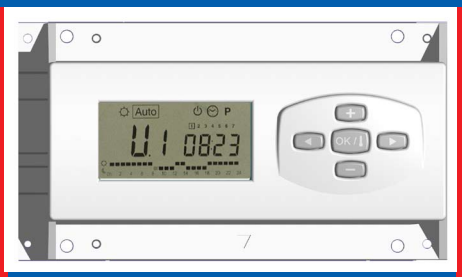
Installation Guide

AquaHeat® Start-up, General Instructions, Mainenance

A better approach to radiant Heating systems



ComfortPro® Systems

AquaHeat

Radiant Heating and Snowmelting products

System Design and Installation

The Mains

PEX pipe mains are recommended to reduce labor and architectural impact. For a slab-on-grade installation, the mains can be buried below or within the slab. For below slab installation refer to insulated supply and returns like ComfortPro Systems Microflex product range. For a wet or dry on plywood application, the mains can be installed within the joist cavity. Always allow for the expansion and contraction of the mains, as the temperature fluctuates. It is recommended that the pipe be allowed free movement and is not fastened directly to the floor joists.

Requirements of a hydronic control system

The intent of a hydronic heating control system is to achieve heating comfort, system protection, energy saving and ease of use.

Heating comfort is achieved by:
- keeping proper system temperatures
- directing the right amount of heat when and where you want it

System protection is achieved by:
- protecting the primary heat source (e.g. boiler) from corrosion and thermal shock
- reducing equipment cycling

Energy saving is achieved by:
- running the system at the lowest water temperature possible
- turning off the system when no heat is demanded
- minimizing boiler short cycling.

Ease of use is achieved by:
- running automatic functions in lieu of manual settings
- providing easy and consistent wiring and installation procedures

AquaHeat Installation Guide Philosophy

A hydronic system can get quiet complicated and with the rapid introduction higher integrated solutions keeping up is challenging more than ever. To keep the basic installation order we have build this guide to reflect the typical steps in the implementation of a project:

Chapter 1 - Hydronic floor installation

Chapter 2 - Manifold installations

Chapter 3 - Boiler room installations

Chapter 4 - Control system installation

Chapter 5 - System start-up, warranty requirements and maintenance

Table of Contents

General System Considerations

When installing a new radiant floor heating system it is important to see all aspects of the heating system design. The first question to answer is how the radiant heating floor loops are being laid out. What subfloors will be used and will the radiant floor be the only heat delivery system or a combination with other heat deliveries.

Minimum wire rough-in should be considered when the customer has not specifically requested individual thermostats for his/her heating system. It is recommended that you rough in a minimum of 4 wires to each loop location for future upgrade capability.

Another question is whether there is only one source of heating supply or will there be several complimentary or alternative heating energy sources, i.e. solar thermal, wood firing boilers, geothermal, etc. Although AquaHeat products are centered around the radiant floor heating implementation there are many possibilities to design a sophisticated heat delivery system with AquaHeat products.

Control System Selection

An appropriate control strategy should take into account: the cost, simplicity of installation, and ease of operation. The following chart is provided as a helpful guide (see chapter 4 of this giuide for detailed information).

Basement	Main Floor	Upper Floor	Single Zone Control System	Multiple Zones
Full (Wet)			Pro Basic or Pro Digital thermostats with PI control	ProZone Master with Pro series thermostats
Full (Wet)	Partial (Wet or Dry)		Pro Basic or Pro Digital thermostats with PI control or Pro Chronotherm *	ProZone Master with Pro series thermostats
Full (Wet)	Full (Wet or Dry)		Three-way mixing with thermostats ProMix boiler module or ProMix Isotherm	ProZone Master with Pro series thermostats
Full (Wet)	Full (Wet or Dry)	Full (Wet or Dry)	Three-way mixing with thermostats ProMix boiler module or ProMix Isotherm with multiple manifold locations	ProZone Master and - Timer Module with Pro series thermostats

* Thermostat choices are subject to boiler compatibility

Table 1 - Control System Rcommendations

Radiant Hydronic Floor Heating System

1. Provide a complete radiant hydronic floor heating system as shown on the plans and as specified. All labor, materials, transportation, equipment and services to install hydronic radiant floor heating system where indicated on project drawings shall be supplied for the project. System shall be complete with all materials from one single manufacturer source. Submittals shall include manufacturer provided design sheets showing heat loss and piping analysis for each zone. System shall be as manufactured by ComfortPro Systems or approved equal that meet or exceed all of the requirements.

2. Piping installed in the slab shall be polyethylene (PEX) cross-linked piping with Oxygen Diffusion Barrier of the sizes indicated on the plans. ASTM and DIN approved tubing shall be installed in loops as per the cross sectional details on the drawings. PEX pipe shall have a minimum operating temperature of 180F at an operating pressure of 90 psig. The installation shall be in strict accordance with all manufacturers instructions in accordance with their warranty policy.

3. Floor heating pipe to be installed with pipe tracking for positive spacing. Insure that a minimal bending radius of 6 times the pipe diameter is maintained and that no piping is twisted or kinked. Piping to have fully enclosed protective conduit elbows where pipes penetrate all floor openings. Where piping crosses expansion joints in the flooring a protective sleeve a minimum of 1 foot shall be provided. Sleeves shall not be binding or tight fitting on tubing.

4. Provide factory pre-fabricated high impact plastic manifolds for all loops. Each circuit manifold module shall incorporate a three part double lock tubing attachment system for positive sealing. Manifold assemblies shall include and not be limited to supply and return thermometers, manual air vent on supply, drain valve and fill cock, supply module fitting with integral shut off valve, and return manifold with integral flow balancing and regulating valve. Return valve manifold integral valves shall have a clearly marked graduation, positive position indicators, and memory position indication. Brass manifolds are acceptable providing they integrate all accessories outlined above and cathodic protection.

5. After installation of tubing and before pouring of floor, AquaHeat piping and system shall be pressure tested to a minimum of 60 psig and a maximum of 100 psig for a 24 hour period. Contractor shall notify factory and general contractor representatives for verification both before and after testing period. All piping shall be bled of air pockets and minimum 4 inch test gauges shall be installed temporarily for testing. If test pressure drop more than 2 psig over the 24 hour period, system shall be rechecked and re-tested. Any tubing showing signs of damage at the jobsite before pour shall be replaced without any concealed joints whatsoever.

6. Installing contractor shall be responsible for all necessary adjustments to floor heating equipment and controls. All system components shall be tested, balanced, and operating to prove system operation. All maintenance data and instructions on control units shall be provided on site complete. Data, Balancing adjustments, Warranty information, and Operator instructions shall be assembled and placed in a suitable binder.

7. All materials shall come complete with a Manufacturers Standard 10 Year Warranty to include both material and repair/replacement costs included for the owners protection. Manufacturers that provide replacement materials only shall not be acceptable. Materials shall also carry an additional 15 year warranty after the initial 10 years.

8. Contractor shall provide the services of a locally authorized manufactures representative to supervise all phases of system installation. Contractor shall submit a letter of compliance with all manufacturers instruction from representative with final operating and maintenance manuals for engineers review and acceptance.

Heating System Startup

Note: Be climate wary! Before the system startup, ensure floor heating piping is protected from freezing. This is a MUST if outside temperatures could ever decrease to or below 32°F (0°C), see section 13.2 for details.

Number of Days after topping is poured	Supply Water Temperature
Approx. 8 - 10 days	Supply Water Temperature can be increased to 60°F
Approx. 10 - 16 days	Supply water temperature can be increased to 77°F
From 16 days	Supply water temperature can be increased per day by 9F to reach the projected maximum temperature
Approx. 16 - 18 days	Normal Operation can commence
Approx. 18 - 20 days	Under normal heating conditions flooring can be laid

Startup guidelines

* These are standard industry recommendations, please confirm the above with your topping supplier.
Carpet, PVC (linoleum) or parquet must not be laid on the floor topping until the concrete is fully cured and the moisture content is stable. The surface temperature of the topping should be 60-65°F (15-18°C).

Approximately 8-10 days after the topping pour, the supply water temperature can be heated up to 60°F (15°C). During days 10-16, the supply water temperature can be heated up to 77°F (25°C). Normal heating operations can commence approximately 16-18 days after the topping pour.

Note: By day 18-20, under normal heating conditions, the flooring can be laid. These are standard industry recommendations, please confirm the above with your topping supplier

After approximately 16 days, the supply temperature per day can be increased by approx. 9°F (5°C) to reach the projected maximum temperature.

Carpet, PVC (linoleum) or parquet must not be laid on the floor topping until the concrete is fully cured and the moisture content is stable. The surface temperature of the topping should be 60-65°F (15-18°C).
Ensure floor heating piping is protected from freezing for system start-up at outside temperature below 32°F (0°C). (See below)

When the system starts up it is vital to have the control system calibrated for accurate readings and settings of the various heating system loops. Make sure valves are open, electrical components are connected and powered up, and thermostats, timer modules, and boiler controls are calibrated.

Chemical treatment

Inhibitors
For all systems it is suggested that inhibitors, approved for closed loop hydronic heating systems, be added to the heating fluid for corrosion protection. For calculation of system water content in the particular PEX piping chosen for your project, please inquire at your local ComfortPro Systems .

Freeze protection
For systems exposed to freezing temperatures the addition of glycols with built-in inhibitors (that are approved for hydronic heating systems) to the heating fluid is required. A minimum of a 30%-35% (maximum 50%) glycol/water mixture for combination system corrosion plus freeze protection is required. For calculation of system water content in the particular PEX piping chosen for the project.

Note: A water analyis should be performed annually (i.e. check corrosion inhibitor and glycol levels) to ensure the 18 month warranty for ComfortPro Systems components, and for the longevity of the system.

Corrosion protection
For all systems it is suggested that inhibitors, approved for closed loop hydronic heating systems, be added to the heating fluid for corrosion protection. For calculation of system water content in the particular PEX piping chosen for your project, please contact your local ComfortPro Systems Supplier for information.

System fill / Air purge (loop-by-loop fill)

It is suggested that an isolation valve be installed at each supply/return manifold header. To fill the system you will need to have a minimum of 40 psi water available. As well, obtain a 5 gallon pail and 5' of hose, complete with a hose connection end. Each loop must be filled individually!

Step 1 Isolate the supply and return piping with valves installed in front of each manifold header.

Step 2 Connect the hose to the hosebib on the return manifold and drop the end into a 5 gallon pail.

Step 3 Hand tighten the red caps on the supply manifold modules and close all the blue return module valves, closing all the loops.

Step 4 Open the isolation valve on the supply pipe to allow water pressure into the supply header. (Note: return valve remains closed.)

Step 5 Open the first blue return module valve. Open the first red cap to allow water to flow into the loop . Watch the hose in the pail until you observe a steady stream of water (no air or spitting). Close red cap #1.

Repeat Step 5 for each loop until all loops are filled with water, and air is purged from pipes. Purging is complete when there is no more air and/or spitting.

Substance	68°F	140°F
Acetic acid	+	+
Acetone	+	
Acrylonitrile	+	+
Agricultural pesticides	+	+
Alkyl alcohol	+	+
Aluminum chloride, anhydrous	+	+
Aluminum sulphate, aqueous	+	+
Ammonia, aqueous	+	+
Ammonium chloride, aqueous	+	+
Ammonium sulphate, aqueous	+	+
Aniline, pure	+	+
Aqua regia	-	-
Beer	+	+
Benzoic acid, aqueous	+	+
Benzol	o	-
Bitumen	+	+
Bleaching liquor	+	
Bromine	-	-
Butanediol	+	+
Butanol	+	+
Butter	+	+
Butyl acetate	+	o
Butyric acid	+	o
Carbon tetrachloride	o	-
Carbonic acid	+	+
Chlorine gas, wet	o	-
Chlorine, liquid	-	-
Chloroform	o	-
Chromic acid 50%	+	-
Chromic acid/Sulphuric acid	+	-
Citric acid	+	+
Cod-liver oil	+	+
Cresols	+	o
Cyclohexane	+	o
Cyclohexanol	+	+
Cyclohexanone	+	o
Decahydronaphthalene	+	-
Detergent	+	+
Detergents, synthetic	+	+
Dibutyl phthalate	+	o
Dichlorobenzene	o	-
Dichloroethylene	o	-
Diesel oil	+	o
Diethyl ether	o	
Ester aliphatic	+	o
aromatic	o	o
Ethyl acetate	+	o
Ethyl alcohol	+	+
Ethylene glycol	+	+
Fluorine	-	-

Substance	68°F	140°F
Formaldehyde (40%)	+	+
Formic acid	+	+
Freon	o	-
Fuel Oil	+	o
Glycerine	+	+
Glycol	+	+
Hexane	+	+
Hydrochloric acid (70%)	+	o
Hydrochloric acid, conc.	+	+
Hydrogen sulphide	+	+
Hydrogen peroxide, 30%	+	+
Hydrogen peroxide, 100%	+	-
Lineseed oil	+	+
Maleic acid	+	+
Mercury	+	+
Methanol	+	+
Methyl ethyl ketone	+	o
Methylene chloride	o	-
Milk	+	+
Motor oils	+	o
Naphtha	+	o
Naphthalene	+	-
Nitric acid, 30%	+	+
Nitric acid, 50%	o	-
Nitrobenzene	+	o
Oils, essential	+	o
Oils, vegetable	+	o
Oleum	-	-
Oxalic acid (50%)	+	+
Ozone aqueous <0.1%	+	-
Ozone	o	-
Paraffin oil	+	+
Petrol	+	o
Petroleum ether	+	
Petroleum	+	o
Phenol	+	o
Phosphates, aqueous	+	+
Phosphoric acid, 95%	+	+
Phtalic acid, 50%	+	+
Polyglycol	+	+
Potassium bichromate (40%)	+	+
Potassium chloride, aqueous	+	+
Potassium permanganate 20% solution	+	+
Propanol	+	+
Propionic acid, 50%	+	+
Propyl alcohol	+	+
Pyridine	+	o
Salts of magnesium, aqueous	+	+
Silicone oil	+	+

Substance	68°F	140°F
Soap solution	+	+
Sodium hypochlorite	+	o
Sodium hydroxide	+	+
Styrene	o	-
Sulphuric acid, up to 50%	+	+
Sulphuric acid, up to 98%	o	-
Sulphuric anhydride	-	-
Tetrahydrofuran	o	-
Tetralin	+	o
Tincture of iodine	+	o
Toluene	o	-
Transformer oil	+	o
Trichloroethylene	o	-
Turpentine oil	+	o
Vaseline	+	o
Water	+	+
Wine	+	+
Xylene	o	-

Table 3 - Chemical Resistance of PEX piping

Changes in the properties of plastics in contact with chemicals are primarily the result of physical processes, such as swelling or solution of the polymers. In this respect, PEX pipes (cross-linked polyethylene) behave more favorably than non-cross-linked PE pipes as a result of their chemical linkage pattern. For assessment of the resistance to different substances, the alteration in tensile and ductile behavior is taken into consideration. The chemical resistance factors shown do not generally apply to the specific behavior of a pipe filled with a specific substance under pressure. In this respect, long-term investigations using test pipes may offer decisive answers.

Maintenance

The following maintenance should be performed on an annual basis to ensure the 18 month warranty for AquaHeat components, and for the longevity of the system:

1. Inspect the system for leaks and erosion of metal/plastic components

2. Retighten plastic and brass nuts as needed

3. Water analysis (i.e. check corrosion inhibitor and/or glycol levels)

4. Sidestream filters should be cleaned at least once a year or when clogged

At 10-year intervals the Shut-off Shaft Assemblies in the supply manifold and the O-ring in the return manifold should be replaced.

ComfortPro Systems LLC
Phone: 1-800-968-8905
www.comfortprosystems.com

Radiant Heating and Snowmelting products

ComfortPro® Systems

AquaHeat

CPS_AQH0035____2011