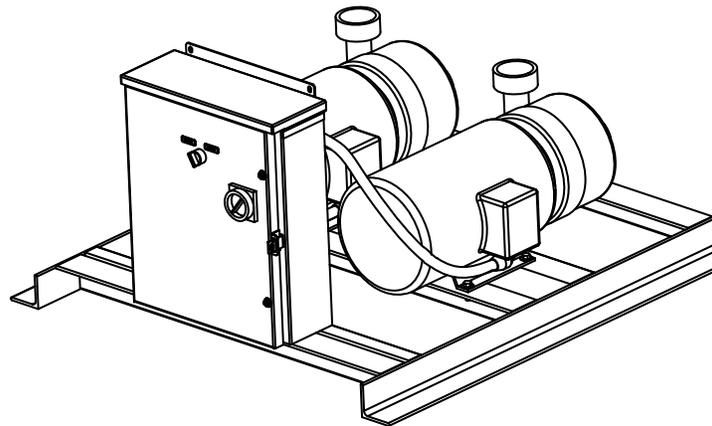
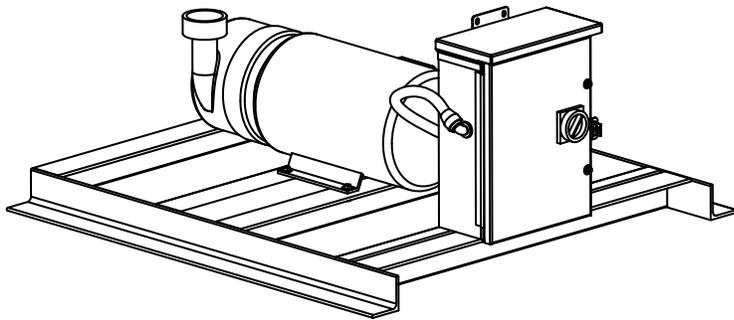


**STULZ**

CLIMATE. CUSTOMIZED.



# Glycol Pump Systems

Installation, Operation and Maintenance Manual



### **ABOUT STULZ**

STULZ is a privately owned, global manufacturer of highly efficient temperature and humidity management technology. STULZ engineers a full line of air conditioners, air handlers, ultrasonic humidifiers, desiccant dehumidifiers and custom solutions, specifically for industrial, commercial and secure mission-critical applications.

### **GLOBAL LEADER**

From our beginnings in Germany 70 years ago to our expansion throughout the world, STULZ is always innovating.

Today, STULZ has seven global production plants, and hundreds of sales and service partners around the world.

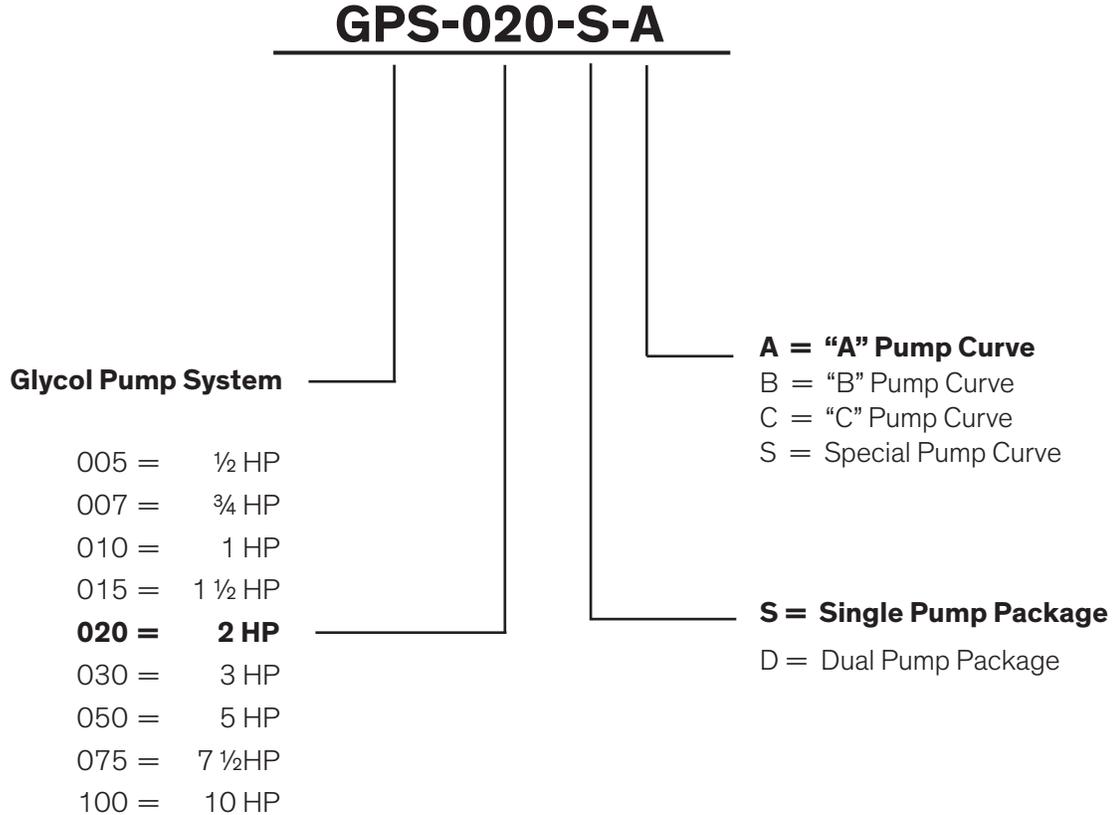
### **MADE IN THE USA**

STULZ believes that every region of the world has specific mission critical cooling needs. This is why STULZ Air Technology Systems, Inc. (STULZ USA) is proud to research, design, manufacture, test and support our solutions in Frederick, MD.

To STULZ, this is what “Made in America” means.



# MODEL NOMENCLATURE



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**1572 Tilco Drive**  
**Frederick, MD 21704**  
**USA**



## 1.0 INTRODUCTION

### 1.1 General

This manual contains instructions for installing, operating, maintaining, troubleshooting and repairing Glycol Pump System (GPS) packages designed and manufactured by Stulz Air Technology Systems, Inc. (STULZ).

STULZ GPS units are designed to deliver the flow of coolant for water/glycol-based A/C condensing systems. Any use beyond this is deemed to be not intended. STULZ is not liable for any damage resulting from improper use. The system is designed to be installed outdoors unless otherwise noted on the equipment nameplate.

### 1.2 Product Description

STULZ GPS units are designed to be the most compact and dependable packaged pump systems in the industry. The unit utilizes one or two highly reliable single stage, end-suction type centrifugal pumps constructed with a heavy duty cast iron housing. Pumps are close-coupled to a weather resistant, 3500 RPM TEFC motor rated for outdoor use.

GPS units are self-contained on a light weight, corrosion resistant, welded aluminum frame designed for mounting to a horizontal surface. The system includes the pump(s), drive motor(s), electrical controls and aluminum frame with removable weather cover. The electrical controls are in a NEMA 3R outdoor rated enclosure which is installed on the front of the frame. The mounting frame comes in various sizes depending on the number and size of pumps used with the system. Refer to the installation drawing supplied with your unit for the layout and dimensions of the system.

The flow capacity in GPM will depend on the system size, which can range from ½ to 10 horsepower. See Appendix A on page 18 for pump capacity curves. The pump system is designed for use in a closed-loop circuit in which coolant is continuously circulated by the suction pressure created by the pump. The pump is designed to provide the total required coolant flow at the rated system pressure drop.

STULZ GPS units are designed to operate with either single or dual (back-up) pumps. Refer to the unit nameplate to identify the model number and capacity rating of your unit.

#### **NOTE**

STULZ GPS units are strictly for non-residential applications.

#### 1.2.1 Capabilities and Features

- All-aluminum welded frame construction.
- Available in sizes ranging from ½ to 10 horsepower.
- Centrifugal pump with precision machined and balanced, bronze pump impellers.
- High efficiency direct drive TEFC motors.

- Removable cover for easy access to all components.
- Unit mounted control enclosure with lockable disconnect switch.
- 15 gallon expansion tank with airtrol fitting.
- Automatic pump switchover, (dual pump systems).
- Field installed flow switch, (dual pump systems).

### 1.3 Safety

#### 1.3.1 General

This manual contains notes, cautions and warnings to indicate important operational and safety information.

A **NOTE** alerts you to an important detail.

A **CAUTION** alerts you to information that is important for protecting your equipment and its performance. Follow all cautions that apply.

A **WARNING** alerts you to information that is important for protecting you from harm. Heed all warnings that apply.

 indicates a general **WARNING** or **CAUTION**.

 indicates an electrical shock hazard **WARNING** or **CAUTION**.

#### 1.3.2 Safety Summary

The following warnings and cautions are applicable throughout the manual.

Prior to performing any installation, operation, maintenance or troubleshooting procedure read and understand all instructions, recommendations and guidelines contained within this manual.

#### **WARNING**

**Install the tank with the two vent openings facing down. The air vent must be installed on the underside of the tank to avoid dangerous pressure building inside the tank.**

#### **WARNING**

**Always refer to the manufacturer's Safety Data Sheet (SDS) when handling glycol coolant.**

#### **WARNING**

**Avoid skin contact with the coolant and wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.**

**WARNING** 

**High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.**

**WARNING** 

**Never work on electrical equipment unless another person who is familiar with the operation and hazards of the equipment and competent in administering first aid is nearby.**

**CAUTION** 

Never lift any component in excess of 35 pounds without help. If a lifting device is used to move a unit ensure it is capable of supporting the unit.

**CAUTION** 

All maintenance and/or repairs must be performed by a qualified technician.

**CAUTION** 

All personnel working on or near equipment should be familiar with hazards associated with electrical maintenance.

**CAUTION** 

When working on electrical equipment, remove all jewelry, watches, rings, etc. Keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

**CAUTION** 

Always disconnect the main power supply to the equipment at the main power disconnect switch before beginning work on the equipment. A lock-out tag-out procedure should be followed to ensure that power is not inadvertently reconnected.

**CAUTION** 

Ensure the unit is properly phased. Improper phasing can cause severe damage.

## 1.4 General Design

GPS models are designed to meet a wide range of application requirements, as defined by pressure drop flow rate and efficiency. They are selected for a given application using the performance curves shown in Appendix A on page 18.

Figure 1 on page 4 illustrates a typical single pump GPS unit and identifies its major components. Figure 2 on page 4 illustrates a typical dual pump unit.

Pump motors range from ½ to 10 HP, with two or three pump variations available for most HP ratings. Pumps are classified as type “A,” “B” and “C,” with the letter incorporated as a suffix in the unit model number. These letters roughly correspond to different application requirements, where:

- “A” models are ideal for applications with high head pressures and low flow rate.
- “B” models are best for average head pressure and flow rate to achieve higher efficiencies.
- “C” models are designed for applications with low head pressures and high flow rate.

### 1.4.1 Pump

Pumps are mounted on an aluminum frame with vibration isolators to eliminate noise and vibration during operation. Each pump is driven by a direct drive motor rated for continuous operation.

### 1.4.2 Pump Motor

Pump motors are rated at the horsepower indicated by the unit model number. The pump motor has individual motor contactors. Each pump motor is protected from over-current by fuses located in the electric box.

### 1.4.3 Electric Box

Electrical components are protected in a NEMA 3R enclosure located on the front of the unit. The electric box has a lockable front access door which is safety interlocked with the service disconnect switch to prevent the door from opening when the switch is in the ON position. The switch must be turned to OFF to gain access to the electrical components.

The service disconnect switch may be used to turn the unit off for emergency shutdown or during routine maintenance. The handle of the switch may be locked in the “Off” position to prevent unintended activation.

### 1.4.4 Expansion Tank

A 15 gallon expansion tank stores excess coolant as it changes in volume due to thermal expansion. The expansion tank is rated at 75 psi; inlet/outlet holes are ¾” NPT. The tank is provided with a field installed automatic air vent.



The automatic air vent includes an air separating trap and liquid control baffle to assure unrestricted airflow to the tank and air-free liquid flow from the tank. It also includes a manual vent for adjusting the air volume in the tank. The expansion tank is to be installed at the highest point of the glycol system with the air vent facing down.

## WARNING

**Install the tank with the two vent openings facing down. The air vent must be installed on the underside of the tank facing downward to avoid dangerous pressure building inside the tank.**

### 1.4.5 Flow Switch (Dual Pump Systems)

A field-installed flow switch verifies fluid flow while the unit is operating. If flow is lost for at least 10 seconds, (the time delay is adjustable), the unit automatically switches operation from the primary pump to the back-up pump. See “Table 1. Pump Timing Adjustments” on page 4 for information about setting the time delay.

### 1.4.6 Pump Selector Switch (Dual Pump Systems)

The pump selector switch is mounted on the front of the pump package electric box. It is used to select which pump—A or B—operates as the primary pump.

### 1.4.7 Optional Automatic Pump Sequencing Timer (Dual Pump Systems)

Also called a “lead/lag switch”, this option provides equal pump run time by automatically cycling operation between the two pumps. The adjustable timer is typically set to rotate pump duty every 7 days of operation. A selector switch labeled “Manual/Auto” is provided with the automatic pump sequencing option. The switch must be set to “Auto” to enable automatic sequencing.

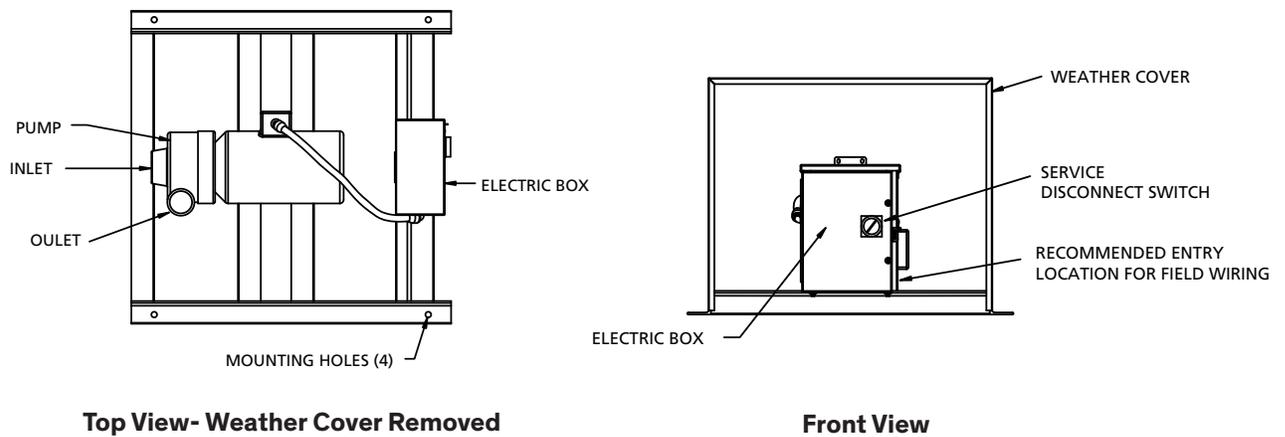
See “Table 1. Pump Timing Adjustments” on page 4 for information about setting the timer.

### 1.4.8 Pump Timing Adjustments

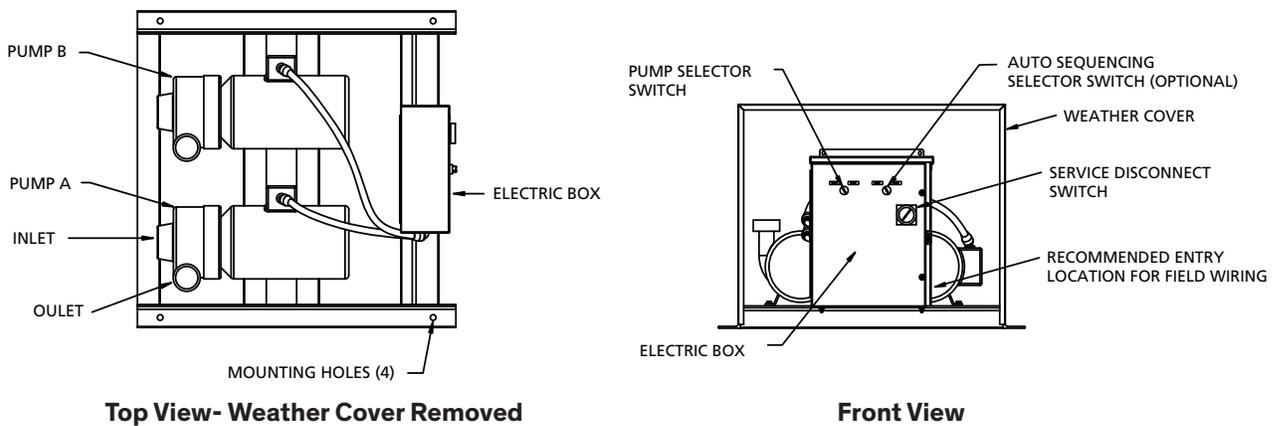
The following timing adjustments can be made to the GPS unit. See “Figure 9. Electric Box Components” on page 10 for the location of electric box components referenced in the following table.

**Table 1. Pump Timing Adjustments**

Timer	Component	Location	Timing Range
Flow Loss Timer	Flow Delay Timer	Electric Box	Variable. Consult STULZ Product Support for assistance.
Pump Sequencing Timer	Smart Relay	Electric Box	Per component control labels.



**Figure 1. Typical Layout- GPS with Single Pump**



**Figure 2. Typical Layout- GPS with Dual Pumps**

## 2.0 INSTALLATION

### 2.1 Receiving the Equipment

Your GPS unit has been tested and inspected prior to shipment. To ensure that your equipment has been received in excellent condition, make a visual inspection of the equipment immediately upon delivery. Carefully remove the shipping container and all protective packaging.

Check the equipment against the packing slip to verify the shipment is complete. Report all discrepancies to the shipper and/or STULZ.

Open the electric box door and thoroughly inspect the unit for any signs of transit-incurred damage. If there is shipping damage, it must be noted on the freight carrier's delivery forms before signing for the equipment. Any freight claims must be done through the freight carrier; STULZ ships all equipment FOB factory and is not liable for any damage to equipment in transit. Should any such damage be present, STULZ can help file a claim with the freight carrier. Notify the STULZ Product Support Group before attempting any repairs. Refer to section 5.0 of this manual for instructions.

A data package was sent with your unit. It contains this manual, system drawings, applicable SDS's and other applicable instructions based on the configuration and options of your unit. The data package has been placed in your unit in a clear plastic envelope. These documents should be kept with the unit for future reference.

### 2.2 Site Preparation

STULZ GPS series units are designed for easy service access. Install the GPS unit in a secure location where it cannot be accessed by unauthorized personnel and where the main power disconnect switch cannot be inadvertently turned off. Allow access to the unit for routine operation, servicing and maintenance.

#### NOTE

Working clearance requirements should be established before mounting the unit. Refer to the installation drawing provided with your unit for the dimensions of the GPS unit and local and national electrical codes for installation guidelines.

### 2.3 Rigging

The GPS unit is designed to be kept level in a vertical position. Move the unit with a suitable device, such as a forklift or overhead lifting sling, and support the unit from the mounting base. Avoid dropping or jarring the unit to prevent damage to the motor bearings or pump parts. Use an appropriate capacity lifting device that can safely handle the weight of the equipment. Weight estimates can be found on the installation

drawing provided with your unit. If using an overhead lifting device, utilize lifting bars that exceed the cabinet width to avoid crushing the sides of the unit. GPS units are shipped on a skid to facilitate moving prior to installation. Units should always be stored in a dry location prior to installation.

### 2.4 Mounting/Placement

#### 2.4.1 Pump Package

GPS units are designed for mounting to a flat surface. Locate the unit with the suction side as close to the suction supply as possible. Install the GPS unit in a secure location with adequate space for accessing components for installation, maintenance and repair procedures. In order to have full service access, the unit must be placed so that there are no obstructions in front or overhead. The components may be accessed from all four sides of the unit and from the top by removing the cover. The electric box is accessed from the front of the unit.

GPS units must not be located in the vicinity of steam, hot air or fume exhausts. Avoid areas that are prone to flooding. Avoid ground level sites that are accessible to the public.

Install the unit on a solid base capable of supporting the weight of the equipment. Refer to the installation drawing for the system weight. The base should be at least 2 inches higher than the surrounding grade and 2 inches larger than the dimensions of the GPS unit base (see Figure 3).

In order to reduce the amount of vibration transmitted to the mounting surface, insert the factory provided vibration isolators between the GPS unit and the base, as shown in Figure 3. Secure the unit with fasteners (supplied by others) so that the system will not move during operation.

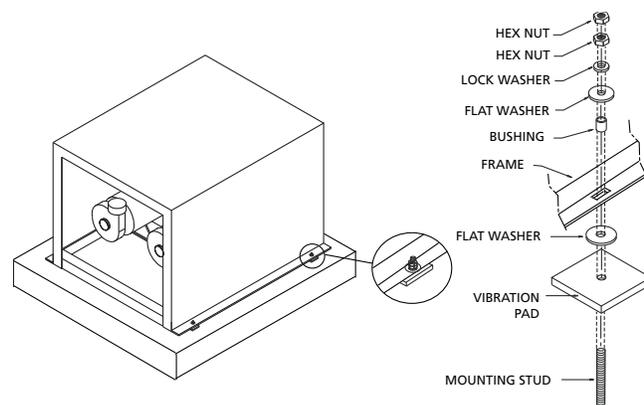


Figure 3. Recommended Mounting



## 2.4.2 Expansion Tank

The expansion tank must be installed at the highest point of the glycol system with the vent holes facing downward. The pump should be at least 3 feet below the height of the expansion tank. Install the automatic air vent in the expansion tank so it faces downward, as shown in Figure 4 and Figure 5.

### WARNING

**Install the tank with the two vent openings facing down. The air vent must be installed on the underside of the tank facing downward to avoid dangerous pressure building inside the tank.**

## 2.4.3 Flow Switch (Dual Pump Systems)

The flow switch (shipped loose) is to be installed directly in the suction pipeline to detect the total amount of coolant flow. When installing the flow switch, refer to the piping diagram provided with your unit and follow the manufacturer's installation instructions provided in the box with the switch.

When installed, the paddle of the flow switch must be allowed to fully travel (swing) to the point where the mechanism of the switch actuates. If the switch is too high above the body of the "Tee" fitting, the paddle could be obstructed by the inside of the fitting, as shown in Figure 6.

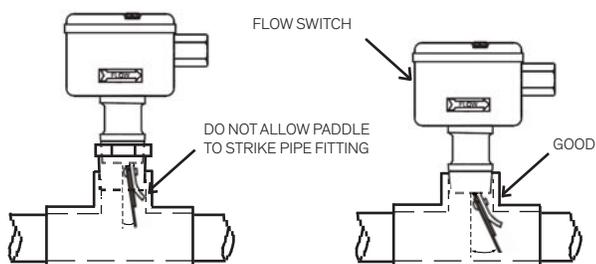


Figure 6. Flow Switch

## 2.5 Piping

The pump system will require a field-installed suction line and discharge line. Refer to the piping diagram provided with your unit for details. The pump inlet and outlet use NPT fittings. Pipe size may not necessarily be the same size as the unit connection.

Piping should be sized to match the total system pressure drop and pump capacity. Piping must be sized according to the piping distance from the pump to the rest of the equipment. Each valve, fitting and bend in the line must be considered in the calculation.

The piping should be isolated from the building by the use of vibration isolating supports. To prevent damage and to reduce vibration transmission, use a soft flexible material to pack around the pipes when sealing openings in walls.

### NOTE

When making the connections to the pump(s), a Teflon tape thread sealant is recommended to minimize internal fouling of the piping.

### 2.5.1 Minimum Recommended Suction-Side Piping

Install a concentric reducer at the pump suction opening and make all suction piping at least one size larger than the diameter of the suction inlet. Install a suction strainer with a net area two to three times larger than the suction piping. The piping leaving the heat exchanger should enter the pump suction port. Install an isolation valve in the suction line for maintenance purposes.

### 2.5.2 Minimum Recommended Discharge-Side Piping

Install a concentric reducer at the pump discharge opening and make all discharge piping at least one size larger than the diameter of the discharge outlet. Install a check valve in the discharge line to prevent back flow that may damage the pump on shut down. Install an isolation valve in the discharge line for maintenance purposes.

### CAUTION

A bypass flow valve must be provided around the pump suction and discharge connections. This provides a path for the coolant to return to the suction side of the pump, allowing the pump to continuously operate at full speed. This will prevent damage to the pump seals which would result from an insufficient load on the pump and cause the motor to overheat.

## 2.6 Utility Connections

### 2.6.1 Main Power and Control Wiring

The GPS unit requires field power and control wiring (see Figure 7). The unit electric box is provided with main power and control terminal positions for connection of field-wiring (supplied by others). It is important to identify the options that were purchased with the unit in order to confirm which field connections are required. The number of control conductors needed will vary depending on the type of control being used with your equipment. Refer to the electrical drawing supplied with your unit to determine the total number of interconnecting conductors required for your system and for the proper wire terminations.

The GPS unit is available in the following voltages:

- 208-230 VAC 1-phase
- 208-230 VAC 3-phase
- 277 VAC 1-phase

- 460 VAC 3-phase
- 575 VAC 3-phase

Verify that the main power supply coincides with the voltage, phase and frequency information specified on the system nameplate. The supply voltage measured at the unit must be within  $\pm 10\%$  of the voltage specified on the nameplate (see Figure 8). The nameplate also provides: The full load amps (FLA), which is the current that the unit will draw under full design load; the minimum circuit ampacity (MCA) for wire sizing; and the maximum fuse size (MFS) for circuit protection. The unit's nameplate is located inside the electric box.

Entrance holes for the conduit may be made in the side of the electric box. The main power wires are terminated at the line side of the service disconnect switch, located within the electric box. A separate equipment ground lug is provided within the electric box for termination of the earth ground wire (see Figure 9).

**⚡ WARNING**

**High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.**

**⚡ WARNING**

**Verify power is turned off before making connections to the equipment.**

**NOTE**

All wiring must conform to local and national electrical code requirements. Use copper conductors only. Wiring terminations may become loose during transit of the equipment, therefore, verify all wiring terminations are secure prior to operation.

It is important to note that the control transformer supplied with the equipment is sized and selected based upon the expected load for the system.

**CAUTION ⚡**

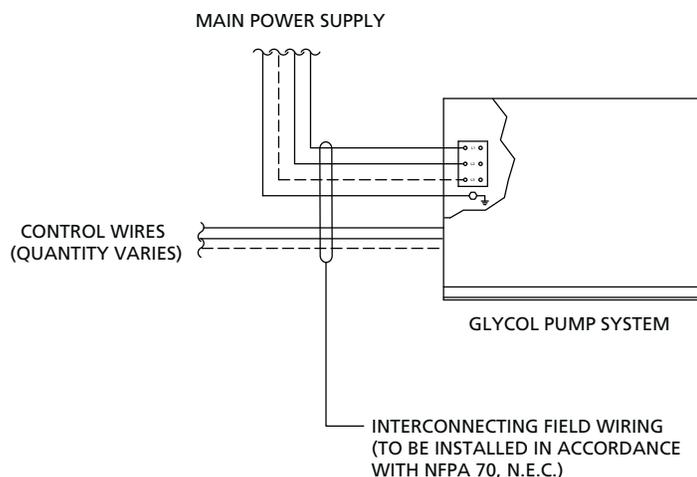
Do not connect any additional loads to the system control transformer. Connecting additional loads to the factory-supplied control transformer may overload the transformer and cause the transformer circuit breaker to trip.

**NOTE**

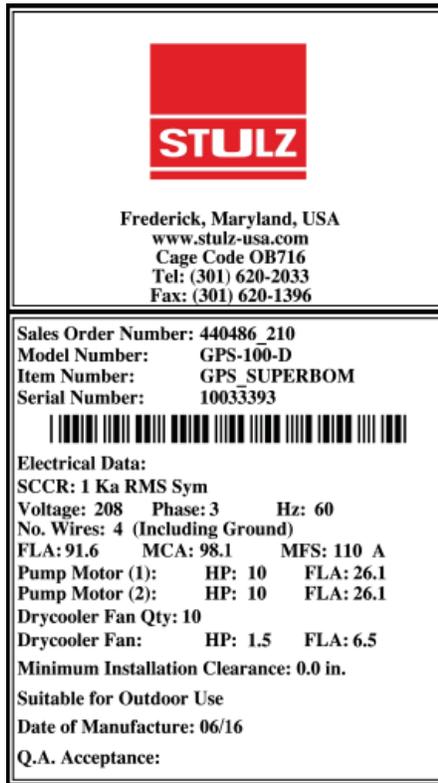
The disconnect switch handle must be in the OFF position to open the electric box.

**CAUTION ⚡**

Improper wire connections will result in reverse rotation of the pump. To correct this problem, exchange any two of the incoming main power wires at the service disconnect switch. Do not rewire the unit's individual components.

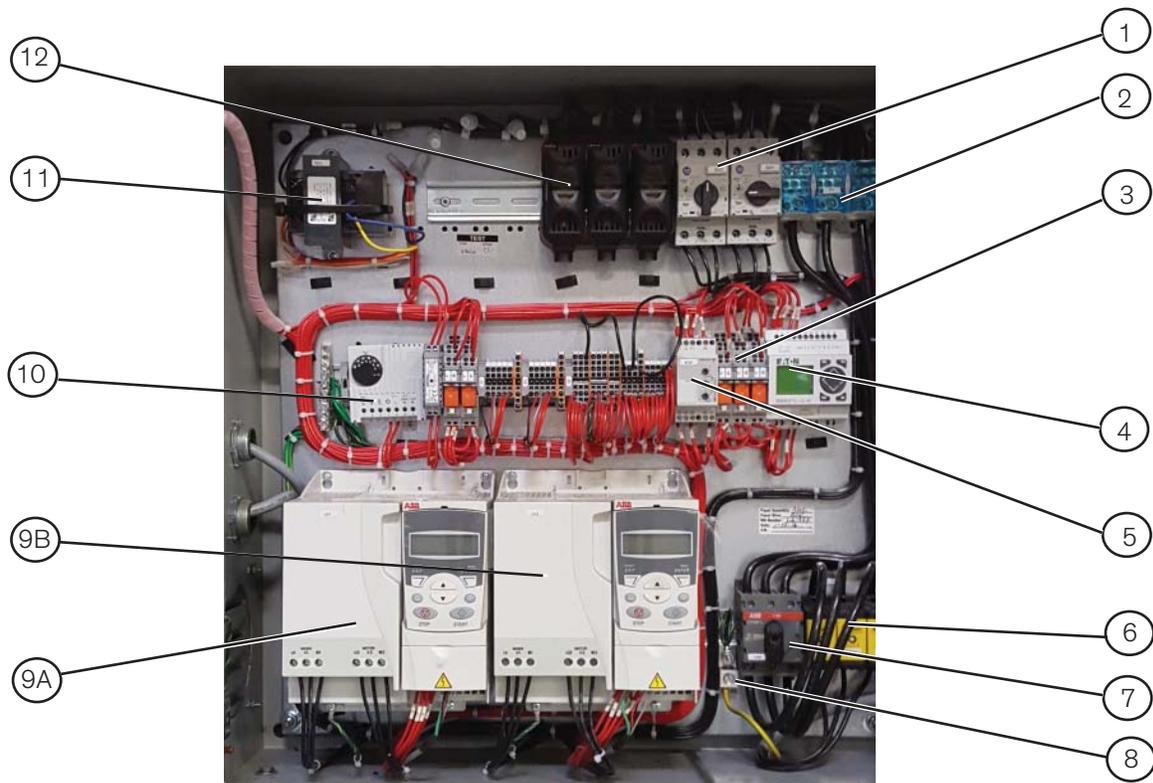


**Figure 7. GPS Field Wiring**



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**Figure 8. Nameplate Example**



**Figure 9. Electric Box Components**

The electric box components pictured in Figure 9 are identified below:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Motor Starter Protectors</li> <li>2. Main Power Distribution Block</li> <li>3. Relays</li> <li>4. Smart Relay</li> <li>5. Flow Delay Timer</li> <li>6. Main Power Distribution Block</li> <li>7. Disconnect Switch Handle Interface</li> <li>8. Equipment Ground Lug</li> <li>9A. Primary VFD</li> </ul> | <ul style="list-style-type: none"> <li>9B. Secondary VFD</li> <li>10. Thermostat</li> <li>11. Transformer</li> <li>12. Drycooler Fuse Protection</li> </ul> |
|--|---|

**NOTE**

The electric box shown in Figure 9 is for reference only. The electric box furnished with your system may look different depending upon the unit model number and the options selected. Electric box components are labeled with reference designators that are defined in the unit electrical drawing. See that drawing if necessary to identify specific components.

## 3.0 START-UP/COMMISSIONING

### 3.1 Procedure

For new installations, ensure the unit is ready to operate by completing the Checklist for Completed Installation prior to start-up.

#### **NOTE**

A Warranty Registration and Checklist for Completed Installation is provided with the unit data package. It should be completed during start-up and sent to STULZ. This checklist should be used as a guideline for items that need to be confirmed during start-up.

#### **CAUTION**

Start-up should be performed by a qualified technician.

The following precautions must be observed when filling the glycol loop:

- All air must be bled from the piping system.
  - The piping system must be cleaned prior to adding the glycol solution to the system.
  - Use only a water/glycol solution with inhibitors for corrosion protection.
1. Once all piping connections have been made and tested for leaks, the system is ready to be filled with water/glycol coolant. Fill the system with pre-mixed glycol solution before turning the pump on. The pump is not self priming so it is important that there is pressure on the suction inlet. This is why the expansion tank must be located above the pump.

#### **CAUTION**

Do not fill the system with water and then add the glycol. They will not mix in the piping system. Pump failure may occur as the glycol “slug” passes through the pump.

2. Turn the pump package on using the service disconnect switch on the door of the electric box.
3. Apply power to the A/C system controller. Refer to the separate controller operation instructions sent with your A/C unit. Test cooling operation by adjusting the temperature setpoint at the system controller. The pump will start running, providing coolant flow through the piping system, when there is a call for cooling.

#### **NOTE**

The system controller may have a time delay for pump system to start-up.

4. If the pump has no discharge pressure, partially close the discharge valve to back up liquid in the pump. Make sure there is always liquid flowing through the pump. If there is no flow, shut off the pump immediately to prevent damage to the pump.

#### **CAUTION**

Do not allow the pump to run dry.

5. The A/C system controller may be bypassed to test pump operation. With the service disconnect switch in the OFF position, install a jumper between the terminals labeled “24 volt Interface To The System Controller”, terminals 1 and 2 (See the electrical drawing supplied with your unit). When the service disconnect switch is turned to the ON position, the pump will operate.

#### **NOTE**

Ensure the jumper is removed prior to commissioning the pump package for use.

## 3.2 Operational Description

When the service disconnect switch is in the ON position, 24 volts is supplied from the pump package to the A/C system controller’s “Pump Enable” dry contact. When the air conditioner has a call (demand) for cooling, the controller “Pump Enable” dry contacts close, completing the circuit to the GPS unit. Power is applied to the interface terminals labeled “Remote Drycooler” inside the electric box. The pump turns on and coolant flows from the pump. The “Remote Drycooler” interface terminals may be used to cycle Drycooler fans on.

### 3.2.1 Dual Pump Systems

A pump selector switch is provided for dual pump systems to allow the operator to manually switch operation from the primary pump to the back-up pump. The normal position for the selector switch is “Pump A” . Manually switching to “Pump B” overrides the primary pump control, causing only the secondary pump to operate.

A flow switch senses when there is a loss of fluid flow while the unit is operating. When the unit is first turned on, a time delay overrides the flow switch long enough to allow the pump to begin circulating the coolant. This time delay is factory set for 10 seconds (the delay is adjustable—see “Table 1. Pump Timing Adjustments” on page 4 for information about setting the time delay). If flow is lost and not re-established after the time delay, the flow switch closes a 24 VAC control circuit to a latching switchover relay, which turns off the primary pump contactor and turns on the secondary pump. The latching relay prevents the pumps from switching back and forth from primary to secondary until manually reset by toggling the pump selector switch or cycling power off and on with the service disconnect switch. Whatever position the pump selector switch is in, the GPS will automatically switch pumps should the flow switch detect a loss of coolant flow.

## 3.2.2 Automatic Pump Sequencing (Optional)

A manual/auto selector switch is mounted on the front of the unit electric box if the optional automatic pump sequencing feature is provided. Normally, the switch is kept in the AUTO position, which allows the controller to rotate the pumps (auto sequence), every 7 days. The pump rotation frequency is adjustable. See “Table 1. Pump Timing Adjustments” on page 4 for information about setting the rotation frequency.

When the manual/auto selector switch set to AUTO, the pump selector switch is disabled. When switched to the MANUAL position, automatic pump sequencing is disabled and the pump selector switch is enabled for the operator to manually switch the pumps.

Switching to the MANUAL position manually overrides the automatic pump control and only the selected pump will operate. With the manual/auto selector switch in the MANUAL position, the pump package will still automatically switch the pumps in the event of a loss of coolant flow.

1. When the service disconnect switch is in the ON position and the A/C unit is calling for cooling (or pins 1 and 2 are jumped on the terminal block), power is applied to the time delay relay, the remote drycooler interface terminals and the pump sequencing timer.
2. If the flow switch does not detect fluid flowing through the piping after the time delay has expired, the Lockout relay coil is energized (24 volts). This automatically switches over to the secondary pump. This is a one-time event, unless power is cycled on and off.
3. When the flow switch proves flow, the normally open contacts of the flow switch close, sending 24 volts through the contacts of the lockout relay to the pump's manual/auto selector switch.

To summarize the two modes:

Manual mode: Power is supplied to either the primary or standby pump (pump A or pump B), as indicated on the pump selector switch.

Auto mode: Power is supplied to the pump sequencing timer and pump selection latching relay coil. This allows the timer to switch pumps after a period of time to give equal run times. The factory setting is 7 days. When the selector switch is set to AUTO, the pump selector switch is bypassed.

## 4.0 MAINTENANCE/REPAIRS

### 4.1 Periodic General Maintenance

Systematic, preventive maintenance of the GPS unit is recommended for optimum system performance. Routine periodic maintenance should include, but not be limited to, the following: Tightening electrical connections, cleaning, inspecting the unit's components visually, checking the level of coolant and ensuring no leaks are present.

A system should be established to record any problems, defects and deficiencies noted by operators and discovered during maintenance inspections, together with the actions taken. Use copies of the Periodic General Maintenance Checklist on page 27 to record periodic general maintenance inspections. For assistance, contact the STULZ Product Support Group. Ensure adherence to all safety statements while performing any type of maintenance.

#### **WARNING**

**This unit employs high voltage equipment with rotating components. To prevent personal injury, stay clear of rotating components because automatic controls may start them unexpectedly. Exercise extreme care to avoid accidents and ensure proper operation.**

#### **WARNING**

**Turn off power to the unit at the service disconnect switch unless you are performing tests that require power. With power and controls energized, the unit could begin operating automatically at any time.**

Always disconnect power before performing any service or repair. Hazardous voltage will still be present even with the unit turned off at the service disconnect switch. To totally isolate the unit for maintenance, ensure power is turned off at the main source of power.

#### 4.1.1 General

Maintenance access is through the front and rear of the unit when the optional weather cover is in place. The pump should require no maintenance other than to the motor bearings, if applicable (see section 4.1.2). Routinely examine the areas around the pump motor(s) and inlets and outlets. Check coolant and piping for signs of leaks. Check all coolant lines for

vibration isolation and support as necessary. Use a vacuum cleaner with a soft bristle brush to clean dirt from components. The following lists preventive maintenance checks and services that should be performed at recommended intervals:

- Examine all wiring for signs of chafing, loose connections or other obvious damage. Examine brackets, motor mounts and hardware for loose or missing parts or other damage semi-annually.
- Clean accumulations of dust and dirt from exterior surfaces semi-annually.
- Lubricate motor bearings if applicable. (See below.)

#### 4.1.2 Lubrication

A grease fitting is provided on motors that require periodic lubrication. Generally, a grease fitting is found on larger pump motors (motors larger than 7 1/2 HP).

#### NOTE

Some motors are provided with permanently lubricated bearings that never require lubrication.

The lubricating ability of bearing grease depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. This lubricating ability can be lost over time. The following recommended lubrication interval and procedure should be followed:

1. A high grade ball or roller bearing grease should be used. Several recommended greases for standard service conditions are Shell Dolium R (factory installed), Texaco Polystar, Amoco Rykon Premium #2 or Chevron SRI#2.
2. Lubrication should be performed at the recommended intervals shown in the table below. These recommended intervals are based on average use.

**Table 2. Lubrication Intervals**

NEMA/(IEC) Frame Size	Rated Speed - RPM	
	3600	1800
Up to 210 incl. (132)	5500 Hrs.	12000 Hrs.
Over 210 to 280 incl. (180)	3600 Hrs.	9500 Hrs.
Over 280	2200 Hrs	7400 Hrs.

**Table 3. Service Conditions**

Severity of Service	Ambient Temperature Maximum	Atmospheric Contamination	Type of Bearing
Standard	40°C	Clean, little corrosion	Deep groove ball bearing
Severe	50°C	Moderate dirt, corrosion	Ball thrust, roller
Extreme	> 50°C* or Class H insulation	Severe dirt, abrasive dust, corrosion	All bearings
Low Temperature	< 30°C**		

\*Special high temperature grease is recommended (Darmex 707).

\*\*Special low temperature grease is recommended (Arrowshell 7).

**Table 4. Lubrication Interval Multiplier**

Severity of Service	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1

**Table 5. Bearing Sizes and Types**

Frame Size NEMA (IEC)	Bearing Description (These are the “Large” bearings (shaft end) in each frame size)					
	Bearing	OD mm	Width mm	Weight of Grease to add oz (grams)	Volume of grease to be added	
					in <sup>3</sup>	teaspoon
Up to 210 incl. (132)	630	8	21	0.30 (8.4)	0.6	2.0
Over 210 to 280 incl. (180)	6311	120	29	0.61 (17.4)	1.2	3.9
Over 280	6313	140	33	0.81 (23.1)	1.5	5.2

**Sample Lubrication Determination**

Assume NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43°C and an atmosphere that is moderately corrosive.

1. Table 1 lists 9500 hrs for standard conditions.
2. Table 2 classifies severity of service as “Severe.”
3. Table 3 lists a multiplier of 0.5 for severe conditions.
4. Table 4 shows 1.2 in<sup>3</sup> or 3.9 teaspoons of grease to be added.

**4.1.2.1 Lubrication Procedure**

Be sure that the grease you are adding is compatible with the grease already in the motor. Consult the factory or the motor manufacturer if you are using a grease other than the recommended type.

**CAUTION** 

To avoid damage to motor bearings, keep grease free of dirt. If you have an extremely dirty environment, contact the factory or the motor manufacturer for additional information.

1. Clean the grease fitting.
2. If the motor has a grease outlet plug, remove it.
3. If the motor is stopped, slowly add the recommended amount of grease. If the motor is to be greased while running, add a slightly greater quantity of grease.
4. Add grease slowly until new grease appears at shaft hole in the endplate or purge outlet plug.
5. Re-install the grease outlet plug, if removed.

## 4.2 Troubleshooting

### WARNING

Turn off all power to the unit before conducting any troubleshooting procedures, unless the procedure specifically requires the system to operate. Keep hands, clothing and tools clear of the electrical terminals and rotating components. Ensure that your footing is stable at all times.

SYMPTOM	PROBABLE CAUSE	RECOMMENDATION
<b>Unit Fails to Start</b>	1. Incorrect phasing or voltage.	Correct phase or voltage input.
	2. Low line voltage.	Check power source for cause of low line voltage.
	3. Power failure.	Check power source, power inlet and fuses. Check power cables and connections.
	4. Overload protection tripped.	Check for cause of overload and replace fuse(s) or reset motor contactor(s).
<b>Control is Erratic</b>	Wiring improperly connected or broken.	1. Check wires for continuity. 2. Check wiring against schematic diagram.
<b>Low Flow</b>	1. Valve stuck or obstructed.	Repair or replace valve.
	2. Loss of fluid.	Locate leak and repair. Replace lost fluid in system.
	3. Clogged strainer.	Replace with new strainer.
<b>A/C and/or Drycooler Fails to Start</b>	1. Temperature setpoint too high.	Adjust to desired temperature.
	2. Control wiring is open.	Ensure that wiring is not broken and connections are not loose.
	3. Time delay has not expired.	Wait for time to expire.

### **4.3 Field Service**

It may be necessary to perform repairs on the GPS unit. If field repairs are necessary, the following procedures apply:

#### **NOTE**

Do not attempt to make repairs without the proper tools.

#### **4.3.1 Leak Detection and Repair**

Visually inspect the pipe inlet/outlet fittings and observe the area around the pump and the base for signs of leaking coolant.

#### **NOTE**

Repairs must be performed by a qualified technician.

If a leak is located in the piping, isolate that section of piping using appropriate shut-off valves. It may be necessary to drain some of the coolant. When repairs are complete, pressure check the system, checking for leaks prior to refilling the system with water/glycol. In 24 hours, observe the piping system for leaks.

#### **4.3.2 General Common Repairs/Component Replacement**

If a failure occurred, determine whether it is an electrical or a mechanical failure. An electrical failure may be indicated by a distinct pungent odor when the electric box is opened. A mechanical failure may be indicated by an abnormal or excessive noise from the pump or motor.

All electrical connections should be checked to be sure they are tight and properly made. Check all fuses, contactors and wiring. The contactor should be examined and replaced if contacts are worn or pitted.

## 5.0 PRODUCT SUPPORT GROUP

STULZ provides to its customers a Product Support Group (PSG) which not only provides technical support and parts but the following additional services, as requested: Performance evaluations, start-up assistance and training.

### 5.1 Technical Support

The STULZ Product Support Group (PSG) is dedicated to the prompt reply and solution to any problem encountered with a unit. Should a problem develop that cannot be resolved using this manual, you may contact PSG at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST.

When calling to obtain support, it is vital to have the following information readily available, (information is found on unit's nameplate):

- Unit Model Number (GPS-XXX-X-X)
- Unit Serial Number
- Description of Problem

### 5.2 Obtaining Warranty Parts

Warranty inquiries are to be made through the Product Support Group (PSG) at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. A service technician at STULZ will troubleshoot the system over the telephone with a field service technician to determine the defect of the part. If it is determined that the part may be defective a replacement part will be sent UPS ground. If the customer requests that warranty part(s) be sent by any other method than UPS ground the customer is responsible for the shipping charges. If you do not have established credit with STULZ you must provide a freight carrier account number.

A written (or faxed) purchase order is required on warranty parts and must be received prior to 12:00 p.m. for same day shipment. The purchase order must contain the following items:

- Purchase Order Number
- Date of Order
- STULZ Stated Part Price (obtained from PSG)
- Customer Billing Address
- Shipping Address
- Customer's Telephone and Fax Numbers
- Contact Name
- Unit Model No., Serial No.

The customer is responsible for the shipping cost incurred for shipping the defective part back to STULZ. Return of defective parts must be within 30 days at which time an evaluation of the part is conducted and if the part is found to have a manufacturing defect a credit will be issued.

When returning a defective part, complete the Return Material Authorization Tag and the address label received with the replacement part.

See STULZ Standard Warranty located in section one of this manual.

### 5.3 Obtaining Spare/Replacement Parts

Spare and replacement parts requests are to be made through the Product Support Group (PSG) by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com). Quotes are given for specified listed parts for a specific unit.

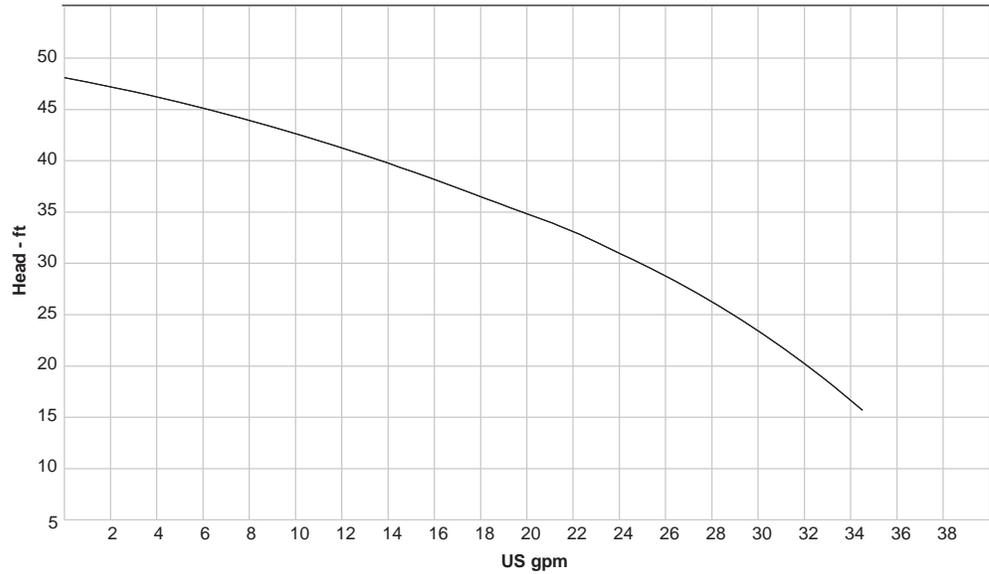
STULZ accepts Visa and MasterCard. STULZ may extend credit to its customers; a credit application must be prepared and approved (this process could take one week).

A 25% minimum restocking charge will be applied on returned stocked parts that were sold as spare/replacement parts. If the returned part is not a stocked item, a 50% restocking charge may be applied. Additionally a Return Material Authorization Number is required when returning parts. Repair/replacement parts may be returned for credit up to 30 days after purchase.

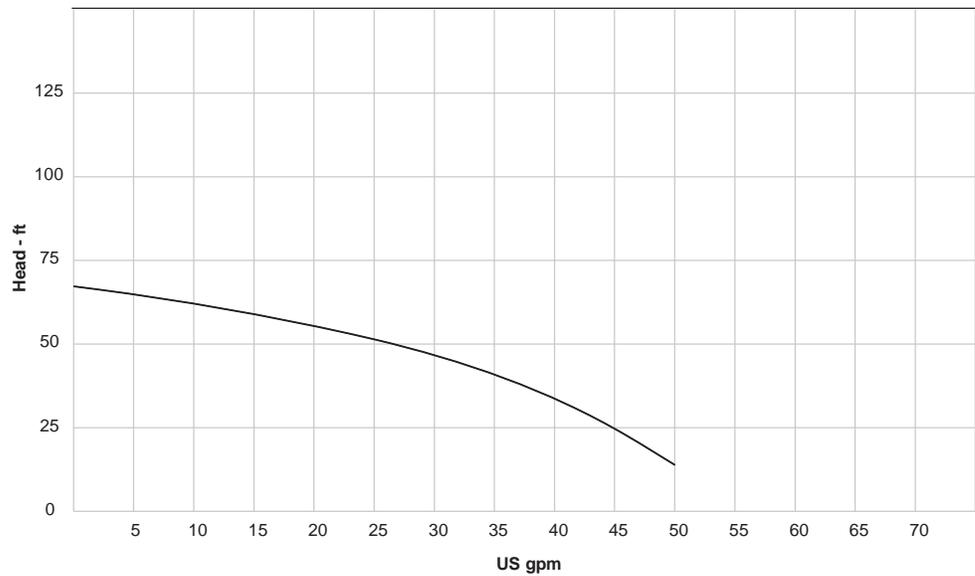
## Appendix A Pressure Drop / Flow Rate Curves

This section provides pressure drop/flow rate curves for the different GPS pump models. A graph containing a pressure drop curve is provided for each model. Note that curves reflect 45 °F and 40% Ethylene Glycol.

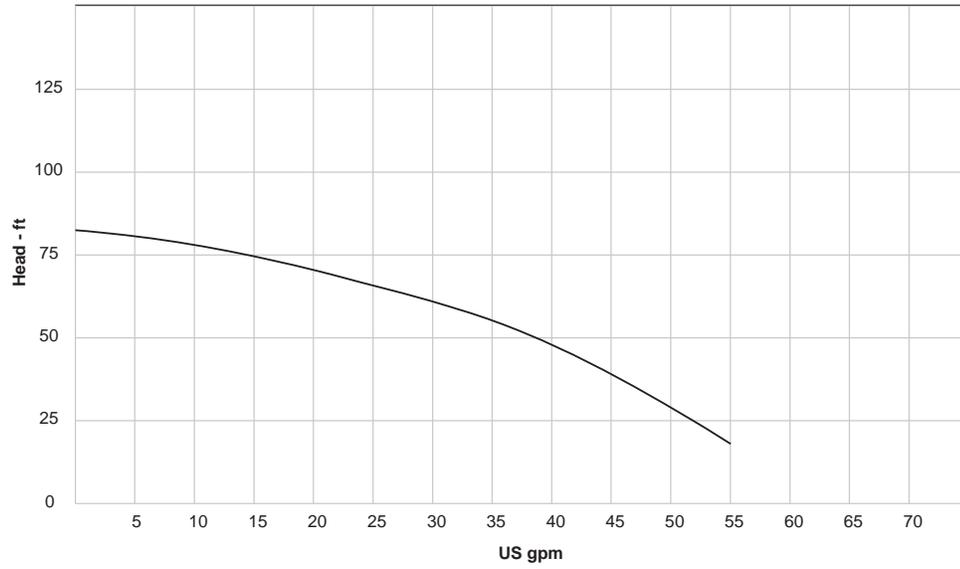
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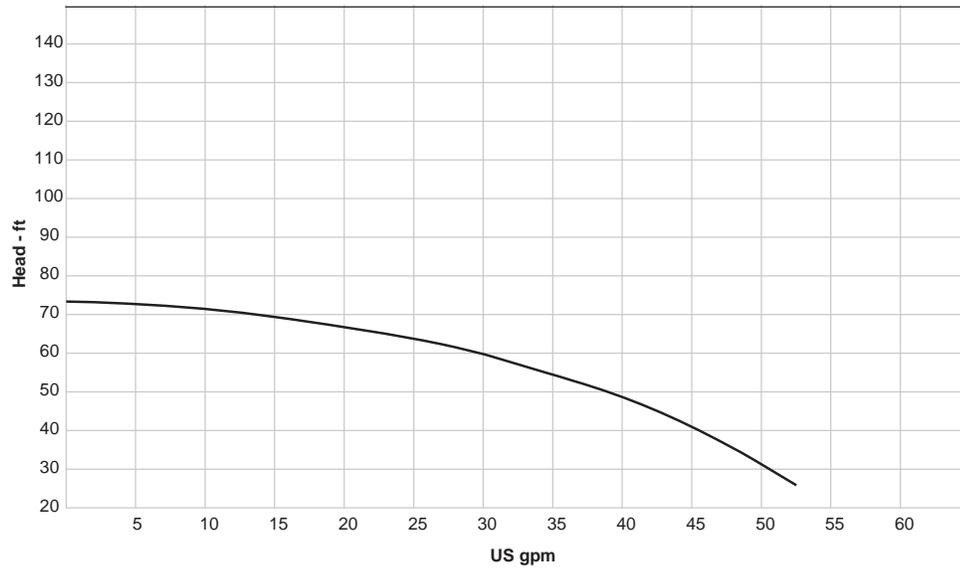
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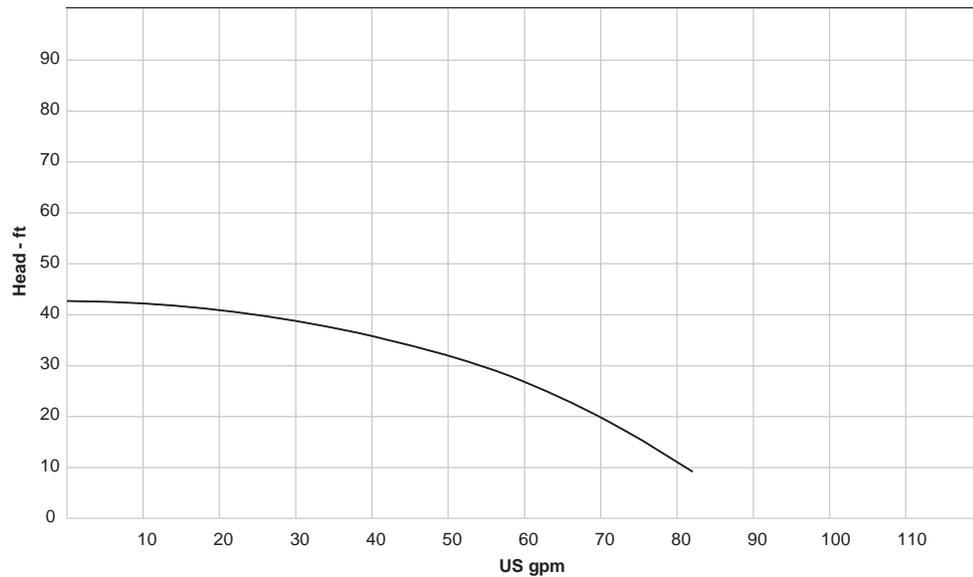
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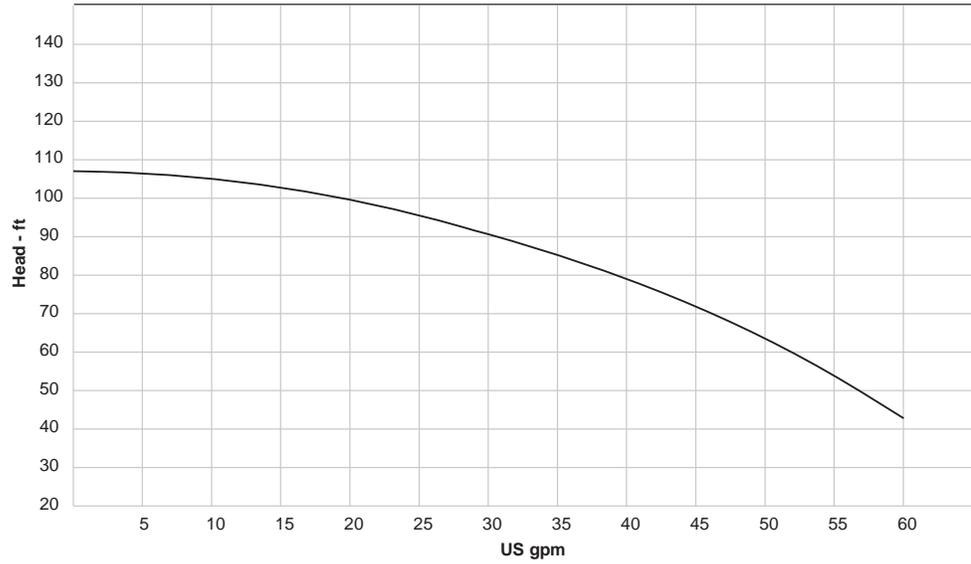
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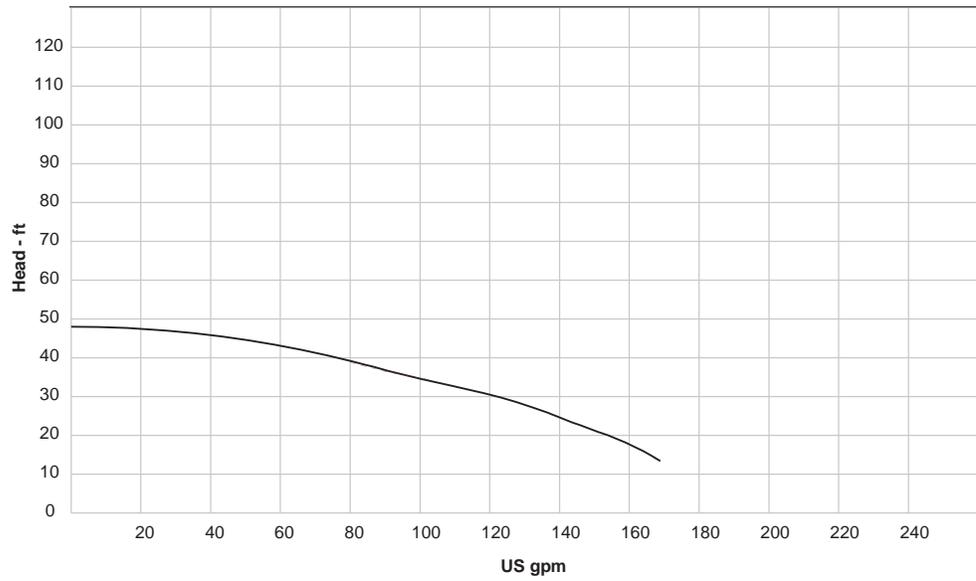
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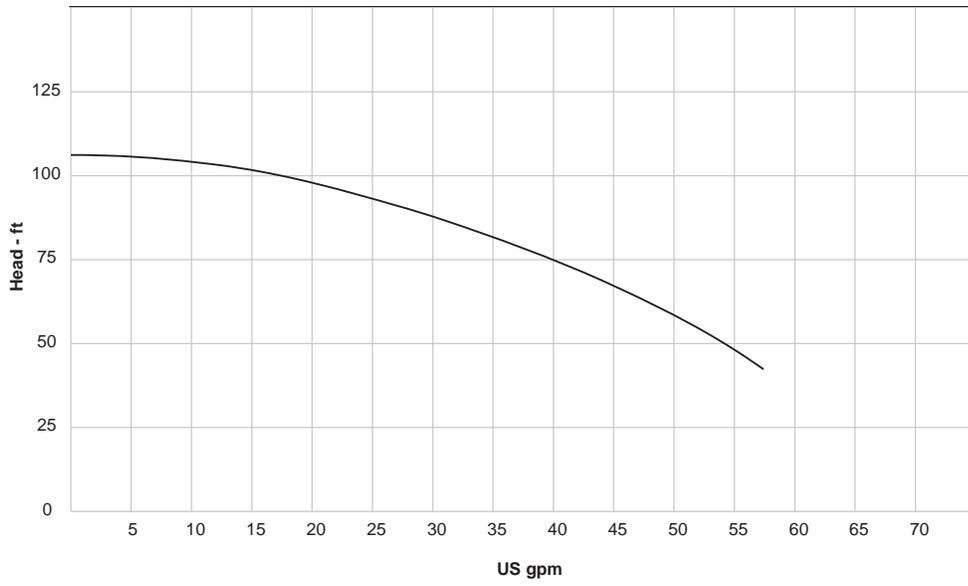
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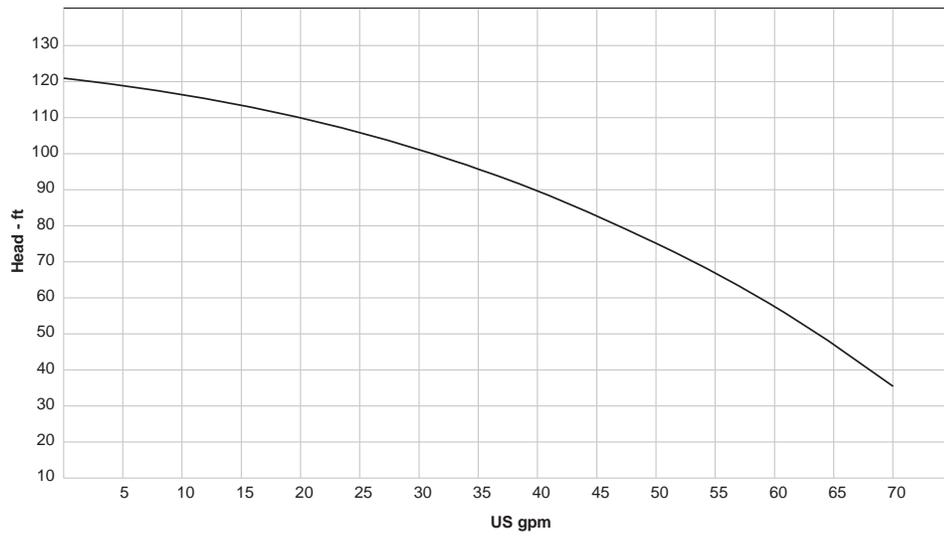
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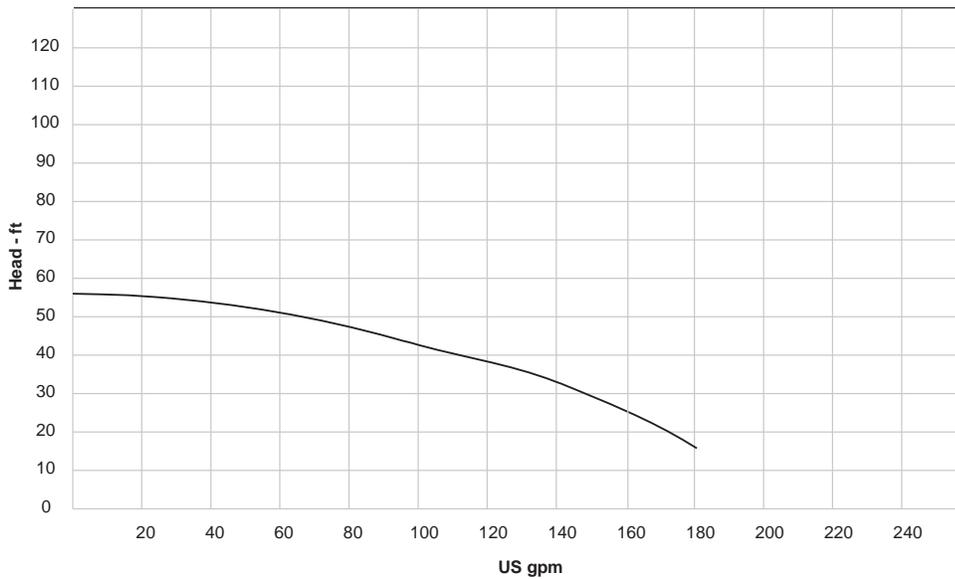
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GPS-020()-B

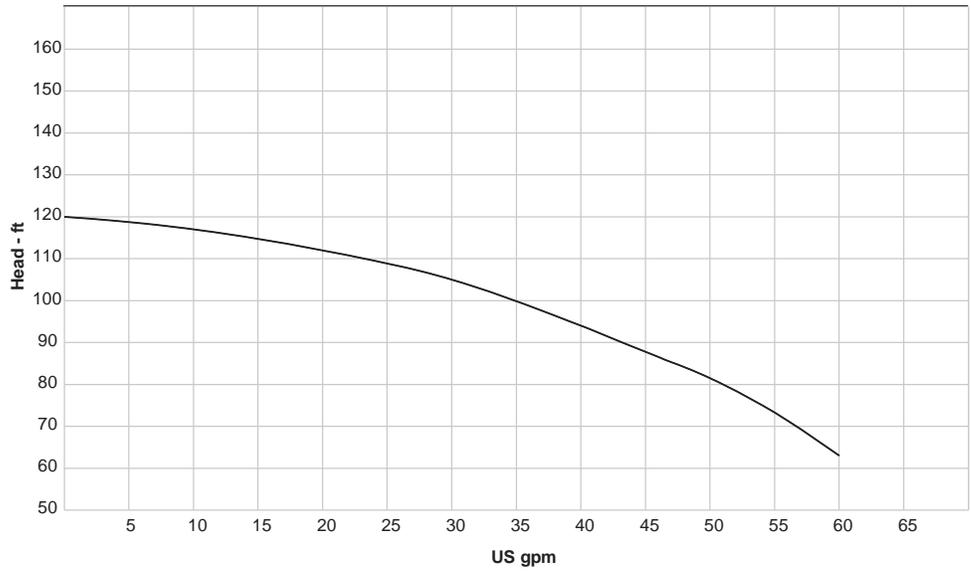


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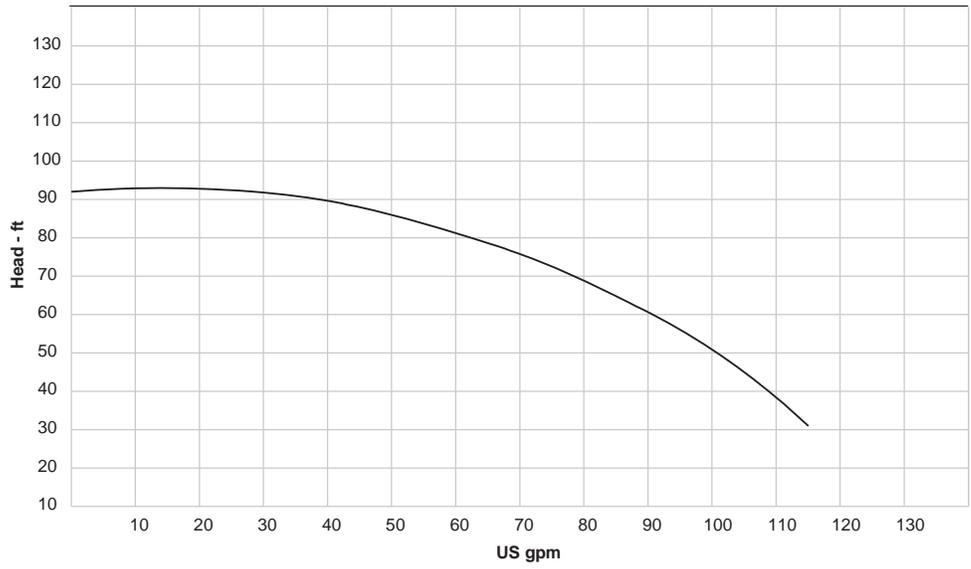


# STULZ GPS INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

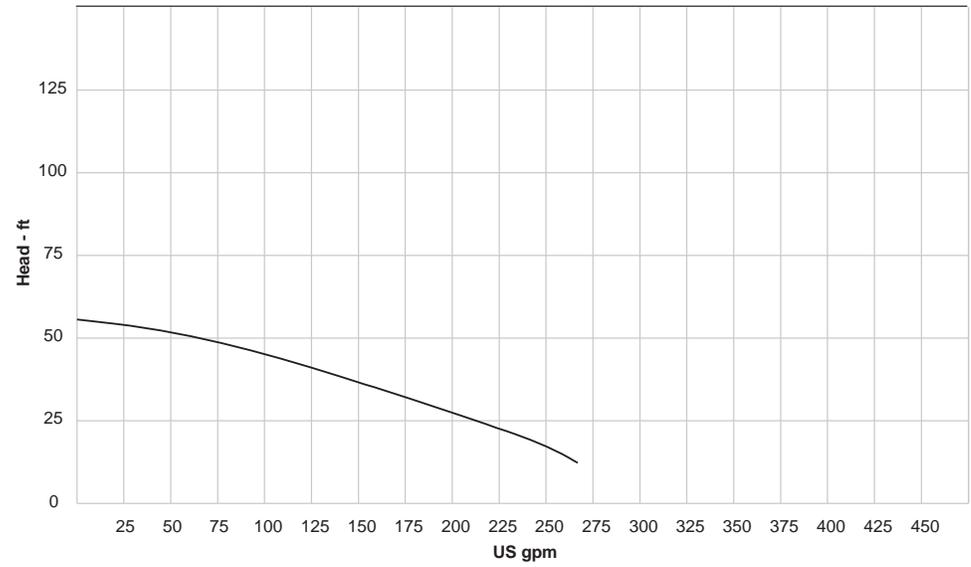
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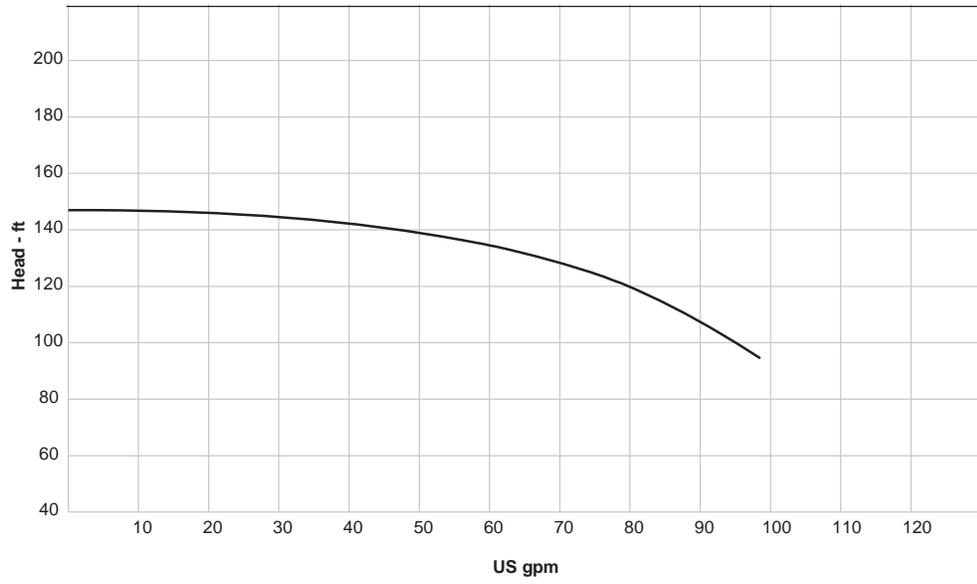
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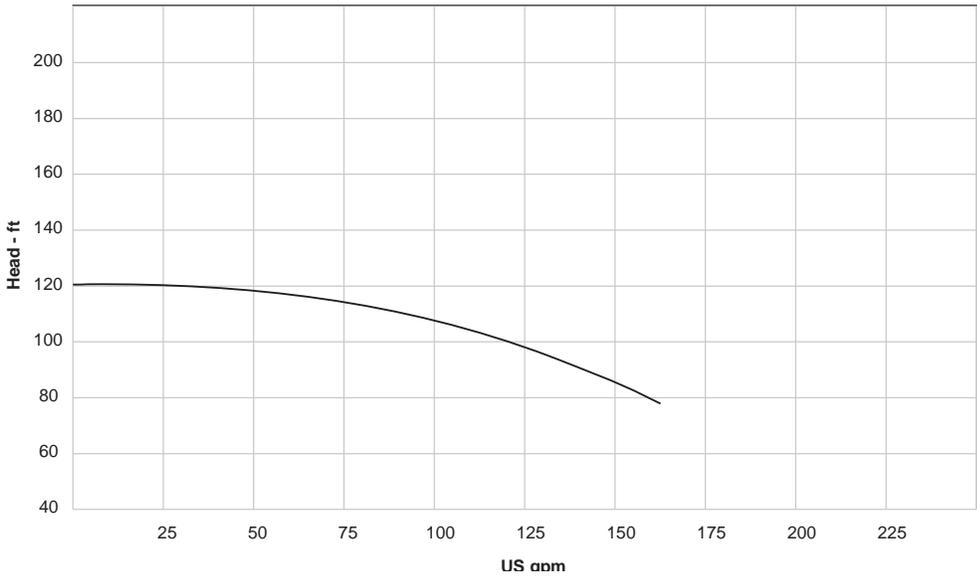
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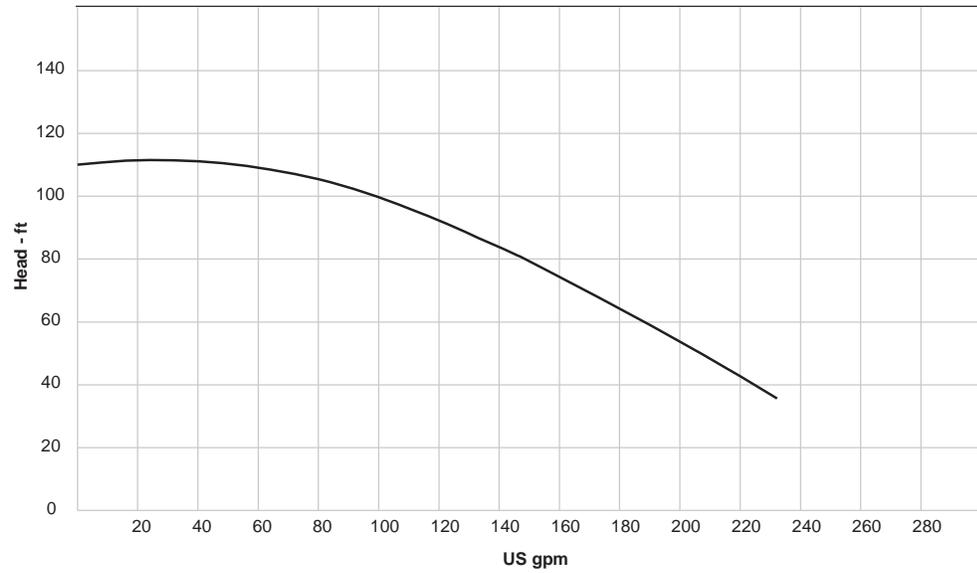
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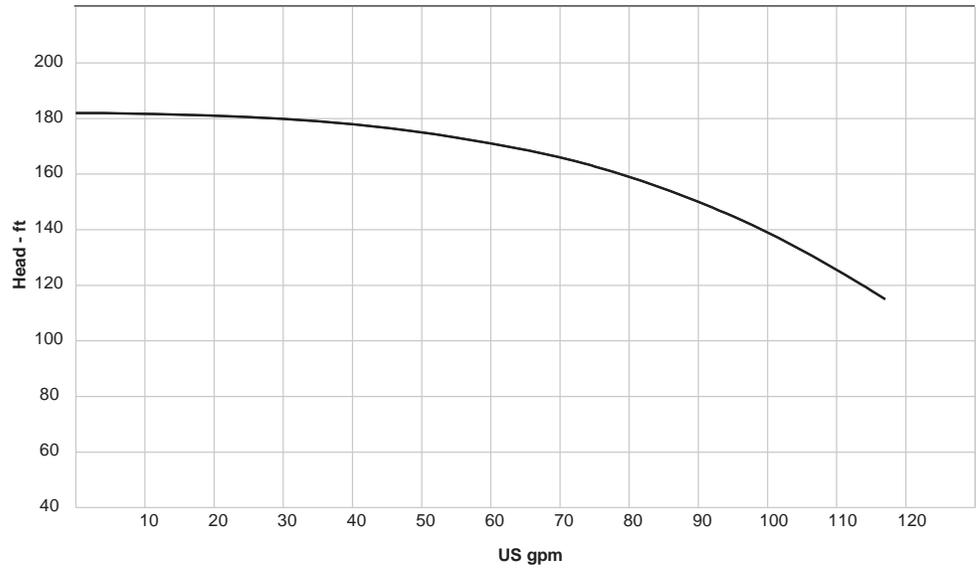
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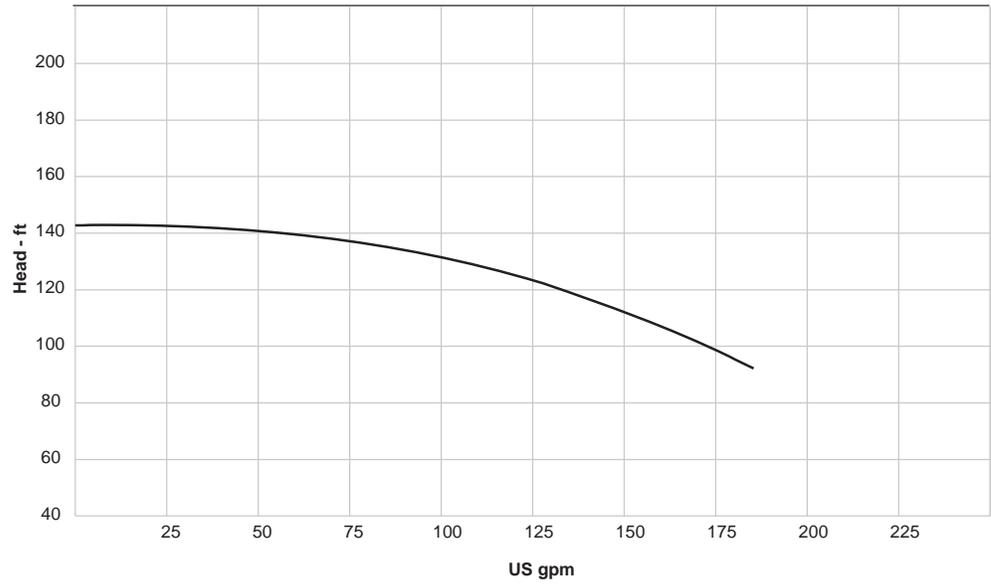
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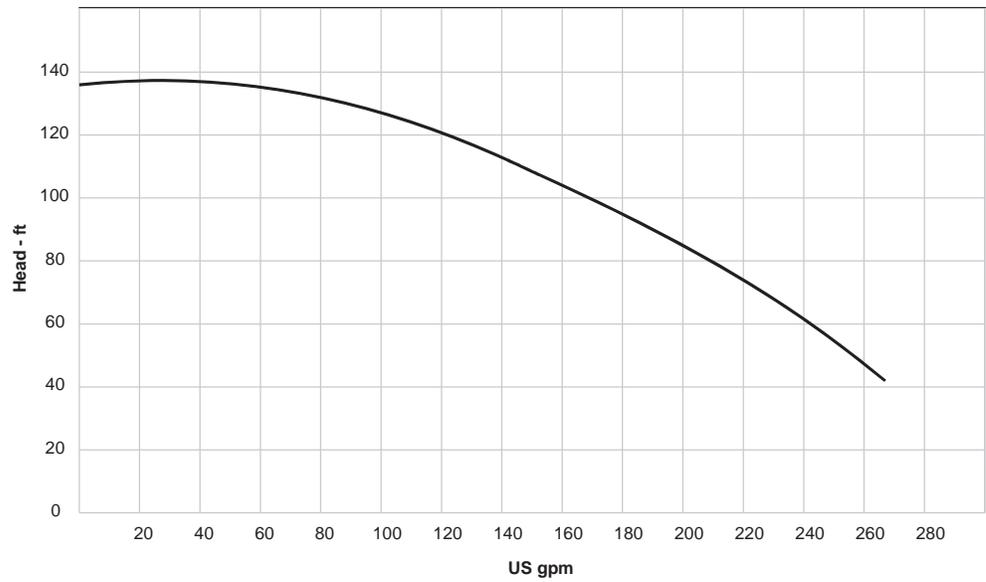
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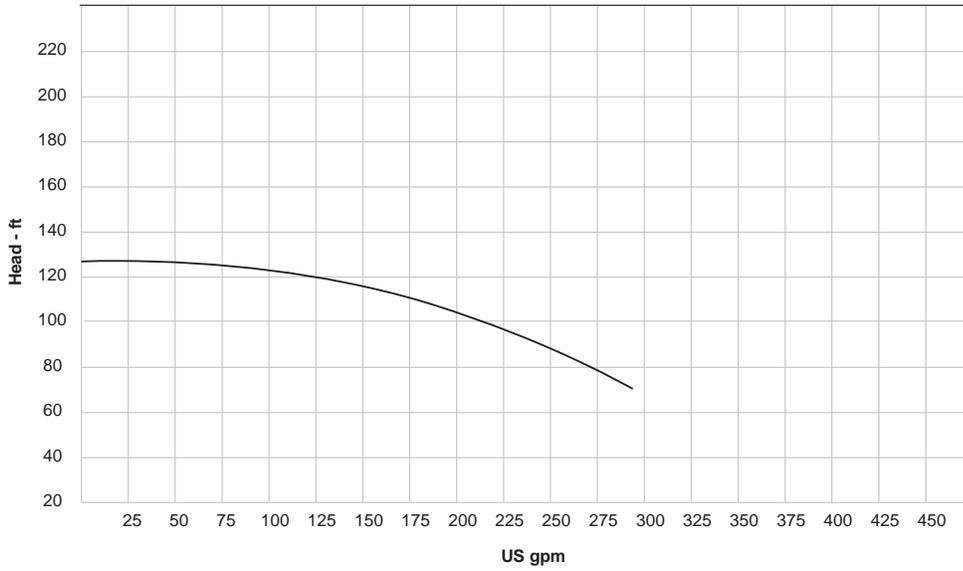
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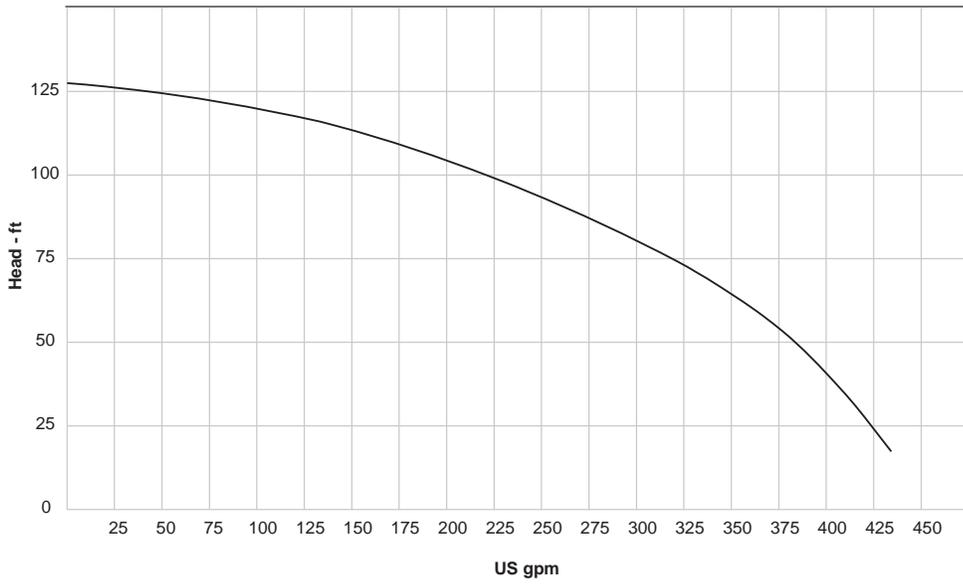
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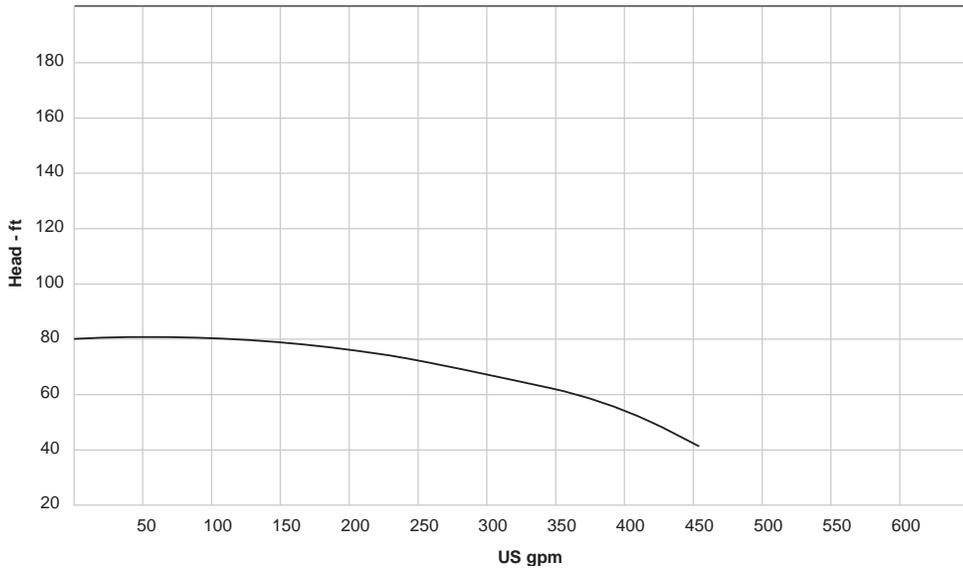
GPS-100-()-A



GPS-100-()-B



GPS-100-()-C



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**GPS Series Pump Package**

**FORMS**

**Checklist for Completed Installation**

- |                          |  |                          |   |
|--------------------------|--|--------------------------|---|
| <input type="checkbox"/> | Proper clearances for service access have been maintained around equipment.  | <input type="checkbox"/> | Customer supplied main power circuit breaker (HACR type) or fuses have proper ratings for equipment installed.                                |
| <input type="checkbox"/> | Equipment is level and mounting fasteners are tight.   | <input type="checkbox"/> | Control wiring connections completed to A/C unit and drycooler.   |
| <input type="checkbox"/> | Piping completed to equipment.   | <input type="checkbox"/> | All wiring connections are tight.   |
| <input type="checkbox"/> | All field installed piping leak tested.  | <input type="checkbox"/> | Foreign materials have been removed from inside and around all equipment installed (shipping materials, construction materials, tools, etc.). |
| <input type="checkbox"/> | Water/glycol added.  | <input type="checkbox"/> | Pump motor rotates freely, in the proper direction and without unusual noise.   |
| <input type="checkbox"/> | Incoming line voltage matches the equipment nominal nameplated rating $\pm$ tolerances.  | <input type="checkbox"/> | Inspect all piping connections for leaks during initial operation.  |
| <input type="checkbox"/> | Main power wiring connections to the equipment, including earth ground, have been properly installed. Ensure correct phasing per the wiring diagram supplied with your unit. |                          |   |

**GPS Series Pump Package**

**Periodic General Maintenance Checks and Services Checklist**

Date: \_\_\_\_\_ Prepared By: \_\_\_\_\_  
Model Number: \_\_\_\_\_ Serial Number: \_\_\_\_\_  
Item Number: \_\_\_\_\_

**Monthly**

- Remove oil, dust, dirt, water, chemicals from exterior of motor and pump.

**Semi-Annually**

- Check water/glycol solution level
- Clean out open motors with low pressure compressed air.
- Ensure Piping is Secured
- Tighten Electrical Connections
- Ensure Motor Mount is Secured
- Clean Unit as Necessary

**Annually**

- Inspect System for Leaks and Corrosion
- Check motor bearings and replace if necessary
- Conduct a Complete Check of All Services Listed Above

**Notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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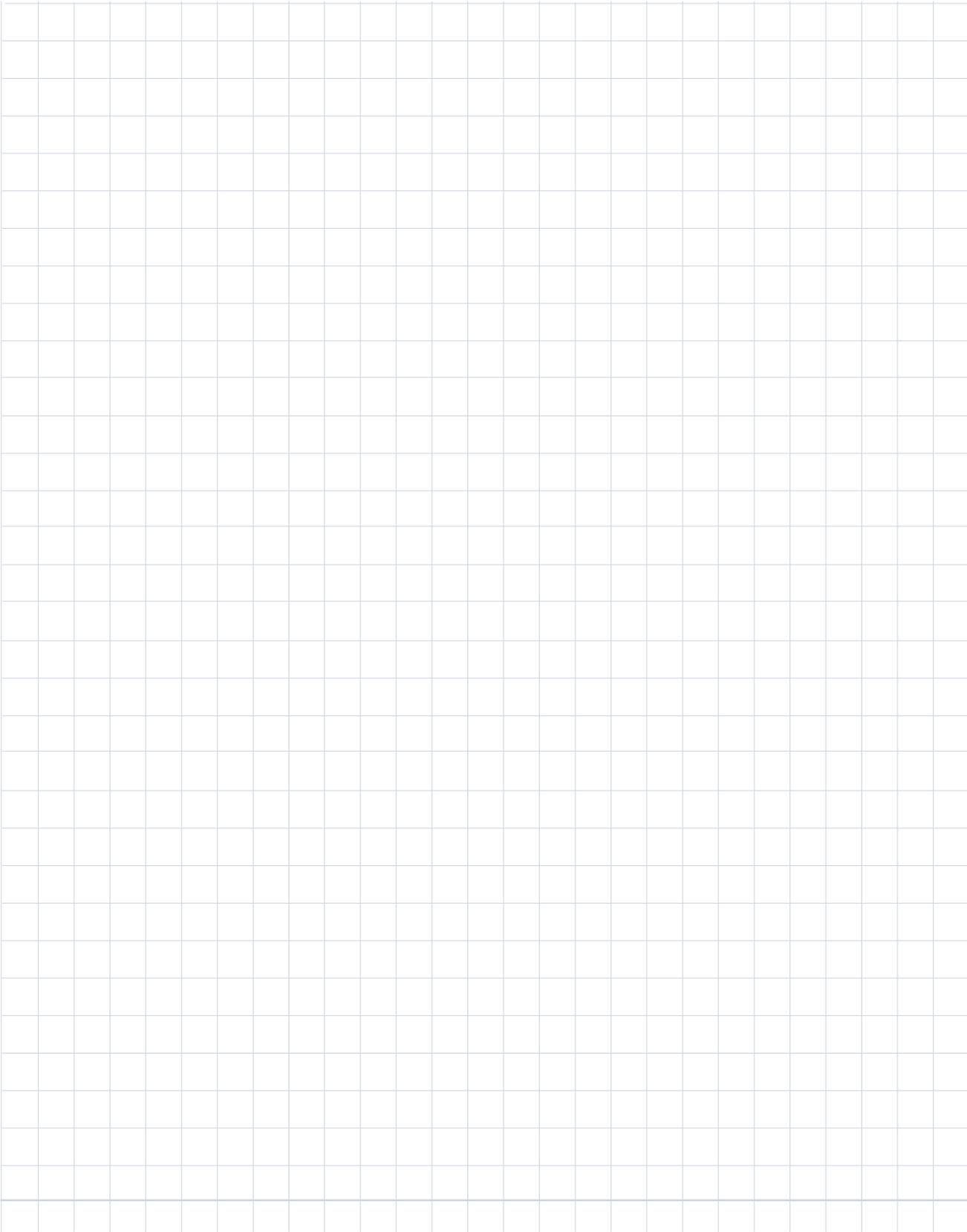
**Signature:** \_\_\_\_\_

\*\*\* If factory assistance is required for any reason, provide the model number, serial number, and STULZ item number found on the unit nameplate. This will speed the process and ensure accuracy of information. \*\*\*

## Glossary

### Definition of Terms and Acronyms

<b>BMS -</b>	Building Management System	<b>MCA -</b>	Minimum Circuit Ampacity
<b>BTU/Hr -</b>	British Thermal Units Per Hour	<b>NEC -</b>	National Electric Code
<b>ESD -</b>	Electrostatic Discharge	<b>NFPA -</b>	National Fire Protection Agency
<b>° F -</b>	Degrees Fahrenheit	<b>NPT -</b>	National Pipe Thread
<b>FLA -</b>	Full Load Amps	<b>PSG -</b>	Product Support Group
<b>FOB -</b>	Freight on Board	<b>PSI -</b>	Pounds Per Square Inch
<b>GPM -</b>	Gallons per Minute	<b>PSIG -</b>	Pounds Per Square Inch Gauge
<b>HACR -</b>	Heating, Air Conditioning, Refrigeration	<b>RLA -</b>	Run Load Amps
<b>HP -</b>	Horsepower	<b>SDS -</b>	Safety Data Sheet
<b>Hz -</b>	Hertz	<b>SPDT -</b>	Single Pole, Double Throw
<b>KVA -</b>	Kilo Volt Amps	<b>STULZ -</b>	Stulz Air Technology Systems, Inc.
<b>kW -</b>	Kilowatt	<b>V -</b>	Volt
<b>MAX CKT BKR -</b>	Maximum Circuit Breaker	<b>VAC -</b>	Volt, Alternating Current
<b>MAX FUSE -</b>	Maximum Fuse		



Notes







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