

# Heat Transfer Package with Air Separation

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**INSTALLER:** PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

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## DESCRIPTION

Frame mounted heat transfer package consisting of but not limited to: heat exchanger, air separation apparatus, pump(s), motor(s), triple duty check valve(s), relief valve(s), pressure reducing valve, gauge(s), thermometer, and interconnecting piping. The following options are also available: motor starter(s), condensate trap, and steam valve.

## OPERATIONAL LIMITS

The standard design pressure is 125 PSI unless otherwise indicated. The ASME nameplates will indicate the ratings of the pressure vessels and relief valves. If a control panel is supplied refer to the nameplate for operating voltage and full load AMP current draw.



## SAFETY INSTRUCTIONS



This safety alert symbol will be used in this manual and on the Heat Transfer Package Safety Instruction decal to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

# Heat Transfer Package INSTRUCTIONS


## UNIT IDENTIFICATION

The unit nameplate give identification and rating information as identified in Figure 1. Units with electrical panels also are identified with a nameplate as shown in Figure 2.

Permanent records for this unit are kept by the factory number and it must therefore be used with all correspondence and spare parts orders.

	<b>BELL &amp; GOSSETT</b> <b>PACKAGED</b> <b>PRODUCTS</b>
MODEL NUMBER	
<input type="text"/>	
FACTORY NUMBER	
<input type="text"/>	
SHIPPING ORDER	DATE
<input type="text"/>	<input type="text"/>
PUMP	
<input type="text"/>	
HEAT EXCHANGER	
<input type="text"/>	
 <b>Bell &amp; Gossett</b> a xylem brand	

**FIGURE 1**

Model No.				
Factory No.				
Wired for	Volts	Hz	Ph	
System FL Amps				
Largest Motor HP				
System Flow GPM				
Suction Pressure PSIG				
Discharge Pressure PSIG				
Pump TDH Feet				
Date Code				
<hr/>				
 <b>Bell &amp; Gossett</b> a xylem brand				

**FIGURE 2**

**TABLE OF CONTENTS**  
**HEAT TRANSFER PACKAGE**

	Page
<b>SECTION 1</b>	
General Description .....	4
Purpose of Manual .....	4
Safety Instruction .....	4
Storage & Handling .....	4
Electrical Connections .....	4
Piping Connections .....	5
<b>SECTION 2</b>	
Installation .....	5
<b>SECTION 3</b>	
Putting the Unit into Service .....	6
Troubleshooting – Electrical .....	7
Factory Service .....	7
Maintenance .....	7
<b>APPENDIX</b>	
Start Up Check List – Piping .....	8
Start Up Check List – Electrical .....	8

**NOTE:**

The information contained in this manual is intended to assist operating personnel by providing information on the characteristics of the purchased equipment.

It does not relieve the user of the responsibility to adhere to local codes and ordinances and the use of accepted practices in the installation, operation and maintenance of this equipment.

Further information pertaining to the installation, operation, and maintenance of your Heat Transfer Package can be found in the I.O.M.s for the associated equipment provided. See section 1.26 for a list of manual part numbers.

## 1.1 DESCRIPTION

1.2 The Bell & Gossett Heat Transfer Package is a complete heating system providing pumping, air separation, flow control and (as an option) temperature regulation. In addition, it is furnished with a suction/discharge pressure gauge, ASME safety relief valve, pressure regulating system fill valve and pump servicing shut-off valves to minimize installation time and errors.

## 1.3 PURPOSE OF MANUAL


1.4 This manual is furnished to acquaint you with some of the practical ways to install, operate, and maintain this unit. Read it completely before doing any work on your unit and keep it handy for future reference.


1.5 Equipment cannot operate well without proper care. To keep this unit at top efficiency, follow the recommended installation and servicing procedures outlined in this manual.


## 1.6 SAFETY INSTRUCTION

1.7 This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used the safety alert symbol means ATTENTION BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN A SAFETY HAZARD.

## 1.8 ADDITIONAL SAFETY REQUIREMENTS

 **WARNING:** Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

 **WARNING:** Prevent electrical shocks. Disconnect the power supply before beginning installation. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

 **CAUTION:** Burn hazard. Surfaces are hot when the unit is in operation. Do not touch the piping, pumps, heat exchanger, and tanks until the equipment has been given enough time to cool down. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

1.9 Even when the motor is stopped, it should be considered "alive" as long as its controller is energized. Keep hands away from the output shaft until the motor has completely stopped, and the input power is removed from the motor control panel.

1.10 Always use accurate test meters when checking electrical components. Always work with another person in case of an emergency.

## 1.11 STORAGE & HANDLING

1.12 When the Heat Transfer Package is received, make a visual inspection of the unit, checking for any damages that may have occurred in shipment. The unit should also be checked against the shipping list to account for the un-mounted components which are boxed and bound to the unit.

1.13 If any damages are found or parts missing, note this on the delivery receipt and inform your B&G Factory Representative at once. Care should be taken to prevent damage due to dropping or jolting when moving the unit. Transportation damage should be brought to the carrier's attention immediately upon receipt.

1.14 For long periods of storage, the unit should be covered to prevent corrosion and contamination from dirt. It should be STORED in a clean, dry location between 0 – 170°F. The relative humidity should not exceed 85%. The unit should be checked periodically to ensure that no condensation has formed. After storage, again check that it is dry before applying power.

1.15 The unit is mounted on wooden skids which provide for safe and easy movement to the installation site.

1.16 The final location should allow ample space for servicing all components of the unit. Be sure to allow room for removal of the heat exchanger tube bundle, should it be necessary.

1.17 The wooden skids should be removed and the base of the frame leveled, grouted and bolted to the floor or pad.


## 1.18 ELECTRICAL CONNECTIONS

1.19 The input voltage tolerance is +10/-10%.

1.20 All electronic equipment is susceptible to failure if operated in ambient temperatures outside of its rating. The OPERATING temperature range for this unit is 32 – 105°F. The relative humidity should not exceed 95% noncondensing. The unit should not be operated outside these extremes.

## 1.21 GROUND CONNECTION

1.22 A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

 **WARNING:** Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

## 1.23 POWER WIRING

1.24 Power wire types and sizes must be selected based upon conformance with the National Electrical Code and all local codes and restrictions. In addition, only copper (Cu) wire related for at least 75°C may be used for the power connections. Refer to the input current as listed on the motor nameplate when sizing wire.

1.25 **FIELD CONNECTION DIAGRAMS**

1.26 Refer to the specific Installation, Operation, and Maintenance Manuals for specific details unique to each component. See the list below.

Component	IOM Part
(1) 1510 Pump	P81673
(2) Triple Duty Valve 2"-10"	V50960
(3) Triple Duty Valve 1"-1-1/2"	V50899
(4) ASME Safety Relief Valve	V55692
(5) Pressure Reducing Valve	V55999
(6) Air Separator, Airtrol Fitting, ASME Compression Tank	S10300
(7) Enhanced Air Separator Model EAS	A03852
(8) Vacuum Breaker	None
(9) High Capacity Air Valve #107A	A82003
(10) ASME Diaphragm Pressurized Expansion Tanks	A01500
(11) Drain-O-Tank Air Charger	V56916
(12) Air Valve #87	None
(13) Heat Exchanger	HT-50A-SM
(14) Suction Diffuser	A91310

1.27 The following field connection diagrams should be reviewed prior to unit installation and operation.


Drawing #	Description
Job Specific Print	Wiring
Job Specific Print	Dimensional Drawings

1.28 **PIPING CONNECTIONS**

1.29 A 3/4" NPT system fill connection is located in the piping to the expansion tank. It is provided with a gate valve and a pressure reducing valve with built-in anti-syphon check valve. The reducing valve is set for 12 PSI system pressure. The PRV may be adjusted to a higher setting when installed in taller buildings.

1.30 Local codes may govern this connection when made to a domestic cold water line.


1.31 **IMPORTANT:** Do not install and operate Bell & Gossett Pumps, 3D Valves, Suction Diffusers, etc., in closed systems unless the system is constructed with properly sized safety devices and control devices. Such devices include the use of properly sized and located pressure relief valves, compression tanks, pressure controls, temperature controls and flow controls as appropriate. If the system does not include these devices, consult the responsible engineer or architect before making pumps operational.

 **WARNING:** The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and release of high temperature fluids. This will be prevented by installing properly sized and located pressure relief valves and compression tanks. **Failure to follow these instruction could result in serious personal injury, death, and/or property damage.**

2.0 **INSTALLATION INSTRUCTIONS**

2.1 **Location**

2.2 Locate the pumping unit for ease of inspection, maintenance and service.

 **WARNING:** Heavy load may drop if not lifted properly. Do not lift the entire unit by the motor eye-bolts. Lift the unit with slings placed under unit base rails. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

2.3 **Leveling**

2.4 Place the unit on its concrete foundation, supporting it with steel wedges or shims.

2.5 **Grouting**

2.6 After the frame has been leveled and securely bolted to the floor, a good grade of grout should be installed beneath the base. A suggested mixture for grout is one part Portland Cement and two or three parts plain, sharp sand mixed with water until it will pour easily. Commercial grout mixtures with suspended iron particles are available. Wet the concrete base before pouring grout. To hold wedges or shims in place, allow the grout to flow around them and beneath the entire length of the base flange.


2.7 **Piping**

2.8 Be sure to eliminate any pipe strain on the unit. Support the pipes independently by use of pipe hangers near the unit. Line up the vertical and horizontal piping so that the bolt holes of the flanges match. **DO NOT ATTEMPT TO SPRING THE PIPE LINES INTO POSITION.** The code for Pressure Piping (A.S.A.B. 31.1) lists many types of supports available for various applications.

2.9 As a rule, ordinary wire or band hangers are not adequate to maintain alignment. It is very important to provide a strong, rigid support for the suction line. A saddle hanger is recommended.

2.9.1 For critical installations, equipment for absorbing expansion and vibration should be installed in the inlet and outlet connections of the unit.

2.9.2 Inspect all piping connections. Joints may become loose during transit due to vibration and shock. All joints are to be checked for tightness. Flanged joints should be checked for proper torque of all flange bolts prior to filling the system with fluid.

 **CAUTION:** Failure to check all joints for tightness and flange bolts for proper torque could result in leaks and/or flooding. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

2.9.3 **Hot Water Supply Connection**

2.10 The supply main may be connected directly to the B&G Triple Duty Valve mounted on the pump discharge nozzle. In some installations, a flexible connector near the Triple Duty valve may be desirable.

2.11 **Hot Water Return Connection**

2.12 The return connection is made to the top opening of the 2 pass heat exchanger head. The return piping should approach the head such that a union or flanged joint can be placed in the section of the piping which is at a right angle to the length of the heat exchanger. This will allow easy removal of the head the tube bundle without pipe interference.

2.13 Install a thermometer in the return line near the heat exchanger.

2.14 Both supply and return mains should be piped so as to prevent air trapping. All high points in the piping system should be provided with manual vents to remove excess air during initial fill. Automatic air vents must not be used in locations where the system pressure may fall below atmospheric while pumping.

## 2.15 Steam Supply and Piping

2.16 Care must be taken when installing the steam supply piping to insure no condensate will flow to the pressure reducing (control) valve. Condensate impingement on the heat exchanger tubes will lead to permanent failure.


## 2.17 Condensate Piping

2.18 Review the condensate trap Installation, Operation, & Maintenance manual prior to connecting the trap to the heat exchanger. Install all recommended valves and fittings to allow servicing the trap while the unit is in operation. Install a strainer upstream of the trap to protect the unit from material that may prevent it from operating properly. Install a blowdown valve on the strainer and periodically purge the strainer of debris.

2.19 Do not connect condensate line from trap to condensate main that is above the heat exchanger without making special provisions to keep the heat exchanger totally free of condensate.

2.20 If traps are installed in parallel, the following should be done. Service valves should be installed before and after each trap so that each trap can be serviced while the other trap remains in service. Unions should be installed before and after each trap, between the trap and service valves. These allow the trap to be replaced without shutting down the system.

## 2.21 Drains


 **CAUTION:** Burn hazard. The system may contain steam or hot water under pressure. Close the valves to isolate the system. Drain and vent the system and allow surfaces to reach acceptable temperatures prior to servicing. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

2.22 There is a drain plug in the pump volute.

2.23 There is a drain on the bottom of the air separator. This port could be used as the primary drain for the return piping since it is the low point of the system.

2.24 The supply main cannot be drained through the air separator above because the Triple Duty valve acts as a check valve. The lower port on the back of the Triple Duty valve may be used as a drain for this section of the piping. If this is undesirable, a separate drain point must be provided in the supply piping.


2.25 Since the relief valve is located relatively high above the floor, it is recommended that the outlet side of the valve be piped to an open drain per local codes. The pipe size must not be less than the outlet size and the drain piping must run so as to avoid water trapping. The end of the drain pipe must not be threaded to avoid installation of a valve or plug.


 **DANGER:** Explosible. Do not operate the heat exchanger outside the limits defined on the heat exchanger nameplate. **Failure to follow these instructions will result in serious personal injury, death, and/or property damage.**

2.26 The expansion tank drain is provided with a hose bibb valve, therefore a garden hose can be used conveniently for draining.

## 2.27 Wiring

2.28 Check power leads in accordance with wiring diagram enclosed in control cabinet, if this option was supplied. If a control panel was not supplied, make wiring connection per the motor manufacturer's recommendations.

 **WARNING:** Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

 **WARNING:** Conduit grounds are not adequate. A separate ground wire must be attached to ground lug provided in the enclosure to avoid potential safety hazards. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

## 2.29 Lubrication

2.30 Before starting, all pumps and motors should be checked for proper lubrication.

## 3.0 PUTTING THE UNIT INTO SERVICE

3.1 The following procedure is suggested for the initial start-up.


3.2 Fill the system with water.


3.3 With the fill valve left open, vent all of the high points in the piping system to remove the trapped air.

3.4 On units with ASME compression tanks, open the vent valve located on the Airtrol Tank Fitting. Bleed the air from the tank until water emits from the valve. Close the valve.


3.5 Align pump coupling (see pump instruction sheet). Check Bearing Lubrication.

3.6 Check pump rotation, 3 Phase motors only.


 **CAUTION:** Seal damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

 **WARNING:** Rotating shaft can catch loose clothing. Do not operate the pump without all guards in place. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**

- 3.7 With the disconnect switch engaged to the "ON" position, turn selector switch to the "HAND" position momentarily, then "OFF." Observe the pump shaft rotation.
- 3.8 If incorrect, turn the main disconnect off and interchange any two wire leads leaving the starter overload block and going to the motor.


 **DANGER:** High voltage 3 phase power can kill. Disconnect and lockout power prior to servicing unit. **Failure to follow these instructions will result in serious personal injury, death, and/or property damage.**

- 3.9 Run the pump. Take an ampere reading on the pump motor. If it is greater than the rated nameplate full load current, close the Triple Duty valve (turn stem clockwise) until the motor current decreases to the nameplate value.


 **DANGER:** Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. **Failure to follow these instructions will result in serious personal injury, death, and/or property damage.**

- 3.10 Note the value indicated by the pointer on the calibrated scale of the Triple Duty valve stem. Tag the valve with this reading for future reference. The stem is to be returned to the position at all times when the pump is in operation, otherwise, motor overloading may result.

### 3.11 TROUBLESHOOTING – ELECTRICAL

 **CAUTION:** Prevent subsequent damage. A unit showing symptoms of possible problems (noise, leaks, vibration, and/or continual operation) must be corrected immediately. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

- 3.12 Starter overload relays must be manually reset when tripped. To reset the overload relay press the external reset button.
- 3.13 Pinpointing failures in the control circuitry largely depends on the understanding of the circuit line diagram furnished with each unit and the proper use of test instruments. Some of the recommended test instruments are:
- Combination Volt-Ohm-Ammeter (VOM multimeter) with a 600 volt AC scale (or greater).
  - Clamp-on Ammeter (Amprobe or equal) with ampere capacity up to 100 amps.
  - Fuse puller.

 **DANGER:** Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. **Failure to follow these instructions could result in serious personal injury, death, and/or property damage.**


- 3.14 Use of "Test Light" for continuity tests is not recommended since these devices do not indicate the actual voltage present at the test point. Locating trouble spots with the use of "Jumper Wire" is strongly discouraged.

### 3.15 Failure and Probable Causes


- 3.16 Motor overload relay trips.
- 3.17 Probable causes:
- High ambient temperature around panel box.
  - Actual line voltage above or below motor nameplate voltage limits.
  - Overload heaters improperly selected or installed (loose hold screw).
  - Unbalanced voltage between phases.
  - Faulty motor.
  - Pump loading beyond design conditions.

### 3.18 Factory Service

- 3.19 When requesting information from the factory, it is imperative that the following data be available for reference.
- Factory Number
  - Model Number
  - The *actual* line voltage, current draw, suction, discharge and system pressure, or other pertinent information relative to the nature of the problem.

 **DANGER:** Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. **Failure to follow these instructions will result in serious personal injury, death, and/or property damage.**

### 3.20 Maintenance


 **CAUTION:** Burn hazard. The system may contain steam or hot water under pressure. Close the valves to isolate the system. Drain and vent the system and allow surfaces to reach acceptable temperatures prior to servicing. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**

- 3.21 Lubricate motor and pump twice a year.
- 3.22 Repair any leaks in the hot water system immediately. Prolonged entry of makeup water will seriously corrode the piping and foul the heat exchanger.
- 3.23 Clean out all strainers periodically.
- 3.24 Be aware of 'gurgling' sounds through the piping system and the pump. It may indicate an air bound expansion tank. Bleed air from tank.
- 3.25 When ordering replacement parts or inquiring about the unit, always give the *complete* data on the unit nameplate as well as the component nameplate data.

## FINAL CHECK LIST

### A. SYSTEM PIPING AND UNIT INSTALLATION


- \_\_\_ 1. Is the unit base properly leveled, grouted and secured?
- \_\_\_ 2. Are all lubrication points properly lubricated?
- \_\_\_ 3. Are the shut-off valves to the pump gauge(s) open?
- \_\_\_ 4. Is the shut-off valve to the pump suction open?
- \_\_\_ 5. Is the Triple Duty valve on the discharge line open?
- \_\_\_ 6. Is the piping properly supported so as to prevent strains on the unit?
- \_\_\_ 7. Is the system, including the pump, purged of debris and air?

 **CAUTION:** Seal damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **Failure to follow these instructions could result in property damage and/or moderate personal injury.**


- \_\_\_ 8. Are the pump and motor shafts properly aligned?
- \_\_\_ 9. Is the pump rotation correct?
- \_\_\_ 10. Have all piping connections been made? Have all flanged joints been checked for tightness?

### B. ELECTRICAL WIRING AND CONTROL SETTINGS


- \_\_\_ 1. Does the feeder line voltage correspond to the unit voltage? Check the unit nameplate or motor terminal connection.

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- \_\_\_ 2. Are the feeder wires correctly sized for the load?
- \_\_\_ 3. Are the fuses in the disconnect switch correctly sized? They must not exceed 1.75 times the full load current of the motor. Usual sizing is 1.15 to 1.5 times the full load current.
- \_\_\_ 4. Is the unit properly grounded?

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- \_\_\_ 5. Have all the power terminals in the control panel been checked for tightness? This is imperative since stranded wires tend to “flow” and become loose after initial installation.

 **DANGER:** High voltage 3 phase power can kill. Disconnect and lockout power prior to servicing unit. **Failure to follow these instructions will result in serious personal injury, death, and/or property damage.**



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