The Radiant Heating and Cooling kits include following items:

- RESOL DeltaSol MX controller – full kit incl. 6 sensors
- RESOL FRHd (digital) relative Humidity and space air temperature sensor.
- RESOL FAP13 Outdoor temperature sensor.
- RESOL FKP23 Cylindrical Clip-on temperature sensor
- PAW K32 -1" or 1.25" Hydronic mixing module incl. Grundfos Alpha2 15-55 circulator and floating actuator (Optional: Grundfos Alpha2 26-99 Circulator)
- 2X Belimo 3-way diverting valve (Customer Field Supply or Source From Modularhydronics.shop)
- RIB Relay panel 2x RIBMU2C, 1x MH1210, 1x X040AAA control transformer 120-24VAC, Pre-Wired
- MX controller shipped with pre-Programmed Radiant heating/cooling Zone Control logic including soft and hard copies
- Optional Items: additional 2 Relay Panels RIBMU2C, and/or additional RESOL EM Extension Modules

These kits will work with any heat source such as condensing/non-condensing boilers, electrical boilers and heat pumps; also, if your system includes solar combined hydronic heating/cooling option, this kit is still your optimal solution for controls and shortening of installation time.
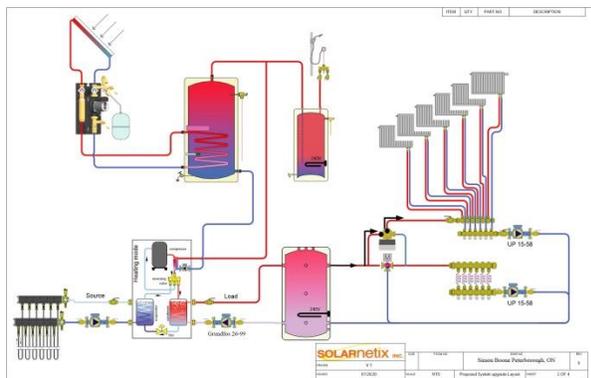
Our examples:
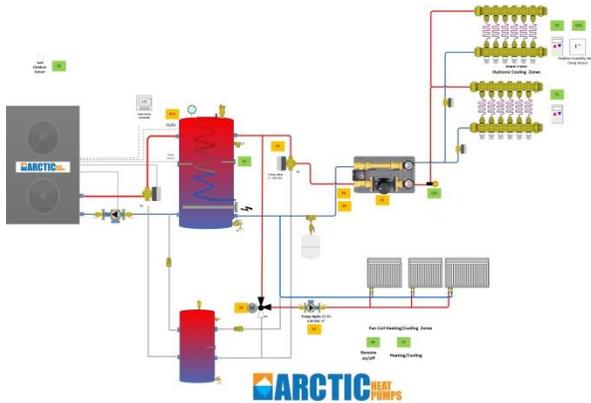
This project is an Air-to-water heat pump working with our MX controller, FRHD humidity sensor and PAW K32 station for supplying water in heating and cooling seasons for radiant zones. MX controller commands the heat pump switch between heating and cooling modes based on pre-set programming & conditions and calls heat pump compressor working for both modes. Dew Point Sensors measure room temperature and current relative humidity, while MX controller calculate hot/cold water supply temperature to the heating/cooling surface, controls 3-way mixing valve activity and stops cooling activity when condensation is going to occur.

Job location: Manitoba

Figure 1 Arctic A-2-W HP & MX controller

The project is a Geo heat pump working with our MX controller, FRHD humidity sensors. It is a typical case solar thermal combined hydronic heating cooling system, and MX controller commands the heat pump switch between heating and cooling modes based on pre-set programming & conditions and calls heat pump compressor working for both modes.

Job location: Peterborough, Ontario

Figure 2 ClimateMaster W-2-W HP & MX controller
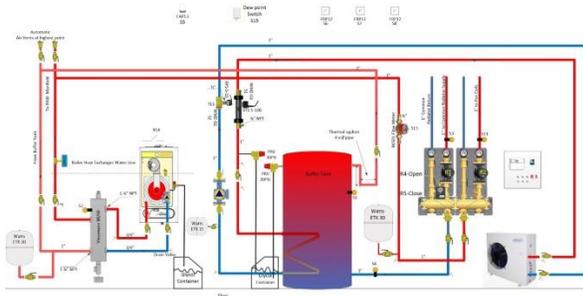
The project is an Air-to-Water heat pump working with our MX controller, FRHD sensors and PAW stations; one of stations is PAW K32 for controlling water temperature supplying. MX controller commands the A-2-W heat pump to switch between heating/cooling modes based on pre-set programming & conditions and calls compressor working for both modes.

Job location: Oshawa, Ontario

Figure 3 Chiltrix A-2-W HP & MX controller

All of these three jobs have same hydronic design features:

1. Heat pump
2. Storage tank(s)
3. Mixing water supply to radiant floor zones

So they have same control features and logic:

A. Room stat call for heat/call for cooling
B. monitoring of supply temperatures
C. Calculating hot/cold water supply temperature based on heating and cooling curve
D. mixing valve open/close control in heating and cooling modes
E. Condensation control by MX controller and FRHd (relative Humidity and air temperature sensor)
F. Heating and cooling seasonal switch in MX controller and in the heat pump at same moment
G. Heat Pump gets demand from MX controller to activate compressor is in heating/cooling mode

There is no intricate system; any system has these basic features.
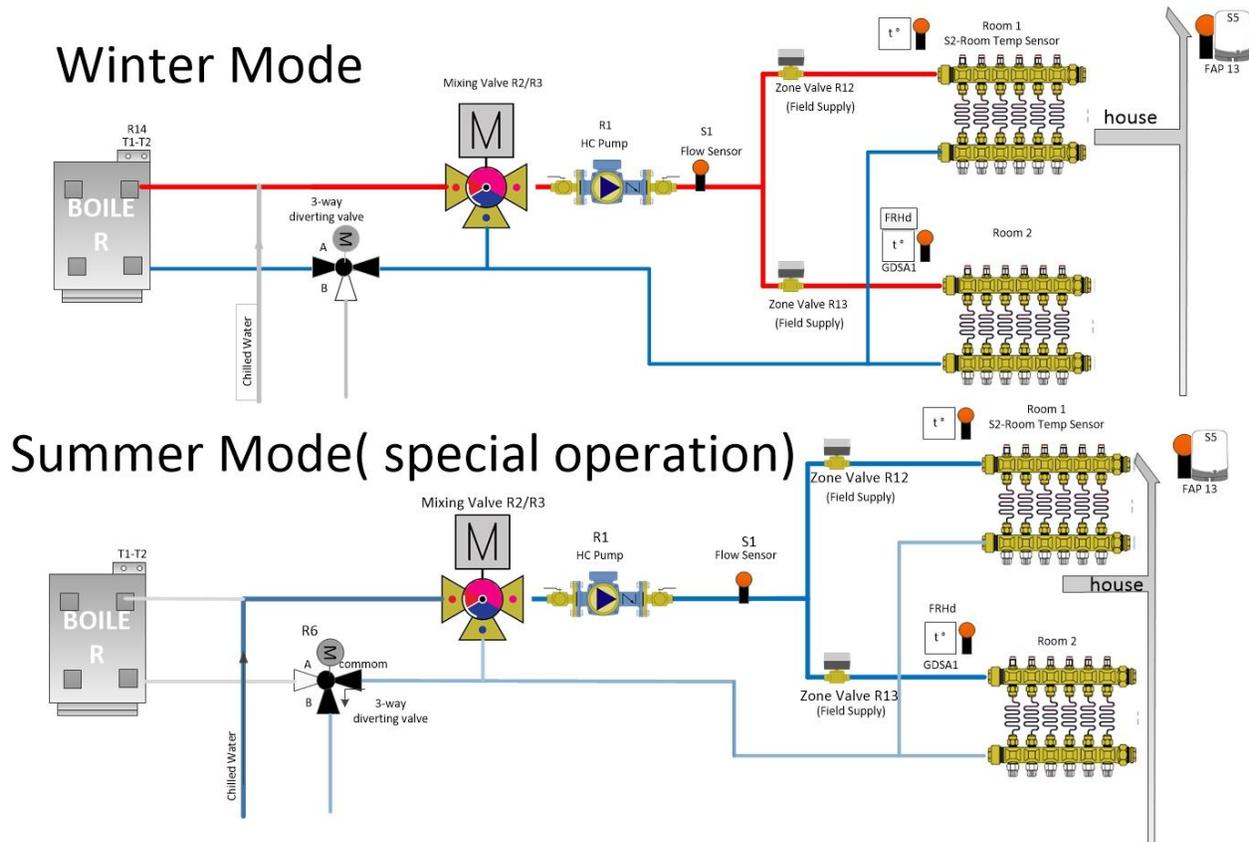
System application basics:

Figure 4 Concept Diagram 1

In the diagram, the same hydronic piping layout works with hot water source and chilled water source. Switching between the heat source and cold source is based on operating mode, and is controlled by outdoor temperature change, a manual switch or combination of both. When switching from winter mode to summer mode, the relay R6 is activated, system will supply chilled water via the 3-way valve.

No matter in which mode - winter or summer, as long as any of zone stats has demand (calling for heat or cooling), the zone valve relay R12 and/or R13 are activated as well as HC pump relay R1.

In the Winter mode, MX controller calculates theoretical supply temperature to the radiant zone: Flow Set, by our pre-set heating curve and outdoor temperature S5; based on the calculation, MX controller commands the 3-way mixing valve to open for getting more hot water from heat source (S1 < Flow Set) or close for allowing less hot water from heat source (S1> Flow Set).

In the Summer mode, MX controller calculates theoretical supply temperature to the radiant zone: Flow Set, by our pre-set cooling curve/constant value; based on the calculation, MX controller commands the 3-way mixing valve to open for getting more cold water from cold source (S1 > Flow Set) or close for allowing less water from cold source (S1< Flow Set). Beside this, condensation control is necessary in radiant cooling systems. MX controller has a built-in psychrometric chart algorithm. FRHd provides ambient temperature and relative humidity of the radiant zone, and the controller calculates the dew

points. So MX controller keeps the lowest cold water supply temperature to the radiant zone, but also ensures that this supply temperature is 4⁰F above the dew points.

Heat Pump is the most versatile heating/cooling source. The winter & summer operation switchover is controlled by reversing valve that is part of the heat pump. The MX controller through the pre-wired dry contact relays in electrical enclosure can talk to any heat pump equipped with external dry-contact signal for switching the operating modes and calling compressor:
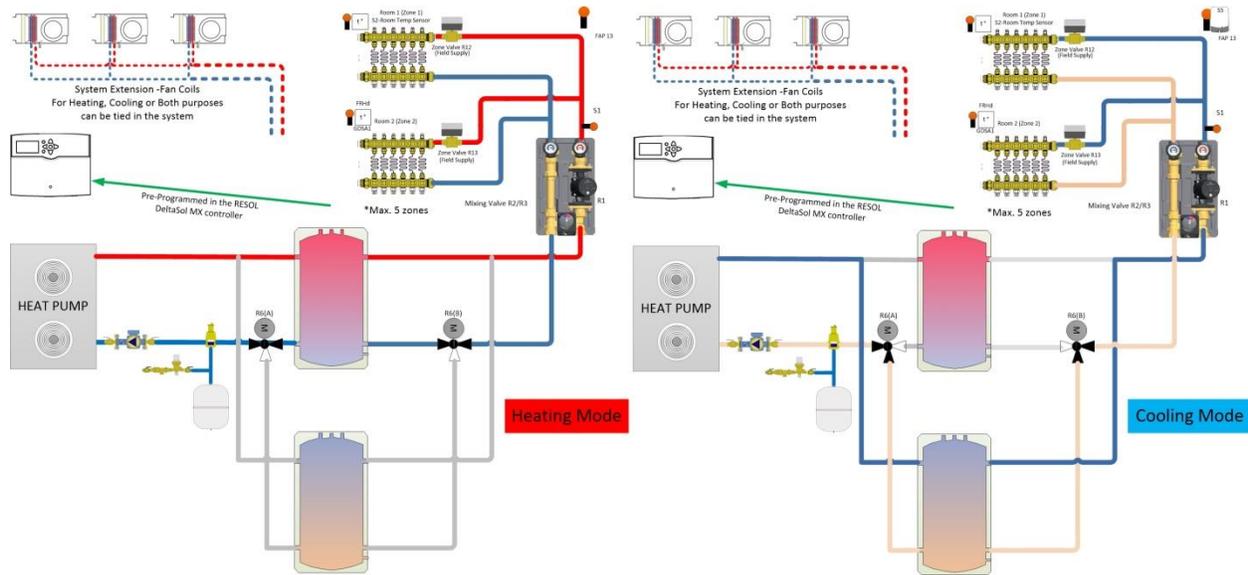

Figure 5 Heat Pump -Heating & Cooling Modes

These concept diagrams (Fig. 5) have exactly same piping at heating/cooling load side as in Fig. 4.

The difference is that 3-way diverting valve (relay R6) is used to control diverting valves for switching over heating and cooling buffer tanks, and also R6 has function on controlling reversing valve inside heat pump. The individual mixing valve and heating pump are part of PAW K32 station supplied with the kit. Beside only radiant heating/cooling zones the fancoils can be added. These will require different supply temperatures: much higher in winter and lower in summer mode.

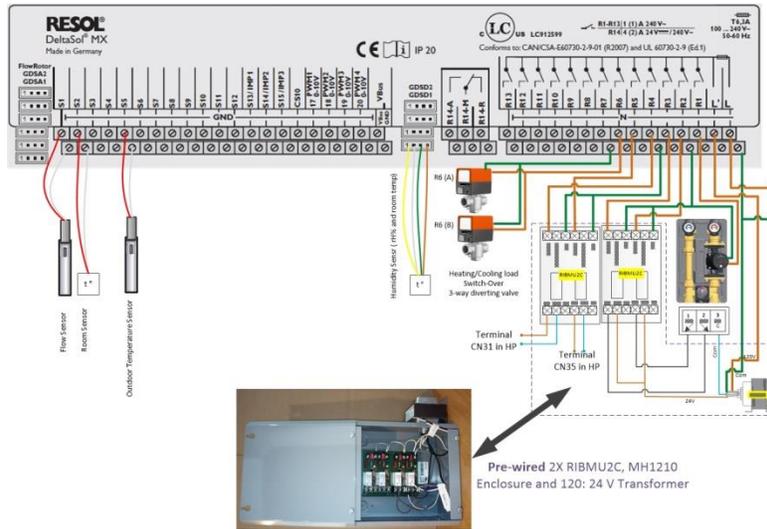Electrical Diagram will be supplied in the kits associated with the programming in the MX controller:

Figure 6 Electrical Diagram Example