

Installation, Operation, & Maintenance Manual

Lync Aegis Heat Exchanger Module Mark II



Single Heat Exchanger



Dual Heat Exchanger

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1. SAFETY CONSIDERATIONS

IMPORTANT!

Read the complete installation instructions BEFORE using this equipment. Failure to read and follow all safety information and operating instructions can result in death, serious personal injury, property damage, or damages to the equipment. Keep this guide for future reference.

Accidental scalding from hot water is a greater risk in certain facilities, including:

- Homes For The Physically or Mentally Disabled
- Hospitals
- Nursing Homes and Assisted Living Facilities
- Foster And Child Care Facilities

Potable hot water should be no more than 110°F when used for bathing or other personal use anywhere the danger of hot water contact is likely.

IMPORTANT!

Always follow local code requirements and the rulings of authorities having jurisdiction.

Thermostatically controlled mixing valves must be used in the design of the potable hot water system.

Good engineering practice mandates that thermostatically controlled mixing valves are set at 120°F or less to keep the delivered water temperature below scalding temperatures. It only takes five seconds of skin contact with 140°F water to cause a second degree burn. You must protect against high water temperatures in all sinks, tubs, showers and other points of hot water contact.

⚠ WARNING!

Installation and service must be performed by a qualified installer, or service agency who must read and follow the manual before installing, servicing, or removing the unit.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, exposure to hazardous materials, or death. Do not use matches, candles, flames, or other sources of ignition to check for gas leaks.

Fluids under pressure may cause injury to personnel or damage to equipment when released. Be sure to shut off all incoming and outgoing water shutoff valves and carefully decrease all trapped pressures to zero before performing maintenance.

The electrical connection cover must be installed at all times, except during maintenance.

A disconnect switch must be installed at the electrical service connection per local codes.

IMPORTANT!

This manual contains information required for the installation, operation and maintenance of the Lync AEGIS HEAT EXCHANGER Module. Read and follow the information in this and all other provided instructions, labels and markings before installing, operating or servicing this equipment.

1.1. General Warnings

Read the following before continuing:

- This manual is an integral part of the product and must be kept for consultation.
- The unit must not be used with functions other than those described.
- Before continuing, check the application limits.
- The company reserves the right to change the composition of its products without notice.

1.2. Safety Precautions

- Use the module only within the intended operating limits.
- Make sure cables for the probes and the power supply are kept separate without twisting.

For applications in especially critical industrial environments, it may be useful to use network filters.

CAUTION!

Disconnect all electrical connections before starting any maintenance work.

2. SECTION 2. INTRODUCTION

The Aegis Heat Exchanger Module is designed to supply domestic hot water as part of a Lync Aegis heat pump water heater system. The Heat Exchanger Module serves several key functions:

- Provides flexible flow conditions to HP to minimize cycling and improve efficiency
- Protects refrigerant loop gas cooler against degradation from incoming city water
- Allows a glycol primary loop for outdoor air-source installations in freezing conditions while providing double-wall separation

The Heat Exchanger Module is designed in-house with HP selection criteria to reduce engineering time and complexity versus ‘stick built’ alternatives. It is manufactured with quality WATTS components to provide true single point accountability.

2.1. Models

The Heat Exchanger comes in two versions: single heat exchanger for Aegis 250 units and dual heat exchanger for Aegis 350 and 500 units. These two versions are also available as 300psi-rated modules. See Appendix A for any details not applicable to the standard 150psi version.

The model, serial number, voltage, and maximum working pressure are shown on labels affixed to the machine.

LYNC® AEGIS INTERMEDIATE SKID				
MODEL NO.	SERIAL NUMBER	MFG. DATE		
LC3.5CMI-LC5.0CMI	F012345	03-2024		
INPUT Btu/h	INPUT kW	WORKING PRESSURE (HYDROSTATIC TEST)		
350,000-500,000	100-150	PSI	kPa	
		150(225)	1034 (1551)	
ELECTRICAL	VOLTS	PHASE	Hz	AMPS
	120	1	50/60	10


 MFG. BY WATTS FORT WORTH, TX
WWW.LYNCPBYWATTS.COM
ASSEMBLED IN THE USA

Figure 1 – Example Heat Exchanger Module Data Label

2.2. Main Components

The Aegis Heat Exchanger Module is divided into two halves, a primary (closed) loop back to the heat pump, and a secondary (domestic hot water) loop that feeds the storage tanks. Each loop has one constant speed pump. The flow in the loops is varied by a motorized valve to maintain the desired temperature in the loop. Other required primary and secondary system components, such as strainers, relief valves, expansion tank, isolation valves, unions, a thermowell, and filling/discharge points are also included.

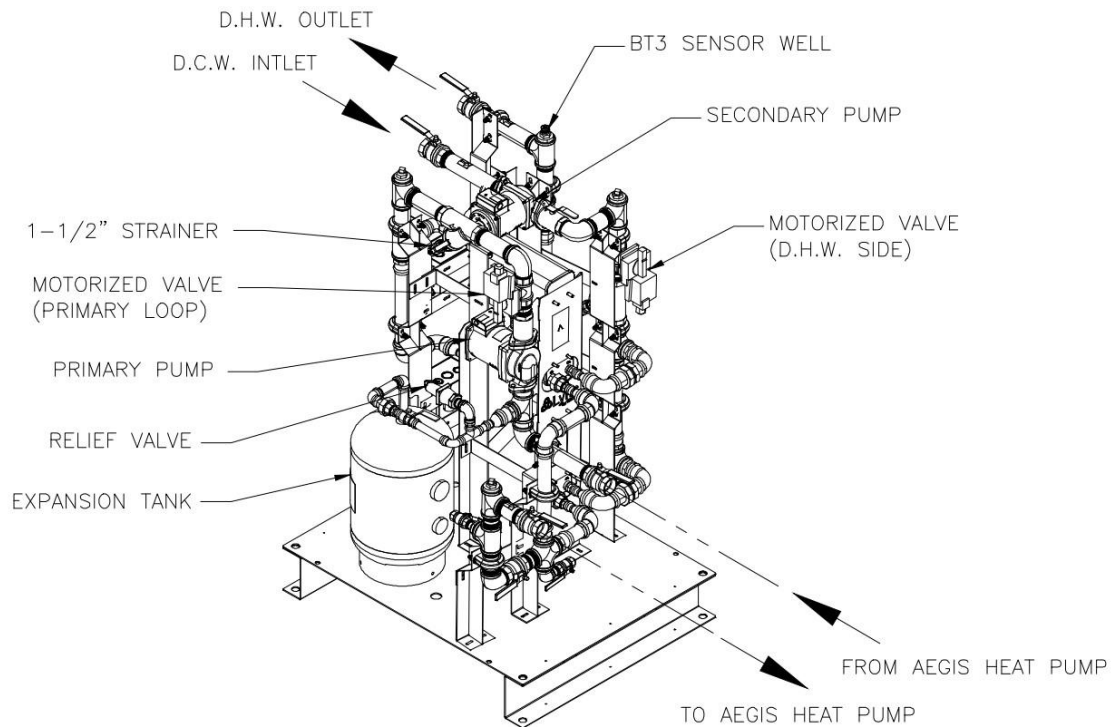


Figure 2 – Mark II Heat Exchanger Module Major Components

2.3. Unit Control

The primary and secondary loop temperatures are controlled by adjusting the water flow rate through the use of modulating valves. The Aegis is responsible for sending control signals to these valves as well as communicating with all required temperature sensors. Descriptions of the Aegis wiring and control points may be found in L-OMM-013 Lync Aegis Electronic Controller Manual.

Additionally, the Aegis heat pump control manages the circulation of water in order to ensure that the correct temperature rise in the system is maintained. This will determine the need for hot water recovery by monitoring the water temperature in the storage tanks.

2.4. Sequence Of Operation

The hot water storage tanks used in this heating system must be equipped with the provided temperature sensors, or other sensors meeting requirements for a NTC 10k temperature sensor. The (BT1) sensor (cold side probe) is placed in the bottom of the first storage, near cold return water connection. The BT2 sensor (hot side probe) is located in the top of the last storage tank in the series, near the supply outlet.

The BT3 sensor is located on the outlet of the external heat exchanger and is used to control the temperature rise across the Heat Exchanger Module. Installation of BT1, BT2, and BT3 probes must be done by the installer prior to operation.

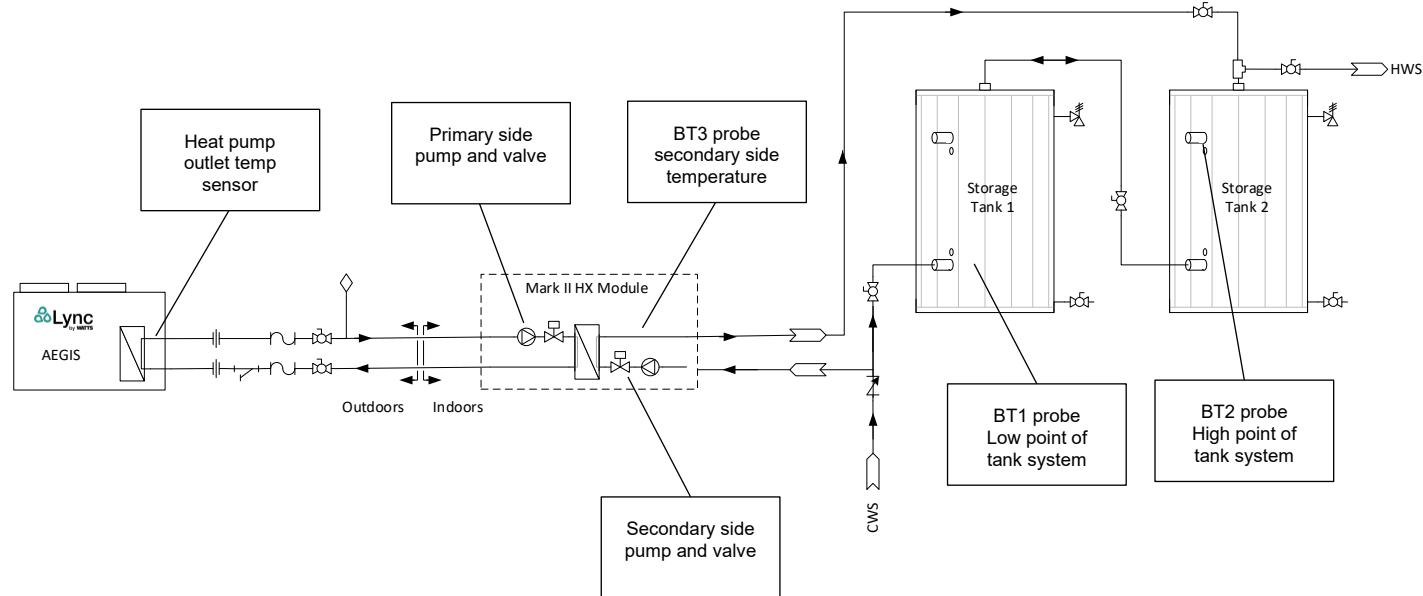


Figure 3: Probe Locations

When the temperature probe BT1 reaches the value "Set point unit ON", (set point (ST03) minus differential (ST04)), the unit will be turned on. The unit will continue to heat the water to the set temperature as long as the temperature BT1 remains below the "Set point unit OFF" value (ST03). Once BT1 reaches "Set point unit OFF" the unit will be turned off.

The heat pump's outlet sensor will control the primary loop to a fixed temperature setpoint ST01, modulating the primary side valve and flow rate to maintain outlet temperature.

The Aegis also manages the secondary valve (domestic hot water loop) position according to the BT3 probe. The BT3 probe measures the temperature out of the heat exchanger module and into the storage tanks. This temperature is controlled by ST01 plus an offset setpoint SP02. For the Mark II heat exchanger module this offset is set to -10°F. For example, if ST01 is set to 170°F and offset SP02 is -10°F, the secondary loop valve will control to a setpoint of 160°F into the storage tanks. Please see Aegis Electronic Controller Manual (L-OMM-013) for further details.

3. INSTALLATION

The Aegis Heat Exchanger Module is available in indoor and outdoor versions. The outdoor configuration includes a sheet metal enclosure to protect against rain. If freezing conditions are expected, an appropriate glycol-water solution must be used to prevent accidental freeze damage when the heat pump is not operating. Lync recommends no greater than 40% glycol in any application due to potential viscosity and corrosion concerns.

If glycol is used in the primary loop corrosion inhibitors must be used to prevent corrosion of the copper braze material. For specific recommendations on glycol types, fill percentages, specific heat changes, or for further recommendations for use with stainless steel copper brazed plate heat exchangers please consult your glycol supplier or manufacturer.

The following must be taken into account when choosing where to install and connect the unit:

- Size and origin of the hydraulic piping
- Location of the power supply
- Accessibility for maintenance or repairs
- Stability of the support surface
- Orientation and exposure to solar radiation
- Possible sound reverberation

The clearances specified in the dimensional drawing of the unit **MUST** be followed. The unit must always be anchored to the ground.

The Heat Exchanger Module ships pre-assembled on a skid base. Housekeeping pads are not required for Heat Exchanger Module installation. The unit must be installed flat and horizontally.

The Heat Exchanger Module should never be installed in the same location where chemicals are stored. Examples of such chemicals are ice melting salt and chlorine for pool treatment. This is not an exhaustive list. If there are any questions about the unit's suitability for a particular environment, contact your local Lync representative.

3.1. Spaces for Installation

The spaces needed to accommodate the unit are shown on dimensional drawings AP-L-1086 (300psi version: AP-L-1102) for the single unit and AP-L-1088 (300psi version: AP-L-1103) for the dual unit, available at lynbywatts.com. It is advisable to leave sufficient space between the units for removing their larger components such as the exchangers and pumps.

3.2. Storage

The Heat Exchanger Module is drained of water prior to shipping. Small amounts of water may remain behind in the piping and in the heat exchanger(s). When transporting and storing the Heat Exchanger Module prior to installation, it must remain in storage that does not experience freezing temperatures to prevent damage to the unit.

3.3. Lifting and Transport

While unloading and positioning the unit, take extreme care to avoid sudden, violent movements. Avoid applying force to components of the machine. The unit may be lifted using assistance from a forklift, inserting the lifting forks in the lifting pallet (see Figure 4).

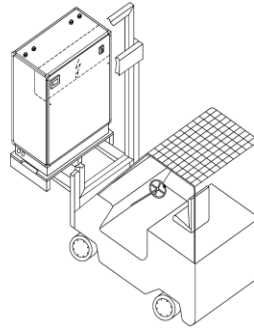


Figure 4: Lifting the Unit with Forklift

3.4. Available Pump Head

The table below shows the available pump head for each Aegis model under the highest expected flow conditions. For 300 PSI module pump heads see Appendix A.

Model	Available Pressure, Primary Side (ft head)	Available Pressure, Secondary Side (ft head)
Aegis A 250	20.6	30.2
Aegis A 350	23.2	27.4
Aegis A 500	17.8	20.3
Aegis W 250	37.5	32.9
Aegis W 350	35.2	30.1
Aegis W 500	30.9	24.8

3.5. General Recommendations For Hydraulic Connection

⚠ WARNING!

All hydronic components must be selected for temperatures as high as 194°F (90°C).

When setting up the hydraulic circuit for the Heat Exchanger Module, users should use the tips and steps below and remain in compliance with national and local regulations. Lync recommends users connect the piping to the heat pumps using flexible joints in order to minimize vibrations and compensate for thermal expansion.

Install the following components on the piping:

- Stop cocks, temperature and pressure indicators for maintenance and inspection.
- Sample points on the input and output pipes to read the temperature, if temperature indicators are not present.
- Shut-off valves to isolate the unit from the circuit.
- Use metal mesh filters with openings 1/16" (1 mm) or less on the exchanger inlet pipe to protect the exchanger against slag or impurities in the pipes.
- Air eliminators must be installed at the highest parts of the hydraulic circuit in order to allow excess air to be released.
- Use the expansion tank and automatic charging valve to maintain the system pressure and to compensate for thermal expansion.
- Drain valves and where necessary, drain the tank to empty the system for maintenance operations or seasonal breaks.

IMPORTANT!

A safety relief valve is installed on the primary side of the Heat Exchanger Module. If an over-pressure condition should arise in the system, this allows the system to be drained to prevent an explosion. Always connect the discharge pipe to a drain with a diameter no less than that of the valve opening and direct it towards the areas where the discharge cannot harm anyone.

3.5.1. Recommended Hydraulic Circuit

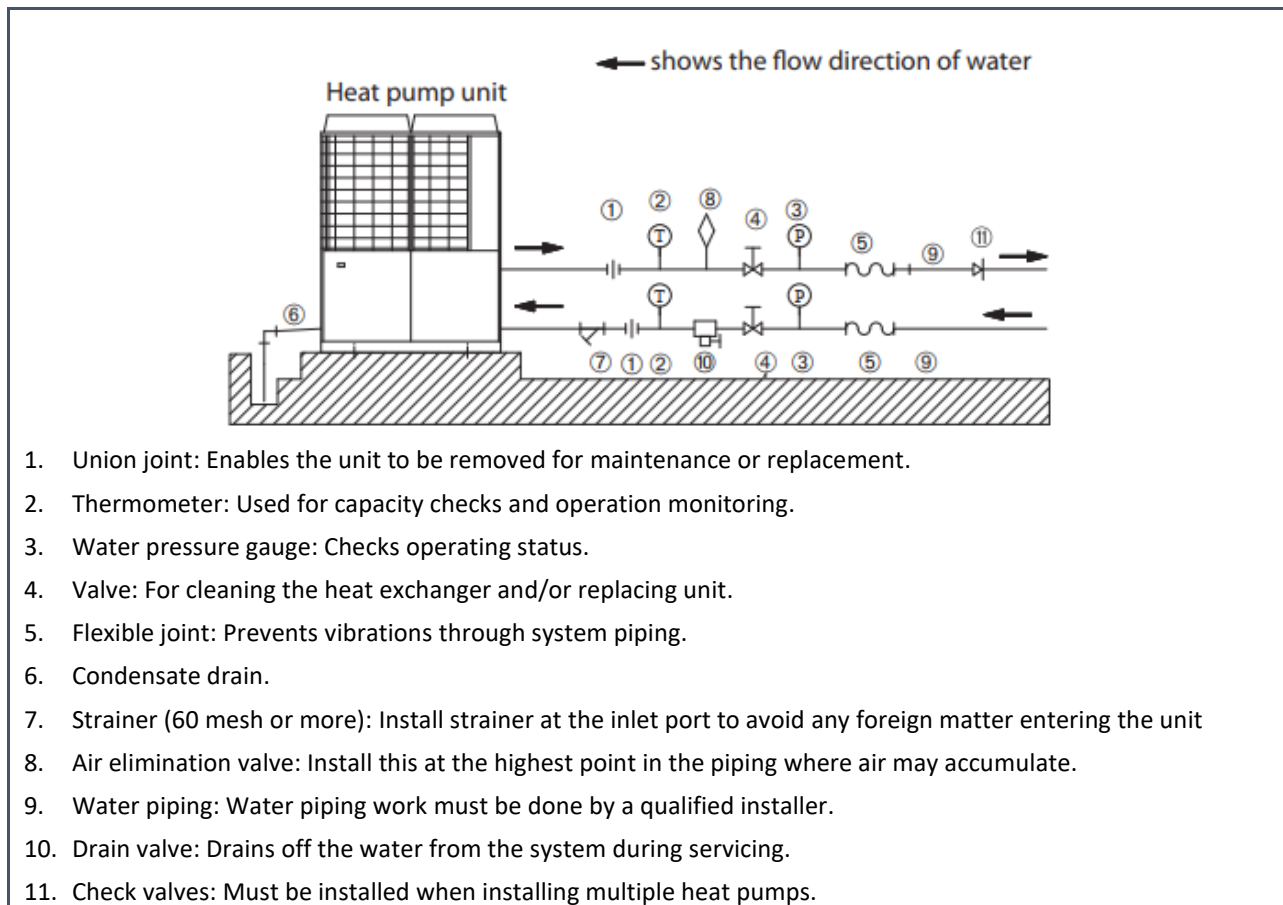


Figure 5: Recommended Water Piping

3.5.2. Key Considerations For Water Piping

Water quality: It is important to check in advance whether the feed water and hot water have good quality. Be sure to use water within the ranges specified in Section 3.7.

If solid matter such as sand piping debris, scale deposits, or floating suspended solids (i.e., any corrosion product in the water), the heat-transfer surface of the heat exchanger is directly attacked by water flow, and corrosion may be created. In order to avoid such corrosion by these substances, be sure to fit a cleanable strainer (60 mesh /0.25mm or smaller) at the water inlet port of the unit to remove any debris.

Certain metals may cause localized corrosion when they make contact with each other. Including non-conductive materials between metals the metals can limit corrosion.

Water piping should have no leaks or air intrusion. If air is introduced at the suction side of pumps, the pump may create excess noise and performance may decrease.

For units exposed to freezing temperatures, take precautions to prevent the freezing of piping.

NOTE: Aegis A has a freeze protection function, but Aegis W does not. For any outdoor piping that may experience freezing conditions it is recommended to include a proper glycol mixture in the primary loop in case of power loss if the piping will be exposed to freezing temperatures. Contact your glycol supplier for further details on freeze protection. Units installed indoors or in warmer climates should NOT have glycol included in the mixture.

3.6. Hydraulic Connection To The Heat Pump

IMPORTANT!

The primary circuit should be set up in such a way as to guarantee a constant flow of water to the exchanger in all operating conditions. If this is not the case, there is a risk of refrigerant returning to the compressor input in a liquid state, which could damage the compressor.

⚠ WARNING!

Do not operate hydraulic connections with open flame near or inside the unit.

IMPORTANT!

- Before starting, check that the pump shaft rotates freely, without mechanical impediments.
- Do NOT run the pump dry, unprimed, and below the minimum nominal water flow rate.
- Do NOT operate the pump with closed shut-off valves, on the suction and delivery side.
- NEVER use the pump when cavitation occurs.
- It is mandatory to fill and bleed the hydraulic circuit correctly before starting the pump.

3.7. Water Composition

To keep your water heater operating efficiently it is critical to make sure the chemical composition of incoming water is not harmful to the heater. To prevent corrosion, fouling, and other harmful effects on the heater, the following water quality guideline should be followed.

3.7.1. Primary (Closed) Loop

Free oxygen can cause the formation of rust (iron oxides), which degrade metallic materials. Magnetite is formed in un-inhibited water if there is electrolytic action in the presence of oxygen. Sludge is formed when calcium compounds, primarily CaCO_3 , are heated. Rust and magnetite, when combined with sludge, can form a very hard scale, which significantly reduces system efficiency and life expectancy of the heating system. Scale reduces heat exchange due to its low heat conductivity and so may cause very dangerous localized overheating. Waterside corrosion of all heating circuit surfaces is also a major concern.

Make-up or feed water is water added to a closed hydronic system to replenish water lost through evaporation, maintenance, or leakage. The quality of make-up or feed water, which may contain dissolved oxygen, minerals and other dissolved contaminants, is extremely important. Such introduced water must be chemically treated or strictly limited when ensuring neutral chemical conditions in boiler system water. Generally, any closed hydronic heating system should be restricted from receiving untreated makeup water of no more than 5% of the total volume of system water per year.

Lync suggests filling the primary loop to meet the following water conditions. It is important to set up a system that eliminates possible organic substances in the water that could pass through the filter and settle in the heat exchangers, which would lead to malfunction and/or damage over time.

Total hardness	1.2 to 3.5 grains/gallon
Langelier index	- 0.4 to + 0.4
pH	7.5 to 8.5
Electrical conductivity	10 to 500 QS/cm
Organic element	-
Hydrogen carbonate (HCO ₃ ⁻)	70 to 300 ppm
Sulphates (SO ₄ ²⁻)	< 50 ppm
Hydrogen carbonate / Sulphates (HCO ₃ ⁻ /SO ₄ ²⁻)	> 1 ppm
Chlorides (Cl ⁻)	< 50 ppm
Nitrates (NO ₃ ⁻)	< 50 ppm
Sulphuric acid (H ₂ S)	< 0.05 ppm
Ammonia (NH ₃)	< 0.05 ppm
Sulphites (SO ₃), free chlorine (Cl ₂)	< 1 ppm
Carbon dioxide (CO ₂)	< 5 ppm
Metal cations	< 0.2 ppm
Manganese ions (Mn ⁺⁺)	< 0.1 ppm
Iron ions (Fe ²⁺ , Fe ³⁺)	< 0.2 ppm
Iron + Manganese	< 0.5 ppm
Phosphates (PO ₄ ³⁻)	< 2 ppm
Oxygen	< 0.1 ppm

Table 1 – Water Quality Requirements

IMPORTANT

If water is used that does not meet this criteria the unit may not operate efficiently and warranty coverage may be affected. Please refer to the [Aegis Heat Pump Water Heater Warranty](#) for details.

3.7.2. Secondary (DHW) Loop

The water quality on the secondary loop must follow the EPA’s national primary drinking water regulation limits. It may be necessary to de-scale the heat exchanger periodically, depending on water conditions. The frequency of cleaning can be determined locally based on the performance of the heater and calcium hardness levels shown in the table below.

Calcium Hardness Level	<3.5 grains/gal (<60 mg/L)	3.5-7.0 grains/gal (60 - 120 mg/L)	7.0-10.5 grains/gal (120 - 180 mg/L)	>10.5 grains/gal (>180 mg/L)
Suggested Cleaning Frequency	Biennially	Annually	Semi-Annually	Monthly

Hard water is generally considered to be any condition >3.5 grains/gallon (>60 mg/L). To extend the life of equipment, guarantee the highest performance, and reduce the required cleaning frequency, Lync recommends installing a scale mitigation system such as the [Lync WQ-AS](#) with OneFlow technology or [WQ-SF](#) with traditional salt-based softening technology.

3.8. Discharge of Safety Valves

⚠ WARNING!

To avoid personal injury and property damage due to valve operation, the safety valve must be installed so that any discharge runs to a safe place of disposal. Consult with your local plumbing codes and standards for any additional requirements.

4. WIRING AND ELECTRIC CONNECTIONS

4.1. Overview

- The electrical connections must follow the information shown on the wiring diagram attached to the unit and the local regulations of where the unit is being installed.
- Verify that the power supply voltage corresponds to the nominal data of the unit (voltage, number of phases, frequency), as stated on the plate on the machine.
- The power supply voltage must not undergo variations over $\pm 5\%$.

IMPORTANT!

- Use power cable fixing systems that resist abrasion and twisting stress.
- Make sure there is no voltage present before performing any operation on electric parts.
- The section of the cable and the line protections must follow the wiring diagram and the relevant table attached to the unit.
- The unit must operate with those limits; failure to do so will immediately void the warranty.

4.2. Low Voltage and Sensors

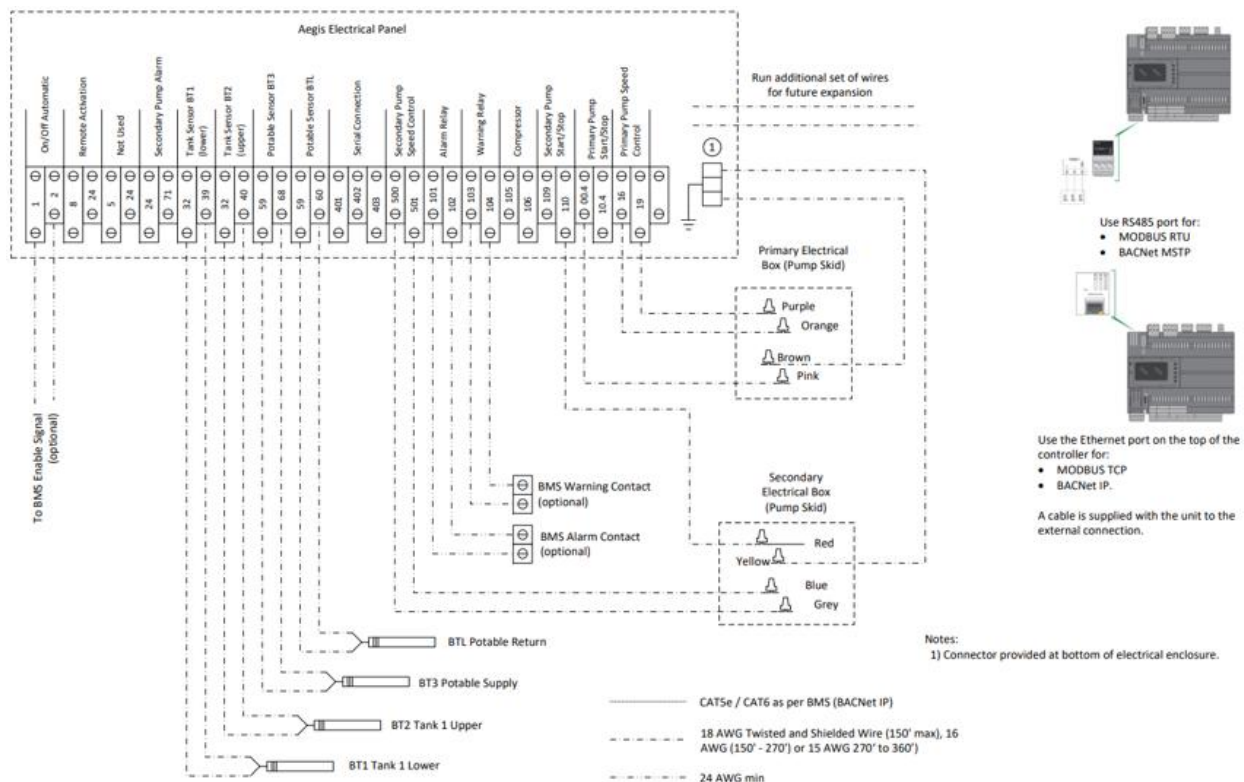


Figure 6 – Low Voltage Connections to Aegis

4.3. High Voltage

The Mark II Heat Exchanger Module only requires a 120V single phase 15 A power supply. See **Appendix A** for the Heat Exchange Module Wiring diagram for the 300psi modules. Mark II Heat Exchanger Module 300 PSI versions require a 120V single phase 20 A power supply.

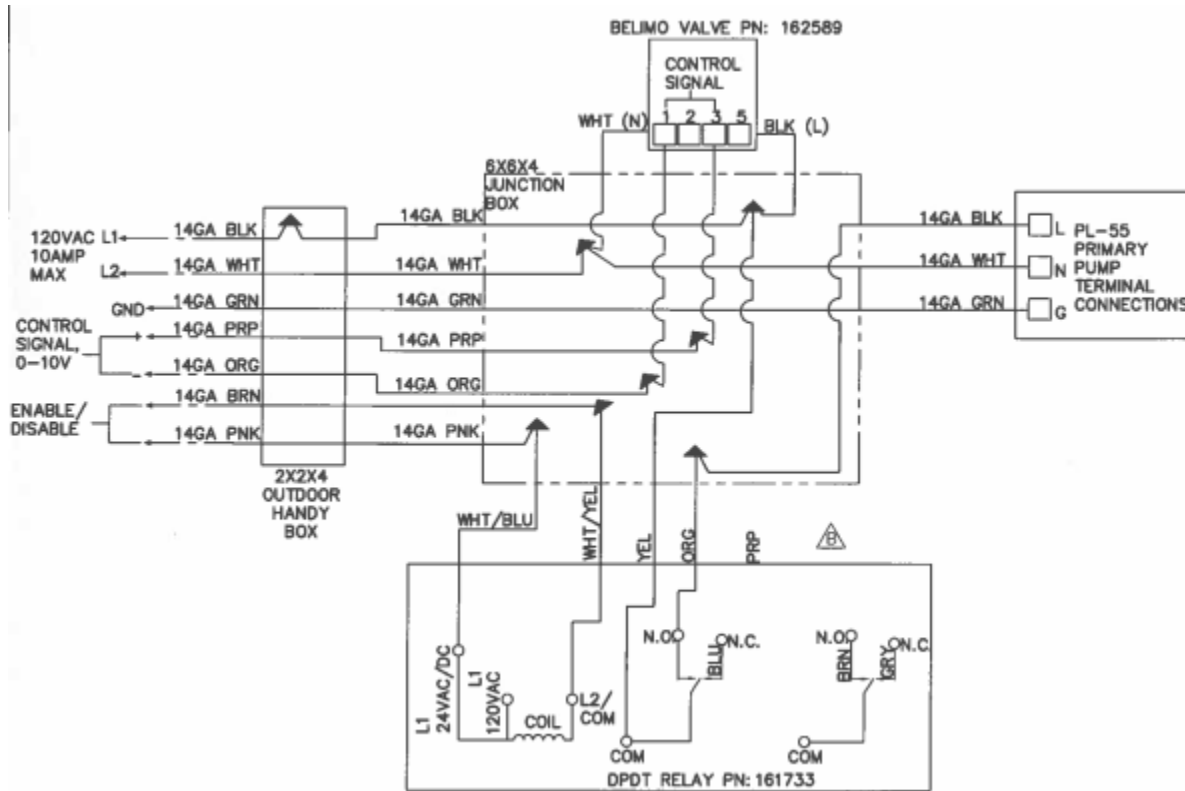


Figure 7 – Heat Exchanger Module Wiring

4.4. Controller Function

Refer to the *Lync Aegis Controller Manual L-OMM-013*, supplied separately.

5. STARTUP

⚠ WARNING!

The machine should be started up only by authorized and qualified personnel.

For additional startup details see the *Lync Aegis Installation, Operation and Maintenance Manual*, L-OMM-012.

5.1. Preliminary Verifications

Check the following before startup:

- Electrical connection has been implemented correctly and all clamps are tightly fastened.
- All hydraulic connections have been made correctly, with attention to the indications on the input/output plates on the machine.
- The hydraulic system has been bled, thereby eliminating all residual air and loaded gradually, opening the vent devices in the upper part, which the installer would have set up together with an expansion tank of adequate capacity.

IMPORTANT!

Before starting-up, verify that all the closing panels of the unit are in place and secured.

NOTE: For additional startup information see the Aegis Startup Checklist in L-OMM-012, Appendix A.

5.2. Filling the Unit

It is critical when filling the primary loop to ensure all air is removed from the loop. Air separators must be used in the primary loop to ensure air is removed. The unit may be filled with a dedicated water fill line, or through the drain ports located on the heat exchanger module.

If connected to an Aegis A unit in an area that may experience freezing temperatures, it is recommended to add glycol to prevent accidental freeze damage.

5.3. Verifications During Operation

- Check that the sequence of the phases is correct. This can be verified by making sure that the fans are rotating in the correct direction (see Section 5.3). The fan should be pulling air in the side of the heat pump and directing it up out the top of the unit.
- Check that gas cooler inlet water temperature is near the electronic control setpoint.

6. DECOMMISSIONING

6.1. Seasonal Shutdown

- The Aegis heat pump water heater is designed for year-round operation. In the case that prolonged shutdown is expected, be sure to follow these steps
- Drain the hydraulic system (unless it contains glycol water).
- Repeat the procedure outlined in Section 5 on successive start-ups.

6.2. Emergency Stop

To stop in an emergency, turn off the main switch to power off the entire machine.

IMPORTANT!

Never modify the internal electrical connections or the warranty is immediately rendered null and void. Disconnect voltage from the unit only in the case of prolonged shutdowns, to leave the compressors guard heating resistances powered.

⚠ WARNING!

Do not use the main power switch to enable or disable the heat pump: this device should be used to isolate the unit from the power supply when the unit is OFF. Removing voltage entirely depowers the guard resistances, jeopardizing the integrity of the compressor.

7. PERIODIC MAINTENANCE AND INSPECTIONS

⚠ WARNING!

Before performing any service on the unit or accessing internal parts, make sure that the power supply has been disconnected. The compressor may remain live for a few minutes after the power supply has been disconnected at the main switch.

Before any maintenance:

- Turn off the power to the Heat Exchanger Module by the field-provided power switch and the Aegis by the main power switch.
- Use a multimeter to make sure there is no voltage at the heads of the clamps.

It is good practice to carry out periodic inspections to verify the proper operation of the unit:

OPERATION	FREQUENCY
Check the functioning of relief valve	Annually
Check for water or water/glycol mixture leaks in the hydraulic circuit	Monthly
If the unit is to remain out of service for a long period, drain the water from the pipes and the heat exchanger. This is necessary whenever room temperatures are lower than the freezing point of the fluid used throughout the standstill period.	Seasonal
Clean the strainers on the primary and secondary side of the heat exchanger module.	Annually
In the case of hard water, it may be necessary to run a descaling solution through the primary loop of the heat exchanger.	Annually, or as required by site conditions

IMPORTANT!

Routine maintenance of the unit is essential to the life of the machine. A lack of maintenance can cause malfunctioning and/or damage to the unit and render the warranty null and void.

8. TROUBLESHOOTING

Symptom	Cause	Corrective Action
High outlet temperature fault on Aegis	Insufficient primary loop flow.	Ensure all air has been removed from primary loop. Even small amounts of air will cause insufficient flow Verify primary pump operation Verify primary valve opening on command Verify Aegis output signal is set to 0-10V
High outlet temperature fault on Aegis	Insufficient secondary loop flow	Verify secondary pump operation Verify secondary valve opening on command Verify Aegis output signal is set to 0-10V
High outlet temperature fault on Aegis	Primary valve not operating	Verify control wiring polarity

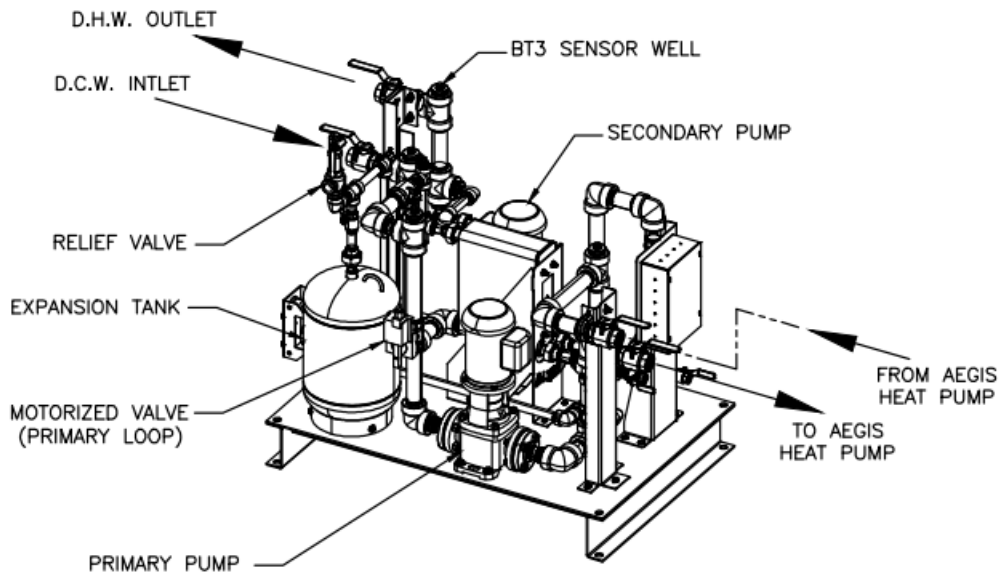
9. DISPOSAL OF THE UNIT

When the unit has reached the end of its intended duration and must be removed and replaced, the unit's structure and components, if no longer usable, should be taken down and grouped by the type of material. The unit contains large amounts of copper and steel. Separating the materials will help collection, disposal, and recycling centers and minimize the environmental impact.

APPENDIX A. 300PSI HIGH PRESSURE MODULES ADDENDUM

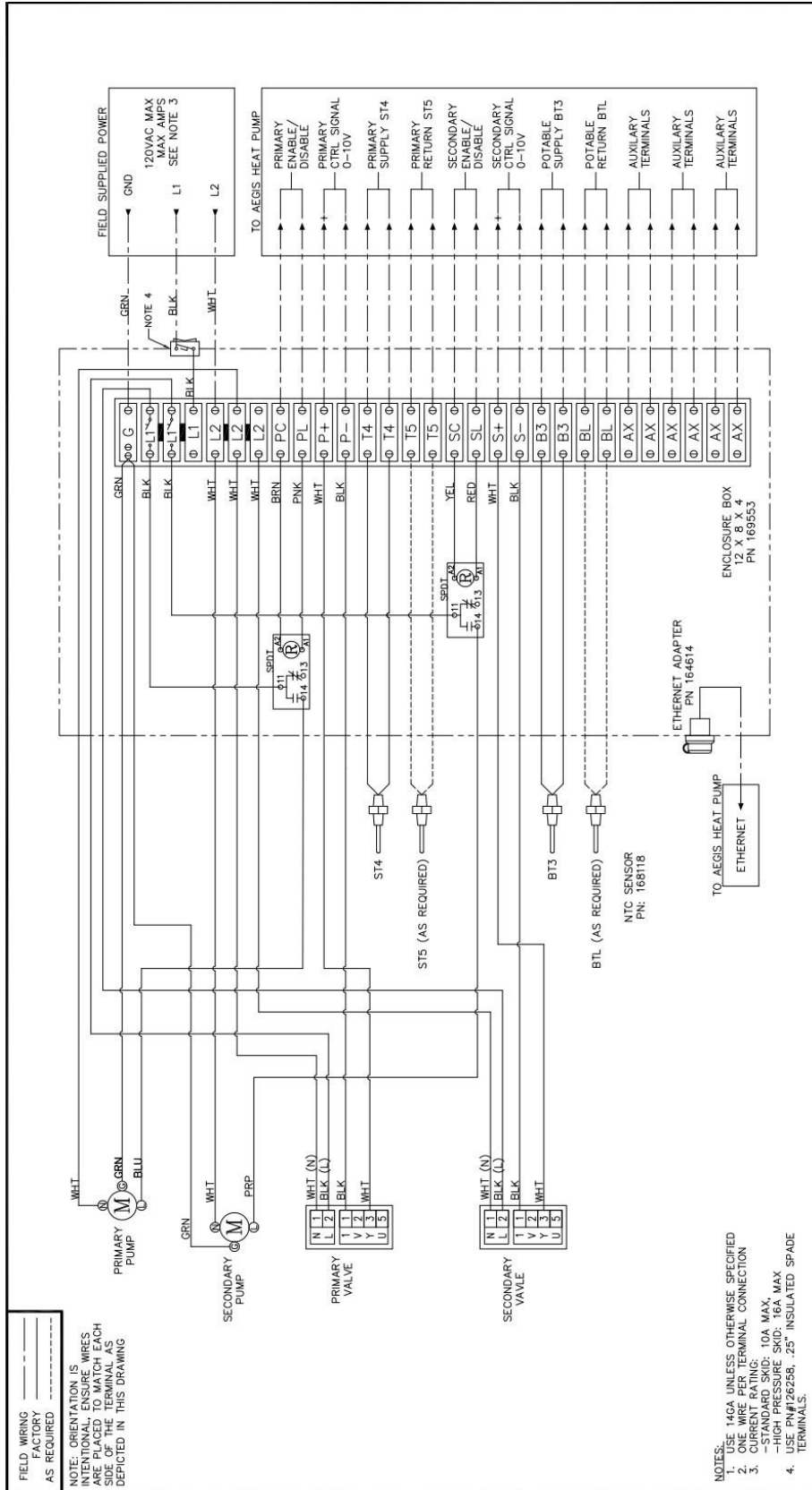


**300psi Single Heat Exchanger Module
(Dual Module Version Also Available)**



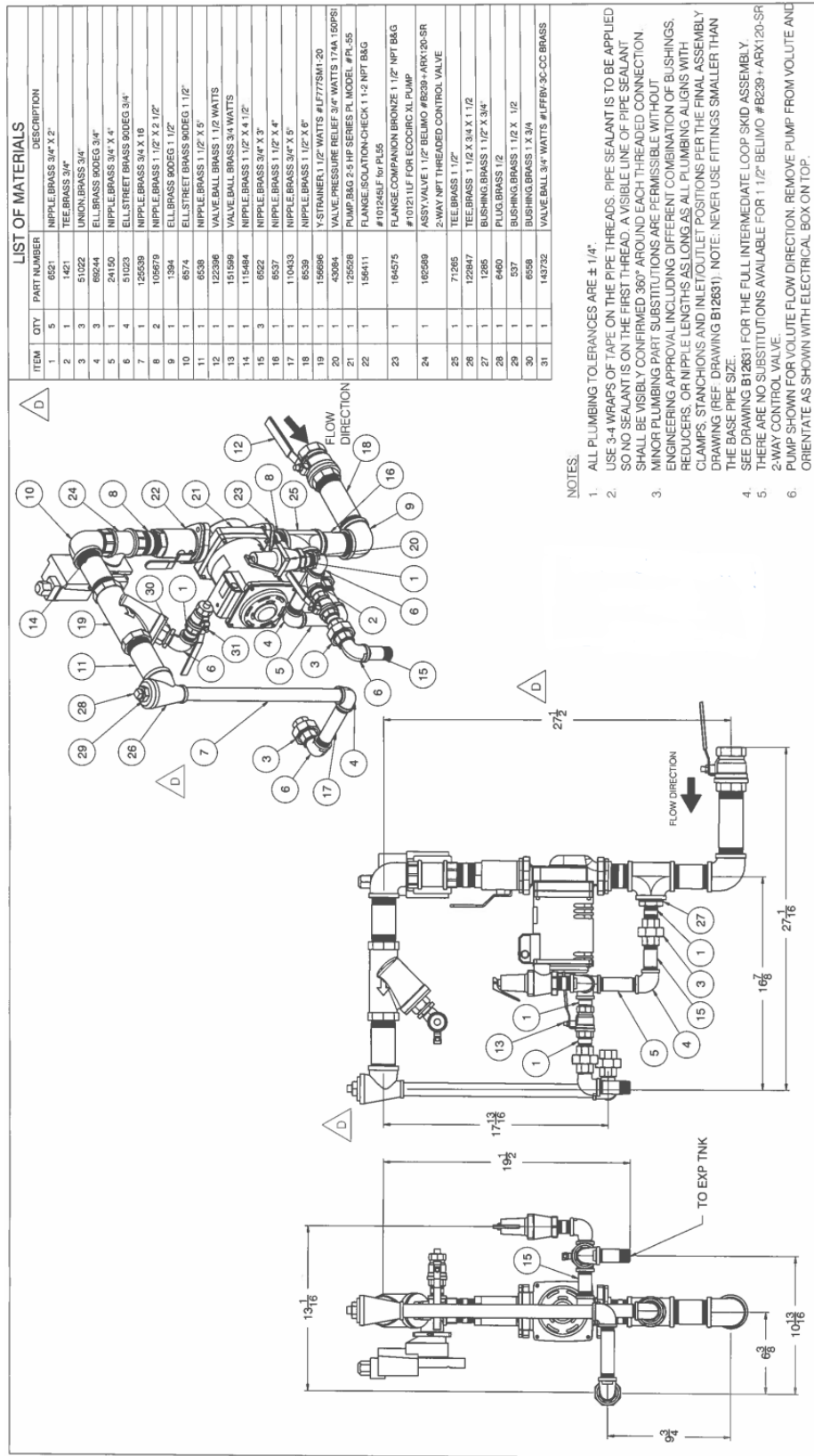
Mark II 300psi Heat Exchanger Module Major Components

Available Pressure (ft head)		
Model	Primary Side, 300psi Module	Secondary Side, 300psi Module
Aegis 250	69.1	41.3
Aegis 350	66.2	33.6
Aegis 500	53.5	23.5



Heat Exchanger Module Wiring diagram - 300psi modules

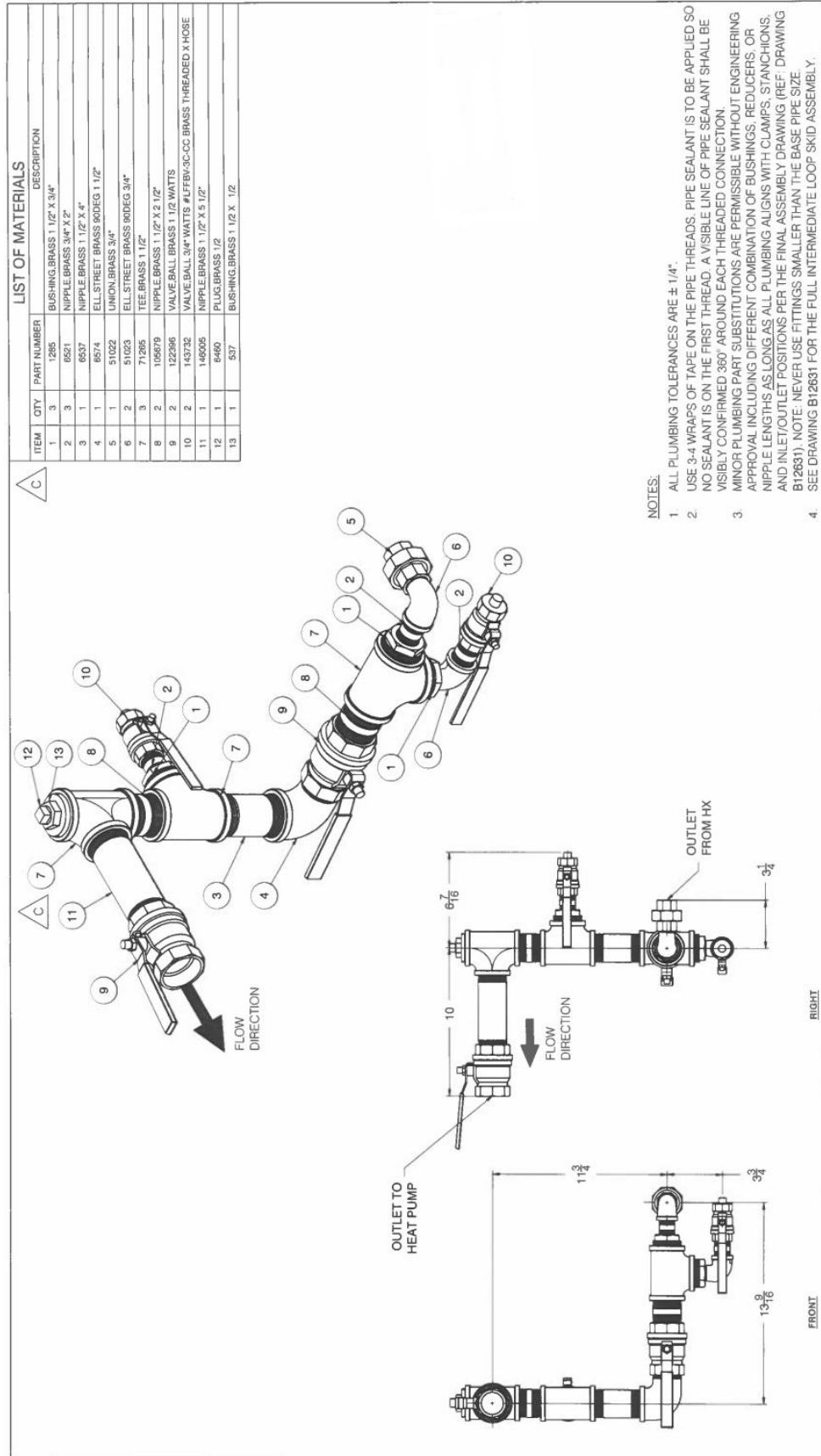
APPENDIX B. MARK II SINGLE PARTS DRAWINGS

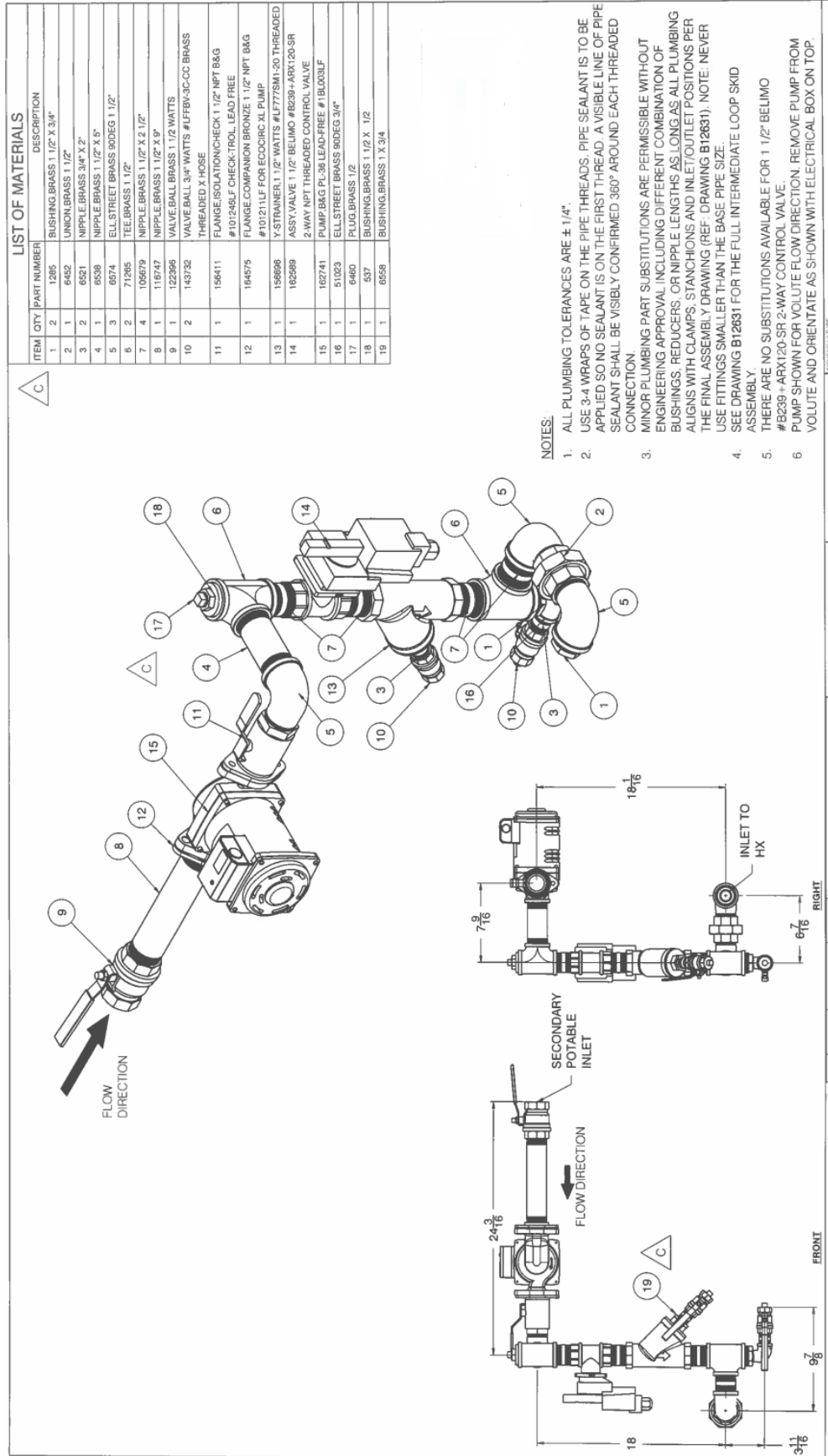


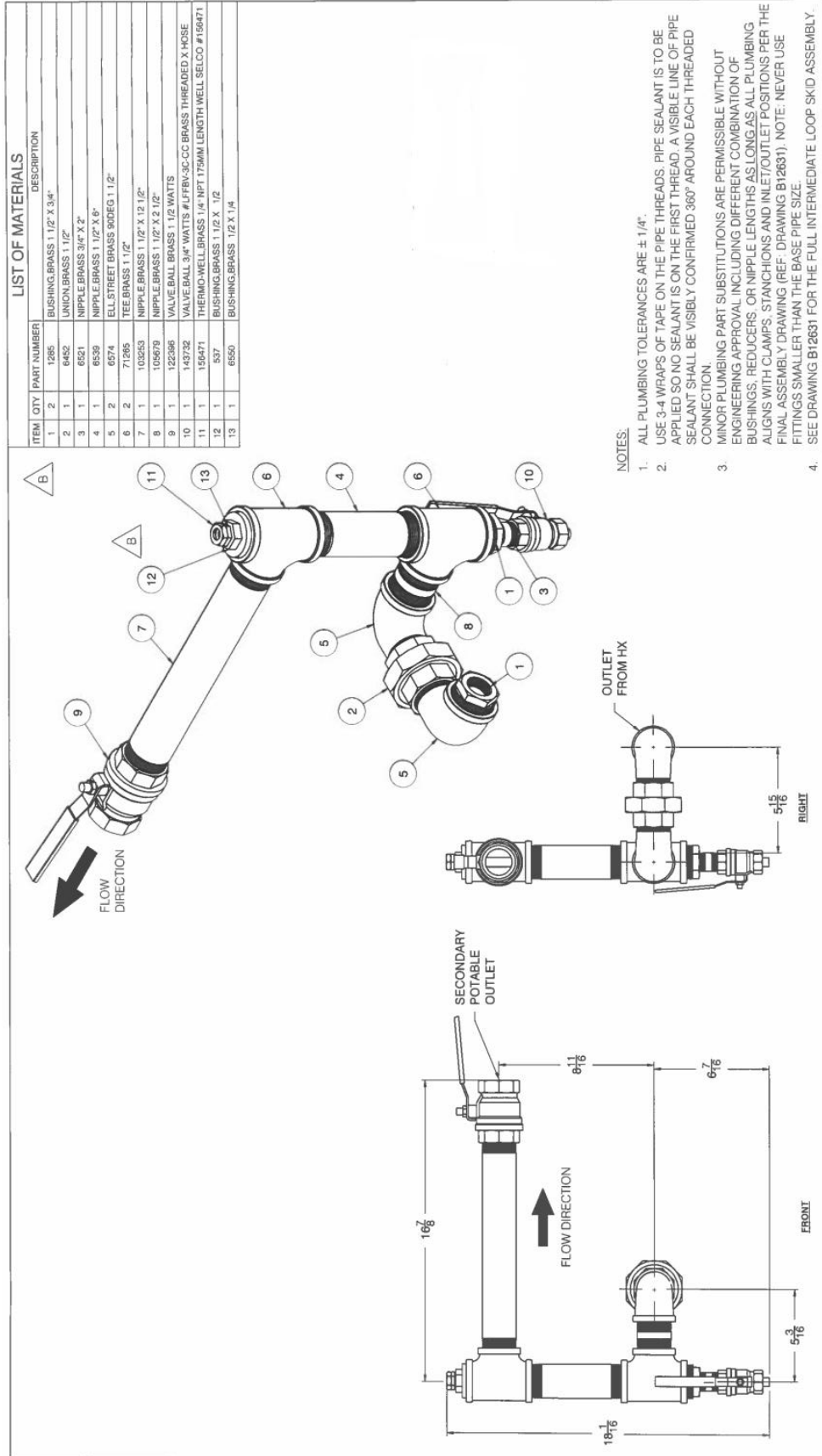
ITEM	QTY	PART NUMBER	DESCRIPTION
1	5	6521	NIPPLE BRASS 3/4" X 2"
2	1	1421	TEE BRASS 3/4"
3	3	51022	UNION BRASS 3/4"
4	3	68244	ELL BRASS 90DEG 3/4"
5	1	24150	NIPPLE BRASS 3/4" X 4"
6	4	51023	ELL STREET BRASS 90DEG 3/4"
7	1	125539	NIPPLE BRASS 3/4 X 1/2
8	2	105679	NIPPLE BRASS 1 1/2" X 2 1/2"
9	1	1384	ELL BRASS 90DEG 1 1/2"
10	1	6574	ELL STREET BRASS 90DEG 1 1/2"
11	1	6539	NIPPLE BRASS 1 1/2" X 5"
12	1	122598	VALVE BALL BRASS 1 1/2 WATTS
13	1	151599	VALVE BALL BRASS 3/4 WATTS
14	1	175464	NIPPLE BRASS 1 1/2" X 4 1/2"
15	3	6522	NIPPLE BRASS 3/4" X 3"
16	1	6537	NIPPLE BRASS 1 1/2" X 4"
17	1	110433	NIPPLE BRASS 3/4" X 5"
18	1	6539	NIPPLE BRASS 1 1/2" X 6"
19	1	156696	Y-STRAINER 1 1/2" WATTS #LF77SM1-20
20	1	43084	VALVE PRESSURE RELIEF 3/4" WATTS 174A 150PSI
21	1	125528	PUMP BAG 2-9 HP SERIES PL MODEL #PL-55
22	1	156411	FLANGE ISOLATION-CHECK 1 1/2 NPT BAG #101245JF for PL55
23	1	164575	FLANGE COMPANION BRONZE 1 1/2" NPT BAG
24	1	162589	ASSY VALVE 1 1/2" BELIMO #B239-ARX120-SR #101211UF FOR ECOCIRC XL PUMP
25	1	71265	2-WAY NPT THREADED CONTROL VALVE
26	1	122447	TEE BRASS 1 1/2" X 3/4 X 1 1/2"
27	1	1265	BUSHING BRASS 1 1/2" X 3/4"
28	1	6460	PLUG BRASS 1 1/2"
29	1	537	BUSHING BRASS 1 1/2" X 1/2"
30	1	6558	BUSHING BRASS 1 X 3/4"
31	1	143732	VALVE BALL 3/4" WATTS #LF8V-3C-CC BRASS

NOTES:

1. ALL PLUMBING TOLERANCES ARE $\pm 1/4$ ".
2. USE 3-4 WRAPS OF TAPE ON THE PIPE THREADS. PIPE SEALANT IS TO BE APPLIED SO NO SEALANT IS ON THE FIRST THREAD. A VISIBLE LINE OF PIPE SEALANT SHALL BE VISIBLY CONFIRMED 360° AROUND EACH THREADED CONNECTION.
3. MINOR PLUMBING PART SUBSTITUTIONS ARE PERMISSIBLE WITHOUT ENGINEERING APPROVAL INCLUDING DIFFERENT COMBINATION OF BUSHINGS, REDUCERS, OR NIPPLE LENGTHS AS LONG AS ALL PLUMBING ALIGNS WITH CLAMPS, STANCHIONS AND INLET/OUTLET POSITIONS PER THE FINAL ASSEMBLY DRAWING (REF. DRAWING B12631). NOTE: NEVER USE FITTINGS SMALLER THAN THE BASE PIPE SIZE.
4. SEE DRAWING B12631 FOR THE FULL INTERMEDIATE LOOP SKID ASSEMBLY. THERE ARE NO SUBSTITUTIONS AVAILABLE FOR 1 1/2" BELIMO #B239-ARX120-SR 2-WAY CONTROL VALVE.
5. PUMP SHOWN FOR VOLUME FLOW DIRECTION. REMOVE PUMP FROM VOLUME AND ORIENTATE AS SHOWN WITH ELECTRICAL BOX ON TOP.







ITEM	QTY	PART NO./DWG. NO.	DESCRIPTION
1	1	3438	BOLT, 1/2" X 13 NC X 2 1/2" PLT HEX HEAD GR 8
2	2	3486	NUT, HEX, 1/2" X 13 NC GR8 PLT
3	2	5640	CONNECTOR, 3/8" FLEXIBLE CONDUIT 90DEG ELL, STEEL/ALUM #1003 (NOT SHOWN)
4	18FT	33217	CONDUIT, 3/8" LIQUIDITTE (NOT SHOWN)
5	8	33218	CONNECTOR, 3/8" LIQUIDITTE 90DEG (NOT SHOWN)
6	2	42453	COVER-HANDY BOX 2 X 2 X 4 WEATHERPROOF W/ GASKET
7	2	42454	BOX-HANDY 2X2X4 WEATHERPROOF 1/2 INCH HOLES
8	7	143079	U-BOLT, VIBRATION DAMPING FOR 1 1/2" PIPE MCMMASTER #3176T35
9	1	156847	TANK EXPANSION WATTS DETA-20
10	2	101723	RELAY ENCLOSED PRE-WIRED DROT GRANGER #2E1A3
11	1	102596	SWEP BOX/IDWHX 1.38" HEAT EXCHANGER
12	1	162680 / B12686	ASSEMBLY, SWEP HX SUPPORT STANCHION FOR AEGIS SINGLE SWEP HX SKID COATED
13	1	162689 / B12687	ASSEMBLY, PLUMBING SUPPORT STANCHION PRIMARY INLET SIDE, COATED
14	1	162688 / B12688	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY INLET SIDE, COATED
15	1	162708 / B12689	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY INLET SIDE, COATED
16	1	162712 / B12611	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY OUTLET SIDE-WIDE, COATED
17	1	162722 / B12612	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY OUTLET SIDE-NARROW, COATED
18	1	162728 / B12613	ASSEMBLY, SKID BASE FOR SINGLE SWEP HX, COATED
19	1	162734 / B12617	ASSEMBLY, PRIMARY OUTLET PLUMBING FOR AEGIS SINGLE HX SKID
20	1	162735 / B12618	SUB-ASSEMBLY, PRIMARY INLET PLUMBING FOR AEGIS SINGLE HX SKID
21	1	168594 / B12619	SUB-ASSEMBLY, PRIMARY INLET PLUMBING FOR AEGIS SINGLE HX SKID
22	1	162738 / B12620	SUB-ASSEMBLY, SECONDARY INLET PLUMBING FOR AEGIS SINGLE HX SKID
23	1	162739 / B12621	SUB-ASSEMBLY, SECONDARY OUTLET PLUMBING FOR AEGIS SINGLE HX SKID
24	2	162745	U-BOLT, VIBRATION DAMPING FOR 3/4" PIPE MCMMASTER #3176T32
25	1	162749 / B12630	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY INLET SIDE-BACK, COATED
26	1	163104 / B12687	BRACE, RIGHT SIDE SINGLE SWEP HX SKID
27	1	163106 / B12687	BRACE, BACK SIDE SINGLE SWEP HX SKID
28	2	163115	ENCLOSURE, INDOOR WITH LIFT-OFF COVER AND KNOCKOUTS, 6" X 6" X 4"

NOTES:

- ORIENT THE EXPANSION TANK WITH THE GAUGES FACING FORWARD AS SHOWN. SEE ENGINEERING FOR EXPANSION TANK DRILL FIXTURE TO DRILL THREE HOLES FOR 5/16" BOLT INTO TANK BASE.
- MOUNT SWEP HX STANCHION AND HX ONTO SKID BASE FIRST (NOTE: THE STUDS ON THE SWEP HX ARE M8X20, P/N 154765). BEGIN WITH PRIMARY PLUMBING FIRST. MOUNTING CORRESPONDING STANCHIONS ONTO BASE TO ENSURE PLUMBING ALIGNS WITH THE HX, EXPANSION TANK, AND STANCHIONS.
- REPEAT THIS PROCESS WITH THE SECONDARY PLUMBING.
- USE 1/4"-20 BOLTS (P/N 55854), NUTS (P/N 3475), AND WASHERS (P/N 15607) TO MOUNT STANCHIONS ONTO BASE.
- USE 1/2" HEX NUTS, AND BOLTS TO SUPPORT THE POTABLE PUMP AS SHOWN IN THE FRONT VIEW.
- REFERENCE DRAWING B12688 FOR WIRING DIAGRAM
- NO COMPONENT, INCLUDING BALL VALVES OR CONTROL VALVES, SHALL OVERHANG THE SKID BASE AS SHOWN IN THE TOP VIEW. ROTATE VALVES IN CLOSED POSITION FOR SHIPPING.
- PLACE ARROW DECALS ON PLUMBING AS SHOWN IN THE TOP VIEW.
- PLUMBING LABELS FOR INLETS/OUTLETS ARE AS FOLLOWS:
 - ITEM 20 (PRIMARY INLET) = FROM HX OUTLET TO HEAT PUMP INLET
 - ITEM 21 (PRIMARY INLET) = FROM HEAT PUMP OUTLET TO HX INLET
 - ITEM 22 (SECONDARY INLET) = POTABLE INLET
 - ITEM 23 (SECONDARY OUTLET) = POTABLE OUTLET

LIST OF MATERIALS

ITEM	QTY	PART NO. / DWG. NO.	DESCRIPTION
1	1	3436	BOLT, 1/2" X 1.3 NC X 2, 1/2" PLT HEX HEAD CR 8
2	2	3486	NUT, HEX 1/2" X 1.3 NC CR8 PLT
3	2	5640	CONNECTOR, 3/8" FLEXIBLE CONDUIT 90DEG ELL STEELALUM #11003 (NOT SHOWN)
4	1BFT	33217	CONDUIT, 3/8" LIQUIDITITE (NOT SHOWN)
5	8	33218	CONNECTOR, 3/8" LIQUIDITITE 90DEG (NOT SHOWN)
6	2	42453	COVER, HANDY BOX 2 X 2 X 4 WEATHERPROOF W/ GASKET
7	2	42454	BOX, HANDY 2X2X4 WEATHERPROOF 1/2" INCH HOLES
8	7	143979	U-BOLT, VIBRATION DAMPING FOR 1 1/2" PIPE MCMMASTER #3176135
9	1	155647	TANK EXPANSION WATTS DETA-20
10	2	161733	RELAY ENCLOSED PRE-WIRED DPT. GRANGER #2ETAS
11	1	162988	SWEP BOW/160WH X139 HEAT EXCHANGER
12	1	162669 / B12606	ASSEMBLY, SWEP HX SUPPORT STANCHION FOR AEGIS SINGLE SWEP HX SKID COATED
13	1	162669 / B12607	ASSEMBLY, PLUMBING SUPPORT STANCHION PRIMARY INLET SIDE, COATED
14	1	162669 / B12608	ASSEMBLY, PLUMBING SUPPORT STANCHION PRIMARY OUTLET SIDE, COATED
15	1	162709 / B12609	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY INLET SIDE, COATED
16	1	162712 / B12611	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY OUTLET SIDE, WIDE, COATED
17	1	162722 / B12612	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY OUTLET SIDE NARROW, COATED
18	1	162728 / B12613	ASSEMBLY, PLUMBING SUPPORT STANCHION PRIMARY INLET SIDE, COATED
19	1	162734 / B12617	ASSEMBLY, SKID BASE FOR SINGLE SWEP HX, COATED
20	1	162735 / B12618	SUB-ASSEMBLY PRIMARY INLET PLUMBING FOR AEGIS SINGLE HX SKID
22	1	162736 / B12620	SUB-ASSEMBLY SECONDARY INLET PLUMBING FOR AEGIS SINGLE HX SKID
23	1	162739 / B12621	SUB-ASSEMBLY SECONDARY OUTLET PLUMBING FOR AEGIS SINGLE HX SKID
24	2	162745	U-BOLT, VIBRATION DAMPING FOR 3/4" PIPE MCMMASTER #3176132
25	1	162746 / B12630	ASSEMBLY, PLUMBING SUPPORT STANCHION SECONDARY INLET SIDE, COATED
26	1	163104 / B12667	BRACE, BACK SIDE SINGLE SWEP HX SKID
27	1	163106 / B12667	BRACE, RIGHT SIDE SINGLE SWEP HX SKID
28	2	163115	ENCLOSURE, INDOOR WITH LIFT-OFF COVER AND KNOCKOUTS, 8" X 6" X 4"
21	1	166947 / B12619	SUB-ASSEMBLY PRIMARY INLET PLUMBING FOR AEGIS SINGLE HX SKID

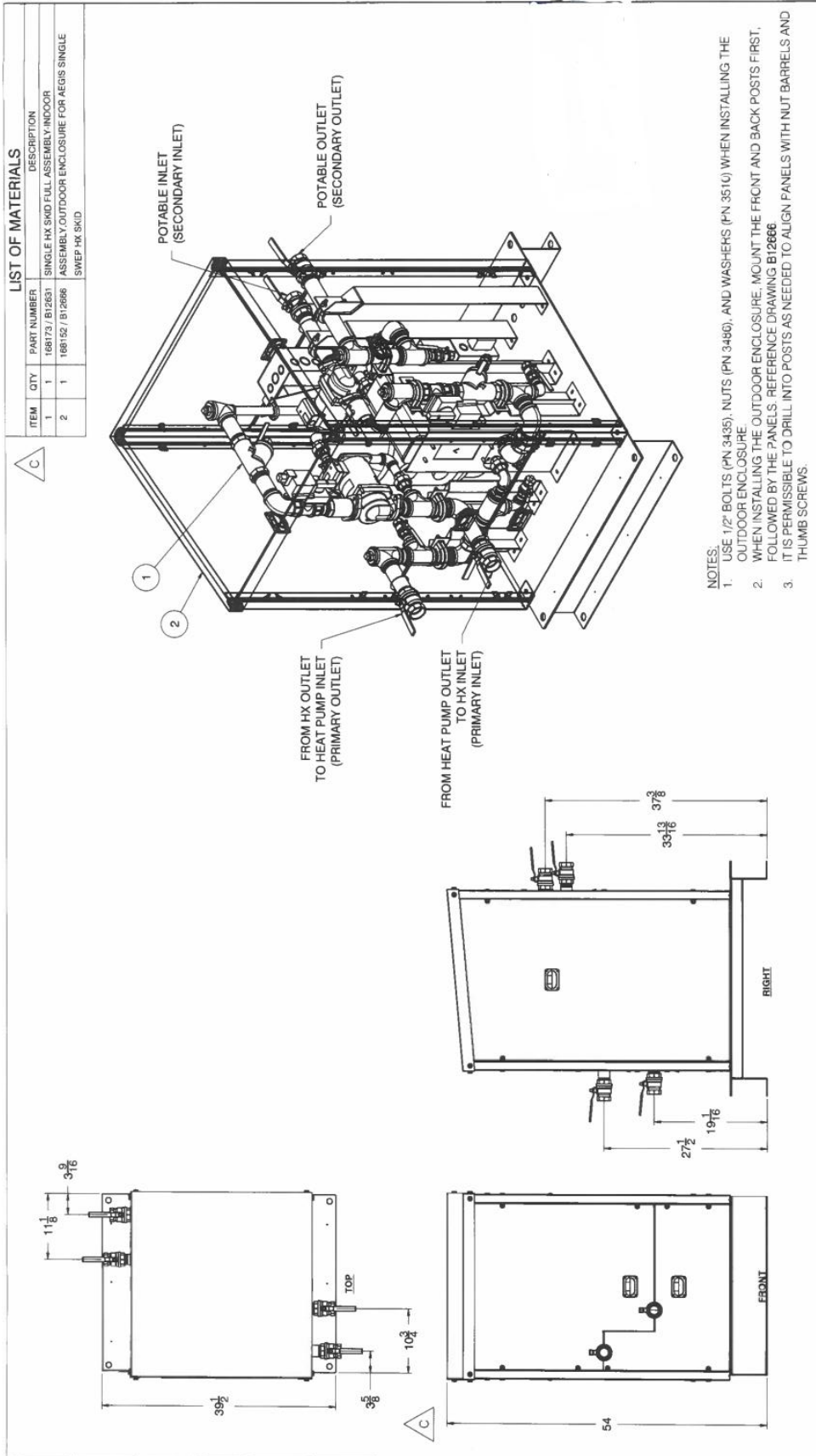
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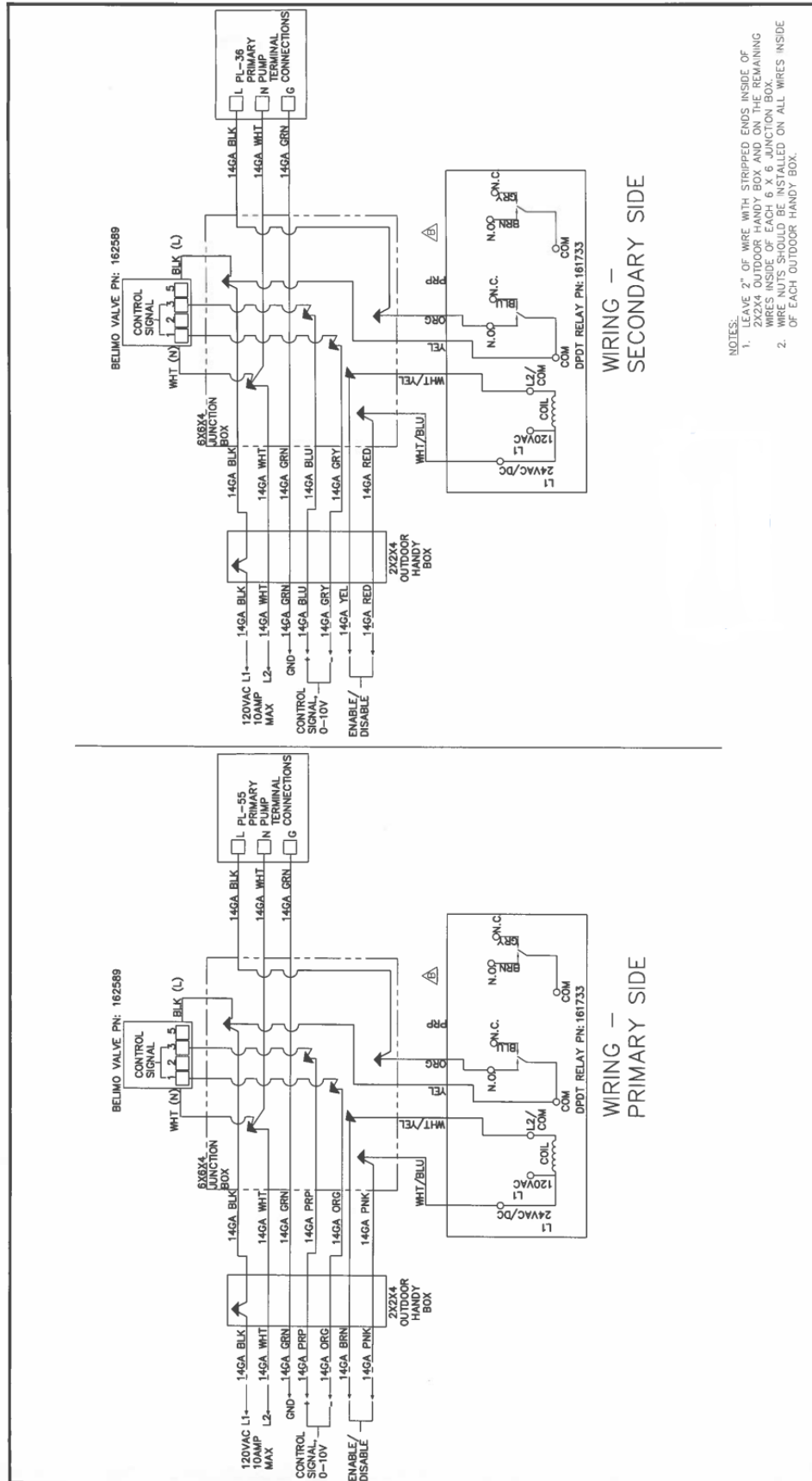
- ORIENT THE EXPANSION TANK WITH THE GAUGES FACING FORWARD AS SHOWN. SEE ENGINEERING FOR EXPANSION TANK DRILL FUTURE TO DRILL THREE HOLES FOR 5/16" BOLT INTO TANK BASE.
- MOUNT SWEP HX STANCHION AND HX ONTO SKID BASE FIRST (NOTE: THE STUDS ON THE SWEP HX ARE M8X20, PN 154765). BEGIN WITH PRIMARY PLUMBING FIRST, MOUNTING CORRESPONDING STANCHIONS ONTO BASE TO ENSURE PLUMBING ALIGNS WITH THE HX, EXPANSION TANK, AND STANCHIONS.
- REPEAT THIS PROCESS WITH THE SECONDARY PLUMBING.
- USE 1/4"-20 BOLTS (PN 55654), NUTS (PN 3475), AND WASHERS (PN 15607) TO MOUNT STANCHIONS ONTO BASE.
- USE 1/2" HEX NUTS AND BOLTS TO SUPPORT THE POTABLE PUMP AS SHOWN IN THE FRONT VIEW.
- REFERENCE DRAWING B12668 FOR WIRING DIAGRAM.
- NO COMPONENT, INCLUDING BALL VALVES OR CONTROL VALVES, SHALL OVERHANG THE SKID BASE AS SHOWN IN THE TOP VIEW. ROTATE VALVES IN CLOSED POSITION FOR SHIPPING.
- PLACE ARROW DECALS ON PLUMBING AS SHOWN IN THE TOP VIEW.
- PLUMBING LABELS FOR INLETS/OUTLETS ARE AS FOLLOWS:
 - ITEM 20 (PRIMARY INLET) = FROM HX OUTLET TO HEAT PUMP INLET
 - ITEM 21 (PRIMARY INLET) = FROM HEAT PUMP OUTLET TO HX INLET
 - ITEM 22 (SECONDARY INLET) = POTABLE INLET
 - ITEM 23 (SECONDARY OUTLET) = POTABLE OUTLET

TOP

FRONT

BACK





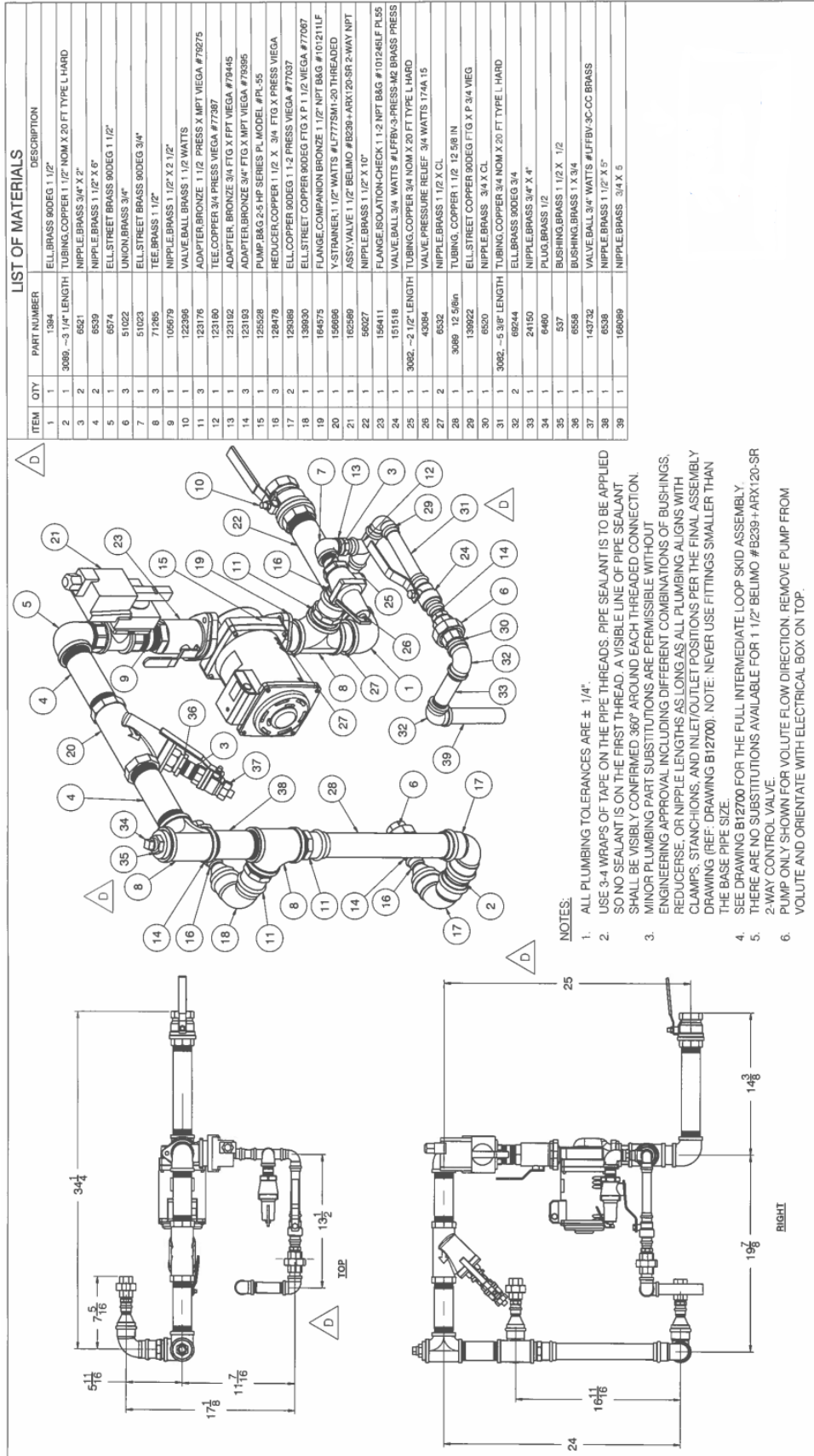
APPENDIX C. MARK II DUAL PARTS DRAWINGS

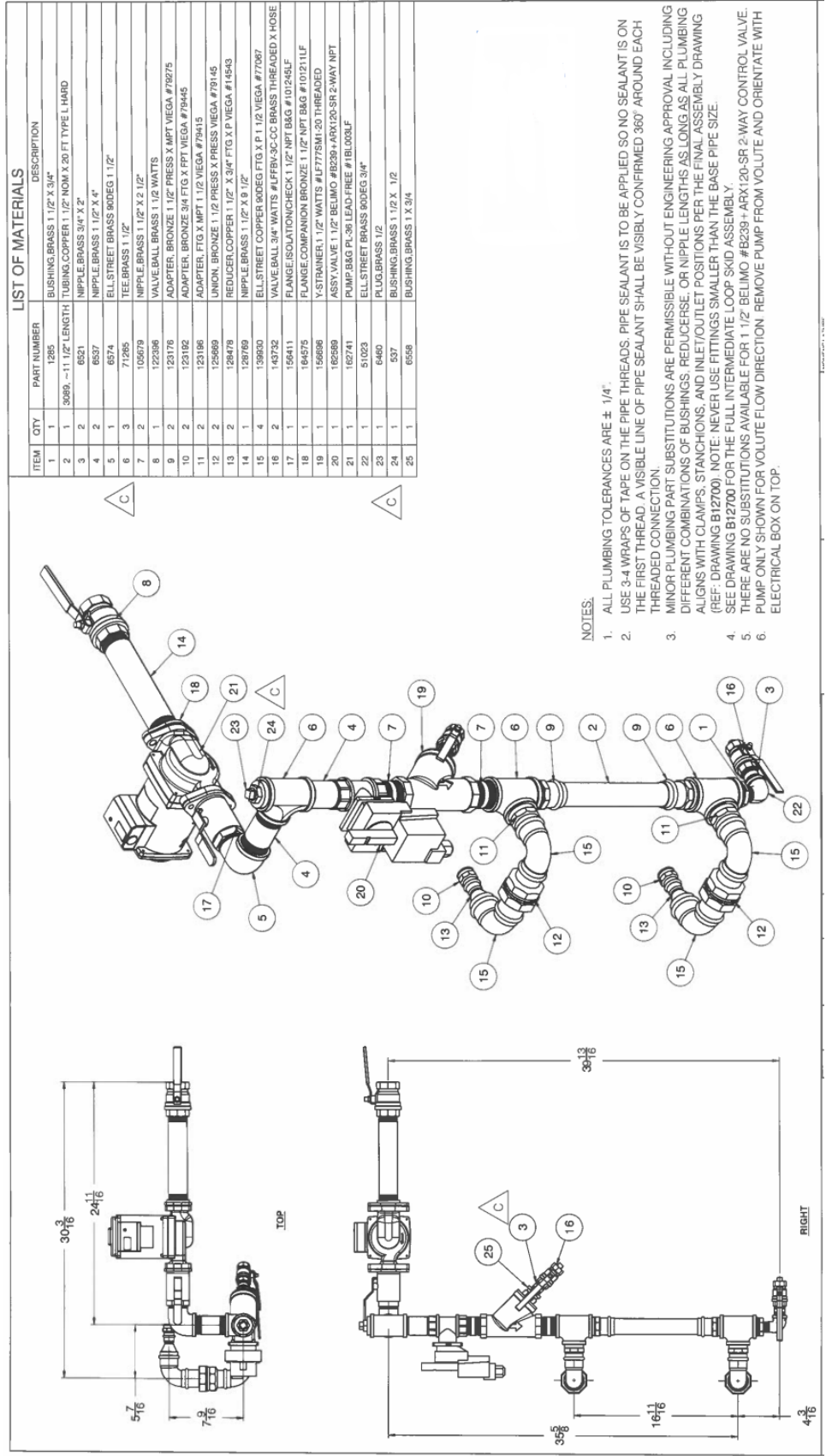
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	1285	BUSHING, BRASS 1 1/2" X 3/4"
2	1	3085	-4 13/16" LENGTH TUBING, COPPER 1 1/2" NOM X 20 FT TYPE L HARD
3	1	3085	-6 3/16" LENGTH TUBING, COPPER 1 1/2" NOM X 20 FT TYPE L HARD
4	1	3089	-12 7/8" LENGTH TUBING, COPPER 1 1/2" NOM X 20 FT TYPE L HARD
5	2	6521	NIPPLE, BRASS 3/4 X 2
6	2	6537	NIPPLE, BRASS 1 1/2" X 4"
7	1	6974	ELL STREET BRASS 90DEG 1 1/2"
8	2	51022	UNION, BRASS 3/4"
9	2	71265	TEE, BRASS 1 1/2"
10	2	79584	CROSS, BRASS 1 1/2"
11	2	105679	NIPPLE, BRASS 1 1/2" X 2 1/2"
12	2	122386	VALVE BALL BRASS 1 1/2 WATTS
13	2	123176	ADAPTER, BRONZE 1 1/2" PRESS X MPT VIEGA #79275
14	2	123183	ADAPTER, BRONZE 3/4" FTG X MPT VIEGA #79395
15	2	128478	REDUCER, COPPER 1 1/2" X 3/4" FTG X P VIEGA #14543
16	3	129389	ELL, COPPER 90DEG 1 1/2 PRESS VIEGA #77037
17	2	143732	VALVE BALL 3/4" WATTS #LFVBV-3C-CC BRASS THREADED X HOSE
18	1	51023	ELL STREET BRASS 90DEG 3/4"
19	1	6460	PLUG, BRASS 1/2
20	1	537	BUSHING, BRASS 1 1/2 X 1/2

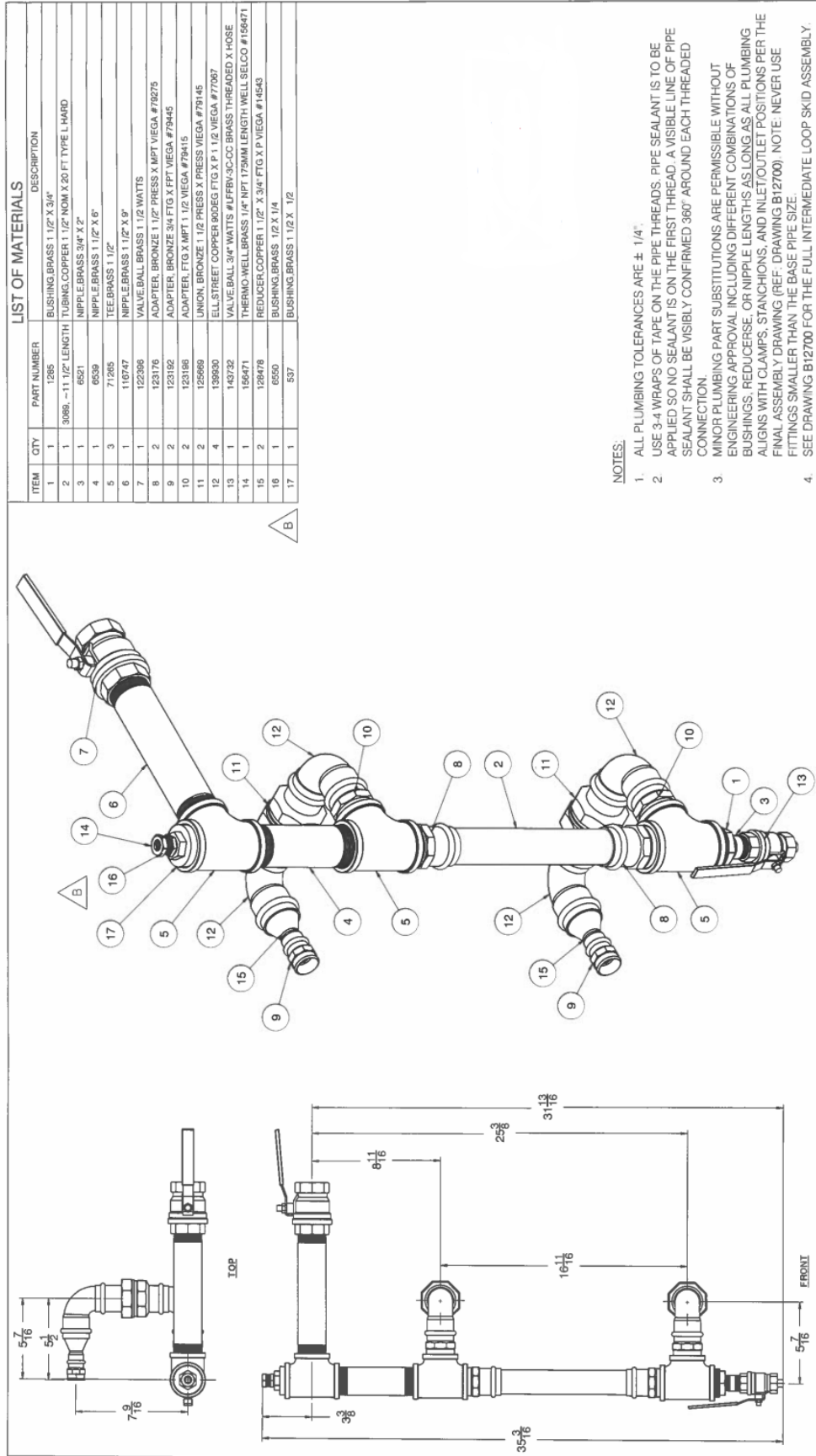
LIST OF MATERIALS

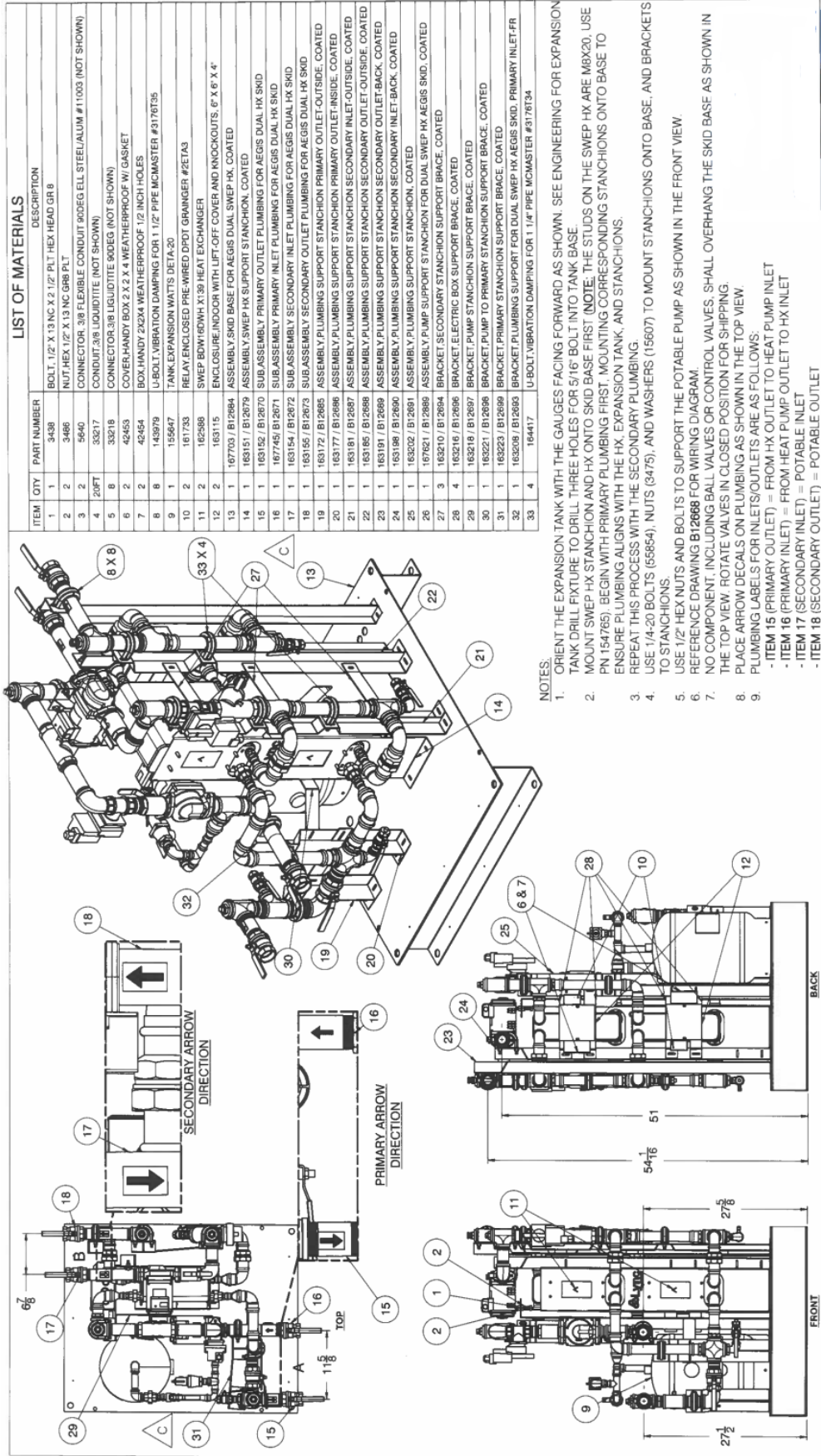
NOTES:

1. ALL PLUMBING TOLERANCES ARE ± 1/4".
2. USE 3-4 WRAPS OF TAPE ON THE PIPE THREADS. PIPE SEALANT IS TO BE APPLIED SO NO SEALANT IS ON THE FIRST THREAD. A VISIBLE LINE OF PIPE SEALANT SHALL BE VISIBLY CONFIRMED 360° AROUND EACH THREADED CONNECTION.
3. MINOR PLUMBING PART SUBSTITUTIONS ARE PERMISSIBLE WITHOUT ENGINEERING APPROVAL INCLUDING DIFFERENT COMBINATIONS OF BUSHINGS, REDUCER, OR NIPPLE LENGTHS AS LONG AS ALL PLUMBING ALIGNS WITH CLAMPS, STANCHIONS, AND INLET/OUTLET POSITIONS PER THE FINAL ASSEMBLY DRAWING (REF: DRAWING B12700). NOTE: NEVER USE FITTINGS SMALLER THAN THE BASE PIPE SIZE.
4. SEE DRAWING B12700 FOR THE FULL INTERMEDIATE LOOP SKID ASSEMBLY.





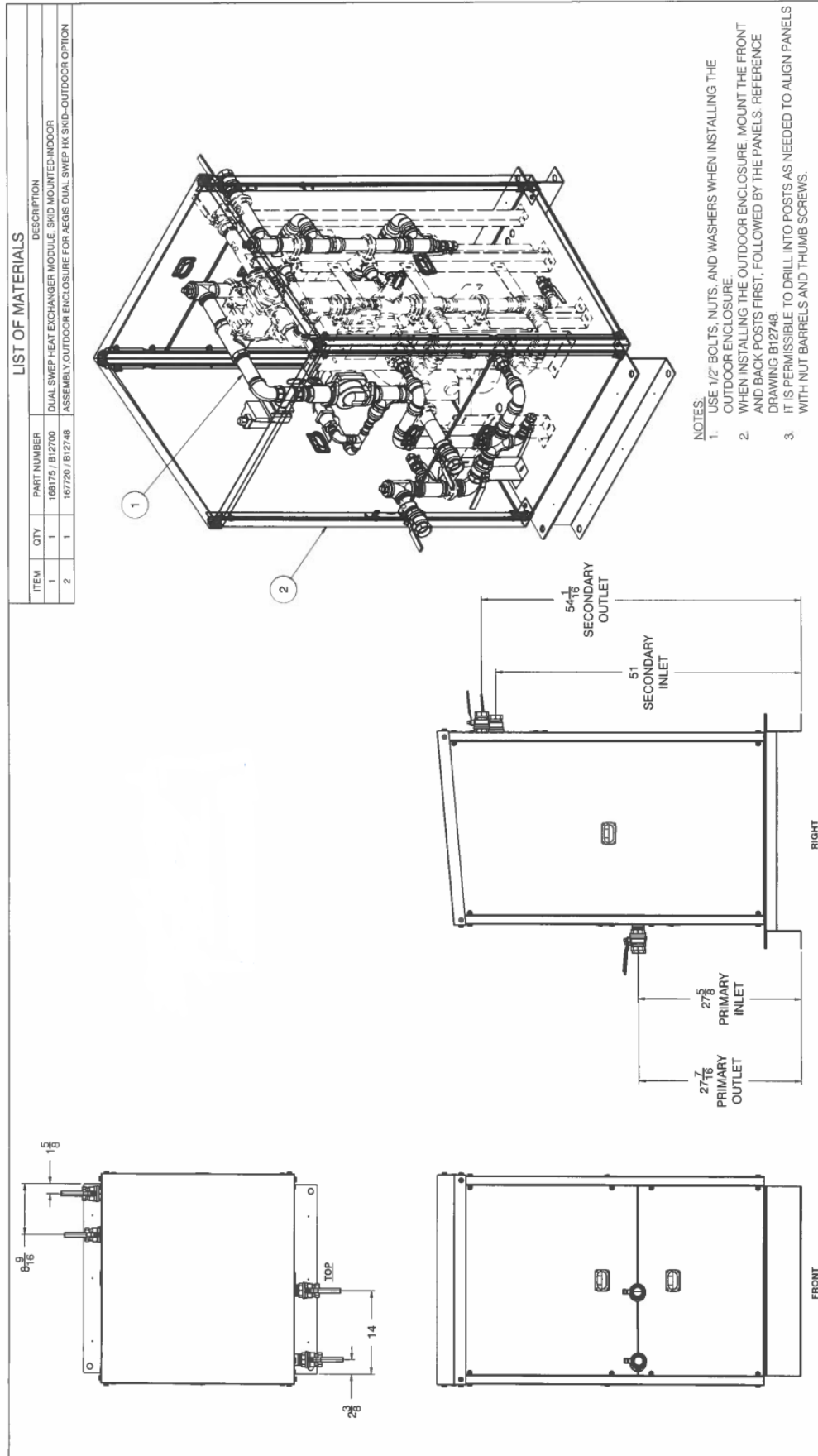


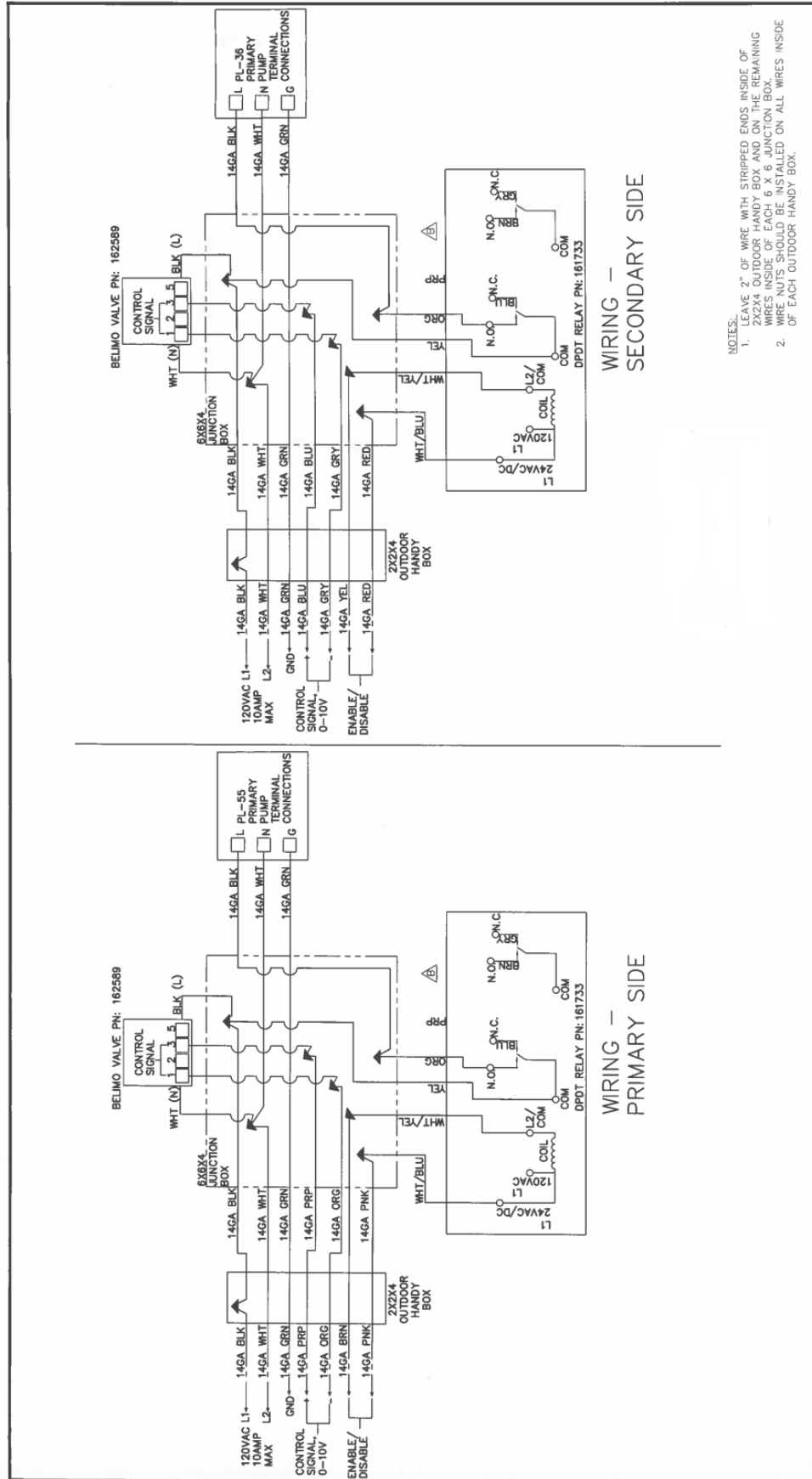


LIST OF MATERIALS		
ITEM	QTY	PART NUMBER DESCRIPTION
1	1	3438 BOLT, 1/2" X 1.31 NC X 2 1/2" PLT HEX HEAD GR 8
2	2	3486 NUT, HEX 1/2" X 1.31 NC GR8 PLT
3	2	5640 CONNECTOR, 3/8" FLEXIBLE CONDUIT 90DEG ELL STEEL/ALUM #11003 (NOT SHOWN)
4	20FT	CONDUIT, 3/8" LIQUIDITE (NOT SHOWN)
5	8	33217 CONNECTOR 3/8" LIQUIDITE 90DEG (NOT SHOWN)
6	2	42453 COVER-HANDY BOX 2 X 2 X 4 WEATHERPROOF W/ GASKET
7	2	42454 BOX-HANDY 202X4 WEATHERPROOF FOR 1 1/2" PIPE MCMMASTER #3178735
8	8	143979 U-BOLT, VIBRATION DAMPING FOR 1 1/2" PIPE MCMMASTER #3178735
9	1	155647 RELAY EXPANDED PRE WIRED DPDT GRANNER #2ET43
10	2	161733 SWEP BOWI60WH X130 HEAT EXCHANGER
11	2	162688 ENCLOSURE INDOOR WITH LIFT OFF COVER AND KNOCKOUTS, 8" X 6" X 4"
12	2	163115 ASSEMBLY SKID BASE FOR AEGIS DUAL SWEP HX, COATED
13	1	167703 / B12684 ASSEMBLY SWEP HX SUPPORT STANCHION, COATED
14	1	163151 / B12679 SUB ASSEMBLY PRIMARY INLET PLUMBING FOR AEGIS DUAL HX SKID
15	1	163152 / B12670 SUB ASSEMBLY PRIMARY INLET PLUMBING FOR AEGIS DUAL HX SKID
16	1	167745 / B12671 SUB ASSEMBLY SECONDARY INLET PLUMBING FOR AEGIS DUAL HX SKID
17	1	163154 / B12672 SUB ASSEMBLY SECONDARY INLET PLUMBING FOR AEGIS DUAL HX SKID
18	1	163155 / B12673 SUB ASSEMBLY SECONDARY INLET PLUMBING FOR AEGIS DUAL HX SKID
19	1	163172 / B12685 ASSEMBLY PLUMBING SUPPORT STANCHION PRIMARY OUTLET-OUTSIDE, COATED
20	1	163177 / B12686 ASSEMBLY PLUMBING SUPPORT STANCHION SECONDARY INLET-OUTSIDE, COATED
21	1	163181 / B12687 ASSEMBLY PLUMBING SUPPORT STANCHION SECONDARY INLET-OUTSIDE, COATED
22	1	163185 / B12688 ASSEMBLY PLUMBING SUPPORT STANCHION SECONDARY OUTLET-OUTSIDE, COATED
23	1	163191 / B12689 ASSEMBLY PLUMBING SUPPORT STANCHION SECONDARY OUTLET-OUTSIDE, COATED
24	1	163198 / B12690 ASSEMBLY PLUMBING SUPPORT STANCHION SECONDARY INLET-BACK, COATED
25	1	163202 / B12691 ASSEMBLY PLUMBING SUPPORT STANCHION, COATED
26	1	167621 / B12689 ASSEMBLY PUMP SUPPORT STANCHION FOR DUAL SWEP HX AEGIS SKID, COATED
27	3	163210 / B12684 BRACKET SECONDARY STANCHION SUPPORT BRACE, COATED
28	4	163218 / B12688 BRACKET ELECTRIC BOX SUPPORT BRACE, COATED
29	1	163218 / B12687 BRACKET PUMP STANCHION SUPPORT BRACE, COATED
30	1	163221 / B12688 BRACKET PUMP TO PRIMARY STANCHION SUPPORT BRACE, COATED
31	1	163223 / B12689 BRACKET PRIMARY STANCHION SUPPORT BRACE, COATED
32	1	163208 / B12693 BRACKET PLUMBING SUPPORT FOR DUAL SWEP HX AEGIS SKID, PRIMARY INLET-FR
33	4	164417 U-BOLT, VIBRATION DAMPING FOR 1 1/4" PIPE MCMMASTER #3178734

NOTES:

- ORIENT THE EXPANSION TANK WITH THE GAUGES FACING FORWARD AS SHOWN. SEE ENGINEERING FOR EXPANSION TANK DRILL FIXTURE TO DRILL THREE HOLES FOR 5/16" BOLT INTO TANK BASE.
- MOUNT SWEP HX STANCHION AND HX ONTO SKID BASE FIRST (NOTE: THE STUDS ON THE SWEP HX ARE M8X20. USE PN 154765). BEGIN WITH PRIMARY PLUMBING FIRST. MOUNTING CORRESPONDING STANCHIONS ONTO BASE TO ENSURE PLUMBING ALIGNS WITH THE HX. EXPANSION TANK, AND STANCHIONS.
- REPEAT THIS PROCESS WITH THE SECONDARY PLUMBING.
- USE 1/4"-20 BOLTS (65864), NUTS (6475), AND WASHERS (15607) TO MOUNT STANCHIONS ONTO BASE, AND BRACKETS TO STANCHIONS.
- USE 1/2" HEX NUTS AND BOLTS TO SUPPORT THE POTABLE PUMP AS SHOWN IN THE FRONT VIEW.
- REFERENCE DRAWING B12688 FOR WIRING DIAGRAM.
- NO COMPONENT, INCLUDING BALL VALVES OR CONTROL VALVES, SHALL OVERHANG THE SKID BASE AS SHOWN IN THE TOP VIEW. ROTATE VALVES IN CLOSED POSITION FOR SHIPPING.
- PLACE ARROW DECALS ON PLUMBING AS SHOWN IN THE TOP VIEW.
- PLUMBING LABELS FOR INLET/OUTLETS ARE AS FOLLOWS:
 - ITEM 15 (PRIMARY INLET) = FROM HX OUTLET TO HEAT PUMP INLET
 - ITEM 16 (PRIMARY INLET) = FROM HEAT PUMP OUTLET TO HX INLET
 - ITEM 17 (SECONDARY INLET) = POTABLE INLET
 - ITEM 18 (SECONDARY OUTLET) = POTABLE OUTLET







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