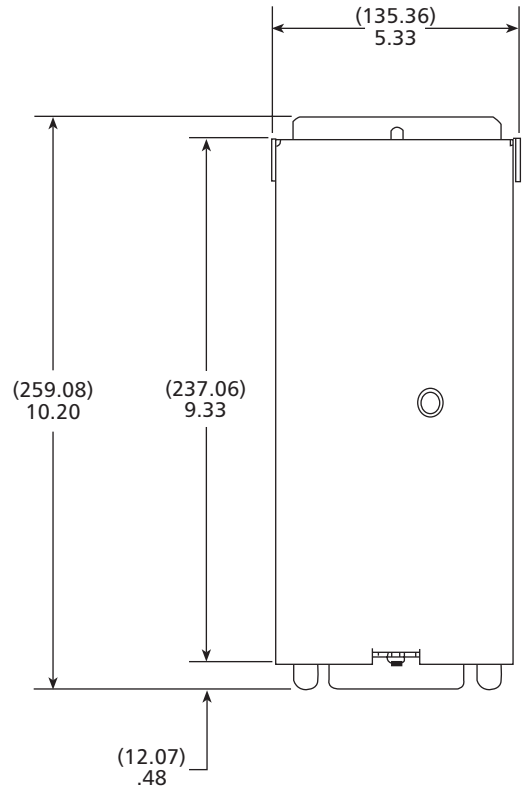
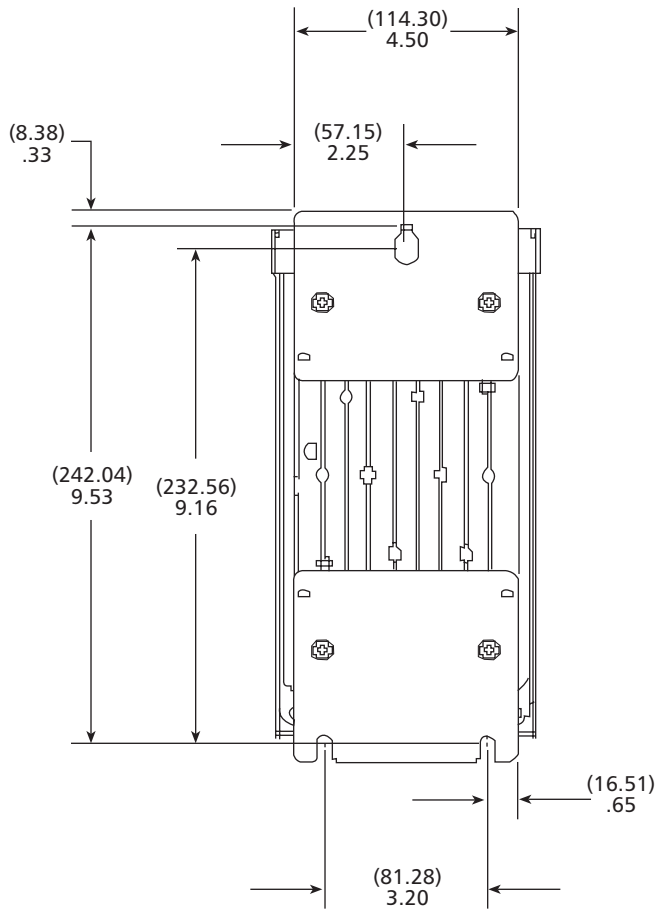
Use the following table to help troubleshoot problems.

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.
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. 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.
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.

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 (>264 Vac)	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.
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 Section 7, <i>Setting the Motor Overload DIP Switches</i> for details. If switches are set according to Section 7, check motor.

Controller Dimensions



GOULDS PUMPS LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by Goulds Pumps.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Pumps distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Pumps Customer Service Department.

The warranty excludes:

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Pumps and the dealer in purchases, consignments or contracts for sale of the subject pumps.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
- (3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

Goulds Pumps, AquaBoost II and the ITT Engineered Blocks Symbol are registered trademarks and tradenames of ITT Industries.