Accessories
Thermostats/Sensors

Thermostat/Sensor Location

Location of the thermostat or zone sensor is an important element of effective room control and comfort.

The best location is typically on a wall, remote from the HVAC unit. Readings at this location assure that the desired set-point is achieved across the space, not just near the unit itself. It may be necessary to subdivide the zone to ensure adequate control and comfort.

See Figure 36 for detailed areas where the thermostat or zone sensor should and should not be mounted. These include:

- Near drafts or "dead spots" (Behind doors or corners)
- Near hot or cold air ducts
- Near radiant heat (appliances, windows, etc.)
- Near concealed pips or chimneys
- On outside walls or other non-conditioned surfaces.
- In air flows from adjacent zones or other units.

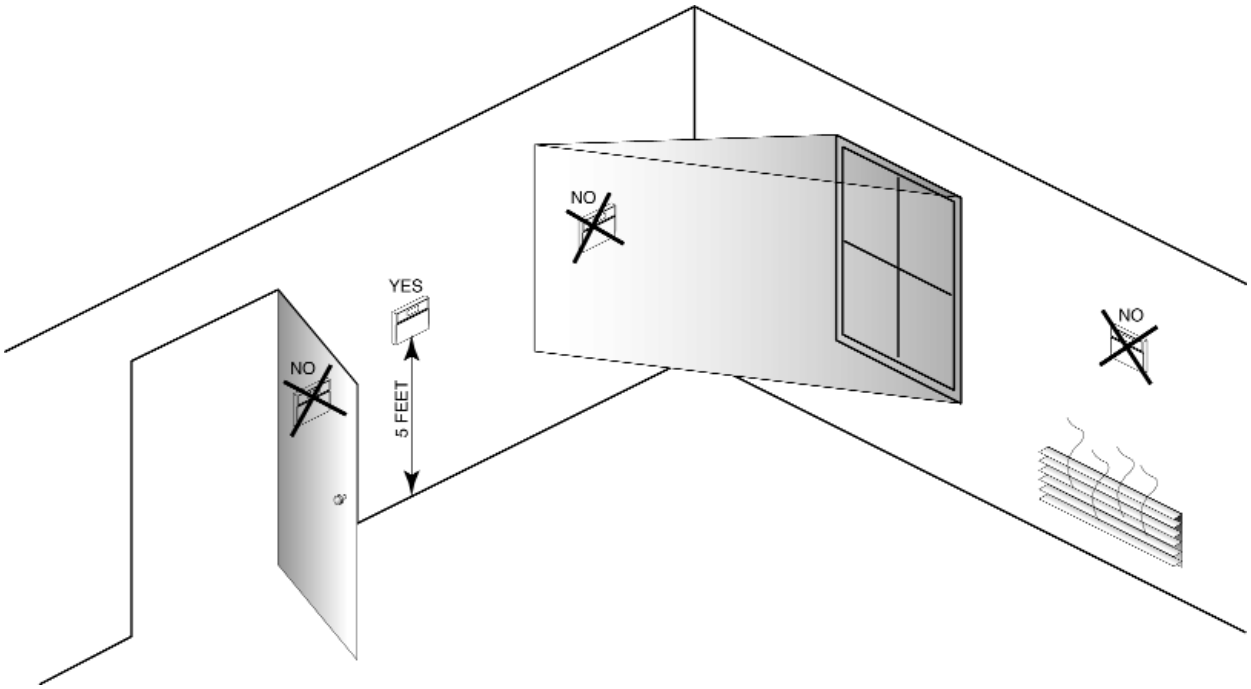

Figure 36: Proper thermostat and sensor location.

Accessories
Thermostats/Sensors

Thermostat/Sensor	Part Number	Description
	**X13510309010 - thermostat** **X13530069010 - subbase** *(006 - 060 models only)*	Mercury Thermostat • 0-stage heat/1-stage cool manual changeover with COOL-OFF • Non Programmable • Fan switching includes • FAN ON-AUTO
	**X13511039010** *(006 - 060 models only)*	Manual Changeover Digital Stat • 2-stage heat/1-stage cool • System switching includes HEAT-OFF-COOL • Fan switching includes AUTO-ON • Non programmable • Auto compatible with F° or C° temperature readings
	**X13511041010**	Auto/Manual Changeover Digital Stat • 1-stage heat/1-stage cool • System switching includes HEAT-OFF-COOL-AUTO • Fan switching includes ON-AUTO • Non programmable • Auto compatible with F° or C° temperature readings
	**X13511042010**	Auto/Manual Changeover Digital Stat • 3-stage heat/2-stage cool • System switching includes HEAT-OFF-COOL-AUTO • Fan switching includes ON-AUTO • 7-day programmable • Adjustable 1 to 15-degree night setback • Auto compatible with F° or C° temperature readings
	**X13511043010**	Manual Changeover Digital Stat • 2-stage heat/1-stage cool • System switching includes HEAT-OFF-COOL • Fan switching includes ON-AUTO • 5-day programmable • Adjustable 1 to 15-degree night setback • Auto compatible with F° or C° temperature readings

Accessories
Thermostats/Sensors

Thermostat/Sensor	Part Number	Description
	**X13511091010 - thermostat** **X13511092010 - subbase** *(072 - 150/240 models only)*	Digital Thermsostat • 3-stage heat/2-stage cool with AUTO-EM HEAT-HEAT-OFF-COOL • Non Programmable • Fan switching includes FAN ON-AUTO • 2 LEDs • Auto compatible with F° or C° temperature readings
	**X13510628010**	Zone Sensor •Tracer ZN510 and ZN524 compatible • Internal setpoint adjustment wheel • Communication Jack
	**X13510606010**	Zone Sensor •Tracer ZN510 and ZN524 compatible • External setpoint adjustment wheel • Communication Jack
	**X13510606020**	Zone Sensor •Tracer ZN510 and ZN524 compatible • External setpoint adjustment wheel • Communication Jack • ON and CANCEL buttons
	**X13510635010**	Zone Sensor •Tracer ZN510 and ZN524 compatible • External setpoint adjustment wheel • Communication Jack • ON and CANCEL buttons • Fan switch AUTO-OFF

Accessories

Pump Module

The pump module and hose kit make a complete self-contained pumping package for distributed pumping systems. These kits contain all the necessary components for the installation, operation and maintenance of the water circuit of a closed loop geothermal application. Standard pump module features include insulated Grundfos pumps, insulated cabinet, bronze or cast iron pump, and 3-way brass valves. The module is factory piped, wired and mounted. See Figure 40 for pump module assembly. Literature number WSHPC-IN-5 (72-9006-03) will provide electrical and dimensional requirements for the PMCA and PMBA products.

Figure 37: Pump module

Pump Module Hose Kit

The pump module hose kit consists of two brass, 3/4 or 1-inch male pipe thread (MPT) -by-barb fittings; two brass 90 degree 1-inch, MPT-by-barb elbows with pressure/temperature ports; and 10 feet of rubber hose with 4 hose clamps. The pump module hose kit is available separately from the pump module.

Figure 38: Pump module hose kit

Water Regulating Valve Assembly

The water regulating valve assembly consists of a direct acting valve and a reverse acting valve installed on the water-out side of the unit. The valve connection sizes shall range from 1/2" to 1 1/2" FPT. The direct acting valve opens in response to an increase in discharge pressure during the cooling cycle. The reverse acting valve opens in response to a decrease in suction pressure during the heating cycle. Water regulating valves should be used where low flow and low or high fluid temperature conditions could occur. See page 29 of this manual for application information. This option is beneficial with open loop systems, but not necessary.

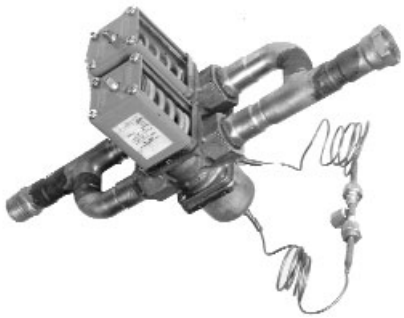

Figure 39: Water regulating valve

Motorized Water Valve

The motorized water valve is installed on the return line of the water loop system between the loop and the loop's pump module. This isolation device is less expensive and a very effective alternative to the water regulating valve.

When the compressor begins running, the valve will open, allowing water to flow through the unit. As the compressor shuts down, the valve slowly closes off. The main purpose of the motorized valve is to shut-off the flow of water through the unit when the unit is off, thus reducing water consumption. The motorized valve is fast opening to prevent compressor trip-out, and slow closing to prevent water hammer.

Figure 40: Motorized water valve

Accessories

Ducted Panel

The return-air arrangement may be easily converted from a free return-air system, to a ducted return-air system with the addition of a return-air side panel. By replacing the filter racks with the return-air panel, a complete seal from the duct to the unit is possible. The 1-1/2"(38mm) duct flange facilitates ease of field connection to the mechanical system. This accessory is typically used when the return-air filter is placed in a built-in ceiling grille, or placed within a field provided filter rack assembly.

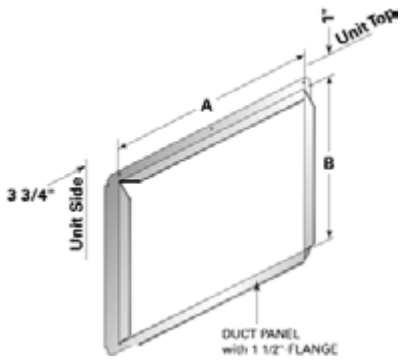

Figure 41: Return-air duct panel

Unit Size	A (in/mm)	B (in/mm)	Model Number
006-015	17-1/2 (445)	13 (330)	4474 1133 0100
018-030	20-1/2 (521)	15 (381)	4474 1134 0100
036-042	22-1/2 (572)	17 (432)	4474 1135 0100
048-060	26-1/2 (673)	19 (483)	4474 1136 0100
150, 180	*	*	4475 2119 0100
240	*	*	4475 2121 0100

Hose Kits

Trane provides three hose kit selections for equipment balancing.

- Ball valve flow control (manual)
- Circuit setter flow control (manual)
- Automatic flow control (automatic)

Each selection provides some accuracy in equipment balancing. Range of accuracy consist of ±25% for the ball valve method, ±20% for the circuit setter method, and ±10% for the automatic flow control method.

Utilizing the ball valve method, the pressure/temperature measurement on the leaving and entering side of the heat pump is measured within the water piping. The ball valve is then throttled to change the amount of flow to the unit to reach the desired temperature or pressure differential.

The circuit setter method combines both the readout and the adjustment feature in one device. In order to determine flow rate, the user must record both handle position, and differential pressure drop. Then, the user must consult a chart containing both pieces of information to make the necessary adjustments to the circuit setter.

For automatic system balancing of a water-source heat pump, the Mesurflo® self balancing kit provides a constant flow rate over the pressure differential rage of 2 to 80 psid. As system pressure changes (through further addition of heat pumps, for example) each individual flow control valve will automatically adjust to the new system conditions. In variable water volume applications, a self balancing hose kit can provide continuous balancing because of its ability to automatically adjust to the varying system conditions. For more information pertaining to the automatic balancing hose kits, see literature documentation WSHP-SLB005-EN.

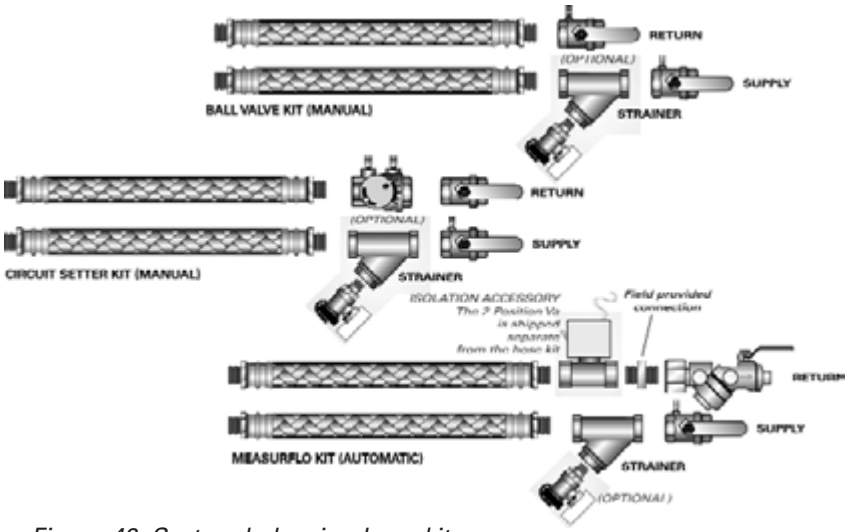

Figure 42: System balancing hose kits.

Mechanical Specifications

General
Equipment shall be completely assembled, piped, internally wired, fully charged with HCFC-22 and test operated at the factory. Filters, thermostat field interface terminal strip, and all safety controls are furnished and factory installed.

The system water inlet and outlet connections shall be female NPT composed of either a copper or a bronze option.

The 5-ton and below equipment shall contain ETL, CETL and ISO-ARI 13256-1 listings and labels prior to leaving the factory. Larger units shall be rated in accordance with ISO-ARI 13256-1. Service and caution area labels shall also be placed on the unit in their appropriate locations.

The 6 through 10-ton equipment shall contain ETL, CETL and ISO-ARI 13256-1 listings and labels prior to leaving the factory. Larger units shall be rated in accordance with ISO-ARI 13256-1. Service and caution area labels shall also be placed on the unit in their appropriate locations.

Cabinet
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Service to the refrigerant and controls shall be provided through a single access panel at the front of the equipment. Access to the refrigerant and controls for the larger units shall be provided through the front and side access panels.

All panels shall be insulated with 1/2-inch (13mm) thick dual density bonded glass fiber. The exposed side is a high density erosion proof material suitable for use in air streams up to 3600 feet per minute (FPM). The insulation meets the erosion requirements of UL 181. It has a flame spread of less than 25 and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.

Access for inspection and cleaning of the unit drain pan, coils and fan section shall be provided. The unit shall be installed for proper access.

Filters
One inch or two inch, throwaway filters shall be standard and factory installed. The filters shall have an average resistance of 76-percent and dust holding capacity of 26-grams per square foot.

Sound Attenuation
Sound attenuation shall be applied as a standard feature in the product design. The sound reduction package shall include a compressor discharge muffler, vibration isolation to the compressor and water-to-refrigerant coil, unit base stiffeners, insulated metal compressor enclosure, and a second stage of vibration isolation to the compressor and water-to-refrigerant base pan.

All units shall be tested and rated in accordance with ARI 260.

Compressors
The unit shall contain a high efficiency rotary, reciprocating, or scroll compressor. External vibration isolation shall be provided by rubber mounting devices located underneath the mounting base of the compressor. A second isolation of the refrigeration assembly shall be supported under the compressor mounting base.

Internal thermal overload protection shall be provided. Protection against excessive discharge pressure shall be provided by means of a high pressure switch. A loss of charge shall be provided by a low pressure safety.

Refrigerant Tubing
The refrigerant tubing shall be of 99% pure copper. This system shall be free from contaminants and conditions such as drilling fragments, dirt and oil. All refrigerant and water lines shall be insulated with an elastomeric insulation that has a 3/8-inch thick wall in the air-side section of the unit.

Refrigerant Circuits
The refrigerant circuit shall contained a thermal expansion device. Service pressure ports shall be factory supplied on the high and low pressure sides for easy refrigerant pressure or temperature testing.

Air-to-Refrigerant Coil
Internally finned, 3/8-inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The coil shall be leak tested to 200 psig and pressure tested to 450 psig.

The tubes are to be completely evacuated of air and correctly charged with proper volume of refrigerant prior to shipment. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor tubes. The tubes shall be sized consistently with the capacity of the coil. Suction header shall be fabricated from rounded copper pipe.

A thermostatic expansion valve shall be factory selected and installed for a wide range of control.

Drain Pan
The condensate pan shall be constructed of corrosion resistant material and insulated to prevent sweating. The bottom of the drain pan shall be sloped on two planes which pitches the condensate to the drain connection. The drain pan shall be flame rated per UL945V-B.

Mechanical Specifications

When the unit is installed and trapped per the manufacturers installation manual, and local city specifications, the drain pan shall be designed to leave puddles no more than 2-inch in diameter, no more than 1/8-inch deep, no longer than 3-minutes following Step 3 of the following test:

1. Temporarily plug the drain pan.
2. Fill the drain pan with 1/2-inch of water or the maximum allowed by the drain pan depth, whichever is smaller.
3. Remove the temporary plug.

Water-to-Refrigerant Heat Exchanger

The water-to-refrigerant heat exchanger shall be of a high quality co-axial coil for maximum heat transfer. The copper or optional cupro-nickel coil shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coil shall have a working pressure of 400 psig on both the refrigerant and water sides. The factory shall provide rubber isolation to the heat exchanging device to enhance sound attenuation.

Indoor Fan

The blower shall be a forward-curved style wheel with four speed combinations, or nine blower motor/sheave combinations available.

All direct drive motors shall have sealed bearings that do not require field lubrication.

Options of the blower motor/fan packages shall be selected and wired from the factory to match performance criteria suggested in the performance section. The motor shall contain a quick disconnect plug for service, convertibility and safety precautions.

The fan(s) shall be placed in a draw-through configuration. They shall be constructed of corrosion resistant galvanized material.

Electrical

The unit control box shall contain all necessary devices to allow heating and cooling operation to occur from a remote wall thermostat. These devices shall be as follows:

- 24 VAC energy limiting class II 50 VA (minimum) transformer
- 24 VAC blower motor relay 24 VAC compressor contactor for compressor control
- Field thermostat connections shall be provided for ease of hook-up to a terminal strip located in the unit's control box
- Lockout relay which controls cycling of the compressor shall be provided to protect the compressor during adverse operating conditions. The device may be reset by interrupting power to the 24 VAC control circuit. Reset may be done either at a remote thermostat or through a momentary main power interruption
- A high pressure switch shall protect the compressor against operation at refrigerant system pressures exceeding 395 psig.
- The low-water temperature switch or sensor shall prevent the compressor operation with leaving water temperatures below 20 F/-6 C.
- Factory installed wire harness shall be available for the Basic, Deluxe, ZN510 and ZN524 control packages.

Nameplate information shall be provided for the application of either time-delay fuses or HACR circuit breakers for branch circuit protection from the primary source of power.

Basic Controls (option)

The basic control package shall contain a low and high pressure switch along with a compressor lockout relay for control assistance. High voltage power connections shall be made at the equipments contactor. An optional condensate overflow detection device shall be made available with this control package. Each device shall be factory mounted, wired, and tested in the equipment.

Deluxe Controls (option)

The deluxe control package shall provide a 75 VA transformer with circuit breaker. The controller shall include a lockout relay, anti-short cycle compressor protection, random start delay, brown-out protection, low pressure time delay, compressor delay on start and an open relay for night setback or pump request.

Optional wiring from the factory for night setback, condensate overflow, hot gas reheat, electric heat, and compressor enable shall also be provided. Three LEDs (light emitting diodes) shall also be included for diagnostics of the equipment.

Tracer ZN510 or ZN524 Controller (option)

This system shall utilize factory furnished and mounted DDC controls for operation of up to 120 units on a Comm 5 (LonMark) link. The Tracer ZN510 control package shall include a 75 VA transformer. The controller shall provide random start delay, heating/cooling status, occupied/unoccupied mode, fan status and filter maintenance options.

Optional wiring from the factory for condensate overflow shall be available.

Mechanical Specifications

Three LEDs (light emitting diodes) shall be included for diagnostics of the equipment.

The ZN510 shall be capable of a stand-alone application, or as applied to a full building automation installation.

Tracer ZN524 Controller (option)
The ZN524 controller shall utilize factory furnished and mounted DDC controls for operation of up to 120 units on a Comm 5 (LonMark) link. The Tracer ZN524 control package shall include a 75 VA (minimum) transformer. The controller shall provide random start delay, heating/cooling status, occupied/unoccupied mode, fan status and filter maintenance options. Optional wiring from the factory for condensate overflow shall be available. Three LEDs (light emitting diodes) shall be included for diagnostics of the equipment.

The ZN524 shall be capable of a stand-alone application, or as applied to a full building automation installation.
With this controller, the unit shall be capable of a hot gas reheat (for dehumidification), boilerless control for electric heat, waterside economizing, and support of variable speed pump control applications.

Orifice Ring
Removal of the motor and fan wheel for the 1/2 through 5-ton units shall be made with the assistance of a factory provided orifice ring device. This device shall attach the wheel and motor to the fan housing in one assembly providing single side service access.

Water Regulating Valve Assembly (option)
The water regulating valve assembly shall consist of a direct acting valve and a reverse acting valve. The direct acting valve shall open in response to an increase in discharge pressure during the cooling cycle. The reverse acting valve shall open in response to a decrease in suction pressure during the heating cycle. Water regulating valves shall be used where low flow, or low or high fluid temperature conditions exist. This accessory shall be used with open-loop systems.

Economizing Coil (GEH option)
The waterside economizing package shall be an external unit accessory pre-piped and pre-wired ready for turn-key installation to the unit. The economizing coil shall be designed to perform with the WSHP at unit measured flow rate of 80.6 F DB/66.2 F WB with 45 F EWT.
All hydronic coils shall be of 5/8" copper and aluminum plate fin combination. All coils shall be proof and leak tested from the manufacturer. The proof test shall be performed at 1.5 times the maximum operating pressure and the leak test at the maximum operating pressure.

A dual sloped non corrosive drain pan shall be easily accessible and cleanable for the hydronic economizing coil.
An electronic two-position, 3-way valve shall meter water flow to the economizing coil during the economizing mode. It shall be factory set to energize the economizing mode at 55 F, while simultaneously halting mechanical operation of the compressor.

Hanging brackets with rubber isolation shall be provided for the horizontal version of the economizing coil option. The bracket design shall be the same throughout the equipment.

Electric Heat (option)
Boilerless control electric heat shall be factory wired and tested. It shall be composed of a nichrome open wire coil designed for 2-kW per unit ton. The design consist of a single stage of electric heat used as a primary heating source when compressor lockout has occurred due to the entering water temperature falling below 55 F with an adjustable range between 25 F to 60 F.

All power connections to the electric heat shall be made in the equipment's control box.

Hot Gas Reheat (option)
Dehumidification shall be provided through a hot gas reheat option. The coil shall consist of 3/8"/1/2" copper tubes mechanically expanded into evenly spaced aluminum fins. All coils shall be proof and leak tested. The proof test must be performed at 1.5 time the maximum operating pressure and the leak test performed at the maximum operating pressure.

Ball Valves (option)
Ball valves shall be field installed between the unit and the supply and return lines of the loop to stop water flow to the unit in a maintenance or service situation.

Motorized Water Valve (option)
When extreme fluid temperature conditions do not exist with an open loop system, a motorized water valve shall be applied to each water-source heat pump. The motorized valve shall stop flow to the unit, causing pressures to rise. This rise in pressure will halt pump operation to provide greater energy savings of the entire system.

Pump Module (option)
The pump module shall be a complete self contained pumping package for an earth-coupled heat pump system.
The module shall consist of a single, 1/6-HP bronze pump, and a brass 3-way shut-off valve. These kits shall contain the necessary components for the installation, operation, and maintenance of the water circuit of a closed-loop distributed pumping application.

Mechanical Specifications

Hoses (option)
Hoses shall consist of a stainless steel outer braid with an inner core of tube made of a nontoxic synthetic polymer material. The hoses shall be suitable for water temperatures ranging between 33 F and 211 F without the use of glycol.

Automatic Flow Devices (option)
The automatic flow kit shall contain a Hays Mesurflo® automatic flow control valve, two ball valves, two flexible hoses, a high flow Y-strainer, and may include a strainer blow-down and various other accessories.

The automatic flow control valve shall be factory set to a rated flow, and shall automatically control the flow to within 10% of the rated value over a 40 to 1 differential pressure, operating range (2 to 80 PSID). Operational temperature shall be rated from fluid freezing, to 225-degrees F. The valve body shall be constructed from hot forged brass UNS C37700 per ASTM B-283 latest revision.

For more information pertaining to the automatic balancing hose kits, see literature documentation WSHP-SLB005-EN.


The Trane Company
An American Standard Company
www.trane.com

For more information, contact
your local district office or
e-mail us at comfort@trane.com

Literature Order Number	WSHP-PRC003-EN
Date	PL-RF-WSHP-PRC003-05-04
Supercedes	Update
Stocking Location	Electronic Only